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REPORT CHANGE RECORD FOR

SYSTEM TEST DIRECTIVE FOR DISCOVERER SATELLITE SYSTEM

The following additions, revisions, or errata corrections, should be incorporated into the document identified above. This Report Change Record page should be inserted as the first page of the affected report preceding the title page. If a page in the original document is eliminated and/or replaced by the instructions which follow, the page must be destroyed according to the Air Force directive governing such destruction.

CONTRACT NUMBER [redacted]

ADDENDUM PAGE	REVISION		ERRATA		REVISION OR ERRATA CORRECTION (CORRECT IN INK)	CORRECTION MADE	
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Divider Tab 10 App A							
Title Page Tab 10 App A							
A-10-1 thru A-10-53							

[redacted]

SECTION 6
ORBIT OPERATIONS

6.1 INITIAL ACQUISITION OPERATIONS

6.1.1 Starting at the liftoff signal, [redacted] and [redacted] will conduct an equipment check to ensure readiness prior to first pass operations. A verification will be made of operational capability of all equipment, the correct settings of all switches and control adjustments, and readiness of recording equipment. A final boresight check will be made on the radar, and teletype tape headings will be perforated for the data transmission. The radar interrogation signal will be checked for proper positioning of the center pulse to eliminate the possibilities of spurious vehicle commands during tracking operations in accordance with LMSD Drawing No. 1301483.

6.1.2 The PAC will evaluate exit trajectory data and transmit to [redacted] and [redacted] updated Reeves Orbit Computer parameters, plotboard check points, and ETA and ETT clock settings. These will be transmitted on the 60-wpm teletype together with an updated acquisition program in Cartesian coordinates (X, Y, Z) and time via 100-wpm teletype. Reception will be verified by each station to the STC. The acquisition program will be entered in the programmer and a preplot of the program will be made to verify that a reasonable program has been received. The program tape will be rewound and readied to start ETA = 0. Orbit computer parameters will be set at all stations, the check points plotted, and the ETA and ETT clocks set. At the given system time, the ETA clock will be started by the shift supervisor at each station.

Table 6-1

ANTENNA POSITIONING PROCEDURE FOR INITIAL ACQUISITION

STATION	EQUIPMENT	PARAMETER	ETA −5	ETA +2	ETA +4	ETA +6
[redacted]	VERLORT	Elevation angle	3°	No change	No change	No change
		Azimuth angle	Acq Pt	No change	No change	No change
		Azimuth scan	±10°	±20°	±20°	±30°
	Tri-helix	Elevation angle	5°	Acq prog +2 position	Acq prog +4 position	10°
		Azimuth angle	Acq Pt	Acq prog +2 position	Acq prog +4 position	Acq prog fade
		Azimuth scan	±10°	0°	0°	±10°
[redacted] (if [redacted] does not acquire)	VERLORT	Elevation angle	3°	No change	No change	No change
		Azimuth angle	Acq Pt			
		Azimuth scan	±10°			
	TLM-18	Elevation angle	0°	No change	No change	No change
		Azimuth angle	Acq Pt			
		Azimuth scan	±10°			
	Tri-helix	Elevation angle	5°	Same as [redacted]	Same as [redacted]	Same as [redacted]
		Azimuth angle	Acq Pt			
		Azimuth scan	±10°			

NOTES:

Radars will use a sector scan over the azimuth angle indicated

Approximate scan rates are: radar, 12°/sec; tri-helix, manual limitation; TLM-18, 8 deg/sec.

6.1.3 Antenna positioning procedures for initial acquisition by the [redacted] and [redacted] antennas are given in Table 6-1. Active search will begin at ETA - 5 minutes. When ETA = 0, the Reeves Orbit Computer will be started.

The acquisition programmer will drive the slave data tracking bus circuit beginning at acquisition. The procedure for initial active search utilizes a sector horizon scan with the VERLORT antenna prepositioned at three degrees elevation and the tri-helix antenna at five degrees. Upon acquisition by any antenna, the other antennas will be vectored in the same direction. Following acquisition by the radar, the tri-helix will be manually slaved to the radar via the tracking data bus.

6.2 GENERAL TRACKING OPERATIONS

6.2.1 Tracking will be maintained from acquisition to signal fade or actual turnoff of the vehicle S-band beacon and telemetry transmitter with the radar normally driving the tracking data bus. The TLM-18, where available, can be used to drive the tracking data bus in the event radar lock-on cannot be maintained.

6.2.2 During tracking, the Reeves Orbit Computer will be updated continuously, by appropriate adjustments in the computer operator panel, to zero out the error signals. If radar acquisition is lost temporarily, the Reeves Orbit Computer will drive the radar until reacquisition. Updating of the computer will be stopped near the end of track at a time when errors are zero so that the parameters of the circular orbit that best fit the actual trajectory at that time may be read from the dials.

6.2.3 The low range and high range control gas supply pressure measurements will be reported, as specified in Table A8-1, as accurately as possible. Real-time readouts from oscilloscopes and/or meters are to be reported to the STC by voice. As soon as possible after each pass, a more accurate readout of control gas supply pressure from the commutated wave

[redacted]

train recorded on the CEC oscillograph/Datarite magazine will be sent to the STC by TWX. This parameter will be plotted at the STC on all passes.

6.2.4 Post-pass station activities will consist of returning equipment to stand-by status and making checks, where possible, to determine any changes in operation since the pre-pass checks. A boresight check is conducted, Doppler reference frequency is checked, synchros are checked for orientation and accuracy, and receiver sensitivities are checked. Plotboard scales are checked, pens cleaned, and maps changed. If acquisition is expected on the next pass, these preparations will begin immediately in order to ensure readiness. Where several orbits occur between station passes, the STC may request a closed-loop check with the computer. Time available and past performance will be considered by the STC in deciding the course of action to be followed.

6.2.5 A JHU/APL Doppler transmitter, if available, and an optical beacon will be carried to permit evaluation of this system. The transmitter will operate continuously on 162 mc and 216 mc. The optical tracking lights will be programmed "on" over twelve Smithsonian Astronomical Observatory camera stations during the flight.

6.2.6 All telemetry recording stations and tracking stations participating in the recovery operation (Christmas Island, South Point, Tern Island, Long View and Sunnyvale Victory Ships) will track the satellite telemetry signal during Pass 2 and will report the following to the RCC or [redacted] for correlation:

a. Time of acquisition
b. Signal direction (azimuth and elevation at acquisition, at one minute intervals, and at fade)
c. Strength of signal
d. Signal deviation from nominal frequency
e. Time of signal fade

[redacted]

The above stations will also track those active passes within their range each day during normal working hours to assure equipment readiness for recovery.

6.2.7 The [redacted] will not participate in orbit operations unless so directed by the STC, to support multiple satellite operations.

6.3 GENERAL COMMAND OPERATIONS

6.3.1 The reset points and reset monitor signals, as explained in Section 2, will be programmed to occur at the latitudes for each station as listed in Table A2-1 of Appendix A. No reset command (Command 3) will be given unless directed by the STC or as explained in Paragraph 6.4, Emergency Procedures. The actual reset point will be obtained from the Palo Alto Computer, either as a latitude or a time-of-command transmission.

6.3.2 Variations in launch-phase performance of both Discoverer Booster and Satellite may cause the actual orbit period to deviate from the nominal. Since the orbital programmer period will be set at launch to agree with the nominal or predicted orbit period, the programmer rate must be changed to agree with the actual orbit period. The following paragraphs indicate how the required adjustment is determined.

6.3.2.1 The actual orbit period can be determined with fair accuracy by comparing the elapsed time-from-launch to crossing of a reference latitude on Pass 1. Table 6-2 provides a tabulated means for determining the orbit period on Pass 1.

6.3.2.2 On Pass 2, the orbit period in seconds can be determined more accurately by observing the system time difference between satellite crossing of the same latitude on Passes 1 and 2. If necessary, crossing of different latitudes may be utilized, using an average value of four degrees per minute for satellite transition between the two latitudes. The orbital programmer period can be obtained from telemetry data as discussed in

Table 6-2

FIRST-PASS ORBIT PERIOD DETERMINATION

	CROSS LATITUDE (REFERENCE LATITUDE)							
	65°N		57.6°N		25°N		22°N	
PERIOD (SEC)	T FROM LAUNCH TIME (SEC)	T + LAUNCH SYSTEM TIME (SEC)	T (SEC)	T + LAUNCH TIME (SEC)	T (SEC)	T + LAUNCH TIME (SEC)	T (SEC)	T + LAUNCH TIME (SEC)
5376	5224		5334		5821		5866	
5400	5245		5356		5845		5890	
5460	5298		5411		5905		5951	
5520	5351		5465		5965		6011	
5580	5404		5519		6024		6071	
5640	5458		5574		6084		6132	
5700	5511		5628		6244		6192	
5760	5564		5683		6204		6252	
5820	5617		5737		6264		6313	
5880	5670		5791		6324		6373	
5940	5723		5846		6383		6433	
6000	5777		5900		6443		6494	
6060	5830		5925		6503		6554	
6120	5883		6009		6562		6614	
6180	5936		6063		6623		6675	
6240	5989		6118		6683		6735	
6300	6042		6172		6742		6795	
6360	6096		6227		6802		6856	
6420	6149		6261		6862		6916	
6480	6202		6335		6922		6976	
6540	6255		6390		6988		7037	
6600	6308		6444		7042		7097	
6660	6361		6499		7101		7157	
6720	6415		6553		7161		7218	
6780	6468		6607		7221		7278	
6840	6521		6662		7281		7338	
6900	6574		6716		7341		7399	
6960	6627		6771		7401		7459	
7020	6680		6825		7460		7519	
7080	6734		6879		7520		7580	
7140	6787		6934		7580		7640	
7200	6840		6988		7640		7700	

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APPENDIX A - TAB 1

SYSTEM TEST DIRECTIVE
FOR
DISCOVERER SATELLITE SYSTEM
DISCOVERER SATELLITE 1061
DISCOVERER BOOSTER 253

APPROVED: [redacted]
SATELLITE SYSTEMS MANAGER

APPROVED: [redacted]
COLONEL, USAF [redacted]
CHAIRMAN
SYSTEM TEST WORKING GROUP

CONTENTS

TABLES

[redacted]

ILLUSTRATIONS

[redacted]

APPENDIX A - TAB 1
SUPPLEMENTAL TEST INFORMATION

A1 INTRODUCTION

This section contains descriptive material which supplements the basic text of the STD. It is applicable only to the flight of Discoverer Satellite 1061. Where the material contained herein is in conflict with that in the basic text, the information in this appendix has precedence. Reference will not be made to this appendix for subsequent flight operations.

A2 CONFIGURATION

A2.1 Discoverer Satellite

A JHU/APL Doppler transmitter and an optical beacon will be carried to permit evaluation of this system. The transmitter will operate continuously on 162 and 216 mc. The optical tracking lights will be programmed "on" over twelve Smithsonian Astronomical Observatory camera stations during the flight.

A2.2 Recovery Capsule

A2.2.1 An AET payload will be carried in a Mark IV recovery capsule with the following capsule characteristics:

Thermal Batteries (2)

Life: 20 seconds
Usage: Orbit ejection to thrust cone separation

Silver Oxide-zinc Batteries (2)

Life: (a) Shelf life after activation, 15 days
(b) Operating life, 10 hours (min)
Usage: Capsule beacon, capsule light, chute cover and chute deployment

[redacted]

Salt Plug (1)

Life: 45 hours (min) 54 hours (norm) 90 hours (max)
Usage: Capsule seals will prevent capsule from capsizing. Capsule will sink after salt plug deterioration within 10 minutes.

Silver Peroxide Battery (1)

Life: A minimum of 20 minutes
Usage: Capsule telemetry.

A2. 2. 2 The crystal-controlled GE acquisition beacon installed in the capsule has the following characteristics:

Pulse Repetition Rate	1000 to 700 cps ± 50 cps, once per 1 ± .01 sec
Power Output	15 watts peak nominal
Pulse Width	30 microsecond nominal
Beacon Life	10 hours minimum
Frequency Stability	±0. 04 percent

A2. 2. 3 A 2. 0-watt telemetry transmitter in the recovery capsule will transmit re-entry and recovery sequence-of-event data. Telemetry channels 7, 9 and 11 will be used.

A2. 3 Facilities and Equipment

The following facilities and/or equipment will be utilized for recovery telemetry and communications:

Facility	Equipment
a. South Point	1 TLM-18 antenna (manual)
	1 WWV timing receiver
	1 Tape Recorder
	4 T/M 1302 receivers
	1 Quad-helix antenna (auto track)
	* 1 Quad-helix antenna (manual)
	1 Phone line to [redacted] toll)

* Added facility or equipment

[redacted]

Facility	Equipment
b. HCC	1 60-wpm TTY (conference mode)
	1 Voice circuit through [redacted] to STC
	* 2 SSB radio systems
	* 1 Dual voice recorder plus 2 existing single units
	* Termination for 2 part-time voice toll circuits to STC
c. [redacted]	VERLORT radar
	TLM-18 antenna
	Tri-helix antenna
	Timing equipment
	Communication equipment
	2 Decommutators
	2 Plot boards
	Tape recorder
	Oscillograph/datarites
d. Dalton and Haiti Victory Ships	Communications (SSB/HF/VHF/UHF)
	1 Tape recorder
	1 1403 and 2 1302A T/M receivers
	1 WWV timing receiver
	* 1 Quad-helix antenna
	1 (FLR-2) of equipment on second antenna
e. Destroyer (Recovery - No TLM Capability)	
f. 9 C-119J Aircraft 1 C-130A Aircraft	Air pickup equipment, DF equipment (FLR-2), communications equipment
g. 4 RC-121 Aircraft	APS-20 radar
	Radar correlator
	APS-45 height finder radar
	Communications (HF/SSB/VHF/UHF)
	* 1 Dual channel voice recorder UHF radio

*Added facility or equipment

[redacted]

	Facility	Equipment
*h.	WV-2 T/M Aircraft (137890)	HI-gain helix antenna
		5 Nems-Clarke 1432 receivers (2 pan adapters)
		1 Nems-Clarke 1502 receiver (1 pan adapter)
		1 TEL 1151 receiver
		1 7-track tape recorder
		1 6 pan brush recorder
		1 Oscilloscope (5 inch)
		1 WWV timing receiver
		DF equipment
		4 Subcarrier discriminators
		Communications (HF/SSB/VHF/UHF)
i.	JC-54 T/M Aircraft	2 TLM 22 antennas
		6 NC 1403 receivers (1 pan adapter)
		2 Tape recorders (7 track)
		2 Oscilloscopes
		1 WWV timing receiver
		DF equipment
		Communication equipment
j.	Barking Sands, Island of Kauai, Hawaii	T/M receiving and recording
		Phone line to [redacted] (toll)
		* Tri-helix antenna
k.	Christmas Island	*3 T/M 1302 receivers
		*1 Ampex tape recorder
		*1 Quad-helix antenna
		*1 WWV timing receiver
		*1 SSB receiver/transmitter and antenna
		*1 HF radio system

* Added facility or equipment

[redacted]

A3 LAUNCH OPERATIONS

A3. 1 Launch Time

In order to obtain adequate data from the sun position indicators, the time of launch will be between 1115 PST and 1500 PST.

A3. 2 Recovery Force Readiness

With the exception of Paragraph 4. 2. 2. 6, the launch criteria listed in Section 4. 2 in the basic text are applicable to the flight. Paragraph 4. 2. 2. 6 is revised as follows:

a. Four RC-121 radar aircraft
b. Eight C-119J recovery aircraft
c. One C-130A recovery aircraft
d. Three surface ships
e. One WV-2 aircraft No. 137890
f. One Electra aircraft
g. Two T/M aircraft.

A3. 3 Telemetry Calibrations

Telemetry calibration data for real-time measurements are included in the Notes 7 and 12 of Table A8-1. These data are to be checked by LMSD/61-71 and verified in a TWX to LMSD/61-41 and the STC not later than two days prior to launch.

A4 ORBIT OPERATIONS

A4. 1 Command Operations

Both normal and alternate re-entry are programmed for Passes 17 and 18 to assure recovery following one day of active orbital life. Both passes are programmed to further assure ejection on the recovery pass in the event an inadvertent SKIP command is received by the satellite on Pass 16.

[redacted]

In order to preclude the possibility of an inadvertent REPEAT command being received by the satellite on Pass 16, either of the following procedures will be employed at the direction of the STC:

a. On Pass 15, [redacted] will send Command 1 to put the increase/decrease switch in the increase position.

b. On Pass 15, [redacted] will transmit final adjustments to the orbital programmer for the recovery pass. Following fade on Pass 15 and prior to beacon turn-on for Pass 16, the [redacted] and [redacted] radar command capability will be disabled by removal of the radar center pulse to prevent inadvertent adjustments to the programmer that could preclude recovery.

A5 RECOVERY OPERATIONS

A5.1 General

The portions of the basic text which refers to recovery pass determination and alternate re-entry selection are not applicable for this flight.

A5.2 Capsule Re-entry Sequence

Event	Time (sec)	Remarks
1	T - 94.5	D Timer Start
2	T - 79.5	D Timer initiates following:
		a. T/M battery activated
		b. Turn on filament and oscillators
		c. T/M transducer switch energized
		d. 200v dc to T/M transmitter plate
		e. Energize radio beacon from capsule 12v dc battery Pack 1
3	T - 2.5	D Timer switch initiates transfer signal
		a. T/C thermal batteries activated
4	T - 1.5	Electrical disconnect squibs fire, activating T/C programmer
5	T - 0	D Timer switch closure blows separation bolts causing capsule-satellite separation

[redacted]

Event	Time (Sec)	Remarks
6	T + 1.9	T/C Programmer Event 1; spin valve actuated
7	T + 3.15	T/C Programmer Event 2; retro-rocket ignition
8	T + 13.9	T/C Programmer Event 3; de-spin valve actuated
9	T + 15.4	T/C Programmer Event 4; thrust cone separation a. Electrical disconnect squibs fire b. Thrust cone separation bolts fire c. Thrust cone "Off"
10	T + G Action	
	G (Increasing) (T + 405 approx)	Initial 3-g deceleration level closes G switches
11	G (Decreasing) (T + 504 approx)	Deceleration below 3 g's starts timing circuits Q1, 2, 3, and 4
12	G (Decreasing) (T + 546 approx)	Timing circuits fire, initiating the following events: a. Relay closures K7 and K9 fire Set 1 of 4 chute eject squibs from battery Pack 1 b. Relay closure K8 and K10 fire Set 2 of 4 chute eject squibs from battery Pack 2 c. Relay closure K8 also switches battery Pack 1 parallel with battery Pack 2 to drive radio beacon d. K4 latches and energizes light beacon and de-energizes circuits Q1 and Q2.
13	(T + 549 approx)	Chute eject squibs fire, initiating the following action: a. Chute cover ejects b. Main chute ejects reefed c. Main chute dis-reefs

[redacted]

A5.2.1 Recovery capsule telemetry Channels 7, 9 and 11 will be used to obtain capsule performance information. Channels 7 and 9 will measure one set of events during the separation sequence and another set of events during the recovery sequence. The oscillator inputs will be switched when the thrust cone is separated. Channel 11 will measure axial acceleration during both the separation sequence and the recovery sequence.

A5.2.2 Figure A8-1 shows the nominal voltage levels which indicate that normal separation and recovery sequence have occurred. The capsule telemetry signal has a bandwidth of ±50 kc; capsule telemetry receivers are to be adjusted accordingly. The capsule telemetry battery will supply power for at least 21 minutes.

A5.3 <u>Re-entry Telemetry Aircraft Operations</u>

A5.3.1 The re-entry telemetry aircraft will be positioned approximately 30 nautical miles south of the capsule separation point, directly under the orbiting satellite on the recovery pass to receive recovery capsule telemetry signals during satellite re-orientation, capsule separation, and the initial re-entry trajectory. The nominal on-station position of this aircraft at capsule separation will be $54^{\circ}15'$ N latitude and $164^{\circ}48'$ W longitude with an aircraft course of 167.5° true. However, immediately following computation of the actual orbit ephemeris, the STC will determine the actual separation time and the deviations from nominal aircraft position and course required to place the aircraft 30 nautical miles south of the separation point and parallel to the orbit path. The STC will transmit this information to [redacted] for relay to the aircraft commander.

A5.3.2 The re-entry telemetry aircraft will depart with sufficient time to arrive on station no later than separation time, T - 30 minutes. Single sideband radio communications will be established with [redacted] on the following operational frequencies for an equipment status report at T - 30 minutes, for acquisition instructions, and for data relay:

[redacted]

a. 17624.0 kc -- primary
b. 6741.0 kc -- secondary (1)
c. 11214.0 kc -- secondary (2)

Alternate single sideband communications may be established with the HCC on 11214.0 kc if the [redacted] net becomes inoperative. However, transmissions by the telemetry aircraft on 11214.0 kc should be avoided after T + 5 minutes due to possible interference with Recovery Force communications. Radio silence will be maintained by the re-entry telemetry aircraft while receiving telemetry signals to avoid r-f interference with data recording.

A5.3.3 At T - 10 minutes, the re-entry telemetry aircraft will assume an inbound course (nominal 167.5° true) designed to cross the on-station position at T - 0. This heading will be varied to optimize maximum signal strength.

A5.3.4 The telemetry aircraft will begin search operations at T - 10 minutes with receivers tuned for acquisition of the capsule telemetry signal on 228.2 mc and the vehicle telemetry signal on 237.8 mc. If the vehicle telemetry signal is received first, reception of this signal will be optimized until acquisition of the capsule telemetry signal. Tracking or search operations will be terminated at signal fade or at T + 10 minutes if no signals are received.

A5.3.5 Immediately following fade of the telemetry signal, the re-entry telemetry aircraft will advise the [redacted] via SSB radio the time of signal acquisition and fade, to the nearest second, in GMT and the deviations from nominal frequencies. The real-time data readout and reporting requirements are listed in Table A8-1. [redacted] will relay this information to the STC.

A5.4 [redacted] Tracking Station Recovery Operations

A5.4.1 On the recovery pass, the [redacted] will track the Agena telemetry signal with the tri-helix antenna and the capsule telemetry signal with the TLM-18 antenna. Acquisition of the Agena telemetry signal with the

[redacted]

tri-helix antenna will be accomplished using standard acquisition procedures. Procedures for acquisition of the capsule telemetry signal by the TLM-18 will vary as a function of the actual orbit and predicted impact point. In general, the TLM-18 will be positioned at the impact point azimuth using a sector scan. The amplitude of the sector scan will be 20° (±10°) for impact azimuths between 345° and 15°. The scan amplitude will be increased 3/4° for each 1° of azimuth over 15° for the eastern sector or under 345° in the western sector.

The TLM-18 antenna acquisition elevation will be 2°. Until acquisition of the capsule signal by the TLM-18, one receiver operating on signals from the tri-helix will be tuned to the 228.2-mc capsule telemetry signal. If the capsule telemetry signal is acquired with the tri-helix before TLM-18 acquisition, the tri-helix will be positioned on the capsule until definite TLM-18 acquisition after which the tri-helix will resume tracking on the satellite telemetry signal. If the TLM-18 loses the capsule signal, the tri-helix will be positioned to assist in reacquiring the capsule signals. TLM-18 angle data recorded after auto-track has been established, will be transmitted to the PAC when requested by the System Test Director. These angle data will be reduced by the computer to provide a predicted impact point.

A5.4.2 [redacted] will report the system time of acquisition and deviations from nominal frequencies to the STC as soon as possible. When the TLM-18 azimuth rate approaches 0°/second or when the telemetered capsule recovery events are received, [redacted] will report antenna azimuth and elevation immediately to the STC and the HCC. [redacted] will also report confirmation of capsule separation and telemetered recovery events to the STC as specified in Table A8-1 and record all capsule telemetry signal or magnetic tape.

A5.4.3 All antenna bearings from South Point and Barking Sands, subsequent to acquisition, will be reported to [redacted] These bearings will be relayed immediately to the STC and the HCC by [redacted] [redacted] will plot the South Point bearings, the Barking Sands bearings, and its own bearings to

[redacted]

determine the approximate capsule trajectory and will relay these data to the STC and the HCC over the control voice line.

A5.5 <u>South Point Facility Recovery Operations</u>

A5.5.1 For this operation either the manually-slewed Canoga or the motor-driven radiation quad-helix antenna and two Nems-Clarke 1302-A receivers will be utilized at the PMR facility at South Point, Hawaii. Existing communications, recording, and timing systems will be used.

A5.5.2 If the orbit period is such as to permit nominal re-entry or re-entry west of [redacted] South Point will scan ±90° about a 270° azimuth at an antenna elevation of 10° at the rate of once per 15 seconds from ETPD - 0 until ETPD + 3 minutes.

A5.5.3 If the satellite path is between [redacted] and South Point, the quad-helix antenna will scan ±90° about a 180° azimuth at the rate of once per 15 seconds from ETPD - 0 until ETPD + 5 minutes. The antenna elevation will be varied cyclically from 10° to 70° to 10° in 20° steps at the rate of one step per scan.

A5.5.4 If the satellite path is east of South Point, the quad-helix antenna will scan ±90° about a 90° azimuth at the rate of once per 15 seconds from ETPD - 0 until ETPD + 5 minutes. The antenna elevation will be varied cyclically from 10° to 70° to 10° in 20° steps at the rate of one step per scan.

A5.5.5 If no capsule signals are acquired before ETPD + 5 minutes, the quad-helix antenna will be positioned at 180° azimuth and 10° elevation, and the telemetry receivers will be monitored until ETPD + 30 minutes. If [redacted] acquires the capsule signals, it will provide South Point with acquisition information.

A5.5.6 Once acquisition is achieved with the quad-helix antenna, the 60-foot antenna will attempt to track the capsule, using the narrower beamwidth to

[redacted]

obtain more accurate bearings at and after parachute deployment. All acquisitions will be reported immediately to [redacted] The capsule parachute deployment telemetry sequence and the antenna azimuth at parachute deployment will be reported. If the parachute telemetry sequence is not received before signal fade, the system time of fade and the antenna azimuth and elevation will be reported. Subsequent to acquisition, South Point will report antenna bearings to [redacted] All 60-foot antenna data, position azimuth and elevation, and suitable timing signal will be recorded on magnetic tape as this tape will be delivered to the HCC for transmittal to Sunnyvale.

A5.6 <u>Barking Sands Facility Recovery Operations</u>

A5.6.1 The PMR facility at Barking Sands, Kauai, is augmented by the addition of an LMSD tri-helix antenna. Barking Sands will maintain communication with [redacted] via toll telephone for exchange of tracking and acquisition data. At ETPD - 15 minutes, Barking Sands will position the tri-helix antenna at the acquisition azimuth and 10° elevation. From ETPD - 5 minutes until ETPD + 5 minutes, the Barking Sands tri-helix antenna will scan $\pm 90^{\circ}$ about a 0° azimuth at the scan rate of 10° per second. Barking Sands will search for the capsule telemetry signal. Barking Sands is directed not to activate any tracking radars during the operation.

A5.6.2 Subsequent to acquisition, Barking Sands will report antenna bearings to [redacted] All acquired capsule telemetry signals will be recorded on magnetic tape with a timing signal.

A5.7 <u>Christmas Island Facility Recovery Operations</u>

A5.7.1 If the satellite path is east of Christmas Island, the quad-helix antenna will scan $\pm 90^{\circ}$ about a 90° azimuth at the rate of once per 15 seconds from ETPD + 3 minutes until ETPD + 8 minutes. The antenna elevation will be varied cyclically from 10° to 70° to 10° in 20° steps at the rate of one step per scan.

[redacted]

A5.7.2 If the satellite path is west of Christmas Island, the quad-helix antenna will scan ±90° about a 270° azimuth from ETPD + 3 minutes until ETPD + 8 minutes. The antenna elevation will be varied cyclically from 10° to 70° to 10° in 20° steps at the rate of one step per scan.

A5.7.3 If the satellite path is a near overhead pass at Christmas Island (±2° W longitude), the quad-helix antenna will scan 360° in azimuth at the rate of once per 30 seconds from ETPD + 3 minutes until ETPD + 8 minutes. The antenna elevation will be varied cyclically from 10° to 70° to 10° in 20° steps at the rate of one step per 360° azimuth.

A5.7.4 The Christmas Island Facility will maintain continuous HF communications with the southern telemetry aircraft for exchange of acquisition and tracking information and will relay this information to the HCC as soon as possible over the SSB radio.

A5.7.5 If no capsule signals are acquired before ETPD + 8 minutes, the quad-helix antenna will be positioned at 180° azimuth and 10° elevation and the telemetry receivers will be monitored until ETPD + 30 minutes. If no signals are acquired before ETPD + 30 minutes, a negative report will be submitted to the HCC over SSB radio.

A5.7.6 Once acquisition is achieved the quad-helix antenna will manually track the capsule, and the telemetry and beacon signals will be recorded on magnetic tape. Immediately after the parachute deployment telemetry sequence is recorded, Christmas Island will so report to the HCC over the SSB radio. The antenna azimuth will be reported to the telemetry aircraft over UHF or HF radio immediately after acquisition and at intervals of one minute until parachute deployment.

[redacted]

A5.8 Surface Ship Deployment and Operations

A5.8.1 The surface ship deployment procedure outlined in the basic text of the STD will not apply for this flight.

A5.8.2 In addition to the USNS Haiti and Dalton Victory, a third ship (Destroyer) will be integrated with the Recovery Force to increase downrange sea retrieval capability. Figure A7-2 presents the deployment of all surface units for a nominal orbit period and for orbit period variations of ±1.5 minutes. Figure A7-3 presents the sea recovery range capability of the surface ships.

A5.8.3 The surface ships will depart with sufficient time to arrive on initial deployment stations by T + 4 hours (initial positions same as nominal positions for Orbit pass 17, see Figure A7-2). Re-deployment of the surface ships will be made laterally along the individual initial deployment latitudes for variations in orbit period.

A5.8.4 The Haiti Victory will be positioned 60 nautical miles south of the nominal impact point and will receive and record capsule telemetry if the capsule impacts in the predicted recovery area. The quad-helix antenna, until acquisition, will scan ±90° about 360° azimuth at the rate of once per 15 seconds beginning at ETPD - 5 minutes. From ETPD - 5 minutes until ETPD - 60 seconds, the antenna elevation will be maintained at 10°. After ETPD - 60 seconds, the antenna elevation will be increased 20° per scan from 10° to 70°. At ETPD + 15 seconds, the scan mode will rotate 180° to scan the southern sector. The antenna elevation will be decreased from 70° to 10° at the rate of 20° for each 15-second scan during this search of the southern sector. If the capsule signals are not acquired by ETPD + 2 minutes, the antenna elevation will be raised from 10° to 30°, and a 360° azimuth scan will be initiated at the slewing rate of 10° per second and continued for two minutes.

If the capsule signals are not acquired by ETPD + 4 minutes, the antenna will be positioned at 180° azimuth and 10° elevation and the telemetry receivers

[redacted]

monitored until ETPD + 30 minutes. When the capsule signals are acquired, the antenna will begin manual tracking as a function of maximum signal strength and all telemetry and beacon signals will be recorded on magnetic tape as specified in the Detailed Recording Requirements. Bearings from this antenna will be reported at intervals of one minute to [redacted] for relay to STC. The DF equipment will be operated normally and will be used to obtain refined capsule directional data after acquisition. When the capsule bearing becomes steady, the Haiti Victory will report position and capsule bearing to the northern Command RC-121 over UHF and to the HCC through PMR immediately, and proceed in the direction of the acquired signals. If the capsule signals are not acquired the Haiti Victory will so report over SSB radio through PMR to the HCC at ETPD + 30 minutes.

A5.8.5 The Destroyer will be positioned at 16° N latitude for the nominal case. This ship does not have a telemetry receiving capability and will be utilized only for sea retrieval of the capsule.

A5.8.6 The Dalton Victory will be positioned at 8° N latitude for the nominal case, directly under the satellite path on the recovery pass to enable reception of the capsule telemeter signal and the capsule beacon signal in the extended range area. The quad-helix antenna, until acquisition, will scan ±90° about 360° azimuth at 10° elevation at the rate of once per 15 seconds from ETPD - 0 until ETPD + 3 minutes. From ETPD + 3 minutes until ETPD + 5 minutes, the quad-helix antenna will give full area coverage by scanning ±90° about 360° azimuth with antenna elevation increasing and decreasing from 10° to 170° to 10° in increments of 20° per scan. The scan rate will be once per 15 seconds. After ETPD + 5 minutes the antenna will be positioned at 10° elevation and 180° azimuth. In the event the Dalton Victory acquires the capsule signals, the telemetry will be recorded on magnetic tape as specified in the Detailed Recording Requirements, and antenna acquisition and bearing will be immediately reported through PMR to the HCC. Bearings will be relayed to HCC at intervals of one minute. When the parachute deployment telemetry sequence is received, or when the

[redacted]

antenna azimuth becomes constant -- whichever is first -- the Dalton Victory will so report verbally over SSB radio through PMR to the HCC and provide ship position and antenna azimuth and elevation. If no capsule signals are acquired by the Dalton Victory, a negative verbal report will be submitted over SSB radio through PMR to the HCC at ETPD + 30 minutes.

A5.9 Airborne Recovery Force Deployment

A5.9.1 The Airborne Recovery Force deployment for a nominal orbit period and for orbit period variations of ±1.5 minutes is presented in Figure A7-2. This force will be deployed to provide a maximum air retrieval capability in the 60x200-nautical mile primary recovery area while emphasizing capsule detection in the extended 60x440-nautical mile secondary recovery area; however, air retrieval will be attempted in the secondary area. Telemetry aircraft will also be deployed south of the secondary area to provide extended capsule detection capability, to approximately 5° south latitude, for the nominal condition.

A5.9.2 Three RC-121 radar search aircraft will be deployed in the northern area to provide overlapping radar coverage of the primary and secondary air retrieval areas. A fourth RC-121 aircraft will be deployed in the extended surface recovery area to provide communications control of the forces within that area. Figure A7-4 presents the detailed deployment of the RC-121 aircraft. Each RC-121 aircraft will be equipped with SSB radio for direct and continuous communications with the HCC. Separate HF communications will be maintained with the remaining elements of the Recovery Force.

A5.9.3 Due to the extended deployment of the Recovery Force, there will be a separate RC-121 aircraft designated as Command Aircraft for the forces in each of the three operational areas. A separate HF frequency will be assigned as the control/data telling frequency in the primary recovery area (northern area) and the combined secondary and extended recovery areas (southern area).

A5.9.4 In the event that one of the four RC-121's aborts the mission, the remaining three aircraft will be deployed to assure continuous radar coverage of the primary and secondary recovery areas at the sacrifice of the extended communications control aircraft position. In this event, alternate communication will be established between Christmas Island and detection aircraft in the extended recovery area, over HF and/or SSB radio for force control and data telling.

A5.9.5 An aircraft departing from Hickam AFB will fly a radar peaking mission for the on-station RC-121 aircraft prior to the recovery pass.

A5.9.6 Six C-119J recovery aircraft will be deployed in the primary recovery area and the remaining three C-119J and the C-130 aircraft will be deployed in the secondary recovery area. Figure A7-5 presents the detailed deployment of the recovery aircraft.

A5.9.7 The C-130 aircraft will be positioned at the highest altitude consistent with gross weight and proper cruise control and will not attempt aerial recovery above 15,000 feet altitude.

A5.9.8 The WV-2 will perform an FIC survey of the predicted impact area and will assume a final position 120 nautical miles south and 100 nautical miles west of the predicted impact point by ETPD - 30 minutes. The FIC aircraft will communicate with the primary recovery area command aircraft on the northern primary HF frequency, will search for the capsule signals, and will attempt to derive a DF bearing from any of the signals acquired. All telemetry signals received will be recorded. Signal acquisitions and bearings will be reported immediately to the primary area command RC-121.

A5.9.9 Telemetry aircraft will be deployed along the satellite flight path as shown in Figure A7-2. Telemetry reception range of these aircraft is expected to be 120 to 150 nautical miles. Placement of these aircraft in order of position priority and the RC-121 aircraft assigned as directional controller for the nominal orbit will be as follows:

[redacted]

Aircraft No.	Position	Control Responsibility
1	540 nautical miles North of DaltonVictory	Vega 3
2	390 nautical miles North of Dalton Victory	Vega 3
3	240 nautical miles North of Dalton Victory	Vega 3
4	180 nautical miles South of Dalton Victory	Vega 4
5	600 nautical miles South of Dalton Victory	Vega 4

The telemetry aircraft will be on station by ETPD - 1 hour. For orbits other than nominal, these aircraft will be positioned to provide continuous telemetry coverage south of the predicted impact point as shown in Figure A7-3.

A5.9.10 JC-54 type aircraft will be utilized for Positions 1 through 4 while WV-2 aircraft No. 137890 will be located in Position 5 due to its long-range SSB radio capability. Telemetry aircraft No. 1 through No. 4 will establish and maintain continuous HF communications with their respective control aircraft on the primary southern area frequency. Telemetry aircraft No. 5 will establish and maintain continuous HF or SSB communications with Vega 4. In the event of communications breakdown, HF and/or SSB communications will be established between Christmas Island and Aircraft No. 4 and No. 5 for control and data teiling operations.

A5.10 Airborne Recovery Force Operations

A5.10.1 The RC-121 aircraft radar will search for the chaff and the radar reflective parachute. All radar and DF returns from elements of the Recovery Force and bearings from the surface stations will be plotted by the RC-121 aircraft as soon as possible to determine the most probable capsule location. Recovery aircraft will not be vectored toward a radar return until the radar return has been correlated with sufficient DF bearings to establish a fix.

After a fix has been established, the RC-121 Area Commander will notify the nearest recovery aircraft and then vector the aircraft to an intercept flight path. The recovery aircraft will follow the RC-121 instructions and use the DF gear for homing. In the event that no DF signals are acquired by the Recovery Force, the radar returns will be investigated at the discretion of the Task Force Commander.

[redacted]

A5. 10. 2 When the recovery aircraft makes visual contact with the capsule parachute, an air recovery will be accomplished. Repeat passes will be made, if necessary, until recovery is successful or until the capsule impacts in the water. The aircraft completing recovery will return to Hawaii as directed by the HCC and will be escorted by either a C-119J, an RC-121, the C-130, or an SC-54 (Air Rescue) aircraft. The remainder of the Recovery Force will return to Hawaii as directed by the HCC.

A5. 10. 3 The recovery aircraft will use the DF equipment in searching for the capsule beacon signal. The crystal control beacon should eliminate the detuning procedures used; however, any capsule beacon or telemetry frequency deviation will be reported by [redacted] and [redacted] to the HCC through the STC and relayed to the RC-121 commanders.

A5. 10. 4 Should the air recovery be unsuccessful, the search aircraft will, after sighting the capsule, circle the area of water impact and drop marker aids. The aircraft will be equipped with strobe light bombs, smoke bombs, and dye markers for this purpose. In addition, Pelicans 8, 9, and 10 will be equipped with a RATU to provide a beacon marker. The RATU's will be dropped at the direction of the STC. Each RATU is equipped with an acquisition beacon that will transmit at 228. 2 mc with an operating life of 30 hours.

A5. 10. 5 The capsule beacon and flashing light minimum operating life is 10 hours and the capsule will float for a minimum of 45 hours.

A5. 10. 6 If recovery operation conditions permit, the primary recovery area Command RC-121 will transmit brief, best-available-information reports to the HCC over SSB at ETPD + 5 and 15 minutes (±2 minutes). The secondary recovery area Command RC-121 will submit brief, best-available-information reports to the HCC at ETPD + 10 and 20 minutes (±2 minutes). The extended recovery area Command RC-121 will submit brief, best-available-information reports to the HCC at ETPD + 15 and 25 minutes (±2 minutes). If the re-entry capsule is not sighted before ETPD + 30 minutes, the northern Command RC-121 will report a brief recap of most reliable data received to the HCC for

[redacted]

relay to the STC at that time. The southern Command RC-121 and extended area Command RC-121 will make their recap reports at ETPD + 35 and ETPD + 40 minutes respectively.

A5.10.7 The data to be reported are aircraft station position, magnetic signal bearing, and local time for each reliable signal acquisition. Range and azimuth with local time and aircraft station position will be reported for each valid sighting. The report shall also contain the Task Force Commander's conclusions regarding the quality of reported signals and bearings, results of triangulation attempts, and most probable impact location. These data will be relayed to the STC immediately upon receipt by the HCC to enable the PAC to determine the most productive search areas.

A5.10.8 If the capsule has not been located by ETPD + 30 minutes in the primary recovery area or ETPD + 35 minutes in the secondary and extended recovery areas, the Airborne Recovery Forces will initiate search, at the direction of the HCC, based on the latest impact prediction received from the STC. If this is not available, the HCC will direct a search of the most probable impact areas as determined from tracking triangulation and other available data.

A5.10.9 The telemetry aircraft will search for the capsule telemetry signal and the beacon signal. All capsule signals acquired will be recorded on magnetic tape with a timing signal. Capsule signal acquisitions will be reported immediately to the area Command RC-121 over the southern area HF frequency.

When the parachute deployment telemetry sequence is received, it will be reported. The telemetry aircraft will attempt to determine the capsule bearing at fade or at parachute deployment. If this can be accomplished, the bearing and aircraft position will be reported to the area Command RC-121.

A5.10.10 If one of the telemetry aircraft visually acquires the capsule in the air or in the water, the position will be reported immediately to the area Command RC-121. The telemetry aircraft will circle the capsule while

[redacted]

maintaining 100 percent visual lock-on until arrival of a surface vessel or until fuel supply requires return to base. While hovering over the floating capsule the telemetry aircraft will attempt to provide a transmission compatible with the receiving equipment on Christmas Island so that the capsule bearing from Christmas Island may be determined more accurately.

A5.11 Hawaiian Control Center Recovery Operations and Communications

A5.11.1 The HCC-STC communications will be augmented by the addition of two voice lines (toll telephone) that will be effective from ETPD - 1 hour until ETPD + 4 hours.

A5.11.2 The HCC will direct and control acquisition, recovery, and search operations of the Christmas Island facility, the telemetry receiving aircraft, and the recovery forces. The primary communication link between the HCC and the surface elements will be the SSB frequency. The three surface ships will communicate with the HCC through PMR and the PMR representative at the HCC.

A5.11.3 The HCC will maintain a real-time analysis for integration of all incoming data to determine the most probable impact point and search areas and will relay all reported data to the STC immediately. Bearings from [redacted] South Point, Barking Sands, and the ships will be plotted. The [redacted] TLM-18 bearing, after the azimuth rate becomes zero, and bearings reported from South Point and Barking Sands will be relayed to the Command RC-121's by the HCC as soon as possible. All bearings will be relayed immediately to the STC for analysis of the capsule trajectory.

A5.11.4 The accuracy of all reported bearings must be considered. The accuracy of the [redacted] TLM-18 antenna is within 1°. The accuracy of the Barking Sands tri-helix antenna is within 5°. The accuracy of the quad-helix antennas at South Point and on board the recovery ships is within $\pm 2^{\circ}$.

[redacted]

A6 POST-RECOVERY OPERATIONS

A6.1 Haiti Victory Data

The Haiti Victory will proceed toward Pearl Harbor at the best speed of advance immediately after termination of the search operation. If the capsule telemetry data have been acquired, the two HRS-3 helicopters will fly it to the HCC as soon as the ship reaches HRS-3 range of Hickam Air Force Base.

A6.2 Dalton Victory Data

If the Dalton Victory acquires telemetry data from the capsule, an aircraft data pick-up will be accomplished only at the discretion of the STC.

A6.3 Christmas Island and Telemetry Aircraft Data

An aircraft will pick up recovery capsule data acquired by the Christmas Island facility and fly it to Hickam AFB on the day of recovery operations. Christmas Island and JC-54 telemetry aircraft data will be delivered to the HCC as soon as possible.

A6.4 South Point and Barking Sands Data

Data from South Point and Barking Sands Tracking Stations, including magnetic tapes, set-up sheets, maps and/or logs of the tracking operation, will be hand-carried by PMR personnel, flown to Hickam AFB, and delivered to the HCC.

A6.5 Transport of Data to Sunnyvale

All recovery capsule data acquired by the receiving facilities in the recovery region will be hand-carried to Flight Data Reports, LMSD/61-44, on the first available commercial airline flight.

[redacted]

A6.6 Tracking Station Post-Recovery Operations

The tracking stations will continue observations of the Discoverer Satellite S-band beacon and telemetry transmission until the battery power is exhausted. The orbital programmer is programmed as shown in Figure A2-7. Command transmission and tracking after the recovery pass will be at the direction of the STC.

A7 PERSONNEL SUBSYSTEM EVALUATION

Observation of selected personnel subsystem operations will be conducted. The data collected will concern critical operations pertaining to tracking, commanding, and data acquisition, wherein a failure in the personnel subsystem could result in serious degradation in Discoverer system performance.

The specific procedures and operations to be observed will be determined by LMSD Personnel Subsystem with the concurrence of Operations Integration. Additional required data will be obtained from the various voice tapes.

A8 TABLES AND ILLUSTRATIONS

The following tables and illustrations are applicable to the flight of Discoverer Satellite 1061/Discoverer Booster 253/AET Payload only. Each table or figure is given the basic number of the section of the general STD to which it applies, the letter A to denote Appendix material, and a number to sequence items in the same category.

[redacted]

Table A2-1

NOMINAL FLIGHT PLANNING DATA

ITEM	DATA
DISCOVERER	
S/N	1061
Payload	AET
Fuel	UDMH, 3743 lb
Oxidizer	IRFNA, 9598 lb
Launch weight	15,857 lb
THOR	
S/N	253
Launch weight	124,166 lb
Fuel	RJ-1
Oxidizer	Liquid oxygen
LAUNCH	
Site	VAFB, SM-75-3, Pad 4
Date	October, 1960
Pad azimuth	181°28'53.86"
Launch azimuth	172°
Nominal airborne Command 5 backup	14 sec
Orbital boost time	243.2 sec
Downrange T/M ship location	13° N, 118.25° W
Downrange T/M ship heading	353° T
Programmer setting	5609 seconds (step setting 19)
INJECTION	
Time	T + 477.7 sec
Location	22° 16.3' N, 119°8.4' W
Altitude	130 sm
Azimuth (inertial)	172°
Nominal velocity	25,963 ft/sec

[redacted]

Table A2-1 (Continued)

ITEM	DATA
ORBIT	
Period	93,485 min (5610 sec)
Apogee	426 sm (370 mn)
Perigee	130 sm (113 nm)
Eccentricity	0.035
Average regression rate (17 passes)	23.5°
Reset latitudes	20°N [redacted] 32°N [redacted] northbound) or 36°N [redacted] southbound) 40°N [redacted] northbound) or 45°N [redacted] southbound) 60°N [redacted]
Inclination angle	81.83°
RE-ENTRY	
Re-entry T/M aircraft location	
RECOVERY	
Aircraft (type and quantity)	C-119's (9), RC-121's (4), telemetry receiving (3), C-130 (1)
Surface ships (recovery)	Dalton Victory and Haiti Victory + 1 auxiliary recovery ship
Surface ship initial locations	
Surface ship helicopters	HR-3 (2 on each Victory ship)
Recovery pass programmed	17
Predicted Impact area center	24°N, 158° 48.7' W
ETPD	T + 26.6 hours

[redacted]

Table A4-1

INSTRUMENTATION AND CAPSULE EQUIPMENT REQUIRED TO BE OPERATIVE AT LAUNCH

1. Agena Telemetry

 a. Continuous Channels:

 6 – Payload quantity. Subcarrier must be present

 7 – Payload quantity. Subcarrier must be present

 8 – Payload quantity. Subcarrier must be present

 10 – Payload quantity. Subcarrier must be present

 b. Commutated Channels:

 12 – Subcarrier must be present and commutator running

 13 – Subcarrier must be present and commutator running

 15 – Subcarrier must be present and commutator running; points 43, 49, and 51 must be present. Channel 16, commutator points 50 and 52 are an acceptable substitution for Channel 15, commutator points 49 and/or 51.

 16 – Subcarrier must be present and commutator running; points 2, 4, 6, 8, 10, 18, 20, 22, 33, and 45 must be present. Channel 1 is an acceptable substitution for Channel 16, points 20 and/or 22. Channel 11 is an acceptable substitution for Channel 16, points 2 and/or 4, 6, 8.

 17 – Subcarrier must be present and commutator running

2. Capsule Telemetry and Equipment

 a. Continuous Telemetry Channels:

 7 – Subcarrier must be present

 9 – Subcarrier must be present

 11 – Subcarrier must be present

Table A5-1

SS/D TIMER SEQUENCE FOR DISCOVERER SATELLITE SERIAL 6205-1061

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	EVENT DESCRIPTION
	-0.1	Timer reset
0		Liftoff
0.1	0.1	Timer reset
		Timer warning (ground function
150	150	Start Fairchild Timer
163.4		MAIN ENGINE SHUTDOWN
167	167	Programmed destruct to lockout
		Uncage IRP gyros
167	167	Flight controls power ON (backup)
172.4		VERNIER SHUTDOWN
181.5	181	Initiate vehicle pneumatics control
		Open pneumatic supply valve
181	181	Fire explosive bolts
181.5	181.5	Arm timer delay circuit
		$-1.65°$/min pitch rate from integ. pot.
181.5	181.5	Fire retro rockets
190	190	Remove $-40°$/min. yaw rate (no yaw correction required)
195		Enable Fairchild Timer delay
196		Command $-3.6°$/sec pitchover program (pitchover 28.8°)
196	196	Fire H/S fairing squib
204	204	Stop $-3.6°$/sec pitch rate
		Connect pitch H/S signal to pitch IRP gyro
204	204	Connect roll H/S signal to roll IRP gyro
208	208	Uncage integrator
		Accept Fairchild Timer and Beacon 5 delay signal*
208	208	Remove 28v dc from N_2 valve
		ORBITAL BOOST
222		Stop SS/D timer delay (norm. 14 sec) Fairchild Timer
224	210	Deactivate timer delay circuit
		Fire ullage rockets
		Activate H/S electrical pitch bias +4 1/2° offset
224	210	Preactivate hydraulics
233	219	Unground integrator input
		Connect accelerometer to integrator

* *Note: Beacon 6 ends timer delay and corrects integrator*

[redacted]

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	EVENT DESCRIPTION
233	219	Arm and fire gas gen squib, fire He valve
234	220	Pitch and yaw pneumatics OFF (backup)
		Open gas gen. arm and fire He valve
234	220	Close circuit to T/M OFF SWITCH
234.5	220.5	STEADY STATE THRUST
471.5	457.5	Arm pitch and yaw pneumatics
471.5	457.5	Engine cutoff safety switch
477.7	(463.7)	Engine shutdown by integrator*
		Disconnect accelerometer
		Ground integrator input
477.7	(463.7)	Activate pitch and yaw pneumatics
		REORIENTATION
498	484	Hydraulic shutdown, pitch and yaw
		Pneumatic ON (backup) and remove 28v to ullage rockets
		Disconnect integrator pitch rate pot.
		Command −40°/min yaw rate (180° yaw left)
498	484	Fire He and oxidizer vent valve squib
508	494	Calibrate T/M
		Open ground to accel. power amps
508	494	Apply 28v unreg. to SS/L power control
518	504	Stop T/M calibrate
		Open eng. shutdown, switch antenna, open flight control gain change relays and switch roll and yaw gyro TLM gain
518	504	Shutdown integrator power
768	754	Command +3.86°/min pitch rate (yaw rate removed)
		Connect roll H/S signal to yaw gyro
		Switch-out 0.1% regulated 400-cycle power
768	754	Shutdown +28.3v IRP ascent power
		ORBIT
895	881	T/M OFF
		SS/D Timer OFF, H/S to low gain
		Phase balance Phase A (spare)
		Phase balance Phase C (spare)
895	881	Fire fuel vent valve squib
		RECOVERY
	881	Restart SS/D Timer, H/S OFF

** Integrator to be set at a dial reading of 2112.5 representing a velocity to be gained of 16,900 fps.*

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	EVENT DESCRIPTION
X + 15	896	Command -45°/min pitch rate
X + 15	896	Arm capsule ejection squib
X + 92	973	Command -3.86°/min pitch rate (stop -45°/min pitch rate)
		SS/L Transfer Circuit 1
		SS/L Transfer Circuit 2
X + 92		Fire capsule plug disconnect squib
94.5	975.5	Command eject (fire capsule squibs)
X + 130	1010	Shutdown SS/D Timer, H/S ON, H/S to low gain

 [redacted]

Table A6-1
NOMINAL ORBIT SCHEDULE
(Based on a 93.5-Minute Period)

PHASE	EVENT	TIME (MIN)	LOCATION N LATITUDE (DEG)
Launch	Launch	0	34.8
	Start orbital timer	2.50 (150 sec)	--
	Separation	3.01 (181 sec)	--
	Nominal fire time	3.88 (233 sec)	--
	Nominal burnout and orbit injection	7.96 (477 sec)	--
	First crossing of equator	13.92 (836 sec)	0
	Beacon and T/M off	15.80 (950 sec)	12 (S)
Pass 1 (N-S) (40 sec RM interrupt)	Beacon and T/M on – reset enable	88.4	75
	65° N latitude (ref)	91.1	65
	Reset signal/command	92.7	60
	57.6° N latitude (ref) [redacted]	93.1	57.6
	Beacon and T/M off – reset disable	104.9	10
	End of Orbit 1	155	0
Pass 2 (N-S) (60 sec RM interrupt)	Beacon and T/M on – reset enable	181.9	75
	Reset signal/command	186.0	60
	57.6° N latitude (ref) [redacted]		57.6
	21.6° N latitude (ref)	195.6	21.6
	Beacon and T/M off – reset disable	198.4	10
	End of Orbit 2	248.5	0
Passes 3 thru 5	End of Orbit 3	342.0	0
	End of Orbit 4	435.5	0
	End of Orbit 5	529.0	0
Pass 6 (S-N) (20 sec RM interrupt)	Beacon and T/M on – reset enable	534.8	25
	Reset signal/command	538.8	40
	42.9° N latitude (ref) [redacted]	541.2	42.9
	Beacon and T/M off – reset disable	545.4	58
	End of Orbit 6	621.6	0

Table A6-1 (Continued)

PHASE	EVENT	TIME (MIN)	LOCATION N LATITUDE (DEG)
Pass 7 (S-N) (40 sec RM interrupt)	Beacon and T/M on – reset enable	629.2	25
	Reset signal/command	633.2	40
	42.9° N latitude (ref) [redacted]	634.7	42.9
	Beacon and T/M off – reset disable	638.8	58
	End of Orbit 7	716.0	0
Pass 8 (S-N) (60 sec RM interrupt)	Beacon and T/M on – reset enable	720.5	17
	Reset signal/command	724.5	32
	34.8° N latitude (ref) [redacted]	725.6	34.8
	Beacon and T/M off – reset disable	730.0	52
	End of Orbit 8	809.5	0
Pass 9 (S-9) (80 sec RM interrupt)	Beacon and T/M on – reset enable	813.9	17
	Reset signal/command	817.9	32
	34.8° N latitude (ref) [redacted]	819.0	34.8
	Beacon and T/M off – reset disable	823.4	52
	End of Orbit 9	902.9	0
Pass 10 (S-N) (100 sec RM interrupt)	Beacon and T/M on – reset enable	904.1	5
	Reset signal/command	908.5	20
	21.6° N latitude (ref) [redacted]	908.9	21.6
	57.6° N latitude (ref)	918.4	57.6
	Beacon and T/M off – reset disable	920.5	66
	End of Orbit 10	996.4	0
Passes 11 and 12	End of Orbit 11	1090.9	0
	End of Orbit 12	1183.4	0
Pass 13 (N-S) (20 sec RM interrupt)	Beacon and T/M on – reset enable	1213.9	61
	Reset signal/command	1218.0	45
	42.9° N latitude (ref) [redacted]	1218.5	42.9
	Beacon and T/M off – reset disable	1220.7	34
	End of Orbit 13	1276.8	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME (MIN)	LOCATION N LATITUDE (DEG)
Pass 14	End of Orbit 14	1370.3	0
	Beacon and T/M on – reset enable	1403.3	52
Pass 15	Reset signal/command	1407.4	36
(N-S)	34.8° N latitude (ref) [redacted]	1407.7	34.8
(40 sec RM interrupt)	Beacon and T/M off – reset disable	1411.0	22
	End of Orbit 15	1463.8	0
	Beacon and T/M on – reset enable	1490.7	75
Pass 16	Reset signal/command	1494.7	60
(N-S)	57.6° N latitude (ref) [redacted]	1495.5	57.6
(60 sec RM	34.8° N latitude (ref)	1501.0	34.8
interrupt)	Beacon and T/M off – reset disable	1504.5	22
	End of Orbit 16		
	Beacon and T/M on – reset enable	1584.2	75
Pass 17	Reset signal/command	1588.2	60
(N-S)	57.6° N latitude (ref) [redacted]	1588.9	57.6
(80 sec RM	21.6° N latitude (ref)	1597.3	21.6
interrupt)	Beacon and T/M off – reset disable	1600.5	10
	End of Orbit 17	1650.8	0
	Beacon and T/M on – reset enable	1677.7	75
Pass 18	Reset signal/command	1681.7	60
(N-S)	57.6° N latitude (ref) [redacted]	1682.4	57.6
(100 sec RM	21.6° N latitude (ref)	1690.8	21.6
interrupt)	Beacon and T/M off – reset disable	1694	10
	End of Orbit 18	1744.3	0

Table A8-1

REAL-TIME DATA READOUT AND REPORTING REQUIREMENTS

	MEASUREMENT		CHANNEL	PRIORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					TELEMETRY SHIP***	TELEMETRY AIRCRAFT***		NOTE
	NAME	NUMBER						[redacted]					PVT. JOE E. MANN	WV-2 137890	ELECTRA	
LAUNCH	Liftoff Signal	---	---	1	RT	X	Ascent	X	X							
	Thor Main Engine Cutoff	---	Thor 12	1	RT	X	Ascent	X	X							
	Agena Engine Ignition and Cutoff	B6	14	1	RT	X	Ascent	X	X				X			
	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		Ascent	X	X							
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	Ascent	X	X							
	11-Second Step Switch Position	H108	16-20	1	RT		Ascent	X	X				X			
	110-Second Step Switch Position	H109	16-22	1	RT		Ascent	X	X				X			
	Increase/Decrease Switch Position	H107	16-18	1	RT	X	Ascent	X	X				X			
	Payload Function Selector Setting	AET 14/15, 17/18, 20/21, 23/24	13-18 thru 13-24, 13-48 thru 13-54	1	RT	X	Ascent	X	X				X			
	Wave Train	AET 52	6	2	PPI	X	Ascent						X			1
ORBIT	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		1 thru 32	X	X	X	X	X				
	Command Verifications 1, 2, 3, 4	H112	11	1	RT	X	1 thru 32	X	X	X	X	X				
	Command Verifications 5, 6	H114	14	1	RT	X	1 thru 32	X	X	X	X	X				
	Programmer Period Readout (Console or Remote)	H110	1	2	RT		1 thru 32	X	X	X	X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	1 thru 32	X	X	X	X	X				
	11-Second Step Switch Position	H108	16-20	1	RT		1 thru 32	X	X	X	X	X				
	110-Second Step Switch Position	H109	16-22	1	RT		1 thru 32	X	X	X	X	X				
	Increase/Decrease Switch Position	H107	16-18	1	RT	X	1 thru 32	X	X	X	X	X				
	Reset Monitor Signal	H70	16-10	1	RT	X	1 thru 32	X	X	X	X	X				
	Programmer Pass Identification	H70	16-10	1	RT	X	1 thru 32	X	X	X	X	X				
	Re-entry Selector Switch Position	H117	16-45	1	RT		1 thru 32	X	X	X	X	X				2

Table A8-1 (Continued)

	Measurement: Name	Measurement: Number	Channel	Priority	Time* Readout Required	Report** to STC by Voice	Orbital Programmer Pass	Tracking Station: [redacted]					Telemetry Ship***: Pvt. Joe E. Mann	Telemetry Aircraft***: WV-2 137890	Telemetry Aircraft***: Electra	Note
ORBIT	Payload Function Selector Setting	AET 14-15, 17-18, 20/21, 23-24	13-18 thru 13-24, 13-48 thru 13-54	1	RT	X	1 thru 32	X	X	X	X	X				
	Control Gas Supply Pressure	D95	16-33	2	PP1		1 thru 32	X	X	X	X	X				
	Battery Bus Voltage	C1	16-38	2	PP1		1 thru 32	X	X	X	X	X				
	Horizon Scanner – Pitch	D37	17-40	3	PP2		2, 9, 13, 15, 24, 28, 31	X		X	X	X				3
	Horizon Scanner – Roll	D39	17-46	3	PP2			X		X	X	X				3
	SPI Temperature	D130	15-43	3	PP2			X		X	X	X				4
	SPI Pitch Angle – Lower	D128	15-51	3	PP2			X		X	X	X				4
	SPI Yaw Angle – Lower	D127	15-49	3	PP2			X		X	X	X				4
	SPI Pitch Ref. Voltage – Lower	D136	15-2	3	PP2			X		X	X	X				4
	SPI Yaw Ref. Voltage – Lower	D137	15-4	3	PP2			X		X	X	X				4
	SPI Pitch Angle – Upper	D138	16-52	3	PP2			X		X	X	X				4
	SPI Yaw Angle – Upper	D139	16-50	3	PP2		2, 9, 13, 15, 24, 28, 31	X		X	X	X				4
	Wave Train	AET 52	6	2	PP1		1 thru 16	X	X	X	X	X				1
	No Name Assigned	AET 26	12-2	2	PP1		9	X								10
	No Name Assigned	AET 40	12-9	2	PP1		9	X								10
	No Name Assigned	AET 48	12-13	2	PP1		9	X								10
RE-ENTRY	Programmer Period Readout (Console or Remote)	H110	1	3	RT		Recovery Pass				X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	2	RT	X					X	X				
	11-Second Step Switch Position	H108	16-20	3	PP2						X	X			X	
	110-Second Step Switch Position	H109	16-22	3	PP2						X	X			X	
	Reset Monitor Signal	H70	16-10	1	RT	X					X	X			X	
	Programmer Pass Identification	H70	16-10	2	RT						X	X			X	
	Re-entry Selector Switch Position	H117	16-45	1	RT						X	X			X	2
	Control Gas Supply Pressure	D95	16-33	2	PP1	X	Recovery Pass				X	X			X	

[redacted]

[redacted]

Table A8-1 (Continued)

	MEASUREMENT		CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					TELEM-ETRY SHIP***	TELEMETRY AIRCRAFT***		NOTE
	NAME	NUMBER						[redacted]					PVT. JOE E. MANN	WV-2 137890	ELECTRA	
RE-ENTRY	Battery Bus Voltage	C1	16-38	2	PP1		Recovery Pass				X	X			X	
	Horizon Scanner – Pitch	D37	17-40	1	PP2						X				X	3
	Horizon Scanner – Roll	D39	17-46	1	PP2						X				X	3
	SPI Pitch Angle – Lower	D128	15-51	2	See Note 5						X				X	5
	SPI Yaw Angle – Lower	D127	15-49	2	See Note 5						X				X	5
	SPI Pitch Ref. Voltage – Lower	D136	15-2	2	See Note 5						X				X	5
	SPI Yaw Ref. Voltage – Lower	D137	15-4	2	See Note 5						X				X	5
	SPI Pitch Angle – Upper	D138	16-52	1	PP2						X				X	5
	SPI Yaw Angle – Upper	D139	16-50	1	PP2						X				X	5
	Pitch Torque Signal	D41	17-38	2	PP1						X				X	6
	SS.D Timer Restart	D85	17-52	1	RT	X					X				X	
	Capsule Separation Event	AET 51	16-42	1	RT	X					X	X		X	X	7
	Payload Connector Dis-connect	AET 26	12-2	2	RT						X	X			X	12
	Beacon Battery 1 Voltage, Retro-Rocket Ignition, Despin Valve Actuated	---	Capsule 7	1	RT, PP1	X					X	X		X	X	8
	Thrust Cone Battery Voltage, Electrical Disconnect, Spin Valve Actuated	---	Capsule 9	1	RT, PP1	X					X	X		X	X	8
	Axial Acceleration	---	Capsule 11	1	PP1, PP2	X					X	X		X	X	9
	Beacon Battery 1 Voltage, 3G Switch Closure, 3G Switch Opening, Parachute Eject Relay K9 Energized, Parachute Eject Relay K9 De-energized	---	Capsule 7	1	RT, PP1	X					X	X		X	^	8
	Beacon Battery 2 Voltage, Parachute Eject Relay K10 Energized, Parachute Cover Off	---	Capsule 9	1	RT, PP1	X					X	X		X	X	8
	Capsule T/M Signal Strength	---	Capsule 7, 9, 11	2	RT		Recovery Pass				X	X		X	X	11

Table A8-1 (Continued)

NOTES:

1. Report the time of the start of the wave train, the elapsed time required for 100 pulses counted from the leading edge after at least 20 pulses from the wave train start, and the number of level shifts within this 100-pulse period. Refer to Figure A8-2.
2. Both tracks punched for nominal re-entry on Pass 17, positive re-entry on Pass 18.
3. Read when sun position indicator data are required in Notes 4 and 5 (until turnoff at start of reorientation). [redacted] reads on the recovery pass to indicate SS/D restart event if measurement D 85 is invalid.
4. Read 3 times at approximately 2-minute intervals correlated with system time on Pass 2 [redacted] and [redacted] on Pass 13 [redacted] on Pass 15 [redacted] on Pass 28 [redacted] and on Pass 31 [redacted] Readings at one system time only are required on Pass 9 [redacted] and Pass 24 [redacted] All [redacted] and [redacted]eadings are to be obtained as far north as possible. [redacted]ransmits data on Channels 15 and 16 to SV on 100-WPM/voice line after Pass 2; Three 10-second data samples at 2-minute intervals required.
5. Read at 1-minute intervals before reorientation, 20-second intervals during reorientation, and immediately prior to separation; correlate with system time. Channel 15 data will be read only if the data on Channel 16 do not appear to be valid. [redacted]ransmits data on Channels 15 and 16 to SV on 100-WPM/voice line after recovery pass; continuous transmission from acquisition to separation.
6. Read system time at start and finish of reorientation, voltage level prior to start of reorientation, and average voltage level during reorientation.
7. Reads 4.67 volts prior to separation, 1.33 volts after separation. Correlation within 2 seconds of exact system time is satisfactory for initial [redacted] and Electra report. [redacted]erifies that event has occurred by voltage level check.
8. The RT readout will contain a verification that each event has occurred. The PP1 readout will contain the system time of each event.
9. The [redacted]nd Electra PP1 readout will contain the average value and duration. The PP2 readout will contain a complete time history of acceleration and will include the system time of each data dropout and the time duration of dropout. [redacted]eads values 5 seconds prior to, at, and 5 seconds after parachute deployment.
10. Record voltage level at beginning, middle, and end of pass. Readout is to be accurate to at least 0.1 volt (2% bandwidth). Read out AET 40 and AET 48 after RT items and report them to the STC by voice within 5 minutes after the pass.
11. Provide a qualitative evaluation of signal reception.
12. Reads 1 volt prior to separation, out of band after separation.

---

*RT – *Read in real time*
PP1 – Read immediately after pass
PP2 – Read immediately after RT and PP1 readouts.

*** All data are also to be reported to the STC by 60-WPM teletype as soon as possible.*

**** Telemetry ships and aircraft will transmit real-time data immediately after signal fade so no interference with the vehicle telemetry signal will be generated.*

[redacted]

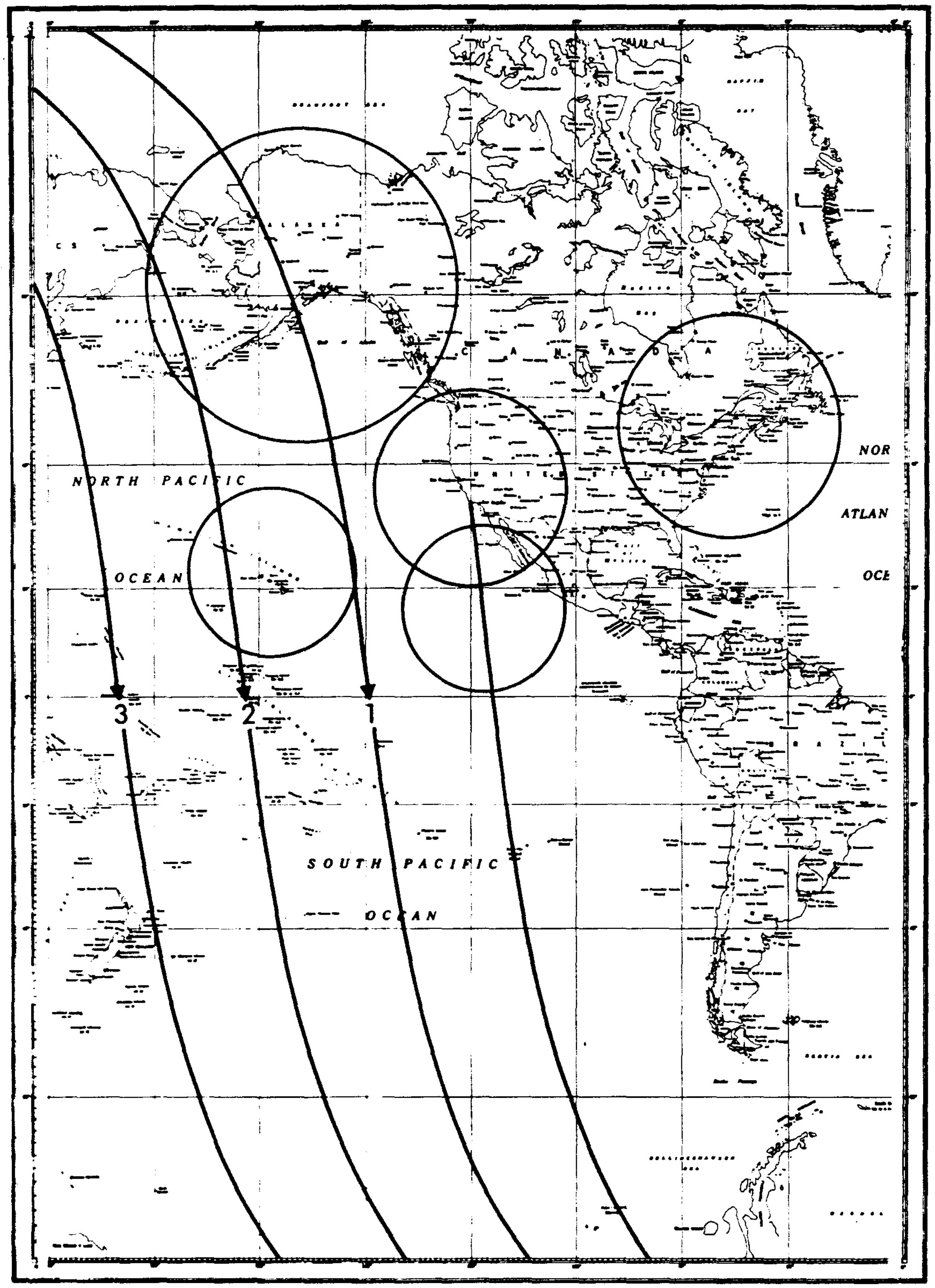

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Figure A2-1(a) Nominal Orbit Traces -- Passes 1 through 3

[redacted]

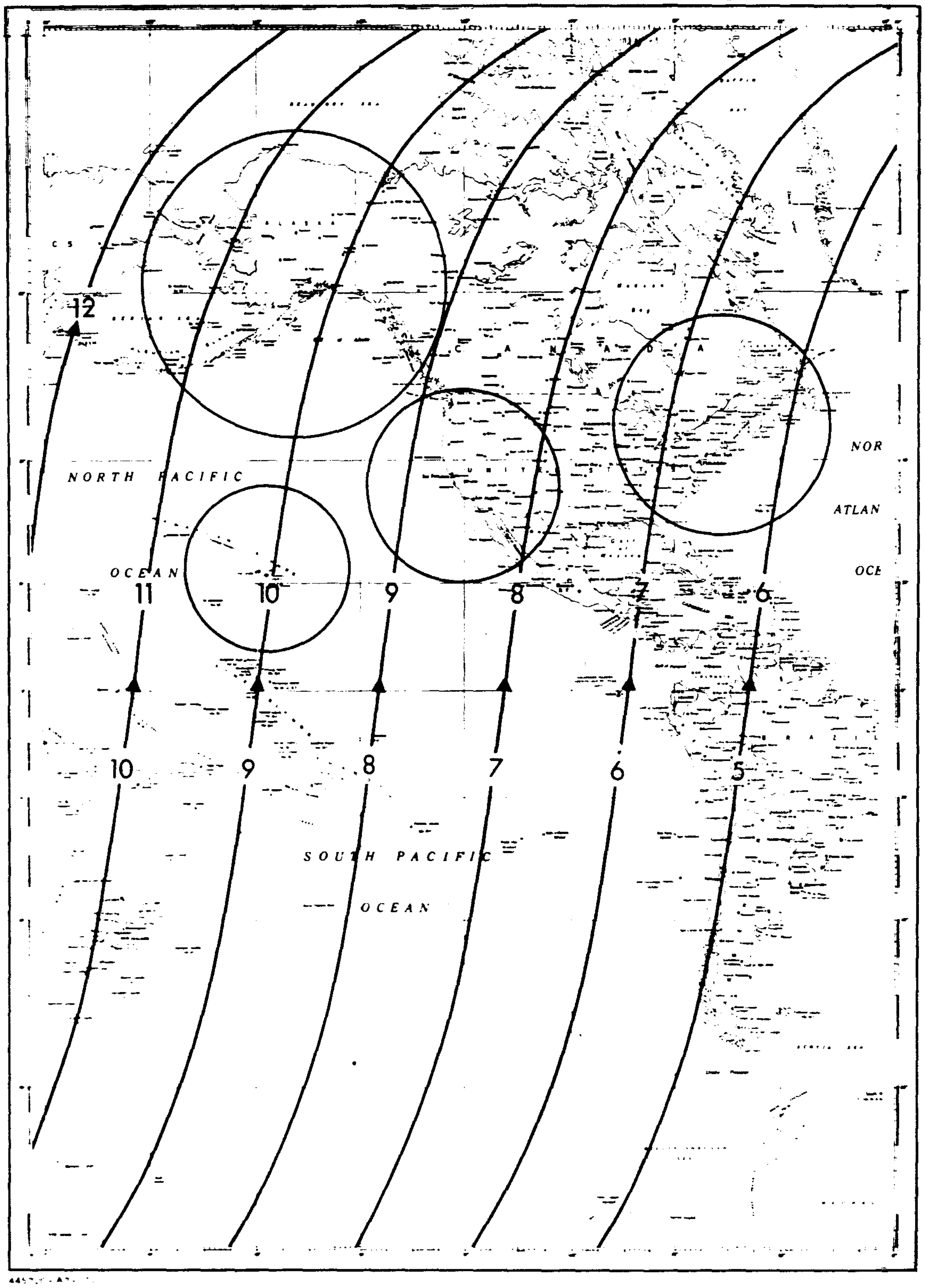

Figure A2-1(b) Nominal Orbit Traces -- Passes 6 through 12

[redacted]

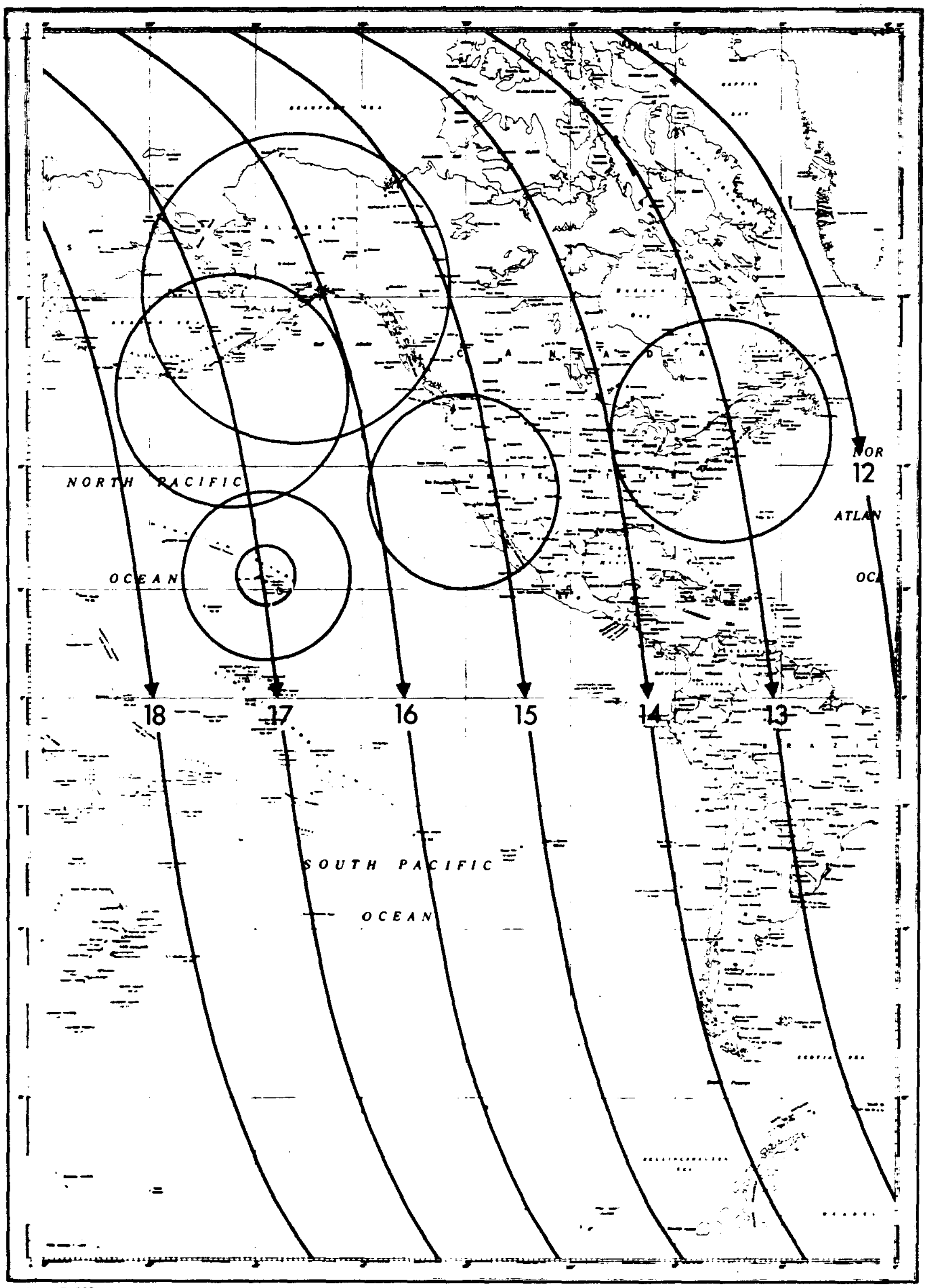

Figure A2-1(c) Nominal Orbit Traces -- Passes 13 through 18

[redacted]

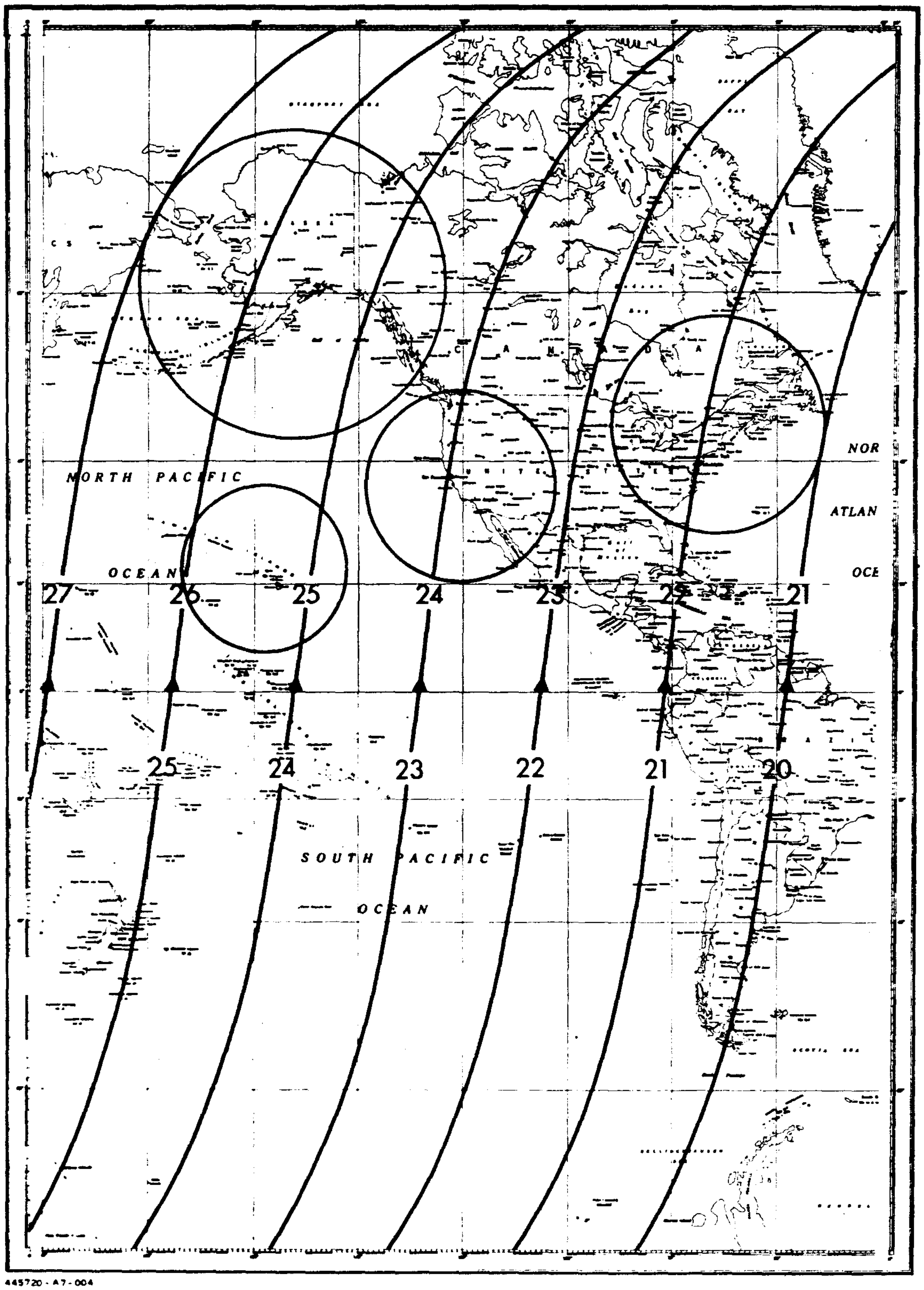

Figure A2-1(d) Nominal Orbit Traces -- Passes 22 through 27

[redacted]

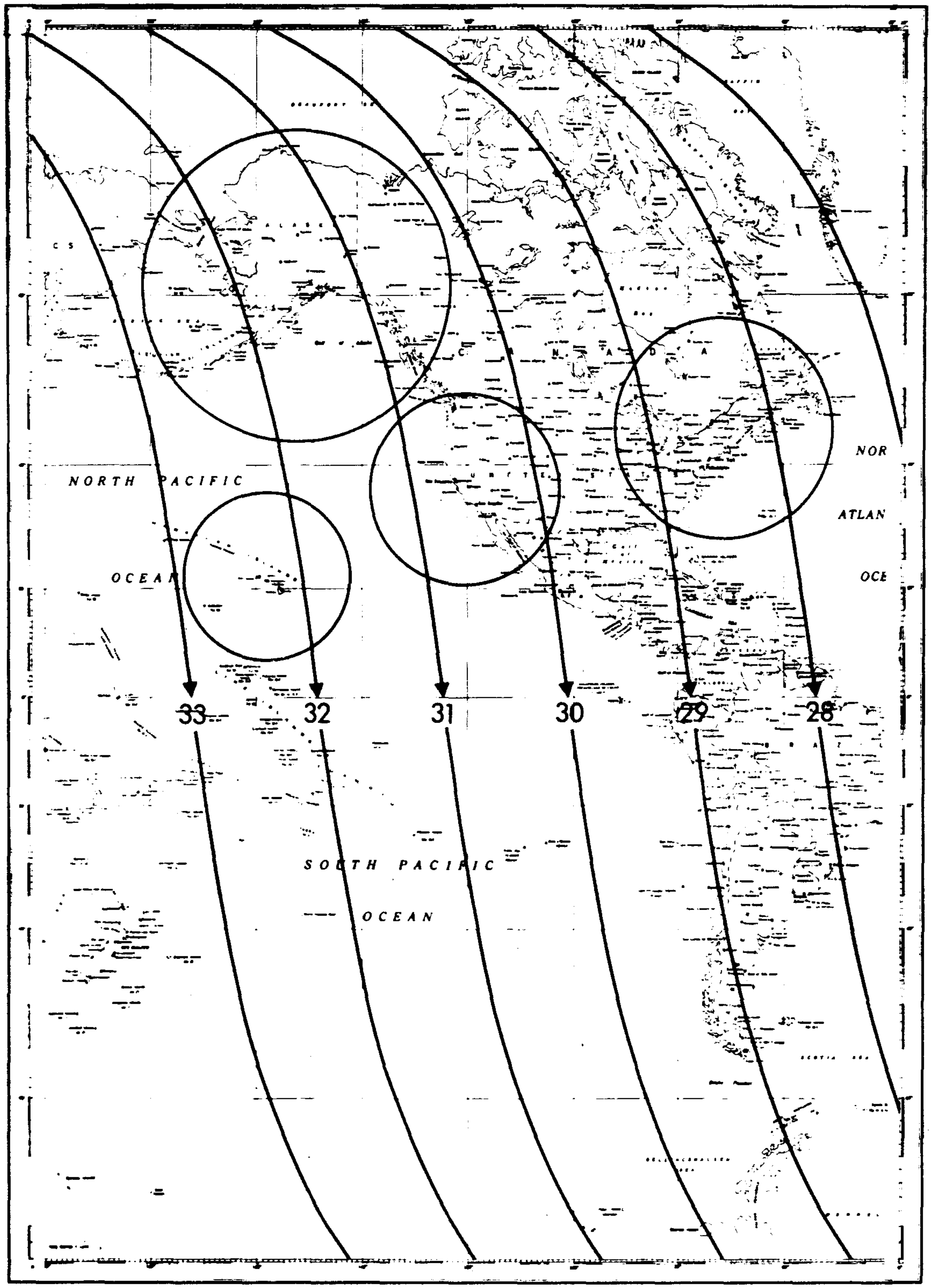

Figure A2-1(e) Nominal Orbit Traces -- Passes 28 through 33

[redacted]

TYPE OF PASS

A	B	C	D	E	F	G
STATION						
[redacted]						
PROGRAMMER PASS NUMBER						
	0 (20 ASCENT)		1 (40)*			
			2 (60)	6(20)		
				7(40)		
					8(60)	
					9(80)	10(100)
13(20)	15(40)	16(60)	17(80)**	22(20)		
				23(40)	24(60)	25(80)
						26(100)
29(20)	31(40)	32(60)	33(80)			
			34(100)	38(20)	39(40)	
					40(60)	41(80)
						42(100)
45(20)		47(40)	48(60)			
			49(80)	53(20)		
				54(40)	55(60)	
					56(80)	57(100)
60(20)	62(40)	63(60)	64(80)	69(20)		
				70(40)	71(60)	72(80)
						73(100)
76(20)	78(40)	79(60)	80(80)	85(20)	86(40)	
					87(60)	88(80)
						89(100)
92(20)						

* NUMBERS IN PARENTHESIS REPRESENT, IN SECONDS, THE PROGRAMMER PASS IDENTIFICATION MARK WHICH FOLLOWS RESET MONITOR

** PASS 18 IS ALSO PROGRAMMED AS A BACKUP

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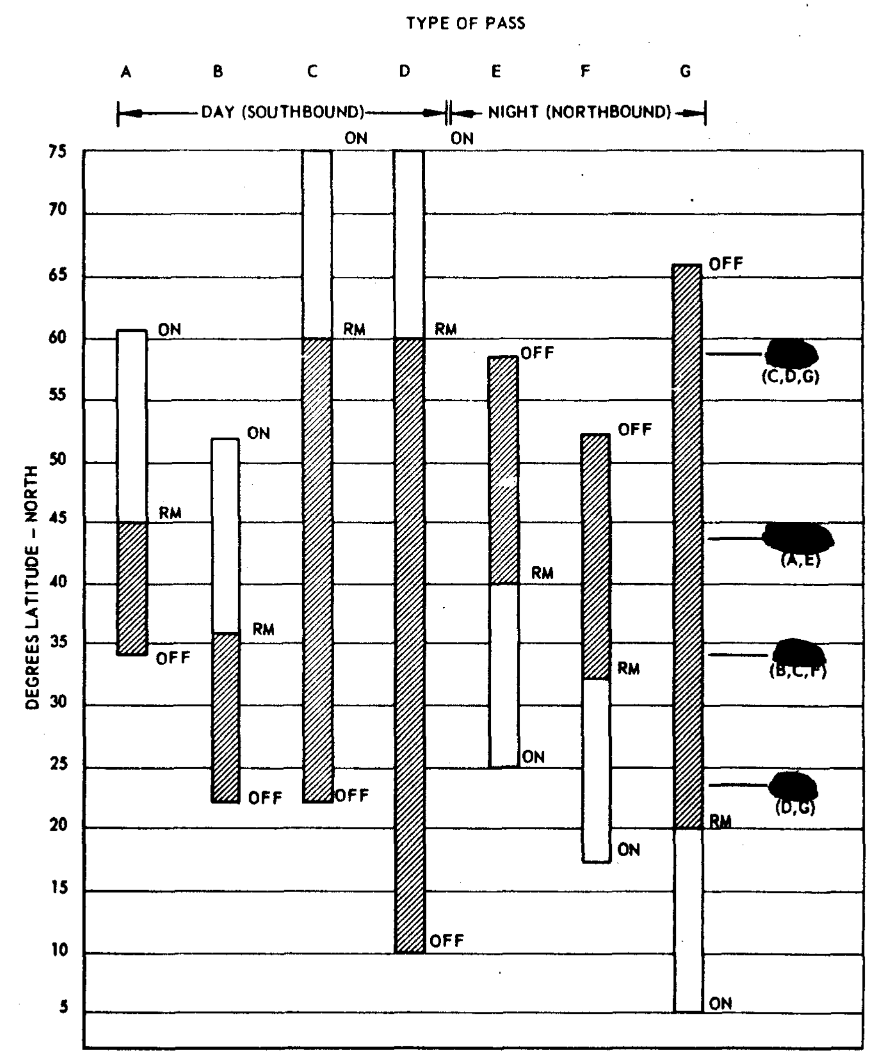


Figure A2-2 Readout and Reset Programming

[redacted]

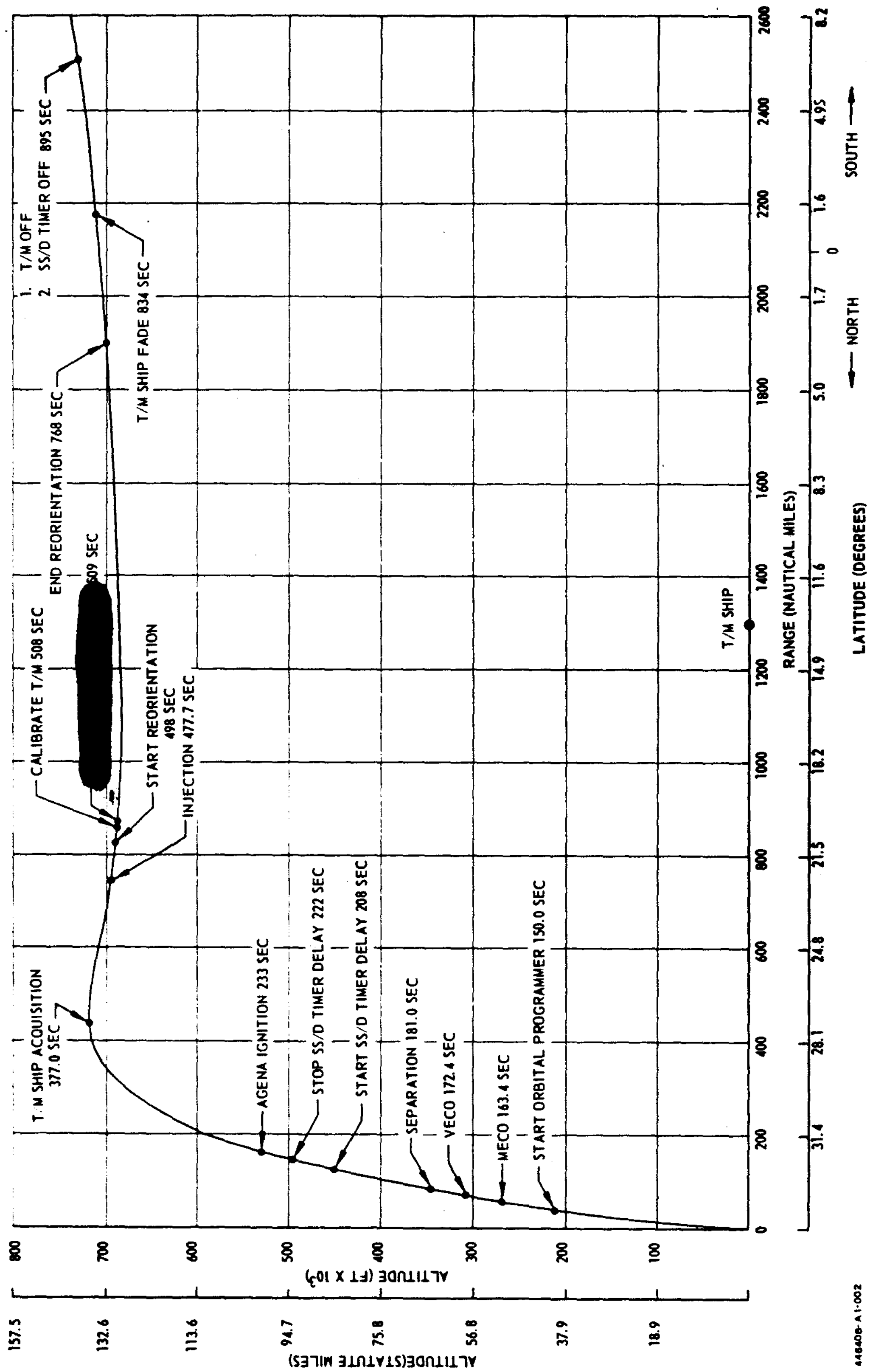


Figure A5-1 Launch Phase Nominal Trajectory

[redacted]

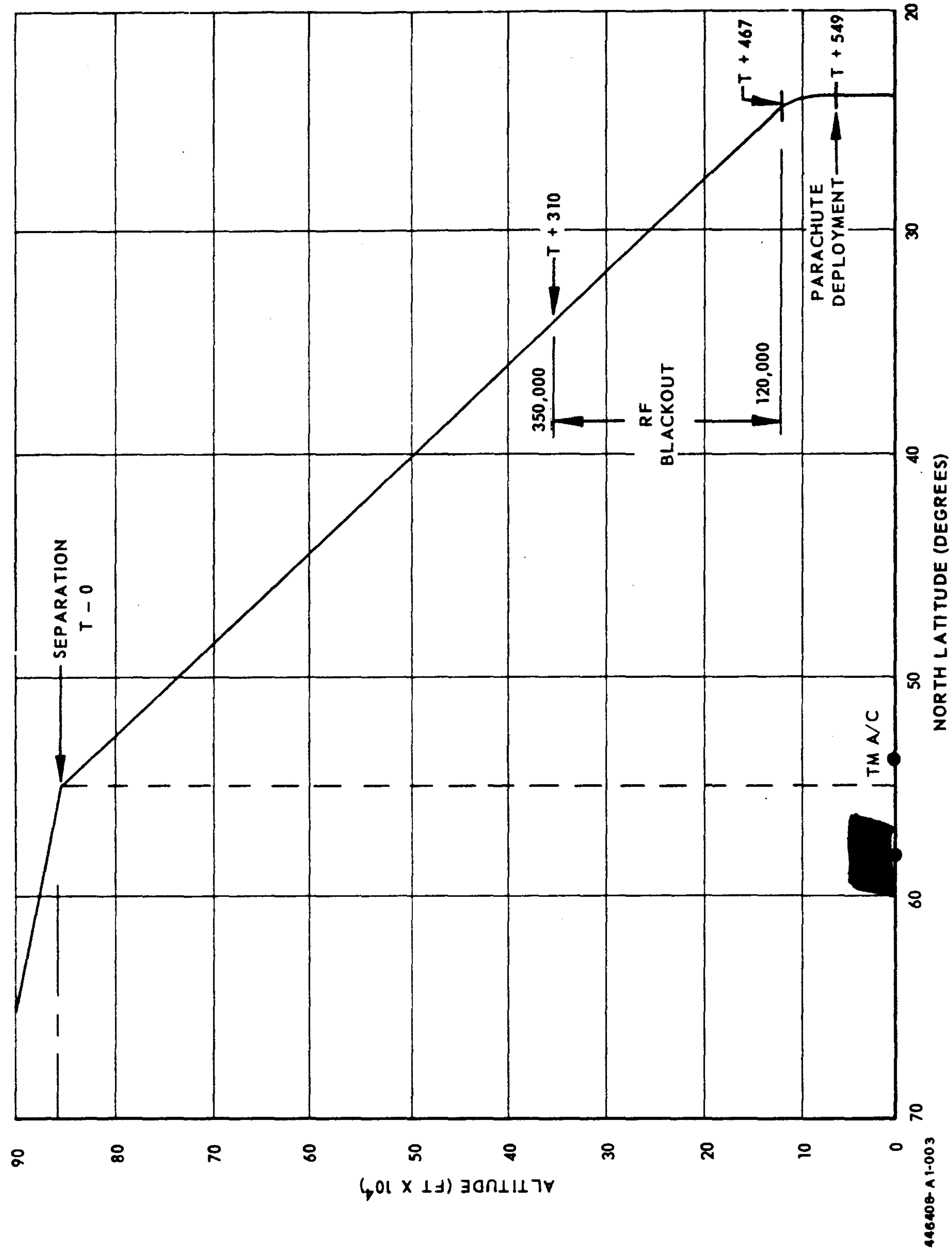


Figure A7-1 Capsule Re-entry Trajectory

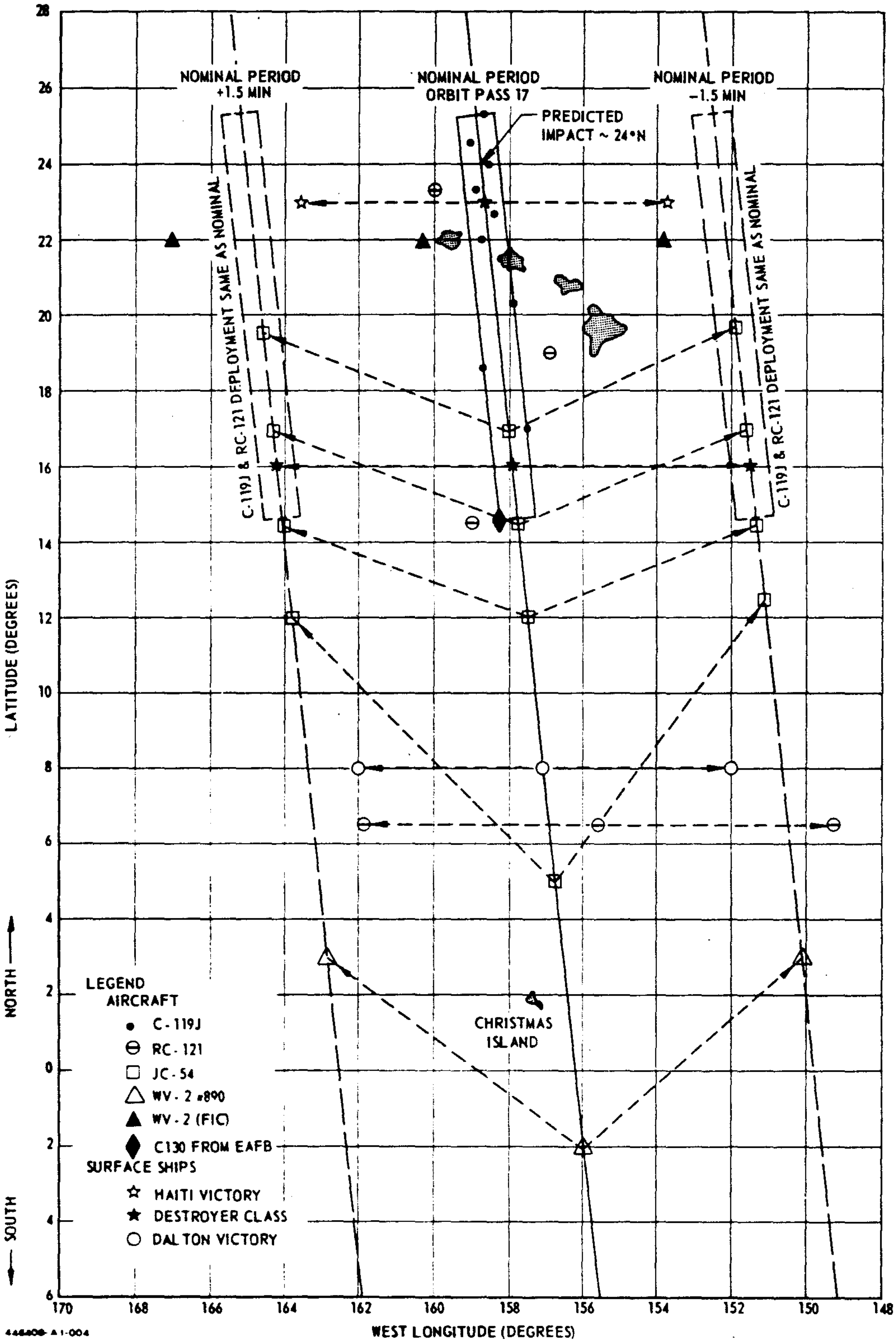


Figure A7-2 Recovery Force Deployment

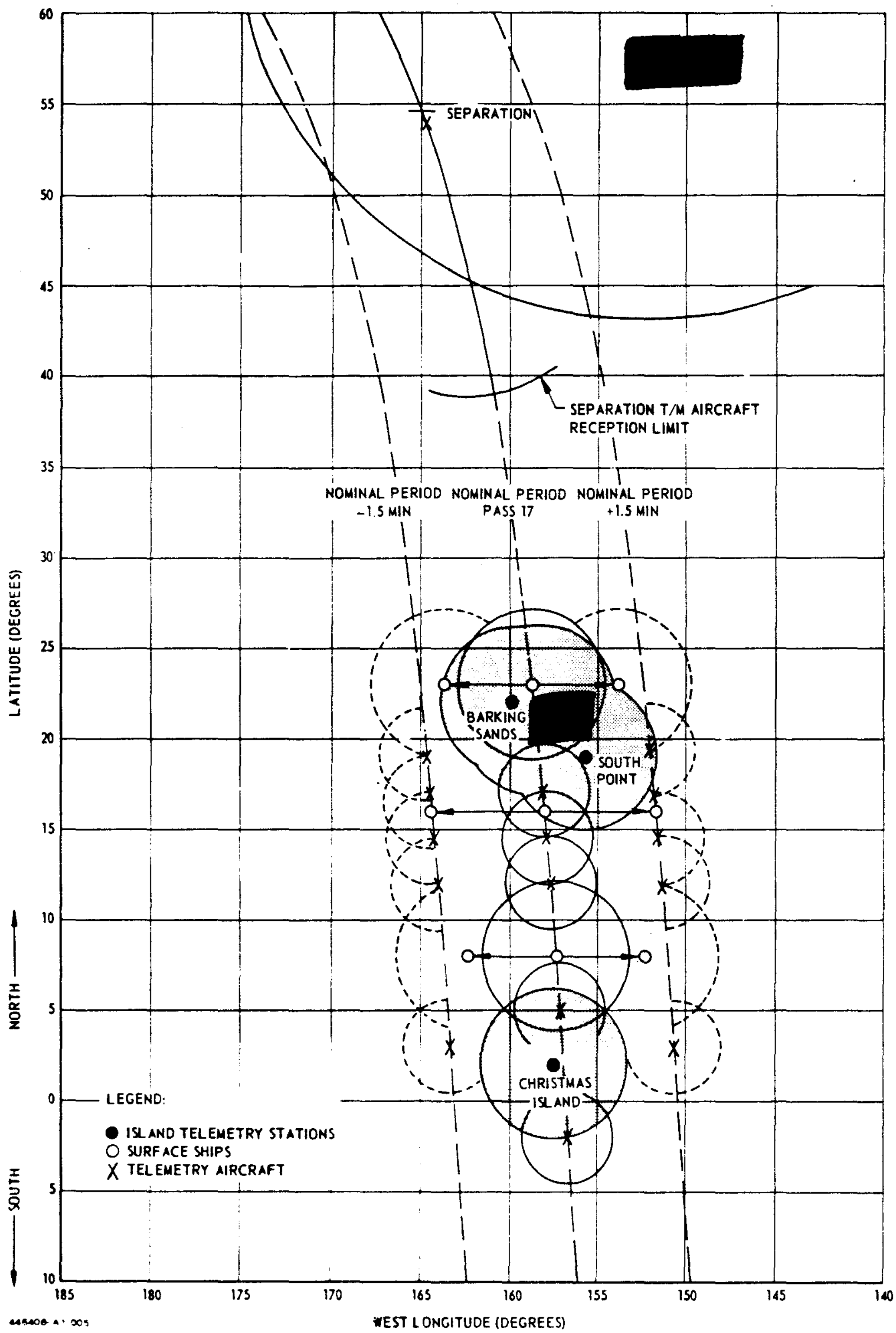


Figure A7-3 Re-entry and Recovery Telemetry Coverage

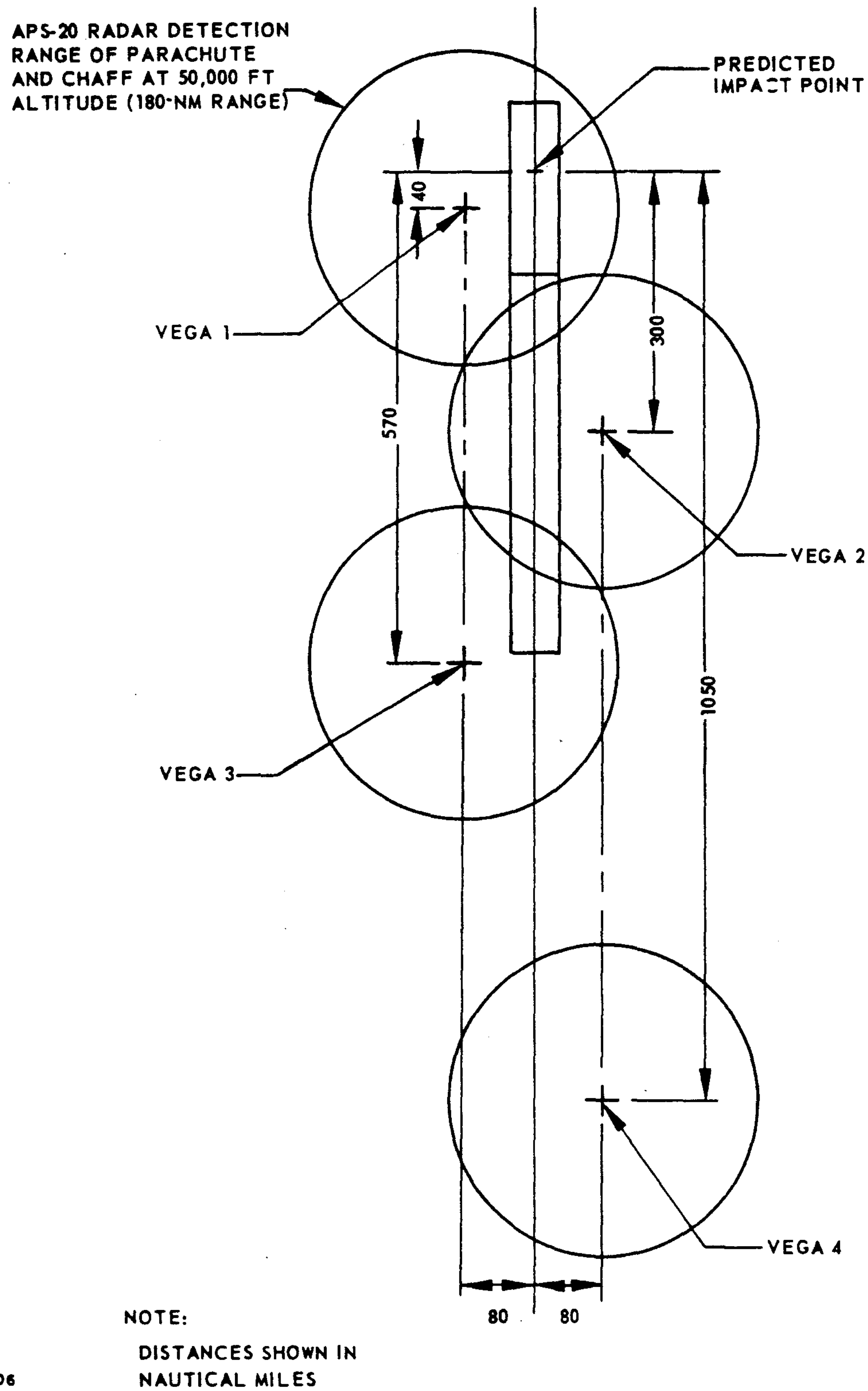
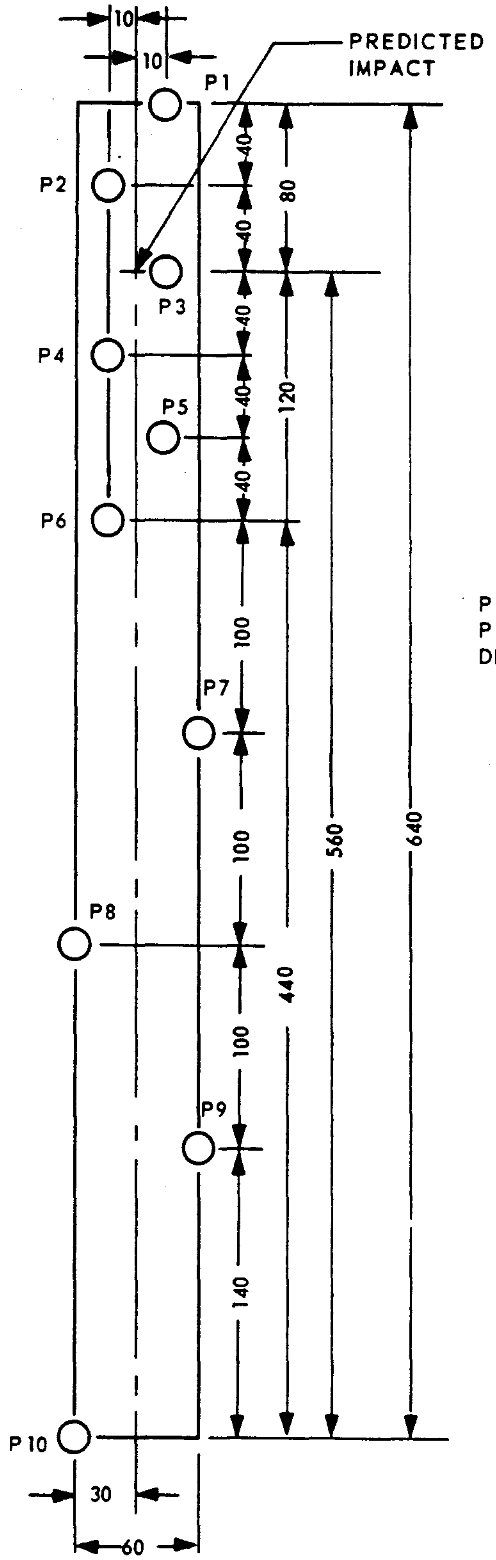


Figure A7-4 RC-121 Aircraft Deployment

[redacted]



P1 THROUGH P9 ARE C-119 AIRCRAFT
P10 IS C-130 AIRCRAFT
DISTANCES SHOWN IN NAUTICAL MILES

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Figure A7-5 Recovery Aircraft Deployment

[redacted]

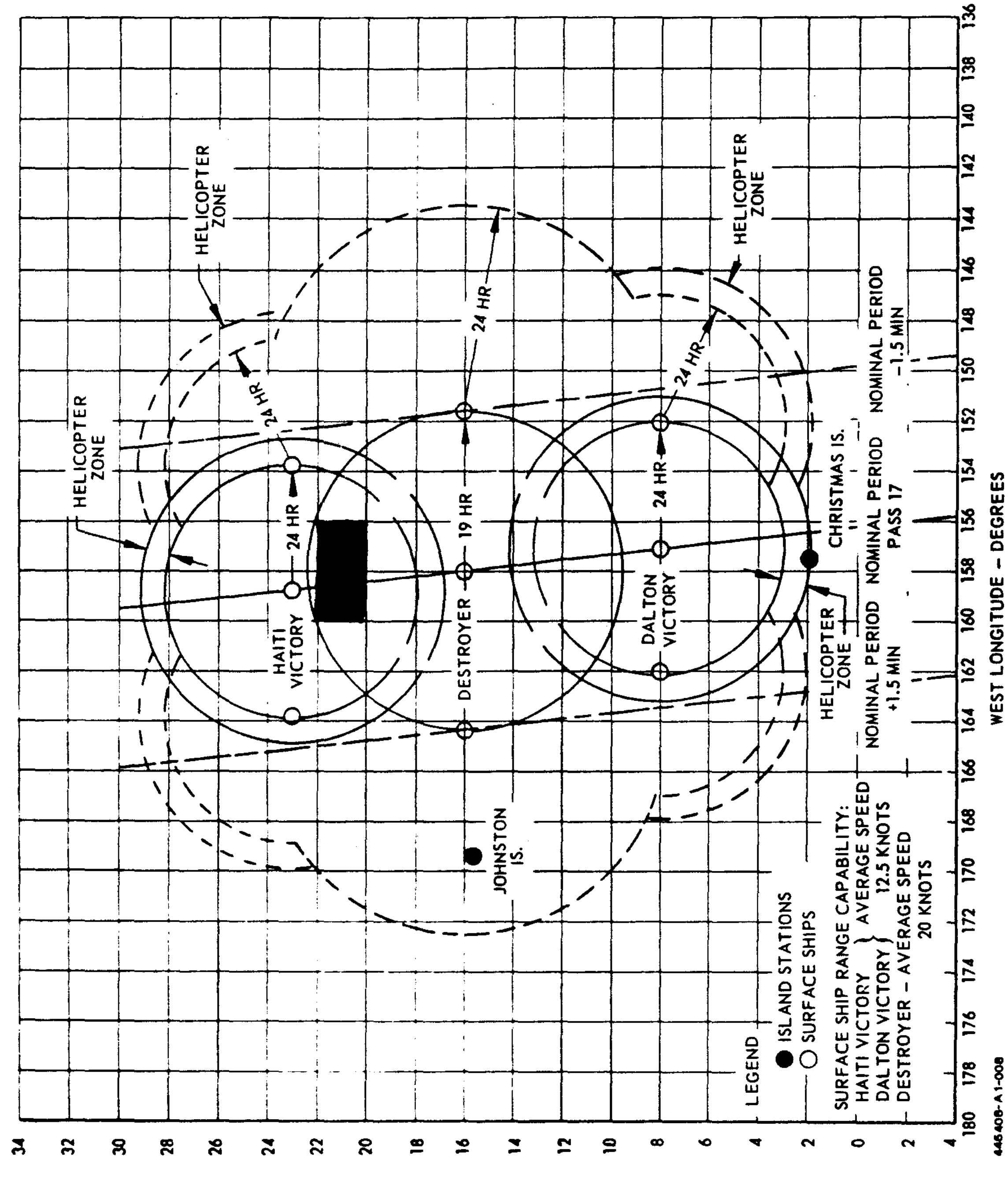


Figure A7-6 Sea Recovery Capability

[redacted]

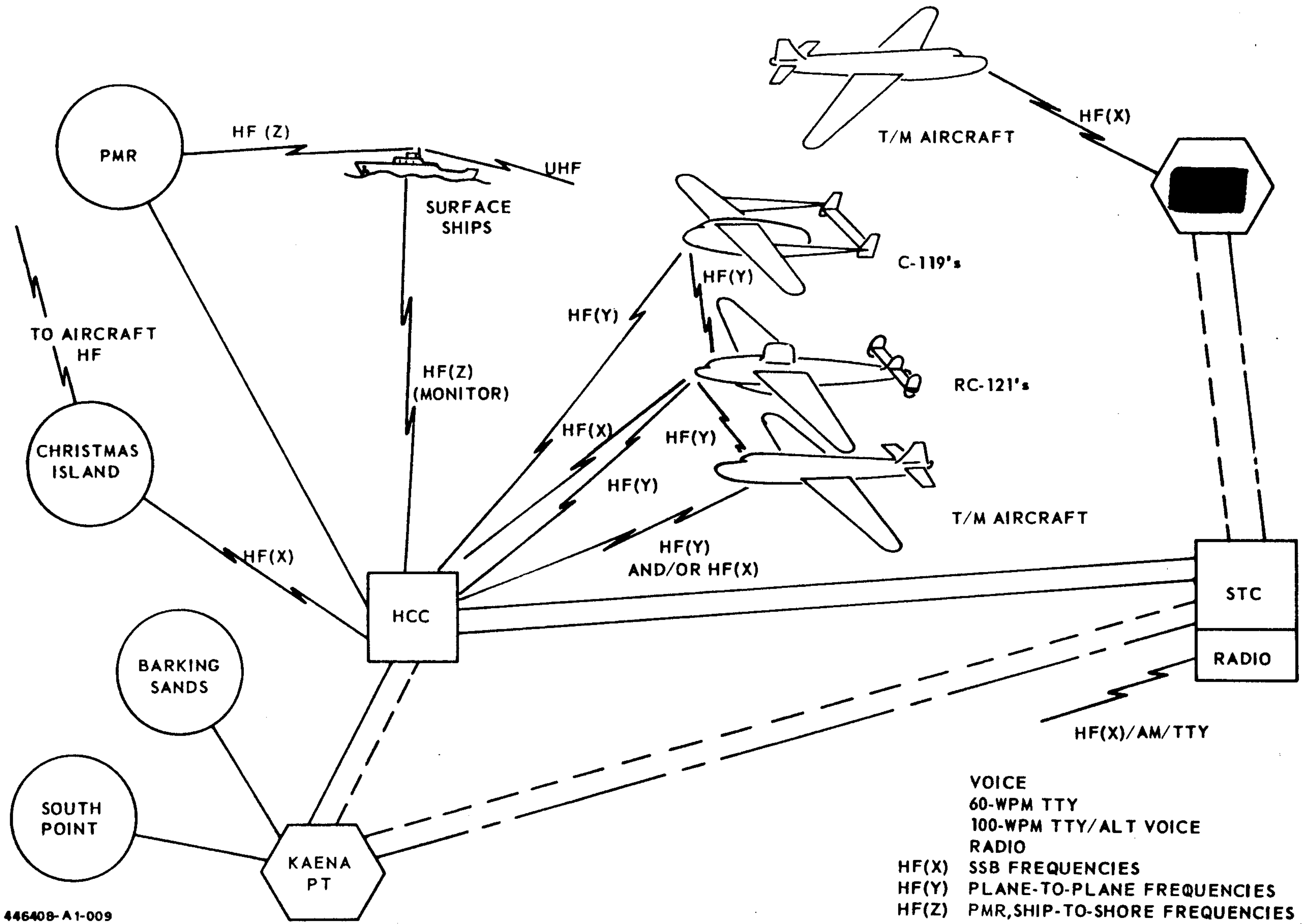
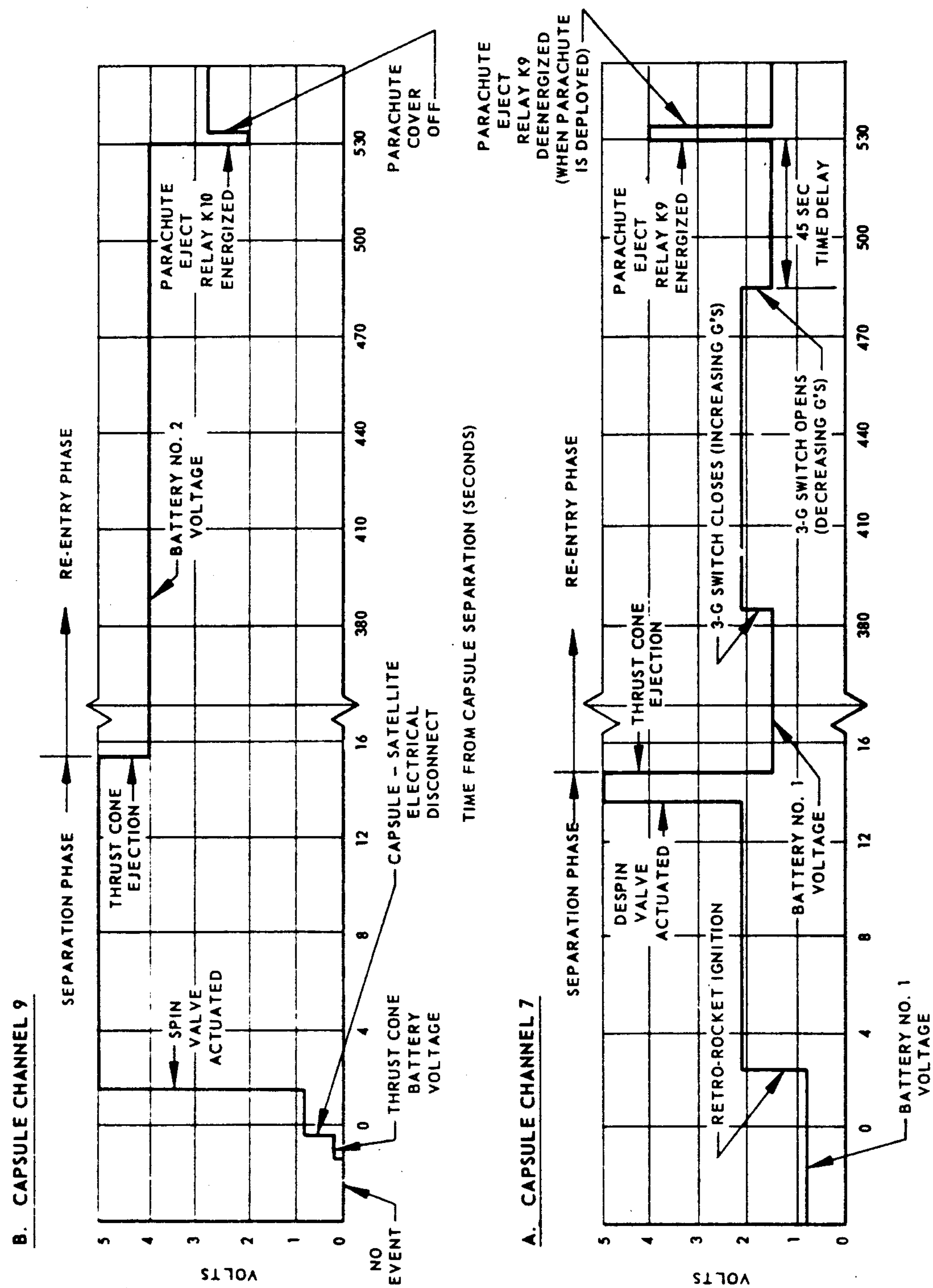


Figure A7-7 Recovery Operations Communications

[redacted]



NOTE: VALUES SHOWN INDICATE NOMINAL SEQUENCE OF EVENTS. CONSULT T/M CALIBRATION DATA FOR VOLTAGE LEVELS WHICH WILL OCCUR IF SEQUENCE OF EVENTS IS NOT NORMAL.

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Figure A8-1 Nominal Capsule Telemetry Voltage Levels

[redacted]

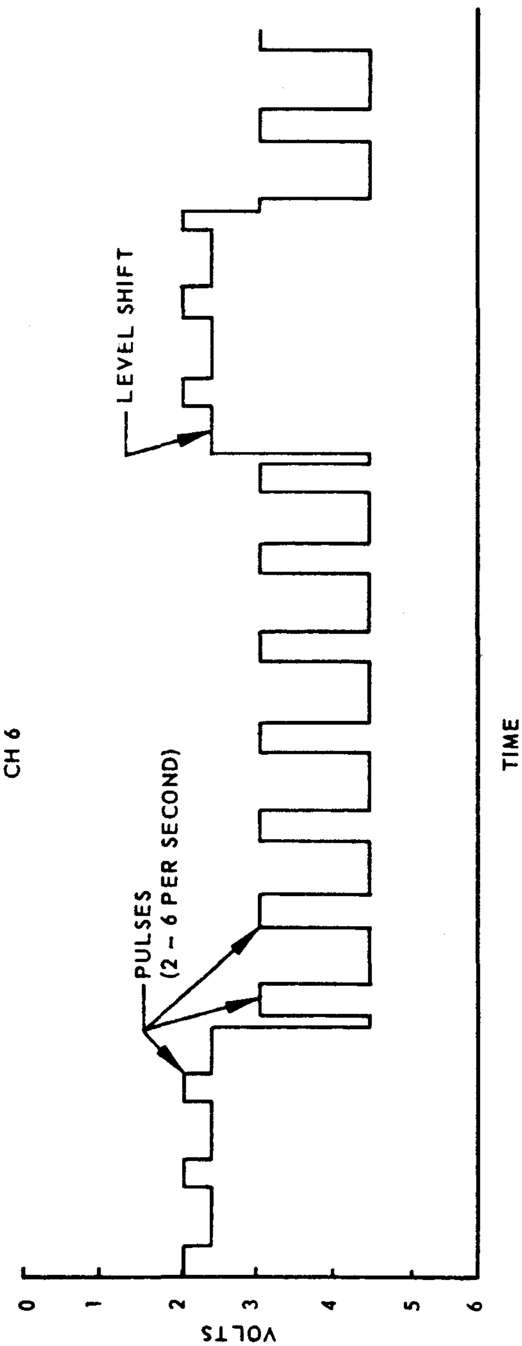

Figure A8-2 Nominal Payload Function Wave Trains

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[redacted]

24 October 1960
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______ Sheets

APPENDIX A – TAB 2
SYSTEM TEST DIRECTIVE
FOR
DISCOVERER SATELLITE SYSTEM
DISCOVERER SATELLITE 1062
DISCOVERER BOOSTER 297

Prepared by

SYSTEMS OPERATIONS PLANNING 61-41

APPROVED:

[redacted]

SATELLIT[redacted]STEMS MANAGER

A[redacted]VED:

[redacted]

CHAIRMAN,
SYSTEM TEST WORKING GROUP

[redacted]

CONTENTS

TABLES

ILLUSTRATIONS

[redacted]

APPENDIX A - TAB 1
SUPPLEMENTAL TEST INFORMATION

A1 INTRODUCTION

This section contains descriptive material which supplements the basic text of the STD. It is applicable only to the flight of Discoverer Satellite 1062. Where the material contained herein is in conflict with that in the basic test, the information in this appendix has precedence. Reference will not be made to this appendix for subsequent flight operations.

A2 CONFIGURATION

A2.1 Discoverer Satellite

A JHU/APL Doppler transmitter and an optical beacon will be carried to permit evaluation of this system. The transmitter will operate continuously on 162 and 216 mc. The optical tracking lights will be programmed "on" over twelve Smithsonian Astronomical Observatory camera stations during the flight.

A2.2 Recovery Capsule

A2.2.1 An AET payload will be carried in a Mark IV recovery capsule. The recovery capsule has the following configuration:

Thermal Batteries (2)

Life: 20 seconds
Usage: Orbit ejection to thrust cone separation

Silver Oxide-zinc Batteries (2)

Life: (a) Shelf life after activation, 15 days
(b) Operating life, 10 hours (min)
Usage: Capsule beacon, capsule light, and parachute deployment events

[redacted]

Salt Plug (1)

Life: 45 hours (min) 54 hours (norm) 90 hours (max)
Usage: Capsule seals will prevent capsule from capsizing. Capsule will sink after salt plug deterioration within 10 minutes.

Silver Peroxide Battery (1)

Life: A minimum of 20 minutes
Usage: Capsule telemetry.

A2.2.2 The crystal-controlled GE acquisition beacon installed in the capsule has the following characteristics:

Pulse Repetition Rate	1000 to 700 pps (± 50 pps) one cycle per sec (± .01 sec)
Power Output	15 watts peak nominal
Pulse Width	30 microsecond nominal
Beacon Life	10 hours minimum
Frequency Stability	±0.04 percent

A2.2.3 A 2.0-watt telemetry transmitter (± 50 kc bandwidth) in the recovery capsule will transmit separation and recovery sequence-of-event data. Telemetry channels 7, 9 and 11 will be used to obtain capsule performance information. Channels 7 and 9 will measure one set of events during the separation sequence. The oscillator inputs will be switched when the thrust cone is separated to measure the recovery events. Channel 11 will measure axial acceleration during both the separation and recovery sequence.

A2.3 Recovery Facilities and Equipment

A2.3.1 Tern Island in the French Frigate Shoals Group of the Hawaiian Islands will be activated as a VHF telemetry receiving and automatic tracking station. In the event capsule overshoot is experienced on a recovery pass in the Tern Island area, this station installation will permit automatic tracking on the capsule telemetry signal. Subsequently an azimuth and elevation angle data input will be made to the Palo Alto Computer for determination of impact location.

A2.3.2 The following listing summarizes the equipment configuration of the various tracking and control facilities and recovery force elements participating in the recovery operation.

Facility/Element	Equipment
a. South Point	1 TLM-18 antenna (manual)
	1 WWVH timing receiver
	3 7-track magnetic tape recorders
	6 NC 1401 receivers
	1 Quad-helix antenna (auto-track)
	1 Quad-helix antenna (manual)
	1 Phone line to [redacted] (toll)
b. HCC	1 60-wpm TTY (conference mode)
	1 Voice circuit through [redacted] to STC
	2 SSB radio systems
	1 Dual voice recorder plus 2 existing single units
	Termination for 2 part-time voice toll circuits to STC
c. [redacted]	VERLORT radar
	TLM-18 antenna
	Tri-helix antenna
	Timing equipment
	2 Decommutators
	2 Plot boards
	3 Tape recorders
	1 Oscillograph/datarite
	Communications (SSB/HF/UHF/RTTY)
d. Dalton and Haiti Victory Ships	1 Tape recorder
	1 1403 and 2 1302A T/M receivers
	1 WWV timing receiver
	1 Quad-helix antenna

[redacted]

Facility/Element	Equipment
	1 (FLR-2) of equipment on second antenna
	Communications (SSB/HF/VHF/UHF)
e. Auxiliary Ship (Recovery - No TLM Capability	
f. 9 C-119J Aircraft 1 C-130A Aircraft	Air pickup equipment, DF equipment (FLR-2), communications equipment
g. 4 RC-121 Aircraft	APS-20 radar
	Radar correlator
	APS-45 height finder radar
	Communications (HF/SSB/VHF/UHF)
	1 Dual channel voice recorder UHF radio
*h. WV-2 T/M Aircraft (137890)	HI-gain helix antenna
	5 Nems-Clarke 1432 receivers (2 pan adapters)
	1 Nems-Clarke 1502 receiver (1 pan adapter)
	1 TEL 1151 receiver
	1 7-track tape recorder
	1 6 pan brush recorder
	1 Oscilloscope (5 inch)
	1 WWV timing receiver
	DF equipment
	4 Subcarrier discriminators
	Communications (HF/SSB/VHF/UHF)
i. JC-54 T/M Aircraft	2 TLM 22 antennas
	6 NC 1403 receivers (1 pan adapter)
	2 Tape recorders (7 track)
	2 Oscilloscopes
	1 WWV timing receiver

*Added facility or equipment

[redacted]

Facility/Element	Equipment
	DF equipment
	HF/UHF communication equipment
*j. 1 Electra Aircraft	*1 Horizon tally fixed helix antenna
	*1 TLM-22A antenna
	*2 Antenna arrays (fore and aft)
	*2 NC 1302A receivers
	*7 NC 1403A receivers
	*2 7-channel magnetic tape recorders
	*2 Oscillograph/Datarite
	*1 WWVH timing receiver
	Communication (SSB/AM/VHF/UHF)
k. Barking Sands, Island of Kauai, Hawaii	6 NC 1401A, 1 NC 1501A receiver
	1 7-channel tape recorder
	1 Phone line to [redacted] (toll)
	*1 Tri-helix antenna
l. Christmas Island	3 NC 1302 receivers
	1 Ampex tape recorder
	1 Quad-helix antenna
	1 WWV timing receiver
	1 SSB receiver/transmitter and antenna
	1 HF radio system
*m. Tern Island	*1 Quad-helix automatic tracking antenna
	*3 NC 1302 receivers
	*1 WWVH timing system
	*1 Digital-to-teletype data converter
	*1 7-channel tape recorder
	*1 Discoverer systems time generator system
	Communications (SSB/HF/UHF/RTTY)

*Added facility or equipment

A3 LAUNCH OPERATIONS

A3.1 Launch Time

In order to obtain adequate data from the sun position indicators, the time of launch will be between 1100 and 1500 PST.

A3.2 Recovery Force Readiness

With the exception of Paragraph 4.2.2.6, the launch criteria listed in Section 4.2 in the basic text are applicable to this flight. Paragraph 4.2.2.6 is revised as follows:

a. Four RC-121 radar aircraft
b. Eight C-119J recovery aircraft
c. One C-130A recovery aircraft
d. Three surface ships
e. One Electra aircraft (separation telemetry)
f. Three telemetry aircraft (recovery)

A3.3 Telemetry Calibrations

Telemetry calibration data for real-time measurements are included in the Notes 3, 7 and 13 of Table A8-1. These data are to be checked by LMSD/61-71 and verified in a TWX to LMSD/61-41 and the STC not later than two days prior to launch

A4 ORBIT OPERATIONS

A4.1 Command Operations

Normal re-entry is programmed for the second day following launch on Pass 32. In addition, Pass 33 is programmed for normal and alternate re-entry to further assure capsule ejection on the recovery pass in the event an inadvertent SKIP command is received by the vehicle prior to Pass 32. Only Pass 17 is programmed for selection of alternate re-entry for the first day following launch.

In order to preclude the possibility on an inadvertent REPEAT command being received by the satellite on Pass 31, either of the following procedures will be employed at the direction of the STC:

a. On Pass 30, [redacted] will send Command 1 to put the increase/decrease switch in the increase position.

b. On Pass 30, [redacted] will transmit final adjustments to the orbital programmer for the recovery pass. Following fade on Pass 30 and prior to beacon turn-on for Pass 31, [redacted] and [redacted] radar command capability will be disabled by removal of the radar center pulse to prevent inadvertent adjustments to the programmer that could preclude recovery

A4.2 Recovery Force Tracking On Pass 2

All land and surface telemetry stations participating in the recovery operation [redacted] Christmas Island, South Point, Barking Sands, Tern Island, Haiti Victory and Dalton Victory) will track the satellite telemetry signal during Pass 2 and will report the following to the HCC for correlation:

a. Time of acquisition

b Signal direction (azimuth and elevation at acquisition, at one minute intervals, and at fade)

c. Strength of signal

d. Signal deviation from nominal frequency

e. Time of signal fade.

A5 RECOVERY OPERATIONS

A5.1 [redacted] Tracking Station Operations

A5.1.1 On the recovery pass, the [redacted] will track the Agena telemetry signal with the tri-helix antenna and the capsule telemetry signal with the TLM-18

[redacted]

antenna. Acquisition of the Agena telemetry signal with the tri-helix antenna will be accomplished using standard acquisition procedures. Procedures for acquisition of the capsule telemetry signal by the TLM-18 will vary as a function of the actual orbit and predicted impact point. In general, the TLM-18 will be positioned at the impact point azimuth using a sector scan. The amplitude of the sector scan will be 20 degrees (± 10 degrees) for impact azimuths between 345 degrees and 15 degrees. The scan amplitude will be increased 3/4 degree for each 1 degree of azimuth over 15 degrees for the eastern sector or under 345 degrees in the western sector.

The TLM-18 antenna acquisition elevation will be 2 degrees. Until acquisition of the capsule signal by the TLM-18, one receiver operating on signals from the tri-helix will be tuned to the 228.2-mc capsule telemetry signal. If the capsule telemetry signal is acquired with the tri-helix before TLM-18 acquisition, the tri-helix will be positioned on the capsule until positive TLM-18 acquisition after which the tri-helix will resume tracking on the satellite telemetry signal. If the TLM-18 loses the capsule signal, the tri-helix will be positioned to assist in reacquiring the capsule signals. TLM-18 angle data recorded after auto-track has been established, will be transmitted to the PAC when requested by the System Test Director. These angle data will be reduced by the computer to provide a predicted impact point.

A5.1.2 [redacted] will report the system time of acquisition and deviations from nominal frequencies to the STC as soon as possible. When the TLM-18 azimuth rate approaches 0 degrees per second or when the telemetered capsule recovery events are received, [redacted] will report antenna azimuth and elevation immediately to the STC and the HCC. [redacted] will also report confirmation of capsule separation and telemetered recovery events to the STC as specified in Table A8-1 and record all capsule telemetry signal on magnetic tape.

A5.1.3 [redacted] will receive all antenna bearings from South Point, Barking Sands and Tern Island for correlation with the TLM-18 bearings. This

[redacted]

bearing information will be relayed immediately to the STC and the HCC. In addition, the [redacted] will receive auto-track angle data transmitted from Tern Island to the STC via SSB-TTY as backup and will relay this data to the STC if requested to do so.

A5.2 <u>South Point Facility Recovery Operations</u>

A5.2.1 For this operation either the manually-slewed Canoga or the motor-driven radiation quad-helix antenna and two Nems-Clarke 1302-A receivers will be utilized at the PMR facility at South Point, Hawaii. Existing communications, recording, and timing systems will be used.

A5.2.2 If the orbit period is such as to permit nominal re-entry west of [redacted] South Point will scan ±90 degrees about a 270-degree azimuth at an antenna elevation of 10 degrees at the rate of once per 15 seconds from ETPD - 0 until ETPD + 3 minutes.

A5.2.3 If the satellite path is between [redacted] and South Point, the quad-helix antenna will scan ±90 degrees about a 180-degree azimuth at the rate of once per 15 seconds from ETPD - 0 until ETPD + 5 minutes. The antenna elevation will be varied cyclically from 10 degrees to 70 degrees to 10 degrees in 20-degree steps at the rate of one step per scan.

A5.2.4 If the satellite path is east of South Point, the quad-helix antenna will scan ±90 degrees about a 90 degree azimuth at the rate of once per 15 seconds from ETPD - 0 until ETPD + 5 minutes. The antenna elevation will be varied cyclically from 10 degrees to 70 degrees to 10 degrees in 20-degree steps at the rate of one step per scan.

A5.2.5 If no capsule signals are acquired before ETPD + 5 minutes, the quad-helix antenna will be positioned at 180-degree azimuth and 10-degree elevation, and the telemetry receivers will be monitored until ETPD + 30 minutes. If [redacted] acquires the capsule signals, it will provide South Point with acquisition information.

[redacted]

A5.2.6 Once acquisition is achieved with the quad-helix antenna, the 60-foot antenna will attempt to track the capsule, using the narrower beamwidth to obtain more accurate bearings at and after parachute deployment. All acquisitions will be reported immediately to [redacted] The capsule parachute deployment telemetry sequence and the antenna azimuth at parachute deployment will be reported. If the parachute telemetry sequence is not received before signal fade, the system time of fade and the antenna azimuth and elevation will be reported. Subsequent to acquisition, South Point will report antenna bearings to [redacted] All 60-foot antenna data, position azimuth and elevation, and suitable timing signal will be recorded on magnetic tape. This tape will be delivered to the HCC for transmittal to Sunnyvale.

A5.3 Barking Sands Facility Recovery Operations

A5.3.1 The PMR facility at Barking Sands, Kauai, is augmented by the addition of an LMSD tri-helix antenna. Barking Sands will maintain communication with [redacted] via toll telephone for exchange of tracking and acquisition data. At ETPD - 15 minutes, Barking Sands will position the tri-helix antenna at the acquisition azimuth and 10-degree elevation. From ETPD - 5 minutes until ETPD + 5 minutes, the Barking Sands tri-helix antenna will scan ±90 degrees about 0-degree azimuth at the scan rate of 10 degrees per second. Barking Sands will search for the capsule telemetry signal. Barking Sands is directed not to activate any tracking radars during the operation.

A5.3.2 Subsequent to acquisition, Barking Sands will report antenna bearings to [redacted] All acquired capsule telemetry signals will be recorded on magnetic tape with a timing signal.

A5.4 Christmas Island Facility Recovery Operations

A5.4.1 If the satellite path is east of Christmas Island, the quad-helix antenna will scan ±90 degrees about a 90-degree azimuth at the rate of once

[redacted]

per 15 seconds from ETPD + 3 minutes until ETPD + 8 minutes. The antenna elevation will be varied cyclically from 10 degrees to 70 degrees to 10 degrees in 20-degree steps at the rate of one step per scan.

A5.4.2 If the satellite path is west of Christmas Island, the quad-helix antenna will scan ±90 degrees about a 270-degree azimuth from ETPD + 3 minutes until ETPD + 8 minutes. The antenna elevation will be varied cyclically from 10 degrees to 70 degrees to 10 degrees in 20-degree steps at the rate of one step per scan.

A5.4.3 If the satellite path is a near overhead pass at Christmas Island (±2° W longitude), the quad-helix antenna will scan 360 degrees in azimuth at the rate of once per 30 seconds from ETPD + 3 minutes until ETPD + 8 minutes. The antenna elevation will be varied cyclically from 10 degrees to 70 degrees to 10 degrees in 20-degree steps at the rate of one step per 360-degree azimuth.

A5.4.4 The Christmas Island facility will maintain continuous HF communications with the southern telemetry aircraft for exchange of acquisition and tracking information and will relay this information to the HCC as soon as possible over the SSB radio.

A5.4.5 If no capsule signals are acquired before ETPD + 8 minutes, the quad-helix antenna will be positioned at 180-degree azimuth and 10-degree elevation and the telemetry receivers will be monitored until ETPD + 30 minutes. If no signals are acquired before ETPD + 30 minutes, a negative report will be submitted to the HCC over SSB radio.

A5.4.6 Once acquisition is achieved the quad-helix antenna will manually track the capsule, and the telemetry and beacon signals will be recorded on magnetic tape. Immediately after the parachute deployment telemetry sequence is recorded, Christmas Island will so report to the HCC over the SSB radio. The antenna azimuth will be reported to the telemetry aircraft over UHF or HF radio immediately after acquisition and at intervals of one minute until parachute deployment.

[redacted]

A5.5 Tern Island Operations

A5.5.1 Tern Island will establish SSB voice communications with [redacted] on the assigned recovery operations frequency for acquisition and tracking instructions and data relay. The STC will monitor this voice frequency. The quad-helix antenna angle data recorded after auto-track has been established will be transmitted by a separate SSB/RTTY channel directly to the DAC when requested by the System Test Director. [redacted] will also receive all RTTY data as back-up and will relay this data to the PAC if requested by the System Test Director. To minimize possible SSB transmission interference while receiving telemetry data, Tern Island will restrict all SSB radio transmissions until after signal fade or until the quad-helix antenna azimuth rate approaches 0 degrees per second.

A5.5.2 At ETPD - 15 minutes the Tern Island auto-tracking quad-helix antenna will be positioned at the impact point azimuth at 10 degrees elevation. From ETPD - 15 minutes to ETPD + 15 seconds the quad-helix antenna will scan ± 90 degrees about the impact azimuth at the maximum slew rate. The antenna elevation will be varied cyclically from 10 degrees to 70 degrees to 10 degrees in 20-degree steps at the rate of one step per scan. At ETPD + 15 seconds the scan mode will rotate to 180 degrees azimuth to scan the southern sector. The antenna elevation will be varied from 70 degrees to 10 degrees to 70 degrees at the rate of 20 degrees per scan.

A5.5.2.1 If no capsule signals are received by ETPD + 2 minutes the quad-helix antenna will be fixed at 30-degree elevation and a 360-degree azimuth scan initiated at the maximum slew rate and continued for two minutes. If the capsule signals are not received by ETPD + 4 minutes, the antenna will be fixed at 180-degree azimuth and 10-degree elevation and the receivers will be monitored until ETPD + 30 minutes.

A5.5.2.2 If no capsule signals are received by ETPD + 30 minutes, a negative report will be submitted to the HCC over SSB radio.

[redacted]

A5.6 Surface Ship Deployment and Operations

A5.6.1 The surface ship deployment procedure outlined in the basic text of the STC will not apply for this flight. In addition, a third auxiliary ship will be integrated with the Recovery Force to increase downrange sea retrieval capability.

A5.6.2 The surface ships will depart with sufficient time to arrive on initial deployment stations shown in Figure A7-2 by T + 4 hours. The Palo Alto Computer will evaluate the tracking data after launch and will provide normal and alternate impact times and location as soon as possible (T + 5 hours). The HCC will direct re-deployment of the surface ships at this time to assure the maximum potential coverage of the normal recovery pass (nominal orbit Pass 32). Initial re-deployment will be made in the direction of the predicted alternate re-entry pass (nominal orbit Pass 17); however, at no time will the range of the individual surface units, (from their predicted normal recovery stations) exceed the capabilities presented in Figure A7-3. Re-deployment of all surface ships will be maintained laterally along the individual initial deployment latitudes for variations in orbit period.

A5.6.3 Upon notification from the STC of intended alternate re-entry the HCC will immediately direct the surface ships to proceed to alternate recovery stations. If the HCC has not been notified of alternate re-entry by ETPD - 6 hours, then the re-deployment will be directed to support normal recovery.

A5.6.4 The Haiti Victory will be positioned 60 nautical miles south of the nominal impact point and will receive and record capsule telemetry data. The quad-helix antenna, until acquisition, will scan ±90 degrees about 360-degree azimuth at the rate of once per 15 seconds beginning at ETPD - 5 minutes. From ETPD - 5 minutes until ETPD - 60 seconds, the antenna elevation will be maintained at 10 degrees. After ETPD - 60 seconds, the antenna elevation will be increased 20 degrees per scan from 10 degrees to

[redacted]

70 degees. At ETPD + 15 seconds, the scan mode will rotate 180 degrees to scan the southern sector. The antenna elevation will be decreased from 70 degrees to 10 degrees at the rate of 20 degrees for each 15-second scan during this search of the southern sector. If the capsule signals are not acquired by ETPD + 2 minutes, the antenna elevation will be raised from 10 degrees to 30 degrees, and a 360-degree azimuth scan will be initiated at the slewing rate of 10 degrees per second and continued for two minutes.

If the capsule signals are not acquired by ETPD + 4 minutes, the antenna will be positioned at 180-degree azimuth and 10-degree elevation and the telemetry receivers monitored until ETPD + 30 minutes. When the capsule signals are acquired, the antenna will begin manual tracking as a function of maximum signal strength and all telemetry and beacon signals will be recorded on magnetic tape as specified in the Detailed Recording Requirements. Bearings from this antenna will be reported at intervals of one minute to HCC for relay to STC. The DF equipment will be operated normally and will be used to obtain refined capsule directional data after acquisition. When the capsule bearing becomes steady, the _Haiti Victory_ will report position and capsule bearing to the northern Command RC-121 over UHF and to the HCC through PMR immediately, and proceed in the direction of the acquired signals. If the capsule signals are not acquired the _Haiti Victory_ will so report over SSB radio through PMR to the HCC at ETPD + 30 minutes.

A5.6.5 The Auxiliary Recovery Ship will be positioned at 16° N latitude directly under the satellite path on the recovery pass. This ship does not have a telemetry receiving capability and will be utilized only for sea retrieval of the capsule. Ship-to-shore radio communication will be maintained with the HCC PMR representative for direction.

A5.6.6 The _Dalton Victory_ will be positioned at 8° N latitude, directly under the satellite path on the recovery pass to enable reception of the capsule telemeter signal and the capsule beacon signal in the extended range area. The quad-helix antenna, until acquisition, will scan ±90 degrees about

[redacted]

360-degree azimuth at 10-degree elevation at the rate of once per 15 seconds from ETPD - 0 until ETPD + 3 minutes. From ETPD + 3 minutes until ETPD + 5 minutes, the quad-helix antenna will give full area coverage by scanning ±90 degrees about 360-degree azimuth with antenna elevation increasing and decreasing from 10 degrees to 70 degrees to 10 degrees in increments of 20 degrees per scan. The scan rate will be once per 15 seconds. After ETPD + 5 minutes the antenna will be positioned at 10-degree elevation and 180-degree azimuth. In the event the Dalton Victory acquires the capsule signals, the telemetry will be recorded on magnetic tape as specified in the Detailed Recording Requirements, and antenna acquisition and bearing will be immediately reported through PMR to the HCC. Bearings will be relayed to HCC at intervals of one minute. When the parachute deployment telemetry sequence is received, or when the antenna azimuth becomes constant -- whichever is first -- the Dalton Victory will so report verbally over SSB radio through PMR to the HCC and provide ship position and antenna azimuth and elevation. If no capsule signals are acquired by the Dalton Victory, a negative verbal report will be submitted over SSB radio through PMR to the HCC at ETPD + 30 minutes.

A5.7 Airborne Recovery Force Deployment

A5.7.1 The Airborne Recovery Force normal and alternate deployment for a nominal orbit period is presented in Figure A7-2. This force will be deployed to provide a maximum air retrieval capability in the 60x200-nautical mile primary recovery area while emphasizing capsule detection in the extended 60x440-nautical mile secondary recovery area; however, air retrieval will be attempted in the secondary area. Telemetry aircraft will also be deployed south of the secondary area to provide extended capsule detection capability, to approximately 1° S latitude, for the normal condition.

A5.7.2 Three RC-121 radar search aircraft will be deployed in the northern area to provide overlapping radar coverage of the primary and secondary air retrieval areas. A fourth RC-121 aircraft will be deployed in the extended

[redacted]

surface recovery area to provide communications control of the forces within that area. Figure A7-4 presents the detailed deployment of the RC-121 aircraft. Each RC-121 aircraft will be equipped with SSB radio for direct and continuous communications with the HCC. Separate HF communications will be maintained with the remaining elements of the Recovery Force.

A5.7.3 Due to the extended deployment of the Recovery Force, there will be a separate RC-121 aircraft designated as Command Aircraft for the forces in each of the three operational areas. A separate HF frequency will be assigned as the control/data telling frequency in the primary recovery area (northern area) and the combined secondary and extended recovery areas (southern area).

A5.7.4 In the event that one of the four RC-121's aborts the mission, the three remaining aircraft will be deployed to assure continuous radar coverage of the primary and secondary recovery areas at the sacrifice of the extended communications control aircraft position. In this event, alternate communications will be established between Christmas Island and T/M aircraft in the extended recovery area, over HF and/or SSB radio for force control and data telling.

A5.7.5 An aircraft departing from Hickam AFB will fly a radar peaking mission for the 3 northern on-station RC-121 aircraft only prior to the recovery pass.

A5.7.6 Six C-119J recovery aircraft will be deployed in the primary recovery area and the remaining three C-119J and the C-130 aircraft will be deployed in the secondary recovery area. Figure A7-5 presents the detailed deployment of the recovery aircraft.

A5.7.7 The C-130 aircraft, if available, will be positioned at the highest altitude consistent with gross weight and proper cruise control and will not attempt aerial recovery above 15,000 feet altitude.

[redacted]

A5.7.8 A WV-2 aircraft will perform an FIC survey of the predicted impact area and will assume a final position 120 nautical miles south and 100 nautical miles west of the predicted impact point by ETPD - 30 minutes. The FIC aircraft will communicate with the primary recovery area command aircraft on the northern primary HF frequency, will search for the capsule signals, and will attempt to derive a DF bearing from any of the signals acquired. All telemetry signals received will be recorded. Signal acquisitions and bearings will be reported immediately to the primary area Command RC-121.

A5.7.9 Telemetry aircraft will be deployed along the satellite flight path as shown in Figure A7-3. Telemetry reception range of these aircraft is expected to be 120 to 150 nautical miles. Placement of these aircraft in order of position priority and the RC-121 aircraft assigned as directional controller for normal recovery (nominal passes) will be as follows:

Aircraft No.	Position	Control Responsibility
1	660 nautical miles North of Dalton Victory	Vega 3
2	450 nautical miles North of Dalton Victory	Vega 3
3	240 nautical miles North of Dalton Victory	Vega 3
4	240 nautical miles South of Dalton Victory	Vega 4
5	390 nautical miles South of Dalton Victory	Vega 4

The telemetry aircraft will be on station by ETPD - 1 hour. For alternate re-entry, these aircraft will be positioned to provide continuous telemetry coverage south of the predicted impact point as shown in Figure A7-3.

A5.7.10 JC-54 type aircraft will be utilized for Positions 1 through 4 while WV-2 aircraft No. 137890 will be located in Position 5 due to its long-range SSB radio capability. Telemetry aircraft No. 1 through No. 4 will establish and maintain continuous HF communications with their respective control aircraft on the primary southern area frequency. Telemetry aircraft No. 5 will establish and maintain continuous HF or SSB communications with Vega 4. In the event of communications breakdown, HF and/or SSB communications will be established between Christmas Island and Aircraft No. 4 and No. 5 for control and data telling operations.

A5.8 Airborne Recovery Force Operations

A5.8.1 The RC-121 aircraft radar will search for the chaff and the radar reflective parachute. All radar and DF returns from elements of the Recovery Force and bearings from the surface stations will be plotted by the RC-121 aircraft as soon as possible to determine the most probable capsule location. Recovery aircraft will not be vectored toward a radar return until the radar return has been correlated with sufficient DF bearings to establish a fix.

After a fix has been established, the RC-121 Area Commander will notify the nearest recovery aircraft and then vector the aircraft to an intercept flight path. The recovery aircraft will follow the RC-121 instructions and use the DF gear for homing. In the event that no DF signals are acquired by the Recovery Force, the radar returns will be investigated at the discretion of the Task Force Commander.

A5.8.2 When the recovery aircraft makes visual contact with the capsule parachute, an air recovery will be accomplished. Repeat passes will be made,if necessary, until recovery is successful or until the capsule impacts in the water. The aircraft completing recovery will return to Hawaii as directed by the HCC and will be escorted by either a C-119J, an RC-121, the C-130, or an SC-54 (Air Rescue) aircraft. The remainder of the Recovery Force will return to Hawaii as directed by the HCC.

A5.8.3 The recovery aircraft will use the DF equipment in searching for the capsule beacon signal. The crystal control beacon should eliminate the detuning procedures used; however, any capsule beacon or telemetry frequency deviation will be reported by [redacted] and [redacted] to the HCC through the STC and relayed to the RC-121 commanders.

A5.8.4 Should the air recovery be unsuccessful, the search aircraft will, after sighting the capsule, circle the areas of water impact and drop marker aids. The aircraft will be equipped with strobe light bombs, smoke bombs, and dye markers for this purpose. In addition, Pelicans 8, 9, and 10 will be

[redacted]

equipped with a RATU to provide a beacon marker. Procedures for the employment of RATU's will be developed by the HCC with consideration given to the economical use of equipment.

A5.8.5 The capsule beacon and flashing light minimum operating life is 10 hours and the capsule will float for a minimum of 45 hours.

A5.8.6 If recovery operation conditions permit, the primary recovery area Command RC-121 will transmit brief, best-available-information reports to the HCC over SSB at ETPD + 5 and 15 minutes (±2 minutes). The secondary recovery area Command RC-121 will submit brief, best-available-information reports to the HCC at ETPD + 10 and 20 minutes (±2 minutes). The extended recovery area Command RC-121 will submit brief, best-available-information reports to the HCC at ETPD + 15 and 25 minutes (±2 minutes). If the re-entry capsule is not sighted before ETPD + 30 minutes, the northern Command RC-121 will report a brief recap of most reliable data received to HCC for relay to the STC at that time. The southern Command RC-121 and extended area Command RC-121 will make their recap reports at ETPD + 35 and ETPD + 40 minutes respectively.

A5.8.7 The data to be reported are aircraft station position, magnetic signal bearing, and local time for each reliable signal acquisition. Range and azimuth with local time and aircraft station position will be reported for each valid sighting. The report shall also contain the Task Force Commander's conclusions regarding the quality of reported signals and bearings, results of triangulation attempts, and most probable impact location. These data will be relayed to the STC immediately upon receipt by the HCC to enable the PAC to determine the most productive search areas.

A5.8.8 If the capsule has not been located by ETPD + 30 minutes in the primary recovery area or ETPD + 35 minutes in the secondary and extended recovery areas, the Airborne Recovery Forces will initiate search, at the direction of the HCC, based on the latest impact prediction received from the STC. If this is not available, the HCC will direct a search of the most

[redacted]

probable impact areas as determined from tracking triangulation and other available data.

A5.8.9 The telemetry aircraft will search for the capsule telemetry signal and the beacon signal. All capsule signals acquired will be recorded on magnetic tape with a timing signal. Capsule signal acquisitions will be reported immediately to the area Command RC-121 over the southern area HF frequency.

When the parachute deployment telemetry sequence is received, it will be reported. The telemetry aircraft will attempt to determine the capsule bearing at fade or at parachute deployment. If this can be accomplished, the bearing and aircraft position will be reported to the area Command RC-121.

A5.8.10 If one of the telemetry aircraft visually acquires the capsule in the air or in the water, the position will be reported immediately to the area Command RC-121. The telemetry aircraft will circle the capsule while maintaining 100 percent visual lock-on until arrival of a surface vessel or until fuel supply requires return to base. While hovering over the floating capsule the telemetry aircraft will attempt to provide a transmission compatible with the receiving equipment on Christmas Island so that the capsule bearing from Christmas Island may be determined more accurately.

A5.9 Hawaiian Control Center Recovery Operations and Communications

A5.9.1 The HCC-STC communications will be augmented by the addition of one voice line for relay of all acquisition and capsule signal bearing information from the recovery forces to SOA. This line will be activated at ETPD - 1 hour and will be terminated as soon as the volume of data from the recovery force elements will permit.

A5.9.2 The HCC will direct and control acquisition, recovery, and search operations of the Christmas Island facility, the telemetry receiving aircraft and the recovery forces. The primary communication link between the HCC and the surface elements will be the SSB frequency. The three surface ships will communicate with the HCC through PMR and the PMR representative at the HCC.

A5.9.3 The HCC will maintain a real-time analysis for integration of all incoming data to determine the most probable impact point and search areas and will relay all reported data to the STC immediately. Bearings from [redacted] South Point, Barking Sands, Tern Island and the ships will be plotted. The [redacted] TLM-18 bearing, after the azimuth rate becomes zero, and bearings reported from South Point and Barking Sands will be relayed to the Command RC-121's by the HCC as soon as possible. All bearings will be relayed immediately to the STC for analysis of the capsule trajectory.

A5.9.4 The accuracy of all reported bearings must be considered. The accuracy of the [redacted] TLM-18 antenna is within 1 degree. The accuracy of the Barking Sands tri-helix antenna is within 5 degrees. The accuracy of the quad-helix antennas at South Point, Tern Island and on board the recovery ships is within ±2 degrees.

A5.10 Air Rescue Service Support

Two parachute teams of the Air Rescue Service will be utilized as a primary capsule water retrieval element of the recovery force and will be subject to deployment at the discretion of the Recovery Test Controller, HCC. Detailed plans for the employment of this support will be furnished by the Recovery Test Controller.

A6 POST-RECOVERY OPERATIONS

A6.1 Haiti Victory Data

The Haiti Victory will proceed toward Pearl Harbor at the best speed of advance immediately after termination of the search operation. If the capsule telemetry data have been acquired, the two HRS-3 helicopters will fly

[redacted]

it to the HCC as soon as the ship reaches HRS-3 range of Hickam Air Force Base.

A6.2 Dalton Victory Data

If the Dalton Victory acquires telemetry data from the capsule, an aircraft data pick-up will be accomplished only at the discretion of the STC.

A6.3 Christmas Island and Telemetry Aircraft Data

An aircraft will pick up recovery capsule data acquired by the Christmas Island facility and fly it to Hickam AFB on the day of recovery operations. Christmas Island and JC-54 telemetry aircraft data will be delivered to the HCC as soon as possible.

A6.4 South Point, Barking Sands, and Tern Island Data

Data from South Point, Barking Sands and Tern Island Tracking Stations, including magnetic tapes, set-up sheets, maps and/or logs of the tracking operation, will be hand-carried by PMR personnel, flown to Hickam AFB, and delivered to the HCC.

A6.5 Transport of Data to Sunnyvale

All recovery capsule data acquired by the receiving facilities in the recovery region will be hand-carried to Flight Data Reports, LMSD/61-44, on the first available commercial airline flight.

A6.6 Tracking Station Post-Recovery Operations

The tracking stations will continue observations of the Discoverer Satellite S-band beacon and telemetry transmission until the battery power is exhausted. The orbital programmer is programmed as shown in Figure A2-2. Command transmission and tracking after the recovery pass will be at the direction of the STC.

[redacted]

A7 TABLES AND ILLUSTRATIONS

The following tables and illustrations are applicable to the flight of Discoverer Satellite 1062/Discoverer Booster 297/AET Payload only Each table or figure is given the basic number of the section of the general STD to which it applies, the letter A to denote Appendix material, and a number to sequence items in the same category

Table A2-1

NOMINAL FLIGHT PLANNING DATA

ITEM	DATA
SATELLITE	
S/N	1062
Payload	AET
Fuel	UDMH, 3107 lb
Oxidizer	IRFNA, 9365 lb
Launch weight	15,759 lb
BOOSTER	
S/N	297
Fuel	RJ-1
Oxidizer	Liquid oxygen
Launch weight (including payload)	124,271 lb
LAUNCH	
Site	VAFB, 75-3, Pad 5
Date	November 1960
Pad azimuth	218°25′ ± 15′
Launch azimuth	172°
Nominal airborne Command 5 backup	14 sec
Orbital boost time	239.3 sec
Downrange T/M ship location	13° N, 117° W
Downrange T/M ship heading	270° T
Programmer setting	5640 sec (step setting 22)
INJECTION	
Time	T + 479.8 sec
Location	22°9.4′ N, 119°6.2′ W
Altitude	131 sm
Azimuth (inertial)	171.2°
Nominal velocity	26,011 ft/sec
ORBIT	
Period	94.0 min (5640 sec)
Apogee	456 sm (396 nm)
Perigee	131 sm (114 nm)
Eccentricity	0.038
Average regression rate	23.50°/pass
Reset Latitudes	20° N [redacted]
	32° N [redacted]orthbound) or
	36° N [redacted]outhbound)
	40° N [redacted]orthbound) or
	45° N [redacted]outhbound)
	60° N [redacted]
Inclination Angle	81.83°

[redacted]

Table A2-1 (Continued)

ITEM	DATA
RE-ENTRY	
Re-entry T/M aircraft nominal position and heading	
Day 1 alternate recovery	55° 18′ N, 167° 24′ W -- 165.5° true
Day 2 normal recovery	55° 18′ N, 161° 54′ W -- 165.5° true
RECOVERY	
Aircraft (type and quantity)	C-119's (9), RC-121's (4), T/M receiving (5), C-130 (1)
Surface Ships -- Initial Positions	
Haiti Victory	23° N, 161° W
Auxiliary	16° N, 160° 20′ W
Dalton Victory	8° N, 159° 36′ W
Surface ship helicopters	
HRS-3	2 on each Victory Ship
ALTERNATE RECOVERY – DAY 1	
Alternate recovery pass	17
Nominal impact area center	24° N, 161° 06′ W
ETPD	T + 26.7 hours
NORMAL RECOVERY – DAY 2	
Programmed recovery pass	32
Nominal impact area center	24°, 155° 30′ W
ETPD	T + 50.1 hours

Table A4-1
INSTRUCTIONS AND CAPSULE EQUIPMENT REQUIRED TO BE OPERATIVE AT LAUNCH

1. <u>Agena Telemetry</u>

   a. Continuous Channels:

      6 – Payload quantity. Subcarrier must be present
      7 – Payload quantity. Subcarrier must be present
      8 – Payload quantity. Subcarrier must be present
      10 – Payload quantity. Subcarrier must be present

   b. Commutated Channels:

      12 – Subcarrier must be present and commutator running
      13 – Subcarrier must be present and commutator running
      15 – Subcarrier must be present and commutator running; points 43, 49, and 51 must be present. Channel 16, commutator points 50 and 52 are an acceptable substitution for Channel 15, commutator points 49 and/or 51.
      16 – Subcarrier must be present and commutator running; points 2, 4, 6, 8, 10, 18, 20, 22, 33, and 45 must be present. Channel 1 is an acceptable substitution for Channel 16, points 20 and/or 22. Channel 11 is an acceptable substitution for Channel 16, points 2 and/or 4, 6, 8.
      17 – Subcarrier must be present and commutator running

2. <u>Capsule Telemetry and Equipment</u>

   a. Continuous Telemetry Channels:

      7 – Subcarrier must be present
      9 – Subcarrier must be present
      11 – Subcarrier must be present

Table A5-1

SS/D TIMER SEQUENCE FOR DISCOVERER SATELLITE SERIAL 6205-1062

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	EVENT DESCRIPTION
	-0.1	Timer reset
0		Liftoff
0.1	0.1	Timer reset
		Timer warning (ground function
150	150	Start Fairchild Timer
166		MAIN ENGINE SHUTDOWN
167	167	Programmed destruct to lockout
		Uncage IRP gyros
167	167	Flight controls power ON (backup)
175		VERNIER SHUTDOWN
180		Enable Fairchild Timer delay
183.5	183.5	Initiate vehicle pneumatics control
		Open pneumatic supply valve
183.5	183.5	Fire explosive bolts
184	184	Arm timer delay circuit
		$-1.65°$/min pitch rate from integ. pot.
184	184	Fire retro rockets
190	190	Remove $-40°$/min. yaw rate (no yaw correction required)
196		Command $-3.6°$/sec pitchover program (pitchover 28.8°)
196	196	Fire H/S fairing squib
204	204	Stop $-3.6°$/sec pitch rate
		Connect pitch H/S signal to pitch IRP gyro
204	204	Connect roll H/S signal to roll IRP gyro
208	208	Uncage integrator
		Accept Fairchild Timer and Beacon 5 delay signal*
208	208	Remove 28v dc from N_2 valve
		ORBITAL BOOST
223	208	Stop SS/D Timer delay (norm. 15 sec) Fairchild Timer
227	212	Deactivate timer delay circuit
		Fire ullage rockets
		Activate H/S electrical pitch bias +4 1/2° offset
227	212	Preactivate hydraulics
240.5	225.5	Unground integrator input
		Connect accelerometer to integrator

* *Note: Beacon 6 ends timer delay and corrects integrator*

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	EVENT DESCRIPTION
240.5	225.5	Arm and fire gas gen squib, fire He valve
241.5	226.5	Pitch and yaw pneumatics OFF (backup)
		Open gas gen. arm and fire He valve
241.5	226.5	Close circuit to T M OFF SWITCH
242	227	STEADY STATE THRUST
473.5	458.5	Arm pitch and yaw pneumatics
473.5	458.5	Engine cutoff safety switch
479.8	(464.8)	Engine shutdown by integrator*
		Disconnect accelerometer
		Ground integrator input
479.8	(464.8)	Activate pitch and yaw pneumatics
		REORIENTATION
498	484	Hydraulic shutdown, pitch and yaw
		Pneumatic ON (backup) and remove 28v to ullage rockets
		Disconnect integrator pitch rate pot.
		Command −40°/min yaw rate (180° yaw left)
498	484	Fire He and oxidizer vent valve squib
508	494	Calibrate T/M
		Open ground to accel. power amps
508	494	Apply 28v unreg. to SS/L power control
518	504	Stop T/M calibrate
		Open eng. shutdown, switch antenna, open flight control gain change relays and switch roll and yaw gyro TLM gain
518	504	Shutdown integrator power
768	754	Command +3.86°/min pitch rate (yaw rate removed)
		Connect roll H/S signal to yaw gyro
		Switch-out 0.1% regulated 400-cycle power
768	754	Shutdown +28.3v IRP ascent power
		ORBIT
895	881	T/M OFF
		SS/D Timer OFF, H/S to low gain
		Phase balance Phase A (spare)
		Phase balance Phase C (spare)
895	881	Fire fuel vent valve squib
		RECOVERY
	881	Restart SS/D Timer, H/S OFF

** Integrator to be set at a dial reading of 2150 representing a velocity to be gained of 17,200 fps.*

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	EVENT DESCRIPTION
X + 15	896	Command −45°/min pitch rate
X + 15	896	Arm capsule ejection squib
X + 92	973	Command −3.86°/min pitch rate (stop −45°/min pitch rate)
		SS/L Transfer Circuit 1
		SS/L Transfer Circuit 2
X + 92		Fire capsule plug disconnect squib
94.5	975.5	Command eject (fire capsule squibs)
X + 130	1010	Shutdown SS/D Timer, H/S ON, H/S to low gain

Table A6-1
NOMINAL ORBIT SCHEDULE
(Based on a 94.0-Minute Period)

PHASE	EVENT	TIME (MIN)	LOCATION N LATITUDE (DEG)
Launch	Launch	0	34.8
	Start orbital timer	2.50 (150.0 sec)	--
	Separation	3.06 (183.5 sec)	--
	Nominal fire time	4.01 (240.5 sec)	--
	Nominal burnout and orbit injection	8.00 (479.8 sec)	--
	First crossing of equator	13.40 (804.0 sec)	0
	Beacon and T/M off	16.30 (979.3 sec)	12 (S)
Pass 1 (N-S) (40 sec RM interrupt)	Beacon and T/M on – reset enable	88.4	75
	65° N latitude (ref)	91.1	65
	Reset signal/command	92.7	60
	57.6° N latitude (ref) [redacted]	93.2	57.6
	Beacon and T/M off – reset disable	105.3	10
	End of Orbit 1	155.3	0
Pass 2 (N-S) (60 sec RM interrupt)	Beacon and T/M on – reset enable	182.5	75
	Reset signal/command	186.6	60
	57.6° N latitude (ref) [redacted]		57.6
	21.6° N latitude (ref)	196.2	21.6
	Beacon and T/M off – reset disable	199.0	10
	End of Orbit 2	249.3	0
Passes 3 thru 5	End of Orbit 3	343.3	0
	End of Orbit 4	437.3	0
	End of Orbit 5	531.3	0
Pass 6 (S-N) (20 sec RM interrupt)	Beacon and T/M on – reset enable	538.0	25
	Reset signal/command	542.0	40
	42.9° N latitude (ref) [redacted]	544.4	42.9
	Beacon and T/M off – reset disable	548.6	58
	End of Orbit 6	625.3	0

Table A6-1 (Continued)

PHASE	EVENT	TIME (MIN)	LOCATION N LATITUDE (DEG)
Pass 7 (S-N) (40 sec RM interrupt)	Beacon and T/M on – reset enable	632.0	25
	Reset signal/command [redacted]	636.1	40
	42.9° N latitude (ref)	637.6	42.9
	Beacon and T/M off – reset disable	641.7	58
	End of Orbit 7	719.3	0
Pass 8 (S-N) (60 sec RM interrupt)	Beacon and T/M on – reset enable	723.9	17
	Reset signal/command [redacted]	727.9	32
	34.8° N latitude (ref)	729.0	34.8
	Beacon and T/M off – reset disable	733.4	52
	End of Orbit 8	813.3	0
Pass 9 (S-N) (80 sec RM interrupt)	Beacon and T/M on – reset enable	817.9	17
	Reset signal/command [redacted]	821.9	32
	34.8° N latitude (ref)	823.0	34.8
	Beacon and T/M off – reset disable	827.4	52
	End of Orbit 9	907.3	0
Pass 10 (S-N) (100 sec RM interrupt)	Beacon and T/M on – reset enable	908.6	5
	Reset signal/command	913.0	20
	21.6° N latitude (ref) [redacted]	913.4	21.6
	57.6° N latitude (ref)	923.0	57.6
	Beacon and T/M off – reset disable	925.1	66
	End of Orbit 10	1001.3	0
Passes 11 and 12	End of Orbit 11	1095.3	0
	End of Orbit 12	1189.3	0
Pass 13 (N-S) (20 sec RM interrupt)	Beacon and T/M on – reset enable	122.0	61
	Reset signal/command [redacted]	1224.2	45
	42.9° N latitude (ref)	1224.7	42.9
	Beacon and T/M off – reset disable	1226.9	34
	End of Orbit 13	1283.3	0

Table A6-1 (Continued)

PHASE	EVENT	TIME (MIN)	LOCATION N LATITUDE (DEG)
Pass 14	End of Orbit 14	1377.3	0
Pass 15 (N-S) (40 sec RM interrupt)	Beacon and T/M on – reset enable	1410.5	52
	Reset signal/command [redacted]	1414.6	36
	34.8° N latitude (ref) [redacted]	1414.9	34.8
	Beacon and T/M off – reset disable	1418.2	22
	End of Orbit 15	1471.3	0
Pass 16 (N-S) (60 sec RM interrupt)	Beacon and T/M on – reset enable	1498.3	75
	Reset signal/command	1502.4	60
	57.6° N latitude (ref) [redacted]	1503.2	57.6
	34.8° N latitude (ref) [redacted]	1508.7	34.8
	Beacon and T/M off – reset disable	1512.2	22
	End of Orbit 16	1565.3	
Pass 17 (N-S) (80 sec RM interrupt)	Beacon and T/M on – reset enable	1592.4	75
	Reset signal/command	1596.4	60
	57.6° N latitude (ref) [redacted]	1597.0	57.6
	21.6° N latitude (ref) [redacted]	1605.5	21.6
	Beacon and T/M off – reset disable	1608.7	10
	End of Orbit 17	1659.3	0
Pass 18	End of Orbit 18	1753.3	0
Pass 19	End of Orbit 19	1847.3	0
Pass 20	End of Orbit 20	1941.3	0
Pass 21 (S-N) (40 sec RM interrupt)	Beacon and T/M on – reset enable	1948.1	25
	Reset signal/command	1952.2	40
	42.9° N latitude (ref) [redacted]	1954.5	42.9
	Beacon and T/M off – reset disable	1957.2	58
	End of Orbit 21	2035.3	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME (MIN)	LOCATION N LATITUDE (DEG)
Pass 22 (S-N) (40 sec RM interrupt)	Beacon and T/M on – reset enable	2042.1	25
	Reset signal/command	2046.2	40
	42.9° N latitude (ref) [redacted]	2048.5	42.9
	Beacon and T/M off – reset disable	2051.2	58
	End of Orbit 22	2129.3	0
Pass 23 (S-N) (60 sec RM interrupt)	Beacon and T/M on – reset enable	2133.9	17
	Reset signal/command	2137.9	32
	34.8° N latitude (ref) [redacted]	2139.0	34.8
	Beacon and T/M off – reset disable	2143.4	52
	End of Orbit 23	2223.3	0
Pass 24 (S-N) (80 sec RM interrupt)	Beacon and T/M on – reset enable	2227.9	17
	Reset signal/command	2231.9	32
	34.8° N latitude (ref) [redacted]	2233.0	34.8
	Beacon and T/M off – reset disable	2237.4	52
	End of Orbit 24	2317.3	0
Pass 25 (S-N) (100 sec RM interrupt)	Beacon and T/M on – reset enable	2318.6	5
	Reset signal/command	2322.9	20
	21.6° N latitude (ref) [redacted]	2323.3	21.6
	57.6° N latitude (ref)	2333.1	57.6
	Beacon and T/M off – reset disable	2335.1	66
	End of Orbit 25	2411.3	0
Pass 26	End of Orbit 26	2505.3	0
Pass 27	End of Orbit 27	2599.3	0
Pass 28 (N-S) (20 sec RM interrupt)	Beacon and T/M on – reset enable	2630.1	61
	Reset signal/command	2634.3	45
	42.9° N latitude (ref) [redacted]	2634.7	42.9
	Beacon and T/M off – reset disable	2637.2	34
	End of Orbit 28	2693.3	0

PHASE	EVENT	TIME (MIN)	LOCATION N LATITUDE (DEG)
Pass 29	End of Orbit 29		0
Pass 30 (N-S) (40 sec RM interrupt)	Beacon and T/M on – reset enable	2820.5	52
	Reset signal/command [redacted]	2824.8	36
	34.8° N latitude (ref) [redacted]	2824.7	34.8
	Beacon and T/M off – reset disable	2828.3	22
	End of Orbit 30	2881.3	0
Pass 31 (N-S) (60 sec RM interrupt)	Beacon and T/M on – reset enable	2908.4	75
	Reset signal/command	2912.6	60
	57.6° N latitude (ref) [redacted]	2913.2	57.6
	34.8° N latitude (ref) [redacted]	2918.7	34.8
	Beacon and T/M off – reset disable	2922.3	22
	End of Orbit 31	2975.3	0
Pass 32 (N-S) (80 sec RM interrupt)	Beacon and T/M on – reset enable	3002.4	75
	Reset signal/command	3006.6	60
	57.6° N latitude (ref) [redacted]	3007.2	57.6
	21.6° N latitude (ref) [redacted]	3016.2	21.6
	Beacon and T/M off – reset disable	3019.3	10
	End of Orbit 32	3069.3	0
Pass 33 (N-S) (100 sec RM interrupt)	Beacon and T/M on – reset enable	3096.4	75
	Reset signal/command	3100.6	60
	57.6° N latitude (ref) [redacted]	3101.2	57.6
	21.6° N latitude (ref) [redacted]	3110.2	21.6
	Beacon and T/M off – reset disable	3113.3	10
	End of Orbit 33	3163.3	0
Pass 34	End of Orbit 34	3257.3	0

[redacted]

Table A8-1

REAL-TIME DATA READOUT AND REPORTING REQUIREMENTS

	MEASUREMENT		CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					T/M SHIP***	T/M AIRCRAFT***		NOTE
	NAME	NUMBER						[redacted]					PVT. JOE E. MANN	WV-2 137890	ELECTRA	
LAUNCH	Liftoff Signal	---	---	1	RT	X	Ascent	X	X							
	Thor Main Engine Cutoff	---	Thor 12	1	RT	X	Ascent	X	X							
	Agena Engine Ignition and Cutoff	B6	14	1	RT	X	Ascent	X	X				X			
	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		Ascent	X	X							
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	Ascent	X	X							
	11-Second Step Switch Position	H108	16-20	1	RT		Ascent	X	X				X			
	110-Second Step Switch Position	H109	16-22	1	RT		Ascent	X	X				X			
	Increase/Decrease Switch Position	H107	16-18	1	RT	X	Ascent	X	X				X			
	Yaw Gyro Torque	D84	17-54	2	PP1		Ascent						X			1
	Payload Function Selector Setting	AET 14/15, 17/18, 20/ 21, 23/24	13-18 thru 13-24 13-48 thru 13-54	1	RT	X	Ascent	X	X				X			
ORBIT	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		1 thru 31	X	X	X	X	X				
	Command Verifications 1, 2, 3, 4	H112	11	1	RT	X	1 thru 31	X	X	X	X	X				
	Command Verifications 5, 6	H114	14	1	RT	X	1 thru 31	X	X	X	X	X				
	Programmer Period Readout (Console or Remote)	H110	1	2	RT		1 thru 31	X	X	X	X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	1 thru 31	X	X	X	X	X				
	11-Second Step Switch Position	H108	16-20	1	RT		1 thru 31	X	X	X	X	X				
	110-Second Step Switch Position	H109	16-22	1	RT		1 thru 31	X	X	X	X	X				
	Increase/Decrease Switch Position	H107	16-18	1	RT	X	1 thru 31	X	X	X	X	X				
	Reset Monitor Signal	H70	16-10	1	RT	X	1 thru 31	X	X	X	X	X				
	Programmer Pass Identification	H70	16-10	1	RT	X	1 thru 31	X	X	X	X	X				
	Re-entry Selector Switch Position	H117	16-45	1	RT	X	1 thru 31	X	X	X	X	X				3

[redacted]

Table A8-1 (Continued)

	MEASUREMENT NAME	MEASUREMENT NUMBER	CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION [redacted]					T/M SHIP*** PVT. JOE E. MANN	T/M AIRCRAFT*** WV-2 137890	T/M AIRCRAFT*** ELECTRA	NOTE
ORBIT (Continued)	Payload Function Selector Setting	AET 14/15, 17/18, 20/21, 23/24	13-18 thru 13-24, 13-48 thru 13-54	1	RT	X	1 thru 31	X	X	X	X	X				
	Control Gas Supply Pressure - High Range	D95	16-33	2	PP1	X	1 thru 31	X	X	X	X	X				
	Control Gas Supply Pressure - Low Range	D140	16-27	2	PP1		1 thru 31	X	X	X	X	X				
	Battery Bus Voltage	C1	16-38	2	PP1		1 thru 31	X	X	X	X	X				
	Horizon Scanner - Pitch	D37	17-40	3	PP2		2, 9, 13, 15, 17, 24, 28,31	X		X	X	X				4
	Horizon Scanner - Roll	D39	17-46	3	PP2			X		X	X	X				4
	SPI Temperature	D130	15-43	3	PP2			X		X	X	X				5
	SPI Pitch Angle - Lower	D128	15-51	3	PP2			X		X	X	X				5
	SPI Yaw Angle - Lower	D127	15-49	3	PP2			X		X	X	X				5
	SPI Pitch Ref. Voltage - Lower	D136	15-2	3	PP2			X		X	X	X				5
	SPI Yaw Ref. Voltage - Lower	D137	15-4	3	PP2			X		X	X	X				5
	SPI Pitch Angle - Upper	D138	16-52	3	PP2			X		X	X	X				5
	SPI Yaw Angle - Upper	D139	16-50	3	PP2		2, 9, 13, 15, 17, 24, 28, 31	X		X	X	X				5
	Wave Train	AET 50	8	2	PP1		1, 2, 6, 7, 8, 9, 13, 15, 16, 24, 31	X		X	X	X				2
	No Name Assigned	AET 40	12-9	2	PP1			X		X	X	X				11
	No Name Assigned	AET 48	12-13	2	PP1		1, 2, 6, 7, 8, 9, 13, 15, 16, 24, 31	X		X	X	X				11
RE-ENTRY	Programmer Period Readout (Console or Remote)	H110	1	3	RT		Recovery Pass				X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	2	RT	X					X	X				
	11-Second Step Switch Position	H108	16-20	3	PP2						X	X			X	
	110-Second Step Switch Position	H109	16-22	3	PP2						X	X			X	
	Reset Monitor Signal	H70	16-10	1	RT	X					X	X			X	
	Programmer Pass Identification	H70	16-10	2	RT		Recovery Pass				X	X			X	

[redacted]

Table A8-1 (Continued)

	MEASUREMENT		CHANNEL	PRIORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					T/M SHIP***	T/M AIRCRAFT***		NOTE
	NAME	NUMBER						[redacted]					PVT. JOE E. MANN	WV-2 137890	ELECTRA	
RE-ENTRY (Continued)	Re-entry Selector Switch Position	H117	16-45	1	RT	X	Recovery Pass				X	X			X	3
	Control Gas Supply Pressure - High Range	D95	16-33	2	PP1	X	↑				X	X			X	
	Control Gas Supply Pressure - Low Range	D140	16-27	2	PP1	X					X	X			X	
	Battery Bus Voltage	C1	16-38	2	PP1						X	X			X	
	Horizon Scanner - Pitch	D37	17-40	1	PP2						X				X	4
	Horizon Scanner - Roll	D39	17-46	1	PP2						X				X	4
	SPI Pitch Angle - Lower	D128	15-51	2	See Note 5						X				X	6
	SPI Yaw Angle - Lower	D127	15-49	2	See Note 5						X				X	6
	SPI Pitch Ref. Voltage - Lower	D136	15-2	2	See Note 5						X				X	6
	SPI Yaw Ref. Voltage - Lower	D137	15-4	2	See Note 5						X				X	6
	SPI Pitch Angle - Upper	D138	16-52	1	PP2						X				X	6
	SPI Yaw Angle - Upper	D139	16-50	1	PP2						X				X	6
	Pitch Torque Signal	D41	17-38	2	PP1						X				X	7
	SS/D Timer Restart	D85	17-52	1	RT	X					X				X	
	Capsule Separation Event	AET 51	16-42	1	RT	X					X	X		X	X	8
	Payload Connector Disconnect	AET 26	12-2	2	RT						X	X			X	13
	Retro-Rocket Ignition, De-spin Valve Actuated, Thrust Cone Ejection	---	Capsule 7	1	RT, PP1	X					X	X		X	X	9
	Spin Valve Actuated, Thrust Cone Ejection	---	Capsule 9	1	RT, PP1	X					X	X		X	X	9
	Axial Acceleration	---	Capsule 11	1	PP1, PP2	X					X	X		X	X	10
	3g Switch Close, 3g Switch Open, Ablative Shell Off	---	Capsule 7	1	RT, PP1	X					X	X		X	X	9
	Parachute Cover Off	---	Capsule 9	1	RT, PP1	X	↓				X	X		X	X	9
	Capsule T/M Signal Strength	---	Capsule 7, 9, 11	2	RT		Recovery Pass				X	X		X	X	12

[redacted]

Table A8-1 (Continued)

NOTES:

1. Report the system time of reorientation, the voltage level prior to start of reorientation, and the average voltage level during reorientation.
2. Refer to Figure A8-2 for details of readout required.
3. Reads 1 volt for normal Pass 32 re-entry, 4 volts for alternate Pass 17 re-entry.
4. Read when sun position indicator data are required in Notes 5 and 6 (until turn-off at start of reorientation). [redacted] reads on the recovery pass to indicate SS/D restart event if measurement D 85 is invalid.
5. Read 3 times at approximately 2-minute intervals correlated with system time on Pass 2 [redacted] and [redacted] on Pass 13 [redacted] on Pass 15 [redacted] on Pass 17 if recovery is to be made on the second day [redacted] on Pass 28 [redacted] and on Pass 31 [redacted]. Readings at one system time only are required on Pass 9 [redacted] and Pass 24 [redacted]. All [redacted] and [redacted] readings are to be obtained as far north as possible. [redacted] transmits data on Channels 15 and 16 to SV on 100-wpm/voice line after Pass 2; three 10-second data samples at 2-minute interval* required.
6. Read at 1-minute intervals before reorientation, 20-second intervals during reorientation, and immediately prior to separation; correlate with system time. Channel 15 data will be read only if the data on Channel 16 does not appear to be valid. [redacted] transmits data on Channels 15 and 16 to SV on 100-wpm/voice line after recovery pass; continuous transmission from acquisition to separation.
7. Read system time at start and finish of reorientation, voltage level prior to start of reorientation, and average voltage level during reorientation.
8. Reads 4.67 volts prior to separation, 1.33 volts after separation. Correlation within 2 seconds of exact system time is satisfactory for initial [redacted] and Electra report. [redacted] verifies that event has occurred by voltage level check.
9. The RT readout will contain a verification that each event has occurred. The PP1 readout will contain the system time of each event. Use event numbers listed in Section 7.4.5 for report identification.
10. The [redacted] and Electra PP1 readout will contain the average value and duration. The PP2 readout will contain a complete time history of acceleration and will include the system time of each data dropout and the time duration of dropout. [redacted] reads values 5 seconds prior to, at, and 5-seconds after parachute deployment.
11. Record voltage level at beginning, middle, and end of pass. Readout, accurate to at least 0.1 volt (2% bandwidth), required of [redacted] (Passes 8, 9, 15, 24, 31), [redacted] (Passes 6, 7, 13), [redacted] (Passes 1, 2, 16), and [redacted] (Pass 2). Readouts on Passes 1 and 2 are required 60 minutes after the pass; all other readouts required 10 minutes after the pass.
12. Provide a qualitative evaluation of signal reception.
13. Reads 1 volt prior to separation, out of band after separation.

---

* *RT - Read in real time.*

PP1 - Read immediately after pass.

PP2 - Read immediately after RT and PP1 readouts.

** *All data are also to be reported to the STC by 60-wpm teletype as soon as possible.*

*** *T/M ships and aircraft will transmit real-time data immediately after signal fade so no interference with the vehicle telemetry signal will be generated.*

Table A8-2

NOMINAL PAYLOAD REAL-TIME READOUT AND REPORTING REQUIREMENTS AND FUNCTION WAVE TRAIN

CHANNEL 8 (AET 50) READOUT AND REPORTING REQUIREMENTS

PASS NO	TRACKING STATION	MAXIMUM DATA REPORTING TIME ALLOWABLE (MINUTES)		
		READOUT (a)	READOUT (b)	READOUT (c)
1	[redacted]	10	--	90
2	[redacted]	--	--	90
2	[redacted]	30	60	90
6	[redacted]	15	60	90
8	[redacted]	--	--	90
9	[redacted]	15	60	90
13	[redacted]	15	60	90
15	[redacted]	15	60	90
16	[redacted]	15	--	--
24	[redacted]	15	60	90
31	[redacted]	15	--	--

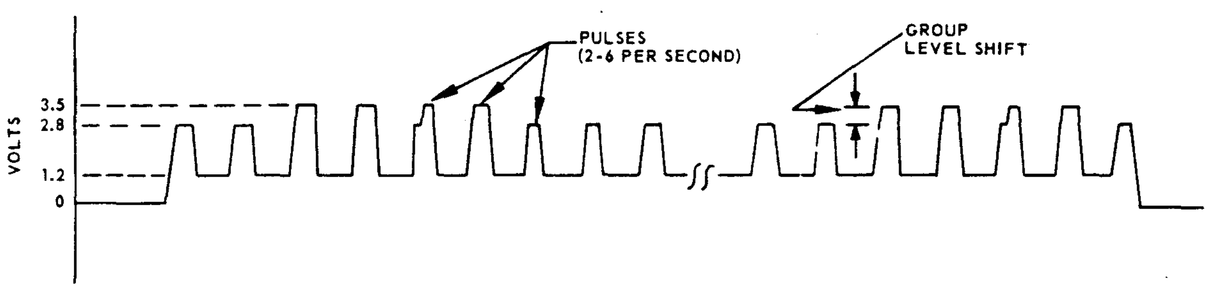
NOTE:

READOUT (a) - COMPARE CHANNEL 8 WAVE TRAIN WITH NOMINAL WAVE TRAIN BELOW. REPORT PRESENCE OR ABSENCE.

READOUT (b) - REPORT THE TIME (±0.5 SEC) OF THE START OF THE WAVE TRAIN.

READOUT (c) - REPORT THE ELAPSED TIME (TO THE NEAREST 0.1 SECOND) REQUIRED FOR 100 PULSES COUNTED FROM LEADING EDGE TO LEADING EDGE AFTER AT LEAST 20 PULSES FROM THE WAVE TRAIN START. REPORT THE NUMBER OF GROUP LEVEL SHIFTS WITHIN THIS 100 PULSE PERIOD.

AET 50, CHANNEL 8 WAVE TRAIN



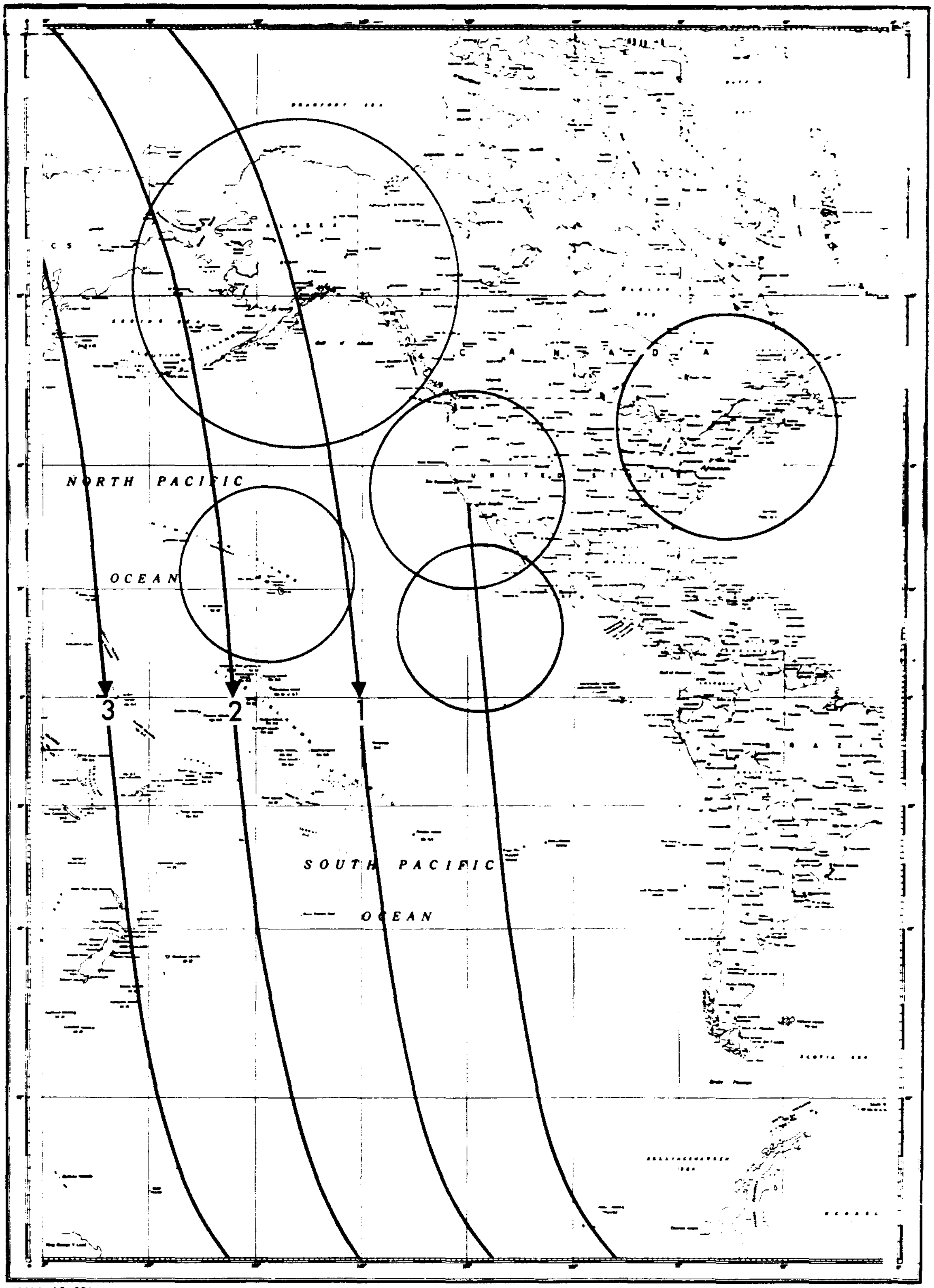


Figure A2-1(a) Nominal Orbit Tracks -- Passes 1 Through 3

[redacted]

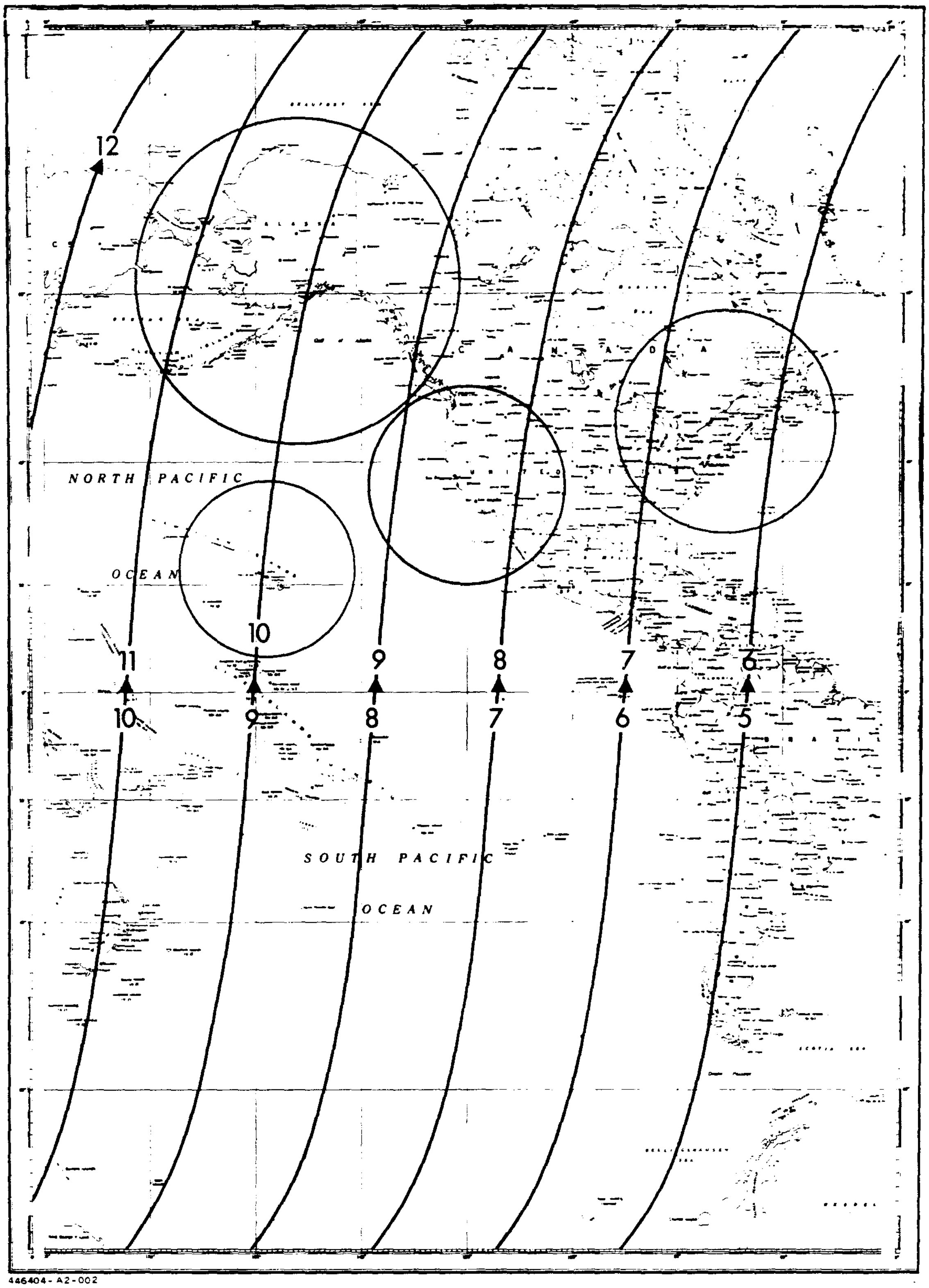


Figure A2-1(b) Nominal Orbit Tracks -- Passes 5 Through 11

[redacted]

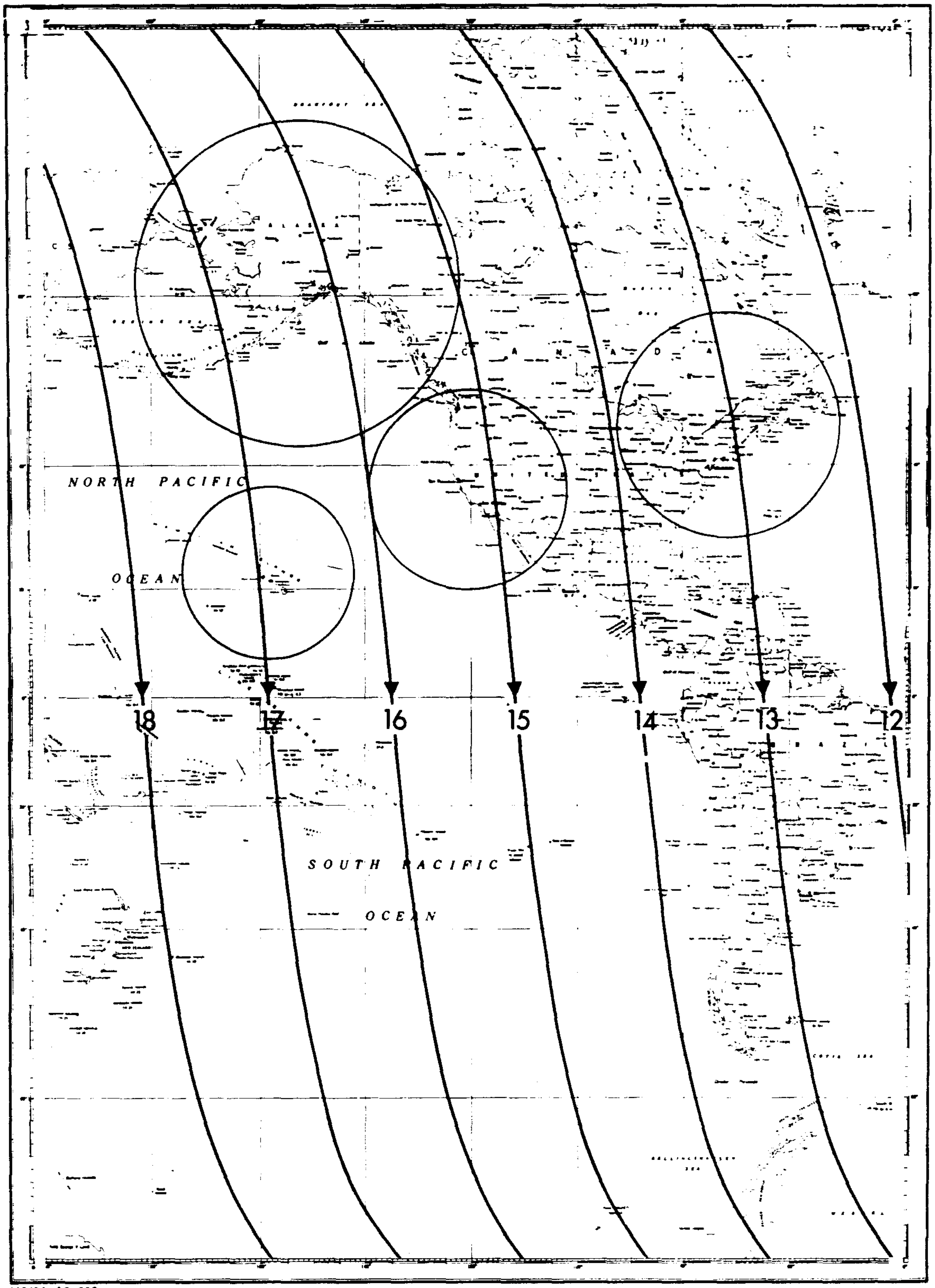


Figure A2-1(c) Nominal Orbit Tracks -- Passes 12 Through 17

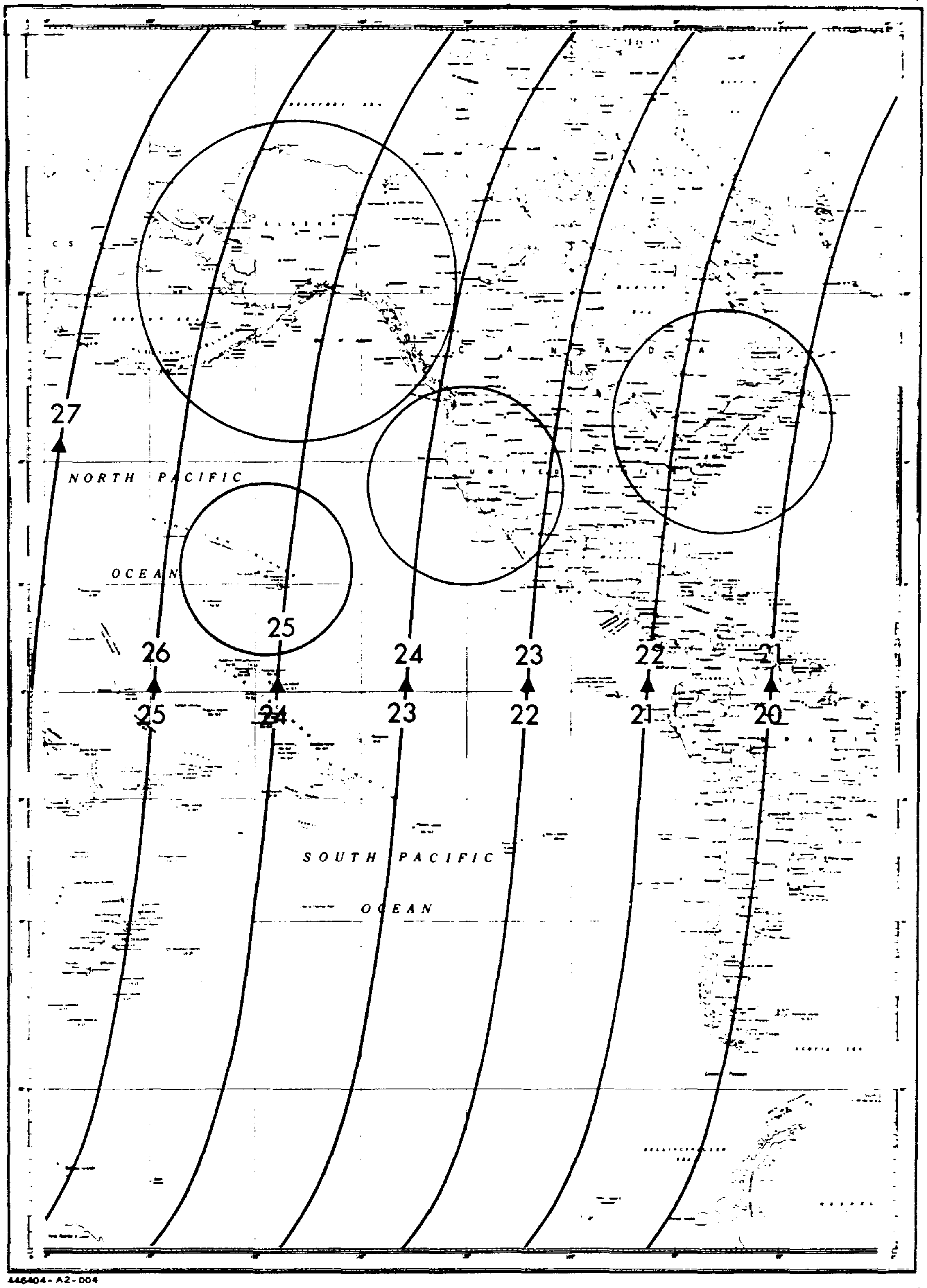


Figure A2-1(d) Nominal Orbit Tracks -- Passes 20 Through 26

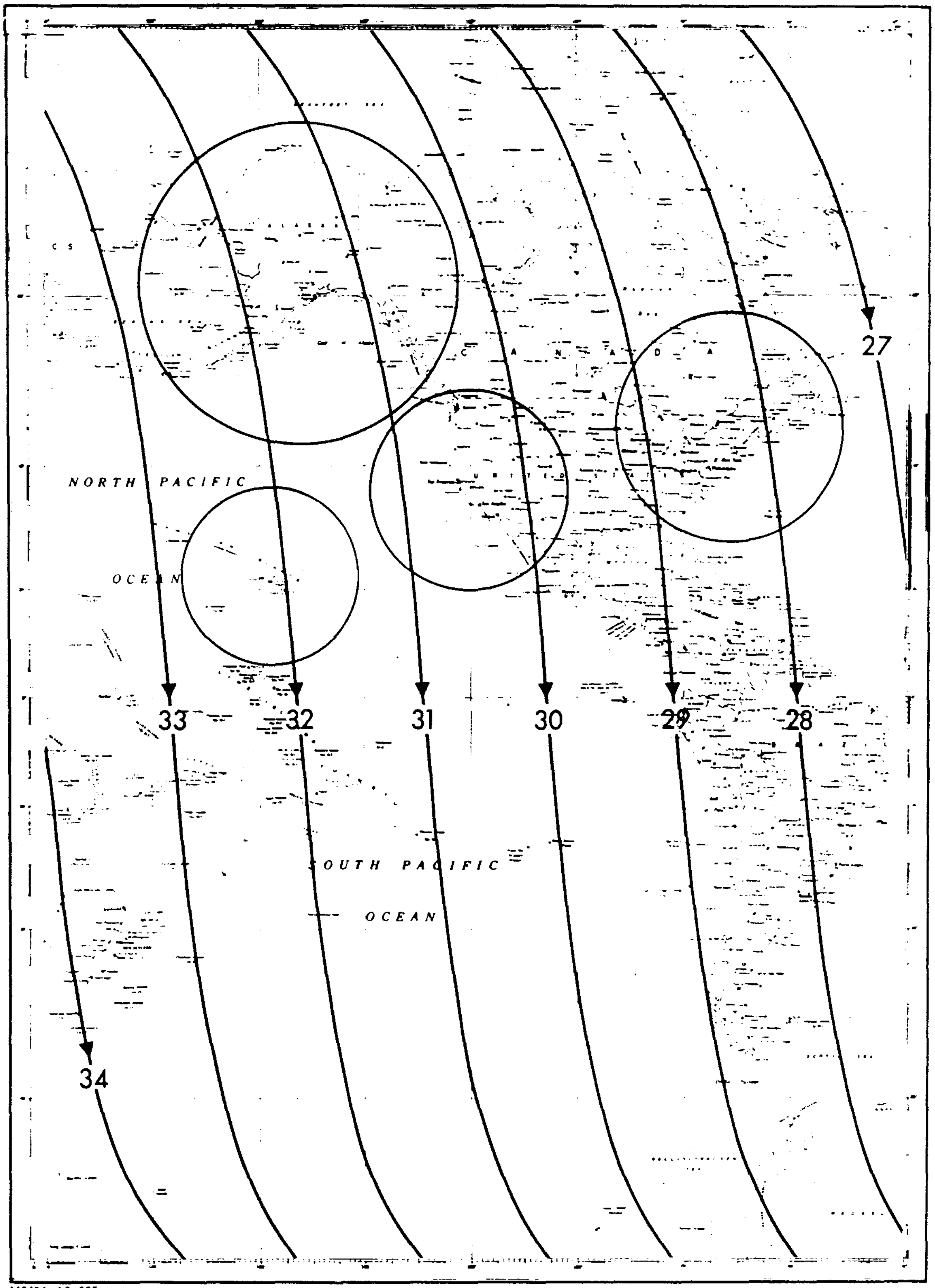


Figure A2-1(e) Nominal Orbit Tracks -- Passes 27 Through 33

TYPE OF PASS

A	B	C	D	E	F	G
STATION						
[redacted]						
PROGRAMMER PASS NUMBER						
	0 (20 ASCENT)		1 (40)			
			2 (60)	6(20)		
				7(40)		
					8(60)	
					9(80)	10(100)
13(20)	15(40)	16(60)	17(80)*	21(20)		
				22(40)	23(60)	
					24(80)	
28(20)	30(40)	31(60)	32(80) **			25(100)
			33(100) ***	37(20)	38(40)	
					39(60)	40(80)
43(20)						41(100)
44(40)	45(60)	46(80)	47(100)	52(20)		
				53(40)	54(60)	55(80)
						56(100)
59(20)		61(40)	62(60)	67(20)		
			63(80)	68(40)	69(60)	70(80)
						71(100)
74(20)	76(40)		77(60)			
			78(80)	82(20)		
				83(40)	84(60)	
					85(80)	86(100)
89(20)	91(40)	92(60)	(BEACON & T/M REMAIN ON)			

NOTE:
NUMBER IN PARENTHESIS ( ) SPECIFIES TIME IN SECONDS FOLLOWING RESET MONITOR INITIATION AT WHICH PROGRAMMER IDENTIFICATION MARK OCCURS.

* PASS 17 PROGRAMMED FOR ALTERNATE RE-ENTRY SELECTION
** PASS 32 PROGRAMMED FOR NOMINAL RE-ENTRY
*** PASS 33 ALSO PROGRAMMED FOR NOMINAL AND ALTERNATE RE-ENTRY FOR BACKUP

446406-A1-001(1)

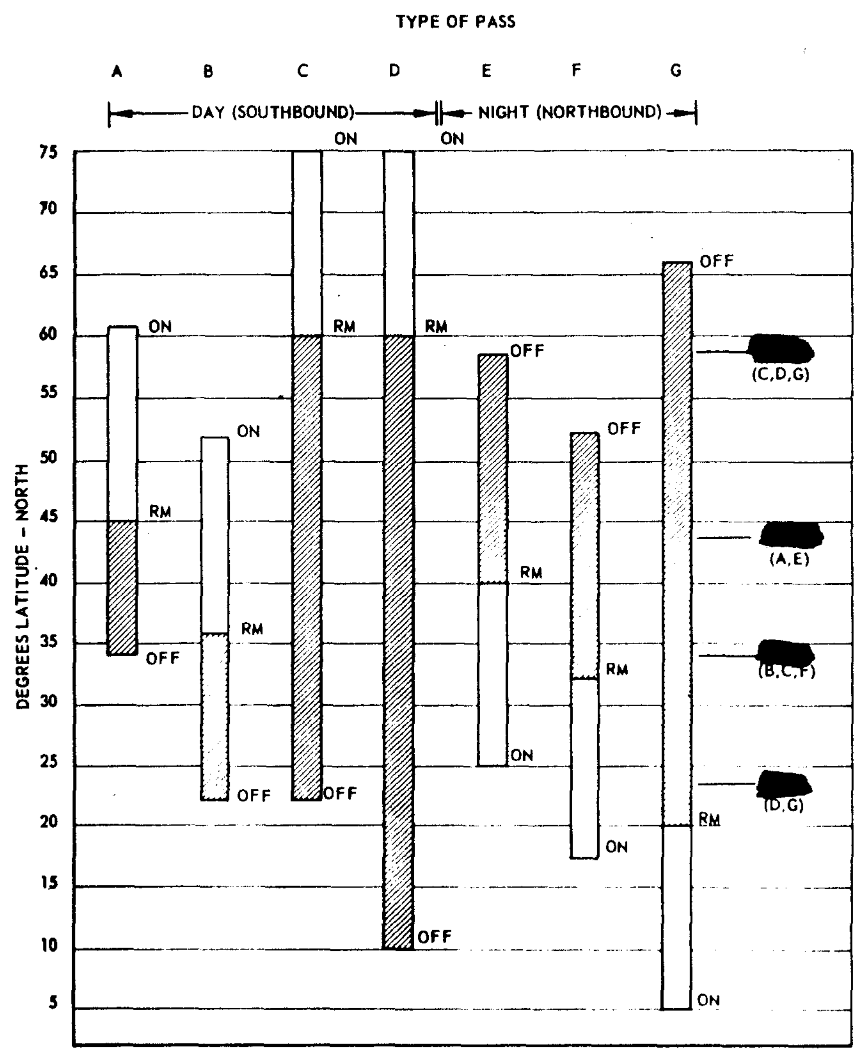


Figure A2-2 Readout and Reset Programming

[redacted]

[redacted]

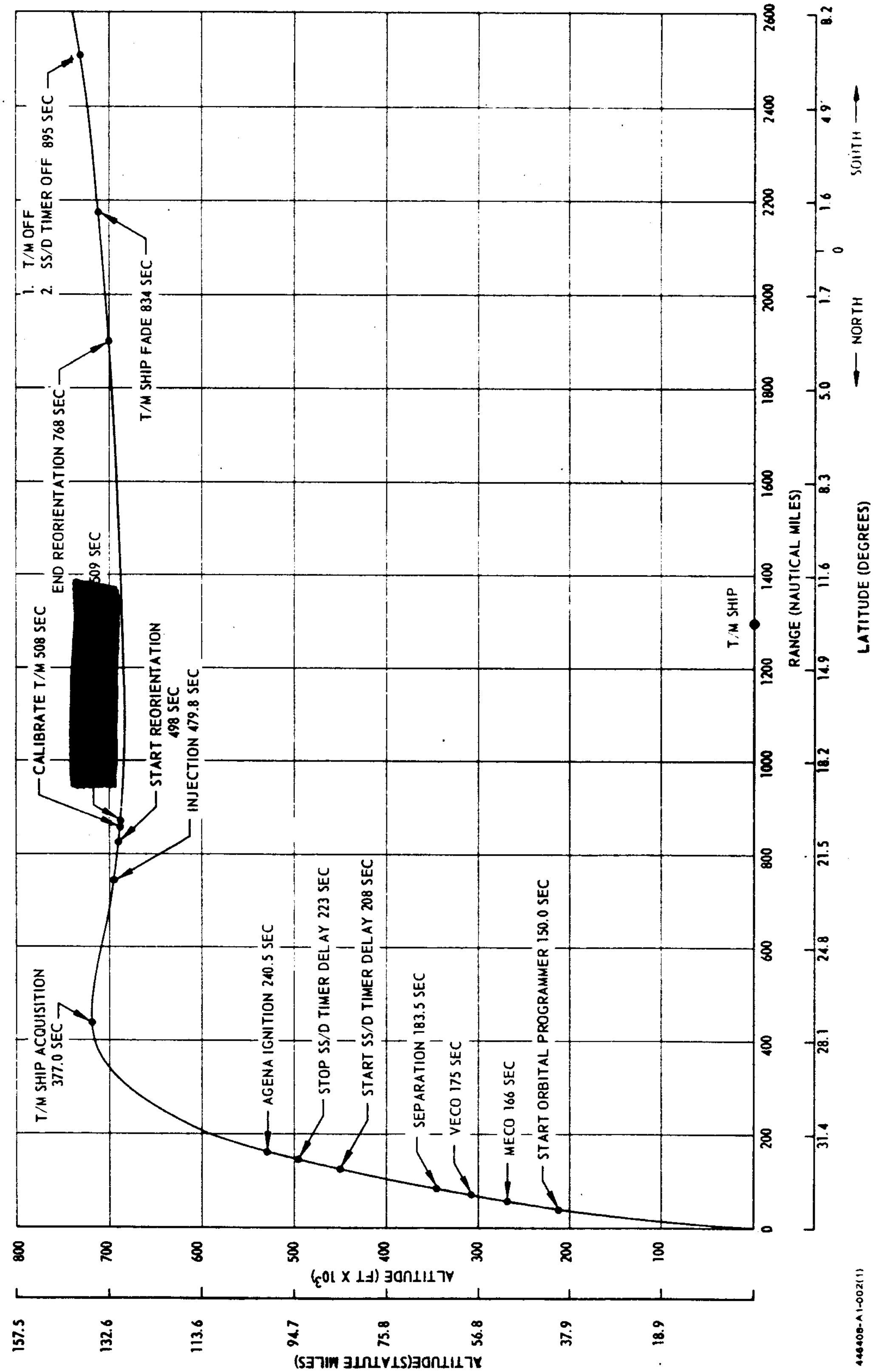
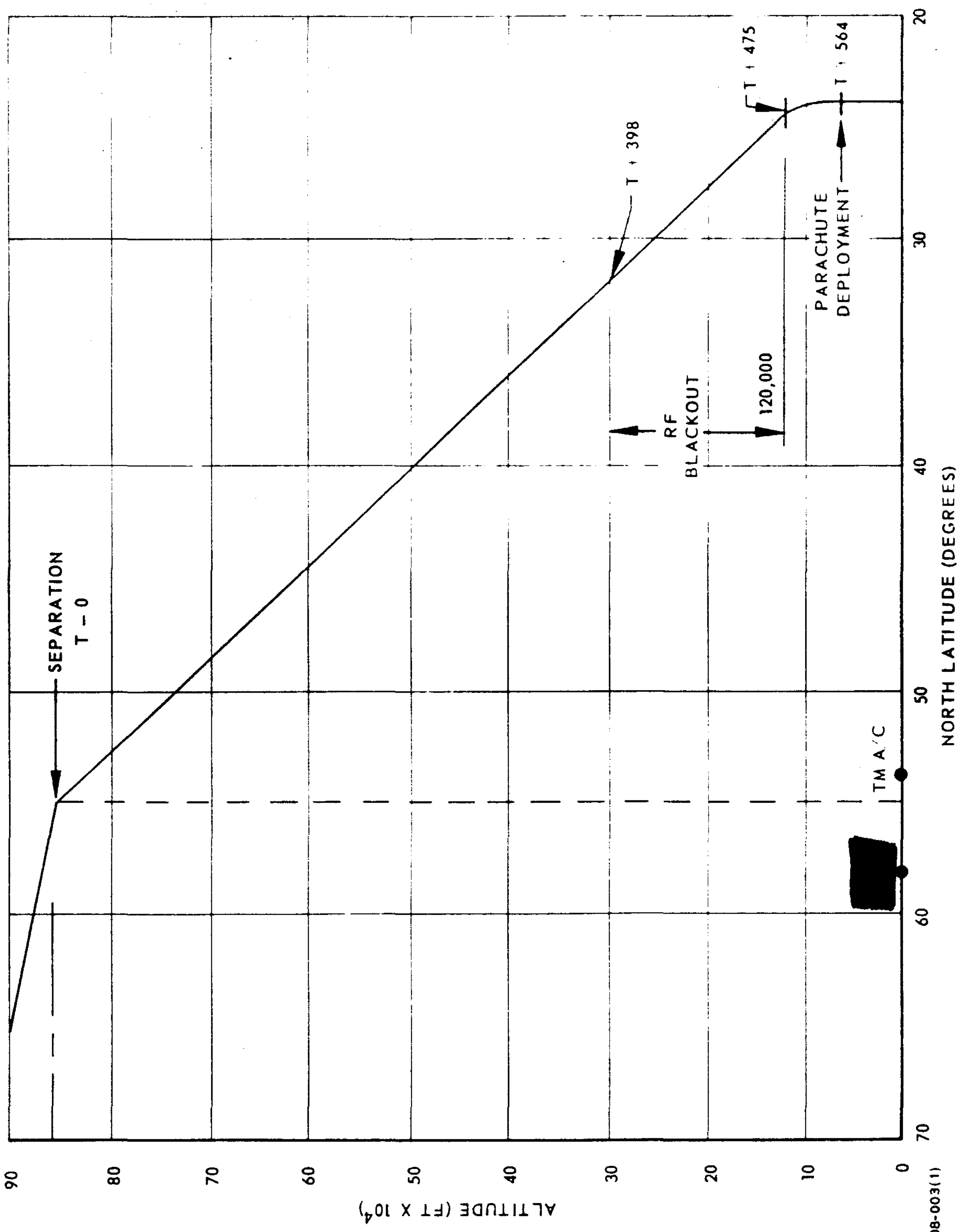


Figure A5-1 Launch Phase Nominal Trajectory

[redacted]



44640B-003(1)

Figure A7-1 Capsule Re-entry Trajectory

[redacted]

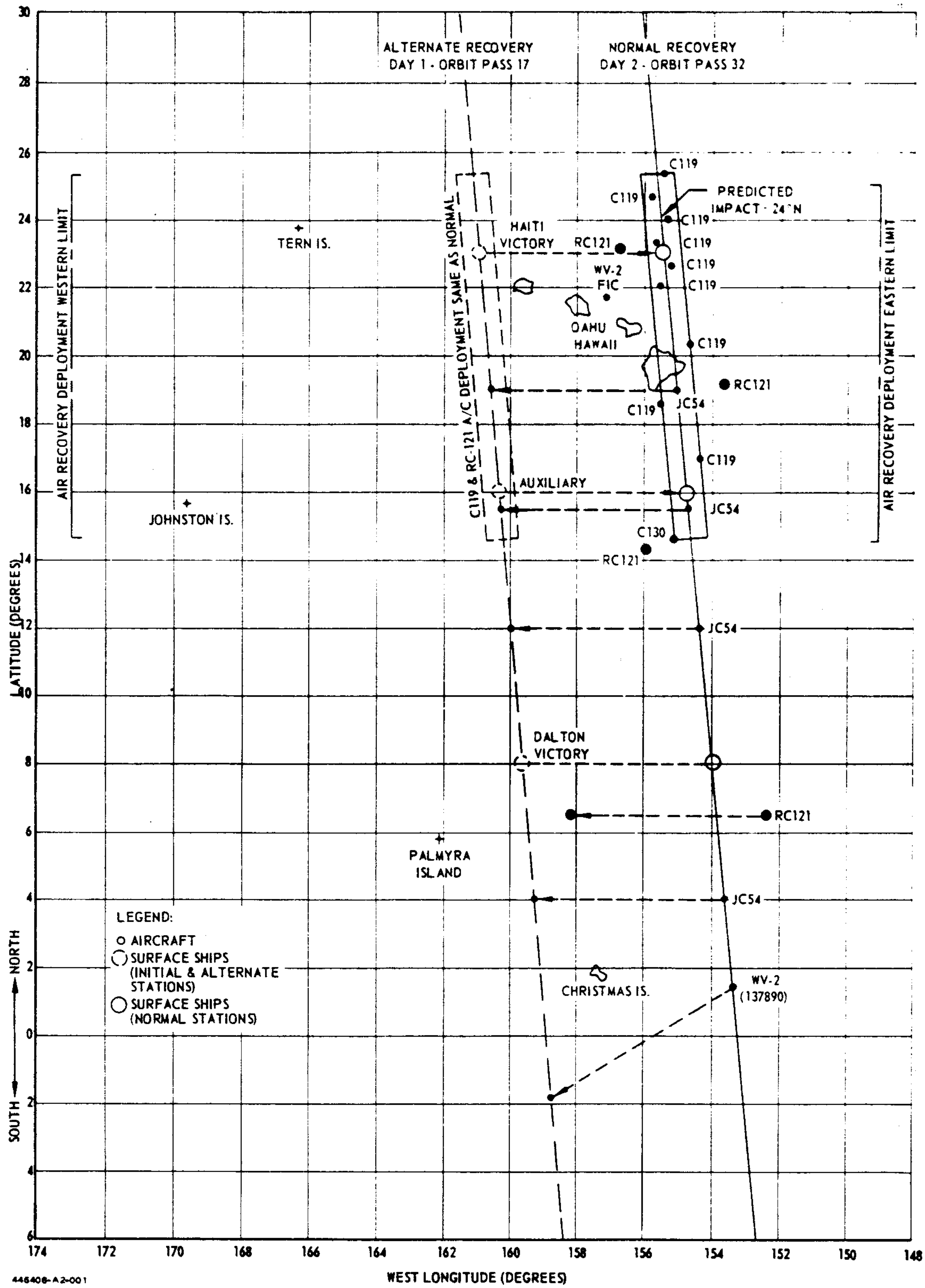


Figure A7-2 Recovery Force Deployment

[redacted]

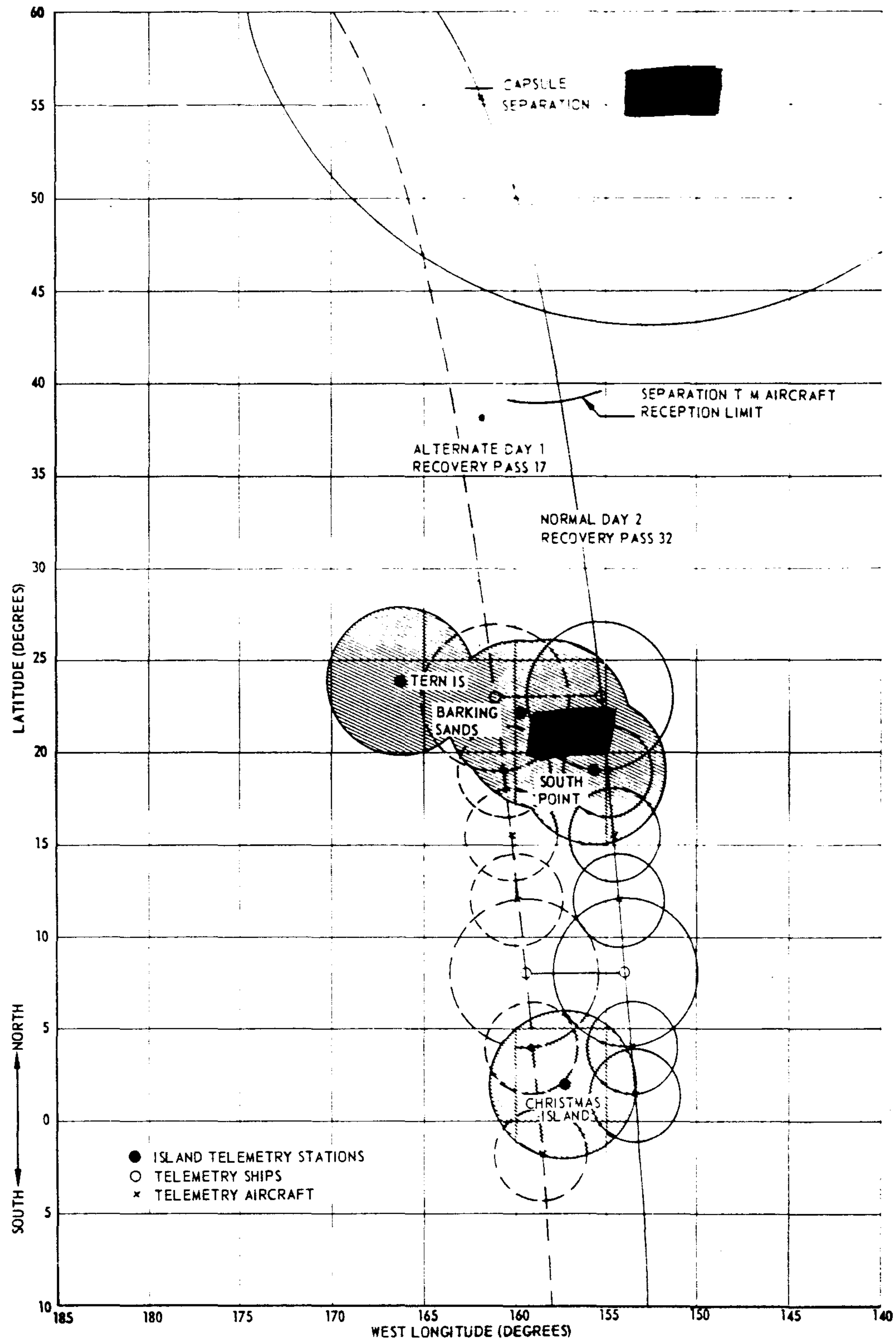


Figure A7-3   Re-entry Telemetry Coverage

 [redacted]

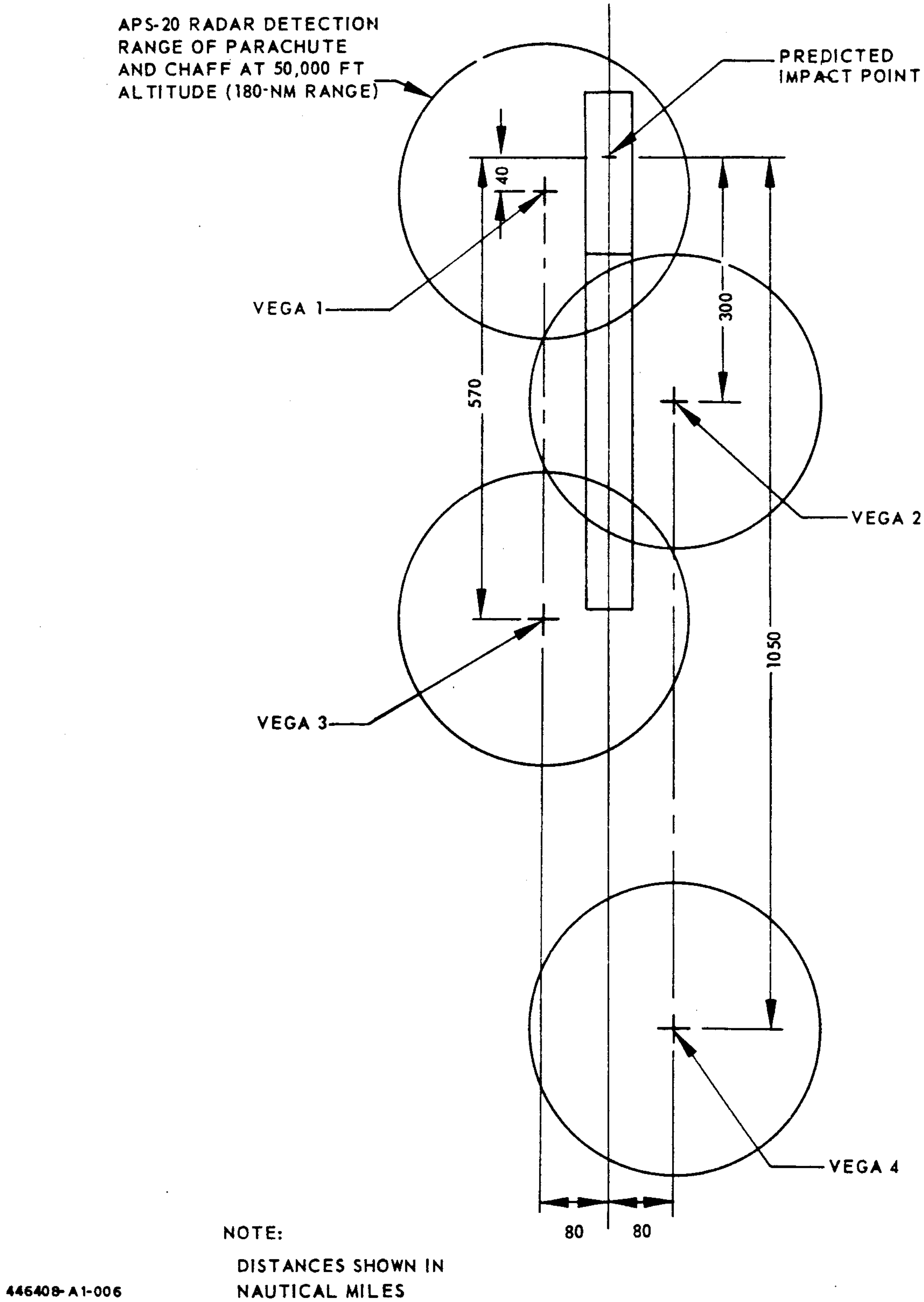


Figure A7-4 RC-121 Aircraft Deployment

[redacted]

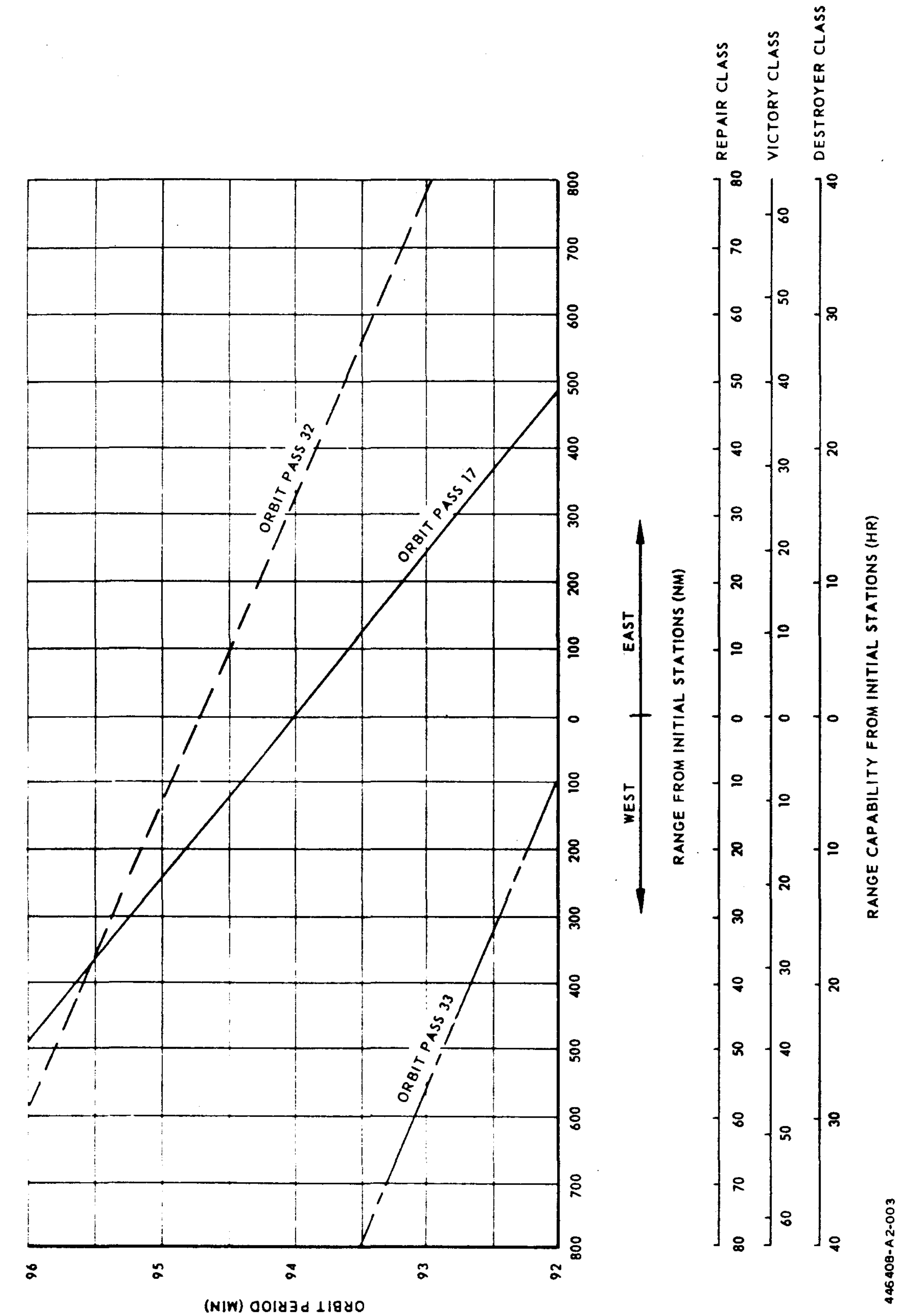
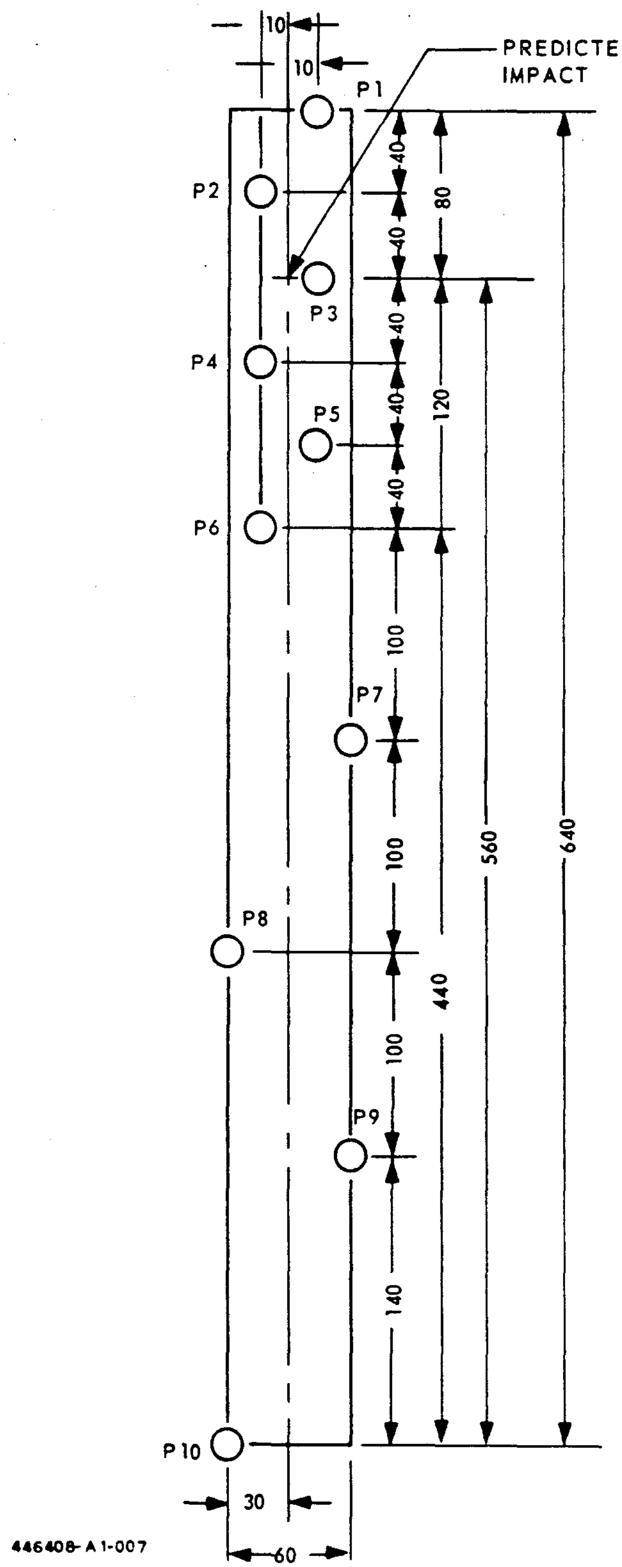


Figure A7-6 Surface Ship Deployment Capability

[redacted]



P1 THROUGH P9 ARE C-119 AIRCRAFT
P10 IS C-130 AIRCRAFT
DISTANCES SHOWN IN NAUTICAL MILES

Figure A7-5 Recovery Aircraft Deployment

[redacted]

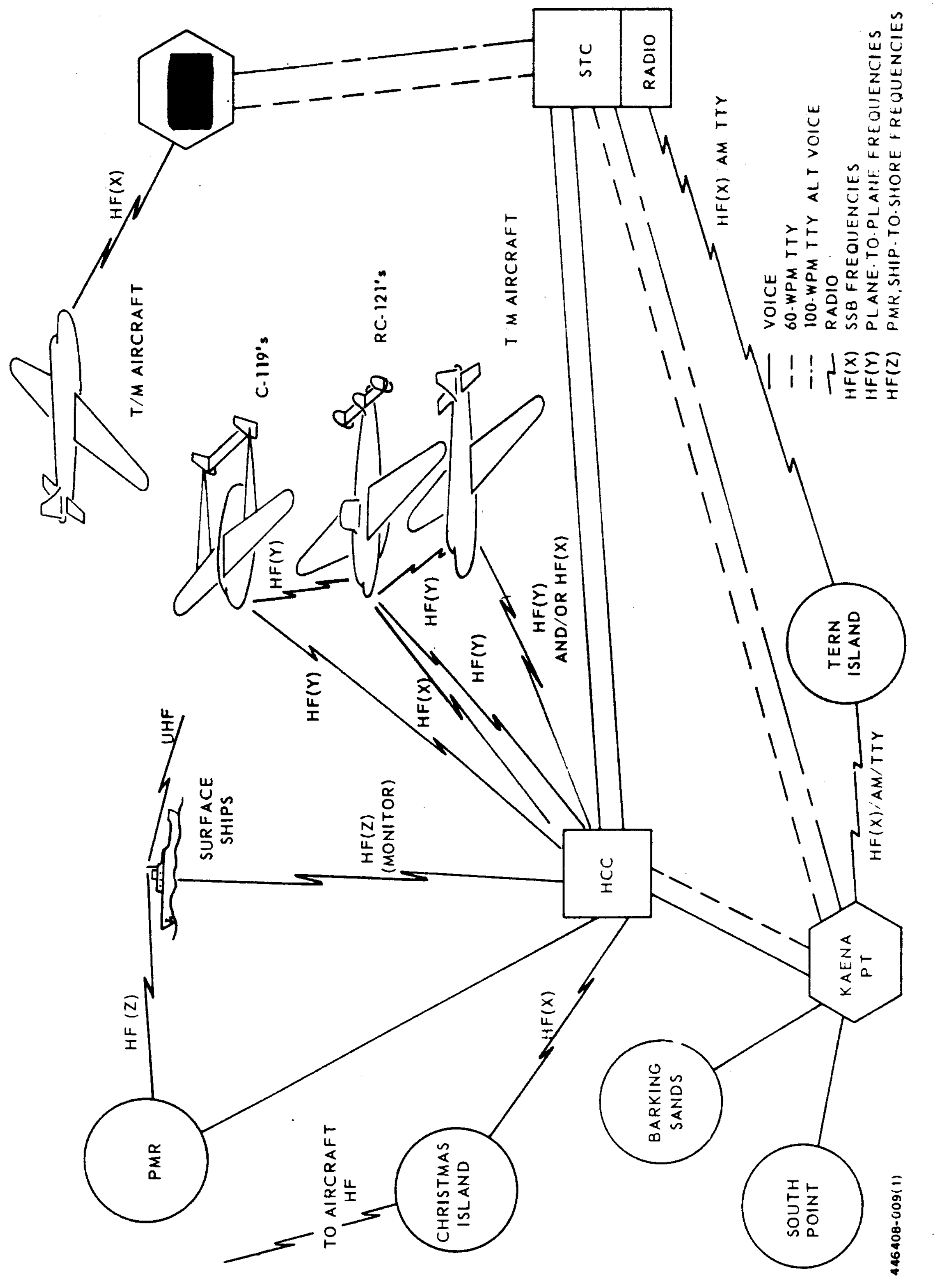
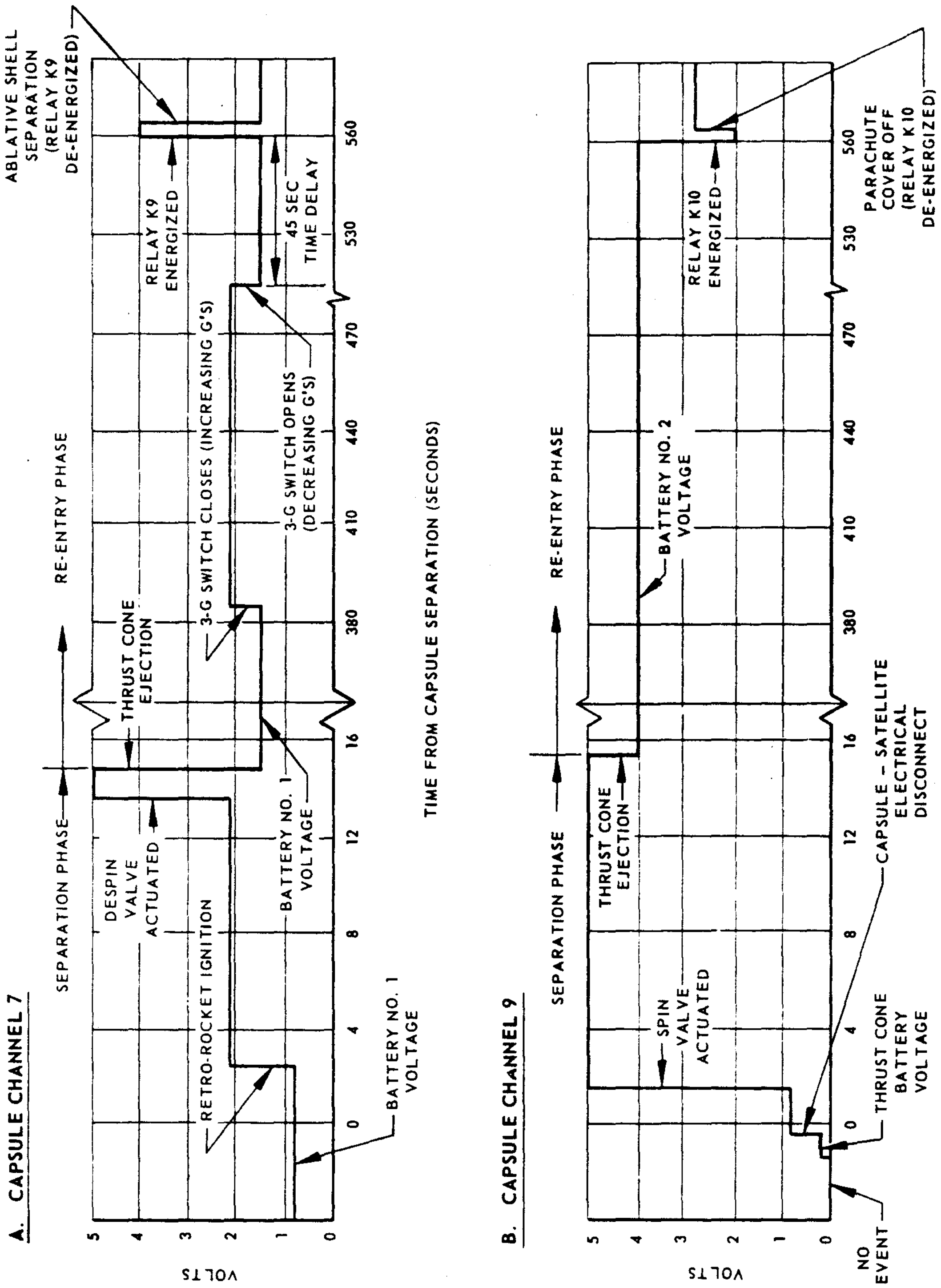


Figure A7-7 **Recovery Operations Communications**



NOTE: VALUES SHOWN INDICATE NOMINAL SEQUENCE OF EVENTS. CONSULT T/M CALIBRATION DATA FOR VOLTAGE LEVELS WHICH WILL OCCUR IF SEQUENCE OF EVENTS IS NOT NORMAL. REFER TO SECTION 7.5 FOR SEQUENCE OF EVENTS DESCRIPTION

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Figure A8-1 Nominal Capsule Telemetry Voltage Levels

[redacted]

Revised Page
7 January 1961

APPENDIX A - TAB 3

Test information for Discoverer Satellite 1101/Discoverer Booster 258 was published in the System Test Directive for Discoverer Satellite System Radiometric Engineering Test, [redacted], 21 November 1960.

[redacted]

Revised Page
7 January 1961

APPENDIX A - TAB 4

Test information for Discoverer Satellite 1102/Discoverer Booster 261 will be published in a revision to the System Test Directive for Discoverer Satellite System Radiometric Engineering Test, [redacted].

SECRET

[redacted]

25 November 1960
Copy No._______
_________Sheets

APPENDIX A – TAB 5
SYSTEM TEST DIRECTIVE
FOR
DISCOVERER SATELLITE SYSTEM
DISCOVERER SATELLITE 1103
DISCOVERER BOOSTER 296

Prepared by

SYSTEMS OPERATIONS PLANNING 61-41

APPROVED: [redacted]

SATELL [redacted] STEMS MANAGER

APPROVED: [redacted]

COLONEL, USAF
CHAIRMAN,
SYSTEM TEST WORKING GROUP

CONTENTS

TABLES

ILLUSTRATIONS

[redacted]

APPENDIX A - TAB 5
SUPPLEMENTAL TEST INFORMATION

A1 INTRODUCTION

This section contains descriptive material which supplements the basic text of the STD and is applicable only to the flight of Discoverer Satellite 1103. Where the material contained herein is in conflict with that in the basic text, the information in this appendix has precedence. Reference will not be made to this appendix for subsequent flight operations.

A2 CONFIGURATION

A2. 1 Discoverer Satellite

A JHU/APL Doppler transmitter and an optical beacon will be carried to permit evaluation of this system. The transmitter will operate continuously on 162 mc and 216 mc; the capability to turn the transmitter off by radar command will not be incorporated. The optical tracking lights will be programmed "on" over twelve Smithsonian Astronomical Observatory camera stations during the flight.

A2. 2 Recovery Capsule

A2. 2. 1 An AET-L payload will be carried in a Mark IV recovery capsule. The recovery capsule has the following configuration:

Thermal Batteries (2)

Life: 20 seconds
Usage: Orbit ejection to thrust cone separation

Silver Oxide-Zinc Batteries (2)

Life: (a) Shelf life after activation, 60 days
(b) Operating life, 10 hours (min)
Usage: Capsule beacon, capsule light, and parachute deployment events

[redacted]

Salt Plug (1)

Life: 45 hours (min) 54 hours (norm) 90 hours (max)
Usage: Sink capsule within 10 minutes after salt plug dissolves. Capsule will not capsize prior to this time.

Silver Peroxide-Zinc Battery (1)

Life: A minimum of 20 minutes
Usage: Capsule telemetry.

A2. 2. 2 The crystal-controlled GE acquisition beacon installed in the capsule has the following characteristics:

Pulse Repetition Rate	1000 to 700 pps (± 50 pps) one cycle per sec (± . 01 sec)
Power Output	15 watts peak nominal
Pulse Width	30 microseconds nominal
Beacon Life	10 hours minimum
Frequency Stability	±0. 04 percent

A2. 2. 3 A 2. 0-watt telemetry transmitter (100 kc bandwidth) in the recovery capsule will transmit separation and recovery sequence-of-event data. Telemetry channels 7, 9 and 11 will be used to obtain capsule performance information. Channels 7 and 9 will initially measure the separation sequence of events and then the oscillator inputs will be switched to measure the recovery sequence of events when the thrust cone is ejected. Channel 11 will measure axial acceleration during both the separation and recovery sequence.

A2. 3 Facilities and Equipment

A2. 3. 1 Tern Island in the French Frigate Shoals Group of the Hawaiian Islands will be used as a VHF telemetry receiving and automatic tracking station if facilities are available. If parachute deployment occurs near Tern Island or if capsule overshoot is experienced on a recovery pass in the Tern Island area, this station installation will permit automatic tracking on the capsule telemetry and for beacon signal. An azimuth and elevation angle data input will then be made to the Palo Alto Computer for determination of impact location.

[redacted]

A2. 3. 2 The following list summarizes the equipment installed at Tern Island:

- a. 1 Quad-helix automatic tracking antenna, Canoga Corporation
- b. 1 7-track tape recorder, Ampex FR 107B
- c. 2 Nems-Clarke 1302A receivers
- d. 1 Nems-Clarke 1412 receiver
- e. 2 Spectrum display units, Nems-Clarke SDU 200, SDU 300
- f. 1 Digital-to-teletype data converter
- g. 1 System time generating system
- h. 1 WWVH timing system
- i. Communications (SSB/HF/UHF/RTTY)
- j. 1 Visicorder
- k. 1 Oscilloscope

A3 LAUNCH OPERATIONS

A3. 1 <u>Launch Time</u>

In order to obtain adequate data from the sun position indicators, the time of launch will be between 1140 and 1500 PST.

A3. 2 <u>Recovery Force Readiness</u>

With the exception of Paragraph 4. 2. 2. 6, the launch criteria listed in Section 4. 2 in the basic text are applicable to this flight. Paragraph 4. 2. 2. 6 is revised as follows:

- a. Three RC-121 radar aircraft
- b. Seven C-119J recovery aircraft
- c. Three surface ships
- d. One Electra telemetry aircraft (separation sequence)
- e. Three telemetry aircraft (recovery sequence)

[redacted]

A3. 3 Telemetry Calibrations

Telemetry calibration data for real-time measurements are included in Notes 3, 8 and 13 of Table A8-1. These data are to be checked by LMSD/61-71 and verified in a TWX to LMSD/61-41 and the STC not later than two days prior to launch.

A3. 4 Downrange Tracking Data

The Pvt. Joe. E. Mann will receive the 216 mc signal from the JHU/APL Doppler transmitter and will obtain accurate Dopper tracking data from this signal. These tracking data, ship attitude data, and antenna position data will be transmitted to the STC by radio teletype at the direction of the STC. The antenna position data will provide angle tracking information which, together with the Doppler data, will verify that orbit has been attained or will define the trajectory in the event that orbit is not attained.

A4 ORBIT OPERATIONS

A4. 1 Command Operations

A4. 1. 1 Recovery on this flight is planned for Day 3 on Pass 48 but the capability to delay recovery until Day 4 on Pass 63 is incorporated. Pass 63 is programmed for normal re-entry while Passes 15, 17, 31, 33, 46, 48, and 61 are programmed for alternate re-entry selection. Pass 64 is programmed for both normal re-entry and alternate re-entry selection to assure that re-entry will occur on the Day 4 recovery pass in the Hawaiian area in the event that an inadvertent SKIP command is received by the vehicle just prior to Pass 63.

A4. 1. 2 Reference to these orbital programmer re-entry passes is made as follows in this Tab:

[redacted]

a. Passes 15, 31, 46, 61 - "Emergency alternate re-entry passes." They will permit recovery off the coast of Mexico, with certain limitations, in emergency situations.

b. Passes 17, 33 - "Alternate re-entry passes." They will permit recovery in the Hawaiian area if recovery before the normal Day 3 Pass 48 is required.

c. Pass 48 - "Normal re-entry pass." This is the planned recovery pass in the Hawaiian area; however, an alternate re-entry enable command must be sent before re-entry will occur on this pass.

d. Pass 63 - "Alternate re-entry pass." The orbital programmer tape is punched for normal re-entry on this pass. If an alternate re-entry enable command is not sent, and the alternate re-entry capability remains disabled, re-entry will occur on Pass 63.

A4. 1. 3 In order to preclude the possibility of an inadvertent REPEAT command being received by the satellite on Pass 62, either of the following procedures will be employed at the direction of the STC:

a. On Pass 61, [redacted] will send Command 1 to put the increase/decrease switch in the increase position.

b. On Pass 61, [redacted] will transmit final adjustments to the orbital programmer for the recovery pass. Following fade on Pass 61 and prior to beacon turn-on for Pass 62, [redacted] and [redacted] radar command capability will be disabled by removal of the radar center pulse to prevent inadvertent adjustments to the programmer that could preclude recovery.

A4. 1. 4 When alternate re-entry is desired on Pass 17, Command 5 Increase (alternate re-entry enable) must not be sent until after the reset point occurs on Pass 15 (nominally 60°N). Command 5 Increase for desired alternate re-entry on Pass 17 will be sent on Pass 15 from [redacted] or on Pass 16 from [redacted] to preclude the possibility of an inadvertent Pass 15 re-entry. A similar procedure will be used on Passes 31 and 32 if alternate re-entry is desired on Pass 33, and on Passes 46 and 47 if re-entry is desired on Pass 48.

[redacted]

A4. 2 Control Gas Supply Pressure

The control gas supply pressure measurements on Channel 16-27 (low range) and on Channel 16-33 (high-range) will be reported as specified in Table A8-1 as accurately as possible. Real-time readouts from oscilloscopes and/or meters are to be reported to the STC by voice. As soon as possible after each pass, a more accurate readout of control gas supply pressure from the Channel 16 wave train recorded on the CEC oscillograph/Datarite magazine will be sent to the STC by TWX. This parameter will be plotted at the STC on all passes.

A4. 3 Recovery Force Tracking on Pass 2

All telemetry recording stations and tracking stations participating in the recovery operation [redacted] Christmas Island, South Point, Barking Sands, Tern Island, Haiti Victory and Dalton Victory) will track the satellite telemetry signal during Pass 2 and will report the following to the HCC for correlation:

a. Time of acquisition
b. Signal direction (azimuth and elevation at acquisition, at one minute intervals, and at fade)
c. Strength of signal
d. Signal deviation from nominal frequency
e. Time of signal fade.

A4. 4 Readiness to Support Alternate Re-entry

All telemetry recording stations and tracking stations participating in the recovery operation will be maintained in readiness to support alternate re-entry until ETPD - 90 minutes unless otherwise directed by the STC.

A4. 5 Agena Reorientation After Capsule Separation

The Agena vehicle will be reoriented after capsule separation and will resume controlled flight in the normal orbit attitude.

[redacted]

A5 RECOVERY OPERATIONS

A5.1 Hawaii Tracking Station Operations

A5.1.1 On the recovery pass, the [redacted] will track the Agena telemetry signal with the tri-helix antenna and the capsule telemetry signal with the TLM-18 antenna. Acquisition of the Agena telemetry signal with the tri-helix antenna will be accomplished using standard acquisition procedures. Procedures for acquisition of the capsule telemetry signal with the TLM-18 antenna will vary as a function of the actual orbit and predicted impact point.

In general, the TLM-18 will be positioned at the capsule acquisition azimuth using a sector scan of 20 degrees (±10 degrees) at an elevation angle of 2 degrees. At ETA - 0 for the capsule, the acquisition programmer will start and the mid point for sector scan will then be positioned to follow the acquisition programmer azimuth. When the TLM-18 acquires, auto-track will be accomplished. If the TLM-18 does not acquire by the time the acquisition programmer pre-plot indicates that the capsule is in the ionization layer, it will immediately be positioned at the predicted impact point and operated in the sector mode. The amplitude of the sector scan will be 20 degrees (±10 degrees) for impact azimuths between 345 degrees and 15 degrees. The scan amplitude will be increased 3/4 degree for each 1 degree of azimuth over 15 degrees for the eastern sector or under 345 degrees in the western sector.

Until acquisition of the capsule signal by the TLM-18, one receiver operating on signals from the tri-helix will be tuned to the 228.2-mc capsule telemetry signal. If the capsule telemetry signal is acquired with the tri-helix before TLM-18 acquisition, the tri-helix will be positioned on the capsule until positive TLM-18 acquisition after which the tri-helix will resume tracking on the Agena telemetry signal. If the TLM-18 loses the capsule signal, the tri-helix will be positioned to assist in reacquiring the capsule signals. TLM-18 angle data, recorded after auto-track has been established, will be transmitted to the PAC when requested by the System Test Director. These angle data will be reduced by the computer to provide a predicted impact point.

A5. 1. 2 [redacted] will report the system time of acquisition, antenna azimuth and elevation data and deviations from nominal frequencies to the STC as soon as possible. When the TLM-18 azimuth rate approaches 0 degrees per second or when the telemetered capsule recovery events are received, [redacted] will report antenna azimuth and elevation immediately to the STC and the HCC. [redacted] will also report confirmation of capsule separation and telemetered recovery events to the STC as specified in Table A8-1 and record all capsule telemetry signals on magnetic tape.

A5. 1. 3 [redacted] will receive all antenna bearings from South Point, Barking Sands and Tern Island for correlation with the TLM-18 bearings. This bearing information will be relayed immediately to the STC and the HCC. In addition, the [redacted] will receive auto-track angle data transmitted from Tern Island to the STC via SSB-TTY as backup and will relay this data to the STC if requested to do so.

A5. 2 South Point Facility Operations

A5. 2. 1 For this operation either the manual Canoga quad-helix antenna or the motor-driven Radiation quad-helix antenna will be utilized at the PMR facility at South Point, Hawaii. Existing communications, recording, and timing systems will be used.

A5. 2. 2 If the orbit period is such as to permit nominal re-entry west of [redacted] South Point will scan ±90 degrees about a 270-degree azimuth at an antenna elevation of 10 degrees at the rate of once per 15 seconds from ETPD - 0 until ETPD + 5 minutes.

A5. 2. 3 If the satellite path is between [redacted] and South Point, the quad-helix antenna will scan ±90 degrees about a 180-degree azimuth at the rate of once per 15 seconds from ETPD - 0 until ETPD + 5 minutes. The antenna elevation will be varied cyclically from 10 degrees to 70 degrees to 10 degrees in 20-degree steps at the rate of one step per scan.

A5. 2. 4 If the satellite path is east of South Point, the quad-helix antenna will scan ±90 degrees about a 90 degree azimuth at the rate of once per 15 seconds from ETPD - 0 until ETPD + 5 minutes. The antenna elevation will be varied cyclically from 10 degrees to 70 degrees to 10 degrees in 20-degree steps at the rate of one step per scan.

A5. 2. 5 If no capsule signals are acquired before ETPD + 5 minutes, the quad-helix antenna will be positioned at 180-degree azimuth and 10-degree elevation, and the telemetry receivers will be monitored until ETPD + 30 minutes. If [redacted] acquires the capsule signals, it will provide South Point with acquisition information.

A5. 2. 6 Once acquisition is achieved with the quad-helix antenna, the 60-foot antenna will attempt to track the capsule, using the narrower beam-width to obtain more accurate bearings at and after parachute deployment. All acquisitions will be reported immediately to [redacted] The capsule parachute deployment telemetry sequence and the antenna azimuth at parachute deployment will be reported. If the parachute telemetry sequence is not received before signal fade, the system time of fade and the antenna azimuth and elevation will be reported. Subsequent to acquisition, South Point will report antenna bearings to [redacted] All 60-foot antenna data, position azimuth and elevation, and suitable timing signal will be recorded on magnetic tape. This tape will be delivered to the HCC for transmittal to Sunnyvale.

A5. 3 Barking Sands Facility Operations

A5. 3. 1 The PMR facility at Barking Sands, Kauai, is augmented by the addition of an LMSD tri-helix antenna. Barking Sands will maintain communication with [redacted] via toll telephone for exchange of tracking and acquisition data. At ETPD - 15 minutes, Barking Sands will position the tri-helix antenna at the acquisition azimuth and 10-degree elevation. From ETPD - 5 minutes until ETPD + 5 minutes, the Barking Sands tri-helix antenna will scan ±90 degrees about 0-degree azimuth at the scan rate of 10 degrees per

[redacted]

second. Barking Sands will search for the capsule telemetry signal. Barking Sands is directed not to activate any tracking radars during the operation.

A5. 3. 2 Subsequent to acquisition, Barking Sands will report antenna bearings to [redacted]. All acquired capsule telemetry signals will be recorded on magnetic tape with a timing signal.

A5. 4 Christmas Island Facility Operations

A5. 4. 1 If the satellite path is east of Christmas Island, the quad-helix antenna will scan ±90 degrees about a 90-degree azimuth at the rate of once per 15 seconds from ETPD + 3 minutes until ETPD + 8 minutes. The antenna elevation will be varied cyclically from 10 degrees to 70 degrees to 10 degrees in 20-degree steps at the rate of one step per scan.

A5. 4. 2 If the satellite path is west of Christmas Island, the quad-helix antenna will scan ±90 degrees about a 270-degree azimuth from ETPD + 3 minutes until ETPD + 8 minutes. The antenna elevation will be varied cyclically from 10 degrees to 70 degrees to 10 degrees in 20-degree steps at the rate of one step per scan.

A5. 4. 3 If the satellite path is a near overhead pass at Christmas Island ($\pm 2^{\circ}$ W longitude), the quad-helix antenna will scan 360 degrees in azimuth at the rate of once per 30 seconds from ETPD + 3 minutes until ETPD + 8 minutes. The antenna elevation will be varied cyclically from 10 degrees to 70 degrees to 10 degrees in 20-degree steps at the rate of one step per 360-degree azimuth.

A5. 4. 4 The Christmas Island facility will maintain continuous HF communications with the southern telemetry aircraft for exchange of acquisition and tracking information and will relay this information to the HCC as soon as possible over the SSB radio.

[redacted]

A5.4.5 If no capsule signals are acquired before ETPD + 8 minutes, the quad-helix antenna will be positioned at 180-degree azimuth and 10-degree elevation and the telemetry receivers will be monitored until ETPD + 30 minutes. If no signals are acquired before ETPD + 30 minutes, a negative report will be submitted to the HCC over SSB radio.

A5.4.6 Once acquisition is achieved the quad-helix antenna will manually track the capsule, and the telemetry and beacon signals will be recorded on magnetic tape. Immediately after the parachute deployment telemetry sequence is recorded, Christmas Island will so report to the HCC over the SSB radio. The antenna azimuth will be reported to the telemetry aircraft over UHF or HF radio immediately after acquisition and at intervals of one minute until parachute deployment.

A5.5 Tern Island Operations

A5.5.1 Tern Island, if available, will establish SSB voice communications with [redacted] on the assigned recovery operations frequency for acquisition and tracking instructions and data relay. The STC and the HCC will monitor this voice frequency. The quad-helix antenna angle data recorded after auto-track has been established will be transmitted by a separate SSB/RTTY channel directly to the PAC when requested by the System Test Director. [redacted] will also receive all RTTY data as back-up and will relay this data to the PAC if requested by the System Test Director. To minimize possible SSB transmission interference while receiving telemetry data, Tern Island will restrict all SSB radio transmissions until after signal fade or until the quad-helix antenna azimuth rate approaches 0 degrees per second. System time of acquisition, antenna azimuth and elevation reports, deviations from nominal frequencies, and readout of telemetered recovery sequence events are required.

A5.5.2 At ETPD - 15 minutes, the Tern Island auto-tracking quad-helix antenna will be positioned at the impact point azimuth at 10 degrees elevation. From ETPD - 5 minutes to ETPD + 15 seconds the quad-helix antenna will

[redacted]

scan ±90 degrees about the impact azimuth at the maximum slew rate. The antenna elevation will be varied cyclically from 10 degrees to 70 degrees to 10 degrees in 20-degree steps at the rate of one step per scan. At ETPD + 15 seconds the scan mode will rotate to 180 degrees azimuth to scan the southern sector. The antenna elevation will be varied from 70 degrees to 10 degrees to 70 degrees at the rate of 20 degrees per scan.

A5. 5. 2. 1 If no capsule signals are received by ETPD + 2 minutes the quad-helix antenna will be fixed at 30-degree elevation and a 360-degree azimuth scan initiated at the maximum slew rate and continued for two minutes. If the capsule signals are not received by ETPD + 4 minutes, the antenna will be fixed at 180-degree azimuth and 10-degree elevation and the receivers will be monitored until ETPD + 30 minutes.

A5. 5. 2. 2 If no capsule signals are received by ETPD + 30 minutes, a negative report will be submitted to the [redacted] over SSB radio.

A5. 6 Surface Ship Deployment and Operations

A5. 6. 1 The surface ship deployment procedure outlined in the basic text of the STD will not apply for this flight. A third ship will be integrated with the Recovery Force to increase downrange sea retrieval capability.

A5. 6. 2 The surface ships will depart with sufficient time to arrive on the initial deployment stations listed in Table A2-1 and shown in Figure A7-2 by T + 4 hours. The PAC will evaluate the tracking data after launch and will provide predicted capsule impact locations and times for each day as soon as possible (not later than T + 4 hours). At this time, the HCC will direct redeployment of the surface ships to provide coverage of possible alternate re-entry while assuring that maximum surface ship coverage of the normal Day 3 re-entry pass will be available. Redeployment of all surface ships will be made laterally on the same latitude on which they are positioned initially (8° N, 16° N, 23° N).

[redacted]

A5. 6. 3 Figure A7-6 shows that the nominal orbit period of 93. 0 minutes will position the Day 1 alternate re-entry pass 185 nautical miles to the east of the initial ship stations and will position the Day 2 alternate re-entry pass 635 nautical miles to the west of the initial ship stations. Considering the distance involved between these two alternate re-entry passes and the speed of the surface ships, a decision must be made by the STC shortly after Pass 2 as to the extent that the Day 1 and the Day 2 alternate re-entry passes will be covered because it will not be possible to cover both completely. An entirely different set of conditions will exist if the period varies from nominal (see Figures 7-1, A7-6) so the surface ship deployment situation must be evaluated early and continuously during the flight.

A5. 6. 4 The Haiti Victory will be positioned 60 nautical miles south of the nominal impact point and will receive and record capsule telemetry data. The quad-helix antenna, until acquisition, will scan ±90 degrees about 360-degree azimuth at the rate of once per 15 seconds beginning at ETPD - 5 minutes. From ETPD - 5 minutes until ETPD - 60 seconds, the antenna elevation will be maintained at 10 degrees. After ETPD - 60 seconds, the antenna elevation will be increased 20 degrees per scan from 10 degrees to 70 degrees. At ETPD + 15 seconds, the scan mode will rotate 180 degrees to scan the southern sector. The antenna elevation will be decreased from 70 degrees to 10 degrees at the rate of 20 degrees for each 15-second scan during this search of the southern sector. If the capsule signals are not acquired by ETPD + 2 minutes, the antenna elevation will be raised from 10 degrees to 30 degrees, and a 360-degree azimuth scan will be initiated at the slewing rate of 10 degrees per second and continued for two minutes.

If the capsule signals are not acquired by ETPD + 4 minutes, the antenna will be positioned at 180-degree azimuth and 10-degree elevation and the telemetry receivers monitored until ETPD + 30 minutes. When the capsule signals are acquired, the antenna will begin manual tracking as a function of maximum signal strength and all telemetry and beacon signals will be recorded on magnetic tape as specified in the Detailed Recording Requirements. Bearings from this antenna will be reported at intervals of one

[redacted]

minute to HCC for relay to STC. The DF equipment will be operated normally and will be used to obtain refined capsule directional data after acquisition. When the capsule bearing becomes steady, the Haiti Victory will report position and capsule bearing to the northern Command RC-121 over UHF and to the HCC through PMR immediately, and proceed in the direction of the acquired signals. If the capsule signals are not acquired the Haiti Victory will so report over SSB radio through PMR to the HCC at ETPD + 30 minutes.

A5.6.5 The Auxiliary Recovery Ship will be positioned at 16° N latitude directly under the satellite path on the recovery pass. This ship does not have a telemetry receiving capability and will be utilized only for sea retrieval of the capsule. Ship-to-shore radio communication will be maintained with the HCC PMR representative for direction.

A5.6.6 The Dalton Victory will be positioned at 8° N latitude, directly under the satellite path on the recovery pass to enable reception of the capsule telemeter signal and the capsule beacon signal in the extended range area. The quad-helix antenna, until acquisition, will scan ±90 degrees about 360-degree azimuth at 10-degrees elevation at the rate of once per 15 seconds from ETPD - 0 until ETPD + 3 minutes. From ETPD + 3 minutes until ETPD + 5 minutes, the quad-helix antenna will give full area coverage by scanning ±90 degrees about 360-degree azimuth with antenna elevation increasing and decreasing from 10 degrees to 70 degrees to 10 degrees in increments of 20 degrees per scan. The scan rate will be once per 15 sec onds. After ETPD + 5 minutes the antenna will be positioned at 10-degree elevation and 180-degree azimuth. In the event the Dalton Victory acquires the capsule signals, the telemetry will be recorded on magnetic tape as specified in the Detailed Recording Requirements, and antenna acquisition and bearing will be immediately reported through PMR to the HCC. Bearings will be relayed to HCC at intervals of one minute. When the parachute deployment telemetry sequence is received or when the antenna azimuth becomes constant, the Dalton Victory will so report verbally over SSB radio through PMR to the HCC and provide ship position and antenna azimuth and elevation.

[redacted]

If no capsule signals are acquired by the Dalton Victory, a negative verbal report will be submitted over SSB radio through PMR to the HCC at ETPD + 30 minutes.

A5. 7 Airborne Recovery Force Deployment

A5. 7. 1 The Airborne Recovery Force normal and alternate deployment for a nominal orbit period is presented in Figure A7-2. This force will be deployed to provide a maximum air retrieval capability in the 60x200-nautical mile primary recovery area while emphasizing capsule detection in the extended 60x440-nautical mile secondary recovery area; however, air retrieval will be attempted in the secondary area. Telemetry aircraft will also be deployed south of the secondary area to provide extended capsule detection capability, to approximately 2^{o} S latitude, for the normal condition.

A5. 7. 2 Three RC-121 radar search aircraft will be deployed in the northern area to provide overlapping radar coverage of the primary and secondary air retrieval areas. A fourth RC-121 aircraft will be deployed in the extended surface recovery area to provide communications control of the forces within that area. Figure A7-4 presents the detailed deployment of the RC-121 aircraft. Each RC-121 aircraft will be equipped with SSB radio for direct communications with the HCC. Separate HF communications will be maintained with the remaining elements of the Recovery Force.

A5. 7. 3 Due to the extended deployment of the Recovery Force, there will be a separate RC-121 aircraft designated as Command Aircraft for the forces in each of the three operational areas. A separate HF frequency will be assigned as the control/data telling frequency in the primary recovery area (northern area) and the combined secondary and extended recovery areas (southern area).

A5. 7. 4 In the event that one of the four RC-121's aborts the mission, the three remaining aircraft will be deployed to assure continuous radar coverage of the primary and secondary recovery areas at the sacrifice of the extended communications control aircraft position. In this event, alternate

[redacted]

communications will be established between Christmas Island and T/M aircraft in the extended recovery area, over HF and/or SSB radio for force control and data telling.

A5.7.5 An aircraft departing from Hickam AFB will fly a radar peaking mission for the 3 northern on-station RC-121 aircraft only prior to the recovery pass.

A5.7.6 Six C-119J recovery aircraft will be deployed in the primary recovery area and the remaining three C-119J and the C-130 aircraft if available will be deployed in the secondary recovery area. Figure A7-5 presents the detailed deployment of the recovery aircraft.

A5.7.7 The C-130 aircraft, if available, will be positioned at the highest altitude consistent with gross weight and proper cruise control and will not attempt aerial recovery above 15,000 feet altitude.

A5.7.8 A WV-2 aircraft will perform an FIC survey of the predicted impact area and will assume a final position 120 nautical miles south and 100 nautical miles west of the predicted impact point by ETPD - 30 minutes. The FIC aircraft will communicate with the primary recovery area command aircraft on the northern primary HF frequency, will search for the capsule signals, and will attempt to derive a DF bearing from any of the signals acquired. All telemetry signals received will be recorded. Signal acquisitions and bearings will be reported immediately to the primary area Command RC-121.

A5.7.9 Telemetry aircraft will be deployed along the satellite flight path as shown in Figure A7-3. Telemetry reception range of these aircraft is expected to be 120 to 150 nautical miles. Placement of these aircraft in order of position priority and the RC-121 aircraft assigned as directional controller for normal Day 3 recovery will be as follows:

[redacted]

Aircraft No.	Position	Control Responsibility
1	630 nautical miles North of Dalton Victory	Vega 3
2	450 nautical miles North of Dalton Victory	Vega 3
3	270 nautical miles North of Dalton Victory	Vega 3
4	240 nautical miles South of Dalton Victory	Vega 4
5	480 nautical miles South of Dalton Victory	Vega 4

The telemetry aircraft will be on station by ETPD - 1 hour. For alternate re-entry, these aircraft will be positioned to provide continuous telemetry coverage south of the predicted impact point as shown in Figure A7-3.

A5. 7. 10 JC-54 type aircraft will be utilized for Positions 1 through 4 while WV-2 aircraft No. 137890 will be located in Position 5 due to its long-range SSB radio capability. Telemetry aircraft No. 1 through No. 4 will establish and maintain continuous HF communications with their respective control aircraft on the primary southern area frequency. Telemetry aircraft No. 5 will establish and maintain continuous HF or SSB communications with Vega 4. In the event of communications breakdown, HF and/or SSB communications will be established between Christmas Island and Aircraft No. 4 and No. 5 for control and data telling operations.

A5. 8 Airborne Recovery Force Readiness

A5. 8. 1 The entire Airborne Recovery Force will be maintained on ground alert status until ETPD - 6 hours to support possible alternate re-entry. A reduced force consisting of two C-119's, one RC-121, one JC-54, and one ARS support aircraft with a parajump team will be maintained in readiness from ETPD - 6 hours to ETPD - 90 minutes and will be capable of takeoff from Hickam AFB within 30 minutes after receiving notification of alternate re-entry from the STC. The remainder of the Airborne Recovery Force will be maintained on telephone alert and will be capable of takeoff from Hickam AFB within one hour after receiving notification of alternate re-entry from the STC. Flight safety considerations must not be compromised during these operations.

[redacted]

A5.8.2 The Recovery Test Controller will prepare plans for recovery operations which will be conducted if short notice of alternate re-entry is given by the STC. In this operation, it is recognized that an extended sea search followed by surface recovery will be the most probable course of action. If the HCC is not notified of intended alternate re-entry by ETPD - 90 minutes, preparations will be made to support alternate or normal re-entry on the following day.

A5.8.3 The Electra telemetry recording aircraft will be maintained on ground alert status at Kodiak NAS so that it can arrive on its assigned station by separation time minus 30 minutes after receiving notification of alternate re-entry from the STC. After this is no longer possible, the Electra crew will be capable of takeoff within 30 minutes after receiving notification of alternate re-entry from the STC until ETPD - 90 minutes. At this time, preparations will be made to support alternate or normal re-entry on the following day.

A5.9 Airborne Recovery Force Operations

A5.9.1 The RC-121 aircraft radar will search for the chaff and the radar reflective parachute. All radar and DF returns from elements of the Recovery Force and bearings from the surface stations will be plotted by the RC-121 aircraft as soon as possible to determine the most probable capsule location. Recovery aircraft will not be vectored toward a radar return until the radar return has been correlated with sufficient DF bearings to establish a fix.

After a fix has been established, the RC-121 Area Commander will notify the nearest recovery aircraft and then vector the aircraft to an intercept flight path. The recovery aircraft will follow the RC-121 instructions and use the DF gear for homing. In the event that no DF signals are acquired by the Recovery Force, the radar returns will be investigated at the discretion of the Task Force Commander.

[redacted]

A5.9.2 When the recovery aircraft makes visual contact with the capsule parachute, an air recovery will be accomplished. Repeat passes will be made, if necessary, until recovery is successful or until the capsule impacts in the water. The aircraft completing recovery will return to Hawaii as directed by the HCC and will be escorted by either a C-119J, an RC-121, the C-130, if available, or an SC-54 (Air Rescue) aircraft. The remainder of the Recovery Force will return to Hawaii as directed by the HCC.

A5.9.3 The recovery aircraft will use the DF equipment in searching for the capsule beacon signal. The crystal controlled beacon should eliminate the detuning procedures used; however, any capsule beacon or telemetry frequency deviation will be reported by [redacted] and [redacted] to the HCC through the STC and relayed to the RC-121 commanders.

A5.9.4 Should the air recovery be unsuccessful, the search aircraft will after sighting the capsule, circle the areas of water impact and drop marker aids. The aircraft will be equipped with strobe light bombs, smoke bombs, and dye markers for this purpose. In addition, four Pelican aircraft will be equipped with one RATU each to provide a beacon marker. Procedures for the employment of RATU's will be developed by the HCC with consideration given to the economical use of equipment. No improved RADARCS are available for use on this flight.

A5.9.5 The capsule beacon and flashing light minimum operating life is 10 hours and the capsule will float for a minimum of 45 hours. The RATU beacon will operate for a minimum of 18 hours.

A5.9.6 If recovery operation conditions permit, the primary recovery area Command RC-121 will transmit brief, best-available-information reports to the HCC over SSB at ETPD + 5 and 15 minutes (±2 minutes). The secondary recovery area Command RC-121 will submit brief, best-available-information reports to the HCC at ETPD + 10 and 20 minutes (±2 minutes). The extended recovery area Command RC-121 will submit brief, best-available-information reports to the HCC at ETPD + 15 and 25 minutes (±2 minutes). If the re-entry capsule is not sighted before ETPD + 30 minutes, the

[redacted]

northern Command RC-121 will report a brief recap of most reliable data received to HCC for relay to the STC at that time. The southern Command RC-121 and extended area Command RC-121 will make their recap reports at ETPD + 35 and ETPD + 40 minutes respectively.

A5.9.7 The data to be reported are aircraft station position, magnetic signal bearing, and local time for each reliable signal acquisition. Range and azimuth with local time and aircraft station position will be reported for each valid sighting. The report shall also contain the Task Force Commander's conclusions regarding the quality of reported signals and bearings, results of triangulation attempts, and most probable impact location. These data will be relayed to the STC immediately upon receipt by the HCC so that the most productive search areas can be determined.

A5.9.8 If the capsule has not been located by ETPD + 30 minutes in the primary recovery area or ETPD + 35 minutes in the secondary and extended recovery areas, the Airborne Recovery Forces will initiate search, at the direction of the HCC, based on the latest impact prediction received from the STC. If this is not available, the HCC will direct a search of the most probable impact areas as determined from tracking triangulation and other available data.

A5.9.9 The telemetry aircraft will search for the capsule telemetry signal and the beacon signal. All capsule signals acquired will be recorded on magnetic tape with a timing signal. Capsule signal acquisitions will be reported immediately to the area Command RC-121 over the southern area HF frequency.

If possible, the parachute deployment telemetry sequence will be reported when received. The telemetry aircraft will attempt to determine the capsule bearing at fade or at parachute deployment. If this can be accomplished, the bearing and aircraft position will be reported to the area Command RC-121.

A5.9.10 If one of the telemetry aircraft visually acquires the capsule in the air or in the water, the position will be reported immediately to the area

[redacted]

Command RC-121. The telemetry aircraft will circle the capsule while maintaining visual contact until arrival of a surface vessel or until fuel supply requires return to base. While circling over the floating capsule, the telemetry aircraft will attempt to provide a transmission compatible with the receiving equipment on Christmas Island so that the capsule bearing from Christmas Island may be determined more accurately.

A5. 10 <u>Hawaiian Control Center Recovery Operations and Communications</u>

A5. 10. 1 The HCC-STC communications will be augmented by the addition of one voice line for relay of all acquisition and capsule signal bearing information from the recovery forces to SOA. This line will be activated at ETPD - 1 hour and will be terminated as soon as the volume of data from the recovery force elements will permit. Transmission of data by voice will be conducted in strict accordance with the procedures specified in [redacted] <u>Satellite Systems Operation Procedures.</u>

A5. 10. 2 The HCC will direct and control acquisition, recovery, and search operations of the Christmas Island facility, the telemetry receiving aircraft and the recovery forces. The primary communication link between the HCC and the surface elements will be the SSB frequency. The three surface ships will communicate with the HCC through PMR and the PMR representative at the HCC.

A5. 10. 3 The HCC will maintain a real-time analysis for integration of all incoming data to determine the most probable impact point and search areas and will relay all reported data to the STC immediately. Bearings from [redacted] South Point, Barking Sands, Tern Island, Christmas Island and the ships will be plotted. The [redacted] TLM-18 bearing, after the azimuth rate becomes zero, and bearings reported from South Point and Barking Sands will be relayed to the Command RC-121's by the HCC as soon as possible. All bearings will be relayed immediately to the STC for analysis of the capsule trajectory.

A5. 10. 4 The accuracy of all reported bearings must be considered. The accuracy of the [redacted] TLM-18 antenna is within 1 degree. The accuracy of

[redacted]

The accuracy of the Barking Sands tri-helix antenna is within 5 degrees. The accuracy of the quad-helix antennas at South Point, Tern Island and on board the recovery ships is within ±2 degrees.

A5.10.5 After launch, the HCC will obtain an estimate from each recovery ship as to the ship speed which could be sustained in an easterly direction and in a westerly direction. This information will be given to the STC within 1 hour after launch.

A5.11 Air Rescue Service Support

Two parachute teams of the Air Rescue Service will be utilized as a primary capsule water retrieval element of the Recovery Force and will be subject to deployment at the discretion of the Recovery Test Controller, HCC. Detailed plans for the employment of this support will be furnished by the Recovery Test Controller.

A5.12 Emergency Alternate Re-entry

A5.12.1 The orbital programmer tape is punched so that emergency alternate re-entry can be accomplished on Passes 15, 31, 46, and 61. Emergency alternate re-entry will be selected only if the existing flight conditions preclude recovery on re-entry Passes 17, 33, 48, or 63 in the Hawaiian area. The impact latitude will be 17° N if emergency alternate re-entry is required and the following procedures are to be used.

A5.12.2 As shown in Figure A7-8, the telemetered data of the separation sequence will be out of range of both [redacted] and [redacted]. The TLM-18 antenna at [redacted] will track on the capsule telemetry signal and will also receive the capsule beacon signal; both signals will be recorded. Approximately five minutes of capsule angle-tracking data will be obtained and these data will be relayed immediately to the PAC for use in computing the most probable impact area. The tri-helix antenna at [redacted] will be positioned to record the Agena telemetry signal.

[redacted]

A5. 12. 3 The Downrange Telemetry Ship will proceed as outlined in Paragraph 5. 6 toward its nominal emergency alternate re-entry position on the orbit track 120 nautical miles south of the predicted impact point. Fig. A7-9 presents the situation which will exist on this flight if the orbit period is nominal and shows that the Downrange Telemetry Ship cannot be on the desired station for Pass 15 re-entry. If the attempt is made to move the ship as close as possible to its Pass 15 station, it will be unable to support a possible emergency alternate re-entry on Pass 31. Therefore, the STC will monitor the position of the ship closely and, depending on the existing flight conditions, direct redeployment to properly utilize its capability. Figure A7-10 shows how the impact longitude at 17° N latitude varies with orbit period in this area.

A5. 12. 4 The Downrange Telemetry Ship forward quad-helix antenna will track on the capsule telemetry signal and will also receive the capsule beacon signal; both signals will be recorded. The aft tri-helix antenna will be positioned to record the Agena telemetry signal.

A5. 12. 5 Air Rescue Service aircraft at San Diego, California, and the C-130A and/or the C-119J aircraft from Edwards Air Force Base, if available, will provide support for emergency alternate re-entry operations. Air-pickup of launch data will not be made until it has been decided that the aircraft will not be needed for emergency alternate re-entry support. Specific procedures for ARS support will be developed by the local ARS Commander. The ARS will direct and control all recovery operations in this area.

A6 POST-RECOVERY OPERATIONS

A6. 1 Haiti Victory Data

The Haiti Victory will proceed toward Pearl Harbor at the best speed of advance immediately after termination of the search operation. If the capsule telemetry data have been acquired, the two HRS-3 helicopters will fly it to the HCC as soon as the ship reaches HRS-3 range of Hickam Air Force Base.

[redacted]

A6. 2 Dalton Victory Data

If the Dalton Victory acquires telemetry data from the capsule, an aircraft data pick-up will be accomplished only at the discretion of the STC.

A6. 3 Christmas Island and Telemetry Aircraft Data

An aircraft will pick up recovery capsule data acquired by the Christmas Island facility and fly it to Hickam AFB on the day of recovery operations. Christmas Island and JC-54 telemetry aircraft data will be delivered to the HCC as soon as possible.

A6. 4 South Point, Barking Sands, and Tern Island Data

Data from South Point, Barking Sands and Tern Island Tracking Stations, including magnetic tapes, set-up sheets, maps and/or logs of the tracking operation, will be hand-carried by PMR personnel, flown to Hickam AFB, and delivered to the HCC.

A6. 5 Transport of Data to Sunnyvale

All recovery capsule data acquired by the receiving facilities in the recovery region will be hand-carried to Flight Data Reports, LMSD/61-44, on the first available commercial airline flight.

A6. 6 Tracking Station Post-Recovery Operations

The tracking stations will continue observations of the Discoverer Satellite S-band beacon and telemetry transmission until the battery power is exhausted. The orbital programmer is programmed as shown in Figure A2-2. Command transmission and tracking after the recovery pass will be at the direction of the STC.

[redacted]

A7 TABLES AND ILLUSTRATIONS

The following tables and illustrations are applicable to the flight of Discoverer Satellite 1103/Discoverer Booster 296/AET Payload only. Each table or figure is given the basic number of the section of the general STD to which it applies, the letter A to denote Appendix material, and a number to sequence items in the same category.

Table A2-1
NOMINAL FLIGHT PLANNING DATA

ITEM	DATA
SATELLITE	
S/N	1103
Payload	AET-L
Fuel	UDMH, 3694 lb
Oxidizer	IRFNA, 9420 lb
Launch weight	15,907 lb
BOOSTER	
S/N	296
Fuel	RP-1
Oxidizer	Liquid oxygen
Launch weight (including payload)	121,258 lb
LAUNCH	
Site	VAFB, 75-3, Pad 4
Date	December 1960
Pad azimuth	181°28′ ± 15′
Launch azimuth	172°
Nominal airborne Command 5 backup	15 sec
Orbital boost time	237.9 sec
Downrange T/M ship location	13° N, 117° W
Downrange T/M ship heading	270° T
Programmer setting	5580 sec (step setting 16)
INJECTION	
Time	T + 463.4 sec
Location	22° 18.3′ W, 119° 8.0′ W
Altitude	147 sm (128 nm)
Azimuth (inertial)	171.0°
Nominal velocity	25,824 ft/sec
ORBIT	
Period	93.0 min (5580 sec)
Apogee	380 sm (330 nm)
Perigee	147 sm (128 nm)
Eccentricity	0.0275
Regression rate	23.39°/pass
Reset Latitudes	20° N [redacted] 32° N [redacted] northbound) or 36° N [redacted] southbound) 40° N [redacted] northbound) or 45° N [redacted] southbound) 60° N [redacted]
Inclination Angle	81.78°

[redacted]

Table A2-1 (Continued)

ITEM	DATA
RE-ENTRY	
Re-entry T/M aircraft nominal position and heading	
Day 1 alternate recovery (Pass 17)	60° N, 165°24′ W, 163.2° true
Day 2 alternate recovery (Pass 33)	60° N, 179°30′ W, 163.2° true
Day 3 normal recovery (Pass 48)	60° N, 170°16′ W, 163.2° true
Day 4 alternate recovery (Pass 63)	60° N, 160°59′ W, 163.2° true
RECOVERY	
Aircraft (type and quantity)	C-119's (9), RC-121's (4), T M recording (5), C-130 (1) if available
Surface Ships -- Initial Positions	
Haiti Victory	23° N, 160° W
Auxiliary	16° N, 159°18′ W
Dalton Victory	8° N, 158°36′ W
Surface Ship Helicopters	
HRS-3	2 on each Victory Ship
ALTERNATE RECOVERY – DAY 1	
Alternate recovery pass	17
Nominal impact area center	24° N, 156°54′ W
ETPD	T + 26.5 hours
ALTERNATE RECOVERY – DAY 2	
Alternate recovery pass	33
Nominal impact area center	24° N, 171°2′ W
ETPD	T + 51.3 hours
NORMAL RECOVERY – DAY 3	
Normal recovery pass	48
Nominal impact area center	24° N, 161°45′ W
ETPD	T + 74.5 hours
ALTERNATE RECOVERY – DAY 4	
Alternate recovery pass	63
Nominal impact area center	24° N, 152°17′ W
ETPD	T + 97.7 hours
EMERGENCY ALTERNATE RECOVERY – DAY 1	
Alternate recovery pass	15
Nominal impact area center	17° N, 109°24′ W
Downrange T/M ship location	15° N, 109°13′ W

[redacted]

Table A2-1 (Continued)

ITEM	DATA
EMERGENCY ALTERNATE RECOVERY – DAY 2	
Alternate recovery pass	31
Nominal impact area center	17° N, 123°33′ W
Downrange T/M ship location	15° N, 123°22′ W
EMERGENCY ALTERNATE RECOVERY – DAY 3	
Alternate recovery pass	46
Nominal impact area center	17° N, 114°16′ W
Downrange T/M ship location	15° N, 114°5′ W
EMERGENCY ALTERNATE RECOVERY – DAY 4	
Alternate recovery pass	61
Nominal impact area center	17° N, 104°48′ W
Downrange T/M ship location	15° N, 104°37′ W

Table A4-1

INSTRUMENTATION REQUIRED TO BE OPERATIVE AT LAUNCH

1. Agena

   a. Continuous Telemetry Channels:

   6 – Payload quantity. Subcarrier must be present

   7 – Payload quantity. Subcarrier must be present

   8 – Payload quantity. Subcarrier must be present

   10 – Payload quantity. Subcarrier must be present

   11 – Z Acceleration during ascent. Subcarrier must be present

   14 – Agena combustion chamber pressure. Subcarrier must be present

   b. Commutated Telemetry Channels:

   12 – Subcarrier must be present and commutator running

   13 – Subcarrier must be present and commutator running

   15 – Subcarrier must be present and commutator running; points 49 and 51 must be present. Channel 16, commutator points 50 and 52 are an acceptable substitution for Channel 15, commutator points 49 and 51; these must be substituted as a pair.

   16 – Subcarrier must be present and commutator running; points 2, 4, 6, 8, 10, 14, 16, 18, 20, 22, 33, and 45 must be present. Channel 1 is an acceptable substitution for Channel 16, points 20 and/or 22. Channel 11 is an acceptable substitution for Channel 16, points 2 and/or 4, 6, and 8.

   17 – Subcarrier must be present and commutator running

2. Capsule

   a. Continuous Telemetry Channels:

   7 – Subcarrier must be present

   9 – Subcarrier must be present

   11 – Subcarrier must be present

NOTE:

Approval of the operation of the instrumentation system by cognizant LMSD personnel at VAFB is required prior to launch.

Table A5-1
SS/D TIMER SEQUENCE FOR DISCOVERER SATELLITE 1103

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	EVENT DESCRIPTION
	-0.1	Timer reset
0	0	Liftoff, SS/D timer start
0.1	0.1	Timer reset
0.1	0.1	Timer warning (ground function)
149		MAIN ENGINE SHUTDOWN*
150	150	Start Fairchild Timer
156	156	Programmed destruct lockout
		Uncage IRP gyros
156	156	Flight controls power ON (backup)
158.5		VERNIER SHUTDOWN*
169	169	Initiate vehicle pneumatics control
		Open pneumatic supply valve
169	169	Fire explosive bolts
169.5	169.5	Arm timer delay circuit
		-1.65°/min pitch rate from integ. pot.
169.5	169.5	Fire retro rockets
175	175	Remove -40°/min. yaw rate (no yaw correction required)
181	181	Command -3.6°/sec pitchover program (pitchover 28.8°)
181	181	Fire H/S fairing squib
189	189	Stop -3.6°/sec pitch rate
		Connect pitch H/S signal to pitch IRP gyro
189	189	Connect roll H/S signal to roll IRP gyro
194	194	Uncage integrator
		Accept Fairchild Timer and Command 5 relay signal*, **
194	194	Remove 28v dc from N_2 valve
		ORBITAL BOOST*
209		Stop SS/D Timer delay (nom. 15 sec) *
213	198	Deactivate timer delay circuit
		Fire ullage rockets
213	198	Activate H/S electrical pitch bias +4-1/2° offset
224	209	Unground integrator input
224	209	Connect accelerometer to integrator
224	209	Arm and fire gas gen squib, fire He valve, pitch and yaw pneumatics OFF
225	210	Pitch and yaw pneumatics OFF (backup)
		Open gas gen. arm and fire, He valve
		Open gas gen. arm and fire, He valve and remove J-box 28v to P and Y pneumatics OFF
225	210	Close circuit to T/M OFF SWITCH
225.5		STEADY STATE THRUST*
457.0	442	Arm pitch and yaw pneumatics

**Notation for reference only.*

***Command 6 ends timer delay (15 seconds nominal) and corrects integrator.*

[redacted]

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	EVENT DESCRIPTION
457.0	442	Engine cutoff safety switch
463.4	448.4	Engine shutdown by integrator***
		Disconnect accelerometer
		Ground integrator input
463.4	448.4	Activate pitch and yaw pneumatics
		<u>REORIENTATION</u>*
483	468	Pneumatic ON (backup) and remove 28v to ullage rockets
		Disconnect integrator pitch rate pot. (remove 4.1°/min pitch rate)
		Command -40°/min yaw rate (180° yaw left)
483	468	Fire He and oxidizer vent valve squib
753	738	Start T/M calibrate
753	738	Apply 28v unreg. to SS/L power control box and switch beacon command channels
753	738	Command +3.86°/min pitch rate (yaw rate removed)
		Connect roll H/S signal to yaw gyro
		Switch-out 0.1% regulated 400-cycle power
753	738	Shutdown +28.3v IRP ascent power
763	748	Stop T/M calibrate
		Open eng. shutdown, switch antenna, open flight control gain change relays and switch roll and yaw gyro TLM gain
763	748	Shutdown integrator power
		<u>ORBIT</u>*
895	880	Open circuit to T/M over-ride
		SS/D Timer OFF, H/S to low gain
		Arm H/S OFF circuit
895	880	Fire fuel vent valve squib
		<u>RECOVERY</u>*
X	880	Restart SS/D Timer, H/S OFF*
X + 15	895	Command -45°/min pitch rate
X + 15	895	Arm capsule ejection squib
X + 92	972	Command + 3.86°/min pitch rate (stop -45°/min pitch rate)
		SS/L Transfer Circuit 1
X + 92	972	SS/L Transfer Circuit 2
X + 92+	972+	Fire capsule plug disconnect squib
X + 94.5	974.5	Fire capsule eject squibs
		Enable timer shutdown circuit
		Fire capsule eject squibs
X + 94.5	974.5	Lockout SS/H restart signal
X + 130	1010	Shutdown SS/D timer, H/S on.

***Notation for reference only.**

******Integrator to be set at a dial reading of approximately 2150 representing a velocity to be gained of 17,200 ±40 fps.***

[redacted]

Table A6-1
NOMINAL ORBIT SCHEDULE
(Based on a 93.0 Minute Period)

PHASE	EVENT	TIME FROM LAUNCH HRS	TIME FROM LAUNCH MIN	LOCATION DEG. N. LATITUDE
Launch	Launch	0	0	34.8
	Start Orbit		2	
	Orbit Injection		7.9	22.4
	Beacon, T/M off		14.9	6.3 (s)
Pass 1	Beacon, T/M on	1	27.5	75
	65°N latitude (ref)		30.2	65
	RM on		31.5	60
	Cross [redacted] latitude		32.2	57.6
	RM interruption (40)		32.2	57.6
	25°N Ref latitude		40.3	25
	Cross [redacted] latitude		41.1	21.6
	Beacon, T/M off		43.9	10
	End of Orbit 1	2	33.6	0
Pass 2	Beacon, T/M on	3	0.5	75
	RM on		4.5	60
	Cross [redacted] latitude		5.2	57.6
	RM interruption (60)		5.5	56.1
	Cross [redacted] latitude		14.1	21.6
	Beacon, T/M off		16.9	10
	End of Orbit 2	4	6.6	0
Pass 3	End of Orbit 3	5	39.6	0
Pass 4	End of Orbit 4	7	12.6	0
Pass 5	End of Orbit 5	8	45.6	0
Pass 6	Beacon, T/M on	8	52.3	25
	RM on		56.4	40
	RM interruption (20)		56.7	41.2
	Cross [redacted] latitude		57.2	42.9
	Beacon, T/M off	9	1.2	58
	End of Orbit 6	10	18.5	0
Pass 7	Beacon, T/M on	10	25.3	25
	RM on		29.4	40
	RM interruption (40)		30.1	42.4
	Cross [redacted] latitude		30.2	42.9
	Beacon, T/M off		34.2	58
	End of Orbit 7	11	51.5	0
Pass 8	Beacon, T/M on	11	56.2	17
	RM on	12	0.2	32
	Cross [redacted] latitude		1.0	34.8
	RM interruption (60)		1.2	35.5
	Beacon, T/M off		5.6	52
	End of Orbit 8	13	24.4	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH HRS	TIME FROM LAUNCH MIN	LOCATION DEG. N. LATITUDE
Pass 9	Beacon, T/M on	13	29.2	17
	RM on		33.2	32
	Cross [redacted] latitude		34.0	34.8
	RM interruption (80)		34.5	36.9
	Beacon, T/M off		38.6	52
	End of Orbit 9	14	57.4	0
Pass 10	Beacon, T/M on	14	58.9	5
	RM on	15	2.9	20
	Cross [redacted] latitude		3.4	21.6
	RM interruption (100)		4.6	27.8
	Cross [redacted] latitude		13.1	57.6
	Beacon, T/M off		15.3	66
	End of Orbit 10	16	30.4	0
Pass 11	End of Orbit 11	18	3.4	0
Pass 12	End of Orbit 12	19	36.3	0
Pass 13	Beacon, T/M on	20	7.1	61
	RM on		11.1	45
	RM interruption (20)		11.4	43.7
	Cross [redacted] latitude		11.6	42.9
	Beacon, T/M off		13.8	34
	End of Orbit 13	21	9.3	0
Pass 14	End of Orbit 14	22	42.3	0
Pass 15	Beacon, T/M on	23	9.2	75
	RM on		13.3	60
	Cross [redacted] latitude		13.9	57.6
	RM interruption (40)		14.6	55.0
	Cross [redacted] latitude		19.6	34.8
	Beacon, T/M off		22.7	22
	End of Orbit 15	24	15.3	0
Pass 16	Beacon, T/M on	24	42.2	75
	RM on		46.2	60
	Cross [redacted] latitude		46.9	57.6
	RM interruption (60)		47.2	56.1
	Cross [redacted] latitude		52.5	34.8
	Beacon, T/M off		55.7	22
	End of Orbit 16	25	48.2	0
Pass 17	Beacon, T/M on	26	15.1	75
	RM on		19.1	60
	Cross [redacted] latitude		19.8	57.6
	RM interruption (80)		20.4	54.7
	Cross [redacted] latitude		28.7	21.6
	Beacon, T/M off		31.5	10
	End of Orbit 17	27	21.2	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH HRS	TIME FROM LAUNCH MIN	LOCATION DEG. N. LATITUDE
Pass 18	End of Orbit 18	28	54.2	0
Pass 19	End of Orbit 19	30	27.1	0
Pass 20	End of Orbit 20	32	0.1	0
Pass 21	End of Orbit 21	33	33.1	0
Pass 22	Beacon, T/M on	33	39.9	25
	RM on		44.0	40
	RM interruption (20)		44.3	41.2
	Cross [redacted] latitude		44.8	42.9
	Beacon, T/M off		48.8	58
	End of Orbit 22	35	06.0	0
Pass 23	Beacon, T/M on	35	10.8	17
	RM on		14.8	32
	RM interruption (40)		15.5	34.5
	Cross [redacted] latitude		15.6	34.8
	Beacon, T/M off		20.2	52
	End of Orbit 23	36	39.0	0
Pass 24	Beacon, T/M on	36	43.7	15
	RM on		47.7	32
	Cross [redacted] latitude		48.5	34.8
	RM interruption (60)		48.7	35.5
	Beacon, T/M off		52.7	52
	End of Orbit 24	38	11.9	0
Pass 25	Beacon, T/M on	38	13.4	5
	RM on		17.4	20
	Cross [redacted] latitude		17.9	21.6
	RM interruption (80)		18.7	24.9
	Cross [redacted] latitude		27.6	57.6
	Beacon, T/M off		29.8	66
	End of Orbit 25	39	44.9	0
Pass 26	Beacon, T/M on	39	46.4	5
	RM on		50.4	20
	Cross [redacted] latitude		50.8	21.6
	RM interruption (100)		52.5	27.8
	Cross [redacted] latitude	40	0.5	57.6
	Beacon, T/M off		2.7	66
	End of Orbit 26	41	17.9	0
Pass 27	End of Orbit 27	42	50.8	0
Pass 28	Beacon, T/M on	43	21.6	61
	RM on		25.6	45
	RM interruption (20)		25.9	43.7
	Cross [redacted] latitude		26.1	42.9
	Beacon, T/M off		28.3	34
	End of Orbit 28	44	23.8	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH HRS	MIN	LOCATION DEG. N. LATITUDE
Pass 29	Beacon, T/M on	44	54.4	61
	RM on		58.4	45
	Cross [redacted] latitude		59.0	42.9
	RM interruption (40)		59.1	42.5
	Beacon, T/M off	45	1.1	34
	End of Orbit 29		56.7	0
Pass 30	Beacon, T/M on	46	29.7	52
	RM on		33.7	36
	Cross [redacted] latitude		34.0	34.8
	RM interruption (60)		34.7	32
	Beacon, T/M off		37.1	22
	End of Orbit 30	47	29.7	0
Pass 31	Beacon, T/M on	47	56.6	75
	RM on	48	0.6	60
	Cross [redacted] latitude		1.3	57.6
	RM interruption (80)		1.9	54.8
	Cross [redacted] latitude		6.9	34.9
	Beacon, T/M off		10.1	22
	End of Orbit 31	49	2.6	0
Pass 32	Beacon, T/M on	49	29.5	75
	RM on		33.5	60
	Cross [redacted] latitude		34.2	57.6
	RM interruption (100)		35.2	53.4
	Cross [redacted] latitude		43.1	21.6
	Beacon, T/M off		45.9	10
	End of Orbit 32	50	35.6	0
Pass 33	Beacon, T/M on	51	2.5	75
	RM on		6.5	60
	Cross [redacted] latitude		7.2	57.6
	RM interruption (120)		8.2	53.4
	Cross [redacted] latitude		16.1	21.6
	Beacon, T/M off		18.9	10
	End of Orbit 33	52	8.5	0
Pass 34	End of Orbit 34	53	41.5	0
Pass 35	End of Orbit 35	55	14.4	0
Pass 36	End of Orbit 36	56	47.4	0
Pass 37	Beacon, T/M on	56	54.2	25
	RM on		58.3	40
	RM interruption (20)		58.6	41.2
	Cross [redacted] latitude		59.1	42.9
	Beacon, T/M off	57	3.1	58
	End of Orbit 37	58	20.3	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH		LOCATION
		HRS	MIN	DEG. N. LATITUDE
Pass 38	Beacon, T/M on	58	27.2	25
	RM on		31.3	40
	RM interruption (40)		32.0	42.4
	Cross [redacted] latitude		32.1	42.9
	Beacon, T/M off		36.1	58
	End of Orbit 38		53.3	0
Pass 39	Beacon, T/M on	59	58.0	17
	RM on	60	2.0	32
	Cross [redacted] latitude		2.8	34.8
	RM interruption (60)		3.0	35.5
	Beacon, T/M off		7.0	52
	End of Orbit 39	61	26.2	0
Pass 40	Beacon, T/M on	61	26.4	5
	RM on		30.4	20
	Cross [redacted] latitude		30.9	21.6
	RM interruption (80)		32.2	24.9
	Cross [redacted] latitude		40.6	57.6
	Beacon, T/M off		42.8	66
	End of Orbit 40	62	59.1	0
Pass 41	Beacon, T/M on	63	0.6	5
	RM on		4.6	20
	Cross [redacted] latitude		5.1	21.6
	RM interruption (100)		6.8	27.8
	Cross [redacted] latitude		14.8	57.6
	Beacon, T/M off		17.0	66
	End of Orbit 41	64	32.1	0
Pass 42	End of Orbit 42	66	5.0	0
Pass 43	End of Orbit 43	67	38.0	0
Pass 44	Beacon, T/M on	68	8.7	61
	RM on		12.7	45
	RM interruption (20)		13.0	43.7
	Cross [redacted] latitude		13.2	42.9
	Beacon, T/M off		15.4	34
	End of Orbit 44	69	10.9	0
Pass 45	End of Orbit 45	70	32.8	0
Pass 46	Beacon, T/M on	71	10.6	75
	RM on		14.7	60
	Cross [redacted] latitude		15.3	57.6
	RM interruption (40)		16.0	54.8
	Cross [redacted] latitude		21.0	34.8
	Beacon, T/M off		24.2	22
	End of Orbit 46	72	16.8	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH HRS	TIME FROM LAUNCH MIN	LOCATION DEG. N. LATITUDE
Pass 47	Beacon, T/M on	72	43.6	75
	RM on		47.6	60
	Cross [redacted] latitude		48.3	57.6
	RM interruption (60)		48.6	56.1
	Cross [redacted] latitude		53.9	34.8
	Beacon, T/M off		59.9	10
	End of Orbit 47	73	49.7	0
Pass 48	Beacon, T/M on	74	16.5	75
	RM on		20.5	60
	Cross [redacted] latitude		21.2	57.6
	RM interruption (80)		21.8	54.7
	Cross [redacted] latitude		30.1	21.6
	Beacon, T/M off		32.9	10
	End of Orbit 48	75	22.6	0
Pass 49	End of Orbit 49	76	52.6	0
Pass 50	End of Orbit 50	78	25.6	0
Pass 51	End of Orbit 51	79	58.6	0
Pass 52	Beacon, T/M on	79	5.5	25
	RM on		9.6	40
	RM interruption (20)		9.9	41.2
	Cross [redacted] latitude		10.4	42.9
	Beacon, T/M off		14.4	58
	End of Orbit 52	81	31.6	0
Pass 53	Beacon, T/M on	81	38.5	25
	RM on		42.6	40
	RM interruption (40)		44.3	42.4
	Cross [redacted] latitude		44.4	42.9
	Beacon, T/M off		48.4	58.0
	End of Orbit 53	83	4.6	0
Pass 54	Beacon, T/M on	83	9.4	17
	RM on		13.4	32
	Cross [redacted] latitude		14.2	34.8
	RM interruption (60)		14.4	35.5
	Beacon, T/M off		18.8	52
	End of Orbit 54	84	37.6	0
Pass 55	Beacon, T/M on	84	42.4	17
	RM on		46.4	32
	Cross [redacted] latitude		48.2	34.8
	RM interruption (80)		48.7	36.9
	Beacon, T/M off		52.8	52
	End of Orbit 55	86	10.6	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH HRS	MIN	LOCATION DEG. N. LATITUDE
Pass 56	Beacon, T/M on	86	10.9	5
	RM on		14.9	20
	Cross [redacted] atitude		15.3	21.6
	RM interruption (100)		17.0	27.8
	Cross [redacted] latitude		25.0	57.6
	Beacon, T/M off		27.2	66
	End of Orbit 56	87	43.6	0
Pass 57	End of Orbit 57	89	16.6	0
Pass 58	End of Orbit 58	90	49.6	0
Pass 59	Beacon, T/M on	91	20.4	61
	RM on		24.4	45
	RM interruption (20)		24.7	43.7
	Cros [redacted] latitude		24.9	42.9
	Beacon, T/M off		27.1	34
	End of Orbit 59	92	22.6	0
Pass 60	End of Orbit 60	93	55.6	0
Pass 61	Beacon, T/M on	94	22.5	75
	RM on		26.6	60
	Cross [redacted] atitude		27.2	57.6
	RM interruption (40)		27.9	54.8
	Cross [redacted] atitude		32.9	34.8
	Beacon, T/M off		36.1	22
	End of Orbit 61	95	28.6	0
Pass 62	Beacon, T/M on	95	55.5	75
	RM on		59.5	60
	Cross [redacted] atitude	96	0.2	57.6
	RM interruption (60)		0.5	56.1
	Cross [redacted] latitude		5.8	34.8
	Beacon, T/M off		9.0	22
	End of Orbit 62	97	1.6	0
Pass 63	Beacon, T/M on	97	28.5	75
	RM on		32.5	60
	Cross [redacted] atitude		33.2	57.6
	RM interruption (80)		33.8	54.7
	Cross [redacted] atitude		42.1	21.6
	Beacon, T/M off		44.9	10
	End of Orbit 63	98	34.6	0
Pass 64	Beacon, T/M on	99	1.5	75
	RM on		5.5	60
	Cros [redacted] atitude		6.2	57.6
	RM interruption (100)		6.8	54.7
	Cros [redacted] latitude		15.1	21.6
	Beacon, T/M off		17.9	10
	End of Orbit 64	100	7.6	0

Table A8-1

REAL-TIME DATA READOUT AND REPORTING REQUIREMENTS

	MEASUREMENT		CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION						T/M SHIP***	T/M AIRCRAFT***		NOTE
	NAME	NUMBER						[redacted]					TIS	PVT. JOE E. MANN	WV-2 137890	ELECTRA	
LAUNCH	Liftoff Signal	---	---	1	RT	X	Ascent	X	X								
	Thor Main Engine Cutoff	---	Thor 12	1	RT	X	Ascent	X	X								
	Booster Separation	A93	16-24	1	RT	X	Ascent	X	X								
	Agena Engine Ignition and Cutoff	B6	14	1	RT	X	Ascent	X	X					X			
	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		Ascent	X	X								
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	Ascent	X	X								
	11-Second Step Switch Position	H108	16-20	1	RT		Ascent	X	X					X			
	110-Second Step Switch Position	H109	16-22	1	RT		Ascent	X	X					X			
	Increase/Decrease Switch Position	H107	16-18	1	RT	X	Ascent	X	X					X			
	Yaw Gyro Torque	D84	17-54	2	PP1		Ascent							X			1
	Payload Function Selector Setting	AET 14/15, 17/18, 20/21, 23/24	13-18 thru 13-24 13-48 thru 13-54	1	RT	X	Ascent	X	X					X			
	Longitudinal Acceleration	A-10	11	2	See Note 2		Ascent	X	X					X			2
	SPI Pitch Angle (Upper)	D-138	16-52	2	See Note 2		Ascent	X	X								2
	SPI Yaw Angle (Upper)	D-139	16-50	2	See Note 2		Ascent	X	X								2
ORBIT	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		1 thru 62	X	X	X	X	X					
	Command Verifications 1, 2, 3, 4	H112	11	1	RT	X	1 thru 62	X	X	X	X	X					
	Command Verifications 5, 6	H114	14	1	RT	X	1 thru 62	X	X	X	X	X					
	Programmer Period Readout (Console or Remote)	H110	1	2	RT		1 thru 62	X	X	X	X	X					
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	1 thru 62	X	X	X	X	X					
	11-Second Step Switch Position	H108	16-20	1	RT		1 thru 62	X	X	X	X	X					
	110-Second Step Switch Position	H109	16-22	1	RT		1 thru 62	X	X	X	X	X					
	Increase/Decrease Switch Position	H107	16-18	1	RT	X	1 thru 62	X	X	X	X	X					
	Reset Monitor Signal	H70	16-10	1	RT	X	1 thru 62	X	X	X	X	X					

Table A8-1 (Continued)

	MEASUREMENT NAME	MEASUREMENT NUMBER	CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION [redacted]					TRACKING STATION TIS	T/M SHIP*** PVT. JOE E. MANN	T/M AIRCRAFT*** WV-2 137890	T/M AIRCRAFT*** ELECTRA	NOTE
ORBIT (Continued)	Programmer Pass Identification	H70	16-10	1	RT	X	1 thru 62	X	X	X	X	X					
	Re-entry Selector Switch Position	H117	16-45	1	RT	X	1 thru 62	X	X	X	X	X					3
	Payload Function Selector Setting	AET 14/15, 17/18, 20/21, 23/24	13-18 thru 13-24, 13-48 thru 13-54	1	RT	X	1 thru 62	X	X	X	X	X					
	Control Gas Supply Pressure - High Range	D95	16-33	1	PP1	X	1 thru 62	X	X	X	X	X					
	Control Gas Supply Pressure - Low Range	D140	16-27	1	PP1	X	1 thru 62	X	X	X	X	X					
	Battery Bus Voltage	C1	16-38	2	PP1		1 thru 62	X	X	X	X	X					
	Horizon Scanner - Pitch	D37	16-35	3	PP2		See Note 5 ↓	X		X	X	X					4
	Horizon Scanner - Roll	D39	16-37	3	PP2			X		X	X	X					4
	SPI Temperature	D130	15-43	3	PP2			X		X	X	X					5
	SPI Pitch Angle - Lower	D128	15-51	3	See Note 5			X		X	X	X					5
	SPI Yaw Angle - Lower	D127	15-49	3	See Note 5			X		X	X	X					5
	SPI Pitch Ref. Volt.-Lower	D136	15-2	3	See Note 5			X		X	X	X					5
	SPI Yaw Ref. Voltage - Lower	D137	15-4	3	See Note 5			X		X	X	X					5
	SPI Pitch Angle - Upper	D138	16-52	3	PP2			X		X	X	X					5
	SPI Yaw Angle - Upper	D139	16-50	3	PP2		See Note 5	X		X	X	X					5
	Wave Train	AET 50	8	2	PP1		See Note 2	X		X	X	X					14
	No Name Assigned	AET 40	12-9	2	PP1		See Note 11	X		X	X	X					11
	No Name Assigned	AET 48	12-13	2	PP1		See Note 11	X		X	X	X					11
RE-ENTRY	Programmer Period Readout (Console or Remote)	H110	1	3	RT		Recovery Pass ↕				X	X					
	Programmer Step Readout (Console)	H108, 109	16-20, -22	2	RT	X					X	X					
	11-Second Step Switch Position	H108	16-20	3	PP2						X	X	X			X	
	110-Second Step Switch Position	H109	16-22	3	PP2						X	X	X			X	
	Reset Monitor Signal	H70	16-10	1	RT	X					X					X	
	Programmer Pass Identification	H70	16-10	2	RT		Recovery Pass				X					X	

[redacted]

Table A8-1 (Continued)

	MEASUREMENT		CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION						T/M SHIP***	T/M AIRCRAFT***		NOTE
	NAME	NUMBER						[redacted]					TIS	PVT. JOE E. MANN	WV-2 137890	ELECTRA	
RE-ENTRY (Continued)	Re-entry Selector Switch Position	H117	16-45	1	RT	X	Recovery Pass				X	X	X			X	3
	Control Gas Supply Pressure - High Range	D95	16-33	1	PP1	X					X	X	X			X	
	Control Gas Supply Pressure - Low Range	D140	16-27	1	PP1	X					X	X	X			X	
	Battery Bus Voltage	C1	16-38	2	PP1						X	X	X			X	
	Horizon Scanner - Pitch	D37	16-35	1	PP2						X					X	4
	Horizon Scanner - Roll	D39	16-37	1	PP2						X					X	4
	SPI Pitch Angle - Lower	D128	15-51	2	See Note 6						X					X	6
	SPI Yaw Angle - Lower	D127	15-49	2	See Note 6						X					X	6
	SPI Pitch Ref. Voltage - Lower	D136	15-2	2	See Note 6						X					X	6
	SPI Yaw Ref. Voltage - Lower	D137	15-4	2	See Note 6						X					X	6
	SFI Pitch Angle - Upper	D138	16-52	1	PP2						X					X	6
	SPI Yaw Angle - Upper	D139	16-50	1	PP2						X					X	6
	Pitch Torque Signal	D41	17-38	2	PP1						X					X	7
	SS/D Timer Restart	D85	17-52	1	RT	X					X					X	
	Capsule Separation Event	AET 51	16-42	1	RT	X					X	X	X		X	X	8
	Payload Connector Disconnect	AET 26	12-2	2	RT						X	X	X			X	13
	Retro-Rocket Ignition, De-spin Valve Actuated, Thrust Cone Ejection	---	Capsule 7	1	RT, PP1	X					X				X	X	9
	Spin Valve Actuated, Thrust Cone Ejection	---	Capsule 9	1	RT, PP1	X					X				X	X	9
	Axial Acceleration	---	Capsule 11	1	PP1, PP2	X					X	X	X		X	X	10
	3 g Switch Close, 3 g Switch Open, Ablative Shell Off	---	Capsule 7	1	RT, PP1	X					X	X	X		X	X	9
	Parachute Cover Off	---	Capsule 9	1	RT, PP1	X					X	X	X		X	X	9
	Capsule T/M Signal Strength	---	Capsule 7, 9, 11	2	RT		Recovery Pass				X	X	X		X	X	12

Table A8-1 (Continued)

NOTES:

1. Report the system of reorientation, the voltage level prior to start of reorientation, and the average voltage level during reorientation.
2. Backup monitors for ascent events. SPI data is used as backup verification of separation.
3. Reads 1 volt for normal Pass 63 re-entry, 4 volts for alternate re-entry.
4. Read when sun position indicator data are required in Notes 5 and 6 (until turn-off at start of reorientation). [redacted]eads on the recovery pass to indicate SS/D restart event if measurement D 85 is invalid.
5. With the exception of D 130, Channel 15 SPI data will be read only if the SPI data on Channel 16 do not appear valid. Read 3 times at approximately 2-minute intervals correlated with system time on Pass 2 [redacted] and [redacted], on Pass 13 [redacted], on Pass 15 [redacted] if recovery is to be made on Day 3, on Pass 48 [redacted] if recovery is to be made on Day 4, on Pass 59 [redacted] and on Pass 61 [redacted]. Readings at one system time only are required of [redacted] on Passes 9, 24, 39, and 55. All [redacted] and [redacted] readings are to be obtained as far north as possible. [redacted] transmits data on Channels 15 and 16 to Sunnyvale on 100-wpm/voice line after Pass 2; three 10-second data samples at 2-minute intervals required.
6. Read at 1-minute intervals before reorientation, 20-second intervals during reorientation, and immediately prior to separation; correlate with system time. Channel 15 SPI data will be read only if the SPI data on Channel 16 do not appear valid. [redacted] transmits data on Channels 15 and 16 to SV on 100-wpm/voice line after recovery pass; continuous transmission from acquisition to separation.
7. Read system time at start and finish of reorientation, voltage level prior to start of reorientation, and average voltage level during reorientation.
8. Reads 4.67 volts prior to separation, 1.33 volts after separation. Correlation within 2 seconds of exact system time is satisfactory for initial [redacted] and Electra report. [redacted] and TIS verify that event has occurred by voltage level check.
9. The RT readout will contain a verification that each event has occurred. The PP1 readout will contain the system time of each event. Use event numbers listed in Paragraph 7.4.5 for identification when reporting.
10. The [redacted] and Electra PP1 readout will contain the average value and duration. The PP2, readout will contain a complete time history of acceleration and will include the system time of each data dropout and the time duration of dropout. [redacted] and TIS read values 5 seconds prior to, at, and 5-seconds after parachute deployment.
11. Record voltage level at beginning, middle, and end of pass. Readout, accurate to at least 0.1 volt (2% bandwidth), required of [redacted] (Passes 8, 9, 15, 24, 31, 39, 55), [redacted] (Passes 6, 7, 13), [redacted] (Passes 1, 2, 16), and [redacted] Pass 2). Readouts on Passes 1 and 2 are required 60 minutes after the pass; all other readouts required 10 minutes after the pass.
12. Provide a qualitative evaluation of signal reception.
13. Reads out of band after separation.
14. Refer to Table A8-2 for details of readout required.

---

* *RT – Read in real time.*

PP1 – Read immediately after pass.

PP2 – Read immediately after RT and PP1 readouts.

** *All data are also to be reported to the STC by 60-wpm teletype as soon as possible.*

*** *T/M ships and aircraft will transmit real-time data immediately after signal fade so no interference with the vehicle telemetry signal will be generated.*

[redacted]

Table A8-2

NOMINAL PAYLOAD FUNCTION WAVE TRAIN REAL-TIME READOUT AND REPORTING REQUIREMENTS

CHANNEL 3 (AET 50) READOUT AND REPORTING REQUIREMENTS

PASS NO	TRACKING STATION	MAXIMUM DATA REPORTING TIME ALLOWABLE (MINUTES)		
		READOUT (a)	READOUT (b)	READOUT (c)
1	[redacted]	10	60	90
2		--	--	90
2		30	60	90
6		15	60	90
8		--	--	90
9		15	60	30
13		15	60	90
15		15	60	90
16		15	--	--
24		15	60	30
31		15	--	--
39		15	60	30
55		15	60	30

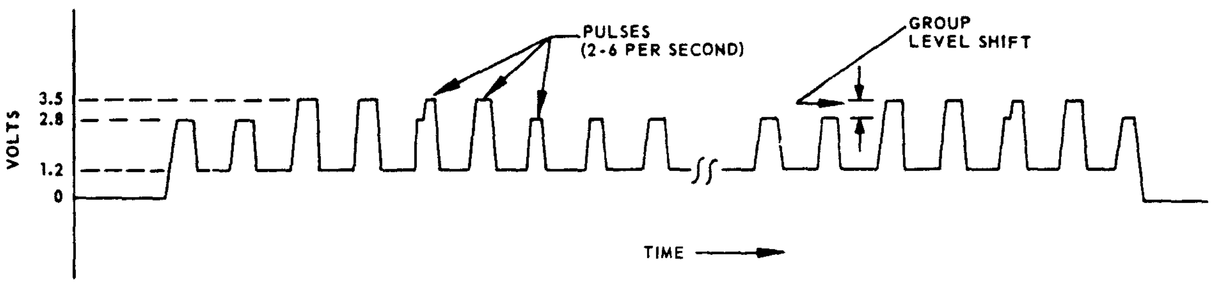
NOTE:

READOUT (a) – COMPARE CHANNEL 8 WAVE TRAIN WITH NOMINAL WAVE TRAIN BELOW. REPORT PRESENCE OR ABSENCE.

READOUT (b) – REPORT THE TIME (±0.5 SEC) OF THE START OF THE WAVE TRAIN AND THE DURATION (±5 SEC) OF THE WAVE TRAIN.

READOUT (c) – REPORT THE ELAPSED TIME (TO THE NEAREST 0.1 SECOND) REQUIRED FOR 100 PULSES COUNTED FROM LEADING EDGE TO LEADING EDGE AFTER AT LEAST 20 PULSES FROM THE WAVE TRAIN START. REPORT THE NUMBER OF GROUP LEVEL SHIFTS WITHIN THIS 100 PULSE PERIOD. DATA ON PASSES 9, 24, AND 39 IS TO BE MADE AVAILABLE AT THE EARLIEST POSSIBLE TIME AFTER ACQUISITION.

CHANNEL 8 (AET 50) WAVE TRAIN



[redacted]

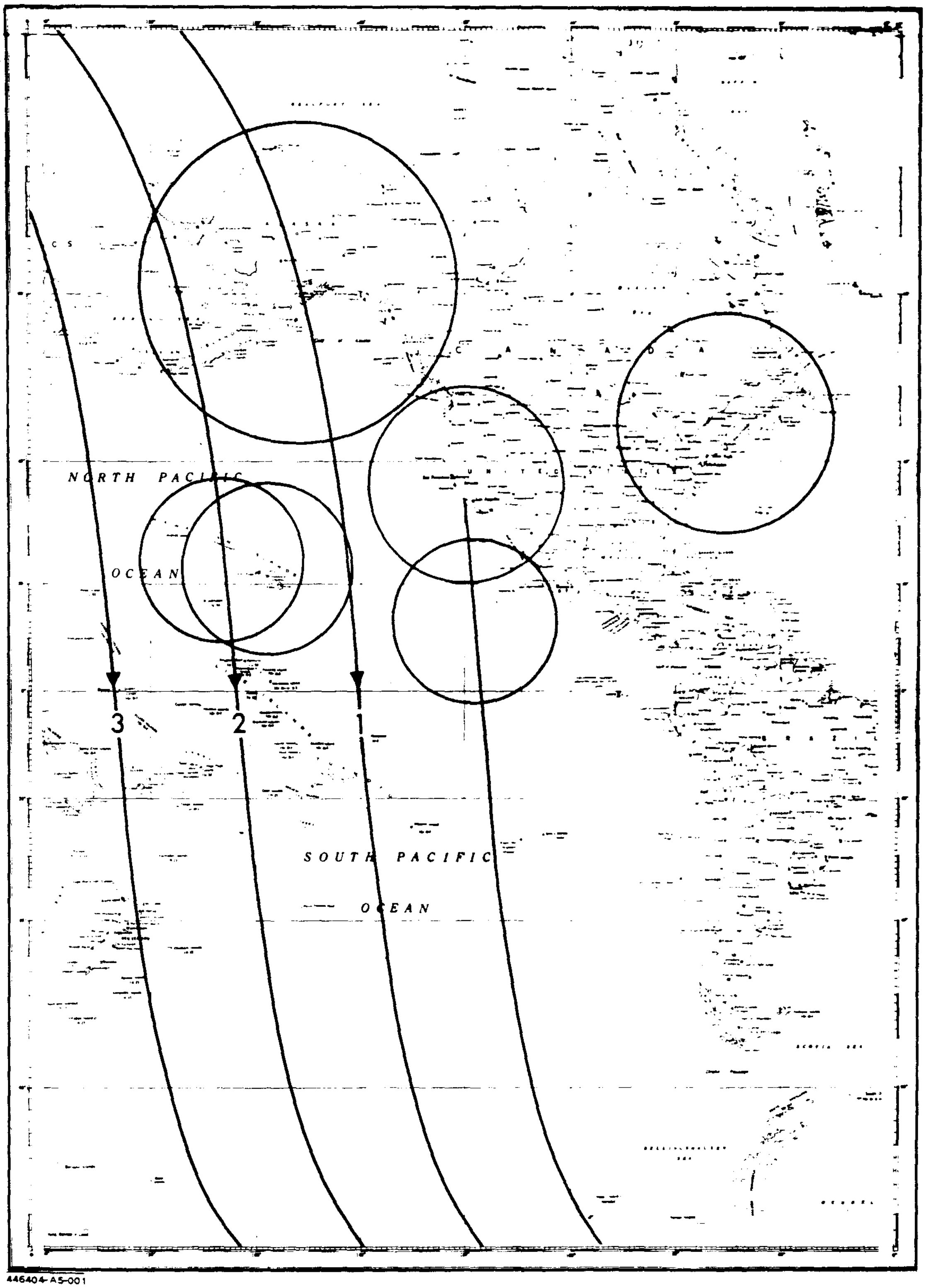


Figure A2-1(a) Nominal Orbit Traces – Passes 1 Through 3

[redacted]

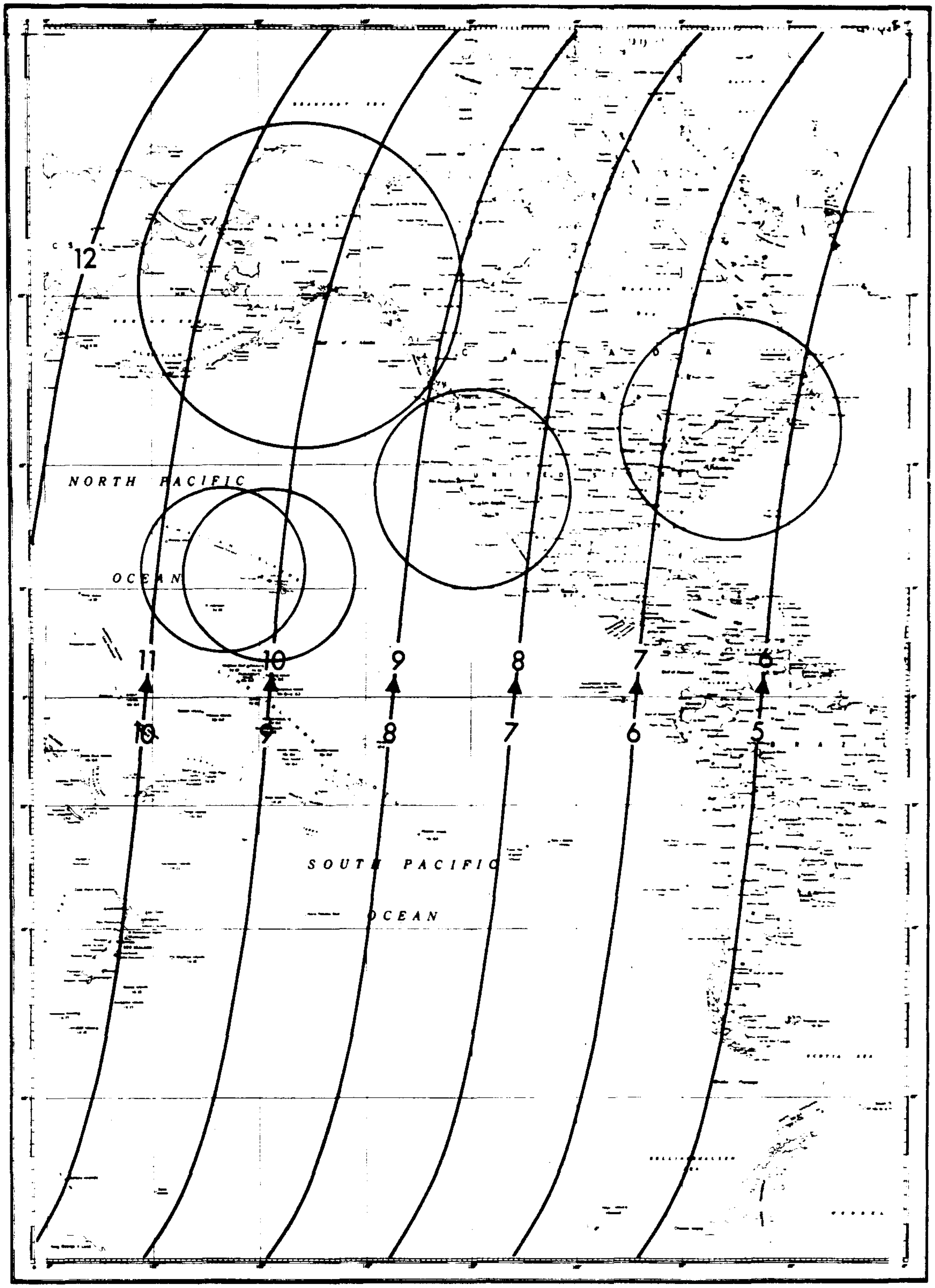


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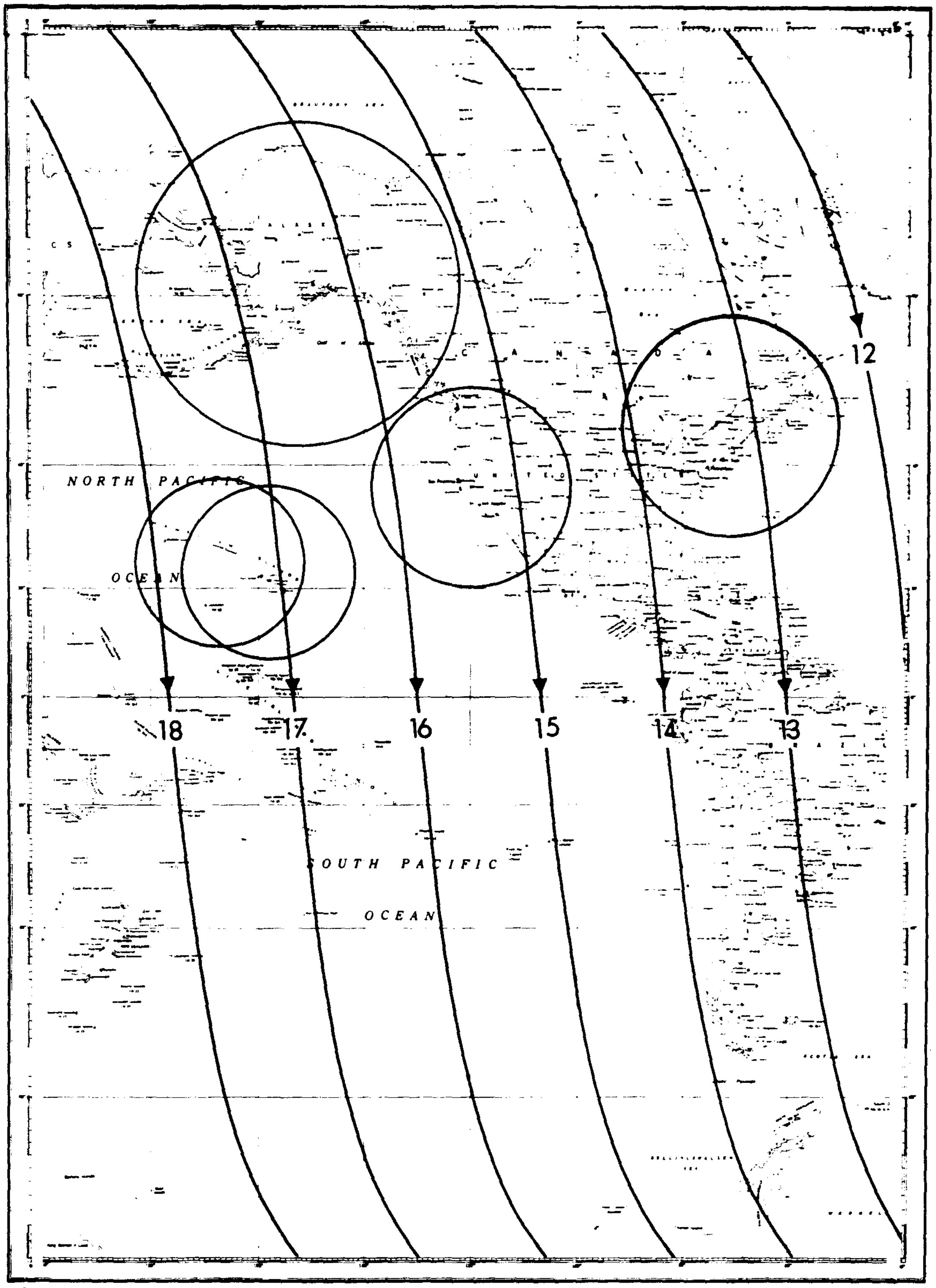
Figure A2-1(b) Nominal Orbit Traces – Passes 5 Through 12

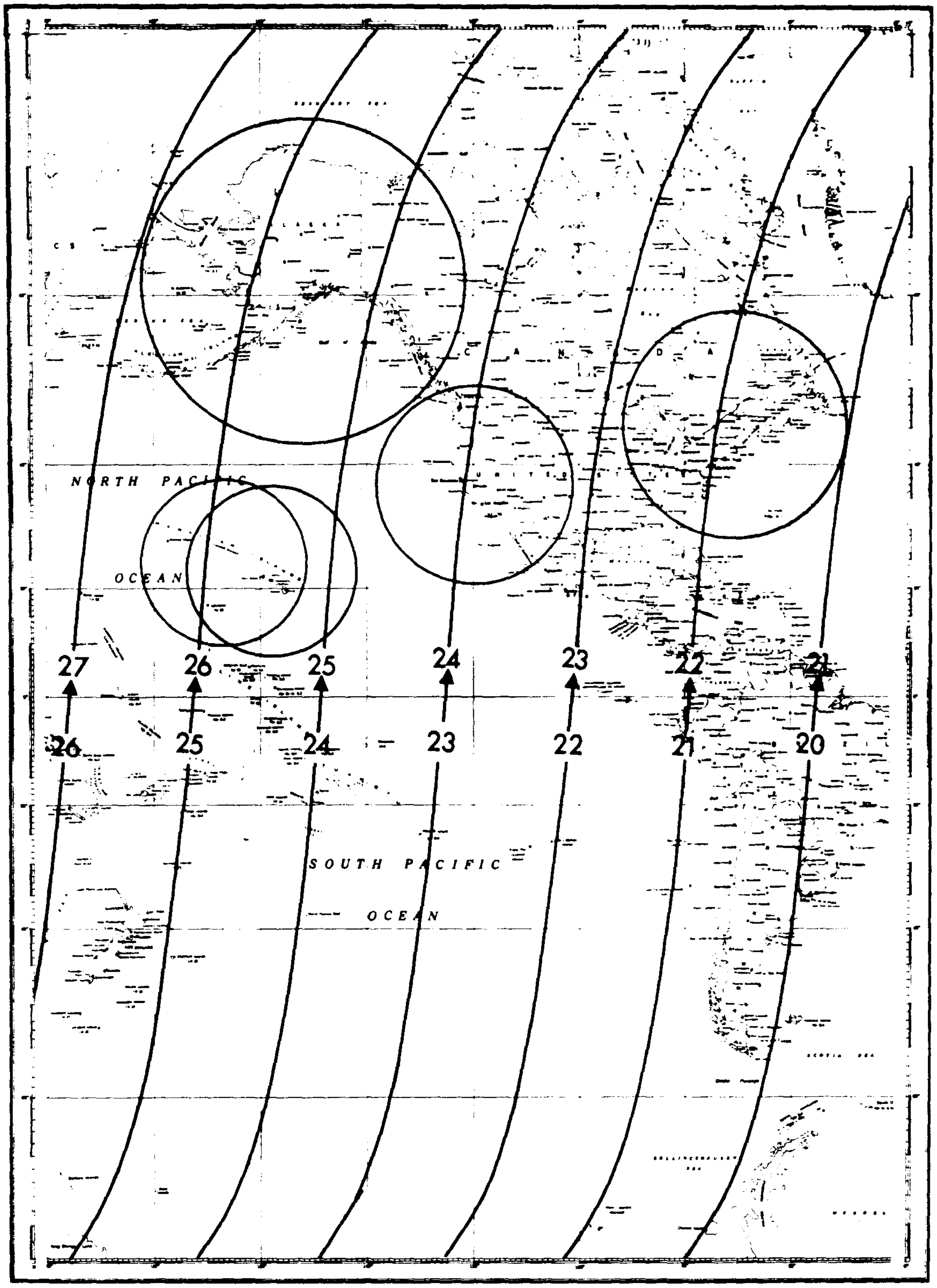
[redacted]



446404-A5-003

Figure A2-1(c)   Nominal Orbit Traces – Passes 12 Through 18

[redacted]



446404-AS-004

Figure A2-1(d) Nominal Orbit Traces – Passes 20 Through 27

[redacted]

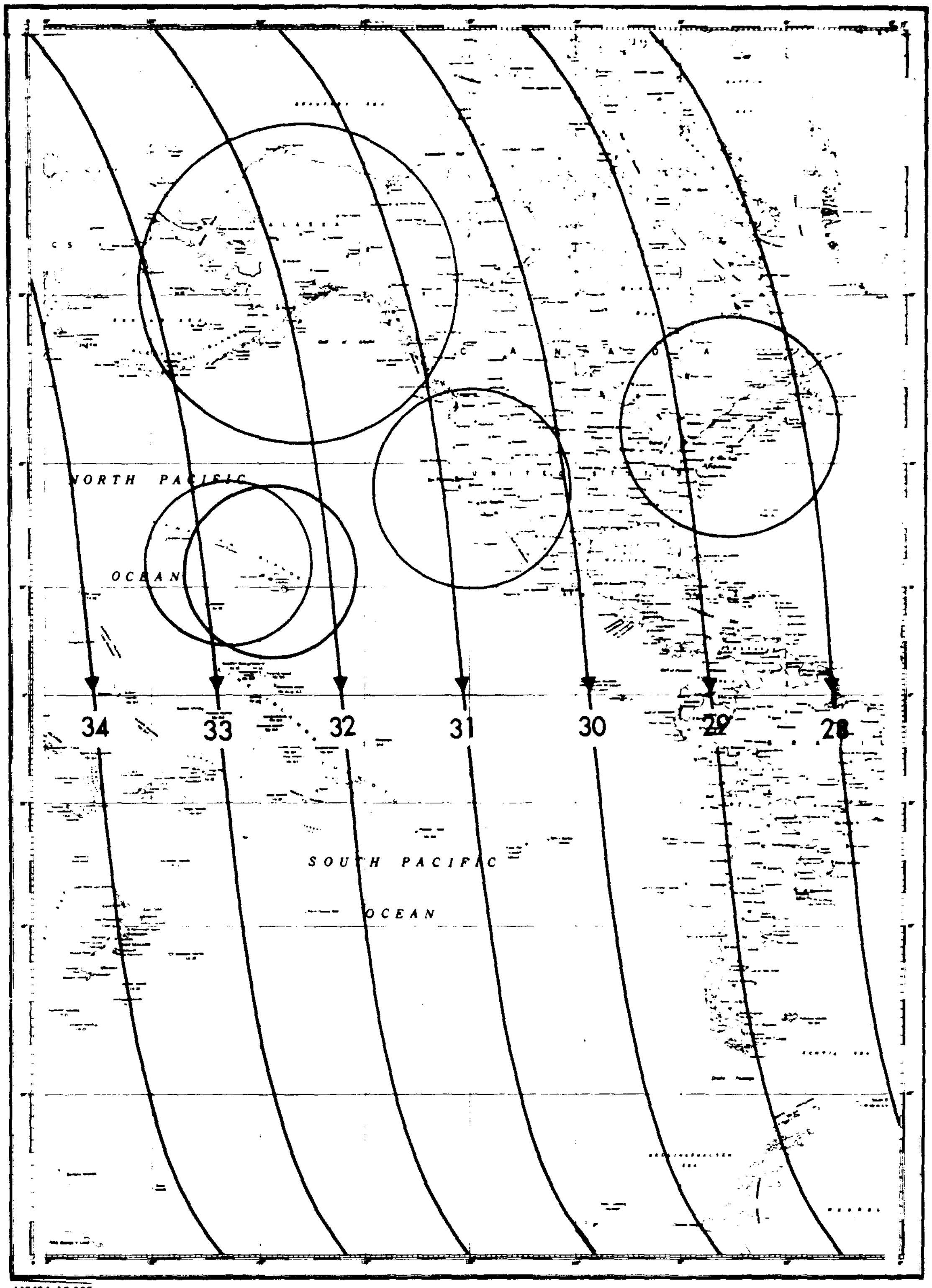
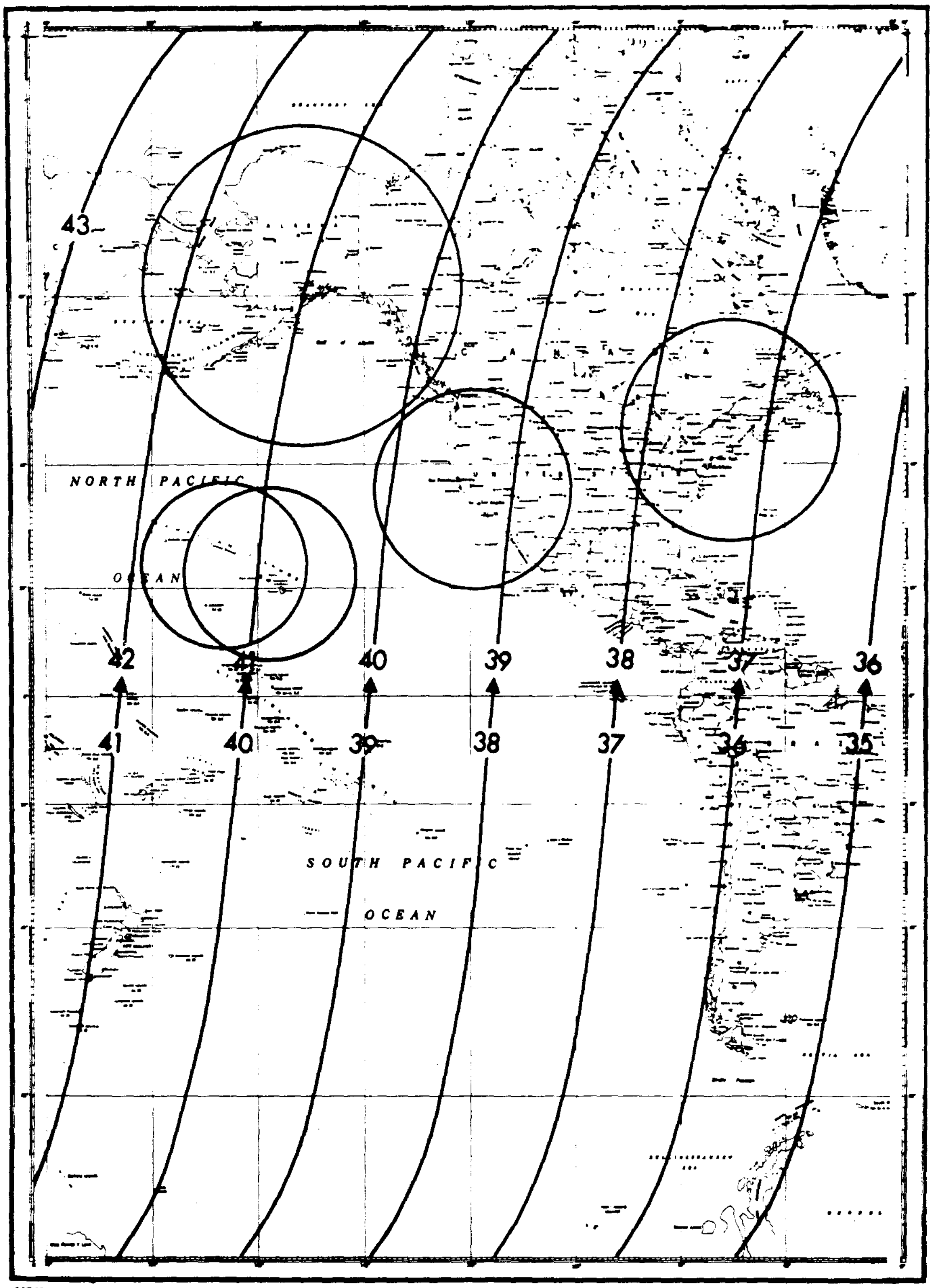


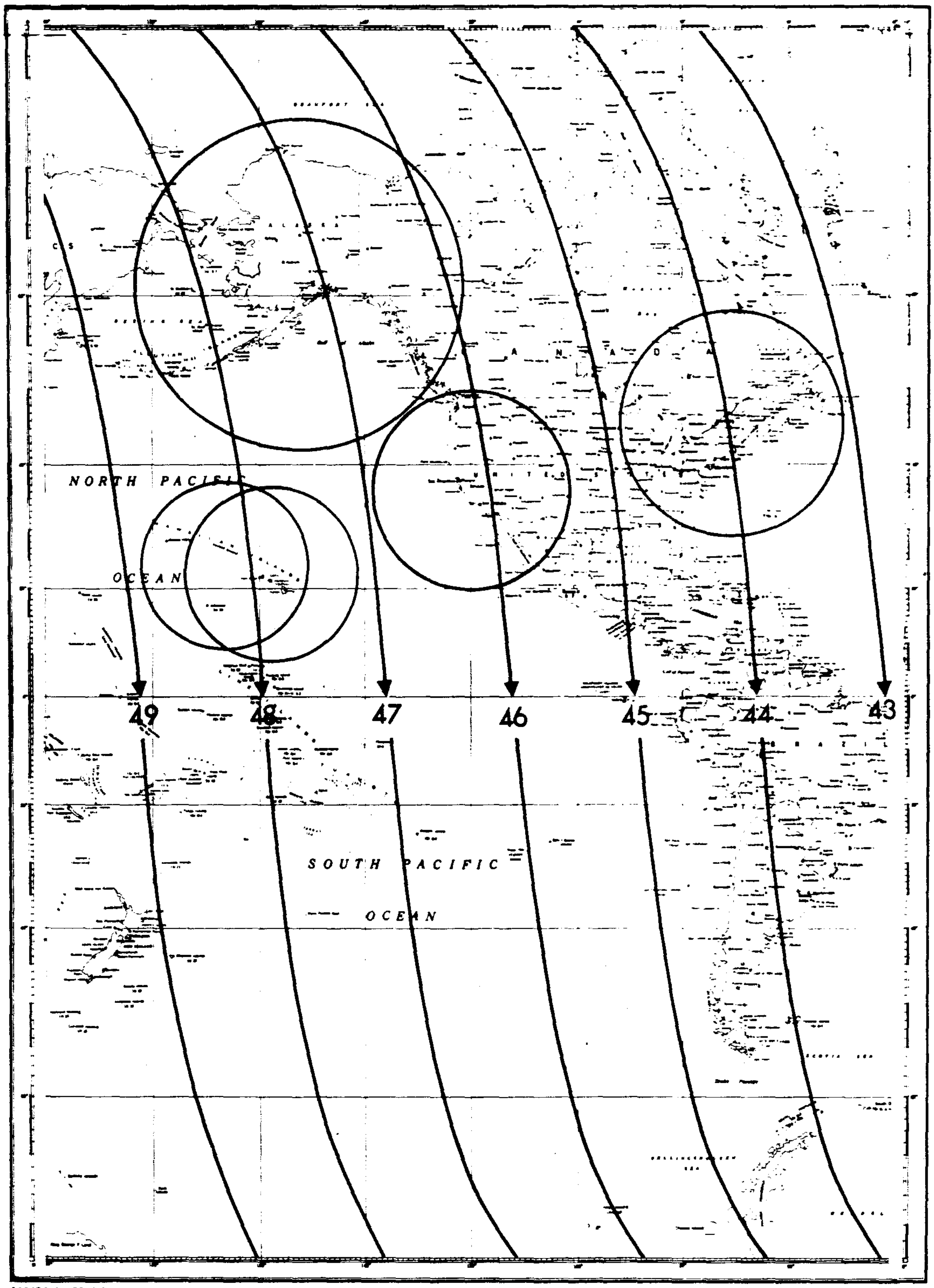
Figure A2-1(e) Nominal Orbit Traces – Passes 28 Through 34



446404-AS-006

Figure A2-1(f) Nominal Orbit Traces – Passes 35 Through 43

[redacted]



446404-A5-007(1)

Figure A2-1(g) Nominal Orbit Traces – Passes 43 Through 49

[redacted]

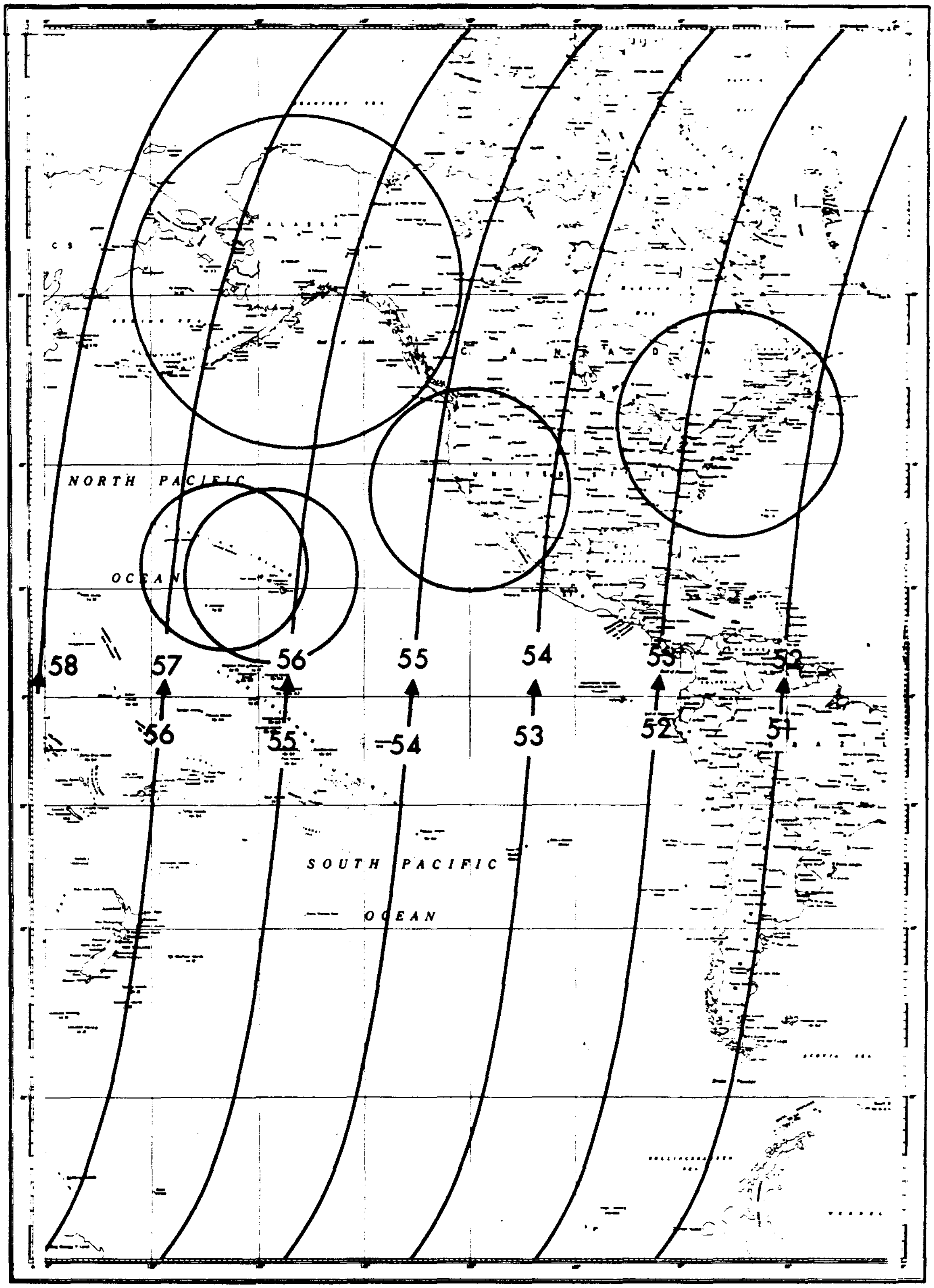


Figure A2-1(h) Nominal Orbit Traces – Passes 51 Through 58

[redacted]

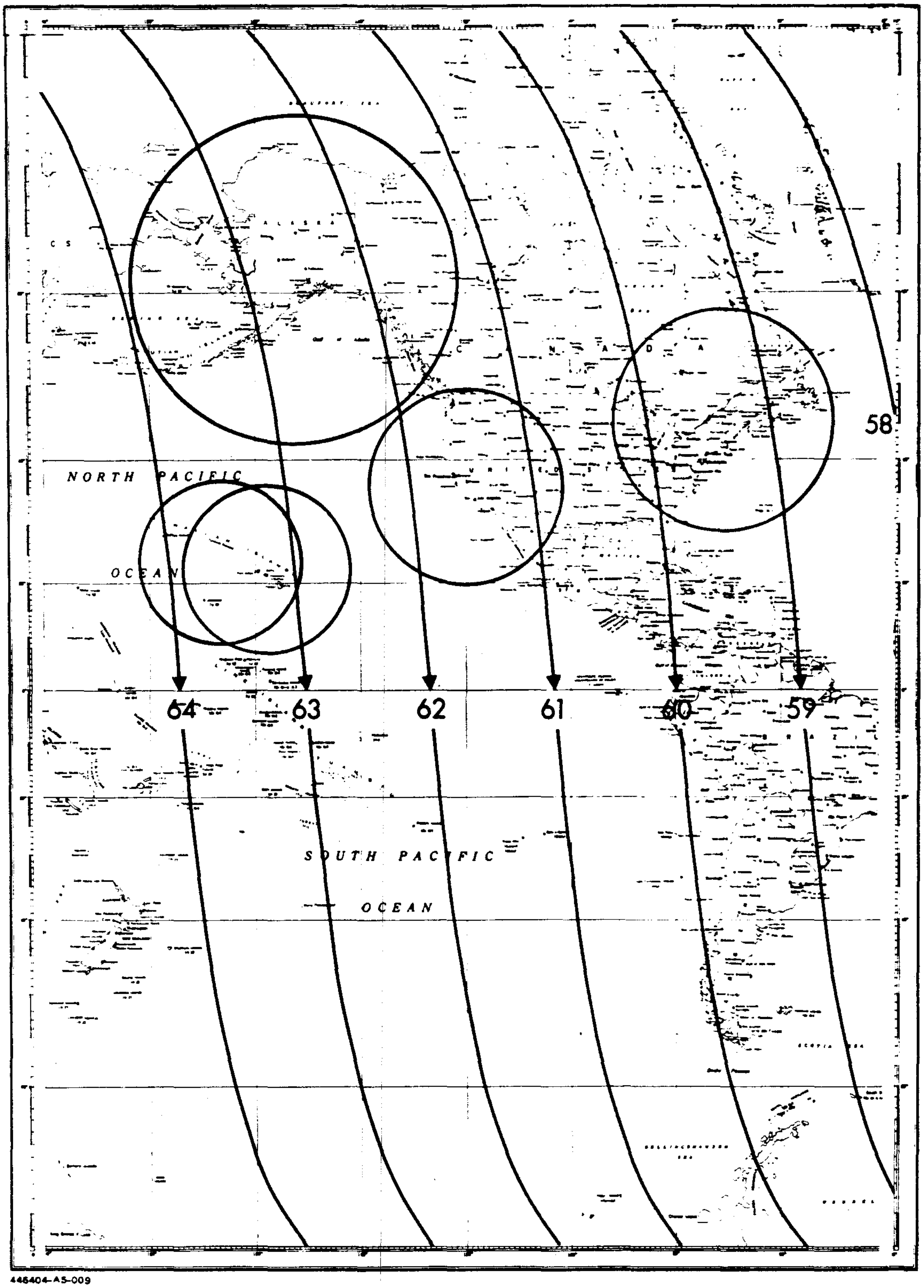


Figure A2-1(i) Nominal Orbit Traces – Passes 59 Through 64

[redacted]

TYPE OF PASS						
A	B	C	D	E	F	G
STATION						
[redacted]						
PROGRAMMER PASS NUMBER						
ASCENT(20)			1(40)			
			2(60)	6(20)		
				7(40)	8(60)	
					9(80)	10(100)
13(20)		15(40)*				
		16(60)	17(80)*	22(20)	23(40)	
					24(60)	25(80)
						26(100)
28(20)						
29(40)	30(60)	31(80)*	32(100)			
			33(120)*	37(20)		
				38(40)	39(60)	40(80)
						41(100)
44(20)		46(40)*	47(60)			
			48(80)*	52(20)		
				53(40)	54(60)	
					55(80)	56(100)
59(20)		61(40)*				
		62(60)	63(80)**			
			64(100)***	68(20)		
				69(40)	70(60)	71(80)
						72(100)
75(20)		77(40)	78(60)			
			79(80)	83(20)		
				84(40)	85(60)	
					86(80)	87(100)
90(20)	92(40)					

NOTE: NUMBER IN PARENTHESIS () SPECIFIES THE TIME IN SECONDS AFTER RESET MONITOR INITIATION AT WHICH THE PROGRAMMER IDENTIFICATION OCCURS.

* PASSES 15, 17, 31, 33, 46, 48, AND 61 PROGRAMMED FOR ALTERNATE RE-ENTRY SELECTION

** PASS 63 PROGRAMMED FOR NORMAL RE-ENTRY

*** PASS 64 PROGRAMMED FOR NORMAL RE-ENTRY AND ALTERNATE RE-ENTRY SELECTION

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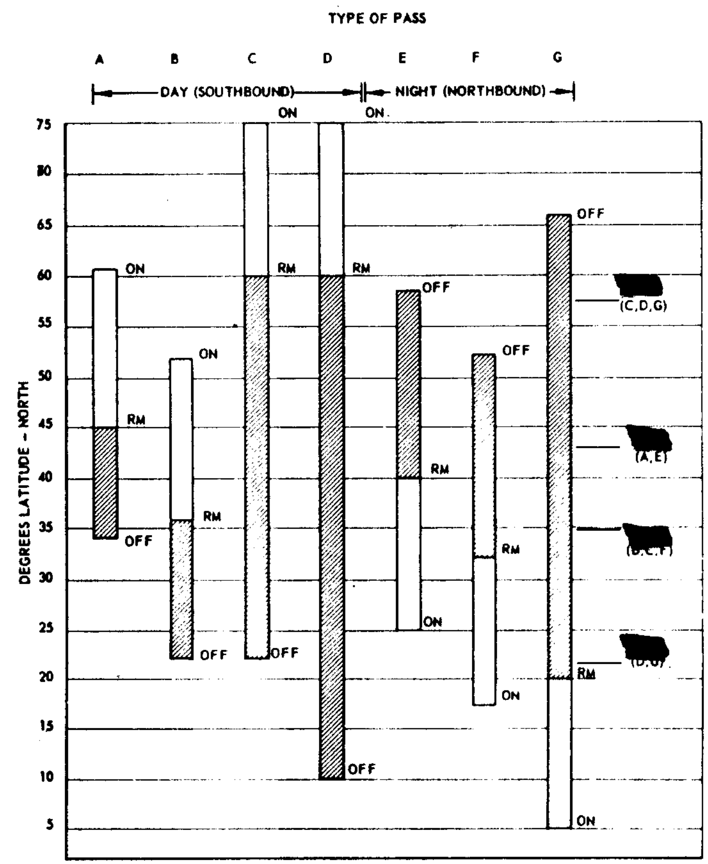


Figure A2-2 Readout and Reset Programming

[redacted]

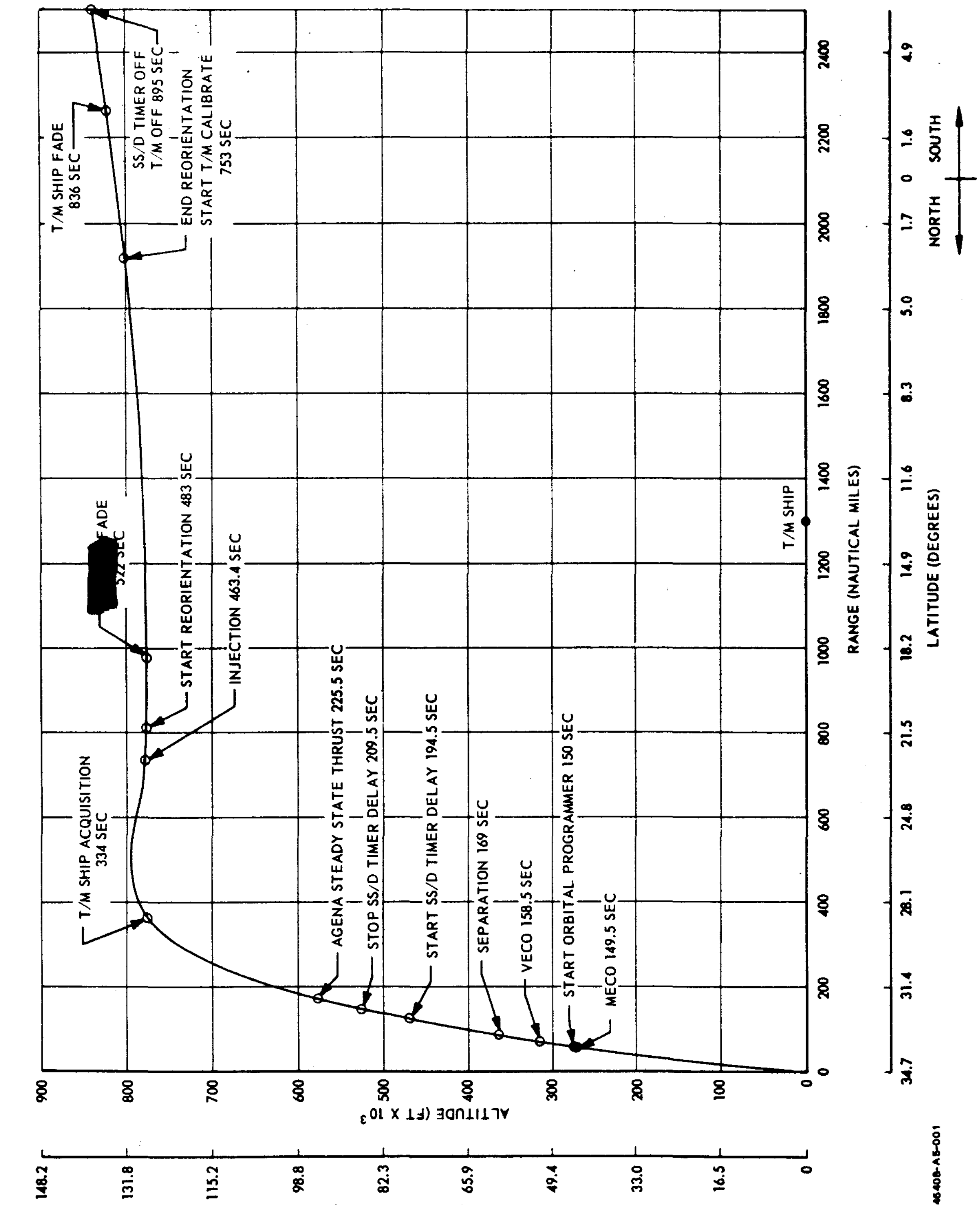


Figure A5-1 Launch Phase Nominal Trajectory

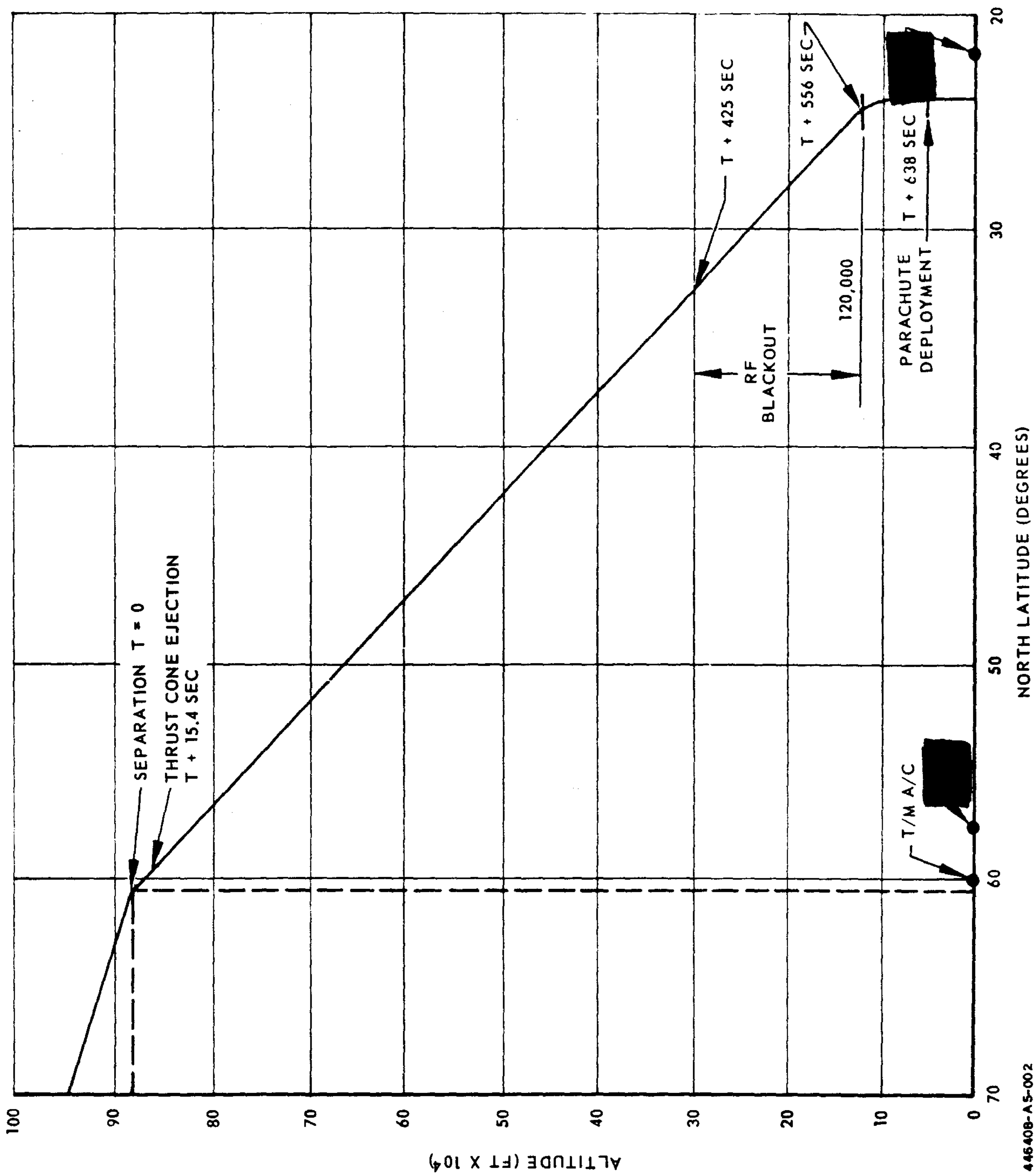


Figure A7-1 Capsule Re-entry Trajectory

[redacted]

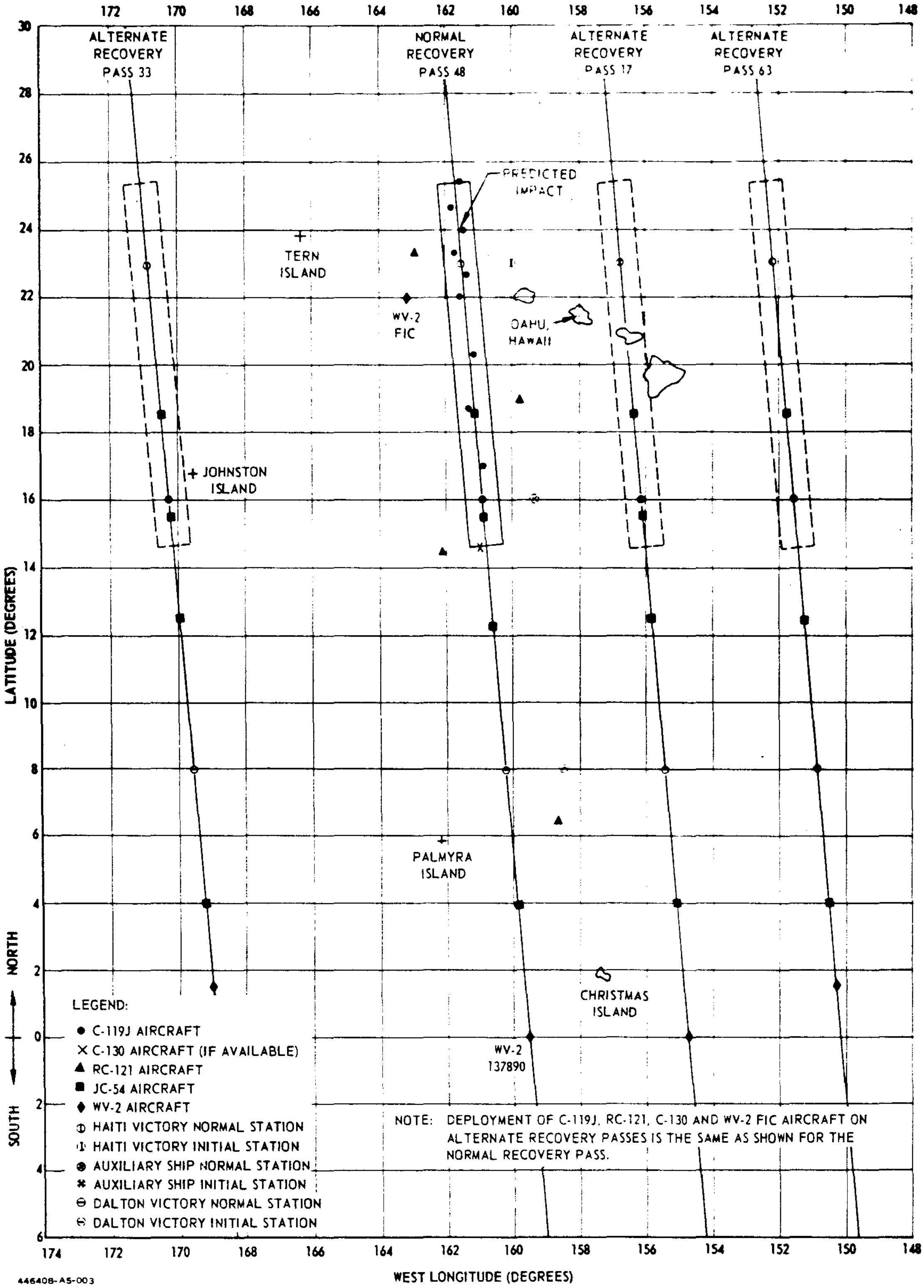
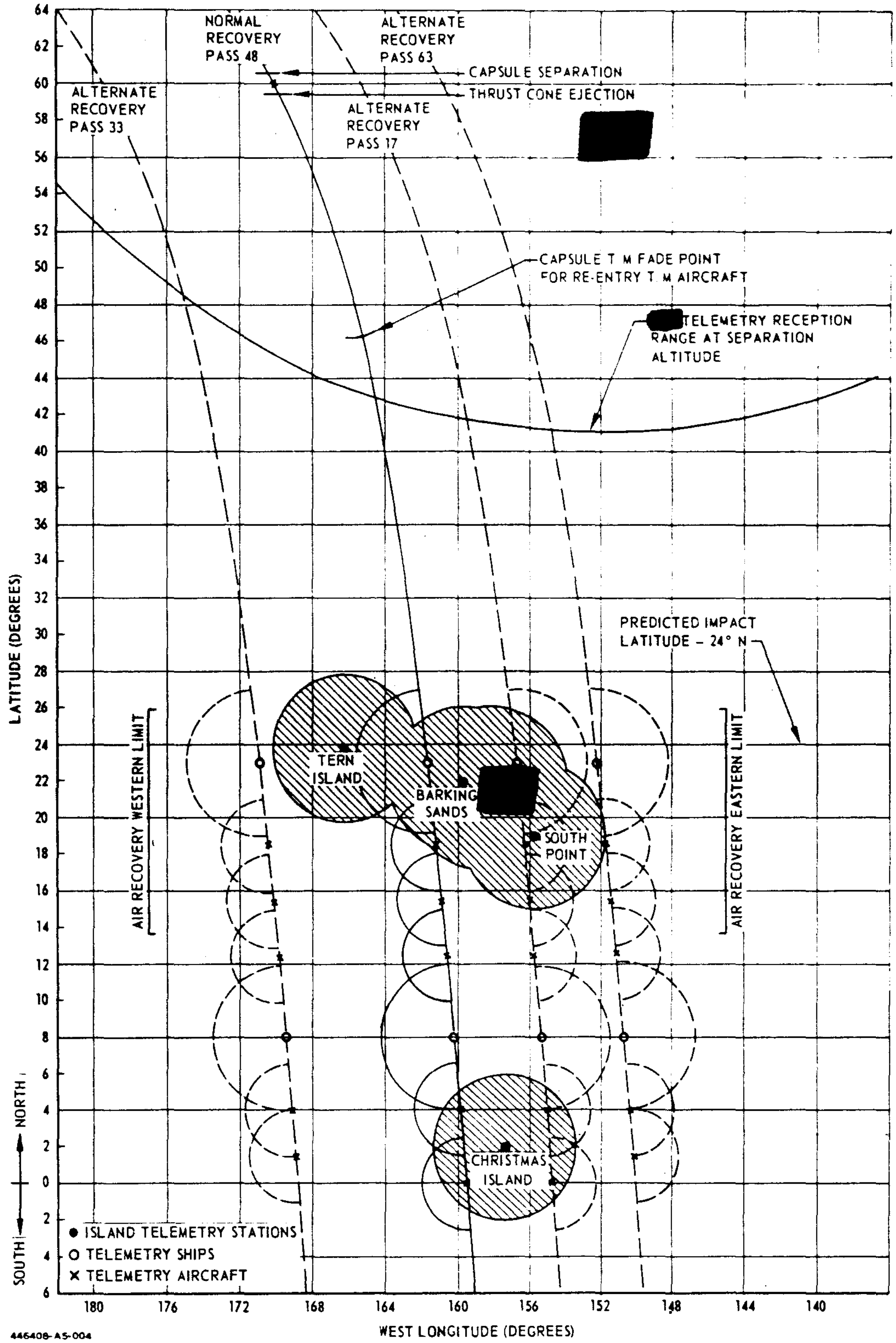


Figure A7-2 Recovery Force Deployment



446408-A5-004

Figure A7-3 Normal and Alternate Re-entry Telemetry Coverage

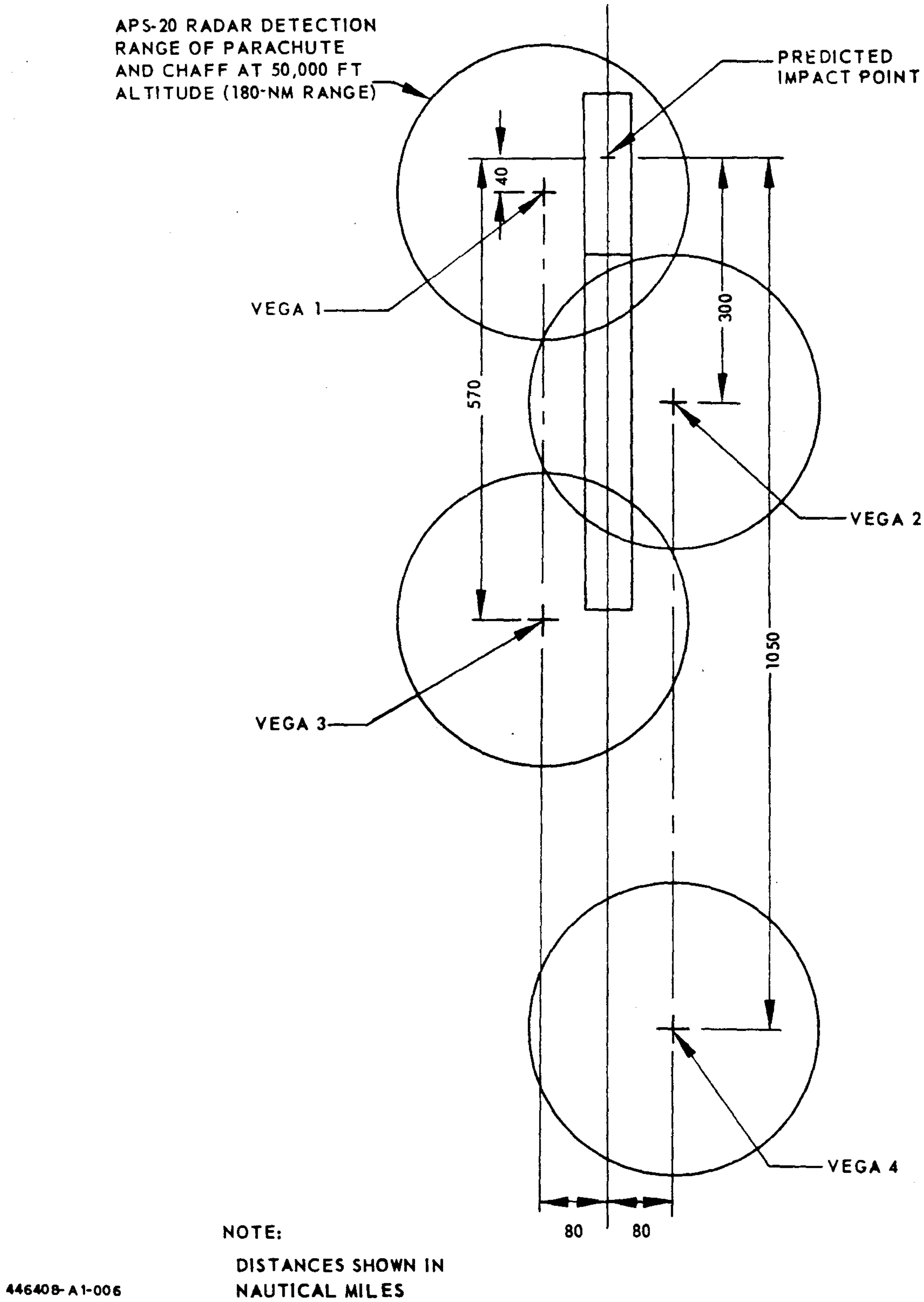
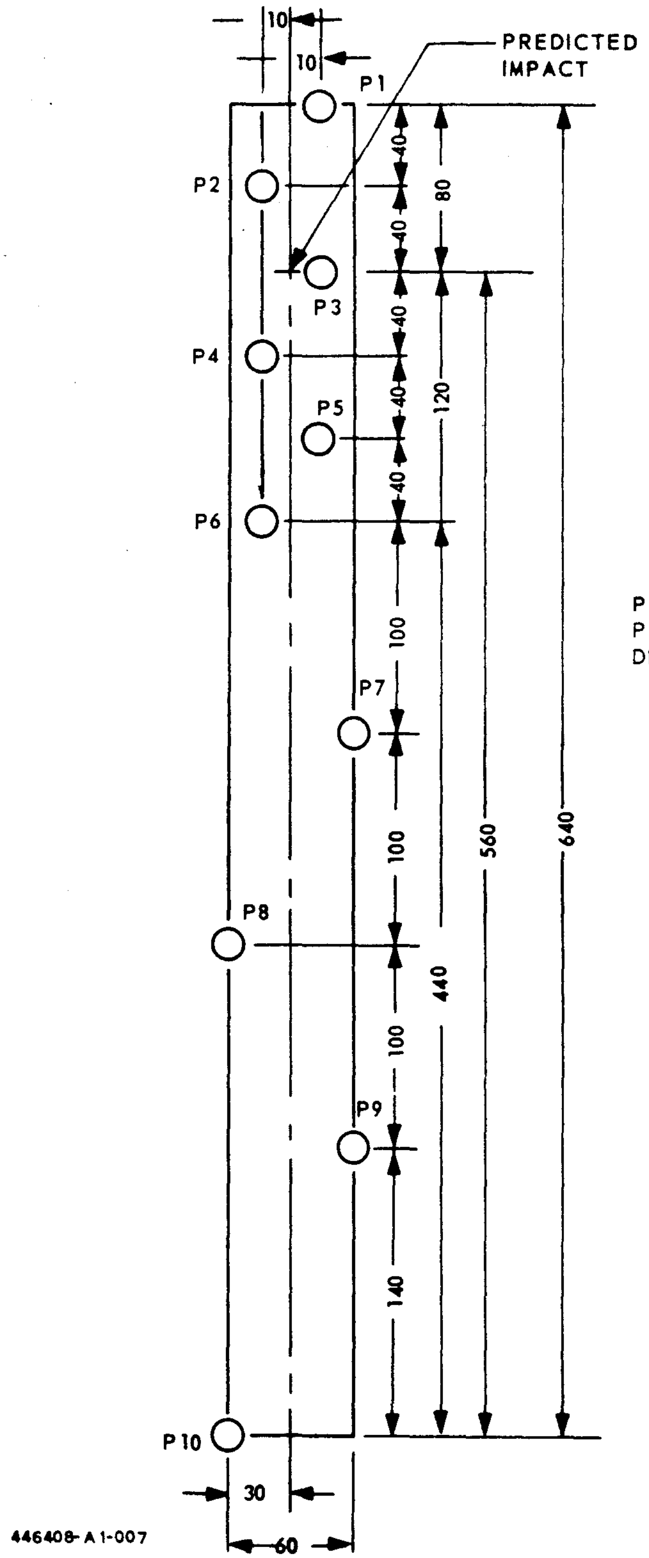


Figure A7-4 RC-121 Aircraft Deployment

[redacted]



P1 THROUGH P9 ARE C-119 AIRCRAFT
P10 IS C-130 AIRCRAFT
DISTANCES SHOWN IN NAUTICAL MILES

Figure A7-5 Recovery Aircraft Deployment

[redacted]

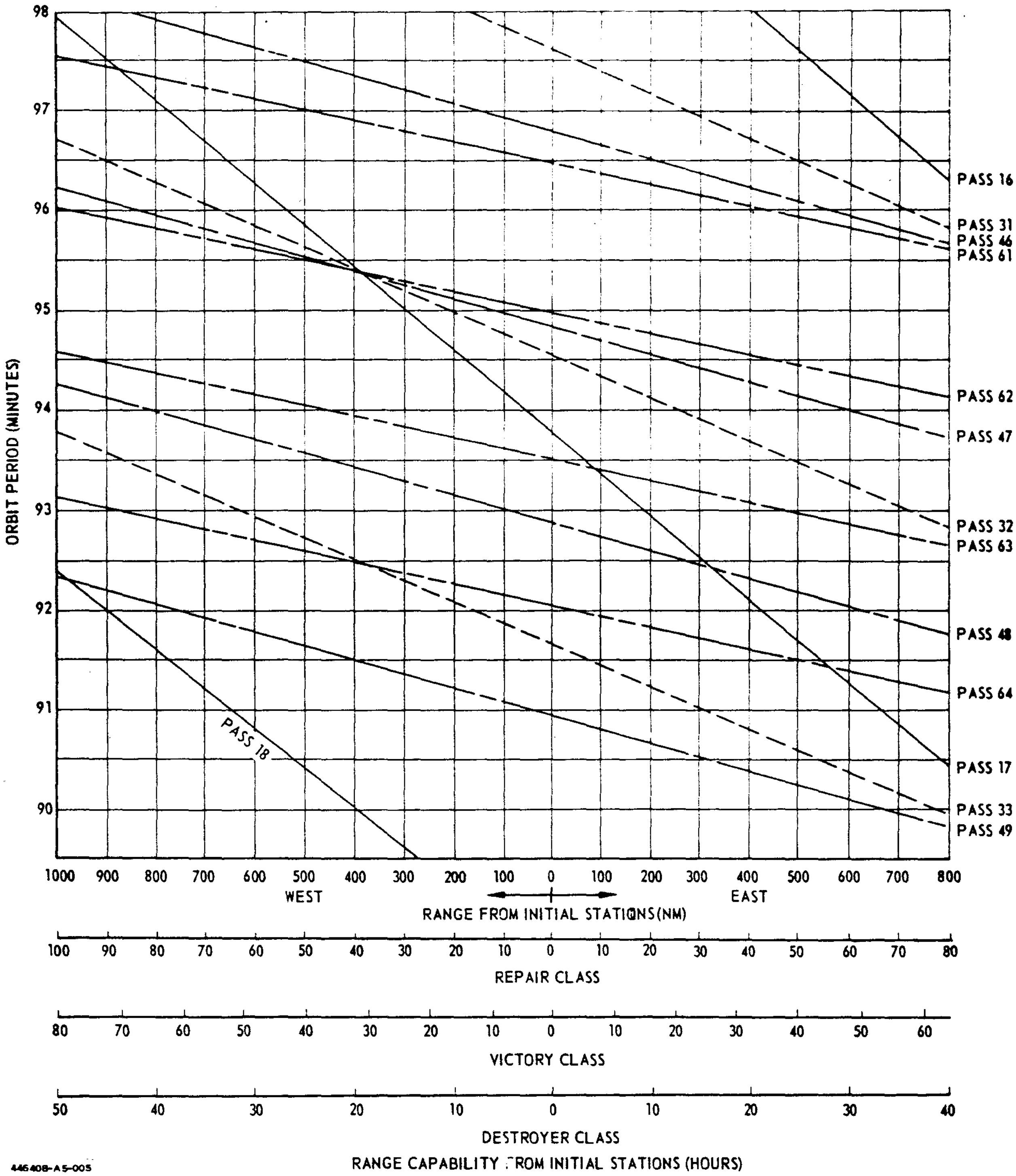


Figure A7-6 Surface Ship Deployment Capability

[redacted]

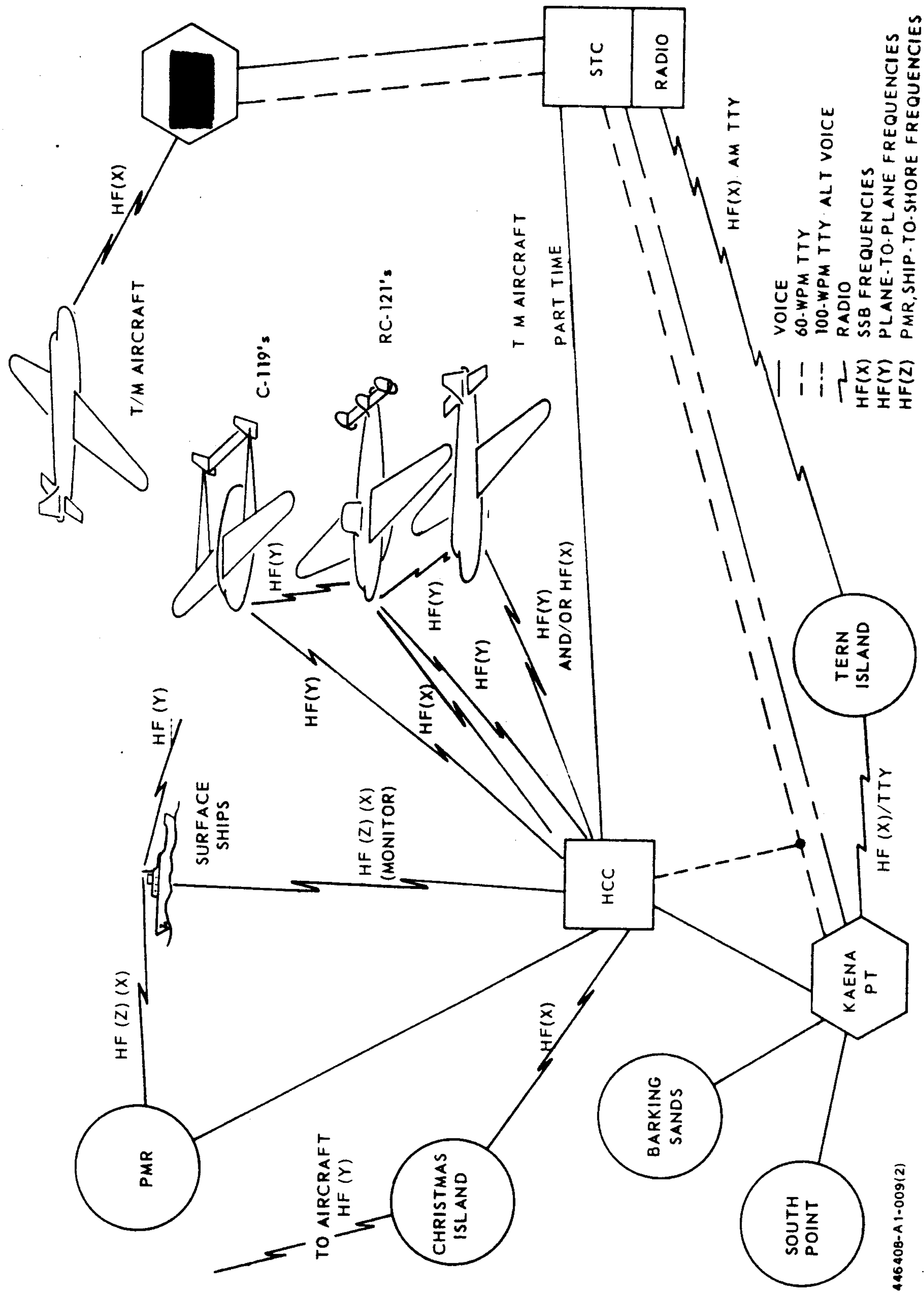


Figure A7-7 ***Recovery Operations*** *Communications*

A-5-63

[redacted]

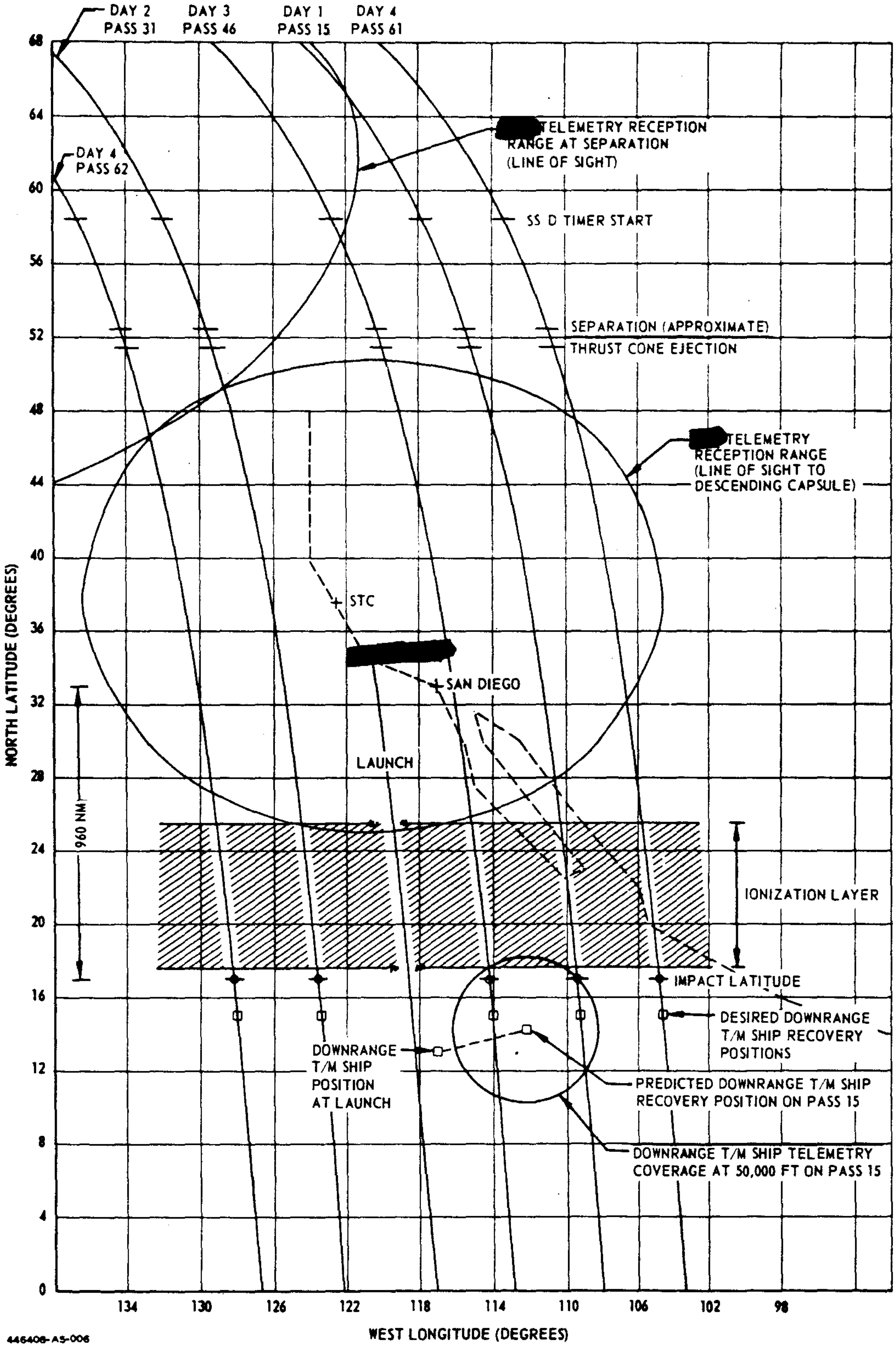


Figure A7-8 Emergency Alternate Re-entry Telemetry Coverage

[redacted]

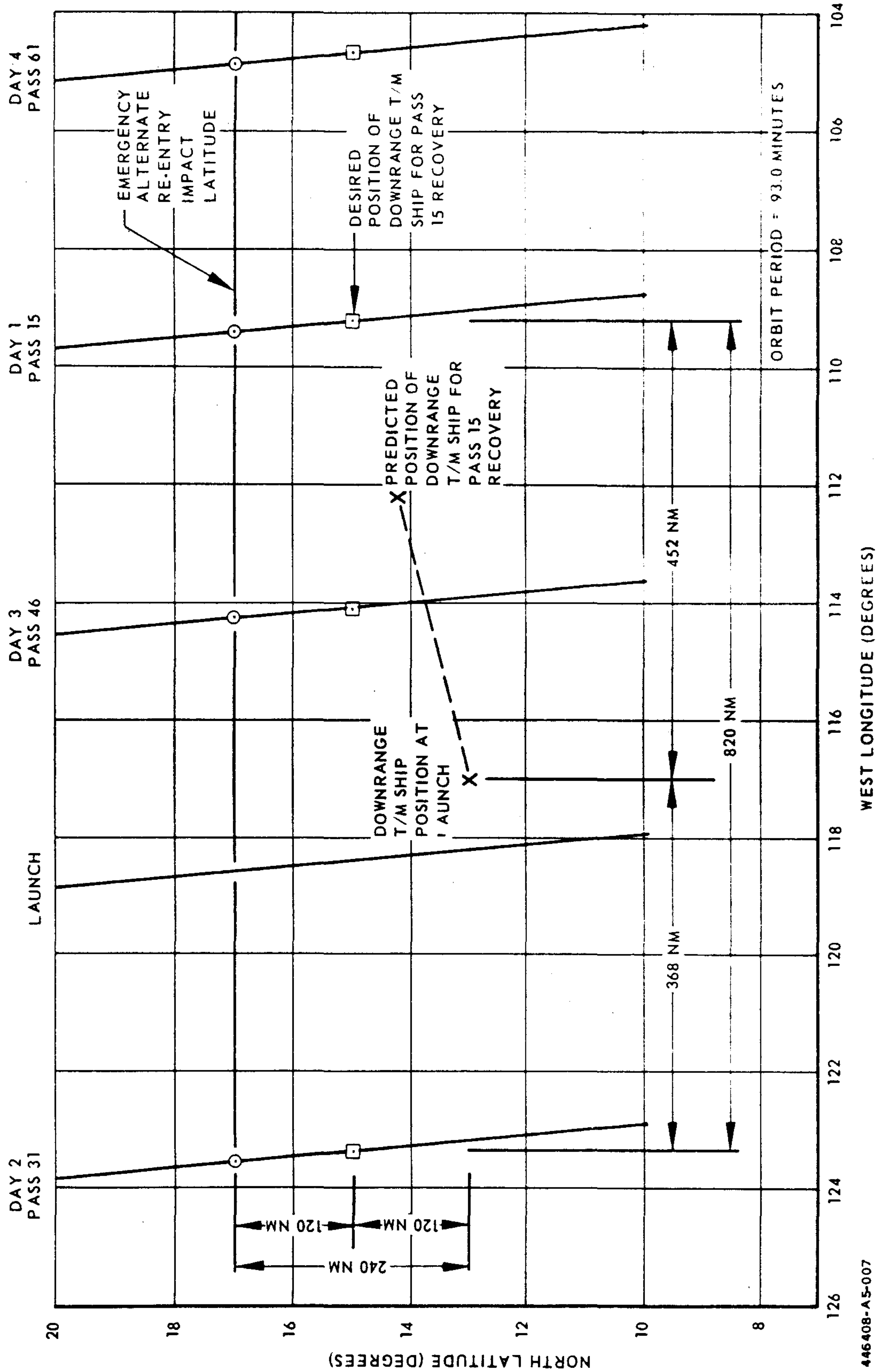
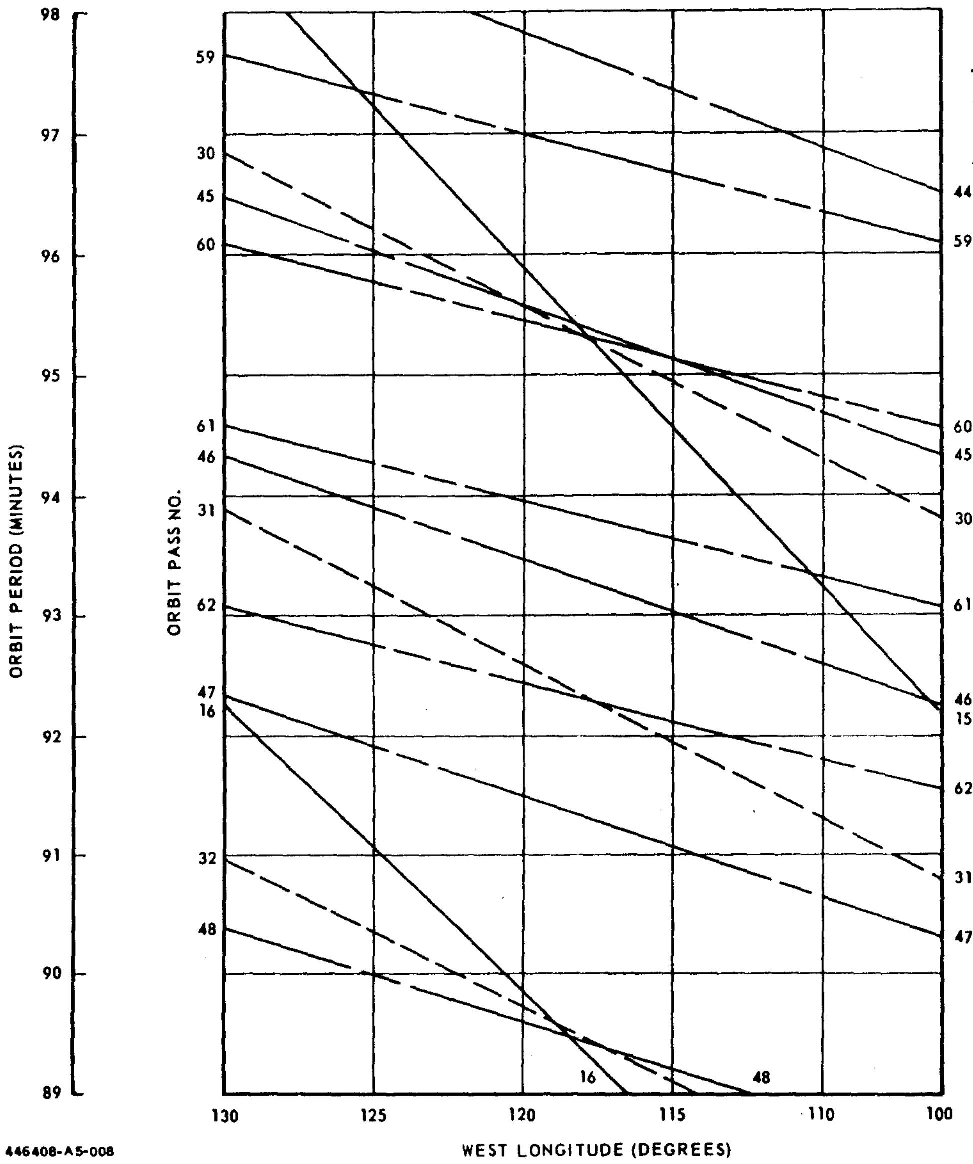


Figure A7-9   Emergency Alternate Re-entry Ship Deployment

[redacted]

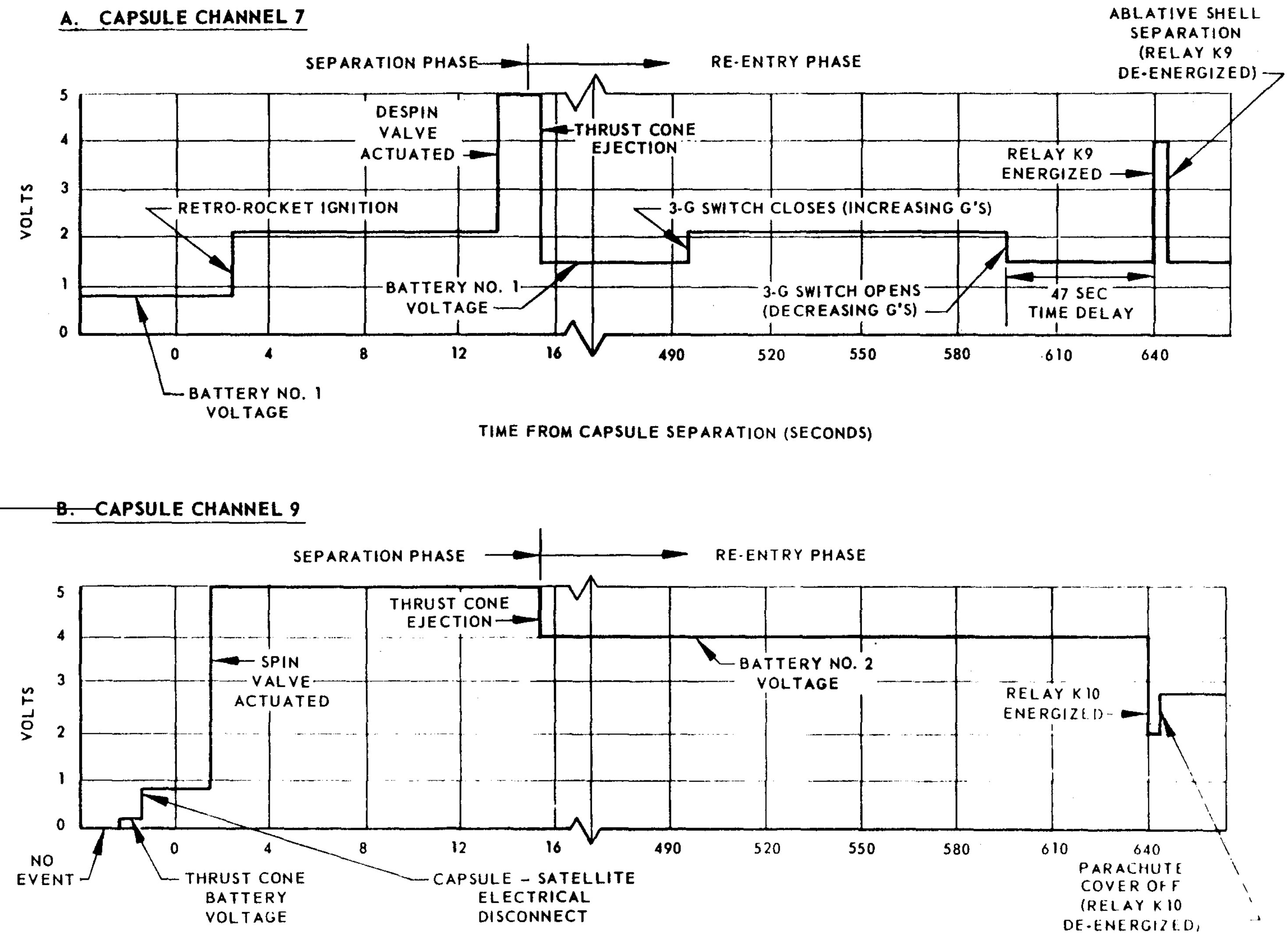


NOTES:

1. FOR USE IN EMERGENCY ALTERNATE RE-ENTRY SITUATIONS WHEN RE-ENTRY IS NOT POSSIBLE IN THE HAWAIIAN AREA
2. IMPACT EAST OF 106° WEST LONGITUDE IS NOT RECOMMENDED BECAUSE OF THE POSSIBILITY OF IMPACT IN MEXICO (SEE FIGURE A7-8)

Figure A7-10 *Recovery Longitude versus Orbit Period at 17° N Latitude*

[redacted]



NOTE: VALUES SHOWN INDICATE NOMINAL SEQUENCE OF EVENTS. CONSULT T M CALIBRATION DATA FOR VOLTAGE LEVELS WHICH WILL OCCUR IF SEQUENCE OF EVENTS IS NOT NORMAL. REFER TO SECTION 7.5 FOR SEQUENCE OF EVENTS DESCRIPTION

446408-A1-010(2)

Figure A8-1 Nominal Capsule Telemetry Voltage Levels

[redacted]

18 January 1961

Copy No.
Sheets

REPORT CHANGE RECORD FOR SYSTEM TEST DIRECTIVE FOR DISCOVERER SATELLITE SYSTEM

The following additions, revisions, or errata corrections, should be incorporated into the document identified above. This Report Change Record page should be inserted as the first page of the affected report preceding the title page. If a page in the original document is eliminated and/or replaced by the instructions which follow, the page must be destroyed according to the Air Force directive governing such destruction.

CONTRACT NUMBER [redacted]

ADDENDUM PAGE	REVISION		ERRATA		REVISION OR ERRATA CORRECTION (CORRECT IN INK)	CORRECTION MADE	
	REMOVE PAGE	INSERT PAGE	REMOVE PAGE	INSERT PAGE		INITIAL	DATE
	A-6-15	A-6-15					
A-6-15a							
A-6-15b							

*** NOTICE OF MISSING PAGES ***

PAGES A-6-1 THROUGH A-6-14 ARE MISSING IN THE ORIGINAL COPY.

Table A5-1

SS/D TIMER SEQUENCE FOR DISCOVERER SATELLITE 1104

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	EVENT DESCRIPTION
	-0.1	Timer (ground function)
0	0	D-Timer start
0.1	0.1	Timer reset (ground function)
0.1	0.1	Timer warning indicator (ground function)
145	145	Start Fairchild Timer
150.9		MAIN ENGINE SHUTDOWN
157	157	Programmed destruct lockout
		Uncage IRP gyro
157	157	Flight controls power ON (backup)
159.9		VERNIER SHUTDOWN
168	168	Initiate vehicle pneumatics control
		Open pneumatic supply valve
168	168	Fire explosive bolts
168.5	168.5	Fire retro rockets
		Arm timer delay circuit
168.5	168.5	-1.65°/min pitch rate from integrator potentiometer
175	175	Disable -40°/min yaw rate
180	180	Command -40°/min yaw program (inoperative)
		Command -3.6°/sec pitch over program(pitchover 28.8°)
180	180	Fire H/S fairing
188	188	Stop -3.6°/sec pitch rate
		Connect pitch H/S signal to pitch IRP gyro
188	188	Connect roll H/S signal to roll IRP gyro
189	189	Uncage integrator
		Accept Fairchild Timer and Beacon 5 delay signal*
189	189	Remove 28v dc from N_2 valve and transfer SS/H TLM to turbine speed
		ORBITAL BOOST
204		Stop SS/D Timer delay (nominal 15 sec)
207	192	Activate H/S electrical bias 0° offset (+1.5° mech. offset only)
		Spare (TM D-Timer monitor)
207	192	Deactivate timer delay circuit

Beacon 6 ends timer delay and corrects integrator

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	EVENT DESCRIPTION
207	192	Fire Ullage Rockets
216	201	Unground integrator input
		Connect accelerometer to integrator*
216	201	Arm and fire gas generator squib, fire He valve, pitch and yaw pneumatics OFF
217	202	Pitch and yaw pneumatics OFF (backup)
		Open gas generator arm and fire, He valve
		Open gas generator arm and fire, He valve and remove J-box 28v to P and Y pneumatic OFF
217	202	Close circuit to TLM OFF switch
217.5		STEADY STATE THRUST
456.5	441.5	Arm pitch and yaw pneumatics
456.5	441.5	Engine cutoff safety switch
462.4		Engine shutdown by integrator
		Disconnect accelerometer
		Ground integrator input
462.4		Activate pitch and yaw pneumatics (de-energize K28)
486	471	Command −40°/min yaw rate (180° yaw)
		Disconnect integrator pitch rate potentiometer (remove 4.1°/min pitch rate)
		Fire He and oxidizer vent valve squib
		Pitch and yaw pneumatics ON (backup) and remove 28v to ullage rockets
		Pitch and yaw pneumatics ON (backup) and remove 28v to ullage rockets
486	471	Fire He and oxidizer vent valve squib
756	741	Start TLM calibrate
		Apply 28v unregulated to SS/L power control box and switch beacon command channels
		Command +3.86°/min pitch rate
		Connect roll H/S signal to yaw gyro (remove −40°/min yaw rate)
756	741	Switch out 0.1% regulated 400 cycle

****Integrator to be set at a dial reading of approximately 2190 representing a velocity to be gained of 17,500 ± 40 fps.***

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	EVENT DESCRIPTION
756	741	Shutdown +28.3v IRP accel. power
756	741	Switch out 0.1% regulated 400 cycle power
766	751	Stop TLM calibrate
		Open engine shutdown, switch antenna, open flight control gain change relays and switch roll and yaw gyro TLM gains
766	751	Shutdown integrator power
770	755	Open circuit to TLM over-ride
		Arm H/S off circuit
		SS/D Timer OFF, H/S to low gain
770	755	Fire fuel vent valve squib
		<u>RECOVERY</u>
X		Restart SS/D Timer, H/S OFF
X + 13	768	Command −45°/min pitch rate (pitchover −58°)
X + 13	768	Arm capsule ejection squib
X + 92*	847	Command +3.86°/min pitch rate (stop −45°/min pitch rate)
		SS/L transfer Circuit No. 1
X + 92	847	SS/L transfer Circuit No. 2
X + 92+		Fire capsule plug disconnect squib
X + 94.5	849.5	Command eject
		Enable timer shutdown circuit
		Command eject
X + 94.5	849.5	Lockout SS/H restart signal
X + 130	885	Shutdown SS/D Timer and H/S ON

** The time interval between event 21 and 22 shall be 2.5 ± 0.1 sec*

Table A6-1

NOMINAL ORBIT SCHEDULE
(BASED ON A 93.4-MINUTE PERIOD)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	TIME FROM LAUNCH (MIN)	LOCATION (DEG. N LATITUDE)
Launch	Launch	0	0	34.8
	Start Orbit		2.5	
	Orbit Injection		7.8	22.95
	Beacon, T/M off		14.9	5.6 (s)
Pass 1	Beacon, T/M on	1	27.7	75
	65° N latitude (ref)		30.3	65
	RM on		31.8	60
	Cross [redacted] latitude		32.4	57.6
	RM interruption (60)		32.4	52.2
	25° N ref latitude		40.7	25
	Cross [redacted] latitude		41.5	21.6
	Beacon, T/M off		44.46	12
	End of Orbit 1	2	34.1	0
Pass 2	Beacon, T/M on	3	1.0	75
	RM on		5.1	60
	Cross [redacted] latitude		5.7	57.6
	RM interruption (40)		5.8	57.5
	Cross [redacted] latitude		14.7	21.6
	Beacon, T/M off		17.6	12
	End of Orbit 2	4	75	0
Pass 3	End of Orbit 3	5	40.9	0
Pass 4	End of Orbit 4	7	14.2	0
Pass 5	End of Orbit 5	8	47.6	0
Pass 6	Beacon, T/M on	8	54.2	25
	RM on		58.6	40
	RM interruption (40)		58.9	42.6
	Cross [redacted] latitude		59.3	42.9
	Beacon, T/M off	9	3.9	60
	End of Orbit 6	10	20.9	0
Pass 7	Beacon, T/M on	10	27.5	25
	RM on		31.9	40
	Cross [redacted] latitude		32.9	42.9
	RM interruption (80)		33.3	45
	Beacon, T/M off		37.3	60
	End of Orbit 7	11	54.3	0

[redacted]

APPENDIX A – TAB 7
(Revised)

SYSTEM TEST DIRECTIVE
FOR
DISCOVERER SATELLITE SYSTEM
DISCOVERER SATELLITE 1105
DISCOVERER BOOSTER 300

Prepared under authority of AFBM Exhibit 60-6, Paragraph 1.4.1

Prepared by

SYSTEMS OPERATIONS PLANNING 61-41

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CONTENTS

TABLES

[redacted]

ILLUSTRATIONS

APPENDIX A - TAB 7
SUPPLEMENTAL TEST INFORMATION

A1 INTRODUCTION

This section contains descriptive material which supplements the basic text of the STD and is applicable only to the flight of Discoverer Satellite 1105. Where the material contained herein is in conflict with that in the basic text, the information in this appendix has precedence. Reference will not be made to this appendix for subsequent flight operations.

A2 CONFIGURATION

A2.1 Discoverer Satellite

A2.1.1 The JHU/APL Doppler transmitter and optical beacon will not be installed on this vehicle.

A2.1.2 An additional Type 1A battery will be installed on vehicle 1105 to increase auxiliary power capability. Addition of this battery will increase the vehicle active orbit lifetime to approximately 172 hours.

A2.1.2 A total of 132 pounds of control gas will provide vehicle attitude control through the primary recovery pass on the fourth day of orbit operations, within the limits of normal expected gas expenditure rates.

A2.2 Discoverer Guidance

Discoverer Vehicle 1105/300 will incorporate the BTL guidance system operating in the closed-loop mode. This system will provide booster guidance during launch, provide time-to-fire and velocity-to-be-gained correction signals to the Agena Vehicle, and command booster/satellite separation as described in Section 3.1.4 of the basic STD.

A2.3 Re-Entry Telemetry Aircraft

The requirement for a telemetry aircraft in the Alaska Area during recovery as described in Sections 3 and 7 of the basic STD has been deleted.

A3 LAUNCH OPERATIONS

A3.1 Launch Time

The specific time of launch will be determined by the System Test Controller.

A3.2 [redacted]

The incorporation of the BTL guidance system for launch trajectory control will delete the requirement for the Reeves Guidance Computer at [redacted] and associated transmission of Commands 5 and 6 during the launch phase. The [redacted] VERLORT radar will remain passive during launch but will be capable of instantaneous active tracking if requested by the STC as backup to [redacted] All radar tracking data received will be transmitted immediately to the PAC via 100-wpm teletype. There will be no requirement for telemetry recording in real-time data from [redacted].

A3.3 [redacted]

Section 5.3 of the basic STD is revised to incorporate the requirement for [redacted] to provide primary active VERLORT tracking from launch through ascent. Radar tracking data will be transmitted immediately to the Palo Alto Computer via 100-wpm teletype.

A3.4 INCREASE/DECREASE Switch Position

The INCREASE/DECREASE switch will be positioned in the increase position during launch to eliminate the possibility of an inadvertent REPEAT command being received by the vehicle. If a REPEAT command is received by the vehicle following orbit injection, the prelaunch phase would be repeated. The INCREASE/DECREASE switch will be returned to the decrease position on Pass 1 by [redacted].

A3.5 Recovery Force Readiness

A3.5.1 The launch criteria as specified in Paragraph 4.2.2.6 of the basic text is amended to specify the following on station recovery force requirements; all search and recovery equipment must be operable:

a. Two RC-121 radar aircraft
b. Seven C-119J recovery aircraft
c. Two TM/detection surface ships
d. Auxiliary surface recovery support in recovery area between 14 and 26 degrees north latitude
e. One para-recovery team
f. Four telemetry aircraft

A3.5.2 It is considered impractical to directly relate the launch decision to specific numbers of telemetry detection aircraft in operational status at time of launch. The nature of aircraft operation is such that during a three or four day nominal orbit period, the actual aircraft status can change several times. It therefore becomes a matter of operational judgement at time of launch to determine expected airborne force status at the time it will be needed and render a decision to launch or not, on such exercise of judgement.

A4 ORBIT OPERATIONS

A4.1 Re-entry Selection

A4.1.1 The re-entry circuit of the orbital programmer has been modified by (1) deletion of the primary re-entry circuit and (2) the addition of a re-entry selection switch operated in parallel with the INCREASE/DECREASE switch. The re-entry circuit is enabled only by transmission of a ground command and does not incorporate the override re-entry circuit formally programmed for nominal fourth day recovery. The re-entry selection switch will permit positive selection of the recovery pass and will be the primary means of synchronizing the recovery longitude for orbit period variations up to + 2 minutes. The SKIP/REPEAT capability has been retained for use when orbit period variations below nominal or in excess of + 2 minutes are encountered.

A4.1.2 Normal recovery is planned for nominal orbit Pass 63 after four days of active orbital life. Passes 2, 15, 17, 31, 32, 47, 48, 62 and 64 are programmed for alternate re-entry. Pass 2 will be selected for recovery only if conditions following launch are such that successful recovery on Passes 15 or 17 would be either impossible or seriously jeopardized. Selection of nominal Pass 15 will permit emergency recovery off the West Coast on Day 1 and is the only recovery pass programmed for this area. If emergency West Coast recovery is required on Days 2, 3 or 4, Command 6 SKIP will be completed prior to fade at NHS immediately preceding the intended recovery pass.

A4.1.3 The re-entry circuit is enabled by sending Command 5 with the INCREASE/DECREASE switch in the INCREASE position and disabled by sending Command 5 with the INCREASE/DECREASE switch in the DECREASE position. The re-entry circuit can be disabled at any time prior to "D" timer start on the recovery pass. Selection of the re-entry pass is effected following Command 5 re-entry enabled by transmitting an additional Command 1 if required to place the INCREASE/DECREASE switch in the desired position as determined by the following table:

	Orbital Programmer Recovery Pass No. Increase/Decrease Switch Position	
Recovery Day	Increase	Decrease
1	2, 15	17
2	31	32
3	47	48
4	62, 63, 64	63, 64

A4.2 Command 6 Operations

A4.2.1 Command 6 will be transmitted for re-entry pass selection only as described in Paragraphs A4.1.1 and A4.1.2. Command 6 may also be transmitted if longitudinal synchronization of the orbit is required for data readout purposes.

A4.2.2 Telemetry Channel 16 commutator points 49, 51, and 53 monitor the position of orbital programmer SKIP/REPEAT subcycle switches S111, S112, and S110. Prior to issuing any Command 6 instructions, the STC will evaluate the position of these switches in accordance with the requirements listed in notes 15 and 16 of Table A8-1.

A4.3 Readout Programming

Additional active orbit passes required for Satellite Control have been programmed for readout and are included in Table A2-2.

A4.4 Agena Reorientation After Capsule Separation

The vehicle flight controls will be left on, following capsule separation. The vehicle should return to the local horizontal through the horizon scanner correction signal and maintain controlled flight in the normal orbit attitude until depletion of the control gas supply or battery power. The S-band beacon and telemetry are programmed through Pass 124.

A4.5 Post Recovery Orbit Operations

A4.5.1 Following the recovery pass, the tracking stations will continue vehicle orbit tracking and telemetry recording operations until battery power is exhausted or until operations are terminated by the STC. The STC will establish operations control procedures to investigate the following areas as required during this period.

a. Systems operations exercise and personnel training
b. Vehicle command operations
c. Tracking station operations
d. Simultaneous active S-band tracking from [redacted] and [redacted]
e. Subsystem test requirements based on real-time analysis.

A4.5.2 Real-time data and reporting requirements for all tracking stations during post-recovery operations will be the same as the orbit requirements listed in Table A8-1, with the following exceptions.

a. AET payload readouts are not required.
b. SPI data will be read out only by [redacted] at the request of the STC.

A5 RECOVERY OPERATIONS

A5.1 Surface Ship Deployment and Operation

A5.1.1 A 24-hour water recovery capability will be provided within the recovery area boundaries as shown in Figure A7-3. In addition to the USNS Sunnyvale and USNS Longview, auxiliary surface recovery support will be provided in the northern area by one or more surface ships, depending on the speed capability of units available.

A5.1.2 The surface ships will depart with sufficient time to arrive at initial deployment stations by T + 4 hours and will subsequently be deployed to assure surface recovery support for all variations of orbit period. The PAC will evaluate tracking data after launch and will provide predicted capsule impact location and time for each day not later than T + 4 hours.

On receipt of impact predictions, the STC will provide surface ship redeployment instruction to the RCC. Figure A7-1 shows the ships at initial stations and nominal positions for each day.

A5.1.3 Auxiliary surface recovery support will be provided to permit recovery within 24 hours after notification of water impact in the recovery area between 14° N and 26° N latitude. Ship-to-shore communications will be maintained with the RCC/PMR representative for direction.

A5.1.4 USNS Longview and USNS Sunnyvale. The USNS Longview and USNS Sunnyvale will be deployed in the extended recovery area to provide capsule detection and surface recovery capability in the event of capsule overshoot. Capsule telemetry will be recorded. These ships will be positioned at 8° N latitude as shown in Figure A7-3 and will be re-deployed laterally to assure one ship coverage for each alternate day pass. If the period is such that both ships can cover the actual recovery pass, the easterly ship will be redeployed to 11° N latitude and the westerly ship to 6° N latitude. Initial stations will permit re-deployment of either ship to cover its assigned area in one day. For the nominal orbit period as shown in Figures A7-1 and A7-2. The Sunnyvale would cover Passes 17 and 32. The Longview would move west for Pass 48 to a point that would permit return to its on-station position for the primary recovery Pass 63.

A5.1.4.1 Antenna Positioning of the USNS Longview and Sunnyvale. Either one or both of these ships will be positioned directly under the orbit plane on the recovery pass to enable reception of the capsule signals in the extended recovery area. The quad-helix antenna, until acquisition, will scan ±90 degrees about 360-degree azimuth at 10 degrees elevation at the rate of once per 15 seconds from ETPD - 0 until ETPD + 2 minutes. From ETPD + 2 minutes until ETPD + 5 minutes, the quad-helix antenna will give full area coverage by scanning ±90 degrees about 360-degree azimuth with antenna elevation increasing and decreasing from 10 degrees to 70 degrees to 10 degrees in increments of 20 degrees per scan. The scan rate will be once per 15 seconds. After ETPD + 5 minutes the antenna will be positioned at 10 degrees elevation and 180-degree azimuth. In the event that either ship acquires the capsule signals, the telemetry will be recorded on magnetic tape as specified in the Detailed Recording Requirements, and antenna acquisition and bearing will be immediately reported through PMR to the RCC. Bearings will be relayed to RCC at intervals of one minute. When the parachute deployment telemetry sequence is received or when the antenna azimuth becomes constant, the ship will so report verbally over SSB radio through PMR to the RCC and provide ship position and antenna azimuth and elevation. If no capsule signals are acquired by the ships, a negative verbal report will be submitted over SSB radio through PMR to the RCC at ETPD + 30 minutes.

A5.2 Airborne Recovery Force Deployment

A5.2.1 Two RC-121 aircraft will be deployed as shown in Figure A7-4 for communications control and direction of the recovery force. Each RC-121 aircraft will be equipped with SSB radio for direct communications with the RCC. Separate HF and VHF Communications will be maintained with elements of the recovery force.

A5.2.2 The Northern area RC-121 aircraft will be designated as Command Aircraft for the forces in the primary and secondary recovery areas. The

Southern area RC-121 aircraft will be designated as Command Aircraft for the forces in the extended recovery area.

A5.2.3 Four detection aircraft will be utilized in the extended recovery area for capsule detection and search. The nominal deployment of these aircraft for alternate and primary recovery days is shown in Figure A7-2.

Placement of these aircraft in order of position priority and the RC-121 aircraft assigned as command aircraft are as follows:

	Predicted Impact Location	Aircraft Position	Controller
a.	East of 154° W longitude and	13 degrees	Vega 2
	West of 170° W longitude	3 degrees	Vega 2
	(With 1 or 2 surface ships)	15 degrees	Vega 2
		23 degrees	Vega 1
b.	154° W to 161° W longitude	13 degrees	Vega 2
	(With 1 surface ship)	3 degrees	Vega 2
		15 degrees	Vega 2
		11 degrees	Vega 2
c.	154° W to 161° W longitude	13 degrees	Vega 2
	(With 2 surface ships)	3 degrees	Vega 2
		15 degrees	Vega 2
		9 degrees	Vega 2
d.	161° W to 170° W longitude	13 degrees	Vega 2
	(With 1 or 2 surface ships)	3 degrees	Vega 2
		15 degrees	Vega 2
		19 degrees	Vega 1

The detector aircraft will be on station by ETPD - 1 hour.

A6 TABLES AND ILLUSTRATIONS

The following tables and illustrations are applicable to the flight of Discoverer Satellite 1105/Discoverer Booster 300/AET-L Payload only. Each table or figure is given the basic number of the section of the general STD to which it applies, the letter A to denote Appendix material, and a number to sequence items in the same category.

Table A2-1
NOMINAL FLIGHT PLANNING DATA

ITEM	DATA
Satellite	
S/N	1105
Payload	AET Low (L)
Fuel	UDMH 3728
Oxidizer	IRFNA 9576
Launch Weight	16,025 lb
Booster	
S/N	300
Fuel	RJ-1
Oxidizer	Liquid Oxygen
Launch Weight (including Payload)	123,405 lb
Launch	
Site	VAFB, 75-3, Pad 4
Date	March, 1961
Pad Azimuth	181°28′ ±15′
Launch Azimuth	172°
Downrange T/M Ship Location (Range Recoverer)	16° N 118°30′ W
Downrange T/M Ship Heading (Range Recoverer)	352°W
Programmer Setting	5,628 (step setting 21)
Injection	
Time	T + 445.6 sec
Location	22°58.8′ N 119°10.8′ W
Altitude	150sm (130nm)
Azimuth (Inertial)	171.02°
Nominal Velocity	25,874 ft/sec
Orbit	
Period	93.8 min
Apogee	380 nm
Perigee	130 nm
Eccentricity	0.032
Regression Rate	23.48°/Pass
Re-set Latitudes	20°N [redacted]
	32°N [redacted]orthbound)
	36°N [redacted]outhbound)
	40°N [redacted]orthbound)
	45°N [redacted]outhbound)
	60°N [redacted]
Inclination Angle	81.74 [redacted]
Recovery	
Aircraft (Type and Quantity)	C-119's (9), RC-121's (4), Detector/TM (5)
Surface Ships - Initial Positions	
USNS Longview	8°N 166°W
USNS Sunnyvale	8°N 154°W
Surface Ship Helicopters	
HRS - 3	2 each on Longview and Sunnyvale

[redacted]

Table A2-1 (Continued)

ITEM	DATA
Day 1 Recovery	
Emergency Recovery Pass	15
Nominal Impact Area Center	17°N 112°20′W
ETPD	T + 23.6 hrs
Downrange T/M Ship Location	15°N 112°48′
Alternate Recovery Pass	17
Nominal Impact Area Center	24°N 160°06′W
ETPD	T + 26.6 hrs
Day 2 Recovery	
Emergency Recovery Pass	30
Nominal Impact Area Center	17°N 106°03′
ETPD	T + 47.0 hrs
Downrange T/M Ship Location	15°N 106°W
Alternate Recovery Pass	32
Nominal Impact Area Center	24°N 153°57′W
ETPD	T + 50.1 hrs
Day 3 Recovery	
Emergency Recovery Pass	46
Nominal Impact Area Center	17°N 123°20′W
ETPD	T + 72.1 hrs
Downrange T/M Ship Location	15°N 123°W
Alternate Recovery Pass	48
Nominal Impact Area Center	24°N 171°13′W
ETPD	T + 75.1 hrs
Day 4 Recovery	
Emergency Recovery Pass	61
Nominal Impact Area Center	17°N 117°17′W
ETPD	T + 95.5 hrs
Downrange T/M Ship Location	15°N 119°W
Primary Recovery Pass	63
Nominal Impact Area Center	24°N 164°50′W
ETPD	T + 98.6 hrs

[redacted]

Table A4-1
INSTRUMENTATION REQUIRED TO BE OPERATIVE AT LAUNCH

1. Agena
   a. Continuous Telemetry Channels:
      6 – Payload quantity. Subcarrier must be present
      7 – Payload quantity. Subcarrier must be present
      8 – Payload quantity. Subcarrier must be present
      9 – Payload quantity. Subcarrier must be present
      10 – Payload quantity. Subcarrier must be present
      11 – Z Acceleration during ascent. Subcarrier must be present
      14 – Agena combustion chamber pressure. Subcarrier must be present
      18 – Payload quantity. Subcarrier must be present
   b. Commutated Telemetry Channels:
      12 – Subcarrier must be present and commutator running
      13 – Subcarrier must be present and commutator running
      15 – Subcarrier must be present and commutator running
      16 – Subcarrier must be present and commutator running; points 2, 4, 6, 8, 10, 18, 20, 22, 27, 33, 38, 45, 50, and 52 must be present. Channel 1 is an acceptable substitution for Channel 16, points 20 and/or 22. Channel 11 is an acceptable substitution for Channel 16, points 2, 4, 6, and 8. Channel 15, points 49 and 51 are acceptable when substituted for Channel 16, points 50 and 52 as a pair.
      17 – Subcarrier must be present and commutator running

2. Capsule
   a. Continuous Telemetry Channels:
      7 – Subcarrier must be present
      9 – Subcarrier must be present
      11 – Subcarrier must be present

[redacted]

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Table A5-1
SS/D TIMER SEQUENCE FOR DISCOVERER SATELLITE 1105

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
	-0.1		Timer re-set (ground function)
0		Umb Drop	Lift-off. D-Timer start
0.1	0.1		Timer re-set (ground function)
0.1	0.1		Timer safety input (ground function)
150	150		Start Fairchild Timer
			Start Fairchild Timer
			Disarm Agena destruct
			Arm BTL guidance
			Flight control power ON (backup)
			Uncage integrator
			Open pneumatic valve
			Arm separation squib relays
150	150		Arm separation squib relays
150.9		BTL	Transmit MECO (P1)
151.7		Fuel Depletion	MECO
152.1		BTL	Transmit arm D1 and D2 (P2)
157.7		BTL	Transmit uncage IRP gyros, initiate velocity correction and timer hold
159.2		BTL	Terminate D1
159.9		Thor timer	VECO
159.3		BTL	Initiate D2 (D-Timer hold)
162.8		BTL	Terminate D2
164.2		BTL	Command separation (P3)
164.5	159.5		Uncage IRP gyros (backup)
167		Separation Switch	Activate pneumatic control (vehicle leaves adaptor)
175	170		Command separation (backup)
			Command separation (backup)
			Fire horizon scanner (H/S) fairing squibs
175	170		Fire horizon scanner (H/S) fairing squibs
176	171		Remove 28v dc from pneumatic valve and transfer SS/H TLM to turbine speed
176	171		Disable -40°/min yaw rate (no yaw correction required)
178	173		Activate pneumatic control (backup)
			Command -3.6°/sec pitch rate (pitchover 28.8°)
178	173		Initiate -1.65°/min pitch rate from integ. pot.
186	181		Remove -3.6°/sec pitch rate
			Connect pitch H/S signal to pitch IRP gyro
186	181		Connect roll H/S signal to roll IRP gyro

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
			ORBITAL BOOST*
196	191		Activate H/S electrical bias 0° effect (+1-1/2° mech. offset only)
			Spare (TLM D-Timer monitor)
			Fire ullage rockets
196	191		Fire ullage rockets
207.5	202.5		Unground integrator input
			Connect accelerometer to integrator**
			Arm and fire gas gen. squib, fire He. Valve, pitch and yaw pneumatics OFF
208.5	203.5		Pitch and yaw pneumatics OFF (backup)
			Open circuit to gas gen. arm and fire and He Valve
			Open circuit to gas gen. arm and fire and He valve and remove J-Box 28v to pitch and yaw pneumatics OFF
			Open circuit to gas gen. arm and fire and He valve and remove J-Box 28v to pitch and yaw pneumatics OFF
208.5	203.5		Close circuit to TLM over-ride
209			STEADY STATE THRUST*
440	435		Arm pitch and yaw pneumatics
440	435		Engine cutoff safety switch
445.6			Engine shutdown by integrator
445.6			Disconnect accelerometer
			Ground integrator input
445.6			Activate pitch and yaw pneumatics
480	475		Command -40°/min yaw rate (180° yaw)
			Disconnect integrator pitch rate pot. (remove -4.1°/min pitch rate)
			Pitch and yaw pneumatics ON (backup)
			Fire helium and oxidizer vent valve squib
			Pitch and yaw pneumatics ON (backup)
480	475		Fire helium and oxidizer vent valve squib
750	745		Start TLM calibrate
			Apply 28v unreg to SS/L power control box
750	745		Apply 28v unreg to SS/L power control box
750	745		Command +3.86°/min pitch rate
			Connect roll H/S signal to yaw gyro (remove -40°/min yaw rate)

** Notation for reference only*

*** Integrator to be set at a dial reading of 2087.5 representing a velocity-to-be-gained of 16,865 fps*

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
750	745		Switch out 0.1% regulated 400-cycle power
750	745		Shutdown +28.3v IRP ascent power
750	745		Switch out 0.1% regulated 400-cycle power
760	755		Stop TLM calibrate
			Open engine shutdown, switch antennas, open flight control gain change relays and switch roll and yaw gyro TLM gain
760	755		Shutdown integrator power
767	762		Open circuit to TLM override
			Arm H/S OFF circuit
			SS/D timer OFF, H/S to low gain
			Fire fuel vent valve squib
767	762		Fire fuel vent valve squib
			RECOVERY*
X	X	Fairchild Timer	Re-start SS/D Timer, H/S OFF
X + 13	X + 13		Command -45°/min pitch rate (pitch over 58°)
X + 13	X + 13		Arm capsule ejection squib
X + 92	X + 92		Command +3.86°/min pitch rate (Stop -45°/min pitch rate)
			SS/L transfer circuit 1
X + 92	X + 92		SS/L transfer circuit 2
X + 92			Fire capsule plug disconnect squib
X + 94.5	X + 94.5		Fire capsule eject squibs
			Enable timer shutdown circuit
			Fire capsule eject squibs
X + 94.5	X + 94.5		Lockout SS/H re-start signal
X + 130	X + 130		Shutdown SS/D Timer and H/S ON

** Notation for reference only*

[redacted]

Table A6-1

NOMINAL ORBIT SCHEDULE

PHASE	EVENT	TIME FROM LAUNCH (HRS)	(MIN)	LOCATION (DEG N LATITUDE)
Launch	Launch	0	0	34.8
	Start Orbit		2	
	Orbit Injection		7.6	23.4
	Beacon, T/M off		14.8	5.9 (s)
Pass 1	Beacon, T/M on	1	28.1	75
	65°N latitude (ref)		30.9	65
	RM on		32.2	60
	Cross [redacted] latitude		32.8	57.6
	RM interruption (60)		33.2	55.95
	25°N Ref latitude		41.0	25
	Cross [redacted] latitude		41.8	21.6
	Beacon, T/M off		44.2	12
	End of Orbit 1	2	34.7	0
Pass 2	Beacon, T/M on	3	1.9	75
	RM on		6.0	60
	Cross [redacted] latitude		6.6	57.6
	RM interruption (40)		6.7	57.3
	Cross [redacted] latitude		15.6	21.6
	Beacon, T/M off		18.0	12
	End of Orbit 2	4	8.5	0
Pass 3	End of Orbit 3	5	42.3	0
Pass 4	End of Orbit 4	7	16.1	0
Pass 5	End of Orbit 5	8	50.0	0
Pass 6	Beacon, T/M on	8	56.86	25
	RM on		1.0	40
	RM interruption (40)		1.7	42.53
	Cross [redacted] latitude		1.8	42.9
	Beacon, T/M off		6.4	60
	End of Orbit 6	10	23.7	0
Pass 7	Beacon, T/M on	10	30.7	25
	RM on		34.8	40
	Cross [redacted] latitude		35.6	42.9
	RM interruption (80)		36.2	45.2
	Beacon, T/M off		40.2	60
	End of Orbit 7	11	57.5	0
Pass 8	Beacon, T/M on	12	2.3	17
	RM on		6.3	32
	RM interruption (20)		6.4	33.3
	Cross [redacted] latitude		7.1	34.8
	Beacon, T/M off		11.8	52
	End of Orbit 8	13	31.3	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	(MIN)	LOCATION (DEG N LATITUDE)
Pass 9	Beacon, T/M on	13	36.0	17
	RM on		40.1	32
	Cross [redacted] latitude		40.9	34.8
	RM interruption (60)		41.1	35.8
	Beacon, T/M off		45.8	52
	End of Orbit 9	15	5.1	0
Pass 10	Beacon, T/M on	15	6.4	5
	RM on		10.6	20
	Cross [redacted] latitude		11.1	21.6
	RM interruption (40)		12.3	22.5
	Cross [redacted] latitude		20.9	57.6
	Beacon, T/M off		22.9	65
	End of Orbit 10	16	38.9	0
Pass 11	End of Orbit 11	18	12.72	0
Pass 12	End of Orbit 12	19	46.5	0
Pass 13	Beacon, T/M on	20	18.4	61
	RM on		21.5	45
	Cross [redacted] latitude		22.0	42.9
	RM interruption (40)		22.2	42.3
	Beacon, T/M off		24.2	34
	End of Orbit 13	21	20.3	0
Pass 14	End of Orbit 14	22	54.12	0
Pass 15	Beacon, T/M on	23	21.0	75
	RM on		25.1	60
	RM interruption (20)		25.5	58.6
	Cross [redacted] latitude		25.7	57.6
	Cross [redacted] latitude		31.6	34.8
	Beacon, T/M off		34.8	22
	End of Orbit 15	24	27.9	0
Pass 16	Beacon, T/M on	24	54.8	75
	RM on		58.9	60
	Cross [redacted] latitude		59.5	57.6
	RM interruption (60)		59.9	55.9
	Cross [redacted] latitude	25	5.4	34.8
	Beacon, T/M off		8.5	22
	End of Orbit 16	26	1.7	0
Pass 17	Beacon, T/M on	26	28.6	75
	RM on		32.7	60
	Cross [redacted] latitude		33.3	57.6
	RM interruption (40)		33.4	57.3
	Cross [redacted] latitude		42.3	21.6
	Beacon, T/M off		44.7	12
	End of Orbit 17	27	35.5	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	TIME FROM LAUNCH (MIN)	LOCATION (DEG N LATITUDE)
Pass 18	End of Orbit 18	29	9.3	0
Pass 19	End of Orbit 19	30	43.1	0
Pass 20	End of Orbit 20	32	16.9	0
Pass 21	Beacon, T/M on	32	23.5	25
	RM on		27.6	40
	RM interruption (40)		28.3	42.5
	Cross [redacted] latitude		28.5	42.9
	Beacon, T/M off		33.0	60
	End of Orbit 21	33	50.7	0
Pass 22	Beacon, T/M on	33	57.3	25
	RM on	34	1.4	40
	Cross [redacted] latitude		2.2	42.9
	RM interruption (80)		2.8	45.1
	Beacon, T/M off		6.8	60
	End of Orbit 22	35	24.5	0
Pass 23	Beacon, T/M on	35	28.9	17
	RM on		33.0	32
	RM interruption (20)		33.4	33.3
	Cross [redacted] latitude		33.8	34.8
	Beacon, T/M off		38.5	52
	End of Orbit 23	36	58.3	0
Pass 24	Beacon, T/M on	37	2.7	17
	RM on		6.8	32
	Cross [redacted] latitude		7.6	34.8
	RM interruption (60)		7.8	35.8
	Beacon, T/M off		12.3	52
	End of Orbit 24	38	32.1	0
Pass 25	Beacon, T/M on	38	33.1	5
	RM on		37.3	20
	Cross [redacted] latitude		37.8	21.6
	RM interruption (40)		38.0	22.5
	Cross [redacted] latitude		47.6	57.6
	Beacon, T/M off		49.6	65
	End of Orbit 25	40	5.9	0
Pass 26	End of Orbit 26	41	39.7	0
Pass 27	End of Orbit 27	43	13.5	0
Pass 28	Beacon, T/M on	43	45.1	61
	RM on		48.2	45
	Cross [redacted] latitude		48.7	42.9
	RM interruption (40)		48.9	42.2
	Beacon, T/M off		50.9	34
	End of Orbit 28	44	47.3	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	TIME FROM LAUNCH (MIN)	LOCATION (DEG N LATITUDE)
Pass 29	Beacon, T/M on	45	18.9	61
	RM on		22.0	45
	Cross [redacted] latitude		22.5	42.9
	RM interruption (80)		23.4	39.5
	Beacon, T/M off		24.7	34
	End of Orbit 29	46	21.1	0
Pass 30	Beacon, T/M on	46	47.7	75
	RM on		51.8	60
	RM interruption (20)		52.2	58.6
	Cross [redacted] latitude		52.4	57.6
	Cross [redacted] latitude		58.3	34.8
	Beacon, T/M off	47	1.4	22
	End of Orbit 30		54.9	0
Pass 31	Beacon, T/M on	48	21.9	75
	RM on		25.6	60
	Cross [redacted] latitude		26.2	57.6
	RM interruption (60)		26.6	55.9
	Cross [redacted] latitude		32.1	34.8
	Beacon, T/M off		35.2	22
	End of Orbit 31	49	28.7	0
Pass 32	Beacon, T/M on	49	55.3	75
	RM on		59.4	60
	Cross [redacted] latitude	50	0.0	57.6
	RM interruption (40)		0.1	57.3
	Cross [redacted] latitude		9.0	21.6
	Beacon, T/M off		11.4	12
	End of Orbit 32	51	2.5	0
Pass 33	End of Orbit 33	52	36.3	0
Pass 34	End of Orbit 34	54	10.1	0
Pass 35	End of Orbit 35	55	43.9	0
Pass 36	End of Orbit 36	57	17.7	0
Pass 37	Beacon, T/M on	57	24	25
	RM on		28.1	40
	RM interruption (40)		28.8	42.5
	Cross [redacted] latitude		28.9	42.9
	Beacon, T/M off		33.5	60
	End of Orbit 37	58	51.8	0
Pass 38	Beacon, T/M on	58	57.8	25
	RM on	59	1.9	40
	Cross [redacted] latitude		2.7	42.9
	RM interruption (80)		3.3	45.1
	Beacon, T/M off		7.3	60
	End of Orbit 38	60	25.3	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	TIME FROM LAUNCH (MIN)	LOCATION (DEG N LATITUDE)
Pass 39	Beacon, T/M on	60	29.4	17
	RM on		33.5	32
	RM interruption (20)		33.9	33.3
	Cross [redacted] latitude		34.3	34.8
	Beacon, T/M off		39.0	52
	End of Orbit 39	61	59.1	0
Pass 40	Beacon, T/M on	61	59.8	5
	RM on	62	4.0	20
	Cross [redacted] latitude		4.5	21.6
	RM interruption (60)		5.0	23.8
	Cross [redacted] latitude		14.3	57.6
	Beacon, T/M off		16.3	65
	End of Orbit 40	63	32.9	0
Pass 41	Beacon, T/M on	63	33.6	5
	RM on		37.8	20
	Cross [redacted] latitude		38.3	21.6
	RM interruption (40)		38.5	22.5
	Cross [redacted] latitude		48.1	57.6
	Beacon, T/M off		50.1	65
	End of Orbit 41	65	6.7	0
Pass 42	End of Orbit 42	66	40.5	0
Pass 43	Beacon, T/M on	67	11.8	61
	RM on		14.9	45
	Cross [redacted] latitude		15.4	42.9
	RM interruption (60)		15.9	40.8
	Beacon, T/M off		17.6	34
	End of Orbit 43	68	14.3	0
Pass 44	Beacon, T/M on	68	45.6	61
	RM on		48.7	45
	Cross [redacted] latitude		49.2	42.9
	RM interruption (40)		49.4	42.2
	Beacon, T/M off		51.4	34
	End of Orbit 44	69	48.1	0
Pass 45	End of Orbit 45	71	21.9	0
Pass 46	Beacon, T/M on	71	48.6	75
	RM on		52.3	60
	RM interruption (20)		52.7	58.6
	Cross [redacted] latitude		52.9	57.6
	Cross [redacted] latitude		58.8	34.8
	Beacon, T/M off	72	1.9	22
	End of Orbit 46		56.3	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	TIME FROM LAUNCH (MIN)	LOCATION (DEG N LATITUDE)
Pass 47	Beacon, T/M on	73	22	75
	RM on		26.1	60
	Cross [redacted] latitude		26.7	57.6
	RM interruption (60)		27.1	55.9
	Cross [redacted] latitude		35.7	21.6
	Beacon, T/M off		38.1	12
	End of Orbit 47	74	29.5	0
Pass 48	Beacon, T/M on	74	55.8	75
	RM on		59.9	60
	Cross [redacted] latitude	75	0.5	57.6
	RM interruption (40)		0.6	57.3
	Cross [redacted] latitude		9.5	21.6
	Beacon, T/M off		11.9	12
	End of Orbit 48	76	3.3	0
Pass 49	End of Orbit 49	77	37.1	0
Pass 50	End of Orbit 50	79	10.9	0
Pass 51	End of Orbit 51	80	44.7	0
Pass 52	Beacon, T/M on	80	50.7	25
	RM on		54.8	40
	RM interruption (40)		55.5	42.5
	Cross [redacted] latitude		55.6	42.9
	Beacon, T/M off	81	0.2	60
	End of Orbit 52	82	18.5	0
Pass 53	Beacon, T/M on	82	24.5	25
	RM on		28.6	40
	Cross [redacted] latitude		29.4	42.9
	RM interruption (80)		30.0	45.1
	Beacon, T/M off		34.0	60
	End of Orbit 53	83	52.3	0
Pass 54	Beacon, T/M on	83	56.1	17
	RM on	84	0.2	32
	RM interruption (20)		0.6	33.3
	Cross [redacted] latitude		1.0	34.8
	Beacon, T/M off		5.7	52
	End of Orbit 54	85	26.1	0
Pass 55	Beacon, T/M on	85	29.9	17
	RM on		34.0	32
	Cross [redacted] latitude		34.8	34.8
	RM interruption (60)		35.0	35.8
	Beacon, R/M off		39.5	52
	End of Orbit 55	87	59.9	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	(MIN)	LOCATION (DEG N LATITUDE)
Pass 56	Beacon, T/M on	87	0.3	5
	RM on		4.5	20
	Cross [redacted] latitude		5.0	21.6
	RM interruption (40)		5.2	22.5
	Cross [redacted] latitude		6.2	57.6
	Beacon, T/M off		16.8	65
	End of Orbit 56	88	33.7	0
Pass 57	End of Orbit 57	90	7.5	0
Pass 58	End of Orbit 58	91	41.3	0
Pass 59	Beacon, T/M on	92	12.3	61
	RM on		15.4	45
	Cross [redacted] latitude		15.9	42.9
	RM interruption (40)		16.1	42.3
	Beacon, T/M off		18.1	34
	End of Orbit 59	93	15.1	0
Pass 60	End of Orbit 60	94	48.9	0
Pass 61	Beacon, T/M on	95	15.3	75
	RM on		19.0	60
	RM interruption (20)		19.4	58.6
	Cross [redacted] latitude		19.6	57.6
	Cross [redacted] latitude		25.5	34.8
	Beacon, T/M off		28.6	22
	End of Orbit 61	96	22.7	0
Pass 62	Beacon, T/M on	96	49.3	75
	RM on		53.4	60
	Cross [redacted] latitude		54.0	57.6
	RM interruption (60)		54.4	55.9
	Cross [redacted] latitude	97	3.0	21.6
	Beacon, T/M off		5.4	12
	End of Orbit 62		56.5	0
Pass 63	Beacon, T/M on	98	23.1	75
	RM on		27.2	60
	Cross [redacted] latitude		27.8	57.6
	RM interruption (40)		27.9	57.3
	Cross [redacted] latitude		34.1	21.6
	Beacon, T/M off		39.2	12
	End of Orbit 63	99	30.3	0
Pass 64	Beacon, T/M on	99	57.0	75
	RM on	100	1.1	60
	Cross [redacted] latitude		1.7	57.6
	RM interruption (80)		2.5	54.5
	Cross [redacted] latitude		10.7	21.6
	Beacon, T/M off		13.1	12
	End of Orbit 64	101	4.1	0

Table A8-1

REAL-TIME DATA READOUT AND REPORTING REQUIREMENTS

	MEASUREMENT		CHANNEL	PRIORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					DOWNRANGE T/M SHIP***	T/M AIRCRAFT***	NOTE
	NAME	NUMBER						[redacted]	[redacted]	[redacted]	[redacted]	TIS		WV-2 137890	
LAUNCH	Liftoff Signal	---	---	1	RT	X	Ascent	X							
	Thor Main Engine Cutoff	---	Thor 12	1	RT	X	Ascent	X							
	Booster Separation	A93	16-24	1	RT	X	Ascent	X							
	Agena Engine Ignition and Cutoff	B6	14	1	RT	X	Ascent	X					X		
	Battery Current Monitor	C27	15-53	2	PP1		Ascent	X					X		
	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		Ascent	X							
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	Ascent	X							
	11-Second Step Switch Position	H108	16-20	1	RT		Ascent	X					X		
	110-Second Step Switch Position	H109	16-22	1	RT		Ascent	X					X		
	Increase/Decrease Switch Position	H107	16-18	1	RT	X	Ascent	X					X		
	Yaw Gyro Torque	D84	17-54	2	PP1		Ascent						X		1
	Payload Function Selector Setting	AET 14/15, 17/18, 20/21, 23/24	13-18 thru 13-24 13-48 thru 13-54	1	RT	X	Ascent	X					X		
	Longitudinal Acceleration	A-10	11	2	See Note 2		Ascent	X					X		2
	SPI Pitch Angle (Upper)	D-138	16-52	2	See Note 2		Ascent	X							2
	SPI Yaw Angle (Upper)	D-139	16-50	2	See Note 2		Ascent	X							2
	Re-entry Enable Switch Position	H117	16-45	1	RT	X	Ascent	X					X		3
	Timer Condition 1	H150	16-53	1	RT	X	1 thru 62	X							15-16
	Timer Condition 2	H151	16-49	1	RT	X	1 thru 62	X							15
	Timer Condition 3	H152	16-51	1	RT	X	1 thru 62	X							16
ORBIT	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		1 thru 62	X	X	X	X				
	Command Verifications 1, 2, 3, 4	H112	11	1	RT	X	1 thru 62	X	X	X	X				
	Command Verifications 5, 6	H114	14	1	RT	X	1 thru 62	X	X	X	X				
	Programmer Period Readout (Console or Remote)	H110	1	2	RT		1 thru 62	X	X	X	X				
	Battery Case Temp.	C9	15-22	2	PP1		1 thru 62	X	X	X	X				
	Battery Current Monitor	C27	15-53	2	PP1		1 thru 62	X	X	X	X				

Table A8-1 (Continued)

	MEASUREMENT NAME	MEASUREMENT NUMBER	CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION [redacted]				TRACKING STATION TIS	DOWNRANGE T/M SHIP***	T/M AIRCRAFT*** WV-2 137890	NOTE
ORBIT (Continued)	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	1 thru 62	X	X	X	X				
	11-Second Step Switch Position	H108	16-20	1	RT		1 thru 62	X	X	X	X				
	110-Second Step Switch Position	H109	16-22	1	RT		1 thru 62	X	X	X	X				
	Increase Decrease Switch Position	H107	16-18	1	RT	X	1 thru 62	X	X	X	X				
	Reset Monitor Signal	H70	16-10	1	RT	X	1 thru 62	X	X	X	X				
	Timer Condition 1	H150	16-53	1	RT	X	1 thru 62	X	X	X	X				15-16
	Timer Condition 2	H151	16-49	1	RT	X	1 thru 62	X	X	X	X				15
	Timer Condition 3	H152	16-51	1	RT	X	1 thru 62	X	X	X	X				16
	Programmer Pass Identification	H70	16-10	1	RT	X	1 thru 62	X	X	X	X				
	Re-entry Enable Switch Position	H117	16-45	1	RT	X	1 thru 62	X	X	X	X				3
	Payload Function Selector Setting	AET 14/15, 17/18, 20/21, 23/24	13-18 thru 13-24, 13-48 thru 13-54	1	RT	X	1 thru 62	X	X	X	X				
	Control Gas Supply Pressure - High Range	D95	16-33	1	PP1	X	1 thru 62	X	X	X	X				
	Control Gas Supply Pressure - Low Range	D140	16-27	1	PP1	X	1 thru 62	X	X	X	X				
	Battery Bus Voltage	C1	16-38	2	PP1		1 thru 62	X	X	X	X				
	Horizon Scanner - Pitch	D37	16-35	3	PP2		See Note 5	X	X	X	X				4
	Horizon Scanner - Roll	D39	16-37	3	PP2		↓	X	X	X	X				4
	SPI Temperature	D130	15-43	3	PP2		↓	X	X	X	X				5
	SPI Pitch Angle - Lower	D128	15-51	3	See Note 5		↓	X	X	X	X				5
	SPI Yaw Angle - Lower	D127	15-49	3	See Note 5		↓	X	X	X	X				5
	SPI Pitch Ref. Volt.-Lower	D136	15-2	3	See Note 5		↓	X	X	X	X				5
	SPI Yaw Ref. Voltage - Lower	D137	15-4	3	See Note 5		↓	X	X	X	X				5
	SPI Pitch Angle - Upper	D138	16-52	3	PP2		↓	X	X	X	X				5
	SPI Yaw Angle - Upper	D139	16-50	3	PP2		See Note 5	X	X	X	X				5
	Wave Train	AET 50	8	2	PP1		See Note 14	X	X	X	X				14
	No Name Assigned	AET 40	12-9	2	PP1		See Note 11	X	X	X	X				11
	No Name Assigned	AET 48	12-13	2	PP1		See Note 11	X	X	X	X				11
RE-ENTRY	Programmer Period Readout (Console or Remote)	H110	1	3	RT		Recovery Pass			X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	2	RT	X	↓			X	X				

Table A8-1 (Continued)

	MEASUREMENT NAME	MEASUREMENT NUMBER	CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION [redacted]				TRACKING STATION TIS	DOWNRANGE T/M SHIP ***	T/M AIRCRAFT*** WV-2 137890	NOTE
RE-ENTRY (Continued)	11-Second Step Switch Position	H108	16-20	3	PP2					X	X				
	110-Second Step Switch Position	H109	16-22	3	PP2					X	X				
	Reset Monitor Signal	H70	16-10	1	RT	X				X					
	Programmer Pass Identification	H70	16-10	2	RT		Recovery Pass			X					
	Re-entry Selector Switch Position	H117	16-45	1	RT	X	Recovery Pass			X	X				3
	Control Gas Supply Pressure - High Range	D95	16-33	1	PP1	X				X	X				
	Control Gas Supply Pressure - Low Range	D140	16-27	1	PP1	X				X	X				
	Battery Bus Voltage	C1	16-38	2	PP1					X	X				
	Horizon Scanner - Pitch	D37	16-35	1	PP2					X					4
	Horizon Scanner - Roll	D39	16-37	1	PP2					X					4
	SPI Pitch Angle - Lower	D128	15-51	2	See Note 6					X					6
	SPI Yaw Angle - Lower	D127	15-49	2	See Note 6					X					6
	SPI Pitch Ref. Voltage - Lower	D136	15-2	2	See Note 6					X					6
	SPI Yaw Ref. Voltage - Lower	D137	15-4	2	See Note 6					X					6
	SFI Pitch Angle - Upper	D138	16-52	1	PP2					X					6
	SPI Yaw Angle - Upper	D139	16-50	1	PP2					X					6
	Pitch Torque Signal	D41	17-38	2	PP1					X					7
	SS/D Timer Restart	D85	17-52	1	RT	X				X					
	Capsule Separation Event	AET 51	16-42	1	RT	X				X	X			X	8
	Payload Connector Disconnect	AET 26	12-2	2	RT					X	X				13
	Retro-Rocket Ignition, De-spin Valve Actuated, Thrust Cone Ejection	---	Capsule 7	1	RT, PP1	X				X				X	9
	Spin Valve Actuated, Thrust Cone Ejection	---	Capsule 9	1	RT, PP1	X				X				X	9
	Axial Acceleration	---	Capsule 11	1	PP1, PP2	X				X	X	X		X	10
	3 g Switch Close, 3 g Switch Open, Ablative Shell Off	---	Capsule 7	1	RT, PP1	X				X	X	X		X	9
	Parachute Cover Off	---	Capsule 9	1	RT, PP1	X				X	X	X		X	9
	Capsule T/M Signal Strength	---	Capsule 7, 9, 11	2	RT		Recovery Pass			X	X	X		X	12

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Table A8-1 (Continued)

NOTES:

1. Report the system time of reorientation, the voltage level prior to start of reorientation, and the average voltage level during reorientation.
2. Backup monitors for ascent events. SPI data is used as backup verification of separation.
3. Reads 1 volt for re-entry disable, 4 volts for re-entry enable.
4. Read when sun position indicator data are required in Notes 5 and 6 (until turn-off at start of reorientation). [redacted] reads on the recovery pass to indicate SS/D restart event if measurement D85 is invalid.
5. With the exception of D130, Channel 15 SPI data will be read only if the SPI data on Channel 16 do not appear valid. Read 3 times at approximately 2-minute intervals correlated with system time on Pass 2 [redacted] and [redacted], on Pass 13 [redacted], on Pass 15 [redacted] if recovery is to be made on Day 1, on Pass 17 [redacted] if recovery is to be made after Day 1, on Pass 28 [redacted], on Pass 30 [redacted], on Pass 48 [redacted] if recovery is to be made on Day 4, on Pass 59 [redacted] and on Pass 61 [redacted]. Readings at one system time only are required on [redacted] on Passes 8, 24, 39, and 55. All [redacted] and [redacted] readings are to be obtained as far north as possible. [redacted] transmits data on Channels 15 and 16 to Sunnyvale on 100-wpm/voice line after Pass 2; three 10-second data samples at 2-minute intervals required.
6. Read at 1-minute intervals before reorientation, 20-second intervals during reorientation, and immediately prior to separation; correlate with system time. Channel 15 SPI data will be read only if the SPI data on Channel 16 do not appear valid. [redacted] transmits data on Channels 15 and 16 to SV on 100-wpm/voice line after recovery pass; continuous transmission from acquisition to separation.
7. Read system time at start and finish of reorientation, voltage level prior to start of reorientation, and average voltage level during reorientation.
8. Reads 4.67 volts prior to separation, 1.33 volts after separation. Correlation within 2 seconds of exact system time is satisfactory for initial [redacted] report. [redacted] and [redacted] verify that event has occurred by voltage level check.
9. The RT readout will contain a verification that each event has occurred. The PP1 readout will contain the system time of each event. Use event numbers listed in Paragraph 7.4.6 for identification when reporting.
10. The [redacted] PP1 readout will contain the average value and duration. The PP2 readout will contain a complete time history of acceleration and will include the system time of each data dropout and the time duration of dropout. [redacted] and TIS read values 5 seconds prior to, at, and 5-seconds after parachute deployment.
11. Record voltage level at beginning, middle, and end of pass. Readout, accurate to at least 0.1 volt (2% bandwidth), required of [redacted] (Passes 8, 9, 15, 24, 31, 39, 55), [redacted] (Passes 6, 7, 13), [redacted] (Passes 1, 2, 16), and [redacted] (Pass 2). Readouts on Passes 1 and 2 are required 60 minutes after the pass; all other readouts required 10 minutes after the pass at [redacted] and 30 minutes after the pass at [redacted] and [redacted]
12. Provide a qualitative evaluation of signal reception.
13. Reads out of band after separation.
14. Refer to Table A8-2 for details of readout required.
15. Skip subcycle Command 6 will be transmitted only if measurement H150 reads 0 volts and H151 reads 1.4 to 1.8 volts DC.
16. REPEAT subcycle Command 6 will be transmitted only if measurement H152 reads 0 volts and H152 reads 3.1 to 4.1 volts DC.

---

* *RT – Read in real time.*
PP1 – Read immediately after pass
PP2 – Read immediately after RT and PP1 readouts.

** *All data are also to be reported to the STC by 60-wpm teletype as soon as possible.*

*** *T/M ships and aircraft will transmit real-time data immediately after signal fade so no interference with the vehicle telemetry signal will be generated.*

[redacted]

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20 March 1961

Table A8-2

NOMINAL PAYLOAD FUNCTION WAVE TRAIN REAL-TIME READOUT AND REPORTING REQUIREMENTS

[redacted]

CHANNEL 8 (AET 50) READOUT AND REPORTING REQUIREMENTS

PASS NO	TRACKING STATION	MAXIMUM DATA REPORTING TIME ALLOWABLE (MINUTES)		
		READOUT (a)	READOUT (b)	READOUT (c)
1	[redacted]	10	60	90
2		--	--	90
2		30	60	90
6		15	60	90
8		--	--	90
9		15	60	30
13		15	60	90
15		15	60	90
16		15	--	--
24		15	60	30
31		15	--	--
39		15	60	30
55		15	60	30

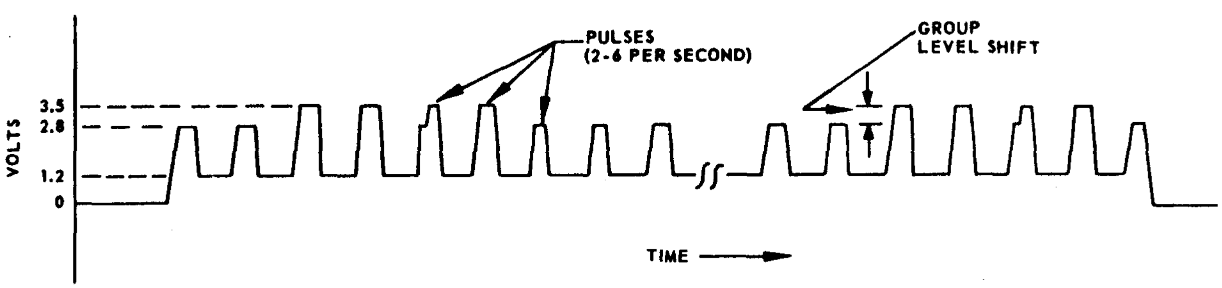
NOTE:

READOUT (a) – COMPARE CHANNEL 8 WAVE TRAIN WITH NOMINAL WAVE TRAIN BELOW. REPORT PRESENCE OR ABSENCE.

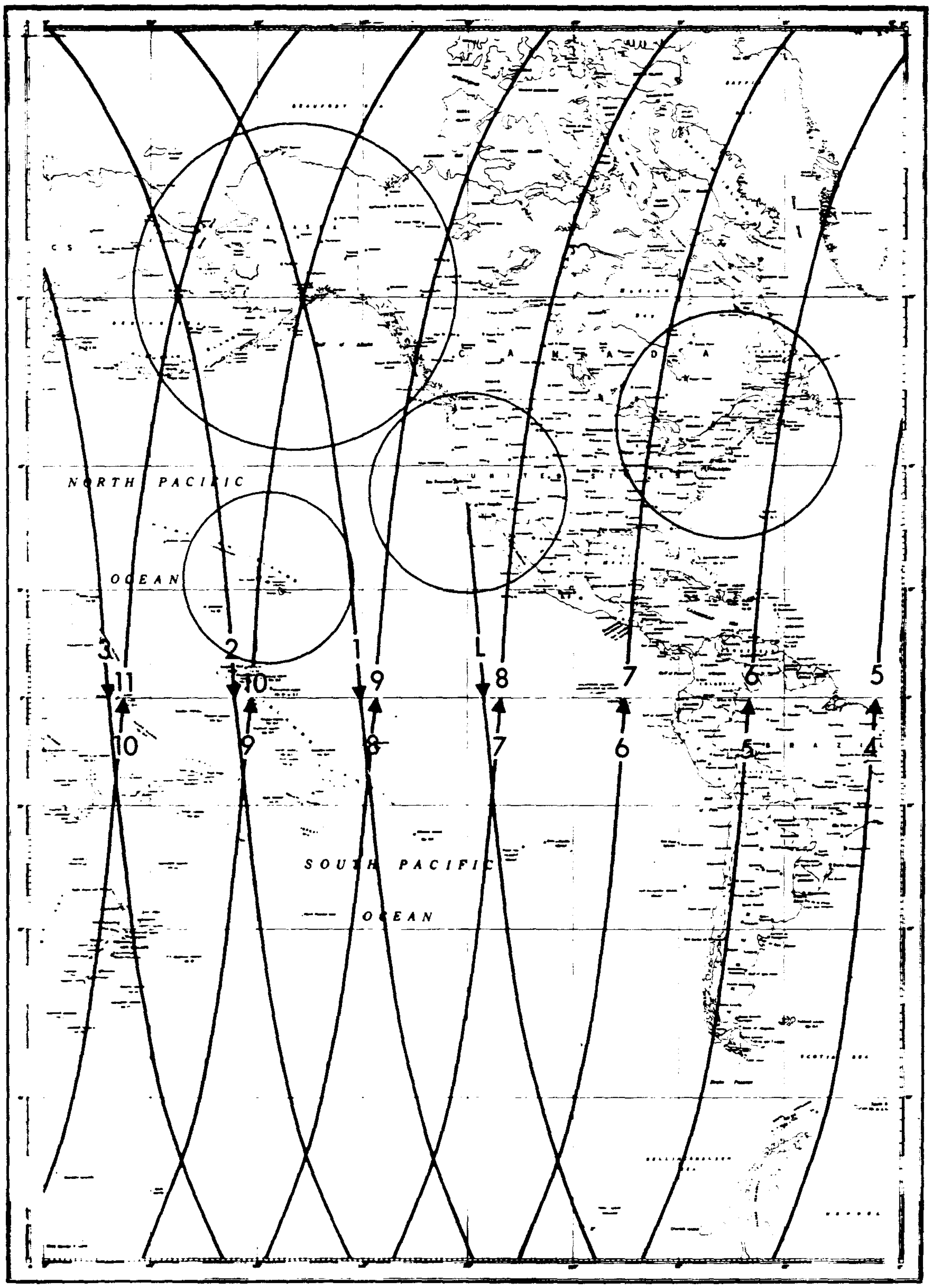
READOUT (b) – REPORT THE TIME (±0.5 SEC) OF THE START OF THE WAVE TRAIN AND THE DURATION (±5 SEC) OF THE WAVE TRAIN.

READOUT (c) – REPORT THE ELAPSED TIME (TO THE NEAREST 0.1 SECOND) REQUIRED FOR 100 PULSES COUNTED FROM LEADING EDGE TO LEADING EDGE AFTER AT LEAST 20 PULSES FROM THE WAVE TRAIN START. REPORT THE NUMBER OF GROUP LEVEL SHIFTS WITHIN THIS 100 PULSE PERIOD. DATA ON PASSES 9, 24, AND 39 IS TO BE MADE AVAILABLE AT THE EARLIEST POSSIBLE TIME AFTER ACQUISITION.

CHANNEL 8 (AET 50) WAVE TRAIN



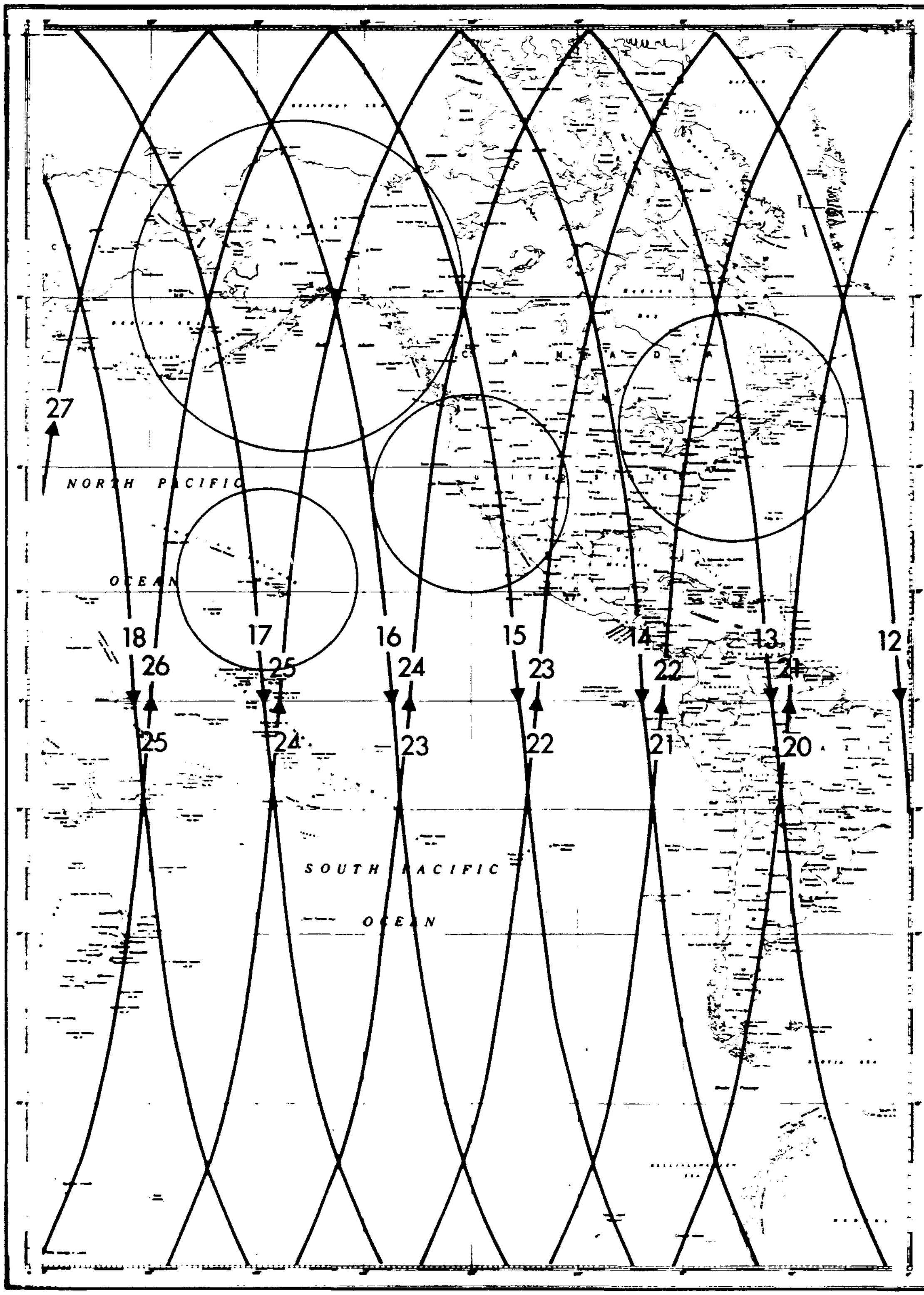
[redacted]



446404-A7-001

Figure A2-1(a) Nominal Orbit Traces – Launch Through Pass 11

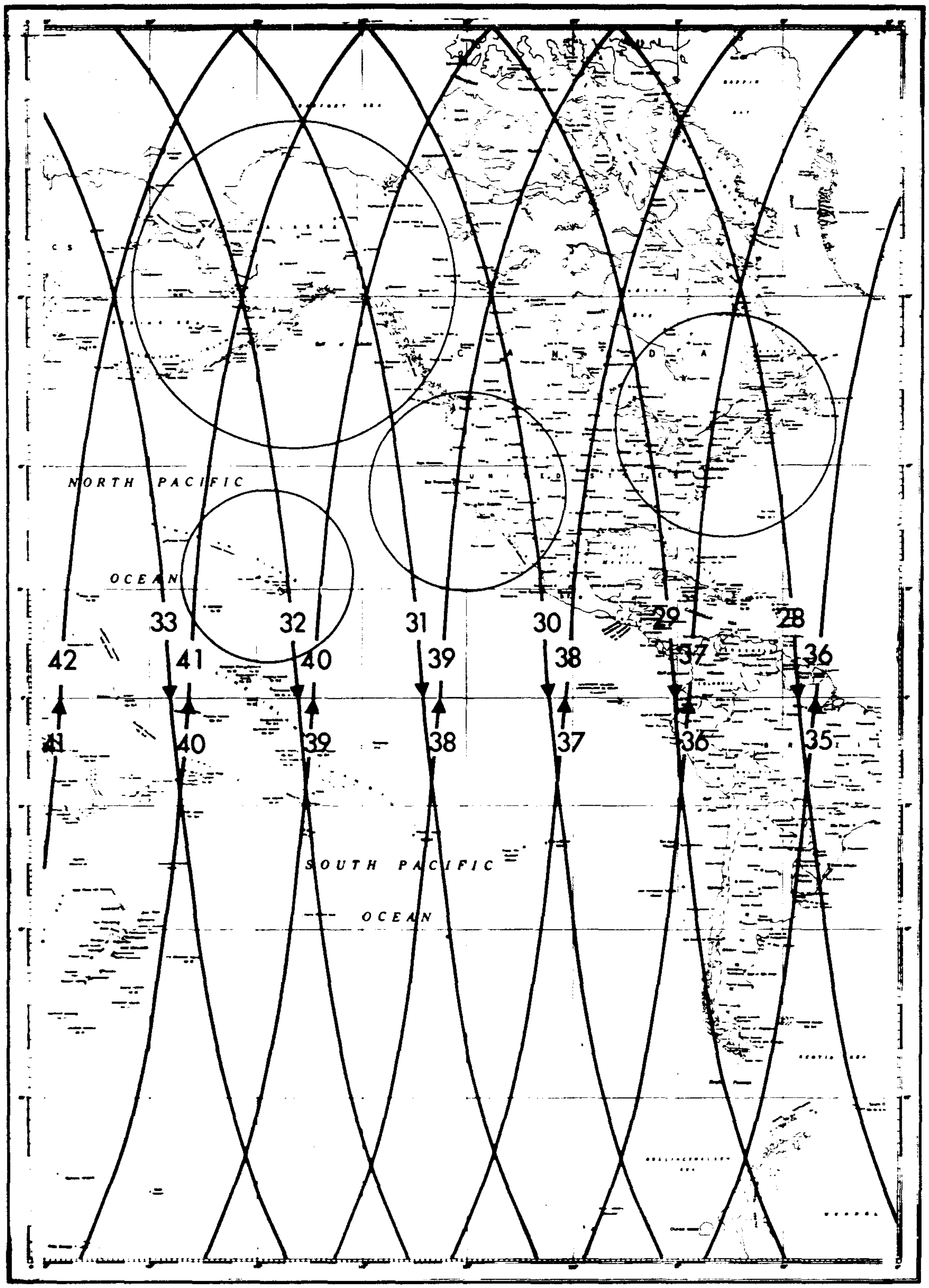
[redacted]



446404-A7-002

Figure A2-1(b) Nominal Orbit Traces – Passes 12 Through 27

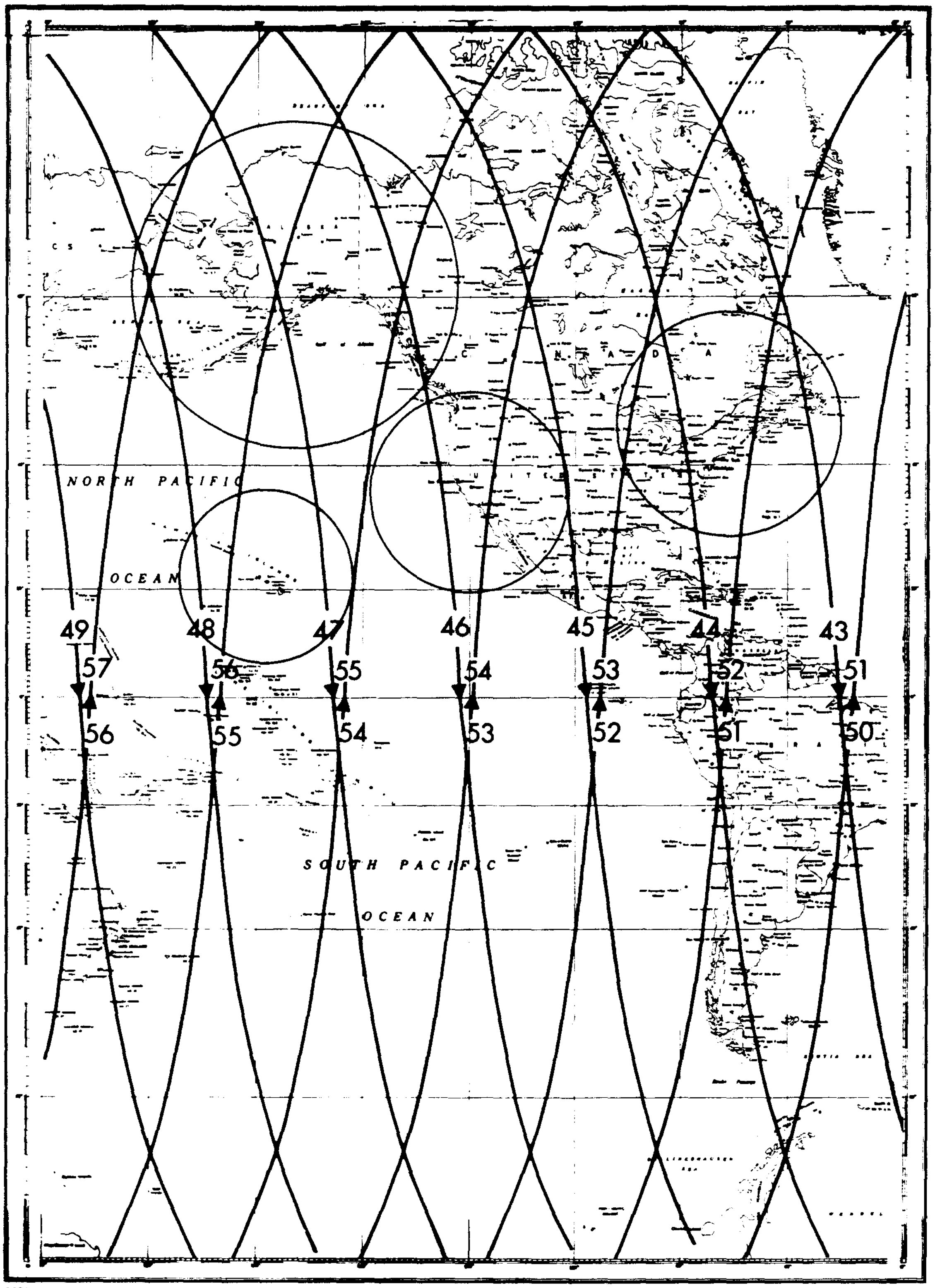
[redacted]



446404-A7-003

Figure A2-1(c) Nominal Orbit Traces – Passes 28 Through 42

[redacted]



446404-A7-004

Figure A2-1(d) Nominal Orbit Traces – Passes 43 Through 57

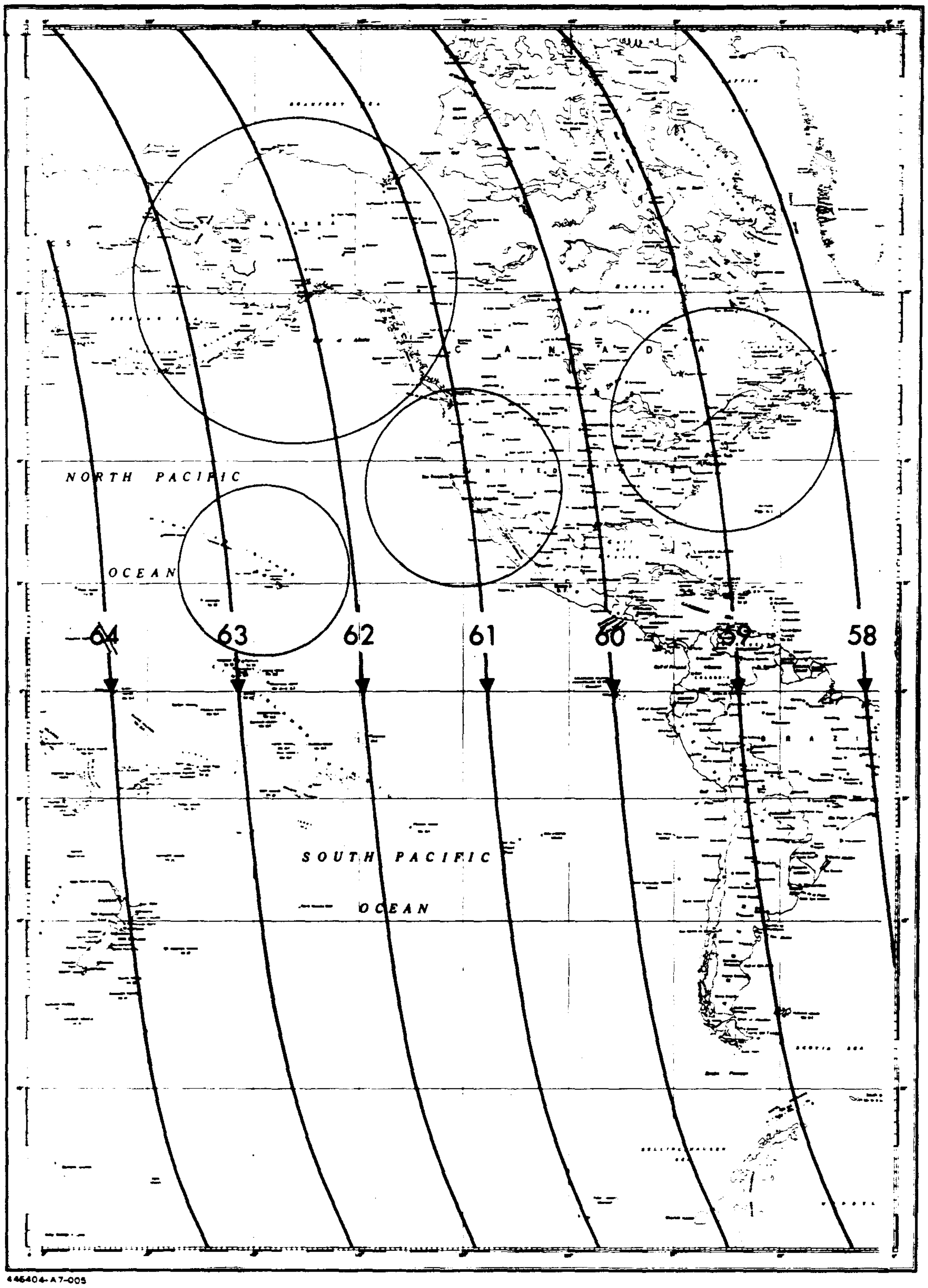


Figure A2-1(e) Nominal Orbit Traces – Passes 58 Through 64

[redacted]

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TYPE OF PASS						
A	B	C	D	E	F	G
STATION [redacted]						
ASCENT (20)			1(60)			
			2(40)	6(40)		
				7(80)	8(20)	
					9(60)	10(40)
13(40)		15(20)		20(60)		
		16(60)	17(40)	21(40)		
				22(80)	23(20)	
27(60)					24(60)	25(40)
28(40)						
29(80)		30(20)	31(60)	36(60)		
		31(60)	32(40)	37(40)	38(80)	
				38(80)	39(20)	40(60)
						41(40)
43(40)						
44(80)	45(100)	46(20)	47(60)	51(60)		
			48(40)	52(40)		
				53(80)	54(20)	
58(60)					55(60)	56(40)
59(40)	60(80)	61(20)	62(60)			
			63(40)			
			64(80)	67(40)		
				68(80)	60(20)	
					70(60)	71(40)
74(40)	76(20)	77(60)	78(40)	82(40)		
				83(80)	84(20)	
					85(60)	86(40)
89(40)						
90(40)						
	91(20)	92(60)	93(40)	98(40)		
				99(80)	100(20)	101(60)
105(40)		107(20)	108(60)			102(40)
			109(40)	113(40)		
				114(80)	115(20)	
120(40)	122(20)		123(60)		116(60)	117(40)
			124(40)			

NOTE: NUMBERS IN PARENTHESIS REPRESENT TIME IN SECONDS FOLLOWING RESET MONITOR INITIATION AT WHICH PROGRAMMER IDENTIFICATION MARK OCCURS. THIS TIME IS TAPE TIME, 90 MIN. PERIOD.

446406 A6-001(2)

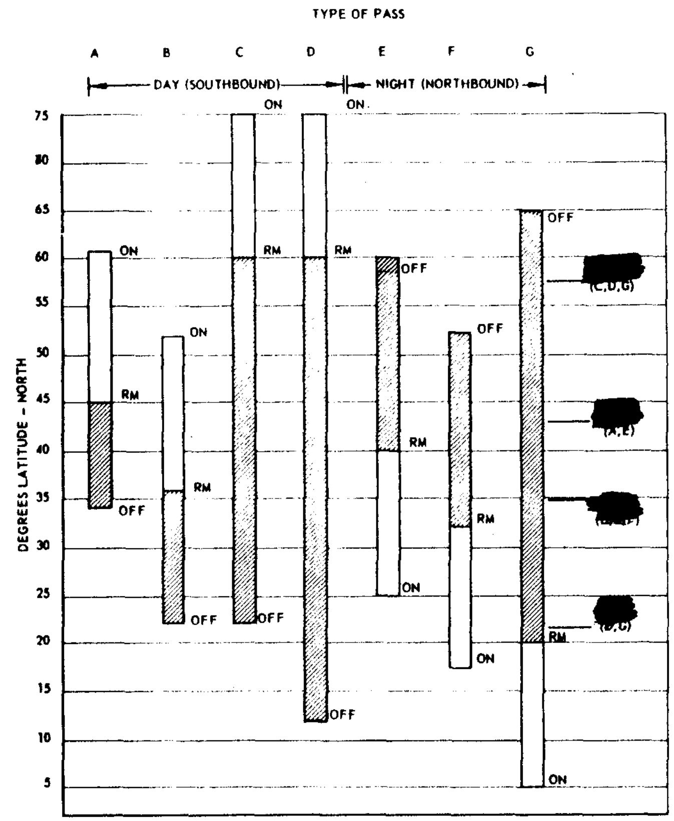

Figure A2-2 *Readout and Reset Programming*

[redacted]

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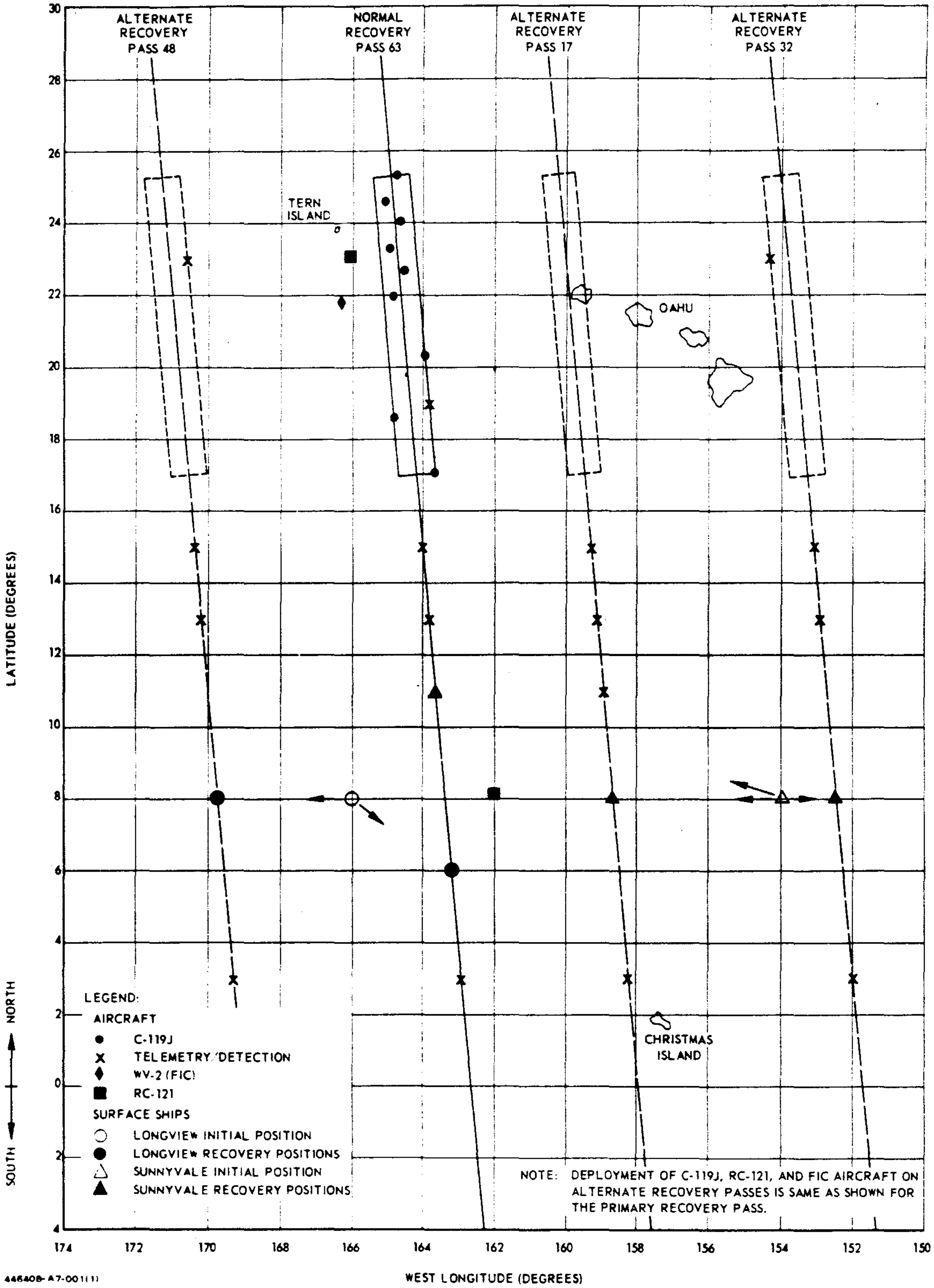

Figure A7-1 Recovery Force Deployment

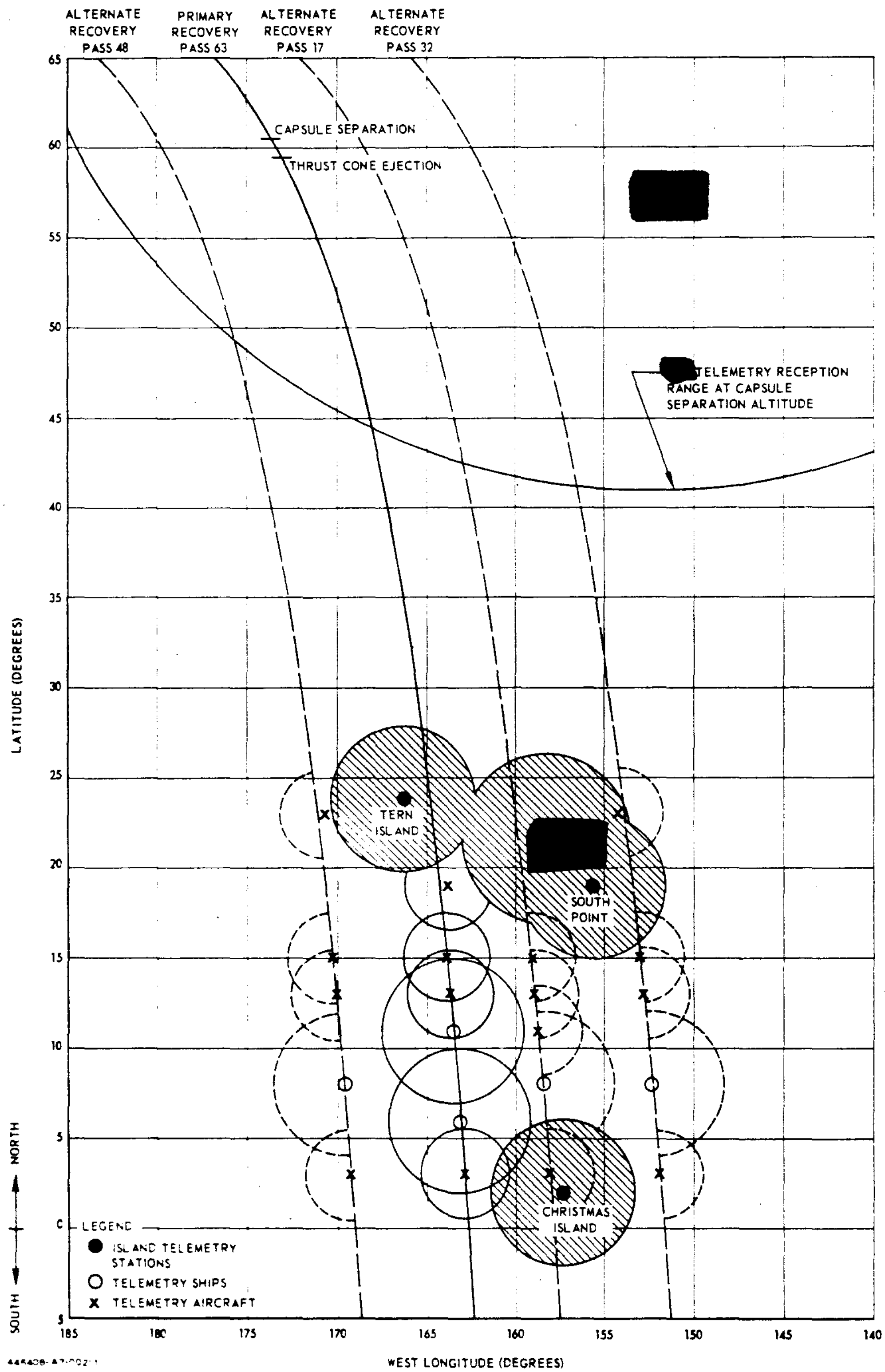

Figure A7-2 Normal and Alternate Re-entry Telemetry Coverage

[redacted]

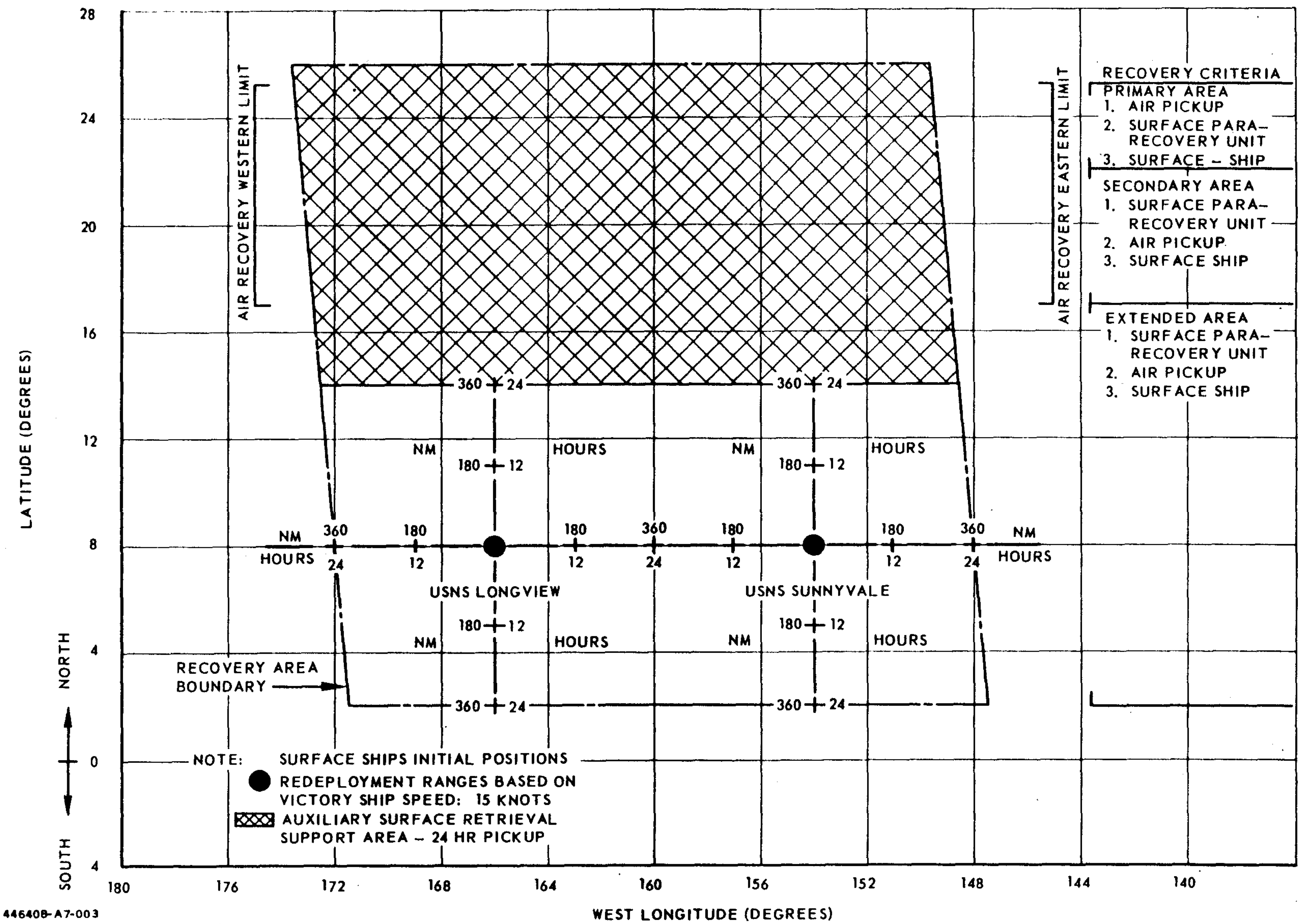

Figure A7-3 Surface Ship Deployment Capability

[redacted]

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20 March 1961

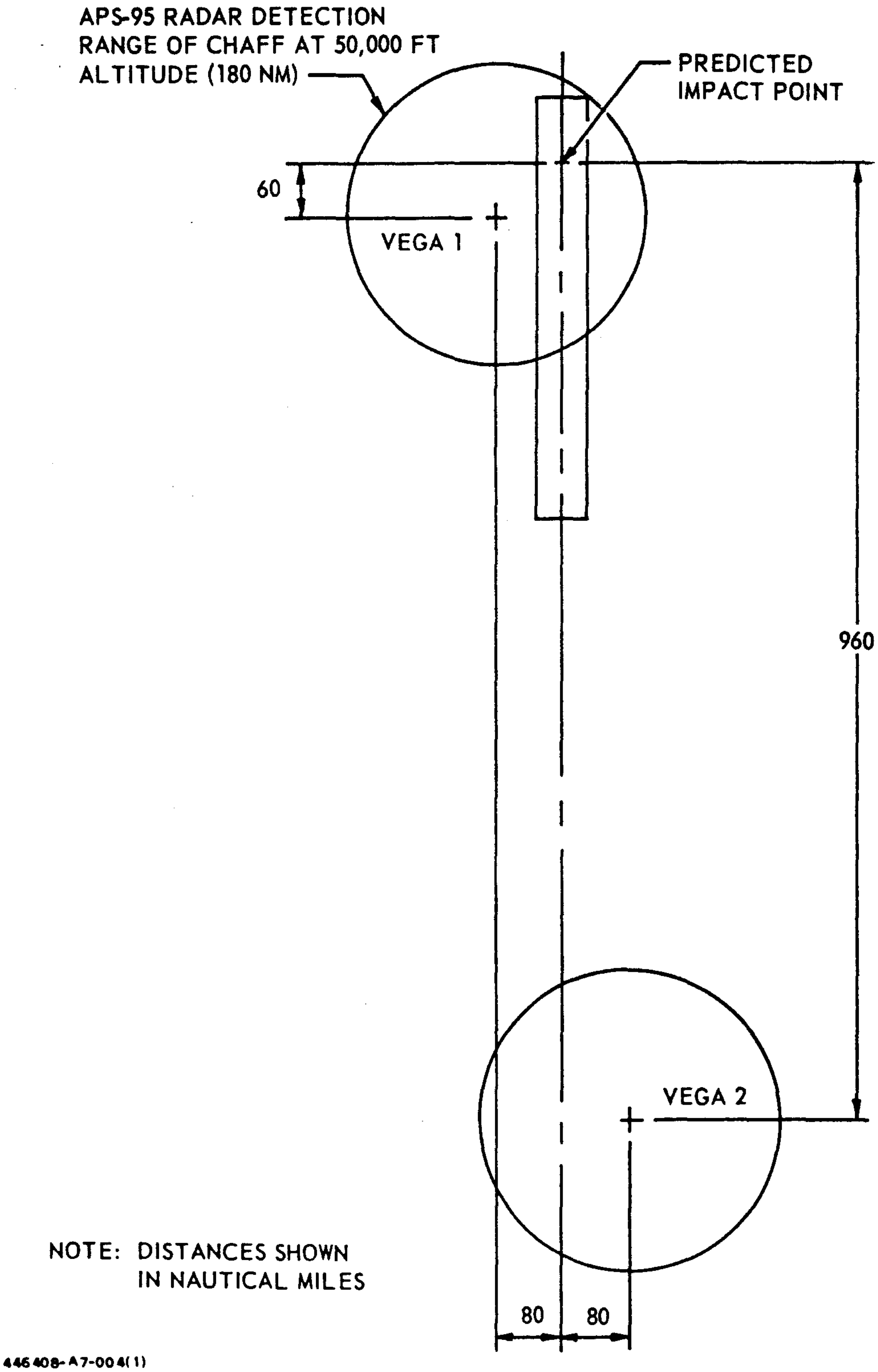
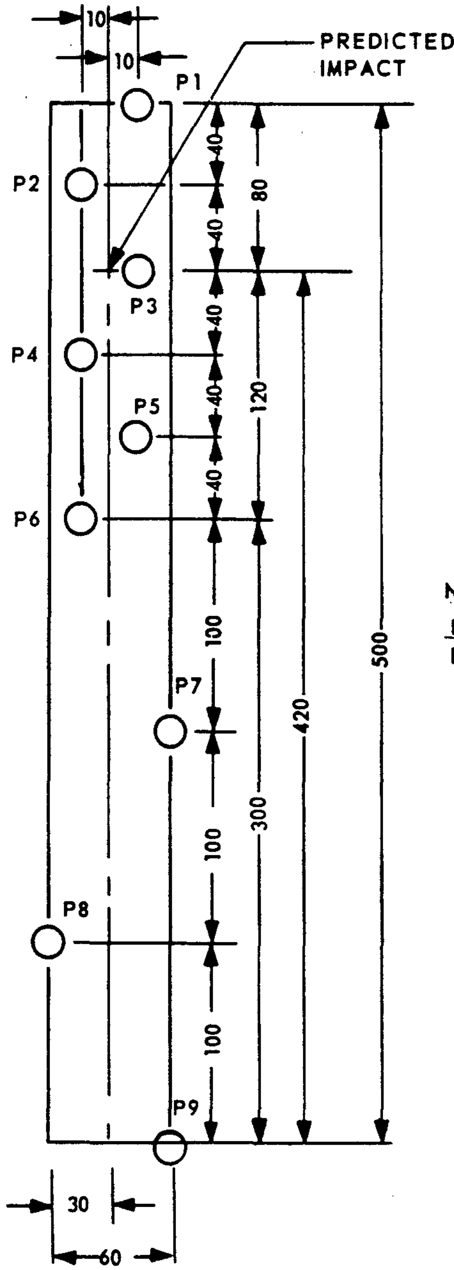


Figure A7-4 RC-121 Aircraft Deployment



NOTE:
P1 THROUGH P9 ARE C-119 AIRCRAFT
DISTANCES SHOWN IN NAUTICAL MILES

446408-A1-007(1)

Figure A7-5 Recovery Aircraft Deployment

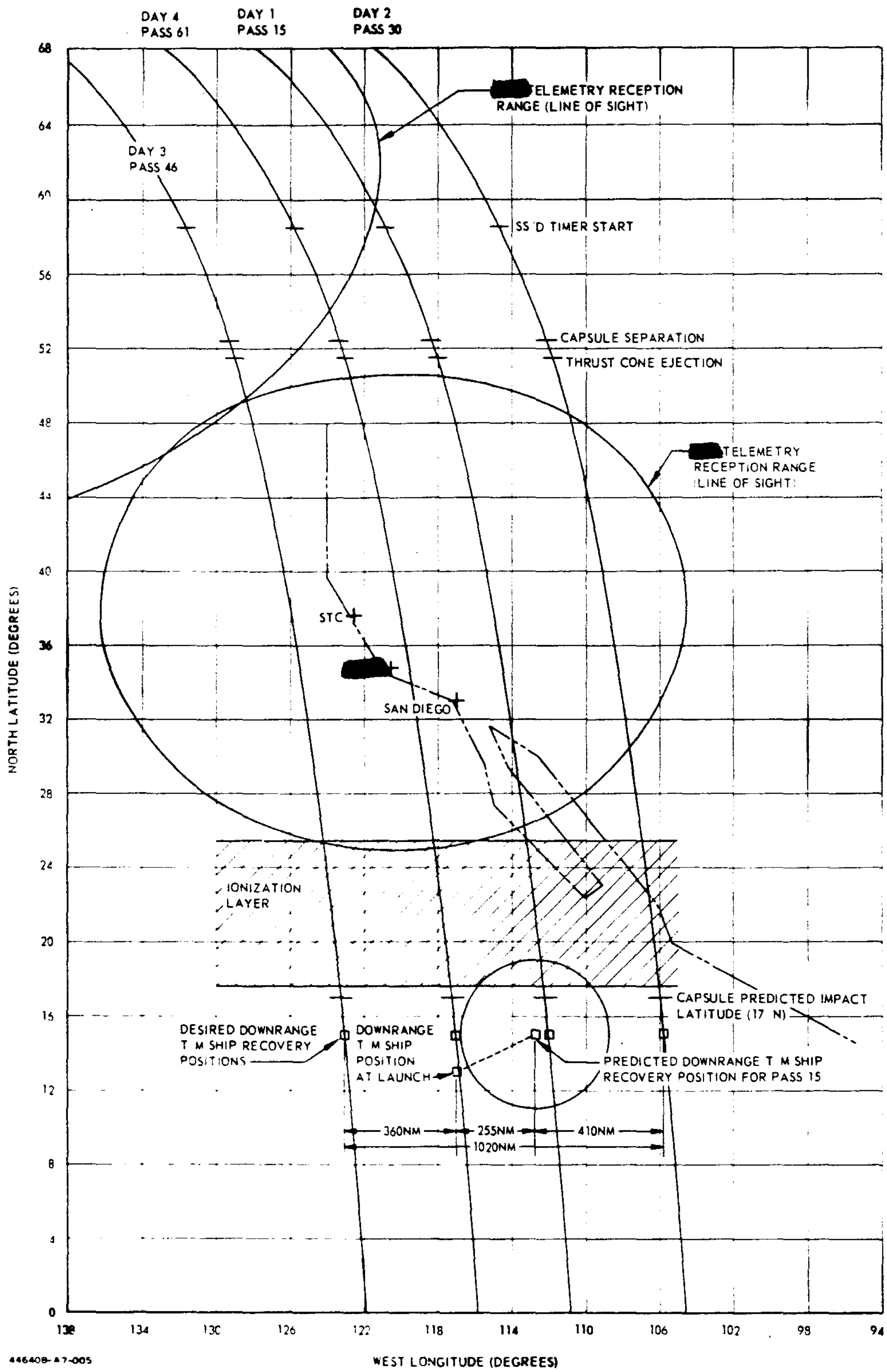
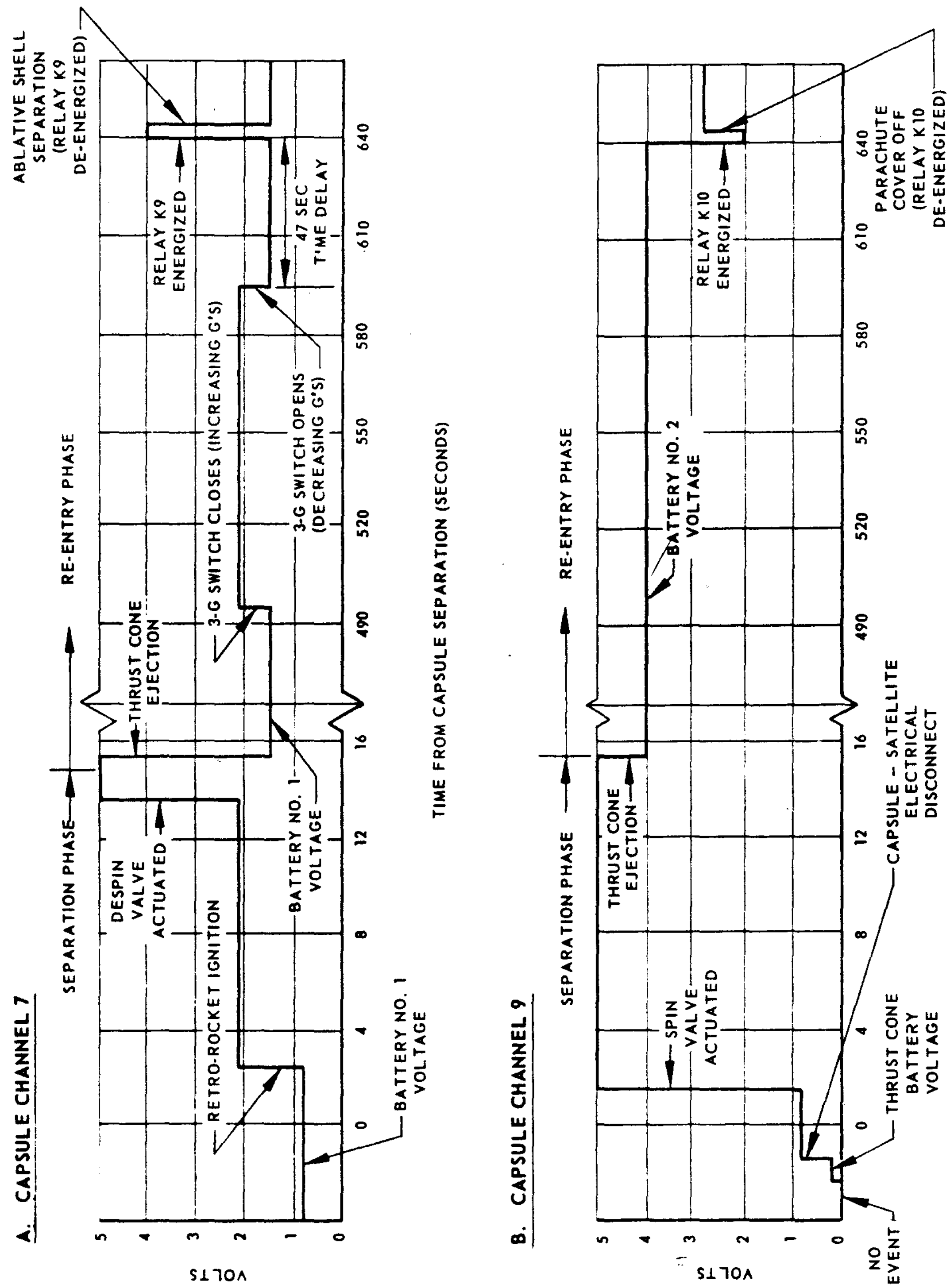


Figure A7-6 Emergency Re-entry Telemetry and Recovery Coverage



NOTE: VALUES SHOWN INDICATE NOMINAL SEQUENCE OF EVENTS. CONSULT T/M CALIBRATION DATA FOR VOLTAGE LEVELS WHICH WILL OCCUR IF SEQUENCE OF EVENTS IS NOT NORMAL. REFER TO SECTION 7.5 FOR SEQUENCE OF EVENTS DESCRIPTION

446408-A1-010(2)

Figure A8-1 Nominal Capsule Telemetry Voltage Levels

[redacted]
29 March 1961
Copy No.____
____Sheets

APPENDIX A – TAB 8
SYSTEM TEST DIRECTIVE
FOR
DISCOVERER SATELLITE SYSTEM
DISCOVERER SATELLITE 1106
DISCOVERER BOOSTER 307

Prepared under authority of AFBM Exhibit 60-6,
Paragraph 1.4.1

Prepared by
SYSTEMS OPERATIONS PLANNING 61-41

APPROVED:

[redacted]
COLONEL, USAF
CHAIRMAN,
SYSTEM TEST WORKING GROUP

APPROVED:

[redacted]
SATELL[redacted]EMS DIRECTOR

[redacted]

CONTENTS

TABLES

ILLUSTRATIONS

[redacted]

APPENDIX A - TAB 8
SUPPLEMENTAL TEST INFORMATION

A1 INTRODUCTION

This section contains descriptive material which supplements the basic text of the STD and is applicable only to the flight of Discoverer Satellite 1106. Where the material contained herein is in conflict with that in the basic text, the information in this appendix has precedence. Reference will not be made to this appendix for subsequent flight operations.

A2 CONFIGURATION

A2. 1 <u>Discoverer Satellite</u>

A2. 1. 1 An AET-H payload will be carried in a Mark IV recovery capsule.

A2. 1. 2 A JHU/APL Doppler transmitter and an optical beacon will be carried for tracking performance evaluation. The transmitter will operate continuously on 162 and 216 mc. The optical tracking lights will be programmed "on" over twelve Smithsonian Astronomical Observatory camera stations during the flight.

A2. 1. 3 Three Type 1A batteries and two Type VI batteries will provide the electrical power supply on this flight.

A2. 1. 4 A total of 132 pounds of control gas will provide vehicle attitude control through the normal recovery pass on the fourth day of orbit operations within the limits of expected gas expenditure rates.

 [redacted]

A2.2 Discoverer Vehicle

Discoverer Vehicle 1106/307 will incorporate the BTL guidance system operating in the closed-loop mode. This system will provide booster guidance during launch, provide time-to-fire and velocity-to-be-gained correction signals to the Agena Vehicle, and will command booster/satellite separation as described in Section 3.1.4 of the basic text.

A3 LAUNCH OPERATIONS

A3.1 Launch Time

The specific time of launch will be determined by the System Test Controller.

A3.2 [redacted]

The incorporation of the BTL guidance system for launch trajectory control will delete the requirement for the Reeves Guidance Computer at [redacted] and the associated transmission of Commands 5 and 6 during the launch phase. The [redacted] VERLORT radar will remain passive during launch but will be capable of active tracking immediately if requested by the STC as backup to [redacted]. Radar tracking data will be transmitted to the PAC via 100-wpm teletype. There will be no requirement for readout and reporting telemetry data in real time at [redacted] or for recording orbital telemetry data after the ascent phase.

A3.3 [redacted]

Section 5.3 of the basic text is revised to direct [redacted] to provide primary active VERLORT tracking during the launch phase. Radar tracking data will be transmitted to the PAC via 100-wpm teletype.

A3.4 INCREASE/DECREASE Switch Position

The INCREASE/DECREASE switch will be positioned in the INCREASE position during launch to eliminate the possibility of an inadvertent REPEAT command being received by the vehicle. If a REPEAT command is received by the vehicle, following orbit injection, the prelaunch phase would be repeated. The INCREASE/DECREASE switch will be returned to the DECREASE position on Pass 2 by [redacted] Keeping the switch in the INCREASE position until this time will enable Pass 2 alternate re-entry to be selected by sending one Command 5 and one Command 1 prior to the Pass 2 D-timer start point.

A3.5 Recovery Force Readiness

A3.5.1 The launch criteria specified in Paragraph 4.2.2.6 of the basic text is amended as follows in reference to telemetry/detection aircraft:

It is considered impractical to directly relate the launch decision to specific numbers of telemetry/detection aircraft in operational status at time of launch. The nature of aircraft operation is such that during a three or four day nominal orbit period, the actual aircraft status can change several times. It therefore becomes a matter of operational judgment at time of launch to determine expected airborne force status at the time it will be needed and render a decision to launch or not, on such exercise of judgment.

The above change in launch criteria does not abrogate in any fashion the operational requirement for four telemetry/detection aircraft on station or the desirability of having these aircraft in commission at Hickam AFB at time of launch.

A3.5.2 The launch criteria specified in Paragraph 4.2.2.6 of the basic text is further amended as follows:

> Item a, "Three RC-121 radar aircraft" is changed to "Two RC-121 aircraft."
>
> Item c, "Three surface ships" is changed to "Two telemetry/detection ships plus surface retrieval capability in the recovery zone between 14° N and 26° N latitude."

 [redacted]

Item d, the requirement for an aircraft to record separation sequence telemetry is deleted.

A4 ORBIT OPERATIONS

A4.1 Re-entry Selection

A4.1.1 The re-entry circuit of the orbital programmer has been modified by (1) deletion of the primary re-entry circuit and (2) the addition of a re-entry selection switch operated in parallel with the INCREASE/DECREASE switch. The re-entry circuit is enabled only by transmission of a ground command and does not incorporate the primary re-entry circuit to program fourth day recovery. The re-entry selection switch will permit positive selection of the recovery pass each day and will be the primary means of synchronizing the recovery longitude for orbit period variations up to +2 minutes. The SKIP/REPEAT capability has been retained for use when orbit period variations below nominal or in excess of +2 minutes are encountered.

A4.1.2 Normal recovery is planned for nominal orbit Pass 62 after four days of active orbital life. Passes 2, 15, 17, 31, 32, 46, 47, 61, 63, 76, 77 and 78 are programmed for alternate re-entry. Pass 2 will be selected for recovery only if conditions following launch are such that successful recovery on Passes 15 or 17 would be either impossible or seriously jeopardized. Selection of nominal Pass 15 will permit emergency recovery off the West Coast on Day 1 and is the only recovery pass programmed for this area. If emergency West Coast recovery is required on Days 2, 3 or 4, Command 6 SKIP will be transmitted prior to fade at [redacted] Passes 76, 77, and 78 give the capability of delaying re-entry until Day 5 if desired.

A4.1.3 The re-entry circuit is enabled by sending Command 5 with the INCREASE/DECREASE switch in the INCREASE position, and disabled by sending Command 5 with the INCREASE/DECREASE switch in the DECREASE position. The re-entry circuit can be disabled at any time prior to "D" timer start on the recovery pass. Selection of the re-entry pass is effected

[redacted]

following Command 5 RE-ENTRY ENABLE by transmitting an additional Command 1, if required, to place the INCREASE/DECREASE switch in the desired position as determined by the following table:

	Orbital Programmer Recovery Pass Number INCREASE/DECREASE Switch Position	
Day	Increase	Decrease
1	15	2, 17
2	31	32
3	46	47
4	61, 63	62, 63
5	76, 78	77, 78

A4.2 Command 6 Operations

A4.2.1 Command 6 will be transmitted for re-entry pass selection only as described in Paragraphs A4.1.1 and A4.1.2. Command 6 may also be transmitted if longitudinal synchronization of the orbit is required for data readout purposes.

A4.2.2 Telemetry Channel 16 commutator points 49, 51, and 53 monitor the position of orbital programmer SKIP/REPEAT subcycle switches S111, S112, and S110. Prior to issuing any Command 6 instructions, the STC will evaluate the position of these switches in accordance with the requirements listed in Note 15 of Table A8-1

A4.3 Agena Reorientation After Capsule Separation

The vehicle flight controls will be left on, following capsule separation. The vehicle should return to the local horizontal through the horizon scanner correction signal and maintain controlled flight in the normal orbit attitude until depletion of the control gas supply or battery power. The S-band beacon and telemetry are programmed through Pass 92.

[redacted]

A4.4 Post Recovery Orbit Operations

A4.4.1 Following the recovery pass, the tracking stations will continue vehicle orbit tracking and telemetry recording operations until battery power is exhausted or until operations are terminated by the STC. The STC will establish operations control procedures to investigate the following areas as required during this period:

a. Systems operations exercise and personnel training
b. Vehicle command operations
c. Tracking station operations
d. Simultaneous active S-band tracking from [redacted] and [redacted]
e. Subsystem test requirements based on real-time analysis.

A4.4.2 Real-time data readout and reporting requirements for all tracking stations during post-recovery operations will be the same as the orbit requirements listed in Table A8-1, with the following exceptions:

a. AET payload readouts are not required
b. SPI data will be read only by [redacted] at the request of the STC.

A5 RECOVERY OPERATIONS

A5.1 Surface Ship Deployment and Operation

A5.1.1 A 24-hour water recovery capability will be provided within the recovery zone boundaries as shown in Figure A7-3. In addition to the USNS Sunnyvale and USNS Longview, auxiliary surface recovery support will be provided in the northern area by one or more surface ships, depending on the speed and range capability of units available.

A5.1.2 Auxiliary surface recovery support will be provided to permit recovery within 24 hours after notification of water impact in the recovery zone between 14° N and 26° N latitude. Ship-to-shore communications will be maintained with the PMR representative for direction.

A5.1.3 The surface ships will depart with sufficient time to arrive at initial deployment stations by T + 4 hours and will subsequently be deployed to assure surface recovery support for all variations of orbit period. The PAC will evaluate tracking data after launch and will provide predicted capsule impact location and time for each day not later than T + 4 hours. On receipt of impact predictions, the STC will provide surface ship re-deployment instructions to the RCC. Figure A7-1 shows the ships at initial stations and nominal positions for each day. If desired by PMR, the initial positions of the USNS Longview and the USNS Sunnyvale can be exchanged. The STC is to be notified of such a change one day prior to launch.

A5.1.4 The USNS Longview and USNS Sunnyvale will be deployed in the extended recovery area primarily to provide capsule detection and surface recovery capability in the event of capsule overshoot. Capsule telemetry will be recorded. These ships will be positioned at 8° N latitude as shown in Figure A7-3 and will be re-deployed laterally to assure one ship coverage for each alternate day pass. If the period is such that both ships can cover the actual recovery pass, the easterly ship will be re-deployed to 11° N latitude and the westerly ship to 6° N latitude. Initial stations will permit re-deployment of either ship to cover its assigned area in one day. For the nominal orbit period as shown in Figures A7-1 and A7-2, the Sunnyvale would cover Passes 32, 47 and 62. The Longview would cover Pass 2 and then move further east of its initial station to cover Passes 17, 32, 47 and 62.

A5.1.4.1 Either one or both of these ships will be positioned directly under the orbit plane on the recovery pass to enable reception of the capsule signals in the extended recovery area. The quad-helix antenna, until acquisition, will scan ±90 degrees about 360-degree azimuth at 10 degrees elevation at the rate of once per 15 seconds from ETPD - 0 until ETPD + 2 minutes. From ETPD + 2 minutes until ETPD + 5 minutes, the quad-helix antenna will give full area coverage by scanning ±90 degrees about 360-degree azimuth with antenna elevation increasing and decreasing from 10 degrees to 70 degrees to 10 degrees in increments of 20 degrees per scan. The scan rate

[redacted]

will be once per 15 seconds. After ETPD + 5 minutes, the antenna will be positioned at 10 degrees elevation and 180-degree azimuth. In the event that either ship acquires the capsule signals, the telemetry will be recorded on magnetic tape as specified in the Detailed Recording Requirements, and antenna acquisition and bearing will be immediately reported through PMR to the RCC. Bearings will be relayed to RCC at intervals of one minute. When the parachute deployment telemetry sequence is received or when the antenna azimuth becomes constant, the ship will so report verbally over SSB radio through PMR to the RCC and provide ship position and antenna azimuth and elevation. If no capsule signals are acquired by the ships, a negative verbal report will be submitted over SSB radio through PMR to the RCC at ETPD + 30 minutes.

A5.2 Airborne Recovery Force Deployment

A5.2.1 Two RC-121 aircraft will be deployed as shown in Figure A7-4 for communication control and direction of the Recovery Force. Each RC-121 aircraft will be equipped with SSB radio for direct communication with the RCC. Separate HF and VHF communication will be maintained with elements of the Recovery Force. The RC-121 aircraft will be designated as Command Aircraft for the forces in the primary and secondary recovery areas.

A5.2.2 Four telemetry/detection aircraft will be utilized in the recovery area for capsule detection and search, and will be on station by ETPD - 1 hour. The aircraft positioned at 13° N latitude will be equipped with SSB radio and will be designated as Command Aircraft for the forces in the extended recovery area. The nominal deployment of these aircraft for normal and alternate recovery days is shown in Figures A7-1 and A7-2. Placement of these aircraft in order of position priority is as follows:

[redacted]

	Predicted Impact Longitude	TM/DF Aircraft Position
a.	East of 154° W and West of 170° W (with 1 or 2 surface ship coverage)	13 degrees 3 degrees 15 degrees 23 degrees
b.	154° W to 161° W (with 1 surface ship coverage)	13 degrees 3 degrees 15 degrees 11 degrees
c.	154° W to 161° W (with 2 surface ship coverage)	13 degrees 3 degrees 15 degrees 9 degrees
d.	161° W to 170° W (with 1 or 2 surface ship coverage)	13 degrees 3 degrees 15 degrees 19 degrees

A5.2.3 A telemetry recording aircraft to record the separation sequence of events in the Alaskan area is not required for this flight.

A6 TABLES AND ILLUSTRATIONS

The following tables and illustrations are applicable to the flight of Discoverer Satellite 1106/Discoverer Booster 307/AET-H Payload only. Each table or figure is given the basic number of the section of the general STD to which it applies, the letter A to denote Appendix material, and a number to sequence items in the same category.

Table A2-1
NOMINAL FLIGHT PLANNING DATA

ITEM	DATA
SATELLITE	
S/N	1106
Payload	AET-H
Fuel	UDMH, 3,738 lb
Oxidizer	IRFNA, 9,602 lb
Launch weight	15,945 lb
BOOSTER	
S/N	307
Fuel	RJ-1
Oxidizer	Liquid oxygen
Launch weight (including payload)	123,273 lb
LAUNCH	
Site	VAFB, 75-3, Pad 5
Date	April 1961
Pad azimuth	218.4°
Launch azimuth	172°
Orbital boost time	237.0 sec
Downrange T/M ship location (if USNS Huntsville)	13° N, 117° W
Downrange T/M ship location (if USNS Range Recoverer)	13° N, 118.2° W
Downrange T/M ship heading (if USNS Huntsville)	270° T
Downrange T/M ship heading (if USNS Range Recoverer)	352° T
Programmer setting	5,664 sec (step setting 24)
INJECTION	
Time	T + 460.0 sec
Location	23.2° N, 119.2° W
Altitude	165 nm (190 sm)
Azimuth	171.0°
Velocity	25,687 ft/sec
ORBIT	
Period	94.4 min (5,664 sec)
Apogee	366 nm (422 sm)
Perigee	165 nm (190 sm)
Eccentricity	.027
Regression rate	23.74°/pass
Reset latitudes	20° N [redacted] 32° N [redacted]orthbound) 36° N [redacted]outhbound) 40° N [redacted]orthbound) 45° N [redacted]outhbound) 60° N [redacted]
Inclination angle	81.7°

[redacted]

Table A2-1 (Continued)

ITEM	DATA
RECOVERY	
Aircraft (type and quantity)	C-119's (9), RC-121's (2), Telemetry/Detection (4)
Surface Ships – Initial Positions	
USNS Longview	8° N, 166° W
USNS Sunnyvale	8° N, 154° W
Surface Ship Helicopters	
HRS-3	2 on each Victory Ship
ALTERNATE RECOVERY – DAY 1	
Alternate recovery pass	2
Nominal impact area center	24° N, 166.8° W
ETPD	T + 3.3 hours
EMERGENCY RECOVERY – DAY 1	
Emergency recovery pass	15
Nominal impact area center	17° N, 114.6° W
ETPD	T + 23.7 hours
ALTERNATE RECOVERY – DAY 1	
Alternate recovery pass	17
Nominal impact area center	24° N, 162.8° W
ETPD	T + 26.9 hours
ALTERNATE RECOVERY – DAY 2	
Alternate recovery pass	32
Nominal impact area center	24° N, 158.8° W
ETPD	T + 50.5 hours
ALTERNATE RECOVERY – DAY 3	
Alternate recovery pass	47
Nominal impact area center	24° N, 154.8° W
ETPD	T + 74.1 hours
NORMAL RECOVERY – DAY 4	
Normal recovery pass	62
Nominal impact area center	24° N, 150.8° W
ETPD	T + 97.7 hours

[redacted]

Table A4-1
INSTRUCTIONS REQUIRED TO BE OPERATIVE AT LAUNCH

Discoverer Satellite

1. Agena

   a. Continuous Telemetry Channels:

      6 – Payload quantity. Subcarrier must be present
      7 – Payload quantity. Subcarrier must be present
      8 – Payload quantity. Subcarrier must be present
      9 – Payload quantity. Subcarrier must be present
      10 – Payload quantity. Subcarrier must be present
      18 – Payload quantity. Subcarrier must be present

   b. Commutated Telemetry Channels:

      12 – Subcarrier must be present and commutator running
      13 – Subcarrier must be present and commutator running
      15 – Subcarrier must be present and commutator running
      16 – Subcarrier must be present and commutator running; points 2, 4, 6, 8, 10, 18, 20, 22, 33, 38, 42, and 45 must be present. Channel 1 is an acceptable substitution for Channel 16, points 20 and/or 22. Continuous Channels 11 and 14, as a pair, are an acceptable substitution for Channel 16, points 2, 4, 6, or 8.
      17 – Subcarrier must be present and commutator running

2. Capsule

   a. Continuous Telemetry Channels:

      7 – Subcarrier must be present
      9 – Subcarrier must be present
      11 – Subcarrier must be present

Discoverer Booster

LMSD has reviewed the DAC instrumentation requirements and considers the following measurement to be a primary requirement for launch.

   a. Continuous Telemetry Channel, DAC Kit No. 1

      12 – Combined BTL commands. Subcarrier must be present

Table A5-1
SS/D TIMER SEQUENCE FOR DISCOVERER SATELLITE 1106

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
	-0.1		Timer re-set (ground function)
0		Umb Drop	Lift-off. D-Timer start
0.1	0.1		Timer re-set (ground function)
0.1	0.1		Timer safety input (ground function)
150	150		Start Fairchild Timer
			Start Fairchild Timer
			Disarm Agena destruct
			Arm BTL guidance
			Flight control power ON (backup)
			Uncage integrator
			Open pneumatic valve
			Arm separation squib relays
150	150		Arm separation squib relays
150.2		BTL	Transmit MECO (PI) (disarm destruct)
151.0		Fuel Depletion	MECO (142.53 – 156.65)
151.4		BTL	Transmit arm D1 and D2 (P2)
157.0		BTL	Transmit uncage IRP gyros, initiate velocity correction and timer hold (D1)
159.2		Thor Timer	VECO
160.0		BTL	Terminate D1
160.1		BTL	Initiate D2 (D-Timer hold)
165.1		BTL	Terminate D2
166.5		BTL	Command separation (P3)
167.5	159.5		Uncage IRP gyros (backup)
170.0		Separation Switch	Activate pneumatic control (vehicle leaves adaptor)
178	170		Command separation (backup)
			Command separation (backup)
			Fire horizon scanner (H/S) fairing squibs
178	170		Fire horizon scanner (H/S) fairing squibs
179	171		Remove 28v dc from pneumatic valve and transfer SS/H TLM to turbine speed
179	171		Disable -40°/min yaw rate (no yaw correction required)
181	173		Activate pneumatic control (backup)
			Command -3.6°/sec pitch rate (pitchover 36°)
181	173		Initiate -1.65°/min pitch rate from integ. pot.
191	183		Remove -3.6°/sec pitch rate
			Connect pitch H/S signal to pitch IRP gyro
191	183		Connect roll H/S signal to roll IRP gyro

[redacted]

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
			ORBITAL BOOST*
209	201		Activate H/S electrical bias 0° offset (+1-1/2° mech. offset only)
			Spare (TLM D-Timer monitor)
			Fire ullage rockets
209	201		Fire ullage rockets
221.5	213.5		Unground integrator input
			Connect accelerometer to integrator**
221.5	213.5		Arm and fire gas gen. squib, fire He. Valve, pitch and yaw pneumatics OFF
222.5	214.5		Pitch and yaw pneumatics OFF (backup)
			Open circuit to gas gen. arm and fire and He Valve
			Open circuit to gas gen. arm and fire and He Valve and remove J-Box 28v to pitch and yaw pneumatics OFF
			Open circuit to gas gen. arm and fire and He valve and remove J-Box 28v to pitch and yaw pneumatics OFF
222.5	214.5		Close circuit to TLM over-ride
223			STEADY STATE THRUST*
454	446		Arm pitch and yaw pneumatics
454	446		Engine cutoff safety switch
460			Engine shutdown by integrator
460			Disconnect accelerometer
			Ground integrator input
460			Activate pitch and yaw pneumatics
483	475		Command -40°/min yaw rate (180° yaw)
			Disconnect integrator pitch rate pot. (remove pitch rate)
			Pitch and yaw pneumatics ON (backup)
			Fire helium and oxidizer vent valve squib
			Pitch and yaw pneumatics ON (backup)
483	475		Fire helium and oxidizer vent valve squib
753	745		Start TLM calibrate
			Apply 28v unreg to SS/L power control box
753	745		Apply 28v unreg to SS/L power control box
753	745		Command +3.86°/min pitch rate
			Connect roll H/S signal to yaw gyro (remove -40°/min yaw rate)

** Notation for reference only*

*** Integrator to be set at a dial reading of____representing a velocity-to-be-gained of_____fps. This information was not available at the time of publication.*

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
753	745		Switch out 0.1% regulated 400-cycle power
753	745		Shutdown +28.3v IRP ascent power
753	745		Switch out 0.1% regulated 400-cycle power
763	755		Stop TLM calibrate
			Open engine shutdown, switch antennas, open flight control gain change relays and switch roll and yaw gyro TLM gain
763	755		Shutdown integrator power
770	762		Open circuit to TLM override
			Arm H/S OFF circuit
			SS/D timer OFF, H/S to low gain
			Fire fuel vent valve squib
770	762		Fire fuel vent valve squib
			RECOVERY*
X	X	Fairchild Timer	Re-start SS/D Timer, H/S OFF
X + 22.5	X + 22.5		Command -45°/min pitch rate (pitch over -51°)
X + 22.5	X + 22.5		Arm capsule ejection squib
X + 92	X + 92		Command +3.86°/min pitch rate (Stop -45°/min pitch rate)
			SS/L transfer circuit 1
X + 92	X + 92		SS/L transfer circuit 2
X + 92			Fire capsule plug disconnect squib
X + 94.5	X + 94.5		Fire capsule eject squibs
			Enable timer shutdown circuit
			Fire capsule eject squibs
X + 94.5	X + 94.5		Lockout SS/H re-start signal
X + 154	X + 154		Shutdown SS/D Timer and H/S ON

** Notation for reference only*

Table A6-1
NOMINAL ORBIT SCHEDULE
(BASED ON A 94.4-MINUTE PERIOD)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG. N LATITUDE)
Launch	Launch	0	34.8
	Start Orbit		
	Orbit Injection		23.2
	Beacon, T/M off		5.6(s)
Pass 1	Beacon, T/M on	1.475	75
	65° N latitude (ref)	0.521	65
	RM on	0.547	60
	Cross [redacted] latitude	0.557	57.6
	RM interruption (40)	0.559	57.3
	25° N ref latitude	0.696	25
	Cross [redacted] latitude	0.710	21.6
	Beacon, T/M off	0.761	12
	End of Orbit 1	2.596	0
Pass 2	Beacon, T/M on	3.050	75
	RM on	0.119	60
	Cross [redacted] latitude	0.129	57.6
	RM interruption (20)	0.133	58.7
	Cross [redacted] latitude	0.280	21.6
	Beacon, T/M off	0.329	12
	End of Orbit 2	4.057	0
Pass 3	End of Orbit 3	5.743	0
Pass 4	End of Orbit 4	7.316	0
Pass 5	End of Orbit 5	8.889	0
Pass 6	Beacon, T/M on	9.000	25
	RM on	0.075	40
	RM interruption (20)	0.079	41.3
	Cross [redacted] latitude	0.086	42.9
	Beacon, T/M off	9.164	60
	End of Orbit 6	10.461	0
Pass 7	Beacon, T/M on	10.572	25
	RM on	0.647	40
	Cross [redacted] latitude	0.663	42.9
	RM interruption (40)	0.660	42.7
	Beacon, T/M off	0.738	60
	End of Orbit 7	12.075	0
Pass 8	Beacon, T/M on	12.086	17
	RM on	0.179	32
	RM interruption (60)	0.199	36
	Cross [redacted] latitude	0.197	34.8
	Beacon, T/M off	0.270	52
	End of Orbit 8	13.609	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG. N LATITUDE)
Pass 9	Beacon, T/M on	13.682	17
	RM on	0.751	32
	Cross [redacted] latitude	0.770	34.8
	RM interruption (20)	0.763	33.3
	Beacon, T/M off	0.842	52
	End of Orbit 9	15.181	0
Pass 10	Beacon, T/M on	15.201	5
	RM on	0.272	20
	RM interruption (40)	0.282	22.5
	Cross [redacted] latitude	0.444	57.6
	Beacon, T/M off	0.475	65
	End of Orbit 10	16.754	0
Pass 11	End of Orbit 11	18.328	0
Pass 12	End of Orbit 12	19.902	0
Pass 13	Beacon, T/M on	20.417	61
	RM on	0.488	45
	Cross [redacted] latitude	0.493	42.9
	RM interruption (40)	0.498	42.5
	Beacon, T/M off	0.538	34
	End of Orbit 13	21.474	0
Pass 14	Beacon, T/M on	21.989	61
	RM on	22.060	45
	Cross [redacted] latitude	0.065	42.9
	RM interruption (60)	0.067	41
	Beacon, T/M off	0.110	34
	End of Orbit 14	23.046	0
Pass 15	Beacon, T/M on	23.490	75
	RM on	0.561	60
	RM interruption (20)	0.566	58.7
	Cross [redacted] latitude	0.561	60
	Cross [redacted] latitude	0.672	34.8
	Beacon, T/M off	0.731	22
	End of Orbit 15	24.618	0
Pass 16	Beacon, T/M on	24.072	75
	RM on	0.143	60
	Cross [redacted] latitude	0.151	57.6
	RM interruption (40)	25.158	56
	Cross [redacted] latitude	0.303	21.6
	Beacon, T/M off	0.305	22
	End of Orbit 16	26.192	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG. N LATITUDE)
Pass 17	Beacon, T/M on	26.644	75
	RM on	0.715	60
	Cross [redacted] latitude	0.725	57.6
	RM interruption (60)	0.722	56
	Cross [redacted] latitude	0.877	21.6
	Beacon, T/M off	0.917	12
	End of Orbit 17	27.766	0
Pass 18	End of Orbit 18	29.338	0
Pass 19	End of Orbit 19	30.911	0
Pass 20	End of Orbit 20	32.483	0
Pass 21	Beacon, T/M on	32.594	25
	RM on	0.664	40
	RM interruption (40)	0.674	42.5
	Cross [redacted] latitude	0.705	42.9
	Beacon, T/M off	0.753	60
	End of Orbit 21	34.057	0
Pass 22	Beacon, T/M on	34.170	25
	RM on	0.249	40
	Cross [redacted] latitude	0.262	42.9
	RM interruption (60)	0.267	44
	Beacon, T/M off	0.340	60
	End of Orbit 22	35.647	0
Pass 23	Beacon, T/M on	35.707	17
	RM on	0.775	32
	RM interruption (20)	0.781	33.4
	Cross [redacted] latitude	0.793	34.8
	Beacon, T/M off	0.867	52
	End of Orbit 23	37.204	0
Pass 24	Beacon, T/M on	37.279	15
	RM on	0.350	32
	Cross [redacted] latitude	0.366	34.8
	RM interruption (40)	0.364	34.7
	Beacon, T/M off	37.441	52
	End of Orbit 24	38.776	0
Pass 25	Beacon, T/M on	38.796	5
	RM on	0.867	20
	Cross [redacted] latitude	0.876	21.6
	RM interruption (60)	0.897	24
	Cross [redacted] latitude	39.041	57.6
	Beacon, T/M off	0.076	66
	End of Orbit 25	40.350	0
Pass 26	End of Orbit 26	41.924	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG. N LATITUDE)
Pass 27	Beacon, T/M on	42.439	0
	RM on	0.510	45
	Cross [redacted] latitude	0.515	42.9
	RM interruption (20)	0.512	43.7
	Beacon, T/M off	0.560	34
	End of Orbit 27	43.496	0
Pass 28	Beacon, T/M on	44.013	0
	RM on	0.082	45
	Cross [redacted] latitude	0.088	42.9
	RM interruption (40)	0.101	42.5
	Beacon, T/M off	0.129	34
	End of Orbit 28	45.069	0
Pass 29	Beacon, T/M on	45.585	61
	RM on	0.655	45
	Cross [redacted] latitude	0.660	42.9
	RM interruption (60)	0.684	41
	Beacon, T/M off	0.703	34
	End of Orbit 29	46.641	0
Pass 30	Beacon, T/M on	47.095	75
	RM on	0.166	60
	RM interruption (20)	0.171	58.7
	Cross [redacted] latitude	0.268	34.8
	Beacon, T/M off	0.327	22.0
	End of Orbit 30	48.220	0
Pass 31	Beacon, T/M on	48.667	75
	RM on	0.738	60
	Cross [redacted] latitude	0.748	57.6
	RM interruption (40)	0.750	57.3
	Beacon, T/M off	0.899	22
	Cross [redacted] latitude	0.914	21.6
	End of Orbit 31	49.787	0
Pass 32	Beacon, T/M on	50.240	75
	RM on	0.309	60
	Cross [redacted] latitude	0.321	57.6
	RM interruption (60)	50.329	56
	Cross [redacted] latitude	0.472	21.6
	Beacon, T/M off	0.522	10
	End of Orbit 32	51.362	0
Pass 33	End of Orbit 33	52.934	0
Pass 34	End of Orbit 34	54.508	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG. N LATITUDE)
Pass 35	Beacon, T/M on	54.605	25
	RM on	0.684	40
	RM interruption (20)	0.689	41.3
	Cross [redacted] latitude	0.697	42.9
	Beacon, T/M off	0.775	60
	End of Orbit 35	56.082	0
Pass 36	Beacon, T/M on	56.177	25
	RM on	0.256	40
	RM interruption (40)	0.268	42.7
	Cross [redacted] latitude	0.269	42.9
	Beacon, T/M off	0.347	60
	End of Orbit 36	57.654	0
Pass 37	Beacon, T/M on	57.765	25
	RM on	0.832	40
	RM interruption (60)	0.877	44
	Cross [redacted] latitude	0.872	42.9
	Beacon, T/M off	0.921	60
	End of Orbit 37	59.227	0
Pass 38	Beacon, T/M on	59.338	25
	Cross [redacted] latitude	0.374	34.8
	RM on	0.406	40
	RM interruption (20)	59.439	41.3
	Beacon, T/M off	0.514	60
	End of Orbit 38	60.799	0
Pass 39	Beacon, T/M on	60.873	17
	RM on	0.944	32
	RM interruption (40)	0.958	34.7
	Cross [redacted] latitude	0.960	34.8
	Beacon, T/M off	61.035	52
	End of Orbit 39	62.373	0
Pass 40	Beacon, T/M on	62.393	5
	RM on	0.615	20
	Cross [redacted] latitude	0.472	21.6
	RM interruption (60)	0.479	23.7
	Cross [redacted] latitude	0.536	57.6
	Beacon, T/M off	0.551	65
	End of Orbit 40	63.947	0
Pass 41	End of Orbit 41	65.519	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG. N LATITUDE)
Pass 42	Beacon, T/M on	65.312	61
	RM on	0.382	45
	RM interruption (20)	0.385	43.7
	Cross [redacted] latitude	0.387	42.9
	Beacon, T/M off	0.430	34
	End of Orbit 42	66.368	0
Pass 43	Beacon, T/M on	67.609	61
	RM on	0.679	45
	RM interruption (40)	0.682	42.3
	Cross [redacted] latitude	0.684	42.9
	Beacon, T/M off	0.727	34
	End of Orbit 43	68.665	0
Pass 44	Beacon, T/M on	69.181	61
	RM on	0.250	45
	RM interruption (60)	0.269	41
	Cross [redacted] latitude	0.257	42.9
	Beacon, T/M off	0.297	34
	End of Orbit 44	70.237	0
Pass 45	Beacon, T/M on	70.686	75
	RM on	0.757	60
	RM interruption (20)	0.762	58.7
	Cross [redacted] latitude	0.859	34.8
	Beacon, T/M off	0.818	22
	End of Orbit 45	71.811	0
Pass 46	Beacon, T/M on	72.262	75
	RM on	0.333	60
	Cross [redacted] latitude	0.343	57.6
	RM interruption (40)	0.341	57.3
	Beacon, T/M off	0.495	22
	Cross [redacted] latitude	0.498	21.6
	End of Orbit 46	73.384	0
Pass 47	Beacon, T/M on	73.836	75
	RM on	0.905	60
	Cross [redacted] latitude	0.915	57.6
	RM interruption (60)	0.922	56.3
	Cross [redacted] latitude	74.115	21.6
	Beacon, T/M off	0.119	12
	End of Orbit 47	74.956	0
Pass 48	End of Orbit 48	76.530	0
Pass 49	End of Orbit 49	78.104	0
Pass 50	End of Orbit 50	79.676	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG. N LATITUDE)
Pass 51	Beacon, T/M on	79.772	25
	RM on	0.851	40
	RM interruption (20)	0.857	41.3
	Cross [redacted] latitude	0.864	42.9
	Beacon, T/M off	0.942	60
	End of Orbit 51	81.249	0
Pass 52	Beacon, T/M on	81.360	25
	RM on	0.427	40
	RM interruption (40)	0.440	42.5
	Cross [redacted] latitude	0.477	42.9
	Beacon, T/M off	0.522	60
	End of Orbit 52	82.823	0
Pass 53	Beacon, T/M on	82.934	25
	Cross [redacted] latitude	0.993	34.8
	RM on	83.002	40
	RM interruption (60)	0.038	44
	Beacon, T/M off	0.094	60
	End of Orbit 53	84.397	0
Pass 54	Beacon, T/M on	84.471	17
	RM on	0.473	32
	RM interruption (20)	0.477	31.3
	Cross [redacted] latitude	0.559	34.8
	Beacon, T/M off	0.631	52
	End of Orbit 54	85.969	0
Pass 55	Beacon, T/M on	86.045	17
	Cross [redacted] latitude	0.063	21.6
	RM on	0.114	32
	RM interruption (40)	0.117	34.7
	Beacon, T/M off	0.204	52
	Cross [redacted] latitude	0.206	57.6
	End of Orbit 55	87.542	0
Pass 56	Beacon, T/M on	87.562	5
	RM on	0.632	20
	Cross [redacted] latitude	0.642	21.6
	RM interruption (60)	0.647	24
	Cross [redacted] latitude	0.693	57.6
	Beacon, T/M off	0.820	65
	End of Orbit 56	89.114	0
Pass 57	Beacon, T/M on	89.632	61
	RM on	0.701	45
	RM interruption (20)	0.705	43.7
	Cross [redacted] latitude	0.708	42.9
	Beacon, T/M off	0.748	34
	End of Orbit 57	90.688	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG. N LATITUDE)
Pass 58	Beacon, T/M on	91.206	61
	RM on	0.275	45
	RM interruption (40)	0.280	42.3
	Cross [redacted] latitude	0.282	42.9
	Beacon, T/M off	0.322	34
	End of Orbit 58	92.262	0
Pass 59	Beacon, T/M on	92.777	61
	RM on	0.848	45
	RM interruption (60)	0.856	41
	Cross [redacted] latitude	0.854	42.9
	Beacon, T/M off	0.895	34
	End of Orbit 59	93.833	0
Pass 60	Beacon, T/M on	94.282	75
	RM on	94.353	60
	RM interruption (20)	94.358	58.7
	Cross [redacted] latitude	94.455	34.8
	Beacon, T/M off	94.514	22
	End of Orbit 60	95.407	0
Pass 61	Beacon, T/M on	95.860	75
	RM on	0.929	60
	Cross [redacted] latitude	0.937	57.6
	RM interruption (40)	0.934	57.3
	Cross [redacted] latitude	96.033	21.6
	Beacon, T/M off	0.093	22
	End of Orbit 61	0.981	0
Pass 62	Beacon, T/M on	97.433	75
	RM on	0.503	60
	Cross [redacted] latitude	0.513	57.6
	RM interruption (60)	0.530	56.3
	Cross [redacted] latitude	0.663	21.6
	Beacon, T/M off	0.665	22
	End of Orbit 62	98.554	0
Pass 63	Beacon, T/M on	99.018	75
	RM on	0.012	60
	Cross [redacted] latitude	0.116	57.6
	RM interruption (20)	0.132	48.7
	Cross [redacted] latitude	0.270	21.6
	Beacon, T/M off	0.311	12
	End of Orbit 63	100.127	0

Table A8-1

REAL-TIME DATA READOUT AND REPORTING REQUIREMENTS

	MEASUREMENT		CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					DOWNRANGE T/M SHIP***	T/M AIRCRAFT***	NOTE
	NAME	NUMBER						[redacted]				TIS		WV-2 137890	
LAUNCH	Liftoff Signal	---	---	1	RT	X	Ascent	X							
	Thor Main Engine Cutoff	---	DAC (1) 13	1	RT	X	Ascent	X							
	Booster Separation	A93	16-24	1	RT	X	Ascent	X							
	Agena Engine Ignition and Cutoff	B6	14	1	RT	X	Ascent	X					X		
	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		Ascent	X							
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	Ascent	X							
	11-Second Step Switch Position	H108	16-20	1	RT		Ascent	X					X		
	110-Second Step Switch Position	H109	16-22	1	RT		Ascent	X					X		
	Increase/Decrease Switch Position	H107	16-18	1	RT	X	Ascent	X					X		
	Re-entry Enable Switch Position	H117	16-45	1	RT	X	Ascent	X					X		3
	Payload Function Selector Setting	AET 14/15, 17/18, 20/ 21, 23/24	13-18 thru 13-24, 13-48 thru 13-54	1	RT	X	Ascent	X					X		
	Control Gas Supply Pressure—High Range	D95	16-33	1	RT	X	Ascent	X					X		15 15
	Timer Condition 1	H150	16-53	1	RT	X	Ascent	X							15
	Timer Condition 2	H151	16-49	1	RT	X	Ascent	X							1
	Timer Condition 3	H152	16-51	1	RT	X	Ascent	X							
	Yaw Gyro Torque	D84	17-54	2	PP1		Ascent						X		2
	Battery Current Monitor	C27	15-53	2	PP1		Ascent	X					X		2
	Longitudinal Acceleration	A-103	11	2	See Note 2		Ascent	X					X		
	Separation Switch Monitor	C-79	17-11	2	See Note 2		Ascent	X							
ORBIT	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		1 thru 62	X	X	X	X				
	Command Verifications 1, 2, 3, 4	H112	11	1	RT	X	1 thru 62	X	X	X	X				
	Command Verifications 5, 6	H114	14	1	RT	X	1 thru 62	X	X	X	X				
	Programmer Period Readout (Console or Remote)	H110	1	2	RT		1 thru 62	X	X	X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	1 thru 62	X	X	X	X				
	11-Second Step Switch Position	H108	16-20	1	RT		1 thru 62	X	X	X	X				
	110-Second Step Switch Position	H109	16-22	1	RT		1 thru 62	X	X	X	X				
	Increase/Decrease Switch Position	H107	16-18	1	RT	X	1 thru 62	X	X	X	X				

[redacted]

Table A8-1 (Continued)

	MEASUREMENT		CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION [redacted]					DOWNRANGE T/M SHIP***	T/M AIRCRAFT***	NOTE
	NAME	NUMBER										TIS		WV-2 137890	
ORBIT (Continued)	Reset Monitor Signal	H70	16-10	1	RT	X	1 thru 62	X	X	X	X				
	Programmer Pass Identification	H70	16-10	1	RT	X	1 thru 62	X	X	X	X				
	Re-entry Enable Switch Position	H117	16-45	1	RT	X	1 thru 62	X	X	X	X				3
	Payload Function Selector Setting	AET 14/15, 17/18, 20/ 21,23/24	13-18 thru 13-24, 13-48 thru 13-54	1	RT	X	1 thru 62	X	X	X	X				
	Timer Condition 1	H150	16-53	1	RT	X	1 thru 62	X	X	X	X				15
	Timer Condition 2	H151	16-49	1	RT	X	1 thru 62	X	X	X	X				15
	Timer Condition 3	H152	16-51	1	RT	X	1 thru 62	X	X	X	X				15
	Control Gas Supply Pressure – High Range	D95	16-33	1	PP1	X	1 thru 62	X	X	X	X				
	Control Gas Supply Pressure – Low Range	D140	16-27	1	PP1	X	1 thru 62	X	X	X	X				
	Battery Bus Voltage	C1	16-38	2	PP1		1 thru 62	X	X	X	X				
	Battery Case Temperature	C9	15-22	2	PP1		1 thru 62	X	X	X	X				
	Battery Current Monitor	C27	15-53	2	PP1		1 thru 62	X	X	X	X				
	Horizon Scanner – Pitch	D37	16-35	3	PP2		See Note 5 ↓	X	X	X	X				4
	Horizon Scanner – Roll	D39	16-37	3	PP2			X	X	X	X				4
	SPI Temperature	D130	15-43	3	PP2			X	X	X	X				5
	SPI Pitch Angle – Lower	D128	15-51	3	See Note 5			X	X	X	X				5
	SPI Yaw Angle – Lower	D127	15-49	3	See Note 5			X	X	X	X				5
	SPI Pitch Ref. Volt. – Lower	D136	15-2	3	See Note 5			X	X	X	X				5
	SPI Yaw Ref. Voltage – Lower	D137	15-4	3	See Note 5			X	X	X	X				5
	SPI Pitch Angle – Upper	D138	16-50	3	PP2		↓	X	X	X	X				5
	SPI Yaw Angle – Upper	D139	16-52	3	PP2		See Note 5	X	X	X	X				5
	Wave Train	AET 50	8	2	PP1		See Note 14			X					14
	No Name Assigned	AET 40	12-9	2	PP1		See Note 11	X	X	X	X				11
	No Name Assigned	AET 48	12-13	2	PP1		See Note 11	X	X	X	X				11
RE-ENTRY	Programmer Period Readout (Console or Remote)	H110	1	3	RT		Recovery Pass ↓			X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	2	RT	X				X	X				
	11-Second Step Switch Position	H108	16-20	3	PP2					X	X				
	110-Second Step Switch Position	H109	16-22	3	PP2					X	X				
	Reset Monitor Signal	H70	16-10	1	RT	X				X					
	Programmer Pass Identification	H70	16-10	2	RT		↓			X					
	Re-entry Enable Switch Position	H117	16-45	1	RT	X	Recovery Pass			X	X				3

[redacted]

Table A8-1 (Continued)

	MEASUREMENT		CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					DOWNRANGE T/M SHIP***	T/M AIRCRAFT***	NOTE
	NAME	NUMBER						[redacted]				TIS		WV-2 137890	
RE-ENTRY (Continued)	Control Gas Supply Pressure – High Range	D95	16-33	1	PP1	X	Recovery Pass			X	X				
	Control Gas Supply Pressure – Low Range	D140	16-27	1	PP1	X				X	X				
	Battery Bus Voltage	C1	16-38	2	PP1					X	X				
	Horizon Scanner – Pitch	D37	16-35	1	PP2					X					4
	Horizon Scanner – Roll	D39	16-37	1	PP2					X					4
	SPI Pitch Angle – Lower	D128	15-51	2	See Note 6					X					6
	SPI Yaw Angle – Lower	D127	15-49	2	See Note 6					X					6
	SPI Pitch Ref. Voltage – Lower	D136	15-2	2	See Note 6					X					6
	SPI Yaw Ref. Voltage – Lower	D137	15-4	2	See Note 6					X					6
	SPI Pitch Angle – Upper	D138	16-50	1	PP2					X					6
	SPI Yaw Angle – Upper	D139	16-52	1	PP2					X					6
	Pitch Torque Signal	D41	17-38	2	PP1					X					7
	SS/D Timer Restart	D85	17-52	1	RT	X				X					
	Capsule Separation Event	AET 51	16-42	1	RT	X				X	X			X	8
	Payload Connector Disconnect	AET 26	12-2	2	RT					X	X				13
	Retro-Rocket Ignition, De-spin Valve Actuated, Thrust Cone Ejection	---	Capsule 7	1	RT, PP1	X				X				X	9
	Spin Valve Actuated, Thrust Cone Ejection	---	Capsule 9	1	RT, PP1	X				X				X	9
	Axial Acceleration	---	Capsule 11	1	PP1, PP2	X				X	X	X		X	10
	3 g Switch Close, 3 g Switch Open, Ablative Shell Off	---	Capsule 7	1	RT, PP1	X				X	X	X		X	9
	Parachute Cover Off	---	Capsule 9	1	RT, PP1	X				X	X	X		X	9
	Capsule T/M Signal Strength	---	Capsule 7, 9, 11	2	RT		Recovery Pass			X	X	X		X	12

[redacted]

Table A8-1 (Continued)

NOTES:

1. Report the system time of reorientation, the voltage level prior to start of reorientation, and the average voltage level during reorientation.
2. Backup monitors for ascent events.
3. Reads 1 volt for re-entry disable, 4 volts for re-entry enable.
4. Read when sun position indicator data are required in Notes 5 and 6 (until turn-off at start of reorientation). [redacted]eads on the recovery pass to indicate SS/D restart event if measurement D85 is invalid.
5. With the exception of D130, Channel 15 SPI data will be read only if the SPI data on Channel 16 do not appear valid. Read 3 times at approximately 2-minute intervals correlated with system time on Pass 2 [redacted] and [redacted] on Pass 13 [redacted] on Pass 17 [redacted], on Pass 28 [redacted], on Pass 32 [redacted] on Pass 43 [redacted] on Pass 47 [redacted] and on Pass 58 [redacted] Readings at one system time only are required of [redacted]on Passes 8, 23, 39, and 54. All [redacted] and [redacted]eadings are to be obtained as far north as possible. [redacted]transmits data on Channels 15 and 16 to Sunnyvale on 100-wpm/voice line after Pass 2; three 10-second data samples at 2-minute intervals required.
6. Read at 1-minute intervals before reorientation, 20-second intervals during reorientation, and immediately prior to separation; correlate with system time. Channel 15 SPI data will be read only if the SPI data on Channel 16 do not appear valid. [redacted]transmits data on Channel 15 and 16 to SV on 100-wpm/voice line after recovery pass; continuous transmission from acquisition to separation.
7. Read system time at start and finish of reorientation, voltage level prior to start of reorientation, and average voltage level during reorientation.
8. Reads 4.67 volts prior to separation, 1.33 volts after separation. Correlation within 2 seconds of exact system time is satisfactory for initial [redacted]eport. [redacted]and TIS verify that event has occurred by voltage level check.
9. The RT readout will contain a verification that each event has occurred. The PP1 readout will contain the system time of each event. Use event numbers listed in Paragraph 7.4.6 for identification when reporting.
10. The [redacted] PP1 readout will contain the average value and duration. The PP2 readout will contain a complete time history of acceleration and will include the system time of each data dropout and the time duration of dropout. [redacted]and TIS read values 5 seconds prior to, at, and 5-seconds after parachute deployment.
11. Record voltage level at beginning, middle, and end of pass. Readout, accurate to at least 0.1 volt (2% bandwidth), required of [redacted](Passes 8, 9, 15, 24, 30, 39, 54), [redacted](Passes 6, 7, 13), [redacted](Passes 1, 2, 16), and [redacted](Pass 2). Readouts on Passes 1 and 2 are required 60 minutes after the pass; all other readouts required 10 minutes after the pass at [redacted]and 30 minutes after the pass at [redacted]and [redacted]
12. Provide a qualitative evaluation of signal reception.
13. Reads out of band after separation.
14. Refer to Table A8-2 for details of readout required.
15. Normal indications are 0 volts for H150, 1.4 to 2.2 volts for H151, and 3.3 to 4.2 volts for H152. Command 6 will not be transmitted if any of these three measurements shows an abnormal indication.

---

* *RT – Read in real time.*

PP1 – Read immediately after pass.

PP2 – Read immediately after RT and PP1 readouts.

** *All data are also to be reported to the STC by 60-wpm teletype as soon as possible.*

*** *T/M ships and aircraft will transmit real-time data immediately after signal fade so no interference with the vehicle telemetry signal will be generated.*

[redacted]

Table A8-2
NOMINAL PAYLOAD FUNCTION WAVE TRAIN REAL-TIME READOUT AND REPORTING REQUIREMENTS

CHANNEL 8 (AET 50) READOUT AND REPORTING REQUIREMENTS

PASS NO	TRACKING STATION	MAXIMUM DATA REPORTING TIME ALLOWABLE (MINUTES)		
		READOUT (a)	READOUT (b)	READOUT (c)
1	[redacted]	10	60	90

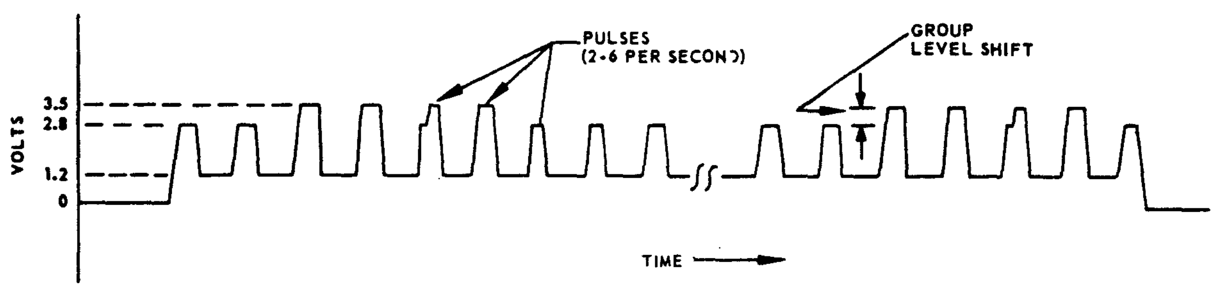
NOTE:

READOUT (a) – COMPARE CHANNEL 8 WAVE TRAIN WITH NOMINAL WAVE TRAIN BELOW. REPORT PRESENCE OR ABSENCE.

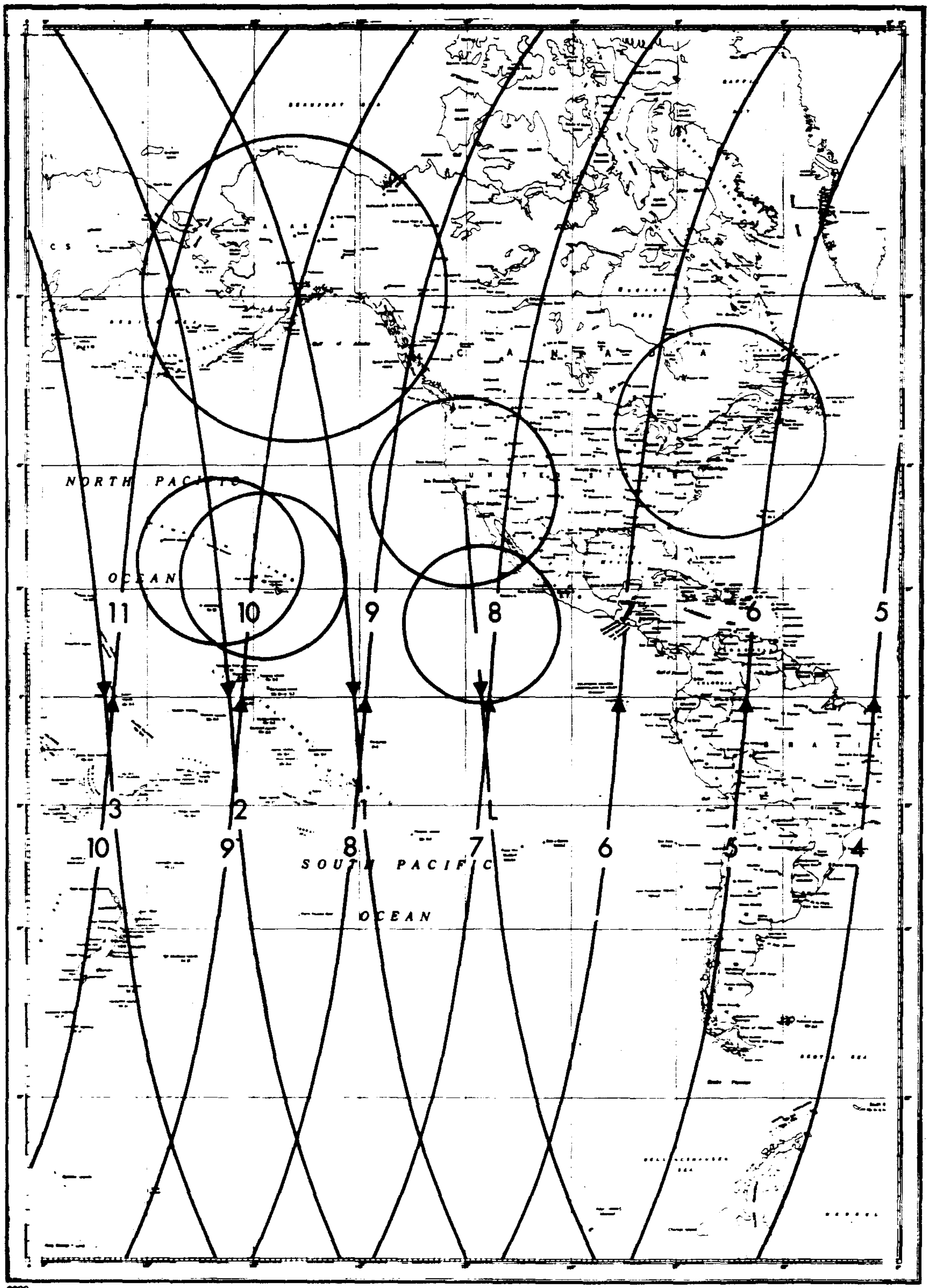
READOUT (b) – REPORT THE TIME (±0.5 SEC) OF THE START OF THE WAVE TRAIN AND THE DURATION (±5 SEC) OF THE WAVE TRAIN.

READOUT (c) – REPORT THE ELAPSED TIME (TO THE NEAREST 0.1 SECOND) REQUIRED FOR 100 PULSES COUNTED FROM LEADING EDGE TO LEADING EDGE AFTER AT LEAST 20 PULSES FROM THE WAVE TRAIN START. REPORT THE NUMBER OF GROUP LEVEL SHIFTS WITHIN THIS 100 PULSE PERIOD.

CHANNEL 8 (AET 50) WAVE TRAIN

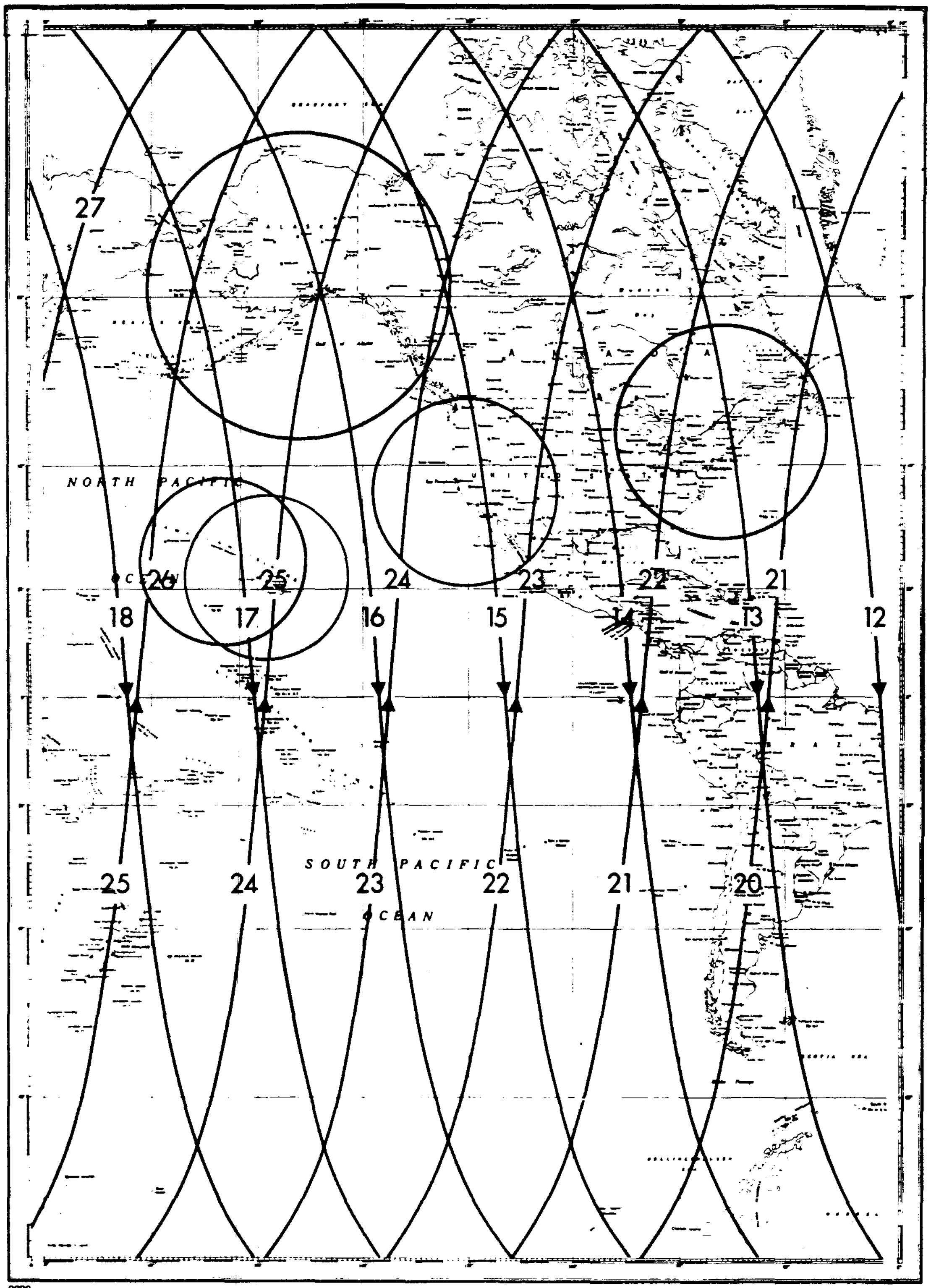


[redacted]



3090
446404-A8-001

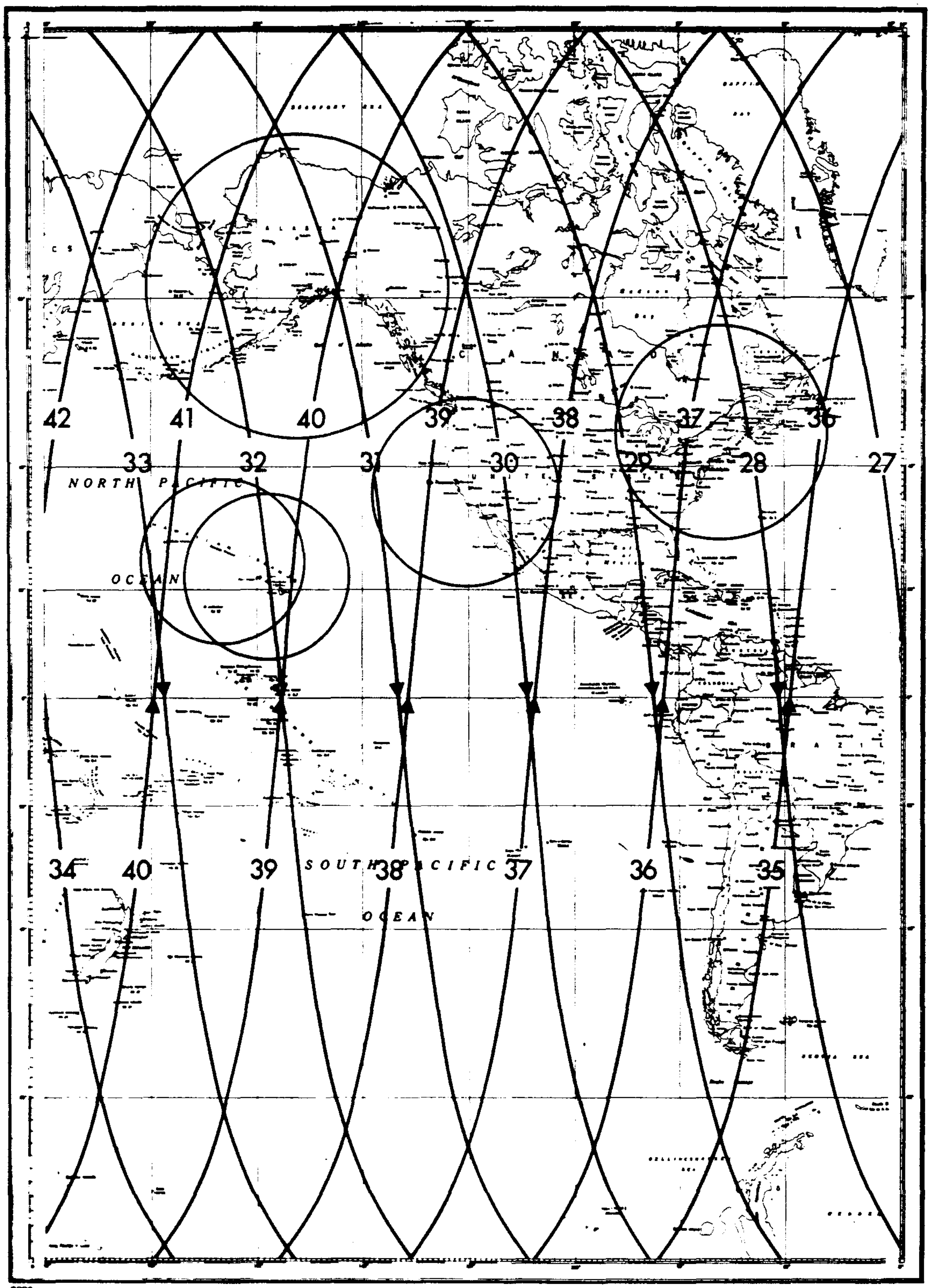
Figure A2-1(a) Nominal Orbit Traces – Launch Through Pass 11



3080
446404-A8-002

Figure A2-1(b) Nominal Orbit Traces – Passes 12 Through 27

[redacted]



3080
446404-A8-003

Figure A2-1(c) Nominal Orbit Traces – Passes 28 Through 42

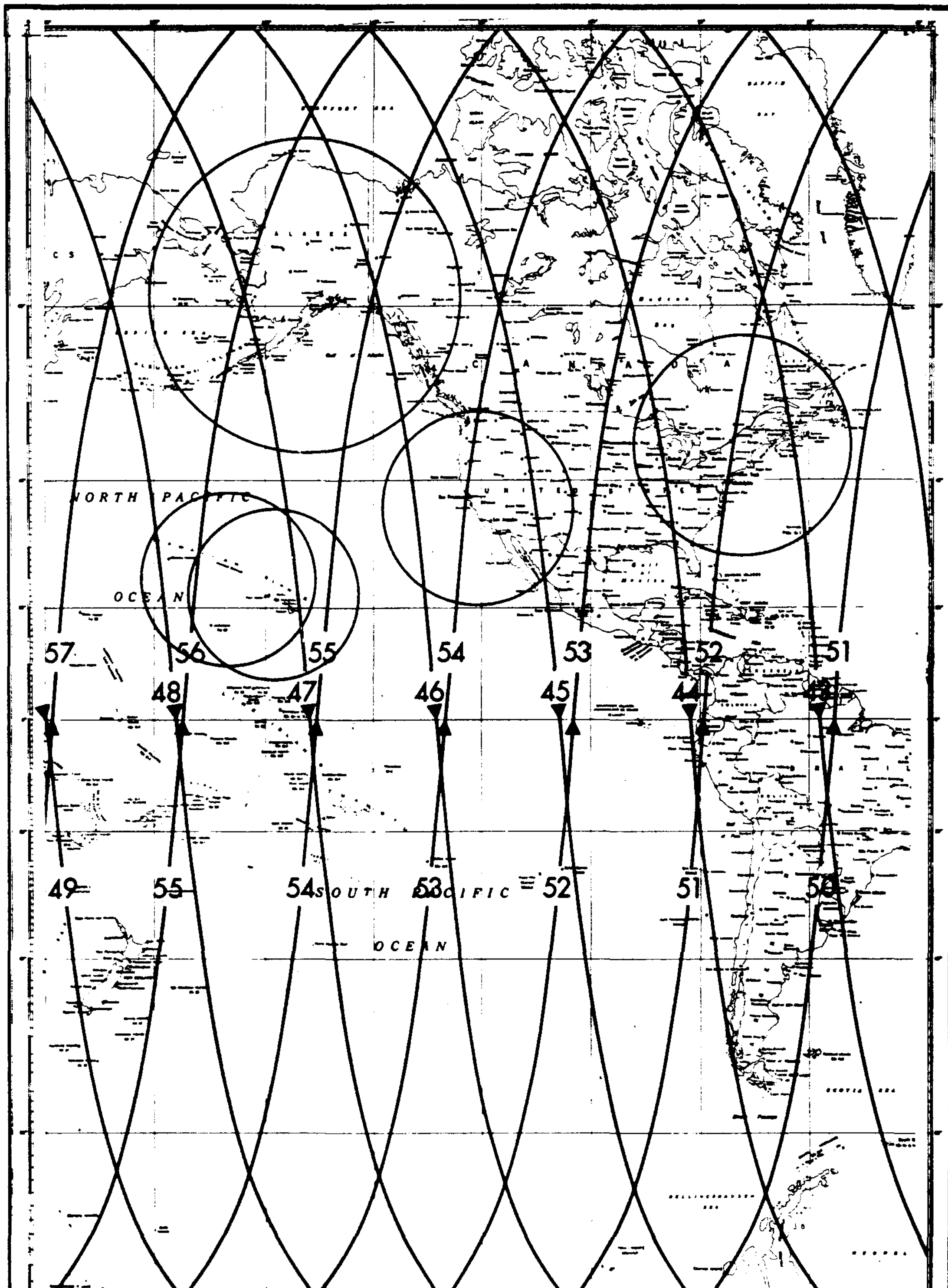


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Figure A2-1(d) Nominal Orbit Traces – Passes 43 Through 57

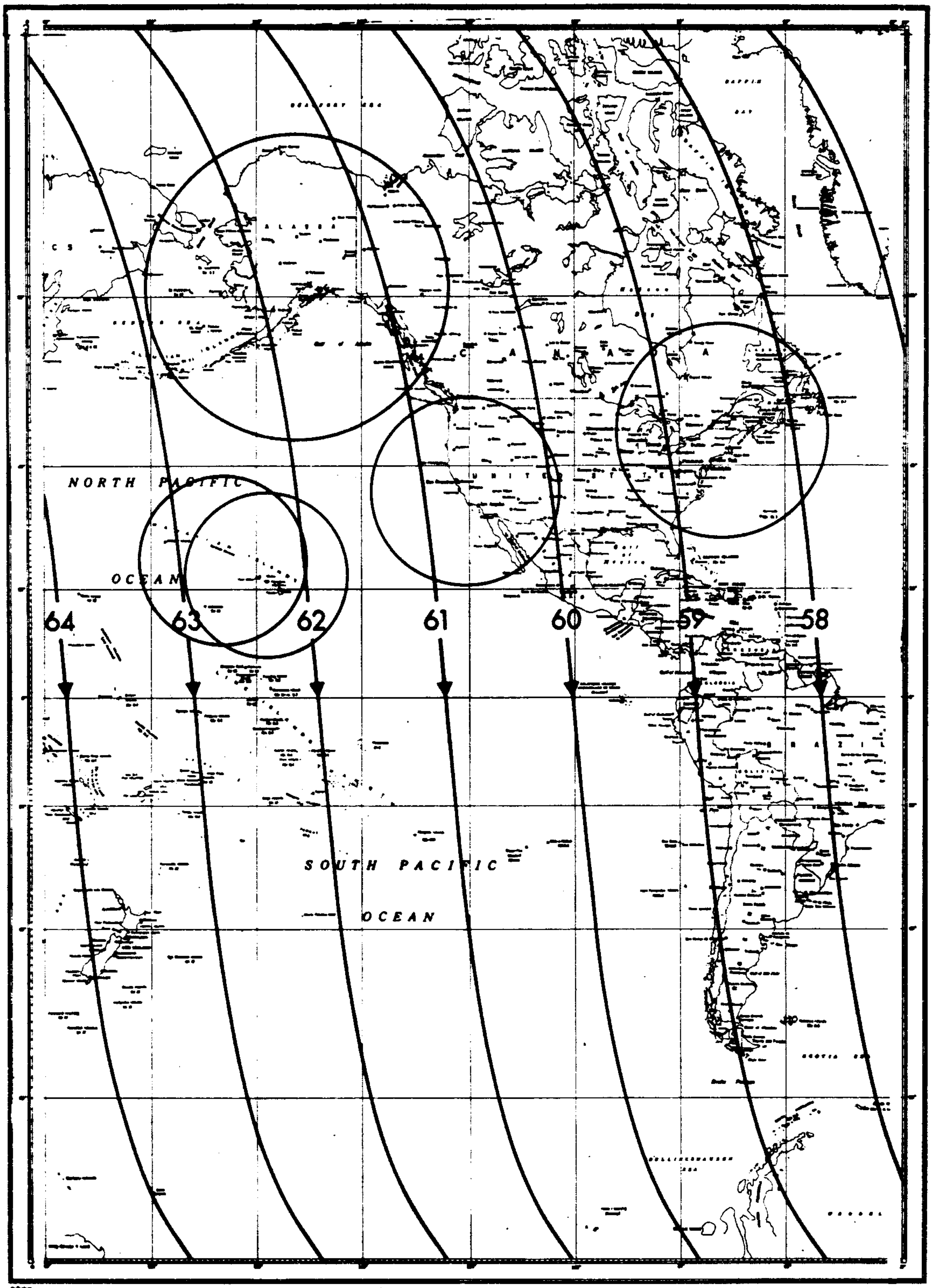


Figure A2-1(e) Nominal Orbit Traces – Passes 58 Through 64

[redacted]

TYPE OF PASS						
A	B	C	D	E	F	G
STATION						
[redacted]						
PROGRAMMER PASS NUMBER						
	ASCENT (20)		1(40)			
			2(60)	6(20)		
				7(40)	8(60)	
					9(20)	10(40)
13(40)						
14(60)		15(20)	16(40)			
			17(60)	21(40)		
				22(60)	23(20)	
					24(40)	25(60)
27(20)						
28(40)						
29(60)	30(20)		31(40)			
			32(60)	35(20)		
				36(40)		
				37(60)	38(20)	
42(20)					39(40)	40(60)
43(40)						
44(60)	45(20)		46(40)			
			47(60)	51(20)		
				52(40)	53(60)	
					54(20)	55(40)
57(20)						56(60)
58(40)						
59(60)	60(20)		61(40)			
			62(60)			
			63(20)	67(20)	68(40)	
					69(60)	70(20)
73(20)						71(40)
74(40)	75(60)		76(20)			
			77(40)			
			78(60)	82(20)		
				83(40)	84(60)	85(20)
88(20)						86(40)
89(40)	90(60)					
	91(20)		92(40)	(BEACON & TM REMAIN ON)		

NOTE: NUMBERS IN PARENTHESIS REPRESENT TIME IN SECONDS FOLLOWING RESET MONITOR INITIATION AT WHICH PROGRAMMER IDENTIFICATION MARK OCCURS. THIS TIME IS TAPE TIME, 90 MIN. PERIOD.

446408-A6-001(3)

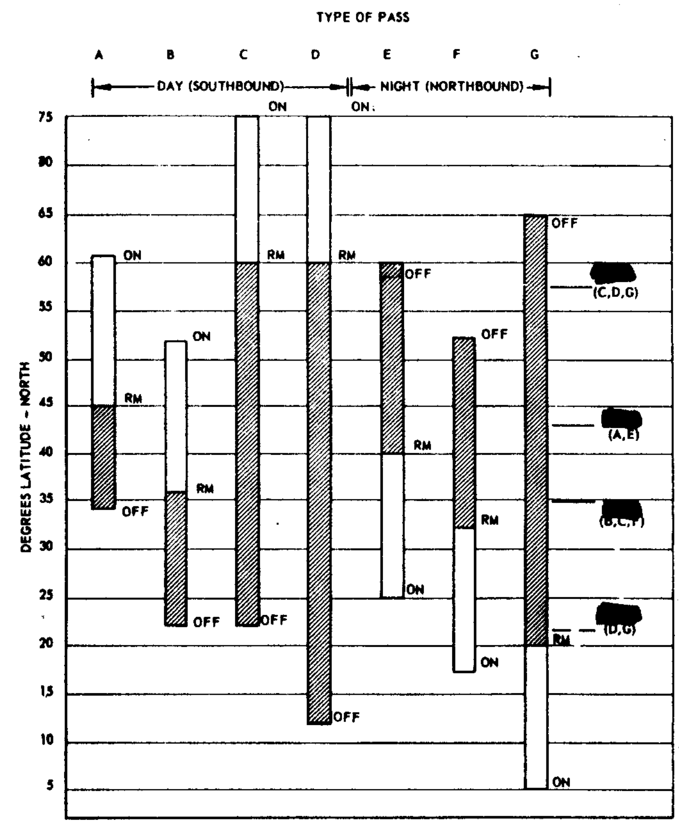


Figure A2-2 Readout and Reset Programming

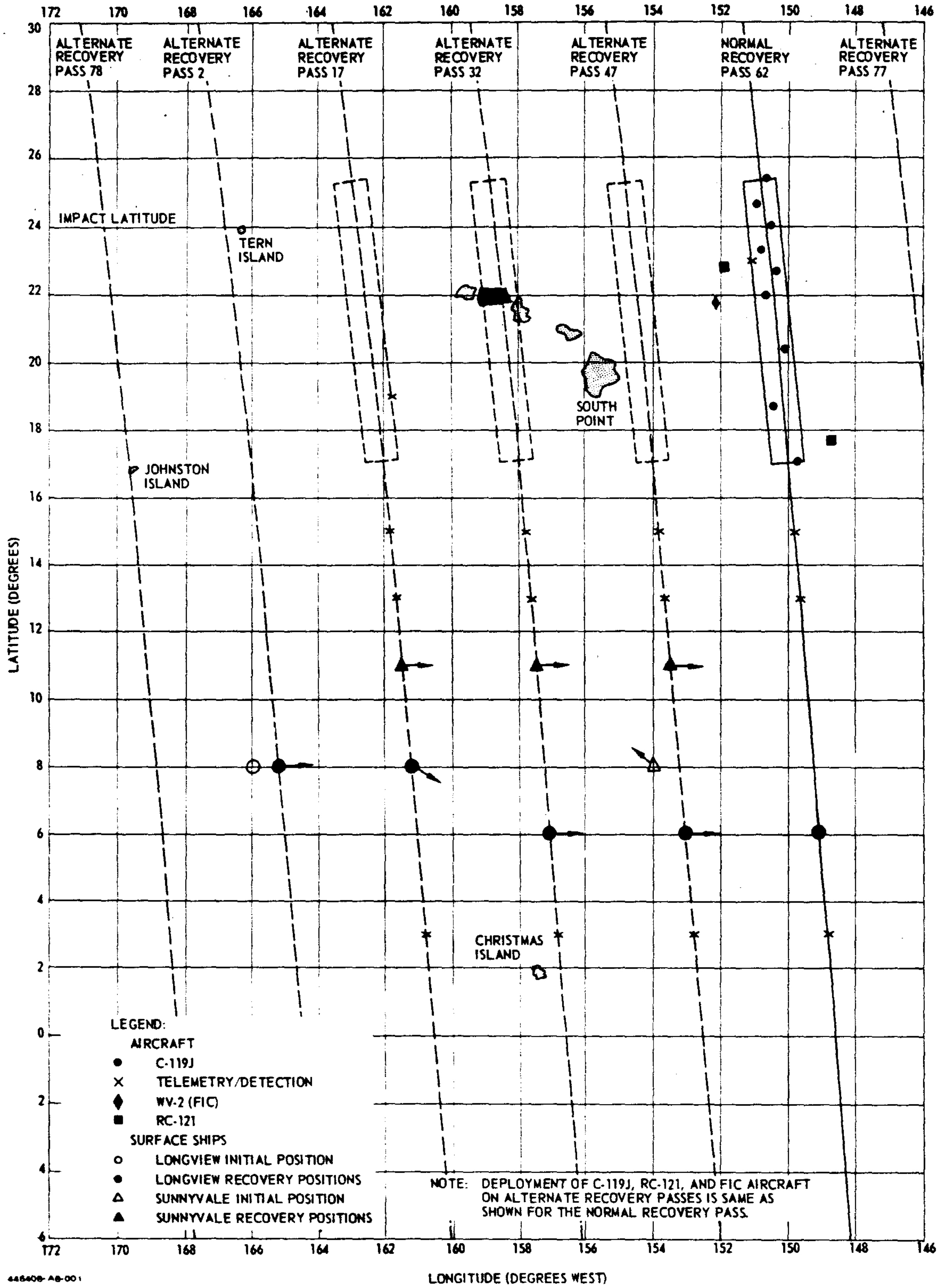


Figure A7-1 Recovery Force Deployment

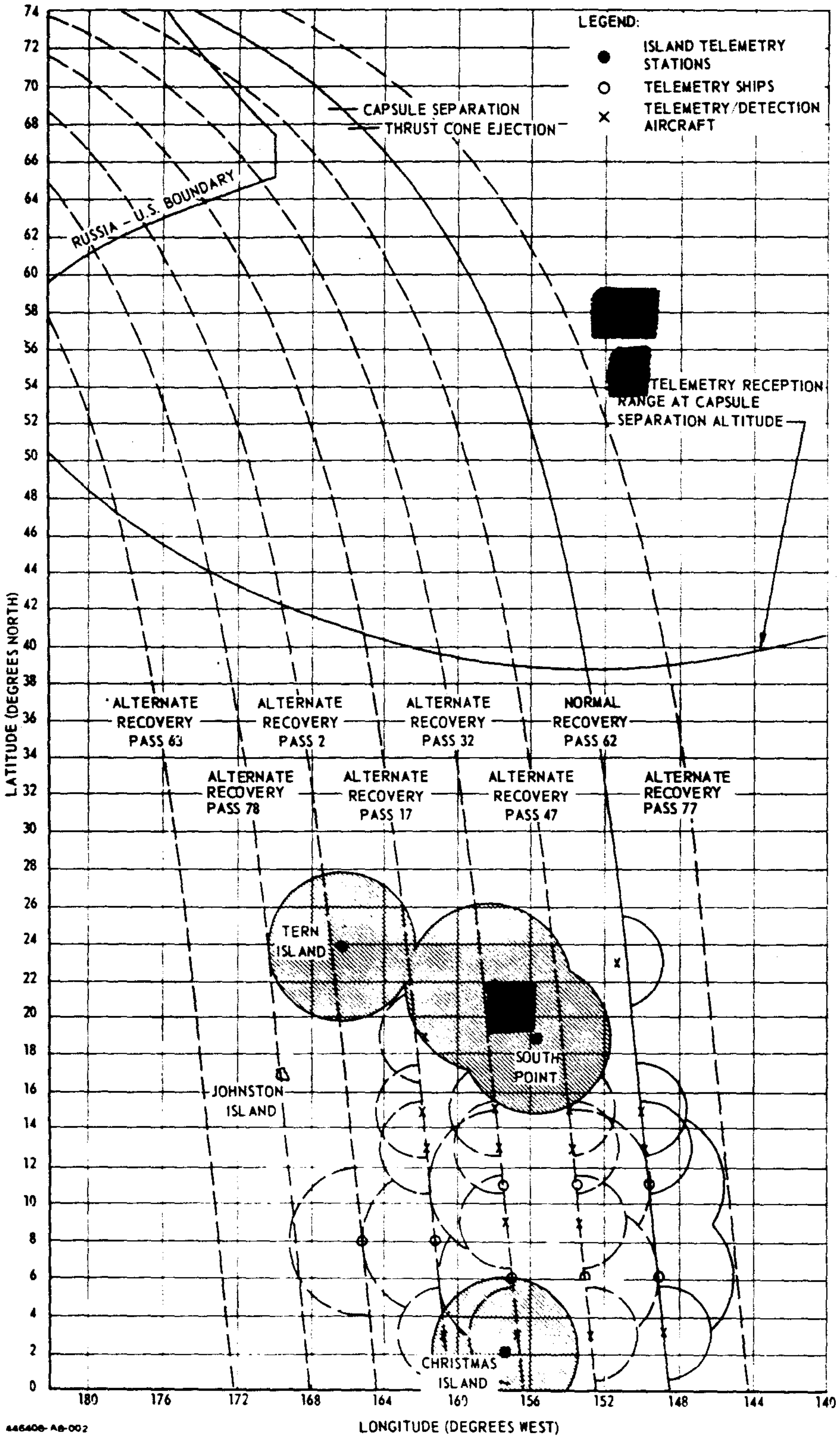


Figure A7-2 Normal and Alternate Re-Entry Telemetry Coverage

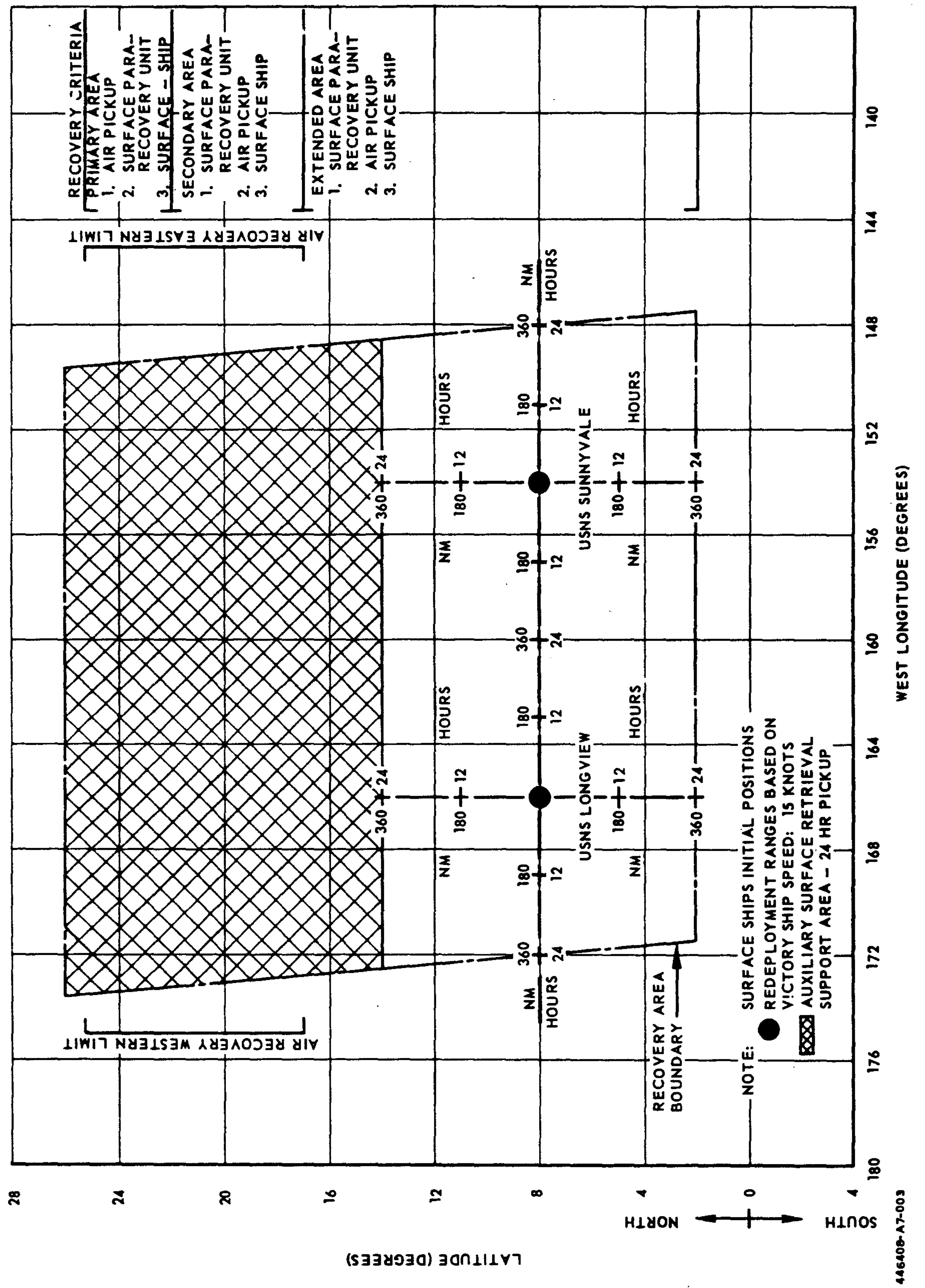


Figure A7-3 Surface Ship Deployment Capability

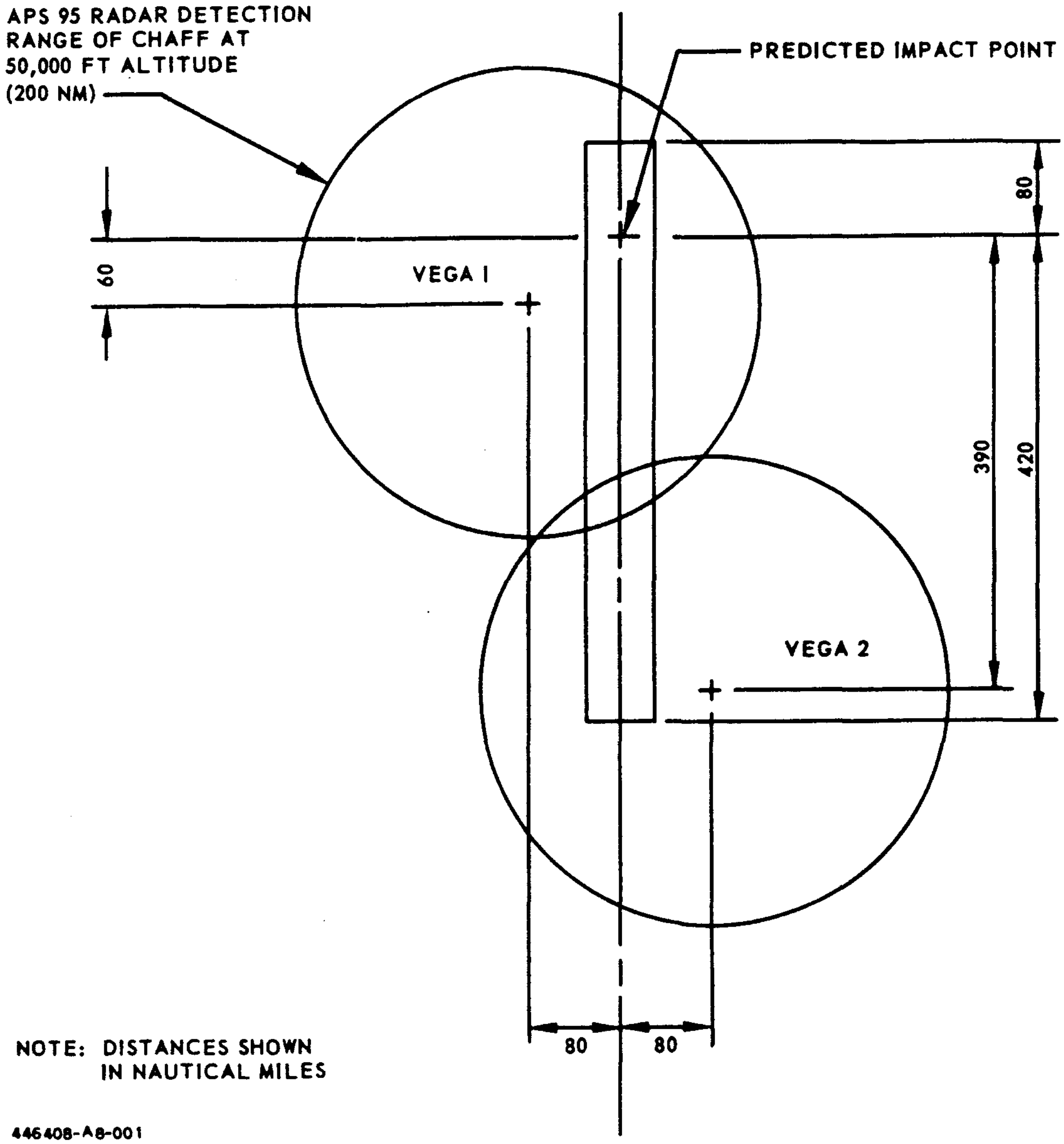
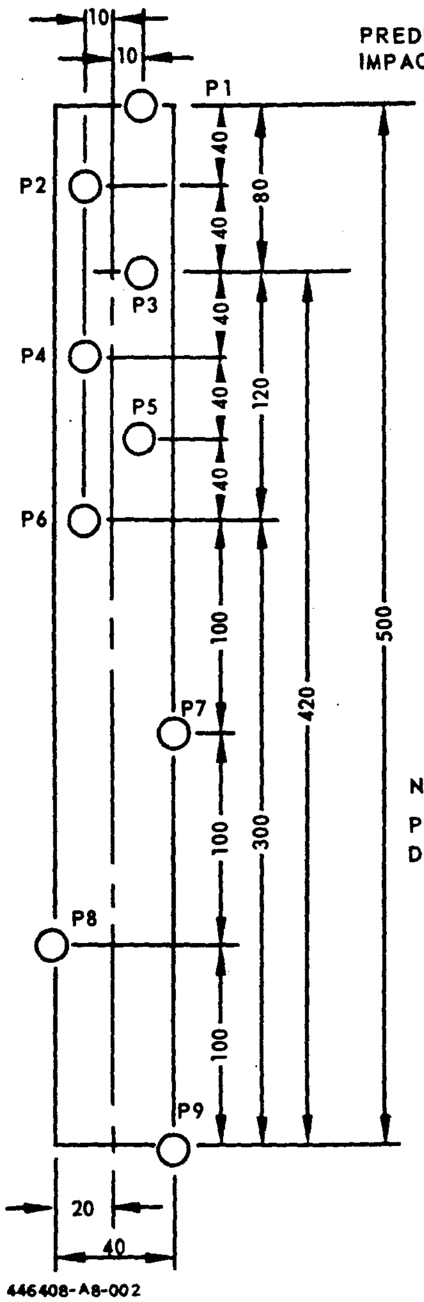


Figure A7-4 RC-121 Aircraft Deployment

[redacted]



NOTE:
P1 THROUGH P9 ARE C-119 AIRCRAFT
DISTANCES SHOWN IN NAUTICAL MILES

Figure A7-5 Recovery Aircraft Deployment

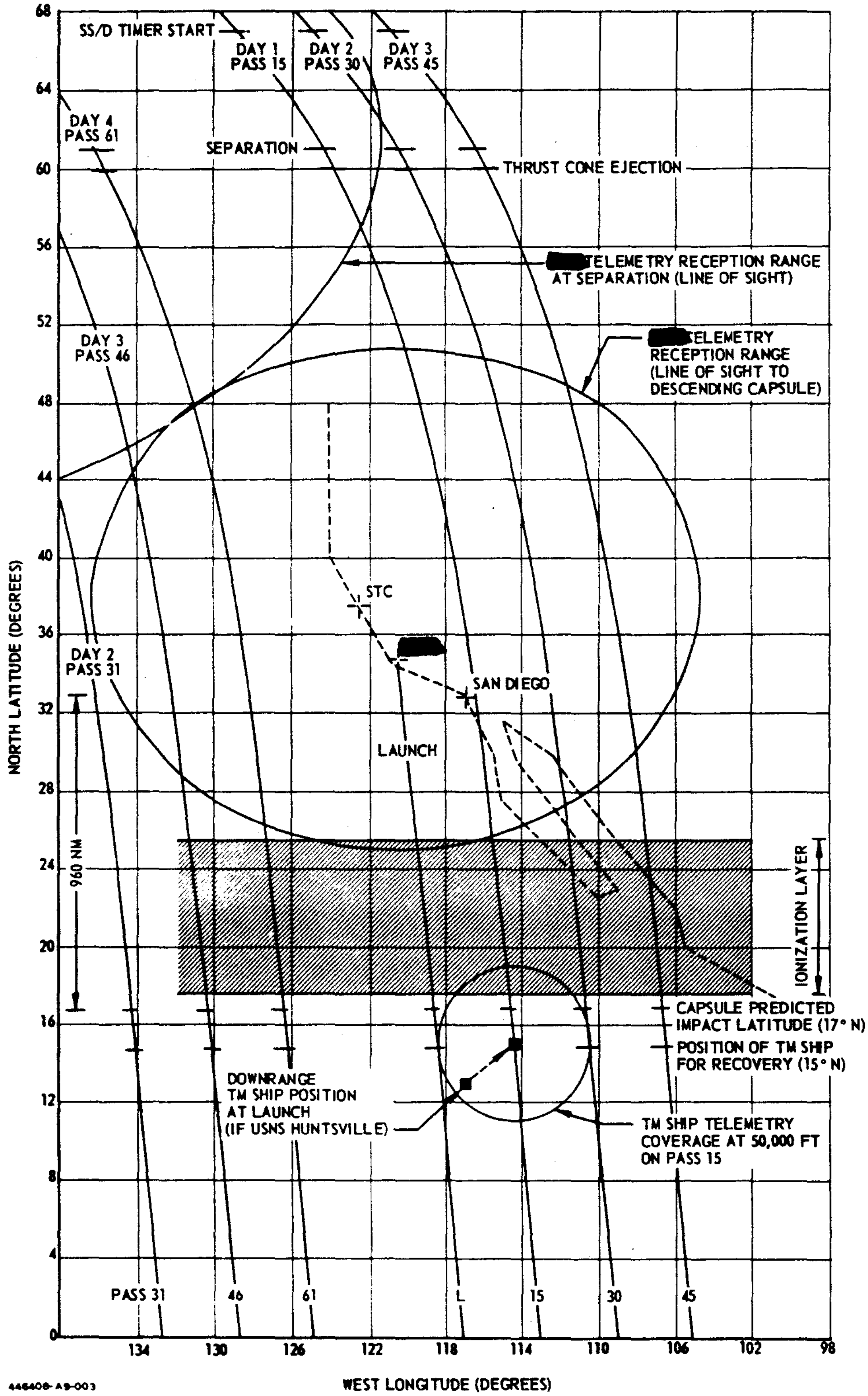
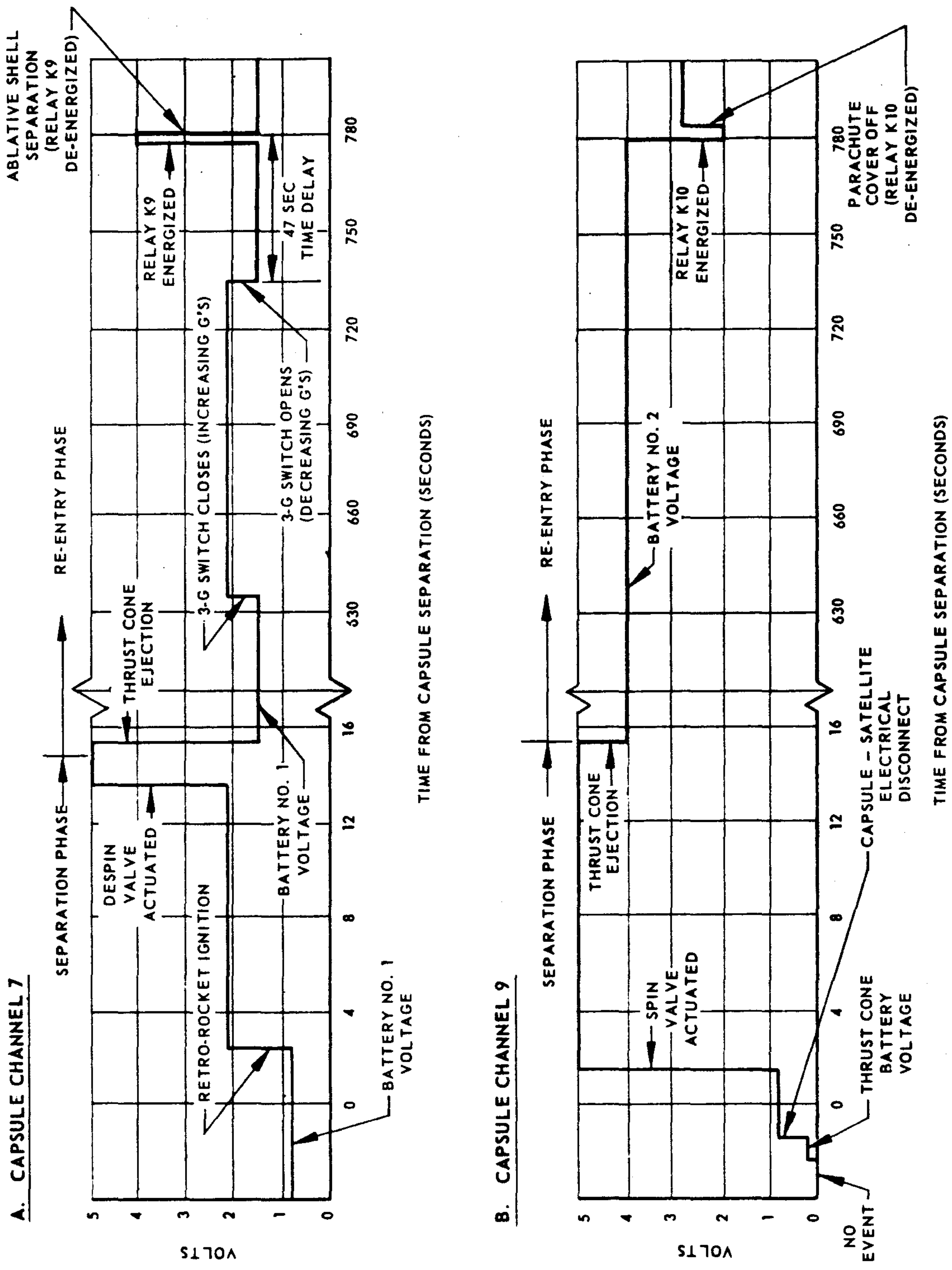


Figure A7-6 Emergency Re-entry Telemetry and Recovery Coverage



NOTE: VALUES SHOWN INDICATE NOMINAL SEQUENCE OF EVENTS. CONSULT T/M CALIBRATION DATA FOR VOLTAGE LEVELS WHICH WILL OCCUR IF SEQUENCE OF EVENTS IS NOT NORMAL. REFER TO SECTION 7.5 FOR SEQUENCE OF EVENTS DESCRIPTION

44640B-A1-010(3)

Figure A8-1 Nominal Capsule Telemetry Voltage Levels

[redacted]
17 May 1961
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APPENDIX A – TAB 9
SYSTEM TEST DIRECTIVE
FOR
DISCOVERER SATELLITE SYSTEM
DISCOVERER SATELLITE 1107
DISCOVERER BOOSTER ~~309~~ 363

Prepared under authority of AFBM Exhibit 60-6,
Paragraph 1.4.1

Prepared by
SYSTEMS INTEGRATION PLANNING

APPROVED: [redacted]
COLONEL, USAF
CHAIRMAN,
SYSTEM TEST WORKING GROUP

APPROVED: [redacted]
SATELLIT[redacted]S DIRECTOR

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U. S. C., Sec. 793 and 794. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

[redacted]
26 May 1961

Extra

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Sheets [redacted]

REPORT CHANGE RECORD FOR SYSTEM TEST DIRECTIVE FOR DISCOVERER SATELLITE SYSTEM

The following additions, revisions, or errata corrections, should be incorporated into the document identified above. This Report Change Record page should be inserted as the first page of the affected report preceding the title page. If a page in the original document is eliminated and/or replaced by the instructions which follow, the page must be destroyed according to the Air Force directive governing such destruction.

CONTRACT NUMBER [redacted]

ADDENDUM PAGE	REVISION		ERRATA		REVISION OR ERRATA CORRECTION (CORRECT IN INK)	CORRECTION MADE	
	REMOVE PAGE	INSERT PAGE	REMOVE PAGE	INSERT PAGE		INITIAL	DATE
	A-9-3 A-9-15 A-9-21 thru A-9-27	A-9-3 A-9-15 A-9-21 thru A-9-27			Appendix A, Tab 9 – Change as follows: The booster for this flight has been changed; change all references to the Discoverer Booster from "309" to "303" (on divider tab, title page, and all subsequent pages).	[redacted]	22 June
					Page A-9-5, 5th paragraph, under "Transmitter", change Pulse Spacing from "21.3 microseconds" to "21.35 microseconds".	[redacted]	22 June
					Page A-9-6, Paragraph A2.6, delete [redacted]	[redacted]	22 June
					Page A-9-10, Paragraph A4.2.1, line 5, change "transmitting" to "receiving".	[redacted]	22 June
					Page A-9-17, 2nd paragraph, line 1, between the words "positioned" and "directly" insert "at 8° N latitude".	[redacted]	22 June
					Page A-9-20, Paragraph A5.4.1, lines 4 and 5 change the following: "20.9" to "15.6"; "176.5" to "96.5"; "244.1" to "133.3".	[redacted]	22 June
					Page A-9-38, under "Channel" column, 2nd item from the bottom, change from "E & 13-42, 51, 53, 54, 56, 57" to "E-42, 51, 53, 54, 56, 57".	[redacted]	22 June
					Page A-9-48, Figure A2-2, under "[redacted]" in stations columns, 2nd item, change "2(20)" to "2(60)".	[redacted]	22 June

[redacted]

CONTENTS

TABLES

[redacted]

ILLUSTRATIONS

 [redacted]

APPENDIX A - TAB 9
SUPPLEMENTAL TEST INFORMATION

A1 INTRODUCTION

This section contains descriptive material which supplements the basic text of the STD and is applicable only to the flight of Discoverer Satellite 1107. Where the material contained herein is in conflict with that in the basic text, the information in this Appendix has precedence. Reference will not be made to this appendix for subsequent flight operations.

A2 CONFIGURATION

A2.1 <u>Discoverer Satellite</u>

A2.1.1 Neither the JHU/APL Doppler transmitter nor optical beacon will be installed on this vehicle.

A2.1.2 Four type 1A batteries will provide the electrical power supply on this flight. These batteries have a minimum lifetime of 125 hours.

A2.1.3 A total of 132 pounds of control gas will provide vehicle attitude control through the normal recovery pass on the fourth day of orbit operations, within the limits of normal expected gas expenditure rates.

A2.2 <u>Discoverer Research Program</u>

A2.2.1 This program consists of the development of special modules with which to conduct orbital research test experiments. These DRP kits are designed for ready interchangeability between vehicles and have the capability of being installed or removed at the launch base. The program will be initiated with the flight of Satellite 1107. The kit for 1107 is typical and consists of: (1) Communications Package, (2) Research Components Package, (3) Research Auxiliary Package, and (4) GRD Packages. The research T/M unit will operate on the recovery capsule T/M frequency, Link 2 IRIG Channels 13, 14 and E. The T/M transmitter is a separate unit mounted on the engine access door and is interlocked with the recovery system so as to be turned off during the recovery pass. Discoverer research components will be programmed by the orbital programmer and will not require ground commands. The DRP telemetry is programmed for readout subsequent to the recovery pass.

A2. 2. 2 The telemetered research data will be recorded on magnetic tape by all stations, using the same procedure as called out in the Detailed Recording Requirements. The data tapes will be shipped to the STC, Attn TWRCA-3, Bldg 171, Sunnyvale, Calif. with other station records.

A2. 3 Discoverer Guidance

Discoverer Vehicle 1107/303 will incorporate the BTL guidance system operating in the closed-loop mode. This system will provide booster guidance during launch, provide time-to-fire and velocity-to-be-gained correction signals to the Agena Satellite, and command booster/satellite separation as described in Section 3. 1. 4 of the basic STD.

A2. 4 Ship and Ground Station Readiness Verification for MIDAS

A2. 4. 1 Discoverer XXIV will be utilized to demonstrate the readiness of the USNS Watertown, and the [redacted] 60 ft T&D antenna T/M recording capability for the forthcoming MIDAS flight.

Tracking and T/M data obtained from these facilities will be transmitted to the STC via SSB from the ship and via the 100-wpm teletype line from [redacted] The data will be compared to simultaneous tracking data from other sources to obtain station accuracy information.

The [redacted] will receive instructions over the normal communication link tied into the STC.

The surface ship will be stationed far enough at sea to experience ocean swells typical of downrange ship operations. If the ship is not capable of leaving port, the tracking system will be exercised in accordance with STC instructions. The ship will communicate with the STC via SSB over the same frequency as used by the downrange ship.

The ship will contact the STC with expected ship position two days prior to launch. When on station the ship will report actual position to the STC. This information will be updated as required and will be used in computing acquisition messages.

The ship will conduct the tracking exercise on the SPQ-8 radar and the AGAVE angle tracker. The angle tracker will be tuned to the FM/FM telemeter transmitter (Link 1) and will record sufficient telemetry data to verify quality of reception as well as antenna position for determination of the angle data.

The SPQ-8 will tune to the satellite transponder frequency and will track the satellite in the two pulse mode only. A third pulse will not be used due to the possibility of inadvertent commands being transmitted.

The SPQ-8 will be adjusted to the following specifications:

<u>Transmitter</u>	
Pulse Spacing	21.35 μsec (width 0.8 μsec/pulse)
Pulse Frequency	410 pulse groups/sec
Frequency	2850 ±2 mc
<u>Satellite Transponder</u>	
Frequency	2920 ±2 mc
Pulse Spacing	Single pulse
Pulse Frequency	As interrogated

The AGAVE Angle-Tracker will be adjusted to the following:

Satellite Transmitter - FM/FM
Satellite Frequency - 237.8 ±0.015 mc
Satellite Transmitter Power - FM 8 Watts

The STC will direct the ship as to expected acquisition times and positions for the duration of the checkout phase.

[redacted] 60-ft T&D antenna will also record and track on the satellite telemetry transmitter frequency. The STC will direct the [redacted] operations.

A2.5 Re-Entry Telemetry Aircraft

The requirement for a telemetry aircraft in the Alaska area during recovery has been deleted.

A2.6 The Satellite Orbital Control System (SOCS) consists of the following ground tracking stations: [redacted] These stations are under the direct control of the STC for all operations from prelaunch to post-recovery.

A3 LAUNCH OPERATIONS

A3.1 Launch Time

The specific time of launch will be determined by the System Test Controller.

A3.2 [redacted] Tracking Station

The incorporation of the BTL guidance system for launch trajectory control will delete the requirement for the Reeves Guidance Computer at [redacted] and associated transmission of Commands 5 and 6 during the launch phase. All tracking and telemetry support requirements supported by [redacted] have been deleted for this and subsequent operations.

A3.3 [redacted] Tracking Station

Section 5.3 of the basic STD is revised to incorporate the requirement for [redacted] to provide primary active VERLORT tracking during the launch phase. Radar tracking data will be transmitted immediately to the Palo Alto Computer via 100-wpm teletype.

A3.4 Increase/Decrease Switch Position

The increase/decrease switch will be positioned in the increase position during launch. The position of the increase/decrease switch during orbit operations may be in either position as directed by the STC. The placing of the switch in the increase position for launch will assure a known position of the switch for first pass operations. [redacted] will verify position of the increase/decrease switch and timer step position before launch and provide this information to the STC prior to launch. This verification should be made at the latest practical time prior to launch.

A3.5 Recovery Force Readiness

A3.5.1 The launch criteria as specified in Paragraph 4.2.2.6 of the basic text is amended to specify the following on station Recovery Force requirements; search and recovery equipment must be operable:

a. Two RC-121 radar aircraft
b. Seven C-119J recovery aircraft
c. Two telemetry/detection surface ships
d. Surface retrieval capability within 24 hours in the recovery zone between 14 and 26 degrees north latitude
e. One para-recovery team
f. Four telemetry aircraft

A4.1.4 The procedure for sending Commands 5 or 6 will be to actuate the command button and await verification from the telemetry console operator that the command has been received and verified.

If verification is not received, the STC will be notified immediately and the vehicle command console operator should be prepared to give priority to resending this command when so directed by the STC. Each attempt at sending these commands must be reported immediately to the STC to permit accurate bookkeeping in case of telemetry failure. The telemetry observer must check Link 1 Channel 16 Positions 53 and 51, which monitor re-entry switches commanded by Commands 5 and 6 respectively, to be sure that the vehicle has acted upon the transmitted command and to be sure that both commands have not been initiated when only one is desired.

A4.1.5 The "D" timer (re-entry sequence timer) start punch has been placed in two locations of the orbital programmer tape for Passes 65 and 81. These start positions are located approximately 90 seconds ahead and 12 seconds after the reset point. The length of each of these punches is 20 seconds. The purpose of adding the second "D" timer punch on these passes is to eliminate the possibility of precluding "dump" initiation in the event a reset command is inadvertently received by the satellite.

> NOTE: DUE TO THE POSSIBILITY OF ACCIDENTALLY INITIATING RE-ENTRY WHILE SENDING COMMANDS 1 THROUGH 4 TO A TUMBLING VEHICLE, [redacted] WILL NOT SEND COMMANDS WHILE THE ORBITAL PROGRAMMER BRUSHES ARE IN CONTACT THROUGH THE "D" TIMER START PUNCHES. THESE ACTUAL TIMES WILL BE DETERMINED BY THE STC FROM THE "H" TIMER SCHEDULE AS MODIFIED FOR THE ACTUAL VEHICLE PERIOD.

A4.1.6 "Sweeping" the satellite at the antenna nutating rate may occur when approaching the fade point, thereby causing incorrect tones to be received by stable as well as unstable satellites. The stations will monitor VERLORT signal strength, and when it decreases to a point where breaking lock is imminent, or when the VERLORT has momentarily lost lock and regained it, the STC will be advised. Commands will not be sent "in the dark", after breaking lock, nor as the vehicle approaches its normal fade point, except under emergency conditions as directed by the STC.

A4.2 Tumbling Vehicle Command Operation

A4.2.1 As defined in Paragraph A4.1.2, the Commands 5 and 6 have been modified to "flip-flop" operation for enabling and disabling the re-entry sequence. This means that one pulse will activate the switch and the next pulse will deactivate. With a tumbling vehicle the possiblity of momentarily losing radar lock and ~~transmitting~~ RECEIVING two commands during a single command pulse is greatly increased.

A4.2.2 The satellite command procedure will include monitoring the telemetry verifications of Commands 5 and 6 (re-entry switch position, Channel 16 Positions 53 and 51) while sending any command. If Commands 5 or 6 are inadvertently received by the vehicle, the station will immediately report the occurrence to the STC and stand by to send a disable command as directed by the STC. Direct communication between the telemetry read-out console and the command console is required to reduce reaction time to a minimum.

A4.2.3 If the re-entry command is determined to be in enable position at vehicle acquisition and total communications blackout occurs between the STC and the active station, the station is authorized to send a disable Command 5 or 6 as required, in the case of a tumbling satellite only. <u>This authority is extended for tumbling vehicles only in conjunction with a total communication failure</u>. One exception to this authorization is that for a tumbling vehicle with the nominal period, Passes 33 and 80 present the optimum ground tracking coverage; therefore, if a station (with a communication blackout) observes re-entry enabled for these passes (or the pass giving the corresponding ground track for the actual period), then the disable command will <u>not</u> be transmitted on the assumption that the STC initiated the re-entry sequence. If communications are available, the Command 5 or 6 position will be reported to the STC for their operational decision. Any emergency action of this nature will be reported to the STC by the earliest possible means. The STC sends Alstation Impact/Messages which define the "Primary" recovery pass. Stations must be continually aware of the pass so designated by the latest impact message. If the enabled command would result in separation on the designated recovery pass, the station will not send the disable command.

A4.3 Re-entry Selection — Nominal and Alternate

A4.3.1 Normal recovery based on the nominal period is planned for orbit Pass 64 after four days of active orbital life. Passes 10, 11, 16, 17, 18, 25, 26, 31, 32, 33, 41, 42, 47, 48, 49, 56, 57, 63, 64, 65, 79, 80, and 81 are all programmed for re-entry. Passes 79, 80, and 81 give the capability of delaying re-entry until Day 5. If emergency re-entry is selected for northbound Passes 10, 11, 25, 26, 41, 42, 56, and 57, separation will occur prior to apogee on Passes 9, 10, 24, 25, 40, 41, 55, and 56 for impact at 24° N latitude. The re-entry selection command will be sent only by direction of the STC. Passes 16, 31, and 47, provide for re-entry off the West Coast.

A4.3.2 Command structure for selecting recovery passes:

	Command 5		Command 6	
	N-S	S-N	N-S	S-N
Day 1	16, 18	10	17	11
Day 2	31, 33	25	32	26
Day 3	47, 49	41	48	42
Day 4	63, <u>65</u>	56	64, <u>65</u>	57
Day 5	79, <u>81</u>		80, <u>81</u>	

The last southbound pass available for recovery on Day 4 (65) and Day 5 (81) can be enabled by sending either Commands 5 or 6. Since Commands 5 and 6 also disable the re-entry circuit, the position of the re-entry switch must be known prior to transmission of any commands. Telemetry Link 1, Channel 16 Positions 53 and 51 monitor the re-entry Commands 5 and 6, respectively. Re-entry switch position monitors (Positions 53 and 51, Channel 16) will present voltages as follows:

a. A voltage level of 4v or 80 percent indicates re-entry enabled.

b. A voltage level of 1v or 20 percent indicates re-entry disabled.

A4.3.3 The maximum acceptable period deviations for programmed nominal and alternate recovery passes are shown below. These deviations represent the nominal maximum and minimum periods that will allow the programmed passes to be within the aerial recovery zone limits.

Recovery Area Period Deviations
145° W Longitude to 176° W Longitude

Item		Data
Day	Pass	Maximum Acceptable Period Deviations (Minutes)
	16	95.9 to 103.6
1	17	90.2 to 97.5
	18	Min to 92.0
	31	95.8 to 99.6
2	32	92.6 to 96.7
	33	89.9 to 93.5
	47	93.6 to 96.2
3	48	91.6 to 94.1
	49	89.7 to 92.2
	63	92.5 to 94.4
4	* 64	91.1 to 92.9
	65	89.7 to 91.5
	79	91.9 to 93.4
5	80	90.8 to 92.3
	81	89.8 to 91.2

* Nominal Recovery Pass Period 91.6 Minutes

[redacted]

A4.4 Re-entry Selection For An Uncontrolled Satellite

A4.4.1 Loss of satellite control gas will result in either an unstable or tumbling satellite but does not preclude capsule re-entry and recovery. The STC will evaluate the desirability of attempting recovery based on residual satellite control capability and considering the probability of impact in an accessible area. Since capsule overshoot is most probable when the capsule is unstable, or tumbling, the predicted separation latitude will be moved 6° further north than normal separation latitude; however, [redacted] Tracking Station will probably be able to monitor capsule separation.

A4.4.2 If the satellite is stable, but the electrical power or control gas is questionable or deteriorating, recovery as soon as practicable is to be considered. If the satellite is tumbling, recovery should be attempted as late as possible in order to select an optimum ground tracking coverage recovery pass and to fully deploy the surface recovery forces.

A4.4.3 Figure A7-7 shows the deployment of recovery forces presupposing early recovery and the utilization of one telemetry ship. However, when it is deemed advisable to postpone re-entry, it will be possible to deploy the second telemetry ship toward a position at 2° S latitude under the re-entry track. Sea recovery capability would then be available to 8° S latitude within 24 hours of impact. The decision to deploy for an uncontrolled satellite and decisions regarding choice of re-entry passes will be made by the STC.

A4.4.4 The optimum passes for recovery of an uncontrollable satellite, either tumbling or non-tumbling, are those that provide telemetry coverage at parachute deployment from ground tracking stations. Passes 33 and 80 offer this advantage; therefore, if tumbling occurs prior to Pass 29, Pass 33 should be considered for recovery. Coverage below the equator is available from Christmas Island and a detector located at 4° S latitude. However, it may be desirable to postpone recovery until Pass 80. In this case a second telemetry ship will have time to deploy to 2° S latitude. With maximum ground-based telemetry and two telemetry ships in position, full telemetry and sea recovery capability from 31° N through 8° S latitude can be provided. If tumbling occurs after Pass 29, recovery may be delayed to Pass 80 if the satellite is otherwise controllable (sufficient battery lifetime). Passes 33 and 80 provide similar capability. The advantage of delaying to latter passes in all cases is that additional tracking and surface recovery capability would then be available below the equator.

A4.4.5 Figure A7-7 indicates the deployment for Passes 33 or 80, utilizing ground based stations in [redacted] and Christmas Island for ground tracking the descending capsule. Pass 49 can be utilized for recovery; however, only one surface ship would be available in the extended area with no tracking of the descending capsule from Christmas Island. Pass 64 is scheduled for normal recovery; however, the decision to utilize this pass for uncontrolled re-entry must be weighed against waiting another day and re-entering on Pass 80 with the increased coverage available from the land-based stations.

A4.4.6 In the case of a stable satellite which is using power or control gas at an excessive rate, the primary consideration is obtaining maximum detection coverage and downrange sea recovery capability as early as possible. In order to allow at least six hours' notice to the Airborne Recovery Force, the decision to recover must be made at least 4 passes prior to the selected recovery pass.

If loss of control gas occurs on Passes 1 through 13, recovery should be planned for Pass 17 unless there is good indication that the excessive gas expenditure has ceased and control can be expected to last until a more favorable Recovery Force deployment can be effected. Delay of recovery until Pass 33 would allow the surface recovery ship to deploy toward a position at 2° S latitude under the re-entry track. Sea recovery capability would then be available to 8° S latitude within 24 hours of impact.

If excessive use of control gas occurs on Passes 14 through 29, recovery should be planned for Pass 33. There is no advantage in waiting until Pass 49 for recovery.

[redacted]

If excessive use of control gas occurs on Passes 30 through 45, recovery may be planned for Pass 49 or Pass 64, depending on the rate of stability deterioration.

Deployment for Pass 64 recovery provides no new problems over normal recovery, except for the greater distances to be traveled by recovery aircraft. Notification should be given as far in advance as possible. Consideration again should be given to Pass 80 recovery to provide time for the surface ship to reach 2° S latitude.

A4. 5 Agena Reorientation After Capsule Separation

The vehicle flight controls will be left on following capsule separation. The vehicle should return to the local horizontal through the horizon scanner correction signal and maintain controlled flight in the normal orbit attitude until depletion of the control gas supply or battery power. The S-band beacon and telemetry are programmed through Pass 95.

A4. 6 Post-Recovery Orbit Operations

A4. 6. 1 Following the recovery pass, the tracking stations will continue vehicle orbit tracking and telemetry recording operations until battery power is exhausted or until operations are terminated by the STC. The STC will establish operations control procedures to investigate the following areas as required during this period:

a. Systems operations exercise and personnel training
b. Vehicle command operations
c. Tracking station operations
d. Subsystem test requirements based on real-time analysis
e. Discoverer Research Program data recording.

A4. 6. 2 Real-time data and reporting requirements for all tracking stations during post-recovery operations will be the same as the orbit requirements listed in Table A8-1, with the following exceptions:

[redacted]

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a. AET payload read-outs are not required.

b. SPI data will be read out only by [redacted] at the request of the STC.

A5 RECOVERY OPERATIONS

A5.1 Surface Ship Deployment and Operation (Normal)

A5.1.1 A 24-hour water recovery capability will be provided within the recovery area boundaries as shown in Figure A7-3. In addition to the USNS Sunnyvale and USNS Longview, auxiliary surface recovery support will be provided in the northern area by one or more surface ships, depending on the speed of units available.

A5.1.2 Auxiliary surface recovery support will be provided to permit recovery within 24 hours after notification of water impact in the recovery area between 14° N and 26° N latitude. Ship-to-shore communications will be maintained with the RCC/PMR representative for direction.

A5.1.3 The surface ships will depart in sufficient time to arrive at initial deployment stations by T + 4 hours and will subsequently be deployed to assure surface recovery support for all variations of orbit period. Subsequent to launch the Test Controller will determine the particular passes for which impact predictions are required. The PAC will evaluate tracking data after launch and will provide predicted capsule impact location and time for each day not later than T + 4 hours.

On receipt of impact predictions, the STC will provide surface ship redeployment instruction to the RCC. Figure A7-1 shows the ships at initial stations and nominal positions for each day. If desired by PMR, the initial positions of the USNS Longview and the USNS Sunnyvale can be exchanged. The STC is to be notified of such a change one day prior to launch.

A5.1.4 USNS Longview and USNS Sunnyvale will be deployed in the extended recovery area to provide capsule detection and surface recovery capability in the event of capsule overshoot. Capsule telemetry will be recorded. These ships will be initially positioned at $6^{\circ}30'$ N latitude as shown in Figure A7-3 and will be redeployed laterally to assure one-ship coverage for each alternate day pass. If the period is such that both ships can cover the actual recovery pass, one ship will be redeployed to 11° N latitude and the other ship to 6° N latitude. Initial stations will permit redeployment of either ship to cover its assigned area in one day.

Either one or both of these ships will be positioned AT 8° N. LAT. directly under the orbit plane on the recovery pass to enable reception of the capsule signals in the extended recovery area. The quad-helix antenna, until acquisition, will scan ±90 degrees about 360-degree azimuth at 10 degrees elevation at the rate of once per 15 seconds from ETPD - 0 until ETPD + 2 minutes. From ETPD + 2 minutes until ETPD + 5 minutes, the quad-helix antenna will give full area coverage by scanning ±90 degrees about 360-degree azimuth with antenna elevation increasing and decreasing from 10 degrees to 70 degrees to 10 degrees in increments of 20 degrees per scan. The scan rate will be once per 15 seconds. After ETPD + 5 minutes the antenna will be positioned at 10 degrees elevation and 180-degree azimuth. In the event that either ship acquires the capsule signals, the telemetry will be recorded on magnetic tape as specified in the Detailed Recording Requirements, and antenna elevation and bearing at acquisition will be immediately reported through PMR to the RCC. Bearings will be relayed to RCC at intervals of one minute. When the parachute deployment telemetry sequence is received or when the antenna azimuth becomes constant, the ship will so report verbally over SSB radio through PMR to the RCC and provide ship position and antenna azimuth and elevation. If no capsule signals are acquired by the ships, a negative verbal report will be submitted over SSB radio through PMR to the RCC at ETPD + 30 minutes.

A5.2 Airborne Recovery Force - Deployment (Normal)

A5.2.1 Two RC-121 aircraft will be deployed as shown in Figure A7-4 for communications control and direction of the recovery force. Each RC-121 aircraft will be equipped with SSB radio for direct communications with the RCC. Separate HF and VHF communications will be maintained with elements of the recovery force. The RC-121 aircraft will be designated as Command Aircraft for the forces in the primary and secondary recovery areas.

A5.2.2 Paragraph 7.3.6.2 of the basic text will be amended to read as follows: Under normal conditions, the RC-121 aircraft will be on station approximately two hours before ETPD.

A5.2.3 Paragraph 7.5.3 of the basic is deleted as the APS-95 does not require peaking aircraft.

A5.2.4 Four telemetry detection aircraft will be utilized in the recovery area for capsule detection and search and will be on station by ETPD - 1 hour. The nominal deployment of these aircraft for alternate and primary recovery days is shown in Figure A7-2. The aircraft positioned at 13° N latitude will be equipped with SSB radio and will be designated as Command Aircraft for the forces in the extended recovery area. Placement of these aircraft in order of position priority is as follows:

	Predicted Impact Location	Aircraft Position
a.	East of 154° W longitude and West of 170° W longitude (with 1 or 2 surface ships)	13 degrees 3 degrees 16 degrees 23 degrees
b.	154° W to 161° W longitude (with 1 surface ship)	13 degrees 3 degrees 16 degrees 11 degrees
c.	154° W to 161° W longitude (with 2 surface ships)	13 degrees 3 degrees 16 degrees 9 degrees
d.	161° W to 170° W longitude (with 1 or 2 surface ships)	13 degrees 3 degrees 16 degrees 19 degrees

 [redacted]

A5.3 Deployment of Forces For An Uncontrolled Satellite

A5.3.1 For deployment purposes, separation is assumed as being 6° N of normal separation. Programmed impact latitude is then 30° N but overshoot is probable. To provide flexibility of operation for an extended area the initial position of the surface recovery ships has been changed from 8° N latitude to $6^{\circ}30'$ N latitude.

A5.3.2 Deployment of the air recovery (C-119) force is shown in Figure A7-7. A 75 nautical mile range of the C-119 aircraft is assumed, based upon the rate of descent of the capsule to 5,000 feet and a descending speed of the C-119 of 240 knots. The extended deployment provides coverage from 30° N latitude to 8° N latitude.

A5.3.3 The latitude positions of the C-119's remain constant for all passes and are as follows:

C-119's

Position Priority	Latitude (degrees N)
1	29°
2	$26^{\circ}30'$
3	24°
4	$21^{\circ}30'$
5	19°
6	$16^{\circ}30'$
7	14°
8	$11^{\circ}30'$
9	9°

A5.3.4 The positions of the Vega's (RC-121) will be at $26^{\circ}30'$ N latitude and 20° N latitude. They will maintain communications with the RCC and provide aircraft control in the recovery area.

A5.3.5 The telemetry detector aircraft (JC-54) will be deployed as indicated below. The aircraft at 13° N latitude will be SSB equipped and will be the command aircraft for forces in the extended recovery area.

	Deployment Position (deg latitude)				
Position Priority	Pass 17	Pass 33	Pass 49	Pass 64	Pass 80
1.	2° N	4° S	2° N	2° N	4° S
2.	13° N	13° N	13° N	13° N	13° N
3.	28°30' N	28°30' N	28°30' N	28°30' N	28°30' N
4.	18° N	16° N	18° N	23°30' N	16° N

A5.4 Nighttime Recovery Operations

A5.4.1 The capability to initiate the recovery sequence during south-to-north nighttime passes in the Hawaiian area is included in the orbital programmer. Capsule impact will be programmed to occur at 24° N latitude with the dispersion limits being ±~~20.9~~ 15.6 nautical miles crossrange, ~~176.5~~ 96.5 nautical miles uprange and ~~244.1~~ 133.3 nautical miles downrange.

A5.4.2 Figure A7-8 presents the telemetry and tracking coverage for each of the nominal passes based on a 91.6-minute period. Although Christmas Island has a long duration of track, the lack of antenna auto-tracking capability and wide beam width reduces the possibility of predicting capsule impact points with this data. However, certain passes will allow sufficient tracking data to be acquired by [redacted] and Tern Island to compute impact prediction.

A5.4.3 Planning for this operations is based on the assumption that south-to-north recovery will be initiated <u>only</u> in the event of an emergency and the vehicle can be expected to be under control (sufficient gas and power for reorientation) up to and including the separation latitude, based on data available up to the time the command is given.

[redacted]

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A5.4.4 As this is an emergency recovery operation the initial deployment of the surface recovery force will not be modified to obtain surface recovery in the northern area. Also, as the capsule will descend during darkness, no attempt will be made to perform an aerial recovery, therefore the C-119 aircraft will not be required in the recovery zone except as surface search aircraft.

A5.4.5 It is desirable to detect the capsule impact as early as possible, therefore two aircraft with D/F gear will be sent to the impact zone, preferably before impact, but in any case as soon after impact as is practical, to search the zone of impact which is 230 nautical miles long.

The long overwater flight time and D/F capability requirement may be met by the four engine JC-54 T/M detector aircraft stationed at Hawaii. Utilization of these aircraft will require two JC-54 crews to be available for deployment as early as practical after alert.

The initial two search aircraft will be deployed before parachute deployment, if possible; however, if they are not airborne before ETPD, the tracking and telemetry information will be examined to determine if the capsule re-entry occurred. If not, the aircraft will not be deployed. However, if there is any doubt regarding capsule re-entry, the aircraft will be sent out to search the area.

A5.4.6 The remainder of the Recovery Force will be alerted for a daylight search. If the JC-54 aircraft locate the capsule, they will drop marker bouys and maintain visual contact until relief aircraft arrive. Provision will be made to maintain continuous surveillance once the capsule is sighted. Recovery of the capsule will be effected at the earliest practicable time.

A5.5 <u>Recovery Rehearsal</u>

Paragraph 7.1.5 of the basic text is amended as follows: (1) Delete the last sentence, (2) Insert, "The C-130 aircraft will be utilized for dropping a RATU in the event of a full recovery rehearsal."

A6 TABLES AND ILLUSTRATIONS

The following tables and illustrations are applicable to the flight of Discoverer Satellite 1107/Discoverer Booster 309/AET-L Payload only. Each table or figure is given the basic number of the section of the general STD to which it applies, the letter A to denote Appendix material, and a number of sequence items in the same category.

Table A2-1

NOMINAL FLIGHT PLANNING DATA

ITEM	DATA
<u>SATELLITE</u>	
S/N	1107
Payload	AET low (L)
Fuel	UDMH 3753 lb
Oxidizer	IRFNA 9460 lb
Launch weight	16,027 lb
<u>BOOSTER</u>	
S/N	303
Fuel	RJ-1
Oxidizer	Liquid oxygen
Launch weight (including payload)	123,413
<u>LAUNCH</u>	
Site	VAFB, 75-1, Pad 1
Date	June 1961
Pad azimuth	259.5°
Launch azimuth	172°
Downrange T/M ship location (range	12.5° N, 119.2° W
Downrange T/M ship heading recoverer)	90° true
Programmer setting	5499 (step setting 09)
<u>INJECTION</u>	
Time	T + 455 sec
Location	23°22′ N, 119°13′ W
Altitude	150 sm (130 nm)
Azimuth (inertial)	171.06°
Nominal velocity	25,684 ft/sec
<u>ORBIT</u>	
Period	91.6 min
Apogee	253 nm
Perigee	130 nm
Eccentricity	.017
Regression rate	23.03°/pass
Reset latitudes	20° N [redacted] orthbound)
	32° N [redacted] orthbound)
	36° N [redacted] outhbound)
	40° N [redacted] orthbound)
	45° N [redacted] southbound)
	60° N [redacted]
Inclination angle	81.75°
<u>RECOVERY</u>	
Aircraft (type and quantity)	C-119's (7), RC-121's (2), Detector/TM (4)
Surface Ships – Initial Positions	
USNS <u>Longview</u>	6°30′ N, 166° W
USNS <u>Sunnyvale</u>	6°30′ N, 154° W
Helicopters	
HRS – 3	2 each on <u>Longview</u> and <u>Sunnyvale</u>

[redacted]
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Table A2-1 (Continued)

NOMINAL FLIGHT PLANNING DATA

ITEM					DATA		
DAY	NIGHT RECOVERY PASS	EMERGENCY RECOVERY PASS	ALTERNATE RECOVERY PASS	NOMINAL RECOVERY PASS	NOMINAL IMPACT CENTER		ETPD (HR)
					WEST LONGITUDE	NORTH LATITUDE	
1	10				153.8°	24°	T + 14.8
		16			127.1°	17°	T + 24.6
			17		150.8°	24°	T + 26.0
2	26				162.3°	24°	T + 39.3
		31			112.4°	17°	T + 47.6
			33		159.3°	24°	T + 50.5
3	41 / 42				147.7° / 170.7°	24° / 24°	T + 62.2 / T + 63.7
		47			120.9°	17°	T + 71.9
			49		167.7°	24°	T + 75.0
4	57				156.1°	24°	T + 86.7
			63		129.3°	24°	T + 96.4
				64	152.9°	24°	T + 97.8
5			80		161.8°	24°	T + 122.4

NOTE: The following additional passes are programmed for recovery: 11, 18, 25, 32, 48, 56, 65, 79, 81

Table A4-1

INSTRUMENTATION REQUIRED TO BE OPERATIVE AT LAUNCH

1. Discoverer Satellite

   a. Continuous Telemetry Channels:

      6 – Payload quantity. Subcarrier must be present

      7 – Payload quantity. Subcarrier must be present

   b. Commutated Telemetry Channels:

      12 – Subcarrier must be present and commutator running

      13 – Subcarrier must be present and commutator running

      16 – Subcarrier must be present and commutator running; points 2, 4, 6, 8, 10, 18, 20, 22, 33, 38, 51, and 53 must be present. Channel 1 is an acceptable substitution for Channel 16, points 20 and/or 22.

2. Capsule

   a. Continuous Telemetry Channels:

      7 – Subcarrier must be present

      11 – Subcarrier must be present

***NOTE:** This table represents the initial LMSD requirements. Final determination of the telemetry channels required to be operable at launch will be made no later than launch minus 7 days.*

[redacted]

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Table A5-1

SS/D TIMER SEQUENCE FOR DISCOVERER SATELLITE 1107
(Preliminary – Subject to Change)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
	-0.1		Timer reset (ground function)
0		Umb Drop	Liftoff. D-Timer start
0.1	0.1		Timer reset (ground function)
0.1	0.1		Timer safety input (ground function)
149.88		BTL	Transmit MECO (P1)
150	150		Start Fairchild Timer
			Disarm Agena destruct
			Arm BTL guidance
			Flight control power ON (backup)
			Uncage integrator
			Open pneumatic valve
150	150		Arm separation squib relays
150.11		Fuel Depletion	MECO (142.53 – 156.65)
154.38		BTL	Transmit arm D1 and D2 (P2)
156.78		BTL	Transmit uncage IRP gyros, initiate velocity correction and timer hold (D1)
158.28		BTL	Terminate D1
158.38		BTL	Initiate D2 (D-Timer hold)
158.88		Thor timer	VECO
161.88		BTL	Terminate D2
162.38			Command separation (P3)
164.88		Separation switch	Activate pneumatic control (vehicle leaves adapter)
165	160		Uncage IRP gyros (backup)
175	170		Command separation (backup)
175	170		Fire horizon scanner (H/S) fairing squibs
176	171		Remove 28v dc from pneumatic valve and transfer SS/H TLM to turbine speed
176	171		Disable -40°/min yaw rate (no yaw correction required)
178	173		Activate pneumatic control (backup)
			Command -3.6°/sec pitch rate (pitchover 28.8°)
178	173		Initiate -1.65°/min pitch rate from integ. pot.

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Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
186	181		Remove −3.6°/sec pitch rate
			Connect pitch H/S signal to pitch IRP gyro
186	181		Connect roll H/S signal to roll IRP gyro
			ORBITAL BOOST*
197	192		Activate H/S electrical bias 2.5° offset (4° total offset)
			Spare (TLM D-Timer monitor
197	192		Fire ullage rockets
209	204		Unground integrator input
			Connect accelerometer to integrator**
209	204		Arm and fire gas gen. squib, fire He valve, pitch and yaw pneumatics OFF
210	205		Pitch and yaw pneumatics OFF (backup)
			Open circuit to gas gen. arm and fire He valve
			Remove J-Box 28v to pitch and yaw pneumatics OFF
210	205		Close circuit to TLM over-ride
210.5			STEADY STATE THRUST*
448	443		Arm pitch and yaw pneumatics
448	443		Engine cutoff safety switch
455.56			Engine shutdown by integrator
			Disconnect accelerometer
			Ground integrator input
455.56			Activate pitch and yaw pneumatics
480	475		Command −40°/min yaw rate (180° yaw)
			Disconnect integrator pitch rate pot. (remove pitch rate)
			Pitch and yaw pneumatics ON (backup)
			Fire helium and oxidizer vent valve squib
			Pitch and yaw pneumatics ON (backup)
480	475		Fire helium and oxidizer vent valve squib
750	745		Start TLM calibrate
			Apply 28v unreg. to SS/L power control box
			Command +3.86°/min pitch rate
			Connect roll H/S signal to yaw gyro (remove −40°/min yaw rate)
			Switch out 0.1% regulated 400-cycle power

** Notation for reference only*

*** Integrator to be set at a dial reading of 2070.6 representing a velocity-to-be-gained of 16,674 ±4° ft/sec.*

[redacted]
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Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
750	745		Shutdown +28.3v IRP ascent power
750	745		Switch out 0.1% regulated 400-cycle power
760	755		Stop TLM calibrate
760	755		Open engine shutdown, switch antennas, open flight control gain change relays and switch roll and yaw gyro TLM gain
760	755		Shutdown integrator power
767	762		Open circuit to TLM override
			Arm H/S OFF circuit
			SS/D timer OFF, H/S to low gain
767	762		Fire fuel vent valve squib
			Fire fuel vent valve squib
			RECOVERY*
X	X	Fairchild Timer	Re-start SS/D timer, H/S OFF
X + 22	X + 22		Command -45°/min pitch rate (pitch over 51°)
X + 22	X + 22		Arm capsule ejection squib
X + 92	X + 92		Command + 3.86°/min pitch rate (Stop -45°/min pitch rate)
			SS/L transfer circuit 1
X + 92	X + 92		SS/L transfer circuit 2
X + 92			Fire capsule plug disconnect squib
X + 94.5	X + 94.5		Fire capsule eject squibs
			Enable timer shutdown circuits
			Fire capsule eject squibs
X + 94.5	X + 94.5		Lockout SS/H re-start signal
X + 154	X + 154		Shutdown SS/D timer and H/S ON

** Notation for reference only*

Table A6-1

NOMINAL ORBIT SCHEDULE

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Launch	Launch	0	34.8
	Start Orbit	0.0416	
	Orbit Injection	0.125	23.4
	Beacon, T/M off		
Pass 1	Beacon, T/M on	1.4	75
	65° N latitude (ref)	1.5	65
	RM on	1.5	60
	Cross [redacted] latitude	1.5	57.6
	25° N ref latitude	1.6	25
	Cross [redacted] latitude	1.7	21.6
	Beacon, T/M off	1.7	12
	End of Orbit 1	2.5	0
Pass 2	Beacon, T/M on	3.0	75
	RM on	3.0	60
	Cross [redacted] latitude	3.0	57.6
	Cross [redacted] latitude	3.2	21.6
	Beacon, T/M off	3.2	12
	End of Orbit 2	4.1	0
Pass 3	End of Orbit 3	5.6	0
Pass 4	End of Orbit 4	7.1	0
Pass 5	End of Orbit 5	8.6	0
Pass 6	Beacon, T/M on	8.7	25
	RM on	8.8	40
	Cross [redacted] latitude	8.8	42.9
	Beacon, T/M off	8.9	60
	End of Orbit 6	10.2	0
Pass 7	Beacon, T/M on	10.3	25
	RM on	10.3	40
	Cross [redacted] latitude	10.3	42.9
	Beacon, T/M off	10.4	60
	End of Orbit 7	11.7	0
Pass 8	Beacon, T/M on	11.8	17
	RM on	11.8	32
	Cross [redacted] latitude	11.8	34.8
	Beacon, T/M off	11.9	52
	End of Orbit 8	13.2	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 9	Beacon, T/M on	13.3	17
	RM on	13.3	32
	Cross [redacted] latitude	13.4	34.8
	Beacon, T/M off	13.4	52
	End of Orbit 9	14.7	0
Pass 10	Beacon, T/M on	14.7	5
	RM on	14.8	20
	Cros[redacted]latitude	14.8	21.6
	Cross [redacted]latitude	14.9	57.6
	Beacon, T/M off	15.0	65
	End of Orbit 10	16.2	0
Pass 11	Beacon, T/M on	16.3	5
	RM on	16.3	20
	Cross [redacted]atitude	16.4	21.6
	Cross [redacted]atitude	16.5	57.6
	Beacon, T/M off	16.5	65
	End of Orbit 11	17.8	0
Pass 12	End of Orbit 12	19.2	0
Pass 13	Beacon, T/M on	19.8	61
	RM on	19.8	45
	Cross [redacted] latitude	19.8	42.9
	Beacon, T/M off	20.9	34
	End of Orbit 13	21.8	0
Pass 14	Beacon T/M on	21.3	61
	RM on	21.4	45
	Cros[redacted]latitude	21.4	42.9
	Beacon T/M off	21.4	34
	End of Orbit 14	22.4	0
Pass 15	Beacon, T/M on	22.4	17
	RM on	22.5	32
	Cross[redacted]atitude	22.5	34.8
	Beacon, T/M off	22.6	52
	End of Orbit 15	23.8	0
Pass 16	Beacon, T/M on	23.3	75
	RM on	23.3	60
	Cross [redacted] latitude	23.4	57.6
	Cross [redacted] latitude	24.5	34.8
	Beacon, T/M off	24.5	22
	End of Orbit 16	25.3	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 17	Beacon, T/M on	25.7	75
	RM on	25.9	60
	Cross [redacted] latitude	25.9	57.6
	Cross [redacted] latitude	26.1	21.6
	Beacon, T/M off	26.1	12
	End of Orbit 17	26.9	0
Pass 18	Beacon on	27.1	25
	RM on	27.1	40
	Cross [redacted] latitude	27.1	42.9
	Beacon off	27.2	60
	End of Orbit 18	28.5	0
Pass 19	End of Orbit 19	30.0	0
Pass 20	End of Orbit 20	31.5	0
Pass 21	Beacon, T/M on	31.6	25
	RM on	31.7	40
	Cross [redacted] latitude	31.7	42.9
	Beacon, T/M off	31.8	60
	End of Orbit 21	33.0	0
Pass 22	Beacon, T/M on	33.1	25
	RM on	33.2	40
	Cross [redacted] latitude	33.2	42.9
	Beacon, T/M off	33.3	60
	End of Orbit 22	34.6	0
Pass 23	Beacon, T/M on	34.7	25
	RM on	34.7	40
	Cross [redacted] latitude	34.8	42.9
	Beacon, T/M off	34.8	60
	End of Orbit 23	36.1	0
Pass 24	Beacon, T/M on	36.2	17
	RM on	36.2	32
	Cross [redacted] latitude	36.3	34.8
	Beacon, T/M off	36.3	52
	End of Orbit 24	37.6	0
Pass 25	Beacon, T/M on	37.6	5
	RM on	37.7	20
	Cross [redacted] latitude	37.7	21.6
	Cross [redacted] latitude	37.9	57.6
	Beacon, T/M off	37.9	65
	End of Orbit 25	39.2	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 26	Beacon, T/M on	39.2	5
	RM on	39.2	20
	Cross [redacted] latitude	39.2	21.6
	Cross [redacted] latitude	39.4	57.6
	Beacon T/M off	39.4	65
	End of Orbit 26	40.7	0
Pass 27	End of Orbit 27	42.2	0
Pass 28	Beacon, T/M on	42.7	61
	RM on	42.8	45
	Cross [redacted] latitude	42.8	42.9
	Beacon, T/M off	42.8	34
	End of Orbit 28	43.7	0
Pass 29	Beacon, T/M on	44.2	61
	RM on	44.3	45
	Cross [redacted] latitude	44.3	42.9
	Beacon, T/M off	44.3	34
	End of Orbit 29	45.2	0
Pass 30	Beacon, T/M on	45.8	61
	RM on	45.8	45
	Cross [redacted] latitude	45.8	42.9
	Beacon, T/M off	45.9	34
	End of Orbit 30	46.8	0
Pass 31	Beacon, T/M on	47.2	75
	RM on	47.3	60
	Cross [redacted] latitude	47.3	57.6
	Cross [redacted] latitude	47.4	34.8
	Beacon, T/M off	47.4	22
	End of Orbit 31	48.3	0
Pass 32	Beacon, T/M on	48.7	75
	RM on	48.8	60
	Cross [redacted] latitude	48.8	57.6
	Cross [redacted] latitude	49.0	21.6
	Beacon, T/M off	49.0	12
	End of Orbit 32	49.8	0
Pass 33	Beacon, T/M on	50.3	75
	RM on	50.3	60
	Cross [redacted] latitude	50.3	57.6
	Cross [redacted] latitude	50.5	21.6
	Beacon T/M off	50.5	12
	End of Orbit 33	51.4	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 34	End of Orbit 34	52.9	0
Pass 35	End of Orbit 35	54.4	0
Pass 36	End of Orbit 36	55.9	0
Pass 37	Beacon, T/M on	56.0	25
	RM on	56.1	40
	Cross [redacted] latitude	56.1	42.9
	Beacon, T/M off	56.2	60
	End of Orbit 37	57.5	0
Pass 38	Beacon, T/M on	57.6	25
	RM on	57.6	40
	Cross [redacted] latitude	57.7	42.9
	Beacon, T/M off	57.7	60
	End of Orbit 38	59.0	0
Pass 39	Beacon, T/M on	59.0	17
	RM on	59.1	32
	Cross [redacted] latitude	59.1	34.8
	Beacon, T/M off	59.2	52
	End of Orbit 39	60.5	0
Pass 40	Beacon, T/M on	60.6	17
	RM on	60.7	32
	Cross [redacted] atitude	60.7	34.8
	Beacon, T/M off	60.7	52
	End of Orbit 40	62.0	0
Pass 41	Beacon, T/M on	62.1	5
	RM on	62.1	20
	Cross [redacted] latitude	62.1	21.6
	Cross [redacted] latitude	62.3	57.6
	Beacon, T/M off	62.3	65
	End of Orbit 41	63.6	0
Pass 42	Beacon, T/M on	63.6	5
	RM on	63.7	20
	Cross [redacted] latitude	63.8	21.6
	Cross [redacted] latitude	63.8	57.6
	Beacon, T/M off	63.8	65
	End of Orbit 42	65.1	0
Pass 43	End of Orbit 43	66.6	0
Pass 44	Beacon, T/M on	67.1	61
	RM on	67.2	45
	Cross [redacted] latitude	67.2	42.9
	Beacon, T/M off	67.2	34
	End of Orbit 44	68.1	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 45	Beacon, T/M on	68.6	61
	RM on	68.7	45
	Cross [redacted] latitude	68.7	42.9
	Beacon, T/M off	68.8	34
	End of Orbit 45	69.7	0
Pass 46	Beacon, T/M on	69.7	17
	RM on	69.8	32
	Cross [redacted] latitude	69.8	34.8
	Beacon, T/M off	69.9	52
	End of Orbit 46	71.2	0
Pass 47	Beacon, T/M on	71.6	75
	RM on	71.7	60
	Cross [redacted] latitude	71.7	57.6
	Cross [redacted] latitude	71.8	34.8
	Beacon, T/M off	71.9	22
	End of Orbit 47	72.7	0
Pass 48	Beacon, T/M on	73.2	75
	RM on	73.2	60
	Cross [redacted] latitude	73.2	57.6
	Cross [redacted] latitude	73.4	21.6
	Beacon, T/M off	73.4	12
	End of Orbit 48	74.2	0
Pass 49	Beacon, T/M on	74.7	75
	RM on	74.7	60
	Cross [redacted] latitude	74.8	57.6
	Cross [redacted] latitude	74.9	21.6
	Beacon, T/M off	75.0	12
	End of Orbit 49	75.8	0
Pass 50	End of Orbit 50	77.3	0
Pass 51	End of Orbit 51	78.8	0
Pass 52	Beacon, T/M on	78.9	25
	RM on	79.0	40
	Cross [redacted] latitude	79.0	42.9
	Beacon, T/M off	79.1	60
	End of Orbit 52	80.3	0
Pass 53	Beacon, T/M on	80.4	25
	RM on	80.5	40
	Cross [redacted] latitude	80.5	42.9
	Beacon, T/M off	80.6	60
	End of Orbit 53	81.9	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 54	Beacon, T/M on	82.0	25
	RM on	82.0	40
	Cross [redacted] latitude	82.0	42.9
	Beacon, T/M off	82.1	60
	End of Orbit 54	83.4	0
Pass 55	Beacon, T/M on	83.5	17
	RM on	83.5	32
	Cross [redacted] latitude	83.5	34.8
	Beacon, R/M off	83.6	52
	End of Orbit 55	84.9	0
Pass 56	Beacon, T M on	84.9	5
	RM on	85.0	20
	Cross [redacted] latitude	85.0	21.6
	Cross [redacted] latitude	85.1	57.6
	Beacon, T M off	85.2	65
	End of Orbit 56	86.4	0
Pass 57	Beacon, T/M on	86.5	5
	RM on	86.5	20
	Cross [redacted] latitude	86.5	21.6
	Cross [redacted] latitude	86.7	57.6
	Beacon, T/M off	86.7	65
	End of Orbit 57	88.0	0
Pass 58	End of Orbit 58	89.5	0
Pass 59	Beacon, T/M on	90.0	61
	RM on	90.1	45
	Cross [redacted] latitude	90.1	42.9
	Beacon, T/M off	90.1	34
	End of Orbit 59	91.0	0
Pass 60	Beacon, T/M on	91.6	61
	RM on	91.6	45
	Cross [redacted] latitude	91.6	42.9
	Beacon, T M off	91.6	34
	End of Orbit 60	92.6	0
Pass 61	Beacon, T M on	93.0	61
	RM on	93.1	45
	Cross [redacted] latitude	93.1	42.9
	Beacon, T M off	93.2	34
	End of Orbit 61	94.1	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 62	Beacon, T/M on	94.2	17
	RM on	94.2	32
	Cross [redacted] latitude	94.2	34.8
	Beacon, T/M off	94.3	52
	End of Orbit 62	95.6	0
Pass 63	Beacon, T/M on	96.0	75
	RM on	96.0	60
	Cross [redacted] latitude	96.2	57.6
	Cross [redacted] latitude	96.3	21.6
	Beacon, T/M off	96.3	12
	End of Orbit 63	97.1	0
Pass 64	Beacon, T/M on	97.6	75
	RM on	97.6	60
	Cross [redacted] latitude	97.6	57.6
	Cross [redacted] latitude	97.8	21.6
	Beacon, T/M off	97.9	12
	End of Orbit 64	98.7	0
Pass 65	Beacon, T/M on	99.1	75
	RM on	99.2	60
	Cross [redacted] latitude	99.2	57.6
	Cross [redacted] latitude	99.3	21.6
	Beacon, T/M off	99.4	12
	End of Orbit 65	100.2	0

Table A8-1
REAL-TIME DATA READOUT AND REPORTING REQUIREMENTS

	MEASUREMENT		CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					DOWNRANGE T/M SHIP***	T/M AIRCRAFT***	NOTE
	NAME	NUMBER						[redacted]				TIS		WV-2 137890	
LAUNCH	Liftoff Signal	---	---	1	RT	X	Ascent	X							
	Thor Main Engine Cutoff	---	DAC(1) 13	1	RT	X	Ascent	X							
	Booster Separation	A93	16-24	1	RT	X	Ascent	X							
	Agena Engine Ignition and Cutoff	B6	14	1	RT	X	Ascent	X					X		
	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		Ascent	X							
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	Ascent	X							
	11-Second Step Switch Position	H108	16-20	1	RT		Ascent	X					X		
	110-Second Step Switch Position	H109	16-22	1	RT		Ascent	X					X		
	Increase/Decrease Switch Position	H107	16-18	1	RT	X	Ascent	X					X		
	Payload Function Selector Setting	AET 14/15, 17/18, 20/21, 23/24	13-18 thru 13-24, 13-48 thru 13-54	1	RT	X	Ascent	X					X		
	Control Gas Supply Pressure – High Range	D95	16-33	1	RT	X	Ascent	X					X		
	Command 5 Monitor	H175	16-53	1	RT	X	Ascent	X						3	
	Command 6 Monitor	H176	16-51	1	RT	X	Ascent	X						3	
	BTL Discretes	C76	17-13	1	RT	X	Ascent	X							
	Yaw Gyro Torque	D84	17-54	2	PP1		Ascent						X	2	
	Longitudinal Acceleration	A-103	11	2	See Note 2		Ascent	X					X		
	Separation Switch Monitor	C-79	17-11	2	See Note 2		Ascent	X							
ORBIT	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		1 thru 62	X	X	X	X				
	Command Verifications 1, 2, 3, 4	H112	11	1	RT	X	1 thru 62	X	X	X	X				
	Programmer Period Readout (Console or Remote)	H110	1	2	RT		1 thru 62	X	X	X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	1 thru 62	X	X	X	X				
	11-Second Step Switch Position	H108	16-20	1	RT		1 thru 62	X	X	X	X				

[redacted]

Table A8-1 (Continued)

	MEASUREMENT NAME	MEASUREMENT NUMBER	CHANNEL	PRIORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION [redacted]				TRACKING STATION TIS	DOWNRANGE T/M SHIP***	T/M AIRCRAFT*** WV-2 137890	NOTE
ORBIT (Continued)	110-Second Step Switch Position	H109	16-22	1	RT		1 thru 62	X	X	X	X				
	Increase Decrease Switch Position	H107	16-18	1	RT	X	1 thru 62	X	X	X	X				
	Reset Monitor Signal	H70	16-10	1	RT	X	1 thru 62	X	X	X	X				
	Payload Function Selector Setting	AET 14 15, 17 18, 20 21, 23 24	13-18 thru 13-24, 13-48 thru 13-54	1	RT	X	1 thru 62	X	X	X	X				
	Command 5 Monitor	H175	16-53	1	RT	X	1 thru 62	X	X	X	X				3
	Command 6 Monitor	H176	16-51	1	RT	X	1 thru 62	X	X	X	X				3
	Control Gas Supply Pressure – High Range	D95	16-33	1	PP1	X	1 thru 62	X	X	X	X				
	Control Gas Supply Pressure – Low Range	D140	16-27	1	PP1	X	1 thru 62	X	X	X	X				
	Battery Bus Voltage	C1	16-38	2	PP1		1 thru 62	X	X	X	X				
	Battery Case Temperature	C9	15-22	2	PP1		1 thru 62	X	X	X	X				
	Battery Current Monitor	C27	15-53	2	PP1		1 thru 62	X	X	X	X				
	Horizon Scanner – Pitch	D37	16-35	3	PP2		See Note 5 ↓	X	X	X	X				4
	Horizon Scanner – Roll	D39	16-37	3	PP2		↕	X	X	X	X				4
	SPI Temperature	D130	15-43	3	PP2		↕	X	X	X	X				5
	SPI Pitch Angle – Lower	D128	15-51	3	See Note 5		↕	X	X	X	X				5
	SPI Yaw Angle – Lower	D127	15-49	3	See Note 5		↕	X	X	X	X				5
	SPI Pitch Ref. Volt. – Lower	D136	15-2	3	See Note 5		↕	X	X	X	X				5
	SPI Yaw Ref. Volt. – Lower	D137	15-4	3	See Note 5		↕	X	X	X	X				5
	SPI Pitch Angle – Upper	D138	16-50	3	PP2		↑	X	X	X	X				5
	SPI Yaw Angle – Upper	D139	16-52	3	PP2		See Note 5	X	X	X	X				5
	Wave Train	AET 52	6	2	PP1		See Note 14	X	X	X	X				14
	No Name Assigned	AET 40	12-9	2	PP1		See Note 11	X	X	X	X				11
	No Name Assigned	AET 48	12-13	2	PP1		See Note 11	X	X	X	X				11
	No Name Assigned	DRC-139, 140 142,143,145, 146	E [redacted]-42,51, 53,54,56,57	3	PP2		See Note 15	X			X				15
	No Name Assigned	DRC-4, 5, 6	12-54,55,56	3	PP2		See Note 15	X			X				15

[redacted]

Table A8-1 (Continued)

	MEASUREMENT		CHANNEL	PRIORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					DOWNRANGE T/M SHIP***	T/M AIRCRAFT***	NOTE
	NAME	NUMBER						[redacted]				TIS		WV-2 137890	
RE-ENTRY	Programmer Period Readout (Console or Remote)	H110	1	3	RT		Recovery Pass			X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	2	RT	X				X	X				
	11-Second Step Switch Position	H108	16-20	3	PP2					X	X				
	110-Second Step Switch Position	H109	16-22	3	PP2					X	X				
	Reset Monitor Signal	H70	16-10	1	RT	X				X					
	Control Gas Supply Pressure – High Range	D95	16-33	1	PP1	X				X	X				
	Control Gas Supply Pressure – Low Range	D140	16-27	1	PP1	X				X	X				
	Battery Bus Voltage	C1	16-38	2	PP1					X	X				
	Horizon Scanner – Pitch	D37	16-35	1	PP2					X					4
	Horizon Scanner – Roll	D39	16-37	1	PP2					X					4
	SPI Pitch Angle – Lower	D128	15-51	2	See Note 6					X					6
	SPI Yaw Angle – Lower	D127	15-49	2	See Note 6					X					6
	SPI Pitch Ref. Voltage – Lower	D136	15-2	2	See Note 6					X					6
	SPI Yaw Ref. Voltage – Lower	D137	15-4	2	See Note 6					X					6
	SPI Pitch Angle – Upper	D138	16-50	1	PP2					X					6
	SPI Yaw Angle – Upper	D139	16-52	1	PP2					X					6
	Pitch Torque Signal	D41	17-38	2	PP1					X					7
	SS/D Timer Restart	D85	17-52	1	RT	X				X					
	Capsule Separation Event	AET 51	16-42	1	RT	X				X	X			X	8
	Payload Connector Disconnect	AET 26	12-2	2	RT					X	X				13
	Retro-Rocket Ignition, Despin Valve Actuated, Thrust Cone Ejection	---	Capsule 7	1	RT, PP1	X				X				X	9
	Spin Valve Actuated, Thrust Cone Ejection	---	Capsule 9	1	RT, PP1	X				X				X	9
	Axial Acceleration	---	Capsule 11	1	PP1, PP2	X				X	X	X		X	10
	3 g Switch Close, 3 g Switch Open, Ablative Shell Off	---	Capsule 7	1	RT, PP1	X				X	X	X		X	9
	Parachute Cover Off	---	Capsule 9	1	RT, FP1	X				X	X	X		X	9
	Capsule T/M Signal Strength	---	Capsule 7, 9, 11	2	RT		Recovery Pass			X	X	X		X	12

Table A8-1 (Continued)

NOTES:

1. Report the system time of reorientation, the voltage level prior to start of reorientation, and the average voltage level during reorientation.
2. Backup monitors for ascent events.
3. Reads 20% (1 volt) for re-entry disable and 80% (4 volts) for re-entry enable.
4. Read when sun position indicator data are required in Notes 5 and 6 (until turn-off at start of reorientation). [redacted] reads on the recovery pass to indicate SS/D restart event if measurement D85 is invalid.
5. With the exception of D130, Channel 15 SPI data will be read only if the SPI data on Channel 16 do not appear valid. Read 3 times at approximately 2-minute intervals correlated with system time on Pass 2 [redacted] and [redacted], on Pass 13 [redacted], on Pass 17 [redacted], on Pass 29 [redacted], on Pass 32 [redacted] on Pass 45 [redacted], on Pass 47 [redacted] and on Pass 60 [redacted]. Readings at one system time only are required of [redacted] on Passes 8, 23, 39, and 54. All [redacted] and [redacted] readings are to be obtained as far north as possible. [redacted] transmits data on Channels 15 and 16 to Sunnyvale on 100-wpm/voice line after Pass 2; three 10-second data samples at 2-minute intervals required.
6. Read at 1-minute intervals before reorientation, 20-second intervals during reorientation, and immediately prior to separation; correlate with system time. Channel 15 SPI data will be read only if the SPI data on Channel 16 do not appear valid. [redacted] transmits data on Channel 15 and 16 to SV on 100-wpm/voice line after recovery pass; continuous transmission from acquisition to separation.
7. Read system time at start and finish of reorientation, voltage level prior to start of reorientation, and average voltage level during reorientation.
8. Reads 4.67 volts prior to separation, 1.33 volts after separation. Correlation within 2 seconds of exact system time is satisfactory for initial [redacted] report. [redacted] and TIS verify that event has occurred by voltage level check.
9. The RT readout will contain a verification that each event has occurred. The PP1 readout will contain the system time of each event. Use event numbers listed in Paragraph 7.4.6 for identification when reporting.
10. The [redacted] PP1 readout will contain the average value and duration. The PP2 readout will contain a complete time history of acceleration and will include the system time of each data dropout and the time duration of dropout. [redacted] and [redacted] read values 5 seconds prior to, at, and 5-seconds after parachute deployment.
11. Record voltage level at beginning, middle, and end of pass. Readout, accurate to at least 0.1 volt (2% bandwidth), required of [redacted] (Passes 8, 9, 15, 24, 31, 39, 55), [redacted] (Passes 6, 7, 13), [redacted] (Passes 1, 2, 16), and [redacted] (Pass 2). Readouts on Passes 1 and 2 are required 60 minutes after the pass; all other readouts required 10 minutes after the pass at [redacted] and 30 minutes after the pass at [redacted] and [redacted]
12. Provide a qualitative evaluation of signal reception.
13. Reads out of band after separation.
14. Refer to Table A8-2 for details of readout required.
15. Data to be readout and reported to STC as % of voltage. [redacted] reads on every active pass, [redacted] will read out on Pass 2 only. Data will be reported by 60-wpm TTY. (Amount of data readout on each pass will be the minimum amount to establish a constant data level.)

---

* *RT – Read in real time.*
PP1 – Read immediately after pass.
PP2 – Read immediately after RT and PP1 readouts.

** *All data are also to be reported to the STC by 60-wpm teletype as soon as possible.*

****T/M ships and aircraft will transmit real-time data immediately after signal fade so no interference with the vehicle telemetry signal will be generated.*

[redacted]

Table A8-2

NOMINAL PAYLOAD FUNCTION WAVE TRAIN REAL-TIME READOUT AND REPORTING REQUIREMENTS

CHANNEL 6 (AET 52) READOUT AND REPORTING REQUIREMENTS

PASS NO	TRACKING STATION	MAXIMUM DATA REPORTING TIME ALLOWABLE (MINUTES)		
		READOUT (a)	READOUT (b)	READOUT (c)
1	[redacted]	10	60	90
2		--	--	90
2		30	60	90
6		15	60	90
8		--	--	90
9		15	60	30
13		15	60	90
15		15	60	90
16		15	--	--
24		15	60	30
31		15	--	--
39		15	60	30
55		15	60	30

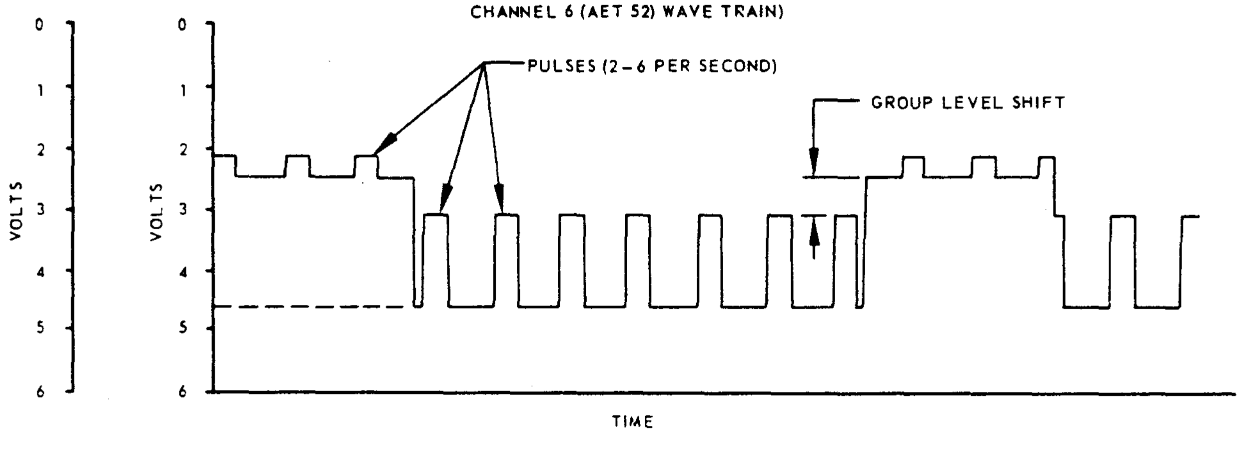
NOTE:

READOUT (a) – COMPARE CHANNEL 6 WAVE TRAIN WITH NOMINAL WAVE TRAIN BELOW. REPORT PRESENCE OR ABSENCE.

READOUT (b) – REPORT THE TIME (±0.5 SEC) OF THE START OF THE WAVE TRAIN AND THE DURATION (±5 SEC) OF THE WAVE TRAIN.

READOUT (c) – REPORT THE ELAPSED TIME (TO THE NEAREST 0.1 SECOND) REQUIRED FOR 100 PULSES COUNTED FROM LEADING EDGE TO LEADING EDGE AFTER AT LEAST 20 PULSES FROM THE WAVE TRAIN START. REPORT THE NUMBER OF GROUP LEVEL SHIFTS WITHIN THIS 100 PULSE PERIOD.

CHANNEL 6 (AET 52) WAVE TRAIN)



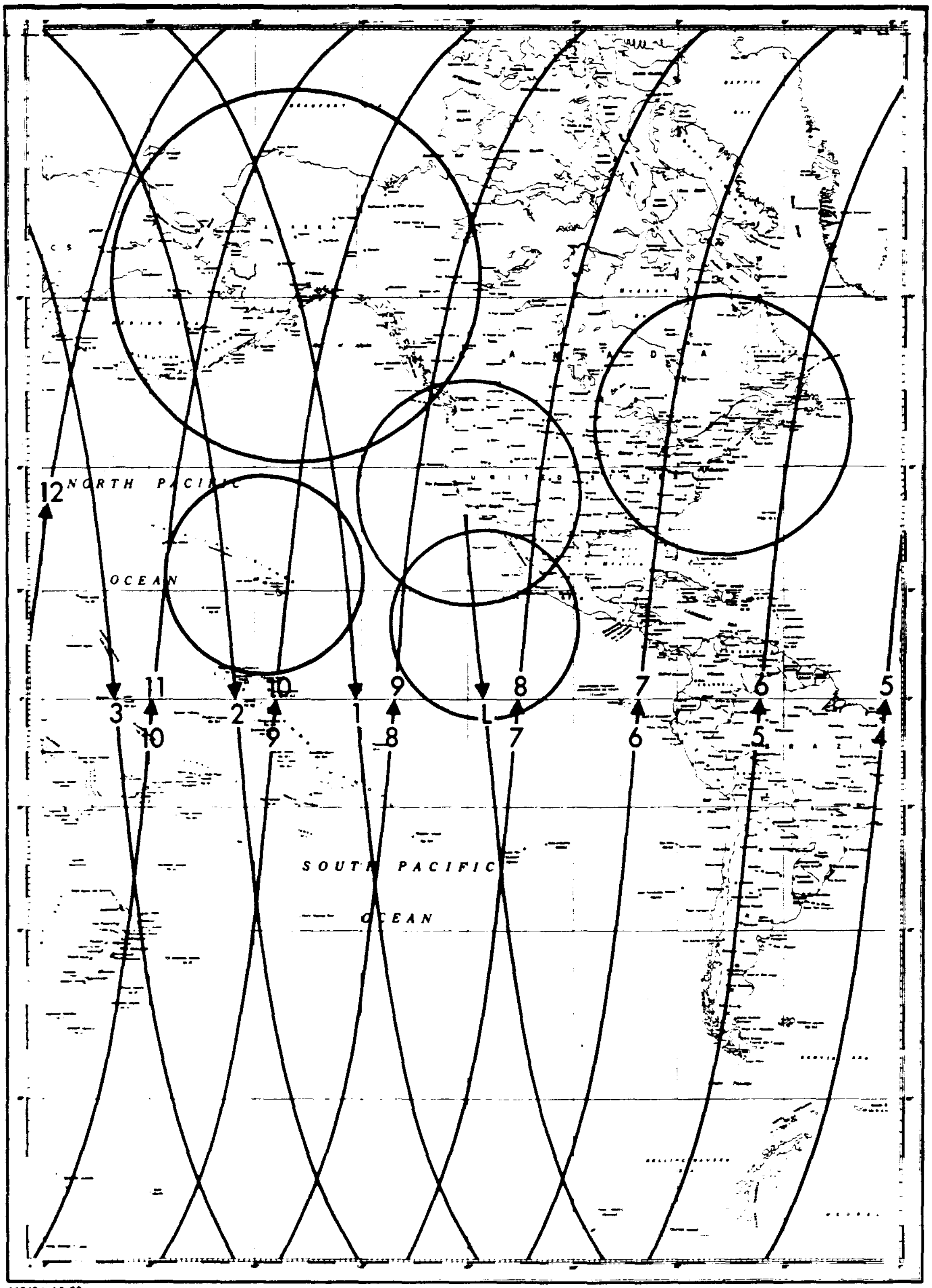


Figure A2-1(a) Nominal Orbit Traces – Launch Through Pass 12

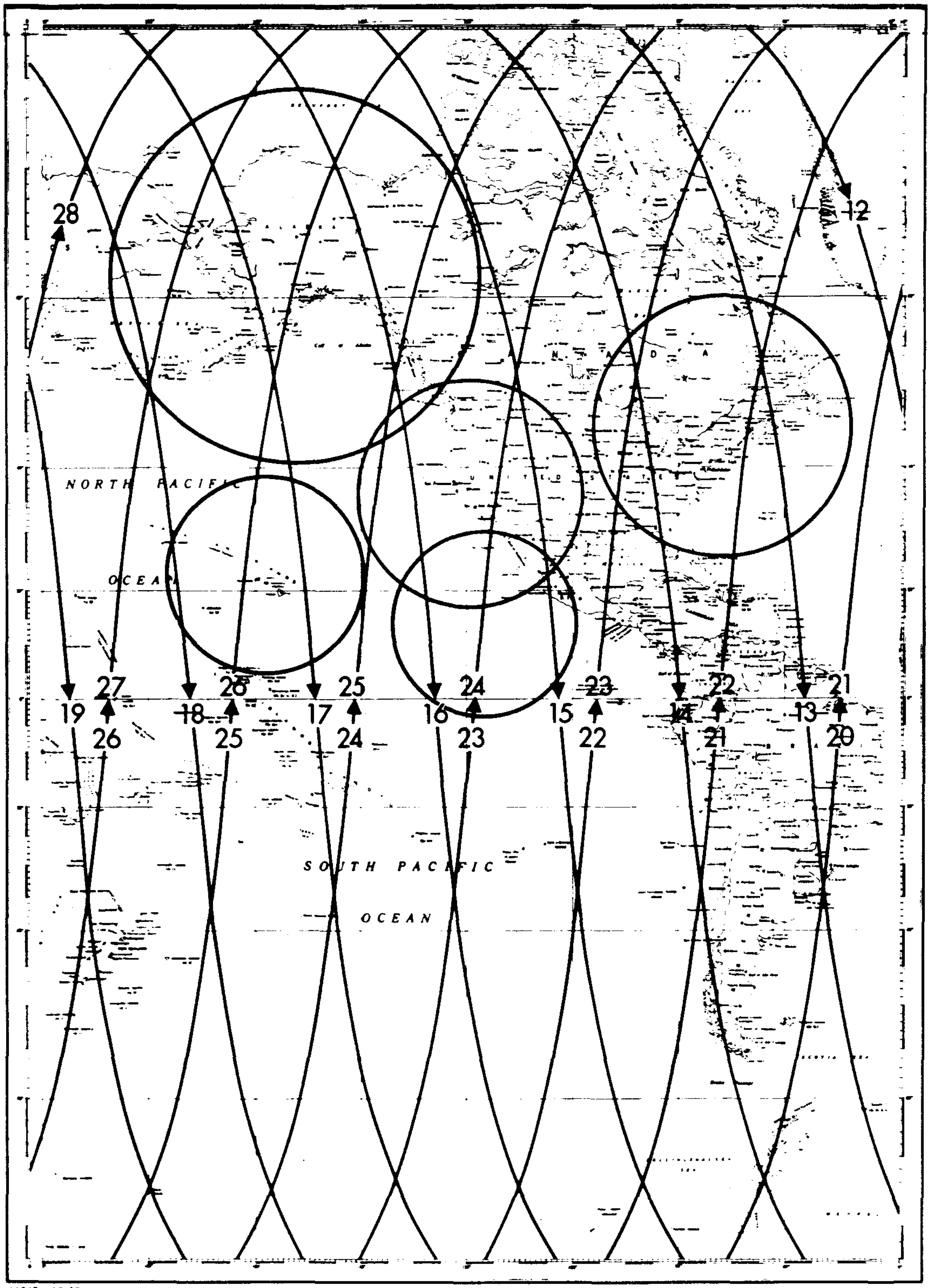


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Figure A2-1(b) Nominal Orbit Traces – Passes 13 Through 27

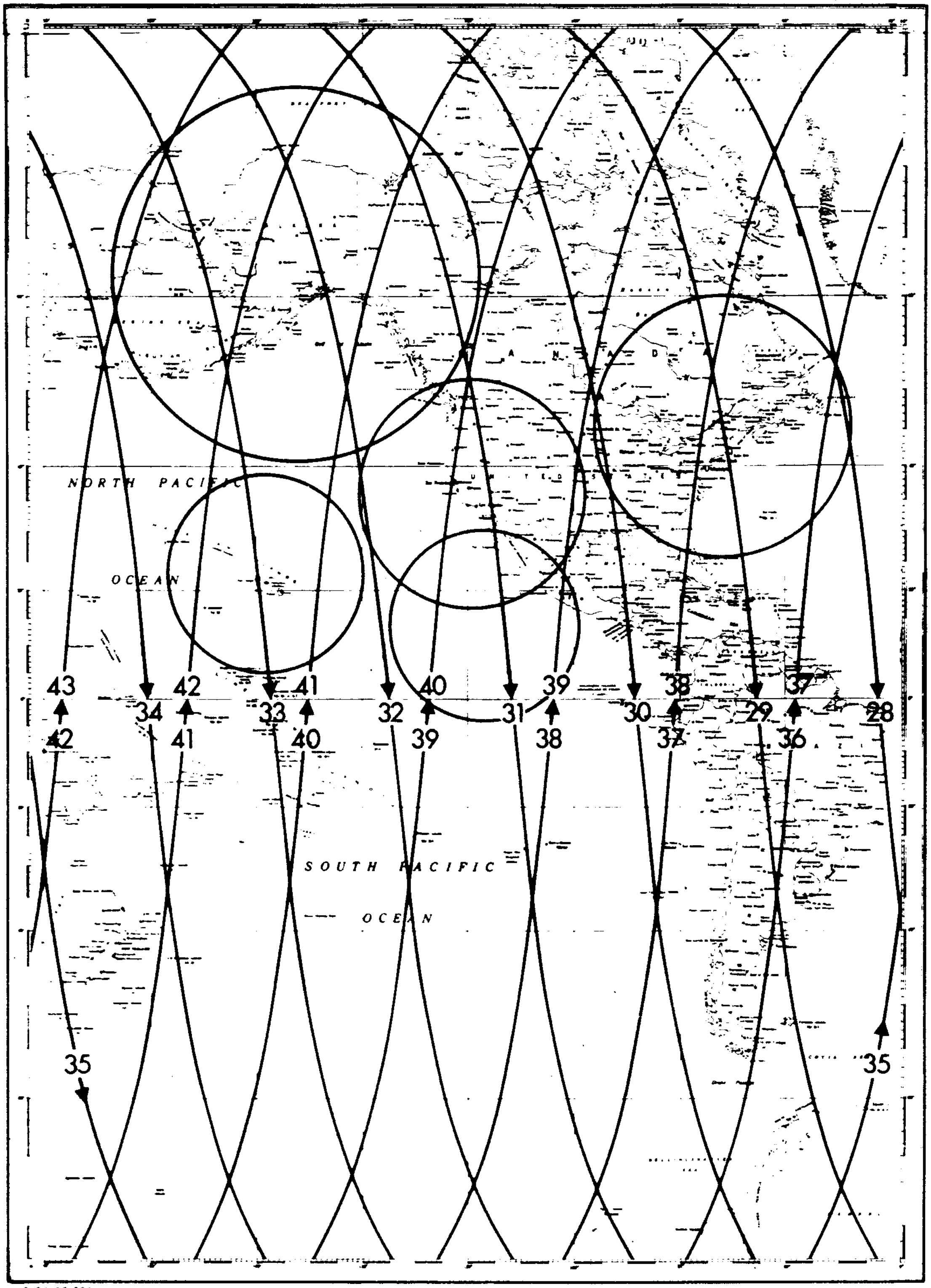

Figure A2-1(c) Nominal Orbit Traces – Passes 28 Through 43

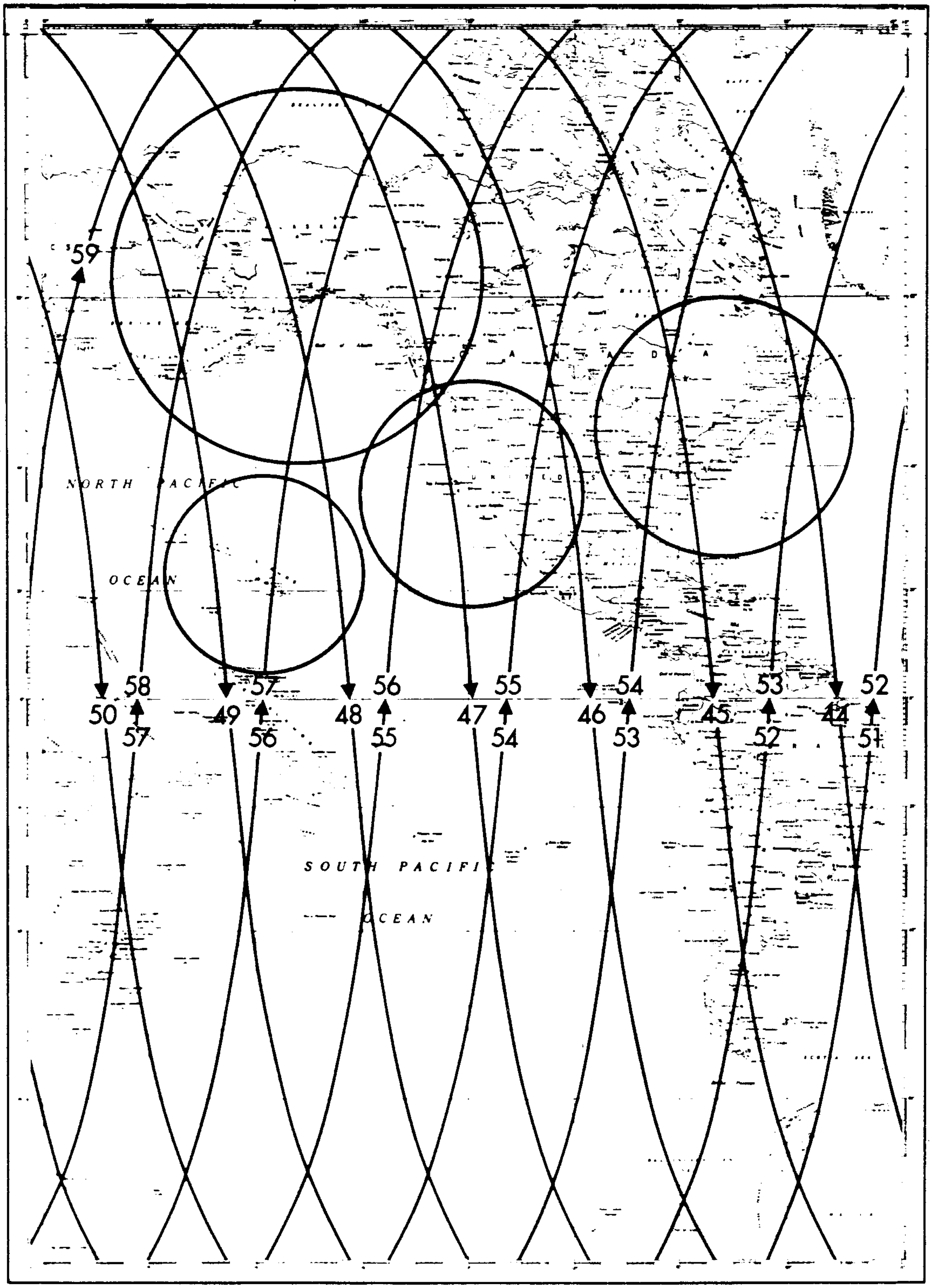

Figure A2-1(d) Nominal Orbit Traces – Passes 44 Through 59

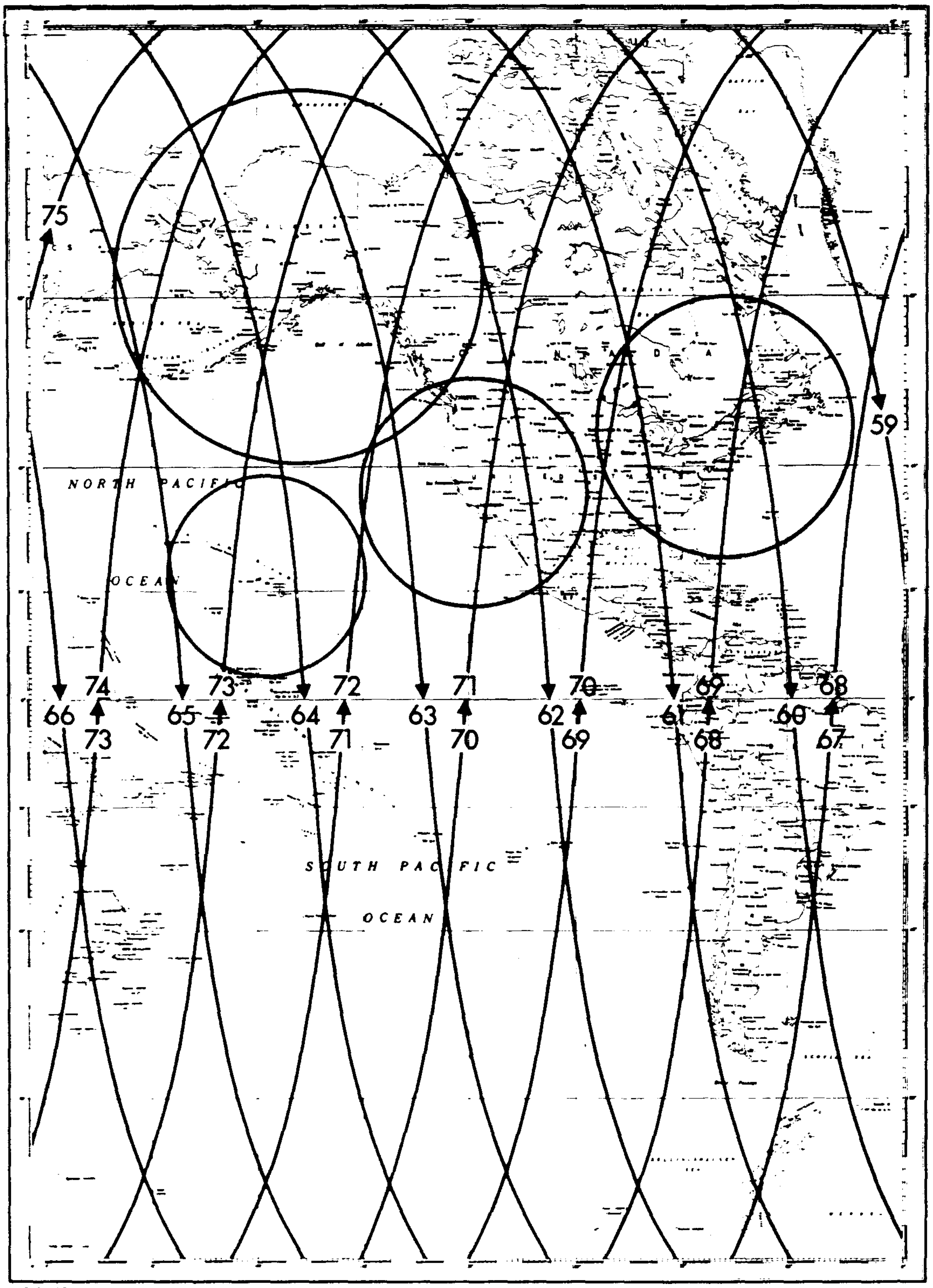

Figure A2-1(e) Nominal Orbit Traces – Passes 60 Through 75

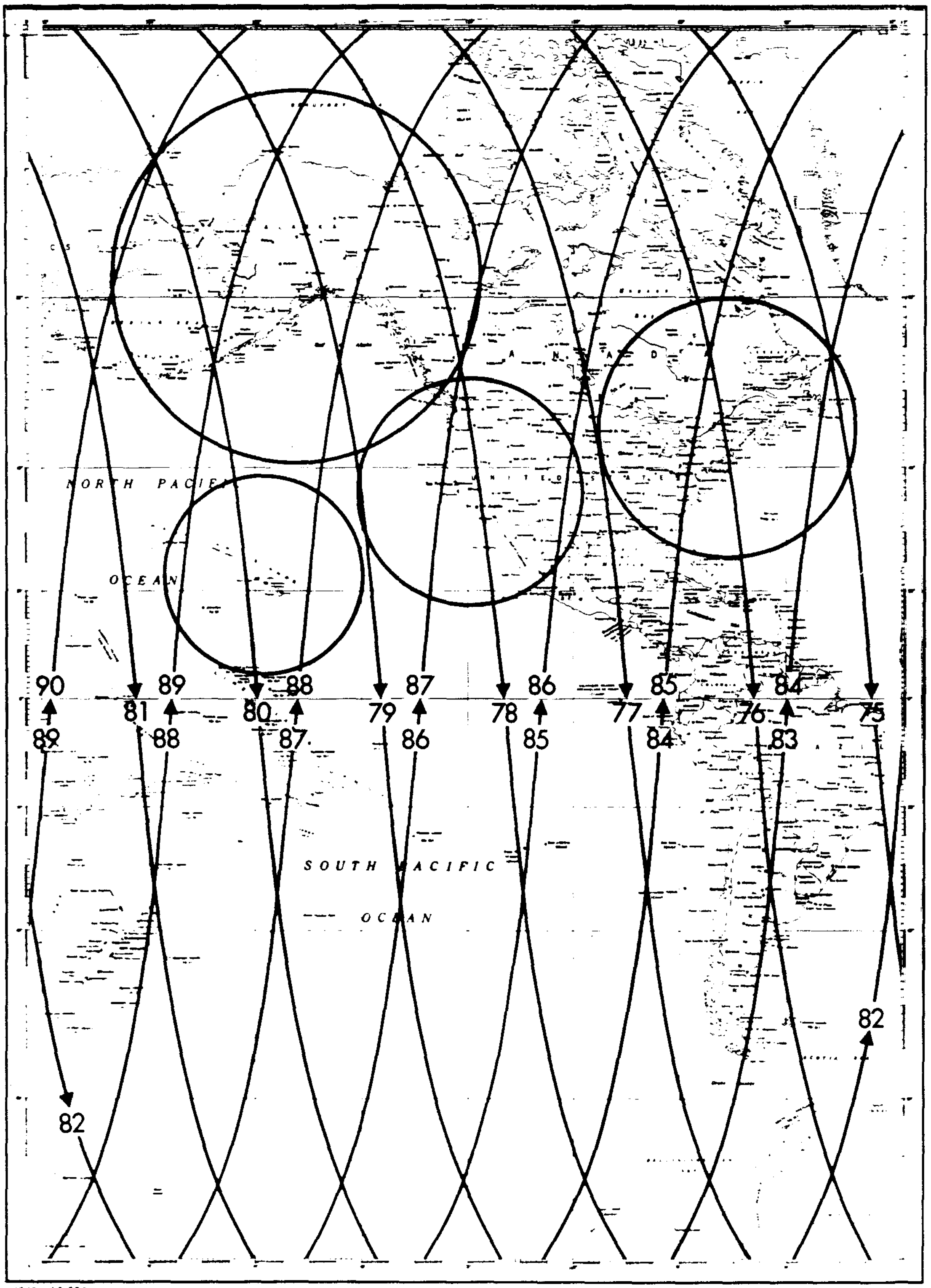

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Figure A2-1(f) Nominal Orbit Traces – Passes 76 Through 90

[redacted]

TYPE OF PASS						
A	B	C	D	E	F	G
STATION						
[redacted]						
			1(20)			
			[redacted]	6(60)		
				7(20)	8(80)	
					9(40)	10(60)
						11(20)
13(60)						
14(20)	15(80)	16(40)	17(60)			
			18(20)	21(60)		
				22(20)		
				23(80)	24(40)	25(60)
						26(20)
28(60)						
29(20)						
30(80)		31(40)	32(60)			
			33(20)	37(60)		
				38(20)		
					39(80)	
					40(40)	41(60)
						42(20)
44(60)						
45(20)	46(80)	47(40)	48(60)			
			49(20)	52(60)		
				53(20)		
				54(80)	55(40)	56(60)
						57(20)
59(40)						
60(60)						
61(20)	62(80)		63(40)			
			64(60)			
			65(20)			
				68(60)		
				69(20)		
				70(80)	71(40)	72(60)
						73(20)
76(60)						
77(20)	78(80)		79(40)			
			80(60)			
			81(20)	84(60)		
				85(20)	86(80)	
					87(40)	88(60)
						89(20)
91(60)						
92(20)	93(80)		94(40)			
			95(60)			

NOTE: NUMBERS IN PARENTHESIS REPRESENT TIME IN SECONDS FOLLOWING RESET MONITOR INITIATION AT WHICH PROGRAMMER IDENTIFICATION MARK OCCURS. THIS TIME IS TAPE TIME, 90 MIN PERIOD

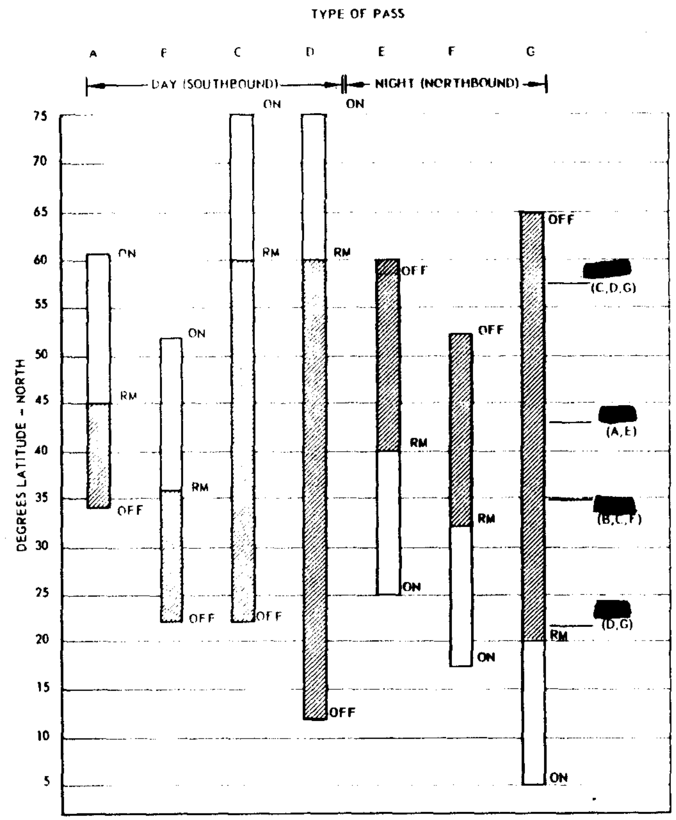

Figure A2-2 Readout and Reset Programming

[redacted]

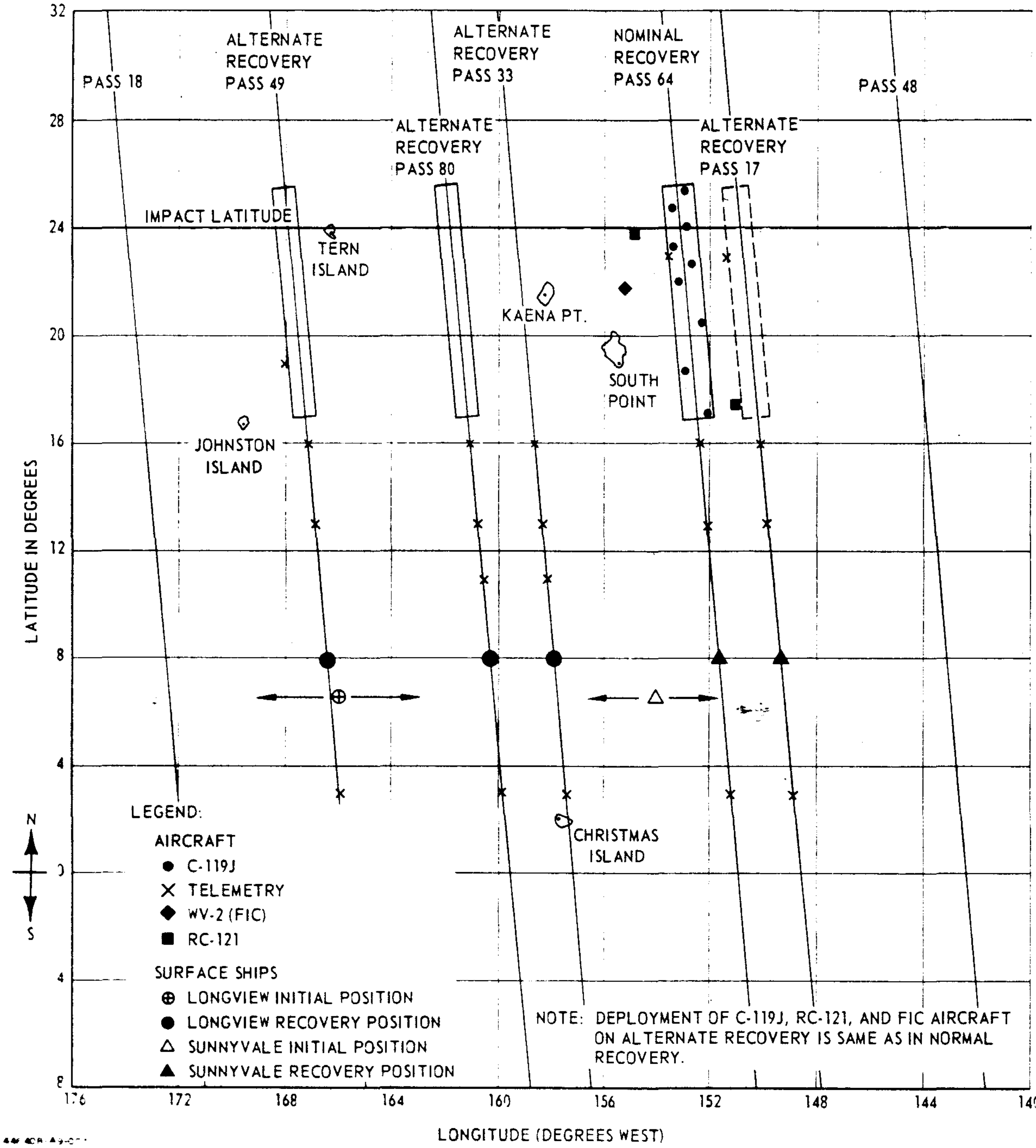

Figure A7-1 Recovery Force Deployment

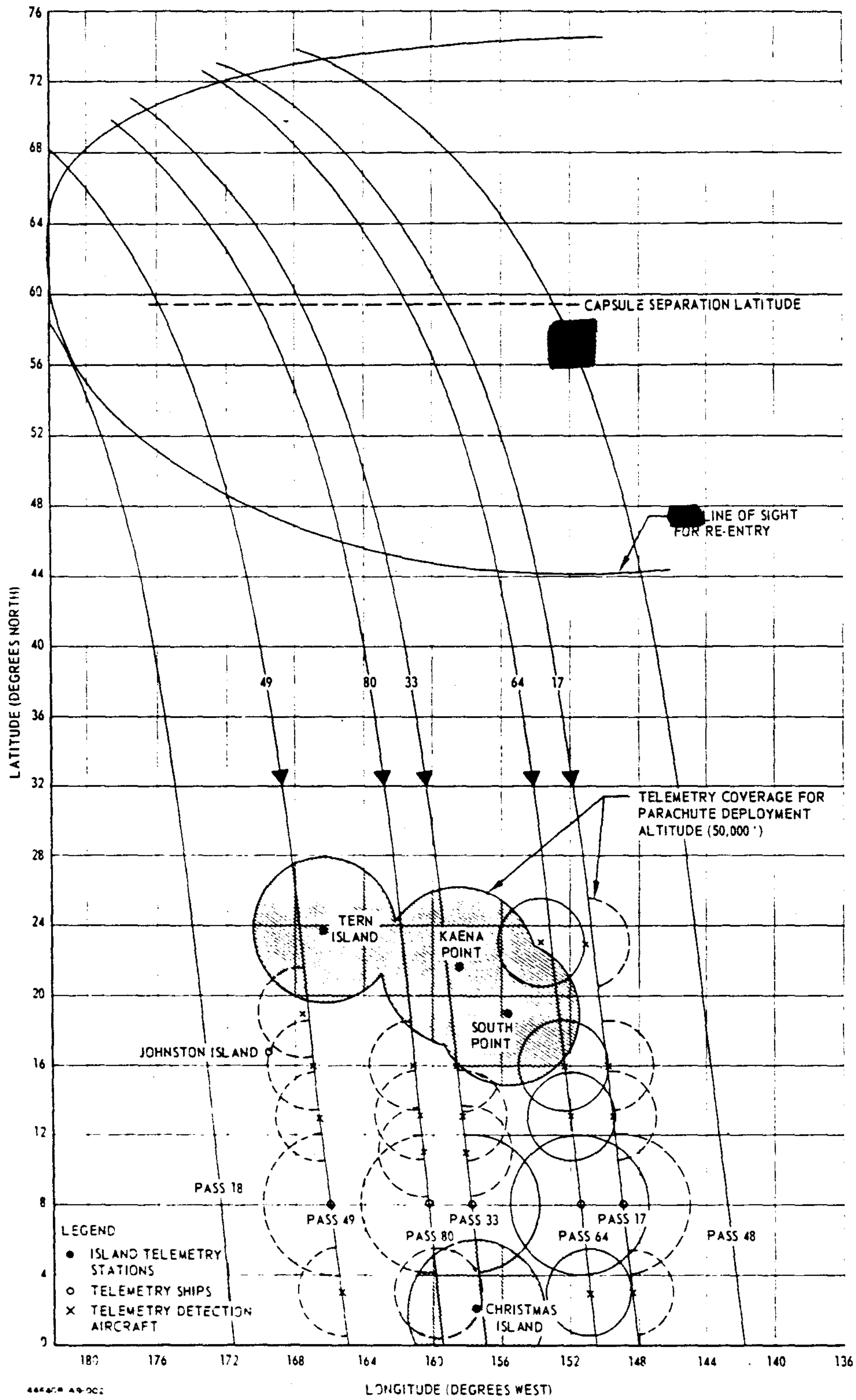

Figure A7-2 Normal and Altemate Re-entry Telemetry Coverage

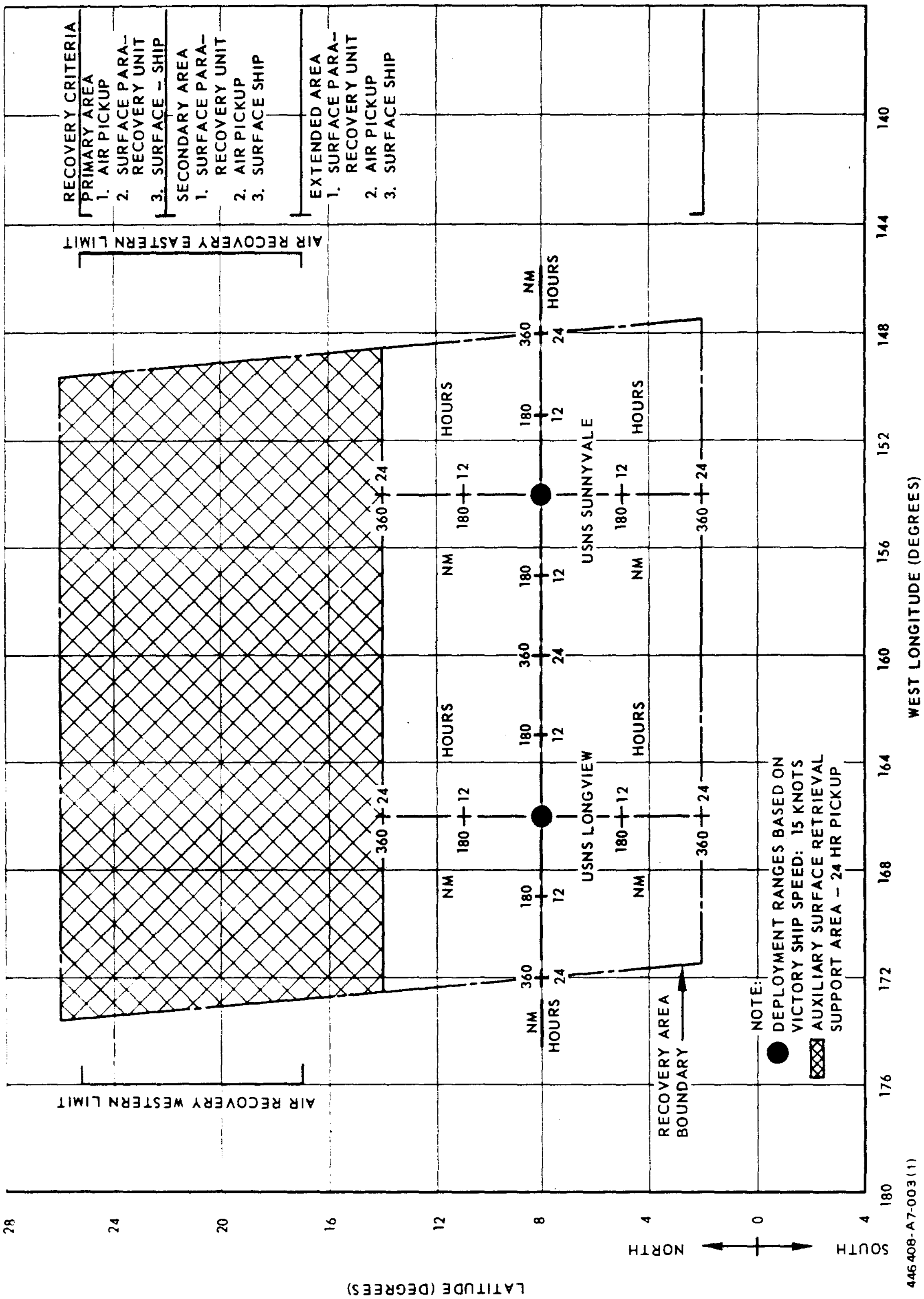

Figure A7-3 Surface Ship Recovery Capability

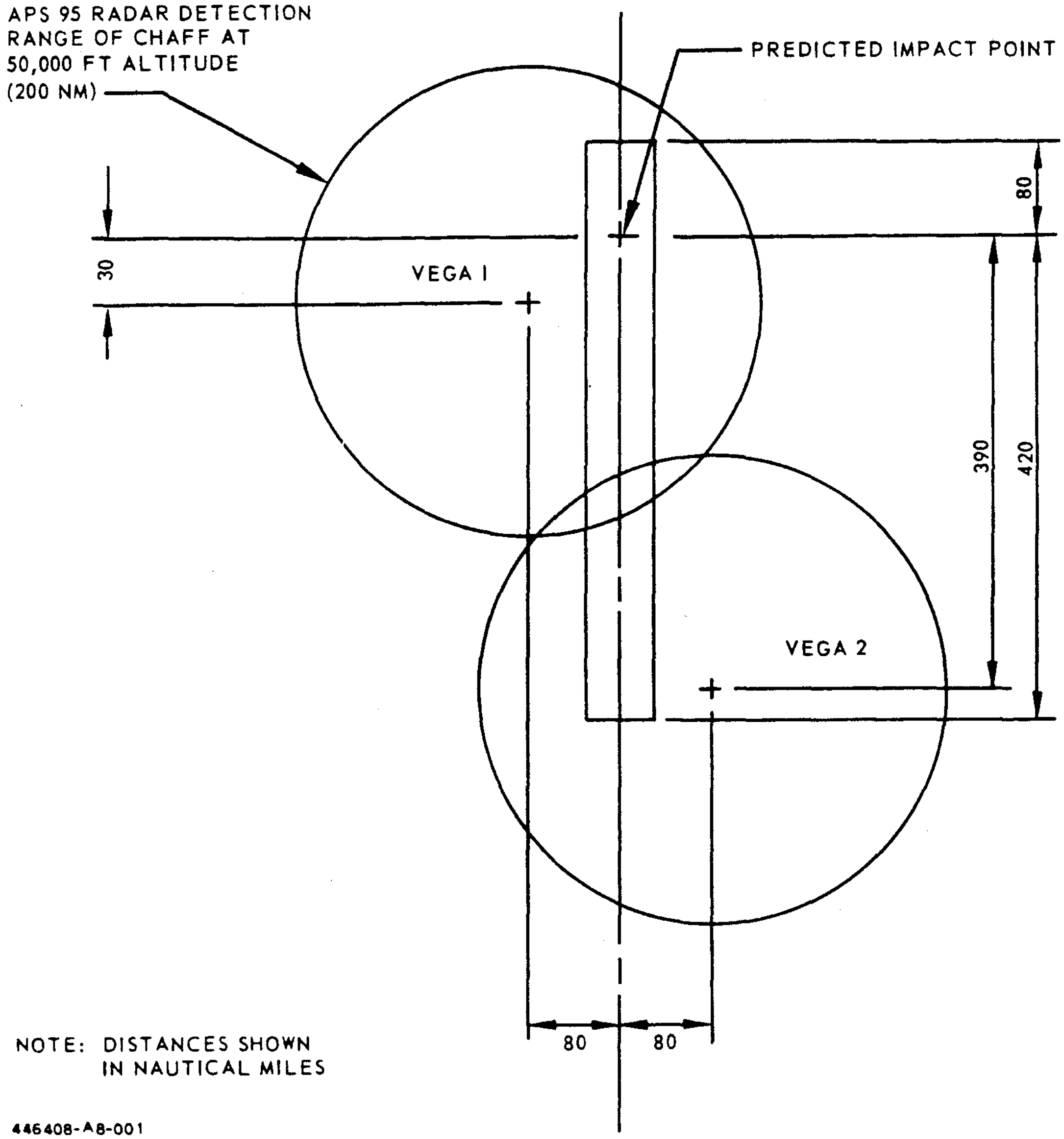

Figure A7-4 RC-121 Aircraft Deployment

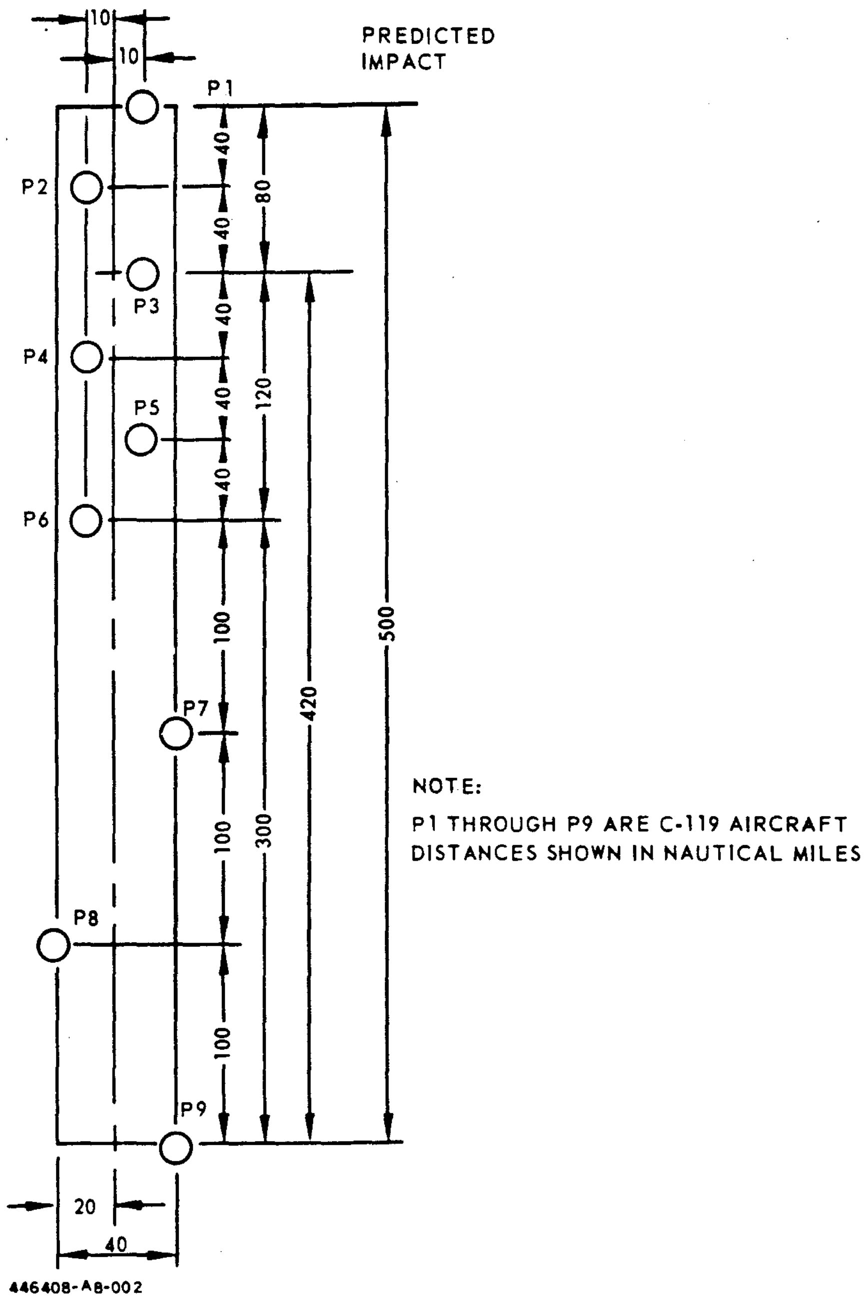

Figure A7-5 Recovery Aircraft Deployment

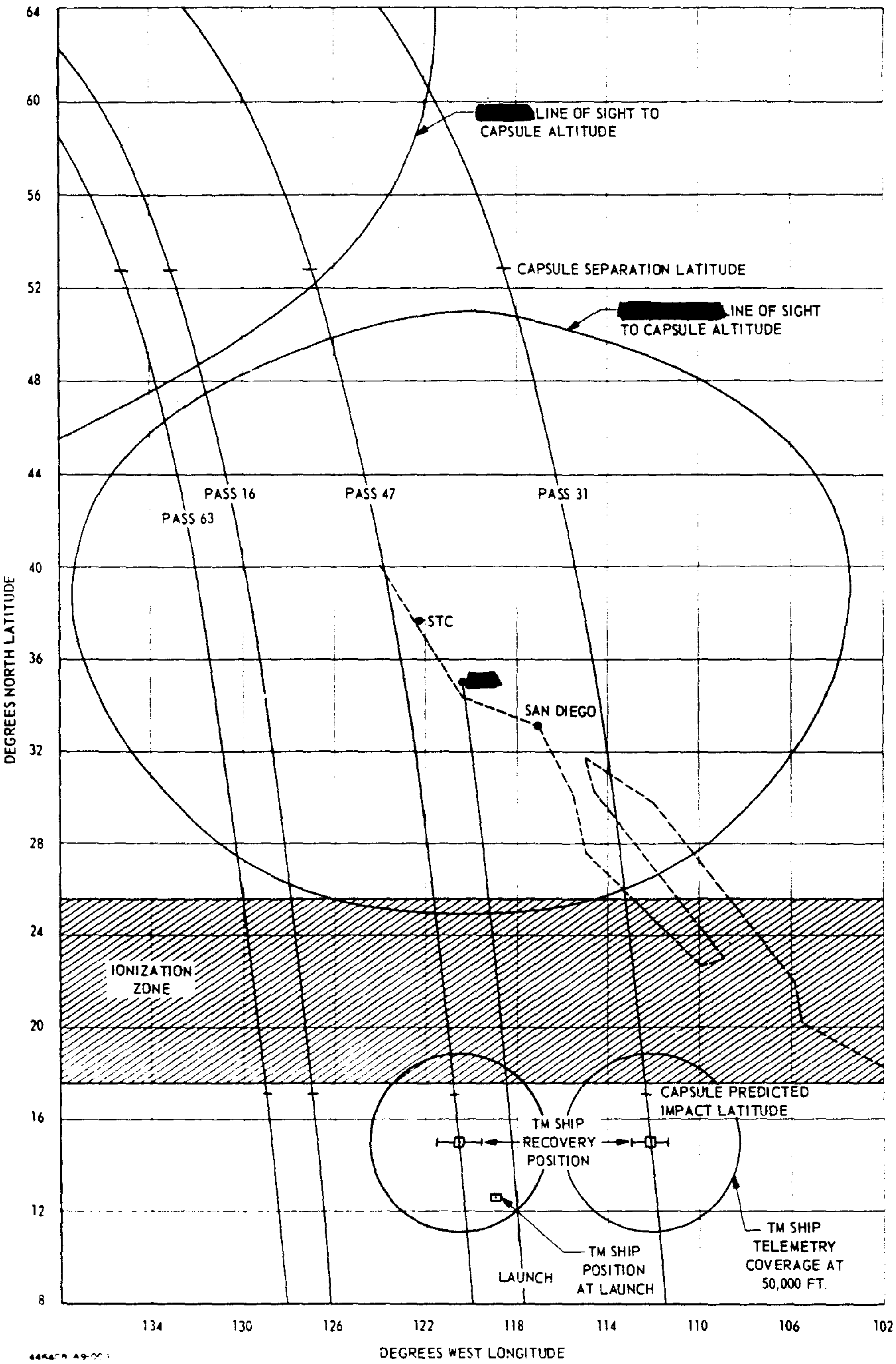

Figure A7-6 Emergency Recovery Telemetry Coverage and Recovery Coverage

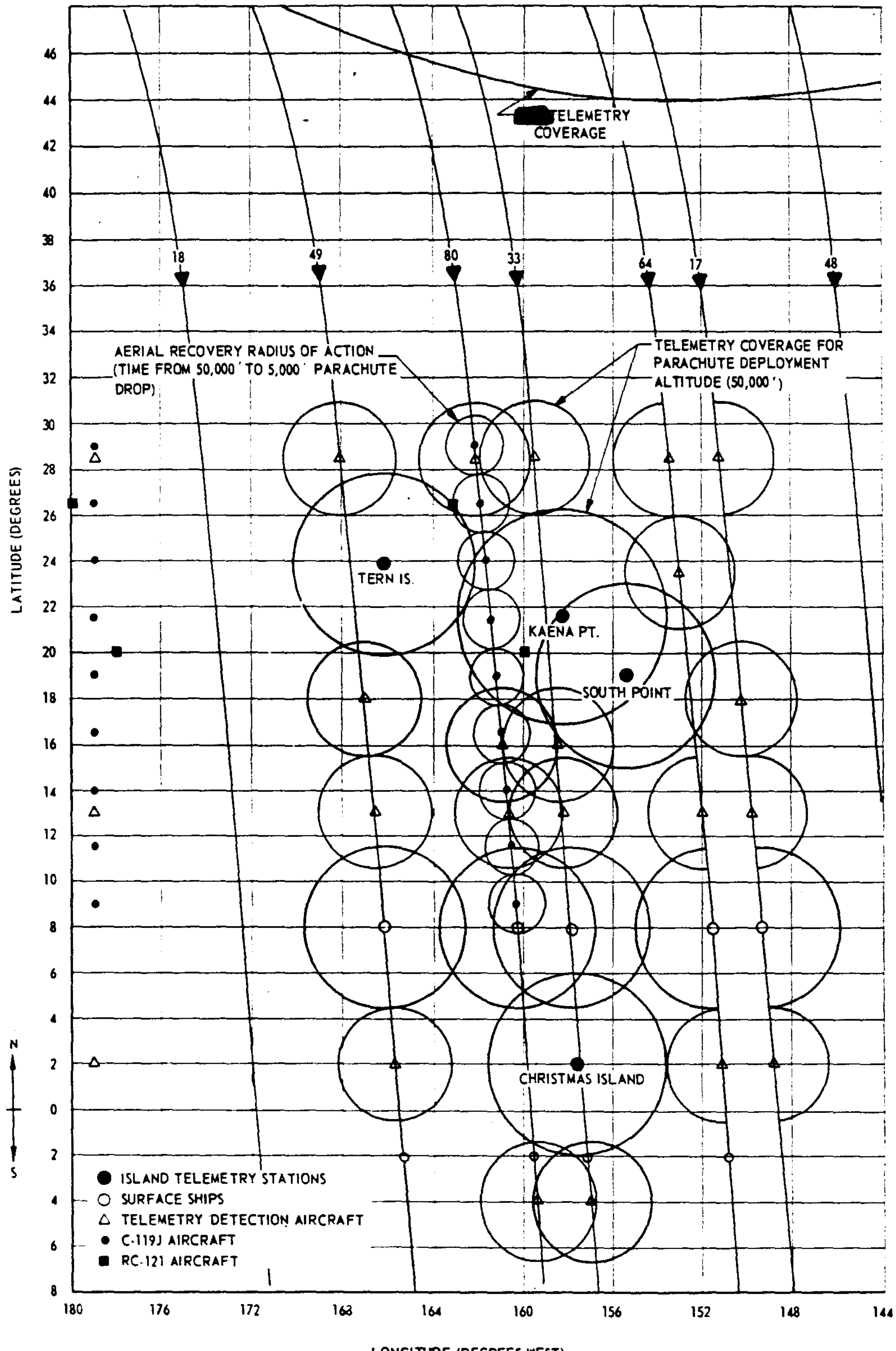

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Figure A7-7 Tumbling Satellite Re-entry Coverage

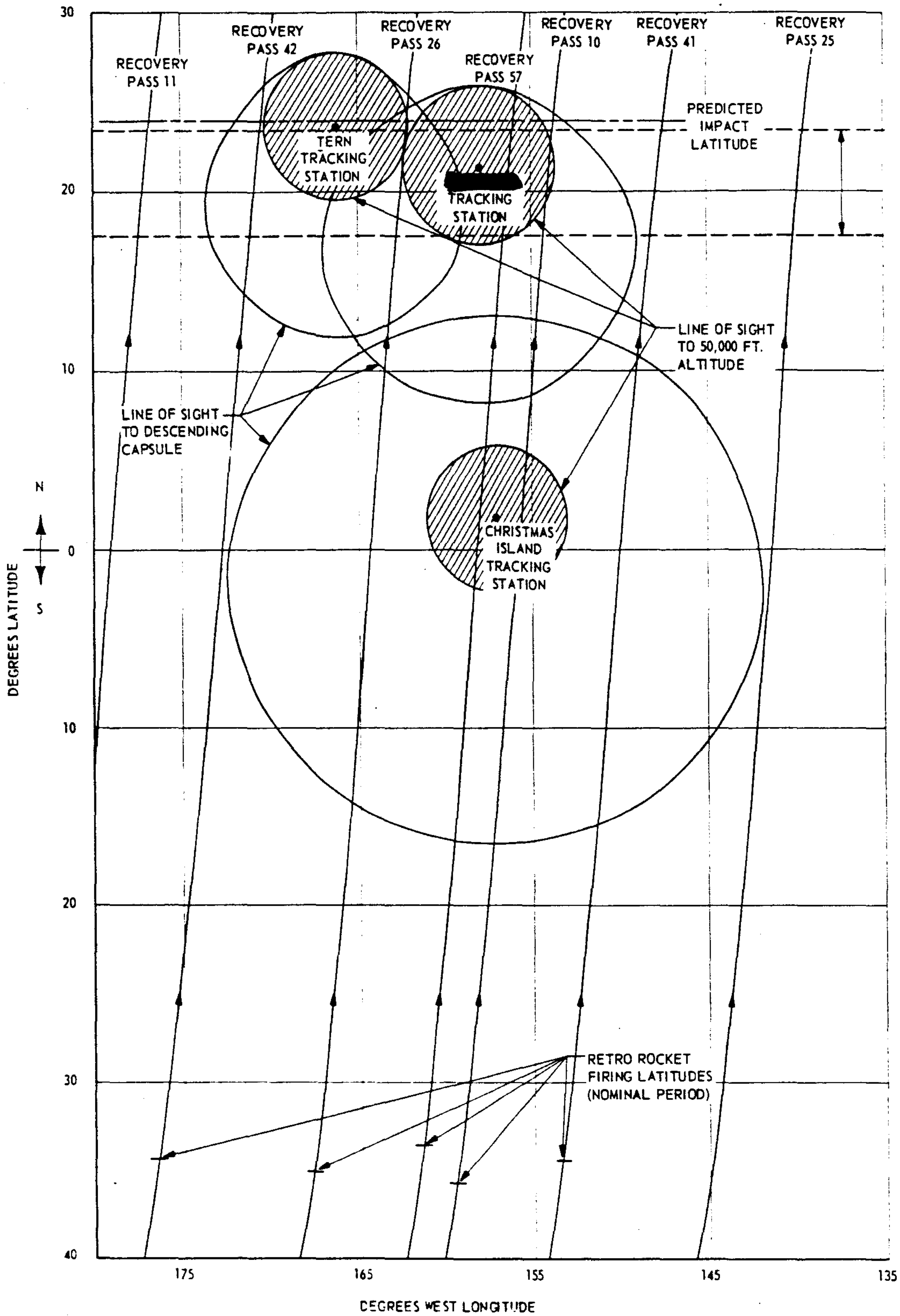
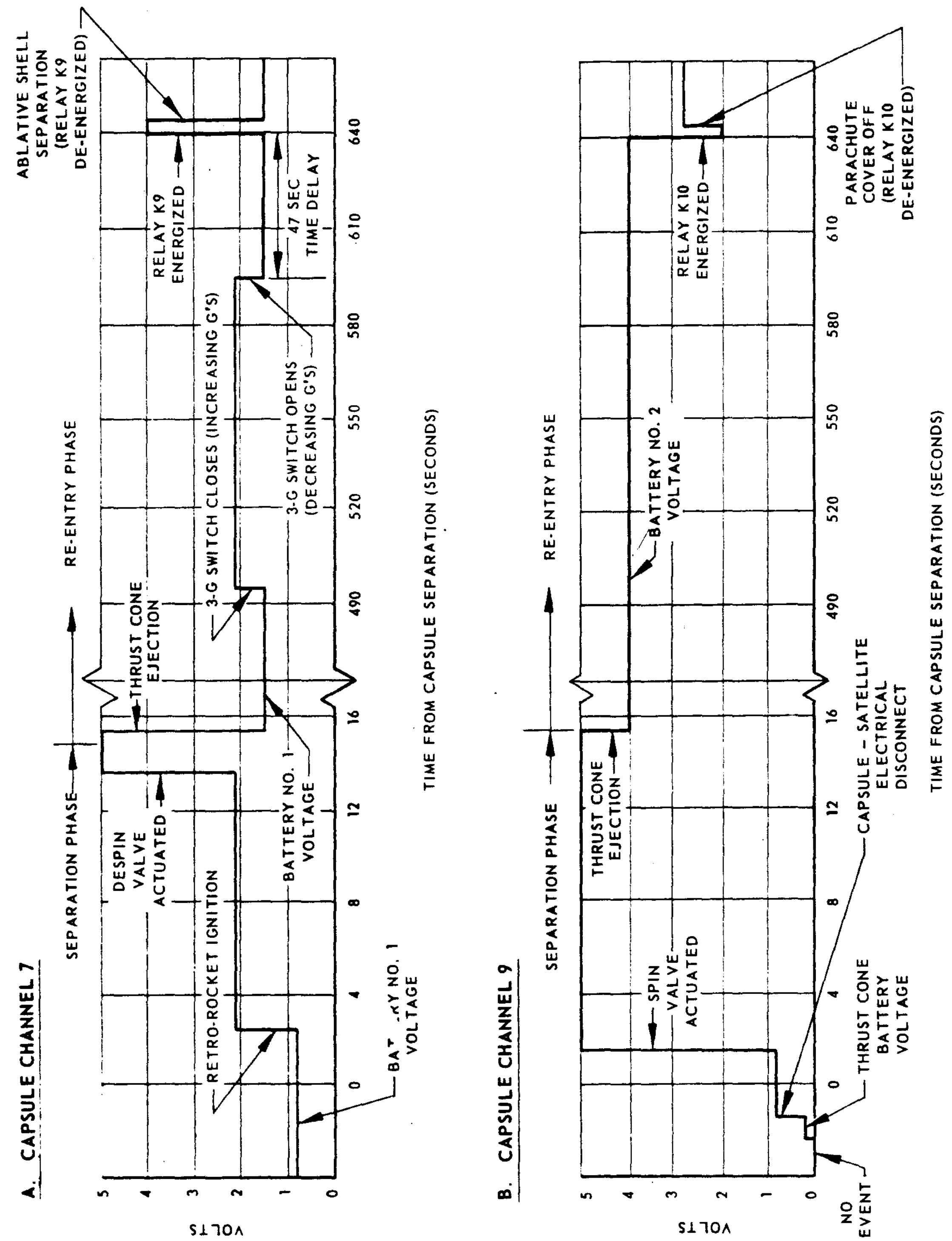


Figure A7-8 Northbound Hawaiian Recovery Telemetry Coverage



NOTE: VALUES SHOWN INDICATE NOMINAL SEQUENCE OF EVENTS. CONSULT T/M CALIBRATION DATA FOR VOLTAGE LEVELS WHICH WILL OCCUR IF SEQUENCE OF EVENTS IS NOT NORMAL. REFER TO SECTION 7.5 FOR SEQUENCE OF EVENTS DESCRIPTION

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Figure A8-1 Nominal Capsule Telemetry Voltage Levels

[redacted]
26 May 1961
Copy No. ——
______Sheets

APPENDIX A – TAB 10

SYSTEM TEST DIRECTIVE
FOR
DISCOVERER SATELLITE SYSTEM
DISCOVERER SATELLITE 1108
DISCOVERER BOOSTER 302

Prepared under authority of AFBM Exhibit 60-6, Paragraph 1.4.1

Prepared by

SYSTEMS INTEGRATION PLANNING

APPROVED:

[redacted]

COLONEL, USAF
CHAIRMAN,
SYSTEM TEST WORKING GROUP

APPROVED:

[redacted]

SATELL [redacted] YSTEMS DIRECTOR

[redacted]

CONTENTS

TABLES

[redacted]

ILLUSTRATIONS

APPENDIX A - TAB 10
SUPPLEMENTAL TEST INFORMATION

A1 INTRODUCTION

This appendix contains descriptive material which supplements the basic text of the STD and is applicable only to the flight of Discoverer Satellite 1108. This appendix contains an additional section (Recovery Operations - Emergency) which is to be incorporated into the revised basic text. Where the material contained herein is in conflict with that in the basic text, the information in this appendix has precedence. Reference will not be made to this appendix for subsequent flight operations.

A2 CONFIGURATION

A2. 1 Discoverer Satellite

A2. 1. 1 An AET-H payload will be carried in a Mark V recovery capsule. The Discoverer Research Payload will not be installed.

A2. 1. 2 Optical tracking lights will be carried for tracking evaluation. They will be programmed ON while the satellite is within range of Smithsonian Astronomical Observatory stations equipped with Baker-Nunn optical tracking cameras.

A2. 1. 3 Three Type 1A batteries and two Type VI batteries will provide the electrical power on this flight.

A2. 1. 4 A total of 132 pounds of control gas will provide vehicle attitude control through the normal recovery pass on the fourth day of orbit operations within the limits of expected gas expenditure rates.

A2.2 Discoverer Vehicle

Discoverer Vehicle 1108/302 will incorporate the BTL guidance system operating in the closed-loop mode. This system will provide booster guidance during launch, provide time-to-fire and velocity-to-be-gained correction signals to the Agena Vehicle, and will command booster/satellite separation as described in Section 3.1.4 of the basic text.

A2.3 SOCS

The Satellite Orbital Control System (SOCS) consists of the following ground tracking stations: [redacted]. These stations are under the direct control of the STC for all operations from prelaunch to post-recovery. Tern Island, South Point, and Christmas Island are additional stations used during the recovery operations.

A2.4 Ship and Ground Station Readiness Verification for MIDAS

A2.4.1 Discoverer XXIV will be utilized to demonstrate the readiness of the USNS Watertown, the USNS Huntsville, and the [redacted] 60-ft T&D antenna telemetry recording capability for the forthcoming MIDAS flight.

Tracking data obtained from these facilities will be transmitted to the STC via SSB from the ships and via the 100-wpm teletype line from [redacted] The data will be compared to simultaneous tracking data from other sources and the final ephemeris to obtain tracking accuracy information.

The [redacted] will receive instructions over the normal communications link tied into the STC. If not already on station as telemetry ships, the surface ships will be stationed far enough at sea to experience ocean swells typical of downrange ship operations. If the ship is not capable of leaving port, the tracking system will be exercised in port in accordance with STC instructions.

[redacted]

The ship will inform the STC of expected ship position two days prior to launch. When on station, the ship will report actual position to the STC. In the event the ship has to change positions to further the test on subsequent orbit passes, the actual position will again be reported to the STC.

Acquisition messages from the STC will be sent to the ship based upon the latest position report received.

The ship will conduct the tracking exercise on the SPQ-8 radar and the AGAVE angle tracker. The angle tracker will be tuned to the FM/FM telemeter transmitter (Link 1) and will record sufficient telemetry data to verify quality of reception as well as antenna position for determination of the angle data.

The SPQ-8 will tune to the satellite transponder frequency and will track the satellite in the two-pulse mode. A third pulse will not be used due to the possibility of inadvertent commands being transmitted.

The SPQ-8 will be adjusted to the following specifications:

<u>Transmitter</u>	
Pulse Spacing	21.35 μ seconds (with 0.8 μ sec/pulse)
Pulse Frequency	410 pulse/second
Frequency	2850 ± 2 mc
<u>Satellite Transponder</u>	
Frequency	2920 ± 2 mc
Pulse Spacing	Single Pulse
Pulse Frequency	(as interrogated)

The AGAVE Angle-Tracker will be adjusted to the following:

Satellite Transmitter - FM/FM
Satellite Frequency - 237.8 ± 0.015 mc
Satellite Transmitter Power - FM 8 Watts

The STC will notify the ships of radar frequency changes at launch.

The STC will alert the ships as to expected acquisition times and direct them to proper positions for the duration of this checkout test.

[redacted] 60-ft T&D antenna will also record on the Satellite telemetry transmitter frequency. The STC will direct the [redacted] operations.

A3 LAUNCH OPERATIONS

A3.1 Launch Time

The target time of launch will be determined by the STC.

A3.2 [redacted] Tracking Station

The incorporation of the BTL guidance system for launch trajectory control has deleted the requirement for the Reeves Guidance Computer at [redacted] and the necessity for transmission of Commands 5 and 6 during the launch phase. All launch and orbit tracking and telemetry requirements supported by [redacted] have been deleted for this and subsequent operations.

A3.3 [redacted] Tracking Station

Section 5.3 of the basic text is revised to direct [redacted] to provide primary active VERLORT tracking during the launch phase. Radar tracking data will be transmitted to the PAC via 100-wpm teletype.

A3.4 Increase/Decrease Switch Position

The increase/decrease switch will be positioned in the INCREASE position during launch. The position of the increase/decrease switch during orbit operations may be in either position as directed by the STC. Placing the switch in the increase position for launch assures a known position of the switch for first pass operations. [redacted] will verify position of the increase/decrease switch and timer step position before launch and provide this information to the STC prior to launch. This verification should be made at the latest practical time prior to launch.

[redacted]

A3.5 Recovery Force Readiness

A3.5.1 The launch criteria as specified in Paragraph 4.2.2.6 of the basic text is amended to specify the following on station operable recovery and search force requirements;

a. Two RC-121 radar aircraft
b. Seven C-119J recovery aircraft
c. Two telemetry/detection surface ships
d. Surface retrieval capability within 24 hours in the recovery zone between 14 and 26 degrees north latitude
e. One para-recovery team
f. Four telemetry aircraft

A3.5.2 It is considered impractical to directly relate the launch decision to specific numbers of telemetry/detection aircraft in operational status at time of launch. The nature of aircraft operation is such that during a three or four day period the actual aircraft status can change several times. It therefore becomes a matter of operational judgement at time of launch to determine expected airborne force status at the time it will be needed and render a decision to launch or not. This change in launch criteria does not abrogate the requirement for four telemetry/detection aircraft on station.

A4 ORBIT OPERATIONS

A4.1 Real-Time Commands

The re-entry capability of the orbital programmer has been modified by (1) deletion of the primary re-entry circuit, (2) elimination of skip/repeat functions and (3) elimination of the increase/decrease switch alternate re-entry selection function. The re-entry selection Commands 5 and 6 will permit positive selection of the recovery pass and will be the only means of initiating recovery.

A4.1.2 The re-entry circuit is enabled by sending Command 5 or Command 6. The re-entry circuit can be disabled by sending the same command used to enable re-entry; i.e., if Command 5 is used to enable, Command 5 will be also used to disable. It is of utmost importance that Command 5 or Command 6 enabling re-entry on a particular future pass be sent only after all possibilities of inadvertently initiating recovery prior to the selected pass have been eliminated.

A4.1.3 The satellite command procedure will include monitoring the telemetry verifications of Commands 5 and 6 (re-entry switch position, Channel 16, Positions 53 and 51) while sending <u>any</u> command. <u>If</u> Command 5 or Command 6 is inadvertently received, the station will immediately report the occurrence to the STC and stand by to send a disable command as directed by the STC. Direct communication between the telemetry read-out station and the Station Test Director is required to reduce reaction time to a minimum.

A4.1.4 The procedure for sending Command 5 or Command 6 is to depress the command button for one second and await verification from the telemetry observer that the command has been received and verified.

If verification is not received, the STC will be notified immediately and the vehicle command console operator will be prepared to give priority to re-sending the command when so directed by the STC. Each attempt at sending these commands must be reported immediately to the STC to permit accurate bookkeeping in case of telemetry failure. The telemetry observer must check Link 1 Channel 16, Positions 53 and 51 which monitor re-entry enable/disable functions controlled by Commands 5 and 6 respectively, to be sure that the vehicle has acted upon the transmitted command and to be sure that both commands have not been initiated when only one is desired.

A4.1.5 The SS/D timer (re-entry sequence timer) start punch has been placed in two locations on the orbital programmer tape for Passes 64 and 79. These start positions are located approximately 90 seconds ahead and 12 seconds after the reset point, with the duration of each being 20 seconds. The purpose of adding the second SS/D timer restart punch on these passes is to ensure dump initiation capability in the event an inadvertent reset command causes the first punch to be by-passed.

NOTE: DUE TO THE POSSIBILITY OF ACCIDENTALLY INITIATING RE-ENTRY WHILE SENDING COMMANDS 1 THROUGH 4 TO A TUMBLING VEHICLE, [redacted] WILL NOT SEND ANY COMMANDS WHILE THE ORBITAL PROGRAMMER BRUSHES ARE MAKING CONTACT THROUGH THE SS/D TIMER START PUNCHES. THESE ACTUAL TIMES WILL BE DETERMINED BY THE STC FROM THE SS/H TIMER SCHEDULE AS MODIFIED FOR THE ACTUAL VEHICLE PERIOD AND SENT TO [redacted] IN ADVANCE OF THE PASS.

A4. 1. 6 "Sweeping" the satellite at the radar antenna nutating rate may occur when approaching the fade point, thereby causing incorrect tones to be received by stable as well as unstable satellites. The stations will monitor VERLORT signal strength, and when it decreases to a point where breaking lock is imminent or when the VERLORT has momentarily lost lock and regained it, the STC will be advised. Commands will not be sent "in the dark," after breaking lock nor as the vehicle approaches its normal fade point except under emergency conditions as directed by the STC.

A4. 2 Tumbling Satellite Command Operations

A4. 2. 1 In the case of a tumbling satellite, special command operations are required. As defined in Paragraphs A4. 1. 2 and A4. 1. 3, the Commands 5 and 6 have been modified to "flip-flop" operation for enabling and disabling the reentry sequence. This of course means that one pulse will activate the switch and a second pulse will deactivate. With a tumbling satellite the possibility of momentarily losing radar lock is greatly increased. In this case, the satellite may receive two commands during a single pulse.

A4. 2. 2 If a total communications blackout occurs between the STC and an active station, and the re-entry command is determined to be in the enable position when the satellite is acquired, the station is authorized to send a disable Command 5 or 6 as required. This authority is extended for a tumbling satellite only in conjunction with a total communication failure. There is one exception to this authorization. If a station with a communication blackout observes re-entry enabled on an optimum recovery pass (Passes 17, 32, 47 and 63 in the case of FTV 1108 with a nominal period), the disable command will not be transmitted on the assumption that the STC initiated the re-entry command for these passes. Any emergency action of this nature will be reported to the STC by the earliest possible means. The STC sends all stations an impact message which defines the "Primary" recovery pass. Stations must be continually aware of the pass so designated by the latest impact message. If the enabled command would result in separation on the designated recovery pass, the station will not send the disable command.

A4.3 Re-Entry Selection - Nominal and Alternate

A4.3.1 Normal recovery based on the nominal period is planned for orbit Pass 63 after four days of active orbital life. Passes 10, 15, 16, 17, 25, 26, 30, 31, 32, 33, 40, 41, 46, 47, 48, 55, 56, 57, 62, 63, 64, 77, 78, and 79 are all programmed for re-entry. Passes 77, 78, and 79 would delay re-entry until Day 5. If emergency re-entry is selected for south-to-north nighttime Passes 10, 25, 26, 40, 41, 55, 56, and 57, separation will occur prior to apogee at approximately 57° S latitude on the numbered pass preceding the selected recovery pass with re-entry impact programmed for 24° N latitude. Passes 15 and 30 provide for re-entry off the West Coast of Mexico.

The re-entry circuit is enabled by sending Command 5 or Command 6, depending upon the pass selected as shown below.

The re-entry enable command will be sent only by direction of the STC.

Command Structure for Enabling Recovery Passes

	Command 5		Command 6	
	N - S	S - N	N - S	S - N
Day 1	16	10	15, 17	
Day 2	30, 32	25	31, 33	26
Day 3	46, 48	40	47	41
Day 4	62, 64	55, 57	63, 64	56
Day 5	77, 79		78, 79	

The last southbound pass available for recovery on Day 4 (Pass 64) and on Day 5(Pass 79) can be enabled by sending either Command 5 or Command 6. Since Commands 5 and 6 also disable the re-entry circuit, the position of the re-entry switches must be known prior to transmission of any commands. Telemetry Link 1, Channel 16 Positions 53 and 51 monitor re-entry Commands 5 and 6 respectively. Re-entry switch position monitors (Positions 53 and 51, Channel 16) will present voltage as follows:

a. A voltage level of 4v or 80 percent indicates re-entry enabled.

b. A voltage level of lv or 20 percent indicates re-entry disabled.

A 4. 3. 2 The maximum acceptable period deviations for programmed nominal and alternate recovery passes are shown below. These deviations represent the maximum and minimum periods that will allow the programmed passes to be within the aerial recovery zone.

Maximum Acceptable Period Deviations

Day	Pass	Period Deviation
1	16	95.9 - 103.6
	17	90.2 - 97.5
2	31	95.2 - 99.7
	32	92.6 - 96.7
	33	89.8 - 93.5
3	46	95.7 - 98.3
	47	93.5 - 96.2
	48	91.6 - 94.1
4	62	94.0 - 96.0
	63	92.5 - 94.4
	64	91.0 - 92.9

A4. 4 Agena Reorientation After Capsule Separation

The vehicle flight controls will be left on, following capsule separation. The vehicle should return to the local horizontal through the horizon scanner correction signal and maintain controlled flight in the normal orbit attitude until depletion of the control gas supply or battery power. The S-band beacon and telemetry are programmed through Pass 93.

[redacted]

A4.5 Post-Recovery Orbit Operations

A4.5.1 Following the recovery pass, the tracking stations will continue vehicle orbit tracking and telemetry recording operations until battery power is exhausted or until operations are terminated by the STC. The STC will establish operations control procedures to investigate the following areas as required during this period:

a. Systems operations exercise and personnel training
b. Vehicle command operations
c. Tracking station operations
d. Subsystem test requirements based on real-time analysis.

A4.5.2 Real-time data readout and reporting requirements for all tracking stations during post-recovery operations will be the same as the orbit requirements listed in Table A8-1, with the following exceptions:

a. AET payload readouts are not required
b. SPI data will be read by [redacted] only at the request of the STC.

A5 NORMAL RECOVERY OPERATIONS

A5.1 Surface Ship Deployment and Operation

A5.1.1 A 24-hour water recovery capability will be provided within the recovery zone boundaries as shown in Figure A7-3. In addition to the USNS Sunnyvale and USNS Longview, auxiliary surface recovery support will be provided in the northern area by one or more surface ships, depending on the speed and range capability of units available.

A5.1.2 Auxiliary surface recovery support will be provided to permit recovery within 24 hours after notification of water impact in the recovery zone between 14 and 26 degrees north latitude. Ship-to-shore communications will be maintained with the RCC/PMR representative.

A5. 1. 3 The surface ships will depart in sufficient time to arrive at initial deployment stations by T + 4 hours and will subsequently be deployed to assure surface recovery support for all variations of orbit period. Subsequent to launch the Test Director will determine the particular passes for which impact predictions are required. The PAC will evaluate tracking data after launch and will provide predicted capsule impact location and time for each day not later than T + 4 hours. On receipt of impact predictions, the STC will provide surface ship re-deployment instructions to the RCC. Figure A7-1 shows the ships at initial stations and nominal positions for each day. If desired by PMR, the initial positions of the USNS Longview and the USNS Sunnyvale can be exchanged. The STC is to be notified of such a change one day prior to launch.

A5. 1. 4 The USNS Longview and USNS Sunnyvale will be deployed in the extended recovery area primarily to provide capsule detection and surface recovery capability in the event of capsule overshoot. Capsule telemetry will be recorded. These ships will be positioned as shown in Figure A7-1 and will be re-deployed laterally to assure one-ship coverage for each alternate day pass. If the period is such that both ships can cover the actual recovery pass, the easterly ship will be re-deployed to 11° N latitude and the westerly ship to 6° N latitude. Initial stations will permit re-deployment of either ship to cover its assigned area in one day. For the nominal orbit period as shown in Figure A7-1, the Sunnyvale would cover Passes 17 and 32. The Longview would cover Passes 48 and 63.

A5. 1. 4. 1 Either one or both of these ships will be positioned directly under the orbit plane on the designated recovery pass to enable reception of the capsule signals in the extended recovery area. Until acquisition the quad-helix antenna, will scan ±90 degrees about a 360-degree azimuth at 10 degrees elevation at the rate of once per 15 seconds from ETPD - 0 until ETPD + 2 minutes. From ETPD + 2 minutes until ETPD + 5 minutes, the quad-helix antenna will give full area coverage by scanning ±90 degrees about 360-degree azimuth with antenna elevation increasing and decreasing from 10 degrees to 70 degrees to 10 degrees in increments of 20 degrees per scan. The scan rate will be once per 15 seconds. After ETPD + 5 minutes, the antenna will be positioned at 10 degrees elevation and 180-degree azimuth. In the event that either ship acquires the capsule signals, the telemetry will be recorded on magnetic tape as specified in the Detailed Recording Requirements, and antenna elevation and bearing at acquisition will be immediately reported through PMR to the RCC. Bearings will be relayed to the RCC at intervals of one minute. When the parachute deployment telemetry sequence is received or when the antenna azimuth becomes constant, the ship will so report verbally over SSB radio through PMR to the RCC giving ship position and antenna azimuth and elevation. If no capsule signals are acquired by the ships, a verbal negative report will be submitted over SSB radio through PMR to the RCC at ETPD + 30 minutes.

A5. 2 Airborne Recovery Force Deployment

A5. 2. 1 Two RC-121 aircraft will be deployed as shown in Figure A7-4 for communications control and direction of the Recovery Force. Each RC-121 aircraft will be equipped with SSB radio for direct communications with the RCC. Separate HF and VHF communication will be maintained with elements of the Recovery Force. The RC-121 aircraft will be designated as Command Aircraft for the forces in the primary and secondary recovery areas.

A5. 2. 2 Paragraph 7. 3. 6. 2 of the basic text is amended to read as follows: Under normal conditions, the RC 121 aircraft will be on station approximately two hours before ETPD.

A5. 2. 3 Four telemetry/detection aircraft will be utilized in the recovery area for capsule detection and search, and will be on station by ETPD - 1 hour. The aircraft positioned at 13° N latitude will be equipped with SSB radio and will be designated as Command Aircraft for the forces in the extended recovery area. The nominal deployment of these aircraft for normal and alternate recovery days is shown in Figure A7-1 and A7-2. Placement of these aircraft in order of position priority is as follows:

Predicted Impact Longitude	TM/DF Aircraft Position (deg N latitude)
a. East of 154° W and West of 170° W (with 1 or 2 surface ship coverage)	13 3 15 23
b. 154° W to 161° W (with 1 surface ship coverage)	13 3 15 11
c. 154° W to 161° W (with 2 surface ship coverage)	13 3 15 9
d. 161° W to 170° W (with 1 or 2 surface ship coverage)	13 3 15 19

A5. 2. 4 A telemetry recording aircraft to record the separation sequence of events in the Alaskan area is not required for this flight.

A5. 2. 5 Paragraph 7. 1. 5 of the basic text is amended as follows: The C-130 aircraft will be utilized for dropping a RATU in the event of a full recovery rehearsal.

A5. 2. 6 Paragraph 7. 5. 3 of the basic STD is deleted (for this case) as the APS-95 does not require peaking.

A6 EMERGENCY RECOVERY OPERATIONS

A6. 1 Uncontrolled Satellite

A6. 1. 1 Loss of satellite control gas will result in either a completely tumbling satellite or an uncontrolled but not yet completely tumbling satellite. Loss of control will decrease the probability of impact in the primary area, therefore the Recovery Force deployment will be revised to extend the detection, sea recovery, and air recovery capabilities downrange as far as practical.

A6.1.2 The nominal impact latitude will be relocated northward by 6 degrees from 24 to 30 degrees north latitude, in order to enhance the probability of impacting within the recovery area. Under tembling satellite conditions it is most probable that impact will occur downrange of the programmed impact latitude in the area of optimum telemetry detection and surface recovery capability. [redacted] will not be able to monitor capsule separation events in the case of high altitude orbits.

To provide flexibility of operation for an extended area, the initial position of the surface recovery ships has been changed from 8° N latitude to 6°30' N latitude.

A6.1.3 In selecting the recovery pass for a completely tumbling satellite, primary consideration should be given to surface ship redeployment time. In most instances, this will result in the choice of nominal Pass 63 for recovery. Figure A8-1 shows the optimum deployment plan (time permitting) for the recovery of a tumbling satellite on Pass 63. If the recovery ships have not deployed from their initial location, the decision to re-deploy, as shown, must be made no later than Pass 38. This deployment assumes ground-based telemetry coverage north of 21° N latitude. However, the deployment pattern can be changed when such ground-based telemetry coverage is not available by moving detector 1 from 18° N latitude to 23°15' N latitude and moving each of the other three detectors northward one position. The deployment depicted in Figure A8-1 will provide continuous detection and sea recovery capability from 30° N through 8° S latitude.

A6.1.4 Deployment of the air recovery (C-119) force is also shown in Figure A8-1. The primary purpose of the aircraft in this emergency situation is detection with air recovery capability a secondary consideration. The deployment of this force is a function of the operational range limitations of the aircraft. The 75-nautical mile air recovery capability of the C-119 aircraft is based upon the calculated rate of descent of the capsule from parachute deployment to 5,000 feet, and a descending speed of 240 knots for the aircraft. The depicted deployment extends the air recovery capability from 30° N latitude through 7° N latitude.

A6. 1. 5 The RC-121 aircraft will maintain communications with the RCC and provide recovery force control in the northern area.

A6. 1. 6 The detection aircraft will deploy as indicated in Figure A8-1. The detection aircraft positioned at 3°30' N latitude will be SSB equipped and will be the command aircraft for forces in the extended recovery area.

A6. 1. 7 The optimum latitudinal positions of the force for the recovery of a tumbling satellite on Pass 63 are as follows:

Unit	Position Priority	Latitude
Pelican (C-119)	1	29° N
	2	26°30' N
	3	24° N
	4	21°30' N
	5	19° N
	6	16°30' N
	7	14°
	8	11°30' N
	9	9° N
Vega (RC-121)	1	26°30' N
	2	20° N
Detector	1	18°30' N
	2	14°30' N
	3	3°30' N
	4	6°00 S
TLM Ship	1	9°00 N
	2	2°00 S

These positions will be assumed only be direction of the STC.

A6. 1. 8 Recovery earlier than Pass 63 is, of course, possible but the deployment of recovery forces as depicted in Figure A8-1 could not then be achieved. The STC will evaluate the desirability of attempting earlier recovery based upon residual satellite control capability.

A6. 1. 9 In the case of an unstable satellite which is using power or control gas at an excessive rate, the primary consideration is effecting recovery as early as possible. In order to allow at least six hours' notice to the Airborne Recovery Force, as described in Paragraph 7. 2. 3 of the basic STD, the decision to recover must be made at least four passes prior to the selected recovery pass.

A6. 1. 10 If excessive expenditure of control gas is detected on Passes 1 through 13, recovery should be planned for Pass 17. If gas expenditure is excessive over a brief period during these passes but returns to normal, recovery may be delayed until Pass 32, which would allow the surface ship to deploy toward a position at 2^{o} S latitude. Sea recovery capability within 24 hours of impact would then be available to 8^{o} S latitude.

A6. 1. 11 If excessive use of control gas is indicated on Passes 14 through 28, recovery should be planned for Pass 32 and the surface recovery ship should deploy as far south as possible in the time available.

A6. 1. 12 If excessive use of control gas occurs on Passes 29 through 44, recovery may be planned for Pass 48 or Pass 63, depending upon the rate of stability deterioration.

A6. 2 Nighttime Recovery Operations

A6. 2. 1 The capability to initiate the recovery sequence during south-to-north nighttime passes in the Hawaiian area is included in the orbital programmer. Capsule impact will be programmed to occur at 24^{o} N latitude with the dispersion limits being ±20. 9 nautical miles crossrange, 176. 5 nautical miles uprange and 244. 1 nautical miles downrange.

A6. 2. 2 Figure A8-2 presents the telemetry and tracking coverage for each of the nominal passes based on a 93. 8-minute period. Although Christmas Island has a long duration of track, the lack of antenna auto-tracking capability and wide beam width precludes the possibility of predicting capsule impact points from this data. However, certain passes will allow sufficient tracking data to be acquired by [redacted] and Tern Island to compute impact prediction.

A6. 2. 3 Planning for this operation is based on the assumption that south-to-north recovery will be initiated <u>only</u> in the event of an emergency and that the vehicle can be expected to be under control (sufficient gas and power for reorientation) up to and including the separation latitude, based on data available up to the time the re-entry command is given.

A6. 2. 4 As this is an emergency recovery the initial deployment of the surface recovery forces will not be modified to obtain surface recovery in the Northern area.

A6. 2. 5 As the capsule will descend during darkness, no attempt will be made to perform an aerial recovery, therefore the C-119 aircraft will not be required in the recovery zone except as surface search aircraft.

A6. 2. 6 It is desirable to detect the capsule impact as early as possible, therefore two aircraft with D/F gear will be sent to the impact zone, preferably before impact, but in any case as soon after impact as is practical, to search the 420-nautical mile long zone of impact.

A6. 2. 7 The long overwater flight time and D/F capability requirement may be met by the JC-53 telemetry detector aircraft stationed at Hawaii. Utilization of these aircraft will require two JC-54 crews to be available for deployment as early as practicable after alert.

A6. 2. 8 The two initial search aircraft will be deployed before parachute deployment if possible; however, if they are not airborne before ETPD, the tracking and telemetry information will be examined to determine if the capsule re-entry occurred. If not, the aircraft will not be deployed; however, if there is any doubt regarding capsule re-entry, the aircraft will be sent out to search the area.

A6.2.9 The remainder of the Recovery Force will be alerted for a daylight search. If the JC-54 aircraft locate the capsule, they will drop marker bouys and maintain visual contact until relief aircraft arrive. Recovery of the capsule will be effected at the earliest practicable time.

A7 TABLES AND ILLUSTRATIONS

The following tables and illustrations are applicable to the flight of Discoverer Satellite 1108/Discoverer Booster 302/AET-H Payload only. Each table or figure is given the basic number of the section of the general STD to which it applies, the letter A to denote Appendix material, and a number to sequence items in the same category.

[redacted]

Table A2-1

NOMINAL FLIGHT PLANNING DATA

ITEM	DATA
SATELLITE	
S/N	1108
Payload	AET-H
Fuel	UDMH, 3732 lb
Oxidizer	IRFNA, 9600 lb
Launch weight	16,009 lb
BOOSTER	
S/N	302
Fuel	RJ-1
Oxidizer	Liquid oxygen
Launch weight (including payload)	123,457 lb
LAUNCH	
Site	VAFB, SM-75-3 Pad 4
Date	June 1961
Pad azimuth	181°28′15″
Launch azimuth	172°
Orbital boost time	237.0 sec
Downrange T/M ship location	11°30′ N, 117° W
Downrange T/M ship heading	270° T
Programmer setting	5,628 sec (step setting 21)
INJECTION	
Time	T + 460.0 sec
Location	23.2° N, 119.2° W
Altitude	165 nm (190 sm)
Azimuth	171.0°
Velocity	25,687 ft/sec
ORBIT	
Period	93.8 min
Apogee	337 nm (392 sm)
Perigee	167 nm (195 sm)
Eccentricity	.023
Regression rate – average	23.62°/pass
Reset latitudes	20° N [redacted] 32° N [redacted]orthbound) 36° N [redacted]outhbound) 40° N [redacted]orthbound) 45° N [redacted]outhbound) 60° N [redacted]
Inclination angle	81.7°

[redacted]

Table A2-1 (Continued)

NOMINAL IMPACT POINTS

DAY	NIGHT RECOVERY PASS	EMERGENCY RECOVERY PASS	ALTERNATE RECOVERY PASS	NOMINAL RECOVERY PASS	NOMINAL IMPACT CENTER		ETPD HOURS
					LONGITUDE	NORTH LATITUDE	
1	10				159.3 W	24°	15.2
		15			112.3 W	17°	23.6
			17		160.1 W	24°	26.7
2	25				152.9 W	24°	38.6
		30			105.9 W	17°	47.0
			32		153.8 W	24°	50.1
3	41				170.3 W	24°	63.6
			48		171.0 W	24°	75.1
4	56				163.8 W	24°	87.1
				63	164.6 W	24°	98.6

Table A4-1

INSTRUMENTATION REQUIRED TO BE OPERATIVE AT LAUNCH

<u>Discoverer Satellite</u>

1. Agena
   - a. Continuous Telemetry Channels:
     - 6 – Payload quantity. Subcarrier must be present
     - 18 – Payload quantity. Subcarrier must be present
   - b. Commutated Telemetry Channels:
     - 12 – Subcarrier must be present and commutator running
     - 16 – Subcarrier must be present and commutator running; points 2, 4, 6, 8, 10, 18, 20, 22, 33, 38, 42, 51, and 53 must be present. Channel 1 is an acceptable substitution for Channel 16, points 20 and/or 22.
2. Capsule
   - a. Continuous Telemetry Channels:
     - 7 – Subcarrier must be present
     - 11 – Subcarrier must be present

***NOTE:** This table represents the initial LMSD requirements. Final determination of the telemetry channels required to be operable at launch will be made no later than launch minus 7 days.*

[redacted]

Table A5-1

SUBSYSTEM D TIMER SEQUENCE FOR DISCOVERER 1108

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
	-0.1		Timer Reset (Ground Function)
0		Umb Drop	Liftoff, D-Timer
0.1	0.1		Timer Reset (Ground Function)
0.1	0.1		Timer Safety Input (Ground Function)
150	150		Start Fairchild Timer
			Disarm Agena Destruct
			Arm BTL Guidance
			Flight Control Power ON (Backup)
			Uncage Integrator
			Open Pneumatic Supply Valve
150	150		Arm Separation Squib Relays
150.77		BTL	Transmit MECO (P1) (Disarm Destruct Backup)
151.11		Fuel Depletion	MECO (142.53 – 156.65)
155.6		BTL	Transmit Arm D1 & D2 (P2)
158.3		BTL	Transmit Uncage IRP Gyros, Initiate Velocity Correction & Timer Hold (D1)
161.3		BTL	Terminate D1
161.4		BTL	Initiate D2 (D-Timer Hold)
159.77		Thor Timer	VECO
166.4		BTL	Terminate D2
166.9		BTL	Command Separation (P3)
169	161		Uncage IRP Gyros (Backup)
169.31+		Separation Switch	Activate Pneumatic Control (Vehicle Leaves Adaptor)
182	174		Command Separation (Backup)
182	174		Fire Horizon Scanner Fairing Squibs
185	177		Remove 28v dc From Pneumatic Valve & Transfer SS/H TLM to Turbine Speed
185	177		Disable −40°/min Yaw Rate (No Yaw Correction Required)
190	182		Activate Pneumatic Control (Backup)
			Command −3.6°/sec Pitch Rate (Pitch Over 28.8°)
190	182		Initiate −1.65°/min Pitch Rate From Integ. Pot.
198	190		Remove −3.6°/sec Pitch Rate
198	190		Connect Pitch H/S Signal to Pitch IRP Gyro

[redacted]

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
			<u>ORBITAL BOOST</u>
211	203		Activate H/S Electrical Bias 1.5° Offset (+3° Total Offset)
211	203		Fire Ullage Rockets
223	215		Unground Integrator Input
			Connect Accelerometer to Integrator*
			Arm & Fire Gas Gen. Squib, Fire He Valve, Pitch and Yaw Pneumatics OFF
224	216		Pitch and Yaw Pneumatics OFF (Backup)
			Open Circuit to Gas Gen. Arm & Fire & He Valve & Remove J-Box 28v to Pitch & Yaw Pneumatics OFF
224	216		Close Circuit to TLM Over-ride
			<u>STEADY STATE THRUST</u>
449	441		Arm Pitch & Yaw Pneumatics
449	441		Engine Cutoff Safety Switch
455			Engine Shutdown by Integrator
455			Disconnect Accelerometer
			Ground Integrator Input
455			Activate Pitch & Yaw Pneumatics
483	475		Command −40°/min Yaw Rate (180° Yaw)
			Disconnect Integrator Pitch Rate Pot. (Remove Pitch Rate)
			Remove 28v dc to Ullage Rockets, Pitch & Yaw Pneumatics ON (Backup)
753	745		Start TLM Calibrate
			Apply 28V Unreg to SS/L Power Control Box
			Command +3.86°/min Pitch Rate
			Connect Roll H/S Signal to Yaw Gyro (Remove −40°/min Yaw Rate)
			Switch Out 0.1% Regulated 400 Cycle Power
			Shut Down +28.3v IRP Ascent Power
763	755		Stop TLM Calibrate
763	755		Open Engine Shutdown, Switch Antennas, Open Flight Control Gain Change Relays & Switch Roll & Yaw Gyro TLM Gain

** Integrator to be set at a dial reading of approximately 2150 representing a velocity to be gained of 17,200 ± 40 ft/sec*

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
763	755		Shut Down Integrator Power
770	762		Open Circuit to TLM Over-ride
			Arm H/S Off Circuit
			SS/D Timer OFF, H/S to Low Gain
770	762		Fire Fuel Vent Valve Squib
			RECOVERY
X	X	Fairchild Timer	Restart SS/D Timer, H/S Off
X + 13	X + 13		Command −45°/min Pitch Rate
X + 13	X + 13		Arm Capsule Ejection Squib
X + 92*	X + 92		Command +3.86°/min Pitch Rate (Stop −45°/min Pitch Rate)
			SS/L Transfer Circuit #1
X + 92	X + 92		SS/L Transfer Circuit #2
X + 92			Fire Capsule Plug Disconnect Squib
X + 94.5	X + 94.5		Fire Capsule Eject Squibs
			Enable Timer Shutdown Circuit
X + 94.5	X + 94.5		Lockout SS/H Restart Signal
X + 130	X + 130		Shut Down SS/D Timer & H/S ON

** The time interval between event # 19 and # 20 shall be 2.5 ± 0.1 sec*

Table A6-1

NOMINAL ORBIT SCHEDULE

PHASE	EVENT	TIME FROM LAUNCH (HRS)	TIME FROM LAUNCH (MIN)	LOCATION (DEG N LATITUDE)
Launch	Launch	0	0	34.8
	Start Orbit		2	
	Orbit Injection		7.6	23.4
	Beacon, T/M off		14.8	5.9 (s)
Pass 1	Beacon, T/M on	1	28.1	75
	65°N latitude (ref)		30.9	65
	RM on		32.2	60
	Cross [redacted] latitude		32.8	57.6
	RM interruption (60)		33.2	55.95
	25°N Ref latitude		41.0	25
	Cross [redacted] latitude		41.8	21.6
	Beacon, T/M off		44.2	12
	End of Orbit 1	2	34.7	0
Pass 2	Beacon, T/M on	3	1.9	75
	RM on		6.0	60
	Cross [redacted] latitude		6.6	57.6
	RM interruption (40)		6.7	57.3
	Cross [redacted] latitude		15.6	21.6
	Beacon, T/M off		18.0	12
	End of Orbit 2	4	8.5	0
Pass 3	End of Orbit 3	5	42.3	0
Pass 4	End of Orbit 4	7	16.1	0
Pass 5	End of Orbit 5	8	50.0	0
Pass 6	Beacon, T/M on	8	56.86	25
	RM on		1.0	40
	RM interruption (40)		1.7	42.53
	Cross [redacted] latitude		1.8	42.9
	Beacon, T/M off		6.4	60
	End of Orbit 6	10	23.7	0
Pass 7	Beacon, T/M on	10	30.7	25
	RM on		34.8	40
	Cross [redacted] latitude		35.6	42.9
	RM interruption (80)		36.2	45.2
	Beacon, T/M off		40.2	60
	End of Orbit 7	11	57.5	0
Pass 8	Beacon, T/M on	12	2.3	17
	RM on		6.3	32
	RM interruption (20)		6.4	33.3
	Cross [redacted] latitude		7.1	34.8
	Beacon, T/M off		11.8	52
	End of Orbit 8	13	31.3	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	TIME FROM LAUNCH (MIN)	LOCATION (DEG N LATITUDE)
Pass 9	Beacon, T/M on	13	36.0	17
	RM on		40.1	32
	Cross [redacted] latitude		40.9	34.8
	RM interruption (60)		41.1	35.8
	Beacon, T/M off		45.8	52
	End of Orbit 9	15	5.1	0
Pass 10	Beacon, T/M on	15	6.4	5
	RM on		10.6	20
	Cross [redacted] latitude		11.1	21.6
	RM interruption (40)		12.3	22.5
	Cross [redacted] latitude		20.9	57.6
	Beacon, T/M off		22.9	65
	End of Orbit 10	16	38.9	0
Pass 11	End of Orbit 11	18	12.72	0
Pass 12	End of Orbit 12	19	46.5	0
Pass 13	Beacon, T/M on	20	18.4	61
	RM on		21.5	45
	Cross [redacted] latitude		22.0	42.9
	RM interruption (40)		22.2	42.3
	Beacon, T/M off		24.2	34
	End of Orbit 13	21	20.3	0
Pass 14	End of Orbit 14	22	54.12	0
Pass 15	Beacon, T/M on	23	21.0	75
	RM on		25.1	60
	RM interruption (20)		25.5	58.6
	Cross [redacted] latitude		25.7	57.6
	Cross [redacted] latitude		31.6	34.8
	Beacon, T/M off		34.8	22
	End of Orbit 15	24	27.9	0
Pass 16	Beacon, T/M on	24	54.8	75
	RM on		58.9	60
	Cross [redacted] atitude		59.5	57.6
	RM interruption (60)		59.9	55.9
	Cross [redacted] latitude	25	5.4	34.8
	Beacon, T/M off		8.5	22
	End of Orbit 16	26	1.7	0
Pass 17	Beacon, T/M on	26	28.6	75
	RM on		32.7	60
	Cross [redacted] atitude		33.3	57.6
	RM interruption (40)		33.4	57.3
	Cross [redacted] atitude		42.3	21.6
	Beacon, T/M off		44.7	12
	End of Orbit 17	27	35.5	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	TIME FROM LAUNCH (MIN)	LOCATION (DEG N LATITUDE)
Pass 18	End of Orbit 18	29	9.3	0
Pass 19	End of Orbit 19	30	43.1	0
Pass 20	End of Orbit 20	32	16.9	0
Pass 21	Beacon, T/M on	32	23.5	25
	RM on		27.6	40
	RM interruption (40)		28.3	42.5
	Cross [redacted] latitude		28.5	42.9
	Beacon, T/M off		33.0	60
	End of Orbit 21	33	50.7	0
Pass 22	Beacon, T/M on	33	57.3	25
	RM on	34	1.4	40
	Cross [redacted] latitude		2.2	42.9
	RM interruption (80)		2.8	45.1
	Beacon, T/M off		6.8	60
	End of Orbit 22	35	24.5	0
Pass 23	Beacon, T/M on	35	28.9	17
	RM on		33.0	32
	RM interruption (20)		33.4	33.3
	Cross [redacted] latitude		33.8	34.8
	Beacon, T/M off		38.5	52
	End of Orbit 23	36	58.3	0
Pass 24	Beacon, T/M on	37	2.7	17
	RM on		6.8	32
	Cross [redacted] latitude		7.6	34.8
	RM interruption (60)		7.8	35.8
	Beacon, T/M off		12.3	52
	End of Orbit 24	38	32.1	0
Pass 25	Beacon, T/M on	38	33.1	5
	RM on		37.3	20
	Cross [redacted] latitude		37.8	21.6
	RM interruption (40)		38.0	22.5
	Cross [redacted] latitude		47.6	57.6
	Beacon, T/M off		49.6	65
	End of Orbit 25	40	5.9	0
Pass 26	End of Orbit 26	41	39.7	0
Pass 27	End of Orbit 27	43	13.5	0
Pass 28	Beacon, T/M on	43	45.1	61
	RM on		48.2	45
	Cross [redacted] latitude		48.7	42.9
	RM interruption (40)		48.9	42.2
	Beacon, T/M off		50.9	34
	End of Orbit 28	44	47.3	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	TIME FROM LAUNCH (MIN)	LOCATION (DEG N LATITUDE)
Pass 29	Beacon, T/M on	45	18.9	61
	RM on		22.0	45
	Cross [redacted] latitude		22.5	42.9
	RM interruption (80)		23.4	39.5
	Beacon, T/M off		24.7	34
	End of Orbit 29	46	21.1	0
Pass 30	Beacon, T/M on	46	47.7	75
	RM on		51.8	60
	RM interruption (20)		52.2	58.6
	Cross [redacted] atitude		52.4	57.6
	Cross [redacted] atitude		58.3	34.8
	Beacon, T/M off	47	1.4	22
	End of Orbit 30		54.9	0
Pass 31	Beacon, T/M on	48	21.9	75
	RM on		25.6	60
	Cross [redacted] latitude		26.2	57.6
	RM interruption (60)		26.6	55.9
	Cross [redacted] latitude		32.1	34.8
	Beacon, T/M off		35.2	22
	End of Orbit 31	49	28.7	0
Pass 32	Beacon, T/M on	49	55.3	75
	RM on		59.4	60
	Cross [redacted] latitude	50	0.0	57.6
	RM interruption (40)		0.1	57.3
	Cross [redacted] latitude		9.0	21.6
	Beacon, T/M off		11.4	12
	End of Orbit 32	51	2.5	0
Pass 33	End of Orbit 33	52	36.3	0
Pass 34	End of Orbit 34	54	10.1	0
Pass 35	End of Orbit 35	55	43.9	0
Pass 36	End of Orbit 36	57	17.7	0
Pass 37	Beacon, T/M on	57	24	25
	RM on		28.1	40
	RM interruption (40)		28.8	42.5
	Cross [redacted] latitude		28.9	42.9
	Beacon, T/M off		33.5	60
	End of Orbit 37	58	51.8	0
Pass 38	Beacon, T/M on	58	57.8	25
	RM on	59	1.9	40
	Cross [redacted] latitude		2.7	42.9
	RM interruption (80)		3.3	45.1
	Beacon, T/M off		7.3	60
	End of Orbit 38	60	25.3	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	(MIN)	LOCATION (DEG N LATITUDE)
Pass 39	Beacon, T/M on	60	29.4	17
	RM on		33.5	32
	RM interruption (20)		33.9	33.3
	Cross [redacted] latitude		34.3	34.8
	Beacon, T/M off		39.0	52
	End of Orbit 39	61	59.1	0
Pass 40	Beacon, T/M on	61	59.8	5
	RM on	62	4.0	20
	Cross [redacted] latitude		4.5	21.6
	RM interruption (60)		5.0	23.8
	Cross [redacted] latitude		14.3	57.6
	Beacon, T/M off		16.3	65
	End of Orbit 40	63	32.9	0
Pass 41	Beacon, T/M on	63	33.6	5
	RM on		37.8	20
	Cross [redacted] latitude		38.3	21.6
	RM interruption (40)		38.5	22.5
	Cross [redacted] latitude		48.1	57.6
	Beacon, T/M off		50.1	65
	End of Orbit 41	65	6.7	0
Pass 42	End of Orbit 42	66	40.5	0
Pass 43	Beacon, T/M on	67	11.8	61
	RM on		14.9	45
	Cross [redacted] latitude		15.4	42.9
	RM interruption (60)		15.9	40.8
	Beacon, T/M off		17.6	34
	End of Orbit 43	68	14.3	0
Pass 44	Beacon, T/M on	68	45.6	61
	RM on		48.7	45
	Cross [redacted] latitude		49.2	42.9
	RM interruption (40)		49.4	42.2
	Beacon, T/M off		51.4	34
	End of Orbit 44	69	48.1	0
Pass 45	End of Orbit 45	71	21.9	0
Pass 46	Beacon, T/M on	71	48.6	75
	RM on		52.3	60
	RM interruption (20)		52.7	58.6
	Cross [redacted] latitude		52.9	57.6
	Cross [redacted] latitude		58.8	34.8
	Beacon, T/M off	72	1.9	22
	End of Orbit 46		56.3	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	TIME FROM LAUNCH (MIN)	LOCATION (DEG N LATITUDE)
Pass 47	Beacon, T/M on	73	22	75
	RM on		26.1	60
	Cross [redacted] latitude		26.7	57.6
	RM interruption (60)		27.1	55.9
	Cross [redacted] latitude		35.7	21.6
	Beacon, T/M off		38.1	12
	End of Orbit 47	74	29.5	0
Pass 48	Beacon, T/M on	74	55.8	75
	RM on		59.9	60
	Cross [redacted] latitude	75	0.5	57.6
	RM interruption (40)		0.6	57.3
	Cross [redacted] latitude		9.5	21.6
	Beacon, T/M off		11.9	12
	End of Orbit 48	76	3.3	0
Pass 49	End of Orbit 49	77	37.1	0
Pass 50	End of Orbit 50	79	10.9	0
Pass 51	End of Orbit 51	80	44.7	0
Pass 52	Beacon, T/M on	80	50.7	25
	RM on		54.8	40
	RM interruption (40)		55.5	42.5
	Cross [redacted] latitude		55.6	42.9
	Beacon, T/M off	81	0.2	60
	End of Orbit 52	82	18.5	0
Pass 53	Beacon, T/M on	82	24.5	25
	RM on		28.6	40
	Cross [redacted] latitude		29.4	42.9
	RM interruption (80)		30.0	45.1
	Beacon, T/M off		34.0	60
	End of Orbit 53	83	52.3	0
Pass 54	Beacon, T/M on	83	56.1	17
	RM on	84	0.2	32
	RM interruption (20)		0.6	33.3
	Cross [redacted] latitude		1.0	34.8
	Beacon, T/M off		5.7	52
	End of Orbit 54	85	26.1	0
Pass 55	Beacon, T/M on	85	29.9	17
	RM on		34.0	32
	Cross [redacted] latitude		34.8	34.8
	RM interruption (60)		35.0	35.8
	Beacon, R/M off		39.5	52
	End of Orbit 55	87	59.9	0

[redacted]

Table A8-1
REAL-TIME DATA READOUT AND REPORTING REQUIREMENTS

	MEASUREMENT		CHANNEL	PRIORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					DOWNRANGE T/M SHIP***	T/M AIRCRAFT***	NOTE
	NAME	NUMBER						[redacted]				TIS		WV-2 137890	
LAUNCH	Liftoff Signal	---	---	1	RT	X	Ascent	X							
	Thor Main Engine Cutoff	---	DAC (1) 13	1	RT	X	Ascent	X							
	Booster Separation	A93	16-24	1	RT	X	Ascent	X							
	Agena Engine Ignition and Cutoff	B6	14	1	RT	X	Ascent	X					X		
	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		Ascent	X							
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	Ascent	X							
	11-Second Step Switch Position	H108	16-20	1	RT		Ascent	X					X		
	110-Second Step Switch Position	H109	16-22	1	RT		Ascent	X					X		
	Increase Decrease Switch Position	H107	16-18	1	RT	X	Ascent	X					X		
	Control Gas Supply Pressure – High Range	D95	16-33	1	RT	X	Ascent	X					X		
	Command 5 Monitor	H175	16-53	1	RT	X	Ascent	X							3
	Command 6 Monitor	H176	16-51	1	RT	X	Ascent	X							3
	BTL Discretes	C76	17-13	1	RT	X	Ascent	X							
	Yaw Gyro Torque	D84	17-54	2	PP1		Ascent						X		2
	Longitudinal Acceleration	A-103	11	2	See Note 2		Ascent	X					X		
	Separation Switch Monitor	C-79	17-11	2	See Note 2		Ascent	X							
ORBIT	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		1 thru 62	X	X	X	X				
	Command Verifications 1, 2, 3, 4	H112	11	1	RT	X	1 thru 62	X	X	X	X				
	Programmer Period Readout (Console or Remote)	H110	1	2	RT		1 thru 62	X	X	X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	1 thru 62	X	X	X	X				
	11-Second Step Switch Position	H108	16-20	1	RT		1 thru 62	X	X	X	X				
	110-Second Step Switch Position	H109	16-22	1	RT		1 thru 62	X	X	X	X				
	Increase/Decrease Switch Position	H107	16-18	1	RT	X	1 thru 62	X	X	X	X				

Table A8-1 (Continued)

	MEASUREMENT		CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					DOWNRANGE T/M SHIP***	T/M AIRCRAFT***	NOTE
	NAME	NUMBER						[redacted]				TIS		WV-2 137890	
ORBIT (Continued)	Reset Monitor Signal	H70	16-10	1	RT	X	1 thru 62	X	X	X	X				
	Command 5 Monitor	H175	16-53	1	RT	X	1 thru 62	X	X	X	X				3
	Command 6 Monitor	H176	16-51	1	RT	X	1 thru 62	X	X	X	X				3
	Control Gas Supply Pressure – High Range	D95	16-33	1	PP1	X	1 thru 62	X	X	X	X				
	Control Gas Supply Pressure – Low Range	D140	16-27	1	PP1	X	1 thru 62	X	X	X	X				
	Battery Bus Voltage	C1	16-38	2	PP1		1 thru 62	X	X	X	X				
	Battery Case Temperature	C9	15-22	2	PP1		1 thru 62	X	X	X	X				
	Battery Current Monitor	C27	15-53	2	PP1		1 thru 62	X	X	X	X				
	Horizon Scanner – Pitch	D37	16-35	3	PP2		See Note 5	X	X	X	X				4
	Horizon Scanner – Roll	D39	16-37	3	PP2			X	X	X	X				4
	SPI Temperature	D130	15-43	3	PP2			X	X	X	X				5
	SPI Pitch Angle – Lower	D128	15-51	3	See Note 5			X	X	X	X				5
	SPI Yaw Angle – Lower	D127	15-49	3	See Note 5			X	X	X	X				5
	SPI Pitch Ref. Volt. – Lower	D136	15-2	3	See Note 5			X	X	X	X				5
	SPI Yaw Ref. Volt. – Lower	D137	15-4	3	See Note 5			X	X	X	X				5
	SPI Pitch Angle – Upper	D138	16-50	3	PP2			X	X	X	X				5
	SPI Yaw Angle – Upper	D139	16-52	3	PP2		See Note 5	X	X	X	X				5
	No Name Assigned	AET 40	12-9	2	PP1		See Note 11	X	X	X	X				11
	No Name Assigned	AET 48	12-13	2	PP1		See Note 11	X	X	X	X				11
RE-ENTRY	Programmer Period Readout (Console or Remote)	H110	1	3	RT		Recovery Pass			X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	2	RT	X				X	X				
	11-Second Step Switch Position	H108	16-20	3	PP2					X	X				
	110-Second Step Switch Position	H109	16-22	3	PP2					X	X				
	Reset Monitor Signal	H70	16-10	1	RT	X	Recovery Pass			X					

Table A8-1 (Continued)

	MEASUREMENT		CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					DOWNRANGE T/M SHIP***	T/M AIRCRAFT***	NOTE
	NAME	NUMBER						[redacted]				TIS		WV-2 137890	
RE-ENTRY (Continued)	Control Gas Supply Pressure – High Range	D95	16-33	1	PP1	X	Recovery Pass			X	X				
	Control Gas Supply Pressure – Low Range	D140	16-27	1	PP1	X				X	X				
	Battery Bus Voltage	C1	16-38	2	PP1					X	X				
	Horizon Scanner – Pitch	D37	16-35	1	PP2					X					4
	Horizon Scanner – Roll	D39	16-37	1	PP2					X					4
	SPI Pitch Angle – Lower	D128	15-51	2	See Note 6					X					6
	SPI Yaw Angle – Lower	D127	15-49	2	See Note 6					X					6
	SPI Pitch Ref. Voltage – Lower	D136	15-2	2	See Note 6					X					6
	SPI Yaw Ref. Voltage – Lower	D137	15-4	2	See Note 6					X					6
	SPI Pitch Angle – Upper	D138	16-50	1	PP2					X					6
	SPI Yaw Angle – Upper	D139	16-52	1	PP2					X					6
	Pitch Torque Signal	D41	17-38	2	PP1					X					7
	SS/D Timer Restart	D85	17-52	1	RT	X				X					
	Capsule Separation Event	AET 51	16-42	1	RT	X				X	X			X	8
	Payload Connector Disconnect	AET 38	12-8	2	RT					X	X				13
	Retro-Rocket Ignition, De-spin Valve Actuated, Thrust Cone Ejection	---	Capsule 7	1	RT, PP1	X				X				X	9
	Spin Valve Actuated, Thrust Cone Ejection	---	Capsule 9	1	RT, PP1	X				X				X	9
	Axial Acceleration	---	Capsule 11	1	PP1, PP2	X				X	X	X		X	10
	3 g Switch Close, 3 g Switch Open, Ablative Shell Off	---	Capsule 7	1	RT, PP1	X				X	X	X		X	9
	Parachute Cover Off	---	Capsule 9	1	RT, PP1	X				X	X	X		X	9
	Capsule T/M Signal Strength	---	Capsule 7, 9, 11	2	RT		Recovery Pass			X	X	X		X	12

[redacted]

Table A8-1 (Continued)

NOTES:

1. Report the system time of reorientation, the voltage level prior to start of reorientation, and the average voltage level during reorientation.
2. Backup monitors for ascent events.
3. Reads 20% (1 volt) for re-entry disable and 80% (4 volts) for re-entry enable.
4. Read when sun position indicator data are required in Notes 5 and 6 (until turn-off at start of reorientation). [redacted] reads on the recovery pass to indicate SS/D restart event if measurement D85 is invalid.
5. With the exception of D130, Channel 15 SPI data will be read only if the SPI data on Channel 16 do not appear valid. Read 3 times on approximately 2-minute intervals correlated with system time on Pass 2 [redacted] and [redacted], on Pass 13 [redacted], on Pass 17 [redacted], on Pass 28 [redacted], on Pass 32 [redacted], on Pass 43 [redacted], on Pass 47 [redacted] and on Pass 59 [redacted]. Readings at one system time only are required of [redacted] on Passes 8, 23, 39, and 54. All [redacted] and [redacted] readings are to be obtained as far north as possible. [redacted] transmits data on Channels 15 and 16 to Sunnyvale on 100-wpm/voice line after Pass 2; three 10-second data samples at 2-minute intervals required.
6. Read at 1-minute intervals before reorientation, 20-second intervals during reorientation, and immediately prior to separation; correlate with system time. Channel 15 SPI data will be read only if the SPI data on Channel 16 do not appear valid. [redacted] transmits data on Channel 15 and 16 to SV on 100-wpm/voice line after recovery pass; continuous transmission from acquisition to separation.
7. Read system time at start and finish of reorientation, voltage level prior to start of reorientation, and average voltage level during reorientation.
8. Reads 4.67 volts prior to separation, 1.33 volts after separation. Correlation within 2 seconds of exact system time is satisfactory for initial [redacted] report. [redacted] and TIS verify that event has occurred by voltage level check.
9. The RT readout will contain a verification that each event has occurred. The PP1 readout will contain the system time of each event. Use event numbers listed in Paragraph 7.4.6 for identification when reporting.
10. The [redacted] PP1 readout will contain the average value and duration. The PP2 readout will contain a complete time history of acceleration and will include the system time of each data dropout and the time duration of dropout. [redacted] and TIS read values 5 seconds prior to, at, and 5-seconds after parachute deployment.
11. Record voltage level once. Readout, accurate to at lease 0.1 volt (2% bandwidth), required at [redacted] (Passes 9, 15, 24, 31, 39, and 55), [redacted] (Pass 2), and [redacted] (Passes 6, 7, and 13). Readouts are required 60 minutes after the pass.
12. Provide a qualitative evaluation of signal reception.
13. Separation indicated by zero % (zero volts).

**RT – Read in real time.*

PP1 – Read immediately after pass.

PP2 – Read immediately after RT and PP1 readouts.

*** All data are also to be reported to the STC by 60-wpm teletype as soon as possible.*

**** T/M ships and aircraft will transmit real-time data immediately after signal fade so no interference with the vehicle telemetry signal will be generated.*

Table A8-2
PAYLOAD REPORTING REQUIREMENTS

AET 52 on Channel 6 may shift between 1 and 4 volt square wave occurring in nominal 2 pulse group for nominal 6 second duration.

Report presence or absence of shift. Qualitative description not required.

Report for [redacted] Pass 1 acquisition only

Reporting time 30 minutes.

AET 55 on Channel 18 may shift between 1 and 4 volt square wave occurring in nominal 25 to 35 pulse group for nominal 1.75 second duration.

Report presence or absence of data. Qualitative description not required.

Report for [redacted] Pass 1 acquisition only.

Reporting time 30 minutes.

NOTICE OF REMOVED PAGES

Pages A-10-39 through A-10-42 are missing from the original copy.

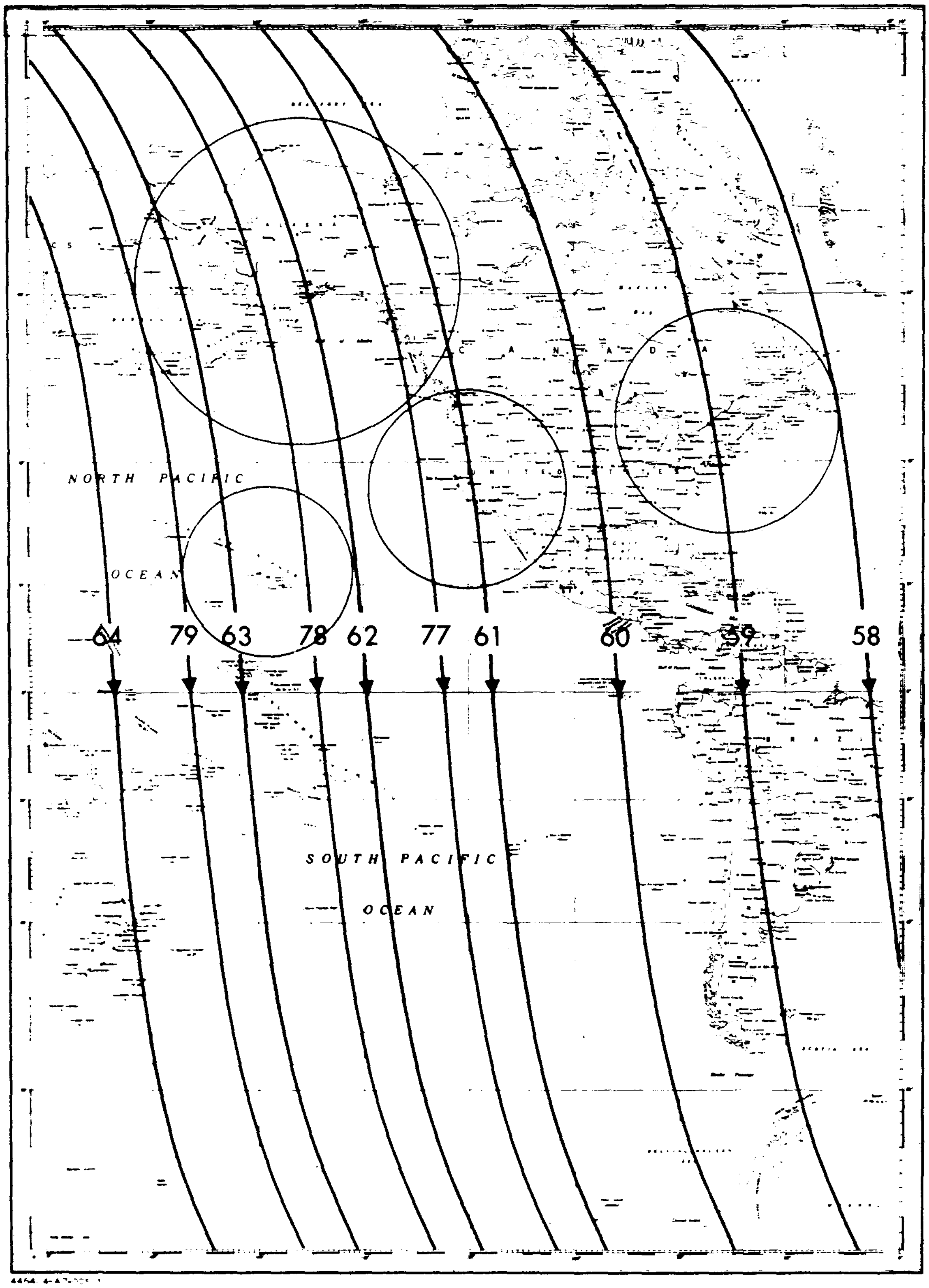


Figure A2-1(e) Nominal Orbit Traces – Passes 58 Through 64 and 77 Through 79

[redacted]

TYPE OF PASS						
A	B	C	D	E	F	G
STATION						
[redacted]						
ASCENT (20)			1(60)			
			2(40)	6(40)		
				7(80)	8(20)	
					9(60)	10(40)
13(40)		15(20)	16(40)	20(60)		
14(20)			17(40)	21(40)		
				22(80)	23(20)	
27(60)					24(60)	25(40)
28(40)						26(20)
29(80)		30(20)	31(60)	36(60)		
			32(40)	37(40)	38(80)	
			33(80)		39(20)	40(60)
						41(40)
43(40)						
44(80)	45(100)	46(20)	47(60)	51(60)		
			48(40)	52(40)		
				53(80)	54(20)	55(60)
58(60)						56(40)
59(40)	60(80)	61(20)	62(60)			57(80)
			63(40)			
			64(80)	67(40)		
				68(80)	69(20)	
			77(40)		70(60)	71(40)
74(40)	76(20)		78(40)	82(40)		
			79(20)	83(80)	84(20)	
					85(60)	86(40)
89(40)						
90(40)						
	91(20)	92(60)	93(40)	98(40)		
				99(80)	100(20)	101(60)
105(40)		107(20)	108(60)			102(40)
			109(40)	113(40)		
				114(80)	115(20)	
120(40)	122(20)		123(60)		116(60)	117(40)
			124(40)			

NOTE: NUMBERS IN PARENTHESIS REPRESENT TIME IN SECONDS FOLLOWING RESET MONITOR INITIATION AT WHICH PROGRAMMER IDENTIFICATION MARK OCCURS. THIS TIME IS TAPE TIME, 90 MIN. PERIOD.

446408-A6-001(5)

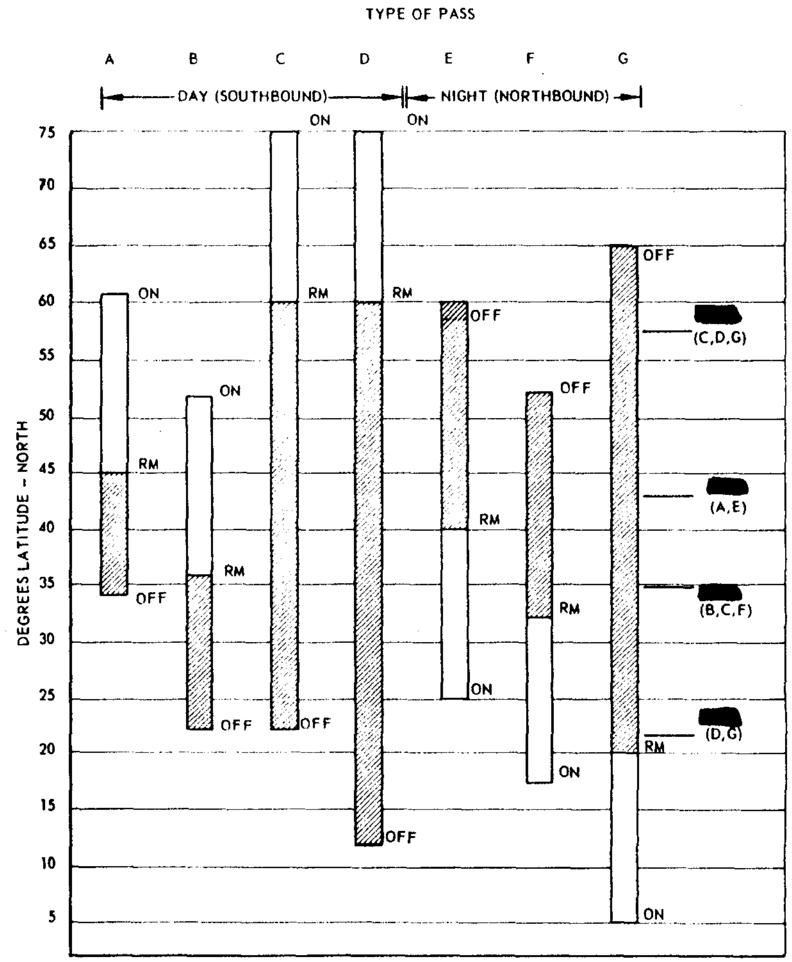


Figure A2-2 Readout and Reset Programming

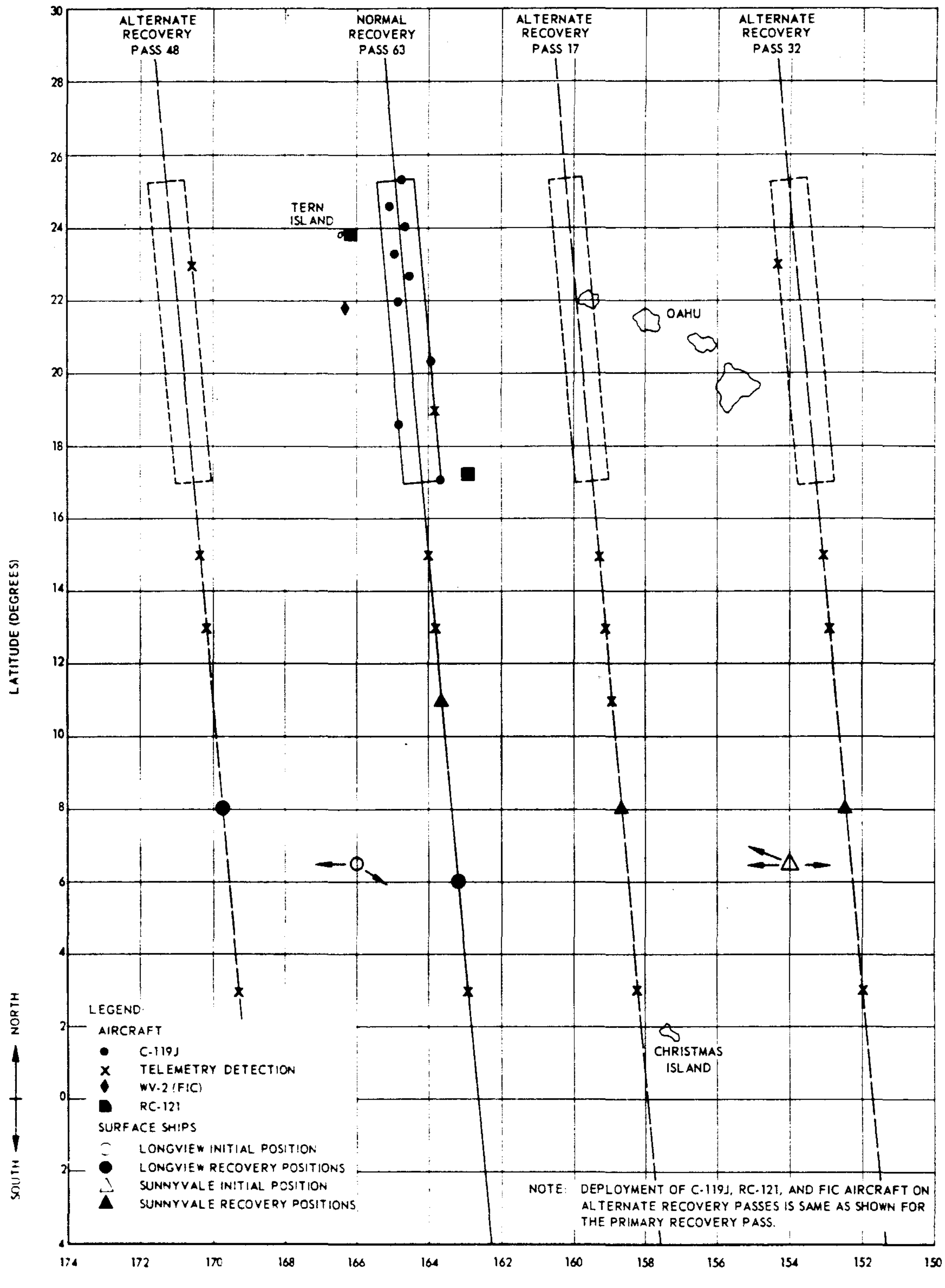


Figure A7-1 Recovery Force Deployment

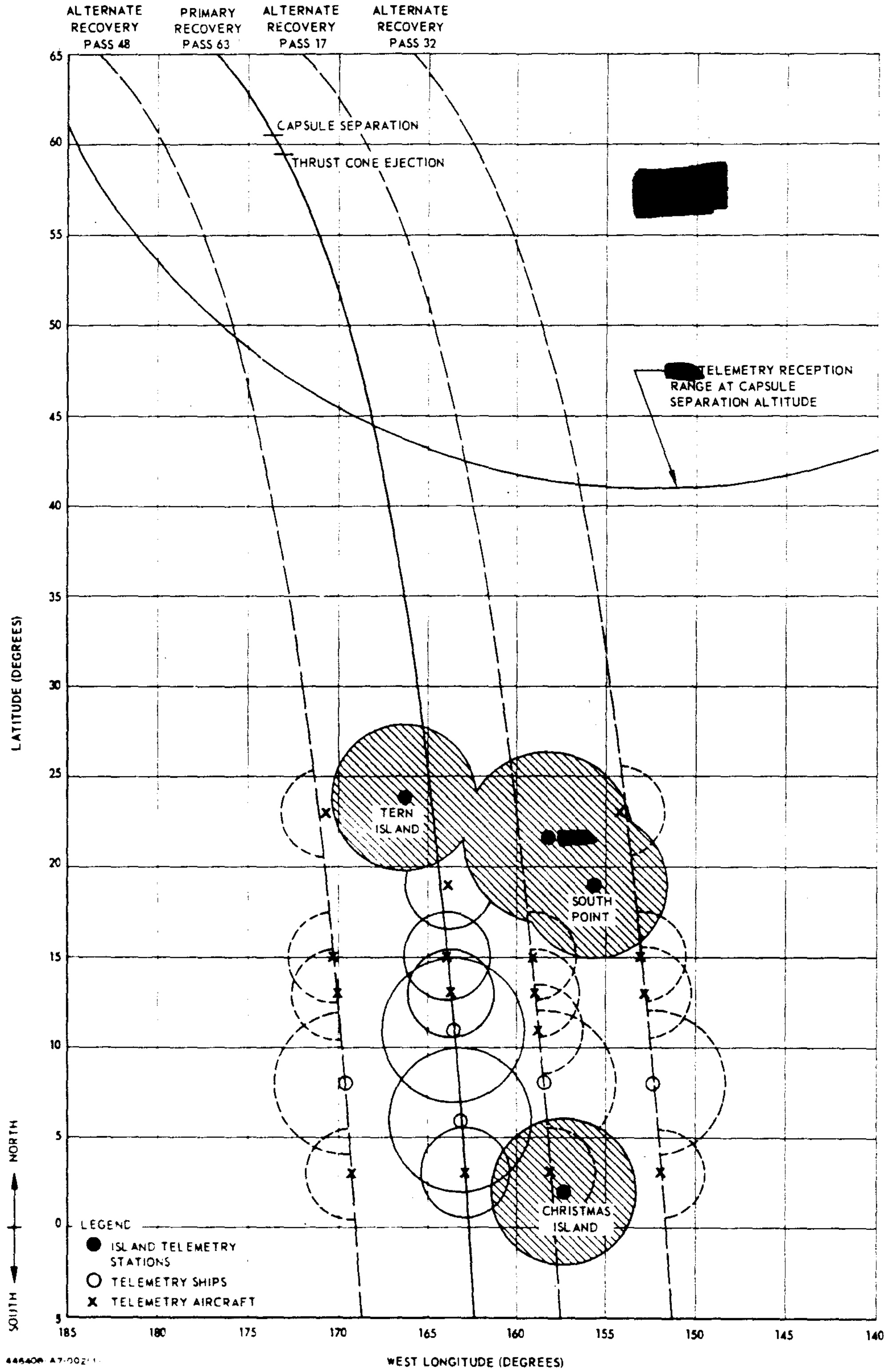


Figure A7-2 North-to-South Re-entry Telemetry Coverage

[redacted]

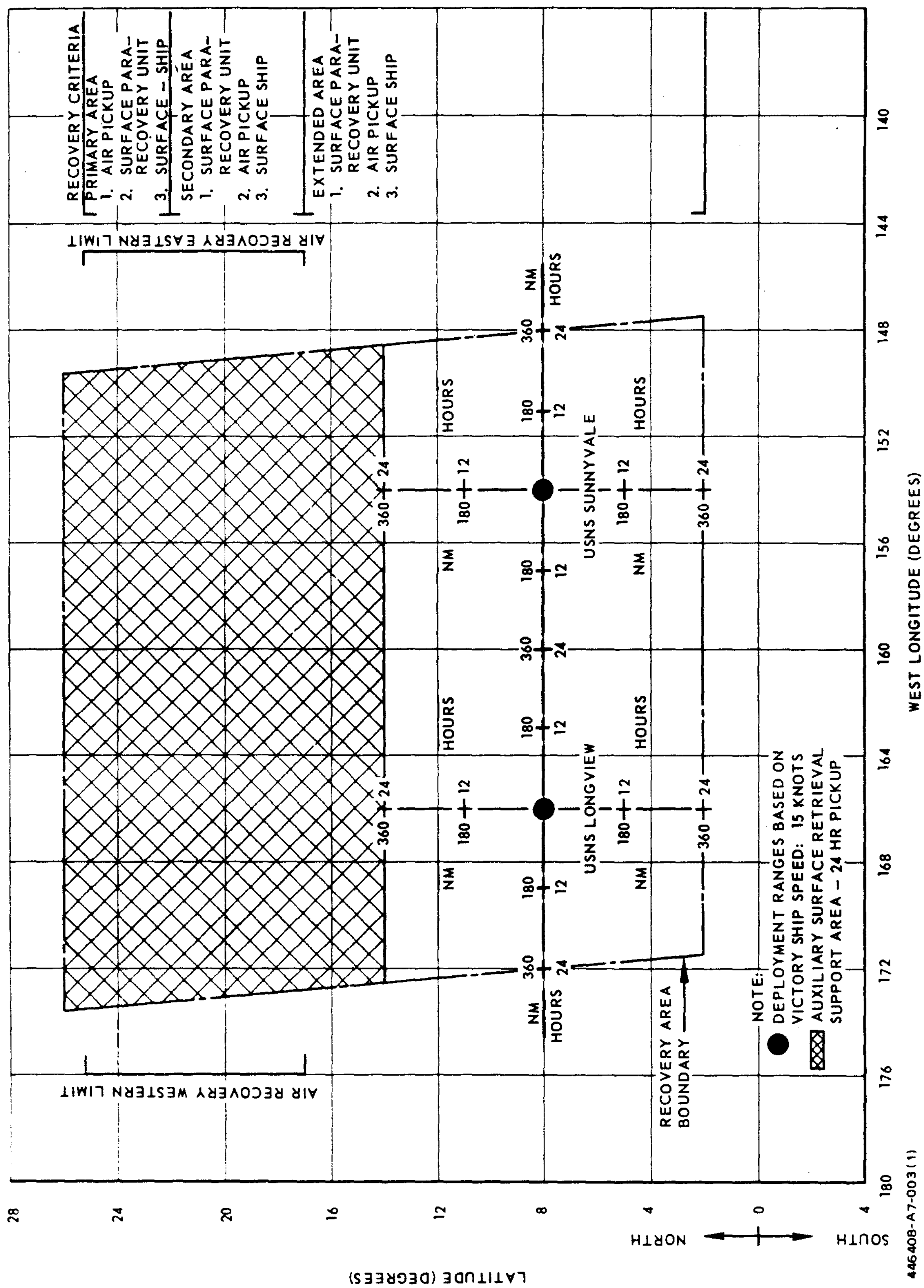


Figure A7-3 Surface Ship Deployment Capability

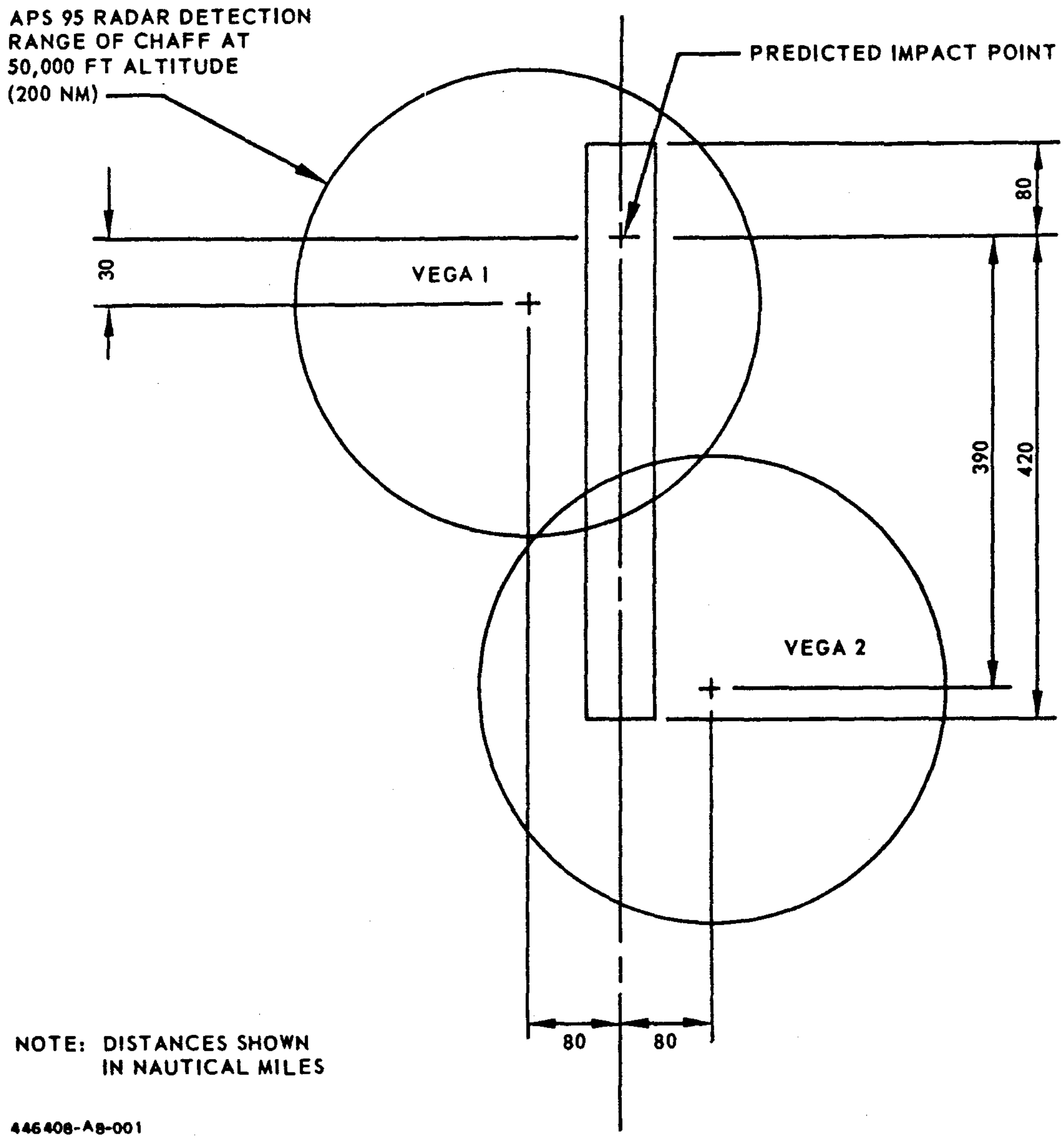
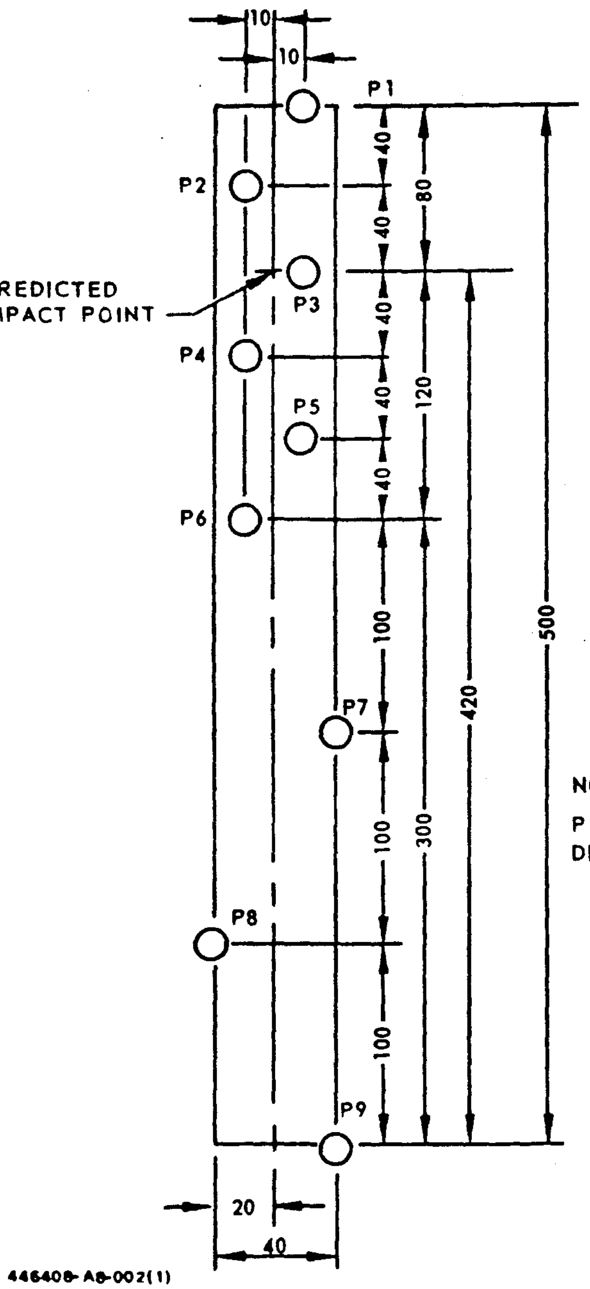


Figure A7-4   RC-121 Aircraft Deployment



NOTE:
P1 THROUGH P9 ARE C-119 AIRCRAFT
DISTANCES SHOWN IN NAUTICAL MILES

Figure A7-5 Recovery Aircraft Deployment

[redacted]

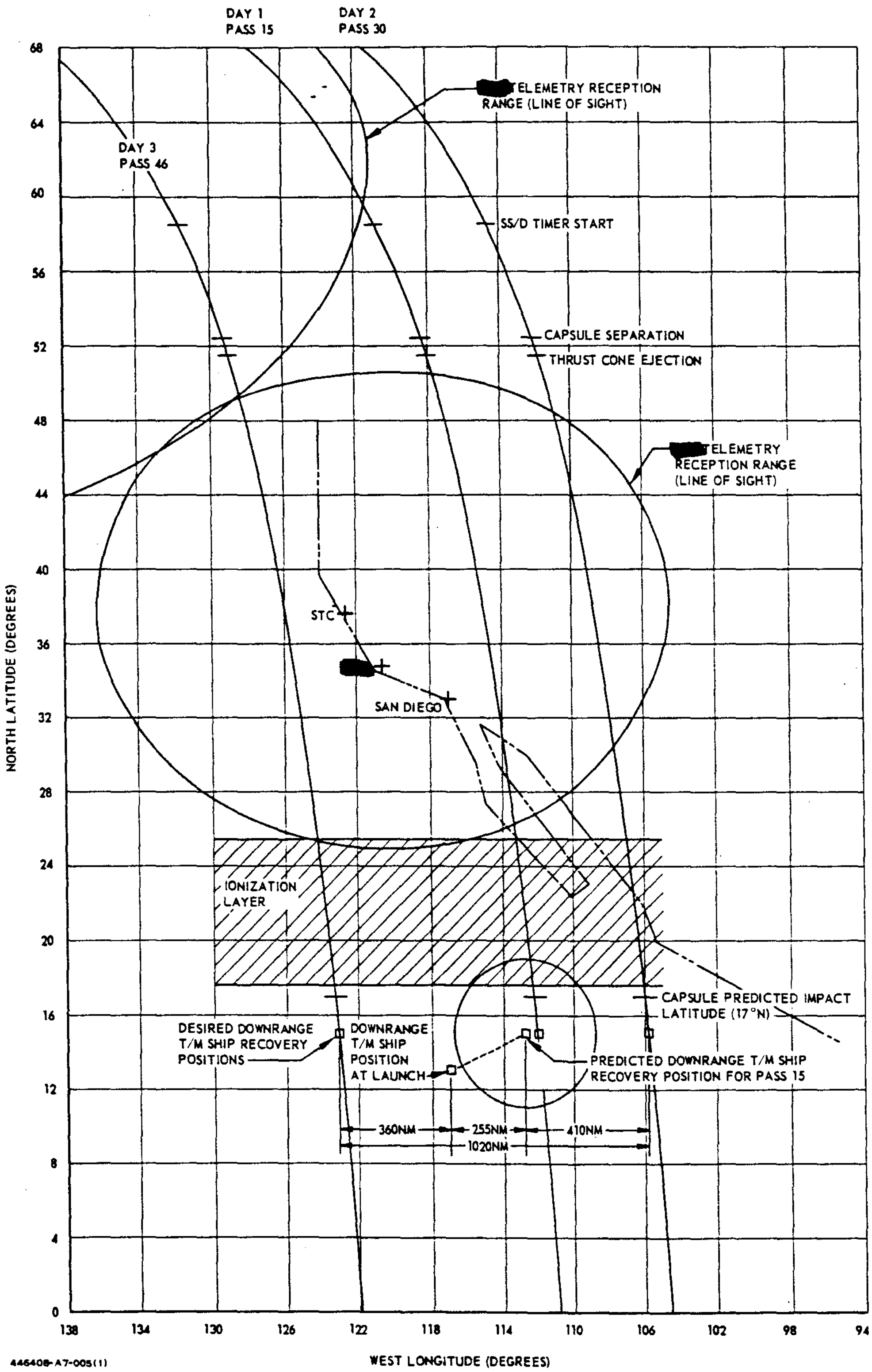
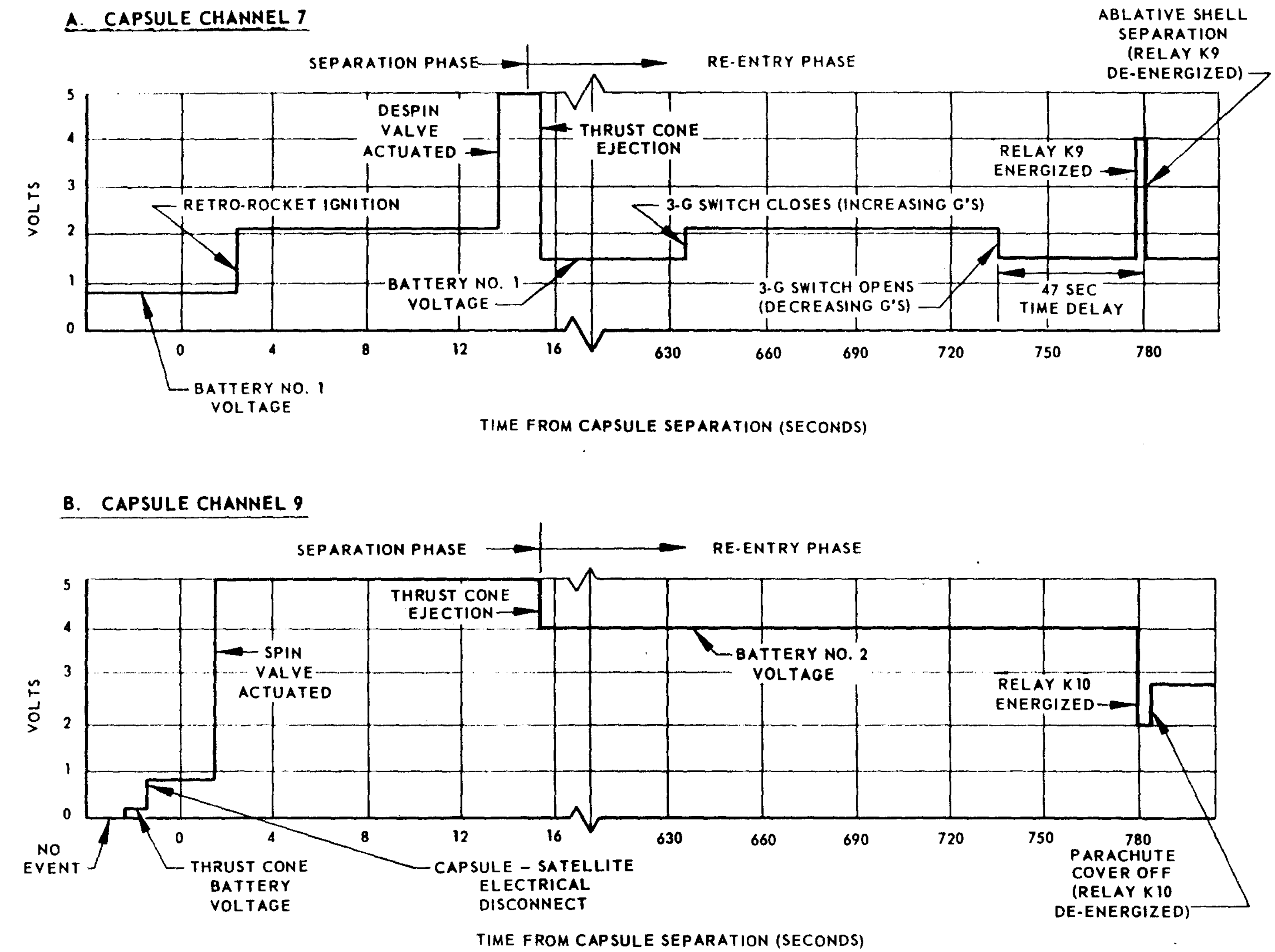


Figure A7-6 Emergency Re-entry Telemetry and Recovery Coverage

[redacted]



NOTE: VALUES SHOWN INDICATE NOMINAL SEQUENCE OF EVENTS. CONSULT T/M CALIBRATION DATA FOR VOLTAGE LEVELS WHICH WILL OCCUR IF SEQUENCE OF EVENTS IS NOT NORMAL. REFER TO SECTION 7.5 FOR SEQUENCE OF EVENTS DESCRIPTION

446408-A1-010(3)

Figure A7-7 Nominal Capsule Telemetry Voltage Levels

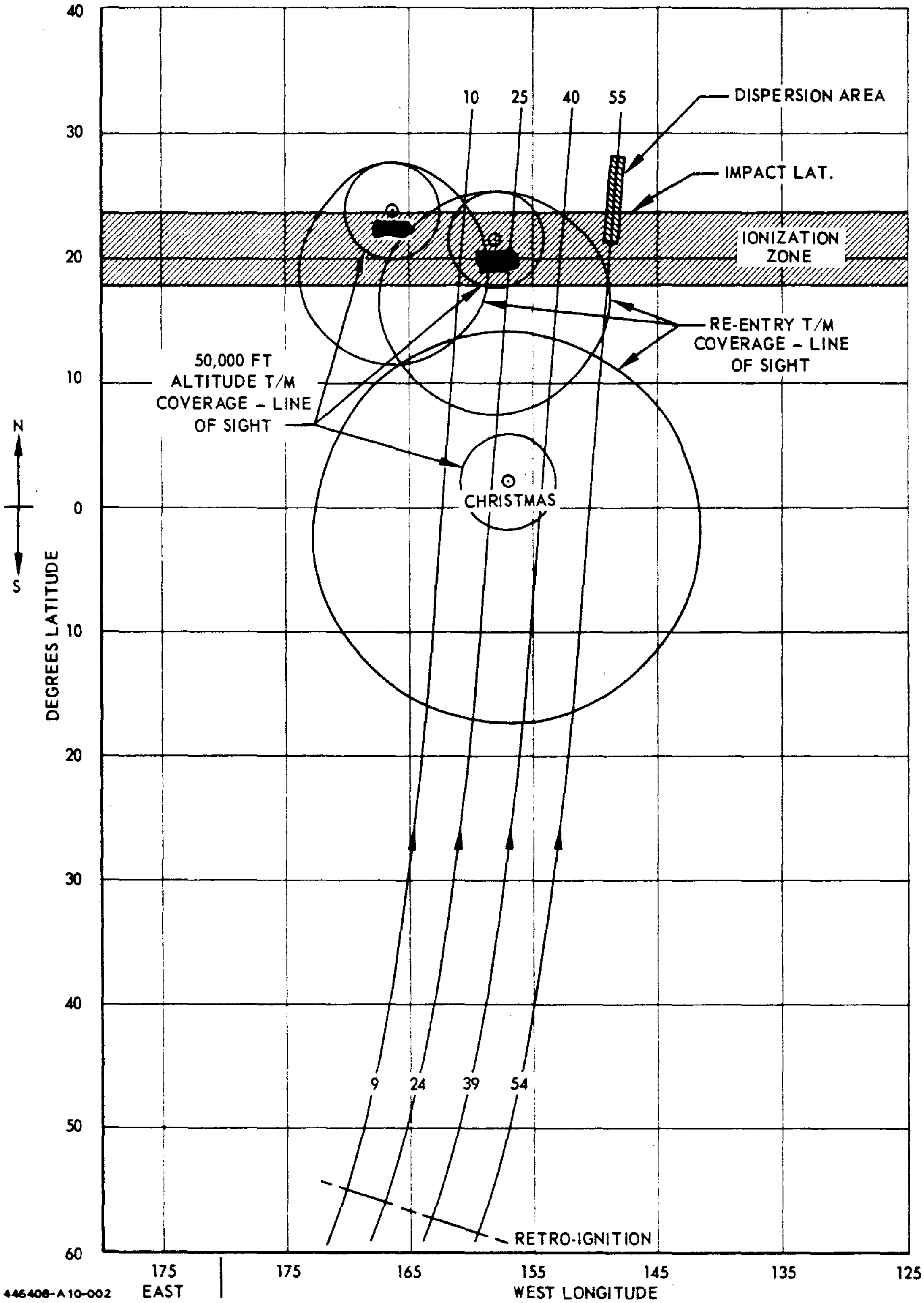
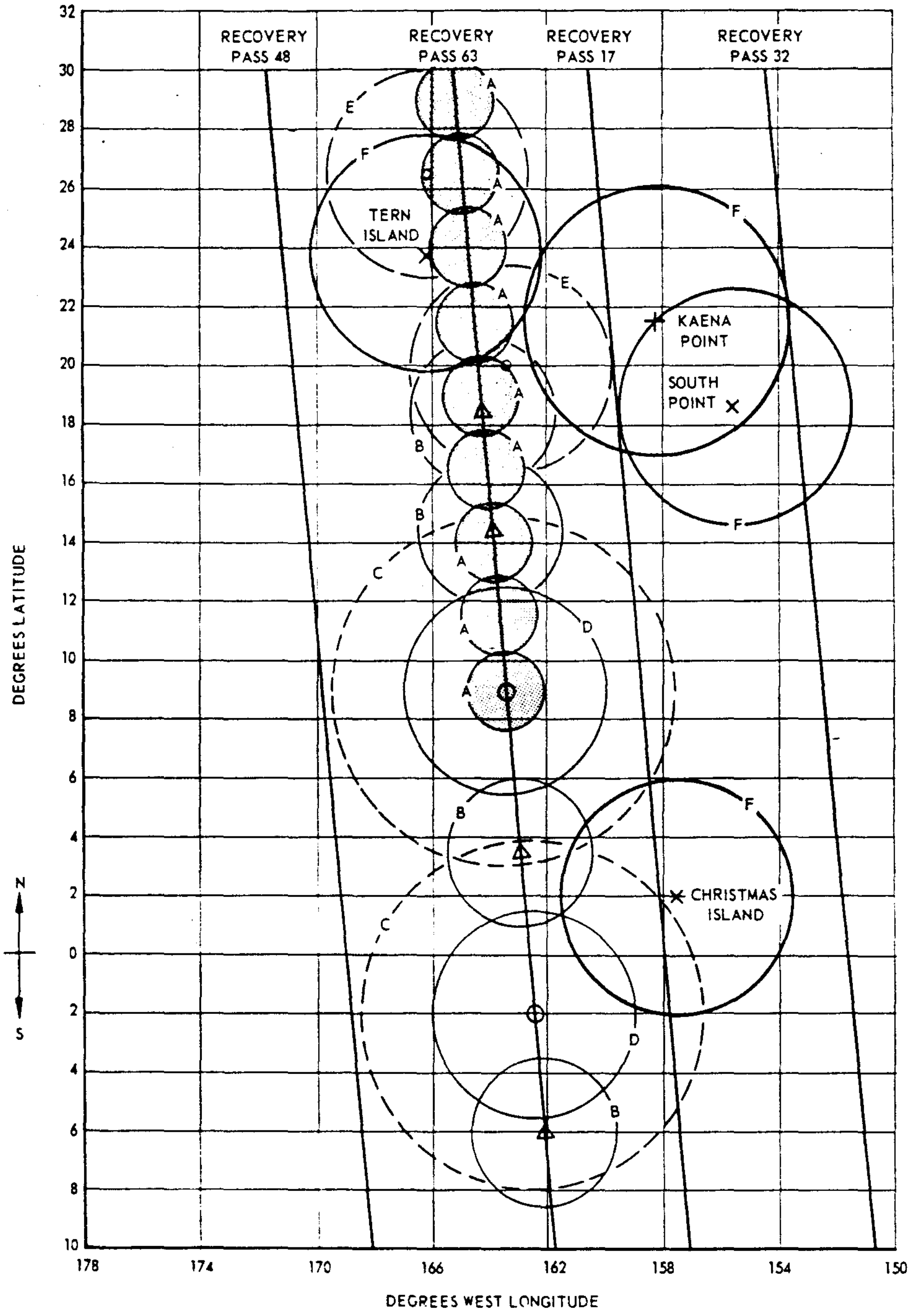


Figure A8-1 Recovery Force Deployment – Uncontrolled Satellite

 [redacted]



A C-119 RADIUS OF ACTION FOR AERIAL PICKUP

B T M RECEPTION RADIUS OF DETECTOR AIRCRAFT AIR CAPSULE AT 50,000 FEET

C SURFACE SHIP 24 HOUR SURFACE RECOVERY RADIUS OF ACTION

D T M RECEPTION RADIUS OF SURFACE SHIP FOR CAPSULE AT 50,000 FEET

E RC-121 RADIUS OF RADAR COVERAGE ON DISCOVERER CAPSULE

F GROUND-BASED TELEMETRY COVERAGE CIRCLES REPRESENT TELEMETRY COVERAGE WITH CAPSULE AT 50,000 FEET

446408-A10-001

Figure A8-2 South-to-North Re-entry Telemetry Coverage

[redacted]
19 June 1961
Copy No.____
______Sheets

APPENDIX A – TAB 11
SYSTEM TEST DIRECTIVE
FOR
DISCOVERER SATELLITE SYSTEM
DISCOVERER SATELLITE 1109
DISCOVERER BOOSTER 308

Prepared under authority of AFBM Exhibit 60-6, Paragraph 1.4.1

Prepared by
SYSTEMS INTEGRATION PLANNING

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CHAIRMAN,
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APPROVED:
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SPACE SY[redacted]RECTOR

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A1 INTRODUCTION

This appendix contains descriptive material which supplements the basic text of the STD and is applicable only to the flight of Discoverer Satellite 1109. An additional section (A6, Emergency Recovery Operations) is now included and will be incorporated into the revised basic text. Where the material contained herein is in conflict with that in the basic text, the information in this appendix has precedence. Reference will not be made to this appendix for subsequent flight operations.

A2 CONFIGURATION

A2. 1 Discoverer Satellite

A2. 1. 1 An AET-L payload in a Mark IV recovery capsule, an optical beacon, and a Discoverer Research Payload will be carried by the Agena.

A2. 1. 2 Optical tracking lights will be carried for tracking evaluation. They will be programmed ON while the satellite is within range of Smithsonian Astrophysical Observatory stations equipped with Baker-Nunn optical tracking cameras.

A2. 1. 3 Four Type 1A batteries will provide the electrical power on this flight. These batteries have a minimum lifetime of 125 hours.

A2. 1. 4 A total of 132 pounds of control gas will provide satellite attitude control through the normal recovery pass on the fourth day of orbit operations within the limits of expected gas expenditure rates.

A2. 1. 5 The Discoverer Research Program (DRP) consists of the development of special modules with which to conduct orbital research test experiments. These DRP kits are designed for ready interchangeability between satellites and have the capability of being installed or removed at the launch base. The program will continue with the flight of Satellite 1109. The kit for 1109 is typical and consists of: (1) Communications Package, (2) Research Components Package, (3) Research Auxiliary Package, and (4) GRD Packages. The research T/M unit will operate on the recovery capsule T/M frequency (228. 2 mc), Link 2 IRIG Channels 13, 14, and E. The T/M transmitter is a separate unit mounted on the engine access door and is interlocked with the recovery system so as to be turned off during the recovery pass. Discoverer research components will be programmed by the orbital programmer and will not require ground commands. The DRP telemetry is programmed for readout subsequent to the recovery pass.

A2. 1. 6 The telemetered research data will be recorded on magnetic tape by all stations, using the same procedures as used for Link 1 satellite telemetry. The data tapes will be shipped to the STC, Attn [redacted] Bldg. [redacted] Sunnyvale, Calif., with other station records.

A2. 2 Discoverer Vehicle

A2. 2. 1 Discoverer Vehicle 1109/308 will incorporate the BTL guidance system operating in the closed-loop mode. This system will provide booster guidance during launch, provide time-to-fire and velocity-to-be-gained correction signals to the Agena Vehicle, and will command booster/satellite separation as described in Section 3. 1. 4 of the basic text.

A2. 3 SOCS

A2. 3. 1 The Satellite Orbital Control System (SOCS) consists of the following ground tracking stations: [redacted] These stations are under the direct control of the STC for all operations from prelaunch to post-recovery. Tern Island, South Point, and Christmas Island are additional stations used during the recovery operations.

A3 LAUNCH OPERATIONS

A3. 1 Launch Time

The target time of launch will be determined by the STC.

A3. 2 [redacted] Tracking Station

The incorporation of the BTL guidance system for launch trajectory control has deleted the requirement for the Reeves Guidance Computer at [redacted] and the necessity for transmission of Commands 5 and 6 during the launch phase. All launch and orbit tracking and telemetry requirements supported by [redacted] have been deleted for this and subsequent operations.

A3. 3 [redacted] Tracking Station

Section 5. 3 of the basic text is revised to direct [redacted] to provide primary active VERLORT tracking during the launch phase. Radar tracking data will be transmitted to the PAC via 100-wpm teletype.

A3. 4 Increase/Decrease Switch Position

The increase/decrease switch will be positioned in the INCREASE position during launch. The position of the increase/decrease switch during orbit operations may be in either position as directed by the STC. Placing the switch in the increase position for launch assures a known position of the switch for first pass operations. [redacted] will verify position of the increase/decrease switch and timer step position before launch and provide this information to the STC prior to launch. This verification should be made at the latest practical time prior to launch.

A3.5 Recovery Force Readiness

A3.5.1 The launch criteria as specified in Paragraph 4.2.2.6 of the basic text is amended to specify the following on station operable recovery and search force requirements:

a. Two RC-121 radar aircraft
b. Seven C-119J recovery aircraft
c. Two telemetry/detection surface ships
d. Surface retrieval capability within 24 hours in the recovery zone between 14 and 26 degrees north latitude
e. One para-recovery team
f. Four telemetry aircraft

A3.5.2 It is considered impractical to directly relate the launch decision to specific numbers of telemetry/detection aircraft in operational status at time of launch. The nature of aircraft operation is such that during a three or four day period the actual aircraft status can change several times. It therefore becomes a matter of operational judgement at time of launch to determine expected airborne force status at the time it will be needed and render a decision to launch or not. This change in launch criteria does not abrogate the requirement for four telemetry/detection aircraft on station.

A4 ORBIT OPERATIONS

A4.1 Real-Time Commands

The re-entry capability of the orbital programmer has been modified by (1) deletion of the primary re-entry circuit, (2) elimination of skip/repeat functions and (3) elimination of the increase/decrease switch alternate re-entry selection function. The re-entry selection Commands 5 and 6 will permit positive selection of the recovery pass and will be the only means of initiating recovery.

A4.1.2 The re-entry circuit is enabled by sending Command 5 or Command 6. The re-entry circuit can be disabled by sending the same command used to enable re-entry; i.e., if Command 5 is used to enable, Command 5 will be also used to disable. It is of utmost importance that Command 5 or Command 6 enabling re-entry on a particular future pass be sent only after all possibilities of inadvertently initiating recovery prior to the selected pass have been eliminated.

A4.1.3 The satellite command procedure will include monitoring the telemetry verifications of Commands 5 and 6 (re-entry switch position, Channel 16, Positions 53 and 51) while sending <u>any</u> command. <u>If</u> Command 5 or Command 6 is inadvertently received, the station will immediately report the occurence to the STC and stand by to send a disable command as directed by the STC. Direct communication between the telemetry read-out station and the Station Test Director is required to reduce reaction time to a minimum.

A4.1.4 The procedure for sending Command 5 or Command 6 is to actuate the command button and await verification from the telemetry observer that the command has been received and verified.

If verification is not received, the STC will be notified immediately and the vehicle command console operator will be prepared to give priority to resending the command when so directed by the STC. Each attempt at sending these commands must be reported immediately to the STC to permit accurate bookkeeping in case of telemetry failure. The telemetry observer must check Link1 Channel 16, Positions 53 and 51 which monitor re-entry enable/disable functions controlled by Commands 5 and 6 respectively, to be sure that the vehicle has acted upon the transmitted command and to be sure that both commands have not been initiated when only one is desired.

A4.1.5 The SS/D timer (re-entry sequence) start punch has been placed in two locations for both Pass 65 and for Pass 81 on the orbital programmer tape. These start positions are located approximately 90 seconds ahead and 12 seconds after the reset point, with the duration of each being 20 seconds. The purpose of adding the second SS/D timer restart punch on each of these passes is to ensure dump initiation capability in the event an inadvertent re-set command causes the first punch to be by-passed.

> NOTE: DUE TO THE POSSIBILITY OF ACCIDENTALLY INITIATING RE-ENTRY WHILE SENDING COMMANDS 1 THROUGH 4 TO A TUMBLING VEHICLE, [redacted] WILL NOT SEND ANY COMMANDS WHILE THE ORBITAL PROGRAMMER BRUSHES ARE MAKING CONTACT THROUGH THE SS/D TIMER START PUNCHES. THESE ACTUAL TIMES WILL BE DETERMINED BY THE STC FROM THE SS/H SCHEDULE AS MODIFIED FOR THE ACTUAL VEHICLE PERIOD AND SENT TO [redacted] IN ADVANCE OF THE PASS.

A4. 1. 6 "Sweeping" the satellite at the radar antenna nutating rate may occur when approaching the fade point, thereby causing incorrect tones to be received by stable as well as unstable satellites. The stations will monitor VERLORT signal strength, and when it decreases to a point where breaking lock is imminent or when the VERLORT has momentarily lost lock and regained it, the STC will be advised. Commands will not be sent "in the dark," after breaking lock nor as the vehicle approaches its normal fade point except under emergency conditions as directed by the STC.

A4. 2 Tumbling Satellite Command Operations

A4. 2. 1 In the case of a tumbling satellite, special command operations are required. As defined in Paragraphs A4. 1. 2 and A4. 1. 3, the Commands 5 and 6 have been modified to "flip-flop" operation for enabling and disabling the re-entry sequence. This of course means that one pulse will activate and a second pulse deactivate the re-entry switch. With a tumbling satellite the possibility of momentarily losing radar lock is greatly increased. In this case, the satellite may receive two commands during a single command pulse.

A4. 2. 2 If a total communications blackout occurs between the STC and an active station, and the re-entry command is determined to be in the enable position when the satellite is acquired, the station is authorized to send a disable Command 5 or 6 as required. This authority is extended for a tumbling satellite only in conjunction with a total communications failure. There is one exception to this authorization. If a station with a communication blackout observes re-entry on an optimum recovery pass (Passes 33 and 80 in the case of FTV 1109 with a nominal period), the disable command will not be transmitted on the assumption that the STC initiated the re-entry command for these passes. Any emergency action of this nature will be reported to the STC by the earliest possible means. The STC sends all stations an impact message which defines the "Primary" recovery pass. Stations must be continually aware of the pass so designated by the latest impact message. If the enabled command would result in separation on the designated recovery pass, the station will not send the disable command.

A4. 3 Re-Entry Selection - Nominal and Alternate

A4. 3. 1 Normal recovery based on the nominal period is planned for orbit Pass 64 after four days of active orbital life. Passes 10, 16, 17, 18, 25, 26, 31, 32, 33, 41, 42, 47, 48, 49, 56, 57, 63, 64, 65, 79, 80, and 81 are all programmed for re-entry. Passes 79, 80, and 81 provide the capability to delay re-entry until Day 5. If emergency re-entry is selected for south-to-north nighttime Passes 10, 25, 26, 41, 42, 56, and 57, separation will occur on the numbered pass preceding the selected recovery pass with re-entry impact programmed for 24^{o}N latitude. Passes 16, 31, and 47 provide for re-entry off the West Coast of Mexico. The re-entry circuit is enabled by sending Command 5 or Command 6, depending upon the pass selected as shown below. The re-entry enable command will be sent only by direction of the STC.

[redacted]

Command Structure for Enabling Recovery Passes

	Command 5 N-S	Command 5 S-N	Command 6 N-S	Command 6 S-N
Day 1	16, 18	10	17	
Day 2	31, 33	25	32	26
Day 3	47, 49	41	48	42
Day 4	63, 65	56	64, 65	57
Day 5	79, 81		80, 81	

The last southbound pass available for recovery on Day 4 (Pass 65) and on Day 5 (Pass 81) can be enabled by sending either Command 5 or Command 6. Since Commands 5 and 6 also disable the re-entry circuit, the condition of the re-entry switch must be known prior to transmission of any commands. Telemetry Link 1, Channel 16 Positions 53 and 51 monitor re-entry Commands 5 and 6 respectively. Re-entry switch condition monitors (Positions 53 and 51, Channel 16) will present voltage as follows:

a. A voltage level of 4v or 80 percent indicates re-entry enabled.

b. A voltage level of 1v or 20 percent indicates re-entry disabled.

A4.3.2 The maximum acceptable period deviations for programmed nominal and alternate recovery passes are shown below. These deviations represent the maximum and minimum periods that will allow the programmed passes to be within the aerial recovery zone.

Maximum Acceptable Period Deviations

Day	Pass	Period Deviation
1	16	95.9 - 103.6
	17	90.2 - 97.5
	18	Min - 92.0
2	31	95.2 - 99.7
	32	92.6 - 96.7
	33	89.8 - 93.5
3	47	93.5 - 96.2
	48	91.6 - 94.1
	49	89.7 - 92.2
4	63	92.5 - 94.4
	64	91.0 - 92.9
	65	89.7 - 91.5

A4. 4 Agena Reorientation After Capsule Separation

The Agena flight controls will be left on following capsule separation. The Agena should return to the local horizontal through the horizon scanner correction signal and maintain controlled flight in the normal orbit attitude until depletion of the control gas supply or battery power. The S-band beacon and telemetry are programmed through Pass 95.

A4. 5 Post-Recovery Orbit Operations

A4. 5. 1 Following the recovery pass, the tracking stations will continue vehicle orbit tracking DRP data recording, and telemetry recording operations until battery power is exhausted or until operations are terminated by the STC. The STC will establish operations control procedures to investigate the following areas as required during this period:

a. Systems operations exercise and personnel training
b. Vehicle command operations
c. Tracking station operations
d. Subsystem test requirements based on real-time analysis.

A4. 5. 2 Real-time data readout and reporting requirements for all tracking stations during post-recovery operations will be the same as the orbit requirements listed in Table A7-3, with the following exceptions:

a. AET payload readouts are not required
b. SPI data will be read by [redacted] only at the request of the STC.

A5 NORMAL RECOVERY OPERATIONS

A5. 1 Surface Ship Deployment and Operation

A5. 1. 1 A 24-hour water recovery capability will be provided within the recovery zone boundaries as shown in Figure A7-8. In addition to the USNS

Sunnyvale and USNS Longview, auxiliary surface recovery support will be provided in the northern area by one or more surface ships, depending on the speed and range capability of units available.

A5. 1. 2 Auxiliary surface recovery support will be provided to permit recovery within 24 hours after notification of water impact in the recovery zone between 14 and 26 degrees north latitude. Ship-to-shore communications will be maintained with the RCC/PMR representative.

A5. 1. 3 The surface ships will depart in sufficient time to arrive at initial deployment stations by T + 4 hours and will subsequently be deployed to assure surface recovery support for all variations of orbit period. Subsequent to launch the Test Controller will determine the particular passes for which impact predictions are required. The PAC will evaluate tracking data after launch and will provide predicted capsule impact location and time for each day not later than T + 4 hours. On receipt of impact predictions, the STC will provide surface ship re-deployment instructions to the RCC. If desired by PMR, the initial positions of the USNS Longview and the USNS Sunnyvale can be exchanged. The STC is to be notified of such a change one day prior to launch.

A5. 1. 4 The USNS Longview and USNS Sunnyvale will be deployed in the extended recovery area primarily to provide capsule detection and surface recovery capability in the event of capsule overshoot. Capsule telemetry will be recorded. These ships will be positioned as shown in Figure A7-1 and will be re-deployed laterally (at the initial $6^{\circ}30'$N latitude) to assure one-ship coverage for each alternate day pass. The ship will be relocated to 8°N latitude for the actual recovery pass if the vehicle condition is normal. If the period is such that both ships can cover the actual recovery pass, the easterly ship will be re-deployed to 11°N latitude and the westerly ship to 6°N latitude. Initial stations will permit re-deployment of either ship to cover its assigned area in one day.

[redacted]

A5. 1. 4. 1 Either one or both of these ships will be positioned directly under the orbit plane on the designated recovery pass to enable reception of the capsule signals in the extended recovery area. Until acquisition, the quad-helix antenna will scan ±90 degrees about a 360-degree azimuth at 10 degrees elevation at the rate of once per 15 seconds from ETPD - 0 until ETPD + 2 minutes. From ETPD + 2 minutes until ETPD + 5 minutes, the quad-helix antenna will give full area coverage by scanning ±90 degrees about 360-degree azimuth with antenna elevation increasing and decreasing from 10 degrees to 70 degrees to 10 degrees in increments of 20 degrees per scan. The scan rate will be once per 15 seconds. After ETPD + 5 minutes, the antenna will be positioned at 10 degrees elevation and 180-degree azimuth. In the event that either ship acquires the capsule signals, the telemetry will be recorded on magnetic tape as specified in the Detailed Recording Requirements, and antenna elevation and bearing at acquisition will be immediately reported through PMR to the RCC. Bearings will be relayed to the RCC at intervals of one minute. When the parachute deployment telemetry sequence is received or when the antenna azimuth becomes constant, the ship will so report verbally over SSB radio through PMR to the RCC giving ship position and antenna azimuth and elevation. If no capsule signals are acquired by the ships, a verbal negative report will be submitted over SSB radio through PMR to the RCC at ETPD + 30 minutes.

A5. 2 Airborne Recovery Force Deployment

A5. 2. 1 Two RC-121 aircraft will be deployed as shown in Figure A7-6 for communications control and direction of the Recovery Force. Each RC-121 aircraft will be equipped with SSB radio for direct communications with the RCC. Separate HF and VHF communication will be maintained with elements of the Recovery Force. The RC-121 aircraft will be designated as Command Aircraft for the forces in the primary and secondary recovery areas.

A5. 2. 2 Paragraph 7. 3. 6. 2 of the basic text is amended to read as follows: Under normal conditions, the RC 121 aircraft will be on station approximately two hours before ETPD.

 [redacted]

A5.2.3 Four telemetry/detection aircraft will be utilized in the recovery area for capsule detection and search, and will be on station by ETPD - 1 hour. The aircraft positioned at 13°N latitude will be equipped with SSB radio and will be designated as Command Aircraft for the forces in the extended recovery area. The nominal deployment of these aircraft for normal and alternate recovery days is shown in Figures A7-1 and A7-2. Placement of these aircraft in order of position priority is as follows:

Normal Re-entry

Zone	Predicted Impact Longitude	TM/DF Aircraft Position-Latitude (in order of priority)
I	East of 154°W	23°N 13°N 18°N 3°N
II	154° to 163°W	13°N 3°S 18°N 10°N
III	163°W to 170°W	13°N 3°N 18°N 10°N
IV	West of 170°W	23°N 13°N 18°N 3°N

A5.2.4 A telemetry recording aircraft to record the separation sequence of events in the Alaskan area is not required for this flight.

A5.2.5 Paragraph 7.1.5 of the basic text is amended as follows: The C-130 aircraft will be utilized for dropping a RATU in the event of a full recovery rehearsal.

A5.2.6 Paragraph 7.5.3 of the basic STD is deleted (for this case) as the APS-95 does not require peaking.

A6 EMERGENCY RECOVERY OPERATIONS

A6.1 Uncontrolled Satellite

A6.1.1 Loss of satellite control gas will result in either a completely tumbling satellite or an uncontrolled but not yet completely tumbling satellite. Loss of control will decrease the probability of impact in the primary area, therefore the Recovery Force deployment will be revised to extend the detection, sea recovery, and air recovery capabilities downrange as far as practical.

A6.1.2 The nominal impact latitude will be relocated northward by 6 degrees from 24 to 30 degrees north latitude, in order to enhance the probability of impacting within the recovery area. Under tumbling satellite conditions it is most probable that impact will occur downrange of the programmed impact latitude; however telemetry detection and surface recovery capability will be available to 8°S latitude. [redacted] will not be able to monitor capsule separation events in the case of high altitude orbits.

To provide flexibility of operation for an extended area, the initial position of the surface recovery ships is 6°30'N latitude. The ships will maneuver at this latitude until relocation instructions are given for the actual recovery pass.

A6.1.3 In selecting the recovery pass for a completely tumbling satellite, primary consideration should be given to surface ship redeployment time. The optimum passes for recovery, are those that provide telemetry coverage at parachute deployment from ground tracking stations. Passes 33 and 80 offer this advantage. Figure A7-3 shows the telemetry coverage for the recovery of a tumbling satellite on either of these passes. If tumbling occurs no later than Pass 9, recovery may be planned for Pass 33. If tumbling occurs after Pass 9, recovery should be planned for Pass 80. Earlier recovery is, of course, possible in both cases, therefore STC will evaluate the desirability of attempting earlier recovery based upon residual satellite control capability.

[redacted]

A6. 1. 4 Deployment of the air recovery (C-119) force is shown in Figure A7-7. The primary purpose of the aircraft in this emergency situation is detection with air recovery capability a secondary consideration. The deployment of this force is a function of the operational range limitations of the aircraft. The 75-nautical mile air recovery capability of the C-119 aircraft is based upon the calculated rate of descent of the capsule from parachute deployment to 5,000 feet, and a descending speed of 240 knots for the aircraft. The depicted deployment extends the air recovery capability from 30°N latitude through 7°N latitude.

A6. 1. 5 The RC-121 aircraft will maintain communications with the RCC and provide recovery force control in the northern area.

A6. 1. 6 The detection aircraft will deploy as indicated in Figure A7-3. The detection aircraft positioned at 13°N latitude will be SSB equipped and will be the command aircraft for forces in the extended recovery area.

A6. 1. 7 The optimum latitudinal positions of the force for the recovery of a tumbling satellite on either Pass 33 or 80 are as follows:

Unit	Position Priority	Latitude
Pelican (C-119)	1	29°N
	2	26°30'N
	3	24°N
	4	21°30'N
	5	19°N
	6	16°30'N
	7	14°
	8	11°30'N
	9	9°N
Vega (RC-121)	1	26°30'N
	2	20°N

[redacted]

Unit	Position Priority	Latitude
Detector	1	28°N
	2	13°N
	3	18°N
	4	6°S
TLM Ship	1	8°N
	2	2°00'S

These positions will be assumed only be direction of the STC.

A6. 1. 8 Telemetry coverage for the tumbling vehicle condition for other recovery passes (as well as 33 and 80) in the four standard recovery zones are shown in Figure A7-3. The T/M aircraft and surface ships are to deploy as shown for passes which fall within those zones. Deployment of the C-119 aircraft and RC-121 aircraft remains the same for each zone. The positions for the T/M aircraft and surface ships for each of the recovery zones is as follows:

Uncontrolled Re-entry

Zone	Predicted Impact Longitude	T/M Aircraft Position-Latitude (in order of priority)	Surface Ship Position
I	East of 154°W	28°N 13°N 23°N 18°N	8°N 1°30'N
II	154°W to 163°W	28°N 13°N 18°N 6°S	8°N 2°S
III	163°W to 170°W	28°N 13°N 18°N 3°N	8°N 2°S
IV	West of 170°W	28°N 13°N 23°N 18°N	8°N 1°30'N

A6. 1. 9 In the case of a satellite which is using power or control gas at an excessive rate, the primary consideration is to effect recovery as early as possible, before the satellite becomes unstable. In order to allow at least six hours' notice to the Airborne Recovery Force, as described in Paragraph 7. 2. 3 of the basic STD, the decision to recover must be made at least four passes prior to the selected recovery pass.

A6. 1. 10 If excessive expenditure of control gas is detected on Passes 1 through 13, recovery should be planned for Pass 17. If gas expenditure is excessive over a brief period during these passes but returns to normal, recovery may be delayed until Pass 33, which would allow the surface ship to deploy toward a position at 2^{o}S latitude. Sea recovery capability within 24 hours of impact would then be available to 8^{o}S latitude.

A6. 1. 11 If excessive use of control gas is indicated on Passes 14 through 29, recovery should be planned for Pass 33 and the surface recovery ship should deploy as far south as possible in the time available.

A6. 1. 12 If excessive use of control gas occurs on Passes 30 through 45, recovery may be planned for Pass 49 or Pass 64, depending upon the rate of stability deterioration.

A6. 2 Nighttime Recovery Operations

A6. 2. 1 The capability to initiate the recovery sequence during south-to-north nighttime passes in the Hawaiian area is included in the orbital programmer. Capsule impact will be programmed to occur at 24^{o}N latitude with the dispersion limits being 15. 6 nautical miles crossrange, 96. 5 nautical miles uprange (south) and 133. 3 nautical miles (north) downrange.

A6. 2. 2 Figure A7-4 presents the telemetry and tracking coverage for each of the nominal passes based on a 91. 6-minute period. Although Christmas Island has a long duration of track, the lack of antenna auto-tracking capability and wide beam width precludes the possibility of predicting capsule impact points from this data. However, certain passes will allow sufficient tracking data to be acquired by [redacted] and Tern Island to compute impact prediction.

A6. 2. 3 Planning for this operation is based on the assumption that south-to-north recovery will be initiated <u>only</u> in the event of an emergency and that the vehicle can be expected to be under control (sufficient gas and power for reorientation) up to and including the separation latitude, based on data available up to the time the re-entry command is given.

A6. 2. 4 As this is an emergency recovery the initial (pre-launch) deployment of the surface recovery forces will not be modified to obtain surface recovery in the Northern area.

A6. 2. 5 As the capsule will descend during darkness, no attempt will be made to perform an aerial recovery, therefore the C-119 aircraft will not be required in the recovery zone except as surface search aircraft.

A6. 2. 6 It is desirable to detect the capsule impact as early as possible, therefore two aircraft with D/F gear will be sent to the impact zone, preferably before impact, but in any case as soon after impact as is practical, to search the 330-nautical mile long zone of impact.

A6. 2. 7 The long overwater flight time and D/F capability requirement may be met by the JC-54 telemetry detector aircraft stationed at Hawaii. Utilization of these aircraft will require two JC-54 crews to be available for deployment as early as practicable after alert.

A6. 2. 8 The two initial search aircraft will be deployed before parachute deployment if possible; however, if they are not airborne before ETPD, the tracking and telemetry information will be examined to determine if the capsule re-entry occurred. If not, the aircraft will not be deployed; however, if there is any doubt regarding capsule re-entry, the aircraft will be sent out to search the area.

[redacted]

A6.2.9 The remainder of the Recovery Force will be alerted for a daylight search. If the JC-54 aircraft locate the capsule, they will drop marker bouys and maintain visual contact until relief aircraft arrive. Recovery of the capsule will be effected at the earliest practicable time.

A7 TABLES AND ILLUSTRATIONS

The following tables and illustrations are applicable to the flight of Discoverer Satellite 1109/Discoverer Booster 308/AET-L Payload only. Each table or figure is given the basic number of the section of the general STD to which it applies, the letter A to denote Appendix material, and a number to sequence items in the same category.

Table A2-1

NOMINAL FLIGHT PLANNING DATA

ITEM	DATA
SATELLITE	
S/N	1109
Payload	AET-L
Fuel	UDMH, 3739 lb
Oxidizer	IRFNA, 9618 lb
Launch weight	16,149 lb
BOOSTER	
S/N	308
Fuel	RJ-1
Oxidizer	Liquid oxygen
Launch weight (including payload)	123,646 lb
LAUNCH	
Site	VAFB, SM-75-3 Pad 5
Date	July 1961
Pad azimuth	218.4°
Launch azimuth	172°
Orbital boost time	237.0 sec
Downrange T/M ship location	12.5° N, 119.2° W
Downrange T/M ship heading	270° T
Programmer setting	5,628 sec (step setting 21)
INJECTION	
Time	T + 445 sec
Location	23.2° N, 119.2° W
Altitude	165 nm (190 sm)
Azimuth	171.0°
Velocity	25,687 ft/sec
ORBIT	
Period	91.6 min
Apogee	253 nm (292 sm)
Perigee	130 nm (150 sm)
Eccentricity	.017
Regression rate – average	23.03°/pass
Reset latitudes	20° N [redacted]
	32° N [redacted]orthbound)
	36° N [redacted]outhbound)
	40° N [redacted]orthbound)
	45° N [redacted]outhbound)
	60° N [redacted]
Inclination angle	81.75°

Table A2-1 (Continued)

NOMINAL FLIGHT PLANNING DATA

ITEM					DATA		
DAY	NIGHT RECOVERY PASS	EMERGENCY RECOVERY PASS	ALTERNATE RECOVERY PASS	NOMINAL RECOVERY PASS	NOMINAL IMPACT CENTER WEST LONGITUDE	NOMINAL IMPACT CENTER NORTH LATITUDE	ETPD (HR)
1	10				153.8°	24°	T + 14.8
		16			127.1°	17°	T + 24.6
			17		150.8°	24°	T + 26.0
2	26				162.3°	24°	T + 39.3
		31			112.4°	17°	T + 47.6
			33		159.3°	24°	T + 50.5
3	41 / 42				147.7° / 170.7°	24° / 24°	T + 62.2 / T + 63.7
		47			120.9°	17°	T + 71.9
			49		167.7°	24°	T + 75.0
4	57				156.1°	24°	T + 86.7
			63		129.3°	24°	T + 96.4
				64	153.0°	24°	T + 97.8
5			80		161.8°	24°	T + 122.4

NOTE: The following additional passes are programmed for recovery: 18, 25, 32, 48, 56, 65, 79, 81

Table A4-1

INSTRUMENTATION REQUIRED TO BE OPERATIVE AT LAUNCH

1. Discoverer Satellite

   a. Continuous Telemetry Channels:

      6 – Payload quantity. Subcarrier must be present

      7 – Payload quantity. Subcarrier must be present

   b. Commutated Telemetry Channels

      12 – Subcarrier must be present and commutator running

      13 – Subcarrier must be present and commutator running

      16 – Subcarrier must be present and commutator running; points 2, 4, 6, 8, 10, 18, 20, 22, 33, 38, 51, and 53 must be present.

2. Capsule

   a. Continuous Telemetry Channels:

      7 – Subcarrier must be present

      11 – Subcarrier must be present

NOTE: This table represents the initial LMSD requirements. Final determination of the telemetry channels required to be operable at launch will be made no later than launch minus 7 days.

Table A5-1

SUBSYSTEM D TIMER SEQUENCE FOR DISCOVERER SATELLITE 1109
(Preliminary – Subject to Change)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
	-0.1		Timer reset (ground function)
0		Umb Drop	Liftoff. D-Timer start
0.1	0.1		Timer reset (ground function)
0.1	0.1		Timer safety input (ground function)
149.88		BTL	Transmit MECO (P1)
150	150		Start Fairchild Timer
			Disarm Agena destruct
			Arm BTL guidance
			Flight control power ON (backup)
			Uncage integrator
			Open pneumatic valve
150	150		Arm separation squib relays
151.11		Fuel Depletion	MECO (142.53 – 156.65)
155.22		BTL	Transmit arm D1 and D2(P2)
157.7		BTL	Transmit uncage IRP gyros, initiate velocity correction and timer hold (D1)
159.2		BTL	Terminate D1
159.3		BTL	Initiate D2 (D-Timer hold)
159.77		Thor timer	VECO
162.8		BTL	Terminate D2
164.2			Command separation (P3)
165	160		Uncage IRP gyros (backup)
167.0		Separation	Activate pneumatic control (vehicle leaves adapter)
175	170		Command separation (backup)
175	170		Fire horizon scanner (H/S) fairing squibs
176	171		Remove 28v dc from pneumatic valve and transfer SS/H TLM to turbine speed
176	171		Disable -40°/min yaw rate (no yaw correction required)
178	173		Activate pneumatic control (backup)
			Command -3.6°/sec pitch rate (pitchover 28.8°)
178	173		Initiate -2.65°/min pitch rate from integ. pot.

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
187	182		Remove -3.6°/sec pitch rate
			Connect pitch H/S signal to pitch IRP gyro
187	182		Connect roll H/S signal to roll IRP gyro
			ORBITAL BOOST*
200	195		Activate H/S electrical bias 2.5° offset (4° total offset)
			Spare (TLM D-Timer monitor)
200	195		Fire ullage rockets
211	206		Unground integrator input
			Connect accelerometer to integrator**
211	206		Arm and fire gas gen. squib, fire He valve, pitch and yaw pneumatics OFF
212	207		Pitch and yaw pneumatics OFF (backup)
			Open circuit to gas gen. arm and fire He valve
			Remove J-Box 28v to pitch and yaw pneumatics OFF
212	207		Close circuit to TLM over-ride
			STEADY STATE THRUST*
438	433		Arm pitch and yaw pneumatics
438	433		Engine cutoff safety switch
445.5			Engine shutdown by integrator
			Disconnect accelerometer
			Ground integrator input
445.5			Activate pitch and yaw pneumatics
470	465		Command -40°/min yaw rate (180° yaw)
			Disconnect integrator pitch rate pot. (remove pitch rate)
			Pitch and yaw pneumatics ON (backup)
			Fire helium and oxidizer vent valve squib
			Pitch and yaw pneumatics ON (backup)
470	465		Fire helium and oxidizer vent valve squib
740	735		Start TLM calibrate
			Apply 28v unreg. to SS/L power control box
			Command +3.86°/min pitch rate
			Connect roll H/S signal to yaw gyro (remove -40°/min yaw rate)
			Switch out 0.1% regulated 400-cycle power

* *Notation for reference only*

** *Integrator to be set at a dial reading of 2150 representing a velocity-to-be-gained of 17,200 ± 40 ft/sec.*

Table A5-1 (Continued)

NOMINAL TIME FROM LIFTOFF (SEC)	COMPUTER RUNNING TIME (SEC)	SOURCE	EVENT DESCRIPTION
740	735		Shutdown +28.3v IRP ascent power
740	735		Switch out 0.1% regulated 400-cycle power
750	745		Stop TLM calibrate
750	745		Open engine shutdown, switch antennas, open flight control gain change relays and switch roll and yaw gyro TLM gain
750	745		Shutdown integrator power
758	753		Open circuit to TLM override
			Arm H/S OFF circuit
			SS/D timer OFF, H/S to low gain
758	753		Fire fuel vent valve squib
			Fire fuel vent valve squib
			RECOVERY
X	X	Fairchild Timer	Re-start SS/D timer, H/S OFF
X + 22	X + 22		Command -45°/min pitch rate (pitch over 51°)
X + 22	X + 22		Arm capsule ejection squib
X + 92*	X + 92		Command + 3.86°/min pitch rate (Stop -45°/min pitch rate)
			SS/L transfer circuit 1
X + 92	X + 92		SS/L transfer circuit 2
X + 92			Fire capsule plug disconnect squib
X + 94.5	X + 94.5		Fire capsule eject squibs
			Enable timer shutdown circuits
			Fire capsule eject squibs
X + 94.5	X + 94.5		Lockout SS/H re-start signal
X + 154	X + 154		Shutdown SS/D timer and H/S ON

* *The timer interval between event X + 92 and X + 94.5 shall be 2.5 ±0.1 sec.*

[redacted]

Table A6-1

NOMINAL ORBIT SCHEDULE

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Launch	Launch	0	34.8
	Start Orbit	0.0416	
	Orbit Injection	0.125	23.4
	Beacon, T/M off		
Pass 1	Beacon, T/M on	1.4	75
	65°N latitude (ref)	1.5	65
	RM on	1.5	60
	RM Interruption	1.5	58.7
	Cross [redacted] latitude	1.5	57.6
	25°N ref latitude	1.6	25
	Cross [redacted] latitude	1.7	21.6
	Beacon, T/M off	1.7	12
	End of Orbit 1	2.5	0
Pass 2	Beacon, T/M on	3.0	75
	RM on	3.0	60
	Cross [redacted] latitude	3.0	57.6
	RM interruption	3.0	56
	Cross [redacted] latitude	3.2	21.6
	Beacon, T/M off	3.2	12
	End of Orbit 2	4.1	0
Pass 3	End of Orbit 3	5.6	0
Pass 4	End of Orbit 4	7.1	0
Pass 5	End of Orbit 5	8.6	0
Pass 6	Beacon, T/M on	8.7	25
	RM on	8.8	40
	Cross [redacted] latitude	8.8	42.9
	RM interruption	8.8	44
	Beacon, T/M off	8.9	60
	End of Orbit 6	10.2	0
Pass 7	Beacon, T/M on	10.3	25
	RM on	10.3	40
	RM interruption	10.3	41.3
	Cross [redacted] latitude	10.3	42.9
	Beacon, T/M off	10.4	60
	End of Orbit 7	11.7	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 8	Beacon, T/M on	11.8	17
	RM on	11.8	32
	Cross [redacted] latitude	11.8	34.8
	RM interruption	11.9	37.3
	Beacon, T/M off	11.9	52
	End of Orbit 8	13.2	0
Pass 9	Beacon, T/M on	13.3	17
	RM on	13.3	32
	RM interruption	13.4	34.7
	Cross [redacted] latitude	13.4	34.8
	Beacon, T/M off	13.4	52
	End of Orbit 9	14.7	0
Pass 10	Beacon, T/M on	14.7	5
	RM on	14.8	20
	Cross [redacted] latitude	14.8	21.6
	RM interruption	14.8	24
	Cross [redacted] latitude	14.9	57.6
	Beacon, T/M off	15.0	65
	End of Orbit 10	16.2	0
Pass 11	End of Orbit 11	17.8	0
Pass 12	End of Orbit 12	19.2	0
Pass 13	Beacon, T/M on	19.8	61
	RM on	19.8	45
	Cross [redacted] latitude	19.8	42.9
	RM interruption	19.8	41
	Beacon, T/M off	20.9	34
	End of Orbit 13	21.8	0
Pass 14	Beacon T/M on	21.3	61
	RM on	21.4	45
	RM interruption	21.4	43.7
	Cross [redacted] latitude	21.4	42.9
	Beacon T/M off	21.4	34
	End of Orbit 14	22.4	0
Pass 15	Beacon, T/M on	22.4	17
	RM on	22.5	32
	Cross [redacted] latitude	22.5	34.8
	RM interruption	22.5	37.3
	Beacon, T/M off	22.6	52
	End of Orbit 15	23.8	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 16	Beacon, T/M on	23.3	75
	RM on	23.3	60
	Cross [redacted] latitude	23.4	57.6
	RM interruption	23.4	57.3
	Cross [redacted] latitude	24.5	34.8
	Beacon, T/M off	24.5	22
	End of Orbit 16	25.3	0
Pass 17	Beacon, T/M on	25.7	75
	RM on	25.9	60
	Cross [redacted] latitude	25.9	57.6
	RM interruption	25.9	56
	Cross [redacted] latitude	26.1	21.6
	Beacon, T/M off	26.1	12
	End of Orbit 17	26.9	0
Pass 18	Beacon T/M on	27.2	75
	RM on	27.4	60
	RM interruption	27.4	56
	Cross [redacted] latitude	27.4	57.6
	Cross [redacted] latitude	27.6	21.6
	Beacon T/M off	27.6	12
	End of Orbit 18	28.4	0
Pass 19	End of Orbit 19	30.0	0
Pass 20	End of Orbit 20	31.5	0
Pass 21	Beacon, T/M on	31.6	25
	RM on	31.7	40
	Cross [redacted] latitude	31.7	42.9
	RM interruption	31.7	44
	Beacon, T/M off	31.8	60
	End of Orbit 21	33.0	0
Pass 22	Beacon, T/M on	33.1	25
	RM on	33.2	40
	RM interruption	33.2	41.3
	Cross [redacted] latitude	33.2	42.9
	Beacon, T/M off	33.3	60
	End of Orbit 22	34.6	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 23	Beacon, T/M on	34.7	25
	RM on	34.7	40
	Cross [redacted] latitude	34.8	42.9
	RM interruption	34.8	45.3
	Beacon, T/M off	34.8	60
	End of Orbit 23	36.1	0
Pass 24	Beacon, T/M on	36.2	17
	RM on	36.2	32
	RM interruption	36.3	34.7
	Cross [redacted] latitude	36.3	34.8
	Beacon, T/M off	36.3	52
	End of Orbit 24	37.6	0
Pass 25	Beacon, T/M on	37.6	5
	RM on	37.7	20
	Cross [redacted] latitude	37.7	21.6
	RM interruption	37.7	24
	Cross [redacted] latitude	37.9	57.6
	Beacon, T/M off	37.9	65
	End of Orbit 25	39.2	0
Pass 26	Beacon, T/M on	39.2	5
	RM on	39.2	20
	RM interruption	39.2	21.3
	Cross [redacted] atitude	39.2	21.6
	Cross [redacted] atitude	39.4	57.6
	Beacon T/M off	39.4	65
	End of Orbit 26	40.7	0
Pass 27	End of Orbit 27	42.2	0
Pass 28	Beacon, T/M on	42.7	61
	RM on	42.8	45
	Cross [redacted] latitude	42.8	42.9
	RM interruption	42.8	41
	Beacon, T/M off	42.8	34
	End of Orbit 28	43.7	0
Pass 29	Beacon, T/M on	44.2	61
	RM on	44.3	45
	RM interruption	44.3	43.7
	Cross [redacted] atitude	44.3	42.9
	Beacon, T/M off	44.3	34
	End of Orbit 29	45.2	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 30	Beacon, T/M on	45.8	61
	RM on	45.8	45
	Cross [redacted] latitude	45.8	42.9
	RM interruption	45.8	39.7
	Beacon, T/M off	45.9	34
	End of Orbit 30	46.8	0
Pass 31	Beacon, T/M on	47.2	75
	RM on	47.3	60
	Cross [redacted] latitude	47.3	57.6
	RM interruption	47.3	57.3
	Cross [redacted] latitude	47.4	34.8
	Beacon, T/M off	47.4	22
	End of Orbit 31	48.3	0
Pass 32	Beacon, T/M on	48.7	75
	RM on	48.8	60
	Cross [redacted] latitude	48.8	57.6
	RM interruption	48.8	56
	Cross [redacted] latitude	49.0	21.6
	Beacon, T/M off	49.0	12
	End of Orbit 32	49.8	0
Pass 33	Beacon, T/M on	50.3	75
	RM on	50.3	60
	RM interruption	50.3	58.7
	Cross [redacted] atitude	50.3	57.6
	Cross [redacted] atitude	50.5	21.6
	Beacon T/M off	50.5	12
	End of Orbit 33	51.4	0
Pass 34	End of Orbit 34	52.9	0
Pass 35	End of Orbit 35	54.4	0
Pass 36	End of Orbit 36	55.9	0
Pass 37	Beacon, T/M on	56.0	25
	RM on	56.1	40
	Cross [redacted] latitude	56.1	42.9
	RM interruption	56.1	44
	Beacon, T/M off	56.2	60
	End of Orbit 37	57.5	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 38	Beacon, T/M on	57.6	25
	RM on	57.6	40
	RM interruption	57.7	41.3
	Cross [redacted] latitude	57.7	42.9
	Beacon, T/M off	57.7	60
	End of Orbit 38	59.0	0
Pass 39	Beacon, T/M on	59.0	17
	RM on	59.1	32
	Cross [redacted] latitude	59.1	34.8
	RM interruption	59.1	37.3
	Beacon, T/M off	59.2	52
	End of Orbit 39	60.5	0
Pass 40	Beacon, T/M on	60.6	17
	RM on	60.7	32
	RM interruption	60.7	34.7
	Cross [redacted] latitude	60.7	34.8
	Beacon, T/M off	60.7	52
	End of Orbit 40	62.0	0
Pass 41	Beacon, T/M on	62.1	5
	RM on	62.1	20
	Cross [redacted] latitude	62.1	21.6
	RM interruption	62.1	24
	Cross [redacted] latitude	62.3	57.6
	Beacon, T/M off	62.3	65
	End of Orbit 41	63.6	0
Pass 42	Beacon, T/M on	63.6	5
	RM on	63.7	20
	RM interruption	63.8	21.3
	Cross [redacted] latitude	63.8	21.6
	Cross [redacted] latitude	63.8	57.6
	Beacon, T/M off	63.8	65
	End of Orbit 42	65.1	0
Pass 43	End of Orbit 43	66.6	0
Pass 44	Beacon, T/M on	67.1	61
	RM on	67.2	45
	Cross [redacted] latitude	67.2	42.9
	RM interruption	67.2	41
	Beacon, T/M off	67.2	34
	End of Orbit 44	68.1	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 45	Beacon, T/M on	68.6	61
	RM on	68.7	45
	RM interruption	68.7	43.7
	Cross [redacted] latitude	68.7	42.9
	Beacon, T/M off	68.8	34
	End of Orbit 45	69.7	0
Pass 46	Beacon, T/M on	69.7	17
	RM on	69.8	32
	Cross [redacted] latitude	69.8	34.8
	RM interruption	69.8	37.3
	Beacon, T/M off	69.9	52
	End of Orbit 46	71.2	0
Pass 47	Beacon, T/M on	71.6	75
	RM on	71.7	60
	Cross [redacted] latitude	71.7	57.6
	RM interruption	71.7	57.3
	Cross [redacted] latitude	71.8	34.8
	Beacon, T/M off	71.9	22
	End of Orbit 47	72.7	0
Pass 48	Beacon, T/M on	73.2	75
	RM on	73.2	60
	Cross [redacted] latitude	73.2	57.6
	RM interruption	73.2	56
	Cross [redacted] latitude	73.4	21.6
	Beacon, T/M off	73.4	12
	End of Orbit 48	74.2	0
Pass 49	Beacon, T/M on	74.7	75
	RM on	74.7	60
	RM interruption	74.7	58.7
	Cross [redacted] latitude	74.8	57.6
	Cross [redacted] latitude	74.9	21.6
	Beacon, T/M off	75.0	12
	End of Orbit 49	75.8	0
Pass 50	End of Orbit 50	77.3	0
Pass 51	End of Orbit 51	78.8	0

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 52	Beacon, T/M on	78.9	25
	RM on	79.0	40
	Cross [redacted] latitude	79.0	42.9
	RM interruption	79.0	44
	Beacon, T/M off	79.1	60
	End of Orbit 52	80.3	0
Pass 53	Beacon, T/M on	80.4	25
	RM on	80.5	40
	RM interruption	80.5	41.3
	Cross [redacted] latitude	80.5	42.9
	Beacon, T/M off	80.6	60
	End of Orbit 53	81.9	0
Pass 54	Beacon, T/M on	82.0	25
	RM on	82.0	40
	Cross [redacted] latitude	82.0	42.9
	RM interruption	82.0	45.3
	Beacon, T/M off	82.1	60
	End of Orbit 54	83.4	0
Pass 55	Beacon, T/M on	83.5	17
	RM on	83.5	32
	RM interruption	83.5	34.7
	Cross [redacted] latitude	83.5	34.8
	Beacon, R/M off	83.6	52
	End of Orbit 55	84.9	0
Pass 56	Beacon, T/M on	84.9	5
	RM on	85.0	20
	Cross [redacted] latitude	85.0	21.6
	RM interruption	85.0	24
	Cross [redacted] latitude	85.1	57.6
	Beacon, T/M off	85.2	65
	End of Orbit 56	86.4	0
Pass 57	Beacon, T/M on	86.5	5
	RM on	86.5	20
	RM interruption	86.5	21.3
	Cross [redacted] atitude	86.5	21.6
	Cross [redacted] atitude	86.7	57.6
	Beacon, T/M off	86.7	65
	End of Orbit 57	88.0	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 58	End of Orbit 58	89.5	0
Pass 59	Beacon, T/M on	90.0	61
	RM on	90.1	45
	Cross [redacted] latitude	90.1	42.9
	RM interruption	90.1	42.3
	Beacon, T/M off	90.1	34
	End of Orbit 59	91.0	0
Pass 60	Beacon, T/M on	91.6	61
	RM on	91.6	45
	Cross [redacted] latitude	91.6	42.9
	RM interruption	91.6	41.0
	Beacon, T/M off	91.6	34
	End of Orbit 60	92.6	0
Pass 61	Beacon, T/M on	93.0	61
	RM on	93.1	45
	RM interruption	93.1	43.7
	Cross [redacted] latitude	93.1	42.9
	Beacon, T/M off	93.2	34
	End of Orbit 61	94.1	0
Pass 62	Beacon, T/M on	94.2	17
	RM on	94.2	32
	Cross [redacted] latitude	94.2	34.8
	RM interruption	94.3	37.3
	Beacon, T/M off	94.3	52
	End of Orbit 62	95.6	0
Pass 63	Beacon, T/M on	96.0	75
	RM on	96.0	60
	Cross [redacted] latitude	96.2	57.6
	RM interruption	96.2	57.3
	Cross [redacted] latitude	96.3	21.6
	Beacon, T/M off	96.3	12
	End of Orbit 63	97.1	0

[redacted]

Table A6-1 (Continued)

PHASE	EVENT	TIME FROM LAUNCH (HRS)	LOCATION (DEG N LATITUDE)
Pass 64	Beacon, T/M on	97.6	75
	RM on	97.6	60
	Cross [redacted]atitude	97.6	57.6
	RM interruption	97.6	56
	Cross[redacted]latitude	97.8	21.6
	Beacon, T/M off	97.9	12
	End of Orbit 64	98.7	0
Pass 65	Beacon, T/M on	99.1	75
	RM on	99.2	60
	RM interruption	99.2	58.7
	Cross [redacted]atitude	99.2	57.6
	Cross[redacted]latitude	99.3	21.6
	Beacon, T/M off	99.4	12
	End of Orbit 65	100.2	0

Table A8-1

REAL-TIME DATA READOUT AND REPORTING REQUIREMENTS

	Measurement: Name	Measurement: Number	Channel	Priority	Time* Readout Required	Report** to STC by Voice	Orbital Programmer Pass	Tracking Station: [redacted]				Tracking Station: TIS	Downrange T/M Ship***	T/M Aircraft*** WV-2 137890	Note
LAUNCH	Liftoff Signal	...	...	1	RT	X	Ascent	X							
	Thor Main Engine Cutoff	...	DAC(1) 13	1	RT	X	Ascent	X							
	Booster Separation	A93	16-24	1	RT	X	Ascent	X							
	Agena Engine Ignition and Cutoff	B6	14	1	PT	X	Ascent	X					X		
	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		Ascent	X							
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	Ascent	X							
	11 Second Step Switch Position	H108	16-20	1	RT		Ascent	X					X		
	110 Second Step Switch Position	H109	16-22	1	RT		Ascent	X					X		
	Increase Decrease Switch Position	H107	16-18	1	RT	X	Ascent	X					X		
	Payload Function Selector Setting	AET 14 15, 17 18, 20 21, 23 24	13-18 thru 13-24, 13-48 thru 13-54	1	RT	X	Ascent	X					X		
	Control Gas Supply Pressure – High Range	D95	16-33	1	RT	X	Ascent	X					X		
	Command 5 Monitor	H175	16-53	1	RT	X	Ascent	X							3
	Command 6 Monitor	H176	16-51	1	RT	X	Ascent	X							3
	BTL Discretes	C76	17-13	1	RT	X	Ascent	X							
	Yaw Gyro Torque	D84	17-54	2	PP1		Ascent						X		2
	Longitudinal Acceleration	A-103	11	2	See Note 2		Ascent	X					X		
	Separation Switch Monitor	C-79	17-11	2	See Note 2		Ascent	X							
ORBIT	Tone Verifications A, B, C, D	H64, 65, 66, 67	16-2, -4, -6, -8	1	RT		1 thru 62	X	X	X	X				
	Command Verifications 1, 2, 3, 4	H112	11	1	RT	X	1 thru 62	X	X	X	X				
	Programmer Period Readout (Console or Remote)	H110	1	2	RT		1 thru 62	X	X	X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	1	RT	X	1 thru 62	X	X	X	X				
	11-Second Step Switch Position	H108	16-20	1	RT		1 thru 62	X	X	X	X				
	Gas Valve Temp	D101	15-6	2	PP2		1 thru 62	X	X		X				
	Gas Valve Temp	D104	15-10	2	PP2		1 thru 62	X	X		X				
	Aft Rack Temp	D107	15-12	2	PP2		1 thru 62	X	X		X				
	Aft Rack Temp	D108	15-21	2	PP2		1 thru 62	X	X		X				
	Gas Valve Heater Duty Cycle	D117	16-45	2	PP2		1 thru 62	X	X		X				
	Control Gas Temp	D94	15-45	2	PP2		1 thru 62	X	X		X				

Table A8-1 (Continued)

	MEASUREMENT NAME	MEASUREMENT NUMBER	CHANNEL	PRIORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION [redacted]				TRACKING STATION TIS	DOWNRANGE T/M SHIP***	T/M AIRCRAFT*** WV-2 137890	NOTE
ORBIT (Continued)	110-Second Step Switch Position	H109	16-22	1	RT		1 thru 62	X	X	X	X				
	Increase Decrease Switch Position	H107	16-18	1	RT	X	1 thru 62	X	X	X	X				
	Reset Monitor Signal	H70	16-10	1	RT	X	1 thru 62	X	X	X	X				
	Payload Function Selector Setting	AET 14 15, 17 18, 20 21, 23 24	13-18 thru 13-24, 13-48 thru 13-54	1	RT	X	1 thru 62	X	X	X	X				
	Command 5 Monitor	H175	16-53	1	RT	X	1 thru 62	X	X	X	X				3
	Command 6 Monitor	H176	16-51	1	RT	X	1 thru 62	X	X	X	X				3
	Control Gas Supply Pressure – High Range	D95	16-33	1	PP1	X	1 thru 62	X	X	X	X				
	Control Gas Supply Pressure – Low Range	D140	16-27	1	PP1	X	1 thru 62	X	X	X	X				
	Battery Bus Voltage	C1	16-38	2	PP1		1 thru 62	X	X	X	X				
	Battery Case Temperature	C9	15-22	2	PP1		1 thru 62	X	X	X	X				
	Battery Current Monitor	C27	15-53	2	PP1		1 thru 62	X	X	X	X				
	Horizon Scanner – Pitch	D37	16-35	3	PP2		See Note 5 ↓	X	X	X	X				4
	Horizon Scanner – Roll	D39	16-37	3	PP2		↕	X	X	X	X				4
	SPI Temperature	D130	15-43	3	PP2		↕	X	X	X	X				5
	SPI Pitch Angle – Lower	D128	15-51	3	See Note 5		↕	X	X	X	X				5
	SPI Yaw Angle – Lower	D127	15-49	3	See Note 5		↕	X	X	X	X				5
	SPI Pitch Ref. Volt. – Lower	D136	15-2	3	See Note 5		↕	X	X	X	X				5
	SPI Yaw Ref. Volt. – Lower	D137	15-4	3	See Note 5		↕	X	X	X	X				5
	SPI Pitch Angle – Upper	D138	16-50	3	PP2		↓	X	X	X	X				5
	SPI Yaw Angle – Upper	D139	16-52	3	PP2		See Note 5	X	X	X	X				5
	Wave Train	AET 52	6	2	PP1		See Note 11	X	X	X	X				11
	No Name Assigned	AET 40	12-9	2	PP1		See Note 11	X	X	X	X				11
	No Name Assigned	AET 48	12-13	2	PP1		See Note 11	X	X	X	X				11
	No Name Assigned	DRC-139, 140 142,143,144, 145,146	18,42,51,53, 54,55,56,57	3	PP2		See Note 14	X			X				14
	No Name Assigned	DRC-4, 5, 6	12-54,55,56	3	PP2		See Note 14	X			X				14
	No Name Assigned		13 & 14 (Link 2)	3	PP2		See Note 15	X			X				15
	No Name Assigned	DRC-109,112 115	18-11, 14, 17	1	PP3		1,2,6		X	X					16

Table A8-1 (Continued)

	Measurement: Name	Measurement: Number	Channel	Priority	Time* Readout Required	Report** to STC by Voice	Orbital Programmer Pass	Tracking Station					Downrange T/M Ship***	T/M Aircraft*** WV-2 137890	Note
								[redacted]				TIS			
RE-ENTRY	Programmer Period Readout (Console or Remote)	H110	1	3	RT		Recovery Pass			X	X				
	Programmer Step Readout (Console)	H108, 109	16-20, -22	2	RT	X	↑			X	X				
	11-Second Step Switch Position	H108	16-20	3	PP2					X	X				
	110-Second Step Switch Position	H109	16-22	3	PP2					X	X				
	Reset Monitor Signal	H70	16-10	1	RT	X				X					
	Control Gas Supply Pressure – High Range	D95	16-33	1	PP1	X				X	X				
	Control Gas Supply Pressure – Low Range	D140	16-27	1	PP1	X				X	X				
	Battery Bus Voltage	C1	16-38	2	PP1					X	X				
	Horizon Scanner – Pitch	D37	16-35	1	PP2					X					4
	Horizon Scanner – Roll	D39	16-37	1	PP2					X					4
	SPI Pitch Angle – Lower	D128	15-51	2	See Note 6					X					6
	SPI Yaw Angle – Lower	D127	15-49	2	See Note 6					X					6
	SPI Pitch Ref. Voltage – Lower	D136	15-2	2	See Note 6					X					6
	SPI Yaw Ref. Voltage – Lower	D137	15-4	2	See Note 6					X					6
	SPI Pitch Angle – Upper	D138	16-50	1	PP2					X					6
	SPI Yaw Angle – Upper	D139	16-52	1	PP2					X					6
	Pitch Torque Signal	D41	17-38	2	PP1					X					7
	SS/D Timer Restart	D85	17-52	1	RT	X				X					
	Capsule Separation Event	AET 51	16-42	1	RT	X				X	X			X	8
	Payload Connector Disconnect	AET 26	12-2	2	RT					X	X				13
	Retro-Rocket Ignition, Despin Valve Actuated, Thrust Cone Ejection	---	Capsule 7	1	RT, PP1	X				X				X	9
	Spin Valve Actuated, Thrust Cone Ejection	---	Capsule 9	1	RT, PP1	X				X				X	9
	Axial Acceleration	---	Capsule 11	1	PP1, PP2	X				X	X	X		X	10
	3 g Switch Close, 3 g Switch Open, Ablative Shell Off	---	Capsule 7	1	RT, PP1	X				X	X	X		X	9
	Parachute Cover Off	---	Capsule 9	1	RT, PP1	X	↓			X	X	X		X	9
	Capsule T/M Signal Strength	---	Capsule 7, 9, 11	2	RT		Recovery Pass			X	X	X		X	12

Table A8-1 (Continued)

NOTES:

1. Report the system time of reorientation, the voltage level prior to start of reorientation, and the average voltage level during reorientation.
2. Backup monitors for ascent events.
3. Reads 20% (1 volt) for re-entry disable and 80% (4 volts) for re-entry enable.
4. Read when sun position indicator data are required in Notes 5 and 6 (until turn-off at start of reorientation). [redacted] reads on the recovery pass to indicate SS/D restart event if measurement D85 is invalid.
5. With the exception of D130, Channel 15 SPI data will be read only if the SPI data on Channel 16 do not appear valid. Read 3 times at approximately 2-minute intervals correlated with system time on Pass 2 [redacted] and [redacted] on Pass 13 [redacted] on Pass 17 [redacted] on Pass 29 [redacted], on Pass 32 [redacted] on Pass 45 [redacted] on Pass 47 [redacted] and on Pass 60 [redacted]. Readings at one system time only are required of [redacted] on Passes 8, 23, 39, and 54. All [redacted] and [redacted] readings are to be obtained as far north as possible. [redacted] transmits data on Channels 15 and 16 to Sunnyvale on 100-wpm/voice line after Pass 2; three 10-second data samples at 2-minute intervals required.
6. Read at 1-minute intervals before reorientation, 20-second intervals during reorientation, and immediately prior to separation; correlate with system time. Channel 15 SPI data will be read only if the SPI data on Channel 16 do not appear valid. [redacted] transmits data on Channel 15 and 16 to SV on 100-wpm voice line after recovery pass; continuous transmission from acquisition to separation.
7. Read system time at start and finish of reorientation, voltage level prior to start of reorientation, and average voltage level during reorientation.
8. Reads 4.67 volts prior to separation, 1.33 volts after separation. Correlation within 2 seconds of exact system time is satisfactory for initial [redacted] report. [redacted] and TIS verify that event has occurred by voltage level check.
9. The RT readout will contain a verification that each event has occurred. The PP1 readout will contain the system time of each event. Use event numbers listed in Paragraph 7.4.6 for identification when reporting.
10. The [redacted] PP1 readout will contain the average value and duration. The PP2 readout will contain a complete time history of acceleration and will include the system time of each data dropout and the time duration of dropout. [redacted] and TIS read values 5 seconds prior to, at, and 5-seconds after parachute deployment.
11. Refer to Table A-8-2 for details of readout required.
12. Provide a qualitative evaluation of signal reception.
13. Reads out of band after separation.
14. Data to be read out and reported to STC as % of voltage. [redacted] reads on every active pass, [redacted] will read out on Pass 2 only. Data will be reported by 60-wpm TTY. (Amount of data read out on each pass will be the minimum amount to establish a constant data level.)
15. Report only presence or absence of these channels.
16. One reading per pass – reading within ±1 volt.

---

* *RT – Read in real time.*
PP1 – Read immediately after pass.
PP2 – Read immediately after RT and PP1 readouts.

** *All data are also to be reported to the STC by 60-wpm teletype as soon as possible.*

****T/M ships and aircraft will transmit real-time data immediately after signal fade so no interference with the vehicle telemetry signal will be generated.*

Table A8-2

NOMINAL PAYLOAD FUNCTION WAVE TRAIN REAL-TIME READOUT AND REPORTING REQUIREMENTS

PASS NO	TRACKING STATION	MAXIMUM DATA REPORTING TIME ALLOWABLE (MINUTES)			
		CHANNEL 6 (AET 52)			CHANNEL 12 (AET 48 & 40)
		READOUT (a)	READOUT (b)	READOUT (c)	READOUT (d)
1	[redacted]	10	60	90	60
2	[redacted]	--	--	90	60
2	[redacted]	30	60	90	60
6	[redacted]	15	60	90	30
7	[redacted]	--	--	--	30
8	[redacted]	--	--	90	10
9	[redacted]	15	60	30	10
13	[redacted]	15	60	90	30
15	[redacted]	15	60	90	10
16	[redacted]	15	--	--	30
24	[redacted]	15	60	30	10
31	[redacted]	15	--	--	10
39	[redacted]	15	60	30	10
55	[redacted]	15	60	30	10

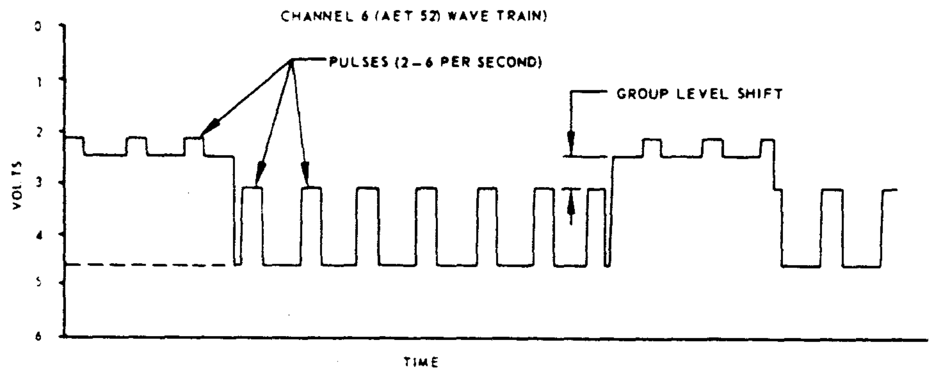
NOTE:

READOUT (a) – COMPARE CHANNEL 6 WAVE TRAIN WITH NOMINAL WAVE TRAIN BELOW. REPORT PRESENCE OR ABSENCE.

READOUT (b) – REPORT THE TIME (±0.5 SEC) OF THE START OF THE WAVE TRAIN AND THE DURATION (±5 SEC) OF THE WAVE TRAIN.

READOUT (c) – REPORT THE ELAPSED TIME (TO THE NEAREST 0.1 SECOND) REQUIRED FOR 100 PULSES COUNTED FROM LEADING EDGE TO LEADING EDGE AFTER AT LEAST 20 PULSES FROM THE WAVE TRAIN START. REPORT THE NUMBER OF GROUP LEVEL SHIFTS WITHIN THIS 100 PULSE PERIOD.

READOUT (d) – REPORT VOLTAGE LEVEL AT START, MIDDLE, AND END OF PASS OF COMMUTATED POINTS 9(AET 40) AND 13(AET 48) ON CHANNEL 12 TO AT LEAST 2% BANDWIDTH(0.1 VOLT).



 [redacted]

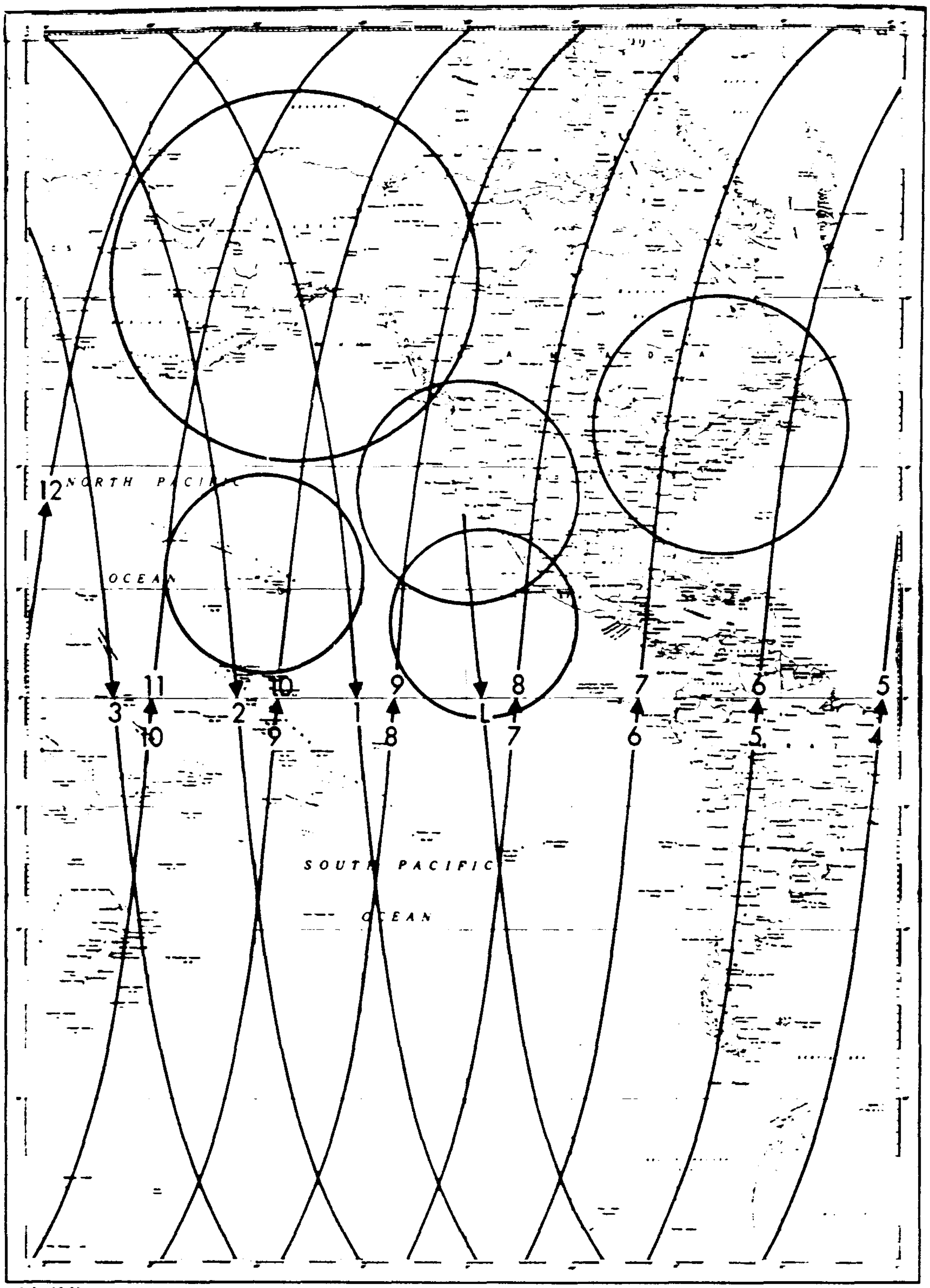


Figure A2-1(a) Nominal Orbit Traces – Launch Through Pass 12

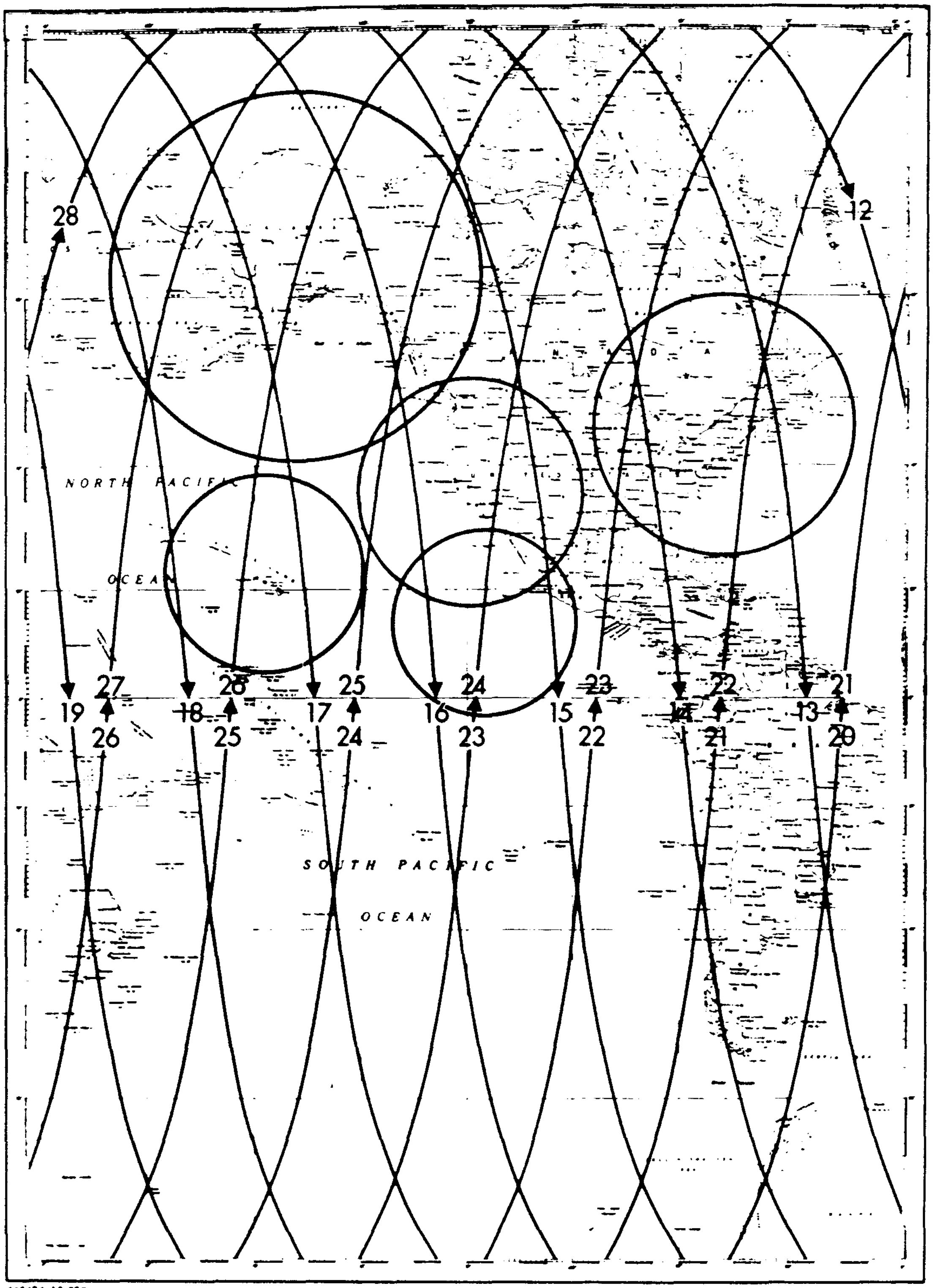


Figure A2-1(b) Nominal Orbit Traces – Passes 13 Through 27

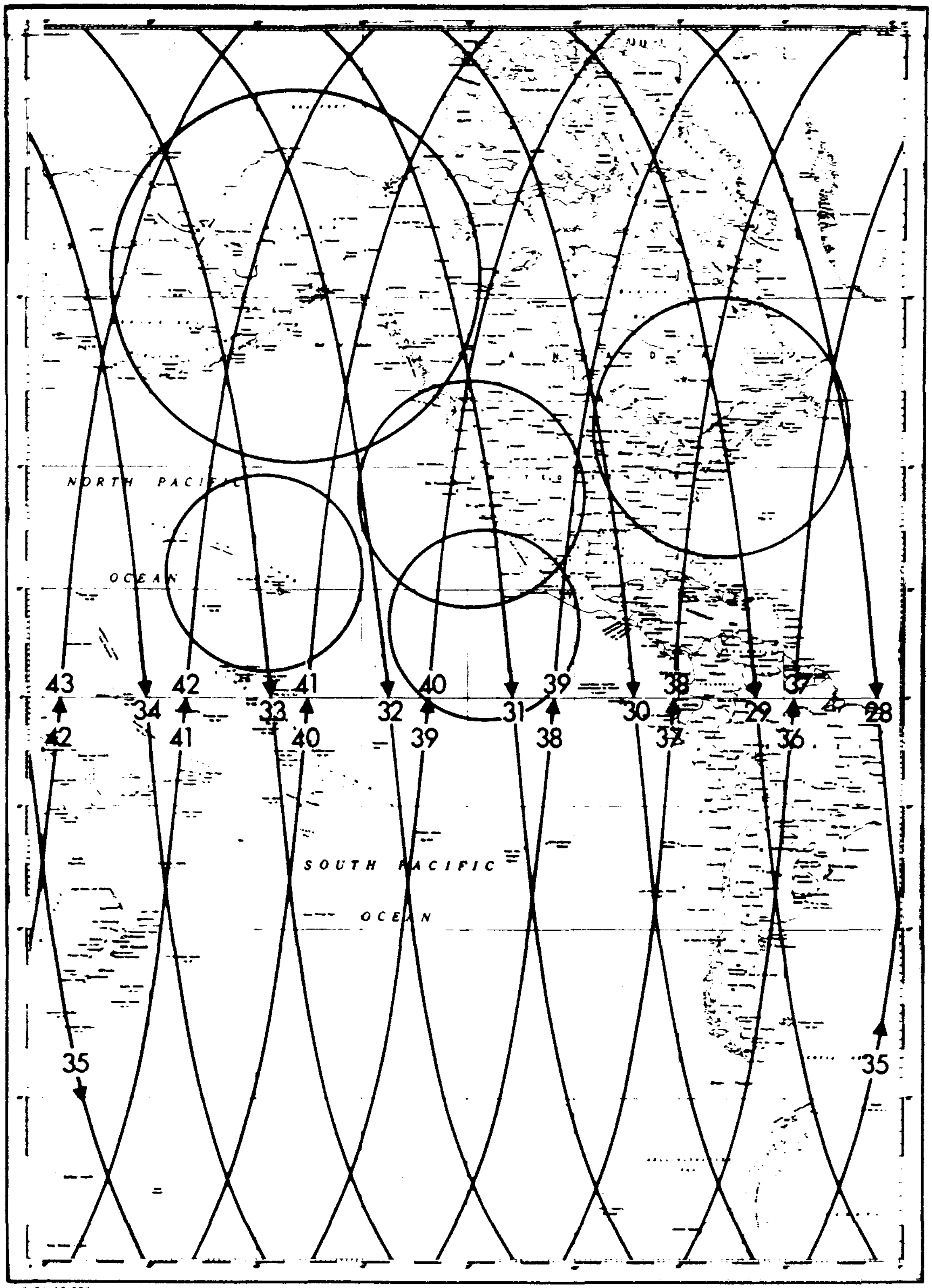


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Figure A2-1(c) Nominal Orbit Traces – Passes 28 Through 43

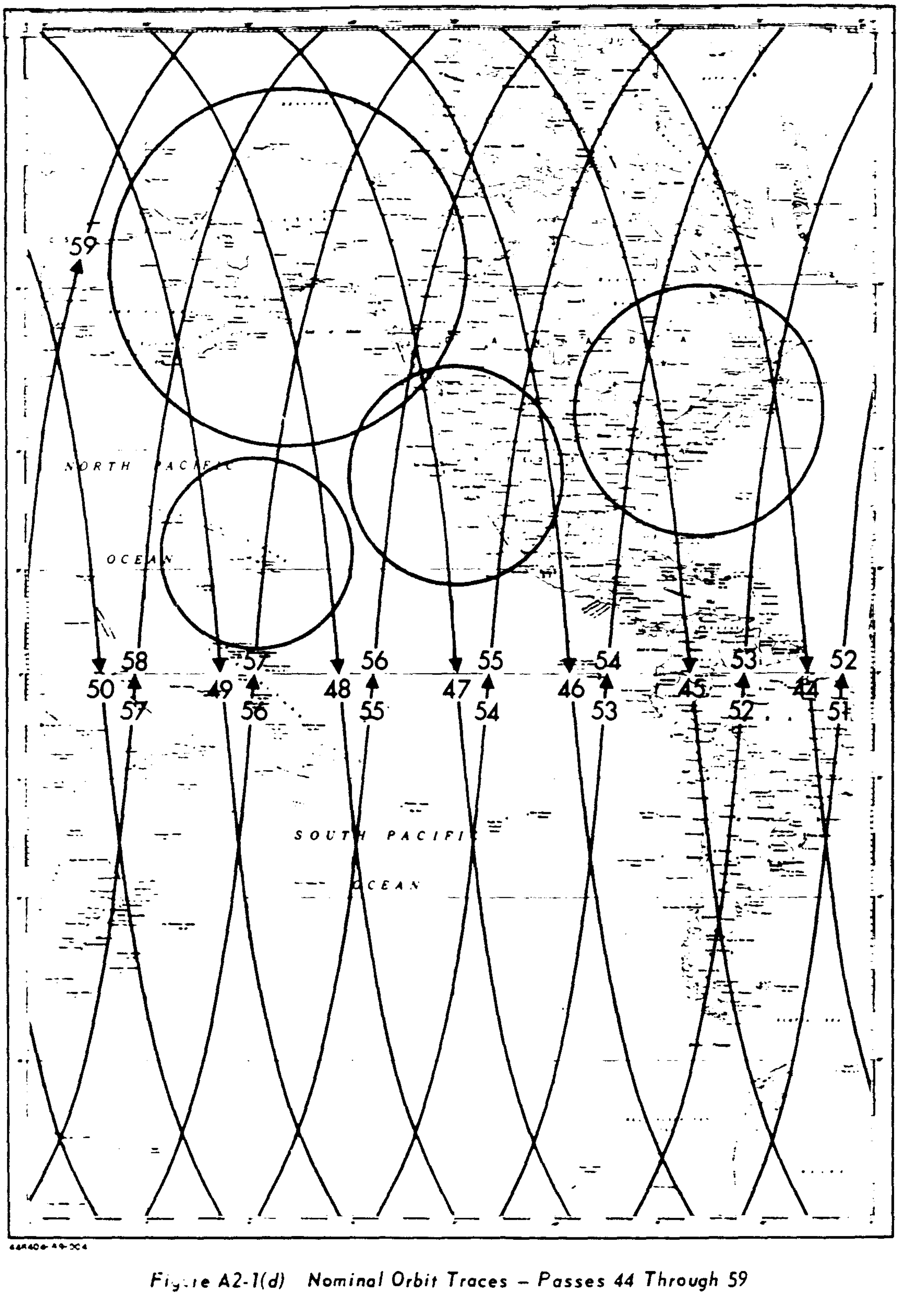

Figure A2-1(d) Nominal Orbit Traces – Passes 44 Through 59

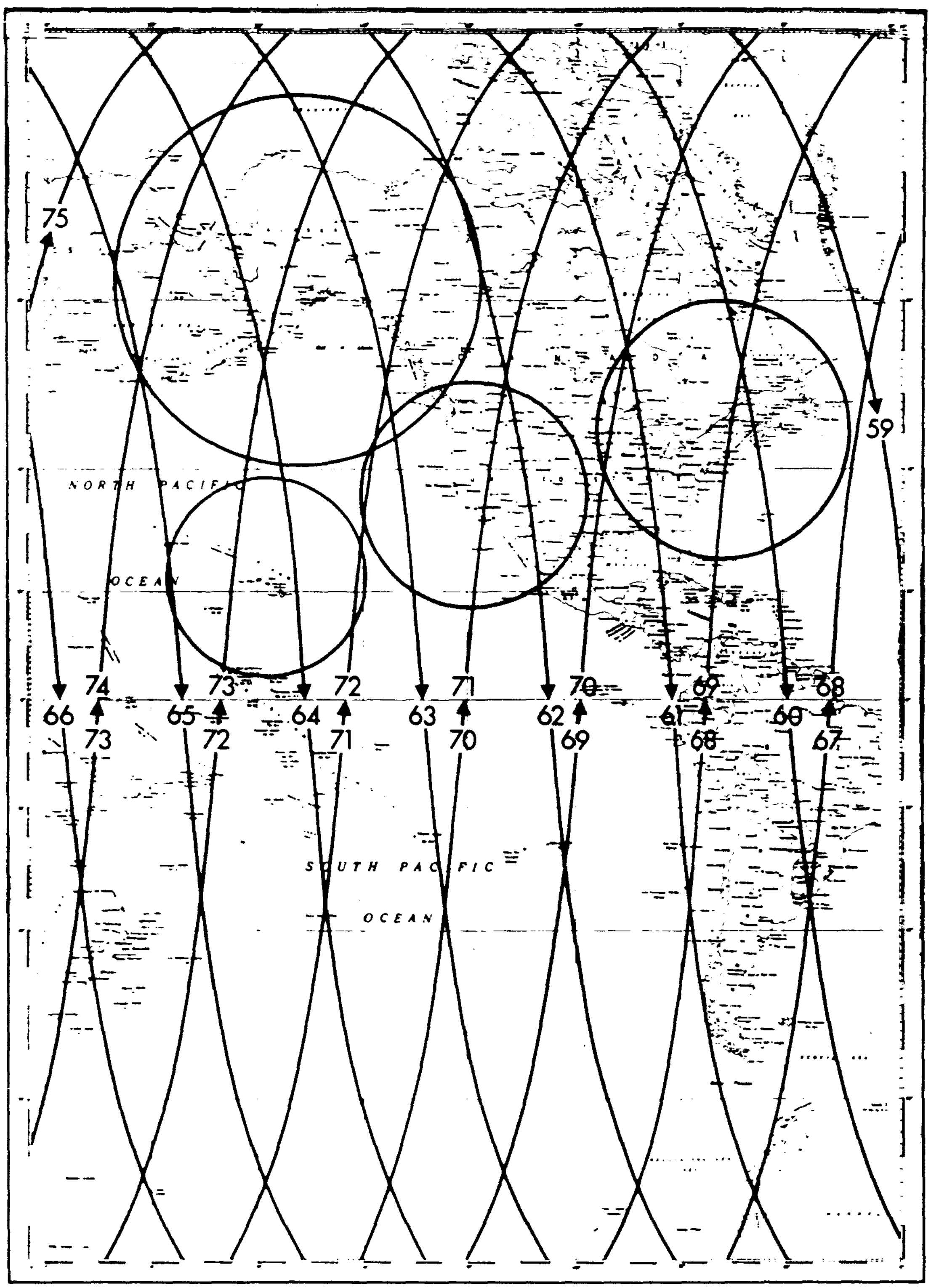

Figure A2-1(e) Nominal Orbit Traces – Passes 60 Through 75

[redacted]

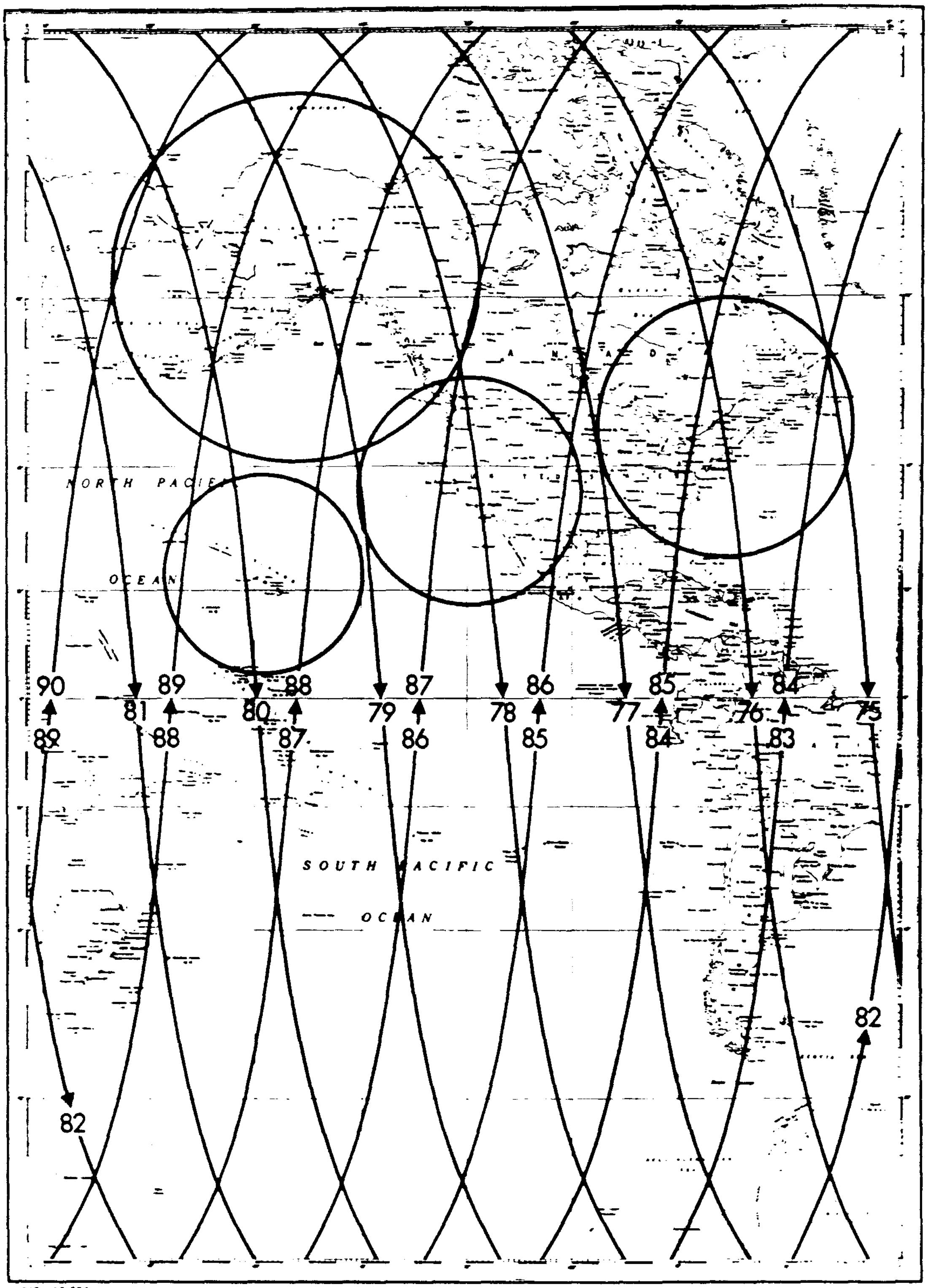

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Figure A2-1(f) Nominal Orbit Traces – Passes 76 Through 90

[redacted]

TYPE OF PASS						
A	B	C	D	E	F	G
STATION						
[redacted]						
			1(20)			
			2(60)	6(60)		
				7(20)	8(80)	
					9(40)	10(60)
13(60)						
14(20)	15(80)	16(40)	17(60)			
			18(20)	21(60)		
				22(20)		
				23(80)	24(40)	25(60)
						26(20)
28(60)						
29(20)						
30(80)		31(40)	32(60)			
			33(20)	37(60)		
				38(20)		
					39(80)	
					40(40)	41(60)
						42(20)
44(60)						
45(20)	46(80)	47(40)	48(60)			
			49(20)	52(60)		
				53(20)		
				54(80)	55(40)	56(60)
						57(20)
59(40)						
60(60)						
61(20)	62(80)		63(40)			
			64(60)			
			65(20)			
				68(60)		
				69(20)		
				70(80)	71(40)	72(60)
						73(20)
76(60)						
77(20)	78(80)		79(40)			
			80(60)			
			81(20)	84(60)		
				85(20)	86(80)	
					87(40)	88(60)
						89(20)
91(60)						
92(20)	93(80)		94(40)			
			95(60)			

NOTE: NUMBERS IN PARENTHESIS REPRESENT TIME IN SECONDS FOLLOWING RESET MONITOR INITIATION AT WHICH PROGRAMMER IDENTIFICATION MARK OCCURS. THIS TIME IS TAPE TIME, 90 MIN PERIOD

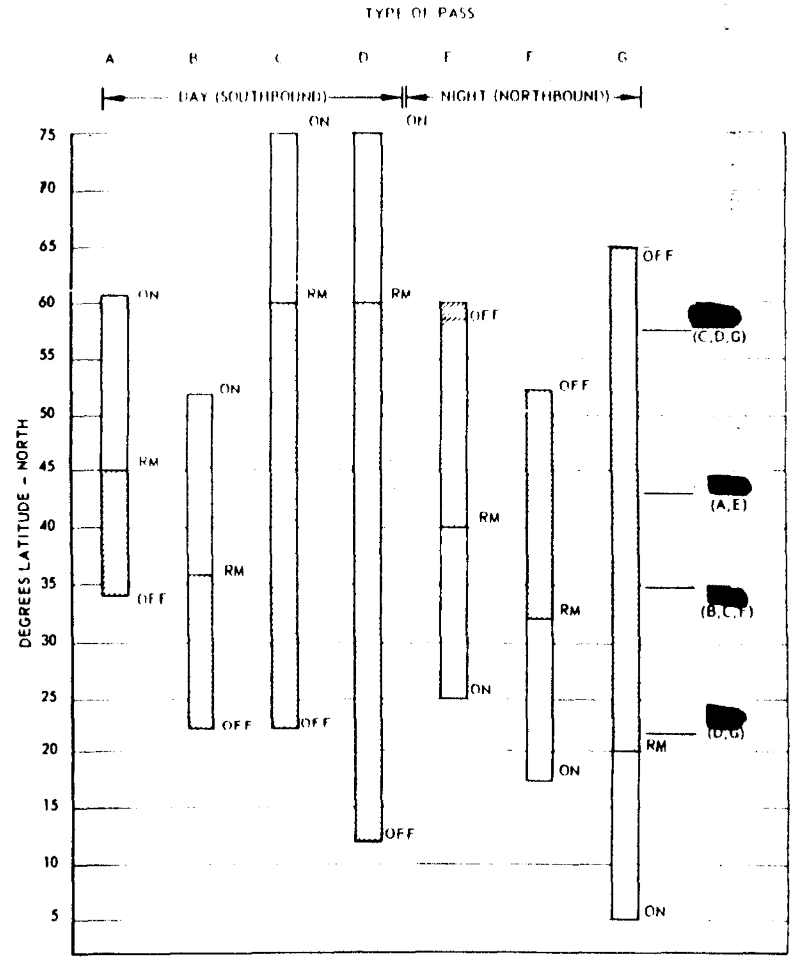

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Figure A2-2 Readout and Reset Programming

[redacted]

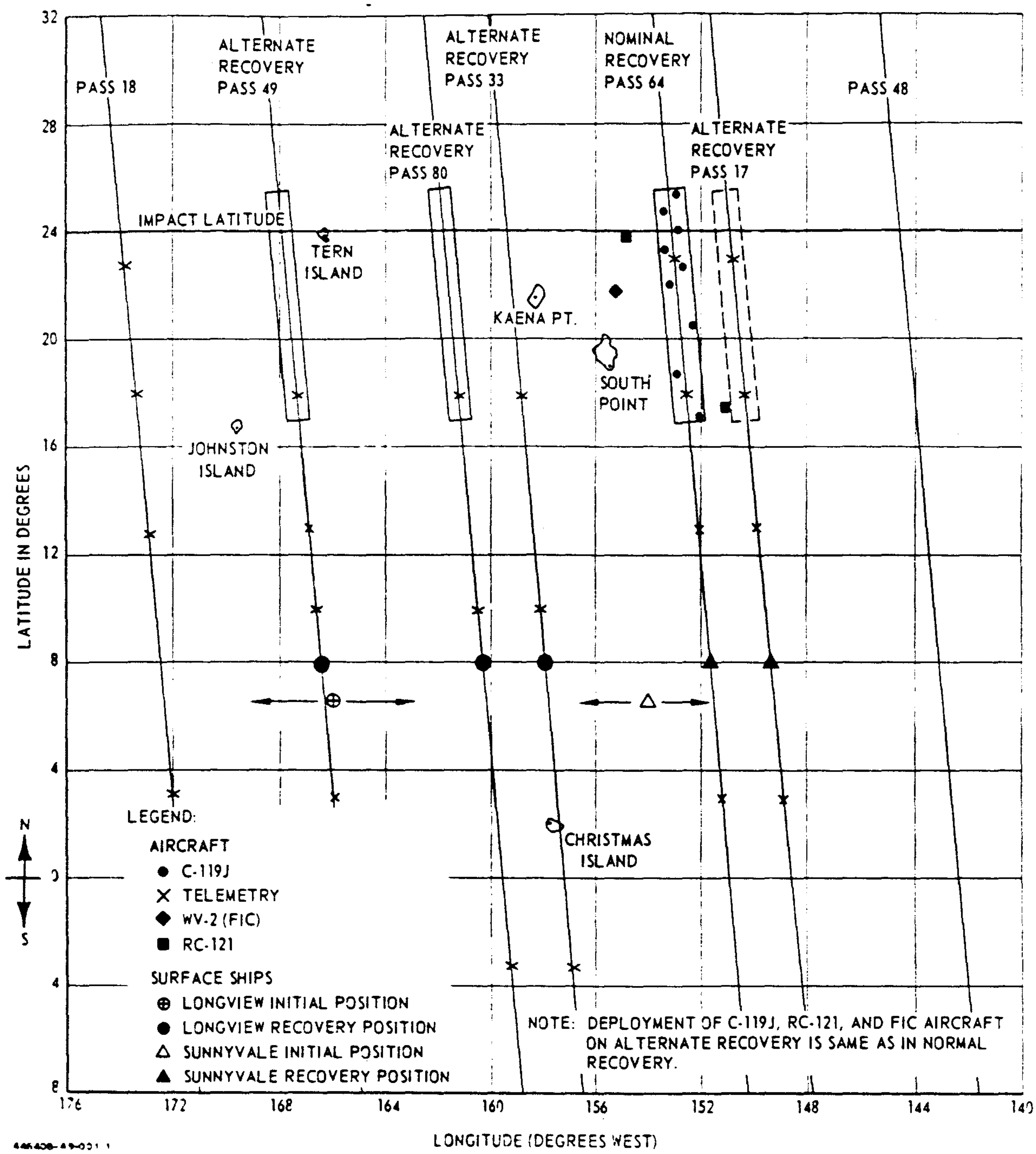


Figure A7-1 North-to-South Recovery Force Deployment

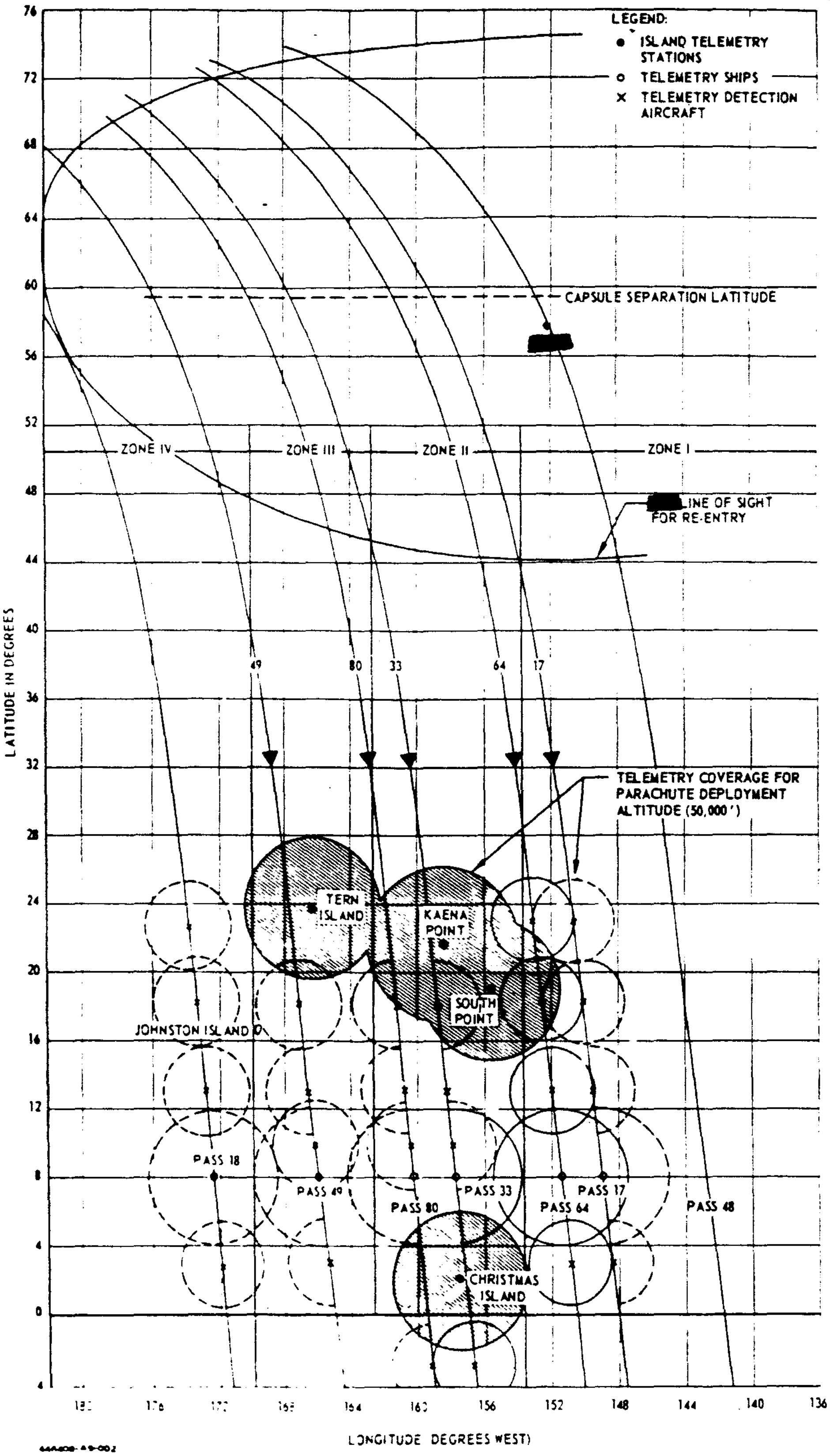


Figure A7-2 North-to-South Re-Entry Telemetry Coverage

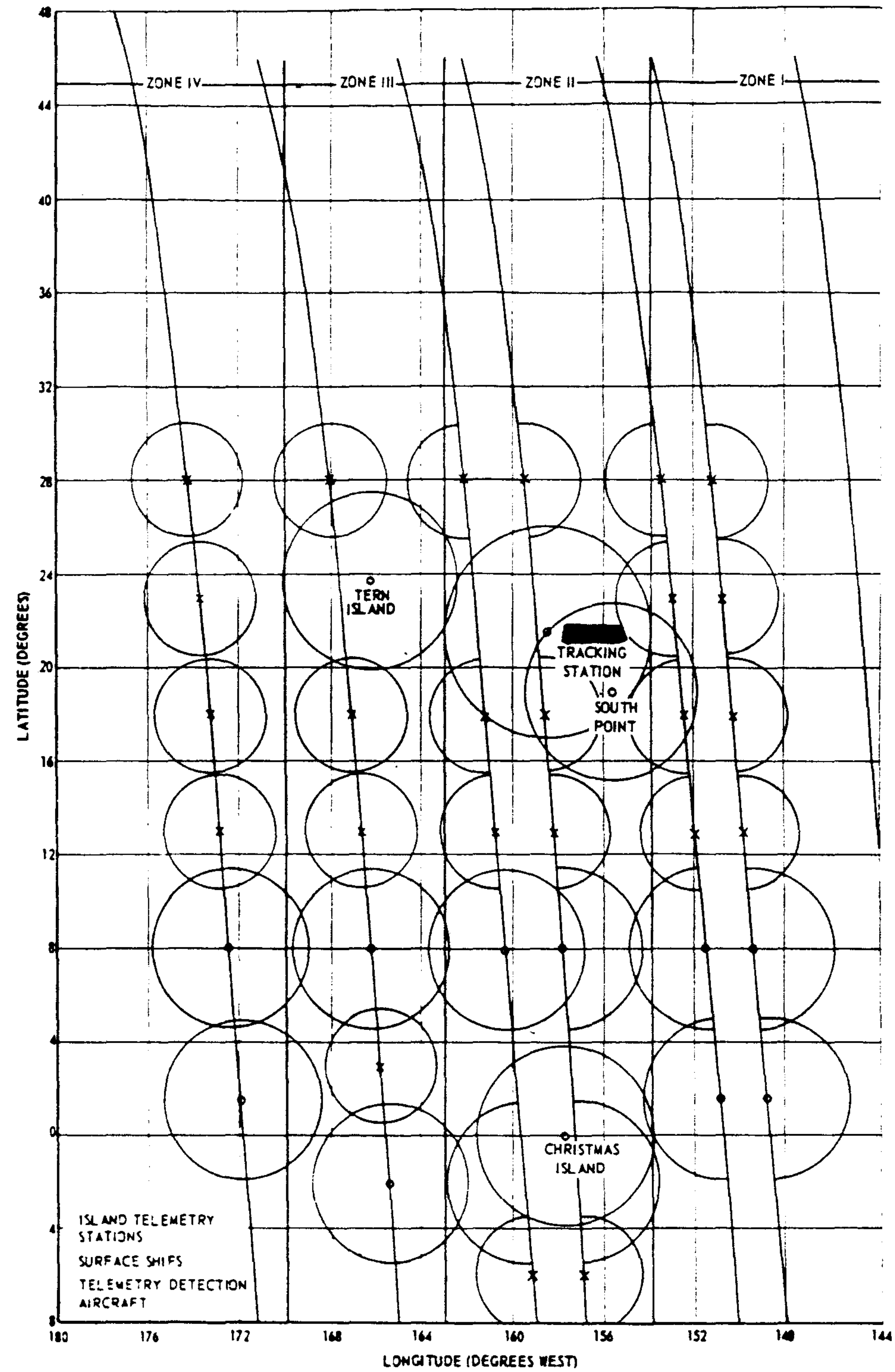


Figure A7-3 Uncontrolled Satellite Telemetry Coverage

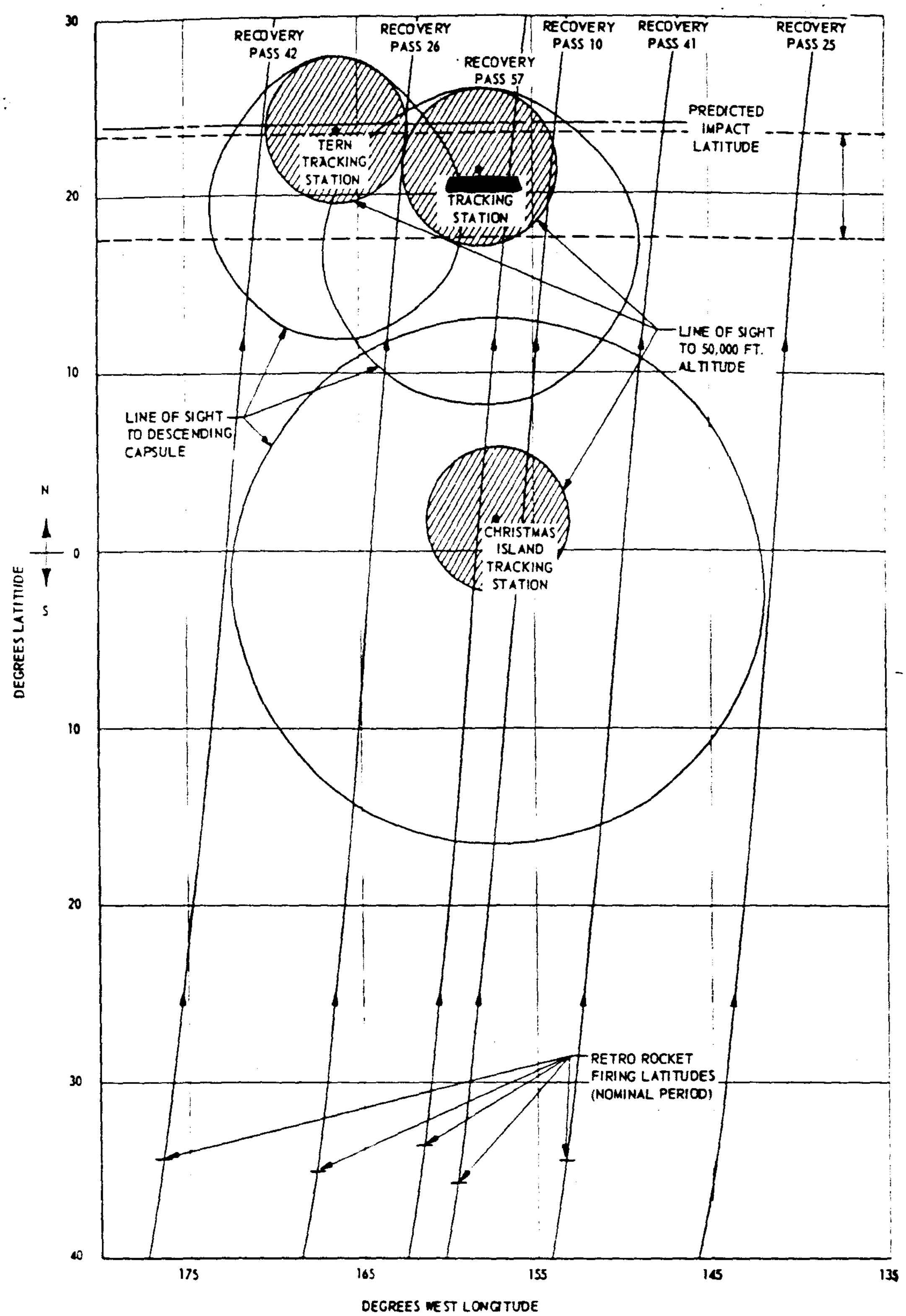


Figure A7-4 South-to-North Re-Entry Telemetry Coverage

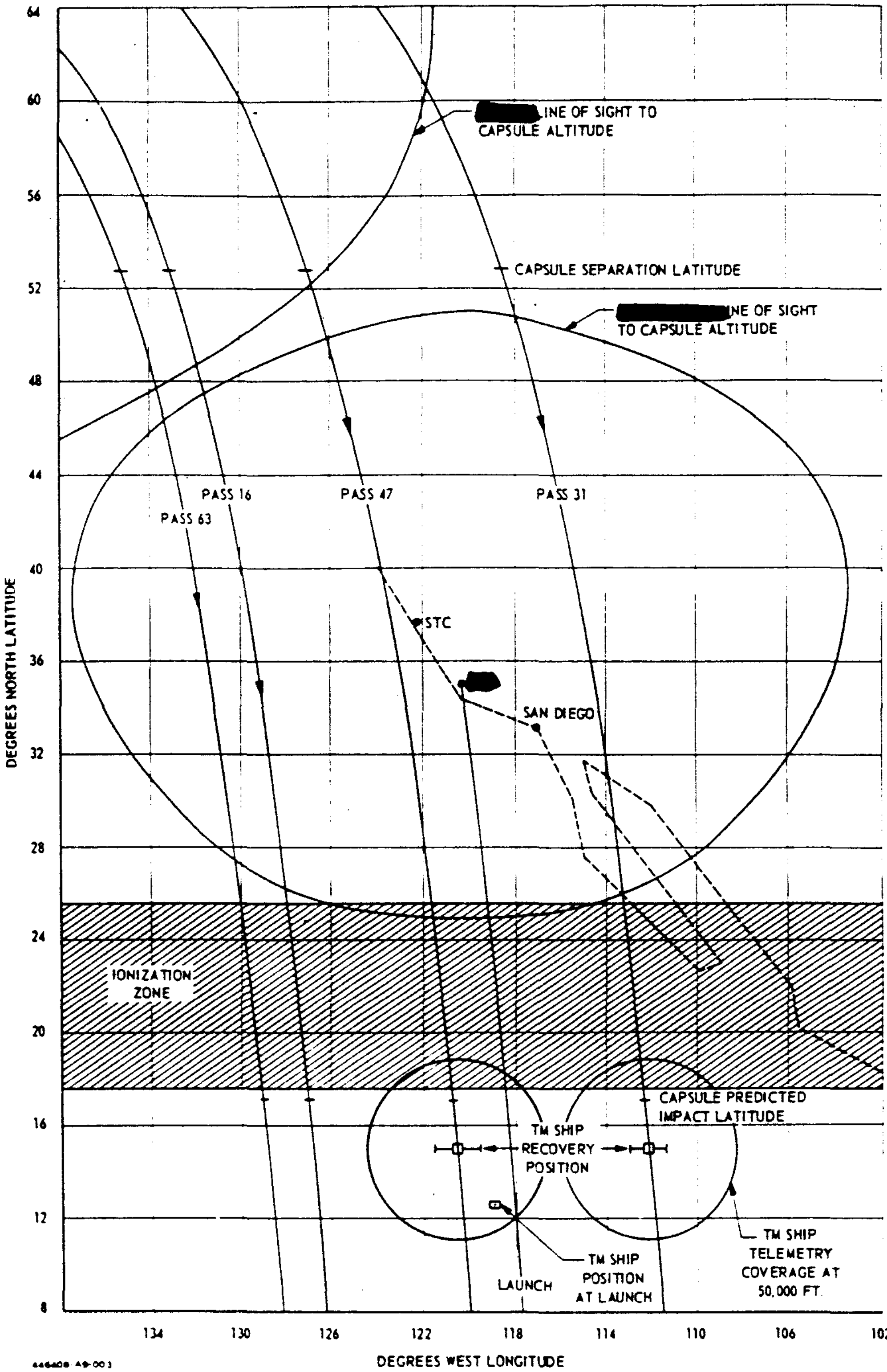


Figure A7-5 Emergency Re-Entry Telemetry and Recovery Coverage

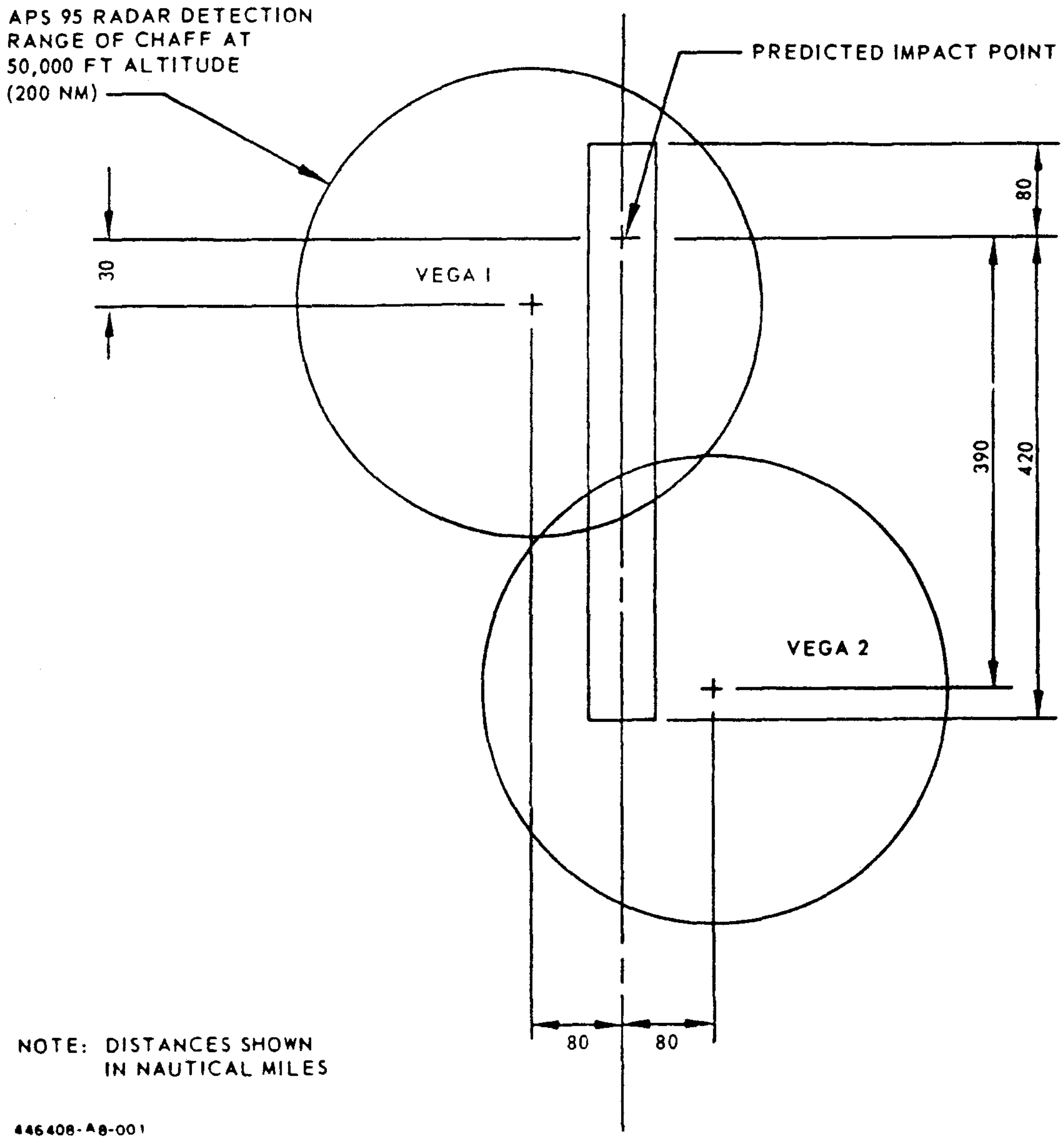


Figure A7-6 RC-121 Aircraft Deployment

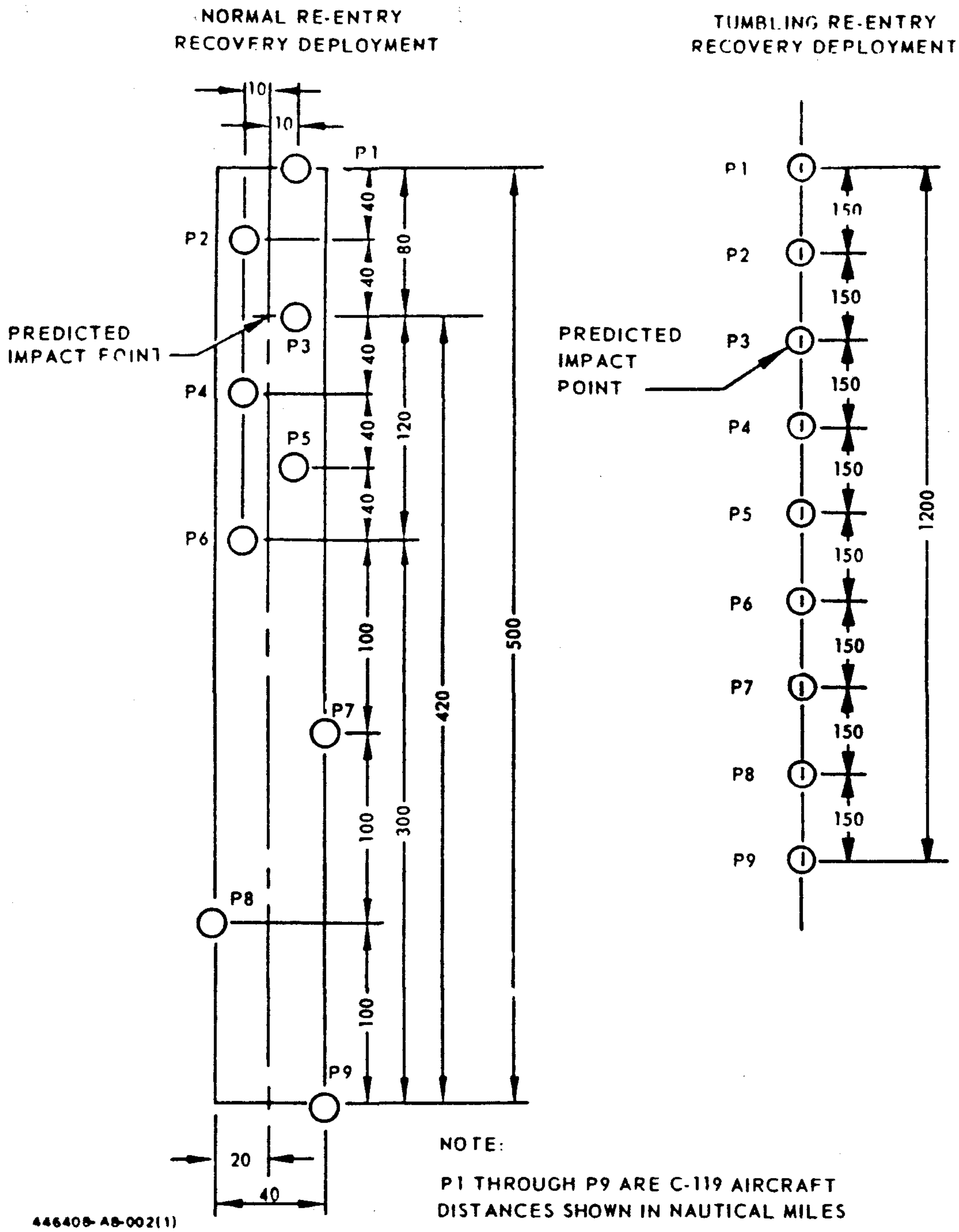


Figure A7-7 Recovery Aircraft Deployment

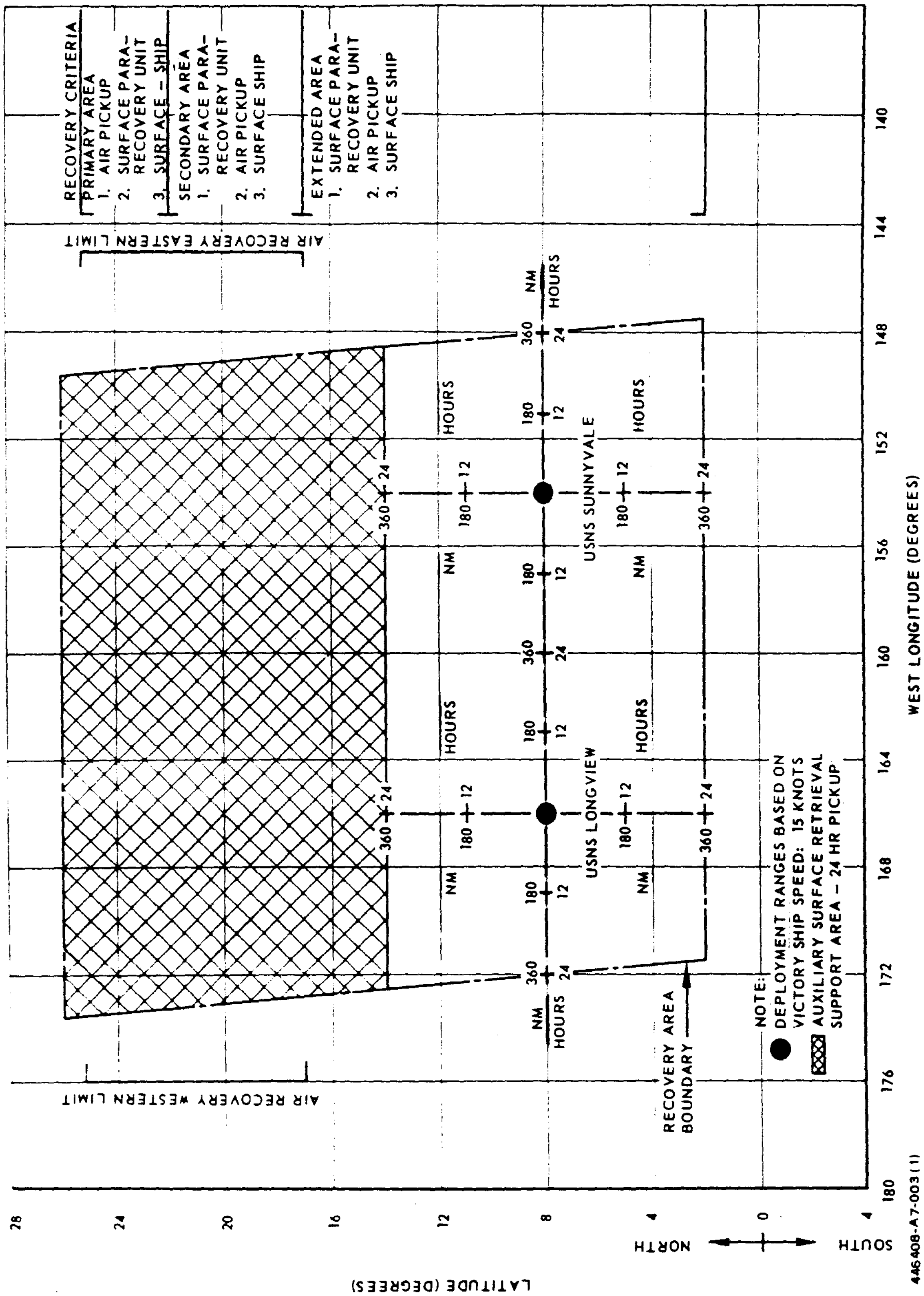
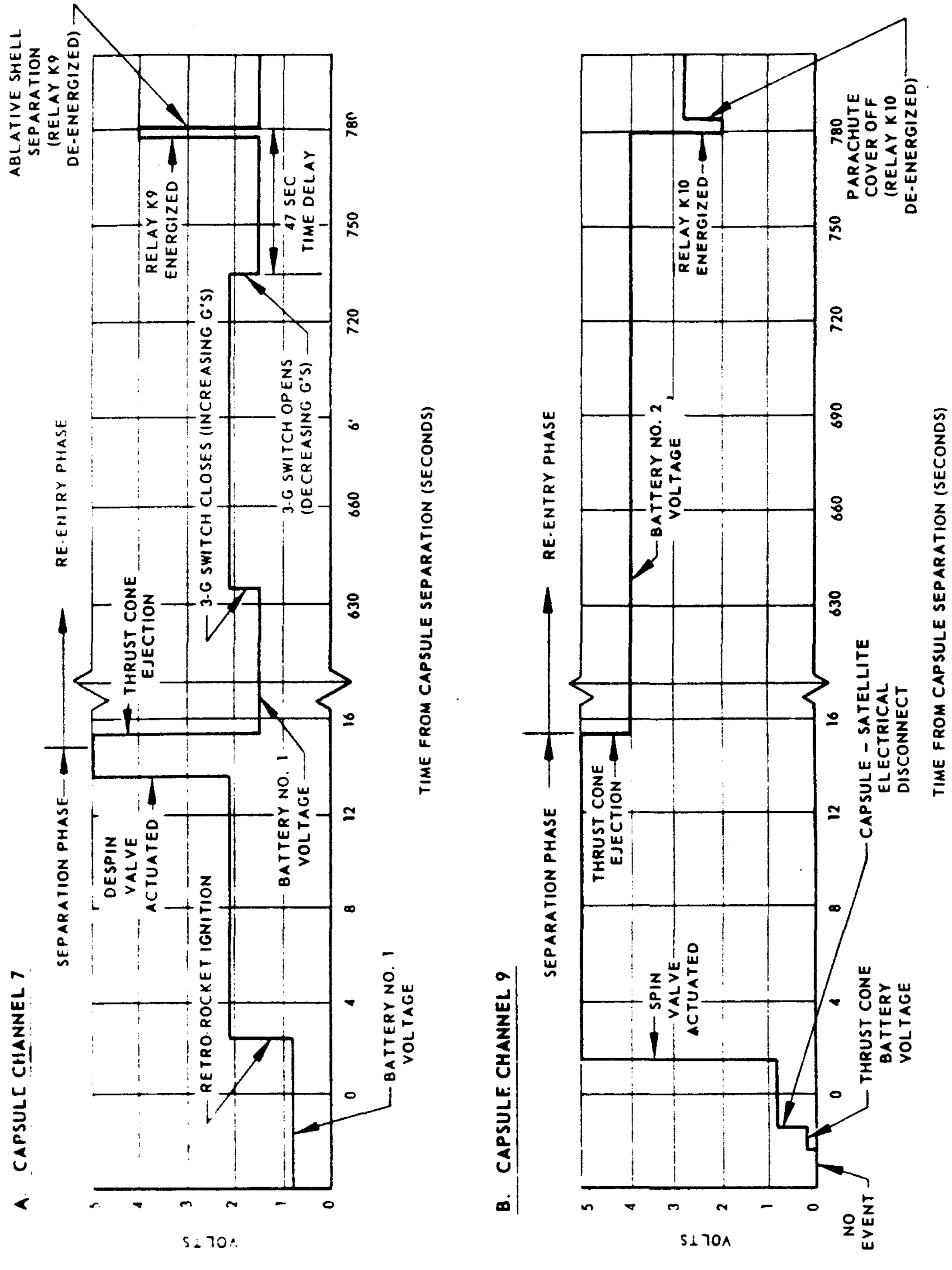


Figure A7-8 Surface Ship Recovery Capability

[redacted]



NOTE: VALUES SHOWN INDICATE NOMINAL SEQUENCE OF EVENTS. CONSULT T/M CALIBRATION DATA FOR VOLTAGE LEVELS WHICH WILL OCCUR IF SEQUENCE OF EVENTS IS NOT NORMAL. REFER TO SECTION 7.5 FOR SEQUENCE OF EVENTS DESCRIPTION

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Figure A7-9 Nominal Capsule Telemetry Voltage Levels

[redacted]

DISTRIBUTION

Addressee	Quantity
[redacted]	[redacted]