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WHS-392  
Copy 2 of 2  
10 July 1967  
Pages: 33

BRIEFINGS TO GENERAL STEWART

7 JULY 1967

BY S. M. TENNANT

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WEIGHT SUMMARY

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ORBITING VEHICLE SYSTEM SEGMENT

WEIGHT SUMMARY - 1 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>6,425</u>
GEMINI B SYSTEM SEGMENT	MAC	5,680	+320	6,000	5,982
FLIGHT CREW SYSTEM SEGMENT	SPO	360	----	360	360
PRESSURE SUIT ASSEMBLY SEGMENT	SPO	80	----	80	80
LABORATORY VEHICLE SYSTEM SEGMENT (AVE)	DAC	<u>14,449</u>	<u>+195</u>	<u>14,644</u>	<u>14,715</u>
<u>MISSION PAYLOAD SYSTEM SEGMENT</u>		<u>8,622</u>	<u>-298</u>	<u>8,324</u>	<u>8,227</u>
G. E.	GE	2,435	+ 27	2,462	2,480
E. K.	EK	5,583	+134	5,717	5,602
GFE	SPO	441	-296	145	145
WIDEBAND READOUT SYSTEM		163	-163	0	0
<u>TOTAL</u>		<u>29,191</u>	<u>+217</u>	<u>29,408</u>	<u>29,367</u>

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PROJECTED WEIGHT CHANGES TO SP/DR

ESTIMATED CONTRACTUAL  
WEIGHT CHANGES

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	- 70	
-	PROVISIONS FOR EXTENDED MISSION DURATION	+ 12	
-	PROVISIONS FOR ACQUISITION SYSTEM - △ WEIGHT	+201	
-	REVISE GEOMETRY OF AFT BULKHEAD BATHTUB FITTING	+ 16	
-	CHANGE STIFFNESS CHARACTERISTICS OF MM PAYLOAD FORWARD MOUNTING STRUCTURE	+ 20	
-	THERMAL DOOR PROVISIONS	<u>+ 16</u>	
			+195

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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	- 57	
	REMOVE 5" ACQUISITION SYSTEM	-326	
	ADD 10" ACQUISITION SYSTEM	+537	
	THERMAL DOOR REDESIGN	<u>-127</u>	+ 27
-	EK		
	REMOVE DRV TAKEUP	- 20	
	ADD MIRROR LOUVRES & MOUNTS	+ 97	
	INCREASE CAPACITY FOR FILM SUPPLY (CCN 14)	+ 23	
	INCREASED HARDWARE FOR POWER SWITCHING (CCN 11)	<u>+ 34</u>	+134
-	GFE		
	REMOVE DRV	-300	
	MISC. GFE REVISIONS - SEE GFE CHART	<u>+ 4</u>	-296
-	WIDEBAND READOUT SYSTEM		
	DELETE SP/DR WEIGHT		<u>-163</u>
o	<u>TOTAL PENDING WEIGHT CHANGES TO SP/DR</u>		<u>+217</u>

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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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OV WEIGHT MARGIN

<u>CONFIGURATION</u>	ORBIT 80° INCL. 80/169, 55°N.	ORBIT 90° INCL. 80/187, 55° N.	
	INCLUDES DRV & WIDEBAND	NO DRV	
		NO WIDEBAND	WITH WIDEBAND
BOOSTER CAPABILITY	32,475	31,090	31,090
PREDICTED SP/DR OV WEIGHT*	30,373	29,308	29,916
P/L MARGIN	2,102	1,782	1,174
PERCENT OF DRY WEIGHT	7.9	7.0	4.5
<hr/>			
* ADJUSTER SP/DR	29,408	29,408	29,408
MODIFIED PROCESSOR & BIMAT	----	-100	-----
WB	508	-----	508
DRV	<u>457</u>	<u>-----</u>	<u>-----</u>
PREDICTED SP/DR OV WEIGHT	30,373	29,308	29,916

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MOL WEIGHT CONTROL

~~LVO-1162~~

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- o MOL MASS PROPERTIES CONTROL BOARD ORGANIZED
  - REQUIREMENTS DEFINED IN SAFSL 21016 AND 24016
  - . DAC - MASS PROPERTIES INTEGRATING CONTRACTOR
  - CONTRACTORS REPORTING PER MIL-M-38310
- o COST INCENTIVES ON ASSOCIATE CONTRACTORS SPECIFICATION WEIGHTS
- o CONTROL BOARD MEETS MONTHLY
- o CONTRACTORS SUBMIT DETAIL STATUS REPORTS MONTHLY
- o DAC OPERATING IN-HOUSE WEIGHT CONTROL BOARD
  - MEETS MONTHLY - REPORTS MONTHLY TO MOL CONTROL BOARD
  - CONSISTS OF DAC ENGINEERING TECHNICAL DIRECTOR, DESIGN CHIEF & ASSOC.
  - REVIEWS DETAIL DESIGN FOR WEIGHT CONTROL/MONITORS SUBSYSTEM TARGET WEIGHTS
- o WEIGHT CONTROL - AGENDA ITEM EVERY MONTHLY MOL MANAGEMENT MEETING AND PROGRAM REVIEWS
- o CONTROL EFFECTIVE - CURRENT WEIGHT WITHIN ONE PERCENT SPECIFICATION WEIGHT

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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	B	C	D	E	F	G	H	I	J
		TMS	PO	+SGLS	Other	SGLS	WB	SGLS/WB	Other	EO/LO	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

PPAC THERMAL HEATERS

200

ATS LOAD MANAGEMENT

100

MISCELLANEOUS

- o FURTHER REFINEMENT AND NEGOTIATION

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WORKING MATERIAL  
IMPACT OF PEAK AND AVERAGE POWER

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EXCEEDING SPEC

OVER-SPEC PEAK POWER

- EXERCISE ADDITIONAL OV POWER MANAGEMENT, E.G.,  
PROVIDE ADDITIONAL INHIBITS, CHANGE MISSION EVENT  
SEQUENCES, ETC.
- ADD PEAK POWER BATTERY
- CHANGE FUEL CELL OPERATING PHILOSOPHY

OVER-SPEC AVERAGE POWER

- PRESENT REACTANT TANKS SIZED FOR 2.1 KW (ADDITIONAL  
41 LBS.)
- ABOVE 2.1 KW
  - / DECREASE MISSION DURATION/OPERATIONS
  - / PROVIDE ADDITIONAL REACTANT STORAGE TANKS

~~D~~

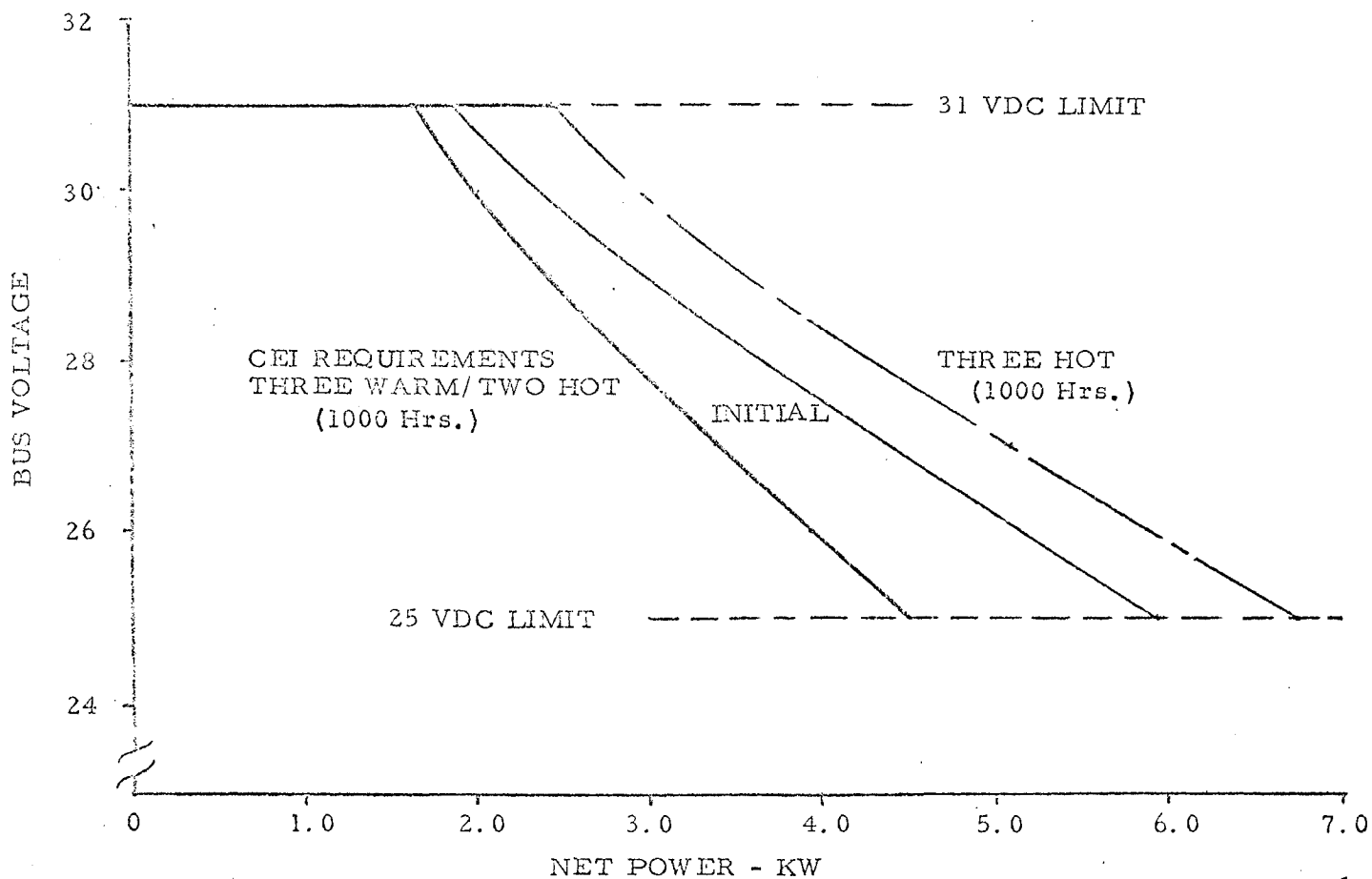
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FUEL CELL OUT OF LIMITS CAPABILITY

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MOR

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ELECTRICAL POWER MANAGEMENT

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SPEC CONTROLS

- SEGMENT CEI's SPECIFIES AVERAGE AND PEAK POWER
- POWER COORDINATION CONTROL BOARD (BIMONTHLY)
  - / CONTRACTORS REPORT STATUS OF POWER NUMBERS,  
ELECTRICAL SYSTEM DESIGN, AND PROBLEM AREAS
  - / CONTRACTORS EXCHANGE MISSION TIMELINE COMPUTER  
PROGRAM STATUS
  - / SPO/AEROSPACE PROVIDES DIRECTION TO ENSURE  
COMPATIBLE POWER SYSTEM

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*MOR*

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ELECTRICAL POWER MANAGEMENT

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PROPOSED ADDITIONAL CONTROLS

• SEGMENT POWER REPORTS

- / INSTITUTE 1423 LINE ITEM FOR DETAILED PERIODIC (BIMONTHLY) POWER REPORT FOR EACH CONTRACTOR
- / FORMAT OF REPORT TO BE UNIFORM AND TO INCLUDE AVERAGE AND PEAK POWER BY MODES

• OV MISSION POWER TIMELINE

- / DAC TO PROVIDE OV MISSION POWER TIMELINE COMPUTER PROGRAM
- / SUBMIT INTEGRATED OV MISSION POWER TIMELINE REPORTS BIMONTHLY

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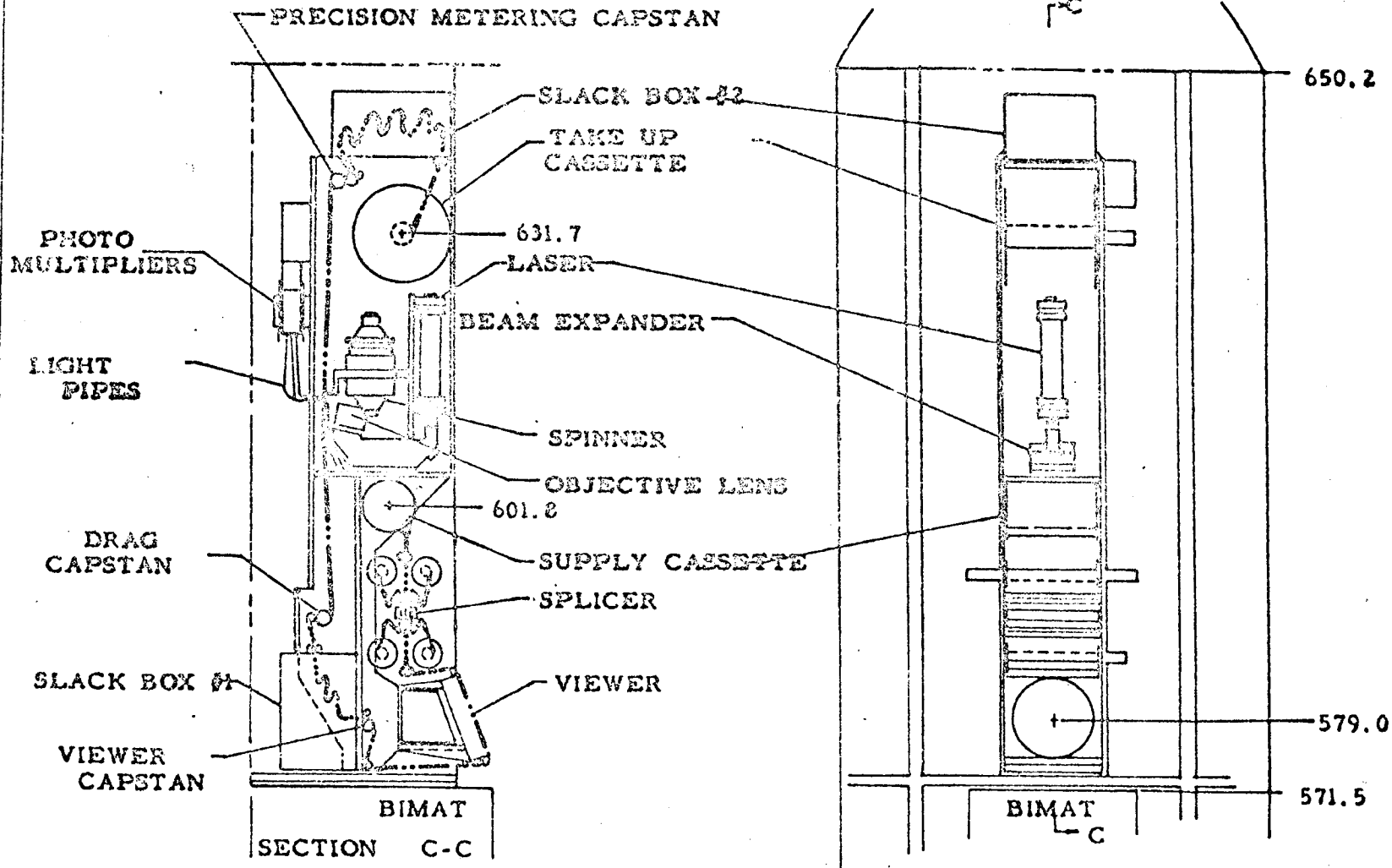
WIDEBAND DATA SYSTEM

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COMPONENT ARRANGEMENT FOR CASSETTE LOADING FROM BIMAT PROCESSOR

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PERFORMANCE PARAMETERS

○	TOTAL VIDEO BANDWIDTH	100	MHz
		50	MHz PER CHANNEL
○	TOTAL RF BANDWIDTH	600	MHz
○	FILM WIDTH SCANNED	4.5	IN.
		2.25	IN. PER CHANNEL
○	RESOLUTION		lp/mm
○	AREA SCAN RATE	100	IN/SEC
		0.371	IN/SEC
○	LINEAR FILM RATE		
○	SPINNER ROTATIONAL RATE	33,946	RPM

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BTL SYSTEM DESCRIPTION

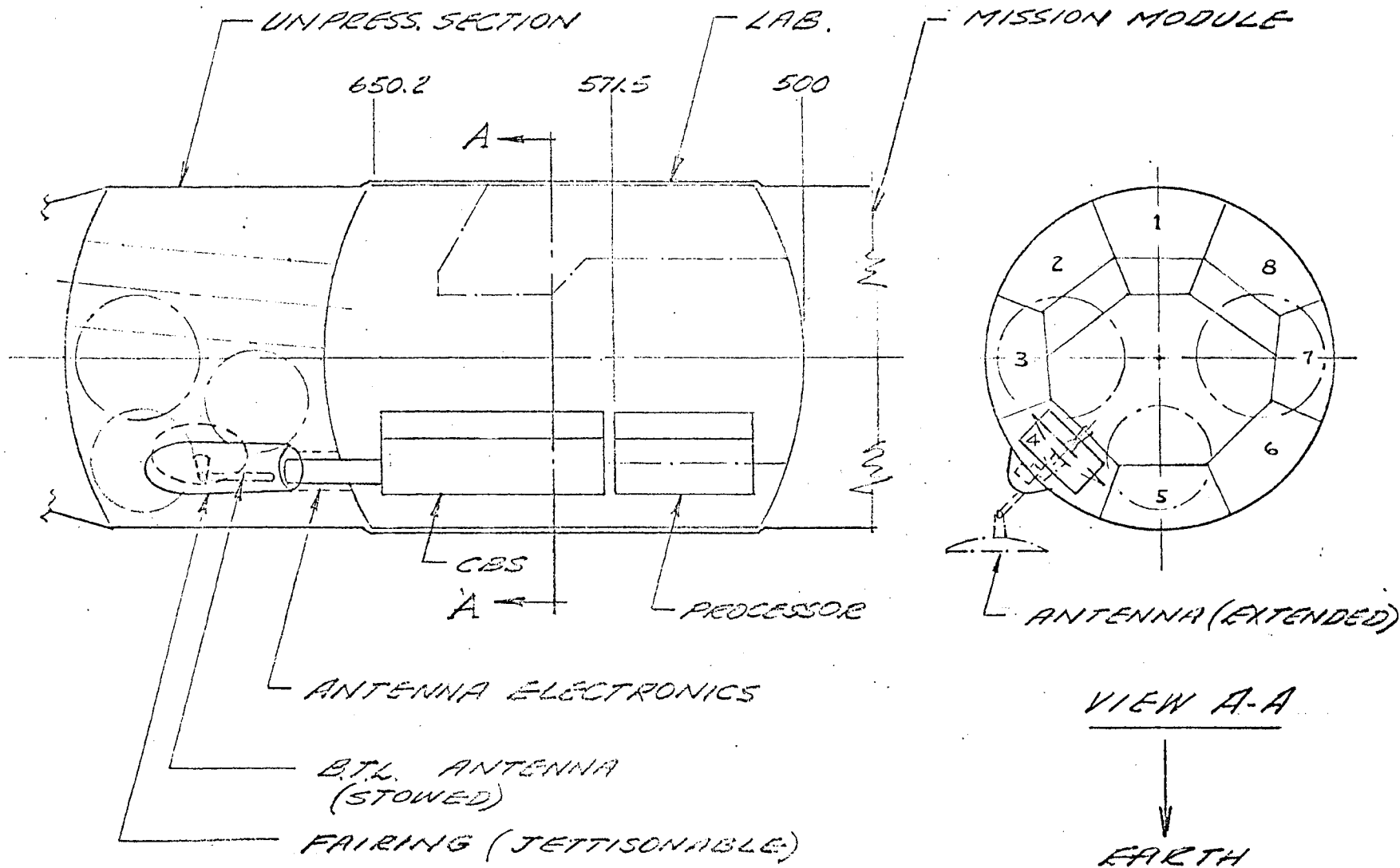
- o INTEGRAL COMMAND, TELEMETRY, AND VIDEO DATA TRANSMISSION SYSTEM
- o SATELLITE AUTOTRACK OF COMMAND SIGNALS, GROUND AUTOTRACK OF TELEMETRY SIGNALS, FULL BANDWIDTH SYSTEMS
- o COMMAND - 9.65 GHZ, TELEMETRY - 9.85 GHZ
- o TWO 300-MHZ VIDEO CHANNELS AT 10.85 GHZ AND 11.2 GHZ
- o 3-FOOT PARABOLIC ANTENNA - 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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BTL WIDE-BAND SYSTEM

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EFFORT REQUIRED FOR WIDEBAND INCORPORATION  
(DACO)

- o SPACE PROVISIONS - RELOCATE EXISTING EQUIPMENT
  - UNPRESSURIZED COMPARTMENT
  - PRESSURIZED COMPARTMENT - TOP OF BAY 4
  - WIRE HARNESS & PLUMBING
  - RELOCATION OF UMBILICAL & ASSOCIATED AGE/FACILITY
  
- o STRUCTURAL PROVISIONS
  - BLOW OFF DOOR IN UNPRESSURIZED COMPARTMENT
  - BAY 4 SEALED ENCLOSURE
  - STRUCTURAL SUPPORTS
  
- o 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
  
- o SYSTEM TESTING
  - EDCTU & QUAL TEST INCORPORATION
  - VAFB
  
- o SIMULATOR
  
- o AGE & FACILITY
  - INCORPORATION INTO SYSTEM AGE (ASTEG)
  - WIDEBAND CHECKOUT LINK
  - FACILITY SPACE PROVISIONS

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WIDEBAND GROUND TEST

- o ASSUMED SECURITY GROUND RULE
  - THE FACT THAT MOL HAS WIDEBAND (X-BAND) ABOARD IS BLACK
- o EFFECTS AT VAFB & HB
  - THE WIDEBAND ANTENNA & ASSOCIATED EQUIPMENT CAN NOT BE VIEWED EXCEPT IN SECURE AREA
  - ALL AREAS & AGE EQUIPMENT ASSOCIATED WITH WIDEBAND MUST MEET SECURITY STANDARDS (FED. ST 222) PHYSICAL & ELECTRICAL
  - LEAKAGE/RADIATION FROM TESTS MUST BE ELIMINATED
- o IMPLEMENTATION AT VAFB
  - NO OPEN LOOP TESTING - NO CHECKOUT OF POINTING ACCURACY
  - CLOSED LOOP VIA "DISGUISED" WAVE GUIDE TO AGE BUILDING
  - SECURE AREA IN AGE BUILDING - 2 NEW ROOMS
  - ELECTRICAL AGE BUILT TO SECURITY REQUIREMENTS - NEW AGE DESIGN
  - DATA SENT TO LAUNCH CONTROL CENTER MUST BE CRYPTO
- o NOT FEASIBLE TO HIDE X-BAND CAPABILITY AND DO SYSTEM TESTING

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DACO WIDEBAND INSTALLATION

(COST IN MILLIONS)

BASIS	FY 67	FY 68	FY 69	FY 70	FY 71	FY 72	TOTAL
ECP 44 & 45	.279	.979	3.040	3.145	1.378		9.889
05	.086	.574	.443	.179	.071	.051	1.406
TOTAL	.365	1.553	3.483	3.324	1.449		11.295

NOTE: DACO ESTIMATES 20% INCREASE FOR TOTAL AND FY 68 COSTS

~ \$1.9M FY 68

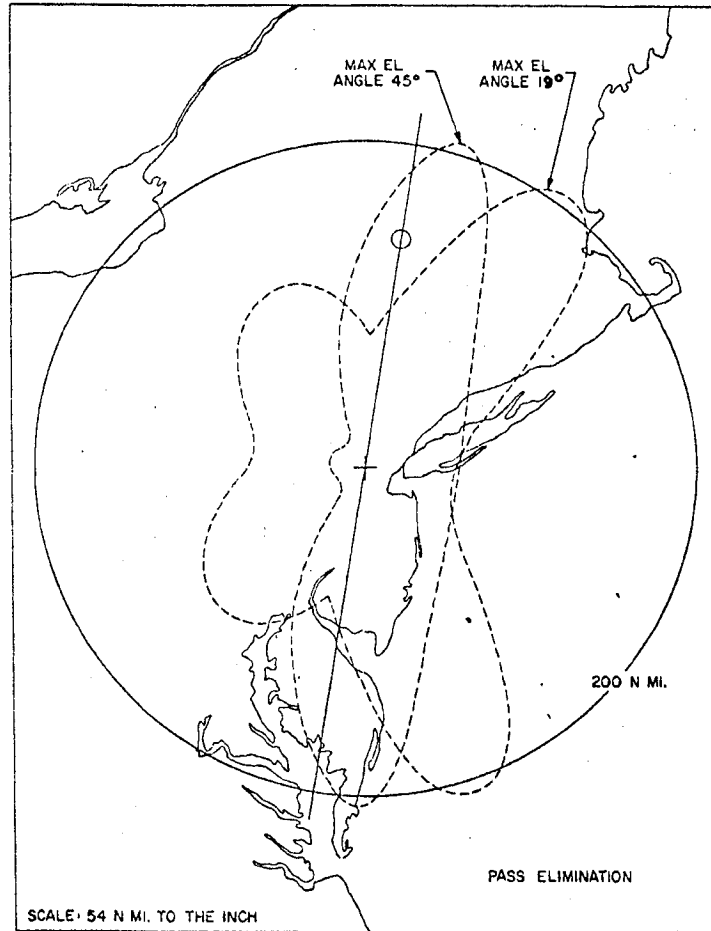
~ \$13.5M TOTAL

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SYSTEM PARAMETERS NEEDING DEFINITION  
FOR DATA LINK

- o NEED FOR INTEGRAL TELEMETRY AND COMMAND SYSTEM VERSUS SGLS
- o USE OF WHIPPANY STATION VERSUS NEW LOCATION
- o DEVIATION FROM SP/DR ON REDUNDANCY RULE
- o POWER PROGRAMMING
- o SIDELobe NOISE INJECTION
- o NEED FOR REAL-TIME COMMAND CAPABILITY
- o USE OF AUTOTRACK STEERING VERSUS COMPUTER COMMAND SYSTEM

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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 MANAGEMENT RESPONSIBILITY FOR WIDEBAND SYSTEM

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WIDEBAND SCHEDULE

ATP	1 AUGUST 1967
TRADE STUDIES BTL	1 AUGUST 1967 TO 15 SEPT. 1967
INTERFACE DEFINITION	15 OCTOBER 1967
MOCKUP	12 FEBRUARY 1968
EDCTU	12 JUNE 1968
LMQTV	1 MAY 1969 (DAC 1 MARCH 1969)
MASS SUBSTITUTES	
STV	26 SEPTEMBER 1968
FLIGHT #2	24 APRIL 1969
FLIGHT #3	23 OCTOBER 1969
FLIGHT #4	18 MARCH 1970
FLIGHT #5	30 JULY 1970

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ACTIONS REQUIRED TO IMPLEMENT WIDEBAND CAPABILITY

ASSUMING 1 AUGUST ATP

SPO

- o ATP TO SPO 7 JULY
- o PREPARE RFP PACKAGE TO CONTRACTORS 7 AUGUST

BTL

- o REQUIREMENTS DEFINITION 1 AUGUST
- o HIGH LEVEL CONTACT 2 AUGUST
- o RFP ISSUED 14 AUGUST
- o PROPOSAL SUBMITTAL 14 SEPTEMBER

CBS

- o RFP ISSUED 14 AUGUST
- o PROPOSAL SUBMITTAL 14 SEPTEMBER

DACO

- o CCN ISSUED FOR SCHEDULE CRITICAL ITEMS 14 AUGUST
- o REVISED ECP REQUESTED 1 AUGUST

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ROM COST SUMMARY

	<u>PROGRAM TOTAL</u>		<u>FY 68</u>	
	<u>JANUARY</u> (CONTRACTOR)	(ADJUSTED)	<u>CURRENT</u>	<u>CURRENT</u>
BTL	4.25	4.25	20.0	3.5
CBS	6.25	13.75	19.45	5.0
DAC	<u>4.5</u>	<u>7.0</u>	<u>13.5</u>	<u>1.6</u>
	15.0	25.0	53.0	10.1

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BTL ESTIMATE ORIGIN

o BTL PREVIOUS PROGRAM ESTIMATE (3 FLIGHT ARTICLES - ONE SET OF AGE) 3-YEAR PROGRAM	15.0M
o TWO ADDITIONAL FLIGHT ARTICLES - ONE DAC QUAL TEST, ONE CBS/BTL ENGINEERING TEST UNIT	2.0M
o TWO ADDITIONAL SETS OF AGE - ONE FOR DAC, ONE RETAINED AT BTL	1.0M
o ONE YEAR ADDITIONAL TEST SUPPORT	1.0M
o FIELD SUPPORT FOR REMOTE TESTING	<u>1.0M</u>
	20.0M

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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 ORDER  
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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PROPOSED TRW SYSTEM DESCRIPTION

- o CONCEPT BASED ON REAL-TIME SGLS LINK FOR COMMAND AND TELEMETRY
- o GROUND STATION IN NEW HAMPSHIRE NEAR BOSTON SGLS STATION
- o 30-FOOT GROUND DISH SERVO SLAVED TO 60-FOOT SGLS DISH
- o HIGH NOISE RECEIVER (NON-CRYOGENIC)
- o AIRBORNE SYSTEM
  - PHASED ARRAY PSEUDO OCTAGON, 36 IN. DIA. x 4 IN. THICK
  - 912 EQUALLY SPACED, CAVITY BACKED, EQUAL ANGLE SPIRALS WITH > 34 DB GAIN
  - AUTOTRACK 8.4 GHZ GROUND SIGNAL
  - NOISE INJECTION FOR SIDELobe SUPPRESSION
  - 8.0 TO 8.8 TWO-BAND, 300 MHZ VIDEO TRANSMISSION
  - BEAM WIDTH  $2.4^{\circ}$ , TRACKING ACCURACY  $\pm 0.24^{\circ}$
- o PROPOSED WEIGHT 60 LB, PEAK POWER 35 WATTS

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SUMMARY OF TRW COST PROPOSAL ADJUSTMENTS  
DOLLARS IN THOUSANDS

	<u>TRW</u>	<u>Δ ADJUSTMENT</u>	<u>TOTAL ADJUST</u>
1. PROJECT MANAGEMENT	\$ 710	\$ 135	\$ 845
2. DESIGN & DEVELOPMENT	1,517	--	1,517
3.1 FAB, ASSY, TEST SC, EQUIPMENT	1,831	1,100	2,931
3.2 FAB, ASSY, TEST SC, GRD STA EQUIP	870	--	870
3.3 FAB, ASSY, TEST SPACECRAFT, AGE	945	315	1,260
4. SPECIAL TOOLS & TEST EQUIPMENT	175	--	175
5. QUALIFICATION TESTS	125	100	225
6. ACCEPTANCE TESTS (WITH 3)	--	--	--
7. QUAL ASSURANCE	240	0	240
8. RELIABILITY	175	0	175
9. DOCUMENT	50	100	150
SUBTOTAL	\$6,638	\$1,750	\$ 8,388
FEE	697	190	887
SUBTOTAL	\$7,335	\$1,940	\$ 9,275
GROUND ANTENNA, INSTALLATION & CHECKOUT O&M	1,348	--	1,348
SUBTOTAL	\$8,683	\$1,940	\$10,623
COST ESCALATION & SCHEDULE	--	1,377	1,377
TOTAL	\$8,683	\$3,317	\$12.0M

RECAP

TRW				SPO	
SPACECRAFT + GROUND STATION = TOTAL	FY 68			TOTAL	FY 68
5,544 + 3,139 = 8,683	785			12.0	4.0

~~D SECRET~~

SPECIAL HANDLING