

MANNED SPACE FLIGHT EXPERIMENTS BOARD
MINUTES, Meeting 72-3
July 14, 1972 NASA Headquarters


Executive Secretary

ATTENDEES

Mr. Dale D. Myers, Chairman
Associate Administrator for
Manned Space Flight, NASA

Mr. Charles W. Mathews
Associate Administrator for
Applications, NASA

Mr. Adelbert O. Tischler
Director, Shuttle Technology Office
Office of Aeronautics & Space Technology, NASA

Mr. Jesse L. Mitchell for
Associate Administrator for
Space Science, NASA

Lt. Col. Melburn C. Spaulding for
Director of Space
Office of Deputy Chief of Staff for
Research & Development
Headquarters, USAF

The 72-3 MSFEB meeting was convened by the Chairman at 10:05 a.m.

I. APPROVAL OF MINUTES

The minutes of the 72-2 MSFEB meeting were approved.

II. NEW EXPERIMENTS FOR MSFEB REVIEW

Experiment M212, Biocore (Biological Cosmic Radiation Effects), was submitted to the MSFEB for consideration and approval for flight on the Apollo 17 mission. The sponsoring office memorandum, compatibility analysis, and Experiment Summary Form 1339 are included in TAB 1. A representative from the Office of Life Sciences (Dr. J. Saunders) presented to the Board highlights of this experiment. The objective of this investigation is to determine whether heavy, high-energy (HZE) cosmic particle radiations will produce morphologically demonstrable damage to the non-regenerative cells of the brain and eye of small mammals. It will significantly assist in the effort to understand, in a quantitative way, the light flash phenomenon experienced by astronauts in space. Dr. Saunders reviewed the chronology of this experiment and noted that it was endorsed for scientific merit by the National Academy of Sciences and the Life Sciences Committee. He presented data on the HZE particle flux in the planned experiment stowage location which was obtained from plastic dosimeters placed in that area on the Apollo 16 mission. About 20 total hits are expected in the brain of each mammal. The experiment is completely passive and is compatible with the Apollo Program from a technical and schedule viewpoint. It should be noted, however, that if a T-24 hour launch condition should develop, the experiment would have to be removed and two LiOH canisters restowed. Funding required in support of the development and integration of this experiment presents an extremely difficult problem for the Apollo Program Office, particularly during FY 1973.

During the discussion which followed, the Chairman expressed his serious concern with the funding availability problem and queried the sponsoring office as to the actual necessity for flying this experiment. Additionally, he inquired as to the status of ground-based work in the field of heavy, high energy particle radiation and whether data to be obtained from the space experiment can be obtained on earth. In response, the sponsor emphasized that it is very important to fly this experiment on Apollo 17 since this mission will provide a last opportunity to conduct such an investigation outside the earth's magnetosphere and that it was essential to determine whether HZE particles do destroy non-regenerative cells. It was further emphasized that

current earth-based facilities (nuclear reactors and particle accelerators) are incapable of duplicating the HZE particle spectrum of interest. Additionally, the information to be obtained from the space experiment could provide a baseline or data point for future ground-based work in this field.

It was noted that the Manned Spacecraft Center had verbally reported that the total number of HZE particle hits on a 12-day Apollo mission is approximately equal to the number of hits to be expected on a 30-day low earth orbit mission as determined from the number of HZE particle tracks per CM^2 registered in plastic detectors. The Chairman requested the Office of Life Sciences to provide a detailed comparative estimate of the HZE particle spectral density and distribution in earth orbit and beyond the earth's magnetosphere.

ACTION: 72-3.1
MM

The MSFEB recommended approval of this M212 experiment for Apollo Program implementation subject to resolution of funding availability. It was agreed that the Apollo Program Office will not provide funds to support this experiment and that the Office of Life Sciences is to identify a funding source from within its own program.

The Earth Resources Experiment Package (EREP) Investigations Program was submitted for MSFEB consideration and approval (See TAB 2.) The program includes 129 investigations comprised of 149 distinct tasks. Fourteen additional investigations have been recommended by the Office of Applications sponsoring office for inclusion in this program but were not submitted to the Board at this time because they require further processing. The numbers, titles, and descriptions of the respective tasks are not being included in these minutes because they are too numerous, but such information is available in the MSFEB records to anyone interested and having a need-to-know. A representative from the sponsoring program office (Mr. Fischetti) briefed the Board on this EREP Investigations Program which involves the analysis and use of EREP sensor data to be obtained by the Skylab Program. Mr. Fischetti noted that over 350 proposals for

EREP data analysis investigations were received in response to an Announcement of Opportunity. These proposals were received from a broad spectrum of sources including universities, state and local governments, other government agencies, and foreign groups. Mr. Fischetti briefly reviewed the background and chronology of this program, the proposal evaluation activities prior to development of recommendations to the MSFEB, and noted that, of the 160 investigations initially identified for further evaluation, no investigation was excluded by operational constraints. Of the 129 proposed investigations recommended to the Board, 90 were received from sources within 30 states, as well as the District of Columbia and the Canal Zone, and 39 were received from 19 foreign countries. The estimated cost for these investigations, including the 14 still under review, is consistent with OMSF funding limitations agreed to at a previous meeting. The investigations have been categorized into nine major applications areas, each of which was further broken down to various discipline areas to facilitate a numbering scheme for the individual tasks. Information pertinent to the EREP program structure and highlights of the EREP Investigations Program review, as presented to the MSFEB, are included in TAB 3.

The MSFEB recommended approval of the 129 EREP data-user investigations for Skylab Program implementation. Additionally, the Board agreed to two proposals by the sponsoring office as follows:

1. The 14 additional investigations, which require further processing, are to be approved for inclusion in the EREP program for flight planning purposes only.
2. Provision should be made for incorporation, by Chairman's action, of additional investigations to be recommended by the Office of Applications, without the necessity of considering these at another formal MSFEB meeting.

A Skylab Student Project was presented to the MSFEB for consideration and approval (See TAB 4) which included the following 19 experiments:

- ED 21 - Libration Clouds
- ED 22 - Objects Within Mercury's Orbit
- ED 11 - Heat Absorption
- ED 12 - Volcanic Studies
- ED 23 - Quasars
- ED 24 - X-Ray Stellar Classes
- ED 25 - X-Rays From Jupiter
- ED 26 - Pulsars
- ED 31 - Bacteria and Spores
- ED 32 - In-Vitro Immunology
- ED 41 - Motor Sensory Performance
- ED 52 - Web Formation
- ED 61/ED 62 - Plant Growth/Plant Phototropism
- ED 63 - Cytoplasmic Streaming
- ED 72 - Capillary Studies
- ED 74 - Mass Measurement
- ED 76 - Neutron Analysis
- ED 78 - Wave Motion

A representative from the Skylab Program Office (Mr. Powers) briefed the Board on the overall student project including its objective, the background and chronology of the national competition, the national selection results, activities leading to flight selection, and the numbering scheme to be used in identifying the experiments. He noted that the objective of the project is to stimulate interest in science and technology by directly involving students of high school age in space research. In response to an invitation to propose experiments for Skylab, over 3400 proposals were received from U.S. high school students in grades 9 through 12. Of these, the National Science Teachers Association chose 25 as national winners. Mr. Powers' introduction was then followed by a more detailed presentation by Mr. H. Floyd of the Marshall Space Flight Center on the specific experiments involved. He covered such topics as experiment category definition, descriptions of the individual experiments, hardware to be launched on the OWS and CM, systems impact with respect to various parameters, compatibility assessment, the quality of experiment definition and feasibility of hardware development, and schedules. He noted that, of the 25 winning proposals, six experiments were judged to be incompatible with the Skylab Program but an attempt will be made to involve the student proposers of these experiments in the project by associating each individual with an approved experiment or activity which

will provide data in the general field of the student's interest. Mr. Floyd indicated that, from a compatibility, definition and development, and schedule viewpoint, there do not appear to be any significant barriers to the success of the project. Brief descriptions of the individual experiments are included in TAB 5. Highlights of Mr. Floyd's presentation are included in TAB 6.

The MSFEB recommended approval of the 19 Skylab Student Project experiments noted above for Skylab Program implementation. The Board also endorsed the approach recommended regarding the disposition of the six incompatible experiments; i.e., continue to involve these students in the program.

III. STATUS OF APPROVED EXPERIMENTS

A. Apollo Program

An Apollo Program Office report, outlining the status of the Lunar Surface experiments, was submitted to the MSFEB and is included as TAB 7.

The status of the Lunar Orbital Science Program experiments is described in TAB 8.

B. Changes in Principal Investigators

The Board agreed to a proposed change (See TAB 9) in Principal Investigator for experiments M551, Metals Melting, and M552, Exothermic Brazing, as follows:

M551 - Mr. Richard M. Poorman vice Mr. R. V. Hoppes
M552 - Mr. James R. Williams vice Mr. R. V. Hoppes

This change was necessitated by the retirement of Mr. Hoppes.

C. Summary of Experiment Assignments

A chart indicating the latest launch assignments of approved experiments on the Apollo and Skylab Programs, which reflects actions taken by the Board at the 72-3 meeting, is included in TAB 10.

IV. STATUS OF OUTSTANDING MSFEB ACTION ITEMS

A listing of outstanding MSFEB Action Items, as of the 72-3 meeting, was provided to the Board (TAB 11). This listing identified the action, action number, due date, and the status of activity in response to the action.

The meeting was adjourned by the Chairman at 12:15 p.m.



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON, D.C. 20546

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REPLY TO
ATTN OF

MM

JUL 7 1972

MEMORANDUM

TO: MTL/Executive Secretary, MSF Experiments Board

FROM: MM/NASA Director for Life Sciences

SUBJECT: Biological Cosmic Radiation Effects (BIOCORE)

It is requested that the experiment entitled as in the subject above be considered by the MSFEB for flight on Apollo 17. This experiment will provide a valuable study of the effects of heavy cosmic particle radiations on the nerve cells of the brain and retina of the pocket mouse.

BIOSTACK, which was flown in Apollo 16, studied the effects of the same radiations on bacteria, spores, seeds and seedlings.

ALFMED will help to correlate these radiations with the "light flashes" reported by the Apollo lunar mission astronauts.

This experiment provides an excellent study of a small mammal which lies between the biological dosimeters of BIOSTACK and the human component of ALFMED.

Charles A. Berry
Charles A. Berry, M.D.

cc: MA/Petrone
MA/Lee
MAO/Holcomb
MMR/Saunders
MMS/Hartman



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON, D.C. 20546

REPLY TO
ATTN OF. MAP

JUL 18 1972

MEMORANDUM

TO: MTL/Executive Secretary, MSF Experiments Board

FROM: MA/Apollo Program Director

SUBJECT: BIOCORE, Experiment No. M-212

This memorandum submits to the Board, for its review and approval, the BIOCORE, Experiment No. M-212.

The experiment has been reviewed by the sponsoring office and has been found to be medically significant. Life Sciences (MM) endorses this experiment and recommends that it be considered for flight (Attachment 1). An Experiment Summary and an Experiment Implementation Plan are attached (Attachment 2). The EIP defines the experiment properly and correctly and maintains the medical requirements.

The compatibility analysis has been performed for the experiment and is summarized as follows:

1. Flight Operations - satisfactory. The experiment is a passive unit stowed in the CM.
2. Astronaut Interface - none.
3. Technical Consideration - satisfactory. **See T-24 launch comments (Attachment 3).**
4. Integration Schedule - satisfactory. The experiment supports the Apollo 17 launch date.
5. Cost - satisfactory. Life Sciences (MM) has noted that it will fund all costs incurred for this experiment. Code MM will reprogram funds to Apollo to cover integration costs.

The Apollo Program Office considers this experiment compatible for flight on Apollo missions.


Rocco A. Petrone

Attachments

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION EXPERIMENT SUMMARY MANNED SPACE FLIGHT		DATE PREPARED <div style="text-align: right;">28 March 1972</div>
TO (Transmit Original Copy) EXECUTIVE SECRETARY MANNED SPACE FLIGHT EXPERIMENT BOARD		FROM (NASA or DOD Sponsoring Office) MM/Office of Life Sciences SIGNATURE <i>Joseph F. Saunders</i> Dr. Joseph F. Saunders
PART I ADMINISTRATIVE		
1. TITLE (Confine to total combination of 30 spaces, punctuation marks, letters, numbers, etc.) BIOCORE- Biologic Cosmic Radiation Effects		2. EXP. NO. M-212
3. PRINCIPAL INVESTIGATOR		
A. FULL NAME Dr. Webb Haymaker	B. INSTITUTION NASA Ames Research Center Moffett Field, California 94035	C. PHONE 415, 965-5240
4. OFFICE OR CENTER		5. CONTACT NAMES
SPONSORING PROGRAM OFFICE Office of Life Sciences (Code MM)		MMR/Dr. Joseph F. Saunders
FLIGHT PROGRAM OFFICE Apollo Spacecraft Program Office		Mr. Robert Newlander
DEVELOPMENT CENTER Ames Research Center		Mr. Bonne C. Look & Dr. John W. Tremor
INTEGRATION CENTER Manned Spacecraft Center		Dr. Richard C. Simmonds
6. MSF/MSFB ACTIONS (To Be Completed by Executive Secretary, MSFEB, only.)		
A. ACTIVITY OR RESULTS		B. DATES
COMPATIBILITY REVIEW AUTHORIZED		
COMPATIBILITY REVIEW BY		
MSFEB RECOMMENDATION		
FLIGHT PROGRAM ASSIGNMENT		
FLIGHT MISSION ASSIGNMENTS		
C. ADDITIONAL MSF/MSFEB COMMENTS		

PART II

TECHNICAL INFORMATION

1. OBJECTIVE

To determine whether heavy, high energy (HZE) particles of galactic cosmic radiation - of known trajectory and terminating in the brain and the eyes of small mammals - will produce morphologically demonstrable damage to cells of the brain and eye.

2. SIGNIFICANCE (Relationship to technical discipline, reference previous experiment data, results, etc.)

An understanding of the biologic effects of HZE particles will aid in determining shielding requirements for future manned space flights of long duration. This experiment will yield information which is currently unavailable and cannot be duplicated at this time in Earth-based nuclear reactors & accelerators. BIOCORE, when coupled to BIOSTACK (M211) & ALFMED, is a significant addition to the NASA effort to understand the "light flash" phenomenon in a quantitative way.

3. DESCRIPTION (Outline approach, briefly describe equipment, include sketch and/or block diagrams, wherever possible, as an attachment to this form.)

BIOCORE, for all practical purposes, is biologically passive & requires no astronaut participation. Six (6) pocket mice, Perognathus longimembris, will be flown in cylindric aluminum container (7.0" x 13.31") containing a life support system independent of the spacecraft. Each experimental animal is contained within a perforated lexan tube with a supply of dry seeds as the source of nutrient. No water is required. The six animal tubes are arranged concentrically within the main housing around a larger, centrally located, perforated tube filled with potassium superoxide (KO₂) granules, the source of breathing oxygen for the animals. Carbon dioxide is removed by a KO₂ by-product. The pressure will remain relatively stable around the initial 5 psi for the mission duration. Radiation dosimeters of sandwiched lexan, cellulose nitrate and nuclear emulsions will be located inside main housing perpendicular to the housing wall.

Radiation dosimeters (lexan and cellulose nitrate) are implanted in the scalps to indicate the types, intensity and trajectories of HZE particles terminating in the brain or eyes. Post-flight, the brains and eyes will be fixed chemically and serially sectioned for histologic and histochemical determinations of the existence of lesions or tracks created by penetrating HZE particles. Tracks in the radiation dosimeters will enable the PI to correlate the entry and path of the HZE particles through the tissue. This, then, will enable the PI to investigate his main experimental concept as to whether HZE particles, which are ionizing, have the capacity to "inactivate" non-dividing cells (brain and eye).

PART III

ENGINEERING INFORMATION

1. WEIGHT		2. SIZE	
LAUNCH	RETURN	LAUNCH	RETURN
15 Pounds	Same	7.0" O.D. x 13.31 long	Same
3. POWER		4. DATA RECORDING	
None		None	

5. SPACECRAFT INTERFACE

The experiment requires no electric power, command signals or data recording.

Stowage in Command Module - To Be Determined

6. SPECIAL CONSTRAINTS (e.g. environmental, equipment lifetime, etc.)

BIOCORE, should be stowed, if possible, in an area where there is minimal spacecraft shielding to the ambient cosmic radiation. Temperature of the package is 20± 5°C, except for 0°C acceptable during EVA and 38°C allowed during recovery. Launch position - package axis perpendicular to launch direction.

PART IV**OPERATIONAL REQUIREMENTS****1. CREW ACTIVITIES** (Include brief profile of crew tasks preflight, inflight, and postflight.)

None.

2. FLIGHT SUPPORT (Include communications, tracking needs, recovery requirements, etc.)

None - after mounting in place in Command Module.

At recovery, the entire package will be delivered to the experiment personnel on-board the recovery ship as soon as possible after splashdown, since certain experiment end points degrade by the hour.

3. SPECIAL REQUIREMENTS (e.g. trajectory, spacecraft stabilization, unusual pre-launch support or recovery techniques, airlock, EVA, fuel, etc.)

The experiment is not to be exposed to ionizing radiation except to levels normally occurring in the spacecraft and to cosmic radiation encountered during flight.

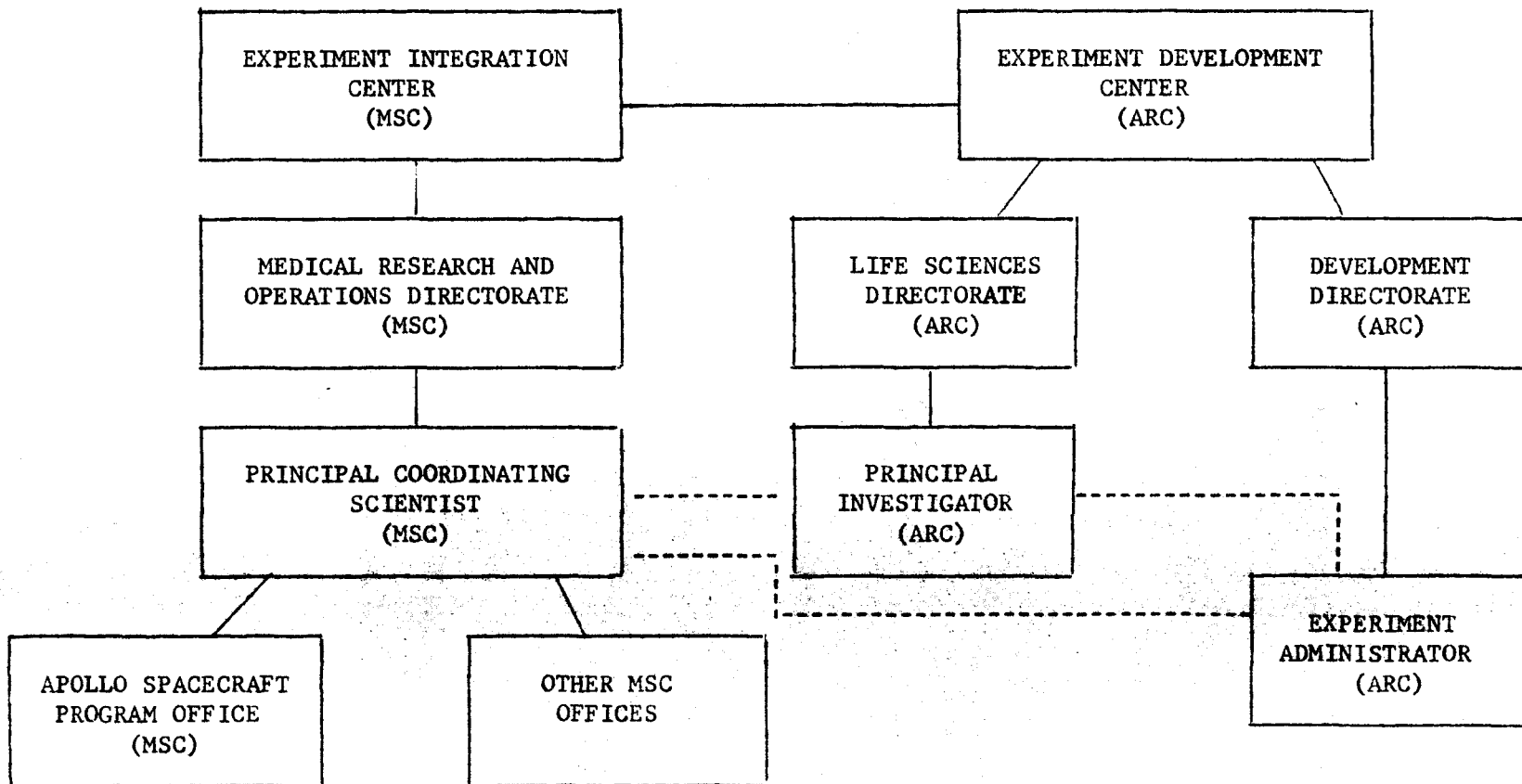
A carrying case will be used to transport the experiment packages before and after flight.

PART V**MANAGEMENT****IDENTIFY AND DIAGRAM THE MANAGEMENT ARRANGEMENTS FOR IMPLEMENTATION OF THIS EXPERIMENT**

The Ames Research Center, through interfaces with ARC and MSC groups, is responsible for the overall planning, coordinating, and directing all technical, operational and administrative aspects of this experiment. The Principal Coordinating Scientist (PCS) is responsible for the coordination and integration of the experiment into the S/C facilities at KSC and at recovery.

MSC, as the PIC, will provide direction related to the interfaces and installation of the experiment package. The PIC will provide the resources for receipt of the experiment, its storage, installation, etc. (SEE FLOW CHART, ATTACHED)

BIOCORE EXPERIMENT MANAGEMENT



PART VI

SCHEDULE AND RESOURCES REQUIREMENTS

1. SCHEDULE OF MAJOR MILESTONES		FY 1972				FY 1973				FY 1974			
		1ST QTR	2ND QTR	3RD QTR	4TH QTR	1ST QTR	2ND QTR	3RD QTR	4TH QTR	1ST QTR	2ND QTR	3RD QTR	4TH QTR
APPROVED FOR FLIGHT					▲								
HARDWARE CONTRACT					▲								
ICD COMPLETE					▲								
DESIGN COMPLETE					▲								
DEP COMPLETE					▲								
PROTOTYPE DELIVERED					▲								
QUALIFICATION TESTING COMPLETE							▲						
FLIGHT HARDWARE DELIVERED						▲							
INSTALLATION AND CHECKOUT COMPLETE								▲					
2. FUNDING REQUIREMENTS	FUNDING SOURCE	1ST QTR	2ND QTR	3RD QTR	4TH QTR	1ST QTR	2ND QTR	3RD QTR	4TH QTR	1ST QTR	2ND QTR	3RD QTR	4TH QTR
DESIGN, DEVELOPMENT, FABRICATION & TESTING (MOCK-UP, PROTOTYPE & SUPPORT EQUIPMENT)			6K		14K								
FABRICATE, TEST & DELIVER (FLIGHT HARDWARE)					44K	21K							
SUPPORTING STUDY EFFORT			9K	38K	47K	48K	51K	41K	31K	20K			
SPACE VEHICLE INSTALLATION AND CHECKOUT						10K	40K	5K					
DATE ANALYSIS & PUBLICATION							2K	4K	4K	3K	2K		
TOTALS		FY TOTAL				FY TOTAL				FY TOTAL			
		158K				257K				25K			



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON, D.C. 20546

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REPLY TO
ATTN OF

JUL 11 1972

TO: MT/Executive Secretary
Manned Space Flight Experiments Board

VIA: Director, Skylab Program

FROM: Director, Earth Observation Program

SUBJECT: Assignment of EREP Data-User Investigations

In response to an announcement of opportunity to use data to be acquired by the Earth Resources Experiment Package (EREP), issued on December 22, 1970, NASA has received over 350 proposals for data analysis investigations. These were received from universities, state and local governments, other government agencies and from foreign groups.

The proposed investigations were reviewed for operational feasibility by MSC and categorized according to technical merit by discipline evaluation teams. The best investigations identified were subjected to further fact-finding, which was completed by MSC in May 1972.

In June 72, MSC submitted a recommended EREP investigations programs. This program has been reviewed by user agency representatives, by the Earth Observations and Skylab Program Offices and by the Co-Chairman (Applications) of the Space Science and Applications Steering Committee.

A revised recommendation incorporating changes resulting from these reviews has been submitted to and has been approved by the Associate Administrator for Applications.

The program submitted for MSFEB consideration includes 128 investigations (149 tasks) involving use of EREP data. These have been classified according to nine applications areas. Individual description of each task has been forwarded under separate cover.

Fourteen other investigations are recommended for inclusion in the EREP investigation Program, but are not submitted herein. These investigations are still under review and will be submitted at a later date.

The estimated cost for the 128 selected investigations and the fourteen in review are consistent with OMSF funding limitations agreed to at the 27 June 1972 meeting.

John M. DeNoyer

EREP PROGRAM STRUCTURE

1 • AGRICULTURE/RANGE/FORESTRY

- 010 CROP INVENTORY
- 020 INSECT INFESTATION
- 030 SOIL TYPE
- 040 SOIL MOISTURE
- 050 RANGE INVENTORY
- 060 FOREST INVENTORY
- 070 FOREST INSECT DAMAGE

2 • GEOLOGICAL APPLICATIONS

- 010 MAPPING
- 020 METALS EXPLORATION
- 030 HYDRO CARBON EXPLORATION
- 040 ROCK TYPES
- 050 VOLCANOS
- 060 EARTH MOVEMENTS

3 • CONTINENTAL WATER RESOURCES

- 010 GROUND WATER
- 020 SNOW MAPPING
- 030 DRAINAGE BASINS
- 040 WATER QUALITY

4 • OCEAN INVESTIGATIONS

- 010 SEA STATE
- 020 SEA/LAKE ICE
- 030 CURRENTS
- 040 TEMPERATURE
- 050 GEODESY
- 060 LIVING MARINE RESOURCES

5 • ATMOSPHERIC INVESTIGATIONS

- 010 STORMS, FRONTS, AND CLOUDS
- 020 RADIANT ENERGY BALANCE
- 030 AIR QUALITY
- 040 ATMOSPHERIC EFFECTS

6 • COASTAL ZONES, SHOALS, AND BAYS

- 010 CIRCULATION AND POLLUTION IN BAYS
- 020 UNDERWATER TOPOGRAPHY AND SEDIMENTATION
- 030 BATHYMETRY
- 040 COASTAL CIRCULATION
- 050 WETLANDS ECOLOGY

7 • REMOTE SENSING TECHNIQUES DEVELOPMENT

- 010 PATTERN RECOGNITION
- 020 MICROWAVE SIGNATURES
- 030 DATA PROCESSING

8 • REGIONAL PLANNING AND DEVELOPMENT

- 010 LAND USE CLASSIFICATION TECHNIQUES
- 020 ENVIRONMENTAL IMPACTS - SPECIAL TOPICS
- 030 STATE AND FOREIGN RESOURCES
- 040 URBAN APPLICATIONS
- 050 COASTAL/PLAINS APPLICATIONS
- 060 MOUNTAIN/DESERT APPLICATIONS

9 • CARTOGRAPHY

- 010 PHOTOMAPPING
- 020 MAP REVISION
- 030 MAP ACCURACY
- 040 THEMATIC MAPPING

EARTH RESOURCES EXPERIMENT PACKAGE

(EREP)

- S190 MULTISPECTRAL PHOTOGRAPHIC FACILITY
 - (A) MULTISPECTRAL PHOTOGRAPHIC CAMERAS
 - (B) EARTH TERRAIN CAMERA
- S191 INFRARED SPECTROMETER
- S192 MULTISPECTRAL SCANNER
- S193 MICROWAVE RADIOMETER/SCATTEROMETER AND ALTIMETER
- S194 L-BAND RADIOMETER
- ESE EXPERIMENT SUPPORT EQUIPMENT

EREP DATA-USER INVESTIGATIONS INCLUDE:

- PRE-MISSION PREPARATIONS
- REDUCTION AND ANALYSIS OF EREP DATA
- ACQUISITION OF GROUND TRUTH AND AIRCRAFT DATA
- PUBLICATION OF RESULTS

BACKGROUND

1. ANNOUNCEMENT OF FLIGHT OPPORTUNITY ISSUED DEC. 22, 1970
(APRIL 30, 1971, DUE DATE)
2. OVER 350 PROPOSAL RECEIVED
3. MSC FEASIBILITY SCREENING (APRIL-MAY 71)
4. HELD DISCIPLINE GROUP EVALUATIONS
 - 160 INVESTIGATIONS IDENTIFIED FOR FURTHER EVALUATION
 - 56 RECEIVED TENTATIVE SELECTION LETTERS
5. MSC COMPATABILITY STUDY (OCT-DEC 71)
 - DEC 7, 70 REPORT TO HEADQUARTERS
 - JAN 13, 72 REPORT TO HEADQUARTERS
6. FACT-FINDING SESSIONS (FEB-MAY 72)
7. 20 ADDITIONAL INVESTIGATIONS ADDED IN APRIL 72
8. 16 MORE RECEIVED (NOT EVALUATED)
9. OFFICE OF APPLICATIONS SELECTION (JULY 13, 72)

RESULTS OF COMPATIBILITY STUDY

(160 INVESTIGATIONS)

1. NO INVESTIGATION EXCLUDED BY OPERATIONAL CONSTRAINTS.
2. ALL INVESTIGATIONS (160) CAN BE ACCOMMODATED WITH
 - 60 Z-LV PASSES
 - 5 SOLAR INERTIAL PASSES
3. NO IMPACT ON ATM OR MEDICAL EXPERIMENTS; MINIMUM IMPACT ON COROLLARY EXPERIMENTS.
4. ADDITIONAL FILM AND TAPE STOWAGE CAN BE ACCOMMODATED.

DISTRIBUTION OF TASKS (149) BY APPLICATION

<u>TASK SERIES</u>	<u>APPLICATION AREA</u>	<u>NO. OF TASKS</u>
1	AGRICULTURE/RANGE/FORESTRY	24
2	GEOLOGICAL APPLICATIONS	31
3	CONTINENTAL WATER RESOURCES	17
4	OCEAN INVESTIGATIONS	19
5	ATMOSPHERE INVESTIGATIONS	8
6	COASTAL ZONES, SHOALS, AND BAYS	11
7	REMOTE SENSING TECH. DEV.	6
8	REGIONAL PLANNING AND DEV.	24
9	CARTOGRAPHY	9

RECOMMENDED EREP PROGRAM

NO. OF TASKS ----- 149

FUNDED ----- 77

DATA ONLY ----- 72

NO. OF INVESTIGATIONS ----- 129

DOMESTIC ----- 54

GOVT. AGENCIES ----- 36

FOREIGN ----- 39

NO. OF CONTRACTS ----- 49

NO. OF AGREEMENTS ----- 68

NO. OF NASA INVESTIGATORS ----- 8

RECOMMENDED EREP PROGRAM

90 INVESTIGATIONS - 30 STATES

CALIFORNIA	12	MASSACHUSETTS	2	ALABAMA	1
MICHIGAN	8	INDIANA	2	ILLINOIS	1
DISTRICT OF COLUMBIA	6	N. CAROLINA	2	MAINE	1
TEXAS	9	DELAWARE	1	S. CAROLINA	1
NEW YORK	6	S. DAKOTA	1	N. DAKOTA	1
COLORADO	4	NEVADA	1	CANAL ZONE	1
VIRGINIA	6	UTAH	1	OHIO	2
MARYLAND	5	PENNA.	1	WYOMING	1
KANSAS	3	OKLAHOMA	1	IOWA	1
MISSISSIPPI	3	NEW HAMPSHIRE	1	WASHINGTON	1
FLORIDA	4	ARIZONA	1		

RECOMMENDED PROGRAM

39 FOREIGN INVESTIGATIONS - 19 COUNTRIES

ARGENTINA	3	ISRAEL	3
AUSTRALIA	1	ITALY	1
BRAZIL	4	JAPAN	3
CANADA	2	MALI	1
CHILE	1	NETHERLANDS	1
FRANCE	2	SWITZERLAND	1
GERMANY	8	THAILAND	1
GREECE	1	UNITED KINGDOM	2
INDIA	1	U. N.	1
IRAN	1	VENEZUELA	1

EREP INVESTIGATIONS PROGRAM
(ESTIMATED COSTS - IN MILLIONS)

	<u>FY 73</u>	<u>FY 74</u>	<u>FY 75</u>	<u>TOTAL</u>
PRINCIPAL INVESTIGATOR	2.5	2.75	0.6	5.85
SUPPORT				
ALLOWANCE FOR	---	---	2.75-	<u>2.75</u>
PROGRAM ADJ.				
			TOTAL	8.60

MSFEB RECOMMENDED ACTIONS

1. APPROVE RECOMMENDED EREP DATA-USER INVESTIGATIONS FOR SKYLAB.
2. APPROVE INCLUSION OF THE FOURTEEN ADDITIONAL INVESTIGATIONS FOR FLIGHT PLANNING PURPOSES ONLY.
3. PROVIDE FOR INCORPORATION (BY CHAIRMAN'S ACTION) OF ADDITIONAL INVESTIGATIONS RECOMMENDED BY THE OFFICE OF APPLICATIONS.



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

REPLY TO
ATTN OF: MLA

JUL 1977

MEMORANDUM


TO: MT/MSFEB, Executive Secretary
FROM: ML/Director, Skylab Program
SUBJECT: Skylab Student Project

4

We have completed our review of the twenty-five proposals that were chosen by the National Science Teachers Association (NSTA) as national winners in the Skylab Student Project. We have determined that nineteen of the twenty-five can be accommodated on Skylab without undue impact upon the Skylab Program. Weight, stowage volume, crew time, training and other requirements are all within or close to the preliminary allocations that have been carried as constraints upon the Student Project.

The remaining six proposed investigations were not selected for flight because their performance was incompatible with the Skylab environment, or because the equipment required would entail a development program incompatible with the Skylab schedule.

Attachment 1 contains background material on the Skylab Student Project. Attachment 2 contains information concerning the experiments.


for
William C. Schneider
Attachments a/s

SKYLAB STUDENT PROJECT

In October 1971, high school students in grades 9 through 12 were invited to propose experiments to be performed on Skylab as part of the Skylab Student Project.

The objective of the project is to stimulate interest in science and technology by directly involving students in space research. The success of achieving this objective can already be partially evaluated from the enthusiastic response to this invitation. Over 80,000 applications were requested, from every state and from U.S. students overseas in such areas as Belgium, Bermuda, Canada, Canal Zone, Germany, Guam, Japan, Korea, Laos, Mexico, Philippines, Puerto Rico, Thailand and the Virgin Islands.

By the announced closing date for entries, 3409 proposals had been received by the 12 regional representatives of the National Science Teachers Association (NSTA), who cooperated with the National Aeronautics and Space Administration in sponsoring and conducting the project. The number of team proposals brought the total number of students participating to well over 4000. The initial selection process, conducted by the NSTA in their 12 regions, resulted in 301 regional winners, each of whom received an award along with the teacher/sponsor and the school.

A second selection process took place in late March 1972 in Washington D.C., to identify the twenty-five national winners. Their winning proposals are the candidate experiments to fly in Skylab. These twenty-five winners and their teacher/sponsors will be rewarded with a trip to the Kennedy Space Center, where they will participate in a Skylab educational conference, and see the initial Skylab launches. Each winner also has received a medallion, as has his school and his teacher/sponsor.

The twenty-five winners were rewarded for their creative ability and imaginative use of the environment in which Skylab operates, rather than for their ability to design equipment suitable for installation in a spacecraft with which they are unfamiliar. Consequently, not all of the twenty-five experiments could be performed on Skylab. Detailed analysis of each experiment has been conducted by teams of NASA scientists and engineers to determine the proposed flight complement.

As part of this analysis, during the week of May 8, the twenty-five national winners and their teachers were brought to MSFC for a series of Preliminary Design Reviews (PDRs) for their proposed experiments. During the week, each of the students and their teachers met with their NASA advisors and then participated in PDR sessions quite similar to those that mainline Skylab experiments undergo.

The results of the PDR's were quite satisfying. The students were very impressive, both in the knowledge they displayed and the poise with which they conducted themselves in what could have been an overwhelming environment.

Since the PDR sessions, work has continued on the individual experiments, and the complete complement has been reviewed to determine the overall impact upon Skylab and what can be accommodated with minimum impact upon Skylab. Key areas of concern were photographic requirements, SWS stowage volume, Command Module transport requirements, crew time, viewing opportunities, and the potential impact upon the Skylab pre-launch operations and the SWS flight activation sequence. All of these have had a thorough review and the proposed flight complement can be accommodated with minimum impact upon the Skylab Program.

Several Skylab PI's have been contacted to solicit their cooperation with the students, and, in some cases, a quite active and continuing involvement with a student and his investigation. A few of the PI's were involved in the PDR's at MSFC and offered their help and continued involvement have been reviewed and meaningful relationships

are anticipated. Also, arrangements are being considered to keep the six students involved whose experiments will not be performed on Skylab.

SKYLAB STUDENT PROJECT
ED 21 - LIBRATION CLOUDS

OBJECTIVE:

PHOTOGRAPH THE TWO LIBRATION CLOUDS ON THE MOON'S ORBIT AT THE LAGRANGIAN POINTS L_4 AND L_5 OF THE EARTH-MOON SYSTEM - POINTS WITHIN THE EARTH-MOON SYSTEM AT WHICH PARTICLES EXPERIENCE ZERO FORCE

CONCEPT:

PHOTOGRAPHY OF THE LAGRANGIAN POINTS SHOULD REVEAL THE EXISTENCE OF PARTICLE CLOUDS COLLECTING THERE DUE TO THE ZERO FORCE FIELD

IMPLEMENTATION:

ATM JOINT OBSERVATION PROGRAM 10, UTILIZING THE S052 WHITE LIGHT CORONAGRAPH, CURRENTLY WILL OBSERVE THE REGIONS OF THE LAGRANGIAN POINTS L_4 AND L_5

DATA ANALYSIS:

EXPERIMENT DATA BOOK TO BE SUPPLIED STUDENT. STUDENT INVITED TO PARTICIPATE IN DATA REDUCTION AND ANALYSIS AT HIGH ALTITUDE OBSERVATORY



SKYLAB STUDENT PROJECT
ED 22 - OBJECTS IN MERCURY'S ORBIT

OBJECTIVE:

PHOTOGRAPH OBJECTS (HOPEFULLY VULCAN) WITHIN THE ORBIT OF THE PLANET MERCURY

CONCEPT:

WHEN THE COMBINED ORBITS OF THE EARTH, MERCURY AND SKYLAB COINCIDE WITH THE NEAR CONJUNCTION OF THE EARTH, SUN AND MERCURY PHOTOGRAPHS OF THE REGION OF CONJUNCTION OF THE SUN AND MERCURY WILL BE MADE. THESE PHOTOGRAPHS WILL BE COMPARED WITH SIMILAR PHOTOGRAPHS MADE WHEN MERCURY IS NOT POSSIBLY WITHIN THE FIELD OF VIEW IN ORDER TO ATTEMPT TO IDENTIFY ANY OBJECTS WITHIN THE ORBIT OF MERCURY

IMPLEMENTATION:

ATM JOINT OBSERVATION PROGRAM 6 UTILIZING THE S052 CORONAGRAPH SPECIFIES SYNOPTIC OBSERVATIONS OF THE SUN TWICE DAILY THROUGHOUT THE SKYLAB MISSION WHICH WILL SATISFY THE STATED OBJECTIVE

DATA ANALYSIS:

STUDENT WILL PARTICIPATE IN S052 JOP-6 DATA ANALYSIS AND EXAMINATION OF PHOTOGRAPHS AT THE HIGH ALTITUDE OBSERVATORY

PM-SL-DP
7/14/72

SKYLAB STUDENT PROJECT

ED 11 - HEAT ABSORPTION

OBJECTIVE:

THE DETERMINATION OF THE ATTENUATION OF VISIBLE AND NEAR INFRARED RADIANT ENERGY THROUGH THE EARTH'S ATMOSPHERE AT VARIOUS LOCATIONS AND UNDER VARYING ATMOSPHERIC CONDITIONS

CONCEPT:

COMPARE MEASUREMENTS OF THE RADIANT ENERGY REFLECTED FROM THE EARTH'S SURFACE AT THE SKYLAB ALTITUDE TO SIMILAR MEASUREMENTS MADE AT AN "INSTRUMENTED GROUND TRUTH SITE". THESE GROUND DATA WILL INCLUDE MEASUREMENT OF BOTH INCOMING AND REFLECTED ENERGY.

IMPLEMENTATION:

THE S191 INFRARED SPECTROMETER WILL MEASURE RADIATION FROM 0.213 x 0.213 NAUTICAL MILE SEGMENTS OF THE EARTH'S SURFACE IN THE 0.4 TO 2.4 MICRON SPECTRAL REGION. SIMULTANEOUS GROUND DATA WILL BE AVAILABLE WHEN THE SPECTROMETER IS VIEWING AN INSTRUMENTED "GROUND TRUTH SITE".

DATA ANALYSIS:

SKYLAB STUDENT PROJECT

ED 12 - VOLCANIC STUDY

OBJECTIVE:

PERFORM INFRARED SURVEYS FROM SKYLAB OF ANY AND ALL VOLCANOES WITHIN THE FIELD OF VIEW OF SKYLAB SENSORS TO SUPPORT DATA FROM GROUND INSTRUMENTATION TO ATTEMPT TO ESTABLISH A METHODOLOGY FOR PREDICTION OF VOLCANIC ACTIVITY

CONCEPT:

COMPARISON OF THE INFRARED PROFILE OF AVAILABLE VOLCANOES WITH GROUND BASED INSTRUMENT DATA SHOULD REVEAL THE CAPABILITY TO PREDICT ABNORMAL ACTIVITY WHICH IS UNDOUBTEDLY PRECEDED BY INCREASED THERMAL RADIATION AND HIGHER LOCAL TEMPERATURES

IMPLEMENTATION:

ON A TARGET OF OPPORTUNITY BASIS ALL NON-DORMANT VOLCANOES AVAILABLE WILL BE SURVEYED BY THE S191 INFRARED SPECTROMETER AND THE S192 MULTI-SPECTRAL SCANNER WITH SUPPORTING TARGETING DATA PROVIDED BY S190A AND S190B PHOTOGRAPHS

DATA ANALYSIS:

ANALYSIS OF SPECTROMETER GROUND TRACK TO DEVELOP IR PROFILES

PM-SL-DP
7/14/72

SKYLAB STUDENT PROJECT

ED 23 - QUASARS

OBJECTIVE:

OBTAIN THE SPECTRA OF QUASARS IN THE ULTRAVIOLET SPECTRAL REGION

CONCEPT:

QUASI-STELLAR RADIO SOURCES HAVE BEEN IDENTIFIED WITH RADIO TELESCOPES AND SUBSEQUENTLY LOCATED WITH OPTICAL TELESCOPES. THE UV ABSORPTION OF THE EARTH'S ATMOSPHERE HAS MADE OBSERVATION OF THE QUASAR SPECTRA IN THE ULTRAVIOLET REGION VIRTUALLY IMPOSSIBLE

IMPLEMENTATION:

ATTEMPTS MAY BE MADE TO DETECT THE QUASAR UV WITH THE S019 ULTRAVIOLET STELLAR ASTRONOMY FACILITY. RESULTS ARE EXPECTED TO BE MINIMAL DUE TO MINIMAL UV RADIATION OF KNOWN QUASARS.

DATA ANALYSIS:

STUDENT WILL PARTICIPATE IN ANALYSIS OF DATA WITH DR. HENIZE AT MSC.

PM-SL-DP
7/14/72

SKYLAB STUDENT PROJECT
ED 24 - X-RAY STELLAR CLASSES

OBJECTIVE:

DETERMINATION OF THE GENERAL CHARACTERISTICS AND LOCATION OF CELESTIAL X-RAY SOURCES, OR TO STUDY THE X-RAY SPECTRUM EMITTED FROM THE SUN

CONCEPT:

THE LOCATION OF CELESTIAL X-RAYS WILL BE DETERMINED BY ANALYSIS OF THE SIMULTANEOUS OBSERVATIONS OF SPECIFIED CELESTIAL FIELDS AND GENERAL CHARACTERISTICS BY USE OF SENSORS PRESENTLY ON APOLLO TELESCOPE MOUNT (ATM).

IMPLEMENTATION:

ATM EXPERIMENTS S056, DUAL X-RAY TELESCOPE OR S054, X-RAY SPECTROGRAPHIC TELESCOPE WILL OBTAIN DATA FOR CHARACTERISTICS AND LOCATION OF X-RAY SOURCES IF JOINT OBSERVATION PROGRAM (JOP) 13 IS IMPLEMENTED. THIS WOULD PERMIT THE ATM MODULE TO BE ROTATED AWAY FROM THE SUN TO OBSERVE CELESTIAL BODIES. IF JOP 13 IS NOT IMPLEMENTED, ONLY THE X-RAY SPECTRUM EMITTED FROM THE SUN WILL BE OBTAINED AT S056 OR S054. THE SPECTRAL RANGES OF THE DATA ARE: S054, 2 TO 10 ANGSTROMS AND S056 6 TO 60 ANGSTROMS

PM-SL-DP
7/14/72

SKYLAB STUDENT PROJECT
ED 25 - X-RAYS FROM JUPITER

OBJECTIVE:

TO DETECT X-RAYS FROM JUPITER AND SEARCH FOR A CORRELATION OF THE X-RAY EMISSION WITH BOTH SOLAR ACTIVITY AND JOVIAN DECAMETRIC RADIO EMISSION

CONCEPT:

THE VERIFICATION OF X-RAY EMISSION FROM JUPITER WOULD ESTABLISH VARIOUS PARAMETERS ASSOCIATED WITH JOVIAN MAGNETIC FIELD, GIVE SOME DATA ON THE DECAMETRIC NOISE STORMS ERRATICALLY OCCURRING ON JUPITER, AND GIVE INFORMATION ABOUT THE SOLAR WIND AT THE RADIUS OF JUPITER. DUE TO THE PREDICTED EXTREME WEAK NATURE OF THE JOVIAN X-RAY EMISSION, THERE IS SOME QUESTION AS TO THE ABILITY OF PRESENT BASELINE INSTRUMENTS TO MEASURE THESE WEAK EMISSIONS.

IMPLEMENTATION:

APOLLO TELESCOPE MOUNT (ATM) EXPERIMENTS S056, DUAL X-RAY TELESCOPE OR S054, X-RAY SPECTROGRAPHIC TELESCOPE WILL OBTAIN DATA IF JOINT OBSERVATION PROGRAM (JOP) 13 IS IMPLEMENTED. THIS WOULD ALLOW THE ENTIRE ATM MODULE TO BE ROTATED TO OBSERVE CELESTIAL BODIES AWAY FROM THE SUN. IF JOP 13 IS NOT IMPLEMENTED, SKYLAB WILL NOT BE ABLE TO OBTAIN DATA FOR THIS EXPERIMENT. THE SPECTRAL RANGE OF S054 IS 2 TO 10 ANGSTROMS AND S056 6 TO 10 ANGSTROMS

PM-SL-DP
7/14/72

SKYLAB STUDENT PROJECT

ED 26 - UV FROM PULSARS

OBJECTIVE:

TO STUDY AND PHOTOGRAPH PULSARS IN THE ULTRAVIOLET WAVELENGTH

CONCEPT:

ONE PULSAR, IN THE CRAB NEBULA, HAS BEEN PHOTOGRAPHED FROM EARTH IN THE VISIBLE LIGHT AND RADIO SPECTRUM. THIS PULSAR'S LIGHT INTENSITY CURVE RISES AS IT ENTERS THE ULTRAVIOLET REGION. THIS PHENOMENA COULD BE VERIFIED BY STUDYING OTHER PULSARS IN THE ULTRAVIOLET REGION USING EXISTING SKYLAB EXPERIMENTS WITHIN THE CATEGORY OF UV STELLAR ASTRONOMY

IMPLEMENTATION:

AN ONBOARD SKYLAB EXPERIMENT, S019 ULTRAVIOLET STELLAR ASTRONOMY WILL PHOTOGRAPH SEVERAL TARGETS TO BE SELECTED BY THE PRINCIPAL INVESTIGATOR OF S019 AND THE STUDENT INVESTIGATOR. S019 HAS A FIELD OF VIEW $4.1 \times 5.0^\circ$ AND USES A SPECIAL SPECTROGRAPHIC FILM

PM-SL-DP

7/14/72

SKYLAB STUDENT PROJECT
ED 31 - BACTERIA AND SPORES

OBJECTIVE:

OBSERVATION, UNDER CONTROLLED CONDITIONS, OF THE SURVIVAL, GROWTH AND MUTATIONS OF BACTERIAL SPORES IN THE SKYLAB ENVIRONMENT

CONCEPT:

COMPARE PHYSICAL CHARACTERISTICS SUCH AS CELL AND COLONY MORPHOLOGY, AND COLONY GROWTH PATTERNS OF BACTERIA COLONIES INNOCULATED AND GROWN IN THE ZERO "G" ENVIRONMENT WITH THOSE OF AN IDENTICALLY CONTROLLED GROUND EXPERIMENT

IMPLEMENTATION:

AGAR FILLED PETRI DISHES WILL BE INNOCULATED WITH VARIOUS SPECIES OF BACTERIA SPORES INFLIGHT. THE CULTURES WILL BE INCUBATED AT 35° IN THE IMSS INCUBATOR WITH PERIODIC OBSERVATION AND PHOTOGRAPHIC SESSIONS, TO RECORD COLONY DEVELOPMENT. AFTER A SPECIFIED PERIOD OF TIME COLONY GROWTH WILL BE ATTENUATED BY COOLING THE CULTURES TO 4°C. THIS TEMPERATURE WILL BE MAINTAINED AS THE CULTURES ARE RETURNED IN THE IMSS RESUPPLY COOLER FOR LABORATORY STUDY

PM-SL-DP
7/14/72

SKYLAB STUDENT PROJECT
ED 32 - IN VITRO IMMUNOLOGY

OBJECTIVE:

THE DETERMINATION OF THE EFFECTS OF ZERO-GRAVITY ON THESE REPRESENTATIVE LIFE PROCESSES:

- A. CHEMOTAXIS
- B. ANTIGENICITY
- C. CELLULAR MOBILITY

CONCEPT:

EXPOSURE OF KNOWN EXPERIMENTAL SYSTEMS, AS DESCRIBED BELOW, TO ZERO-GRAVITY:

PART A: (CHEMOTAXIS) UTILIZES GUINEA PIG MACROPHAGE UNDER THE INFLUENCE OF CASEIN, INCORPORATING A CELLULOSE FILTER TO ENTRAP THE MIGRATING CELLS

PART B: (ANTIGENICITY) INDICATES CONCENTRATION OF ANTIGEN/ANTIBODY AS A FUNCTION OF THE DIAMETER OF A PRECIPITIN RING FORMED AT THE POINT OF THEIR REACTION

PART C: (MOBILITY) DEMONSTRATES MOBILITY OF A CILIATED CELL TO A SCIENTIFIC OBSERVER BY MEANS OF MICROSCOPIC OBSERVATION AND PHOTOMICROGRAPH

SKYLAB STUDENT PROJECT
ED 32 - IN VITRO IMMUNOLOGY

IMPLEMENTATION

UTILIZING HARDWARE OF MODIFIED "OFF-THE-SHELF CONFIGURATION, PARTS A AND B ARE SIMULTANEOUSLY, BUT INDEPENDENTLY PERFORMED. OBSERVATIONS WITH VOICE AND LOG RECORDS ARE MADE TOGETHER WITH CLOSE UP PHOTOGRAPHIC RECORDING OF PART B; PART A HAS NO INFLIGHT OBSERVATION. AT TERMINATION EACH PART IS PRESERVED AND RETURNED FOR POST FLIGHT ANALYSIS.

PART C:

DEVELOPMENT STUDIES TO DATE INDICATE THAT PROTOZOA EXHIBIT EXTREMELY ERRATIC BEHAVIOR UNDER STIMULI. IT IS CONCLUDED THAT THIS PART OF THE EXPERIMENT WILL NOT OPERATE SUCCESSFULLY IN SKYLAB. HOWEVER, IT IS ANTICIPATED THAT SIMILAR DATA WILL BE DERIVED FROM ED 63, CYTOPLASMIC STREAMING.

SKYLAB STUDENT PROJECT
ED 41 - MOTOR SENSORY PERFORMANCE

OBJECTIVE:

MEASURE CHANGES IN MOTOR SENSOR PERFORMANCE RESULTING FROM PROLONGED SPACE FLIGHT AND COMPARE SKYLAB PERFORMANCE DATA WITH EXISTING BASELINE DATA AND THAT OBTAINED DURING PRE- AND POST-FLIGHT ANALYSIS.

CONCEPT:

AN ESTABLISHED SENSORY PERFORMANCE MAZE WILL BE UTILIZED TO EXERCISE THE CREW MEMBERS MOTOR SENSORY SKILL IN A TASK PERFORMED IN A PHYSICALLY "RELAXED" MODE

IMPLEMENTATION:

THE STANDARD EYE-HAND COORDINATION TEST APPARATUS, AS DEVELOPED BY THE HUMAN PERFORMANCE GROUP OF THE DEPARTMENT OF INDUSTRIAL ENGINEERING AT THE UNIVERSITY OF MICHIGAN, HAS BEEN MODIFIED FOR USE ON SKYLAB. DATA WILL BE RECORDED ON THE SKYLAB AUDIO TAPE RECORDER TOGETHER WITH MILLI-SECOND TIME MARKS. THIS DATA WILL BE SUBJECTED TO COMPUTER ANALYSIS, THE RESULTS EXAMINED AND ANALYZED BY THE MSC FLIGHT CREW OPERATIONS DIVISION AND THE LIFE SCIENCES DIVISION PRIOR TO ANY RELEASE

PM-SL-DP
7/14/72

SKYLAB STUDENT PROJECT

ED 52 - WEB FORMATION

OBJECTIVE:

OBSERVE THE WEB BUILDING PROCESS AND DETAILED STRUCTURE OF THE WEB OF THE COMMON CROSS SPIDER (ARANEUS DIADEMATUS) IN BOTH A NORMAL ENVIRONMENT AND THE SKYLAB ENVIRONMENT

CONCEPT:

MOTION PICTURE PHOTOGRAPHS OF THE SPIDER BUILDING THE WEB REVEALS THE MECHANICS OF THE METHODOLOGY OF THE CONSTRUCTION PROCESS. STILL PHOTOGRAPHS OF THE COMPLETED WEB ENABLES DETAILED ANALYSIS OF THE WEB INCLUDING SIZE, TOTAL THREAD LENGTH, NUMBER OF RADII, NUMBER OF SPIRALS PER QUADRANT, SHAPE AND REGULARITY

IMPLEMENTATION:

SPIDERS, ACCLIMATED TO THE SKYLAB AMBIENT ENVIRONMENT IN AN EARTH GRAVITATIONAL FIELD, ARE LAUNCHED IN THE COMMAND MODULE AND DEPLOYED TO A CAGE LAUNCHED IN THE ORBITAL WORKSHOP. AUTOMATED MOTION PICTURES ARE TAKEN DURING THE ATTEMPTS TO BUILD A WEB AND STILL PHOTOGRAPHS MADE AT THE COMPLETED WEB EARLY, ABOUT HALF WAY THROUGH AND AS LATE AS POSSIBLE DURING THE ASSIGNED MISSION

PM-SL-DP

7/14/72

SKYLAB STUDENT PROJECT
ED 61/62 - PLANT GROWTH/PLANT PHOTOTROPISM

OBJECTIVE:

1. OBSERVATION AND RECORDING DIFFERENCES IN ROOT AND STEM GROWTH AND ORIENTATION OF RADISH SEEDS GERMINATED IN THE SKYLAB ENVIRONMENT, COMPARED WITH NORMAL ENVIRONMENT GERMINATION AND DEVELOPMENT
2. ASSESSMENT OF WHETHER OR NOT PHOTOTROPISM CAN SERVE AS A SUBSTITUTE FOR GEOTROPISM FOR RADISH SEEDS GERMINATED AND DEVELOPED IN THE SKYLAB ENVIRONMENT

CONCEPT:

INDIVIDUAL SEED GROUPS, IMPLANTED IN SPACE, ARE SUBJECTED TO SPECIFIC, BUT DIFFERENT LEVELS OF GEOMETRICALLY ORIENTED VISIBLE RADIATION. PERIODICALLY, PHOTOGRAPHIC RECORDS OF THE EMBRYONIC SEED DEVELOPMENT ARE MADE FOR GROUND BASED ANALYSIS

IMPLEMENTATION:

EIGHT SEED GROUPS ARE IMPLANTED IN A COMPARTMENTAL CONTAINER FILLED WITH CLEAR AGAR. EACH COMPARTMENT OF THE CONTAINER IS SUPPLIED WITH A NEUTRAL DENSITY FILTER TO ENABLE VARIATION IN TOTAL LIGHT IMPINGING ON THE CONTAINER FROM TOTAL DARKNESS TO THE MAXIMUM AVAILABLE USING AMBIENT SPACECRAFT LIGHTING. PHOTOGRAPHIC RECORDS ALONG THE PRINCIPAL AXES OF THE CONTAINER ARE MADE ONCE A DAY FOR 14 CONSECUTIVE DAYS

PM-SL-DP
7/14/72

SKYLAB STUDENT PROJECT
ED 63 - CYTOPLASMIC STREAMING

OBJECTIVE:

OBSERVATION OF THE EFFECTS OF ZERO GRAVITY ON CYTOPLASMIC STREAMING
IN PLANTS

CONCEPT:

A LEAF OF A LIVING PLANT WILL BE OBSERVED UNDER A MICROSCOPE TO IDENTIFY
THE EXISTENCE, OR LACK THEREOF, OF PROTOPLASMIC STREAMING

IMPLEMENTATION:

A SPRIG OF THE WATER PLANT, ELODEA, WILL BE PLACED IN A TRANSPARENT
CONTAINER, TOGETHER WITH ADEQUATE NUTRIENT, NEAR AN EXISTING LIGHT
SOURCE OF SUFFICIENT LEVEL TO MAINTAIN PHOTOSYNTHESIS THROUGHOUT A
SKYLAB MISSION. AS CONVENIENT, ONCE EARLY IN THE MISSION AND ONCE LATE
IN THE MISSION, A LEAF OF THE PLANT WILL BE PLACED UNDER A MICROSCOPE
AND EXAMINED FOR THE PRESENCE OF STREAMING. 16MM MOVIES OF THE
STREAMING PROCESS WILL BE MADE THROUGH THE MICROSCOPE TO ENABLE
ASSESSMENT OF THE QUALITY OF THE STREAMING

PM-SL-DP
7/14/72

SKYLAB STUDENT PROJECT
ED 72 - CAPILLARY STUDIES

OBJECTIVE:

DEMONSTRATION OF CAPILLARY AND WICKING ACTIONS IN THE SKYLAB ENVIRONMENT

CONCEPT:

OBSERVE AND RECORD WITH MOTION PICTURE PHOTOGRAPHY CAPILLARY AND WICKING ACTIONS AS A FUNCTION OF: 1) CAPILLARY TUBE DIAMETER; 2) SCREEN WEAVE; AND 3) FLUID VISCOSITY

IMPLEMENTATION:

THREE MODULES, TWO CAPILLARY AND ONE WICKING, PROVIDED WITH "ZERO FORCE" BLADDERS FILLED WITH COLORED FLUID WITH PROPER VALVING TO INITIATE "FLOW" WILL BE PHOTOGRAPHED AT 24 FRAMES/SEC

POTENTIAL PROBLEM

USE OF GLASS VALVES TO MINIMIZE DISTORTION OF THE MENISCUS FOR USE WITH THE GLASS TUBES REQUIRED FOR PHOTOGRAPHY DEEMED MANDATORY. NO VALVE MANUFACTURER, INCLUDING THOSE OF BOTH GLASS AND GLASS COATED METAL VALVES, IS WILLING TO COMMIT TO THE DELIVERY SCHEDULE REQUIRED FOR THE STUDENT PROGRAM

PM-SL-DP
7/14/72

SKYLAB STUDENT PROJECT
ED 74 - MASS MEASUREMENT

OBJECTIVE:

DEMONSTRATION OF THE METHODS OF MASS MEASUREMENT UTILIZED ON BASELINE SKYLAB SYSTEMS

CONCEPT:

DEVELOP A SIMPLE MECHANICAL SYSTEM SATISFYING THE FUNDAMENTAL EQUATION $M\ddot{X} + KX = 0$. WITH APPROPRIATE INITIAL CONDITIONS, THE DISPLACEMENT, X , AS A FUNCTION OF A TIME IS A SINE WAVE, IDEALLY OF SINGLE FREQUENCY $\omega = \sqrt{K/M}$ WHERE K IS THE SPRING CONSTANT AND M THE TOTAL MASS OF THE SYSTEM

IMPLEMENTATION:

A SIMPLE CANTILEVERED BEAM SUPPORTING A LUMPED MASS AT ONE END IS SET INTO OSCILLATION. THE FREQUENCY OF OSCILLATION, AS MEASURED BY A SIMPLE STRAIN GAUGE WITH ELECTRONIC READOUT, IS A FUNCTION OF THE BASIC BEAM PROPERTIES AND THE LUMPED MASS. CALIBRATION WILL BE DONE IN ORBIT USING A NEAR-REAL-TIME TV RECORD FOR ANALYSIS AND DEMONSTRATION WITH 16MM MOVIE FILM AS A BACKUP

SKYLAB STUDENT PROJECT
ED 76 - NEUTRON ANALYSIS

OBJECTIVE:

MEASUREMENT OF THE AMBIENT NEUTRON FLUX EXISTENT IN THE ORBITAL WORKSHOP AND ATTEMPT IDENTIFICATION OF THE CONTRIBUTION FROM EACH OF THREE SOURCES: 1) EARTH ALBEDO NEUTRONS; 2) SOLAR NEUTRONS; 3) COSMIC RAY SECONDARY NEUTRONS

CONCEPT:

ENERGY SELECTIVE NEUTRON DETECTORS ARE MOUNTED IN SEVERAL LOCATIONS IN THE OWS UTILIZING THE OWS WATER TANKS TO THERMALIZE THE HIGH ENERGY IMPINGING NEUTRONS. THE NOW LOW ENERGY NEUTRONS REACT WITH A PRIMARY TARGET PRODUCING HIGH CHARGE FISSION PARTICLES WHICH IN TURN INTERACT WITH A PLASTIC MATERIAL (PROBABLY LEXAN FILM) DAMAGING THE POLYMER CHAINS. THESE PLASTIC MATERIALS ARE THEN CHEMICALLY TREATED TO REMOVE THE DAMAGED MATERIAL LEAVING A READILY IDENTIFIED "TRACK" INDICATING THE IMPINGEMENT OF A LOW ENERGY NEUTRON

IMPLEMENTATION:

SEVERAL SANDWICH DETECTORS CONSISTING OF LEXAN FILM WITH A FOUR-PART U₂₃₅ GRID/FOIL ARRANGEMENT USING FOIL, BISMUTH FOIL, THORIUM FOIL AND CADMIUM COVERED U₂₃₅ AND A SUITABLE CONTAINER ARE DEPLOYED ON THE INBOARD SURFACE OF THE OWS AND OWS WATER STORAGE TANKS. AT STATED TIMES DURING THE SKYLAB PROGRAM CERTAIN OF THE SANDWICHES WILL BE DEACTIVATED AND PLACED IN STOWAGE FOR ULTIMATE RETURN FOR ANALYSIS ON THE GROUND

PM-SL-DP
7/14/72

SKYLAB STUDENT PROJECT

ED 78 - WAVE MOTION

OBJECTIVE:

OBSERVATION OF THE MOTION OF A GAS BUBBLE SURROUNDED BY A FLUID EXCITED BY A SIMPLE MECHANICAL SYSTEM OF CALIBRATED DRIVING FORCE OF SIMPLE FREQUENCY

CONCEPT:

TWO LIQUIDS SUCH AS 3-IN-1 OIL AND GLYCERINE, EACH MIXED WITH A PASTEL DYE SOLUTION FOR PHOTOGRAPHIC CONTRAST ARE TO BE ENCLOSED IN SEPARATE CONTAINERS. SIMPLE HARMONIC MOTIONS ARE IMPARTED TO THE CONTAINER BY AFFIXING THE CONTAINER TO THE SPRING BEAM OF ED 74

IMPLEMENTATION:

THE LIQUID WILL FORM AN ENVELOPE AROUND AN AIR POCKET; THE SIZE OF THE AIR POCKET WILL DEPEND ON THE AMOUNT OF CABIN ATMOSPHERE ENCLOSED WITH THE LIQUID. THE STUDY WILL INCLUDE VARYING THE SIZE OF THE AIR POCKET WHILE CHANGING THE OSCILLATING FREQUENCY OF THE LIQUID

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SKYLAB STUDENT PROJECT
DEFINITION OF EXPERIMENT CATEGORIES

- CATEGORY I PROVIDE STUDENT WITH DUPLICATION OF DATA ALREADY PLANNED TO BE OBTAINED ON SKYLAB - 2 EXPERIMENTS
- CATEGORY II WILL USE EXISTING HARDWARE, BUT WILL HAVE FLIGHT PLAN, CREW PROCEDURES AND/OR RESOURCES IMPACT - 6 EXPERIMENTS
- CATEGORY III HARDWARE EXPERIMENTS - 11 EXPERIMENTS
- CATEGORY IV EXPERIMENTS REQUIRING OTHER DISPOSITION/AFFILIATION - 6 EXPERIMENTS
- CATEGORY V SPECIAL MENTION (RUNNERS, UP TO 25 NATIONAL WINNERS) - 22 EXPERIMENTS

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SKYLAB STUDENT PROJECT
CURRENT LISTING
NON-HARDWARE EXPERIMENTS
(8 EXPERIMENTS)

CATEGORY I

- ED 21 - LIBRATION CLOUDS
- ED 22 - OBJECTS IN MERCURY'S ORBIT

CATEGORY II

- ED 11 - HEAT ABOSRPTION
- ED 12 - VOLCANIC STUDY
- ED 23 - QUASARS
- ED 24 - X-RAY STELLAR
- ED 25 - X-RAYS FROM JUPITER
- ED 26 - PULSARS

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7/14/72

SKYLAB STUDENT PROJECT
IMPLEMENTATION OF CATEGORY I & II EXPERIMENTS

1. ASSIGN, BY MULTILATERAL AGREEMENT, STUDENT INVESTIGATOR TO A SKYLAB PRINCIPAL INVESTIGATOR OR NASA ADVISER
2. EXCHANGE APPROPRIATE LETTERS OF UNDERSTANDING CONTAINING:
 - STUDENT REQUIREMENTS/LIMITATIONS
 - STUDENT INVOLVEMENT (TIME, TRAVEL, GFP, ETC.)
 - DEFINITION
 - PRE-MISSION CONTROL AND BASELINE ACTIVITIES
 - MISSION OPERATIONS
 - POST-MISSION REPORTING
 - ADMINISTRATIVE AND CONTRACTUAL MECHANICS
3. SKYLAB PRINCIPAL INVESTIGATOR WILL SUPPORT STUDENT'S DOCUMENTATION AND OTHER NEEDS AS IF PART OF PRINCIPAL INVESTIGATOR'S BASIC EXPERIMENT (SIMILAR TO ECR/EDCR)

SKYLAB STUDENT PROJECT

CURRENT LISTING
HARDWARE EXPERIMENTS
(11 EXPERIMENTS)

CATEGORY III

- ED 31 - BACTERIA AND SPORES
- ED 32 - IN VITRO IMMUNOLOGY
- ED 41 - MOTOR SENSORY PERFORMANCE
- ED 52 - WEB FORMATION
- ED 61/ED 62 - PLANT GROWTH/PLANT PHOTOTROPISM
- ED 63 - CYTOPLASMIC STREAMING
- ED 72 - CAPILLARY STUDY
- ED 74 - MASS MEASUREMENT
- ED 76 - NEUTRON ANALYSIS
- ED 78 - WAVE MOTION

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7/14/72

SKYLAB STUDENT PROJECT
IMPLEMENTATION OF HARDWARE EXPERIMENTS

BASIC GROUND RULES:

- SKYLAB CRITICALITY IV - QUALIFICATION BY SIMILARITY, MINIMAL TESTING AND USE OF APPROVED MATERIALS
- OPERATION CAPABLE OF PERFORMANCE WITHIN ALLOTTED CREW TIME OF 1-1/2 HOURS PER WEEK
- MINIMUM SKYLAB SYSTEM INTERFACES
- INSTRUMENTATION AND COMMUNICATION - RECORDING ON VOICE CHANNELS ONLY
- DESIGN AND DEVELOPMENT IN-HOUSE BY MSFC
- DELIVERY, INTEGRATION AND CHECKOUT AT KSC

-PM-SL-DP
7-14-72

SKYLAB STUDENT PROJECT

CATEGORY IV EXPERIMENTS

(Six experiments)

ED 33	MICROORGANISMS IN VARYING G
ED 51	CHICK EMBRYOLOGY
ED 71	COLLOIDAL STATE
ED 73	POWDER FLOW
ED 75	BROWNIAN MOTION
ED 77	UNIVERSAL GRAVITY

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7-14-72

SKYLAB STUDENT PROJECT

IMPLEMENTATION OF CATEGORY IV EXPERIMENTS

ALTERNATIVES FOR PARTICIPATION OF STUDENT IN SKYLAB PROGRAM:

- ° IN ASSOCIATION WITH CATEGORY I, II, OR III EXPERIMENTS
- ° ESTABLISH ALTERNATE AREA OF INTEREST AND ASSOCIATE WITH MAINLINE SKYLAB EXPERIMENT ON A CATEGORY I BASIS
- ° MAINTAIN STUDENT INVOLVEMENT IN OTHER SKYLAB/SATURN/APOLLO TECHNOLOGY

**SKYLAB STUDENT PROJECT
DISPOSITION OF CATEGORY IV EXPERIMENTS**

- ED 33 - PROVIDE DATA FROM ED 31 AND MICROBIOLOGY DTO**
- ED 51 - BASELINE DR. SIMMOND'S FISH EMBRYOLOGY EXPERIMENT AND
ASSOCIATE STUDENT WITH THIS EXPERIMENT**
- ED 71 - AFFILIATE STUDENT WITH APOLLO 14/16 ELECTROPHORESIS
INVESTIGATOR (DR. SNYDER, MSFC)**
- ED 73 - AFFILIATE STUDENT WITH S-IVB HYDROGEN FLOW DEVELOPERS
(MSFC) AND APOLLO 14 FLUIDS FLOW INVESTIGATOR**
- ED 75 - ASSOCIATE STUDENT WITH ASTRONOMY EXPERIMENT**
- ED 77 - AFFILIATE STUDENT WITH GUIDANCE AND CONTROL ACTIVITIES
(SKYLAB GUIDANCE SYSTEMS PERSONNEL, AND/OR MAJ. WHITSETT,
MS09, PI)**

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7-14-72**

SKYLAB STUDENT PROJECT
SYSTEMS IMPACT SUMMARY

<u>MISSION</u>	<u>LAUNCH WEIGHT (LBS.)</u>	<u>VOLUME</u>	<u>CREW TIME (MIN.)</u>	<u>TRAINING HOURS</u>	<u>FILM RETURN</u>	<u>EXPT. WEIGHT (LBS.)</u>	<u>RETURN VOLUME</u>
SL-1	65.95	1.126 cu ft	---	---	---	---	---
SL-2	2.0	4 cu.in.	232	7	2-35mm Cassettes	2	4 in ³ in IMSS Cooler
SL-3*	5.0	116 cu. in.	388	20	1-35mm Cass. 2-16mm Mag.	TBD	TBD
SL-4		2-35mm Cassettes	235	9	2-35mm Cassettes	1.2	11 in ³
<hr/>							
TOTAL	72.95	1.2 cu. ft.	855 Min.	36 Hrs.		3.2+ Lbs.	15+ In ³
<hr/>							

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SKYLAB STUDENT PROJECT

SUMMARY AND CONCLUSIONS

COMPATIBILITY:

- o LAUNCH - EXCEEDS ORIG. CONSTRAINTS: CAPABILITY ADEQUATE
- o RETURN - ADEQUATE
- o CREW OPERATIONS: WITHIN 1-1/2 HRS PER WEEK ALLOCATION
- o SYSTEMS SUPPORT: POWER, PHOTOGRAPHY, ENVIRONMENTAL CONTROL

& OPERATIONAL SPACE ADEQUATE

DEFINITION AND DEVELOPMENT

- o EXPERIMENTS ARE ADEQUATELY DEFINED, INCLUDING HARDWARE REQUIREMENTS
- o HARDWARE DEVELOPMENT IS FEASIBLE AND IN KEEPING WITH STUDENT PROJECT CONCEPTS

SCHEDULES:

- o DOCUMENTATION (MRD, STOW. LIST, EOP, ETC.): ON SCHEDULE
- o TRAINING: AVAILABLE AS REQUIRED BY MSC
- o FLIGHT HARDWARE: AVAILABLE AS REQUIRED FOR INSTALLATION AND CHECKOUT

CONCLUSION:

- o NO SIGNIFICANT BARRIERS TO SUCCESS



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON, D.C. 20546

REPLY TO
ATTN OF: MAL

JUL 6 1972

MEMORANDUM

TO: MTL/Executive Secretary, MSF Experiments Board

FROM: MA/Apollo Program Director

SUBJECT: Status of Lunar Surface Experiments

General

The Apollo 16 ALSEP forty-five day phase II operations were terminated at 2100 G.m.t., 5 June, when mission control's 24-hour real time support was suspended and the Manned Space Flight Network shifted to phase III operations in support of the ALSEP 12, 14, 15 and 16 stations. Phase III operations require that all ALSEP scientific and engineering data be recorded continuously at the tracking stations for subsequent analysis. Intermittent periods of real time data monitoring, phase II operations, at mission control are basically scheduled at a minimum of three hours every other day during lunar night, and three hours per day during lunar day-time. Additional periods are scheduled at optical terminator crossings of lunar sunrise and sunset.

Apollo 12 Science Experiments

The Apollo 12 ALSEP is in its thirty-first month of continuous operation. During this period of time it has responded to more than 13,900 commands transmitted from Mission Control Center, Houston. The Passive Seismic Experiment (PSE), Solar Wind Spectrometer (SWS), and Suprathermal Ion Detector Experiment (SIDE) continue to record valid science data. Operation of the Lunar Surface Magnetometer has been curtailed due to the engineering and science data being invalid.

Apollo 14 Science Experiments

The Apollo 14 ALSEP is in its sixteenth month of continuous operation. The PSE and the SIDE/Cold Cathode Gauge Experiment (CCGE) are functioning without interruption. The Charged Particle Lunar Environment Experiment (CPLEE) is operated during real time support periods only during lunar day and continuously during lunar night.

The Active Seismic Experiment (ASE) is in standby status with weekly listening modes scheduled to monitor instrument operation.

Apollo 15 Science Experiments

The Apollo 15 ALSEP has been in continuous operation for 10 months. The Heat Flow Experiment (HFE), PSE, LSM, and SIDE/CCGE are producing continuous scientific information. The SWS ceased transmitting valid scientific data on 30 June. It was placed on standby status. Attempts to analyze and recover from the failure are underway.

Apollo 16

On May 23, 1972 three of the four grenades in the Apollo 16 Active Seismic Experiment mortar package were fired. After firing the third grenade there was a telemetry indication that the pitch sensor was off scale and the firing of the fourth grenade was cancelled to avoid any possible damage to the ALSEP. Initial results indicate there is no layering or structure in the first 100M of the subsurface.

The LSM and PSE continue to return scientific data. Analysis of the Cosmic Ray Detector (CRD) plastic and glass panels shows large numbers of tracks resulting from a moderate solar flare during trans-lunar coast. Analysis will continue for several months. The ASE geophones continue to be monitored for a short period each week.

Apollo 17

The Apollo 17 ALSEP is scheduled for delivery to KSC in September 1972. The flight hardware for the Surface Electrical Properties and the Lunar Gravity Traverse Experiments is to be delivered in July 1972. The Lunar Neutron Probe is to be delivered in August 1972. All flight hardware deliveries support the Apollo 17 launch date.


Rocco A. Petrone



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON, D.C. 20546

REPLY TO MAIL
ATTN OF:

JUL 10 1972

MEMORANDUM

TO: MTL/Executive Secretary, MSF Experiments Board
FROM: MA/Apollo Program Director
SUBJECT: Status of Apollo Lunar Orbital Science Experiments

The Apollo 16 subsatellite impacted the moon on May 29, 1972. Based on early real-time tracking data of the subsatellite, the impact occurred approximately one week before the predicted date, and on the 425th revolution. The location is on the lunar backside, southeast of the Sea of Moscow.

All Apollo 17 orbital experiment flight hardware, except the Mapping Camera and Laser Altimeter, have been installed in the spacecraft and are undergoing integrated spacecraft/experiment checkout. The flight backup Mapping Camera and Laser Altimeter are installed in the spacecraft to support checkout while the flight units are undergoing repairs and modifications at the contractors' plants. The estimated completion dates for these repair and modification activities support delivery dates to meet final checkout and launch.

Rocco A. Petrone
Rocco A. Petrone



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812

REPLY TO
ATTN OF:

S&E-R-F (403-72 ahc)

July 5, 1972

TO: NASA Headquarters
Attn: MT/A. B. Bass

FROM: S&E-R-F/R. E. Lake

SUBJECT: Changes in Principal Investigators

Due to the retirement of Mr. R. V. Hoppes, the Marshall Space Flight Center has named the following MSFC personnel to replace him as Principal Investigator on M-551 and M-552.

Mr. Richard M. Poorman, S&E-ASTN-MM, has been designated as Principal Investigator for Experiment M-551, "Metals Melting"; and Mr. James R. Williams, S&E-PE-M, has been designated as Principal Investigator for Experiment M-552, "Exothermic Heating".

It is requested that you take appropriate action to incorporate these changes into the records of the MSFEB.

Robert E. Lake
Chief, Flight Experiments
Office

cc:
Hdqtrs./MT/W. O. Armstrong
Hdqtrs./MT/J. Bredt
S&E-PE-DIR/Dr. Siebel
S&E-PE-M/Mr. Hoppes
S&E-PE-MM/Mr. Williams
S&E-ASTN-DIR/Mr. Kingsbury
S&E-ASTN-M/Mr. Schwinghamer
S&E-ASTN-MM/Mr. Poorman
PM-SL-DP/Mr. Waite

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LEGEND
X LAUNCH ASSIGNMENT
U EXPERIMENT APPROVED, LAUNCH UNASSIGNED
O APOLLO DATA ANALYSIS EXPERIMENTS

* REFER TO SKYLAB PROGRAM DIRECTIVE NO. 43B FOR EXPERIMENT PERFORMANCE/SPECIFIC MISSION RELATIONSHIP

*** INDIVIDUAL NUMBERING SCHEME

MSFEB ACTION ITEMS

<u>ACTION NO.</u>	<u>ACTION</u>	<u>DUE</u>	<u>STATUS</u>	<u>DATE COMPLETED</u>
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I. ACTIONS ASSIGNED TO SKYLAB

72-1.1	Complete compatibility assessment for experiment S228, Trans-Uranic Cosmic Rays and resubmit experiment to Board.	No later than 72-2 MSFEB Meeting	No documentation available as of 5/30/72 but will be available in time for 72-2 meeting.	6/1/72 by ML Memo to 72-2 MSFEB
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II. ACTIONS ASSIGNED TO MM

72-2.1	Review experiment M132, Neurological Experiment-EEG, with chairman of SPAC Life Sciences Committee and resolve disposition..	As soon as feasible	In process	
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Mr. Larry Draper/Code 732

Mr. Lawrence Dunkelman/Code 613

John F. Kennedy Space Center, Kennedy Space Center, Fla.

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Mr. Robert C. Hock/AA

Mr. D. M. Smith/AA-PCO (18)

Manned Spacecraft Center, Houston, Tex.

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Mr. Robert E. Lake/S&E-R (30)

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