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SUPPLEMENT TO

PMR GROUND SAFETY REPORT

NASA/DOD SCOUT VEHICLE

Report No. AST/R-13430-1-4

REVISION A OF

ADDENDUM II

DATED MARCH 28, 1962

SOLAR RADIATION PAYLOAD INFORMATION SR-IVB

Submitted to: SPACE SYSTEMS DIVISION
UNITED STATES AIR FORCE
SSVB

Under Contract Number: AF 04(695)-31

Prepared by: Chance Vought Corporation
Astronautics Division
Los Angeles Facility

Approved: [redacted]

LtCol, USAF
Director of SLV-1

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9 PAGES
(SUBJECT TO CHANGE)

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A. Reference Basic Document, Page 7, Paragraph 2-6, Payload Explosives

2-6 Sol Rad Payload Explosives

1. Payload Spin-Up

a. Explosive Valve

Conax Model SFV-22M

Maximum no fire current: 0.15 AMP

Minimum fire current: 1.0 AMP

Bridge resistance: 0.9 OHMS nominal

Two (2) required per vehicle

b. Control Rocket

Atlantic Research Corp., Type P/N MARC 3-0.3KS5

USF 706 Squib

Maximum no fire current: 0.25 AMP

Mininum fire current: 0.50 AMP

Bridge resistance: 0.7 to 1.4 OHMS

Four (4) required per vehicle

2. Payload Separation

a. Explosive Cutter 0A-A6

Ordnance Associates

Double Bridgewire Type

Bridge resistance: 2.7 OHM $\pm$ 0.6

Maximum safe no-fire: 0.1 AMP for 5 min.

Minimum all-fire: 1.0 AMP

Actual fire voltage: 12 V.D.C.

Two (2) required per vehicle

b. Dimple Motor Type DM 25N4

Manufactured by Hercules Powder Co.

Double Bridgewire Type

Bridge resistance: 0.35 OHM ± 0.10

Maximum no fire current: 0.5 AMP for 30 sec.

Minimum fire current: 2.0 AMP

Recommended fire: 5.0 AMP

Four (4) required per vehicle (timer initiation)

B. Reference Basic Document, Page 11, Paragraph 4-3, Payload Telemetry

4-3 Sol Rad Telemetry

1. Frequency : 108.09 mc

Power output: 100 milli-watts

Modulation: AM

C. Reference Basic Document, Page 15, Paragraph 5-3-d-6,7, Vehicle Stage Assembly

Fourth Step - The Sol Rad Payload will not be required at the Spin Facility for dynamic balancing of the fourth stage.

D. Reference Basic Document, Page 20, Paragraph 6-1, Installation, Connection, and Arming of Explosive Devices

6-1 General

1. Description

The explosive valves and spin-up rockets have their terminals shorted thru resistors inherent in the firing circuit design. A mechanical separation switch also in the firing circuitry provides an "open" in the firing circuit until released from the separation ring by ejection of the payload.

Spin rockets will also be provided with mating sorting connectors which will be removed only immediately prior to normal system plug connection just prior to nose fairing installation.

In addition to the above, an ordnance "flight" plug is provided. This plug is required to complete the ignition battery circuit and is installed only immediately prior to nose heat shield installation. The basic firing circuit is described by Figure (1).

2. Description

The Sol Rad Payload Separation System consists of a mechanical clamp arrangement attaching the payload to the separation ring. Release of the clamp device is by initiation of two (2) explosive cutters. This is accomplished by an integral battery-timer arrangement including safe/arm relays mounted on the fourth stage motor head near the separation ring. Figure (2) represents the simplified payload separation circuit. The safe/arm relay control function is by hard lines to the blockhouse arming console. (Vehicle launched in the armed condition).

The timer is actuated by signal from a hold-out switch on the fourth stage separation plane. The timer is set for payload release subsequent to fourth stage burn-out (0 to 30 min. timer).

Actual payload ejection is mechanical by release of compressed springs at separation ring upon clamp explosive cutter ignition.

3. General safety precautions established by range policy and described by section VI of the Basic Document are to be complied with.

SOL RAD PAYLOAD SR-IVB

ORDNANCE FIRING CIRCUIT

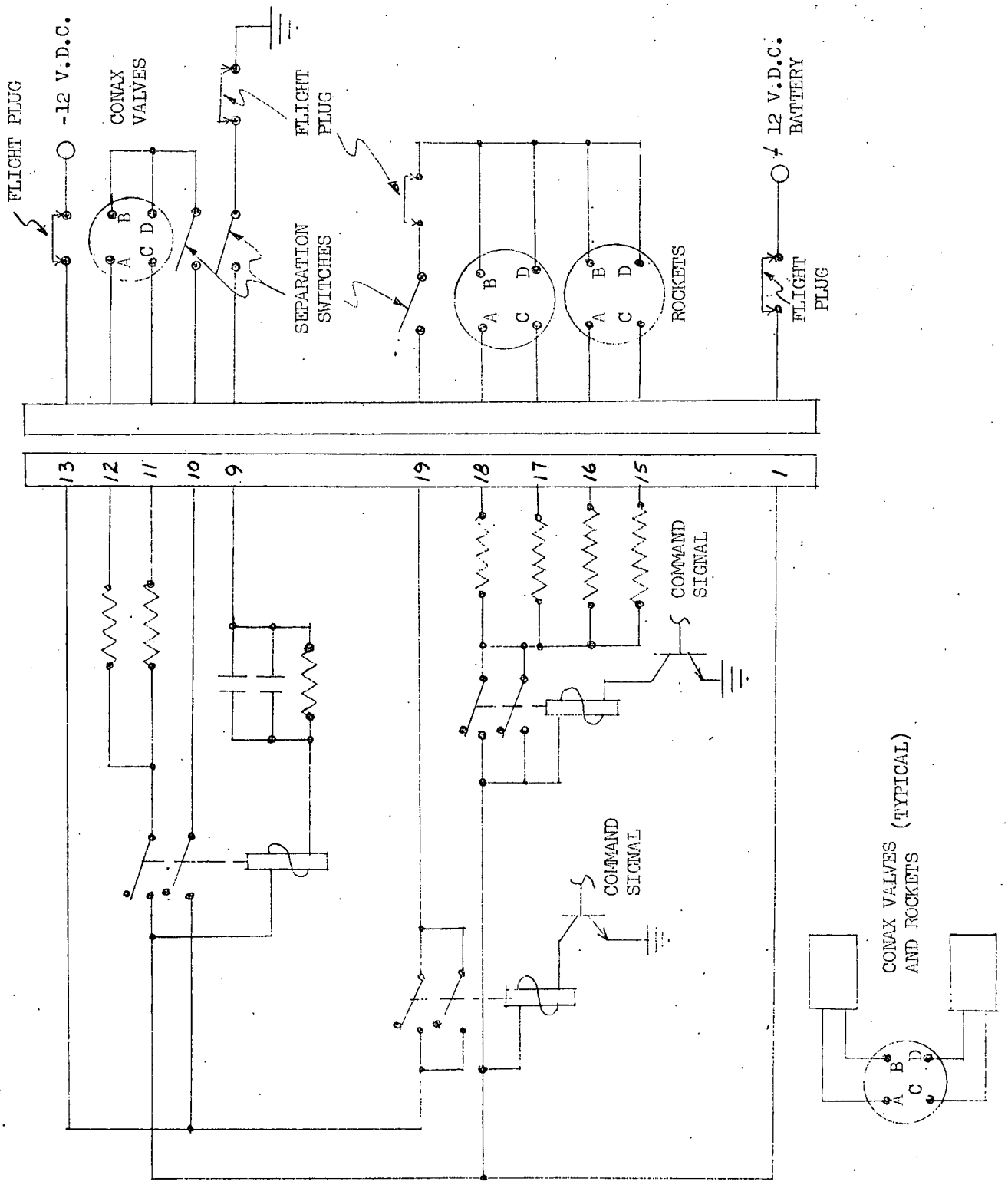

FIGURE (1)

SOL RAD SCOUT

SIMPLIFIED SEPARATION CIRCUIT # 1
(System # 2 is Identical)

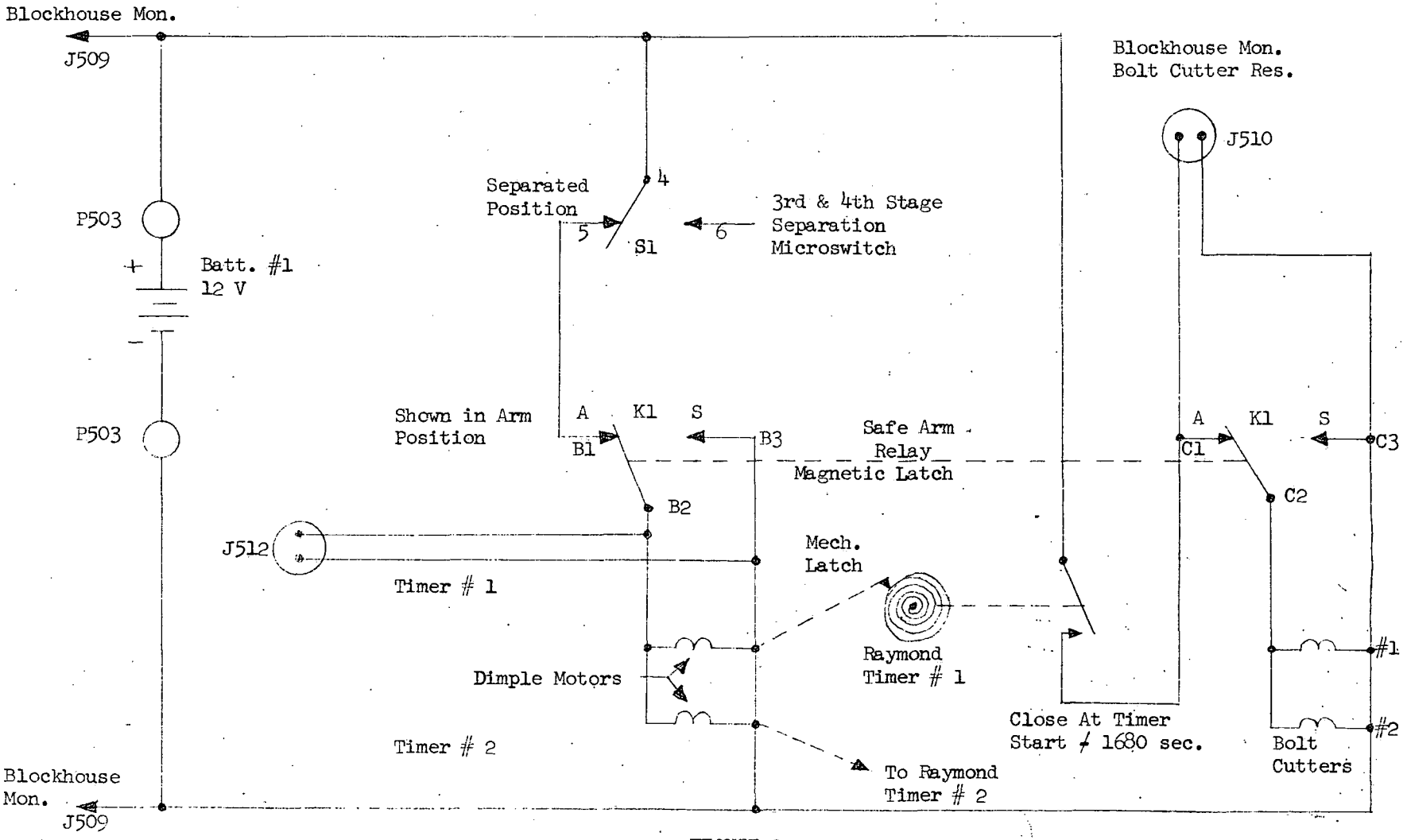

FIGURE 2

Approved for Release: 2024/06/08 C05025871

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4. Ordnance requirements for an aborted operation for the payload are as follows:

   a. Safe the payload separation safe/arm relays at the arming console.

   b. Switch Telemetry to external power - telemetry off.

   c. Remove electrical circuit "flight" plug from payload.

   d. Install shorting plugs on rocket motor connectors.

E. Ordnance Test Gear

1. No voltage checks:

   A high impedance voltmeter plugs into satellite in place of rockets and conax valves. Indicates safe condition.

2. Continuity check:

   50 - 0 - -50 microameter plugs into ordnance items: Indicates continuity of ordnance devices by providing damping for meter movement.

3. Circuit Operation check:

   6 light bulbs and their associated three connectors plug into satellite in place of ordnance items. Indicates circuit operation by lighting light bulbs.

F. Checkout Procedure - Satellite

1. All ordnance plugs open.
2. Keepers on separation switches to simulate launch condition.
3. Flight plug installed.
4. No voltage check at each ordnance plug.
5. Light bulbs connected to ordnance plugs.

6. Keeper taken off conax valve separation switches. Conax valve lights should light.
7. Keeper taken off Rocket separation switch. Rockets lights should not light.
8. Flight plug out.
9. Keepers back on separation switches.
10. Safe flight plug-in. This plug does not have pin 11 connected to pin 12, and also does not have pin 13 connected to pin 14.
11. Keeper taken off conax valve separation switches. Conax valve lights should not light.
12. Keeper taken off rocket separation switch. Rocket lights should not light.
13. Application of command signals. Rocket lights should not light.
14. Safe flight plug out.
15. Light bulbs disconnected from ordnance plugs.
16. Continuity check of conax valves and rockets.
17. Mechanical installation of conax valve spin-up system.
18. Mechanical installation of rockets.
19. Rocket shorting plugs installed.
20. Safe flight plug installed.
21. No voltage checks at ordnance plugs.
22. Final electrical connection of conax valves.
23. Safe flight plug out.
24. Transport of satellite to pad.
25. Mechanical installation of satellite to structure on rocket at pad. This is equivalent to putting keepers on all separation switches.

26. Flight plug installed.

27. No voltage check at rocket plugs.

28. Removal of rocket shorting plugs.

29. Electrical connection of rockets.

30. Nose Fairing installation.

31. Launch.

G. Checkout Procedure - Payload Separation

1. Circuit Operation Check

a. Before ordnance hookup, both timers will be operated by manual start, the time interval measured, and the presence of the proper voltage at the bolt-cutter connectors measured with a special voltmeter. The safe/arm relay will be operated at this time to show application and removal of the firing potential at the bolt-cutter connectors. (This measurement should be made with the flight batteries connected for flight and the separation microswitch in the unseparated condition.)

b. Operation of the firing circuits for the dimple motors in the two timers will be observed by replacing the timers with a test box including a voltmeter, and simulating closure of the separation switches (S1 and S2). Flight batteries are to be used, and the safe/arm relay will be operated to demonstrate application and removal of the firing potentials.

2. Ordnance bridge wire continuity measurements will be made using a zero center 50 micro amp meter connected across each wire in turn. Continuity is indicated by damping of the meter movement. This measurement will be made prior to ordnance installation.

The bolt cutter bridge wire resistance will be measured from the blockhouse after ordnance hookup through the jack J510 (see Fig. 2).

3. Prior to ordnance hookup, a no voltage check at each ordnance connector will be made as follows:

a. Separation switches S1, and S2 must be in unseparated condition.

b. All ordnance connectors either disconnected or connected to ordnance test box.

c. Both Raymond timers are reset to the latched start condition.

d. Separation system batteries are then connected as for flight.

e. The safe/arm relays K1 and K2 are operated from safe to arm and returned to safe condition while observing voltmeter at each ordnance connector. Indication should be no greater than 0.5 volts across any firing circuit or from either side of any firing circuit to ground.

f. Ordnance connectors are now placed in the flight configuration, and any further observations are made from the blockhouse monitor panel.

H. Vehicle Countdown

A detailed time schedule for the test procedure outlined will be included in the final countdown for the vehicle operation. Tests will be performed by competent NRL payload personnel.

5170-27:ELD:js
NRL Prob RO6-29
SER: 3398
15 Mar. 62

From: Director, U. S. Naval Research Laboratory, Washington 25, D. C.
To: Chief, Bureau of Naval Weapons (Code RT)

Subj: Solar Radiation 4B Operational Requirements

Encl: (1) SOL RAD SCOUT Operational Requirements (Payload Appendix)

1. Enclosure (1) is intended for use in the final preparation of the Operational Requirements Document for the Solar Radiation Scout Program.

Copy to:
AFSSD,

SOL RAD SCOUT Operational Requirements (Payload Appendix)

1.0 General Information

1.1 Operational Control

Payload

a. Martin J. Votaw
Code 5170
U. S. Naval Research Laboratory
Washington 25, D. C.
Telephone: JOhnson 3-6600, ext. 2611

b. Mr. E. L. Dix
Code 5171
U. S. Naval Research Laboratory
Washington 25, D. C.
Telephone: JOhnson 3-6600, ext 2611

1.2 Range Time Utilization

Payload work for launches will be accomplished in two week period prior to each launch.

Launches are scheduled four per year beginning with Scout 111 in April 1962.

Countdown will not exceed ten hour period and will include payload installation to rocket after vehicle electronic systems test and before final ordnance hookup. Detail payload countdown items will be supplied to program four weeks before each launch.

Prelaunch payload radiation tests will be scheduled with the range on a day-to-day basis.

1.3 Program Objective

To study solar emissions in the X-ray and ultra-violet regions in an attempt to understand the mechanisms of solar activity that produce disturbances in the earth's ionosphere.

1.4 Program Description

Small satellites may be utilized to provide simultaneous monitoring of solar emissions in as many as eight wavelength bands. This capability will allow an identification of the type of emission and the magnitude of the change that might be associated with such solar events as flares, prominences, and sun spots both on the disk and on the limb. A comparison of satellite data with optical data and radio communication data provides a tie-in of the satellite data with fields of interest to the Navy.

ENCL 1 TO NRL LTR 5170-29

Small spinning satellites with simple FMAM continuous telemetry are designed to operate from solar cells and provide a monitor of the solar emission for many months in orbit.

1.5 Program Vehicle Description

The program is based on utilization of the improved Scout B and a prograde PMR launch to place a 75 pound payload into a 500 nautical mile circular orbit.

1 1.5.1.2 Payload drawing (See attached photograph)

1.5.2 Telemetry System

Solar Radiation 4B contains a continuously radiating telemetry transmitter with the following characteristics:

Frequency: 108.090 Mcs ±2 Kc
Modulation: Amplitude
Power Output: 100 mw

Also contained in the payload is a command receiver as follows:

Frequency: 138.060 Mcs ±3 Kc
Sensitivity: -90 dbm
Bandwidth: ±10 Kcs

1.5.5 Ordnance Items

Located on or in the payload, are the following:

(a) Four (3) MARC-3, Type 0.3KS5 control rockets for payload spin.
(b) Two (2) Conax valves, Type SFV-22M explosive valves for payload de-spin.

Located between the payload and the fourth stage motor as part of the separation mechanism are the following:

(a) Two (2) Ordnance Associates Type OA-A6 explosive cutters on flight clamp.
(b) Four (4) Hercules Powder Co., Type DM25N4 Dimple motors as part of Raymond timers.

1.6 Range Users Ground Instrumentation

A complete ground station providing for reception, recording, and data reduction will be provided by the U. S. Naval Research Laboratory. In addition, a command transmitter and associated equipment will be utilized to transmit command functions to the satellite during the launch checkout procedure.

Range timing will be required at the ground station during the launch countdown.

1.6.1. Transmitter

VHF transmitter
Manufacturer - General Electronics Laboratory
Silver Spring, Maryland
Frequency: 138.060 Mc ±2 Kc
Power: 50 watts
Modulation: AM, Audio tones

1.6.2 Receivers

a. Receiver Type 390
Tapetone Converter Type TC 136
Frequency: 136.890 Mcs ±3 Kc
(Tracking Beacon)

b. Receiver Type 390
Tapetone Converter Type TC 108
Frequency: 108.090 Mcs ±3 Kc
(Satellite telemetry)

1.7 Summary of Planned Frequencies

a. Satellite Telemetry: 108.090 Mcs ±3 Kc
b. Tracking Beacon: 136.890 Mcs ±3 Kc
c. Command: 138.060 Mcs ±3 Kc

2.0 Data

2.1 Metric Data

2.1.1 Metric launch data

NR

2.1.2 Metric Midcourse data

NR

2.1.3 Metric Orbital and Space Data

Injection parameters are required by NRL as soon as available after launch.

2.1.4 Metric terminal data

NR

2.1.5 Other metric data

NR

2.2 Photographic Requirements

None

2.3 Telemetry

NR

2.4 Other data

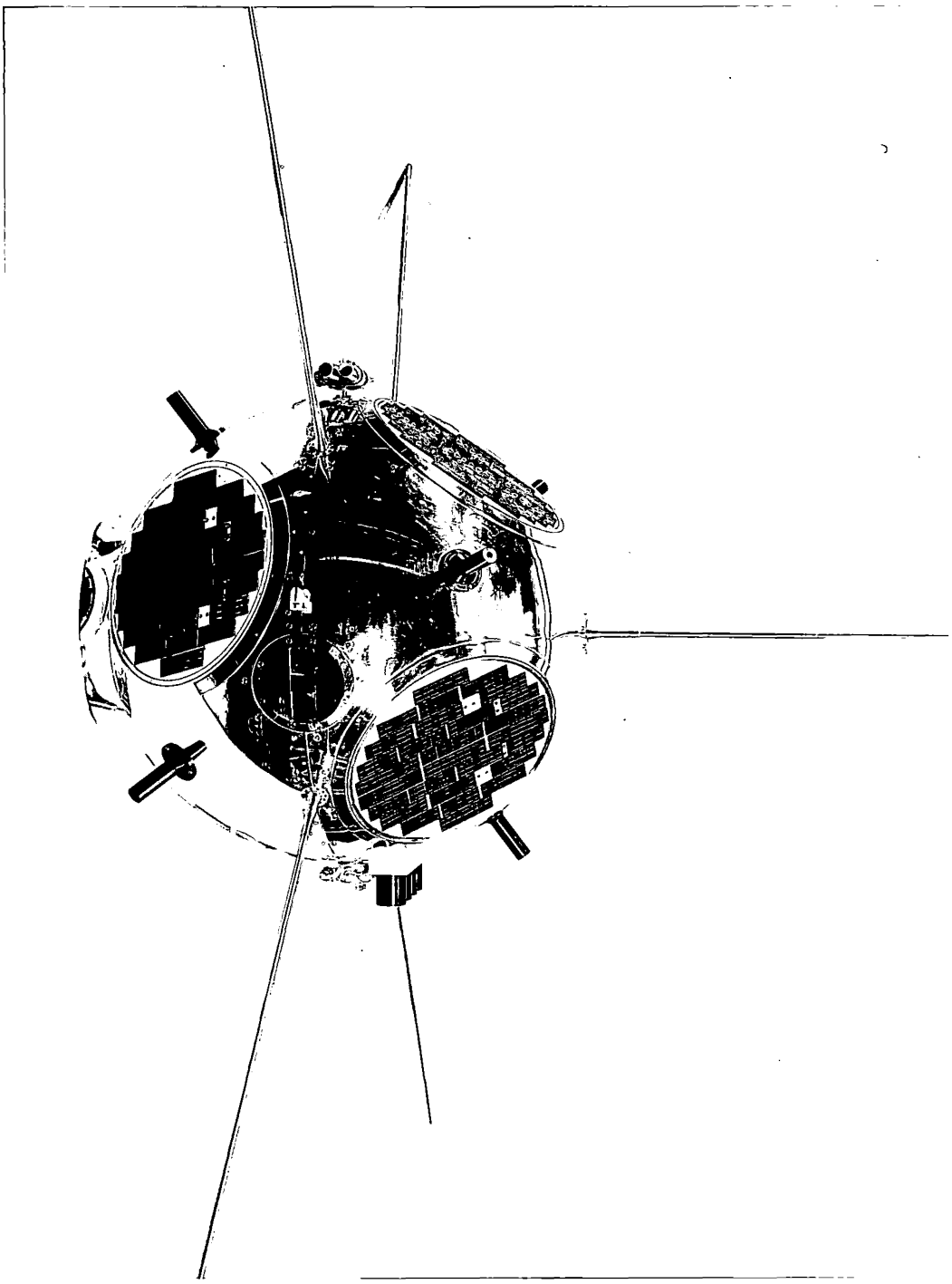
NR

3.0 Meteorological Services

No satellite requirements

4.0 Support Instrumentation

One phone line to SOL RAD ground instrumentation trailer is required. In addition, MOPS communication from the trailer to blockhouse, and range timing signals in the trailer will be required.



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