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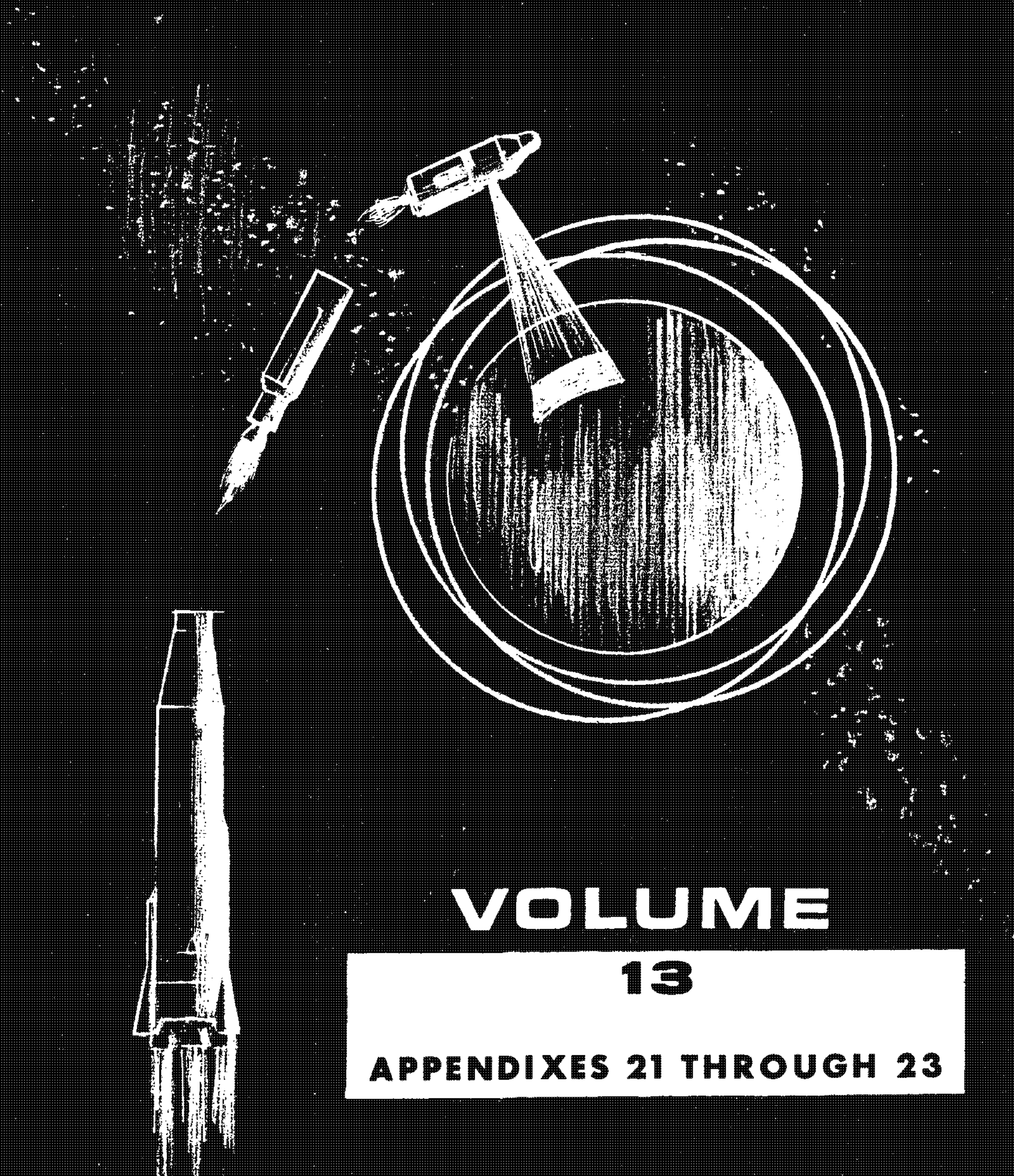
PROGRAM REPORT



VOLUME

13

APPENDIXES 21 THROUGH 23

THIS DOCUMENT CONTAINS 341 PAGES
NOVEMBER 1967

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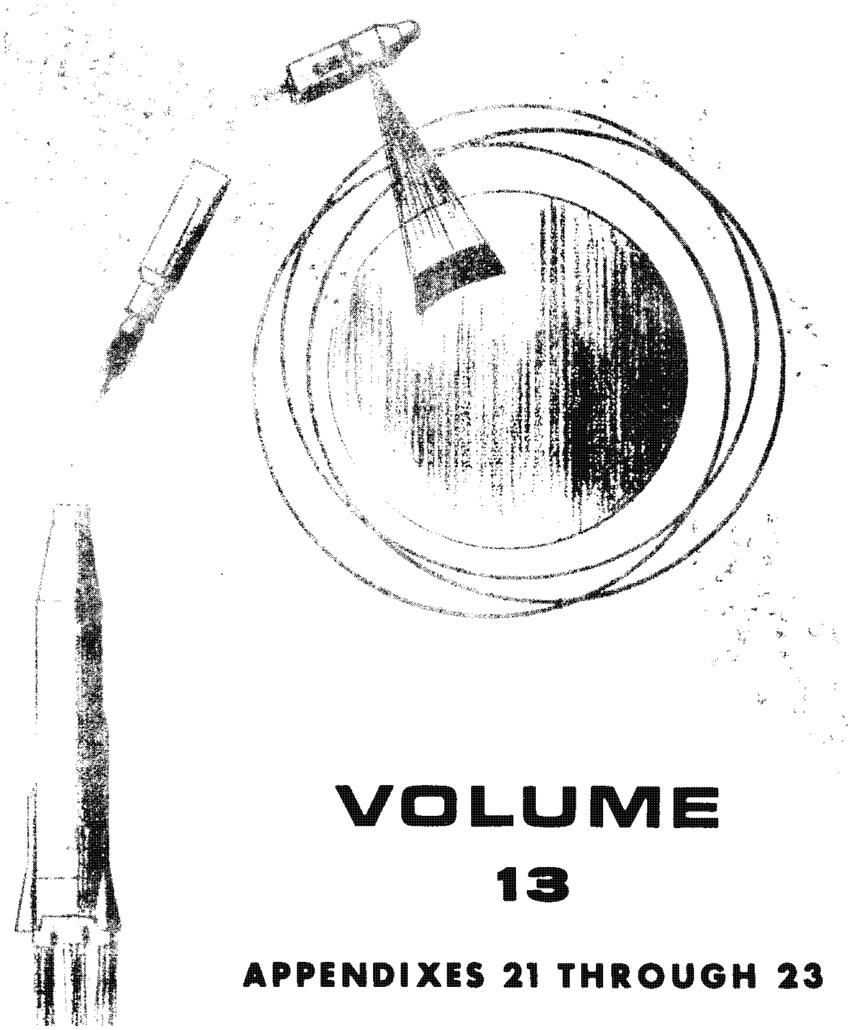
PROGRAM REPORT



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13

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ADDENDA TO SYSTEM ACCEPTANCE SPECIFICATION

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GENERAL ELECTRIC COMPANY
Missile & Space Division
Special Military Space Project
P. O. Box 8661
Philadelphia, Pennsylvania 19101

DIN: SVS 5388, Addendum 88A

This document contains 15 pages

9 November 1966

SYSTEM ACCEPTANCE SPECIFICATION (U)

SVS 5388, ADDENDUM 88A

GENERAL ELECTRIC
MISSILE AND SPACE DIVISION
SPECIAL MILITARY SPACE PROJECT
KING OF PRUSSIA PARK
P.O. BOX 8661, PHILADELPHIA 1, PA.

SVS 5388
Addendum 88A

LIST OF EFFECTIVE PAGES

This document contains 15 pages consisting of the following:

Title

1 through 14

SVS 5388, ADDENDUM 88A
9 NOVEMBER 1966

APPROVAL PAGE

PREPARED BY: R A Graytock — 11/11/66
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Specification Control
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SVS 5388
ADDENDUM 88A
9 NOVEMBER 1966

1.0 GENERAL

1.1 Scope - This specification identifies the changes to the Basic System Acceptance Specification SVS 5388, applicable to SV 988.

2.0 APPLICABLE DOCUMENTS

SVS 5388 System Acceptance Specification

3.0 REQUIREMENTS

This specification is the same as SVS 5388, System Acceptance Specification, except as follows.

SVS 5388
Addendum 88A

88A 1. Pages B-0012 through B-0018, Appendix B Holdtime Limitations Green and Red Line Limits.

Delete existing Red Line Limits Maximum Accumulated Hours or Cycles at Launch and substitute the following:

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
84A	BUSS	
	Auxiliary Timer	500 cycles
	Magnetometer	1600 hrs.
	VHF Receiver	1325 hrs.
	Decoder, Type V	1325 hrs.
	Decoder, Type VIII	1325 hrs.
	Decoder, Type IX (BUSS)	1325 hrs.
	Decoder, Type IX (Command)	1325 hrs.
	Electronic Flight Controller	150 hrs.
	Rate Gyro	100 hrs.
	Thrust Valve	9000 cycles
	Tank	395 cycles
	Junction Box	1900 cycles
	Differential Pressure Transducer	295 cycles
	Temperature Sensor (Tank)	295 cycles
	Junction Box (Selective Address)	1825 cycles
	Fill Solenoid Valve	1500 cycles
	Signal Conditioner	4825 hrs.
	Multiplexer (30 x 2.5)	9890 cycles
	SCO Base 8	1440 hrs.
	Pneumatic Regulator	9000 cycles
	Quick Disconnect	50 cycles
84A	TRACKING AND COMMAND	
	Verlort S-Band Beacon	500 hrs.
	Command Decoder	1885 hrs.
	Power Controller	44800 cycles
	Command Programmer	1600 hrs.
	Power Supply, 6-Volt	1500 hrs.
	Command Decoder Relay Box	97,000 cycles
	Latching Contactor	17,000 cycles
	Pulse Position Demodulator	9875 hrs.
	Power Sequencer	1885 hrs.

SVS 5388
Addendum 88A

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
88A	TELEMETRY	
	RF Transmitter (Delta 3)	2875 hrs.
	RF Transmitter (Delta 2)	2875 hrs.
	Transmitter Transfer Switch Assembly	97,000 cycles
	Multiplexer, Dual 30 x 5	9890 hrs.
	Command Decoder Busy Sig. Monitor	1885 hrs.
	VHF Antenna	N/A
	VCO (Base 6 and 7)	1440 hrs.
	Mixer Amp. (Base 1,2,3)	1440 hrs.
	Audio Ripple Filter	18,000 hrs.
	S-Band Antenna	N/A
	Multiplexer, 30 x 2.5	9890 hrs.
86A	Multiplexer, 90 x 1/3	9890 hrs.
	SCO Base 1 (5 Unit)	1440 hrs.
	SCO Base 2 (5 Unit)	1440 hrs.
	SCO Base 3 (5 Unit)	1440 hrs.
	SCO Base 6 (7 Unit)	1440 hrs.
	Signal Data Recorder	1885 hrs.
	Recording Tape, Drive Belts and Clutch	100 hrs.
	Recorder Bearing and Motor	400 hrs.
	Component Temp. Det.	4250 hrs.
84A	SEPARATION	
	OCV Separation Spring and Guide Assembly	2 lockup of set screw on shaft
	RV OCV Sep. Spring + Guide Assembly	2 lockup of set screw on shaft
	Separation Microswitch	9000 cycles
	Auxiliary Controller	500 cycles at flight current
	Separation Controller	500 cycles at flight current
	Baroswitch	100 cycles at flight current
	Separation Fuse Box	500 cycles at flight current
88A	STABILIZATION ELECTRONICS	
	TARS Gimbal Assembly	
	TARS Platform (Gyros)	1325 hrs.
	TARS Platform (Torque Motors)	1325 hrs.
	Rate Gyro Package	1325 hrs.
	Control Amplifier - Roll	1325 hrs.
	Control Amplifier - Yaw, Pitch	1325 hrs.
	Roll Maneuvering Amplifier	1325 hrs.
	Power Supply DC	9325 hrs.
	TARS Electronics	1325 hrs.

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
	STABILIZATION ELECTRONICS (Continued)	
	Resolver Summing Amplifier	1325 hrs.
	Compensator Electronics	2325 hrs.
	IR Sensor Scanner (Barnes)	690 hrs.
	Total Test Time (Barnes + G.E.)	690 hrs.
	GE Maximum Test Time	500 hrs.
	Barnes Mixer Box	690 hrs.
	Predac	2325 hrs.
	Inhibit Box	97,000 cycles
86A	Inhibit Override	97,000 cycles
88A	Redundant Pneumatic Control Box	1600 hrs.
84A	STABILIZATION PNEUMATICS	
	Low Press. Transducer (Low Press. System)	N/A
	High Press. Transducer (High Press. System)	N/A
	High-Pressure Regulator	6000 cycles
	Low-Pressure Regulator	6000 cycles
	Solenoid Valve, High Flow	2000 cycles
	Solenoid Valve, Low Flow	2000 cycles
	Freon Tanks	95 cycles
	Pressure Switch	830 cycles
	Quick Disconnect	95 cycles
	Primary Fill Filter	45 cycles
	Pad Abort Solenoid	1200 cycles
	Secondary Fill Filter	45 cycles
	Pressure Relief Valve	600 cycles
	High Press. Transducer (Tanks)	20,000 cycles
	N/O Squib Valves	N/A
	Temperature Detector	595 hrs.
	Nozzle-High Flow, High Pressure	N/A
	Nozzle-Low Flow, Low Pressure	N/A
	Nozzle-High Flow, Low Pressure	N/A
	Nozzle-Low Flow, High Pressure	N/A
88A	ENVIRONMENTAL CONTROL	
	Thermostat	6000 hrs.
	Compartment Heaters	8000 hrs.
	Temperature Controller (Differential)	2900 hrs.
	Temperature Sensor	4250 hrs.
	Inlet Port Assembly	N/A
	Monitor Assembly	
	Microswitch Phase A	7250 C
	Microswitch Phase A Setting	1000 C
	Position Indicator	7250 C

Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
ENVIRONMENTAL CONTROL (Continued)	
Exhaust Port Assembly	N/A
Magnetic Switch	9000 C
Switch Resistance Measurements	1000 C
Back-up Actuator	7250 C
Actuator Brush & Torque Setting	500 C
Retractable Pin Assembly	
Flange Assembly	1000 C
Retractable Pin	150 C
Aft Hinge	1000 C
Control Logic Box	10,000 C
Thermal Fuse Module	500 C at flight current
Fwd. Hinge Shaft Assembly	
Retaining Pin	1000 C
Aft Hinge Assembly	
Bearing and Ring	1000 C
Retaining Pin	1000 C
84A ORBIT ADJUST	
Propellant Tank Fuel Bladder Flexure	4 cycles
Pressurant Tank No Bladder Flexure	350 cycles
Propellant Tank Fuel No Bladder Flexure	350 cycles
Propellant Tank Oxidizer Bladder Flexure	4 cycles
Pressurant Tank	350 cycles
Pneumatic Relief Valve	850 cycles
Pneumatic Regulator	875 cycles
Pneumatic Check Valve and Filter	875 cycles
Press. Fill Valve, Fuel	25 cycles
Press. Fill Valve, Oxidizer	25 cycles
Temperature Sensor	295 cycles at max. temp. 100 hrs. at max. press.
High-Pressure Transducer (Pressurant)	20,000 cycles
Low-Pressure Transducer	N/A
Quick-Disconnect Propellant Fill, Fuel (Nipple)	40 cycles
Quick-Disconnect Propellant Fill, Oxidizer (Nipple)	40 cycles
OCV Relay Box	3940 cycles
Thrust Chamber Assembly (Hot Firing)	1 minute
Pressure Fill Valve	50 cycles
Tank, Pressure, Supply	350 cycles

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
	ORBIT ADJUST (Continued)	
	Tank Module, Oxidizer	4 cycles
	Tank Module, Fuel	4 cycles
	Burst Diapraghm, Press.	N/A
	Tube, Diapraghm (Fuel)	N/A
	Filter In Line	45 cycles
	Start Squib Valve	N/A
	Tubing and Fittings	N/A
84A	FORWARD SECTION	
	VCO and Amplifier Assembly	1490 hrs.
	Converter Controller	49,950 cycles
	Converter Translater	1495 hrs.
	Translator, 0.6 G	1498 hrs.
	Translator, 0.40 G	1496 hrs.
	Transmitter	995 hrs.
	Transfer Module	3995 hrs.
	Diode Module	470 hrs.
	Arm Module	3990 hrs.
	Inertial G Switch	984 cycles
	Temp. Sensor, Thrust Cone	4325 hrs.
	Separation Switch, Thrust Cone	995 cycles
	Flashing Light Controller	1950 hrs.
	Temp. Sensor, Forebody	4400 hrs.
	Ejection Programmer	1980 cycles
	Recovery Programmer	1965 cycles
	Beacon Controller	1950 hrs.
	Beacon	50 hrs.
	Flashing Lights	1450 hrs.
	Mechanical Timer	2495 cycles
	Resistor Module	3995 cycles
	Forebody (From Time of Mfg. to Projected Time of Recovery Usage)	18 mos. max.
	In Flight Disconnect (SRV/Adapter)	70 cycles
84A	ELECTRICAL POWER AND SIGNAL DISTRIBUTION	
	Umbilical Disconnect Receptacle	185 cycles
	LLCB	2200 hrs.
	Relay, Stab. Cutoff	500 cycles
	Relay, AGE Instrumentation	500 cycles

Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
ELECTRICAL POWER AND SIGNAL DISTRIBUTION (Continued)	
Voltage Step-Down Module (BUSS)	2325 hrs.
Plug, In-Flight Disconnect	70 cycles
Receptacle, In-Flight Disconnect	70 cycles
Ampere Hour Counter	2200 hrs.
Battery (Operational and Backup)	21 days wet stand

88A F 2. Page 4-0016, Paragraph 4.5.1.2.1 Operational Batteries.

Delete item I2 in its entirety.

88A HF 3. Page 4-0028, Paragraph 4.5.2.2.5.4 Vehicle Clock Time Recording.

Delete paragraph in its entirety.

88A HF 4. Page 4-0051, Table 4.5.4.2.4 Separation Function, Timing, and Required Squib Simulator Currents.

At end of table, under "Other Functions" add the following:

SV BUSS Sep. Cmd.No.	SV Primary Sep. Cmd. No.	Delta Time (Sec.)	Function	Unit	SV Primary Maximum Current (Amps)	BUSS/Sep. Backup Minimum Current (Amps)
1	N/A	N/A	Primary Gas Disable			
			High Thrust Branch	A1050(2)	N/A	3.0 each
			Low Thrust Branch	A1048(2)	N/A	3.0 each

88A HF 5. Page 4-0065, Paragraph 4.5.5.2.7.1 Functional Commands.

Under "The AGE functions shall be as follows", add item F as follows:

F. ACA Initialize

88A 6. Page 4-0067, Paragraph 4.5.5.2.7.2 Taboo Logic.

Delete item F in its entirety and substitute the following:

HF F. Orbit Adjust On. An Orbit Adjust command (engine 1 on and/or engine 2 on) shall not change the thrust level commanded state in the yaw, pitch and roll ACA's. Low Thrust or High Thrust Jet commands to the ACA during engine 1 on and/or engine 2 on shall cause the S/V to operate in the new commanded state.

88A HF 7. Page 4-0068, Paragraph 4.5.5.2.7.3 Redundant Pneumatic Requirements.

Under sentence which states "The high section (SV-2) and the low section (SV-1) commanded open, followed by a high section (SV-2) command...." delete existing item E in its entirety and substitute the following:

E. Not close the high section (SV-2) squib valve A1050.

Add item F as follows:

F. The RMA shall remain "Disable" and the pitch, yaw and roll ACA shall remain in "Low Thrust", regardless of any other vehicle commanded state, until a "High and Low Selector Valve Open" command has been executed."

Under sentence which states "The high section (SV-2) and the low section (SV-1) commanded open, followed by a low section (SV-1) command...." delete existing items D and E and substitute the following:

D. ACA high thrust on and switch from high thrust roll nozzle to low thrust redundant roll nozzles.

E. Not close the low section (SV-1) squib valve A1048.

Add item F as follows:

F. The RMA shall remain "Disable" and the pitch, yaw and roll ACA shall remain in "High Thrust", regardless of any other vehicle commanded state until a "High and Low Selector Valve Open" command has been executed.

Under sentence which states "The BUSS function (disable primary pneumatic) shall" delete items A, B and D.

Change item C to read as follows:

C. Close the high and low section by firing N/O squib valves A1050 and A1048.

88A 8. Page 4-0109, Paragraph 4.5.9.2.7.5 Actuator Limitation.

In left margin, preceding "HF", add "88 ".

88A 9. Page 4-0126, Paragraph 4.5.10.2.4 BUSS SV Interface Requirements.

In item I2A change

FROM:
"...command shall..."
TO:
"...command 1 shall..."

88A 10. Page 4-0151, Paragraph 4.6.1.4.3.11 SRV.

In left margin next to paragraph heading change:

FROM:
"80A"
TO:
"88 "

88A 11. Page 5-0002, Paragraph 5.3.2 Thermal Stabilization.

At bottom of page change:

FROM:
"STA 305 Bulkhead Temperatures"
TO:
"STA 209 Bulkhead Temperatures"

88A 12. Page 5-0007, Paragraph 5.5.3.3 Stabilization Tanks.

Delete paragraph in its entirety and substitute the following:

The stabilization tanks shall contain 252 $\pm$ 1 pounds of Freon 14 gas meeting the requirements of GE-SMSP Dwg. 255E952D, Propellant Loading Piping Interface, at a maximum static pressure of 4800 psig. The pressure shall not exceed 3600 psig when personnel are in the area. Refer to Figure D1 of Appendix D.

88A 13. Page 5-0007, Paragraph 5.5.3.4 Stabilization Gas Tank Heating.

In last line of paragraph change:

FROM:
"4775 PSIG"
TO:
"4800 PSIG"

88A 14. Page C-0005, Appendix C SV Telemetry Channel Assignment Summary.

Change IRIG Channel 15 Link 2 (RT) pulses 19, 20 and 21 to read as follows:

Pulse	Telemetry Measurement	Limits
19	Low Thrust Supply Press. Gas Tank at 38 deg., Sta. 217	Comp. Cal. Curve

Pulse	Telemetry Measurement	Limits
20	Cold Gas Press. Switch Low Thrust	
	Greater than 1000 Psia	23-43
	Between 750 and 1000 Psia	54-74
	Less than 750 Psia	90-100
21	High Thrust Supply Press. Gas Tank at 321 deg., Sta. 217	Comp. Cal. Curve

88A 15. Page C-0020, Appendix C SV Telemetry Channel Assignment Summary.

Change Continuous Channels Link 2 (RT)/Link 3 (PB) pulse 6 as follows:

Channels	Frequency	Function	Limits
6	1.7 KC	Command Dec/Prog Busy Signal	
		Quiescent	45 to 64
		POA	-8 to + 8
		POA/CD Busy	9 to 26
		POA/PROG Busy	27 to 44
		CD Busy	65 to 84
		PROG Busy	85 to O.B.H.

88A 16. Page D-0015, SV Launch + Hold/Abort Criteria.

Add line 81 to Group II Measurements as follows:

Line No.	Measurements	Link/ Channel/Pulse	Launch Limits Low	Launch Limits High	Remarks
81	Press. Switch (Cold Gas) Low Thrust Tank	2/15/20	23	43	-

88A 17. Pages F-0007 and F-0008, Appendix F Command Allocations.

Change Stored Command, DSPC No. 5, word 1, bits 30, 35, and word 2, bits 9, 10, 11, 13, 14, 16, 17 and 34 to read as follows:

Cmd. Type	Word	Bit Number	Function	States 1/0	Abbrev.	States 1/0
DSPC	1	30	Spare			
No. 5	1	35	Spare			
	2	9	GFE 1-C17	On/Norm	FA	
	2	10	GFE 1-C18	On/Norm	RA	

Cmd. Type	Word	Bit Number	Function	States 1/0	Abbrev.	States 1/0
	2	11	Computer Prearm	On/Norm	CPR	
	2	13	OCV/Agena	Sep/Norm	OVS	
	2	14	Disconnect 2	On/Norm	DS2	
	2	17	Spare			
	2	34	Spare			

88A 18. Page F-0011, Paragraph B. Real Time Command List

In Command Allocations, change Command Descriptor of RTC 11, 12 and 16 to read as follows:

Cmd. No.	Command Descriptor
RTC	
11	High Selector Valve Closed
12	Low Selector Valve Closed
16	High and Low Selector Valves Open

CHANGE ACTIVITY LOG

Vehicle No. 988 **Addendum** 88A

Addendum & Date	Adden. Page #	Item #	CHANGE INFORMATION					
			Doc. Affected				Differs From	
			Add.	5388	Page	Paragraph	SVS 5388	Veh.
88A 1966 11/9	4 - 8	1		X	B-0012-B-0018	Appendix B	X	
	9	2			4-0016	4.5.1.2.1		
	9	3			4-0028	4.5.2.2.5.4		
	9	4			4-0051	Table 4.5.4.2.4		
	9	5			4-0065	4.5.5.2.7.1		
	9	6			4-0067	4.5.5.2.7.2		
	10	7			4-0068	4.5.5.2.7.3		
	10	8			4-0109	4.5.9.2.7.5		
	10	9			4-0126	4.5.10.2.4		
	11	10			4-0151	4.6.1.4.3.11		
	11	11			5-0002	5.3.2		
	11	12			5-0007	5.5.3.3		
	11	13			5-0007	5.5.3.4		
	11	14			C-0005	Appendix C		
	12	15			C-0020	Appendix C		
	12	16			D-0015	Appendix D		
	12	17			F-0007-F-0008	Appendix F		
	13	18			F-0011	Appendix F		

GENERAL ELECTRIC COMPANY
Missile and Space Division
Special Military Space Project
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Philadelphia, Pennsylvania 19101

DIN: SVS 5388, Addendum 88B

This document contains 25 pages

30 December 1966

SYSTEM ACCEPTANCE SPECIFICATION (U)

SVS 5388, ADDENDUM 88B

GENERAL ELECTRIC
SPECIAL MILITARY SPACE PROJECT
MILITARY SPACE PROGRAMS
KING OF PRUSSIA PARK
P.O. BOX 8661, PHILADELPHIA 1, PA.

SVS 5388
Addendum 88B

LIST OF EFFECTIVE PAGES

This document contains 25 pages, consisting of the following:

Title

1 through 24

SVS 5388, ADDENDUM 88B

APPROVAL PAGE

PREPARED BY: R Graytock 12-30-66
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APPROVED BY: T. D. McLay 12-30-66
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Systems Development Engineer
Date

APPROVED BY: 1-3-67
L. A. Binegar
Military Program Office
Date

ISSUED BY: Charles J. Broomall 1-4-67
Specification Control
Date

SVS 5388
ADDENDUM 88B

1.0 GENERAL

1.1 Scope - This specification identifies the changes to the Basic System Acceptance Specification SVS 5388, applicable to SV 988.

2.0 APPLICABLE DOCUMENTS

SVS 5388 System Acceptance Specification

3.0 REQUIREMENTS

This specification is the same as SVS 5388, System Acceptance Specification, except as follows.

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	Tank	395 cycles
	Junction Box	1900 cycles
	Differential Pressure Transducer	295 cycles
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	Fill Solenoid Valve	1500 cycles
	Signal Conditioner	4825 hrs.
	Multiplexer (30 x 2.5)	9890 cycles
	SCO Base 8	1440 hrs.
	Pneumatic Regulator	9000 cycles
	Quick Disconnect	50 cycles
84A	TRACKING AND COMMAND	
	Verlort S-Band Beacon	500 hrs.
	Command Decoder	1885 hrs.
	Power Controller	44800 cycles
	Command Programmer	1600 hrs.
	Power Supply, 6-Volt	1600 hrs.
	Command Decoder Relay Box	97,000 cycles
	Latching Contactor	17,000 cycles
	Pulse Position Demodulator	9875 hrs.
	Power Sequencer	1885 hrs.

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
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	RF Transmitter (Delta 2)	2875 hrs.
	Transmitter Transfer Switch Assembly	97,000 cycles
	Multiplexer, Dual 30 x 5	9890 hrs.
	Command Decoder Busy Sig. Monitor	1885 hrs.
	VHF Antenna	N/A
	VCO (Base 6 and 7)	1440 hrs.
	Mixer Amp. (Base 1,2,3)	1440 hrs.
	Audio Ripple Filter	18,000 hrs.
	S-Band Antenna	N/A
	Multiplexer, 30 x 2.5	9890 hrs.
86A	Multiplexer, 90 x 1/3	9890 hrs.
	SCO Base 1 (5 Unit)	1440 hrs.
	SCO Base 2 (5 Unit)	1440 hrs.
	SCO Base 3 (5 Unit)	1440 hrs.
	SCO Base 6 (7 Unit)	1440 hrs.
	Signal Data Recorder	1885 hrs.
	Recording Tape, Drive Belts and Clutch	100 hrs.
	Recorder Bearing and Motor	400 hrs.
	Component Temp. Det.	4250 hrs.
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	OCV Separation Spring and Guide Assembly	2 lockup of set screw on shaft
	RV OCV Sep. Spring + Guide Assembly	2 lockup of set screw on shaft
	Separation Microswitch	9000 cycles
	Auxiliary Controller	500 cycles at flight current
	Separation Controller	500 cycles at flight current
	Baroswitch	100 cycles at flight current
	Separation Fuse Box	500 cycles at flight current
88A	STABILIZATION ELECTRONICS	
	TARS Gimbal Assembly	
	TARS Platform (Gyros)	1325 hrs.
	TARS Platform (Torque Motors)	1325 hrs.
	Rate Gyro Package	1325 hrs.
	Control Amplifier - Roll	1325 hrs.
	Control Amplifier - Yaw, Pitch	1325 hrs.
	Roll Maneuvering Amplifier	1325 hrs.
	Power Supply DC	9325 hrs.
	TARS Electronics	1325 hrs.

Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
STABILIZATION ELECTRONICS (Continued)	
Resolver Summing Amplifier	1325 hrs.
Compensator Electronics	2325 hrs.
IR Sensor Scanner (Barnes)	690 hrs.
Total Test Time (Barnes + G.E.)	690 hrs.
GE Maximum Test Time	500 hrs.
Barnes Mixer Box	690 hrs.
Predac	2325 hrs.
Inhibit Box	97,000 cycles
86A Inhibit Override	97,000 cycles
88A Redundant Pneumatic Control Box	1600 hrs.
84A STABILIZATION PNEUMATICS	
Low Press. Transducer (Low Press. System)	N/A
High Press. Transducer (High Press. System)	N/A
High-Pressure Regulator	6000 cycles
Low-Pressure Regulator	6000 cycles
Solenoid Valve, High Flow	2000 cycles
Solenoid Valve, Low-Flow	2000 cycles
Freon Tanks	95 cycles
Pressure Switch	830 cycles
Quick Disconnect	95 cycles
Primary Fill Filter	45 cycles
Pad Abort Solenoid	1200 cycles
Secondary Fill Filter	45 cycles
Pressure Relief Valve	600 cycles
High Press. Transducer (Tanks)	20,000 cycles
N/O Squib Valves	N/A
Temperature Detector	595 hrs.
Nozzle-High Flow, High Pressure	N/A
Nozzle-Low Flow, Low Pressure	N/A
Nozzle-High Flow, Low Pressure	N/A
Nozzle-Low Flow, High Pressure	N/A
88A ENVIRONMENTAL CONTROL	
Thermostat	6000 hrs.
Compartment Heaters	8000 hrs.
Temperature Controller (Differential)	2900 hrs.
Temperature Sensor	4250 hrs.
Inlet Port Assembly	N/A
Monitor Assembly	
Microswitch Phase A	7250 C
Microswitch Phase A Setting	1000 C
Position Indicator	7250 C

SVS 5388
Addendum 88B

Component	Red Line Limits Maxmum Accumulated Hours or Cycles at Launch
ENVIRONMENTAL CONTROL (Continued)	
Exhaust Port Assembly	N/A
Magnetic Switch	9000 C
Switch Resistance Measurements	1000 C
Back-up Actuator	7250 C
Actuator Brush & Torque Setting	500 C
Retractable Pin Assembly	
Flange Assembly	1000 C
Retractable Pin	150 C
Aft Hinge	1000 C
Control Logic Box	10,000 C
Thermal Fuse Module	500 C at flight current
Fwd. Hinge Shaft Assembly	
Retaining Pin	1000 C
Aft Hinge Assembly	
Bearing and Ring	1000 C
Retaining Pin	1000 C
84A ORBIT ADJUST	
Propellant Tank Fuel Bladder Flexure	4 cycles
Pressurant Tank No Bladder Flexure	350 cycles
Propellant Tank Fuel No Bladder Flexure	350 cycles
Propellant Tank Oxidizer Bladder Flexure	4 cycles
Pressurant Tank	350 cycles
Pneumatic Relief Valve	850 cycles
Pneumatic Regulator	875 cycles
Pneumatic Check Valve and Filter	875 cycles
Press. Fill Valve, Fuel	25 cycles
Press. Fill Valve, Oxidizer	25 cycles
Temperature Sensor	295 cycles at max. temp. 100 hrs. at max. press.
High-Pressure Transducer (Pressurant)	20,000 cycles
Low-Pressure Transducer	N/A
Quick-Disconnect Propellant Fill, Fuel (Nipple)	40 cycles
Quick-Disconnect Propellant Fill, Oxidizer (Nipple)	40 cycles
OCV Relay Box	3040 cycles
Thrust Chamber Assembly (Hot Firing)	1 minute
Pressure Fill Valve	50 cycles
Tank, Pressure, Supply	350 cycles

Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
ORBIT ADJUST (Continued)	
Tank Module, Oxidizer	4 cycles
Tank Module, Fuel	4 cycles
Burst Diapraghm, Press.	N/A
Tube, Diapraghm (Fuel)	N/A
Filter In Line	45 cycles
Start Squib Valve	N/A
Tubing and Fittings	N/A
84A FORWARD SECTION	
VCO and Amplifier Assembly	1490 hrs.
Converter Controller	49,950 cycles
Converter Translater	1495 hrs.
Translator, 0.6 G	1498 hrs.
Translator, 0.40 G	1496 hrs.
Transmitter	995 hrs.
Transfer Module	3995 hrs.
Diode Module	470 hrs.
Arm Module	3990 hrs.
Inertial G Switch	984 cycles
Temp. Sensor, Thrust Cone	4325 hrs.
Separation Switch, Thrust Cone	995 cycles
Flashing Light Controller	1950 hrs.
Temp. Sensor, Forebody	4400 hrs.
Ejection Programmer	1980 cycles
Recovery Programmer	1965 cycles
Beacon Controller	1950 hrs.
Beacon	50 hrs.
Flashing Lights	1450 hrs.
Mechanical Timer	2495 cycles
Resistor Module	3995 cycles
Forebody (From Time of Mfg. to Projected Time of Recovery Usage)	18 mos. max.
In Flight Disconnect (SRV/Adapter)	70 cycles
84A ELECTRICAL POWER AND SIGNAL DISTRIBUTION	
Umbilical Disconnect Receptacle	185 cycles
LLCB	2200 hrs.
Relay, Stab. Cutoff	500 cycles
Relay, AGE Instrumentation	500 cycles

Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
ELECTRICAL POWER AND SIGNAL DISTRIBUTION (Contiued)	
Voltage Step-Down Module (BUSS)	2325 hrs.
Plug, In-Flight Disconnect	70 cycles
Receptacle, In-Flight Disconnect	70 cycles
Ampere Hour Counter	2200 hrs.
Battery (Operational and Backup)	21 days wet stand

88A F 2. Page 4-0016, Paragraph 4.5.1.2.1 Operational Batteries.

Delete item I2 in its entirety.

88A HF 3. Page 4-0028, Paragraph 4.5.2.2.5.4 Vehicle Clock Time Recording.

Delete paragraph in its entirety.

88A HF 4. Page 4-0051, Table 4.5.4.2.4 Separation Function, Timing, and Required Squib Simulator Currents.

At end of table, under "Other Functions" add the following:

SV BUSS Sep. Cmd.No.	SV Primary Sep. Cmd. No.	Delta Time (Sec.)	Function	Unit	SV Primary Maximum Current (Amps)	BUSS/Sep. Backup Minimum Current (Amps)
1	N/A	N/A	Primary Gas Disable			
			High Thrust Branch	A1050(2)	N/A	3.0 each
			Low Thrust Branch	A1048(2)	N/A	3.0 each

88A HF 5. Page 4-0065, Paragraph 4.5.5.2.7.1 Functional Commands.

Under "the ACE functions shall be as follows", add item F as follows:

F. ACA Initialize

88A 6. Page 4-0067, Paragraph 4.5.5.2.7.2 Taboo Logic.

Delete item F in its entirety and substitute the following:

HF F. Orbit Adjust On. An Orbit Adjust command (engine 1 on and/or engine 2 on) shall not change the thrust level commanded state in the yaw, pitch and roll ACA's. Low Thrust or High Thrust Jet commands to the ACA during engine 1 on and/or engine 2 on shall cause the S/V to operate in the new commanded state.

88A HF 7. Page 4-0068, Paragraph 4.5.5.2.7.3 Redundant Pneumatic Requirements.

Under sentence which states "The high section (SV-2) and the low section (SV-1) commanded open, followed by a high section (SV-2) command...." delete existing item E in its entirety and substitute the following:

E. Not close the high section (SV-2) squib valve A1050.

Add item F as follows:

F. The RMA shall remain "Disable" and the pitch, yaw and roll ACA shall remain in "Low Thrust", regardless of any other vehicle commanded state, until a "High and Low Selector Valve Open" command has been executed."

Under sentence which states "The high section (SV-2) and the low section (SV-1) commanded open, followed by a low section (SV-1) command...." delete existing items D and E and substitute the following:

D. ACA high thrust on and switch from high thrust roll nozzle to low thrust redundant roll nozzles.

E. Not close the low section (SV-1) squib valve A1048.

Add item F as follows:

F. The RMA shall remain "Disable" and the pitch, yaw and roll ACA shall remain in "High Thrust", regardless of any other vehicle commanded state until a "High and Low Selector Valve Open" command has been executed.

Under sentence which states "The BUSS function (disable primary pneumatic) shall" delete items A, B and D.

Change item C to read as follows:

C. Close the high and low section by firing N/O squib valves A1050 and A1048.

88A 8. Page 4-0109, Paragraph 4.5.9.2.7.5 Actuator Limitation.

In left margin, preceding "HF", add "88A".

88A 9. Page 4-0126, Paragraph 4.5.10.2.4 BUSS SV Interface Requirements.

In item 12A change

FROM:
"...command shall..."
TO:
"...command 1 shall..."

88A 10. Page 4-0151, Paragraph 4.6.1.4.3.11 SRV.

In left margin next to paragraph heading change:

FROM:
"80A"
TO:
"88A"

88A 11. Page 5-0002, Paragraph 5.3.2 Thermal Stabilization.

At bottom of page change:

FROM:
"STA 305 Bulkhead Temperatures"
TO:
"STA 209 Bulkhead Temperatures"

88A 12. Page 5-0007, Paragraph 5.5.3.3 Stabilization Tanks.

Delete paragraph in its entirety and substitute the following:

The stabilization tanks shall contain 252 ± 1 pounds of Freon 14 gas meeting the requirements of GE-SMSP Dwg. 255E952D, Propellant Loading Piping Interface, at a maximum static pressure of 4800 psig. The pressure shall not exceed 3600 psig when personnel are in the area. Refer to Figure D1 of Appendix D.

88A 13. Page 5-0007, Paragraph 5.5.3.4 Stabilization Gas Tank Heating.

In last line of paragraph change:

FROM:
"4775 PSIG"
TO:
"4800 PSIG"

88A 14. Page C-0005, Appendix C SV Telemetry Channel Assignment Summary.

Change IRIG Channel 15 Link 2 (RT) pulses 19, 20 and 21 to read as follows:

Pulse	Telemetry Measurement	Limits
19	Low Thrust Supply Press. Gas Tank at 38 deg., Sta. 217	Comp. Cal. Curve

Pulse	Telemetry Measurement	Limits
20	Cold Gas Press. Switch Low Thrust	
	Greater than 1000 Psia	23-43
	Between 750 and 1000 Psia	54-74
	Less than 750 Psia	90-100
21	High Thrust Supply Press. Gas Tank at 321 deg., Sta. 217	Comp. Cal. Curve

88A 15. Page C-0020, Appendix C SV Telemetry Channel Assignment Summary.

Change Continuous Channels Link 2 (RT)/Link 3 (PB) pulse 6 as follows:

Channels	Frequency	Function	Limits
6	1.7 KC	Command Dec/Prog Busy Signal	
		Quiescent	45 to 64
		POA	-8 to + 8
		POA/CD Busy	9 to 26
		POA/PROG Busy	27 to 44
		CD Busy	65 to 84
		PROG Busy	85 to O.B.H.

88A 16. Page D-0015, SV Launch + Hold/Abort Criteria.

Add line 81 to Group II Measurements as follows:

Line No.	Measurements	Link/ Channel/Pulse	Launch Limits Low	High	Remarks
81	Press. Switch (Cold Gas) Low Thrust Tank	2/15/20	23	43	-

88A 17. Pages F-0007 and F-0008, Appendix F Command Allocations.

Change Stored Command, DSPC No. 5, word 1, bits 30, 35, and word 2, bits 9, 10, 11, 13, 14, 16, 17 and 34 to read as follows:

Cmd. Type	Word	Bit Number	Function	States 1/0	Abbrev.	States 1/0
DSPC	1	30	Spare			
No. 5	1	35	Spare			
	2	9	GFE 1-C17	On/Norm	RA	
	2	10	GFE 1-C18	On/Norm	RA	

Cmd. Type	Word	Bit Number	Function	States 1/0	Abbrev.	States 1/0
	2	11	Computer Prearm	On/Norm	CPR	
	2	13	OCV/Agena	Sep/Norm	OVS	
	2	14	Disconnect 2	On/Norm	DS2	
	2	17	Spare			
	2	34	Spare			

88A 18. Page F-0011, Paragraph B. Real Time Command List

In Command Allocations, change Command Descriptor of RTC 11, 12 and 16 to read as follows:

Cmd. No. RTC	Command Descriptor
11	High Selector Valve Closed
12	Low Selector Valve Closed
16	High and Low Selector Valves Open

88B 19. Page 4-0008, Table 4.3.2. Weight and Balance Requirements.

Change weight of SV at Launch

FROM:
"LT4934**"
TO:
"LT4988**"

85B 20. Page 4-0049, Table 4.5.4.2.4 Separation Function, Timing, and Required Squib Simulator Currents.

For Unit A1811 change

	SV Primary Minimum Current(Amps)	BUSS/Sep. Backup Minimum Current (Amps)
FROM:	7.7	7.0
TO:	7.1	6.3

86B 21. Page 4-0078, Paragraph 4.5.5.3.3 Functional Requirements.

Add items H and I as follows:

F H. Solenoid Valve Operating Time Requirements - Solenoid thrust valve maximum opening and closing reponse time shall meet the following requirements:

Type of Valve	Opening Response Time	Closing Response Time
High Flow	0.030 sec.	0.020 sec.
Low Flow (Low Roll Valves Only)	0.020 sec.	0.010 sec.

H H. Solenoid Valve Operating Time Requirements - Solenoid thrust valve maximum opening response time shall meet the following requirements:

Type of Valve	Opening Response Time
High Flow	0.030 sec.
Low Flow (Low Roll Valves Only)	0.020 sec.

F I. The capability of all primary subsystem thrust valves to exhaust gas upon command shall be verified during the final SV confidence test prior to Agena Mating.

88B 22. Page 4-0082, Paragraph 4.5.5.4 Stabilization Subsystem Operational Requirements.

Add item E as follows:

HF E. To prevent damage to the solenoid valves, a test "Flow Restrictor" or flight nozzle shall be used on each thrust valve whenever the thrust valves are required to port gas. The test "Flow Restrictor" when installed on the vehicle shall be torqued 90 to 120 inch-pounds.

86C 23. Page 4-0110, Add Paragraph 4.5.9.5, Outer Shield Requirements, through paragraph 4.5.9.5.5 as follows:

86C HF 4.5.9.5 Outer Shield Requirements

85B HF 4.5.9.5.1 Cleanliness and Lubrication Requirement

A. Cleanliness requirement - Prior to final installation the outer shield lugs, structure lugs, latch pin, bell crank, bell crank to coupler pin, coupler and bell crank bracket shall be cleaned and inspected to ensure that foreign materials such as dirt, chips, brush hairs, etc. are not present.

B. Lubrication requirement - After cleaning, the bearing surfaces of the outer shield lugs, structure lugs, latch pin, bell crank, bell crank to coupler pin, coupler, and bell crank bracket shall be lightly lubricated with silicone grease (171A8231) per Drawing 238R872.

86C HF 4.5.9.5.2 Manual Unlatch Requirement

The total mechanically mated SV (flight configuration) shall meet the following requirements:

HF A. Outer shield release mechanism configuration

1. The shear pin shall not be installed.

2. The explosive pistons may or may not be installed.

3. The outer shield spring shall be in the flight configuration.

HF B. The outer shield shall be manually unlatched a minimum of three (3) times. Each time the force required to disengage the latch pin from the outer shield shall be applied at the Pyro end of the bell crank and shall be 100 pounds minimum and 200 pounds maximum.

F C. The above requirement shall be met just prior to outer shield flight installation.

85B F 4.5.9.5.3 <u>Partial Unlatch Requirement</u>

Prior to outer shield shear pin installation, the total mechanically mated SV (flight configuration) shall meet the following requirements when the outer shield has been installed for flight.

1. The bell crank shall be moved 0.10 ± 0.03 inches.

2. The forces required to move the latch pin shall be applied at the pyro end of the bell crank and shall be 100 pounds minimum, 200 pounds maximum.

86C HF 4.5.9.5.4 <u>Outer Shield General Requirements</u>

HF A. The following requirements shall be met in accordance with installation drawing 238R872:

HF 1. With the bell crank positioned in the flight configuration (touching the pyro, see item B), the latch pin shall be engaged 0.25 inches nominal, 0.20 inches minimum.

HF 2. With lead face of bell crank in contact with face of bell crank bracket, all lugs of latch pin shall be fully contained within lugs of structure half of latch and shall have 0.025 inches minimum remaining travel at all lug locations before re-engagement. Clearance between coupler and structure shall be 0.12 minimum measured in the direction of latch pin motion.

HF 3. With arrestor face in contact with the face of structure latch lug, all lugs of latch pin shall be fully contained within lugs of structure half of latch. A minimum of one lug shall be flush to 0.005 inches less than flush with forward face of structure half of latch. Maximum distance from power piston to bell crank shall be 0.50 inches. Minimum latch pin travel from this position to point where lead face of bell crank contacts face of bell crank bracket shall be 0.145 inches.

F B. The outer shield shall be installed per installation drawing 238R872. With the bell crank positioned in the flight configuration and the shear pin installed, maximum gap between the pyro pistons and the bell crank shall be 0.005 inches for one of the pistons and 0.010 inches for the other piston.

88B 24. Page 4-0146, Paragraph 4.6.1.4.3.2 Separation Subsystem.

Delete existing text under this heading and substitute the following:

The validation harness shall be installed in the vehicle. The baroswitch operation shall be simulated. All continuity loops shall be complete. All pyro-electrical functions shall be verified. Pyro simulators shall be used to simulate all non-reversible pyro functions. When it is necessary to provide a pyro operated piston mechanical function, live pyro may be used to verify the electrical function. The separation subsystem operation shall include, but not be limited to, the following separation functions:

1. All separation functions via primary command

2. BUSS separation command sequence.

88B 25. Page 4-0149, Paragraph 4.6.1.4.3.6 Environmental Control Requirements.

Delete first sentence on page, which reads "The thermal dissipation of the operational batteries shall be simulated."

88B 26. Page 4-0155, Paragraph 4.6.1.4.4.1.5.2 Chamber Pump Down or Pump Up Requirements.

Add item 6 under B as follows:

6. The system thermal vacuum operational assurance test may start when zone 35 is less than -55 deg. F.

88B 27. Page 5-0007, Add new Paragraph 5.5.3.7 High Thrust Roll Nozzles as follows:

5.5.3.7 High Thrust Roll Nozzles
The roll high thrust test "Flow Restrictor" shall be removed and the flight roll high thrust nozzles shall be installed.

88B 28. Page 5-0008, Paragraph 5.6.3 Electrical Power and Distribution Subsystem Requirements.

Add item E as follows:

E. The load sharing of any battery as monitored by T/M shall not decrease by more than 40% from the time of batteries installation until launch as shown by the following:

$$\frac{\%\ \text{load at installation} - \%\ \text{load at any time}}{\%\ \text{load at installation}} = \text{less than } 40\%$$

The above requirement is applicable only when the bus voltage is above 30 volts, all batteries are at approximately the same state of discharge, the variation in age of the batteries does not exceed three months and the change in load does not exceed 50% at the time of measuring the change in load sharing.

88B 29. Pages C-0004, C-0005 and C-0006, Appendix C SV Telemetry Channel Assignment Summary

Change IRIG Channel 15 Link 2 (RT) pulses 1, 3, 17, 18 and 22 to read as follows:

Pulse	Telemetry Measurement	Test Primary	Test BUSS	Limits Flight (Info Only)
1	H-30 Continuity and Sep. Events			
	No Event	18-28	18-28	18-28
	Event = 1 - Disc 1	69-79	69-79	69-79
	Event = 2 - Disc 2	18-28	18-28	69-79
	Event = 3 - Arm	0+-5	0+-5	50-60
	Event = 4 - Pin Puller	N/A	N/A	0+-5
3	Spare			0-10
17	Temp., Low Thrust Cold Gas Tank at 38 Deg. (Sta.217) at 70 Deg. F.			33-43
18	Temp., High Thrust Cold Gas Tank at 321 Deg. (Sta.217) at 70 Deg. F.			33-43

Pulse	Telemetry Measurement	Limits
22	High/Low Section Open Balance Off	-5 +5
	High/Low Section Open Balance On	5-15
	High Section Closed Balance Off	15-25
	Low Section Closed Balance Off	30-40
	High Section Closed Balance On	25-35
	Low Section Closed Balance On	35-45
	High/Low Section Open Commanded	35-45
	High/Low Section Closed	45-55
	High Section Closed Commanded	55-65
	High/Low Section Closed Commanded	85-100

88B 30. Page C-0013 and C-0014, Appendix C SV Telemetry Channel Assignment Summary.

Change IRIG Channel 10 Link 2 (RT)/Link 3 (PB) pulses 14 through 22 inclusive.

	Telemetry Measurement	Limits
FROM:	5V Bus	95-105
TO:	Spare	0-10

88B 31. Page C-0031, Appendix C SV Telemetry Channel Assignment Summary.

Change Continuous Channels Link 4 Channel 10 Unsecure Modes to read as follows:

Channel	Frequency	Function	Limits
10	5.4 KC	BUSS Mode and Event Monitor Unsecure Modes	
		Reset	32-52
		Mode 1 (BRT)	67-77
		Mode 2 (BNS)	77-87
		Mode 3 (BNO)	87-OBH
		Mode 5 (BRTNG)	57-67

86B 32. Page C-0032, Figure C-1, SV Telemetry Subsystem, Block Diagram.

Change caption on multiplexer providing input to Band 10-5.4 KC, SCO Base 1

FROM:
"90 x 1/18 Multiplexer"
TO:
"90 x 1/3 Multiplexer"

88B 33. Page G-0001 and G-0002, Appendix G. Canister Zone Temperatures for the +1.7 Sigma and -1.7 Sigma.

Change Hot Case and Cold Case Canister Zone Temperatures for Zones 1 through 43 to read as follows:

Section	Zone	Hot Case Temp.(Deg.F)	Cold Case Temp.(Deg.F)
RV	1	82	53
	2	56	-27
	3	120	29
	4	134	-48
Adapter	5	30	0
	6	63	-19
	7	43	14
	8	49	-22
	9	119	-40
	10	76	-109
	11	66	36
	12	45	-25
5	13	71	29
	14	122	16
	15	89	12
	16	57	-15
	16A	57	-15
	17	112	-2
	18	131	-109
	19	29	-44
	20	106	59
	21	124	4
	22	145	7
6	23	128	-7
	24	81	-18
	25	62	-9
	26	136	-33
	27	99	-115
	28	60	-164
	29	-64	-87
	30	29	-44
	31	-5	-66
	32	110	25
	33	110	25
	34	100	30
	43	3	-207

Section	Zone	Hot Case Temp.(Deg.F)	Cold Case Temp.(Deg.F)
7	35	-59	-110
	36	-86	-110
	37	-33	-51
	38	12	9
	39	-13	-29
	40	-22	-110
	41	Off	Off
	42	Off	Off

88B 34. Page 4-0127, Paragraph 4.5.12 SV Systems E.M.I. Test requirements. Change the following four Monitor Point Maximum Allowable Levels to read as follows:

Monitor Point	Maximum Allowable Level: Amplitude	Freq. or Duration
+6V Switches, Command Decoder P375 +J, Ret. P	A) +1.8V (Stby-Pwr.On)	
	-1.15V (Stby-Pwr. On)	
	B) +1.25V (Store Cmd. Cmding)	
	-1.0V (Store Cmd. Cmding)	
	C) +1.4V (On-Off)	
	-1.5V (On-Off)	
	D) 1.3V P/P (Store Cmd. Cmding)	30 cps - 15 kcs
	E) 0.75V P/P (Store Cmd. Cmding)	15 kcs - 100 kcs
	F) 0.75V P/P (RTC Cmding)	15 kcs - 100 kcs
	G) 0.75V P/P (Stby-Pwr. On)	15 kcs - 100 kcs
-6V Switches, Command Decoder P375 +K, Ret. P	A) +2.75V (Stby-Pwr.On)	
	B) +2.75V (On-Off)	
	C) +2.75V (Store Cmd. Cmding)	
	D) -2.75V (On-Off)	
	E) -2.75V (Store Cmd.Cmding)	
	F) 3.0V P/P (All Modes)	Audio
+6V Continuous, Command Decoder, P375 +S, Ret. P	A) +1.4V (Stby-Pwr.On)	
	B) +0.85V (On-Off)	
	C) +0.85V (RTC Cmding)	
	D) +1.85V (Store Cmd. Comding)	
	E) -1.4V (Stby-Pwr. On)	
	F) -1.4V (Store Cmd. Cmding)	
	G) -1.3V (On-Off)	
	H) -1.3V (RTC Cmding)	
	I) 1.25V P/P (Stby-Pwr.On)	Audio

Monitor Point	Maximum Allowable Level Amplitude	Freq. or Duration
-6V Continuous, Command Decoder, P375 +T, Ret. P	A) +1.75V (On-Off) B) -1.75V (On-Off) C) +1.35V (Store Cmd. Cmding) D) -1.3V (Store Cmd Cmding)	

Change +28V, Cmd Prog, P367 + M Ret. K, Item B), Frequency or Duration

FROM:
"10 msec"
TO:
"10 usec"

Change Clock Hold, Command Programmer P367 +BB, Ret. K, Items A and B, Frequency or Duration

FROM:
"5 msec"
TO:
"5 usec"

Change -6V, PPD, P350 +B, Ret. C, Item B), Frequency or Duration

FROM:
"4 KC"
TO:
"4 MC"

Under Amplitude column of -6V, PPD, P350 +B, Ret. C, add Item E as follows:

E) 25V (On-Off)

Change +28V, Sep. Contr., P760 +T, Ret. E, Item A, Frequency or Duration

FROM:
"10 vsec"
TO:
"10 usec"

For Monitor Point 1C21A, P1499+W, Ret. Y, delete existing Amplitude and Frequency or Duration levels and substitute the following.

Amplitude	Frequency or Duration
A) +5.0V	10 usec
B) +2.0V	26 usec
C) +0.5V	200 usec
D) +400 MV	Continuously
E) -3.5V	0.1 usec

Change +28V, Low I, PIG Controller, P2101 + H, Ret. J, Items A and B, Frequency or Duration levels
FROM:
"4 msec pulse"
"3 msec pulse"
TO:
"4 usec pulse"
"3 usec pulse"

For Monitor Point +28V, Redund. Pneu., P1036 + A, Ret. B, add Frequency or or Duration levels as follows:

Amplitude	Frequency or Duration
A) +30V	10 usec
B) -12.5V	10 usec

For Monitor Point +28V, 30 x 5 Multiplex, P124 + 19, Ret. 37, add Amplitude and Frequency or Duration levels as follows:

Amplitude	Frequency or Duration
A) +25V	10 usec

88B 35. Page 4-0077, Paragraph 4.5.5.3.3 Functional Requirements.

In item C3, first line, change
FROM:
"7.5 psig max"
TO:
"75.0 psig max"

88B 36. Page B-0003, Holdtime Limitations, Electrical Power and Distribution Subsystem.

For BUSS/SEP Backup Batt., add the following to column 5:

Would take about 5 days to recycle for battery replacement (count down assumed).

CHANGE ACTIVITY LOG

Vehicle No. 988 **Addendum** 88B

Addendum & Date	Adden. Page #	Item #	Doc. Affected: Add.	Doc. Affected: 5388	Page	Paragraph	Differs From: SVS 5388	Differs From: Veh.
1966 88A 11/9	4 - 8	1		X	B-0012-B-0018	Appendix B Appendix B	X	
	9	2			4-0016	4.5.1.2.1		
	9	3			4-0028	4.5.2.2.5.4		
	9	4			4-0051	Table 4.5.4.2.4		
	9	5			4-0065	4.5.5.2.7.1		
	9	6			4-0067	4.5.5.2.7.2		
	10	7			4-0068	4.5.5.2.7.3		
	10	8			4-0109	4.5.9.2.7.5		
	10	9			4-0126	4.5.10.2.4		
	11	10			4-0151	4.6.1.4.3.11		
	11	11			5-0002	5.3.2		
	11	12			5-0007	5.5.3.3		
	11	13			5-0007	5.5.3.4		
	11	14			C-0005	Appendix C		
	12	15			C-0020	Appendix C		
	12	16			D-0015	Appendix D		
	12	17			F-0007-F-0008	Appendix F		
	13	18			F-0011	Appendix F		
1966 88B 12/28	13	19			4-0008	Table 4.3.2	X	
85B 11/23	13	20			4-0049	Table 4.5.4.2.4		
86B 12/1	13	21			4-0078	Para. 4.5.5.3.3		
88B 12/28	14	22			4-0082	" 4.5.5.4		
86C 12/21	14	23			4-0110	" 4.5.9.5		
88B 12/28	16	24			4-0146	" 4.6.1.4.3.2		
88B 12/22	16	25			4-0149	" 4.6.1.4.3.6		
88B 12/28	16	26			4-0155	" 4.6.1.4.4.1.5.[illegible]		
88B 12/28	17	27			5-0007	" 5.5.3.7		
[illegible]	17	28			5-0008	" 5.6.3	5380	87
88B 12/28	17	29			C-0004-6	Appendix C		
88B 12/28	18	30			C-0013 & 14	Appendix C		
88B 12/28	18	31			C-0031	Appendix C		
86B 12/1	18	32			C-0032	Figure C-1		

CHANGE ACTIVITY LOG (CONTINUED)

Vehicle No. 988 | Addendum 88B

Addendum & Date	Adden. Page #	Item #	CHANGE INFORMATION: Doc. Affected: Add.	Doc. Affected: 5388	Page	Paragraph	Differs From: SVS 5388	Differs From: Veh.
88B 12/28	19	33			G-0001 & 2	Appendix G		
88B 12/28	20	34			4-0127 thru 4-0130	Para. 4.5.12		
88B 12/30	22	35			4-0077	Para. 4.5.5.3.3		
88B 12/30	22	36			B-0003	Appendix B		

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Special Military Space Project
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DIN: SVS 5388, Addendum 88C
This document contains 30 pages
20 January 1967

SYSTEM ACCEPTANCE SPECIFICATION (U)

SVS 5388, ADDENDUM 88C

GENERAL ELECTRIC
SPECIAL MILITARY SPACE PROJECT
MILITARY SPACE PROGRAMS
KING OF PRUSSIA PARK
P.O. BOX 8661, PHILADELPHIA 1, PA.

SVS 5388
Addendum 88C

LIST OF EFFECTIVE PAGES

This document contains 30 pages, consisting of the following:

Title

1 through 29

SVS 5388, ADDENDUM 88C

APPROVAL PAGE

PREPARED BY:	R. A. Graytock R. Graytock Flight System Engineering	1-23-67 Date
APPROVED BY:	C. Charron C. Charron Flight System Engineering	1/23/67 Date
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APPROVED BY:	T. D. McLay T. D. McLay Systems Development Engineer	1-23-67 Date
APPROVED BY:	L. A. Binegar L. A. Binegar Military Program Office	1-23-67 Date
ISSUED BY:	C. J. Broomall Specification Control	1-23-67 Date

SVS 5388
ADDENDUM 88C

1.0 GENERAL

1.1 Scope -- This specification identifies the changes to the Basic System Acceptance Specification SVS 5388, applicable to SV 988.

2.0 APPLICABLE DOCUMENTS

SVS 5388 System Acceptance Specification

3.0 REQUIREMENTS

This specification is the same as SVS 5388, System Acceptance Specification, except as follows.

88C 1. Pages B-0012 through B-0018, Appendix B Holdtime Limitations Green and Red Line Limits.

Delete existing Red Line Limits Maximum Accumulated Hours or Cycles at Launch and substitute the following:

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
84A	BUSS	
	Auxiliary Timer	500 cycles
	Magnetometer	1600 hrs.
	VHF Receiver	1325 hrs.
	Decoder, Type V	1325 hrs.
	Decoder, Type VIII	1325 hrs.
	Decoder, Type IX (BUSS)	1325 hrs.
	Decoder, Type IX (Command)	1325 hrs.
	Electronic Flight Controller	150 hrs.
	Rate Gyro	100 hrs.
	Thrust Valve	9000 cycles
	Tank	395 cycles
	Junction Box	1900 cycles
	Differential Pressure Transducer	295 cycles
	Temperature Sensor (Tank)	295 cycles
	Junction Box (Selective Address)	1825 cycles
	Fill Solenoid Valve	1500 cycles
	Signal Conditioner	4825 hrs.
	Multiplexer (30 x 2.5)	9890 cycles
	SCO Base 8	1440 hrs.
	Pneumatic Regulator	9000 cycles
	Quick Disconnect	50 cycles
84A	TRACKING AND COMMAND	
	Verlort S-Band Beacon	500 hrs.
	Command Decoder	1885 hrs.
	Power Controller	44800 cycles
	Command Programmer	1600 hrs.
	Power Supply, 6-Volt	1600 hrs.
	Command Decoder Relay Box	97,000 cycles

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
	Latching Contactor	17,000 cycles
	Pulse Position Demodulator	9875 hrs.
	Power Sequencer	1885 hrs.
88A	TELEMETRY	
	RF Transmitter (Delta 3)	2875 hrs.
	RF Transmitter (Delta 2)	2875 hrs.
	Transmitter Transfer Switch Assembly	97,000 cycles
	Multiplexer, Dual 30 x 5	9890 hrs.
	Command Decoder Busy Sig. Monitor	1885 hrs.
	VHF Antenna	N/A
	VCO (Base 6 and 7)	1440 hrs.
	Mixer Amp. (Base 1,2,3)	1440 hrs.
	Audio Ripple Filter	18,000 hrs.
	S-Band Antenna	N/A
	Multiplexer, 30 x 2.5	9890 hrs.
86A	Multiplexer, 90 x 1/3	9890 hrs.
	SCO Base 1 (5 Unit)	1440 hrs.
	SCO Base 2 (5 Unit)	1440 hrs.
	SCO Base 3 (5 Unit)	1440 hrs.
	SCO Base 6 (7 Unit)	1440 hrs.
	Signal Data Recorder	1885 hrs.
	Recording Tape, Drive Belts and Clutch	100 hrs.
	Recorder Bearing and Motor	400 hrs.
	Component Temp. Det.	4250 hrs.
84A	SEPARATION	
	OCV Separation Spring and Guide Assembly	2 lockup of set screw on shaft
	RV OCV Sep. Spring + Guide Assembly	2 lockup of set screw on shaft
	Separation Microswitch	9000 cycles
	Auxiliary Controller	500 cycles at flight current
	Separation Controller	500 cycles at flight current
	Baroswitch	100 cycles at flight current
	Separation Fuse Box	500 cycles at flight current

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
88A	STABILIZATION ELECTRONICS	
	TARS Gimbal Assembly	
	TARS Platform (Gyros)	1325 hrs.
	TARS Platform (Torque Motors)	1325 hrs.
	Rate Gyro Package	1325 hrs.
	Control Amplifier - Roll	1325 hrs.
	Control Amplifier - Yaw, Pitch	1325 hrs.
	Roll Maneuvering Amplifier	1325 hrs.
	Power Supply DC	9325 hrs.
	TARS Electronics	1325 hrs.
	Resolver Summing Amplifier	1325 hrs.
	Compensator Electronics	2325 hrs.
	IR Sensor Scanner (Barnes)	690 hrs.
	Total Test Time (Barnes + GE)	690 hrs.
	GE Maximum Test Time	500 hrs.
	Barnes Mixer Box	690 hrs.
	Predac	2325 hrs.
	Inhibit Box	97,000 cycles
86A	Inhibit Override	97,000 cycles
88A	Redundant Pneumatic Control Box	1600 hrs.
88C	STABILIZATION PNEUMATICS	
	Low Press. Transducer (Low Press. System)	N/A
	High Press. Transducer (High Press. System)	N/A
	High-Pressure Regulator	6000 cycles
	Low-Pressure Regulator	6000 cycles
	Solenoid Valve, High Flow	2000 cycles
	Solenoid Valve, Low-Flow	2000 cycles
	Freon Tanks	95 cycles
	Pressure Switch	830 cycles
	Quick Disconnect	95 cycles
	Primary Fill Filter	45 cycles
	Pad Abort Solenoid	1200 cycles
	Secondary Fill Filter	45 cycles
	Pressure Relief Valve	600 cycles
	High Press. Transducer (Tanks)	20,000 cycles

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
	STABILIZATION PNEUMATICS (Continued)	
	N/O Squib Valves	N/A
	Temperature Detector	595 hrs.
	Nozzle-High Flow, High Pressure	N/A
	Nozzle-Low Flow, Low Pressure	N/A
	Nozzle-High Flow, Low Pressure	N/A
	Nozzle-Low Flow, High Pressure	N/A
88C	Valve, Solenoid, Balance	1200 cycles
88A	ENVIRONMENTAL CONTROL	
	Thermostat	6000 hrs.
	Compartment Heaters	8000 hrs.
	Temperature Controller (Differential)	2900 hrs.
	Temperature Sensor	4250 hrs.
	Inlet Port Assembly	N/A
	Monitor Assembly	
	Microswitch Phase A	7250 C
	Microswitch Phase A Setting	1000 C
	Position Indicator	7250 C
	Exhaust Port Assembly	N/A
	Magnetic Switch	9000 C
	Switch Resistance Measurements	1000 C
	Back-up Actuator	7250 C
	Actuator Brush and Torque Setting	500 C
	Retractable Pin Assembly	
	Flange Assembly	1000 C
	Retractable Pin	150 C
	Aft Hinge	1000 C
	Control Logic Box	10,000 C
	Thermal Fuse Module	500 C at flight current
	Fwd. Hinge Shaft Assembly	
	Retaining Pin	1000 C
	Aft Hinge Assembly	
	Bearing and Ring	1000 C
	Retaining Pin	1000 C

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
84A	ORBIT ADJUST	
	Propellant Tank Fuel Bladder Flexure	4 cycles
	Pressurant Tank No Bladder Flexure	350 cycles
	Propellant Tank Fuel No Bladder Flexure	350 cycles
	Propellant Tank Oxidizer Bladder Flexure	4 cycles
	Pressurant Tank	350 cycles
	Pneumatic Relief Valve	850 cycles
	Pneumatic Regulator	875 cycles
	Pneumatic Check Valve and Filter	875 cycles
	Press. Fill Valve, Fuel	25 cycles
	Press. Fill Valve, Oxidizer	25 cycles
	Temperature Sensor	295 cycles at max. temp. 100 hrs. at max. press.
	High-Pressure Transducer (Pressurant)	20,000 cycles
	Low-Pressure Transducer	N/A
	Quick-Disconnect Propellant Fill, Fuel (Nipple)	40 cycles
	Quick-Disconnect Propellant Fill, Oxidizer (Nipple)	40 cycles
	OCV Relay Box	3940 cycles
	Thrust Chamber Assembly (Hot Firing)	1 minute
	Pressure Fill Valve	50 cycles
	Tank, Pressure, Supply	350 cycles
	Tank Module, Oxidizer	4 cycles
	Tank Module, Fuel	4 cycles
	Burst Diaphragm, Press.	N/A
	Tube, Diaphragm (Fuel)	N/A
	Filter In Line	45 cycles
	Start Squib Valve	N/A
	Tubing and Fittings	N/A
84A	FORWARD SECTION	
	VCO and Amplifier Assembly	1490 hrs.
	Converter Controller	49,950 cycles
	Converter Translater	1495 hrs.
	Translator, 0.6 G	1498 hrs.
	Translator, 0.40 G	1496 hrs.

Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
FORWARD SECTION (Continued)	
Transmitter	995 hrs.
Transfer Module	3995 hrs.
Diode Module	470 hrs.
Arm Module	3990 hrs.
Inertial G Switch	984 cycles
Temp. Sensor, Thrust Cone	4325 hrs.
Separation Switch, Thrust Cone	995 cycles
Flashing Light Controller	1950 hrs.
Temp. Sensor, Forebody	4400 hrs.
Ejection Programmer	1980 cycles
Recovery Programmer	1965 cycles
Beacon Controller	1950 hrs.
Beacon	50 hrs.
Flashing Lights	1450 hrs.
Mechanical Timer	2495 cycles
Resistor Module	3995 cycles
Forebody (From Time of Mfg. to Projected Time of Recovery Usage)	18 mos. max.
In Flight Disconnect (SRV/Adapter)	70 cycles
84A ELECTRICAL POWER AND SIGNAL DISTRIBUTION	
Umbilical Disconnect Receptacle	185 cycles
LLCB	2200 hrs.
Relay, Stab. Cutoff	500 cycles
Relay, AGE Instrumentation	500 cycles
Voltage Step-Down Module (BUSS)	2325 hrs.
Plug, In-Flight Disconnect	70 cycles
Receptacle, In-Flight Disconnect	70 cycles
Ampere Hour Counter	2200 hrs.
Battery (Operational and Backup)	21 days wet stand

88A F 2. Page 4-0016, Paragraph 4.5.1.2.1 Operational Batteries.

Delete item I2 in its entirety.

88A HF 3. Page 4-0028, Paragraph 4.5.2.2.5.4 Vehicle Clock Time Recording.

Delete paragraph in its entirety.

88A HF 4. Page 4-0051, Table 4.5.4.2.4 Separation Function, Timing, and Required Squib Simulator Currents.

At end of table, under "Other Functions" add the following:

SV BUSS Sep. Cmd. No.	SV Primary Sep. Cmd. No.	Delta Time (Sec.)	Function	Unit	SV Primary Maximum Current (Amps)	BUSS/Sep. Backup Minimum Current (Amps)
1	N/A	N/A	Primary Gas Disable			
			High Thrust Branch	A1050(2)	N/A	3.0 each
			Low Thrust Branch	A1048(2)	N/A	3.0 each

88A HF 5. Page 4-0065, Paragraph 4.5.5.2.7.1 Functional Commands.

Under "the AGE functions shall be as follows," add item F as follows:

F. ACA Initialize

88A 6. Page 4-0067, Paragraph 4.5.5.2.7.2 Taboo Logic.

Delete item F in its entirety and substitute the following:

HF F. Orbit Adjust On. An Orbit Adjust command (engine 1 on and/or engine 2 on) shall not change the thrust level commanded state in the yaw, pitch and roll ACA's. Low Thrust or High Thrust Jet commands to the ACA during engine 1 on and/or engine 2 on shall cause the S/V to operate in the new commanded state.

88A HF 7. Page 4-0068, Paragraph 4.5.5.2.7.3 Redundant Pneumatic Requirements.

Under sentence which states "The high section (SV-2) and the low section (SV-1) commanded open, followed by a high section (SV-2) command..." delete existing item E in its entirety and substitute the following:

E. Not close the high section (SV-2) squib valve A1050.

Add item F as follows:

F. The RMA shall remain "Disable" and the pitch, yaw and roll ACA shall remain in "Low Thrust," regardless of any other vehicle commanded state, until a "High and Low Selector Valve Open" command has been executed."

Under sentence which states "The high section (SV-2) and the low section (SV-1) commanded open, followed by a low section (SV-1) command..." delete existing items D and E and substitute the following:

D. ACA high thrust on and switch from high thrust roll nozzle to low thrust redundant roll nozzles.

E. Not close the low section (SV-1) squib valve A1048.

Add item F as follows:

F. The RMA shall remain "Disable" and the pitch, yaw and roll ACA shall remain in "High Thrust," regardless of any other vehicle commanded state until a "High and Low Selector Valve Open" command has been executed.

Under sentence which states "The BUSS function (disable primary pneumatic) shall" delete items A, B and D.

Change item C to read as follows:

C. Close the high and low section by firing N/O squib valves A1050 and A1048.

88A 8. Page 4-0109, Paragraph 4.5.9.2.7.5 Actuator Limitation.

In left margin, preceding "HF," add "88A."

88A 9. Page 4-0126, Paragraph 4.5.10.2.4 BUSS SV Interface Requirements.

In item 12A change

FROM:
"...command shall..."
TO:
"...command 1 shall..."

88A 10. Page 4-0151, Paragraph 4.6.1.4.3.11 SRV.

In left margin next to paragraph heading change:

FROM:
"80A"
TO:
"88A"

88A 11. Page 5-0002, Paragraph 5.3.2 Thermal Stabilization

At bottom of page change:

FROM:
"STA 305 Bulkhead Temperatures"
TO:
"STA 209 Bulkhead Temperatures"

88A 12. Page 5-0007, Paragraph 5.5.3.3 Stabilization Tanks.

Delete paragraph in its entirety and substitute the following:

The stabilization tanks shall contain 252 $\pm$ 1 pounds of Freon 14 gas meeting the requirements of GE-SMSP Dwg. 255E952D, Propellant Loading Piping Interface, at a maximum static pressure of 4800 psig. The pressure shall not exceed 3600 psig when personnel are in the area. Refer to Figure D1 of Appendix D.

88A 13. Page 5-0007, Paragraph 5.5.3.4 Stabilization Gas Tank Heating.

In last line of paragraph change:

FROM:
"4775 PSIG"
TO:
"4800 PSIG"

88A 14. Page C-0005, Appendix C SV Telemetry Channel Assignment Summary.

Change IRIG Channel 15 Link 2 (RT) pulses 19, 20 and 21 to read as follows:

Pulse	Telemetry Measurement	Limits
19	Low Thrust Supply Press. Gas Tank at 38 deg., Sta. 217	Comp. Cal. Curve
20	Cold Gas Press. Switch Low Thrust	
	Greater than 1000 Psia	23-43
	Between 750 and 1000 Psia	54-74
	Less than 750 Psia	90-100
21	High Thrust Supply Press. Gas Tank at 321 deg., Sta. 217	Comp. Cal. Curve

88A 15. Page C-0020, Appendix C SV Telemetry Channel Assignment Summary.

Change Continuous Channels Link 2 (RT)/Link 3 (PB) pulse 6 as follows:

Channels	Frequency	Function	Limits
6	1.7 KC	Command Dec/Prog Busy Signal	
		Quiescent	45 to 64
		POA	-8 to +8
		POA/CD Busy	9 to 26
		POA/PROG Busy	27 to 44
		CD Busy	65 to 84
		PROG Busy	85 to 0. B. H.

88A 16. Page D-0015, SV Launch + Hold/Abort Criteria.

Add line 81 to Group II Measurements as follows:

Line No.	Measurements	Link/ Channel/Pulse	Launch Limits Low	High	Remarks
81	Press. Switch (Cold Gas)	2/15/20	23	43	-

88A 17. Pages F-0007 and F-0008, Appendix F Command Allocations.

Change Stored Command, DSPC No. 5, word 1, bits 30, 35, and word 2, bits 9, 10, 11, 13, 14, 16, 17 and 34 to read as follows:

Cmd. Type	Word	Bit Number	Function	States 1/0	Abbrev.	States 1/0
DSPC	1	30	Spare			
No. 5	1	35	Spare			
	2	9	GFE 1-C17	On/Norm	FA	
	2	10	GFE 1-C18	On/Norm	RA	
	2	11	Computer Prearm	On/Norm	CPR	
	2	13	OCV/Agena	Sep/Norm	OVS	
	2	14	Disconnect 2	On/Norm	DS2	
	2	17	Spare			
	2	34	Spare			

88A 18. Page F-0011, Paragraph B. Real Time Command List

In Command Allocations, change Command Descriptor of RTC 11, 12 and 16 to read as follows:

Cmd. No.	Command Descriptor
RTC	
11	High Selector Valve Closed
12	Low Selector Valve Closed
16	High and Low Selector Valves Open

88B 19. Page 4-0008, Table 4.3.2. Weight and Balance Requirements.

Change weight of SV at Launch

FROM:
"LT4934**"
TO:
"LT4988**"

85B 20. Page 4-0049, Table 4.5.4.2.4 Separation Function, Timing, and Required Squib Simulator Currents.

For Unit A1811 change

	SV Primary Minimum Current (Amps)	BUSS/Sep. Backup Minimum Current (Amps)
FROM:	7.7	7.0
TO:	7.1	6.3

86B 21. Page 4-0078, Paragraph 4.5.5.3.3 Functional Requirements.

Add items H and I as follows:

F H. Solenoid Valve Operating Time Requirements - Solenoid thrust valve maximum opening and closing response time shall meet the following requirements:

Type of Valve	Opening Response Time	Closing Response Time
High Flow	0.030 sec.	0.020 sec.
Low Flow (Low Roll Valves Only)	0.020 sec.	0.010 sec.

H H. Solenoid Valve Operating Time Requirements - Solenoid thrust valves maximum opening response time shall meet the following requirements:

Type of Valve	Opening Response Time
High Flow	0.030 sec.
Low Flow (Low Roll Valves Only)	0.020 sec.

F I. The capability of all primary subsystem thrust valves to exhaust gas upon command shall be verified during the final SV confidence test prior to Agena Mating.

88B 22. Page 4-0082, Paragraph 4.5.5.4 Stabilization Subsystem Operational Requirements.

Add item E as follows:

HF E. To prevent damage to the solenoid valves, a test "Flow Restrictor" or flight nozzle shall be used on each thrust valve whenever the thrust valves are required to port gas. The test "Flow Restrictor" when installed on the vehicle shall be torqued 90 to 120 inch-pounds.

86C 23. Page 4-0110, Add Paragraph 4.5.9.5, Outer Shield Requirements, through paragraph 4.5.9.5.5 as follows:

86C HF 4.5.9.5 Outer Shield Requirements

85B HF 4.5.9.5.1 Cleanliness and Lubrication Requirement

A. Cleanliness requirement - Prior to final installation the outer shield lugs, structure lugs, latch pin, bell crank, bell crank to coupler pin, coupler and bell crank bracket shall be cleaned and inspected to ensure that foreign materials such as dirt, chips, brush hairs, etc. are not present.

B. Lubrication requirement - After cleaning, the bearing surfaces of the outer shield lugs, structure lugs, latch pin, bell crank, bell crank to coupler pin, coupler, and bell crank bracket shall be lightly lubricated with silicone grease (171A8231) per Drawing 238R872.

86C HF 4.5.9.5.2 Manual Unlatch Requirement

The total mechanically mated SV (flight configuration) shall meet the following requirements:

HF A. Outer shield release mechanism configuration

1. The shear pin shall not be installed.

2. The explosive pistons may or may not be installed.

3. The outer shield spring shall be in the flight configuration.

HF B. The outer shield shall be manually unlatched a minimum of three (3) times. Each time the force required to disengage the latch pin from the outer shield shall be applied at the Pyro end of the bell crank and shall be 100 pounds minimum and 200 pounds maximum.

F C. The above requirement shall be met just prior to outer shield flight installation.

85B F 4.5.9.5.3 Partial Unlatch Requirement

Prior to outer shield shear pin installation, the total mechanically mated SV (flight configuration) shall meet the following requirements when the outer shield has been installed for flight.

1. The bell crank shall be moved 0.10 $\pm$0.03 inches.

2. The forces required to move the latch pin shall be applied at the pyro end of the bell crank and shall be 100 pounds minimum, 200 pounds maximum.

86C HF 4.5.9.5.4 Outer Shield General Requirements

HF A. The following requirements shall be met in accordance with installation drawing 238R872:

HF 1. With the bell crank positioned in the flight configuration (touching the pyro, see item B), the latch pin shall be engaged 0.25 inches nominal, 0.20 inches minimum.

HF 2. With lead face of bell crank in contact with face of bell crank bracket, all lugs of latch pin shall be fully contained within lugs of structure half of latch and shall have 0.025 inches minimum remaining travel at all lug locations before re-engagement. Clearance between coupler and structure shall be 0.12 minimum measured in the direction of latch pin motion.

HF 3. With arrestor face in contact with the face of structure latch lug, all lugs of latch pin shall be fully contained within lugs of structure half of latch. A minimum of one lug shall be flush to 0.005 inches less than flush with forward face of structure half of latch. Maximum distance from power piston to bell crank shall be 0.50 inches. Minimum latch pin travel from this position to point where lead face of bell crank contacts face of bell crank bracket shall be 0.145 inches.

F B. The outer shield shall be installed per installation drawing 238R872. With the bell crank positioned in the flight configuration and the shear pin installed, maximum gap between the pyro pistons and the bell crank shall be 0.005 inches for one of the pistons and 0.010 inches for the other piston.

88B 24. Page 4-0146, Paragraph 4.6.1.4.3.2 Separation Subsystem.

Delete existing text under this heading and substitute the following:

The validation harness shall be installed in the vehicle. The baroswitch operation shall be simulated. All continuity loops shall be complete. All pyro-electrical functions shall be verified. Pyro simulators shall be used to simulate all non-reversible pyro functions. When it is necessary to provide a pyro operated piston mechanical function, live pyro may be used to verify the electrical function. The separation subsystem operation shall include, but not be limited to, the following separation functions:

1. All separation functions via primary command.

2. BUSS separation command sequence.

88B 25. Page 4-0149, Paragraph 4.6.1.4.3.6 Environmental Control Requirements.

Delete first sentence on page, which reads "The thermal dissipation of the operational batteries shall be simulated."

88B 26. Page 4-0155, Paragraph 4.6.1.4.4.1.5.2 Chamber Pump Down or Pump Up Requirements.

Add item 6 under B as follows:

6. The system thermal vacuum operational assurance test may start when zone 35 is less than -55 deg. F.

88C 27. Page 5-0007, Add new Paragraph 5.5.3.7 High Thrust Roll Nozzles as follows:

5.5.3.7 High Thrust Roll Nozzles
The roll high thrust test "Flow Restrictor" shall be removed and the flight roll high thrust nozzles shall be installed per the drawing located on the Fairing Access Door. Polarity of the high thrust nozzles shall be verified after installation of flight nozzles.

88B 28. Page 5-0008, Paragraph 5.6.3 Electrical Power and Distribution Subsystem Requirements.

Add item E as follows:

E. The load sharing of any battery as monitored by T/M shall not decrease by more than 40% from the time of batteries installation until launch as shown by the following:

$$\frac{\%\text{ load at installation} - \%\text{ load at any time}}{\%\text{ load at installation}} = \text{less than } 40\%$$

The above requirement is applicable only when the bus voltage is above 30 volts, all batteries are at approximately the same state of discharge, the variation in age of the batteries does not exceed three months and the change in load does not exceed 50% at the time of measuring the change in load sharing.

88B 29. Pages C-0004, C-0005 and C-0006, Appendix C SV Telemetry Channel Assignment Summary

Change IRIG Channel 15 Link 2 (RT) pulses 1, 3, 17, 18 and 22 to read as follows:

Pulse	Telemetry Measurement	Limits: Test Primary	Limits: Test BUSS	Limits: Flight (Info Only)
1	H-30 Continuity and Sep. Events			
	No Event	18-28	18-28	18-28
	Event = 1 - Disc 1	69-79	69-79	69-79
	Event = 2 - Disc 2	18-28	18-28	69-79
	Event = 3 - Arm	0 + -5	0 + -5	50-60
	Event = 4 - Pin Puller	N/A	N/A	0 + -5
3	Spare			0-10
17	Temp., Low Thrust Cold Gas Tank at 38 Deg. (Sta. 217) at 70 Deg. F.			33-43

Pulse	Telemetry Measurement	Limits
18	Temp., High Thrust Cold Gas Tank at 321 Deg. (Sta. 217) at 70 Deg. F.	33-43
22	High/Low Section Open Balance Off	-5 +5
	High/Low Section Open Balance On	5-15
	High Section Closed Balance Off	15-25
	Low Section Closed Balance Off	30-40
	High Section Closed Balance On	25-35
	Low Section Closed Balance On	35-45
	High/Low Section Open Commanded	35-45
	High/Low Section Closed	45-55
	High Section Closed Commanded	55-65
	High/Low Section Closed Commanded	85-100

88B 30. Page C-0013 and C-0014, Appendix C SV Telemetry Channel Assignment Summary.

Change IRIG Channel 10 Link 2 (RT)/Link 3 (PB) pulses 14 through 22 inclusive.

	Telemetry Measurement	Limits
FROM:	5V Bus	95-105
TO:	Spare	0-10

88B 31. Page C-0031, Appendix C SV Telemetry Channel Assignment Summary.

Change Continuous Channels Link 4 Channel 10 Unsecure Modes to read as follows:

Channel	Frequency	Function	Limits
10	5.4 KC	BUSS Mode and Event Monitor	
		Unsecure Modes	
		Reset	32-52
		Mode 1 (BRT)	67-77
		Mode 2 (BNS)	77-87
		Mode 3 (BNO)	87-OBH
		Mode 5 (BRTNG)	57-67

86B 32. Page C-0032, Figure C-1, SV Telemetry Subsystem, Block Diagram.

Change caption on multiplexer providing input to Band 10-5.4 KC, SCO Base 1.

FROM:
"90 x 1/18 Multiplexer"
TO:
"90 x 1/3 Multiplexer"

88B 33. Page G-0001 and G-0002, Appendix G. Canister Zone Temperatures for the +1.7 Sigma and -1.7 Sigma.

Change Hot Case and Cold Case Canister Zone Temperatures for Zones 1 through 43 to read as follows:

Section	Zone	Hot Case Temp. (Deg. F)	Cold Case Temp. (Deg. F)
RV	1	82	53
	2	56	-27
	3	120	29
	4	134	-48
Adapter	5	30	0
	6	63	-19
	7	43	14
	8	49	-22
	9	119	-40
	10	76	-109
	11	66	36
	12	45	-25
5	13	71	29
	14	122	16
	15	89	12
	16	57	-15
	16A	57	-15
	17	112	-2
	18	131	-109
	19	29	-44
	20	106	59

Section	Zone	Hot Case Temp. (Deg. F)	Cold Case Temp. (Deg. F)
	21	124	4
	22	145	7
6	23	128	-7
	24	81	-18
	25	62	-9
	26	136	-33
	27	99	-115
	28	60	-164
	29	-64	-87
	30	29	-44
	31	-5	-66
	32	110	25
	33	110	25
	34	100	30
	43	3	-207
7	35	-59	-110
	36	-86	-110
	37	-33	-51
	38	12	9
	39	-13	-29
	40	-22	-110
	41	Off	Off
	42	Off	Off

88B 34. Page 4-0127, Paragraph 4.5.12 SV Systems E.M.I. Test requirements. Change the following four Monitor Point Maximum Allowable Levels to read as follows.

Monitor Point	Maximum Allowable Level Amplitude	Freq. or Duration
+6V Switches, Command Decoder P375 + J, Ret. P	A) +1.8V (Stby-Pwr. On) -1.15V (Stby-Pwr. On) B) +1.25V (Store Cmd. Cmding) -1.0V (Store Cmd. Cmding) C) +1.4V (On-Off) -1.5V (On-Off)	

Monitor Point	Maximum Allowable Level Amplitude	Freq. or Duration
	D) 1.3V P/P (Store Cmd. Cmding)	30 cps - 15 kcs
	E) 0.75V P/P (Store Cmd. Cmding)	15 kcs - 100 kcs
	F) 0.75V P/P (RTC Cmding)	15 kcs - 100 kcs
	G) 0.75V P/P (Stby-Pwr. On)	15 kcs - 100 kcs
-6V Switches, Command Decoder P375 +K, Ret. P	A) +2.75 (Stby-Pwr. On)	
	B) +2.75V (On-Off)	
	C) +2.75 (Store Cmd. Cmding)	
	D) -2.75V (On-Off)	
	E) -2.75V (Store Cmd. Cmding)	
	F) 3.0V P/P (All Modes)	Audio
+6V Continuous, Command Decoder, P375 +S, Ret. P	A) +1.4V (Stby-Pwr. On)	
	B) +0.85V (On-Off)	
	C) +0.85V (RTC Cmding)	
	D) +1.85V (Store Cmd. Cmding)	
	E) -1.4V (Stby-Pwr. On)	
	F) -1.4V (Store Cmd. Cmding)	
	G) -1.3V (On-Off)	
	H) -1.3V (RTC Cmding)	
	I) 1.25V P/P (Stby-Pwr. On)	Audio
-6V Continuous Command Decoder P375 +T, Ret. P	A) +1.75V (On-Off)	
	B) -1.75V (On-Off)	
	C) +1.35V (Store Cmd. Cmding)	
	D) -1.3V (Store Cmd Cmding)	

Change +28V, Cmd Prog, P367 + M Ret. K, Item B), Frequency or Duration

FROM:
"10 msec"
TO:
"10 usec"

Change Clock Hold, Command Programmer P367 +BB, Ret. K, Items A and B, Frequency or Duration

FROM:
"5 msec"
TO:
"5 usec"

Change -6V, PPD, P350 +B, Ret. C, Item B), Frequency or Duration

FROM:
"4 KC"
TO:
"4 MC"

Under Amplitude Column of -6V, PPD, 2350 +B, Ret. C, add Item E as follows:

E) 25V (On-Off)

Change +28V, Sep. Contr., P760 +T, Ret. E, Item A, Frequency or Duration

FROM:
"10 vsec"
TO:
"10 usec"

For Monitor Point 1C21A, P1499+W, Ret. Y, delete existing Amplitude and Frequency or Duration levels and substitute the following.

Amplitude	Frequency or Duration
A) +5.0V	10 usec
B) +2.0V	26 usec
C) +0.5V	200 usec
D) +400 MV	Continuously
E) -3.5V	0.1 usec

Change +28V, Low I, PIG Controller, P2101 + H, Ret. J, Items A and B, Frequency or Duration levels

FROM:
"4 msec pulse"
"3 msec pulse"

TO:
"4 usec pulse"
"3 usec pulse"

For Monitor Point +28V, Redund. Pneu., P1036 + A, Ret. B, add Frequency or Duration levels as follows:

Amplitude	Frequency or Duration
A) +30V	10 usec
B) -12.5V	10 usec

For Monitor Point +28V, 30 x 5 Multiplex, P124 + 19, Ret. 37, add Amplitude and Frequency or Duration levels as follows:

Amplitude	Frequency or Duration
A) +25V	10 usec

88B 35. Page 4-0077, Paragraph 4.5.5.3.3 Functional Requirements.

In item C3, first line, change

FROM:
"7.5 psig max"
TO:
"75.0 psig max"

88B 36. Page B-0003, Holdtime Limitations, Electrical Power and Distribution Subsystem.

For BUSS/SEP Backup Batt., add the following to column 5:

Would take about 5 days to recycle for battery replacement (count down assumed).

88C 37. Page 4-0075 Paragraph 4.5.5.3.2 Leakage Requirements

Add to item C

HF		Section	Test Pressure	Leakage Limit
	5.	Balance Valves, when deenergized	500 ±25 in each supply tank	Maximum Total leakage through both balance valves - 200 scc/hr.

88C 38. Page 4-0138 Paragraph 4.6.1.2.1 MAB Mission Profile

Change item 3

FROM:

3. Operation of all one-shot pyro-actuated devices except for RV recovery events, shall be verified by the use of simulators.

TO:

3. Operation of all one-shot pyro-actuated devices shall be verified by the use of simulators.

88C 39. Page 4-0100 Table 4.5.8.3.13-1 Circuit Resistance

Change items 16 and 17

FROM:

Function	Interface	Resistance (OHMS)	
16. Piston No. 1	A1728/29 1576	0.9	1.1
17. Piston No. 2	A1730/31 1576	0.9	1.1

TO:

Function	Interface	Resistance (OHMS)	
16. Piston No. 1	A1728/29 1588	0.45	0.58
16A Piston No. 1	A1730/31 1588	0.45	0.58
17. Piston No. 2	A1728/29 1588	0.45	0.58
17A Piston No. 2	A1730/31 1588	0.45	0.58

88C 40. Page 4-0078 Paragraph 4.5.5.3.3 Functional Requirements

Add item J as follows:

H The thrust nozzle shall meet the following flow requirements after system thermal vacuum:

	CF_4 Flow (SCFM)/per nozzle
High Roll	23 ±2.3
High Pitch	42.3 ±4
High Yaw	42.3 ±4
Low Roll	1.1 ±0.1
Low Pitch	6.5 ±0.6
Low Yaw	6.5 ±0.6
Low Redundant Roll	0.8 ±0.1

Nitrogen Flow = 1.83 Freon (CF_4) Flow

CHANGE ACTIVITY LOG

Vehicle No. 988 **Addendum** 88C

Addendum & Date	Adden. Page #	Item #	CHANGE INFORMATION					
			Doc. Affected				Differs From	
			Add.	5388	Page	Paragraph	SVS 5388	Veh.
90 1/6/67	4 - 8	1	X	X	B-0012-	Appendix B	X	89
					B-0018	Appendix B		
	9	2		X	4-0016	4.5.1.2.1		
	9	3			4-0028	4.5.2.2.5.4		
90 1/6/67	9	4	X		4-0051	Table 4.5.4.2.4		89
	9	5			4-0065	4.5.5.2.7.1		
	9	6			4-0067	4.5.5.2.7.2		
90 1/6/67	10	7	X		4-0068	4.5.5.2.7.3		89
	10	8			4-0109	4.5.9.2.7.5		
	10	9			4-0126	4.5.10.2.4		
	11	10			4-0151	4.6.1.4.3.11		
	11	11			5-0002	5.3.2		
	11	12			5-0007	5.5.3.3		
	11	13			5-0007	5.5.3.4		
	11	14			C-0005	Appendix C		
	12	15			C-0020	Appendix C		
	12	16			D-0015	Appendix D		
	12	17			F-0007- F-0008	Appendix F		
	13	18			F-0011	Appendix F		
1966								
88B 12/28	13	19			4-0008	Table 4.3.2	X	
85B 11/23	13	20			4-0049	Table 4.5.4.2.4		
86B 12/1	13	21			4-0078	Para. 4.5.5.3.3		
88B 12/28	14	22			4-0082	" 4.5.5.4		
86C 12/21	14	23			4-0110	" 4.5.9.5		
88B 12/28	16	24			4-0146	" 4.6.1.4.3.2		
88B 12/22	16	25			4-0149	" 4.6.1.4.3.6		
88B 12/28	16	26			4-0155	" 4.6.1.4.4.1.5.2		
88B 12/28	17	27			5-0007	" 5.5.3.7		
88B 12/30	17	28			5-0008	" 5.6.3	5380	87
88B 12/28	17	29			C-0004-5	Appendix C		
88B 12/28	18	30			C-0013 & 14	Appendix C		
88B 12/28	18	31			C-0031	Appendix C		
86B 12/1	18	32			C-0032	Figure C-1		

CHANGE ACTIVITY LOG (CONTINUED)

Vehicle No. 988 Addendum 88C

Addendum & Date	Adden. Page #	Item #	CHANGE INFORMATION					
			Doc. Affected				Differs From	
			Add.	5388	Page	Paragraph	SVS 5388	Veh.
88B 12/28	19	33			G-0001 & 2	Appendix G		
88B 12/28	20	34			4-0127 thru 4-0130	Para. 4.5.12		
88B 12/30	22	35			4-0077	Para. 4.5.5.3.3		
88B 12/30	22	36			B-0003	Appendix B		
88C 1/20/67	22	37		X	4-0075	Para. 4.5.5.3.2	X	87
88C 1/20	23	38		X	4-0138	Para. 4.6.1.2.1	X	87
88C 1/20	23	39		X	4-0100	Table 4.5.8.3.13-1	X	87
88C 1/20	23	40		X	4-0078	Para. 4.5.5.3.3	X	87

GENERAL ELECTRIC COMPANY
Missile & Space Division
Special Military Space Project
P. O. Box 8661
Philadelphia, Pennsylvania 19101

DIN: SVS 5388, Addendum 88D
This document contains 33 pages
21 February 1967

SYSTEM ACCEPTANCE SPECIFICATION (U)

SVS 5388, ADDENDUM 88D

GENERAL ELECTRIC
SPECIAL MILITARY SPACE PROJECT
MILITARY SPACE PROGRAMS
KING OF PRUSSIA PARK
P.O. BOX 8661, PHILADELPHIA 1, PA.

SVS 5388
Addendum 88D

LIST OF EFFECTIVE PAGES

This document contains 33 pages, consisting of the following:

Title

1 through 32

SVS 5388, ADDENDUM 88D

APPROVAL PAGE

PREPARED BY: R. A. Graytock — Date: 2-22-...
R. Graytock
Flight System Engineering

APPROVED BY: ... — Date: 2/22/67
C. Charron
Flight System Engineering

APPROVED BY: ... — Date: 2/22/67
P. M. Connaught
Systems Engineer

APPROVED BY: T. D. McLay — Date: 2/22/67
T. D. McLay
Systems Development Engineer

APPROVED BY: ... — Date: ...
D. A. Binegar
Military Program Office

ISSUED BY: Charles J. Broomall — Date: 2/22/67
Specification Control

SVS 5388
ADDENDUM 88D

1.0 GENERAL

1.1 Scope - This specification identifies the changes to the Basic System Acceptance Specification SVS 5388, applicable to SV 988.

2.0 APPLICABLE DOCUMENTS

SVS 5388 System Acceptance Specification

3.0 REQUIREMENTS

This specification is the same as SVS 5388, System Acceptance Specification, except as follows.

88D 1. Pages B-0012 through B-0018, Appendix B Holdtime Limitations Green and Red Line Limits.

Delete existing Red Line Limits Maximum Accumulated Hours or Cycles at Launch and substitute the following:

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
84A	BUSS	
	Auxiliary Timer	500 cycles
	Magnetometer	1600 hrs.
	VHF Receiver	1325 hrs.
	Decoder, Type V	1325 hrs.
	Decoder, Type VIII	1325 hrs.
	Decoder, Type IX (BUSS)	1325 hrs.
	Decoder, Type IX (Command)	1325 hrs.
	Electronic Flight Controller	150 hrs.
	Rate Gyro	100 hrs.
	Thrust Valve	9000 cycles
	Tank	395 cycles
	Junction Box	1900 cycles
	Differential Pressure Transducer	295 cycles
	Temperature Sensor (Tank)	295 cycles
	Junction Box (Selective Address)	1825 cycles
	Fill Solenoid Valve	1500 cycles
	Signal Conditioner	4825 hrs.
	Multiplexer (30 x 2.5)	9890 cycles
	SCO Base 8	1440 hrs.
	Pneumatic Regulator	9000 cycles
	Quick Disconnect	50 cycles
84A	TRACKING AND COMMAND	
	Verlort S-Band Beacon	500 hrs.
	Command Decoder	1885 hrs.
	Power Controller	44800 cycles
	Command Programmer	1600 hrs.
	Power Supply, 6-Volt	1600 hrs.

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
84A	TRACKING AND COMMAND (Continued)	
	Command Decoder Relay Box	97,000 cycles
	Latching Contactor	17,000 cycles
	Pulse Position Demodulator	9875 hrs.
	Power Sequencer	1885 hrs.
88A	TELEMETRY	
	RF Transmitter (Delta 3)	2875 hrs.
	RF Transmitter (Delta 2)	2875 hrs.
	Transmitter Transfer Switch Assembly	97,000 cycles
	Multiplexer, Dual 30 x 5	9890 hrs.
	Command Decoder Busy Sig. Monitor	1885 hrs.
	VHF Antenna	N/A
	VCO (Base 6 and 7)	1440 hrs.
	Mixer Amp. (Base 1,2,3)	1440 hrs.
	Audio Ripple Filter	18,000 hrs
	S-Band Antenna	N/A
	Multiplexer, 30 x 2.5	9890 hrs.
86A	Multiplexer, 90 x 1/3	9890 hrs.
	SCO Base 1 (5 Unit)	1440 hrs.
	SCO Base 2 (5 Unit)	1440 hrs.
	SCO Base 3 (5 Unit)	1440 hrs.
	SCO Base 6 (7 Unit)	1440 hrs.
	Signal Data Recorder	1885 hrs.
	Recording Tape, Drive Belts and Clutch	100 hrs.
	Recorder Bearing and Motor	400 hrs.
	Component Temp. Det.	4250 hrs.
84A	SEPARATION	
	OCV Separation Spring and Guide Assy	2 lockup of set screw on shaft
	RV OCV Sep. Spring + Guide Assembly	2 lockup of set screw on shaft
	Separation Microswitch	9000 cycles
	Auxiliary Controller	500 cycles at flight current
	Separation Controller	500 cycles at flight current
	Baroswitch	100 cycles at flight current
	Separation Fuse Box	500 cycles at flight current

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
88A	STABILIZATION ELECTRONICS	
	TARS Gimbal Assembly	
	TARS Platform (Gyros)	1325 hrs.
	TARS Platform (Torque Motors)	1325 hrs.
	Rate Gyro Package	1325 hrs.
	Control Amplifier - Roll	1325 hrs.
	Control Amplifier - Yaw, Pitch	1325 hrs.
	Roll Maneuvering Amplifier	1325 hrs.
	Power Supply DC	9325 hrs.
	TARS Electronics	1325 hrs.
	Resolver Summing Amplifier	1325 hrs.
	Compensator Electronics	2325 hrs.
	IR Sensor Scanner (Barnes)	690 hrs.
	Total Test Time (Barnes + G. E.)	690 hrs.
	GE Maximum Test Time	500 hrs.
	Barnes Mixer Box	690 hrs.
	Predac	2325 hrs.
	Inhibit Box	97,000 cycles
86A	Inhibit Override	97,000 cycles
88A	Redundant Pneumatic Control Box	1600 hrs.
88D	STABILIZATION PNEUMATICS	
	Low Press. Transducer (Low Press. System)	N/A
	High Press. Transducer (High Press. System)	N/A
88D	High-Pressure Regulator	20,000 cycles
88D	Low-Pressure Regulator	20,000 cycles
88D	Solenoid Valve	
	Low Yaw	3,750 cycles
	Low Pitch	6,850 cycles
	Low Roll	9,000 cycles
	Redundant Low Roll	9,000 cycles
	High Pitch	8,700 cycles
	High Yaw	8,700 cycles
	High Roll	10,418 cycles

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
88D	STABILIZATION PNEUMATICS (Continued)	
	Freon Tanks	95 cycles
	Pressure Switch	830 cycles
	Quick Disconnect	95 cycles
	Primary Fill Filter	45 cycles
	Pad Abort Solenoid	1,200 cycles
	Secondary Fill Filter	45 cycles
	Pressure Relief Valve	600 cycles
	High Press. Transducer (Tanks)	20,000 cycles
	N/O Squib Valves	N/A
	Temperature Detector	595 hrs.
	Nozzle-High Flow, High Pressure	N/A
	Nozzle-Low Flow, Low Pressure	N/A
	Nozzle-High Flow, Low Pressure	N/A
	Nozzle-Low Flow, High Pressure	N/A
88C	Valve, Solenoid, Balance	1,200 cycles
88A	ENVIRONMENTAL CONTROL	
	Thermostat	6,000 hrs.
	Compartment Heaters	8,000 hrs.
	Temperature Controller (Differential)	2,900 hrs.
	Temperature Sensor	4,250 hrs.
	Inlet Port Assembly	N/A
	Monitor Assembly	
	Microswitch Phase A	7,250 C
	Microswitch Phase A Setting	1,000 C
	Position Indicator	7,250 C
	Exhaust Port Assembly	N/A
	Magnetic Switch	9,000 C
	Switch Resistance Measurements	1,000 C
	Actuator, Primary and Back-up	7,250 C
	Actuator, Brush & Torque Setting	500 C
	Retractable Pin Assembly	
	Flange Assembly	1,000 C
	Retractable Pin	150 C
	Aft Hinge	1,000 C

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
88A	ENVIRONMENTAL CONTROL (Continued)	
	Control Logic Box	10,000 C
	Thermal Fuse Module	500 C at flight current
	Fwd. Hinge Shaft Assembly	
	Retaining Pin	1,000 C
	Aft Hinge Assembly	
	Bearing and Ring	1,000 C
	Retaining Pin	1,000 C
84A	ORBIT ADJUST	
	Propellant Tank Fuel Bladder Flexure	4 cycles
	Pressurant Tank No Bladder Flexure	350 cycles
	Propellant Tank Fuel No Bladder Flexure	350 cycles
	Propellant Tank Oxidizer Bladder Flexure	4 cycles
	Pressurant Tank	350 cycles
	Pneumatic Relief Valve	850 cycles
	Pneumatic Regulator	875 cycles
	Pneumatic Check Valve and Filter	875 cycles
	Press. Fill Valve, Fuel	25 cycles
	Press. Fill Valve, Oxidizer	25 cycles
	Temperature Sensor	295 cycles at max. temp. 100 hrs. at max. press.
	High-Pressure Transducer (Pressurant)	20,000 cycles
	Low-Pressure Transducer	N/A
	Quick-Disconnect Propellant Fill, Fuel (Nipple)	40 cycles
	Quick-Disconnect Propellant Fill, Oxidizer (Nipple)	40 cycles
	OCV Relay Box	3,940 cycles
	Thrust Chamber Assembly (Hot Firing)	1 minute
	Pressure Fill Valve	50 cycles
	Tank, Pressure, Supply	350 cycles
	Tank Module, Oxidizer	4 cycles
	Tank Module, Fuel	4 cycles

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
84A	ORBIT ADJUST (Continued)	
	Burst Diaphragm, Press.	N/A
	Tube, Diaphragm (Fuel)	N/A
	Filter In Line	45 cycles
	Start Squib Valve	N/A
	Tubing and Fittings	N/A
84A	FORWARD SECTION	
	VCO and Amplifier Assembly	1490 hrs.
	Converter Controller	49,950 cycles
	Converter Translater	1495 hrs.
	Translator, 0.6 G	1498 hrs.
	Translator, 0.40 G	1496 hrs.
	Transmitter	995 hrs.
	Transfer Module	3995 hrs.
	Diode Module	470 hrs.
	Arm Module	3990 hrs.
	Inertial G Switch	984 cycles
	Temp. Sensor, Thrust Cone	4325 hrs.
	Separation Switch, Thrust Cone	995 cycles
	Flashing Light Controller	1950 hrs.
	Temp. Sensor, Forebody	4400 hrs.
	Ejection Programmer	1980 cycles
	Recovery Programmer	1965 cycles
	Beacon Controller	1950 hrs.
	Beacon	50 hrs.
	Flashing Lights	1450 hrs.
	Mechanical Timer	2495 cycles
	Resistor Module	3995 cycles
	Forebody (From Time of Mfg. to Projected Time of Recovery Usage)	18 mos. max.
	In Flight Disconnect (SRV/Adapter)	70 cycles

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
84A	ELECTRICAL POWER AND SIGNAL DISTRIBUTION	
	Umbilical Disconnect Receptacle	185 cycles
	LLCB	2200 hrs.
	Relay, Stab. Cutoff	500 cycles
	Relay, AGE Instrumentation	500 cycles
	Voltage Step-Down Module (BUSS)	2325 hrs.
	Plug, In-Flight Disconnect	70 cycles
	Receptacle, In-Flight Disconnect	70 cycles
	Ampere Hour Counter	2200 hrs.
	Battery (Operational and Backup)	21 days wet stand

88A F 2. Page 4-0016, Paragraph 4.5.1.2.1 Operational Batteries.

Delete item 12 in its entirety.

88A HF 3. Page 4-0028, Paragraph 4.5.2.2.5.4 Vehicle Clock Time Recording.

Delete paragraph in its entirety.

88A HF 4. Page 4-0051, Table 4.5.4.2.4 Separation Function, Timing, and Required Squib Simulator Currents.

At end of table, under "Other Functions" add the following:

SV BUSS Sep. Cmd. No.	SV Primary Sep. Cmd. No.	Delta Time (Sec.)	Function	Unit	SV Primary Maximum Current (Amps)	BUSS/Sep. Backup Minimum Current (Amps)
			Primary Gas Disable			
			High Thrust Branch	A1050(2)	N/A	3.0 each
			Low Thrust Branch	A1048(2)	N/A	3.0 each

88A HF 5. Page 4-0065, Paragraph 4.5.5.2.7.1 Functional Commands.

Under "the AGE functions shall be as follows", add item F as follows:

F. ACA Initialize

88A 6. Page 4-0067, Paragraph 4.5.5.2.7.2 Taboo Logic

Delete item F in its entirety and substitute the following:

HF F. Orbit Adjust on. An Orbit Adjust command (engine 1 on and/or engine 2 on) shall not change the thrust level commanded state in the yaw, pitch and roll ACA's. Low Thrust or High Thrust Jet commands to the ACA during engine 1 on and/or engine 2 on shall cause the S/V to operate in the new commanded state.

88A HF 7. Page 4-0068, Paragraph 4.5.5.2.7.3 Redundant Pneumatic Requirements.

Under sentence which states "The high section (SV-2) and the low section (SV-1) commanded open, followed by a high section (SV-2) command...." delete existing item E in its entirety and substitute the following:

E. Not close the high section (SV-2) squib valve A1050.

Add item F as follows:

F. The RMA shall remain "Disable" and the pitch, yaw and roll ACA shall remain in "Low Thrust", regardless of any other vehicle commanded state, until a "High and Low Selector Valve Open" command has been executed.

Under sentence which states "The high section (SV-2) and the low section (SV-1) commanded open, followed by a low section (SV-1) command...." delete existing items D and E and substitute the following:

D. ACA high thrust on and switch from high thrust roll nozzle to low thrust redundant roll nozzles.

E. Not close the low section (SV-1) squib valve A1048.

Add item F as follows:

F. The RMA shall remain "Disable" and the pitch, yaw and roll ACA shall remain in "High Thrust", regardless of any other vehicle commanded state until a "High and Low Selector Valve Open" command has been executed.

Under sentence which states "The BUSS function (disable primary pneumatic) shall" delete items A, B and D.

Change item C to read as follows:

C. Close the high and low section by firing N/O squib valves A1050 and A1048.

88A 8. Page 4-0109, Paragraph 4.5.9.2.7.5 Actuator Limitation.

In left margin, preceding "HF", add "88A".

88A 9. Page 4-0126, Paragraph 4.5.10.2.4 BUSS SV Interface Requirements.

In item 12A change

FROM:
"...command shall..."
TO:
"...command 1 shall..."

88A 10. Page 4-0151, Paragraph 4.6.1.4.3.11 SRV.

In left margin next to paragraph heading change:

FROM:
"80A"
TO:
"88A"

88A 11. Page 5-0002, Paragraph 5.3.2 Thermal Stabilization

At bottom of page change:

Approved for Release: 2024/01/30 C05099020

FROM:
"STA 305 Bulkhead Temperatures"
TO:
"STA 209 Bulkhead Temperatures"

88A 12. Page 5-0007, Paragraph 5.5.3.3 Stabilization Tanks.

Delete paragraph in its entirety and substitute the following:

The stabilization tanks shall contain 252 $\pm$ 1 pounds of Freon 14 gas meeting the requirements of GE-SMSP Dwg. 255E952D, Propellant Loading Piping Interface, at a maximum static pressure of 4800 psig. The pressure shall not exceed 3600 psig when personnel are in the area. Refer to Figure D1 of Appendix D.

88A 13. Page 5-0007, Paragraph 5.5.3.4 Stabilization Gas Tank Heating.

In last line of paragraph change:

FROM:
"4775 PSIG"
TO:
"4800 PSIG"

88A 14. Page C-0005, Appendix C SV Telemetry Channel Assignment Summary.

Change IRIG Channel 15 Link 2 (RT) pulses 19, 20 and 21 to read as follows:

Pulse	Telemetry Measurement	Limits
19	Low Thrust Supply Press. Gas Tank at 38 deg., Sta. 217	Comp. Cal. Curve
20	Cold Gas Press. Switch	
	Low Thrust	
	Greater than 1000 Psia	23-43
	Between 750 and 1000 Psia	54-74
	Less than 750 Psia	90-100
21	High Thrust Supply Press. Gas Tank at 321 deg., Sta. 217	Comp. Cal. Curve

88A 15. Page C-0020, Appendix C SV Telemetry Channel Assignment Summary.

Change Continuous Channels Link 2 (RT)/Link 3 (PB) pulse 6 as follows:

Channels	Frequency	Function	Limits
6	1.7 KC	Command Dec/Prog Busy Signal	
		Quiescent	45 to 64
		POA	-8 to +8
		POA/CD Busy	9 to 26
		POA/PROG Busy	27 to 44
		CD Busy	65 to 84
		PROG Busy	85 to O.B.H.

88A 16. Page D-0015, SV Launch + Hold/Abort Criteria.

Add line 81 to Group II Measurements as follows:

Line No.	Measurements	Link / Channel/Pulse	Launch Limits Low	Launch Limits High	Remarks
81	Press. Switch (Cold Gas) Low Thrust Tank	2/15/20	23	43	-

88A 17. Pages F-0007 and F-0008, Appendix F Command Allocations.

Change Stored Command, DSPC No. 5, word 1, bits 30, 35, and word 2, bits 9, 10, 11, 13, 14, 16, 17 and 34 to read as follows:

Cmd. Type	Word	Bit Number	Function	States 1/0	Abbrev.	States 1/0
DSPC	1	30	Spare			
No. 5	1	35	Spare			
	2	9	GFE 1-C17	On/Norm	FA	
	2	10	GFE 1-C18	On/Norm	RA	
	2	11	Computer Prearm	On/Norm	CPR	
	2	13	OCV/Agena	Sep/Norm	OVS	
	2	14	Disconnect 2	On/Norm	DS2	
	2	17	Spare			
	2	34	Spare			

88A 18. Page F-0011, Paragraph B. Real Time Command List

In Command Allocations, change Command Descriptor of RTC 11, 12 and 16 to read as follows:

Cmd No.	Command Descriptor
RTC	
11	High Selector Valve Closed
12	Low Selector Valve Closed
16	High and Low Selector Valves Open

88B 19. Page 4-0008, Table 4.3.2 Weight and Balance Requirements

Change weight of SV at Launch

FROM:
"LT4934**"
TO:
"LT4988**"

85B 20. Page 4-0049, Table 4.5.4.2.4 Separation Function, Timing, and Required Squib Simulator Currents.

For Unit A1811 change

	SV Primary Minimum Current (Amps)	BUSS/Sep. Backup Minimum Current (Amps)
FROM:	7.7	7.0
TO:	7.1	6.3

86B 21. Page 4-0078, Paragraph 4.5.5.3.3 Functional Requirements.

Add items H and I as follows:

F H. Solenoid Valve Operating Time Requirements - Solenoid thrust valve maximum opening and closing response time shall meet the following requirements:

Type of Valve	Opening Response Time	Closing Response Time
High Flow	0.030 sec.	0.020 sec.
Low Flow (Low Roll Valves Only)	0.020 sec.	0.010 sec.

H H. Solenoid Valve Operating Time Requirements - Solenoid thrust valve maximum opening response time shall meet the following requirements:

Type of Valve	Opening Response Time
High Flow	0.030 sec.
Low Flow (Low Roll Valves Only)	0.020 sec.

F I. The capability of all primary subsystem thrust valves to exhaust gas upon command shall be verified during the final SV confidence test prior to Agena Mating.

88B 22. Page 4-0082, Paragraph 4.5.5.4 Stabilization Subsystem Operational Requirements.

Add Item E as follows:

HF E. To prevent damage to the solenoid valves, a test "Flow Restrictor" or flight nozzle shall be used on each thrust valve whenever the thrust valves are required to port gas. The test "Flow Restrictor" when installed on the vehicle shall be torqued 90 to 120 inch-pounds.

86C 23. Page 4-0110, Add Paragraph 4.5.9.5, Outer Shield Requirements, through paragraph 4.5.9.5.5 as follows:

88D HF 4.5.9.5 Outer Shield Requirements

88D HF 4.5.9.5.1 Cleanliness and Lubrication Requirement

A. Cleanliness requirement - Prior to final installation the outer shield lugs, structure lugs, latch pin, bell crank, bell crank to coupler pin, coupler and bell crank bracket shall be cleaned and inspected to ensure that foreign materials such as dirt, chips, brush hairs, etc. are not present.

B. Lubrication requirement - After cleaning, the bearing surfaces of the outer shield lugs, structure lugs, latch pin, bell crank, bell crank to coupler pin, coupler, and bell crank bracket shall be lightly lubricated with silicone grease (171A8231) per Drawing 242R641.

86C HF 4.5.9.5.2 <u>Manual Unlatch Requirement</u>

The total mechanically mated SV (flight configuration) shall meet the following requirements:

HF A. Outer shield release mechanism configuration

1. The shear pin shall not be installed.

2. The explosive pistons may or may not be installed.

3. The outer shield spring shall be in the flight configuration.

HF B. The outer shield shall be manually unlatched a minimum of three (3) times. Each time the force required to disengage the latch pin from the outer shield shall be applied at the Pyro end of the bell crank and shall be 100 pounds minimum and 200 pounds maximum.

F C. The above requirement shall be met just prior to outer shield flight installation.

85B F 4.5.9.5.3 <u>Partial Unlatch Requirement</u>

Prior to outer shield shear pin installation, the total mechanically mated SV (flight configuration) shall meet the following requirements when the outer shield has been installed for flight.

1. The bell crank shall be moved 0.10 ± 0.03 inches.

2. The forces required to move the latch pin shall be applied at the pyro end of the bell crank and shall be 100 pounds minimum, 200 pounds maximum.

88D HF 4.5.9.5.4 Outer Shield General Requirements

A. The following requirements shall be met in accordance with installation drawing 242R641:

HF 1. With the bell crank positioned in the flight configuration (touching the pyro, see item B), the latch pin shall be engaged 0.25 inches nominal, 0.20 inches minimum.

HF 2. With lead face of bell crank in contact with face of bell crank bracket, all lugs of latch pin shall be fully contained within lugs of structure half of latch and shall have 0.025 inches minimum remaining travel at all lug locations before re-engagement. Clearance between coupler and structure shall be 0.12 minimum measured in the direction of latch pin motion.

HF 3. With arrestor face in contact with the face of structure latch lug, all lugs of latch pin shall be fully contained within lugs of structure half of latch. A minimum of one lug shall be flush to 0.005 inches less than flush with forward face of structure half of latch. Maximum distance from power piston to bell crank shall be 0.50 inches. Minimum latch pin travel from this position to point where lead face of bell crank contacts face of bell crank bracket shall be 0.145 inches.

F B. The outer shield shall be installed per installation drawing 238R872. With the bell crank positioned in the flight configuration and the shear pin installed, maximum gap between the pyro pistons and the bell crank shall be 0.005 inches for one of the pistons and 0.010 inches for the other piston.

88B 24. Page 4-0146, Paragraph 4.6.1.4.3.2 Separation Subsystem.

Delete existing text under this heading and substitute the following:

The validation harness shall be installed in the vehicle. The baroswitch operation shall be simulated. All continuity loops shall be complete. All pyro-electrical functions shall be verified. Pyro simulators shall be used to simulate all non-reversible pyro functions. When it is necessary to provide a pyro operated piston mechanical function, live pyro may be used to verify the electrical function. The separation subsystem operation shall include, but not be limited to, the following separation functions:

1. All separation functions via primary command.

2. BUSS separation command sequence.

88B 25. Page 4-0149, Paragraph 4.6.1.4.3.6 Environmental Control Requirements.

Delete first sentence on page, which reads "The thermal dissipation of the operational batteries shall be simulated."

88B 26. Page 4-0155, Paragraph 4.6.1.4.4.1.5.2 Chamber Pump Down or Pump Up Requirements.

Add item 6 under d as follows:

6. The system thermal vacuum operational assurance test may start when zone 35 is less than -55 deg. F.

88C 27. Page 5-0007, Add new Paragraph 5.5.3.7 High Thrust Roll Nozzles as follows:

5.5.3.7 High Thrust Roll Nozzles

The roll high thrust test "Flow Restrictor" shall be removed and the flight roll high thrust nozzles shall be installed per the drawing located on the Fairing Access Door. Polarity of the high thrust nozzles shall be verified after installation of flight nozzles.

88B 28. Page 5-0008, Paragraph 5.6.3 Electrical Power and Distribution Subsystem Requirements.

Add Item E as follows:

E. The load sharing of any battery as monitored by T/M shall not decrease by more than 40% from the time of batteries installation until launch as shown by the following:

$$\frac{\%\text{ load at installation} - \%\text{ load at any time}}{\%\text{ load at installation}} = \text{less than } 40\%$$

The above requirement is applicable only when the bus voltage is above 30 volts, all batteries are at approximately the same state of discharge, the variation in age of the batteries does not exceed three months and the change in load does not exceed 50% at the time of measuring the change in load sharing.

88B 29. Pages C-0004, C-0005 and C-0006, Appendix C SV Telemetry Channel Assignment Summary

Change IRIG Channel 15 Link 2 (RT) pulses 1, 3, 17, 18 and 22 to read as follows:

Pulse	Telemetry Measurement	Test Primary	Test BUSS	Limits / Flight (Info Only)
1	H-30 Continuity and Sep. Events			
	No Event	18-28	18-28	18-28
	Event = 1 - Disc 1	69-79	69-79	69-79
	Event = 2 - Disc 2	18-28	18-28	69-79
	Event = 3 - Arm	0+-5	0+-5	50-60
	Event = 4 - Pin Puller	N/A	N/A	0+-5
3	Spare			0-10
17	Temp., Low Thrust Cold Gas Tank at 38 Deg. (Sta. 217) at 70 Deg. F.			33-43
18	Temp., High Thrust Cold Gas Tank at 321 Deg. (Sta. 217) at 70 Deg. F.			33-43
22	High/Low Section Open Balance Off			-5 +5
	High/Low Section Open Balance On			5-15
	High Section Closed Balance Off			15-25
	Low Section Closed Balance Off			30-40
	High Section Closed Balance On			25-35
	Low Section Closed Balance On			35-45
	High/Low Section Open Commanded			35-45
	High/Low Section Closed			45-55
	High Section Closed Commanded			55-65
	High/Low Section Closed Commanded			85-100

88B 30. Page C-0013 and C-0014, Appendix C SV Telemetry Channel Assignment Summary.

Change IRIG Channel 10 Link 2 (RT)/Link 3 (PB) pulses 14 through 22 inclusive.

	Telemetry Measurment	Limits
FROM:	5V Bus	95-105
TO:	Spare	0-10

88B 31. Page C-0031, Appendix C SV Telemetry Channel Assignment Summary.

Change Continuous Channels Link 4 Channel 10 Unsecure Modes as follows:

Channel	Frequency	Function	Limits
10	5.4 KC	BUSS Mode and Event Monitor	
		Unsecure Modes	
		Reset	32-52
		Mode 1 (BRT)	67-77
		Mode 2 (BNS)	77-87
		Mode 3 (BNO)	87-OBH
		Mode 5 (BRTNG)	57-67

86B 32. Page C-0032, Figure C-1, SV Telemetry Subsystem, Block Diagram.

Change caption on multiplexer providing input to Band 10-5.4 KC, SCO Base 1.

FROM:
"90 x 1/18 Multiplexer"
TO:
"90 x 1/3 Multiplexer"

88B 33. Page G-0001 and G-0002, Appendix G. Canister Zone Temperatures for the +1.7 Sigma and -1.7 Sigma.

Change Hot Case and Cold Case Canister Zone Temperatures for Zones 1 through 43 to read as follows:

Section	Zone	Hot Case Temp. (Deg. F)	Cold Case Tem. (Deg. F)
RV	1	82	53
	2	56	-27
	3	120	29
	4	134	-48
Adapter	5	30	0
	6	63	-19
	7	43	14
	8	49	-22
	9	119	-40
	10	76	-109
	11	66	36
	12	45	-25
5	13	71	29
	14	122	16
	15	89	12
	16	57	-15
	16A	57	-15
	17	112	-2
	18	131	-109
	19	29	-44
	20	106	59
	21	124	4
	22	145	7
6	23	128	-7
	24	81	-18
	25	62	-9
	26	136	-33
	27	99	-115
	28	60	-164
	29	-64	-87
	30	29	-44
	31	-5	-66
	32	110	25
	33	110	25
	34	100	30
	43	3	-207

Section	Zone	Hot Case Temp. (Deg. F)	Cold Case Temp. (Deg. F)
7	35	-59	-110
	36	-86	-110
	37	-33	-51
	38	12	9
	39	-13	-29
	40	-22	-110
	41	Off	Off
	42	Off	Off

88B 34. Page 4-0127, Paragraph 4.5.12 SV Systems E.M.I. Test Requirements.

Change the following four Monitor Point Maximum Allowable Levels to read as follows:

Monitor Point	Maximum Allowable Level: Amplitude	Maximum Allowable Level: Freq. or Duration
+6V Switches, Command Decoder P375 +J, Ret. P	A) +1.8V (Stby-Pwr. On)	
	-1.15V (Stby-Pwr. On)	
	B) +1.25V (Store Cmd. Cmding)	
	-1.0V (Store Cmd. Cmding)	
	C) +1.4V (On-Off)	
	-1.5V (On-Off)	
	D) 1.3V P/P (Store Cmd. Cmding)	30 cps - 15 kcs
	E) 0.75V P/P(Store Cmd. Cmding)	15 kcs - 100 kcs
	F) 0.75V P/P (RTC Cmding)	15 kcs - 100 kcs
	G) 0.75V P/P (Stby-Pwr. On)	15 kcs - 100 kcs
-6V Switches, Command Decoder P375 +K, Ret. P	A) +2.75V (Stby-Pwr. On)	
	B) +2.75V (On-Off)	
	C) +2.75V (Store Cmd. Cmding)	
	D) -2.75V (On-Off)	
	E) -2.75V (Store Cmd. Cmding)	
	F) 3.0V P/P (All Modes)	Audio

Monitor Point	Maximum Allowable Level Amplitude	Freq. or Duration
+6V Continuous, Command Decoder, P375 +S, Ret. P	A) +1.4V (Stby-Pwr. On)	
	B) +0.85V (On-Off)	
	C) +0.85V (RTC Cmding)	
	D) +1.85V (Store Cmd. Cmding)	
	E) -1.4V (Stby-Pwr. On)	
	F) -1.4V (Store Cmd. Cmding)	
	G) -1.3V (On-Off)	
	H) -1.3V (RTC Cmding)	
	I) 1.25V P/P (Stby-Pwr. On)	Audio
-6V Continuous, Command Decoder, P375 +T, Ret. P	A) +1.75V (On-Off)	
	B) -1.75V (On-Off)	
	C) +1.35V (Store Cmd. Cmding)	
	D) -1.3V (Store Cmd Cmding)	

Change +28V, Cmd Prog, P367 + M Ret. K, Item B), Frequency or Duration

FROM:
"10 msec"
TO:
"10 usec"

Change Clock Hold, Command Programmer P367 +BB, Ret. K, Items A and B, Frequency or Duration

FROM:
"5 msec"
TO:
"5 usec"

Change -6V, PPD, P350 +B, Ret. C, Item B , Frequency or Duration

FROM:
"4 KC"
TO:
"4 MC"

Under Amplitude column of -6V, PPD, P350 +B, Ret. C, add Item E as follows:

E) 25V (On-Off)

Change +28V, Sep. Contr., P760 +T, Ret. E, Item A, Frequency or Duration

FROM:
"10 vsec"
TO:
"10 usec"

For Monitor Point 1C21A, P1499+W, Ret. Y, delete existing Amplitude and Frequency or Duration levels and substitute the following:

Amplitude	Frequency or Duration
A) +5.0V	10 usec
B) +2.0V	26 usec
C) +0.5V	200 usec
D) +400 MV	Continuously
E) -3.5V	0.1 usec

Change +28V, Low I, PIG Controller, P2101 + H, Ret. J, Items A and B, Frequency or Duration levels
FROM:
"4 msec pulse"
"3 msec pulse"
TO:
"4 usec pulse"
"3 usec pulse"

For Monitor Point +28V, Redund. Pneu., P1036 + A, Ret. B, add Frequency or Duration levels as follows:

Amplitude	Frequency or Duration
A) +30V	10 usec
B) -12.5V	10 usec

For Monitor Point +28V, 30 x 5 Multiplexer, P124 +19, Ret. 37, add Amplitude and Frequency or Duration levels as follows:

Amplitude	Frequency or Duration
A) +25V	10 usec

88B 35. Page 4-0077, Paragraph 4.5.5.3.3 Functional Requirements.

In item C3, first line, change
FROM:
"7.5 psig max"
TO:
"75.0 psig max"

88B 36. Page B-0003, Holdtime Limitations, Electrical Power and Distribution Subsystem.

For BUSS/SEP Backup Batt., add the following to column 5:

Would take about 5 days to recycle for battery replacement (count down assumed).

88C 37. Page 4-0075 Paragraph 4.5.5.3.2 Leakage Requirements

Add to item C

		Section	Test Pressure	Leakage Limit
HF	5.	Balance Valves, when deenergized	500 $\pm$ 25 in each supply tank	Maximum Total leakage through both balance valves - 200 scc/hr.

88C 38. Page 4-0138 Paragraph 4.6.1.2.1 MAB Mission Profile

Change item 3

FROM:

3. Operation of all one-shot pyro-actuated devices except for RV recovery events, shall be verified by the use of simulators.

TO:

3. Operation of all one-shot pyro-actuated devices shall be verified by the use of simulators.

88C 39. Page 4-0100 Table 4.5.8.3.13-1 Circuit Resistance

Change items 16 and 17

FROM:

Function	Interface		Resistance (OHMS)	
16. Piston No. 1	A1728/29	1576	0.9	1.1
17. Piston No. 2	A1730/31	1576	0.9	1.1

TO:

16. Piston No. 1	A1728/29	1588	0.45	0.58
16A Piston No. 1	A1730/31	1588	0.45	0.58
17. Piston No. 2	A1728/29	1588	0.45	0.58
17A Piston No. 2	A1730/31	1588	0.45	0.58

88C 40. Page 4-0078 Paragraph 4.5.5.3.3 Functional Requirements

Add item J as follows:

H The thrust nozzle shall meet the following flow requirements after system thermal vacuum:

	CF_4 Flow (SCFM)/Per Nozzle
High Roll	23 ± 2.3
High Pitch	42.3 ± 4
High Yaw	42.3 ± 4
Low Roll	1.1 ± 0.1
Low Pitch	6.5 ± 0.6
Low Yaw	6.5 ± 0.6
Low Redundant Roll	0.8 ± 0.1

Nitrogen Flow = 1.83 Freon (CF_4) Flow

88D 41. Page 4-0003, Paragraph 4.16 Major Harness Rework Requirements

Change to read as follows:

The System or Development Engineers or their appointed representative in conjunction with the responsible test agency and Quality Assurance shall determine the extent of harness retest required for any harness falling under this category.

88D 42. Page 4-0019, Paragraph 4.5.1.2.3.4, Current Unbalance.

Add the following as the last part of the sentence:

, when powered by an external power source.

88D 43. Page E-0005, Figure 4.5.5.2.2.3, Rate Roofs.

Replace the figure with the attached (page 29)

88D 44. Page 4-0087, Paragraph 4.5.7.2.2, Leakage Requirement.

Change paragraph B Field

FROM: Deleted

TO:

F B. Low Pressure - With the entire system (Seven Segments) charged to 60 psig, total leakage rate shall not exceed a value of 34.36 SCC/hr. The gas and propellant burst disc shall be checked for leakage by pressurizing one side of the disc with 50 psig of helium and probing the opposite side with a mass spectrometer leak detector. There shall not be any leakage.

88D 45. Page 4-0045, Paragraph 4.5.4.2.3, Separation Subsystem Operation

Subparagraph C: Add H in the margin. (Requirement is for in-house only.)

88D 46. Page C-0023, Link 3 Channel 13 Pulse 4

Change flight level for Sep 4, 5, 6

FROM: Sep 4, 5, 6 20 - 70

TO: Sep 4, 5, 6 50 - 70

NOTE: It shall be determined that the Rate Roof Inhibit Line does not overlap the Fine Limit Cycle Line such that opposing polarity solenoid valves will not be on simultaneously.

Linearity = ± 2% maximum deviation from best straight line through test points

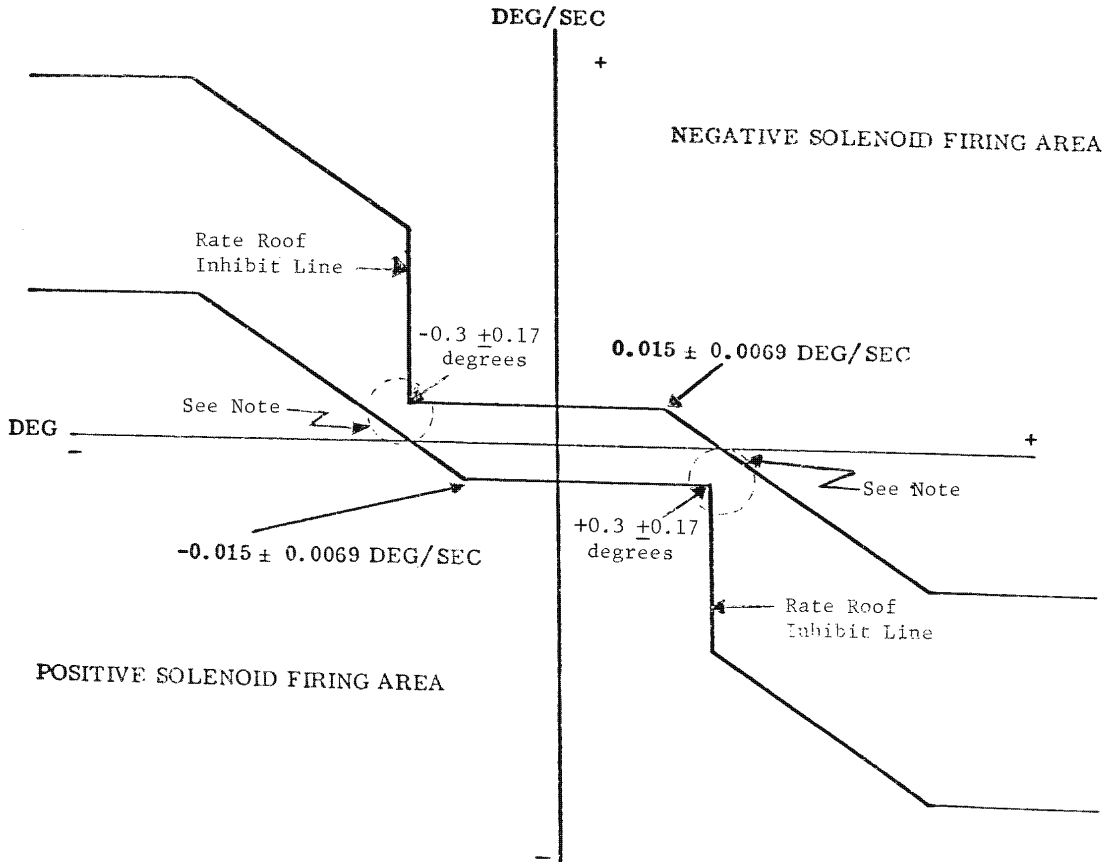

Figure 4.5.5.2.2-3. Rate Roofs

88D 47. Page 4-0017, Paragraph 4.5.1.2.2, BUSS/Separation Back-Up Battery

Item E, Electrolyte, Subparagraph 1 change

FROM: The volume of electrolyte shall be 60 $\pm$ 1cc.

TO: The volume of electrolyte shall be 63 $\pm$ 1cc.

88D 48. Page 4-0107, Paragraph 4.5.9.2.7.3.4, Back-up Mode Torque Requirements

Change the torque requirements to stop the shield in subparagraphs A1, and A2

FROM: 125 $\pm$ 35 inch-pounds

TO: 135 $\pm$ 25 inch-pounds

88D F 49. Page 4-0085, Add the following as a new paragraph:

4.5.6.1.7 BUSS Antenna and Magnetometer Fairing Requirements.

The BUSS fairings (Antenna and Magnetometer) shall be unlatched a minimum of three times each. The unlatching shall be accomplished using 54 $\pm$ 13 inch-pounds of torque applied to the Manual Unlatch Insert Tool or a similar lever arm.

The BUSS fairings shall be installed per G. E. drawing 689E732, Rev. M.

CHANGE ACTIVITY LOG

Vehicle No. 988

Addendum 88D

Addendum & Date		Adden. Page No.	Item No.	CHANGE INFORMATION					
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				Add.	5388	Page	Paragraph	SVS 5388	Veh.
88D	2/21/67	4-8	1	X	X	B-0012- B-0018	Appendix B Appendix B	X	87
		9	2		X	4-0016	4.5.1.2.1		
		9	3			4-0028	4.5.2.2.5.4		
90	1/6/67	9	4	X		4-0051	Table 4.5.4.2.4		87
		9	5			4-0065	4.5.5.2.7.1		
		9	6			4-0067	4.5.5.2.7.2		
90	1/6/67	10	7	X		4-0068	4.5.5.2.7.3		87
		10	8			4-0109	4.5.9.2.7.5		
		10	9			4-0126	4.5.10.2.4		
		11	10			4-0151	4.6.1.4.3.11		
		11	11			5-0002	5.3.2		
		11	12			5-0007	5.5.3.3		
		11	13			5-0007	5.5.3.4		
		11	14			C-0005	Appendix C		
		12	15			C-0020	Appendix C		
		12	16			D-0015	Appendix D		
		12	17			F-0007- F-0008	Appendix F		
		13	18			F-0011	Appendix F		
	1966								
88B	12/28	13	19			4-0008	Table 4.3.2	X	
85B	11/23	13	20			4-0049	Table 4.5.4.2.4		
86B	12/1	13	21			4-0078	Para. 4.5.5.3.3		
88B	12/28	14	22			4-0082	" 4.5.5.4		
88D	2/21/7	14	23	X		4-0110	" 4.5.9.5		
88B	12/28	16	24			4-0146	" 4.6.1.4.3.2		
88B	12/28	16	25			4-0149	" 4.6.1.4.3.6		

CHANGE ACTIVITY LOG

Vehicle No. 988 Addendum 88D

Addendum & Date	Adden. Page No.	Item No.	CHANGE INFORMATION					
			Doc. Affected				Differs From	
			Add.	5388	Page	Paragraph	SVS 5388	Veh.
88B 12/28	16	26		4	4-0155	Para. 4.6.1.4.4.1.5.2		
88B 12/28	17	27			5-0007	" 5.5.3.7		
88B 12/30	17	28			5-0008	" 5.6.3	5380	87
88B 12/28	17	29			C-0004-6	Appendix C		
88B 12/28	18	30			C-0013 & 14	Appendix C		
88B 12/28	18	31			C-0031	Appendix C		
86B 12/1	18	32			C-0032	Figure C-1		
88B 12/28	19	33			G-0001 & 2	Appendix G		
88B 12/28	20	34			4-0127 thru 4-0130	Para. 4.5.12		
88B 12/30	22	35			4-0077	Para. 4.5.5.3.3		
88B 12/30	22	36			B-0003	Appendix B		
88C 1/20/67	22	37		X	4-0075	Para. 4.5.5.3.2	X	87
88C 1/20	23	38		X	4-0138	Para. 4.6.1.2.1	X	87
88C 1/20	23	39		X	4-0100	Table 4.5.8.3.13-1	X	87
88C 1/20	23	40		X	4-0078	Para. 4.5.5.3.3	X	87
88D 2/21	24	41		X	4-0003	Para. 4.1.6	X	87
88D 2/21	24	42		X	4-0019	Para. 4.5.1.2.3.4	X	87
88D 2/21	24	43		X	E-0005	Fig. 4.5.5.2.2.3	X	87
88D 2/21	24	44		X	4-0087	Para. 4.5.7.2.2	X	87
88D 2/21	24	45		X	4-0045	Para. 4.5.4.2.3	X	87
88D 2/21	24	46		X	C-0023	Appendix C	X	87
88D 2/21	26	47		X	4-0017	Para. 4.5.1.2.2	X	87
88D 2/21	26	48		X	4-0107	" 4.5.9.2.7.3.4	X	87
88D 2/21	26	49		X	4-0085	Para. 4.5.6.1.7	X	87

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SYSTEM ACCEPTANCE SPECIFICATION (U)

SVS 5388, ADDENDUM 88E

GENERAL ELECTRIC
SPECIAL MILITARY SPACE PROJECT
MILITARY SPACE PROGRAMS
KING OF PRUSSIA PARK
P.O. BOX 8661, PHILADELPHIA 1, PA.

SVS 5388
Addendum 88E

LIST OF EFFECTIVE PAGES

This document contains 36 pages, consisting of the following:

Title

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APPROVAL PAGE

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SVS 5388
ADDENDUM 88E

1.0 GENERAL

1.1 Scope - This specification identifies the changes to the Basic System Acceptance Specification SVS 5388, applicable to SV 988.

2.0 APPLICABLE DOCUMENTS

SVS 5388 System Acceptance Specification

3.0 REQUIREMENTS

This specification is the same as SVS 5388, System Acceptance Specification, except as follows.

88D 1. Pages B-0012, through B-0018, Appendix B Holdtime Limitations Green and Red Line Limits.

Delete existing Red Line Limits Maximum Accumulated Hours or Cycles at Launch and substitute the following:

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
84A	BUSS	
	Auxiliary Timer	500 cycles
	Magnetometer	1600 hrs.
	VHF Receiver	1325 hrs.
	Decoder, Type V	1325 hrs.
	Decoder, Type VIII	1325 hrs.
	Decoder, Type IX (BUSS)	1325 hrs.
	Decoder, Type IX (Command)	1325 hrs.
	Electronic Flight Controller	150 hrs.
	Rate Gyro	100 hrs.
	Thrust Valve	9000 cycles
	Tank	395 cycles
	Junction Box	1900 cycles
	Differential Pressure Transducer	295 cycles
	Temperature Sensor (Tank)	295 cycles
	Junction Box (Selective Address)	1825 cycles
	Fill Solenoid Valve	1500 cycles
	Signal Conditioner	4825 hrs.
	Multiplexer (30 x 2.5)	9890 cycles
	SCO Base 8	1440 hrs.
	Pneumatic Regulator	9000 cycles
	Quick Disconnect	50 cycles
84A	TRACKING AND COMMAND	
	Verlort S-Band Beacon	500 hrs.
	Command Decoder	1885 hrs.
	Power Controller	44800 cycles
	Command Programmer	1600 hrs.
	Power Supply, 6-Volt	1600 hrs.
	Command Decoder Relay Box	97,000 cycles

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
	TRACKING AND COMMAND (Continued)	
	Latching Contractor	17,000 cycles
	Pulse Position Demodulator	9875 hrs.
	Power Sequencer	1885 hrs.
88A	TELEMETRY	
	RF Transmitter (Delta 3)	2875 hrs.
	RF Transmitter (Delta 2)	2875 hrs.
	Transmitter Transfer Switch Assembly	97,000 cycles
	Multiplexer, Dual 30 x 5	9890 hrs.
	Command Decoder Busy Sig. Monitor	1885 hrs.
	VHF Antenna	N/A
	VCO (Base 6 and 7)	1440 hrs.
	Mixer Amp. (Base 1, 2, 3)	1440 hrs.
	Audio Ripple Filter	18,000 hrs.
	S-Band Antenna	N/A
	Multiplexer, 30 x 2.5	9890 hrs.
86A	Multiplexer, 90 x 1/3	9890 hrs.
	SCO Base 1 (5 Unit)	1440 hrs.
	SCO Base 2 (5 Unit)	1440 hrs.
	SCO Base 3 (5 Unit)	1440 hrs.
	SCO Base 6 (7 Unit)	1440 hrs.
	Signal Data Recorder	1885 hrs.
	Recording Tape, Drive Belts and Clutch	100 hrs.
	Recorder Bearing and Motor	400 hrs.
	Component Temp. Det.	4250 hrs.
84A	SEPARATION	
	OCV Separation Spring and Guide Assembly	2 lockup of set screw on shaft
	RV OCV Sep. Spring + Guide Assembly	2 lockup of set screw on shaft
	Separation Microswitch	9000 cycles
	Auxiliary Controller	500 cycles at flight current
	Separation Controller	500 cycles at flight current
	Baroswitch	100 cycles at flight current
	Separation Fuse Box	500 cycles at flight current

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
88A	STABILIZATION ELECTRONICS	
	TARS Gimbal	
	TARS Platform (Gyros)	1325 hrs.
	TARS Platform (Torque Motors)	1325 hrs.
	Rate Gyro Package	1325 hrs.
	Control Amplifier - Roll	1325 hrs.
	Control Amplifier - Yaw, Pitch	1325 hrs.
	Roll Maneuvering Amplifier	1325 hrs.
	Power Supply DC	9325 hrs.
	TARS Electronics	1325 hrs.
	Resolver Summing Amplifier	1325 hrs.
	Compensator Electronics	2325 hrs.
	IR Sensor Scanner (Barnes)	690 hrs.
	Total Test Time (Barnes + G. E.)	690 hrs.
	GE Maximum Test Time	500 hrs.
	Barnes Mixer Box	690 hrs.
	Predac	2325 hrs.
	Inhibit Box	97, 000 cycles
86A	Inhibit Override	97, 000 cycles
88A	Redundant Pneumatic Control Box	1600 hrs.
88D	STABILIZATION PNEUMATICS	
	Low Press. Transducer (Low Press. System)	N/A
	High Press. Transducer (High Press. System)	N/A
88D	High-Pressure Regulator	20, 000 cycles
88D	Low-Pressure Regulator	20, 000 cycles
88D	Solenoid Valve	
	Low Yaw	3, 750 cycles
	Low Pitch	6, 850 cycles
	Low Roll	9, 000 cycles
	Redundant Low Roll	9, 000 cycles
	High Pitch	8, 700 cycles
	High Yaw	8, 700 cycles
	High Roll	10, 418 cycles

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
	STABILIZATION PNEUMATICS (Continued)	
	Freon Tanks	95 cycles
	Pressure Switch	830 cycles
	Quick Disconnect	95 cycles
	Primary Fill Filter	45 cycles
	Pad Abort Solenoid	1,200 cycles
	Secondary Fill Filter	45 cycles
	Pressure Relief Valve	600 cycles
	High Press. Transducer (Tanks)	20,000 cycles
	N/O Squib Valves	N/A
	Temperature Detector	595 hrs.
	Nozzle-High Flow, High Pressure	N/A
	Nozzle-Low Flow, Low Pressure	N/A
	Nozzle-High Flow, Low Pressure	N/A
	Nozzle-Low Flow, High Pressure	N/A
88C	Valve, Solenoid, Balance	1,200 cycles
88A	ENVIRONMENTAL CONTROL	
	Thermostat	6,000 hrs.
	Compartment Heaters	8,000 hrs.
	Temperature Controller (Differential)	2,900 hrs.
	Temperature Sensor	4,250 hrs.
	Inlet Port Assembly	N/A
	Monitor Assembly	
	Microswitch Phase A	7,250 C
	Microswitch Phase A Setting	1,000 C
	Position Indicator	7,250 C
	Exhaust Port Assembly	N/A
	Magnetic Switch	9,000 C
	Switch Resistance Measurements	1,000 C
	Actuator, Primary and Back-up	7,250 C
	Actuator Brush & Torque Setting	500 C
	Retractable Pin Assembly	
	Flange Assembly	1,000 C
	Retractable Pin	150 C
	Aft Hinge	1,000 C

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
	ENVIRONMENTAL CONTROL (Continued)	
	Control Logic Box	10,000 C
	Thermal Fuse Module	500 C at flight current
	Fwd. Hinge Shaft Assembly	
	Retaining Pin	1,000 C
	Aft Hinge Assembly	
	Bearing and Ring	1,000 C
	Retaining Pin	1,000 C
84A	ORBIT ADJUST	
	Propellant Tank Fuel Bladder Flexure	4 cycles
	Pressurant Tank No Bladder Flexure	350 cycles
	Propellant Tank Fuel No Bladder Flexure	350 cycles
	Propellant Tank Oxidizer Bladder Flexure	4 cycles
	Pressurant Tank	350 cycles
	Pneumatic Relief Valve	850 cycles
	Pneumatic Regulator	875 cycles
	Pneumatic Check Valve and Filter	875 cycles
	Press. Fill Valve, Fuel	25 cycles
	Press. Fill Valve, Oxidizer	25 cycles
	Temperature Sensor	295 cycles at max. temp. 100 hrs. at max. press.
	High-Pressure Transducer (Pressurant)	20,000 cycles
	Low-Pressure Transducer	N/A
	Quick-Disconnect Propellant Fill, Fuel (Nipple)	40 cycles
	Quick-Disconnect Propellant Fill, Oxidizer (Nipple)	40 cycles
	OCV Relay Box	3,940 cycles
	Thrust Chamber Assembly (Hot Firing)	1 minute
	Pressure Fill Valve	50 cycles
	Tank, Pressure, Supply	350 cycles
	Tank Module, Oxidizer	4 cycles
	Tank Module, Fuel	4 cycles
	Burst Diaphragm, Press.	N/A
	Tube, Diaphragm, (Fuel)	N/A

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
	ORBIT ADJUST (Continued)	
	Filter In Line	45 cycles
	Start Squib Valve	N/A
	Tubing and Fittings	N/A
84A	FORWARD SECTION	
	VCO and Amplifier Assembly	1490 hrs.
	Converter Controller	49,950 cycles
	Converter Translator	1495 hrs.
	Translator, 0.6 G	1498 hrs.
	Translator, 0.40 G	1496 hrs.
	Transmitter	995 hrs.
	Transfer Module	3995 hrs.
	Diode Module	470 hrs.
	Arm Module	3990 hrs.
	Inertial G Switch	984 cycles
	Temp. Sensor, Thrust Cone	4325 hrs.
	Separation Switch, Thrust Cone	995 cycles
	Flashing Light Controller	1950 hrs.
	Temp. Sensor, Forebody	4400 hrs.
	Ejection Programmer	1980 cycles
	Recovery Programmer	1965 cycles
	Beacon Controller	1950 hrs.
	Beacon	50 hrs.
	Flashing Lights	1450 hrs.
	Mechanical Timer	2495 cycles
	Resistor Module	3995 cycles
	Forebody (From Time of Mfg. to Projected Time of Recovery Usage)	18 mos. max.
	In Flight Disconnect (SRV/Adapter)	70 cycles
88E	ELECTRICAL POWER AND SIGNAL DISTRIBUTION	
	Umbilical Disconnect Receptacle	185 cycles
	LLCB	2200 hrs.
	Relay, Stab. Cutoff	500 cycles

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
	ELECTRICAL POWER AND SIGNAL DISTRIBUTION (Continued)	
	Relay, AGE Instrumentation	500 cycles
	Voltage Step-Down Module (BUSS)	2325 hrs.
	Plug, In-Flight Disconnect	70 cycles
	Receptacle, In-Flight Disconnect	70 cycles
	Ampere Hour Counter	2200 hrs.
88E	Battery (Operational and Backup)	Holdtime Limitation (Ref.)

88A F 2. Page 4-0016, Paragraph 4.5.1.2.1 Operational Batteries.

Delete item 12 in its entirety.

88A HF 3. Page 4-0028, Paragraph 4.5.2.2.5.4 Vehicle Clock Time Recording.

Delete paragraph in its entirety.

88A HF 4. Page 4-0051, Table 4.5.4.2.4 Separation Function, Timing, and Required Squib Simulator Currents.

At end of table, under "Other Functions" add the following:

SV BUSS/ Sep. Cmd. No.	SV Primary Sep. Cmd. No.	Delta Time (Sec.)	Function	Unit	SV Primary Maximum Current (Amps)	BUSS/Sep. Backup Minimum Current (Amps)
1	N/A	N/A	Primary Gas Disable			
			High Thrust Branch	A1050(2)	N/A	3.0 each
			Low Thrust Branch	A1048(2)	N/A	3.0 each

88A HF 5. Page 4-0065, Paragraph 4.5.5.2.7.1 Functional Commands.

Under "the AGE function shall be as follows", add item F as follows:

F. ACA Initialize

88A 6. Page 4-0067, Paragraph 4.5.5.2.7.2 Taboo Logic

Delete item F in its entirety and substitute the following:

HF F. Orbit Adjust On. An Orbit Adjust command (engine 1 on and/or engine 2 on) shall not change the thrust level commanded state in the yaw, pitch and roll ACA's. Low Thrust or High Thrust Jet commands to the ACA during engine 1 on and/or engine 2 on shall cause the S/V to operate in the new commanded state.

88A HF 7. Page 4-0068, Paragraph 4.5.5.2.7.3 Redundant Pneumatic Requirements.

Under sentence which states "The high section (SV-2) and the low section (SV-1) commanded open, followed by a high section (SV-2) command...." delete existing item E in its entirety and substitute the following:

E. Not close the high section (SV-2) squib valve A1050.

Add item F as follows:

F. The RMA shall remain "Disable" and the pitch, yaw and roll ACA shall remain in "Low Thrust", regardless of any other vehicle commanded state, until a "High and Low Selector Valve Open" command has been executed.

Under sentence which states "The high section (SV-2) and the low section (SV-1) commanded open, followed by a low section (SV-1) command...." delete existing items D and E and substitute the following:

D. ACA high thrust on and switch from high thrust roll nozzle to low thrust redundant roll nozzles.

E. Not close the low section (SV-1) squib valve A1048.

Add item F as follows:

F. The RMA shall remain "Disable" and the pitch, yaw and roll ACA shall remain in "High Thrust," regardless of any other vehicle commanded state until a "High and Low Selector Valve Open" command has been executed.

Under sentence which states "The BUSS function (disable primary pneumatic) shall" delete items A, B and D.

Change item C to read as follows:

C. Close the high and low section by firing N/O squib valves A1050 and A1048.

88A 8. Page 4-0109, Paragraph 4.5.9.2.7.5 Actuator Limitation.

In left margin, preceding "HF", add "88A."

88A 9. Page 4-0126, Paragraph 4.5.10.2.4 BUSS SV Interface Requirements.

In item 12A change

FROM:
"...command shall..."
TO:
"...command 1 shall..."

88A 10. Page 4-0151, Paragraph 4.6.1.4.3.11 SRV.

In left margin next to paragraph heading change:

FROM:
"80A"
TO:
"88A"

88A 11. Page 5-0002, Paragraph 5.3.2 Thermal Stabilization

At bottom of page change:

FROM:
"STA 305 Bulkhead Temperatures"
TO:
"STA 209 Bulkhead Temperatures"

88A 12. Page 5-0007, Paragraph 5.5.3.3 Stabilization Tanks.

Delete paragraph in its entirety and substitute the following:

The stabilization tanks shall contain 252 $\pm$ 1 pounds of Freon 14 gas meeting the requirements of GE-SMSP Dwg. 255E952D, Propellant Loading Piping

Interface, at a maximum static pressure of 4800 psig. The pressure shall not exceed 3600 psig when personnel are in the area. Refer to Figure D1 of Appendix D.

88A 13. Page 5-0007, Paragraph 5.5.3.4 Stabilization Gas Tank Heating.

In last line of paragraph change:

FROM:
"4775 PSIG"
TO:
"4800 PSIG"

88A 14. Page C-0005, Appendix C SV Telemetry Channel Assignment Summary.

Change IRIG Channel 15 Link 2 (RT) pulses 19, 20 and 21 to read as follows:

Pulse	Telemetry Measurement	Limits
19	Low Thrust Supply Press. Gas Tank at 38 deg., Sta. 217	Comp. Cal. Curve
20	Cold Gas Press. Switch Low Thrust	
	Greater than 1000 Psia	23-43
	Between 750 and 1000 Psia	54-74
	Less than 750 Psia	90-100
21	High Thrust Supply Press. Gas Tank at 321 deg., Sta. 217	Comp. Cal. Curve

88A 15. Page C-0020, Appendix C SV Telemetry Channel Assignment Summary.

Change Continuous Channels Link 2 (RT)/Link 3 (PB) pulse 6 as follows:

Channels	Frequency	Function	Limits
6	1.7 KC	Command Dec/Prog Busy Signal	
		Quiescent	45 to 64
		POA	-8 to +8
		POA/CD Busy	9 to 26

Channels	Frequency	Function	Limits
		POA/PROG Busy	27 to 44
		CD Busy	65 to 84
		PROG Busy	85 to O.B.H.

88A 16. Page D-0015, SV Launch + Hold/Abort Criteria

Add line 81 to Group II Measurement as follows:

Line No.	Measurements	Link/ Channel/Pulse	Launch Limits Low	High	Remarks
81	Press. Switch (Cold Gas) Low Thrust Tank	2/15/20	23	43	-

88A 17. Pages F-0007 and F-0008, Appendix F Command Allocations.

Change Stored Command, DSPC No. 5, word 1, bits 30, 35, and word 2, bits 9, 10, 11, 13, 14, 16, 17 and 34 to read as follows:

Cmd. Type	Word	Bit Number	Function	States 1/0	Abbrev.	States 1/0
DSPC	1	30	Spare			
No. 5	1	35	Spare			
	2	9	GFE 1-C17	On/Norm	FA	
	2	10	GFE 1-C18	On/Norm	RA	
	2	11	Computer Prearm	On/Norm	CPR	
	2	13	OCV/Agena	Sep/Norm	OVG	
	2	14	Disconnect 2	On/Norm	DS2	
	2	17	Spare			
	2	34	Spare			

88A 18. Page F-0011, Paragraph B. Real Time Command List

In Command Allocations, change Command Descriptor of RTC 11, 12 and 16 to read as follows:

Cmd. No.	Command Descriptor
RTC	
11	High Selector Valve Closed
12	Low Selector Valve Closed
16	High and Low Selector Valves Open

88B 19. Page 4-0008, Table 4.3.2. Weight and Balance Requirements

Change weight of SV at Launch

FROM:
"LT4934**"
TO:
"LT4988**"

85B 20. Page 4-0049, Table 4.5.4.2.4 Separation Function, Timing, and Required Squib Simulator Currents.

For Unit A1811 change

	SV Primary Minimum Current (Amps)	BUSS/Sep. Backup Minimum Current (Amps)
FROM:	7.7	7.0
TO:	7.1	6.3

86B 21. Page 4-0078, Paragraph 4.5.5.3.3 Functional Requirements.

Add Items H and I as follows:

F H. Solenoid Valve Operating Time Requirements - Solenoid thrust valve maximum opening and closing response time shall meet the following requirements:

Type of Valve	Opening Response Time	Closing Response Time
High Flow	0.030 sec.	0.020 sec.
Low Flow (Low Roll Valves Only)	0.020 sec.	0.010 sec.

H H. Solenoid Valve Operating Time Requirements - Solenoid thrust valve maximum opening response time shall meet the following requirements:

Type of Valve	Opening Response Time
High Flow	0.030 sec.
Low Flow (Low Roll Valves Only)	0.020 sec.

F I. The capability of all primary subsystem thrust valves to exhaust gas upon command shall be verified during the final 6V confidence test prior to Agena Mating.

88B 22. Page 4-0082, Paragraph 4.5.5.4 Stabilization Subsystem Operational Requirements.

Add item E as follows:

HF E. To prevent damage to the solenoid valves, a test "Flow Restrictor" or flight nozzle shall be used on each thrust valve whenever the thrust valves are required to port gas. The test "Flow Restrictor" when installed on the vehicle shall be torqued 90 to 120 inch-pounds.

88D 23. Page 4-0110, Add Paragraph 4.5.9.5, Outer Shield Requirements, through paragraph 4.5.9.5.5 as follows:

88D HF 4.5.9.5 Outer Shield Requirements

88D HF 4.5.9.5.1 Cleanliness and Lubrication Requirement

A. Cleanliness requirement - Prior to final installation the outer shield lugs, structure lugs, latch pin, bell crank, bell crank to coupler pin, coupler and bell crank bracket shall be cleaned and inspected to ensure that foreign materials such as dirt, chips, brush hairs, etc. are not present.

88D B. Lubrication requirement - After cleaning, the bearing surfaces of the outer shield lugs, structure lugs, latch pin, bell crank, bell crank to coupler pin, coupler, and bell crank bracket shall be lightly lubricated with silicone grease (171A8231) per Drawing 242R641.

86C HF 4.5.9.5.2 Manual Unlatch Requirement

The total mechanically mated SV (flight configuration) shall meet the following requirements:

HF A. Outer shield release mechanism configuration

1. The shear pin shall not be installed.

2. The explosive pistons may or may not be installed.

3. The outer shield spring shall be in the flight configuration.

HF B. The outer shield shall be manually unlatched a minimum of three (3) times. Each time the force required to disengage the latch pin from the outer shield shall be applied at the Pyro end of the bell crank and shall be 100 pounds minimum and 200 pounds maximum.

F C. The above requirement shall be met just prior to outer shield flight installation.

85B F 4.5.9.5.3 Partial Unlatch Requirement

Prior to outer shield shear pin installation, the total mechanically mated SV (flight configuration) shall meet the following requirements when the outer shield has been installed for flight.

1. The bell crank shall be moved 0.10 ± 0.03 inches.

2. The forces required to move the latch pin shall be applied to the pyro end of the bell crank and shall be 100 pounds minimum, 200 pounds maximum.

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88D HF 4.5.9.5.4 Outer Shield General Requirements

88D HF A. The following requirements shall be met in accordance with installation drawing 242R641:

HF 1. With the bell crank positioned in the flight configuration (touching the pyro, see item B), the latch pin shall be engaged 0.25 inches nominal, 0.20 inches minimum.

HF 2. With lead face of bell crank in contact with face of bell crank bracket, all lugs of latch pin shall be fully contained within lugs of structure half of latch and shall have 0.025 inches minimum remaining travel at all lug locations before re-engagement. Clearance between coupler and structure shall be 0.12 minimum measured in the direction of latch pin motion.

HF 3. With arrestor face in contact with the face of structure latch lug, all lugs of latch pin shall be fully contained within lugs of structure half of latch. A minimum of one lug shall be flush to 0.005 inches less than flush with forward face of structure half of latch. Maximum distance from power piston to bell crank shall be 0.50 inches. Minimum latch pin travel from this position to point where lead face of bell crank contacts face of bell crank bracket shall be 0.145 inches.

88D F B. The outer shield shall be installed per installation drawing 242R641. With the bell crank positioned in the flight configuration and the shear pin installed, maximum gap between the pyro pistons and the bell crank shall be 0.005 inches for one of the pistons and 0.010 inches for the other piston.

88B 24. Page 4-0146, Paragraph 4.6.1.4.3.2 Separation Subsystem.

Delete existing text under this heading and substitute the following:

The validation harness shall be installed in the vehicle. The baroswitch operation shall be simulated. All continuity loops shall be complete. All pyro-electrical functions shall be verified. Pyro simulators shall be used to simulate all non-reversible pyro functions. When it is necessary to provide a pyro operated piston mechanical function, live pyro may be used to verify the electrical function. The separation subsystem operation shall include, but not be limited to, the following separation functions:

1. All separation functions via primary command

2. BUSS separation command sequence.

88B 25. Page 4-0149, Paragraph 4.6.1.4.3.6 Environmental Control Requirements.

Delete first sentence on page, which reads "The thermal dissipation of the operational batteries shall be simulated."

88B 26. Page 4-0155, Paragraph 4.6.1.4.4.1.5.2 Chamber Pump Down or Pump Up Requirements.

Add item 6 under B as follows:

6. The system thermal vacuum operational assurance test may start when zone 35 is less than -55 deg. F.

88C 27. Page 5-0007, Add new paragraph 5.5.3.7 High Thrust Roll Nozzles as follows:

5.5.3.7 High Thrust Roll Nozzles
The roll high thrust test "Flow Restrictor" shall be removed and the flight roll high thrust nozzles shall be installed per the drawing located on the Fairing Access Door. Polarity of the high thrust nozzles shall be verified after installation of flight nozzles.

88B 28. Page 5-0008, Paragraph 5.6.3 Electrical Power and Distribution Subsystem Requirements.

Add item E as follows:

E. The load sharing of any battery as monitored by T/M shall not decrease by more than 40% from the time of batteries installation until launch as shown by the following:

$$\frac{\%\text{ load at installation} - \%\text{ load at any time}}{\%\text{ load at installation}} = \text{less than } 40\%$$

The above requirement is applicable only when the bus voltage is above 30 volts, all batteries are at approximately the same state of discharge, the variation in age of the batteries does not exceed three months and the change in load does not exceed 50% at the time of measuring the change in load sharing.

88E 29. Pages C 0004, C-0005 and C-0006, Appendix C SV Telemetry Channel Assignment Summary

Change IRIG Channel 15 Link 2 (RT) pulses 1, 3, 17, 18 and 22 to read as follows:

Pulse	Telemetry Measurement	Limits
1	H-30 Continuity and Sep. Events	

	Test Primary	Test BUSS	Flight (Info Only)
No Event	18-28	18-28	18-28
Event = 1 - Disc 1	69-79	69-79	69-79
Event = 2 - Disc 2	18-28	18-28	69-79
Event = 3 - Arm	0+-5	0+-5	50-60
Event = 4 - Pin Puller	N/A	N/A	0+-5

Pulse	Telemetry Measurement	Limits
3	Spare	0-10
17	Temp., Low Thrust Cold Gas Tank at 38 Deg. (Sta. 217) at 70 Deg. F.	33-43
18	Temp., High Thrust Cold Gas Tank at 321 Deg. (Sta. 217) at 70 Deg. F.	33-43

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Pulse	Telemetry Measurement	Limits
22	Redundant Penumatics	
	High/Low Section Open Balance Off	-5 +5
	High/Low Section Open Balance On	5-15
	High Section Closed Balance Off	15-25
	Low Section Closed Balance Off	30-40
	High Section Closed Balance On	25-35
	Low Section Closed Balance On	35-45
	High/Low Section Open Commanded	35-45
	High/Low Section Closed	45-55
	High Section Closed Commanded	55-65
	High/Low Section Closed Commanded	85-100
	Low Thrust Off Commanded	60-70

88B 30. Page C-0013 and C-0014, Appendix C SV Telemetry Channel Assignment Summary.

Change IRIG Channel 10 Link 2 (RT)/Link 3 (PB) pulses 14 through 22 inclusive.

	Telemetry Measurement	Limits
FROM:	5V Bus	95-105
TO:	Spare	0-10

88B 31. Page C-0031, Appendix C SV Telemetry Channel Assignment Summary.

Change Continuous Channels Link 4 Channel 10 Unsecure Modes to read as follows:

Channel	Frequency	Function	Limits
10	5.4 KC	BUSS Mode and Event Monitor Unsecure Modes	
		Reset	32-52
		Mode 1 (BRT)	67-77
		Mode 2 (BNS)	77-87
		Mode 3 (BNO)	87-OBH
		Mode 5 (BRTNG)	57-67

86B 32. Page C 0032, Figure C-1, SV Telemetry Subsystem, Block Diagram.

Change caption on multiplexer providing input to Band 10-5.4 KC, SCO Base 1

FROM:
"90 x 1/18 Multiplexer"
TO:
"90 x 1/3 Multiplexer

88B 33. Page C-0001 and C-0002, Appendix G. Canister Zone Temperatures for the +1.7 Sigma and -1.7 Sigma.

Change Hot Case and Cold Case Canister Zone Temperatures for Zones 1 through 43 to read as follows:

Section	Zone	Hot Case Temp. (Deg. F)	Cold Case Temp. (Deg. F)
RV	1	82	53
	2	56	-27
	3	120	29
	4	134	-48
Adapter	5	30	0
	6	63	-19
	7	43	14
	8	49	-22
	9	119	-40
	10	76	-109
	11	66	36
	12	45	-25
5	13	71	29
	14	122	16
	15	89	12
	16	57	-15
	16A	57	-15
	17	112	-2
	18	131	-109
	19	29	-44
	20	106	59
	21	124	4
	22	145	7
6	23	128	-7
	24	81	-18
	25	62	-9
	26	136	-33
	27	99	-115
	28	60	-164

Section	Zone	Hot Case Temp. (Deg. F)	Cold Case Temp. (Deg. F)
	29	-64	-87
	30	29	-44
	31	-5	-66
	32	110	25
	33	110	25
	34	100	38
	43	3	-207
7	35	-59	-110
	36	-86	-110
	37	-33	-51
	38	12	9
	39	-13	-29
	40	-22	-110
	41	Off	Off
	42	Off	Off

88B 34. Page 4-0127, Paragraph 4.5.12 SV Systems E.M.I. Test requirements.

Change the following four Monitor Point Maximum Allowable Levels to read as follows.

Monitor Point	Maximum Allowable Level: Amplitude	Freq. or Duration
+6V Switches, Command Decoder P375 +J, Ret. P	A) +1.8V (Stby-Pwr. On)	
	-1.15V (Stby-Pwr. On)	
	B) +1.25V (Store Cmd. Cmding)	
	-1.0V (Store Cmd. Cmding)	
	C) +1.4V (On-Off)	
	-1.5V (On-Off)	
	D) 1.3V P/P (Store Cmd. Cmding)	30 cps - 15 kcs
	E) 0.75V P/P (Store Cmd. Cmding)	15 kcs - 100 kcs
	F) 0.75V P/P (RTC Cmding)	15 kcs - 100 kcs
	G) 0.75V P/P (Stby-Pwr. On)	15 kcs - 100 kcs

Monitor Point	Maximum Allowable Level Amplitude	Freq. or Duration
-6V Switches, Command Decoder P375 +K, Ret. P	A) +2.75V (Stby-Pwr. On)	
	B) +2.75V (On-Off)	
	C) +2.75V (Store Cmd. Cmding)	
	D) -2.75V (On-Off)	
	E) -2.75V (Store Cmd Cmding)	
	F) 3.0V P/P (All Modes)	Audio
+6V Continuous Command Decoder P375 +S, Ret. P	A) +1.4V (Stby-Pwr. On)	
	B) +0.85V (On-Off)	
	C) +0.85V (RTC Cmding)	
	D) +1.85V (Store Cmd. Cmding)	
	E) -1.4V (Stby-Pwr. On)	
	F) -1.4V (Store Cmd. Cmding)	
	G) -1.3V (On-Off)	
	H) -1.3V (RTC Cmding)	
	I) 1.25V P/P (Stby-Pwr. On)	Audio
-6V Continuous, Command Decoder, P375 +T, Ret. P	A) +1.75V (On-Off)	
	B) -1.75V (On-Off)	
	C) +1.35V (Store Cmd. Cmding)	
	D) -1.3V (Store Cmd Cmding)	

Change +28V, Cmd Prog, P367 + M Ret. K, Item B), Frequency or Duration

FROM:
"10 msec"
TO:
"10 usec"

Change Clock Hold, Command Programmer P367 +BB, Ret. K, Items A and B, Frequency or Duration

FROM:
"5 msec"
TO:
"5 usec"

Change -6V, PPD, P350 +B, Ret. C, Item B)
Frequency or Duration

FROM:
"4 KC "
TO:
"4 MC"

Under Amplitude column of -6V, PPD, P350 +B, Ret. C, add Item E as follows:

E) 25V (On-Off)

Change +28V, Sep. Contr., P760 +T, Ret. E, Item A,
Frequency or Duration

FROM:
"10 vsec"
TO:
"10 usec"

For Monitor Point 1C21A, P1499+W, Ret. Y, delete existing Amplitude and Frequency or Duration levels and substitute the following.

Amplitude	Frequency of Duration
A) +5.0V	10 usec
B) +2.0V	26 usec
C) +0.5V	200 usec
D) +400 MV	Continuously
E) -3.5V	0.1 usec

Change +28V, Low I, PIG Controller, P2101 +H, Ret. J, Items A and B,
Frequency or Duration levels

FROM:
"4 msec pulse"
"3 msec pulse"
TO:
"4 usec pulse"
"3 usec pulse"

For Monitor Point +28V, Redund, Pneu., P1036 + A, Ret. B, add Frequency or Duration levels as follows:

Amplitude	Frequency or Duration
A) +30V	10 usec
B) -12.5V	10 usec

For Monitor Point +28V, 30 x 5 Multiplex, P124 + 19, Ret. 37, add Amplitude and Frequency or Duration levels as follows:

Amplitude	Frequency or Duration
A) +25V	10 usec

88B 35. Page 4-0077, Paragraph 4.5.5.3.3 Functional Requirements

In item C3, first line, change

FROM:
"7.5 psig max"
TO:
"75.0 psig max"

88B 36. Page B-0003, Holdtime Limitations, Electric Power and Distribution Subsystem.

For BUSS/ SEP Backup Batt., add the following to column 5:

Would take about 5 days to recycle for battery replacement (count down assumed).

88C 37. Page 4-0075 Paragraph 4.5.5.3.2 Leakage Requirements

Add to item C

HF	Section	Test Pressure	Leakage Limit
	5. Balance Valves, when deenergized	500 ± 25 in each supply tank	Maximum Total leakage through both balance valves - 200 scc/hr.

88C 38. Page 4-0138 Paragraph 4.6.1.2.1 MAB Mission Profile

Change item 3

FROM:

3. Operation of all one-shot pyro-actuated devices except RV recovery events, shall be verified by the use of simulators.

TO:

3. Operation of all one-shot pyro-actuated devices shall be verified by the use of simulators.

88C 39. Page 4-0100 Table 4.5.8.3.13-1 Circuit Resistance

Change items 16 and 17

FROM:

	Function	Interface		Resistance (OHMS)	
16.	Piston No. 1	A1728/29	1576	0.9	1.1
17.	Piston No. 2	A1730/31	1576	0.9	1.1

TO:

	Function	Interface		Resistance (OHMS)	
16.	Piston No. 1	A1728/29	1588	0.45	0.58
16A	Piston No. 1	A1730/31	1588	0.45	0.58
17.	Piston No. 2	A1728/29	1588	0.45	0.58
17A	Piston No. 2	A1730/31	1588	0.45	0.58

88C 40. Page 4-0078 Paragraph 4.5.5.3.3 Functional Requirements

Add item J as follows

H The thrust nozzle shall meet the following flow requirements after system thermal vacuum:

	CF_4 Flow (SCFM)/per nozzle
High Roll	23 ± 2.3
High Pitch	42.3 ± 4
High Yaw	42.3 ± 4
Low Roll	1.1 ± 0.1

Low Pitch	6.5 ± 0.6
Low Yaw	6.5 ± 0.6
Low Redundant Roll	0.8 ± 0.1

Nitrogen Flow = 1.83 Freon (CF_4) Flow

88E 41. Page 4-0003, Paragraph 4.1.6 Major Harness Rework Requirements

Change to read as follows:

Quality Assurance will determine when a harness falls into this category. The extent to which hi-pot, megger and continuity requirements are to be met, after re-work, will be concurred with by the System or Development Engineer (or their designated representative) before the hi-pot and megger re-tests.

88D 42. Page 4-0019, Paragraph 4.5.1.2.3.4, Current Unbalance.

Add the following as the last part of the sentence:

, when powered by an external power source.

88D 43. Page E-0005, Figure 4.5.5.2.2.3, Rate Roofs.

Replace the figure with the attached (page 29).

88D 44. Page 4-0087, Paragraph 4.5.7.2.2, Leakage Requirement.

Change paragraph B Field

FROM:

Deleted

TO:

F B. Low Pressure - With the entire system (Seven Segments) charged to 60 psig, total leakage rate shall not exceed a value of 34.36 SCC/hr. The gas and propellant burst disc shall be checked for leakage by pressurizing one side of the disc with 50 psig of helium and probing the opposite side with a mass spectrometer leak detector. There shall not be any leakage.

NOTE: It shall be determined that the Rate Roof Inhibit Line does not overlap the Fine Limit Cycle Line such that opposing polarity solenoid valves will not be on simultaneously.

Linearity = ± 2% maximum deviation from best straight line through test points

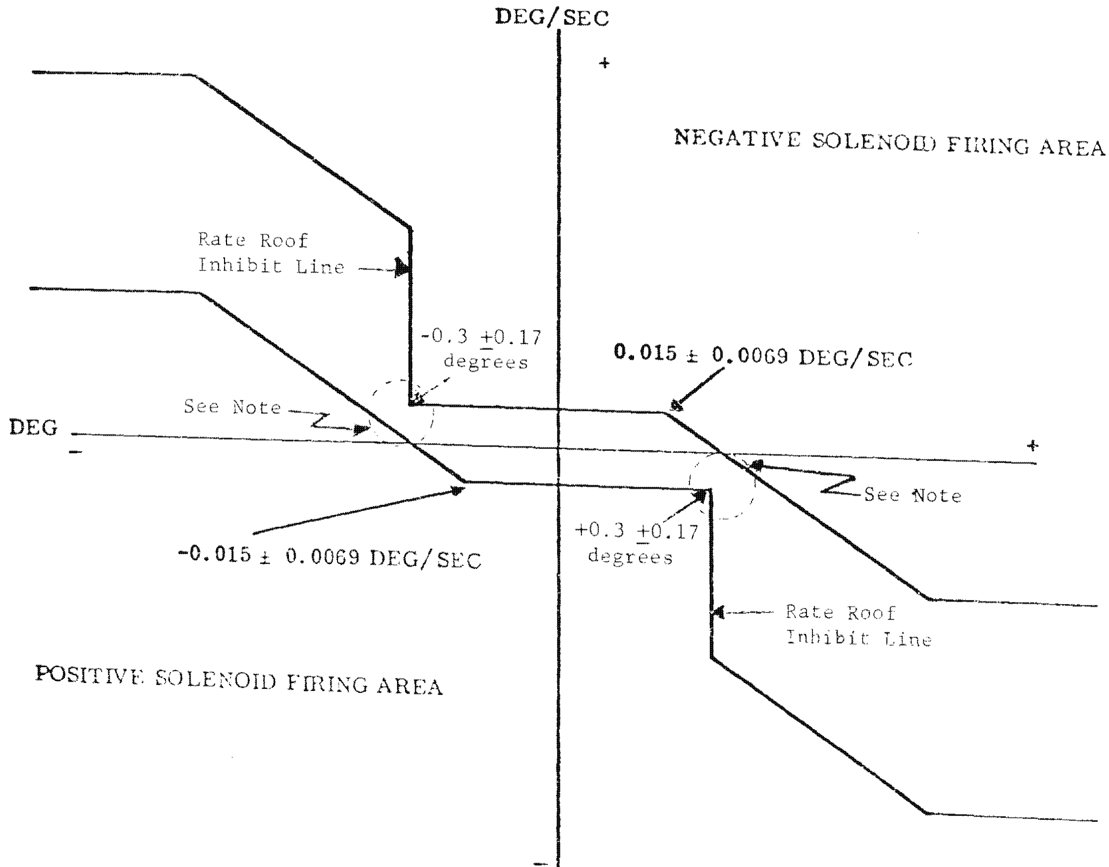

Figure 4.5.5.2.2-3. Rate Roofs

29 SYS 5388

E-0005

88D 45. Page 4-0045, Paragraph 4.5.4.2.3, Separation Subsystem Operation

Subparagraph C; Add H in the margin. (Requirement is for in-house only.)

88D 46. Page C-0023, Link 3 Channel 13 Pulse 4

Change flight level for Sep 4, 5, 6

FROM:
Sep 4, 5, 6 20 - 70

TO:
Sep 4, 5, 6 50 - 70

88D 47. Page 4-0017, Paragraph 4.5.1.2.2, BUSS/Separation Back-up Battery

Item E, Electrolyte, Subparagraph 1 change

FROM:
The volume of electrolyte shall be 60 ± 1cc.

TO:
The volume of electrolyte shall be 63 ± 1cc.

88D 48. Page 4-0107, Paragraph 4.5.9.2.7.3.4, Back-up Mode Torque Requirements

Change the torque requirements to stop the shield in subparagraphs A1, and A2.

FROM:
125 ± 35 inch-pounds

TO:
135 ± 25 inch-pounds

88D F 49. Page 4-0085, Add the following as a new paragraph:

4.5.6.1.7 BUSS Antenna and Magnetometer Fairing Requirements.

The BUSS fairings (Antenna and Magnetometer) shall be unlatched a minimum of three times each. The unlatching shall be accomplished using 54 ± 13 inch-pounds of torque applied to the Manual Unlatch Insert Tool or a similar lever arm.

Approved for Release: 2024/01/30 C05099020

The BUSS fairings shall be installed per GE drawing 689E732, Rev. M.

88E 50. Page 4-0082, Paragraph 4.5.5.4, Stabilization Subsystem Operational Requirements

Change first item under subparagraph C as follows:

FROM:

Pad Abort Solenoid Valve and Balance Valves	For Continuous Electrical Operation, Voltage will be Reduced to 8 volts.

TO:

Pad Abort Solenoid Valve and Balance Valves	For Continuous Electrical Operation, Voltage will be reduced to 12 ± 4 volts.

88E 51. Page 4-0075, Paragraph 4.5.5.3.2, Leakage Requirements

Change subparagraph C as follows:

Add "H" in margin of existing subparagraph 3.

Add additional subparagraph 3 as follows:

88E F	3. Pad Abort Solenoid Valve, when de-energized	3600 + 0 - 150 on downstream side of Pad Abort Squib Valves	120 scc/hr.**

Add "H" in margin of existing subparagraph 4.

Add additional subparagraph 4 as follows:

88E F	4. Quick Disconnect Nipple with Pad Abort Solenoid Valve Energized	3600 + 0 - 150 on downstream side of Pad Abort Squib Valves	120 scc/hr.**

88E 52. Page B-0003, Appendix B, Page B-0002, BUSS/Sep Back Up Battery

Change column 2, 3, and 5 as follows:

2	3	5
16 days nom. See Figure 4.5.1.2.2-1. Must have a min. wet storage time of 5 days prior to inst. in the vech. 5 days min. wet storage establishes day 1 for the 16 days mentioned above.	Repl. Batt. if not launched within wet stand time requirement see Fig. 4.5.1.2.2-1 Maintain temp. below 80 deg. F after activation.	12 days if activated 9 days before launch. Less degrad. than for Operational Battery.

88E 53. Page D-0021, Figure D-4.

Change Fig. D-4 to read Figure 4.5.1.2.2-1

Add to title:

"and BUSS/Sep Battery Drawing 114C1561"

CHANGE ACTIVITY LOG

Vehicle No. 988 Addendum 88E

Addendum & Date	Adden. Page #	Item #	CHANGE INFORMATION					
			Doc. Affected				Differs From	
			Add.	5388	Page	Paragraph	SVS 5388	Veh.
88E 3/7/7	4 - 8	1	X	X	B-0012- B-0018	Appendix B Appendix B	X	89
88A 11/11/6	9	2		X	4-0016	4.5.1.2.1		
88A 11/11/6	9	3			4-0028	4.5.2.2.5.4		
88A 11/11/6	9	4	X		4-0051	Table 4.5.4.2.4		89
88A 11/11/6	9	5			4-0065	4.5.5.2.7.1		
88A 11/11/6	9	6			4-0067	4.5.5.2.7.2		
88A 11/11/6	10	7	X		4-0068	4.5.5.2.7.3		89
88A 11/11/6	10	8			4-0109	4.5.9.2.7.5		
88A 11/11/6	10	9			4-0126	4.5.10.2.4		
88A 11/11/6	11	10			4-0151	4.6.1.4.3.11		
88A 11/11/6	11	11			5-0002	5.3.2		
88A 11/11/6	11	12			5-0007	5.5.3.3		
88A 11/11/6	11	13			5-0007	5.5.3.4		
88A 11/11/6	11	14			C-0005	Appendix C		
88A 11/11/6	12	15			C-0020	Appendix C		
88A 11/11/6	12	16			D-0015	Appendix D		
88A 11/11/6	12	17			F-0007- F-0008	Appendix F		
88A 11/11/6	13	18			F-0011	Appendix F		
1966 88B 12/28	13	19			4-0008	Table 4.3.2	X	
85B 11/23	13	20			4-0049	Table 4.5.4.2.4		
86B 12/1	13	21			4-0078	Para. 4.5.5.3.3		
88B 12/28	14	22			4-0082	" 4.5.5.4		
88D 2/21/7	14	23	X		4-0110	" 4.5.9.5		
88B 12/28	16	24			4-0146	" 4.6.1.4.3.2		

CHANGE ACTIVITY LOG

Vehicle No. 988 Addendum 88E

Addendum & Date	Adden. Page #	Item #	CHANGE INFORMATION					
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			Add.	5388	Page	Paragraph	SVS 5388	Veh.
88B 12/22	16	25			4-0149	Para. 4.6.1.4.3.6		
88B 12/28	16	26			4-0155	" 4.6.1.4.4.1.5.2		
88C 1/20/7	17	27	X		5-0007	" 5.5.3.7		
88B 12/30	17	28			5-0008	" 5.6.3	5380	87
88E 3/7/7	17	29	X		C-0004-6	Appendix C		
88B 12/28	18	30			C-0013 & 14	Appendix C		
88B 12/28	18	31			C-0031	Appendix C		
86B 12/1	18	32			C-0032	Figure C-1		
88B 12/28	19	33			G-0001 & 2	Appendix G		
88B 12/28	20	34			4-0127 thru 4-0130	Para. 4.5.12		
88B 12/30	22	35			4-0077	" 4.5.5.3.3		
88B 12/30	22	36			B-0003	Appendix B		
88C 1/20/7	22	37		X	4-0075	Para. 4.5.5.3.2	X	87
88C 1/20	23	38		X	4-0138	" 4.6.1.2.1	X	87
88C 1/20	23	39		X	4-0100	Table 4.5.8.3.13	X	87
88C 1/20	23	40		X	4-0078	Para. 4.5.5.3.3	X	87
88E 3/7/7	24	41	X	X	4-0003	" 4.1.6	X	87
88D 2/21	24	42		X	4-0019	" 4.5.1.2.3.4	X	87
88D 2/21	24	43		X	E-0005	Fig. 4.5.5.2.2.3	X	87
88D 2/21	24	44		X	4-0087	Para. 4.5.7.2.2	X	87
88D 2/21	24	45		X	4-0045	" 4.5.4.2.3	X	87
88D 2/21	24	46		X	C-0023	Appendix C	X	87
88D 2/21	26	47		X	4-0017	Para. 4.5.1.2.2	X	87
88D 2/21	26	48		X	4-0107	" 4.5.9.2.7.3.4	X	87

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			Add.	5388	Page	Paragraph	SVS 5388	Veh.
88D 2/21	26	49		X	4-0085	Para. 4.5.6.1.7	X	87
88E 2/28	26	50		X	4-0082	" 4.5.5.4	X	87
88E 2/28	27	51		X	4-0075	" 4.5.5.3.2	X	87
88E 2/28	27	52		X	B-0003	Appendix B	X	87
88E 2/28	27	53		X	D-0021	Fig. D-4	X	87

General Electric Company
Missile and Space Division
Special Military Space Project
P. O. Box 8661
Philadelphia, Pennsylvania 19101

DIN: SVS 5388, Addendum 88F
This document contains 38 pages

SYSTEM ACCEPTANCE SPECIFICATION (U)

SVS 5388, Addendum 88F

GENERAL ELECTRIC
SPECIAL MILITARY SPACE PROJECT
MILITARY SPACE PROGRAMS
KING OF PRUSSIA PARK
P.O. BOX 8661, PHILADELPHIA 1, PA.

SVS 5388
Addendum 88F

LIST OF EFFECTIVE PAGES

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SVS 5388, Addendum 88F

APPROVAL PAGE

PREPARED BY:	R. Graytock R. Graytock Flight Systems Engineering	Date: 5-12-67
APPROVED BY:	C. E. Charron Flight Systems Engineering	Date: 5/11/67
APPROVED BY:	P. M. Connaught Systems Engineer	Date: 5/11/67
APPROVED BY:	T. D. McLay T. D. Mc Lay Systems Development Engineer	Date: 5-10-67
APPROVED BY:	L. A. Binegar Military Program Office	Date: 5-11-67
ISSUED BY:	Charles J. Broomall Specification Control	Date: 5-15-67

SVS 5388
ADDENDUM 88F

1.0 GENERAL

1.1 Scope - This specification identifies the changes to the Basic System Acceptance Specification SVS 5388, applicable to SV 988.

2.0 APPLICABLE DOCUMENTS

SVS 5388 System Acceptance Specification

3.0 REQUIREMENTS

This specification is the same as SVS 5388, System Acceptance Specification, except as follows:

88D 1. Pages B-0012 through B-0018, Appendix B Holdtime Limitations Green and Red Line Limits.

Delete existing Red Line Limits Maximum Accumulated Hours or Cycles at Launch and substitute the following:

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
84A	BUSS	
	Auxiliary Timer	500 cycles
	Magnetometer	1600 hrs.
	VHF Receiver	1325 hrs.
	Decoder, Type V	1325 hrs.
	Decoder, Type VIII	1325 hrs.
	Decoder, Type IX (BUSS)	1325 hrs.
	Decoder, Type IX (Command)	1325 hrs.
	Electronic Flight Controller	150 hrs.
	Rate Gyro	100 hrs.
	Thrust Valve	9000 cycles
	Tank	395 cycles
	Junction Box	1900 cycles
	Differential Pressure Transducer	295 cycles
	Temperature Sensor (Tank)	295 cycles
	Junction Box (Selective Address)	1825 cycles
	Fill Solenoid Valve	1500 cycles
	Signal Conditioner	4825 hrs.
	Multiplexer (30 x 2.5)	9890 cycles
	SCO Base 8	1440 hrs.
	Pneumatic Regulator	9000 cycles
	Quick Disconnect	50 cycles
84A	TRACKING AND COMMAND	
	Verlort S-Band Beacon	500 hrs.
	Command Decoder	1885 hrs.

Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
TRACKING AND COMMAND (Continued)	
Power Controller	44800 cycles
Command Programmer	1600 hrs.
Power Supply, 6-Volt	1600 hrs.
Command Decoder Relay Box	97,000 cycles
Latching Contactor	17,000 cycles
Pulse Position Demodulator	9875 hrs.
Power Sequencer	1885 hrs.
88A TELEMETRY	
RF Transmitter (Delta 3)	2875 hrs.
RF Transmitter (Delta 2)	2875 hrs.
Transmitter Transfer Switch Assembly	97,000 cycles
Multiplexer, Dual 30 x 5	9890 hrs.
Command Decoder Busy Sig. Monitor	1885 hrs.
VHF Antenna	N/A
VCO (Base 6 and 7)	1440 hrs.
Mixer Amp. (Base 1,2,3)	1440 hrs.
Audio Ripple Filter	18,000 hrs.
S-Band Antenna	N/A
Multiplexer, 30 x 2.5	9890 hrs.
86A Multiplexer, 90 x 1/3	9890 hrs.
SCO Base 1 (5 Unit)	1440 hrs.
SCO Base 2 (5 Unit)	1440 hrs.
SCO Base 3 (5 Unit)	1440 hrs.
SCO Base 6 (7 Unit)	1440 hrs.
Signal Data Recorder	1885 hrs.
Recording Tape, Drive Belts and Clutch	100 hrs.
Recorder Bearing and Motor	400 hrs.
Component Temp. Det.	4250 hrs.

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
84A	SEPARATION	
	OCV Separation Spring and Guide Assembly	2 lockup of set screw on shaft
	RV OCV Sep. Spring + Guide Assembly	2 lockup of set screw on shaft
	Separation Microswitch	9000 cycles
	Auxiliary Controller	500 cycles at flight current
	Separation Controller	500 cycles at flight current
	Baroswitch	100 cycles at flight current
	Separation Fuse Box	500 cycles at flight current
88A	STABILIZATION ELECTRONICS	
	TARS Gimbal Assembly	
	TARS Platform (Gyros)	1325 hrs.
	TARS Platform (Torque Motors)	1325 hrs.
	Rate Gyro Package	1325 hrs.
	Control Amplifier - Roll	1325 hrs.
	Control Amplifier - Yaw, Pitch	1325 hrs.
	Roll Maneuvering Amplifier	1325 hrs.
	Power Supply DC	9325 hrs.
	TARS Electronics	1325 hrs.
	Resolver Summing Amplifier	1325 hrs.
	Compensator Electronics	2325 hrs.
	IR Sensor Scanner (Barnes)	690 hrs.
	Total Test Time (Barnes + G.E.)	690 hrs.
	GE Maximum Test Time	500 hrs.
	Barnes Mixer Box	690 hrs.
	Predac	2325 hrs.
	Inhibit Box	97,000 cycles
86A	Inhibit Override	97,000 cycles
88A	Redundant Pneumatic Control Box	1600 hrs.

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
88D	STABILIZATION PNEUMATICS	
	Low Press. Transducer (Low Press. System)	N/A
	High Press. Transducer (High Press. System)	N/A
88D	High-Pressure Regulator	20,000 cycles
88D	Low-Pressure Regulator	20,000 cycles
88D	Solenoid Valve	
	Low Yaw	3,750 cycles
	Low Pitch	6,850 cycles
	Low Roll	9,000 cycles
	Redundant Low Roll	9,000 cycles
	High Pitch	8,700 cycles
	High Yaw	8,700 cycles
	High Roll	10,418 cycles
	Freon Tanks	95 cycles
	Pressure Switch	830 cycles
	Quick Disconnect	95 cycles
	Primary Fill Filter	45 cycles
	Pad Abort Solenoid	1,200 cycles
	Secondary Fill Filter	45 cycles
	Pressure Relief Valve	600 cycles
	High Press. Transducer (Tanks)	20,000 cycles
	N/O Squib Valves	N/A
	Temperature Detector	595 hrs.
	Nozzle-High Flow, High Pressure	N/A
	Nozzle-Low Flow, Low Pressure	N/A
	Nozzle-High Flow, Low Pressure	N/A
	Nozzle-Low Flow, High Pressure	N/A
88C	Valve, Solenoid, Balance	1,200 cycles

	Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
88A	ENVIRONMENTAL CONTROL	
	Thermostat	6,000 hrs.
	Compartment Heaters	8,000 hrs.
	Temperature Controller (Differential)	2,900 hrs.
	Temperature Sensor	4,250 hrs.
	Inlet Port Assembly	N/A
	Monitor Assembly	
	Microswitch Phase A	7,250 C
	Microswitch Phase A Setting	1,000 C
	Position Indicator	7,250 C
	Exhaust Port Assembly	N/A
	Magnetic Switch	9,000 C
	Switch Resistance Measurements	1,000 C
	Actuator, Primary and Back-up	7,250 C
	Actuator Brush & Torque Setting	500 C
	Retractable Pin Assembly	
	Flange Assembly	1,000 C
	Retractable Pin	150 C
	Aft Hinge	1,000 C
	Control Logic Box	10,000 C
	Thermal Fuse Module	500 C at flight current
	Fwd. Hinge Shaft Assembly	
	Retaining Pin	1,000 C
	Aft Hinge Assembly	
	Bearing and Ring	1,000 C
	Retaining Pin	1,000 C
84A	ORBIT ADJUST	
	Propellant Tank Fuel Bladder Flexure	4 cycles
	Pressurant Tank No Bladder Flexure	350 cycles
	Propellant Tank Fuel No Bladder Flexure	350 cycles

Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
ORBIT ADJUST (Continued)	
Pressurant Tank	350 cycles
Pneumatic Relief Valve	850 cycles
Pneumatic Regulator	875 cycles
Pneumatic Check Valve and Filter	875 cycles
Press. Fill Valve, Fuel	25 cycles
Press. Fill Valve, Oxidizer	25 cycles
Temperature Sensor	295 cycles at max. temp. 100 hrs. at max. press.
High-Pressure Transducer (Pressurant)	20,000 cycles
Low-Pressure Transducer	N/A
Quick-Disconnect Propellant Fill, Fuel (Nipple)	40 cycles
Quick-Disconnect Propellant Fill, Oxidizer (Nipple)	40 cycles
OCV Relay Box	3,940 cycles
Thrust Chamber Assembly (Hot Firing)	1 minute
Pressure Fill Valve	50 cycles
Tank, Pressure, Supply	350 cycles
Tank Module, Oxidizer	4 cycles
Tank Module, Fuel	4 cycles
Burst Diapraghm, Press.	N/A
Tube, Diapraghm (Fuel)	N/A
Filter In Line	45 cycles
Start Squib Valve	N/A
Tubing and Fittings	N/A
84A FORWARD SECTION	
VCO and Amplifier Assembly	1490 hrs.
Converter Controller	49,950 cycles
Converter	1495 hrs.
Translator, 0.6 G	1498 hrs.
Translator, 0.40 G	1496 hrs.
Transmitter	995 hrs.

Component	Red Line Limits Maximum Accumulated Hours or Cycles at Launch
FORWARD SECTION (Continued)	
Transfer Module	3995 hrs.
Diode Module	470 hrs.
Arm Module	3990 hrs.
Inertial G Switch	984 cycles
Temp. Sensor, Thrust Cone	4325 hrs.
Separation Switch, Thrust Cone	995 cycles
Flashing Light Controller	1950 hrs.
Temp. Sensor, Forebody	4400 hrs.
Ejection Programmer	1980 cycles
Recovery Programmer	1965 cycles
Beacon Controller	1950 hrs.
Beacon	50 hrs.
Flashing Lights	1450 hrs.
Mechanical Timer	2495 cycles
Resistor Module	3995 cycles
Forebody (From Time of Mfg. to Projected Time of Recovery Usage)	18 mos. max.
In Flight Disconnect (SRV/Adapter)	70 cycles
88E ELECTRICAL POWER AND SIGNAL DISTRIBUTION	
Umbilical Disconnect Receptacle	185 cycles
LLCB	2200 hrs.
Relay, Stab. Cutoff	500 cycles
Relay, AGE Instrumentation	500 cycles
Voltage Step-Down Module (BUSS)	2325 hrs.
Plug, In-Flight Disconnect	70 cycles
Receptacle, In-Flight Disconnect	70 cycles
Ampere Hour Counter	2200 hrs.
88E Battery (Operational and Backup)	Holdtime Limitation (Ref.)

88A F 2. Page 4-0016, Paragraph 4.5.1.2.1 Operational Batteries.

Delete item I2 in its entirety.

88A HF 3. Page 4-0028, Paragraph 4.5.2.2.5.4 Vehicle Clock Time Recording.

Delete paragraph in its entirety.

88A HF 4. Page 4-0051, Table 4.5.4.2.4 Separation Function, Timing and Required Squib Simulator Currents.

At end of table, under "Other Functions" add the following:

SV BUSS Sep. Cmd. No.	SV Primary Sep. Cmd. No.	Delta Time (Sec.)	Function	Unit	SV Primary Maximum Current (Amps)	BUSS/Sep. Backup Minimum Current (Amps)
1	N/A	N/A	Primary Gas Disable			
			High Thrust Branch	A1050(2)	N/A	3.0 each
			Low Thrust Branch	A1048(2)	N/A	3.0 each

88A HF 5. Page 4-0065 Paragraph 4.5.5.2.7.1 Functional Commands.

Under "the AGE functions shall be as follows", add item F as follows:

F. ACA Initialize

88A 6. Page 4-0067, Paragraph 4.5.5.2.7.2 Taboo Logic.

Delete item F in its entirety and substitute the following:

HF F. Orbit Adjust On. An Orbit Adjust command (engine 1 on and/or engine 2 on) shall not change the thrust level commanded state in the yaw, pitch and roll ACA's. Low Thrust or High Thrust Jet commands to the ACA during engine 1 on and/or engine 2 on shall cause the S/V to operate in the new commanded state.

88A HF 7. Page 4-0068, Paragraph 4.5.5.2.7.3 Redundant Pneumatic Requirements.

Under sentence which states "The high section (SV-2) and the low section (SV-1) commanded open, followed by a high section (SV-2) command . . . . " delete existing item E in its entirety and substitute the following:

E. Not close the high section (SF-2) squib valve A1050.

Add item F as follows:

F. The RMA shall remain "Disable" and the pitch, yaw and roll ACA shall remain in "Low Thrust", regardless of any other vehicle commanded state, until a "High and Low Selector Valve Open" command has been executed. "

Under sentence which states "The high section (SV-2) and the low section (SV-1) commanded open, followed by a low section (SV-1) command. . . . " delete existing items D and E and substitute the following:

D. ACA high thrust on and switch from high thrust roll nozzle to low thrust redundant roll nozzles.

E. Not close the low section (SV-1) squib valve A1040.

Add item F as follows:

F. The RMA shall remain "Disable" and the pitch, yaw and roll ACA shall remain in "High Thrust", regardless of any other vehicle commanded state until a "High and Low Selector Valve Open" command has been executed.

Under sentence which states "The BUSS function (disable primary pneumatic) shall" delete items A, B, and D.

Change item C to read as follows:

C. Close the high and low section by firing N/O squib valves A1050 and A1048.

88A 8. Page 4-0109, Paragraph 4.5.9.2.7.5 Actuator Limitation.

In left margin, preceding "HF", add "88A".

88A 9. Page 4-0126, Paragraph 4.5.10.2.4 BUSS SV Interface Requirements.

In item 12A change

FROM:
"... command shall..."
TO:
"... command 1 shall..."

88A 10. Page 4-0151, Paragraph 4.6.1.4.3.11 SRV.

In left margin next to paragraph heading change:

FROM:
"80A"
TO:
"88A"

88A 11. Page 5-0002, Paragraph 5.3.2 Thermal Stabilization

At bottom of page change:

FROM:
"STA 305 Bulkhead Temperatures"
TO:
"STA 209 Bulkhead Temperatures"

88A 12. Page 5-0007, Paragraph 5.5.3.3 Stabilization Tanks.

Delete paragraph in its entirety and substitute the following:

The stabilization tanks shall contain 252 $\pm$ 1 pounds of Freon 14 gas meeting the requirements of GE-SMSP Dwg. 255E952D, Propellant Loading Piping Interface, at a maximum static pressure of 4800 psig. The pressure shall not exceed 3600 psig when personnel are in the area. Refer to Figure D1 of Appendix D.

88A 13. Page 5-0007, Paragraph 5.5.3.4 Stabilization Gas Tank Heating.

In last line of paragraph change:

FROM:
"4775 PSIG"
TO:
"4800 PSIG"

88A 14. Page C-0005, Appendix C SV Telemetry Channel Assignment Summary.

Change IRIG Channel 15 Link 2 (RT) pulses 19, 20 and 21 to read as follows:

Pulse	Telemetry Measurement	Limits
19	Low Thrust Supply Press. Gas Tank at 38 deg., Sta. 217	Comp. Cal. Curve
20	Cold Gas Press. Switch Low Thrust	
	Greater than 1000 Psia	23-43
	Between 750 and 1000 Psia	54-74
	Less than 750 Psia	90-100
21	High Thrust Supply Press. Gas Tank at 321 deg., Sta. 217	Comp. Cal Curve

88A 15. Page C-0020, Appendix C SV Telemetry Channel Assignment Summary.

Change Continuous Channels Link 2 (RT)/Link 3 (PB) pulse 6 as follows:

Channels	Frequency	Function	Limits
6	1.7 KC	Command Dec/Prog Busy Signal	
		Quiescent	45 to 64
		POA	-8 to +8
		POA/CD Busy	9 to 26
		POA/PROG Busy	27 to 44
		CD Busy	65 to 84
		PROG Busy	85 to O.B.H.

88A 16. Page D-0015, SV Launch + Hold/Abort Criteria.

Add line 81 to Group II Measurements as follows:

Line No.	Measurements	Link/ Channel/Pulse	Launch Low	Limits High	Remarks
81	Press. Switch (Cold Gas) Low Thrust Tank	2/15/20	23	43	-

88A 17. Pages F-0007 and F-0008, Appendix F Command Allocations.

Change Stored Command, DSPC No. 5, work 1, bits 30, 35, and word 2, bits 9, 10, 11, 13, 14, 16, 17 and 34 to read as follows:

Cmd. Type	Word	Bit Number	Function	States 1/0	Abbrev.	States 1/0
DSPC	1	30	Spare			
No. 5	1	35	Spare			
	2	9	GFE 1-C17	On/Norm	FA	
	2	10	GFE 1-C18	On/Norm	RA	
	2	11	Computer Prearm	On/Norm	CPR	
	2	13	OCV/Agena	Sep/Norm	OVG	
	2	14	Disconnect 2	On/Norm	DS2	
	2	17	Spare			
	2	34	Spare			

88A 18. Page F-0011, Paragraph B, Real Time Command List

In Command Allocations, change Command Descriptor of RTC 11, 12 and 16 to read as follows:

Cmd. No.	Command Descriptor
RTC	
11	High Selector Valve Closed
12	Low Selector Valve Closed
16	High and Low Selector Valves Open

88B 19. Page 4-0008, Table 4.3.2. Weight and Balance Requirements

Change of weight of SV at Launch

FROM:
"LT4934**"
TO:
"LT4988**"

85B 20. Page 4-0049, Table 4.5.4.2.4 Separation Function, Timing, and Required Squib Simulator Currents

For Unit A1811 change

	SV Primary Minimum Current (Amps)	BUSS/Sep. Backup Minimum Current (Amps)
FROM:	7.7	7.0
TO:	7.1	6.3

86B 21. Page 4-0078, Paragraph 4.5.5.3.3 Functional Requirements.

Add items H and I as follows:

F H. Solenoid Valve Operating Time Requirements - Solenoid thrust valve maximum opening and closing response time shall meet the following requirements:

Type of Valve	Opening Response Time	Closing Response Time
High Flow	0.030 sec.	0.020 sec.
Low Flow (Low Roll Valves Only)	0.020 sec.	0.010 sec.

H H. Solenoid Valve Operating Time Requirements - Solenoid thrust valve maximum opening time shall meet the following requirements:

Type of Valve	Opening Response Time
High Flow	0.030 sec.
Low Flow (Low Roll Valves Only)	0.020 sec.

F I. The capability of all primary subsystem thrust valves to exhaust gas upon command shall be verified during the final SV confidence test prior to Agena Mating.

88B 22. Page 4-0082, Paragraph 4.5.5.4 Stabilization Operational Requirements.

Add item E as follows:

HF E. To prevent damage to the solenoid valves, a test "Flow Restrictor" or flight nozzle shall be used on each thrust valve whenever the thrust valves are required to port gas. The test "Flow Restrictor" when installed on the vehicle shall be torqued 90 to 120 inch-pounds.

88D 23. Page 4-0110, Add Paragraph 4.5.9.5, Outer Shield Requirements, through paragraph 4.5.9.5.5 as follows:

88D HF 4.5.9.5 <u>Outer Shield Requirements</u>

88D HF 4.5.9.5.1 <u>Cleanliness and Lubrication Requirement</u>

A. Cleanliness requirement - Prior to final installation the outer shield lugs, structure lugs, latch pin, bell crank, bell crank to coupler pin, coupler and bell crank bracket shall be cleaned and inspected to ensure that foreign materials such as dirt, chips, brush hairs, etc., are not present.

88D B. Lubrication requirement - After cleaning, the bearing surfaces of the outer shield lugs, structure lugs, latch pin, bell crank, bell crank to coupler pin, coupler, and bell crank bracket shall be lightly lubricated with silicone grease (171A8231) per Drawing 242R641.

86C HF 4.5.9.5.2 <u>Manual Unlatch Requirement</u>

The total mechanically mated SV (flight configuration) shall meet the following requirements:

A. Outer shield release mechanism configuration

1. The shear pin shall not be installed.

2. The explosive pistons may or may not be installed.

3. The outer shield spring shall be in the flight configuration.

B. The outer shield shall be manually unlatched a minimum of three (3) times. Each time the force required to disengage the latch pin from the outer shield shall be applied at the Pyro end of the bell crank and shall be 100 pounds minimum and 200 pounds maximum.

C. The above requirement shall be met just prior to outer shield flight installation.

85B F 4.5.9.5.3 Partial Unlatch Requirement

Prior to outer shield shear pin installation, the total mechanically mated SV (flight configuration) shall meet the following requirements when the outer shield has been installed for flight.

1. The bell crank shall be moved 0.10 ± 0.03 inches.

2. The forces required to move the latch pin shall be applied at the pyro end of the bell crank and shall be 100 pounds minimum, 200 pounds maximum.

88D HF 4.5.9.5.4 Outer Shield General Requirements

88D HF A. The following requirements shall be met in accordance with installation drawing 242R641:

HF 1. With the bell crank positioned in the flight configuration (touching the pyro, see item B), the latch pin shall be engaged 0.25 inches nominal, 0.20 inches minimum.

HF 2. With lead face of bell crank in contact with face of bell crank bracket, all lugs of latch pin shall be fully contained within lugs of structure half of latch and shall have 0.025 inches minimum remaining travel at all lug locations before re-engagement. Clearance between coupler and structure shall be 0.12 minimum measured in the direction of latch pin motion.

HF 3. With arrestor face in contact with the face of structure latch lug, all lugs of latch pin shall be fully contained within lugs of structure half of latch. A minimum of one lug shall be flush to 0.005 inches less than flush with forward face of structure half of latch. Maximum distance from power piston to bell crank shall be 0.50 inches. Minimum latch pin travel from this position to point where lead face of bell crank contacts face of bell crank bracket shall be 0.145 inches.

88D F B. The outer shield shall be installed per installation drawing 242R641. With the bell crank positioned in the flight configuration and the shear pin installed, maximum gap between the pyro pistons and the bell crank shall be 0.005 inches for one of the pistons and 0.010 inches for the other piston.

88B 24. Page 4-0146, Paragraph 4.6.1.4.3.2 Separation Subsystem.

Delete existing text under this heading and substitute the following:

The validation harness shall be installed in the vehicle. The baroswitch operation shall be simulated. All continuity loops shall be complete. All pyro-electrical functions shall be verified. Pyro simulators shall be used to simulate all non-reversible pyro functions. When it is necessary to provide a pyro-operated piston mechanical function, live pyro may be used to verify the electrical functio. The separation subsystem operation shall include, but not be limited to, the following separation functions:

1. All separation functions via primary command

2. BUSS separation command sequence.

88B 25. Page 4-0149, Paragraph 4.6.1.4.3.6 Environmental Control Requirements.

Delete first sentence on page, which reads "The thermal dissipation of the operational batteries shall be simulated."

88B 26. Page 4-0155, Paragraph 4.6.1.4.4.1.5.2 Chamber Pump Down or Pump Up Requirements.

Add item 6 under B as follows:

6. The system thermal vacuum operational assurance test may start when zone 35 is less than -55 deg. F.

88C 27. Page 5-0007, Add new Paragraph 5.5.3.7 High Thrust Roll Nozzles as follows:

5.5.3.7 High Thrust Roll Nozzles
The roll high thrust test "Flow Restrictor" shall be removed and the flight roll high thrust nozzles shall be installed per the drawing located on the Fairing Access Door. Polarity of the high thrust nozzles shall be verified after installation of flight nozzles.

88B 28. Page 5-0008, Paragraph 5.6.3 Electrical Power and Distribution Subsystem Requirements.

Add item E as follows:

E. The load sharing of any battery as monitored by T,M shall not decrease by more than 40% from the time of batteries installation until launch as shown by the following:

$$\frac{\%\text{ load at installation} - \%\text{ load at any time}}{\%\text{ load at installation}} = \text{less than } 40\%$$

The above requirement is applicable only when the bus voltage is above 30 volts, all batteries are at approximately the same state of discharge, the variation in age of the batteries does not exceed three months and the change in load does not exceed 50% at the time of measuring the change in load sharing.

88E 29. Pages C-0004, C-0005 and C-0006, Appendix C SV Telemetry Channel Assignment Summary

Change IRIG Channel 15 Link 2 (RT) pulses 1, 3, 17, 18 and 22 to read as follows:

Pulse	Telemetry Measurement			Limits
1	H-30 Continuity and Sep. Events			
		Test		Flight
		Primary	BUSS	(Info Only)
	No Event	18-28	18-28	18-28
	Event = 1 - Disc 1	69-79	69-79	69-79
	Event = 2 - Disc 2	18-28	18-28	69-79
	Event = 3 - Arm	0+-5	0+-5	50-60
	Event = 4 - Arm Puller	N/A	N/A	0+-5
3	Spare			0-10
17	Temp., Low Thrust Cold Gas Tank at 38 Deg. (Sta. 217) at 70 Deg. F.			33-43
18	Temp., High Thrust Cold Gas Tank at 321 Deg. (Sta. 217) at 70 Deg. F.			33-43
22	Redundant Pneumatics			
	High/Low Section Open Balance Off			-5 +5
	High/Low Section Open Balance On			5-15
	High Section Closed Balance Off			15-25
	Low Section Closed Off			30-40
	High Section Closed Balance On			25-35
	Low Section Closed Balance On			35-45
	High/Low Section Open Commanded			35-45
	High/Low Section Closed			45-55
	High Section Closed Commanded			55-65
	High/Low Section Closed Commanded			85-100
	Low Thrust Off Commanded			60-70

88E

88B 30. Page C-0013 and C-0014, Appendix C SV Telemetry Channel Assignment Summary.

Change IRIG Channel 10 Link 2 (RT)/Link 3 (PB) pulses 14 through 22 inclusive.

	Telemetry Measurement	Limits
FROM:	5V Bus	95-105
TO:	Spare	0-10

88B 31. Page C-0031, Appendix C SV Telemetry Channel Assignment Summary.

Change Continuous Channels Link 4 Channel 10 Unsecure Modes to read as follows:

Channel	Frequency	Function	Limits
10	5.4 KC	BUSS Mode and Event Monitor Unsecure Modes	
		Reset	32-52
		Mode 1 (BRT)	67-77
		Mode 2 (BNS)	77-87
		Mode 3 (BNO)	87-OBH
		Mode 5 (BRTNG)	57-67

86B 32. Page C-0032, Figure C-1, SV Telemetry Subsystem, Block Diagram.

Change caption on multiplexer providing input to Band 10-5.4 KC, SCO Base 1

FROM:
"90 x 1/18 Multiplexer"

TO: "90 x 1/3 Multiplexer"

88B 33. Page G-0001 and G-0002, Appendix G. Canister Zone Temperatures for the +1.7 Sigma and -1.7 Sigma.

Change Hot Case and Cold Case Canister Zone Temperatures for Zones 1 through 43 to read as follows:

Section	Zone	Hot Case Temp. (Deg. F)	Cold Case Temp. (Deg. F)
RV	1	82	53
	2	56	-27
	3	120	29
	4	134	-48
Adapter	5	30	0
	6	63	-19
	7	43	14
	8	49	-22
	9	119	-40
	10	76	-109
	11	66	36
	12	45	-25
5	13	71	29
	14	122	16
	15	89	12
	16	57	-15
	16A	57	-15
	17	112	-2
	18	131	-109
	19	29	-44
	20	106	59
	21	124	4
	22	145	7
6	23	128	-7
	24	81	-18
	25	62	-9
	26	136	-33
	27	99	-115
	28	60	-164
	29	-64	-87
	30	29	-44
	31	-5	-66
	32	110	25
	33	110	25
	34	100	38
	43	3	-207

Section	Zone	Hot Case Temp. (Deg. F)	Cold Case Temp. (Deg. F)
7	35	-59	-110
	36	-86	-110
	37	-33	-51
	38	12	9
	39	-13	-29
	40	-22	-110
	41	Off	Off
	42	Off	Off

88B 34. Page 4-0127, Paragraph 4.5.12 SV Systems E.M.I. Test requirements.

Change the following four Monitor Point Maximum Allowable Levels to read as follows.

Monitor Point	Maximum Allowable Level Amplitude	Freq. or Duration
+6V Switches, Command Decoder P375 +J, Ret. P	A) +1.8V (Stby-Pwr. On)	
	-1.15V (Stby-Pwr. On)	
	B) +1.25V (Store Cmd. Cmding)	
	-1.0V (Store Cmd. Cmding)	
	C) +1.4V (On-Off)	
	-1.5V (On-Off)	
	D) 1.3V P/P (Store Cmd. Cmding)	30 cps - 15 kcs
	E) 0.75V P/P (Store Cmd. Cmding)	15 kcs - 100 kcs
	F) 0.75V P/P (RTC Cmding)	15 kcs - 100 kcs
	G) 0.75V P/P (Stby-Pwr. On)	15 kcs - 100 kcs
-6V Switches, Command Decoder P375 +K, Pet. P	A) +2.75V (Stby-Pwr. On)	
	B) +2.75V (On-Off)	
	C) +2.75V (Store Cmd. Cmding)	
	D) -2.75V (On-Off)	
	E) -2.75V (Store Cmd. Cmding)	
	F) 3.0V P/P (All Modes)	Audio
+6V Continuous, Command Decoder, P375 +S, Ret. P	A) +1.4V (Stby-Pwr. On)	
	B) +0.85V (On-Off)	
	C) +0.85V (RTC Cmding)	
	D) +1.85V (Store Cmd. Comding)	
	E) -1.4V (Stby-Pwr. On)	
	F) -1.4V (Store Cmd. Cmding)	

	G) -1.3V (On-Off)	
	H) -1.3V (RTC Cmding)	
	I) 1.25V P/P (Stby-Pwr. On)	Audio
-6V Continuous, Command Decoder P375 +T, Ret. P	A) +1.75V (On-Off)	
	B) -1.75V (On-Off)	
	C) +1.35V (Store Cmd. Cmding)	
	D) -1.3V (Store Cmd Cmding)	

Change +28V, Cmd Prog, P367 + M Ret. K, Item B), Frequency or Duration

FROM:
"10 msec"
TO:
"10 usec"

Change Clock Hold, Command Programmer P367 +BB, Ret. K, Items A and B, Frequency or Duration

FROM:
"5 msec"
TO:
"5 usec"

Change -6V, PPD, P350 +B, Ret. C, Item B), Frequency or Duration

FROM:
"4 KC"
TO:
"4 MC"

Under Amplitude column of -6V, PPD, P350 +B, Ret. C, add Item b as follows:

E) 25V (On-Off)

Change +28V, Sep. Contr., P760 +T, Ret. E, Item A, Frequency or Duration

FROM:
"10 vsec"
TO:
"10 usec"

For Monitor Point 1C21A, P1499+W, Ret. Y, delete existing Amplitude and Frequency or Duration levels and substitute the following.

Amplitude	Frequency or Duration
A) +5.0V	10 usec
B) +2.0V	26 usec
C) +0.5V	200 usec
D) +400 MV	Continuously
E) -3.5V	0.1 usec

Change +28V, Low I, PIG Controller, P2101 + H, Ret. J, Items A and B, Frequency or Duration levels

FROM:
"4 msec pulse"
"3 msec pulse"
TO:
"4 usec pulse"
"3 usec pulse"

For Monitor Point +28V, Redund. Pneu., P1036 + A, Ret. B, add Frequency or Duration levels as follows:

Amplitude	Frequency or Duration
A) +30V	10 usec
B) -12.5V	10 usec

For Monitor Point +28V, 30 x 5 Multiplex, P124 + 19, Ret. 37, add Amplitude and Frequency or Duration levels as follows:

Amplitude	Frequency or Duration
A) +25V	10 usec

88B 35. Page 4-0077, Paragraph 4.5.5.3.3 Functional Requirements.

In item C3, first line, change
FROM:
"7.5 psig max"
TO:
"75.0 psig max"

88B 36. Page B-0003, Holdtime Limitations, Electrical Power and Distribution Subsystem.

For BUSS/SEP Backup Batt., add the following to column 5:

Would take about 5 days to recycle for battery replacement (count down assumed).

88C 37. Page 4-0075 Paragraph 4.5.5.3.2 Leakage Requirements

Add to item C

HF

Section	Test Pressure	Leakage Limit
5. Balance Valves when deenergized	500 ± 25 in each supply tank	Maximum Total leakage through both balance valves -200 sec/hr.

88C 38. Page 4-0138 Paragraph 4.6.1.2.1 MAB Mission Profile

Change item 3

FROM:
3. Operation of all one-shot pyro-actuated devices except for RV recovery events, shall be verified by the use of simulators.

TO:
3. Operation of all one-shot pyro-actuated devices shall be verified by the use of simulators.

88C 39. Page 4-0100 Table 4.5.8.3.13-1 Circuit Resistance

Change items 16 and 17

FROM:

Function	Interface	Resistance (OHMS)	
16. Piston No. 1	A1728/29 1576	0.9	1.1
17. Piston No. 2	A1730/31 1576	0.9	1.1

TO:

16. Piston No. 1	A1728/29 1588	0.45	0.58
16A Piston No. 1	A1730/31 1588	0.45	0.58
17. Piston No. 2	A1728/29 1588	0.45	0.58
17A Piston No. 2	A1730/31 1588	0.45	0.58

88C 40. Page 4-0078 Paragraph 4.5.5.3.3 Functional Requirements

Add item J as follows:

H The thrust nozzle shall meet the following flow requirements after system thermal vacuum:

	CF_4 Flow (SCFM)/per nozzle
High Roll	23 ± 2.3
High Pitch	42.3 ± 4
High Yaw	42.3 ± 4
Low Roll	1.1 ± 0.1
Low Pitch	6.5 ± 0.6
Low Yaw	6.5 ± 0.6
Low Redundant Roll	0.8 ± 0.1

Nitrogen Flow = 1.83 Freon (CF_4) Flow

88E 41. Page 4-0003, Paragraph 4.1.6 Major Harness Rework Requirements

Change to read as follows:

Quality Assurance will determine when a harness falls into this category. The extent to which hi-pot, megger and continuity requirements are to be met, after re-work, will be concurred with by the System or Development Engineer (or their designated representative) before the hi pot and megger re-tests.

88D 42. Page 4-0019, Paragraph 4.5.1.2.3.4, Current Unbalance.

Add the following as the last part of the sentence:

, when powered by an external power source.

88D 43. Page E-0005, Figure 4.5.5.2.2.3, Rate Roofs.

Replace the figure with the attached (page 30).

88D 44. Page 4-0087, Paragraph 4.5.7.2.2, Leakage Requirement.

Change paragraph B Field

FROM: Deleted

TO:

B. Low Pressure - With the entire system (Seven Segments) charged to 60 psig, total leakage rate shall not exceed a value of 34.36 SCC/hr. The gas and propellant burst disc shall be checked for leakage by pressurizing one side of the disc with 50 psig of helium and probing the opposite side with a mass spectrometer leak detector. There shall not be any leakage.

88D 45. Page 4-0045, Paragraph 4.5.4.2.3, Separation Subsystem Operation

Subparagraph C; Add H in the margin. (Requirement is for in-house only.)

88D 46. Page C-0023, Link 3 Channel 13 Pulse 4

Change flight level for Sep 4, 5, 6

FROM: Sep 4, 5, 6 20 - 70

TO: Sep 4, 5, 6 50 - 70

NOTE: It shall be determined that the Rate Roof Inhibit Line does not overlap the Fine Limit Cycle Line such that opposing polarity solenoid valves will not be on simultaneously.

Linearity = ± 2% maximum deviation from best straight line through test points

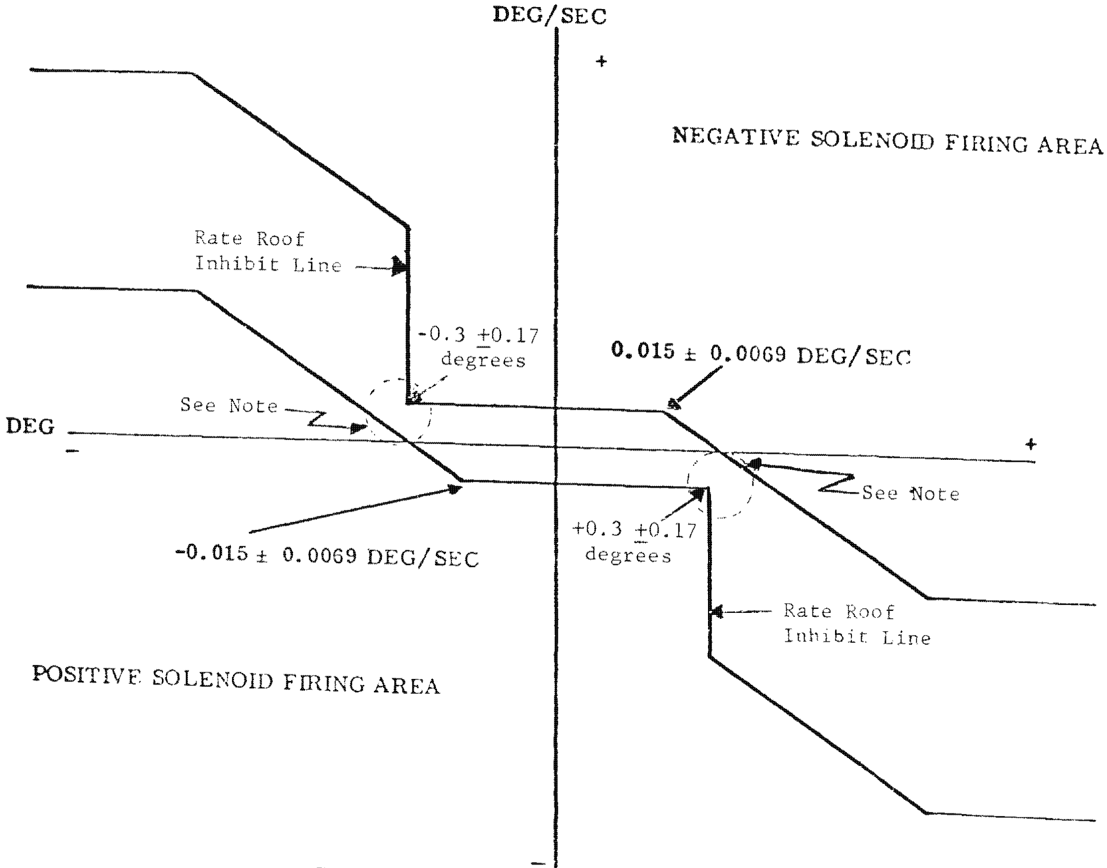

Figure 4.5.5.2.2-3. Rate Roofs

88D 47. Page 4-0017, Paragraph 4.5.1.2.2, BUSS/Separation Back-Up Battery Item E, Electrolyte, Subparagraph 1 change

FROM: The volume of electrolyte shall be 60 ±1cc.

TO: The volume of electrolyte shall be 63 ±1cc.

88D 48. Page 4-0107, Paragraph 4.5.9.2.7.3.4, Back-up Mode Torque Requirements Change the torque requirements to stop the shield in subparagraphs A1, & A2.

FROM: 125 ±35 inch-pounds

TO: 135 ±25 inch-pounds

88D F 49. Page 4-0085, Add the following as a new paragraph:

4.5.6.1.7 BUSS Antenna and Magnetometer Fairing Requirements.

The BUSS fairings (Antenna and Magnetometer) shall be unlatched a minimum of three times each. The unlatching shall be accomplished using 54 ± 13 inch-pounds of torque applied to the Manual Unlatch Insert Tool or a similiar lever arm.

The BUSS fairings shall be installed per G.E. drawing 689E732, Rev. M.

88E 50. Page 4-0082, Paragraph 4.5.5.4, Stabilization Subsystem Operational Requirements

Change first item under subparagraph C as follows:

88E FROM:	Pad Abort Solenoid Valve and Balance Valves	For Continuous Electrical Operation, Voltage will be reduced to 8 volts.
TO:	Pad Abort Solenoid Valve and Balance Valves	For Continuous Electrical Operation, Voltage will be reduced to 12 ± 4 volts.

88E 51. Page 4-0075, Paragraph 4.5.5.3.2, Leakage Requirements

Change subparagraph C as follows:

Add "H" in margin of existing subparagraph 3.

Add additional subparagraph 3 as follows:

88E	F	3.	Pad Abort Solenoid Valve, when de-energized	3600 + 0 - 150 on downstream side of Pad Abort Squib Valves	120 scc/Hr. **

Add "H" in margin of existing subparagraph 4.

Add additional subparagraph 4 as follows:

88E	F	4.	Quick Disconnect Nipple with Pad Abort Solenoid Valve Energized	3600 + 0 - 150 on downstream side of Pad Abort Squib Valves	120 scc/Hr. **

88E 52. Page B-0003, Appendix B, Page B-0002, BUSS/Sep Back Up Battery

Change column 2, 3, and 5 as follows:

2	3	5
16 days nom. See Figure 4.5.1.2.2-1. Must have a min. wet storage time of 5 days prior to inst. in the vech. 5 days min. wet storage establishes day 1 for the 16 days mentioned above.	Repl. Batt. if not launched within wet stand time requirement see Fig. 4.5.1.2.2-1. Maintain temp. below 80 deg. F after activation.	12 days if activated 9 days before launch. Less degrad. than for Operational Battery.

88E 53. Page D-0021, Figure D-4.

Change Fig. D-4 to read Figure 4.5.1.2.2-1

Add to title:

"and BUSS/Sep Battery Drawing 114C1561"

88F 54. Page C-0024, Appendix C., Link 3 Channel 13

Pulse 12, 13, 14
Change to read:

From:

Pulse	Telemetry Measurement	Limits %
12	Temp. 216 Bulkhead at 82 deg (High Roll Solenoid)	25-39
13	Temp 216 Bulkhead at 262 deg (High Roll Solenoid)	18-32
14	Temp. BUSS Beam at 358 deg. (Balancing Valves)	19-33

To:

Pulse	Telemetry Measurement	Limits %
12	Temp BUSS Beam at 358 deg (Balancing Values A-1044 at 70°F)	18-39
13	Temp 216 Bulkhead at 242 deg (High Roll Solenoid A-1052 at 70°F)	18-39
14	Temp 216 Bulkhead at 62 deg (High Roll Solenoid A-1053 at 70°F)	18-39

88F 55. Page 4-0052, Table 4.5.4.2.4 Separation Function, Timing, and Required Squib Simulator Current (SRV Recovery Function)

Change to read:

From:

Function	Unit	Minimum Current (amps)
Spin Valve	A1606(2)	3.0 ea
Rocket Initiator	A1607	3.5
Despin Valve	A1608(2)	3.0 ea
Capsule Thrust Cone	A1601	3.0
Inflight Disconnect	A1602	3.0
Capsule Thrust Cone	A1609	3.0
Explosive Bolt	A1610	3.0

Parachute Cover	A1728	3.0
	A1729	3.0
	A1730	3.0
	A1731	3.0

To:

Function	Unit	Minimum Current (amps)
Spin Valves	A1606A1	4.4 amps
	A1606A2	4.4
Rocket Initiator	A1607	8.3
Despin Valves	A1608A1	4.4
	A1608A2	4.4
Capsule Thrust Cone	A1601	3.0
Inflight Disconnect	A1602	3.0
Capsule Thrust Cone	A1609	3.0
Explosive Bolt	A1610	3.0
Parachute Cover		
Piston #1	A1728, A1729, A1730, A1731	11.4
Piston #2	A1728, A1729, A1730, A1731	11.4

88F 56. Page C-0007, Appendix C Link 2 (RT) Link 3 (PB) Channel 14, Pulse 1 and 2.

Change to read:

From:

Pulse	Telemetry Measurement	Limits %
1	Roll Torque Motor Voltage (caged)	30-70
2	Pitch Torque Motor Voltage (caged)	30-70

To:

1	Roll Torque Motor Voltage (caged)	+12.5 to -12.5 Volts
2	Pitch Torque Motor Voltage (caged)	(Refer to component cal. curve)

CHANGE ACTIVITY LOG								
Vehicle No. 988						Addendum 88 F		
Addendum & Date	Adden. Page #	Item #	CHANGE INFORMATION					
			Doc. Affected				Differs From	
			Add.	5388	Page	Paragraph	SVS 5388	Veh.
88E 3/7/7	4-8	1	X	X	B-0012- B-0018	Appendix B Appendix B	X	89
88A 11/11/6	9	2		X	4-0016	4.5.1.2.1		
88A 11/11/6	9	3			4-0028	4.5.2.2.5.4		
88A 11/11/6	9	4	X		4-0051	Table 4.5.4.2.4		89
88A 11/11/6	9	5			4-0065	4.5.5.2.7.1		
88A 11/11/6	9	6			4-0067	4.5.5.2.7.2		
88A 11/11/6	10	7	X		4-0068	4.5.5.2.7.3		89
88A 11/11/6	10	8			4-0109	4.5.9.2.7.5		
88A 11/11/6	10	9			4-0126	4.5.10.2.4		
88A 11/11/6	11	10			4-0151	4.6.1.2.3.11		
88A 11/11/6	11	11			5-0002	5.3.2		
88A 11/11/6	11	12			5-0007	5.5.3.3		
88A 11/11/6	11	13			5-0007	5.5.3.4		
88A 11/11/6	11	14			C-0005	Appendix C		
88A 11/11/6	12	15			C-0020	Appendix C		
88A 11/11/6	12	16			D-0015	Appendix D		
88A 11/11/6	12	17			F-0007- F-0008	Appendix F		
88A 11/11/6	13	18			F-0011	Appendix F		
1966								
88B 12/28	13	19			4-0008	Table 4.3.2	X	
85B 11/23	13	20			4-0049	Table 4.5.4.2.4		
86B 12/1	13	21			4-0078	Para. 4.5.5.3.3		
88B 12/28	14	22			4-0082	Para. 4.5.5.4		
88D 2/21/7	14	23	X		4-0110	Para. 4.5.9.5		
88B 12/28	16	24			4-0146	Para. 4.6.1.4.3.2		
88B 12/22	16	25			4-0149	Para. 4.6.1.4.3.6		
88B 12/28	16	26			4-0155	Para. 4.6.1.4.4.1.5.2		
88C 1/20/7	17	27	X		5-0007	Para. 5.5.3.7		

CHANGE ACTIVITY LOG

Vehicle No. 988 — Addendum 88 F

Addendum & Date	Adden. Page #	Item #	CHANGE INFORMATION: Doc. Affected: Add.	5388	Page	Paragraph	Differs From: SVS 5388	Veh.
88B 12/30	17	28			5-0008	Para. 5.6.3	5380	87
88E 3/7/7	17	29	X		C-0004-6	Appendix C		
88B 12/28	18	30			C-0013 & 14	Appendix C		
88B 12/28	18	31			C-0031	Appendix C		
86B 12/1	18	32			C-0032	Figure C-1		
88B 12/28	19	33			G-0001 & 2	Appendix G		
88B 12/28	20	34			4-0127 thru 4-0130	Para. 4.5.12		
88B 12/30	22	35			4-0077	Para. 4.5.5.3.3		
88B 12/30	22	36			B-0003	Appendix B		
88C 1/20/7	22	37		X	4-0075	Para. 4.5.5.3.2	X	87
88C 1/20	23	38		X	4-0138	Para. 4.6.1.2.1	X	87
88C 1/20	23	39		X	4-0100	Table 4.5.8.3.13	X	87
88C 1/20	23	40		X	4-0078	Para. 4.5.5.3.3	X	87
88E	24	41	X	X	4-0003	Para. 4.1.6	X	87
88D 2/21	24	42		X	4-0019	Para. 4.5.1.2.3.4	X	87
88D 2/21	24	43		X	E-0005	Fig. 4.5.5.2.2.3	X	87
88D 2/21	24	44		X	4-0087	Para. 4.5.7.2.2	X	87
88D 2/21	24	45		X	4-0045	Para. 4.5.4.2.3	X	87
88D 2/21	24	46		X	C-0023	Appendix C	X	87
88D 2/21	26	47		X	4-0017	Para. 4.5.1.2.2	X	87
88D 2/21	26	48		X	4-0107	Para. 4.5.9.2.7.3.4	X	87
88D 2/21	26	49		X	4-0085	Para. 4.5.6.1.7	X	87
88E 2/28	26	50		X	4-0082	Para. 4.5.5.4	X	87
88E 2/28	27	51		X	4-0075	Para. 4.5.5.3.2	X	87
88E 2/28	27	52		X	B-0003	Appendix B	X	87
88E 2/28	27	53		X	D-0021	Fig. D-4	X	87
88F 5/12	28	54		X	C-0024	Appendix C	X	87
88F 5/12	28	55		X	4-0052	Table 4.5.4.2.4	X	87
88F 5/12	29	56		X	C-0007	Appendix C	X	87

APPENDIX 22

SYSTEM REQUIREMENTS SPECIFICATION

DIN: 2865-162-2

53 Sheets

PROGRAM G

SYSTEM REQUIREMENTS SPECIFICATION

Revision 1

and

Addenda

2 through 9

5 January 1967

LIST OF EFFECTIVE PAGES

This document contains 53 pages, consisting of the following:

Title

A

1 through 51

PROGRAM G
SYSTEM REQUIREMENTS
SPECIFICATION
Revision 1
20 February 1963

Addendum 1	See Note
Addendum 2	5 August 1963
Addendum 3	6 December 1963
Addendum 4	21 April 1964
Addendum 5	27 May 1964
Addendum 6	8 July 1964
Addendum 7	9 November 1964
Addendum 8	25 August 1965
Addendum 9	26 August 1965

Note: Reference to Addendum 1 deleted by specific exclusion from compliance documents listed in [redacted] Exhibit Z-C.

This document incorporates the changes made to the revised system requirements specification by Addenda 2 through 9, inclusive. It is issued for internal use only. Changes and reference to the addendum making the changes are denoted by a vertical line and asterisk (*|).

1.0 SCOPE

This specification establishes design requirements on the Gambit Reconnaissance Satellite System.

2.0 APPLICABLE DOCUMENTS

MIL-E-6051C	Interference Limits and Methods of Measurements, Electrical and Electronic Installation in Airborne Weapons Systems and Associated Equipment.
MIL-I-26600	Interference Control Requirements, Aeronautical Equipment.
MIL-T-26985A	Telemetry Standards for Missiles and Aircraft
MIL-W-8160B	Wiring, Guided Missile, Installation of, General Specification for
MIL-E-8189B	Electronic Equipment, Guided Missiles, General Specification for
MIL-E-26144	Electric Power, Missile, Characteristics and Utilization, General Specifications for

General Electric/Eastman Kodak

SVS 104Z (Revised)	GE/EK External Internal Environmental Design Criteria
SVS 105Z (Revised)	EK Program W - GE Program Z Interface Specification, (deleted) *
GE/LMSC SVS 4382	Program 206 System Interface Specification SV/S01A *

Lockheed

LMSC Spec. 6117 Revised	General Environmental Specification for Agena and Associated Payload Equipment

* Addendum 2

3.0 REQUIREMENTS

3.1 General Systems Requirements

The Aerospace Vehicle will consist of a Modified Atlas D, a Modified Agena D booster, a satellite vehicle, and a photographic payload contained therein. Ascent powered flight and orbit injection will be accomplished by the booster combination of the Atlas D and Agena D.

Following injection, the Satellite Vehicle (SV), [comprising the Orbital Control Vehicle (OCV) and the Re-entry Vehicle (RV)] and the photographic payload, will separate from the Agena D. The SV, following complete separation from the boost system, will provide the initial orbit correction and will proceed in its orbit responding to appropriate commands and will obtain very high resolution photography of specified targets in regions north of 30° N latitude. Dependent on the time of launch, photography will be accomplished by a South to North or North to South orbit track. Based upon ephemeris data obtained through the use of Air Force Satellite Control Facility, the initial orbit correction requirement will be established as will subsequent orbit adjust operations of the SV. Following completion of the photographic portion of the mission a final orbit adjust will be provided as required to cause the ground track to intersect the selected retrieval area. At an appropriate time following the final orbit correction, the RV portion of the SV will be separated and through its own deboost propulsion system will eject from orbit to impact in the selected retrieval area. The primary impact area is a broad ocean area within the PMR. Retrieval will be accomplished by one of two modes:

1. Air retrieval
2. Water pickup

Program objectives require a quick reaction capability of selecting any one of a number of trajectories with final trajectory selection to be made as late as possible prior to launch. The N.S. - S.N. capability can be changed in the MAB cycle prior to the installation of the photographic payload in the OCV.

As an additional requirement the Agena D and SV shall be capable of remaining connected after orbit injection. In this mode (to be referred to hereafter as the hitchup mode) the Agena D will provide attitude control. The OCV will not be required to provide attitude control or orbit adjust while attached to the Agena. After separation of the Agena D and the OCV, the OCV shall be capable of performing all normal functions. "Hitchup" mode shall not exceed 40 hours of orbital duration.

3.1.1 Aerospace Vehicle General Performance Requirements

3.1.1.1 Atlas D

The Atlas D is required to deliver the Agena D, and SV combination to a specified position in space and impart thereto a velocity consistent with successful injection into orbit following the subsequent Agena D boost. Nominally, the Atlas is thus required to boost its own sustainer burnout weight plus 19,600 lbs., to an altitude of 571,000 ft., imparting to it a velocity of approximately 15,500 ft/sec. This performance will be achievable recognizing a 3 sigma deviation from nominal Atlas performance parameters.

3.1.1.2 Agena D

The Agena D following successful Atlas D boost is nominally required to deliver itself, plus the SV, to a nominal altitude of 90 n.m. to 120 n.m., in a near-circular orbit with an inclination of 80° to 105°. The Agena D must therefore provide a velocity increment of approximately 10,500 ft/sec. to a weight of 6,500 lb., of which the SV weighs up to 5100 lbs. The Agena D must control its attitude during its boost intp orbit such that the post injection velocity vector will be within ± 3.6 milliradians (3 sigma variation) of the nominal direction and within ± 18.5 ft/sec. (3 sigma variation) from the nominal direction orbit velocity. Further, injection will be biased toward super-orbital conditions to prevent undue orbit decay prior to the initial orbit correction. As stated in Paragraph 3.1, the Agena shall have the capability of remaining attached and be used as the attitude control vehicle.

3.1.1.3 Satellite Vehicle (SV)

The SV will have a propulsion system capability providing 400 ft/sec. velocity increment or decrement for orbit adjust where this velocity increment can be imparted in the forward direction with respect to the SV configuration. The useful * impulse shall be at least 80,000 lb/sec. of which the first seven

* Addendum 6

minutes shall provide 40,000 lb/sec. with a thrust axis alignment within $\pm$ 0.25 degree. Total impulse shall be at least 60,000 lb/sec.

The deboost prepulsion system shall provide a velocity increment to the re-entry vehicle to effect orbit ejection.

The attitude control subsystem shall have the capability of re-orienting the vehicle attitude about the roll axis. The roll attitude shall vary from zero (0) plus or minus forty-five (45°) degrees. The control system shall have sufficient control impulse to perform at least 350 roll re-orientation maneuvers at a roll rate of one (1) degree per second.

3.1.1.4 Payload

The Satellite Vehicle will contain a Photographic Payload capable of providing: strip photographs, or up to 600 stereo or lateral pairs of specified ground target photographs having a resolution corresponding to 2 to 3 feet, for vertical photography from an altitude of 95 n.m. The Photographic Payload is defined as the aerial camera and its associated airborne film handling and control equipments within the SV including the Photographic Film.

In the hitchup mode photography is limited to zero roll angle photography.

3.1.2 Aerospace Vehicle Reliability Requirements

Each reliability figure given below represents the minimum probability that all in-line functions to be performed by each vehicle will successfully take place when this vehicle is presented with an opportunity to perform. A confidence level of

.90 shall be associated with design to meet the reliability objective.

3.1.2.1 The Atlas D and Agena D vehicles being utilized on this program are expected to have a combined boost reliability of .5; their reliability objectives are .95 each or .90 combined.

3.1.2.2 <u>Satellite Vehicle Reliability</u>

Reliability shall be defined as the probability that the satellite vehicle will perform satisfactorily when the satellite vehicle is presented with an opportunity to perform. For purposes of this program, reliability shall be divided into two categories; i.e., Reliability Design Objective and Reliability Flight Requirement.

3.1.2.2.1 <u>Reliability Design Objective</u>

Reliability design objective shall be defined as that reliability number assigned to the satellite vehicle for purposes of design apportionment to the subsystem and component level - said number being treated as a goal in the SV design against which a continual design assessment will be made and reported prior to each flight.

The reliability figure given below represents the calculated minimum probability that all in-line performance functions of the SV will successfully take place when an opportunity to perform is presented for vehicles 951 through 960. (The reliability design objective for each component, subsystem and system shall be established by a reliability apportionment.) *

SV Design Objective = 0.95

For purposes of calculation, the contractors portion of the

* Addendum 3

critical Aerospace Ground Equipment shall be considered as an in-line function.

3.1.2.2.2 Reliability Flight Requirement

Flight reliability relates to that portion of the program involving the actual launch, orbit flight, re-entry and retrieval of the SV or portions of the SV. It is required that the observed frequency of satisfactory satellite vehicle flight performance conform, in the minimum sense, to the following tables:

Number of Opportunities for SV to Perform	Unsatisfactory if Flight Performance is Unsatisfactory for more than
First Six Flight Tests	
1 - 3	2
4 - 6	3
Flight Test Seven and Following	
1 - 4	1
5 - 9	2
10 - 15	3

The criteria for satisfactory SV flight performance shall be defined prior to each flight. The contractor may exclude from consideration in the table for Flight Test Seven and Following any one or all of flight vehicles seven through ten for vehicles 951 through 960. * This part of the table is associated, in the mathematical sense, with a reliability of 0.88 based on the assumption of a 90 per cent one-sided confidence level, binomial distribution.

3.1.2.2.3 AGE Reliability Demonstration Requirement

AGE End Items 7.1, 8, 88, 89, 110, 112, and 118 (utilized during

* Addendum 3

the period from SV mating on the PAD until launch) shall demonstrate no more than the maximum allowable failures in the table below. A failure shall be defined as any malfunction of the above end items which requires a hold of the countdown during the T-30 minutes and counting period as defined in the countdown sequence.

*NUMBER OF EQUIVALENT LAUNCHES	MAXIMUM ALLOWABLE FAILURES
0 - 9	1
10 - 18	2
19 - 29	3

For information purposes the above table is based on a 94% reliability with a 90% confidence.

*Equivalent Launch Definition

1. Each complete launch shall count as one launch.
2. Aborted launches will be counted as equivalent launches on the basis that time accumulated after T-30 as defined in the countdown sequence on all aborted launches will be divided by 270 minutes to determine the number of equivalent launches. (Fractions of equivalent launches will be counted as an equivalent launch.)

3.1.2.3 The photographic subsystem shall have an engineering performance requirement to achieve a 95% reliability factor on a 60% information return with an engineering confidence level objective of 90%.

3.1.3 Aerospace Vehicle Weight Budgets

Following is the design goal weight allocation which will represent the maximum weights for each vehicle:

Modified Atlas D including propellants (at lift off) - 263,500 lbs.

Modified Agena D including propellants (and adaptor) - 15,200 lbs.

Satellite Vehicle, including propellants, less payload - 3,587 lbs. ***

Photograph Payload, including film - 1,182 lbs. **

Stellar Index Camera - 32 lbs. *

(Lifeboat weight allocation deleted) **

The weight of the pressure bulkhead between the Agena D and the SV is not included in the 3587 pounds. An additional 120 lb. *** maximum is allocated to the Satellite when flight experiment hardware is flown in the 6th battery well. * An additional 132 lbs. *** maximum is allocated to the Satellite Vehicle when an 8th battery is flown in the 8th battery well.

3.1.4 Preflight and Flight Environments

Preflight and Flight Environments shall be as defined in GE/EK Specification SVS 104Z, Revised - External and Internal Environmental Design Criteria and LMSD Specification 6117 Revised.

3.1.5 Electrical Design Requirements

The Aerospace Vehicle will be designed in accordance with the following:

3.1.5.1 Electrical Noise and Interference

All subsystems of the Aerospace Vehicle shall comply with MIL-I-26600 and MIL-E-6051C except as specifically authorized. An electrical interference plan will be furnished in accordance with the requirements of MIL-I-26600.

* Addendum 4
** Addendum 5
*** Addendum 8

3.1.5.2 Grounding, Bonding, and Shielding

Applicable MIL Specifications shall be used as appropriate.

3.1.6 Range of Flight Requirements

In Section 3.5, the nominal and extreme performance is described. The system shall be capable of functioning within the following limits:

1. Orbit inclination, 80° to 105° as achieved by launch azimuths at PMR between 172° and 197°.
2. Orbit altitudes, 83 to 150 n.m.
3. Photographic altitude while over selected target areas 95 ± 12 n.m. The system will be capable of operation up to 125 n.m. with degradation of data.
4. Maximum apogee of 270 n.m. after orbit adjust correction prior to deboost. No photography will be required after this event. This correction will be applied such that a perigee of approximately 100 n.m. will exist at the deboost point.
5. Orbital duration of 6 days with early call-down capability. ***
6. Launch window, lift-off shall occur between one hour before * or after meridian midnight or meridian noon.
7. Call-down may be initiated on either a S-N or a N-S orbit track. The time of call-down may be either day or night.

3.1.6.1 Fly Low Capability

The minimum fly low capability shall be based on a minimum altitude of 70 nautical miles with a minimum apogee determined by thermal requirements of $90^{\circ}F$ maximum internal temperature of the RV. The RV internal temperature shall be determined by appropriate TM

* Addendum 6
*** Addendum 8

available during flight. The vehicle life based on 350 equivalent degree/second maneuvers shall be 7 days using (Ti, Al, V) cold gas tanks with PAD cap-off, 10,200 lb/sec. impulse. **

3.1.6.2 West Launch Mission Capability *

Effective SV 968 the Satellite Vehicle shall have, upon installation of the extended capability Mod-Kit, the optional capability of operation under the following orbital conditions:

Launch Window	0200 PST Nominal
Orbital Inclination	130° Nominal
Apogee	$280\ ^{+0}_{-10}$ n mi
Perigee	100 ± 10 n mi
Location of Perigee	20 to 35° North Latitude

Recovery shall be South to North during local daylight hours into a mid-Pacific Ocean recovery area. Maximum SRV weight at separation from the OCV shall be 365 lbs. to provide BUSS re-entry capability.

3.1.7 SV System Accuracy

To achieve the over-all system performance objective of 2 to 3 feet ground resolution as specified in Paragraph 3.2.4.2.1, the 3 sigma ground smears caused by the SV system including photographic payload and an uncertainty of $\pm$ 0.5 n.m. in SV altitude during photography (at nominal conditions of 95 n.m. altitude and an exposure time of 1/400 sec.) shall not exceed the following:

	Vertical Photograph	15° Stereo 30° Obliquity Photograph
in track	0.75 foot	1.25 foot
cross track	0.90 foot	1.14 foot

* Addendum 6
** Addendum 9

The Agena-to-OCV alignment in the roll joint configuration will contribute no more than 0.25 degree misalignment in the pitch, roll and yaw dimensions. This error when combined with all other errors will not exceed 0.94 degree in pitch, 0.91 degree in roll, and 1.0 degree in yaw in altitude accuracy. The requirements of this paragraph shall be waived when there is IR disturbance present within the scan-cone as evidenced by telemetry. *

* Addendum 6

3.2 Aerospace Vehicle

3.2.1 Atlas D

The Atlas D will be described in GDA Model Spec. AXD-27-002C (dated 15 December 1961) and addendum thereto defining 698AL requirements.

3.2.2 Agena D

The modified Agena D will be described in Detailed Specification for the Agena D vehicle. It will include the lifeboat package until lifeboat is incorporated in the OCV.

3.2.3 Satellite Vehicle

3.2.3.1 General

The satellite vehicle, consisting of an orbital control vehicle (OCV) and re-entry vehicle (RV), shall separate from the Agena D and will perform as described in Paragraph 3.1. Both the RV and OCV will be light-weight structures. The cylindrical OCV shall contain components of a propulsion subsystem for orbit adjust and deboost, an attitude control subsystem, components of the tracking telemetry and command subsystem together with components of the electrical power subsystem, environmental control subsystem and camera payload. The RV configuration will be a sphere-cone as close as possible in every detail to the present 162 configuration. It will be attached to the forward end of the OCV and separable therefrom. The re-entry vehicle shall contain an event telemetry subsystem, an electrical power subsystem, a deorbit propulsion subsystem, a retrieval subsystem and associated airborne film handling equipment. The RV shall be separated from the OCV with sufficiently small disturbances and subsequently sufficiently stabilized to provide acceptable low dispersion arising from tipoff rates, thrust misalighments and other asymmetries during ejection from orbit. The RV will be ejected from orbit, to impact in an ocean area. The OCV shall be capable of being ejected from orbit when sufficient impulse is available. Flotation following impact will be required for the RV only. However, protection of the equipment from natural environments is a requirement upon the SV throughout the mission and for the RV following impact. Retrieval aids in the RV, in the form of a VHF Beacon and the telemetry transmitter, both operating from separation, and a flashing light, operating after parachute deployment, are included. The VHF beacon will operate a minimum of 10 hours. Retrieval will be effected under nominal conditions by air retrieval. It shall be a design objective for the RV to impact within a 3 sigma impact rectangle of 15.4 x 150.2 nautical miles and centered on the predicted impact point except when * re-entry is implemented by the BUSS subsystem. The OCV will include a backup stanilization and command system (BUSS) adequate for orientation of the OCV immediately prior to RV separation and initiating the RV separation sequence. The BUSS subsystem shall consist of a repackaging of the Agena lifeboat components. The BUSS subsystem will be incorporated on Vehicle 954 and subsequent vehicles.

* Addendum 2

3.2.3.2 Electrical Power and Signal Distribution Subsystem

3.2.3.2.1 Function

The electrical power and signal distribution subsystem shall provide the primary electrical energy for the SV including photographic payload and shall distribute all electrical functions (power and signals) between components and major elements.

3.2.3.2.2 Operational Power Supply

The operational power supply (consisting of an adequate number of batteries) shall supply the electrical energy for all components and major elements of the SV including photographic payload from lift-off through orbital flight, and until separation of the OCV and RV; it shall continue to power the OCV through OCV deorbit. The nominal voltage of these batteries shall be 28.0 volts DC. These batteries shall be capable of operating at a mean bulk temperature of 50° F. External heaters shall be used to maintain the batteries at a temperature which will optimize total usable electrical energy.

3.2.3.2.2.1 Terminal Power Source *

A back-up power source (Terminal Power Source) shall be provided and be capable of supplying sufficient energy to enable recovery of the SRV by use of the Back Up Stabilization Subsystem should the primary operational power source not have sufficient energy to accomplish SRV recovery. Sufficient energy shall be available in the Terminal Power Source to provide a minimum orbital lifetime of 20 revolutions and still accomplish recovery of the SRV using BUSS.

* Addendum 9

3.2.3.2.3 Re-entry and Retrieval Battery

The re-entry battery or batteries will supply power for all of the components and major elements of the RV from after separation until the re-entry and retrieval sequence is completed.

3.2.3.2.4 (Entire paragraph deleted.)

3.2.3.2.5 Electrical Wire Harnesses

The electrical wire harness shall provide suitable electrical paths for the distribution of electrical power and signals to the components, major elements and photographic payload. The wiring shall be such as to minimize noise and interference problems through use of twisted pairs, shields, coaxes, etc. The harness shall be suitable for operation in a vacuum environment. The maximum voltage drop in any individual circuit from battery to using component and return attributable to the harness including connectors at the battery and at the component and all connectors between shall be 0.5 volts DC. Voltage drops in primary leads of up to 1 volt will be permitted where this can be shown to be consistent with voltage requirements at the component and does not involve common wiring resistance to two or more components leading to an interference problem. Wiring circuits to pyrotechnics and return shall be capable of handling a maximum of four times the minimum all-fire current of the pyrotechnic except for the RV which is a maximum of two times.

3.2.3.2.6 Internal/External Power Transfer Switch

An internal/external transfer switch shall be used approximately two minutes before lift off to transfer the AGE power supply to the SV operational power supply. The transition shall be made so as to have no deleterious effect on the components or the system's operation.

3.2.3.2.7 In-flight Disconnects

The in-flight disconnect between the RV and the OCV shall be of a type suitable for obtaining a clean separation with negligible resulting disturbing forces caused by the activation of this disconnect. This disconnect shall contain sufficient pins of the proper size and sufficient coaxial leads to provide reliable operation between the RV and the OCV.

3.2.3.2.8 Umbilical Connector

The satellite vehicle shall contain its own umbilican connector.

3.2.3.2.9 Test Connectors

The umbilical connector also shall serve as a suitable test connector. It may be supplemented by manually removable test connectors as required. There shall be an external (SV) test connector for use by the photographic payload. Mating test plugs other than the umbilical shall be removed immediately prior to missile service tower (gantry) rollback.

3.2.3.2.10 SV/Agena D Interface

There shall be no electrical interface between the SV and Agena D except for the "hitchup" mode. During the hitchup mode, there shall be an electrical interface to provide the following four commands from the Agena to the SV:

Initiate	-	2 minutes to 3 hours prior to arm command
Arm	-	75 seconds prior to separation command
Transfer	-	2.5 seconds prior to separation command
Separate command		

Hitchup mode will not be employed commencing with Vehicle 954. *

3.2.3.2.11 SV/Photographic Payload Electrical Interface

The SV shall provide all of the required wiring power, signals, etc., to the photographic payload. Interface specification SVS 105Z, Revised, entitled, "EK Program W-GE Program Z Interface Specification Revised" (EK drawing #502-146) will apply.

3.2.3.3 Tracking, Telemetry and Command

The SV will contain all airborne components of the tracking, telemetry and command subsystem. Basic tracking capability will be accomplished by use of the Verlort "S" band radar, operating in conjunction with a transponder beacon in the SV and providing range-angle data. The primary RF link used for transmitting commands to the vehicle will be by pulse position modulation of the Verlort radar. The command system will have adequate capacity to execute all real time and stored time commands as required. No encryption is required. There shall be a provision for securing the RV de-orbit function command security. The photographic payload shall be provided with the

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commands (both real time and stored program, including real times commands for focus adjust) which may be required. Sufficient measurements shall be obtained by telemetry to enable necessary command generation and decision in addition to the adequate monitoring of the operation and environment of photographic payload. Telemetry transmission will be in the IRIG frequency band of 215-260 mc. A combination of FM/FM and PAM/FM/FM modulation will be used. A separate event telemetry subsystem will be incorporated in the RV.

3.2.3.3.1 Tracking and Command (TS &SV)

The command subsystem will parallel as closely as possible that in use for Program 201 (P201), Mod 1A. Differences from that subsystem are outlined below.

The TS and SV command subsystem consists of the following components.

a) Command Encoder

b) Pulse Position Modulator

c) Pulse Position Demodulator

d) Command Decoder

e) Command Programmer

f) Command Decoder Relay Box

3.2.3.3.1.2 Component Description

Command Encoder

This unit will be the same unit as used in P201, Mod 1 (Mod 1A), minimal changes. *

Pulse Position Modulator. This unit will be the same unit as used in P201, Mod 1 with minimal changes.

Pulse Position Demodulator (PPD). This unit will be the so-called "Delay Line Decoder" version of the Pulse Position Demodulator utilized with the P201 Mod 1B Program.

Command Decoder. The Command Decoder will have the following requirements.

Response to 7-bit Real Time Commands (RTC) from the PPD. This command decoder will turn on ready to receive 7-bit RTC. It will respond to a given set of RTC's in exactly the same fashion as the Program 201 Decoder-Translator.

Response to 37-bit commands from the PPD. When the command decoder has received one of four RTC which select delay lines of the programmer, it will be ready to receive 37 bit commands. These commands will be presented to the programmer where they will be stored.

The command decoder will not interpret 37-bit commands from the PPD, but it will identify and interpret one special code of the 37-bits to mean "prepare to receive 7-bit commands and release the selected programmer delay line". When the command decoder identifies this special 37-bit code, it must generate a "verify" signal for telemetry.

Response to commands from the Programmer. The programmer will present 45 information bits (the 45 information bits may have other nonfunctional bits interspersed among them) to the command decoder at the time a command is to be performed. The command decoder will interpret three of these bits to establish the manner of decoding the other 42.

The time period for stereo operation which consists of a combination of T1, T2, T3, and T4 are required to have the following time values. (T2-T1, is camera operating time, T2-T1 is equivalent to T4-T3, and is defined as camera operating time. T3-T2 is defined as the time between end of first photographic shot and beginning of second shot).

T3-T2. Time values for eight times represented by these bits should be 3.2, 5.3, 7.4, 9.5, 11.6, 13.7, 15.8, and 17.9 secs.

T2-T1. The time values for sixteen times represented by these bits shall be 2.0, 2.7, 3.4, 4.1, 4.8, 5.5, 6.2, 7.6, 8.3, 9.0, 9.7, 10.4, 11.1, 11.8, and 12.5 secs.

Command Programmer (CP). The CP will be an enlarged and modified version of the Program 201 CP.

Storage Format. The storage format will be exactly the same as the P201 CP. Upon receipt of 37-bit commands from the command decoder, the CP will respond exactly as the P201 CP, providing verify and reject signals, and storing consecutive accepted commands in successive word positions.

The CP will identify and interpret one special code of the 37 bits to mean "erase the selected delay line".

Time Comparison. Time comparison over bits P4 to P26 will take place exactly as in the P201 CP. The comparison will be made with bits held in a clock component which will be identical to the P201 CP clock component.

Output Address. Bit P31 will be an output address. If P31 equals 1, the output will be to the command decoder. If P31 equals 0, the output will be to line terminated with some proper impedance.

Read Out Requirement. Upon a proper time comparison in a stored command the CP will read out to the selected output adress bits P29 to P39 of the command containing the time label and bits P4-P26 and bits P29-P39 of the command immediately following (in the delay line) the command containing the time label.

3.2.3.3.1.3 Security

Security will be provided to prevent an unauthorized agent from initiating control deorbit maneuver. All commands which directly initiate firing an engine(s) capable of deorbiting the vehicle will be protected by a secure code word. The secure key code storage device will store 127 code words which are cyclicly accessed. 37-bit key words will be used to provide cryptographic security to 1:3 x 10^5 when randomly interrogated by an unauthorized agent during a total of sixty 6-minute tracking passes. All feasible measures shall be included to enhance anti-spoof capability; however, cryptographic security is not required.

3.2.3.3.2 Backup Command for RV de-orbit Initiation

The electrical and mechanical components that presently constitute the Agena lifeboat assembly shall be repackaged for inclusion in the SV as backup for the stabilization reorientation and RV deboost initiation. *

3.2.3.4 Attitude Control

A SV Attitude control subsystem shall operate during the orbital (including photographic) and deboost phases of flight to provide proper vehicle stabilization. The attitude control subsystem shall consist of a horizon sensing device mounted on a two axis gyro stabilized platform, and appropriate electronic and logic circuitry. Cold Gas reaction jets will be utilized to provide restoring moments and roll torques for reorienting vehicle attitude for camera pointing.

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3.2.3.4.1 Functional Requirements

Agena Separation Phase

Separation from the Agena shall be accomplished in a manner to assure no interference during separation and to provide full attitude control immediately following separation. The horizon sensor shall be capable of obtaining horizon lock within 30 seconds after separation and attitude control pneumatics shall remain disengaged until shortly after separation.

In-orbit Phase

The attitude control subsystem is required to stabilize and point the satellite vehicle during orbit. The satellite vehicle shall be stabilized with its longitudinal axis in the orbital plane and normal to the local vertical. The attitude control subsystem shall be capable of rolling the SV about the local horizontal to that angle specified by the in-flight programmer. The number of selectable discrete roll angles shall be such that the angle chosen is within 1/2 degree of the desired roll pointing angle. The control system shall be capable of rolling the payload vehicle at least $\pm 45^{\circ}$ about the local horizontal. The programmer will command the roll angle required to proceed from picture to picture. The control systems horizon sensor shall maintain horizon lock at all times during these maneuvers. There shall be three nominal roll slewing rates of 0.25°/sec., 1.5°/sec., and 3.0°/sec. The SV shall be capable of maneuvering 1.5° and settling out to photographic resolution requirements within seven seconds. The maximum settling time shall be 6 seconds for all other maneuvers. Settling time is defined as the time above the phase plane ideal parabolic trajectory time required to get into and remain within the final limit cycle. There shall be a capability of at least 350 roll maneuvers at an average rate of one degree per second and average amplitude of 30°.

In-orbit Phase - Photographic Subsystem Not Operating

The control system is required to stabilize the SV during in-orbit phase. The payload vehicle will be oriented as during photographic operations except that it will be rolled so that the camera points along the local vertical. The horizon sensor will maintain horizon locks at all times.

Orbit Adjust

The attitude control subsystem is required to stabilize the SV during secondary propulsion firings. The horizon sensor will maintain horizon lock.

Deboost Phase

The attitude control subsystem is required to stabilize the SV during orbit and for the deboost maneuvers: it will orient the vehicle by yawing 180° and pitching (nose down) to the proper deorbit angle. The horizon sensor shall maintain horizon lock during the orientation period. The RV will be separated for deorbit engine firing to properly control the deorbit velocity vector.

Control of the OCV is required following RV separation to allow OCV solo operation for evaluation purposes.

3.2.3.4.2 Accuracy Requirements

Orbit Adjust Phase

During secondary propulsion firing, the SV shall be stabilized to

(a) Orbit adjust
(b) RV spin-up
(c) RV de-spin
(d) RV deorbit
(e) (Deleted) *
(f) OCV deboost
(g) SV attitude control

3.2.3.5.1 Attitude Control and OCV Spin-up Pheumatics

A cold gas attitude control subsystem will utilize pitch, yaw and roll nozzles located on the OCV structure in such a manner as to produce the maximum moments and minimize cross coupling.

The gas plumes issuing from the nozzles shall not interfere with the horizon sensing devices. Valves will be designed for a minimum life of 12,000 cycles per valve.

The roll nozzles may be utilized prior to RV separation as a backup to spin the SV to a partial spin rate in case of an emergency operation.

3.2.3.5.2 Orbit Adjust, Orbital Control Vehicle (OCV) Deboost Propulsion

Periodic velocity corrections are required to compensate for the effects of aerodynamic drag on the vehicle. A hot gas hypergolic bipropellant system is provided for this purpose. Storable propellants will be used capable of proper operation over a temperature range of 30°F to 120°F. Two rearward firing engines will be utilized. Each engine will have a thrust level of approximately 50 pounds. In order to provide for injection errors and orbit corrections, a minimum velocity capability of 400 ft/sec.

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within ± 1° in pitch, ± 2° in yaw, ± 2° in roll (3 sigma values).

On-orbit Phase - Photographic System Operating

The on-orbit stabilization, position, and rate accuracies will be determined from system trade-offs based on on-orbit operation requirements and as specified in the EK Program W and GE Program Z Interface Specification SVS 105Z and EK Drawing 502-146 Revised.

In-orbit Phase - Photographic Subsystem Not Operating

The control mode accuracy without camera operation will be determined by minimizing control energy consumption. Switch from "fine" (with camera operating) to "coarse" (without camera operating) shall be used only if a useful weight saving or reduction in required operation cycles is achieved. If such a mode change is used, the "coarse" stabilization accuracy will be determined by minimizing control and pneumatic system weights.

Deboost Phase

(first sentence deleted). Following RV separation and extending * through ejection, the attitude of the OCV will be controlled for at least one revolution around the earth to an accuracy necessary to permit achievement of a 3 sigma impact rectangle of 100 x 500 n.m. when sufficient deboost impulse is available to impart a 400 ft/sec. velocity decrement.

3.2.3.5 Satellite Vehicle Propulsion Subsystems

The SV propulsion systems are required to perform the following functions:

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imparted to the satellite vehicle is required. Because of the short total burning time and intermittent operation of the engines, thrust chamber reliability and restart operation will be enhanced by the use of ablative cooling.

3.2.3.5.3 Re-entry Vehicle Deorbit Propulsion

The deorbit velocity is achieved by utilizing a single retrorocket.

3.2.3.5.4 RV Spin-up and De-spin

A cold gas subsystem shall be used to spin stabilize the RV prior to the activation of the RV deorbit subsystem and de-spin after retro firing to achieve acceptable dispersion.

3.2.3.6 Re-entry/Retrieval Sequence

This re-entry/retrieval sequence can be divided into four phases: deorbit, re-entry, impact, and retrieval or three for air snatch: deorbit, re-entry and retrieval.

3.2.3.6.1 Deorbit

The deorbit events will be preceded by a yaw-around maneuver of the SV. The SV will then be pitched down to an angle (approximately 60^{o}) chosen to minimize range dispersion from deorbit. (third sentence deleted). The RV is separated from the OCV by pin pullers and springs. Immediately after separation from the OCV, RV spin shall be provided and the RV deorbit retrorocket shall be fired. During the deorbit maneuver, the telemetry system and the VHF transponder beacon in the RV will be operative. The SV will have the capability of spinning up prior to RV separation. *

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3.2.3.6.2 Re-entry Impact and Retrieval

After deorbit the RV, with the telemetry systems and beacons still operating, is in free-fall along a ballistic trajectory. Blackout of all transmission from the vehicle occurs at approximately 350,000 feet and continues to an altitude of approximately 70,000 feet.

The parachute deployment and retrieval phase sequence will be initiated by re-entry deceleration sensing. When the vehicle senses 3 g's deceleration the recovery programmer and timer are to be activated and control the recovery sequence.

When the vehicle deceleration decreases to less than 3 g's, the recovery programmer shall cause the thermal cover parachute deployment sequence, as noted below, to occur at the same time causing the heat shield to be detached from the capsule. The recovery programmer initiates commands to activate four (4) parachute thermal cover piston ejection devices. The firing of the four (4) pyrotechnic piston ejection devices drives the parachute thermal cover through the aerodynamic wake. Ejection of the parachute thermal cover also accomplishes the physical unlocking of the capsule from the forebody. The first stage decelerator parachute is deployed from a line attached to the parachute thermal cover. Deployment of the decelerator parachute mechanically initiates a main parachute deployment pyrotechnic timer.

Deployment of the decelerator parachute provides sufficient aerodynamic drag force to separate the capsule from the forebody.

Ten (10) seconds after deployment of the decelerator parachute the pyrotechnic timer initiates guillotine cutters, thereby detaching the decelerator parachute from the capsule and deploying the main parachute in the reefed condition. Deployment of the main parachute in the reefed condition mechanically initiates two (2) pyrotechnic reefing line cutters.

After four (4) seconds delay, the reefing line cutters function and allow the main parachute to deploy to the disreefed or full open condition.

The main parachute will be full-open at approximately 50,000 ft. and will provide minimum descent time to impact of approximately 30 minutes during which time the capsule can be air-retrieved.

If air retrieval is not accomplished, water impact will occur and the capsule will float with the capsule centerline along a vertical axis.

After a minimum of 50 and a maximum of 90 hours, if retrieval of the capsule has not taken place, sink ports will open allowing the capsule to flood and sink.

A recovery inhibit means shall be incorporated which initiates * at a specific time. This time shall be specified such that if the vehicle would impact 3200 miles or greater down range of the nominal impact point using lifeboat or the OCV on a North-South

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recovery, then the recovery inhibit function shall initiate a time sequence (activating the recovery programmer) approximately equivalent to the deceleration timed sequence noted above. In the event of a South-North recovery, the OCV command system shall initiate the sequence when the impact point is 2400 miles or greater down range of the predicted impact point. The sequence causes deployment of the parachute thermal cover and parachute as noted above and consequent mechanical detachment of the heat shield from the capsule. For an overshoot, of the nominal impact point, of less than 1400 miles, the inhibit function shall not be exercised.

3.2.3.6.3 (Entire paragraph deleted.)

3.2.3.6.4 (Entire paragraph deleted.)

3.2.3.7 Separation

There are three separation sequences occurring during the mission. The first takes place during the Agena D coast phase; the second takes place when the Agena D is separated from the SV shortly after injection except during the hitchup mode as defined in Paragraph 3.1; the third occurs when the RV is separated from the OCV prior to RV deorbit.

3.2.3.7.1 Ejectable Door

There shall be a protective door on the OCV, which shall be jettisoned, on stored command. (Remainder deleted) Jettison of this door shall expose the environmental door and camera viewing port. The completion of hatch ejection shall be signaled via telemetry. *

3.2.3.7.2 OCV-RV Separation Sequence

The OCV-RV separation sequence has been described in Paragraph 3.2.3.6.1. After the OCV is separated from the RV it remains in orbit until it can be deboosted into an ocean area when deboost impulse is available.

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3.2.3.8 Structure

The Satellite Vehicle (SV) consists of two sections having two distinct functions: an orbital control vehicle (OCV) housing a high-acuity camera and all vehicle subsystems required for on-orbit operation and a re-entry vehicle (RV) housing airborne film handling equipment which is required to re-enter and impact in a specified area.

3.2.3.8.1 Orbital Control Vehicle (OCV)

The OCV structure consists primarily of a cylindrical outer skin which serves as an aerodynamic fairing on ascent, a compression load carrying member during ascent and deboost, and a radiation shield while on orbit. The diameter of the cylindrical shell will be 60 inches to eliminate the necessity for a conical interface when mating to the Agena D and to allow as much room as possible for the camera. The stabilization and control elements, such as the infrared sensors will be located on structural members that are supported from the OCV through the Agena D separating plane so that the required view will be available following separation. Access openings will be constructed in the outer skin as required. An opening in the structure that will permit an unobstructed camera view of the earth will be provided within the orbit sequence. A solar radiation reflecting door will be provided inside this opening which will be opened only during photographic and focus passes, and will be closed at other times to simplify thermal control.

The OCV loading is critical during boost and consists of bending and axial compression loads in conjunction with exit heating. Structural configurations such as honeycomb, sandwiches, or waffle construction and materials such as aluminum or magnesium will be considered. Selection of material and the construction will be made based on evaluation of these factors. The camera shall be attached to the shell in such a manner that the loads are transmitted to the shell as uniformly as possible to reduce shell weight and to minimize deflections of critical camera parts.

3.2.3.8.2 Re-entry Vehicle Structure (RV)

Re-entry loads are critical on the RV structure. Re-entry loading includes the effects of thermal and aerodynamic loads upon entering the atmosphere, deceleration loads occurring at parachute opening, and impact loads imposed on water contact.

A sphere-cone ballistic type re-entry body will be employed. It will duplicate the 162 re-entry vehicle as closely as possible.

The RV will be protected from excessive heating by applying suitable ablative materials to the external shell.

The RV structure shall be so designed to maintain its integrity for proper operation and protection of the retrieval aids and internal equipment for air snatch and water impact.

The film cassette and its supporting structure shall be designed to withstand the following local limit loads for air retrieval: 30 g's along the longitudinal axis with negligible low lateral loads. During re-entry the RV will be subjected to deceleration loads approximately 25 g's longitudinal and 8 g's lateral.

The capsule assembly shall protect the payload by maintaining a sealed container, light tight, water tight and dust free which can withstand an ultimate pressure differential of 3.5 PSI.

3.2.3.8.3 Structural - Mechanical/Interface - Agena D

Reference S-01A/SV Interface Specification. *

3.2.4 Photographic Payload

The objective of the photographic payload is to photograph, in stereo, selected areas of the earth's surface from an orbiting satellite, and to permit the recovery of the exposed film at a preselected site.

3.2.4.1 General

The photographic payload will utilize an optical system with the axis of the primary elements parallel to the vehicle axis. A folding mirror will be used to reflect the field of view into the primary optics. The folding mirror will also be used to achieve stereo photography by pivoting plus or minus 7 1/2° about the vehicle pitch axis upon command. Correction for earth rotational velocity with lattitude will be made by pivoting the folding mirror about the vehicle roll axis upon command. The lens system will have a 77-inch focal length and a relative aperture of F/4.0. The moving image will be focused on 9.4 inch thin base aerial film transported upon a rotating cylindrical platten to obtain image motion compensation.

Exposure will be made through a rectangular slit whose width is preselected to yield the correct exposure time. Three slit

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widths will be provided to give nominal exposures of 1/400, 1/200, and 1/100 seconds. The slit to be used for a particular mission is preselected and fixed before launch. The exposed film will be transported via the film chute to the recovery cassette which is located in the re-entry vehicle. Upon command the exposed film in the take-up cassette will be severed and sealed from the balance of the photographic payload.

3.2.4.2 Performance Requirements

The photographic payload shall include a very high acuity camera capable of providing a record with the following characteristics.

3.2.4.2.1 Resolution

The photographic payload shall yield photography along the longitudinal axis of the photograph with 2 to 3 feet ground resolution of targets with an apparent contrast ratio of 2:1 when photographed vertically from the satellite vehicle at an altitude of 95 n.m. and with satellite vehicle attitude control within the limits specified in Paragraph 3.2.3.4. This resolution shall be attainable if weather and launch time allow nominal exposure of the film.

3.2.4.2.2 Coverage

The photographic payload shall be capable of yielding 600 stereo pairs of photographs of selected targets. Modes of photography shall include stereo pairs, lateral pairs, and simple strip coverage. Provision shall be included for oblique photography to a maximum angle of 42^{o} from the local vertical over the range of altitudes specified in Paragraph 3.5.2 with oblique pointing being obtained by rolling the orbiting vehicle. There shall be a capability to vary the length of photographs of selected targets consistent with (photography) operating times varying from 2.0 to 12.5 seconds. The width of the photograph shall be at least 10 n.m. for vertical photography. Provision shall be made to record time to establish the time of photography. The signals in digital form will be furnished from the orbiting vehicle.

3.2.4.2.4 Instrumentation

Instrumentation shall be included within the photographic payload to permit a gross evaluation of payload operation or failure diagnosis via telemetry to ground stations. Instrumentation signals shall be 0 to +5.0 volts DC.

3.2.4.2.5 Life

The life on orbit of the photographic payload shall be 7 days * with 7 batteries - (Requirement for 8 days - 8 batteries deleted) ** with early call down possibilities.

3.2.4.2.6 Environment

The environmental conditions for all life phases shall be specified in interface Specifications SVS 105Z, SVS 104Z.

3.2.4.2.7 Focus Adjustment

The photographic payload shall include provision for in-orbit adjustment of the location of the film plane to assure coincidence with the prime focus of the optical system. Capability will exist and may be utilized during passes over certain tracking and command stations. This adjustment shall be made by the use of Real Time Commands

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** Addendum 5, [redacted] [illegible]

3.2.4.2.8 Data Track

Provision shall be made to record time to establish the time of photography. The signals in digital form, will be furnished from the orbiting vehicle.

3.3 Ground Stations

Tracking telemetry command and data processing equipment required for this program shall provide the necessary communication capability and the required accuracy of ephemeris determination. In particular, the tracking network and data processing equipment will determine the satellite position in orbit with the following three (3) sigma accuracies:

	On-orbit	At Deboost
Altitude	0.5 n.m.	0.5 n.m.
In-track	4.0 n.m.	4.0 n.m.
Cross-track	2.0 n.m.	2.0 n.m.

3.3.1 Launch and MAB Facilities

Facilities for use on this program shall be PAD #3 and PAD #4 of PALC #2, a vehicle support building (VSB) in close to the PAD and a missile assembly building (MAB). *

Propellant loading capabilities will be provided at the PAD for loading the SV propellant tanks and freon tanks on the gantry. *

3.3.2 Tracking Telemetry and Command Station (See Table I)

Primary stations will be located at:

Vandenberg Air Force Base, California	-	VTS*
New Boston, New Hampshire	-	NHS*
Kodiak, Alaska	-	KTS
Thule, Greenland	-	TTS
Kaena Point, Hawaii	-	HTS

* Will be used for real time commands for focus adjust

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A T/M ship will be provided at the retrieval site for retrieval verification and data recording.

A ship equipped with tracking and telemetry equipment will be located downrange.

A separate secure area must be provided at each station for the [redacted] cryptographic equipment and the SV manual control consoles at VTS and NHS.

Minimum but sufficient telemetry information will be demodulated to support the on-orbit operation. Magnetic tapes of all telemetry will be made at each contact and shipped to the STA.

Command information will be transmitted from the STA to the tracking stations by 1200 bits per second circuits, using type [redacted] terminal equipments for cryptographic security.

Additional communication links between STA, and tracking stations, T/M station and terminal control center will be provided by 1200 bit/alternate voice circuits and voice communication circuits from each station to the STA.

3.3.3 Satellite Text Annex (STA)

3.3.3.1 General

The STA in Sunnyvale, California, will serve as the central point for communications, command, computing, and control. The STA will be the facility through which the Test Director implements his command.

3.3.3.2 Communications

As the communications center, the STA will receive transmissions of tracking and telemetry data and voice communications concerning

TABLE I

STATION EQUIPMENTS

Major Equipment	VTS	KTS	HTS	NHS	TTS	Post Ejection Down-Range	Remarks
Verlort w/PTM	x	x	x	x	x	x	
Full Telemetry Equipment	x	x	x	x	x		Provision for near real time reduction of essential data
Telemetry for Retrieval Only						x	Limited Function Station
160 A for Commands and Telemetry Compression*	x	x	x	x	x		
SV Manual Control Console	x			x			
[redacted]	x	x	x	x	x	x	
Automatic Time Comparison	x			x			
Automatic Telemetry Reduction Via PICE*	x			x			To provide printout of telemetry data
Auxiliary Computers*	x			x			To reduce STA load if necessary
Lifeboat Command Station		x					

* Depending on Satellite Control Office schedules.

status and performance. The STA will transmit acquisition data to tracking stations, SV commands to command sites and impact prediction information to the Recovery Command Center (RCC).

3.3.3.3 Data Processing and Display

The STA will house digital computers, data conversion devices, timing devices, recording equipment, electronic and optical display devices, Test Controller consoles and keysets, and data communications terminal equipment required to support the individual functioning, monitoring, tracking, command and control.

3.3.3.4 Launch Support

Prelaunch checkouts of data systems and communications equipment systems will be conducted at the STA. Computing support to the launch operations will be provided, including wind data analysis and preparation of nominal ascent acquisition data.

3.3.3.5 Trajectory Computations

As the mission progresses, tracking and telemetry data will be processed at STA to obtain an ascent trajectory ephemeris, injection conditions, initial and periodically updated orbit elements, an on-orbit ephemeris, a re-entry trajectory ephemeris, and a retrieval point prediction.

3.3.3.6 Acquisition Data

Prior to launch, nominal orbital and re-entry acquisition data will be prepared at STA and transmitted to each tracking station and RCC. During the mission, acquisition data and schedules will be recomputed in accord with the actual orbit and transmitted periodically to tracking stations and RCC.

3.3.3.7 Command Generation

At STA command, data for the SV will be prepared, transmitted to command sites, and verified on retransmission. Commands will be provided for SV power control and attitude control, orbit adjusts, and deboost. Within STA a means will be provided through which the Test Director can initiate the preparation of special command data for mission modification or abort.

3.3.3.8 Status Monitor

Telemetry data received at STA will be continuously processed and interpreted to determine the status of SV equipments. Through voice communication links, the status of tracking stations and equipments will be continuously determined and displayed.

3.3.3.9 On-orbit Monitor

From command and trajectory data processed at STA, the status and progress of the SV in its performance of on-orbit objectives will be derived and displayed to the Test Controllers and Test Director. Special information will be provided on request when needed to plan on-orbit modification or abort. Current and predicted schedules of STA and tracking and command station operation for the satellite lifetime will be maintained and displayed.

3.3.3.10 Retrieval Support

Prior to launch, information will be prepared for use by the retrieval team in estimating retrieval point location from raw re-entry tracking data. Deboost and re-entry tracking and telemetry data will be processed to obtain successively more refined predictions of retrieval point location and dispersion. This information will be transmitted from the STA to the RCC.

3.3.3.11 Postflight Support

Subsequent to the test, a recapitulation of the orbit will be constructed and a refined ephemeris established.

3.4 Data Handling and Processing

3.4.1 Data Flow Paths (STA)

The principal data flow paths and the type of data involved are listed in Table II.

3.4.2 Data Processing Tasks (STA)

The principal data processing tasks performed at STA shall be as follows:

1. Trajectory computations, including preparation of an ascent trajectory ephemeris, injection conditions, initial and periodically updated orbit elements, an on-orbit satellite ephemeris, a re-entry trajectory ephemeris, and an impact point prediction with dispersion estimate.
2. Preparation of acquisition data and schedules for tracking stations.
3. Preparation and verification of SV commands for power and attitude control, orbit adjusts, deboost, and any special commands required that are within the capability of the system.
4. Specified telemetry data processing and interpretation for determination of SV equipment status.
5. Preparation of on-orbit progress and maintenance of satellite schedules.

TABLE II

DATA FLOW PATHS

FROM	TO	VIA	TYPE OF DATA
Tracking Station	STA	1200 bit/sec line or 100 wpm teletype, voice*	Digital Verlort tracking data Digital time correlation data
Post Ejection	STA	1200 bit/sec line or 100 wpm teletype, voice*	Digital angle and range track data Deboost and re-entry digital telemetry data
Tracking Station	STA	1200 bit/sec data link or 100 wpm teletype*	Voice or teletype telemetry data Digital telemetry data
Tracking Station	STA	Courier	Magnetic tape video telemetry data for reproduction as needed
STA	Tracking Station	1200 bit/sec line or 100 wpm teletype, voice*	Acquisition data
STA	Deboost or Re-entry Tracking Station	1200 bit/sec line or 100 wpm teletype, voice*	Acquisition data
STA	Command Sites	1200 bit/sec line secure line or 100 wpm teletype, voice*	SV Command Data
Command Sites	STA	1200 bit/sec secure line or 100 wpm teletype, voice *	Retransmission of SV command data for verification
STA	RCC	100 wpm teletype line voice	Retrieval point prediction

*Depending on Satellite Control Office schedules.

3.4.3 Data Processing Equipment

3.4.3.1 Equipment Configuration at STA

1. Computers

On-line computers are four CDC 1604's, and PICE or 160A Bird Buffers. Peripheral CDC equipment includes magnetic tape system, magnetic disc, paper tape, punch and reader, card reader, card punch, printer, and computer couplers. Peripheral PICE equipment includes tape systems and high-speed plotter.

Off-line computer is one CDC 1604 with peripheral tape, card, and printer equipment.

2. Data Communications Terminal Equipment

Existing data line translators, 1200 bit per second line, and wide band terminal equipment may be employed for communications between STA and Tracking Stations. Also [redacted] cryptographic equipment for secure transmission of commands.

3. Telemetry Data Processing Equipment

Telemetry data may be processed by means of the existing PICE Switching Unit, magnetic tape systems, filter discriminator equipment, and Sync Separator and Digitizers, or 160A Bird Buffer and CDC 1604 combination.

4. Control Equipment

Satellite control will be implemented via the existing System Timing Generator, Data Control Console, Alpha-numeric and Iconorama displays, and Test Controller keysets.

3.4.3.2 Equipment Configuration at Tracking Stations

Only the Vandenberg and New Boston Tracking Stations contain data processing equipment in the digital computation sense. Each of these stations houses one CDC 1604 computer and one PICE, each within certain peripheral equipment. (Note: 1200 bit/sec lines to PICE or 160A may be used depending on the Satellite Control Office schedule.) Data line translators and teletype translators exist at these stations for PICE-to-PICE communication with STA. In addition, the VTS houses wide band terminal equipment associated with the microwave data link between VTS and STA.

3.4.4 Off-Line Data Processing Task

Off-line data shall include all data other than that upon which satellite vehicle command or control action can be based. Facilities and procedures shall be established for maximum processing of the SV off-line data. Processing procedures shall be consistent with required security safeguards.

3.4.5 On-Line Data Processing Task

Processing of on-line telemetered data shall be accomplished in real time at the tracking and command stations and in near real time at the STA.

3.5 Reference Trajectory and Orbit

A nominal reference trajectory and orbit is described below. As stated in 3.1.6, the system must perform properly throughout a range of orbits.

3.5.1 Nominal Ascent Trajectory

The ascent trajectory is initiated with a fifteen second vertical rise of the ATLAS/AGENA vehicle followed by a controlled pitch * program which causes the vehicle to follow a path approximating that of a zero lift turn until booster cut-off. After booster cut-off, the booster engines are jettisoned and the sustainer phase of active guidance ensues. During sustainer operation, the vehicle flies at essentially constant inertial attitude, the attitude being computed to produce the desired sub-orbital condition at ATLAS-D sustainer cut-off. A short vernier phase follows thereafter during which time the velocity vector is trimmed and the vehicle attitude stabilized. At vernier cut-off the Agena-D vehicle is separated from the Atlas-D by means of retrorockets attached to the ATLAS-D. The Agena-D vehicle then coasts for approximately 55 seconds during which time the horizon sensor fairings are jettisoned and the vehicle is pitched over to an attitude of 12.3 degrees (nose up) relative to the real horizon. This local attitude is maintained throughout the Agena-D burning program and is precomputed to provide the desired orbital condition after the Agena-D accelerates through a prescribed velocity increment. Agena-D cut-off is initiated by a velocity meter. The SV is then separated from the Agena-D.

* Addendum 2

Biasing will compensate for guidance errors which might otherwise produce an unacceptably low pre-correction perigee altitude.

The significant parameters associated with the ascent trajectory are presented in Figure 1. The pitch attenuation factor shall not exceed 1.03. *

3.5.2 Extremes of Orbital Characteristics

Inclination: 80° to 105°

Photographic altitude over target areas: 95 ± 12 n.m.

Altitude Extremes: 83 to 150 n.m.

Note: Under maximum correction for retrieval location the altitude extreme may extend to 270 n.m. at the apogee for a maximum time period of 1/2 day. (No photography required at this altitude).

Eccentricity: Orbits may be near circular or eccentric within the altitude constraints shown above.

Orbit Correction and Maintenance: No more than ten utilizations of the secondary propulsion system with a velocity expenditure not to exceed 400 f.p.s. will be employed. No single correction will exceed 100 f.p.s.

4.0 FLIGHT CERTIFICATION TESTING AND QUALITY ASSURANCE PROVISION

Flight certification will depend upon subsystem certification and acceptance testing at each of the contractor facilities whence subsystems are supplied, and upon subsequent integrated testing at the MAB and at the PAD. In particular, each design shall be properly certified and each delivered subsystem shall be thoroughly acceptance tested at the contractor's plants. Approved specifications shall govern the acceptance testing of each of these subsystems.

* Addendum

To insure conformance of produced items with requirements, each contractor shall implement a program for assuring quality throughout development and manufacturing phases in accordance with the requirements of MIL-Q-9858, "Quality Control System Requirements," dated 9 April 1959.

To enhance product quality there shall be receiving inspection at each contractor's plant of all critical parts and components.

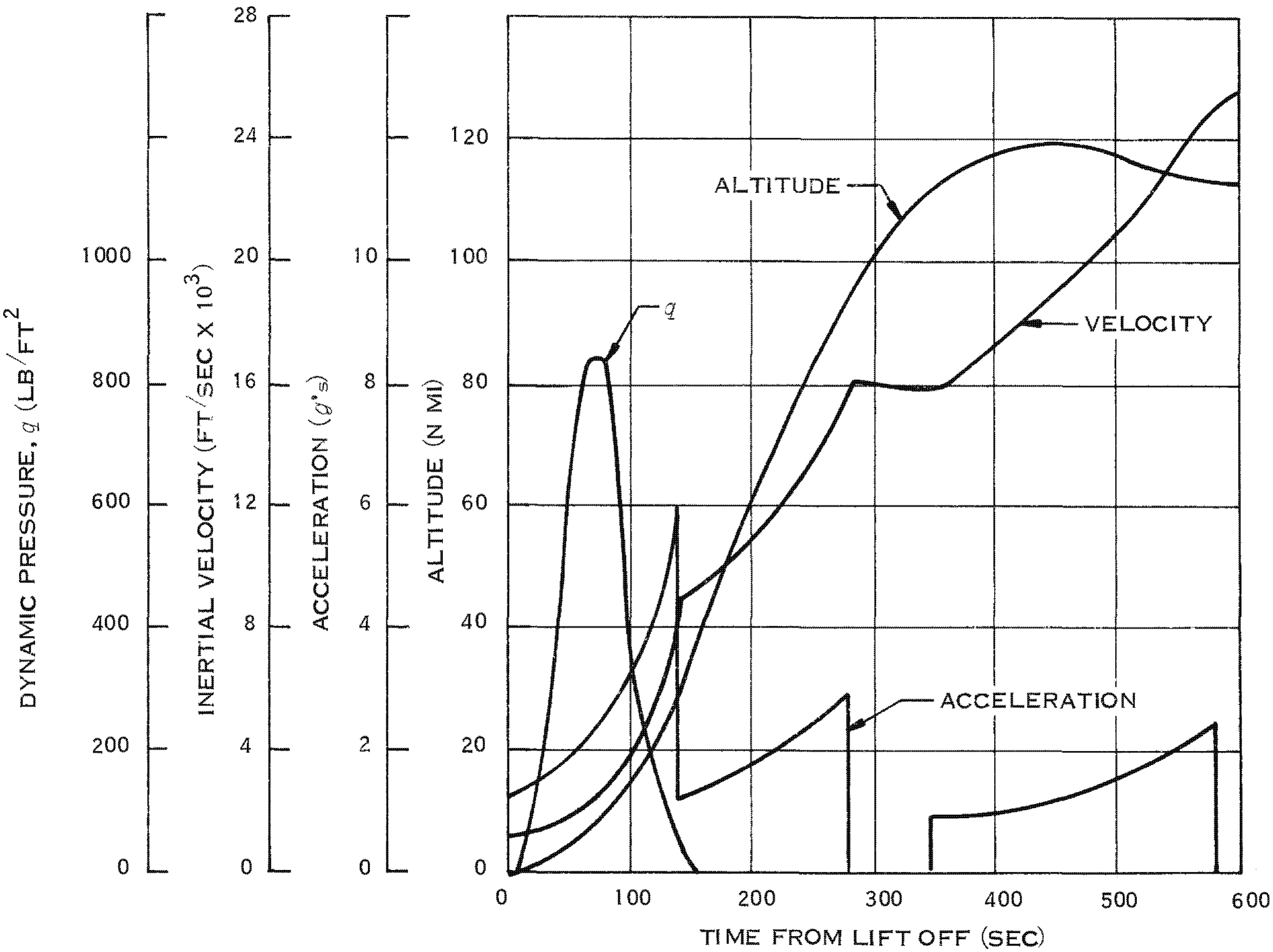

Figure 1. Nominal Ascent Trajectory Profile: Atlas-Agena Milestone 5

APPENDIX 23

SYSTEM TEST OBJECTIVES

FLIGHT VEHICLE NO. 1

Approved for Release: 2024/01/30 C05099020

FHR-558
This Document Contains 109 Pages

GAMBIT PROGRAM
SYSTEM TEST OBJECTIVES
FOR FLIGHT VEHICLE NO. 1

MAY 1963

Approved by: W Sampson
W. F. Sampson

Approved by: W. G. King Jr.
W. G. King, Jr.

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1.0 INTRODUCTION

1.1 SCOPE AND PURPOSE

The System Test Objectives document establishes flight objectives and flight test criteria for the launch, orbit and recovery of GAMBIT Program Flight Vehicle No. 1. In addition, the nominal flight plan, measurements to be monitored, configuration changes, trajectory data, event sequences and other pertinent information are presented to fulfill the following purposes:

a. To furnish the flight planning information that is necessary for the establishment of a detailed flight plan and associated requirements.

b. To coordinate and control configuration and operating concepts for Flight Vehicle No. 1.

c. To furnish background information relevant to the first flight.

1.2 SOURCE

This STO is based upon information contained in References 7.1 through 7.9.

1.3 PRECEDENCE OF REPORTS

In case of conflict between the STO and the test plans prepared by Associate Contractors, the STO shall take precedence. The Launch Test Directive and Test Operations Order documents are prepared in response to the requirements and concepts of the STO, and accordingly must not conflict with the information contained herein.

1.4 AMENDMENTS AND REVISIONS

All additions and changes to the information contained in this document must be submitted to SAFSP/Aerospace for approval. This STO will then be amended or revised as required. Last minute changes will be transmitted by TWX to all document holders.

2.0 NOMINAL FLIGHT PLAN SUMMARY

This section summarizes the nominal flight plan. Details regarding specific portions of the flight (e.g., trajectory data, sequence of events, and orbital operations) are given in the following sections.

2.1 LAUNCH CONDITIONS

2.1.1 Launch Site and Flight Vehicles

Location	PALC II, Pad 3
Cordinate (DOD-WGS-1960)	34° 37' 59" N latitude 120° 36' 57" W longitude
Vehicles	Atlas D Booster No. Agena D Booster No. OCV No. 951 RV No. 3051A-5775512 CP No. FM-1

2.1.2 Launch Window

Day 26 June 1963

Time (PST)	Nominal	Maximum	Minimum
	1100 hrs.	1400 hrs.	1100 hrs.

2.2 ORBITAL CONDITIONS

The planned orbit injection conditions are:

Geocentric Latitude	14.34505°N
Longitude	235.99419°E
Radius	21,595,296 ft
Velocity	25,535.972 fps

Flight Path Angle*	89.99264°
Azimuth	185.12746° from true North

The planned orbit parameters are:

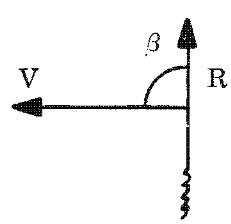
Inclination	94.467192° (retrograde)
Average alt.	115.3 n mi.
Maximum alt.	120.4 n mi.
Minimum alt.	110.1 n mi.

2.3 ORBITAL OPERATIONS

The Agena will remain attached (hitch-up mode) to the OCV after orbit injection and will provide on-orbit attitude control until immediately after RV deboost on rev 18. A summary of the operations performed during this hitch-up period is given below.

Revolutions	Operations
1-5	Determine orbit ephemeris and prepare command load. Assess status of subsystems.
6-10	Operate CP over operational targets in support of the primary flight objective (see Section 3.1).
15-16	Operate CP over selected land masses in support of the secondary flight objectives which require payload operations. (See Section 3.2).
16-17	Prepare for recovery (film run-out, seal, and yaw-around).
18	Initiate deboost and re-entry sequence and separate Agena and OCV.

*measured from the Geocentric local vertical



2.4 RECOVERY OPERATIONS

Separation, deboost, and re-entry of the RV will occur during rev 18 over the KTS. The nominal impact point coordinates are 24°N latitude, 161.3° W longitude. The inhibit timer will be set so that parachute deployment can occur up to approximately 7000 miles downrange in case of overshoot. See Appendixes A and B for trajectory data and re-entry sequence of events.

2.5 OCV SOLO OPERATIONS

After RV deboost, OCV Solo operations will be performed to determine the functional capability of the OCV and CP subsystems. These operations will begin after RV separation and will continue until malfunctions preclude further testing, or until the SAFSP Program Office terminates the operations. OCV Solo operations will be considered successful if all planned secondary objectives for Day 2 and Day 3 are accomplished. Subsequent OCV Solo operations will consist of monitoring expendables (e.g., control gas and battery power) and vehicle status.

The OCV useful life remaining after RV separation is estimated to be three days, based upon the amount of battery available and assuming maximum usage conditions.

3.0 FLIGHT OBJECTIVES

Mission requirements are grouped into two categories: flight objectives and performance requirements. Flight objectives are the accomplishments, demonstrations, and measurements for which the flight is conducted. Performance requirements are the functions or services which must be performed in order to achieve the flight objectives. This section establishes the primary and secondary flight objectives for the first flight. The performance requirements associated with these objectives are described in Section 4.

3.1 PRIMARY FLIGHT OBJECTIVE

Primary flight objectives are those of paramount importance to a successful mission. This flight has one primary flight objective:

> Demonstrate the basic photographic system quantitative resolution capability by obtaining at least one image of a ground target, preferably within the area of interest.

To attain this objective, the camera payload (CP) will be operated only in vertical strip or stereo photographic modes. Updated command loads, with computed IMC and crab angle settings, will be used to control payload operations through revolution 15. A minimum ground resolution capability of 3.6 feet, at a contrast ratio of 2 to 1, using nadir photography over the anticipated altitude range (110 to 130 n mi.) is expected from this flight (Reference 7.28).

Pad loads will provide a back-up capability for controlling CP operations during revolutions 6 to 15 in the event of command system malfunction. The pad loads will contain nominal crab angle settings and a range of several IMC setting above and below a nominal IMC setting. Consideration should be given to operating the CP at latitudes as near to the injection latitude as possible to optimize chances of obtaining the correct IMC setting for the orbital conditions attained.

Results of the photographic analysis of the film exposed during the first 15 revolutions will be used to evaluate system performance and achievement of the primary objective. Analysis results such as resolution, image scale, and tone reproduction are important for this evaluation.

3.2 SECONDARY FLIGHT OBJECTIVES

All other objectives, regardless of extent or purpose, shall be secondary to the primary objective, and their assignment to the flight shall be on a non-interference basis with the primary objective. These secondary objectives are assigned to each flight to one of three categories of importance.

Category 1 Objectives involve the acquisition of engineering data vital to the earliest achievement of the desired reconnaissance capability. The launch countdown will be delayed* if failure to do so will jeopardize the probability of accomplishing these objectives, and the Program Director may elect to abort.

Category 2 Objectives are related to either of the following:

a. Improving the effectiveness of the system in accomplishing the primary objective.

b. Determining quantitatively the effectiveness with which the primary objective is met.

c. Analyzing malfunctions.

A countdown may be delayed to achieve these objectives, but it may not be aborted.

Category 3 Objectives are related to the evaluation of hardware or software to aid in the implementation of nonvital changes, or to accumulate statistical engineering data on system or subsystem performance. Achievement of these objectives must in no way interfere with

*The Program Director must be notified immediately if countdown difficulties portend a delay.

the achievement of other objectives; therefore, the flight will not be delayed or aborted solely to attain Category 3 Objectives.

Table 3-1 lists the secondary flight objectives, assigns importance categories, and describes a typical method of achieving each objective. The methods listed in the table imply that the 6594th ATW will perform the operations and will gather and furnish the resultant operational data which will be transmitted to the Associate Contractors, who will perform the required analyses.

The secondary objectives assigned to system equipments are listed below:

Item	Cat. 1 Obj. No.	Cat. 2 Obj. No.	Cat. 3 Obj. No.
Atlas	5, 10, 11	17	None
Agena	None	None	None
OCV	1, 2, 3, 4 7, 12, 13, 16	8, 9	6
RV	14, 15	None	None
CP	101 thru 107 109, 113	108, 110, 111	112
TT & C	None	None	18

See Appendixes B and E for more information concerning the attainment of flight objectives. The Test Operations Order prepared by the 6594th ATW will provide an integrated flight plan describing in detail how the flight objectives will be achieved.

3.3 TERMINOLOGY

The terms defined below establish a standard datum for uniform interpretation of the flight objectives.

3.3.1 Abort

Abort denotes a termination of a countdown before launch. (It does not imply a specific time during which certain tasks must be accomplished before a new countdown may begin; for example, a new countdown may be initiated within 24 hours).

3.3.2 Delay

Delay (or hold) denotes a temporary interruption for any reason whatsoever in the progress of a countdown. (The length of time involved in such an interruption is not pertinent to the definition.) A delay may involve a recycling of a portion of a countdown already accomplished. (A delay converts to abort when a launch for the primary test objective becomes impossible within the preassigned launch window.)

3.3.3 Calldown

Calldown denotes RV deboost and re-entry.

3.3.4 Demonstrate*

Denotes the occurrence of an action(s) or an event(s) during the test. The accomplishment of this type objective requires a qualitative answer. The answer will be derived through the relation of this event to some other known information or occurrence. This cateogry of objective implies a minimum of airborne instrumentation and/or that the information be obtained external to the vehicle.

3.3.5 Determine*

Denotes the measuring of performance of any unit or system. This category implies the quantitative investigation of over-all operation which generally includes instrumentation for measuring basic inputs and outputs of the unit or system. The information obtained should indicate to what extent the system is operating as designed. The instrumentation should allow performance deficiencies to be isolated to either the system or to the system inputs.

*These terms also imply the establishment, to the extent possible, of confidence in system performance.

3.3.6 Evaluate*

Denotes the measuring of performance of any unit or system, as well as the performance and/or inter-action of its sections or subsystems that are under investigation. The accomplishment of objectives of this type requires quantitative data on the performance of both the unit or system and its sections or subsystems. Instrumentation for this category generally includes measuring the basic inputs and outputs of its sections or subsystems. The performance levels of the sections or subsystems will then be analyzed for their contribution toward performance of the unit or system. This category will provide the most detailed information of any of these categories.

*These terms also imply the establishment, to the extent possible, of confidence in system performance.

Table 3-1. Secondary Flight Objectives

No.	Hitch Up	OCV Solo	Objective	Cat.	Method
1			Evaluate the OCV stabilization subsystem's capability to:	1	
a		x	Provide initial earth acquisition and rate stabilization during normal orbit operations after separation from the Agena		Initial earth acquisition will occur after Agena separation and the enabling of the stabilization subsystem. TLM aircraft will be used* to obtain realtime telemetry during the period (up to 200 sec) immediately after enabling the stabilization subsystem. (Initial pitch-up and yaw around will be performed over tracking stations as practical.)
b		x	Provide proper OCV yaw-around and pitch-down orientation.		Yaw-around and pitch-down maneuvers will be performed over tracking stations to the extent practical.
c		x	Provide the required roll maneuvers.		Simulated operational missions will be performed.
d		x	Provide adequate Freon impulse for OCV stabilization for a full-duration mission.		Freon consumption rate will be determined from TLM data.
2	x	x	Determine the capability of the command subsystem to receive, store, and execute realtime, stored, and secure commands properly.	1	This objective will be satisfied as a result of Hitch-Up and OCV Solo operations as outlined in Section 3 and Appendix D.
3	x	x	Determine the capability of the tracking subsystem to provide signal outputs for determination of tracking data when beacon is properly interrogated.	1	This objective will be satisfied as a result of the Hitch-Up and OCV Solo operations as outlined in Section 3 and Appendix D.

*Applies only if separation does not occur over a tracking station.

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Table 3-1. Secondary Flight Objectives (Cont.)

No.	Hitch Up	OCV Solo	Objective	Cat.	Method
4	x	x	Determine the capability of the OCV TLM subsystem to indicate receipt or rejection of commands, occurrence of events, and status of SV subsystems.	1	This objective will be satisfied as a result of the Hitch-Up and OCV Solo operations as outlined in Section 3 and Appendix D.
5			Determine the Atlas System Performance	2	This objective will be satisfied as a result of normal operation and analysis of tracking data and the telemetry measurements listed in Table 5-1.
6		x	Determine the effects of linear shaped charge firing and OCV/Agena separation shocks on the SV subsystems.	3	"Tell-Tales" will be loaded in two delay lines. These two delay lines will not be reloaded at HTS after separation. Data will be available from TLM at the time of OCV/Agena separation.
7	x	x	Determine the capability of the environmental control subsystem to provide adequate thermal control.	1	Data required to satisfy objectives will be obtained during the Hitch-Up and OCV-Solo operation.
8	x		Determine the vibration, thermal, acceleration, and pressure environment experienced by the SV during powered flight.	2	Data will be transmitted by OCV TLM subsystem during the powered flight phase.
9	x	x	Determine the capability of the operational and programmer backup power supplies to support a 5 day mission.	2	Power demands of the Hitch-Up and OCV Solo flight will be used to predict power demands of a fully operational mission.
10			Evaluate the capability of the Mark II guidance system to support program requirements.	1	Analysis of tracking and TLM data.

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Table 3-1. Secondary Flight Objectives (Cont.)

No.	Hitch Up	OCV Solo	Objective	Cat.	Method
11			Determine the prelaunch and flight environment for the relocated SLV-3 (Atlas) control system rate gyro group.	1	Telemetry measurements used for this analysis are listed in Table 5-1.
12	x	x	Demonstrate proper environmental door performance.	1	Operate door during OCV Solo as required for simulated operation exercises.
13	x		Demonstrate mechanical and electrical separation of the OCV/SRV on command and proper sequencing of separation events.	1	Analysis of Link 1 and Link 2 TLM data.
14			Determine spin-up, de-spin, and proper velocity increment to deboost from orbit.	1	Analysis of Link 4 TLM data.
15			Demonstrate recovery aids and proper sequence of recovery events.	1	Analysis of Link 4 TLM data.
16	x	x	Determine the capability of the electrical power and distribution subsystem to support a 5 day mission.	1	Satisfied as a result of the Hitch-Up and OCV Solo operations.
17			Determine the temperature and vibration environment of the Mark II Guidance System.	2	Telemetry measurements used for this analysis are listed in Table 5-1.
18	x	x	Demonstrate the capability of augmented tracking stations to support on-orbit operations.	3	Data may be obtained on a non-interference basis with other objectives for demonstration of the augmented capability.

Table 3-1. Secondary Flight Objectives (Cont.)

No.	Hitch Up	OCV Solo	Objective	Cat.	Method
101*	x		Demonstrate that the film handling system functions properly.	1	For time intervals corresponding to photography, compare data from the airborne recorder**, in particular CPL 15, 17, and 18, with the command tables.
102	x	x	Demonstrate that the stereo mirror servos function properly.	1	For time intervals corresponding to stereo and crab servo motion, compare data from the airborne recorder**, in particular CPL 13 and 14, with the command tables.
103	x	x	Determine the capability of the environmental control system to provide adequate thermal control.	1	Satisfied by data obtained during normal hitch-up and OCV-Solo operations. During OCV-Solo, turn off the environmental power supply and leave off for a period of about 360 minutes. Then turn the environmental power supply back on. The "turn on" and "turn off" time must be known. From 90 minutes before "turn off" to 360 minutes after "turn on" record CP environmental data for 2 minutes approximately every 60 minutes. Analyze CPL 1 through 11, CPL 24, and 26 for times corresponding to the above events (OCV-Solo) and for times during photography (Hitch-Up).
104	x		Determine the capability of the system to take stereo photography.	1	Program stereo photography at a zero obliquity angle. Analyze CPL 13, 14, 15, 17, 18, the attitude control telemetry and results obtained from analysis of the film.

*"100 series" flight objectives apply to the camera payload.
**Payload health may also be determined by realtime readout over a tracking station.

Table 3-1. Secondary Flight Objectives (Cont.)

No.	Hitch Up	OCV Solo	Objective	Cat.	Method
105	x		Determine the effect on resolution of stereo mirror exposure time for times <u>up to</u> 12 minutes.	1	Immediately prior to beginning the sequence for objective 107 (varied IMC's over ZI), program one photo at nominal IMC and crab angle settings. Program the IMC sequence as described for objective 107. Keep the window open at the end of the 107 sequence. Run the sequence for objective 108 (varied crab angles). Keep the port door open. (Refer to objective 109.) Data for evaluation of objective 105 will then be available from the nominal photos taken prior to beginning objective 107, during 107 (38.5N lat.), and at the end of objective 108.
106	x		Determine the effect of changes in film exposure levels obtained when passing from darkness to light (across sunline).	1	Take a series of nadir photographs beginning at about 60^{O}N during S-N portion of revolution 15. Program strip photography through sunline (darkness to light). Continue series to a point approximately 80^{O}N. Use 0^{o} crab angle and the best IMC that can be obtained conveniently.
107	x		Determine the effect of incremental changes of IMC speeds on resolution.	1	Take a series of photographs over the zone of interior (ZI) on revolution 15 between approximately 49^{o} and 30^{O}N latitude. Use the following criteria: a. Nominal crab angle settings for all photos. b. Camera ON time of about 4 seconds for each frame of IMC sequence.

Table 3-1. Secondary Flight Objectives (Cont.)

No.	Hitch Up	OCV Solo	Objective	Cat.	Method
107 (cont.)					c. Three groups of five IMC steps consisting of +10, +5, +2, 0, and -2 steps about the nominal. d. Camera ON time of about 15 seconds for nominal IMC run over St. Louis. e. Camera ON times of about 4.3 seconds for each frame of each stereo pair sequence beyond St. Louis. Beginning at approximately 49°N latitude, program the three IMC groups (items b and c) such that the sequence is completed before St. Louis (approximately 38.5°N latitude). Program a continuous strip run over St. Louis (item d). Program a series of stereo pairs, at nominal IMC's, from exit St. Louis run to approximately 30°N latitude (item e). Keep the view port door open at the end of payload operations. (See objectives 105 and 108.)
108	x		Determine the effect of incremental changes of crab angle on resolution.	2	Take a series of nadir photographs (one for each crab angle setting) over Central America on revolution 15. Use the following criteria: a. Nominal IMC settings b. Camera ON time about 4 seconds each frame.

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Table 3-1. Secondary Flight Objectives (Cont.)

No.	Hitch Up	OCV Solo	Objective	Cat.	Method
108 (cont.)					c. Selected crab angle settings of 0^{o}, 1.5^{o}, 2.5^{o}, and nominal in that sequence.
109	x		Determine the effect on resolution of stereo mirror exposure time for times up to about 90 minutes.	1	Take a nadir photograph at any convenient time on revolution 16 after TTS fade and before yaw-around over a suitable land mass. Use nominal IMC and crab angle settings with camera ON time of approximately 4 seconds. Additional data for analysis of objective will be obtained from runs during objectives 105, 107, and 108.
110		x	Determine the disturbances and transient times caused by stereo mirror motion.	2	Operate the stereo and crab servos together and separately (to be done as part of simulated operational mission). Analyze data, in particular CPL 13 and 14 along with the attitude control telemetry.
111		x	Determine the functional capability of the open loop mode of focus adjust.	2	Prior to a station contact, prepare for a focus adjust (i.e., set obliquity angle, open port door, turn on focus control power, etc.). During the station contact, transmit a command to move the platen from its nominal position to one extreme and then to the other extreme. (This command is to be based on calculations and must be "tape transmitted" as the 126 console is not available). Analyze CPL 20, 21, 22, 23, and 27 from realtime readouts and the airborne recorder.

Table 3-1. Secondary Flight Objectives (Cont.)

No.	Hitch Up	OCV Solo	Objective	Cat.	Method
112		x	Demonstrate that the closed loop mode of focus functions in that the platen moves in the right direction.	3	Program an automatic focus adjust following an intentional out-of-focus adjust. Analyze data from the airborne recorder, in particular CPL 20 through 23 and CPL 27. An obliquity angle is required and the view port door must be open. (In order to be independent of the airborne recorder, the automatic focus adjust may be performed over a tracking station with monitoring of CPL 20 through 23 and CPL 27 in real time.)
113		x	Determine stereo mirror differential temperature and focus vs environmental door open times.	1	Open the view port door and leave open for 180 minutes. Turn on payload power and obtain data for a 2-minute period approximately every 12 minutes for the first 60 minutes and for a 2-minute period every 30 minutes for the remaining 120 minutes. Analyze data, in particular CPL 1 through 11 and 20 through 27. A different obliquity angle will be required so that CPL 21, 22 and 23 are useful.

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4.0 PERFORMANCE REQUIREMENTS

4.1 GENERAL

Performance requirements are the functions or services which must be performed in order to achieve the flight objectives. They form the basis for the establishment of monitor instrumentation or observation techniques necessary to assure, as practical, that the required performance will be delivered, and/or to evaluate (after the operation) whether the required performance was delivered so that corrective measures may be taken for subsequent operations.

4.2 PRIMARY PERFORMANCE REQUIREMENTS

Primary performance requirements are those performances of systems, subsystems, components, complexes, and facilities required to achieve the primary flight objective. Included as primary performance requirements shall be that assessment capability as may be necessary to establish the status of these systems, subsystems, components, complexes, or facilities before launch, during ascent, on orbit, and in recovery. A launch will not be attempted if achievement of any primary performance requirement is in jeopardy.

Table 4-1 lists the primary performance requirements for the first mission.

4.3 SECONDARY PERFORMANCE REQUIREMENTS

Secondary performance requirements are all performances required solely to accomplish secondary test objectives.

Secondary performance requirement priorities will be the same as the highest category of importance assigned to the related secondary flight objectives being supported.

The secondary performance requirements for this flight are listed in Table 4-2.

4.4 ASSOCIATED MEASUREMENT CATEGORIES

Monitor instrumentation associated with the performance requirements and necessary to their accomplishment are grouped according to categories of importance (Group I, II, and III). Section 5 describes these measurement categories, assigns specific measurement requirements, and describes actions required in case of malfunctions or loss of measurement data.

Table 4-1. Primary Performance Requirements

No.	System/ Subsystem	Requirements	Monitoring Methods*
P1	Atlas	A. Boost the Agena and SV into a specified coast ellipse. (See Appendix A)	Atlas TLM Tracking Data Hardline Monitors
		B. Send command to separate the Agena at the proper time.	
		C. Maintain Agena/SV attitude within specified tolerances until separation is completed.	
P2	Agena (Ascent)	A. Separate from Atlas upon receipt of programmed command.	Agena TLM (Link 1)
		B. Boost the SV into a specified orbit. (See Appendix A)	
P3	Agena (on-orbit)	A. Provide fine attitude control for a minimum of 27 hours.	Agena TLM (Link 1) Hardline Monitors
		B. Provide electrical power capability to perform mission requirements.	
		C. Provide yaw and pitch-down maneuvers necessary to deboost RV.	
		D. Provide four commands to separate the RV from the OCV.	
		E. Provide a back-up system (lifeboat) for receipt and execution of deorbit command and recovery of RV.	

*See Section 5.0 for the detailed listing of instrumentation and their associated performance requirements.

Table 4-1. Primary Performance Requirements (Cont)

No.	System/ Subsystem	Requirements	Monitoring Methods*
P3		F. Provide TLM and command capability for Agena functions.	
P4	SCF, VAFB, RCG	Personnel, procedures, training and documentation must provide timely and adequate system operation.	Operating records will be examined and personnel contacted regarding delays or system failures occurring during flight operations.
P5	AGE	The MAB and Pad AGE must provide the capability to assemble, conduct prelaunch checks, control vehicle environment, and execute countdown operations.	Preparation logs, checkout records and data, critique meeting minutes, etc.
P6	SCF-Computer Programming	The computer programs capabilities of the SCF must meet mission requirements throughout the on-orbit life of the vehicle.	Command lists, computer output listings, etc.
P7	OCV	A. Provide TT&C capability. B. Provide adequate thermal control. C. Open and close environmental door as required. D. Separate the RV on commands. E. Provide electrical power. F. Maintain proper internal environment.	Link 2 and 3 TLM Hardline Monitors (Refer to Section 5. 0)

*See Section 5. 0 for the detailed listing of instrumentation and their associated performance requirements.

Table 4-1. Primary Performance Requirements (Cont)

No.	System/ Subsystem	Requirements	Monitoring Methods*
P7		G. Maintain proper alignment of camera systems.	
P8	RV	A. Provide spin-up, de-spin, and proper velocity increment to deboost the SRV from orbit.	Link 4 TLM See Appendix B
		B. Provide recovery aids and proper sequence of recovery events.	
		C. Provide RV real time TLM capability.	
		D. Provide film take-up and capsule sealing with backup positive film cut and film chute cutting action.	
P9	SCF Tracking and Command	Provide tracking telemetry and command equipment and functions.	Tracking Data Command Summaries.
P10	Camera Payload	Obtain and store reconnaissance photography to satisfy primary flight objective.	

*See Section 5.0 for the detailed listing of instrumentation and their associated performance requirements.

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Table 4-2. Secondary Performance Requirements

No.	System/ Subsystem	Requirement	Monitoring Measurements
S1	Telemetry	The telemetry channels solely associated with secondary flight objectives must remain operational.	TLM output on ground monitor Atlas TLM Link 1 TLM Link 2 TLM Link 3 TLM Link 4 TLM
S2	Separation	The OCV must separate from the Agena upon command and with the proper attitude.	Link 2 TLM

5.0 HOLD, ABORT, AND CALLDOWN CRITERIA

This section establishes some of the critical requirements which shall be used as general criteria* for interrupting or terminating countdown, ascent, and orbital operations. Specific measurements and tolerances are defined and assigned, and other established and documented criteria are referenced throughout. The LTD (or reference documents) will contain comprehensive lists of delay and abort criteria for the launch vehicles; these lists will be based upon the general criteria set forth in this document.

5.1 MEASUREMENT CATEGORIES

Measurements associated with the flight objectives and the subsystem performance requirements are grouped into three categories of importance (see below). All discrepancies occurring in any of the measurements assigned to either of these categories must be reported to the STA through the LOCC. Hold or Abort actions should be exercised only when an inspection of related telemetry points has failed to provide clarifying information and there is no doubt that the equipment being monitored is malfunctioning.

5.1.1 Group I Measurements

These measurements are essential to the attainment of the primary flight objective or to the attainment of secondary flight objectives in Category 1, unless waived in the latter case. The launch countdown will be delayed or aborted if loss of Group I data jeopardizes the attainment of these objectives. Furthermore, emergency calldown of the RV will be commanded if loss of Group I data jeopardizes retrieval of significant photographic data already collected.

Group I measurements must be monitored during countdown. Corrective actions shall be taken if non-normal vehicle status is indicated or cannot be determined. Measurements used in support of Category 1 secondary flight objectives may be waived by the Program Director.

*The decision to abort launch or terminate flight operations shall be made by the SAFSP-206 Program Director.

5.1.2 Group II Measurements

These measurements are those which provide valuable data during flight operations in support of the primary or Category 1 secondary flight objectives but for which abort would not be considered if these measurements were not available.

Status of these measurements shall be checked during countdown. The Launch Controller shall be notified if discrepancies occur. The Launch Controller will conduct an evaluation to determine if improper readings actually represent vehicle status. Corrective action must then be taken, or a waiver obtained from Launch Controller. Countdown time shall be taken as necessary to ensure proper functioning of Group II measurement channels until it is clear that significant delay in the test would be incurred by repairs. Excessive delay will not be permitted unless Group II measurements affected would hamper successful attainment of the primary objective.

5.1.3 Group III Measurements

These measurements are required to achieve Category 2 and 3 secondary flight objectives. If these measurements are inoperative, the launch may be delayed to effect repairs; however, the launch countdown will not be aborted if repairs are impractical.

Confidence in Group III Measurements must be established during either prelaunch or countdown operations.

5.2 MEASUREMENT TERMINOLOGY AND DEFINITIONS

5.2.1 Red-Line Limits

These are the minimum and maximum tolerances permitted for critical measurements during early countdown subsystem checkout tests or status checks, when vehicle subsystems are not in their normal "lift-off" status.

5.2.2 Launch Limits

These are the minimum and maximum limits permitted for critical measurements during terminal countdown and at launch.

5.2.3 Sub-Carrier Oscillator Base Frequencies

BASE 1	BASE 2	BASE 3	BASE 4	BASE 5	BASE 6
2.3	14.5	14.5	3.0	14.5	22
3.0	30 *	10.5*	3.9	22	40
3.9	40 *	22*	5.4	30 *	70
5.4*	52.5		7.35	40 *	
7.35	70		10.5	52.5	

Link No.	Operational Mode
1	Agena Telemetry
2	OCV real time orbital telemetry, Base 1,2,3
2V	OCV powered flight vibration telemetry, Base 4, 5
3	OCV real time orbital telemetry, Base 6
3V	OCV powered flight vibration telemetry, Base 6 (with A, C, E)
3P	OCV orbital playback telemetry, Base (1 and 3) x 4
4	RV telemetry

Delta No.	Operational Mode
1	Agena Transmitter
2	OCV Low Frequency Transmitter
3	OCV High Frequency Transmitter
4	RV Transmitter

* Multiplexed

5.3 DELAY AND ABORT CRITERIA

5.3.1 Atlas

The telemetry measurements listed in Table 5-1 are Group I Atlas measurements and must be available at life-off.

PMR establishes the criteria for terminating the Atlas boost phase (Reference 7.21). Go-No/go wind shear conditions will be evaluated at T-12, T-6, and T-3 hours by LMSC, Sunnyvale.

5.3.2 Agena

For this flight the Agena must be capable of providing a 27-hour on-orbit capability. The Group I Agena measurements listed in Table 5-2 are essential to on-orbit operations and must be available at lift-off. Group II Agena orbital measurements to be monitored are listed in Table 5-3.

5.3.3 Satellite Vehicle

5.3.3.1 Measurements

Tables 5-4 through 5-6 list the Group I, II and III SV measurements required during launch countdown, ascent, orbital, and recovery operations. Details concerning the use of these measurements will be given in the Calibration Book and the Malfunction Analysis Reference Book. The LTD and the Countdown Manual will expand upon the information given in these tables, and will provide details concerning the method of establishing SV readiness at lift-off.

Group III SV measurements, although third in priority, are extremely important to the diagnosis of flight operations. Every effort must be made during launch operations to determine the availability of Group III SV measurements.

5.3.3.2 Control Gas

Red-Line and launch limits for attitude control tank loading are given in Figures 5-1 and 5-2. All limits in these figures are shown in engineering units. For conversions to readout performance values see the Calibration Book.

5.3.3.3 Environmental Conditions

The SV skin temperature shall not exceed 70 $\pm$ 5 degrees F during SV transportation and erection. The SV shall not be transported or erected when the outside ambient temperature exceeds either 70 degrees F (dry bulb) on an overcast day, or 60 degrees F (dry bulb) on a sunny day.

5.3.4 Re-Entry Vehicle

Refer to Table 5-3.

5.3.5 Camera Payload

Operational readiness of the CP must be demonstrated before lift-off to provide maximum assurance that performance requirements (and related flight objectives) for hitch-up and OCV-Solo operations will be achieved. The operational readiness of the CP will be determined from the availability of the Group I and II payload measurements in Table 5-7. Group II and III Payload measurements considered for hold/abort criteria are contained in Tables 5-8 and 5-9. The following abbreviations are used in Tables 5-7, 5-8, and 5-9:

- BBT - Umbilical monitor point available until lift-off.
- VTP and VP - Hardline monitor point available until gantry removal.
- CPL - Telemetry monitor point

The steady state operating supply voltage applied to the camera payload shall not exceed +32.5V at the CP-OCV electrical interface either during the prelaunch Pad System Test or during on-orbit operations. To accomplish this it may be necessary to discharge the operational flight batteries to reduce their terminal voltage to an acceptable level before installation in the OCV.

The maximum continuous operatory duty-cycle for the camera payload is 10 minutes ON and 13 minutes OFF. This constraint is imposed by thermal limitations on the take-up motor.

5.4 CALLDOWN

The decision to effect emergency calldown will be made by SAFSP. The 6594th ATW and the Technical Advisors' Staff, however, will monitor orbital operations and will confer with SAFSP as required to assist in determining the need for emergency calldown. The decision to effect emergency calldown will be based on the following criteria:

a. A record of Agena electrical power system status shall be maintained continuously from lift-off by monitoring power bus voltage and current, and comparing them with nominal values of these parameters. Premature deterioration of the system is a prime consideration for an early initiation of the terminal phase because the Lifeboat and Agena systems use a common power source. Agena/OCV separation is a possible alternate course of action.

b. A record of OCV operational battery supply voltage, ampere-hours, and individual battery current shall be maintained from lift-off. Premature deterioration of supply voltage or loss of battery power is prime consideration for emergency calldown because it is impossible to initiate the final events without OCV electrical power.

c. Premature orbit decay may be cause for effecting emergency calldown.

Revolution 10 has been selected for the early initiation of the terminal phase. The characteristics of the inhibit timer make it imperative that this revolution be used for calldown only in extreme emergencies. (The inhibit timer will permit parachute deployment as far as 7,000 n mi north of the nominal impact point. Overshoot on this south-to-north pass could result in RV descent over a land mass.)

Although nominal calldown will occur on revolution 18, system malfunctions may require either of the following emergency actions to provide the correct deboost attitude:

a. Use of the Lifeboat backup stabilization subsystem.

b. Use of the OCV stabilization subsystem (only after positive indication that both primary Agena attitude control system and the Lifeboat system have failed.

The initial maneuver (yaw-around) will occur two orbits before pitch-down and within range of a telemetry station to provide for real-time performance analysis and recording of the Agena telemetry.

The final maneuver (pitch-down) and initiation of the terminal sequence signals will occur within range of a fixed or mobile telemetry station to provide for real-time performance analysis and recording of the Agena telemetry signal.

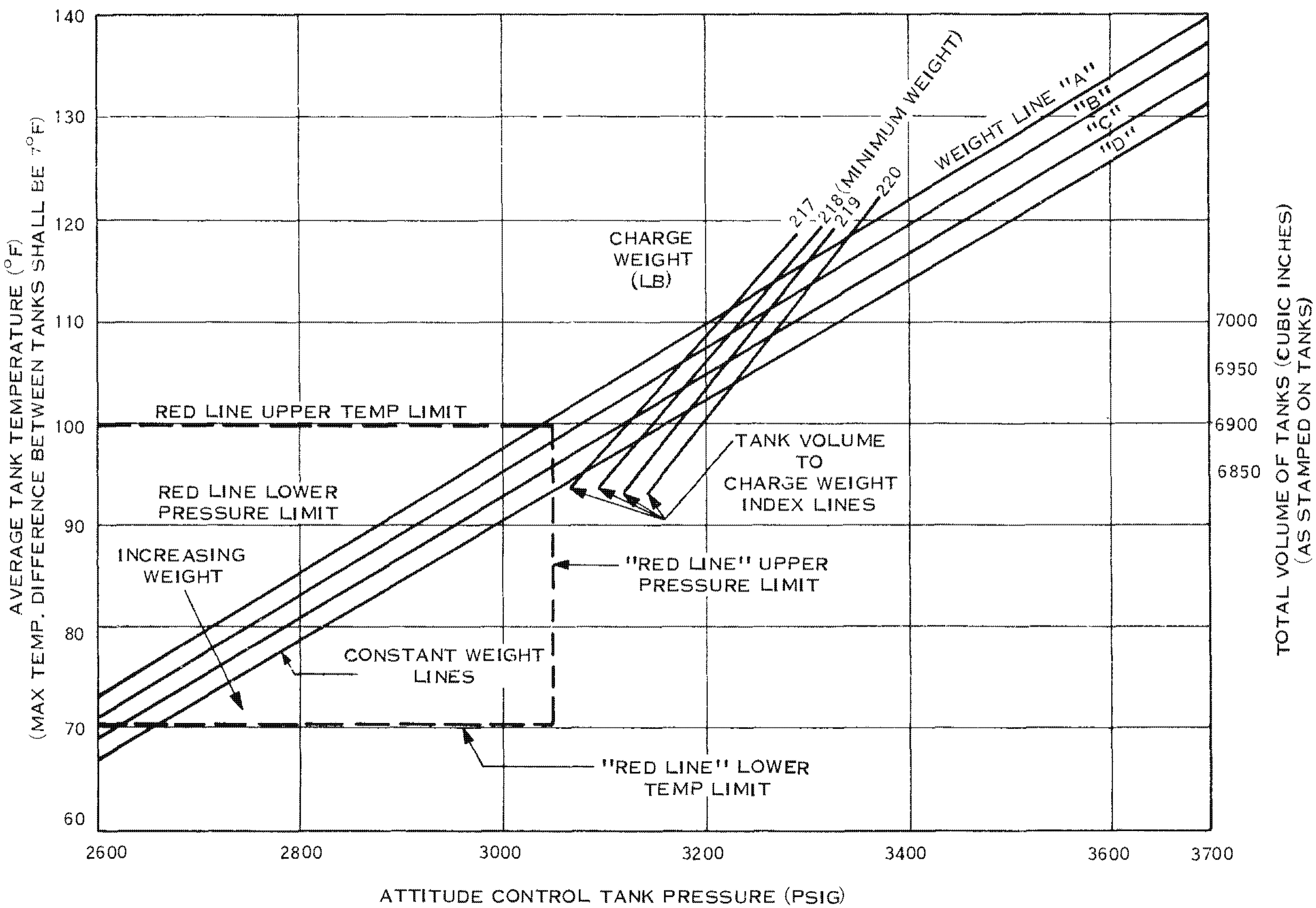

Figure 5-1. Attitude Control Tanks Load: SV Red Line Limits

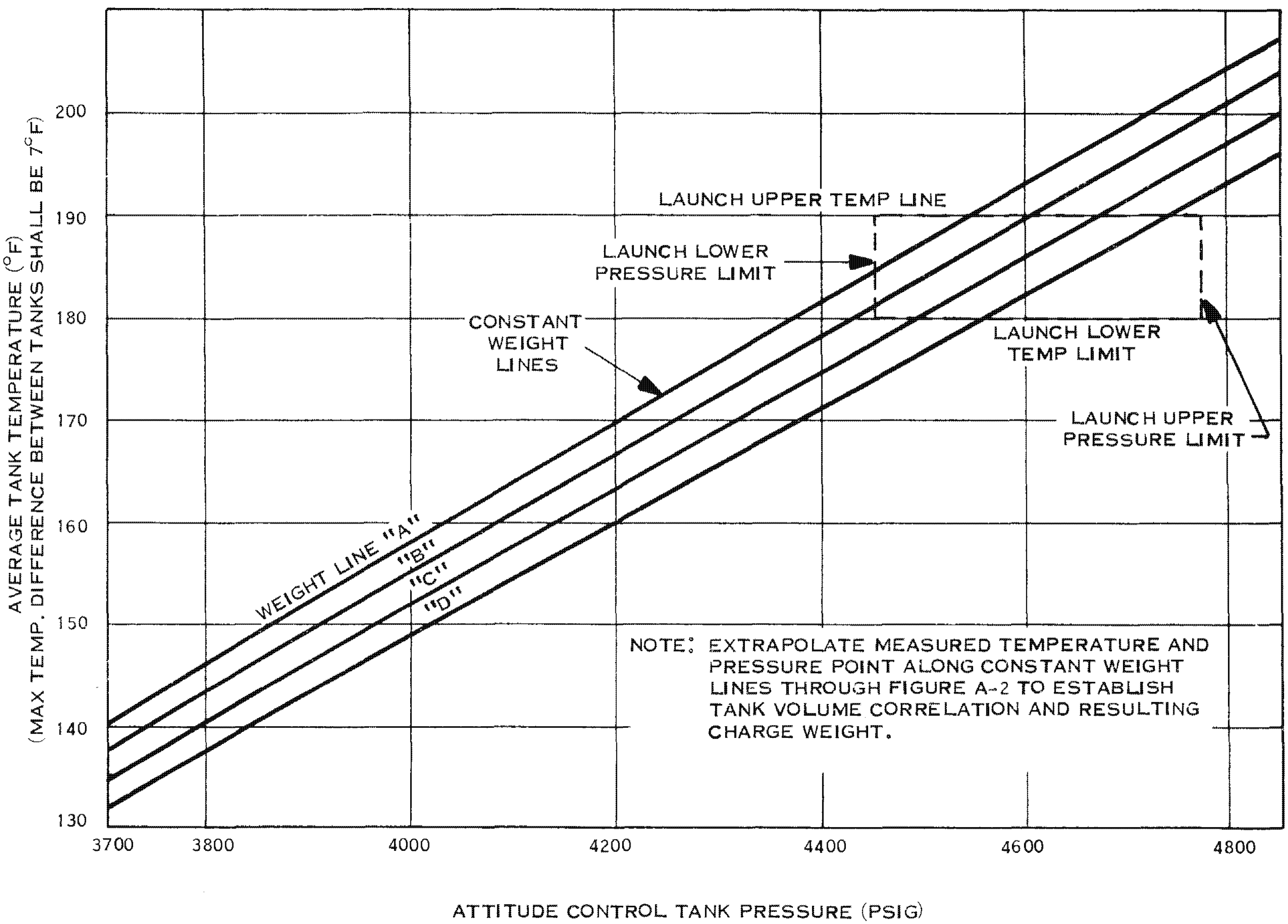

Figure 5-2. Attitude Control Tanks Load: SV Launch Limits

Table 5-1. Atlas Group I Measurements

Measurement	No.	Chan/Pin	Remarks	Cat. 1 SFO No.
400 Cycle AC Pwr. Sup. Frequency	E50Q	1 (cont)		5
400 Cycle AC Phase A Voltage	E51V	8 (cont)		
Lox Tank Helium Press	F1P	14/24		
Fuel Tank Helium Press	F3P	14/25		
PB Magnetron Ave. Current	G4C	13/49		
RB RF Output Power	G82E	13/47		
Pulse Beacon AGC	G3V	13/45		
RB AGC No. 1	G279V	13/51	These measurements must be available during ascent for postflight analysis purposes.	
B1 Hyd. Accumulator Press	H33P	14/20		
Sust./Vern. Hyd. Press	H140P	14/21		
Sust. Thrust Chamber Press	P6P	14/6		
V1 Thrust Chamber Press.	P28P	15/20		
V2 Thrust Chamber Press.	P29P	15/21		
B2 Thrust Chamber Press.	P59P	15/18		
B1 Thrust Chamber Press.	P60P	14/7		
Roll Rate Gyro Signal	S52R	9 (cont)		
Pitch Rate Gyro Signal	S53R	10 (cont)		
Yaw Rate Gyro Signal	S54R	11 (cont)		
B1 Yaw Roll Position	S252D	15/2		
B2 Yaw Roll Position	S253D	15/5		5

Table 5-1. Atlas Group I Measurements (Cont)

Measurement	No.	Chan/Pin	Remarks	Cat. 1 SFO No.
B1 Pitch Position	S254D	15/1		5
B2 Pitch Position	S255D	15/4		5
Sustainer Yaw Position	S256D	15/8		5
Sustainer Pitch Position	S257D	15/7		5
Start D Timer	Y41X	14/95		5
MSL Systems Input Voltage	E28V	15/16		5
Engine Comp. Ambient Temp	P14T	13/11		5
Thrust Sect. Ambient Temp Quad 4	P671T	13/1	These measurements must be available during ascent for postflight analysis purposes.	5
Diff Press. Rate Gyro Fairing	A392P	14/22		11
Diff Press. Rate Gyro Fairing	A393P	14/23		11
Canister Sta 521 Temp	A983T	13/3		11
Inner Surf Fairing Temp	A984T	13/13		11
Lox Tank Skin 515.5 Temp	A985T	13/21		11
Lox Tank Skin 521 Temp	A986T	13/23		11
Lox Tank Skin 532 Temp	A987T	13/53		11
Lox Tank Skin 514.2 Temp	A988T	13/15		11
Lox Tank Skin 523 Temp	A989T	13/43		11

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Table 5-1. Atlas Group I Measurments (Cont)

Measurement	No.	Chan/Pin	Remarks	Cat. 1 SFO No.
Rate Beacon Radial Acc	G1550	16 (cont)		17
Pulse Beacon Impact Predict Radial Acc	G1960	17 (cont)	These measurements must be available during ascent for postflight analysis purposes.	17
Rate Beacon Impact Predict Radial Acc	G1970	18 (cont)		17
Rate Beacon Canister Skin Temp	G335T	13/31		17

Table 5-2. Agena Group I Measurements Supporting Orbital Operations

Measurement	No.	Chan/Pin	Remarks	Monitor During*	Primary Performance Reqmt No.	Secondary Objective (Category 1)
Horizon sensor pitch	D41	16/40		LAO		
Horizon sensor roll	D42	16/37		LAO		
Control gas supply pressure	D59	16/32		LAO		
Control gas supply temperature	D70	15/42		LAO		
Terminal sequence enable/disable	H200	16/12		LO		
Terminal sequence command 5	H201	16/13		LO		
Terminal sequence command 6	H202	16/15		LO		
Beacon tone A verification	H243	16/2		LO		
Beacon tone B verification	H244	16/4		LO		
Beacon tone C verification	H245	16/6	The 6594th ATW will monitor and evaluate orbital operations per existing procedures. See LTD for limits used during launch operations.	LO		
Beacon tone D verification	H246	16/8		LO		
LB Command Monitor	LB37	15/10		LO		
Interface signal K-1 sent	P4	15/23		LO		
Interface signal K-2 sent	P5	15/26		LO		
Interface signal K-3 sent	P6	15/33		LO		
Interface signal K-4 sent	P7	15/35		LO		
Orbital prog. motor frequency	H185	1/2		LO		
	B037			LO		
Agena Beacon Signal		16/14		LO		
Agena Beacon Power		16/16		LO		
LB Power Monitor		16/19		LO		
Agena Beacon Command ZEKE/ Secure		16/17		LO		

*L = Launch, A = Ascent, O = Orbit, S = OCV Solo

Table 5-3. Agena Group II Measurements

Measurement	No.	Chan/Pin	Remarks	Monitor During *	Primary Performance Reqmt No.	Secondary Objective (Category 1)
Orbital prog. motor frequency	D068			LO		
28 VDC Unregulated supply	C003			LO		
400 cps 3 ph inverted temp	C021			LO		
	B001					
400 cps. 1 ph power amp temp	C024			LO		
400 cps AB phase bus volt	B002					
	C031			LO		
	D069			LO		
-28 VDC regulated supply	C005	15/30	The 6594th ATW will monitor and evaluate orbital operations per existing procedures. See LTD for limits used during launch operations.	LO		
DC/DC converter 28 VDC regulated	H204			LO		
Velocity cut-off switch	D086			LAO		
Guidance and Control Monitor	D014			LAO		
S/V Separation Monitor	P003	16/56		LAO		
Mag Temperature		15/25		LO		
LB Aux Timer Temperature		15/31		LO		
LB Electrical Temperature		15/44		LO		
LB Event monitor		16/21		LO		
K-1 pre-arm		15/23		LO		
K-3 transfer		15/33		LO		
K-4 pin pull		15/35		LO		
P axis valve commands	LB29	8		LO		
Q axis valve commands	LB30	11		LO		
Roll axis valve commands	LB31	9		LO		

*L = Launch, A = Ascent, O = Orbit, S = OCV Solo

Table 5-4. SV Group I Measurements

Measurement Description	Link/Chan/Pulse	Red Line Limits Low	Red Line Limits High	Launch Limits Low	Launch Limits High	Remarks	Monitored During	Primary Performance Reqmt No.	Secondary Objective (Category 1)
Separation No. 1	2/40/12(PF)	0.94v	1.14v	0.94v	1.14	Based on 28vdc bus voltage. 1 of 2 required	L,O	P7	12,13
Separation No. 5	2/30/13 (O)	2.32v	2.52v	2.32v	2.52v	Same as above.	L,O	P7,P8	13,14,15
Separation No. 6	3/50/14	0.93v	1.13v	0.93v	1.13v	Same as above.	L,O	P7,P8	13
Separation No. 7	3/40/22	0	0.25v	0	0.25	Same as above.	O,S	P7,P8	19,13,17,14,15
II-30 continuity & events	2 & 3/22/4	3.03v	3.24v	3.03v	3.24v	Based on 28vdc to cont loop, UMB 4b (3Q). Should read same as UMB 3u (3Q)	L,O	P8,P7	13
Continuity sep event TLM	UMB 3u (3Q)	3.03v	3.24v	3.03v	3.24v	Based on 28vdc to cont loop, UMB 4b (3Q). Should read same as TLM 4/22/4.	L	P8	14,15
Fwd vehicle continuity loop	UMB 4b (3Q)	See Remarks				Must be continuous. Should read same as bus voltage.	L	P8	14,15
Separation cont loop	UMB 4f (4g)	See Remarks				Same as above.	L	P7,P8	12,13,14,15
Environmental panel	2 & 3/10.5/28	4.5v	5.5v	4.5v	5.5v		L,O,S	P7	7,12
Voltage, OCV bttry	2/40/26	27.5v	33.4v	28.5v	33.4v	High limit is for reference only.	L,O,S	P7	16
Op bttry buss monitor	UMB 2B (1F)	27.5v	33.4v	28.5v	33.4v	Red line limit for external power	L	P7	16
Voltage, programmer Back-up battery	2/30/18	27.0v	31.5v	27.0v	31.5v	Monitors back-up battery voltage	L,O,S	P7	2,16
Prog voltage mon (P/U bttry)	UMB 2D (1F)	27.0v	33.4v	27.0v	33.4v	Monitors voltage input to programmer	L	P7	2,16
Command verification	2/52.5/Cont	2.0v 4.7v	3.2v 5.7v	2.0v 4.7v	3.2v 5.7v	Accept. Reject	L,O,S	P6,P7	2,4
Vehicle clock time	3/70/Cont	See Remarks				Binary wave train repeating every 0.8 sec. Binary "1" = 5 ± 0.5v: "0" = 0.5 ± 0.5v	L,O,S	P6,P7	2,4,13 1a,b,c
Continuity loop EP&SD	UMB 3P (4t)	See Remarks				Shall indicate "Continuous"	L	P7	16
Continuity loop (test plugs and int power	UMB 4D (4t)	See Remarks				Shall indicate "Continuous" on int power and "Open" on ext power.	L	P7	16
Secure word count (If OCV commands RV/OCV separation)	3/16/612					Either of two levels: Logic "1" = 0.50 ± 0.5v Logic "0" = 5.0 ± 0.5v. Counter must advance one count each time PPD is energized. Report secure word count at lift-off to STA	L,O	P6,P7	2,13
Roll attitude error angle (ACA)	2 & 3/22/7 & 22	-3 deg	+3 deg	-0.3 deg	+0.3 deg	Red line limits for gyros uncaged. Launch limits for gyros caged. Vehicle sway may obscure these readings.	L,O,R,S		1a,1b,1c
Pitch attitude error angle (ACA)	2 & 3/22/8 & 23	-3 deg	+3 deg	-0.3 deg	+0.3 deg	Same as above	L,O,R,S		1a, 1b
Yaw attitude error angle (ACA)	2 & 3/22/9 & 24	-3 deg	+3 deg	-0.3 deg	+0.3 deg	Same as above	L,O,R,S		
Pitch ACA output	2 & 3/22/11 & 26	3.75v 1.75v	4.25v 2.25v	Four levels, to be cycled		High thrust level. Low thrust level.	L,S		1a,1b
Yaw ACA output	2 & 3/22/12 & 27	3.75v 1.75v	4.25v 2.25v	Four levels, to be cycled		High thrust level. Low thrust level.	L,S		1a,1b
Roll ACA output	2 & 3/22/13 & 28	3.75v 1.75v	4.25v 2.25v	Four levels, to be cycled		High thrust level. Low thrust level.	L,S		1a,1b
+10 vdc	2 & 3/5.4/13	9v	11v	9v	11v		L,S		1a,1b,1c
+26 vdc	2 & 3/5.4/14	20v	30v	20v	30v		L,S		1a,1b,1c

NOTES: L = Launch, O = Orbit, S = OCV solo, R = Recovery
See Malfunction Analysis Reference Book for measurement limits during O and S

Table 5-4. SV Group I Measurements (Cont.)

Measurement Description	Link/Chan/Pulse	Red Line Limits Low	Red Line Limits High	Launch Limits Low	Launch Limits High	Remarks	Monitored During	Primary Performance Reqmt No.	Secondary Objective (Category 1)
Current btty No. 1, 2, 3, 4, 5	2/30/20-24	See Remarks		1a	10a	Red Line and Launch Limits are dependent upon amount of load in system when monitor is checked.	L, O, S	P7	16
Gyro roll rate output (fine)	2 & 3/2.3 Cont.	-0.05 deg/sec	+0.05 deg/sec	Qualitative Check			L, O, S	P7	1a, 1c, 2, 4, 6, 1d
Gyro pitch rate output (fine)	2 & 3/3.9 Cont.	-0.05 deg/sec	+0.05 deg/sec	Qualitative Check			L, O, S	P7	1a, 1c, 2, 4, 6, 1d
Gyro yaw rate output (fine)	2 & 3/3.0 Cont.	-0.05 deg/sec	+0.05 deg/sec	Qualitative Check			L, O, S	P7	1a, 1c, 2, 4, 6, 1d
Amp-hour meter (0-480 AH)	2/40/21			0	0 AH	Ampere-hours used should not exceed 12.5 A.H.	L, O, S	P7	16, 9
+22 vdc monitor	2.3/5.4/60	See Remarks				Limits to be provided by Assoc. Contractor	L, O, S		16
Delay line No. 1 full	2/40/13	55%	65%	55%	65%		L, O, S	P5, P7	2, 4
Delay line No. 2 full	2/40/13	35%	45%	35%	45%		L, O, S	P5, P7	2, 4
Delay line No. 1 & 2 full	2/40/13	95%	105%	95%	105%		L, O, S	P5, P7	2, 4
Delay line No. 1 & 3 not full	2/40/13	0%	25%	0%	25%		L, O, S	P5, P7	2, 4
Delay line No. 3 full	2/40/14	55%	65%	55%	65%		L, O, S	P5, P7	2, 4
Delay line No. 4 full	2/40/14	35%	45%	35%	45%		L, O, S	P5, P7	2, 4
Delay line No. 3 & 4 full	2/40/14	95%	105%	95%	105%		L, O, S	P5, P7	2, 4
Delay line No. 3 & 4 not full	2/40/14	0%	25%	0%	25%		L, O, S	P5, P7	2, 4
S-Band interrogate	2/30/7	410 pps	612 pps	410 pps	625 pps		L, O, S	P7	2, 3
S-Band transmit	2/30/8	410 pps	612 pps	410 pps	625 pps		L, O, S	P7	2, 3
S-Band temp	2/30/6	0^{o}	160^{o}F	0^{o}	90^{o}F		L, O, S	P7	2, 3
Delay line No. 1 erase/select	2 & 3/7.35 Cont.	75%	85%	75%	85%		L, O, S	P5, P7	2, 4
Delay line No. 2 erase/select	2 & 3/7.35 Cont.	55%	65%	55%	65%	66 millisec pulse (Erase).	L, O, S	P5, P7	2, 4
Delay line No. 3 erase/select	2 & 3/7.35 Cont.	35%	45%	35%	45%	45 millisec pulse (Selected).	L, O, S	P5, P7	2, 4
Delay line No. 4 erase/select	2 & 3/7.35 Cont.	15%	25%	15%	25%		L, O, S	P5, P7	2, 4
Door eject	2/40/12 (PF)			90%	94%	See Table B-2	L	P9	

NOTES: L = Launch, O = Orbit, S = OCV solo, R = Recovery
See Malfunction Analysis Reference Book for measurement limits during O and S

Table 5-5. SV Group II Measurements

Measurement Description	Link/Chan/Pulse	Red Line Limits Low	Red Line Limits High	Launch Limits Low	Launch Limits High	Remarks	Monitored During	Primary Performance Reqmt No.	Secondary Objective (Category 1)
Amp-hour meter (0-30 AH)	2/40/19			0	10 AH	Ampere-hours used should not exceed 12.5 AH	L,O,S	P7	16,9
Amp-hour meter (0-120 AH)	2/40/20			0	0 AH		L,O,S		
Temp, op bttry No. 1	2 & 3/5.4/80	65°F	80°F	65°F	80°F				
Temp, op bttry No. 2	2 & 3/5.4/81	65°F	80°F	65°F	80°F				
Temp, op bttry No. 3	2 & 3/5.4/82	65°F	80°F	65°F	80°F				
Temp, op bttry No. 4	2 & 3/5.4/83	65°F	80°F	65°F	80°F		L,O,S	P7	16,9,7
Temp, op bttry No. 5	2 & 3/5.4/84	65°F	80°F	65°F	80°F				
Temp, programmer backup bttry	2 & 3/5.4/45	65°F	90°F	65°F	80°F				
Att control gas weight (based on HW temp averages, tank pressure, and loading curves)	See Remarks	218 lb		218 lb		Refer to figure 5-1 (Red Line Limits) and figure 5-2 (Launch Limits) to establish actual weight, using Freon tank temp UMB 3q (3f), 3r (3f) and pressure, attitude control tank outlet, TLM 3/40/27.	L,O,S		1
Temp. cold gas line (int)	2/30/9			30°F	200°F			P7	7, 7b, Id
Temp. Sta. 104 @ 25°	2 & 3/5.4/23			65°F	75°F				
Temp. Sta. 127 @ 10°	2 & 3/5.4/25			30°F	75°F				
Temp. Sta. 127 @ 180°	2 & 3/5.4/26			30°F	75°F		L,O,S	P7	7
Temp. Sta. 127 @ 300°	2 & 3/5.4/27			30°F	75°F				
Temp. outs, ins, STA 209	2 & 3/5.4/33			30°F	100°F				
Temp, struct adapt.	2/30/6 (PF) 2 & 3/5.4/76			60°F	90°F				
Command verification (B/U)	3/70/Cont	2.0 v 4.7 v	3.2 v 5.7 v	2.0 v 4.7 v	3.2 v 5.7 v	Accept. Reject. } Time shared with playback data.	L,O,S	P6, P7	2,4
Vehicle clock time	3/70/Cont (PF)	See Remarks				Binary wave train repeating every 0.8 sec. Binary "1" = 5 ± 0.5 v; "0" = 0.5 ± 0.5 v.	L,O,S	P2	
OCV fwd bay blanket/skin temp (1)				60°F	68°F		L	P5	7
OCV midbay blanket/skin temp (4)	Ground cooling equipment			65°F	69°F		L	P5	7
Adapter int cooling air temp		32°F	36°F	32°F	36°F		L	P5	7
Aft bay int cooling air temp		32°F	36°F	32°F	36°F		L	P5	7
Temp, power ampl	2/30/1 (PF) 3/5.4/5	0	120°F	0	90°F		L O	P7	4

NOTES: L = Launch, O = Orbit, S = OCV solo, R = Recovery
See Malfunction Analysis Reference Book for measurement limits during O and S

Table 5-5. SV Group II Measurements (Cont.)

Measurement Description	Link/Chan Pulse	Red Line Limits Low	Red Line Limits High	Launch Limits Low	Launch Limits High	Remarks	Monitored During	Primary Performance Reqmt No.	Secondary Objective (Category 1)
Roll demod output	2/10/1 & 16	-3 deg	+3 deg	-0.3 deg	+0.3 deg	Red line limits for gyros uncaged. Launch limits for gyros caged. Vehicle sway may obscure readings.	L,S	P7	1c,2
Pitch demod output	2/40/2 & 17	-3 deg	3 deg	-0.3 deg	+0.3 deg	Same as above.	L,S	P7	1b,2
Yaw demod output	2/10/3 & 18	-3°	+3°	-1°	+1°	Same as above.	L,S	P7	1b,2
Temp, Pneum Equip	2 & 3/5.4/14			30°F	90°F		L,S	P7	7,1
Temp, Dec Prog Plate	2 & 3/5.4/62	See Remarks				To be defined in LTD	L,S	P7	2,7
Temp, VHF Ant.	2 & 3/5.4/79 } 2/30/3 (PF) }			0°F	90°F	Limits to be supplied by Assoc. Contractor	L,S	P7	4,7
Temp, Sta 77.5, AFT Equip Struct	2 & 3/5.4/77			0°F	90°F		L,S	P7	7
Temp, Sta 66.16, Fwd Equip Struct	2 & 3/5.4/78			0°F	90°F		L,S	P7	7
Gyro roll rate output (coarse)	2 & 3/22/6 & 21	-0.45 deg/sec	+0.45 deg/sec	-0.5 deg/sec	+0.5 deg/sec	Vehicle sway may obscure readings.			1c,2
Gyro pitch rate output (coarse)	2 & 3/10.5/3 & 18	-0.15 deg/sec	+0.15 deg/sec	-0.15 deg/sec	+0.15 deg/sec	Same as above.			2
Gyro yaw rate output (coarse)	2 & 3/10.5/4 & 19	-0.15 deg/sec	+0.15 deg/sec	-0.15 deg/sec	+0.15 deg/sec	Same as above.			2
L/H preampl	3/10 Cont	See Remarks				30 cps ± 10% pulse. } Time shared with playback data.	S		1a,1b
R/H preampl	3/22 Cont	See Remarks				30 cps ± 10% pulse. }			
TARS gyro wheel power	2 & 3/5.4/21	22.8 v	29.2 v	22.8 v	29.2 v		L,S		1a,1b
Voltage rate gyro, 400 cps	2 & 3/5.4/11	22.8 v	29.2 v	22.8 v	29.2 v		L,S		1a,1b,1c
Temp, TARS elect (int)	2 & 3/5.4/20	18°F	108°F	20°F	95°F		L,S	P5,P7	7
Temp, rate gyro pkg (int)	2 & 3/5.4/12	110°F	160°F	110°F	160°F		L,S	P5	
Temp, TARS elect (ext)	2 & 3/5.4/34	18°F	108°F	20°F	95°F		L,S	P5	
Forebody skin temp	ground cooling equip			65°F	90°F			P5,P7	7
Temp Freon Tank No. 1	Umb 3q (3t) }	70°F	100°F	180°F	190°F	Automatic Heater Cutout at 200°F.	L		1a,1b,1c,1d
Temp Freon Tank No. 2	Umb 3r (3f) }								
Axial Accel No. 1	2/10.5/Cont	0.9 g	1.1 g	Not Available		At T/C Separation SCU is switched to Accel No. 2 (Not Shown)	L,R	P8	14

Table 5-5. SV Group II Measurements (Cont)

Measurement Description	Link Chan Pulse	Red Line Limits Low	Red Line Limits High	Launch Limits Low	Launch Limits High	Remarks	Monitored During	Primary Performance Reqmt No.	Secondary Objective (Category 1)
Pressure, att control tank outlet	2/40/27	2600 psia	3100 psia	4450 psia	4775 psia	Red Line shown are for Freon unheated condition.	L,O,S		1(a-d)
Pressure, low-pressure reg output	2 & 3/5.4/15	55 psia	75 psia	55 psia	75 psia		L,O,S		1(a-d)
Pressure, high-pressure reg output	2 & 3/5.4/16	380 psia	500 psia	380 psia	500 psia		L,O,S		1(a-d)
TARS temp monitor	UMB 3a, 3g, 3h (3j)	130°F	180°F			Cannot be monitored when power is on the OCV Bus.	L		
RAGS temp monitor	UMB 3n (3p)	130°F	180°F				L		1a, 1b, 1c
Temp, dc power supply	2 & 3/5.4/66			0°F	145°F		O,S	P7, P5	7
Temp, H-30 capsule	2 & 3/5.4/72			60°F	90°F		O	P7, P5	7
Temp, vehicle Sta 84 at 180°	2 & 3/10.5/9			65°F	78°F		O,S		
Temp, vehicle Sta 104.385 at 90°	2 & 3/10.5/16			65°F	78°F		O,S	P5, P7	7
Temp, vehicle Sta 104.385 at 270°	2 & 3/10.5/23			65°F	78°F		O,S		
Temp, TARS platform, pitch	2 & 3/5.4/8			162.5°F	167.5°F		L,O,S		1a, 1b
Temp, TARS platform, roll	2 & 3/5.4/9			162.5°F	167.5°F				1a, 1c
Temp, TARS platform, yaw	2 & 3/5.4/10			162.5°F	167.5°F				1a, 1b
Compartment heaters	UMB 4z, 4y, 4x, 4w, 4v, 4g, 4h, 4d, and 4r (IF)	130°F	170°F	See Remarks		Pulse amplitude = bus voltage. Pulse width varies with heater duty cycle.	L	P5	7
Temp, vehicle Sta 104.385 at 180°	2 & 3/10.5/26			65°F	75°F		O,S	P7, P5	7, 13
Separation No. 2	2/40/13 (PF)	3.75 v	4.25 v	3.75 v	4.25 v	Based on 28 vdc bus voltage.	O,S	P7	13
Separation No. 3	2/30/17	2.5 v	3.0 v	2.5 v	3.0 v	Based on 28 vdc bus voltage.	O,S	P7, P8	5, 13
Separation No. 4	2/30/10	0	0.25 v	0	0.25 v	Based on 28 vdc bus voltage.	O,S	P7, P8	13, 14, 15
Separation No. 7	2/40/22	0	0.25 v	0	0.25 v	Based on 28 vdc bus voltage.	O,S	P7, P8	13, 14, 15
Int pressure, OCV Sta 102.78; X = 22.8, Y = 16.6	2/40/3 (PF)	Local barometric pressure: ± 0.5 psia					L	P7	4
Int pressure, OCV Sta 188.75; X = 2.2, Y = 26.6	2/40/4 (PF)	Local barometric pressure: ± 0.5 psia					L	P7	4
Int pressure, Adapter Sta 76 at CL	2/40/26 (PF)	Local barometric pressure: + 0.7 - 0.5 psia				+0.2 psia due to ground cooling pressurization	L	P7	4
Roll torque motor voltage	2 & 3/10.5/1	-5v	+5v	-5v	+5v	Vehicle sway may obscure these readings	L	P7	1a, 1b, 1c, 2
Pitch torque motor voltage	2 & 3/10.5/24	-5v	+5v	-5v	+5v	Same as above.	L	P7	1a, 1b, 2
Roll IR computer output	2/30/11 & 26	Responds to Stimulation					L,S	P7	1a, 1b, 2, 4
Pitch IR computer output	2/30/12 & 27	Responds to Stimulation					L,S	P7	1a, 1b, 2, 4

NOTES: L = Launch, O = Orbit, S = OCV solo, R = Recovery
See Malfunction Analysis Reference Book for measurement limits during O and S

Table 5-6. SV Group III Measurements

Measurement Description	Link/Chan/Pulse	Launch Limits* Low		High	Remarks	Monitored During	Secondary Flight Objective
Temp, inside insul, Sta 190 at 180°	2 & 3/5.4/28					O, S	7
Temp, inside insul, Sta 190 at 60°	2 & 3/5.4/29						
Temp, inside insul Sta 190 at 300°	2 & 3/5.4/30						
Temp, inside insul Sta 146 at 0°	2 & 3/5.4/31						
Temp, inside insul, DC power supply	2 & 3/5.4/32						
Temp, cold gas tank at 38°	2 & 3/5.4/35						
Temp, cold gas tank at 321°	2 & 3/5.4/36						
Temp, vehicle Sta 190 at 60°	2 & 3/5.4/37						
Temp, liner Sta 190 at $2^{\circ}30'$	2 & 3/5.4/39 2/40/8 (PF)						
Temp, liner Sta 190 at $180^{\circ}30'$	2 & 3/5.4/40 2/40/9 (PF)						
Temp, vehicle Sta 190 at 240°	2 & 3/5.4/41						
Temp, vehicle Sta 190 at 120°	3 & 4/5.4/38	$65^{\circ}F$	to	$70^{\circ}F$			
Temp, vehicle Sta 190 at 300°	2 & 3/5.4/42						
Temp, Adapter liner, Sta 81 at 300°	3/40/6 (PF)						
Temp, vehicle Sta 190 at 120°	2 & 3/5.4/38	$65^{\circ}F$	to	$70^{\circ}F$			
Temp, Adapter liner, Sta 49 at 0°	2/40/14 (PF)						
Temp, Adapter liner, Sta 66 at 0°	2/40/20 (PF)						
Temp, Adapter liner, Sta 66 at 60°	2/40/21 (PF)						
Temp, Adapter liner, Sta 81 at 0°	2/40/22 (PF)						
Temp, Adapter liner, Sta 81 at 120°	2/40/23 (PF)					OS	7

* Limits not listed here will be included in the LTD.

Table 5-6. SV Group III Measurements (Cont)

Measurement Description	Link/Chan/Pulse	Launch Limits* Low	Launch Limits* High	Remarks	Monitored During	Secondary Flight Objective
Temp, recorder	2/30/2 (PF) 3/5.4/7	0	90°		L O	4
Pressure, Adapter ext, Sta 58 at 68°	2/40/17 (PF)					
Pressure, Adapter ext, Sta 69 at 68°	2/40/18 (PF)				L	8
Pressure, Adapter ext, Sta 80 at 68°	2/40/19 (PF)					
Radial accel	4/5.4/Cont				R	14
Re-entry Sequence				Transfer (Voltage T/C Batt.)		
				OCV/SRV I & D		
				Spin Breakwire		
				Retro Breakwire		
				Despin Breakwire		
				T/C Separation (Rec. Batt. # 1 Voltage)		
	4/2.9/Seq			T/C Sep. Back-up Signal		
				T/C Back-up Signal Removed		
				3-g Switch Close	R	14, 15, 16
				3g-Switch Open		
				Piston Fire No. 1		
				Forebody Separation		
				Spin Actuation Signal		
				Retro Rocket Fire Signal		
				Despin Signal		
	4/3.0/Seq			T/C Elec. Disc. (Rec. Batt. # 2 Voltage)		
				Piston Fire No. 2		
				Para. Cover Off		

* Limits not listed here will be included in the LTD.

Table 5-6. SV Group III Measurements (Cont)

Measurement Description	Link/Chan/Pulse	Launch Limits* Low	High	Remarks	Monitored During	Secondary Flight Objective
Temp, Adapter liner, Sta 81 at 180°	2/40/24 (PF)				OS	7
Temp, Adapter liner, Sta 81 at 240°	2/40/27 (PF)				OS	7
Temp, retrorocket	2 & 3/5.4/17	0°F	110°F		OS	7,14
Temp, forebody	2 & 3/5.4/18	0°F	160°F		OS	7
Temp, thrust cone	2 & 3/5.4/4				OS	7
Battery current, total	2/30/16				OS	16, 9
Sep spring mon No. 1	2/22/Cont (PF)					
Sep spring mon No. 2	2/14.5/Cont (PF)					
Sep spring mon No. 3	2/10.5/Cont (PF)				O	13
Sep spring mon No. 4	2.7.35/Cont (PF)					
Temp, Sta 64 at 0°	2 & 3/5.4/63					
Temp, Sta 64 at 60°	2 & 3/5.4/64					
Temp, Sta 64 at 120°	2 & 3/5.4/64					
Temp, Sta 64 at 180°	2 & 3/5.4/73				OS	7, 8
Temp, Sta 64 at 240°	2 & 3/5.4/74					
Temp, Sta 64 at 300°	2 & 3/5.4/75					
Accel, axial	2/5.4/Cont (PF)					
Accel, pitch	2/3.9/Cont (PF)				L, R	8
Accel, yaw	2/3.0/Cont (PF)1					
Vibration meas Sta 125	2/52.5/Cont (PF)					
Vibration meas Sta 209	3/40/Cont (PF)				L, R	6, 8
Vibration meas Sta 220	3/22/Cont (PF)					
Ext press.OCV Sta 97 at 77° 30'	2/40/1 (PF) 2/40/1					
Ext pressure OCV Sta 187.25 at 354° 23'	2/40/2 (PF) 2/40/1				L	8
Pressure, Adapter ext, Sta 49.25 at 68°	2/40/16 (PF) 2/41/1					

* Limits not listed here will be included in the LTD.

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Table 5-7. Payload Measurements - Group I

(Measurements required to support Primary Objective or Category 1, Secondary Flight Objectives)

Monitor Point					Action			
Description and Secondary Flight Objective Number	On Orbit	Pre-Launch	Nominal Value	Range (Acceptable)	Information Not Available	Information Out of Range		
						Hold	Abort	Remarks
				Indicates operation in range of				
1. Looper position (Sec. Flt. Obj. 101)		BBT-1*	--	2" - 27"	Hold/Abort	x	x	If CPL-17 is inoperative on-orbit and CPL-15 is not available, consider termination of camera operation.
		VTP-17	--	2" - 27"	Hold/Abort	x	x	
		CPL-17	--	2" - 27"	Hold/Abort	x	x	
	CPL-17		--	2" - 27"	No action	--	--	
If the above test points are inoperative these may be used to measure that the looper is working (See also Meas. 13)		VTP-15	--	0 - 300 ft.	Hold	x		
		CPL-15	--	0 - 300 ft.	Hold	x		
	CPL-15		--	0 - 300 ft.	Do nothing unless CPL-17 also inoperative.	--	--	Do nothing unless CPL-17 also inoperative.
2. Film Drive Speed Frequency (Sec. Flt. Obj. 101)	--	BBT-2	Must agree with command value within ± 0.1 % (Except speed 33 - see EKC calibration book for FM# 1)		Hold/Abort	x	x	
3. Stereo Mirror Temp. (Sec. Flt. Obj. 103, 105, 109)		BBT-3	68°F	65°F - 78°F	Hold/Abort	x	x	See Meas. -12 also.
		VTP-4	68°F	65°F - 78°F	Hold/Abort	x	x	
		CPL-4	68°F	65°F - 78°F	Hold/Abort	x	x	
	CPL-4		68°F	65°F - 78°F	No action	--	--	

* BBT, VP, and VTP hardline monitors are backup to CPL telemetry points for purposes of prelaunch evaluation .

Table 5-7. Payload Measurements - Group I (Cont)

(Measurements required to support Primary Objective or Category 1, Secondary Flight Objectives)

Description and Secondary Flight Objective Number	Monitor Point: On Orbit	Monitor Point: Pre-Launch	Nominal Value	Range (Acceptable)	Action: Information Not Available	Information Out of Range: Hold	Information Out of Range: Abort	Information Out of Range: Remarks
4. Stereo Mirror Diff. Temp. (Sec. Flt. Obj. 103)		VTP-3	$0^{\circ}F$	To be supplied later.	Hold/Abort	x	x	
		CPL-3	$0^{\circ}F$		Hold/Abort	x	x	
	CPL-3		$0^{\circ}F$			x		
5. Temp of Comp. Support Tube 179 (Sec. Flt. Obj. 103)		BBT-4	$70^{\circ}F$	$60^{\circ} - 75^{\circ}F$	Hold/Abort	x	x	See Meas. 12 also.
		VTP-8	$70^{\circ}F$	$60^{\circ} - 75^{\circ}F$	Hold			
		CPL-8	$70^{\circ}F$	$60^{\circ} - 75^{\circ}F$	Hold			
6. Torque Motor Command (Sec. Flt. Obj. 101)		BBT-5	+32 V	+24 to +33.4 V	Hold/Abort	x	x	
7. Master Umbilical Telltale		BBT-6	Go state	Go state only	Hold/Abort		x	
8. Lens Barrel Diff. Temperature (Sec. Flt. Obj. 103)		VTP-5	$0^{\circ}F$	$\pm 2^{\circ}F$	Hold/Abort	x	x	
		CPL-5	$0^{\circ}F$	$\pm 10^{\circ}F$	Hold/Abort	x	x	
	CPL-5		$0^{\circ}F$	$\pm 10^{\circ}F$	---	--	--	
9. Stereo Position (Sec. Flt. Obj. 102)		VTP-13	$0, +7.5^{\circ} -7.5^{\circ}$	$\pm 0.22^{\circ}$ From Nom.	Hold	x		
		CPL-13	$0, +7.5^{\circ} -7.5^{\circ}$	$\pm 0.22^{\circ}$ From Nom.	Hold/Abort	x		

Table 5-7. Payload Measurements - Group I (Cont)

(Measurements required to support Primary Objective or Category 1, Secondary Flight Objectives)

Description and Secondary Flight Objective Number	Monitor Point: On Orbit	Monitor Point: Pre-Launch	Nominal Value	Range (Acceptable)	Information Not Available	Action: Information Out of Range: Hold	Abort	Remarks
10. Crab Position (Sec. Flt. Obj. 102)		VTP-14	Commanded or Preset	$\pm 0.1^{o}$ From Nom.	Hold	x		
		CPL-14	Commanded or Preset	$\pm 0.1^{o}$ From Nom.	Hold/Abort	x		
11. Film in R/V Film Takeup (Sec. Flt. Obj. 101, 104)		VTP-15 CPL-15	0 - 300 ft. and cycling during operation of looper over 25"	0 - 300 ft.	Hold/Abort	x	x	
12. Temp. Diff over Payload Length (Sec. Flt. Obj. 103)		BBT-4	0	$\Delta T = 2^{o}F$	Hold/Abort	x	x	
		BBT-3	0	$\Delta T = 2^{o}F$	Hold/Abort	x	x	
		VTP-8	0	$\Delta T = 2^{o}F$	Hold/Abort	x	x	
	CPL-8		0	$\Delta T = 10^{o}F$		--	--	
	CPL-4		0	$\Delta T = 10^{o}F$		--	--	
13. Film Drive Electronics Output (Sec. Flt. Obj. 101)		VTP-18	See Fig. 5-3	± 2% of nominal	Hold	x	x	
		CPL-18			Hold	x	x	
	CPL-18				---	--	--	

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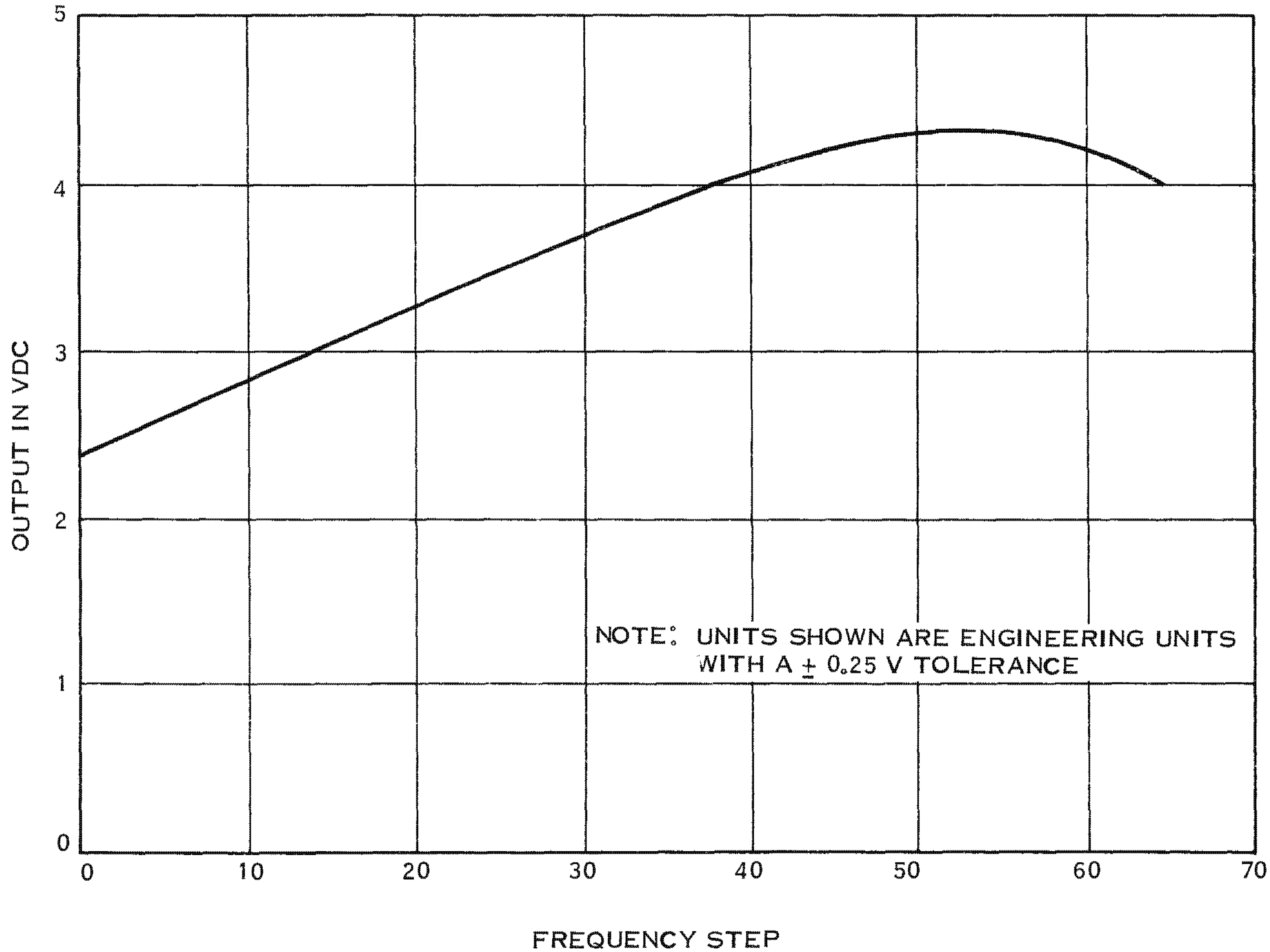

Figure 5-3. Motor Power Test Point (CPL 18)

Table 5-8. Payload Measurements - Group II

(Measurements required to support Primary Objective or Category 1, Secondary Flight Objectives)

Description and Secondary Flight Objective Number	Monitor Point: On Orbit	Monitor Point: Pre-Launch	Nominal Value	Range (Acceptable)	Action: Information Not Available	Action: Information Out of Range: Hold	Action: Information Out of Range: Remarks
1. Stereo Position* (Sec. Flt. Obj. 102, 104, 110)	CPL-13		0^{o}	$\pm 0.22^{o}$	Hold	If info shows between $+7.5^{o}$ -7.5^{o} require analysis for hand spec program.	If not in $+7.5^{o}$ to -7.5^{o} range assume instrumentation wrong.
2. Crab Position* (Sec. Flt. Obj. 102)	CPL-14		Programmed Value	$\pm 0.1^{o}$ From Nom.	Hold	If info shows between 0, $\pm 3.5^{o}$	If not in $\pm 3.5^{o}$ range assume instrumentation wrong.
3. Thermal Status of Component Support Tube (Sec. Flt. Obj. 103)	VTP-7		$68^{o}F$	60^{o} - $70^{o}F$	Hold	x	
	VTP-8		$68^{o}F$	60^{o} - $70^{o}F$	Hold	x	
	VTP-9		$68^{o}F$	60^{o} - $70^{o}F$	Hold	x	
	VTP-10		$68^{o}F$	60^{o} - $70^{o}F$	Hold	x	
	VTP-11		$68^{o}F$	60^{o} - $70^{o}F$	Hold	x	
	CPL-7		$68^{o}F$	60^{o} - $70^{o}F$	Hold	--	
	CPL-8		$68^{o}F$	60^{o} - $70^{o}F$	Hold	--	
	CPL-9		$68^{o}F$	60^{o} - $70^{o}F$	Hold	--	
	CPL-10		$68^{o}F$		Hold	--	
	CPL-11		$68^{o}F$	60^{o} - $70^{o}F$	Hold	x	

* Denotes measurement supporting Primary Performance Requirement

Table 5-8. Payload Measurements - Group II (Cont)

(Measurements required to support Primary Objective or Category 1, Secondary Flight Objectives)

Description and Secondary Flight Objective Number	On Orbit	Pre-Launch	Nominal Value	Range (Acceptable)	Information Not Available	Information Out of Range: Hold	Information Out of Range: Remarks
	Monitor Point				Action		
3. cont'd	CPL-7		$68^{o}F$	$60^{o} - 70^{o}F$	Hold	--	
	CPL-8		$68^{o}F$	$60^{o} - 70^{o}F$	Hold	--	
	CPL-9		$68^{o}F$	$60^{o} - 70^{o}F$	Hold	--	
	CPL-10		$68^{o}F$	$60^{o} - 70^{o}F$	Hold	--	
	CPL-11		$68^{o}F$	$60^{o} - 70^{o}F$	Hold	--	
4. Film Path Temperatures* (Sec. Flt. Obj. 103)		VTP-1	$68^{o}F$	$60^{o} - 75^{o}F$	Hold	x	If the film
		VTP-2	$68^{o}F$	$60^{o} - 75^{o}F$	Hold	x	path tempera-
		VPT-24	$68^{o}F$	$60^{o} - 75^{o}F$	Hold	x	ture and/or
		CPL-1	$68^{o}F$	$60^{o} - 75^{o}F$	Hold	x	temperature
		CPL-2	$68^{o}F$	$60^{o} - 75^{o}F$	Hold	x	history indi-
		CPL-24	$68^{o}F$	$60^{o} - 75^{o}F$	Hold	x	cates jeopardy
	CPL-1		$68^{o}F$	$60^{o} - 75^{o}F$	--	--	to exposed
	CPL-2		$68^{o}F$	$60^{o} - 75^{o}F$	--	--	record, consider
	CPL-24		$68^{o}F$	$60^{o} - 75^{o}F$	--	--	calldown.
5. Temperature of the 45^{o} Mirror (Sec. Flt. Obj. 103)		VTP-6	$70^{o}F$	$65^{o} - 75^{o}F$			
		CPL-6	$70^{o}F$	$65^{o} - 75^{o}F$			
	CPL-6		$70^{o}F$	$65^{o} - 75^{o}F$			
6. 5 Volt Supply*		VP13	+5 V	± 0.1 V	Hold	x	
7. -22 Volt Supply*		VP44	-22 V	± 0.1 V	Hold	x	

* Denotes measurement supporting Primary Performance Requirement

6.0 SYSTEM CONFIGURATION

This section identifies special features and modifications to be incorporated in the flight hardware and ground support equipment for Flight Vehicle No. 1. For detailed descriptions of each major subsystem see referenced documents.

6.1 FLIGHT VEHICLE

6.1.1 Atlas

Table 6-1 lists the modifications to be made on SLV-3 (D-series wet start configuration). Items i through 3 in the table are required to support the 20,000-lb (nominal) weight of the Agena and satellite vehicles. All of the items in the table except those noted are effective on all Program D-series vehicles.

Specifications for the Atlas booster are given in Reference 7.10. A description of each system installed on these vehicles is given in Reference 7.11.

6.1.2 Agena

The S01-A vehicle specifications are described in detail in References 7.12 and 7.13. Agena vehicle meets all performance requirements in these specifications.

The Agena command and telemetry frequencies are:

S-Band Interrogate	2850 ±1%
S-Band Respond	2920 ±1%
Link 1 TLM	231.4 ± 0.04%

6.1.3 Satellite Vehicle

6.1.3.1 Hardware

Table 6-2 lists hardware deviations for SV No. 951. Satellite Vehicle holddown limitations are given in Reference 7.15.

6.1.3.2 RF Links

Table 6-3 lists the SV command and telemetry frequency links.

6.1.3.3 Telemetry Modulation

Table 6-4 delineates the telemetry subcarrier oscillator (SCO) configuration for each flight phase. All SCO's have a deviation of ±6.5 percent with the following exceptions: (a) IRIG channels A, C, and E are ±15 percent; (b) the 30 x 5 and the 30 x 2.5 multiplexer channels deviate +6.5 percent, -7.1 percent.

6.1.3.4 Weight and Balance

For the current status of SV weight, center of gravity, moments, and products of inertia for all nominal flight configurations, refer to the airborne weight and balance data in the Weight Status Report, issued bi-weekly.

For final weight and balance data as measured during acceptance testing in the Missile Assembly Building, refer to the Actual Weight and Balance Report, issued 20 days before launch.

6.1.3.5 Propellants and Cold Gases

The weights of the propellants and cold gases required are listed below.

Gas	Design Weight (Lbs.)	Supply to be Loaded	
		Lbs.	Days
Pressurant (GN_2).	10.1	0	0
Oxidizer (N_2O_4).	186.8	0	0
Fuel (N_2H_4).	130.4	0	0
Freon (CF_4).	218.0	218.0	5
Spin gas (26% CF_4, 74% GN_2).	0.86	0.86	5
Despin gas (26% CF_4, 74% GN_2).	0.73	0.73	5

6.1.4 Payload

6.1.4.1 Hardware

No deviations exist for Flight Vehicle No. 1.

6.1.4.2 Film Load

The quantity of film to be loaded will be determined by SAFSP-206 in sufficient time to permit MAB loading before mated system tests. The film load will contain sufficient footage to allow for prelaunch testing and flight requirements. Film used in MAB/Pad tests may be removed from the RV before RV/OCV final assembly at the VSB.

6.2 GROUND SUPPORT

6.2.1 Satellite Control Facilities

6.2.1.1 Command

Digital commands will be sent to the vehicle from those network stations having the GE 701 digital data encoders which have been modified to the GE 125 configuration. This modification will increase the delay time from a one-bit period to a two-bit period between the parity bit and the verify bit in the stored program command word.

Mutual interference tests on the two S-Band beacons for use during the hitch-up configuration have resulted in adoption of the following operational procedures:

a. The Agena beacon may be safety programmed ON for all desired station passes. On those specific TTS passes where OCV loading is scheduled and where the Agena beacon is not needed, it may be desirable to program the Agena beacon OFF as an additional precautionary measure.

b. The OCV beacon shall be commanded ON for all station passes from orbit injection until the PAD load has been successfully replaced. The OCV beacon may be commanded ON for all required station passes except station passes where Zoro secure commanding is scheduled. An emergency procedure for commanding OCV PPD OFF shall be devised for use if unscheduled Zoro secure commanding occurs.

6.2.1.2 Computer Programs

The GE computer programs are described in References 7.16 and 7.17.

6.2.1.3 Telemetry

Special telemetry characteristics for the first flight are listed below.

a. The data processing network will be capable of satisfying program requirements while operating in a non-augmented mode. Augmented telemetry capability may be used if available and checked out.

b. Real-time telemetry readout at the tracking stations is limited inasmuch as only two decommutators are available at each station. Maximum real-time data from multiplexed channels must be obtained either by reading oscillographic traces and decommutator switching, or by utilizing successive telemetry readout capabilities available between consecutive station passes.

c. The SCF will provide an oscilloscope display of the 7.35 kc telemetry channel adjacent to the GE 125 command consoles. This display will contain the addressed programmer line identification and the delay line erase signals and command verification signals in real time.

d. Each FM/FM telemetry ground station will require a wow-and-flutter compensation capability for a 14.5 kc reference frequency.

e. The telemetry facilities must obtain and process Agena telemetry data from Link 1 during hitch-up mode operations.

f. The maximum reception range at KTS and TTS may be less during vehicle set then at vehicle rise due to the forward tilt of the radiation pattern on the conical section of the SV, and due to the limited gain of the tri-helix, quad-helix and D-O-R antennas (see antenna patterns in Reference 7.19).

6.2.2 Aerospace Ground Equipment

Control functions normally executed by the AGE 126 Manual Control Console will be furnished by precut command tapes applied directly to the GE 125 encoder for SV 951. All other AGE items will be used as listed in Reference 7.14.

Table 6-1. Atlas Configuration

Item	Component	Changes	Comments
1	Skins	Thickness of skins on forward conical section to be increased from sta. 502 to sta. 667.	
2	L02 Bioloff Valve	New valve to be installed	This valve will have a minimum 4.7 psig reseat pressure and a maximum 5.8 psig cracking pressure.
3	L02 Pressure Regulators	High pressure regulators to be installed.	These regulators have a pressure range from 24 to 26 psig during the first 20 sec. of flight and from 28.5 to 31.0 psig during the remaining portion of the boost phase.
4	Rate Gyros	Gyros to be relocated. Roll rate gyro will be packaged in the displacement gyro canister. Pitch and yaw rate gyros will be relocated forward at sta 521.	Effective on the first four vehicles. A second package of rate gyros will be installed in the S01-A adapter on the third and fourth vehicles and will be flown open loop. The gyros at sta. 521 will be removed on the fifth and subsequent vehicles, and the gyros in the adapter will be flown closed loop.
5	Insulation Blanket	Blankets to be removed from both the forward and intermediate bulkheads.	
6	S01-A Adapter Extension	No modification.	The adapter will be installed at GD/A beginning with the third vehicle.
7	Accelerometer and autopilot	Staging backup will be accomplished by an accelerometer set for 6.25 g's. The autopilot will be changed to generate the sustainer pitch program from staging plus five seconds to SECO.	

Table 6-2. Hardware Changes for SV 951

Subsystem	Component	Assembly Drawing No.	Change	Operational Effects
TT&C	UHF rate beacon (Recvr)	893D239		
	UHF rate beacon (Xmtr)	893D238		
	UHF rate antenna	114C1618	Remove from vehicle	(Velocity data not required per revised System Specification)
	UHF rate antenna	114C1619		
	SRV TLM transmitter	103C4277	Frequency changed from 228.2 to 242.0 mc. Deviation of ±52 kc not in accordance with Launch PRD deviation of ±75 kc (min).	None
	OCV TLM transmitter	113C9710 G2	Deviation of ±150 kc not in accordance with IRIG standards of ±125 kc (max).	None
Orbit Adjust	Velocimeter	884D1227	Removed from vehicle.	No effect; propellants not loaded
	Velocimeter control box	884D1309		
	Propellant and GN_2 loading		No propellants or GN_2 will be loaded.	Risk to mission has been removed.
Separation	In-flight disconnect	114C1596	Added to vehicle	Provides capability to separate the SRV on command from the Agena Lifeboat system.

Table 6-2. Hardware Changes for SV 951 (Cont)

Subsystem	Component	Assembly Drawing No.	Change	Operational Effects
Separation	Separation auxiliary controller	894D930		
EP&SD	Boost regulator	893D261	Removed from vehicle.	Loss of regulated voltage for vehicle components. Operational bus will decay from 33 vdc to expected value (25 vdc). Overall total ampere-hour capacity reduced to 1650 AH at nominal 33 vdc.
Structure	Bulkhead, Sta. 60.8	242R570	Added to vehicle.	Provides thermal protection for Adapter components during OCV solo flight.
Stabilization	IR Simulator	Not available	Added to vehicle	Provides simulated earth stimuli to test IR Scanners both on PAD and during hitch-up.
	Restrictor	238R878	Added to vehicle and plumbing changed.	High press regulator now in series with low press regulator. Restrictor (orifice) placed in series between Freon tanks and squib to inhibit pressure buildup exponentially. Total impulse is reduced by 25%.

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Table 6-3. SV Command and Telemetry Frequency Links

Link	Location	Item	Frequency (mc)	Tolerance (%)
2	OCV	VHF realtime TLM transmitter.	248.6	±0.01
3	OCV	VHF playback TLM transmitter.	258.5	±0.01
4	SRV	VHF realtime TLM transmitter.	242.0	±0.01
-	OCV	Verlort beacon receiver.	2920	±2 mcps
-	OCV	Verlort beacon transponder.	2850	±2 mcps
-	SRV	RF beacon	235.0	±0.01%

Table 6-4. SV Telemetry SCO Configurations

Flight Mode	Realtime Transmitter OCV (Link 2)		Playback Transmitter OCV (Link 3)		Realtime Transmitter SRV (Link 4)	
	IRIG Channel	SCO (kc)	IRIG Channel	SCO (kc)	IRIG Channel	SCO (kc)
Powered Flight	17	52.5	E*	70.0	Not used in powered flight mode.	
	16	40.0	C*	40.0		
	15	30.0	A*	22.0		
	14	22.0				
	13	14.5				
	12	10.5				
	11	7.35				
	10	5.4				
	9	3.9				
	8	3.0				
Orbital	18	70.0	14	22	Not used in orbital mode.	
	17	52.5	13	14.5		
	16	40.0	12	10.5		
	15	30.0	11	7.35		
	14	22.0	10	5.4		
	13	14.5	9	3.9		
	12	10.5	8	3.0		
	11	7.35	7	2.3		
	10	5.4				
	9	3.9	E**	70.0		
	8	3.0	C**	40.0		
	7	2.3	A**	22.0		
Re-entry	Same as powered flight		Not used in re-entry mode		12	10.5
					10	5.4
					9	3.9
					8	3.0

*These subcarriers are not energized during SEPARATION MODE Telemetry Transmission.
**These are time shared with the recorder output via the telemetry transfer switch.

7.0 REFERENCES

7.1 GAMBIT Program System Test Plan, Aerospace Corporation Report No. FHR-505, Revision 1, 1 April 1963.

7.2 GAMBIT Program System Test Objectives for Flight Vehicle No. 1, Aerospace Corporation Report No. FHR-538, Coordination Draft, April 1963.

7.3 EK Input to System Test Objectives for Flight Vehicle No. 1, EK Report No. CD-8728, 28 March 1963.

7.4 "Camera Payload Operation During Early Revolutions," EK Memo CD-8487 S-3536, 27 March 1963.

7.5 GE-ASPD Inputs to Aerospace System Test Objectives, (Vehicle 951) DIN 5982-29-2, 22 March 1963.

7.6 "Transmittal of Covert Inputs to the System Test Objectives," GE Letter No. 2619-116-2, 26 March 1963.

GE Input to Aerospace System Test Objectives, DIN 2904-30-2, 15 April 1963.

7.7 OCV Solo Operational and Command Profile for Vehicle 951, Revision A, GE Report No. DIN 3234-09-4, 19 March 1963.

7.8 Review of STO Draft for Vehicle 951, GE Report No. 2908-128-1, 15 April 1963.

7.9 Review of System Test Objectives Draft, 6594th ATW Report No. P-5129, 15 April 1963.

7.10 Model Specification for Atlas Booster Vehicle, USAF Model SM-65-D (Modified) GD/A Report No. AZD-27-002C, 15 March 1962.

7.11 Atlas Space Booster Program Requirements at PALC I and PALC II, GD/A Report No. AE62-0078.

7.12 Detail Specifications for Model 44205 Vehicle, LMSC-1415685.

7.13 Final Assembly Launch, LMSC-396872-501.

7.14 AGE System Specification, GE-ASPD Report No. SVS 3954, Revision B and Addendum

7.15 Hold Time Limitations, GE-ASPD Report No. DIN 63SD4629, 2 January 1963.

7.16 Program 206 Milestone 5 Command and Control Computer Program, GE Report No. DIN 62SD4614, 20 December 1962.

7.17 Milestone 11 Computer Program Subroutines, GE Report to be published July 1963.

7.18 "Case 222 for Vehicle AA6," Aerospace Corporation Security Control No. AS-63-0000-01445.

7.19 Orbital Requirements Document, Aerospace Corporation Report No. FHR-442, 14 December 1962.

7.20 Preliminary Launch Trajectory Data Book for Program 206, Aerospace Corporation Security Control No. AS-63-0000-01752, 29 March 1963.

7.21 Program 206 Range Safety Report, Aerospace Corporation Report No. TOR-169(3123)-4, March 1963.

7.22 Supplemental Requirements Document, Aerospace Corporation Report No. TOR-169(3123)-1, Revision 2, 22 April 1963.

7.23 SLV-3 Flight Test Plan for Program 206 at PMR, GD/A Report No. AE62-0675, 28 February 1963.

7.24 "Telemeter System Instrumentation Schedule," LMSC Dwg. No. 1354554, Model 44205-4701 Serial Revision A.

7.25 Data Handling and Distribution Plan, Aerospace Corporation Report No. TOR-169(3123)-8, 3 June 1963.

7.26 Gambit Supplement to Data Handling and Distribution Plan, to be published June 1963.

7.27

7.28 Subsystem Engineering Analysis Report, EKC Report No. CD-6805, S-R-049, 31 December 1962.

8.0 GLOSSARY

AGARTS	Astronautics Guidance Analysis Trajectory Service
AGE	Aerospace Ground Equipment
ARDC	Air Research Development Command
ATW	Air Force Test Wing
Augmented	Improved capability for multi-satellite operations
A-83A	Re-entry vehicle description number
CP	Camera Payload
DOD WGS 1960	Department of Defense - World Geodetic Survey - Year 1960
Hitch up	Use of Agena to provide SV attitude control during on-orbit operations
HTS	Hawaiian Tracking Station
IMC	Image Motion Compensation
KTS	Kodiak Tracking Station
LTD	Launch Test Directive
MAB	Missile Assembly Building
NHS	New Hampshire Tracking Station
OCV	Orbital Control Vehicle
OCV-Solo	OCV after RV and Agena separation
PPD	Pulse Position Demodulator
PRD	Program Requirements Document
PST	Pacific Standard Time
RAGS	Rate Gyro Package
RV	Re-entry Vehicle
SAFSP	Secretary Air Force Special Projects
SCF	Satellite Control Facilities
SLV-3	Atlas Vehicle
S01-A	Agena Vehicle
SRV	Satellite Re-entry Vehicle
STA	Satellite Test Annex

GLOSSARY (Continued)

SV	Satellite Vehicle (includes orbital control vehicle, camera payload, and re-entry vehicle)
TARS	Two Axis Reference System
Tell-tale	A programmed discreet event which, by its occurrence or failure, indicates whether the equipment is operating as planned. These events are observed in real time from a TLM readout.
TOO	Test Operating Order
TTS	Thule Tracking Station
TLM	Telemetry
VAFB	Vandenberg Air Force Base
VSB	Vehicle Support Building
Zoro	Secure command for Agena S-Band Command System
Zeke	UHF Backup Command System

APPENDIX A
TRAJECTORY DATA

A.1 INTRODUCTION

This section contains current launch and re-entry trajectory data and orbit ephemeris data required for mission planning. This data has been extracted from trajectory printouts and relevant documentation and is presented in table format for easy reference. New data or revisions to the data contained herein will be published and distributed in accordance with the amendment practices described in Section 1 of this STO.

A.2 LAUNCH TRAJECTORY

Reference 7.18, Case 222, is the official first-flight trajectory. It was generated by the Aerospace Corporation Space Kinetics Department for the Program 206 Program Office. The GD/A AGARTS System will be phased in as the official source of launch trajectories within the period of the first three launches; however, Aerospace Corporation will continue to furnish the trajectories until the AGARTS System is established. Trial runs of the AGARTS System will be exercised at L-43 days and L-10 days for the first flight.

Reference 7.20 is the primary source for detailed launch trajectory information. It contains or references the sources of all information (including weights and tolerances) used to generate the trajectory. It also references the Range Safety Report and associated trajectories, and lists the guidance computer (J) constants and the critical vehicle settings (e.g., Atlas roll program, the Agena horizon sensor bias angle and the Agena velocimeter).

Trajectory revisions will be made whenever a change in the total Agena/SV weight exceeds 50 lbs. or when any mission planning revision alters the orbit injection conditions. Such trajectory changes will be documented in revisions to the applicable STO document and/or the Launch Trajectory Data Book.

The basic launch trajectory constraints will be established at L-25 days in a revision to the Launch Trajectory Data Book. Subsequent changes up to L-3 days will affect only the J constants, the Atlas roll program, the Agena velocimeter setting, and the Agena horizon sensor bias angle. These changes will be documented by TWX revisions to the STO document and the Launch Trajectory Data Book.

Selected launch trajectory data are shown in Table A-1 for Case 222. The ascent sequence of events for Case 222 is given in Appendix B, Table B-2.

A.3 ORBITAL TRAJECTORY

A.3.1 Criteria*

Selection of the orbit for the first flight was based upon the following criteria:

a. Early acquisition of tracking data.

b. Minimum orbit lifetime of 2 days for "worst case" orbit injection errors.

c. North to south daylight recovery with command and TLM capability from KTS on rev 18.

d. Minimum altitude variation over complete revolution.

The selected orbit lifetime will exceed 80 hours. For normal Atlas/Agena boost performance, the probability of achieving an orbital altitude greater than 140 n mi. is 0.02. Nominal altitudes for revs 1 and 80 are shown in Figure A-1.

A.3.2 Parameters

The orbital parameters are given in Section 2.2. The three-sigma orbit injection errors for normal Atlas/Agena boost performance and the corresponding three-sigma orbital parameter values are:

*Reference 7.1

Velocity	=	25 fps
Range	=	2.4 n mi.
Flight path angle	=	0.26 deg
Inclination	=	0.39 deg
Period	=	10 sec.
Eccentricity	=	0.0043

The W/C_dA for the Agena/SV at orbit injection is given below for both dynamic and constant ARDC atmosphere models.

Atmosphere Model	W/C_dA
Dynamic	66
Constant ARDC with 100 n mi. minimum altitude	200

A.4 RE-ENTRY TRAJECTORY

The nominal re-entry trajectory data prepared by Aerospace Corporation (22 April 1963) is given in Reference 7.22 and is summarized below. The 6594th ATW will provide additional re-entry trajectory data in the Test Operations Order.

RE-ENTRY TRAJECTORY DATA

RV weight at:	
Separation	371 lbs.
Burn Out	330 lbs.
Re-entry	278 lbs.
Specific Impulse	260 seconds
Total Impulse	10,296 lbs/sec.

Position at Retro Start: ($T_r = 0$)	
Altitude	116.8 n mi. (710,337 ft.)
Latitude	59.437°N
Longitude	152.871°W
3g Open Time	T_r + 574.8 sec.
Drogue Chute Deploy Time	T_r + 608.8 sec.
Main Chute Deploy Time	T_r + 618.8 sec.
Water Impact Position	24.°N
	161.3°W

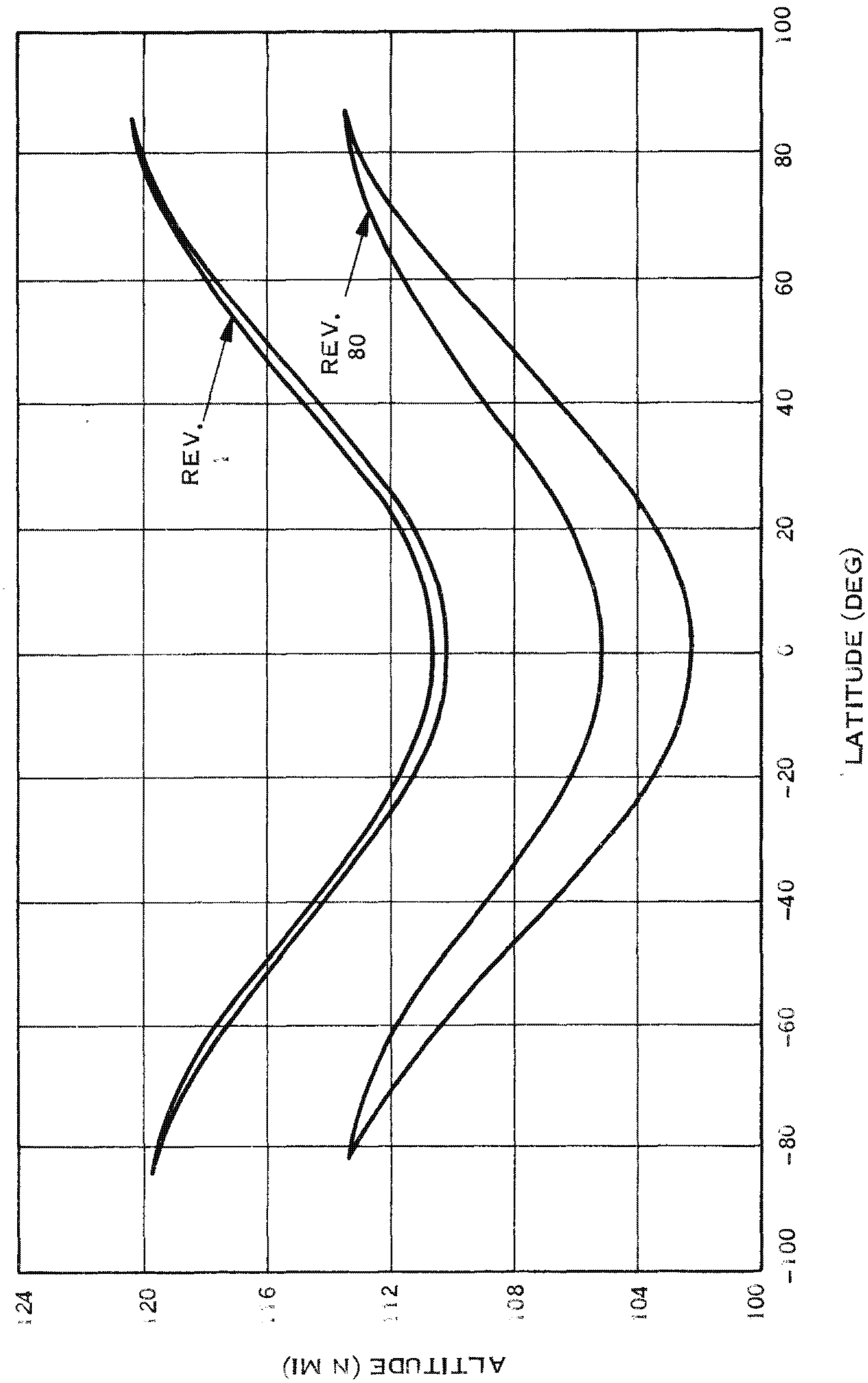

Figure A-1. Altitude vs Latitude for 1st and 80th Revolutions

Table A-1. Selected Launch Trajectory Nominal Data for Flight Vehicle No. 1 (Trajectory Case 222)

Item	Units	BECO	SECO	VECO	Agena Start	Agena Cut-off
Time	sec.	137.8	279.7	296.6	356.9	589.3
Altitude above earth	ft	190,353	576,632	613,338	699,146	673,927
Surface Range	n. mi.	44.9	299.6	342.0	491.7	1222
Inertial Velocity	ft/sec	8473.6	15,643	15,595	15,433	25535
Angle between the inertial velocity vector & the local geocentric horizontal, positive upward	deg	23.4	8.7	7.5	3.29	-
Relative Velocity	ft/sec	8551.3	15,790	15,744	15,587	25,717
Angle between the relative velocity vector and the local geocentric horizontal positive upward	deg	23.1	8.6	7.4	3.26	-
Angle between body Axis and Radius vector	deg	67.1	81.2	80.0	79.4	79.4
Weight	lb	73,215	28,022	27,869	19,057	6365
Thrust (total)	lb	81,661	1265	0	19087	0
Acceleration	ft/sec^2	37.6	30.3	30.4	39.8	30.2
Latitude, Geodetic		33.9	29.6	28.9	26.5	14.4
Longitude		-120.7	-121.4	-121.6	-122.0	-124.0
Slant range, Missile to Radar Site	ft	367,873	1,973,340	2,235,618	3,155,865	
Elevation angle of Missile from Radar Site (from vertical)	deg	59.3	75.5	77.0	81.4	
Azimuth of Radar-Missile-Line-of-Sight (from North)	deg	-172.4	-171.2	-171.2	-170.9	-170.4

APPENDIX B
SEQUENCE OF EVENTS

B.1 INTRODUCTION

This section describes the sequence of events for key flight operations. The information provided varies from a general description of requirements (pad load preparation) to a detailed presentation of deboost event times.

B.2 LAUNCH OPERATIONS

Table B-1 lists the sequence of major events during SV flight preparation and countdown operations. The Launch Test Directive and Countdown Manual will contain the final detailed event sequence. Table B-2 lists the ascent sequence of events. This sequence is based on the first flight trajectory Case 222. Changes to this ascent sequence of events will be included in revisions to the Launch Trajectory Data Book (Ref. 7.20).

B.3 ORBITAL OPERATIONS

B.3.1 <u>OCV Pad Load</u>

The pad load will be loaded into the vehicle during the terminal count. In general, the load will provide for:

a. Station contacts with widening factors and safety sequences.

b. Programmed events (tell-tales) that will occur during ascent or during the first-orbit station contacts to demonstrate programmer operation. These will include events which can be monitored by tracking stations (e.g., TLM interruptions).

c. Tracking and Telemetry equipment programmed OFF when not in station contact.

d. Payload operations to achieve the primary objective. These operations will be programmed for rev 6 or later using a range of IMC settings to account for expected altitude variations. These commands are provided in case a failure results in loss of command loading capability before an updated pad load command sequence is generated after accurate ephemeris determination.

B.3.2 Agena Orbital Timer Command Load

The Agena orbital timer tapes will be prepared by LMSC per SAFSP-206/Aerospace direction as coordinated with the 6594th ATW. In general, this tape will include:

a. The H-timer tape will be cut for 18 revolutions with nominal orbital re-entry sequence to be initiated over Kodiak Tracking Station on revolution 18. The K-4 interface signal (pin-pull) will occur at approximately 60°N latitude so that the RV will impact at 24°N latitude.

b. The yaw maneuver for the nominal orbit will be timed to occur within the VTS cone of telemetry coverage on revolution 16.

c. Provisions for an Agena overburn resulting in a non-nominal early-orbit execution of the yaw maneuver on revolution 15 and separation events on revolution 17 will be included.

d. The Agena attitude control system will remain in the fine mode throughout the 18 revolutions. The H-timer tape should be cut to insure against inadvertant operation in the coarse mode by commanding the fine mode condition once each orbit at approximately the ascending node.

e. Agena telemetry shall be programmed ON for all station passes.

f. Emergency calldown (rev 10) will be included on the tape for RV impact at 16°N latitude.

B.3.3 Rev 1 and 2 Operational Task

The major tasks to be accomplished during this time are:

a. Obtain tracking data and generate ephemeris.

b. Begin generating updated command message to refine payload and station-pass operation.

c. Verify SV and Agena health from analysis of TLM data.

d. Adjust Agena orbital timer to match achieved orbit.

e. The payload command sequence which has been programmed into the pad load shall be retained in at least one delay line until an updated payload command sequence (based upon an accurate ephemeris determination) is available.

B.3.4 Revs 3 - 15 Operational Tasks

The major tasks to be accomplished during this time are:

a. Update ephemeris as required when tracking data are received.

b. Receive, reduce, and analyze CP, SV and Agena TLM data.

c. Maintain synchronization of Agena orbital timer.

d. Prepare command loads and update the vehicle command loads as required for optimum vehicle performance. With nominal vehicle performance and early ephemeris determination an updated payload command sequence should be in the vehicle prior to any payload operation.

e. Execute operations required to achieve Secondary Flight Objectives No's. 105, 106, 107, 108, and 109 on revs 15 and 16.

B.3.5 Revs 15 - 18 Operational Tasks

The major operational tasks required for recovery preparation during this time are:

a. Monitor SV status

b. Observe yaw around sequence

c. Adjust retro time on Agena orbital timer

d. Send secure pitch-down and separation enable

e. Prepare for emergency use of Zeke

f. Observe pitch-down and RV separation

g. Update 2 delay lines over HTS (rev 18)

h. Due to possible susceptibility of the GE Command System to interference from the Agena Zoro secure command, the OCV PPD must be programmed OFF during the station pass and backup pass scheduled for Zoro execution.

B.3.6 Sequence of Events

Tables B-3 and B-4 present the yaw around and pitch down sequences during the hitch-up mode. The Test Operations Order will contain the sequence of events for tracking station telemetry, tracking and command loading passes and orbital sequence of events for payload operations.

B.4 DEBOOST AND RE-ENTRY OPERATIONS

B.4.1 Nominal Re-Entry

The terminal sequence of events (rev 18) is shown in Table B-5A. These events include Agena commands to OCV, backup OCV commands for separation, OCV/RV separation events, and Agena/OCV separation events. It is expected that separation of the OCV/Agena will occur over KTS within the 200-second interval following execution of the interface signal K-4. The OCV/Agena separation signal will be delayed long enough after the programming of K-4 to allow for nominal variations between OCV Vehicle time and Agena H-timer synchronization plus any additional delay necessary to provide adequate time for execution of Lifeboat. Table B-5B lists the Agena/OCV separation events. The event times listed in this table are preliminary and will be revised.

B.4.2 Emergency Re-Entry

The Lifeboat system incorporates three modes (1) Lifeboat reorientation started next orbit, (2) auxiliary timer started next orbit, or (3) Lifeboat reorientation started this orbit. Any one of these can be selected by Zeke nonsecure command and executed by a Zeke secure command. Table B-6 shows the sequence of events for each of the three modes. The sequences are controlled by a single timer which has various functions enabled depending upon which mode is executed.

The Lifeboat timer can be used to provide a backup command for auxiliary sequence timer start when the proper mode has been selected and executed by Zeke commands. The orbital programmer will be programmed to start the timer twice: once for each of the separate sequences to be executed two orbits apart. In the U2* Mode, the Lifeboat timer sequence provides one start signal to the auxiliary sequence timer. This signal will be used only as a backup start signal for the pitchdown maneuver.

*See Table B-6

Table B-1. SV Flight Preparation and Countdown Sequence of Events

Time from Liftoff	Event	Comments
T-60 hrs	Mating operation	Refer to LTD and count-down manual for a detail final sequence.
T-48 hrs	Satellite vehicle confidence test	
T-14 hrs	Countdown Initiation	
T-10 hrs	Satellite vehicle checkout	
T-5 hrs	Countdown evaluation	
T-4 hrs	Tower removal and open-loop RF test	
T-1 hr	Final countdown evaluation	
T-30 min	Terminal countdown:	
	Vehicle internal power on	
	Programmer erased	
	Programmer loaded with initial commands	
	Prelaunch reset executed	
	Vehicle TM switched to powered flight mode	
	Start vehicle clock	

Table B-2. Ascent Sequence of Events

Time (sec)	Event	Event Initiated by:	Event Monitored by:
T + 0	Atlas programmer is started when missile has risen 2 inches. (Atlas 201D) Agena orbital timer start.	Motion switches	
	SV-TM and Verlort beacons on (12 min. timer) TM in powered flt. mode.	SV - TM	
	All umbilicals except main autopilot and gyro null umbilicals ejected.		
T + 0.175 approx.	Main autopilot umbilical ejected when missile has risen 8 inches.	Motion switches and launcher arms	
	Launcher holddown arms are retracted.		
	Backup Stage II umbilical ejection.		
T + 0.7 approx.	Gyro null umbilical is pulled when missile has risen 42 inches.	Launcher and lanyard	
	Autopilot loop is closed at this time and booster engines are able to achieve pitch, yaw, and roll control.		
	Vernier engines are able to accomplish roll control.		
T + 2	Programmer roll is initiated from azimuth 185° true. (PAD No. 3)	Stage I A/P programmer	
	High excitation of roll gyros		
T + 15	Programmed roll to azimuth of 188.2° true complete.	Stage I A/P programmer	
	Normal excitation of roll gyros.		
	Start pitch program (gain 0.96)		
T + 20	Lox pressure change		
T + 24	Change filter response	Stage I A/P programmer	
T + 60	Max. critical flight loads		
T + 70	Peak dynamic pressure	Stage I A/P programmer	
T + 90	Power to sep. S/S (altitude = approximately 70,000 ft)	SRV baroswitches close	2/40/12 (PF)
T + 130	Stage I booster engine cutoff is enabled	Stage I A/P programmer	
T + 137.7 BECO	BECO discrete (nominal accel. 6.04 g's)	GE Mod II Guidance Accelerometer	
T + 139	Accelerometer (backup 6.25 g's)		
T + 137.8 BECO + 0.1	Cutoff booster engines (discrete)	Stage I A/P programmer	
	Stop booster phase A/P pitch program		
BECO + 0.1	Command booster engines to zero position		
	Activate vernier and sustainer engines for pitch and yaw control		
	Null pitch and yaw integrators		
	Pressurize vernier solo tanks		
T + 138.1	Booster engine thrust to zero		

Table B-2. Ascent Sequence of Events (Cont)

Time (sec)	Event	Event Initiated by:	Event Monitored by:
T + 140	Peak heating loads		
T + 140.7 BECO + 3	Sustainer engine is centered to zero position.	Stage I A/P programmer	
	Control maintained in yaw, pitch, and roll by vernier engines.		
T + 140.8 BECO + 3.1	Jettison boost package	Stage I A/P programmer	
	Jettison booster lub oil		
T + 141	Jettison complete		
T + 141.4 BECO + 3.7	Sufficient clearance between sustainer and jettisoned booster package is attained, sustainer engine is activated in pitch and yaw control.	Stage I A/P programmer	
	Vernier engines continue in pitch, yaw, and roll control.		
T + 142.7 BECO + 5	Enable guidance steering in pitch and yaw.	Stage I A/P programmer	
	Start sustainer phase pitch program		
T + 144.4 BECO + 6.7	Vernier engine deactivated for pitch and yaw control, biased out to 50 deg., and continue to control roll.	Stage I A/P programmer	
T + 147.7 BECO + 10	Remove nulls on the pitch and yaw integrators.	Stage I A/P programmer	
T + 158 BECO + 20	Guidance steering commences	GE Mod II Guidance	
T + 217.7 BECO + 80	Enable sustainer and vernier cutoff	Stage I A/P programmer	
	Enable initiate separation sequence		
	Enable start Agena ascent timer.		
T + 254.7 SECO - 25	Guidance enable Agena ascent timer	GE Mod II Guidance	
T + 275.8 SECO-3.9	Start Agena ascent timer, (brake release)	GE Mod II Guidance	
T + 276.0	Timer safety indication and transfer F/C to ascent mode Timer reset	D-Timer	
T + 279.7 SECO	Sustainer engine cutoff discrete	GE Mod II Guidance	
	Fuel depletion backup	Fuel depletion switch	
	Disarm Agena premature separation destruct	Stage I A/P programmer	
	End sustainer pitch program		
	Activate verniers in pitch and yaw		
	Null integrators in pitch and yaw.		

Table B-2. Ascent Sequence of Events (Cont)

Time (sec)	Event	Event Initiated by:	Event Monitored by:
T + 279.8 SECO + 0.1	Sustainer engine thrust to zero		
T + 280.2 SECO + 0.5	Initiate vernier attitude change		
T + 287.7 SECO + 8.0	Terminate vernier attitude change		
T + 294.2 SECO + 14.5	Guidance enable vernier cutoff		
T + 296.7 SECO + 17 (approx) VECO 0.0	Stage I vernier cutoff Uncage Agena IRP gyros Arm Stage I/Agena separation Disarm premature separation destruct (backup) Eject horizon sensor fairing.	GE Mod II Guidance and Agena B sequence	
T + 299.2 VECO + 2.5 SEP 0.0	Stage I/Agena separation command Fire mid-body pin pullers Fire Stage I retro rockets	GE Mod II Guidance	
T + 299.7 SECO + 20 VECO + 3	Stage I vernier cutoff (backup) Uncage Agena IRP gyros (backup) Arm Stage I/Agena separation (backup) Eject horizon sensor fairing (backup) Disarm premature separation destruct (backup No. 2).	Stage I A/P programmer	
T + 299.72 SECO + 20.02 VECO + 3.02	Start Agena ascent timer (backup).	State I/Agena pull-away-plug	
T + 301.7 SEP + 2.5	Separation complete Activate Agena pneumatic control system.	Switch at end of rails	
T + 302.2 SECO + 22.5	Stage I/Agena separation command (backup) Fire pin pullers and retro rockets (backup)	Stage I A/P programmer	
T +	Agena roll realignment completed (1.066°)		
T + (approx)	Enter downrange tracking ship zero degree horizon		
T + 326.9	Uncage IRP gyros (backup) Stage I/Agena separation command (backup No. 2) Eject H/S fairing (backup) Start TLM calibrate	"D" Timer	

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Table B-2. Ascent Sequence of Events (Cont)

Time (sec)	Event	Event Initiated by:	Event Monitored by:
T + 335.8 Pitchdown	Connect H/S roll to roll inertial reference package	"D" Timer	
	Remove "eject H/S fairings" power		
	Initiate - 40 deg/min pitch rate (pitch down 2.0^{o} approx)		
	Remove "start TLM calibrate" power		
	Remove "uncage Agena gyros" power		
T + 338.8 Pitchdown	Transfer to minus 3.29 deg/min pitch rate	"D" Timer	
	Switch TLM to Accelerometer Output		
	Connect pitch H/S sig to pitch IRP (H/S bias 10.6 degrees)		
	Fire ullage engines.		
	Enable velocity meter (velocity to be gained): 10292.6 fps + 11.7 fps decay transient		
T + 355.6 Ignition	Fire He bypass valve squib (open)	"D" Timer	
	Enable Hydr. Int. Circuit		
	Arm engine control and deactivate pitch and yaw pneumatics		
	Fire gas generator No. 1		
	Stop TLM calibrate (backup)		
T + 356.9 Ignition +1.3	Steady state thrust (90%)	Main engine	
T + 357.6 Ignition +2	Open Motor Operated Pressure Valve	"D" Timer	
	Arm TLM "on" circuit		
	Remove power from eng arm circuit		
	Arm TLM orbit adjust calibrate circuit		
	Remove power from engine fire circuit		
	Arm TLM "off" circuit.		
T + 369.1	Remove "Open Motor Operated Pressure Valve" power		
T + (approx)	Enter downrange tracking ship at 5 degree horizon		
T +	Fire oxidizer line pneumatics	"D" Timer	
	Shutoff squibs		
	Fire oxidizer line pneumatics		
	Shutoff squibs.		
T + 415 (approx)	Exit VAFB tracking station at 5 degree horizon		

Table B-2. Ascent Sequence of Events (Cont)

Time (sec)	Event	Event Initiated by:	Event Monitored by:
T +	Fire fuel line pneumatics	"D" Timer	
	Cutoff squibs		
	Fire fuel line pneumatics		
	Cutoff squibs		
T + 495 (Approx)	Exit VAFB tracking station at zero degree horizon		
	Arm Lip Seal Pressure Valve		
T + 579.5	Arm engine cutoff circuit	"D" Timer	
	Disarm V/M cutoff safety circuit (Engine safety switch No. 1)		
	Arm Oxyd. Dump Valve		
T + 588.4 (Approx)	Engine cutoff, first burn (sensed velocity 10292.6)	Velocity meter Engine relay	
	Activate pitch-yaw pneumatics control.		
	Close Lip Seal Pressure Valve		
	Open Oxyd. Dump Valve		
	Disable Hydr. Int. Circuit		
T + 589.4 (Approx)	Nominal Injection into orbit:		
	Geocentric Latitude 14.345 deg. N. Longitude 124.006 deg. W		
	Flight Path Angle: 0.00735 degrees		
	Radius vector: 21,595,297 ft		
	Azimuth: 185.13 degrees		
	Altitude: 110.8 n mi		
	Inertial Velocity: 25536.0 fps		
	Inclination: 94.967 Retrograde		
T + 597.5	Close Lip Seal Pressure Valve (backup)	"D" Timer	
	Engine cutoff (backup)		
	Remove "Stop TLM calibrate" power		
	Fire H/S zero deg position squibs		
	Disable V/M and switch TLM from V/M to counter output		
T + 598.4 (Approx)	Eject SV Door	SV (SSPC)	2/40/12 PF
T + 600	Switch TM to orbital mode. 35.9^{O}N Lat. at 10 minutes after launch	SV - TM	
T + 688.5	Remove power from engine cutoff circuit (backup)	"D" Timer	
	Open Fuel Dump Valve		
	Disarm V/M engine cutoff relay		

Table B-2. Ascent Sequence of Events (Cont)

Time (sec)	Event	Event Initiated by:	Event Monitored by:
T + 748.5	Switch roll H/S to low gain (1/3 Deg./min./deg.)	"D" Timer	Transfer to orbital mode of vehicle clock time and presence of command verification signal
	Transfer flight controls to orbit mode		
	Start TLM calibrate		
	Switch Gyro TLM to orbit Mode		
T + 718	Turn off TM and tracking beacons	SV SSPC	
T + 720	Turn off TM and tracking beacons (12 min. timer)	SV	
T +	Exit downrange trackingship at 5 degree horizon		
T +	Exit downrange trackingship at 0 degree horizon		
T + 758.5	Transfer to xxx deg/min pitch rate	"D" Timer	
	Transfer pneumatics to low pressure		
	Stop TLM calibration (backup)		
	Start gyro compassing		
	Close Decoupling Circuits		
	Switch from Ascent to Orbit Antenna		
	Remove power from "Velocity Meter"		
	Remove power from "SM RD"		
	Remove power from "Start TLM calibrate"		
T + 763.5	Remove power from pneumatics pressure transfer switch TLM from ascent to orbit mode.	"D" Timer	
	Remove power from "Stop TLM calibrate"		
	Stop Standard Timer		

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Table B-3. Agena Yaw Maneuver Sequence of Events*

Time	Event	Signal Source	Monitored by	Comments
T –	Auxiliary Timer Reset	Aux. Timer		
X – 2 min	Start Auxiliary Timer warmup	Orb. Programmer		
X – 0	Start Auxiliary Timer	Orb. Programmer		
X + 0.2 sec	Auxiliary Timer Reset Auxiliary Timer Safety Input	Aux. Timer		
X + 5 sec	Transfer Pitch Rate to degrees per minute Initiate 60^{o}/min Yaw rate Stop Gyrocompassing and open Decoupling Circuits Switch Flight Control to Ascent Mode Switch Gyro TM to Ascent Mode Disable "Coarse to Fine" Orbit Mode switching Pneumatics to High Pressure	Aux. Timer		
X $\pm$185 sec	Remove 60^{o}/min Yaw rate Remove power from: Pneumatics to High Pressure Pneumatics to Low Pressure Start Gyrocompassing, close decoupling circuits Transfer flight control to Orbit mode Switch Gyro TM to Orbit Mode Switch Gyrocompassing phase	Aux. Timer		

Table B-3. Agena Yaw Maneuver Sequence of Events* (Cont)

Time	Event	Signal Source	Monitored by	Comments
X + 200 sec	Enable "Coarse to Fine" Orbit Mode Switching Remove Power from: "Pneumatic to Low Pressure." Stop Auxiliary Timer and Disable Auxiliary Timer "First" Start Circuit	Aux. Timer		
X + 201 sec	Stop Auxiliary Timer (BU) Disable Auxiliary Timer "First" Start Circuit	Aux. Timer		

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Table B-4. Agena Pitchdown Maneuver Sequence of Events

Time (sec)	Event	Signal Source	Monitored By	Comments
Y	Restart Auxiliary Timer	Orb. Programmer		
Y + 5	Lock out "Coarse to Fine" Orbit mode switching Transfer to 60^o/min pitch rate (Pitch over to -58^o) Pneumatics to High Pressure Remove Horizon Sensor Pitch Signal Stop Gyrocompassing and Open Decoupling Circuits Transfer Flight Control to Ascent Mode Switch Gyro TM to Ascent Mode Initiate S/V Relay K1	Aux. Timer		
Y + 25	Initiate S/V Relay K2	Aux. Timer		
Y + 59	Transfer to Orbital Pitch Rate	Aux. Timer		
Y + 100	Initiate S/V Relay K3	Aux. Timer		
Y + 102.5	Initiate S/V Relay K4	Aux. Timer		
Y + 302	Stop Auxiliary Timer	Aux. Timer		

Table B-5A. Terminal Sequence of Events

Item No.	Event Time (sec) Integrated System Time	OCV System	Agena System	A83A (RV) System	Signal Source	Event Description	Ref. Item No.	Telemetry Data TLM Event and Source Description	Link/ Channel/ Pulse	Req'd Performance Values (3) Low	Nominal	High
1	T_o - 12,000 to T_o - 301	T_o - 12,000 to T_o - 301			OCV Orbital Programmer	Fire Disconnects Nos. 3 and 4						
2	T_o - 300	T_o - 300			OCV Orbital Programmer	Pre-Arm 1. Activate A83A TLM Batt. 2. Power A83A TLM with OCV Batt.						
3	T_o - 200 (approx)				No Signal	KTS Rise (5^o horizon)						
4	T_o - 80		T_o - 80		OCV Sep. Prog (initiated from Agena H Timer, K_1 signal)	Fire Disconnect No. 1 (Duplicate of Item 1)						
5	T_o - 75		T_o - 75		OCV Sep. Prog. (K_2 Signal initiated from Agena H-Timer)	A. Fire Disconnect No. 2 (Duplicate of Item 1) B. Pre-Arm Signal (Duplicate of T_o - 300 Signal, Item No. 2)						
6	T_o		T_o		OCV Sep. Prog (K_3 Signal initiated from Agena H-timer	A. Arm Signal 1. Fires thermal relays to connect ejection subsystem thermal batteries to load. 2. Switches A83A TLM to the A83A TLM Batt. 3. Starts inhibit timer 4. Connects rec. batt's to rec. programmer 5. Turns on rec. DF beacon	6a	Agena Command K_3	2/30/14	49	51.0 (From 20.8)	53
						B. Transfer Signal 1. Activates thermal batt's that power ejection subsystem 2. Closes redundant relay to connect rec batt's to rec programmer. 3. Starts pyrotechnic delay circuit to separate adapter/thrust cone inflight disconnect at T_o + 0.9	b	Thermal Batt. Voltage	4/3/91	23	30	36
7	T_o + 0.9			$T_o + 0.9^{+.5}_{-.4}$	Delay circuit started at arm/trans command	Fire adapter/SRV thrust cone inflight disconnect (IFD)	7	OCV/A83A Inflight Disc Voltage	4/3.9/- 2/22/4 3/22/4	33 27.8 27.8	42 29.8 (From 49.8) 29.8 (From 49.8)	53 31.8 31.8

Table B-5A. Terminal Sequence of Events (Cont)

	Event Time (sec)						Telemetry Data					
Item No.	Integrated System Time	OCV System	Agena System	A83A (RV) System	Signal Source	Event Description	Ref. Item No.	TLM Event and Source Description	Link/ Channel/ Pulse	Req'd Performance Values (%) Low	Nominal	High
8	$T_o + 2.5$		$T_o + 2.5$		OCV Sep. Prog (K_4 Signal initiated from Agena H-Timer)	Fire Pin Pullers 1. Separates A83A from adaptor. (At nominal 1.7 ft/sec rate).	8a	Agena Command K_4	2/30/14	90.9	92.6 (from 51.0)	94.7
							b	Separation Pins Pulled	2/40/13 (P. F.)	54.6	56.5 (from 25.6)	58.5
							c	Separation Spring Monitor 1	2/22/ Cont (P. F.)		100	
							d	Separation Spring Monitor 2	2/14.5/ Cont (P. F.)		100	
							e	Separation Spring Monitor 3	2/10.5/ Cont (P. F.)		100	
							f	Separation Spring Monitor 4	2/7.15/ Cont (P. F.)		100	
9	$T_o + 4.3$			$T_o + 4.3$ (IFD+3.4 ±0.3)	A83A Timer initiated by IFD signal	Fire pneumatic bottle for spin-up of A83A to 74.5 RPM	9a	Spin Actuation	4/3.0/-	23	27	37
							b	Spin Nozzle Breakwire	4/3.9/-	42	53	67
10	$T_o + 5.5$			$T_o + 5.5$ (Spin up +1.25 ±0.1)	A83A Timer initiated by spin up signal	Fire retro rocket in A83A	10a	Retro Rocket Fire Signal	4/3.0/-	41	49	64
							b	Retro Rocket Breakwire	4/3.9/-	55	69	88
11	$T_o + 16.5$			$T_o + 16.3$ (Retro rocket +10.75 ±0.34)	A83A Timer initiated by retro rocket fire signal	Fire pneumatic bottle for de-spin of A83A to 10 rpm nominal	11a	Despin Actuation Signal	4/3.0/-	58	68	94
							b	Despin Nozzle Breakwire	4/3.9/-	72	90	113
12	$T_o + 17.8$			T_o+17.8 (Despin + 1.5±0.15)	A83A Timer initiated by despin signal	Fire explosive bolts holding thrust cone to forebody (heat shield) of A83A and separates thrust cone/capsule inflight disconnect	12a	Thrust Cone Separ Signal	4/3.0/-	68	82 Decaying to 78*	87
							b	Recovery Batt 1 (Volt)	4/3.9/-	35		46
							c	Recovery Batt 2 (Volt)	4/3.0/-	52		66
							d	Thrust Cone Elect Disc (Volt)	4/3.0/-	69		87
							e	Axial Accel (0 to -40g)	4/10.5/-			

* 82% based on 28 vdc
78% based on 13 vdc

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Table B-5A. Terminal Sequence of Events (Cont)

Item No.	Event Time (sec): Integrated System Time	Event Time (sec): OCV System	Event Time (sec): Agena System	Event Time (sec): A83A (RV) System	Signal Source	Event Description	Ref. Item No.	Telemetry Data: TLM Event and Source Description	Telemetry Data: Link/Channel/Pulse	Req'd Performance Values (%): Low	Req'd Performance Values (%): Nominal	Req'd Performance Values (%): High
13	$T_o + X_1$ (See Notes)	$T_o + X_1$			OCV Orbital Programmer	Arm signal backup command (duplicate action of previous arm signal from Agena)						
14	$T_o + X_2$ (See Notes)	$T_o + X_2$			OCV Orbital Programmer	Transfer signal backup command (duplicate action of previous transfer command)						
15	$T_o + X_3$ (See Notes)	$T_o + X_3$			OCV Orbital Programmer	Fire pin pullers backup command (duplicate action of previous command)						
16	$T_o + Y$	$T_o + Y$			OCV Orbital Programmer	Fire Shaped Charge to separate OCV/Agena						
17	$T_o + 180$			$T_o + 180$	Inhibit Timer in A83A	Back up signal to fire thrust cone explosive bolts	17	Timer Switch Opens	4/3. 9/-	35	39	44
18	$T_o + 480$			$T_o + 480$	g switch closing in A83A	Applies power to rec. timer while shorting out to prevent timer start.	18	3g Switch Close	4/3. 9/-	61	68	76
19	$T_o + 579$			$T_o + 579$	g switch opening in A83A	Releases short circuit on rec. timer-begin timing.	19	3g Switch Open	4/3. 9/-	35	39	44
20	$T_o + 613$			$T_o + 613$ (3g open + 34±1. 5)	Recovery Timer	A. Fire drogue chute ejection bolts which also releases fore body (heat shield) from capsule.	20a	Ejection Piston 1	4/3. 9/-	79	89	109
						B. Turn on flashing light	b	Ejection Piston 2	4/3. 0	35	39	44
						C. Start 10 sec timer for main chute deployment	c	Para Cover Off (Rec Prog Sig)	4/3. 0	87	98	109

Note:

1. X_1 = Max uncertainty between OCV and Agena vehicle time synchronization resulting from both equipment and operation procedure + 2. 5 sec
2. $X_2 > X_1$ + 0. 3 sec
3. $X_3 = X_2$ + 2. 5 sec ± 0. 5 sec.
4. $Y \geq X_3$ + necessary time interval to allow for uncertainties involved in use of Lifeboat if selected T < Agena K_4 signal + 200 sec.

*Note (For Items 18 - 27, Time is dependent on Trajectory)

Table B-5A. Terminal Sequence of Events (Cont)

Item No.	Event Time (sec): Integrated System Time	Event Time (sec): OCV System	Event Time (sec): Agena System	Event Time (sec): A83A (RV) System	Signal Source	Event Description	Ref. Item No.	Telemetry Data: TLM Event and Source Description	Telemetry Data: Link/ Channel/ Pulse	Req'd Performance Values (%): Low	Req'd Performance Values (%): Nominal	Req'd Performance Values (%): High
21	$T_o + 614$			$T_o + 614$	No Signal	Force Body Separation (from drag action or drogue chute).	21	Fore Body Sep Break-wire	4/3.9	35	50	44
22	$T_o + 623$			$T_o + 623$ (Drogue eject +10 ±1.5)	Delay Timer started at drogue chute deployment.	Reefed main chute deployment						
23	$T_o + 628$			$T_o + 628$	De-reef Line Cutter Delay Pyro Timer started when reach appropriate load on reefing line.	De-reef main chute						
24	$T_o + 2100$ (See Note)			$T_o + 2100$	Inhibit Timer	Timer closes for redundant signal for 3g switch closing (Item 18) in case of abnormal re-entry	24	Inhibit Timer Close	4/3.9		69	
25	$T_o + 2210$ (See Note)			$T_o + 2210$	Inhibit Timer	Timer opens for redundant signal for 3g switch opening (Item 19)	25	Inhibit Timer Open	4/3.9		39	
26	$T_o + 2244$			$T_o + 2244$ (Timer oper +34±1.3)	Recovery Program	Fires all pyrotechnic devices to destroy A83A	26a	Para Piston Signal 1	4/3.9		39	
						1. Separates thrust cone from forebody	b	Para Cover Off	4/3.0		95	
						2. Ejects drogue chute cover and separates forebody from capsule.	c	Forebody Separ Breakwire	4/3.9		30	
27	$T_o + 2270$ (Approximate)			$T_o + 2270$	No Signal	Water impact for normal re-entry if not air recovered.						

Note 1. Inhibit sequencer - provides parachute sequence if first 3g point does not occur before T + 2249 sec due to overshoot or re-entry system malfunction.
2. Event will occur 75 sec before time shown if OCV Command System is used.

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Table B-5B. Agena/OCV Separation Events*

Item	Event Time	Signal Source	Event Description	Comments
1	$T_a - 272$	Orbital Programmer	All Gyros Caged; TM in Orbital Mode	
2	$T_a - 270$	Orbital Programmer	Yaw, Pitch and Roll Levels High; Yaw, Pitch and Roll Deadbands Coarse; VM OFF, Recorder OFF	
3	$T_a - 260$	Orbital Programmer	All Gyros Caged; Telemetry in Orbital Mode; Pitch Down ON (58.6°)	
4	T_a	Agena H Timer	Agena Pitch Down	
5	$T_a + 40$	Orbital Programmer	Causes reset of Command Decoder Timer (in six minute resettable mode) for an additional 6 minutes when its time tag occurs.	
6	$T_a + 340$	Orbital Programmer	Yaw, Pitch and Roll Levels High; Yaw, Pitch and Roll Deadbands Coarse	
7	$T_v - 314$	Orbital Programmer	Repeat 1	
8	$T_{sep} - 13$	Orbital Programmer	Yaw, pitch and roll levels high; yaw, pitch and roll deadbands coarse; velocimeter OFF, recorder ON	
9	$T_{sep} - 13$	Orbital Programmer	Yaw, pitch and roll levels high; yaw, pitch and roll deadbands coarse; fly reverse/yawing torque normal; velocimeter OFF, recorder ON	
10	T_{sep}	Orbital Programmer	All gyros caged; TLM in powered flight mode; GFE 1-C24 ON; OCV/Agena separate	
11	$T_{sep} + 0.3$	Orbital Programmer	Roll and pitch gyros uncaged; yaw gyro caged; TLM in orbital mode.	
12	$T_{sep} + 0.9$	Orbital Programmer	Yaw level low; pitch and roll levels high; yaw, pitch and roll deadbands coarse; velocimeter OFF, recorder ON	
13	$T_{sep} + 1.2$	Orbital Programmer	Roll and pitch gyros uncaged; TLM in orbital mode; pressurize attitude control	
14	$T_{sep} + 3.4$	Orbital Programmer	Yaw level low; pitch and roll levels high; yaw deadband fine; pitch and roll deadbands coarse; yaw rate roofs ON; velocimeter OFF, recorder ON	
15	$T_{sep} + 3.7$	Orbital Programmer	Yaw gyro caged; roll and pitch gyros uncaged; TLM in orbital mode; attitude control system ON	
16	$T_{sep} + 10.0$	Orbital Programmer	Yaw, pitch and roll levels low; yaw deadband fine; pitch and roll deadbands coarse; recorder ON	
17	$T_{sep} + 20.5$	Orbital Programmer	Yaw gyro caged; roll and pitch gyros uncaged; TLM in orbital mode; attitude control ON; IR signals ON	
18	$T_{sep} + 60.0$	Orbital Programmer	All gyros uncaged; TLM in orbital mode; attitude control ON; IR signals ON	
19	$T_{sep} + 61.0$	Orbital Programmer	Yaw, pitch and roll levels high; yaw, pitch and roll deadbands coarse; yaw rate roofs OFF	
20	$T_{sep} +$	Orbital Programmer	Recorder OFF	

*Reference 7.25

Table B-6. Lifeboat Sequence of Events

Command	Title	Function	Remarks
U1	Lifeboat mode select LBNO	Selects Lifeboat terminal sequence for the next orbit	
U2	Lifeboat mode select DTNO	Selects auxiliary sequence timer start for the next orbit	
U3	Lifeboat mode select LBRT	Selects Lifeboat terminal sequence in real time	

Effective for Mode Selected	Time	Event Description	Source of Signal	Monitored By	Remarks
U1, U2, U3	---	206/S-01A TM on for 20 min. LB rate gyro, magnetometer and electronics warmup for 20 min.	Zeke command U1, U2, U3		
U1, U2, U3	T-0	Remove power from LB mode select switch. Activate S/V relay K1	Zeke secure command #1		
U3		LB pneumatics ON (commence attitude orientation)	---		
U1, U3		Dump 206/S01A control gas	---		
U3	+25 sec	Activate S/V relay K2	LB relay T1		
U3	+100 sec	Activate S/V relay K3	LB relay T2		
U3	+102.5 sec	Activate S/V relay K4	LB relay T3		
U1, U2	To be	206/S-01A TM on for 20 min	LB relay T4		
U1, U2	defined	Backup for relay T4	LB relay T5		
U1	later.	LB pneumatics and electronics ON (commence attitude orientation)	LB relay T6		
U2	To be	Start 206/S01A Auxiliary Timer	LB relay T7		
U1	defined	Activate S/V relay K2	LB relay T8		
U1	later.	Activate S/V relay K3	LB relay T9		
U1		Activate S/V relay K4	LB relay T10		
U1, U2, U3		Remove power from LB auxiliary power bus	LB relay T12		

APPENDIX C
TELEMETRY LIST

C.1 Atlas TLM List

See Launch Test Directive and Reference 7.23

C.2 Agena TLM List

See Launch Test Directive and Reference 7.24

C.3 OCV TLM List

See the Calibration Book

C.4 CP TLM List

See Table C-1

Table C-1. Payload Telemetry List

Code	Function	Irig Channel	SCO 5.4 KC	SCO 10.5 KC	SCO 22.0 KC	Pulse
CPL 1	Camera Film Path Temp.	10	x			49
CPL 2	Take-Up Cassette Film Path Temp.	10	x			50
CPL 3	Stereo Mirror Differential Temp.	14			x	14
CPL 4	Stereo Mirror Temp.	10	x			51
CPL 5	Lens Barrel Differential Temp.	12		x		6
CPL 6	45^{o} Mirror Temp.	10	x			52
CPL 7	Component Support Tube-Y Sta. 149 Temp.	10	x			53
CPL 8	Component Support Tube-Y Sta. 179 Temp.	10	x			54
CPL 9	Component Support Tube-Y Sta. 198 Temp.	10	x			55
CPL 10	Component Support Tube-Z Sta. 149 Temp.	10	x			56
CPL 11	Component Support Tube-Z Sta. 179 Temp.	10	x			57
CPL 12	Not Used	...	.	.	.	...
CPL 13	Stereo Position	12		x		7
CPL 14	Crab Position	12		x		8
CPL 15	Film Take-Up Quantity	12		x		10

Table C-1. Payload Telemetry List (Cont.)

Code	Function	Irig Channel	SCO 5.4 KC	SCO 10.5 KC	SCO 22.0 KC	Pulse
CPL 16	Not Used	...	.	.	.	...
CPL 17	Looper Position	12		x		2,17
CPL 18	Film Drive Electronics Output	12		x		11
CPL 19	Amplified Data Signals	12		x		12
CPL 20	Platen Position (Coarse)	14			x	19
CPL 21	Focus Output	14			x	1,16
CPL 22	Focus Forward Channel Output	14			x	2,17
CPL 23	Focus Reverse Channel Output	14			x	3,18
CPL 24	Supply Cassette Film Path Temp.	10	x			59
CPL 25	Not Used	...	.	.	.	...
CPL 26	Environmental Power Supply - OCV	12		x		13
CPL 27	Platen Position (Fine)	14			x	20

APPENDIX D
OCV-SOLO OPERATIONS

D.1 INTRODUCTION

This appendix defines the purpose of the OCV-solo operations, establishes operating ground rules, describes the planned orbital events, and defines key tasks required to support the operations.

D.2 PURPOSE

The purpose of OCV-solo operations is to obtain data required for a comprehensive evaluation of the OCV stabilization subystem, camera payload, and supporting subsystems. To accomplish this purpose a series of tests and simulated operations will be programmed for execution by the OCV during the second and third days of orbital life, or until the Program Director terminates the operations. After completion of the third day of orbital life, the OCV shall be monitored periodically to determine vehicle status and usage of control gas and battery power.

D.3 GROUND RULES

The following ground rules for the OCV-solo flight are, based upon the system operational philosophy (Reference 7.1):

a. Category 1 - type operations shall be performed above the 0^{o} horizon over tracking stations, whenever possible.

b. Category 1 - type operations shall be repeated (simulating an operational mission as practical) to establish confidence levels and to identify marginal performance areas.

c. Electrical power shall be conserved and shall be used primarily for the accomplishment of Category 1 secondary flight objectives.

d. The testing schedule may be accelerated if malfunctions limit the OCV orbital life*.

*Depletion of battery power is expected to occur during the 4th or 5th day and will probably be the factor limiting orbital life.

e. Nominal OCV-solo operations will be rehearsed.

f. Contingency planning support will be provided by the Technical Advisor's Staff during operations.

g. During the latter part of OCV-solo operations, the vehicle may be used to exercise available augmented SCF capabilities. These exercises, however, shall be subordinate to all other objectives, and shall not interfere with their accomplishment.

D.4 OPERATIONAL SEQUENCE

The sequence of operations is summarized in Table D-1. The events listed in Table D-1 are described below:

D.4.1 Stabilization Subsystem Operations

D.4.1.1 Preliminary Activation and Initial Acquisition

See Table B-5B for events occurring during this sequence.

D.4.1.2 Typical Payload Passes

The stabilization system will be operated in typical operational sequences. This can be accomplished by using simulated or real targets on either side of the ground track. An average of about 12 roll maneuvers (targets), exercising the total capability of the OCV, is desired per pass.

At least one roll maneuver for each of the three slew (roll) rates available will be performed each day over a tracking station to determine settling characteristics. The required angles (targets selected) for these maneuvers must be such that the desired slewing rates are commanded (i.e., a medium rate of $\geq 1^{\circ}$ and a high rate of $\geq 3.7^{\circ}$).

The fine control mode with rate roofs ON in all 3 axes shall be used during these operations.

D.4.1.3 Simulated Strip Photography Runs

These runs shall be made with a 0^{o} roll angle and with rate roofs ON for approximately 12 minutes.

D.4.1.4 Pitch, Roll, Yaw Coarse Control

During periods when an operational sequence is not being performed the three control axes shall be placed in the coarse control mode.

D.4.1.5 Pitch and Yaw Maneuvers

The required maneuvers consist of:

a. Yaw around 180^{o} (fly backward)

b. Pitch down 58^{o}

c. Pitch zero

d. Yaw around 180^{o} (fly forward)

It is desirable to observe each of these maneuvers over a tracking station. It will not be possible, however, to observe a complete yaw around over a tracking station, because the time required to perform this maneuver exceeds station contact time.* An acceptable alternative would be to begin the yaw around maneuver ~ 400 sec before acquisition so that at least part of the maneuver and settling characteristics may be observed.

D.4.2 Camera Payload Operation

Selected camera operations shall be performed only during the first two days of OCV-solo operations. The payload operations are listed in Table D-1 and are described below. See the referenced secondary flight objectives for a typical method of performing each operation (Table 3-1).

*Maximum station contact time is ~ 400 sec. The basic yaw around requires ~450 sec. (± 2% not including settling time).

a. Open Loop Focus Adjust (Secondary Flight Objective No. 111). Exercise platen from one extreme to another over a tracking station and analyze TLM readout data.

b. Closed Loop Focus Adjust (Secondary Flight Objective No. 112). Program an automatic focus adjust and analyze readout data.

c. Stereo Mirror Differential Temperature (Secondary Flight Objective No. 113). Observe selected TLM readout points with port door held open. Record data and analyze playback.

d. Stereo Mirror Disturbances (Secondary Flight Objective No. 110). Observe during planned simulated operations. Record on airborne recorder or in real time and analyze together with attitude control data.

e. Environmental Control System (Secondary Flight Objective No. 103). Record effect of no CP environmental power for two runs on airborne recorder and analyze.

D.4.3 TT & C Station Passes

Operations performed to exercise nonaugmented TT & C will be defined in the Test Operations Order.

Table D-1. Summary of OCV-Solo Operations

No.	Event	S.F. Obj. Cat.	Frequency of Operation: Day 2 OCV-Solo	Day 3 OCV-Solo	(To OCV) (Failure)	Remarks
1.	Stabilization Subsystem Operations (Secondary Flight Objective No. 1)					
1.1	Preliminary Activation and Initial Orientation	1	1			See Table B-5B for Sequence of Events
1.2	Typical Payload Pass	1	5	5		Approximately 12 roll maneuvers per payload pass. Payload operation will also be commanded.
1.3	Simulated strip photography run	1	1	1		
1.4	Pitch, roll, yaw; coarse control	1	See remarks			During periods when the sequences outlined are not being performed the pitch, roll, and yaw control axes shall be placed in the coarse control mode. Do not switch back to coarse for periods less than 1 hour.
1.5	Pitch, roll, yaw; fine control	1	as required		continuous	Allows definitive measuring of gas consumption in fine mode.

Table D-1. Summary of OCV-Solo Operations (Cont)

No.	Event	S.F. Obj. Cat.	Frequency of Operation Day 2 OCV-Solo	Day 3 OCV-Solo	(To OCV) (Failure)	Remarks
1.6	Pitch and yaw maneuvers	1	1	1		
2.	Thermal Subsystem (OCV)					
2.1	OCV Capability Determination	1	See remarks			No special operations required.
2.2	Environmental Door Operation	1	10	10		Simulate operational mission requirements.
3.	Camera Payload (CP)					
3.1	Open Loop Focus Adjust	2		1	...	Over Tracking Station
3.2	Closed Loop Focus Adjust	3		1	...	Over Tracking Station
3.3	Stereo Mirror Differential Temperature	1	1	...	...	
3.4	Stereo Mirror Disturbances	1	1	1		
3.5	CP Environmental Control System	1	...	1	...	Also accomplished by data obtained during typical payload operations (Items 1.2 and 2.2 above).

Table D-1. Summary of OCV-Solo Operations (Cont)

No.	Event	S.F. Obj. Cat.	Frequency of Operation: Day 2 OCV-Solo	Day 3 OCV-Solo	(To OCV) (Failure)	Remarks
4.	TT & C Station Passes					
4.1	Nonaugmented	...	All stations		as required	Monitor gas and battery supply to determine depletion of expendables after Day 3.
4.2	Augmented	3	Information not available			To be scheduled by 6594th ATW.