RELEASE AND IMPACT DATA

1. Release Data can be obtained from Ballistic Cameras and from Askania Cameras. Release Data is computed for the instant of bomb release and the results are tabulated as follows:

a. Round numbers are assigned by the Ballistic Test Facility to each unit released or pass completed for data on the Ballistic Test Facility Range at Edwards AFB.

b. Position (feet)

Serial number is that identification number applied to the unit by the Testing Agency (generally applied by the Weapon Handling Unit for the 4925th Test Group (Atomic) test units.

y_r is the "y" coordinate (in the BTF orthogonal coordinate system) of the aircraft nose (unless otherwise noted).

a_r is the "a" coordinate (in the BTF orthogonal coordinate system) of the aircraft nose (unless otherwise noted).

b_r is the "b" coordinate (in the BTF orthogonal coordinate system) of the aircraft nose (unless otherwise noted).

NOTE: The BTF orthogonal coordinate system is described in Section V.

h_r is the elevation of the aircraft nose (unless otherwise noted) above mean sea level and with reference to the direction of gravity at the release point.

$$h_r = y_r + 2616.71 + .0240(a_r^2 + b_r^2) \cdot 10^{-6},$$

where 2616.71 is the elevation in feet above mean sea level of the B-1 Benchmark, and the constant .0240 is a curvature correction factor.

c. Velocities (feet per second)

$\dot{y}_r$ is the vertical component (in the BTF orthogonal coordinate system) of the aircraft velocity.

$\dot{a}_r$ is the "a" component (in the BTF orthogonal coordinate system) of the aircraft velocity with respect to the a, b plane.

$\dot{b}_r$ is the "b" component (in the BTF orthogonal coordinate system) of the aircraft velocity with respect to the a, b plane.

v_r is the total velocity (in the BTF a, b plane) of the aircraft. (Ground speed.)

$$v_r = \sqrt{\dot{a}_r^2 + \dot{b}_r^2}$$

d. Track (degrees)

Grid Azimuth is the angle between the track (or course) of the aircraft and the positive direction of the "b" axis of the BTF orthogonal coordinate system. It is measured <u>clockwise</u> from the positive "b" axis.

NazE is the angle between the track (or course) of the aircraft and the North-South meridian through the B-1 Benchmark. It is measured clockwise from true north (at B-1) to the positive direction of the flight path.

2. The position of impact is obtained from the reduction of theodolite readings. The results are tabulated as follows:

a. Impact Position (feet)

y_i is the "y" coordinate (in the BTF orthogonal coordinate system) of the center of the bomb impact.

a_i is the "a" coordinate (in the BTF orthogonal coordinate system) of the center of the bomb impact.

b_i is the "b" coordinate (in the BTF orthogonal coordinate system) of the center of the bomb impact.

h_i is the evaluation of the bomb impact above mean sea level, and with reference to the direction of gravity at the bomb impact position.

3. The time of flight of the bomb can be determined from geophone and/or sound microphone detector records, or from Askania, Mitchell or Bowen film. The results are tabulated as follows:

a. Time of Flight (seconds)

Geophone	is the time interval between the release of the bomb (as recorded on an oscillograph tape) and the time when the bomb strikes the ground. The time reported is usually determined from the average from several geophone and/or sound microphone detectors.
Number in Average	refers to the number of detectors used to obtain the average time of flight which is reported as "Geophone" time of flight.
Estimated P.E.	is the estimated probable error of the time of flight obtained from Geophone data.
Askania	is the time interval between release (as recorded on an oscillograph tape) and the time when the bomb strikes the ground as determined from Askania film data.

3. Striking velocity can be obtained from the Mitchell camera, Bowen camera, Askania camera, and (for bombs which strike the ground with supersonic velocities only) from Geophone and sound microphone detectors. The results are tabulated as follows:

Striking Velocity (feet per second) is the velocity of the bomb at height, "h_{sv}" above the ground (Mitchell, Bowen and Askania), or the velocity of the bomb at impact (Geophone).

Striking Angle (degrees) is the angle between the bomb's trajectory and the a, b plane of the BTF orthogonal coordinate system at height "h_{sv}" above the ground (Mitchell, Bowen and Askania), or at impact (Geophone).

Estimated Quality of Data is an adjective based on the consistency of the computed results) describing the quality of the data.

h_{sv} is the average elevation above the ground of the bomb positions used in determining striking velocity from the film. This column will be blank if the striking velocity is obtained from Geophones or Sound Microphones.

4. Dive Angle at release is tabulated under "Remarks." It is the angle between the flight path of the aircraft and the horizontal plane at release.

$$\text{Dive Angle} = \arcsin \frac{\dot{h}_r}{v_r}$$

RELEASE AND IMPACT DATA

PROJECT

Round No.	Program Altitude	Date of Drop

Plane	Time	Type of Bomb

Origin of Coordinates: B_1 Benchmark	Azimuth "+a" Axis: 353° 44' 47"

RELEASE DATA FROM _____ CAMERAS

Serial Number	Position (feet)				Velocities (f/s)				Track (degrees)	
	y_r	a_r	b_r	h_r (sea lev)	$\dot{y}_r$	$\dot{a}_r$	$\dot{b}_r$	v_r	Grid Az.	N az E

IMPACT POSITION (feet)					TIME OF FLIGHT (seconds)			
Serial Number	y_i	a_i	b_i	h_i (sea level)	Geophone	Number in Av.	Estimated P.E.	Askania

STRIKING VELOCITY FROM _____ CAMERA

Serial Number	Striking Velocity (f/s)	Striking Angle (Degree)	Est. Quality of Data	h_{sv}* (feet)

*Striking velocity given represents velocity of bomb at approximately h_{sv} feet above impact.

REMARKS

Release coordinates are those of _____ of aircraft.

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DATA REDUCTION BRANCH
BALLISTIC TEST FACILITY
AIR PROVING GROUND CENTER
AIR RESEARCH AND DEVELOPMENT COMMAND
125 So. Grand Ave.
Pasadena, California

DRBO _____

TRAJECTORY AND FLIGHT PATH DATA

1. Time (seconds after release). Explanation: The instant of release of the bomb is assigned the time value, "0.000 seconds." All other times are figures from this. A negative time indicates time before release.

2.	y (feet)	is the "y" coordinate (in the BTF orthogonal coordinate system) of the aircraft nose (unless otherwise noted) in flight path data, or bonb nose (unless otherwise noted) in trajectory data at the instant indicated in the column headed, "Time."
3.	Delta y (feet)	is the first difference between successive tabulated values of "y".
4.	a (feet)	is the "a" coordinate (in the BTF orthogonal coordinate system) of the aircraft nose (unless otherwise noted) in the flight path data, or the bomb nose (unless otherwise noted) in trajectory data at the instant indicated in the column headed, "Time."
5.	Delta a (feet)	is the first difference between successive tabulated values of "a".
6.	b (feet)	is the "b" coordinate (in the BTF or orthogonal coordinate system) of the aircraft nose (unless otherwise noted) in the flight path data, or the bomb nose (unless otherwise noted) in trajectory data at the instant indicated in the column headed, "Time".
7.	Delta b (feet)	is the first difference between successive tabulated values of "b".
8.	h (feet above sea level)	is the elevation of the aircraft (flight path) nose or bomb (trajectory) nose (unless otherwise noted) above mean sea level and with reference to the direction of gravity through the point for which the position is given at the instant indicated in the column headed, "Time". See Paragraph 1 b, h_r for the equation relating "h" and "y". See Page VI-1.
9.	Residuals	Each entry of the column headed, "Residuals" has six digits. The first two digits refer to the first camera used in the computation of the tabulated space position; the third and fourth digits refer to the

second camera used in the solution; and the fifth and sixth digits refer to the third camera used in the solution. If only two cameras are used, two dots replace the residuals for the third camera. The residual "99" indicates poor data. The residuals are the distances (in feet) from the computed point to the lines of sight of the cameras used.

10. Frame and Channel Numbers — The last column to the right, if it appears, is for local BTF use only.

Supplementary flight path data for level flights can be determined from Ballistic camera photographs.