# AGC

N79-76280

COMPUTER

GUIDANCE

APOLLO

ND ASSOCIATED GROUND

NASA-CR-1167411

UARTERLY TECHNICAL (Raytheon Co.)

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EQUIPMENT

SUPPORT

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# **APOLLO GUIDANCE COMPUTER** AND **ASSOCIATED GROUND** SUPPORT EQUIPMENT [U]

QUARTERLY TECHNICAL REPORT NO. 8 FR-4-362 INCLUDES MONTHLY REPORT NO. 24

RAYTHEON

RAYTHEON COMPANY

SPACE AND INFORMATION SYSTEMS DIVISION

RAYTHEON

# QUARTERLY TECHNICAL REPORT NO. 8

#### FR-4-362

# (INCLUDES MONTHLY REPORT NO. 24)

# APOLLO GUIDANCE COMPUTER AND ASSOCIATED GROUND SUPPORT EQUIPMENT

Reporting Period

1 April 1964 - 30 June 1964

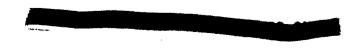
CLASSIFICATION CHANGE

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To\_\_\_\_\_UNCLASSIFIED By authority of \_\_\_\_\_\_ DJ-Fo //652 Changed by \_\_\_\_\_\_ Date /2/3/52 Classified Document Master Control Station, NASA Scientific and Technical Information Facility

Prepared for National Aeronautics and Space Administration Contract NAS 9-498

Sudbury, Massachusetts



PACE AND INFORMATION SYSTEMS DIVISION

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GROUP 4 Downgraded at year intervals; declassified after Tayears.

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# SECTION 1 PROGRAM MANAGEMENT

#### 1.1 TECHNICAL DIRECTIVES

This is Quarterly Technical Report No. 8 which includes Monthly Technical Report No. 24. This report is issued in accordance with Work Statement for Industrial Support E-1097. Information contained in this report relates to the period 1 April through 30 June 1964.

One hundred ninety-four TD's have been received to date; 135 have been formally accepted, 84 have been completed, superseded, or incorporated into other TD's, 51 are active. Man Hour Status Charts and Active Resident Status Charts are grouped at the end of this section of the report. The Raytheon Apollo Milestone Chart has been updated and included as figure 1-1. The Raytheon Apollo Hardware Delivery Schedule is shown in figure 1-2.

The progress of active TD effort is normally reflected in the following sections of the report as indicated:

Section 1: R-1, R-9, R-129.
Section 2: R-49, R-95, R-108, R-122, R-132, R-139, R-145.
Section 3: R-55, R-67, R-82, R-86, R-102, R-134, R-148
Section 4: R-8, R-58, R-79, R-89, R-90, R-136, R-143.
Section 5: R-16, R-18, R-63, R-75, R-83, R-125, R-163, R-164, R-165.
Section 6: R-11, R-21, R-26, R-39, R-43, R-66, R-91, R-112, R-131.
Section 7: R-107, R-109, R-110, R-111, R-113, R-114, R-116, R-141, R-152.

#### 1.2 SCHEDULE REVIEW

The ninth NASA Status Review meeting for the Raytheon Apollo Program

1 -1

was conducted on 9 June, 1964. The following matters relative to equipment status were reviewed and discussed.

AGC 6 was reviewed in detail with respect to schedule and status. It was noted that potting problems, Malco pin incompatibility, ARTEMIS rope production and late wiring changes were prime factors in the slippage of AGC 6. Contrary to previous expectations, DSKY's have not been gating items in AGC 6. Vibration and life testing of AGC were discussed and it was stressed that if such tests were required, additional slippage would result.

AGC 7 production status was also discussed in some detail; this system is now at preliminary test. No problems are expected regarding Navigational and Main DSKY's. Raytheon's present plans include vibration and life tests on System 8.

Apollo Hardware Deliveries were reviewed and it was noted that some schedule recovery was expected at AGC 20 and production operations are building up to expected load of two (2) systems per month. The Hughes connector problem has slipped delivery of spares kits.

AGC System Test schedule is being hampered by the lack of Computer Test Sets. Without an additional Computer Test Set, extensive transfer of CTS's will be necessary to handle peak loading requirements (four AGC's simultaneously). Core rope status was reviewed and production plans discussed.

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Figure 1-1. Raytheon Apollo Milestone Chart

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Figure 1-2. Raytheon Apollo Hardware Deliveries

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AGC 6				
AGC 7	<b> </b>			
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NAV DSKY				
MAIN DSKY				
SIMULATION COMPUTER				
COMPUTER TEST SET				
AGC/CTS OPERATION CONSOLE				
NAV PANEL DSKY HOLDING FIXTURES				
MAIN PANEL DSKY HOLDING FIXTURES				
AGC HOLDING FIXTURES				
SHIPPING CONTAINERS				
SPARES KIT - AGC				
SPARES KIT - GSE				
CTS CABLES (RECOVERY SCHEDULE) 1) NO. 1020114				
2) NO. 1020115				

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	MIT ENG'R		W. KUPFER R. FRONCILLO	W. KUPFER J. POUNDSTONE	G. NAYO L. HAWORTH	G. MAYO L. HAWORTH	G. MAYO L. HAWORTH	J. LEVY J. AVTGES	E. HALL J. POUNDSTONE	E. HALL J. POUNDSTONE	I. HALZEL W. FARNSWORTH	G. MAYO L. HAWORTH	J. LEVY 'E. 'ALL R. FRONCILLO	T. LAWTON F. NESLINE	N. SEARS F. NESLINE	J. MILLER F. NESLINE	E. DUGGAN J. POUNDSTONE	G.MAYO L.HAWORTH	E. DUGGAN J. POUNDSTONE
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TECHNICAL DIRECTIVE MAN HOUR FOR COMMAND MODULE	ISSUED	ACCEPTED	10.3.62 10.16.62	10/3/62 10/16/62	10/2/62 10/16/62	10/2/62 10/15/62	10 ~2 ~62 10 2. 62	10/9/62 10/9/62	10/15/62 10/15/62	11/8/62 11/28/62	11 21 62 11 28 62	11/28/62 11/28/62	11/28/62 11/30/62	11/28/62 11/30/62	12/31/62 1/7/63	11 28 62 11 28 62	11 / 28 / 62 11 / 28 / 62	12/18/62 12/26.62	12/20/62 1/7/63
	MIT FNG'R		R. SCHOLTEN F. NESLINE	E DUGGAN J. POUNDSTONE	E DUGGAN D GRASSI	E DUGGAN R FRONCILLO	J. LEVY R. FRONCILLO	S. COPPS J. POUNDSTONE	G. MAYO R. GOULART	G. MAYO' R. SPARACINO V. WHITE	J. LEVY J. AVTGES	J. LEVY J. AVTGES	J. GILMORE/ D. scolamiero	E HALL J. POUNDSTONE	E. OLSSON J. POUNOSTONE	E. HALL J. POUNDSTONE	E. HALL J. POUNDSTONE	G MAYO R FRONCILLO	R. BOYD . R. WILSON
CONTRACT NAS 9-498		SUBJECT	HID COURSE GUIDANCE ANALYSIS	RESIDENT ENCINEERS	LAYOUT DRAFTSMAN	PSA PLANNING SUPPORT	SPECIAL PROCESSES AND MATERIAL SPECIFICATIONS	KOPE STUDY	OPERATOR WELDING TRAINING	PROCESS SPECIFICATIONS	PROGRAM PROGRESS AND STATUS REPORTING	SPECIFICATION CONTROL DRAWINGS	GSE DESIGN: BREADBOARD COMPUTER Smulator	AGC FABRICATION	SPACE STUDY TEAN	THERMAL INTERFACE COMMITTEE	DC DC CONVERTER DESIGN	PROCESS SPECIFICATIONS	SUPPORT ENGINEER FOR FIELD MAINTENANCE PROCEDURES & PLANNING F
CONTF	Γ	N.S.	41.3	413	.2	9	4.6.3	82	5	<b>1</b> 63	4.6.3	3	1212 1222	541	412	4.21.3	4221	<b>(</b> £3	QUD
		Ü.	R-35	R-36	R-37	R-38	R-39	<b>8</b> -8	R-4İ	R-42	R-43	₩-₩	R-45	R-47	R-48	R-49	R-50	R .51	R-52

< > INDICATES ACCOUNTING CHANGE FROM PREVIOUS REPORT

AS OF 30 JUNE 1964		COMMENTS	EFFORT COMPLETED APRIL 1963	PROJECTED TO 30 JULY 1964	EFFORT COMPLETED MAY 1964. FOLLOW ON EFFORT COVERED BY OTHER TD'S.	EFFORT COMPLETED APRIL 1964	PROJECTED TO JULY 1964	EFFORT COMPLETED MARCH 1964	COMPLETED JULY 1963 FOLLOW ON EFFORT COVERED ON OTHER TO'S	COMPLETED JUNE 1963 COMPUTER TIME ONLY	PROJECTED TO AUGUST 1964	EFFORT COMPLETED FEB 1963	COMPLETED SEPTEMBER 1963	PROJECTED TO DECEMBER 1964	PROJECTED TO AUGUST 1964	EFFORT COMPLETED AUGUST 1963	COMPLETED SEPTENDER 1963	EFFORT COMPLETED MAY 1964	EFFORT COMPLETED MAY 1964
	1966	FMAM																	······································
	55	JASONDJ																	
R STATUS	1965	DJFMAMJ																	
TECHNICAL DIRECTIVE MAN HOUR FOR COMMAND MODULE	1964	J J A S O N E																	· · · · ·
	JRS	EXP TO DATE	112	20,451	8152	6281	200	2122	7126	1	5351	200	1539	1376	36.655	3139	10,321	3150	3821
FOR C	MAN HOURS	TOTAL EST	н 	23.494	t .		4959	+	1	+	6223		1	1649	37.774	1	1	J	1
NICAL	N	D EXP THIS MONTH	1	200	2 0 0 E	131	256	ł	1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000	<b>3</b>	63		1	87	4960	- <b>8</b>	t	<¥>	\$ <del>\$</del>
тесн	ISSUED	ACCEPTED	1.4.63 2.15/63	1 4/63 1 9 63	E9/6/1	1/14/63 3/18/63	1 - 14/63 2 28/63	1/14/63 1,/21/63	1/24/63 2/6/63	1/18/63 2/6/63	1 22 63 1.26 63	1/21/63 1/28/63	1/24/63 2/15/63	1 24-63 2.27.63	1.30.63 2.1.63	1/30/63 3/14/63	1/30/63 2/1/63	2/26/63 2/27/63	2 21/63 2/28/63
	MIT ENG'R	RAY ENG'R	J. GILMORE D. SCOLAMIERO J. SCHRMACK	J. GILMORE D. SCOLAMIERO J. SCHRMACK	E. HALL J. POUNOSTONE	E. HALL J. POUNDSTONE	E. HALL J. POUNDSTONE	R. ALONSO J. POUNDSTONE	R. BOYD, JR. R. WILSON	N. SEARS F. NESLINE	E. HALL J. POUNDSTONE	D. SCOLAMIERO J. POUNDSTONE	L. HANLEY L. HANORTH	E. HALL J. POUNDSTONE	D. SCOLAMIERO J. GILMORE J. SCHRMACK	D. SCOLAMIERO/ J. GILMORE J. SCHRMACK	D. SCOLAMIERO J. SCHRMACK	E. DUGGAN V. WHITE	J. FLEMING J. POUNDSTONE
CONTRACT NAS 9-498		SUBJECT	AGC CALIBRATION EQUIPMENT	SPECIAL TOOLING AND TEST EQUIPMENT	AGC OSCILLATOR DOCUMENTATION	ERASABLE MEMORY TESTER	APOLLO MODULE TESTER	ENGINEERING SUPPORT	LOGISTICS SUPPORT FOR FIELD OPERATIONS	TRAJECTORY CHECKS AND EVALUATION	MICROLOGIC EVALUATION AND QUALIFICATION PROGRAM	AGC/GSE RESIDENT	EVALUATION OF MIT'S MICROLOGIC	AGC INTERFACE SPECIFICATION	GSE MODULE AND DRAWER FABRICATION	COMPUTER SIMULATOR, PROTOTYPE	BREADBOARD COMPUTER TEST SETS	AGC WIRE WRAP FOOLING	RESIDENTS FOR SYSTEM TEST PREPARATION
CONT		N.N.	432 542	54.2 4.3.2	4.2.1.2 63	5.4	5.4	412	45	421	4.4	41.2	442	4.6.3	5.3	5.3 <sup>°</sup> h	53b	431 541	4.1.2
	1	. n.	R-54	R-55	R-56	R-57	R-58	R-59	8-60	R-62	R-63	R-64	R-65	R-66	R-67	R-68	R-69	R-70	R-71

A INDICATES ACCOUNTING CHANGE FROM PREVIOUS REPORT
 A

SUBJECT         MIT ENG'R         ISSUED         MIT ENG'R         MIT EN		CONT	CONTRACT NAS 9-498		TECHNICAL DIRECTIVE MAN HOUR FOR COMMAND MODULE	ICAL FC	DIRE(		MAN H ID MODU	HOUR	STATUS		965		-	996	AS OF 30 JUNE 1964
Interface         RAY ENG R         ACCEPTED         Minist         Fight         Minist         Jold         Jo	Ö	w.s.	SUBJECT	ENG'R	-			S S	1 1 1	+	+			F	-	200	COMMENTS
LTTTRF         FIDE FAMULATION DESCALAND         E MALL         2365         -         961         1         1         1           S1         WERGALTOIN         E MALL         2365         -         961         -         961         -         961         -         -         -         1         -         1         -         1         -         -         1         -         1         -         1         -         1         -         1         -         1         -         1         -         1         -         1         - </th <th></th> <th></th> <th></th> <th>ENG'R</th> <th></th> <th>_</th> <th>TOTAL EST</th> <th></th> <th>۲ م</th> <th>z</th> <th>Ŀ</th> <th>∑ ⊄</th> <th>Ч Р</th> <th>2 0 5</th> <th>D J F</th> <th>ΜΑΜ</th> <th></th>				ENG'R		_	TOTAL EST		۲ م	z	Ŀ	∑ ⊄	Ч Р	2 0 5	D J F	ΜΑΜ	
23         WERPLONGE PROCUREMENT         E. MALL         3 18 61         -	2	LETTER*	ROPE SIMULATOR DESIGN AND Fabrication	E. HALL J. POUNDSTONE	3/15/63 3/20/63	1. I	2 ju	3761	797	9 <u>74</u>							EFFORT COMPLETED JANUARY 1964
23         BLOCK I AGC PROCURENT         E MALL         2.2 (5)   <	<u> </u>	52 53		E. HALL J. POUNDSTONE	3.18.63 3.20.63	С. F	t	1									EFFORT COMPLETED MAY 1964 (Material Only)
341       SCREENING & BURN IN EQUIPMENT       C MAYO       2 21 65       1092       2 72 65       1092       2 72 65         413       RESIDENT EFFORT GUIDANCE AMALYSIS       L HAWORTH       3 4 63       3 3 5 63		52	BLOCK   AGC PROCUREMENT	E. HALL J. POUNDSTONE	2::21:63 3:25:63	t	1	1									EFFORT COMPLETED NAY 1964 (NATERIAL ONLY)
413       RESUENT FFORT GUIDANCE AMALYSIS       R. BATTIM       226 63       CMD       840       1       1       1         411       SCO COORDINATION MECHANICAL DESIGN       J. DOUNGTONE       314 63       CMD       6013       1       1       1         413       FAMILARIZATION MANUAL       J. LEVY       314 63       CMD       6013       1       1       1         413       FAMILARIZATION MANUAL       J. AVTGES       326 63       -       6023       1       1       1       1         413       AGG GSE IN PROCESS FESTING EOUIP       HALL       319 63       327 33 63       -       139 53       339 53       1       1       1       1       1         442       COUNT 6 HI POT TESTER)       J. POUNDSTONE       236 63       -       405       3995       1 </td <td>2</td> <td>54.1</td> <td>SCREENING &amp; BURN-IN EQUIPMENT</td> <td>G.MAYO L.HAWORTH</td> <td>2 21 63 3 4 63</td> <td></td> <td>19.912</td> <td>20,287</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>PROJECTED TO JULY 1964</td>	2	54.1	SCREENING & BURN-IN EQUIPMENT	G.MAYO L.HAWORTH	2 21 63 3 4 63		19.912	20,287									PROJECTED TO JULY 1964
4.1         SCD CORDINATION WECHANICAL DESIGN         L EVC         278 63         45         403         1 <th1< th="">         1&lt;</th1<>	ی دو	413b	RESIDENT EFFORT GUIDANCE ANALYSIS	R. BATTIN J. POUNDSTONE	2/26/63 3/14/63	<308>	6116	3840									EFFORT COMPLETED MAY 1964
443         FAMILARIZATION MANUAL         J. LEVY         3.28 63         4          402          403         5          403         5          403          403          403          403          403          403          403          403          403          403          403          403          403          403          403          403           375           375	*	411	SCD COORDINATION MECHANICAL DESIGN COORDINATION	E. DUGGAN J. POUNDSTONE	2/28/63 3/14/63	<b>(8)</b>	. <b>1</b>	4013									EFFORT COMPLETED MAY 1964
4.3       AGC GSE IN-PROCESS TESTING EQUIP.       E HALL.       3 19 63       2621       29317       30995       1       1       1       1         5.4       (CONT. & HI POT TESTER)       J POUNDSTONE       41 53       2621       29317       30995       1       1       1       1         4.42       CONT & HI POT TESTER)       J POUNDSTONE       41 53       -       -       3795       1		463		J. LEVY J. AVTGES	3/26/63 3/28/63		L.	4062									EFFORT COMPLETED APRIL 1964
4.42       VENDOR RELIABILITY AND QUALITY       G. MAYO       3.26.63        3796        3796        3796        1		4.3 5.4	AGC GSE IN-PROCESS TESTING EQUIP. (CONT. & HI POT TESTER)	E. HALL J. POUNDSTONE	3 19 63 4∞1∴53		29.377	30,995									PROJECTED TO JULY 1964
442       acc a GSE MANUALS       R. BOYD       3.28 63 <t< td=""><td></td><td>2117</td><td>VENDOR RELIABILITY AND QUALITY CONTROL</td><td>G. MAYO L. HAWORTH</td><td>3/26/63 4/2/63</td><td>1</td><td>1</td><td>3796</td><td></td><td></td><td></td><td></td><td></td><td></td><td>, tangén</td><td></td><td>EFFORT COMPLETED MAY 1964</td></t<>		2117	VENDOR RELIABILITY AND QUALITY CONTROL	G. MAYO L. HAWORTH	3/26/63 4/2/63	1	1	3796							, tangén		EFFORT COMPLETED MAY 1964
53b       COMPUTER SMULATOR FABRICATION       D. SCOLAMIERO       3 26 63       99       20,163       19,218       1       1       1         442       DESIGN EVALUATION AND OUAL FICATION       D. SCOLAMIERO       3 26 63       99       20,163       19,218       1       1       1         442       TEST FROGRAM       L HAWORTH       11,564       4 63       46       9327       437       437       1       <		462 463-7		R. BOYD J. AVTGES	3 28 63	1						<u>.</u>					SUPERSEDED BY TD 84
442       DESIGNE VALUATION AND OUALIFICATION       G. MAYO       4 4 63       46       937       437       1		53b		D. SCOLAMIERO J. GILMORE J. SCHRMACK	3 29 63 4√5√63		20,163	19,218									PROJECTED TO JULY 1964
452       MAINTENANCE & REPAIR MANUALS       J. LEVY       4/18/53       -<		4.4.2	DESIGN EVALUATION AND QUALIFICATION TEST PROGRAM	G.MAYO L.HAWORTH	4 4 63 1 15 64	46	9327	437									PROJECTED TO DECEMBER 1964
4.12a         POST INSTALLATION TESTING         J. FLEMIG         4.3 (53         1922         1<	-	4.6.2		J. LEVY J. POUNDSTONE	4/18/63 4/25/63	· · r ·	(a. j.)	t.									TD SUPERSEDED BY TD 131 ALL EFFORT TRANSFERRED.
5.3 b     ACC CALIBRATION EQUIPMENT     D     SCOLAMIERO     4 8 63     21     7784       5.3 b     MANUFACTURE (RETROFIT)     J     SCHRMACK     4 18 63     21     7784       4.12a     P.A.C.E. INTEGRATION     J     FLEMING     4 16 63     (15)     -       6.41     MICEDI OFFIC STER     E. HALL     4 25 63     127     5590		4.1.2.a	POST INSTALLATION TESTING	J. FLEMING J. BERNARD	4/3/63 4/8/63			1922									EFFORT COMPLETED APRIL 1954
412a P.A.C.E.INTEGRATION J. FLEMING 416 63 (15) - J. BERNARD 4.22 63 (15) - 5.41 MICEDI DRIG STICK TESTER E HALL 4 25 63 127 5690	10	5.3. b	AGC CALIBRATION EQUIPMENT MANUFACTURE (RETROFIT)	D. SCOLAMIERO J. GILMORE J. SCHRMACK	4 8 63 4 18 63		7784	6761									PROJECTED TO JULY 1964
541 MICPOLIDIC STICK TESTER E HALL 4 25 63 127 3690	_	4.12a		J. FLEMING J. BERNARD	4.16.63 4/22.63	(16)	t -	3736									EFFORT COMPLETED MAY 1964
J. POUNDSTONE 53.63		5.4.1	MICROLOGIC STICK TESTER	E. HALL J. POUNDSTONE	4 25 63 5 3 63	127	0696	9533									PROJECTED TO JULY 1964

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• MKA LETTER MRITTEN BY M. HOLZMMY. SUBJECT CONTRACT NKS 9-498 CORE ROPE SMULATOR EQPT. DATED 13 MARCH 1953 ( ) INDICATES ACCOUNTING CHANGE FROM PREVIOUS REPORT

TECHNICAL DIRECTIVE MAN HOUR STATUS

	CONT	CONTRACT NAS 9-498		FOR COMMAND MODULE	ي تر ک	OR CC	MMA	NOW ON	DULE	) Sui	ć	2				:	AS OF <u>30 JUNE 1964</u>
			MIT ENG'R	ISSUED	MA	MAN HOURS	3S	51	1964			1965	55			9961	
T. D.	w.S.	SUBJECT		ACCEPTED	EXP THIS MONTH	TOTAL EST	EXP TO DATE	A L L	2 0 S	r a	F M P	r ع	J A S	Z 0	ч Г О	M M	COMMENTS
R-90	5.4.1	SCREENING & BURN-IN EQUIPMENT	E HALL J. POUNDSTONE	4 25∞63 5 3 63	1877	14.100	13,056										PROJECTED TO JULY 1964
R-91	4.6.2 b 4.6.3 c	PREPARATION OF INTERFACE SPECIFICATIONS	J. GILMORE J. AVTGES	4 30 63 5 6,63	8	1	1671										PROJECTED TO DECEMBER 1964
R-92	6229	ENGINEERING SERVICES	E. HALL J. POUNDSTONE	5/1/63 5/6/63	<150>	\$5,261	40,910										EFFORT COMPLETED MAY 1964. FOLLOW ONCOVERED BY OTHER TD'S
R-93	<b>II</b>	RESIDENT DETAILER	E DUGGAN J. POUNDSTONE	5/1/63 5/1/63	F	1	674										EFFORT COMPLETED SEPT 1963
8-94	ងង≵	SUPPLEMENTAL NICROLOGIC PROCUREMENT	E. HALL J. POUNDSTONE	5/1/63 5/15/63	ł	1997) 1997 1997 1997	andinan Al-Second Al-Second Al-Second										SUPERSEDED BY TO 99 JUNE 1963
R-95	5.4.1	AGC TOOLING	E.HALL V.WHITE	5, '9.463 5, 22.463	472	19,096	17.480										PROJECTED TO SEPT 1964
8-96	411	DRAFTING SQUAD LEADER	E. DUGGAN D. GRASSI	5/21/63 5/23/63	<01>	2088	1866				() ()				4977 8 - - 2		EFFORT COMPLETED MAY 1964
16-N	TWX 777	FABRICATION OF DNE COMPUTER SIMULATOR	E. HALL R. FRONCILLO	5/31/63 6/12/63	r		4										TD INCORPORATED INTO TD 82 PER AG 61 64 Completed 28 January 1964
66-89	5.2 5.3	SUPPLEMENTAL NICROLOGIC PROCUREMENT	E. HALL J. POUNDSTONE	\$/28/63 6/5/63	4	r.	1										EFFORT COMPLETED DECEMBER 1963 (MATERAL DNLY)
R-101	1.13	ANALYTICAL SUPPORT FOR SPACE Guidance Analysis division Povered Flight Group	R. BATTIN J. POUNDSTONE	6/5/63 6/13/63			1696										EFFORT COMPLETED MAY 1964
R-102	5.3 b	COMPUTER TEST SET PRODUCTION	J. GILMORE J. POUNDSTONE	6/17/63 6 28 63	27.269	120,000	108.850										PROJECTED TO SEPTEMBER 1964
R-103	1	EXTRA COMPUTER TEST SET	J. GILMORE J. POUNDSTONE	6/17/63 6/28/63	1	ی بر ا	1										INCORPORATED INTO TO 102 12 MARCH 1964
R-105	5.1.3	AGC POWER SUPPLY AND OSCILLATOR	E. HALL J. POUNDSTONE	6/17/63 6/28/63	9	з <sup>і</sup> ,	735		:		·						COMPLETED OCTOBER 1963
R-106	4.2.1.2	YUL SYSTEM DESCRIPTIVE WRITING	T. LAWSON J. POUNDSTONE	6/18/63 6/25/63	۰.	E.	392										COMPLETED DECEMBER 1963
R-107	4.3.3*	FIELD OPERATIONS TRAINING	R.BOYD R.WILSON	6 25 63 7 17 63	105/	17,226	11.838										EFFORT PROJECTED TO DEC. 1964
R-108	4.2.1.2	AGC FIXTURE AND SHIPPING CONTAINER	E.HALL J.POUNESTONE	10 8 63 10 15.63	318	1073	545								-		PROJECTED TO SEPTEMBER 1964
R-109	4.2.1*	FIELD OPERATIONS MANAGEMENT	R.BOYD R.WILSON	6 (25 (63 7 17 63	1221	16.530	7262										EFFORT PROJECTED TO DEC. 1964

•NASA LETTER DATED 13 JUNE 1963, SUBJECT: SPECIFICATIONS OF FIELD OPERATION PROGRAM

< > INDICATES ACCOUNTING CHANGE FROM PREVIOUS REPORT

\*\*NASA, TWX SGC-4-233 (ITEM 2.C.2.H) DATED 10 APRIL 63

1 $1$ <th>CON</th> <th>CONTRACT</th> <th>NAS 9-498</th> <th>•</th> <th>TECHNICAL</th> <th></th> <th>RECT COM</th> <th></th> <th>DIRECTIVE MAN HOUR</th> <th>S. IT</th> <th>STATUS</th> <th>S</th> <th></th> <th></th> <th></th> <th></th> <th>AS OF 30 JUNE 1964</th>	CON	CONTRACT	NAS 9-498	•	TECHNICAL		RECT COM		DIRECTIVE MAN HOUR	S. IT	STATUS	S					AS OF 30 JUNE 1964
ACCEPTED         WER         Fort.         FOR         J J A S O N D J F M A M         J A S O N D J F M A M           171563         548         612         303         1         A <t< td=""><td>1</td><td></td><td></td><td></td><td>ISSUED</td><td>ΦW</td><td>пон и</td><td>RS</td><td>1964</td><td></td><td></td><td></td><td>1965</td><td></td><td>_</td><td>1966</td><td></td></t<>	1				ISSUED	ΦW	пон и	RS	1964				1965		_	1966	
6 25 (3)         56 (1)         308         611         308         611         308         611         1 <th1< th=""> <th1< th=""></th1<></th1<>	Ţ.D.	N.S.	SUBJECT		ACCEPTED	EXP. THIS MONTH	TOTAL EST	EXP TO DATE	J A S	z	Ŀ	٩	~	s o		MA	
6'20 6,3       130       220       10x3       61       10x3       10x1	R-110	4.3.2*	MATERIAL & SPARES INTEGRATION	R. BOYD R. WILSON	6.25/63 7/17/63	548	6612	3678									PROJECTED THRU DECEMBER 1964
5/28/53     1318     /482     6224     1     1     1     1     1       5/25/53     304     6090     2343     1     1     1     1     1       5/25/53     304     6090     2343     1     1     1     1     1       5/25/53     304     6090     2343     1     1     1     1     1       5/25/53     -     308     -     1090     203     1     1     1     1       7/17/53     495     10.000     303     1     1     1     1     1     1       7/17/543     495     10.000     303     1     1     1     1     1     1       7/17     563     495     10.000     303     1     1     1     1     1       7/17     563     495     10.000     303     1     1     1     1     1       7/17     563     495     1000     303     1     1     1     1     1       7/17     563     495     1000     303     1     1     1     1     1       7/18     57     495     1     1     1     1     1	R-111	4.1*	RESIDENT EFFORT, FIELD OPERATIONS	R.BOYD R.WILSON	6/28/63 7/17/63	150	5220	1052	· · · · ·								PROJECTED THRU DECEMBER 1964
5/25/53       504       600       253        338        106       7       10	R112	4.3.4*	PROCUREMENT SPECIFICATIONS	R.BOYD R.WILSON	6/28/63 7/17/63	1318	/482	6324									PROJECTED THRU DECEMBER 1964
5/25 63        3308        1666       1	R-113	4.3.1*	MAINTENANCE ANALYSIS SUPPORT	R.BOYD R.WILSON	6/25/63 7/17/63	504	0609	2543	• • • •								PROJECTED THRU DECEMBER 1964
\$728.63          1666          1666	R-114	3.2* 4.4.2	SPECIAL TEST EQUIPMENT	R. BOYD R. WILSON	6/25/63 7/17/63	I	3308	1	 								PROJECTED THRU DECEMBER 1964
7/12 63       495       10.000       503       503       503       503       503       503	R-115	4.1.3 b	RESIDENT EFFORT-GUIDANCE AMALYSIS	N SEARS J. POUNDSTONE	6/28/53 1/16/63			9691									EFFORT COMPLETED MAY 1964
6(29/63)       -<	R-116	3.1 SEC.5	SPARES PROCUREMENT	R.BOYD R.WILSON	7/12/63 7/18/6 <b>3</b>	495	10,000	503									MAJOR EFFORT PRESENTLY CHARGED TO RESPECTIVE HARDWARE TD'S
3 26 64       37       -       53       53       -       53       53         9/5/63       -       -       569       -       569       -       569       -       -       569       -       -       569       -       -       563       25,546       187,146       189,667       -       -       56,63       -       56,63       -       -       -       -       -       -       -       56,64       -	R-117		AGC IN-FLIGHT MAINTENANCE STUDY	E. HALL J. POUNDSTONE	6/28/63		1	1									CANCELLED BY TD 9L
9.23%35       -       569       -       569       -       569       -       569       -       569       -       569       -       569       -       563       213       213       213       213       213       213       213       213       213       213       213       213       213       213       213       213       211       1332       213       211       211       213       211       211       213       211       213	R-120		SUBASSEMBLY QUALIFICATION TEST PROGRAM	G.MAYO L.HAWORTH	3 26 64	37	I	23									NOT FORMALLY ACCEPTED
8 1953       42.546       187.146       199.657       1 <td>R-121</td> <td></td> <td>AGC - SA FABRICATION</td> <td>E. HALL J. POUNDSTONE</td> <td>8/23/63 9/5/63</td> <td></td> <td></td> <td>269</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>COMPLETED OCTOBER 1963</td>	R-121		AGC - SA FABRICATION	E. HALL J. POUNDSTONE	8/23/63 9/5/63			269									COMPLETED OCTOBER 1963
8/20/63         (8)         1877         1332         1         1332         1         1332         1         1332         1         1332         1         1332         1         1332         1         1332         1         1332         1         1332         1         1332         1         1332         1         1332         1         1332         1         1332         1 <th1< th=""></th1<>	R-122	5.1 5.2 5.3	FABRICATION OF BLOCK I AGC'S	E. HALL J. POUNDSTONE	8 19~63 9/5/63		187.146	189,667									PROJECTED TO AUGUST 1964
3 18 64     1485     17.194     3647     3647       3 25 64     -     1053     -     1053       9/6 63     -     -     1053       9 63     1244     21.924     7498       9 63     23 63     3322     27.345       2 26 64     3322     27.345     24.858	£-123	4.5	RESIDENT EFFORT - APOLLO SYSTEM TEST GROUP	J. FLEMING J. POUNDSTONE	8/20/63 9/3/63	\$	1827	1332									EFFORT COMPLETED MAY 1954
8/26/63     -     1069     1       9/10/63     -     -       9/10/63     -     -       9/10/63     -     -       1461     1       9/10/63     -       2/26/64     1/348       1/244     21.924       7/355     23       2/26/64     3322       2/26/64     21.345	R-125			G.MAYO L.HAWORTH	3 18 64 3, 25 64	1485	17.194	3647									PROJECTED TO DECEMBER 1964
8/26 63         -         1461         1461         6         6           9/10/63         -         -         1461         -	R-126	4.1.2	ENGINEERING SUPPORT	R.ALONSO J. POUNDSTONE	8/26/63 9/6/63		i P	1059		411 - 44 14							EFFORF COMPLETED MARCH 1964
9     63     1244     21.924     7438     1       9     23     63     3322     21.345     24,858	R-128	5.1		A. HOPKINS J.POUNDSTONE	8/26/63 9/10/63		1	1461									EFFORT COMPLETED DECEMBER 1963
9 63 3322 21.345 24.858 24.858	R-129	TWX 227		J.FLEMING J.POUNDSTONE	9 9 63 9 23 63	1244	21.924	7498									PROJECTED TO FEBRUARY 1965
	R-131	4.6.2	MAINTENANCE AND REPAIR MANUALS	L.LARSON J.POUNDSTONE	9 9 63 2 26 64	3322	27.345	24,858									PROJECTED TO DECEMBER 1964

() INDICATES ACCOUNTING CHANGE FROM PREVIOUS REPORT \*NASA LETTER DATED 13 JUNE 1963, SUBJECT: SPECIFICATIONS OF FIELD OPERATION PROGRAM

L ≥	D. W.S. SUBJECT	MIT ENG'R	ISSUED	MA Exp	MAN HOURS	RS								9966 	COMMENTS
5.2	AGC BLOCK I RC	I RAY ENG R E.HALL J.POUNDSTONE	ACCEP1EU 9963 91663	THIS MONTH 10.427	101AL	то DATE 29.019		2 0 S	<b>Σ</b>	Σ	2 2	2	- 	M M	PROJECTED THRU DECEMBER 1964
	AGC SIMULATION COMPUTERS	E.HALL J.POUNDSTONE	9 23 63 9 30 63	15,431	67.210	52.127			 	_					EFFORT PROJECTED THRU JULY 1964
	AGC SIMULATION COMPUTERS CORE ROPES	E.HALL J.POUNDSTONE	9 23 63 9/30/63	١	11.106	I									ALL EFFORT CURRENTLY CHARGED TO TD 132. PROJECTED TO JULY 1964
	5.4.1 AGC COMPUTER POWER SUPPLY TESTER	E.HALL J. POUNDSTONE	9. 27 63 10. 4. 63	160	1349	2014			 						PROJECTED THRU JUNE 1964
	FAILURE EFFECTS ANALYSIS	C.MAYO J.POUNDSTONE	3 18 64	,	i	1									NOT FORMALLY ACCEPTED
1				I	t	1			 						
5.1	I AGC 4B FABRICATION	E.HALL J.POUNDSTONE	10 15 63 10/22 63	497	33,069	32.522			 						PROJECTED TO JUNE 1964
5.1	I AGC 4B CORE ROPES	E.HALL J.POUNDSTONE	10 15 63 10 22 63	t	7404	1			 						ALL EFFORT CURRENTLY CHARGED TO TD 132. PROJECTED TO JULY 1964
	4.2.2 DEPLOYMENT OF FIELD TEST (FO, SOW) AND OPERATIONS PERSONNEL	R.T. BOYD R.D. WILSON	10.17 63 10/24/63	4624	69,235	16.379							·		PROJECTED TO DECEMBER 1964
				I	I	I			 						
	5.4.1 AGC DISPLAY AND KEY BOARD TEST STATION	E.HALL J.POUNDSTONE	10/18/63 10:23 63	736	2088	2235			 						PROJECTED THRU JUNE 1964
				I	1	1									
IZ	NA GROUND TEST DATA REDUCTION AND ANALYSIS PLANNING	J. FLEMING J. POUNDSTONE	2 7 64 2 21 64	857	10.218	5156									PROJECTED THRU DECEMBER 1964
Z	NA RESIDENT EFFORT COU & GSE	J WILLER R FRONCILLO	12/2/63 12/9/63	<16>	ı.	ш	·								EFFORT COMPLETED MAY 1964
~	NA SPECIFICATION CONTROL DWGS	G. MAYO R. FRONCILLO	11 27 63	1331	10.440	4335			 						NOT FORMALLY ACCEPTED
1 Z	NA AGC ROPE SIMULATORS	E. HALL J. POUNDSTONE	2 3 64 2 10 64	4601	14,787	8874			 						PROJECTED THRU JULY 1964

AS UF		COMMENIS		NOT FORMALLY ACCEPTED		PROJECTED TO DECEMBER 1964		NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED			NOT FORMALLY ACCEPTED		NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	PROJECTED TO DECEMBER 1964	PROJECTED TO DECEMBER 1964	PROJECTED TO DECEMBER 1964
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<u>В</u>	MAN HOURS	TOTAL		275,007		1548		13,226	3952			4856		3534		1	5493	2130	<b>00</b> 6
ē	Σ	EXP. THIS MONTH		3900		186		1365	70			1021		532		387	1051	196	124
FOR COMMAND MODULE	ISSUED	ACCEPTED		3. 5: 64		2 17.64 2 24/64		3/5/64	4/8/64			5/8/64		5/8/64	3 26 64	4764	4.7.64 4.14.64	4 3 64 4 10 64	4 3 64 4 10 64
	MIT ENG'R			L. LARSON R. FRONCILLO		R. J. BOYD R. D. WILSON		E. HALL R. VOLPI	C. SPERLING J. POUNDSTONE			E. HALL J. POUNDSTONE		E. HALL R. FRONCILLO	G.MAYO L.HAWORTH	G. MAYO R. FRONCILLO	G. MAYO R. FRONCILLO L. HAWORTH	G. MAYO R. FRONCILLO L. HAWORTH	G. MAYO R. FRONCILLO L. HAWORTH
001-0 011		SUBJECT		BLOCK I DRAWINGS - MAINTENANCE		GSE INSTALLATION TEAM		AGC PROGRAM DOCUMENTATION	STU MAIN DSKY			POWER SUPPLY REDESIGN		AGC OSCILLATOR REDESIGN	RELIABILITY PROGRAM PLAN	RELIABILITY DESIGN SUPPORT - CM BLOCK II	FAILURE ANALYSIS	FAILURE REPORTING AND CORRECTIVE ACTION	RELIABILITY ANALYSIS
		w.S.		æ		<del>ن</del>		<	~			4	   		æ			<u></u>	
CONTRACT		T.D.	R-149	R-150	R-151	R-152	R-153	R-154	R-155	R-156	R-157	R-158	R-159	R-160	R-161	R-162	R-163	R-164	R-165

NAS 9-498 SUBJECT MAIN DSKY TEST STAMD AGC PRODUCTION EFFORT ENGINEERING AGC PRODUCTION SUPPORT BLOCK II SSE PRODUCTION SUPPORT ENGINEERING BLOCK II PROGRAM MANAGEMENT ENGINEERING SUPPORT (MFG. TECHNIQUE TOOLING) BLOCK II PESIGN ENGINEERING SUPPORT (MFG. TECHNIQUE TOOLING) BLOCK II DESIGN ENGINEERING SUPPORT (INFORMATION SERIES) BLOCK II DESIGN ENGINEERING SUPPORT (INFORMATION SERIES) BLOCK II DESIGN ENGINEERING SUPPORT (INFORMATION SERIES) BLOCK II DESIGN ENGINEERING SUPPORT (AGC GSE) BLOCK II DESIGN ENGINEERING SUPPORT (AGC GSE) BLOCK II DESIGN ENGINEERING SUPPORT (AGC GSE) BLOCK II DESIGN ENGINEERING SUPPORT (OISFLAY AND KEY BOARDS) BLOCK II DESIGN ENGINEERING SUPPORT (OISFLAY AND KEY BOARDS) BLOCK II FABRICATION (DSKY'S) BLOCK II FABRICATION (AGC PROTOTYPES)

< > INDICATES ACCOUNTING CHANGE FROM PREVIOUS REPORT

AS OF 30 JUNE 1984		COMMENTS	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED		NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED
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TIVE MAN	URS	EXP TO DATE	12,359																
R CON	MAN HOURS	TOTAL EST	25.056																
AL D FOI	Σ	EXP THIS MONTH	7926																
TECHNICAL DIRECTIVE MAN HOUR FOR COMMAND MODULE	ISSUED	ACCEPTED	5.8.64	5.8.64		5/8/64	5/8/64	5/21/64	5/21/64	5/8/64	5/8/64		5/14/64	5/14/64	5/12/64	5/11/64	5/26.64	5 26 64	5 26 64
	MIT ENG'R		E. HALL W. KURTZ/ J. POUNDSTONE	E. HALL W. KURTZ J. Poundstone		J. MILLER W. Kurtz/ J. Poundstone	D. TEST/J. MILLER W. KURTZ/ J. POUNDSTONE	E. HALL J. POUNDSTONE	E. HALL J. POUNDSTONE	E. OLSSON J. POUNDSTONE	D. TEST/ J. MILLER J. POUNDSTONE		E. HALL J. POUNDSTONE	E. HALL J. POUNDSTONE	E. HALL J. POUNDSTONE	E. HALL J. POUNDSTONE	E. HALL J. POUNDSTONE	E. HALL J. POUNDSTONE	E. HALL J. POUNDSTONE
NAS 9-498		SUBJECT	ELOCK II RESIDENT EFFORT	BLOCK II FABRICATION (AGC FIXED MEMORY CORE ROPE MODULES)		BLOCK II CDU DESIGN ENGINEERING SUPPORT	BLOCK II CDU MANUFACTURING PROCESS	DESIGN ENGINEERING SUPPORT (DART INPUT/OUTPUT EQUIPMENT, (IOE))	DART IOE FABRICATION	BLOCK II FABRICATION (BLOCK II AGC/GSE RETROFIT KITS)	FABRICATION OF PROTOTYPES BLOCK		L BLOCK 1 (F) DESIGN ENGINEERING	BLOCK II FABRICATION (TEST EQUIPMENT AND TOOLING AGC)	BLOCK IF FABRICATION (TEST EQUIPMENT E AND TOOLING GE)	BLOCK II FABRICATION (DSKY TEST Equipment and tooling	BLOCK I (100 SERIES) FABRICATION (AGC TEST EQUIPMENT AND TOOLING)	BLOCK I (100 SERIES) AGC FABRICATION	BLOCK 1 (100 SERIES) FABRICATION (FIXED MEMORY CORE ROPE MODULES)
CONTRACT		W.S.																	
CONT		T.D.	R-183	R-184	R-185	R-186	R-187	R-188	R-189	R-190	R-191	R-192	R-193	R-194	R-195	R-196	R-197	R-198	R-199

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TECHNICAL DIRECTIVE MAN HOUR         STUC           MS         SUBJECT         MS         NUME         MS         MS           1         3         SUBJECT         MT         NUME         MS         M			COMMENTS	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED	NOT FORMALLY ACCEPTED											
TECHNICAL DIRECTIVE MAN HOUR STAUS           With ALT         State         Man HOURS         STAUS           WS         Subject         Mar Evel in the first of the first			Σ										_			<u> </u>		
TECHNICAL DIFFECTIVE MAN HOLE         TECHNICAL DIFFECTIVE MAN HOLE           ws         subject         man		99	A V				<u> </u>					 						
MUTAGT         MAST Diffect TVE         MAN HOUR         STATUS           MS         SUBJECT         MT ENDIR         SUBJECT         MT ENDIR         SUBJECT         MA ENDIR         MA I         MA I <td></td> <td>୍ଗ</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td> </td> <td></td> <td> </td> <td>-</td> <td></td> <td></td> <td></td>		୍ଗ										 		 	-			
TITCH DIFFECTIVE MAN HOUR STATUS           Mission         Enclusion         Enclusion         Enclusion         Enclusion         Enclusion           MS         SubJect         MT ENG         MT ENG         MT ENG         MT ENG         MM July         MT July         <												 		 				
MTHAGT         TECHNICAL DIRECTIVE MAN HOUR         STAUS           MS         SUBJECT         MT         EVENTIOL         STAUS           MS         SUBJECT         MT         EVENTIOL         MM HOURS         MM         MM <td></td> <td></td> <td></td> <td></td> <td></td> <td> </td> <td></td> <td></td> <td></td> <td></td> <td></td> <td> </td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>												 						
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MTFRACT         MAS         Sub-LECT         TECHNICAL DIFECTIVE MAN HOUR STATE           WS         SUB-LECT         MIT ENG'         RAIN HOUR STATE           MS         SUB-LECT         MIT ENG'         RAIN HOUR STATE           RECONTINUE STATE         RAIN HOUR STATE         RAIN HOUR STATE           RECONTINUE STATE         RAIN         STATE         STATE           RECONTINUE STATE         RAIN         STATE         STATE         STATE           RECONTINUES STATE         RAIN         STATE         STATE         STATE         STATE           RECONTINUES STATE         RAIN         STATE         STATE         STATE         STATE           RECONTINUES STATE         RAIN         STATE <td< td=""><td></td><td>965</td><td></td><td><u>_</u></td><td></td><td></td><td></td><td>- <u></u></td><td></td><td></td><td></td><td></td><td></td><td> </td><td></td><td></td><td></td><td></td></td<>		965		<u>_</u>				- <u></u>						 				
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MTTACT_NAS_9-498 W.S. SUBJECT MITENG'R BLOCK 1100 SERIES DESIN FABRICATION J POUNDSTORE SUBJECT RAC ELECTRICAL MECHANICAL ELECTRICAL MECHANICAL ELECTRICAL MECHANICAL ELECTRICAL MECHANICAL BLOCK 1100 SERIES DESING FUNDEER ELECTRICAL MECHANICAL ELECTRICAL MECHANICAL ELALL DESIGN DESI	Ξ											 		 				
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MTTACT_NAS_9-498 W.S. SUBJECT MITENG'R BLOCK 1100 SERIES DESIN FABRICATION J POUNDSTORE SUBJECT RAC ELECTRICAL MECHANICAL ELECTRICAL MECHANICAL ELECTRICAL MECHANICAL ELECTRICAL MECHANICAL BLOCK 1100 SERIES DESING FUNDEER ELECTRICAL MECHANICAL ELECTRICAL MECHANICAL ELALL DESIGN DESI	다칭	ΩĢ	AL					,077										
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MTTACT_NAS_9-498 W.S. SUBJECT MITENG'R BLOCK 1100 SERIES DESIN FABRICATION J POUNDSTORE SUBJECT RAC ELECTRICAL MECHANICAL ELECTRICAL MECHANICAL ELECTRICAL MECHANICAL ELECTRICAL MECHANICAL BLOCK 1100 SERIES DESING FUNDEER ELECTRICAL MECHANICAL ELECTRICAL MECHANICAL ELALL DESIGN DESI	38	MA						99				 		 				
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COL	CONTRACT	NAS 9-498		TECHNIC, FOR	AL DIR	ECTI 38N	VE M.	TECHNICAL DIRECTIVE MAN HOUR STATUS FOR LEM G&N CONCEPT DESIGN	STATUS GN			AS OF 30 JUNE 1964
			MIT ENG'R	ISSUED	MAN	MAN HOURS	s	1964		1965	9961	
, D.	S.S.	SUBJECT		0	EXP THIS MONTH	TOTAL	EXP TO DATE J	J J A S O N	D J F M A	MJJAS	F M A	COMMENTS
R-1L	30 50&E	LEM PROJECT MANAGEMENT	P. K. BRYANT J. POUNDSTONE	6/19/63 6/24/63	1	3	2444				 	COMPLETED MARCH 1964
R-21	ЗА	RESIDENT EFFORT	P. K. BRYANT J. POUNDSTONE	69/57/9 59/61/9	1	1	8776					COMPLETED MARCH 1964
R 3	40	DOCUMENTATION	P. K. BRYANT J. POUNDSTONE	6/19/63 6/24/63	1	1	254					COMPLETED MARCH 1954
R	<b>48</b> 50	SCHEDULING AND REPORTING	P. K. BRYANT J. POUNDSTONE	6/13/63 5/26/63	1	. <u>1</u>	210					COMPLETED 28 FEBRUARY 1964
R-5L	362	LEM HARDWARE FABRICATION	J. GILMORE J. POUNDSFONE	6/19/63	1	1	F					CANCELLED PER AG 896-63 16 OCTOBER 1963
R-6L			_		1	1	1					
R-7L					1	,	1					
R-8L	ЗА	LGE SYSTEMS TEST PROCEDURES	J. FLEMING J. Bernard	6/28/63 1//16/63	la si la si si la si fi si si		1					EFFORT COVERED ON TO 2L
<b>16-8</b>	3.b	AGC IN FLIGHT MAINTENANCE STUDY	E. HALL J. POUNDSTONE	8/6/63 £9/13/63			1680					EFFORT COMPLETED FEBRUARY 1964
R-10L	3.a	LEM G&N GSE RESIDENT	D. SCOLANIERO J. SHRMACK	8/7/63 8/7/53	. 1	1						EFFORT COVERED ON TD 21.
R-11L	3.b.1	GSE REQUIREMENTS FOR LGC	D. SCOLAMIERO J.SCHRMACK	E3/E1/8	- 	t	101					EFFORT COMPLETED FEDRUARY 1964
R-12L	3.b.1	THERMAL AND STRUCTURAL ANALYSIS OF LCC DESIGN	E.DUGGAN R.FRONCILLO	8/6/63 8/13/63		1	1315					EFFORT COMPLETED 7 FEBRUARY 1564
R-13L	3.b.1	CORE ROPE MANUFACTURING STUDY For LGC	E.DUGGAN R.FROMCILLO	8/6/63 8/13/63		J	527					EFFORT COMPLETED JANUARY 1964
R-]4L	3.b.(2), (c)	LEM/CM INTERCHANGEABLE HARDWARE	E.HALL R.FRONCILLO	10/15/63 10/22/63	i	1	1					EFFORT COVERED ON TD 2L
R-15L	3.b.(2), (a)	LGC CIRCUIT AND LOGIC DESIGN	E.HALL R.FRONCILLO	10,17,63 10,24,63	<b>I</b>		165					EFFORT COMPLETED FEBRUARY 1964
R-16L	3.b.(2), (b)	LGC MECHANICAL DESIGN	E.HALL R.FRONCILLO	10/17/63 10/24/63	•	- 2	2892					EFFORT COMPLETED FEBRUARY 1964
		TOTALS			,		18.596		PREPARE	PREPARED BY D.J. WHALEN		

TECHNICAL DIRECTIVE MAN HOUR STATUS

CONTRACT	RACT NAS 9-498			ACTIVE RESI	ACTIVE RESIDENT STATUS	AS OF 30 JUNE 1564
T.D.	SUBJECT	MIT ENG'R RAY ENG'R	ISSUED ACCEPTED	1963 J J A S O N D J	1964 1965 1965 1965 1965	A M COMMENTS
III	RESIDENT FIELD OPERATIONS	R. BOYD R. WILSON	6 28 63 7 17 63		4/1/64 R HEWNESSEY	
129	RESIDENT PACE AND STU SYSTEMS TEST	J. FLEMING J. POUNDSTONE	9963 92363	\$9/1/01	3 ¢. 8/880	
129	RESIDENT PACE AND STU SYSTEMS TEST	J. FLEMING J. POUNDSTONE	9 9 63 9.23.63	10.4.63	J. HARRISDN	
621	RESIDENT PACE AND STU SYSTEMS TEST	J. FLEMING J. POUNDSTONE	9 9 63 9 23 63		11. 17 (63 R. Arel Angon	PROJECTED TO 1 JANUARY 1965
129	RESIDENT PACE AND STU SYSTEMS TEST	J. FLEMING J. POUNDSTONE	9-9-63 9-23-63		12/5 (3 4. 0 COMMEL	PROJECTED TO 5 APRIL 1965
129	RESIDENT PACE AND STU SYSTEMS TEST	J. FLEMING J. POUNDSTONE	9.⁄9.⁄63 9.′23.63		1.46.64 R WIGGINS	PROJECTED TO 5 APRIL 1965
129	RESIDENT PACE AND STU SYSTEMS TEST	J. FLEMING J. POUNDSTONE	9/9/63 9/23/63		//14/646 E. GRACE	PROJECTED TO 15 SEPTEMBER 1965
129	RESIDENT PACE AND STU SYSTEMS TEST	J. FLEMING J. POUNDSTONE	9 9 63 9/23/63		4/1/64 J. #OPDLO	PROJECTED TO 1 JULY 1965
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5.8.64 5.15/64		5/1/6# PL CGRBETT	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5 '8 '64 5,15 64		5/1/64 H. THALER	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5/8/64 5/15/64		5/1/61 R GREWER	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5:8/64 5/15/64		5/1/64 J. VOGEL	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5:8:64 5/15/64		5/1/44 1. DEUTICH	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5, 8 <sup>-</sup> 64 5, 15, 64		sin ka W. REEVES	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5 8 64 5 15/64		S/1/6 P NICHOLAS	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5.8.64 5.15.64		5///64 R.WIBRATTIS	-
183	BLOCK II RESIDENT EFFORT	E. HALL W. KURTZ	5-8/64 5-15-64		ST/44 A MCINTY	

CONTRACT	ACT NAS 9-498			ACTIVE RE	ACTIVE RESIDENT STATUS		AS OF 30 JUNE 1964
		MIT ENG'R	ISSUED	1963	1964	1965	COMMENTS
Ö.	SUBJECT		ACCEPTED	JJASOND	JFMAMJJASOND	JFMAM	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5-8 64 5 15 64		517/64 0, MILLARD		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5/8/64 5/15/64		1/1/54 p. SPRAGUE		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5:8:64 5:15/64		5/ /64 J. FUICO		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5/8/64 5/15/64		5/1/64 D. LINDELL		
183	BLOCK II RESIDENT EFFORT	E. HALL W. KURTZ	5/8/64 5/15/64		5/1/64 R. BAKER		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5/8/64 5/15/64		2/1/64 A. SEIFLE		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5/8/64 5/15 ′64		\$/1/54 R. TRYDER		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5/8/64 5/15/64		5/1/64 B. PAPIA		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5 8 64 5, 15 64		5/1/61 R Di GLORIA		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5 8/64 5. 15 64		5/1/34 E. RDGERS		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5:8:64 5:15:64		5// /64 G. RICE		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5864 51564		5/1/64 R. HONG		
183	BLOCK IJ RESIDENT EFFORT	E. HALL W. KURTZ	5/8/64 5 15/64		5/1/64 A. BILEO		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5864 51564		2/1 /24 / WILL DON		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5 8 64 5 15 64		S/1/44 C. PRESFIA		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5./8/64 5.15-64		5/1/64 E. POWER		
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5864 51564		S/V64 R. KIN5BURY		

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CONTR	CONTRACT NAS 9-498			ACTIVE RESIDENT STATUS	INT STATUS	AS OF 30 JUNE 1964
ł		MIT ENG'R	ISSUED	1963	1964 1965	
	SUBJECT	RAY ENG'R	ACCEPTED	JJASONDJF	MAMJJASONDJFMA	COMMENTS
183	BLOCK II RESIDENT EFFORT	E. HALL W. KUPTZ	5864 51564		S 7 64 E ONANNSEN	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5 8 64 5/15 64		5/1/64 F. DUVAL	
183	BLOCK II: RESIDENT EFFORT	E.HALL W.KURTZ	5/8/64 5/15/64		5/1/64 R. GOG JEN	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5/8/64 5/15/64		S/1/44 . BRIGHAM	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	578 °64 57 157 64		s/1/54 M. PAIGE	
183	BLOCK II RESIDENT EFFORT	E. HALL W. KURTZ	5. 8/64 5/15/64		5/1/64 M. JACK	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5 8 64 5 15 64		5 1 64 B KRECIMAN	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5 8 64 5 15 64		3.1 64 E. MULLER	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5 8 64 5 15 64		517.04 A. MARTD	
183	BLOCK II RESIDENT EFFORT	E.HALL W.KURTZ	5/8/64 5/15/64		48/44 A.W. POLLIN	

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#### **SECTION 2**

#### COMPUTER SUBSYSTEM

#### 2.1 APOLLO GUIDANCE COMPUTERS

System testing of AGC 6 was conducted in April using the AGC 4A monitor. The central processor, sequence generator, counter increment priority logic, interrupt priority logic, programmable alarms, rate circuits, and erasable memory subsystem were checked out during April using the AGC 4A monitor.

Computer Test Set (CTS) No. 4 was connected to AGC 6 during the quarter and all 13 EXTEST programs (part of the ARTEMIS program) were successfully run. Upon completion of the complete Final Test Method (FTM) run, the computer was scheduled for potting. Core Rope Simulator (CRS) No. 2 was integrated and checked out with AGC 4A in April. In addition, core ropes were tested using the AGC 4A and CTS 2.

AGC 4A was updated during May to reflect the revised wirelist which was issued during the previous quarter. The G & N Harness (Tray C) for AGC 5 was completed on 11 May. All AGC 5 items except for replacement Trays A and B were delivered to MIT/IL. System testing of AGC 6 was conducted during May using the CTS, as well as both DSKY's. The final revision of the FTM was used and several changes were made to Interface Signal Measurement and DSKY checkout parts. The FTM portion dealing with core rope program checkout was not attempted because the necessary ropes were not available at the time.

Problems were encountered with Tray A modules bulging after potting. This situation is currently being investigated. The first approach is to epoxy hardcoat the outer surfaces. Two sticks are now being potted in this fashion and will be ready for thermal cycling during the next reporting period. This attempted fix is primarily for 125 sticks which have already been potted.



2-1

# CONFIDENTIAL

A dummy stick containing no internal elements except mylar insulators and a bead of 2216 epoxy on one side of the header and a bead of Ecco Bond 45 on the other side was potted in foam. The second thermal cycle caused the side with Ecco Bond to bulge. This stick is now being bisected to determine if there is foam separation in the header.

The epoxy impregnated glass cloth has been eliminated from Tray B modules to solve the problem of covers separating from the potting. An epoxy coat is being used to replace the glass cloth with excellent results. The time delay circuit in the strand gate module was redesigned in June. The change will be effective at System No. 10 with all Block I sub-systems to be retrofitted.

A TDRR was submitted in June to relocate the diode in the core rope component holder. This modification will eliminate the effects of temperature gradient on matched diodes. A set of Sunrise modules are being potted to evaluate the potting procedure, as well as the material being used for potting (Epocast 212). In addition, a hold has been placed on potting to investigate the lack of adherence of the epoxy encapusulent to the header.

AGC oscillators for Systems Nos. 5 and 6 were calibrated, tested, and released to Production during the quarter. A prototype thermal electric oven with the capability of compensating and testing two oscillators concurrently has been developed and is operational (see figure 2-1 of Apollo Monthly Technical Progress Report No. 22, FR-4-265).

With the delivery of the G & N Harness Tray, the end connector, and Trays A and B on 22 June, 1964, the gating item for the start of AGC 6 FTM testing is the completion of thirteen logic sticks now being reworked. The anticipated shipping date for AGC 6 is now 9 July, 1964.

The mechanical trays and Navigation Panel DSKY for AGC 7 are on hand. Because of the stick potting problem, the number of sticks required for testing purposes are unavailable. The expected completion date for this system is now 5 August, 1964.



The expected completion date for AGC 8 has been improved by one week because of a re-estimate of the activity time required for final testing. The oscillator and Tray A potted modules continue to be the gating items. The anticipated completion date is 18 August, 1964. AGC 20 and AGC 10 hold virtually the same status as AGC 8 with expected completion dates of 27 August and 2 September, respectively.

#### 2.2 DISPLAY AND KEYBOARD UNITS (DSKY'S)

The Navigation Panel DSKY for System No. 5 was delivered to MIT/IL in April. Main Panel DSKY No. 6 was fabricated and successfully tested in an unpotted state during April. The unit was then integrated into testing for System No. 6.

Effort on Block I DSKY's was completed during May with the exception of the implementation of minor production and testing changes. Studies and estimates were performed to determine the design approach and level of effort for the Block II DSKY's. Plans were also made for improved DSKY moisture resistance.

Additional potted areas have been added to the backs of the electroluminescent lights, as well as to the keyboard, brightness potentiometer, and UPTL switch terminals for System 8 DSKY's and subsequent.

A gasket for sealing was designed during the quarter and the tooling order is in process. These gaskets will be retrofitted into System 8 and subsequent DSKY's when available. A mechanical stop has been added to the thumb wheel of the brightness control to prevent damage to the potentiometer when its control limit is reached.

Effective at System No. 8, the Check Fail light was changed to Keyboard Release light. An addition, signals to the Computer Fail Light were changed. Systems Nos. 5, 6, and 7 will be retrofitted to reflect these modifications.

The magnesium portions of DSKY decoding modules are being painted

2-3



with epoxy paint for environmental protection purposes. Block 100 series will have a Dow 17 coating in addition to a black finish.

#### 2.2.1 Main DSKY Pedestal Mount

The Main DSKY Pedestal Mount drawings were first reviewed on June 3, 1964. At that time it was decided to hold their release pending the fabrication and checkout of the Serial No. 1 (breadboard) unit. The unit (figure 2-1) was fabricated between 3 June and 23 June. All drawings were reviewed and released on 24 June 1964.

#### 2.3 PROGRAM SUPPORT

The AGC Factory Diagnostics Programs were completely checked out during the quarter. The diagnostic programs, which check out thirty-five different types of sticks were used to exercise and check-out AGC 6 with the Core Rope Simulator (CRS) and the Computer Test Set (CTS). In addition, the ARTEMIS programs, entered via punched paper tape, were used to determine the operational and functional capability of AGC 6.

A program to produce Core Rope Tester (CRT) tapes was written and debugged during April. The tapes were produced and verified. The program was prepared as back-up for one which was previously produced by Raytheon personnel at MIT/IL. In this manner, prompt delivery of all desired tapes is assured.

The ARTEMIS, EXTEST, and AGC Factory Diagnostics programs were used extensively during May for verification of AGC operational and functional capabilities, as well as for diagnostic assistance in the isolation of malfunctions.

A series of programs was produced for the MH-800 computer to verify each punched paper tape produced during the core rope manufacturing.



Figure 2-1. Main DSKY Pedestal Mount



procedure. These programs will assist in eliminating hardware mispunching which has been prevalent in the past.

The Final Test Method (FTM) procedures which will be used during factory sell-off were exercised during June and minor changes were incorporated. A preliminary Computer Subsystem Field Verification Procedure (FR-4-423) has been written in conjunction with MIT/IL. This document will accompany AGC's into the field and will be used for receiving inspection and subsystem testing at all field sites.

A Tally machine to reproduce and verify punched paper tapes has been ordered and will be delivered during August, 1964. A set of programs were coded during June. These programs will be used to produce tapes for a new wiring machine at MIT/IL.

#### 2.4 SPECIAL TOOLING

The Signal Layer Punch (figure 2-2) was used to manufacture 144 matrices during the quarter. A portion of the matrices have been assembled into sticks which are currently being evaluated by MIT/IL. All matrix drawings submitted to date have been programmed. The submissions constitute a completion of 94 drawings. The production of approximately 384 more matrices is being anticipated in the near future. Back-up punches have also been completed. An additional die is being made and a delivery of 20 July is expected. A new punch configuration is being evaluated, as well as a thicker stripper plate which gives the solenoids a greater usable velocity and greater penetration of the nickel material used in the punch. The service manual for the signal layer punch was completed in June.

Changes have been made to the wire guides of the Eubanks Wire Stripper. Preliminary results from the modification indicate improved performance of the stripper. The overall performance of the stripper portion of the system is not up to proficiency standards, however, and the vendor has been contacted

2-6

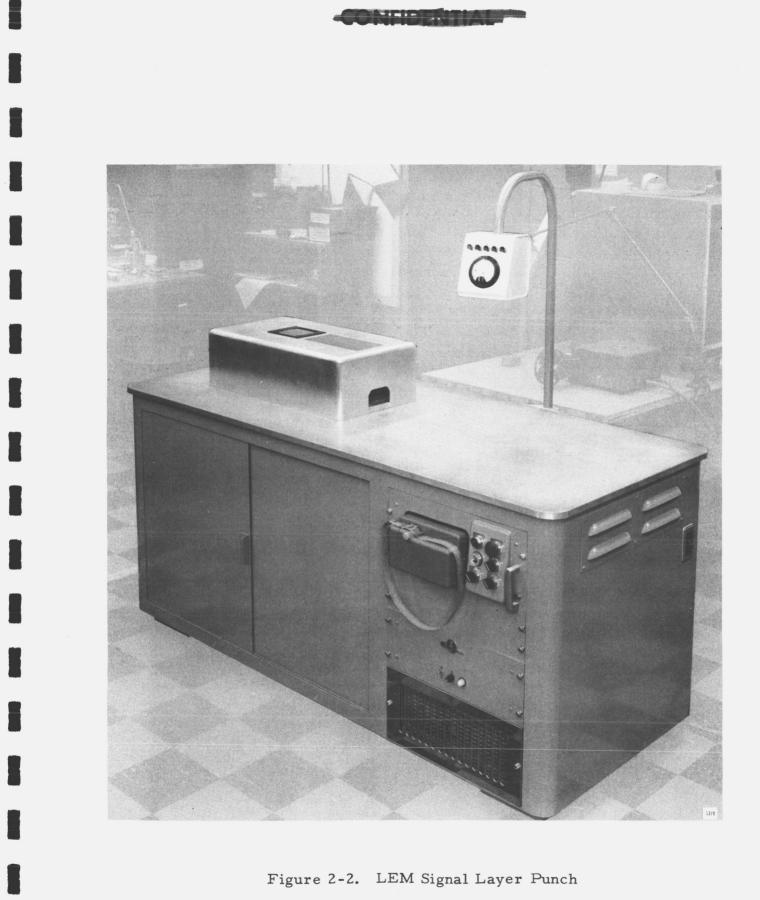


Figure 2-2. LEM Signal Layer Punch



for action. Meanwhile, the equipment will continue to be tested to assure an efficient wirewrap system. During this period of evaluation, the equipment can still be used in Production but at a slightly decreased efficiency. The service manual has been written and will be issued during the next reporting period.

The equipment designed for the insertion of 0.200 center Malco pins has been completed and production parts are being assembled. An updated manual for the 0.125 center equipment has been re-issued.

Eight core rope machines have been completed and delivered to Production. These machines have been retrofitted with an advanced design bell crank linkage for smoother vertical aperture movement. A new inhibit wiring attachment was designed during the quarter for existing core rope machines. The order for the first model will be issued during the next reporting period. A new one-piece steel weldment is being designed for the standard core rope machines, as well as the new inhibit machine.

# SECTION 3 GROUND SUPPORT EQUIPMENT

#### 3.1 COMPUTER TEST SET

Computer Test Set (CTS) No. 3 was integrated with AGC 4B during the quarter. During the integration process, several changes were made to the CTS to achieve operational integrity. All design features of CTS 3 were fully exercised and results indicated that the integration of CTS 3 with AGC 4B was complete and acceptable. Considerable retrofitting was deemed necessary, however, to update CTS 3 to current electrical and mechanical production configurations.

The formal retrofit for CTS 5, 6, and 9 was completed at NAA and ACSP during June. Retrofits for CTS 4, 7, and 8 will be completed when NASA gives authorization for these units. The updating of CTS 2 to the electrical configuration of CTS 7 was completed on 29 June. CTS 9 was shipped to ACSP on 23 June, 1964. CTS 10 is in final test with an expected completion date of 1 July, 1964.

#### 3.2 COMPUTER SIMULATOR

The final sale of Computer Simulator No. 11 was completed in April. This shipment constituted fulfillment of Raytheon's contractual commitments for these units. MIT/IL requested a retrofit in the simulator and associated marked drawings were completed during May. Engineering effort on the Computer Simulator Retrofit was completed during June and the marked prints were reviewed by the Raytheon Design Review Committee.

#### 3.3 AGC/CTS OPERATION CONSOLE

Minor mechanical modifications were made to console subassemblies because of alignment problems during the quarter. A new cable was designed for the AGC Self Test which will connect the Power and Servo Assembly (PSA) programmable counter outputs to PSA counter inputs. Cable changes were also made to the Operation Console during April, as a result of pin connector changes in the Main and Navigation Panel DSKY's. Final test and sale of Computer Simulator No. 1 was completed during May.

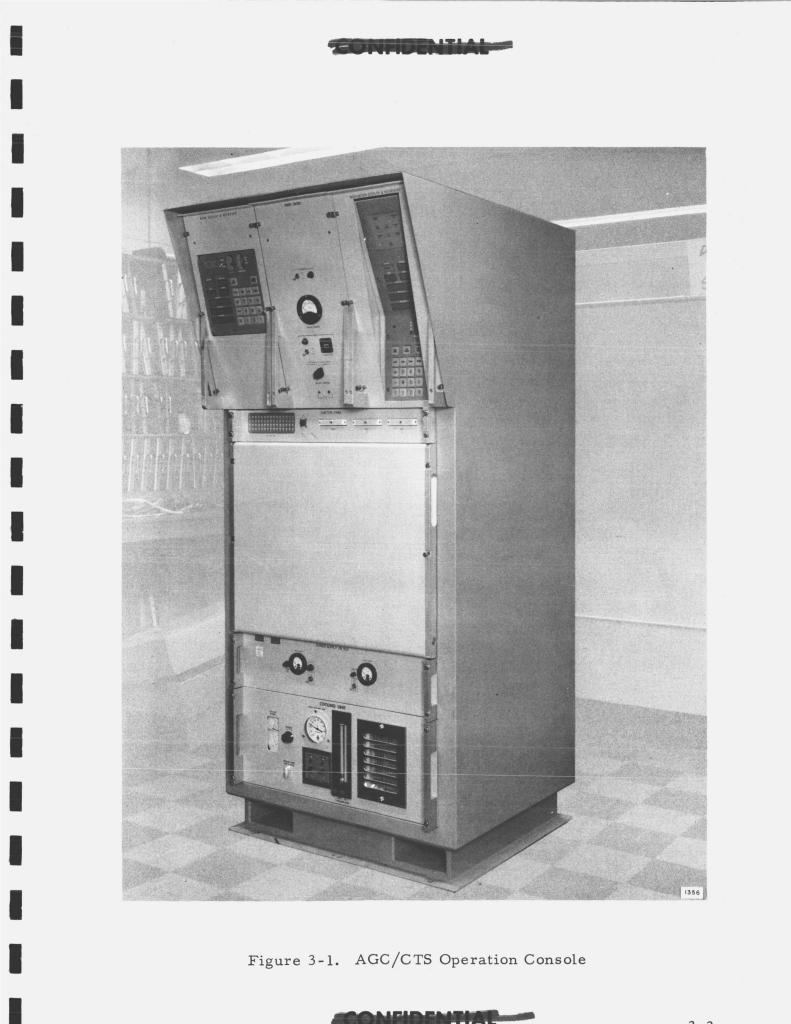
Operation Console No. 1 (see figure 3-1) was integrated with CTS 4 and AGC 6 in June. Several wiring problems were encountered during the testing. Three wires were in error and a noise problem was encountered in the tray extenders. The noise in the tray extenders effected a redesign in the type of wires used. Twisted pairs and coaxials were specified in the redesign. The cable drawings for the new tray extenders are currently being prepared. Operation Console No. 2 is in final test with System No. 3 scheduled for testing during the next reporting period.

#### 3.4 SIMULATION COMPUTER

Logic modules for Simulation Computer No. 1 were completed in April. The cabinet for System 1 was delivered on 13 May, 1964. Changes and additions to the Simulation Computer were studied during the quarter for integration with the current configuration. These modifications were as follows:

- 1. Use of 28V output from PSA for internal power
- Modification of J box to channel all non-common DSKY signals to the Main DSKY connector
- 3. Allowance for operation with the Core Rope Simulator

Plug-in modules for Tray A were completely fabricated and tested during the quarter. Plug-in modules for Tray B have been fabricated and





tested, however, the incorporation of flyable Class I changes has necessitated retesting. The majority of the affected boards are ready for retest and are awaiting the availability of test equipment currently being used for other production purposes.

Trays for System No. 1 have been wirewrapped at RCA and checked out at Raytheon-Waltham. Keying pins and ground busses are now being installed. Inter-tray hand wiring should begin during the next reporting period.

The power control and junction box panels are being redesigned. Additional parts are on order for the Power Control Panel and a new panel is being machined. New drawings for the assembly will be issued during July. The Junction Box Panel was redesigned to accommodate connectors from the Core Rope Simulator. A new panel has been machined and is now being painted. A formal drawing of the new configuration is now being prepared.

A vane operated switch has been installed in the air duct of the blower to shut off the computer should the blower fail. Stick extenders remain a design problem and effort is being concentrated on the rotating lock of the extender. A new design is in process and will be completed during the next reporting period.

# 3.5 CORE ROPE SIMULATOR

The Core Rope Simulator is presently being built in the model shop. All drawings were final released during the quarter with the exception of the signal interconnection, logic flow, and the one-shot module. Final release of these drawings will be accomplished during the next reporting period. The first Simulator will be ready for electrical check-out during the reporting period. Marked sepias will be submitted for review during July.

# 3.6 AGC CALIBRATION SYSTEM

The printer connector for Calibration System No. 1 was received during June and the printer interface was updated to reflect Calibration System No. 2 and subsequent models. The retrofit kit will be checked out upon receipt of a digital ohmmeter from a vendor. The gating item on the procurement of this test equipment is the SCD which is currently in process.

### SECTION 4

## FACTORY TEST EQUIPMENT

Apollo factory test equipment is divided into four categories: AGC inprocess, GSE in-process, AGC/GSE in-process, and AGC/GSE incoming inspection test stations. The status of Apollo factory test equipment is shown in table 4-1.

# TABLE 4-1

# APOLLO FACTORY TEST EQUIPMENT

, <u>, , , , , , , , , , , , , , , , , , ,</u>	Test Station	
Number	Name	Remarks
	AGC/GSE Incoming I	nspection
1 - 0 1		
1 201	Pulse Transformer	* Checkout complete
1202	Semiconductor Leakage	* Checkout complete
1 203	Gross Leak	* Checkout complete
1 204	Oscillator (GSE)	* Checkout complete
1 205	Helium Leak	* Checkout complete
1 206	Automatic Semiconductor	
	(TACT) (Figure 4-1)	* Checkout complete
1 207	Lead	* Checkout complete
1 208	Visual	* Checkout complete
1 209	High-Temperature Storage	* Checkout complete
1210	Constant Acceleration	-
	(Figure 4-2)	* Checkout complete
1212	Micrologic	* Checkout complete
1213	Relay (Figure 4-3)	* Checkout complete
1214	Power Supply	* Checkout complete
1215	Resistor	* Checkout complete
1216	Micrologic Burn-in	* Checkout complete
1210	Transistor Burn-in	* Checkout complete
1217	Diode Burn-in	* Checkout complete
1210	Diode Durn-in	* Checkout complete

\* Indicates test station in use.

# TABLE 4-1

# APOLLO FACTORY TEST EQUIPMENT (continued)

Т	Cest Station	Remarks
Number	Name	X
	AGC/GSE Incoming In	spection
1 2 2 0	Tape Wound Rope Core	* Checkout complete
1 2 2 1	Capacitor	* Checkout complete
1 2 2 2	Indicator Light (Figure 4-4)	* Checkout complete
1224	Transformer and Inductor	* Checkout complete
1 2 2 5	Power Semiconductor	* Checkout complete
1226	Power Semiconductor	
	(Figure 4-5)	* Checkout complete
1 2 2 7	Relay (for AGC)	* Checkout complete
1 2 2 8	Thermal Shock	* Checkout complete
1 2 2 9	Marking	* Checkout complete
1 2 3 0	Propagati <b>o</b> n Delay	
	(Figure 4-6)	* Checkout complete
1 231	Integrated Sense Amp-	_
	lifier (Figure 4-7)	* Checkout complete
1 233	Varicap	* Checkout complete
	AGC In-Proc	ess
1002	Micrologic Stick	* Checkout complete
1003	Erasable Memory	* Checkout complete
1004	Core Rope	* Checkout complete
1006	DSKY	* Checkout complete
1008	Power Supply	* Checkout complete
1009	AGC Oscillator	Checkout in process
, 	(Figure 4-8)	
	GSE In-Proc	ess
1101	Control Panels	
1102	Computer Simulator	*Checkout complete
1103	Computer Test Set	-
1104	Module	

\* Indicates test station in use.

# TABLE 4-1

# APOLLO FACTORY TEST EQUIPMENT (continued)

	Test Station	
Number	Name	Remarks
	GSE In-Process (c	ontinued)
1105 1106	Operation Console Coldplate	* Checkout comple <sub>te</sub>
	AGC/GSE In-Pr	ocess
1 301 1 302	Module Interconnection Assemblies	* Checkout complete

\* Indicates test station in use.

\_\_\_\_

# CONFIDENTIAL

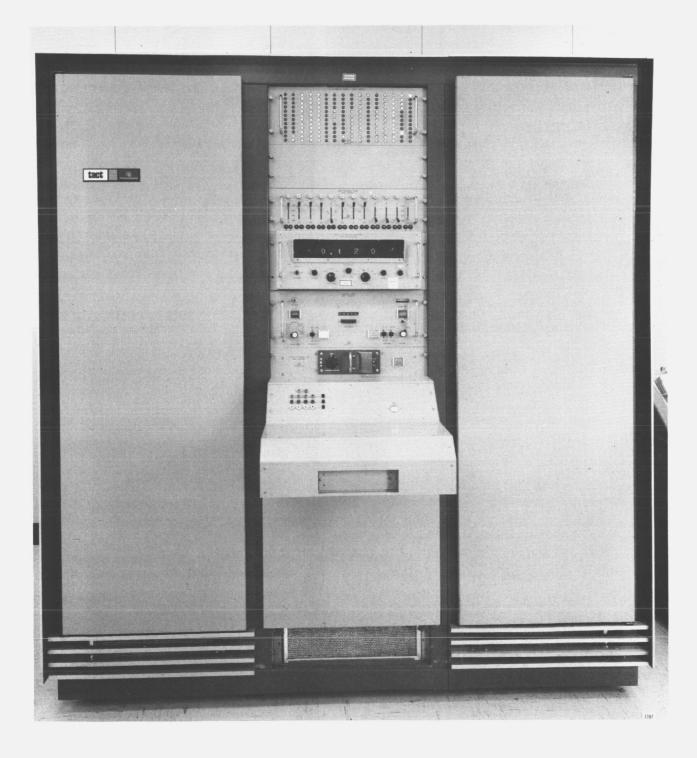
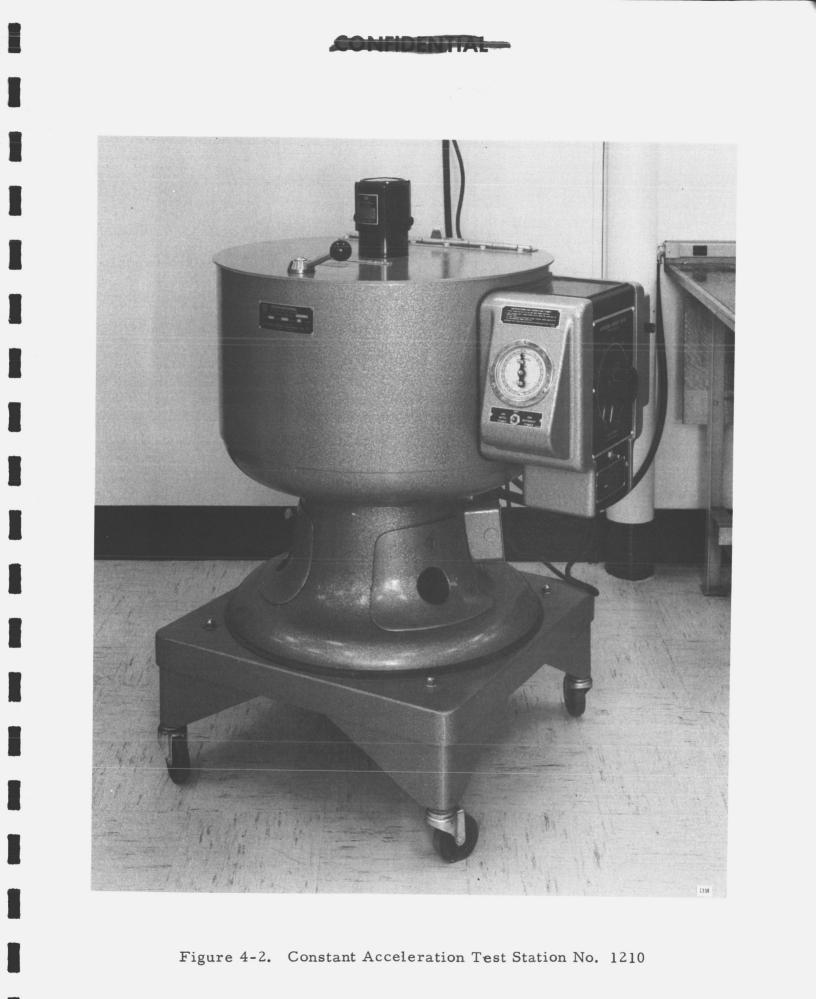


Figure 4-1. Automatic Semiconductor Test Station No. 1206 (TACT)







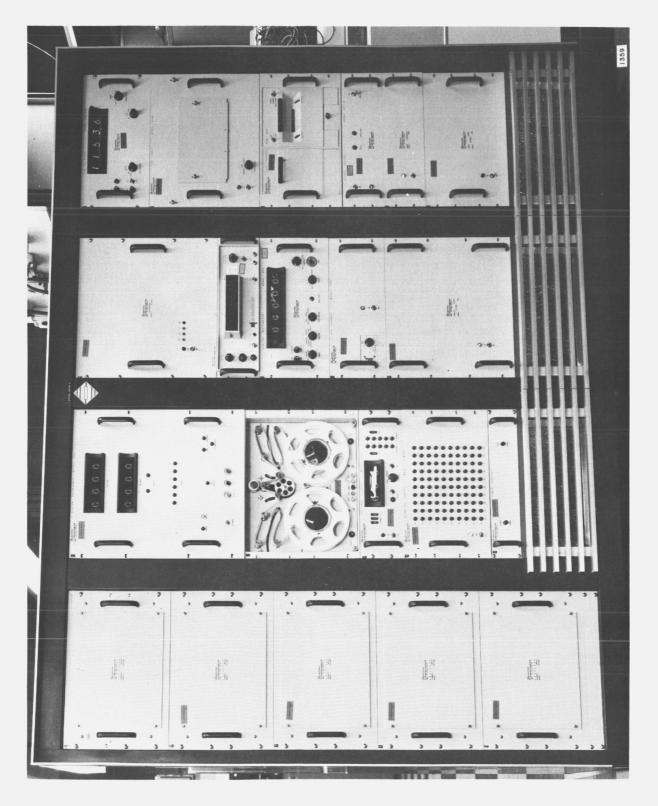


Figure 4-3. Relay Test Station No. 1213

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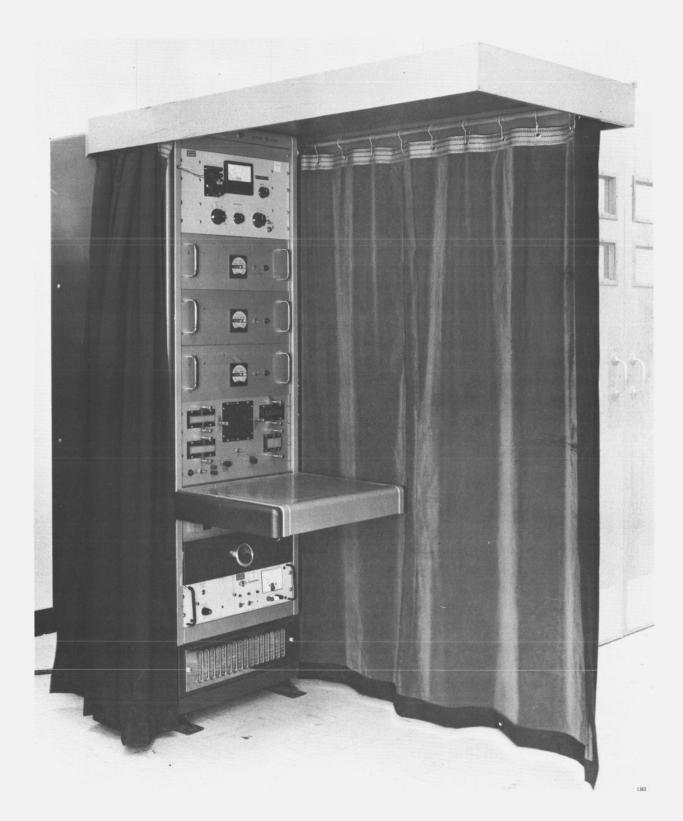


Figure 4-4. Indicator Light Test Station No. 1222





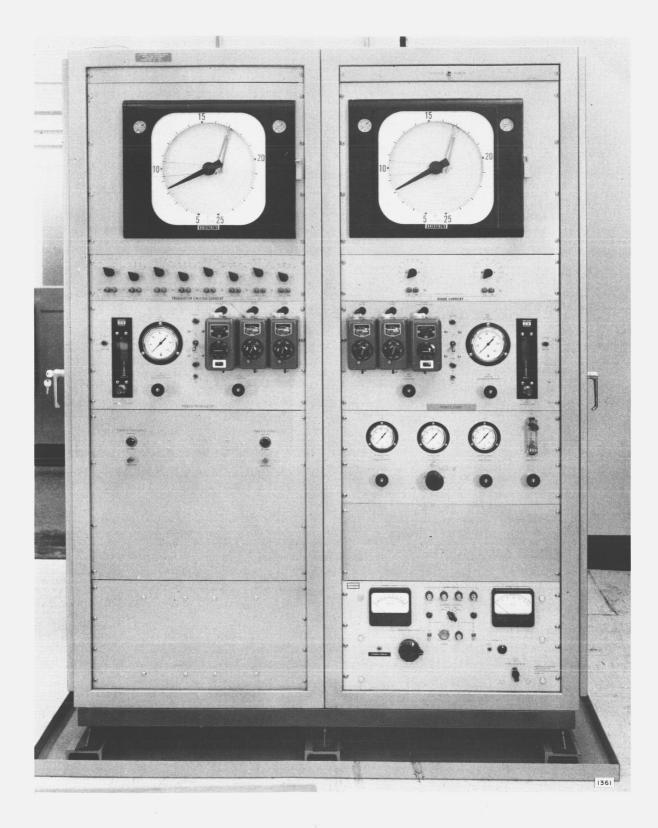


Figure 4-5. Power Semiconductor Test Station No. 1226



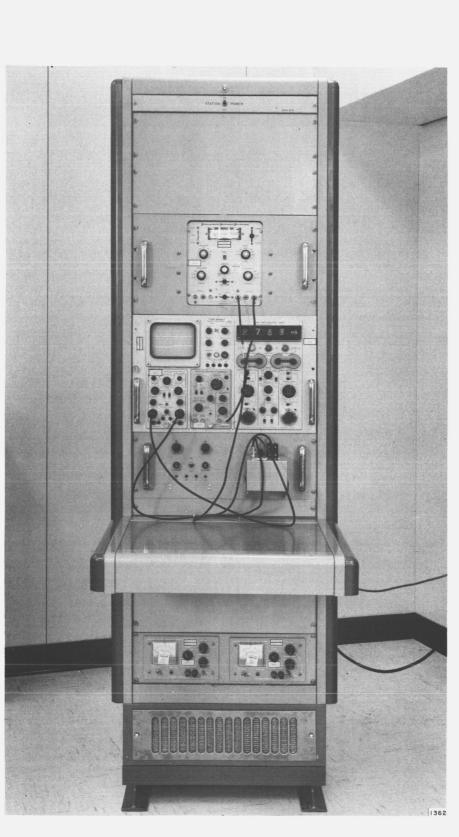


Figure 4-6. Propagation Delay Test Station No. 1230



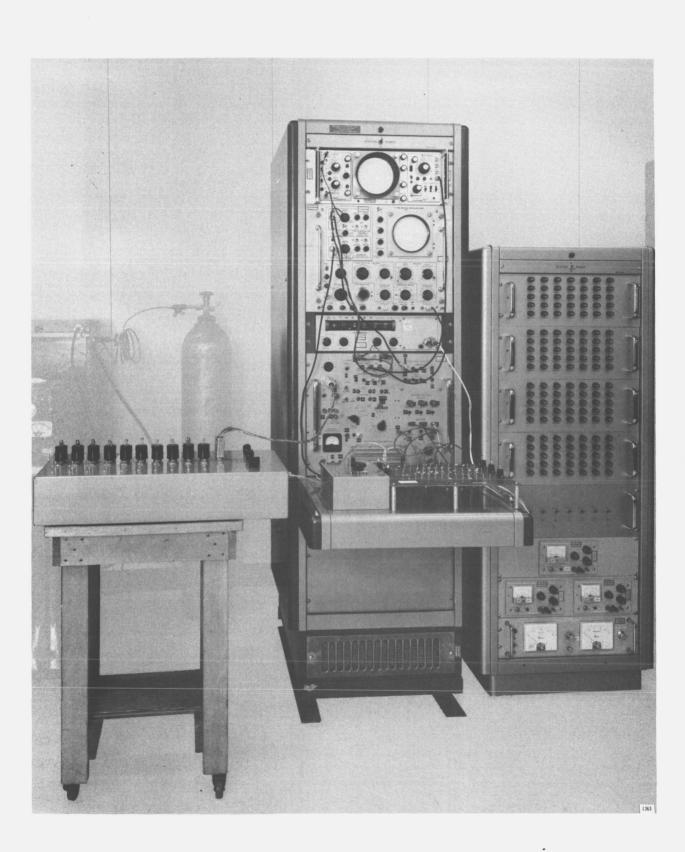


Figure 4-7. Integrated Sense Amplifier Test Station No. 1231



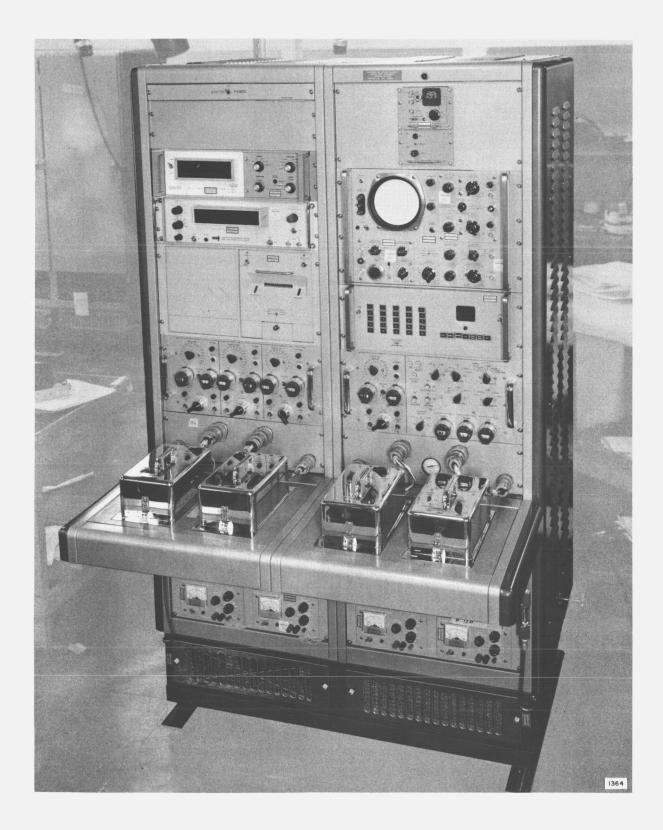


Figure 4-8. AGC Oscillator No. 1009



# SECTION 5 RELIABILITY

### 5.1 RELIABILITY ENGINEERING

Two groups of sense amplifiers were subjected to the complete screen and burn-in cycle during April. The cycle revealed a bonding control problem in one vendor device. A conference was held with the vendor and the following corrective action resulted:

- 1) Intensive operator instructions
- 2) Jewel tightening
- 3) Stringent daily monitoring of wire bond strength and pull test
- One-hundred percent, 20,000 g centrifuge testing of devices prior to shipment.

Five types of pulse transformers manufactured by four different vendors to SCD 1006762 were chemically depotted during the quarter to analyze the reliability of their mechanical design and construction. This examination indicated potential failure mechanisms in two of five devices. (A complete summary of the analysis can be found in Apollo Monthly Technical Progress Report No. 23, FR-4-306).

Effort to determine the cause of transformer driver module failures was conducted during June. There was no conclusive data reported to indicate poor reliability of the module. To date, no satisfactory way to remove the potting material without damaging electrical parts has been found. A new mechanical method of removing the potting is being investigated, as well as a determination regarding possible excessive use of potting material.

### 5.2 RELIABILITY ANALYSIS LABORATORY

Vendor transistors which conform to SCD 1006759 were analyzed during the quarter. Two of the groups had two separate patterns of masking. Most of the units showed a considerable amount of purple plague. (A complete description of the nature of purple plague can be found in Apollo Monthly Technical Report No. 22, FR-4-265).

Two other transistor units were submitted for inspection. The electrical tests on both units proved to be satisfactory. Two different patterns were used. Both units displayed signs of purple plague. A surface ripple resulted in one unit which was probably caused by dislocations in the epitaxial layer and highly pitted oxide around the emitter.

A routine inspection of transistors which conform to SCD 1006752 was conducted during the reporting period. Four units were received in each lot except for ID 8486 from which three were received. All of these devices proved to be electrically sound. All of these units showed signs of purple plague, some quite pronounced. For a detailed description and photos of the complete transistor (SCD 1006752) evaluation refer to Apollo Monthly Technical Progress Report No. 23, FR-4-306.

The following information was assembled in June concerning transformer 1006762 used in transformer driver module 1014053. There are 122 used in the AGC, 11 used in the CTS, as well as extensive use in the Computer Simulator. The internal magnet wire is AWG 31. Five vendors were considered and evaluated, and a sole source was chosen to supply the transformer. Transformers that have been examined internally display good design and workmanship. Transformers that were temperature cycled had stable electrical and mechanical characteristics. Two out of 800 have been rejected at incoming inspection. Future plans call for negotiation of some changes with the vendor, as well as the selection of a second source of supply. Samples will then be obtained and subjected to qualification testing and analyzed in the analysis laboratory.

5-2

### 5.3 COMPONENTS ENGINEERING

A timing problem in relays (SCD 1006815) was investigated during April. Vendor test equipment indicated that the parts were satisfactory. Inquiries were received during the quarter from several vendors regarding the supplying of wire to SCD 1006732. Test equipment was set up in the analysis laboratory for testing the wire per the applicable SCD as it arrived. No completion date was established for completion of this program. Effort is also being expended in setting up and calibrating the electroluminescent panel test set.

A tenative list was established in June for vendor survey trips. These trips will be made in conjunction with AC Spark Plug and Kollsman Instrument with Raytheon as acting chairman of the group. It is anticipated that with this tenative planning, other relative information will be received from the cooperating companies.

# 5.4 RELIABILITY ANALYSIS AND STATISTICS

Summary reports on screening and burn-in results for three Vendor "A" and two Vendor "B" micrologic lots were issued during April. Testing of these units constituted completion of all backlog for these lots. Summary charts for each vendor are being prepared which give a quality history of components tested. These charts will be continually updated as data becomes available.

A package for an Apollo Block I maintainability program was prepared in May in a joint effort with Field Operations. A new format for the Apollo Failure Report was approved in June with the suggestion that block numbers pertaining to system, component, assembly, and part run consecutively across the form.

5-3

# SECTION 6 DOCUMENTATION

# Apollo Documentation Milestone Charts are presented in this section. It should be noted that the specification control drawing section lists only SCD's in process. Table 6-l is a summary of the SCD effort.

# TABLE 6-1

# SPECIFICATION CONTROL DRAWINGS

	Гуре	Received	Completed	Cancelled	In-Process
AGC	Revisions	25	25	0	0
	Class B	1 70	1 21	39	10
GSE	Revisions	1 75	175	0	0
	Class B	221	182	34	5
PSA	Revisions	41	41	0	0
	Class B	181	155	26	0

RAVTHEON	APOLLO DOCU	MEN	DOCUMENTATION	1	MILESTONES	ONES					DATE:	6/30/64
DOCUMENT SERIES:	S: Special Process (ND)	TYPE CUMENT	T FIRST TAART T3012 TAA	LETE FIRST IRAFT	DRAFT	DRPORATE MMENTS FUBE CYCL F	DMPLETE	COMMENTS	COMMENTS COMMENTS	JBMIT TO CCB	BY CCB	REMARKS
NUMBER	TITLE		 ]		]	00			MIT (	15	ЭТАО I	
1002009	Embedding and/or Staking with Silicone Rubber	н	X	х	X	x >	×	×	×	X	8/14/63	Class "A"
1002017	Special Test Requests for Sense Amplifier	н	×	×	×	×	×	×	×	X	2/15/63	Class "B"
1002019	General Marking	н	×	×	×	×	×	×	×	X	6/26/63	Class "A"
1002025	Std-Weld Repair	н	х	x	×	x	x	x	x	Х	9/20/63	
1002026	Inspection Criteria of Welds in Electrical Assemblies	н	×	X	×	×	Cance	elled	8/21	1/63		Refer to ND 1002005
1002027	Wire Stripping, Magnetic	T	х	X	×	×	Cance	elled	6/21	1/63		
1002028	Core Replacement	н	×	×	×	x	Cance	elled	6/2	1/63		
1002029	Fixed Memory Wiring	н	х							8/31/6 <sup>1</sup> +		
1002030	Matrix Bonding	I	х	x	×	x	×	×	×	12/15/63	12/30/63	Class "A"
1002031	Wire Wrapping	н	×	×	×	x	x	X	х	1/31/64	2/21/64	Class "A"
1002032	Fabrication of Wiring Harness in Wired Assemblies	г	×	X	×	x	x	×	х	х	9/10/63	Class "A"
7002107	Wire, PVC Insulated, Nylon Jacketed	I	х	х	X	x	x	x	х	1/31/64	2/21/64	Class "A"
1002117	Process for Encapsulating with Thermally Cond. Resin	н	х	×	×	x	×	×	×	Х	9/5/63	Class "A"

RAYIHEON	APOLLO DOCL	MEN	DOCUMENTATION		MILESTONES	VES				DATE:	6/30/64
DOCUMENT SERIE	DOCUMENT SERIES: Special Process (ND)	TYPE CUMENT	T FIRST TAAFT T2912 TAA	ETE FIRST RAFT Tem First	TTAR( TARORATE	MPLETE URE CYCLE MMENTS	COMMENTS	ATAAOAA 2TAAOAA 2TNAMMO(	BMIT TO CCB	IY CCB Released	REMARKS
NUMBER	וודנב	00	a			TANDIS		MIT C INCO	ns	ЭТАО 8	
1002119	Process Specification for Scotchcast No. 8	н	×	X X	×	х	×	×	Х	8/8/63	Class "A"
1002121	Installation of Keenserts	н	Х	X X	×	X	×	×	Х	8/8/63	Class "A"
1002126	Process for Embedding with Epoxy Resin	н	×	x x	x	х	Х	×	X	8/8/63	Class "A"
1002183	Casting with 2850 FT Epoxy Resin	н	×	X X	×	×	×	×	Х	9/5/63	Class "A"
1002186	Insulating with Silicone Rubber	I	X	x c	Cancell	led 8,	/21/63				
1002212	Filling Coldplate of CTS Han- dling Fixture With an Inhibit	н	Х	x x	X	×	X	X	X	t1/7/64	Class "B"
	ed Ethylene Glycol Coolant										
1002217	Potting with low density Silicone Rubber	н	Х	x x	Х	×	×	×	5/30/64	6/23/64	Class "A"
1002221	Application of Epoxy Gel-Coat	н	×	x							
1002226	Encapsulating with a Low Viscosity Epoxy Resin		x								

RAVTHEON	APOLLO DOCL	DOCUMENTATION	ATION		MILESTONES	S				DATE:	6/30/64
DOCUMENT SERIES:	S: AGC - Final Test Method (FTM)	TYPE CUMENT	72817 73817 73817 72813 73817 72813 73817 7377 737	ETE FIRST RAFT IEW FIRST	TAART RPORATE TAMORTE TAMMENTS	MPLETE URE CYCLE	COMMENTS	RPORATE STNAMMO(	100 100 100 100 100 100 100 100 100 100	RELEASED	REMARKS
NUMBER	דודנב			BEVI	INCO	TANDIR DD	) TIM	NIT C NIT C	ns	ЭТАО Э	
	Computer - AGC	н	×	X X	×	Х	Х	Х	5/20/64	Required statement	1 by work 1t 11/23/62
	Tray A:										
1003074	Arithmetic	н	×	X X	×	×			5/15/64		
1003174-26	Parity	I	х	x X	Х	х	Х	х	5/15/64		
1003174-2	GSA Service	н	×	X					5/15/64		
1003123	Interface (A19)	н	×	X X					5/15/64		
1003115	Interface (A20)	н	×	X					5/5/64		
1003174-3	Control Pulse l	н	×	X X					6/12/64		
1003174 <b>-</b> 4	Control Pulse 2	н	×	X X					6/19/64		
1003174-6	Control Pulse 3	н	×	X X					6/26/64		
1003174 <b>-</b> 5	Instruction Decode	н	×	X					5/15/64		
100317 <sup>4</sup> -7	SQ Complex	н	×	X X					6/19/64		

RAVIHEON	APOLLO DOCU	MENT	DOCUMENTATION		MILESTONES	NES					DATE:	6/30/64
DOCUMENT SERIES:	: AGC - Final Test Method (FTM) continued	TYPE CUMENT	RT FIRST TAAR TAAR	ETE FIRST RAFT 1991	IEW FIRST JRPORATE JTARORATE	URE CYCLE	MPLETE	COMMENTS	STNAMOC STNAMMOC	IBMIT TO	RELEASED	REMARKS
NUMBER	עוערפ				]	00	20		MIT (	ns	ЭТАО Э	
1003174-8	Time Pulse Counter	Т	Х	X 2	х					6/16/64		
1003174-9	Bank Register	ы	Х	X >	X					6/21/64		
1003174-10	Ring Counter	Ц	Х	x 3	X					5/7/6 <sup>1;</sup>		
1003174-11	Alarms	г	х	X >	X					5/14/64		
1003174-13	Counter Service	I	Х	X >	х					5/21/64		
1003174-12	Counter Priority	I	х	x ×	х					5/28/64		
1003174-14	Scaler	н	×	x	×					6/4/64		
1003174-15	Ferrite Address	н	×	X	×					6/11/64		
1003174-16	Rate Circuits	н	×	X						6/18/64		
1003174-17	Rupt Service	н	×	X						6/25/64		
1003174-18	Down-link	н	×	X X						6/25/64		
	Tray B:											
1003113	Power Switch	н	×							5/15/64		

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DOCUMENT SERIES:	s: AGC - Final Test Method (FTM) continued	TYPE CUMENT	RT FIRST TAAA	ETE FIRST RAFT	EW FIRST DAFT	RPORATE 8 MMENTS	MPLETE URE CYCLE	OMMENTS	RPORATE 21N3MMO:	BMIT TO CCB	IY CCB	REMARKS
NUMBER	ШТЕ	00		D COWLI	0		TANDIZ 00	MITC	MIT C	NS	ЭТАД 8	
1003527	Oscillator	н								7/31/64		
1003165	Driver Service	н	×	х	х					7/31/64		
1003153	Current Switch	I	×	х	×					7/31/64		
1003069	Erasable Memory	П	х	х	х	x				7/31/64		
1003139	Erasable Driver	Ι	x	х	х					7/31/64		
1003138	<b>Er</b> asable Sense	Г	Х	х	х					7/31/64		
1003150	Power Supply Control	н	×							8/28/64		
1003133	Rope	н	×	×	×	×	×	×	X	6/27/64	6/27/64	
1003167	Strand Gate	н	×	×	×					8/28/64		
1003132	Rope Strand Select	н	х	x	×					8/28/64		
1003178	Rope Driver	н	×	X	×					8/28/64		
1003154	Rope Sense Amplifier	н	×	×	×					8/28/64		
1003457	Connector Cover Plate Assy	н	x	×								

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RAVTHEON	APOLLO DOCI	MEN	DOCUMENTATION		MILESTONES	ONES					DATE:	6/30/64
DOCUMENT SERIES:	: <u>GSE - Final Test Method</u> (FIM)	TYPE CUMENT	RT FIRST RAFT	ETE FIRST RAFT	IEW FIRST DRAFT	MMENTS MMENTS	MPLETE URE CYCLE	COMMENTS	TARORA 2TN3MMOC	18MIT TO 158	RELEASED	REMARKS
NUMBER	ПТЕ	00	0		)				MIT C	ns	ЭТАО Э	
1014156	GSE - Test Set	н	×	×	×	×	×	×	×	3/19/64	3/20/64	Required by work state-
												ment II/23/62
1014061	GSE - Simulator	н	×	×	×	×	×	×	х	8/14/63	8/15/63	ired by state-
												ment 11/23/62
101 <sup>4</sup> 217	GSE - Calibration Equipment	н	×	×	×	×	×	×	×	1/17/64	12/4/63	Required by work state-
1014465	GSE - Operational Console	н	×	×	×	×	×	×	×	5/5/64	5/20/64	
	GSE - Modules			·								work state- ment
1014064	Diode	г	х	Х	x	x x		×	Х	9/30/63	10/10/63	
1014209	Interface Coupling	н	×	X	×	X X		×	×	1/3/64	3/10/64	
1014096	Driver	I	х	x	х	x x		X	х	1/3/64	1/24/64	
101 <sup>4</sup> 053	Transformer Driver	ц	х	X	x	x x		Х	Х	1/31/64	t/9/11/9	
1014065-1	Resistor	н	Х	X	x	x x		X	X ]	11/15/63	1/2¼/6¼	
1014034	NOR	н	×	X	×	X X		×	×	1/3/64	6/17/64	
1014079	Gated Flip-flop	н	×	×	×	x		×	×	3/2/64	6/17/64	

/64	REMARKS												
6/30/64	RE												
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	RPORATE 2TN3MM03	MIT C	Х	х	Х	х	×		 	 			
	OMMENTS	MIT C	х	х	х	х	х						
S	MPLETE URE CYCLE	T <b>ANĐI</b> R DD	Х	х	х	х	х						
TONE	RPORATE MMENTS	CO DONI	Х	х	Х	х	х						
MILESTONES	T2RIRST DRAFT	C BEN	Х	Х	Х	×	×						
	T2817 JTJ RAFT	D COWDI	Х	х	х	×	х						
ITATI	RT FIRST RAFT	AT2 0	Х	х	х	×	×						
DOCUMENTATION	TYPE CUMENT	00	Г	ц	н	н	ы			 		 	
APOLLO DOC	s: GSE - Final Test Method (FTM) continued	TITLE	Resistor	Clock	DAC	Interface Receiver	Resistor (510)						
RATHEON	DOCUMENT SERIES:	NUMBER	1014065-2	1014226	1014219	1014230	101 <sup>4</sup> 065 <b>-</b> 3						

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	OMMENTS	МІТ С			x	Х						
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ILLES	EW FIRST BAFT	D BEAI		Х	Х	х	х					
	ETE FIRST RAFT	DI COWET		х	х	х	х			 		
TATI	Т2817 ТЯАТ2 ТЗАЯС ТЭАЯС		Х	Х	Х	х	х				 	
DOCUMENTATION	TYPE CUMENT	00	Н	Ι	I	н	н					
APOLLO DOC	DOCUMENT SERIES: Interface Specs (ND)	חודנב	AGC & DSKY	GSE - Test Set	GSE - Simulator	GSE - Calibration Equipment	GSE - Operation Console					
NC3HLT3	DOCUMENT SERIES	NUMBER	1002076	1002192	1002193	1002194	1002222					

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RAVTHEON	APOLLO DOCU	IMEN.	DOCUMENTATION	-	MILESTONES	ONES					DATE:	6/30/64
DOCUMENT SERIE	DOCUMENT SERIES: GSE - Procurement Specs (PS)	TYPE CUMENT	тгялтя тая тая	ETE FIRST RAFT	EW FIRST IRAFT	RPORATE STN3MM MMENTS	МРLETE ИRE СҮСLЕ	OMMENTS	RPORATE 2TN3MMO	BMIT TO CCB	Y CCB RELEASED	REMARKS
NUMBER	ЛТСЕ	00	a		]	00			MIT C INCO	ns	91AQ 8	
	GSE - Modules											
1014064	Diodes	н	×	×	×	X X		Х	×	1/22/64	3/10/64	Class "B"
1014209	Interface Coupling	н	×	×	×	x		X	х	3/13/64	3/31/64	
1014096	Driver	г	х	. X	x	x x		x	х	3/13/64	3/31/64	
1014053	Transformer Driver	I	х	х	X	х х		x	Х	th/6/64	5/6/64	
1014065	Resist <b>or*</b>	н	×	X	X	x x		×	Х	1/22/64	3/10/64	Class "B"
1014034	NOR	н	×	x	x	x x		x	Х	1/22/64	3/10/64	Class "B"
1014079	<b>Gat</b> ed Flip-Flop	I	х	x z	x x	x x		x	х	t/18/64	5/19/64	
1014226	Clock		х	x	x >	x x		x	x	3/17/64	4/22/64	
1014219	DAC	ы	×	X >	x >	x x		x	×	2/26/64	3/31/64	
1014230	Interface Receive <b>r</b>	ц	х	X >	x x	X X		x	Х	2/26/64	3/31/64	
							$\left  \right $					

\*All resistor modules covered under (1) specification

					3/64 19/64	/30/64	/64 10/64									
6/30/64	REMARKS		Released to ACSP 2/21/64	Preliminary Copy 15 May 1964	1. To MIT 4/16 2. Returned 4/	1. To MIT $12/3$ 2. Returned $4/$	1. To MIT $1/10$ 2. Returned $4/$		TD-R-138 Cancelled					Complete	Complete	
DATE:	BY CCB RELEASED	∃TAQ }	NA													
	18MIT TO 800	ns	NA			Х	Х							NA	NA	NA
	АТАЯОЯЯ СТИЭММОС		Х		х	X	Х							NA	NA	NA
	COMMENTS	) TIM	×	Х	х	Х	Х		Х					NA	NA	NA
S	MPLETE URE CYCLE	ranjir Do	×	×	×	х	х		х					Х	Х	Х
TONE	APORATE 800RATE 8102	CO DONI	×	×	х	х	х		Х	х				Х	Х	Х
MILESTONES	IEW FIRST Taart	IN BREVI	×	×	X	Х	Х		×	х				Х	х	Х
	ETE FIRST RAFT	D 14W00	×	×	х	х	х		х	Х		×		х	х	х
MENTATION	RT FIRST RT FIRST TAAR	AT2 D	×	×	X	x	x	Х	Х	Х	x	х		×	Х	×
UMEN	TYPE CUMENT	00	H	н	H		н Г	III	н	н	TII	III	III	III	III	III
APOLLO DOCUI	: AGC and GSE Manuals	ШТЕ	Familiarization Manual	Computer Subsystem Checkout, Maintenance and Repair Manual	AGC Test Set Checkout Maintenance and Re <b>pair</b> Manual	AGC Simulator Checkout Maintenance and Repair Manual	AGC Calibration System Check- out Maintenance & Repair Man.		AGC Simulator Field Test Procedure	AGC Test Set Connections Manual (3 Volumes)	Simulation Computer Operation and Maintenance Manual	Computer Subsystem Field Verification Procedures	Information Series	Issues 1 thru 13 and 15	Revisions - Issue 12	Issue - 2, 5, 15
RAVIHEON	DOCUMENT SERIES:	NUMBER	1021037	1021001	1021000	1021003	1021002	FR-4-355	1021004	1021005	FR-4-282	FR-4-323		FR-2-100 Series		

RATHEON	APOLLO DOCI	IMENT	DOCUMENTATION		MILESTONES	S				DATE:	6/30/64
DOCUMENT SERIES:	s: Reports and Plans	TYPE CUMENT	RT FIRST IRAFT TERST	ETE FIRST RAFT IEW FIRST SAFT	АТАЯОВАТЕ ВМИЕИТS	MPLETE URE CYCLE	COMMENTS	TAPORA 2TN3MMO(	CCB BMIT TO	RELEASED BY CCB	REMARKS
NUMBER	ЭТЦЦ			BEVI	CO DONI	TANDIS DD	MITC	MIT C	ns	∃TAQ 9	
	Monthly Technical Progress	II	EACH	HTUDM							
	Quarterly Technical Progress	II	EACH	QUARTER	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						
	Still Photos (300)	II	AS RF	REQUIRED							
	Motion Pictures (20 min)	II	AS RE	REQUIRED							
	Emergency Action	II	AS RF	REQUIRED							
	Lesson Plan (Training)	III	AS RE	REQUIRED							
	Failure Data	II	AS RE	REQUIRED							
	Qualification Test	н									
	Documentation Plan	II	COMPLETE	H.H.							To be updated
	Development Plan	II	COMPLETE	ElE							To be updated
	Factory Test Plan (GSE)	III									Update as re- quired
	Factory Test Plan (AGC)	III	х								
	Master Summary Schedule	III	COMPLETE	E							

HAVTHEON	APOLLO DOCL	MEN	DOCUMENTATION	N MIL	ΙШ	STONES					DATE:	6/30/64
DOCUMENT SERIE	DOCUMENT SERIES: <u>Specification Control</u> Drawings	TYPE CUMENT	RT FIRST TAAR TAAR	ETE FIRST RAFT	EW FIRST DRAFT	RPORATE MMENTS	МРLETE ИRE СҮСLЕ	OMMENTS	APORATE 2TN3MMO	BMIT TO CCB	א ככפ גדרבאזבם	REMARKS
NUMBER	TITLE	00	٥		<b>0</b>	100	TANDIZ 00	MITC	MIT C	ns.	JTAQ 8	
1006225	Back Shell, 2 <sup>44</sup> Pin Connector	ы	x	х	Х	X	х	х	Х		4/29/64	GSE
1006226	Back Shell, 88 Pin Connector	ц	х	x	x							GSE CANCELLED
1006227	Back Shell, 108 Pin Connector	н	×	×	×	X X	×	×	х	5/27/64	5/28/64	GSE
1006228	Card	н	х	X	x	X	×	x	×	2/20/64	4/15/64	GSE
1006229	Container, Shipping & Storage Main Display	ц	х	X	x	x	×	x	x	t4/6/t	4/24/64	GSE
1006230	Container, Shipping & Storage, Computer	н	x	x	x	x	х	Х	х	4/9/64	4/24/64	GSE
1006231	Container, Shipping & Storage Nav Display	н	×	×	×	×	X	X	×	4/9/614	4/24/64	GSE
1006232	Back Shell, Straight	н	Х	x	x	x 3	х	Х	Х	5/27/64	5/28/64	GSE
1006233	Back Shell, 90 <sup>0</sup> Bend	н	×	×	×	X	X	x	х	5/27/64	5/28/64	GSE
1006234	Relay	н	×	×	×	×	×	×	×	3/19/64	4/15/64	GSE
1006235	Lamp, Incandescent	Ц	х	X	х	x	x	Х	Х	3/19/64	4/13/64	GSE
1006236	Terminal, Lug	н	X	×	×	x >	×	х	х	3/12/64	4/15/64	GSE
1006237	Plastic Sheet	н	×	×	×	^ X	×	×	×	3/20/64	4/15/64	GSE
1006266	Silicone Rubber Compound	н	×	×	×	×	×	×	X	4/14/64	4/22/64	AGC

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RAVIHEON	APOLLO DOCL	DOCUMENTATION	ATIO		MILESTONES	NES					DATE:	6/30/64
DOCUMENT SERIES:	s: <u>Specification Control</u> Drawings	TYPE CUMENT	T2817 T3A8 T322 T2912 T3	ETE FIRST RAFT EW FIRST	T 1 A A (	ИВЕ СУССЕ ММЕИТS	APLETE	RPORATE 3TAROAR	OMMENTS	CCB BMIT TO	IY CCB RELEASED	REMARKS
NUMBER	חודנפ		۵			CO SIGNAT			MIT C	00	JTAQ 8	
1006267	Curing Agent	н	х	X X	X	X	X		X 4/	#/1#/64	4/22/64	AGC
1006268	Connector, Plug, Elec, 244 Pins	ы	Х	X X	X	X	Х		X 3/2	3/23/64	3/31/64	AGC
1006269	Connector, Recept, Elec, 244 Sockets	н	Х	x x	x	×	X		X 3/2	3/23/64	3/31/64	AGC
1006270	Chromate Conversion Compound	н	×	x x	×	×	×		X 3/2	3/20/64	3/31/64	AGC
1006271	Ink, Epoxy Base	н	Х	x	×	×	×		X 3/2	3/20/64	4/14/64	AGC
1006693	Connector, Plug, Elec, 68 Pins	н	X	x x	×	×	X		X 5/2	/21/64	6/10/64	GSE
1006695	Terminal, Coaxial	н	X	X	×	×	×		x 3/J	/12/64	4/15/64	GSE
1006696	Tubing	ьч	×	× ×	×	×	×		x 2/1	2/7/64	3/6/64	GSE
1006697	Strap, Cable	н	×	x	×	×	×		х 2/ <sub>7</sub>	2/7/64	3/6/64	GSE
1006698	Adapter, Connector	н	×	× ×	×	×	×		x 3/2	3/20/64	4 /15/64	GSE
1006699	Cyclohexanone	н	×	X X	X	X	×	X		2/7/64	3/6/64	GSE
1006742	Plastic, Polyurethane	н	×	× ×	×	×	×	×		3/6/64	3/18/64	AGC
1006743	Catalyst	н	×									AGC CANCELLED
1006744	Indicator	н	×	x	×	×	×	×		5/14/64	5/27/64	AGC

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RAVIHEON	APOLLO DOCL	MEN	DOCUMENTATION		MILESTONES	ONES					DATE:	6/30/64
DOCUMENT SERIES:	8: <u>Specification Control</u> Drawings	TYPE CUMENT		LETE FIRST IRAFT	IEW FIRST DRAFT	DRPORATE MMENTS	DMPLETE	COMMENTS	COMMENTE COMMENTS	18MIT TO 18MIT TO 800	BY CCB Released	REMARKS
NUMBER	TITLE	Da					))) 101010		WIL (	าร	ЭТАО I	
1006745	Indicator	П	x	Х	X	Х	X	Х	Х	5/14/64	5/14/64	AGC
1006746	Indicator	I	×	Х	X	×	×	×	×	5/14/64	5/14/64	AGC
1006748	Catalyst	н	×									CANCELLED
1006945	Wire	г	×	Х	х	x	x	x	×	3/6/64	4/14/64	GSE
1006274	Thinner	П	Х	х	x	x	×	X	Х	6/12/64	6/17/64	AGC
1006272	Curing Agent	Ц	х	Х	x	x	×	×	×	5/5/64	5/20/64	AGC
1006275	Magnet Wire	ы	×	X	х	x	x					AGC
1006273	Screw, Cap	н	х	Х	×	×	×	×	х	5/20/64	5/27/64	AGC
1006238	Fastener Ass'y, Captive	П	х	х	x	×	×	X	×	5/27/64	5/28/64	GSE
	K Core	П	х									CANCELLED
	Epoxy Resin	Ц	x	X	Х	×	×					AGC
	Epoxy Resin	н	×	×	×	x	X					AGC
	Curing Agent	н	×	×	×	×	×					AGC
	Curing Agent	н	×	×	×	×	×					AGC

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	APOLLO DOCL	MEN.	DOCUMENTATION	1	ILEST	MILESTONES					DATE:	6/30/64
DOCUMENT SERIES:	: Specification Control Drawings	TYPE CUMENT	RT FIRST TAAR	ETE FIRST RAFT	T2817 W3 Maft Maft	RPORATE STN3MM STN3MM	МРLЕТЕ ИRE СҮСLE	OMMENTS	RPORATE 20MMENTS	BMIT TO CCB	IY CCB Released	REMARKS
NUMBER	ШТЕ	00	٥	D COW61	C B B B B B B B B B B B B B B B B B B B	00	TANDIZ 00	MITC	MIT C INCO	ns	ЭТАД 8	
1006276	Pigment	н	х	Х	х	x	Х	Х	Х	6/12/64	6/17/64	AGC
1006277	Silica	н	×	×	х	х	Х	х	х	5/20/64	5/27/64	AGC
1006279	Nut, Hexagon	н	х	x	х	х	Х	х	Х	5/20/64	5/27/64	AGC
1006239	Lanyard Assembly	н	×	х	х	x	Х	х	х	5/20/64	6/2/64	GSE
1006240	Cap, Protective, Plastic	н	х	х	Х	х	х	х	х			GSE
1006241	Plug, Protective, Plastic	I	х	х	х	Х	Х	х	Х			GSE
1006242	Channel, Rubber	Г	х	х	Х	х	х	х	Х			GSE
1006280	Pigment	Н	x	X	×	×	Х					AGC
1006281	Resin, Urethane Foam	н	х									AGC
1006282	Relay Armature	П	х									AGC
1006288	Epoxy Resin	I	х									AGC
1006289	Curing Agent	ы	х									AGC
1.006243	Flange, Floor	н	×	×								GSE
1006244	Ohmmeter, Digital	н	×	×								GSE

### SECTION 7

## SYSTEMS SUPPORT

# 7.1 SUPPORT ENGINEERING

### 7.1.1 Personnel

Deployment of personnel from the second class was completed in April. Four field engineers retained from the second class successfully completed the Soldering and Welding course of instruction.

The field site personnel deployment status upon completion of the second class was as follows:

Company	Location	Number
ACSP	Milwaukee, Wisconsin	8
NAA	Downey, California	13
Raytheon	(Temporary Special	
	Assignments)	4

# 7.1.2 Training

The third class consisting of 13 field engineers commenced training on 6 April, 1964. The present teaching schedule has been updated to include uninterrupted continuation of training during the scheduled vacation period (3 July through 19 July). Training of the third class is progressing on schedule. The Inertial Subsystem Section has been completed, and instruction has begun on the AGC Programs Section.

### 7.1.3 Equipment Status

Two failures were reported during April. One failure was reported at ACSP and another at MIT/IL. (Complete descriptions of these failures can be found in Apollo Monthly Technical Report No. 22, FR 4-265.) One failure was reported at ACSP during May and three failures were reported at Raytheon Company. (Complete descriptions of these failures can be found in Apollo Monthly Technical Report No. 23, FR 4-306).

Two failures were reported at NAA during June. The first of these consisted of a lack of reception on the 20 kc channel of the Gertsch Receiver in AGC Calibration System No. 4. The unit was returned to Gertsch for evaluation. A detailed report will be submitted by Gertsch upon completion of the evaluation. The second failure consisted of broken wires in a relay module of Navigation Panel DSKY No. 4. These wires have been repaired.

### 7.1.4 GSE Deployment Status

Serial No.	Computer Simulator	AGC Calibration System	CTS
2	MIT	MIT	
3	MIT	ACSP	
4	ACSP	NAA	RAY
5	ACSP	RAY	ACSP
6	ACSP	MIT	NAA
7	NAA		RAY
8	ACSP		MIT
9	ACSP		ACSP
10	ACSP		
11	ACSP		

The deployment of Ground Support Equipment (GSE) is as follows:

## 7.2 LOGISTICS

### 7.2.1 Maintenance Engineering Analysis

In response to an April MIT/IL request, Raytheon Logistics prepared and delivered to MIT/IL an analysis of "D" forms of the maintenance activities for the Block I AGC to be performed at the NAA Guidance and Navigation (G&N) Laboratory (A complete report of this activity can be found in Apollo Monthly Technical Report No. 22, FR 4-265.)

Raytheon Logistics representation, in support of MIT/IL, participated in a presentation of the Apollo G&N Field Maintenance philosophy and plans at NASA in Houston. The presentation included:

- (1) Flow charts of the maintenance activities
- (2) Floor space requirements at field sites
- (3) Tools and test equipment
- (4) Maintenance parameters (stated and assumed)
- (5) Anticipated G&N system operating hours
- (6) Isometric drawings of the prime equipments
- (7) Estimated depth of field maintenance for each equipment

During the quarter, Raytheon responded to an MIT/IL request for data on the support requirements of the Apollo GSE (AGC/CTS Operation Console, Computer Test Set, AGC Calibration System, and Computer Simulator), as well as for listings of "Soft Consumable Items" and Bulk Item Requirements". (A complete report on this subject can be found in Apollo Monthly Technical Report No. 23, FR-4 306).

## 7.2.2 Spares Documentation

Master Number 4 of the Recommended Spare Parts List (RSPL) was submitted during this reporting period. Logistics periodically issues a complete revision of the RSPL in order to provide an up-to-date RSPL with all the latest revisions integrated into the listing. The frequency of the issuance of a master list is determined by the quantity and complexity of the revisions to the previous master. Master No. 4 supersedes all previous submissions of the RSPL, as well as RSPL revisions. Spares Recommendations for support of the Core Rope Simulator were prepared and submitted to RASPO during the quarter.

### 7.2.3 Spares Production and Status

The Apollo Field Site and Factory Inventory and Consumption Reports for March, April and May were prepared and submitted during the quarter. The May report constituted a revision to the report of the previous month.

The first Apollo Equipment Status and Location Report was submitted in May. In accordance with a request by ACSP, the major assemblies of the Apollo equipments have been included in this report. This requirement is necessary since design changes to the equipments will be reflected by part number changes up through the major assemblies, the equipment identifications will not be changed, however, when a design change is incorporated.

Authorization was received from NASA to procure and fabricate the approved spares for the Simulation Computer, and a release for this order was made to the Manufacturing Department.

7-4