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Total Pages

SUPPORT MODULE, WIDEBAND, WEIGHT, AND POWER BRIEFINGS

FOR PROGRAM REVIEW COUNCIL

27 July 1967

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SUPPORT MODULE STATUS REPORT

JULY 1967

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S/M EVENTS

- o 30 DAY BASELINE INITIAL STATUS - MID 1966
- o STUDY AWARDED DAC/GE/EK - SEPT. 1966
  - FEASIBILITY OF 60 DAY AUTO MODE  
SM PRELIMINARY DESIGN CONCEPT  
MODS TO LV REQUIRED
- o NEW BASELINE ESTABLISHED - JAN. 1967
  - 30 DAY VEHICLE WITH GROWTH CAPABILITY TO 60
- o LM MODS TO ACCOMMODATE 60 DAY S/M - FEB - JUNE
  - ECP TO DAC - HYDROGEN PUMP SEPARATOR, BEARING, CRYOS  
FACILITY AND STRUCTURAL MODS
- o SUPPORT MODULE STUDY - PRELIMINARY DESIGN & HARDWARE FLOW - APRIL 1967
  - SPO/AEROSPACE - SELECT S/M STRUCTURE & FLOW  
BASED ON 60 DAY OPTION
- o CURRENT STATUS
  - EK UNDER CONTRACT FOR FILM TRANSPORT SYSTEM
  - GE/DAC EFFORT DEFERRED

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STUDY ROLES & RESPONSIBILITY

- o DACO - STRUCTURE  
EXPENDABLES  
OVER ALL INTEGRATION SM
  
- o EK - FILM HANDLING
  
- o GE - DRV'S  
SOFTWARE
  
- o ALL - SYSTEM SEGMENTS

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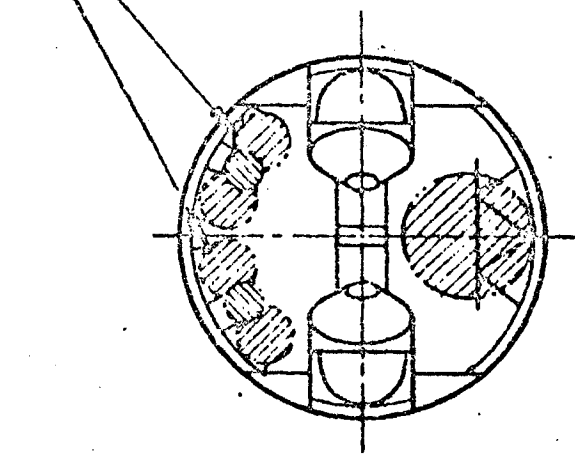
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SUPPORT MODULE

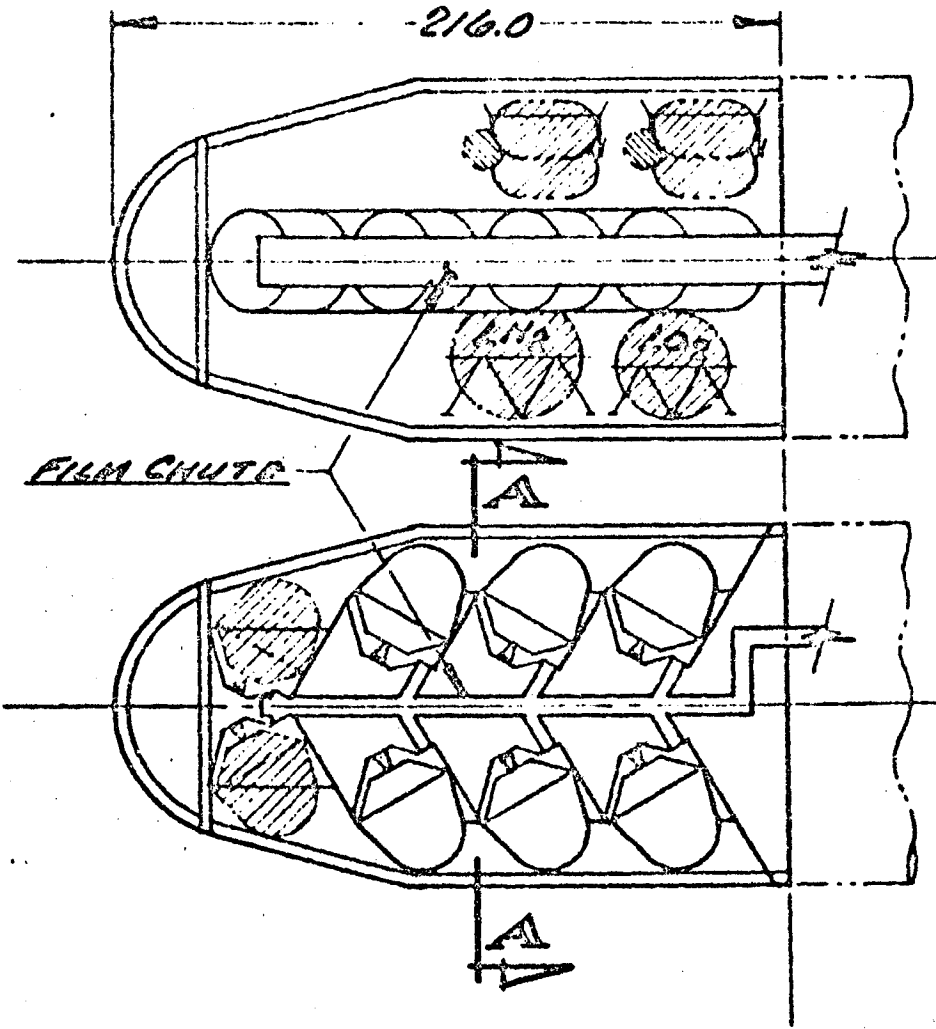
30 DAY - WITH 60 DAY


GROWTH CAPABILITY

ACTS PROPRIANT



SECTION A-A



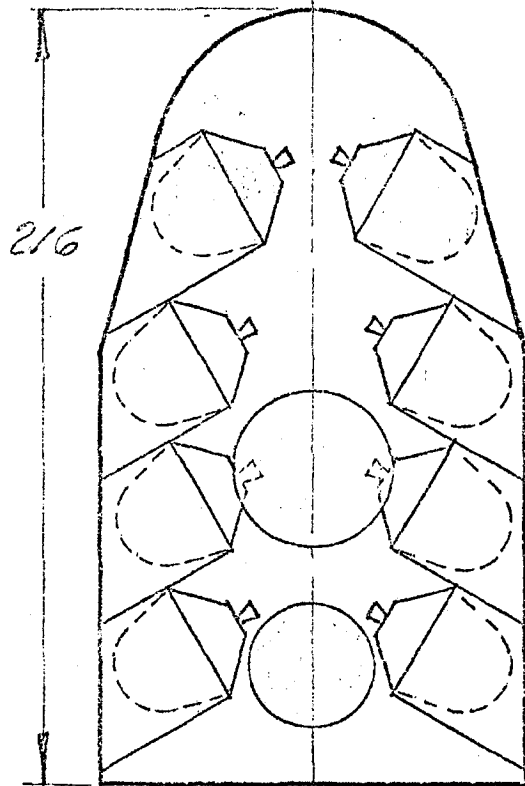
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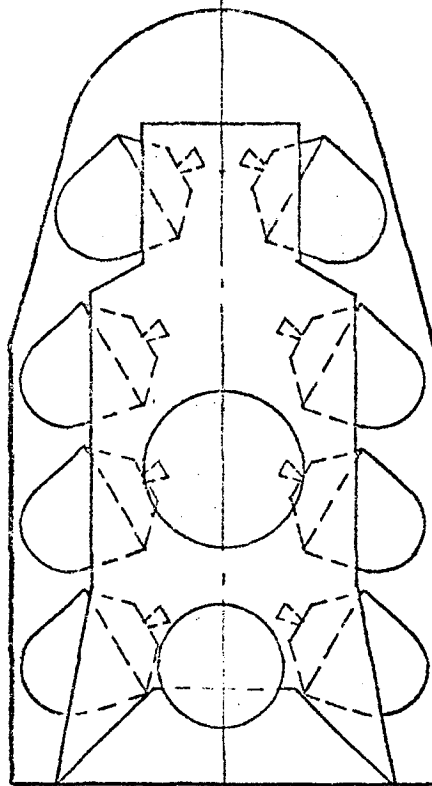
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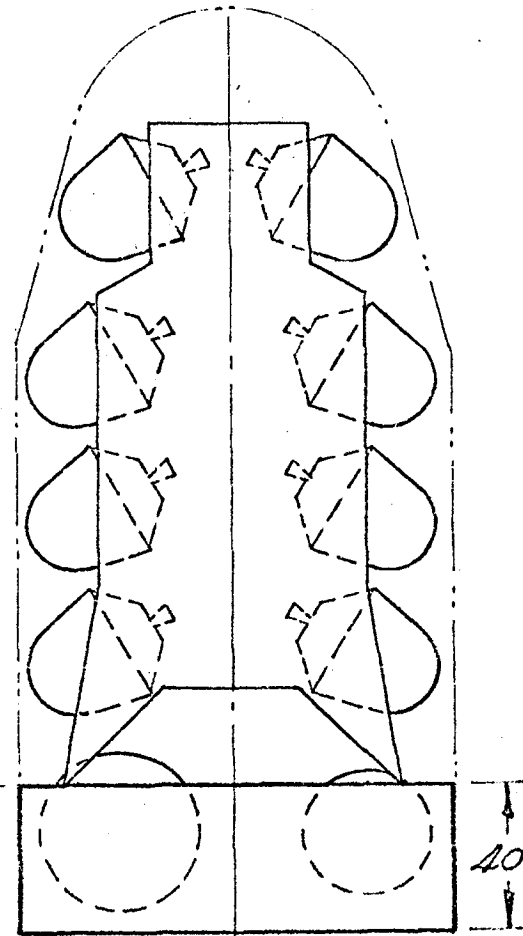
# CONFIGURATIONS



CONCEPT A



CONCEPT B



CONCEPT C

○ INTEGRAL STRUCTURE

○ INDEPENDENT STRUCT

● INTEGRAL RV TANK FAIRING STRUCT ● INDEPENDENT RV STRUCT

● DOOR MOUNTED ACTS & CRYO TANKS ● DOOR MOUNTED ACTS & CRYO TANKS

● REMOVABLE ACCESS DOORS ● REMOVABLE ACCESS DOORS

● EJECTABLE RV DOORS ● EJECTABLE RV DOORS

○ MODULAR STRUCTURE

● EJECTABLE FAIRING (WT SAVINGS)

● ACTS & CRYO TANKS IN MODULE

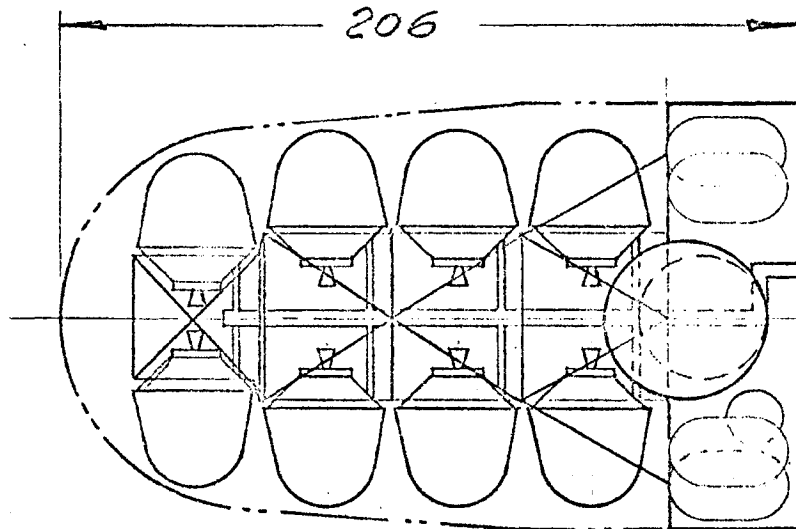
● UNRESTRICTED MFG ACCESSIBILITY

● INDEPENDENT RV STRUCT

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CONCEPT C



o MODIFICATION

- STRAIGHT RV'S
- MODIFIED FAIRING SHAPE
- REDUCED FAIRING LENGTH

o MERITS

- WEIGHT SAVING - STAGED FAIRING
- CLEANEST INTERFACE
- EASES DEVELOPMENT & MFG. TESTING
- MAX ACCESSIBILITY: FACTORY & ON-PAD

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ALTERNATE SM DESIGN

	<u>PAYLOAD LBS</u>
o POTENTIAL CONFIGURATIONS	
ONE 612 DRV	510
TWO 612 DRV'S	1020
ONE 612 DRV + ONE MARK V DRV	565
o BASELINE FLTS 6 & 7 - 330 LB PAYLOAD, FOLLOW-ON 60-DAY VERSION 560 LB	
o FROM SYSTEM STANDPOINT, 612 DRV PROBABLY EASIER DEVELOPMENT	
o KEY DECISION: ARE MULTIPLE BUCKETS REQUIRED FOR TARGET REPROGRAMMING, ETC. ?	

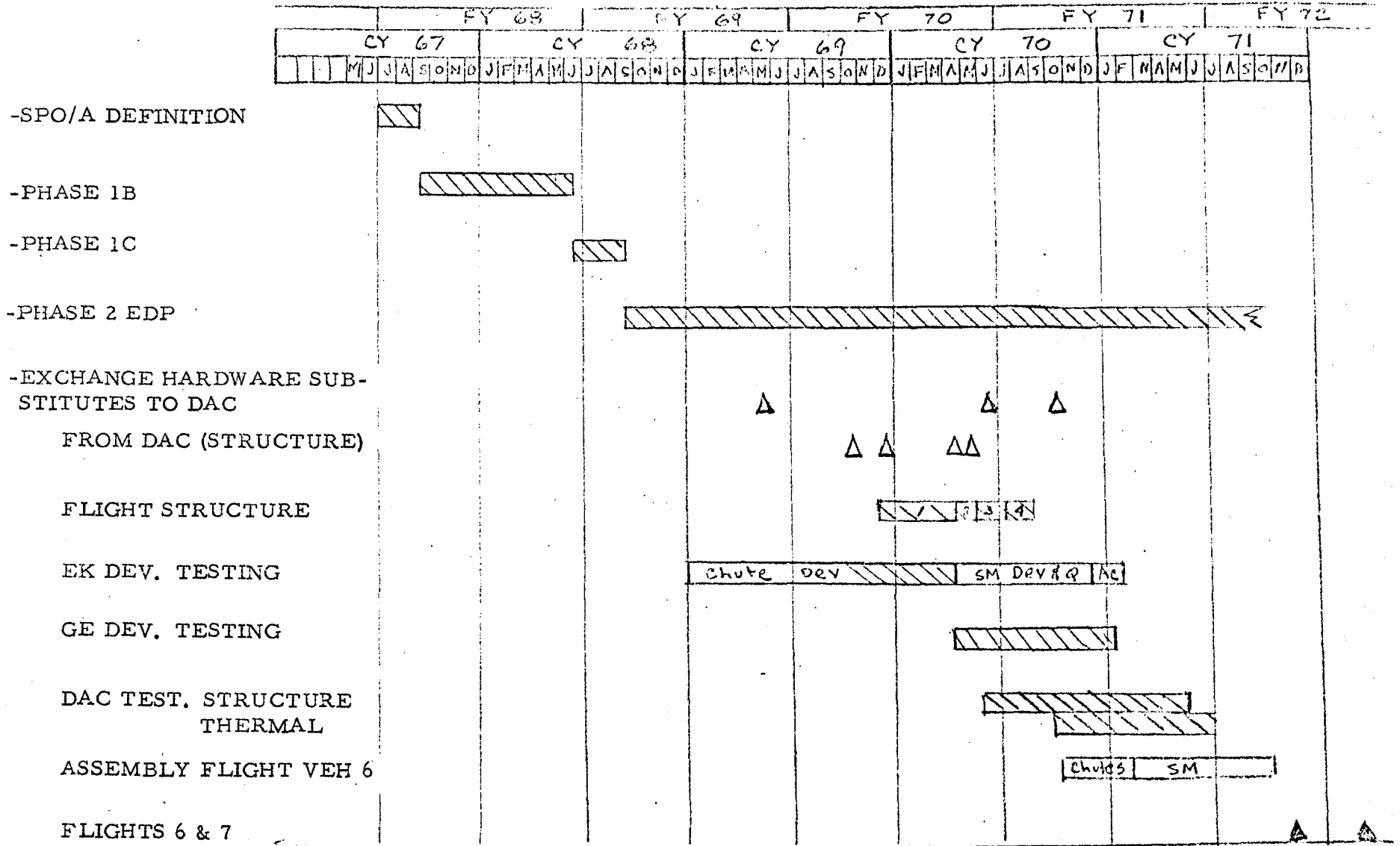
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SUPPORT MODULE

MAJOR MILESTONES



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INTERFACE AREAS REQUIRING CONTRACTOR SUPPORT

- o FAIRING SHAPE/LAUNCH LOADS/PAYLOAD ENVELOPE
- o FILM TRANSPORT/SUPPORT STRUCTURE/ALIGNMENT-VIBRATION
  - SM AND LM/MAM - AM COMPATIBILITY
- o FILM TRANSPORT/DRV/OVERALL DESIGN IMPACT
- o ENVIRONMENTAL & THERMAL CONTROL
- o MAM/AM AGE COMPATIBILITY
- o VAFB TOWER MODS/MAM AM REQUIREMENT COMPATIBILITY
- o ELECTRICAL INTERFACE/POWER AND HARNESS
- o TRANSPORTER DESIGN/MAM AM COMPATIBILITY
- o GROUND TEST SCHEDULE 6-7/LAUNCH SCHEDULE

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SUPPORT MODULE SUMMARY

- PHASE 1B TO START 15 SEPTEMBER 1967
  
- IF MULTIPLE BUCKETS ARE NOT REQUIRED, 612 BUCKET  
WILL BE STUDIED FOR IMPLEMENTATION

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NRO APPROVED FOR  
RELEASE 1 JULY 2015

WIDEBAND DATA SYSTEM

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STATUS WIDEBAND INCORPORATION

- o SEPT - DEC. 1966      STUDY ON MOL WIDEBAND SYSTEM CBS-BTL DAC
- o JAN. 1967            WASHINGTON BRIEFING  
                            FULL PROVISION FOR SYSTEM
- o FEB. 1967            DAC - MODIFY SCHEDULE CRITICAL ITEM  
                            START FULL INCORPORATION
- o MAY 1967            WASHINGTON BRIEFING  
                            SPACE PROVISIONS ONLY
- o MAY 1967            DAC - STOP EFFORTS ON FULL INCORPORATION  
                            - SPACE PROVISION ONLY  
                            - SUBSYSTEMS RETURN TO PRE-WIDEBAND BASELINE
- o JUNE 1967            DAC - SUBMITS FULL INCORPORATION ECP  
                            - PARTIALLY INVALID  
                                  STOP WORK DIRECTION  
                                  CHANGES IN ASSOCIATE DESIGNS  
                                  CHANGE IN SCHEDULE  
                            - ATP OF 1 AUGUST.  
                                  FLY ON FLIGHT #3  
                                  SYSTEM TESTING  
                                  MINIMUM RETESTING EFFORT  
                                  ASSOCIATES ALSO ON CONTRACT  
                                  INCREASED \$ - OVERTIME TO MAKE UP TIME

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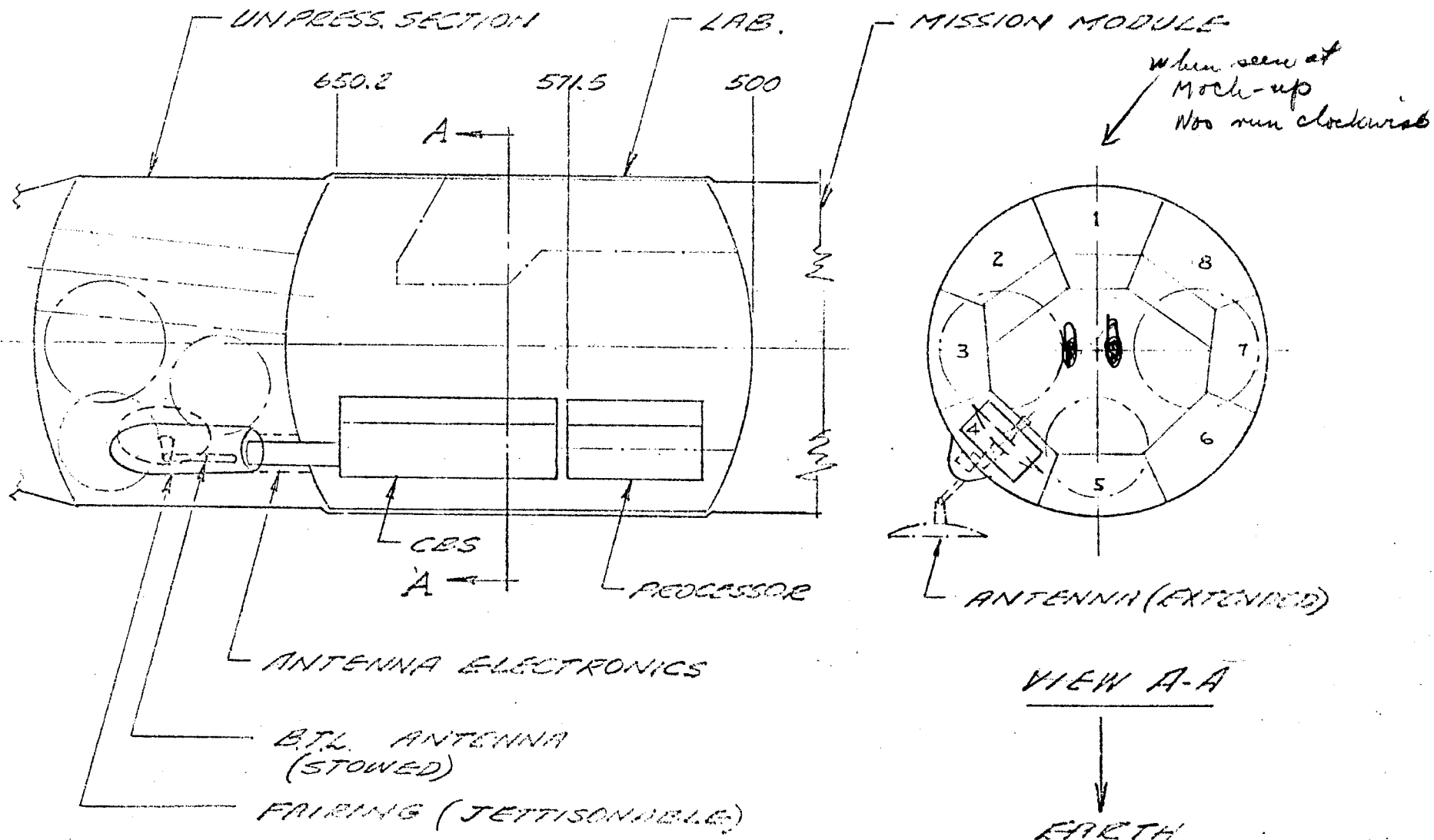
EFFORT REQUIRED FOR WIDEBAND INCORPORATION

(DACO)

- o PROVISIONS INCORPORATED
  - UNPRESSURIZED COMPARTMENT REARRANGED
  - PRESSURIZED COMPARTMENT - TOP OF BAY 4 SPACE CLEARED
  - WIRE HARNESS & PLUMBING SPACE
  - RELOCATION OF UMBILICAL & ASSOCIATED AGE/FACILITY
- o ADDITIONAL CHANGES REQUIRED
  - STRUCTURAL PROVISIONS
    - BLOW OFF DOOR IN UNPRESSURIZED COMPARTMENT
    - BAY 4 SEALED ENCLOSURE
    - STRUCTURAL SUPPORTS
  - SUBSYSTEM MODIFICATION
    - INCREASE HELIUM CAPACITY
    - ADDITIONAL COLD PLATES
    - OVERBOARD DUMP VALVE
    - MONITOR & ALARM ADDITION
    - ADDITION TO ELECTRICAL DISTRIBUTION SYSTEM
    - T/M AND COMMAND ADDITIONS
    - INSTRUMENTATION
  - SYSTEM TESTING
    - EDCTU & QUAL TEST INCORPORATION
    - VAFB
  - SIMULATOR
  - AGE & FACILITY
    - INCORPORATION INTO SYSTEM AGE (ASTEG)
    - WIDEBAND CHECKOUT LINK
    - FACILITY SPACE PROVISIONS

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# BTL WIDE-BAND SYSTEM



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BTL SYSTEM DESCRIPTION

- o INTEGRAL COMMAND, TELEMETRY, AND VIDEO DATA TRANSMISSION SYSTEM
- o SATELLITE AUTOTRACK OF COMMAND SIGNALS, GROUND AUTOTRACK OF TELEMETRY SIGNALS, FULL BANDWIDTH SYSTEMS
- o COMMAND - 9.65 GHZ, TELEMETRY - 9.85 GHZ
- o TWO 300-MHZ VIDEO CHANNELS AT 10.85 GHZ AND 11.2 GHZ
- o 3-FOOT PARABOLIC ANTENNA - CASSEGRAIN FEED HORN DESIGN, 37 DB GAIN
- o TLM HAS FIVE DOWN LINK CHANNELS: CHANNEL A 960 BPS FOR BTL;  
CHANNEL B 500 BPS - VEHICLE TIME AND ROLL; CHANNEL C 1500 BPS;  
CHANNEL D 1500 BPS; CHANNEL E 1800 BPS FOR CBS
- o 19 COMMANDS/SEC - 72 POSSIBLE COMMANDS
- o GROUND STATION AT WHIPPANY, NEW JERSEY, 22 FT NIKE ZEUS ANTENNA,  
55 DB GAIN
- o AIRBORNE WEIGHT 171 LB, PEAK POWER 296 WATTS

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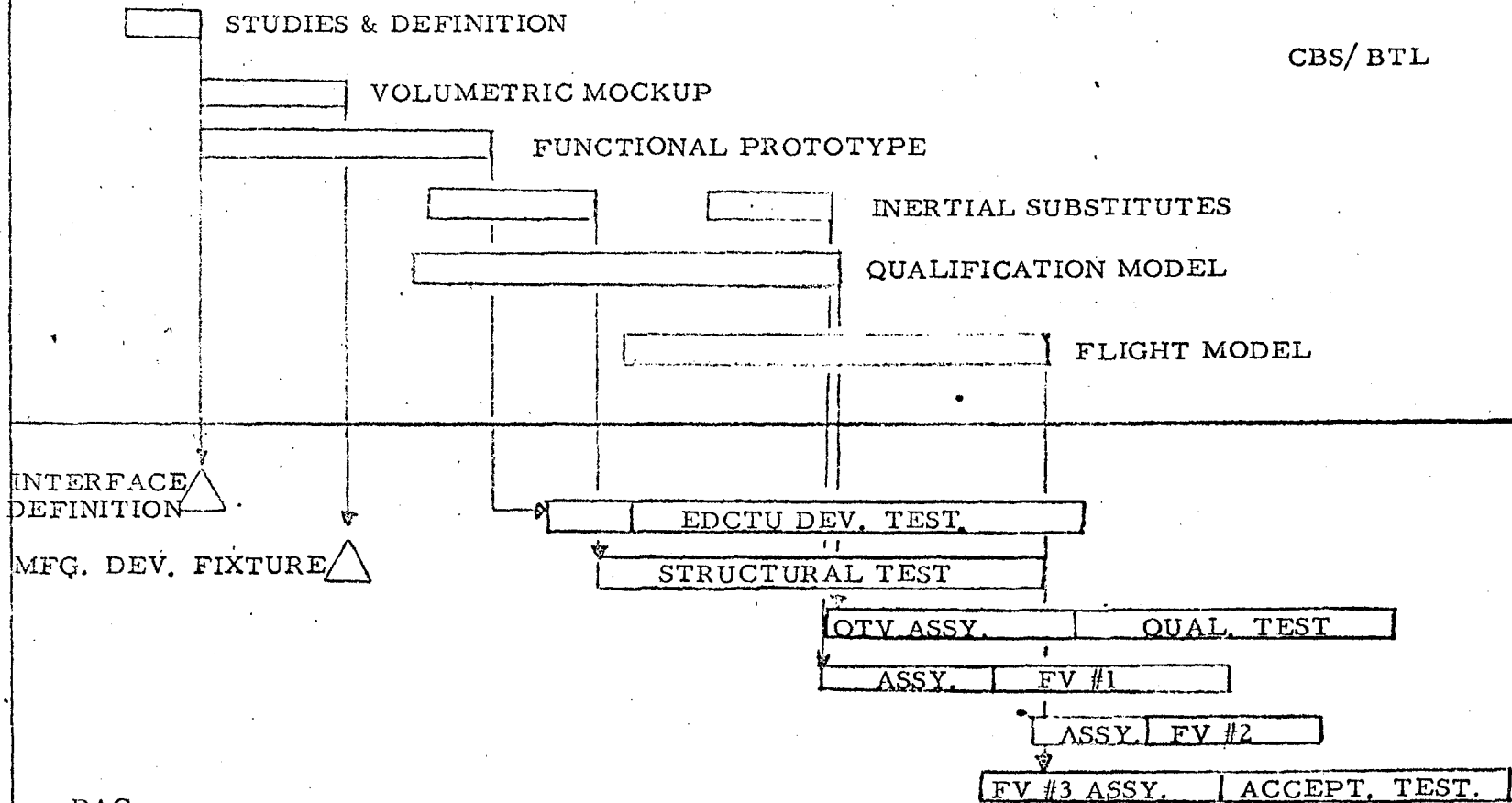


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WIDE BAND SCHEDULE INTEGRATION

1967					1968					1969					1970																
M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D

△ ATP 1 AUGUST 1967



CBS/BTL

INTERFACE  
DEFINITION △

MFQ. DEV. FIXTURE △

DAC

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△ FV #1    △ FV #2    △ FV #3

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CONSIDERATIONS OF DELAYING START TO 1/1/68

- o NO CONTRACTOR DATA TO SUPPORT FEASIBILITY
  - BTL HAS NOT ADDRESSED QUESTION
  - DAC HAS INDICATED 20% INCREASE FOR 1 AUGUST START
  
- o DAC WILL BE INTO CDR STATUS BY THEN REQUIRING EXTENSIVE DESIGN EFFORT
  - STRUCTURAL DOORS
  - HELIUM REQUIREMENTS
  
- o OMIT SYSTEM TESTING AT DAC
  
- o USE BRUTE FORCE ON DATA LINK RATHER THAN REFINING DESIGN

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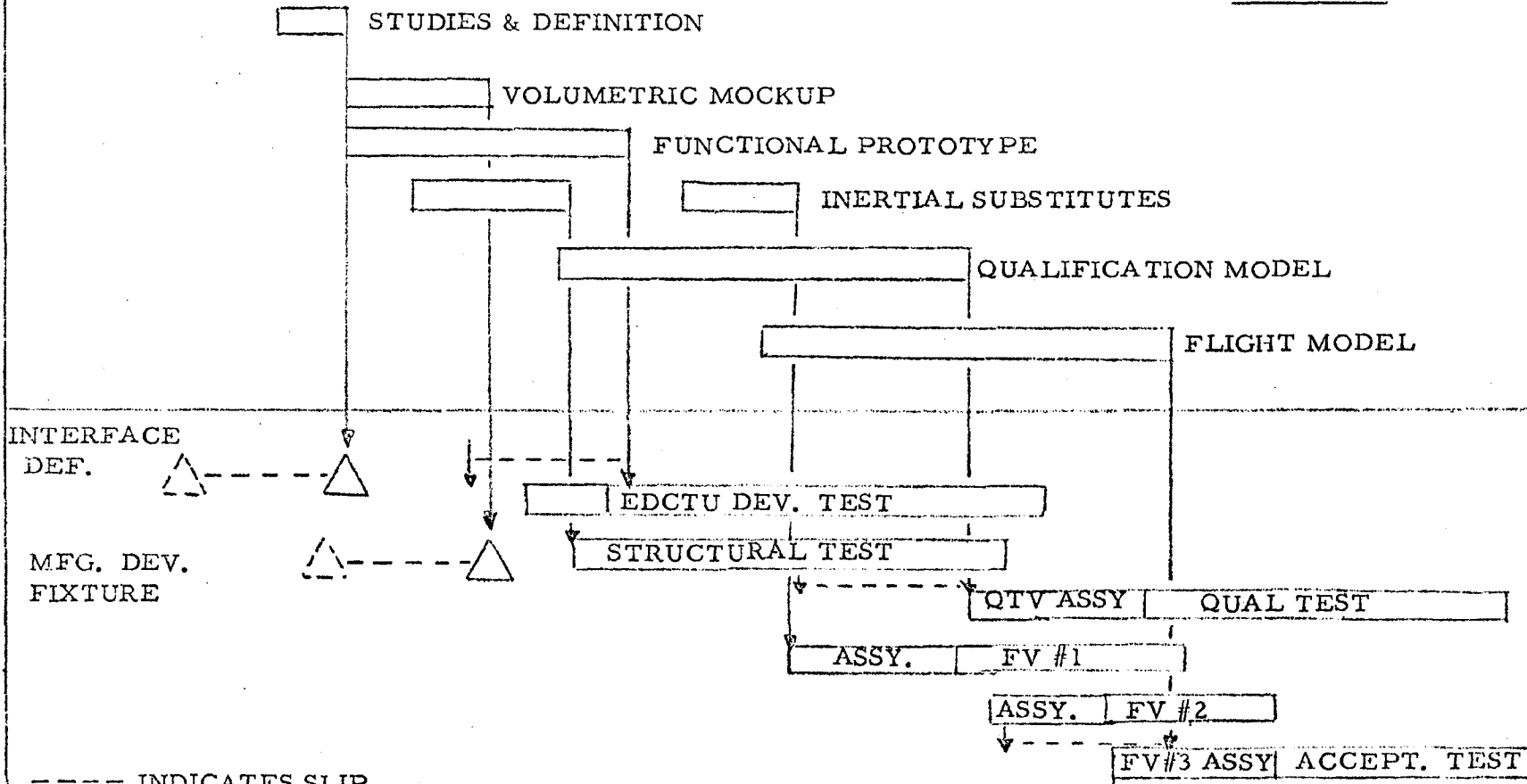
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WIDE BAND SCHEDULE SLIPPAGE



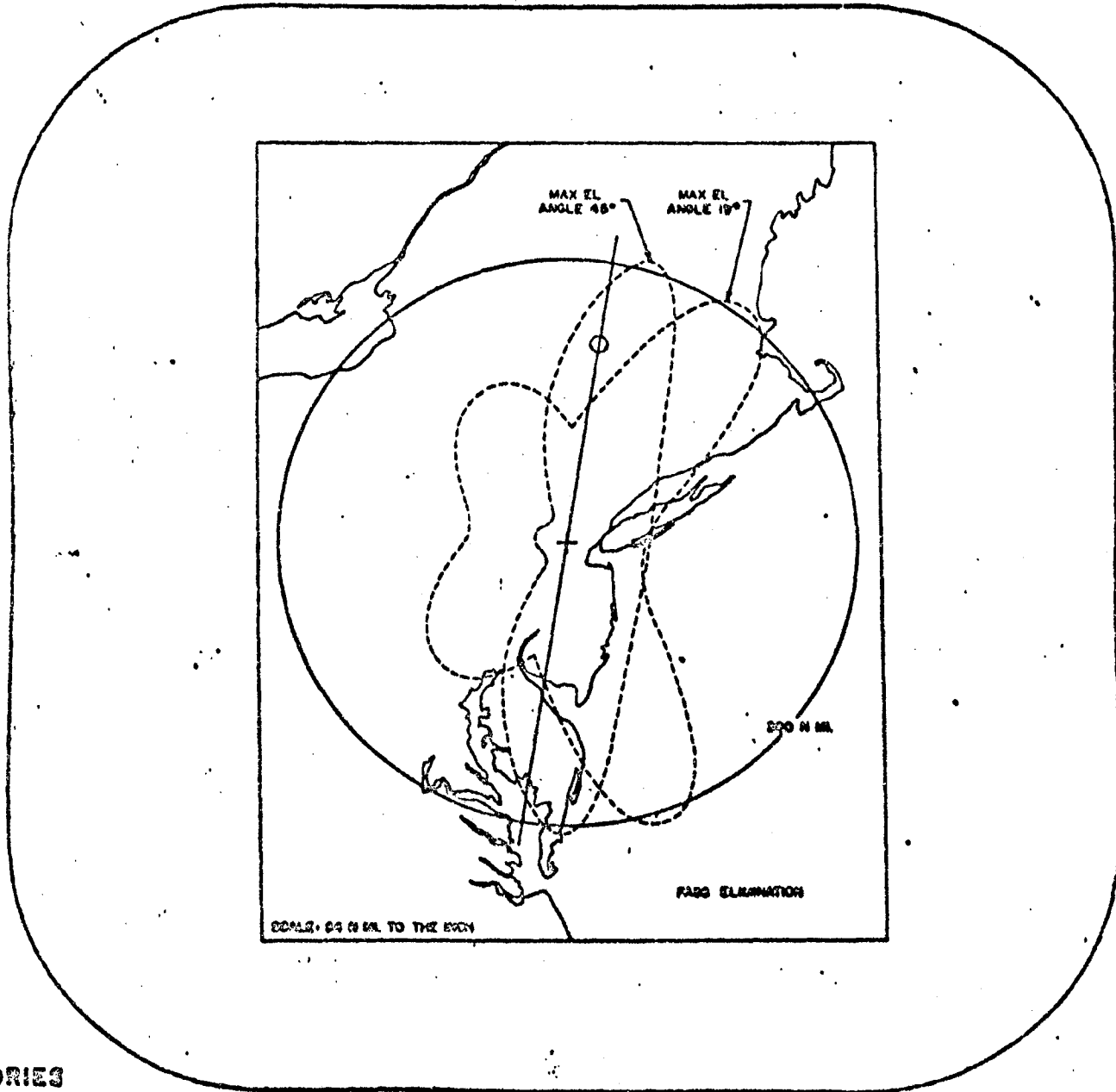
△ ATP - 1 JAN 1968

CBS/BTL



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△ FV #1 △ FV #2 △ FV #3 △



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REQUIREMENTS DEFINITION NEEDED

- o OPERATIONAL SYSTEM VERSUS CAPABILITY DEMONSTRATION
- o MOL-PECULIAR SYSTEM VERSUS BEING SELF-CONTAINED  
FOR USE ON OTHER PROGRAMS
- o NEW STATIONS, IF ANY, WITH SGLS OR WITHOUT
- o INTERCEPTABLE RADIATION CONTAINED WITHIN CONUS
- o SECURITY RULING RELATIVE TO WIDEBAND ANTENNA ON MOL
- o IMPLEMENTATION RESPONSIBILITY FOR WIDEBAND SYSTEM

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PROPOSED GROUND RULES

- o CBS/BTL EQUIPMENT GFE TO DAC
- o MOL-PECULIAR SYSTEM CONFIGURED AT MINIMUM COST
- o SGLS COMMAND & TELEMETRY
- o POWER PROGRAMMING
- o USE WHIPPANY GROUND STATION
- o REDUNDANCY INCORPORATED
- o COMPUTER STEERING
- o SECRET-SAR SECURITY RELATED TO WIDEBAND CAPABILITY  
ON MOL
- o WIDEBAND TESTS AS ALL MOL SUBSYSTEMS -  
EDCTU/LMQTV/ACCEPTANCE/CHECKOUT

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7/21/67

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1 AUGUST TO 31 DECEMBER TASKS

DAC

- o ACCOMMODATION OF WB INTO AVE, AGE AND FACILITIES
- o AVE/ AGE INTERFACE DEFINITION ESTABLISHED
- o LABORATORY MODIFICATIONS
  - DESIGN AND FABRICATION INITIATED
  - STRUCTURES
    - ANTENNA EJECTABLE DOOR
    - EQUIPMENT ENCLOSURE
    - SUPPORT STRUCTURE
  - EC/ LS
    - HELIUM SUPPLY
    - EQUIPMENT COLD PLATES
  - ELECTRONICS
    - COMMAND
    - POWER DISTRIBUTION
    - INSTRUMENTATION AND MONITOR/ ALARM
- o AGE/ FACILITIES
  - PLAN FOR INCORPORATION OF WIDEBAND REQUIREMENT IN SYSTEM AGE
  - PLAN FOR INCORPORATION OF WIDEBAND CONTRACTOR REQUIRED AND HB AND VAFB

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1 AUGUST TO 31 DECEMBER TASK

BTL/ CBS

- o DESIGN AND ANALYSIS TO ESTABLISH LAB VEHICLE INTERFACE DEFINITIONS (REQ. OCT. 67)
  
- o BTL STUDIES REQUIRED FOR DESIGN
  - MICROMINIATURIZATION-COMMUNICATION LINK -  
USE OF LAB SUBSYSTEMS
  
  - SECURITY MEASURES, I. E. , POWER MODULATION
  
- o DESIGN AND INITIATE FABRICATION OF EQUIPMENT
  - EDCTU COMPONENTS (REQUIRED FEB. 68)
  - LMQTV COMPONENTS (REQUIRED JUNE 68)
  
- o CONDUCT SYSTEM TEST OF BREADBOARD COMPONENTS
  
- o INITIATE PLANNING IN AGE, FACILITY, SIMULATOR AREAS
  
- o MAINTENANCE OF WHIPPANY IN CARETAKER STATUS

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PROCESSOR COMPARISON

	<u>BASELINE</u>	<u>HEALTH CHECK</u>
SIZE	54 x 20 x 18	15" x 20" x 18"
WEIGHT	1935 (600 Dimat)	1005 Initial Est. (199 Dimat)
AVERAGE POWER	90W	60W
FILM CAPACITY	1270'	300'
WARM-UP	10 Minutes	Zero
PROCESSING & DRYING TIME 20' BATCH	62.4 Minutes	69.4 Minutes <i>Hand comes to 69.4</i>
TOXICANTS & MOISTURE TO LAB	None	Acceptable (For Health Check Amounts Only)
PROCESSING TEMPERATURE	Controlled	Variable
SENSITOMETRIC QUALITY	Uniform	Temperature Dependent
PROCESSOR OPERATION & CONTROL	Mostly Automatic	Mostly Manual
PRESENT DEVELOPMENT/TESTING	All Applicable	Some New <i>Why is auto complete but manual some new</i>
PRESENT STATUS	Spec, PDR Complete Design Layout 50% Complete	Concept Only
CAPABILITY	Health Check + Intelligence Function	Health Check Only

HEALTH CHECK PROCESSOR

● LATEST DATE TO SUBSTITUTE HEALTH CHECK PROCESSOR FOR  
BASELINE PROCESSOR WITHOUT SCHEDULE IMPACT IS 15 AUGUST 67.

-- IMPACT NEED DATES FOR HARDWARE TO COMPLEMENT  
MISSION DEVELOPMENT SIMULATOR (MDS) AND ENGINEERING MODEL (EM)

ARE:	MDS	15 DEC 67
	EM	1 JUL 68

● RESIDUAL FUNDING ALLOCATED TO BASELINE PROCESSOR WOULD  
COVER COST OF HEALTH CHECK PROCESSOR.

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WEIGHT SUMMARY

21 JULY 1967

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OBRITING VEHICLE SYSTEM SEGMENT

WEIGHT SUMMARY - 20 JULY 1967

	<u>Contractor</u>	<u>SP/DR Weight</u>	<u>Projected Changes to SP/DR</u>	<u>Adjusted SP/DR Weight</u>	<u>Current Predicted Weight</u>
<u>GEMINI B</u>		<u>6,120</u>	<u>+320</u>	<u>6,440</u>	<u>6,430</u>
GEMINI B SYSTEM SEGMENT	MAC	5,680	+320	6,000	5,985
FLIGHT CREW SYSTEM SEGMENT	SPO	360	----	360	360
PRESSURE SUIT ASSEMBLY SEGMENT	SPO	80	----	80	85
LABORATORY VEHICLE SYSTEM SEGMENT (AVE)	DAC	<u>14,449</u>	<u>+217</u>	<u>14,666</u>	<u>14,740</u>
<u>MISSION PAYLOAD SYSTEM SEGMENT</u>		<u>8,622</u>	<u>-306</u>	<u>8,316</u>	<u>8,322</u>
G. E.	GE	2,435	+ 74	2,509	2,585
E. K.	EK	5,583	+ 79	5,662	5,544
GFE	SPO	441	-296	145	145
WIDEBAND READOUT SYSTEM		163	-163	0	0
<u>TOTAL</u>		<u>29,191</u>	<u>+231</u>	<u>29,422</u>	<u>29,444</u>

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PROJECTED WEIGHT CHANGES TO SP/DR

	<u>ESTIMATED CONTRACTUAL WEIGHT CHANGES</u>	
o GEMINI B - MAC		
- PAD ABORT CONTROL SYSTEM	+ 46	
- REDESIGN TENSION STRAPS DUE TO SHUTDOWN LOADS	+ 14	
- BLAST SHIELD	<u>+260</u>	+320
o LABORATORY VEHICLE SYSTEM SEGMENT - DAC		
- REMOVE DRV PROVISIONS	- 67	
- PROVISIONS FOR EXTENDED MISSION DURATION	+ 12	
- PROVISIONS FOR ACQUISITION SYSTEM - Δ WEIGHT	+201	
- REVISE GEOMETRY OF AFT BULKHEAD BATHTUB FITTING	+ 16	
- CHANGE STIFFNESS CHARACTERISTICS OF MM PAYLOAD FORWARD MOUNTING STRUCTURE	+ 20	
- SLIDING MASK PROVISIONS	+ 12	
- SPACE PROVISIONS FOR WIDEBAND SYSTEM	+ 26	
- ELIMINATE 1 PSI REQUIREMENT FOR FOOD LOCKER	- 10	
- INCREASE INVERTER SIZE TO PROVIDE AC FOR GE PANEL ELECTRO-LUMINESCENCE	+ 7	
	<u>          </u>	+217

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PROJECTED WEIGHT CHANGES TO SP/DR (CONTINUED)

		<u>ESTIMATED CONTRACTUAL WEIGHT CHANGES</u>	
o	MISSION PAYLOAD SYSTEM SEGMENT		
-	GE		
	REMOVE DRV PROVISIONS	- 61	
	REMOVE 5" ACQUISITION SYSTEM	-326	
	ADD 10" ACQUISITION SYSTEM	+537	
	SLIDING MASK REDESIGN	- 99	
	ADD AN ANGULAR ACCELEROMETER	+ 6	
	REDUNDANT WIRING FOR MDAU CONNECTIONS	+ 7	
	PROVIDE 2° INCLINATION OF THE TRACKING MIRROR HUB	+ 10	+ 74
-	EK		
	REMOVE DRV SPLICER-HANDLER	- 8	
	REMOVE DRV TAKEUP	- 20	
	ADD MIRROR SLATS & MOUNTS	+ 50	
	INCREASE CAPACITY FOR FILM SUPPLY (CCN 14)	+ 23	
	INCREASED HARDWARE FOR POWER SWITCHING (CCN 11)	+ 34	+ 79
-	GFE		
	REMOVE DRV	-300	
	MISC. GFE REVISIONS - SEE GFE CHART	+ 4	-296
-	WIDEBAND READOUT SYSTEM		
	DELETE SP/DR WEIGHT		-163
o	<u>TOTAL PENDING WEIGHT CHANGES TO SP/DR</u>		<u>+231</u>

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OV WEIGHT MARGIN

CONFIGURATION	<u>NO WIDEBAND</u>	ORBIT 90° INCL. <u>80/187, 55° N.</u>	<u>WITH WIDEBAND</u>
		<u>NO DRV</u>	
BOOSTER CAPABILITY	31,090		31,090
PREDICTED SP/DR OV WEIGHT *	29,322		29,930
P/L MARGIN	1,768		1,160
PERCENT OF DRY WEIGHT	6.9		4.4
<hr/>			
*ADJUSTED SP/DR	29,422		29,422
MODIFIED PROCESSOR & BIMAT	- 100		---
WB	---		508
DRV	---		---
PREDICTED SP/DR OV WEIGHT	<u>29,322</u>		<u>29,930</u>

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ELECTRICAL POWER SUMMARY

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OV ELECTRICAL LOAD SUMMARY  
(CONTRACTOR REPORTED)

	Average Power (Watts)	PEAK POWER MODES (WATTS)									
		MPSS OPER.					COMM				
		A TMS	B PO	C +SGLS	D Other	E SGLS	F WB	G SGLS/WB	H Other	I EO/LO	J Ascent
GEMINI B	93	235	235	235	235	320	235	320	235	735	0
LABORATORY	1040	1791	1791	1925	2354	2158	1755	2024	2728	2215	886
MPSS	434	1948	1227	1227	1154	569	569	569	498	543	604
PPAC	273	586	1103	1103	593	259	243	259	521	274	274
WIDEBAND	13	0	0	0	0	0	700	700	0	0	0
TOTAL	1853	4560	4356	4490	4336	3306	3502	3872	3982	3767	1764
SPEC. ALLOC.	1825				4500						

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POTENTIAL POWER REDUCTION

- o EMPLOY ADDITIONAL INHIBITS

APPROX. WATTS REDUCTION

ITEM

90	GEMINI-B RCS TANK HEATERS
220	EK THERMAL HEATERS
200	ATS LOAD MANAGEMENT
100	MISCELLANEOUS

- o FURTHER REFINEMENT AND NEGOTIATION

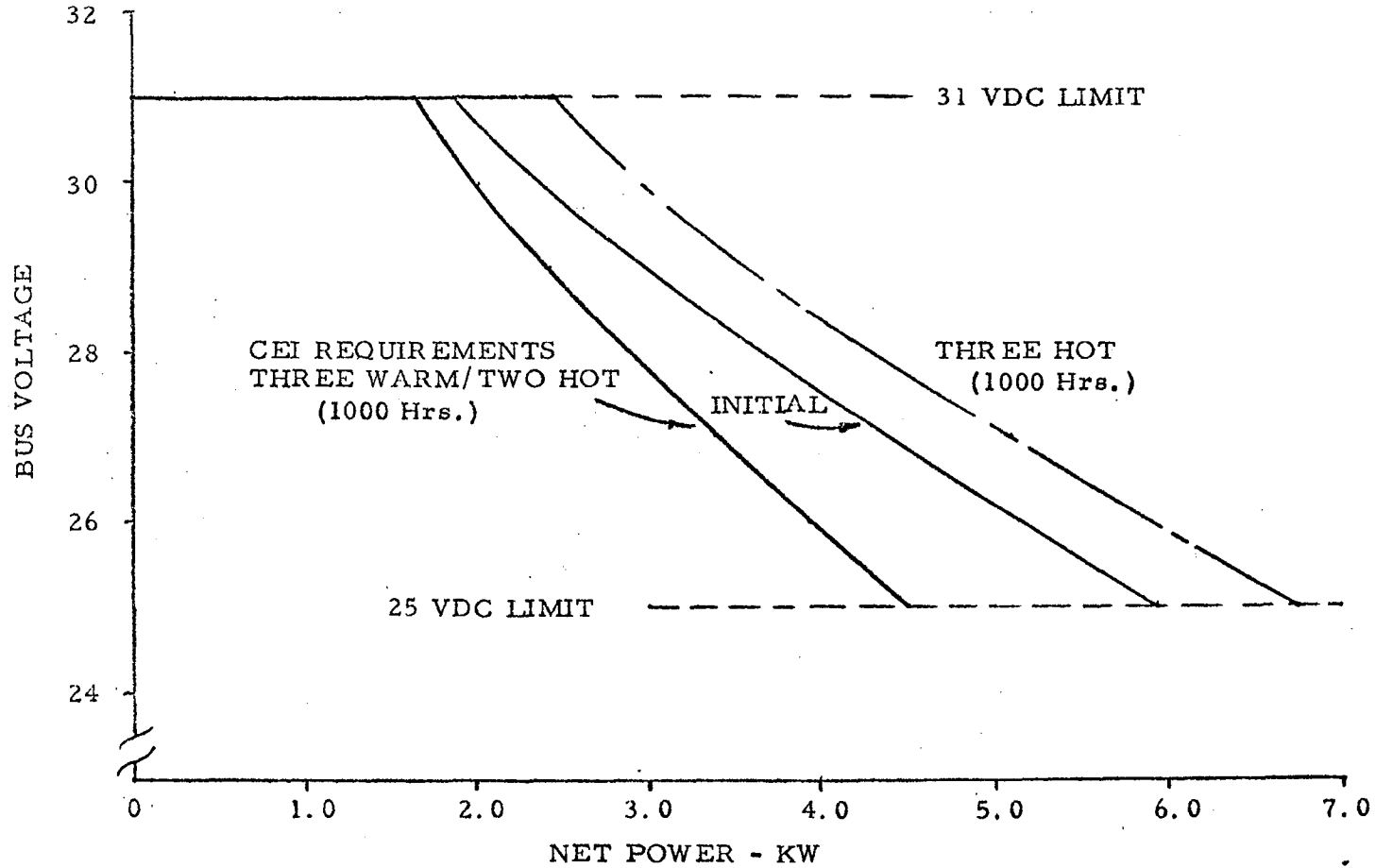
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FUEL CELL OUT OF LIMITS CAPABILITY



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MISSION PAYLOAD SYSTEM SEGMENT  
GFE WEIGHT SUMMARY

	<u>BASIS FOR SPEC. WT.</u>	<u>1 JUNE 1967</u>
IMAGE VELOCITY SENSOR (I/V)	22	20
HARD COPY PRINTERS (2)	20	0 *
CUE FILM & CONTAINERS	20	10
COMPUTER	68	85
TERRAIN CAMERA & FILM	11	0
DATA RECOVERY VEHICLE (DRV)	300	0
SPECTRAL PAINT ON AFT MM (E. K.)	---	30 **
	<hr/>	<hr/>
TOTAL	441	145

\* 2 PRINTERS CARRIED IN DAC WEIGHT

\*\* EK WORK STATEMENT SPECIFIES THAT AFT MM SPECTRAL PAINT IS GFE TO EK  
(SPECTRAL PAINT FOR FORWARD MM(16 LB) IS INCLUDED IN G. E. WEIGHT)

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