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FLIGHT TEST OF THE FULL-SCALE STRATUS VEHICLE, LTU-3B (U)

Organization 7300 Environmental Test Report

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Introduction

The object of this test included the determination of the following six points:

1. Lift and drag characteristics of the wings, body, fin and parachute arrangement.
2. Body trim angle during flight.
3. Stability characteristics in pitch, yaw and roll.
4. Structural verification of the hinges, actuator arm, and basic wing structure.
5. Deployment of the small and large parachutes.
6. Trajectory traversed including altitude, down range, offset range, and velocity.

The test vehicle is called out on Sandia Drawing K34706.

This test was requested by R. Straut, 8124, on October 15, 1965. W. R. Kampfe, 7344, was the Test Engineer. The test item was received January 17, 1966, and the test was completed January 19, 1966.

Summary

The unit was released from the sled at a velocity of 730 fps, some 145 fps slow, due to the ignition failure of five HVAR rocket motors on the second stage of a three-stage sled trajectory. The unit, unperturbed by sled lift-off, began yawing and rolling to the left (looking forward), thus causing an abbreviated flight terminating 4740' south and 1700' east of the release point after reaching an apogee of about 300 feet.

Procedure and Results

Test Setup

The programmed trajectory to bring the unit up to ejection speed dictated the use of twenty-eight HVAR rocket motors, divided into three stages, on two rocket sleds. The first two stages were comprised of eleven rockets each on 7344's VME sled, while the third and final stage used six HVARs on

the six-foot tower sled. Three stages were used in order to keep the sled acceleration low enough to insure no structural damage to the six-foot tower sled which might be caused by inertial loadings of the heavy unit (1200#) supported six feet above the rail.

The unit was mounted on a wedge atop the tower sled to give it an initial ten degree angle of attack (nose upward). The unit was braced against lateral motion by two "sway braces" of the type used on military aircraft ejection racks. The vehicle was secured to the sled by holding its two lugs in explosively activated lug holders. These devices, gripping the lugs in a "clamshell" fashion, were released by a blast of high pressure air initiated by an explosive valve. The valve received its pulse from a cutter bar-screen box system placed along the track at the proper location. Figure 1 depicts the sled-unit assembly before testing.

The unit was instrumented with a telemetry system that was to transmit data on attitude and rates of motion (i.e., roll, pitch, and yaw angles and roll, pitch, and yaw rates). The remainder of the instrumentation consisted solely of photographic coverage including tracking from the ground, tracking from the air, and the use of the 70mm Ballistic Range.

Results

The first and third stages operated normally, but the second stage misfired with five HVAR motors failing to ignite. When the remaining six rockets fired, two of the live motors were thrown from the sled while the other three remained as excess weight. As a consequence of this mishap, the sled velocity at unit release was 145 fps slow (730 rather than 875). One possible explanation for the failure is that the acceleration, vibration, and rocket blast of the first stage disconnected the five leads from the second stage firing circuit.

After leaving the sled smoothly, the unit immediately began to yaw and roll to the left (looking forward). Ultimately, the unit impacted some 4740' south and 1700' east of the ejection point after climbing to an apogee of about 300'.

The flight lasted approximately twelve seconds in that the gas generator deploying the large parachute fired shortly after the unit struck the ground. Damage to the unit resulting from impact as shown in Figures 2 through 5.

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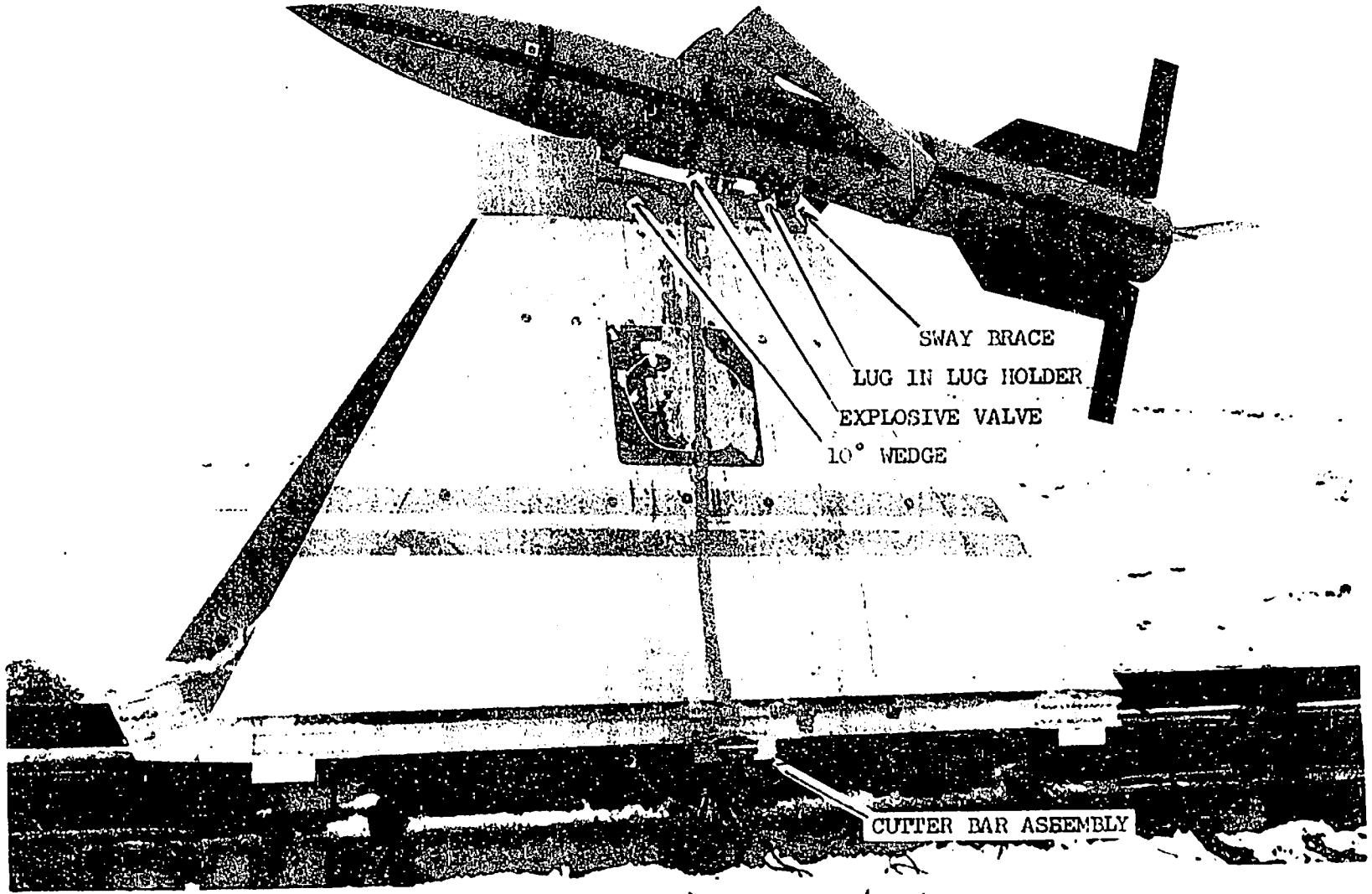

FIGURE 1. UNIT MOUNTED ON 6' TOWER SLED.

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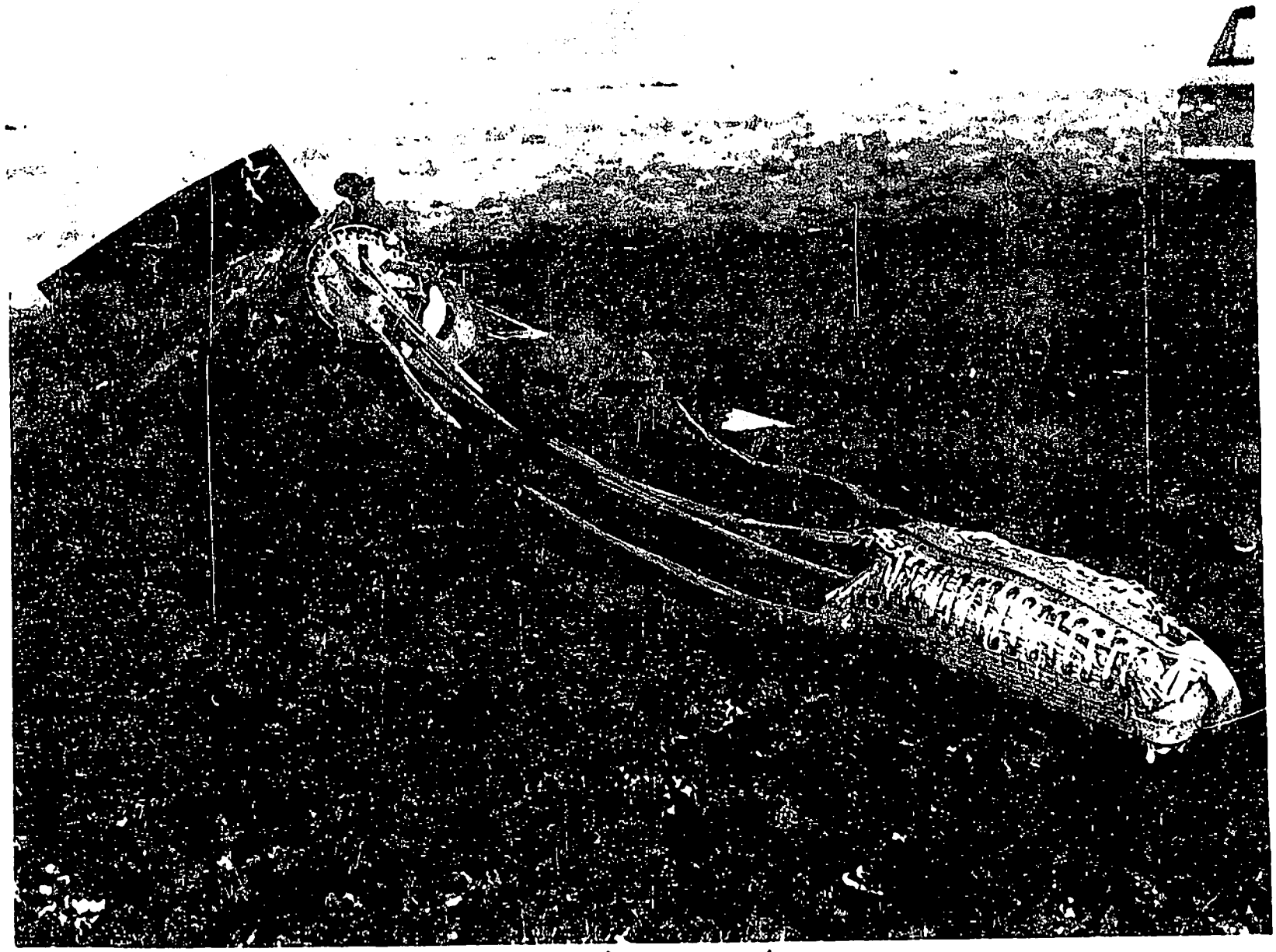

FIGURE 2. UNIT AFTER TEST.

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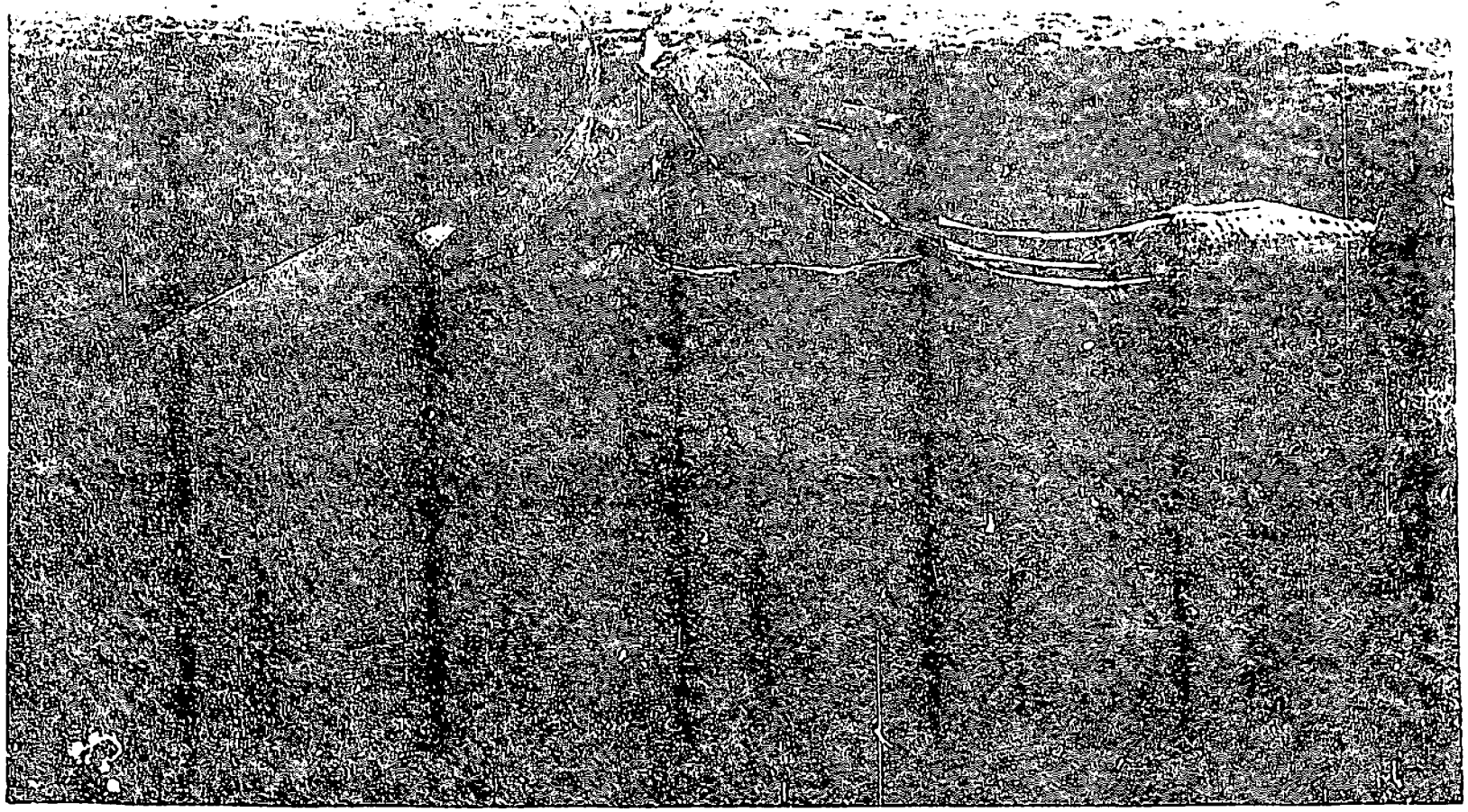

FIGURE 3. UNIT AFTER TEST.

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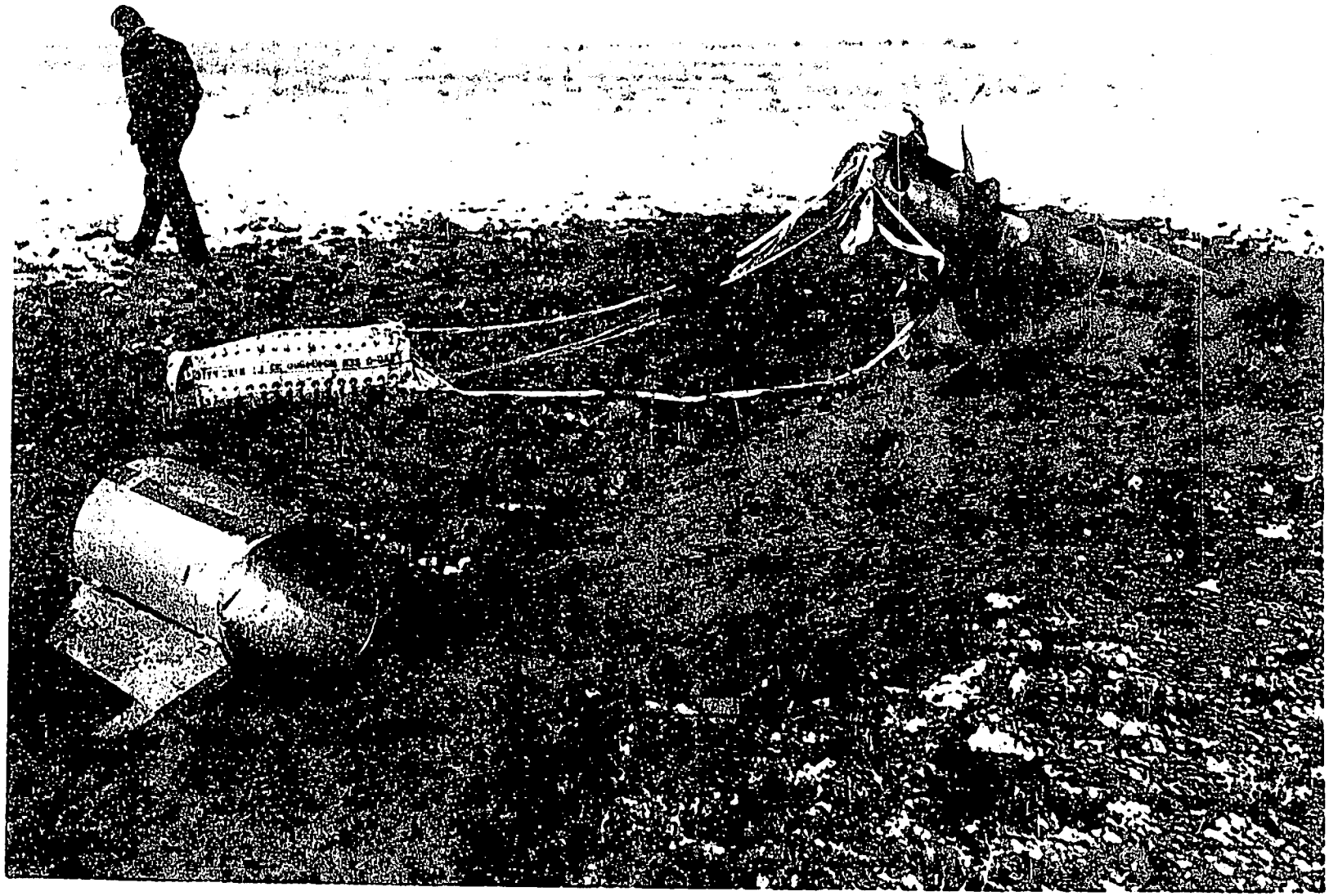

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FIGURE 4. UNIT AFTER TEST.

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FIGURE 5. UNIT AFTER TEST.

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