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SC-DR-64-920

RESULTS OF TX-61 WEAPON TESTS 100-4 AND 100-5  
(Title Unclassified)

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RS 3410/90

R. D. Lindsey, 1513  
Sandia Laboratory, Albuquerque

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INVENTORIED

MAR 1 1966

3428-3

July 1964

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MAR 8 1965  
3427-1

Approved by: James W. Jones  
J. W. Jones, 1510

### ABSTRACT (U)

This report supplements SC-DR-64-522, Test Plan for TX-61 Weapon Test 100-4, and SC-DR-64-6, Test Plan for TX-61 Weapon Test 100-5, with the test results for two freefall drops in the TX-61 weapon development program.

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## RESULTS OF TX-61 WEAPON TESTS 100-4 AND 100-5

### Introduction

Weapon Test 100-4 was a freefall drop designed to check the stability of a unit with canted fins, and Weapon Test 100-5 was a freefall drop designed to check the stability of a unit employing spin rockets and canted fins. Table I summarizes the delivery conditions for these two drops.

TABLE I

<u>Test No.</u>	<u>Date</u>	<u>Carrier</u>	<u>Release Altitude (ft MSL)</u>	<u>Release Speed (Mach)</u>
100-4	1/8/64	F-104C, No. 920	54,600	1.72
100-5	2/7/64	F-104C, No. 889	53,363	1.72

### Test Objectives

The purposes of Tests 100-4 and 100-5 were:

1. To determine trajectory.
2. To determine the stability of the unit during freefall, especially with regard to aerodynamic coupling, with the fins canted for clockwise rotation on both units and with spin rockets on test unit 100-5.

### Summary

Both units were stable throughout the trajectory. Unit 100-4, which had a 1-degree fin cant, reached a maximum roll rate of 8 rps at impact. Unit 100-5, which had a 45-minute angular fin cant, reached a maximum roll rate of approximately 4 rps near impact. The spin rockets in 100-5 did not function because of a failure in the initiation system.

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## Description of Test Vehicles

The vehicles used in these tests are described in SC-DR-64-522 and SC-DR-64-6. Table II summarizes the physical characteristics of the two units.

TABLE II

	<u>100-4</u>	<u>100-5</u>
Length (in.)	141	141
Weight (lbs)	616	610
C. G. (Station)	59.75	59.94
Roll MI (lb-in. <sup>2</sup> )	16,000	14,000
Pitch MI (lb-in. <sup>2</sup> )	684,000	682,000
Yaw MI (lb-in. <sup>2</sup> )	683,000	681,300
Dynamic Unbalance (oz-in.)	Not checked	13 at Sta. 25.5 147 at Sta. 80.4 37 at Sta. 137.3
Fin cant*	1° +10' - 0'	45' ± 3'

### Instrumentation

The instrumentation used in both of these tests is described in SC-DR-64-522 and SC-DR-64-6.

### Test Results

#### Test 100-4

In Test 100-4, the unit pitched down 14 degrees at release and stabilized in about 10 seconds. The roll rate increased smoothly to 4 rps at 10 seconds and to a maximum of 8 rps at impact. A summary of trajectory data is given in Table III.

#### Test 100-5

In Test 100-5, the unit pitched down 9 degrees at release and stabilized in about 8 seconds. The spin rockets failed to fire, but the fin cant (0°45') produced a roll rate of about 4 rps at the time of impact.

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\* Fin cant is the angle between the longitudinal axis of the fin and the longitudinal axis of the test unit. A positive angle is that which produces clockwise rotation as viewed from the rear.

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The spin rockets did not fire because no initiation signal was supplied to them. A thorough investigation did not disclose a definite cause for the signal failure. The initiation system has worked satisfactorily on two later tests.

A summary of trajectory data is given in Table III. Graphs of trajectory, speed, dynamic pressure, and roll rate for each unit are shown in Figures 1 through 8.

TABLE III

## Trajectory Data

	<u>100-4</u>	<u>100-5</u>
Release altitude (ft MSL)	54,600	53,363
Release speed (Mach)	1.72	1.72
Ejection velocity (fps)	12.7	14.9
Time of fall (sec)	60.306	60.537
Range (ft)	84,547	84,528
Trajectory length (ft)	101,532	101,202
Impact velocity (fps)	1592	1553
Impact angle (degrees)	54	55
Roll rate at impact (rps)	8.0	4.0
Maximum roll rate (rps)	8.0	4.1 (at 54 sec)

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TEST NO. 100-4  
CARRIER F-104

TRAJECTORY

INSTRUMENTATION  
3 Contraves Cinethodolites

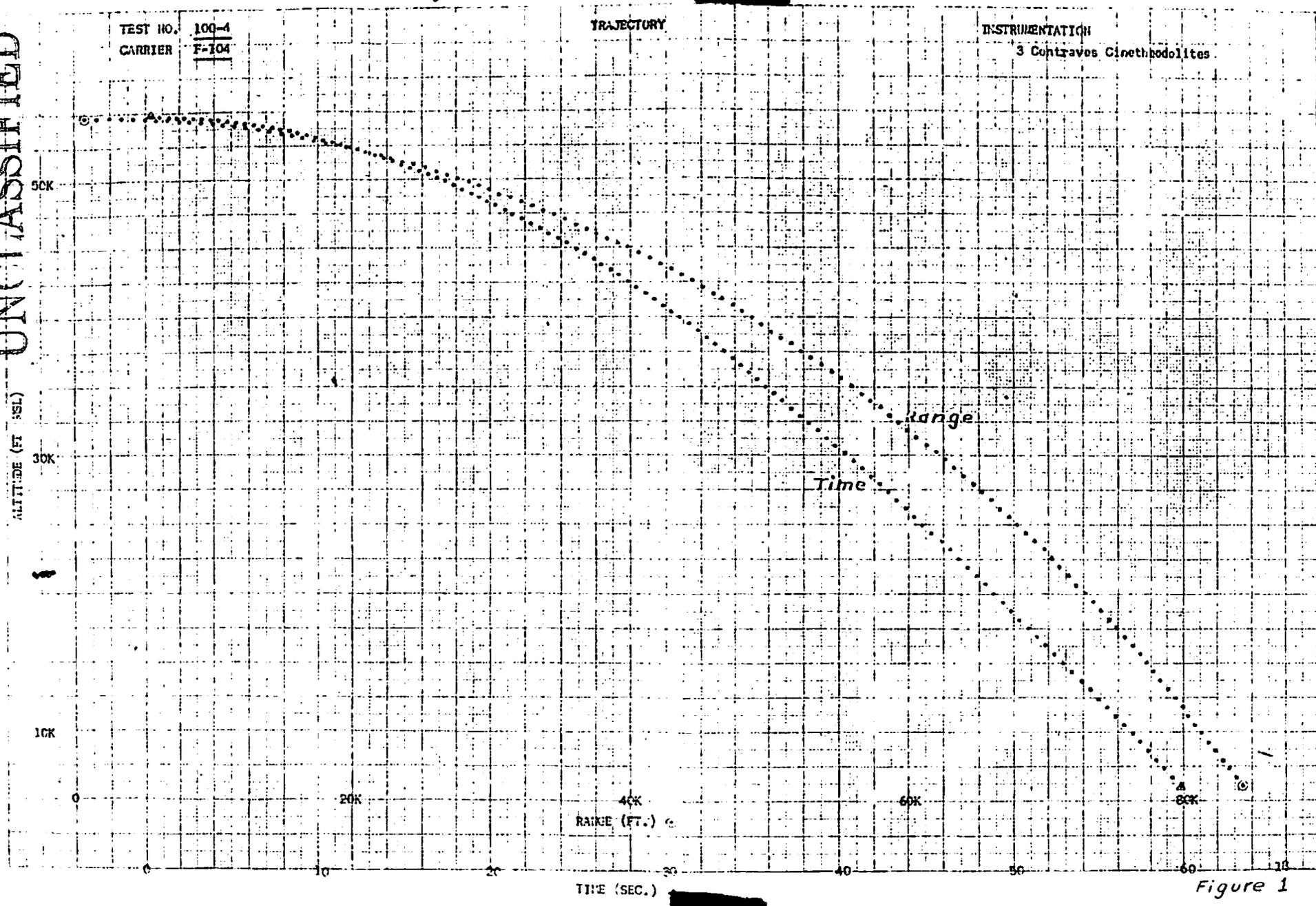


Figure 1

Test No. 100-5  
Carrier F-104

TRAJECTORY

Instrumentation  
3 Cinethocolites

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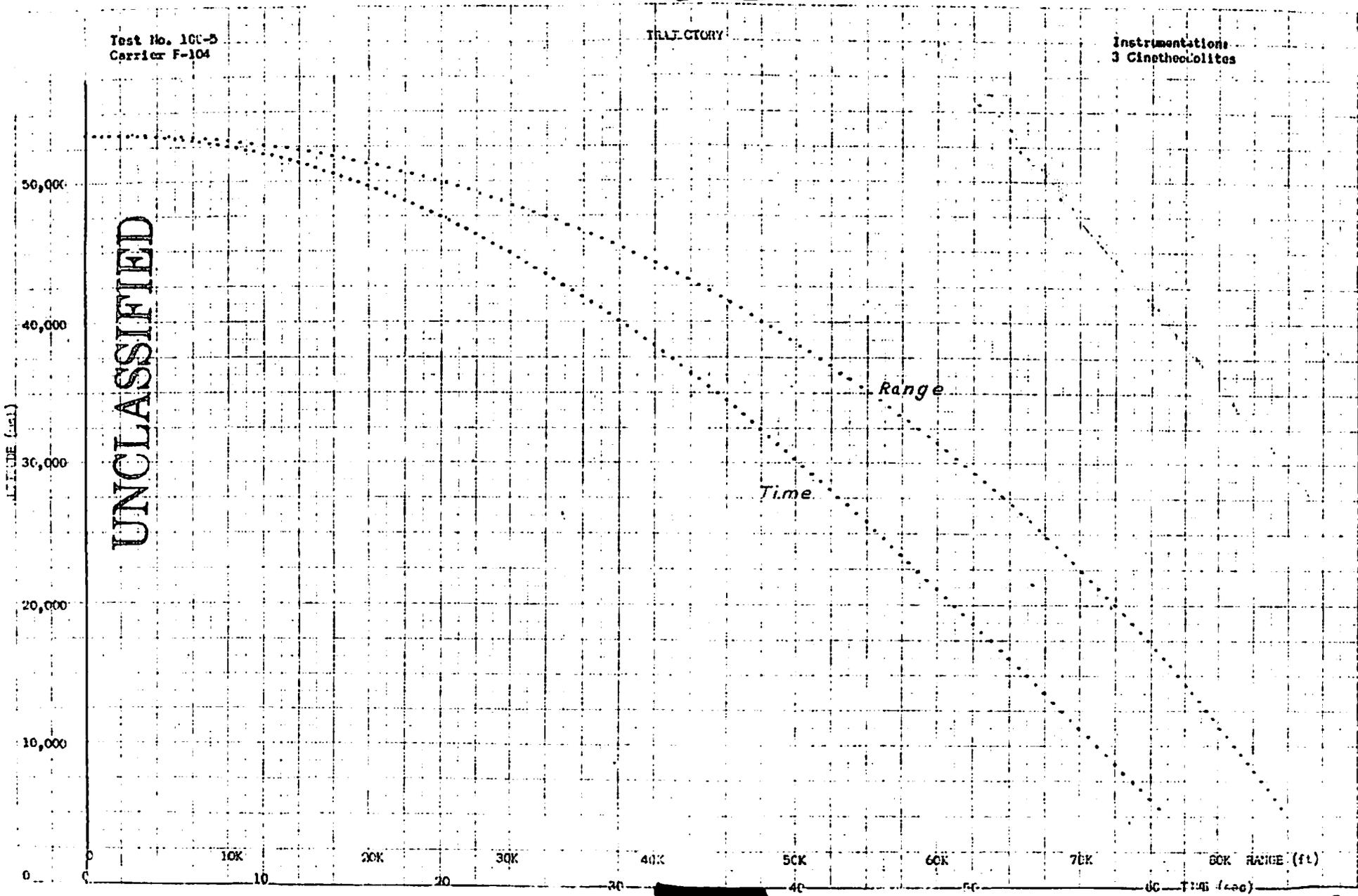


Figure 2

TEST NO. 100-4  
CARRIER F-104

SPEED

20

15

10  
MACH

5

0

0

10

20

30

40

50

60

TIME (SEC.)

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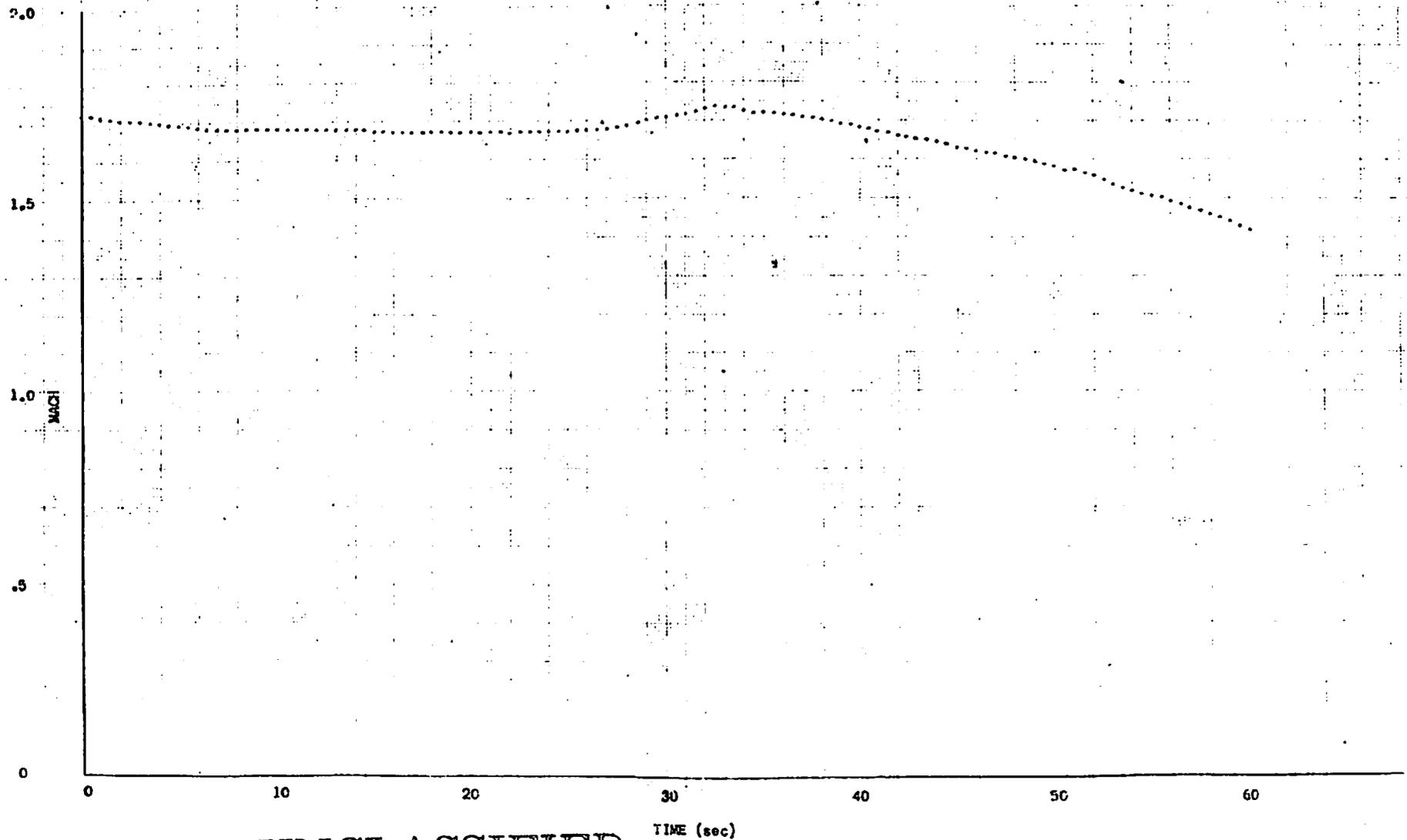
Figure 3

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Test No. 100-5  
Carrier F-104

SPEED

Instrumentation:  
3 Clintheodolites



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TIME (sec)

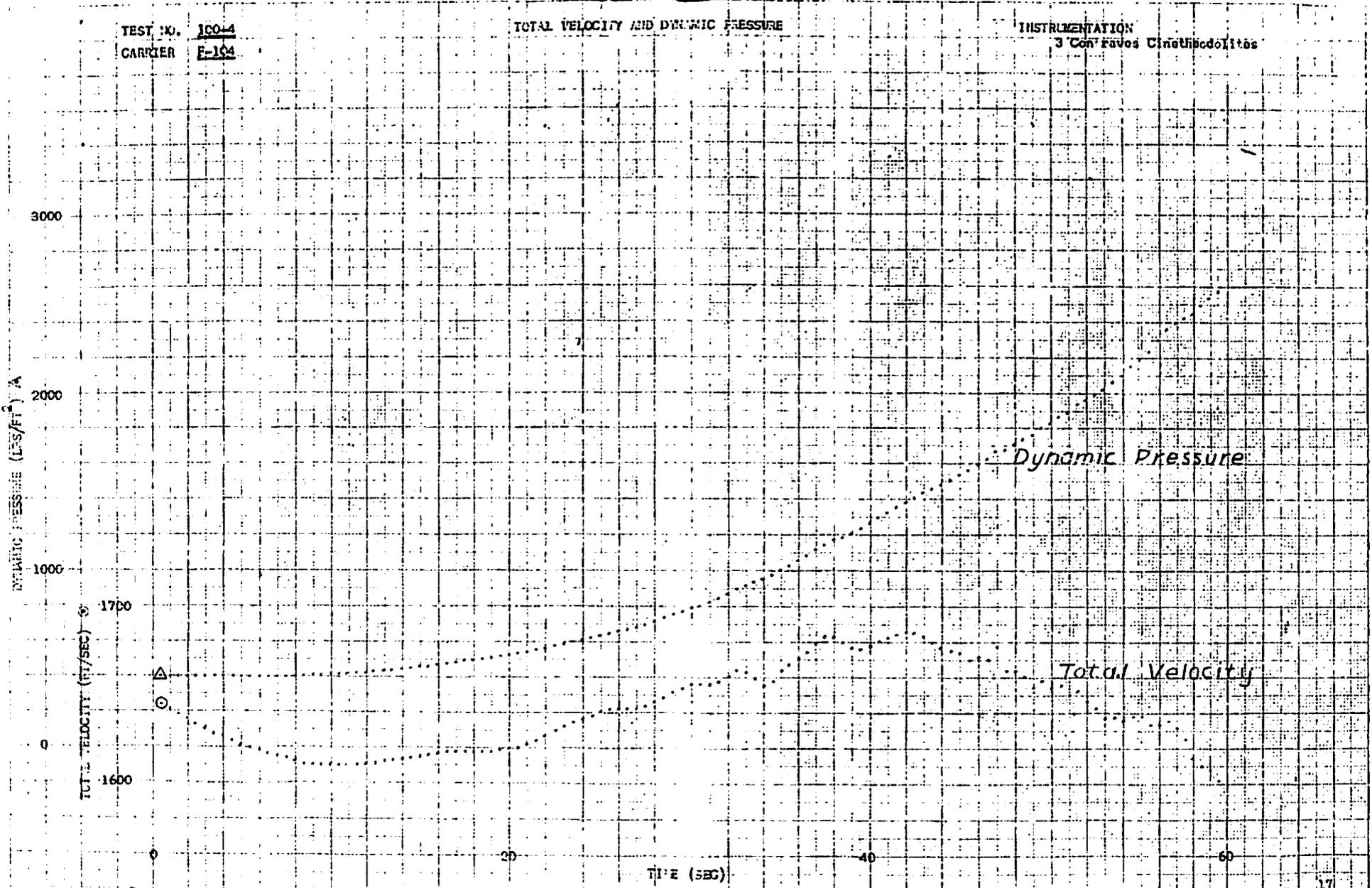
Figure 4

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TEST NO. 100-4  
CARRIER F-104

TOTAL VELOCITY AND DYNAMIC PRESSURE

INSTRUMENTATION  
3 Con Favos Cinetheodolites



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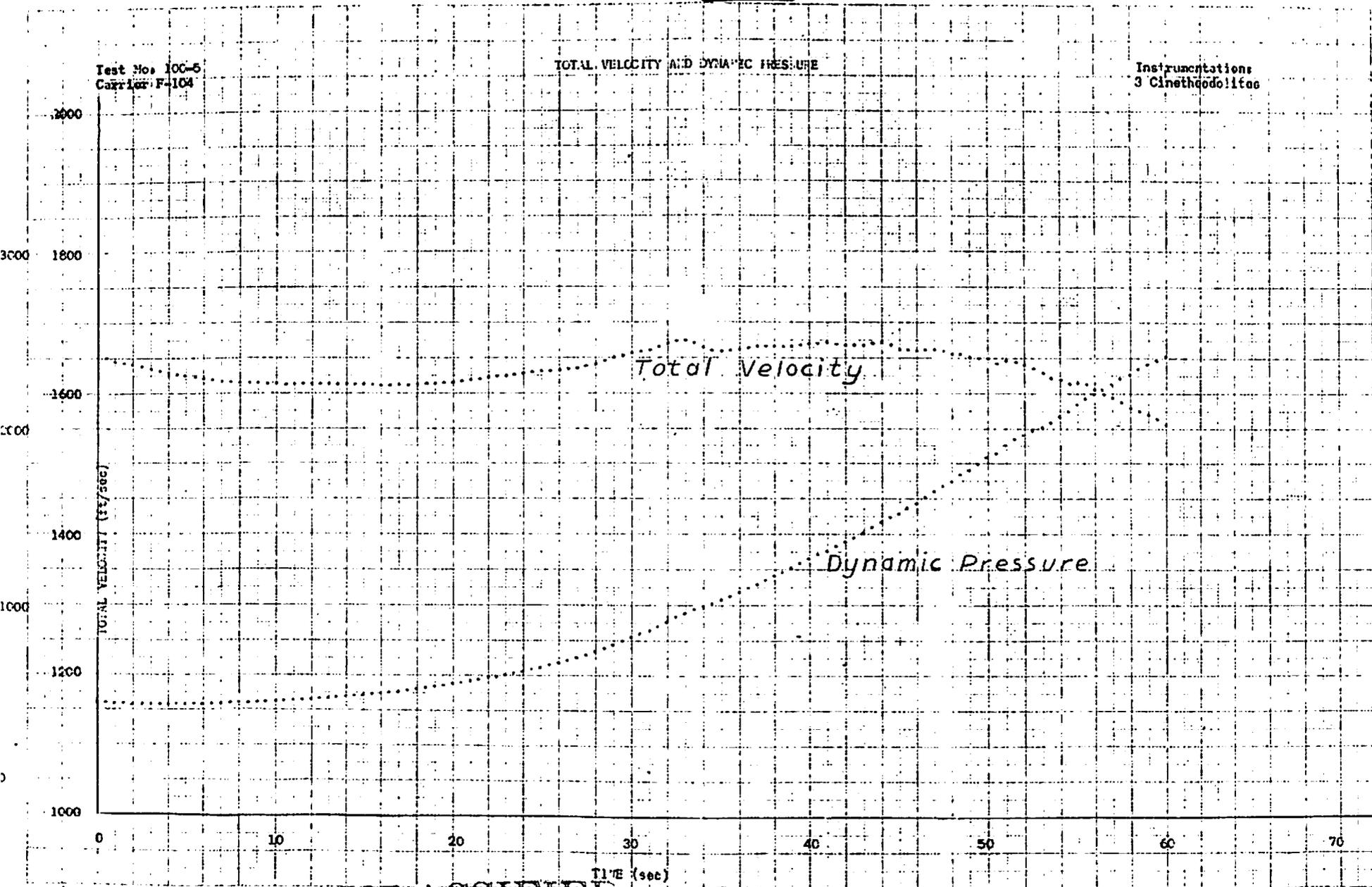
Figure 5

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Test No. 100-5  
Carrier F-104

TOTAL VELOCITY AND DYNAMIC PRESSURE

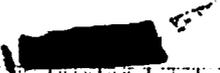
Instrumentation:  
3 Cinethodolite



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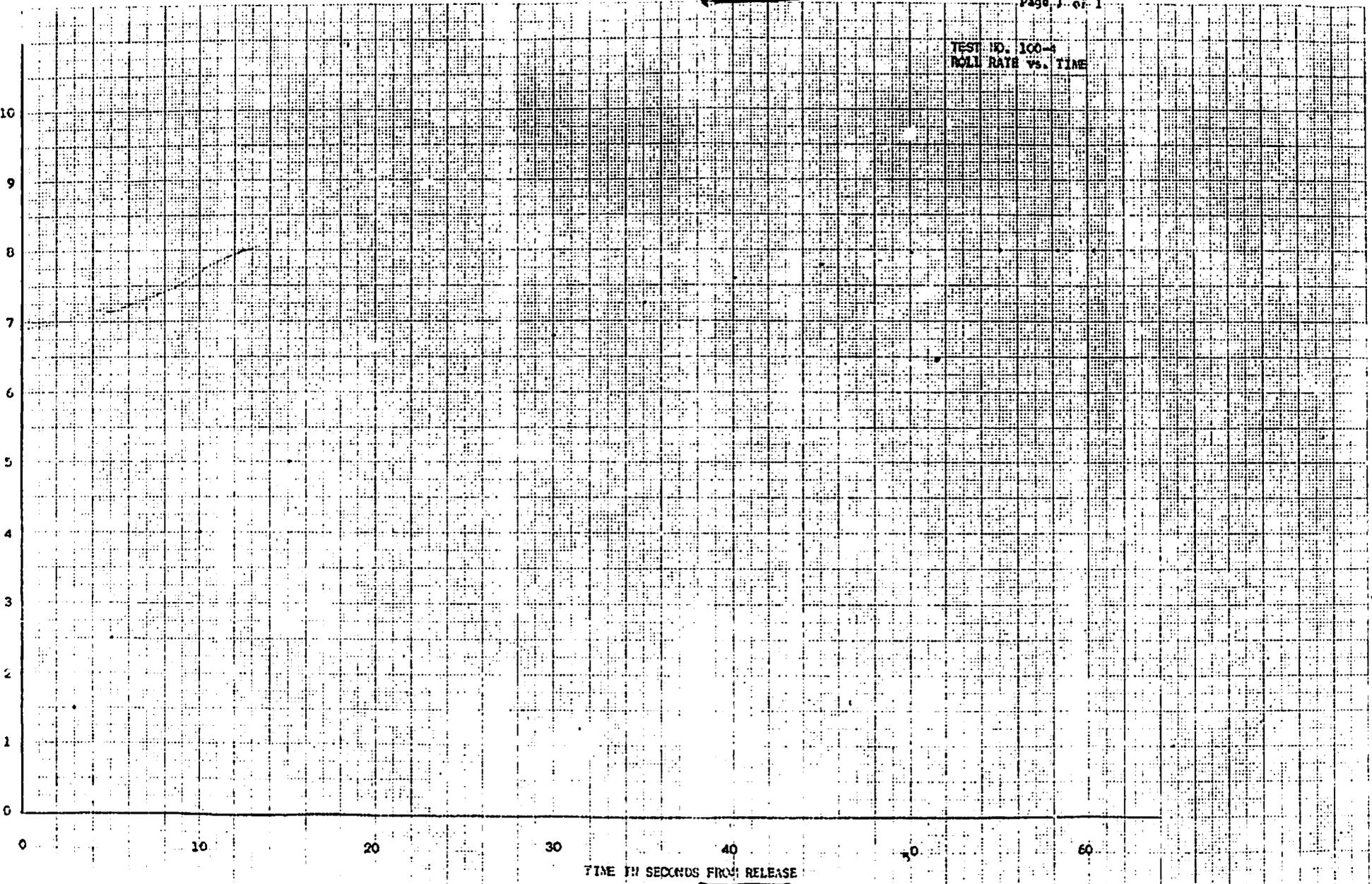
Figure 6

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TEST NO. 100-4  
ROLL RATE vs. TIME



TIME IN SECONDS FROM RELEASE

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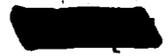
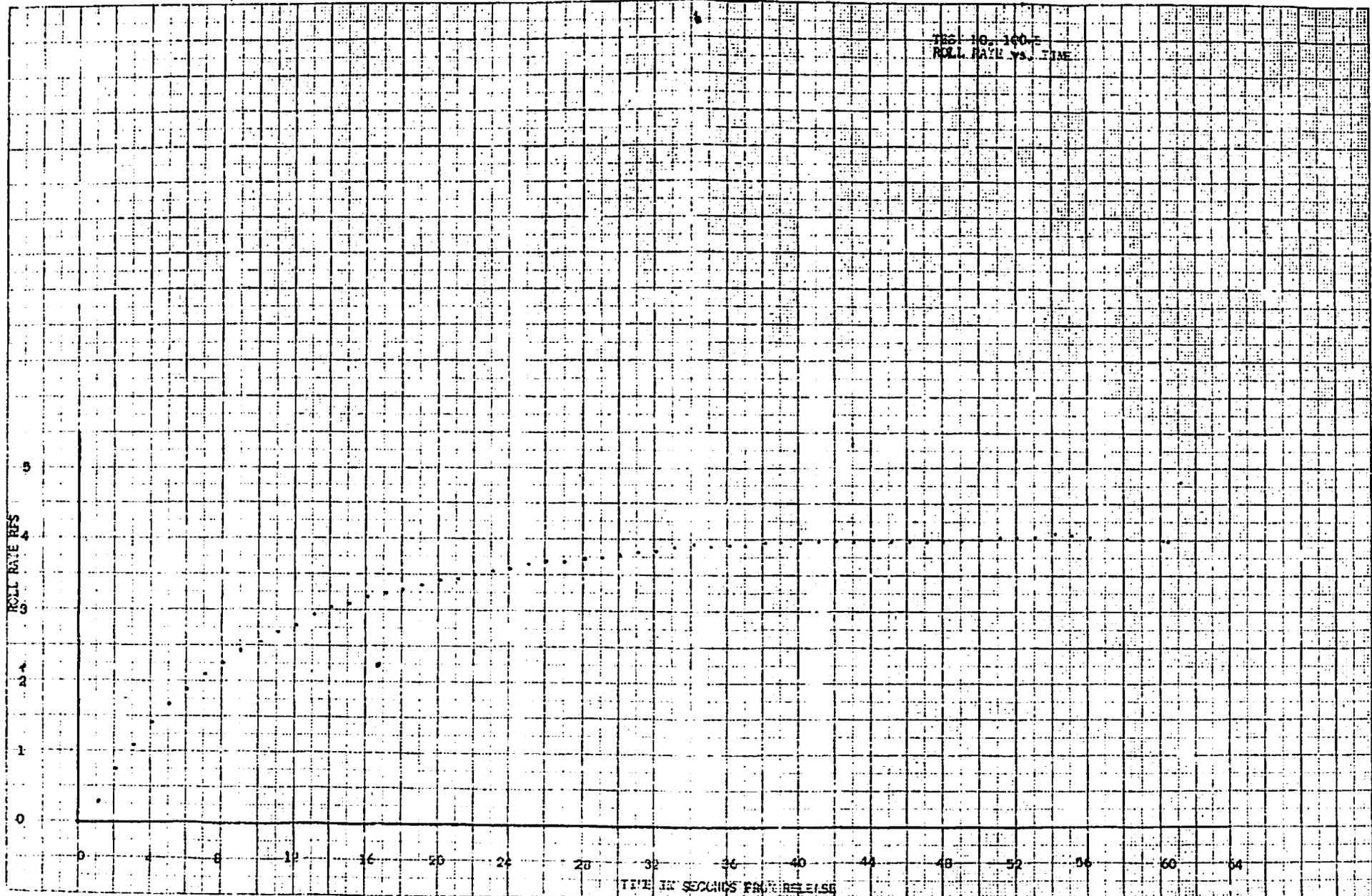


Figure 7

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Figure 8