

NASA CR-65953

FINAL REPORT

EXPERIMENT S046

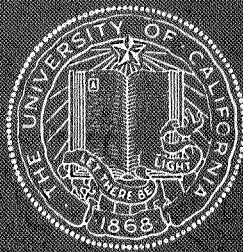
VISIBLE RADIATION POLARIZATION MEASUREMENTS

PHASE C

PREPARED FOR: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
Manned Spacecraft Center,
Houston, Texas.

NASA Contract No. NAS 9-7267

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THE UNIVERSITY OF CALIFORNIA, LOS ANGELES

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FINAL REPORT

NASA CR 65953

January, 1968

EXPERIMENT S046

VISIBLE RADIATION POLARIZATION MEASUREMENTS

PHASE C

Prepared By: Paul A. Lang
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Prepared For National Aeronautics and Space Administration
Manned Spacecraft Center, Houston Texas 77058

NASA Nas 9-7267

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FINAL REPORT

FOREWARD

This Final Report covers the work conducted at the Institute of Geophysics and Planetary Physics of the University of California at Los Angeles between July 1, 1967 and January 31, 1968 under NASA Contract NAS 9-7267.

Other work in conjunction with this program was performed by the Space Sciences Laboratory of General Electric Company at King of Prussia, Pennsylvania (the subcontractor to UCLA) under UCLA Contract 50772-0. The results of the work performed by the subcontractor between September 7, 1967 and January 5, 1968 is contained in the General Electric Final Report, submitted separately.

Principal contributors to the UCLA effort were

Professor Z. Sekera

Dr. T. A. Hariharan

Mr. P. A. Lang

Mr. W. L. Stephens

Dr. H. L. Richter, Jr.

1.0 INTRODUCTION

This report summarizes the work carried out by UCLA under NASA Contract NAS 9-7267 whereby efforts including scientific and technical support, supporting studies and project management were provided for the purpose of defining the experiment preliminary design, specifications and management plans for the flight hardware phase of the program. A number of tasks required by this program were carried out by the subcontractor, General Electric Company, under UCLA Contract 50772-0. These tasks included the preliminary design of the experiment, critical parts of which were mocked up and tested in the laboratory at General Electric, engineering drawings, specifications and management plans for the Phase D contract. The work carried out by the subcontractor was given the necessary scientific, technical and management support and supervision and subsequent approval by UCLA. The primary purpose of this final report is to summarize for future reference the work performed by UCLA.

2.0 OBJECTIVES

In order to accomplish the required results during the Phase C program, certain objectives had to be met. These and the means of achieving them are described below.

2.1 Support Studies Conducted during Phase C.

The support studies carried out during Phase C of the S046 Experiment are as follows.

2.1.1 Reduction and analysis of polarization data obtained from the Convair 990 aircraft experiments. These experiments were completed prior to the Phase C Experiment S046 contract.

2.1.2 Reduction and analysis of ground-based measurements made at China Lake, California with the instrument developed earlier at UCLA.

2.1.3 Improvement and modification of the existing UCLA instrument for future ground-based and high altitude measurements during the Phase C extension and Phase D portion of the contract.

2.1.4 Most of the data obtained from the aircraft experiments have been analyzed. The results show interesting features in comparison with computed values.

The determination of atmospheric parameters such as aerosol content, distribution and concentration will be possible only with more extensive data with improved accuracy.

2.1.5 The data obtained from ground-based measurements have not been completely retrieved because of problems with the analog and digital converter and the tape transport system. Special programs are being written and tried out to retrieve all the recorded data.

2.1.6 The modification of the existing UCLA polarimeter instrument carried out during the Phase C contract consisted of improvement of the electronic circuitry in order to obtain better signal to noise ratio, integration of a time code generator into the system, and the replacement of "Ledex" digimotors used for filter changing with small stepper motors.

2.1.7 The performance of the instrument during ground-based measurements was far better than that during the earlier aircraft flight experiments. Additional improvements will be required in the future if the UCLA instrument is to be used again for aircraft flight experiments.

2.1.8 Additional descriptive information regarding these supporting studies is contained in the attached UCLA to NASA-MSO Monthly Progress Reports.

2.2 Scientific and Technical Support.

The UCLA project team provided scientific and technical support during Phase C of Experiment SO46 as follows.

2.2.1 Scientific and Technical Liaison between UCLA and the General Electric Company

A number of tasks required by this program were carried out by the subcontractor under a UCLA contract. These tasks included the preliminary design of the experiment, critical parts of which were mocked up, breadboarded and tested in the General Electric laboratory, and preparation of engineering drawings, specifications and management plans for the Phase D contract. This work, which was carried out by the subcontractor, was given the following scientific and technical support by the UCLA personnel.

2.2.1.1 Providing the subcontractor with information and results obtained from those supporting studies carried

out by UCLA having an effect on the work conducted by the subcontractor.

2.2.1.2 Evaluating the work and progress thereof carried out by the subcontractor. This included the evaluation of the General Electric Program Information Releases, weekly and monthly progress reports. Technical assistance was provided as necessary.

2.2.1.3 Participation in technical review meetings were the overall work was reviewed and appropriate technical assistance provided in areas requiring such aid.

2.2.1.4 Subsequent final review, approval and acceptance of all technical and similar work (deliverable items) conducted and submitted by the subcontractor.

2.2.2 Technical Support to the UCLA Project Team

Technical and engineering support was provided to the tasks carried out by the UCLA team as follows.

2.2.2.1 Evaluation of Proposals from Industry. This involved the review of the proposals from industry bidding on the Phase C subcontract effort. In conjunction with this, UCLA engineering personnel provided the necessary assistance in preparing the Request for Proposals, participated in technical briefings with prospective bidders' engineering representatives, conducted facilities' surveys, evaluated and aided in the selection and approval of the proposals from industry and participated in the subcontract negotiations.

2.2.2.2 Technical and Engineering Assistance in the Modification and Improvement of the UCLA Polarimeter Instrument.

During the Phase C effort, it was necessary to modify and improve the UCLA polarimeter instrument which had been used in the past for aircraft flight measurements during Phase C of the ground-based measurements and subsequent aircraft flight measurements. These measurements were carried out by the UCLA personnel as part of the supporting studies. Technical and engineering support was provided in the following: improvement of the electronic circuitry in order to obtain better signal to noise ratio; integration of a time code generator into the system; replacement of "Ledex" digimotors with small stepper motors for filter changing; redesign and rework of certain mechanical components; and documentation of the changes and modifications made.

Additional descriptive information regarding these activities is contained in the attached UCLA Monthly Progress Reports and other reports.

2.3 Project and Program Management.

A portion of the tasks and responsibilities carried out by UCLA during Phase C consisted of the following Project and Program Management activities.

2.3.1 Program Plan

In order to achieve the objectives of the Phase C program, a program plan was devised to delineate the means by which

objectives assigned to UCLA were to be carried out. This program plan consisted of the following.

2.3.1.1 Program Plan Flow Chart.

This chart was used as a complete, single authoritative document to delineate the manner in which the objectives of Phase C of the S046 Experiment were to be achieved. It was so devised as to provide all pertinent data and information on a monthly basis for the entire period during which Phase C of the experiment took place.

2.3.1.2 Organization Chart.

This chart describes in outline form the various tasks and functions of the UCLA personnel participating in Phase C of the S046 Experiment.

2.3.2 Management Plan

In order to achieve the management objectives of UCLA during Phase C of Experiment S046, a management plan was utilized to describe the methods by which the objectives were to be achieved.

2.3.2.1 UCLA Program Management Organization and Manpower

A project group as outlined on the Organization Chart performed the various tasks and work associated with fulfilling the UCLA management requirements during Phase C.

2.3.2.2 Management Scheme

The management scheme employed during the Phase C effort utilized the following services, personnel and related functions.

2.3.2.2.1 The UCLA central administrative, budget and accounting offices handled all funds received under the contract and maintained the necessary expense records.

2.3.2.2.2 The office of the Institute of Geophysics and Planetary Physics maintained direct contact with the Principal Investigator and his staff and administered the day-to-day logistics needs of the project.

2.3.2.2.3 The Principal Investigator was responsible for the overall project management activities and guided the progress of the work, aided in refining and reviewing the experiment implementation plan and helped conduct supporting studies to advance the state of the art of the experiment theories and data analysis.

2.3.2.2.4 The Co-Investigator was responsible for the research and research support activities of the project. In conjunction with the Principal Investigator, Project Engineer and special consultant(s) he was responsible for the specifications of the polarimeter instrument characteristics and evaluation of contractor design specifications and performance. He collaborated with the Principal Investigator in all phases of the supporting studies.

2.3.2.2.5 The Project Engineer was directly responsible to the Principal Investigator. He was in the capacity of engineering and administrative liaison between UCLA and NASA-MSU, and between UCLA and the subcontractor. In this capacity, he provided necessary technical support where instrument design and construction and related test and calibration equipment might have an effect on the proposed experiment. This included the evaluation of any proposed design changes of the equipment as and when felt necessary in the best interests of the S046 Experiment. He also assisted the Principal Investigator and Co-Investigator in preparing and presenting all necessary documents, and supervised the carrying out of all in-house administrative duties including such project management functions as writing project reports, preparation of all required documentation and records, planning and scheduling. All other personnel working on the project reported to the Project Engineer.

2.3.2.3 Implementation of the Management Scheme
Implementation of the Management Scheme was limited to the extent to which the work and responsibilities of UCLA's effort applied. The following describes the tasks by means of which this Scheme was implemented.

2.3.2.3.1 UCLA Weekly Project Review
Meetings and Reports

Project review meetings were held once a week at UCLA. These meetings were attended by all UCLA project personnel. Their purpose was:

to report on and discuss all activities of each staff member during that particular week; to consider any problems which might be encountered and provide necessary solutions or action; to consider and discuss all interfaces within UCLA and those with NASA-MSFC and with the subcontractor; to record and document all pertinent information (technical, engineering, scientific, contractual, administrative and financial) pertinent to the management of the program; and to prepare and plan all activities for the following week.

2.3.2.3.2 Periodic Project Review Meetings

During the course of the program several project review meetings were held at UCLA, at NASA-MSFC in Houston, Texas and at the subcontractor's plant at King of Prussia, Pennsylvania. The purpose of these meetings was: to discuss and review all activities and tasks performed by the subcontractor during each period and take necessary action; to consider any and all technical problems which might be encountered by the subcontractor, particularly in those areas having an effect on the S046 Experiment, and provide all necessary support; to discuss the planned activities of the subcontractor for the following period and to provide supervision and technical support as necessary; to record, document and take required action on all technical and scientific matters pertaining to the program objectives; and to review, approve and finally accept the work of the subcontractor at the preliminary and final Design Review Meetings.

Additional descriptive information regarding these activities is contained in the attached UCLA Monthly Progress Reports and other reports.

2.4 Monthly Progress Reports to NASA-MSD.

At the end of each month UCLA submitted to NASA-MSD a Progress Report covering all activities carried out during that month by the UCLA personnel and by the subcontractor. Included were a Monthly Financial Status Report, a Monthly Financial Status Chart, a Manhour Report Chart and the latest copy of the Program Plan flow chart.

Additional information regarding these report and enclosures is contained in the attached UCLA Monthly Progress Reports.

3.0 DOCUMENTATION

The documentation carried out during Phase C was to the extent required in the contract. All documents, outgoing, incoming and in-house were logged.

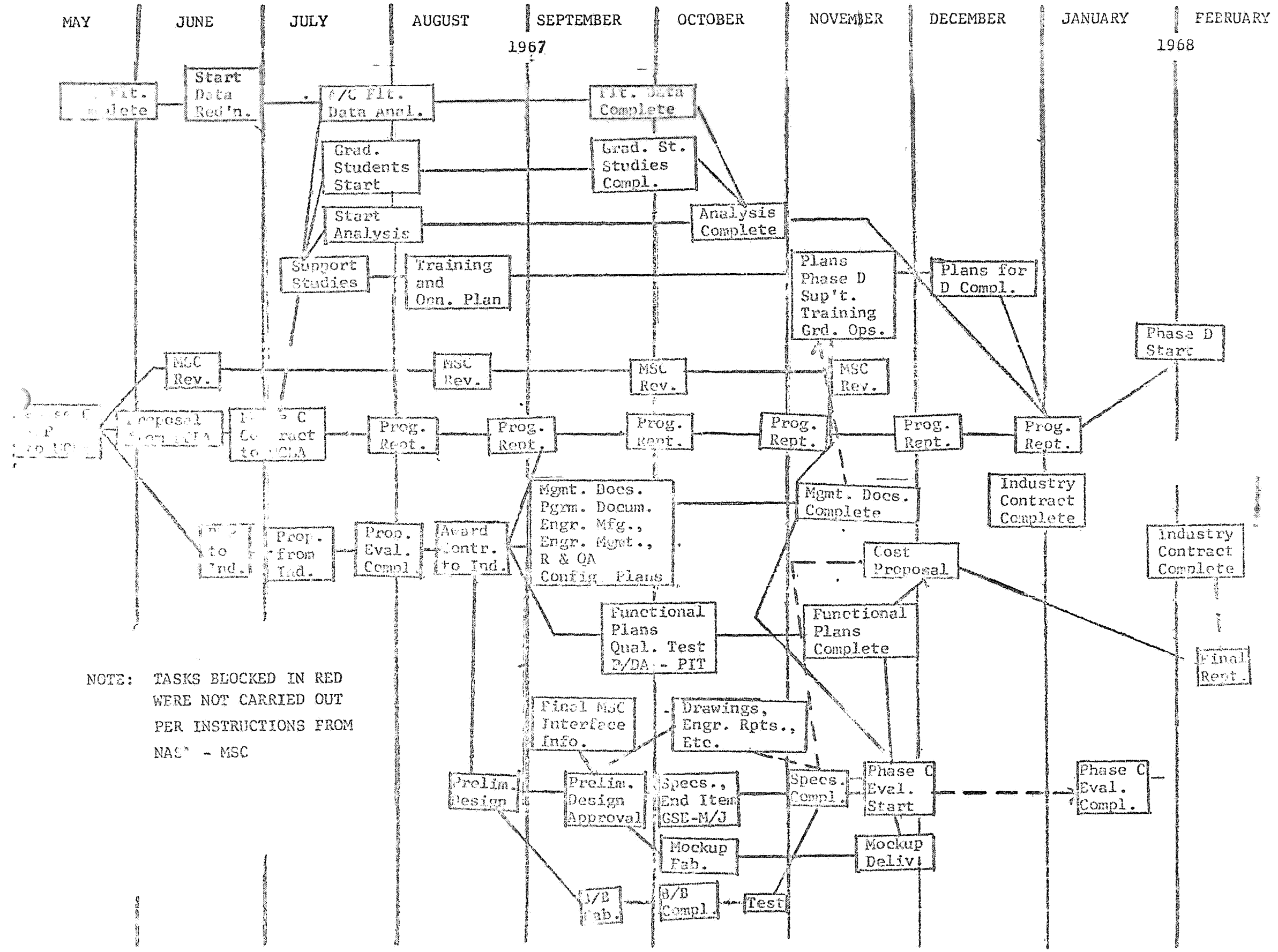
4.0 NOTE

This Final Report for Phase C of Experiment S046 has been prepared to the extent to which the work and responsibilities of the UCLA effort are applicable.

11A

118

PROGRAM PLAN FLOW CHART FOR EXPERIMENT S046 - PHASE C



NOTE: TASKS BLOCKED IN RED
 WERE NOT CARRIED OUT
 PER INSTRUCTIONS FROM
 NAS - MSC

DATE: October 2, 1967
LOG NO.: 10-67-80
MEMORANDUM TO: NASA Manned Spacecraft Center
FROM: Paul A. Lang
SUBJECT: Monthly Progress Report September 1-30, 1967

1. The official contract has been placed with the General Electric Company for Phase C of Experiment S046. The UCLA Purchasing Department notified GE on September 8 about this award, and work started immediately thereafter. The delay in making said award caused a slippage of approximately three weeks, and GE has brought this matter to the attention of this project office. GE has requested an extension of the completion date of Phase C as a result of this delay; the completion date has been changed to January 5, 1968.
2. A technical review meeting was held at the GE plant in Valley Forge, Pennsylvania during the week of September 18, and during September 25-26, 1967. Please see Trip Report, LOG NO. 9-67-79 for information regarding this meeting.
3. As of this date, GE has submitted to this office three weekly progress reports, accompanied by several GE "PIR's" (Program Information Releases) describing in detail the technical and engineering work tasks and assignments accomplished so far, plus preliminary program management reports and documentation.
4. Dr. Hariharan has been continuing his work on the aircraft flight experiment data reduction, which is proceeding according to schedule. Work is also proceeding on modifications and improvements of the existing flight instrument.
5. Mr. Lang carried out his duties and assignments connected with the project engineering aspects of the experiment. He is carefully following the progress made by GE in engineering and program management and is, within the limitations of the program schedule, time element and geographic distances, participating in and supervising GE's efforts.

Conclusions.

Despite the delay in awarding the contract for Phase C, GE has done quite well, and is attempting to meet the original schedule if at all possible. The tasks to be performed by the UCLA Project Staff are proceeding according to schedule.

\$ 57,564 (Beginning appropriation)

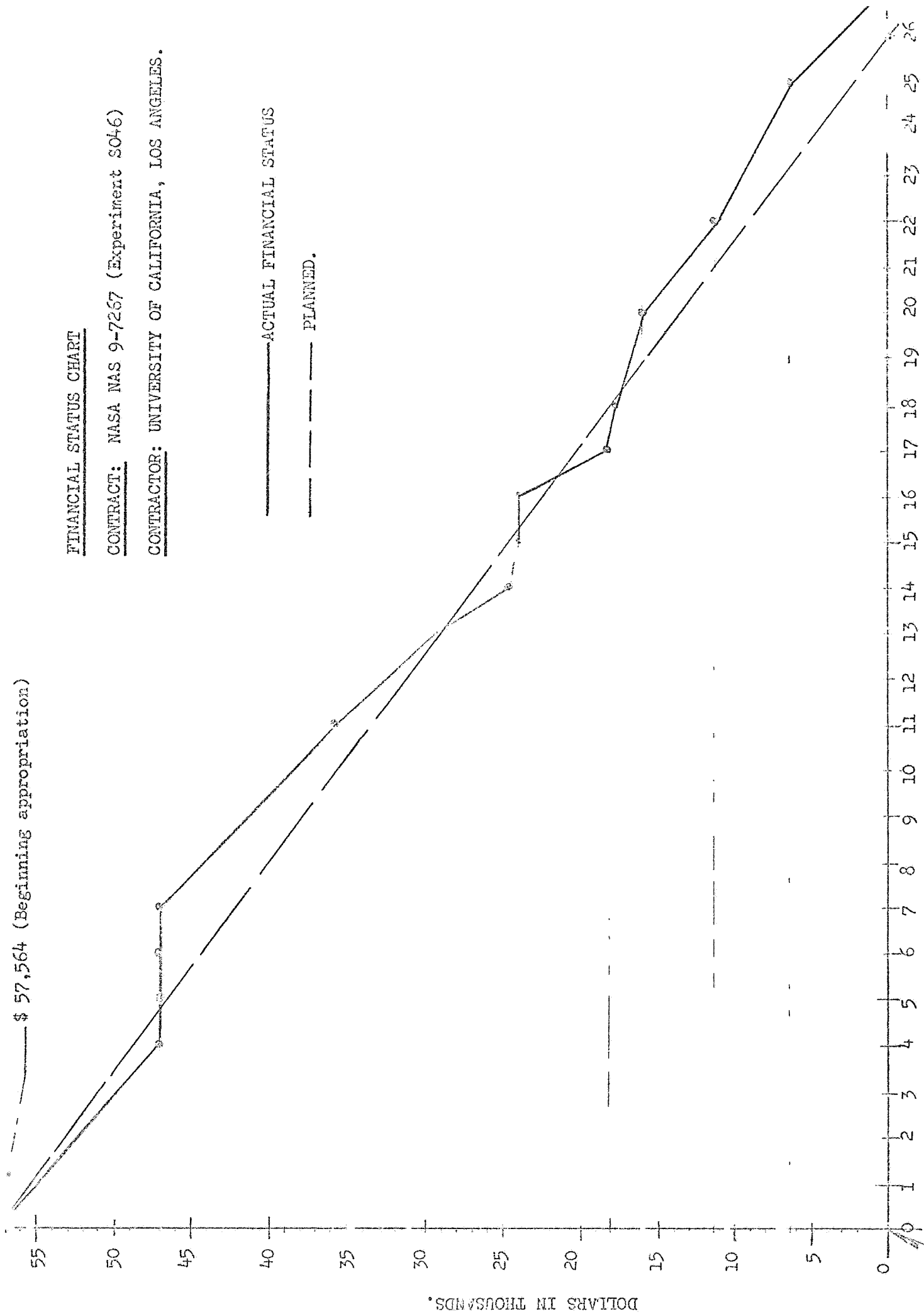
FINANCIAL STATUS CHART

CONTRACT: NASA NAS 9-7267 (Experiment S046)

CONTRACTOR: UNIVERSITY OF CALIFORNIA, LOS ANGELES.

————— ACTUAL FINANCIAL STATUS

- - - - - PLANNED.



July 1, 1967 (Start) -

WEEKS

DATE: November 1, 1967
LOG NO.: 11-67-91
MEMORANDUM TO: NASA - Manned Spacecraft Center
FROM: Paul A. Lang
SUBJECT: Monthly Progress Report - October 1-31, 1967

1. As of this date, General Electric Co. has submitted to this office seven weekly progress reports accompanied by several GE Program Information Releases (PIR's) describing in detail major technical and engineering work accomplished, plus program management reports and documentation. These reports indicate that GE is making good progress, is on schedule, and that there do not appear to be any major problem areas at this time.
2. GE has submitted the first Monthly Progress Report for Experiment S046 - Visible Radiation Polarization Measurement - Phase C, LOG NO. 10-67-83.
3. A technical-management review meeting was held at UCLA October 19-20, 1967. This meeting was attended by the UCLA S046 project staff and representatives of GE. Mr. R. F. Hergert of NASA-MSC was unable to attend. For a detailed report of this meeting please see LOG NO. 10-67-88.
4. Dr. T. A. Hariharan has been continuing his work on the aircraft flight experiment data reduction, which is proceeding according to schedule. Work is also proceeding on modifications and improvements of the existing flight instrument, namely its conversion to ground operations for field test performance. For this work, a time code generator has been purchased from Space General Corp. and is presently being installed and tested.
5. Mr. Lang carried out his duties and assignments pertaining to the project engineering and management aspects of the experiment. He is carefully following the progress made by GE in engineering and program management, providing all required assistance and guidance.
6. Grave concern has been expressed by all participants in the S046 experiment regarding the lack of funding for the gap brought about by the delay in starting Phase D. Phase C will be completed on December 31, 1967; the new schedule calls for the beginning of Phase D on July 1, 1968. This delay represents an unfunded period of six months for both UCLA and GE. Since a discontinuity of this nature would be highly detrimental to the success of the project, it has been suggested that a proposal for an extension of the Phase C effort be made, covering time and funding for both UCLA and GE during this six month period. This is presently being prepared and will be sent to the attention of Mr. R. F. Hergert of the Special Projects Office of NASA - Manned Spacecraft Center, during the first week of November.

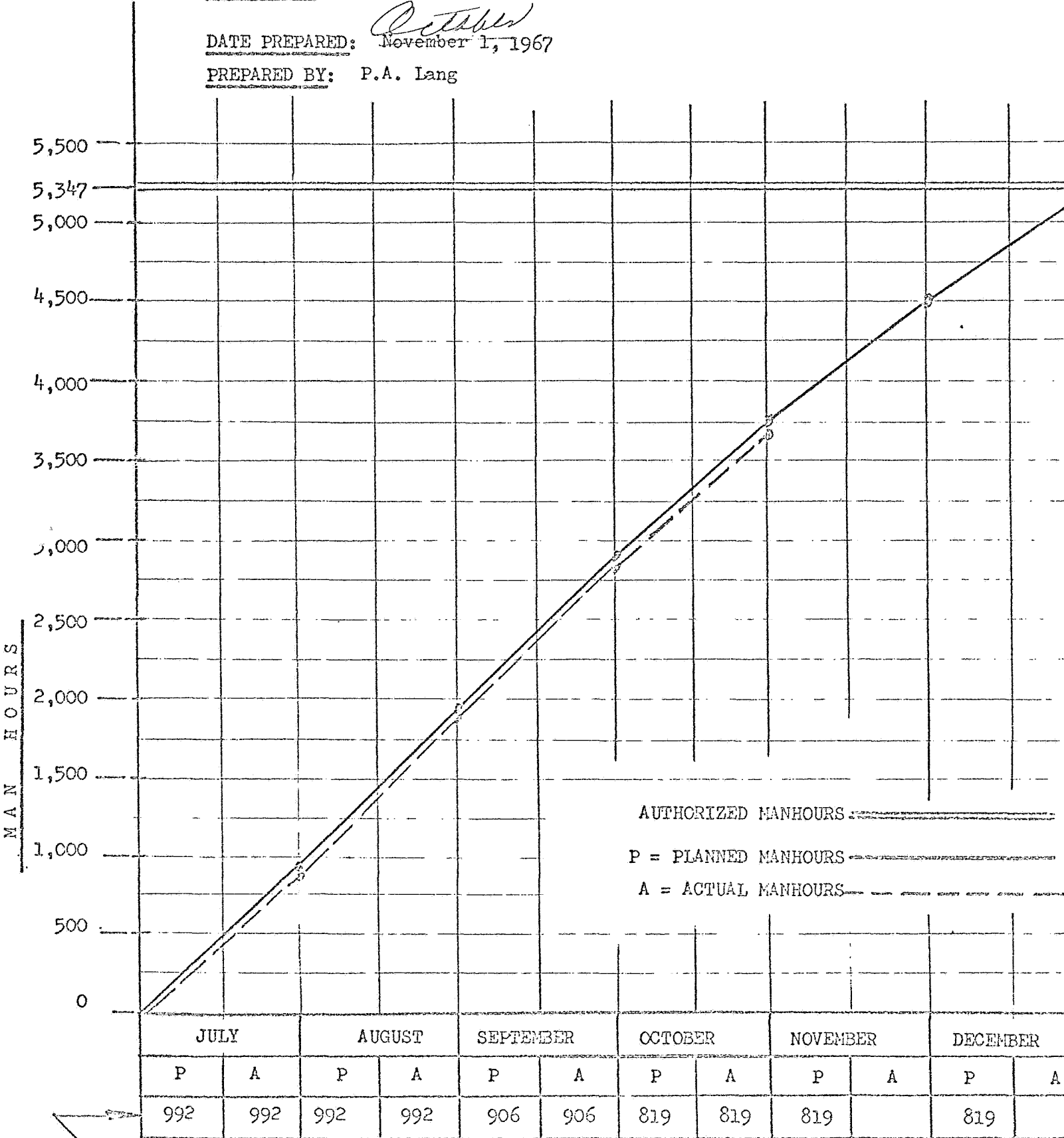
MAN HOUR REPORT CHART

CONTRACT: NASA NAS 9-7267 (Experiment S046)

CONTRACTOR: UNIVERSITY OF CALIFORNIA, LOS ANGELES.

DATE PREPARED: *October*
November 1, 1967

PREPARED BY: P.A. Lang



MONTHLY MANHOURS (PLANNED and ACTUAL)

DATE: December 1, 1967
LOG NO.: 12-67-100
MEMORANDUM TO: NASA - Manned Spacecraft Center
FROM: Paul A. Lang
SUBJECT: Monthly Progress Report - 11/1-30/67

1. As of this date General Electric Company has submitted to this office 11 weekly progress reports and 16 Program Information Releases (PIR's) describing in detail major technical and engineering work accomplished, plus program management reports and documentation. These reports indicate that GE is making good progress, is on schedule, and that there do not appear to be any major problem areas at this time.
2. GE has submitted the second Monthly Progress Report for Experiment S046 - Phase C - Visible Radiation Polarization Measurement (LOG NO. 11-67-97).
3. Dr. Hariharan has been continuing his work on the aircraft flight experiment data reduction and analysis, which is proceeding according to schedule.
4. Dr. Hariharan and Mr. Stephens have completed the modifications of the existing flight instrument, which has been converted for use in field tests (ground based experiments at the U. S. Naval Ordnance Test Station, China Lake, California). The time code generator purchased from Space General Corp. has been tested, installed, and integrated into the system.
5. Mr. Lang carried out his duties pertaining to the project engineering and management aspects of the experiment. He is carefully following the progress made by GE in engineering and program management, providing all required assistance and guidance.
6. Dr. Hariharan and Mr. Stephens have gone to the U. S. Naval Ordnance Test Station at China Lake, where they have set up the modified instrument and related equipment with which they will conduct ground based experiments (see Para. 4 above). These experiments are presently taking place, the results will be recorded in future progress reports.
7. Arrangements were made to hold a Preliminary Design Review (PDR) meeting at the GE plant in Valley Forge, Pennsylvania December 4-5, 1967. The meeting will be attended by Professor Sekera, Dr. Hariharan and Mr. Lang of the UCLA project staff and Mr. Hergert of NASA - MSC.

8. Concern is still being expressed by all participants in the SO¹⁶ experiment regarding the lack of funding for the gap created by the delay in starting Phase D. As suggested by Mr. Hergert, a proposal for the extension of Phase C was prepared by UCLA and forwarded to NASA - Manned Spacecraft Center, on November 14. No action has been taken regarding this matter to date.

Conclusions.

All work by both UCLA and GE is proceeding according to schedule, the results are satisfactory, and except for the funding situation (Para. 8 above), there are no major problem areas.

Additional Information.

For more detailed information on items discussed in this report, please refer to:

Log Nos. 11-67-92
 11-67-96
 11-67-98
 11-67-99.

Paul A. Lang
 Project Engineer

PAL:jk

12-67-100

Encls: Financial Status Report
 Financial Status Chart
 Manhour Report Chart
 PERT Flow Chart (R. F. Hergert only)

cc: Professor Z. Sekera
 Dr. T. A. Hariharan
 Mr. P. A. Lang (2)
 Mr. J. Belsha
 Mr. R. F. Hergert (3)
 Dr. H. L. Richter, Jr.
 Mr. R. B. Shaw
 Mr. P. W. Robinson
 File

FINANCIAL STATUS REPORT

ACCT. NAME & NO. *Deer Run 97267 26293* *488604-26293*
 MONTH ENDING

PREVIOUS BALANCE	EXPENDITURES	ENCUMBRANCE	TRANSFERS	CURRENT BALANCE	BEGINNING APPROPRIATION	CUMULATIVE EXPENDITURES	% FUNDS EXPENDED	AT PRESEN RATE FUND WILL RUN C
10,234.67	3,730.67			6,504.00	31,281.00	24,777.00		
1,384.04	452.97 ^a	1.06		1,835.95	5,200.00	3,724.05		
26.00	304.00 ^a			330.00	1100.00	770.00		
2,561.36	558.60	250.00		1,752.76	3,758.00	2,005.24		
1,279.95	374.59			905.36	2,461.00	1,555.64		
15,486.02	48+2-83-3,906.89	251.06		11,328.07	43,800.00	32,471.93		

GA

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TRAVEL

EMPL. BNF.

TOTAL

4 mo

7-1-67 to 1-21-68

GRANT PERIOD TIME ELAPSED

\$ 57,564 (Beginning appropriation)

FINANCIAL STATUS CHART

CONTRACT: NASA NAS 9-7267 (Experiment SO-6)

CONTRACTOR: UNIVERSITY OF CALIFORNIA, LOS ANGELES.

———— ACTUAL FINANCIAL STATUS

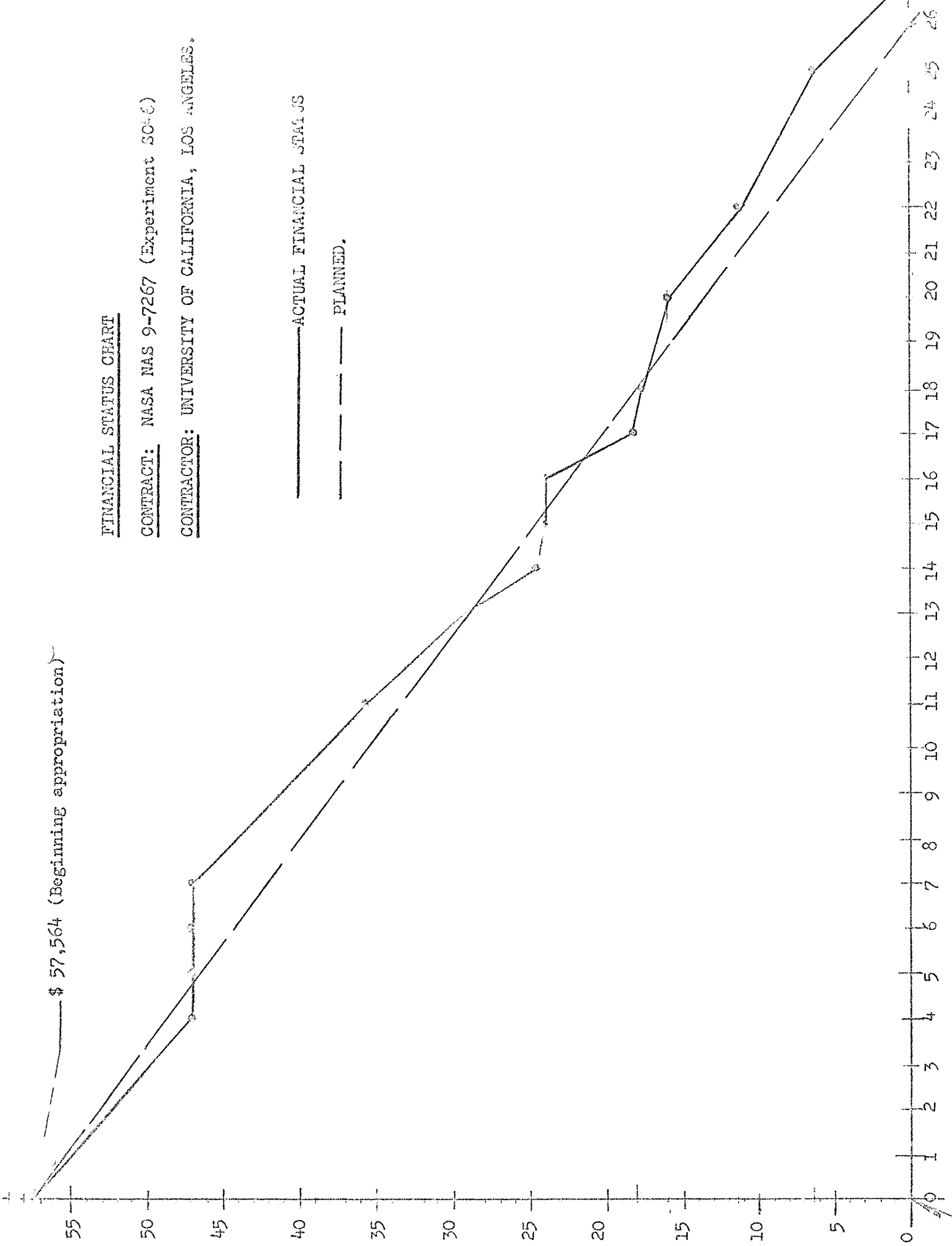
- - - - - PLANNED.

DOLLARS IN THOUSANDS.

55
50
45
40
35
30
25
20
15
10
5
0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

-- July 1, 1967 (Start) ----- W E E K S -----



DATE: January 2, 1968
LOG NO.: 12-67-108
MEMORANDUM TO: NASA - Manned Spacecraft Center
FROM: Paul A. Lang
SUBJECT: Monthly Progress Report - 12/1-31/67

1. As of this date General Electric has submitted to this office 15 Weekly Progress Reports and 24 Program Information Releases describing in detail major technical and engineering work accomplished, plus program management reports and related documentation. These reports indicate that GE is making good progress, is, in most areas, on schedule, and that there appear to be no major problems at this time. Although all engineering and technical tasks conducted by GE will be completed on schedule, the GE program manager, Dr. Frost, has requested that submission of their final report and formal documentation be delayed by one week. The request has been approved.
2. GE has submitted the third Monthly Progress Report for Experiment S046 - Phase C Visible Radiation Polarization Measurement (LOG NO.: 12-67-105).
3. Dr. Hariharan has now completed his work on the aircraft flight experiment data reduction and analysis.
4. Dr. Hariharan and Mr. Stephens have conducted field tests (ground-based experiments with the UCLA polarimeter) on two occasions at the U. S. Naval Ordnance Test Station at China Lake, California.
5. Mr. Lang carried out his duties pertaining to project engineering and the management aspects of the experiment.
6. A Preliminary Design Review meeting was held at the GE plant in Valley Forge, Pennsylvania December 4-5, 1967 (LOG NO.: 12-67-102).
7. Concern is still being expressed by all participants in the S046 Experiment regarding the lack of funding for the gap created by the indefinite postponement of Phase D. Unless this problem is resolved in the immediate future the lack of funding will necessitate discontinuance of all work as well as the loss of the UCLA scientific and engineering personnel presently associated with the S046 Program.

Conclusions

Except for the one week delay of C's submittal of final documents and reports all work by both C and CC is proceeding per schedule, and there are no major problem areas other than the funding situation described in Paragraph 7 above.

Additional Information.

For more detailed information on items discussed in this report, please refer to LOG NO's.: 12-67-101

" 102
 " 104
 " 105
 " 106
 " 107.

Paul A. Lang
 Project Engineer

PAL:jk

Encls: Financial Status Report
 Financial Status Chart
 Manhour Report Chart
 PERT Flow Chart (R. F. Hergert only)

cc: Professor Z. Sehera
 Dr. T. A. Hariharan
 Mr. P. A. Lang (2)
 Mr. J. Belsha
 Mr. R. F. Hergert (3)
 Dr. H. L. Richter, Jr.
 Mr. R. B. Shaw
 Mr. P. W. Robinson
 File

1-68-103

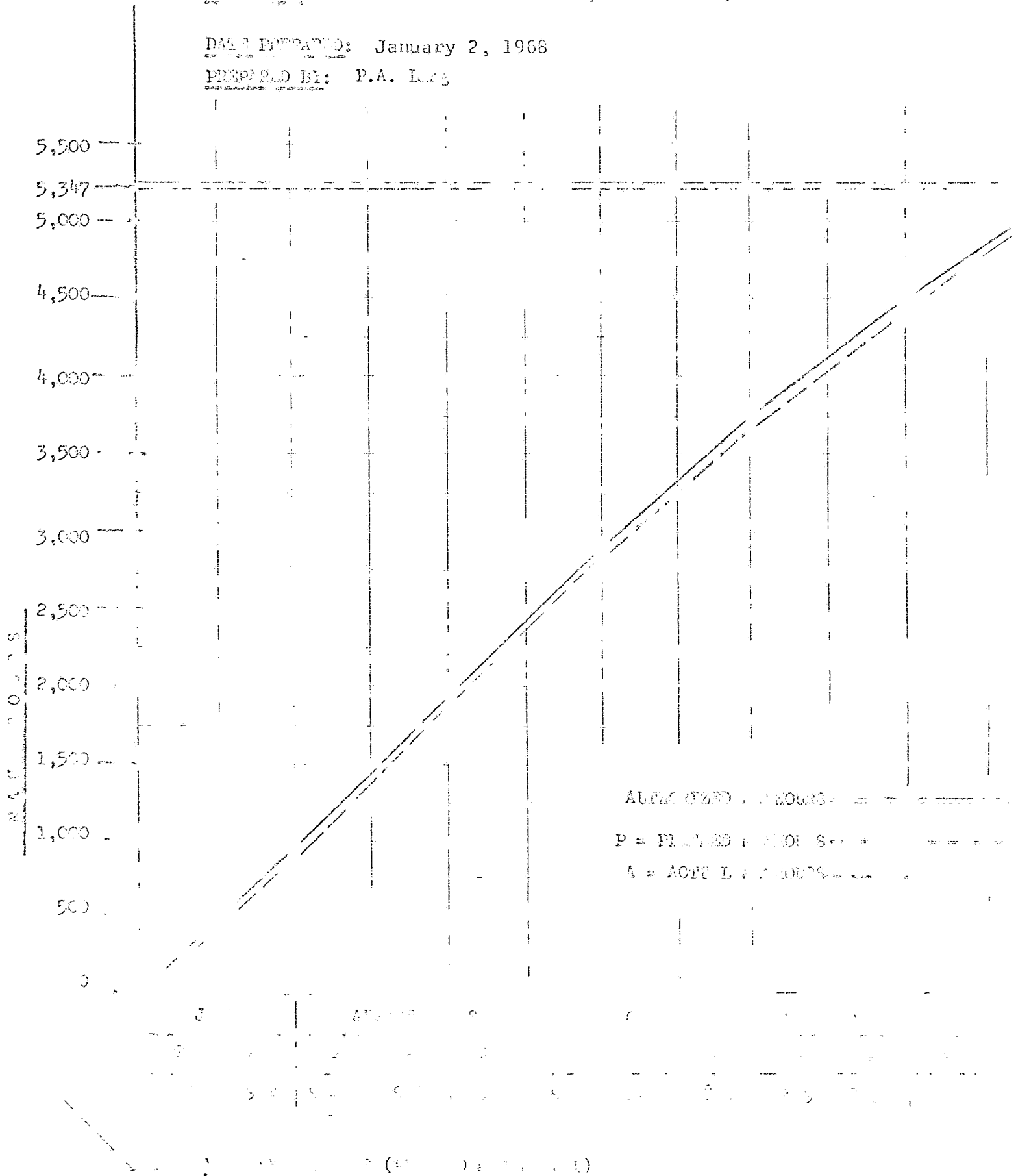
HANFOUR PROJECT CHART

CONTACT: PHONES 9-72-7 ()

COORDINATOR: LINDERS BY O.C. (), 103

DATE PREPARED: January 2, 1968

PREPARED BY: P.A. LUG



FINANCIAL STATUS REPORT

488604-26293
Sakura
Harizan

ACCT. NAME & NO NASA NAS 97217 21293

MONTH ENDING 12-31-67

PREVIOUS BALANCE	EXPENDITURES	ENCUMBRANCE	TRANSFERS	CURRENT BALANCE	BEGINNING APPROPRIATION	CUMULATIVE EXPENDITURES	% FUNDS EXPENDED	AT PRESENT RATE FUND WILL RUN
6,504.00	3,977.05			2,626.95	31,281.00	28,654.05		
1,835.95	181.64	7.19		1,647.12	5,200.00	3,552.58		
330.00	324.50			5.20	1,100.00	1,074.80		
1,752.76	421.98			320.78	3,758.00	3,427.22		
905.36	374.59			530.77	2,461.00	1,930.23		
11,328.07	6,180.06	7.19		(5040.82)	43,800.00	38,651.97		

GA

S & E

T & F

TRAVEL

EMPL. BNF.

TOTAL

7-1-67 to 1-31-68
GRANT PERIOD

5 mos.
TIME ELAPSED

\$ 57,500 (Deduction of depreciation)

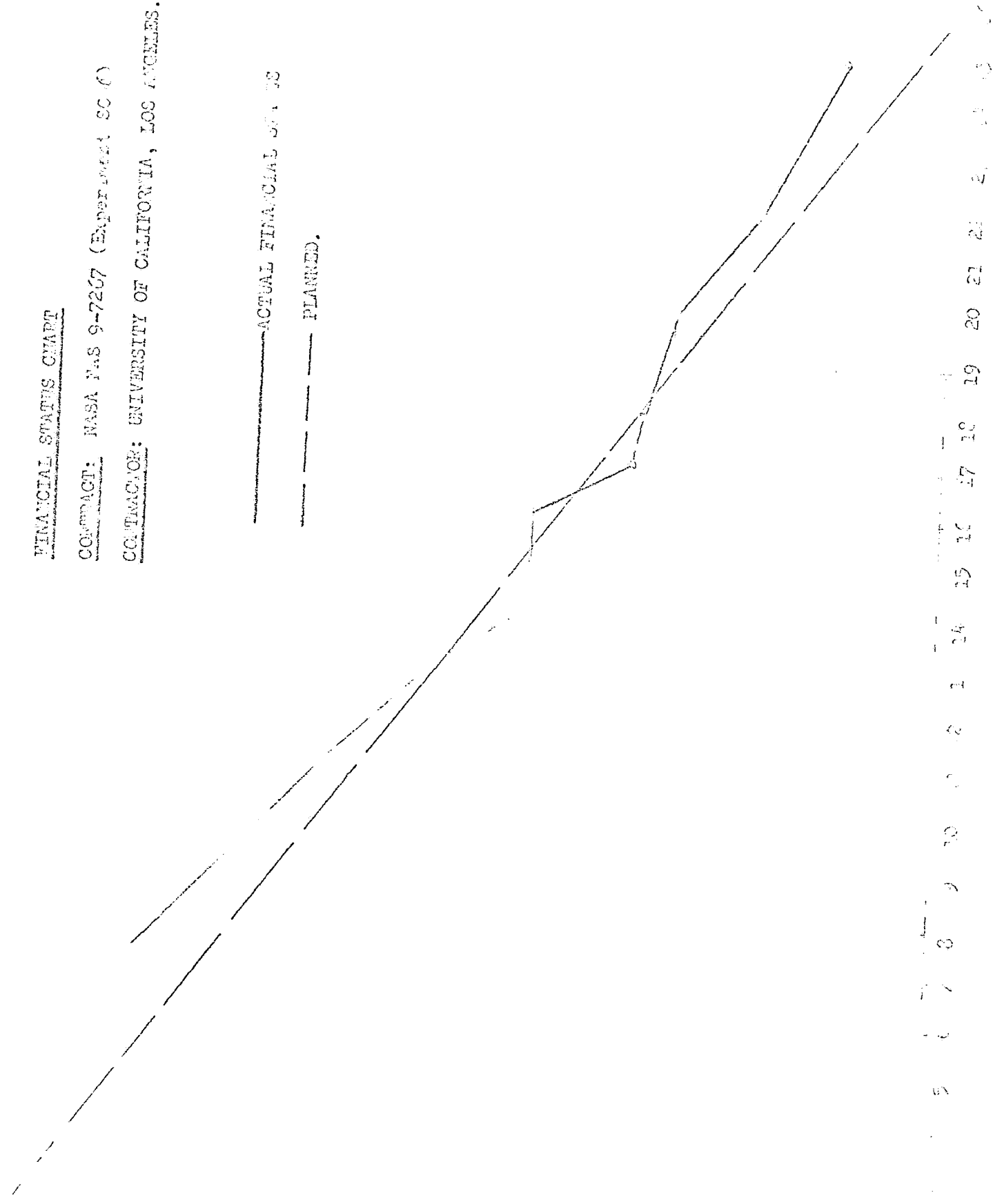
FINANCIAL STATUS CHART

CONTRACT: NASA NAS 9-7267 (Experiment SC 6)

CONTRACTOR: UNIVERSITY OF CALIFORNIA, LOS ANGELES.

----- ACTUAL FINANCIAL STATUS

- - - - - PLANNED.



DATE: February 5, 1968
LOG NO.: 2-68-115
MEMORANDUM TO: NASA-Manned Spacecraft Center
FROM: Paul A. Lang
SUBJECT: Monthly Progress Report January 1 - 31, 1968

1. During January 1968, General Electric Co. submitted to this office:

- a. the last Weekly Progress Report (LOG NO. 1-68-112);
- b. Progress Report No. 4, Final Report "Experiment S046 - Visible Radiation Polarization Measurement, Phase C" (26 copies, LOG NO. 1-68-113);
- c. 24 sets of all deliverable items as set forth by the contract (documentation, reports, etc.) pertaining to the Phase C program;
- d. one Phase C mockup unit for the S046 Experiment.

2. Mr. Lang carried out his duties pertaining to the project engineering and management of the experiment; Dr. Hariharan and Mr. Stephens applied their efforts to completing their respective project assignments.

3. Work is now in progress writing and preparing for submittal to NASA all required documentation, reports, etc., of the UCLA effort connected with the Phase C experiment. This final UCLA report and related documentation will be completed by February 9 and forwarded immediately thereafter to NASA-MSC.

4. The Final Report Meeting, attended by representatives of GE, UCLA and NASA was held February 1-2 at UCLA (LOG NO. 2-68-114).

This meeting represents the end of GE's work on Phase C of Experiment S046, and, upon completion and submittal of items described in Paragraph 3 above, the end of UCLA's effort on the project.

5. As recorded in the attached UCLA Financial Status Report and Financial Status Chart, all funding received by UCLA from NASA under contract NAS 9-7267 has been used up. Consequently, concern is being expressed by all participants in the S046 Experiment regarding the lack of funding for the gap created by the indefinite postponement of Phase D. Unless this problem is resolved immediately, there will be a discontinuation of all work and the loss of the UCLA scientific and engineering personnel presently associated with the S046 program.

6. This is the final UCLA Monthly Progress Report covering the Phase C effort of Experiment S046.

Conclusions.

The submittal to UCLA and the NASA-MSC representative of all deliverable items by General Electric Co., and the acceptance and approval thereof by UCLA and NASA-MSC (LOG NO. 2-68-114) represents the successful conclusion of the GE effort pertaining to Phase C of Experiment S046.

UCLA's effort with regard to Phase C will end with the completion and submittal to NASA-MSC, of the UCLA Final Report and documentation (see Paragraph 3 above). This will take place prior to February 15.

Additional Information.

For more detailed information on items referred to in this report, please refer to LOG NOs:

- 1-68-110
- 1-68-111
- 1-68-112
- 1-68-113
- 2-68-114.

Paul A. Lang
Project Engineer

PAL:jk

Encls.: Financial Status Report
Financial Status Chart
PERT Flow Chart (Mr. R. F. Hergert only)

cc: Professor Z. Sekera
Dr. T. A. Hariharan
Mr. P. A. Lang (2)
Mr. R. F. Hergert (3)
Dr. H. L. Richter, Jr.
Mr. P. W. Robinson
Mr. R. B. Shaw
Mr. J. Belsha
File

FINANCIAL STATUS REPORT

ACCT NAME & NO. NAS 9-7267 SEMPERA
 MONTH ENDING 1-31-68

PREVIOUS BALANCE	EXPENDITURES	ENCUMBRANCE	TRANSFERS	CURRENT BALANCE	BEGINNING APPROPRIATION	CUMULATIVE EXPENDITURES	% FUNDS EXPENDED	AT PRESENT RATE FUNDS WILL RUN
31,281.00	32,401.22		1,112.31 cr	7.91 dr	31,281.00	32,401.22		
5,700.00	3,065.62	822.90	1,313.43 dr	418.05	5,700.00	3,065.62		
600.00	771.60		494.80 cr	323.20	600.00	771.60		
3,758.00	3,131.50	258.94		367.56	3,758.00	3,131.50		
2,461.00	2,312.91		148.08 dr	0-	2,461.00	2,312.91		
95,150.00	94,595.00		555.00 dr	0-	95,150.00	94,595.00		
13,764.00	14,253.41		489.41 cr		13,764.00	14,253.41		
152,714.00	150,531.26	1,081.84	0-	1,100.90	152,714.00	150,531.26		

SA
 S & E
 S & F
 TRAVEL
 EMPL BNF.
 SUB-CONTRACT
 O.H
 TOTAL

July 1, 1967 to January 31, 1968 7 MONTHS
 GRANT PERIOD TIME ELAPSED

\$ 57,564 (Beginning appropriation)

FINANCIAL STATUS CHART

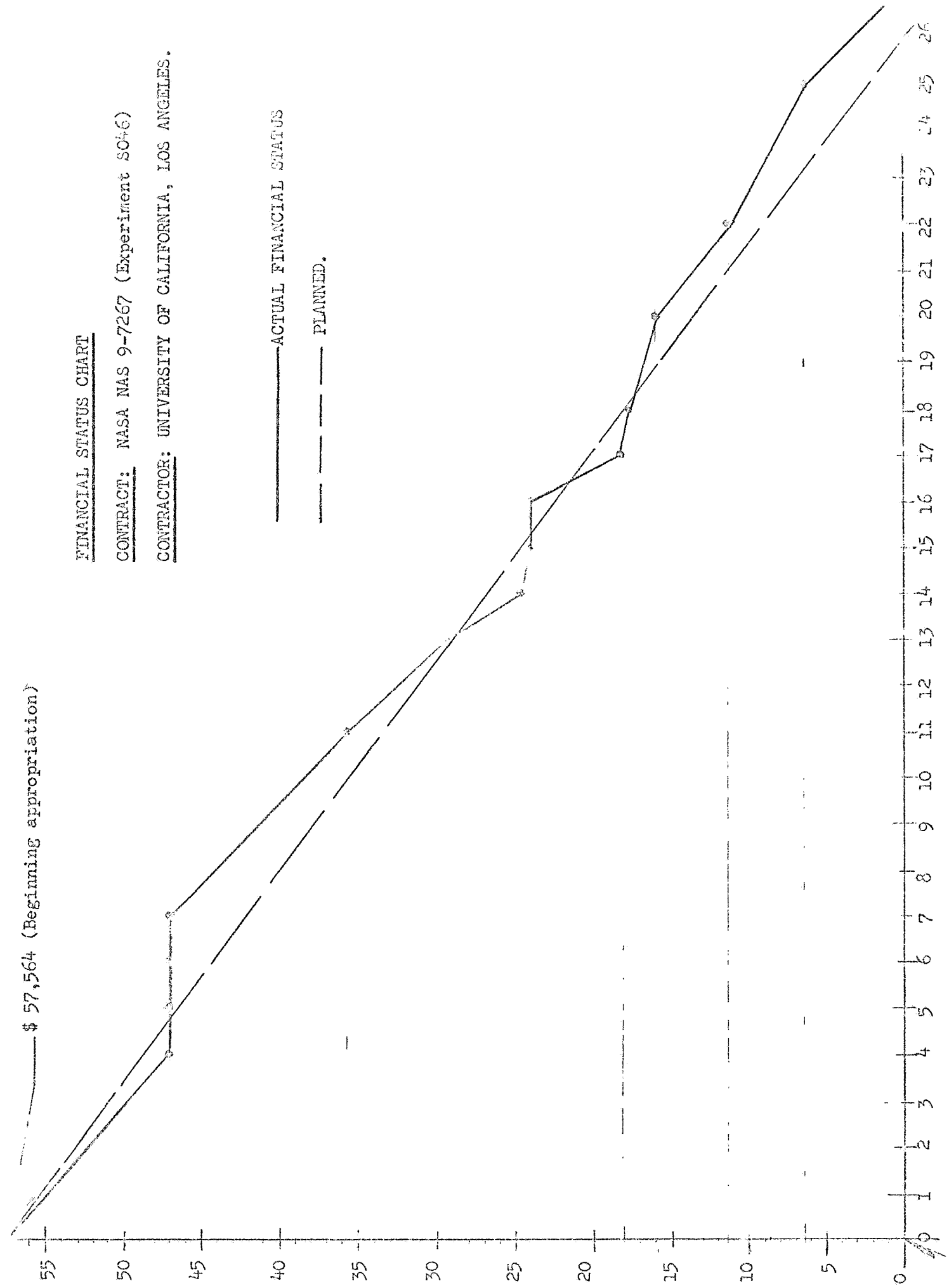
CONTRACT: NASA NAS 9-7267 (Experiment SO46)

CONTRACTOR: UNIVERSITY OF CALIFORNIA, LOS ANGELES.

———— ACTUAL FINANCIAL STATUS

- - - - - PLANNED.

DOLLARS IN THOUSANDS.



- July 1, 1967 (Start)

WEEKS

Conclusions.

All work of both UCLA and GE is proceeding according to schedule, the results are satisfactory, and except for the funding situation described in Paragraph 6 above, there are no major problem areas.

Additional Information.

For additional information on the above items, please refer to:

LOG NOS.: 10-67-82
10-67-83
10-67-85
10-67-85A
10-67-87
10-67-88
10-67-80

Paul A. Lang
Project Engineer

PAL:jk

Encls: Financial Status Report
Financial Status Chart
Manhour Report Chart
PERT Flow Chart (R. F. Hergert only)

cc: Professor Z. Sekera
Dr. T. A. Hariharan
Mr. P. A. Lang (2)
Mr. J. Belsha
Mr. R. F. Hergert (3)
Dr. H. L. Richter, Jr.
Mr. R. B. Shaw
Mr. P. W. Robinson
File

11-67-91

FINANCIAL STATUS REPORT

ACCT. NAME & NO. NASA NGR 9-7267 SEKERA
 MONTH ENDING 10-27-67

PREVIOUS BALANCE	EXPENDITURES	ENCUMBRANCE	TRANSFERS	CURRENT BALANCE	BEGINNING APPROPRIATION	CUMULATIVE EXPENDITURES	% FUNDS EXPENDED	AT PRESENT RATE FUNDS WILL RUN OUT
13,726				13,726	31,281	17,555		
2,347				2,347	5,200	2,857		
26.				26.	1,100	1,074		
2607				2607	3,758	1151		
1280				1280	2,461	1280		
555				555	95,150	94,595		
3572				3572	13,764	10,192		
24,113				24,113	152,714	128,601		

A

B & E

B & F

RAVEL

MPL. BNF.

TOTAL

7-1-67 to 1-31-68
 GRANT PERIOD

16 WEEKS
 TIME ELAPSED

\$ 57,564 (Beginning appropriation)

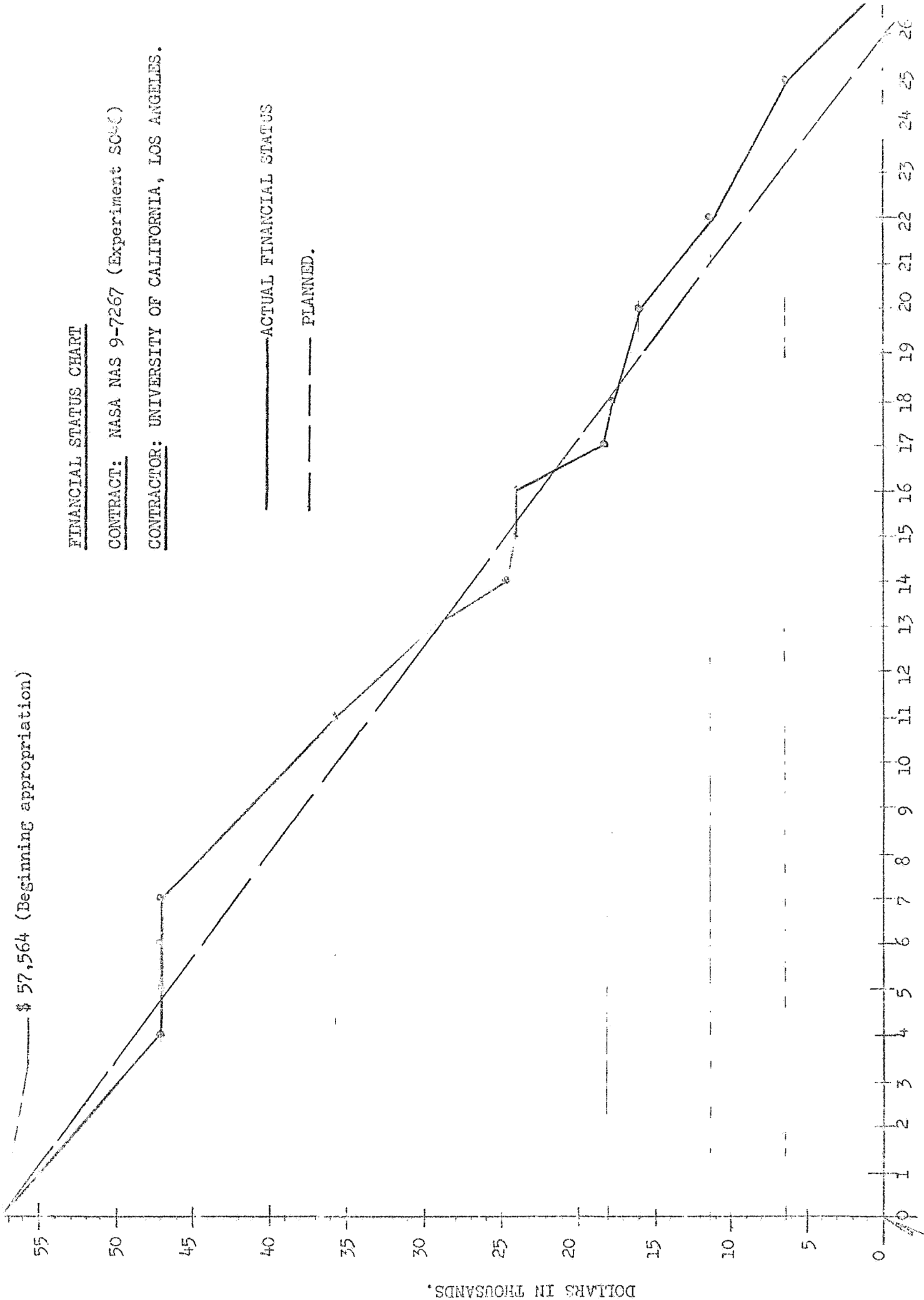
FINANCIAL STATUS CHART

CONTRACT: NASA NAS 9-7267 (Experiment SC4C)

CONTRACTOR: UNIVERSITY OF CALIFORNIA, LOS ANGELES.

— ACTUAL FINANCIAL STATUS

- - - - - PLANNED.



DOLLARS IN THOUSANDS.

July 1, 1967 (Start) - - - - - W E E K S - - - - -

DATE: September 1, 1967
LOG NO.: 9-67-70
MEMORANDUM TO: NASA Manned Spacecraft Center
FROM: Paul A. Lang
SUBJECT: Monthly Progress Report August 1 - 31, 1967

PROGRESS REPORT.

1. The proposals from General Electric, EOS, and Space General were received on schedule and were evaluated per the plan as described in Log Nos. 7-67-47 and 7-67-48. The final evaluation meeting took place August 10, 1967 at which time General Electric was selected as the sub-contractor for Phase C of the S046 experiment.

As of this date, General Electric has not yet officially received notification of the award of contract.

2. The first meeting was held at the GE plant in Valley Forge Pennsylvania on August 28-29, with Mr. Lang and Mr. Belsha representing UCLA. For details of this meeting see Log No. 8-67-67. This meeting was important and useful to both GE and UCLA.

3. Dr. Hariharan has been continuing his work on the aircraft flight experiment data reduction. This task is proceeding according to schedule.

4. Dr. Hariharan and Mr. Stephens are still engaged in performing the modifications and improvements in the aircraft flight instrument. This work is proceeding per schedule.

5. Mr. Lang carried out his duties connected with the project engineering aspects of the experiment.

6. As noted above, the contract has not been officially awarded as yet, and General Electric has expressed fears that unless the contract arrives there by August 31, the original schedule will slip by several weeks, and also that the engineering personnel assigned to the project, and who are now fully familiar with the project, might have to be reassigned to other General Electric projects. Both Mr. Lang and Mr. Belsha immediately contacted MSC and ONR trying to expedite this matter. For action taken, see Los Nos. 8-67-56, -58, -60, -62, -64, -66, -67, -68, and 8-67-69.

CONCLUSIONS.

Except for the delay in awarding the contract for Phase C to General Electric, which might cause a schedule slip of several weeks, all tasks either have been completed or are proceeding according to schedule

FINANCIAL REPORT.

See attached "Financial Status Report".

Paul A. Lang
Project Engineer

PAL jk

Encls.

cc: Dr. Z. Sekera
Dr. T. A. Hariharan
Mr. P. A. Lang
Mr. J. Belsha
Mr. R. F. Hergert (3)
Dr. H. L. Richter Jr.
Mr. R. B. Shaw
Mr. P. Robinson

9-67-70

FINANCIA' STATUS REPORT

ACCT. NAME & NO. NASA 9-7267 SEKEEA
 MONTH ENDING 9-1-67

	PREVIOUS BALANCE	EXPENDITURES	ENCUMBRANCE	TRANSFERS	CURRENT BALANCE	BEGINNING APPROPRIATION	CUMULATIVE EXPENDITURES	% FUNDS EXPENDED	AT PRESENT RATE FUNDS WILL RUN OUT
GA	25,562	6968			18594	31,281	12,687		
S & E	3,222	14030	1185		9520	5700	2,180		
E & F	600				600	600	0		
TRAVEL	3,758		200		3,558	3,758	300		
EMPL BNF.	2,120	696 202			1,424				
TOTAL	555 11,298 47064	3,066 9247	1,385		36,433	95,150 12,764 152,714	94,575 5,582 116,281		

7-1-67 to 1-31-68 9 weeks
GRANT PERIOD TIME ELAPSED

\$ 57,564 (Beginning appropriation)

FINANCIAL STATUS CHART

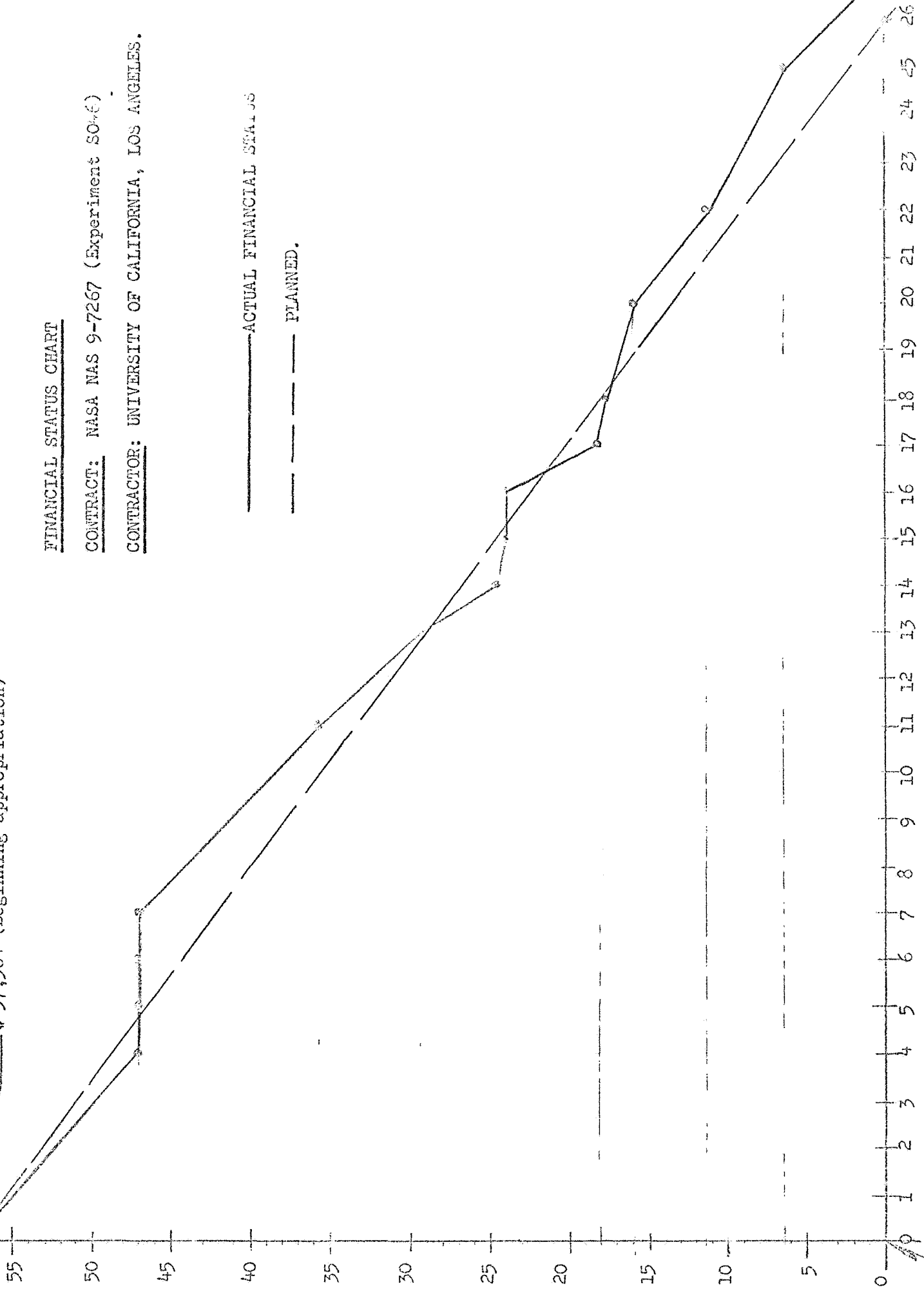
CONTRACT: NASA NAS 9-7267 (Experiment SO-6)

CONTRACTOR: UNIVERSITY OF CALIFORNIA, LOS ANGELES.

———— ACTUAL FINANCIAL STATUS

- - - - PLANNED.

DOLLARS IN THOUSANDS.



- July 1, 1967 (Start) - - - - - WEEKS

\$ 57,564 (Beginning appropriation)

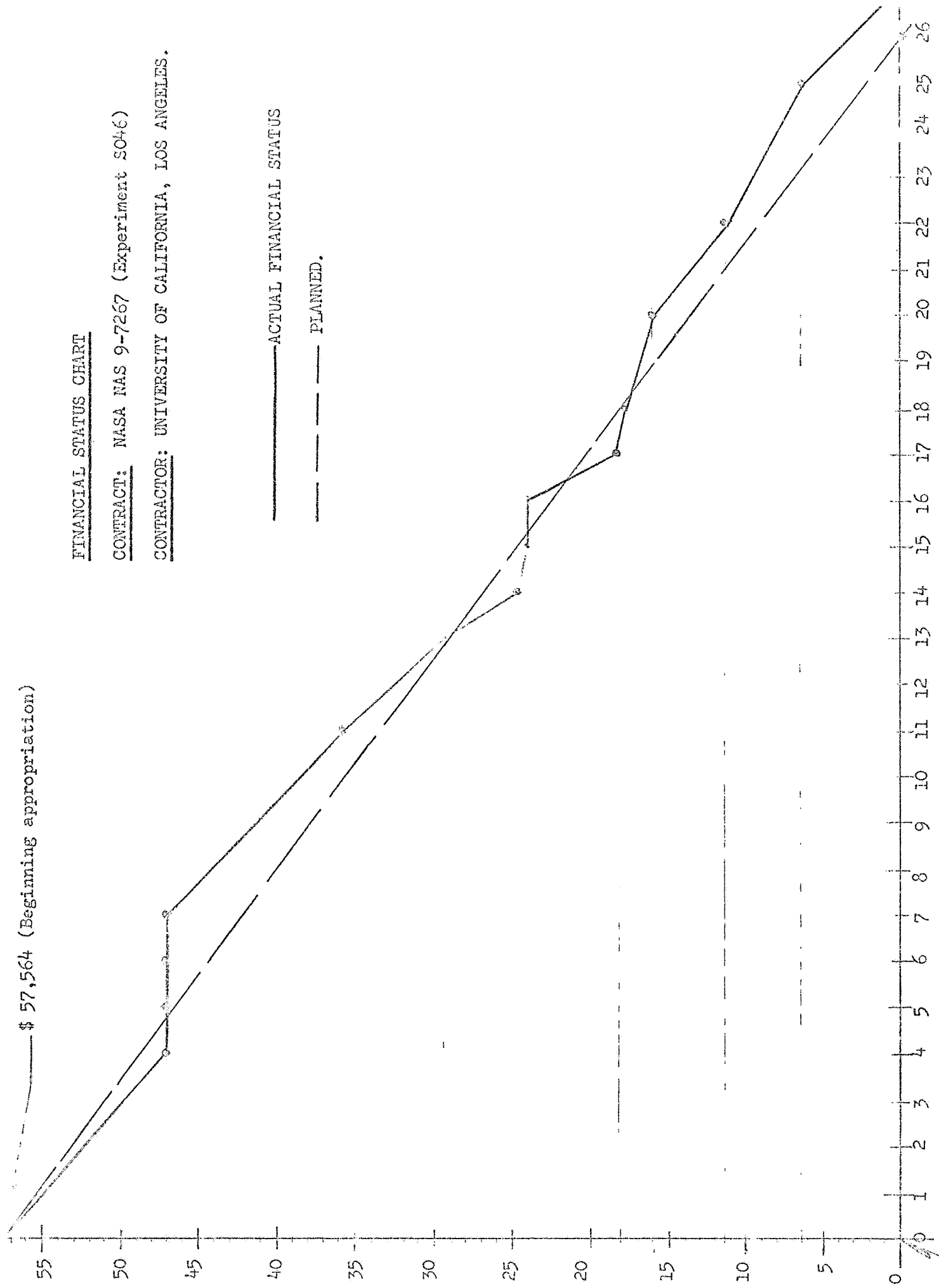
FINANCIAL STATUS CHART

CONTRACT: NASA NAS 9-7267 (Experiment S046)

CONTRACTOR: UNIVERSITY OF CALIFORNIA, LOS ANGELES.

————— ACTUAL FINANCIAL STATUS
- - - - - PLANNED.

DOLLARS IN THOUSANDS.



July 1, 1967 (Start) ----- W E E K S -----

Financial Report.

Financial Status Report and Manhour Report Chart attached.

Additional Information.

For additional information pertaining to items in this progress report, please refer to the following: LOG NO.:

9-67-74
9-67-75
9-67-76
9-67-77
9-67-78
9-67-79.

Paul A. Lang
Project Engineer

PAL:jk

Encls.

cc: Professor Z. Sekera
Dr. T. A. Hariharan
Mr. P. A. Lang (2)
Mr. J. Belsha
Mr. R. F. Hergert (3)
Dr. H. L. Richter Jr.
Mr. R. B. Shaw
Mr. P. Robinson
File

FINANCIAL STATUS REPORT

ACCT NAME & NO. NASA NGR 9-7267 SEKERA
 MONTH ENDING 9-30-67

PREVIOUS BALANCE	EXPENDITURES	ENCUMBRANCE	TRANSFERS	CURRENT BALANCE	BEGINNING APPROPRIATION	CUMULATIVE EXPENDITURES	% FUNDS EXPENDED	AT PRESENT RATE FUNDS WILL RUN OUT
18,533	10,477			8,056	31,281	23,225		
3,537	108			3,429	5,700	2,271		
600				600	600	0		
3,758	388	600		2,770	3,758	988		
1,418	105			1,313	2,461	1,148		
555				555	95,150	94,595		
8,155	4,610			3,545	13,764	19,219		
36,556	15,688	600		20,268	152,714	132,446		

GA

S & E

E & F

TRAVEL

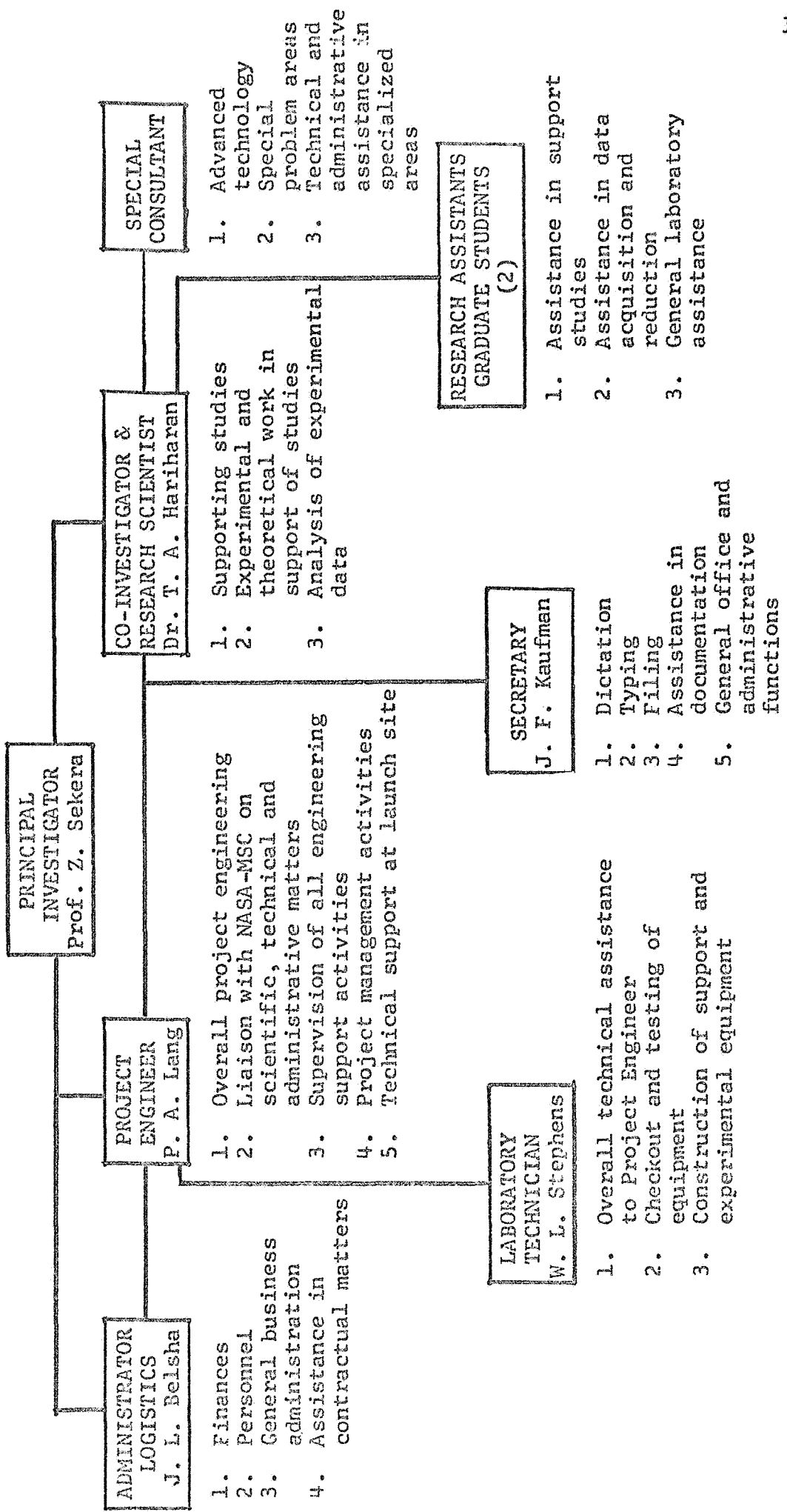
EMPL BNF

SUB-CONTRACT

OVERHEAD TOTAL

7-1-67 To 1-31-68 3 MONTHS
 GRANT PERIOD TIME ELAPSED

UCLA ORGANIZATION CHART



DATE. July 31, 1967
LOG NO: 7-67-49
MEMORANDUM TO. NASA Manned Spacecraft Center
FROM: Paul A Lang, Project Engineer
SUBJECT: Monthly Progress Report -- July 1 - July 31, 1967

PROGRESS REPORT

1. The UCLA proposal to MSC was received by MSC and accepted with certain modifications as described in LOG NOS. 6-67-39 and 6-67-40.
2. The MSC contract for Phase C of Experiment S046 was received by UCLA effective July 1, 1967 and the UCLA Polarimeter project staff is proceeding with its assignments accordingly.
3. The UCLA RFP's to industry were completed on schedule and copies of said documents were forwarded to the following interested companies:

GENERAL ELECTRIC COMPANY
MARSHALL LABORATORIES
ELECTRO-OPTICAL SYSTEMS
SPACE GENERAL CORPORATION

4. Dr. T. A. Hariharan has been devoting his efforts to the data reduction in connection with the aircraft flight experiments; this task is proceeding per schedule.
5. A "Support Studies Report for the period July 1 - July 31, 1967" has been written by Dr. T. A. Hariharan (see LOG NO. 7-67-44).
6. Dr. Hariharan and Mr Stephens have been engaged in performing modifications and improvements in the aircraft flight instrument so that it may be used for the planned ground tests.
7. A major technical presentation was held by EOS, to enable the UCLA project personnel to become acquainted with the approach being considered by the newly formed team of EOS and Beckman Instrument Co (see LOG NO. 7-67-46).
8. With the exception of Marshall Laboratories, who declined to bid, the other companies listed in paragraph 3 above will submit their respective proposals on schedule.
9. Arrangements were made to engage graduate students as required by Dr. Hariharan

10 A plan for the evaluation of proposals from industry has been devised and will be put into effect accordingly (see LOG NOS. 7-67-47 and 7-67-48).

11. A new filing and documentation system has been put into effect in the project offices by means of which optimum efficiency can be achieved in project management.

CONCLUSIONS

As recorded above, the progress of the project is in accordance with the official schedule; no particular or unusual problems have been encountered during this period.

FINANCIAL (BUDGET) REPORT

See attached document, "Financial Status Report" for detailed information.

Paul A. Lang
Project Engineer

PAL:jk

cc: Dr. Z. Sekera
Dr. T. A. Hariharan
Mr. P. A. Lang
Mr. J. Belsha
Mr. R. F. Hergert (3)
Dr. H. L. Richter
Mr. R. B. Shaw
File

Encls.

Financial Status Report
PERT flow chart (shaded area-blocks indicate tasks completed to date)
For more detailed information regarding this report, please refer to the UCLA reports listed below:

LOG NOS: 6-67-39
6-67-40
7-67-41
7-67-42
7-67-43
7-67-44
7-67-45
7-67-46
7-67-47
7-67-48

7-67-49