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APR 12 1956

Case No. 690.00
Ref. Sym: 1612 (312)
Project No. TM-378
File: TX-28, 3-2

MR. S. A. MOORE - 1224

Attn: Mr. L. M. Spivey - 1224-2

Re: Simulated Flight Test of TX-28 Shape with Dynamic Balance

Summary of Results

Three simulated air loads were statically applied simultaneously to determine the structural adequacy of the TX-28 shape when mounted as in actual aircraft carriage by suspending it from its 30-inch hooks to the Douglas Aero 7A-Ejector. As a guide to help determine the structural adequacy, Stresscoat was applied to the test unit.

The three simultaneous simulated air loads were: a lateral load of 2200 pounds total applied at station 24.5; a lateral load of 3800 pounds total inclined 50 degrees to a horizontal axis applied at station 153.5; and a torque of 15,000 inch-pounds applied at the forward fin mounting brackets at station 144. Under this loading condition no Stresscoat cracks developed indicating that the strain in the skin up to and including 100 per cent design limit load was between the threshold value of the Stresscoat which was 700 microinches per inch.

Object of Test

The object of this test was to determine if the TX-28 shape is structurally adequate when statically tested under simulated flight conditions. Deflection readings and Stresscoat information were used as a guide to help determine the structurally adequacy of the TX-28 shape.

Reason for Test

The static test was requested in a Work Order Authorization from S. A. Moore, 1224, to P. H. Adams, 1612, dated January 24, 1956.

Function of Object Tested

The TX-28 shape is a model of the TX-28 ballistic case containing a six component dynamic balance used to determine air loads while in flight.

Summary of Past Tests

No previous static tests have been performed by Division 1612 on the TX-28 shape.

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Setup for Test

The general test setup for TX-28 shape is shown in Fig. 1.

Test Item

TX-28 Shape -- Dwg. No. SK(1224)56439

Test Equipment

One Blackhawk hydraulic jack, capacity 50 tons.
One Simplex hydraulic jack, capacity 30 tons.
One Blackhawk hydraulic jack, capacity 7-1/2 tons.
Four Baldwin load cells, capacity, two 10,000 pound cells and two 5000 pound cells, Serial Nos. 4888 and 4898, respectively.
Stresscoat kit 1203, sensitivity 700 microinches/inch at time of test.

Test Instrumentation

Ten Starrett dial indicators, minimum reading 0.001 inch.

Procedure

An adapter mounting plate was matched drilled to fit the four mounting holes in the Douglas Aero 7A-Ejector. Four 3/4 AN bolts were used to attach the Douglas Aero 7A-Ejector to the mounting plate which in turn was mounted to the static jig. The exterior of the TX-28 shape was Stresscoated and then mounted as in actual aircraft carriage by suspending the shape by its 30-inch hooks from the Douglas Aero 7A-Ejector. Figure 2 shows the TX-28 shape suspended from the Douglas Aero 7A-Ejector.

Three simulated air loads were applied, simultaneously. A lateral load of 2200 pounds total applied through a steel band four inches wide that encircled the unit at station 24.5 and directed along a horizontal axis perpendicular to the longitudinal axis of the TX-28 shape; a lateral load of 3800 pounds total applied through a steel band four inches wide that encircled the unit at station 153.5 and inclined 50 degrees to a horizontal axis perpendicular to the longitudinal axis of the TX-28 shape; a torque of 15,000 inch-pounds applied to the forward fin mounting bracket at station 144. Figures 1 and 3 show the method and location of applied loads.

These loads were applied in increments of 10, 12, 14.4, 17.3, 20.7, 24.9, 30, 36, 43, and 50 percent and further increased in 10 percent steps to 100 percent of design limit loads.

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After each load increment, the TX-28 shape was thoroughly inspected for Stresscoat cracks, and deflection readings taken at 10 different locations. Figures 1, 2, 3, and 4 show the position of the 10 dial indicators.

Under the applied loads the TX-28 shape deflected in directions other than parallel to the dial indicator sensing direction. Hence, the dial indicator readings did not indicate the total deflection of the test unit.

All loads were applied through calibrated load cells using hand operated hydraulic jacks and pumps.

Results

Under the static loads applied no Stresscoat cracks were observed throughout the test. This indicated that the strain in the skin up to and including 100 percent design limit load was below the threshold value of the Stresscoat which at the time of and during the test was 700 microinches per inch.

Under the applied loads the TX-28 shape deflected in directions other than parallel to the dial indicator sensing directions. Hence, the dial indicator readings did not indicate the total deflection of the test unit; however, Table I shows the deflection readings taken in the event a rough approximation is desired.

Conclusion

The skin on the TX-28 shape is capable of withstanding all the loads to which it was tested without yield. Furthermore, the strain in the skin is well below the yield point under these loading conditions and method of support.

A. F. TODARO - 1612-2

Approved by: Paul H. Adams
P. H. ADAMS - 1612

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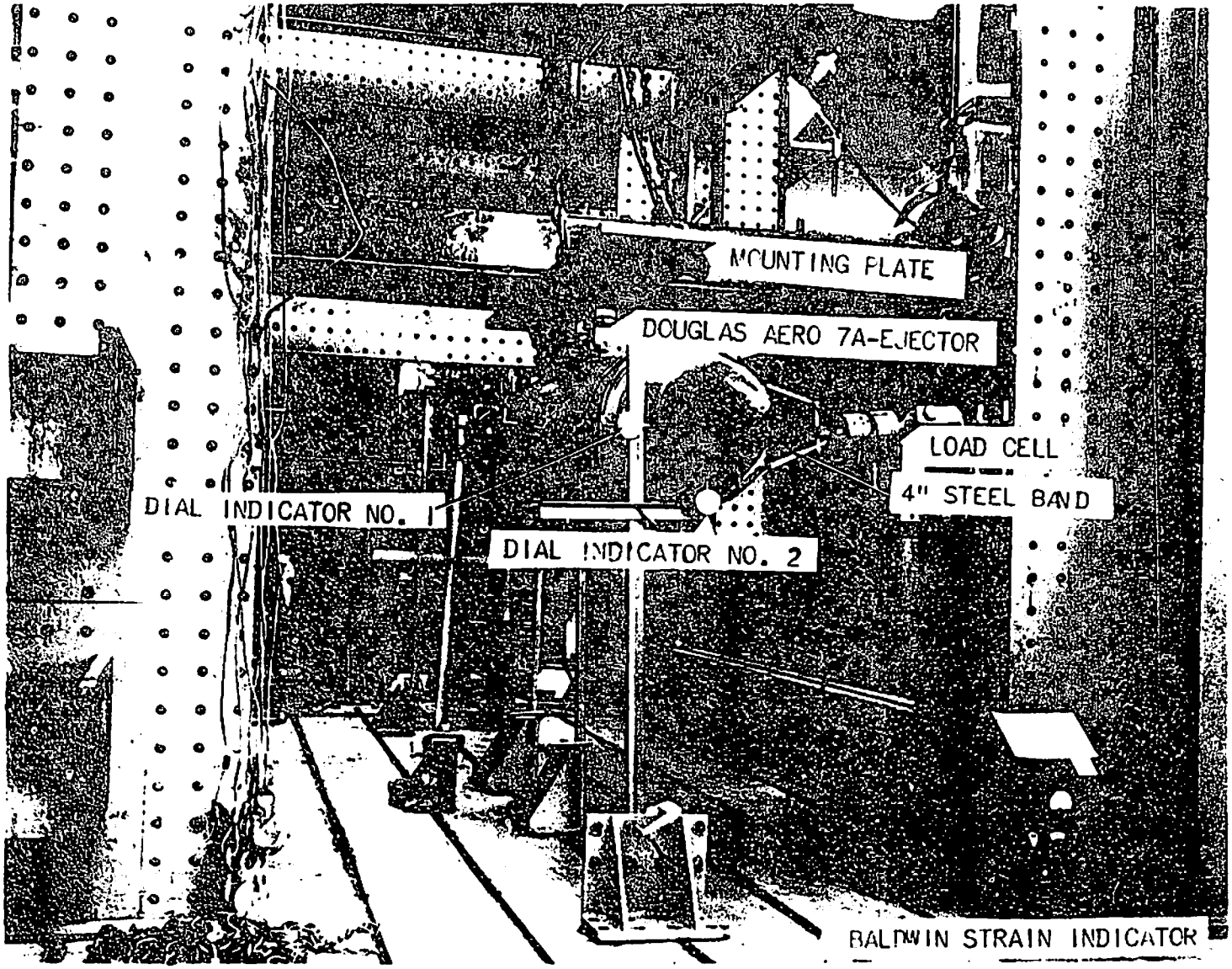

FIG. 1--GENERAL TEST SETUP IN THE SIMULATED FLIGHT TEST OF THE TX-28 SHAPE WITH DYNAMIC BALANCE.

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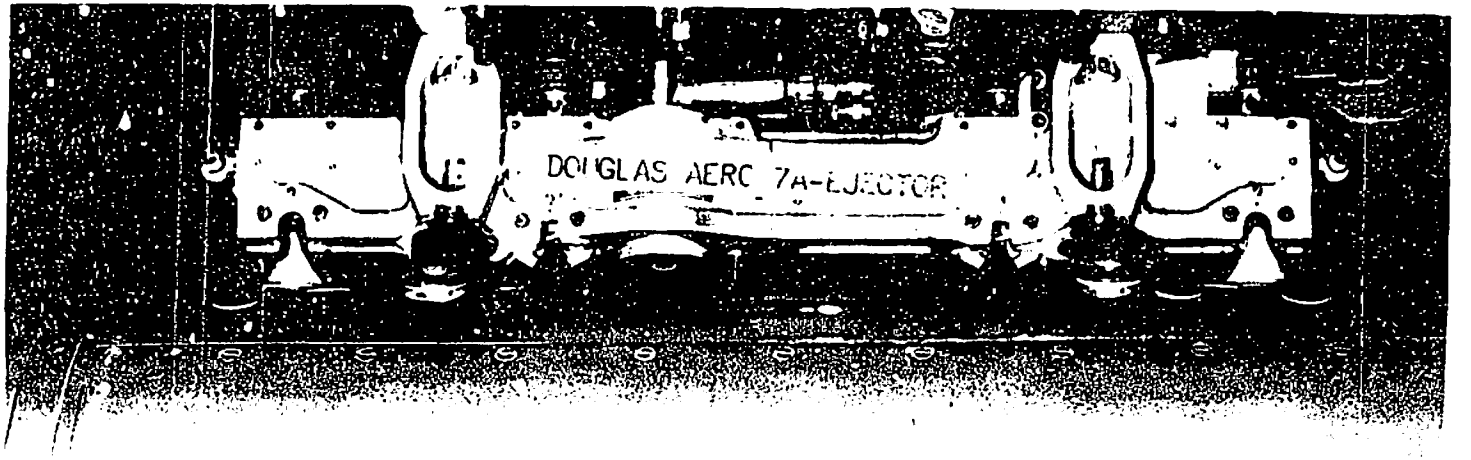

TX-28 SHAPE

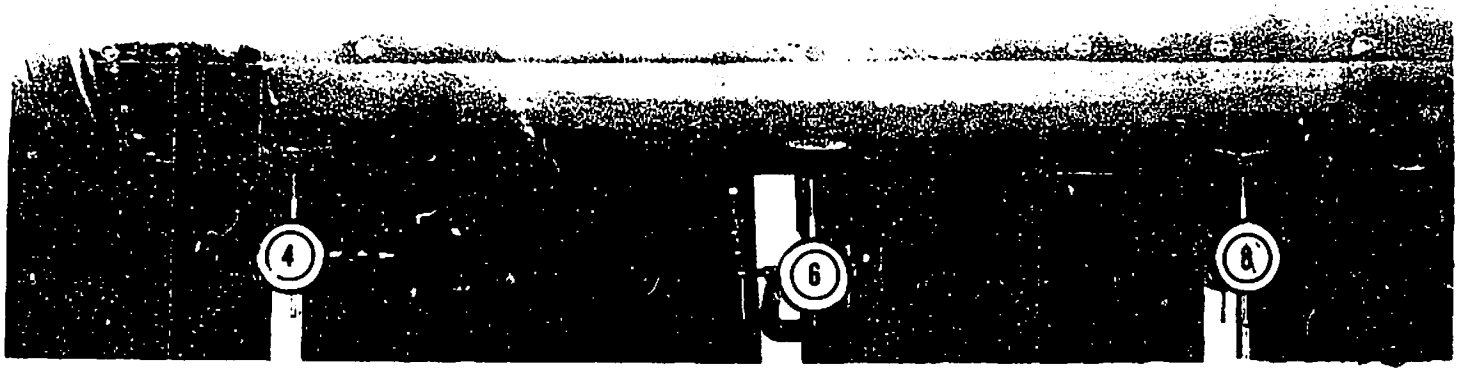

FIG. 2--TX-28 SHAPE SUSPENDED FROM DOUGLAS AERO 7A EJECTOR AND LOCATION OF DIAL INDICATORS IN THE SIMULATED FLIGHT TEST OF THE TX-28 SHAPE WITH DYNAMIC BALANCE.

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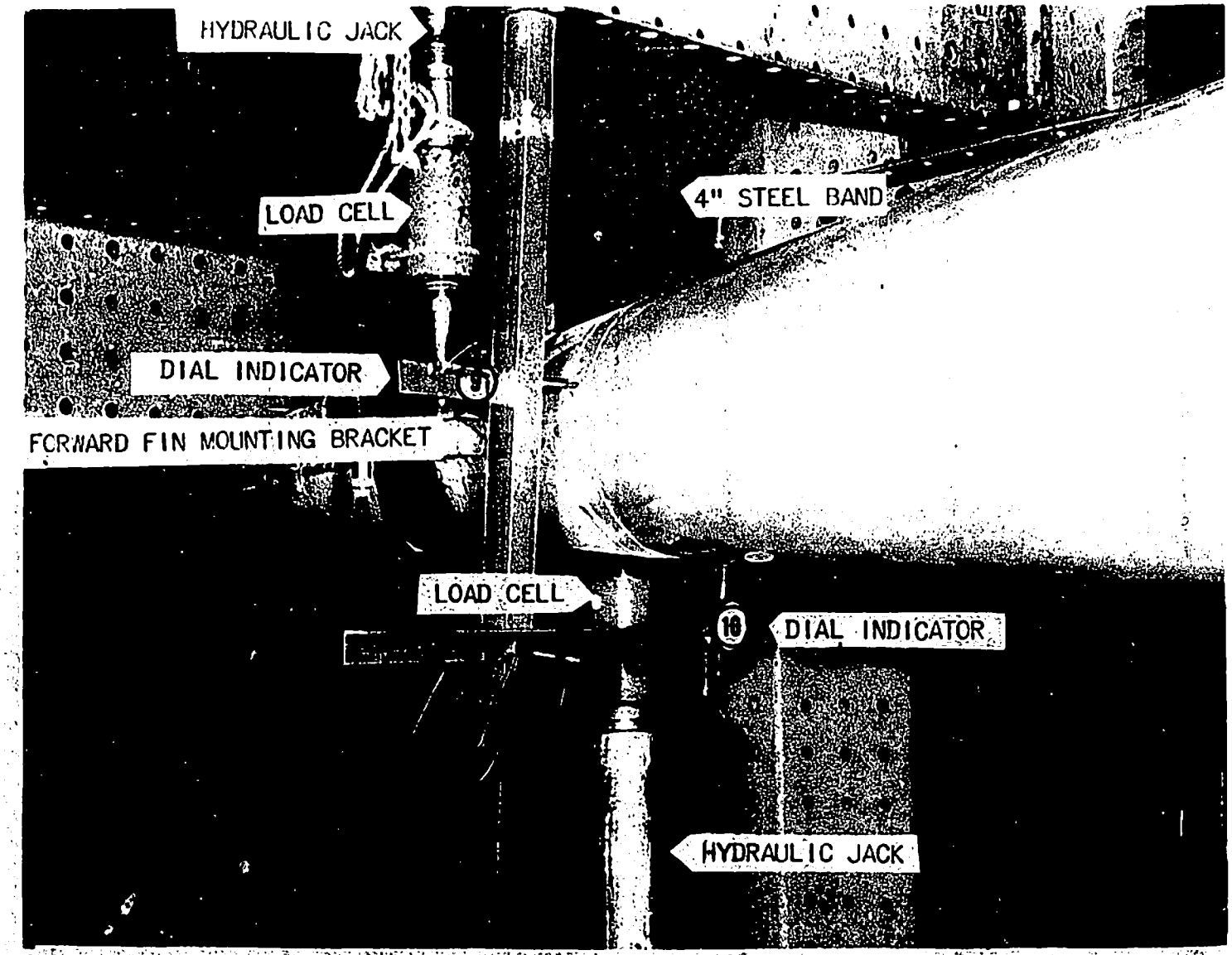

FIG. 3--LOAD AND DIAL INDICATOR LOCATIONS IN THE SIMULATED FLIGHT TEST OF THE TX-28 SHAPE WITH DYNAMIC BALANCE.

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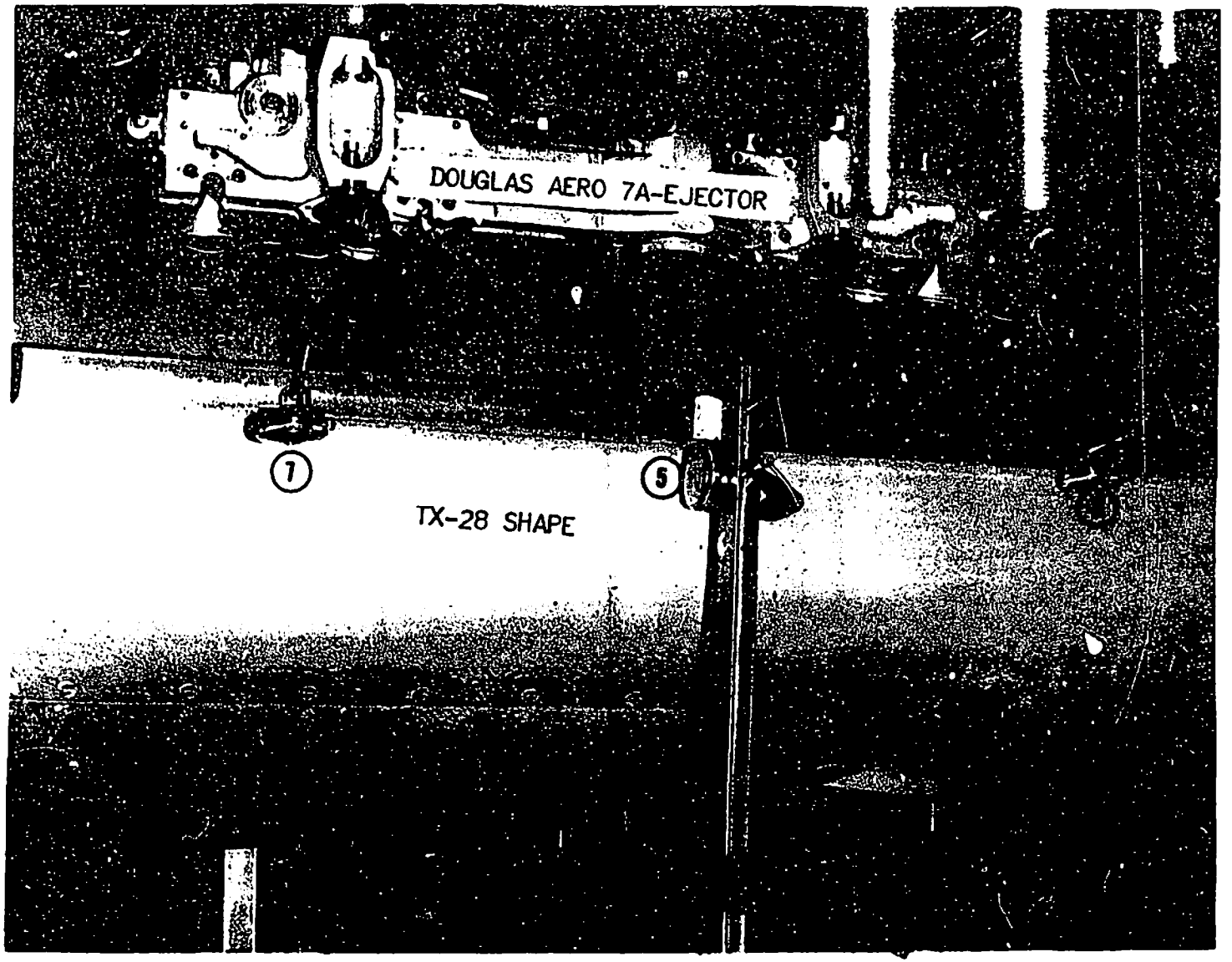

FIG. 4--TX-28 SHAPE SUSPENDED FROM DOUGLAS AERO 7A EJECTOR AND LOCATION OF DIAL INDICATORS IN THE SIMULATED FLIGHT TEST OF THE TX-28 SHAPE WITH DYNAMIC BALANCE.

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TABLE I

DIAL INDICATOR READINGS ON THE TX-28 SHAPE IN THE SIMULATED FLIGHT TEST OF THE TX-28 SHAPE

Percent Load	Dial Indicator Deflections in Inches									
	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0
10	.014	.039	.015	.048	.029	-.004	.039	-.011	.094	-.071
12	.013	.051	.015	.051	.034	-.006	.047	-.014	.118	-.095
14.4	.011	.069	.017	.055	.046	-.005	.069	-.017	.147	-.127
17.3	.007	.100	.023	.061	.053	-.007	.075	-.023	.201	-.182
20.7	-.003	.104	.038	.062	.074	-.005	.099	-.024	.265	-.201
24.9	-.002	.137	.051	.068	.095	-.007	.125	-.032	.331	-.289
30.0	.004	.172	.074	.073	.133	-.008	.181	-.038	.451	-.366
36.0	.017	.199	.087	.075	.146	-.012	.192	-.041	.519	-.410
43.2	.028	.234	.100	.084	.165	-.023	.213	-.052	.645	-.474
50	--	.289	.110	.090	.208	-.030	.287	-.066	.783	-.588
60	--	.335	.116	.095	.247	-.050	.359	-.075	1.183	-.673
70	--	.437	.202	.123	.377	-.045	.522	-.139	1.542	--
80	--	.525	.156	.135	.359	-.094	.520	-.168	--	--
90	*.218	*.750	.250	.143	.474	-.095	.670	-.194	*1.250	*-.375
100	*.312	--	.324	.147	.556	-.106	.745	-.230	*1.310	*-1.00

+ Deflections are in direction of applied loads.
- Deflections are opposite in direction of applied loads.
* Deflection readings recorded with a 12-inch scale.