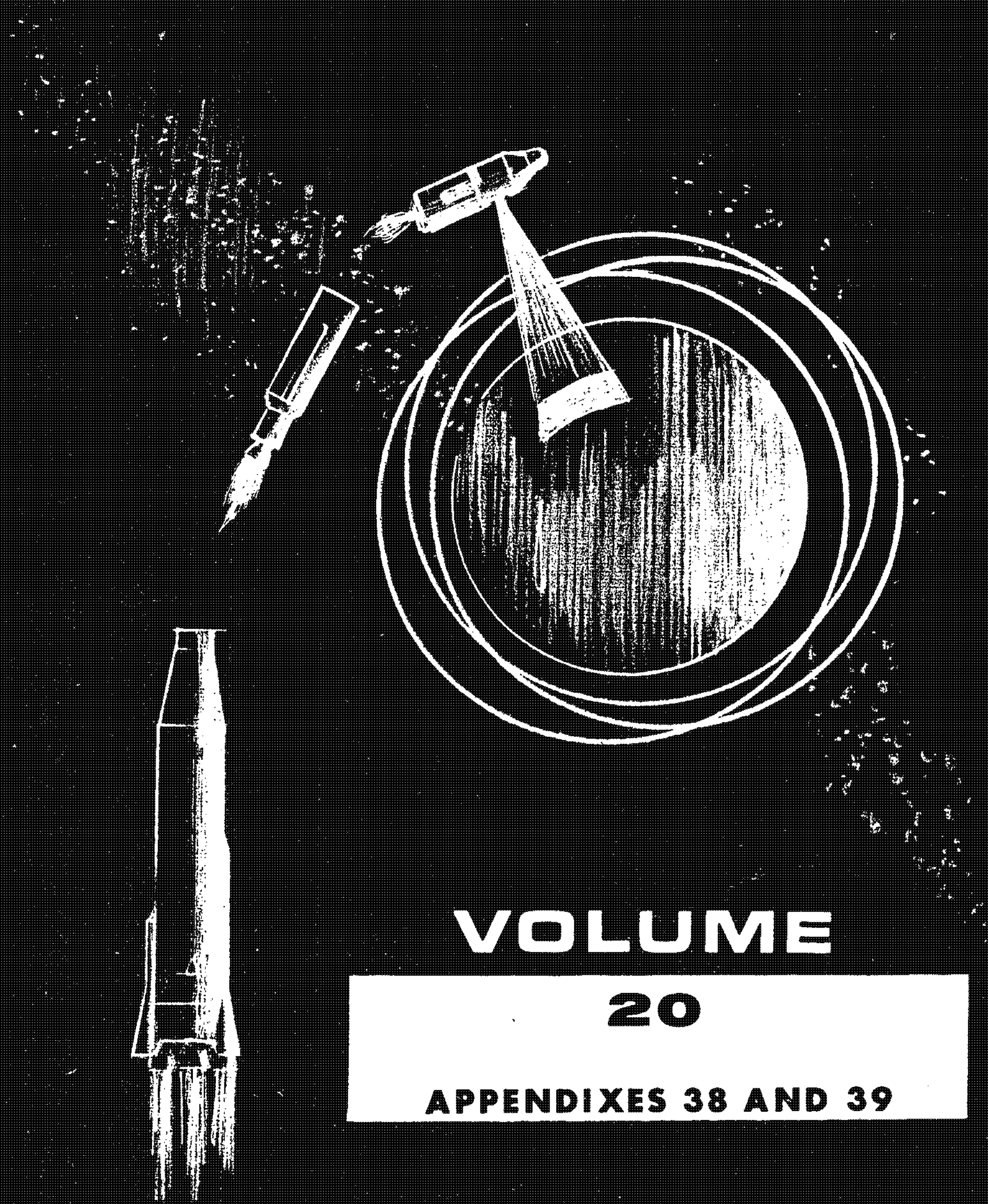
206

PROGRAM REPORT



VOLUME

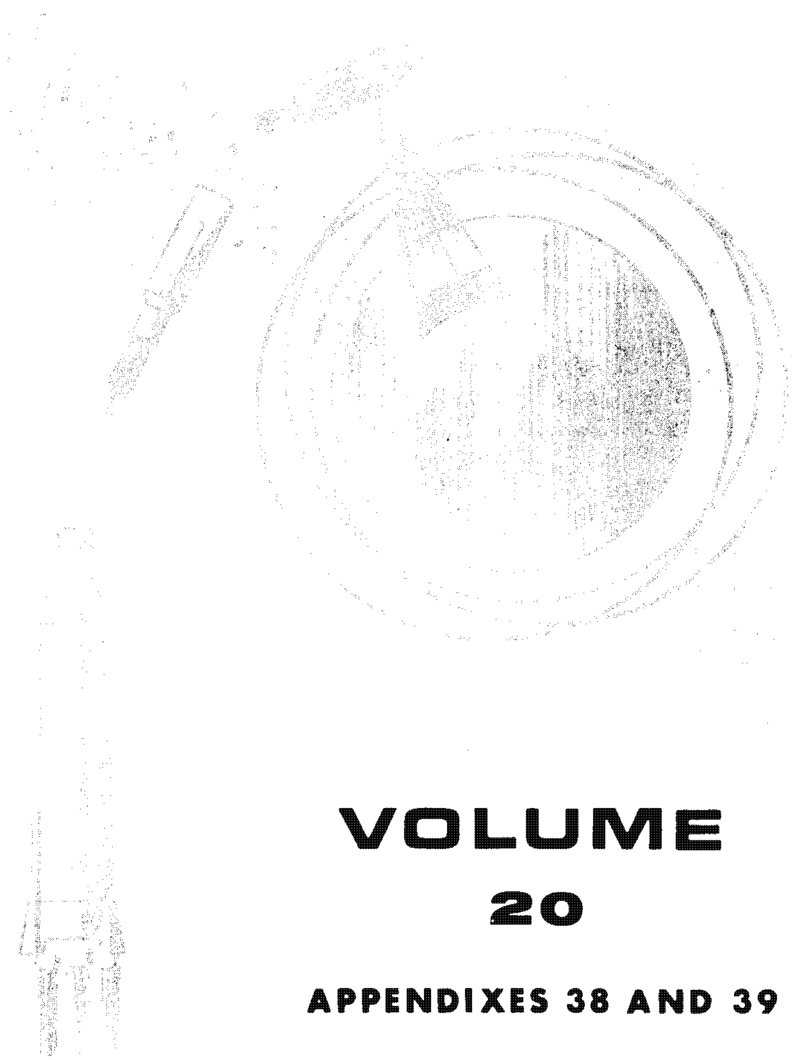
20

APPENDIXES 38 AND 39

THIS DOCUMENT CONTAINS 395 PAGES
NOVEMBER 1967

206

PROGRAM REPORT



VOLUME
20

APPENDIXES 38 AND 39

CONTENTS

APPENDIX 38

TEST OPERATIONS ORDER 63-7

(U) TEST OPERATIONS ORDER 63-7

5 JULY 1963

6594TH AEROSPACE TEST WING

AIR FORCE SYSTEMS COMMAND USAF

SUNNYVALE · · · CALIFORNIA

LIST OF EFFECTIVE PAGES

This document contains 388 pages, consisting of the following:

HEADQUARTERS
Air Force Satellite Control Facility
Air Force Systems Command
United States Air Force
Sunnyvale, California 94086

6 May 1966

TEST OPERATIONS ORDER NO. 63-7

TASK ORGANIZATIONS

Directorate of Test Operations
Hq. Air Force Satellite Control Facility (AFSCF)
Sunnyvale, California 94086

Air Force Satellite Control Facility OL 2 (KTS)
P. O. Box 2577
Kodiak, Alaska 99615

Air Force Satellite Control Facility OL 5
APO New York 09023

Air Force Satellite Control Facility OL 10 (GTS)
APO San Francisco 96334

6594th Test Group (HTG)
APO San Francisco 96553

6593rd Instrumentation Squadron (HTS)
APO San Francisco 96553

6594th Instrumentation Squadron (NHS)
Grenier Field
Manchester Municipal Airport, New Hampshire 03103

6596th Instrumentation Squadron (VTS)
Vandenberg AFB, California 93437

6593rd Test Squadron
APO San Francisco 96553

Detachment 51, 4th Weather Group (SSOTW)
Sunnyvale, California 94086

SUPPORT AGENCIES

6595th Aerospace Test Wing
Vandenberg AFB, California 93437

Air Force Western Test Range
Vandenberg AFB, California 93437

1. GENERAL SITUATION

1.1 Program Identification

Program 206 is a satellite system designed for achievement of an accurate orbit with precision re-entry and aerial/water recovery capability. Re-entry vehicles will be recovered in the Hawaiian Recovery Area.

Program 206 Configuration I satellite vehicles are launched from Vandenberg AFB, California (PALC II, Pad 4) into circular near-polar orbits having the following parameters:

Altitude	75 to 400 nautical miles
Period	87.5 to 89 minutes
Inclination	80 to 130 degrees
Eccentricity	0 to 0.045

The vehicle system configuration is comprised of the Atlas (SLV-3A) first stage booster, the Agena (S01-B) second stage, and the Satellite Vehicle (SV). Components of the SV are discussed in Annex B, Appendix 2.

Nominal orbital lifetime for each vehicle is five days. However, Vehicle 097? (Flight No. 23) and subsequent vehicles will be provided with six batteries allowing extension to six-day operation.

Support for Program 206 Configuration I will be provided by the augmented SCF station configuration at the following facilities: VTS, HTS, KTS, NHS, OL-5, and OL-10.

Although not a part of Program 206, on selected flights, a secondary payload will be injected as a separate satellite by the Agena 206/S01-B vehicle following separation of the Orbital Control Vehicle (OCV) from the Agena. The SCF support given to the secondary payload will be on a non-interference basis with the support of Program 206.

Priorities for the 206 program have been established as follows:

USAF	Priority 1A
USAF	Precedence 1-1
DOD	Priority DO

2. MISSION

2.1 Primary Objectives

Primary objectives are:

a. Boost Phase. To demonstrate the capability of the Atlas D/ Agena D to boost the Satellite Vehicle (SV) into the required nearly cricular polar orbit.

b. Orbital Phase. To demonstrate the capability of the SV to maintain precise control of the orbit by providing orbit adjust velocity increments at appropriate times.

c. Recovery Phase. To (1) demonstrate the capability of the SV to carry out a precise deboost maneuver, (2) demonstrate the capability of the Re-entry Vehicle (RV) to achieve an accurate impact at a preselected area, (3) recover the RV using aerial recovery techniques, and (4) recover the RV by any suitable means.

2.2 Support Documents

A comprehensive description of program objectives, operational requirements and technical operations is available in the following program documents.

Title	Originator/Document Control No.
System Test Plan Program 206-I	[redacted]/Aerospace Corp. TOR-169 (3123-3)
Program Requirements Document Program 206-I (7100)	[redacted]/AFWTR WTLRS-65-003
Program 206-I Orbital Requirements Document	[redacted]/Aerospace Corp. TOR-469 (5101)-2
Orbital Support Plan Program 206-I	Aerospace Corporation Aerospace Satellite Control Office AS-65-0000-03887
System Test Objectives Program 206-I	[redacted]/Aerospace Corp. TOR-269 (4123)-19

3. TASKS FOR PARTICIPATING UNITS

3.1 Task Organizations

Task organizations will perform tasks as follows:

3.1.1 Hq, AFSCF (STC).

a. Prepare detailed Test Operation Orders for the conduct of launch, orbital, and recovery phases of this program

b. Maintain a liaison interface between the support elements of the SCF and the Air Force Program Office [redacted]

c. Control all orbital and recovery operations conducted within the SCF

d. Collect, reduce and analyze satellite data as necessary to maintain satellite control

e. Initiate all commands necessary for satellite control

f. Initiate re-entry events to impact the Re-entry Vehicle (RV) in a predetermined area

g. Evaluate the performance of the SCF in support of the test program

h. Prepare detailed Operations Requirements (OR) establishing requirements for AFWTR support of launch and recovery operations.

3.1.2 <u>Remote Stations</u>. VTS, HTS, KTS, NHS, OL-5, and OL-10 as remote stations providing support will:

a. Perform tracking functions

b. Transmit real-time and stored-program commands as directed by the STC Test Controller

c. Process, record and transmit tracking, telemetry and command data to the STC

d. Read out and report selected data to STC

e. Forward recorded data to the STC

f. In addition to the above:

(1) VTS will support 6595th ATW during prelaunch and launch operations.

(2) HTS will provide tracking and telemetry support during recovery operations when recovery pass is within station range capability.

(3) KTS will receive, record, and read out telemetry and tracking data from Re-entry Vehicle (RV) and will monitor the deorbit sequence.

3.1.3 6594th Test Group (HTG)

a. Operate the Recovery Control Center (RCC)

b. Direct and control aerial and surface recovery forces during recovery operations

c. Provide a Recovery Operations Plan and applicable Ops Orders

d. Provide necessary operating documentation and briefings for all recovery elements prior to each recovery mission.

3.1.4 6593rd Test Squadron (Special)

a. Provide recovery aircraft, helicopters, and crews as specified in the HTG OPlan and applicable Ops Order

b. Perform recovery functions as directed by the HTG

c. Provide a liaison officer to the HTG.

3.1.5 Fourth Weather Group. The Commander, 4th Weather Group through SSOTW (Det 51, 4th Weather Group), is responsible for developing plans and providing or arranging for the provision of all meteorological-geophysical services to satisfy system test requirements. Special meteorological-geophysical requirements such as solar activity forecasts, special weather reconnaissance, special aerial photographic and/or radiation measurement missions for weather purposes, rocket soundings and/or RAWINSONDE observations must be requested through SSOTW, Hq AFSCF.

The Staff Meteorologist (SSOTW) has assigned a Meteorological Project Officer (MPO) to Program 206-I. He will provide or arrange for all required meteorological-geophysical services. Any subsequent changes in requirements or documentation that require action and/or coordination must be referred to the proper MPO or the Staff Meteorologist.

3.2 Support Organizations

Support organizations will provide support as follows:

3.2.1 6595th Aerospace Test Wing - VAFB

a. Participate in certain prelaunch satellite and ground system equipment checkout, calibration, and rehearsal operations necessary to ensure equipment and personnel readiness

b. Conduct final countdown and launch operations in conformity with the countdown manual, under the direction of the Launch Controller (6595th ATW) and the SCF Test Controller

c. Order wind and weather soundings on launch days, monitor and analyze cross wind conditions in the launch area with reference to preflight limits, and determine if range safety boundary limits are likely to be exceeded.

3.2.2 AF Western Test Range - VAFB

a. Provide a downrange ship (DRS) for telemetry recording and readout, and surface recovery units (SRU) for recovery operations

b. Provide support for recovery operations, as directed, and in accordance with the HTG Recovery Operations Plan

c. Provide support as defined in the Program Requirements Document and Operations Requirements (OR 7100).

3.2.3 Space Defense Center. The Space Defense Center will provide tracking support upon request.

4. SPECIAL LOGISTICS

There is no requirement for special logistics on this program.

5. COMMAND AND SIGNAL

The operational structures for Program 206-I are shown in Figures 1, 2, and 3. The management lines are essentially the same as for other Air Force programs.

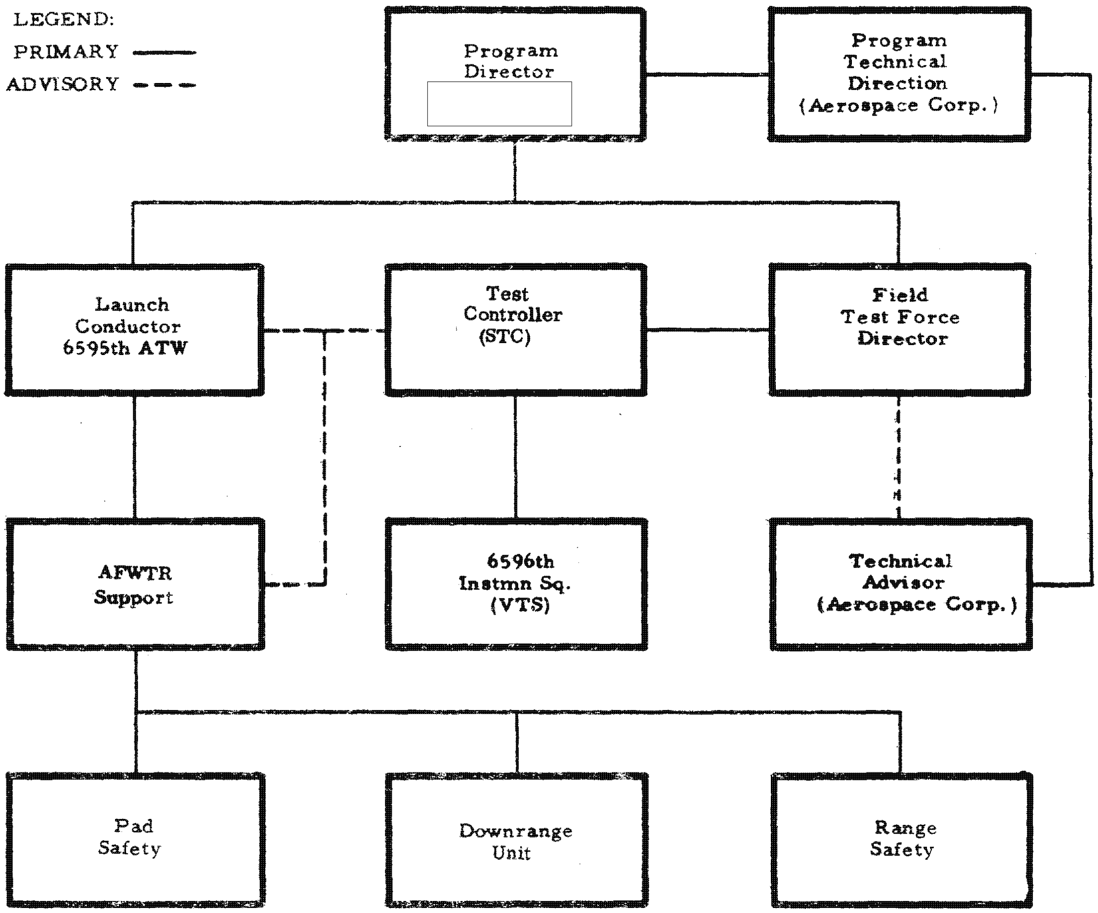


Figure 1. Operational Structure Prelaunch-Launch Phase

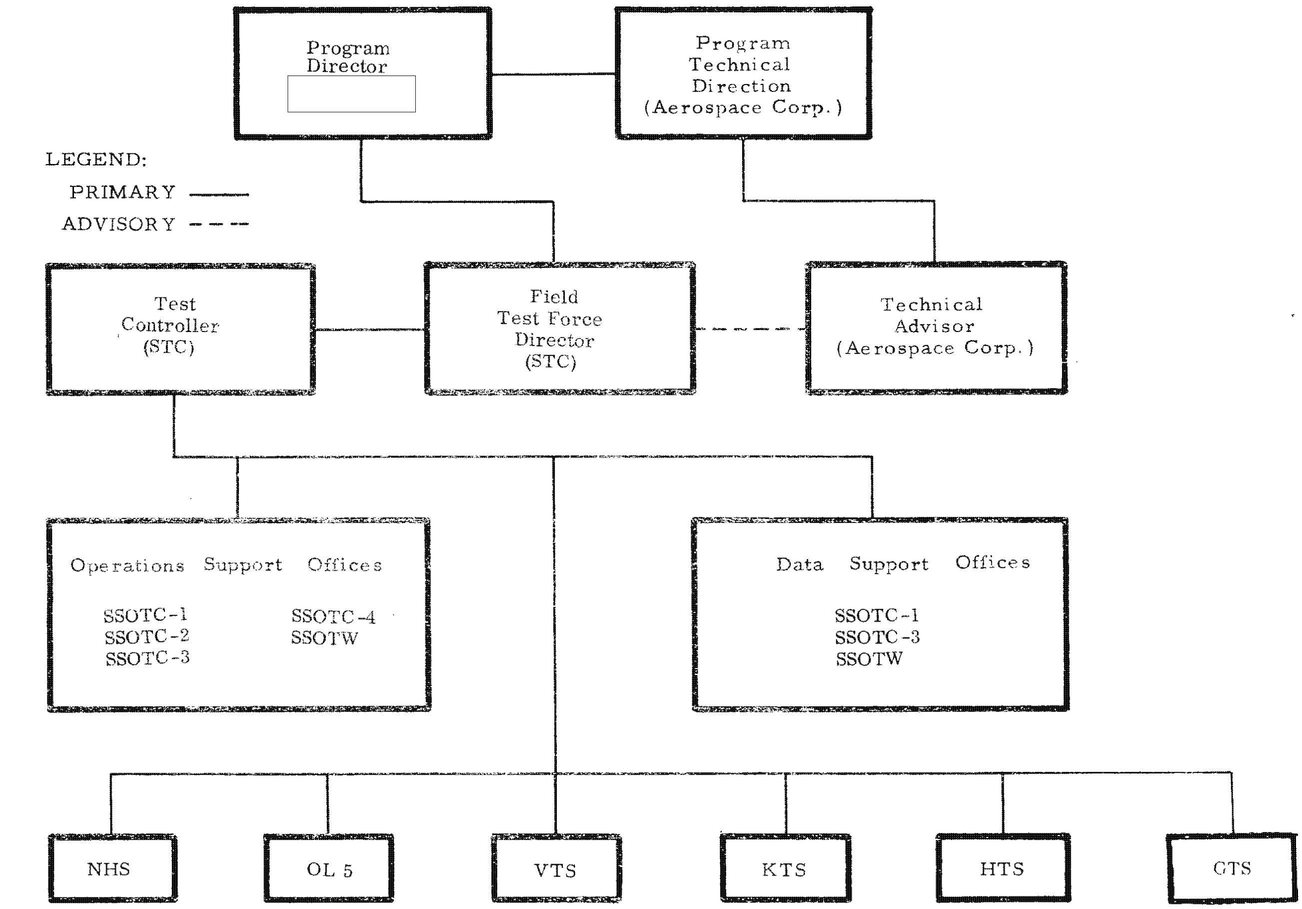


Figure 2 Operational Structure, Orbital Phase

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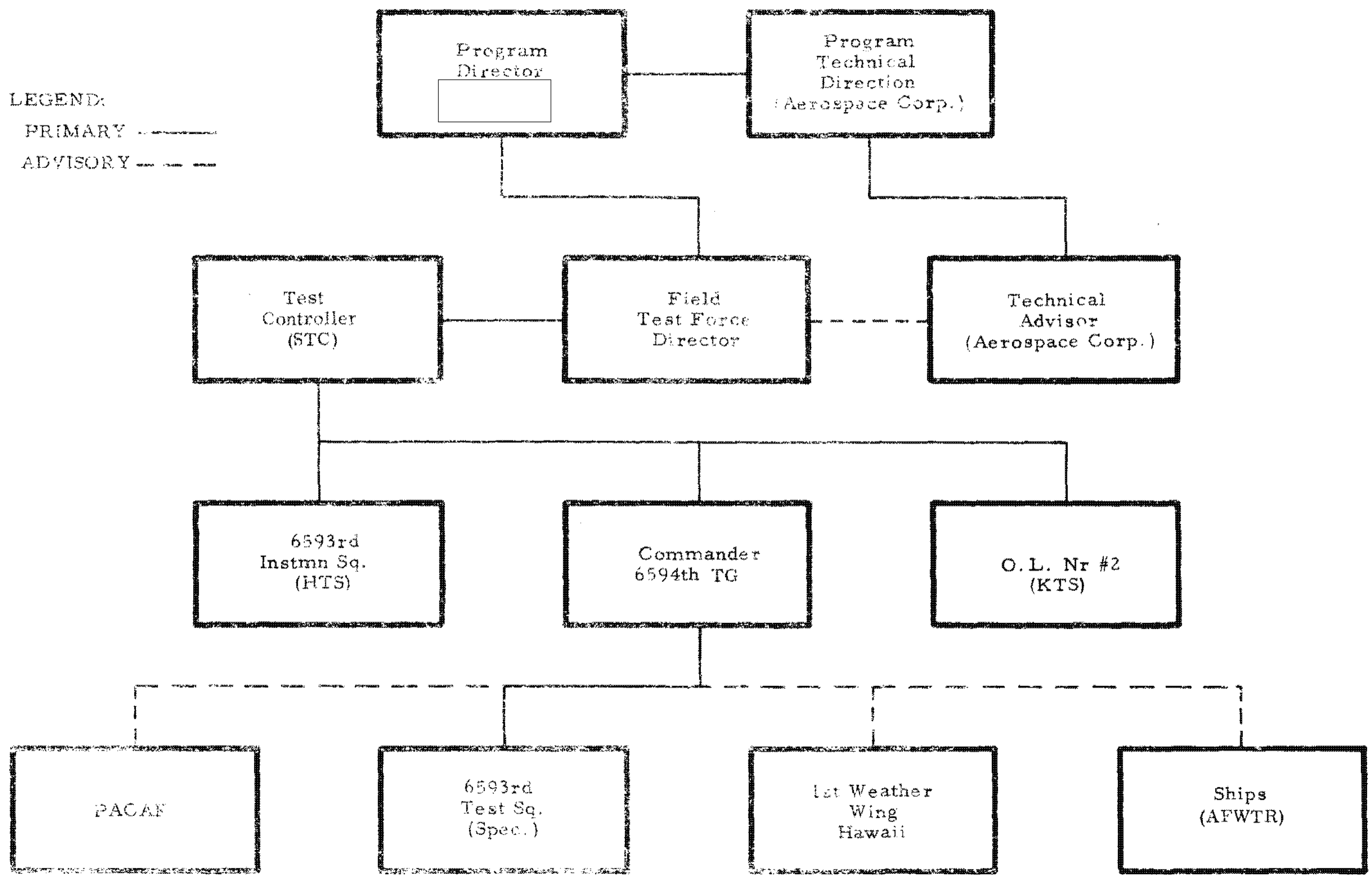


Figure [illegible] Organizational Structure, Recovery Phase

Overall responsibility for management of the program is vested in the System Program Office (SPO) [redacted] The Program Office imposes requirements on the Satellite Control Facility (SCF) through the Field Test Force Director (FTFD), and coordinates support requirements with AFWTR and other support agencies committed to the program. The Test Controller (SSOTC-2) will command the SCF control net in accordance with established mission requirements and operational control procedures. The FTFD will provide direction to the Test Controller reflecting changes in operational requirements of the Program Director and the advice of the Technical Advisor (Aerospace Corp.).

Orbital control of the satellite will be maintained through the SCF network composed of VTS, HTS, KTS, NHS, OL-5 and OL-10. During test operations and rehearsals thereto, support agencies within the SCF will come under direct control of the Test Controller.

During recovery operations, the Test Controller will direct recovery efforts through the Recovery Control Center (RCC) in Hawaii. Units participating in the recovery operations will come under direct control of the HTG at this time.

FOR THE COMMANDER

[redacted]

Director for Test Operations

ANNEX A	CONCEPT OF OPERATIONS
ANNEX B	FACILITIES AND EQUIPMENT
ANNEX C	ELECTRONIC COMMAND/CONTROL
ANNEX D	DETAILED TASKS
ANNEX E	FLIGHT INFORMATION

ANNEX A

CONCEPT OF OPERATIONS

ANNEX A

APPENDIX 1

LAUNCH AND FLIGHT CONCEPT

CONTENTS

ANNEX A

APPENDIX 1

LAUNCH AND FLIGHT CONCEPT

1. LAUNCH CONCEPT

Program 206 satellite vehicles will be launched from South Vandenberg AFB (PALC II Pad 4) toward the south. The launch configuration is comprised of an Atlas D (SLV-3) first stage booster, Agena D (S-01B) second stage, and the Satellite Vehicle (SV).

During the ascent phase, tracking and control are provided through the launch base facilities. The ascent trajectory is initiated with a 15-second vertical rise of the aerospace vehicle during which the Atlas rolls to the programmed flight azimuth, followed by a controlled pitch program until booster cutoff. After booster cutoff, the booster engines are jettisoned and the sustainer engine provides primary thrust. During sustainer operation the vehicle flies at essentially a constant inertial pitch rate, the rate being computed to produce the desired coast ellipse at sustainer engine cutoff. A short vernier phase follows, during which time the velocity vector is trimmed and vehicle attitude stabilized. At vernier cutoff, the Agena horizon sensor fairings are jettisoned, the gyros are uncaged, and the destruct system is disarmed.

The Agena/SV combination is separated from the Atlas by means of retro-rockets attached to the booster adapter, and coasts for approximately 50 seconds. The Agena engine is started after attaining the predetermined altitude and attitude, and when orbital velocity is attained the engine is shut down. Agena engine cutoff is accomplished by a velocimeter programmed to provide a velocity increment placing the Agena/SV combination in a near-circular orbit at the designed altitude.

For 200 seconds following injection the Agena will maintain attitude stability for the Agena/SV combination. During this 200 seconds the SV separates from the Agena by command, referenced from launch, stored in the storage programmer of the OCV command system.

The Ascent Sequence of Events is contained in Annex E.2.

2. FLIGHT CONCEPT

2.1 General

Following Agena/SV separation the Satellite Vehicle (SV) will begin six days of orbital operation. During this phase, maneuvers and vehicle functions will be controlled by commands loaded by the Satellite Control Facilities.

In the early passes over tracking stations, the orbit ephemeris is generated and the health of the vehicle determined. During subsequent passes commands for orbital operations are transmitted and stored. Subsequently the ephemeris is recomputed and the command programmer updated as required.

Calldown of the Recovery Vehicle (RV) will be planned for a day pass in the Hawaiian Recovery Area after 83 revs of orbital operation, but may occur earlier if it is warranted by technical considerations.

At the end of 81 revs, a yaw command of 180 degrees and pitchdown to approximately 58 degrees is performed. In this attitude, the RV is separated from the OCV and provided with a retro impulse causing re-entry. The RV will be recovered by aerial techniques with surface backup.

Following RV separation, the OCV may be deboosted, or will be controlled for an additional day prior to deboost.

2.2 Maneuvers and Tests

The purpose of orbital operations is to obtain data required for a comprehensive evaluation of Satellite Vehicle (SV) subsystems. To accomplish this purpose, a series of tests and exercises are programmed for execution by the OCV.

2.2.1 Infrared Scanner Operation. Infrared scanner data are required to determine the effects of cold clouds on stabilization subsystem performance. Real-time data will be over NHS, VTS and KTS when weather conditions (e.g., cloud formations, snow cover, cold fronts) are suitable. Roll maneuvers may be programmed as required to obtain additional data.

2.2.2 Pitch and Yaw Maneuvers. For RV re-entry the OCV is normally yawed around two revs before the primary recovery rev. The OCV is pitched down over KTS on the recovery rev and the RV deboosted. On entrance into the HTS telemetry cone during this rev, the OCV is pitched up and yawed forward.

Yaw maneuvers will be programmed as required for orbit adjust operations.

2.2.3 Orbit Adjust Operations. The orbit adjust subsystem may be used to:

a. Increase orbital lifetime
b. Raise or lower apogee or perigee
c. Shift the point of apogee/perigee
d. Deboost the OCV

Orbit adjust maneuvers are nominally planned only for emergency conditions, as required, to demonstrate precise orbit adjust engine capabilities, to raise minimum altitude to about 85 nautical miles for RV deboost and for OCV deboost. Sufficient lifetime shall exist between orbit adjusts to allow for a recovery opportunity with a tumbling vehicle.

The orbit adjust capability for each flight is:

Launch to RV recovery	400 sec (max)
OCV deboost	260 sec (min)
Total	660 sec (max)

2.2.4 Backup Stabilization System (BUSS). At the termination of the flight, BUSS will be exercised under simulated emergency conditions. For the BUSS demonstration designated rates will be assigned to the roll/pitch/yaw axes after OCV deboost burn, but prior to BUSS real-time enable. The BUSS exercise should be conducted above 65 nm altitude.

2.2.5 Command Subsystem. A secure word check will be made at least ten hours before the start of recovery operations on the primary recovery day.

The secure word separation command sequence will be contained in two delay lines of the recovery secure word message.

2.3 System Test Objectives

Specific objectives and constraints are provided by the System Program Office for each operation by Addendum to the System Test Objectives, (TOR-269(4123)-19).

ANNEX A

APPENDIX 2

RECOVERY CONCEPT

CONTENTS

ANNEX A
APPENDIX 2
RECOVERY CONCEPT

1. OBJECTIVE

One of the primary objectives of Program 206 is to demonstrate the capability of the Re-entry Capsule (RC) to carry out a precise re-entry.

2. CONCEPT

Recovery of the RC will be effected in the Hawaiian Recovery Area using aircraft for aerial recovery and surface ships for a back-up water recovery capability. KTS and HTS will provide tracking and telemetry coverage during re-entry. The detailed recovery zone and positioning of the aircraft and surface ships for recovery are presented in Annex D.4.

2.1 If air retrieval is unsuccessful the RC will impact in the water and float, if the impact has not ruptured the metal skin. A flashing light and a radio acquisition beacon will aid search and detection by the recovery forces. If impact is in the water, the RC will be recovered by using aircraft and surface ships to determine its location and then using Pararescue teams, or helicopters, to effect the recovery. Sink plugs made of a water soluble substance limit the flotation to approximately 72 hours.

2.2 The RC will normally be de-orbitted on the fifth day of operation on an orbit which would pass over the Hawaiian Recovery Area in a north-to-south direction. The RC may be de-orbitted earlier than the fifth day if deemed necessary because of failing vehicle health or bad weather in the recovery area which might preclude a successful aerial recovery.

2.3 The RC is first separated from the OCV, which is in the tail-first pitch-down attitude, and given the required retro-velocity at the proper latitude to cause a predetermined ballistic trajectory. After re-entry through the ionization layer into the more dense atmosphere, the parachute system is activated. Deployment of a ring-slot parachute ensures a descent rate which is compatible with aircraft recovery techniques, and is also such that if air recovery is unsuccessful, the water impact does not rupture the RC skin.

2.4 The Inhibit Timer provides a means of destroying the RC if it should re-enter beyond the recovery area. This timer is set to eject the parachute and release the protective shield at a predetermined time if the 3-g switch closure has not occurred. As a result, the RC and parachute will be destroyed by aerodynamic heating as it re-enters the atmosphere. See Annex B.2b for a description of the Inhibit Timer.

3. RECOVERY CONTROL

The 6594th Test Group is responsible for coordination and direction of air and sea recovery forces. This group conducts the recovery operation and operates the Recovery Control Center (RCC) which implements all STC direction. The recovery force caries out the direction of the RCC during a recovery operation.

4. CALL-DOWN

Recovery Capsule (RC) call-down will normally be accomplished by inserting the proper time label command message into a delay line of the OCV command system. When the command time label matches vehicle clock time the separation sequence will be initiated. A description of commands and their operation are explained in Annex C.2.

Emergency call-down capabilities have been incorporated in the OCV in the form of a Back-Up Stabilization System (BUSS). BUSS is a separate attitude control system which is capable of providing proper positioning of the satellite vehicle to effect separation and subsequent recovery of the RC. BUSS is restricted, however, to passes over the recovery area in the north-to-south direction. Refer to Annexes C.1 and C.2 for a description of BUSS commands.

5. RECOVERY AIDS

A telemetry link, acquisition radio beacon and a flashing light are included in the RC to aid in search, detection and recovery.

A VHF telemetry link provides real-time data on performance characteristics at and after separation from the OCV. Events which are transmitted are presented in Annex E.8. The transmitter operates in the standard IRIG telemetry band and is phase modulated by a 3-channel composite subcarrier signal. The data are received by the ground stations and the recovery forces and transmitted to the STC for impact analysis. Minimum design life of the telemetry link is 20 minutes.

The acquisition or direction-finding VHF beacon operates on a nominal modulation excursion of 500 Hz within the modulation frequency band of 200 to 1500 Hz, with a 50-percent duty cycle. This provides a unique signature for positive identification by the recovery forces. The beacon, which has a life of approximately 10 hr, is turned on shortly before separation.

A flashing Xenon light turned on at parachute deployment will operate for 10 hours after impact to provide visual detection at night, or during periods of low visibility.

The Test Controller at the STC will specify which of the possible passes will be used for recovery, based on vehicle health analysis and predetermined call-down criteria. A decision will be given to the RCC at least six hours in advance of the estimated time of parachute deployment (ETPD). The STC will transmit impact locations and time prediction messages to the RCC based on current estimates of the ephemeris. Messages will be updated when significant changes occur. The recovery forces will be deployed by the RCC in accordance with established plans and the latest operational situation.

6. RC DISPOSITION

Upon successful recovery, the RC will be handled in accordance with instructions published in the TG Operations Plan.

ANNEX B

FACILITIES AND EQUIPMENT

A
N
N
E
X
B

ANNEX B
APPENDIX 1

SCF HARDWARE AND SOFTWARE CONFIGURATION

CONTENTS

FIGURES

TABLE

ANNEX B

APPENDIX 1

SCF HARDWARE AND SOFTWARE CONFIGURATION

1. HARDWARE CONFIGURATION

The Program 206-I ground system configuration is presented in Figures B.1-1 through B.1-5. Figures B.1-1, B.1-2 and B.1-3 respectively present the tracking, telemetry, and command configuration at the SCF tracking stations. Figure B.1-4 presents the communications network employed, and Figure B.1-5 the STC equipment used.

Table B.1-1 lists tracking station antenna assignments and priorities.

2. SOFTWARE CONFIGURATION

Annex B, Appendix 1, Tab a presents the Software Configuration.

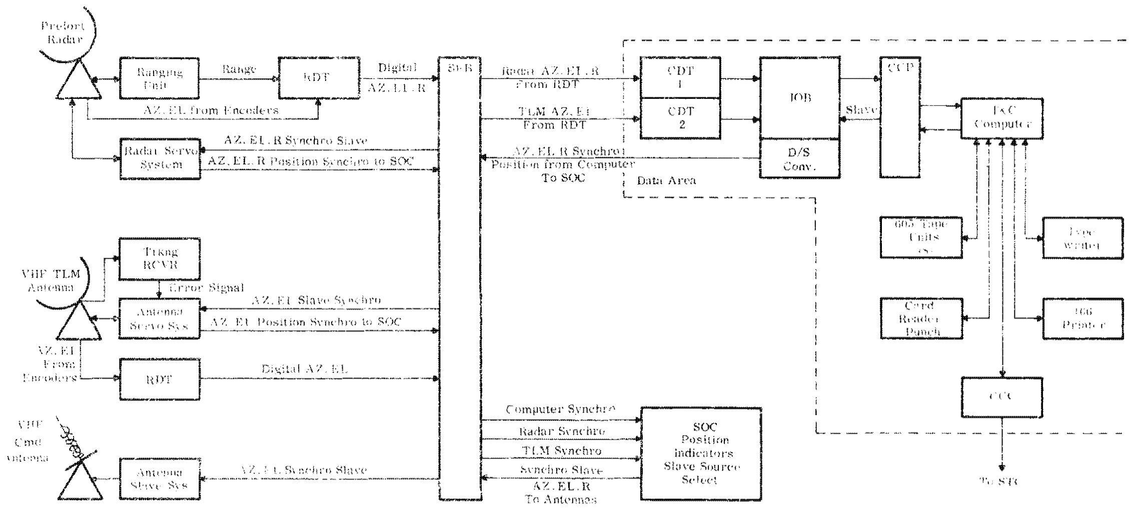


Figure B.1-1 Tracking Configuration

B.1-3

TEST OPS ORDER 63-7
275
28 Mar 66

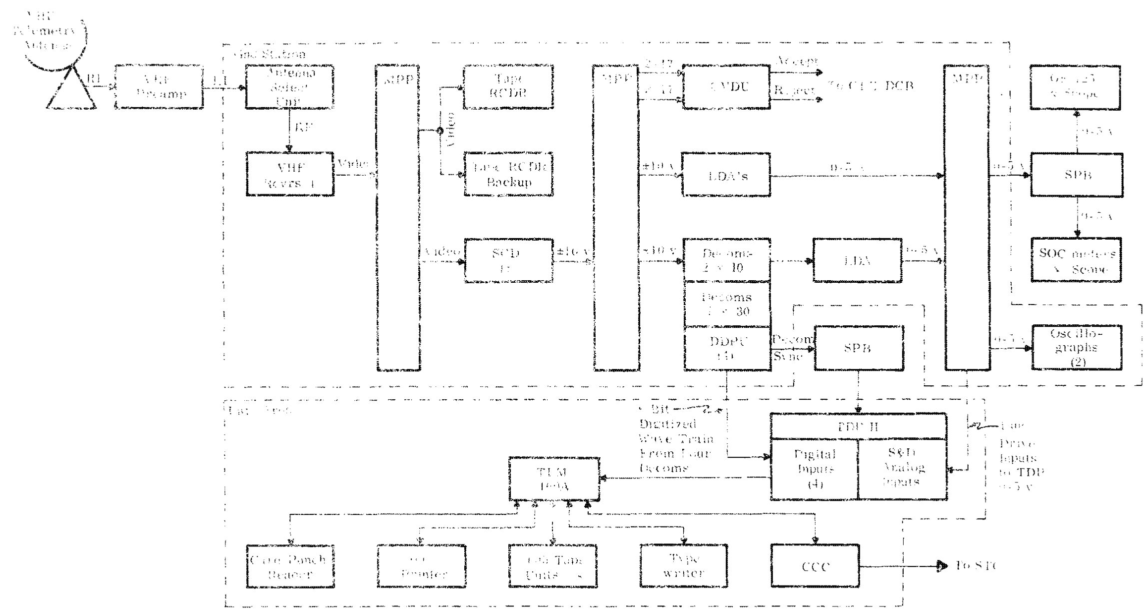


Figure B.1-2 Telemetry Configuration

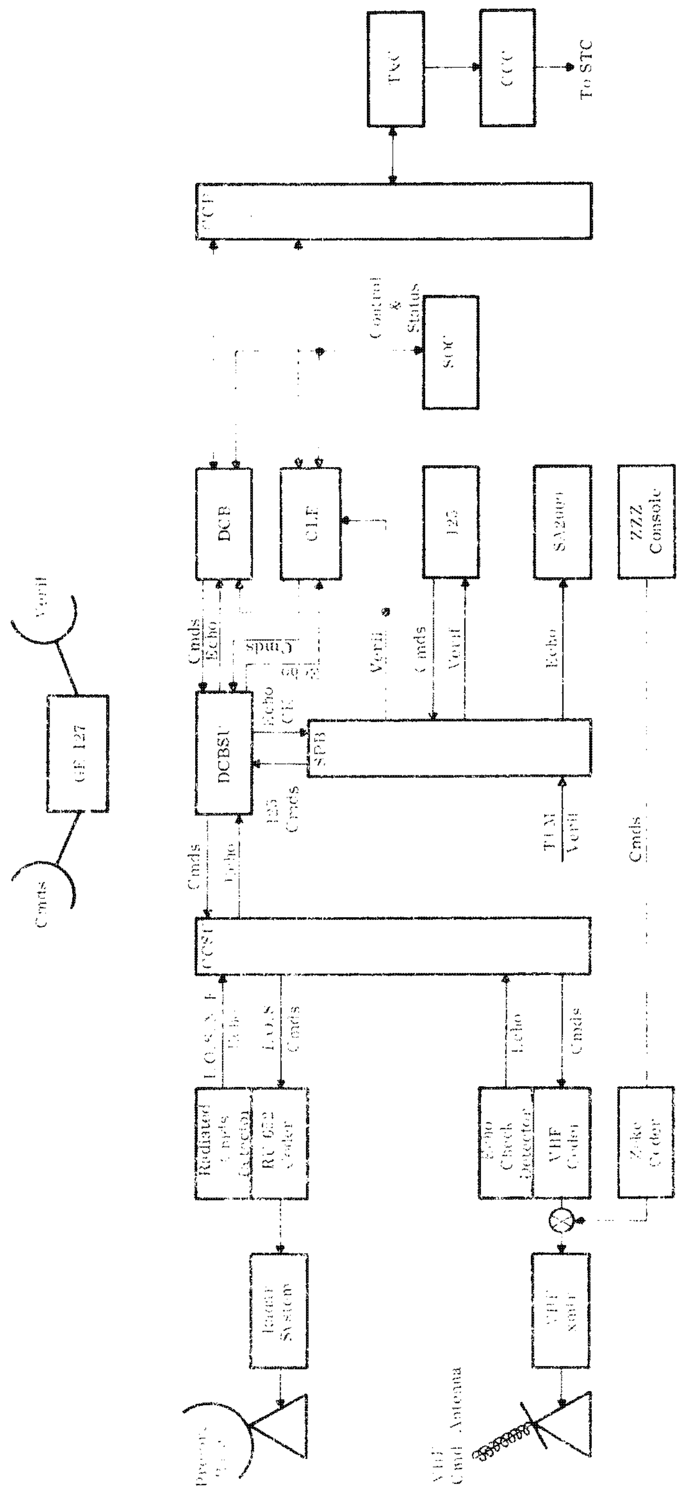


Figure B.1-3 Commanding Configuration

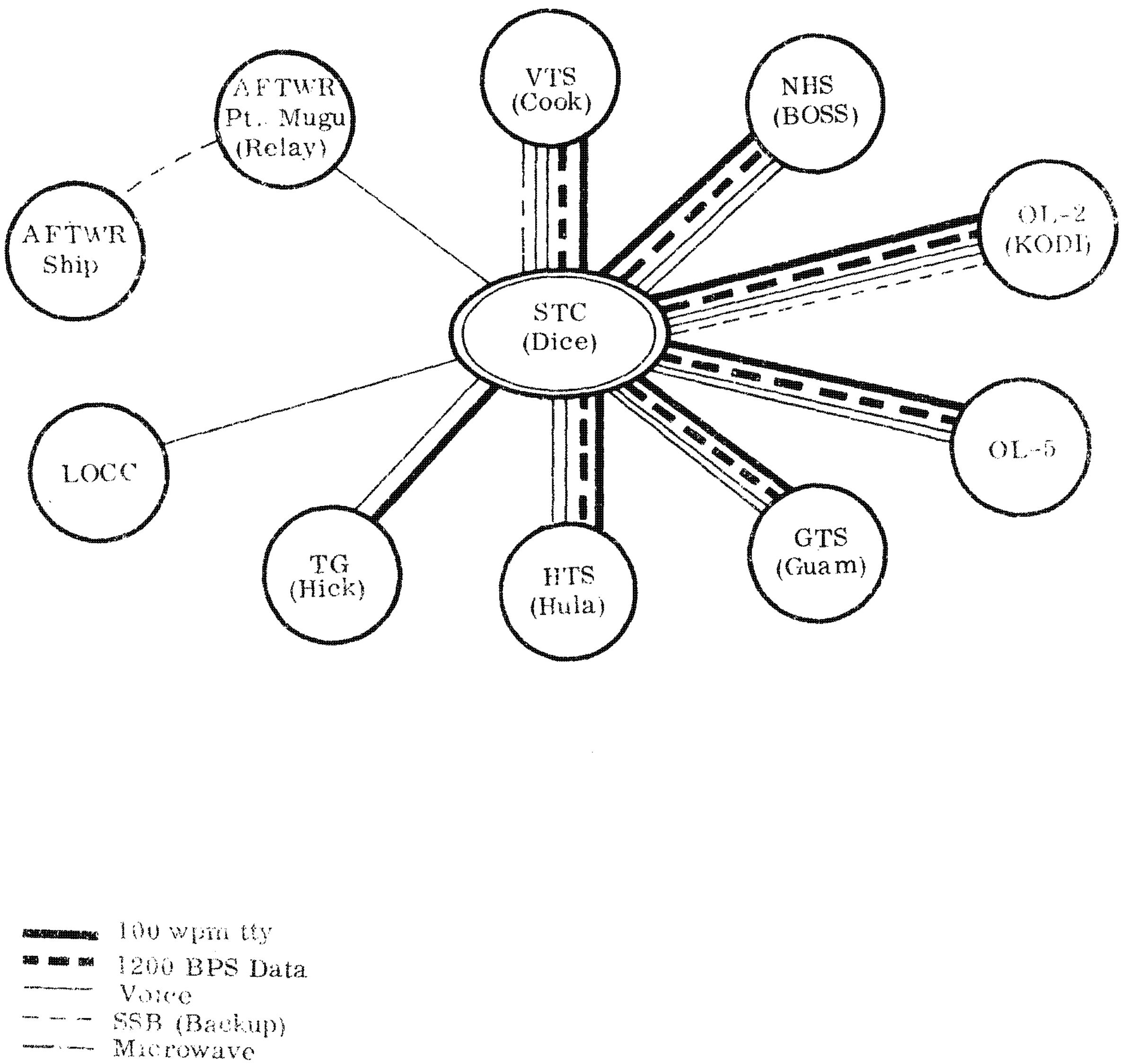


Figure B.1-4 Communication Network

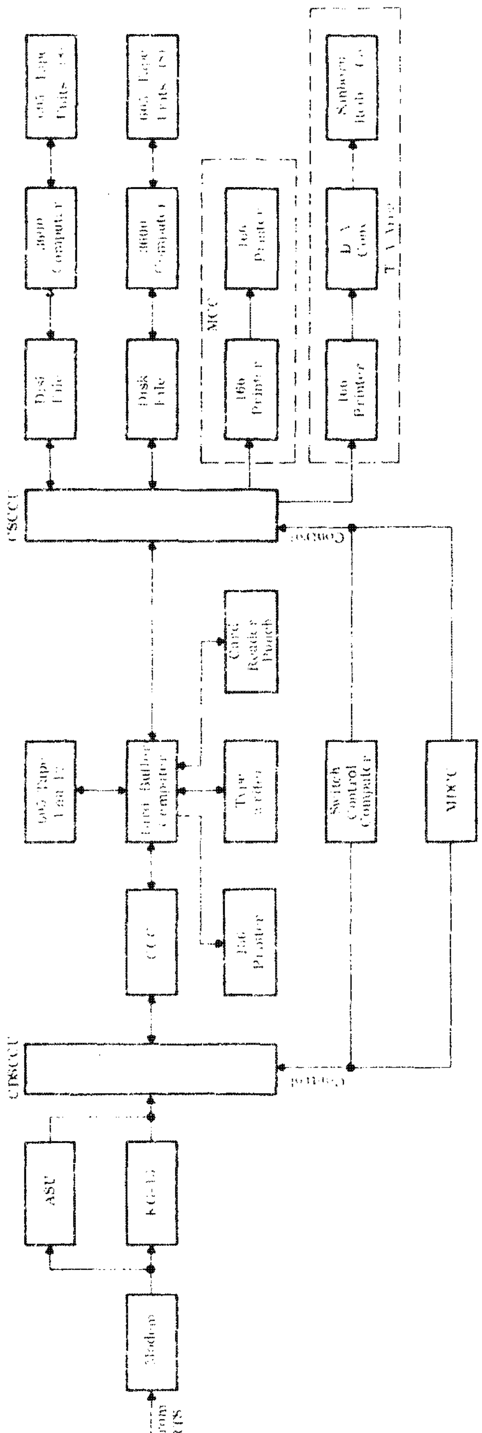


Figure B.1-5 STC Equipment

Approved for Release: 2024/01/30 C05099045

TABLE B.1-1

SCF SITE USAGE

Support Function	VTS	NHS	HTS	KTS	GTS	OL-5	STC
Launch	X						X
On-Orbit	X	X	X	X	X	X	X
Recovery			X	X			X

TRACKING STATION TELEMETRY ANTENNAS

	VTS	NHS	HTS	KTS	GTS	OL-5	Autotrack on VHF
FPA/DOR		X	X	X	X	X	Yes
TLM-18	X		X				Yes
D/R	X	X					No
Tri-Helix	X						No

ANTENNA PRIORITIES ON ORBIT

Priority	VTS	NHS	HTS	KTS	GTS	OL-5
1	TLM-18	FPA	FPA	FPA	FPA	DOR
2	D/R	D/R	TLM-18			
3	Tri-Helix					

ANNEX B

APPENDIX 1 – Tab a

COMPUTER PROGRAMS

CONTENTS

FIGURES

ANNEX B

APPENDIX 1 – Tab a

COMPUTER PROGRAMS

1. GENERAL

Requirements for computer program utilization for Program 206 are outlined. Software support material flow charts are given as well as directive references for control of computer operations.

1.1 References.

Listed are the documents giving the most detailed and current information on all phases of the software operating system, the specific software products involved with a given flight, and the responsible persons. These references are an integral part of Annex B. 1. a and should be used by persons requiring a complete understanding of the computer software role.

1.1.1 Software Operational Support Information. The SOSI is published for each flight and is the key software reference for that flight. It contains the following:

a. The master tapes recommended by SSONS for use with the current operation: system support tape (BESST 8X); flight support tape (FAST 8-3/4X BLKX); facility tape (FACT 8.1X); bird buffer master tape

b. A list of correctors by tape for each of the master tapes listed above, except for the flight support tape.

c. Special software limitations and operating instructions.

d. References to SSONS-2 letters such as software summary letters and recommendations for operational usage.

1.1.2 Milestone 7. Model 8 (current model) for the 3600 (TM(L)-2462/704/00X), Bird Buffer (TM(L)-2462/702/00X) and Tracking Station (TM(L)-2462/703/00X). These documents contain the computer system overview showing the data flow and use of the major software products (See Part 1.2, flow charts). The detailed descriptions of the programs for the respective computers (3600, BB, T&C, TLM) are given with function card formats and operating procedures.

1.1.3 The Model 8.0 3600 Subsystem Description, (TM(L)-2462/950/00X Model 8.0 160A Subsystem Description.* These documents summarize the essential changes made in the current model from the previous model for their respective equipments.

1.2 Software Products

Self-explanatory flow charts, each of which summarizes the sequential generation of major software support materials used in support of a specific flight are presented. The part each of these products plays in the entire software system is not given here since that information is presented in detail in the Milestone 7 documents.

*(TM(L)-2462/920/00X)

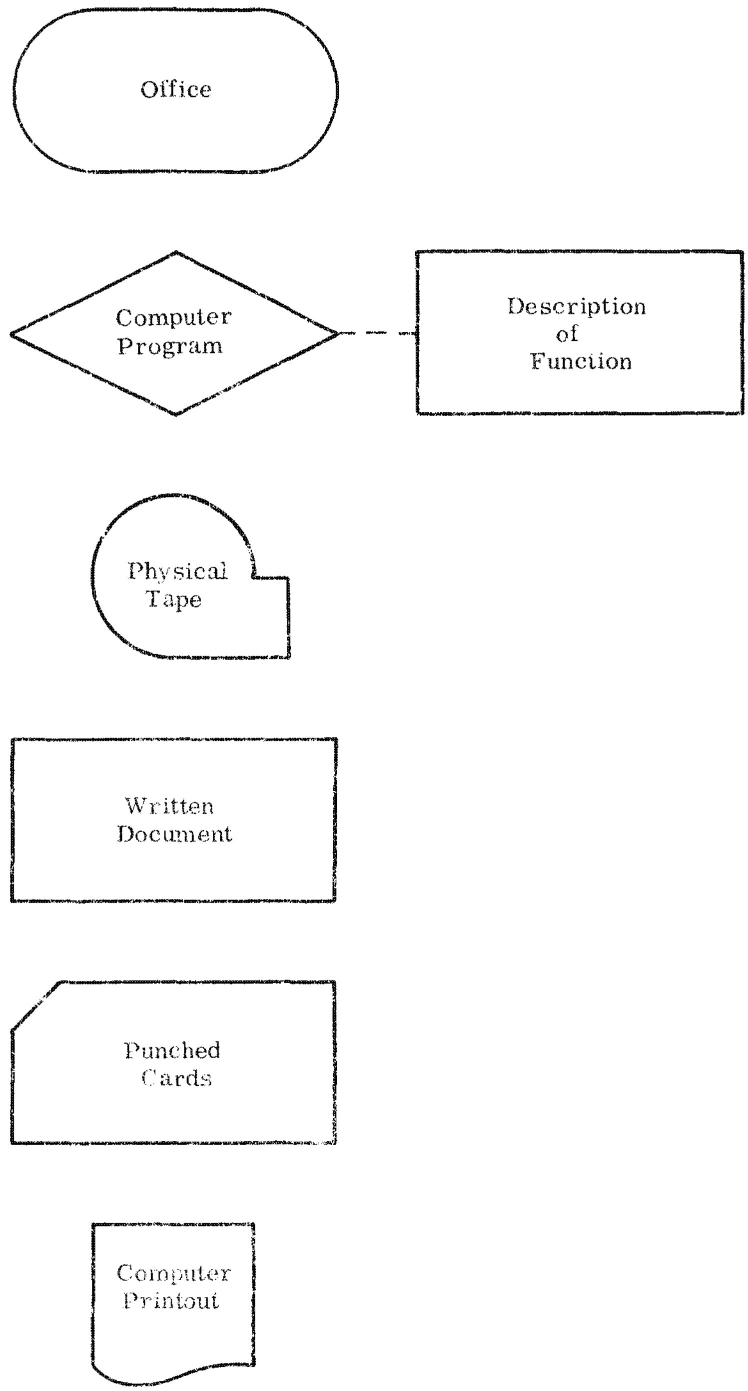


Figure B.1.a-1 Software Flow Symbol Conventions

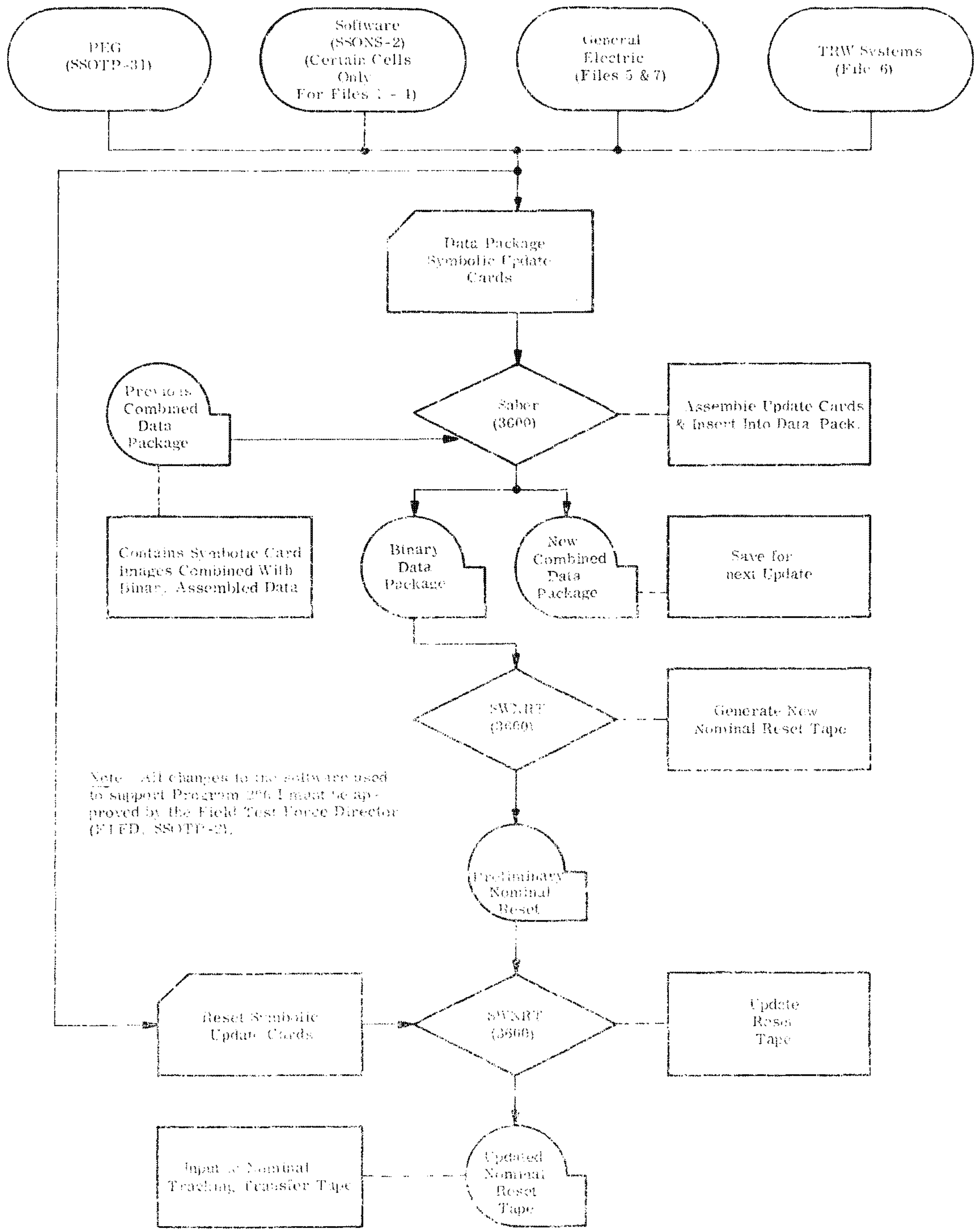


Figure B.1.a-2 Data Package and Nominal Reset Tape

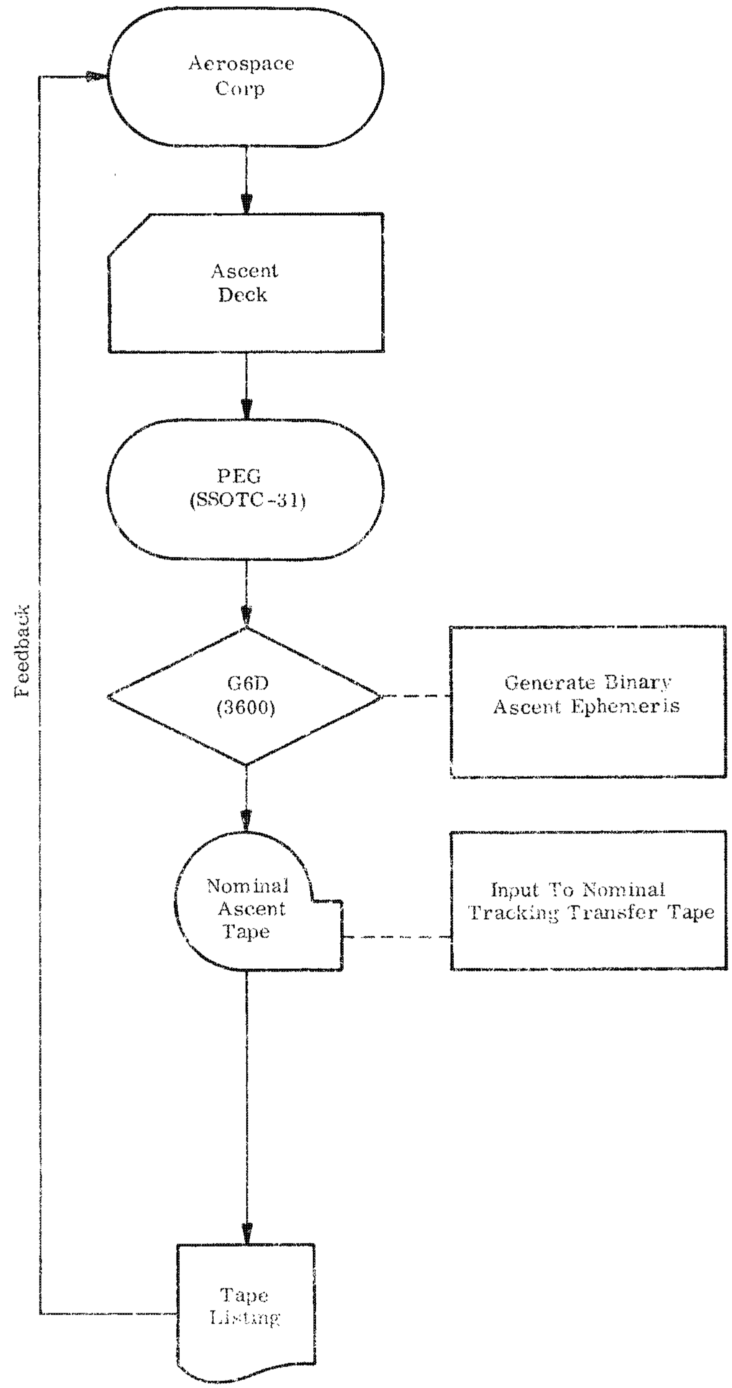


Figure B.1.a-3 Nominal Ascent Tape

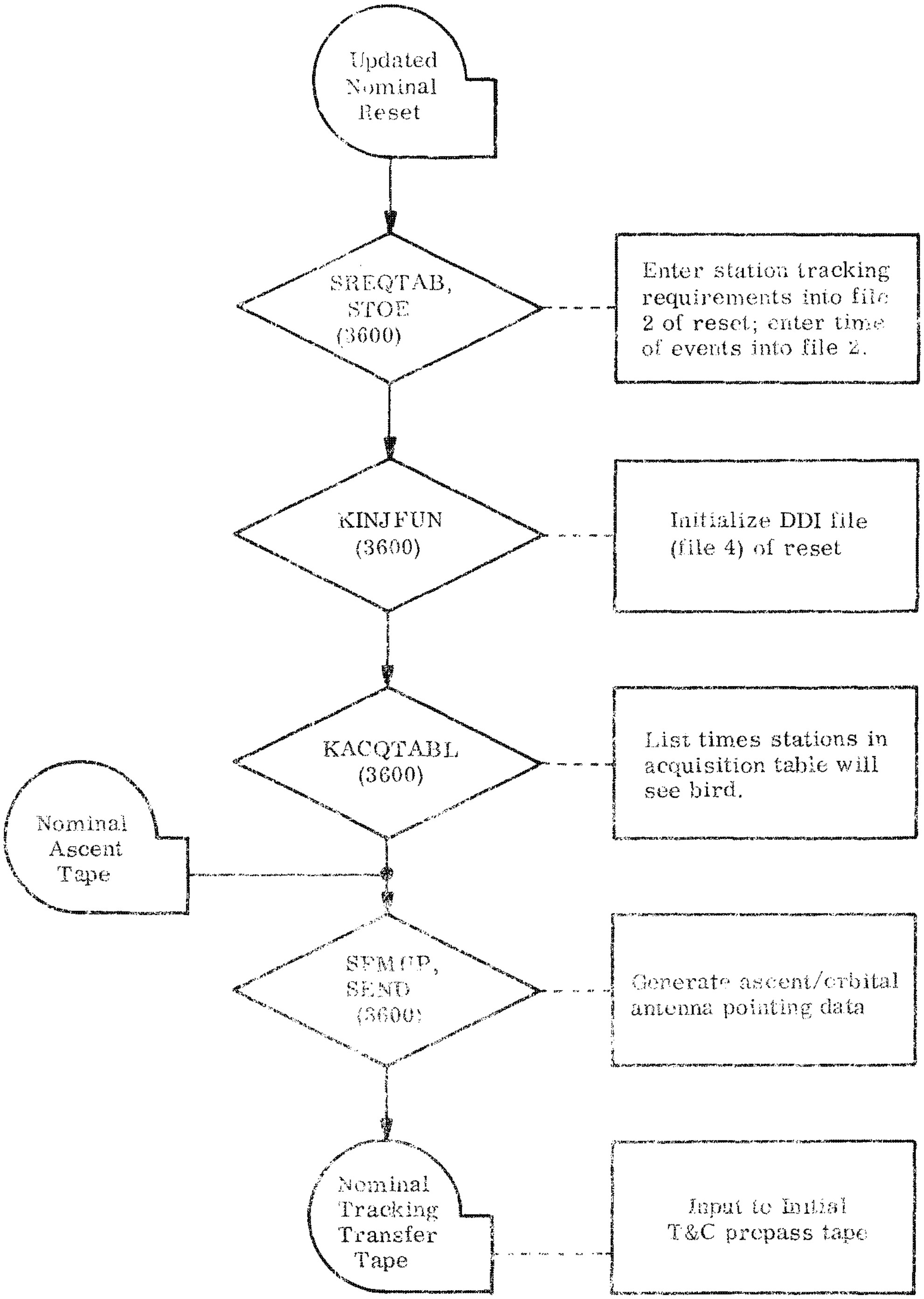


Figure B.1.a-4 Nominal Tracking Transfer Tape

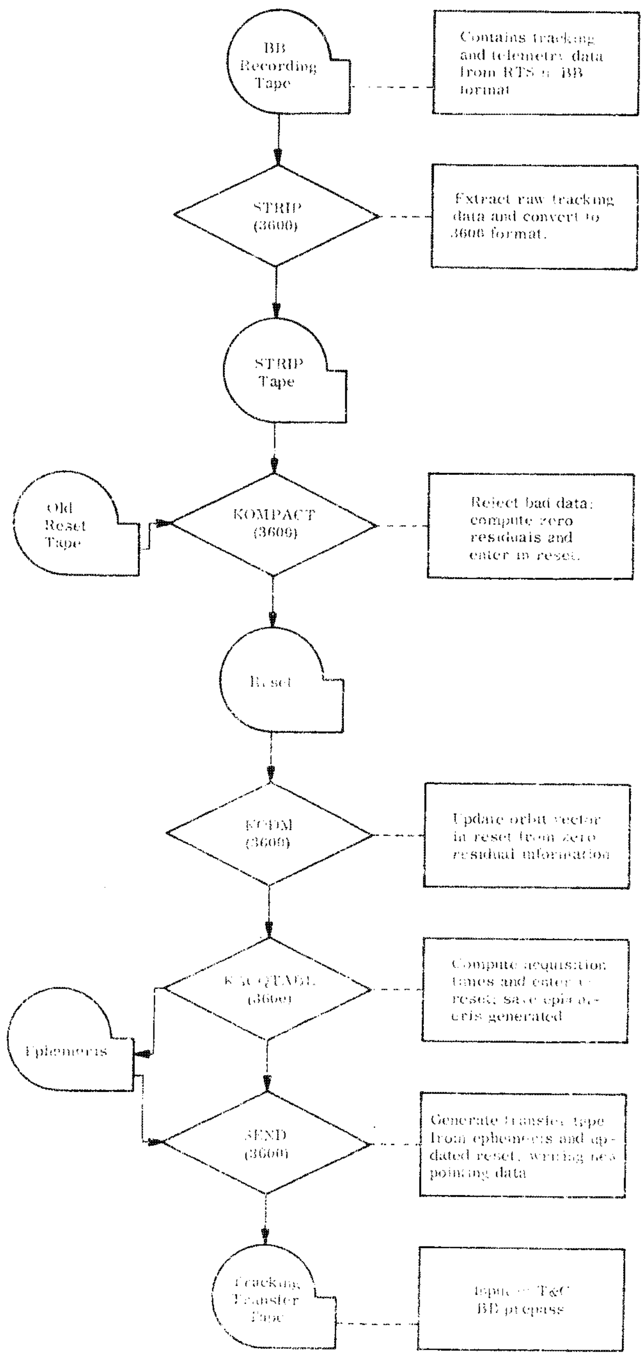


Figure B.1.a-5 On-Orbit Tracking Transfer Tape

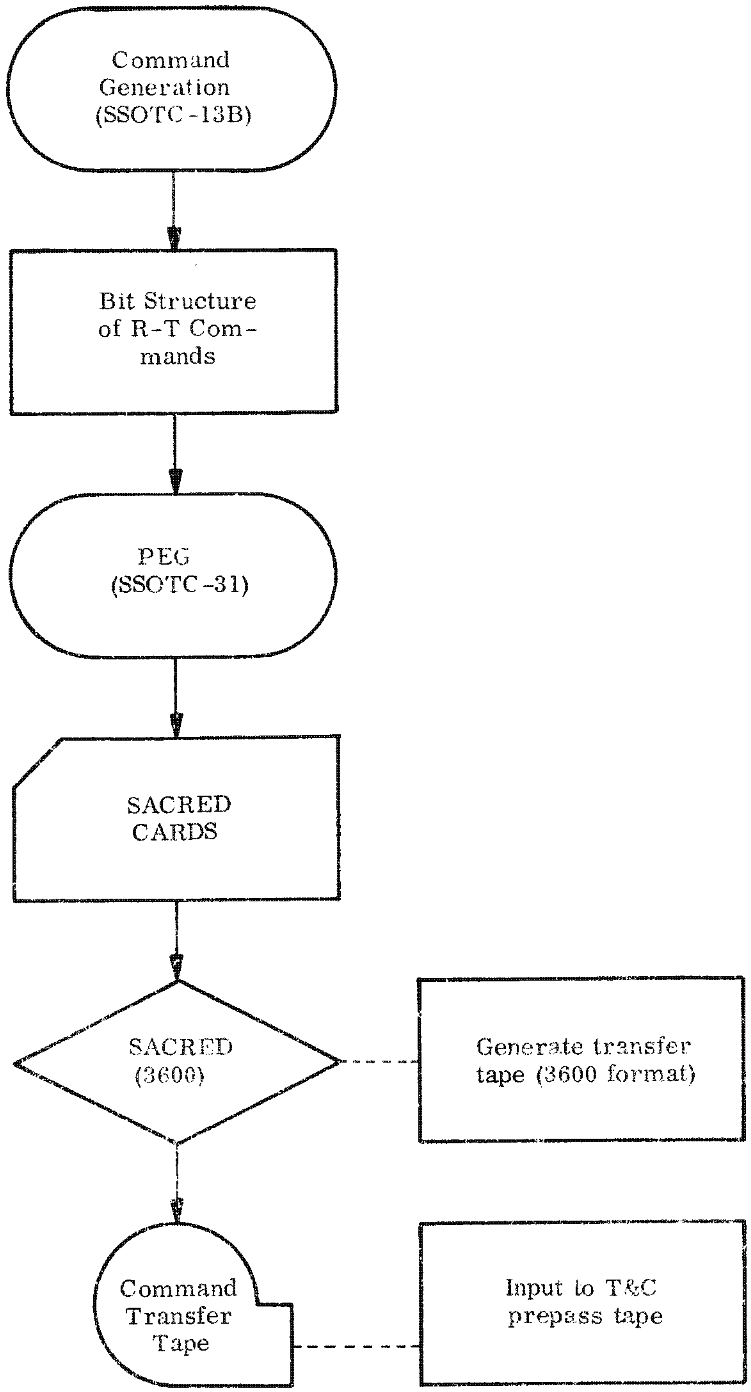


Figure B.1.a-6 Real-Time Commands

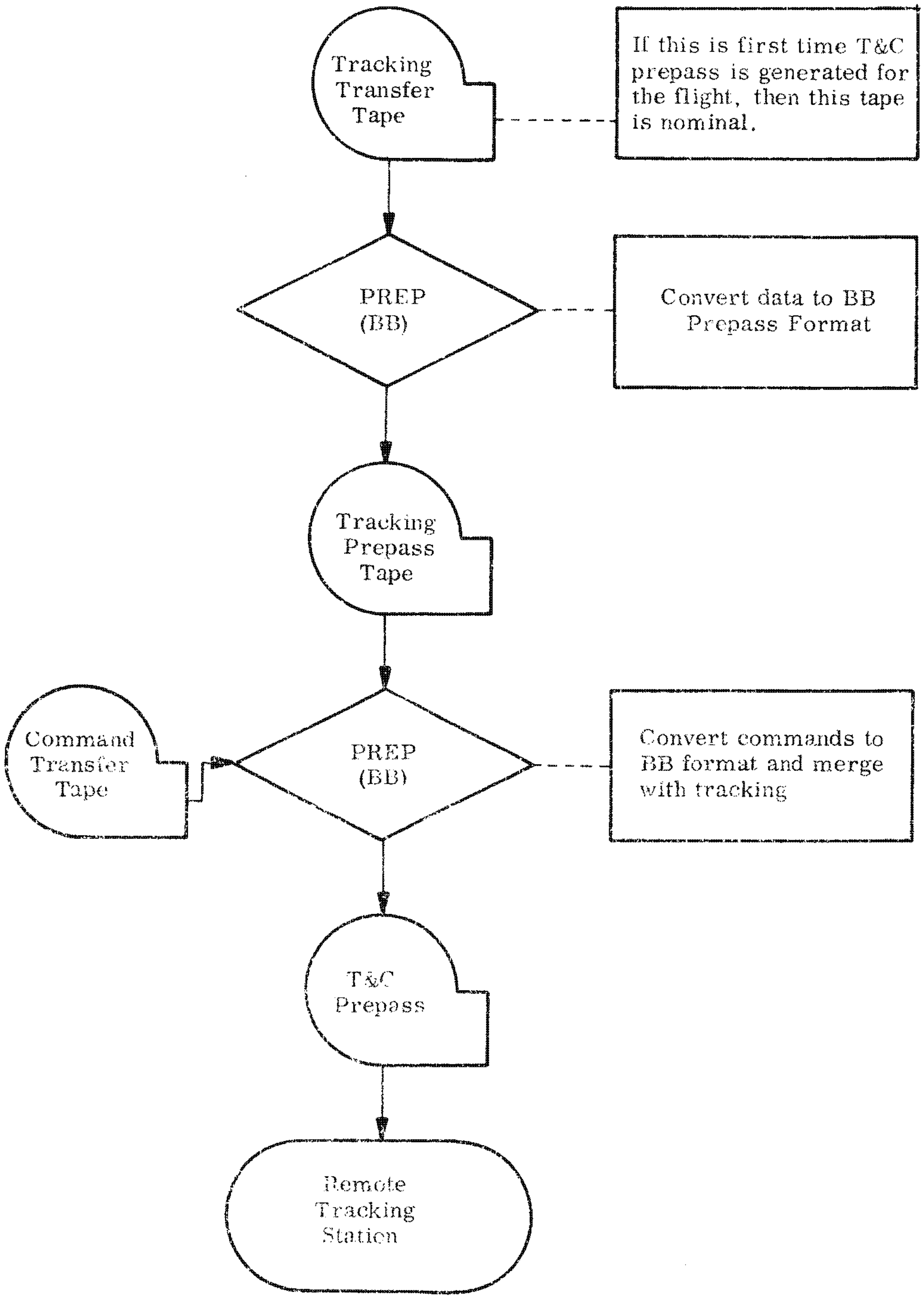


Figure B.1.a-7 Tracking & Command Prepass Tape

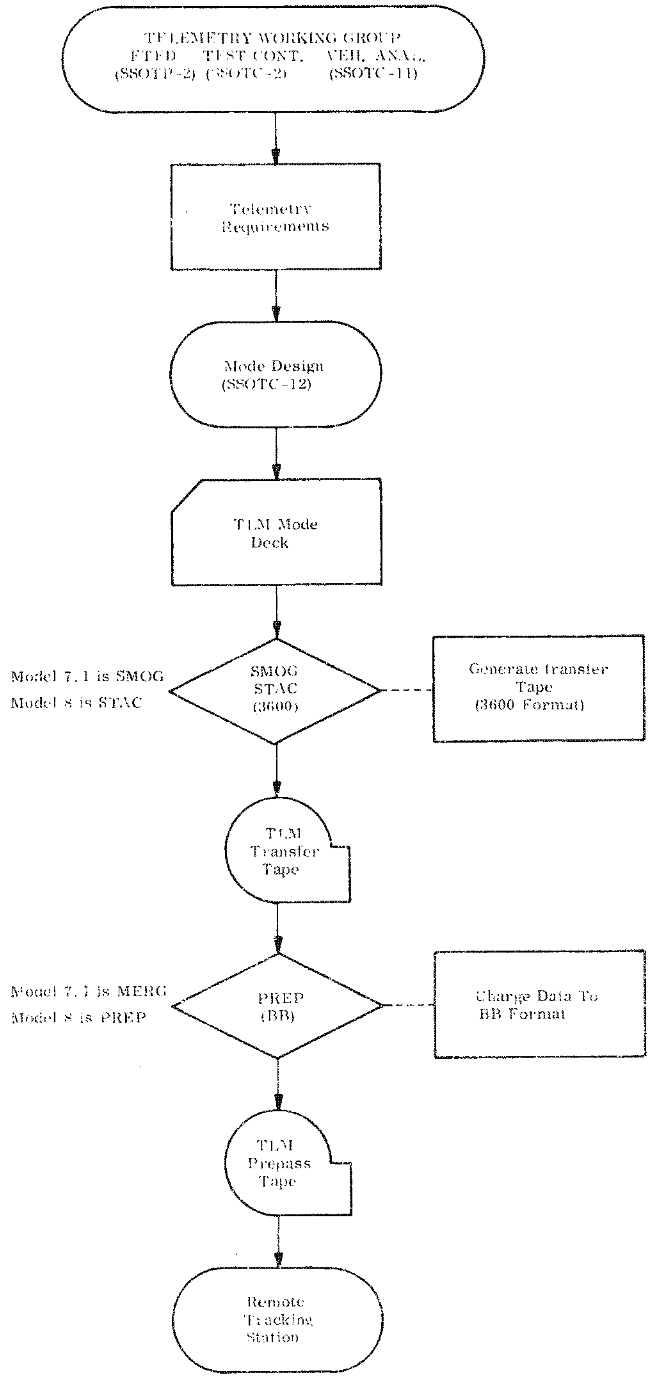


Figure B.1.a-8 Telemetry Prepass Tape

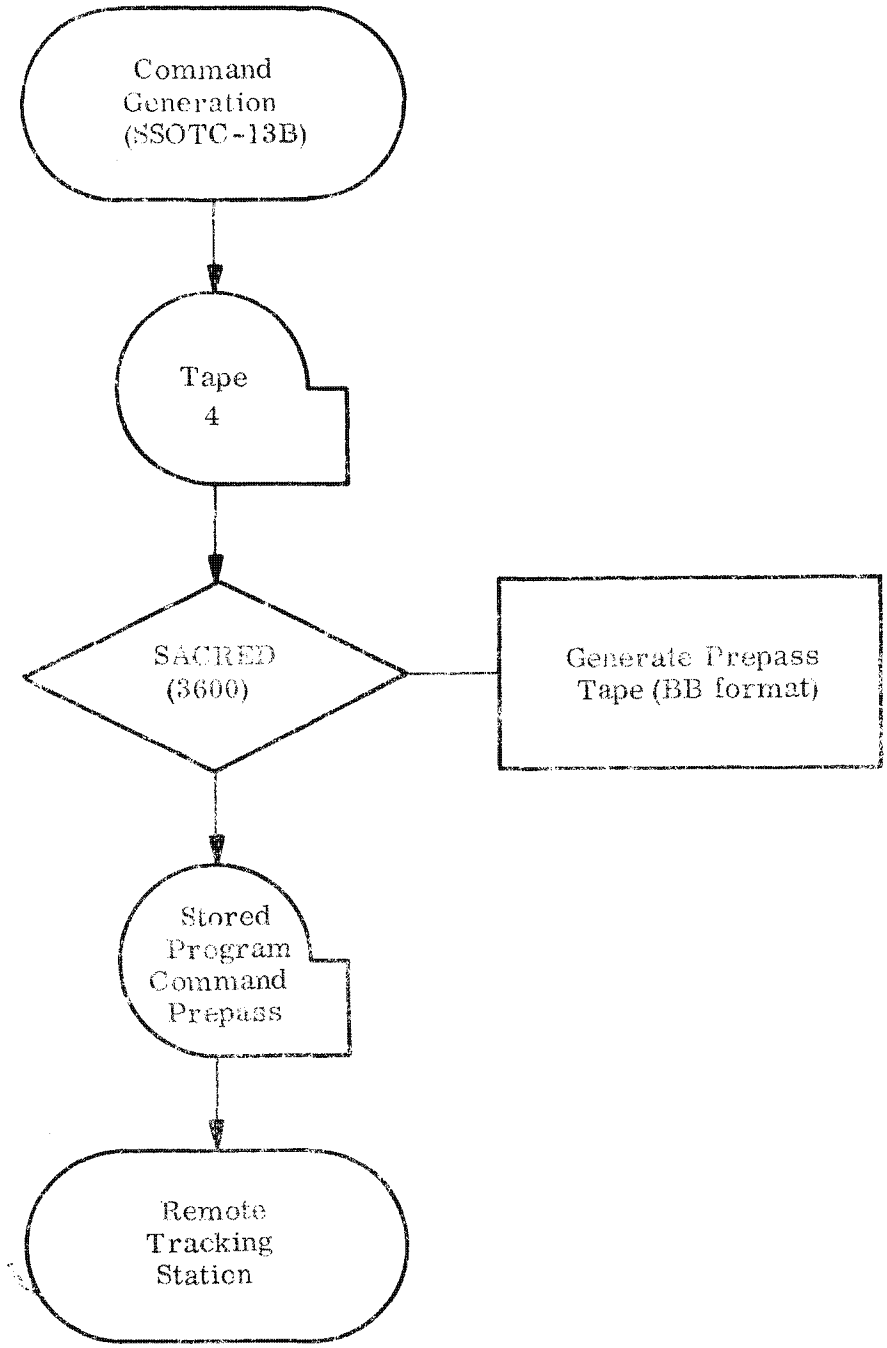
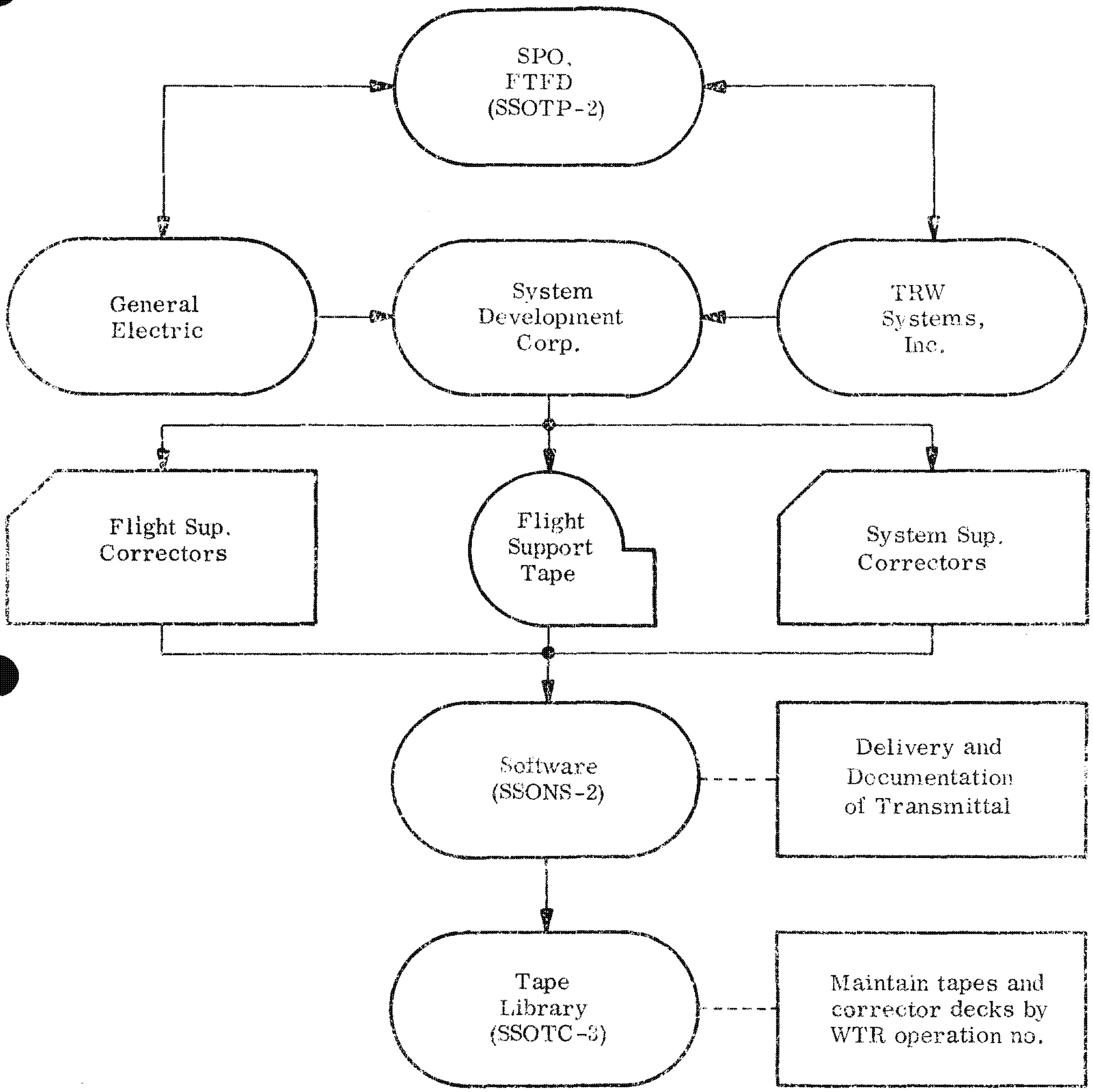


Figure B.1.a-9 Stored Program Commands



Note: All changes to the software used to support Program 206 must be approved by the Field Test Force Director (FTFD, SSOTP-2).

Figure B.1.a-10 Flight Support Tape

ANNEX B

APPENDIX 2

SATELLITE EQUIPMENT

CONTENTS

TABS

ILLUSTRATIONS

TABLES

ANNEX B

APPENDIX 2

SATELLITE EQUIPMENT

1. GENERAL

The on-orbit satellite for Program 206 is the General Electric Satellite Vehicle (SV) which consists of three main parts: the Orbit Control Vehicle (OCV), an Adapter, and the Re-entry Vehicle (RV). The OCV is further divided functionally into subsystems which are:

a. Structure Subsystem
b. Telemetry, Tracking, and Command Subsystem
c. Separation Subsystem
d. Attitude Stabilization Subsystem
e. Orbit Adjust Subsystem
f. Electrical Power and Signal Distribution Subsystem
g. Environmental Control Subsystem
h. Back-up Stabilization Subsystem

The Satellite Recovery Vehicle (SRV) equipment is discussed in Annex B, Appendix 2, Tab b.

2. STRUCTURE SUBSYSTEM

The Structure Subsystem consists of the OCV, RV, and the Adapter which contain, support, and protect all on-board subsystems through all phases of vehicle life. The RV, which extends from Station 18 to Station 46 is discussed in Tab b. The Adapter is a section which forms a transition between the RV and the OCV and extends from Station 46 to Station 83. This section contains most of the antennas and telemetry equipment. The OCV, which extends from Station 83 to Station 234 contains the majority of the on-board components such as the command decoder and the pneumatic and hypergolic propulsion devices. This subsystem is shown in Figure 1.

3. TELEMETRY TRACKING AND COMMAND SUBSYSTEM

The TT&C Subsystem provides the beacons, sensors, multiplexers, transmitters, etc., which allow the ground system to monitor the vehicle performance and to track and command the vehicle. A block diagram of the telemetry equipment is shown in Figure 2 and the command and tracking equipment in Figure 3.

3.1 Major Components

The major components of the TT&C Subsystem may be conveniently grouped as the telemetry equipment, commanding equipment, and tracking equipment.

3.1.1 Telemetry Equipment. The telemetry equipment is organized within the vehicle into several SCO Bases which are further grouped into telemetry links by connecting the SCO outputs. These TM links are tabulated in Table 1 and are discussed separately below. The Channels included on each base are listed in Table 2. An airborne recorder is also incorporated to record certain information while the vehicle is out of contact with the stations. This recorder has a capacity of recording 16 minutes of data at a recording speed of 7.5 inches per second. When commanded to read out, the recorder plays back at 30 IPS, thereby transmitting its contents to the ground in four minutes. Since the readout is non-destructive, any 240-second continuous segment of recorded data contains the full contents of the recorder. Included in this recorder output is a crystal controlled 14.5-kc signal from SCO Base 3 for tape speed compensation.

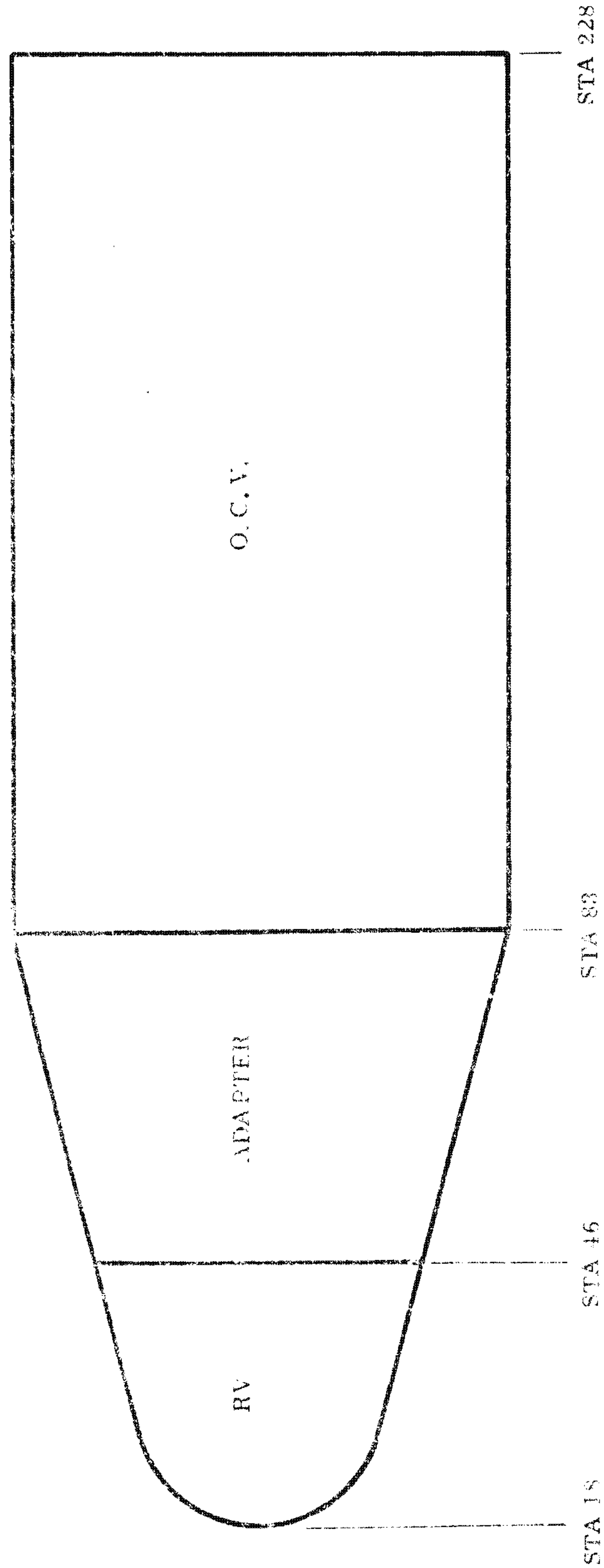


Figure 1 Structure Subsystem

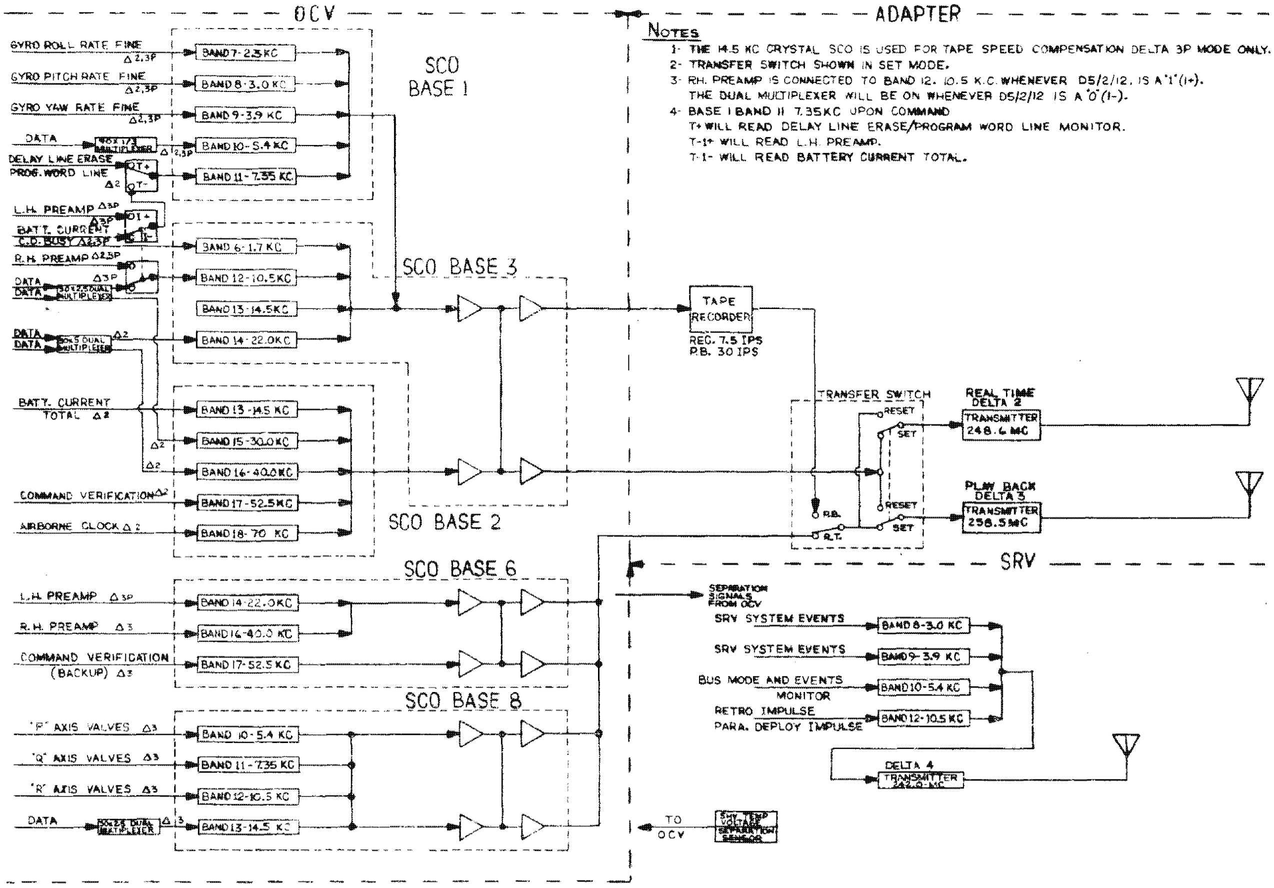


Figure 2 SV Telemetry Subsystem

B. 2-6

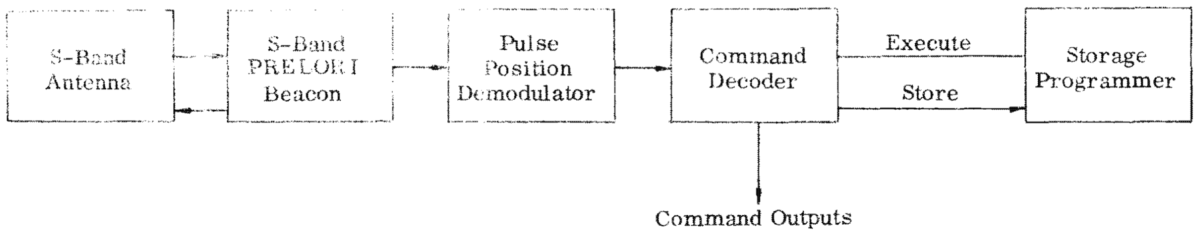


Figure 3 Tracking and Command Equipment

Table 1

(S) OCV CHANNEL RATE AND TYPE

Channel	ORT Link 2
6	Cont
7	Cont
8	Cont
9	Cont
10	90 x 1/3
11	Cont
12	30 x 2.5/or Cont.
13	Cont
14	30 x 5
15	30 x 2.5
16	30 x 5
17	Cont
18	Cont

Channel	Playback Link 3P*	BUSS Link 3B
6	Cont	
7	Cont	
8	Cont	
9	Cont	
10	90 x 1/3	Cont
11	Cont	Cont
12	30 x 2.5**	Cont
13	OSC.	30 x 2.5
14	30 x 5	Cont
15	----	----
16	----	Cont
17	----	Cont

*Played at four times recorded speed
**Will be cont if I+ is commanded (Refer to Fig. 2, page B.2-6)

Table 2

SUBCARRIER OSCILLATOR BASE CHANNELS

Base	Channels
1	7, 8, 9, 10, 11
2	13, 15, 16, 17, 18
3	12, 13, 14, 6
6	14, 16, 17
8	10, 11, 12, 13

Link	Operational Mode
2	Orbital Real Time (ORT)
3P	Orbital Playback
3B	BUSS Telemetry
4	RV Telemetry

Notes:

1. The sub carrier oscillators of the telemetry subsystem increase frequency with increasing positive voltage stimulus. SCD polarity switches will have to be set to the non-IRIG mode accordingly.

2. The deviation of the SCO is ± 7.2% with calibrations provided for ± 7.5% equal to 0% to 100% bandwidth on the continuous channels. The wavetrains have internal calibrations. - 7.2% corresponds to zero volts and + 7.2% corresponds to + 5 volts input stimulus on all channels except Channel 10.

   The Channel 10 wavetrain corresponds to 0 to + 5 volts data, but the multiplexer output to the SCO is -2.25 volts to 4.3 volts for ± 7.2% deviation.

Both the realtime telemetry SCOs and the recorded outputs are wired through a transfer switch which can be commanded in real time to connect either realtime or recorder data to either of two transmitters having an output of 5 watts. By definition, link refers to the modulation and delta to the RF transmitter.

3.1.2 Commanding Equipment. The commanding equipment, shown in Figure 3, consists of an S-band beacon, a Pulse Position Demodulator (PPD), a Command Decoder and a Storage Programmer. Commands are introduced into the vehicle by positioning the center pulse of the PRELORT radar as described in Annex C. This pulse position is converted to command information by the PPD and routed to the Command Decoder for execution, in the case of realtime commands, or for storage in the Storage Programmer in the case of stored-program commands. Incorporated in the Storage Programmer is a vehicle clock to which all vehicle functions are referenced.

3.1.3 Tracking Equipment. The tracking equipment consists solely of the S-band transponder mentioned above. This transponder returns a pulse at 2920 MHz when properly interrogated by two coded pulses at 2850 MHz (nominal).

3.2 TT&C Subsystem Operation

The TT&C Subsystem operates in several telemetry modes which are commandable from the ground. Normally, the equipment is off unless the vehicle is over a tracking station, however, the recorder is turned on at certain times and the SCO bases are energized to read in data from Bases 1 and 3 for subsequent readout over the stations. Prior to a station pass, a stored program command (SPC) will turn on the telemetry transmitters, sensors, and S-band beacon so that the vehicle may be tracked and data collected. Another command may be issued when the vehicle is at the 4-deg horizon to enable the PPD for commanding. Since command operations are discussed in Annex D, they will not be detailed in this annex. The telemetry modes which may be selected are discussed below.

3.2.1 Orbital Real-Time Mode. In the ORT mode, LINK 2 contains status information on the vehicle systems transmitted in real time. This information is taken from SCO Bases 1, 2, and 3. LINK 3B contains information on the IR Scanner outputs and a back-up command verification information taken from SCO Base 6.

3.2.2 Playback Mode. In this mode, LINK 2 telemetry is the same as in ORT mode. LINK 3P, however, contains the output of the airborne recorder. Since this information is played at four times recorded speed, it cannot be processed in real time but must be recorded in the ground station for processing at a later time.

3.2.3 BUSS Mode. Whenever the BUSS Subsystem is commanded by an unsecure command or when BUSS TM is commanded on by an SPC, SCO Bases 6 and 8 are activated on LINK 3B. In this mode, LINK 2 remains as in the ORT mode.

4. SEPARATION SUBSYSTEM

The Separation Subsystem performs numerous operations to control the separation of the OCV and the Agena booster as well as the OCV and the RV on the recovery pass. It also supplies sequenced signals to initialize the vehicle after injection and to prepare the RV for recovery.

4.1 Major Components

The major components of the Separation Subsystem are a group of baroswitches, explosive devices, and controllers which actuate the explosive devices and event monitors. These are briefly described below. (See Figure 4.)

4.1.1 Baroswitches. Baroswitches are incorporated in the subsystem to prevent firing current from entering the subsystem until the vehicle approaches orbital altitude. These switches close at 65,000 to 100,000 feet and arm the system.

4.1.2 Marmon Clamp. A Marmon clamp is used to separate the OCV/Agena after injection. This clamp is explosively released by command from the Storage Programmer.

4.1.3 In-flight Disconnect. An explosive IFD is used to provide electrical circuit disconnect preparatory to OCV/SRV separation on orbit.

4.1.4 Pin Pullers. Two Pin Pullers are located on the adapter/RV interface to hold the RV in place until separation is commanded. These are actuated by squibs upon command, allowing compressed springs to physically separate the RV from the OCV.

4.1.5 Separation Auxiliary Controller. This unit provides isolation of the various commands received from the TT&C Subsystem and the BUSS Subsystem. It also contains electrical circuits which provide erection of the magnetometer boom and VHF antenna when OVS (TT&C Command 2) is commanded.

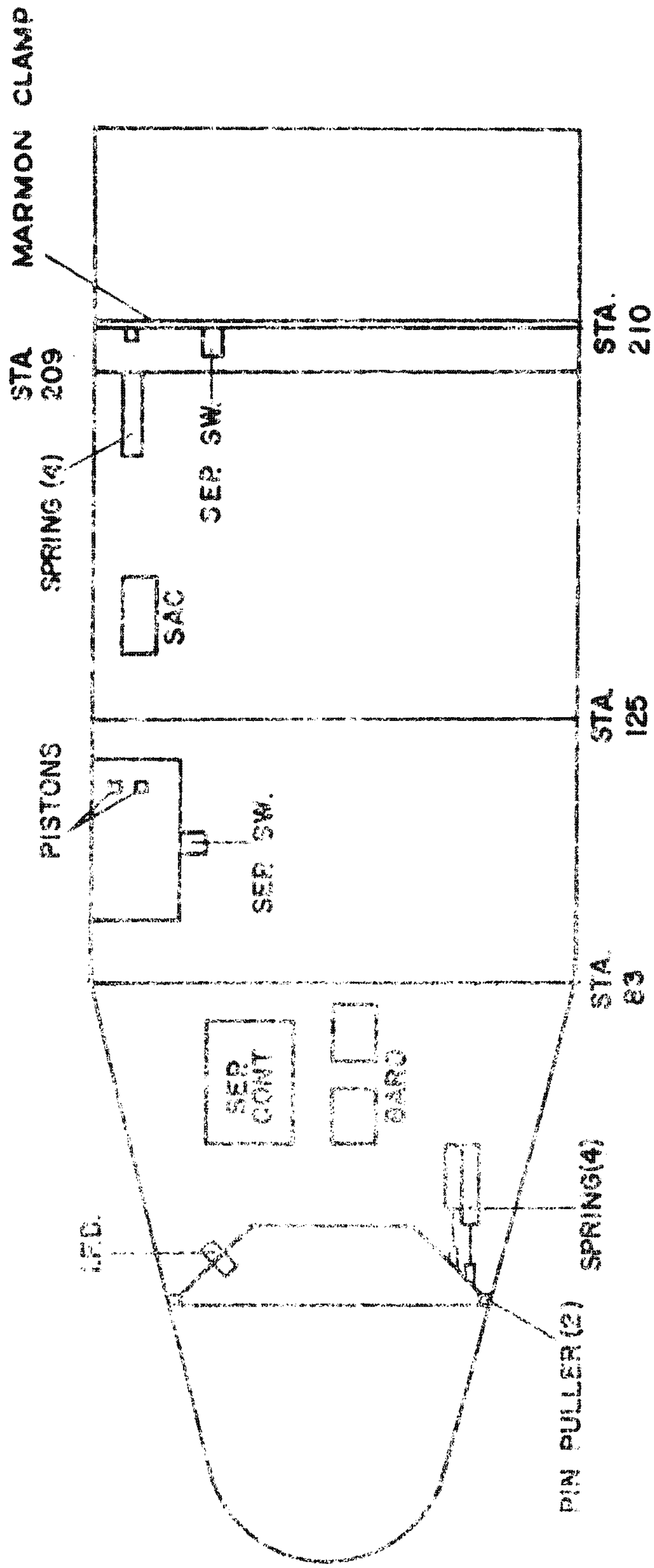


Figure 4 Separation Subsystem Inboard Profile

Approved for Release: 2024/01/30 C05099045

4.1.7 Separation Controller. This unit provides all firing functions for separation events and squib current limiting and short protection. It also provides all T/M circuitry for monitoring of separation events with the exception of that circuitry in the Auxiliary Controller.

4.1.8 Continuity Loop. The Continuity Loop tells that all switches and relays are in proper position, and that all connectors in the subsystem are mated.

4.2 Subsystem Operation

The Separation Subsystem operates in three different phases of the vehicle life as indicated below.

4.2.1 Prelaunch. During prelaunch, the subsystem prevents firing of squibs through the baroswitches. The continuity loop provides a check of the following:

a. Pyrotechnics are properly mated
b. EED bridge wires are intact
c. Separation switches are open
d. Baroswitch main switches are open.

4.2.2 Powered Flight. During ascent, the subsystem operates to control certain events such as:

a. Baroswitch closure to Arm the subsystem at 65,000 to 100,000 feet
b. Ejecting the outer shield upon receipt of computer prearm signal (TT&C Command 1)
c. Erecting the BUSS magnetometer boom and VHF antenna (TT&C Command 2).

4.2.3 Orbital Flight. During orbital flight, the subsystem controls the recovery sequence by performing the following functions:

a. Issues the DISC 1 command to fire eight squib actuators (TT&C Command 3).

b. Issues the DISC 2 command to fire three squib actuators (TT&C Command 4).

c. Sends the Arm signal to the SRV which actuates the TM battery, arms the recovery programmer, applies OCV power to Delta 4 telemetry, and initiates the inhibit timer (TT&C Commands 5 and 6).

d. Initiates the SRV thermal batteries (which provide power to the rocket programmer), places Delta 4 telemetry on internal power (SRV), redundantly arms the recovery programmer, and initiates the SRV/OCV IFD squibs (TT&C Command 7).

e. Fires the pin pullers which initiate SRV/OCV separation (TT&C Command 8).

5. ATTITUDE STABILIZATION SUBSYSTEM

The Attitude Stabilization Subsystem orients the vehicle in the local vertical-orbit plane and provides for roll maneuvering without affecting the basic orientation. It also provides vehicle stabilization during periods of orbit adjust and allows the vehicle to fly forward or reversed, and pitched down or horizontal, depending upon how it is commanded. The subsystem block diagram is shown in Figure 5.

5.1 Major Components

The major component of this subsystem is a gyro reference package which is slaved to the horizon by IR scanners and provides pitch, roll, and yaw position information to a series of pneumatic controls through attitude control amplifiers. These amplifiers may be commanded to place the vehicle in a certain position through the TT&C Subsystem and a computer in this subsystem.

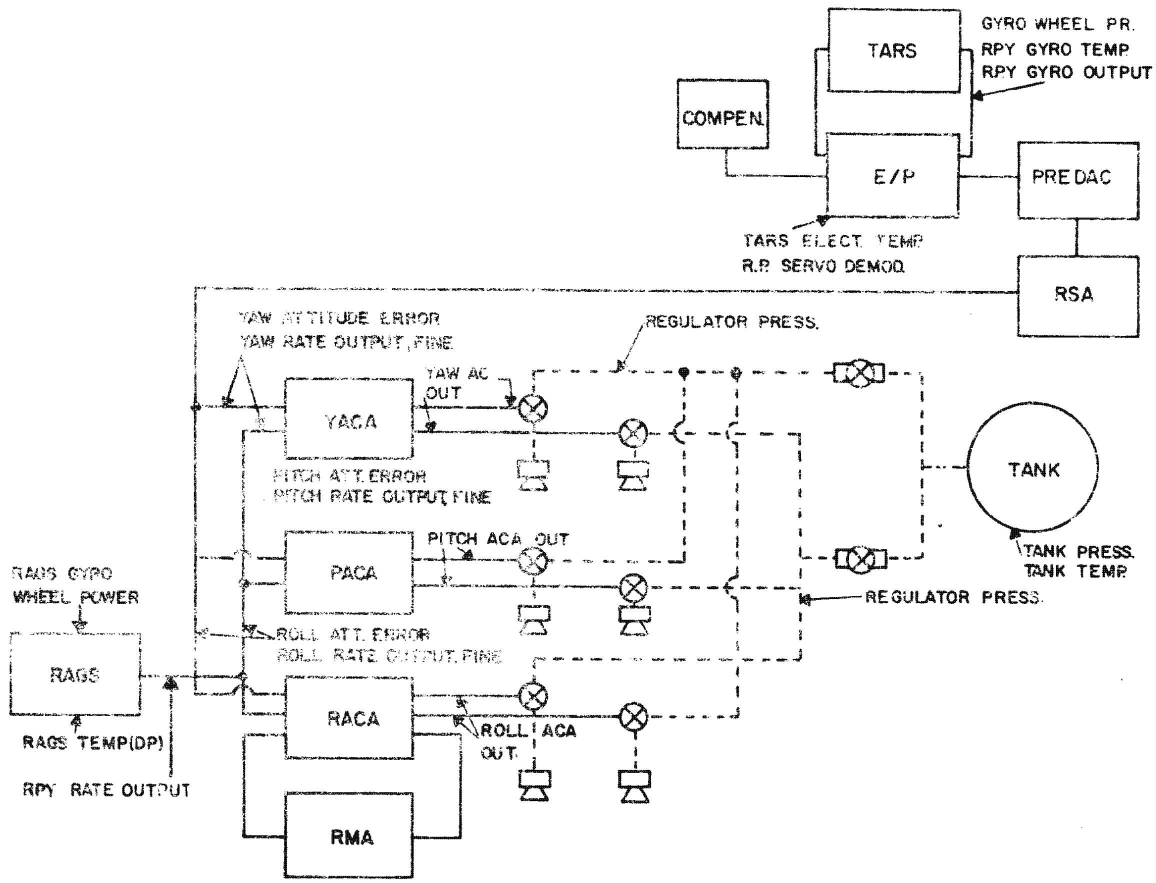
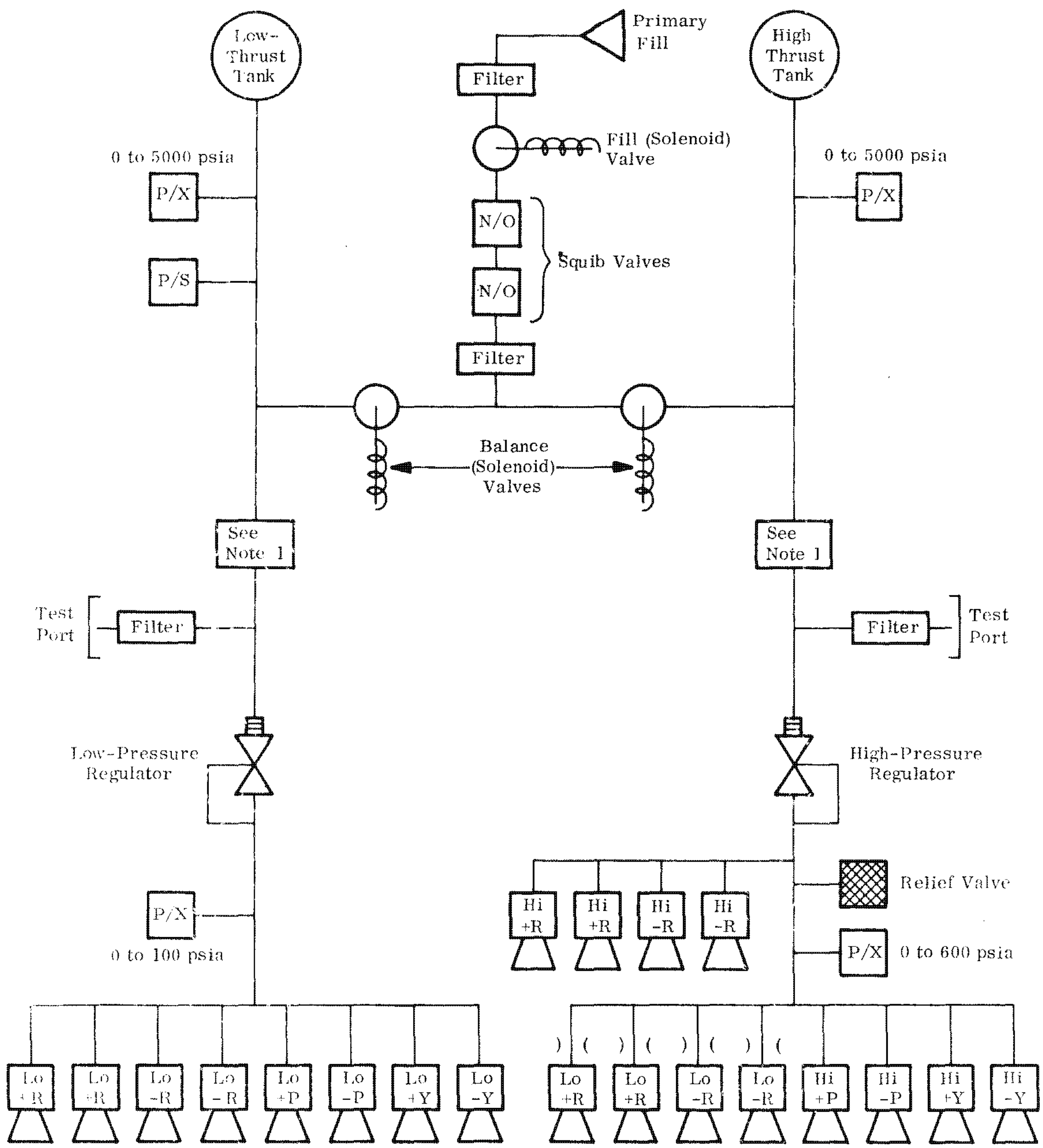


Figure 5 Stabilization Subsystem Telemetry

5.1.1 Two-Axis Reference System. The TARS is a two-gimbal stable platform which acts as the basic reference for the Attitude Stabilization Subsystem. Since the dynamic range of the yaw gyro is adequate for system control, no yaw gimbal is used. Three integrating gyros and their output amplifiers are located on the outer (pitch) gimbal and sense the motion of the vehicle, providing this information to the TARS Electronic Package. Platform errors in pitch and roll are derived from the IR Scanners which are located on the outer gimbal and are described below. Yaw error correction is derived by a gyro compassing technique which requires that both the yaw and roll gyro torque generators receive the same error signal from the IR roll output. Thus, a yaw error causes a roll error due to the orbital pitch rate and this signal is used to drive the yaw gyro until the platform is re-aligned in the orbital plane. When the vehicle is commanded to fly reverse, the connection between the roll and yaw gyro is changed.

5.1.2 Horizon Sensor. Two IR Scanners are mounted to the outer gimbal of the TARS so that they scan through the horizon in a 30-degree cone angle on each side of the vehicle at approximately 30 cycles per second. The axis of the scan cone is depressed to cause a duty cycle of approximately 50 percent at an orbital altitude of 97 nautical miles. These scanners detect pitch errors by comparing the time that the scanner looks at the earth with a reference mark produced by a magnetic pickup, and roll errors by comparing the duty cycle of one set of scanners with that on the opposite side. Examples of the output of these scanners are shown in Appendix D.5. The output of these scanners is sent through a computer network and compensation circuitry to torque the TARS platform whenever it becomes misaligned.

5.1.3 Pitch-Roll Digital-to-Analog Converter. The PREDAC allows the insertion of a commanded angle of pitch or roll. Signals from the TARS resolvers are sent to PREDAC and then back to the platform after the insertion of the commanded angle. The roll angle is received from the TT&C Subsystem in 7-bit digital form and pitch is received in the form of two discrete bits.



Note 1

Tasks 88 and 89

This component is a normally-open (N/O) squib valve, closed by a BUSS disable command only.

Task 90

This component is a solenoid valve, closed by a primary gas disable command or opened and closed by primary commands.

Figure 6 Redundant Stabilization Pneumatics

5.1.4 Resolving Summing Amplifiers. The RSAs consist of three AC amplifiers which combine the elements of the coordinate transformation equations to yield pitch, roll, and yaw error signals in vehicle coordinates.

5.1.5 Rate Gyro System. The Rate Gyro System (RAGS) measures the vehicle angular velocities about the three separate axes in vehicle coordinates and sends this information to the three Attitude Control Amplifiers (ACAs). The pitch and yaw rate gyros have a bias correction for orbital rate when the vehicle is flying forward. The bias correction is not reversed when the vehicle is flying reversed.

5.1.6 Attitude Control Amplifiers. Three ACAs are provided, one for each of pitch, roll, and yaw. These contain the analog data processing logic necessary to effect the switching capability of the pneumatic equipment. These ACAs generate both coarse and fine deadbands which may be selected by command to allow a choice of the accuracy of control desired. They also enable the selection of rate roofs which prevent exceeding 0.015 degree/second rate of maneuvering when precise control is commanded. In addition, position information is differentiated in the ACAs to generate a derived rate signal equal to 15 percent of vehicle rate to provide ratio information in the event of RAGS failure.

5.1.7 Roll Maneuvering Amplifier. Roll Maneuvering Amplifier (RMA) generates switching lines which are used to effect roll maneuvering, permitting the optimum use of stored impulse. Three maneuvering rates are selectable by command so that the lowest rate which will complete the maneuver properly may be selected.

5.1.8 Primary Gas Disable. A BUSS Execute command will disable the primary stabilization gas by activating the two normally open squib valves (see Figure 6).

5.1.9 Redundant Pneumatic Control Box (RPCB). This component will provide the necessary control to operate the high-pressure and low-pressure pneumatic systems. It will control electronic modes, select appropriate control nozzles, and balance pressures in the pneumatic storage tanks. The following items are discussed to help describe the RPCB:

a. Balance. This function will equalize the pressure in the two pneumatic tanks. The balance ON command will provide +28 vdc to the two normally closed pneumatic tanks' balance valves. The valves will close upon receipt of a Balance OFF command or by a timer in the control box 20 to 45 sec after a balance ON command.

b. High System OFF Command (RTC 11). Upon receipt of this command, the RPCB will provide a continuous +8 vdc signal to disable the RMA and also initiate an ACA Low Thrust ON signal to the pitch, yaw, and roll ACAs.

c. Low System OFF Command (RTC 12). Upon receipt of this command, the RPCB will provide a continuous +8 vdc signal to disable the RMA and also initiate an ACA High Thrust ON signal to the pitch, yaw, and roll ACAs. The RPCB will also transfer the Roll High Thrust Solenoid ON signal from the normal high-thrust solenoids to the backup low-thrust solenoids.

d. High and Low Systems OFF Commands (RTC 11 and RTC 12). When both the high and low systems are commanded OFF, the RPCB will provide a +8 vdc signal to disable the RMA and the pitch, yaw, and roll ACAs.

e. High and Low Systems ON Command (RTC 16). Upon receipt of this command the RPCB will enable normal RMA and ACAs operation.

5.1.10 Pneumatic Subsystem. Each branch has a 2-cu ft gas storage tank, a storage gas-pressure transducer, a normally open explosive valve, a filter-regulator assembly, a regulated pressure transducer and solenoid valves, and nozzles for three-axis attitude control. (See Figure 6.)

The gas storage tanks are connected by a cross-feed line having two balancing/isolation solenoid valves, permitting the transfer of storage gas from one thrust branch to the other on a command basis. The normally open explosive squib valves in the individual thrust branches provide for positive shutoff of the primary actuation subsystem if BUSS is enabled.

The high-pressure system downstream of the high-pressure regulator is protected from overpressure by a relief valve. The low-pressure system is similarly protected by the self-relieving feature of the low-roll solenoid valves.

The normally open explosive valves are actuated approximately 120 sec after launch to provide a positive seal in the charge line. In flight, the storage tanks are heated to maintain stored-gas temperature between the limits of 100° and $120^{\circ}F$. This provides a specific impulse of approximately 40 lb-sec per pound of gas.

Thrust rating for the nozzles is as follows:

	Nozzle Thrust (lb)		
Attitude	High	Low	Redundant Low
Roll	4.0	0.1306	0.1306
Pitch	7.0	0.8025	--
Yaw	7.0	0.8025	--

Note:
For Tasks 88 and 89 the squib valves in each branch is a normally open squib valve; for Task 90 this component will be a solenoid valve.

5.2 Subsystem Operation

In order for the Attitude Stabilization Subsystem to operate, two types of inputs are necessary. Both IR sensor output and orbital rate pitch correction are necessary for attitude sensing, and command signals from the command decoder are necessary to operate the system in its various modes. Normally, the IR scanner outputs are used to slave the TARS to the horizon and provide the horizontal reference as described earlier. The vehicle can then be commanded into high or low thrust and coarse or fine deadbands as the orbital maneuvers to be performed dictate. Roll angles are commanded through ±45 degrees in 0.709-degree steps using seven-bit digital information from the TT&C Subsystem. When yaw torquing is commanded, the vehicle will move at 0.4 degrees/second about the yaw axis. Therefore to turn the vehicle from the forward to reverse position takes 450 seconds. Two commandable pitch positions, pitch zero and pitchdown, are available allowing the vehicle to be pitched down to -58 degrees for deboost and RV separation. Due to the many options and the complexity of the interrelationships, the Attitude Control System commands are determined by a digital computer program while on orbit.

During normal operation, both the low- and high-thrust pneumatic systems are enabled. However, either pneumatic system may be disabled upon command. This redundant feature permits continued, although degraded, control capability should an on-orbit failure occur in either system. The two balancing/isolation valves will be commanded open periodically during orbit operations, permitting transfer of storage gas between the two storage tanks. Both pneumatic systems are disabled by a BUSS Execute command (except for BUSS Real Time No Gas mode).

6. ORBIT ADJUST SUBSYSTEM

The Orbit Adjust Subsystem (see Figures 7 and 8) supplies impulses, or velocity increments and decrements, on command to the SV to make corrections in its orbit necessitated by injection errors, aerodynamic drag orbit decay, cross range maneuvers, and deboost during the last pass to ensure impact or recovery in the predetermined area.

6.1 Principal Subassemblies

The principal subassemblies of this subsystem are the propulsion equipment and a relay box.

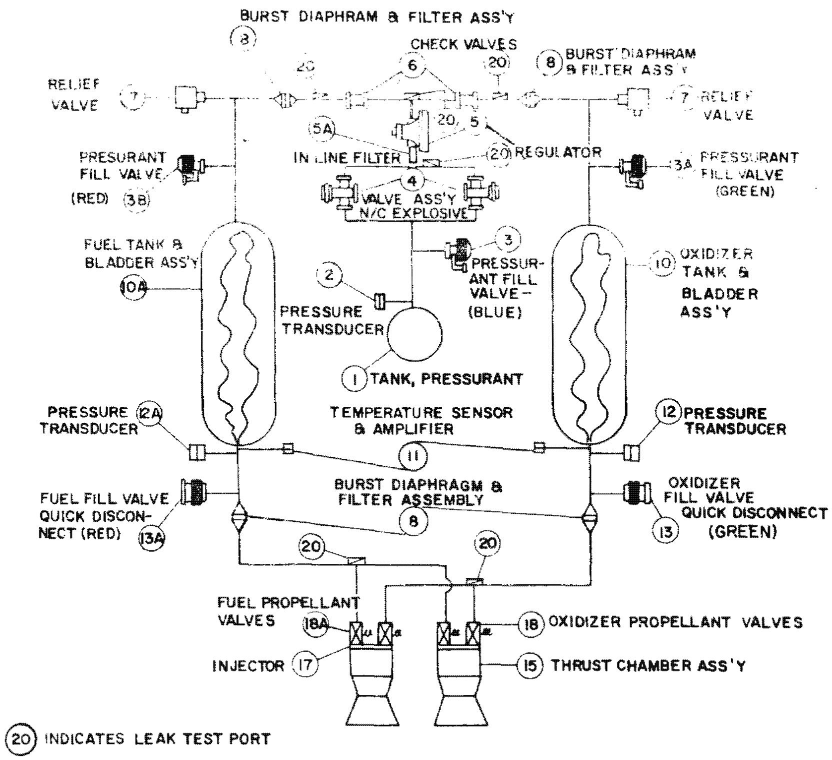


Figure 7 Orbit Adjust Subsystem Propulsion

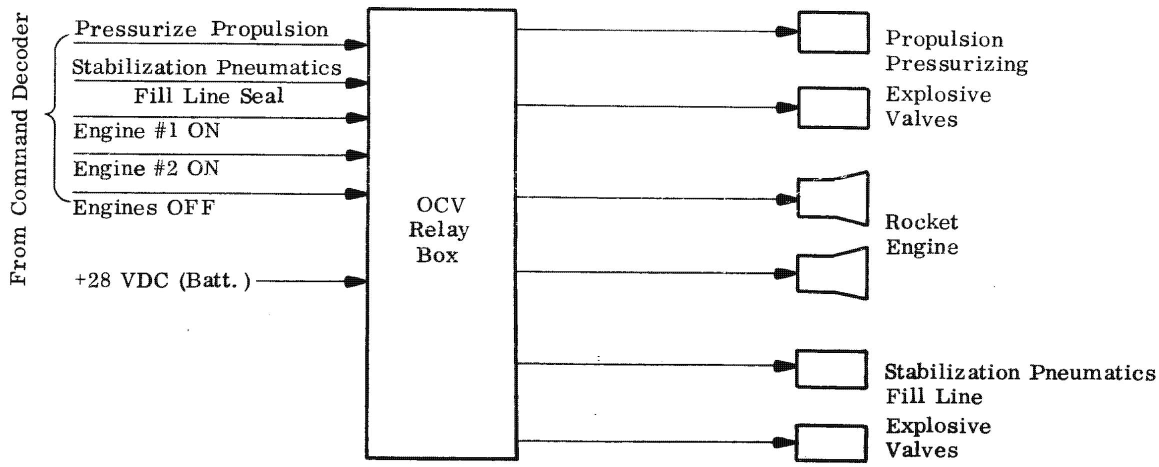


Figure 8 Simplified Block Diagram Orbit Adjust Subsystem

6.1.1 Propulsion Equipment. The propulsion system diagrammed in Figure 7 uses two 48-pound-thrust bi-propellant rocket engines. The propellants are hypergolic (ignite on mixing) so an ignition system is not required. The current engines have achieved a specific impulse lasting about 281 sec. High pressure nitrogen is used to expel the propellants into the thrust chambers. The pressurant tank initially contains nitrogen at about 4500 psi. When the squibs of the normally closed valves are fired, the high pressure nitrogen is reduced to 280 ±5 psi by the regulator, the burst diaphragms break, and the propellant tanks become pressurized. The propellants then flow through their stainless steel lines again causing burst diaphragms to break, and the propellants fill the lines to the engine solenoid valves. Upon command, by command system, the engine solenoid valves open, both propellants enter the thrust chambers, and thrust begins. The pressurant side of the system also contains a relief valve and a check valve in each propellant leg. The relief valve is to prevent over-pressure buildup in the event the environmental control allows the system to get too hot. The check valves prevent possible mixing of the two propellant vapors upstream which could have catastrophic results. The propellants must be maintained between $+30^{o}$ and $+120^{o}F$. The lower temperature is set at a point which ensures a margin of safety to avoid freezing of the propellants. The higher temperature is set at a point which prevents the internal pressure of the oxidizer from becoming too high.

6.1.2 OCV Relay Box. The OCV Relay Box contains circuitry to pressurize the propulsion system, insure that the stabilization pneumatics fill line seals after lift-off, and to open and close the solenoid valves for rocket engine operation.

7. (S) ELECTRICAL POWER AND SIGNAL DISTRIBUTION SUBSYSTEM

The EP&SD Subsystem includes the harness, batteries, switching components, and power devices necessary to route power throughout the vehicle. A block diagram of this subsystem is shown in Figure 9.

7.1 Major Subassemblies

The major components of the EP&SD Subsystem are the batteries, the Long Life Control Box (LLCB), and the Amp-Hour Counter.

7.1.1 Batteries. Eight operational batteries are supplied, providing a net predicted availability of approximately 2560 amp-hours. The nominal use rate is approximately 20.5 amp-hrs/rev. These batteries supply the dc power to the power controller.

A BUSS/Sep backup battery is also included which supplies power for recovery if the main battery supply is not operating or is below the required voltage.

7.1.2 Long Life Control Box (LLCB). The power subsystem is protected from certain in-flight malfunctions such as battery cell shorting. This is accomplished by power transistors configured for diode isolation of the individual batteries.

7.1.3 Amp-Hour Counter. The feed wires from the batteries are fed through a toroid which is used to count total amp hours consumed. This equipment feeds three segments of a telemetry multiplexer to count power consumed

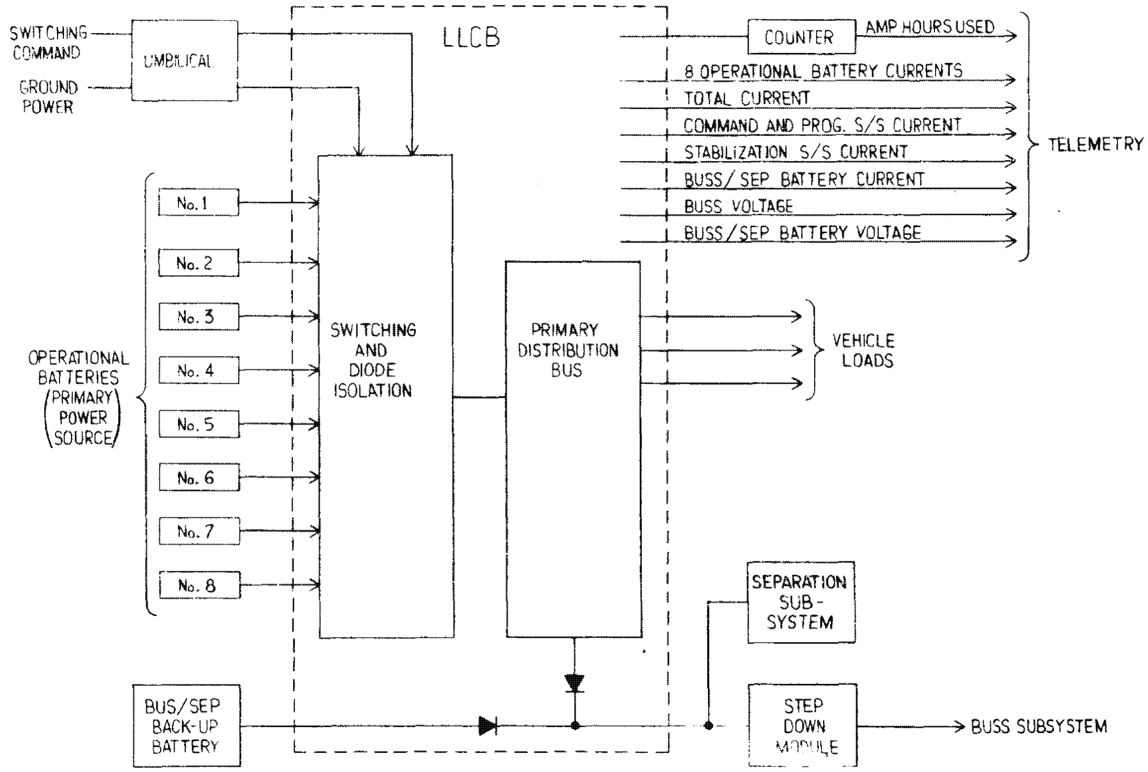


Figure 9 Power Subsystem

B.2-27

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in three steps on each segment. These segments in turn represent amp-hour usages of 0 - 30, 0 - 120, and 0 - 480 amp hours. After 630 ampere hours are consumed (all three segments read maximum), the counters reset to 0 and the ampere hour meter count repeats. To ascertain total ampere hours consumed at a certain point in the mission, a record of the number of times the counter steps through an indicated 630 ampere hours must be kept.

8. ENVIRONMENTAL CONTROL SUBSYSTEM

The Environmental Control Subsystem maintains the proper temperatures within the vehicle. Temperature control is achieved using both passive and active means. Passive means are such features as location of components and design, while active control is effected through heating where required. This subsystem is controlled from the SCF only by turning environmental power on and off as necessary.

9. BACK-UP STABILIZATION SUBSYSTEM

BUSS is a back-up command and attitude control subsystem which allows re-entry of the vehicle to be accomplished in the event of primary command equipment or Attitude Stabilization Subsystem failure.

9.1 Major Subassemblies

The major subassemblies used in BUSS are:

a. Commanding Equipment
b. Attitude Control Equipment
c. BUSS Timers

9.1.1 Commanding Equipment. BUSS may be commanded either by the ZEKE system or the primary command system. BUSS may be commanded through the ZEKE system into one of five modes:

BUSS Real Time (BRT)
BUSS Next Station (BNS)

BUSS Next Orbit (BNO)

BUSS Real Time No Gas (BRTNG)

BUSS Mode Determination (BMD)

The primary command system will only command BUSS Real Time (BRT). This is designated as Mode 4/BUX.

9.1.2 Attitude Control Equipment. The BUSS attitude control system consists of an electronic/sensor subsystem and a pneumatic subsystem. The former consists of a tri-axis magnetometer sensor, magnetometer electronics, rate gyro, and flight control electronics. The pneumatic subsystem consists of six pneumatic control solenoid valve/nozzles, yielding 10-pound thrust, one pneumatic regulator, a squib initiator to turn on the system, a pressure and temperature transducer, and a cold gas storage tank. The tri-axis magnetometer sensor is mounted on an extendable boom and aligned such that one sensor is parallel to the vehicle roll axis. This is termed the "R Magnetometer" while the remaining two sensors define what is called the "P" and "Q" axis. The magnetic noise in the vicinity of the magnetometers will be maintained less than 0.001 gauss. The rate gyro is mounted in the BUSS module and aligned such that its input axis is parallel to the vehicle roll axis. Four pneumatic nozzles are mounted in the adapter aligned with respect to the "P" and "Q" magnetometer axes (2 each, one plus, one minus) to control vehicle motions about those axes. The remaining two pneumatic nozzles are mounted to control positive and negative rotation about roll.

9.1.3 BUSS Timers. A 20-minute timer is started whenever a mode select command is executed by an unsecure ZEKE command. This timer controls the T/M link, rate gyro, magnetometer, and attitude control electronics. A 100-minute timer is started when an execute KIK ZEKE command is received. This timer controls the execute sequence for BUSS.

9.2 (S) Subsystem Operation

Upon receipt of the unsecure mode select command, the system is turned on by the 20-minute timer. Receipt of the secure execute command starts the 100-minute timer and disables the unsecure command loop.

Table 3

(S) BUSS SEQUENCE OF EVENTS

Event	Time(sec)	Mode 4/BUX Mode 1/BRT	Mode 2/BNS	Mode 3/BNO	Mode 5/BRTNG
T_0	0	Dis Pri Pneu	Dis Pri Pneu	Dis Pri Pneu	---
T_1	2	Dis 1	Dis 1	Dis 1	Dis 1
T_2	4	Dis 2	Dis 2	Dis 2	Dis 2
T_3	6	Init A Timer Turn TM ON Enab BUSS Pneu ARM	N/A	N/A	Init A Timer Turn TM ON ARM
T_4	105.5	Transfer	N/A	N/A	Transfer
T_5	108	Separate	N/A	N/A	Separate
T_6	491	N/A	Init A Timer Turn TM ON Enab BUSS Pneu ARM	N/A	N/A
T_7	590.5	N/A	Transfer	N/A	N/A
T_8	593	N/A	Separate	N/A	N/A
T_9	5098	N/A	N/A	Init A Timer Turn TM ON Enab BUSS Pneu ARM	N/A
T_{10}	5197.5	N/A	N/A	Transfer	N/A
T_{11}	5200	N/A	N/A	Separate	N/A
T_{12}	5800	Enable BUSS Cmd & Reset BUSS J-Box			

ANNEX B

APPENDIX 2 – Tab a

INSTRUMENTATION SCHEDULE

Table B.2.a-1

CONTINUOUS CHANNELS

Link	Channel	Function
2, 3P	6	Command Decoder Busy Signal
2, 3P	7	Gyro Roll Rate – Fine
2, 3P	8	Gyro Pitch Rate – Fine
2, 3P	9	Gyro Yaw Rate – Fine
3	10	"P" Axis Valves
2, 3P	11	Delay Line Erase Monitor/Program Word Line Monitor
3P	11	L.H. Pre-amp or Current or
3P	11	Battery Total
3	11	"Q" Axis Valves
2, 3P	12	R.H. Preamp
3	12	"R" Axis Valves
2	13	Current Ops Battery Total
3P	13	Tape Speed Compensation
3	14	L.H. Preamp
3	16	R.H. Preamp
2	17	Command Verification
3	17	Command Verification
2	18	Vehicle Clock Time

Table B.2.a-2

Commutated Channels

Channel 10 (Link 2, 3P)

Pin	Function	Pin	Function
1	Calibration – 10 percent	40	DC Power Supply 28v input
2	Calibration – 50 percent	41	DC Power Supply ± 26.5v
3	Calibration – 90 percent	42	DC Power Supply + 36v
4	22 vdc Monitor	43	DC Power Supply Peak Detector Q4
5	GFE 1-4	44	DC Power Supply Q3 Temp
6	GFE 1-5	45	DC Power Supply Q4 Temp
7	GFE 1-6	46	DC Power Supply ± 24.5 volts
8	GFE 1-7	47	DC Power Supply Internal temp
9	GFE 1-8	48	Temp. Base Plate, 6v Power Supply
10	GFE 1-9	49	Temp. Liner 190/240°
11	GFE 1-10	50	Temp. Liner 190/300°
12	GFE 1-26	51	Temp. Liner 190/2°
13	GFE 2-2	52	Temp. OCV Skin 190/60°
14	5 vdc Bus	53	Temp. OCV Skin 190/120°
15	5 vdc Bus	54	Temp. Liner 190/182°
16	5 vdc Bus	55	Temp. Inside Insul. 190/60°
17	5 vdc Bus	56	Temp. Inside Insul. 190/180°
18	5 vdc Bus	57	Temp. Inside Insul. 190/300°
19	5 vdc Bus	58	Temp. Vehicle Struct 127/185°
20	5 vdc Bus	59	Temp. Decoder/Program Plate 192/356°
21	5 vdc Bus		
22	5 vdc Bus	60	Temp. Outside Insul. 216/Q IV
23	5 vdc Bus	61	Temp. Sect 5 Htr 84/180°
24	5 vdc Bus	62	Temp. Sect 5 Htr 104/15°
25	5 vdc Bus	63	Temp. Sect 5 Htr 104/90°
26	Temp. OA Oxid Tank	64	Temp. Sect 5 Htr 104/180°
27	Temp. OA Fuel Tank	65	Temp. Sect 5 Htr 104/270°
28	Temp. OA Solenoid Valve	66	Temp. 64/0°
29	Press. OA N_2 Reg Inlet	67	Temp. 64/60°
30	Press. Stab. Reg Low Output	68	Temp. 64/120°
31	Press. Stab. Reg Hi Output	69	Temp. 64/180°
32	Temp. TARS Roll Gyro	70	Temp. 64/240°
33	Temp. TARS Pitch Gyro	71	Temp. 64/300°
34	Temp. TARS Yaw Gyro	72	Temp. Aft Equipment Struct
35	Temp TARS Electronics	73	Temp. Adapter Struct
36	Volts, TARS Gyro 400 cps	74	PIGGYBACK No. 6
37	Volts, RAGS Gyro 400 cps	75	Temp. Delta III Plate
38	Temp. RAGS Gyro Block	76	Temp. Signal Data Rcdr
39	DC Power Supply ± 10 v	77	Temp. Thrust Cone

Table B.2.a-2 (Continued)

Pin	Function
78	Temp. Capsule
79	Temp. Recovery Battery
80	Volts, Recovery Batt 1
81	Temp. Op Batt 1
82	Temp. Op Batt 2
83	Temp. Op Batt 3
84	Temp. Op Batt 4
85	Temp. Op Batt 5
86	Temp. Op Batt 6
87	Temp. Op Batt 7
88	Temp. Op Batt 8
89	Frame Sync
90	Frame Sync

Table B.2.a-2 (Continued)

Channel 12 (Link 2, 3P)

Pin	Function	Pin	Function
1	GFE 2-15	16	PIGGYBACK No. 1
2	GFE 1-16	17	PIGGYBACK No. 2
3	GFE 1-29	18	Temp. stag point at 70°F
4	GFE 1-18	19	Pressure, OCV Oxidizer
5	Calibration – 10 percent	20	Pressure, OCV Fuel
6	GFE 1-12	21	5 vdc Bus
7	GFE 1-3	22	5 vdc Bus
8	GFE 1-33	23	5 vdc Bus
9	GFE 1-34	24	5 vdc Bus
10	GFE 1-35	25	Calibration – 90 percent
11	GFE 1-25	26	Recorder Counter LSD
12	Computer Phase	27	Recorder Counter
13	Computer Events	28	Recorder Counter MSD
14	Current Command Status	29	Frame Sync
15	Calibration – 50 percent	30	Frame Sync

Channel 13 (Link 3)

Pin	Function	Pin	Function
1	Separation Monitor 2	15	Calibration – 50 percent
2	Antenna/Magnetometer Erect	16	Voltage Monitor (BUSS)
3	Separation Monitor 4	17	Power Monitor
4	Separation Monitor 5	18	Select Address Monitor
5	Calibration – 10 percent	19	Mode Monitor
6	Separation Monitor 6	20	Secure Cmd Mon – PPD ON
7	Separation Monitor 7	21	Secure Cmd Mon – BUSS Exec
8	+5 vdc Bus	22	Event Monitor
9	+5 vdc Bus	23	+5 vdc Bus
10	Pressure, BUSS Gas	24	+5 vdc Bus
11	Temp. BUSS Gas	25	Calibration – 90 percent
12	Temp. BUSS Beam at 358°	26	+5 vdc Bus
13	Temp. Hi Roll Solenoid 216/242°	27	+5 vdc Bus
		28	+5 vdc Bus
14	Temp. Hi Roll Solenoid 216/62°	29	Frame Sync
		30	Frame Sync

Table B.2.a-2 (Continued)

Channel 14 (Link 2, 3P)

Pin	Function	Pin	Function
1	Roll Torque Motor Volts	16	Inhibit Transfer
2	Pitch Torque Motor Volts	17	Yaw Torque ON/OFF
3	Roll IR Computer	18	Current Stab Subsystem
4	Pitch IR Computer	19	GFE 1-13
5	Calibration – 10 percent	20	GFE 1-14
6	Gyro Roll Rate – Coarse	21	GFE 1-17
7	Gyro Pitch Rate – Coarse	22	GFE 1-20
8	Gyro Yaw Rate – Coarse	23	GFE 1-27
9	Roll Att. Error ACA	24	GFE 1-19
10	Pitch Att. Error ACA	25	Calibration – 90 percent
11	Yaw Att. Error ACA	26	GFE 1-21
12	Roll ACA Output	27	GFE 1-22
13	Pitch ACA Output	28	GFE 1-23
14	Yaw ACA Output	29	Frame Sync
15	Calibration – 50 percent	30	Frame Sync

Channel 15 (Link 2, 3P)

Pin	Function	Pin	Function
1	Cont. Loop/Sep Events	16	Press OA N_2 Reg Inlet
2	Separation Monitor 1	17	Temp. Cold Gas Tank
3	5 vdc Bus	18	Temp. Cold Gas Tank
4	5 vdc Bus	19	Press. Low Thrust Tank
5	Calibration – 10 percent	20	Pressure Switch, Cold Gas
6	Secure Word Count 1 (Least)	21	Press. Hi Thrust Tank
7	Secure Word Count 2	22	Redundant Pneumatics Monitor
8	Secure Word Count 3	23	GFE 1-11
9	Secure Word Count 4	24	GFE 1-26
10	Secure Word Count 5	25	Calibration – 90 percent
11	Secure Word Count 6	26	GFE 1-28
12	Secure Word Count 7 (Most)	27	GFE 2-2
13	Delay Line 1 and/or 2	28	22 vdc Monitor
14	Delay Line 3 and/or 4	29	Frame Sync
15	Calibration – 50 percent	30	Frame Sync

Table B.2.a-2 (Continued)

Channel 16 (Link 2, 3P)

Pin	Function	Pin	Function
1	Volt, OCV BUSS Primary	16	AH Meter Total (LSD)
2	Volt, BUSS/Sep B/U Batt	17	AH Meter Total
3	DC Power Supply Voltage Input	18	AH Meter Total (MSD)
4	Cmd Decoder Voltage Mon.	19	"P" Axis Magnetometer
5	Calibration – 10 percent	20	"Q" Axis Magnetometer
6	Current, Op Batt 1	21	"R" Axis Magnetometer
7	Current, Op Batt 2	22	Pitch Demod Error
8	Current, Op Batt 3	23	Roll Demod Error
9	Current, Op Batt 4	24	Yaw Demod Error
10	Current, Op Batt 5	25	Calibration – 90 percent
11	Current, Op Batt 6	26	Temp. "S" – Band Beacon, Int.
12	Current, Op Batt 7	27	S-Band Beacon Interrogate
13	Current, Op Batt 8	28	S-Band Beacon Transmit
14	Current, BUSS/Sep B/U Batt	29	Frame Sync
15	Calibration – 50 percent	30	Frame Sync

ANNEX B
APPENDIX 2 – Tab b

RECOVERY CONFIGURATION

CONTENTS

ANNEX B

APPENDIX 2 – Tab b

RECOVERY CONFIGURATION

1. RE-ENTRY VEHICLE CONFIGURATION

The Satellite Re-entry Vehicle (SRV) extending to Sta. 46 is basically of the same configuration as the A-45 vehicle with some minor modifications. The basic components of the SRV are the thrust cone, parachute systems, recovery capsule (RC), and ablative shell.

1.1 Thrust Cone

The thrust cone is an aluminum structure containing a cold gas spin and de-spin system, solid fuel retro-rocket, thrust cone programmer, barometric switch, and thermal batteries. The thrust cone is attached to the RC ablative shell and held against the force of two springs by an explosive type separation mechanism which is ignited by a signal from the thrust cone programmer.

1.2 Parachute System

The parachute system installed on top of the RC consists of a thermal cover with ejection pistons, a 4.5-foot diameter ribbon deceleration chute, and a main 29.6-foot diameter ringslot descent chute. The main chute deployment bag is designed so that it will separate into two components when retention lines are cut. Ten seconds after deployment of the deceleration chute, two pyrotechnical line-cutters on the main chute deployment bag sever retention lines and permit the deceleration chute to function as a pilot chute, pulling the main chute deployment bag apart. The main chute then deploys in a reefed condition and four seconds later is de-reefed by the action of the reefing line cutters. Significant parachute system data are as follows:

a. Weight of SRV at re-entry is approximately 260 pounds.
b. The suspended weight of the RC is approximately 200 pounds.
c. The weight of the main parachute is 17 pounds.
d. The main chute has alternating orange and white rings.

RC descent time vs altitude, and parachute descent rates are given in TG OPlan.

1.3 Recovery Capsule

The recovery capsule consists of a hemispherically shaped gold-plated aluminum housing, measuring about 29 inches in diameter and 19 inches in height. The recovery capsule contains the recovery sequence programmer components, acquisition light, acquisition beacon, telemetry package, batteries, and instrumentation components. Two semi-regid 1/4-wave whip antennas are mounted on the outside lip of the bucket and extend about four inches above the ablative shell. A soluble plug is installed which will allow the RC to flood and sink 54 to 90 hours following water impact.

1.4 Ablative Shell

The ablative shell is fabricated of phenolic resin impregnated glass cloth approximately 0.100 inch thick forming the structural portion of the heat shield. An outer ablative layer composed of phenolic resin impregnated nylon is provided to limit temperature rise of the inner structural shell during re-entry.

1.5 Inhibit Timer

An inhibit timer is employed to provide a redundant means of ensuring deorbit in the event of gross malfunction in the deorbit system. The planned concept of inhibit mode is to deploy the pilot parachute and drop the heat shield before reentry if a long downrange impact is likely to occur. The inhibit sequence is controlled by a preset on-board timer, with no provisions for ground control based on observation of events. The inhibit timer is started by execution of Separation Commands 5 and 6 (Arm).

Briefly, the inhibit sequence occurs as follows:

a. The inhibit timer directs a firing signal to the thrust-cone-ejection pyrotechnics 250 ± 25 sec after receipt of Separation Commands 5 and 6 (Arm). This is about 180 sec after the programmed nominal separation time.

b. If the 3-g switch has not closed before Arm +860 ± 25 sec, the inhibit timer will then start the 34-sec recovery-programmer parachute-deployment timer. (In a nominal reentry the 3-g switch will close at Arm +350 to 550 sec.)

c. Since the removal of the heat shields will leave the RC, parachutes, and location aids unprotected during reentry, it is expected that they will be destroyed by heat. Should the RC withstand the heat of reentry, it is not expected to survive the impact.

1.6 Acquisition Aids

The following are the operation characteristics of each:

a. Recovery Beacon

(1)	Carrier Frequency	235 MHz ± 0.01%
(2)	Power Output	400 milliwatts average, 800 milliwatts peak into a 50 OHM resistive load.
(3)	Modulation	
	Type	Amplitude
	Frequency	200 – 1500 Hz
	Excursion	500 Hz minimum within frequency band
	Sweep Rate	1-3 Hz

b. Recovery Flashing Light Beacon (only one)

(1)	Repetition Rate	52-75 Flashes per minute
(2)	Intensity	100 lunen seconds
(3)	Life	10-17 hours

c. Telemetry System

(1)	Modulation	FM/FM (100 kHz bandwidth)
(2)	Frequency	242.0 MHz (crystal controlled)
(3)	Power	2.0 watts
(4)	Life	20 minutes
(5)	Type	Four continuous IRIG Channels – 8, 9, 10, and 12.

2. POWER SOURCE

The power sources are as follows:

a. Separation (Thrust Cone Power Source)

(1)	Type	Thermal primary battery
(2)	Quantity	Two
(3)	Activation Time	One second to provide open circuit voltage of 31 ±4vdc
(4)	Life	25 seconds minimum

b. Recovery Power Source

(1)	Type	Silver oxide-zinc battery with potassium hydroxide as electrolyte
(2)	Quantity	Two
(3)	Activation	Activated by addition of electrolyte
(4)	Life	Under normal conditions, 10 hours after parachute deployment

c. Telemetry Power Source

(1)	Type:	Silver oxide-zinc battery with potassium hydroxide as electrolyte
(2)	Quantity:	One
(3)	Activation:	Remotely activated by 28v dc arm signal. Signal ignites two gas generators which force the electrolyte out of its reservoir and into the cells.
(4)	Life:	20 minutes

ANNEX B
APPENDIX 3
RECOVERY FORCE EQUIPMENT (U)

CONTENTS

ANNEX B

APPENDIX 3

RECOVERY FORCE EQUIPMENT

1. STANDARD EQUIPMENT

The following listed aircraft and ships support recovery operations:

Recovery Force (Air Force)	Function
JC-130 Aircraft	Capsule detection, air recovery or search
CH-3B Helicopters	Surface retrieval personnel
Air Rescue Aircraft/HC-97 (w/Pararescue team)	Air rescue service and to secure capsule on surface by deploying pararescue team
Surface Recovery Ship	Detection, search, surface recovery, and event recording

2. DESCRIPTION OF RECOVERY FORCE EQUIPMENT

2.1 Recovery Aircraft

JC-130 aircraft are equipped for aerial recovery and assigned to the 6593rd Test Squadron (Special) to support recovery operations. Aerial recovery is accomplished by snaring the capsule parachute with hooks on a recovery loop suspended between two poles from the rear ramp and cargo door opening of the aircraft. The aircraft system consists of two hydraulically-operated recovery poles mounted on tracks, a recovery loop and hook assembly, a track mounted hydraulically-operated boom provided with a cable and winch assembly, and a track-mounted carriage. Control is from the winch operator's control console.

Special direction-finding (DF) equipment is installed in the aircraft and consists of a receiving system, decoding equipment, tracking system, and indicating system. Its purpose is to identify the beacon signal, continuously determine the bearing of the beacon transmitter, and relay this information to the aircraft crew. If aerial-recovery is not successful this system is also used to locate the floating capsule.

The JC-130 recovery aircraft have a nominal radius of action of 1,060 nautical miles with three hours on-station.

2.2 Recovery Helicopters

The CH-3B helicopter is a single rotor, twin-turbine powered helicopter with an emergency amphibious capability. Six CH-3B helicopters are assigned to the 6593rd Test Squadron and are modified to meet the special needs of recovery operations. Each is equipped with auxiliary flotation bags for over water emergency use; an auxiliary internal fuel tank; the AN/APW 130 Doppler Navigation System; UHF, and HF-103 radios; and an external cargo sling with an 8000-pound capacity. The CH-3B helicopter crew consists of a pilot, co-pilot, helicopter mechanic, and two loadmasters (SCUBA trained and qualified).

With the auxiliary fuel tank installed and at a true air speed of 125 knots, a cruise endurance of about six hours can be obtained with a no wind range of about 700 nm* (radius of action 350 nm). Without the auxiliary fuel tank the radius of action is 200 nm with one hour on-station. The maximum permissible indicated air speed for forward flight is 150 knots.

*Note: This capability will not be available until modification of CH-3B landing gear, to accommodate higher gross weight, is accomplished.

3. RECOVERY FORCE COMMUNICATIONS EQUIPMENT

The RCC has HF, VHF, and UHF point-to-point and air-to-ground radio circuits plus landline voice and teletype circuits required for the recovery effort. The applicable RCG OPLAN and other sections of this Test Ops Order detail all communication procedures, provide frequencies and frequency assignments, and establish communication discipline.

Recovery force communication equipment is as follows:

Unit	Type	Equipment
Airplanes	JC-130	Standard HF, UHF, VHF, and SSB radio
Helicopters	CH-3B	UHF and SSB radio
SRU	T-AGM	Standard HF, UHF, VHF and SSB radio
Land Stations	KTS	100-wpm TTY/alternate voice
	HTS	100-wpm TTY/alternate voice
	RCC	Standard HF, UHF, SSB radio, 100-wpm TTY, and voice lines

4. COMMUNICATIONS LINKS

4.1 HF Communications

HF/AM and HF/SSB provide a two-way link between the RCC, all participating aircraft, and the surface recovery units.

4.2 UHF Communications

UHF circuits are available to all elements of the Recovery Force and will be used for primary communications between the RCC and/or the elements of the force in the recovery area.

4.3 VHF Communications

VHF circuits are available to all elements of the Recovery Force except the RCC and the CH-3B helicopters.

4.4 Ship-to-Shore TTY

There is two-way TTY communication between the SRU, RCC and AFWTR.

4.5 Ship-to-Shore SSB-Voice

This is a secondary mode of HF communications between the SRU and RCC.

4.6 Ship-to-Shore CW

This is a high-frequency backup circuit utilizing the same shipboard equipment as the TTY and SSB circuits. Sufficient backup equipment exists to permit simultaneous communications on all three modes.

4.7 Air Rescue Net

The Air Rescue Net is a direct two-way voice link between all air elements of the Recovery Force and the Air Rescue aircraft positioned in the recovery area.

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3.2.6 Ship-to-Shore (SSB-VOICE). This will be a secondary mode of HF communications between the SRU and PMRF.

3.2.7 Ship-to-Shore (CW). This is a high-frequency backup circuit utilizing the same shipboard equipment as the TTY and SSB circuits. Sufficient backup equipment exists to permit simultaneous communications on all three modes.

3.2.8 Air Rescue Net. The Air Rescue Net is a direct two-way voice link between all air elements of the Recovery Force and the Air Rescue aircraft positioned in the recovery area.

4. COMMUNICATION BACKUP

The RCC can communicate with the Recovery Force by means of CW and/or teletype in the event voice communications fail or cannot be established. Continuous wave traffic may be routed as follows:

a. CW and TTY: RCC, via telephone to PMRF direct to the SRU with subsequent voice relay to the Command Aircraft.

b. CW: RCC via telephone to PMRFH, via telephone to Naval Communication Center, via CW to SRU with subsequent voice relay to the Command Aircraft.

5. COMMUNICATION LIMITATIONS

The SRU is limited to HF single sideband to PMRF. UHF/VHF is available for communications with the air elements in the recovery area. SRU monitors HF SSB/AM with the RCC.

6. PROCEDURE AND CIRCUIT DISCIPLINE

All stations will use standard radio telephone procedure. Strict circuit discipline will be enforced in view of the number of stations on the same operating frequencies. All circuits will be monitored directly or by tape recording.

7. FREQUENCY DESIGNATORS

Emphasis is placed on the use of frequency designators during all radio/telephone transmissions to the participating forces. Frequency designators will be used to preclude additional calls to determine proper selection of circuits for two-way conversations.

Authorized frequencies and call signs will be specified in the current 6594th Recovery Control Group Operations Plan.

A Brevity Code will be listed in the current 6594th Recovery Control Group Operations Plan and will be used on all communication circuits for expediency and limited mission security.

ANNEX C

ELECTRONIC COMMAND AND CONTROL

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N
E
X

C

ANNEX C
APPENDIX I

GROUND SPACE CONTROL FUNCTIONS

CONTENTS

ILLUSTRATIONS

TABLES

ANNEX C
APPENDIX 1
GROUND SPACE CONTROL FUNCTIONS

1. GENERAL

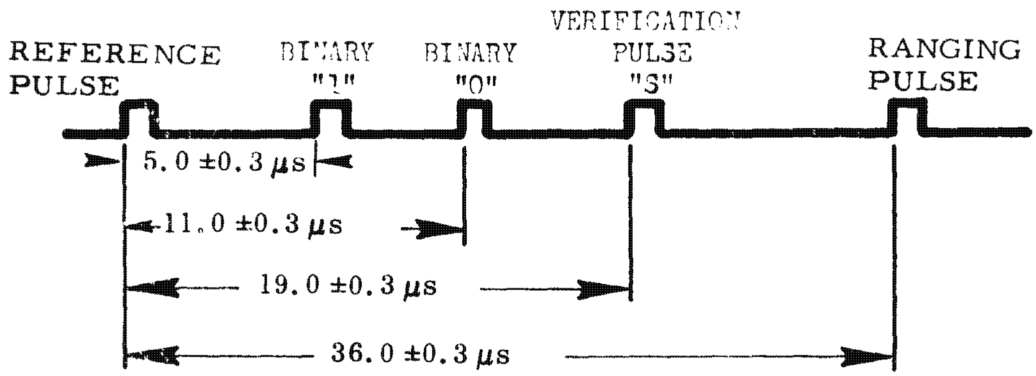
Commanding of Program 206 satellites is accomplished using computer commanding, with the Digital Data Encoder (125) as backup, and the PRELORT radar through a closed-loop system. The center pulse of the PRELORT radar output is modulated as indicated in Figure 1 and results in a pulse position which corresponds to a "1", a "0" or an "S" pulse each time the radar transmits. Within the satellite, the position of the center pulse is decoded in the Command Decoder and commands are either executed as soon as received, or stored in a Storage Programmer for execution at a later time.

When a command has been transmitted to the OCV, it is checked for bit count and parity and is either rejected or accepted. An accept or reject signal is then transmitted by telemetry to the ground station.

In addition to the primary command system, there is a VHF system used for commanding the Back-up Stabilization Subsystem (BUSS). This command link is usable only for the execution of re-entry commands and to control the telemetry and command system.

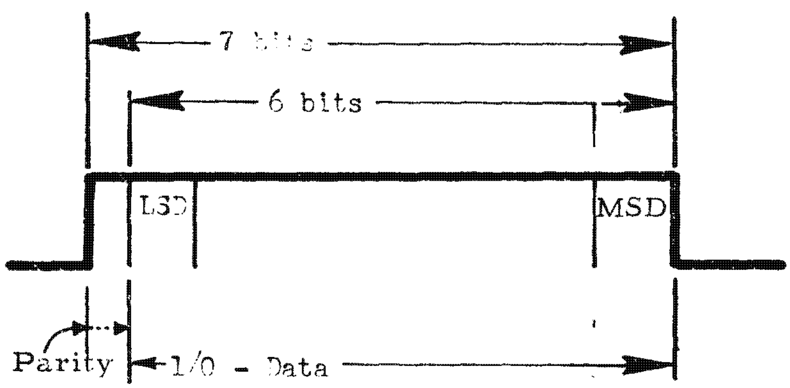
2. COMMAND SUBSYSTEM DESCRIPTION

The functional block diagram of the Command Subsystem is shown in Figure 2. S-band pulses are received by the S-band beacon and the relative position of the center pulse is decoded as a "1", "0", or "S" by the Pulse Position

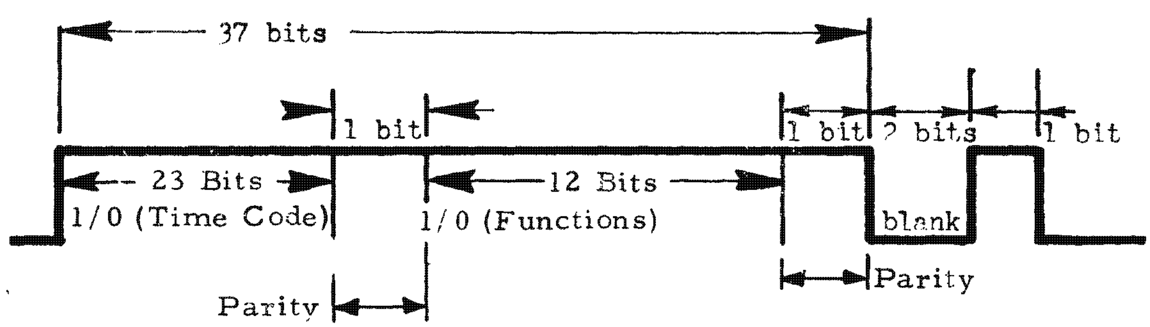


PULSE GROUP STRUCTURE

"1", "0", or "S" - Only One Per Pulse Group



REAL TIME COMMAND



SINGLE STORED PROGRAM COMMAND

Figure 1 Word Format

C.1-3

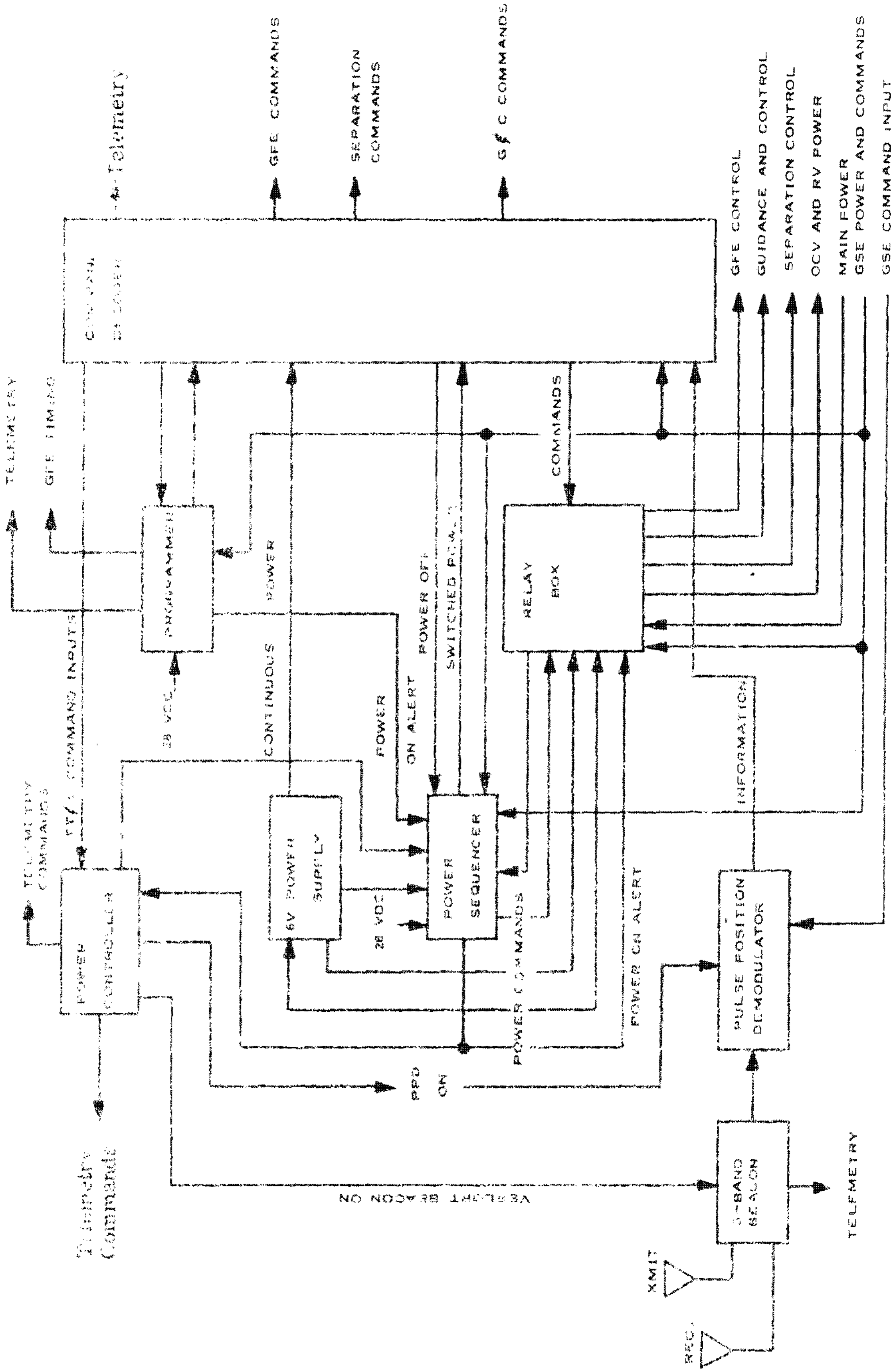


Figure 2 OCV Command Subsystem

8-3

Demodulator. This information is transmitted to the Command Decoder as NRZ information where it is decoded and checked for bit count and parity. If the command is an acceptable RTC, the receipt of an "S" pulse causes it to be executed immediately. If it is an acceptable SPC, it is stored in the Storage Programmer. When the time label of an SPC matches the reading of the vehicle clock, the SPC is read out to the Command Decoder and executed.

2.1 Pulse Position Demodulator (PPD)

The PPD converts the position of the center pulse to NRZ digital information when it is received through the beacon. Normally, this equipment is off, to disable the command link, and is only turned on by an SPC when the vehicle is over a station. When the PPD is off, commands cannot be inserted into the vehicle.

2.2 Command Decoder

The Command Decoder receives the output of the PPD and either executes RTC's immediately or relays SPC's to the Storage Programmer. The decoder is turned on in a mode which allows it to decode RTC's only and will reject SPC's unless commanded to address a delay line. Once the decoder is commanded to an SPC mode, it will not accept the 7-bit RTC's and will process only SPC's.

When the time label of an SPC which is in the delay lines of the Storage Programmer coincides with the vehicle clock, the command is read into the decoder and executed unless the decoder is in an SPC mode. In this event, the command will not be executed. If an SPC is in the Command Decoder being executed and another command is directed to the decoder either from the Storage Programmer or the PPD, the second command will not be read into the decoder and therefore will not execute.

2.3 Storage Programmer

The Storage Programmer contains four magnetostrictive delay lines with a capacity to store 16,000 bits of information each. These four delay lines are capable of storing up to 99 SPC words at any time and can read out an SPC word and the word immediately following it to the Command Decoder when the time label matches the vehicle clock. The word is then examined to see if it is a Single Stored Program Command (SSPC) or a Double Stored Program Command (DSPC) and is routed to the appropriate logic for execution.

2.4 Power Controller

The Power Controller provides commandable relays which distribute power to the various commandable functions within the vehicle. When a time label match occurs, a signal from the Command Decoder, called a "Power on Alert" is fed to the Power Sequencer which in turn turns on the Command Decoder and starts a timer in the power controller. This timer may be operated for either six or twelve minutes and may be energized in a resettable or non-resettable mode. In the resettable mode, each succeeding command which is executed also resets the timer and the Command Decoder will turn off either six or twelve minutes after the last command is executed. In the non-resettable mode, the Command Decoder turns off either six or twelve minutes after it was turned on, regardless of intervening commands.

3. COMMAND SUBSYSTEM TELEMETRY MONITORS

There are two significant telemetry monitors on the primary command subsystem which are used to close the command loop and monitor the status of the vehicle.

3.1 Accept/Reject Channel

Link 2 Channel 17 and Link 3 Channel 17 contain the accept, reject, and command decoder ON signals which are routed to the 125 or the Command Verification Detector Unit (CVDU) to close the command loop. Normally 2-17 is used as the signal input to the 125 or the CVDU, since the playback of the airborne recorder disables SCO Base 6 which contains 3-17. In the event of a telemetry malfunction on 2-17, the signals on 3-17 may be used at the discretion of the Test Controller. The various states of the accept/reject channel are discussed below. Calibration of the 125 and CVDU is to be in accordance with Table 1.

3.1.1 Command Decoder ON. In this case, 2-17 and 3-17 indicate +10 percent and the input to the 125 is 0.5v. This is the state in which the command subsystem will normally be at station acquisition. Since the PPD is not yet enabled under normal conditions, the accept/reject signals will not be seen.

3.1.2 Accept Signal. When a command has been accepted by the vehicle 2-17 and 3-17 will both move to 50 percent or 2.5v for a period of 23 milliseconds. This is interpreted by the 125 and CVDU as an accept signal for both RTC and SPC commands.

3.1.3 Reject Signal. If an improper word is in the Command Decoder and the vehicle receives an "S" pulse, 2-17 and 3-17 will move to 98 percent for 9 milliseconds and the 125 and CVDU logic will interpret the 4.9v signal as a reject. Under normal conditions with the PPD on and no commanding, the telemetry will indicate continuous rejects at the radar PRF as shown in Figure 3.

Table 1

TELEMETRY CALIBRATIONS (NOMINAL)

LINK 2, CHANNEL 17*

Function	% Deviation at SCD	Volts at 125	Volts At CVDU	% BW
Full Scale Deflection	+ 7.5	+ 5.0	+ 10.0	100
Reject Signal	+ 3.75	+ 3.75	+ 5.0	75
Accept Signal	- 2.5	+ 1.6	- 3.6	32
Comd Decoder ON	- 6.0	+ 0.5	- 8.0	10
Full Scale Deflection	- 7.5	0.0	-10.0	0

LINK 2, CHANNEL 11*

Mode	Deviation at SCD (percent)	Percent Full Scale
Delay Line 1	+ 2.2	65.0
Delay Line 2	0	50.0
Delay Line 3	- 2.5	33.0
Delay Line 4	- 4.7	18.0
RTC or No Commands	- 7.2	0

*Note: For actual deviations, refer to the Calibration Book for the appropriate vehicle.

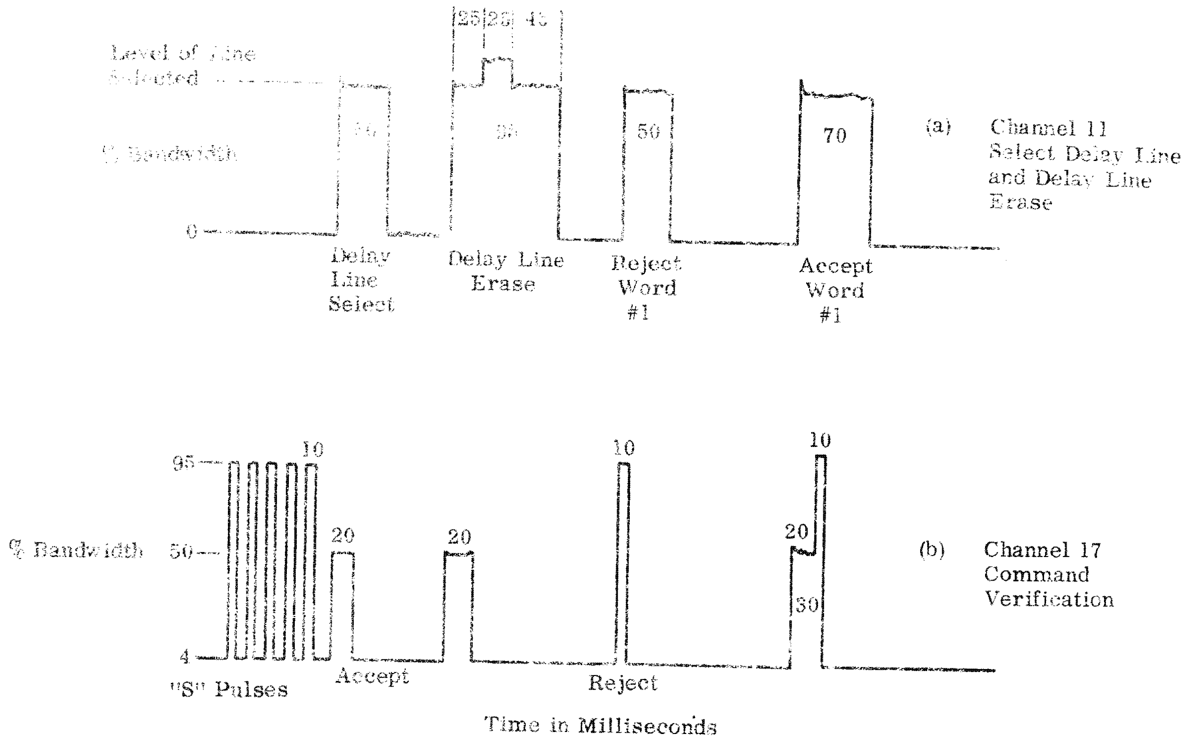


Figure 3 Command Subsystem Telemetry Monitors

3.2 Program Word Monitor

Link 2 Channel 11 monitors the delay line to which the Command Decoder is addressed and is used in conjunction with 2-17 or 3-17 to indicate whether the decoder is in the real or stored mode. If the vehicle is in the real mode, 2-11 is at 7.2 percent deviation and remains there continuously while 2-17 will show normal accepts/rejects. If the vehicle is in the stored mode, the channel indicates a pulse of 60 milliseconds duration each time an "S" pulse is received whether a word is accepted or rejected. Thus, if words are being loaded into delay line 1, a pulse of 67 percent bandwidth is seen for each word. If for some reason the decoder is not accepting words for storage, the continuous "S" pulsing from the 125 will keep the monitor at the level corresponding to the delay line addressed.

3.3 125 - SOC Oscilloscope

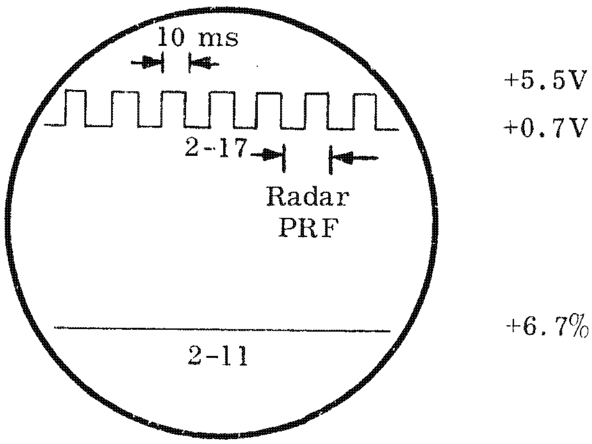
During commanding operations, the telemetry indications on the accept/reject channel and the delay line monitor should be monitored on an oscilloscope at the 125, and on an oscilloscope and meter at the SOC. Reference to these telemetry channels will allow quick determination of command system performance and status as shown in Figure 4. Inputs to the 125 and the oscilloscope should be calibrated in accordance with Table 1.

4. BUSS Command System

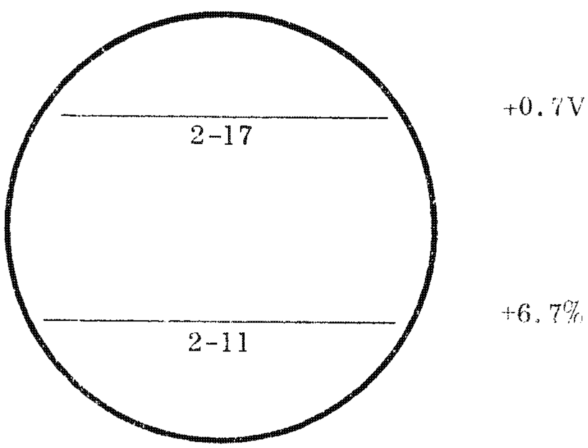
The BUSS system is commanded through either the standard ZEKE commanding equipment or the primary command system.

4.1 ZEKE Commands

This program uses selective address ZEKE commands to command the mode of operation of the BUSS system. The capability exists within the equipment to operate in five modes. The command link to the BUSS system is accessible at any time while the vehicle is on orbit and uses the following commands:



This corresponds to PPD On Real Mode. S Pulses cause Reject signals at VERLORT PRF. If 2-11 is at 18%, 33%, 50%, or 67%, vehicle is in Stored Mode.



This corresponds to Command Decoder On, PPD Off, Real Mode or no Alpha lock. Absence of S Pulses removes rejects even if PPD is On.

Figure 4 125 Oscilloscope Presentations

Command	Tone	Frequency (kHz)	Mode/Identity	
ZEKE 23	FG	(5.1) (5.3)	1	BUSS Real Time
ZEKE 21	GE	(5.3) (4.9)	2	BUSS Next Station
ZEKE 22	GF	(5.3) (5.1)	3	BUSS Next Orbit
ZEKE 24	FE	(5.1) (4.9)	5	BUSS Real Time, No Gas
ZEKE 25	EF	(4.9) (5.1)	6	BUSS Mode Determination (BMD)
ZEKE 26	EG	(4.9) (5.3)	-	Vehicle Address

4.2 KIK ZEKE Commands

KIK ZEKE Commands are used to execute the chosen mode of the BUSS System and also to control the PPD of the primary command system. The particular bit pattern of the KIK ZEKE command is determined by a secure encoder plug which transmits a pattern of digital ones and zeros to a matching decoder in the vehicle. This system uses the following tones to modulate the VHF transmitter:

WDL ICS Tone	LMSC ZZZ Tone	Frequency (kHz)	Identity
D	A	4.3	Power Tone
A	B	4.1	One
B	C	4.5	Zero
C	D	4.7	Reset

The format for KIK ZEKE commands is illustrated in Appendix C-2.

4.3 BUSS Execution via Primary Command System

BUSS may be executed in the BUSS Realtime Mode via the primary command system. To do this, an Enable must be executed prior to and in conjunction with this command.

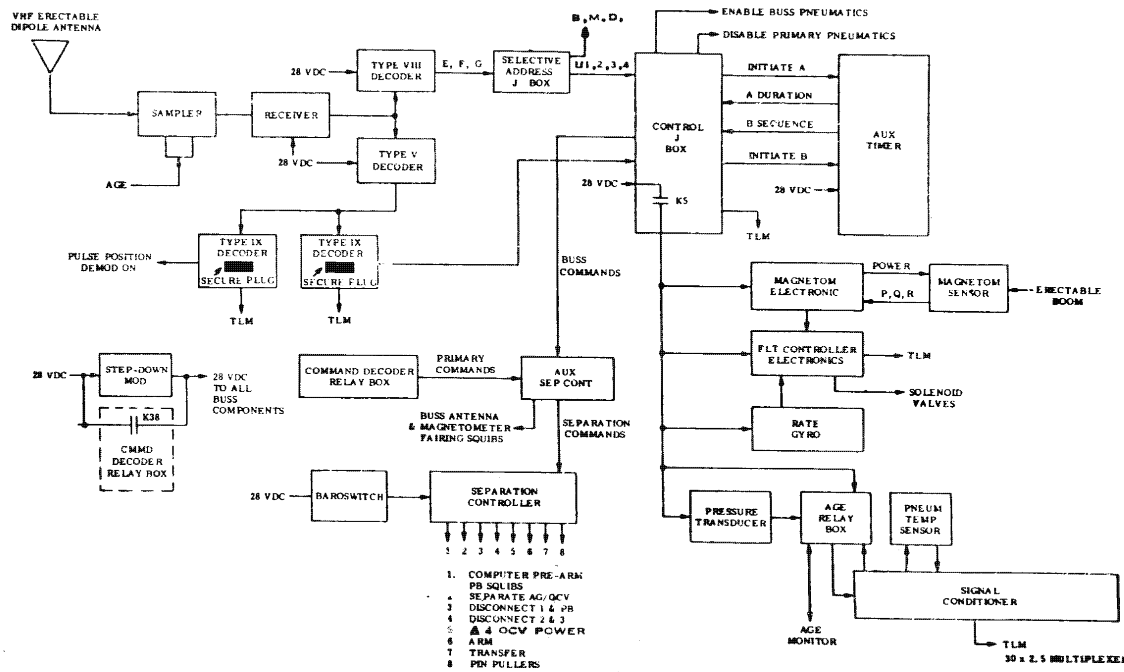


Figure 5 BUSS/Separation Subsystem Block Diagram

Approved for Release: 2024/01/30 C05099045

4.4 BUSS Command System Operation

A functional block diagram of the BUSS Subsystem is shown in Figure 5. ZEKE commands are received through the Type I Receiver and both real and stored commands are routed from the Command Decoder Relay Box of the primary command subsystem.

4.4.1 ZEKE Commands. ZEKE commands are received through the VHF antenna and the Type I Receiver and are sent to the Type V and Type VIII Decoders. Tones, E, F, and G are decoded by the Type VIII Decoder and set appropriate relays within the Junction Box to enable the correct routing of T_0 - T_{12} commands from the "B" channel of the Auxiliary Timer to the Separation Programmer. Tones A, B, C, and D are routed to the two Type IX Decoders. If a correct secure word match is achieved in either of these decoders, a signal is sent to start the "B" Timer or to turn on the PPD, depending on which decoder provides the signal. Receipt of either of the mode select commands also accomplishes the following functions:

a. Sets Relay K5. This relay places power from the vehicle 28v dc unregulated buss to the Rate Gyro, Flight Control Electronics, and other electrical equipment associated with BUSS. A dropping module is incorporated between K5 and the electrical buss to prevent exceeding 29v dc during initial revs.

b. Sets Relay K25. This relay also provides 28v dc unregulated power to the electrical equipment mentioned above.

c. Starts the "A" Timer. This is a 20-minute timer which provides a reset signal to K5 when it times out, thus removing 28v dc power from the electronics.

d. Telemetry and Tracking On. This signal powers both telemetry transmitters, the S-band transponder and turns OFF the recorder.

e. Sets 6-Minute Timer. This signal turns the 6-minute timer of the primary command subsystem on in the 6-minute resettable mode. At the expiration of this time period, the timer shuts off telemetry and command equipment.

f. Turns off recorder playback.

4.4.2 SSPC 2 Commands. Whenever BUSS telemetry is commanded on by bit 34 of SSPC 2, relay K25 is closed placing power to the electronic equipment with the exception of the Rate Gyro. This equipment is isolated from the rest by a blocking diode shown in Figure 5. In order to prevent damage to BUSS equipment during initial revs when battery voltage is above 29 volts, a dropping module is incorporated in the circuit. This module drops the applied voltage approximately 3.5 volts. BUSS telemetry will remain on until commanded off by another SSPC 2 or until the timer in the primary command system times out.

4.4.3 RTC Command. Sending an RTC 6 will set relay K38 in the command decoder relay box. This relay bypasses the dropping module, thus allowing the application of 28-vdc unregulated power directly to the BUSS electronics equipment. RTC 6 is normally sent when the electrical BUSS voltage reaches 28 ...

The BUSS dropping module can also be bypassed by sending a sequence of three unsecure BUSS commands within a 20-minute period, with no intervening TM ... (T-) command. The three commands must be as follows and must be transmitted in the order shown:

- First: A Zeke 26/21, Zeke 26/22, Zeke 26/23, or Zeke 26/24 command
- Second: A Zeke 26/25 (BUSS Mode Determination) command
- Third: A Zeke 26/21, Zeke 26/22, Zeke 26/23, or Zeke 26/24 command

4.4.4 Stored Commands. The "B" channel of the Auxiliary Timer provides 12 commands at different time intervals to control the operation of BUSS and separation events. These commands, called T_0* - T_{12}, are described in Table 3, Annex B.2.

---

*T_0 originates in the J-Box

Table 2

BUSS SEQUENCE OF EVENTS

Event	BRT	BNS	Time (sec)
T_0	BUSS Gas ON/ GFE Power ON Disable Primary Pneumatics	N/A	0
T_1	Disconnect #1	N/A	20
T_2	Disconnect #2 & #3	N/A	25
T_3	Arm & Transfer	N/A	100
T_4	Separate	N/A	102.5
T_5	Initiate T/M	Initiate T/M	340
T_6	N/A	BUSS Gas ON/GFE Power ON	490
T_7	N/A	Disconnect #1	510
T_8	N/A	Disconnect [illegible] & #3	515
T_9	N/A	Arm and Transfer	590
T_{10}	N/A	Separate	592.5
T_{11}	Spare	Spare	
T_{12}	Power OFF BUSS	Power OFF BUSS	1300

ANNEX C

APPENDIX 2

DESCRIPTION OF COMMANDS

CONTENTS

ILLUSTRATIONS

TABLES

ANNEX C
APPENDIX 2
DESCRIPTION OF COMMANDS

1. GENERAL

The OCV primary command system uses four types of commands: Realtime commands (RTC), single stored-program commands (SSPC), double stored program commands (DSPC), and unique stored program commands. The command link for BUSS uses the ZEKE command system both secure and unsecure. (Refer to Table 2.)

2. OCV COMMANDS

2.1 Realtime Commands

Realtime commands are 7-bit commands which are executed immediately upon receipt by the vehicle. These are used to command functions such as delay line address and other items which must be changed over a station. These commands are described in detail in Table 1.

2.2 Single Stored Program Commands

There are two SSPC commands used to control the OCV. These commands contain 37 bits which are formatted as shown in Figure 1. The time bits (1-23) are included to indicate the time at which the command is to be executed. Bit 24 is used as a time parity and bit 25 is a programmer code which is always a zero for an SSPC. Bits 26-28 are used to identify the decoding logic appropriate to this command and bits 29-36 are function bits. Bit 37 is used to establish even parity for bits 25-37. Format for both SSPC and DSPC words is shown in Figure 1.

Table 1

REALTIME COMMANDS (GREEN)

SOC Command No.	125 Command No.	Function	Resulting Action
Sierra 1	Green 1	Select Delay Line 1	Data is sent through Command Decoder to Delay Lines 1 - 4 of Storage Programmer
Sierra 2	Green 2	Select Delay Line 2	
Sierra 3	Green 3	Select Delay Line 3	
Sierra 4	Green 4	Select Delay Line 4	PPD output NRZ
Sierra 5	Green 5	Balance Valves Open	Balance Valves Open from 20 to 45 sec
Sierra 6	Green 6	Voltage Dropping Bypass	Bypasses the Dropping Module for the 28-vdc Input to BUSS
Sierra 7	Green 7	TM Transmitters Normal	Places Link 2 on Delta 2, Link 3 on Delta 3
Sierra 8	Green 8	TM Transmitter Reverse	Places Link 2 on Delta 3, Link 3 on Delta 2
Sierra 9	Green 9	PPD Off	Turns Off Pulse Position Demodulator
Sierra 10	Green 10	Balance Valve Close	Close Balance Valves
Sierra 11	Green 11	RMA/Hi Thrust Disable	Disable High Thrust Line
Sierra 12	Green 12	RMA/Lo Thrust Disable	Disable Low Thrust Line
Sierra 13	Green 13	Tape Recorder On	Turns Recorder On in the High-Speed Playback Mode
Sierra 14	Green 14	Tape Recorder Off	Turns Recorder Off
Sierra 15	Green 15	IR "Search"	Places IR System to a Search Mode when inhibited
Sierra 16	Green 16	RMA/Hi Thrust/Lo Thrust Enable	Both Lines Open

REAL-TIME COMMANDS

1	2 - 7
PARITY	FUNCTION

SINGLE STORED-PROGRAM COMMANDS

1 - 23	24	25	26 - 28	29 - 36	37
TIME	P	PC	DECODER INPUT ADDRESS	FUNCTION	P

DOUBLE STORED PROGRAM COMMANDS

1 - 23	24	25	26 - 28	29 - 36	37
TIME	P	PC	DECODER INPUT ADDRESS	FUNCTION	P

1 - 23	24	25	26 - 36	37
FUNCTION	P	PC	FUNCTION	P

Figure 1 Command Bit Structure

2.3 Double Stored-Program Commands

There are six DSPC commands which are used to control the OCV. These commands are formatted similarly to SSPC's, however, the bits of the second word which correspond to the time bits of the first word are used as function bits. The first 37 bits of a DSPC are used for the same functions as an SSPC. In the second word however, Bits 1-23 are function bits and Bit 24 is a parity bit for these. Bit 25 is always a 1, which identifies the second word of a DSPC. Bits 26-36 are function bits and Bit 37 is a parity bit for 25-36.

2.4 Unique Stored-Program Commands

Unique SPC's are used to command real-time functions when the Command Decoder is in an SPC mode. One command, which contains all ones for time bits and all zeros for function bits, resets the Command Decoder to an RTC mode when it is in an SPC mode. The other unique SPC contains all zeros for time bits and all ones for function bits and erases the delay line to which the Command Decoder is addressed.

3. COMMAND MESSAGES

3.1 Operational Command Messages

Operational command messages are assembled by the 3600 computer and sent to the stations either on punch paper tape for the GE 125 or in the case of Augie Commanding on a magnetic tape. A punch paper tape may also be obtained from the T&C computer using the Augie Commanding Magnetic tape. These messages contain from one to four blocks of commands each of which contains up to 99 SPC words. Operational messages are numbered from 101 to 190 and are used to load commands into the storage programmer for execution on orbit. Each block of commands is addressed to a different delay line and contains an RTC 1-4 as the first word to address the proper delay line.

The second word of a given block is normally an erase command, although this is not necessarily so. The third and subsequent words are the SSPC's and DSPC's to be stored in the vehicle and the last work in a unique command to return the Command Decoder to the RTC mode.

3.2 Special Command Messages

Special Command messages are used to accomplish certain special functions on orbit. These messages are uniquely numbered and pre-positioned on station prior to launch. Special messages used on Program 206 are outlined below:

3.2.1 Green Message 922 (Sierra 17) or A/S 922. This is a message which contains the unique RTC enable command.

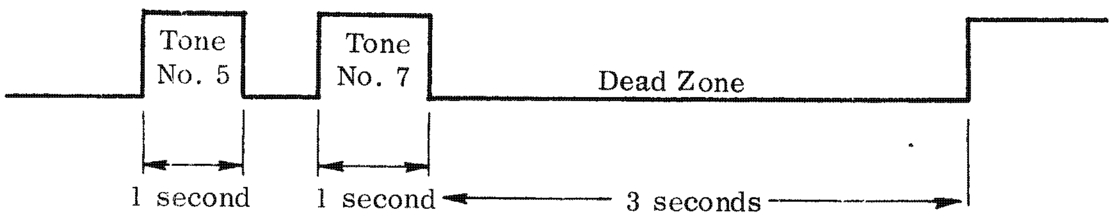
3.2.2 Green Message 944 or A/S 944. This message contains an erase command followed by an RTC enable command.

3.2.3 Green Message 966 or A/S 966 Blks 1-5. This message contains five blocks of commands which address delay lines 1-4 and return the Command Decoder to the RTC mode.

4. BUSS COMMANDS

4.1 ZEKE Commands

Zeke Commands consist of two tones of one-second duration followed by three seconds of unmodulated output, as shown in Figure 2. For this program, the following ZEKE commands are used.



Each functional command consists of two 1-second pulses, followed by a 3-second dead zone. These pulses allow the output of the selected audio oscillators in the Audio Coder to be applied to the VHF Transmitter.

Figure 2 Example ZEKE Functional Command Format

4.1.1 ZEKE 26. This command is a Vehicle Address Command which enables the BUSS subsystem to receive a ZEKE 21, 22, 23, 24, or 25 unsecure command when the ZEKE 26 transmission starts 3.8 sec or less prior to transmission of the other unsecure command.

4.1.2 ZEKE 21, 22, 23, or 24. These unsecure commands, when preceded by a properly spaced ZEKE 26 Address Command, will:

a. Set the BUSS subsystem in the appropriate mode (See Annex C.1, Para 4.1) and initiate the A timer

b. Apply power to the BUSS rate gyro, the flight control electronics. BUSS gas pressure transducer, and the magnetometer for 20 ± 0.5 minutes

c. Initiate the PRELORT Beacon, ORT SCO bases, Delta 2 and Delta 3 transmitters, reset the six-minute timer, and turn the recorder playback OFF

d. SV Telemetry Delta 2 and 3 and the PRELORT Beacon will turn OFF after the six-minute timer times out

e. Each subsequent ZEKE 21, 22, 23, or 24 unsecure command, when preceded by a properly spaced ZEKE 26 Address Command, will reinitialize events delineated above

f. ZEKE 26/21, 26/22, 26/23, or 26/24 commands will not turn OFF the recorder when the recorder is in the $R_{1}+$ mode.

4.1.3 ZEKE 25. This command enables the BUSS Mode Determination (BMD) mode. A ZEKE 25 Command, when preceded by a properly spaced ZEKE 26 Address Command, after execution of ZEKE 26/21, 26/22, 26/23, or 26/24 will:

a. Energize the RV telemetry for 20 ± 0.5 minutes. This time is measured from execution of the last ZEKE 26/21, 26/22, 26/23, or 26/24 unsecure command

b. Indicate in Delta 4, Channel 10 the selected BUSS mode

c. A Zeke 26/25 command transmitted when the BUSS subsystem is in the reset mode results in Delta 4 turning ON for 1 sec.

d. A Zeke 26/21, 26/22, 26/23, or 26/24 command transmitted while the BUSS subsystem is active in the BMD mode will set the bypass relay of the BUSS stepdown module (if this relay has not been set earlier in the flight). See par. 4.4.3 for details.

e. A TM OFF (T-) primary command will turn off BUSS Mode 6 (BMD) and turn off Delta 4 transmitter.

4.2 KIK ZEKE Commands

Two KIK ZEKE commands are used in this program, one to execute BUSS and the other to enable the PPD. The format of these commands is shown in Figure 3 and consists of 40 equal time periods normally of 134 milliseconds each. During the first half of each period a D tone is transmitted to energize the power relay in the Type V decoder. Tone C is transmitted during the second half of the first period and either A or B tones are transmitted during the second half of the second through 36th periods. For period 37 - 40, the second tone is an D tone.

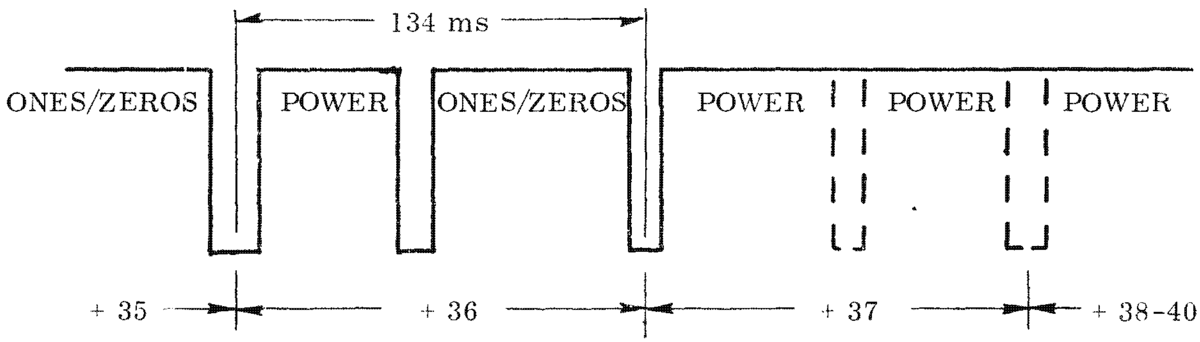
4.2.1 KIK-ZEKE 31. This secure command will execute the BUSS system in the chosen mode and start the B-timer.

4.2.2 KIK-ZEKE 32. This command will energize the PPD and turn on the command decoder. Each execution of a ZEKE 32 Command will advance the secure count by one count. In the event that it is to be sent, a ZEKE 26 followed by a ZEKE 21, 22, 23, or 24 should be sent preceding this command since the mode select command will turn ON telemetry and the PRELORT Beacon and the KIK-ZEKE 32 will only turn on the command decoder and the PPD.

During execution of a KIK-ZEKE 31 or 32 Secure Command, the BUSS unsecure link is inhibited.

4.2.3 BUX Secure Command. A BUX Secure Command from the primary system executed when ABE is in the ENABLE state will execute BUSS in the BUX Mode 4 and start the B-timer.

A BUX secure command from the primary system executed when ABE is in the DISABLE state will not execute BUSS.



The secured code format is generated once for a total of approximately 5.36 seconds.

Figure 3 KIK ZEKE Command Format

Table 2

COMMAND FUNCTION LIST (OCV)

Green	Sierra	Function	Lk-Ch-Pos	Percent BW
One	One	Select Delay Line 1	2-11-00	70
Two	Two	Select Delay Line 2	2-11-00	50
Three	Three	Select Delay Line 3	2-11-00	33
Four	Four	Select Delay Line 4	2-11-00	14
		Delay Line Full Status:		
		D/L 1 Full	2-15-13	60
		D/L 2 Full	2-15-13	40
		D/L 1 and 2 Full	2-15-13	100
		Neither Full	2-15-13	10
		D/L 3 Full	2-15-14	60
		D/L 4 Full	2-15-14	40
		D/L 3 and 4 Full	2-15-14	100
		Neither Full	2-15-14	10
Five	Five	Balance Valves Open	2-15-22	(See Note 1)
Six	Six	BUSS Dropping Module Bypass	3-13-16	(See Note 2)
Seven	Seven	Telemetry Transmitters Normal (Lk2 - Δ2/Lk3 - Δ3)		
Eight	Eight	Telemetry Transmitters Reversed (Lk2 - Δ3/Lk3 - Δ2)		

Notes:

(1) Percent bandwidth on 2-15-22 will be:
- 5 - 15 if in RMA/High Thrust/Low Thrust enable mode
- 25 - 35 if in RMA/High Thrust disable mode
- 35 - 45 if in RMA/Low Thrust disable mode

Percent bandwidth will return to the previous telemetered level in 35 ± 15 sec or upon receipt of RTC 10.

(2) The BUSS voltage monitor, Ch 3-13-16, will be read after a Green 6 (BUSS voltage dropping module bypass). Proper action will be manifested by a rise in the readout only if the TM has been turned ON via the Zeke command link. There will be no change if the TM was turned ON via the primary command system. An increase on this channel will be observed also if the bypass is accomplished via BUSS commands.

Green	Sierra	Function	Lk-Ch-Pos	Percent BW
Nine	Nine	PPD Off		
Ten	Ten	Balance Valves Closed	2-15-22	(See Note 1)
Eleven	Eleven	RMA/High Thrust Disable	2-15-22	60 (for 2.5 sec) 18 (steady state)
Twelve	Twelve	RMA/Low Thrust Disable	2-15-22	64 (for 2.5 sec) 30 (steady state)
Thirteen	Thirteen	Tape Recorder Readout	3P	
Fourteen	Fourteen	Tape Recorder Off	3P	
Fifteen	Restricted Fifteen	IR Scanner "Search"		
Sixteen	Sixteen	RMA/High Thrust/Low Thrust Enable	2-15-22	40 (for 2.5 sec) 0 (steady state)
	Seventeen	Realtime Enable	2-11	7
		Command Decoder:		
		Primary On	2-17	10
		Off	2-17	2
		Backup On	3-17	10
		Off	3-17	2
		Command Verification:		
		Primary Accept	2-17	50
		Reject	2-17	90
		Backup Accept	3-17	50
		Reject	3-17	90
Msg 101-190	Auto Sierra 101 to 190 Blocks 1-4	Operational Command Messages		
Msg 191-199	Auto Sierra 191 to 199 Blocks 1-4	Practice Loading Messages (Expired Time Labels)		
Msg 922	Auto Sierra 922	Real Time Enable	2-11	0-7
Msg 944	Auto Sierra 944	Erase Delay Line Followed by RTE	2-11	0-7

Green	Sierra	Function	Lk-Ch-Pos	Percent BW
Msg 966	Auto-Sierra: 966	All Delay Line Address:		
	Block One	D/L 1	2-11	70
	Block Two	RTE + D/L 2	2-11	50
	Block Three	RTE + D/L 3	2-11	33
	Block Four	RTE + D/L 4	2-11	14
	Block Five	RTE	2-11	0.7
Msg 301, 302, etc.	A/S 301, 302 Etc. Block 1, 2 Etc.	GFE Exercise (PRF 3 for Green msg) (PRF 1 for A/S msg)		
Msg 999	Auto Sierra 999			
	Block 1	D/L 1 - Erase - RTE		
	Block 2	D/L 2 - Erase - RTE		
	Block 3	D/L 3 - Erase - RTE		
	Block 4	D/L 4 - Erase - RTE		

Command	Mode	Function	Lk-Ch-Pos	Percent BW
		ZEKE (Unsecure VHF Functional Commands)		
		(Reset)	3-13-19*	44
ZEKE 23	1	BUSS Real Time	3-13-17 3-13-19*	80 75
ZEKE 21	2	BUSS Next Station	3-13-17 3-13-19*	80 85
ZEKE 22	3	BUSS Next Orbit	3-13-17 3-13-19*	80 95
ZEKE 24	5	BUSS Real Time, No Gas	3-13-17 3-13-19*	80 67
ZEKE 25	6	BUSS Mode Determination (BMD)	4-10	BRT 77 BNS 85 BNO 94 BRTNG 67
ZEKE 26	-	Vehicle Address Command	3-13-18	100 (50 msec)** 40 (7 sec)
		KIK-ZEKE (Secure VHF Commands)		
KIK-ZEKE 31		BUSS Execute		
		Power On Type IX	3-13-21	45
		Type IX Execute	3-13-21	100
			(Pulse Duration 1 sec Then to Zero)	
			3-13-19* 4-10	30 29
KIK-ZEKE 32		PPD ON	2-17-00	(See Page C.1-12)
		Primary System	4-10	26
BUX (Mode 4)		(BUSS Real Time)	3-13-17 3-13-19*	80 26

*3-13-19 will change only if the BUSS mode is changed.

**Because of sampling rate, this level may not be seen.

ANNEX C
APPENDIX 3
COMMAND OPERATIONS

CONTENTS

TABLES
(See Annex E.6)

ANNEX C

APPENDIX 3

COMMAND OPERATIONS

1. GENERAL

All commands and command messages will be transmitted to the vehicle only at the direction of the Test Controller, using the procedures outlined in Table 1. The prepass configuration which will be used for the 125 is included in Table 2 and will be deviated from only by specific instruction. In addition, the accept/reject channel (2-17 or 3E) and the delay line monitor (2-11) will be presented on an oscilloscope at the 125. ZEKE commands will be transmitted using standard ZEKE procedures. (Refer to Annex E.6 for Tables 1 and 2.)

2. TRANSMISSION OF OCV DIGITAL COMMANDS

OCV Commands will be referred to as "Green Commands" or as "Green Command Messages" to differentiate from commands used on other programs.

2.1 Green Commands

Green commands will be sent at the direction of the Test Controller from the dial-a-command panel of the 125.

2.2 Green Messages

Green messages are transmitted to SCF stations using the 100-wpm secure teletype on 5-level punch paper tape. Upon receipt at the stations, the messages are transmitted back to the STC for verification by DICE by comparing the re-transmitted message with the original. If one or more blocks of a message are not verified, they will be transmitted again until a verified message is received. The station will then be notified by DICE that the message has been verified.

Upon receipt of a verified Green Message, it will be transmitted through the 125 to check for bit count, parity check, and tape or logic errors. The station will then verify to the Test Controller during the prepass briefing that the message has been received, verified, and successfully transmitted through the 125 as well as a word count of each block. Stations will then follow the procedures of Table 1 as directed by Test Control. (Refer to Annex E.6.)

3. COMMAND SYSTEM MALFUNCTIONS

Several possible malfunctions exist which will cause commanding to be interrupted or fail completely. The procedures outlined below will normally be used to circumvent these malfunctions, however, the exact procedure to be used is left to the judgment of the Test Controller. It is to be emphasized that no commands are to be transmitted to the vehicle except by direction of the Test Controller.

3.1 Reject Error

Whenever the 125 receives a number of consecutive rejects equal to the number dialed into the reject counter with error hold enabled, transmission of commands will cease and the "reject error" light will illuminate. Stations should report the reject error to the Test Controller immediately, stating the scope condition and whether the vehicle is in real or stored mode. In most cases, the direction will be to take error hold off which directs the stations to follow the procedures of Table 1, Annex E.6.

3.2 Spoof Error

If the 125 receives an accept signal during the transmission of a word, it will halt the transmission and the Spoof Error light will illuminate. When this occurs, the station will report the spoof to the Test Controller as well as scope condition and whether the vehicle is in the real or stored mode. Normal procedure under these conditions will be to retransmit the entire block of commands, since serious difficulty may occur if an improper command is introduced into the vehicle. If circumstances warrant, the Test Controller may direct the station to back up the tape one word and retransmit. Spoof override will not be used.

3.3 Tape Error

A tape error will occur whenever the tape is improperly punched, either through improper punching of holes 4 and 5 or improper frame count. This will light the Tape Error light and will also stop the transmission of commands if error hold is on. Stations should report the occurrence of a tape error to the Test Controller should one occur during actual transmission of commands. This malfunction will not normally occur since the command messages are checked for tape and logic errors as soon as they are verified by DICE. Normal procedure will be to check the tape reader for foreign objects, back up and continue, and, if transmission does not occur, to skip one or two words using emergency advance. One other procedure would be to erase the line, loading it at a subsequent station contact.

3.4 Logic Error

A logic error is an indication of improper timing in the 125 circuitry or tape slippage in the reader. This malfunction should be detected on the initial check of the verified tape through the 125. If it occurs on the actual transmission of commands, the normal procedure will be to back up and continue or to erase the delay line and reload. If this does not result in transmission of the commands, the line should be erased and loaded at another station.

4. TRANSMISSION OF ZEKE COMMANDS

Both ZEKE and KIK ZEKE commands will be transmitted at the direction of the Test Controller as circumstances dictate during a given mission. These commands are sent using the ZEKE/ZORRO/ZOMBIE panel at the stations and are real-time commands. Before sending a KIK ZEKE command, station will verify with the Test Controller that the proper secure plug is installed in the ground equipment by giving the identification number of the plug to DICE over the voice line. Voice procedures for these commands are included in Table 3, Annex E.6.

ANNEX D

DETAILED TASKS

Approved for Release: 2024/01/30 C05099045

ANNEX D
APPENDIX 1
PRELAUNCH ACTIVITIES

ANNEX D
APPENDIX 1
PRELAUNCH ACTIVITIES

1. GENERAL ACTIVITIES

This section outlines prelaunch preparation from the initiation of the Satellite Control Facilities (SCF) operations for flight, to the start of final vehicle countdown on launch day. The satellite and the booster vehicle are given a final systems test at the launch base in preparation for flight. Prelaunch preparation of the SCF is shown as follows:

SCF Preparation

Prelaunch Events	Schedule	Reference
Ground Equipment Installation & Checkout	T - 6 to T - 1 month	PSP
Equipment Verification	T - 3 months - R - 2 weeks	Annex D. 1. a
Computer Program Validation	T - 1 month L - 15 days	Computer Milestones
Computer Program Acceptance	R - 2 weeks to L - 5 days	Annex D. 1. b
Rehearsals	L - 9 days - L - 3 days	Annex D. 1. c
System Countdown	L - 1 day	Countdown Manual

2. VTS PRELAUNCH SUPPORT

The Vandenberg Tracking Station assists in satellite checkout including countdown activities and simulated flight. This station also provides support to the launch pad operations during the Range RF check to the extent outlined in the Countdown Manual.

Computer contact between the STC and VTS will be established at the beginning of Countdown Task 19. Contact will be maintained until transmission of the pad load is completed. The Test Controller will advise when computer contact may be terminated.

3. PRE-FINAL COUNTDOWN CONSIDERATIONS

3.1 Communications Verification

System runs involving the STC and the tracking stations must be successfully accomplished prior to launch.

3.2 Range and Support Considerations

Range RF interference monitoring prior to launch must be reported as satisfactory.

3.3 Weather Reports

VTS, the Recovery Control Center, and the downrange telemetry stations send weather observations of their operational areas, starting on L - 1 day, and keep the Test Controller advised of changes in weather status which could affect the launch and recovery operations.

4. SCF LAUNCH COORDINATION

Launch day operations begin with the verification of readiness of the STC Control and Computer Complex, the communications network, the tracking and telemetry stations, the RCC, and the recovery forces. The Test Controller determines the status of the capability of the SCF to support operations and transmits this information to the SAFSP-14 program representative. Final launch countdown in accordance with the Countdown Manual is monitored by Test Control through the Launch Director, who relays significant information to the STC via voice hot-line.

On the day of launch, the Padload Update Reset Tapes will be delivered to SSD as soon as possible after generation. These should leave Moffett NAS by 1700 hours for delivery to [redacted] This material is also SECRET and a courier will be required. Tapes will be delivered to a person specified by the FTFD Program 206. Commercial Air will be used as backup to military air.

Within the STC, TWOCC-4 (System Scheduling) will advise Wing Flight Operations as early as possible of all launch date changes. Flight Operations will schedule aircraft and crews for this support on a priority basis. TWOCC-4 and the FTFD-206 will be advised immediately if Commercial Air backup is required in lieu of military air.

4. SCF LAUNCH COORDINATION

Launch day operations begin with the verification of readiness of the STC Control and Computer Complex, the communications network, the tracking and telemetry stations, the RCC, and the recovery forces in accordance with Annex D, Appendix 5. The Test Controller determines the status of the capability of the SCF to support operations and transmits this information to the [redacted] program representative. Final launch countdown in accordance with the Countdown Manual monitored by the Test Controller through the Launch Director; who relays significant information to the STC via voice hot-line.

ANNEX D
APPENDIX 1 – Tab a
SCF EQUIPMENT VERIFICATION

1. PURPOSE/SCOPE

SCF equipment verification is planned to ensure that the equipments are operational. The verification exercises are conducted from R -60 to R -30 days. The tracking station equipment configuration and functional block diagrams are located in Annex B, Appendix 1.

2. SCHEDULE

Systems Scheduling and Liaison Branch, SSOTC-3, schedule inter-station exercises as well as those with the STC.

3. RESPONSIBILITIES

The Test Control Branch, SSOTC-2, is responsible for conducting tests with the stations and the STC. However, the tracking station commanders are responsible for equipment verification exercises at their respective stations.

4. TEST METHODS

The methods of conducting equipment verification exercises are defined by function with respect to the tracking station.

4.1 TT&C Ground Equipment

The tracking, telemetry and command ground equipment is operational and requires no special exercise unless specified by the Station Commander or the Test Controller.

In addition to normal station verification procedure, the 125 digital data encoder equipment will be verified on a daily basis, preferably prior to a pass series. Stations will use the computer command verification program ST/125 for a bit-by-bit verification of the 125 digital data encoder performance.

ANNEX D

APPENDIX 1 – Tab b

COMPUTER PROGRAM ACCEPTANCE

1. GENERAL

The computer program acceptance testing for the primary F. S. T. will be performed in accordance with TM-L-1171/000/00, Integrated Milestone 6 for 4801 (U), prepared by System Development Corporation.

2. RESPONSIBILITIES

The Computer Program Integration Contractor is responsible for validation in accordance with the above specification. The Integration Contractor will present a formal letter of delivery of the Computer Program Subsystem. This letter should state:

a. Delivery and identification of the Master Tape, PICE Program, 6-D Ascent Trajectory Tape, Data Package, etc., as applicable.

b. The status of the Master Tape, its limitations, and any corrector cards used with it.

c. Delivery of the Assembly Listings.

d. Delivery and identification of a complete Milestone 7, Operating Instructions.

ANNEX D
APPENDIX 1 – Tab c
EXERCISE AND REHEARSAL ACTIVITIES

CONTENTS

ANNEX D

APPENDIX 1 – Tab c

EXERCISE AND REHEARSAL ACTIVITIES

1. PURPOSE

The purpose of this tab is to present the methods, responsibilities and steps required to develop and implement a systematic plan to attain, demonstrate, and specify at any point in time the operational readiness of the SCF for a flight vehicle. The general plan presented herein will be followed for all future flight preparations for this program.

2. GENERAL OBJECTIVES

The general objectives of the Operational Readiness Plan are:

a. To provide a detailed, systematic schedule of activities for flight preparation.

b. To provide Test Control with a tool for maintaining status and positive control of preparations throughout the period of development of operational readiness.

c. To enable the early detection and resolution of problems affecting operational readiness.

d. To ensure that maximum benefits are received from SCF exercises and rehearsals.

3. PLANNING PREREQUISITES

The following material is required in order to develop a detailed Operational Readiness Plan:

a. Program test objectives

b. Software checkout and delivery dates

c. Documentation
d. Flight schedule
e. Test Controller's checklist

4. OPERATIONAL READINESS RESPONSIBILITIES

The Lead Test Controller will establish and act as Chairman of a Test Control Working Group (TCWG), responsible for the development and implementation of a detailed Operational Readiness Plan. The Rehearsal Development Unit representative will provide Human Factors support and function as staff to Test Control in preparing and assisting in the implementation of the Operational Readiness Plan.

The TCWG will meet as directed by Test Control and will be composed of the following members:

a. Test Control, Chairman
b. Orbit Plans (TWOCE-3)
c. Vehicle Analysis (TWOCE-1)
d. Command Generation (TWOCE-3B)
e. Data Systems Section (TWOCU-1A)
f. Rehearsal Development Unit (TWOCC-3)
g. Operational Procedures (TWOCC-3)
h. Data Presentation (TWOCC-1)
i. Automatic Control Integration (TWOIS)
j. Equipment Integration (TWOIH)
k. ACES (TWOCU-1B)

The Field Test Force Director (FTFD) is not a TCWG member; however, he should be in attendance to aid in the readiness effort.

Each TCWG member will:

a. Present the detailed requirements of his group for each phase of operational readiness activities.

b. Implement the activities outlined to satisfy each phase of readiness.

c. Verify to the TCWG Chairman that the readiness phases have been completed satisfactorily.

d. Alert the Lead Test Controller to special requirements or problem areas.

In addition to the requirements and plans of the STC support groups, the Test Controller will receive inputs from each Tracking Station listing their requirements and their plans to accomplish the required readiness activities. Subsequent to the publishing of the exercise and rehearsal portions of the readiness plan, stations will be requested to affirm that these plans will accomplish the station exercise and rehearsal requirements or indicate additional activities which should be scheduled.

5. OPERATIONAL READINESS PHASES

The concept of development of operational readiness includes division of activities into three major phases. As soon as the prerequisites listed in subsection 3 exist, the initial phase will begin.

a. <u>Phase One - Preliminary Preparation, In-House and Station Exercises</u>

This phase includes all those activities that must be completed effectively in order to begin Phase 2, SCF Exercises. In-house individual and crew familiarization, preparation of specific flight plans and materials shall be accomplished during this phase, as well as all in-house exercises and checks.

b. <u>Phase Two - SCF Exercises</u>

SCF exercises are defined as those activities involving portions of the SCF not necessarily in real-time or in the sequence required by an actual flight. Normally the entire system is not required to support an SCF exercise. The purpose of the SCF exercises is to verify subsystem functions including:

(1) Operation and compatibility of computer programs and SCF equipment required for support of the mission

(2) Compatibility of program formats and 1604 Bird Buffer and station configurations

(3) System preparation for Phase 3 rehearsals

c. Phase Three - Rehearsals

Rehearsals consist of real-time system exercises of the SCF in the contacts and activities required in support of the flight. The rehearsal period culminates in a full dress rehearsal to determine and demonstrate the ability of the SCF to support orbit operations.

6. REHEARSAL ACTIVITIES

a. General Objectives

The general objectives of rehearsal activities are to establish and demonstrate in real time:

(1) On-orbit command and control capability

(2) Integration of program and SCF subsystem functions

(3) Development and validation of system operations procedures

(4) Personnel readiness and proficiency

b. Rehearsal Prerequisites

Completion of Phases 1 and 2

c. Planning

Rehearsals will be planned in general by the TCWG and in detail by a Rehearsal Committee chaired by Test Control and composed of personnel from the Rehearsal Development Unit and representatives of concerned operations sections.

d. Rehearsal Support

All organizations will support rehearsals with the full working teams that will be assigned to specific operational functions and will exercise their normal operational functions to the maximum degree possible.

e. Critiques

Test Control will conduct a formal critique as soon as practicle following each rehearsal.

7. READINESS CERTIFICATION

After the completion of all phases of Operational Readiness and the resolution of problems encountered, Test Control will certify flight readiness to TWOC.

ANNEX D
APPENDIX 2
LAUNCH AND ASCENT OPERATIONS

CONTENTS

TABLES

TABS

ANNEX D

APPENDIX 2

LAUNCH AND ASCENT OPERATIONS

1. GENERAL

The launch phase of operations, as defined for tracking and control, begins at liftoff and will consist of all operations associated with exit trajectory to loss of signal by the downrange telemetry station. Procedural information governing AFSCF participation in the launch and ascent phase is outlined in Table 1, and in greater detail in AFSCF Manual 375-1.

Briefly, the following functions occur during the launch and ascent of Program 206 vehicles:

a. The final launch countdown is monitored on the voice network by the FTFD and the Test Controller at the STC

b. Liftoff tone and voice announcement from the LOCC

c. Voice commentary and vehicle tracking by VTS until loss of signal downrange

d. Recording of telemetry data and real-time readout of selected events by VTS and the downrange ship

e. Transmission of launch trajectory, time of events, and performance data from VTS to the STC

f. Quick evaluation of the vehicle ephemeris, and updating of the Flight Profile by the STC

2. SATELLITE TEST CENTER

The STC monitors the countdown by direct voice communications with the LOCC starting at T-6 hours. At approximately T-5 minutes all SCF stations, the

LOCC, and STC supporting elements are placed on a common voice net for completion of the final countdown. Also, at T-5 minutes direct voice communications is established between the STC and Space Defense Center.

3. LAUNCH OPERATIONS CONTROL CENTER

The LOCC, located at VAFB, is equipped as the communications and command link between the STC and each of the following launch stations:

a. Blockhouse
b. VAFB Range Safety Office
c. AFWTR Range Control Officer (RCO)
d. Optical Tracking Sites
e. Downrange Telemetry Ship (DRS), by relay through the RCO

During countdown, LOCC keeps the STC informed of the following:

a. Countdown status, including holds and degree of seriousness
b. Countdown milestones, as designated in the Countdown Manual
c. Additional items as deemed necessary during countdown by LOCC or the Test Controller

The downrange telemetry stations and all tracking stations will be kept advised of the countdown status by events as they occur, using standard terminology.

4. VANDENBERG TRACKING STATION (VTS)

Vandenberg Tracking Station will support the 6595th ATW in accordance with the Countdown Manual and established VTS station procedures. VTS will maintain active radar tracking status and record ascent telemetry until loss of signal downrange. Selected telemetry events will be reported, in respect to system time, as outlined in paragraph 5.

5. LAUNCH SEQUENCE OF EVENTS

At launch and during the ascent phase, LOCC and VTS maintain voice communications with the STC. A continuous commentary describes the events at liftoff and the launch ascent trajectory.

The following information is reported to the STC from VTS or the LOCC just prior to liftoff and during ascent:

a. Time delay of OCV Beacon
b. Vehicle clock readout (at liftoff)
c. Velocity meter readout (before liftoff)
d. Ascent TM including vehicle clock on ascent
e. Signal strengths and frequency deviations*
f. The following events:
   (1) LIFTOFF
   (2) Booster Engine Cutoff (BECO)
   (3) Booster Engine Separation (SPLIT 1)
   (4) Sustainer Engine Cutoff (SECO)
   (5) Vernier Engine Cutoff (VECO)
   (6) Atlas/S-01A Separation (SPLIT 2)
   (7) S-01A Engine Ignition (PUSH 1)
   (8) FADE
g. Description of ascent

*During the initial ascent, excessive frequency deviations on telemetry or beacon transmitters should be noted by the RCO and passed immediately to the DRS to assist in T/M acquisition and beacon lock-on. Excessive deviations are:

a. ± 4mc for radar beacon
b. Out-of-bandwidth for telemetry transmitters

6. DOWNRANGE SUPPORT UNIT

Air Force Western Test Range (AFWTR) will provide a telemetry ship downrange to record Links 1, 2, and 3. The DRS will also produce an oscillograph display of required ascent events for a voice report to the STC (through the RCO), followed by postpass teletype telemetry reports. The DRS will have a nominal location of 11 degrees North, and approximately 50 nm East of the vehicle ground track. A downrange aircraft will be used only when a ship is not available.

Since the aircraft may be unable to transmit during actual telemetry recording, it may not be possible to report time of events observed in real-time; however, following telemetry recording, the aircraft reports events as soon as possible by voice, followed by teletype reports.

The following information is requested from downrange stations:

a. Acquisition
b. Signal Strengths
c. TM (See OR 7100)
d. The following events in near-real-time voice:
   (1) Event No. 1, (VTS — Not normally seen by the DRS)
   (2) Event No. 2, (S-01A Engine Cutoff and Velocity Meter Readout)
   (3) Event No. 3, (Computer Pre-Arm)
   (4) Event No. 4, (S-01A/OCV Separation (SPLIT III))
e. Fade

7. SPACE DEFENSE CENTER REQUIREMENTS

The STC will be in direct voice contact with Space Defense Center, which will provide certain tracking data used to establish orbit achievement and a quick-look analysis of the vehicle ephemeris.

Table 1

CHRONOLOGY OF EVENTS
(Launch and Ascent)

Time	Action/Function
LIFTOFF	
T = 0:00	Liftoff tone monitored on voice net. STC passes time to Space Defense Center. RCO passes to DRSU.
ASCENT	
T + 0:01/T + 0:05 (minutes)	AFWTR (RCO) advises DRS of observed vehicle anomalies and frequency deviations. Launch commentary by VTS.
T + 0:10	VTS transmits Time of Events message to STC. DRS sends voice readouts to STC, through the RCO.
T + 0:15	Orbit Plans notify *PEG and Command Generation of Vehicle Clock Time at liftoff.
T + 0:25	DRS sends Postpass Telemetry Message (TTY) to AFWTR. RCO routes to STC, with information to Launch Wing (VWZS).
T + 0:30	Vehicle Analysis (SSOTC-1) converts Velocity Meter Report and advises Orbit Plans of results.
	PEG and Command Generation update the vehicle command load (CVCT) to reflect the actual liftoff time.
T + 0:40	Orbit Plans and PEG predicts Rev 1, based on ascent observations.
T + 0:45	DRS advises AFWTR of time departing station and estimated position at T +12 hours.
ORBIT	
T + 1:30	STC transmits Orbit Achieved Message to Space Defense Center, HTG, and AFWTR.
POST REV 2	STC (SSOTC) advises AFWTR if air pickup of DRS data will be required.

* Program Engineering Group

Table 2

DOWNRANGE SUPPORT UNIT (DRSU), MAGNETIC TAPE TRACK ASSIGNMENTS

Track	Content
1	IRIG Timing, 100 pps on 1 kc (Substitute WWV if necessary)
2	RECVR #1, Link 1, with 100 kc wow and flutter compensation
3	RECVR #2, Link 2
4	Mixer
5	50 kc wow and flutter compensation
6	RECVR #3, Link 3, with wow and flutter compensation
7	Spare

Mixer: Speedlock
RECVR #1, AGC Voltage
RECVR #2, AGC Voltage
RECVR #3, AGC Voltage
IRIG C Timing
Voice Annotation

Notes:
Tape Speed 60 ips
Inner Track is No. 1

ANNEX D

APPENDIX 2 – Tab a

MINIMUM SCF REQUIREMENTS FOR LAUNCH

1. GENERAL

Primary test objectives essential to mission accomplishment must not be compromised by actual or incipient malfunctions in the overall system. Primary and secondary objectives are outlined in the System Test Objectives document. Failure or malfunction of equipment affecting the total system is reported to the FTFD by the Test Controller for final decision on whether to continue, hold, recycle, or abort the launch countdown.

2. R - 1 DAY ACTIVITIES

Launch-day operations commence with the Test Controller at the STC monitoring the system and vehicle countdown status, reaffirming SCF and downrange telemetry station operational status, and receiving current weather status. Prior to start of terminal countdown, the countdown communications network is tied into the overall systems communication net.

3. SYSTEM READINESS

The following listed capabilities represent general criteria for launch; however, the Program Director may elect to launch with less capability if, in his judgment, the successful attainment of any primary objective is not jeopardized.

3.1 Vehicle Readiness

Vehicle readiness is monitored by the Launch Controller in accordance with the criteria contained in the Countdown Manual. Detailed vehicle readiness criteria are outlined in Section 5 of the System Test Objectives (STO). General countdown sequence follows:

T - 14 hours	Countdown Initiation
T - 10 hours	Satellite Vehicle Checkout
T - 5 hours	Countdown Evaluation
T - 4 hours	Tower Removal and Open-loop RF Test
T - 1 hour	Final Countdown Evaluation
T - 30 minutes	Terminal Countdown Vehicle power on Programmer erased Programmer loaded Prelaunch reset executed T/M to desired flight mode Start vehicle clock
T - 0	Liftoff

3.2 SCF Readiness

STC readiness criteria include:

a. Computer capability

b. General purpose ground station (GP-1)

c. Communications capability:

(1) 100-wpm, TTY/alternate voice to all tracking stations

(2) Voice communications between the STC and the LOCC

Each SCF station will be manned and checkout procedures will begin at T -6 hours. Tracking stations readiness includes:

a. VTS, NHS, KTS, HTS, OL 5, and GTS
   (1) Capable of transmitting acceptable vehicle commands.
   (2) Monitor and record the real-time T/M data specified in Appendix E.4
   (3) Lock on and track the vehicle beacon/transponder.
   (4) Ability to transmit tracking data to the STC.
   (5) ZEKE Command Capability.

4. OTHER SUPPORT

4.1 Downrange Support Unit (WTR*)

Readiness includes:

a. Telemetry receiving system
b. Telemetry ground station, including tape recorders, decommutators, oscilloscopes, and timing system
c. Voice communications between the DRU and RCO (WTR).

4.2 Weather Support

Launch go, no-go weather requirements are detailed in the Program 206 Range Safety Report, Aerospace, No. TOR-169(3123)-4, dated 4 March 1962. Surface wind restrictions are presented in tabular form in LMSC Document B058532, dated 22 February 1963.

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*Detailed requirements are outlined in the 206 PRD 7100 (not a SCF facility).

ANNEX D

APPENDIX 3

ORBIT OPERATIONS

CONTENTS

TAB

TABLES

ANNEX D
APPENDIX 3
ORBIT OPERATIONS

1. GENERAL

The STC is responsible for operations control and for the related functions of reducing selected data and analysis thereof. Data reduction and analysis are performed almost continuously; operations control is carried out in coincidence with vehicle contacts at the various tracking stations.

A typical operations control sequence for a station pass starts with the transmission of the Prepass Tape and the Command Message from the STC to the station; and ends with the transmission of the pass summary messages from the station to the STC. Included in this section are detailed descriptions of the operational functions of the STC.

2. STC ACTIVITIES

2.1 Prepass Operations

Prior to ETA the STC transmits Prepass Tapes and Command Message to the tracking station. The Test Controller conducts communication checks with the station and proceeds with the station briefing. In general, this briefing will inform the station of the equipment and actions required on the impending pass.

Tracking pass plot and pass data tables are prepared for the Test Controller's use in conducting the operations.

2.2 Pass Operations

The Test Controller monitors the Operations Controller's running commentary of station operation commencing at acquisition and continuing to fade. The Test Controller orders the transmission of all commands and receives reports of transmission and vehicle acceptance from the Operations Controller. All operational decisions are made by the Test Controller. Unusual or emergency situations will be referred to the Test Controller for diagnosis and remedial action. Details regarding procedures to be followed during the pass are found in Annex D, Appendix 5.

2.3 Postpass Operations

After completion of an active pass, the STC receives data from the station as detailed in Annex D, Appendix 5.

On-line data processing and analysis begins immediately after receipt of the first data and continues as additional data inputs are received. The major tasks to be performed by the STC are:

a. On-line data analysis
b. Generation of new Prepass Tapes
c. Generation of the Command Message.

2.4 General Flight Operation Activities

Re-entry traces and recovery force movements are plotted and updated as necessary. Orbit elements, command system status, and pass schedule displays are all maintained in a current status. Action plans are prepared and submitted to the Test Controller. Any vehicle status change is immediately reported.

Command load requirements, based on vehicle health, multi-ops conflicts, and other operational requirements, are determined prior to the generation of a Command Message. Command Generation translates these requirements into computer inputs. The Command Message is then generated on the 3600 computer, checked, and sent to the station. After the message is loaded, it is updated on the reset tapes on the 3600 computer.

3. TRACKING STATIONS

3.1 General

The basic functions to be performed at tracking stations are:

a. Tracking with PRELORT radar
b. Readout and recording of VHF telemetry
c. Decommutation and display of selected telemetry
d. Transmission of RTCs and SPCs via the proper command links
e. Maintenance of status and control of vehicle
f. Transmission of data to the STC
g. Transmission of operations reports to the STC.

The following information covers the tracking station operational sequence in four phases: prepass, acquisition, tracking and commanding, and postpass. These sections deal with the general operating sequences to be followed during these phases. Details of the individual operations within each station subsystem are covered only as necessary to ensure proper satellite control and data readout.

3.2 Pre-pass Phase

The tracking station performs equipment checkout and calibration to ensure maintained accuracy in the system. All communication links are checked in conjunction with the STC. The Prepass Tape and Command Message are received and processed. The Operations Controller reports station status and is briefed by the Test Controller. Detailed procedures are covered in the Tracking Station Procedures.

3.3 Acquisition Phase

The Acquisition Phase extends from ETA to PRELORT lock-on. At ETA, the PRELORT and the telemetry antenna are positioned by the T&C computer. Commentary and reports required in this phase are described in detail in Annex D, Appendix 5.

3.4 Tracking and Commanding Phase

The tasks to be performed during the Tracking and Commanding phases are:

a. Transmit RTCs and command blocks as directed by the Test Controller
b. Report on significant events as they occur
c. Read out and record Telemetry and Tracking data.

The general sequence of operations for this phase is given in the paragraphs that follow.

3.4.1 Readout and Recording of TM and Tracking Data. Data are recorded from the receiving antennas after acquisition and when all antenna systems are tracking. Required data recording and readout are described in Annex D, Appendix 5.

3.4.2 Normal SPC Load, OCV Command System. All vehicle equipment necessary to permit reception and storage of SPCs is turned on by SPC prior to ETA. Command Message transmission proceeds with the T&C computer or the 125 configured as specified by the Test Controller in the station briefing. Telemetry readout requirements, when loading, are given in the Tabs to this Appendix.

3.4.3 Transmission of RTCs, OCV Command System. The RTCs planned for transmission during a pass are specified by the Test Controller in the station briefing. The transmission of RTC's is performed only at the direction of the STC Test Controller, unless alternate procedures are directed.

Punched paper tapes containing RTCs are transmitted to appropriate tracking stations prior to flight. They are to be used in the event 125 dial commands are inoperative. Real-time command sequences are generated by the STC and transmitted to the station via the 1200 bit line for convenience in sending from the 125. Station Operator's procedures for the operation of the 125 in transmitting RTCs are detailed in the Tabs to this Appendix.

3.4.4 Contact Termination. All antennas track the vehicle continuously until loss of signal. Loss of tracking and data links is reported to the Test Controller, along with the time of occurrence. Turn-off of specific vehicle command equipment may be accomplished by RTC or SPC with backup provided by a timer in the vehicle.

3.5 Postpass Phase

When requested by the Test Controller, the station submits postpass reports to the STC summarizing activities during the pass. Refer to SOM Chapter 403, Section A5, for contents and formats of these reports.

3.6 Space Defense Center Requirements

The Program Engineer Group (PEG) will be responsible for transmitting KOMPACT zero residual tracking data to Space Defense Center, Ent Air Force Base, Colorado, Attn: NCOC-SSO OBJ XXXX, for the following circumstances:

a. Rev 3

b. Daily, for one Rev (two or three revs before alternate/primary recovery revs and)CV deboost).

ANNEX D

APPENDIX 3 – Tab a

ALTERNATE OPERATIONS

1. GENERAL CONCEPT

The following plan for control and support of Program 206 operations during contingencies establishes minimal capabilities and equipment required to maintain essential flight support pending complete restoration of the system.

Loss of support capability can result from facility/equipment destruction or outage affecting control from the STC. The majority of tracking stations are assumed to be in an operational posture, except for the usual communications links terminating at the STC.

The following contingency is considered:

> Major destruction or outage of STC facilities requiring transfer of the total operation to the Computer Program Development Center of the Systems Development Corporation, Santa Monica (CPDC/SDC).

The following plan for control and support of Program 206 operations during contingencies expands in detail upon requirements and actions directed by the SCF Operation Contingency Plan. The Systems Operations Manual (SOM) directs actions and responsibilities for activation of emergency facilities at the CPDC (SDC) in Santa Monica. Decision to utilize the alternate facilities rests with the Director for Test Operations, based on requirements of the operation and the nature of the contingency. As the SSOT managerial representative, the FTFD will determine the use of backup facilities for this program.

2. PROGRAM REQUIREMENTS FOR CONTINGENCY OPERATIONS

The following defines the operational impact of total or major outage at the SCF and identifies backup capabilities and equipment required to maintain essential flight support pending complete restoration of the system.

For Program 206, the minimum backup equipments required are 100-wpm TTY links and a 3600 computer. Loss of the data display and distribution system would be inconvenient but not significant. The time allowed to activate alternate facilities is very sensitive to flight status. During the early orbit, and in some circumstances during on-orbit phases, the loss of 3600 computers for a period of more than one hour would critically disrupt the support of operations. A communications outage could be tolerated for a longer period of time, but would become critical if extended over a period of twelve hours. For emergency recovery support, voice or TTY communications are required with KTS and the 6594th Test Group.

2.1 Communications

At the minimum, 100-wpm TTY links must be provided. If computer equipment only is lost and operational command continues from the STC, TTY lines to the stations must be operable. If command is transferred to the CPDC, TTY lines must exist between the temporary center and the stations.

If a station loses all communications with the STC before acquisition, it will proceed to record all data possible using existing acquisition data, maintaining the recorded data in readiness for transmission when communications are restored. For scheduled passes for which a prepass briefing and clearance have been given, the station will proceed to support the operation in accordance with Emergency Communications Procedures (Tab d).

If STC operations are transferred to the SDC facility in Santa Monica, stations will transmit required telemetry and tracking data by teletype. Minimum requirements include scheduled TM groups, each processed TM point on the local station printer reported once per pass, and tracking data punched on a one point per eight second basis.

2.2 3600 Computer Facilities

If STC computer facilities are lost, decision to transfer operations to an alternate facility will be based on predicted duration of outage and computer requirements during that period. The total capability needed includes not only hardware compatible with the SCF Software System, but the documents and tapes listed in Table 1.

2.3 Data Distribution and Display

Loss of internal SCF data distribution and display capability would be inconvenient, but would not critically hamper operations.

3. MINIMUM EQUIPMENT REQUIREMENTS

The following define minimum STC computer and communication requirements to maintain essential flight support during various phases of the operations:

3.1 Launch/Revs 1 and 2

Outage duration of one hour or less	Loss of all STC equipment can be sustained for outages of this duration.
Outage duration of one hour or more	3600 Computer 160A Bird Buffer 100-wpm TTY

3.2 Early Orbit Revs 2-10

Outage duration of one hour or less	3600 Computer required for generation of reset tape.
Outage duration of one hour or more	3600 Computer 160A Bird Buffer 100-wpm TTY

3.3 Nominal On-Orbit

Outage duration of one hour or more	3600 Computer 160A Bird Buffer 100-wpm TTY

3.4 Recovery

Voice or TTY communications are required with KTS and the RCG for use in designation of the planned recovery pass. During the planned recovery phase, in event of loss of communications, the 6594th Test Group will continue to support the recovery operation in accordance with previously provided impact predictions.

Table 1

DOCUMENT REQUIREMENTS

1. The document permanently required at the designated alternate computer area (CDPC) is the SDC Milestone Document (Milestone VII - BESST 8).
2. Documents and tapes required at the designated alternate computer area prior to liftoff: a. Copy of latest 160A Master Tape and Bootstrap b. Copy of latest BCD Master Tape c. Crypto Secure Word List and Crypto Tape d. Mission Profile e. Flight Profile f. Latest Command Definition Specification g. Nominal Flight Reset

Table D.3.b-1

SOC CONFIGURATION

SOC Switch	Standard Configuration (Sierra) Single	Auto Sierra	ZEKE	KIK-ZEKE	Sierra Repetitive	125 (DDE) Console
Transmitter Config	Prelort Digital		150 MHz ZEKE	150 MHz ZEKE		**Prelort Digital**
Transmission Rate	Prelort PRF		1 pps	20 pps		**Prelort PRF**
Command Mode	Digital Manual, Single	Computer Auto	Analog Manual Single	Digital Manual Single	Digital Manual Repetitive	
Command Source	DCB					DDE
Verification Source	Continuous					
ICS Mode	Operate					
Command Selected	0000					
Command Verifications	000					
Command Transmissions	000					
Command Select	0000					
Transmission Verification	Primary Dig Verif					
Command Status, Alarms	All OFF					
Reject Select	4					
Reject Count	0					
Repetitive Select	01				No. of Cmds. Desired	
Repetitive Selected	00					
Command Transmit	None Selected					
Radar S Mode Select	OFF		ON	ON		

Note: These columns indicate changes from the Standard SOC Configuration.

Table D.3.b-2

STANDARD STATION PRE-PASS 125 CONFIGURATION

	Switch	Position
1.	N-Rejects (Thumb)	4
2.	Reject Error Light	Off
3.	Tape Error Light	Off
4.	Logic Error Light	Off
5.	Spoof Error Light	Off
6.	Error Hold	On (Red)
7.	Power	On (Grn)
8.	Tape Power	On (Grn)
9.	In Contact	Off
10.	Prepare Tape	(Do not operate)
11.	Tape Ready	Off
12.	Transmit Tape	(Off)
13.	End of Tape	Off
14.	Spoof Override	N. A.
15.	Manual Enable	On (Yell)
16.	Tape/Sim	Tape
17.	Radar and TLM/Sim	Radar and TLM
18.	Left Manual/Auto	Auto
19.	Right Manual/Auto	Manual
20.	PSS Enable	Off
21.	Emer Enable	On
22.	RTC Enable	Off
23.	Transmit	Off
24.	Word Selection	00
25.	Telemetry Verification	Link 2 Channel 17
26.	DDE Enable (SOC)	ON (Light ON)
27.	Configuration I/II (VTS and OL 5 only)	I

Note: Any deviations to the above will be made by the STC Test Controller in the Station Pre-pass Briefing.

Table D.3.b-2

STANDARD STATION PRE-PASS 125 CONFIGURATION

	Switch	Position
1.	N-Rejects (Thumb)	4
2.	Reject Error Light	Off
3.	Tape Error Light	Off
4.	Logic Error Light	Off
5.	Spoof Error Light	Off
6.	Error Hold	On (Red)
7.	Power	On (Grn)
8.	Tape Power	On (Grn)
9.	In Contact	Off
10.	Prepare Tape	(Do not operate)
11.	Tape Ready	Off
12.	Transmit Tape	(Off)
13.	End of Tape	Off
14.	Spoof Override	N. A.
15.	Manual Enable	On (Yell)
16.	Tape/Sim	Tape
17.	Radar and TLM/Sim	Radar and TLM
18.	Left Manual/Auto	Auto
19.	Right Manual/Auto	Manual
20.	PSS Enable	Off
21.	Emer Enable	On
22.	RTC Enable	Off
23.	Transmit	Off
24.	Word Selection	00
25.	Telemetry Verification	Link 2 Channel 17
26.	DDE Enable (SOC)	ON (Light ON)
27.	Configuration I/II (VTS and OL 5 only)	I

Note: Any deviations to the above will be made by the STC Test Controller in the Station Pre-pass Briefing.

ANNEX D

APPENDIX 3 -- TAB c

COMMAND PROCEDURES

Table 1

125 COMMAND PROCEDURES*

Item	DICE Voice	Station Action	Station Reply	Remarks
1	(Prepass only) "Load GREEN Msg XXX in the 125 at this time (or at ETA ____)."	a. Actuate RESET b. Load Tape in 125 c. Tape Power On	a. "GREEN Msg XXX is loaded (or was loaded at ETA___)."	
2	"Send GREEN Msg XXX (or GREEN Tape)."	a. Actuate Prepare Tape b. Actuate Transmit Tape	a. "Block One in Progress" b. "Block One Complete, word count XX." c. Repeat a and b for each block.	After last Block Report 125 Condition
3	"Load GREEN Msg XXX in the 125 and STANDBY."	a. Actuate RESET b. Load Tape in 125 c. Tape Power On	a. "GREEN Msg XXX is loaded."	Next direction will be either Item 2 or 4.
4	"Remove GREEN Msg XXX from the 125"	a. Actuate RESET b. Tape Power Off c. Remove Tape	a. "GREEN Msg XXX has been removed."	
5	"Load and send GREEN Msg XXX."	a. Actuate RESET b. Load Tape in 125 c. Tape Power On d. Actuate Prepare Tape e. Actuate Transmit Tape	a. "GREEN Msg XXX is loaded and in progress" b. "Block One Complete, word count XX." c. Repeat for each block	Report 125 condition after Msg complete

*All commanding will be at the direction of DICE. In the event of lost communications, no commanding is authorized unless briefed otherwise by DICE.

Table D. 3. c-1 (Continued)

Item	DICE Voice	Station Action	Station Voice Reply	Remarks
6	"Send GREEN_____"	a. Actuate RESET b. Dial GREEN______ c. Actuate RTC Enable d. Actuate RTC Transmit e. If not verified advise DICE	a. "GREEN___sent and (not) verified system time___." b. "Report functional verification."	a. 125 console indicates accept or reject. b. Example: 3 Papa on (off) system time.
7	"Error Hold Off"	a. Error Hold Off b. Error Hold On	a. "Msg is going out" b. "Constant Rejects"	
8A	"Send Block _____ Again"	a. Actuate RESET b. Tape Pwr Off c. Move Tape Back to Beginning of Block _______ d. Tape Pwr On e. Prepare Tape f. Transmit Tape	a. Reloading at Beginning of Block _____ c. Block_____Sent Again. Reject on Word One.	
8B	"Emergency Advance"	a. Actuate Emergency Advance Once.	a. We have Emergency Advanced Over Word One. Blk______is (is not) Going Out.	

Table D.3.c-1 (Continued)

Item	DICE Voice	Station Action	Station Voice Reply	Remarks
9	"Load GREEN Message ___ ___, Block ______, at word _____."	a. Actuate Reset b. Load GREEN Message ______, beginning Block ____. c. Tape Power On d. Radar TLM/SIM On SIM e. Actuate Prepare Tape f. Actuate Transmit Tape g. Actuate Accept until word shows in tape word number.	a. "GREEN Message ____, Block __. Loaded at Word _____." b. "Tape Word Number _______."	
10	"Send GREEN Msg. _____ starting at Block ______ Word _____." or "Send only Block _____ of GREEN Message _____, beginning with Word _______."	a. RADAR TLM/SIM On Radar TLM	a. "Block ___ being transmitted." b. "Block ____, ____ words" (Only blocks specified by DICE will be transmitted).	Word Count reported by station will be the total block word count. Nr. of words xmitted will be total count minus the word nr. at which xmsn was started.

Table D.3.c-1 (Continued)

Item	DICE Voice	Station Action	Station Voice Reply	Remarks
11	"Load GREEN Message ____ for manual transmission."	a. Actuate Reset b. Load Tape in 125 c. Tape Power On d. Remove Telemetry from 125	a. "GREEN Message ____ loaded for manual transmission."	
12	"Send GREEN Message ____ manually."	a. Actuate Prepare Tape b. Actuate Transmit Tape c. Actuate Emergency Advance until entire message has been transmitted. d. Monitor Telemetry Link 2, Channel 15, Points 13 and 14.	a. "Block one being transmitted." b. Block one ____ words, block two being transmitted, etc." c. "2-15-13 Reads ____%" "2-15-14 Reads ____%"	
13	"Skip one word using Emergency Advance"	a. Emergency Enable On. b. Actuate Emergency Advance c. Report tape word number reading to DICE at end of each block.	a. "Emergency Advance actuated, message is (is not) going out, block ____, ____ words, etc."	One word is to be skipped and transmission continued.
14	"Skip two words and continue."	a. Reset b. Actuate Prepare Tape c. Actuate Transmit Tape	a. "Two words skipped." . "Msg is (is not) going out."	
15	"Switch to Back-up Mode of verif."	a. Patch Link 3, Ch. 17 to 125.	a. "Have switched to B/U mode of verif." b. "125 Scope --- (describe 125 condition)"	

Table D.3.c-1 (Continued)

Item	DICE Voice	Station Action	Station Voice Reply	Remarks
16	"Switch Ground to reverse config. -or- to normal config."	Telemetry Link patched into 125 switched to Delta 3 for reverse and to Delta 2 for normal.	"Ground Station switched to reverse (or normal)"	Note: This should be done after applicable command has been sent (unless otherwise directed)
17	"125 Condition"	a. Check 125 Console for error lights. b. Check 125 telemetry scope for levels, real mode, stored mode noisy signal. etc.	a. "125 scope shows real mode with clean signal." b. "125 scope shows stored mode. 2-11 Reads ____%." c. "125 scope shows real mode with noisy signal." d. "125 scope shows ambient mode." e. "________error light on."	The DDE Operator will immediately report any changes in 125 presentation to the OD who will relay to DICE.
18	"Advise when 3 papa is usable."	a. Monitor 3-14. b. Report system time 3-14 goes from noise spikes to modulated signal.	"3 papa was usable at system time______."	
19	"Emergency Retransmit"	a. Actuate Emergency Retransmit.	a. "Emergency Retransmit Actuated. Block _____ is (is not) going out."	None.

Note: The following standard definitions and reporting procedures will be used.

1. All stations will report "PPD ON" as follows: "C COCOA AT ____" (system time). The term "PPD" will not be used on voice lines.

2. To clarify reporting of 125 conditions the following modes are defined:

Ambient Mode

LK 2-11	Approx 10 pct
LK 2-17 or LK 3-17	5 to 10 pct

Real Mode

LK 2-11	Approx 10 pct
LK 2-17 or LK 3-17	Constant rejects

Stored Mode

LK 2-11	18 to 70 pct
LK 2-17 or LK 3-17	Constant rejects

Command capability will continue to be reported as "real mode clean signal", the clean signal referring to LK 2-17 or LK 3-17. Note that "real mode" cannot be determined unless both LK 2-11 and LK 2-17 (or LK-3-17) are observed.

3. If asked for reading on LK 2-11 report percent of bandwidth. Normal reading is approx 10% in real or ambient mode and 18 to 70% in stored mode. Under certain conditions LK 2-11 may read zero and should be reported as such, however this condition will be rare. If asked for a reading on LK 2-17, report either ambient level for the 5 to 10 pct condition or, if in real or stored mode, report normal (or abnormal) rejects and whether signal is clean or noisy.

Table D.3.c-2

COMPUTER COMMAND PROCEDURES

A. VOICE PROCEDURES

Item	DICE/Voice	Station Action	Station Reply	Remarks
1	"Request word count on Auto Sierra ________"	a. Select Isolated loop test b. Dial block no. ________ c. Transmit d. Repeat b & c for each block	"Word count for Auto Sierra ______ is; block ______ words, block ______ words, etc.	
1A	"Confirm you have the following A/S messages selected ________".	None	"We confirm A/S ________ have been selected".	
2	"Send Sierra ________"	a. Dial Sierra b. Transmit	a. "Sierra ______ sent and (1) verified (2) not verified at system time ________ (3) rejected"	

Table D.3.c-2 (Continued)

Item	DICE/Voice	Station Action	Station Reply	Remarks
2.A	"Send Restricted Sierra ______"	a. Dial in proper command number. b. Depress Restricted Command Enable after restricted light comes on. c. Depress Transmit.	a. "Restricted Sierra ______ sent and (1) Verified or (2) Not verified at system time ______."	
3	"Send Sierra ______ again"	a. Clear error condition b. Transmit	a. "Sierra ______ sent again and (1) verified (2) not verified at system time ______ (3) rejected"	a. See Item 5 for error conditions
3.A	"In the Repetitive mode, send Sierra ______ (or Restricted Sierra ______) ______ times."	a. Select Xmit mode Repetitive b. Dial desired number in Repetitive Number Select. c. Dial in proper command number. d. If restricted light comes on - depress Restricted Command Enable. e. Depress Transmit.	a. "Sierra ______ (or Restricted Sierra ______) sent repetitively, verify count ______. XMSN count ______" Report any error condition that occurs.	

Table D. 3. c-2 (Continued)

Item	DICE/Voice	Station Action	Station Reply	Remarks
3.B	"In the Repetitive Mode, send Sierra ________(or Restricted Sierra ________) for ________ seconds (or continuously)." or "Starting at system time ________ in the Repetitive Mode, send, etc. (same as above)."	a. Select Xmit mode Repetitive. b. Dial ØØ in Repetitive Number Select. c. Dial in proper command number. d. If Restricted, depress Restricted Command Enable. e. Depress Transmit f. Depress Repetitive Stop at proper time or when directed.	a. "Sierra ________ (or restricted Sierra ________) in progress, (or initiated at system time ________). Sierra ______ (or Restricted Sierra ________) terminated at system time ________ ."	

Table D. 3. c-2 (Continued)

Item	DICE/Voice	Station Action	Station Reply	Remarks
4	"Send Auto Sierra _____ through _____	a. Select command mode Computer Auto b. Dial proper A/S no. and block no. c. Transmit d. Repeat b&c for each block	a. "A/S _____ Block _____ in progress" b. "A/S _____ Block _____ complete, verify count _____" c. Repeat a&b for each block	
5	"Send block _____ _____ again"	a. Select another block b. Reselect proper block c. Clear error indication d. Transmit	a. "Block _____ sent again, message going out (or report error condition transmit count _____)"	a. The error indication to be cleared under Item c of station action will normally be a spoof (spoof alarm, Reject Level alarm, Echo alarm, verification alarm. b. Normally a reject on transmit count 0 will be expected when a block is sent again.
6A	"Select Auto Sierra _____ Block _____ at word _____ "	a. Dial proper A/S block numbers. b. Actuate Computer Command Advance until transmit count READS WORD _____.	a. A/S _____ Block _____ selected, transmit count _____"	

Table D.3.c-2 (Continued

Item	DICE/Voice	Station Action	Station Reply	Remarks
6B	"Starting at word ______ send A/S ______ block ______"	a. Transmit	a. "A/S ______ Block ______ ______ is (is not) going out"	
7	Reset and Transmit	a. Reject Level alarm. b. Transmit	a. Reset, message going out (or reject ______)"	
8	"Transmit Continuously"	a. Change reject level to Ø, reset b. Transmit c. Return reject level to 4 at end of block	a. "Block ______ going out. (or continuous rejects transmit count ______ ______)"	a. Will normally be used only after "count clear" was unsuccessful in rectifying problem
9	"Reset Command Advance and Transmit"	a. Reset b. Computer command advance one word c. Transmit	a. "Computer advanced over one word" b. Message going out (or (report error condition transmit count ______")	
10	"Switch to back up mode of verification"	a. Actuate secondary digital verification source	a. "Have switched to back up mode of verification" b. "SOC condition ______"	
11	"Switch ground station to normal/reverse configuration"	a. Switch TM links in ground station	a. "Ground station switched to normal/reverse"	

Table D. 3. c-2 (Continued)

Item	DICE/Voice	Station Action	Station Reply	Remarks
12	"SOC condition"	a. Check SOC console for error lights b. Check 2-11 & 2-17	a. "SOC indicates ______" (stored, real, ambient, noise, etc.) b. "2-11 reads ______" c. "______ alarm light on"	a. Any change in SOC presentation will be relayed to DICE immediately
13	"125 Enable"	a. Actuate DDE Command source on SOC console.	a. "125 Enabled."	None.
14	"Computer Enable"	a. Place SOC in Standard Configuration.	a. "Computer Enabled".	None.
15	"Send Auto-Sierra 966 block 1 through 5	a. Select Cmd. mode Computer Auto b. Dial A/S 966 Block 1. c. Transmit	a. "Block 1 sent and verified 2-11 reads ______ %."	
		d. Dial Block 2 e. Transmit	b. "Block 2 sent and verified 2-11 reads ______ %."	
		f. Repeat for Blocks 3 and 4	c. Repeat for Blocks 3 & 4	
		g. Dial Block 5 h. Transmit	d. "Block 5 sent and verified TM indicates ______ Mode, ______ Signal."	

Table D.3.c-3

ZEKE COMMAND PROCEDURES

Item	DICE/Voice	Station Action	Station Reply	Remarks
1	At prepass briefing, inform station that command will be from ICS or 3Z panel. ICS Zeke	(a) Station will be prepared to command from ZZZ at all times and ICS on selected passes		
2	"S" mode enable and Configure SOC for Zeke commanding	(a) Depress "S" mode select switch (b) Configure SOC for Zeke commands	Roger, "S" mode enabled, SOC configured for Zeke commands. SOC scope is real mode, (ambient) clean signal.	
3	Send Zeke 26-XX or at system time ________ Send Zeke 26-XX	(a) Dial 26-XX on command select thumbwheels (b) Transmit (c) Verify vehicle reception (function or telemetry)	(a) Roger. DICE, send Zeke 26-XX or Roger, at System time ____ send Zeke 26-XX. (b) Zeke 26-XX sent at [illegible] time ____ and [illegible] verified)	If 3P on, verify [illegible] 3P off. If 3B on, verify by change [illegible] [illegible] [illegible] changing [illegible] mode)
4	Configure SOC standard, "S" mode Disabled.	(a) Configure SOC standard (b) Disable "S" mode select button	Roger DICE, SOC is standard. "S" mode is disabled. SOC scope shows real (ambient) mode, clean signal	

Table D.3.c-3 (Continued)

Item	DICE/Voice	Station Action	Station Reply	Remarks
5	"S" mode enable and prepare for Kik Zeke XX. Read back command selected.	(a) Depress "S" mode select switch. (b) Configure SOC for Kik Zeke commands (c) Dial 00-XX on command select thumbwheels	Roger DICE "S" mode enabled. Station is configured for Kik Zeke-XX. I have Kik-Zeke-XX in command window.	
6	Send Kik Zeke-XX or at system time ______ send Kik-Zeke-XX	(a) Depress transmit (b) Verify vehicle reception (function or telemetry)	Roger DICE, send Kik-Zeke-XX or Roger, at system time ______ send Kik-Zeke-XX. Kik-Zeke-XX sent at system time ______ and verified (not verified)	

Table D.3.c-3 (Continued)

Zeke Commanding From the 3Z Panel

Item	DICE/Voice	Station Action	Station Reply	Remarks
7	Send Zeke 26-XX or at system time ________ send Zeke 26-XX.	(a) Transmit (b) Verify vehicle reception (function or telemetry).	(a) Roger, send Zeke 26 XX or at system time ________ send Zeke 26-XX. (b) Zeke 26-XX sent system time ________ and verified (not verified)	If 3P on verify by 3P off. If 3B on, verify by change on 3-13-17 (or 3-13-19 if changing BUSS mode
8	Prepare for Kik-Zeke XX and read back designator.	(a) Install designator. (b) Read back designator <u>after</u> it is installed	Roger DICE prepare for Kik Zeke XX. Station prepared for Kik Zeke XX. Designator is ________.	
9	Send Kik Zeke-XX or at system time ________ send Kik Zeke-XX.	(a) Depress transmit (b) Verify reception (function or telemetry).	(a) Roger, DICE send Kik-Zeke XX or Roger at system time ________ send Kik-Zeke XX. (b) Kik-Zeke XX sent at system time ________ and verified (not verified)	

Table D. 3. c-4

ICS COMMAND TERMINOLOGY

The following voice terminology will be used with all stations using the ICS Panel:

(NOTE: The switch labeled "Transmission Alarm/Reset" will be labeled "Echo Alarm/Reset". SSONS will send out instructions on temporary labeling until permanent plates can be obtained.)

Examples below are voice exchanges for all possible error conditions:

1. Station: "Reject, Transmission Count ____________".
   DICE: "Reset and Transmit"
   STATION: "We have reset and transmitted, commands proceeding normally." (or report any subsequent error). Block ____ complete. Verify count ______".

2. STATION: "Spoof, Transmission Count ________".
   DICE: "Send Block ____________ again".
   STATION: "Roger, sending Block again".
   (Station will re-select the Block, Reset the alarm condition, and transmit.)
   STATION: "Block ______ sent again, Reject, Transmission count ØØ"
   DICE: "Reset, Command advance, and transmit"
   STATION: "Roger, we have advanced over word one, Commands are proceeding normally (or report any subsequent error condition.) Block _____ complete, verify count ________, transmission count _______."

3. STATION: "Echo alarm, transmission count _______".
   DICE: "Send Block ______ again" (Remainder of voice exchange is same as Item 2.)

Table D.3.c-4 (Continued)

4. STATION: "Verification alarm, transmission count ______."

DICE: "Send Block ________ again." (Remainder of voice exchange is same as Item 2.)

NOTE: If station has a verification alarm, OC should check primary verification signal immediately to see if failure is in ground station. Notify DICE immediately if primary verification signal is not present.

Table D.3.c-5

GREEN MESSAGE HANDLING PROCEDURES

The following procedures will be used for receipt and handling of green msgs:

1. Always receive green msgs on TM computer unless otherwise advised.
2. Msgs will be sent one way transmission only, Echo Check Mode.
3. If time permits, transmissions will continue until the station has punched two tapes, each compared successfully against CORE.
4. As soon as the first tape has been compared against CORE, it will be rushed to the 125 for word count.
5. As soon as the second tape has been compared against CORE, it will be rushed to the 125 for word count.
6. Teletype will be used for emergency back-up, or for short msgs as determined by Test Control.
7. All msgs sent to stations by TTY will be returned by TTY for verification.
8. Msgs sent by SDDT will not be sent back by TTY for verification unless directed by DICE.
9. All green messages will be marked in the space prior to each block with the block number that follows. A white-lead pencil will be used.

ANNEX D

APPENDIX 3 – TAB d

LOST COMMUNICATIONS PROCEDURES

1. TRACKING AND TELEMETRY

If data lines are lost and alternative action is not directed, the following action shall be taken:

- Make every effort to record tracking data normally. Do not use quick recovery unless loss of tracking data is imminent.
- Record TM data as briefed in Station Briefing. Playback can be made from History Tape when lines are restored.

2. COMMANDING

If voice communications are lost before ETA-0, command messages or real-time commands will not be transmitted to the vehicle unless specifically briefed to do so. If specific briefing has been given, follow procedures in the succeeding paragraph.

If communications are lost during the pass following direction to send XXX, and DICE has acknowledge the OC readback, proceed with the commanding as follows:

a. Realtime Commands. Send as directed. (If briefed to send in event of lost comm, Paragraph a, send at times specified.) Use computer as primary, 125 backup.

b. Command Messages. Use computer as primary, 125 backup if possible. If it is necessary to switch to 125, make certain Green Message is loaded in the 125 at the beginning of the Block in which the computer was when it failed. In the event of error alarms while transmitting, take the following action:

CORRECTIVE ACTION

<table>
<tr><th>Problem</th><th>Computer</th><th>125</th></tr>
<tr><td>1. Reject (except for first word of Block when sending Block again)</td><td>Reset and transmit</td><td>Error hold off momentarily.</td></tr>
<tr><td>2. Spoof</td><td>Send Block again:
a. Reselect Block
b. Reset alarm condition
c. Transmit
d. After reject on xmsn count ØØ:
(1) Reset reject alarm
(2) Command Advance one word
(3) Transmit
e. Verify count should equal one less than proper word count at end of Block</td><td>Send Block again:
a. Reload tape at beginning of Block.
b. Reset, prepare tape and transmit.
c. After reject on word Ø1, emergency advance one time
d. Word count should equal proper count at end of Block</td></tr>
<tr><td>3. Echo Alarm (ICS) or Tape Error (125)</td><td>Send Block again: (same as a thru e above)</td><td>Send Block again: (same as a thru d above)</td></tr>
<tr><td>4. *Verification Alarm or 125 stops</td><td>Send Block again (same as a thru e above.)</td><td rowspan="2">Send Block again: (same as a thru d above)</td></tr>
<tr><td colspan="2">*Check ground station for verification channel failure. Switch to back-up verification if necessary.</td></tr>
<tr><td>5. Loss of command capability while in block, unable to find problem, vehicle in stored mode.</td><td>a. Send Auto-Sierra 944
b. Verify Real Mode
c. Send Sierra 09

Note: Record reading of 2-11 before sending A/S 944</td><td>a. Send Green Msg 944
b. Verify Real Mode
c. Send Green 09

Note: Record reading of 2-11 before sending 944</td></tr>
</table>

ANNEX D
APPENDIX 4
RECOVERY OPERATIONS

CONTENTS

TABS

ANNEX D

APPENDIX 4

RECOVERY OPERATIONS

1. GENERAL

Recovery planning and direction is a function of the Field Test Force Director (FTFD) and the Systems Controller at the STC. During the recovery operation the Recovery Control Center (RCC) at Hickam AFB, Hawaii receives general direction and authority from the Systems Controller. Prior to launch a Nominal Impact Prediction Message is transmitted to the Commander, 6594th Test Group (TG), who operates the RCC and directs the composite recovery forces in accordance with OPlan 1-66 and the TG Operations Order published for each operation.

2. OPERATIONS NOTIFICATION

The STC will notify the TG of impending operations by the following means:

Messages	Schedule
Vehicle Peculiar Supplement (VPS) (Updated information to OR 7100)	R - 10 days
Nominal Impact Predictions (Included primary and alternate passes)	R - 9 days
Launch Notification Message	R - 7 days
Launch Notification Message	T - 24 hours
Revised Impact Predictions	Daily
Confirm or cancellation of selected pass	ETPD - 6 hours
Emergency Alert Force Deploy or Release	ETPD - 90 min

3. RECOVERY FORCE INSTRUCTIONS

Overall recovery concept and general force instructions are outlined in TG OPlan 1-66. The TG will prepare and issue an Operations Order for each operation supported and will brief all participating elements committed to the operation. SRU briefings will be conducted approximately four days prior to scheduled launch. After launch, the RCC will conduct daily briefings of the airborne recovery forces with the assumption that a re-entry will be selected for that day. This briefing will cover the refined deployment area, ETPD, latest impact prediction, weather conditions, and any revision of plan required since the original briefing.

Daily SRU re-deployment positions will be passed to the RCC, from the STC, based on computer calculated impact locations, vehicle health, weather, multi-operations, and other influencing factors. Ship positioning messages will be relayed by the RCC to the SRU's as expeditiously as possible.

4. ALERT REQUIREMENTS

The composite recovery forces are listed in Annex B.3 of this order. As soon as the vehicle ephemeris can be accurately determined, impact prediction messages will be transmitted to the RCC daily for one recovery pass per day. The normal alert forces will be released not later than ETPD - 6 hours if not required. The emergency alert force will be released not later than ETPD - 90 minutes each day when the force is not required.

5. DEPLOYMENT SCHEDULE

5.1 Aircraft

Recovery force aircraft will deploy according to the patterns and times outlined in TG OPlan 1-66. The type of deployment pattern to be utilized will be mutually agreed upon by the RCC and the Systems Controller at the STC.

5.2 Ships

SRU deployments are directed daily by the STC and relayed by the RCC. For additional guidance the following criteria are established for SRU recovery support of this program:

a. Normal situation prevailing - Two SRU's will be deployed approximately on orbit trace. The northern SRU (with helicopters) at 24 degrees north latitude; and the southern SRU at 16 degrees north latitude (with helicopters if available).

b. When multi-operations prevail, or only one SRU is readily available. The following requirements will be supported:

(1) For alternate passes, one SRU will be maintained within 24 hours normal sailing time of the impact position. For passes relatively close to the Hawaiian chain, the SRU could remain on port alert and helicopter coverage would be acceptable.

(2) For primary passes, one SRU near the impact point (with helicopters) and, if available, the second SRU within twelve hours sailing distance of the downrange orbit trace between 16 and 18 degrees north latitude. Use of the second SRU will depend upon the multi-operations situation at the time.

(3) When only one SRU is available, the northern position will be supported; if only one SRU has helicopter capability, the northern position is preferred.

(4) The northern SRU position will always be at 24 degrees north, unless directed otherwise by the FTFD or the Systems Controller.

5.3 Helicopters

The helicopters will be deployed as outlined in TG OPlan 1-66 and changes thereto.

6. SEQUENCE OF EVENTS

6.1 RC Events

Coded event numbers and associated telemetry readings are outlined in Annex E.8 (Terminal Events). Voice report of events will be accomplished as outlined in Annex E.8 and in TG OPlan 1-66. Events to be reported by the SRU are detailed in OR 7100 and OD 7100. Figure 1 shows the descent time of the RC.

6.2 Chronology of Recovery Events

A detailed chronology is shown in TG OPlan 1-66 for all recovery forces. OR 7100 contains a chronology for AFWTR units during launch and recovery support operations.

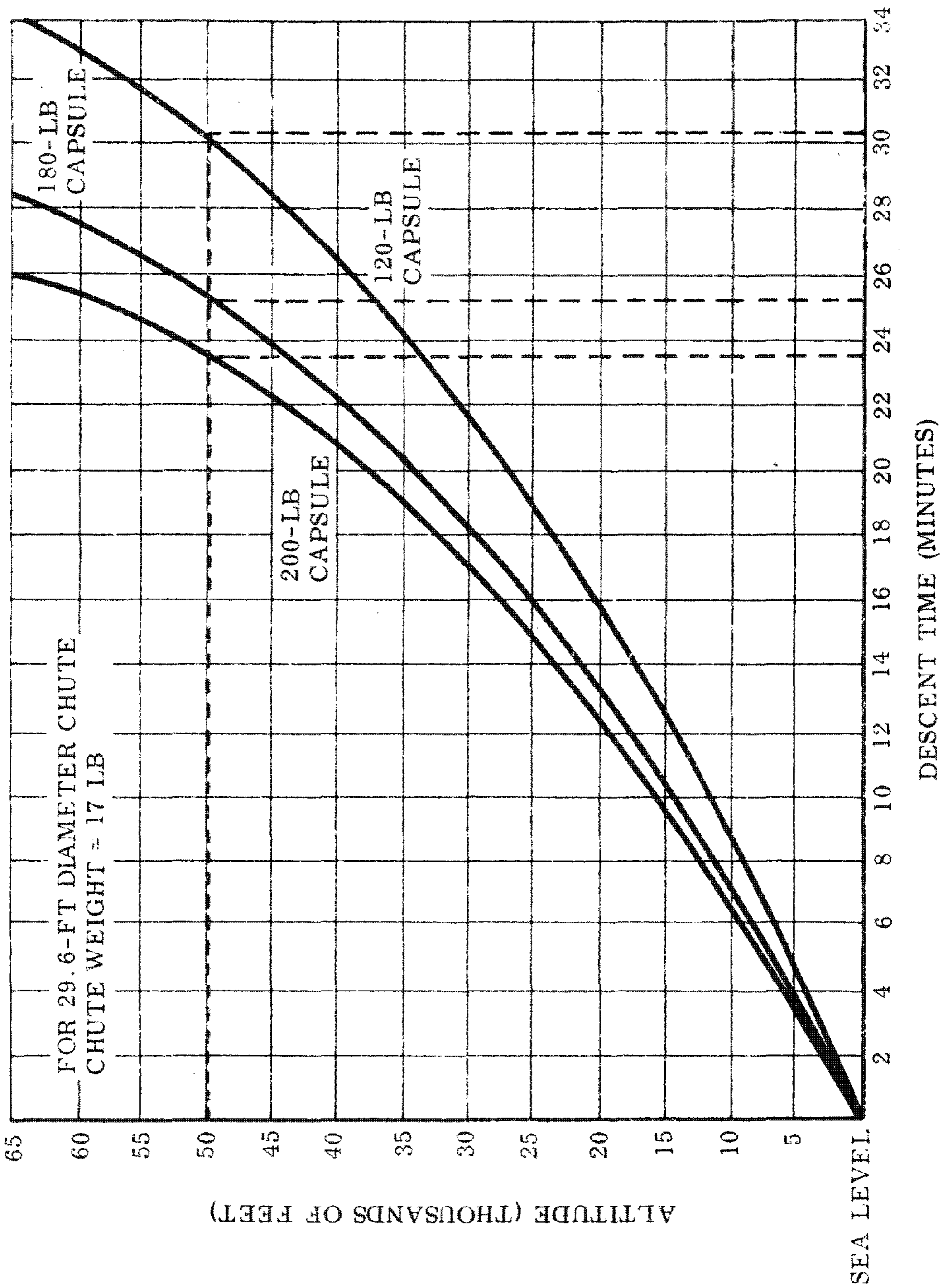


Figure 1 Descent Time vs Altitude

7. RC TRACKING AND DETECTION

All methods of RC detection by recovery force elements will be activated at ETPD -10 minutes. Electronic detection includes the RC beacon signals and telemetry. Frequencies are listed in Annex E.1 and RC beacon and telemetry characteristics are outlined in Annex B.2.b and in OD 7100. Procedures for reporting RC signals and DF vectors are covered in TG OPlan 1-66 and in the Operations Order for each operation.

7.1 Telemetry Recording

Telemetry data from the RC will be recorded by KTS, HTS, and the SRU's when re-entry occurs within recording range. Recording and readout requirements are specified in Annex E.8 and in OR 7100 and OD 7100 for the SRU's. If KTS acquires RC signals, signal strength and frequency durations will be reported and relayed by the RCC to recovery forces.

7.2 Tracking and Detection

Tracking (Angles data) is required from HTS when re-entry occurs within range. In event of RC overshoot, angles data are significant to the STC for computer generation of probable impact location. (Reference Paragraph 8, below.)

8. SCF REQUIREMENTS FOR RECOVERY

Prior to and during the recovery phase, OL 5, KTS, HTS, and PEG, will provide the normal tracking, command, and telemetry support. Additional requirements in support of recovery operations are:

8.1 PEG

PEG will generate a re-entry trajectory ephemeris table. PEG also computes a TG impact point from angles-only re-entry tracking data, and look angles for the SRU on recovery day.

8.2 OL 5 and KTS

OL 5 and KTS will read out certain SRV status telemetry, and transmit recovery commands to the OCV depending upon the recovery mode to be used.

8.3 HTS

HTS will report by voice and teletype, with system time, using the coded event numbers assigned. HTS also reports system time of RC beacon and telemetry acquisition and fade, plus frequency deviations and signal strength. When recovery is within station range, HTS reports bearing with system time as associated with reference bearings cited in TG OPlan 1-66. The DICE, HTS, HICKAM voice net will be manned on a continuous basis until released by the Test Controller.

HTS will use the TLM-18 antenna for RC acquisition telemetry and angle tracking data. The PRELORT and FPA will be used for OCV support. The primary prepass message is for PRELORT drive; the RC prepass message is to aid in acquisition.

8.4 Recovery Control Center

The Recovery Control Center serves as the Command Post for each recovery operation. The Center is manned by a Duty Officer at launch - 2 hours. Daily briefings are conducted at the RCC as required. The Center is fully manned on recovery day and remains in operation until all forces are released and/or termination of the operation.

8.5 OL 1 Aircraft Support

The use of JC-130 aircraft for mission support will be in accordance with AFSCF Regulation 55-1. Detailed procedures are covered in the AFSCF SOM.

9. AFWTR SUPPORT

AFWTR Surface Recovery Units (SRU) are committed to each recovery operation in response to OR 7100. The SRU's are placed under TG operational control from 48 hours prior to their scheduled departure for operational support; to 48 hours after return to port unless released sooner by the TG. Daily instructions and impact information is passed to the ships from the RCC. (Reference Paragraph 3.) SRU deployment criteria are outlined in Paragraph 5.2 and detailed in OR 7100.

In support of recovery the SRU's perform the following functions:

a. Track the RC and record RC telemetry
b. Report RC events and bearings to the RCC for relay to the STC
c. Recover the RC from the sea if necessary
d. Pick up pararescue teams if required
e. Communications relay and homing signals for aircraft
f. Staging base for helicopter operations as required
g. Weather observations and reports

Telemetry recording and reporting requirements are outlined in OR 7100, Paragraphs 2.3 and 2.3.3. Data processing and disposition instructions are outlined in Paragraph 9 of OR 7100 and AFWTR OD 7100A.

Table 1

TELEMETRY TAPE TRACK ASSIGNMENTS
(Surface Recovery Units)

Track	Content
1	IRIG C Timing (Substitute WWV if necessary)
2	RECVR #1, Link 4, with 50 kc wow and flutter compensation
3	IRIG B Timing (Substitute WWV if necessary)
4	RECVR #2, Link 4, with 50 kc wow and flutter compensation
5	Mixer
6	RECVR #3, RC Beacon (Delta 5)
7	50 kc Reference Signal

Mixer: Speedlock
RECVR #1, AGC Voltage
RECVR #2, AGC Voltage
Voice Annotation

Notes:
Link 4 is 100 kc Bandwidth
Tape Speed 60 ips
Inner Track is No. 1

ANNEX D

APPENDIX 4 – Tab a

FORCE POSITIONS

CONTENTS

FIGURES

TABLE

ANNEX D

APPENDIX 4 - Tab a

FORCE POSITIONS

1. RECOVERY AREA

The recovery area is defined as that area between 8° and 26° North latitude, and between 148° and 172° West longitude with nominal impact at 24° North latitude. (See Figure 1) The Eastern and Western boundaries represent approximately the area covered by orbit regression during one revolution and are within the range capability of the recovery aircraft. The composite recovery forces are deployed within this area as required to support each operation (reference Table 1 for voice/radio call signs of deployed forces).

2. RECOVERY ZONE

The recovery zone is the three-sigma area centered on the impact point at 24° North latitude, extending in the direction of orbit path. This zone extends 51 nm uprange and 51 nm downrange from nominal impact point, and ± 10 nm crossrange. The three-sigma area is based on nominal RV separation time and subsequent operation of the de-orbit and recovery components within design tolerances.

3. FIXED TELEMETRY AND TRACKING ELEMENTS

OL#5, KTS, and HTS are the fixed TT&C elements for the recovery pass. Their functions are outlined in paragraph 8 of Annex D.4. Figure 2 depicts an altitude versus range profile of the re-entry trajectory, with zero horizon cones shown for KTS and HTS.

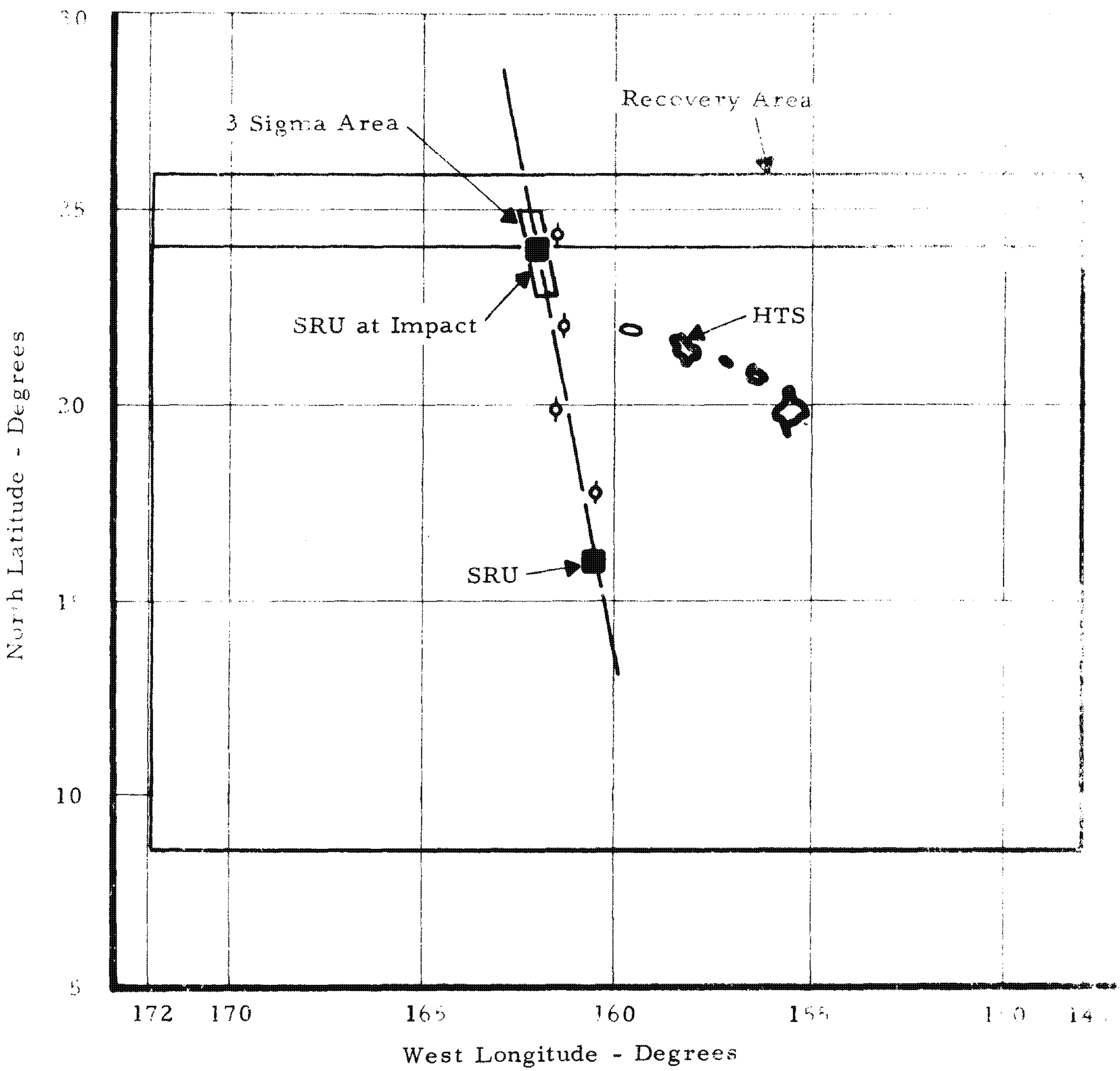
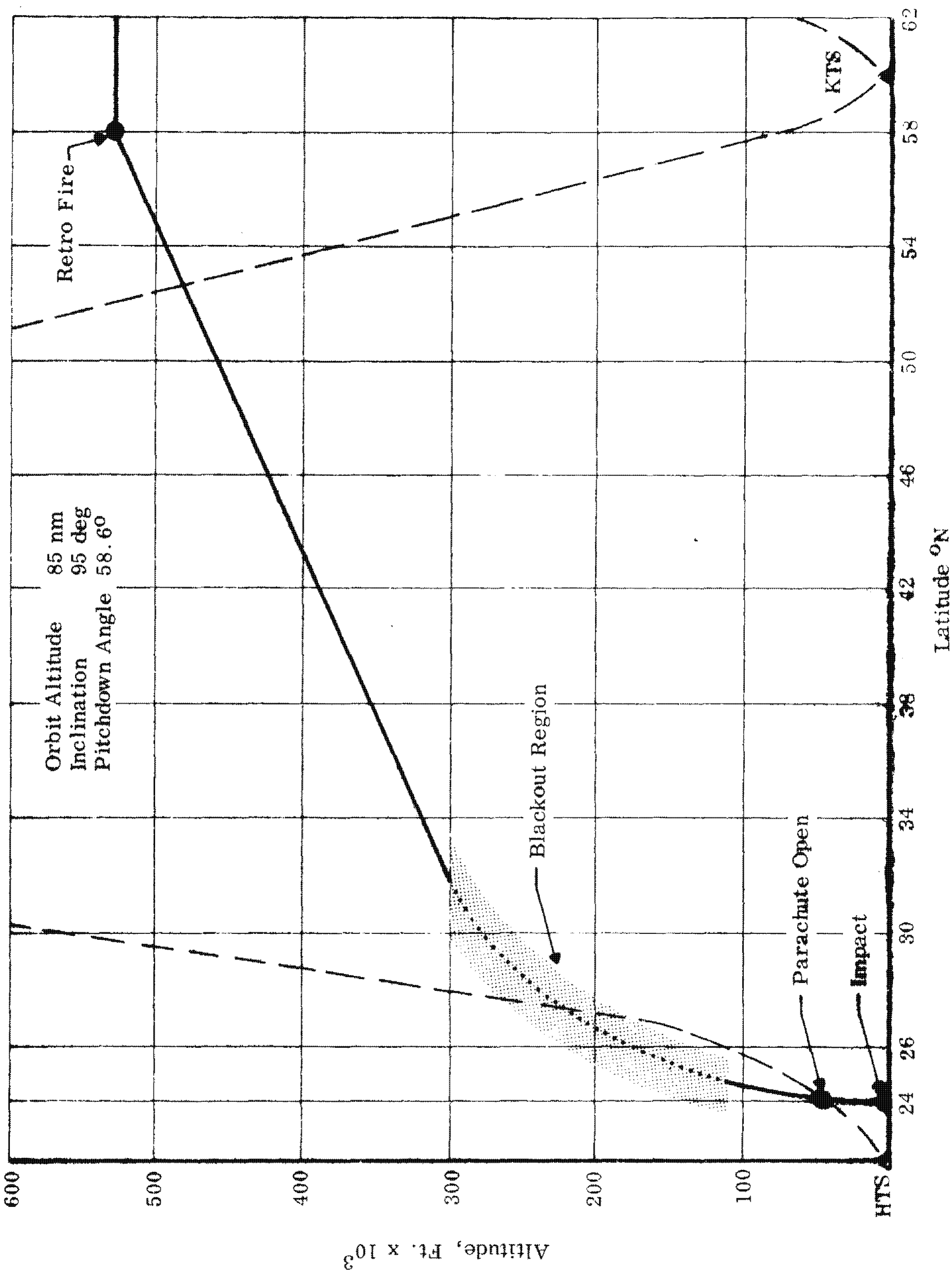


Figure 1 Recovery Area

D.4.a-3


Retro Fire
KTS
Orbit Altitude 85 nm
Inclination 95 deg
Pitchdown Angle 58.6°
Blackout Region
Parachute Open
Impact
HTS
600
500
400
300
200
100
62
58
54
50
46
42
38
34
30
26
24
Latitude °N
Altitude, Ft. x 10^3

D.4.a-4

Table 1

RADIO VOICE CALL SIGNS

HANDYMAN	Area Controller
RELATE	Force Controller
RELATE ONE	RCC (Radio Room)
RELATE TWO	Mobile Command Post
OZZIE 1, 2, etc	JC-130 Aircraft
MISTY 37, 38, etc	CH-3B Helicopters
CUTIE 44 and 55	HC-97 Aircraft
SAINT BERNARD	Para-rescue team
LOON SPECIAL	WB-47, WX Aircraft
COLLEGIATE 2	USNS Huntsville
COLLEGIATE 3	USNS Longview
COLLEGIATE 7	USNS Sunnyvale

4. AIRCRAFT DEPLOYMENT

The approximate radius of action of the JC-130 for recovery support is 1100 nm. The aircraft deployment pattern used for each recovery will depend upon the recovery mode to be used. Nominal, extended, and emergency patterns are outlined in TG OPlan 1-66 in detail.

On nominal North-South passes the recovery aircraft will deploy to ensure that:

a. A minimum of two aircraft will be in position to effect recovery at 15,000 feet altitude between 60 nm uprange and 80 nm downrange of the predicted impact point.

b. At least one aircraft is in position to effect recovery at 15,000 feet aititude between 70 nm uprange and 150 nm downrange of the predicted impact point.

When BUSS is employed, the minimum criteria is that single aircraft recovery capability will be provided in the recovery zone at RC altitude of 15,000 feet.

Changes to the standard deployments shown in TG OPlan 1-66 may be necessary for special situations. Any changes will be coordinated with the FTFD and the System Controller prior to implementation.

5. EMERGENCY RECOVERY

The RC is capable of being de-orbited early in event of a serious malfunction of the satellite vehicle. Emergency recovery can be accomplished using either Primary or BUSS system on any North-South daytime pass that passes through the recovery area. Nominal impact would be at 24° North altitude. For a South-North emergency recovery (night time), the nominal impact position would be at approximately 16° North latitude. Figures 3 and 4 depict a day and night emergency deployment respectively.

6. RECOVERY AIRCRAFT OPERATION

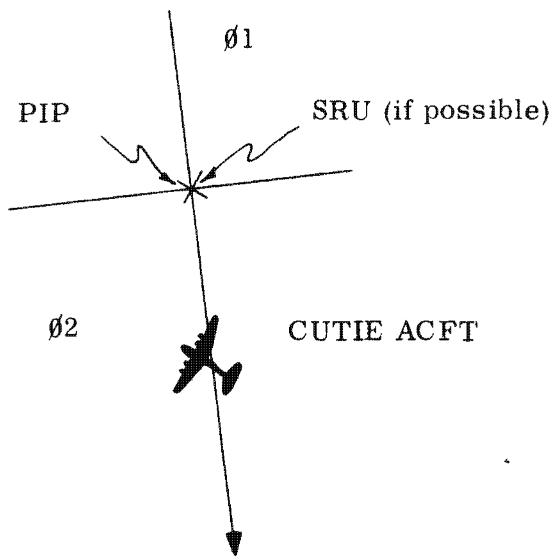
Recovery aircraft holding at 28,000 - 30,000 feet will normally obtain first signal acquisition when the RC leaves the ionization layer, approximately 90 seconds prior to ETPD. The aircraft will not depart station until after ETPD, and not until a definite stabilized DF bearing has been established. At this time it will proceed toward the descending RC. All signal acquisitions and magnetic bearings will be expeditiously reported to the RCC for relay to the STC.

The applicable TG Operations Order for each operation outlines coded event numbers to be used in reporting significant events and actions by each recovery element. For security reasons, new random numbers are selected prior to each operation.

7. HELICOPTER DEPLOYMENT

Helicopters assigned to the 6593d Test Squadron (Special) will be deployed as outlined in Annex A, TG OPlan 1-66. In general, this includes both shipboard operations and deployment from land bases. This deployment will provide support when the predicted impact point falls near the islands. Also, these helicopters should have the capability of retrieving the RC should it impact on land. In this event procedures for a land recovery are contained in the TG OPlan.

The helicopters have a radius of action of 200 nm. With auxiliary fuel tanks their radius can be increased to 350 nm, however takeoff is restricted to land surface only.



Reference Impact Point and Orbit Trace:

Ø1 is 20 nm E and 40 nm N
Ø2 is 20 nm W and 40 nm S
(CUTIE 44 is 40 nm S on the flight azimuth)

Notes:

(1) The SRU will be at the impact point if possible.

(2) When required to deploy for recovery effort with 30 minutes notification, the EMERGENCY RECOVERY FORCE will consist of:

(a) Two - Recovery Aircraft

(b) One - Aircraft w/Pararescue Team

(c) One - Surface Recovery Unit (SRU), if possible.

Figure 3. (Day) Emergency Recovery Force Deployment

Reference Impact Point and Orbit Trace

Ø1 is 20 nm W and 40 nm S
Ø2 is 20 nm E and 40 nm N
CUTIE 44 is 40 nm N on the flight azimuth

Notes:

(1) The SRU will be at the impact point, if possible.

(2) When required to deploy for recovery effort with 60 minutes reaction time, the night alert recovery force will consist of:

(a) Two - Recovery Aircraft

(b) One - Aircraft w/Pararescue Team

(c) One - Surface Recovery Unit (SRU), if possible.

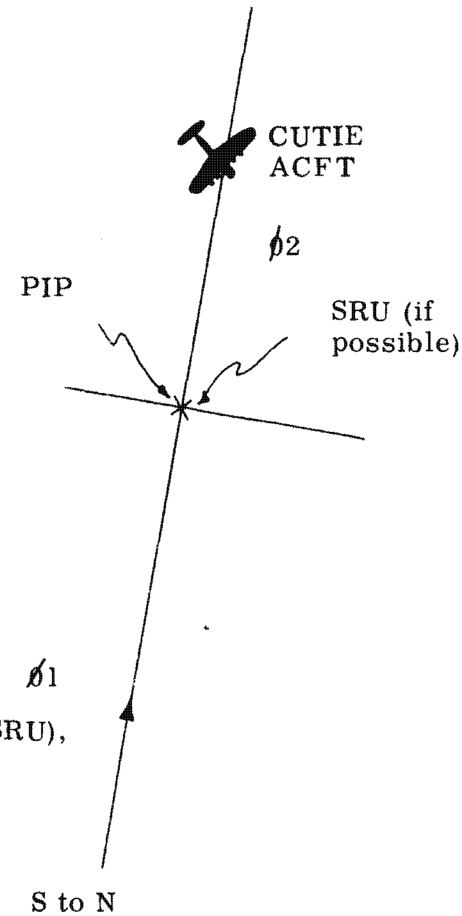


Figure 4. (Night) Recovery Force Deployment

8. SRU DEPLOYMENT

Criteria for SRU support and deployment are outlined in paragraph 5.2 of Annex D.4. AFWTR ships are deployed by the TG, based upon directions from the STC. Detailed SRU instructions and support requirements are contained in AFWTR OD 7100A and changes thereto.

ANNEX D

APPENDIX 4 – Tab b

EMERGENCY ACTIONS

CONTENTS

ANNEX D
APPENDIX 4 – Tab b
EMERGENCY ACTIONS

1. WATER IMPACT

In the event the Re-entry Capsule (RC) impacts in the water beyond aircraft and/or SRU visual range, a search plan will be instituted upon direction of the RCC. When the RC has been located, the recovery aircraft will mark the impact location with smoke bombs, dye marker, and/or electronic buoy. The aircraft will maintain visual and/or electronic surveillance until the RC is recovered or has sunk.

2. PARARESCUE TEAM UTILIZATION

When the RC is located and helicopters are not in the immediate area, the deployment of a pararescue team to physically secure the floating RC may be requested by the RCC. The deployment of the pararescue team will be at the discretion of the aircraft commander and team. This technique requires personnel to parachute into the ocean, secure the RC on a 20-man life-raft, and to remain with the RC until picked up by a surface vessel or helicopter.

3. CAPSULE RECOVERY

3.1 Water Recovery

The helicopter arriving over the impact point will maintain an assigned altitude and make visual contact with the RC as soon as possible. When the RC impacts on the water, the swimmer team or SCUBA personnel will secure the RC, load it aboard the helicopter, place it in a plastic bag, and lock it in the appropriate container in accordance with the instructions in the TG OPLAN. The helicopter will transport the RC (in the container) to the nearest JC-130 landing area, to the SRU, or directly to Hickam AFB.

3.2 Land Recovery

If the RC impacts on land within the Hawaiian chain, the detecting aircraft will direct the helicopters to the impact area for RC pickup. Immediate action will be taken to deploy retrieval forces to locate and secure the RC in the shortest possible time. The TG will initiate and maintain adequate detailed plans for land surface recovery contingencies.

4. RC SEARCH

4.1 Search will be instituted under the following conditions:

a. No RC beacon detection; probable impact point determined from recovery pass tracking data.

b. Minimum RC signal detection; impact point determined from best direction and sequence of events data.

4.2 The RCC will establish search plans in the TG OPLAN to meet the various search requirements.

4.3 The decision for search will be forwarded from the RCC to the recovery forces within thirty (30) minutes after ETPD and will include:

a. Coordinates of search area based on computer information or tri-angulation of reported bearings, the search pattern to be used, and the number of aircraft to be committed.

b. Duration of the search period, search area, weather, and any other information pertinent to the search.

4.4 Headquarters, Pacific Air Rescue Center has the responsibility of providing an augmented search force for search and surveillance operations using current PARC OPLANS. The RCC Test Controller will determine resources to be employed.

5. AIRCRAFT EMERGENCY PROCEDURES

Hawaiian Sea Frontier is responsible for Search and Rescue procedures and will govern sea search or rescue operations when required. Information will be contained in the TG OPlan to augment normal search or rescue procedures of action in the recovery area.

6. TERMINATION

Termination of recovery operations will be at the direction of the System Controller in the STC.

ANNEX D
APPENDIX 5
SCF TEST DATA

CONTENTS

TABS

ILLUSTRATIONS

CONTENTS (Continued)

TABLES

1. TRACKING DATA

Stations will provide quality locked-on PRELORT tracking data from 2 degrees rise to 2 degrees fade (obscura permitting).

1.1 Tracking Data Processing - SCF Stations

Tracking data will be recorded on the station T&C computer history tape and transmitted to the STC in realtime via the 1200 bps lines. Stations will display antenna angles and radar range as required for realtime voice reports.

The following procedure will be used by VTS during ascent:

a. The OD will report by voice deviations in azimuth, elevation and range from the T&C computer beginning at L+60 seconds

   Reporting interval will be approximately every 60 seconds Delta azimuth and elevation will be in degrees, Delta range in kiloyards.

   Terms azimuth, elevation and range will not be stated as they will be reported in the specified order

b. Immediately following the deviations, the appearance of the ascent on the plotboard will be reported

Example:

"Deviations are as follows: Plus 0.5, Minus 1.2, 5.0 Track appears smooth and nominal".

c. An ascent tape will be furnished for rehearsals and this procedure exercised then.

Stations will photograph abnormal beacon response pulses at the radar scope and include pictures with data shipments.

1.2 Tracking Data Processing – STC

SSOTU will process all tracking data received. Tracking data transfer tapes and edited tracking data will be retained for thirty days. A copy of all tracking data recorded at the STC will be provided to the Technical Advisor. Distribution of tracking data and other computer listings is specified in Table D.5.b-5.

2. COMMAND AND CONTROL DATA

In all cases concerning access to command data, a strict need-to-know policy will be enforced. The security provisions included in Annex A, Appendix 1 will govern all operational policies and procedures. Command message contents will not be presented in any manner through various computer dump or listing options without specific direction to do so from the Field Test Force Director. In particular, the following computer options will not be performed:

a. The list option of the non-op function SPRELOG
b. The log-option
c. The tap-option if command data is the only data on the prepass tape
d. The jump switch 1 option of the non-op function SPRECAT
e. The compare-option of the non-op function — STRIM — when used to compare a bird buffer or station prepass tape against another tape
f. The TAPEDMP-function on the bird buffer and station masters.

If a computer malfunctions and a test program is to be used for diagnosis while a Program 206-I computer commanding prepass is in core or on a tape handler, the core will be cleared and the tape will be removed prior to any servicing.

2.1 Command Data Handling

Stations will record digital command transmissions (echo checks). Magnetic tape track assignments are specified in Table D.5.b-3. Duplicate records of command transmissions and command messages will not be made.

Command echo check recordings will be retained at the station for fifteen days then degaussed, unless shipment is requested by the Field Test Force Director. Degaussed recordings will be stored as Secret material and re-used for subsequent operations of this program.

Punched paper tape (PPT) command messages that were not transmitted to the vehicle may be destroyed at the completion of the operation as Secret working material. PPT command messages that were transmitted to the vehicle will be retained for fifteen days then destroyed as Secret working material. PPT messages retained in excess of fifteen days will be accounted for. When they are destroyed, a teletype message will be sent to SSOTP-2 certifying destruction.

2.2 Computer Command Tape Procedures

Once a magnetic tape has been used for computer commanding, it will be marked prominently as SECRET/PROGRAM 206 ACCESS REQUIRED, and stored and controlled in accordance with AFR 205-1 and Program 206 security policy.

These command tapes will not be copied or used for any other purpose without the specific written consent of the Field Test Force Director. Each tape will be erased as needed or at the direction of the Test Controller, but no later than the termination of the current operation. Storage and re-use procedures will be similar to those afforded echo check recordings. If any portion of a computer command tape, or the entire tape, degrades to the point that it is no longer deemed serviceable, the portion or the entire tape will be destroyed in accordance with AFR 205-1.

2.3 Command Data Shipping Instructions

Command messages and/or command echo check data will be shipped to the Field Test Force Director upon request. The final destination written on the reverse side of the fly tag attached to the mail pouches containing the Secret command data will be:

SSOTP-2 (OPS XXXX)
ATTN: [redacted]

3. GROUND EQUIPMENT PERFORMANCE DATA (GEPD)

Performance data of selected SCF ground equipment will be recorded and displayed as follows:

PRELORT 6-pen event records
PRELORT 100-pen event records
Command GEPD records

Recorded setups for the realtime command GEPD recordings are specified in the radar manual.

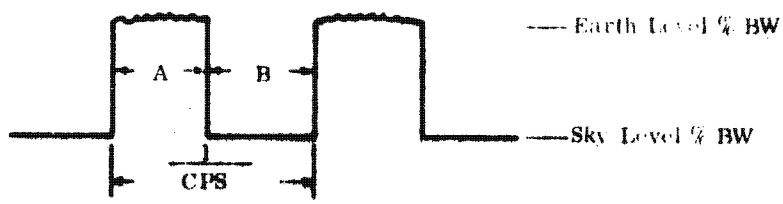
Stations will record postpass, when requested, an accept and reject output of the Command Verification Detector Unit (CVDU) together with system time and command verification telemetry channels. The oscillogram recordings, when requested, will be mailed to the Field Test Force Director. These oscillogram records are unclassified.

Command echo check recordings may be displayed graphically on an oscillograph or pen recorder only when so directed by the FTFD. All records thus generated will be destroyed as Secret working material as soon as possible after evaluation.

Table 1

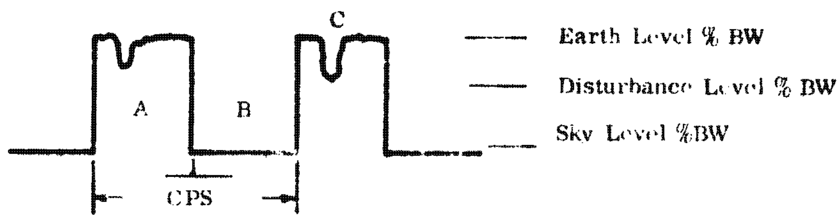
I. R. WAVEFORMS

Case ALFA - Nominal Wave



Duty Cycle: $\frac{A}{A+B}$, $\frac{B}{A+B}$

Case BRAVO - Cold Cloud/Object



Duty Cycle $\frac{A}{A+B}$, $\frac{B}{A+B}$

Does Disturbance Move in Rel Position?

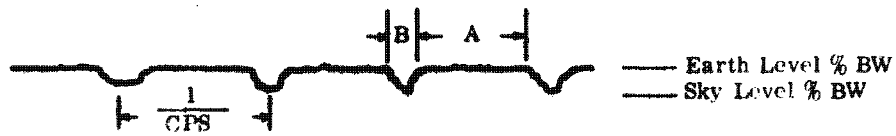
Case CHARLIE - No Modulation

Case DELTA - Marginal Earth Signal

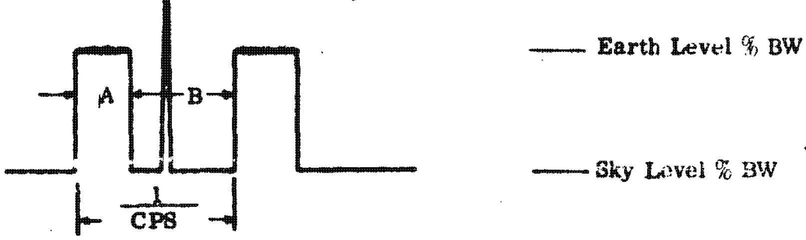
Duty Cycle $\frac{A}{A+B}$, $\frac{B}{A+B}$

Table [illegible] (Continued)

Case ECHO – Marginal Sky Signal



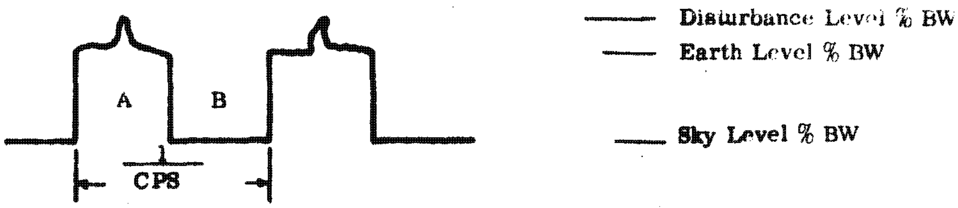
Case FOXTROT – Sun or Hot Body Inhibit



Duty Cycle $\frac{A}{A+B}$, $\frac{B}{A+B}$

Sun Spike may appear anywhere in Sky Scan (B) interval; its amplitude substantially greater than normal Earth Level

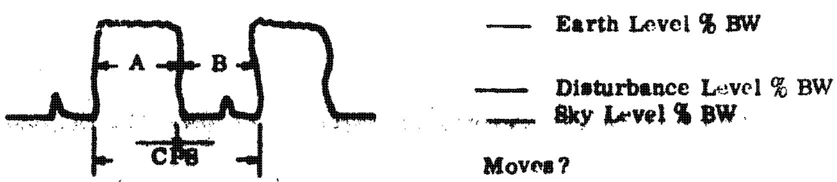
Case GOLF – Hot Body During Earth Scan



Duty Cycle $\frac{A}{A+B}$, $\frac{B}{A+B}$

Moves?

Case HOTEL – Hot Body During Sky Scan



Moves?

8.2.2 Vehicle Time Correlation

a. Objective: To correlate vehicle time with system time

b. Addressee: DICE

c. Originator: Remote Stations

d. Nominal Time: Acquisition and Fade upon direction

e. Special Considerations: Six readings will be taken: three after solid acquisition and three prior to loss of decom sync. System time (at time of vehicle clock readout) will be reported to milli-second accuracy. Correlation will be accomplished using the leading edge of the least significant bit. (See Figure 1.)

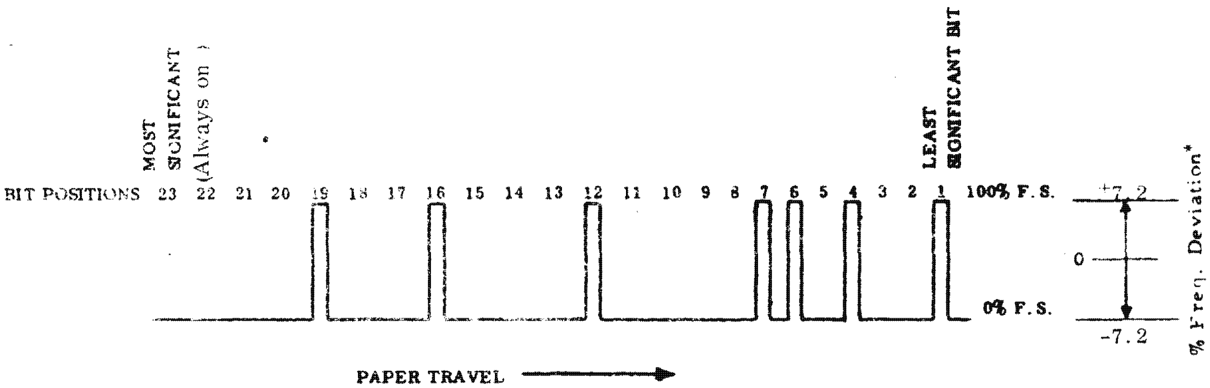
f. Format: Fixed

DICE DE ____________ (MSG NR)

UNCLASS OPS __________

VEHICLE TIME CORRELATION /PASS _______

100/100/100/101/000/110/000/000	78595.095
100/010/100/101/000/110/000/000	78595.895
100/110/100/101/000/110/000/000	78596.695
100/010/010/010/100/110/000/000	78858.296
100/110/010/010/100/110/000/000	78859.096
100/001/010/010/100/110/000/000	78859.896



23 BIT READOUT AT 500 CPS RZ

BIT	VALUE	VALUE
1	1	1
4	2^3	8
6	2^5	32
7	2^6	64
12	2^{11}	2048
16	2^{15}	32768
19	2^{18}	262144
		297065 = 29, 706.5 SEC

Note:

(1) Least significant Bit is always one. Second and third bits are always zero.

(2) **0 - 5 Volts RZ Binary Pulses Every 100 Milliseconds.**

(3) **A 23 Bit Binary Readout of Time. (Every 800 Milliseconds)**

Figure 1 Vehicle Time Clock (70.0 kc) Link 2/Channel 18

8.2.3 "V" Option

a. Objective: To correlate vehicle time with system time

b. Addressee: DICE

c. Originators: Remote Stations

d. Nominal Time: Postpass upon direction

e. Special Considerations: Six readings will be taken at midpass upon direction from Test Control. System time and vehicle time are input to the Input/Output Buffer and the Delta is determined. This information is then stored on the T&C History Tape.

f. Format: Fixed

DICE DE ______ MSG NR

UNCLASS OPS __________

V OPTION/PASS __________

(System Time)	(Vehicle Time)	(Offset)	(Range - KYDS)
XX:XX	XXXXX.X	0.XXX	XXX.X
XX:XX	XXXXX.X	0.XXX	XXX.X

8.2.4 Data Shipment Notification

All remote stations will use the Standard Data Shipment Notification Message format except OL 5. The format to be used by OL 5 is described below:

OL 5 Data Shipment Notification

a. Objective: To immediately inform the FTFD of a data shipment from OL 5

b. Addressee: SSOTP-2

c. Originator: OL 5

d. Nominal Time: Upon shipment

e. Special Considerations: Refer to Annex D-5, paragraph 3.6 for special shipping instructions

f. Format: Fixed

```
SSOTP-2   DE  OL 5    MSG NR
UNCLASS/OPS ________  REV ______
DATA SHIPMENT NOTIFICATION    MSG IN FIVE PARTS

PART ONE     AIRLINE ________ FLT NR ______ TAIL NR _______
PART TWO     DEPARTURE DATA (MO/DAY/YR) TIME (LOCAL TIME)
PART THREE   ETA DATE (MO/DAY/YR) TIME (PST) MC GUIRE AFB
PART FOUR    TRANS CONTROL NR _______ MANIFEST NR _________
             COURIER (NAME) ________
PART FIVE    CONTENTS WEIGHT _________ SIZE _________
             OPS ________ REV _________
```

8.2.5 (S) KIK Designator Message

a. Objective: To list the designator number with the associated command number

b. Addressee: Applicable stations

c. Originator: SSOTP-2

d. Nominal Time: Not later than L-1 day

e. Special Considerations: Message has priority precedence

f. Format: Fixed

SECRET SSOTP-2 ________________. SPECIAL ACCESS REQUIRED. CLASSIFIED SPACE PROJECT. FOR THE IMMEDIATE ATTN OF OPERATIONS DIRECTORS AFWTR ____________. ITEM I. THE FOLLOWING KIK-10 PLUG ASSIGNMENTS ARE FOR USE ON AFWTR ________________.

COMMAND	FUNCTION	KIK-10 PLUGS
KIK ZEKE 31	BUSS EXECUTE	KIK-10 ______________
KIK ZEKE 32	PPD CONTROL	KIK-10 ______________

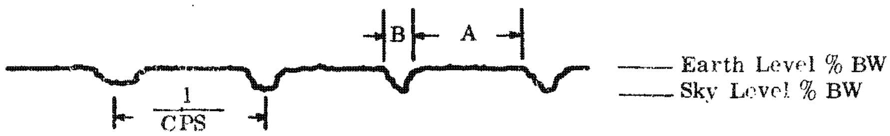
ITEM II. REQUEST ADDRESSEES NOTIFY THE TEST CONTROLLER BY OPERATIONAL MESSAGE THAT THESE DEVICES ARE ON STATION AND INCLUDE THE CODE NUMBER PLUG WHICH WILL BE USED FOR EACH COMMAND TO VERIFY THAT TRANSMISSION ERRORS IN THIS MESSAGE HAVE NOT OCCURRED. EXAMPLE. RETRANSMIT THAT KIK ZEKE 32 IS PLUG KIK-10 ______________, ETC. ITEM III. THESE DEVICES HAVE BEEN VERIFIED BY 6595 ATW AT THE PAD.
GP-3

9. TABLE INDEX

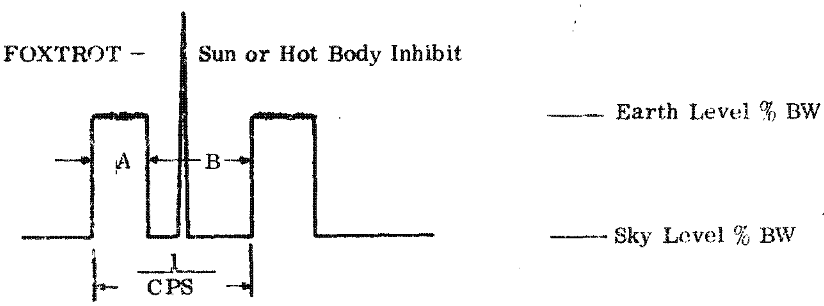
Test Phase			
Launch	Orbit	Recovery	Title
a-1	b-1	c-1	TM Antenna Requirements
a-2	b-2	c-2	TM Magnetic Tape Track Assignments
	b-3		Echo Check Magnetic Tape Track Assignments
	b-4		Remote Station Data Requirements
	b-5		STC Data Requirements

Table 2 (Continued)

Case ECHO – Marginal Sky Signal



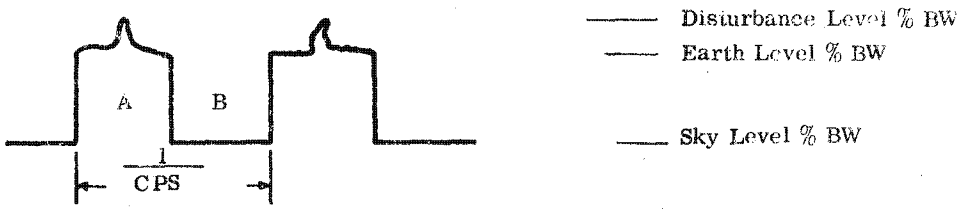
Case FOXTROT – Sun or Hot Body Inhibit



Duty Cycle $\frac{A}{A+B}$, $\frac{B}{A+B}$

Sun Spike may appear anywhere in Sky Scan (B) interval with amplitude substantially greater than normal Earth Level

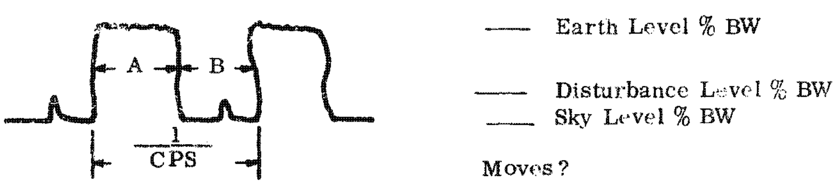
Case GOLF – Hot Body During Earth Scan



Duty Cycle $\frac{A}{A+B}$, $\frac{B}{A+B}$

Moves ?

Case HOTEL – Hot Body During Sky Scan



Moves ?

8.2.2 Vehicle Time Correlation

a. Objective: To correlate vehicle time with system time

b. Addressee: DICE

c. Originator: Remote Stations

d. Nominal Time: Acquisition and Fade upon direction

e. Special Considerations: Six readings will be taken; three after solid acquisition and three prior to loss of decom sync. System time (at time of vehicle clock readout) will be reported to millisecond accuracy. Correlation will be accomplished using the leading edge of the least significant bit. (See Figure 1.)

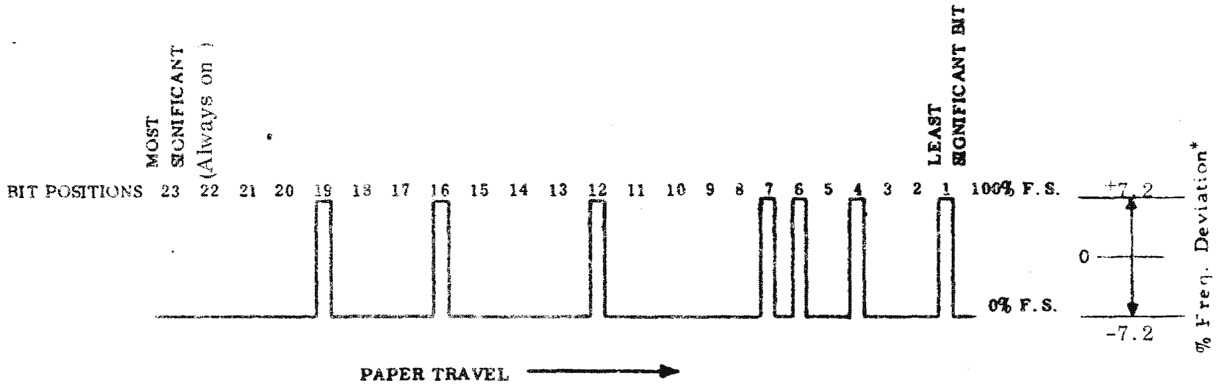
f. Format: Fixed

DICE DE ____________ (MSG NR)

UNCLASS OPS __________

VEHICLE TIME CORRELATION /PASS _______

100/100/100/101/000/110/000/000	78595.095
100/010/100/101/000/110/000/000	78595.895
100/110/100/101/000/110/000/000	78596.695
100/010/010/010/100/110/000/000	78858.296
100/110/010/010/100/110/000/000	78859.096
100/001/010/010/100/110/000/000	78859.896



23 BIT READOUT AT 500 CPS RZ

BIT	VALUE	VALUE
1	1	1
4	2^3	8
6	2^5	32
7	2^6	64
12	2^{11}	2048
16	2^{15}	32768
19	2^{18}	262144
		297065 = 29, 706.5 SEC

Note:

(1) Least significant Bit is always one. Second and third bits are always zero.

(2) **0 - 5 Volts RZ Binary Pulses Every 100 Milliseconds.**

(3) **A 23 Bit Binary Readout of Time. (Every 800 Milliseconds)**

Figure 1 Vehicle Time Clock (70.0 kc) Link 2/Channel 18

8.2.3 "V" Option

a. Objective: To correlate vehicle time with system time

b. Addressee: DICE

c. Originators: Remote Stations

d. Nominal Time: Postpass upon direction

e. Special Considerations: Six readings will be taken at midpass upon direction from Test Control. System time and vehicle time are input to the Input/Output Buffer and the Delta is determined. This information is then stored on the T&C History Tape.

f. Format: Fixed

DICE DE ______ MSG NR

UNCLASS OPS ___________

V OPTION/PASS __________

(System Time)	(Vehicle Time)	(Offset)	Range -- KYDS)
XX:XX.	XXXXX. X	0. XXX	XXX X
↕	↕	↕	↕
XXXXX.	XXXXX. X	0. XXX	XXX X

TEST OPS ORDER [illegible]
267-0974 [illegible]

8.2.4 Data Shipment Notification

All remote stations will use the Standard Data Shipment Notification Message format except OL 5. The format to be used by OL 5 is described below:

OL 5 Data Shipment Notification

a. Objective: To immediately inform the FTFD of a data shipment from OL 5

b. Addressee: SSOTP-2

c. Originator: OL 5

d. Nominal Time: Upon shipment

e. Special Considerations: Refer to Annex D-5, paragraph 3.6 for special shipping instructions

f. Format: Fixed

```
SSOTP-2  DE  OL 5     MSG NR
UNCLASS/OPS ________  REV ______
DATA SHIPMENT NOTIFICATION    MSG IN FIVE PARTS

PART ONE     AIRLINE ________ FLT NR ______ TAIL NR _______
PART TWO     DEPARTURE DATA (MO/DAY/YR) TIME (LOCAL TIME)
PART THREE   ETA DATE (MO/DAY/YR) TIME (PST) MC GUIRE AFB
PART FOUR    TRANS CONTROL NR _______ MANIFEST NR _________
             COURIER (NAME) __________
PART FIVE    CONTENTS WEIGHT _________ SIZE _________
             OPS ________ REV _________
```

8.2.5 (S) KIK Designator Message

a. Objective: To list the designator number with the associated command number

b. Addressee: Applicable stations

c. Originator: SSOTP-2

d. Nominal Time: Not later than L-1 day

e. Special Considerations: Message has priority precedence

f. Format: Fixed

SECRET SSOTP-2 ________________. SPECIAL ACCESS REQUIRED. CLASSIFIED SPACE PROJECT. FOR THE IMMEDIATE ATTN OF OPERATIONS DIRECTORS AFWTR ____________. ITEM I. THE FOLLOWING KIK-10 PLUG ASSIGNMENTS ARE FOR USE ON AFWTR ________________.

COMMAND	FUNCTION	KIK-10 PLUGS
KIK ZEKE 31	BUSS EXECUTE	KIK-10 ______________
KIK ZEKE 32	PPD CONTROL	KIK-10 ______________

ITEM II. REQUEST ADDRESSEES NOTIFY THE TEST CONTROLLER BY OPERATIONAL MESSAGE THAT THESE DEVICES ARE ON STATION AND INCLUDE THE CODE NUMBER PLUG WHICH WILL BE USED FOR EACH COMMAND TO VERIFY THAT TRANSMISSION ERRORS IN THIS MESSAGE HAVE NOT OCCURRED. EXAMPLE. RETRANSMIT THAT KIK ZEKE 32 IS PLUG KIK-10 ______________, ETC. ITEM III. THESE DEVICES HAVE BEEN VERIFIED BY 6595 ATW AT THE PAD.
GP-3

9. TABLE INDEX

Test Phase			
Launch	Orbit	Recovery	Title
a-1	b-1	c-1	TM Antenna Requirements
a-2	b-2	c-2	TM Magnetic Tape Track Assignments
	b-3		Echo Check Magnetic Tape Track Assignments
	b-4		Remote Station Data Requirements
	b-5		STC Data Requirements

ANNEX D

APPENDIX 5 - Tab a

LAUNCH AND ASCENT DATA REQUIREMENTS

Table D.5.a-1

TELEMETRY ANTENNA AND RECEIVER BANDWIDTH REQUIREMENTS

(Vandenberg Tracking Station)

Link	Description	Prime Antenna	Receiver IF BW
1	FM/FM S-01B	TLM-18	300 kHz
2	FM/FM OCV	TLM-18	300 kHz
3	FM/FM OCV	TLM-18	300 kHz
	SLV-3	TLM-18	300 kHz

Table D.5.a-2

TELEMETRY MAGNETIC TAPE TRACK ASSIGNMENTS

VTS only

Track	Data
1	Link 1 (S-01B)
2	Link 2 (OCV)
3	Link 3 (OCV)
4	SLV-3
5	a. Voice (command and telemetry nets) b. Liftoff tone
6	a. 17 kHz Speedlock b. 10 + 50 kHz reference signal
7	a. System Time on 1 kHz carrier b. Delta 1 Signal Strength c. Delta 2 Signal Strength d. Delta 3 Signal Strength e. SLV-3 Signal Strength

ANNEX D

APPENDIX 5 - Tab b

ORBITAL PHASE DATA REQUIREMENTS

Table D.5.b-1

TELEMETRY ANTENNA AND RECEIVER BANDWIDTH REQUIREMENTS

Tracking Stations	Antenna	Receiver I.F. Bandwidths
VTS	TLM-18	300-kHz
HTS	TLM-18/FPA	
NHS	FPA	
KTS	FPA	
GTS	FPA	
OL-5	DOR	

Table D.5.b-2

TELEMETRY MAGNETIC TAPE TRACK ASSIGNMENTS

VTS HTS NHS KTS GTS OL-5

Track	Data
1	OCV Link 2
2	OCV Link 2 (redundant)
3	OCV Link 3
4	OCV Link 3 (redundant)
5	Voice (command and telemetry nets)
6	a. 17-kHz Speedlock b. 10 + 50-kHz reference signal
7	a. System time on 1-kHz carrier b. Delta 2 signal strength c. Delta 3 signal strength

Table D.5.b-3

ECHO CHECK MAGNETIC TAPE TRACK ASSIGNMENTS
(Output of the RU-652)

Track	Data	
1	A Output	DCBSU
2	B Output	DCBSU
3	C Output	DCBSU
4	D Output	DCBSU
	E Output	DCBSU
6	PRF (if available)	DCBSU
7	a. Voice (Command Net)(if available) b. System Time on 1-kHz carrier c. 2-17-00 Wavetrain through VCO (if available) d. 2-11-00 Wavetrain through VCO (if available)	

Notes:
(1) Record at 30 ips. More than one pass may be recorded on a single reel when physically practicable.
(2) Voice should be patched through the master patch panel (MPP) for recording.
(3) If PRF and Track 7 mixer are not available, record voice on Track 6 and system time on Track 7.

Table D.5.b-4

REMOTE STATION DATA REQUIREMENTS

VTS, HTS, NHS, KTS, GTS, OL-5

Data	Class	Disposition
Primary Magnetic Data Recording	U	Include in data shipment
Secondary Magnetic Data Recording	U	Degauss after 30 days
PRELORT 6-Pen Event Record	U	Include in data shipment
PRELORT 100-Pen Event Record	U	Include in data shipment
Command Message Recording	S	Degauss at completion of operation
PPT Command Messages (not transmitted to vehicle)	S	Destroy at completion of operation
PPT Command Messages (transmitted to vehicle)	S	Destroy after 15 days
Command Echo Check Recording	S	Degauss after 15 days
Command GEPD Oscillograph Record	S	Destroy after 5 days
Voice Tapes	U	Degauss after 7 days
T&C Computer History Tape	U	Degauss after 2 days
T&C Computer Printout	U	Destroy after 7 days
TM Oscillograph Records	U	Destroy after 15 days
TM Computer History Tape	U	Degauss after 1 day
TM Computer Printout	U	Destroy after 7 days

NOTE: 1. Where ground equipment malfunction has prevented generation of a required record, a notation to this effect should be included in the data shipment.
2. VTS may deliver launch PRELORT pen records to LMSC VAFB.

Table D.5.b-5
STC DATA REQUIREMENTS

Data	Class	Distribution (No. of copies)						
		SSOTU11	SSOTC3	SSOTC1	SSOTE3C	SSOTE3B	SSOTE1	TECH/AD
					OP	CG		
A. Computer Listings								
1. Tape 3 & Mass Predict	SNF	1	1		1			1
2. On-Line	SNF	1		1	1			1
3. Best Fit Ephemeris	U	1				1		4
B. Raw Tracking Data	U							1
C. Datafax Records	U							1
D. Oscillogram Records	U						1	
E. TM Magnetic Recordings	U							1
F. Voice Recordings (Request)	U							1
F. Data Printer Listings								
DP	U						1	2
DA	U						1	2
DA (TA)	U							3
H. TA Sanborn Records	U							1

Note: SSOTR-1 is authorized to pickup 1 copy of TA rehearsal On-Line distribution.

ANNEX D

APPENDIX 5 - Tab c

RECOVERY DATA REQUIREMENTS

Table D.5.c-1

TELEMETRY ANTENNA AND RECEIVER BANDWIDTH REQUIREMENTS

Link	Data	Prime Antenna HTS	KTS	VHF Receiver I.F. B/W
2	OCV	FPA	FPA	300-kc
3	OCV	FPA	FPA	300-kc
4	RC	TLM-18	FPA	100-kc

Table D.5.c-2

TELEMETRY MAGNETIC TAPE TRACK ASSIGNMENTS

HTS KTS

Track	Data
1	Link 2
2	Link 3
3	Link 4
4	Link 4 (Redundant)
5	Voice (command and telemetry nets)
6	a. 17-kc Speedlock b. 10 + 50-kc reference signal
7	a. System time on 1-kc carrier b. Delta 2 signal strength c. Delta 3 signal strength d. Delta 4 signal strength

ANNEX D

APPENDIX 5 - Tab d

OPERATIONS EVALUATION REPORTS

1. GENERAL

Written inputs to the SCF Operation Evaluation Report are required by SSOTP-2 and will be prepared in accordance with SOM, Chapter 401, Section B. Transmit OER inputs as operations messages. Due dates are as follows:

	(Calendar Days)	
Tracking Station OER Inputs	T +1 day	
Recovery Data Report		
Part I (message)	R +2 days	Info to SSONR
Part II (Message)	R +3 days	Info to SSONR
SSOTE OER Input	T +3 days	
SSOTU OER Input	T +3 days	
SSOTC OER Input	T +3 days	
SSONS OER Input	T +3 days	
SSOTT OER Input	T +3 days	
SCF Operations Evaluation Report (SSOTP-2)	T +10 days	

Note: T +dates refer to termination of orbital operations.
R +dates refer to termination of recovery operations.

ANNEX D

APPENDIX 5 - Tab e

MESSAGE REQUIREMENTS

1. STANDARD MESSAGES (Refer to AFSCF/SOM)

1.1 General System Messages

Support Message
Electronic Interference Message
Data Shipment Notification

1.2 Prelaunch Messages

Vehicle Information
Launch Notification
Launch Confirmation
Countdown Status
Launch Complex Forecast
Winds Aloft Observation
Winds Aloft Analysis
Downrange Forecast
Marine Weather Observation
System Run Evaluation

1.3 Launch and Ascent Messages

Liftoff
Launch Time of Events
Orbit Achieved/Not Achieved
Updated Orbital Parameters

1.4 Prepass Messages

Acquisition/See Messages

1.5 Postpass Messages

Pass Summary

1.6 Recovery Messages

Recovery Ship Reposition
Recovery Force Status and Weather Forecast
Separation Event
Impact Prediction (T-Pot)
Impact Report
Normal/Emergency Force Release
Recovery Data Report

1.7 Terminal and Post-Operations Messages

Secure all SCF Units
Secure all Recovery Forces
Station OER Input

2. PROGRAM PECULIAR MESSAGES

2.1 KIK Designator Message

a. Objective: To list the designator number with the associated command number

b. Addressee: Applicable stations

c. Originator: SSOTP-2

d. Nominal Time: Not later than L-1 day

e. Special Considerations: Message has priority precedence

f. Format: Fixed

SECRET SSOTP-2 ______________. SPECIAL ACCESS REQUIRED. CLASSIFIED SPACE PROJECT. FOR THE IMMEDIATE ATTN OF OPERATIONS DIRECTORS AFWTR ___________. ITEM I. THE FOLLOWING KIK-10 PLUG ASSIGNMENTS ARE FOR USE ON AFWTR ______________.

COMMAND	FUNCTION	KIK-10 PLUGS
KIK ZEKE 31	BUSS EXECUTE	KIK-10 ______________
KIK ZEKE 32	PPD CONTROL	KIK-10 ______________

ITEM II. REQUEST ADDRESSEES NOTIFY THE TEST CONTROLLER BY OPERATIONAL MESSAGE THAT THESE DEVICES ARE ON STATION AND INCLUDE THE CODE NUMBER PLUG WHICH WILL BE USED FOR EACH COMMAND TO VERIFY THAT TRANSMISSION ERRORS IN THIS MESSAGE HAVE NOT OCCURRED. EXAMPLE. RETRANSMIT THAT KIK ZEKE 32 IS PLUG KIK-10 ______________, ETC. ITEM III. THESE DEVICES HAVE BEEN VERIFIED BY 6595 ATW AT THE PAD.
GP-3

2.2 SP-2 Report

a. Objective: To provide the STC with information to determine the Stabilization Subsystem performance in keeping the vehicle oriented to the local vertical.

b. Addressees: DICE

c. Originator: Remote Stations

d. Nominal Time: Postpass when directed

e. Special Considerations: The duty cycle of each channel should be reported with the percentage of time the scanner is looking at the earth first. The cycles-per-second should be the number of complete earth/sky cycles measured to the closest complete cycle in any representative second.

The SP-2 report should also include the percent bandwidth corresponding to earth and sky to allow complete analysis and comparisons of each channel and during various sections of the orbit. In addition, any comments considered pertinent should be included, such as irregular waveforms or changes in the 3-16 or 3-14 outputs which occur during the pass.

Several cases of IR waveforms are defined in Table D.5.e-1 which indicate expected anomalous waveforms and measurements of significance should they occur. Stations should report the waveform case for 3-16 and 3-14 as well as the additional measurements for the case if other than normal.

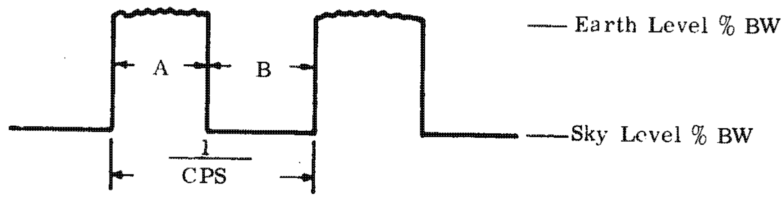
f. Format: Fixed

```
DICE DE ________ (MSG NR)
UNCLAS OPS ____________
SP-2 REPORT/PASS ________

                                *                      **
3-16   CASE  (ALFA)          XX/XX     XX CPS      XX/XX
3-14   CASE  (BRAVO)         XX/XX     XX CPS      XX/XX

REMARKS
```

Notes: * Duty cycle in percent time (earth/sky)
** Signal in percent bandwidth (earth/sky)

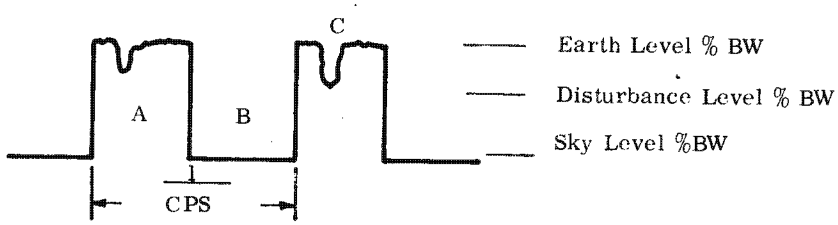
Table D.5.e-1
I R WAVEFORMS

Case ALFA – Nominal Wave



Duty Cycle: $\frac{A}{A+B}$, $\frac{B}{A+B}$

Case BRAVO – Cold Cloud/Object



Duty Cycle $\frac{A}{A+B}$, $\frac{B}{A+B}$

Does Disturbance Move in Rel Position?

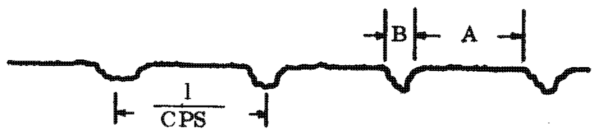
Case CHARLIE – No Modulation

Case DELTA – Marginal Earth Signal

Duty Cycle $\frac{A}{A+B}$, $\frac{B}{A+B}$

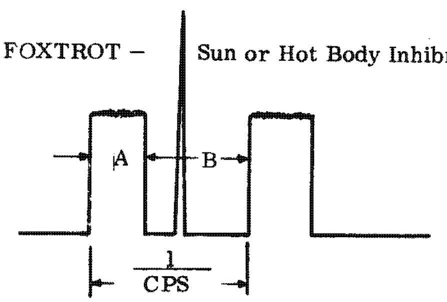
Table D. 5. e-1 (Continued)

Case ECHO – Marginal Sky Signal



—— Earth Level % BW
—— Sky Level % BW

Case FOXTROT – Sun or Hot Body Inhibit



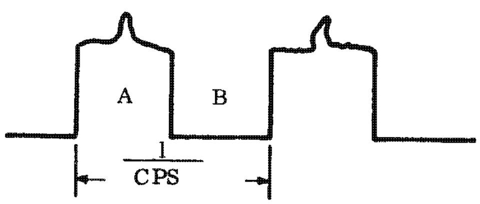
—— Earth Level % BW

—— Sky Level % BW

Duty Cycle $\frac{A}{A+B}$, $\frac{B}{A+B}$

Sun Spike may appear anywhere in Sky Scan (B) interval with amplitude substantially greater than normal Earth Level

Case GOLF – Hot Body During Earth Scan



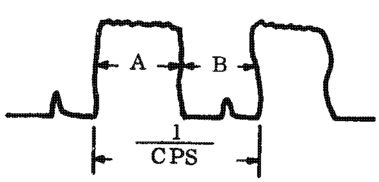
—— Disturbance Level % BW
—— Earth Level % BW

—— Sky Level % BW

Duty Cycle $\frac{A}{A+B}$, $\frac{B}{A+B}$

Moves ?

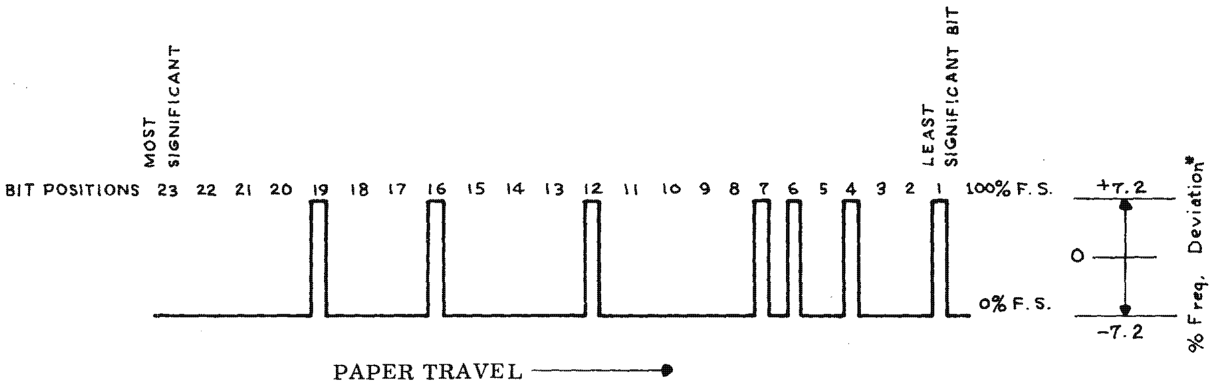
Case HOTEL – Hot Body During Sky Scan



—— Earth Level % BW

—— Disturbance Level % BW
—— Sky Level % BW

Moves ?



23 BIT READOUT AT 500 CPS RZ

BIT	VALUE	VALUE
1	1	1
4	2^3	8
6	2^5	32
7	2^6	64
12	2^{11}	2048
16	2^{15}	32768
19	2^{18}	262144
		297065 = 29,706.5 SEC

Note:
(1) Least Significant Bit is always one. Second and third bits are always zero.

(2) 0 - 5 volts RZ Binary Pulses Every 100 Milliseconds.

(3) A 23 Bit Binary Readout of Time. (Every 800 Milliseconds)

Figure D.5.e-2 Vehicle Time Clock (70.0 kc) Link 2/Channel 18

2.3 Vehicle Time Correlation

a. Objective: To correlate vehicle time with system time

b. Addressee: DICE

c. Originator: Remote Stations

d. Nominal Time: Acquisition and Fade upon direction

e. Special Considerations: Six readings will be taken; three after solid acquisition and three prior to loss of decom sync. System time (at time of vehicle clock readout) will be reported to millisecond accuracy. Correlation will be accomplished using the leading edge of the least significant bit. (See Figure 1.)

f. Format: Fixed

```
DICE DE ____________ (MSG NR)
UNCLASS OPS __________
VEHICLE TIME CORRELATION          /PASS _______

  100/100/100/101/000/110/000/000     78595.095
  100/010/100/101/000/110/000/000     78595.895
  100/110/100/101/000/110/000/000     78596.695
  100/010/010/010/100/110/000/000     78858.296
  100/110/010/010/100/110/000/000     78859.096
  100/001/010/010/100/110/000/000     78859.896
```

2.4 "V" Option

a. Objective: To correlate vehicle time with system time

b. Addressee: DICE

c. Originators: Remote Stations

d. Nominal Time: Postpass upon direction

e. Special Considerations: Six readings will be taken at midpass upon direction from Test Control. System time and vehicle time are input to the Input/Output Buffer and the Delta is determined. This information is then stored on the T&C History Tape.

f. Format: Fixed

DICE DE ______ MSG NR

UNCLASS OPS __________

V OPTION/PASS __________

(System Time)	(Vehicle Time)	(Offset)	Range – KYDS)
xxxxx.	xxxxx.x	0.xxx	xxx.x
xxxxx.	xxxxx.x	0.xxx	xxx.x

2.5 Data Shipment Notification

a. Objective: To immediately inform addressees of a data shipment.

b. Addressee:

(1) Ops message to the STC for SSOQP-21; Info: SSOTP-2.

(2) Administrative message to GE:

General Electric Company
STC/CCF #5
Special Military Space Project
King of Prussia, Pa.
Attn: L. Binegar/C. Peterson

c. Originator: Tracking station

d. Nominal Time: Upon shipment

e. Special Considerations: Two messages are to be transmitted: one to the STC and the other to the General Electric Company. Text for the two messages will be identical. Instructions are detailed in Appendix D.5, par. 3.6.

f. Format: Fixed

JOINT MESSAGEFORM

RESERVED FOR COMMUNICATION CENTER

SECURITY CLASSIFICATION
(AS REQUIRED)/EFTO

TYPE MSG	BOOK	MULTI	SINGLE

PRECEDENCE
ACTION PRIORITY
INFO

DTG

SPECIAL INSTRUCTIONS

FROM: (REMOTE STATIONS)

TO: 6594 SPT GP SUNNYVALE CALIF

(CLASSIFICATION) OPS MSG (ORIGINATOR)
FOR SSOQP-21, INFO SSOTP-2. DATA FOR STC (AMF OR MAC) SHIPMENT NOTIFICATION. MSG IN FIVE PARTS. PART ONE. AIRLINE (XXX) FLT NO. (XXX) TAIL NO. (IF APPLICABLE). PART TWO. DEPARTURE (MO/DAY/YEAR) TIME (LOCAL TIME). PART THREE. ETA DATE (MO/DAY/YEAR) TIME (PST) LOCATION (XXX). PART FOUR. REGISTRY NO. (XXX). MANIFEST NO. (IF APPLICABLE) COURIER (IF APPLICABLE). PART FIVE. CONTENTS WEIGHT (XXX) SIZE (XXX).

OPS	REV
(XXX)	(XXX)

DATE	TIME
MONTH	YEAR
PAGE NO.	NO. OF PAGES

DRAFTER: TYPED NAME AND TITLE | PHONE

RELEASER: SIGNATURE
REMOTE STATION
TYPED (or stamped) NAME AND TITLE

SECURITY CLASSIFICATION
(AS REQUIRED)/EFTO

REGRADING INSTRUCTIONS
(AS REQUIRED)

DD 1 FORM NOV. 63 173 REPLACES EDITION OF 1 MAY 55 WHICH MAY BE USED. ☆ GPO : 1964-0-734-334

(U) Figure D.5.e-3 Shipment Notification

ANNEX D

APPENDIX 5 – TAB f

TELEMETRY GROUPS

1. TELEMETRY REAL-TIME VOICE REPORTS AND PP TTY MESSAGES – VANDENBERG TRACKING STATION (LAUNCH AND ASCENT)

Meas. No.	Location L-Ch-Pos	Event Measurement		Real Time Voice	PP TTY Msg
-	2-15-06	Secure Word Count (LSD)			4
-	2-15-07	Secure Word Count			4
-	2-15-08	Secure Word Count			4
-	2-15-09	Secure Word Count			4
-	2-15-10	Secure Word Count			4
-	2-15-11	Secure Word Count			4
-	2-15-12	Secure Word Count (MSD)			4
-	-	Liftoff Tone (2 in)		1	1
-	-	BECO	(SLV-3 TM)	1	1
-	-	SLV-3 Separation	(SLV-3 TM)	1	1
-	-	SECO	(SLV-3 TM)	1	1
-	-	VECO	(SLV-3 TM)	1	1
-	-	S-01B/SLV-3 Sep	(SLV-3 TM)	1	1
	2-18-00	SV Vehicle Clock (Vehicle Clock vs Grd System Time)		3	3
B035	1-1-00	Turbine Speed			2
B091	1-15-04	S-01B Ignition-Combustion			
or	(1-15-34)	Chamber Pressure No. 3		1	1
C001	1-16-40	+28v dc Unregulated Supply		2	2
C004	1-16-13	+28v dc Current Monitor			2

NOTES:

1. Report system time of event.
2. Report percent bandwidth once during ascent.
3. Report simultaneous clock readings during ascent.
4. Read percent BW prior to liftoff (OCV TM in orbit mode).

2. REMOTE SCF STATION TELEMETRY READOUTS

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report
Group A:			
2-15-26	GFE 1-28		1
2-16-26	Temp S-Band Beacon	1	1
2-16-27	S-Band Beacon Inter.	1	1
2-16-28	S-Band Beacon Transmit	1	1
2-15-21	Press. High Thrust Att. Cont. Tank	1	
2-16-02	Voltage BUSS/Sep B/U Battery		1
2-16-06	Current Op Batt No. 1		1
2-16-07	Current Op Batt No. 2		1
2-16-08	Current Op Batt No. 3		1
2-16-09	Current Op Batt No. 4		1
2-16-10	Current Op Batt No. 5		1
2-15-13	Delay Line 1 and/or 2	1	
2-15-14	Delay Line 3 and/or 4	1	
2-15-17	Temp Cold Gas Tank, 217/38^{o}		1
2-15-18	Temp Cold Gas Tank, 217/321^{o}		1
2-16-16	Amp Hr Meter Total (LSD)		1
2-16-17	Amp Hr Meter Total		1
2-16-18	Amp Hr Meter Total (MSD)		1
2-16-01	Voltage, OCV BUSS Primary	1	1
2-15-19	Press. Low Thrust Att. Cont. Tank	1	1
2-15-20	Press Sw, Cold Gas Manifold		1
2-16-11	Current Op Batt #6		1
2-16-12	Current Op Batt #7		1
2-16-13	Current Op Batt #8		1
2-15-22	Redundant Pneumatics Mode Monitor	1	1

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report
Group B:			
2-16-19	P Axis Magnetometer		2
2-16-20	Q Axis Magnetometer		2
2-16-21	R Axis Magnetometer		2
3-13-19	Mode and Event Monitor	1	1
3-13-17	Power Monitor		1
3-13-22	Event Monitor	1	1
3-13-21	Command Monitor - BUSS Execute	1	1
3-13-20	Command Monitor - PPD ON via BUSS	1	1
3-13-10	Pressure, BUSS Gas	1	1
3-13-16	Voltage Monitor (BUSS)		1
3-13-11	Temp, BUSS Gas	1	1

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report
Special Group SP-1:			
2-18-00	Vehicle Clock		4
Special Group SP-2:			
3-14-00	L. H. Pre-Amp.	5	
3-16-00	R. H. Pre-Amp.	5	
Special Group SP-2P			
3P-11-00	L. H. Pre-Amp		6
3P-12-00	R. H. Pre-Amp		6

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report
Special Group SP-3:			
2-15-06	Secure Word Ct 1 LSD		1
2-15-07	Secure Word Ct 2		1
2-15-08	Secure Word Ct 3		1
2-15-09	Secure Word Ct 4		1
2-15-10	Secure Word Ct 5		1
2-15-11	Secure Word Ct 6		1
2-15-12	Secure Word Ct 7 MSD		1
Special Group SP-4:			
2-14-06	Roll Rate Gyro (Coarse)		2
2-14-09	Roll Att Error ACA		2
2-14-10	Pitch Att Error ACA		2
2-14-11	Yaw Att Error ACA		2
2-14-03	Roll IR Computer Output		2
2-14-04	Pitch IR Computer Output		2
2-14-07	Pitch Rate Gyro (Coarse)		2
2-14-16	Inhibit		2
2-14-08	Yaw Rate Gyro (Coarse)		2
2-07-00	Roll Rate Gyro (Fine)		2
2-08-00	Pitch Rate Gyro (Fine)		2
2-09-00	Yaw Rate Gyro (Fine)		2
Special Group SP-5:			
2-12-19	Pressure Oxidizer (OCV)		1
2-12-20	Pressure Fuel (OCV)		1
2-15-16	Pressure N_2 Reg Inlet		1
			1
			1

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report
Special Group SP-6:			
2-12-12	Computer Phase	1	1
3-13-02	Antenna/Magnetometer Erection	1	1
Special Group SP-7:			
2-15-23	GFE 1-11		1
2-12-01	GFE 2-15		1
2-12-04	GFE 1-18		1
2-15-24	GFE 1-26		1
2-15-27	GFE 2-2		1
2-14-19	GFE 1-13		1
2-14-20	GFE 1-14		1
2-14-24	GFE 1-19		1
2-12-11	GFE 1-25		1
2-12-07	GFE 1-3		1
2-12-06	GFE 1-12		1
2-14-21	GFE 1-17		1
2-12-02	GFE 1-16		1
2-14-22	GFE 1-20		1
2-14-23	GFE 1-27		1

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report

Special Group SP-8: Note: If SP-8 is requested, read in following order of priority unless otherwise directed.

2-15-19	Press. Low Thrust Att. Cont. Tank	1	
2-15-21	Press. High Thrust Att. Cont. Tank	1	
2-15-22	Redundant Pneumatics Monitor	1	
2-07-00	Gyro Roll Rate – Fine	1	
2-08-00	Gyro Pitch Rate – Fine	1	
2-09-00	Gyro Yaw Rate – Fine	1	
2-14-16	Inhibit Transfer	1	
2-14-17	Yaw Torque ON/OFF	1	

Special Group SP-9:

This group is comprised of the following points of Channel 10, Link 2. All points are to be read once near fade and reported by postpass TM summary.

29-35	61-65 incl.
38	
40	
47	
48	74-76 incl.
59	81-88 incl.

Special Group SP-10:

2-16-06	Curr. Op. Batt. #1	1
2-16-07	Curr. Op. Batt. #2	1
2-16-08	Curr. Op. Batt. #3	1
2-16-09	Curr. Op. Batt. #4	1
2-16-10	Curr. Op. Batt. #5	1
2-16-11	Curr. Op. Batt. #6	1
2-16-12	Curr. Op. Batt. #7	1
2-16-13	Curr. Op. Batt. #8	1
2-14-18	Curr. Stab. S/S	1
2-12-14	Curr. Command S/S	1
2-16-14	Curr. BUSS/Sep B/U Batt.	1

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report

Special Group SP-11:

This group is comprised of Link 2, Channel 10. Requirement is for one frame of the Channel 10 wavetrain, taken near midpass, for datafax transmission.

Special Group SP-12:

2-16-19	"P" Axis Magnetometer		
2-16-20	"Q" Axis Magnetometer	1	
2-16-21	"R" Axis Magnetometer		

Special Group SP-13:

2-10-37	Volts, RAGS Gyro, 400 Hz		
2-10-43	DC Power Supply Peak Detector Q4		
2-10-41	DC Power Supply ±24.5 vdc		1
2-10-36	Volts, TARS Gyro 400 Hz		
2-10-44	DC Power Supply (Q3 Temp)		
2-10-45	DC Power Supply (Q4 Temp)		
2-10-46	DC Power Supply ± 24.5 vdc		
2-10-40	DC Power Supply 28v input		

Special Group SP-14:

Prior to recovery operations, a datafax transmission of the following data points will be required from OL 5 or KTS. The Test Controller will notify the station of an SP-14 requirement during the station briefing, specifying the interval of system time from which the data are desired.

2-06-00	Command Decoder Busy
2-12-16	Piggyback No. 1
2-12-17	Piggyback No. 2
2-13-00	Current, Op Battery Total

Notes:

1. Report percent bandwidth once during a pass, near fade.
2. Report maximum and minimum values during pass in percent bandwidth with system time.
3. Report at acquisition, midpass, and fade with system time.
4. Report per Paragraph 2.3, Annex D.5.e, as directed.
5. Report by voice as soon as possible after acquisition. Estimate values to 10%. TTY report to follow in accordance with Paragraph 2.2, Annex D.5.e.
6. Send report by datafax.

MODE 30 (All Stations)

Location L-Ch-Pos	Measurement	Location L-Ch-Pos	Measurement
2-15-05	10% Calibration	2-16-23	Roll Demod. Error
2-15-15	50% Calibration	2-16-22	Pitch Demod. Error
2-15-25	90% Calibration	2-16-24	Yaw Demod. Error
2-15-02	P77 Events	2-15-01	Continuity Loop
2-15-28	22-VDC Monitor	2-15-06	Secure Word Count 1 (LSD)
2-15-26	GFE 1-28	2-15-07	Secure Word Count 2
2-16-26	Temp. S-Band Beacon	2-15-08	Secure Word Count 3
2-16-27	S-Band Beacon Interr.	2-15-09	Secure Word Count 4
2-16-28	S-Band Beacon Trans.	2-15-10	Secure Word Count 5
2-15-24	GFE 1-26	2-15-11	Secure Word Count 6
2-16-19	"P" Axis Magnetometer	2-15-12	Secure Word Count 7 (Most)
2-16-20	"Q" Axis Magentometer	2-15-13	Delay Line 1 and/or 2 Full
2-15-27	GFE 2-2	2-15-14	Delay Line 3 and/or 4 Full
2-16-02	Volt. BUSS/Sep B/U Batt	2-15-17	Temp. Cold Gas Tank
2-15-16	Press. N_2 Reg. Inlet	2-15-18	Temp. Cold Gas Tank
2-16-06	Curr. Op. Batt. #1	2-16-16	Amp. Hr. Meter (0-30)
2-16-07	Curr. Op. Batt. #2	2-16-17	Amp. Hr. Meter Total (0-120)
2-16-08	Curr. Op. Batt. #3	2-16-18	Amp. Hr. Meter Total (0-480)
2-16-09	Curr. Op. Batt. #4	2-16-03	Volt, DCPS Input
2-16-10	Curr. Op. Batt. #5	2-16-14	Curr. BUSS/Sep Back-Up Batt.
2-16-21	"R" Axis Magnetometer	2-16-04	C.D. Voltage Monitor
2-16-05	10% Calibration	2-16-01	Voltage OCV Battery
2-16-15	50% Calibration	2-15-19	Press. A/C Tank
2-16-25	90% Calibration	2-15-20	Press. Sw., Cold Gas
2-16-11	Curr. #6 Batt.	2-06-00	C.D. Busy
2-16-12	Curr. #7 Batt.	2-07-00	Gyro Roll Rage - Fine
2-16-13	Curr. #8 Batt.	2-08-00	Gyro Pitch Rate - Fine
2-15-23	GFE 1-11	2-09-00	Gyro Yaw Rate - Fine
2-15-03	P77 Low Voltage Pwr Sup	2-11-00	Delay Line Erase
2-15-04	P77 High Voltage Pwr Sup	2-13-00	Curr. Op. Batt. Total

MODE 31 (All Stations)

Location L-Ch-Pos	Measurement	Location L-Ch-Pos	Measurement
2-12-05	10% Calibration	2-14-24	GFE 1-19
2-12-25	90% Calibration	2-12-17	Piggyback No. 2
2-12-16	Piggyback No. 1	2-14-06	Gyro Roll Rate Coarse
2-12-03	GFE 1-29	2-14-09	Roll Attitude Error ACA
2-14-26	GFE 1-21	2-14-10	Pitch Attitude Error ACA
2-12-26	Recorder Counter (LSD)	2-14-11	Yaw Attitude Error ACA
2-14-27	GFE 1-22	2-12-11	GFE 1-25
2-12-01	GFE 2-15	2-14-12	Roll ACA Output
2-12-04	GFE 1-18	2-14-13	Pitch ACA Output
2-14-28	GFE 1-23	2-14-14	Yaw ACA Output
2-12-14	Current, Cmd S/S	2-12-07	GFE 1-3
2-12-27	Recorder Counter	2-12-06	GFE 1-12
2-14-17	Yaw Torque ON	2-14-21	GFE 1-17
2-12-28	Recorder Counter (MSD)	2-12-02	GFE 1-16
2-12-19	Press., OCV Oxidizer	2-14-22	GFE 1-20
2-12-20	Press., OCV Fuel	2-14-23	GFE 1-27
2-12-18	Temp., Stagnation Point	2-14-01	Roll Torque Motor Volts
2-12-13	Computer Events	2-14-02	Pitch Torque Motor Volts
2-12-12	Computer Phase	2-14-03	Roll IR Computer
2-14-05	10% Calibration	2-14-04	Pitch IR Computer
2-14-15	50% Calibration	2-14-07	Gyro Pitch Rate - Coarse
2-14-25	90% Calibration	2-14-16	Inhibit Transfer
2-14-18	Current, Stab S/S	2-14-08	Gyro Yaw Rate - Coarse
2-12-21	P77 Ion Density	2-06-00	C.D. Busy
2-12-22	P77 Feedback	2-07-00	Gyro Roll Rate - Fine
2-12-23	P77 10 cps	2-08-00	Gyro Pitch Rate - Fine
2-12-24	P77 Yaw Error	2-09-00	Gyro Yaw Rate - Fine
2-14-19	GFE 1-13	2-11-00	Delay Line Erase
2-14-20	GFE 1-14	2-13-00	Curr. Op. Batt. Total

MODE 32 (All Stations)

Location L-Ch-Pos	Measurement	Location L-Ch-Pos	Measurement
3-12-05	10% Calibration	3-14-19	GFE 1-13
3-12-15	50% Calibration	3-14-20	GFE 1-14
3-12-25	90% Calibration	3-14-24	GFE 1-19
3-12-16	Piggyback No. 1	3-12-17	Piggyback No. 2
3-12-03	GFE 1-29	3-14-06	Gyro Roll Rate Coarse
3-14-26	GFE 1-21	3-14-09	Roll Attitude Error ACA
3-12-14	Current, Cmd S/S	3-14-10	Pitch Attitude Error ACA
3-12-26	Recorder Counter (LSD)	3-14-11	Yaw Attitude Error ACA
3-14-27	GFE 1-22	3-12-11	GFE 1-25
3-12-01	GFE 2-15	3-14-12	Roll ACA Output
3-12-04	GFE 1-18	3-14-13	Pitch ACA Output
3-14-28	GFE 1-23	3-14-14	Yaw ACA Output
3-12-10	GFE 1-35	3-12-07	GFE 1-3
3-12-27	Recorder Counter	3-12-06	GFE 1-12
3-12-08	GFE 1-33	3-14-21	GFE 1-17
3-12-09	GFE 1-34	3-12-02	GFE 1-16
3-14-17	Yaw Torque ON	3-14-22	GFE 1-20
3-12-28	Recorder Counter (MSD)	3-14-23	GFE 1-27
3-12-19	Press., OCV Oxidizer	3-14-01	Roll Torque Motor Volts
3-12-20	Press., OCV Fuel	3-14-02	Pitch Torque Motor Volts
3-12-18	Temp., Stagnation Point	3-14-03	Roll IR Computer
3-12-13	Computer Events	3-14-04	Pitch IR Computer
3-12-12	Computer Phase	3-14-07	Gyro Pitch Rate
3-14-05	10% Calibration	3-14-16	Inhibit Transfer
3-14-15	50% Calibration	3-14-08	Gyro Yaw Rate - Coarse
3-14-25	90% Calibration	3-06-00	C.D. Busy
3-12-21	P77 Low Density	3-07-00	Gyro Roll Rate - Fine
3-12-22	P77 Feedback	3-08-00	Gyro Pitch Rate - Fine
3-12-23	P77 10 cps	3-09-00	Gyro Yaw Rate - Fine
3-12-24	P77 Yaw Error	3-11-00	L.H. Preamp/Batt. Current
		3-14-18	Current, Stab S/S

MODE 33 (All Stations)

Location L-Ch-Pos	Measurement	Location L-Ch-Pos	Measurement
3-13-05	10% Calibration	2-16-24	Yaw Demod. Error
3-13-15	50% Calibration	2-16-06	Current, Batt. #1
3-13-25	90% Calibration	2-16-07	Current, Batt. #2
3-16-19	"P" Axis Magnetometer	2-16-08	Current, Batt. #3
3-16-20	"Q" Axis Magnetometer	2-16-09	Current, Batt. #4
3-16-21	"R" Axis Magnetometer	2-16-10	Current, Batt. #5
3-13-18	Selective Address Monitor	2-16-11	Current, Batt. #6
3-13-19	Mode and Event Monitor	2-16-12	Current, Batt. #7
3-13-06	Separation Monitor #6	2-16-13	Current, Batt. #8
3-13-17	Power Monitor	2-16-14	Curr. BUSS/Sep B/U Batt.
3-13-22	Event Monitor	2-16-16	0-30 AH Meter
3-13-03	Separation Monitor #4	2-16-17	0-120 AH Meter
3-13-21	Secure Cmd. Monitor - BUSS	2-16-18	0-480 AH Meter
3-13-20	Secure Cmd. Monitor - PPD	2-16-04	C.D. Voltage Monitor
3-13-04	Separation Monitor #5	2-16-01	Voltage OCV Bus Pr.
3-13-10	Press., BUSS Gas	2-16-02	Voltage, BUSS/Sep. Back-up Batt.
3-13-07	Separation Monitor #7	2-06-00	C.D. Busy
3-13-16	Voltage Monitor	2-07-00	Gyro Roll Rate - Fine
3-13-12	Temp., Magnetometer Elec.	2-08-00	Gyro Pitch Rate - Fine
3-13-14	Temp., Auxiliary Timer	2-09-00	Gyro Yaw Rate - Fine
3-13-13	Temp., F/C Electx.	2-11-00	Delay Line Erase
3-13-11	Temp., BUSS Gas	2-13-00	Curr. Op. Batt. Total
3-13-01	Separation Monitor #2	2-16-03	Voltage DC PS Input
3-13-02	Antenna/Magnetometer Erection	2-16-26	Temp, "S" Band Beacon, Int.
2-16-05	10% Calibration	2-16-27	"S" Band Beacon Inter.
2-16-15	50% Calibration	2-16-28	"S" Band Beacon Trans.
2-16-25	90% Calibration		
2-16-23	Roll Demod. Error		
2-16-22	Pitch Demod. Error		

MODE 34 (All Stations)

Location L-Ch-Pos	Measurement	Location L-Ch-Pos	Measurement
2-12-15	50% Calibration	2-15-15	50% Calibration
2-12-16	Piggyback No. 1	2-16-06	Curr. Op. Batt. #1
2-15-23	GFE 1-11	2-16-07	Curr. Op. Batt. #2
2-12-01	GFE 2-15	2-16-08	Curr. Op. Batt. #3
2-12-19	Press., OCV Oxidizer	2-16-09	Curr. Op. Batt. #4
2-12-20	Press., OCV Fuel	2-16-10	Curr. Op. Batt. #5
2-12-13	Computer Events	2-16-15	50% Calibration
2-14-15	50% Calibration	2-15-06	Secure Word Count 1 (Least)
2-14-19	GFE 1-13	2-15-07	Secure Word Count 2
2-14-20	GFE 1-14	2-15-08	Secure Word Count 3
2-14-06	Gyro Roll Rate Coarse	2-15-09	Secure Word Count 4
2-14-09	Roll Attitude Error ACA	2-15-10	Secure Word Count 5
2-14-10	Pitch Attitude Error ACA	2-15-11	Secure Word Count 6
2-14-11	Yaw Attitude Error ACA	2-15-12	Secure Word Count 7 (Most)
2-12-11	GFE 1-25	2-15-13	Delay Line 1 and/or 2 Full
2-14-12	Roll ACA Output	2-15-14	Delay Line 3 and/or 4 Full
2-14-13	Pitch ACA Output	2-16-16	Amp. Hr. Meter Total (0-30)
2-14-14	Yaw ACA Output	2-16-17	Amp. Hr. Meter Total (0-120)
2-12-07	GFE 1-3	2-16-18	Amp. Hr. Meter Total (0-480)
2-12-06	GFE 1-12	2-16-04	CD Voltage Monitor
2-14-21	GFE 1-17	2-16-01	Voltage OCV Battery
2-12-02	GFE 1-16	2-15-19	Press., A/C Tank
2-14-22	GFE 1-20	2-06-00	CD Busy
2-14-01	Roll Torque Motor Volts	2-07-00	Gyro Roll Rate - Fine
2-14-02	Pitch Torque Motor Volts	2-08-00	Gyro Pitch Rate - Fine
2-14-03	Roll IR Computer	2-09-00	Gyro Yaw Rate - Fine
2-14-04	Pitch IR Computer	2-11-00	Delay Line Erase
2-14-07	Gyro Pitch Rate Coarse	2-13-00	Curr. Op. Batt. Total
2-14-16	Inhibit Transfer	2-16-02	Voltage BUSS/Sep. Back-up Batt.
2-14-08	Gyro Yaw Rate Coarse	2-16-14	Current BUSS/Sep. Back-up Batt.
2-16-11	Curr. #6 Batt.	2-16-19	"P" Axis Magnetometer
2-16-12	Curr. #7 Batt.	2-16-20	"Q" Axis Magnetometer
2-16-13	Curr. #8 Batt.	2-16-21	"R" Axis Magnetometer

Approved for Release: 2024/01/30 C05099045

MODE 35 (KTS, OL-5)

Location L-Ch-Pos	Measurement	Location L-Ch-Pos	Measurement
2-15-05	10% Calibration	3-13-21	Secure Cmd. Monitor - BUSS
2-15-15	50% Calibration	3-13-20	Secure Cmd. Monitor - PPD
2-15-25	90% Calibration	3-13-04	Separation Monitor No. 5
3-13-05	10% Calibration	3-13-07	Separation Monitor No. 7
3-13-15	50% Calibration	3-13-01	Separation Monitor No. 2
3-13-25	90% Calibration	2-14-09	Roll Attitude Error ACA
2-14-05	10% Calibration	2-14-10	Pitch Attitude Error ACA
2-14-25	90% Calibration	2-14-11	Yaw Attitude Error ACA
2-16-05	10% Calibration	2-14-12	Roll ACA Output
2-16-15	50% Calibration	2-14-13	Pitch ACA Output
2-16-25	90% Calibration	2-14-14	Yaw ACA Output
2-06-00	C. D. Busy	2-14-16	Inhibit Transfer
2-07-00	Gyro Roll Rate - Fine	2-15-01	Continuity Loop
2-08-00	Gyro Pitch Rate - Fine	2-15-13	Delay Line 1 and/or 2 Full
2-09-00	Gyro Yaw Rate - Fine	2-15-14	Delay Line 3 and/or 4 Full
3-10-00	"P" Axis Valves	2-16-01	Voltage OCV Battery
4-08-00	System Events	2-15-19	Press. A/C Tank
4-09-00	System Events	3-13-18	Selective Address Monitor
4-12-00	Retro/Parachute Deploy	3-13-10	Press., BUSS Gas
4-10-00	BUSS Mode and Events	3-13-16	Voltage Monitor
3-16-19	"P" Axis Magnetometer	3-13-12	Temp. Magnetometer Electx.
3-16-20	"Q" Axis Magnetometer	3-13-14	Temp. Auxiliary Timer
3-16-21	"R" Axis Magnetometer	3-13-13	Temp. F/C Electx.
3-13-19	Mode and Event Monitor	3-13-11	Temp. BUSS Gas
3-13-06	Separation Monitor No. 6	2-14-08	Yaw Rate - Coarse
3-13-17	Power Monitor	2-14-17	Yaw Torque ON/OFF
2-16-02	Volt BUSS Sep B/U Batt.	2-15-16	Press. OA N_2 Reg Input
2-16-26	Temp "S" Band Beacon (Int)	2-16-14	Current BUSS/Sep Back-up Batt.
2-16-27	"S" Band Beacon Interr.	2-16-16	0-30 AH Meter
2-16-28	"S" Band Beacon Trans	2-16-17	0-120 AH Meter
3-13-22	Event Monitor	2-16-18	0-480 AH Meter
3-13-03	Separation Monitor No. 4		

MODE 36 (All Stations)

Location L-Ch-Pos	Measurement	Location L-Ch-Pos	Measurement
3-10-01	10% Calibration	3-10-31	Press Stab Reg High Out
3-10-02	50% Calibration	3-10-32	Temp TARS Roll Gyro
3-10-03	100% Calibration	3-10-33	Temp TARS Pitch Gyro
3-10-04	22 VDC Monitor	3-10-34	Temp TARS Yaw Gyro
3-10-05	GFE 1-4	3-10-35	Temp TARS Elect (Int)
3-10-06	GFE 1-5	3-10-36	Volt TARS Gyro 400 cps
3-10-07	GFE 1-6	3-10-37	Volt RAGS Gyro 400 cps
3-10-08	GFE 1-7	3-10-38	Temp RAGS Gyro Block
3-10-09	GFE 1-8	3-10-39	DCPS ±10 volt
3-10-10	GFE 1-9	3-10-40	DCPS 28 volt input
3-10-11	GFE 1-10	3-10-41	DCPS ±26.5 volt
3-10-12	GFE 1-26	3-10-42	DCPS +36 volt
3-10-13	GFE 2-2	3-10-43	DCPS Peak Det (Q4)
3-10-14	5 Volt Bus	3-10-44	DCPS Q3 Temp
3-10-15	5 Volt Bus	3-10-45	DCPS Q4 Temp
3-10-16	5 Volt Bus	3-10-46	DCPS ±24.5 volt
3-10-17	5 Volt Bus	3-10-47	DCPS Int Temp
3-10-18	5 Volt Bus	3-10-48	Temp 6 volt P.S. Base Plate
3-10-19	5 Volt Bus	3-10-49	Temp, Liner 190/240°
3-10-20	5 Volt Bus	3-10-50	Temp, Liner 190/300°
3-10-21	5 Volt Bus	3-10-51	Temp 184/350°
3-10-22	5 Volt Bus	3-10-52	Temp OCV Skin 190/60°
3-10-23	5 Volt DC Bus	3-10-53	Temp OCV Skin 190/120°
3-10-24	5 Volt DC Bus	3-10-54	Temp OCV Skin 190/182°
3-10-25	Temp P77	3-10-55	Temp Inside Insul 190/60°
3-10-26	Temp OA Oxid Tank (Int)	3-10-56	Temp Inside Insul 190/180°
3-10-27	Temp OA Fuel Tank (Int)	3-10-57	Temp Inside Insul 190/300°
3-10-28	Temp OA Solenoid Valve	3-10-58	Temp Veh Struct. 127/185°
3-10-29	Press OA N_2 Reg Inlet	3-10-59	Temp Decoder/Prog Plate
3-10-30	Press Stab Reg Low Out	3-10-60	Temp Outside Insul 216/QIV

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MODE 36 (Continued)

Location L-Ch-Pos	Measurement	Location L-Ch-Pos	Measurement
3-10-61	Temp Sect 5 Heater 84/180°		
3-10-62	Temp Sect 5 Htr 104/15°		
3-10-63	Temp Sect 5 Htr 104/90°		
3-10-64	Temp Sect 5 Htr 104/180°		
3-10-65	Temp Sect 5 Htr 104/270°		
3-10-66	Temp 69/0°		
3-10-67	Temp 68/55°		
3-10-68	Temp 68/115°		
3-10-69	Temp 64/180°		
3-10-70	Temp 64/240°		
3-10-71	Temp 64/295°		
3-10-72	Temp, Aft Struct		
3-10-73	Temp Adapter		
3-10-74	Temp Piggyback No. 6		
3-10-75	Temp Delta 3 Xmtr Plate		
3-10-76	Temp Signal Data Rcdr		
3-10-77	Temp Thrust Cone		
3-10-78	Temp, Capsule		
3-10-79	Temp Recovery Battery		
3-10-80	Volts, Recovery Batt. 1		
3-10-81	Temp Batt. 1		
3-10-82	Temp Batt. 2		
3-10-83	Temp Batt. 3		
3-10-84	Temp Batt. 4		
3-10-85	Temp Batt. 5		
3-10-86	Temp Batt. 6		
3-10-87	Temp Batt. 7		
3-10-88	Temp Batt. 8		
3-10-89	Frame Sync		
3-10-90	Frame Sync		

MODE 37 (All Stations)

Location L-Ch-Pos	Measurement
2-12-05	10% Calibration
2-12-15	50% Calibration
2-12-25	90% Calibration
2-12-21	P77 Ion Density
2-12-22	P77 Feedback
2-12-23	P77 10 cps
2-12-24	P77 Yaw Error
2-15-05	10% Calibration
2-15-15	50% Calibration
2-15-25	90% Calibration
2-15-02	P77 Events
2-15-03	P77 Low Voltage Power Supply
2-15-04	P77 High Voltage Power Supply

Mode 38 (All Stations)

Location L-Ch-Pos	Measurement
2-07-00	Gyro Roll Rage - Fine
2-08-00	Gyro Pitch Rate - Fine
2-09-00	Gyrc Yaw Rate - Fine

MODE 39 (VTS Only)

Location L-Ch-Pos	Measurement
2-16-05	10% Calibration
1-15-01	Cal 1/2
1-16-01	Cal 1/2
1-11-00	Voltage Controlled Oscillator
2-06-00	C. D. Busy
2-07-00	Gyro Roll Rate - Fine
2-08-00	Gyro Pitch Rate - Fine
2-09-00	Gyro Yaw Rate - Fine
2-13-00	Curr. Op. Batt. Total
1-15-03	Pitch Actuator Position
1-15-04	Combustion Chamber Press #3
1-15-07	Switch Group Z
1-15-10	Structure Current Monitor
1-15-15	Fuel Pump Inlet Press.
1-15-17	Oxidizer Pump Inlet Press.
1-15-21	Hydraulic Oil Press.
1-15-24	Yaw Actuator Position
1-16-13	+28 VDC Current
1-16-27	Guidance/Control Monitor
1-16-36	Pitch Gyro (Fine)
1-16-39	Yaw Gyro (Fine)
1-16-42	Roll Gyro (Fine)
2-15-05	10% Calibration
2-16-11	Curr Op Batt #6
2-16-12	Curr Op Batt #7

Location L-Ch-Pos	Measurement
1-16-45	Horizon Sensor Pitch
1-16-46	Horizon Sensor Roll
2-16-06	Curr. Op. Batt. #1
2-16-07	Curr. Op. Batt. #2
2-16-08	Curr. Op. Batt. #3
2-16-09	Curr. Op. Batt. #4
2-16-10	Curr. Op. Batt. #5
2-15-06	Secure Word Count 1 (LSD)
2-15-07	Secure Word Count 2
2-15-08	Secure Word Count 3
2-15-09	Secure Word Count 4
2-15-13	Delay Line 1 and/or 2 Full
2-15-14	Delay Line 3 and/or 4 Full
2-16-01	Voltage OCV Battery
2-15-19	Press. A/C Tank
1-16-28	Velocity Cutoff Switch
1-15-12	+28 VDC Regulated Supply
1-15-18	400 Cps 3 Phase BUS, Phase AB
1-15-30	-28 VDC Regulated Supply
1-16-40	+28 VDC Unreg. Supply
1-16-47	Control Gas Press (High)
1-15-42	Control Gas Supply Temp
1-15-57	Cal Z
1-15-29	Cal +
1-16-57	Cal Z
1-16-29	Cal +

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ANNEX D

APPENDIX 8 – Tab a *

SUPPLEMENTAL OPERATIONS REQUIREMENTS

PREPARED BY: TWOP-2

DUE DATE: Launch - 4 Weeks

DISTRIBUTION: As shown on pages 16 and 17, Basic OPS ORDER 63-7.

* This Tab produced for information only. The official National Range Document (NRD) has precedence, and is published and distributed by AFO-PMR as required.

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SUPPLEMENTARY OPERATIONS REQUIREMENT NO. 13260

SUPPLEMENTARY OPERATIONS REQUIREMENT NO. 13260*

PART II PROGRAM 206

CONTRACT NO. AF 04(695)- REV #3

PROJECT NO. 28 Oct 63

Located Villars released in CADRE documents C05099921 pg 7 and C05099290 pg. 183. Lifting this redaction. Les D.

APPROVED ______________________

PAUL E VILLARS
Colonel, USAF
Deputy for Test Operations
6594th ATW

The contents of the Operations Requirements have been reviewed and are approved.

APPROVED [redacted]
Colonel, USAF
Deputy for Air Force
Pacific Missile Range

*References to SPRD AF 13260

______________________ Date __________
Program Manager, PMR

SOR REVISION SHEET

BASIC SOR	28 Oct 63	6594th ATW
- - - - - - -	- - - - - -	Posted by:
Revision 1 (R-1)		
Revision 2 (R-2)		
Revision 3 (R-3)		
Revision 4 (R-4)		
Revision 5 (R-5)		
Revision 6 (R-6)		
Revision 7 (R-7)	20 Mar 64	

20 Mar 64 SOR 13260

SUPPLEMENTARY OPERATIONS REQUIREMENTS - 13260

1 GENERAL INFORMATION

1-1 Command (Operations Personnel)

Lt Col John J Gallagher
Field Test Force Director (Ext 651)
6594th Aerospace Test Wing
Sunnyvale, California

William Sheppard
Systems Planning Engineer (Ext 651)
Satellite Test Center
Sunnyvale, California

[redacted]
Commander
6594th Recovery Control Group
Hickam AFB, Hawaii

[redacted]
Program Manager, AF Office (Ext 7416)
Pacific Missile Range
Point Mugu, California

[redacted]
Range Operations Dept (Ext 7751)
Pacific Missile Range (Code 3216)
Point Mugu, California

1-2 Range Time Utilization

1-2.1 Launch Window - N/R

1-2.2 General Countdown

Time	Item/Function
T - 12 Hrs	Recovery Ships report position, weather, and equipment status to the Recovery Control Center.
T - 6 Hrs	Recovery Ships report equipment status to the Recovery Control Center.
T - 1 Hr	Recovery Ships report position, weather, and equipment status.
T + 30 Min	"Attained Orbit" msg sent by STC to Spacetrack and PMR. T/M aircraft depart PMR for PMRF.

1-3 Test Objectives - See SPRD AF13260, Page 130

1-4 Test Description - See SPRD AF13260, Page 140

1-4.1 Trajectory/Plan View - N/R

1-4.2 Trajectory/Full Range - N/R

1-4.3 Trajectory/Launch - N/R

1-4.4 Trajectory/Terminal - See SPRD AF13260, Page 145 - 145.3

1-4.5 Trajectory/Orbital and Space - See OR 13200 dated 1 Apr 63, Part II

1-5 Test Vehicle Description - See SPRD AF13260, Page 150

Approved for Release: 2024/01/30 C05099045

1-5.1 Drawing/Test Vehicle - See SPRD AF13260, Page 151

1-5.2 Telemetry System

a. Recovery Vehicle - See SPRD AF13260, Page 152

1-5.3 Transponders and Beacons

a. Recovery Beacon:

Frequency	235.0 mc
Pulse Rate	1000 pps
Pulse Width	30 Microseconds (at 3 DB points)
Average Power	.225 Watts
Peak Power	7.5 Watts
Life Expectancy	10 Hours

1-5.4 Destruct System/Command Control - N/R

1-5.5 Ordnance - See SPRD AF13260, Pages 155, 155.1 and 156

1-5.6 Other Vehicle Borne Equipment - See SPRD AF13260, Page 157

1-5.7 Weapons System/Mission Capable - N/R

1-5.8 Weapons System/Functions - See SPRD AF13260, Page 159

1-6 Range User's Instrumentation - See Part I

1-6.1 Transmitters - N/A

1-6.2 Receivers - N/A

1-7 Summary of Frequency Utilization

Recovery Vehicle:	DELTA 4	242.0 mc	2 Watts
Agena:	DELTA 1	231.4 mc	2 Watts
Orbital Control Vehicle:	DELTA 2	248.6 mc	8 Watts
	DELTA 3	258.5 mc	8 Watts

2. DATA

2-1 Metric - N/R

2-2 Engineering Sequential Data - N/R

2-3 Telemetry

2-3.1 Launch Data - N/R

2-3.2 Deboost Data

a. On the recovery pass, the DELTA 4 (242.0 mc) is to be recorded by the EC-121K Aircraft at M + 120 sec until M + 600 sec. The following event numbers are to be reported by SSB to the Test Controller at the STC immediately after termination of recording:

Event No. *	Time Sec	Event Name	Link Chan	Description %B.W. Pre-Event	Description % B.W. Final
	M + 260	T/C Backup ON	4 - 9	40	59
	M + 375	3g SW. Close	4 - 9	40	67
	M + 475	3g Sw. Open	4 - 9	67	40
	M + 510	Para Cover OFF	4 - 8	40	95

Reporting aircraft will provide event numbers and system time or ZULU time of events. Time at M -0 will be provided by the Test Controller. Primary frequency will be established by the RCG. The aircraft will relay its report through Hawaii Tracking Station.

b. The EC-121K aircraft will record on magnetic tape both the Link 4 signals and the Recovery Beacon signals.

c. The tapes will be returned to Hickam AFB to be airmailed to the STC via airmail.

d. PMR will forward to the RCG the names and security clearances of the EC-121K personnel who will attend any program briefings.

*New event numbers will be supplied for each operation by message from the STC (TWOP-2), at approximately T -5 days. Event numbers are also shown in Annex E.8 of T.O.O. 63-7, published by the 6594th ATW.

2-3.3 Recovery Data

The Recovery Ships will record T/M on 242.0 mc from M + 300 sec (3g Switch Close) until M + 600 (Chute De-reef).

2-4 Other Data - N/R

3 METEOROLOGICAL SERVICES

3-1 Forecasts - N/R

3-2 Observations - Reference Paragraph 1-2.2 for Observations required from the Recovery Ships.

3-3 Minima - N/R

3-4 Consultant Services - N/R

4 SUPPORT INSTRUMENTATION

4-1 Radio

The Recovery Ships will have HF/SSB for communications with the RCC, and with HTS or KTS as necessary. Radio silence will be required on SSB Frequencies for a period 30 minutes prior to launch to 80 minutes after launch, except between the STC and the Down-Range Ship. (PMR)

4-2 Wire - N/R

4-3 Communications Recording - N/R

4-4 Timing - N/R

4-5 Sequencer - N/R

4-6 Visual Indicators - N/R

4-7 Other Support Instrumentation - N/R

4-8 Summary of Radio Frequency Requirements - N/R

5 MATERIAL AND SERVICES

5-1 Services - N/R

5-2 Vehicle and Ground Handling Equipment - N/R

5-3 Propellants, Gases, and Chemicals - N/R

5-4 Chemical and Physical Analysis - N/R

5-5 Bio-Science - N/R

5-6 Facilities - N/R

6 TRANSPORTATION

6-1 Surface - N/R

6-2 Air - N/R

7 RECOVERY

7-1 Normal

7-1.1 Recovery Zone:

The Recovery Zone is defined as that area between 26° and 8°N Latitude and between approximately 148° and 172°W Longitude at the nominal impact Latitude of 24°N. The Eastern and Western Boundaries represent the area covered by regression of the orbit during one revolution and are within the range capability of the Recovery Aircraft.

7-1.2 Primary Recovery Area:

The Primary Recovery Area is the Three-Sigma Area centered on the impact point at 24°N Latitude. This area is a zone that extends approximately 51 nautical miles up-range and 51 nautical miles down-range from the nominal impact Latitude, and approximately ± 10 nautical miles cross-range. This Three-Sigma Area is based on nominal RV separation time and subsequent operation of separation and re-entry components within design tolerances.

7-1.3 Recovery:

The primary method of recovery is Aerial Recovery using specially equipped JC-130B Aircraft. Seven (7) JC-130B Aircraft equipped for Aerial Recovery are assigned to the 6593rd Test Squadron to support recovery. Aerial Recovery is accomplished by snaring the RV parachute with hooks on a Recovery Cable Loop that is suspended between poles from the rear ramp and cargo door opening.

7-2 Emergency

In the event the RV is not air-recovered but impacts within sight, the Recovery Aircraft will mark the impact location with smoke bombs, dye marker, and/or electronic buoy. Surveillance of the RV will be maintained until the RV is recovered or has sunk.

7-2.2 Para-rescue Team:

When the RV is located and a Surface Recovery Ship is not in the immediate area, deployment of a Para-rescue Team to physically secure the floating RV may be requested. This technique requires personnel to parachute into the ocean, secure the RV on a 20-man lift-raft, and to remain with the RV until picked up by a surface vessel or helicopter.

7-2.3 RV Search:

7-2.3.1 Search will be instituted under the following conditions:

a. No RV signal detection, probable impact point determined from Recovery Pass Tracking Data.

b. Minimum RV signal detection; impact point determined from best direction and Sequence of Events Data.

7-2.3.2 The RCC will establish various search plans in the RCG OPLAN to meet the various search requirements.

7-2.3.3 The decision for search will be forwarded from the RCG to the Recovery Forces within 30 minutes after ETPD.

7-2.3.4 Termination of recovery operations will be at the direction of the System Test Controller or the Field Test Force Director at the STC. Termination message will be dispatched to RCG and PMR.

8 AIRCRAFT AND SHIP

8-1 Aircraft

8-1.1 Telemetry Aircraft:

An EC-121K will be on-station for the recovery at 36°N Latitude to record and read out the events listed in Paragraph 2-3.2.

8-1.2 FIC Aircraft:

An EC-121K will be used to monitor frequency interference in the Recovery Area 2 hours prior to and during the recovery operation. The FIC A/C may be used as a back-up to the T/M aircraft. *.

8-2 Ships

PMRF will deploy two (2) Surface Recovery Units to be on a nominal station by Rev. #18 - 2 hours. The Northern Recovery Ship will be deployed to 24°N Latitude and the Southern Ship to 16°N Latitude. These ships will record the Recovery Data as listed in Paragraph 2-3.3. Exact ship locations for each operation, will be as shown in the Frag Order to RCG OPlan 2.63.

*Except A/C #756 and 758, which are not yet fully configured as T/M aircraft.

E - FLT INFO

ANNEX E

FLIGHT INFORMATION

ANNEX E

CONTENTS

ANNEX E
FLIGHT INFORMATION

1. FLIGHT/VEHICLE DATA

WTR OPERATION NO.	____	____	____	____
1.1 <u>Atlas Booster (SLV-3)</u>	____	____	____	____
Agena D (S-01B)	____	____	____	____
GE Vehicle (OCV)	____	____	____	____
989 Vehicle	____	____	____	____
989 Ops No.	____	____	____	____
Agena Experiments	____	____	____	____
SCLS Ops No.	____	____	____	____

1.2 <u>Launch Data</u>

Date	____	____	____	____
S/VAFB, SLC	____	____	____	____
Pad Coordinates:				
Latitude (deg)	**34° -37' -55" N**			
Longitude (deg)	**120° -36' -39" W**			
Altitude (ft)	**500 ft (ASL)**			
Launch Window (Z)	____	____	____	____
Optimum Time (Z)	____	____	____	____
Launch Azimuth (deg)	____	____	____	____

1.3 Injection Parameters

Geocentric Latitude (deg)	____	____	____	____
Geocentric Longitude(deg)	____	____	____	____
Altitude (nm)	____	____	____	____
Inertial Velocity Azim(nm)	____	____	____	____
Inertial Velocity (fps)	____	____	____	____
Flight Path Angle (deg)	____	____	____	____
Geocentric Radius (ft)	____	____	____	____

1.4 Orbital Parameters

Type	____	____	____	____
Period (min:sec)	____	____	____	____
Eccentricity	____	____	____	____
*Inclination (deg)	____	____	____	____
Perigee Altitude (nm)	____	____	____	____
Perigee Latitude(deg)	____	____	____	____
Apogee Altitude (nm)	____	____	____	____
Apogee Latitude (deg)	____	____	____	____
Arg. of Perigee (deg)	____	____	____	____
Duration (days)	____	____	____	____

*The inclination angle is measured on the ascending node side of orbit between the equatorial and orbit planes.

1.5 Frequency Summary

1.5.1 Telemetry.

Definitions:

Link - Specific Modulation (Vehicle Information)

DELTA - A Specific RF Carrier Frequency

Link No.	Operational Mode	SCF Designation	Frequency
1	Agena Telemetry	DELTA 1	231.4 mc
2	OCV Real-Time Orbital Telemetry; Base 1, 2, and 3	DELTA 2	248.6 mc
3P	OCV Orbital Playback Telemetry. Base 1 and 3	DELTA 3	258.5 mc
3B	Buss Telemetry; Base 6 and 8	DELTA 3	258.5 mc
4	RV Telemetry	DELTA 4	242.0 mc

Note: Ground Commands can switch Link 2 and Link 3 into frequencies DELTA 3 and DELTA 2 respectively.

1.5.2 GE/OCV.

S-Band Beacon	Receive Transmit	2850.0 mc 2920.0 mc
OCV Digital Command System	Code X, 36 microseconds between reference pulse and range pulse Standard delay setting of 178 yards will be used with OCV S-band beacon	
Recovery Beacon		235.0 mc
ZEKE Functional Command System		137.64 mc

ANNEX E

2. ASCENT SUMMARY OF EVENTS

Event No.	Time From Liftoff (sec)	Event Description	Source
1	T ± 0.0	Liftoff	Atlas 2" Motion Switch
2		Atlas Booster Cutoff (BECO)	Atlas
3		Split One	Atlas
4		Atlas Sustainer Cutoff (SECO) Disarm Agena Destruct	Atlas
5		Atlas Sustainer Cutoff (BU) Disarm Agena Destruct (BU)	Atlas
6		Agena Timer Start	Atlas
7		Agena Timer Reset Agena Timer Safety Input	Agena Timer
8		Atlas Vernier Cutoff (VECO) Uncage Agena Gyros Eject H/S Fairings Arm Atlas/Agena Separation Disarm Agena Destruct (BU)	Atlas
9		Command Separation Fire Atlas Retro Rockets	Atlas
10		Start Agena Timer (BU)	Pullaway Plug
11		Activate Agena Pneumatics	Separation Switch on Rails
12		Atlas Vernier Cutoff VECO (BU) Uncage Agena Gyros (BU) Eject H/S Fairings (BU) Arm Atlas/Agena Separation (BU)	Atlas

Event No.	Time From Liftoff (sec)	Event Description	Source
13		Separation Command (BU) Fire Atlas Retro Rockets	Atlas
14		Uncage Agena Gyros (BU) Eject H/S Fairings (BU) Connect H/S Roll to Roll Gyro (BU)	Std. Timer
15		Remove Power from Uncage Gyros (BU) Eject H/S Fairings (BU) Transfer Pitch Input Ground	Std. Timer
16		Enable V/M, Switch T/M to Accelerometer Output Initiate Pitch Rate Connect H/S Pitch to Pitch Gyro	Std. Timer
17		Engine Ignition Arm Engine Control, Disable P&Y Pneumatics, Enable Hydraulic Integral Circuits	Std. Timer
18		Fire Prop. He. Press. Squibs	Std. Timer
19		Switch Pitch Hydr. to Low Gain Switch Yaw Hydr. to Low Gain	Std. Timer
20		Enable Engine Shutdown	Std. Timer
21		Engine Shutdown, Close Lip Seal Press. Valve Activate P&Y Pneumatics Disable Hydr. Integral Circuits	V/M Eng. Relay
22		Engine Shutdown (BU) Close Lip Seal Press Valve (BU) Disable V/M and Switch TM to Counter Transfer Roll H/S to Low Gain Fire H/S 0-Deg Squibs Open Engine Arm Circuit	Std. Timer
23		Close Ox. Isolation Valve	Std. Timer

Event No.	Time From Liftoff (sec)	Event Description	Source
24		Computer Pre-Arm	
25		OCV/Agena Separation	OCV
26		Transfer Pneumatics to Low Press. F/C and Deadbands to Orbit Mode Turn V/M Power Off Start T/M Cal. Remove Power from "Engine Shut-down (BU)" Remove Power from "Closed Lip-seal Press. Valve"	Std. Timer
27		Remove Power from "Pneu. to Low Press." Remove Power from "Start T/M Cal." Stop T/M Calibrate	Std. Timer
28		Transfer to -4^{o}/Min Pitch Rate Start Gyro Compassing and Switch H/S Gain Close Decoupling Circuits	Std. Timer
29		Enable Secondary Payload (SPL) Interface Remove Power from "Stop T/M Cal." Remove Power from "Close Decoupling Circuits"	Std. Timer
30		Remove Power from "Enable SPL Interface" Apply SPL Interface Power	Std. Timer
31		Stop Agena Timer Motor	Std. Timer

Note: Ascent sequence times will be provided by OCN message when applicable.

ANNEX E
APPENDIX 3
FLIGHT PROFILE

1. GENERAL

The following notes are not flight specific and will not be revised for each flight. Station procedures and checklists should reflect these items where applicable.

1.1 Prepass

1.1.1 The Microwave link will be required on all VTS passes including ascent, but is not required during countdown unless specifically requested.

1.1.2 VTS will report ascent deviations from the station printer using 60-sec increments.

1.1.3 All stations will initialize with both primary and secondary antennas on all passes unless otherwise advised.

1.1.4 The 125 checkout program, SHAT, need only be run preflight; L-1 Command loop checks will be run from both the computer and the 125 before each pass.

1.1.5 All stations should have two copies of all Green tapes 1 through 16, and Green message 922, 944, and 966.

1.1.6 The Auto Sierra prepasses will be non-rev specific. Stations must call up Auto Sierra messages as directed by DICE.

1.1.7 Sierra commands will be on nominal T&C prepasses. All stations will merge new antenna pointing data on the latest prepass in order to retain Sierra commands.

1.1.8 Each station will punch one copy of 125-formated punched paper tape upon receipt of new Auto Sierra prepass, unless otherwise directed.

1.1.9 The CCC should be switched to manual if a paper tape is to be punched after receipt of an Auto Sierra message.

1.1.10 Record the time (GMT) for completing word counts for both Auto Sierra messages and Green messages. Report word counts and times to DICE ASAP.

1.1.11 The following procedures govern use of Quick Recovery of the T&C computer when close to ETA or in pass:

a. If the T&C is not recording normally, i.e., data will be lost, stations will use whatever means is necessary to recover.

b. If the T&C is recording normally, but is not in contact with the Bird Buffer, quick recovery will not be used unless directed by DICE.

1.1.12 Telemetry cals are not required using Model 8.1 software.

1.1.13 There will be no acquisition messages. Event times will be furnished by DICE during station briefings.

1.1.14 Station briefing procedures are as follows:

a. If TM requirements are as given in the Flight Profile, DICE will so state. Station will reply by reading back TM requirements. If requirements change, DICE will say "TM requirements are as in Profile, except, --------."

b. Auto Sierra message selections will be given in the Command Plan. Stations do not CALL-UP the blocks at this time. (Except for obtaining the computer word count, A/S messages will not be called up until directed by DICE.)

c. Standard station configuration is as follows:

Alpha active code X at ETA 5.
C/T passive - ZEKE Mode
SOC/125 standard, computer enabled. Link-Deltas normal. If the station configuration is to be standard, DICE will so state. If changes are required, DICE will say "Station configuration is standard – except --------." Stations will confirm by voice.

d. The order of briefing is as follows:

1. Introduction
2. TM
3. Message selections
4. Station status (discuss conflicts)
5. Event times
6. Station configuration
7. Command plan
8. Word count re-verify
9. Emergency procedures.

1.1.15 The PRELORT at the second or third station on a multi-station pass will go active when the PRELORT at the previous station goes passive, or at ETA -300 seconds, whichever occurs last. The OC will report his alpha active time.

1.1.16 Stations should report the station configuration as soon as contact is established with DICE at ETA-5, or, if a multi-station pass, as soon as contact is established following fade of the preceding station. Examples of reports are:

a. "DICE, BOSS, ETA-290 seconds, at ETA-300 Alpha was active Code X; C/T is passive ZEKE mode, antennas are at the point of acquisition. SOC and 125 are in standard configuration with the computer enabled. We have Auto-Sierra 20, 25, and 31 through 34 selected. Green Message 115 is loaded in the 125. Both computers are on-line and in contact with the Bird Buffer.

The second or third station will report as follows if time permits:

b. "COOK, DICE, go active Code X". "DICE, COOK, Roger, Alpha active Code X at 610, C/T passive ZEKE (or C/T standing by to go active at ETA zero). Antennas are at the point of acquisition, etc. (Same as subparagraph a. from this point on.)

1.1.17 Stations will send Sierra 17 in test mode after Bird-Buffer contact and before ETA zero to avoid dumping commands during the pass.

1.1.18 If computer contact is not made, stations will be prepared to report Group A by voice in real time as early as possible in the pass, and be prepared to report one line of printer data near acquisition, midpass, and fade by voice postpass if requested.

1.1.19 All stations will use the following merge option for prepass reception:

1. Current prepass on TD-2, with write ring
2. Blank tape on TD-3
3. Receive and merge on TD-3
4. Duplicate back on TD-2
5. Run LPT CMD, TAP, and PCT from TD-2.
6. Remove write ring from TD-2 before pass if time allows.
7. Store tape from TD-3 as latest prepass.

Use TD-3 for recovery and TD-4 as history. Ascertain that the latest tape is mounted on TD-2 for new prepass transmission.

1.1.20 Stations should use the following procedure for receiving Auto-Sierra and SDDT transmissions:

a. After receipt of an A/S message, the OC is cleared to release the station computer and initialize the A/S word count after a 125 tape has been punched.

b. The Bird Buffer will stay on-line until the word count is verified at the 125.

c. The word count verification will be coordinated between the OC and Test Controller.

d. The Data Coordinator will notify the Bird Buffer that the word count has been verified.

Note: It is not necessary to tap an Auto-Sierra prepass. Proper word count at the 125 determines that transmission was valid.

1.1.21 The following procedure will apply for transmission of Green Messages during marginal data-line conditions:

a. As soon as the message is generated, the magnetic tape will go to the Bird Buffer for Auto-Sierra transmission. One paper tape will go to the Communications Center for TTY transmission.

b. DICE communications will bẽgin transmission as soon as they receive the message. The message will be sent to the station three times.

c. The tracking station will return the message one time to DICE communications.

d. DICE communications will attempt to compare the returned message.

e. The tracking station will attempt to compare two of the three transmissions.

f. If the Auto-Sierra prepass is transmitted successfully, the Test Controller will notify DICE communications as soon as possible.

1.1.22 All stations will punch a paper tape from an old A/S message and run it through the 125 for word count prior to any loading or backup loading pass.

1.1.23 SOC Configuration: Unless directed otherwise, the SOC will be in the standard configuration. When ICS ZEKE or KIK-ZEKE commanding is anticipated, DICE will direct the OC to switch to the proper configuration, i.e., "BOSS, DICE, S-Mode enable and switch to ZEKE configuration" or "S-Mode enable and configure for KIK-ZEKE commanding."

The station will perform the desired action and report: "DICE, BOSS, SOC in ZEKE configuration with S-Mode enabled", etc.

The SOC scope condition will be reported following every configuration change.

1.1.24 KIK ZEKE cards will never be entered during computer initialization unless directed by DICE.

1.1.25 When initializing the T&C computer for "Pass", all stations will select the ZEKE command module to permit ZEKE commanding from the ICS panel if required.

1.1.26 Where possible all stations will use the 127 rather than the VPG for performing command loop checks.

1.1.27 Stations will be briefed on C Cocoa ON and OFF times. After C Cocoa ON, report actual signals, i.e., clean signal, noisy signal, and absence of signal.

1.1.28 After reporting C Cocoa ON, report command capability (alpha lock, clean signal, etc.). Report negative command capability if such is the case and report why.

1.1.29 In the event of equipment failure, report the failure to DICE before taking any corrective action that would affect the station configuration.

1.1.30 Use voice terminology when commanding as outlined in Tab D.3.c. If, after block commanding, the <u>transmit</u> count and the verify count differ, report both. Report <u>transmit</u> count following any error condition.

1.1.31 If the test controller does not brief on loss of communications procedures, remind him. Loss of communication commanding procedures will be either "Send XXX," or "Follow page D.3.d-1."

1.2 Data

1.2.1 If processed data are not returned to the STC, a reading from each processed point printed on the local station printer will be reported at least once by voice, datafax or postpass TWX when requested.

1.2.2 Vehicle time options will be run near midpass or at the point of best signal using one-sec intervals. Six consecutive readings will be taken. Range readings will be included in the message.

1.2.3 Command histories will be run ASAP after fade for single station passes and the last station of the multiple station passes. The command history for the first or second station of multiple station passes will be run by ETA -15 minutes prior to the first station on the next rev. GTS-OL 5 or OL 5-GTS passes will be treated as a single station pass. Six copies of the command history will be printed on the analysis printer.

1.2.4 All TM playbacks will be in tape time except Link 3P which will be in system time.

1.2.5 All messages concerning the operation will be sent to DICE as an operational message from the time of the preflight ALSTA conference until release from support at end of the operation.

1.2.6 Any special data handling requirements will be confirmed by message from DICE.

1.2.7 On three-station passes and on some two-station passes which include GTS, Mode 32 will be received on a floor printer immediately after fade of the first station.

1.2.8 SPUT runs will not be terminated until they are completed. In the event of a SPUT conflict with a station pass, the SPUT run will continue. The TA will obtain the real time TM printout from Analysis. The Analysis section will use six-ply paper in their printer at all times.

1.2.9 If the SP-1 or the V-option is requested it will be sent by postpass TWX as soon as possible. If both are requested, the V-option will be sent without waiting for the SP-1.

1.2.10 When stations are directed to fade the T&C, the PRELORT will go passive without further direction.

1.2.11 If the Datafax is inoperable, report SP-11 by voice and SP-9 by TWX postpass.

REV.	STA.	ACQ. GMT	EL. DEG	DUR SEC	TM MODES PASS	SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
28.0	GUAM	1214	7.	393	34 32	SP2,9	3P A/S MSG
28.3	POGO	1237	1.	158			DELETE
28	PEG	1220		(90)		U L R W	
28	160A	1250		(40)	S-32G4		
29.0	GUAM	1342	10.	442	31/30 32		3P B/U LD
29.3	POGO	1405	7.	323			DELETE
29	PEG	1350		(110)		L R W G32	
29	160A	1420		(40)	S-32G4		
30.3	POGO	1534	27.	389			DELETE
30.4	BOSS	1543	63.	357	34 32/37	V	3P,VEXP
30	PEG	1540		(90)		L W R H W	
30	160A	1610		(40)	S-32P4		
31.3	POGO	1703	36.	392	30/31/33 32	SP2,11	3P,Z26/21
31	PEG	1710		(90)		L R Z W	
32.3	POGO	1832	11.	357	34 32	SP11	3P A/S MSG
32.4	COOK	1844	22.	343	34	V,SP2	B/U LDG
32	PEG	1840		(90)		U L R W	
32	160A	1910		(40)	S-32P4		
33.3	POGO	2001	6.	314	33/30 32		3P
33.3	KODI	2008	3.	250			DELETE
33	PEG	2010		(80)		L R W G36	
33	160A	2040		(40)	S-32P4		
34.3	POGO	2129	5.	303			PASS. DELETE
34.3	KODI	2136	29.	363	31/30 32	V,SP11	3P
34.4	HULA	2146	12.	323			PASS. DELETE
34	PEG	2130		(90)		L W R H W D50	
34	160A	2200		(40)	S-32K4		

REV.	STA.	ACQ. GMT	EL. DEG	DUR SEC	TM MODES PASS	SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
35.2	POGO	2257	8.	341	30/31/33	32/36 SP2	3P,726/21
35	PEG	2300		(90)		L R W	
35	160A	2330		(40)	S-32P4		
36.2	POGO	0025	16.	396	34 32	V,SP11	3P A/S MSG
36.5	GUAM	0047	10.	320		SP2	B/U LDG
36	PEG	0030		(90)		U L R W G39	
36	160A	0100		(40)	S-32P4		
37.2	POGO	0153	59.	431	31/30 32		3P
37	PEG	0200		(80)		L W R W	
37	160A	0230		(40)	S-32P4		
38.1	BOSS	0313	80.	483	30/31/33	32/37 SP2,9	3P,VEXP Z26/21
38.2	POGO	0322	23.	420			DELETE
38	PEG	0320		(90)		L R H W	
	**	0350				PROFILE UPDATE	
38	160A	0350		(40)	S-32B4		
39.1	BOSS	0446	0.	91			DELETE
39.2	POGO	0452	7.	343	34/32	V,SP11	3P A/S MSG
39	PEG	0450		(90)		U L R W G42	
39	160A	0520		(40)	S-32P4		
40.1	COOK	0610	23.	469	31/30 32	V,SP2	3P,B/U LDG
40.2	POGO	0624	1.	160			DELETE
40	PEG	0620		(90)		L W R W	
40	160A	0650		(40)	S-32C4		
41.1	COOK	0741	3.	297			DELETE
41.2	KODI	0746	18.	426	30/31/33	32/37	3P,VEXP. 726/21
41	PEG	0750		(80)		L R W	
	**	0820		(120)		A-RUNS	
41	160A	0820		(40)	S-32K4		

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REV.	STA.	ACQ. GMT	EL. DEG	DUR SEC	TM MODES PASS		SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
42.1	HULA	0905	67.	508	34	32	V	3P A/S MSG
42.2	KODI	0915	15.	424	34		SP2,11	B/U LDG
42	PEG	0910		(180)			U L R H J W G45	
	**	0940		(360)			C1,3,4 T PP44.6	RB50 X44-132 E44.6
42	160A	0940		(40)	S-32H4			
44.0	GUAM	1204	3.	308	31/30	32/37		3P,VEXP.
44.3	POGO	1227	0.	100				DELETE
44	PEG	1210		(90)			L W R W	
44	160A	1240		(40)	S-32G4			
45.0	GUAM	1331	15.	467	34	32	V,SP2	3P A/S MSG
45.3	POGO	1355	6.	303				DELETE
45	PEG	1340		(110)			U L R W G48	
45	160A	1410		(40)	S-32G4			
46.3	POGO	1524	22.	378	31/30	32	SP11	3P,B/U LDG
46.4	BOSS	1532	28.	349				DELETE
46	PEG	1530		(90)			L W R H W	
46	160A	1600		(40)	S-32P4			
47.3	POGO	1653	43.	387	30/31/33	32/37	V,SP2	3P,VEXP. Z26/21
47	PEG	1700		(90)			L R Z W	
47	160A	1730		(40)	S-32P4			
48.3	POGO	1822	12.	353	34	32	SP2	3P A/S MSG
48.4	COOK	1833	12.	325	33			B/U LDG Z26/21
48	PEG	1830		(90)			U L R W	
48	160A	1900		(40)	S-32P4			
49.3	POGO	1950	6.	308	31/30	32	V,SP11	3P
49.3	KODI	1958	2.	194				DELETE
49	PEG	2000		(80)			L R W G52	
49	160A	2030		(40)	S-32P4			

REV.	STA.	ACQ. GMT	EL. DEG	DUR SEC	TM MODES PASS	SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
50.3	POGO	2118	5.	291			PPS.DELETE
50.3	KODI	2126	48.	364			PPS, DELETE
50.4	HULA	2135	24.	345	30/31/33	32/37 SP2	3P,726/21 VEXP.
50	PEG	2120		(90)		L W R H W D66	
50	160A	2150		(40)	S-32K4		
51.2	POGO	2246	7.	324	31/30	32/36 V	3P
51.3	KODI	2256	0.	79			DELETE
51	PEG	2250		(90)		L R W	
51	160A	2320		(40)	S-32P4		
52.2	POGO	0014	14.	380	34	32 SP2,11	3P A/S MSG
52.5	GUAM	0036	5.	280			DELETE
52	PEG	0020		(90)		U L R W G55	
52	160A	0050		(40)	S-32P4		
53.2	POGO	0142	47.	419	31/30	32 V,SP11	3P,B/U LDG
53	PEG	0150		(80)		L W R W	
53	160A	0220		(40)	S-32P4		
54.1	BOSS	0302	45.	467	30/31/33	32/37 SP2	3P,VEXP. 726/21
54.2	POGO	0311	26.	413			DELETE
54	PEG	0310		(90)		L R H W	
54	160A	0340		(40)	S-32B4		
55.1	BOSS	0434	1.	218			DELETE
55.2	POGO	0441	7.	344	34	32 SP11	3P,A/S MSG
55	PEG	0440		(80)		U L R W G58	
	**	0510				PROFILE UPDATE	
55	160A	0510		(40)	S-32P4		

REV.	STA.	ACQ. GMT	FL. DEG	DUR SEC	TM MODES PASS		SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
56.1	COOK	0559	14.	433	30/31/33	32	V,SP2	3P,B/U LDG Z26/21
56.2	POGO	0612	1.	169				DELETE
56	PEG	0600		(90)			L W R W	
56	160A	0630		(40)	S-32C4			
57.1	COOK	0729	5.	350				DELETE
57.2	KODI	0735	13.	398	31/30	32/37		3P,VEXP.
57	PEG	0730		(90)			L R W	
	**	0800		(120)			A-RUNS	
57	160A	0800		(40)	S-32K4			
58.1	HULA	0854	34.	487	34	32	V,SP2	3P A/S MSG
58.2	KODI	0903	19.	427	33		SP11	B/U LDG Z26/21
58	PEG	0900		(180)			U L R H J W G41	
	**	0930		(300)			C1,2,3,4 T PP40	77 RB66 E60-84
58	160A	0930		(40)	S-32H4			
60.0	GUAM	1154	0.	136	OJ	32	V	3P
60	PEG	1200		(90)			L W R W	
60	160A	1230		(40)	S-32G4			
61.0	GUAM	1320	23.	484	34	32	SP2,9	3P,A/S MSG
61.3	POGO	1343	4.	281	D			DELETE
61	PEG	1330		(110)			U L R W G64	
61	160A	1400		(40)	S-32G4			
62.3	POGO	1512	18.	366	31/30	32	V	3P,B/U LDG
62.4	ROSS	1521	15.	333				DELETE
62	PEG	1520		(90)			L W R H W	
62	160A	1550		(40)	S-32P4			

REV.	STA.	ACQ. GMT	EL. DEG	DUR SEC	TM MODES PASS	SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
63.3	POGO	1641	54.	382	30/31/33	32/37 SP2,11	3P,VEXP. 726/21
63.4	BOSS	1651	0.	91			DELETE
63	PEG	1650		(90)		L R Z W	
63	160A	1720		(40)	S-32P4		
64.3	POGO	1810	13.	351	34 32	V	3P A/S MSG
64.4	COOK	1821	7.	290			DELETE
64	PEG	1820		(80)		U L R W	
64	160A	1850		(40)	S-32P4		
65.3	POGO	1938	6.	303	31/30 32	SP2,11	3P,B/U LDG
65.3	KODI	1947	0.	87			DELETE
65.4	COOK	1951	1.	143			DELETE
65	PEG	1940		(90)		L R W G68	
65	160A	2010		(40)	S-32P4		
66.3	POGO	2107	4.	279			PAS. DELETE
66.3	KODI	2114	82.	362			PAS. DELETE
66.4	HULA	2122	77.	356	30/31/33	32/36/37 SP2	3P,VEXP. 726/21
66	PEG	2110		(90)		L W R H W D82	
66	160A	2140		(40)	S-32H4		
67.3	POGO	2234	6.	307	31/30 32	SP11	3P
67.3	KODI	2244	1.	166			DELETE
67	PEG	2240		(90)		L R W	
67	160A	2310		(40)	S-32P4		
68.2	POGO	0002	12.	364	34 32	SP2,V	3P A/S MSG
68.5	GUAM	0024	2.	199			DELETE
68	PEG	0010		(90)		U L R W G71	
68	160A	0040		(40)	S-32P4		

Approved for Release: 2024/01/30 C05099045

REV.	STA.	ACQ. GMT	EL. DEG	DUR SEC	TM MODES PASS	SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
69.2	POGO	0130	37.	407	31/30 32	SP11	3P,B/U LDG
69.5	GUAM	0153	1.	167			DELETE
69	PEG	0140		(80)		L W R W	
69	160A	0210		(40)	S-32P4		
70.1	BOSS	0250	25.	443	30/31/33 32/37	V.SP2	3P,VEXP. Z26/21
70.2	POGO	0259	30.	407			DELETE
70	PEG	0300		(90)		L R H W	
70	160A	0330		(40)	S-32B4		
71.1	BOSS	0421	3.	292			DELETE
71.2	POGO	0429	8.	345	34 32	SP11	3P A/S MSG
71	PEG	0430		(80)		U L R W G74	
	**	0500				PROFILE UPDATE	
71	160A	0500		(40)	S-32P4		
72.1	COOK	0547	9.	382	31/30 32	V.SP2	3P,B/U LDG
72.2	POGO	0600	1.	181			DELETE
72	PEG	0550		(90)		L W R W	
72	160A	0620		(40)	S-32C4		
73.1	COOK	0716	9.	391	31/30 32/37	V	3P,VEXP.
73.2	KODI	0723	9.	361			DELETE
73	PEG	0720		(90)		L R W	
	**	0750		(120)		A-RUNS	
73	160A	0750		(40)	S-32C4		
74.1	HULA	0842	18.	453	34 32	SP2	3P A/S MSG
74.2	KODI	0851	27.	428	33	SP11	B/U LDG Z26/21
74	PEG	0850		(90)		U L R H W G77	
	**	0920		(300)		C1,3,4 T PP77.9	RB83 X76-132 E76-1
74	160A	0920		(40)	S-32H4		

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REV.	STA.	ACQ. GMT	EL. DEG	DUR SEC	TM MODES PASS		SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
75.1	HULA	1012	1.	215	34	32		3P
75	PEG	1020		(170)			L R J W G77	
75	160A	1050		(40)	S-32H4			
77.0	GUAM	1307	43.	491	34	32		3P A/S MSG
77.3	POGO	1331	3.	253				DELETE
77	PEG	1310		(110)			U L W R W G80	
77	160A	1340		(40)	S-32G4			
78.3	POGO	1459	15.	353	31/30	32	V,SP11	3P,B/U LDG
78.4	BOSS	1508	8.	304				DELETE
78	PEG	1500		(90)			L W R H W	
78	160A	1530		(40)	S-32P4			
79.3	POGO	1628	73.	377	30/31/33	32/37	SP2	3P,VEXP. Z26/21
79.4	BOSS	1637	2.	210				DELETE
79	PEG	1630		(90)			L R Z W	
79	160A	1700		(40)	S-32P4			
80.3	POGO	1757	14.	350	34	32	SP11,V	3P A/S MSG
80.4	COOK	1809	3.	227				DELETE
80	PEG	1800		(90)			U L R W	
80	160A	1830		(40)	S-32P4			
81.3	POGO	1925	6.	300	31/30	32	SP2	3P,B/U LDG
81.4	COOK	1937	4.	244				DELETED
81	PEG	1930		(90)			L R W G84	
81	160A	2000		(40)	S-32P4			
82.3	POGO	2053	4.	269				PPS DEL
82.3	KODI	2100	36.	356	30/31/33	32/37	V,SP11	3P,VEXP. Z26/21
82.4	HULA	2109	27.	351				PPS DEL
82	PEG	2100		(90)			L W R H W D98	
82	160A	2130		(40)	S-32K4			

Approved for Release: 2024/01/30 C05099045

REV.	STA.	ACQ. GMT	EL. DEG	DUR SEC	TM MODES PASS	SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
83.3	POGO	2221	5.	290	34 32/36		3P
83.3	KODI	2230	3.	223			DELETE
83	PEG	2230		(80)		L R W	
83	160A	2300		(40)	S-32P4		
84.2	POGO	2349	10.	347	34 32	V,SP2	3P A/S MSG
84	PEG	2350		(90)		U L R W G87	
84	160A	0020		(40)	S-32P4		
85.2	POGO	0117	29.	394	31/30 32	SP11	3P,B/U LDG
85.5	GUAM	0139	5.	277			DELETE
85	PEG	0120		(80)		L W R W	
85	160A	0150		(40)	S-32P4		
86.1	BOSS	0237	14.	407	30/31/33 32/37	V,SP2	3P,VEXP. Z26/21
86.2	POGO	0245	37.	402			DELETE
86	PEG	0240		(90)		L R H W	
86	160A	0310		(40)	S-32B4		
87.1	BOSS	0406	6.	346	34 32		3P A/S MSG
87.2	POGO	0415	9.	348	33	SP11	B/U LDG Z26/21
87	PEG	0410		(90)		U L R W G90	
	**	0440				PROFILE UPDATE	
87	160A	0440		(40)	S-32B4		
88.1	COOK	0534	4.	301	31/30 32	V,SP2	3P
88.2	POGO	0546	1.	198			DELETED
88	PEG	0540		(90)		L W R W	
88	160A	0610		(40)	S-32C4		
89.1	COOK	0702	14.	420	30/31/33 32/37	V	3P,VEXP. Z26/21
89.2	KODI	0709	5.	313			DELETED
89	PEG	0710		(80)		L R W	
	**	0740		(120)		A-RUNS	
89	160A	0740		(40)	S-32C4		

REV.	STA.	ACQ. GMT	EL. DEG	DUR SEC	TM MODES PASS	SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
90.1	HULA	0828	10.	396			DELETED
90.2	KODI	0837	45.	425	34 32	SP2	3P A/S MSG
90	PEG	0830		(90)		U L R H J W Ge3	
	**	0900		(300)		C1,3,4 T PP93.1	9 BH99 E91-116
90	160A	0900		(40)	S-32K4		
91.1	HULA	0957	4.	325	31/30 32	V,SP9	3P,B/U LDG
91.2	KODI	1008	0.	142			DELETED
91	PEG	1000		(180)		L R J W G93	
91	160A	1030		(40)	S-32H4		
93.0	GUAM	1253	75.	484	34 32	SP2	3P A/S MSG
93.3	POGO	1316	2.	221			DELETE
93	PEG	1300		(110)		U L W R W	
93	160A	1330		(40)	S-32G4		
94.3	POGO	1445	12.	338	31/30 32	V,SP11	3P B/U LDG
94.4	BOSS	1454	4.	250			DELETE
94	PEG	1450		(90)		L R H W G97	
94	160A	1520		(40)	S-32P4		
95.3	POGO	1614	78.	371	30/31/33 32/37	SP2	3P,VEXP. 726/21
95.4	BOSS	1622	6.	276			DELETE
95	PEG	1620		(90)		L W R Z W	
95	160A	1650		(40)	S-32P4		
96.3	POGO	1742	16.	350	31/30 32	V,SP11	3P
96.4	COOK	1756	0.	55			DELETE
96	PEG	1750		(90)		L R W	
96	160A	1820		(40)	S-32P4		

Approved for Release: 2024/01/30 C05099045

REV.	STA.	ACQ. GMT	EL. DEG	DUR SEC	TM MODES PASS		SP. IAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
97.3	POGO	1911	6.	300	34	32	SP2	3P,A/S MSG
97.4	COOK	1922	8.	304	33		V	B/U LDG Z26/21
97	PEG	1920		(170)			U L R W G100	
97	160A	1950		(40)	S-32P4			
98.3	POGO	2207	4.	261				PAS, DELETE
98.3	KODI	2046	18.	342	31/30	32/37		VEXP, 3P
98.4	HULA	2055	11.	325				PAS, DELETE
98	PEG	2210		(00)			L W R H W D114,	15
98	160A	2240		(40)	S-32K4			
99.3	POGO	2207	4.	274	34	32/36	SP11	3P
99.3	KODI	2215	5.	268	31/30		V	
99	PEG	2210		(90)			L R W	
99	160A	2240		(40)	S-32P4			
100.2	POGO	2334	8.	329	34	32	SP2	3P A/S MSG
100	PEG	2340		(90)			U L R W G103	
100	160A	0010		(40)	S-32P4			
101.2	POGO	0102	23.	380				DELETED
101.5	GUAM	0123	13.	338	31/30	32	SP9	3P B/U LDG
101	PEG	0110		(80)			L W R W	
101	160A	0140		(40)	S-32G4			
102.1	BOSS	0223	8.	353				DELETE
102.2	POGO	0230	50.	395	30/31/33	32/37	V,SP2	3P,VEXP,(PD,PU) Z26
102	PEG	0230		(90)			L R H W	
102	160A	0300		(40)	S-32P4			
103.1	BOSS	0351	10.	383	34	32		3P A/S MSG
103.2	POGO	0400	10.	351	33		SP11	B/U LDG Z26/21
103	PEG	0400		(90)			U L R W G106	
	**	0430					PROFILE UPDATE	
103	160A	0430		(40)	S-32B4			

REV.	STA.	ACQ. GMT	FL. DEG	DUR SEC	TM MODES PASS	SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
104.1	COOK	0521	0.	143			DELETE
104.2	POGO	0530	2.	217			DELETE
104	PEG	0530		(80)		U L R W G106	
105.1	COOK	0647	27.	436	30/31/33	32/37 V,SP2	3P,VEXP,(45DEG YAW)
105.2	KODI	0655	3.	245			DELETE
105	PEG	0650		(90)		L W R W	
	**	0720		(120)		A-RUNS	
105	160A	0720		(40)	S-32C4		
106.1	HULA	0814	4.	298			DELETE
106.2	KODI	0821	88.	417	34 32	SP11	3P A/S MSG
106	PEG	0820		(90)		U L R H J W G10	
	**	0850		(300)		C1,3,4 T PP10e-	2P BB115 E107-133
106	160A	0850		(40)	S-32K4		
107.1	HULA	0942	9.	391	30/31/33	32 V,SP2	3P,B/U LDG Z26/21
107.2	KODI	0952	2.	232			DELETE
107	PEG	0950		(170)		L W R W	
107	160A	1020		(40)	S-32H4		
109.0	GUAM	1237	27.	457	34 32	SP9	3P A/S MSG
109.3	POGO	1301	1.	178			DELETE
109	PEG	1240		(110)		U L R W G112	
109	160A	1310		(40)	S-32G4		
110.3	POGO	1429	9.	321	31/30	32 SP2,11	3P,B/U LDG
110.4	ROSS	1439	1.	136			DELETE
110	PEG	1430		(90)		L W R H W	
110	160A	1500		(40)	S-32P4		

Approved for Release: 2024/01/30 C05099045

REV.	STA.	ACQ. GMT	EL. DEG	DUR SEC	TM MODES PASS	SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
111.3	POGO	1558	51.	365	30/31/33 32/37	V	3P,VEXP, Z26/21
111.4	BOSS	1606	12.	321			DELETE
111	PEG	1600		(90)		L R Z W	
111	160A	1630		(40)	S-32P4		
112.3	POGO	1727	19.	351	34 32	SP2.11	3P A/S MSG
112	PEG	1730		(90)		U L R W G115	
112	160A	1800		(40)	S-32P4		
113.3	POGO	1855	7.	302			DELETE
113.4	COOK	1906	20.	341	31/30 32	V	3P,B/U LDG
113	PEG	1900		(90)		L W R W	
113	160A	1930		(40)	S-32C4		
114.3	POGO	2023	4.	256			P&S,DELETE
114.3	KODI	2030	10.	319	30/31/33 32	SP11	3P
114.4	HULA	2039	4.	259			P&S,DELETE
114	PEG	2030		(90)		L R H W D131	
114	160A	2100		(40)	S-32K4		
115.3	POGO	2151	4.	258			P&S,DELETE
115.3	KODI	2159	8.	304	34 32/36	SP2	3P A/S MSG
115.4	HULA	2209	0.	126			DELETE
115	PEG	2200		(80)		U L R W	
115	160A	2230		(40)	S-32K4		
116.2	POGO	2318	7.	310	30/31/33 32	V.SP2	3P,B/U LDG Z26/21
116	PEG	2320		(90)		L R W G119	
116	160A	2350		(40)	S-32P4		
117.2	POGO	0046	18.	366			DELETE
117.5	GUAM	0107	45.	368	31/30 32		3P
117	PEG	0050		(80)		L W R W	
117	160A	0120		(40)	S-32G4		

REV.	STA.	ACQ. GMT	FL. DEG	DUR SEC	TM MODES PASS	SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
118.1	BOSS	0207	3.	266			DELETE
118.2	POGO	0214	72.	388	30/31/33 32/37	SP2	3P,VEXP. 726/21
118	PEG	0210		(90)		L R H W	
118	160A	0240		(40)	S-32P4		
119.1	BOSS	0334	19.	406	34 32	V	3P A/S MSG
119.2	POGO	0343	12.	355	31/30	SP2,11	R/U LDG
119	PEG	0340		(100)		U L R W G122	
	**	0410				PROFILE UPDATE	
119	160A	0410		(40)	S-32B4		
120.2	POGO	0513	3.	237	34 32		3P
120	PEG	0520		(80)		L W R W	
120	160A	0550		(40)	S-32P4		
121.1	COOK	0630	72.	436	30/31/33 32	V,SP2	3P 726/21
121.2	KODI	0639	0.	123			DELETE
121	PEG	0640		(90)		L R W	
122.2	KODI	0805	38.	402	34 32	SP11	3P A/S MSG
122	PEG	0810		(80)		U L R H W	
	**	0840		(120)		A-RUNS	
123.1	HULA	0925	19.	428	34 32	V,SP2	3P R/U LDG
123.2	KODI	0935	4.	292	30/31		SW CHECK
123	PEG	0930		(180)		L R J W G126.	
	**	1000		(300)		C1,3,4 T PP125-	44 RB131 F124-133
125.0	GUAM	1221	11.	400	30/31/33 32	SP9	3P,VEXP. (RECORDED)
125.3	POGO	1245	0.	117			DELETE
125	PEG	1230		(90)		L W R W	

REV.	STA.	ACQ. GMT	EL. DEG	DUR SEC	TM MODES PASS		SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
126.0	GUAM	1351	1.	217				DELETE
126.3	POGO	1412	7.	300	34	32		3P, A/S MSG
126	PEG	1400		(110)			U L R H W G12e	
127.3	POGO	1541	33.	358	31	32	SP. DATAFAX	3P B/U LDG
127.4	BOSS	1549	29.	347				
127	PEG	1550		(80)			L W R W	
128.3	POGO	1709	24.	353	30/31/33	32		3P, Z26/21
128	PEG	1710		(90)			L R W	
129.3	POGO	1838	8.	307	34		SP2,12	YAW (DARK)
129.4	COOK	1849	88.	356	33	31		A/S MSG (SW LOAD,P.
129	PEG	1840		(90)			U L R Z W	
130.3	POGO	2006	4.	255	37	32	SP2,12	
130.3	KODI	2013	6.	279	34			B/U LDG, DISC.
130.4	HULA	2024	0.	35				DELETE
130	PEG	2010		(90)			L R H W	
131.3	POGO	2134	3.	245	34	31	SP2,12	
131.3	KODI	2141	15.	331	35	37	SP2	SEP
131.4	HULA	2150	5.	279	31		SP2	P.U
131	PEG	2140		(90)			L R W	
132.2	POGO	2301	6.	291	30/31	37	SEQ F	OPV DEBOOST
132	PEG	2310		(80)			L R W	
133.2	POGO	0028	14.	350				
133.5	GUAM	0050	28.	367				
133	PEG	0030		(90)			L R W	
134.1	BOSS	0152	0.	33				
134.2	POGO	0156	73.	380				
134	PEG	0200		(80)			H	

REV.	STA.	ACQ. GMT	FL. DEG	DUR SEC	TM MODES PASS	SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
135.1	ROSS	0317	44.	414			
135.2	POGO	0325	15.	358			
135	PEG	0320		(100)		H	
136.2	POGO	0455	3.	257			
136	PEG	0500		(80)		H	
137.1	COOK	0612	32.	416			
137	PEG	0620		(90)		H	
138.2	KODI	0747	19.	376			
138	PEG	0750		(80)		H	
139.1	HULA	0906	57.	439			
139.2	KODI	0916	8.	333			
139	PEG	0910		(180)		H	
141.0	GUAM	1204	4.	286			
141	PEG	1210		(90)		H	
142.0	GUAM	1331	7.	349			
142.3	POGO	1354	5.	274			
142	PEG	1340		(110)		H	
143.3	POGO	1522	22.	349			
143.4	BOSS	1531	54.	353			
143	PEG	1530		(90)		H	
144.3	POGO	1651	33.	354			
144	PEG	1700		(80)		H	
145.3	POGO	1819	9.	313			
145.4	COOK	1830	19.	344			
145	PEG	1820		(90)		H	

Approved for Release: 2024/01/30 C05099045

REV.	STA.	ACQ. GMT	FL. DEG	DUR SEC	TM MODES PASS	SPECIAL TM P/P	FLT. PROFILE EVENTS AND REMARKS
146.3	POGO	1947	4.	257			
146.3	KODI	1955	2.	207			
146	PEG	1950		(90)		H	
147.3	POGO	2115	3.	234			
147.3	KODI	2122	32.	347			
147.4	HULA	2131	17.	347			
147	PEG	2120		(90)		H	
148.2	POGO	2242	5.	271			
148	PEG	2250		(90)		H	
149.2	POGO	0010	11.	332			
149.5	GUAM	0031	8.	323			
149	PEG	0020		(80)		H	
150.2	POGO	0137	45.	371			

ANNEX E.

4. TELEMETRY

4.1 Telemetry Real-Time Voice Reports and PP TTY Messages - Vandenberg Tracking Station (Launch and Ascent)

Meas. No.	Location L-Ch-Pos	Event Measurement		Real Time Voice	PP TTY Msg
-	2-16-06	Secure Word Count			4
-	2-16-07	Secure Word Count			4
-	2-16-08	Secure Word Count			4
-	2-16-09	Secure Word Count			4
-	2-16-10	Secure Word Count			4
-	2-16-11	Secure Word Count			4
-	2-16-12	Secure Word Count			4
-	-	Liftoff Tone (2 in)		1	1
-	-	BECO	(SLV-3 TM)	1	1
-	-	SLV-3 Separation	(SLV-3 TM)	1	1
-	-	SECO	(SLV-3 TM)	1	1
-	-	VECO	(SLV-3 TM)	1	1
-	-	S-01B/SLV-3 Sep	(SLV-3 TM)	1	1
	2-18-000	OCV Vehicle Clock (Vehicle Clock vs Grd System Time)		3	3
B035	1-1-000	Turbine Speed			2
B091	1-15-04	S-01B Ignition-Combustion			
or	(1-15-34)	Chamber Pressure No. 3		1	1
C001	1-16-40	+28v dc Unregulated Supply		2	2
C004	1-16-13	+28v dc Current Monitor			2

NOTES:

1. Report system time of event.
2. Report percent bandwidth once during ascent.
3. Report simultaneous clock readings during ascent.
4. Read percent BW prior to liftoff (OCV TM in orbit mode).

4.2 Remote SCF Station Telemetry Readouts

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report
Group A:			
2-15-04	GFE 1-28		1
2-15-06	Temp S-Band Beacon	1	1
2-15-07	S-Band Beacon Inter.	1	1
2-15-08	S-Band Beacon Transmit	1	1
2-15-18	Voltage BUSS/Sep B/U Battery		1
2-15-20	Current Op Batt No. 1		1
2-15-21	Current Op Batt No. 2		1
2-15-22	Current Op Batt No. 3		1
2-15-23	Current Op Batt No. 4		1
2-15-24	Current Op Batt No. 5		1
2-16-13	Delay Line 1 and 2 Full	1	
2-16-14	Delay Line 3 and 4 Full	1	
2-16-17	Temp Cold Gas Tank		1
2-16-18	Temp Cold Gas Tank		1
2-16-19	Amp Hr Meter Total		1
2-16-20	Amp Hr Meter Total		1
2-16-21	Amp Hr Meter Total		1
2-16-26	Voltage OCV Battery	1	1
2-16-27	Press Att. Cont Stor Tank	1	1
2-16-28	Press Sw, Cold Gas Manifold		1
2-15-01	Current Op Batt #6		1
2-15-02	Current Op Batt #7		1
2-15-13	Current Op Batt #8		1

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report
Group B:			
3-13-01	P Axis Magnetometer		2
3-13-02	Q Axis Magnetometer		2
3-13-03	R Axis Magnetometer		2
3-13-06	Mode and Event Monitor	1	1
3-13-08	Power Monitor		1
3-13-10	Event Monitor	1	1
3-13-12	Command Monitor - BUSS	1	1
3-13-13	Command Monitor - Prime Sys.	1	1
3-13-16	Gas Pressure (BUSS)	1	1
3-13-18	Voltage Monitor		1
3-13-19	Temp. Magnetometer Electronics		1
3-13-20	Aux. Timer Temp.		1
3-13-21	Temp F/C Electronics		1
3-13-22	Gas Temp (BUSS)	1	1

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report
Special Group SP-1:			
2-18-00	Vehicle Clock		4
Special Group SP-2:			
3-14-00	L. H. Pre-Amp.	5	
3-16-00	R. H. Pre-Amp.	5	
Special Group SP-2P			
3P-11-00	L. H. Pre-Amp		6
3P-12-00	R. H. Pre-Amp		6

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report
Special Group SP-3:			
2-16-06	Secure Word Ct 1 LSD		1
2-16-07	Secure Word Ct 2		1
2-16-08	Secure Word Ct 3		1
2-16-09	Secure Word Ct 4		1
2-16-10	Secure Word Ct 5		1
2-16-11	Secure Word Ct 6		1
2-16-12	Secure Word Ct 7 MSD		1
Special Group SP-4:			
2-14-06	Roll Rate Gyro (Coarse)		2
2-14-07	Roll Att Error ACA		2
2-14-08	Pitch Att Error ACA		2
2-14-09	Yaw Att Error ACA		2
2-14-23	Roll IR Computer Output		2
2-14-24	Pitch IR Computer Output		2
2-14-26	Pitch Rate Gyro (Coarse)		2
2-14-27	Inhibit		2
2-14-28	Yaw Rate Gyro (Coarse)		2
2-07-00	Roll Rate Gyro (Fine)		2
2-08-00	Pitch Rate Gyro (Fine)		2
2-09-00	Yaw Rate Gyro (Fine)		2
Special Group SP-5:			
2-16-22	Temp Oxidizer Int		1
2-16-23	Temp Fuel Int		1
2-12-21	Pressure Oxidizer (OCV)		1
2-12-22	Pressure Fuel (OCV)		1
2-15-19	Pressure N_2 Reg Inlet		1

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report
Special Group SP-6:			
2-12-28	Computer Phase	1	1
3-13-27	Antenna/Magnetometer Erection	1	1
Special Group SP-7:			
2-12-06	GFE 1-11		1
2-12-10	GFE 2-15		1
2-12-11	GFE 1-18		1
2-15-09	GFE 1-26		1
2-15-17	GFE 2-2		1
2-14-01	GFE 1-13		1
2-14-02	GFE 1-14		1
2-14-03	GFE 1-19		1
2-14-10	GFE 1-25		1
2-14-14	GFE 1-3		1
2-14-16	GFE 1-12		1
2-14-17	GFE 1-17		1
2-14-18	GFE 1-16		1
2-14-19	GFE 1-20		1
2-14-20	GFE 1-27		1

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report

Special Group SP-8: Note: If SP-8 is requested, read in following order of priority unless otherwise directed.

2-16-27	Press. Att. Cont. Storage Tank	1	
2-07-00	Gyro Roll Rate - Fine	1	
2-08-00	Gyro Pitch Rate - Fine	1	
2-09-00	Gyro Yaw Rate - Fine	1	
2-12-19	Yaw Torque on	1	
2-14-27	Inhibit	1	

Special Group SP-9:

This group is comprised of the following points of Channel 10, Link 2. All points are to be read once near fade and reported by post pass TM summary.

8 - 10 incl.	44
15 - 17 incl.	45
20	62
22 - 25 incl.	66
31	70
35	73
36	76
43	79 - 84 incl.

Special Group SP-10:

2-15-20	Curr. Op. Batt. #1	1
2-15-21	Curr. Op. Batt. #2	1
2-15-22	Curr. Op. Batt. #3	1
2-15-23	Curr. Op. Batt. #4	1
2-15-24	Curr. Op. Batt. #5	1
2-15-01	Curr. Op. Batt. #6	1
2-15-02	Curr. Op. Batt. #7	1
2-15-13	Curr. Op. Batt. #8	1
2-15-14	Curr. Stab. S/S	1
2-15-27	Curr. Command S/S	1
2-16-16	Curr. BUSS/Sep B/U Batt.	1

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report

Special Group SP-11:

This group is comprised of Link 2, Channel 10. Requirement is for one frame of the Channel 10 wavetrain, taken near midpass, for datafax transmission.

Special Group SP-12:

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report
2-15-11	"P" Axis Magnetometer		
2-15-12	"Q" Axis Magnetometer	1	
2-15-26	"R" Axis Magnetometer		

Special Group SP-13:

Location L-Ch-Pos	Measurement Name	Voice RT	TM Data Report
2-10-11	Voltage Gyro 400 Cycle		
2-10-13	DCPS (Q4 Peak Detector)		
2-10-14	DCPS +26.5 VDC		1
2-10-21	TARS Gyro Wheel Power		
2-10-67	DCPS (Q3 Temp)		
2-10-68	DCPS (Q4 Temp)		
2-10-69	DCPS -24.5 VDC		
2-10-70	DCPS Voltage Input		

Notes:

1. Report percent bandwidth once during a pass, near fade.
2. Report maximum and minimum values during pass in percent bandwidth with system time.
3. Report at acquisition, midpass, and fade with system time.
4. Report per Paragraph 8.2.2 or 8.2.3, Annex D.5, as directed.
5. Report by voice as soon as possible after acquisition. Estimate values to 10%. TTY report to follow in accordance with Paragraph 8.2.1, Annex D.5.
6. Send report by datafax.

MODE 30 (All Stations)

Location L-Ch-Pos	Measurement
2-15-05	10% Calibration
2-15-15	50% Calibration
2-15-25	90% Calibration
2-15-03	22-VDC Monitor
2-15-04	GFE 1-28
2-15-06	Temp. S-Band Beacon
2-15-07	S-Band Beacon Interr.
2-15-08	S-Band Beacon Trans.
2-15-09	GFE 1-26
2-15-11	"P" Axis Magnetometer
2-15-12	"Q" Axis Magnetometer
2-15-17	GFE 2-2
2-15-18	Volt. BUSS/Sep B/U Batt
2-15-19	Press. N_2 Reg. Inlet
2-15-20	Curr. Op. Batt. #1
2-15-21	Curr. Op. Batt. #2
2-15-22	Curr. Op. Batt. #3
2-15-23	Curr. Op. Batt. #4
2-15-24	Curr. Op. Batt. #5
2-15-26	"R" Axis Magnetometer
2-16-05	10% Calibration
2-16-15	50% Calibration
2-16-25	90% Calibration
2-15-01	Curr #6 Batt
2-15-02	Curr #7 Batt
2-15-13	Curr #8 Batt
2-15-14	Curr Stab S/S
2-15-27	Curr Command S/S

Location L-Ch-Pos	Measurement
2-16-01	Roll Demod. Error
2-16-02	Pitch Demod. Error
2-16-03	Yaw Demod. Error
2-16-04	Continuity Loop
2-16-06	Secure Word Count 1 (LSD)
2-16-07	Secure Word Count 2
2-16-08	Secure Word Count 3
2-16-09	Secure Word Count 4
2-16-10	Secure Word Count 5
2-16-11	Secure Word Count 6
2-16-12	Secure Word Count 7 (Most)
2-16-13	Delay Line 1 and/or 2 Full
2-16-14	Delay Line 3 and/or 4 Full
2-16-16	Curr BUSS/Sep B/U Batt
2-16-17	Temp. Cold Gas Tank
2-16-18	Temp. Cold Gas Tank
2-16-19	Amp. Hr. Meter Total
2-16-20	Amp. Hr. Meter Total
2-16-21	Amp. Hr. Meter Total
2-16-22	Temp. OCV Oxidizer
2-16-23	Temp. OCV Fuel
2-16-24	C.D. Voltage Monitor
2-16-26	Voltage OCV Battery
2-16-27	Press. A/C Tank
2-16-28	Press. Sw., Cold Gas
2-06-00	C.D. Busy
2-07-00	Gyro Roll Rate - Fine
2-08-00	Gyro Pitch Rate - Fine
2-09-00	Gyro Yaw Rate - Fine
2-11-00	Delay Line Erase
2-13-00	Curr. Op. Batt. Total

MODE 31 (All Stations)

Location L-Ch-Pos	Measurement
2-12-05	10% Calibration
2-12-15	50% Calibration
2-12-25	90% Calibration
2-12-01	Piggyback No. 1
2-12-02	GFE 1-29
2-12-03	GFE 1-21
2-12-06	GFE 1-11
2-12-07	Recorder Counter (LSD)
2-12-08	GFE 1-22
2-12-10	GFE 2-15
2-12-11	GFE 1-18
2-12-12	GFE 1-23
2-12-14	Recorder Counter
2-12-16	Temperature, Recovery Battery
2-12-19	Yaw Torque ON
2-12-20	Recorder Counter (MSD)
2-12-21	Press., OCV Oxidizer
2-12-22	Press., OCV Fuel
2-12-23	Temp., Stagnation Point
2-12-26	Yaw Error Monitor (P77)
2-12-27	Computer Events
2-12-28	Computer Phase
2-14-05	10% Calibration
2-14-15	50% Calibration
2-14-25	90% Calibration

Location L-Ch-Pos	Measurement
2-14-01	GFE 1-13
2-14-02	GFE 1-14
2-14-03	GFE 1-19
2-14-04	Piggyback No. 2
2-14-06	Gyro Roll Rate Coarse
2-14-07	Roll Attitude Error ACA
2-14-08	Pitch Attitude Error ACA
2-14-09	Yaw Attitude Error ACA
2-14-10	GFE 1-25
2-14-11	Roll ACA Output
2-14-12	Pitch ACA Output
2-14-13	Yaw ACA Output
2-14-14	GFE 1-3
2-14-16	GFE 1-12
2-14-17	GFE 1-17
2-14-18	GFE 1-16
2-14-19	GFE 1-20
2-14-20	GFE 1-27
2-14-21	Roll Torque Motor Volts
2-14-22	Pitch Torque Motor Volts
2-14-23	Roll IR Computer
2-14-24.	Pitch IR Computer
2-14-26	Gyro Pitch Rate - Coarse
2-14-27	Inhibit Transfer
2-14-28	Gyro Yaw Rate - Coarse
2-06-00	C. D. Busy
2-07-00	Gyro Roll Rate - Fine
2-08-00	Gyro Pitch Rate - Fine
2-09-00	Gyro Yaw Rate - Fine
2-11-00	Delay Line Erase
2-13-00	Curr. Op. Batt. Total

MODE 32 (All Stations)

Location L-Ch-Pos	Measurement
3-12-05	10% Calibration
3-12-15	50% Calibration
3-12-25	90% Calibration
3-12-01	Piggyback No. 1
3-12-02	GFE 1-29
3-12-03	GFE 1-21
3-12-06	GFE 1-11
3-12-07	Recorder Counter (LSD)
3-12-08	GFE 1-22
3-12-10	GFE 2-15
3-12-11	GFE 1-18
3-12-12	GFE 1-23
3-12-14	Recorder Counter
3-12-16	Temperature, Recovery Battery
3-12-19	Yaw Torque ON
3-12-20	Recorder Counter (MSD)
3-12-21	Press., OCV Oxidizer
3-12-22	Press., OCV Fuel
3-12-23	Temp., Stagnation Point
3-12-26	Yaw Error Monitor (P77)
3-12-27	Computer Events
3-12-28	Computer Phase
3-14-05	10% Calibration
3-14-15	50% Calibration
3-14-25	90% Calibration

Location L-Ch-Pos	Measurement
3-14-01	GFE 1-13
3-14-02	GFE 1-14
3-14-03	GFE 1-19
3-14-04	Piggyback No. 2
3-14-06	Gyro Roll Rate Coarse
3-14-07	Roll Attitude Error ACA
3-14-08	Pitch Attitude Error ACA
3-14-09	Yaw Attitude Error ACA
3-14-10	GFE 1-25
3-14-11	Roll ACA Output
3-14-12	Pitch ACA Output
3-14-13	Yaw ACA Output
3-14-14	GFE 1-3
3-14-16	GFE 1-12
3-14-17	GFE 1-17
3-14-18	GFE 1-16
3-14-19	GFE 1-20
3-14-20	GFE 1-27
3-14-21	Roll Torque Motor Volts
3-14-22	Pitch Torque Motor Volts
3-14-23	Roll IR Computer
3-14-24	Pitch IR Computer
3-14-26	Gyro Pitch Rate
3-14-27	Inhibit Transfer
3-14-28	Gyro Yaw Rate - Coarse
3-06-00	C. D. Busy
3-07-00	Gyro Roll Rate - Fine
3-08-00	Gyro Pitch Rate - Fine
3-09-00	Gyro Yaw Rate - Fine
3-11-00	L. H. Preamp/Batt. Current

MODE 33 (All Stations)

Location L-Ch-Pos	Measurement
3-13-05	10% Calibration
3-13-15	50% Calibration
3-13-25	90% Calibration
3-13-01	"P" Axis Magnetometer
3-13-02	"Q" Axis Magnetometer
3-13-03	"R" Axis Magnetometer
3-13-04	Selective Address Monitor
3-13-06	Mode and Event Monitor
3-13-07	Separation Monitor #6
3-13-08	Power Monitor
3-13-10	Event Monitor
3-13-11	Separation Monitor #4
3-13-12	Secure Cmd. Monitor-BUSS
3-13-13	Secure Cmd. Monitor-PPD
3-13-14	Separation Monitor #5
3-13-16	Press, BUSS Gas
3-13-17	Separation Monitor #7
3-13-18	Voltage Monitor
3-13-19	Temp, Magnetometer Elec
3-13-20	Temp, Auxiliary Timer
3-13-21	Temp, F/C Electx.
3-13-22	Temp, BUSS Gas
3-13-23	Separation Monitor #2
3-13-27	Antenna/Magnetometer Erection
2-16-05	10% Calibration
2-16-15	50% Calibration
2-16-25	90% Calibration
2-16-01	Roll Demod. Error
2-16-02	Pitch Demod. Error

Location L-Ch-Pos	Measurement
2-16-03	Yaw Demod. Error
2-16-04	Continuity Loop
2-16-06	Secure Word Count 1(LSD)
2-16-07	Secure Word Count 2
2-16-08	Secure Word Count 3
2-16-09	Secure Word Count 4
2-16-10	Secure Word Count 5
2-16-11	Secure Word Count 6
2-16-12	Secure Word Count 7 (MOST)
2-16-13	Delay Line 1 and/or 2 FULL
2-16-14	Delay Line 3 and/or 4 FULL
2-16-16	Curr BUSS/Sep B/U Batt
2-16-17	Temp, Cold Gas Tank
2-16-18	Temp, Cold Gas Tank
2-16-19	Amp. Hr. Meter Total
2-16-20	Amp. Hr. Meter Total
2-16-21	Amp. Hr. Meter Total
2-16-22	Temp, OCV Oxidizer
2-16-23	Temp, OCV Fuel
2-16-24	C.D. Voltage Monitor
2-16-26	Voltage OCV Battery
2-16-27	Press. A/C Tank
2-16-28	Press. Sw. Cold Gas
2-06-00	C.D. Busy
2-07-00	Gyro Roll Rate-Fine
2-08-00	Gyro Pitch Rate-Fine
2-09-00	Gyro Yaw Rate-Fine
2-11-00	Delay Line Erase
2-13-00	Curr. Op. Batt. Total

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MODE 34 (All Stations)

Location L-Ch-Pos	Measurement
2-12-15	50% Calibration
2-12-01	Piggyback No. 1
2-12-06	GFE 1-11
2-12-10	GFE 2-15
2-12-21	Press, OCV Oxidizer
2-12-22	Press, OCV Fuel
2-12-27	Computer Events
2-14-15	50% Calibration
2-14-01	GFE 1-13
2-14-02	GFE 1-14
2-14-06	Gyro Roll Rate Coarse
2-14-07	Roll Attitude Error ACA
2-14-08	Pitch Attitude Error ACA
2-14-09	Yaw Attitude Error ACA
2-14-10	GFE 1-25
2-14-11	Roll ACA Output
2-14-12	Pitch ACA Output
2-14-13	Yaw ACA Output
2-14-14	GFE 1-3
2-14-16	GFE 1-12
2-14-17	GFE 1-17
2-14-18	GFE 1-16
2-14-19	GFE 1-20
2-14-21	Roll Torque Motor Volts
2-14-22	Pitch Torque Motor Volts
2-14-23	Roll IR Computer
2-14-24	Pitch IR Computer
2-14-26	Gyro Pitch Rate Coarse
2-14-27	Inhibit Transfer
2-14-28	Gyro Yaw Rate Coarse
2-15-05	10% Calibration
2-15-01	Curr #6 Batt
2-15-02	Curr #7 Batt
2-15-13	Curr #8 Batt

Location L-Ch-Pos	Measurement
2-15-20	Curr. Op. Batt. #1
2-15-21	Curr. Op. Batt. #2
2-15-22	Curr. Op. Batt. #3
2-15-23	Curr. Op. Batt. #4
2-15-24	Curr. Op. Batt. #5
2-16-15	50% Calibration
2-16-04	Continuity Loop
2-16-06	Secure Word Count 1 (Least)
2-16-07	Secure Word Count 2
2-16-08	Secure Word Count 3
2-16-09	Secure Word Count 4
2-16-10	Secure Word Count 5
2-16-11	Secure Word Count 6
2-16-12	Secure Word Count 7 (Most)
2-16-13	Delay Line 1 and/or 2 Full
2-16-14	Delay Line 3 and/or 4 Full
2-16-17	Temp, Cold Gas Tank
2-16-18	Temp, Cold Gas Tank
2-16-19	Amp. Hr. Meter Total
2-16-20	Amp. Hr. Meter Total
2-16-21	Amp. Hr. Meter Total
2-16-24	CD Voltage Monitor
2-16-26	Voltage OCV Battery
2-16-27	Press, A/C Tank
2-06-00	CD Busy
2-07-00	Gyro Roll Rate-Fine
2-08-00	Gyro Pitch Rate-Fine
2-09-00	Gyro Yaw Rate-Fine
2-11-00	Delay Line Erase
2-13-00	Curr. Op. Batt. Total

MODE 35 (KTS, OL-5)

Location L-Ch-Pos	Measurement	Location L-Ch-Pos	Measurement
2-12-05	10% Calibration	3-13-10	Event Monitor
2-12-15	50% Calibration	3-13-11	Separation Monitor No. 4
2-12-25	90% Calibration	3-13-12	Secure Cmd. Monitor - BUSS
3-13-05	10% Calibration	3-13-13	Secure Cmd. Monitor - PPD
3-13-15	50% Calibration	3-13-14	Separation Monitor No. 5
3-13-25	90% Calibration	3-13-17	Separation Monitor No. 7
2-14-05	10% Calibration	3-13-23	Separation Monitor No. 2
2-14-15	50% Calibration	2-14-07	Roll Attitude Error ACA
2-14-25	90% Calibration	2-14-08	Pitch Attitude Error ACA
2-16-05	10% Calibration	2-14-09	Yaw Attitude Error ACA
2-16-15	50% Calibration	2-14-11	Roll ACA Output
2-16-25	90% Calibration	2-14-12	Pitch ACA Output
2-06-00	C. D. Busy	2-14-13	Yaw ACA Output
2-07-00	Gyro Roll Rate - Fine	2-14-27	Inhibit Transfer
2-08-00	Gyro Pitch Rate - Fine	2-16-04	Continuity Loop
2-09-00	Gyro Yaw Rate - Fine	2-16-13	Delay Line 1 and/or 2 Full
3-10-00	"P" Axis Valves	2-16-14	Delay Line 3 and/or 4 Full
4-08-00	System Events	2-16-26	Voltage OCV Battery
4-09-00	System Events	2-16-27	Press. A/C Tank
4-12-00	Retro/Parachute Deploy	3-13-04	Selective Address Monitor
2-12-19	Yaw Torque ON	3-13-16	Press, BUSS Gas
3-13-01	"P" Axis Magnetometer	3-13-18	Voltage Monitor
3-13-02	"Q" Axis Magnetometer	3-13-19	Temp. Magnetometer Electx.
3-13-03	"R" Axis Magnetometer	3-13-20	Temp. Auxiliary Timer
3-13-06	Mode and Event Monitor	3-13-21	Temp. F/C Electx.
3-13-07	Separation Monitor No. 6	3-13-22	Temp. BUSS Gas
3-13-08	Power Monitor		

MODE 38 (All Stations)

Location L-Ch-Pos	Measurement
2-07-00	Gyro Roll Rate - Fine
2-08-00	Gyro Pitch Rate - Fine
2-09-00	Gyro Yaw Rate - Fine

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MODE 39 (VTS Only)

Location L-Ch-Pos	Measurement
2-15-15	50% Calibration
2-16-05	10% Calibration
1-15-01	Cal 1/2
1-16-01	Cal 1/2
1-11-00	Voltage Controlled Oscillator
2-06-00	C. D. Busy
2-07-00	Gyro Roll Rate - Fine
2-08-00	Gyro Pitch Rate - Fine
2-09-00	Gyro Yaw Rate - Fine
2-13-00	Curr. Op. Batt. Total
1-15-03	Pitch Actuator Position
1-15-04	Combustion Chamber Press #2
1-15-07	Switch Group Z
1-15-10	Structure Current Monitor
1-15-15	Fuel Pump Inlet Press.
1-15-17	Oxidizer Pump Inlet Press.
1-15-21	Hydraulic Oil Press.
1-15-24	Yaw Actuator Position
1-16-13	+28 VDC Current
1-16-27	Guidance/Control Monitor
1-16-36	Pitch Gyro (Fine)
1-16-39	Yaw Gyro (Fine)
1-16-42	Roll Gyro (Fine)
2-15-05	10% Calibration
2-15-01	Curr Op Batt #6
2-15-02	Curr Op Batt #7

Location L-Ch-Pos	Measurement
1-16-45	Horizon Sensor Pitch
1-16-46	Horizon Sensor Roll
2-15-08	S-Band Beacon Trans.
2-15-20	Curr. Op. Batt. #1
2-15-21	Curr. Op. Batt. #2
2-15-22	Curr. Op. Batt. #3
2-15-23	Curr. Op. Batt. #4
2-15-24	Curr. Op. Batt. #5
2-16-06	Secure Word Count 1 (LSD)
2-16-07	Secure Word Count 2
2-16-08	Secure Word Count 3
2-16-09	Secure Word Count 4
2-16-13	Delay Line 1 and/or 2 Full
2-16-14	Delay Line 3 and/or 4 Full
2-16-26	Voltage OCV Battery
2-16-27	Press. A/C Tank
1-16-28	Velocity Cutoff Switch
1-15-12	+28 VDC Regulated Supply
1-15-18	400 Cps 3 Phase BUS, Phase AB
1-15-30	-28 VDC Regulated Supply
1-16-40	+28 VDC Unreg. Supply
1-16-47	Control Gas Press (High)
1-15-42	Control Gas Supply Temp
1-15-57	Cal Z
1-15-29	Cal +
1-16-57	Cal Z
1-16-29	Cal +

MODE 37 (All Stations)

Location L-Ch-Pos	Measurement
2-12-15	50% Calibration
2-14-15	50% Calibration
2-15-05	10% Calibration
2-16-15	50% Calibration
2-06-00	C. D. Busy
2-07-00	Gyro Roll Rate - Fine
2-08-00	Gyro Pitch Rate - Fine
2-09-00	Gyro Yaw Rate - Fine
2-11-00	Delay Line Erase
2-13-00	Current Op. Batt. Total
2-12-01	Piggyback No. 1
2-12-06	GFE 1-11
2-12-10	GFE 2-15
2-12-21	Press., OCV Oxidizer
2-12-26	Yaw Operating Monitor (P77)
2-12-27	Computer Events
2-14-01	GFE 1-13
2-14-02	GFE 1-14
2-14-06	Gyro Roll Rate Course
2-14-07	Roll Attitude Error ACA
2-14-08	Pitch Attitude Error ACA
2-14-09	Yaw Attitude Error ACA
2-14-10	GFE 1-25
2-14-11	Roll ACA Output
2-14-12	Pitch ACA Output
2-14-13	Yaw ACA Output
2-14-14	GFE 1-3
2-14-16	GFE 1-12
2-14-17	GFE 1-17
2-14-19	GFE 1-20
2-14-21	Roll Torque Motor Volts
2-14-22	Pitch Torque Motor Volts
2-14-23	Roll IR Computer

Location L-Ch-Pos	Measurement
2-14-24	Pitch IR Computer
2-14-26	Gyro Pitch Rate-Coarse
2-14-27	Inhibit Transfer
2-14-28	Gyro Yaw Rate-Coarse
2-15-01	Curr #6 Batt
2-15-02	Curr #7 Batt
2-15-13	Curr #8 Batt
2-15-14	Curr Stab S/S
2-15-20	Curr. Op. Batt. #1
2-15-21	Curr. Op. Batt. #2
2-15-22	Curr. Op. Batt. #3
2-15-27	Curr Command S/S
2-16-04	Continuity Loop
2-16-06	Secure Word Count 1 (LSD)
2-16-07	Secure Word Count 2
2-16-08	Secure Word Count 3
2-16-09	Secure Word Count 4
2-16-10	Secure Word Count 5
2-16-11	Secure Word Count 6
2-16-12	Secure Word Count 7 (Most)
2-16-13	Delay Line 1 and/or 2 Full
2-16-14	Delay Line 3 and/or 4 Full
2-16-17	Temp. Cold Gas Tank
2-16-18	Temp. Cold Gas Tank
2-16-19	Amp. Hr. Meter Total
2-16-20	Amp. Hr. Meter Total
2-16-21	Amp. Hr. Meter Total
2-16-24	C. D. Voltage Monitor
2-16-26	Voltage OCV Battery
2-16-27	Press. A/C Tank

ANNEX E

5. COMMAND FUNCTION LIST (OCV)

Green	Sierra	Function	L-Ch-Pos	% BW
One	One	Select Delay Line 1	2-11-00	70
Two	Two	Select Delay Line 2	2-11-00	50
Three	Three	Select Delay Line 3	2-11-00	33
Four	Four	Select Delay Line 4	2-11-00	14
		Delay Line Full Status:		
		D/L 1 Full	2-16-13	62
		D/L 2 Full	2-16-13	42
		D/L 1 and 2 Full	2-16-13	100
		Neither Full	2-16-13	10
		D/L 3 Full	2-16-14	60
		D/L 4 Full	2-16-14	40
		D/L 3 and 4 Full	2-16-14	100
		Neither Full	2-16-14	10
Five	Five	Spare		
Six	Six	Spare		
Seven	Seven	Telemetry Transmitters Normal (LK2 - Δ2/LK3 - Δ3)		
Eight	Eight	Telemetry Transmitters Reversed (LK2 - Δ3/LK3 - Δ2)		
Nine	Nine	PPD Off		
Ten	Ten	Spare		

Green	Sierra	Function	L-Ch-Pos	% BW
Eleven	Restricted Eleven	GFE - C17A		
Twelve	Restricted Twelve	GFE - C18A		
Thirteen	Thirteen	Tape Recorder Readout	3P	
Fourteen	Fourteen	Tape Recorder Off	3B	
Fifteen	Restricted Fifteen	IR Scanner "Search"		
Sixteen	Restricted Sixteen	BUSS Dropping Module By Pass	(See Note 2)	
		Command Decoder:		
		Primary On	2-17	10
		Off	2-17	2
		Backup On	3-17	10
		Off	3-17	2
		Command Verification:		
		Primary Accept	2-17	50
		Reject	2-17	90
		Backup Accept	3-17	50
		Reject	3-17	90
Msg 101-190	Auto Sierra 31-84	Operational Command Messages		
Msg 191-199	Auto Sierra 91-94	Practice Loading Messages (Expired Time Labels)		
Msg 222	Seventeen	Real Time Enable	2-11	0-7
———	Restricted Eighteen	Erase Delay Line		
Msg 444	Auto Sierra Twenty	Erase Delay Line Followed by RTE	2-11	0-7

Green	Sierra	Function	L-Ch-Pos	% BW
Msg 666	Auto-Sierra:	All Delay Line Address:		
	Twenty One	Block 1 - Green 1 D/L 1	2-11	70
	Twenty Two	Block 2 - RTE + Green 2 D/L 2	2-11	50
	Twenty Three	Block 3 - RTE + Green 3 D/L 3	2-11	33
	Twenty Four	Block 4 - RTE + Green 4 D/L 4	2-11	14
	Twenty Five	Block 5 - RTE	2-11	0-7
Msg 777		GFE Exercise (PRF of 584)		
Msg 888		GFE Exercise (PRF of 584)		
Msg 301, 302, etc.		GFE Exercise (PRF of 584)		

Notes:

1. The voltage monitor, Ch 13 Pin 18, should be read after GREEN SIXTEEN (BUSS dropping module bypass). Proper action will be manifested by a rise in the readout only if the TM has been turned on via the ZEKE command link. There will be no change if TM is turned on via the primary command system.

2. Green messages 777 and 888 will be transmitted at the radar PRF setting of 584.

Command	Mode	Function	Lk-Ch-Pos	% BW
		ZEKE (Unsecure VHF Functional Commands)		
		(Reset)	3-13-06	54
ZEKE 23	1	BUSS Real Time	3-13-06 3-13-08	82 96
ZEKE 21	2	BUSS Next Station	3-13-06 3-13-08	91 96
ZEKE 22	3	BUSS Next Orbit	3-13-06 3-13-08	100 96
ZEKE 24	5	BUSS Real Time, No Gas	3-13-06 3-13-08	74 96
ZEKE 25	6	BUSS Mode Determination (BMD)	4-10	BRT 79 BNS 88 BNO 97 BRTNG 71 BUX 29
ZEKE 26	-	Vehicle Address Command	3-13-04	100 50 msec 54 7 sec
		KIK-ZEKE (Secure VHF Commands)		
KIK-ZEKE 31		BUSS Execute		
		Power On Type IX	3-13-12	50
		Type IX Execute	3-13-12	95
			(Pulse Duration 1 sec Then to Zero)	
			3-13-06 4-10	32 29
KIK-ZEKE 32		PPD ON	2-17-00	(See Page C. 1-12)
		Primary System		
BUX (Mode 4)		(BUSS Real Time)	3-13-06 3-13-08	32 96

ANNEX E

6. COMMAND PROCEDURES

Table 1

125 COMMAND PROCEDURES

Note: All commanding will be at the direction of DICE. In the event of lost communications, no commanding is authorized unless briefed otherwise by DICE.

Item	DICE Voice	Station Action	Station Reply	Remarks
1	(Prepass only) "Load GREEN Msg XXX in the 125 at this time (or at ETA ____)."	a. Actuate RESET b. Load Tape in 125 c. Tape Power On	a. "GREEN Msg XXX is loaded (or was loaded at ETA___)."	
2	"Send GREEN Msg XXX (or GREEN Tape)."	a. Actuate Prepare Tape b. Actuate Transmit Tape	a. "Block One in Progress" b. "Block One Complete, word count XX." c. Repeat a and b for each block.	After last Block Report 125 Condition
3	"Load GREEN Msg XXX in the 125 and STANDBY."	a. Actuate RESET b. Load Tape in 125 c. Tape Power On	a. "GREEN Msg XXX is loaded."	Next direction will be either Item 2 or 4.
4	"Remove GREEN Msg XXX from the 125"	a. Actuate RESET b. Tape Power Off c. Remove Tape	a. "GREEN Msg XXX has been removed."	
5	"Load and send GREEN Msg XXX."	a. Actuate RESET b. Load Tape in 125 c. Tape Power On d. Actuate Prepare Tape e. Actuate Transmit Tape	a. "GREEN Msg XXX is loaded and inprogress" b. "Block One Complete, word count XX." c. Repeat for each block	Report 125 condition after Msg complete

Table 1 (Continued)

Item	DICE Voice	Station Action	Station Voice Reply	Remarks
6	"Send GREEN____"	a. Actuate RESET b. Dial GREEN____ c. Actuate RTC Enable d. Actuate RTC Transmit e. If not verified advise DICE	a. "GREEN____sent and (not) verified system time____." b. "Report functional verification."	a. 125 console indicates accept or reject. b. Example: 3 Papa on (off) system time.
7	"Error Hold Off"	a. Error Hold Off b. Error Hold On	a. "Msg is going out" b. "Constant Rejects"	
8A	"Send Block ____ Again"	a. Actuate RESET b. Tape Pwr Off c. Move Tape Back to Beginning of Block ____ d. Tape Pwr On e. Prepare Tape f. Transmit Tape	a. Reloading at Beginning of Block ____ c. Block____ Sent Again. Reject on Word One.	
8B	"Emergency Advance"	a. Actuate Emergency Advance Once.	a. We have Emergency Advanced Over Word One. Blk ____ is (is not) Going Out.	

Table 1 (Continued)

Item	DICE Voice	Station Action	Station Voice Reply	Remarks
9	"Load GREEN Message ______, Block ______, at word ______."	a. Actuate Reset b. Load GREEN Message ______, beginning Block ____. c. Tape Power On d. Radar TLM/SIM On SIM e. Actuate Prepare Tape f. Actuate Transmit Tape g. Actuate Accept until word shows in tape word number.	a. "GREEN Message ____, Block __, Loaded at Word ____." b. "Tape Word Number ______."	
10	"Send GREEN Msg. ____ starting at Block ______ Word ____." or "Send only Block ____ of GREEN Message ____, beginning with Word ______."	a. RADAR TLM/SIM On Radar TLM	a. "Block ___ being transmitted." b. "Block ___, ___ words" (Only blocks specified by DICE will be transmitted).	Word Count reported by station will be the total block word count. Nr. of words xmitted will be total count minus the word nr. at which xmsn was started.

Table 1 (Continued)

Item	DICE Voice	Station Action	Station Voice Reply	Remarks
11	"Load GREEN Message ________ for manual transmission."	a. Actuate Reset b. Load Tape in 125 c. Tape Power On d. Remove Telemetry from 125	a. "GREEN Message____ loaded for manual transmission."	
12	"Send GREEN Message ________ manually."	a. Actuate Prepare Tape b. Actuate Transmit Tape c. Actuate Emergency Advance until entire message has been transmitted. d. Monitor Telemetry Link 2, Channel 16, Points 13 and 14.	a. "Block one being transmitted." b. Block one____words, block two being transmitted, etc." c. "2-16-13 Reads____%" "2-16-14 Reads____%"	
13	"Skip one word using Emergency Advance"	a. Emergency Enable On. b. Actuate Emergency Advance c. Report tape word number reading to DICE at end of each block.	a. "Emergency Advance actuated, message is (is not) going out, block______, ________ words, etc."	One word is to be skipped and transmission continued.
14	"Skip two words and continue."	a. Reset b. Actuate Prepare Tape c. Actuate Transmit Tape	a. "Two words skipped." "Msg is (is not) going out."	
15	"Switch to Back-up Mode of verif."	a. Patch Link 3, Ch. 17 to 125.	a. "Have switched to B/U mode of verif." b. "125 Scope --- (describe 125 condition)"	

Table 1 (Continued)

Item	DICE Voice	Station Action	Station Voice Reply	Remarks
16	"Switch Ground to reverse config. -or- to normal config."	Telemetry Link patched into 125 switched to Delta 3 for reverse and to Delta 2 for normal.	"Ground Station switched to reverse (or normal)"	Note: This should be done after applicable command has been sent (unless otherwise directed)
17	"125 Condition"	a. Check 125 Console for error lights. b. Check 125 telemetry scope for levels, real mode, stored mode noisy signal, etc.	a. "125 scope shows real mode with clean signal." b. "125 scope shows stored mode. 2-11 Reads ____%. c. "125 scope shows real mode with noisy signal." d. "125 scope shows ambient mode." e. "______ error light on."	The DDE Operator will immediately report any changes in 125 presentation to the OD who will relay to DICE.
18	"Advise when 3 papa is usable."	a. Monitor 3-14. b. Report system time 3-14 goes from noise spikes to modulated signal.	"3 papa was usable at system time______."	
19	"Emergency Retransmit"	a. Actuate Emergency Retransmit.	a. "Emergency Retransmit Actuated. Block _____ is (is not) going out."	None.

Note: The following standard definitions and reporting procedures will be used.

1. All stations will report "PPD ON" as follows: "C COCOA AT ____" (system time). The term "PPD" will not be used on voice lines.

2. To clarify reporting of 125 conditions the following modes are defined:

Ambient Mode

LK 2-11	Approx 10 pct
LK 2-17 or LK 3-17	5 to 10 pct

Real Mode

LK 2-11	Approx 10 pct
LK 2-17 or LK 3-17	Constant rejects

Stored Mode

LK 2-11	18 to 70 pct
LK 2-17 or LK 3-17	Constant rejects

Command capability will continue to be reported as "real mode clean signal", the clean signal referring to LK 2-17 or LK 3-17. Note that "real mode" cannot be determined unless both LK 2-11 and LK 2-17 (or LK-3-17) are observed.

3. If asked for reading on LK 2-11 report percent of bandwidth. Normal reading is approx 10% in real or ambient mode and 18 to 70% in stored mode. Under certain conditions LK 2-11 may read zero and should be reported as such, however this condition will be rare. If asked for a reading on LK 2-17, report either ambient level for the 5 to 10 pct condition or, if in real or stored mode, report normal (or abnormal) rejects and whether signal is clean or noisy.

Table 2

STANDARD STATION PRE-PASS 125 CONFIGURATION

	Switch	Position
1.	N-Rejects (Thumb)	4
2.	Reject Error Light	Off
3.	Tape Error Light	Off
4.	Logic Error Light	Off
5.	Spoof Error Light	Off
6.	Error Hold	On (Red)
7.	Power	On (Grn)
8.	Tape Power	On (Grn)
9.	In Contact	Off
10.	Prepare Tape	(Do not operate)
11.	Tape Ready	Off
12.	Transmit Tape	(Off)
13.	End of Tape	Off
14.	Spoof Override	N. A.
15.	Manual Enable	On (Yell)
16.	Tape/Sim	Tape
17.	Radar and TLM/Sim	Radar and TLM
18.	Left Manual/Auto	Auto
19.	Right Manual/Auto	Manual
20.	PSS Enable	Off
21.	Emer Enable	On
22.	RTC Enable	Off
23.	Transmit	Off
24.	Word Selection	00
25.	Telemetry Verification	Link 2 Channel 17
26.	DDE Enable (SOC)	ON (Light ON)

Note: Any deviations to the above will be made by the STC Test Controller in the Station Pre-pass Briefing.

Table 3

VERBAL COMMAND PROCEDURES

Command	DICE	Station Action	Station Reply
1. KIK-ZEKE 31 thru 34	1. Prepare for KIK-ZEKE_____ . Read back designator.	1. a. System select switch to ZEKE. b. Place ZEKE/ZORRO patchboard in patch panel. c. Connect ZEKE transmitter to antenna. d. Insert designated code plug into receptacle #1	1. Station prepared for KIK-ZEKE_____. Designator is_____.
2. KIK-ZEKE 31 thru 34	2. Send KIK-ZEKE_____ now (or at system time_______.)	2. a. Execute command (use KIK-ZEKE EXECUTE button) b. Verify transmitter modulation c. Verify vehicle reception (function or telemetry)	2. KIK-ZEKE_____ sent at system time_____, (not) verified.
3. ZEKE 21 thru 26	3. "Send ZEKE 26-XX now" or "At System Time____ send ZEKE 26-XX."	3. a. Depress ZEKE 26 until execute light comes on. b. Immediately depress ZEKE XX until execute light on. Note: In absence of 3 papa, ground station should monitor 3-13-04 for ZEKE 26 verification for post commanding comments in event of malfunction.	3. "ZEKE 26-XX sent and (not) verified at system time_____." or "At System Time____ we will send ZEKE 26-XX."

TABLE 4

LOST COMMUNICATIONS PROCEDURES

1. Tracking and Telemetry

If data lines are lost, the following action shall be taken:

a. Make every effort to record tracking data normally. Do not use quick recovery unless loss of tracking data is imminent.

b. Record TM data as briefed in Station Briefing. Playback can be made from History Tape when lines are restored.

2. Commanding

a. If voice communications are lost before ETA-O, command messages or realtime commands will not be transmitted to the vehicle unless specifically briefed to do so. If specific briefing has been given, follow procedures in Paragraph b.

b. If, during the pass, instructions are received from DICE to "Send ______________", and then communications are lost, proceed with the commanding as follows:

1. Real Time Commands: Send as directed. (If briefed to send in event of lost comm, Paragraph a, send at times specified.) Use computer as primary, 125 backup.

2. Command Messages: Use computer as primary, 125 backup if possible. If it is necessary to switch to 125, make certain Green Message is loaded in the 125 at the beginning of the Block in which the computer was when it failed. In the event of error alarms while transmitting, take the following action:

	CORRECTIVE ACTION	
PROBLEM	COMPUTER	125
1. Reject (except for first word of Block when sending Block again)	Reset and transmit (or count clear and transmit)	Error hold off momentarily.
2. Spoof	Send Block again: a. Reselect Block b. Reset alarm condition c. Transmit d. After reject on xmsn count ØØ: (1) Reset reject alarm (2) Command advance one word (3) Transmit e. Verify count should equal one less than proper word count at end of Block	Send Block again: a. Reload tape at beginning of Block. b. Reset, prepare tape and transmit. c. After reject on word Ø1, emergency advance one time d. Word count should equal proper count at end of Block
3. *Echo Alarm (ICS) or Tape Error (125) *Same as Command Error	Send Block again: (same as a thru e above)	Send Block again: (same as a thru d above)
4. *Verification Alarm or 125 stops *Check ground station for verification channel failure. Switch to back-up verification if necessary.	Send Block again (same as a thru e above.)	Send Block again: (same as a thru d above)
5. Loss of command capability while in block, unable to find problem, vehicle in stored mode.	a. Send Auto-Sierra 20 b. Verify Real Mode c. Send Sierra 09 Note: Record reading of 2-11 before sending A/S20.	a. Send Green Msg 444 b. Verify Real Mode c. Send Green 09 Note: Record reading of 2-11 before sending 444.

Table 5

GREEN MESSAGE HANDLING PROCEDURES

The following procedures will be used for receipt and handling of green msgs:

1. Always receive green msgs on TM computer unless otherwise advised.
2. Msgs will be sent one way XMSN only, Echo Check Mode.
3. If time permits, XMSNS will continue until the station has punched two tapes, each compared successfully against CORE.
4. As soon as the first tape has been compared against CORE, it will be rushed to the 125 for word count.
5. As soon as the second tape has been compared against CORE, it will be rushed to the 125 for word count.
6. Teletype will be used for emergency back-up, or for short msgs as determined by Test Control.
7. All msgs sent to stations by TTY will be returned by TTY for verification.
8. Msgs sent by SDDT will <u>not</u> be sent back by TTY for verification unless directed by DICE.

Table 6

AUGIE COMMAND PROCEDURES

A. VOICE PROCEDURES

Item	DICE/Voice	Station Action	Station Reply	Remarks
1	"Request word count on Auto Sierra ______ blocks ______ thru ______"	a. Place CLE in test mode. b. Dial block no. ______ c. Transmit d. Repeat b&c for each block	"Word count for Auto Sierra ______ is; block ______ words, block ______ words, etc.	
1A	"Confirm you have the following A/S blocks selected ______".	None	"We confirm A/S ______ have been selected".	
2	"Send Sierra ______"	a. Select command mode Digital Manual b. Select transmit mode Single c. Dial Sierra ______ d. Transmit	a. "Sierra ______ sent and (1) verified (2) not verified at system time ______ (3) rejected"	

Table 6 (Continued)

Item	DICE/Voice	Station Action	Station Reply	Remarks
2.A	"Send Restricted Sierra ________"	a. Select Cmd mode Digital Manual. b. Select transmit mode Single. c. Dial in proper command number. d. Depress Restricted Enable after restricted light comes on. e. Depress Transmit.	a. "Restricted Sierra ________ sent and (1) Verified or (2) Not verified at system time ____________."	
3	"Send Sierra ________ again"	a. Clear error condition b. Transmit	a. "Sierra ________ sent again and (1) verified (2) not verified at system time ____________ (3) rejected"	a. See Item 5 for error conditions
3.A	"In the Repetitive mode, send Sierra ________ (or Restricted Sierra ______) ________ times."	a. Select Cmd mode Digital Manual. b. Select Xmit mode Repetitive. c. Dial desired number in Repetitive Number Select. d. Dial in proper command number. e. If restricted light comes on - depress Restricted Enable. f. Depress Transmit.	a. "Sierra ________ (or Restricted Sierra ______) sent repetitively, verify count ____________ . XMSN count ____________" Report any error condition that occurs.	

Table 6 (Continued)

Item	DICE/Voice	Station Action	Station Reply	Remarks
3.B	"In the Repetitive Mode, send Sierra ________(or Restricted Sierra ________) for ________seconds (or continuously)." or "Starting at system time ________ in the Repetitive Mode, send, etc. (same as above)."	a. Select Cmd mode Digital Manual. b. Select Xmit mode Repetitive. c. Dial ØØ in Repetitive Number Select. d. Dial in proper command number. e. If Restricted, depress Restricted Enable. f. Depress Transmit, g. Depress Repetitive Stop at proper time or when directed.	a. "Sierra ________ (or restricted Sierra ________) in progress, (or initiated at system time ________). Sierra ________ (or Restricted Sierra ________) terminated at system time ________."	

Table 6 (Continued)

Item	DICE/Voice	Station Action	Station Reply	Remarks
4	"Send Auto Sierra_____ thru_______"	a. Select command mode Computer Auto b. Dial proper block no. c. Transmit d. Repeat b&c for each block	a. "Block___ in progress" b. "Block ____________ complete, verify count ______" c. Repeat a&b for each block	
5	"Send block _____again"	a. Select another block b. Reselect proper block c. Clear error indication d. Transmit	a. "Block _______sent again, message going out (or report error condition transmit count _______)"	a. The error indication to be cleared under Item c of station action will normally be a spoof (spoof reset), command error (error override), or verification not received (manual verify). b. Normally a reject on transmit count 1 will be expected when a block is sent again.
6A	"Select Auto Sierra block ________ at word______"	a. Dial proper block b. Actuate Computer Command Advance until transmit count	a. "Block ____________ selected, transmit count_____"	

Table 6 (Continued)

Item	DICE/Voice	Station Action	Station Reply	Remarks
6B	"Starting at word ________ send block ________"	a. Transmit	a. "Block ________ is (is not) going out"	
7	"Count clear"	a. Count clear b. Transmit	a. "Count cleared, message going out (or reject ________)"	
8	"Transmit Continuously"	a. Change reject level to ØØ "Count clear" b. Transmit c. Return reject level to Ø4 at end of block	a. "Block going out. (or continuous rejects transmit count ________)"	a. Will normally be used only after "count clear" was unsuccessful in rectifying problem
9	"Command advance"	a. Count clear b. Computer command advance one word c. Transmit	a. "Computer advanced over one word" b. Message going out (or (report error condition transmit count ________")	
10	"Switch to back up mode of verification"	a. Actuate secondary verification source	a. "Have switched to back up mode of verification" b. "SOC condition ________"	
11	"Switch ground station to normal/reverse configuration"	a. Switch TM links in ground station	a. "Ground station switched to normal/reverse"	

Table 6 (Continued)

Item	DICE/Voice	Station Action	Station Reply	Remarks
12	"SOC condition"	a. Check SOC console for error lights b. Check 2-11 & 2-17	a. "SOC indicates ______" (stored, real, ambient, noise, etc.) b. "2-11 reads ______________" c. "______ error light on"	a. Any change in SOC presentation will be relayed to DICE immediately
13	"125 Enable"	a. Actuate DDE Enable on SOC console.	a. "125 Enabled."	None.
14	"Computer Enable"	a. Place SOC in Standard Configuration.	a. "Computer Enabled".	None.
15	"Send Auto-Sierra 21 thru 25"	a. Select Cmd. mode Computer Auto b. Dial Block 21. c. Transmit	a. "Block 21 sent and verified 2-11 reads ____________ %."	
		d. Dial Block 22 e. Transmit	b. "Block 22 sent and verified 2-11 reads ____________ %."	
		f. Repeat for Blocks 23 and 24	c. Repeat for Blocks 23 & 24	
		g. Dial Block 25 h. Transmit	d. "Block 25 sent and verified TM indicates ______ Mode, ______ Signal."	

Table 6 (Continued)

B. STANDARD SOC CONFIGURATION

Section	Item	State
Command mode	Digital Manual Computer Auto DDE Enable Analog Manual Remote Enable MCDU Enable	ON OFF OFF OFF (not used) OFF (not used) OFF (not used)
Transmit mode	Single Repetitive Stop Repetitive Analog Long	ON OFF OFF OFF (not used)
Command count	Vehicle verif Transmissions	ØØ ØØ
Repetitive	Number selected Number select	ØØ ØØ
Analog cmnd verif	Primary Verif Source Secondary Verif Source Verify Disable 1-15 verify	ON OFF OFF OFF (not used)
Command	Number selected Number select	ØØ ØØ
Command status (upper)	Computer Auto Complete In Progress Ready DDE Complete DDE in Progress DDE Ready Remote Command & MCDU Computer Auto Stop Computer Command Advance	OFF OFF OFF OFF OFF OFF OFF (not used) OFF OFF

Table 6 (Continued)

Section	Item	State
Command status (lower)	Digital Command Coder Analog Command Coder Decomm synch out All error lights All error clear switches	ON OFF (not used) ON OFF OFF
Reject	Count Level select	ØØ Ø4
Direct command select		Not Used
Stepper switch		Not Used
Vehicle Prog		Not Used

STANDARD SOC CONFIGURATION (ICS) SIERRA COMMANDING

Section	Item	State
Transmitter Configuration	Prelort Digital	On (Effective with Model 8).
Transmission Rate	Prelort PRF	ON (Effective with Model 8).
Command Mode	Digital Manual	ON
	Single	ON
Command Source	CLE	ON
Verif. Source	N/A	N/A
Command Count	Verifications	ØØ
	Transmissions	ØØ
Command Select	--	ØØ
Repetitive Select	--	ØØ
Reject	Count	ØØ
	Level Select	Ø4
Command Verif.	Primary	ON
Alarm Lights	--	OFF

Special Command Instructions:

a. If Restricted Sierra 11 or 12 is to be sent in repetitive mode:

1. Switch to PRF-3 5 secs before commanding.
2. Alpha should slave or follow prepass.

b. If Auto-Sierra 77, 78, or 88, 89 is to be sent:

1. Set reject level to Ø1.
2. Switch to PRF-1,5 seconds before commanding.
3. Alpha should slave or follow prepass.
4. In event of any error condition, reset and transmit. Cease transmitting if more than three error conditions are encountered in a block.

c. If Green Msg 777, 888, or 30x are to be sent from the 125:

1. Set reject level to Ø2.
2. Switch to PRF-3 5 seconds before commanding.
3. Alpha should slave or follow prepass.
4. In event of "Spoof", skip two words and continue, i.e., reset, prepare tape and transmit.
5. In event of "Reject" or "Tape error", emergency advance one word and continue. Discontinue transmission after three rejects or two "Spoofs".

ICS COMMAND TERMINOLOGY

The following voice terminology will be used with all stations using the ICS Panel:

(NOTE: The switch labeled "Transmission Alarm/Reset" will be labeled "Echo Alarm/Reset". SSONS will send out instructions on temporary labeling until permanent plates can be obtained.)

Examples below are voice exchanges for all possible error conditions:

1. Station: "Reject, Transmission Count ____________".
   DICE: "Reset and Transmit"
   STATION: "We have reset and transmitted, commands proceeding normally." (or report any subsequent error). Block ____ complete. Verify count ______".

2. STATION: "Spoof, Transmission Count _________".
   DICE: "Send Block _____________ again",
   STATION: "Roger, sending Block again".
   (Station will re-select the Block, Reset the alarm condition, and transmit.)
   STATION: "Block ______ sent again, Reject, Transmission count ØØ"
   DICE: "Reset, Command advance, and transmit"
   STATION: "Roger, we have advanced over word one, Commands are proceeding normally (or report any subsequent error condition.) Block _____ complete, verify count ________, transmission count _______."

3. STATION: "Echo alarm, transmission count ______".
   DICE: "Send Block _______ again" (Remainder of voice exchange is same as Item 2.)

4. STATION: "Verification alarm, transmission count ______."

DICE: "Send Block ________ again." (Remainder of voice exchange is same as Item 2.)

NOTE: If station has a verification alarm, OC should check primary verification signal immediately to see if failure is in ground station. Notify DICE immediately if primary verification signal is not present.

ANNEX E

FLIGHT INFORMATION

7. (S) ON-ORBIT EVENTS

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
A. OCV/Agena Separation Sequence:					
(Launch)	A = 0	Reference System Time			
DRS #1	[See Annex E.2]	Agena Ignition	1-15-04/34	0	42
#2		Agena Cutoff	1-15-04/34	42	0
#3	A + 680	Computer Prearm	2-12-12	25	78
			*3-13-03	95	80
			2-15-02	90	60
			3-13-04	95	60
#4	A + 700	SV/Agena Separation	*3-13-03	80	60
			3-13-01	60	40
			2-15-02	60	40
	A + 715	BUSS Mag. Boom and Antenna Erected	3-13-02	0	54

Notes: (1) With good Augie TM data contact with the STC, the station will report only events identified by the Test Controller. The remainder of the events will be verified at the STC Analysis Printer for display.

(2) In event of Augie failure, underlined events will be reported realtime voice with postpass TTY verification.

(3) Asterisks denote the primary telemetry point to confirm each event.

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
B. Yaw Around Sequence: (Fly forward or reverse)					
	B = 0	Reference System Time			
59	B + 15	Yaw Torque Start	2-9	Within Band Limits	OBH
			*2-14-08	51	66
			2-14-17	0	100
90	B + 465	Yaw Torque Stop	2-9	OBH	Within Band Limits
			*2-14-08	66	51
			2-14-17	100	0
C. Pitch Down: (Flying Reverse)					
	C = 0	Reference System Time			
61	C + 15	Pitch Down Start	*2-14-07	51	25
			2-8	OBH	OBL
			2-14-10	Within Band Limits	OBL
76	C + 86	Pitch Down Complete	*2-14-07	25	51
			2-8	OBL	OBH
			2-14-10	OBL	Within Band Limits
D. Pitch Up: (Flying Reverse)					
	D = 0	Reference System Time			
87	D + 15	Pitch Up Start	*2-14-07	51	69
			2-14-10	Within Band Limits	OBH
91	D + 121	Pitch Up Complete	*2-14-07	69	51
			2-14-10	OBH	Within Band Limits

Note: If flying forward, both pitch-up and pitch-down maneuvers require approximately 86 seconds.

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
E. Orbit Adjust:					
	E = 0	Reference System Time			
73	E + 15	Propellant Tanks Pressurized (PTP)	2-12-19	96	20
			2-12-20	96	20
			2-8	In Band	OBH (Returns to within Band Limit within Few Seconds)
53	E + 45	Engines #1 and #2 ON	2-7	IN BAND	SAWTOOTH
			*2-9	IN BAND	SAWTOOTH
			2-8**	IN BAND	SAWTOOTH
55	E + 45 + Δt	Engines #1 and #2 OFF	2-7	SAWTOOTH	IN BAND
			*2-9	SAWTOOTH	IN BAND
			2-8**	SAWTOOTH	IN BAND
F. OCV Deboost - With Attitude Control:					
	F = 0	Reference System Time			
73	F + 15	Propellant Tanks Pressurized (PTP)	2-12-19	96	20
			2-12-20	96	20
			2-8	In Band	OBH (Returns to within Band Limit within Few Seconds)
53	F + 50	Engines #1 and #2 ON	2-7	IN BAND	SAWTOOTH
			*2-9	IN BAND	SAWTOOTH
55	F + 50 + Δt	Engines #1 and #2 OFF	2-7	SAWTOOTH	IN BAND
			*2-9	SAWTOOTH	IN BAND

**When flying forward only.

Notes (1) GN_2 Tank Pressure (2-15-19) should increase bandwidth 4 to 5% per minute of engine firing interval.

(2) (2-15-19) should increase bandwidth approx. 8% at PTP command.

(3) Propellant tanks pressurized signature does not exist if tanks previously pressurized.

8. TERMINAL EVENTS

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
G. Disconnect No. 1 and No. 2 Sequence:					
	G = 0	Reference System Time			
62	G + 15	Disconnect No. 1	*2-15-01	23	74
			3-13-03	60	40
98	G + 16.5	Disconnect No. 2	*3-13-03	40	20
			3-13-04	10	92

Notes:

1. With good Augie TM data contact with the STC, the station will report only events identified by the Test Controller. The remainder of the events will be verified at the STC Analysis Printer for display.
2. In event of Augie failure, underlined events will be reported in realtime voice with postpass TTY verification.
3. Asterisks denote the primary telemetry point to confirm each event.

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
H.	Recovery Sequence: (Prime System)				
	H = 0	Reference System Time			
92	H + 15	Arm, (Δ4/ON) (BEACON/ ON)	3-13-04 *2-15-01	92 74	60 56
89	H + 69.5	Transfer	3-13-04 *4-9	60 2	14 34
82	H + 70.4	OCV/SRV IFD	*4-9	34	50
67	H + 72.0	Separation	3-13-01	40	20
94	H + 73.8	Spin	*4-9 4-8	44 2	55 30
96	H + 75.1	Retro	*4-9 4-8	55 30	70 50
69	H + 85.8	Despin	*4-9 4-8	70 50	90 64
71	H + 87.3	Thrust Cone Eject	*4-9 4-8	90 64	40 86
93	H + 265.	T/C (BU) Sw. Closed	4-9	40	59
74	H + 315.	T/C (BU) Sw. Open	4-9	59	40
86	H +	3G Switch Closed	4-9	40	67
99	H +	3G Switch Opened	4-9	67	40
80	Event 99 +34 sec	Parachute Cover Off	4-8	40	95

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
J.	Emergency Recovery Sequence:				
	J = 0	Reference System Time			
59	J + 15	Yaw Torque Start	2-9	Within Band Limits	OBH
			*2-14-08	51	66
			2-14-17	0	100
62	J + 170.0	Disconnect No. 1	*2-15-01	23	74
			3-13-03	60	40
98	J + 171.5	Disconnect No. 2	*3-13-03	40	20
			3-13-04	10	92
90	J + 465.0	Yaw Torque Stops	2-9	OBH	Within Band Limits
			*2-14-08	66	51
			2-14-17	100	45
61	J + 470.0	Pitch Down Start	*2-14-07	51	25
			2-8	OBH	OBL
			2-14-10	Within Band Limits	OBL
63	J + 510	Arm, (Δ4/ON) (BEACON/ON)	3-13-04	92	60
			*2-15-01	74	56
76	J + 541.0	Pitch Down Complete	*2-14-07	25	51
			2-8	OBL	OBH
			2-14-10	OBL	Within Band Limits
89	J + 564.4	Transfer	3-13-04	60	14
			*4-9	2	34
82	J + 565.3	OCV/SRV IFD	*4-9	34	50

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
J.	Emergency Recovery Sequence (Continued)				
67	J + 566.9	Separation	3-13-01	40	20
94	J + 568.7	Spin	*4-9 4-8	44 2	55 30
96	J + 570.0	Retro	*4-9 4-8	55 30	70 50
87	J + 574.0	Pitch Up Start	2-14-07 2-14-10	51 Within Band Limits	69 OBH
69	J + 580.7	Despin	*4-9 4-8	70 50	90 64
71	J + 582.2	Thrust Cone Eject	*4-9 4-8	90 64	40 86
91	J + 680	Pitch Up Complete	2-14-07 2-14-10	69 OBH	51 Within Band Limits
93	J + 760.	T/C (BU) Sw. Closed	4-9	40	59
74	J + 810.	T/C (BU) Sw. Open	4-9	59	40
86	J +	3G Switch Closed	4-9	40	67
99	J +	3G Switch Opened	4-9	67	40
80	Event 99 +34 sec	Parachute Cover Off	4-8	40	95

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
K.	BUSS Real Time	Mode 1/BRT Mode 4/BUX			
	K = 0	Reference System Time			
52	K + 15	Secure Command Transmission	3-13-21	01	48
54	K + 20	Secure Command Execute (Primary Gas Off)	*3-13-19 3-13-21	75 48	26 100
62	K + 22	Disconnect No. 1	*2-15-01 3-13-22	23 0	74 20
98	K + 24	Disconnect No. 2	3-13-22 *3-13-04	20 10	47 92
63	K + 26	ARM/BUSS Gas ON (ΔON/Beacon ON)	3-13-22 *3-13-04 2-15-01	47 92 74	55 60 56
89	K + 125.5	Transfer	3-13-22 *3-13-04 4-9	55 60 2	80 14 34
82	K + 126.4	OCV/SRV IFD	*4-9	34	50
67	K + 128.0	Separate	*3-13-22 3-13-01	80 40	92 20
94	K + 129.8	Spin	*4-9 4-8	44 2	55 30
96	K + 131.1	Retro	*4-9 4-8	55 30	70 50
90	K + 141.1	Propellant Tanks Pressurized (PTP)	*2-12-19 *2-12-20	96 96	20 20
69	K + 141.8	Despin	*4-9 4-8	70 50	90 64
71	K + 143.3	Thrust Cone Eject	*4-9 4-8	90 64	40 86

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
K.	BUSS Real Time (Continued)				
53	K + 171.1	Engines #1 and #2 ON	2-7	In Band	Sawtooth
			*2-9	In Band	Sawtooth
93	K + 276.	T/C (BU) Sw. Closed	4-9	40	59
74	K + 326.	T/C (BU) Sw. Open	4-9	59	40
86	K +	3G Switch Closed	4-9	40	67
99	K +	3G Switch Opened	4-9	67	40
80	(Event 99 +34 sec)	Parachute Cover OFF	4-8	40	95
55	K + 621.1	Engines #1 and #2 OFF	2-7	Sawtooth	In Band
			*2-9	Sawtooth	In Band

Note: Propellant tanks pressurized (PTP) and engine ON/OFF events are for OCV deboost. Times indicated are nominal.

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
L.	BUSS Next Station	Mode 2/BNS			
	L= 0	Reference System Time			
52	L + 15	Secure Command Transmission	3-13-21	01	48
54	L + 20	Secure Command Execute (Primary Gas OFF)	*3-13-19 3-13-21	85 48	26 100→0
62	L + 22	Disconnect No. 1	*2-15-01 3-13-22	23 0	74 20
98	L + 24	Disconnect No. 2	3-13-22 *3-13-04	20 10	47 92
63	L + 511	Arm/BUSS Gas ON (Δ 4 ON/Beacon ON)	3-13-22 *3-13-04 2-15-01	47 92 74	55 60 56
89	L + 610.5	Transfer	*3-13-22 3-13-04 4-9	55 60 2	80 14 34
82	L + 611.4	OCV/SRV IFD	4-9	34	50
67	L + 613	Separate	*3-13-22 3-13-01	80 40	92 20
94	L + 614.8	Spin	*4-9 4-8	44 2	55 30
96	L + 616.1	Retro	*4-9 4-8	55 30	70 50
90	L + 626.1	Propellant Tanks Pressurized (PTP)	*2-12-19 *2-12-20	96 96	20 20

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
L.	BUSS Next Station (Continued)				
69	L + 626.8	Despin	*4-9	70	90
			4-8	50	64
71	L + 628.3	Thrust Cone Eject	*4-9	90	40
			4-8	64	86
53	L + 656.1	Engines #1 and #2 ON	2-7	In Band	Sawtooth
			*2-9	In Band	Sawtooth
93	L + 761.0	T/C (BU) Sw Closed	4-9	40	59
74	L + 811.0	T/C (BU) Sw Open	4-9	59	40
86	L +	3G Switch Closed	4-9	40	67
99	L +	3G Switch Opened	4-9	67	40
80	(Event 99 +34 sec)	Parachute Cover Off	4-8	40	95
55	L + 1106.1	Engines #1 and #2 OFF	2-7	Sawtooth	In Band
			*2-9	Sawtooth	In Band

Note: Propellant Tanks pressurized (PTP) and engine ON/OFF events are for OCV deboost. Times indicated are nominal.

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
M.	BUSS Next Orbit	Mode 3/BNO			
	M = 0	Reference System Time			
52	M + 15	Secure Command Transmission	3-13-21	01	48
54	M + 20	Secure Command Execute (Primary Gas OFF)	*3-13-19	95	26
			3-13-21	48	100 → 0
62	M + 22	Disconnect No. 1	*2-15-01	23	74
			3-13-22	0	20
98	M + 24	Disconnect No. 2	3-13-22	20	47
			*3-13-04	10	99
63	M + 5118	Arm/BUSS Gas ON (Δ 4 ON/Beacon ON)	3-13-22	47	55
			*3-13-04	92	60
			2-15-01	74	56
89	M + 5217.5	Transfer	3-13-22	55	80
			*3-13-04	60	14
			4-9	2	34
82	M + 5218.4	OCV/SRV IFD	*4-9	34	50
67	M + 5220	Separate	3-13-22	80	92
			*3-13-01	40	20
94	M + 5221.8	Spin	*4-9	44	55
			4-8	2	30
96	M + 5223.1	Retro	*4-9	55	70
			4-8	30	50
90	M + 5233.1	Propellant Tanks Pressurized (PTP)	*2-12-19	96	20
			*2-12-20	96	20

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
M.	BUSS Next Orbit (Continued)				
69	M + 5233.8	Despin	*4-9	70	90
			4-8	50	64
71	M + 5235.3	Thrust Cone Eject	*4-9	90	40
			4-8	64	86
53	M + 5263.1	Engines #1 and #2 ON	2-7	In Band	Sawtooth
			*2-9	In Band	Sawtooth
93	M + 5368	T/C (BU) Sw Closed	4-9	40	59
74	M + 5418	T/C (BU) Sw Open	4-9	59	40
86	M +	3G Switch Closed	4-9	40	67
99	M +	3G Switch Opened	4-9	67	40
80	(Event 99 +34 sec)	Parachute Cover Off	4-8	40	95
55	M + 5713.1	Engines #1 and #2 OFF	2-7	Sawtooth	In Band
			*2-9	Sawtooth	In Band

Note: Propellant Tanks pressurized (PTP) and engine ON/OFF events are for OCV deboost. Times indicated are nominal.

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
N.	BUSS Real Time No Gas	Mode 5/BRTNG			
	N = 0	Reference System Time			
52	N + 15	Secure Command Transmission	3-13-21	01	48
54	N + 20	Secure Command Execute	*3-13-19	65	0
			3-13-21	48	100 → 0
62	N + 22	Disconnect No. 1	*2-15-01	23	74
			3-13-22	0	20
98	N + 24	Disconnect No. 2	3-13-22	20	45
			*3-13-04	10	92
63	N + 26	ARM (Δ ON/Beacon ON)	*3-13-04	92	60
			2-15-01	74	56
89	N + 125.5	Transfer	3-13-22	45	72
			*3-13-04	60	14
			4-9	2	34
82	N + 126.4	OCV/SRV IFD	*4-9	34	50
67	N + 128.0	Separate	3-13-22	72	82
			*3-13-01	40	20
94	N + 129.8	Spin	*4-9	44	55
			4-8	2	30
96	N + 131.1	Retro	*4-9	55	70
			4-8	30	50
90	N + 141.1	Propellant Tanks Pressurized (PTP)	*2-12-19	96	20
			*2-12-20	96	20
69	N + 141.8	Despin	*4-9	70	90
			4-8	50	64
71	N + 143.3	Thrust Cone Eject	*4-9	90	40
			4-8	64	86

Event No.	Time	Event	Lk-Ch-Pos	Percent BW Pre	Percent BW Final
N.	BUSS Real Time No Gas (Continued)				
53	N + 171.1	Engines #1 and #2 ON	2-7	In Band	Sawtooth
			*2-9	In Band	Sawtooth
93	N + 276.	T/C (BU) Sw Closed	4-9	40	59
74	N + 326.	T/C (BU) Sw Open	4-9	59	40
86	N +	3G Switch Closed	4-9	40	67
99	N +	3G Switch Opened	4-9	67	40
80	(Event 99 +34 sec)	Parachute Cover OFF	4-8	40	95
55	N + 621.1	Engines #1 and #2 OFF	2-7	Sawtooth	In Band
			*2-9	Sawtooth	In Band

Note: Propellant tanks pressurized (PTP) and engine ON/OFF events are for OCV deboost. Times indicated are nominal.

8.1 Recovery Event Code Numbers

a. The following event code numbers will be used for reporting acquisition and Fade of RC beacon and telemetry.

Event No.	Event
85	RC beacon acquired
65	RC telemetry acquired
84	RC beacon not acquired
57	RC telemetry not acquired
81	RC beacon faded
72	RC telemetry faded
97	RC bearing

(These numbers will also be included in TG Op Order for each flight.)

b. The terms "Scotch Charlie" and "Scotch Delta" will not be used. The above event numbers replace these terms.

Examples:

Hula - Event 61 G - plus 36 - at 916
Collegiate - Event 61 - minus 38 - at 2138
Ozzie 1 - Event 61 G - 350 - at 2140

c. RC bearings will be reported by event number, followed by plus or minus the bearing in degrees (units not to be mentioned). Ground and surface station bearings will be reported in relation to reference bearing specified in TG Ops Order. Aircraft will report magnetic bearings.

d. HTS and SRU will report non-stabilized capsule bearings by event number only, followed by plus or minus the bearing in degrees, and will report stabilized capsule bearings by event number and the suffix "G" (Golf) followed by plus or minus the bearing in degrees.

8.2 NOMINAL IMPACT PREDICTIONS OPERATIONS NUMBER

	Pass Number					
GMT (hr-min-sec) of Penetration to 50,000 feet						
Latitude of Penetration (N)	24-00	24-00	24-00	24-00	24-00	
Longitude of Penetration (W)						
Time 15° N Latitude Longitude (W)						
Time Equatorial Crossing Longitude (W)						
Time 15° S Latitude Longitude						

8.2 NOMINAL IMPACT PREDICTIONS
OPERATIONS NUMBER

	Pass Number					
GMT (hr-min-sec) of Penetration to 50,000 feet						
Latitude of Penetration (N)	24-00	24-00	24-00			
Longitude of Penetration (W)						
Time 15° N Latitude Longitude (W)						
Time Equatorial Crossing Longitude (W)						
Time 15° S Latitude Longitude						

Notes: (1) Nominal Launch Time used in above tabulation is ___ GMT.

(2) Refer to HTG Operations Plan 1-66 RAINDROP Chart "D", Page E-2 applies.

Event No.	Time	Event	L-Ch-Pos	% BW Pre	% BW Final
R.	BUSS Next Two Orbits	(For Use with 3-Mode BUSS J-Box			
	R = 0	Reference System Time			
82	R + 15	Secure Command Transmission	3-13-12	04	50
54	R + 20	Secure Command	*3-13-6	70	0
		Execute	3-13-12	50	98
		(Primary Gas OFF) (1 sec)	3-13-10	31	0
65	R + 22	Disconnect No. 1	*2-16-4	25	74
			3-13-6	0	19
			3-13-7	19	64
87	R + 24	Disconnect No. 2	3-13-6	19	48
			*3-13-11	18	46
			3-13-17	3	14
78	R + 10718	Arm/BUSS Gas ON	3-13-10	0	70
		(Δ 4 ON/Beacon ON)	3-13-11	46	92
			*2-16-4	74	56
59	R + 10817.5	Transfer	*3-13-6	48	77
			3-13-14	68	92
			3-13-17	14	40
			4-9	2	34
67	R + 10,818.4	OCV/SRV IFD	*2-16-4	56	Open Circuit
			4-9	34	50
86	R + 10820.	Separate (M + 15)	3-13-6	77	100
			3-13-17	40	75
			*3-13-23	44	70
95	R + 10821.8	Spin	*4-9	50	63
			4-8	3	33
81	R + 10823.1	Retro	*4-9	63	82
			4-8	33	60
92	R + 10833.1	Propellant Tanks Pressurized (PTP)	2-12-21	96	20
			2-12-22	96	20
			2-8	In Band	OBH (Returns to within Band Limit within Few Seconds)

(Continued on Next Page)

Event No.	Time	Event	L-Ch-Pos	% BW Pre	% BW Final
R.	BUSS Next Two Orbits				
64	R + 10833.8	Despin	*4-9 4-8	82 60	OBH 82
72	R + 10835.3	Thrust Cone Eject	*4-9 4-8	OBH 82	37 74
57	R + 10863.1	Engines #1 and #2 ON	2-7 *2-9	In Band In Band	Sawtooth Sawtooth
99	R + 11067.5	B/U Timer Sw Closed	4-9	37	59
55	R + 11117.5	B/U Timer Sw Open	4-9	59	37
74	R +	3G Switch Closed	4-9	37	67
66	R +	3G Switch Opened	4-9	67	37
91	(Event 66 +34 sec)	Parachute Cover Off	4-8	40	95
69	R + 11313.1	Engines #1 and #2 OFF	2-7 *2-9	Sawtooth Sawtooth	In Band In Band

Note: Propellant Tanks pressurized (PTP) and engine ON/OFF events are for OCV deboost. Times indicated are nominal.

ANNEX E

APPENDIX 9

AGENA EXPERIMENTS

CONTENTS

ANNEX E
APPENDIX 9
AGENA EXPERIMENTS

1. GENERAL

Certain Agena vehicles used for Program 206 operations have been modified to carry "research packages" (RP) into orbit along with the primary 206 satellite. Operation of the RP system will be monitored and coordinated with the prime contractor by SSOTP-7. The launch, ascent, and orbital operations will be conducted with minimum interference to Program 206.

2. TEST OBJECTIVES

2.1 Primary

The primary test objective is to provide second stage thrust and attitude control as necessary to place the 206/SV into a selected orbit.

2.2 Secondary

Secondary Agena objectives are to:

a. Maintain stabilization and provide an orbital platform for operation of the research package

b. Provide electrical power and timer signals to the RP, after completion of the primary objective

c. Transmit selected telemetry in relation to Agena health and orbital attitude

3. FLIGHT DESCRIPTION

3.1 Prelaunch

(See Annex E.10, paragraph 3.1 as outlined for P-11 vehicles.)

3.2 Launch/Ascent

The RP is electrically isolated from the 206/S-01 vehicle during launch and ascent until after 206/S-01 separation has occurred. This is accomplished through the use of a relay matrix and lockout junction box. After 206/S-01 separation the Agena timer applies electrical power to the RP system and initiates TT&C systems.

3.3 Orbit Operations

On passes over KTS, HTS, VTS and NHS the Agena telemetry will be silent until commanded ON by ZOMBIE command. Recorder read-out schedules will be prescribed in the Flight Profile issued by SSOTP-7, and approved by the 206 Test Controller. Detailed orbital requirements and operations will be outlined in the T.O.O. published by SSOTP-7. Duration of the operation will be approximately six days, or until depletion of Agena electrical power and/or control gas.

4. TEST DATA FLOW

4.1 Recorded Telemetry

Agena telemetry will be recorded during scheduled station intercepts and forwarded in the normal manner. Tracks 2 and 4 of the Program 206 recorder may be used occasionally on a non-interference basis.

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4.2 Data Handling

Following each SCF station intercept, command performance and telemetry summaries will be transmitted to the STC. RP data recorded on 206 tapes will be dubbed off and handled according to the T.O.O. published by SSOTP-7.

ANNEX E

10. PROGRAM 989

CONTENTS

ANNEX E

10. PROGRAM 989

1. GENERAL

Program 989 is a "piggy-back" research satellite vehicle designed for attachment to the Program 206/S01 vehicle. Agena vehicles (S-01) are modified to accept the 989 payload for injection into orbit. After the S-01 has completed the primary mission of placing the 206/S-01 vehicle into the selected orbit, it will maintain stabilization for two orbits to permit 989 separation at a planned position in space. The S-01 will also provide electrical power and timer signals to the 989 interface.

Operation of the 989 system will be conducted by SSOTP-3 with minimum interference to Program 206 operations. Detailed planning and operating procedures are contained in Test Operations Order 66-7 and Flight Appendix published for each 989 flight by SSOTP-3.

2. TEST OBJECTIVES

2.1 Primary

The primary mission objective of the Agena (S-01) vehicle is to provide second stage thrust and attitude control necessary to place the 206/SV in a pre-planned orbit.

2.2 Secondary

Secondary Agena objectives are:

a. To maintain vehicle attitude for two orbits after engine (backup) cutoff signal, to permit the 989 package to separate at a planned orbital position.

b. To provide electrical power and timer signals to the 989 payload interface, subsequent to accomplishment of the primary objective.

c. To transmit telemetry from liftoff to 900 seconds, and from 4000 seconds to 6400 seconds approximately.

3. FLIGHT PROFILE

3.1 Prelaunch

The 989 vehicle will be checked out and installed at the launch base. Provisions are made for quick removal of the 989 and substitution of necessary hardware to accomplish the primary 206/S-01 mission at any time prior to mate. After S-01 mate the payload will be committed to flight, unless it will interfere with primary 206 objectives. Circuitry will be checked out and verified from the payload consoles to the 206/S-01 umbilical and test plugs by Program 206.

Prelaunch servicing after 206 Stage I/II mating shall be limited to:

a. Station monitoring and control of the 989 vehicle through the 206/S-01 umbilical.

b. 989 vehicle battery charging.

c. 989 timer setting and installation on R - 1 day.

d. Insertion and inspection of 989 safe/arm plugs and special monitoring T-connection during Simulated Flight Test.

3.2 Launch and Ascent

The 989 payload will be electrically isolated from the 206/S-01 during launch and until completion of the 206/S-01 primary objective. This is accomplished through use of a relay matrix and a lockout junction box. After orbit injection of the 206/S-01 vehicle the S-01 timer applies 28V unregulated power to the 989 system, which initiates the 989 launch timer. The S-01 remains stable for completion of two orbits to provide an orientated platform for 989 erection and separation.

3.3 Orbit Operations

Early orbit support for the 989 flight will be as follows:

a. Downrange Station – The downrange telemetry station supporting the 206 launch will report telemetry points to the Satellite Test Center. The required points are: (1) System time of change in the level of 1-16-30 (2) System time of D-timer start.

b. OL 5 or KTS Rev 1 – The station will turn telemetry on for approximately 60 seconds. Voice report of approximately 10 TM points will be required as specified in the appropriate 989 flight appendix.

c. OL 5 or KTS Rev 2 – The station will turn telemetry on for approximately 60 seconds. Telemetry will be reported as specified in the appropriate 989 flight appendix.

d. HTS Rev 2 – If available, the TLM-18 will be used to provide tracking data. Remaining requirements are in the appropriate 989 flight appendix.

4. DATA COLLECTION AND ROUTING

In cases where 206 and 989 telemetry are recorded on the same magnetic tape, the station will dub the 989 telemetry, voice, system time, and signal strength tracks on a separate tape and ship that tape to SSOTP-3.

5. REFERENCES

a. (STO). System Test Objectives, LMSC-B076391, Annex A, dated 6 Feb 64 (Program 206) (S)

b. (ORD). Orbital Requirements Document, Aerospace, TOR-930(2123)-2, Volume I, 15 Mar 63 (Program 206) (S)

c. 206 Program Requirements Document, Aerospace, TOR-469(5101-01)-12, dated 15 Jan 65 (Annex A)

d. Detailed Specifications, LMSC 1416725, Program 206/989 Interface Requirements (U)

e. Test Operations Order (SSOTP-3), 66-7 dated 15 Sept 66

APPENDIX 39

BLOCK 4 INPUTS FOR

TEST OPERATIONS ORDER 63-7

DIN# 6143-42-4

COPY NO.

PAGES 12

Block #4 Inputs for T. O. O.

GENERAL ELECTRIC

LIST OF EFFECTIVE PAGES

This document contains 12 pages, consisting of the following:

Title

A

1 through 10

The following modifications and changes shall be incorporated to make the T.O.O. compatible with vehicle 973 and subsequents:

Annex A

1. Page A.3-5

   Paragraph 3.1 reword next to last sentence to read: "Buss is restricted to passes over the recovery area in the north-to-south direction; however, upon hardware modification prior to flight, it will have capability to pass over the recovery area in the south-to-north direction instead. This modification will be made only upon proper program authorization.

Annex B

2. Page B.2-4

   Change first sentence to read: "Station 83 to Station 234" instead of "Station 83 to Station 228".

3. Page B.2-5

   Figure 1 - Structure Subsystem - Change the following:

   Sta. 18 to 18.98
   Sta. 46 to 46.43
   Sta. 83 to 83.38

   Add Sta. 234.88 (Bulk head)

4. Page B.2-6

   See Figure 2 - (Modified Schematic of T/M Modes)

5. Page B.2-11

   Paragraph 3.2.2 - Add Note: Recorded data can be processed in real time if the Ground Station has the proper frequency discriminators.

   Paragraph 4.1 - Delete "safe and arm devices".

6. Page B.2-12

   Paragraph 4.1.2 - Delete entirely

7. Page B.2-13

   Figure 4 - Separation Subsystem Inboard Profile - Delete "S & A3" and "S & A4" at Station 83.

8. Page B.2-14

   Paragraph 4.2.1 - Delete "and S/A."

   Paragraph 4.2.1.c - Delete entirely

   Paragraph 4.2.2.c - Delete entirely

9. Page B.2-15

   Paragraph 4.2.3.b - Delete "S & A 3 & 4 squibs"
   Replace with "pressure bottles and disconnect commands."

10. Page B.2-16

    See Figure 5 - (Modified Stab. Subsystem T/M)

11. Page B.2-19

    Paragraph 5.1.5 - Correct last sentence to read: "The yaw and pitch rate gyros have bias correction for orbital rate when the vehicle is flying forward. These biases are not reversed when vehicle is flying reversed."

    Paragraph 5.1.6 - Add "Each A.C.A. provides redundant rate information derived from the position error. The gain of each derived rate (15%) is such that the normal performance of Rags will not be affected."

12. Page B.2-22

    Figure 8 - Delete "O.C.V. Spin-up ON/OFF."

13. Page B.2-25

    Figure 9 - EP&SD Subsystem, add another block in a like manner to other battery blocks for "Oper. Batt. 6."

14. Page B.2-26

    Paragraph 7.1.3 - Add "After each full 640 ampere-hour cycle an automatic reset shall reset the counter to its index position. To determine total mission ampere hour use, a log must be kept of the number of recycles of this meter.

15. Page B.2-27

    Paragraph 9.1.1 - Change "two modes" to "three modes" and add "Buss No Gas Next Station."

16. Page B.2-28

Paragraph 9.2 - Add after last sentence, "If channel C is selected, outputs will be identical to channel B; the only exception being that the Primary gas is not disabled."

17. Page B.2-29

Table 3 - (Buss Sequence of Events) - Add another column for "B.N.G.N.S."

T0	N/A
T1	N/A
T2	N/A
T3	N/A
T4	N/A
T5	Initiate T/M
T6	N/A
T7	Disc. 1
T8	Disc. 2&3
T9	Arm & Transfer
T10	Separate
T11	N/A
T12	Pwr off Buss

18. Page B.2, b-1

Paragraph 1.1 (Thrust Cone) - Delete "Barometric switch"

19. Page B.2, b-2

Paragraph 1.2-a - Change "260 pounds" to "310 pounds."

20. Page B.2, b-2

Paragraph 1.3 - Third sentence, change "whip antenna" to "stub antenna."

21. Page B.2, b-3

Paragraph 1.5-b - Delete existing sentence and replace with "b. At 940 seconds after the activation of the inhibit timer, the main parachute is deployed."

22. Page B.2, b-3

Paragraph 1.6 (Acquisition Aids) - Delete items 1 thru 6 and add the following:

1. Frequency 235.0 MC
2. Peak Pulse Power 7.5 watts
3. Pulse Width 30 microsecond (min.)
4. Pulse Repetition rate - 1000 $\pm$ 200 down to 750 $\pm$ 125 at a cyclic interval of 1 $\pm$ 0.2 seconds.

23. Page B.2, b-4

Paragraph 1.6-C (Telemetry System)

(3) Power, add "at 28 vdc" after "watts"
(5) Modulation, change "four" to "three"; "two" to "one".
Delete "channel 10."

Annex C

24. Page C.1-3

Paragraph 1 - Change "Command Decoder" in first paragraph to "P.P.D." Add "in C.D." after "both executed" in the next to last sentence of the first paragraph.

In the third paragraph, delete "only" in the next to last sentence and add "turn on" after the last word.

25. Page C.1-5

Ref.Figure 2. Indicate 28 VDC input to the Relay Box and 6V Power Supply. Show just one Antenna for both Transmit and Receiver.

26. Page C.1-8

Paragraph 3.1.1 - Change voltage at D.D.E. from "1.5v" to "0.15v."

Paragraph 3.1.3 - Change "-6.0 percent" to "+7.1%"

27. Page C.1-9

Table 1, T/M Calibrations (Nominal) change to following (VCO frequencies are now directly proporational to the voltage)

Function	Deviation at SCO (Percent)	Volts at 125	Percent Full Scale
	Link 2, Channel 17		
Full scale deflection	+7.2	5	100%
Reject Signal	+7.1	4.9	98%
Accept Signal	0	2.5	50%
Command Decoder ON	-5.76	.5	10%
Full scale deflection	-7.2	0	0%
	Link 3, Channel 17		
Reject Signal	+7.1	4.9	98%
Accept Signal	0	2.5	50%
Command Decoder ON	-5.76	.5	10%

Mode	Link 2, Channel 11 Deviation at SCO (percent)	Percent full scale
Delay Line 1	+2.6	68%
Delay Line 2	0	50%
Delay Line 3	-2.3	34%
Delay Line 4	-4.7	18%
RTC or No Commands	-7.2	0%

28. Page C.1-11

Paragraph 3.2 - Change "7.2% deviation," to "-7.2% deviation."

29. Page C.1-12

Figure 4 - Change "+6.7%" to "-6.7%"

30. Page C.1-13

Paragraph 4.1 - First sentence, delete "however, the third mode is not implemented." Add:

Command	Tone	Freq. (K.C.)	Identity
Zeke 22	GF	(5.3) (5.1)	Buss No Gas Next Station

31. Page C.1-14

Figure 4 - Add a line from Junction Box to Separation Programmer, "titled, BNGNS at T6, T8, T9, T10."

32. Page C.1-17

Table 2 - Add another column for B.N.G.N.S.

T0, T1, T2, T3, T4	N/A
T5	Initiate T/M
T6	N/A
T7	Disc. 1
T8	Disc. 2&3
T9	Arm & Transfer
T10	Separate
T12	Buss Pwr off

Add to "BNS" at time T0, "Disable Pri. Pneu."

33. Page C.2-3

Paragraph 2.2 - First sentence, add "types of" before S.S.P.C.

34. Page C.2-6

    Paragraph 2.3 - First sentence add "type of" before D.S.P.C.

35. Page C.2-9

    Add Paragraph 4.1.4 Zeke 22 This command sets the mode select relays to enable output commands for Buss Next Station times only.

    Paragraph 4.2.2 - Add "Zeke 22" between Zeke 23 and 21.

Annex D

36. Page D.5.C-6
    Paragraph 4.1, second paragraph - Second sentence, change "lowest frequency excursion" to "highest frequency excursion."

37. Page D.8-XI (Glossary)

    Change GE/ASPD to GE/SD
    Change GE-Advanced Space Projects Div. to GE-Spacecraft Dept.

38. Page D.8-15

    Paragraph RV-Delta 4
    FM/FM channels, delete "channel 10." and change "(4)" to "(3)"

39. Page D.8-22

    Figure 4 - Telemetry Characteristics
    Change -7.1% to +7.2%.
    Change +6.5% to -7.2%.
    Delete pulse call out (Pulse 26 & 27) for max. & min. sig.

40. Page D.8-31

    Figure 11 - Recovery Events Add the following steps prior to "Spin Event"
    Show "Transfer, Approx. 24-34%" (Thermal Batt.)
    Show "Elect. Disconnect, approx. 37-47%" (IFD)

Annex E

41. Page E.4-1

    Location 2-16-06 add "L.S.D."
    Location 2-16-12 add "M.S.D."

42. Page E.4-3

    Location 2-15-21 add "and Op. Batt. #6."

43. Page E.4-8

Location 2-15-21 add "and Op. Batt. #6."

44. Page E.4-10

Location 2-15-21 add "and Op. Batt. #6."

45. Page E.4-12

Location 3-12-00 add "/Multiplexer."

46. Page E.4-14

Location 2-15-21 add "and Op. Batt. #6."

47. Page E.4-15

Delete Location "4-10-00 Roll Accelerometer."

48. Page E.4-17

Change location 2-15-02 to "3-13-7"
Change location 2-15-03 to "3-13-17"
Change location 2-15-10 to "3-13-11"
Change location 2-15-17 Separation Monitor #3 to "3-13-23 Separation #2"
Location 2-15-21 add "and Op. Batt. #6"
Delete "4-10-00 Roll Accelerometer"

49. Page E.5-3

Table Zeke (Unsecure VHF functional Cmds) at top of page, add following:

Command	Function	L. Ch. Pos.	% B.W.
Zeke 22	Buss No Gas Next Station	3-13-6	51
		3-13-8	92

Change % of B.W. for Buss Next Station 3-13-6 from 85% to 69%
Delete "100 50 milli-seconds."

Note 1 - Add "Zeke 22" after "Zeke 23."
Add at the end of sentence, "when properly preceded by a Zeke 26 command."

Change third line from: "Turn on T/M for Line 2 & 3B" to: "Turn on Real Time Telemetry."

50. Page E.7-1

DRS #3 Computer Pre-Arm delete "2-12-28." This channel is now "Computer Phase."

51. Page E.7-4

Delete "Events 52 and 61" completely.

52. Page E.8-2

Event #55, Disconnect No. 1 - 2-16-4 change Pre from "63%" to "23%."

53. Page E.8-3 (Same as Item 52)

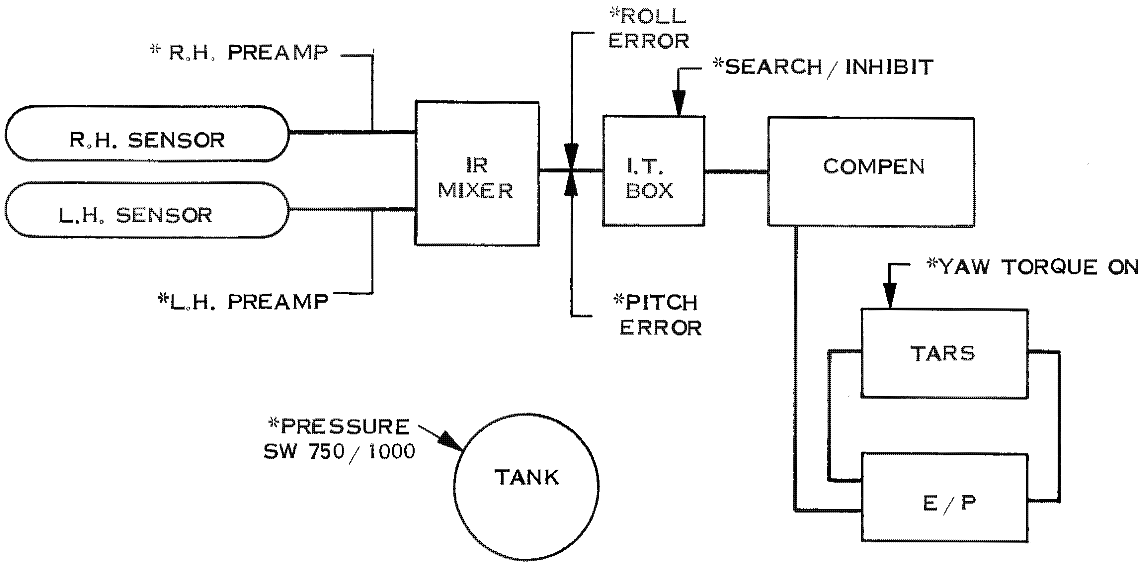
54. Page E.8-5 (Same as Item 52)

55. Page E.8-7 (Same as Item 52)

56. Page E.8-13

Figure I Recovery Events
Add following levels before the spin event:

Transfer approx. 34%
Separation (IFD) approx. 47%



NOTE: KEEP PREVIOUS FIGURE 5 AS IS. ADD ITEMS MARKED WITH ASTERISK (*) TO EXISTING FIGURE 5.
* = TELEMETRY CHANNELS TO BE INCORPORATED

Figure 5. Stabilization Subsystem Telemetry

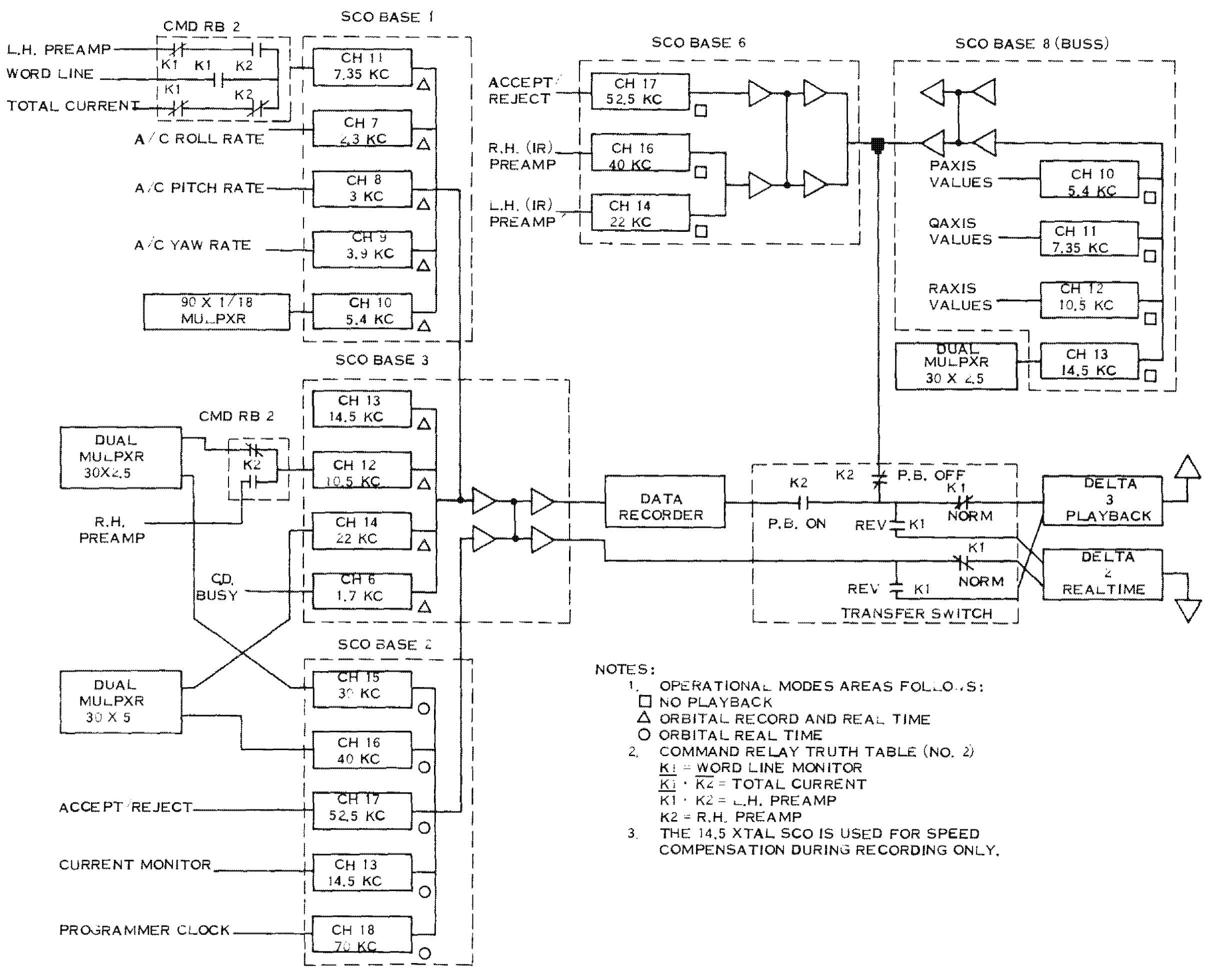


Figure 2. Telemetry Subsystem Block Diagram