

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO : Co-chairmen, G&C Implementation Sub-panel, MSC, MSFC DATE: September 30, 1966

FROM : Chief, Guidance and Control Systems Analysis Branch, R-ASTR-NG In reply refer to:
R-ASTR-NG-144-66
MBrooks/lw/876-8476

SUBJECT : LVDC Flight Program Input Data Schedule

1. This memorandum was prepared in response to action item 8-12-66-15 from the seventh meeting of the Guidance and Control Implementation Sub-panel and provides the schedule of input data for the LVDC Flight Program.
2. Most of the inputs to the LVDC Flight Program are listed in the enclosure along with delivery dates. Two dates, the "scheduled date" and the "required date," are given for each item. The "scheduled dates" are those dates required to meet presently established contract delivery schedules to the IU contractor (IBM). The "required dates" are those dates necessary to provide the IU contractor sufficient lead time to develop the LVDC flight program in time for launch without reducing the normal verification effort expended on the program. Any reduction in the verification effort would reduce the reliability of the finished program.
3. In the event that necessary data is not received in time to meet the "required dates" of Enclosure 1, every effort will be made to incorporate the data as received into the flight program without affecting the launch schedule. However, the extent to which the launch date may be affected or the flight program verification effort reduced is dependent upon the time relative to launch that the data is received and the magnitude and number of changes to the flight program required by the data.
4. Certain constant changes in the flight program can be made very close to launch without jeopardizing the flight providing these updated constants do not exceed the established scaling. An example of an allowable change is an update of the targeting constants. Contributors to the flight program are urged to identify as early as possible those constants requiring very late updates so that provisions can be made in the flight program and the ground launch complex to facilitate these changes. Contributors are further urged to keep these required changes to a minimum.


S. M. Seltzer

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a/s

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Approval:

R-ASTR-NG-144-66

for *B. B. Hassaway*

F. B. Moore
Chief, Guidance and
Control Division

Addressees:

MSC, Mr. Cohen
MSFC, R-ASTR-NG, Dr. Seltzer

cc:

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LVO-2, Mr. I. Rigel
I-V-MGR, Dr. Rudolph
I-V-E, Mr. Chereek
I-V-E, Mr. Barraza
I-V-E, Mr. Beaman
I-V-IU, Mr. Duerr
I-V-IU, Mr. Grant
I-I/IB-MGR, Col James
I-I/IB-E, Mr. Germany
I-I/IB-E, Mr. Callaway
I-I/IB-E, Mr. Vreuls
JRI-I/IB-U, Mr. Simmons
I-I/IB-U, Mr. Moseley
I-I/IB-U, Mr. Hight
I-MO-MGR, Dr. Speer
I-MO-R, Mrs. McNair
I-MO-FO, Mr. Burdeshaw
I-MO-F, Mr. Casey
R-TO, Mr. Richard
R-AERO-P, Mr. McNair
R-AERO-P, Mr. Ledford
R-AERO-P, Mr. Jackson
R-AERO-P, Mr. Hoag
R-AERO-F, Mr. Lindberg
R-AERO-FM, Mr. Stone
R-AERO-FMT, Mr. Hardage
R-AERO-AU, Mr. Reed
R-AERO-Y, Mr. Vaughan
R-AERO-DA, Mr. Deaton
R-AERO-DAP, Mr. Cremin
R-P&VE-P, Mr. Paul
R-P&VE-PP, Mr. Heusinger
R-P&VE-VOI, Mr. Byers
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R-P&VE-SL, Mr. Showers
R-P&VE-PT, Mr. Wood
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R-ASTR-DIR, Dr. Haeussermann
R-ASTR-DIR, Mr. Kroeger
R-ASTR-DIR, Mr. Hoberg
R-ASTR-S, Mr. Mack
R-ASTR-S, Mr. Hammers
R-ASTR-B, Mr. Weber
R-ASTR-BU, Mr. Cagle
R-ASTR-F, Mr. Hosenthien
R-ASTR-F, Mr. Blackstone
R-ASTR-EA, Mr. Shields
R-ASTR-EAA, Mr. Greer
R-ASTR-E, Mr. Fichtner
R-ASTR-N, Mr. Moore
R-ASTR-N, Mr. Wood
R-ASTR-N, Mr. Wojtalik
R-ASTR-NF, Mr. Swearingen
R-ASTR-NF, Mr. White
R-ASTR-NG, Mr. Brooks
R-ASTR-NG, Mr. McMahan
R-ASTR-NGD, Mr. Chubb
R-ASTR-NGD, Mr. Brown
R-ASTR-NGD, Mr. Ellsworth
R-ASTR-NGD, Mr. Jones
R-ASTR-NGI, Mr. Nicaise
IBM (R-ASTR-NG), Mr. Carson
IBM " " Mr. Smythe
IBM " " Mr. Dolittle
IBM " " Mr. Medlock
IBM " " Mr. Paschal
R-ASTR-NG, Branch file/Record copy
R-ASTR-X, Reference file

Record copy

SATURN IB DATA SCHEDULE

R-ASTR-NG, 26 Sep 1966

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	207		208	
MISSION DEFINING DOCUMENT (MDD) DATA			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
A. General Data (No scheduled updates - items will be revised only if required)			Mdd Issued		MDD Issued	
1. Mission Control Center (MCC) Telemetry	I-MO	Memo	-	4-15-66	-	4-15-66
2. MCC Digital Command System (DCS) requirements	I-MO	Memo	-	4-15-66	-	4-15-66
3. Aerodynamic data	R-AERO-A	Memo	-	4-1-66	-	4-1-66
4. Mission description, objectives, constraints	R-AERO-DA	3	-	"	-	"
		5	-	"	-	"
5. Targeting conditions	R-AERO-DA	4	-	"	-	"
6. Launch pad number and coordinates	R-AERO-DA	5	-	"	-	"
7. Iterative Guidance Mode (IGM) guidance equations.	R-AERO-DA	6	-	"	-	"
8. Navigation and targeting update requirements	R-AERO-FM	Memo	-	"	-	"
9. Variable Launch Azimuth Equations	R-AERO-DA	5	-	"	-	"
10. Sequence, time bases and backups, discretizes, interrupts	R-ASTR-EA	7	-	"	-	"
11. Antenna switching requirements	R-ASTR-I	Memo	-	4-15-66	-	4-15-66
12. Orbital hardware evaluation program requirements	R-ASTR-ND	Memo	-	" "	-	" "
13. Ground test requirements (pseudo flight and flight simulation requirements)	R-ASTR-ND	Memo	-	" "	-	" "
14. Control gains and limits	R-ASTR-NF	Memo	-	4-1-66	-	4-1-66
15. M/F filter definition	R-ASTR-NF	Memo	-	4-15-66	-	4-15-66
16. Instrumentation backup requirements	R-ASTR-NG	Memo	-	4-1-66	-	4-1-66
17. Navigation equations	R-ASTR-NG	Memo	-	" "	-	" "
18. Telemetry requirements other than MCC's	R-ASTR-NG	Memo	-	4-15-66	-	4-15-66
19. Venting data (time, duration, direction, magnitude)	R-P&VE-P	Memo	-	4-1-66	-	4-1-66
20. Vehicle configuration description	R-P&VE-P	Memo	-	" "	-	" "

SATURN IB DATA SCHEDULE

R-ASTR-NG, 26 Sep 1966

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	207		208	
			Scheduled Date 1 MDD Issued	Required Date 2	Scheduled Date 1 MDD Issued	Required Date 2
<u>MISSION DEFINING DOCUMENT DATA (cont)</u>						
<u>B. Preliminary Data (Updates scheduled - reference and operational data)</u>						
1. Constants for Variable Launch Azimuth	R-AERO-DA	5	-	4-1-66	-	4-1-66
2. Propellant utilization (thrust and mass flow curves and mixture ratio shift times and tolerances)	R-AERO-DA	5	-	"	-	"
3. Time tilt program	R-AERO-DA	5	-	"	-	"
4. IGM guidance presettings	R-AERO-DA	5	-	"	-	"
5. Mission vehicle attitude time lines	R-AERO-DA	3	-	"	-	"
6. Abort and alternate mission routines	R-AERO-DA	8	-	"	-	"
<u>FINAL MDD DATA</u>						
<u>A. Reference or Operational Data</u>						
1. Variable Launch Azimuth final coefficients	R-AERO-FM	9	11-1-66	11-1-66	1-27-67	11-1-66
2. Propellant utilization final values	R-AERO-FM	9	"	"	"	"
3. Time tilt program final parameters	R-AERO-FM	9	"	"	"	"
4. IGM guidance and targeting final presettings	R-AERO-FM	9	"	"	"	"
5. Attitude maneuvers, final magnitudes	R-AERO-FM	Memo	"	"	"	"
6. Abort and alternate mission, final parameters	R-AERO-FM	10	"	"	"	"

- Notes:
1. The scheduled date shown is from the existing contract.
 2. The required date shown is based on launch date.
 3. Joint Preliminary Mission Constraints.
 4. Joint Launch Vehicle Targeting Document.
 5. Joint preliminary Reference Trajectory.
 6. Launch Vehicle Guidance Equations.
 7. Definition of Saturn ... Flight Sequence Program.
 8. Preliminary Alternate Mission and Abort Plan.
 9. Operational Reference Trajectory.
 10. Joint Alternate Mission and Abort Plan.

SATURN IBDATA SCHEDULE

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	209		210	
MISSION DEFINING DOCUMENT (MDD) DATA			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
A. General Data (No scheduled updates - items will be revised only if required)						
1. Mission Control Center (MCC) Telemetry	I-MO	Memo	10-14-66	1-15-67	12-16-66	1-15-67
2. MCC Digital Command System (DCS) requirements	I-MO	Memo	"	"	"	"
3. Aerodynamic data	R-AERO-A	Memo	10-3-66	1-1-67	12-2-66	1-1-67
4. Mission description, objectives, constraints	R-AERO-DA	3	"	"	"	"
5. Targeting conditions	R-AERO-DA	5	"	"	"	"
6. Launch pad number and coordinates	R-AERO-DA	4	"	"	"	"
7. Iterative Guidance Mode (IGM) guidance equations.	R-AERO-DA	5	"	"	"	"
8. Navigation and targeting update requirements	R-AERO-DA	6	"	"	"	"
9. Variable Launch Azimuth Equations	R-AERO-FM	Memo	"	"	"	"
10. Sequence, time bases and backups, discretizes, interrupts	R-AERO-DA	5	"	"	"	"
11. Antenna switching requirements	R-ASTR-EA	7	"	"	"	"
12. Orbital hardware evaluation program requirements	R-ASTR-I	Memo	10-14-66	1-15-67	12-16-66	1-15-67
13. Ground test requirements (pseudo flight and flight simulation requirements)	R-ASTR-ND	Memo	"	"	"	"
14. Control gains and limits	R-ASTR-ND	Memo	"	"	"	"
15. M/F filter definition	R-ASTR-NF	Memo	10-3-66	1-1-67	12-2-66	1-1-67
16. Instrumentation backup requirements	R-ASTR-NF	Memo	10-14-66	1-15-67	12-16-66	1-15-67
17. Navigation equations	R-ASTR-NG	Memo	10-3-66	1-1-67	12-2-66	1-1-67
18. Telemetry requirements other than MCC's	R-ASTR-NG	Memo	"	"	"	"
19. Venting data (time, duration, direction, magnitude)	R-ASTR-NG	Memo	10-14-66	1-15-67	12-16-66	1-15-67
20. Vehicle configuration description	R-P&VE-P	Memo	10-3-66	1-1-67	12-2-66	1-1-67
	R-P&VE-P	Memo	"	"	"	"

SATURN IB DATA SCHEDULE

R-ASTR-NG, 26 Sep 1966

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	209		210	
MISSION DEFINING DOCUMENT DATA (cont)			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
<u>B. Preliminary Data (Updates scheduled - reference and operational data)</u>						
1. Constants for Variable Launch Azimuth	R-AERO-DA	5	10-3-66	1-1-67	12-2-66	1-1-67
2. Propellant utilization (thrust and mass flow curves and mixture ratio shift times and tolerances)	R-AERO-DA	5	"	"	"	"
3. Time tilt program	R-AERO-DA	5	"	"	"	"
4. IGM guidance presettings	R-AERO-DA	5	"	"	"	"
5. Mission vehicle attitude time lines	R-AERO-DA	3	"	"	"	"
6. Abort and alternate mission routines	R-AERO-DA	8	"	"	"	"
<u>FINAL MDD DATA</u>						
<u>A. Reference or Operational Data</u>						
1. Variable Launch Azimuth final coefficients	R-AERO-FM	9	4-28-67	8-15-67	6-30-67	8-15-67
2. Propellant utilization final values	R-AERO-FM	9	"	"	"	"
3. Time tilt program final parameters	R-AERO-FM	9	"	"	"	"
4. IGM guidance and targeting final presettings	R-AERO-FM	9	"	"	"	"
5. Attitude maneuvers, final magnitudes	R-AERO-FM	Memo	"	"	"	"
6. Abort and alternate mission, final parameters	R-AERO-FM	10	"	"	"	"

- Notes:
1. The scheduled date shown is from the existing contract.
 2. The required date shown is based on launch date.
 3. Joint Preliminary Mission Constraints.
 4. Joint Launch Vehicle Targeting Document.
 5. Joint preliminary Reference Trajectory.
 6. Launch Vehicle Guidance Equations.
 7. Definition of Saturn ... Flight Sequence Program.
 8. Preliminary Alternate Mission and Abort Plan.
 9. Operational Reference Trajectory.
 10. Joint Alternate Mission and Abort Plan.

SATURN IB DATA SCHEDULE

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	211		212	
MISSION DEFINING DOCUMENT (MDD) DATA			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
A. General Data (No scheduled updates - items will be revised only if required)						
1. Mission Control Center (MCC) Telemetry	I-MO	Memo	2-16-67	6-15-67	4-19-67	6-15-67
2. MCC Digital Command System (DCS) requirements	I-MO	Memo	"	"	"	"
3. Aerodynamic data	R-AERO-A	Memo	1-27-67	6-1-67	4-05-67	6-1-67
4. Mission description, objectives, constraints	R-AERO-DA	3	"	"	"	"
5. Targeting conditions	R-AERO-DA	5	"	"	"	"
6. Launch pad number and coordinates	R-AERO-DA	4	"	"	"	"
7. Iterative Guidance Mode (IGM) guidance equations.	R-AERO-DA	5	"	"	"	"
8. Navigation and targeting update requirements	R-AERO-DA	6	"	"	"	"
9. Variable Launch Azimuth Equations	R-AERO-FM	Memo	"	"	"	"
10. Sequence, time bases and backups, discretizes, interrupts	R-AERO-DA	5	"	"	"	"
11. Antenna switching requirements	R-ASTR-EA	7	"	"	"	"
12. Orbital hardware evaluation program requirements	R-ASTR-I	Memo	2-16-67	6-15-67	4-19-67	6-15-67
13. Ground test requirements (pseudo flight and flight simulation requirements)	R-ASTR-ND	Memo	"	"	"	"
14. Control gains and limits	R-ASTR-ND	Memo	"	"	"	"
15. M/F filter definition	R-ASTR-NF	Memo	1-27-67	6-1-67	4-05-67	6-1-67
16. Instrumentation backup requirements	R-ASTR-NF	Memo	2-16-67	6-15-67	4-19-67	6-15-67
17. Navigation equations	R-ASTR-NG	Memo	1-27-67	6-1-67	4-05-67	6-1-67
18. Telemetry requirements other than MCC's	R-ASTR-NG	Memo	"	"	"	"
19. Venting data (time, duration, direction, magnitude)	R-ASTR-NG	Memo	2-16-67	6-15-67	4-19-67	6-15-67
20. Vehicle configuration description	R-P&VE-P	Memo	1-27-67	6-1-67	4-05-67	6-1-67
	R-P&VE-P	Memo	"	"	"	"

SATURN IB DATA SCHEDULE

R-ASTR-NG, 26 Sep 1966

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	211		212	
			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
<u>MISSION DEFINING DOCUMENT DATA (cont)</u>						
<u>B. Preliminary Data (Updates scheduled - reference and operational data)</u>						
1. Constants for Variable Launch Azimuth	R-AERO-DA	5				
2. Propellant utilization (thrust and mass flow curves and mixture ratio shift times and tolerances)	R-AERO-DA	5	1-27-67	6-1-67	4-05-67	6-1-67
3. Time tilt program	R-AERO-DA	5	"	"	" "	"
4. IGM guidance presettings	R-AERO-DA	5	"	"	"	"
5. Mission vehicle attitude time lines	R-AERO-DA	3	"	"	"	"
6. Abort and alternate mission routines	R-AERO-DA	8	"	"	"	"
<u>FINAL MDD DATA</u>						
<u>A. Reference or Operational Data</u>						
1. Variable Launch Azimuth final coefficients	R-AERO-FM	9	8-31-67	1-15-68	10-27-67	1-15-68
2. Propellant utilization final values	R-AERO-FM	9	"	"	"	"
3. Time tilt program final parameters	R-AERO-FM	9	"	"	"	"
4. IGM guidance and targeting final presettings	R-AERO-FM	9	"	"	"	"
5. Attitude maneuvers, final magnitudes	R-AERO-FM	Memo	"	"	"	"
6. Abort and alternate mission, final parameters	R-AERO-FM	10	"	"	"	"

- Notes:
1. The scheduled date shown is from the existing contract.
 2. The required date shown is based on launch date.
 3. Joint Preliminary Mission Constraints.
 4. Joint Launch Vehicle Targeting Document.
 5. Joint preliminary Reference Trajectory.
 6. Launch Vehicle Guidance Equations.
 7. Definition of Saturn ... Flight Sequence Program.
 8. Preliminary Alternate Mission and Abort Plan.
 9. Operational Reference Trajectory.
 10. Joint Alternate Mission and Abort Plan.

SATURN V DATA SCHEDULE

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	503		504	
MISSION DEFINING DOCUMENT (MDD) DATA			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
A. General Data (No scheduled updates - items will be revised only if required)			MDD Issued			
1. Mission Control Center (MCC) Telemetry	I-MO	Memo	-	6-15-66	7-4-66	10-15-66
2. MCC Digital Command System (DCS) requirements	I-MO	Memo	-	"	"	"
3. Aerodynamic data	R-AERO-A	Memo	-	6-1-66	6-20-66	10-1-66
4. Mission description, objectives, constraints	R-AERO-DA	3	-	"	"	"
5. Targeting conditions	R-AERO-DA	5	-	"	"	"
6. Launch pad number and coordinates	R-AERO-DA	4	-	"	"	"
7. Iterative Guidance Mode (IGM) guidance equations.	R-AERO-DA	5	-	"	"	"
8. Navigation and targeting update requirements	R-AERO-DA	6	-	"	"	"
9. Variable Launch Azimuth Equations	R-AERO-FM	Memo	-	"	"	"
10. Sequence, time bases and backups, discrettes, interrupts	R-AERO-DA	5	-	"	"	"
11. Antenna switching requirements	R-ASTR-EA	7	-	"	"	"
12. Orbital hardware evaluation program requirements	R-ASTR-I	Memo	-	6-15-66	7-4-66	10-15-66
13. Ground test requirements (pseudo flight and flight simulation requirements)	R-ASTR-ND	Memo	-	"	"	"
14. Control gains and limits	R-ASTR-ND	Memo	-	"	"	"
15. M/F filter definition	R-ASTR-NF	Memo	-	6-1-66	6-20-66	10-1-66
16. Instrumentation backup requirements	R-ASTR-NF	Memo	-	6-15-66	7-4-66	10-15-66
17. Navigation equations	R-ASTR-NG	Memo	-	6-1-66	6-20-66	10-1-66
18. Telemetry requirements other than MCC's	R-ASTR-NG	Memo	-	"	"	"
19. Venting data (time, duration, direction, magnitude)	R-ASTR-NG	Memo	-	6-15-66	7-4-66	10-15-66
20. Vehicle configuration description	R-P&VE-P	Memo	-	6-1-66	6-20-66	10-1-66
	R-P&VE-P	Memo	-	"	"	"

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	503		504	
			Scheduled Date 1 MDD Issued	Required Date 2	Scheduled Date 1	Required Date 2
<u>MISSION DEFINING DOCUMENT DATA (cont)</u>						
<u>B. Preliminary Data (Updates scheduled - reference and operational data)</u>						
1. Constants for Variable Launch Azimuth	R-AERO-DA	5	-	6-1-66	6-20-66	10-1-66
2. Propellant utilization (thrust and mass flow curves and mixture ratio shift times and tolerances)	R-AERO-DA	5	-	6-1-66	"	"
3. Time tilt program	R-AERO-DA	5	-	6-1-66	"	"
4. IGM guidance presettings	R-AERO-DA	5	-	6-1-66	"	"
5. Mission vehicle attitude time lines	R-AERO-DA	3	-	6-1-66	"	"
6. Abort and alternate mission routines	R-AERO-DA	8	-	6-1-66	"	"
<u>FINAL MDD DATA</u>						
<u>A. Reference or Operational Data</u>						
1. Variable Launch Azimuth final coefficients	R-AERO-FM	9	10-14-66	1-15-67	1-13-66	5-15-67
2. Propellant utilization final values	R-AERO-FM	9	"	"	"	"
3. Time tilt program final parameters	R-AERO-FM	9	"	"	"	"
4. IGM guidance and targeting final presettings	R-AERO-FM	9	"	"	"	"
5. Attitude maneuvers, final magnitudes	R-AERO-FM	Memo	"	"	"	"
6. Abort and alternate mission, final parameters	R-AERO-FM	10	"	"	"	"

- Notes:
1. The scheduled date shown is from the existing contract.
 2. The required date shown is based on launch date.
 3. Joint Preliminary Mission Constraints.
 4. Joint Launch Vehicle Targeting Document.
 5. Joint preliminary Reference Trajectory.
 6. Launch Vehicle Guidance Equations.
 7. Definition of Saturn ... Flight Sequence Program.
 8. Preliminary Alternate Mission and Abort Plan.
 9. Operational Reference Trajectory.
 10. Joint Alternate Mission and Abort Plan.

SATURN V DATA SCHEDULE

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	505		506	
MISSION DEFINING DOCUMENT (MDD) DATA			Scheduled Date	Required Date	Scheduled Date	Required Date
A. General Data (No scheduled updates - items will be revised only if required)			1	2	1	2
1. Mission Control Center (MCC) Telemetry	I-MO	Memo	9-30-66	1-15-67	12-2-66	4-15-67
2. MCC Digital Command System (DCS) requirements	I-MO	Memo	"	"	"	"
3. Aerodynamic data	R-AERO-A	Memo	9-16-66	1-1-67	11-19-66	4-1-67
4. Mission description, objectives, constraints	R-AERO-DA	3	"	"	"	"
5. Targeting conditions	R-AERO-DA	5	"	"	"	"
6. Launch pad number and coordinates	R-AERO-DA	4	"	"	"	"
7. Iterative Guidance Mode (IGM) guidance equations.	R-AERO-DA	5	"	"	"	"
8. Navigation and targeting update requirements	R-AERO-DA	6	"	"	"	"
9. Variable Launch Azimuth Equations	R-AERO-FM	Memo	"	"	"	"
10. Sequence, time bases and backups, discretes, interrupts	R-AERO-DA	5	"	"	"	"
11. Antenna switching requirements	R-ASTR-EA	7	"	"	"	"
12. Orbital hardware evaluation program requirements	R-ASTR-I	Memo	9-30-66	1-15-67	12-2-66	4-15-67
13. Ground test requirements (pseudo flight and flight simulation requirements)	R-ASTR-ND	Memo	"	"	"	"
14. Control gains and limits	R-ASTR-ND	Memo	"	"	"	"
15. M/F filter definition	R-ASTR-NF	Memo	9-16-66	1-1-67	11-19-66	4-1-67
16. Instrumentation backup requirements	R-ASTR-NF	Memo	9-30-66	1-15-67	12-2-66	4-15-67
17. Navigation equations	R-ASTR-NG	Memo	9-16-66	1-1-67	11-19-66	4-1-67
18. Telemetry requirements other than MCC's	R-ASTR-NG	Memo	"	"	"	"
19. Venting data (time, duration, direction, magnitude)	R-ASTR-NG	Memo	9-30-66	1-15-67	12-2-66	4-15-67
20. Vehicle configuration description	R-P&VE-P	Memo	9-16-66	1-1-67	11-19-66	4-1-67
	R-P&VE-P	Memo	"	"	"	"

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	505		506	
MISSION DEFINING DOCUMENT DATA (cont)			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
B. Preliminary Data (Updates scheduled - reference and operational data)			MDD Issued		MDD Issued	
1. Constants for Variable Launch Azimuth	R-AERO-DA	5	7-16-66	1-1-67	11-19-66	4-1-67
2. Propellant utilization (thrust and mass flow curves and mixture ratio shift times and tolerances)	R-AERO-DA	5	"	"	"	"
3. Time tilt program	R-AERO-DA	5	"	"	"	"
4. IGM guidance presettings	R-AERO-DA	5	"	"	"	"
5. Mission vehicle attitude time lines	R-AERO-DA	3	"	"	"	"
6. Abort and alternate mission routines	R-AERO-DA	8	"	"	"	"
<u>FINAL MDD DATA</u>						
A. Reference or Operational Data						
1. Variable Launch Azimuth final coefficients	R-AERO-FM	9	4-15-67	8-15-67	6-17-67	11-15-67
2. Propellant utilization final values	R-AERO-FM	9	"	"	"	"
3. Time tilt program final parameters	R-AERO-FM	9	"	"	"	"
4. IGM guidance and targeting final presettings	R-AERO-FM	9	"	"	"	"
5. Attitude maneuvers, final magnitudes	R-AERO-FM	Memo	"	"	"	"
6. Abort and alternate mission, final parameters	R-AERO-FM	10	"	"	"	"

- Notes:
1. The scheduled date shown is from the existing contract.
 2. The required date shown is based on launch date.
 3. Joint Preliminary Mission Constraints.
 4. Joint Launch Vehicle Targeting Document.
 5. Joint preliminary Reference Trajectory.
 6. Launch Vehicle Guidance Equations.
 7. Definition of Saturn ... Flight Sequence Program.
 8. Preliminary Alternate Mission and Abort Plan.
 9. Operational Reference Trajectory.
 10. Joint Alternate Mission and Abort Plan.

SATURN V DATA SCHEDULE

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	507		508	
MISSION DEFINING DOCUMENT (MDD) DATA			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
A. General Data (No scheduled updates - items will be revised only if required)						
1. Mission Control Center (MCC) Telemetry	I-MO	Memo	2-6-67	7-15-67	3-30-67	10-15-67
2. MCC Digital Command System (DCS) requirements	I-MO	Memo				
3. Aerodynamic data	R-AERO-A	Memo	1-23-67	7-1-67	3-16-67	10-1-67
4. Mission description, objectives, constraints	R-AERO-DA	3	"	"	"	"
5. Targeting conditions	R-AERO-DA	5	"	"	"	"
6. Launch pad number and coordinates	R-AERO-DA	4	"	"	"	"
7. Iterative Guidance Mode (IGM) guidance equations.	R-AERO-DA	5	"	"	"	"
8. Navigation and targeting update requirements	R-AERO-DA	6	"	"	"	"
9. Variable Launch Azimuth Equations	R-AERO-FM	Memo	"	"	"	"
10. Sequence, time bases and backups, discretizes, interrupts	R-AERO-DA	5	"	"	"	"
11. Antenna switching requirements	R-ASTR-EA	7	"	"	"	"
12. Orbital hardware evaluation program requirements	R-ASTR-I	Memo	2-6-67	7-15-67	3-30-67	10-15-67
13. Ground test requirements (pseudo flight and flight simulation requirements)	R-ASTR-ND	Memo	"	"	"	"
14. Control gains and limits	R-ASTR-ND	Memo	1-23-67	7-1-67	3-16-67	10-1-67
15. M/F filter definition	R-ASTR-NF	Memo	2-6-67	7-15-67	3-30-67	10-15-67
16. Instrumentation backup requirements	R-ASTR-NF	Memo	1-23-67	7-1-67	3-16-67	10-1-67
17. Navigation equations	R-ASTR-NG	Memo	"	"	"	"
18. Telemetry requirements other than MCC's	R-ASTR-NG	Memo	2-6-67	7-15-67	3-30-67	10-15-67
19. Venting data (time, duration, direction, magnitude)	R-P&VE-P	Memo	1-23-67	7-1-67	3-16-67	10-1-67
20. Vehicle configuration description	R-P&VE-P	Memo		"	"	"

SATURN V DATA SCHEDULE

R-ASIR-NG, 26 Sep 1966

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	507		508	
MISSION DEFINING DOCUMENT DATA (cont)			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
<u>B. Preliminary Data (Updates scheduled - reference and operational data)</u>						
1. Constants for Variable Launch Azimuth	R-AERO-DA	5	1-23-67	7-1-67	3-16-67	10-1-67
2. Propellant utilization (thrust and mass flow curves and mixture ratio shift times and tolerances)	R-AERO-DA	5	"	"	"	"
3. Time tilt program	R-AERO-DA	5	"	"	"	"
4. IGM guidance presettings	R-AERO-DA	5	"	"	"	"
5. Mission vehicle attitude time lines	R-AERO-DA	3	"	"	"	"
6. Abort and alternate mission routines	R-AERO-DA	8	"	"	"	"
<u>FINAL MDD DATA</u>						
<u>A. Reference or Operational Data</u>						
1. Variable Launch Azimuth final coefficients	R-AERO-FM	9	8-18-67	2-15-68	10-13-67	5-15-68
2. Propellant utilization final values	R-AERO-FM	9	"	"	"	"
3. Time tilt program final parameters	R-AERO-FM	9	"	"	"	"
4. IGM guidance and targeting final presettings	R-AERO-FM	9	"	"	"	"
5. Attitude maneuvers, final magnitudes	R-AERO-FM	Memo	"	"	"	"
6. Abort and alternate mission, final parameters	R-AERO-FM	10	"	"	"	"

- Notes:
1. The scheduled date shown is from the existing contract.
 2. The required date shown is based on launch date.
 3. Joint Preliminary Mission Constraints.
 4. Joint Launch Vehicle Targeting Document.
 5. Joint preliminary Reference Trajectory.
 6. Launch Vehicle Guidance Equations.
 7. Definition of Saturn ... Flight Sequence Program.
 8. Preliminary Alternate Mission and Abort Plan.
 9. Operational Reference Trajectory.
 10. Joint Alternate Mission and Abort Plan.

SATURN V DATA SCHEDULE

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	509		510	
			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
MISSION DEFINING DOCUMENT (MDD) DATA						
A. General Data (No scheduled updates - items will be revised only if required)						
1. Mission Control Center (MCC) Telemetry	I-MO	Memo	6-3-67	12-15-67	8-4-67	2-15-68
2. MCC Digital Command System (DCS) requirements	I-MO	Memo	"	"	"	"
3. Aerodynamic data	R-AERO-A	Memo	5-20-67	12-1-67	7-21-67	2-1-68
4. Mission description, objectives, constraints	R-AERO-DA	3	"	"	"	"
5. Targeting conditions	R-AERO-DA	5	"	"	"	"
6. Launch pad number and coordinates	R-AERO-DA	4	"	"	"	"
7. Iterative Guidance Mode (IGM) guidance equations.	R-AERO-DA	5	"	"	"	"
8. Navigation and targeting update requirements	R-AERO-DA	6	"	"	"	"
9. Variable Launch Azimuth Equations	R-AERO-FM	Memo	"	"	"	"
10. Sequence, time bases and backups, discreties, interrupts	R-AERO-DA	5	"	"	"	"
11. Antenna switching requirements	R-ASTR-EA	7	"	"	"	"
12. Orbital hardware evaluation program requirements	R-ASTR-I	Memo	6-3-67	12-15-67	8-4-67	2-15-68
13. Ground test requirements (pseudo flight and flight simulation requirements)	R-ASTR-ND	Memo	"	"	"	"
14. Control gains and limits	R-ASTR-NF	Memo	5-20-67	12-1-67	7-21-67	2-1-68
15. M/F filter definition	R-ASTR-NF	Memo	6-3-67	12-15-67	8-4-67	2-15-68
16. Instrumentation backup requirements	R-ASTR-NG	Memo	5-20-67	12-1-67	7-21-67	2-1-68
17. Navigation equations	R-ASTR-NG	Memo	"	"	"	"
18. Telemetry requirements other than MCC's	R-ASTR-NG	Memo	6-3-67	12-15-67	8-4-67	2-15-68
19. Venting data (time, duration, direction, magnitude)	R-P&VE-P	Memo	5-20-67	12-1-67	7-21-67	2-1-68
20. Vehicle configuration description	R-P&VE-P	Memo	"	"	"	"

SATURN V DATA SCHEDULE

R-ASTR-NG, 26 May 1968

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	509		510	
			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
MISSION DEFINING DOCUMENT DATA (cont)						
B. Preliminary Data (Updates scheduled - reference and operational data)						
1. Constants for Variable Launch Azimuth	R-AERO-DA	5	5-20-67	12-1-67	7-21-67	2-1-68
2. Propellant utilization (thrust and mass flow curves and mixture ratio shift times and tolerances)	R-AERO-DA	5	" "	" "	" "	" "
3. Time tilt program	R-AERO-DA	5	" "	" "	" "	" "
4. IGM guidance presettings	R-AERO-DA	5	" "	" "	" "	" "
5. Mission vehicle attitude time lines	R-AERO-DA	3	" "	" "	" "	" "
6. Abort and alternate mission routines	R-AERO-DA	8	" "	" "	" "	" "
FINAL MDD DATA						
A. Reference or Operational Data						
1. Variable Launch Azimuth final coefficients	R-AERO-FM	9	12-16-67	6-15-68	2-18-68	8-15-68
2. Propellant utilization final values	R-AERO-FM	9	" "	" "	" "	" "
3. Time tilt program final parameters	R-AERO-FM	9	" "	" "	" "	" "
4. IGM guidance and targeting final presettings	R-AERO-FM	9	" "	" "	" "	" "
5. Attitude maneuvers, final magnitudes	R-AERO-FM	Memo	" "	" "	" "	" "
6. Abort and alternate mission, final parameters	R-AERO-FM	10	" "	" "	" "	" "

- Notes:
1. The scheduled date shown is from the existing contract.
 2. The required date shown is based on launch date.
 3. Joint Preliminary Mission Constraints.
 4. Joint Launch Vehicle Targeting Document.
 5. Joint preliminary Reference Trajectory.
 6. Launch Vehicle Guidance Equations.
 7. Definition of Saturn ... Flight Sequence Program.
 8. Preliminary Alternate Mission and Abort Plan.
 9. Operational Reference Trajectory.
 10. Joint Alternate Mission and Abort Plan.

SATURN V DATA SCHEDULE

R-ASTR-NG, 26 Sep 1966

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	511		512	
MISSION DEFINING DOCUMENT (MDD) DATA			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
A. General Data (No scheduled updates - items will be revised only if required)						
1. Mission Control Center (MCC) Telemetry	I-MO	Memo	9-30-67	4-15-68	11-31-67	6-15-68
2. MCC Digital Command System (DCS) requirements	I-MO	Memo	"	"	"	"
3. Aerodynamic data	R-AERO-A	Memo	9-16-67	4-1-68	11-17-67	6-1-68
4. Mission description, objectives, constraints	R-AERO-DA	3	"	"	"	"
5. Targeting conditions	R-AERO-DA	5	"	"	"	"
6. Launch pad number and coordinates	R-AERO-DA	4	"	"	"	"
7. Iterative Guidance Mode (IGM) guidance equations.	R-AERO-DA	5	"	"	"	"
8. Navigation and targeting update requirements	R-AERO-DA	6	"	"	"	"
9. Variable Launch Azimuth Equations	R-AERO-FM	Memo	"	"	"	"
10. Sequence, time bases and backups, discretes, interrupts	R-AERO-DA	5	"	"	"	"
11. Antenna switching requirements	R-ASTR-EA	7	"	"	"	"
12. Orbital hardware evaluation program requirements	R-ASTR-I	Memo	9-30-67	4-15-68	11-31-67	6-15-68
13. Ground test requirements (pseudo flight and flight simulation requirements)	R-ASTR-ND	Memo	"	"	"	"
14. Control gains and limits	R-ASTR-ND	Memo	"	"	"	"
15. M/F filter definition	R-ASTR-NF	Memo	9-16-67	4-1-68	11-17-67	6-1-68
16. Instrumentation backup requirements	R-ASTR-NF	Memo	9-30-67	4-15-68	11-31-67	6-15-68
17. Navigation equations	R-ASTR-NG	Memo	9-16-67	4-1-68	11-17-67	6-1-68
18. Telemetry requirements other than MCC's	R-ASTR-NG	Memo	"	"	"	"
19. Venting data (time, duration, direction, magnitude)	R-ASTR-NG	Memo	9-30-67	4-15-68	11-31-67	6-15-68
20. Vehicle configuration description	R-P&VE-P	Memo	9-16-67	4-1-68	11-17-67	6-1-68
	R-P&VE-P	Memo	"	"	"	"

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	511		512	
MISSION DEFINING DOCUMENT DATA (cont)			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
<u>B. Preliminary Data (Updates scheduled - reference and operational data)</u>						
1. Constants for Variable Launch Azimuth	R-AERO-DA	5	9-16-67	4-1-68	11-17-67	6-1-68
2. Propellant utilization (thrust and mass flow curves and mixture ratio shift times and tolerances)	R-AERO-DA	5	"	" "	"	"
3. Time tilt program	R-AERO-DA	5	"	"	"	"
4. IGM guidance presettings	R-AERO-DA	5	"	"	"	"
5. Mission vehicle attitude time lines	R-AERO-DA	3	"	"	" "	"
6. Abort and alternate mission routines	R-AERO-DA	8	"	"	"	"
<u>FINAL MDD DATA</u>						
<u>A. Reference or Operational Data</u>						
1. Variable Launch Azimuth final coefficients	R-AERO-FM	9	4-29-68	11-15-68	6-28-68	1-15-69
2. Propellant utilization final values	R-AERO-FM	9	"	"	"	"
3. Time tilt program final parameters	R-AERO-FM	9	"	"	"	"
4. IGM guidance and targeting final presettings	R-AERO-FM	9	"	"	"	"
5. Attitude maneuvers, final magnitudes	R-AERO-FM	Memo	"	"	"	"
6. Abort and alternate mission, final parameters	R-AERO-FM	10	"	"	"	"

- Notes:
1. The scheduled date shown is from the existing contract.
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 3. Joint Preliminary Mission Constraints.
 4. Joint Launch Vehicle Targeting Document.
 5. Joint preliminary Reference Trajectory.
 6. Launch Vehicle Guidance Equations.
 7. Definition of Saturn ... Flight Sequence Program.
 8. Preliminary Alternate Mission and Abort Plan.
 9. Operational Reference Trajectory.
 10. Joint Alternate Mission and Abort Plan.

SATURN V DATA SCHEDULE

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	513		514	
MISSION DEFINING DOCUMENT (MDD) DATA			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
A. General Data (No scheduled updates - items will be revised only if required)						
1. Mission Control Center (MCC) Telemetry	I-MO	Memo	2-4-68	8-15-68	4-6-68	10-15-68
2. MCC Digital Command System (DCS) requirements	I-MO	Memo	"	"	"	"
3. Aerodynamic data	R-AERO-A	Memo	1-21-68	8-1-68	3-23-68	10-1-68
4. Mission description, objectives, constraints	R-AERO-DA	3	"	"	"	"
5. Targeting conditions	R-AERO-DA	5	"	"	"	"
6. Launch pad number and coordinates	R-AERO-DA	4	"	"	"	"
7. Iterative Guidance Mode (IGM) guidance equations.	R-AERO-DA	5	"	"	"	"
8. Navigation and targeting update requirements	R-AERO-DA	6	"	"	"	"
9. Variable Launch Azimuth Equations	R-AERO-FM	Memo	"	"	"	"
10. Sequence, time bases and backups, discretizes, interrupts	R-AERO-DA	5	"	"	"	"
11. Antenna switching requirements	R-ASTR-EA	7	"	"	"	"
12. Orbital hardware evaluation program requirements	R-ASTR-I	Memo	2-4-68	8-15-68	4-6-68	10-15-68
13. Ground test requirements (pseudo flight and flight simulation requirements)	R-ASTR-ND	Memo	"	"	"	"
14. Control gains and limits	R-ASTR-ND	Memo	1-21-68	8-1-68	3-23-68	10-1-68
15. M/F filter definition	R-ASTR-NF	Memo	2-4-68	8-15-68	4-6-68	10-15-68
16. Instrumentation backup requirements	R-ASTR-NF	Memo	1-21-68	8-1-68	3-23-68	10-1-68
17. Navigation equations	R-ASTR-NG	Memo	"	"	"	"
18. Telemetry requirements other than MCC's	R-ASTR-NG	Memo	2-4-68	8-15-68	4-6-68	10-15-68
19. Venting data (time, duration, direction, magnitude)	R-P&VE-P	Memo	1-28-68	8-1-68	3-23-68	10-1-68
20. Vehicle configuration description	R-P&VE-P	Memo	"	"	"	"

SATURN V DATA SCHEDULE

R-ASTC-107, 26 Nov 1968

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	513		514	
MISSION DEFINING DOCUMENT DATA (cont)			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
<u>B. Preliminary Data (Updates scheduled - reference and operational data)</u>						
1. Constants for Variable Launch Azimuth	R-AERO-DA	5	1-21-68	8-1-68	3-23-68	10-1-68
2. Propellant utilization (thrust and mass flow curves and mixture ratio shift times and tolerances)	R-AERO-DA	5	"	"	"	"
3. Time tilt program	R-AERO-DA	5	"	"	"	"
4. IGM guidance presettings	R-AERO-DA	5	"	"	"	"
5. Mission vehicle attitude time lines	R-AERO-DA	3	"	"	"	"
6. Abort and alternate mission routines	R-AERO-DA	8	"	"	"	"
<u>FINAL MDD DATA</u>						
<u>A. Reference or Operational Data</u>						
1. Variable Launch Azimuth final coefficients	R-AERO-FM	9	9-3-68	3-15-69	10-25-68	5-15-69
2. Propellant utilization final values	R-AERO-FM	9	"	"	"	"
3. Time tilt program final parameters	R-AERO-FM	9	"	"	"	"
4. IGM guidance and targeting final presettings	R-AERO-FM	9	"	"	"	"
5. Attitude maneuvers, final magnitudes	R-AERO-FM	Memo	"	"	"	"
6. Abort and alternate mission, final parameters	R-AERO-FM	10	"	"	"	"

- Notes:
1. The scheduled date shown is from the existing contract.
 2. The required date shown is based on launch date.
 3. Joint Preliminary Mission Constraints.
 4. Joint Launch Vehicle Targeting Document.
 5. Joint Preliminary Reference Trajectory.
 6. Launch Vehicle Guidance Equations.
 7. Definition of Saturn ... Flight Sequence Program.
 8. Preliminary Alternate Mission and Abort Plan.
 9. Operational Reference Trajectory.
 10. Joint Alternate Mission and Abort Plan.

SATURN DATA SCHEDULE

R-ASTR-NG, 26 Sep 1968

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	515		Scheduled Date	Required Date
MISSION DEFINING DOCUMENT (MDD) DATA			Scheduled Date 1	Required Date 2	Scheduled Date 1	Required Date 2
A. General Data (No scheduled updates - items will be revised only if required)						
1. Mission Control Center (MCC) Telemetry	I-MO	Memo	5-30-68	12-15-68		
2. MCC Digital Command System (DCS) requirements	I-MO	Memo	"	"		
3. Aerodynamic data	R-AERO-A	Memo	5-16-68	12-1-68		
4. Mission description, objectives, constraints	R-AERO-DA	3	"	"		
5. Targeting conditions	R-AERO-DA	5	"	"		
6. Launch pad number and coordinates	R-AERO-DA	4	"	"		
7. Iterative Guidance Mode (IGM) guidance equations.	R-AERO-DA	5	"	"		
8. Navigation and targeting update requirements	R-AERO-DA	6	"	"		
9. Variable Launch Azimuth Equations	R-AERO-FM	Memo	"	"		
10. Sequence, time bases and backups, discreties, interrupts	R-AERO-DA	5	"	"		
11. Antenna switching requirements	R-ASTR-EA	7	"	"		
12. Orbital hardware evaluation program requirements	R-ASTR-I	Memo	5-30-68	12-15-68		
13. Ground test requirements (pseudo flight and flight simulation requirements)	R-ASTR-ND	Memo	"	"		
14. Control gains and limits	R-ASTR-ND	Memo	"	"		
15. M/F filter definition	R-ASTR-NF	Memo	5-16-68	12-1-68		
16. Instrumentation backup requirements	R-ASTR-NF	Memo	5-30-68	12-15-68		
17. Navigation equations	R-ASTR-NG	Memo	5-16-68	12-1-68		
18. Telemetry requirements other than MCC's	R-ASTR-NG	Memo	"	"		
19. Venting data (time, duration, direction, magnitude)	R-ASTR-NG	Memo	5-30-68	12-15-68		
20. Vehicle configuration description	R-P&VE-P	Memo	5-16-68	12-1-68		
	R-P&VE-P	Memo	"	"		

SATURN V DATA SCHEDULE

R-ASTR-NG, 26 Sep 1966

DATA	SOURCE		VEHICLE			
	ORGANIZATION	DOCUMENT	515		Scheduled Date 1	Required Date 2
<u>MISSION DEFINING DOCUMENT DATA (cont)</u>						
B. Preliminary Data (Updates scheduled - reference and operational data)						
1. Constants for Variable Launch Azimuth	R-AERO-DA	5	5-16-68	12-1-68		
2. Propellant utilization (thrust and mass flow curves and mixture ratio shift times and tolerances)	R-AERO-DA	5	"	"		
3. Time tilt program	R-AERO-DA	5	"	"		
4. IGM guidance presettings	R-AERO-DA	5	"	"		
5. Mission vehicle attitude time lines	R-AERO-DA	3	"	"		
6. Abort and alternate mission routines	R-AERO-DA	8	"	"		
<u>FINAL MDD DATA</u>						
A. Reference or Operational Data						
1. Variable Launch Azimuth final coefficients	R-AERO-FM	9	12-30-68	7-15-69		
2. Propellant utilization final values	R-AERO-FM	9	"	"		
3. Time tilt program final parameters	R-AERO-FM	9	"	"		
4. IGM guidance and targeting final presettings	R-AERO-FM	9	"	"		
5. Attitude maneuvers, final magnitudes	R-AERO-FM	Memo	"	"		
6. Abort and alternate mission, final parameters	R-AERO-FM	10	"	"		

- Notes:
1. The scheduled date shown is from the existing contract.
 2. The required date shown is based on launch date.
 3. Joint Preliminary Mission Constraints.
 4. Joint Launch Vehicle Targeting Document.
 5. Joint preliminary Reference Trajectory.
 6. Launch Vehicle Guidance Equations.
 7. Definition of Saturn ... Flight Sequence Program.
 8. Preliminary Alternate Mission and Abort Plan.
 9. Operational Reference Trajectory.
 10. Joint Alternate Mission and Abort Plan.