

PHYSICAL DESCRIPTION OF THE FLIGHT

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PHYSICAL DESCRIPTION OF THE FLIGHT

Successful analysis of the biologic and dosimetric specimens flown on Discoverer XVII¹ permitted several changes in the experimental plan. Proof that the more rugged tissue cultures could survive the conditions of the flight permitted inclosure of six additional types of tissue culture. A second type of spore was also added.

As Discoverer XVII was exposed to the solar protons from one of the largest flares ever observed, and received a radiation dose of less than 35 rads equivalent 730 Mev proton from the primary radiation, the entire dosimetry experiment was redesigned to obtain additional information at low doses.

EXPERIMENTAL PLAN

The object of the experiment was to determine the biologic effect of cosmic radiations at the cellular level and to correlate the observed biologic effects with the types and intensities of measured cosmic radiations.

On 30 November 1960, the SAM biopack aluminum can was packed as shown in figures 1 and 2 with the following:

	Symbol
Section I	
1 neutron film pack	NT, S.F.P.
4 chemical dosimeters (2 lead wrapped)	CD
2 alanine packets	AL
2 ampuls of spores	S
2 552 film strips	552
4 glass rod sets	●
1 gold foil	F
2 glass chip dosimeters	G

¹Crawford, G. W. Radiobiologic experiments in Discoverer satellites. *In* Lectures in Aerospace Medicine. USAF Aerospace Medical Center, Brooks AFB, Tex., Jan. 1961.

Section II

1 step plate and film in X-Y plane	S.P.
1 step plate and film in Y-Z plane	S.P.
1 step plate and film in X-Z plane	S.P.
2 552 film packages	552
4 ampuls of spores	S
3 ampuls of tissue (nerve)	NT
3 ampuls of tissue	T
6 ampuls of algae	A
6 glass rod sets	●
2 alanine packets	AL

Section III

2 neurospora samples with track plates	NS.S., T.P.
2 protein plates with track plates	G.G., T.P.
3 track plates	T.P.

Section IV

5 track plates	T.P.
6 ampuls of spores	S
6 ampuls of tissue	T
2 ampuls of algae media	A
8 glass rod sets	●
2 alanine packets	AL

Polyethylene foam was used to pack the many small items tightly in the aluminum can. The packed can weighed 2 pounds. A second can was prepared as a ground control.

DESCRIPTION OF THE FLIGHT

On 1 December 1960, Dr. George Crawford delivered both cans to Roy Wardell of Lockheed Missile and Space Division at Vandenberg Air Force Base, Calif. The cans were maintained at a temperature near 40° F. from the time of packing to the time the flight can was mounted in the Discoverer XVIII nose cone. The ground-control package received identical preflight treatment.

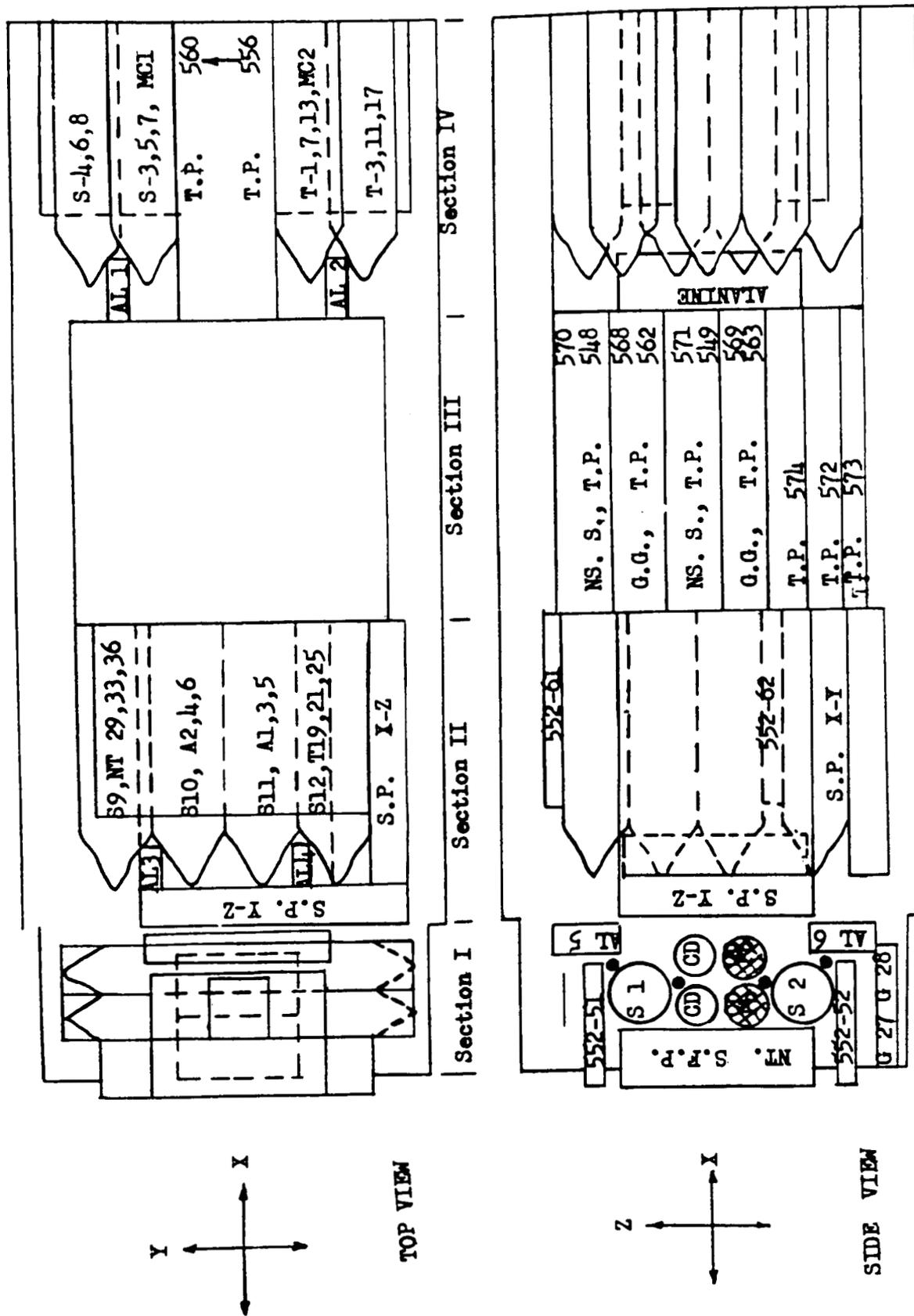


FIGURE 1
Top and side view of the 4 sections of SAM biopack aboard Discoverer XVIII.

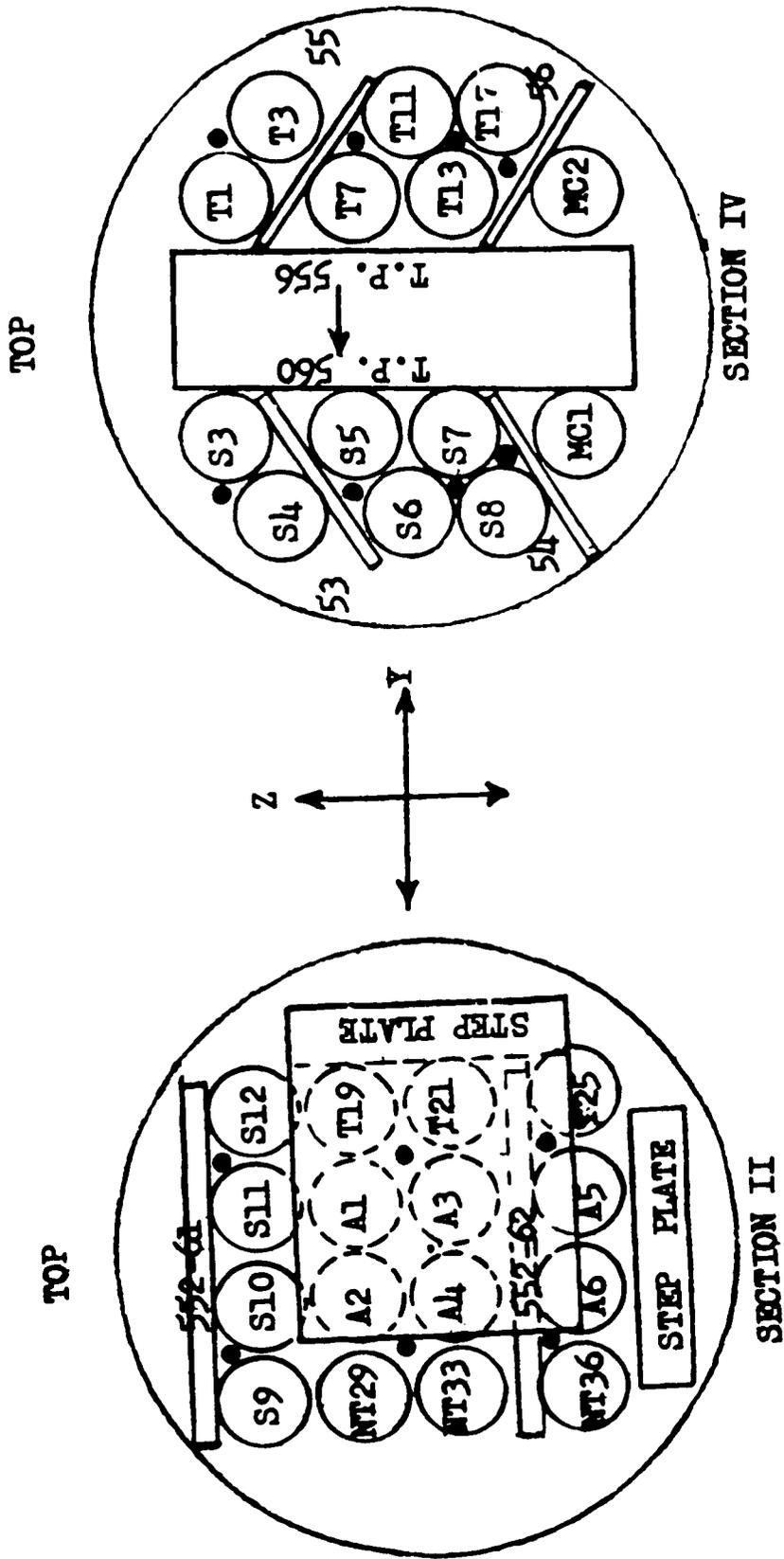


FIGURE 2
SAM biopack aboard Discoverer XVIII.

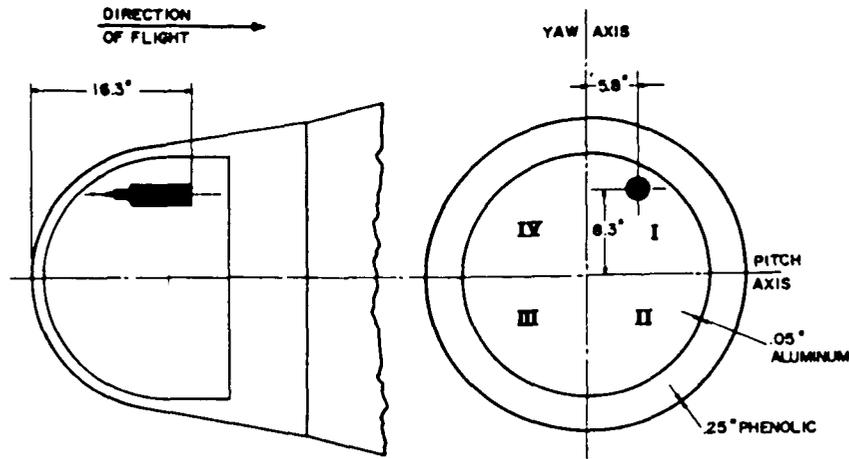


FIGURE 3

Location of SAM biopack in Discoverer XVIII.

The flight can was mounted in the Discoverer nose cone as shown in figure 3. The only shielding for the 180 degrees of the can was that given by the 0.25-inch phenolic (0.85 gm./cm.²) heat shield, the 0.05-inch aluminum (0.34 gm./cm.²) wall of the nose cone, and the 0.06-inch aluminum (0.43 gm./cm.²) wall of the SAM can. A flexible stainless steel strap 0.030 inch thick and 0.50 inch wide was placed around section IV to hold the can in place. The temperature inside the nose cone was maintained at 70° F. ± 10°.

At 2021 universal time (UT) on 7 December 1960, Discoverer XVIII was boosted to near orbit altitude by an Air Force Thor rocket from a launching site at Vandenberg Air Force Base, Calif. After the Thor had separated from the Agena, the Agena liquid fuel engine was ignited, placing the satellite on a polar orbit having a perigee of 125.7 nautical miles and an apogee of 332.1 nautical miles. The orbit period was 93.67 minutes.

After 75 hours and 48 orbits in outer space, on 10 December 1960, Discoverer XVIII ejected its 300-pound nose cone on command from the ground. An Air Force C-119 used a trapezoidal device to catch the capsule. Recovery was timed at 2342 UT. This was the third air snatch and the fourth Discoverer recovered from orbit.

The nose cone was flown to the Lockheed Missile and Space Division at Sunnyvale, Calif. The SAM biopack and the ground-control biopack were replaced in the refrigerated shipping box and returned to Brooks Air Force Base on 12 December 1960.

The members of the SAM Discoverer team appreciate the assistance of the following: Major General Otis O. Benson, Jr., Colonel Robert B. Blount, Colonel John E. Pickering, and Dr. Roland B. Mitchell, of the School of Aerospace Medicine; Lieutenant Colonel Edward L. Cole, Captain Bruce W. Pinc, and Captain A. W. Johnson, of the Air Force Ballistic Missile Division; and George Manalga and Robert E. Watson, of the Lockheed Missile and Space Division.