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APPENDIX A - TAB 1

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

APPROVED:

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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

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 HTS (toll)

* Added facility or equipment

Facility	Equipment
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
	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

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 HTS (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

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.

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

b. On Pass 15, VTS 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 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.

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

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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

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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 Re-entry Telemetry Aircraft Operations

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°15' N latitude and 164°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 KTS 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 KTS on the following operational frequencies for an equipment status report at T - 30 minutes, for acquisition instructions, and for data relay:

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 KTS 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 KTS 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. KTS will relay this information to the STC.

A5.4 <u>Hawaii Tracking Station Recovery Operations</u>

A5.4.1 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° ($\pm 10^{\circ}$) for impact azimuths between 345° and 15°. The scan amplitude will be increased $3/4^{\circ}$ 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 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°/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 or magnetic tape.

A5.4.3 All antenna bearings from South Point and Barking Sands, subsequent to acquisition, will be reported to HTS. These bearings will be relayed immediately to the STC and the HCC by HTS. HTS will plot the South Point bearings, the Barking Sands bearings, and its own bearings to determine the approximate capsule trajectory and will relay these data to the STC and the HCC over the control voice line.

A5.5 South Point Facility Recovery Operations

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 HTS, 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 HTS 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 HTS 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 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 as this tape will be delivered to the HCC for transmittal to Sunnyvale.

A5.6 Barking Sands Facility Recovery Operations

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 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° 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 HTS. All acquired capsule telemetry signals will be recorded on magnetic tape with a timing signal.

A5.7 Christmas Island Facility Recovery Operations

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.

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.

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 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 HTS 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 $\pm 90^{\circ}$ 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 $\pm 90^{\circ}$ 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 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:

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 telling 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.

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 KTS and HTS 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 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 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 HTS, South Point, Barking Sands, 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.

A5.11.4 The accuracy of all reported bearings must be considered. The accuracy of the HTS 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 $\pm 2^{\circ}$.

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.

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.

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

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 (HTS) 32°N (VTS northbound) or 36°N (VTS southbound) 40°N (NBTS northbound) or 45°N (NBTS southbound) 60°N (KTS)
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

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*

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

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) KTS	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) KTS		57.6
	21.6° N latitude (ref) HTS	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) NBTS	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) NBTS	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) VTS	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) VTS	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) HTS	908.9	21.6
	57.6° N latitude (ref) KTS	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) NBTS	1218.5	42.9
	Beacon and T/M off – reset disable	1220.7	34
	End of Orbit 13	1276.8	0

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) VTS	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) KTS	1495.5	57.6
(60 sec RM	34.8° N latitude (ref) VTS	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) KTS	1588.9	57.6
(80 sec RM	21.6° N latitude (ref) HTS	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) KTS	1682.4	57.6
(100 sec RM	21.6° N latitude (ref) HTS	1690.8	21.6
interrupt)	Beacon and T/M off – reset disable	1694	10
	End of Orbit 18	1744.3	0

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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					TELEMETRY SHIP***	TELEMETRY AIRCRAFT***		NOTE
	NAME	NUMBER						VTS	NTS	NBTS	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			
	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

~~SECRET~~

Table A8-1 (Continued)

	MEASUREMENT		CHANNEL	PRI-ORITY	TIME* READOUT REQUIRED	REPORT** TO STC BY VOICE	ORBITAL PROGRAMMER PASS	TRACKING STATION					TELEMETRY SHIP***	TELEMETRY AIRCRAFT***		NOTE
	NAME	NUMBER						VTS	MTS	NBTS	KTS	HTS	PVT. JOE E. MANN	WV-2 137890	ELECTRA	
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	

Table A8-1 (Continued)

	Measurement: Name	Measurement: Number	Channel	Priority	Time* Readout Required	Report** to STC by Voice	Orbital Programmer Pass	Tracking Station: VTS	Tracking Station: NTS	Tracking Station: NHTS	Tracking Station: KTS	Tracking Station: HTS	Telemetry Ship***: Pvt. Joe E. Mann	Telemetry Aircraft***: RV-2 137890	Telemetry Aircraft***: Electra	Note
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
	S5/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 Disconnect	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	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). KTS 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 (KTS and HTS), on Pass 13 (NBTS), on Pass 15 (VTS), on Pass 28 (NBTS), 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.
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. KTS transmits 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 KTS and Electra report. HTS verifies 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 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.
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.*

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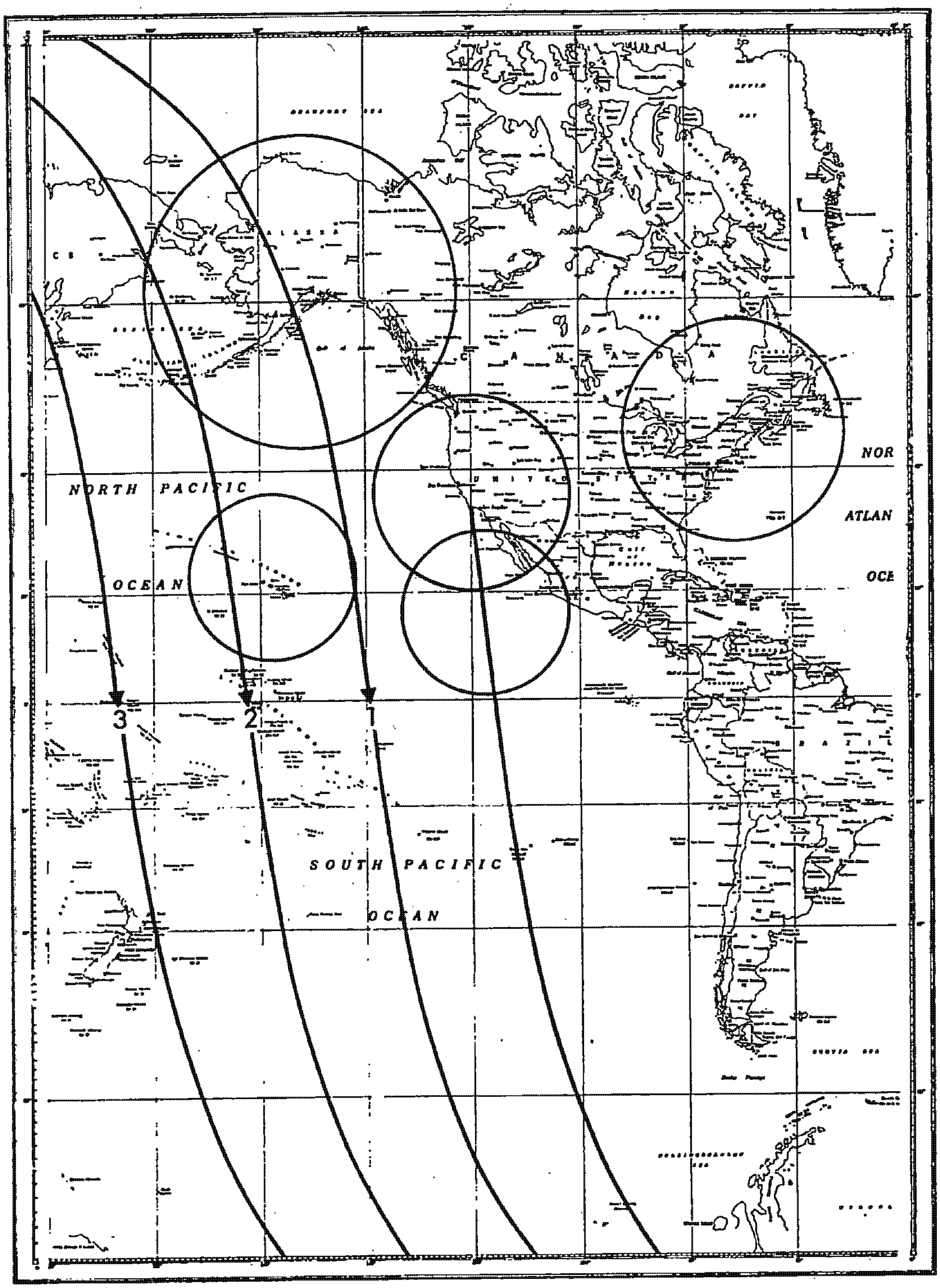

Figure A2-1(a) Nominal Orbit Traces -- Passes 1 through 3

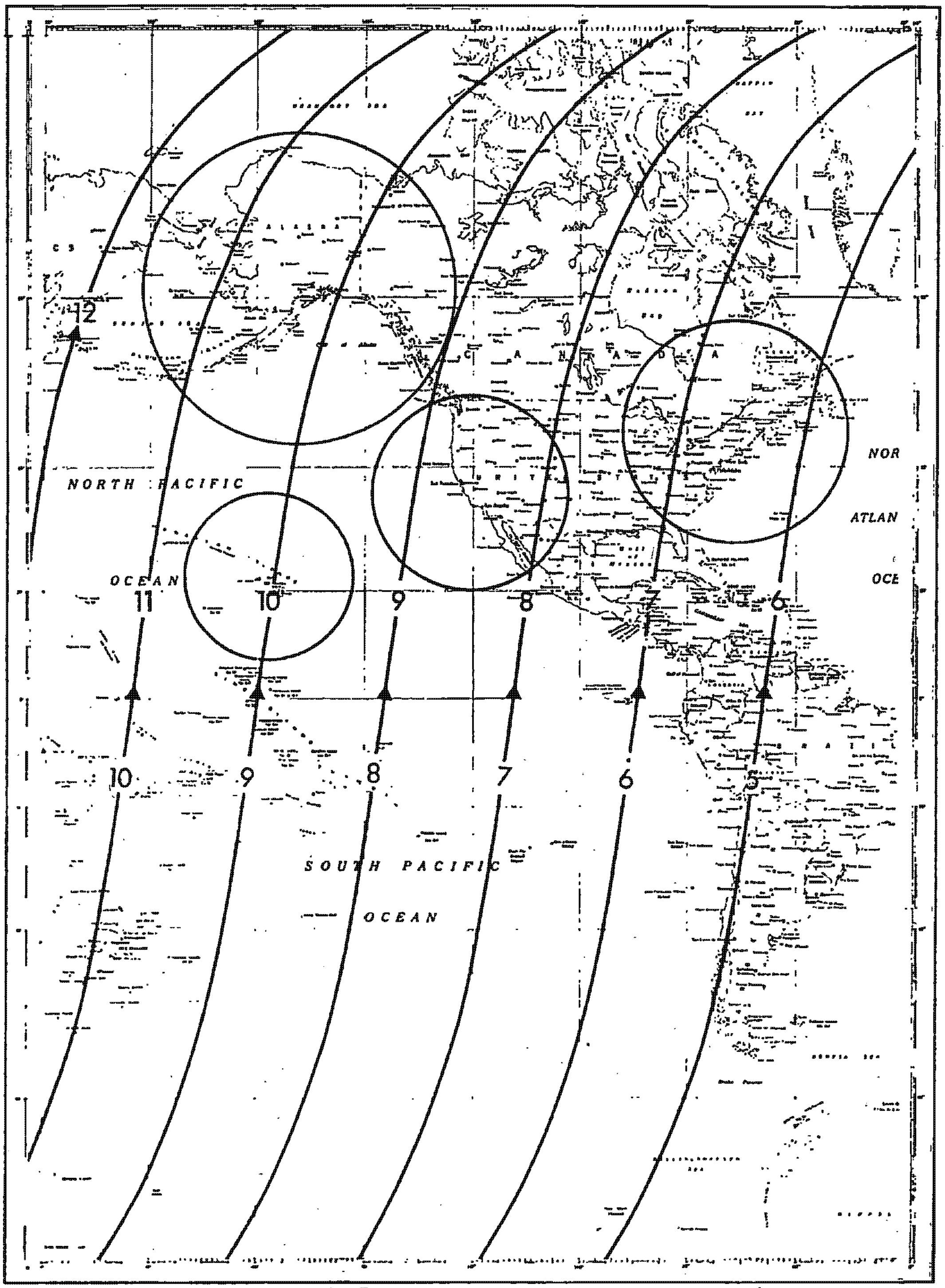

Figure A2-1(b) Nominal Orbit Traces -- Passes 6 through 12

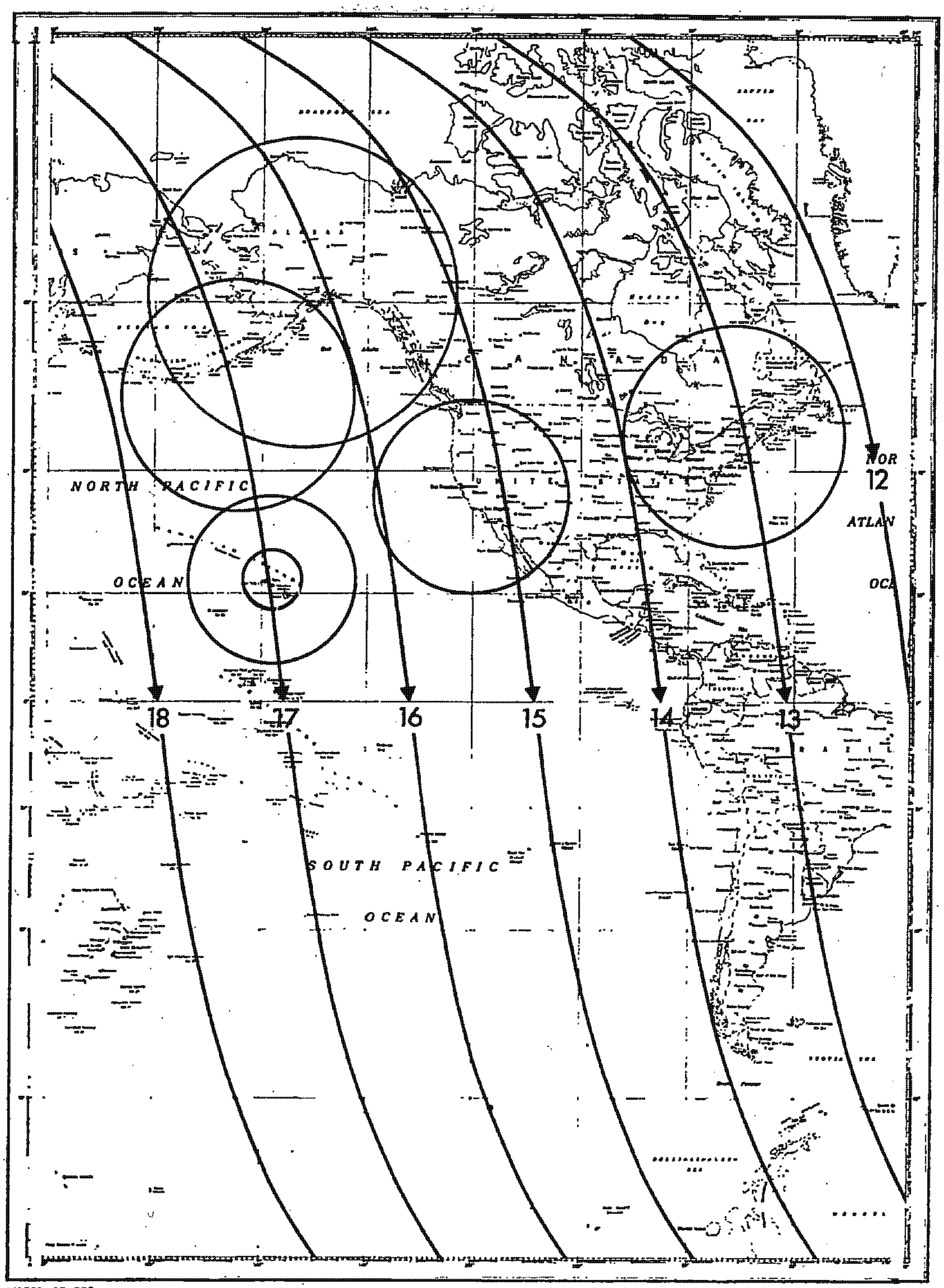

Figure A2-1(c) Nominal Orbit Traces -- Passes 13 through 18

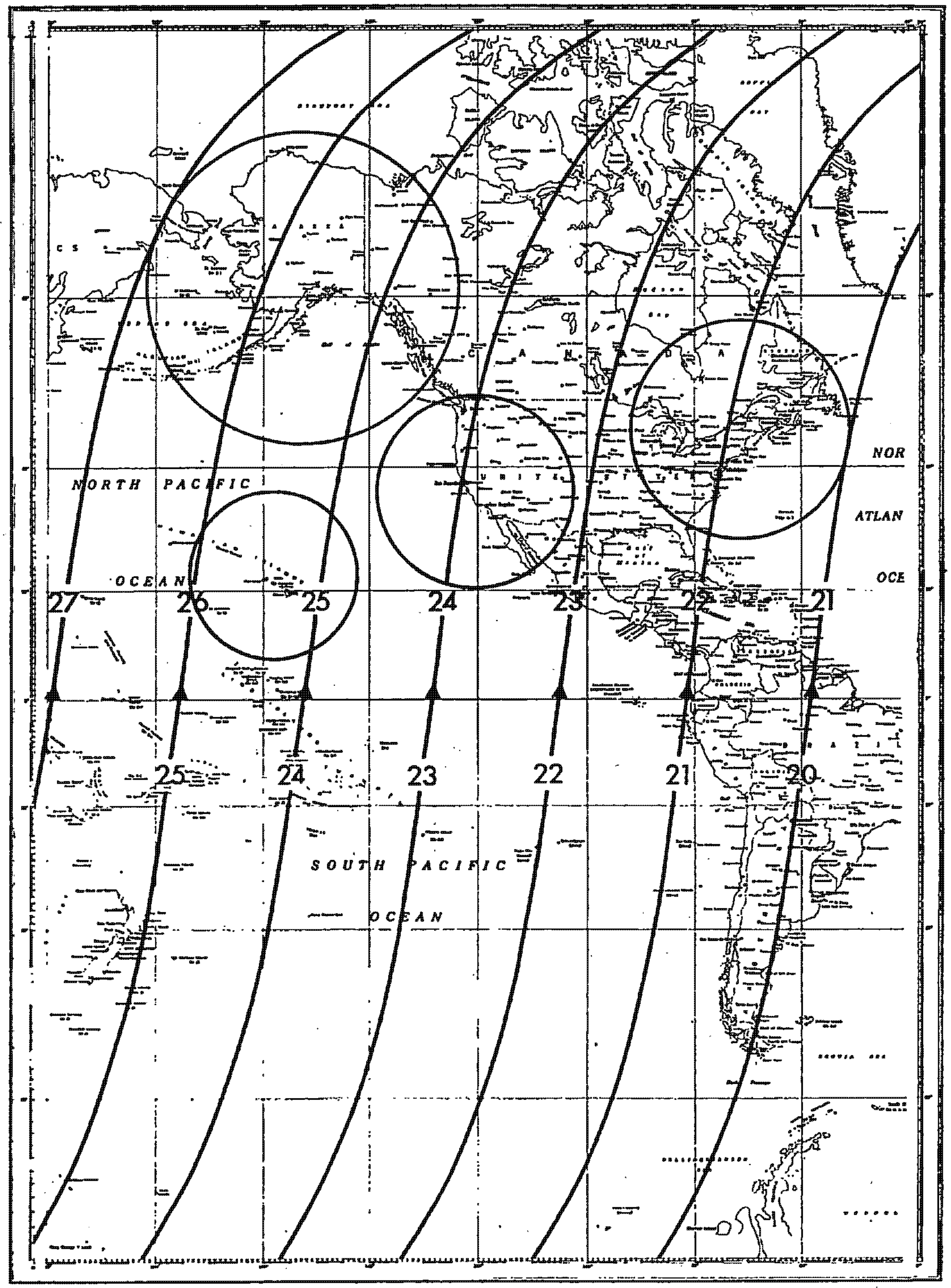

Figure A2-1(d) Nominal Orbit Traces -- Passes 22 through 27

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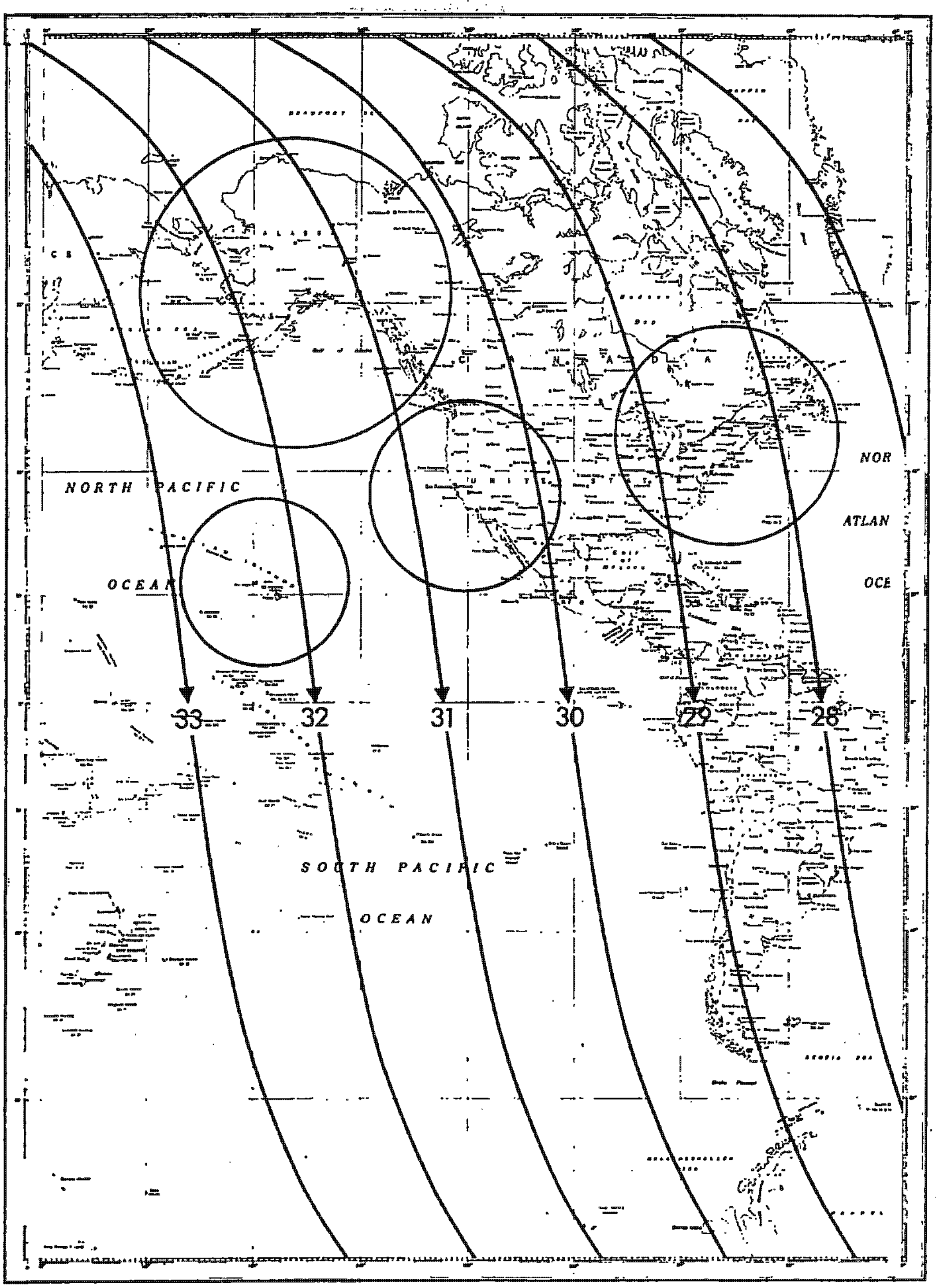

Figure A2-1(e) Nominal Orbit Traces -- Passes 28 through 33

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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)**	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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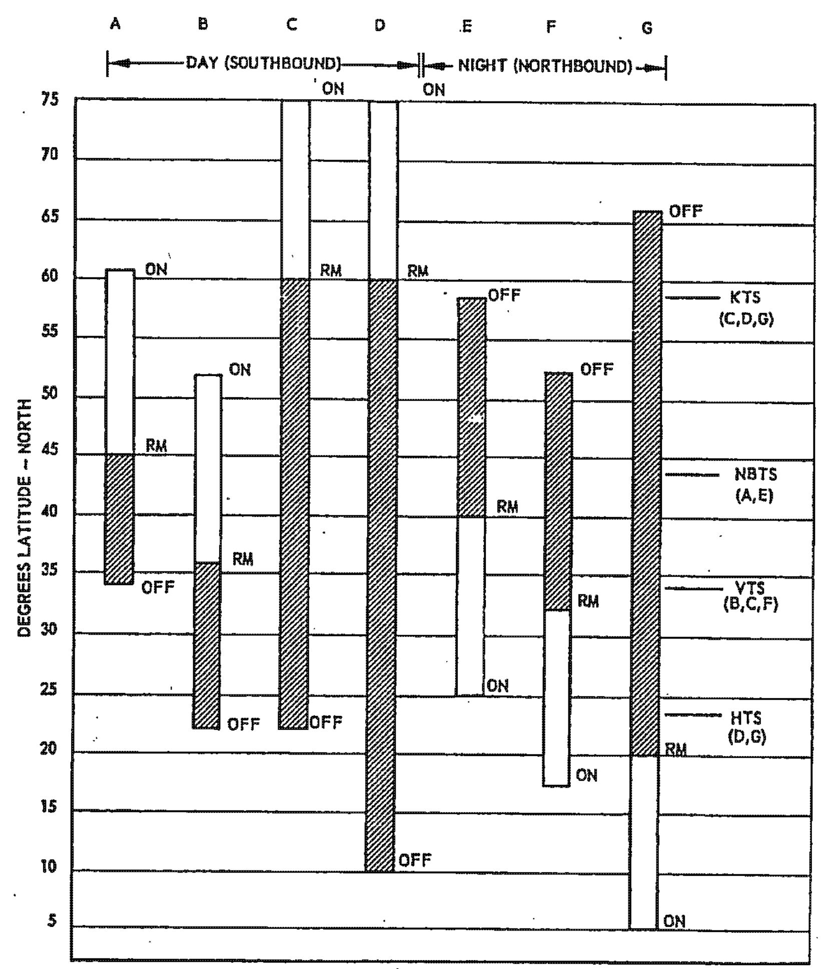

Figure A2-2 Readout and Reset Programming

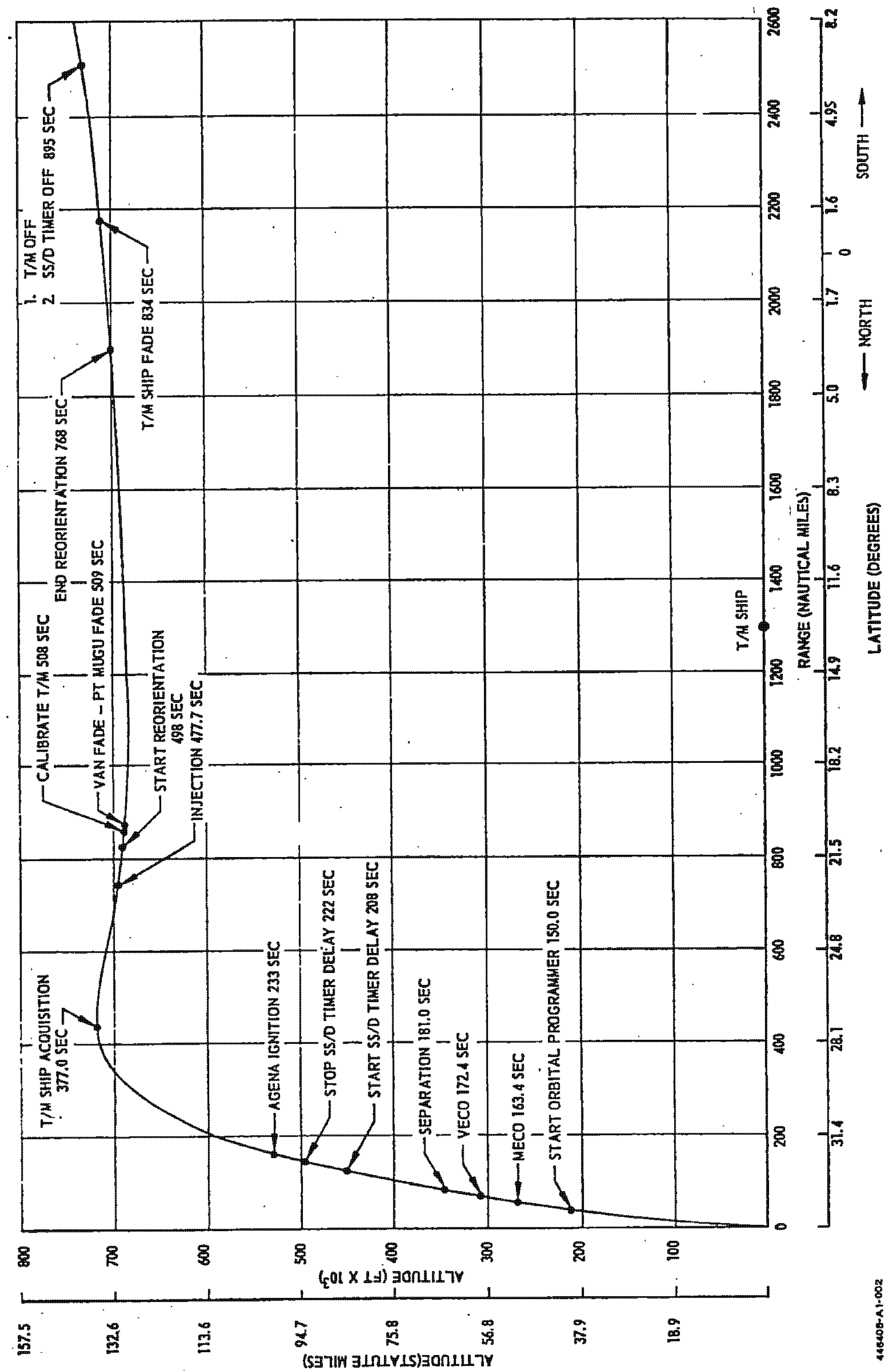

Figure A5-1 Launch Phase Nominal Trajectory

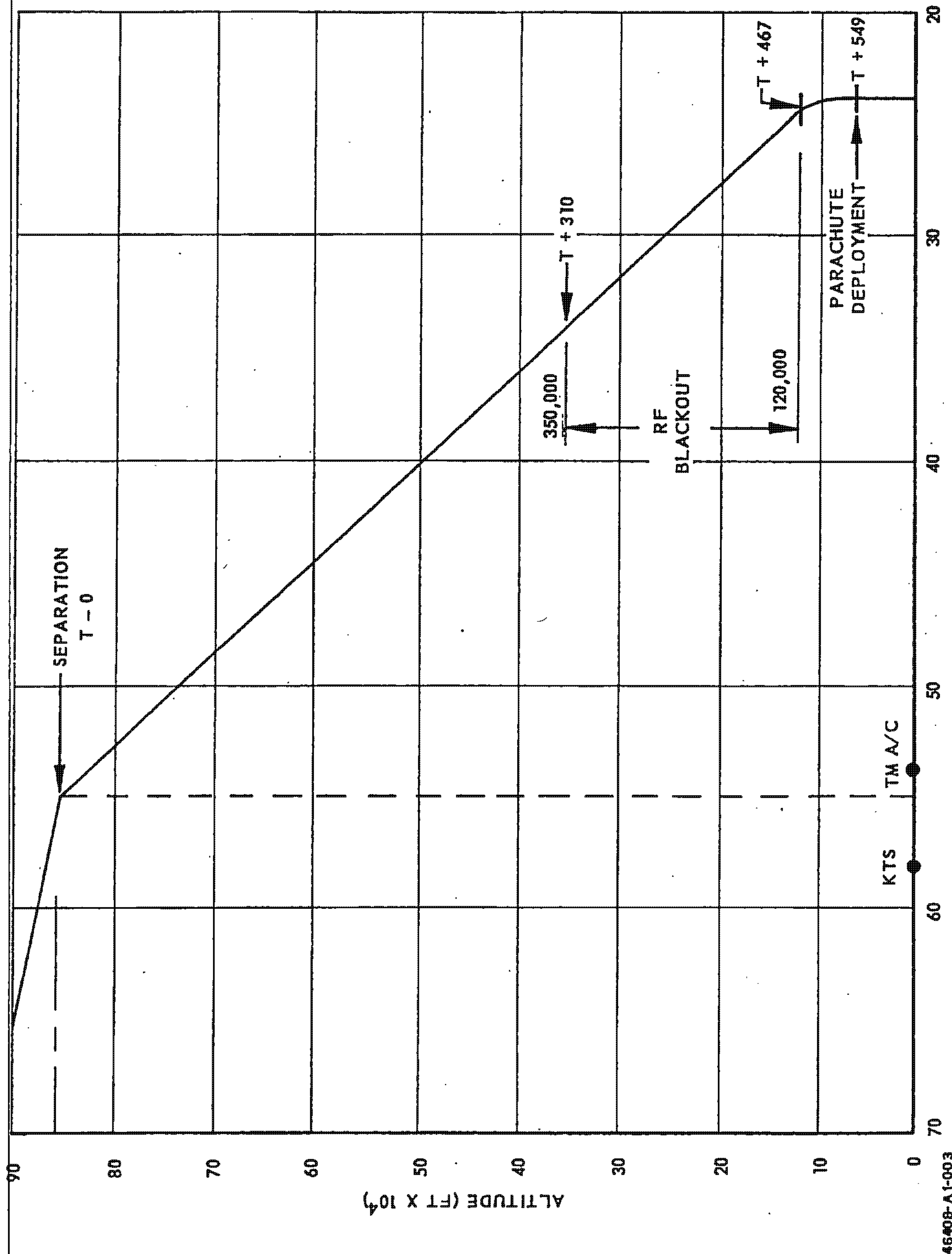

Figure A7-1 Capsule Re-entry Trajectory

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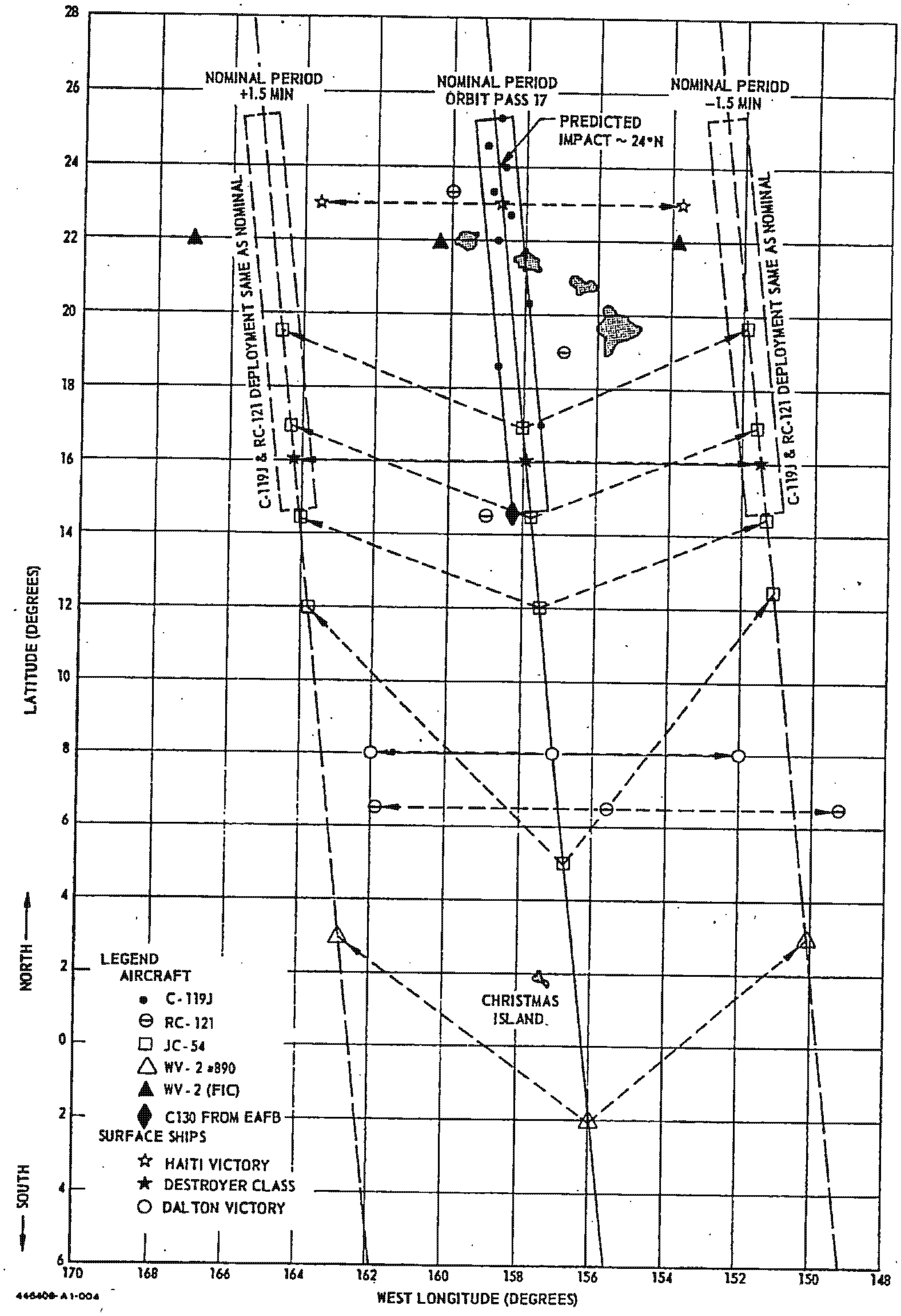

Figure A7-2 Recovery Force Deployment

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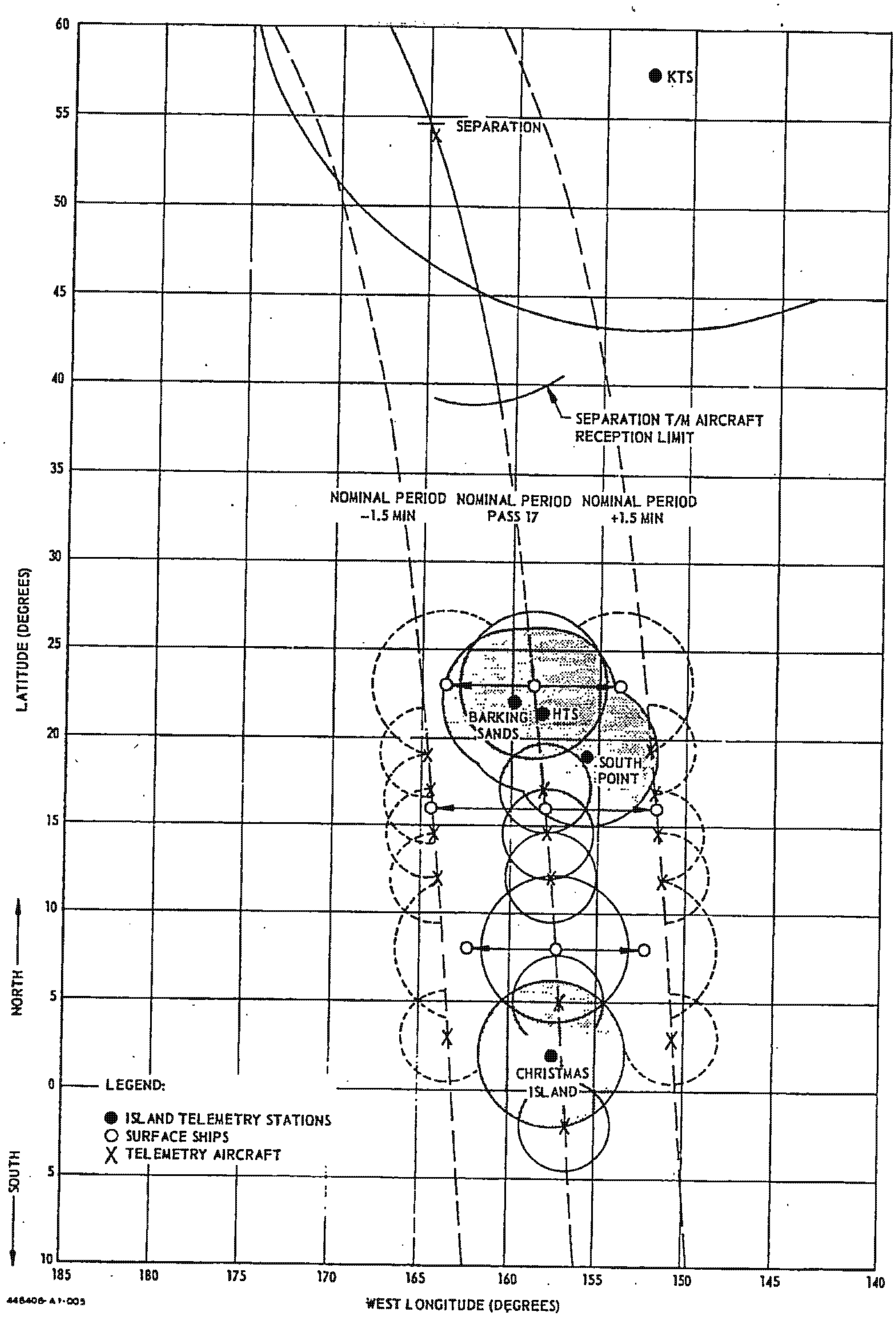


Figure A7-3 Re-entry and Recovery Telemetry Coverage

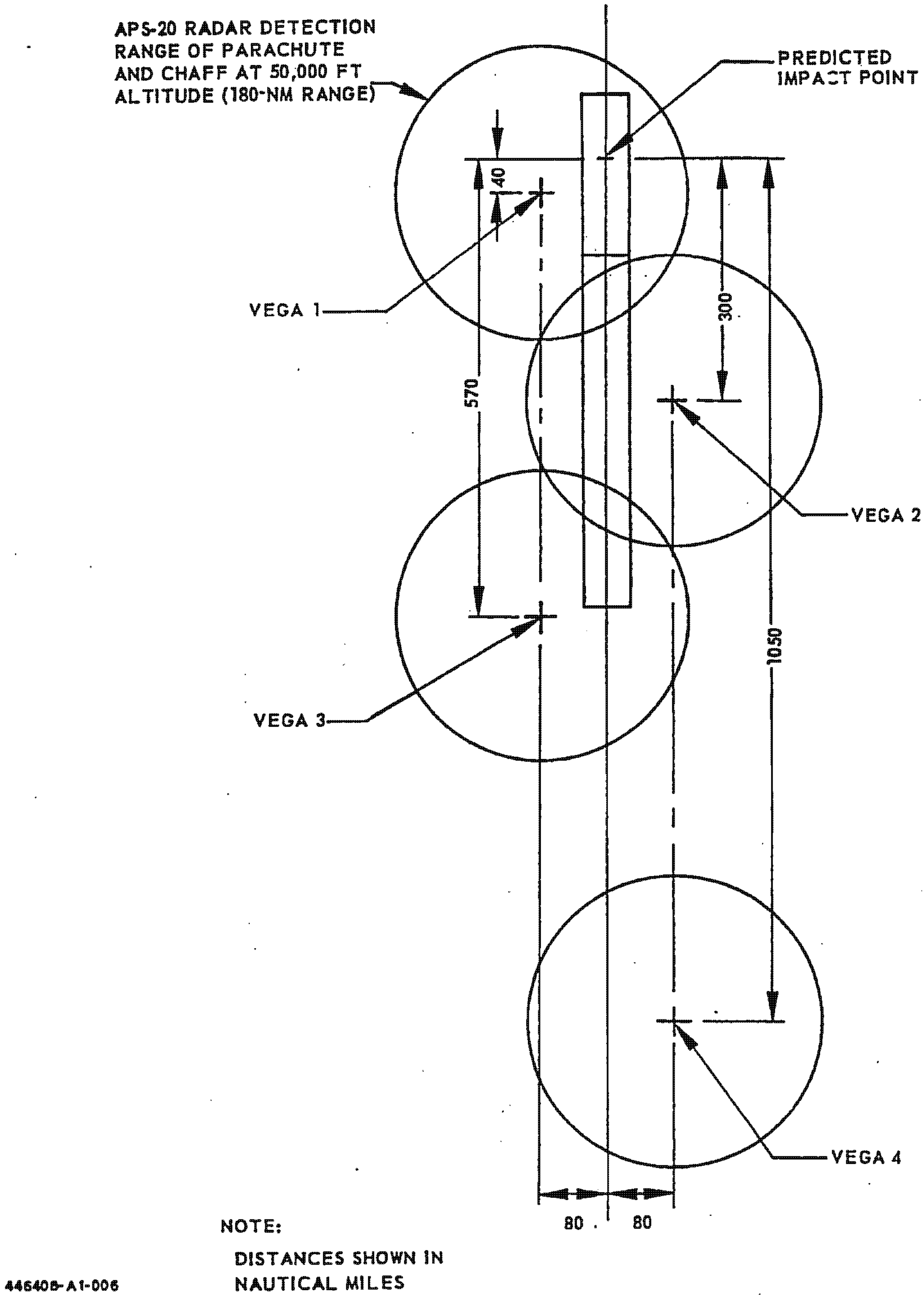
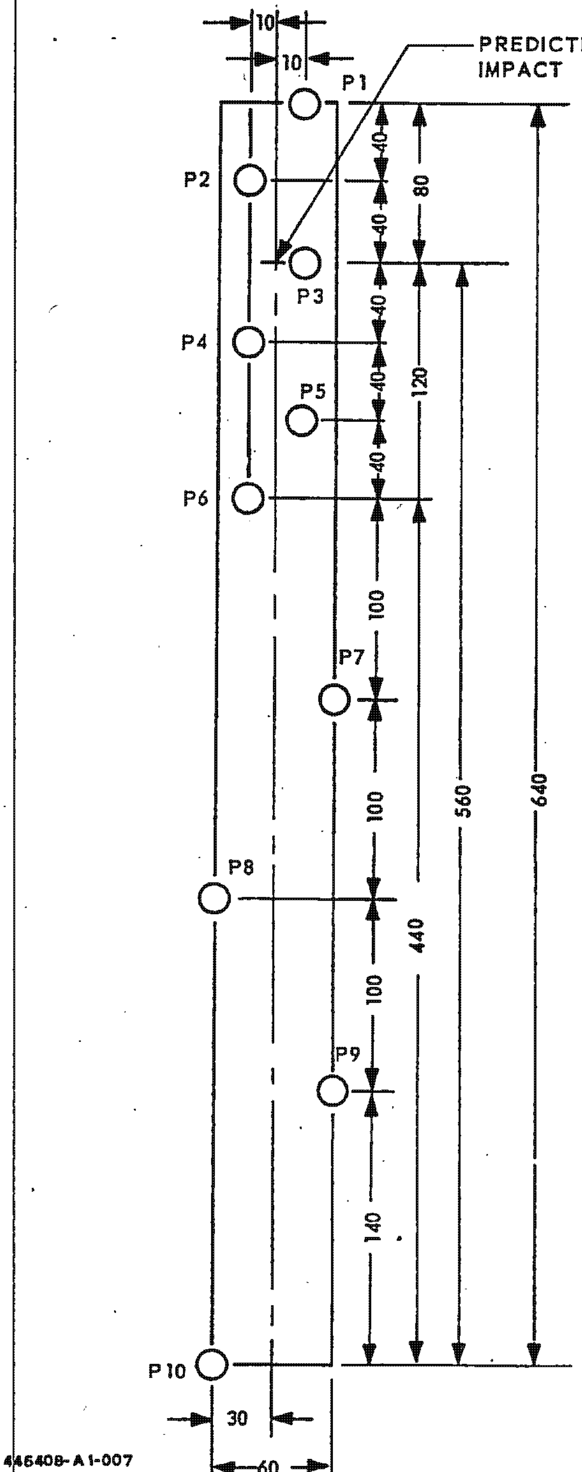


Figure A7-4 RC-121 Aircraft Deployment



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

Figure A7-5 Recovery Aircraft Deployment

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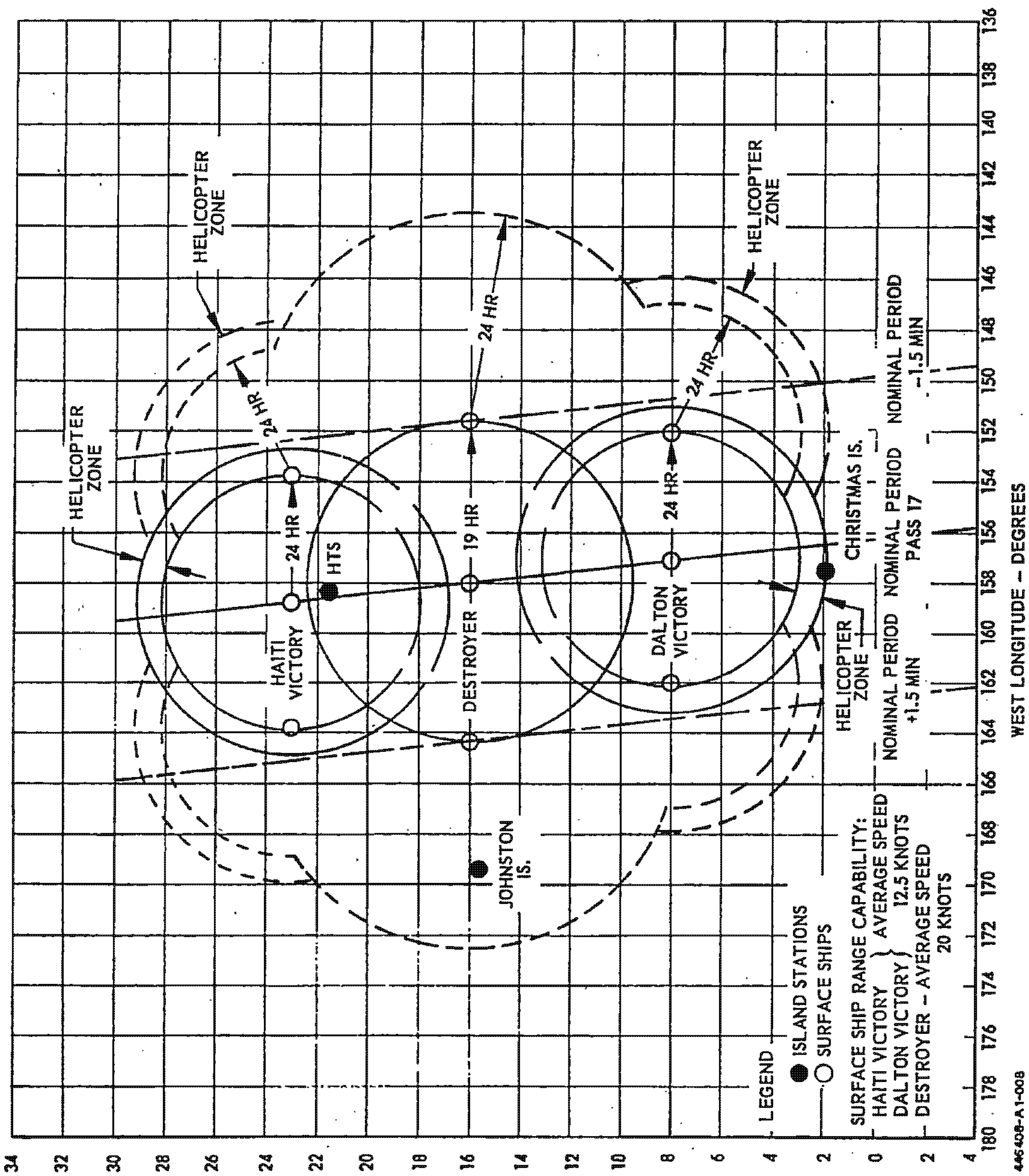


Figure A7-6 Sea Recovery Capability

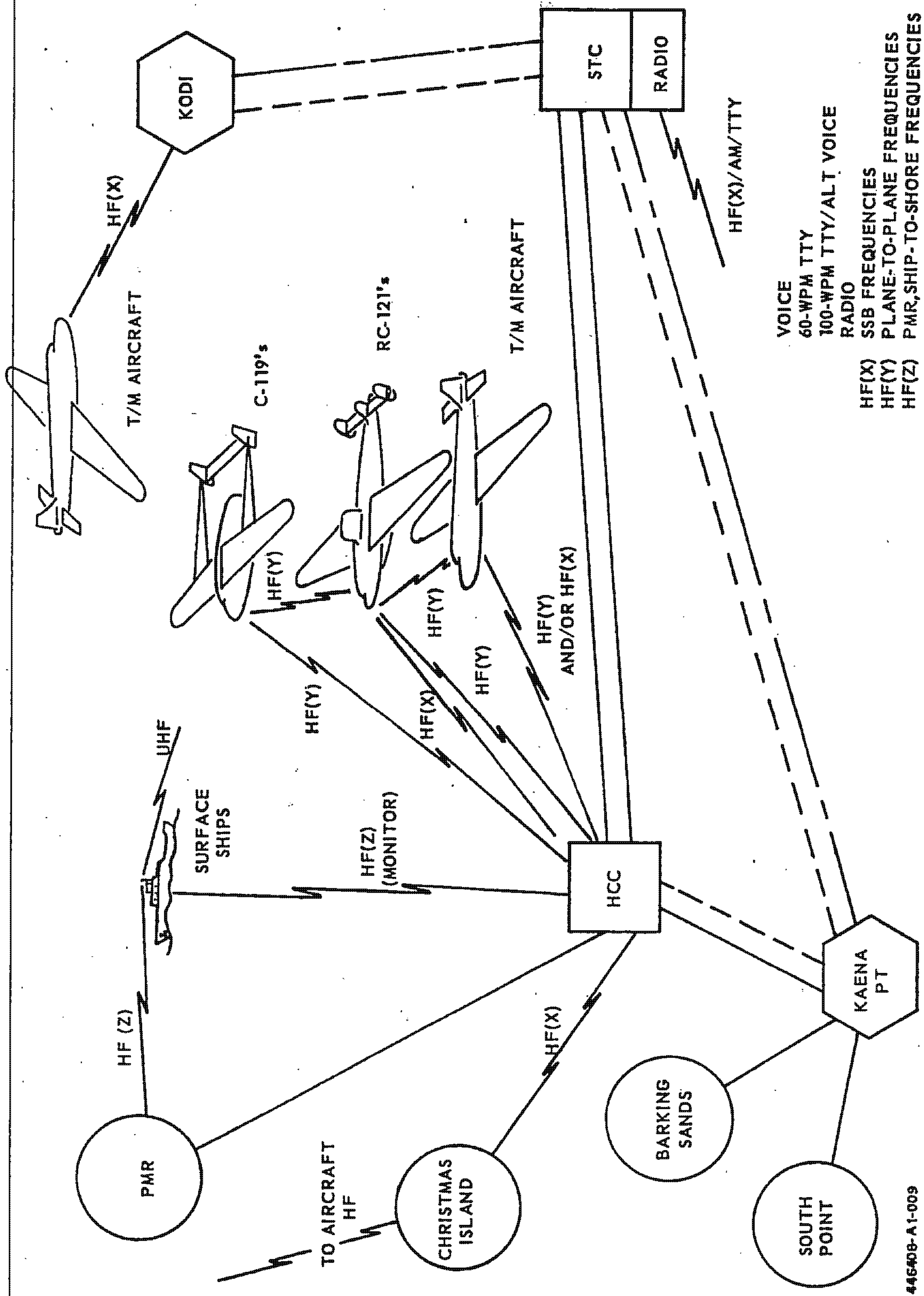
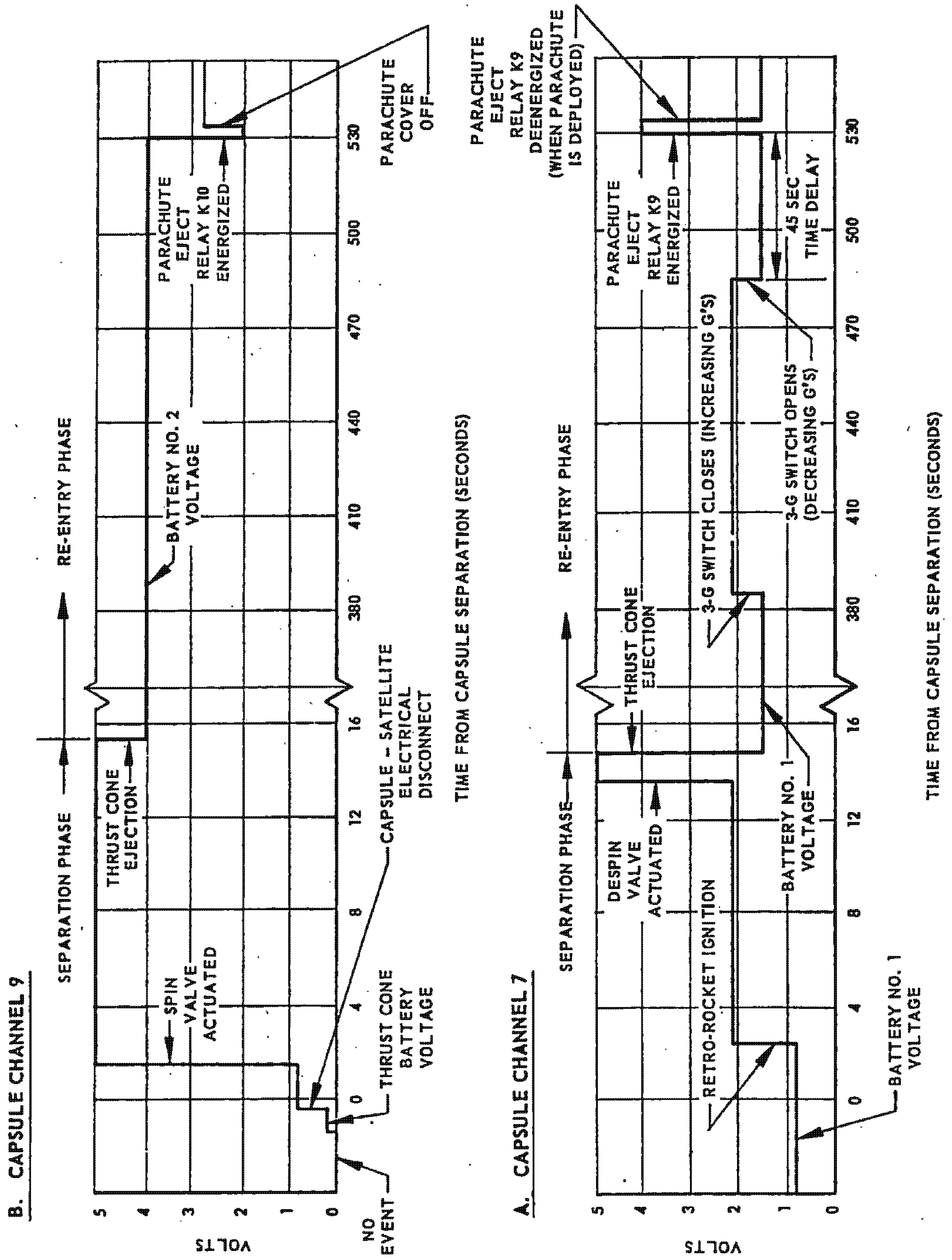


Figure A7-7 Recovery Operations Communications



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.

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Figure A8-1 Nominal Capsule Telemetry Voltage Levels

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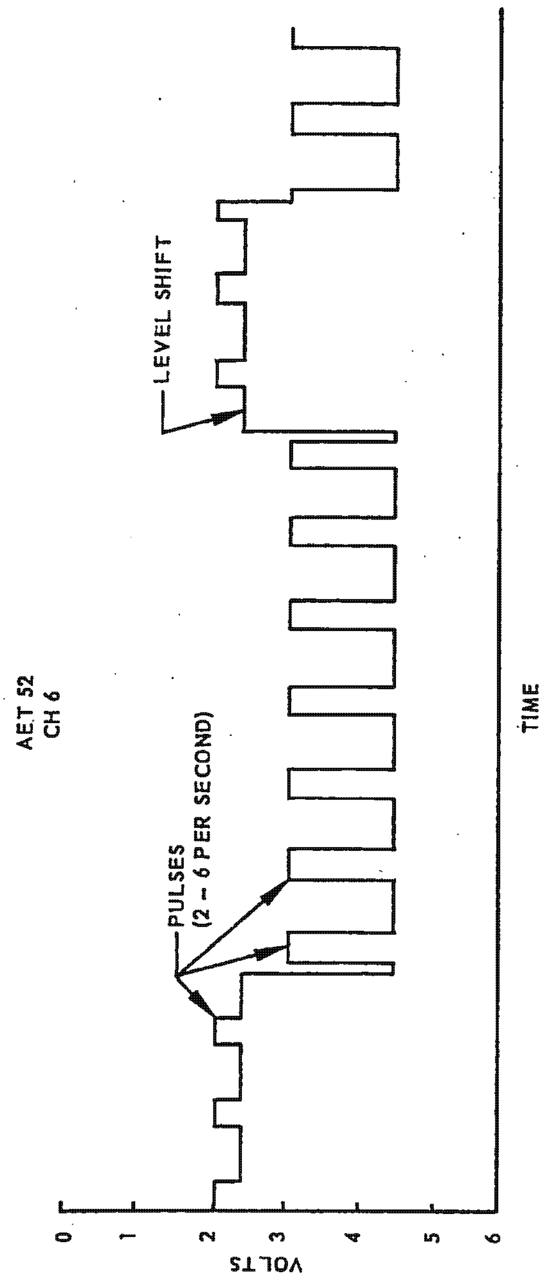

Figure A8-2 Nominal Payload Function Wave Trains

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