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265-11001

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

APOLLO

GUIDANCE AND NAVIGATION

Approved Wilton B. Trageser Date 6/7/62
MILTON B. TRAGESER, DIRECTOR
APOLLO GUIDANCE AND NAVIGATION PROGRAM

CLASSIFICATION CHANGE

To **UNCLASSIFIED**

By authority of G.D. Fallis Date 12/3/62
Changed by A. Shirley
Classified Document Master Control Station, NASA
Scientific and Technical Information Facility

G4

(Unclassified Title)
E-1174
Slide Reprints *Copy #3*
Quarterly Management Review Meeting
NASA, in Houston
by
Perry K. Bryant
11 June 1962



INSTRUMENTATION LABORATORY

CAMBRIDGE 39, MASSACHUSETTS

COPY # 5 OF 16 COPIES
THIS DOCUMENT CONTAINS 37 PAGES

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ACKNOWLEDGMENT

This report was prepared under the auspices of DSR Project 55-186, sponsored by the Manned Spacecraft Center of the National Aeronautics and Space Administration through contract NAS9-153.

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C., Sections 793 and 794, the transmission or the revelation of which in any manner to an unauthorized person is prohibited by law.

The publication of this report does not constitute approval by the National Aeronautics and Space Administration of the findings or the conclusions contained therein. It is published only for the exchange and stimulation of ideas.

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AGENDA - MIT

I ORGANIZATION AND PERSONNEL

II FACILITIES

III SUPPORT CONTRACTOR

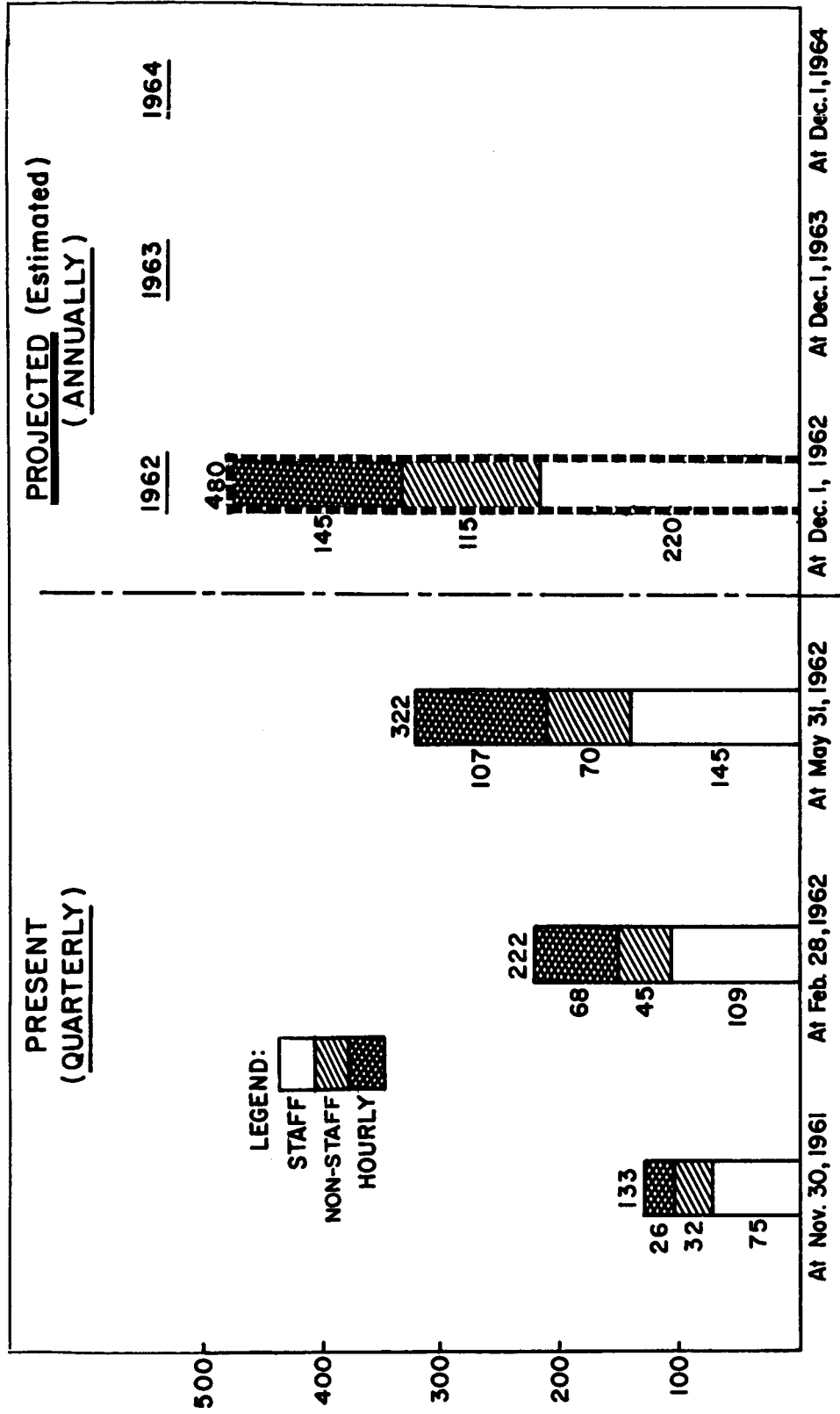
IV FUNDING

V TECHNICAL STATUS



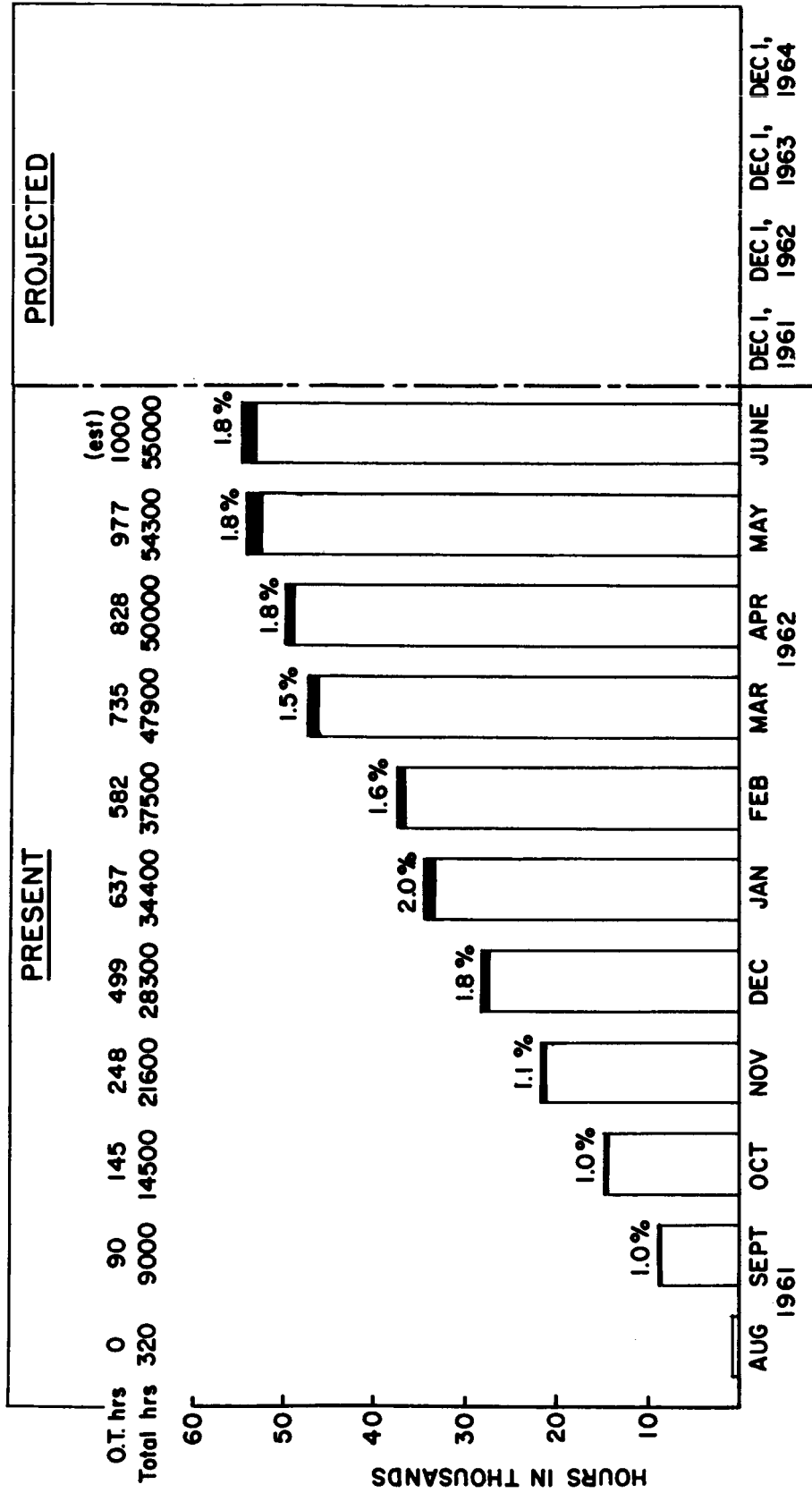
QUARTERLY MANAGEMENT REVIEW MEETING JUNE 11, 1962
M.I.T. INSTRUMENTATION LABORATORY

NUMBER OF PERSONNEL (Equivalent - by type)



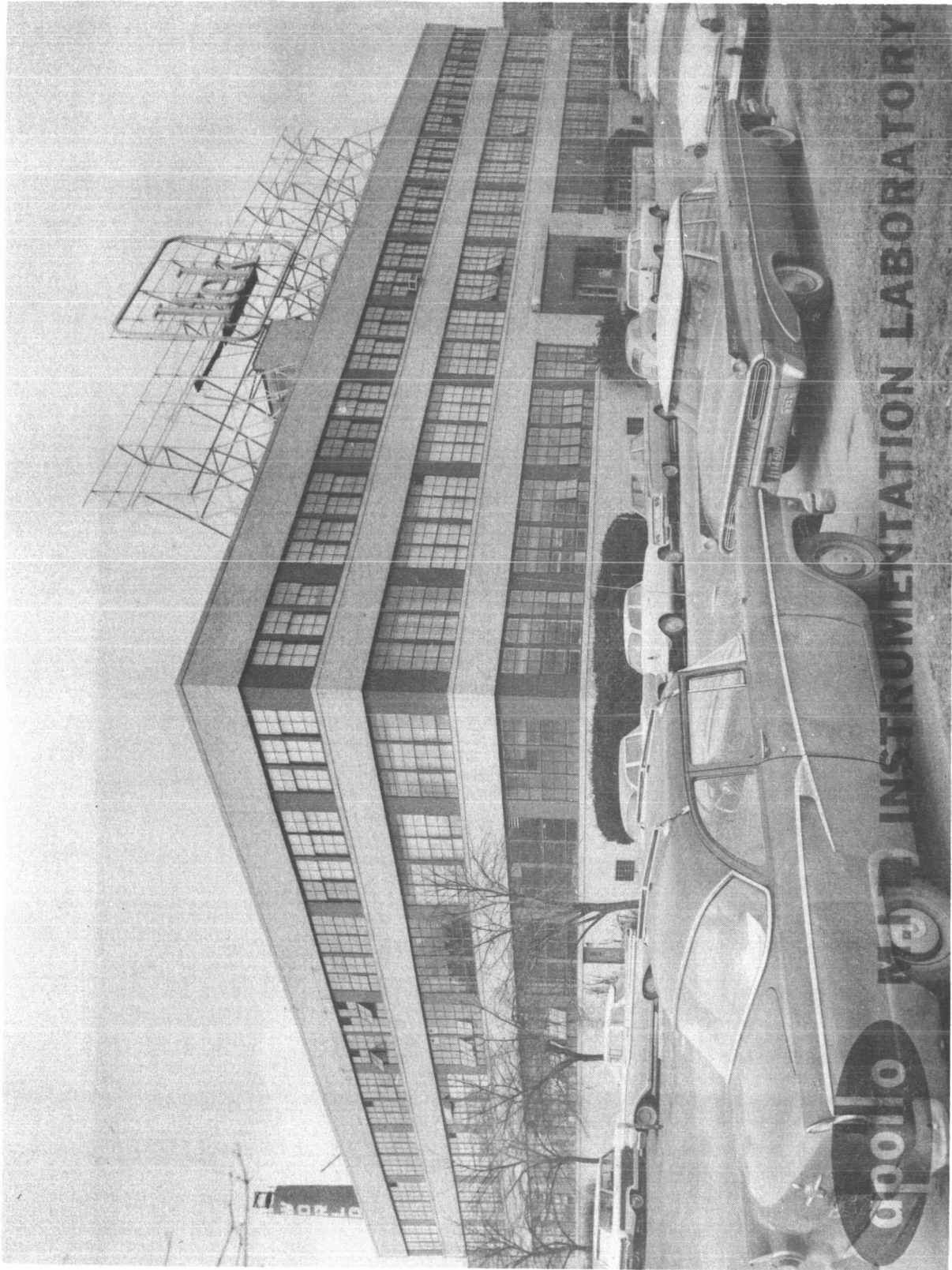
QUARTERLY MANAGEMENT REVIEW MEETING - NASA
M.I.T. INSTRUMENTATION LABORATORY
6078-70
 JUNE 11, 1962

OVERTIME HOURS (Premium) vs. TOTAL HOURS



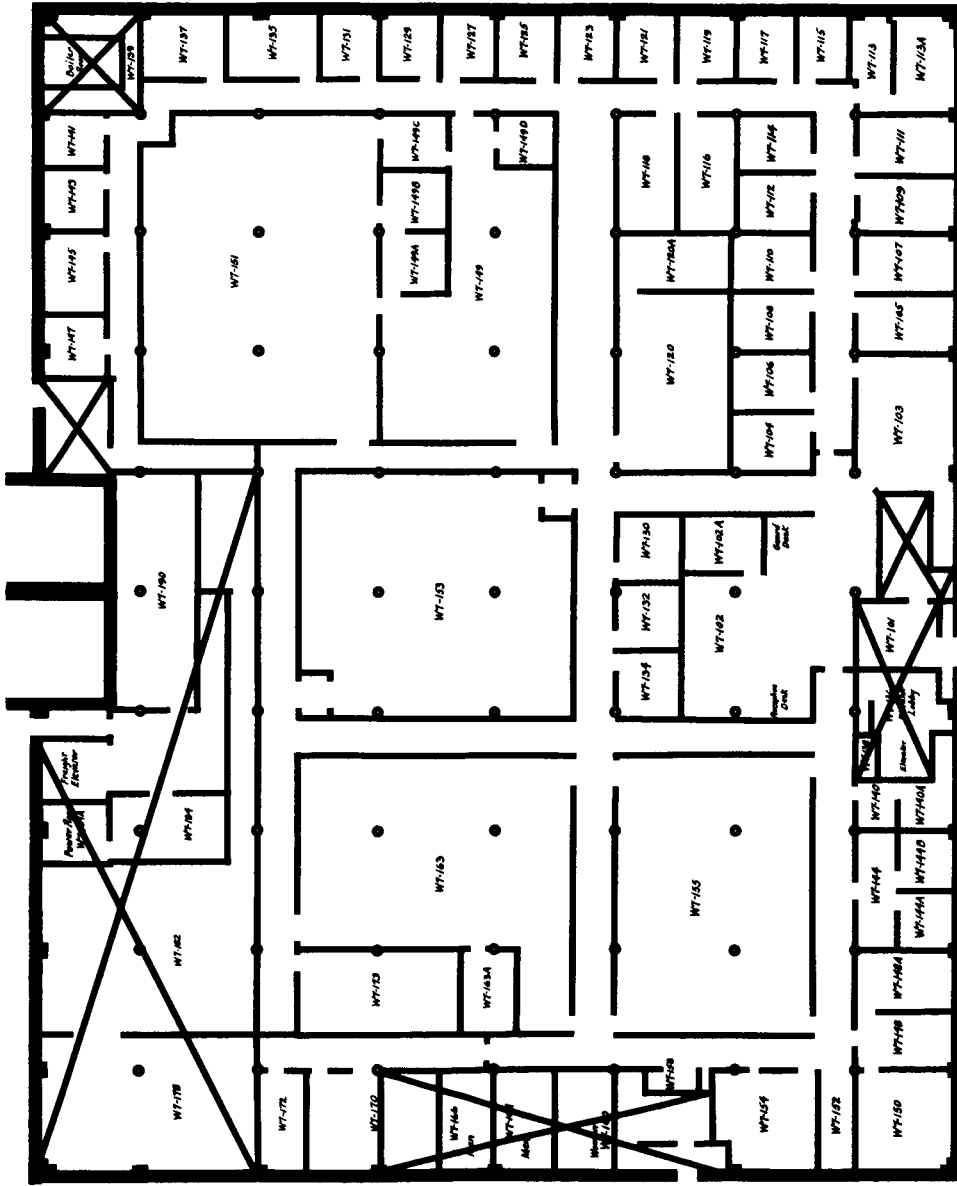
QUARTERLY MANAGEMENT REVIEW MEETING-NASA
M.I.T. INSTRUMENTATION LABORATORY
6098-9

JUNE 11, 1962



APOLLO

QUARTERLY MANAGEMENT REVIEW MEETING



1st

APPROX. SQ. FT.
MAY 31, 1962

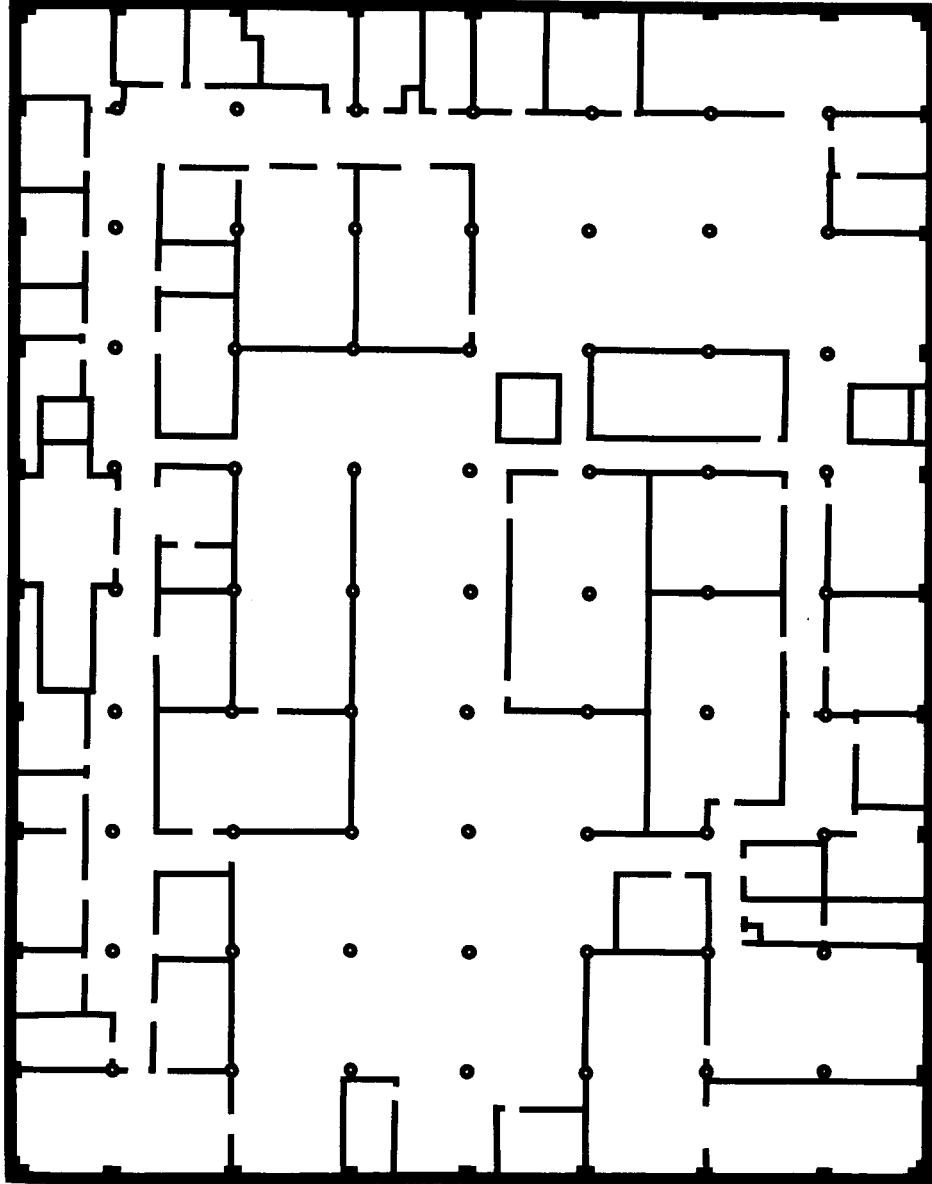
TOTAL	32,000
LAB	3,850
OFFICE & OTHER	18,590
UNUSED	—
NOT APOLLO	9,560

74-6098-3

NOTE: X NOT APOLLO
MIT INSTRUMENTATION LABORATORY
75 CAMBRIDGE PKWY. FIRST FLOOR (ITEK BLDG.)
JUNE 11, 1962

APOLLO

QUARTERLY MANAGEMENT REVIEW MEETING



2nd

APPROX. SQ. FT.
MAY 31, 1962

TOTAL	32,000
LAB	—
OFFICE & OTHER	—
UNUSED	32,000
NOT APOLLO	—

17 6098-2

NOTE: NOT APOLLO

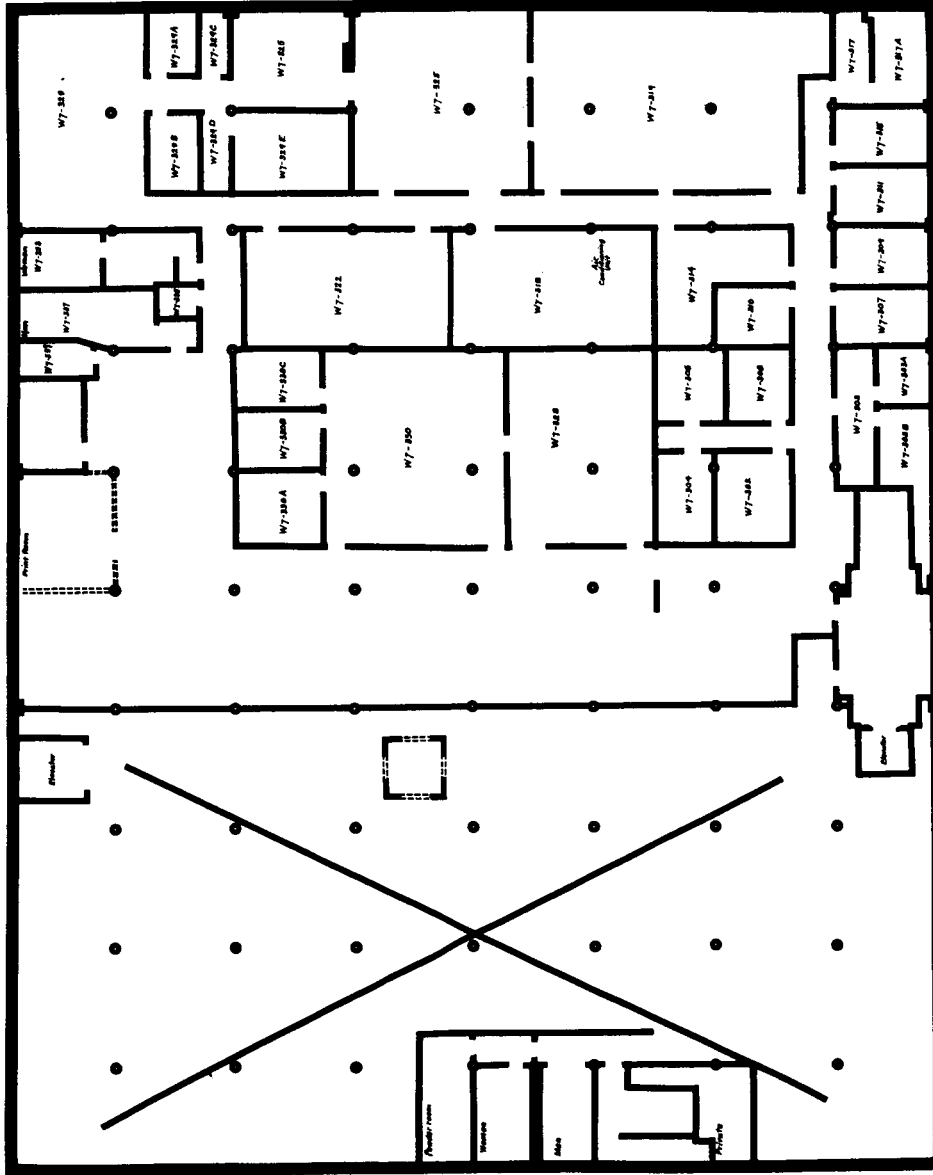
MIT INSTRUMENTATION LABORATORY

75 CAMBRIDGE PKWY. SECOND FLOOR (ITEK BLDG.)

JUNE 11, 1962

APOLLO

QUARTERLY MANAGEMENT REVIEW MEETING



3d

APPROX. SQ. FT.
MAY 31, 1962

TOTAL	32,000
LAB	—
OFFICE & OTHER	—
UNUSED	16,000
NOT APOLLO	16,000

78 6089-1

NOTE: — NOT APOLLO
MIT INSTRUMENTATION LABORATORY

75 CAMBRIDGE PRKY. THIRD FLOOR (ITEK BLDG.)

JUNE 11, 1962

TECHNICAL DIRECTIVE

Work to be accomplished by: XYZ Co.

Contract No. : _____

Title: Computer Test Set Directive Number: MIT-T. D. X-1

Engineering Contact _____ Division Dir. Approved _____

Instrumentation Lab: J. Smith Ext. 3961
Contractor: A. Brown (L. Doe) Ext. 2593 (2550)

Description of Effort

1. Fabricate one Computer Test Set according to MIT Dwg. 0000, Rev. C.
2. Perform final acceptance tests in accordance with test procedures outlined in MIT ltr dated Jan. 1, 1962.
3. Delivery date as shown below.
4. NASA-PERT planning and reporting is required.
5. Costs for this T. D. not to exceed \$100,000.00

S A M P L E

Delivery Date: July 31, 1962 (if applicable)

Manpower Estimate in Man Hours

Engineers _____ Other (Specify): _____
Technicians _____
Draftsmen _____
Manufacturing _____

Issued by: P. K. Bryant (MIT) Date 4/11/62

NASA Technical Approval: J. Barnard (NASA) Date 4/12/62

NASA C.O. Approval: M. Holzman (NASA) Date 4/12/62

Accepted by: A. Banon (Part. Contr.) Date 4/15/62

Completed by: J. Rice (Part. Contr.) Date 6/1/62

Confirmed by: J. Smith (MIT) Date 6/6/62

TYPICAL PAGE FOR PROPOSED SYSTEM IDENTIFICATION DATA LIST (SIDL)

DOC. TYPE	DOCUMENT NUMBER	REV. LTR.	ID. NO.	DATE OF ISSUE		DOCUMENT DESCRIPTION	M. I. T. APP. CODE	COMPLETE THRU RD.		STAT. CODE
				MAY 19 62				ASSEMBLY	SYSTEMS C/I	
1	D2318113	E 353 E 763				MYLAR FILM MASTER RD/E-353A RETRFIT RD/E763A	22 15	2099231	05 15 06 15	2 2
1	D2318114	E 353 E 763				MYLAR FILM MACHINED RD/E-353A RETRFIT RD/E763A	22 15	2099231	05 15 06 15	2 2
1	C2318772	E				TERMINAL STUD, OBSOLETE				
1	J2318914	E 410				ENCODER SHAPER AGC ELECTRICAL SCHEMATIC	07		05 15	2
1	J2401995	AE 686				MATRIX ASSY. ADA-LESS GIMBAL SERVO	22		05 15	2

DOCUMENTATION TYPE

DOCUMENT NUMBER (SELF EXPLANATORY)

REVISION LETTER (WHEN APPLICABLE)

REVISION NUMBER

TITLE OF DOCUMENT OR DESCRIPTION OF CHANGE

M.I.T. ENGINEER APPROVAL CODE
THE M.I.T. ENGINEER RESPONSIBLE FOR TECHNICAL RELEASE TO THE CHANGE CONTROL BOARD

ASSEMBLY OR SUB ASSEMBLY

CUT-IN AND CUT-OUT BY SYSTEM SERIAL NUMBER

CUT-IN AND CUT-OUT BY COMPONENT SERIAL NUMBER

DOCUMENT STATUS CODE

119



QUARTERLY MANAGEMENT REVIEW MEETING
M.I.T. INSTRUMENTATION LABORATORY
JUNE 11, 1962
TP-6096-14

**CHANGE CONTROL BOARD
APOLLO GUIDANCE AND NAVIGATION**

ISSUANCE AND REVISION

RD/.....

1. TITLE

DWG. AFFECTED:

2. DESCRIPTION OF CHANGE:

3. REASON FOR CHANGE

4. OTHER APPLICABLE DOCUMENTS:

5. NEXT HIGHER ASSEMBLY AFFECTED

6. INTERFACE AFFECTED:

7. ACTIVITIES AFFECTED:

8. UNIT OR AGE EFFECTIVITY:

9. PREPARED BY: DATE

**CHANGE CONTROL
BOARD APPROVAL**

11. DATE

10. DESIGN APPROVAL (IL/MIT) DATE

12. IL/MIT DATE

13. NASA/STG APPROVAL DATE

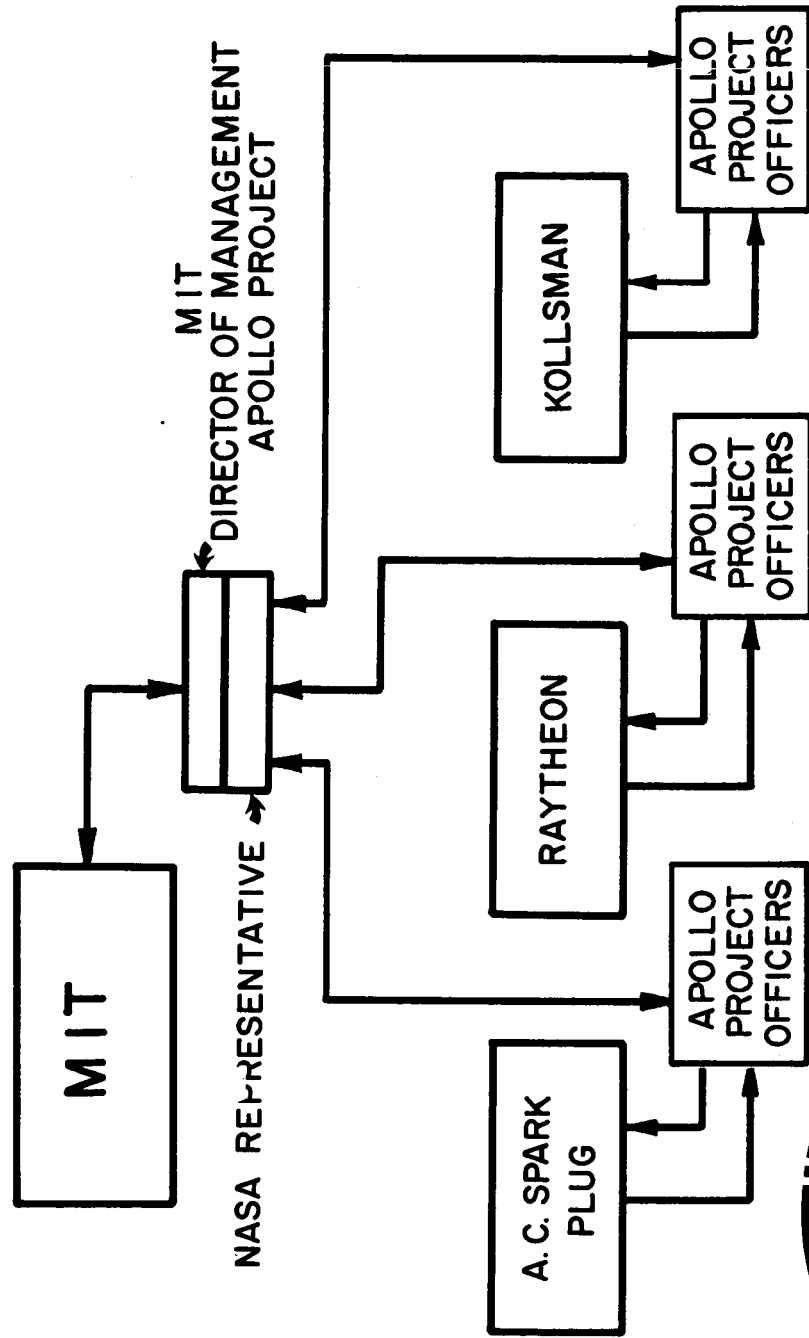
RD/.....
DWG. AFFECTED:

14. CONTRACT

PROPOSED ISSUANCE AND REVISION FORM

6098-13

TECHNICAL DIRECTIVE CONTROL



M.I.T. INSTRUMENTATION LABORATORY

TP 6038-II REVISED 7 JUNE 1961

CHANGE CONTROL BOARD PROCEDURE

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TOTAL

CHAIRMAN - MIT

MEMBERSHIP

NASA - 1 PERMANENT

MIT

1 PERMANENT

1 ROTATING

PARTICIPATING CONTRACTORS

1 EACH - PERMANENT

1 EACH - ROTATING

GOVERNMENT INSPECTORS

1 FOR EACH CONTRACTOR

PROCEDURES

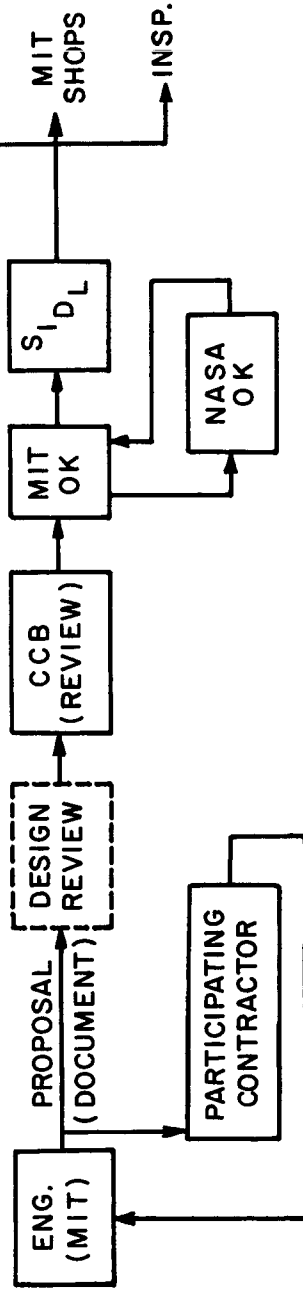
1

2

6

3

CONTR.
MIT SHOPS
INSP.



M.I.T. INSTRUMENTATION LABORATORY

TP 6038-10 REVISED 7 JUNE 1961

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~~THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18, U. S. C., SECTIONS 793 AND 794, AND IS INTENDED TO BE CONTROLLED BY THE EXPORT ADMINISTRATION REGULATIONS TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.~~

TECHNICAL DIRECTIVES (PARTICIPATING CONTRACTORS)

COMPANY	A. C. SPARK PLUG (Div. of Gen. Motors)		RAYTHEON COMPANY		KOLLSMAN INSTRUMENT CORP.	
	DIR. NO.	TITLE	DIR. NO.	TITLE	DIR. NO.	TITLE
	A-1	APOLLO PROJECT OFFICE	R-1	APOLLO PROJECT OFFICE	K-1	APOLLO PROJECT OFFICE
	A-2	DEVELOPMENT PLAN	R-2	DEVELOPMENT PLAN	K-2	DEVELOPMENT PLAN
	A-3	RELIABILITY IMPLM. PLAN	R-3	RELIABILITY IMPLM. PLAN	K-3	RELIABILITY IMPLM. PLAN
	A-4	QUALITY ASSURANCE PROGRAM	R-4	QUALITY ASSURANCE PROGRAM	K-4	QUALITY ASSURANCE PROGRAM
	A-5	WELDING SPECIFICATIONS	R-5	WELDING SPECIFICATIONS	K-5	ENGINEERS RESIDENT AT M.I.T.
	A-6	DOCUMENTATION CONTROL PROCEDU'S	R-6	DOCUMENTATION CONTROL PROCEDU'S	K-6	DOCUMENTATION CONTR'L PROCEDU'S
	A-7	IMU ELECTRONICS FACILITIES (WAKEFIELD)	R-7	RESIDENT ENGINEERS AT M.I.T.		
	A-8	IMU ELECTRONICS RESIDENCE ENGINEERS	R-8	CORE ROPE TESTER		
	A-9	RESIDENT ENGINEERS AT M.I.T.				
	A-10	ENGINEER RESIDENT AT M.I.T.				
	A-11	ENGINEERING RESIDENT AT M.I.T.				
NO. OF PERSONNEL (Through Aug 31, 1962) (Excludes Directives for which estimates are not available - approx. 18 equiv. staff person'l)						
STAFF	14		3		4	21
NON STAFF	--		--		--	--
HOURLY	--		--		--	--
TOTALS	<u>14</u>		<u>3</u>		<u>4</u>	<u>21</u>



QUARTERLY MANAGEMENT REVIEW MEETING - NASA
M.I.T. INSTRUMENTATION LABORATORY
6098 - 4

JUNE 11, 1962

SUB-CONTRACT AND MATERIAL AND SERVICES STATUS AT APRIL 30, 1962

Dollars in Thousands

VENDOR	ITEM	ORIGINAL TOTAL VALUE	ALLOCATED	AMOUNT INVOIC'D OR CHRG IN	DATE FUNDED TO
SUB-CONTRACT					
ARCON CORP.	EVAL. OF APOLLO NAV. GUIDANCE COMPUTER	\$ 43.9	\$ 43.9	\$ 19.6	MAY 14, 1962
ILIKON	TESTING OF GEARS AND OPTICAL PARTS IN A HIGH VACUUM ENVIRONMENT	200.8	80.	32.2	OCT 31, 1962
NORTRONICS	CONSTRUCTION OF A PRECISION WORM-GEAR TRAIN	85.6	30.	—	JULY 20, 1962
CRYO THERM	DEV. OF A HIGH CAPACITY HEAT STORAGE - CHEMICAL MATERIALS	8.7	8.7	—	MAY 30, 1962
	SUB-TOTAL (SUB-CONTRACTS)	\$ 339.	\$ 162.	\$ 51.8	
MATERIALS AND SERVICES (\$10,000 OR MORE - SINGLE ORDER)					
AUTONETICS, INC.	VERDAN COMPUTERS	\$ 199.3	\$ 199.3	\$ 199.3	—
WASH. ENG. SRVCE	DOCUMENTATION	54.1	54.1	54.1	—
JACKSON & MOREL'D	MACHINE DESIGN SERVICE	43.	43.	43.	—
BOSTON FILTER	AIR CONDITIONERS - FOR FOUR LABS	19.4	19.4	19.4	—
RAZDOW LABS	MONITORING SYSTEM	18.	18.	18.	—
NRC EQUIP.	HIGH VACUUM CHAMBER	18.	18.	18.	—
LAB FOR EL'CTRNC'S	MEMORY DEVICE	13.4	13.4	13.4	—
SPEEDRING CORP.	MACHINED PARTS	11.	11.	11.	—
F W DIXON	APOLLO VEHICLE MOCK-UP	10.	10.	10.	—
	SUB-TOTAL (MAT'L & SERVICES)	\$ 386.2	\$ 386.2	\$ 386.2	—
	TOTALS	\$ 725.2	\$ 548.8	\$ 438.	



QUARTERLY MANAGEMENT REVIEW MEETING
M.I.T. INSTRUMENTATION LABORATORY
TP 6098-7

JUNE 11, 1962

**SUBCONTRACTS AND SUPPORTING MIT LABS
EQUIPMENT AND SERVICES**

ITEM	AMOUNT (DOLLARS)	APPROX. MONTH (1962)
PIPA TEST CONSOLES	346,000	JULY
DEVELOPMENT OF SEMI-CONDUCTOR NETWORK TO BE USED IN AGC	200,000	AUG.
ENV. TESTING OF COMPUTER COMPONENTS	150,000	SEPT.
TELEMETRY DATA REDUCTION EQUIPMENT	100,000	OCT.
MACHINE DESIGN, EDITORIAL & PUBLICATIONS	253,000	NOV.
COMPUTER RENTAL CHARGES	161,500	—
ELECTRON MICROSCOPY	2,000	—
OTHERS	75,000	NOV.
TOTAL	1,287,500	



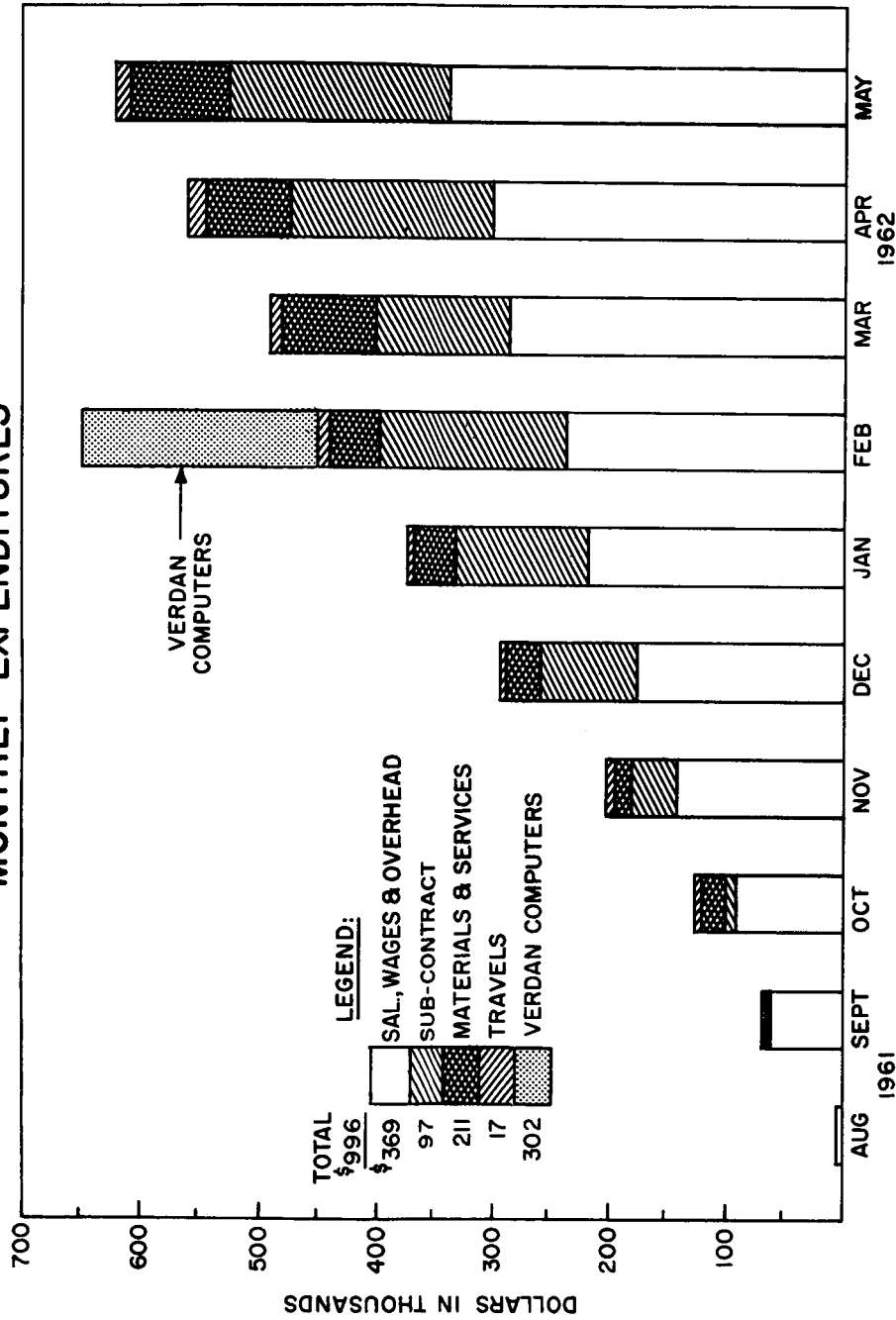
QUARTERLY MANAGEMENT REVIEW MEETING - NASA

JUNE 11, 1962

M.I.T. INSTRUMENTATION LABORATORY

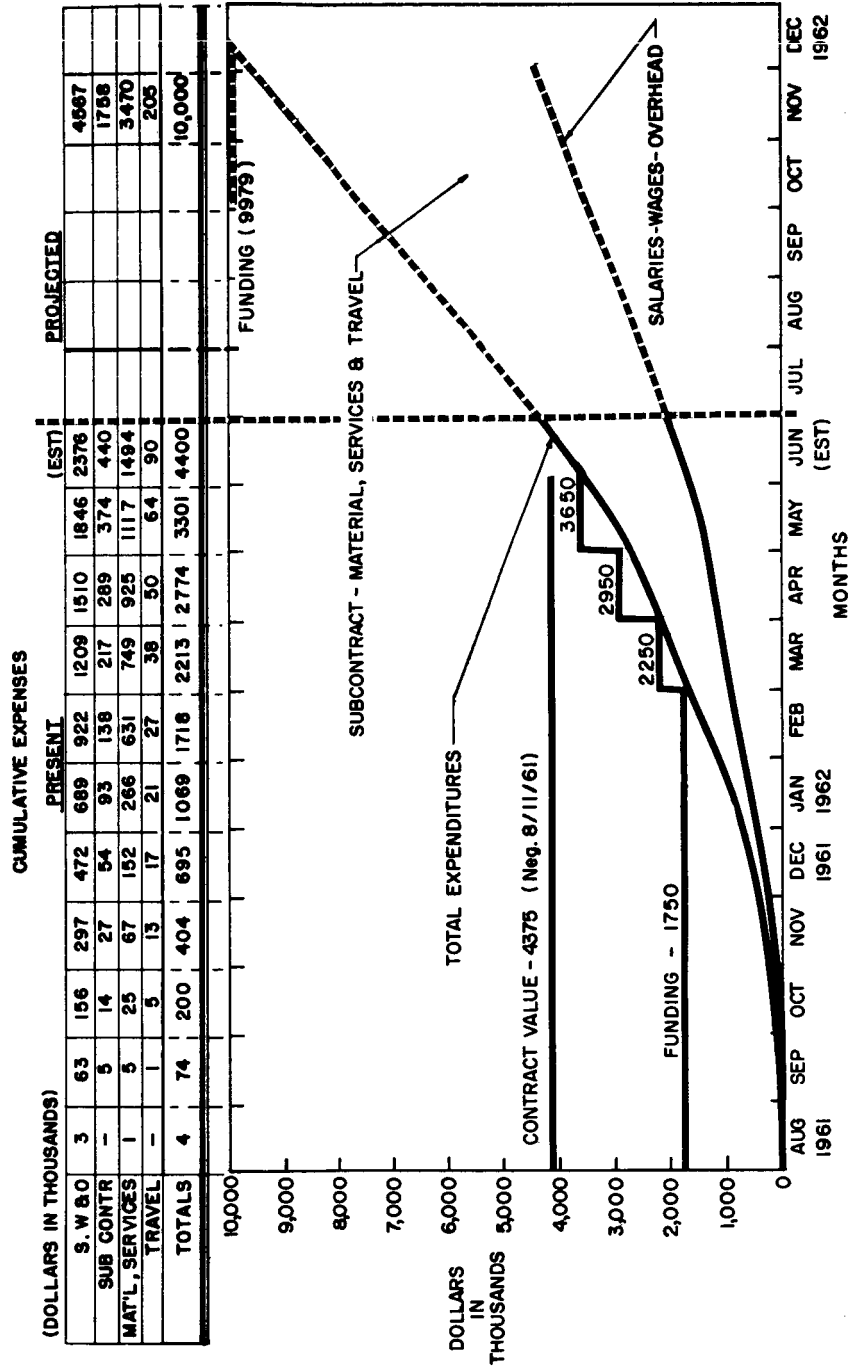
5098-6

MONTHLY EXPENDITURES

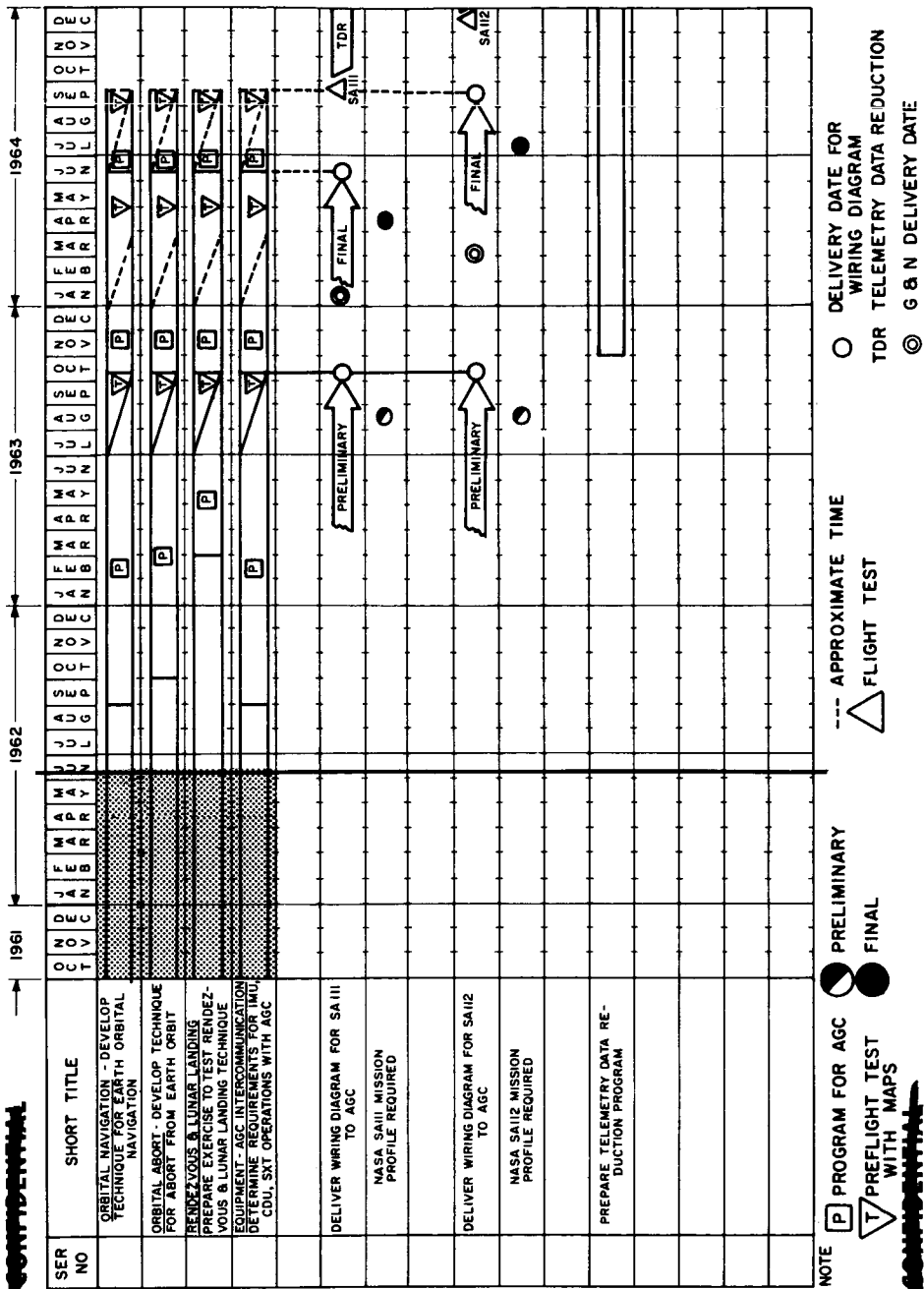


QUARTERLY MANAGEMENT REVIEW MEETING - NASA
 JUNE 11, 1962
M.I.T. INSTRUMENTATION LABORATORY
 6-118-11

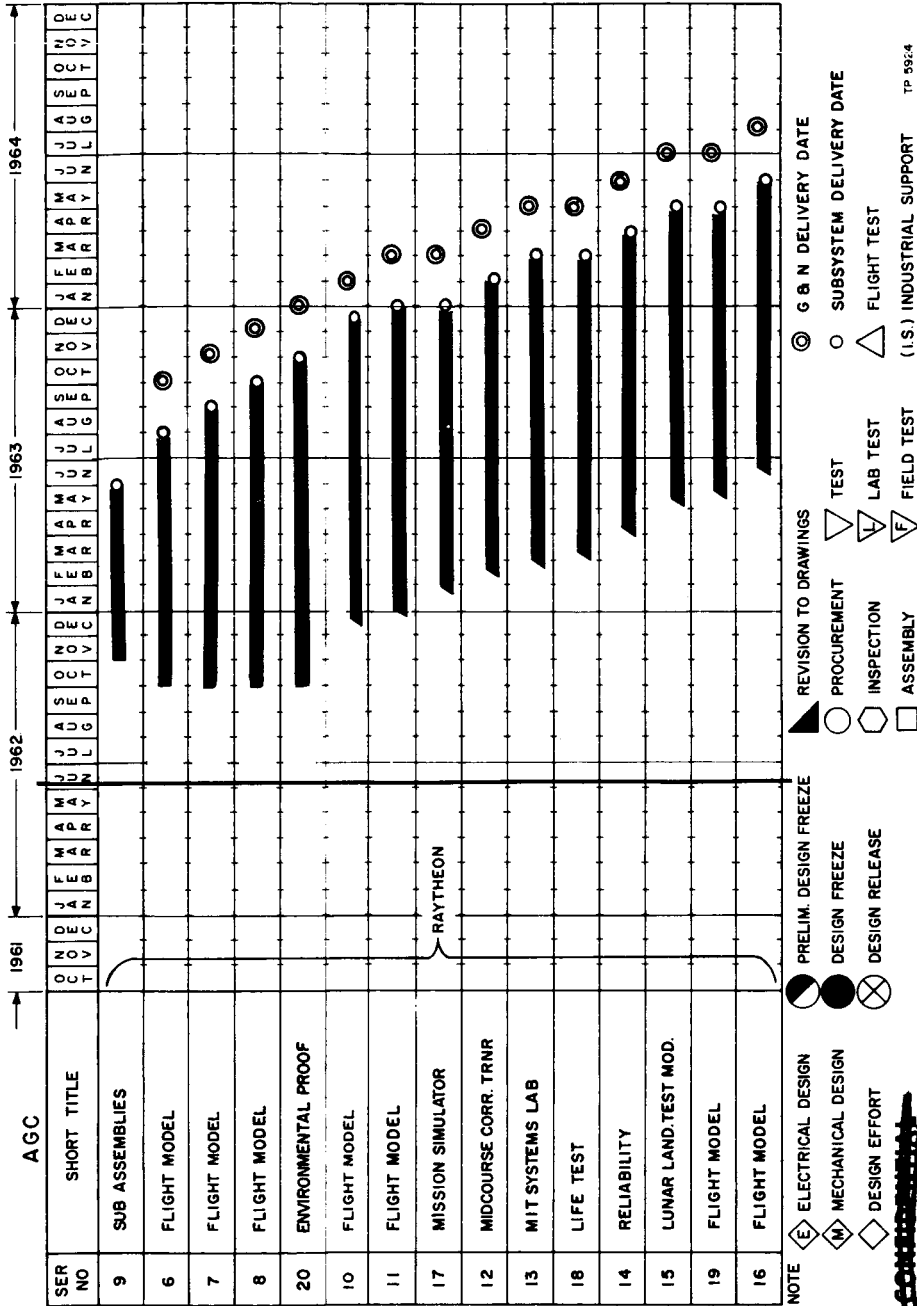
EXPENDITURES (Dollars in Thousands) EXPENDITURES AND FUNDING



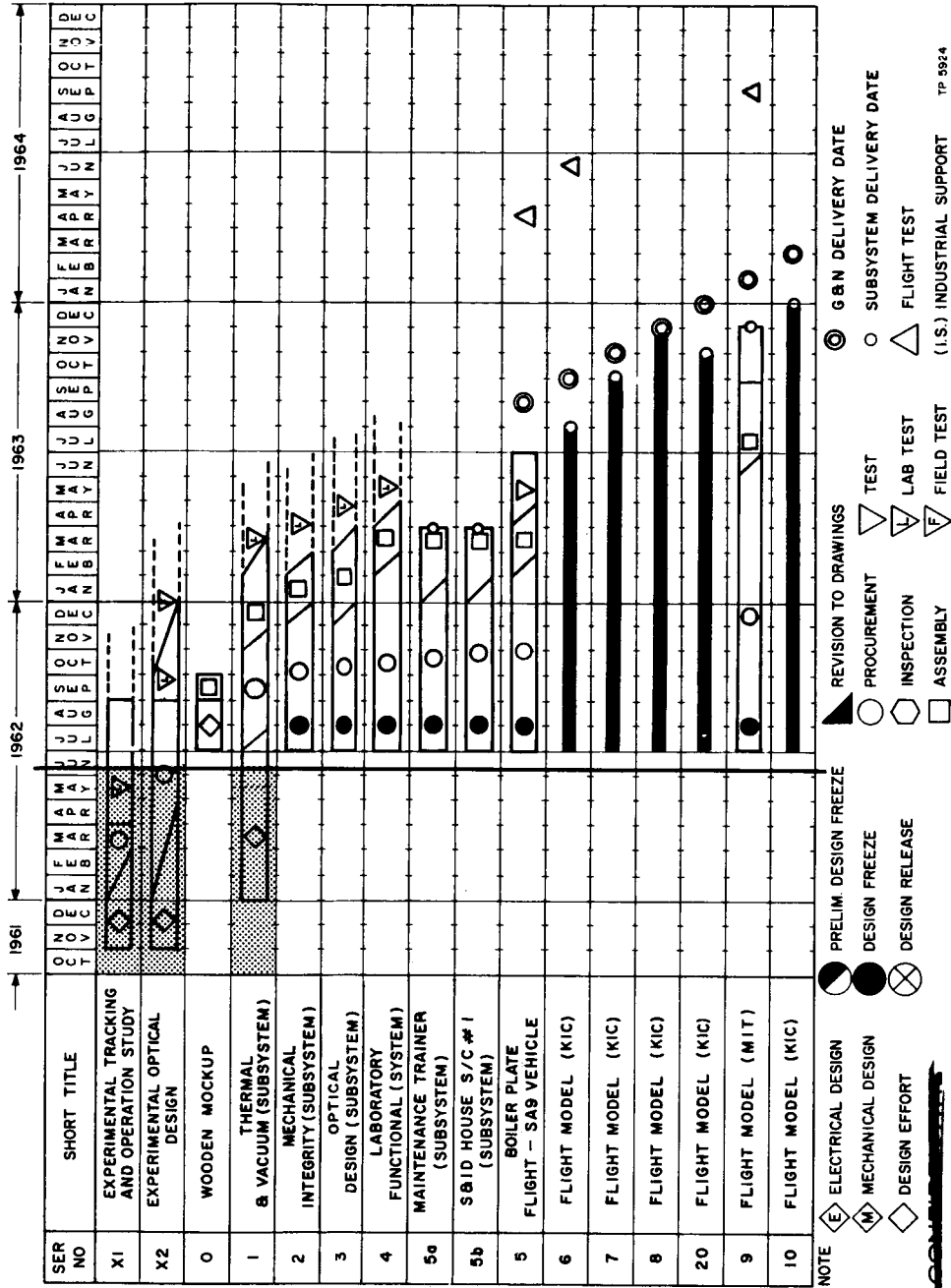
APOLLO MILESTONE CHART FOR GUIDANCE THEORY AND PROGRAMMING (EARTH ORBITAL MISSIONS), Continued



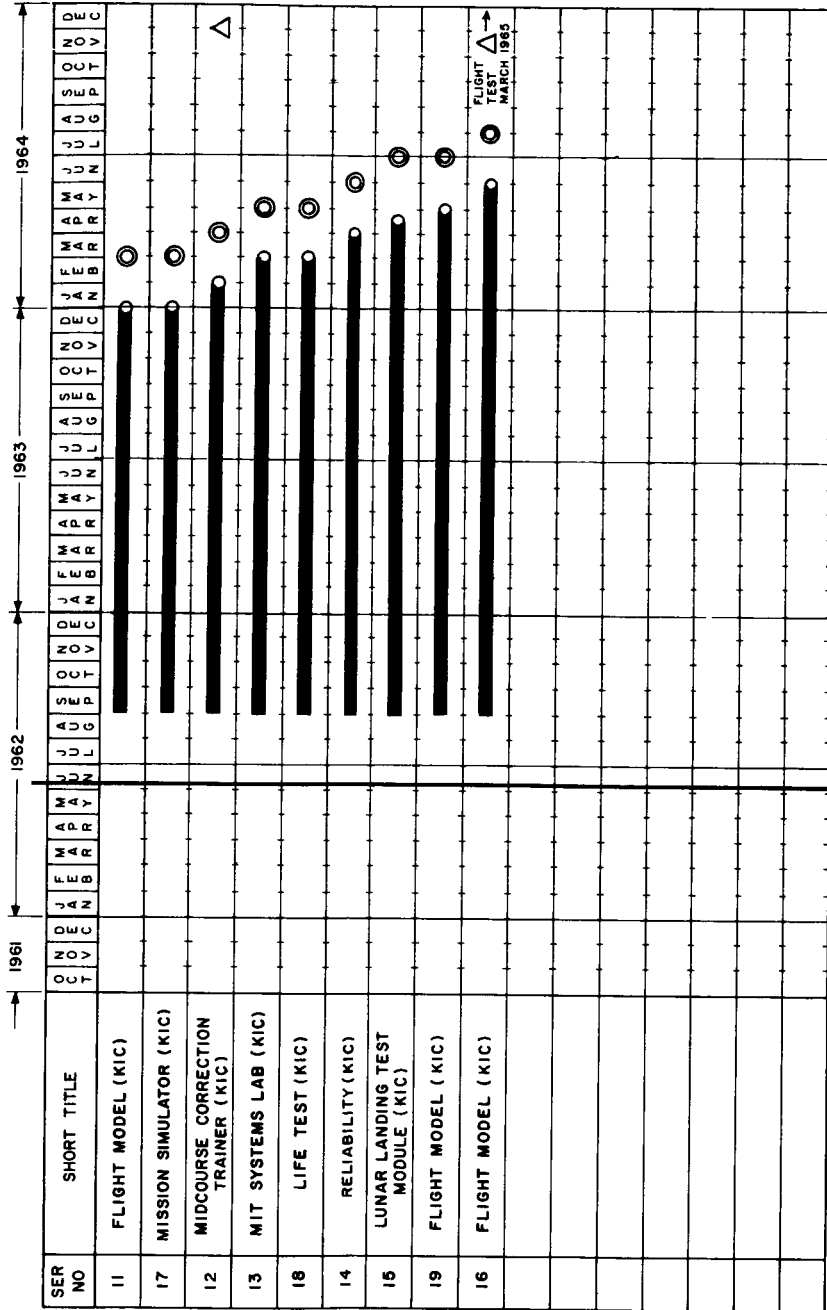
APOLLO MILESTONE CHART FOR GUIDANCE COMPUTER



APOLLO MILESTONE CHART FOR SEXTANT AND SCANNING TELESCOPE



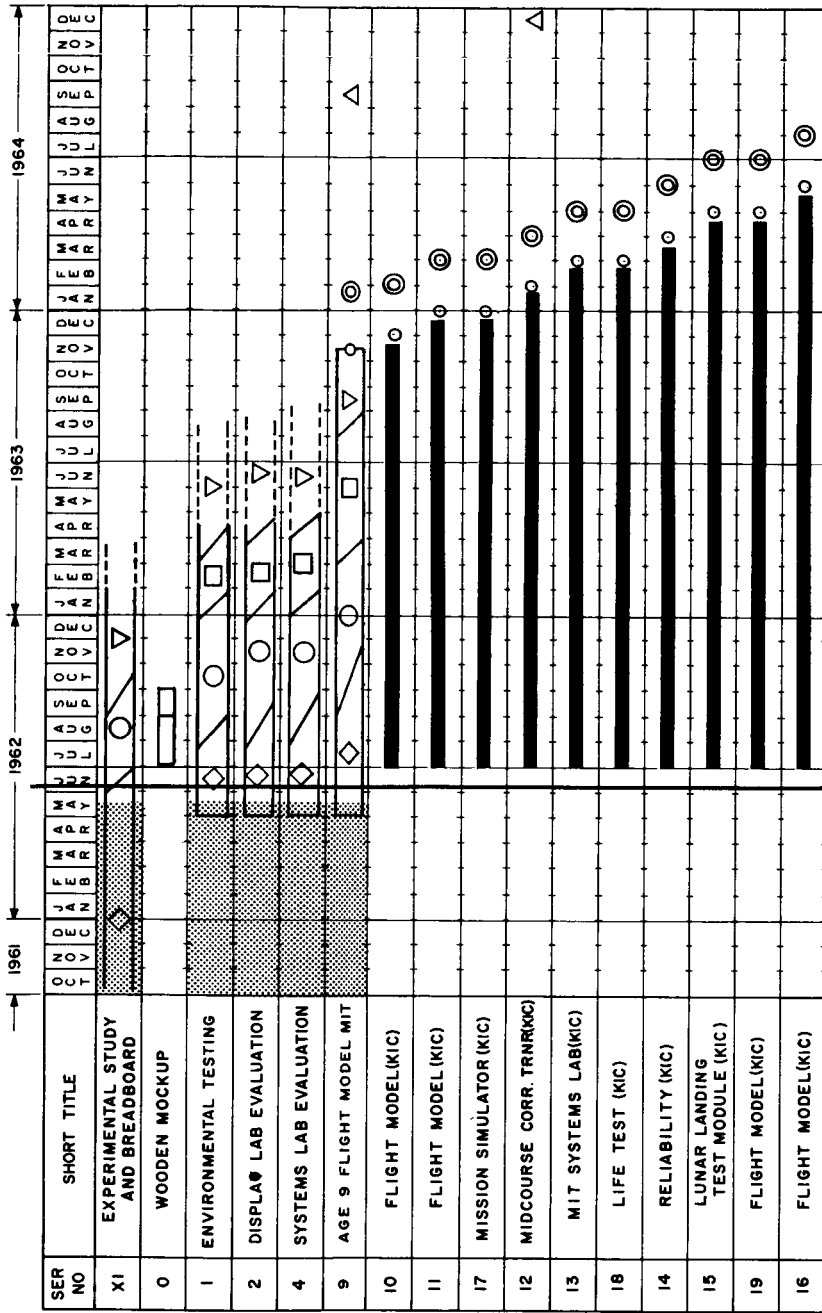
APOLLO MILESTONE CHART FOR SEXTANT AND SCANNING TELESCOPE (CONT.)



NOTE

- ◊ ELECTRICAL DESIGN
- ◊ MECHANICAL DESIGN
- ◊ DESIGN EFFORT
- ◐ PRELIM. DESIGN FREEZE
- ◑ DESIGN FREEZE
- ⊗ DESIGN RELEASE
- ◼ REVISION TO DRAWINGS
- ◐ PROCUREMENT
- ◑ INSPECTION
- ◒ ASSEMBLY
- ◓ TEST
- ◔ LAB TEST
- ◕ FIELD TEST
- ◖ G.B.N DELIVERY DATE
- ◗ SUBSYSTEM DELIVERY DATE
- ◘ FLIGHT TEST
- ◙ (I.S.) INDUSTRIAL SUPPORT

APOLLO MILESTONE CHART FOR MAP AND VISUAL DATA DISPLAY EQUIPMENT

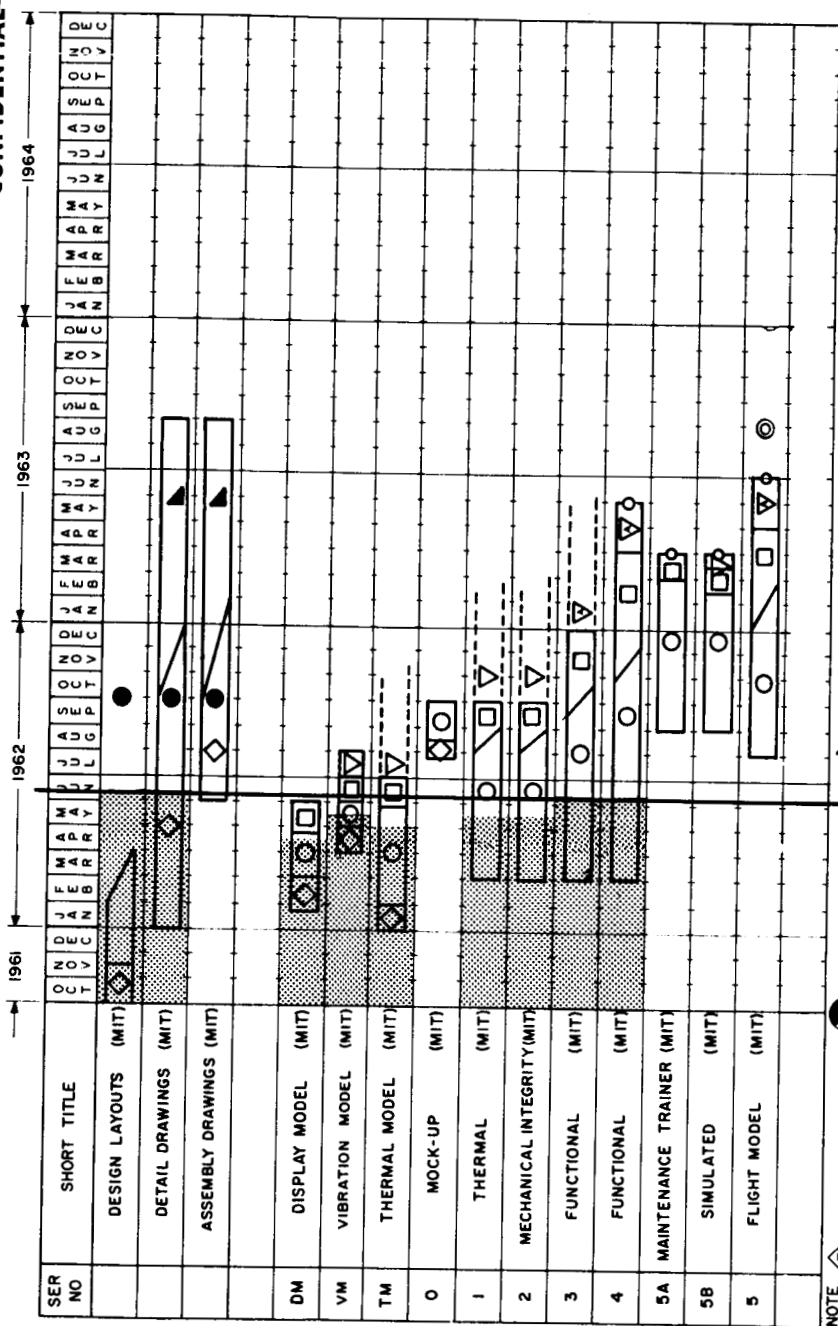


NOTE: 2 UNITS REQUIRED PER SYSTEM

◊ ELECTRICAL DESIGN ◐ PRELIM. DESIGN FREEZE
 ◊ MECHANICAL DESIGN ◐ DESIGN FREEZE
 ◊ DESIGN EFFORT ◐ DESIGN RELEASE
 ◊ REVISION TO DRAWINGS ◐ TEST
 ◊ PROCUREMENT ◐ LAB TEST
 ◊ INSPECTION ◐ FIELD TEST
 ◊ ASSEMBLY ◐ FLIGHT TEST
 ◊ DELIVERY DATE ◐ (I.S.) INDUSTRIAL SUPPORT

APOLLO MILESTONE CHART FOR IMU DEVELOPMENT PLAN

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NOTE

- ◊ ELECTRICAL DESIGN
- ◊ MECHANICAL DESIGN
- ⊗ DESIGN EFFORT
- ◐ PRELIM DESIGN FREEZE
- ◑ DESIGN FREEZE
- ⊗ DESIGN RELEASE
- ◐ REVISION TO DRAWINGS
- ◑ ALIGNMENT, ETC.
- ◑ G & N DELIVERY DATE
- PROCUREMENT
- TEST
- SUBSYSTEM DELIVER DATE
- ◊ INSPECTION
- ◊ LAB TEST
- ◊ FLIGHT TEST
- ◊ ASSEMBLY
- ◊ FIELD TEST
- ◊ (I.S.) INDUSTRIAL SUPPORT

APOLLO MILESTONE CHART FOR CDU DEVELOPMENT PLAN

