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SKYLAB EXPERIENCE BULLETIN NO. 5

INFLIGHT MAINTENANCE AS A VIABLE PROGRAM ELEMENT

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National Aeronautics and Space Administration
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MAN-MACHINE ENGINEERING DATA APPLICATIONS
OF
SKYLAB EXPERIMENTS M487/M516

BULLETIN NO. 5

INFLIGHT MAINTENANCE AS A
VIABLE PROGRAM ELEMENT

This document is the fifth in a series of releases which are intended to make available to NASA and contractor personnel those results from the Skylab Man-Machine Engineering Experiments which have design and requirements relevance to current projects and programs. This method of data distribution has been instituted as a convenient way to provide early access to Skylab experience and is intended as an interim measure, to be followed up by a thorough experiment report six to nine months after receipt of all Skylab flight data.

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INFLIGHT MAINTENANCE AS A VIABLE PROGRAM ELEMENT

SUMMARY

Inflight Maintenance (IFM), as addressed by this bulletin, refers to those tasks which were performed aboard Skylab to either correct a problem (repair) or to prevent a problem from occurring (servicing). The major emphasis is placed upon the problem correcting process, with selected examples provided to indicate the range of IFM tasks accomplished and the importance of these tasks to the successful conduct of the Skylab missions.

The raw data appendix includes a detailed listing of those events that occurred during the Skylab missions which were considered to be off-nominal happenings. From this total inventory those events which were corrected by crew activity have been extracted and plotted by major subsystem and experiment category. The resulting graphs depict trend data across mission time with respect to the cumulative IFM tasks which were not scheduled as part of the routine daily timeline. These figures indicate classical maintainability curves in terms of numerous difficulties showing up upon system initialization with fewer instances of problems as operating time and experience increased. The primary point to be made is that multiple instances of problems did occur and that the crew was equipped to perform IFM tasks and either return systems or experiments to full operational status or at least render them partially useful.

These IFM tasks were encountered and accomplished both in the IVA and EVA environments. Building upon this experience by incorporating IFM as a viable program element in future manned programs will enhance the opportunities for success while making use of the flexibility and capability that "man-in-the-loop" provides to the exploration and utilization of space.

PRE-SKYLAB EXPERIENCE

Manned space programs prior to Skylab demonstrated that man in space is capable of conducting many of the activities that he accomplished on earth. Confined to the small volume space vehicles and short duration missions of pre-Skylab programs, the crewman could only realize a limited part of the broad spectrum of possible task and work activities. Thus, data concerning the crew's ability to use tools and assemble and disassemble equipment as functions of IFM were naturally limited. A major contributor to this limitation of data has been the dependence upon reliability and redundancy to eliminate the need for IFM. Manned programs prior to Skylab were not planned to accommodate IFM as an integral element of the overall inflight capability. This decision was strongly influenced by weight, cost, schedule, and crew timeline considerations. Also, the spacecraft used during these programs were flown only once for a very limited time, not revisited by different crews as was Skylab. A limited set of tools was developed for the Apollo missions but no planned IFM program was implemented as a nominal portion of the missions. However, even with limited tools and available onboard materials, man's ability to perform IFM was dramatically illustrated on the Apollo 13 mission. Jury-rigged environmental control elements, fabricated from various items scavenged from numerous sources on board, kept the spacecraft atmosphere habitable through the recovery phase of the mission.

SKYLAB DESIGN

The Skylab Program used the design mediums of reliability and redundancy to short-stop the need for inflight maintenance. However, in a departure from previous practice, a committee of NASA and industry engineers was established during Skylab's design and production phases to study inflight maintenance and to recommend a set of tools and a list of candidate tasks for incorporation into the mission profiles. A standard set of mechanical tools was recommended and will be addressed in detail in a subsequent bulletin. The tasks selected as candidate IFM chores are listed in reference 1, appendix pages 1-5.

The design approach for the Skylab Program was not to incorporate IFM requirements in systems designs unless definite operational and/or cost advantages could justify these requirements. As justifications for onboard maintenance tasks were presented and accepted, appropriate tools and spares were added to the onboard inventory to support the tasks. These proved to be of significant value during the Skylab missions.

In summary, the Skylab IFM program was implemented through the following steps:

- (1) Identification of candidate IFM component items, based on contractor reliability and design trade-offs that established the need for consideration of IFM as a means of meeting reliability requirements.

- (2) Definition of the related support requirements for the candidate IFM item. This included tools, spares, part numbers, and stowage locations. Data on recommended quantities and approved quantities was also included.
- (3) Inclusion of each newly defined task and its related support requirements within a qualitative priority grouping and rating of all such tasks (154 had been identified by SL-1 launch) based on criticality, probability, redundancy, alternate operating modes, complexity, mission and crew effect.

SKYLAB EXPERIENCE

Overview

The bar graph shown in Figure 1 illustrates by subsystem and major experiment category those problem events corrected by unscheduled IFM during the SL-2, SL-3, and SL-4 missions. The data are based on the JSC/MSFC SL problem tracking lists (ref. 2, appendix pages 6-22 and ref. 3, appendix pages 23-46) and present cumulative IFM trends. The bar graph data correlate well with maintainability history in terms of IFM activity as a function of previous experience with the systems and hardware being flown, the complexity of the particular system, and the use rate of that system. Those systems with previous flight experience offered few problems, while those being flown for

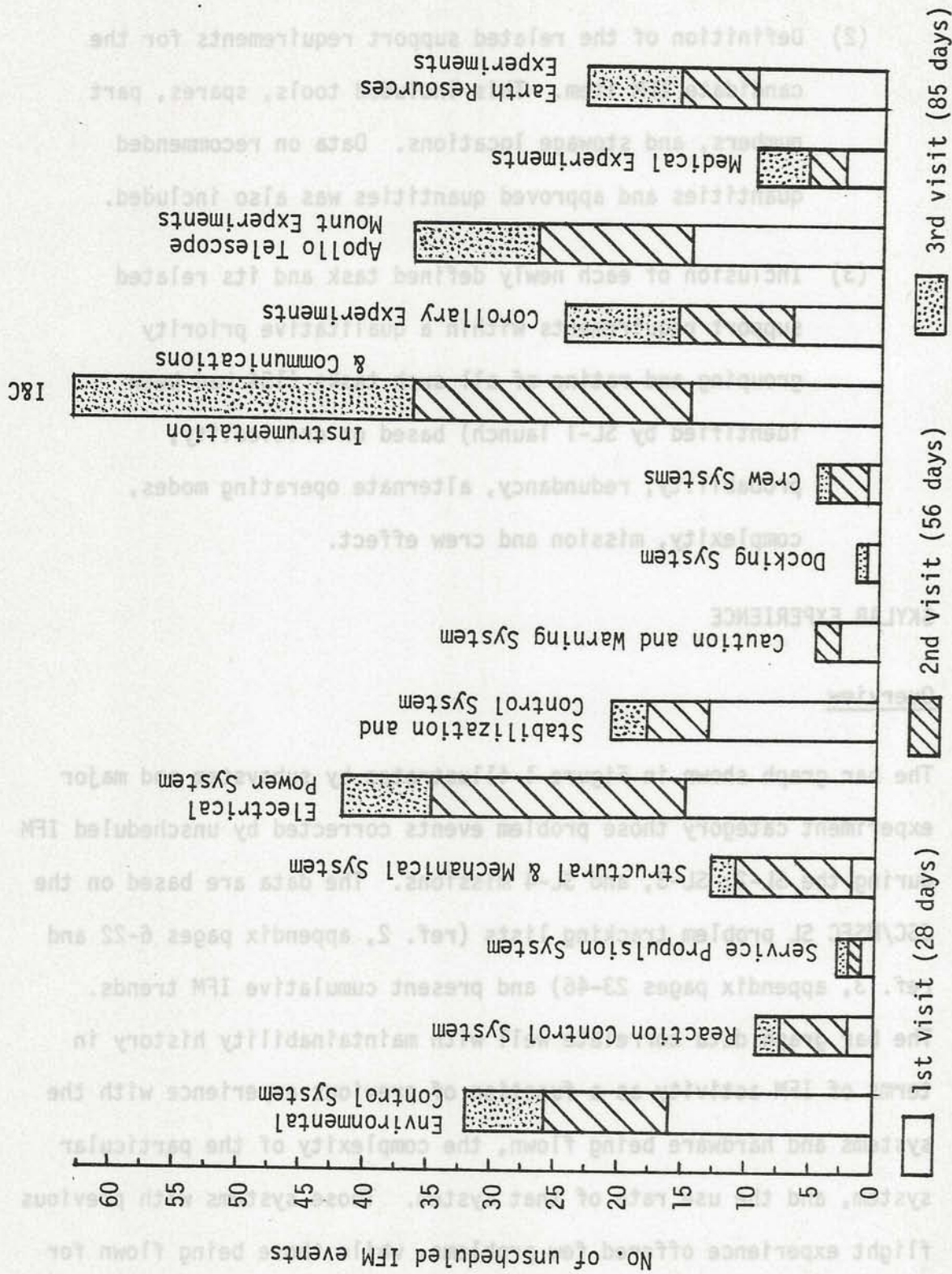


Figure 1 - SL Mission IFM cumulative effect

the first time had to undergo their "shakedown" cruise difficulties. For the most part, the experiment equipment was experiencing its first flight exposure, but the incidence of IFM attention needed by this hardware was remarkably low. One of the prime factors contributing to this low maintenance rate was probably the extensive use of flight-type hardware in ground test programs and crew training exercises, which tended to "flush out" numerous potential bugs which could be corrected in the flight hardware prior to the SL-1 launch. The Skylab Medical Experiment Altitude Test Program (SMEAT) is a prime example of a maintenance engineering and servicing test bed experience, and no doubt was one of the prime contributors to the comparatively few events requiring IFM for medical experiments (shown in Figure 1).

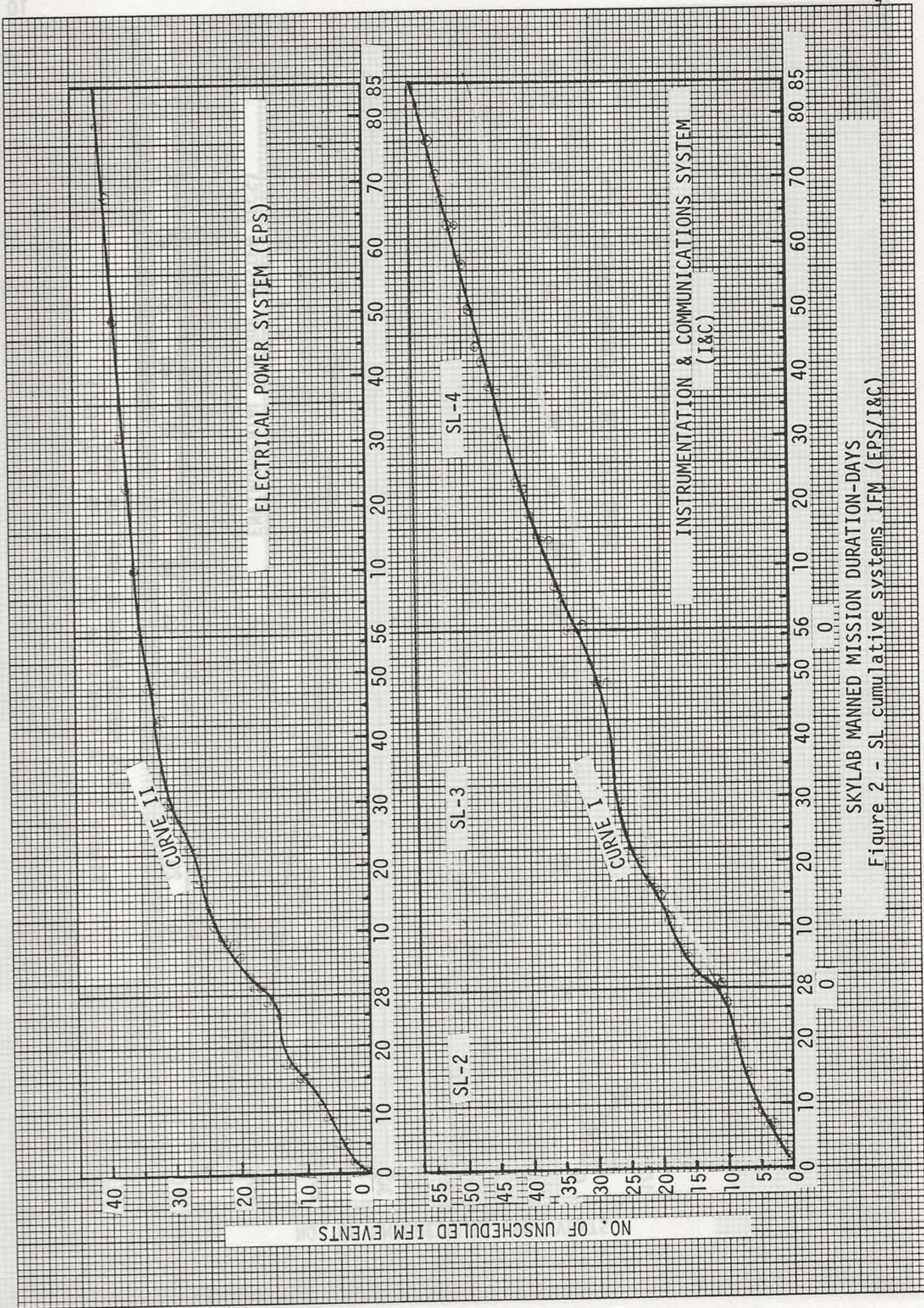
Skylab conclusively showed the need for an integrated preflight maintenance engineering effort. Viable IFM programs must begin with a maintenance engineering analysis conducted concurrently with the preliminary and detailed design, development, and testing phases of manned spacecraft and their associated payloads. Once maintainable equipment has been identified, and candidate IFM tasks proposed, attention must focus on providing the crewmen with proper access to the potential problem item, tools and test equipment to perform the task required, and an IFM worksite at which to accomplish the task. Each of these areas will be given detail treatment in subsequent bulletins.

Spacecraft Systems

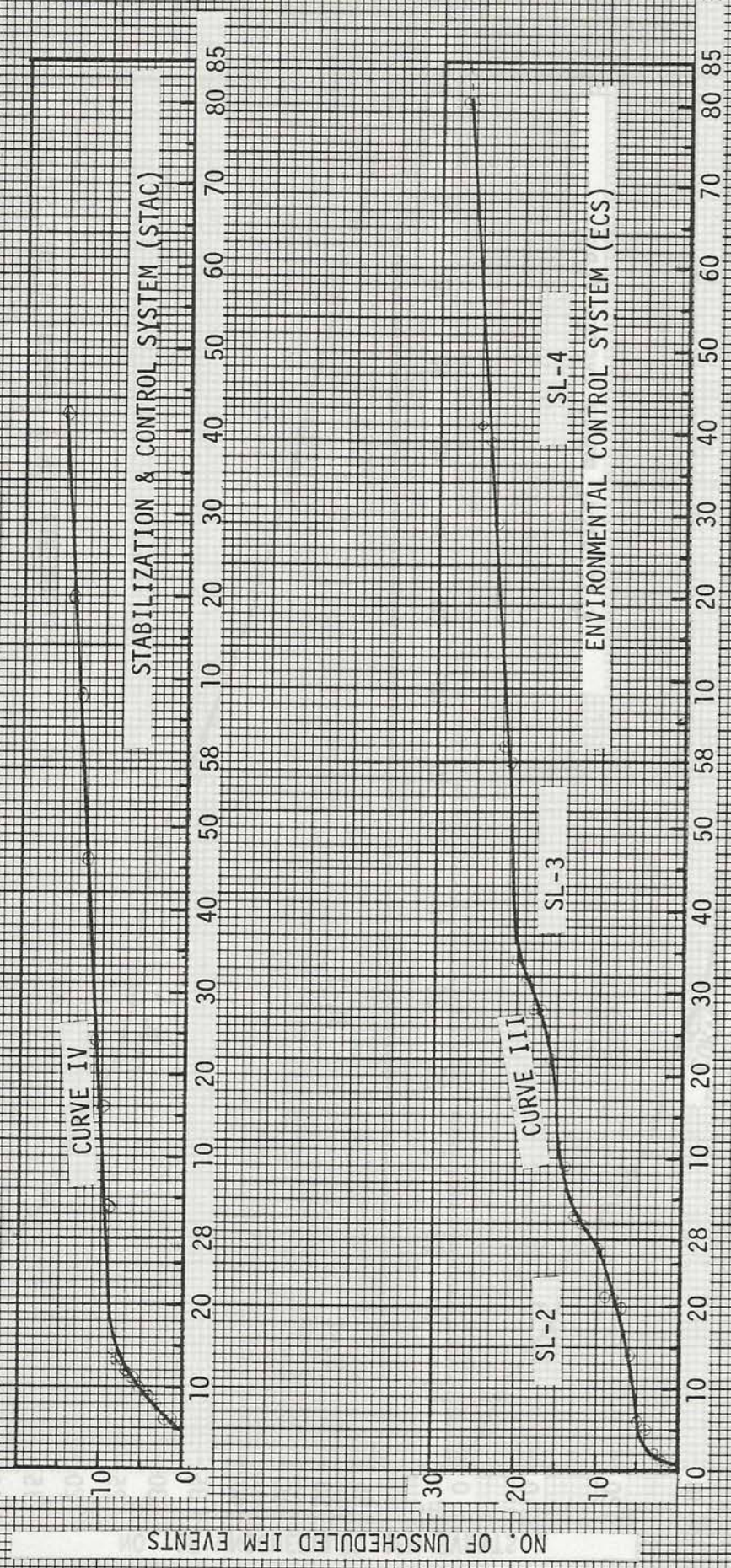
The cumulative unscheduled systems IFM during the entire Skylab Program is depicted in Figures 2 and 3. It is interesting to note that the basic trend is one of less unscheduled IFM with successive manned mission time after the SL-2 mission. The curves exhibit an initial steep positive slope, with a gradual leveling off during the SL-3 mission which continues to flatten into a uniform linear rate approaching a horizontal asymptote (except for curve I), during the SL-4 mission. This shape is consistent with early mission identification of system problem areas (anomalies and discrepancies) followed by later stabilization of functions as a result of operating experience and successful IFM procedures. Typical problem events requiring crew correction (IFM) are listed below for selected subsystems as representative examples of the range of IFM tasks accomplished by the Skylab crews. Parenthetical comments address crew IFM action taken in each case.

Instrumentation and Communications Systems

1. Failure of video tape recorder (changeout, disassembly and inspection, retrieval of suspect component).
2. TV camera failure (replacement).
3. Airlock Module tape recorder failure (changeout).
4. Speaker Intercom Assembly failure (changeout).



SKYLAB MANNED MISSION DURATION-DAYS
 Figure 2 - SL cumulative systems IFM (EPS/I&C)



SKYLAB MANNED MISSION DURATION-DAYS
Figure 3 - SL Cumulative Systems IFM (ECS/STAC)

NO. OF UNSCHEDULED IFM EVENTS

CURVE IV

STABILIZATION & CONTROL SYSTEM (STAC)

CURVE III

ENVIRONMENTAL CONTROL SYSTEM (ECS)

SL-2

SL-3

SL-4

Electrical Power System

1. Stuck relay in Charger Battery Relay Module (mechanically freed).
2. Failures in electrically controlled doors (mechanically freed or pinned).

Environmental Control System

1. 50% decrease in OWS heat exchanger gas flow (heat exchangers cleaned).
2. Condensate dump system blockage (dump probe replaced).
3. Loss of coolant in secondary coolant loop (loop reserviced with replacement coolant).

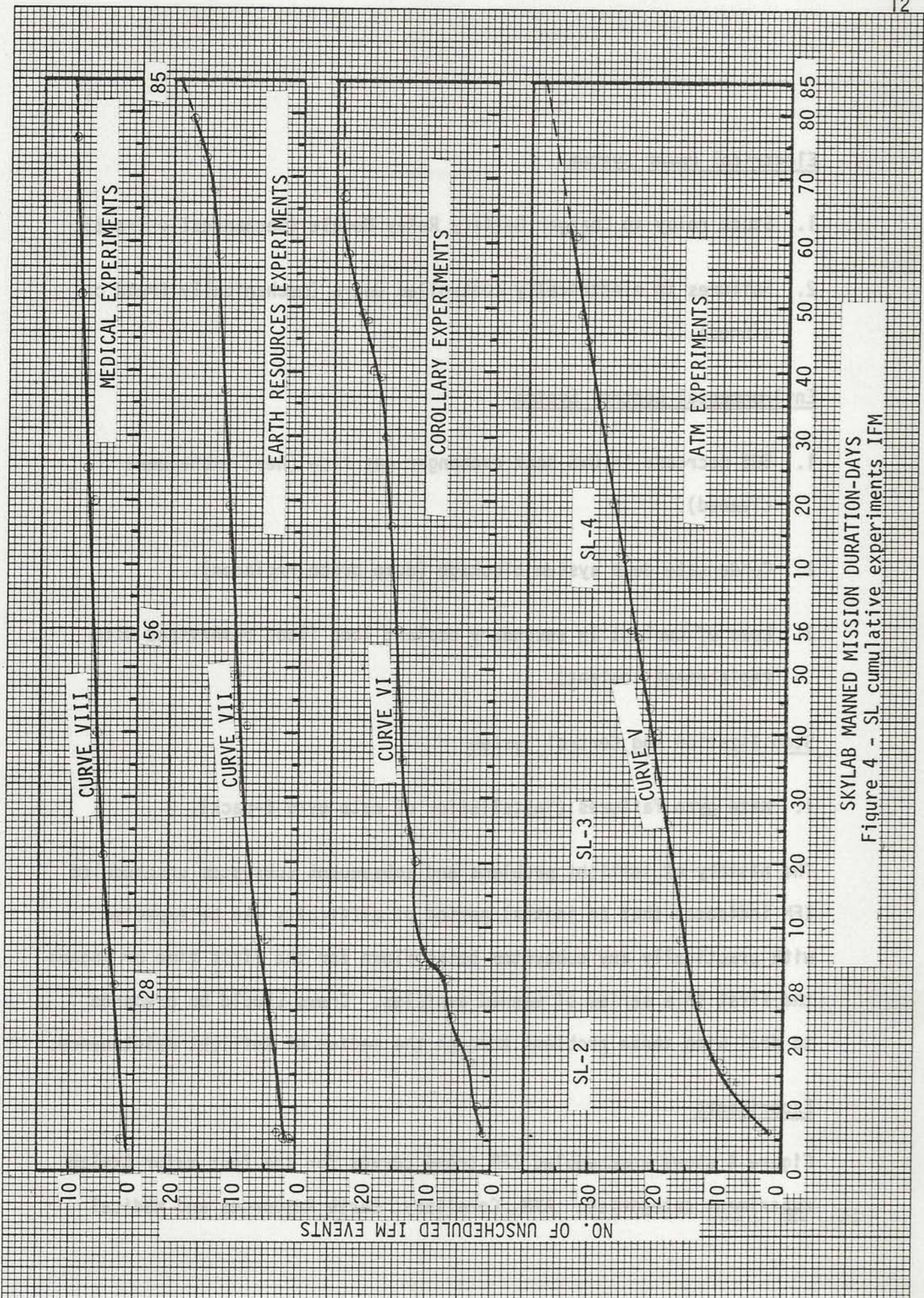
Stabilization and Control System

1. Rate gyro failures (installation of rate gyro 6-pack).

The history of inflight problems and subsequent subsystem unscheduled IFM indicates that an initial period of difficulty can be expected with practically any subsystem being flown for the first time or aboard the first in a series of manned vehicles. Crews should be prepared to deal with these problems through the medium of inflight maintenance.

Experiments

Figure 4 shows unscheduled IFM trend curves for the four major Skylab experiment categories: ATM, Corollary, Earth Resources and Medical



SKYLAB MANNED MISSION DURATION-DAYS
Figure 4 - SL cumulative experiments IFM

Experiments. In spite of the magnitude of the experiments program (a multidisciplinary complement of more than 100 experiments), the number of unscheduled IFM events is only about 2/3 that of the four systems IFM summaries presented in the previous section. However, it is recognized that the experiments did not function 24 hrs/day as the subsystems were required to do.

The shape of the experiments curves in Figure 4 is essentially the same as those presented earlier for the vehicle subsystems. The same starting transients seem to apply to all flight hardware in terms of early mission "debugging" and subsequent settling into routine patterns of operation. The ATM (curve V) suffered a somewhat steeper slope early in the program, but settled into a linear format of problem presentation as a function of time. The corollary curve fluctuates somewhat in shape over various short time segments as a function of the emphasis upon those particular experiments as scientific priorities shifted during the course of the missions. Nevertheless, curve VI tends to follow the same overall trend pattern as the other experiment and subsystem curves. Again, typical examples of inflight problems resulting in crew action (IFM) will be listed to show representative tasks.

ATM Experiments

1. Camera door failures (pinned open during EVA).
2. Degradation of H-alpha 1 TV image (changeout).
3. Camera lens contamination (cleaned during EVA).

Corollary Experiments

1. S009 drive motor failure (replaced).
2. S019 tilt and rotation gear jam (repaired).

Earth Resources Experiments

1. TV power cable failure (replaced).
2. S193 antenna scan failure (partially repaired).
3. Tape recorder failure (changeout).

Medical Experiments

1. M074 electronics package failure (replaced).
2. Bicycle ergometer pedal failure (repaired).
3. Mark I exerciser failed (repaired).
4. M092 blood pressure cuff failure (changeout).

EVA

Some of the most mission critical problems encountered on Skylab were resolved during the EVA periods. Thus it seems appropriate to present a representative summation of the unscheduled IFM tasks accomplished during EVA.

There were 12 IFM repair tasks accomplished through EVA during the Skylab missions, including at least one major repair item during each mission.

Mission SL-2

1. Solar Panel Erection - After the restraining debris was cut, the crewman stood up under an attached deployment tether until the solar panel beam restraint bracket was sheared and the panel deployed.
2. CBRM Relay Release - A malfunction in one of the CBRM's was corrected by a crewman striking the module with a ball-pean hammer; the blows freed a stuck internal relay.

Mission SL-3

1. First EVA - During the first EVA performed by the SL-3 crew, the crew deployed the twin pole sun shade, performed visual troubleshooting inspections, removed a ramp latch on the ATM S055 telescope aperture door, and installed the S149 experiment.
2. Second EVA - Performed the EVA portion of the rate gyro 6-pack installation task, removed ramp latches on the S056 and S082A aperture doors.
3. Third EVA - Retrieved the S149 experiment.

Mission SL-4

1. First EVA - Installation and operation of the T025 experiment, S193 experiment installation and repair (antenna system was corrected), inspection, diagnostic and repair operations were performed e.g. potentiometers inspected/cleaned, installed a jumper box, replaced launch lock with gimbal lock, installed cover over jumper box, etc.

2. Second EVA - S020 experiment mounting and operation, S054 filter wheel repair, mounting of S201 hardware on ATM truss.
3. Third EVA - No EVA IFM performed--only scheduled, routine EVA activities.
4. Fourth EVA - Zero-g fixture cover retrieval (this task involved using a ratchet wrench with a straight screwdriver blade attachment to remove several flat-head slotted screws), S020 experiment and S149 experiment mounting, and T025 experiment installation and operation.

CONCLUSIONS/RECOMMENDATIONS

1. The numerous IFM events during Skylab gave each crew ample opportunity to perform in this area, with the subsequent conclusion being drawn that given proper tools, worksites, restraints, accessibility, and procedures, man can perform maintenance tasks (both EVA and IVA) as readily in zero-g as he can on the earth.
2. Skylab manned mission experience should offset the tendency to under-estimate, for future programs, the effect of cumulative inflight subsystem and experiment problems which will require crew IFM corrective action.
3. Maintenance engineering studies should be a part of preliminary and detailed design development in future programs. Concurrent systems and accessibility analyses should determine the recommended

level of inflight maintenance. The definition of basic hand tool kit sets, tool stowage and deployment concepts, special IFM test equipment, and crew maintenance aids to support the recommended level of IFM should be based upon these studies.

4. Good developmental design testing contributed significantly to the relatively low incidence of Skylab experiment malfunctions, particularly in the medical experiments.
5. Trend analysis of IFM events on previous missions and programs should be considered as an integral part of IFM planning for future missions.
6. The status of the maintenance engineering discipline should be elevated to be comparable to the status of weight, cost, safety and other mature subsystem engineering disciplines.

RAW DATA APPENDIX

<u>REFERENCE</u>	<u>SOURCE</u>	<u>PAGE</u>
1	SL Inflight Maintenance Task and Support Requirements Document	1
2	SL Problem Tracking List - JSC	6
3	SL Problem Tracking List - MSFC	23

5. INFLIGHT MAINTENANCE TASKS/SUPPORT REQUIREMENTS

The IFM Maintenance Tasks/Support Requirements Charts in Section I list, in task reference number (TRN) order, the inflight maintenance tasks approved for the Skylab program. The data elements portrayed are as follows:

Task Reference No. - A controlling number assigned to each task for control purposes.

Task Title - A descriptive title of the inflight maintenance task.

Module or Experiment - The module or experiment the task is applicable to. If the task is common to more than one module or experiment, all applications will be shown.

Priority Group - A grouping indicating relative priority of the task. Groups are indicated by a rating of 10, 20, 30 or 40, with 10 the highest priority and 40 the lowest priority. This rating is described in ED-2002-1169 and is assigned considering the criticality of the failure, the probability of failure occurrence, the redundancy installed, the existence of an alternate mode of operation, the complexity of the maintenance task, the effect of the failure on the mission and the crew. Groups 10, 20, and 30 will have onboard support and Group 40 will have back-up support at KSC.

Spares/Material Identification - These data identify the spares and materials by part number and nomenclature required to support the respective IFM tasks.

oAttaching (Non-Captive) Hardware: Items that may be damaged or lost from their original attachments during Cluster Maintenance.

Spares/Material Quantities - The quantity of spares/materials recommended by each module/experiment contractor required to support their respective IFM tasks is provided here with the total cluster requirements (NASA approved quantity) and the hardware supplier.

Stowage Location - This column identifies the module in which the spare is to be stowed.

Tool Requirements - The necessary tools required in the performance of the maintenance task are shown here.

SECTION I
INDEX
TASK SUPPORT REQUIREMENTS

<u>TASK REF. NUMBER</u>	<u>TASK TITLE</u>	<u>MODULE/ EXPERIMENT</u>	<u>SCHED./ UNSCHED.</u>	<u>PRIORITY</u>
1a	Replace CO ₂ Cartridge (Active) Inlet	AM	S	10
1b	Replace CO ₂ Cartridge (Passive) Inlet	AM	S	10
1c	Replace CO ₂ Cartridge (Active) Outlet	AM	S	10
1d	Replace CO ₂ Cartridge (Passive) Outlet	AM	S	10
2	Replace Umbilical CCU	AM	U	10
3	Repair Axial Port Hatch MDA	MDA	U	10
4	Repair Structure	AM,MDA,OWS	U	10
5	Replace Intercom	AM,MDA,OWS	U	20
7	Replace Tape Recorder	AM	S	20
8	Replace Manual Pointing Controller	ATM (C&D)	U	20
9	Replace - Valve Hot Water	OWS	U	20
13	Replace Dispenser Drinking Water	OWS	U	20
21	Clean Chamber Assy. - Air Mixing	OWS	S	20
22	Replace Fan	AM,MDA,OWS	U	20
23	Replace Valve Water Dispenser	OWS	U	20
24	Replace Sensor PPO ₂	AM	S	20
25	Replace Mol Sieve Fan	AM	U	20
26	Replace Solids Trap Assy.	AM	S	20
27	Replace Power Module	OWS	U	20
28	Replace Precision Clock	ATM (C&D)	U	30
29	Repair Flex Duct Assy.	MDA	U	30
30	Replace Probe	OWS	U	30
31	Replace Control Unit Window Heating	MDA	S/U	40
32	Replace Filter Odor	OWS	S/U	30
34	Replace Light Bulb	AM	U	30
35	Replace Light Bulb Assy.	OWS, MDA	U	30
36	Replace Charcoal Canister	AM	S	30
37	Replace Batteries	AM	U	30
38	Clean Filter Upstream Ventilation Unit	OWS	S	30
39	Repair - ECS Duct	OWS	U	30
40	Replace Power Module	OWS	U	30

<u>TASK REF. NUMBER</u>	<u>TASK TITLE</u>	<u>MODULE/ EXPERIMENT</u>	<u>SCHED./ UNSCHED.</u>	<u>PRIORITY</u>
41	Replace Filter and Charcoal Cartridge	OWS	S	30
42	Replace O-Ring	OWS, MDA	U	30
43	Replace Seal	OWS	U	30
45	Replace Filter	AM	S	30
47	Replace Indexing Cleat	OWS	U	30
48	Replace Indexing Cleat	OWS	U	30
49	Replace Heater Assy.	OWS	U	30
50	Replace Plug O-Ring Sub Assy	OWS	U	30
51	Replace Video Switch	MDA	U	30
55	Replace Repair Sealing Device	OWS, MDA	U	30
56	Replace Seal	OWS	U	20
57	Replace Panel Assy.	OWS	U	20
58	Replace Fire Sensor	AM,MDA,OWS	U	20
59	Replace Water Separator Plates	AM	U	20
60	Replace Gas Separator	AM	S	20
61	Replace - Crewman Com. Umb.	AM,MDA,OWS	U	20
62	Replace - Teleprinter Cartridge	AM	U	30
63	Replace - Teleprinter Assy.	AM	U	30
64	Replace - Window Heater Cable	MDA	S/U	40
65	Replace - TV Input Station	AM,MDA,OWS	U	30
66	Clean Fan Inlet Screen	MDA	U	30
67	Replace - Fire Sensor Panel	AM,MDA,OWS	U	20
68	Replace - Electronics Module	M074	U	40
69	Replace - VCG Cable	M093	U	30
70	Replace - Electrode Harness	M093	U	30
72	Replace Electronics Module	M172	U	40
78	Replace Drive Assy.	S190	U	30
79	Replace Desicant Assy.	S190	S	30
80	Replace CDO Assy.	S192	U	30
81	Replace Tape Recorder	EREP	U	30
82	Replace Paper Spool	AM	U	30
83	Replace Control Head Cable Assy.	AM/MDA/OWS	U	20
84	Replace Battery	AM	U	30
85	Replace Condensate Module	AM	U	20
86	Replace CO ₂ Detector End Plate, Inlet	AM	U	10
87	Replace CO ₂ Detector End Plate, Outlet	AM	U	10
88	Replace Digital Display Unit	AM	U	20
89	Replace Indicator Lamp Assy.	AM/MDA/OWS	U	20
90	Replace DAS Input Unit	MDA	U	30

<u>TASK REF. NUMBER</u>	<u>TASK TITLE</u>	<u>MODULE/ EXPERIMENT</u>	<u>SCHED./ UNSCHED.</u>	<u>PRIORITY</u>
91	Replace Radio Noise Burst Monitor	MDA	S	20
92	Remove ECS Duct	MDA	U	30
93	Replace MDA Power Module Umbilical	MDA	U	10
94	Replace MDA No. 2 Control Umbilical	MDA	U	20
95	Replace MDA CSM Cable	MDA	U	20
96	Replace Filter	OWS	S/U	30
97	Replace Filter	OWS	S/U	30
98	Repair - Stowage Compartment Doors	OWS	U	20
99	Replace S1B	M091/M093	U	30
100	Install Thruster Cap	M509	U	30
101	Replace Magazine	S190	U	30
102	Replace Cassette	S190	U	30
103	Replace Light Bulb	AM	U	30
104	Replace Dosimeter	OWS	U	30
105	Replace Pressure Gage	OWS	U	30
106	Replace O-Ring	OWS	U	30
107	Replace O-Ring	OWS	U	30
108	Replace O-Ring	OWS	U	30
109	Replace O-Ring	OWS	U	30
110	Replace Bal-Seal	OWS	U	30
111	Replace Flapper Valve	OWS	U	30
112	Replace Urine Separator	OWS	S/U	30
113	Replace Hose Assembly	OWS	U	30
114	Replace Flush Water Dispenser	OWS	U	30
115	Replace Motor and Filter	OWS	U	30
116	Replace Power Module	OWS	U	10
117	Replace Packing Preform	OWS	U	30
118	Replace Support and Filter	OWS	S	30
119	Replace Packing O-Ring	OWS	U	30
120	Replace - Quick Disconnect Coupling	OWS	U	30
121	Replace - Quick Disconnect Coupling	OWS	U	30
122	Replace Hose Wardroom Separator	OWS	U	30
123	Replace - Centrifugal Separator Cable Assy.	OWS	U	30
124	Replace Food Tray	OWS	U	30
125	Repair - Entry Hatch, OWS	OWS	U	10
126	Repair - Forward Hatch, AM	AM	U	10
127	Replace - Coupling, Quick Disconnect	OWS	U	30

<u>TASK REF. NUMBER</u>	<u>TASK TITLE</u>	<u>MODULE/ EXPERIMENT</u>	<u>SCHED./ UNSCHED.</u>	<u>PRIORITY</u>
128	Replace - Screen Assy., Processor	OWS	U	20
129	Replace - Package, O-Ring	OWS	U	30
130	Replace - Battery, Dry Cell, Size D	OWS	S/U	30
131	Replace - Battery, Dry Cell, Size AA	OWS	S/U	30
132	Replace - Bellows, Fecal Collector	OWS	U	30
133	Replace - Pressure Mechanism Assy. Processor	OWS	U	30
134	Replace - Liner Assy., Fecal Collector	OWS	U	30
135	Repair - S190 Window Leakage	S190	U	10
136	Repair - Aperature Doors, ATM	ATM	U	10
137	Repair - Indexing Cleat	OWS	U	30
138	Clean - Screen, Trash Airlock Ejector	OWS	U	30
139	Repair - Film Vault Door	OWS	U	30
140	Repair - Ring Container Door	OWS	U	20
141	Repair - Urine Collection Drawer	OWS	U	30
142	Repair - Trash Airlock Ejector	OWS	U	30
143	Repair - Battery Vent Line, M512	MDA	U	30
144	Service/Deservice - Cluster Water Systems	OWS/AM	S/U	30
145	Replace - Molded Hose, Air Return, Separator	OWS	U	30
146	Replace - Packing, O-Ring	OWS	U	20
147	Repair - Equalization Valve, MDA Hatch	MDA	U	10
148	Clean - Filter, Suit Drying Station	OWS	S	10
149	Replace - Seal, Docking Port Hatch - Axial	MDA	U	10
150	Replace Wardroom Hot Water Heater	OWS	U	40
151	Replace WMC Hot Water Heater	OWS	U	40
152	Replace Wardroom Hot Water Heater	OWS	U	30
153	Remove Wardroom Hot Water Heater	OWS	U	30
154	Replace Urine Collection Pressure Plate	OWS	U	30

DESCRIPTION

ACTION PROGRESS

ACTION
ASSIGNED
TO

FIRST VISIT

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
1 DOY 141	Orbital Workshop temperatures in the forward food compartment have exceeded recommended levels for certain foods.	Huffstetler/ Zill	Testing confirms food usable. Configuration Control Board approved catsup resupply.
2 DOY 141	Film vault temperatures have reached 125° F which is in excess of the temperatures at which much of the film begins to degrade.	Kuehmel/Zill	Film test complete. First visit resupply adequate for second and third visits.
3 DOY 145	Suit-to-cabin differential pressure remained negative in excess of 5 minutes at T-20 minutes.	Bell/Crews	Postflight testing and analysis has not identified the cause. If suit circuit leakage was the cause, the leakage was well within the oxygen supply make-up capability and presents no hazard to future visits.
4 DOY 145	Service module reaction control system quad A and propellant storage module pressure/temperature sensors are off-scale high.	Munford/ Gadbois	Ground calculations will be the primary method of computing quantity. Failure believed to be the result of lightning strike on launch pad.
5 DOY 145	Second phasing maneuver resulted in a reported 1.6 ft/sec underfiring.	Finch/Reubens	Data evaluation are complete. Tolerance of service propulsion engine thrust tail off and short-burn logic thrust constant indicates reported 1.6 ft/sec underfiring to be within specification performance.
6 DOY 145	Unable to capture during docking attempt after, standup extravehicular activity.	Smith/Ward	Special test and inspection on command module 117 probe. Clearance was increased where required. Re-design 117 probe for contingency operations without standup extravehicular activity.
7 DOY 146	Engine temperature package B (SR 5066T) is off-scale high.	Munford/ Gadbois	Probable signal-to-shield short. Procedure provided to preheat quad prior to use.
8 DOY 146	Main bus A undervoltage caution and warning alarm activated during power-down sequence.	Munford/ Gadbois	Procedure provided which ties both buses together to minimize the possibility of an undervoltage condition. Caution and warning system appears normal for existing power system configuration.

SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
9 DOY 146	Secondary coolant loop evaporator outlet temperature sensor reading off-scale low (146:01:43 G.m.t.)	Bell/Crews	Measurement not required for mission control. Problem caused by shorted bias diode in signal conditioner amplifier.
10 DOY 145	Low coolant flow warning light came on when the radiators were activated at 145:13:30 G.m.t.	Bell/Crews	Data indicates a procedural problem.
11 DOY 146	Update link logic - FM transmitter switched off by update link logic when data storage equipment commanded to tape forward.	Irvin/ Gadbois	A shorted diode created a sneak circuit which switched the FM transmitter off.
12 DOY 148	Waste management compartment specimen mass measuring device (Experiment M074) inoperative. Circuit breaker closed, reset tried still inoperative. Mass switch left on for undetermined period.	Huffstetler/ Reubens	Failed because of thermal overstress. Resupply electronics on second visit. Interchange of waste management compartment and wardroom electronics is adequate for first visit.
13	Void. (Not a Johnson Space Center item)		
14 DOY 149	Experiment S190A - Six malfunction lights came on (149:21:33 G.m.t.) during Earth Resources Experiment Package checkout.	Cox/Frost	Malfunction lights caused by loose film on supply spool. Data loss does not occur. Tape restraint provided for second visit film.
15 DOY 149	Experiment M092 leg band AX (13- to 14-inch) failure reported by the crew.	Huffstetler/ Reubens	Leg band AX has been used 5 times successfully subsequent to the reported failure. Problem believed to be procedural.
16 DOY 149	The experiment S191 ready light did not come on.	Cox/Zill	Cooler case temperature not high enough to attain proper cooler operation. Procedure derived to assure case temperature of 60° F prior to experiment operation.
17 DOY 150	Experiment S192 thermal alignment signal shows alignment not achieved.	Cox/Zill	Procedures defined for alignment preparation and search patterns resulted in successful alignment on pass 4. Achieved 1.1° K resolution.
18 DOY 150	Experiment S019 tilt and rotational control not operating properly.	Ray/Frost	Cause is gear train binding. Procedure uplinked to crew cleared problem.

SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
19 DOY 151	Portable carbon dioxide/dewpoint monitor; Carbon dioxide sensors A and B and temperature are reading inaccurately.	Huffstetler/ Crews	Probable membrane failure. Fixed carbon dioxide sensors available onboard. Unit not planned for use on second and third visits.
20 DOY 151	Crew reported 2 blown fuses in the Hasselblad 70-mm camera.	Kuehnel/Zill	Postflight examination showed the magazine was not jammed, but the film was out of synchronization (red flag showing in window). Spare fuses provided on second visit should problem recur.
21 DOY 153	Television camera failed (Serial no. 3005).	Lattier/ Reubens	Serial no. 3002 and both monitors are working. New cameras will be supplied on second visit. Failure caused by conductive contamination particle in video synchronization hybrid circuit.
22	Void. (Same as item 17)		
23	Void. (Same as item 20)		
24 DOY 162	Hasselblad 70-mm film magazine (CX05) frame counter stopped at count of 70.	Kuehnel/Zill	Postflight inspection found low and rounded gear teeth on counter drive gear. Film was transported and exposed.
25 DOY 164	Data acquisition camera (16-mm) film jammed in film transporter 5.	Kuehnel/Zill	Transporter 5 has been cleared using normal malfunction procedures.
26 DOY 165	During environmental control system dual coolant loop operation at 165:00:29, the environmental control system secondary coolant loop temperatures and fuel cell current indicated that the secondary radiator heater activated when the switch was off.	Munford/Bell Gadbois	Crew confirmed that switch was off. Dual loop operation terminated and system reconfigured for normal primary coolant loop operation. For second visit, and subsequent spacecraft, the heater fuses have been removed.
27 DOY 165	Van Allen Belt dosimeter data show large excursions at 20-second intervals.	Copeland/	Problem occurs when the command module inertial measurement unit cycles on and off. Data quality are not significantly degraded.
28 DOY 154	Crew reported that Earth Resources Experiment Package tape recorder 2 tape-motion lights blinking and off for short periods of time during Earth Resources Experiment Package passes 3 and 4.	Cox/Jacobs	Postflight tape testing confirmed tape speed variations equivalent to 1.5-percent flutter. Slightly sticky tape caused these speed variations. Data are recoverable during blinking and off periods.

SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
29 DOY 170	Crew reported that contamination was observed internal to the television lens assembly. Also, spots were observed on the television transmissions during veiwfinder tracking system television operation and television-only operation.	Irvin/Reubens	Contamination found on camera faceplate and backside of color wheel. Second visit launched cameras subjected to special cleaning procedures.
30 DOY 173	Readout of trunnion angle from coupling data unit drifting.	Finch/Reubens	A 12.8-kHz clock signal was coupled to the read counter output through a low impedance path in a multilayer tape cable. Contingency procedures are available should the problem recur.
31 DOY 172	Reaction control system fuel bladder leaking out of specification during postflight operations.	White/Ward	Small "U" shaped hole found in bladder. System performance inflight and during deservicing was normal. No contamination or irregularities were found in the tank.
32 DOY 182	Drogue parachute reefing line hit recovery helicopter rotor blade.	Smith/Lobb	Recovery procedures modified to prevent helicopter entry into command module debris pattern until all pieces which could damage the helicopter have impacted the water.
33 DOY 168	Crew reported hissing sound (vacuum leak) when using the vacuum provisions for the experiment S190B camera.	Kuehnel/Zill	Supplying a double shoulder grommet to prevent leak on second visit. Leak caused by tolerance buildup and wear in blind-made vacuum line joint.
34 DOY 174	Excessive pressure decay in the Scientist Pilot anti-hypotensive garment was reported aboard carrier.	Bell/Crews	Garment returned to Johnson Space Center for test and no leak was found. Believed to be volume change or leakage in test equipment.
35 DOY 200	Experiment S192 alignment shift and low-frequency noise superimposed on data.	Cox/Zill	Procedures were developed for crew to inspect for loose subassembly and to tighten, if found.
36 DOY 200	Electrostatic marking found on 5-percent of experiment S190A black-and-white film.	Cox/Reubens	Procedure was developed to add moisture to film stored in film vault. The moisture should reduce or eliminate marking.
37 DOY 200	Experiment S193 radioneter automatic gain control circuit saturates for a short time following switching from altimeter mode.	Cox/Gadbois	Pad uplinks will change switching time to prevent saturation.

SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
38 DOY 200	Experiment S193 altimeter 130-nanosecond pulse compression failed.	Cox/Gadbois	Relay or circuit switching in the delay line failed. Altimeter operates properly in 10- and 100-nanosecond mode.
39 DOY 200	Two experiment S193 data subframes indicating time of receiver noise measurement were missing.	Cox/Gadbois	Low temperature was probably cause. No corrective action possible. Data loss was not significant.
40 DOY 200	Experiment S193 pitch gimbal hung up for approximately 1 second upon initial activation.	Cox/Blount	Probable cause was incompletely pulled launch lock pin or contamination. Operation is now normal. No corrective action is required.
41 DOY 200	Nikon 35-mm camera incrementing frame counter operates intermittently.	Kuehnel/ Reubens	Exact cause undetermined. Camera was not returned. Procedures were revised to use decrementing counter only.
42 DOY 209	Experiment M133 sleep monitoring tape recorded data noisy.	Huffstetler/ Gadbois	Tape damaged by Orbital Workshop high temperature. Tape testing confirmed temperature damage. Tape resupplied for second visit.

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SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
SECOND VISIT			
43 DOY 209	Service module reaction control system quad B positive vav engine (B-3) oxidizer leak.	White/Lobb	Isolation valves closed and engines inhibited. Contingency procedures prepared for using quad B, if required. Contamination on the valve seat is the probable cause of the leak.
44 DOY 209	TV camera - Lower part of picture blocked out and full color not available during pre-docking flyaround.	Irvin/Reubens	Color wheel was not rotating. Crew cleared color wheel jam and camera functions normally.
45 DOY 209	Erratic operation of optics in manual mode on day 209.	Finch/Reubens	Procedural situation. Attempted first paising maneuver star check after P-40 gimbal drive test option displayed on display and keyboard. Optics response normal for configuration.
46 DOY 210	Water leak around buffer ampule bag while potable water tank being chlorinated.	Bell/Crews	Problem experienced on Apollo 17 and was not unexpected. Spare ampules available for chlorination.
47 DOY 210	Command and service module update link - data storage equipment goes to "rewind" when tape stop command sent.	Irvin/Gadbois	Workaround procedure defined to permit continuing use of data storage equipment. Postflight testing showed solder ball in update link control relay which could jam relay armature.
48	Void. (See problem 50)		
49 DOY 210	Experiment S071/S072 failed.	Ray/Zilli	Internal experiment short blew fuses. No corrective action possible.
50 DOY 211	Carbon dioxide sensor failed.	Bell/Ward	A 10-mm Hg spike was identified in the data at 210/16:34:40 coinciding with a master alarm. Reading is now static and not responding to carbon dioxide partial pressure. Similar problems during previous missions were caused by free water in the carbon dioxide sensor.

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
51 DOY 214	Oxidizer leak in service module reaction control system quad D.	White/Reubens	Isolation valves closed and engines inhibited. Analyses shows quad B and D leaks are not related by common causative factors. Probable cause of the leak is an untorqued dynatube fitting.
52 DOY 216	Command and service module master alarm at 216.03:20.21.	Munford/ Gadbois	Master alarm caused by Apollo Telescope Mount short circuit fault current flowing in command and service module structure to single point ground.
53 DOY 219	Cryogenic hydrogen tank controls interchanged relative to downlink data indications.	White/Ward	Controls reset by crew to balance hydrogen consumption. Tank 1 and 2 heater and fan controls wiring probably interchanged at the terminal board.
54 DOY 216	Experiment S190B earth terrain camera power interruption.	Kuehnel/Zill	Earth terrain camera shutter motor thermal breaker opened and reset after 30 seconds. Procedures changed to turn power OFF instead of to STANDBY when not imaging for data runs longer than 30 minutes. Experiment objectives not compromised.
55 DOY 214	The limb volume measurement system on the M092 experiment could not be calibrated with leg band assembly BJ.	Nolte/ Reubens	Leg band BJ was replaced by leg band AD and was satisfactorily calibrated and used. (See SMEAT Anomaly Report JSC-07921)
56 DOY 221	Experiment S191 door operation is slow and jerky.	Cox/Ward	Torque output of motor is marginal due either to reduced motor torque or increased torque requirement of door mechanism. Door will only be closed between visits.
57 DOY 225	Quad B temperature failed off-scale low.	Rotramel/ Reubens	Bus currents to be monitored prior to quad use to insure heater operation. Instrumentation failure probably due to open solder joint in temperature compensation loop.
58 DOY 228	Electrical counter on Nikon camera O1 inoperative.	Kuehnel/ Reubens	Malfunction procedure confirms camera counter is operating properly. Problem report resulted from a procedural error.

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SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
59 DOY 230	Unaccountable loss of approximately 16 percent of primary glycol loop accumulator quantity as of DOY 230.	Bell/Crews	On DOY 235, crew found about 1/3 pint of liquid in panel 382 (access to coolant control) and by suit heat exchanger coolant bypass valve. Postflight tests show valve can leak in intermediate position and some contamination on valve shaft seal.
60 DOY 231	Mark 1 exerciser rope broke.	Huffstetler/ Lobb	Procedure to replace the rope transmitted to crew. Crew implemented and exerciser is working.
61 DOY 216	Experiment S192 thermal channel data downlinked on day 216 was noisy.	Cox/Zill	Tests showed that the objectionable low frequency noise is inherent in the detector and can be removed from the data by ground data processing.
62 DOY 233	Experiment S019 spectrometer mechanism jammed during retraction.	Ray/Lobb	Retraction was accomplished 30 hours subsequent to initial failure. Probable cause was ice formed from either condensation on cold parts while changing a prism, or minor contamination. Normal operations have been restored. Warm up procedures in the scientific airlock will be observed prior to exposure of the mechanism to Orbital Workshop environment.
63 DOY 236	Water drops were found in the Commander's liquid cooling garment following an extravehicular activity.	Bell/Crews	No liquid cooling garment leak could be found post-flight. Possible water drop sources are (1) condensation (2) leak of urine transfer collection assembly or (3) leak from drinking water bag. No corrective action required.
64 DOY 237	The television picture became gray with horizontal streaks near the end of the second extravehicular activity, and the camera had a smell of "hot burnt rags".	Irvin/Zill	Camera serial no. 3002 is inoperative. Failure was probably due to overheating. Camera serial no. 3006 is to be used for the remainder of the visit. Camera will be resupplied on the third visit.
65 DOY 230	The output from the hand-held microphone was noisy.	Irvin/ Gadbois	The circuit configuration does not provide good common mode rejection. A new design will be furnished for the third visit.

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
66 DOY 240	A screw came out of the bicycle ergometer pedal.	Huffstetler/ Lobb	The crew replaced the screw and operation is now normal. Replacement screws will be resupplied on the third visit.
67 DOY 249	Experiment S192 meter readings A2 (S192 Det 1 AOC) and C4 (S192 Det 11 AGC) are out of specification.	Cox/Ziill	Earth Resources Experiment Package data downlink unit on days 253 and 254 showed readings to be normal. Postflight data evaluation showed the alignment light was inadvertently left on causing the problem.
68 DOY 252	Experiment S192 data downlinked via Earth Resources Experiment Package data downlink unit was intermittent.	Cox/Irvin/ Gadbois	Data downlinked on days 253 and 254 showed no data dropouts. Data downlinked subsequent to day 252 showed no recurrence of problem. Refer to problem 70 for further action.
69 DOY 217	Service module reaction control system propellant supply module oxidizer manifold pressure dropped 12 psi during loss of signal between 217/02:47 and 217/03.25 when crew reconfigured isolation valves.	White/Lobb	Data indicates the most probable cause is that a small reverse leakage in one of two quad C oxidizer isolation valves allowed the propellant supply module manifold pressure to bleed down to quad C pressure. Valve design is primarily for holding normal flow direction. No detrimental effect.
70 DOY 256	Television power cable serial no. 3002 failed.	Irvin/ Reubens	Resistance check of cable serial no. 3002 confirmed open video coaxial cable. Television power cable is also used to connect Earth Resources Experiment Package data downlink unit to television is most probable cause of intermittent downlink (ref. problem 68). Cable serial no. 3006 now in use. New cable will be resupplied for third visit.
71 DOY 256	Crew reported no video on television monitor. Monitor replaced and crew reported replacement monitor intermittent.	Irvin/Reubens	Troubleshooting procedures resulted in isolation of intermittent problem to monitor cable. Resistance checks showed an intermittent power conductor. Monitor and monitor cable to be resupplied for the third visit.
72 DOY 257	Experiment S193 antenna failed to scan properly.	Cox/Ward	Data review indicates loss of minus 10 Vdc reference in servo loop. Extravehicular activity procedures approved to restore total or partial operation.

SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
73 DOY 264	Experiment S019 film cassette 5 jammed.	Ray/Lobb	Postflight inspection found a loose NYLOK screw which caused the jam. The screw will be staked for the next visit.
74 DOY 267	Service propulsion system oxidizer interface pressure dropped 22 psi abruptly.	White/ Reubens	Abrupt change indicates instrumentation calibration shift and gain change. No corrective action is planned since other instrumentation provides the necessary information.
75 DOY 268	Service module reaction control system quad C oxidizer manifold pressure reading at time of regulator lock up indicated a shift of about 9 psi from initial readings on day 209.	Rotramel	Instrumentation problem. Stable oxidizer manifold pressure verified by helium manifold and fuel manifold pressure readings. Problem cause/ by slow leak in reference chamber.
76 DOY 209	Electron/proton spectrometer high voltage tripped off on days 209 and 262.	Rhodes/ Reubens	Update link command to reset. This is a procedural problem occurring when the crew performs a command reset. Procedures have been changed for the next visit.
77 DOY 218	Command module reaction control system 2 helium manifold pressure measurement erratic.	Weary/ Rotramel	Instrumentation problem. All other parameters remained stable. Postflight testing showed electrical noise introduced into the cable to the signal conditioner will cause output data characteristics similar to the flight data. Source of the electrical noise could be from command module structure or electromagnetic radiation. The 2 percent variation is within the specification of the instrumentation.
78 DOY 218	Recovery personnel could not communicate with the crew after landing.	Irvin/ Gadbois	Spacecraft VHF transmitter was continuously keyed by salt water flooding of Airlock Module umbilical connector located in docking tunnel. Procedural changes for the third visit will place 2 communications centers which were continuously keyed by salt water in the connector in the receive-only mode.
79 DOY 229	Experiment M171 ergometer load intermittent.	Gadbois/Lem	Probable intermittent circuit in the generator load loop caused by elevated temperatures. Constraints have been placed on work late. A spare load module is available, if required.

No.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
80 DOY 257	Two extra film frame advances were found on experiment S190A film from station 6.	Zill/ Giesecke	The magazine drive assembly is suspect. A spare magazine drive assembly is available on board and will be used if this condition should become worse.
81 DOY 239	Data acquisition camera 16-mm transporter indicator lights were erratic.	Gerlach/ Reubens	A cracked bellows-type electrical contact caused the 28 Vdc power to the indicator light to become intermittent. Spare cameras on board are adequate for the third visit.
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TIME (GMT)

121 - 122

DOY

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ACTION PROGRESS

SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
82 DOY 320	Secondary loop steam pressure measurement reading decreased to lower limit during launch.	Gibson/Ward	Crew held secondary coolant loop switch in reset position and pressure returned to normal. Closed.
83 DOY 320	Tracker fail light illuminated and a coupling data unit alarm occurred during platform alignment program.	Finch/Reubens	Data review indicates cause could be in the coupling data unit assembly, a coupling data unit fail detect circuit, or a computer input bit. Contingency procedures are available. Postflight testing is required.
84 DOY 320	Unexpected delta V changes on entry monitor system.	Finch/Reubens	Entry monitor system was configured to "delta V - normal." Switching from standby to normal sometimes causes a 0.1 ft/sec change. Also, entry monitor system accelerometer bias causes 0.1 ft/sec changes with time in this mode. Closed.
85 DOY 320	Docking system did not latch up on first two tries. On the third try a hard dock was obtained.	Langley/Ward	Slow capture latch response caused probe head to lock after probe-drogue separation on first attempt. Second attempt was with probe locked. Closed.
86 DOY 324	Service propulsion system oxidizer aft outboard temperature dropped from 62.60 to 0.20F.	Rotramel/ Reubens	Probable failure of signal conditioner. Inboard temperature measurement is a redundant measurement. Closed.
87 DOY 324	Data acquisition camera 16-mm serial no. 02 failed.	Gerlach/ Reubens	Crew performed camera malfunction procedures. Camera 02 then operated satisfactorily. Ground tests showed that camera runs at 24 frames/sec regardless of speed chosen. Under further investigation.
88 DOY 326	Data acquisition camera 16-mm serial no. 06 failed.	Gerlach/ Reubens	Crew performed camera malfunction procedures. Camera 06 continued to blow fuses and therefore was stowed. Ground test showed short in motor. Under further test.

SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
89 DOY 316	Experiment S190A camera array failed to actuate in "AUTO SEQ" mode.	Cox/Zi11	"AUTO SEQ" position of the mode switch is intermittent. Normal operation was restored during troubleshooting. Contingency manual sequence will be used if switch completely fails. Closed.
90 DOY 333	No modulation was present on S-band carrier while trying to downlink from the Earth Resources Experiment data downlink unit.	Cox/Reubens	Subsequent downlinks have been normal. Problem is believed to have been caused by improper switch configuration. Closed.
91 DOY 334	Data acquisition camera 16-mm serial no. 08 failed.	Gerlach/ Reubens	Crew performed camera malfunction procedures. The film claw is not engaging the perforations in the film. The camera was returned for post-flight analysis. Ground test showed camera drive sprocket teeth bent at the tips.
92 DOY 338	Experiment S190A stopped after 3 frames in AUTO mode and all six malfunction lights came on.	Cox/Zi11	Normal operation restored on day 340. Closed.
93 DOY 339	Mark I exerciser recoil spring broke.	Huffstetler/ Lobb	Crew replaced broken return spring. Records indicate inadequate bakeout after plating. This would result in hydrogen embrittlement. Closed.
94	Void. Refer to problem 92.		
95 DOY 341	Data acquisition camera 16-mm serial no. 04 failed.	Gerlach/ Reubens	The crew cleared a film transporter jam and the camera is presently operating normally. Ground test verified camera is operational. Closed.
96 DOY 342	Polaroid SX70 camera claw mechanism did not eject film.	Gerlach/ Reubens	Paper or foreign material had jammed the ejection slot. The crew restored normal camera operation. Closed.

SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
97 DOY 344	Experiment M133 sleep monitor control panel test lights indicated an erratic condition.	Huffstetler/ Lobb	Repeated flexing caused cable assembly to become intermittent. Cable assembly was replaced with spare and normal operation was restored. Closed.
98 DOY 322	Fuel is passing through a closed quad B fuel isolation valve.	Weary/Reubens	Propellant stowage module quad B valves have been closed and reaction control system quad B propellant valves have been opened. The crew has been advised of required procedural changes. Closed.
99 DOY 349	Data acquisition camera 16-mm serial no. 01 failed.	Gerlach/ Reubens	Crew performed malfunction procedure and restored normal camera operations. Ground test showed that the armature won't start when it is stopped in a particular 10-degree zone. An open winding is indicated.
100 DOY 349	Loss of reticle illumination on experiment S063 optical sight.	Prim/Lobb	A substitute battery pack is being used and normal operation has been restored. Closed.
101 DOY 356	Experiment S190B earth terrain camera end-of-film light remained on in AUTO mode.	Prim/Lobb	Subsequent operations indicate that the end-of-film microswitch adjustment is marginal and results in intermittent false indications. The supply spool was observed to indicate proper film transport. Closed.
102 DOY 348	Command and service module primary glycol loop flow rate measurement shifted upward approximately 4 percent two times following cycling of the secondary glycol system.	Rotramel/ Gadbois	Accumulator quantity and pump pressure measurements can be used to determine flow rate. Closed.
103 DOY 358	Experiment S019 film magazine serial no. 002 jammed during operation.	Prim/Lobb	A transfer pickup claw slipped, cocking and jamming a film slide in the transfer slide. Closed.

SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
104 D0Y 360	Ice crystals were observed coming out from the extravehicular mobility unit area.	Gibson/ Reubens	The crew reported ice on the composite connector on the life support umbilical. Spare hardware will be used on subsequent extravehicular activities. Closed.
105 D0Y 359	Experiment S149 sample discs are loose and peeling.	Ray/Lobb	Cassettes were retrieved and stowed. Postflight inspection is required.
106 D0Y 363	Data acquisition camera 16-mm film was torn using transporter 02 and camera 01.	Kuehnel/Lobb	Crew performed malfunction procedure. Remaining film was fed to spare takeup reel. Alternate procedures provided to crew. Transporter 02 was returned for analysis.
107 D0Y 002	Experiment S019 mirror rotation control counter tens and hundreds digits do not index.	Prim/Lobb	Procedures have been provided to use tens and units readout plus counting handwheel turns for proper indexing. Closed.
108 D0Y 004	Data acquisition camera 16-mm film magazine (CL-09) end-of-film light came on with 40 percent of the film remaining.	Gerlach/ Reubens	The crew monitored film advance manually until film depletion. The magazine was returned. Closed.
109 D0Y 006	Experiment M133 sleep monitoring telemetry was lost at 005:05:47 G.M.T.	Booher/ Badbois	Intermittent cable was replaced and normal operations have been restored. Closed.
110 D0Y 007	Experiment S019 film canister serial no. 003 jammed.	Ray/Lobb	A film slide assembly was disassembled during transfer when the metal platen caught on the square edge of the carriage gate. Closed.
111 D0Y 009	Void. (Same as item 80).		

SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
112 D0Y 012	Experiment S190A camera station 1 frame counter showed one more frame advance than the other stations.	Mollberg/ Zill	Probable cause was a one frame counter advance upon installation of the station 1 magazine. No data has been lost. Closed.
113 D0Y 021	Data acquisition camera magazine 04 jammed.	Gerlach/ Reubens	Jammed magazine caused an inaccessible fuse to blow in the S183 experiment. A procedure for restoring power to the S183 experiment was developed and accomplished. Postflight tests on magazine showed that the drive spline had snagged the film loop that had become too large. This was caused by a perforation alignment procedure used 12 times making the loop too large. Closed.
114 D0Y 022	Experiment S190A station 6 malfunction light illuminated.	Cox/Ward	Malfunction procedures indicate film is advancing properly and malfunction light is caused by a film motion sensing failure. The magazine will be used until the film is depleted. Closed.
115 D0Y 025	Television monitor has loose part in picture tube.	Edmiston/ Gadbois	Loose part has not affected camera or monitor operation. If monitor fails, spare monitor can be used. Closed.
116 D0Y 029	Experiment S190A shutter failed to function and all six malfunction lights illuminated.	Cox/Zill	Similar to problem on day 338. Cycling circuit breaker again restored normal operation. Closed.
117 D0Y 030	Data acquisition camera 16-mm serial no. 01 was inoperative.	Kuehnel/ Reubens	Camera not used again. Returned camera will be examined. See 99-J-349.
118 D0Y 030	Experiment M092 blood pressure measurement system cuff 11 failed to drive the experiment support system displays.	Huffstetler/ Reubens	Crew changed to cuff 12 and operations returned to normal.

SKYLAB PROBLEM TRACKING LIST - JSC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
119 D0Y 027	Earth Resources Experiment Package tape recorder 1 tape motion light has blinked intermittently throughout the visit and went out for 10 to 15 seconds on pass 42 during experiment S192 data take operations.	Cox/Zi11	Tape recorder 2 is to be used for the remainder of the visit. Returned tape data will be examined. Closed.
120 D0Y 033	Experiment S191 infrared spectrometer cooler temperature exceeded the normal range but stayed within operational limits.	Cox/Zi11	No action required. Closed.
121 D0Y 033	During entry minus 6 days checkout, the command and service module battery A voltage and current did not readout.	Munford/ Gadbois	Cycling the battery A battery bus A circuit breaker cleared the problem. Circuit breaker manufactured with one contact cocked, thus preventing contact wiping and cleaning on closure. Closed.
122 D0Y 034	During the fourth extravehicular activity, a water leak occurred at the pressure control unit/life support umbilical composite disconnect.	Gibson/ Reubens	Crew made detailed examination of the disconnect as requested. Quick disconnect viton O-rings caused the leak when subjected to side loading at lower than ambient temperature. Closed.
123 D0Y 034	Command module reaction control system 2 Leak upstream of propellant isolation valves.	White/ Gadbois	Problem caused by defective braze joints. Braze material did not wet base metal. Closed.

/s/ R. A. Colonna

Donald D. Arabian

Manager, Mission Evaluation Team
March 1, 1974

SKYLAB PROBLEM

TRACKING LIST - MSFC

TIME (GMT)

REFERENCE 3

23

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
1 DOY 134	Meteroid shield failure during boost. (Anomaly)	FIRST VISIT MEWG/Clark	Investigation board evaluation complete. <u>CLOSED</u>
2 DOY 134	Solar array wing 2 missing and wing 1 failed to deploy as a result of item 1. (Anomaly) Ref: Z0-248, AR-74, AR-175	S&M/CS Eudy/ Thompson	Wing 1 released by EVA. <u>CLOSED</u>
3 DOY 139	AM coolant switchover to secondary system. (Discrepancy) Ref: AR-31	ECS/Hopson	Group 2 switchover enabled during stowage periods or when manned and only one loop is operating. <u>CLOSED</u>
4 DOY 143	CBRM #15 off line. (Anomaly) Ref: AR-54, SWS-672, AR-185, SWS-870, SWS-415, SWS-427	EPS/Woosley	<u>CLOSED</u> . Brought back on line during EVA.
5 DOY 134	ATM aft antenna high reflected power. (Anomaly) Ref: SWS-71, SWS-908	I&C/Adair	Decision to remain on forward antenna. <u>CLOSED</u>
6 DOY 134	Excessive rate gyro drift. (Anomaly). Ref: SWS-81, AR-48, SWS-660, AR-186, AR-337, AR-367, AR-370.	STAC/Chubb Wojtalik	Attributed to bubbles in rate gyro fluid. Six pack to be carried on SL-3 and available for installation. <u>CLOSED</u>
7 DOY 143	Quad-redundant vent valve malfunction. (Discrepancy) Ref: SWS-481, AR-93, AR-176, AR-244, SWS-805	ECS/Hopson	Troubleshooting on day 162 shows all 4 valves closed. <u>CLOSED</u>
8 DOY 144	High ATM canister pressure indication. (Discrepancy) Ref: AR-100	ATM/TCS Vaniman	Outgassing loads greater than expected have now diminished. No further problems are expected. <u>CLOSED</u>
9 DOY 146	Secondary condensate heater temp not displayed when heater on light is illuminated. (Discrepancy) Ref: AR-101	EPS/Woosley	Problem cleared on day 163 after crew cycled the switch. <u>CLOSED</u>
10 DOY 150	Fine sun sensor primary pitch readout appears to be lost. (Discrepancy) Ref: AR-113, AR-143	STAC/Chubb	Recommended recovery procedure was successful implemented by crew. <u>CLOSED</u>

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
11 DOY 148	Noise spikes on PPCO ₂ meas. (Discrepancy) Ref: AR-94.	I&C/Adair	Due to transients produced by tape recorder operation. Causes no data problems. <u>CLOSED</u>
12 DOY 150	H-alpha TV picture jiggling (Discrepancy) Ref: AR-106.	ATM/EXP White/Hassler	Due to optical characteristics within the instrument. No image degradation detected. <u>CLOSED</u>
13 DOY 150	PPCO ₂ of Mo1 sieve A and B inlet read low. (Discrepancy) Ref: AR-108, ZO-514, AR-193, AR-265, AR-331, AR-410.	ECS/Littles	Failure analysis on returned cartridges indicate that they were good. M171 Mass Spectrometer will be used with CO ₂ sensors to derive CO ₂ levels. A calibration cartridge will be on SL-3. <u>CLOSED</u>
14 DOY 150	Excitation of ATM spar bending modes. (Discrepancy) Ref: AR-109, AR-169, AR-201, AR-137, AR-199, SWS-705, AR-153, ZO-577, AX-705	STAC/Chubb	Crew should not make unusual moves while in experiment pointing mode. <u>CLOSED</u>
15 DOY 150	S055 high voltage has high voltage tripout problem. (Discrepancy) Ref: AR-111, AR-330, AX-537	ATM/Exp. White	All but two tripouts have corresponded to high electron/proton flux belts and the number 5 power supply trip circuit is overly sensitive to this flux belt. <u>CLOSED</u>
16 DOY 149	Cabin pressure drop after approx. 149:16:58. (Discrepancy) Ref: SWS-508, AR-105	ECS/Littles	Attributed to LBNP (M092) operation. <u>CLOSED</u>
17 DOY 152	CBRM #3 off line. (Anomaly) Ref: AR-131, AR-124, AR-405, SWS-1117, SWS-1118	EPS/Woosley	Attempts to turn on DOY 210 (cycled 5 times) failed. If attempts fail, CBRM 3 has been turned off for the remainder of mission. <u>CLOSED</u>
18 DOY 152	Unexplained 2 MIB's firing of TACS (Discrepancy) Ref: AR-150	STAC/Chubb	TACS desat firings because rate spikes reflected in momentum. <u>CLOSED</u>
19 DOY 153	Sun presence flag appears just before day flag. (Discrepancy) Ref: AR-151.	STAC/Chubb	Problem has cleared itself. Will continue to monitor times. <u>CLOSED</u>
20 DOY 150	AM secondary coolant loop inverter 1 C.B. open. (Discrepancy) Ref: AR-134, AR-116, SWS-1245, SWS-1760.	EPS/Woosley	Troubleshooting procedure submitted. No further action planned unless additional failures occur. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
21 DOY 150	S082A frame remaining counter does not decrement. (Anomaly) Ref: AR-165, AX-642, AX-703, AX-679.	ATM/Exp. White	EVA changed camera; operation satisfactory. <u>CLOSED</u>
22 DOY 153	OWS bus 1 and 2 C&W indication. (Discrepancy) Ref: AR-168.	EPS/Woosley	Circuit breakers were cycled and system is operating properly. <u>CLOSED</u>
23 DOY 151	S052 operate light blinking and film counter failure. (Discrepancy) Ref: AX-574.	ATM/Exp. White	Problem has cleared itself, operation nominal. <u>CLOSED</u>
24 DOY 153	S082A C&D panel operate light does not go off when operating mode terminates. (Discrepancy) Ref: AX-627, AR-301.	ATM/Exp. White	Permanent operational anomaly causing crew inconvenience. Problem isolated to sneak circuit between C&D panel and ATM C&D logic distributor. <u>CLOSED</u>
25 DOY 153	Portable TV camera failure. (Anomaly)	I&C/Adair	Problem isolated to camera and not the television system. <u>CLOSED</u>
26 DOY 153	MDA wall heater C.B. control 2 opened. (Discrepancy) Ref: AR-178, SWS-901, AR-268.	EPS/ECS Woosley Littles	Circuit breakers were cycled and system is operating properly. <u>CLOSED</u>
27 DOY 154	Rate gyro 1 in Z axis failed hard over; switch to backup strapdown control. (Anomaly) Ref: AR-177, AR-331, SWS-1030, AR-150, AR-222, AR-342.	STAC/Chubb	Related to relay switching problem. Problem has cleared, but may recur if gyro is switched from fine to coarse scale. <u>CLOSED</u>
28 DOY 155	S054 thermal shield door failed closed. (Anomaly) Ref: AX-634, AX-671, AX-641, CX-682, AR-198, AR-407.	ATM/Exp. White	EVA successfully opened door permanently. <u>CLOSED</u>
29 DOY 154	S183 film magazine did not return to carousel. (Anomaly) Ref: AR-180.	Cor. Exp. DeSanctis	Spectrograph cleared and operated properly DOY 155. <u>CLOSED</u>
30 DOY 153	Crew report of TACS firing day 153, none commanded by ATMDC. (Discrepancy) Ref: SWS-658.	STAC/Chubb	Sounds of TACS firings associated with other equipment. <u>CLOSED</u>

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
31 DOY 155	High rate gyro temperature indications. (Anomaly) Ref: AR-189, SWS-35, SWS-618, AR-99, SWS-674, SWS-797.	STAC/Chubb/ Wojtalik	No catastrophic conditions are anticipated at this temperature (66.5° C). Gyro will function for required life. <u>CLOSED</u>
32 DOY 155	Low capacity performance of CBRM's 6, 7, 8 and 16. (Discrepancy) Ref: SWS-631, SWS-1156, SWS-1196, AR-465, SWS-1216, SWS-1228, AX-1437.	EPS/Woosley	CBRM 7 capacity test performed DOY 226. Capacity is 12.2 ampere hours.
33 DOY 156	Y3 gyro oscillation. (Anomaly) Ref: SWS-709, AR-207, AR-282, AR-418, AR-337.	STAC/Chubb Wojtalik	Void. Transferred to problem 72.
34 DOY 157	Low reg. output CBRM 17 during daylight portion of orbit. (Anomaly) Ref: SWS-737, AR-387, ZO-1101, SWS-1154, AR-542, SWS-1435.	EPS/Woosley	Short external to CBRM. Troubleshooting planned submitted for SL-3. Implementation TBD. <u>CLOSED</u>
35 DOY 157	Star tracker failure to acquire and loss of lock. (Discrepancy) Ref: AR-219, AR-283, AR-334, AR-343, SWS-736, AR-304, AR-419, SWS-1128, SWS-1141.	STAC/Chubb Raps/Lee	Star tracker operates properly. Two causes for failure to acquire and loss of lock are contamination and maneuvers affecting the Z-axis by two degrees or more. <u>CLOSED</u>
36 DOY 158	S054 power could not be turned off. (Anomaly) Ref: AR-142, AR-226, AX-895.	ATM/Exp, EPS, I&C/White/ Woosley/Adair	Only known way is by powering down control dist busses film magazine changed out on EVA. <u>CLOSED</u>
37 DOY 158	AM primary and secondary coolant loop control valves malfunctioned. (Anomaly) Ref: AR-248, ZO-840, SWS-854, AR-264, AR-266, SWS-871, SWS-884, AR-297, SWS-977, IV-967, SWS-1033, SWS-881, IV-890, SWS-947, SWS-1056, AR-349, ZO-1189, ZO-1190.	ECS/Hopson	Malfunction procedures performed and both loops operating properly. EVA procedure was modified so that bypass valve would not be placed in "EVA" position and EVA's were performed satisfactorily. <u>CLOSED</u>
38 DOY 158	S054 door indicated open when door was closed. (Discrepancy) Ref: AX-781, AR-249, AR-231, AX-798, ZO-798.	EPS/ATM/Exp. Woosley/ White	Door drive mechanism failure results in the apparent failure of the door position indicator. Door pinned open. <u>CLOSED</u>
39 DOY 160	Caution and warning fire sensor failed test. (Discrepancy) Ref: AR-250, AR-275, SWS-902.	EPS/Woosley	Recommend failed FSCP be retained as a spare: Side 1 is good. Two panel locations in OWS do not use side 2. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
40 DOY 161	Battery charge alert light cannot be reset. (Discrepancy) Ref: ZO-830.	EPS/Woosley	Problem associated with CBRM 15 offline. Operation normal with CBRM 15 back on. <u>CLOSED</u>
41 DOY 160	Premature cutoffs of S056 active 1 modes. (Anomaly) Ref: AX-831, AR-251, AR-299, AR-335, AX-952, AX-961, AX-1541.	ATM/Exp. White	(See problem 113). Failure analysis on the SL-2 failed magazine indicates problem caused by mechanical drag in film magazine. <u>CLOSED</u>
42 DOY 161	S052 camera failure. (Anomaly) Ref: AR-254.	ATM/Exp. White	Preliminary camera analysis results indicated the problem is not in the camera. Principal Investigator is analyzing flight film for cause of jamming and will report upon completion. No further MSFC effort. <u>CLOSED</u>
43 DOY 162	S054 Ready/operate lights inoperative. (Discrepancy) Ref: AX-838, AR-249.	ATM/Exp. White	Door position indicator determines ready/operate light operation. (See problem 38) <u>CLOSED</u>
44 DOY 161	CBRM 6 remained on after being commanded off 3 times. (Anomaly) Ref: AR-263.	EPS/Woosley	Attributed to a failed transistor, no further attempts will be made to turn the regulator off. <u>CLOSED</u>
45 DOY 159	AM tape recorder no. 1 failure. (Discrepancy) Ref: AR-233, CM-470.	I&C/Adair	Replaced with spare. Recorder exceed specified life. Recorder will not be returned for failure analysis. <u>CLOSED</u>
46 DOY 161	S009 Motor/drive train stalls on close cycle. (Anomaly) Ref: AR-258, AR-302, EX-869.	Cor. Exp./ DeSanctis	Attributed to drive motor failure. Resupply on SL-3. <u>CLOSED</u>
47 DOY 162	T027/S073 Tripod unit mounting problem. (Discrepancy) Ref: AR-257	Cor. Exp./ DeSanctis	Adjustment mechanism misdrilled causing 4 inches off-set. <u>CLOSED</u>
48 DOY 163	Low signal strength on AM transmitter A10 (Anomaly) Ref: AR-276, AR-277, AR-294, AR-285 SWS-934, AR-371, SWS-1087, SWS-921.	I&C/Adair	Problem attributed to transmitter. Transmitter management will be utilized for remainder of mission. <u>CLOSED</u>
49 DOY 164	M512 electron beam gun power cutoff failure. (Discrepancy) Ref: AR-278, CX-905-R1, AR-321, CX-905, AR-309, CX-978.	Cor. Exp./ DeSanctis	Attributed to a high amperage relay intermittent failure. Not required for SL-3 or SL-4 <u>CLOSED</u>

DESCRIPTION

ACTION ASSIGNED TO

ACTION PROGRESS

50 DOY 164	S055 door failed to open at sunrise. (Discrepancy) Ref: AR-279, AR-281, AX-954, AR-293, AX-906, AR-407, AX-1140, AX-1151, AX-1134.	ATM/Exp. White	Auto door switch apparently left in "Inhibit" position. Now working properly. <u>CLOSED</u>
51 DOY 164	Water droplet formation on wardrobe window. (Discrepancy) Ref: AR-284, AR-286, SWS-992, SWS-936, SWS-981, AR-338, SWS-1119, SWS-1065, AR-358, SWS-1049, AR-421, CX-1239, SWS-1538, AR-606, AR-540-16, AR-615 CX-1589, AR540-20.	ECS/Hopson (Lead) EPS/ Woosley, S&M/ Eudy, Contam/ Davis	Window evacuated, but not back-filled with desiccated air. Fog no longer exists. <u>CLOSED</u>
52 DOY 165	Possible contaminant on S052 occulting disk. (Discrepancy) Ref: AX-939, AX-991, AX-1786, IV-1782.	Cr.Sys (Lead) Thompson ATM/Exp/White Contam/Davis	Reopened - Problem has recurred on SL-3 after EVA-2. "Whiskers" on disc were removed during DOY 265 EVA. <u>CLOSED</u>
53 DOY 165	Pressure low and decreasing on 150 psi N2 regulator outlet. (Discrepancy) Ref: AR-296, SWS-946, SWS-985, SWS-1000, AR-379, AR-631, AR-658, AR-659.	ECS/Littles	Reopened - Problem recurred during SL-3. Periodically turning 1 regulator off restores performance. <u>CLOSED</u>
54 DOY 167	Clogged water dispenser valve in waste management compartment. (Anomaly) Ref: SWS-979, ZO-938, AR-298, AR-412.	S&M Eudy	Valve replaced. Will resupply spare on SL-3. Seal material being changed from neopreme to viton. <u>CLOSED</u>
55	S082 Ready/operate light indication defective (Discrepancy) Ref: AR-301.	ATM/Exp. White	Void - Same as no. 24.
56 DOY 168	Possible leak in airlock condensate system during decoupling. (Discrepancy) Ref: SWS-1003, SWS-1016, SWS-1018, SWS-1120, AR-331.	S&M/Eudy	Malfunction procedure performed DOY 244, press valve not cycled back to "off" and dump Q.D. disconnected. Delta P Okay and daily dumps discontinued. <u>CLOSED</u>
57 DOY 169	S056 door failed to open. (Discrepancy) Ref: AX-1014, AR-407, AX-1173.	EPS/Woosley	Procedure for door operation provided and agreed upon. <u>CLOSED</u>
58 DOY 168	T027/S073 retraction difficulty. (Discrepancy) Ref: EX-1002, CX-1067, CX-1032, AR-345, AR-274, EX-775.	Cor. Exp./ DeSanctis	Crew corrected problem by docking existing J-8 connector that was 20 degrees off locked position. <u>CLOSED</u>

SKYLAB PROBLEM

TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
59 DOY 170	S054 binary picture counter and shutter duration counter reset to 000 several times during mission. (Discrepancy) Ref: AX-1071.	ATM/Exp. White	Problem expected to continue through mission. Caused by transients from more than one source. No loss of scientific data is being experienced. <u>CLOSED</u>
60 DOY 171	ONS solar array group 4 current reads low. (Discrepancy) Ref: AR-351, SWS-1060.	EPS/Woosley	Short to structure resulting only in lower than actual current measurements. Correction factor being used. <u>CLOSED</u>
61 DOY 171	X-ray/RF activity history plotter failed. (Anomaly) Ref: AX-1054.	EPS/Woosley	No resupply and replacement. <u>CLOSED</u>
62 DOY 172	S055 door TM indicated not open/not closed at computer sunset. 172:14:50. (Discrepancy) Ref: AX-1078, AX-1086, AX-1088, AR-407, AX-1134, AR-381, AX-1140, SWS-1138, AR-420, AR-293, AR-414, AR-293, AX-1151, SWS-1242.	Henry (Lead) EPS/Woosley TCS/Vaniman S&M/Eudy ATM-Exp/White STAC/Chubbs	Door will be left open during experiment day (0800 to 2400) until SL-3. Procedure for door operation provided and agreed upon. <u>CLOSED</u>
63 DOY 173	Elevated temps in OWS refrigeration system. (Anomaly) Ref: AR-368, BX-1080, AR-409, SWS-1082, SWS-1090, SWS-1083, AR-372, AR-402, AR-399, SWS-1106, AR-413, AR-388, AR-391, SWS-1124, AR-411, AR-431, AR-458, ZO-1180, SWS-1153, AR-478, ZO-1185, SWS-1242, SWS-1241, SWS-1248, AR-591, AR-592, ZO-1522, AR-734, SWS-1859, SWS-1977, SWS-2062, SWS-2092.	ECS/Hopson	Currently operating on primary loop and all temps are within specification values. J-5 cable disconnected on DOY 266 providing capability for independent loop operation. No further action is planned. <u>CLOSED</u>
64 DOY 173	AM tape recorder 1 failure. (Anomaly) Ref: AR-369, AR-375, AR-356, AR-373, AR-456.	I&C Adair	Failed recorder 1 (S/N 22) disassembly on DOY 227 showed drive belt 5 broken. Repair kit and procedure in work. <u>CLOSED</u>
65 DOY 174	ATM watt hr meter reset to 0 and staying there. (Discrepancy) Ref: AR-376.	EPS/STAC Woosley/Chubb	Suspected one time occurrence that has cleared itself. <u>CLOSED</u>
66 DOY 171	Oxygen bottle 6 temp. rise 5° F/day and approaching limit. (Discrepancy) Ref: AR-378, SWS-1109.	ECS/S&M Hopson/Eudy	Investigation shows no problem. Temperature decreasing with decreasing Beta angle. <u>CLOSED</u>

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
67 DOY 176	High OWS film vault temp. (Discrepancy) Ref: ZO-1075, AR-380, AR-359.	ECS Hopson	Film vault temp exceeded 100° F limit. Decreased to below limit on DOY 178. Decrease continues with decreasing Beta angle. Film was not degraded. <u>CLOSED</u>
68 DOY 178	Teflon guide on S056 return magazine missing. (Discrepancy) Ref: AR-396.	S&M/Eudy ATM Exp/White CS/Thompson	SL-2 crew to be questioned about missing guide. No problems are anticipated on SL-3, if camera in-stallation recommendations are followed. <u>CLOSED</u>
69 DOY 147	2 CBRM 13 solar array modules open. (Anomaly) Ref: AR-437.	EPS/Woosley	Data analysis shows negligible system effects. <u>CLOSED</u>
70 DOY 189	Generation of fine sun sensor false wedge counts. (Discrepancy) Ref: AR-432.	STAC/ Appelgate	Problem isolated to a shorter than required delta time between 2 discretes. <u>CLOSED</u>
71 DOY 180	Proton spectrometer has lost 12 of 13 data channels (Anomaly) Ref: AR-444.	Cor. Exp. DeSanctis	Loss of measurements is due to low temperature resulting from the inadequacy of the thermal shroud. <u>CLOSED</u>
72 DOY 156	Vehicle rate gyro oscillations, Y3, Z1, Y2. (Anomaly) Ref: SWS-709, AR-207, AR-282, AR-418, AR-337, AR-442, AR-449, SWS-1202, AR-466, SWS-1212, SWS-1194, SWS-1187, AX-1176, SWS-1254, AR-471, AR-492, AR-495, ZO-1299, AR-514, SWS-1399, SWS-1374, AR-543, SWS-1435, SWS-1434, AR-567, SWS-1491, SWS-1505, AR-607, AR-609, AR-610, ZO-1548, AR-617, AR-618, AR-626, SWS-1633, SWS-1658, SWS-1650, SWS-1676, AR-643, SWS-1690, SWS-1677, AR-655, SWS-1711, AR-647, SWS-1460, SWS-1729, SWS-1749.	STAC/ Wojtalik	X5, Y1, Y5, Y1, Z5 and Z3 now controlling with X6, Y6 and Z6 in standby change was made because of single failure point in the six pack power line 6 pack maneuvers conducted DOY 239 to determine 6 pack misalignment to vehicle axes. Misalignments very small and do not recommend ATMDC program patch to compensate. <u>CLOSED</u>
73 DOY 197	ECP pitch rate gyro failure. (Anomaly) Ref: AR-452, ZO-1183, SWS-1215, SWS-1208.	STAC/ Appelgate	Consider primary up/dn rate gyro failed. A plug-in module which differentiates FSS outputs to determine canister rates was carried up on SL-3 as a backup. Implementation procedure is onboard Skylab. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
74 DOY 160	Failure to get C&W occurred when SUS pump 1 was activated. (Discrepancy)	EPS/Crowell	Inflight usage of SUS pump 1 indicates sensor failed per EVA on DOY 218 and periodic activation per housekeeping task 10-A. <u>CLOSED</u>
75 DOY 135	OMS hatch leak during pressurization. (Discrepancy)	S&M/Eudy	One-time occurrence attributed to check valve contamination which cleared itself. <u>CLOSED</u>
76 DOY 197	EPC rate gyro null shifts. (Discrepancy) Ref: SWS-1208	STAC/ Applegate	Operating on remaining rate gyros. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
SECOND VISIT			
77 DOY 150	CBERM 4 charger went off when regulator was commanded off. (Discrepancy) Ref: SWS-1247.	EPS/Woosley	Problem was duplicated with component failures. Discrepancy has not reoccurred since DOY 150. <u>CLOSED</u>
78 DOY 209	Mole seive B secondary fan C/B opened when switch turned to secondary. (Discrepancy) Ref: AR-496, SWS-1409, AR-500-7A.	EPS/Woosley	Carry-up jumper cable to power seive B fan from seive A inverter planned for SL-4. <u>CLOSED</u>
79 DOY 210	Malfunction of WMC pressure meter/transducers in the waste system. (Discrepancy) Ref: AR-503.	S&M/Eudy, ECS/Hopson, I&C/Adair	D7125 has failed. D7104 reading approximately 0.05 psia high. <u>CLOSED</u>
80 DOY 211	S055 door did not open on day signal. (Discrepancy) Ref: AX-1296, AX-1298, AR-511, AR-516, AX-1341, AR-535; AX-1390, AX-1456, AR-526, AR-620.	EPS/Woosley S&M/Eudy	Ramp latches removed during EVA on DOY 218. Satisfactory operation on one motor. <u>CLOSED</u>
81 DOY 211	Condensate delta P decreased to zero indicating leak. (Discrepancy) Ref: AR-506, AR-513, AR-508, SWS-1302, AR-518, AR-502, SWS-1339, SWS-1339R1, AR-552, AR-553, SWS-1402, CX-1423, AR-562, SWS-1461, SWS-1539, SWS-1551, CX-1589, SWS-1284.	ECS/Hopson	No further T/S planned. No evidence of leak since 245:05:20, the last time tank was dumped. Leak probably at a QD and may be randomly experienced as QD's are exercised. <u>CLOSED</u>
82 DOY 212	Star tracker shutter did not close during dump at 212:00:36. (Discrepancy) Ref: AR-510, SWS-1315, AR-586, AR-724, AR-540-41, SWS-1919, SWS-2093, AR-800.	STAC/ Appelgate	Problem occurred DOY's 212, 222, 249, and 264. Procedure established to prevent damage to star tracker if problem recurs. <u>CLOSED</u>
83 DOY 212	ED52 automatic camera actuator malfunction. (Discrepancy) Ref: AR-519, BX-1319, BX-1438, BX-1512.	Cor. Exp/ Walls	Manual DAC camera operation procedure being utilized. <u>CLOSED</u>
84 DOY 213	Dumped voice recording on channel B garbled. (Discrepancy) Ref: AR-520, AR-524, SWS-1373.	I&C/Adair	Carry-up workaround being considered for SL-4. <u>CLOSED</u>
85 DOY 212	SL49 experiment retraction problem. (Discrepancy)	Cor. Exp/ DeSanctis	Warm-up period necessary to correct problem. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
86 DOY 213	T027/S073 universal extension mechanism power problem. (Anomaly) Ref: AR-534, CX-1359, AR-535, AR-539, AR-525, CX-1365, CX-1338.	Cor. Exp/ DeSanctis	T027/S073 was ejected on DOY 216. <u>CLOSED</u>
87 DOY 212	ED63 Elodea plant deaths in ground test unit. (Discrepancy) Ref: ZO-1451, AR-565, BX-1537.	Cor. Exp/ DeSanctis	Science Pilot observed no streaming on two slides from one plant on DOY 223. Request for observation of other two plants prior to mission day 20 has been made. <u>CLOSED</u>
88 DOY 214	Video tape recorder problem. (Anomaly) Ref: AR-530, AR-565, ZO-1515, AR-582.	I&C/Adair	Failed VTR replaced on DOY 219. Replacement functioning properly. Problem is in the electronics unit. Carry-up replacement being investigated. <u>CLOSED</u>
89 DOY 215	Malfunction of OWS low level MUX B. (Anomaly) Ref: AR-536, SWS-1380, AR-556, AR-561, AR-589, AR-711.	I&C/Adair	Malfunction intermittent and not explained. Operated 1 1/2 hours on DOY 233. Low temp/high temp test results are inconclusive. T/S not recommended due to high risks and non-criticality of measurements. <u>CLOSED</u>
90 DOY 214	Malfunction of ATM AC1 pulse width modulator assembly (master) in I/LCA. (Anomaly) Ref: AR-540-18, AR-622, SWS-1721, SWS-1581, ZO-1855.	EPS/Woosley	Variable lighting on I/LCA not available for remainder of mission. No further troubleshooting planned. <u>CLOSED</u>
91 DOY 216	CBRM's 17 and 16 regs off when crew turned rotary switch on C&D panel. (Discrepancy) Ref: AR-555, AR-574, SWS-1478, AR-595, SWS-1543.	EPS/Woosley	Attributed to an intermittent condition or an inadvertent reg off switch operation. <u>CLOSED</u>
92 DOY 216	Hard short on ATM TV bus 2. (Anomaly) Ref: SWS-1385, AR-550, AX-1386, SWS-1407, AX-1459, AR-575.	EPS/Woosley	Short located in power transfer distributor. Location of short and extent of damage cannot be assessed. Operating on ATM TV bus 1. <u>CLOSED</u>
93 DOY 217	S052 door open when should have been closed. (Discrepancy) Ref: AR-554.	EPS/Woosley S&M/Eudy	False door open indication attributed to sneak circuit as a result of relay timing. <u>CLOSED</u>
94 DOY 216	High ATM canister pressure. (Discrepancy) Ref: AX-1397.	ATM/TCS/ Vaniman	Cause of pressure increase unknown. Pressure has returned to normal. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
95 DOY 217	AM primary and secondary coolant loops low pump inlet pressure. (Discrepancy) Ref: SWS-1414, AR-560, SWS-1428, AR-568, CX-1432, SWS-1481, AR-572, AR-593, AR-611, SWS-1562, AR-621, SWS-1608, SWS-1621, SWS-1628, AR-638, SWS-1673, SWS-1680, SWS-1683, SWS-1697, AR-656, AR-654, SWS-1712, SWS-1477, AR-669, AR-670, RI, SWS-1745, SWS-1747, AR-682, AR-646, SWS-1773, SWS-1815, SWS-1836, SWS-1745-R2, AR-540-47, SWS-2019, SWS-2024, SWS-2028, SWS-2063, SWS-2082, SWS-2126, SWS-2135, SWS-2210, SWS-2216, SWS-2239.	ECS/Hopson S&M/Kraus	Primary loop successfully reserviced on day 323 and is operating normally. <u>CLOSED</u>
96 DOY 215	S052 ready/operate light flickered. (Discrepancy) Ref: AR-563.	ATM Exp/ White	Problem has not recurred and does not affect experiment operation. Under investigation. <u>CLOSED</u>
97 DOY 219	Teleprinter paper feed failure. (Anomaly) Ref: SWS-1463, AR-608.	I&C/Reed	Head replaced. Repair of failed shaft assembly and carry-up replacement being evaluated. <u>CLOSED</u>
98 DOY 219	S056 door failed to open. (Discrepancy) Ref: AR-571, AX-1494, AX-1546, AR-640.	EPS/Woosley	Ramp latch removal scheduled for DOY 236 extra-vehicular activity. <u>CLOSED</u>
99 DOY 220	Mole sieve a primary timer failed to switch. (Discrepancy) Ref: AR-569, SWS-1480.	ECS/Hopson	Primary timer selected at 224:20:01. Beds have cycled normally since then. <u>CLOSED</u>
100 DOY 220	S082B film transporter indication failure (K-132). (Discrepancy)	ATM EXP/ White	Camera/magazine replacement during EVA on DOY 236 solved the problem. Failure analysis to be performed on faulty unit after return. <u>CLOSED</u>
101 DOY 222	Mole sieve A and B heat exchanger out temps read low onboard. (Discrepancy) Ref: AR-579, AR-598.	EPS/Woosley I&C/Adair	Ground measurements are valid. <u>CLOSED</u>
102 DOY 223	Video tape recorder audio problem. (Discrepancy) Ref: AR-605.	I&C	Degraded audio on VTR tape dump DOY 223. Problem isolated to hand held mike. Mike being stowed. No further action anticipated. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
103 DOY 223	Crew reported WMC squeezer leaks approximately 1 out of 5 operations. (Discrepancy) Ref: AR-612.	S&M/Eudy CSD/Thompson	A change in operating technique resulted in satisfactory operation. <u>CLOSED</u>
104 DOY 224	Crew readouts of CMC 1 and 3 outer gimbal angles have indicated "OSL" a number of times (Discrepancy) Ref: AR-613, SWS-1632.	I&C/Adair EPS/Woosley	Attributed to intermittent relay operation. Procedure for clearing problem when it occurs has been provided. <u>CLOSED</u>
105 DOY 224	Control system anomaly caused excessive TACS usage during GG dump following EREP 9 and EREP cal maneuvering. (Anomaly) Ref: SWS-1563, SWS-1578, ZO-1585, AR-618, AR-610 R1, AR-627, SWS-1805.	STAC/Chubb	All sequences associated with anomaly can now be explained. A large X axis momentum buildup coupled with a Z rate gyro discrepancy caused the problem. Manned management criteria has been updated to preclude recurrence. <u>CLOSED</u>
106 DOY 228	T013 force measuring unit no. 2 load cells 4 and 5 off scale high. (Anomaly)	Cor. Exp/ DeSanctis	Malfunction procedure unsuccessful. No additional malfunction procedures planned. <u>CLOSED</u>
107 DOY 229	Broken ICO1/XMIT switch on -Z SAL station. (Anomaly) Ref: AR-540-26.	I&C/Adair	Crew replaced unit on DOY 230. Problem considered to be random failure of switch. <u>CLOSED</u>
108 DOY 231	S082A aperature door failed to indicate closed. (Discrepancy) Ref: AX-1652, AX-1670, AR-640.	EPS/Woosley S&M/Eudy ATM EXP/White	Ramp latch removal scheduled for DOY 236 EVA. <u>CLOSED</u>
109 DOY 231	C and D battery charge alert light on and flag is barberpole. (Discrepancy) Ref: SWS-1655.	EPS/Woosley	Attributed to an intermittent short in power transfer distributor. <u>CLOSED</u>
110 DOY 233	Multiple docking adapter aft lights 2 and 4 failed (Discrepancy) Ref: AR-660-R1, ZO-1855.	EPS/Woosley	Lights operating will be controlled during SL-4 by individual switches on lights. <u>CLOSED</u>
111 DOY 232	During line-of-sight roll, EPC drove off of sun. (Discrepancy) Ref: AR-639.	STAC/Chubb	Present operation is satisfactory. HSL simulation confirmed problem caused by wedge counter errors. Recommendations to preclude recurrence forwarded to FOMR. <u>CLOSED</u>

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
112 DOY 234	S056 hung up twice in patrol mode short. (Discrepancy) Ref: AR-563.	ATM Exp/White	Data analysis and X-ray science at JSC verified modes were normal. <u>CLOSED</u>
113 DOY 234	S056 operate light remained illuminated in active 1 long mode filter position 1. (Discrepancy) Ref: AR-653.	ATM Exp/White EPS/Woosley	Transferred to problem 132. <u>CLOSED</u>
114 DOY 236	AM sec coolant loop TCVB stuck in cold flow position after DOY 236 EVA. (Discrepancy) Ref: AR-677, SWS-1763, SWS-1773.	ECS/Hopson	TCVB operating OK except that it precludes water cooling for EVA. <u>CLOSED</u>
115 DOY 236	S052 thermal shield door open (should have been closed) during EVA DOY 236. (Discrepancy) Ref: AR-663, AX-1813, AR-554.	EPS/Woosley	Similar problem occurred on DOY 217. Suspected to be due to a relay race. Use ATM mal procedure to activate alt motor and circuitry. <u>CLOSED</u>
116 DOY 237	Time reference system exhibited erratic behavior. (Discrepancy) Ref: AR-664, AR-685, SWS-2004, AR-785, AR-793, SWS-2076, AR-826.	I&C/Adair	Problem could not be duplicated at Stu/St. Louis, or during inflight tests. Both systems are presently operative. <u>CLOSED</u>
117 DOY 226	Low capacity performance of CBRM'S. (Discrepancy) Ref: SWS-1695, AR-641, SWS-1730, SWS-1728.	EPS/Woosley	Ref: Problem 155-M-32. Tests on CBRM's 5, 7, 8, 10 and 18 show capacity of 12.1 - 13.1 amp-hr. Only normal degradation expected for the remainder of the mission. <u>CLOSED</u>
118 DOY 238	During CBRM 7 capacity test DOY 238, regulator would not switch off. (Other regs with same problem are 6 and 16) (Discrepancy) Ref: AR-675, AR-595, AR-263.	EPS/Woosley	Regulator relays are stuck in the "on" position. Operation is satisfactory. Troubleshooting procedure submitted but implementation not required. <u>CLOSED</u>
119 DOY 240	Decrease in OWS heat exchanger gas flow. (Discrepancy) Ref: SWS-1793, ZR-686, AR-717, SWS-1885.	ECS/Littles	Decreased 50 percent since beginning of SL-2. Heat flow exchangers were cleaned DOY 251 and gas flow increased to normal levels. <u>CLOSED</u>
120 DOY 244	ED78 piston failed to move when release button was pressed. (Discrepancy) Ref: AR-712.	Cor Exp/ DeSanctis	ED78 hardware in M512 facility possible for late in SL-4 mission. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

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NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
121 DOY 242	Condensate dump system blockage. (Discrepancy) Ref: AR-706.	ECS/Hopson	Problem recurred DOY 244 and dump probe was re-placed. Troubleshooting DOY's 250 and 251 showed no obstacles. Probe considered sound and acceptable for spare. Most likely cause of problem was ice. Dumps, water and condensate, restricted. <u>CLOSED</u>
122 DOY 247	Crew awakened by loud thump at approx. 247:07:25. (Discrepancy) Ref: AR-715.	All MSG's	STAC, EPS, ECS, TCS, S&M and ATM EXP report no evidence of anomaly. <u>CLOSED</u>
123 DOY 248	Loss of 1/2 S082B frames taken in auto mode (Discrepancy) Ref: AR-725.	ATM EXP/ White	Auto timer being developed by MSFC to be instilled by SL-4 crew. <u>CLOSED</u>
124 DOY 249	Difficulties closing trash airlock. (Discrepancy) Ref: AR-728, SWS-1911, AR-733.	Crew Sys/ Thompson; S&M/Eudy	TAL operation is normal. SL-2 crew used two man operation due to amount of force necessary to compress lid seal. <u>CLOSED</u>
125 DOY 251	H-alpha two door failure to close. (Discrepancy) Ref: AR-729, AX-1931, AX-1979, AX-2090, AR-840.	EPS/Woosley S&M/Eudy ATM EXP/White	Pin pulled and door latched open on first EVA of SL-4. <u>CLOSED</u>
126 DOY 252	Failure to get S082B film transport indication for short exposures. (Discrepancy) Ref: AX-1928.	ATM EXP/ White	Due to switch bounce of film transport micro-switch. Camera will be changed out next EVA. <u>CLOSED</u>
127 DOY 252	S082A door failed to close. (Discrepancy) Ref: AR-743, AX-1964, AX-1979.	S&M/Eudy	Operation satisfactory with two motors. <u>CLOSED</u>
128 DOY 254	Y3 rack rate tyro oscillation. (Discrepancy) Ref: AR-741, AR-760.	STAC/Chubb	Oscillations are a function of vehicle disturbances exciting the 1.6 Hz bending mode. They do not couple into the CMG system. <u>CLOSED</u>
129 DOY 256	CBRM 5 charger malfunction. (anomaly) Ref: AR-754, AR-751.	EPS/Woosley	CBRM 5 and 3 to be interconnected to form 1 CBRM during SL-4 EVA. <u>CLOSED</u>

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
130 DOY 256	AM tape recorder 3 failure (S/N 28). (Anomaly) Ref: AR-750, AR-769, SWS-2015, SWS-2034.	I&C/Adair	Exceeded lifetime of 1000 hours. T/S procedure performed on DOY 260 revealed tape was off drive capstans and idlers. Tape now positioned correctly and recorder is stowed. <u>CLOSED</u>
131 DOY 256	Regulator voltage talkback on C&D panel 130 for regs 1-12. (Discrepancy) Ref: AR-775.	EPS/Woosley	Attributed to a relay failure in the power transfer distributor. <u>CLOSED</u>
132 DOY 257	S056 film transport hangups. (Discrepancy) Ref: AX-2005, AR-768.	ATM EXP/ White	Analyses on SL-3 returned magazines (including materials) to be complete 1/25-74. Dry lube added to clutch surfaces and Delrin gears on new SL-4 magazine.
133 DOY 259	Noisy image on TV monitor no. 1. (Discrepancy) Ref: AX-2042, AX-2097, AR-803, AR-810, AR-846, Z0-2157.	I&C/Adair	Monitor inoperative DOY 265. Troubleshooting DOY 266 inconclusive. Spare carry-up monitor planned for SL-4. <u>CLOSED</u>
134 DOY 263	S082B frames remaining counter failed to decrement and transport switch did not indicate film transport. (Discrepancy) Ref: AX-2073.	ATM EXP/ White	Camera powered down and removed during DOY 265 EVA. Failure analysis showed normal camera operation. Failure to decrement and film transport indication resulted when end of film was reached. <u>CLOSED</u>
135 DOY 264	Faulty WMC washcloth squeezer seal. (Discrepancy) Ref: AR-801.	Crew sys/ Thompson S&M/Eudy	Replaced by crew. Crew recommends SL-4 replacement. Two spare seals will be supplied on SL-4. <u>CLOSED</u>
136 DOY 264	Possible S052 film camera jam. (Discrepancy)	ATM EXP/ White	Magazine changed during DOY 265 EVA and returned on SL-3. Camera found to be jammed. Cause concluded to be larger than nominal diameter of take-up reel at end of film due to greater than nominal film thickness. <u>CLOSED</u>
137 DOY 265	Four cycle oscillation on audio channel B. (Discrepancy) Ref: AR-804.	I&C/Adair	One-time occurrence. Problem no longer exists. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
138 DOY 266	Possible malfunction of pump A in C&D coolant loop. (Discrepancy) Ref: SWS-2104, AR-806, EX-2101, AR-809, AR-808.	ECS/Littles	Replaced filter returned on SL-3 was clean. Therefore, pump A failure concluded. Pumps B and C available for C&D cooling. No further action planned. <u>CLOSED</u>
139 DOY 278	S055 main power (low voltage) will not turn off by RF commands. (Discrepancy) Ref: AR-844, AX-2146, AX-2199, AR-875.	ATM EXP/White EPS/Woosley	Present plans are to keep S055 powered up during SL-4 EVA's. C&D configured for secondary instrument power. <u>CLOSED</u>
140 DOY 278	SL-3 S082A film degraded (streaked). (Discrepancy)	ATM EXP/ White	Modified cameras will be flown on SL-4. <u>CLOSED</u>
141 DOY 293	CBRM 9 battery stopped charging prematurely. (Discrepancy) Ref: AR-866.	EPS/Woosley	Suspected one time occurrence. <u>CLOSED</u>
142 DOY 307	CMG no. 1 wheel speed decrease and current increase. (Discrepancy) Ref: SWS-2219.	STAC/Chubb	Operation returned to normal after CMG heaters came on. <u>CLOSED</u>
143 DOY 315	AM tape recorder no. 3 (S/N 23) malfunction. (Discrepancy) Ref: AR-900, AR-901, SWS-2237, AR-904, AR-908.	I&C/Adair	Exp 2/data 2 fast forward off command executed revolution 2634. Command DSM 514 removed the ground capability. Crew workaround procedure available if needed. Most probable cause is contaminated fast forward command relay. <u>CLOSED</u>
144 DOY 318	EPC up/down lock failure. (Discrepancy) Ref: AR-907, AR-910, AR-911, AR-937.	ASTR/ Wojtalik	DOY 318 failure occurred with EPC system on primary EPEA. Similar problem occurred DOY 334 with system on secondary EPEA. Lock later released by ground command system now appears normal. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
145	ATM C&D coolant loop flow erratic with pump B in loop. (Discrepancy) Ref: AR-913, MPR 266-M-138, AR-914, SWS-2342, AR-936, SWS-2415, AR-962, SWS-2462, AR-964, SWS-2487, SWS-2505, SWS-2540, SWS-2599.	THIRD VISIT ECS/Littles	Filter inspection and gas removal procedure successful on DOY 352. Crew reported contamination on filter, bubbles and foam at quick disconnect. After liquid/gas separator procedure, loop flow was 295 lb/hr on pump B, 280 lb/hr on pump C. Filter was replaced. <u>CLOSED</u>
146	Control moment gyro no. 1 failure. (Anomaly) Ref: AR-923, SWS-2307, SWS-2333, SWS-2338, SWS-2357, AR-929, AR-932, AR-942, SWS-2414, SWS-2446, ZO-2452 AR-959, SWS-2471, SWS-2448.	STAC/Chubb ATM/TCS/ Vaniman	Patch to limit CMG gimbal rates delivered 12/19/73. Patch to provide an oscillating TACS only mode has been developed in the event another CMG fails. Analysis attributes failure to combination of bearing retainer instability and insufficient lubrication. <u>CLOSED</u>
147	CBRM 5 charger on/off control relay failed closed. (Discrepancy) Ref: AR-926.	EPS/Woosley	Suspect welded relay contacts. Ground can control available. <u>CLOSED</u>
148	OMS film vault door-latch malfunction. (Discrepancy) Ref: SWS-2340.	Crew Sys/ Thompson S&M/Eudy	Corrective action submitted. Implementation is crew's option. <u>CLOSED</u>
149	S056 beryllium counter does not show counts on C&D panel. (Discrepancy) Ref: AX-2344.	ATM EXP/ White	Suspected to be due to a failed relay for which no corrective action is possible due to inaccessibility. No impact on data results from the failure. <u>CLOSED</u>
150	S054 filter wheel malfunction. (Discrepancy) Ref: AX-2350, AR-933, AR-982.	ATM EXP/ White	Filter wheel stowed in position 3 during DOY 359 EVA. Crew verified wheel was stuck between positions 5 and 6. <u>CLOSED</u>
151	Speaker intercom assembly failure (no. 131) in the MDA. (Discrepancy) Ref: AR-931.	I&C/Adair	Replaced with the one remaining onboard spare on DOY 334. Recommend failed SIA be put on return storage list for postmission failure analysis. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
152 DOY 334	Vehicle vibrations reported by crew. (Discrepancy) Ref: AR-941, AR-941-RI, AR-984.	All MSG's	Crew reported two 10-second vibrations DOY 334. On DOY 353 crew heard "klunkety" sound again, but felt less vibration. Cause of both events unknown. Investigation reveals no correlation with CMG no. 2 problems (Ref: prob. no. 157). <u>CLOSED</u>
153 DOY 335	S183 released small piece of glass when carousel door opened. (Discrepancy) Ref: CX-2390, CX-2399, SX-2390-RI, AR-975, AR-976, CX-2558.	COR EXP/ DeSanctis	Crew has procedure for carousel 1-1 on operation to avoid advancing SC-5 film plates past film gate. Crew transcript indicates 2-2 is still out of sync, but TM indicates normal performance. <u>CLOSED</u>
154 DOY 337	S052 TV image displayed faint spot at 12 o'clock position. (Discrepancy) Ref: AR-951.	I&C/Adair	Black streak also appeared on image on DOY 340. Spot due to problem with vidicon tube. Streak caused by AGC response to spot. No corrective action possible, but no data is being lost. MSFC recommends normal S052 operation. <u>CLOSED</u>
155 DOY 339	S082A door failed to close via C&D control. (Discrepancy) Ref: AR-961, AR-961-RI, AX-2466, AX-2469, AX-2493.	Eudy, Woosley White, Thompson	T/S door assumed stuck in full open position. Experiment operations resumed with door not being pinned. Door will be pinned open on next EVA. <u>CLOSED</u>
156 DOY 338	ED63 elodea plants apparently dead. (Discrepancy) Ref: AR-953.	COR EXP/ DeSanctis	Further crew observations on DOY 340 and ground evaluation of information confirms plants have perished. Plants disposed of in the trash airlock and vials were stowed. <u>CLOSED</u>
157 DOY 339	CMG 2 inverter temperature increase, wheel speed decrease and phase A current increase. (Discrepancy) Ref: AR-955, AR-963, AR-965, AR-971, SWS-2530, AR-980, AR-987, AR-1026, SWS-2889, AR-1063, SWS-2939, SWS-2957.	STAC/Chubb	Load relief patch and heater management apparently extending beating life to mission completion. <u>CLOSED</u>
158 DOY 342	SAS 13, 14, and 15 performance degraded. (Discrepancy) Ref: AR-952.	EPS/Woosley	SAS 15 voltage drops approximately 6 volts when temperature rises to 82° F. Voltage returns to normal at trip back. SAS 13 and 14 voltage drops occur at lower temperatures and do not occur each orbit, only intermittently. No corrective action possible. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

42

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
159 DOY 349	Low level multiplexer P excessively noisy measurements. (Discrepancy) Ref: AR-978.	I&C/Adair	Measurements involved are common to a second level tier switch in mux P. The tier switch cannot be repaired or replaced but alternate measurements exist for 6 of the 8 noisy measurements. <u>CLOSED</u>
160 DOY 350	ATM C&D/DAS lockout. (Discrepancy) Ref: AR-979.	EPS/Woosley STAC/Chubb	Primary enable was masked out. DAS and keyboard electronics now OK. EMI generated by cycling power switches on C&D was probably onto data lines. Procedure to enter 5 digits to clear DAS provided. <u>CLOSED</u>
161 DOY 350	S054 CRT display loses lower 40 percent of image intermittently. (Discrepancy) Ref: AX-2537.	ATM EXP/ White	Suspect intermittent component failure in CRT sweep logic. No corrective action possible, but problem not expected to affect routine experiment or crew operations. <u>CLOSED</u>
162 DOY 356	AM transmitter "C" failure to respond to "on" commands. (Discrepancy) Ref: AR-989.	I&C/Adair	Occurred DOY's 335, 353, and 356. DOY 356, circuit breaker was tripped. Loss of Xmtr "C" would result in loss of real time data over some sites. This loss would result in no significant mission impact. <u>CLOSED</u>
163 DOY 357	AM low level multiplexers erratic. (Anomaly) Ref: AR-991, AR-992, SWS-2666.	I&C/Adair	Simulations to duplicate problem completed. Problem is in basic circuitry of the instrumentation system and cannot be corrected. Secondary system is operating adequately to complete the mission; primary can be used as backup. <u>CLOSED</u>
164 DOY 354	S055 grating position counter increments 80 steps on C&D. (Discrepancy) Ref: AX-2593.	ATM EXP/ White EPS/ Woosley	Telemetry indicates correct grating position. Crew workaroud provided. <u>CLOSED</u>
165 DOY 358	ATM C&D coolant loop flow fluctuations. (Discrepancy) Ref: 321-M-145, SWS-2675.	ECS/Littles	Liquid/vapor separator used to remove gas from loop DOY 004. Pumps C and B operated with normal flow rates. Estimate that loop degassing will be necessary every 2 or 3 weeks. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
166 DOY 361	Suspected failure of the star tracker outer gimbal encoder. (Anomaly) Ref: SWS-2634, SWS-2635, AR-1001, SWS-2668.	STAC/Chubb	Failure was duplicated in lab DOY 362 by failing the light source in the outer gimbal optical encoder. The star tracker is not considered useable for the remainder of the mission. <u>CLOSED</u>
167 DOY 361	TV input station 642 has broken pin on connector J-3. (Anomaly) Ref: SWS-2636.	I&C/Adair	Input station was replaced by spare on DOY 364. Cause of broken pin unknown. No further action planned. <u>CLOSED</u>
168 DOY 361	S054 exposure times are 260 seconds instead of 256 seconds. (Discrepancy) Ref: AX-2627.	ATM EXP/ White	Problem is in TM and not in actual length of exposures. Shutter override adapter installed DOY 259. EVA causes some electronics to be bypassed resulting in TM error. <u>CLOSED</u>
169 DOY 364	S082B outer door failed in intermediate position. (Discrepancy) Ref: AX-2651, AR-1003.	ATM EXP/ White S&M/Eudy EPS/Woosley	Door opened fully via ground command on pri motor. S082B and XUV mon door have been opened via ground command and motor power disabled. Doors will remain open permanently. <u>CLOSED</u>
170 DOY 003	Loss of integral lighting on the ATM C&D. (Anomaly) Ref: SWS-2677.	EPS/Woosley	A short exists on the integral lighting bus; loads are hard wired and cannot be isolated. No further troubleshooting recommended. Background lighting not required for console operation. <u>CLOSED</u>
171 DOY 003	Broken "E" clip on S183 carousel shaft. (Discrepancy) Ref: AR-1107.	COR EXP/ DeSanctis	Carousel 2-2 will be used for future operations. If carousel 1-1 is required, use will be attempted using established procedures. <u>CLOSED</u>
172 DOY 003	S082B pointing reference system has oscillations in the primary mirror drive system. (Discrepancy) Ref: AX-2698.	ATM EXP/ White	FBU testing and a special malfunction procedure were conducted DOY 009. Results indicate a decrease in PRS sensitivity. ATM MPC will be used for S082B limb offset pointing off the disk. <u>CLOSED</u>
173 DOY 011	OWS high level multiplexer J reference voltage variation. (Discrepancy)	I&C/Adair	Measurement shifts are correlatable to shifts on high reference and may be corrected. <u>CLOSED</u>
174 DOY 012	ED72 malfunction. (Anomaly) Ref: AR-1023, AR-1037.	COR EXP/ DeSanctis	Experiment equipment has been discarded through trash airlock. Procedure to obtain data utilizing other onboard materials was submitted to JSC, but was disapproved. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
175 DOY 010	Probable failure of one of two heater elements in WR water heater. (Discrepancy)	S&M/Eudy	Procedure for replacement of heater and a spare is onboard. <u>CLOSED</u>
176 DOY 016	H-alpha film camera failure to advance. (Discrepancy) Ref: AX-2779, AR-1025.	ATM EXP/ White	Problem cleared by crew reinitializing system DOY 016. <u>CLOSED</u>
177 DOY 017	Noise interference of approximately 6 hertz on audio system channel B. (Discrepancy) Ref: AR-1038.	I&C/Adair	Troubleshooting DOY 21 isolated problem to amplifiers within the 2 audio load compensators. No corrective action possible. Workaround procedure provided. <u>CLOSED</u>
178 DOY 019	S019 articulated mirror system rotation control knob slippage, springiness, and interplay between rotation and tilt.		This problem erroneously listed on MSFC Tracking List (S019 is a JSC experiment). <u>VOID</u>
179 DOY 017	Airlock module transmitter B problem. (Discrepancy) Ref: AR-1035.	I&C/Adair	AM SMTR was not on at CRO AOS 017:22:16. Problem recurred at 020:23:54 over VAN. Suspected to be caused by corona. Procedure to minimize presures in area of quadruplexer submitted. <u>CLOSED</u>
180 DOY 021	S183 power loss concurrent with jammed DAC film magazine. (Discrepancy) Ref: AR-1044, AR-1045, CX-2338, CX-2879.	COR EXP/ DeSanctis	Workaround verified on ground equipment and successfully implemented on MD 73. Experiment operations satisfactory MD 74, and MD 75. <u>CLOSED</u>
181 DOY 021	H-alpha 1 aperture door not closing properly. (Discrepancy) Ref: AX-2888.	S&M/Eudy EPS/Woosley ATM EXP/ White	Door disabled and re-enabled by ground command and proper operation resulted. Door failed to open automatically on DOY 025 but did open after crewman re-enabled it. Operation was satisfactory to complete the mission. <u>CLOSED</u>
182 DOY 015	Degradation of H-alpha 1 TV Image. (Discrepancy) Ref: 1039, AR-1050.	ATM EXP/ White	Problem is with vidicon, crew turns off when not in use. <u>CLOSED</u>
183 DOY 022	Apparent failure of H-alpha 1 frames remaining counter. (Discrepancy)	EPS/Woosley ATM EXP/ White	No corrective action possible. Camera operates properly; recommend operation be continued. Film usage will be estimated daily. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC

TIME (GMT)

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
184 DOY 029	Failure of one of two elements in WMC water heater. (Discrepancy)	S&M/Eudy	One of the two parallel heating elements has opened a failure mode observed during qual tests. A spare is available if needed. <u>CLOSED</u>
185 DOY 031	Water in shower blower. (Discrepancy)	S&M/Eudy	Two other blowers are available if the crew decides showers are desirable before the end of the mission. They are the vacuum cleaner and the suit drying station. <u>CLOSED</u>
186 DOY 034	Scientist Pilot's suit water QD leaked during EVA DOY 034. (Discrepancy)	ECS/Hopson	Void. JSC hardware.
187 DOY 034	Condensate tank leaked to cabin pressure after DOY 034 EVA.	ECS/Hopson	Leak at a quick disconnect suspected. QD on panel 217 unmated and capped on DOY 035; this effectively stopped the leak. <u>CLOSED</u>

SKYLAB PROBLEM TRACKING LIST - MSFC *6-19-74* TIME (GMT) DOY 266

NO.	DESCRIPTION	ACTION ASSIGNED TO	ACTION PROGRESS
1 DOY 134	Meteoroid shield failure during boost. (Anomaly)	MEMG/Clark	Investigation board evaluation complete. <u>CLOSED</u>
2 DOY 134	Solar array wing 2 missing and wing 1 failed to deploy as a result of item 1. (Anomaly) Ref: ZO-248, AR-74, AR-175	SSM/CS Eudy/ Thompson	Wing 1 released by EVA. <u>CLOSED</u>
3 DOY 139	AM coolant switchover to secondary system. (Discrepancy) Ref: AR-31	ECS/Hopson	Group 2 switchover enabled during stowage periods or when manned and only one loop is operating. <u>CLOSED</u>
4 DOY 143	CBRM #15 off line. (Anomaly) Ref: AR-54, SWS-672, AR-185, SWS-870, SWS-415, SWS-427	EPS/Woosley	<u>CLOSED</u> . Brought back on line during EVA.
5 DOY 134	ATM aft antenna high reflected power. (Anomaly) Ref: SWS-71, SWS-908	I&C/Adair	Decision to remain on forward antenna. <u>CLOSED</u>
6 DOY 134	Excessive rate gyro drift. (Anomaly). Ref: SWS-81, AR-48, SWS-660, AR-186, AR-337, AR-367, AR-370.	STAC/Chubb Wojtalik	Attributed to bubbles in rate gyro fluid. Six pack to be carried on SL-3 and available for installation. <u>CLOSED</u>
7 DOY 143	Quad-redundant vent valve malfunction. (Discrepancy) Ref: SWS-481, AR-93, AR-176, AR-244, SWS-805	ECS/Hopson	Troubleshooting on day 162 shows all 4 valves closed. <u>CLOSED</u>
8 DOY 144	High ATM canister pressure indication. (Discrepancy) Ref: AR-100	ATM/TCS Vaniman	Outgassing loads greater than expected have now diminished. No further problems are expected. <u>CLOSED</u>
9 DOY 146	Secondary condensate heater temp not displayed when heater on light is illuminated. (Discrepancy) Ref: AR-101	EPS/Woosley	Problem cleared on day 163 after crew cycled the switch. <u>CLOSED</u>
10 DOY 150	Fine sun sensor primary pitch readout appears to be lost. (Discrepancy) Ref: AR-113, AR-143	STAC/Chubb	Recommended recovery procedure was successful implemented by crew. <u>CLOSED</u>