LMSC-B 165-81
(Enclosure to LMSC-A [redacted]

ENCLOSURE 1

3 August 1965

FTV 1618 MISSION PROFILE AND VEHICLE INFORMATION (U)

MISSION PROFILE

Improved Thor Booster LV-2A S/N 449, Agena Vehicle SSOL-B, S/N 1618, will be an afternoon launch from Point Arguello Complex No. 1, Pad 1. The Booster is an improved Thor with a 56 second bottle drop.

The following nominal orbit parameters and nominal mission profile were agreed upon at the FTV 1618 Operations Review Meeting at Sunnyvale, California on 8/3/65 by [redacted] of USAF [redacted] of SSOTP-1 of Det. 1, AF SCF, and LMSC representatives.

Nominal orbit parameters for Mission #318, 1618 primary, Pass 1, are as follows:

1.	Inclination Angle	-	70°
2.	Perigee	-	100 N.M.
3.	Apogee	-	226.7 N.M.
4.	Orbital Period	-	90.90 Min. (5489.97 Secs)
5.	Injection Latitude	-	22.28° N
6.	Injection Longitude	-	115.93° W
7.	Perigee Latitude	-	Inj.
8.	Eccentricity	-	.0176
9.	Regression Rate	-	22.87°/Rev
10.	Longitude of Ascending Node	-	59.62° E

FTV 1618 is a dual recovery vehicle. FTV 1618's nominal mission profile (for orbital programming purposes) is as follows:

1. Five days stable orbit operation.
2. Recovery #1 (pass 81)
3. Deactivate capability - ~~0-7 days programmed~~
4. Four days stable orbit operation
5. Recovery #2 (pass 144)
6. Two days stable orbit operation for orbit adjust system (O.A.S.)

   a. Fire ullage rocket #1 on pass 145 at Perigee (Quadrant #2) - add energy to the orbit, [redacted] send O.A.S. enable (KIK ZEKE 34 or 35) on Pass 144 after verification of capsule #2 separation.

(continued)

[redacted]

SECRET

b. Fire ullage rocket #2 on pass 152 at apogee (Quadrant #4) - add energy to the orbit - [redacted] send O.A.S. Enable (KIK ZEKE 34 or 35) on pass 152.

c. Fire Ullage rocket #3 on pass 159 at mid-point between apogee and perigee (Quadrant 3) - add energy to the orbit, [redacted] send O.A.S. Enable (KIK ZEKE 34 or 35) on pass 159.

d. Fire ullage rocket #4 on pass 169 at perigee (Quadrant 2) - add energy to the orbit. [redacted] send O.A.S. Enable (KIK ZEKE 34 or 35) on pass 169.

FTV 1618 has Deactivate/Reactivate capability, however, it is not planned to be exercised because of the O.A.S. experiment.

Drag life prediction for this vehicle is 22 days, based on a 10 day stable mission (without rocket firings).

The objectives of the post recovery phase of this flight are the demonstration of the vehicle O.A.S. system and the operational software compatability. Nominal rocket firings have been planned to occur during periods away from station acquisitions in order to emphasize the build-up of system tolerances over extended periods. (The incorporation of [redacted] Tracking Station will considerably reduce this tolerance build-up.)

During the O.A.S. test phase the SCF is to generate an ephemeris 4 hours prior to each boost phase. This ephemeris is to include 2 passes prior to and 8 passes after the firing (and to include the next scheduled rocket firing where appropriate).

[redacted] tapes will be required for the O.A.S. test phase as an APF evaluation will be made of the SCF predictions vs. observed tracking data.

IMPACT PREDICTIONS

FTV 1618 Impact Predictions are as follows:

a. Nominal Impact N ——> S 24 Degrees North

Day	Impact Rev	Degrees West Longitude	*ETPD
1	17	144.90	25:45
	18	168.05	27:16
2	33	151.09	49:52
3	49	156.50	74:02
4	65	162.26	98:05
5	81	167.64	122:12
6	96	172.99	146:18
7	112	155.38	168:52
8	128	160.48	192:56
9	144	165.44	217:01

b. Emergency Nominal Impact S ——> N 18 Degrees North

Day	Impact Rev	Degrees West Longitude	*ETPD
1	10	140.66	14:38
	11	163.53	16:09
2	26	145.90	38:48
3	42	192.16	62:52
4	58	157.70	87:03
5	74	173.92	112:36
6	89	145.77	133:41
7	105	151.04	157:48
8	121	156.20	181:19
9	137	161:37	205:09
10	153	166.01	229:54

*ETPD is in hours and minutes after launch time.

Additional information for recovery force planning is as follows:

Day	Nominal Impact Rev	Degrees Longitude	Degrees Latitude
1	18	165.81 W	17.38 N
		163.32 W	09.62 N
		158.67 W	05.92 S
2	33	149.85 W	20.74 N
		144.88 W	05.23 N
		142.57 W	02.54 S

VEHICLE CONFIGURATION

Payloads structures configuration is a 50-inch diameter type 7; electrical configuration is a type 6 (see LMSC-A386369 [redacted] System Design Requirements & Revisions). Vehicle configuration includes two recovery capsules, and telemetry links 1 and 2.

The Type 3B S-band beacon will be installed on FTV's 1616-1623. The 120 second timer is incorporated within the S-band transponder box on the 3B S-band beacon.

On FTV's 1616-1623, H-timer brush 3 will be removed as a backup for the S-band beacon 120 second timer. The H-timer brush 3 beacon transmitter on backup circuitry produced the possibility of beacon cold starts while pre-flight testing the vehicle.

FTV 1618 will have a redundant type IX DC/DC converter. The redundant type IX DC/DC converter will be in parallel with the present type IX DC/DC converter and will be diode isolated from it; therefore, both converters will be on line and operating at the same time.

The Mod IIC horizon sensor will be installed on FTV's 1613-1623. Motor scan rate of the Mod IIC horizon sensor is 21 revolutions per second.

On FTV's 1613-1623, the 400 cps 3-phase Type X inverter and the two 400 cps 1-phase Type 1A inverters are being replaced by two 400 cps 3-phase and 1-phase type XIIA inverters. On previous vehicles only the 400 cps 1-phase was backed up by a redundant inverter. On FTV's 1613-1623, both the 400 cps 3-phase and 1-phase are backed up.

On FTV's 1616-1623, 1610, and 1625 and up, the recovery timer reset circuitry has been modified to prevent an inadvertent recovery program from occurring. A latching relay has been added to disable the recovery timer start brush circuitry (brushes 7, 8, 9, and 10) after the recovery timer has started. This latching relay is closed by a KIK ZORRO 36 or 37 command and opened as follows:

FTV's 1616-1623, 1610	FTV's 1625 and up
Event T_0 of the Auxiliary Recovery Timer (Recovery Timer Start)	Event T_0 of the Auxiliary Recovery Timer (X + 6 Seconds)

Measurement H-201 (Re-entry Select) will be a 4 level monitor (previously it was 2 level) for the above vehicles, and will indicate (1) which recovery timer start brushes have been selected, and (2) whether the recovery timer start brushes are enabled or disabled.

Orbital Adjust System (O.A.S.)

The O.A.S. experiment will be flown on FTV 1618 after the primary mission has been completed, and will be a test of operational system capability. The primary purpose of the O.A.S. system is to provide a long life capability for low orbital period vehicles. Four ullage rockets will be mounted on brackets located on the aft rack and will be oriented to fire in the same direction the main Agena engine fires. The four ullage rockets will be fired separately - each firing should be at least 7 passes apart. (See Mission Profile for Nominal Rocket Firings)

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The O.A.S. sequence of events is as follows:

1. KIK-ZEKE 34 or 35 Enables H-timer brushes 24 and 25.
2. Brush 24 does the following:
   a. Removes + 4°/min pitch program
   b. Initiates -36°/min pitch program
   c. Selects next rocket
3. ~~4.5~~ 4.35 minutes after H-timer brush 24, H-timer brush 25 fires selected rocket.
4. ~~4.5~~ 4.65 minutes after H-timer brush 25, H-timer brush 26 does the following:
   a. Removes -36°/min. pitch program
   b. Initiates +4°/min. pitch program
   c. Disables H-timer brushes 24 and 25.

The following information is for SCF ephemeris determination for each individual rocket:

1.	Ullage rocket	-	(1)
2.	Thrust	-	136 lbs
3.	Duration of firing	-	16.6 seconds
4.	Fuel Flow	-	.536 PPS
5.	Δ V	-	~~24.7~~ 24.7 ft/sec
6.	Impulse	-	2250 lb. sec.
7.	Vehicle weight prior to #1 firing	-	2863 LBS.

*Based on 5 1C batteries (total vehicle weight is 3746 lbs). Weight of the vehicle just prior to ullage #1 firing is 2929 lbs.

A single breakwire has been installed in the exhaust stream of each ullage rocket to give indication that the rocket has fired. These breakwires will be on the RF tape recorder.

4.65
36
2790
1395
4185

500
36

The breakwire monitors are as follows:

Measurement	Meas. No.	Real Time CE-LK-FOS	Tape Recorded CE-LK-FOS	Prior to Fire	Post Fire
Rocket Breakwire #1	RP 114	17-1-32 10-2-23 10-2-48	18-2-23 18-2-48	*3.0 Volts	*4.5 Volts
Rocket Breakwire #2	RP 113	17-1-25 10-2-25 10-2-50	18-2-25 18-2-50	*3.0 Volts	*4.5 Volts
Rocket Breakwire #3	RP 102	8-1-4 10-2-27 10-2-52	18-2-27 10-2-52	*3.0 Volts	*4.5 Volts
Rocket Breakwire #4	RP 108	8-1-16 10-2-29 10-2-54	18-2-29 18-2-54	*3.0 Volts	*4.5 Volts

*Based on 25 volts battery buss voltage

RP 204, O.A.S. Enable/Disable Monitor, (15-1-31) steps from 80% to 80% when KIK ZEKE 34 or 35 is sent.

O.A.S. E-timer brushes 24, 25, and 26 will be programmed from subcycles 145 to 200. The following table indicates how these brushes will be programmed:

S/C	Br 24, 25, & 26
145	Quad. 2 Perigee
146	Quad. 4 Apogee
147	Quad. 3 Semi-Minor Axis
148	Quad. 2 Perigee
149	Quad. 4 Apogee
150	Quad. 3 Semi-Minor Axis

The above sequence of perigee, apogee, and semi-minor axis (mid-point between apogee and perigee) is repeated on out to subcycle 200. This insures operational flexibility in O.A.S. firing in that if on orbit power consumption is greater than expected, the O.A.S. experiment could be executed in one days time, or 1 rocket firing every 4 orbits. The nominal mission profile of two days for O.A.S. firing, however, will give the SCF a better ephemeris determination between rocket firings, and should be followed if adequate vehicle power is available for two days of stable vehicle operation on orbit.

PAYLOAD CONFIGURATION

Payload configuration includes the following:

1. Advanced Payload (2 capsules)
2. RP Payload consisting of:
   a. Tape Recorder
   b. Telemetry Link 2
   c. [redacted] Experiment

COMMAND CONFIGURATION

FTV 1618 command structure is as follows:

S-Band Unsecure	S-Band Beacon Unsecure Command Function
Analog 1	Increase/Decrease
2	Timer 10 Sec Step
3	Timer Reset
4	Re-entry Pass Select (SPC-10)
5	Re-entry Pass Select (SPC-9)
6	AP Command
7	Timer One-Sec Step
8	AP Command
9	AP Command
10	AP Command
11	AP Command
12	AP Command
13	Deactivate Vehicle
14	Inverter Control
15	AP Command

S-Band Secure	S-Band Beacon Secure Command Function
KIK-ZORRO 36	Recovery Enable
KIK-ZORRO 37	Recovery Enable

ZEKE-Secure	ZEKE-Secure Command Function
KIK-ZEKE 31	Lifeboat Execute
KIK-ZEKE 32	S-Band On (U-6 through U-10 enable)
KIK-ZEKE 33	Lifeboat Execute
KIK-ZEKE 34	Reactivate Vehicle; Enables H-Timer Br.24 & 25 for *O.A.S.
KIK-ZEKE 35	Reactivate Vehicle; Enables H-Timer Br. 24 & 25 for *O.A.S.

*Orbit Adjust System

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ZEKE-Unsecure	Address Signal No.	Command No.	Zeke Unsecure Command Function
U-1	Zeke 21	Zeke 26	Lifeboat (LBMO)
U-2	Zeke 21	Zeke 22	Lifeboat (DTMO)
U-3	Zeke 21	Zeke 23	Lifeboat (LBPC)
U-4	Zeke 21	Zeke 24	S-Band Transmitter Disable/Enable
U-5	Zeke 21	Zeke 25	Increase/Decrease
U-6	Zeke 25	Zeke 21	Timer Reset
U-7	Zeke 25	Zeke 22	AP Command 12
U-8	Zeke 25	Zeke 23	AP Command 15
U-9	Zeke 25	Zeke 24	AP Command 9
U-10	Zeke 25	Zeke 26	Timer 10 Sec Step

ORBITAL PROGRAMMING

The type VIII orbital programmer will be programmed for 200 subcycles.

RANGE & STATION SUPPORT

Tracking Station support will be required of the following SCF stations during the flight of FTV 1618:

[redacted]

AMF handling of station recordings is required for:

Pass 1 [redacted] 2 [redacted] Recovery #1 [redacted] & Recovery #2 [redacted]

*If [redacted] sees Recovery.

A downrange T/M aircraft will be required during FTV 1618's launch to record Link 1 telemetry. The purpose of the T/M aircraft will be to overlap [redacted] a minimum of 30 seconds and record Link 1 telemetry out to launch + 620 seconds (engine cutoff + 204 seconds) to observe engine tailoff and propellant dump characteristics. Nominal vehicle location at L + 620 seconds is as follows:

Latitude	9.12° N
Longitude	111.60° W
Altitude	100.56 NM

SPECIAL INFORMATION

A. S-Band beacon code setting is code 5 for FTV 1618.
B. Retro pitch-down angle is -60°.
C. Type VIII orbital programmer information will be available at a later date.

ENCLOSURE 2

[redacted]

3 August 1965

FTV 1618 TELEMETRY SUPPORT REQUIREMENTS

Telemetry Support Requirements, FTV 1609-1623, [redacted] dated 5/19/65, Revision A dated 12/11/64, Revision B, dated 2/8/65, and Revision C dated 3/25/65, with the following revisions will constitute the telemetry support requirements for FTV 1618.

Set No.	Comments	Meas.	CH-IX POS	CH-IX-Pos	Measurement Name	Report Freq	Amplitude Change Increment	Time Res (Sec)	Class	Flight Phase
.	Was	C1	16-1-40	8-2-16	+28 VDC Unregulated Supply	A-C-F	2%	1.0	1,4	L,O,R
	Is	C1	16-1-40	8-2-22	+28 VDC Unregulated Supply	A-C-F	2%	1.0	1,4	L,O,R
.	Delete	C6	17-1-47		Pyro Mode Monitor	A-C-F	5%	1.0	2	R
?	Was	C130	16-1-50	8-2-22	Amp Hour Meter Monitor #1	A-C-F	15%	1.0	2,4	O,R
	Is	C130	16-1-50	8-2-16	Amp Hour Meter Monitor #1	A-C-F	15%	1.0	2,4	O,R
?	Delete	C142	16-1-37		Pyro Current Monitor	A-C-F	2%	1.0	2	O
?	Add	C322	15-1-16		No.2 Type IX DC/DC Converter + Voltage	A-C-F	5%	1.0	2	O
?	Add	C323	15-1-32		No.2 Type IX DC/DC Converter + - Voltage	A-C-F	5%	1.0	2	O
?	Add	C324	15-1-56		No.1 Type IX DC/DC Converter + Voltage	A-C-F	5%	1.0	2	O
?	Add	C325	15-1-53		No. 1 Type IX DC/DC Converter + - Voltage	A-C-F	5%	1.0	2	O
.	Was	D73	16-1-35, 41		Pitch Torque Rate	32 Sec	2%	1.0	1	R
	Is	D73	16-1-35		Pitch Torque Rate	32 Sec	2%	1.0	1	R
.	Was	D160	14-1-00		Horizon Sensor Right Head Preamp				5	O(#4)
	Is	D191	14-1-00		Horizon Sensor Head Preamp Outputs				5	O(#4)
.	Delete	D161	14-1-00		Horizon Sensor Left Head Preamp				5	O(#4)
.	Was	H62	17-1-12		Telemeter Trans Temp	A-C-F	5%	1.0	5	O
	Is	C321	17-1-12		No. 2 Type IX DC/DC Converter Temperature	A-C-F	3%	1.0	2	O

Sheet No.	Comments	Meas.	CH-LK POS	CH-LK POS	Measurement Name	Report Freq	Amplitude Change Increment	Time Res (Sec)	Class	Flight Phase
7	Was	AP237	13-1-12	8-2-44	AP RTC 10 Selector Pos	A-C-F	10%	1.0	2,4	0,R(*5)
	Is	AP237	13-1-11	8-2-44	AP RTC 10 Selector Pos	A-C-F	10%	1.0	2,4	0,R(*5)
7	Was	AP238	13-1-13	8-2-45	AP RTC 10 Selector Pos	A-C-F	10%	1.0	2,4	0,R(*5)
	Is	AP238	13-1-12	8-2-45	AP RTC 10 Selector Pos	A-C-F	10%	1.0	2,4	0,R(*5)
7	Was	AP239	13-1-15	8-2-48	AP RTC 11 Selector Pos	A-C-F	10%	1.0	2,4	0,R(*5)
	Is	AP239	13-1-14	8-2-48	AP RTC 11 Selector Pos	A-C-F	10%	1.0	2,4	0,R(*5)
7	Was	AP240	13-1-16	8-2-50	AP RTC 11 Selector Pos	A-C-F	10%	1.0	2,4	0,R(*5)
	Is	AP240	13-1-15	8-2-50	AP RTC 11 Selector Pos	A-C-F	10%	1.0	2,4	0,R(*5)
7	Was	AP241	13-1-18	8-2-52	AP RTC 12 Selector Pos	A-C-F	10%	1.0	2,4	0,R(*5)
	Is	AP241	13-1-17	8-2-52	AP RTC 12 Selector Pos	A-C-F	10%	1.0	2,4	0,R(*5)
7	Was	AP242	13-1-19	8-2-53	AP RTC 12 Selector Pos	A-C-F	10%	1.0	2,4	0,R(*5)
	Is	AP242	13-1-18	8-2-53	AP RTC 12 Selector Pos	A-C-F	10%	1.0	2,4	0,R(*5)
8	Add	AP1310	13-1-10		AP	A-C-F	2%	1.0	2	R(*9)
8	Was	AP1325	13-1-25		AP	A-C-F	2%	1.0	2	0,R(*7)
	Is	AP1325	13-1-25		AP	A-C-F	2%	1.0	2	0,R(*6)
8	Was	AP1331	13-1-31		AP	A-C-F	2%	1.0	2	0,R(*7)
	Is	AP1331	13-1-31		AP	A-C-F	2%	1.0	2	0,R(*6)
8	Add	AP1332	13-1-32		AP	A-C-F	2%	1.0	2	0(*8)
8	Was	AP1333	13-1-33		AP	A-C-F	2%	1.0	2	0(*8)
	Is	AP1333	13-1-33		AP	A-C-F	2%	1.0	2	R(*9)
9	Add	AP1334	13-1-34		AP	A-C-F	2%	1.0	2	0(*)
9	Delete	AP1338	13-1-38		AP	A-C-F	2%	1.0	2	R(*9)

*Orbit Phase
(a) Best acq. on each pass, [redacted]

Sheet No.	Comments	Meas.	CH-LK POS	CH-LK POS	Measurement Name	Report Freq.	Amplitude Change Increment	Time Res (Sec)	Class	Flight Phase
9	Add	AP1339	13-1-39		AP	A-C-F	2%	1.0	2	R(*9)
9	Add	AP1340	13-1-40		AP	A-C-F	2%	1.0	2	R(*9)
9	Add	AP1341	13-1-41		AP	A-C-F	2%	1.0	2	R(*9)
9	Add	AP1342	13-1-42		AP	A-C-F	2%	1.0	2	O(*8)
9	Was	AP1343	13-1-43		AP	A-C-F	2%	1.0	2	O(*8)
	Is	AP1343	13-1-43		AP	A-C-F	2%	1.0	2	R(*9)
9	Add	AP1344	13-1-44		AP	A-C-F	2%	1.0	2	R(*9)
9	Add	AP1346	13-1-46		AP	A-C-F	2%	1.0	2	R(*9)
9	Delete	AP1347	13-1-47		AP	A-C-F	2%	1.0	2	R(*9)
9	Delete	AP1348	13-1-48		AP	A-C-F	2%	1.0	2	R(*9)
9	Delete	AP1349	13-1-49		AP	A-C-F	2%	1.0	2	R(*9)
9	Add	AP1350	13-1-50		AP	A-C-F	2%	1.0	2	R(*9)
9	Delete	AP1351	13-1-51		AP	A-C-F	2%	1.0	2	R(*9)
9	Delete	AP1352	13-1-52		AP	A-C-F	2%	1.0	2	R(*9)
9	Delete	AP1353	13-1-53		AP	A-C-F	2%	1.0	2	R(*9)
9	Delete	AP1354	13-1-54		AP	A-C-F	2%	1.0	2	R(*9)
9	Delete	AP1355	13-1-55		AP	A-C-F	2%	1.0	2	R(*9)
9	Add	AP1356	13-1-56		AP	A-C-F	2%	1.0	2	R(*9)
9	Delete	RP112	17-1-17		R/I, R/O EOT	A-C-F	10%	1.0	5	O(*11)
	Add	RP114	17-1-32	10-2-23 10-2-48	Ullage Rocket Breakwire #1	A-C-F	10%	1.0	3,4	O
0	Add	RP113	17-1-25	10-2-25 10-2-50	Ullage Rocket Breakwire #2	A-C-F	10%	1.0	3,4	O
0	Add	RP102	8-1-4	10-2-27 10-2-52	Ullage Rocket Breakwire #3	A-C-F	10%	1.0	3,4	O
0	Add	RP108	8-1-16	10-2-29 10-2-54	Ullage Rocket Breakwire #4	A-C-F	10%	1.0	3,4	O
0	Add	RP204	15-1-31		O.A.S. Enable/Disable	A-C-F	10%	1.0	3	O
0	Add	RP205	15-1-38		O.A.S. Pyro Enable	A-C-F	10%	1.0	3	O

Telemetry Link 2, commutated channel 8 (link 1 back-up) should be checked twice/day to insure that usable data is being obtained on the link 1 back-up in the event of a link 1 failure.

SPECIAL T/M SUPPORT REQUIREMENTS

1. The STC Ground Station should provide an analogue record of link 2, channels 10, 14, 18, and F (paper speed of 1"/sec) for all [redacted] passes (to include ascent). A one inch galvo deflection should be used on link 2, channels 14, 18, & F; a two inch galvo deflection should be used on link 2, channel 10. The link 2, channel F galvo should be capable of a sample speed of approximately 2000 S.P.S. The link 2, channel 18 galvo should be capable of a sample speed of approximately 700 S.P.S. These analogue records should be delivered to the TA Room 139 in the STC, Attention: [redacted] Sunnyvale, California.

2. [redacted] Recovery Revs only (if seen by [redacted]), report by voice in real time, capsule channel 7 and 9, percent band width and system time at fade.

3. [redacted] Rev 1 only, report by voice real time, modulation (C.W.T.) on and off times of link 2, channel 18.