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

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SYSTEMS OPERATIONS PLANNING 61-41

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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

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 HTS (toll)
b. HCC	1 60-wpm TTY (conference mode)
	1 Voice circuit through HTS 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. HTS	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

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

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 HTS (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, VTS will send Command 1 to put the increase/decrease switch in the increase position.

b. On Pass 30, VTS 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, KTS, VTS, and HTS 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 (HTS, 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 Hawaii Tracking Station Operations

A5.1.1 On the recovery pass, the HTS 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 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 HTS 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, HTS will report antenna azimuth and elevation immediately to the STC and the HCC. HTS 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 HTS 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 HTS 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 Recovery Operations

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 HTS, 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 HTS 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 HTS 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 beamwidth to obtain more accurate bearings at and after parachute deployment. All acquisitions will be reported immediately to HTS. 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 HTS. 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 HTS 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 HTS. 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

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.

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 will establish SSB voice communications with HTS 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. HTS 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.

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

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

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

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.

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 KTS and HTS 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

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

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 HTS, South Point, Barking Sands, Tern Island and the ships will be plotted. The HTS 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 HTS 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

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.

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 (HTS) 32° N (VTS northbound) or 36° N (VTS southbound) 40° N (NHS northbound) or 45° N (NHS southbound) 60° N (KTS)
Inclination Angle	81.83°

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
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 6205-1062

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) KTS	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) KTS		57.6
	21.6° N latitude (ref) HTS	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) NHS	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)
	Beacon and T/M on – reset enable	632.0	25
Pass 7	Reset signal/command	636.1	40
(S-N)	42.9° N latitude (ref) NHS	637.6	42.9
(40 sec RM interrupt)	Beacon and T/M off – reset disable	641.7	58
	End of Orbit 7	719.3	0
	Beacon and T/M on – reset enable	723.9	17
Pass 8	Reset signal/command	727.9	32
(S-N)	34.8° N latitude (ref) VTS	729.0	34.8
(60 sec RM interrupt)	Beacon and T/M off – reset disable	733.4	52
	End of Orbit 8	813.3	0
	Beacon and T/M on – reset enable	817.9	17
Pass 9	Reset signal/command	821.9	32
(S-N)	34.8° N latitude (ref) VTS	823.0	34.8
(80 sec RM interrupt)	Beacon and T/M off – reset disable	827.4	52
	End of Orbit 9	907.3	0
	Beacon and T/M on – reset enable	908.6	5
Pass 10	Reset signal/command	913.0	20
(S-N)	21.6° N latitude (ref) HTS	913.4	21.6
(100 sec RM interrupt)	57.6° N latitude (ref) KTS	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
	Beacon and T/M on – reset enable	122.0	61
Pass 13	Reset signal/command	1224.2	45
(N-S)	42.9° N latitude (ref) NBTS	1224.7	42.9
(20 sec RM interrupt)	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	1414.6	36
	34.8° N latitude (ref) VTS	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) KTS	1503.2	57.6
	34.8° N latitude (ref) VTS	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) KTS	1597.0	57.6
	21.6° N latitude (ref) HTS	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) NHS	1954.5	42.9
	Beacon and T/M off – reset disable	1957.2	58
	End of Orbit 21	2035.3	0

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) NHS	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) VTS	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) VTS	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) HTS	2323.3	21.6
	57.6° N latitude (ref) HTS	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) NHS	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	2824.8	36
	34.8° N latitude (ref) VTS	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) KTS	2913.2	57.6
	34.8° N latitude (ref) VTS	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) KTS	3007.2	57.6
	21.6° N latitude (ref) HTS	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) KTS	3101.2	57.6
	21.6° N latitude (ref) HTS	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

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					T/M SHIP***	T/M AIRCRAFT***		NOTE
	NAME	NUMBER						VTS	MTS	NHS	KTS	HTS	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

~~SECRET~~

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						VTS	MTS	NHS	KTS	HTS	PVT. JOE E. MANN	WV-2 137890	ELECTRA	
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	

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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						VTS	MTS	NHS	KTS	HTS	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

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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). KTS 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 (KTS and HTS), on Pass 13 (NHS), on Pass 15 (VTS), on Pass 17 if recovery is to be made on the second day (KTS), on Pass 28 (NHS), and on Pass 31 (VTS). Readings at one system time only are required on Pass 9 (VTS) and Pass 24 (VTS). All VTS and HTS readings are to be obtained as far north as possible. KTS 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 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 data will be read only if the data on Channel 16 does not appear to be valid. KTS 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 KTS and Electra report. HTS 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 KTS 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. HTS 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 VTS (Passes 8, 9, 15, 24, 31), NHS (Passes 6, 7, 13), KTS (Passes 1, 2, 16), and HTS (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	KTS	10	--	90
2	KTS	--	--	90
2	HTS	30	60	90
6	NHS	15	60	90
8	VTS	--	--	90
9	VTS	15	60	90
13	NHS	15	60	90
15	VTS	15	60	90
16	KTS	15	--	--
24	VTS	15	60	90
31	VTS	15	--	--

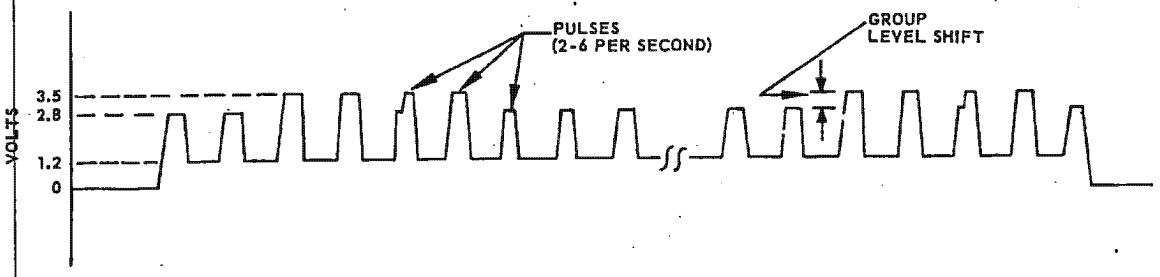
NOTE:

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



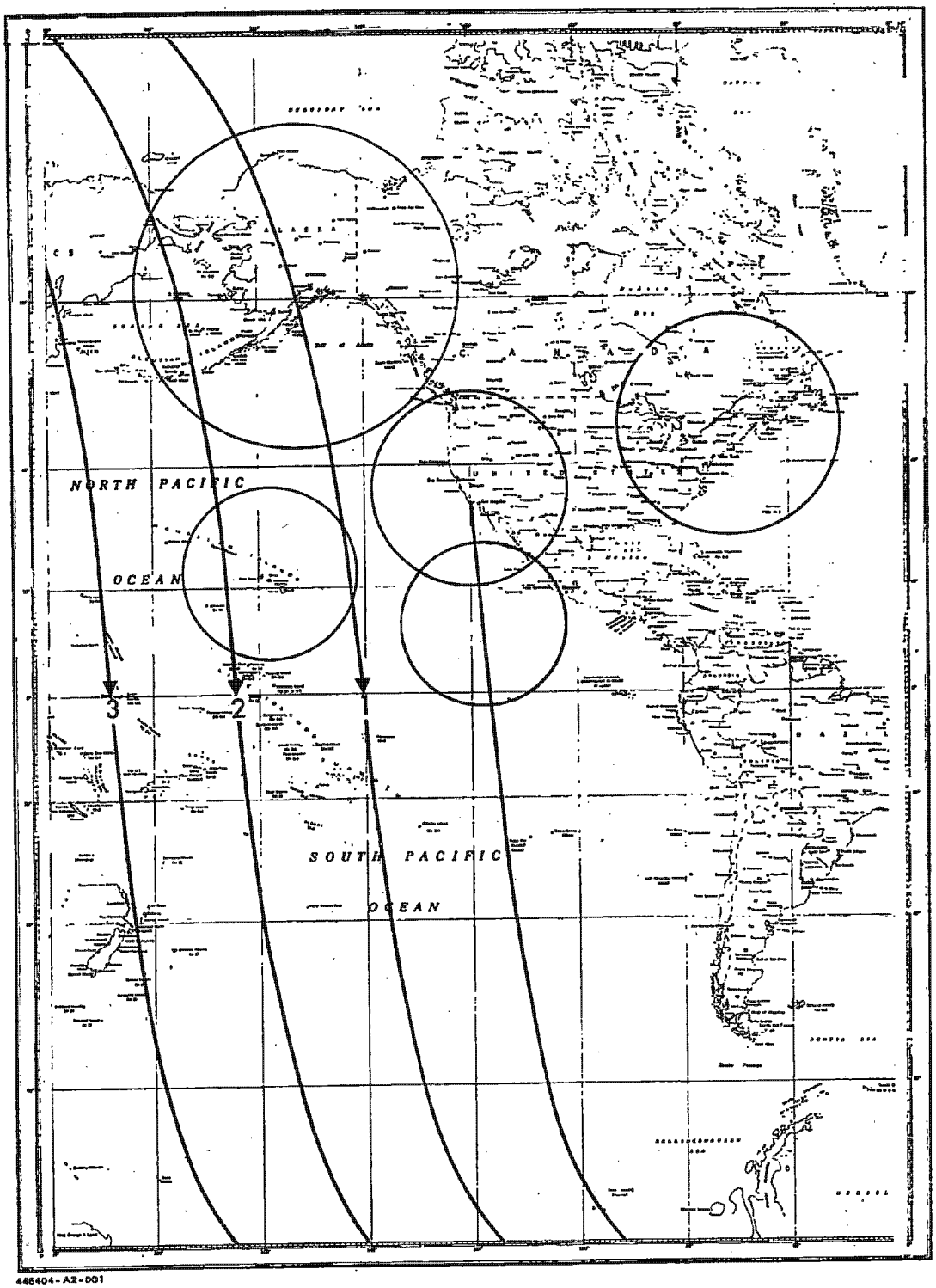


Figure A2-1(a) Nominal Orbit Tracks -- Passes 1 Through 3

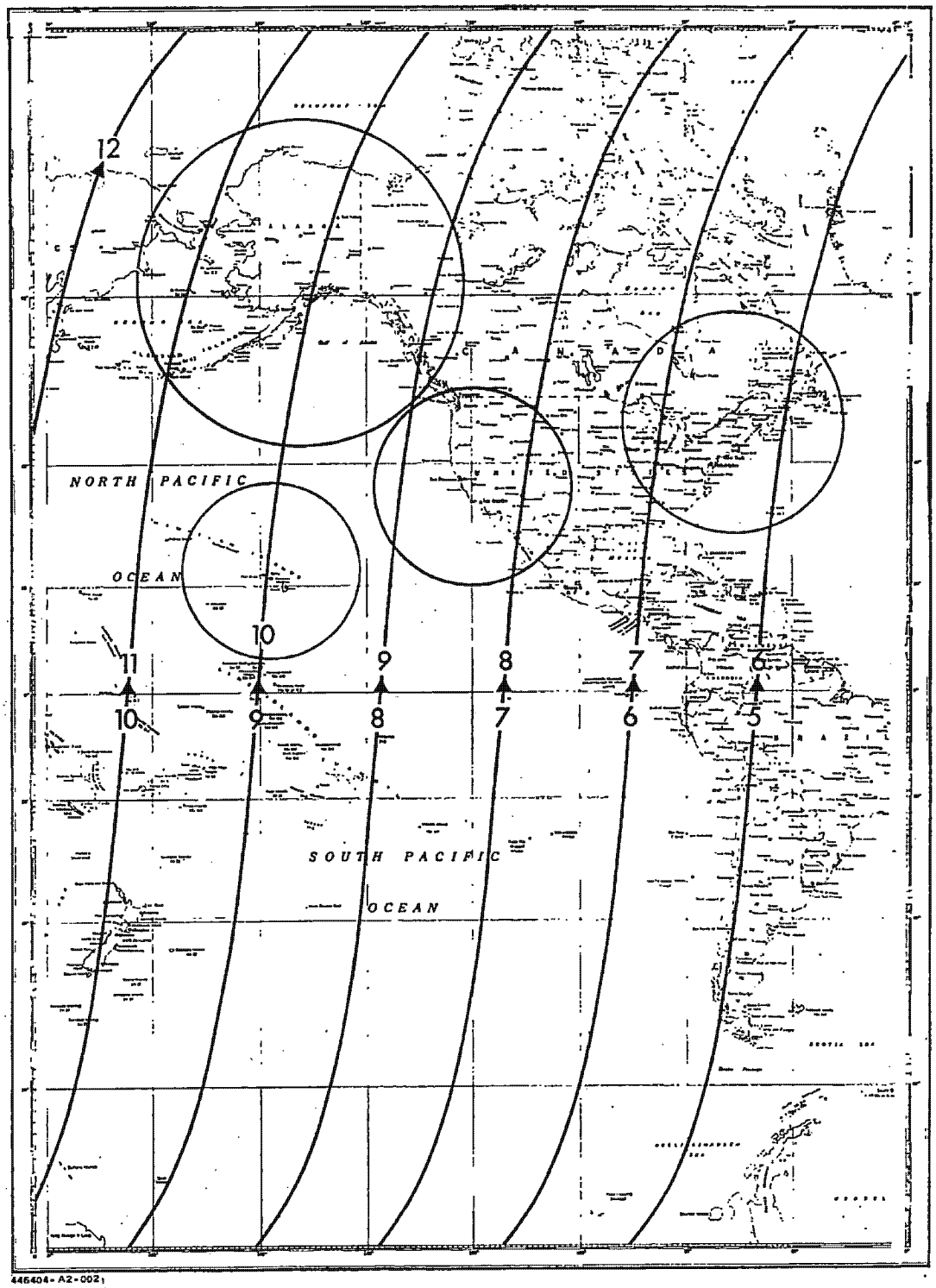


Figure A2-1(b) Nominal Orbit Tracks -- Passes 5 Through 11

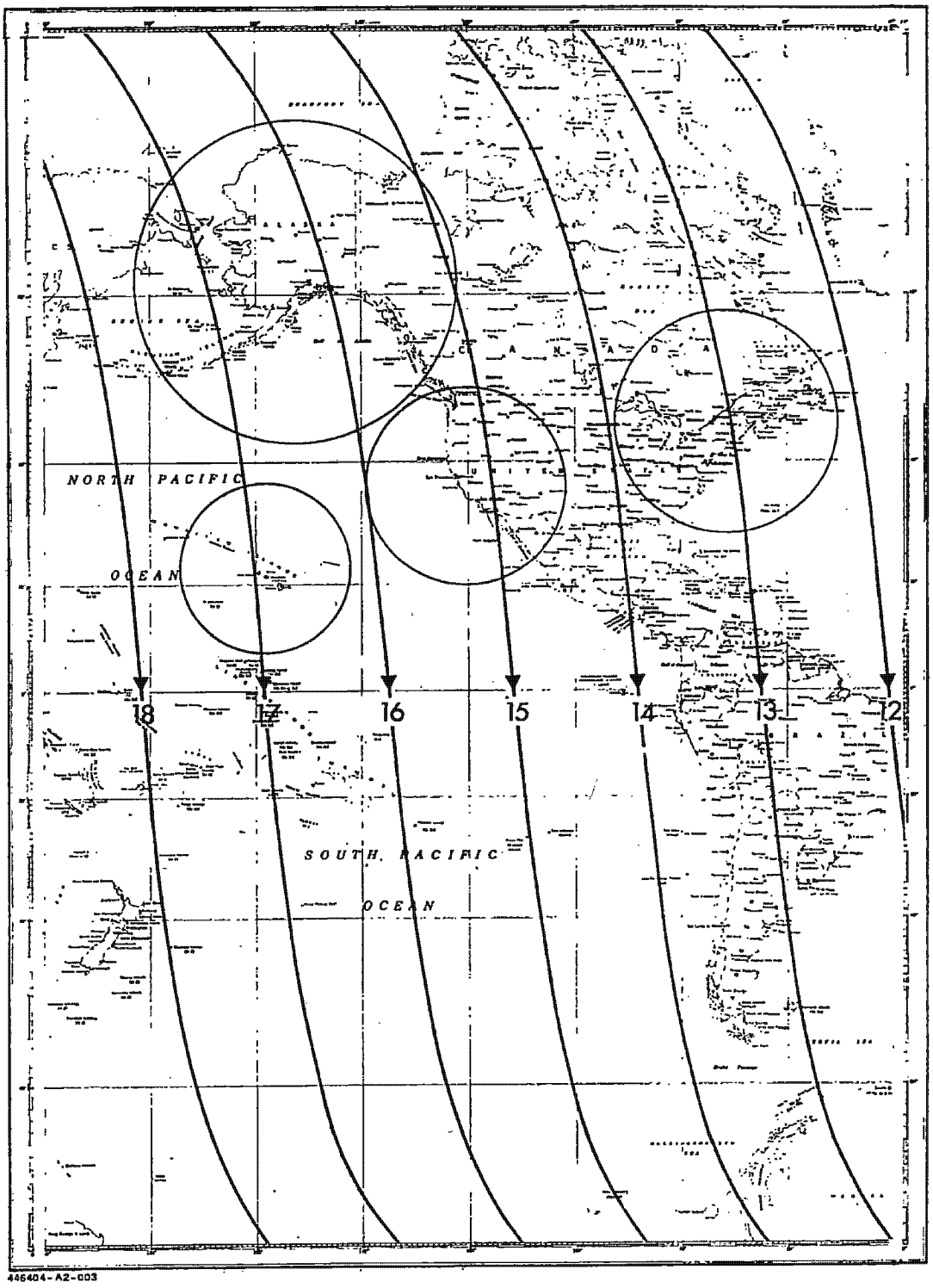


Figure A2-1(c) Nominal Orbit Tracks -- Passes 12 Through 17

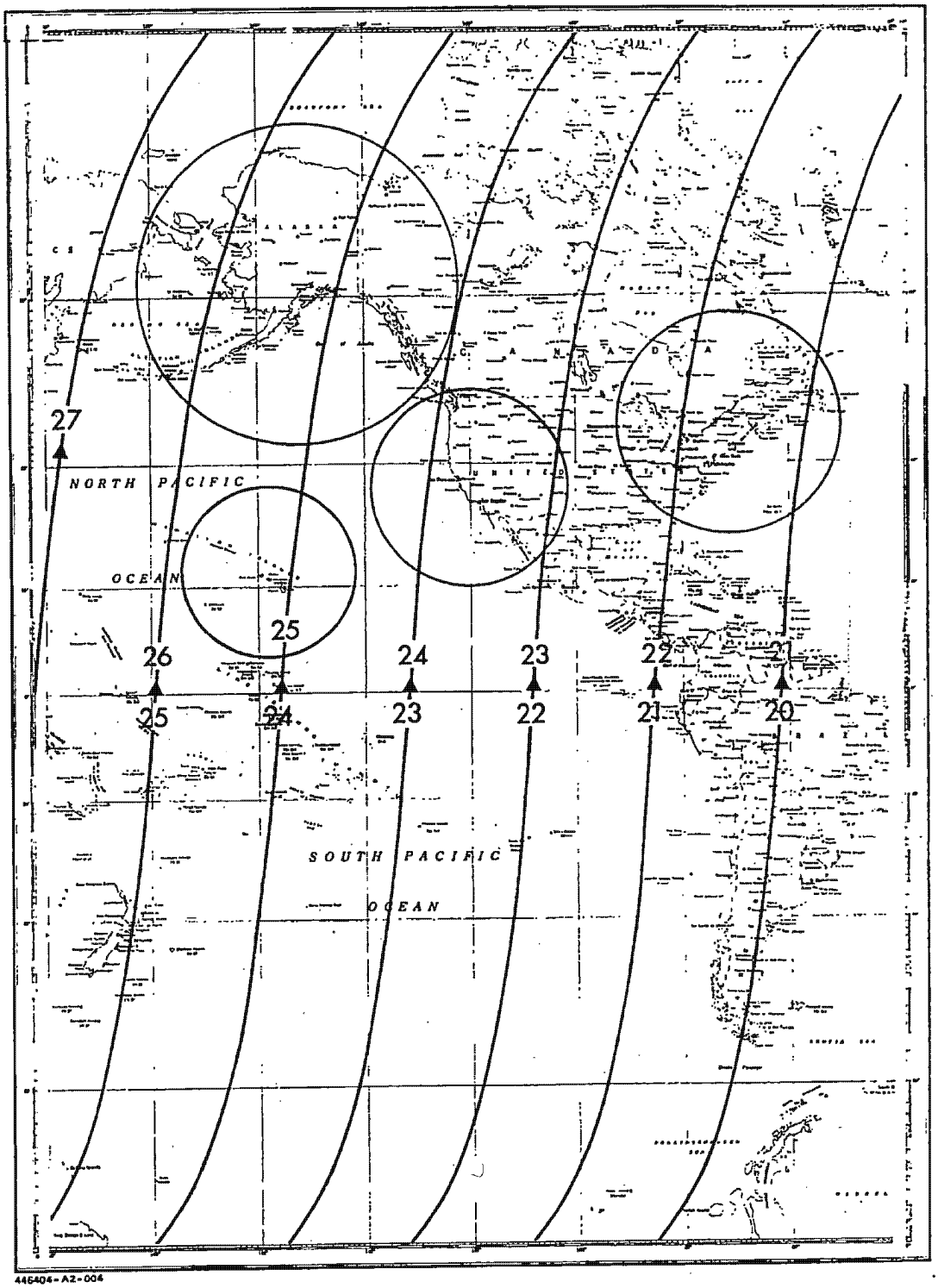


Figure A2-1(d) Nominal Orbit Tracks -- Passes 20 Through 26

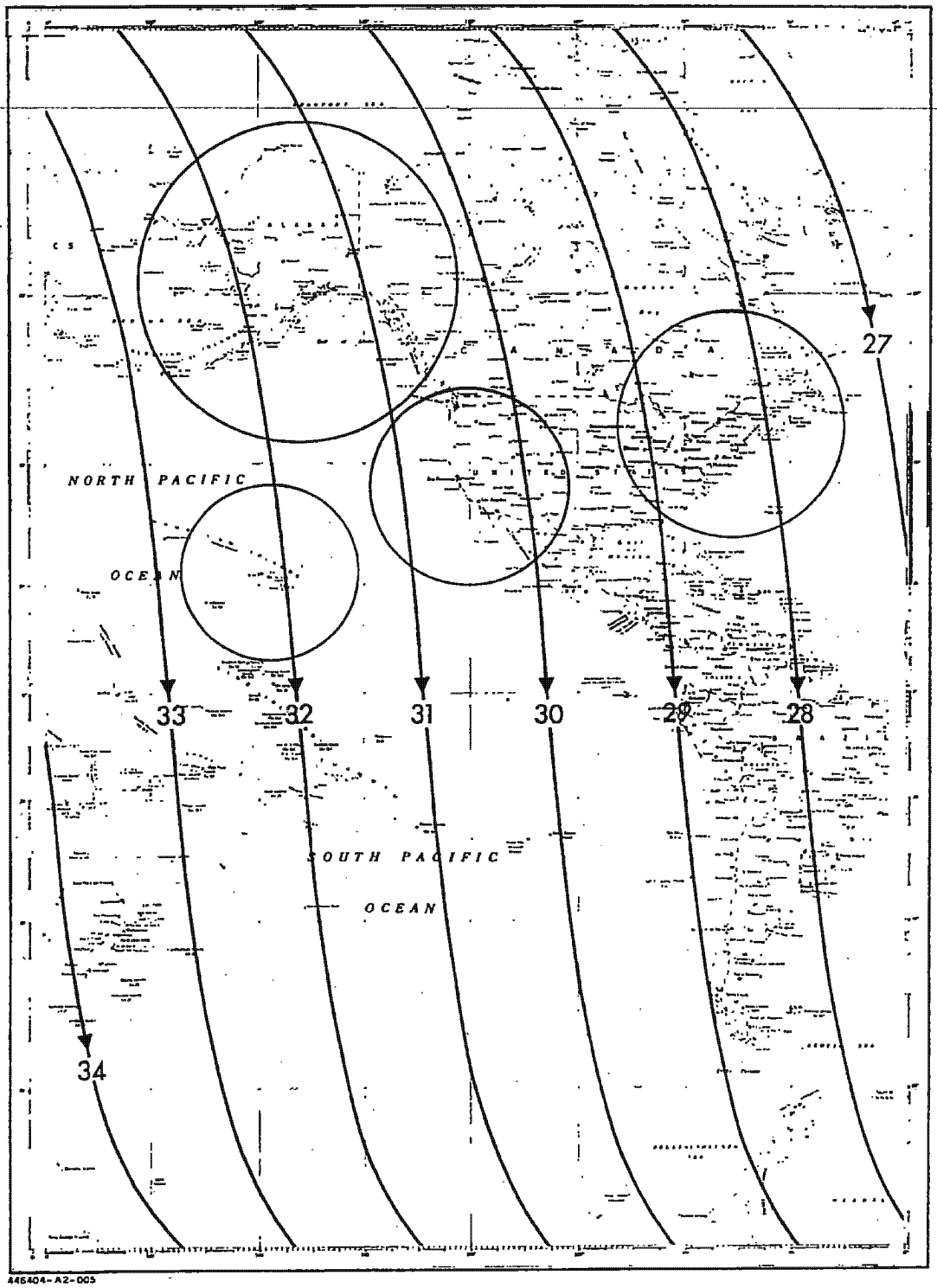
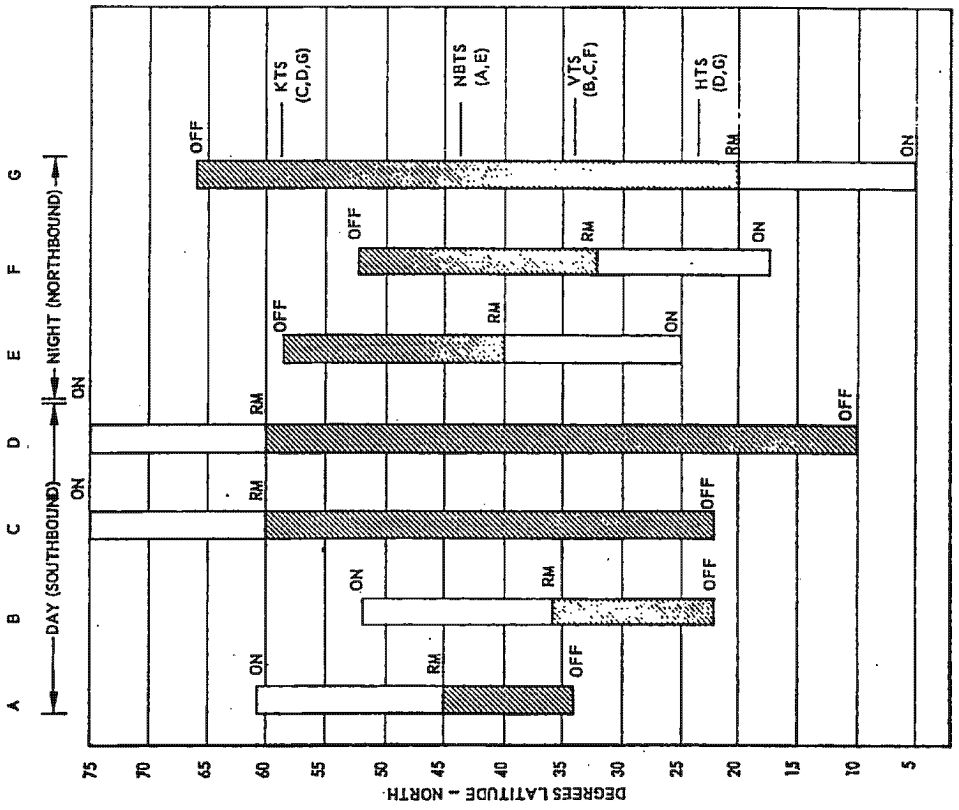


Figure A2-1(e) Nominal Orbit Tracks -- Passes 27 Through 33



TYPE OF PASS

A	B	C	D	E	F	G
STATION						
NBTS	VTS	KTS–VTS	KTS–HTS	NBTS	VTS	HTS–KTS
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

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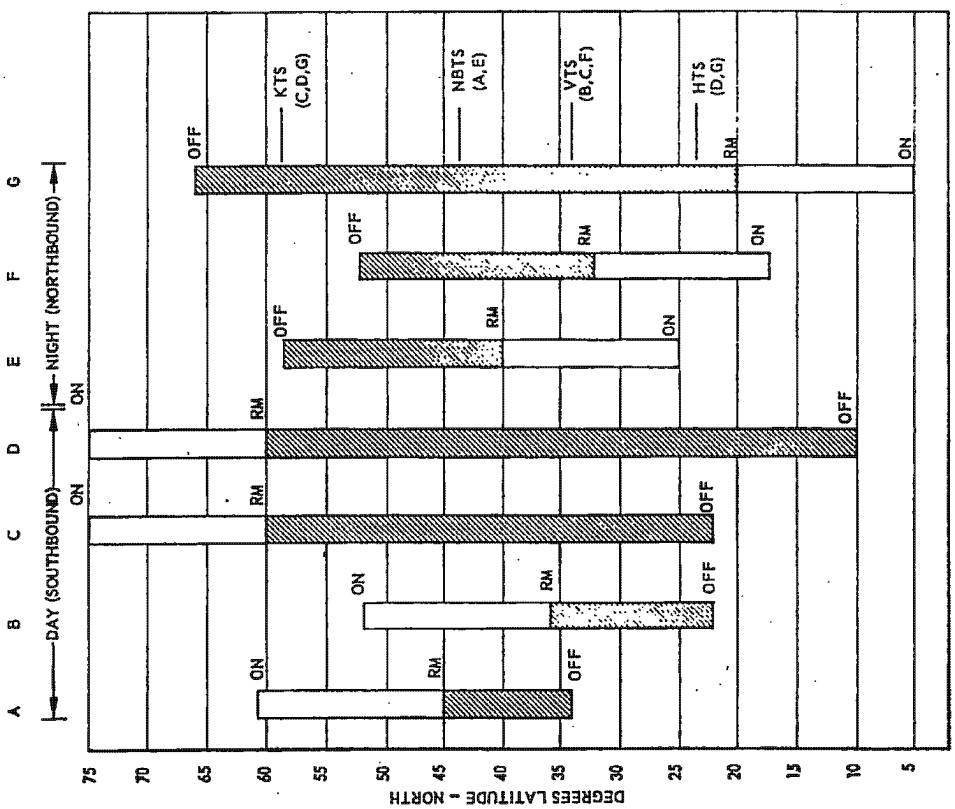
Figure A2-2 Readout and Reset Programming



TYPE OF PASS

	STATION							
A	B	C	D	E	F	G		
NBTS	VTS	KTS–VTS	KTS–HTS	NBTS	VTS	HTS–KTS		
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

446408-A1-001(1)

Figure A2-2 Readout and Reset Programming

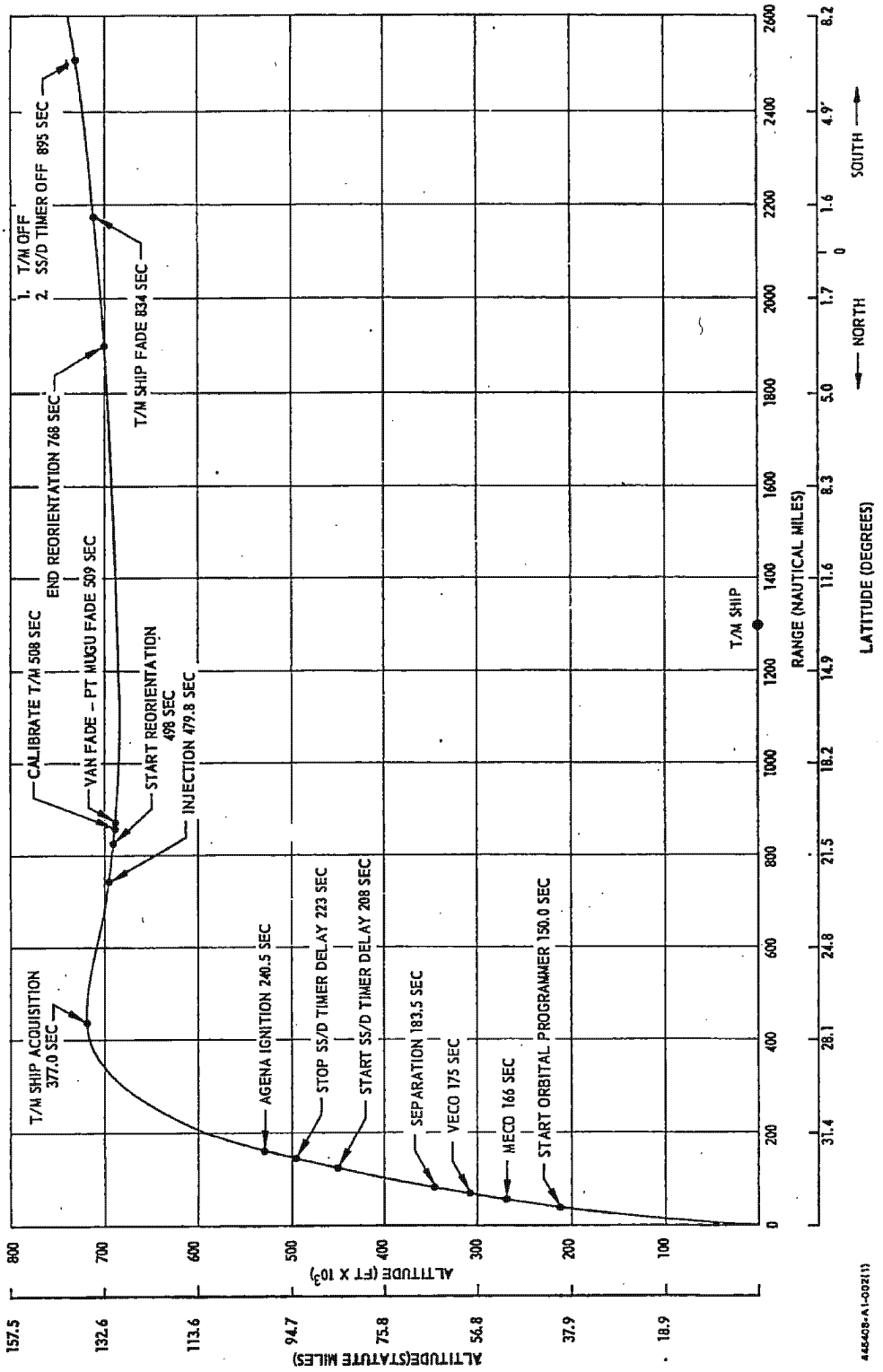


Figure A5-1 Launch Phase Nominal Trajectory

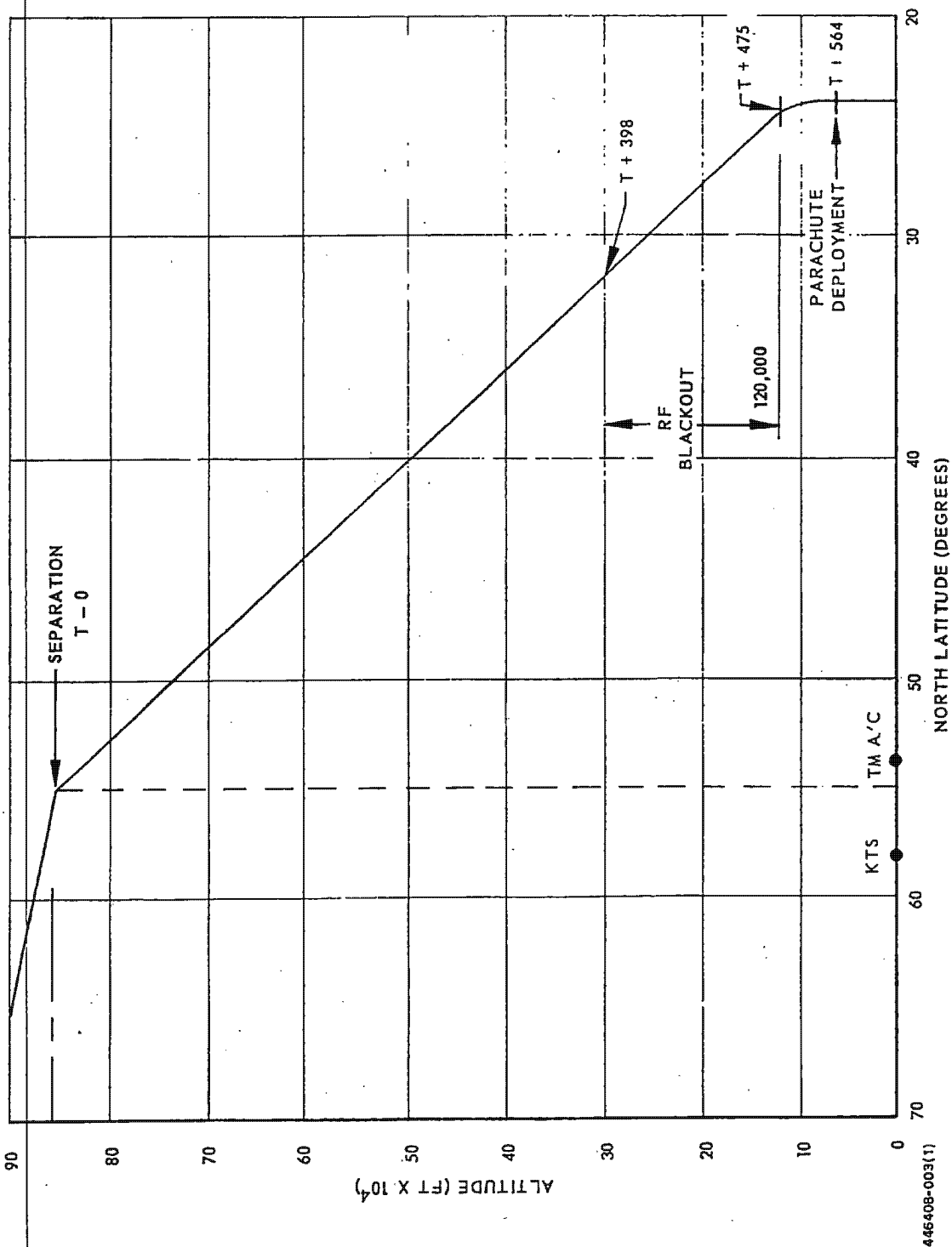


Figure A7-1 Capsule Re-entry Trajectory

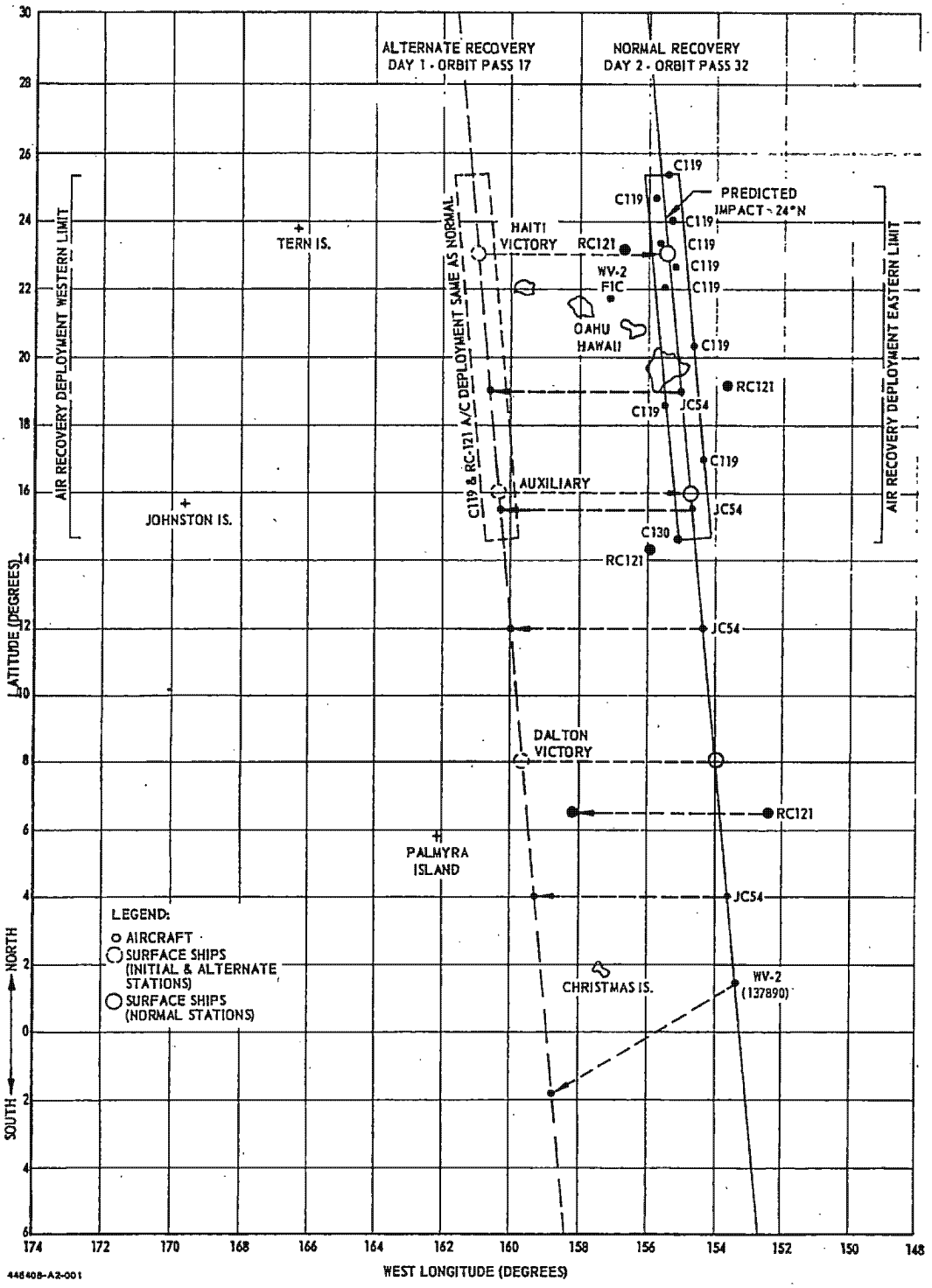


Figure A7-2 Recovery Force Deployment

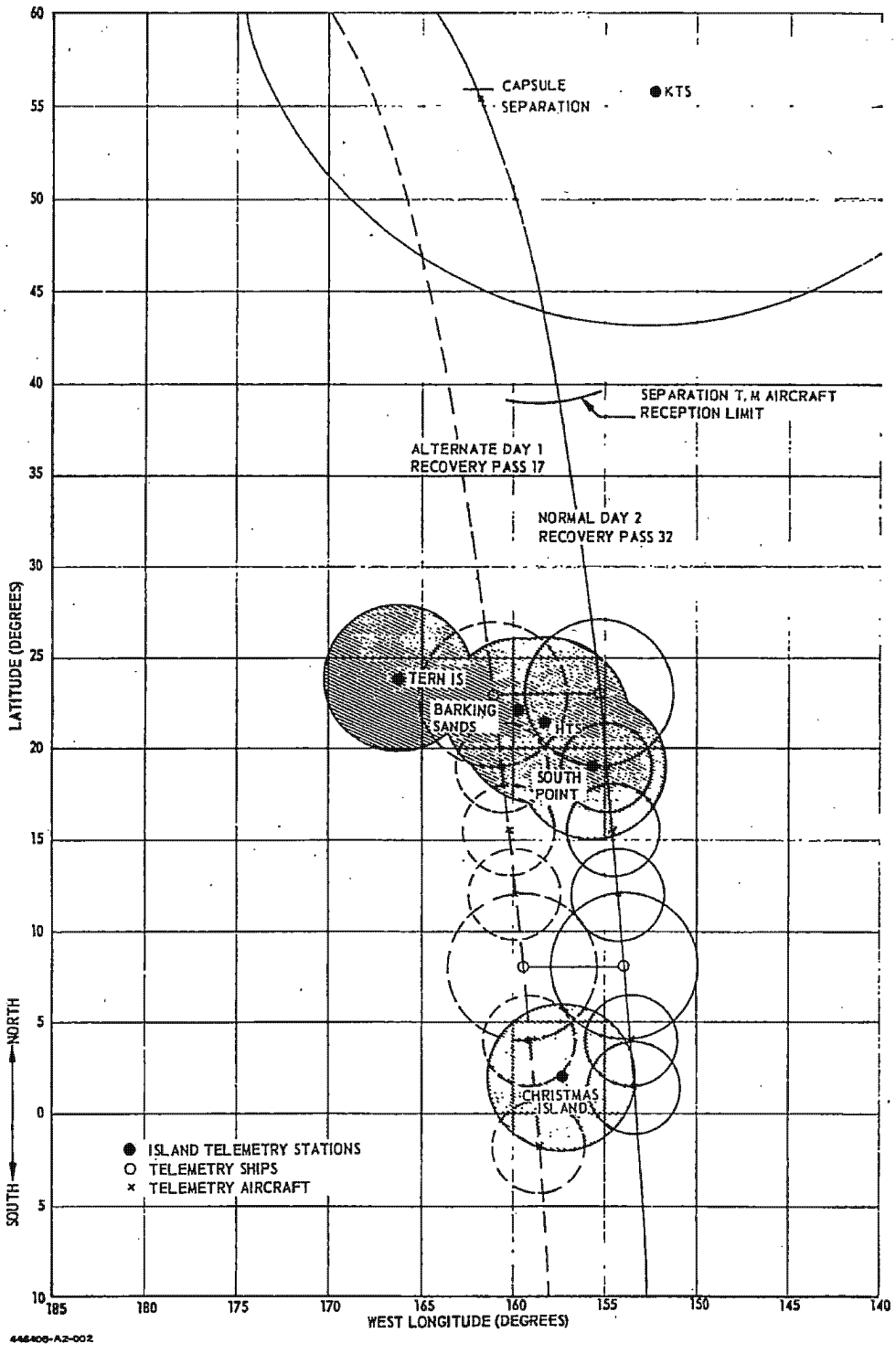


Figure A7-3 Re-entry Telemetry Coverage

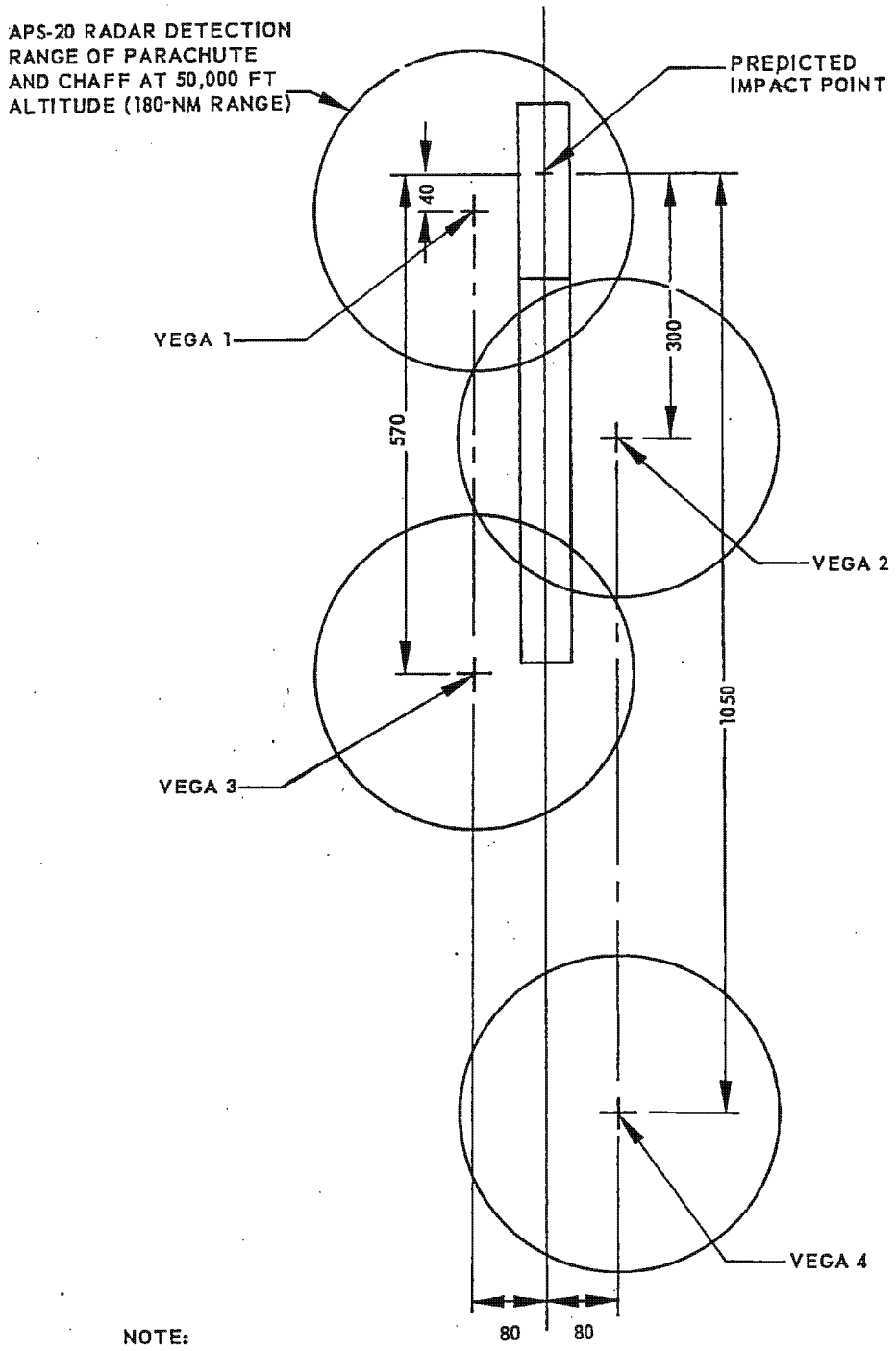
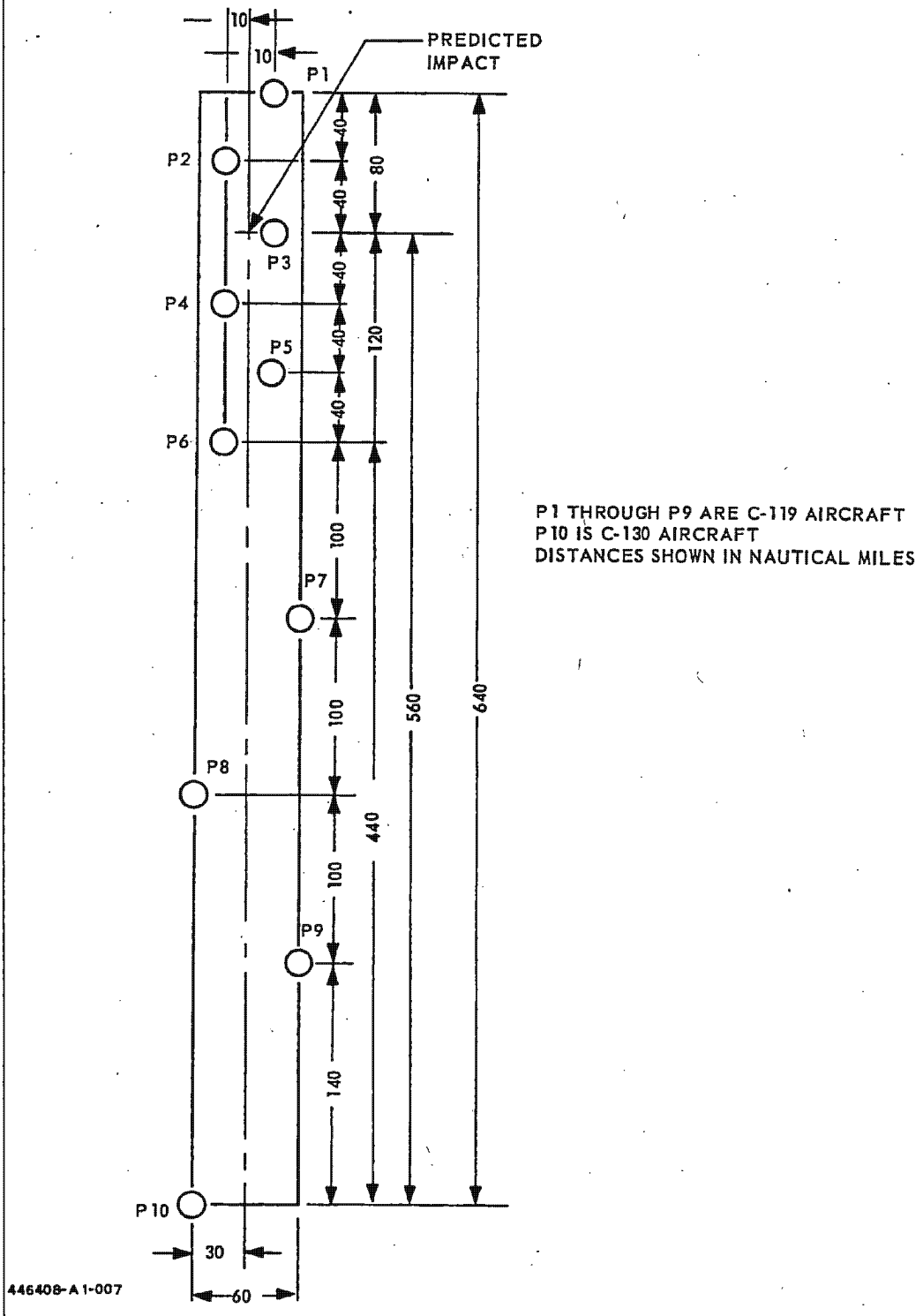


Figure A7-4 RC-121 Aircraft Deployment



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

Figure A7-5 Recovery Aircraft Deployment

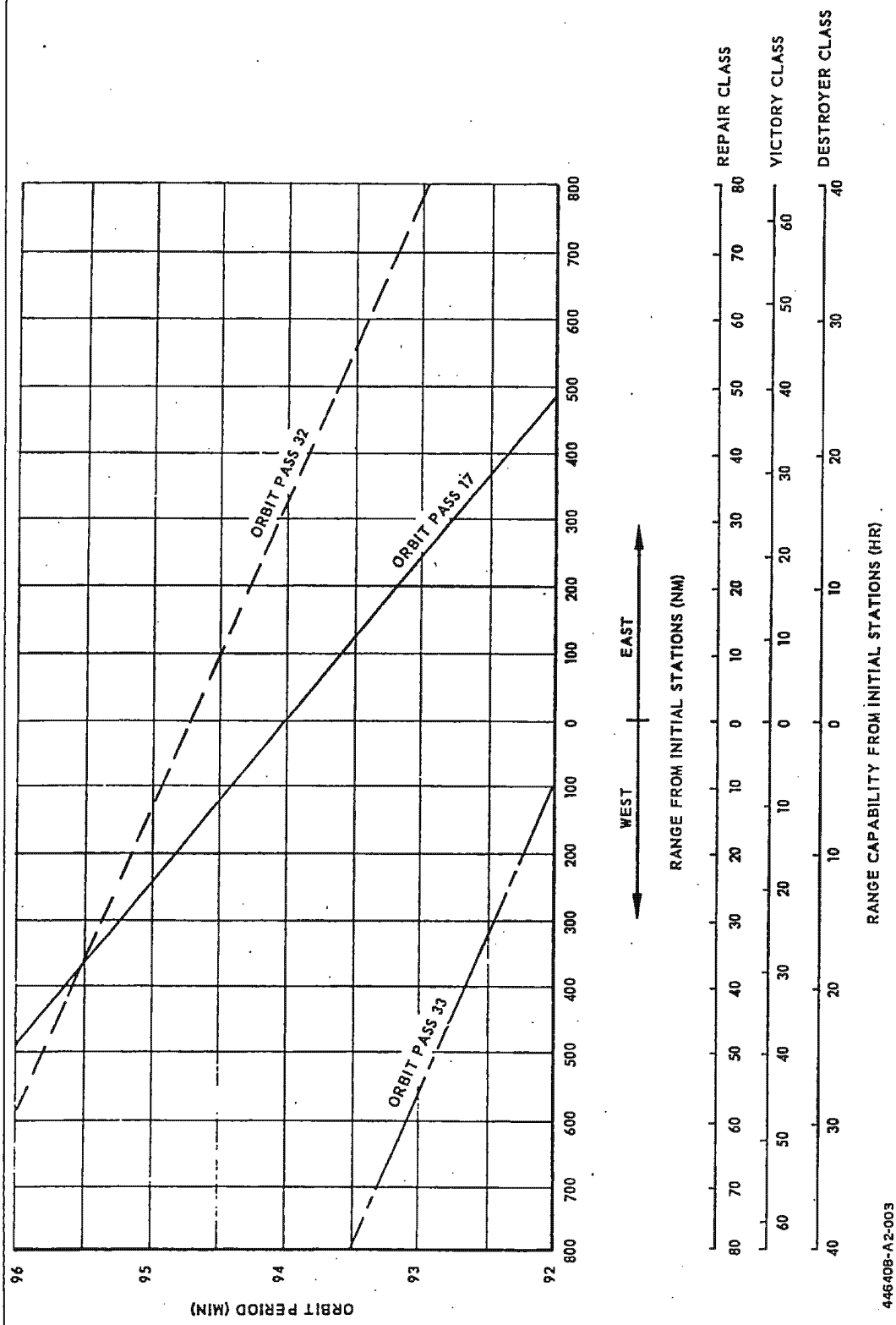


Figure A7-6 Surface Ship Deployment Capability

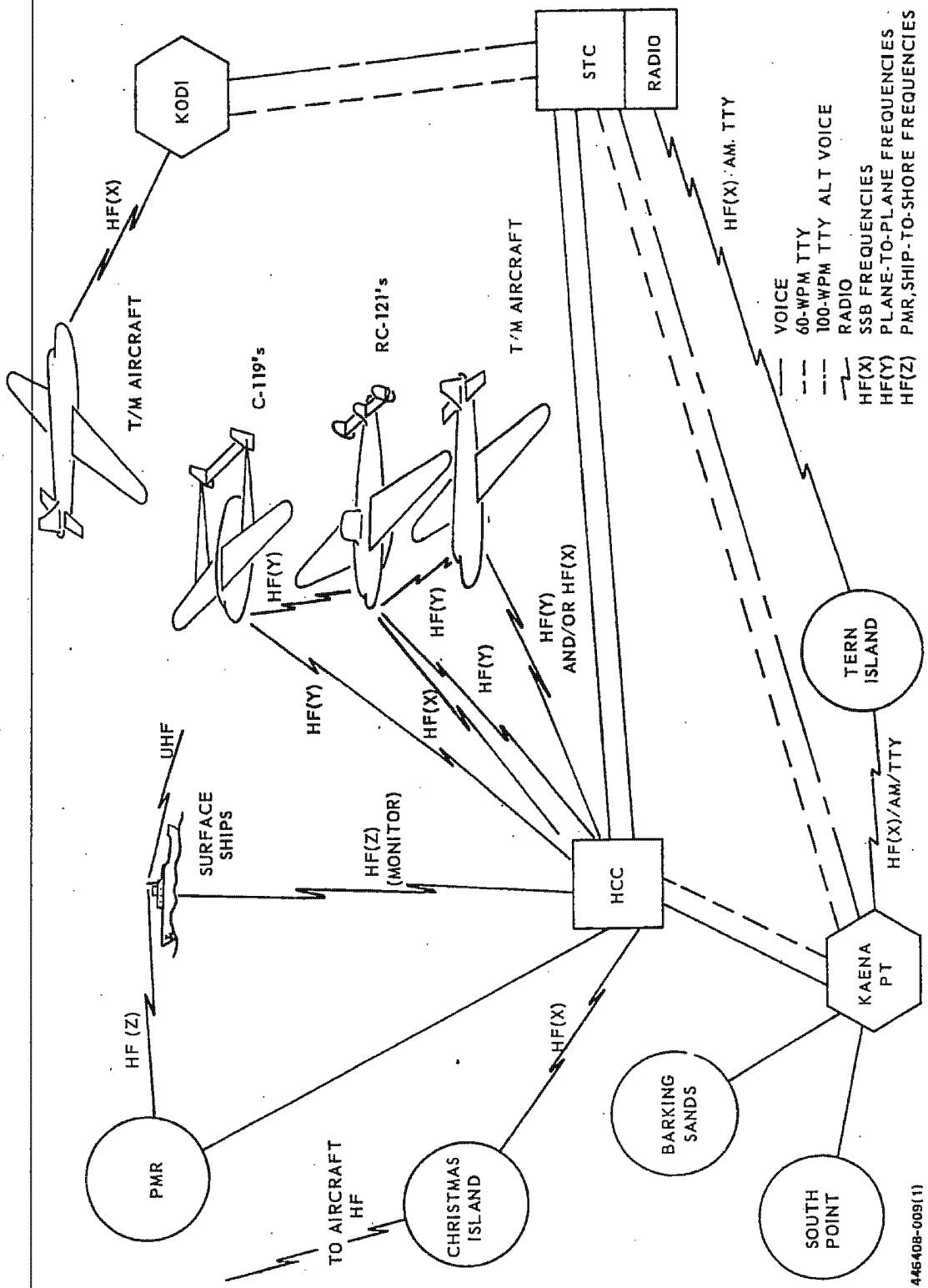
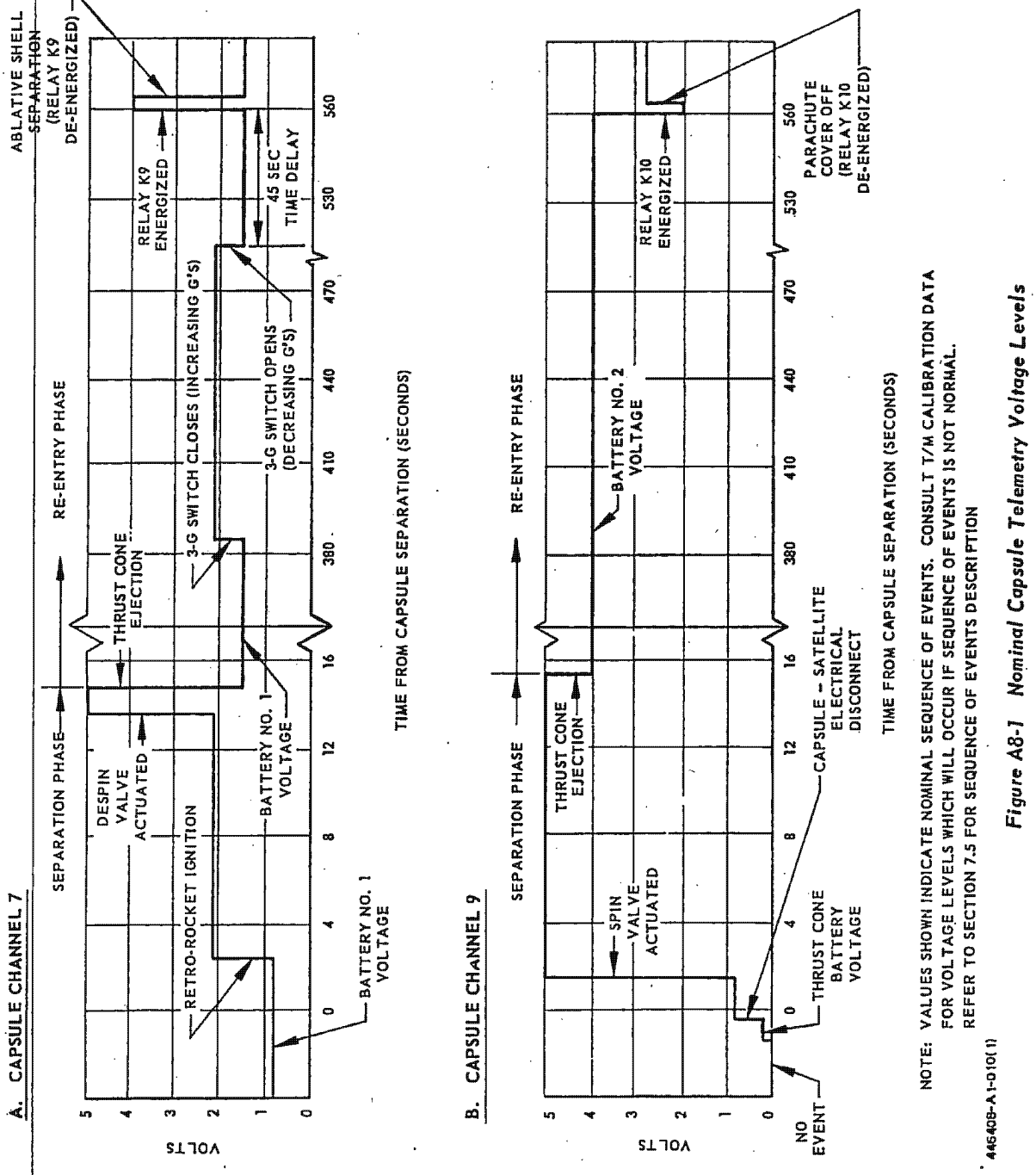


Figure A7-7 Recovery Operations Communications



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

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