LANDING LOADS INVESTIGATION INSTRUMENTATION

Report No. ES 40636

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DOUGLAS AIRCRAFT DIVISION • LONG BEACH, CALIFORNIA

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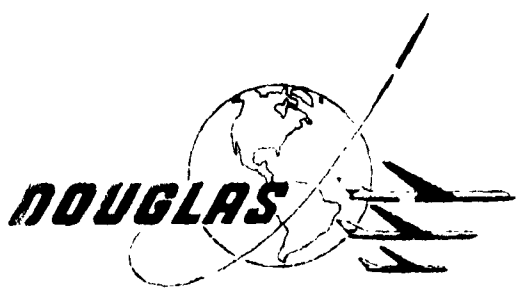
LANDING LOADS INVESTIGATION INSTRUMENTATION

REPORT NO. ES 40636
DATE: 10-26-62

CONTRACT NOa(s) 59-6226c

DOUGLAS AIRCRAFT COMPANY, INC.
AIRCRAFT DIVISION
LONG BEACH, CALIFORNIA



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LANDING LOADS INVESTIGATION INSTRUMENTATION

INTRODUCTION

Contract NOa(s) 59-6226c was established to measure loads and contact conditions during landings of an A4D-2 airplane. Under the terms of the contract, instrumentation was installed in the airplane and landings were performed at the Naval Air Test Center, Patuxent River, Maryland under specific contact conditions. Upon completion of these landings, the instrumentation was removed from the airplane and shipped to the Douglas Aircraft Company facility at El Segundo, California for a series of laboratory drop tests with an A4D-2 static test airplane. This report discusses the instrumentation installed in both the flight and drop test airplanes and also the supporting instrumentation used during the flight and drop tests.

DISCUSSION

An experimental flight and airplane drop test program was conducted with consistent instrumentation on a Model A4D-2 airplane to measure landing loads and contact conditions. The data obtained during these tests were to be combined with a dynamic analysis. The results of that analysis, together with the results of the tests previously conducted by the NASA at their landing loads track, were expected to provide a firm basis for evaluating the adequacy of simulating loads in airplane and jig drop tests as well as determining the extent to which those loads might be calculated by dynamic analysis.

The installation of the instrumentation in the airplane was completed at the Naval Air Test Center, Patuxent River, Maryland. The work was done under the supervision of Douglas Aircraft Company engineering personnel with the assistance of NATC personnel. The Model A4D-2 airplane, BuNo 142089, remained under the custody of NATC during the instrumentation period and the flight test phase. Actual installation of instrumentation in the airplane commenced July 1, 1960, when the airplane was made available for the Landing Loads Investigation. The airplane had been utilized by NATC for Carrier Suitability testing and contained partial instrumentation. Following completion of the flight test phase of the program at NATC, the Landing Loads instrumentation was removed from the airplane during the month of November, 1960. The instrumentation was then shipped to the Douglas Aircraft Company, El Segundo plant for use in the drop test phase of the program.

A left instrumented main landing gear, No. 10, which had been used by the NASA in their forward velocity drop jig, was installed on the Model A4D-2 airplane, BuNo 142089, together with a right instrumented main landing gear, No. 16. In addition, accelerometers were installed at the airplane center of gravity, the nose, the nose gear, the wing tips and on external wing stores to measure response characteristics of the airplane structure to typical applied ground loads. Other instrumentation was used to define the airplane attitudes, motions, and velocities and to define pressures within the landing gear. Calibrations of the instrumented landing gear were conducted prior to the flight tests, after the flight tests and prior to the drop tests, and again after the drop tests were completed. These calibrations are discussed in detail on Page 2.019.

A special instrumentation store, consisting of a modified 300 gallon external fuel tank, was utilized to carry the oscillograph recorders and the associated equipment. This

DISCUSSION (continued)

store was carried on the airplane centerline pylon for all the landing tests and, subsequently, was used with its equipment during the drop test program. Photographs of the airplane with the instrumentation store installed on the centerline pylon and with the external fuel tanks installed on the wing pylons are included on Pages 1.201 and 1.202.

The airplane parameters were recorded on two 36 channel recording oscillographs. The oscillographs were CEC type 5-119P-3 and were installed in the instrumentation store. Photographs of the instrumentation store with the equipment installed are shown on Pages 1.203 through 1.205. Additional equipment installed in the instrumentation store included four strain gage balance panels, one thermocouple control panel, power supply, time standard, and special calibration boxes.

The strain gage balance panels were of Douglas design, drawing No. X-5501720, and contain a balance circuit, sensitivity circuit and an automatic calibration circuit. All parameters recorded on the oscillograph were controlled through these balance panels except strut positions, strut velocity, wheel position, strain gage voltage monitor, time standard, and thermocouples. The thermocouple control panel was built by Douglas and contains an automatic calibration circuit and a sensitivity circuit. All thermocouples recording temperatures were controlled through this panel.

Strain gage voltage was obtained from batteries. Six volt batteries were connected in series and parallel to provide either 12 or 18 volts to the balance panels depending upon the sensitivity desired. Part of the batteries were replaced after each day's flight test operation to maintain a constant voltage. The voltage input to the balance panel was monitored on an oscillograph channel to assure that the voltage did not drop below an acceptable level.

The time standard utilized for the flight test phase was a 50 cps frequency generator type 2001-2LP. A 50 cycle trace was generated on both oscillographs and was used as a time base and for oscillograph correlation. For the drop test phase, a Hewlett Packard 205 AG oscillagor was used to record 1000 cycles per second simultaneously on all oscillographs.

Special calibration boxes were used for strut positions and strut velocities. Strut position transducer calibration is discussed on Page 2.401. Strut velocity transducer calibration is discussed on Page 2.415.

DISCUSSION (continued)

The galvanometers used for the measurement of the loads and accelerations were selected for a flat frequency response of 135 cps 5 per cent. Galvanometers with a flat frequency response of 60 ±5 per cent were used for the lower frequency parameters. All galvanometers were checked prior to use and only those with a damping ratio of 0.64 ±0.1 of critical were acceptable. The galvanometer response characteristics were measured before the drop test program and again after the drop test program was completed. These results are tabulated on Pages 1.206 through 1.213 and are presented again with the discussions of the individual parameters in the following portions of this report.

Accelerometers were dynamically checked for natural frequency and damping ratio prior to their initial use. Acceptable limits for damping ratio were 0.70 ±0.1 of critical. The accelerometers were dynamically checked following the flight test phase and the results are shown on Page 1.214. Static calibrations were performed on the accelerometers prior and subsequent to the flight test phase. Results of the pre- and post-calibration are also presented on Page 1.214 and an average value was used to compute accelerations.

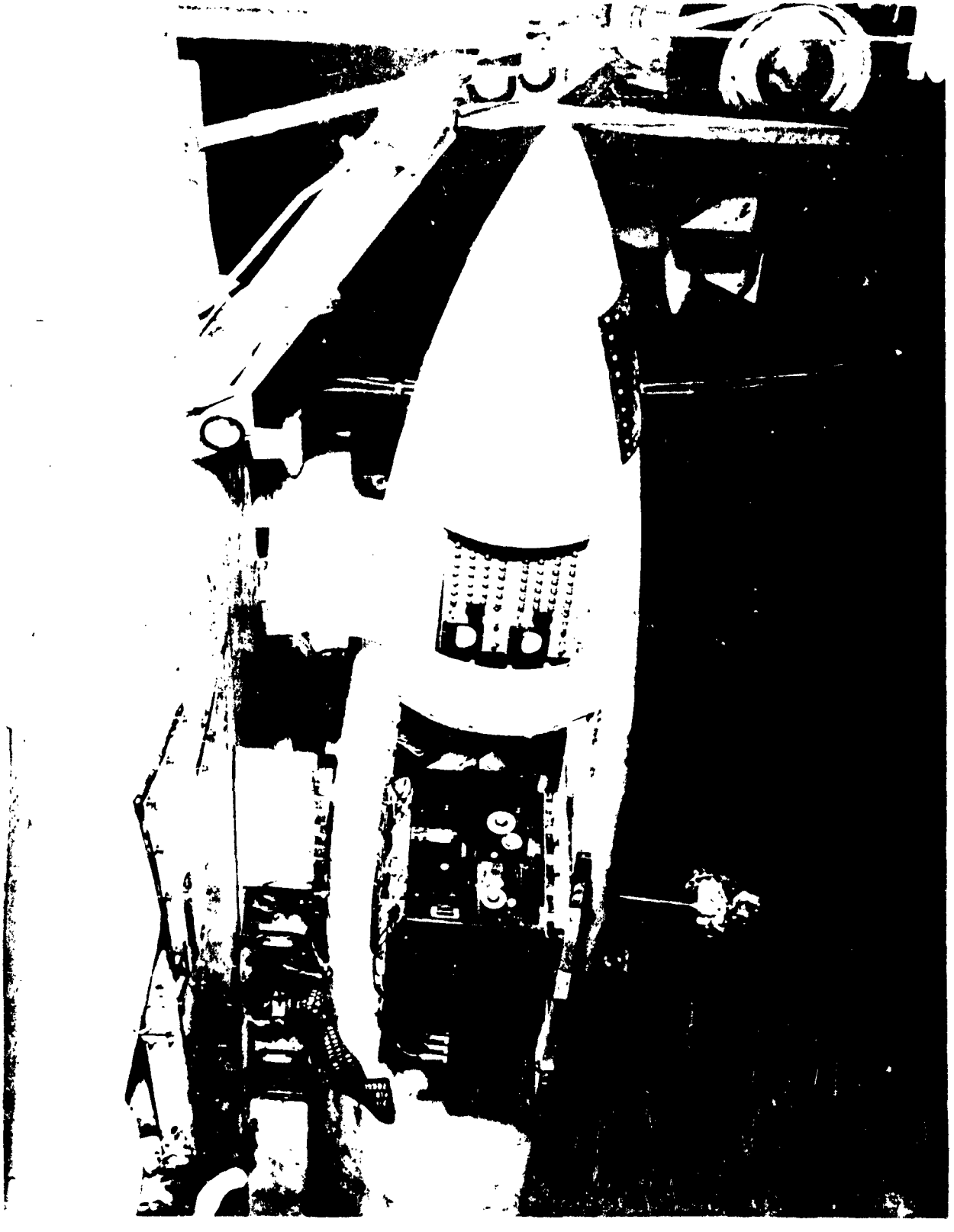
Temperatures were monitored in the main landing gear lower mass (axle area) and in the nose section to provide a temperature correction to the unheated accelerometer data if necessary. Temperatures remained within acceptable limits and no corrections were necessary.

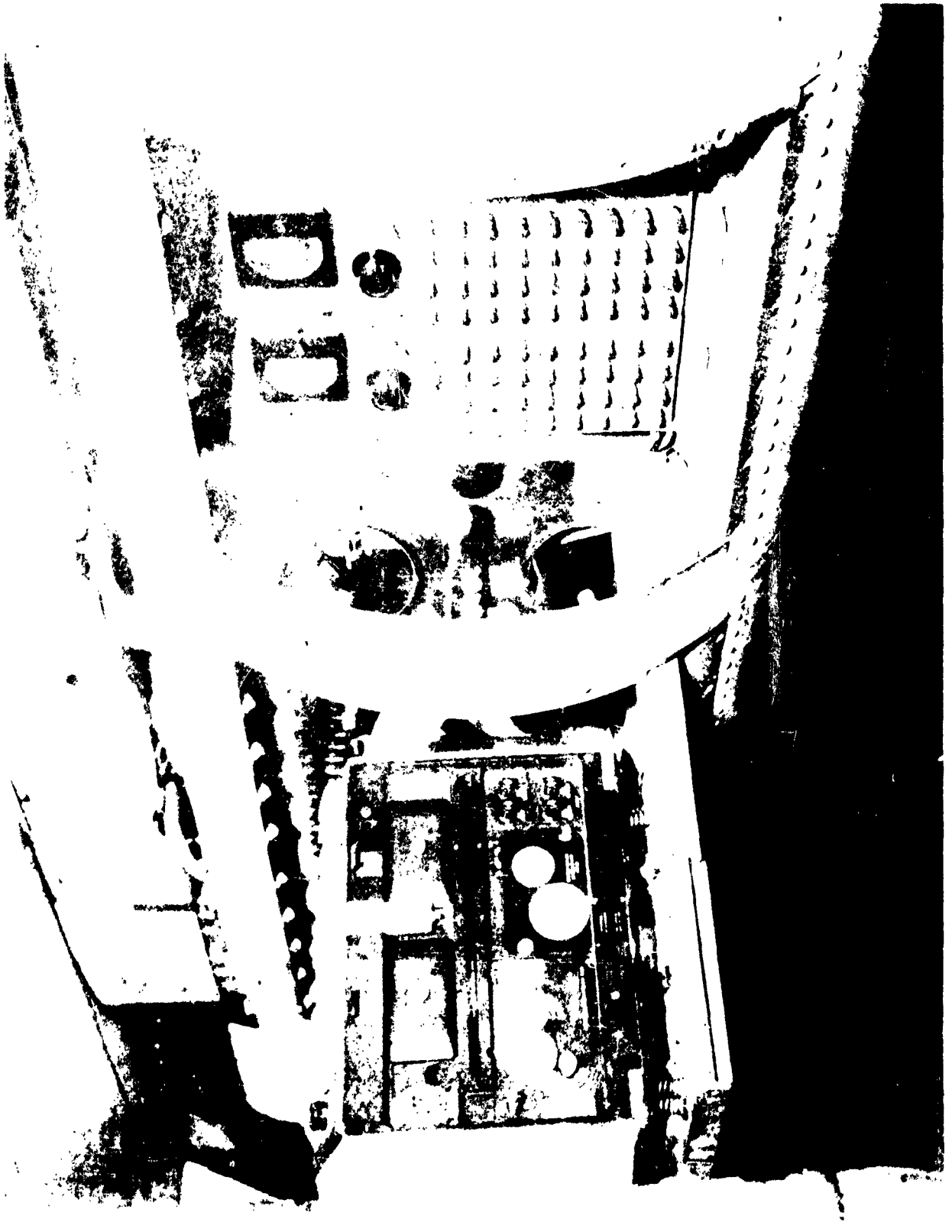
The combined effect of the galvanometer and accelerometer on the frequency response characteristics of the recorded parameters is shown in the following sections of this report under the individual sections. The frequency response characteristics are tabulated on Page 1.215. The estimated overall recorded parameter accuracies are shown on Page 1.216.

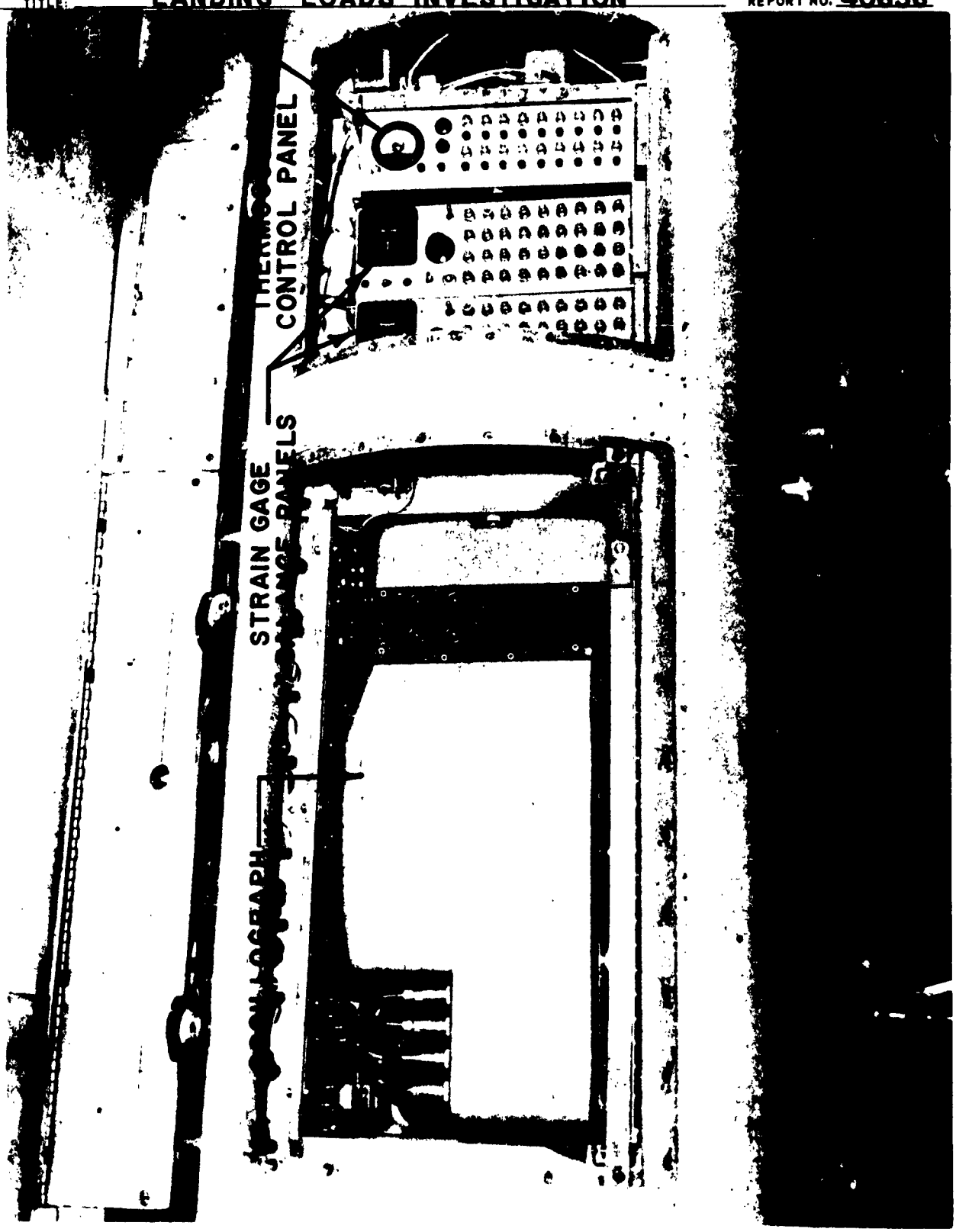
MODEL A4D-2 AIRPLANE BU NO 142089 WITH CENTERLINE INSTRUMENTATION STORE AND TWO 150 GAL. EXTERNAL FUEL TANKS INSTALLED

MODEL A4D-2 AIRPLANE BU NO 142089 WITH CENTERLINE INSTRUMENTATION STORE AND TWO 150 GAL. EXTERNAL FUEL TANKS INSTALLED

LANDING LOADS INVESTIGATION






CONTROL PANEL
STRAIN GAGE

GALVANOMETER RESPONSE CHARACTERISTICS

AMP 1 = Calibration Pip Height from Calibration at Balance Panel

AMP 2 = Calibration Pip Height from Calibration at Transducer

RES = Transducer Resistance at Galvanometer

ω = Natural Frequency of Galvanometer

AMP 3 = Desired Amplitude Ratio* at Galvanometer Natural Frequency

AMP 4 = Measured Amplitude Ratio* at Galvanometer Natural Frequency

*Based on a low frequency amplitude of 2000

A4D-2 LANDING LOADS INVESTIGATION BEFORE DROP TEST
GALVANOMETER RESPONSE CHARACTERISTICS

OSCG	CH	TITLE	AMP 1	AMP 2	RES.	ω	AMP 3	AMP 4
1	4	LH Air Chamber Pressure	4.852	4.852	352.3	50.4	1187	1196
1	6	LH Strut Position	73.49	73.47	80.15	297.0	1201	1206
1	7	LH Strut Velocity	7.285	-	350.9	201.2	1220	1224
1	8	LH Vertical Platform 1	4.795	4.805	344.7	217.3	1228	1233
1	9	LH Metering Chamber Pressure	4.768	4.768	351.2	220.0	1245	1248
1	10	LH Axle Vertical Strain Gage V-1	13.84	14.00	352.0	229.5	1253	1259
1	11	LH Gear Lower Mass Vert. Accel.	11.304	11.396	342.4	226.7	1390	1395
1	12	LH Drag Brace	7.124	7.17	358.8	216.9	1644	1648
1	13	LH Gear Lower Mass Long. Accel.	11.01	11.20	332.9	224.0	1401	1405
1	14	LH Axle Drag Strain Gage D-3	7.718	7.706	350.4	226.5	1264	1269
1	16	LH Drag Platform	5.694	5.71	354.4	222.0	1418	1422
1	20	LH Gear Side Bending Moment S-5	11.144	11.158	352.0	229.6	1272	1277
1	21	LH Gear Lower Mass Lateral Accel.	10.694	10.908	332.6	227.1	1409	1413
1	23	Nose Gear Strut Position	72.65	72.63	78.95	312.5	1426	1430
1	24	Nose Gear Upper Mass Vert. Accel.	11.58	11.584	350.8	228.4	1291	1296
1	25	Nose Gear Vertical Platform	2.772	2.754	344.6	228.2	1434	1438
1	27	C.G. Normal Acceleration ± 1G	12.222	12.178	357.7	110.6	1310	1314
1	28	FRL Pitch Attitude	2.756	-	347.8	51.3	1317	1321

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A4D-2 LANDING LOADS INVESTIGATION BEFORE DROP TEST (Cont'd)
GALVANOMETER RESPONSE CHARACTERISTICS

OSCG	CH	TITLE	AMP 1	AMP 2	RES.	ω	AMP 3	AMP 4
1	29	C.G. Longitudinal Acceleration	12.354	--	364.9	106.9	1463	1466
1	30	A/C Roll Attitude	2.79	--	347.8	50.7	1325	1329
1	31	C.G. Normal Acceleration ± 10G	11.962	11.98	357.7	218.9	1301	1306
1	33	LH Gear Upper Mass Vertical Accel.	14.742	14.828	403.2	228.6	1651	1655
1	34	LH Gear Upper Mass Long. Accel.	12.878	13.015	370.5	217.0	1381	1386
1	19	Rebound Chamber Pressure			352.5	231.3	1776	1779

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A4D-2 LANDING LOADS INVESTIGATION DROP TEST COMPLETED

GALVANOMETER RESPONSE CHARACTERISTICS

OSCG	CH	TITLE	AMP 1	AMP 2
1	4	LH Air Chamber Pressure	5.33	5.28
1	6	LH Strut Position		
1	7	LH Strut Velocity		
1	8	LH Vertical Platform 6	7.62	7.57
1	9	LH Metering Chamber Pressure	7.33	7.26
1	10	LH Axle Vertical S. G. 1	13.20	13.05
1	11	LH Lower Mass. Vertical Accelerometer	10.55	10.43
1	12	LH Drag Brace	23.97	23.73
1	13	LH Gear Lower Mass Longitudinal Acc.	10.07	9.94
1	14	LH Axle Drag S. G. D3	5.64	5.56
1	16	LH Drag Platform 6	7.40	7.33
1	20	LH Gear Side Bending Moment	10.22	10.10
1	21	LH Gear Lower Mass. Lateral Accel.	10.73	10.58
1	23	Nose Gear Strut Position		
1	24	Nose Gear Upper Mass. Vertical Accel.	10.93	10.78
1	19	LH Gear Rebound Chamber Pressure	7.42	7.42
1	27	C.G. Normal Accelerometer 1G	11.53	11.44
1	28	FRL Pitch Attitude		
1	29	CG Longitudinal Accel.	11.54	11.45
1	30	A/C Roll Attitude		
1	31	C.G. Normal Accelerometer 10G	11.50	11.41
1	33	LH Gear Upper Mass Vertical Accel.	14.00	13.92
1	34	LH Upper Mass Longitudinal Accel.	12.21	12.10

GALVANOMETER RESPONSE CHARACTERISTICS

AMP 1 = Calibration Pip Height from Calibration at Balance Panel

AMP 2 = Calibration Pip Height from Calibration at Transducer

RES = Transducer Resistance at Galvanometer

ω = Natural Frequency of Galvanometer

AMP 3 = Desired Amplitude Ratio* at Galvanometer Natural Frequency

AMP 4 = Measured Amplitude Ratio* at Galvanometer Natural Frequency

*Based on a low frequency amplitude of 2000

A4D-2 LANDING LOADS INVESTIGATION DROP TEST COMPLETED

GALVANOMETER RESPONSE CHARACTERISTICS

OSCG	CH	TITLE	AMP 1	AMP 2
2	4	RH Air Chamber Pressure	5.32	5.25
2	6	RH Strut Position		
2	7	RH Strut Velocity		
2	8	RH Vertical Platform 2	7.58	7.49
2	9	RH Metering Chamber Pressure	7.30	7.22
2	10	RH Axle Vertical SG 4	12.48	12.34
2	11	RH Gear Lower Mass Vert. Acc.	11.07	10.94
2	12	RH Drag Platform	7.23	7.16
2	13	RH Axle Drag SG 5	8.94	8.81
2	14	RH Gear Lower Mass Long. Accel.	10.88	10.78
2	15	RH Drag Brace	10.97	10.87
2	16	LH Drag Brace		
2	23	LH Lift Pot Link	7.82	7.72
2	24	RH Lift Pot Link	7.83	7.75
2	26	RH Wing Tip Accelerometer	9.38	9.30
2	27	LH Wing Tip Accelerometer	9.45	9.40
2	29	RH Gear Upper Mass Vert. Accel.	13.29	13.18
2	31	RH Gear Upper Mass Long. Accel.	10.94	10.84
2	33	RH Axle Side SG 3	8.94	8.81
2	35	RH Gear Lower Mass Lateral Acc.	10.37	10.25

A4D-2 LANDING LOADS INVESTIGATION BEFORE DROP TEST
GALVANOMETER RESPONSE CHARACTERISTICS

OSCG	CH	TITLE	AMP. 1	AMP. 2	RES	ω	AMP 3	AMP 4
2	1							
2	4	RH Air Chamber Pressure	2.332	2.32	352.2	51.0	1496	1500
2	6	RH Strut Position	70.63	70.63	79.55	299.0	1547	1551
2	7	RH Strut Velocity	7.54	-	364.2	220.1	H = 0.506	
2	8	RH Vertical Platform	5.386	5.316	344.7	227.8	1505	1509
2	9	RH Metering Chamber Pressure	5.586	5.44	350.4	223.0	1514	1518
2	10	RH Axle Vertical Strain Gage	11.02	11.02	348.4	216.0	1488	1492
2	11	RH Gear Lower Mass Vert. Accel.	10.812	10.926	342.9	210.5	1618	1622
2	12	RH Drag Platform	5.604	5.558	354.1	227.8	1522	1526
2	13	RH Axle Drag Strain Gage	10.216	10.248	348.4	224.8	1479	1483
2	14	RH Gear Lower Mass Long. Accel.	11.084	10.954	345.9	217.8	1627	1637
2	15	RH Drag Brace	11.354	11.366	346.8	230.7	1565	1569
2	16	LH Drag Brace	Note Osc No. 1		359.8	209.8	1575	1579
2	17	RH Wheel Angular Position	N.R.					
2	18	1000 Cycle Time Standard	N.R.					
2	19	LH Wheel Angular Position	N.R.					
2	22	Strain Gage Voltage	N.R.					
2	23	LH Lift Pot Link	8.774	8.624	120.4	214.7	1531	1535

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A4D-2 LANDING LOADS INVESTIGATION BEFORE DROP TEST (Cont'd)
GALVANOMETER RESPONSE CHARACTERISTICS

OSCG	CH	TITLE	AMP. 1	AMP. 2	RES	ω	AMP 3	AMP 4
2	24	RH Lift Pot Link	9.00	9.00	120.7	203.0	1539	1543
2	26	RH Wing Tip Accel.	10.26	10.50	335.3	226.5	1584	1588
2	27	LH Wing Tip Accel.	10.452	10.78	336.6	230.7	1593	1597
2	29	RH Gear Upper Mass Vert. Accel.	14.23	14.204	395.3	219.2	1602	1606
2	31	RH Gear Upper Mass Long. Accel.	11.09	11.27	349.6	225.1	1610	1614
2	33	RH Axle Side Strain Gage	2.802	2.82	348.6	237.0	1469	1474
2	35	RH Gear Lower Mass Lateral Accel.	10.542	10.714	338.6	222.6	1636	1640

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PREPARED BY: L.R. Harris DATE
CHECKED BY: DATE
TITLE: Landing Loads Investigation

DOUGLAS AIRCRAFT COMPANY, INC.

FORM L825 5-58 (3-52)

A4D-2 BUNO 142089 LANDING LOADS PROGRAM
ACCELEROMETER INFORMATION

CH NO	MEASURES	EFFECTIVE LANDING WT	S/N	TYPE	EQUIVALENT PRE	EQUIVALENT POST	EQUIVALENT USE	SP2 CALIB	F_N SPEC	F_N ACT	DR ③	REMARKS
2	LEFT OUT TANK LAT (STA 328)	133 THRU 154	1600	A142-10	7.576	7.567	7.582	–	1.16	1.16	.063	G-TP
3	FLIGHT		5764	A142-10	8.545	8.538	8.567	–	1.16	1.28	.065	" TP
4	LEFT (STA 328)		1965	F-10	7.570	7.101	7.141	–	1.10	.85	.068	" TP
5	VERT (STA 328)	"	1251	A142-25	18.367	18.932	18.930	–	2.00	2.06	.068	" TP
6	FLIGHT		1252	A142-25	16.298	16.353	16.350	–	2.00	2.10	.072	" TP
7	LEFT REAR AUX FUEL LAT	1 THRU 203	3578	A4A-50	32.378	32.213	32.223	32.653	3.00	2.47	.072	
8	INNER EQUIP RACK FWD STRAT	138 THRU 154	464	A50-200	74.222	74.072	74.147	–	9.50	11.10	.074	
9	LEFT REAR AUX FUEL VERT	1 THRU 203	3764	A4A-100	51.741	51.741	51.741	51.358	4.50	3.30	.076	WT STA 6.92 on PAD 1 POST MOUNT
10	LONG	"	3776	A4A-100	53.138	52.638	52.838	53.241	4.50	2.05	.077	
11	LH E EQUIP FWD RACK FACE	138 THRU 154	1015	A50-200	84.88	84.833	84.872	–	9.50	6.65	.074	
12	ART SHAFT		10019	A4-100	22.240	22.190	22.165	–	4.50	3.06	.096	
13	RACK		2026	A50-200	74.230	74.052	74.094	–	9.50	12.25	.074	
14	LEFT WING TIP AFT	1 THRU 209	2648	A4-50	34.434	33.780	34.852	–	5.00	4.42	.083	
15	R WING		2642	A4-50	32.965	32.743	32.774	–	3.50	4.45	.068	
16	LEFT GEAR WHEEL VERT		5022	A50-50	19.200	18.542	18.593	18.532	.K	6.90	.70	
17	R WING		3029	A50-50	20.777	20.377	20.577	19.776	.K	7.24	.80	
18	LEFT LONG	1 THRU 209	3552	A50-50	12.644	11.793	11.913	8.K	–	5.50	1.53	
19	FLIGHT	1 THRU 209	3701	A50-50	12.999	12.342	12.442	11.985	–	4.20	.45	
20	LEFT OUT TANK VERT (STA 328)	138 THRU 154	263	A142-25	19.421	19.007	19.046	–	2.00	2.10	.074	
	G.S. VERT (REAR TUNNEL)	1 THRU 209	33	A142-1	6.606	6.568	6.618	–	–	–	–	NO DYNAMIC CALIB
	" " VERT	"	420	A142-1	6.574	6.574	6.577	–	–	–	–	
	" " VERT (REAR FUSELAGE)	"	744	A142-10	7.847	7.812	7.825	–	1.00	1.20	.078	
24	INNER GEAR WHEEL MASS VERT		2917	A50-50	11.852	11.798	11.838	11.854	–	3.82	.085	
27	R WING JEEP AMP MASS LAT	1 THRU 209	3573	A4A-50	41.320	38.520	38.570	37.241	3.00	2.94	.046	
27	LEFT OUT TANK LONG (STA)	139 THRU 154	813	A142-10	7.121	7.867	7.909	–	1.10	1.10	.070	
28	R WING GEAR AMP MASS VERT	1 THRU 209	3762	A4A-100	61.520	53.145	53.145	52.638	4.50	4.88	.086	
29	LONG	"	3593	A4A-100	67.178	67.568	67.568	66.400	4.50	3.80	.050	

① PRE PROGRAM CALIBRATION PERFORMED BY EL SEGUNDO
② SPECIAL CALIBRATION CALIBRATION RESISTOR PLACED ACROSS G_1T_P AT TERMINAL ENDS
③ DAMPING RATIO OBTAINED SUBSEQUENT TO PROGRAM - PRE PROGRAM D.R. .070 ± .010

GENERAL NOTES

CALIBRATION RESISTORS ACROSS G_1C_P UNLESS OTHERWISE NOTED

FREQUENCY RESPONSE CHARACTERISTICS OF RECORDED PARAMETERS

PARAMETER	FLAT RESPONSE-CPS ±2%	±5%
R.H. Gear Vertical Load	115	135
R.H. Gear Drag Load	55	95
R.H. Gear Side Bending Moment	90	180
L.H. Gear Vertical Load	65	195
L.H. Gear Drag Load	50	100
L.H. Gear Side Bending Moment	65	190
L.H. Gear Lower Mass Vertical Acceleration	60	180
L.H. Gear Lower Mass Drag Acceleration	135	150
L.H. Gear Lower Mass Lateral Acceleration	155	175
R.H. Gear Lower Mass Vertical Acceleration	110	130
R.H. Gear Lower Mass Drag Acceleration	45	75
R.H. Gear Lower Mass Lateral Acceleration	40	60
R.H. Gear Upper Mass Vertical Acceleration	50	85
R.H. Gear Upper Mass Longitudinal Acceleration	105	130
L.H. Gear Upper Mass Vertical Acceleration	50	85
L.H. Gear Upper Mass Longitudinal Acceleration	60	90
R.H. Gear Strut Position	65	110
L.H. Gear Strut Position	55	90
R.H. Gear Strut Velocity	45	70
L.H. Gear Strut Velocity	50	90
R.H. Gear Metering Chamber Pressure	70	180
L.H. Gear Metering Chamber Pressure	60	185
L.H. Gear Strut Rebound Chamber Pressure	55	185
R.H. Gear Strut Air Pressure	15	40
L.H. Gear Strut Air Pressure	15	40
R.H. Gear Drag Brace Load	60	100
L.H. Gear Drag Brace Load	50	80
Nose Gear Strut Position	80	135
Nose Gear Upper Mass Vertical Acceleration	120	145
C.G. Normal Acceleration (Low Range)	25	40
C.G. Normal Acceleration (High Range)	40	55
C.G. Longitudinal Acceleration	20	35
Aircraft Pitch Attitude	30	35
Aircraft Roll Attitude	20	35
R.H. Wing Tip Vertical Acceleration	65	160
L.H. Wing Tip Vertical Acceleration	50	80
R.H. Wing Lift Link Load	55	170
L.H. Wing Lift Link Load	125	145

ESTIMATED OVERALL RECORDED PARAMETER ACCURACY

PARAMETER	ACCURACY ± %
R.H. Gear Vertical Load	3
R.H. Gear Drag Load	3
L.H. Gear Vertical Load	3
L.H. Gear Drag Load	3
L.H. Gear Lower Mass Vertical Acceleration	2
L.H. Gear Lower Mass Drag Acceleration	2
L.H. Gear Lower Mass Lateral Acceleration	2
R.H. Gear Lower Mass Vertical Acceleration	2
R.H. Gear Lower Mass Drag Acceleration	2
R.H. Gear Lower Mass Lateral Acceleration	2
R.H. Gear Upper Mass Vertical Acceleration	2
R.H. Gear Upper Mass Longitudinal Acceleration	2
L.H. Gear Upper Mass Vertical Acceleration	2
L.H. Gear Upper Mass Longitudinal Acceleration	2
R.H. Gear Strut Position	3
L.H. Gear Strut Position	3
R H. Gear Strut Velocity	4
L.H. Gear Strut Velocity	4
R.H. Gear Metering Chamber Pressure	3
L.H. Gear Metering Chamber Pressure	3
L.H. Gear Shock Strut Rebound Chamber Pressure	2
R.H. Gear Strut Air Pressure	3
L.H. Gear Strut Air Pressure	3
R.H. Gear Drag Brace Load	2
L.H. Gear Drag Brace Load	2
Nose Gear Strut Position	3
Nose Gear Upper Mass Vertical Acceleration	2
C.G. Normal Acceleration (Low Range)	2
C.G. Normal Acceleration (High Range)	2
C.G. Longitudinal Acceleration	2
Aircraft Pitch Attitude	3
Aircraft Roll Attitude	3
R.H. Wing Tip Vertical Acceleration	2
L.H. Wing Tip Vertical Acceleration	2
R.H. Gear Reaction Platform Vertical Load	2
R.H. Gear Reaction Platform Drag Lead	8
L.H. Gear Reaction Platform Vertical Load	2
L.H. Gear Reaction Platform Drag Load	8
Nose Gear Reaction Platform Vertical Load	2
R.H. Wing Lift Link Load	2
L.H. Wing Lift Link Load	2
Timing Clock	0.1

MAIN LANDING GEAR

Landing Gear Loads

The main landing gears, left and right, were instrumented with strain gages to measure vertical, drag, and side loads perpendicular and parallel to the strut centerline at the axle. Pages 2.002 through 2.018 discuss the individual main gear load parameters and Pages 2.019 through 2.032 discuss the calibration of the strain gages.

DESCRIPTION:

Right hand main gear vertical strain gage channel. This transducer measures vertical loads felt at the base of the piston.

CONSTANT:

See section on Gear Calibration. (Page 2.020)

CHARACTERISTICS:

TRANSDUCER

Type - ABF 13 Strain Gage

GALVANOMETER

Type - 7-342

Serial No. - 4981

Resistance - 348.4 Ohms

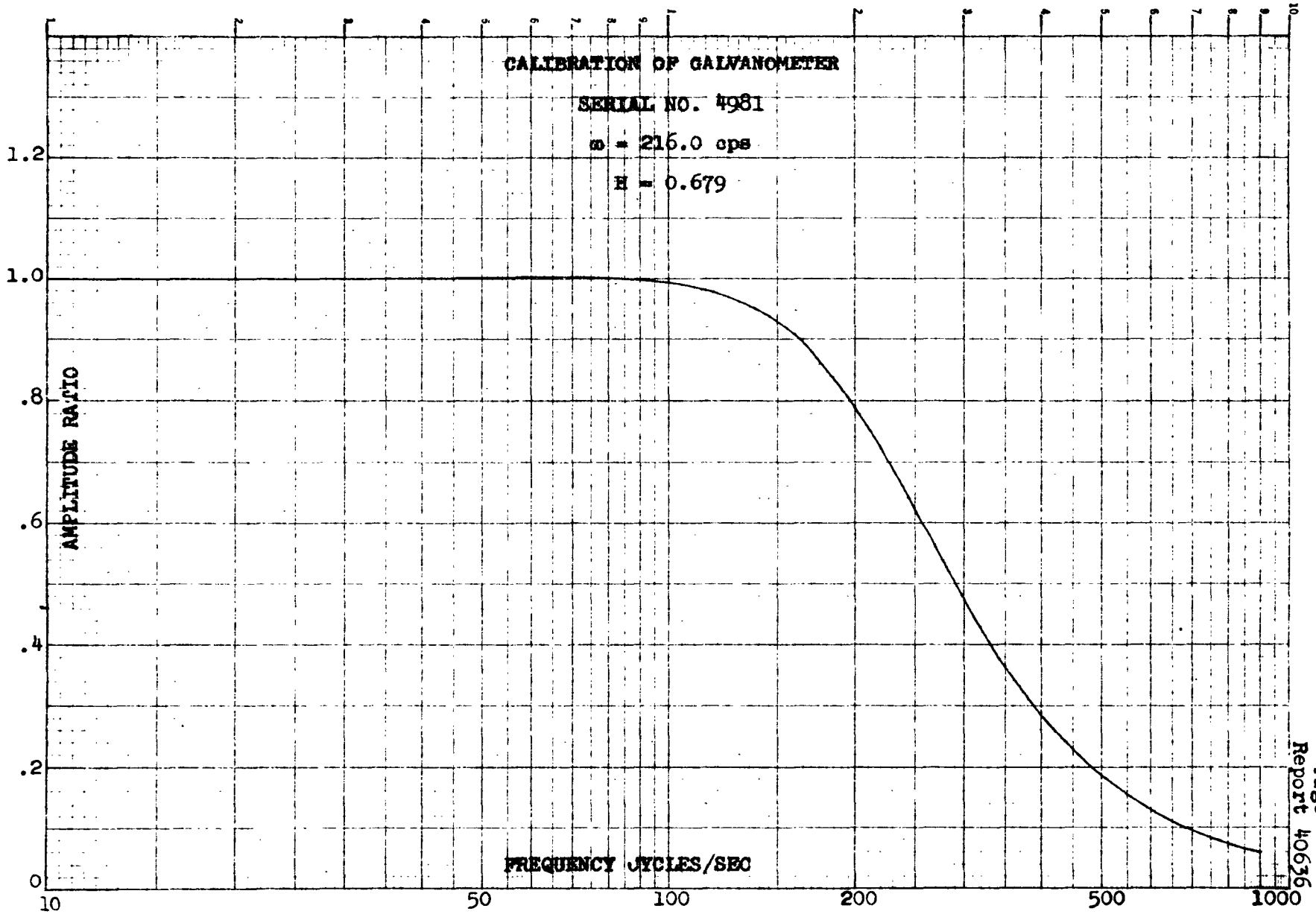
Natural Frequency - 216.0 cps

Damping - 0.679

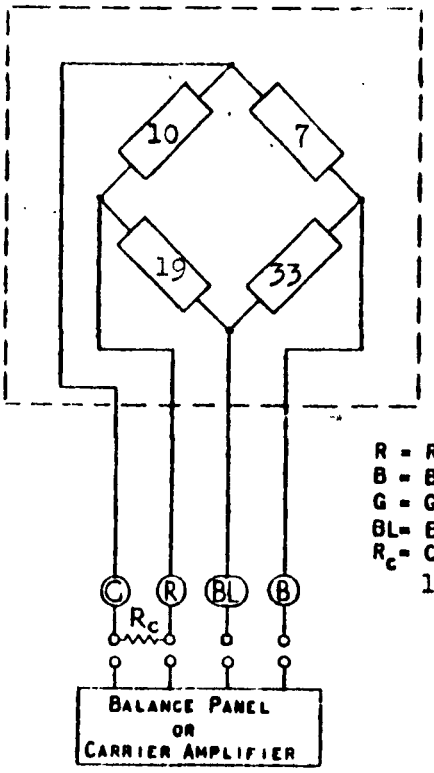
RECORDED:

Oscillograph Channel 2-10 for Drop Test
2-16 for Flight Test

SEMI LOGARITHMIC 359T-61
KEUFFEL & ESSER CO.



RIGHT HAND GEAR NO. 16, VERTICAL CHANNEL 4



R = RED (+ BATTERY)
B = BLACK (- BATTERY)
G = GREEN (GRID 1)
BL = BLUE (GRID 2)
R_c = CALIBRATION RESISTANCE
100 K Ohms

DESCRIPTION:

Right hand main gear drag strain gage. This transducer measures drag loads felt at the base of the piston.

CONSTANT:

See section on Gear Calibration.

CHARACTERISTICS:

TRANSDUCER

Type - ABF 13 Strain Gages

GALVANOMETER

Type - 7-342

Serial No. - 4952

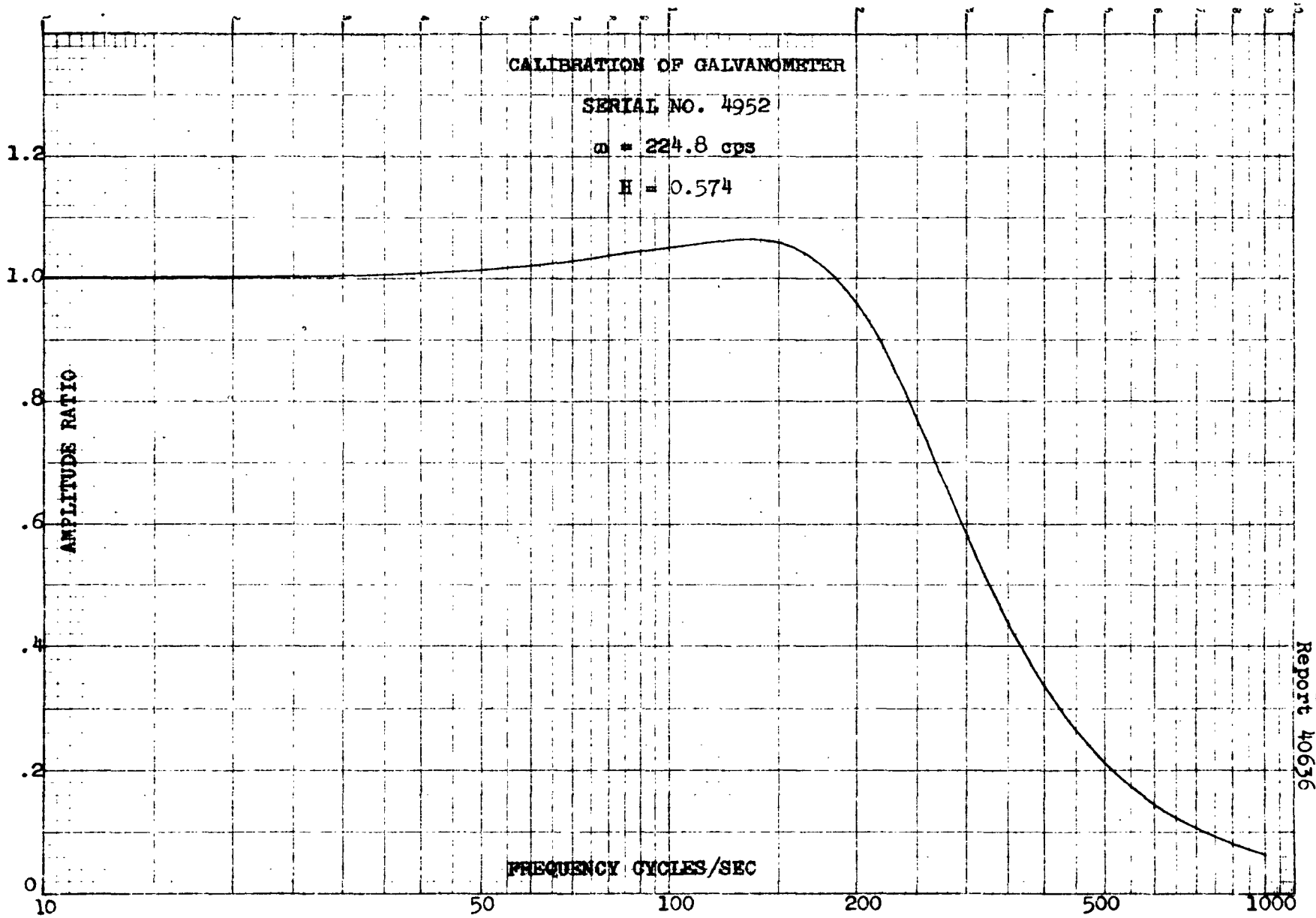
Resistance - 348.4 Ohms

Natural Frequency - 224.8 cps

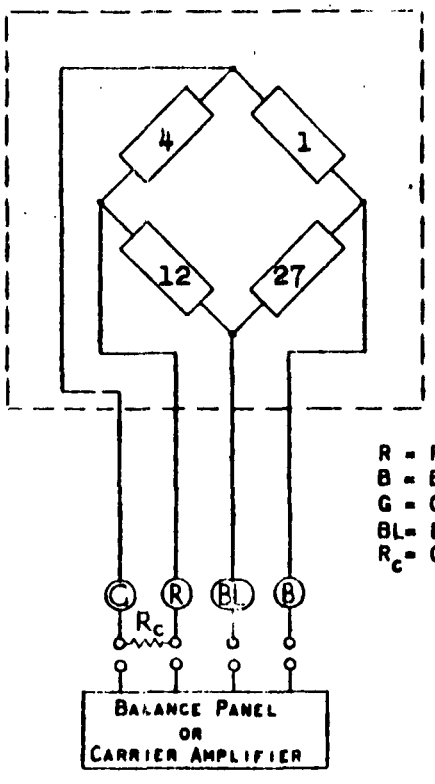
Damping - 0.574

RECORDED:

Oscillograph Channel 2-13 for Drop Test
2-15 for Flight Test


SEMI-LOGARITHMIC 359T-61
CALIBRATION OF GALVANOMETER
SERIAL NO. 4952
ω = 224.8 cps
H = 0.574
AMPLITUDE RATIO
1.2
1.0
.8
.6
.4
.2
0
10
50
100
200
500
1000
FREQUENCY CYCLES/SEC

RIGHT HAND MAIN GEAR NO. 16 DRAG CHANNEL 5



R = RED (+ BATTERY)
B = BLACK (- BATTERY)
G = GREEN (GRID 1)
BL = BLUE (GRID 2)
R_c = CALIBRATION RESISTANCE
100 K Ohms

DESCRIPTION:

Repaired right hand gear side Channel 3A.

CONSTANT:

See section on Gear Calibration.

$\delta/\Delta = 1.003\ \delta/\Delta$

CHARACTERISTICS:

TRANSDUCER

Type - ABF-13 Strain Gages

GALVANOMETER

Type - 7-342

Serial No. - 4946

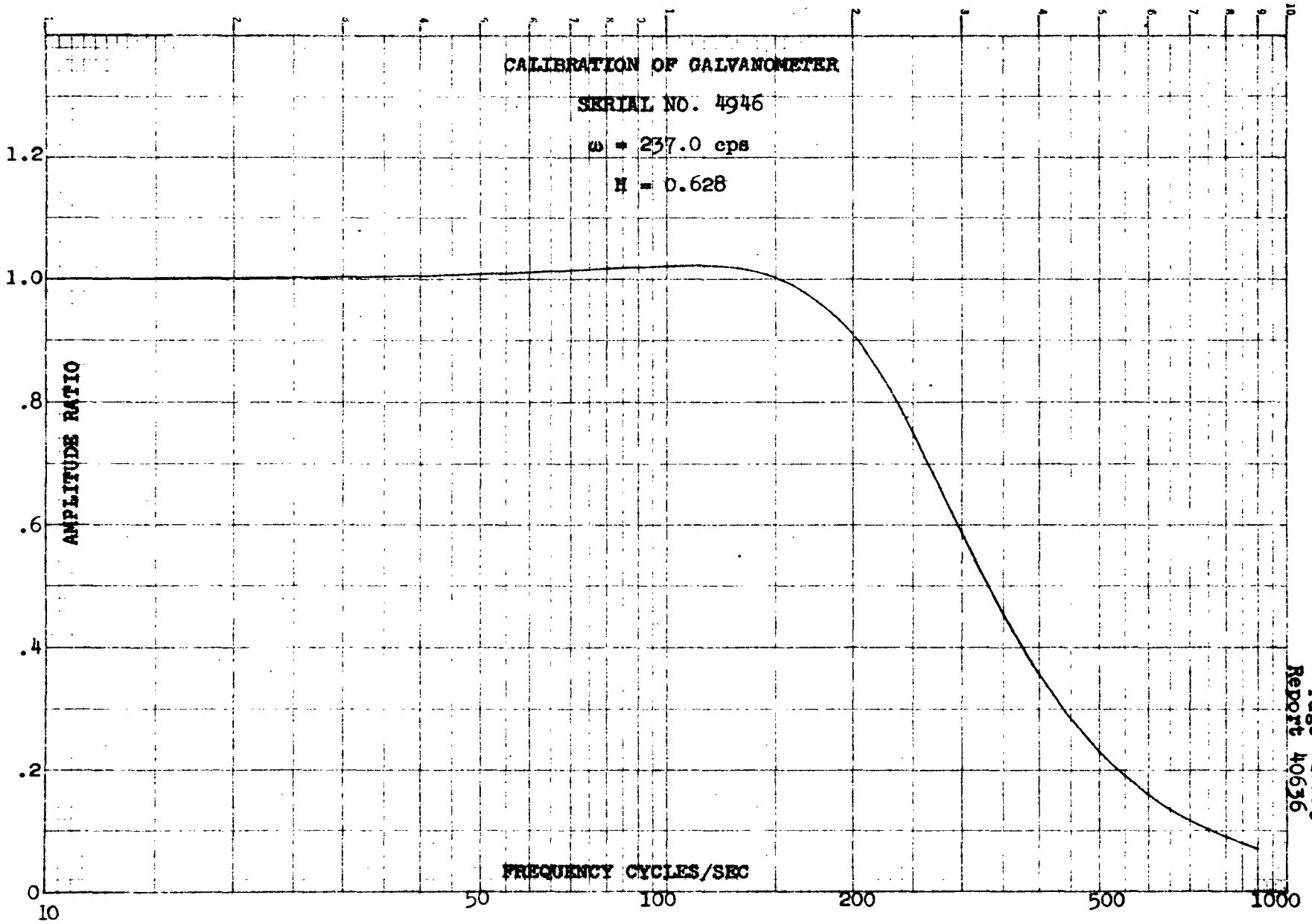
Resistance - 348.6 Ohms

Natural Frequency - 237.0 cps

Damping - 0.628

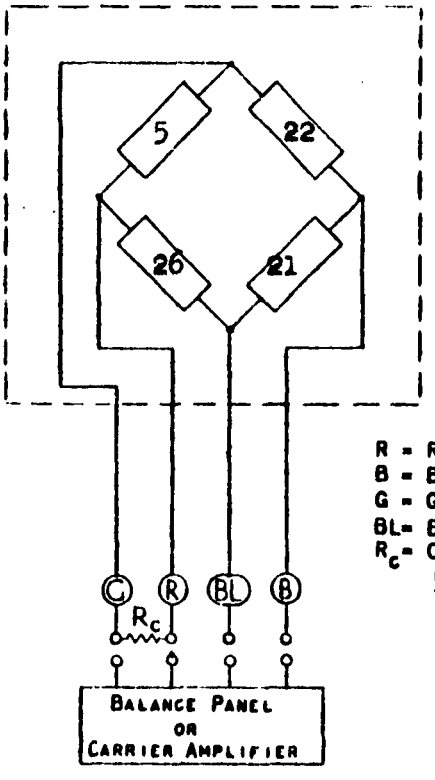
RECORDED:

Oscillograph Channel 2-33 for Drop Test
2-15 for Flight Test



Page 2.009
Report 40636

RIGHT HAND GEAR NO. 16 SIDE CHANNEL 3



R = RED (+ BATTERY)
B = BLACK (- BATTERY)
G = GREEN (GRID 1)
BL = BLUE (GRID 2)
R_c = CALIBRATION RESISTANCE
5[illegible]1 Ohms

DESCRIPTION:

Left hand main gear 10 vertical strain gage bridge 1.

CONSTANT:

See calibration of main gears section

$\delta/\Delta = .9947\ \delta/\Delta$

CHARACTERISTICS:

TRANSDUCER

Type - ABF-13 strain gage

GALVANOMETER

Type - 7-342

Serial No. - 4942

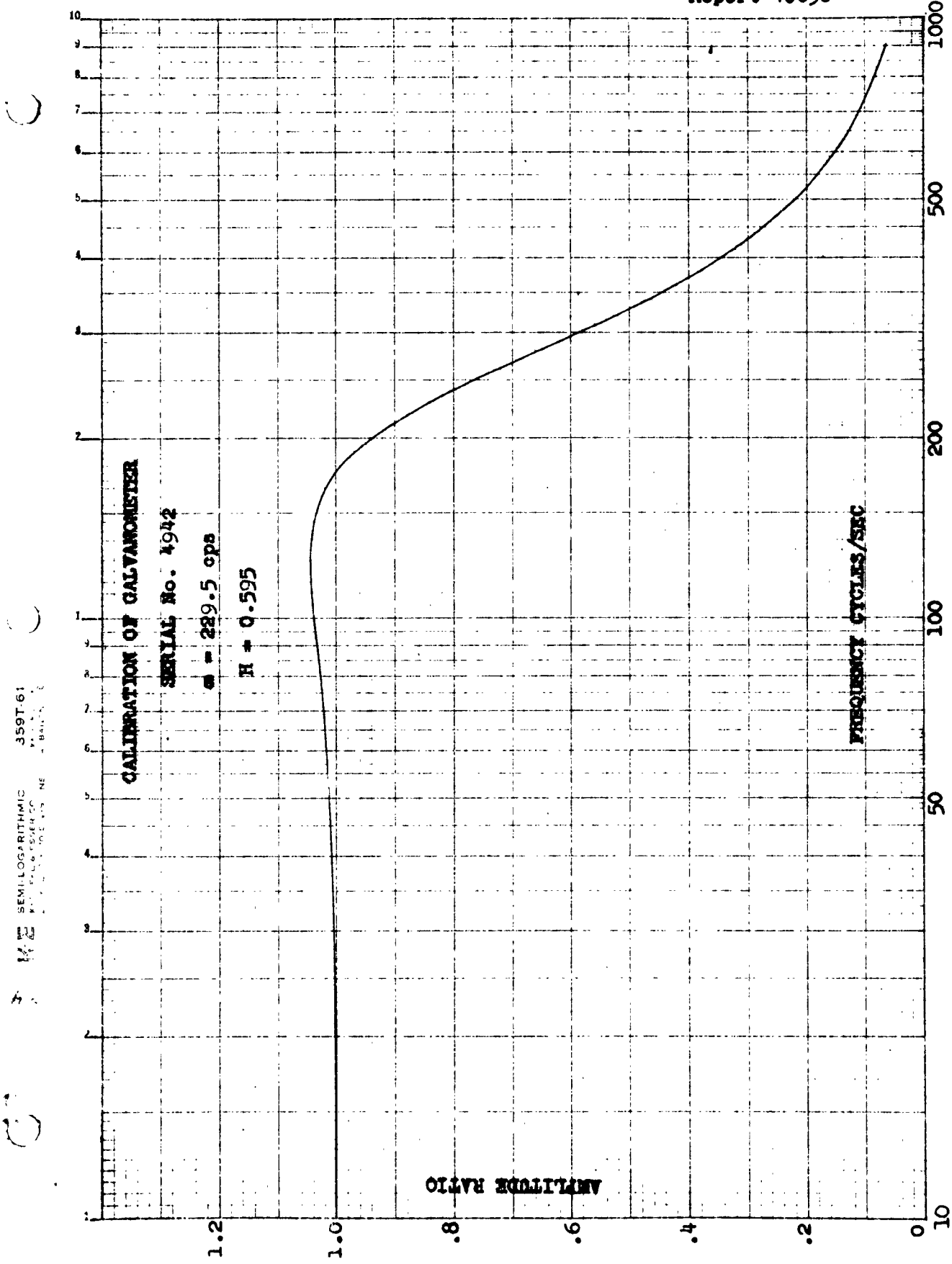
Resistance - 352.0 Ohms

Natural Frequency - 229.5 cps

Damping - 0.595

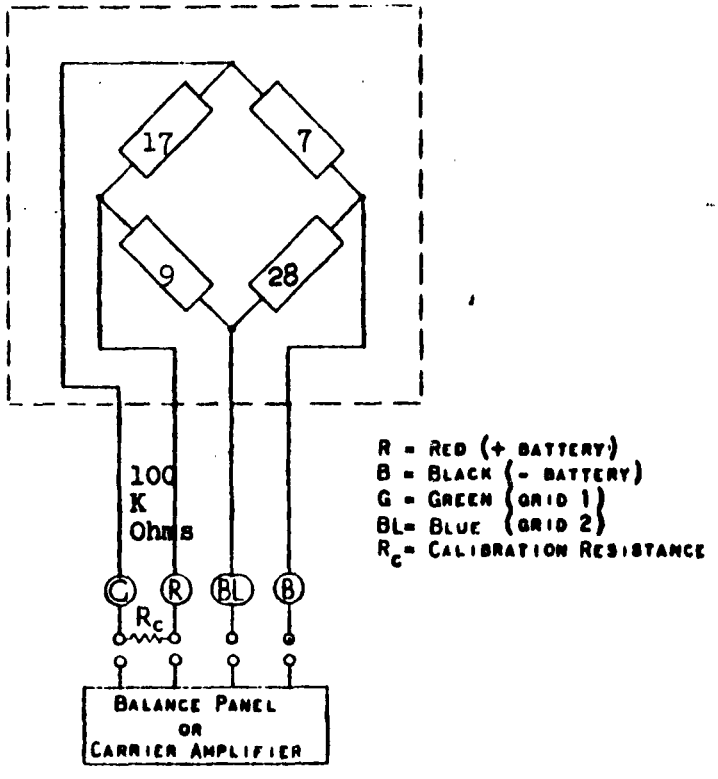
RECORDED:

Oscillograph Channel 1-10 for Drop Test
1-15 for Flight Test


CALIBRATION OF GALVANOMETER
SERIAL No. 4942
a = 229.5 cps
H = 0.595
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1.2
1.0
.8
.6
.4
.2
0
10
50
100
200
500
1000
SEMI-LOGARITHMIC
359T-61

LEFT HAND MAIN GEAR VERTICAL STRAIN GAGE

CHANNEL 1



DESCRIPTION:

Left hand main gear 10 drag strain gage bridge 3. This transducer measures drag loads felt at the base of the piston.

CONSTANT:

See section on main gear calibration.

$\delta/\Delta' = 1.010\ \delta/\Delta$

CHARACTERISTICS:

TRANSDUCER

Type - ABF-13 Strain Gages

GALVANOMETER

Type - 7-342

Serial No. - 7379

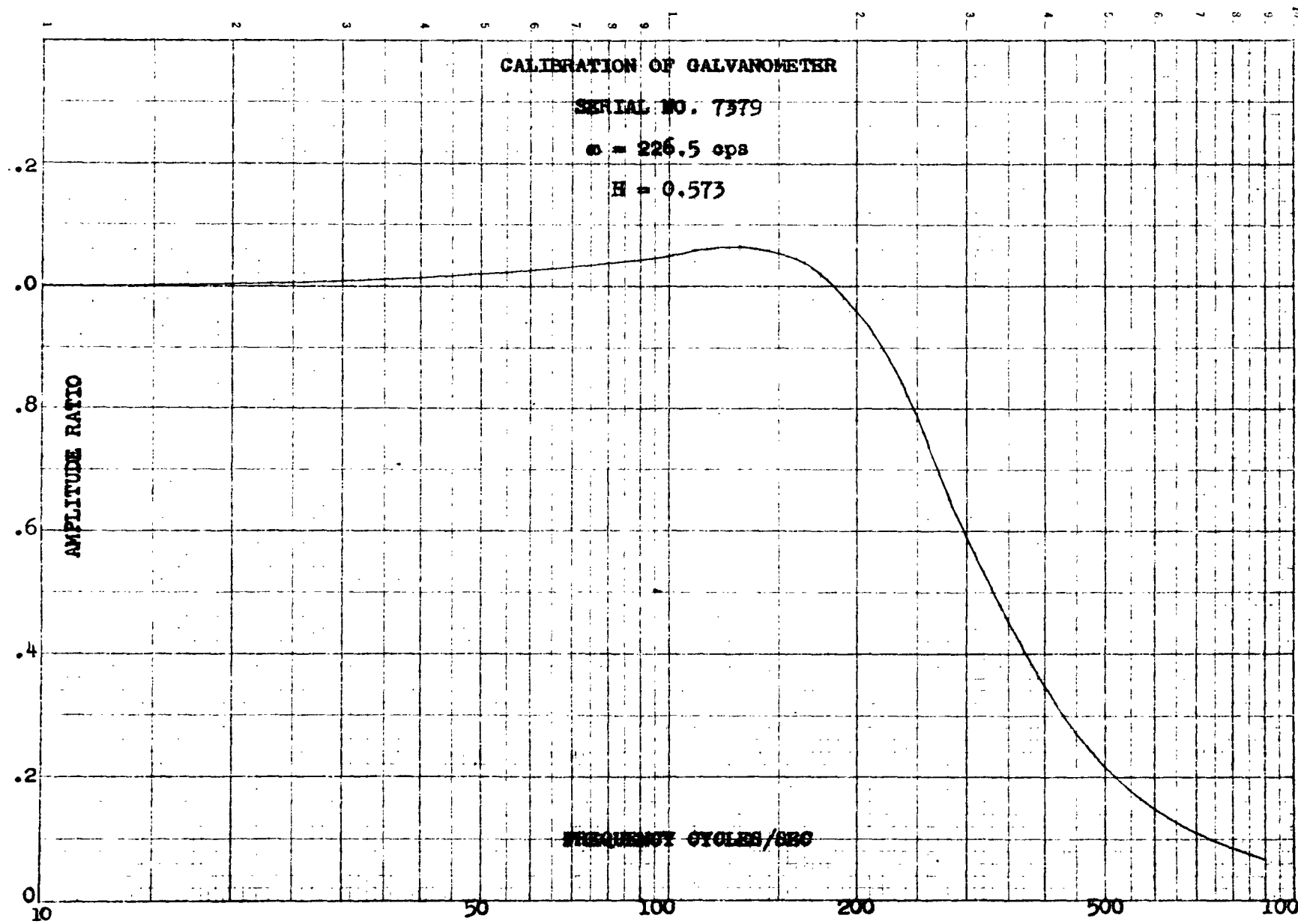
Resistance - 350.4 Ohms

Natural Frequency - 226.5 cps

Damping - 0.573

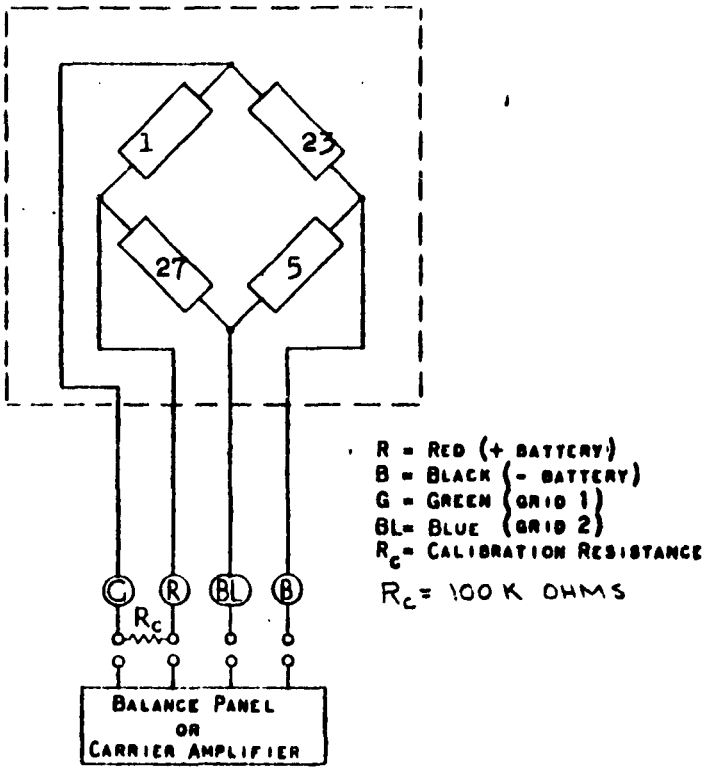
RECORDED:

Oscillograph Channel 1-14 for Drop Test
1-18 for Flight Test


CALIBRATION OF GALVANOMETER
SERIAL NO. 7379
ω = 226.5 cps
H = 0.573
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
0
.2
.4
.6
.8
.0
10
50
100
200
500
1000

LH MAIN GEAR DRAG STRAIN GAGE

CHANNEL 3



DESCRIPTION:

Left hand main gear side bending moment channel 5. This transducer was intended to measure bending moments induced by side loads.

CONSTANT:

See section on calibration.

CHARACTERISTICS:

TRANSDUCER

Type - ABF 13 strain gages

GALVANOMETER

Type - 7-342

Serial No. - 4662 for Drop Test

Resistance - 352.0 Ohms

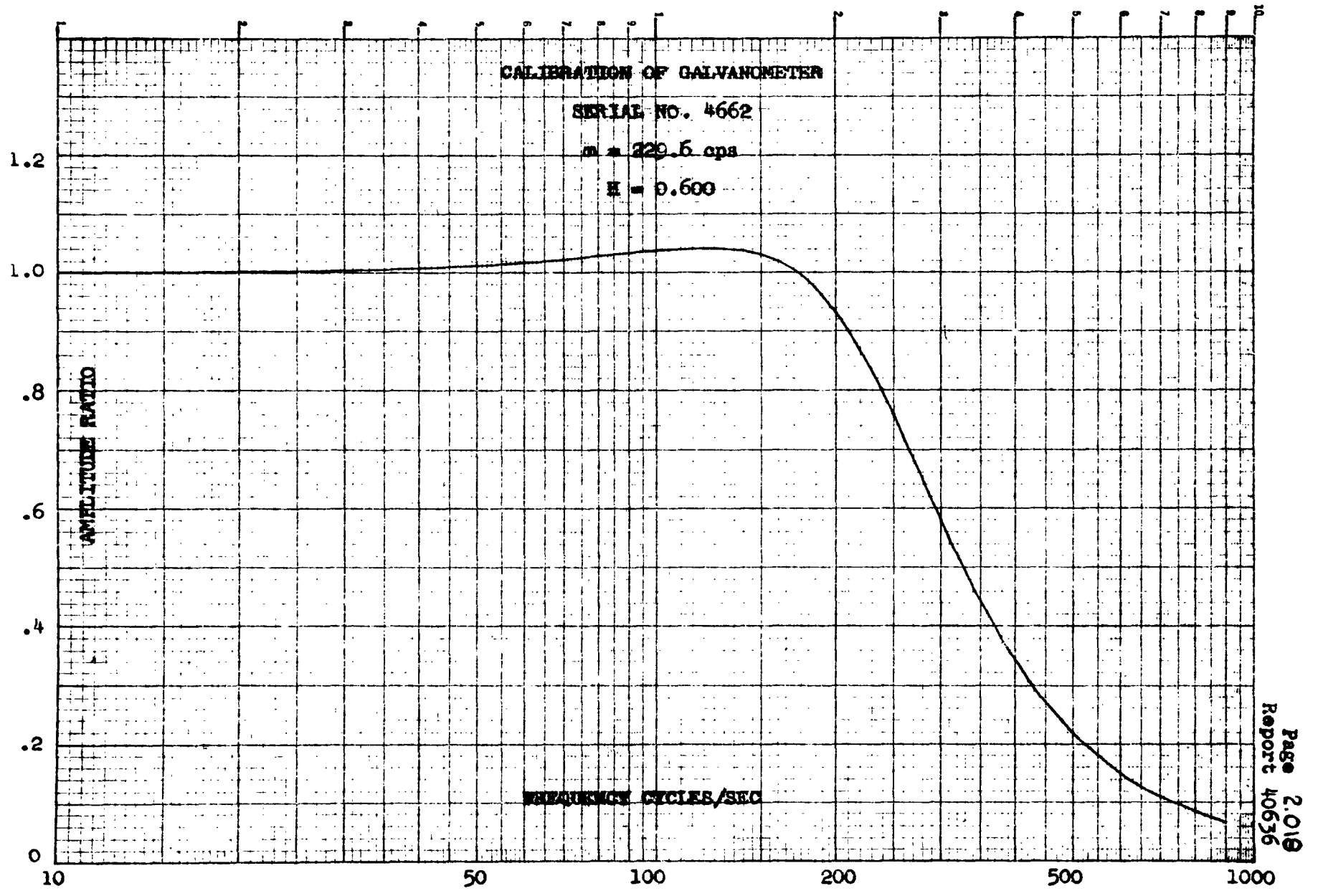
Natural Frequency - 229.6 cps

Damping - 0.600

Serial No. - 5085 for Flight Test

RECORDED:

Oscillograph Channel 1-20 for Drop Test
1-12 for Flight Test


SEMI-LOGARITHMIC
KEUFFEL & ESSER CO.
2 CYCLES X 70 DIVISIONS
359T-61
CALIBRATION OF GALVANOMETER
SERIAL NO. 4662
n = 229.6 cps
H = 0.600
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1.2
1.0
.8
.6
.4
.2
0
10
50
100
200
500
1000

MAIN LANDING GEAR CALIBRATION:

Although both gears were calibrated statically, the set of equations used to determine loads was obtained from a dynamic calibration.

The static calibrations were initially conducted without the lower mass accelerometer mounts. Subsequent to the test program conducted at NATC, Patuxent River, and the laboratory drop tests, it was determined that the presence of the accelerometer mounts materially affected the stress distribution in the area of the strain gages and, hence, the equation constants.

Both gears were drop tested three times in a column drop jig in the 'as received' condition immediately after the flight test portion of the program, and the set of equations used to determine flight landing loads was obtained from this series. Comparison of the reaction platform load with the strut load obtained using these equations is shown on Pages 2.023, 2.024 and 2.025. Landing gear loads for the airplane drop test part of the program were derived from equations obtained in the same manner. Comparison of loads using these equations is shown on Pages 2.026 through 2.031. Detailed discussion of this procedure follows:

VERTICAL LOADS:

The vertical load constants were obtained by fitting coefficients to strain gage readings such that the coefficients would produce the vertical platform readings obtained during drop tests.

Let the desired equation form be set as

$$V \quad (A + Bs)x + (C + Ds)y$$

where V = vertical load

s = strut position

x = vertical gage reading

y = drag gage reading

A, B, C, D = equation coefficients

VERTICAL LOADS: (Cont'd)

Then the difference, d, between calculated vertical load and measured vertical load can be expressed as

$$d = (A + Bs)x + (C + Ds)y - V_M$$

V_M here represents the platform load minus the acceleration-induced load measured by the lower mass vertical accelerometer. The value of "d" was determined every .002 second from the records.

When the summation of d^2 is set to a minimum then the values of the coefficients that produce this condition produce the best fit.

$$d^2 = \left((A + Bs)x + (C + Ds)y - V_M\right)^2$$

The values of A, B, C and D can be obtained by setting the first partial derivatives of the equation with respect to each of the unknowns equal to zero.

$$\frac{\rho\left((A + Bs)x + (C + Ds)y - V_M\right)^2}{\rho A} = 0$$

etc.

After differentiating and re-arranging:

$$A\Sigma x^2 + B\Sigma x^2 s + C\Sigma xy + D\Sigma xsy = \Sigma V_M x$$

$$A\Sigma x^2 s + B\Sigma^2 s^2 + C\Sigma xsy + D\Sigma xs^2 y = \Sigma V_M xs$$

$$A\Sigma xy + B\Sigma xsy + C\Sigma y^2 + D\Sigma sy^2 = \Sigma V_M y$$

$$A\Sigma xsy + B\Sigma xs^2 y + C\Sigma sy^2 + D\Sigma s^2 y^2 = \Sigma V_M sy$$

The solution of these four equations and four unknowns produced the values of the coefficients used. The formation and manipulation of these equations was handled by an IBM 7090 computer. In those cases where unrealistic (but mathematically correct) values for the less important coefficients were obtained, a modification to the basic program was made to have the off-diagonal elements in the matrix solution converge about a diagonal constant which was obtained either during the landing gear static calibration or during the investigation of the effect of the location of the accelerometer mount.

VERTICAL LOADS: (cont'd)

The values obtained by this process are:

Flight Tests

Left hand gear 10

$$V = (42{,}500 + 90s)x + (100 + 95s)y$$

Right hand gear 16

$$V = (55495 - 425.4s)x + (450 + 1103.9s)y$$

Airplane Drop Tests

Left hand gear 10

$$V = (43574.6 - 142.1s)x + (-223.8 + 66.7s)y$$

Right hand gear 16

$$V = (56995 + 337.2s)x + (1200 - 101s)y$$

The reason two sets of equations are necessary is that the accelerometer mount location had been altered between the two series of tests.

DRAG LOADS:

The drag load coefficients were obtained from drop tests that were conducted with no wheel spin up and with the strut perpendicular to the deck. A check of drag coefficients during the accelerometer mount investigation showed a negligible change in value of the drag equation coefficients regardless of mount position, hence only the vertical coefficients were determined. The coefficients were then set to produce a minimum residual about zero.

The values obtained by this process are:

Flight Tests

Left hand gear 10

$$D = (-670 + 110s)x + (4575 - 5s)y$$

Right hand gear 16

$$D = (-2869.9 + 32.8s)x + (8455.8 + 30.8s)y$$

DRAG LOADS: (cont'd)

Airplane Drop Tests

Left hand gear 10

$$D = (983.3 - 99.1s)x + (4575.0 - 5.0s)y$$

Right hand gear 16

$$D = (4800 - 145.3s)x + (8455.8 + 30.8s)y$$

SIDE LOADS:

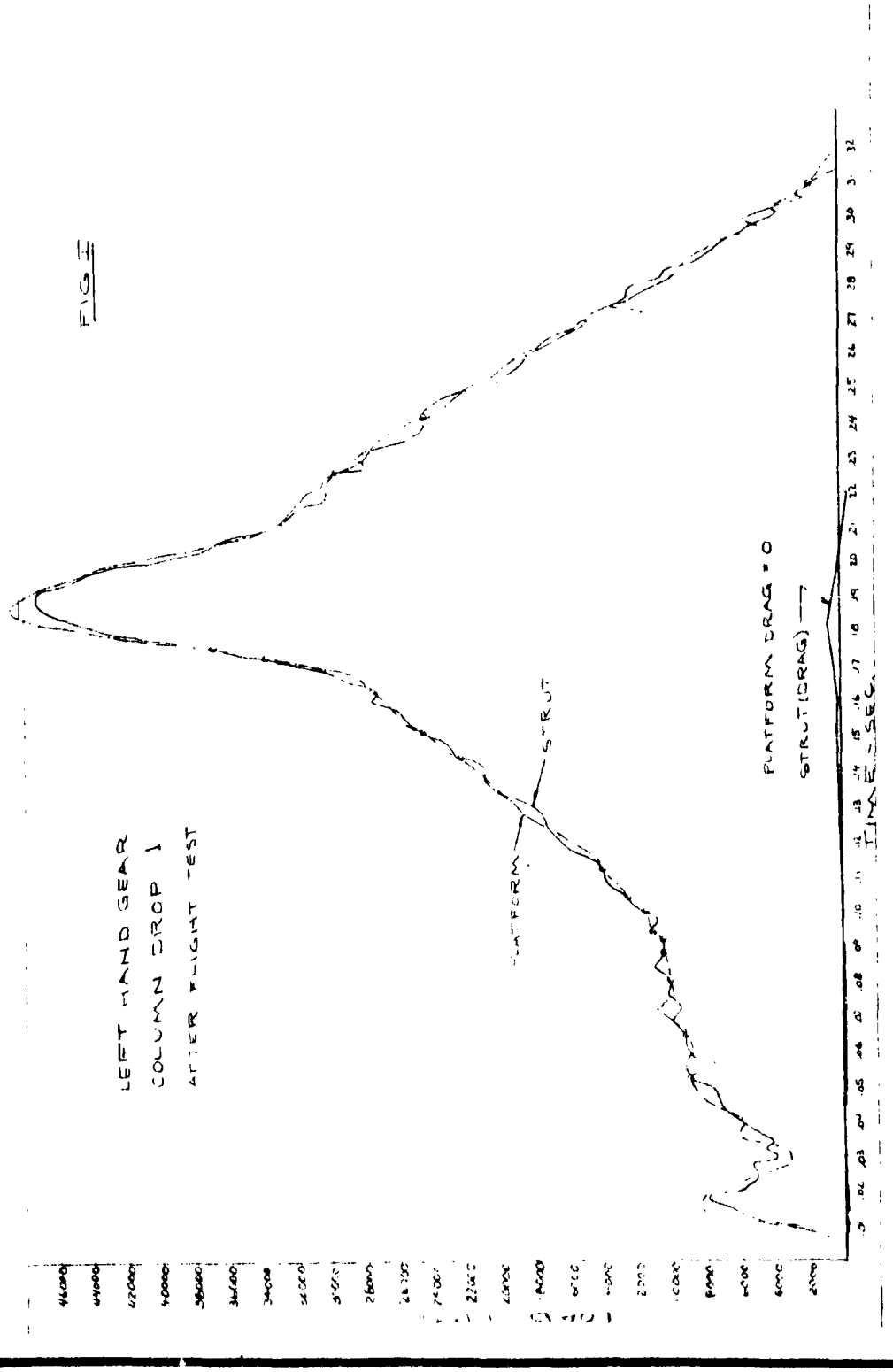
Left Hand Main Gear 10

The piston instrumentation did not include side load measuring gages. An attempt to calibrate for side loads was made by installing bending gages upon the main landing gear barrel. It was found that moments induced by vertical loads far overshadowed any moments induced by side loads, and the attempts at calibration were discontinued.

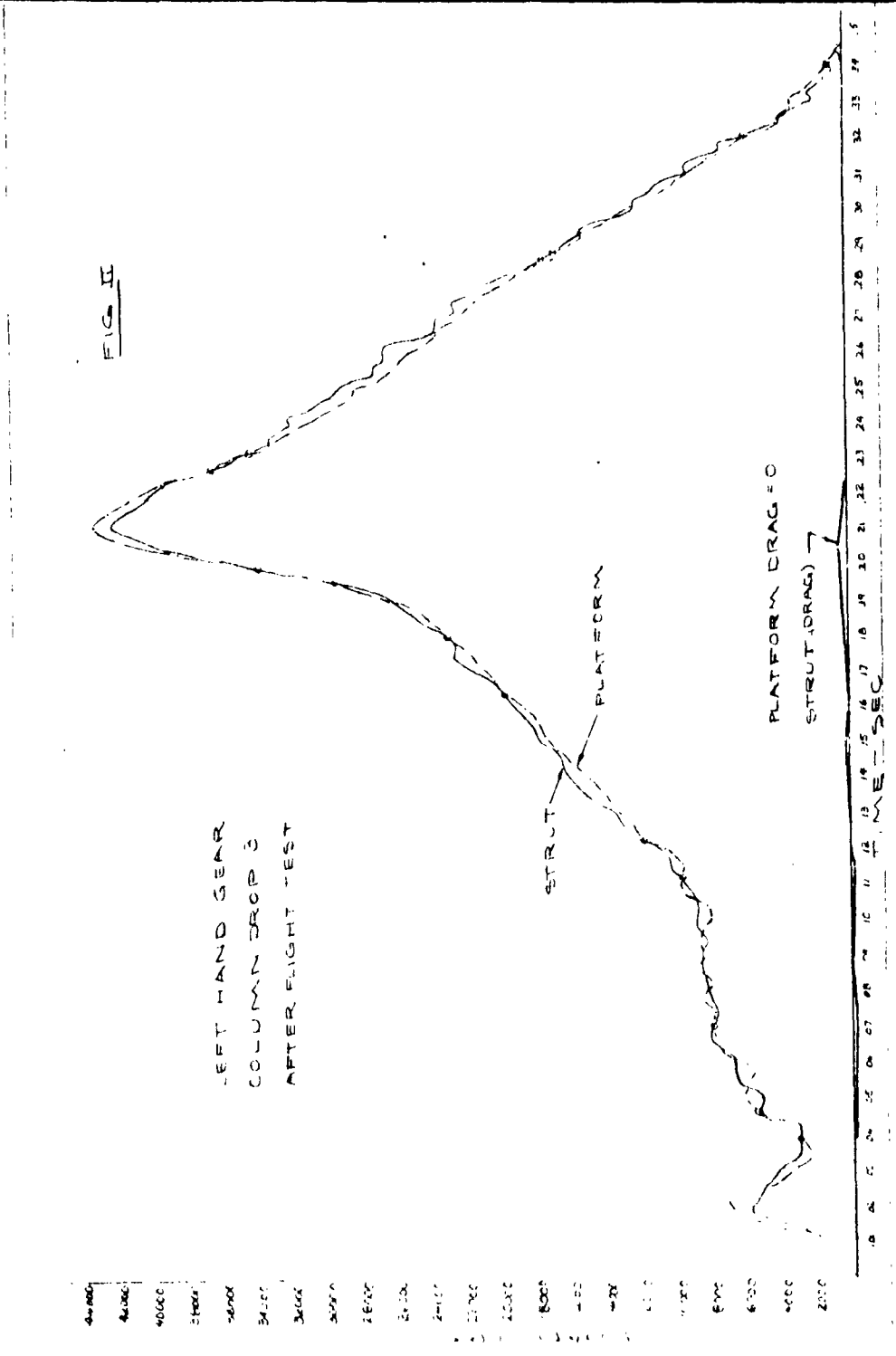
Right Hand Main Gear 16

Instrumented main gear No. 16 was used by NATC for catapult tests prior to the Landing Loads Program. During the catapult tests, both primary and secondary side load measuring channels became inoperative. Upon completion of the catapult tests and prior to the landing loads program, unsuccessful attempts were made to salvage these channels. As a last resort, a new strain gage was substituted into the primary side load channel to replace the damaged gage and this channel was recorded during the flight test phase. After completion of the flight test phase, the landing gear was returned to the Contractor's El Segundo Facility where a calibration of this channel was performed. The calibration proved unsatisfactory due to the large amount of interaction with vertical load.

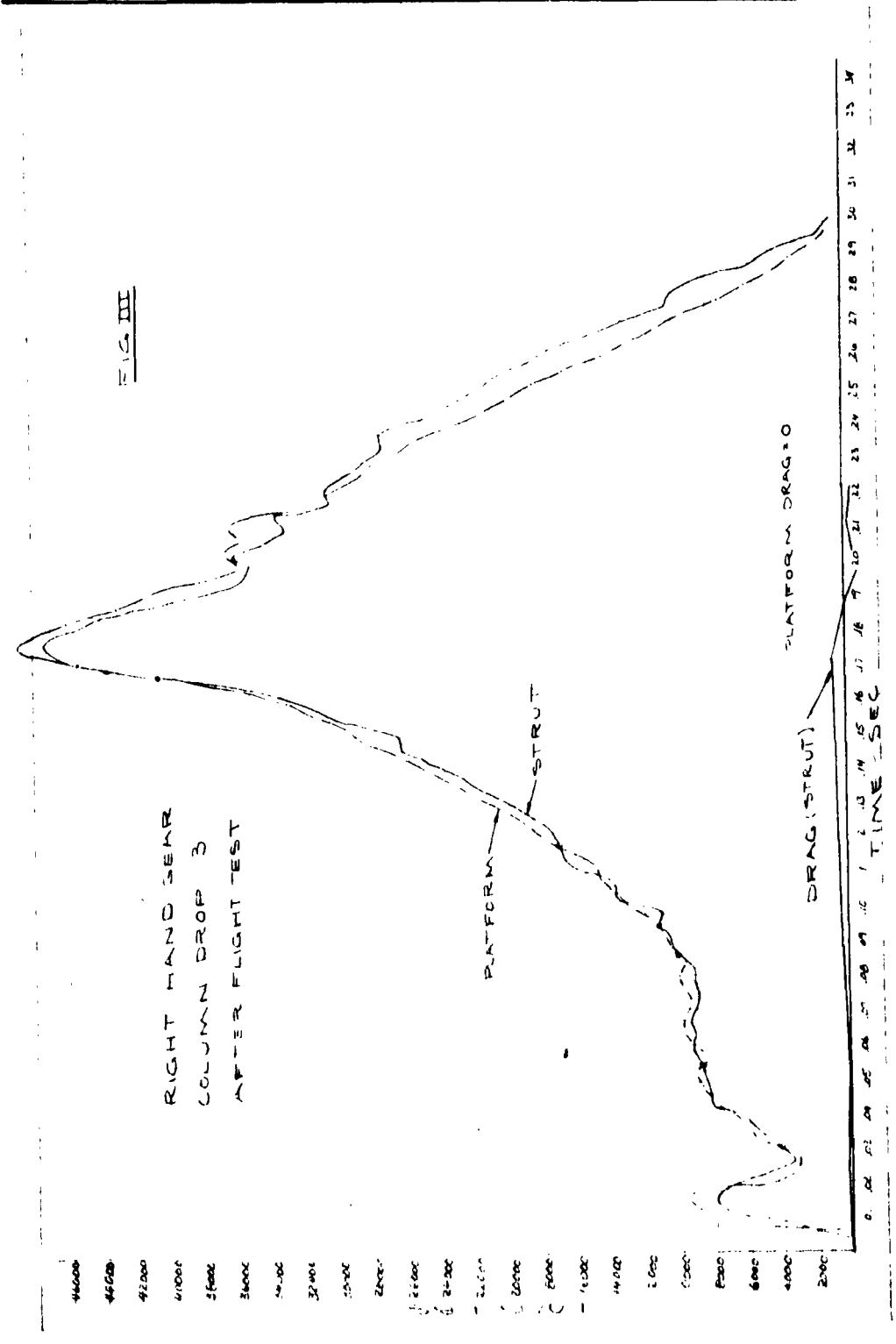
COMPARISON OF REACTION PLATFORM LOADS WITH COMPUTED GROUND LOADS



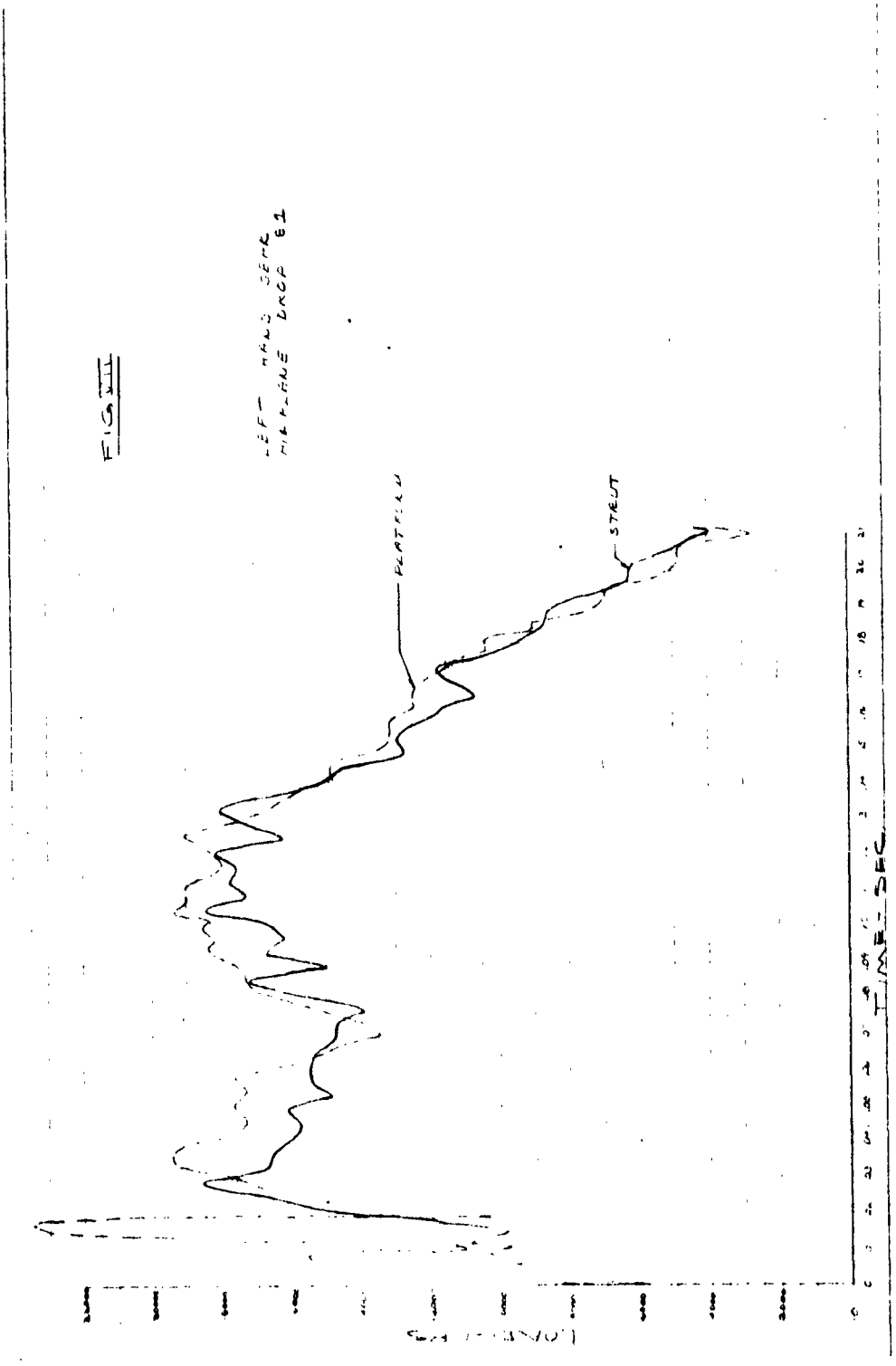
COMPARISON OF REACTION PLATFORM LOADS WITH COMPUTED GROUND LOADS



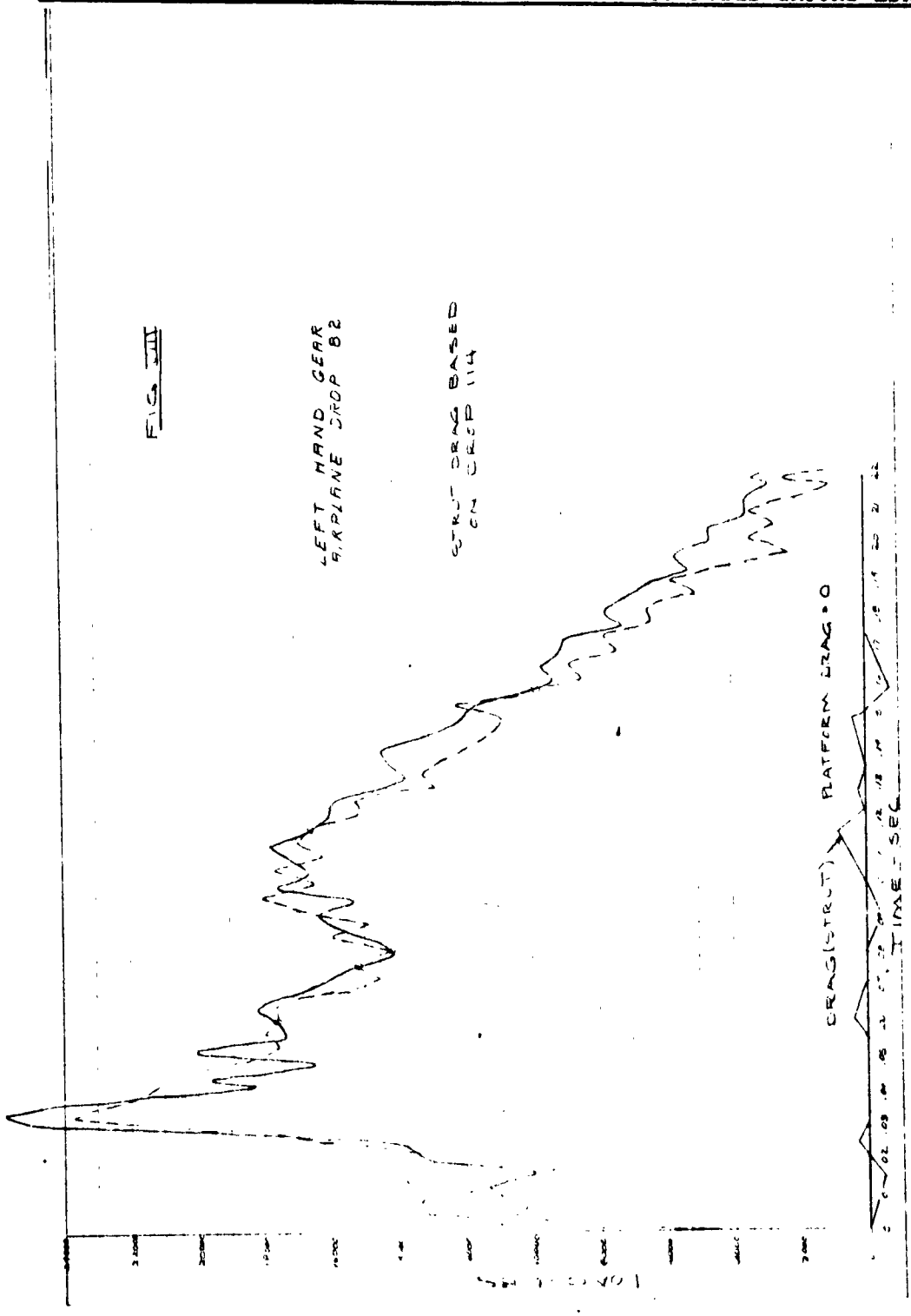
COMPARISON OF REACTION PLATFORM LOADS WITH COMPUTED GROUND LOADS



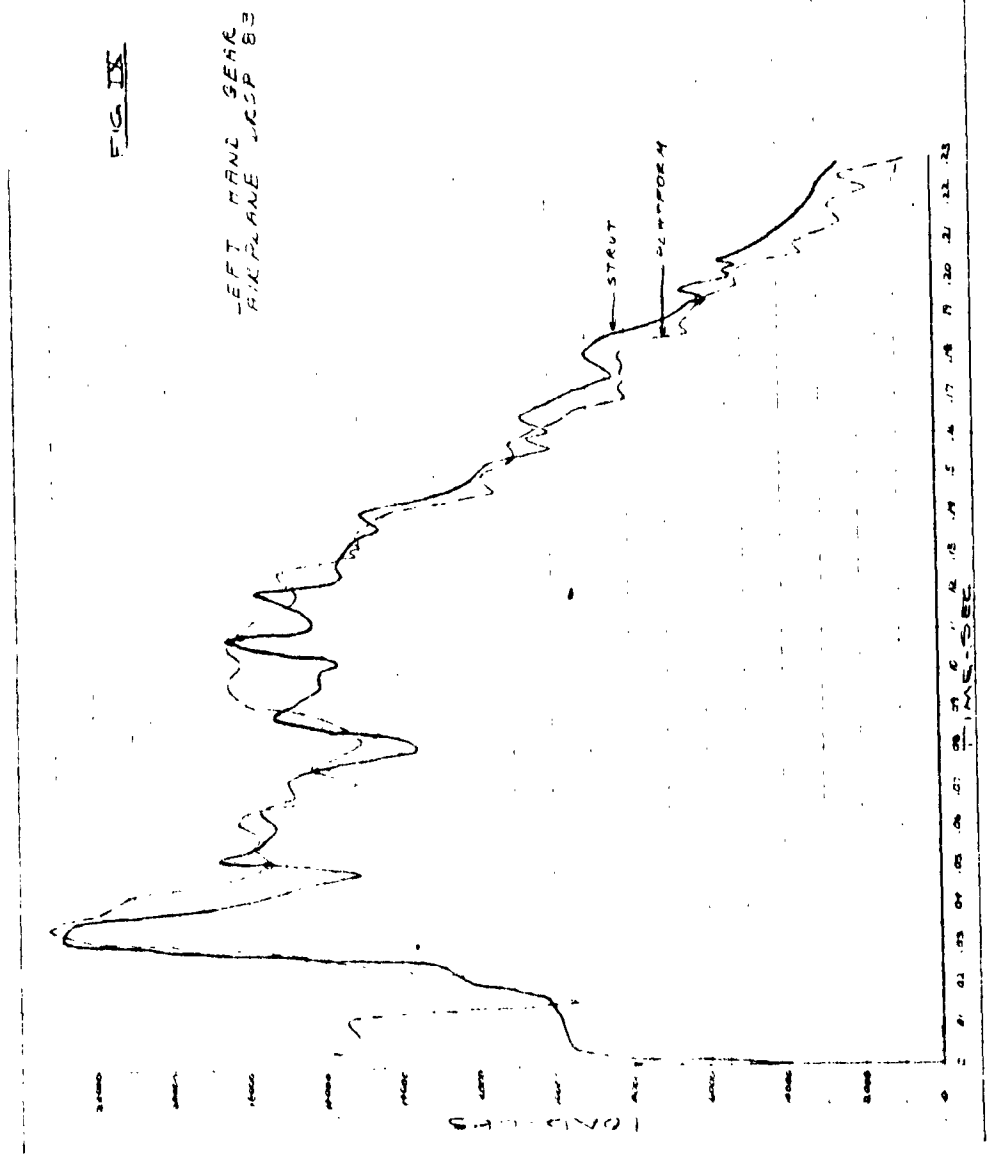
COMPARISON OF REACTION PLATFORM LOADS WITH COMPUTED GROUND LOADS



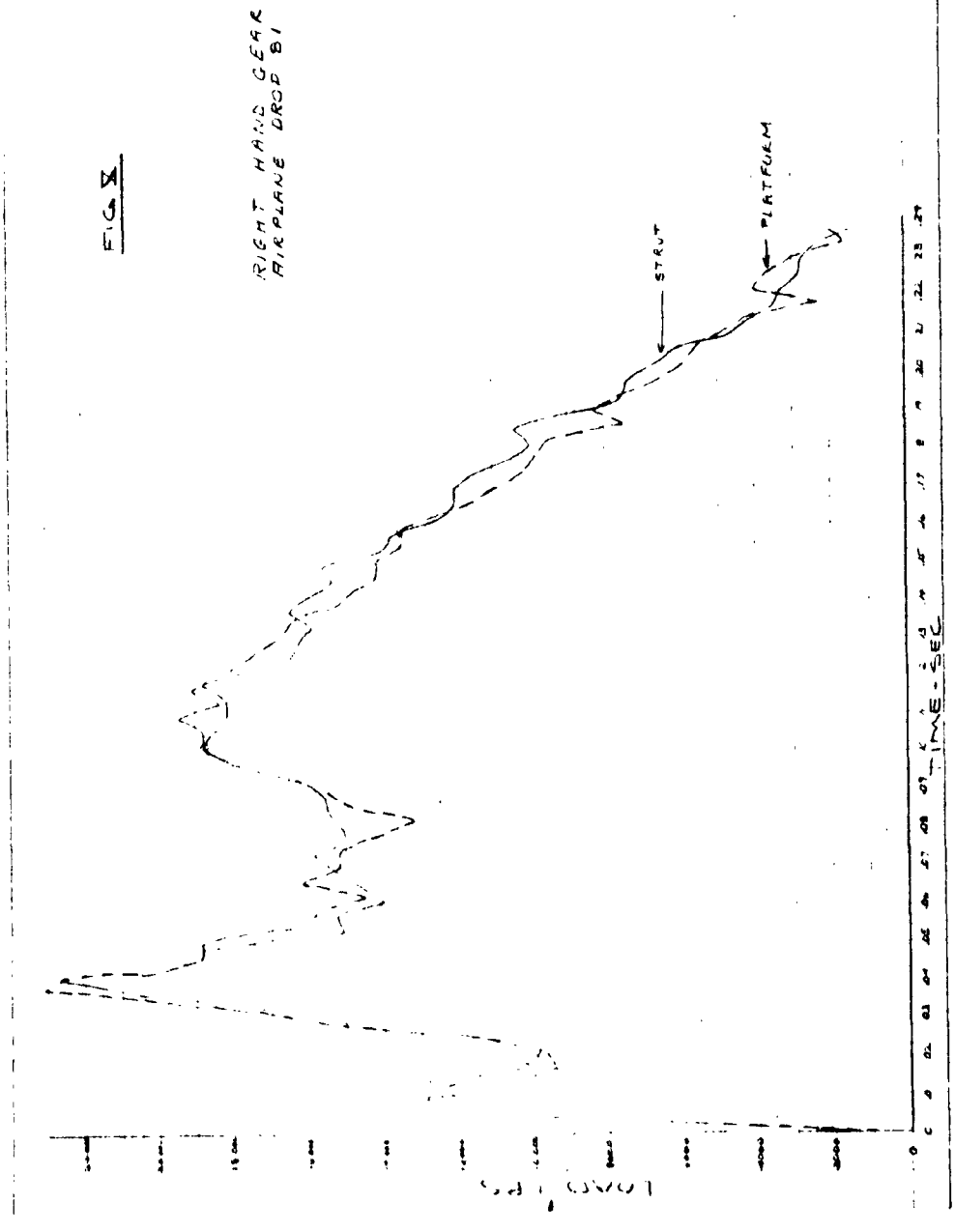
COMPARISON OF REACTION PLATFORM LOADS WITH COMPUTED GROUND LOADS



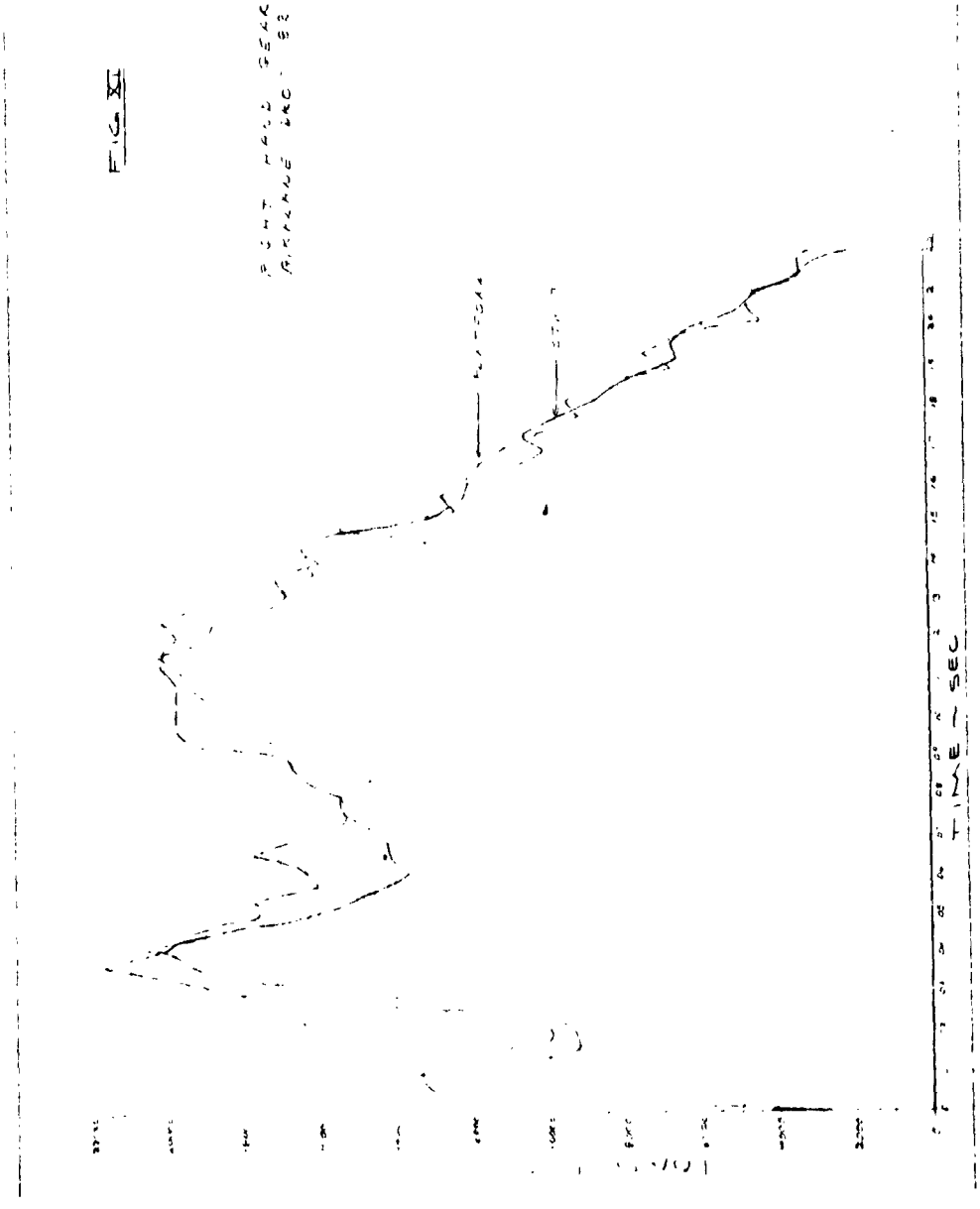
COMPARISON OF REACTION PLATFORM LOADS WITH COMPUTED GROUND LOADS



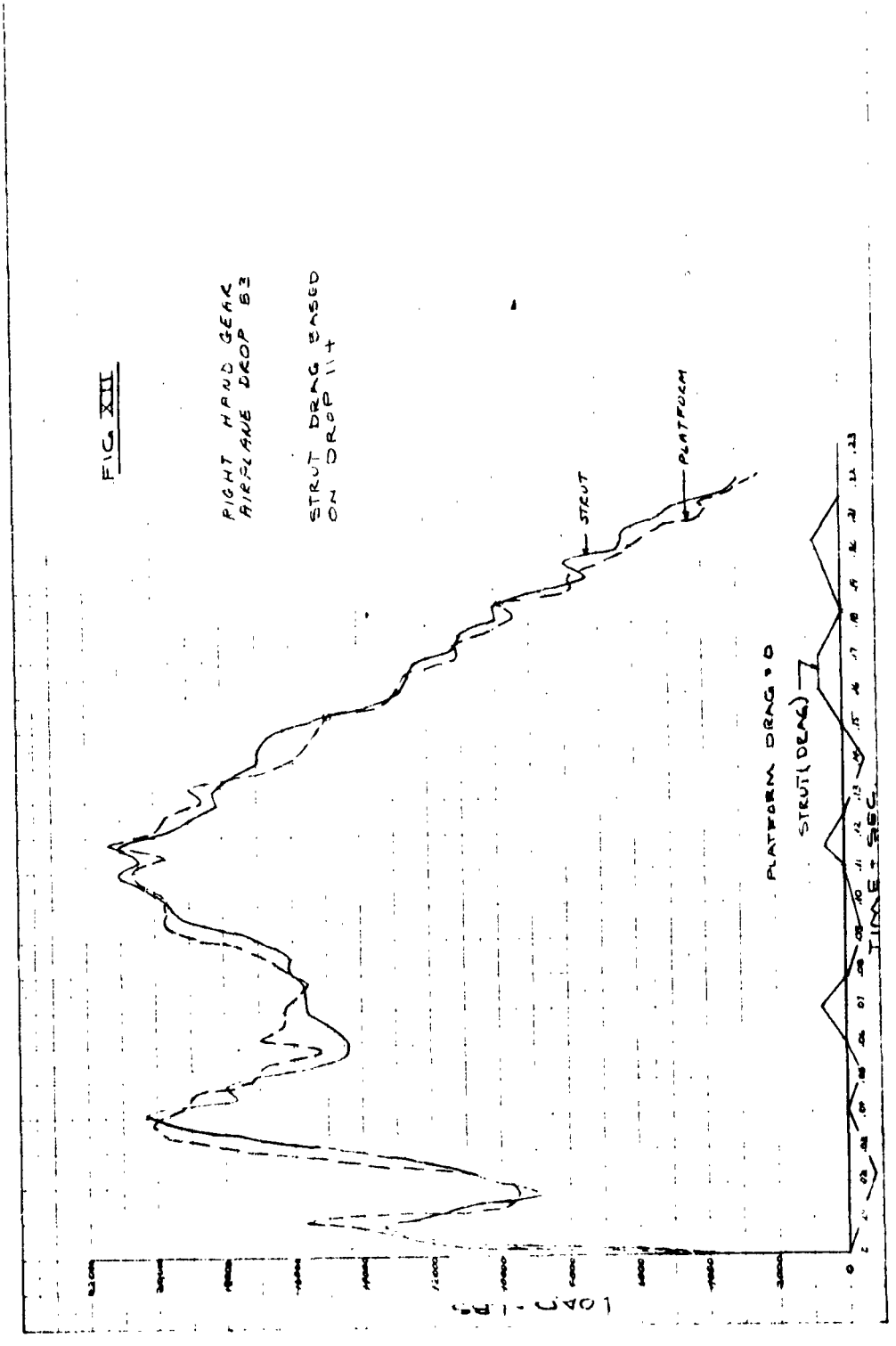
COMPARISON OF REACTION PLATFORM LOADS WITH COMPUTED GROUND LOADS



COMPARISON OF REACTION PLATFORM LOADS WITH COMPUTED GROUND LOADS



COMPARISON OF REACTION PLATFORM LOADS WITH COMPUTED GROUND LOADS



Lower Mass Accelerations .

Accelerometers were installed at the lower end of the main landing gear to measure gear lower mass vertical (normal), drag (longitudinal), and side (lateral) accelerations. A photograph of the typical installation of the mount for the vertical and drag accelerations is shown on Page 2.118. Photographs of the installation for lateral acceleration of the left hand gear appear on Pages 2.113 and 2.114 and for lateral acceleration on the right hand gear appear on Page 2.126.

DESCRIPTION:

Left hand gear lower mass vertical accelerometer. This transducer measures inertial loads felt at the shock strut axle.

CONSTANT:

G's = 51.239 δ/Δ / 50 K Ohms Resistor Calib.

CHARACTERISTICS:

TRANSDUCER

Type - Statham A6-100-350

Serial No. - 3726

Natural Frequency - 320 cps (no mount effect)

Damping - 0.66

GALVANOMETER

Type - 7-342

Serial No. - 4910

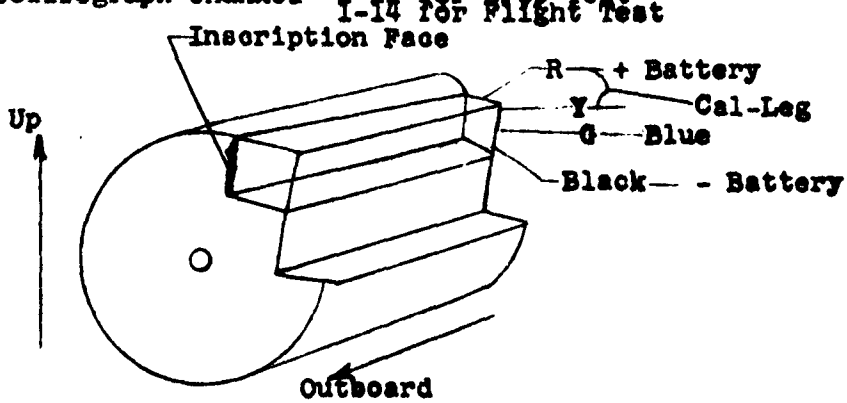
Resistance - 342.4 Ohms

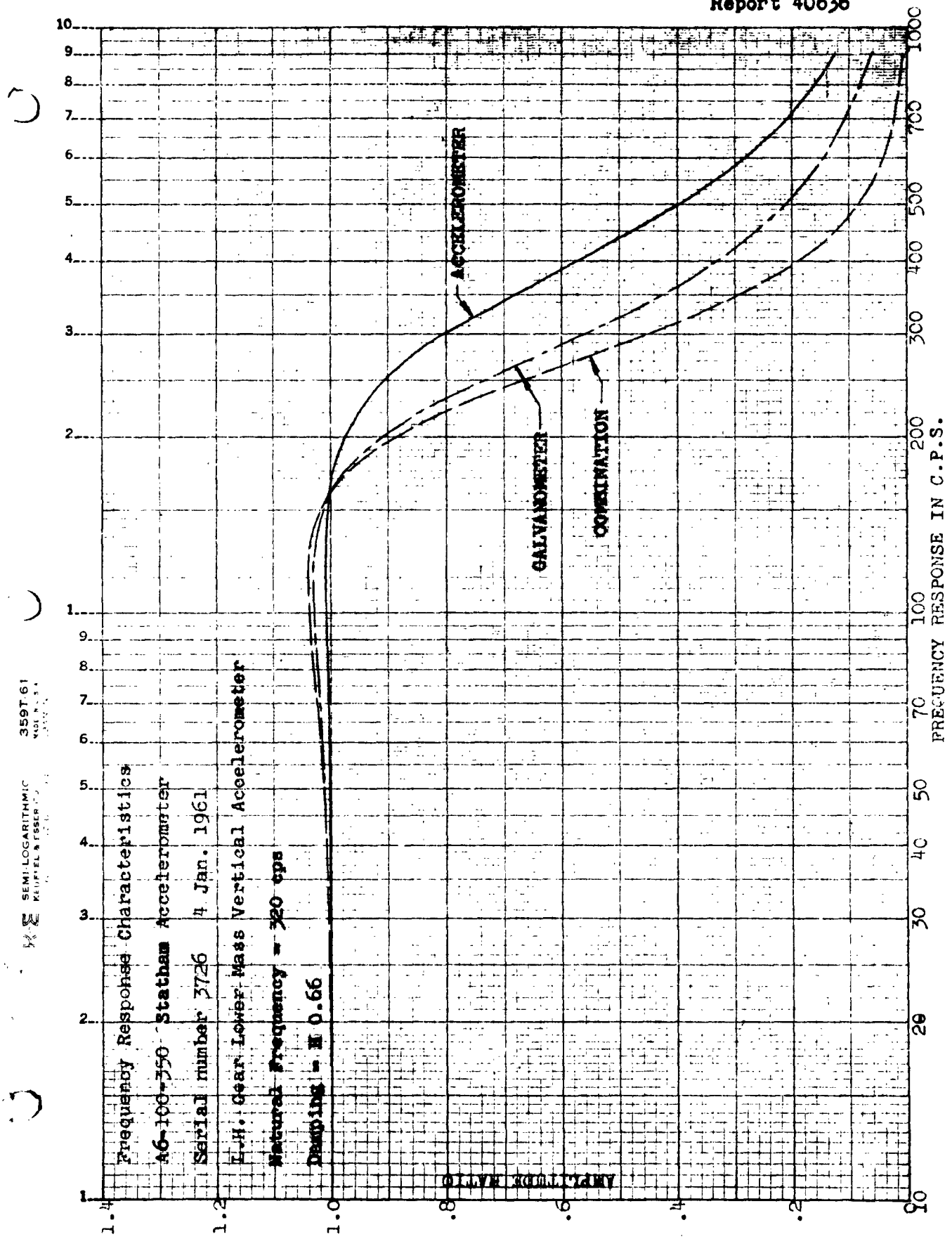
Natural Frequency - 226.7 cps

Damping - 0.612

RECORDED:

Oscillograph Channel 1-11 for Drop Test
1-14 for Flight Test




Frequency Response Characteristics
A6-100-350 Statham Accelerometer
Serial number 3726 4 Jan. 1961
L.H. Gear Lower Mass Vertical Accelerometer
Natural Frequency = 320 cps
Damping = K 0.66
ACCELEROMETER
GALVANOMETER
COMBINATION
AMPLITUDE RATIO
FREQUENCY RESPONSE IN C.P.S.
SEMI-LOGARITHMIC
3597-61

TRANSDUCER CALIBRATION

SERIAL 5726
TAG 55084
D&R.Co. 641070
PLANE A4D069

CALIBRATION AFTER FLIGHT TEST PHASE

PROGRAM E004
ANALYST
ENGR.

TRANSDUCER DESCRIPTION..STRAIN A6-100-350 ACCEL. DR 0.66
NOMINAL RANGE..... F-100
DIMENSIONS.....
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 2
CALIBRATION DATE.....01/04/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .30099 02 GS / MV/V
1/RMS SLOPE .33223 -01 MV/V/ GS
RMS INTERCEPT -.94279 02 GS

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.91041	02 GS	/ 50K
G1-IP	-.91775	02	
G2-IP	.92114	02	
G2-CP	-.91945	02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.70000 02	-.80249 00	-.45	-.59543 00	-.33	-.69894 00
-.80000 02	-.21770 00	-.12	-.25035 00	-.14	-.23152 00
-.60000 02	.82496 00	.46	.44983 -01	.02	.23279 00
-.40000 02	.81665 00	.36	.11308 00	.06	.27710 00
-.20000 02	.86030 00	.48	.16394 00	.09	.51212 00
.00000 -39	.76001 00	.42	.02648 -01	.04	.41183 00
.20000 02	.24566 00	.14	-.10247 00	-.15	-.84176 -01
.40000 02	.88952 -01	.05	-.26369 00	-.15	-.39892 -01
.60000 02	-.49033 -01	-.03	-.40067 00	-.23	-.22763 00
.80000 02	-.36498 -01	-.02	-.17518 00	-.11	-.10579 00
.90000 02	-.14307 00	-.08	-.14307 00	-.08	-.14307 00

5 JAN. 1961

SPECIAL CALIBRATION 51.358
T_P G_2 AT TERM. ENDS

DESCRIPTION:

Left hand main gear lower mass drag accelerometer. This transducer measures inertial loads felt at the shock strut axle centerline.

CONSTANT:

G = 52.351 g/Δ / 50 K Ohms Res. Calib.

CHARACTERISTICS:

TRANSDUCER

Type - Statham A6-100-350

Serial No. - 3748

Natural Frequency - 265 cps (No mount effect measurements)

Damping - 0.77

GALVANOMETER

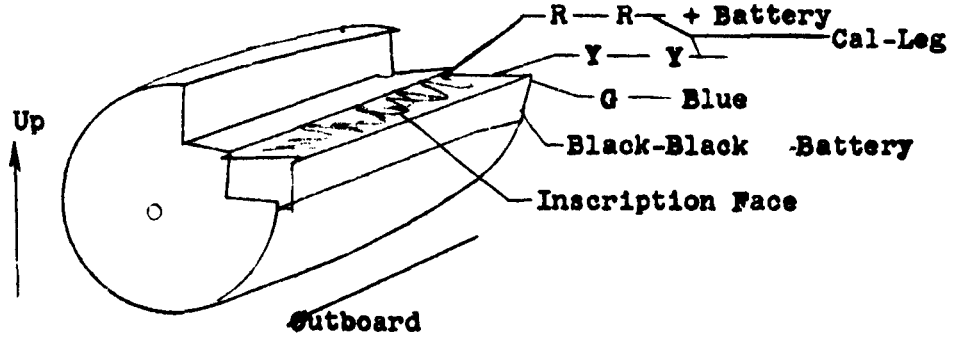
Type - 7-342

Serial No. - 4971

Resistance - 332.9 Ohms

Natural Frequency - 224.0 cps

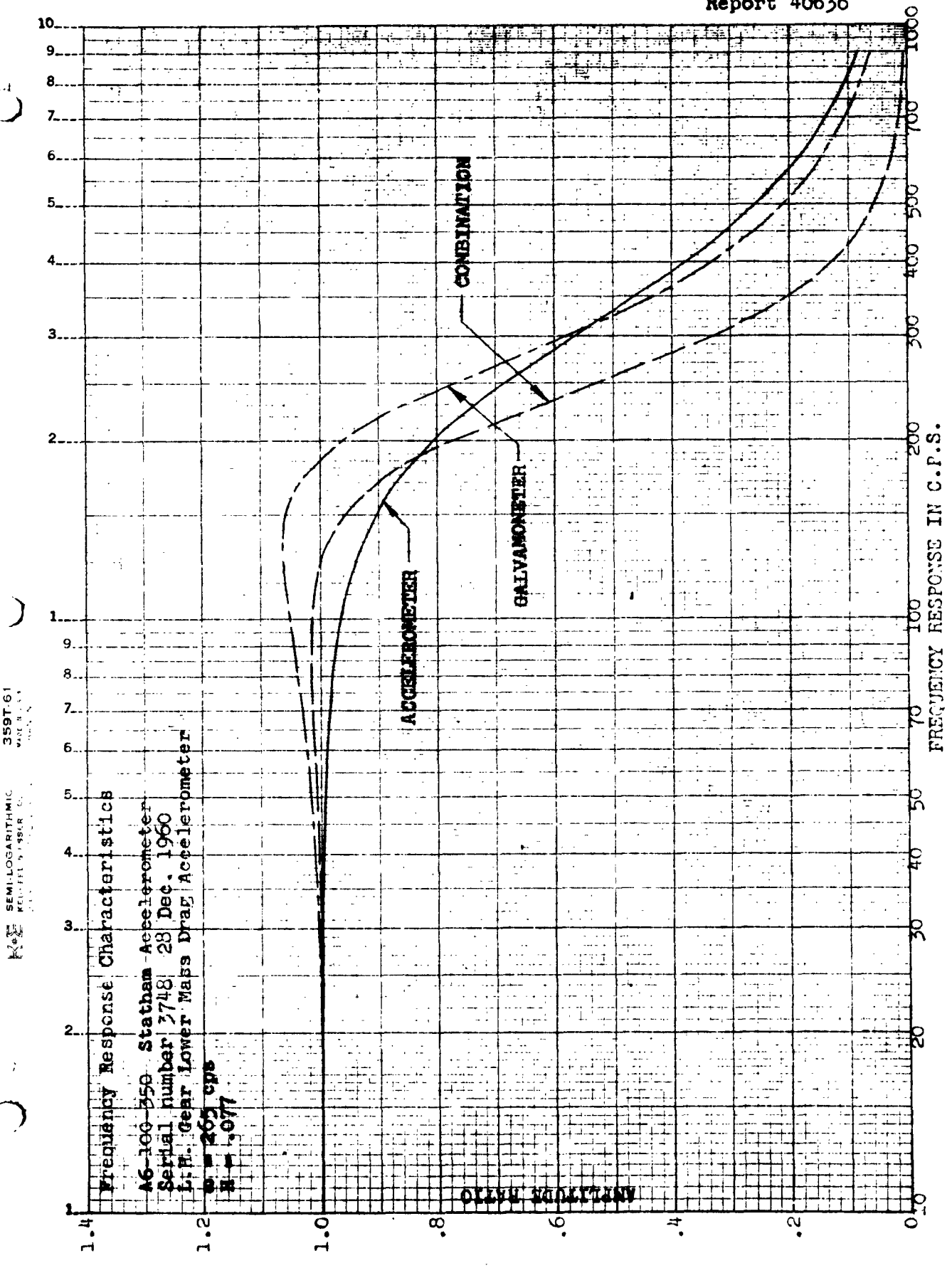
Damping - 0.573



RECORDED:

Oscillograph Channel 1-13 for Drop Test
1-17 for Flight Test

MOUNT RESONANCE WITH APPLICATION
OF 50 LB STEP FORCE


Frequency Response Characteristics
A6-100-350 Statham Accelerometer
Serial number 2748 28 Dec. 1960
L.R. Gear Lower Mass Drag Accelerometer
ω = 265 cps
H = .077
COMBINATION
GALVAMONETER
ACCELEROMETER
AMPLITUDE RATIO
FREQUENCY RESPONSE IN C.P.S.
SEMI-LOGARITHMIC
359T-61

TRANSDUCER CALIBRATION

SERIAL 3748
TAG 33086
D.R.O. 641070
PLANE A4D089

PROGRAM E004
ANALYST
ENGR.

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STHM A6-100-350 ACCFL. DR 0.77
NOMINAL RANGE..... +-100
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/28/60

W_n = 265

Rc= 333.1Ω

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	.32075	02 GS	/MV/V
1/RMS SLOPE	.31177	-01 MV/V/ GS	
RMS INTERCEPT	-.10376	03 GS	

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.52638	02 GS	/ 50K
G1-TP	-.53802	02	
G2-TP	.53844	02	
G2-CP	-.53074	02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10000 03	.22721 00	.11	.22721 00	.11	.22721 00
-.80000 02	.26972 00	.13	-.14606 00	-.07	.61830 -01
-.60000 02	.10434 00	.05	-.37381 00	-.19	-.13473 00
-.40000 02	-.61040 -01	-.03	-.47682 00	-.24	-.26893 00
-.20000 02	.22593 -02	.00	-.20563 00	-.10	-.10169 00
.00000 -39	.23187 00	.12	-.32943 00	-.16	-.48781 -01
.20000 02	.29517 00	.15	-.14140 00	-.07	.76885 -01
.40000 02	.33768 00	.17	-.98890 -01	-.05	.11940 00
.60000 02	.33861 00	.17	-.56379 -01	-.03	.14112 00
.80000 02	.21481 00	.11	-.20097 00	-.10	.69208 -02
.10000 03	-.15846 00	-.08	-.15846 00	-.08	-.15846 00

30 DEC. 1960

SP. CALIB 53.241

DESCRIPTION:

Left hand gear lower mass lateral accelerometer. This transducer measures accelerations at aircraft stations X = -38.0, Y = 265.7, Z = -91.4

CONSTANT:

G's = 49.961 δ/Δ / 50 K Ohms Resis. Calib.
(up scale mass outboard)

CHARACTERISITICS:

TRANSDUCER

	DROP TEST	FLIGHT TEST
Type - Statham	A6-150-350	A6-50-350
Serial No. -	3736	3576
Natural Frequency -	289.0	247.0
Damping -	0.744	0.72

GALVANOMETER

Type - 7-342

Serial No. - 6171

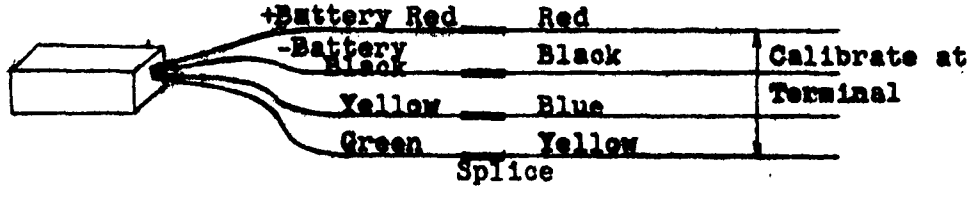
Resistance - 332.6 Ohms

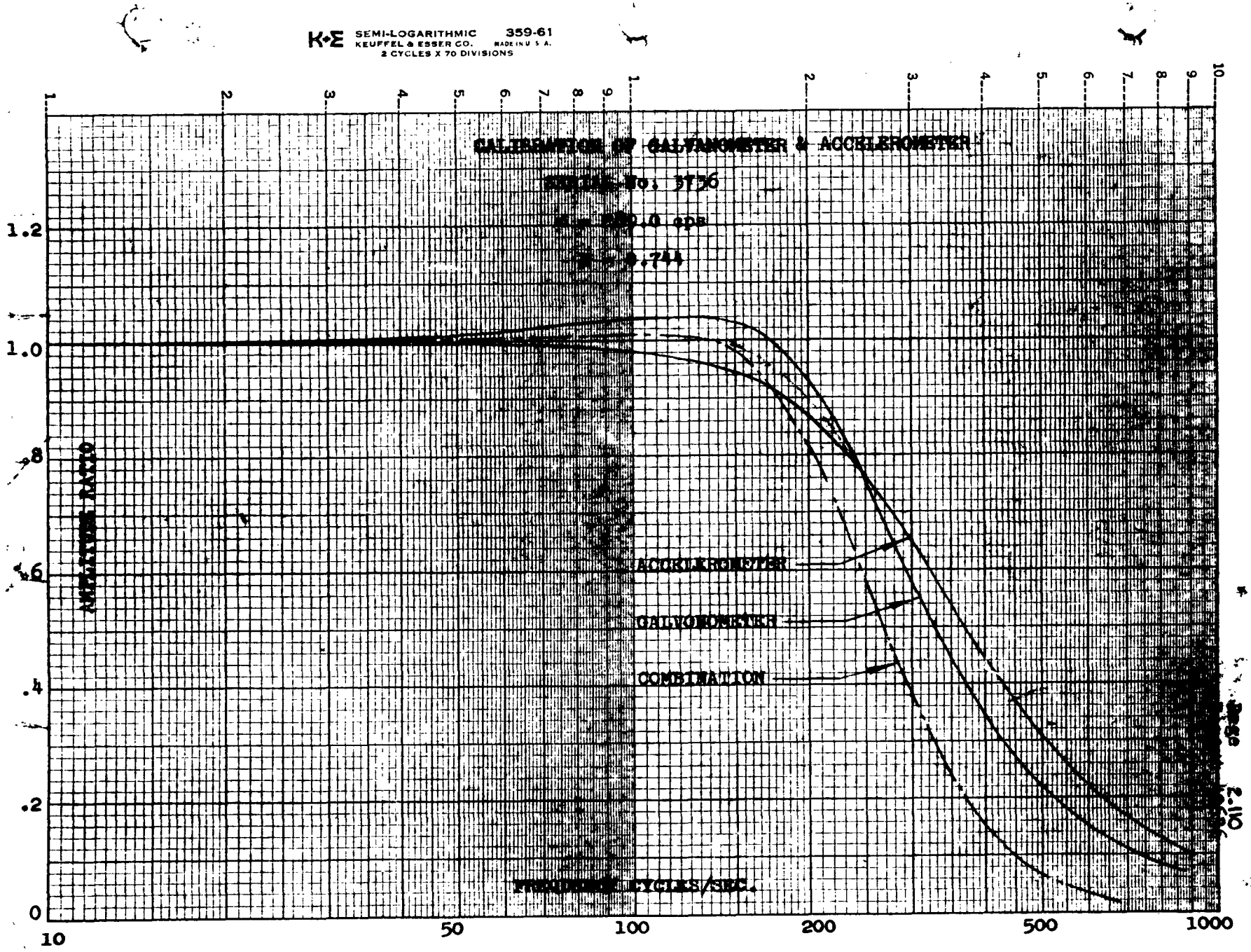
Natural Frequency - 227.1 cps

Damping - 0.606

RECORDED:

Oscillograph Channel 1-21 for Drop Test
1-11 for Flight Test




K+E SEMI-LOGARITHMIC 359-61
KEUFFEL & ESSER CO. MADE IN U.S.A.
2 CYCLES X 70 DIVISIONS
CALIBRATION OF GALVANOMETER & ACCELEROMETER
1.2
1.0
.8
.6
.4
.2
0
AMPLITUDE RATIO
ACCELEROMETER
GALVOMETER
COMBINATION
10
50
100
200
500
1000
CYCLES/SEC.

TRANSDUCER • CALIBRATION

SERIAL 3576
TAG 33083
D.R.O. 641067
PLANE A4D089

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STHM A6-50-350 ACCL. DR0.72
NOMINAL RANGE..... +-50
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/23/60

PROGRAM E004
ANALYST
ENGR.

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .19661 02 GS /MV/V

1/RMS SLOPE .50861 -01 MV/V/ GS

RMS INTERCEPT -.51940 02 GS

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.32213	02 GS	/ 50K
G1-TP	-.33076	02	
G2-TP	.33273	02	
G2-CP	-.32712	02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.50000 02	.17359 00	.17	.17359 00	.17	.17359 00
-.40000 02	.20822 00	.21	.38862 -03	.00	.10430 00
-.30000 02	.12853 00	.13	-.19360 00	-.19	-.32833 -01
-.20000 02	.14237 00	.14	-.27328 00	-.27	-.65455 -01
-.10000 02	-.41224 -01	-.04	-.35297 00	-.35	-.19709 00
.00000 -39	.86922 -01	.09	-.32874 00	-.33	-.12091 00
.10000 02	.12154 00	.12	-.30450 00	-.30	-.91480 -01
.20000 02	.14578 00	.15	-.17636 00	-.18	-.15291 -01
.30000 02	.26353 00	.26	-.14174 00	-.14	.60897 -01
.40000 02	.18385 00	.18	-.23982 -01	-.02	.79933 -01
.50000 02	.20808 00	.21	.20808 00	.21	.20808 00

30 DEC. 1960

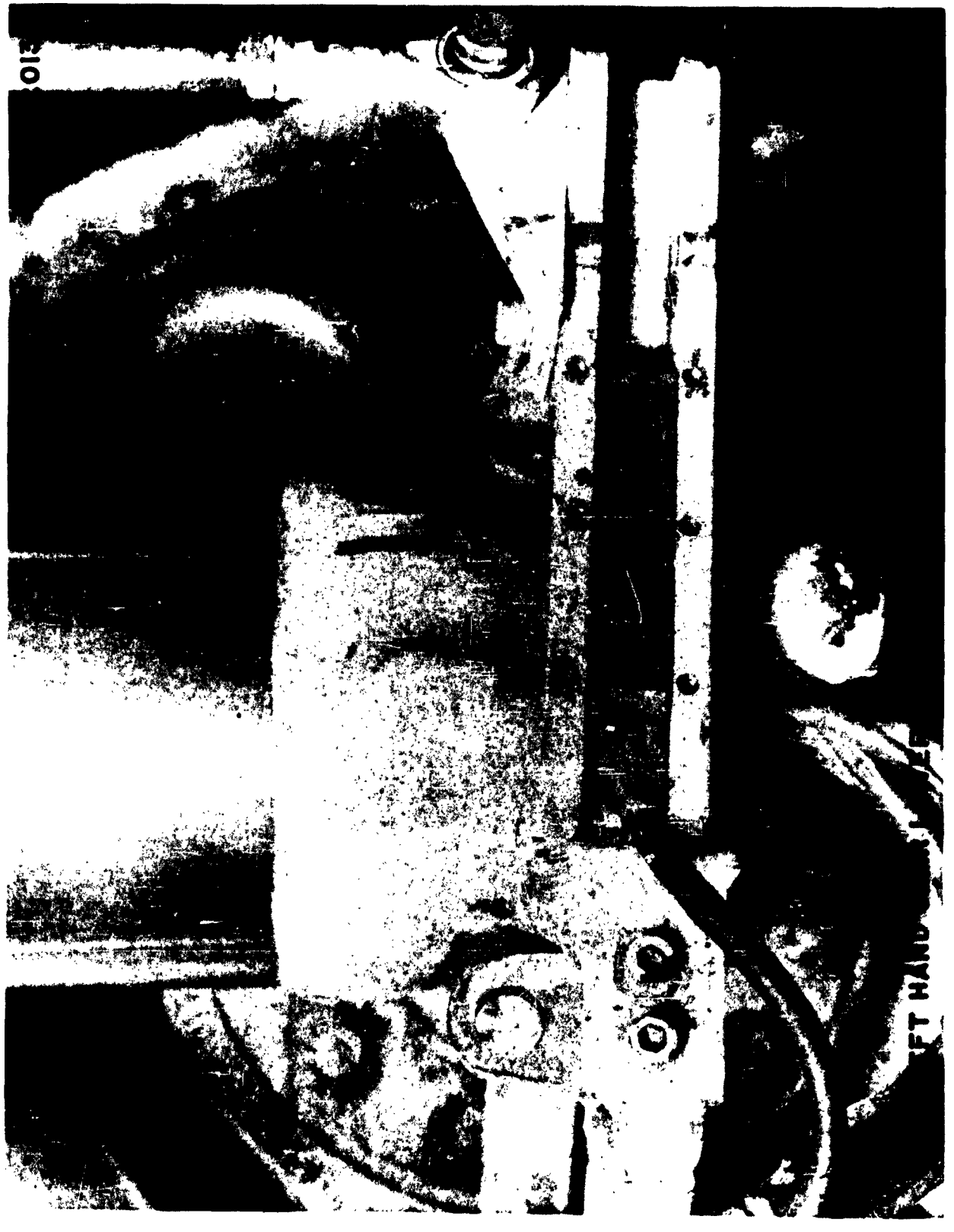
A7

PREPARED BY H.D. MERIWETHER
DATE 10 APR 61 MODEL A4D-2
TITLE LANDING LOADS INVESTIGATION REPORT NO. 40636

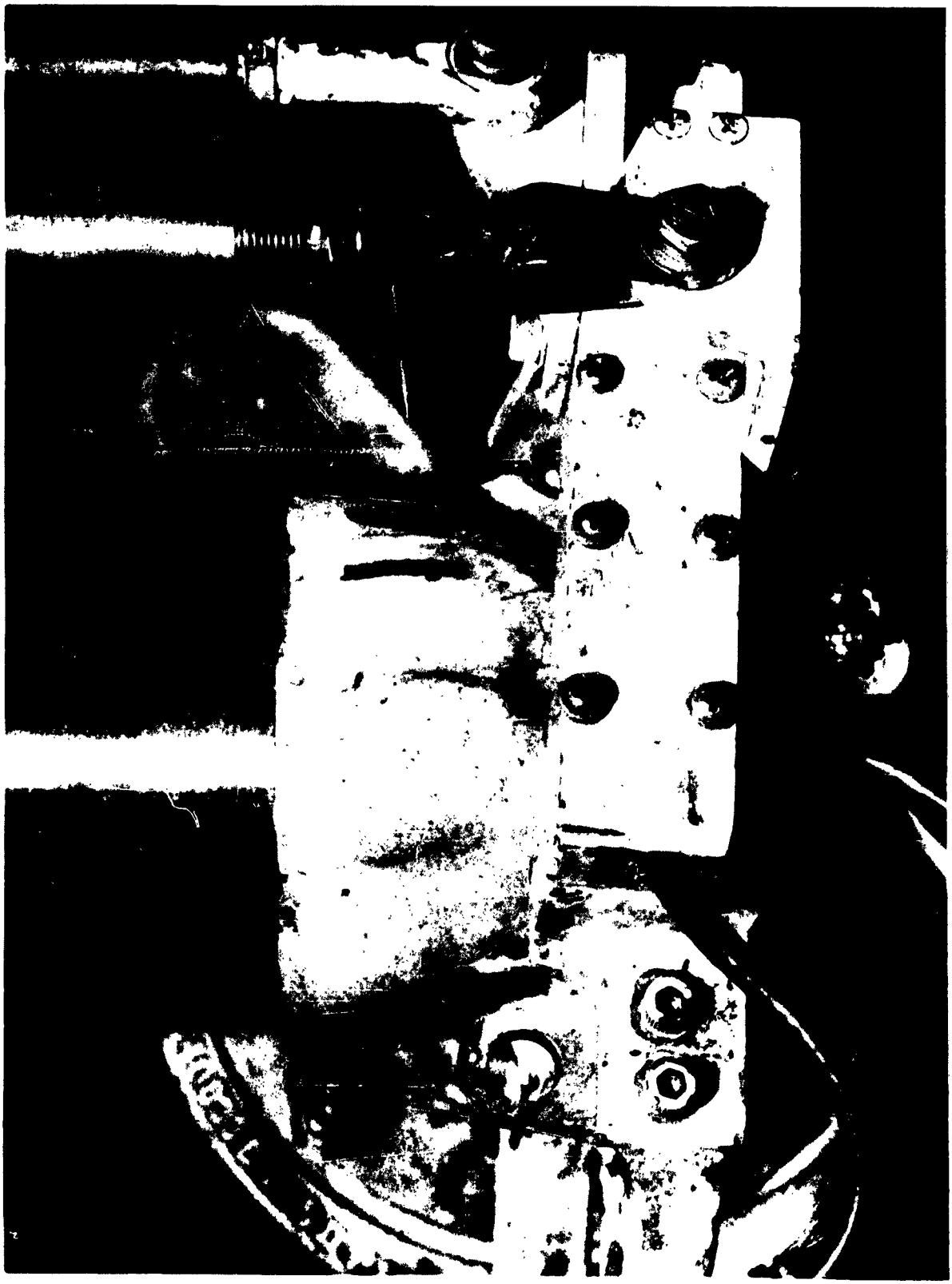
STATIC CALIBRATION OF LWR MASS LAT ACC
USED AFTER DROP 14

TEST	RUN	CHANNEL	LOAD	READING	X	Y
16	1	21		902		
16	1	21	1	20	.02217	1
16	1	21	3	62	.05765	3
16	1	21	6	119	.13193	6
16	1	21	9	163	.18071	9
16	1	21	12	220	.24390	12
16	1	21	15	280	.31042	15
16	1	21	18	323	.35809	18
16	1	21	21	378	.41907	21
16	1	21	24	431	.47785	24
16	1	21	27	480	.53215	27
16	1	21	30	536	.59424	30
16	1	21	35	621	.68847	35
16	1	21	40	719	.79701	40
16	1	21	45	804	.89135	45
16	1	21	50	887	.98327	50
16	1	21	55	998	1.09534	55
16	1	21	60	1074	1.19069	60
16	1	21	65	1162	1.28825	65
16	1	21	70	1257	1.39357	70
16	1	21	75	1351	1.49778	75
16	1	21	80	1449	1.60643	80
16	1	21	85	1540	1.70722	85
16	1	21	90	1638	1.81596	90
16	1	21	95	1719	1.90022	95
16	1	21	100	1816	2.01330	100

INTERCEPT	SLOPE 1	SLOPE 2	SLOPE 3	SLOPE 4
AVE.DELTA Y	MAX.+	MAX.-	OMITTED X	
.129	49.908			
.327	.793	-.760	.00000	
.104	49.900			
.310	.613	-.719	.98337	
.066	49.901			
.285	.546	-.694	1.81596	
.083	50.101			
.258	.504	-.613	2.01330	
.084	50.037			
.234	.466	-.617	.13193	



97



LEFT HAND GEAR LOWER MASS LATERAL ACCELEROMETER INSTALLATION

DESCRIPTION:

Right hand gear lower mass vertical accelerometer. This transducer measures inertial loads felt at the shock strut axle.

CONSTANT:

G's = 53.628 δ/Δ/50K Ohms Resistor Calibration

CHARACTERISTICS:

TRANSDUCER

Type - Statham A6-100-350

Serial No. - 3762

Natural Frequency - Acc., 288 cps / Mount, 5000 cps

Damping - 0.86

GALVANOMETER

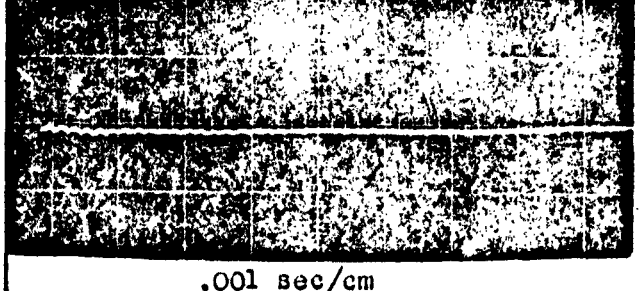
Type - 7-342

Serial No. - 4622

Resistance - 342.9 Ohms

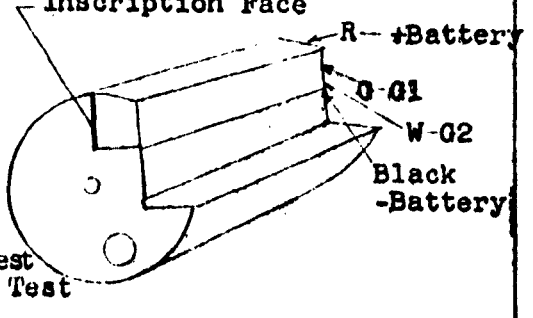
Natural Frequency - 210.5 cps

Damping - 0.578



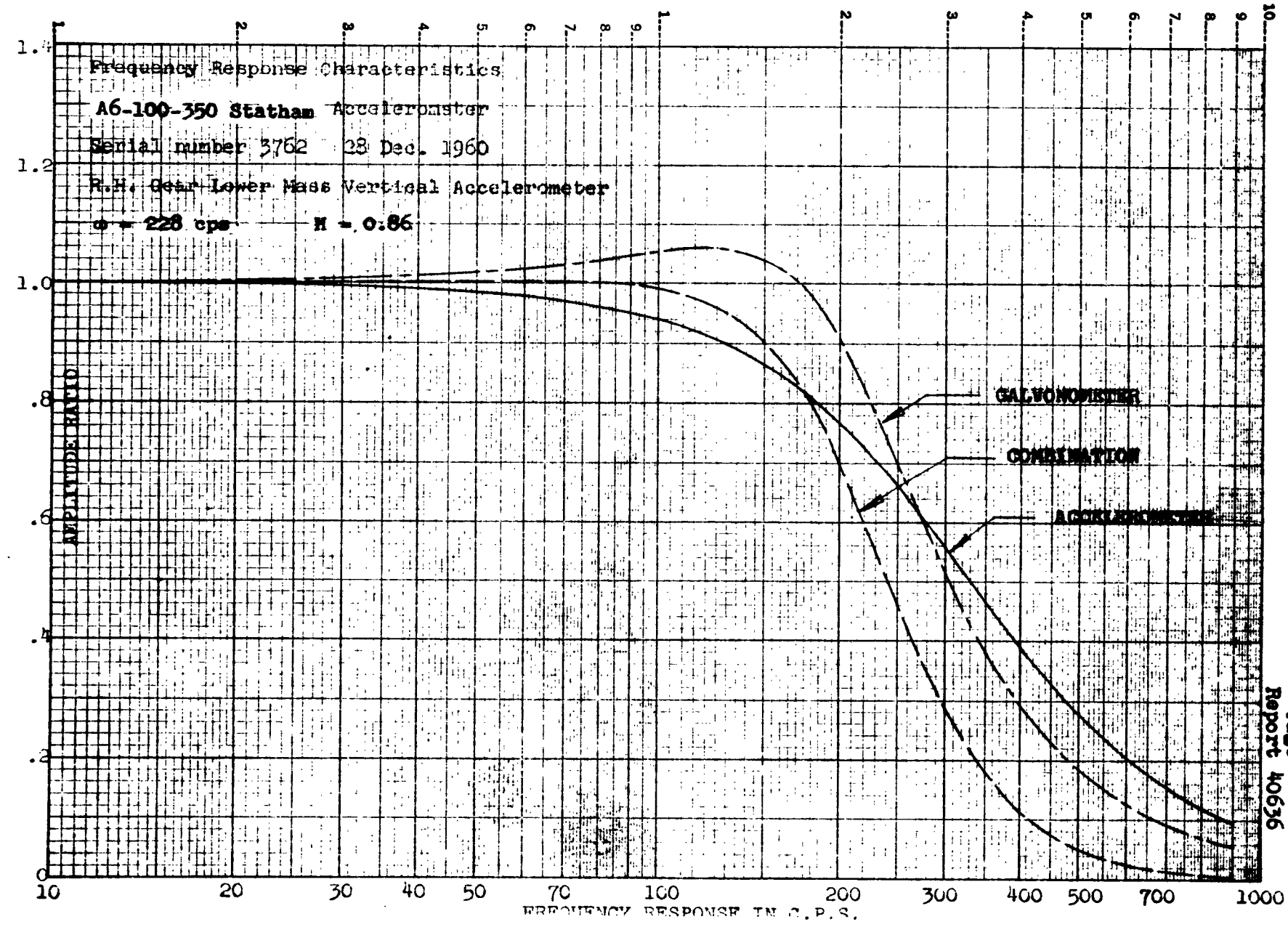
1 mv/cm

.001 sec/cm



RECORDED:

Oscillograph Channel 2-11 for Drop Test
2-28 for Flight Test


K+E SEMI-LOGARITHMIC KEUFFEL & ESSER CO 359T-61
Frequency Response Characteristics
A6-100-350 Statham Accelerometer
Serial number 3762 28 Dec. 1960
R.H. Gear Lower Mass Vertical Accelerometer
φ = 228 cps H = 0.86
GALVONOMETER
COMBINATION
ACCELEROMETER
AMPLITUDE RATIO
FREQUENCY RESPONSE IN C.P.S.
1.4
1.2
1.0
.8
.6
.4
.2
0
10
20
30
40
50
70
100
200
300
400
500
700
1000

TRANSDUCER CALIBRATION

SERIAL 3762
TAG 33087
D.R.O. 641070
PLANE A4D089

PROGRAM EQ04
ANALYST
ENGR.

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STHM A6-100-350 ACCEL. DR 0.86
NOMINAL RANGE..... +-100
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/28/60

Rg = 943.1 Ω

VOLTAGE CALIBRATION FACTORS

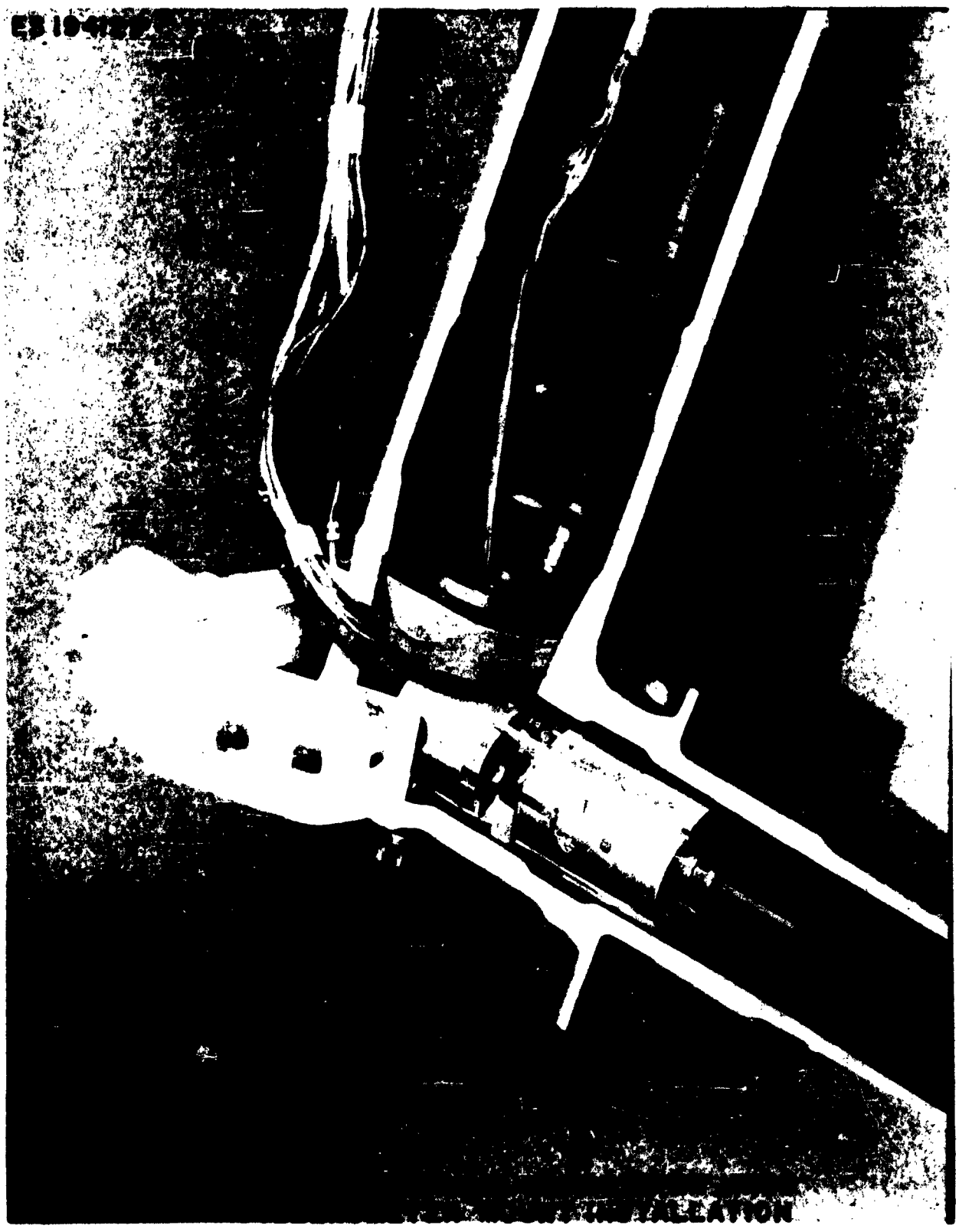
RMS SLOPE	.31340	02 GS	/MV/V
1/RMS SLOPE	.31908	-01 MV/V/ GS	
RMS INTERCEPT	-.10337	03 GS	

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.53145	02 GS	/ 50K
G1-TP	-.54119	02	
G2-TP	.54016	02	
G2-CP	-.53663	02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10000 03	.52561 -01	.03	.28047 00	.14	.16652 00
-.80000 02	.94838 00	.17	-.21105 00	-.11	.68666 -01
-.60000 02	.12621 00	.06	-.14314 00	-.07	-.84674 -02
-.40000 02	.33915 00	.17	-.44819 00	-.22	-.54521 -01
-.20000 02	.26202 00	.13	-.46316 00	-.23	-.10057 00
.00000 -39	-.22311 -01	-.01	-.43670 00	-.22	-.22951 00
.20000 02	.10775 00	.05	-.32736 00	-.16	-.10980 00
.40000 02	.21709 00	.11	-.19730 00	-.10	.98982 -02
.60000 02	.28900 00	.14	-.10867 00	-.05	.88161 -01
.80000 02	.22858 00	.11	.66948 -03	.00	.11463 00
.10000 03	.11001 00	.06	.11001 00	.06	.11001 00

30 DEC. 1960



DESCRIPTION:

Right hand main gear lower mass drag accelerometer. This transducer measures inertial loads felt at the shock strut axle.

CONSTANT:

G's = 67.203 δ/Δ / 50K Ohms Resistor Calibration

CHARACTERISTICS:

TRANSDUCER

Type - Statham A6-100-350

Serial No. - 3593

Natural Frequency - 340.0 cps

Damping - 0.50

GALVANOMETER

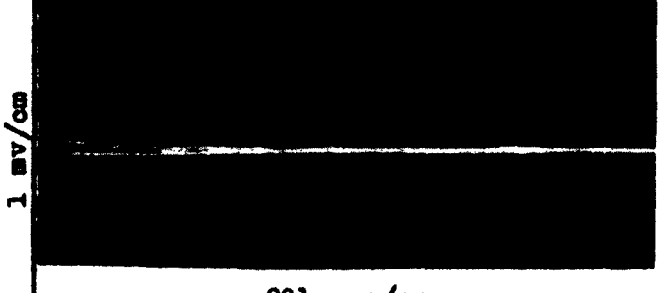
Type - 7-342

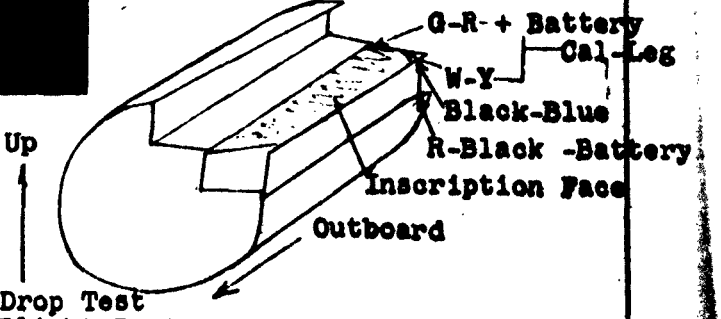
Serial No. - 3706

Resistance - 345.9 Ohms

Natural Frequency - 217.8 cps

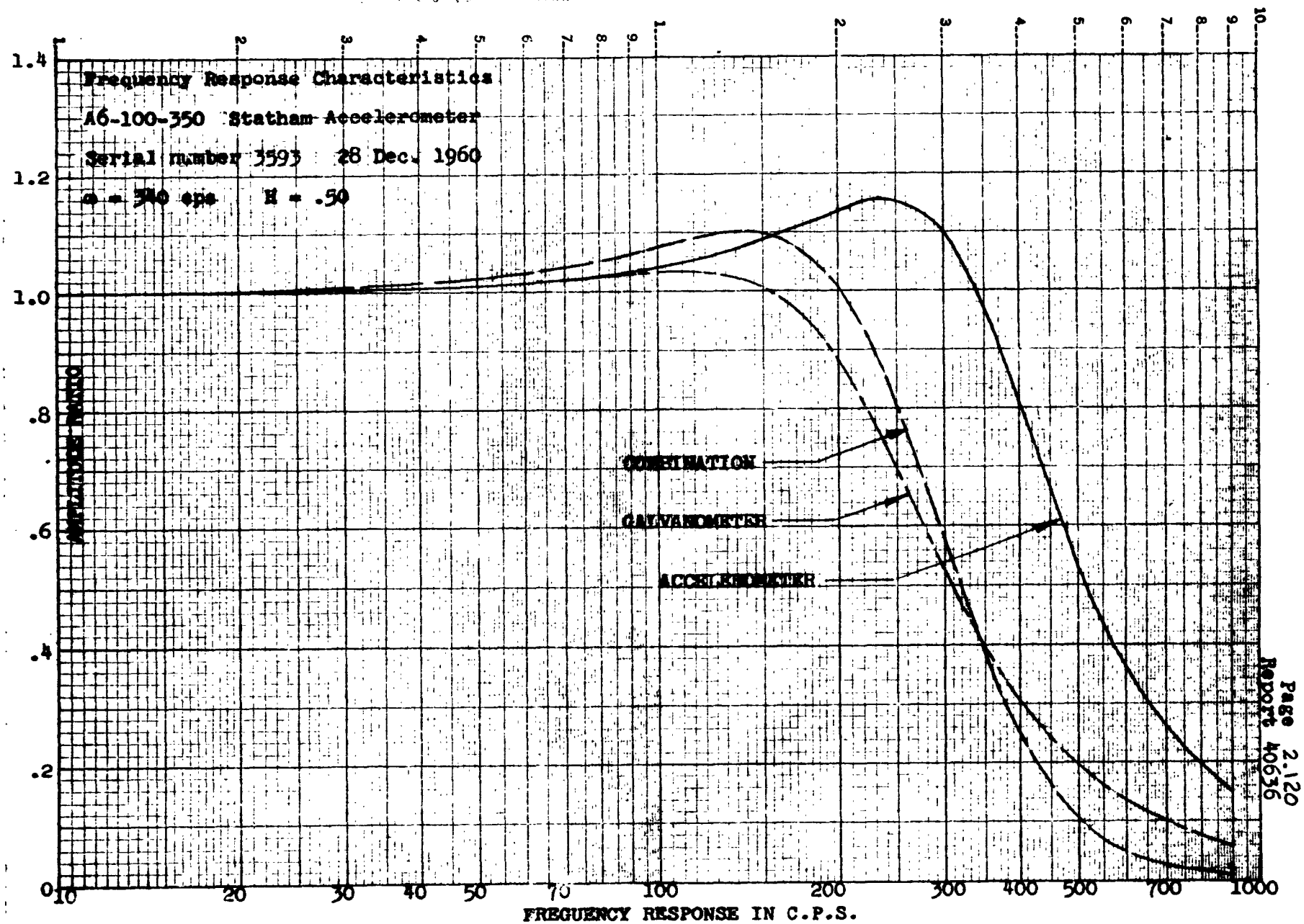
Damping - 0.611





RECORDED:

Oscillograph Channel 2-14 for Drop Test
2-29 for Flight Test


SEMI-LOGARITHMIC
KEUFFEL & ESSER CO
359T-61
Frequency Response Characteristics
A6-100-350 Statham Accelerometer
Serial number 3593 28 Dec. 1960
ω = 300 cps H = .50
AMPLITUDE RATIO
1.4
1.2
1.0
.8
.6
.4
.2
0
COMBINATION
GALVANOMETER
ACCELEROMETER
10
20
30
40
50
70
100
200
300
400
500
700
1000
FREQUENCY RESPONSE IN C.P.S.

TRANSDUCER CALIBRATION

SERIAL 3593
TAG 32417
D.R.O. 641070
PLANE A4D089

CALIBRATION AFTER FLIGHT TEST PHASE

PROGRAM E004
ANALYST
ENGR.

TRANSDUCER DESCRIPTION..STHM A6-100-350 ACCEL. DR 0.50
NOMINAL RANGE..... +-100
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/28/60

W_n= 340

R_G= 846.3 Ω

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	-.38908 02 GS	/MV/V
1/RMS SLOPE	-.25701 -01	MV/V/ GS
RMS INTERCEPT	.10436 03 GS	

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT	
G1-CP	-.67508 02 GS	/ 50K
G1-TP	.66505 02	
G2-TP	-.67027 02	
G2-CP	.68698 02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10000 03	.12540 00	.06	-.83470 -01	-.04	.20967 -01
-.80000 02	.44956 00	.22	-.15617 00	-.08	.14669 00
-.60000 02	.41863 00	.21	-.39598 00	-.20	.11325 -01
-.40000 02	.36681 00	.18	-.67756 00	-.34	-.15537 00
-.20000 02	.33588 00	.17	-.62494 00	-.31	-.14453 00
.00000 -39	.49294 00	.25	-.57232 00	-.29	-.39690 -01
.20000 02	.60822 00	.30	-.51970 00	-.26	.44260 -01
.40000 02	.51463 00	.26	-.46708 00	-.23	.23774 -01
.60000 02	.48370 00	.24	-.28913 00	-.14	.97281 -01
.80000 02	.28567 00	.14	-.29918 00	-.15	-.67549 -02
.10000 03	.40894 -02	.00	.40894 -02	.00	.40894 -02

30 DEC. 1960

SP. CALIB 66.400

DESCRIPTION:

Right hand main gear lower mass lateral accelerometer. This transducer measures accelerations at aircraft stations X = 38.0, Y = 265.7, and Z = -91.4.

CONSTANT:

G's = 39.700 δ/Δ / 50K Ohms Resistor Calibration
(up scale, mass inboard)

CHARACTERISTICS:

TRANSDUCER

Type - Statham A6-50-350

Serial No. - 3575

Natural Frequency - 294.0 cps, Mount 745.4 cps

Damping - 0.46, Mount 0.060

GALVANOMETER

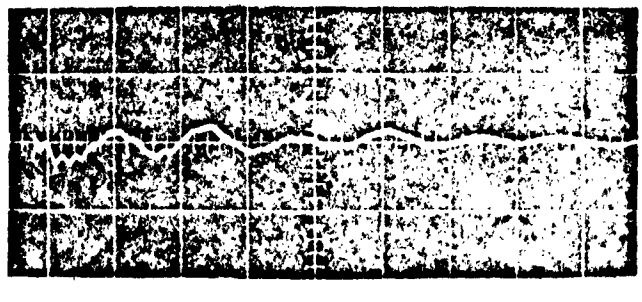
Type - 7-342

Serial No. - 5021

Resistance - 338.6 Ohms

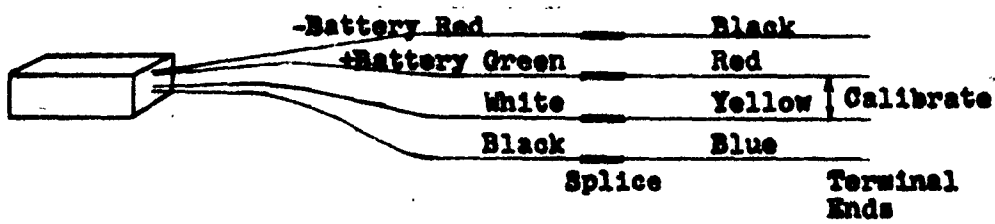
Natural Frequency - 222.6 cps

Damping - 0.586



.001 sec/cm

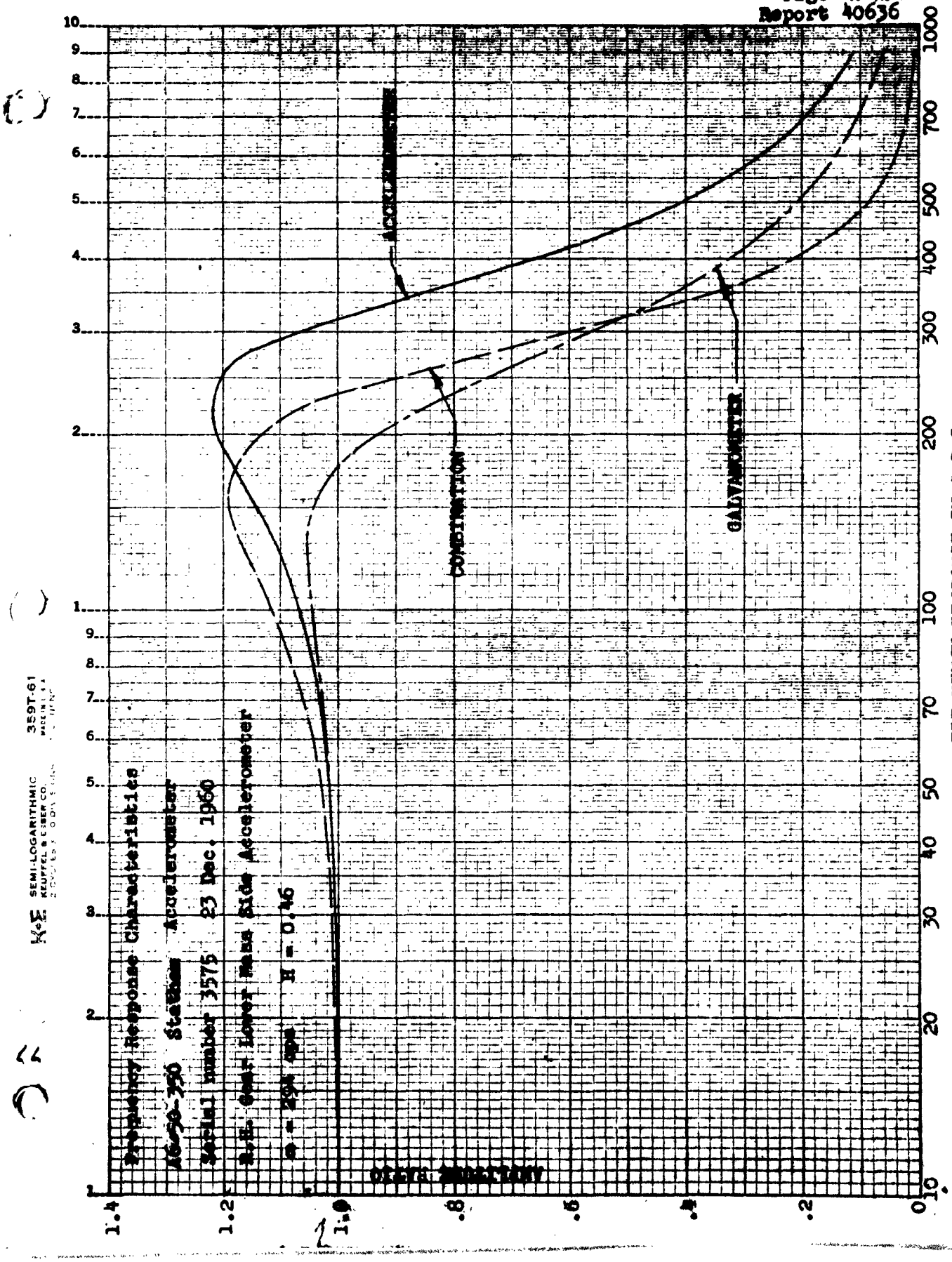
RIGHT HAND LOWER MASS LATERAL ACCELERATION



Acce. label on top, wire leads aft

RECORDED:

Oscillograph Channel 2-35 for Drop Test
2-27 for Flight Test


ACCELEROMETER
COMBINATION
GALVANOMETER
STATE MONETARY
FREQUENCY RESPONSE IN C.P.S.
Frequency Response Characteristics
Model number 3575 23 Dec. 1960
H = 0.46
K&E SEMI-LOGARITHMIC
KEUFFEL & ESSER CO.
359T-61

I

TRANSDUCER CALIBRATION

SERIAL 3575
TAG 33082
D.R.O. 641067
PLANE A4D089

CALIBRATION AFTER FLIGHT TEST PHASE

PROGRAM E004
ANALYST
ENGR. Tyleman

TRANSDUCER DESCRIPTION..STHM A6-50-350 ACCL. DR0.46
NOMINAL RANGE..... +-50
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/23/60

$W_n = 244$

VOLTAGE CALIBRATION FACTORS

RMS SLOPE -.23026 02 GS /MV/V

1/RMS SLOPE -.43430 -01 MV/V/ GS

RMS INTERCEPT .52311 02 GS

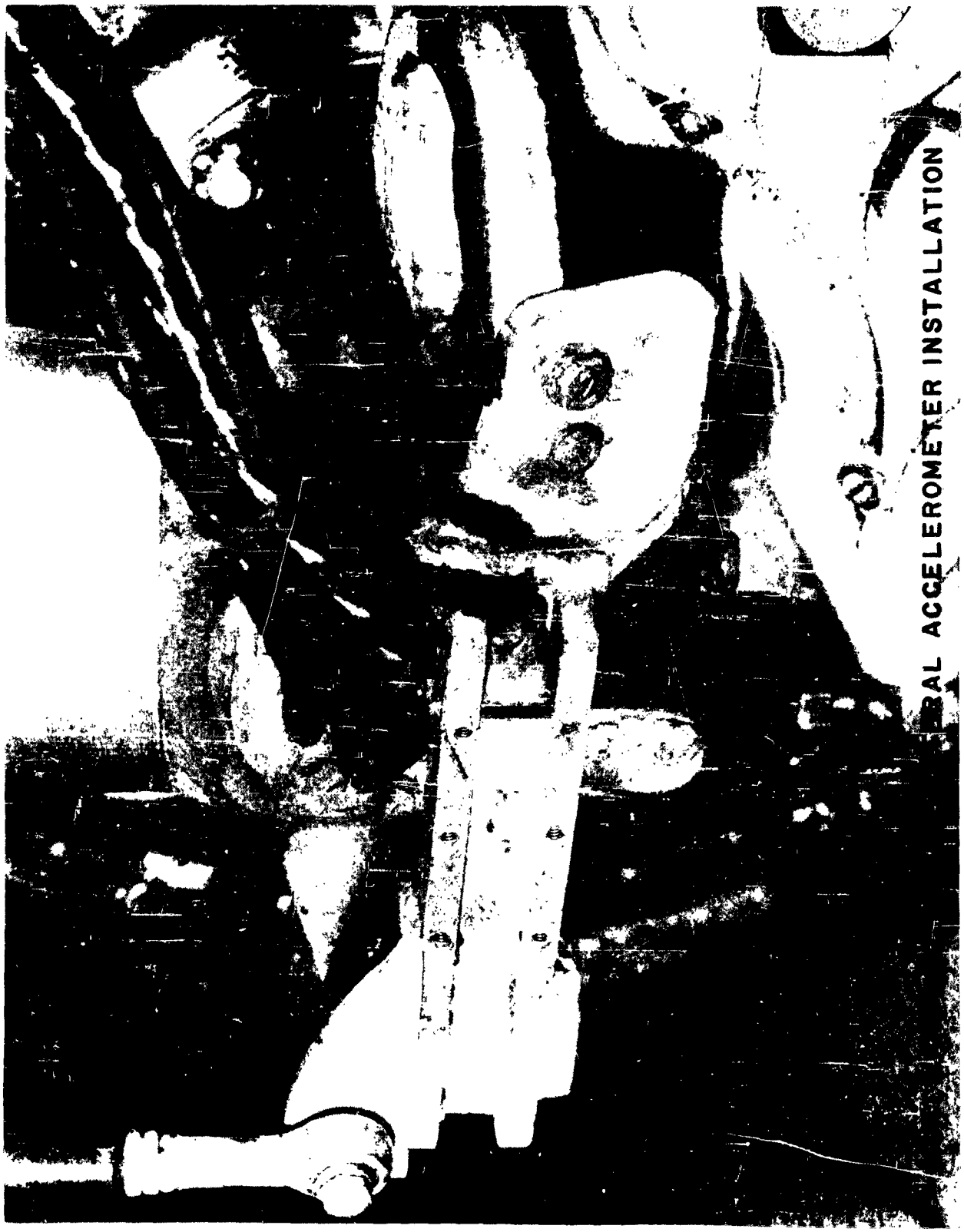
SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT	
G1-CP	-.38520 02	GS / 50K
G1-TP	.39336 02	
G2-TP	-.39577 02	
G2-CP	.39169 02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.50000 02	.48725 -01	.05	.16387 00	.16	.10630 00
-.40000 02	.10475 00	.10	-.10460 00	-.10	.77724 -04
-.30000 02	.13984 00	.14	-.15324 00	-.15	-.67005 -02
-.20000 02	.11213 00	.11	-.19142 00	-.19	-.39647 -01
-.10000 02	.63483 -01	.06	-.22960 00	-.23	-.83060 -01
.00000 -39	.12998 00	.13	-.28872 00	-.29	-.79371 -01
.10000 02	.18600 00	.19	-.13849 00	-.14	.23758 -01
.20000 02	.13735 00	.14	-.17667 00	-.18	-.19655 -01
.30000 02	.19338 00	.19	-.13111 00	-.13	.31137 -01
.40000 02	.14473 00	.14	-.64613 -01	-.06	.40060 -01
.50000 02	.54217 -01	.05	.54217 -01	.05	.54217 -01

30 DEC. 1960

SR CALIB 39.241



VERTICAL ACCELEROMETER INSTALLATION

Upper Mass Accelerations

Accelerometers were installed on the upper portion of the landing gear barrel to measure vertical and drag accelerations. A photograph of the installation of the accelerometers on the right hand gear is shown on Page 2.206. The installation of the accelerometers on the left hand gear is shown on Page 2.215.

DESCRIPTION:

Right hand main gear upper mass vertical accelerometer. This transducer measures accelerations at aircraft station X = 40, Y = 263.4, and Z = -43.8.

CONSTANT:

G's = 19.433 δ/Δ / 50K Ohms Resistor Calibration
(up scale, mass down)

CHARACTERISTICS:

TRANSDUCER

Type - Statham A5A-50-380

Serial No. - 3024

Natural Frequency - 720 cps, Mount 987.9 cps

Damping - 1.00, Mount 0.009

GALVANOMETER

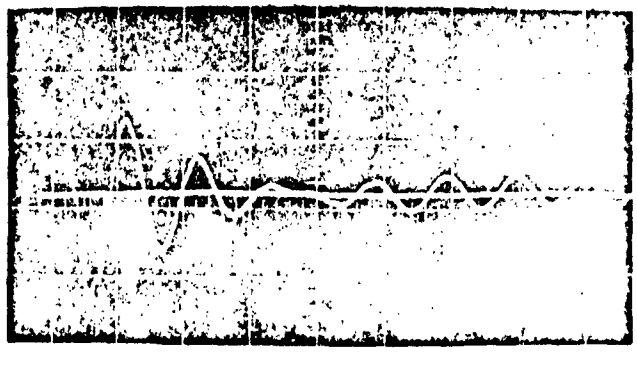
Type - 7-342

Serial No. - 7243

Resistance - 395.3 Ohms

Natural Frequency - 219.2 cps

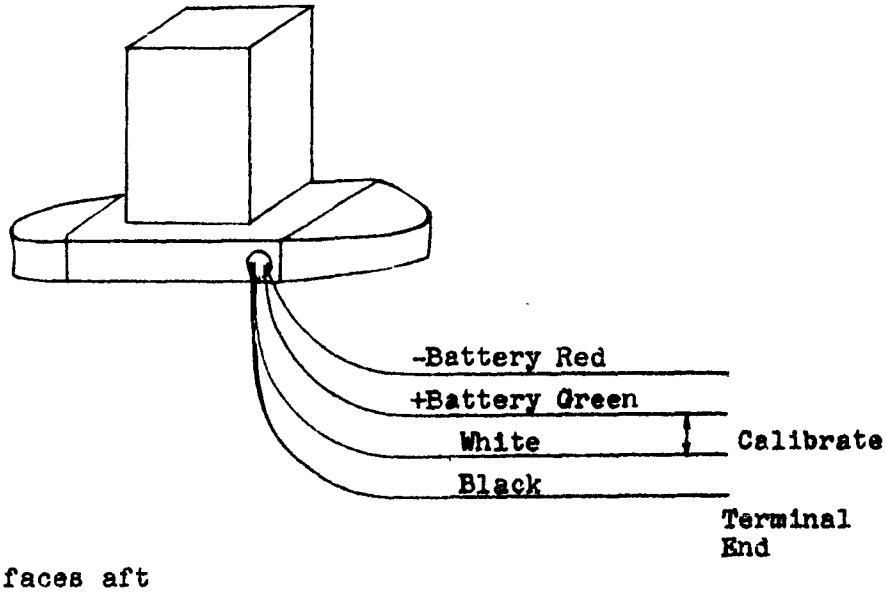
Damping - 0.512



1 mv/cm

.001 sec/cm

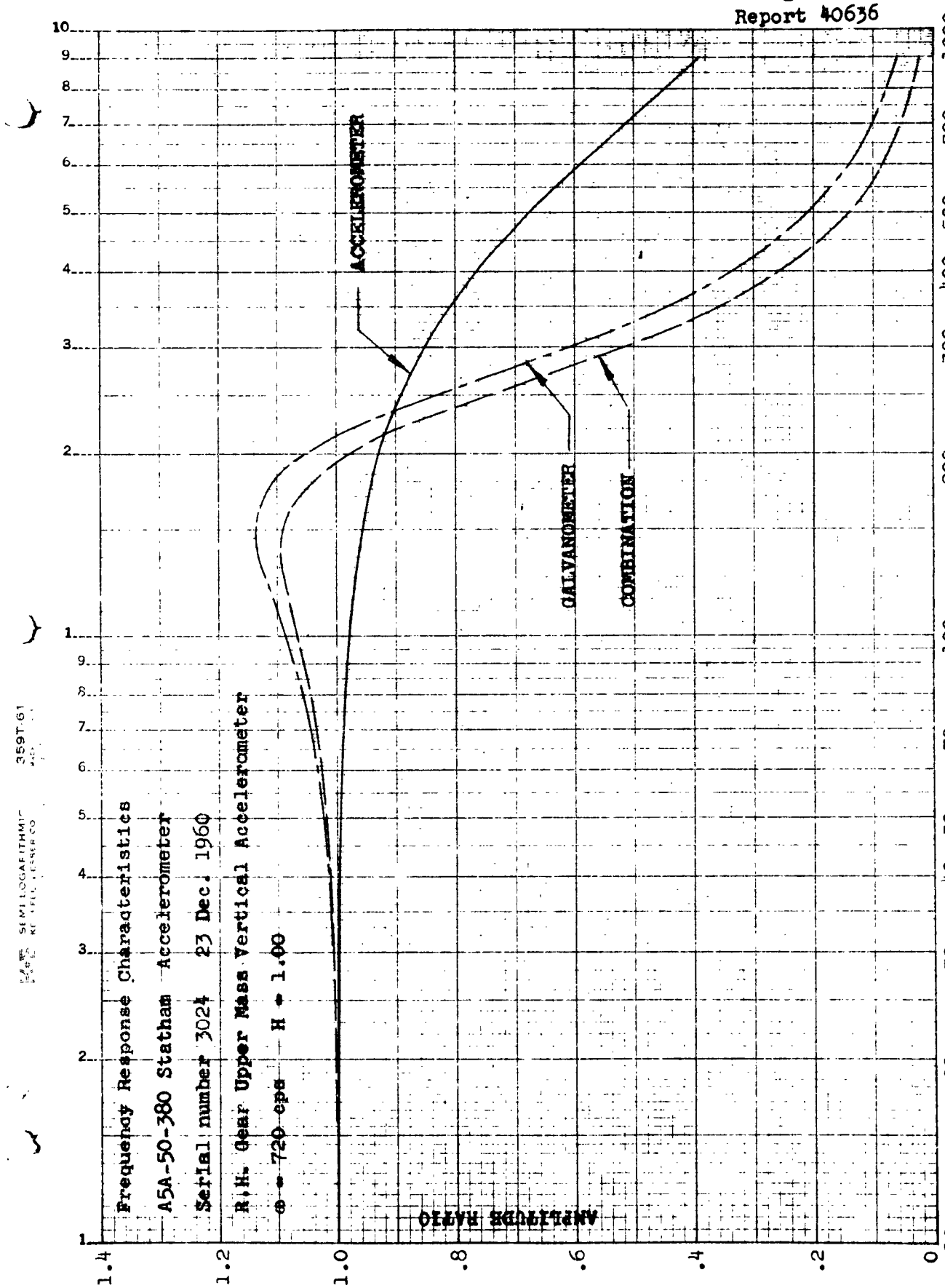
RIGHT HAND UPPER MASS VERTICAL ACCELEROMETER



Accel. label faces aft

RECORDED:

Oscillograph Channel 2-29 for Drop Test
1-32 for Flight Test


Frequency Response Characteristics
A5A-50-380 Statham Accelerometer
Serial number 3024 23 Dec. 1960
R.H. Gear Upper Mass Vertical Accelerometer
ω = 720 cps H = 1.00
ACCELEROMETER
GALVANOMETER
COMBINATION
AMPLITUDES RATIO
FREQUENCY RESPONSE IN C.P.S.
1.4
1.2
1.0
.8
.6
.4
.2
0
10
9
8
7
6
5
4
3
2
1
1000
700
500
400
300
200
100
70
50
40
30
20
10

TRANSDUCER CALIBRATION

SERIAL 3024
TAG I-3981
D.R.O. 641067
PLANE A4D089

CALIBRATION AFTER FLIGHT TEST PHASE

PROGRAM E004
ANALYST
ENGR.

TRANSDUCER DESCRIPTION..STHM A5A-50-380 ACCL.DR 1.00
NOMINAL RANGE..... +-50
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/23/60

$\omega_n = 720$

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	-.97950	01 GS	/MV/V
1/RMS SLOPE	-.10209	00 MV/V/ GS	
RMS INTERCEPT	.52067	02 GS	

SHUNT CALIBRATION FACTORS

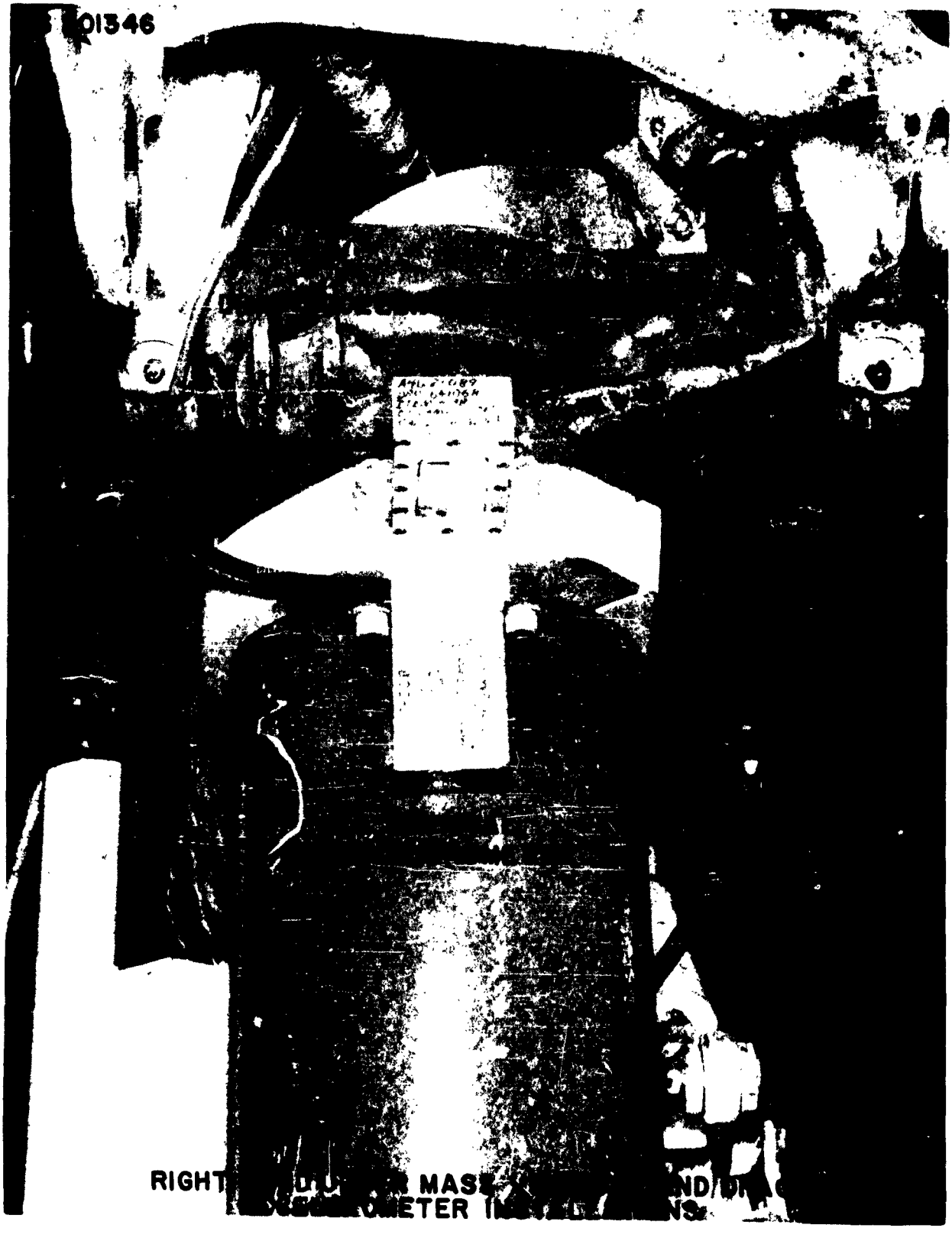
LEG	CAL-PIP EQUIVALENT		
G1-CP	-.19377	02 GS	/ 50K
G1-TP	.19587	02	
G2-TP	-.19576	02	
G2-CP	.19482	02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.50000 02	-.48237 -01	-.05	-.48237 -01	-.05	-.48237 -01
-.40000 02	.21076 00	.21	-.20821 00	-.21	.12755 -02
-.30000 02	.31264 00	.31	-.27391 00	-.27	.19466 -01
-.20000 02	.29931 00	.30	-.32914 00	-.33	-.14915 -01
-.10000 02	.45357 00	.45	-.37390 00	-.37	.39835 -01
.00000 -39	.45071 00	.45	-.42913 00	-.43	.10791 -01
.10000 02	.34311 00	.34	-.28535 00	-.29	.28881 -01
.20000 02	.36120 00	.36	-.34057 00	-.34	.10311 -01
.30000 02	.24312 00	.24	-.28059 00	-.28	-.18732 -01
.40000 02	.83151 -01	.08	-.23107 00	-.23	-.73962 -01
.50000 02	.90767 -01	.09	.90767 -01	.09	.90767 -01

30 DEC. 1960

SPECIAL CALIB -19.272

A 2



.58

DESCRIPTION:

Right hand gear upper mass longitudinal accelerometer. This transducer measures accelerations at aircraft stations X = 40.0, Y = 263.6, and Z = -43.0.

CONSTANT:

G's = 12.095 δ/Δ / 50K Ohms Resistor Calibration (up scale, mass aft)

CHARACTERISTICS:

TRANSDUCER

Type - Statham A5A-30-350

Serial No. - 3901

Natural Frequency - 420 cps

Damping - 1.05

No mount effects measurable.

GALVANOMETER

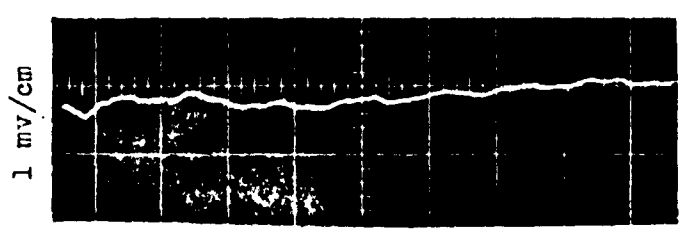
Type - 7-342

Serial No. - 7317

Resistance - 349.6 Ohms

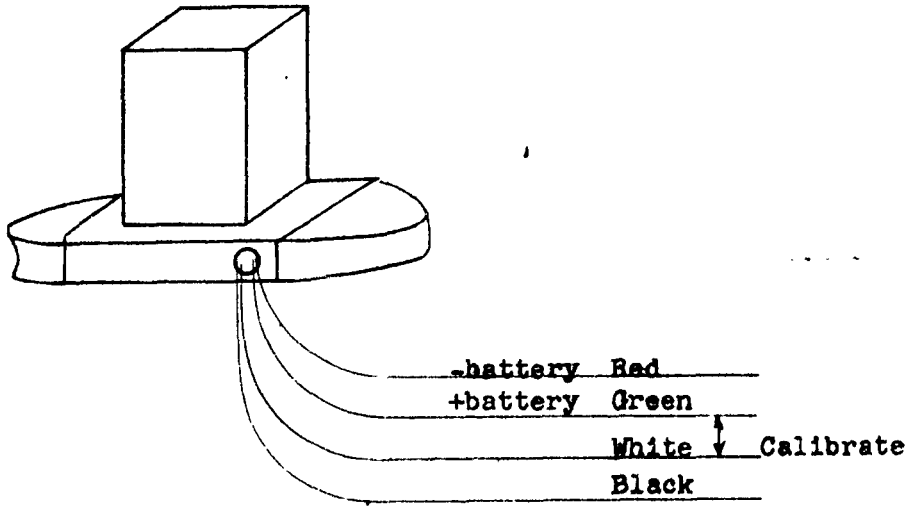
Natural Frequency - 225.1 cps

Damping - 0.574



.001 sec/cm

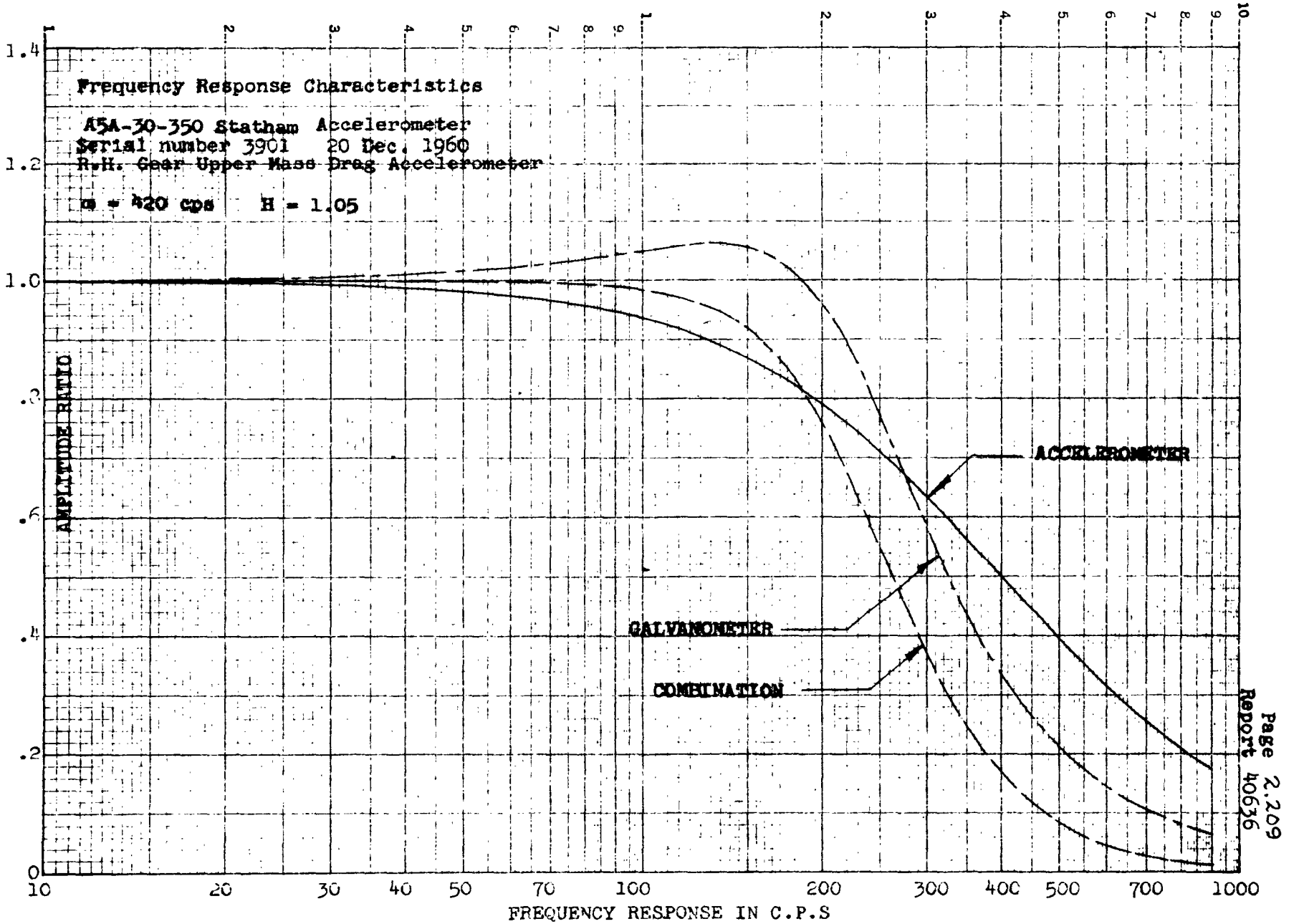
RIGHT HAND UPPER MASS LONGITUDINAL ACCELEROMETER



Accel. label faces down

RECORDED:

Oscillograph Channel 2-31 for Drop Test
1-34 for Flight Test


SEMI-LOGARITHMIC
359T-61
Frequency Response Characteristics
A5A-30-350 Statham Accelerometer
Serial number 3901 20 Dec. 1960
R.H. Gear Upper Mass Drag Accelerometer
ω = 420 cps H = 1.05
AMPLITUDE RATIO
ACCELEROMETER
GALVANOMETER
COMBINATION
FREQUENCY RESPONSE IN C.P.S
1.4
1.2
1.0
.8
.6
.4
.2
0
10
20
30
40
50
70
100
200
300
400
500
700
1000

DOUGLAS AIRCRAFT COMPANY, INC.

DATE
PREPARED BY
TITLE

PAGE 2-240
MODEL
REPORT

Page 2-240
Report 40636

TRANSDUCER CALIBRATION

SERIAL 3901
TAG 015331
DWG.# 641968
PLANE A4D089

CALIBRATION AFTER FLIGHT TEST PHASE

PROGRAM E004

TRANSDUCER DESCRIPTION..STHM ASA-20-350 ACCL. DR 1.05
NOMINAL RANGE..... +-30
DIMENSIONS.....GS
PERCENT UNBALANCE.....00
BRIDGE VOLT.....5
CHANNEL NUMBER.....03
RUN NUMBER.....1
CALIBRATION DATE.....12 /60

ANALYST
ENGR.

VOLTAGE CALIBRATION FACTO

RMS SLOPE .68640 01 MV/V
I/RMS SLOPE .14590 00 V/ GS
RMS INTERCEPT -.31362 02 MV

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.11942	0?	GS / 50K
G1-IP	-.12049	02	
G2-IP	.12017	02	
G2-CP	-.11994	0?	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10000 02	.31342 +01	.05	.56764 +01	.07	.44153 -01
-.15000 02	.30153 +01	.05	-.20246 +01	-.12	-.20045 -01
-.20000 02	.14153 00	.24	-.65457 +01	-.11	-.25857 -01
-.15000 02	.10817 00	.18	-.85767 +01	-.14	.11501 -01
-.10000 02	.14494 00	.24	-.15001 00	-.25	-.69337 -02
-.50000 01	.80700 -01	.13	-.78287 000	-.40	-.51083 -01
.00000 +39	.98362 +01	.16	-.19690 00	-.33	-.10430 -01
.50000 01	.80792 +01	.13	-.16075 00	-.27	-.35729 -01
.10000 02	.12019 00	.20	-.11829 00	-.20	.24294 -03
.15000 02	.10114 00	.18	-.12606 00	-.21	-.99543 -02
.20000 02	.61105 -01	.10	-.69884 +01	-.15	.11122 -02
.25000 02	.10217 00	.17	-.35054 +01	-.01	.49831 -01
.30000 02	.45209 +01	.08	.45204 +01	.08	.45204 -01

SP. CALIBRATION H.985

27 DEC. 1960

DESCRIPTION:

Left hand main gear upper mass vertical accelerometer. Aircraft station X = -40.0, Y = 263.4, Z = -43.8, gear extended.

CONSTANT:

G's = 18.532 δ/Δ / 50 K Ohms Resis. Calib. up scale, mass down

CHARACTERISTICS:

TRANSDUCER

Type - Statham A5A-50-380

Serial No. - 3022

Natural Frequency - 680 cps,, mount 833.9 cps

Damping - 0.90, mount 0.0075

GALVANOMETER

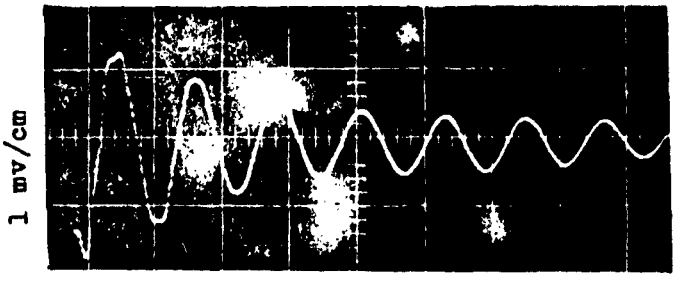
Type - 7-342

Serial No. - 7320 (Drop Tests and Flight Test Landings 138 through 209); 7275 (Landings 1 through 137)

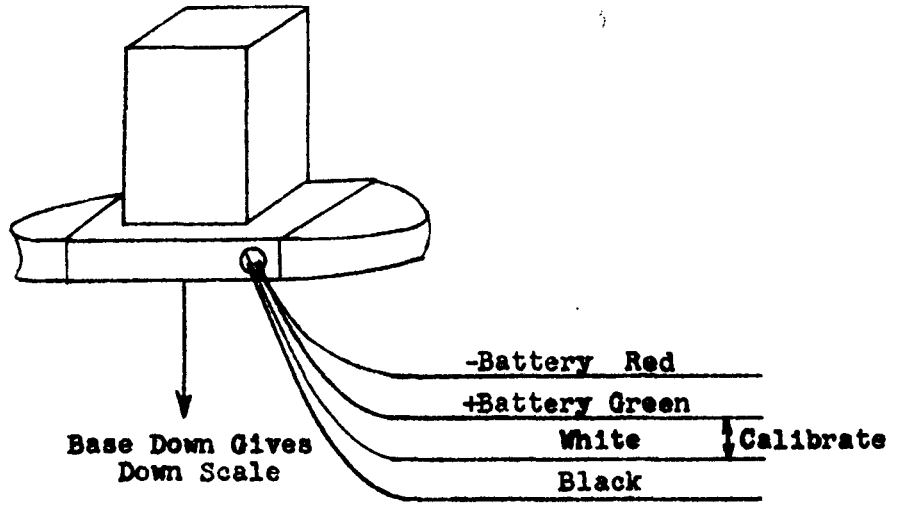
Resistance - 403.2 Ohms

Natural Frequency - 225.6 cps

Damping - 0.520



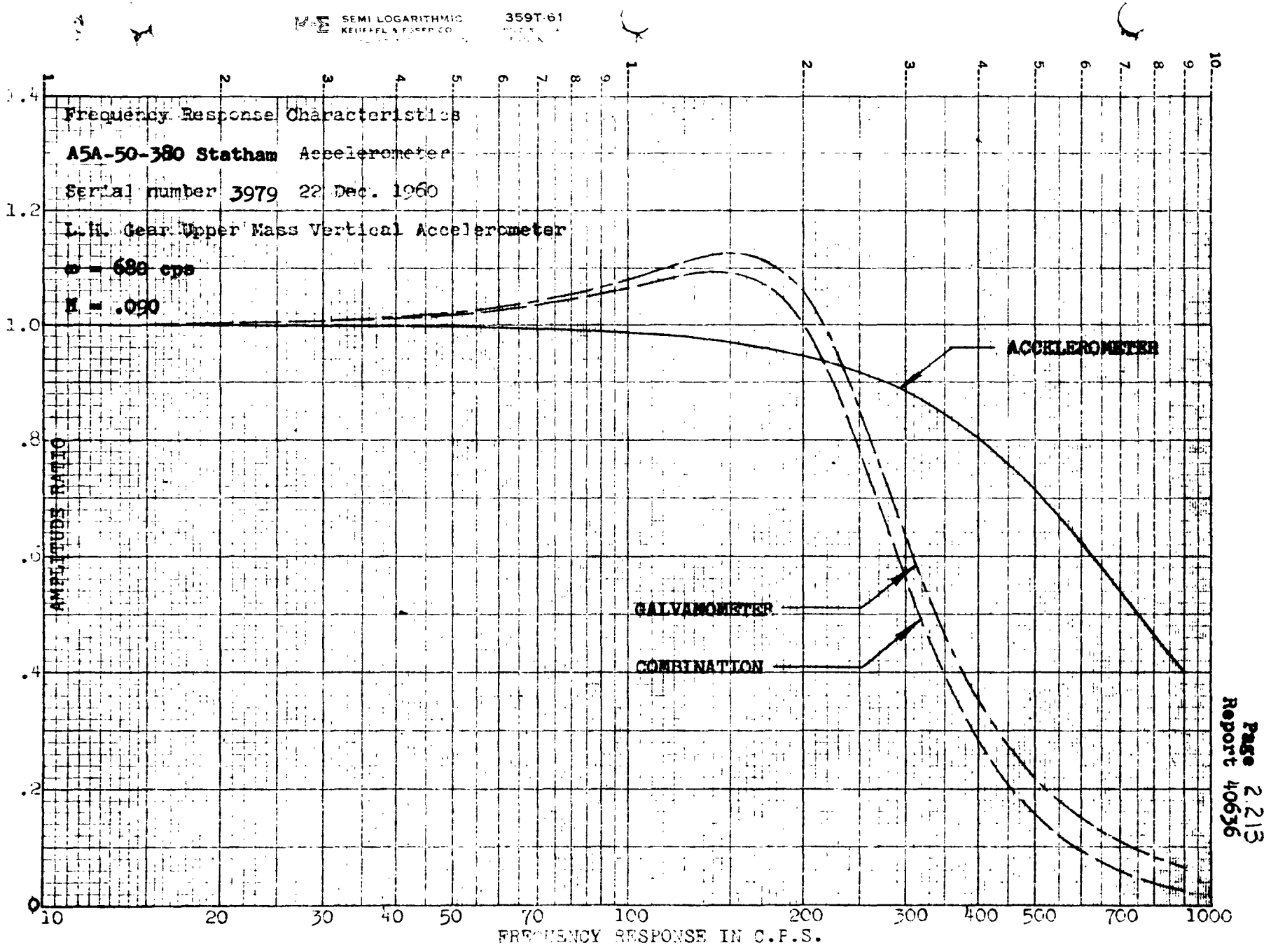
LEFT HAND UPPER MASS VERTICAL ACCELEROMETER



RECORDED:

Oscillograph Channel 1-33 for Drop Test
1-31 for Flight Test

16


SEMI LOGARITHMIC
KEUFFEL & ESSER CO.
359T-61
Frequency Response Characteristics
A5A-50-380 Statham Accelerometer
Serial number 3979 22 Dec. 1960
L.H. Gear Upper Mass Vertical Accelerometer
ω = 680 cps
H = .090
ACCELEROMETER
GALVANOMETER
COMBINATION
AMPLITUDE RATIO
FREQUENCY RESPONSE IN C.P.S.
0
.2
.4
.6
.8
1.0
1.2
1.4
10
20
30
40
50
70
100
200
300
400
500
700
1000

I 3979

SERIAL 3022
TAG 222542
D.R.O. 641068
PLANE A4D089

PROGRAM EOD4
ANALYST
ENGR.

TRANSDUCER CALIBRATION

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION.. THM A5A-50-980 ACCL. DRO.90
NOMINAL RANGE..... ± 0
DIMENSIONS.....
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/22/60

$W_n = 680$

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	-.91982	01 GS	/MV/V
1/RMS SLOPE	-.10872	00 MV/V/ GS	
RMS INTERCEPT	.51905	02 GS	

SHUNT CALIBRATION FACTORS

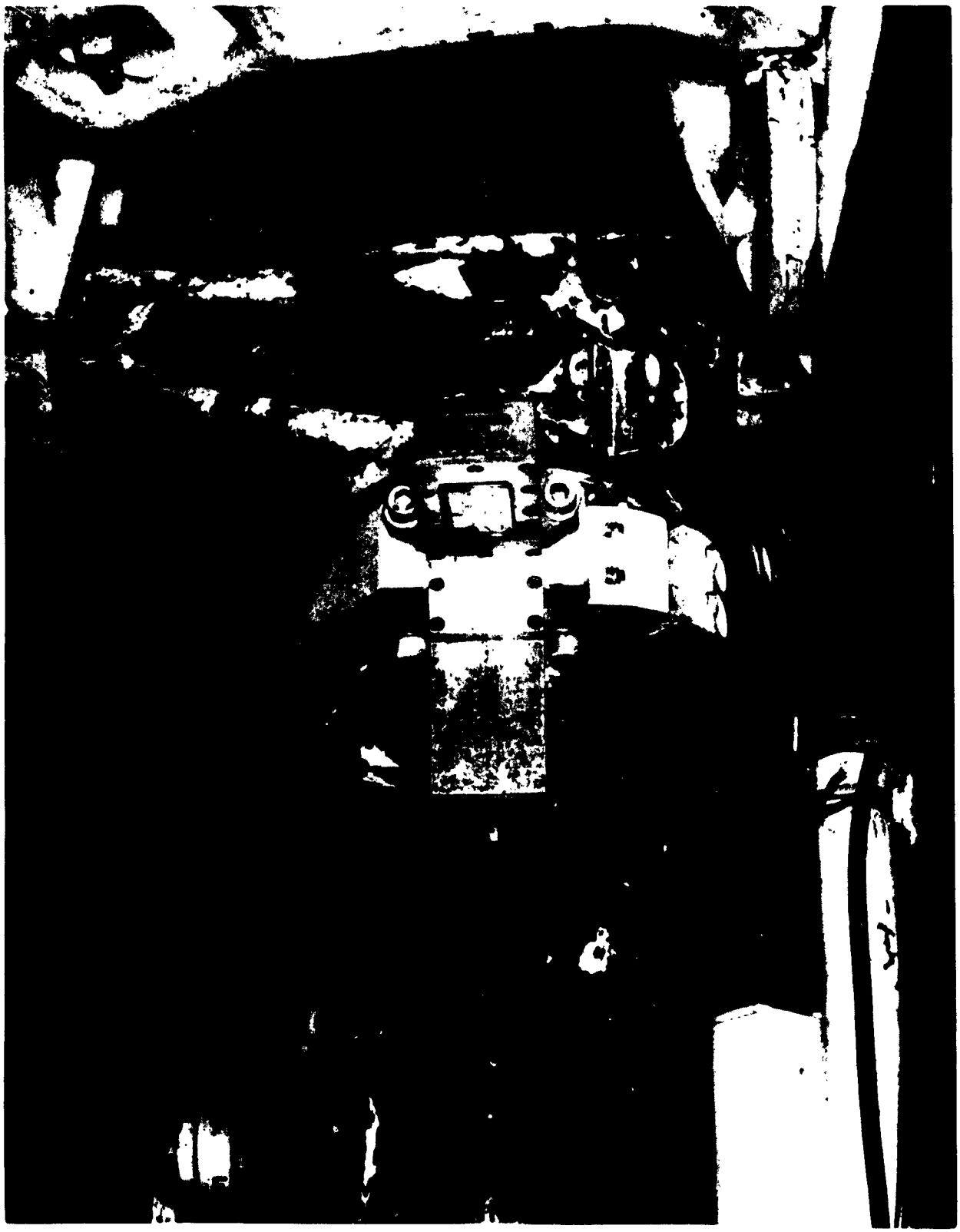
LEG	CAL-PIP EQUIVALENT		
G1-CP	-.18563	02 GS	/ 50K
G1-TP	.18480	02	
G2-TP	-.18709	02	
G2-CP	.18802	02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.50000 02	-.55277 -01	-.06	-.34513 -01	-.03	-.44895 -01
-.40000 02	.71262 -01	.07	-.22178 -01	-.02	.24542 -01
-.30000 02	.93979 -01	.09	-.92901 -01	-.09	.53930 -03
-.20000 02	.13746 00	.14	-.90948 -01	-.09	.23256 -01
-.10000 02	.18094 00	.18	-.13052 00	-.13	.25209 -01
.00000 -39	.13098 00	.13	-.76660 -01	-.08	.27162 -01
.10000 02	.13294 00	.13	-.18891 00	-.19	-.27988 -01
.20000 02	.10374 00	.10	-.15581 00	-.16	-.26035 -01
.30000 02	.95313 -01	.10	-.12271 00	-.12	-.13700 -01
-.40000 02	.86883 -01	.09	-.13114 00	-.13	-.22130 -01
.50000 02	.68071 -01	.07	.68071 -01	.07	.68071 -01

30 DEC. 1960

SP CALIB -18.592

E6



h6

DESCRIPTION:

Left hand main gear upper mass longitudinal accelerometer. Aircraft stations X = -40.0, Y = 263.6, Z = -43.0.

CONSTANT:

G's = 11.84 δ/Δ / 50 K Ohms Resis. Calib.
Up scale, mass aft

CHARACTERISTICS:

TRANSDUCER

Type - Statham A5A-30-350

Serial No. - 3899

Natural Frequency - 530 cps no measureable mount effect

Damping - 1.50

GALVANOMETER

Type - 7-342

Serial No. - 7456

Resistance - 370.5 Ohms

Natural Frequency - 217.0 cps

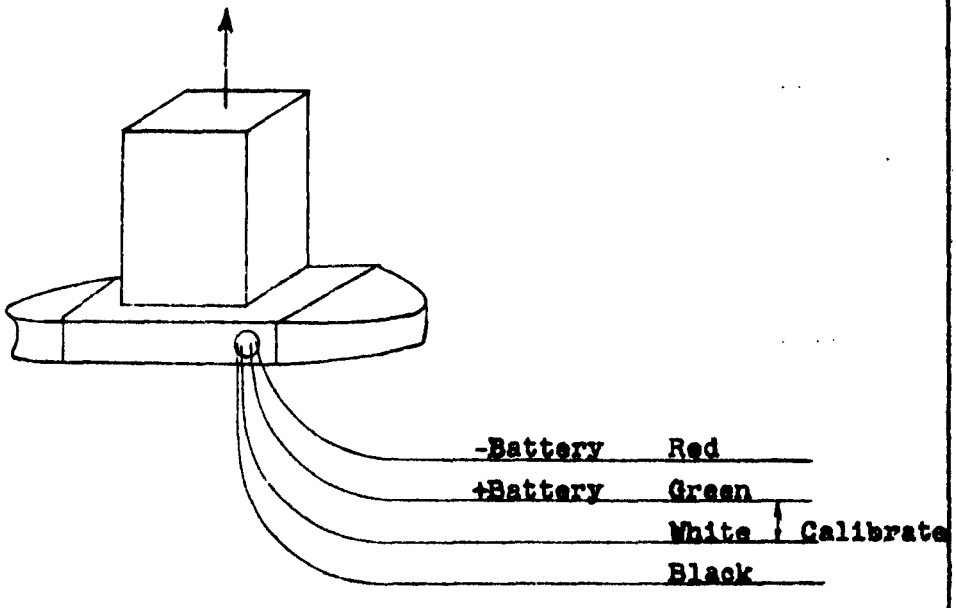
Damping - 0.578

.001 sec/cm

.005 sec/cm

LEFT HAND UPPER MASS LONGITUDINAL ACCELEROMETER

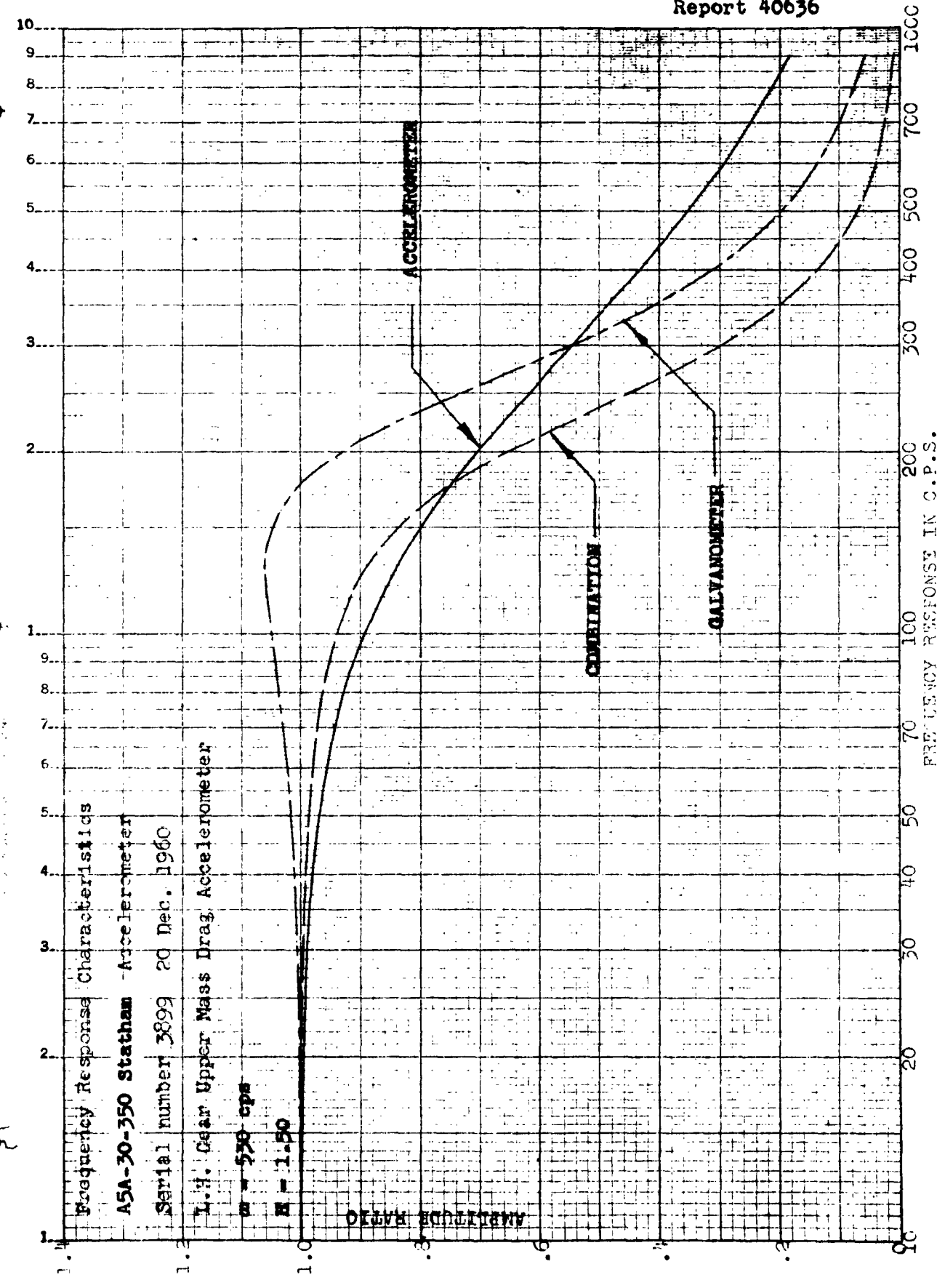
Base down gives up scale deflection



Accel. label faces down

RECORDED:

Oscillograph Channel 1-34 for Drop Test
1-33 for Flight Test


Frequency Response Characteristics
ASA-30-350 Statham Accelerometer
Serial number 3899 20 Dec. 1960
L.H. Gear Upper Mass Drag Accelerometer
ACCELEROMETER
CORRELATION
GALVANOMETER
FREQUENCY RESPONSE IN C.P.S.
Arbitrary Units

DOUGLAS AIRCRAFT COMPANY, INC.

DATE
PREPARED BY L. L. Harris
TITLE Sqc. Loads Investigation

Page 2.219
MODEL
REPORT

C

Page 2.219
Report 40636

TRANSDUCER CALIBRATION

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STHM A5A-30-350 ACCL. IN 1.50
NOMINAL RANGE.....+-30
DIMENSIONS.....G
PERCENT UNBALANCE.....00
BRIDGE VOLTS.....1
CHANNEL NUMBER.....03
RUN NUMBER.....1
CALIBRATION DATE.....12 0/60

W_G = 530

VOLTAGE CALIBRATION FACTO

RMS SLOPE	.63663 01		V/MV/V
1/RMS SLOPE	.15708 00	MV/V/	GS
RMS INTERCEPT	-.30370 02		GS

SHUNT CALIBRATION FACTORS

CP-CP	.1171	0	7.508
SH-IP	-.1171	0	
P-IP	.1171	0	
CP-P	-.1171	0	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.15000	02 .24830	00 .40	.14167	00 .23	.19499 00
-.25000	02 .19510	00 .31	.16069	00 .26	.17790 00
-.20000	02 .62263	-01 .10	.25264	-01 .04	.43763 -01
-.15000	02 -.10000	-01 -.06	-.40383	-00 -.17	-.25192 -01
-.10000	02 .59017	-01 .09	-.21465	-00 -.36	-.78219 -01
-.50000	01 -.97775	-01 -.16	-.35150	-00 -.59	-.21038 00
.00000	+39 -.78252	-01 -.13	-.30084	-00 -.50	-.20460 00
.50000	01 -.10358	00 -.17	-.61015	-00 -.10	-.11078 00
.10000	0 .15117	-01 .03	-.90015	-00 -.15	-.37427 -01
.15000	0 .20659	00 .34	-.12081	00 -.21	.41401 -01
.20000	0 .31792	00 .53	.42000	-01 .07	.16896 00
.25000	0 .42308	00 .71	-.94758	-01 -.16	.14416 00
.30000	0 .16453	00 .27	.16453	00 .27	.16453 00

27 DEC. 1960

SP. C-118 11,830

33

Wheel Position

Magnetic pick-ups were installed on the wheel brake assembly as shown on Pages 2.303 and 2.305. Metal nail heads were attached to the wheel rim, 10 degrees apart, and passage of these nail heads past the pick-up produced blips on the oscillograph trace.

DESCRIPTION:

Right hand wheel position pickup. This transducer measures wheel angular position with respect to the gear axle ℄.

CONSTANT:

36 PIPS/Rev.

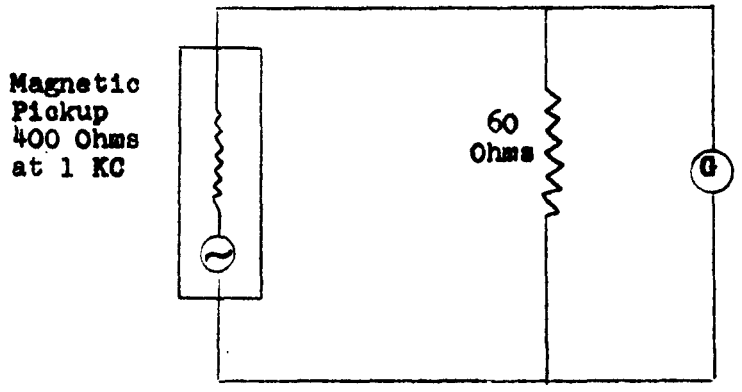
CHARACTERISTICS:

TRANSDUCER

Type - Electro 3010A

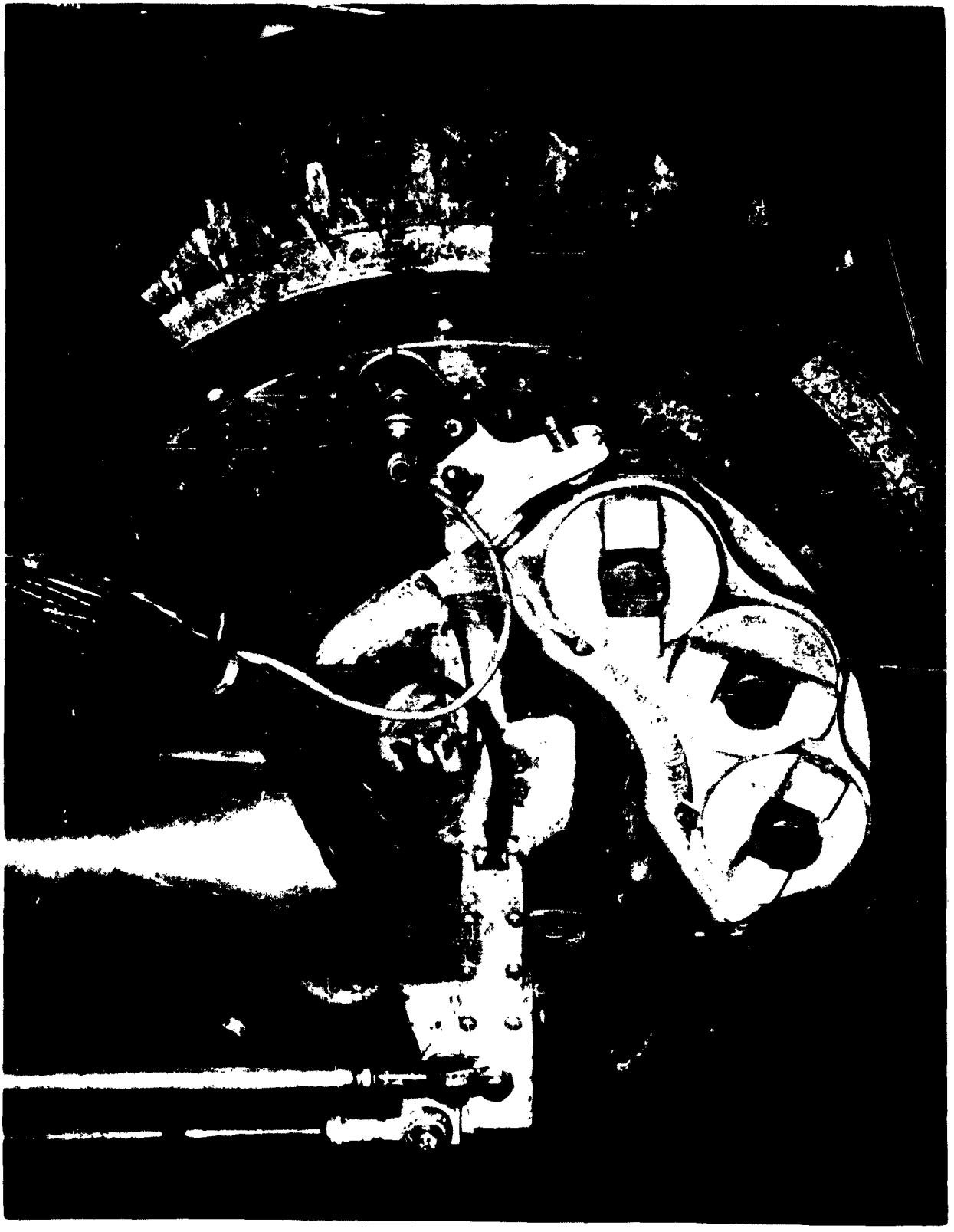
GALVANOMETER

	DROP TESTS	FLIGHT TESTS
Type -	7-326	7-323
Serial No. -	5040D	9298



RECORDED:

Oscillograph Channel 2-17 for Drop Test
2-19 for Flight Test



DESCRIPTION:

Left hand wheel position pickup. This transducer measures wheel angular position with respect to the gear axle ℄.

CONSTANT:

36 PIPS/Rev.

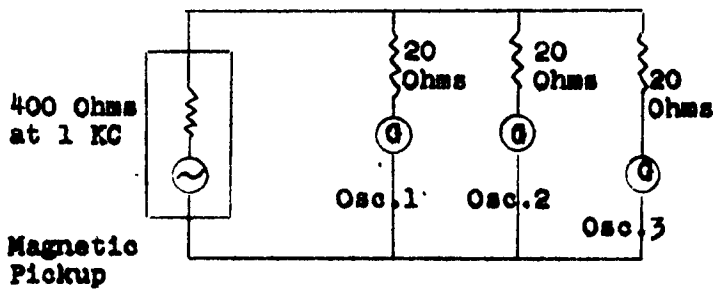
CHARACTERISTICS:

TRANSDUCER

Type - Electro 3010A

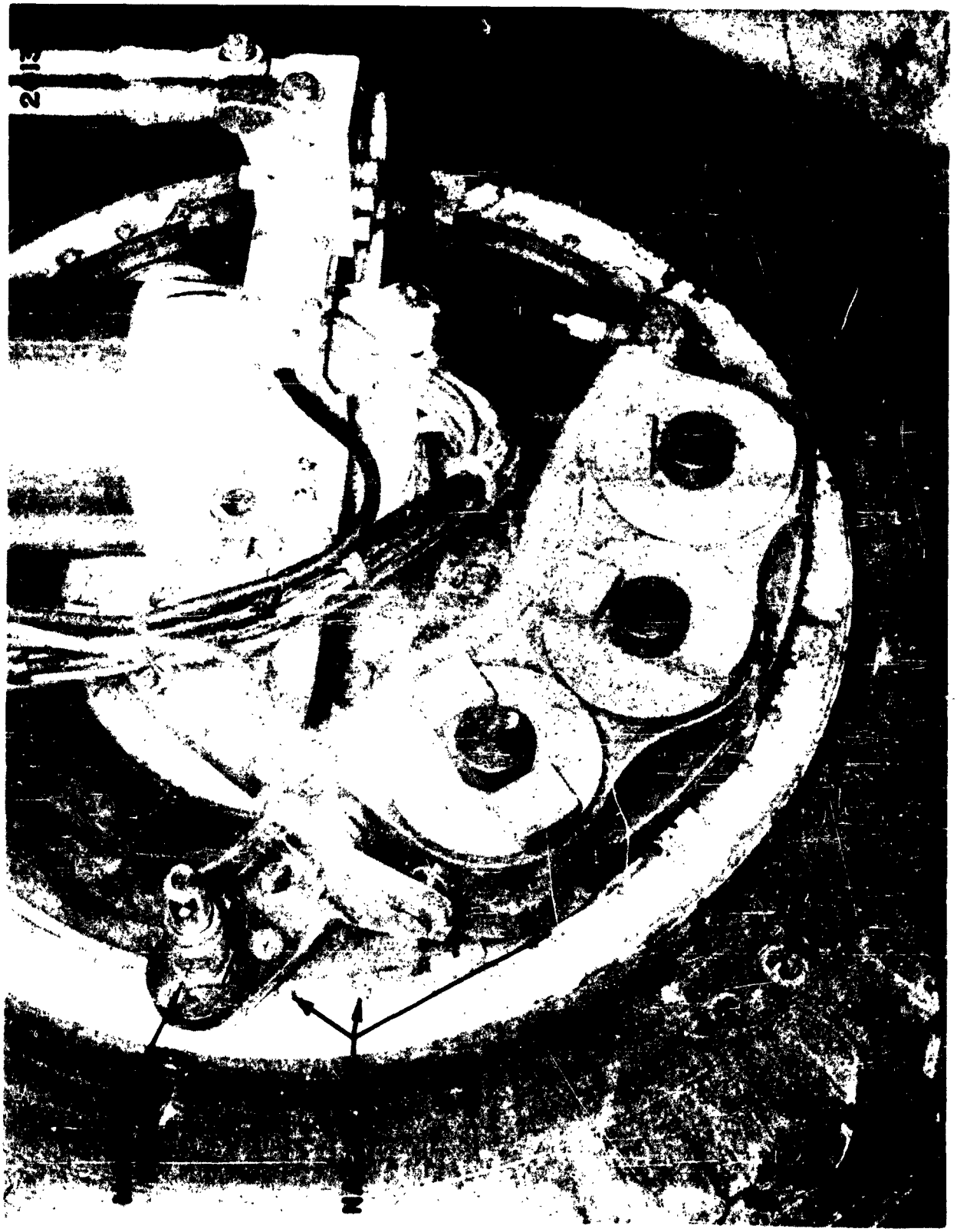
GALVANOMETER

	DROP TESTS	FLIGHT TESTS
Type -	7-326	7-323
Serial No. -	539DD	8548



RECORDED:

Oscillograph Channel 2-18 for Drop Test
2-32 for Flight Test



DESCRIPTION:

Left hand wheel position pickup. This transducer measures wheel angular position with respect to the gear axle centerline. See DAC drawing 22542 for mounting details.

CONSTANT:

36 Pips/Rev.

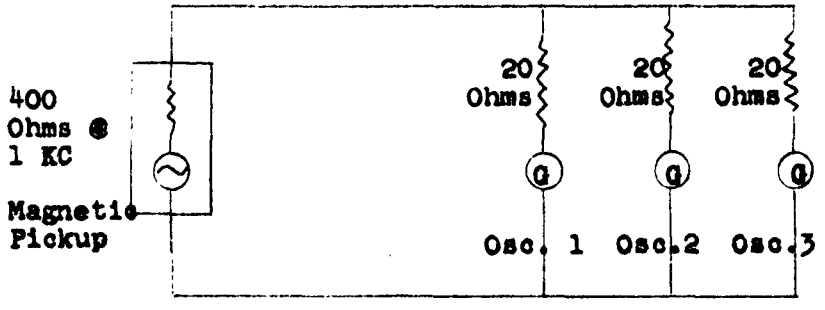
CHARACTERISTICS:

TRANSDUCER

Type - Electro 3010A

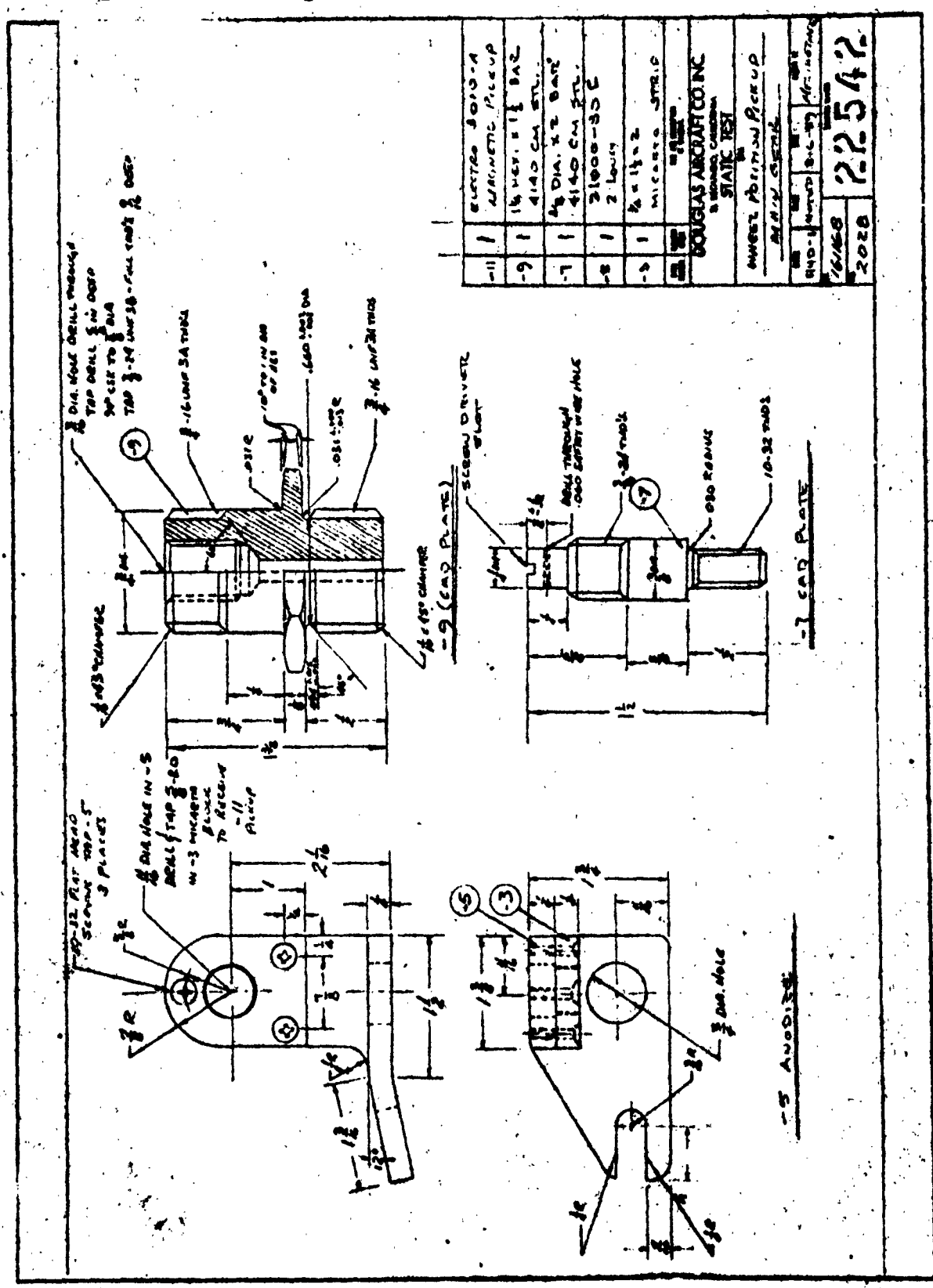
GALVANOMETER

	DROP TESTS	FLIGHT TESTS
Type -	7-326	7-323
Serial No. -	7055	14153



RECORDED:

Oscillograph Channel 1-15 for Drop Test
1-35 for Flight Test


DOUGLAS AIRCRAFT CO. INC.
STATIC TEST
NOSE WHEEL PICKUP
22542
-9 (CAP PLATE)
-7 CAP PLATE
-5 ANODIZE

Strut Positions

The main landing gear strut positions were measured with a slide wire position transmitter of Douglas Aircraft Company design, shown on Pages 2.406 through 2.410. Photographs of installations on the airplane are shown on Pages 2.411 and 2.412. A special calibration circuit and control box was used for the strut position transmitters. A schematic of this circuit appears on Page 2.413 and a photograph of the control box is shown on Page 2.414.

DESCRIPTION:

Right hand main gear strut position. This transducer measures relative displacement of the piston and cylinder.

CONSTANT:

Inches = 16.0 δ/Δ / Pot Setting (fixed)

CHARACTERISTICS:

TRANSDUCER - DAC Design ES 2621

Type - Slide Wire

GALVANOMETER

Type - 7-324

Serial No. - 6056

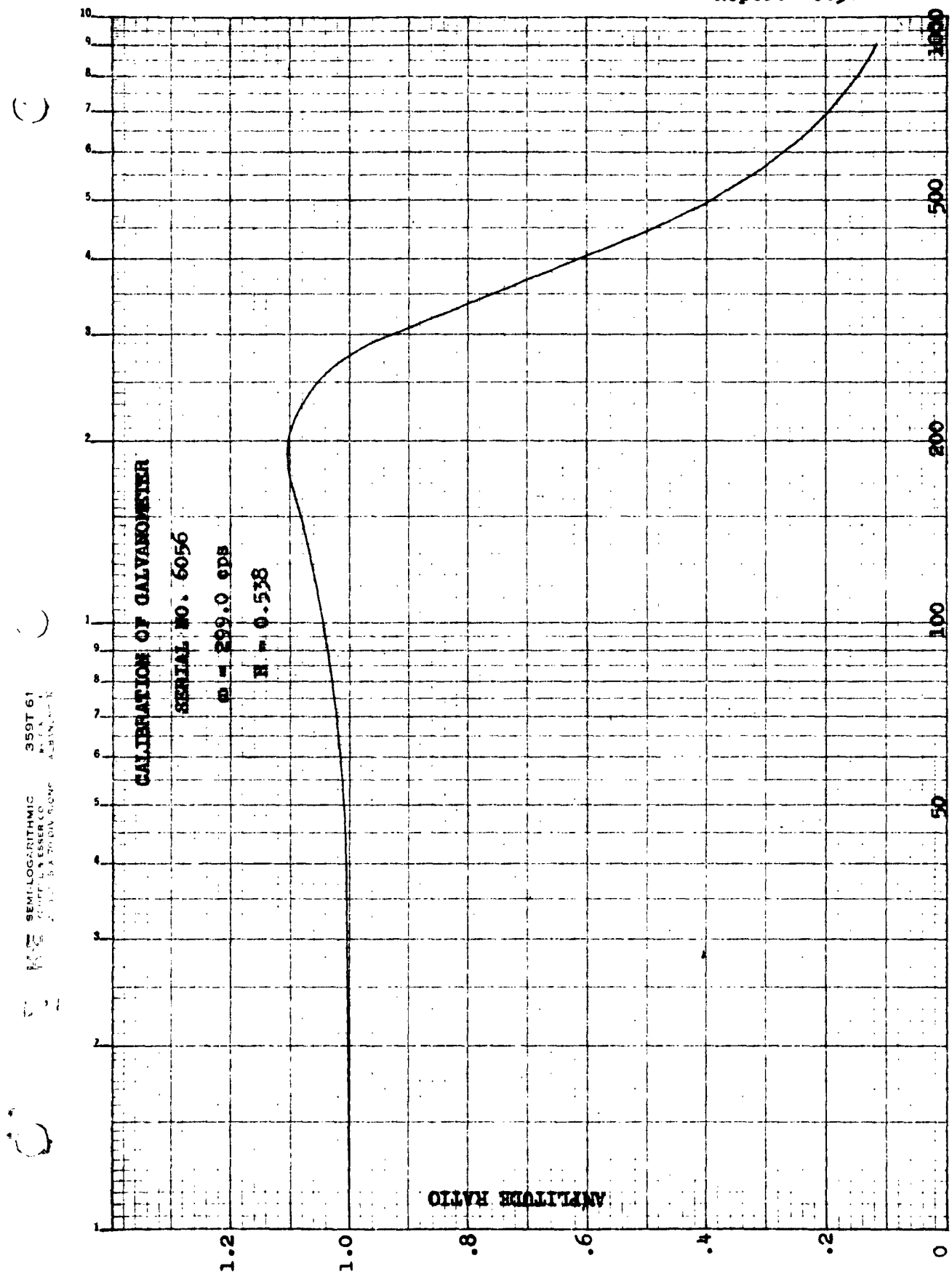
Resistance - 79.55 Ohms

Natural Frequency - 299.0 cps

Damping - 0.538

RECORDED:

Oscillograph Channel 2-6 for Drop Test
2-17 for Flight Test


CALIBRATION OF GALVANOMETER
SERIAL NO. 6056
ω = 299.0 cps
H = 0.538
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1.2
1.0
.8
.6
.4
.2
0
1000
500
200
100
50
SEMI-LOGARITHMIC
359T 61

DESCRIPTION:

This transducer measures the position of the left hand strut.

CONSTANT:

Stroke = 16.0 δ/Δ

CHARACTERISTICS:

TRANSDUCER

Type - DAC Drawings 2617, 2618, 2619, 2620 and 2621

GALVANOMETER

Type - CEC 7-324

Serial No. - 6234

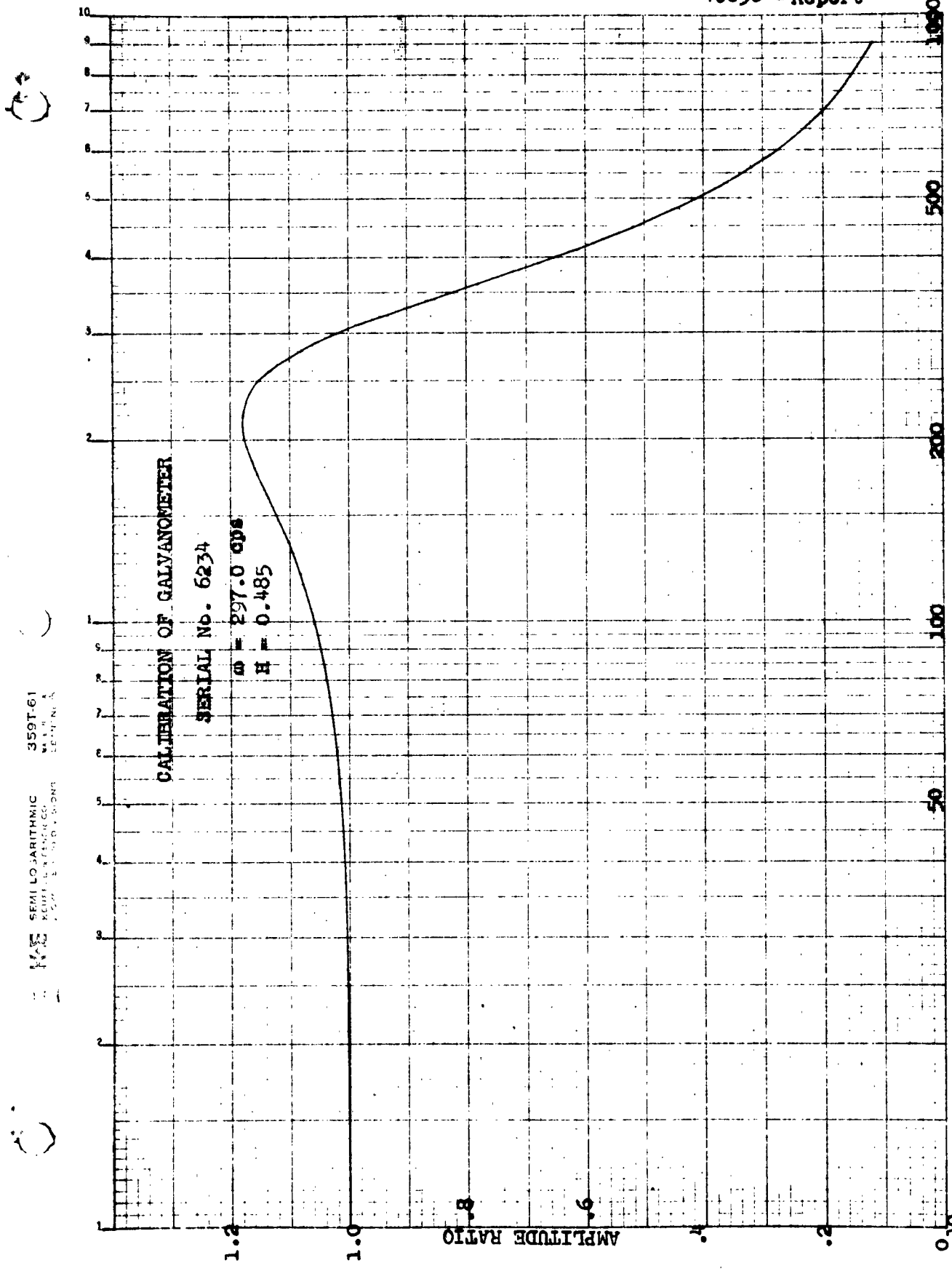
Resistance - Galvo sees 80.15 ohms

Natural Frequency - 297.0 cps

Damping - H = 0.485

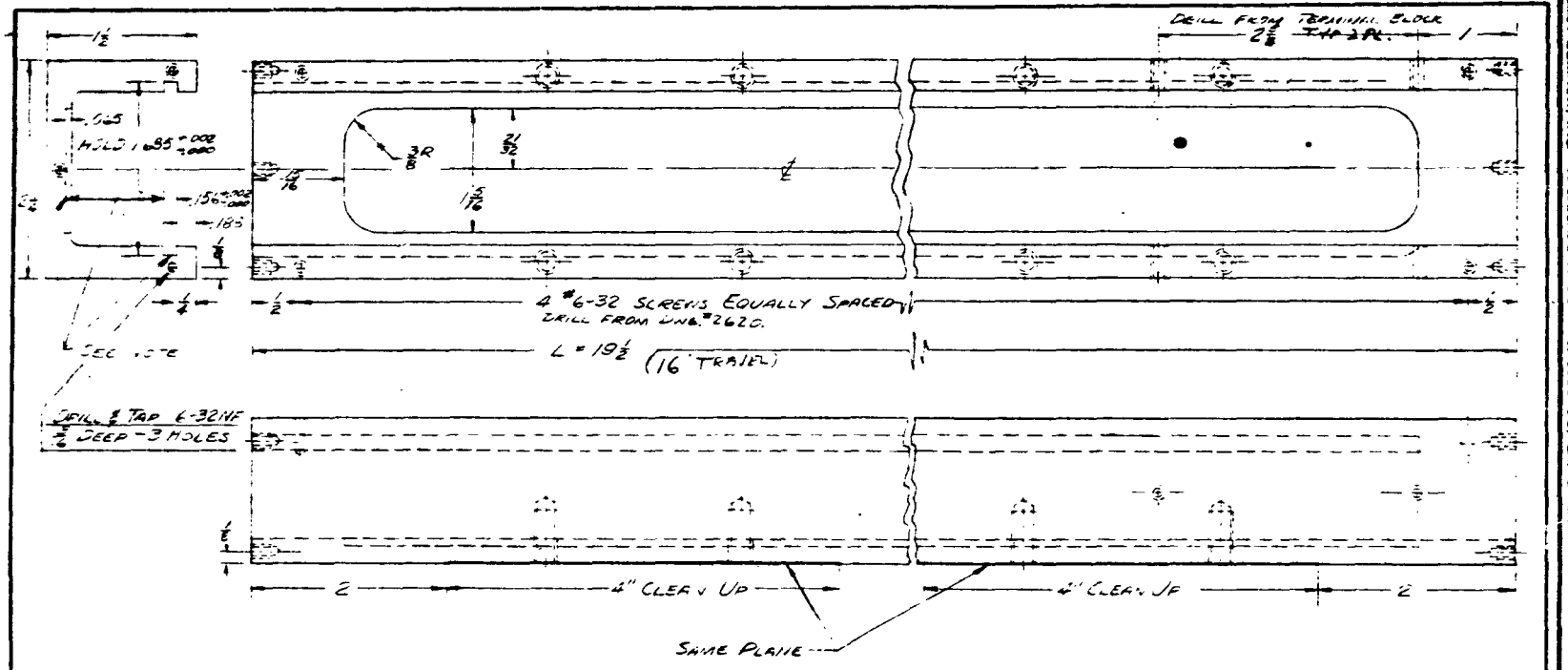
RECORDED:

Oscillograph Channel 1-6 for Drop Test
2-30 for Flight Test


CALIBRATION OF GALVANOMETER
SERIAL No. 6234
ω = 297.0 cps
H = 0.485
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1.2
1.0
.8
.6
.4
.2
0
10
50
100
200
500
1000
SEMI LOGARITHMIC
359T-61

FORM 30-250W
(7-51)

SLIDE WIRE USED IN DROP TEST OF A4D-2 NOSE GEAR AND MAIN GEARS NO. 10 AND 16



NOTE:

Dimensions L = 21 1/2 for Nose Gear Slide Wire.

Dimension L = 23 1/2 for Main Gear Slide Wires.

Maximum Required Travel = 16 inches.

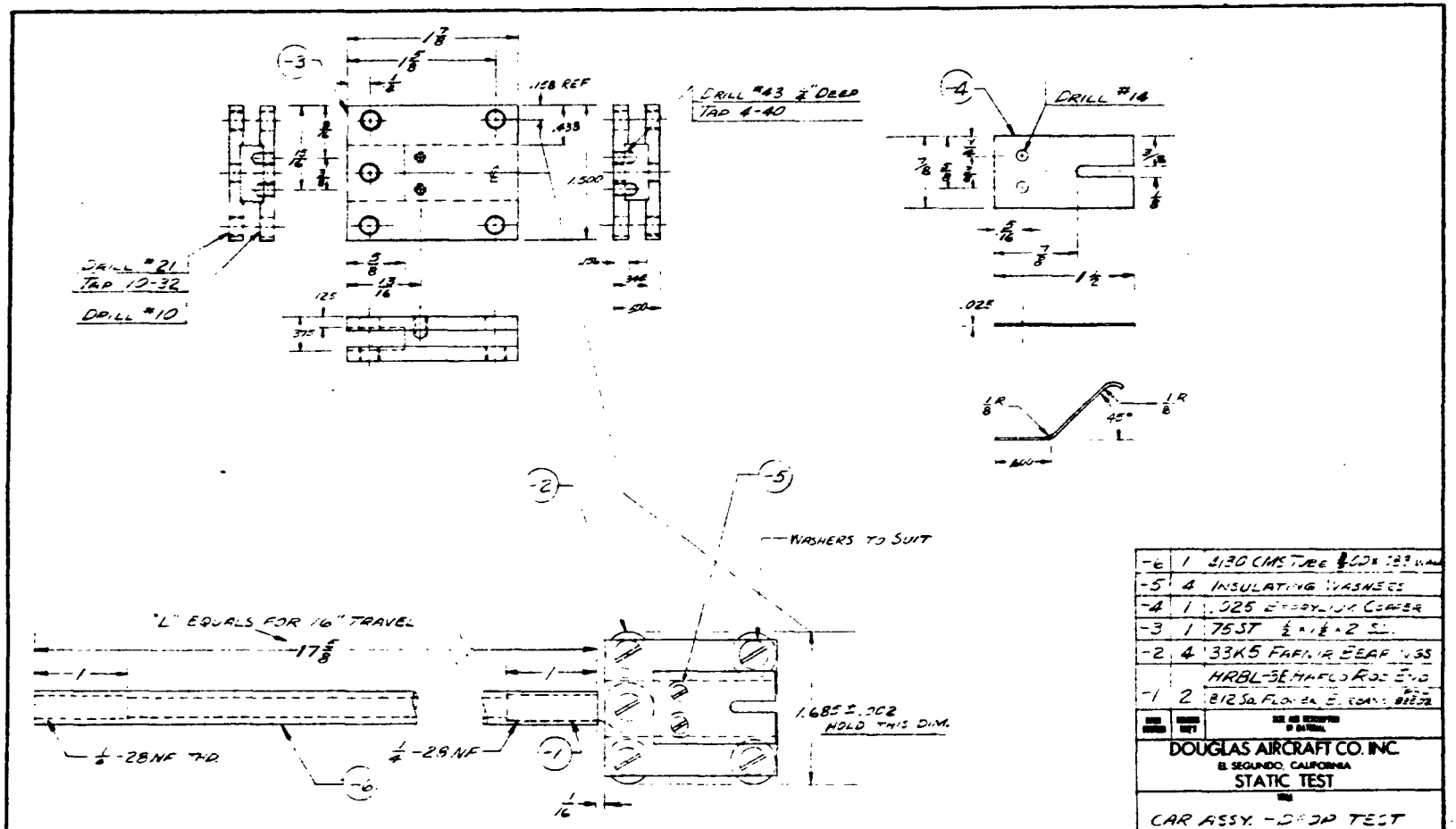
SEE DRAWING # 2619 FOR SEQUENCE OF OPERATIONS

DOUGLAS AIRCRAFT CO. INC. EL SEGUNDO, CALIFORNIA			
STATIC TEST			
CHANNEL - DROP TEST SLIDE WIRE			
	FULL	4-2-53	STUBBS
		2617	

DOUGLAS AIRCRAFT COMPANY, INC. EL SEGUNDO DIVISION EL SEGUNDO, CALIFORNIA

FORM 30-250W
(7-51)

SLIDE WIRE USED IN DROP TEST OF A-4D-2 NOSE GEAR AND MAIN GEARS NO. 10 AND 15



-6	1	4130 CRS TUBE
-5	4	INSULATING WASHERS
-4	1	.025 [illegible] COPPER
-3	1	75ST ½ × ⅛ × 2 SL.
-2	4	33K5 FAFNIR BEARINGS
-1	2	HRBL-5E MAFCO ROD ENDS

DOUGLAS AIRCRAFT CO. INC.
EL SEGUNDO, CALIFORNIA
STATIC TEST

CAR ASSY. -DROP TEST
SLIDE WIRE

FULL | 3-30-53 | STODDS

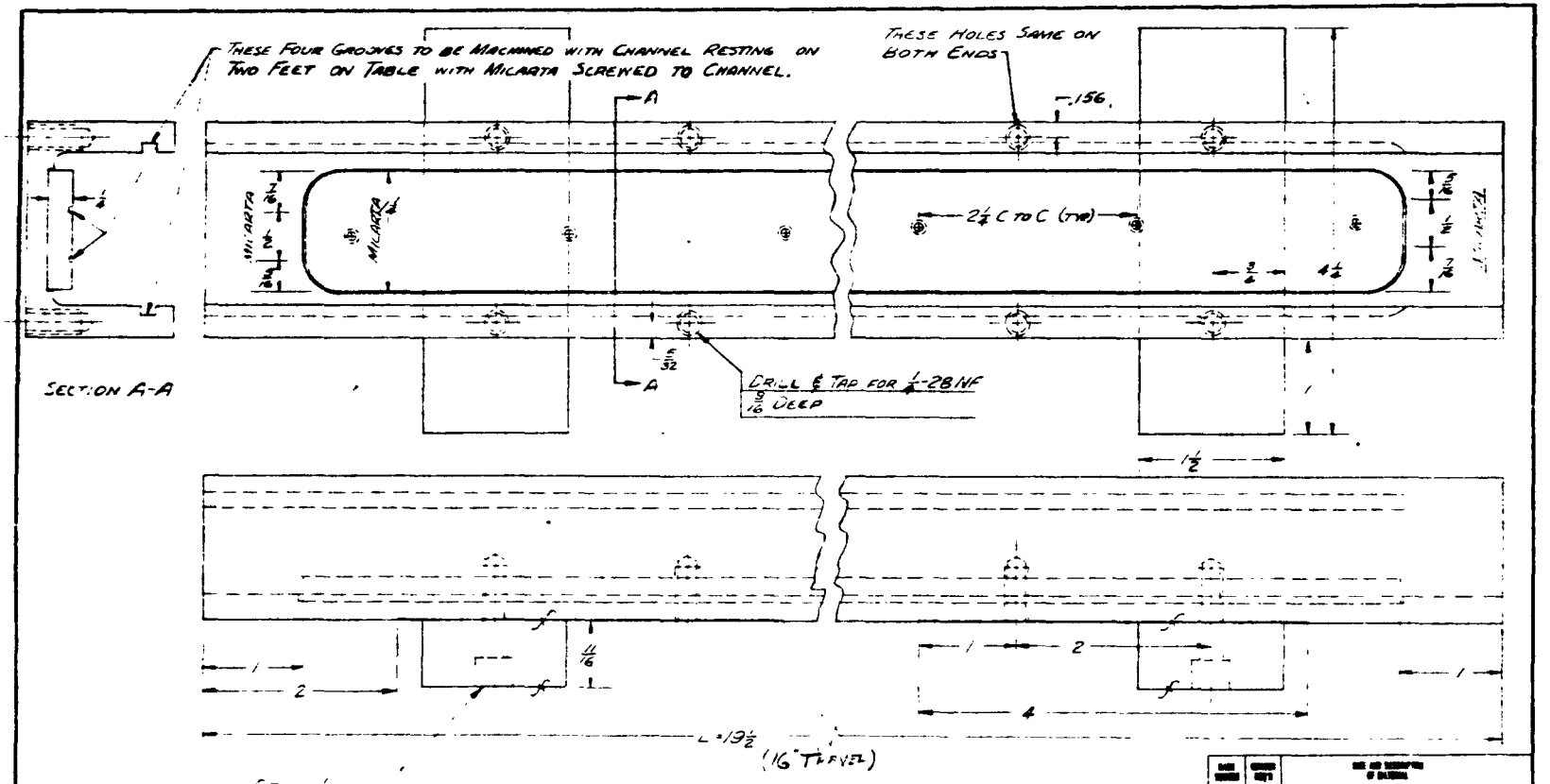
2613

DOUGLAS AIRCRAFT COMPANY, INC. EL SEGUNDO DIVISION EL SEGUNDO, CALIFORNIA

Page 2.407
Report 40636

FORM 30-250V
(7-51)

SLIDE WIRE USED IN DROP TEST OF A4D-2 NOSE GEAR AND MAIN GEARS NO. 10 AND 16



DOUGLAS AIRCRAFT CO. INC.
EL SEGUNDO, CALIFORNIA
STATIC TEST

SLIDE WIRE ASSEMBLY - DROP TEST

FULL | 1-1-53 | STRUCTURES

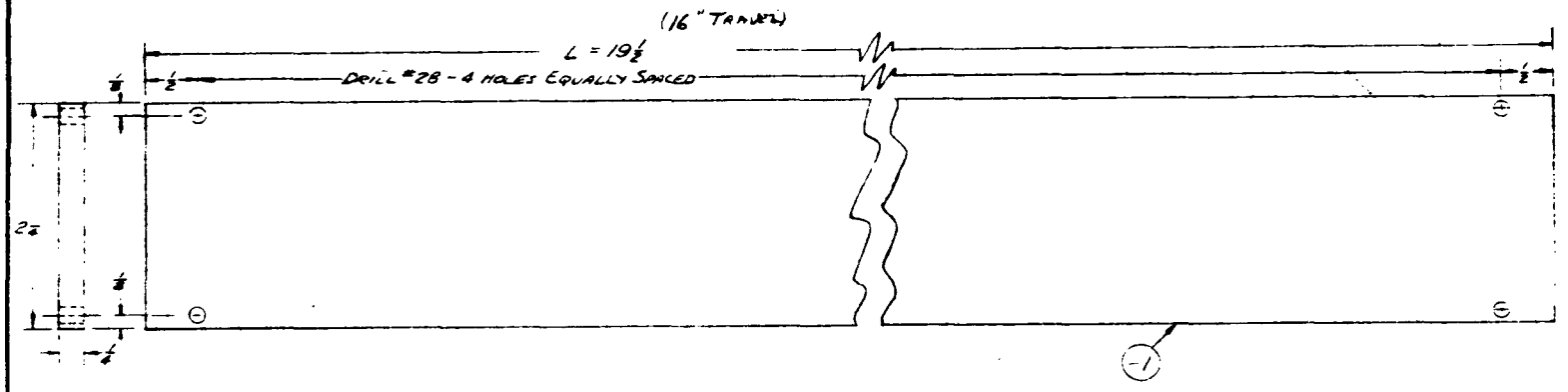
2619

DOUGLAS AIRCRAFT COMPANY, INC. EL SEGUNDO DIVISION EL SEGUNDO, CALIFORNIA

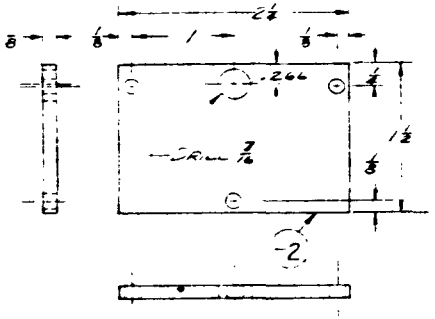
Page 2.408
Report 40636

FORM 30-250V
(7-51)

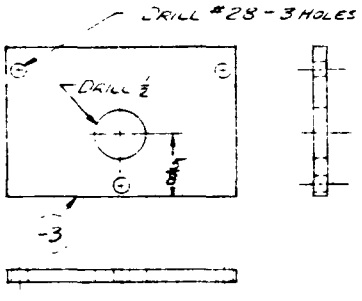
SLIDE WIRE USED IN DROP TEST OF A4D-2 NOSE GEAR AND MAIN GEARS NO. 10 AND 16



FRONT COVER PLATE



BOTTOM COVER PLATE



TOP COVER PLATE

-3	1	2½ × 1½ × ⅛ 24.5° OR 75.5°
-2	1	2½ × 1½ × ⅛ 24.5° OR 75.5°
-1	1	19½ × 2½ × ½ CLEX GLASS

DOUGLAS AIRCRAFT CO. INC.
EL SEGUNDO, CALIFORNIA
STATIC TEST

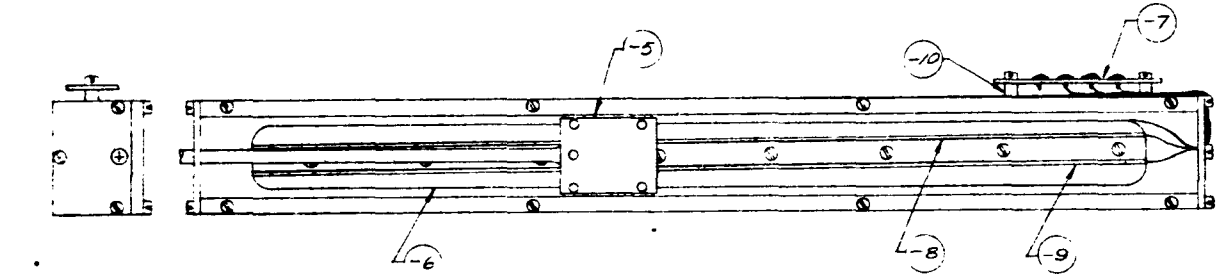
COVER PLATES - DROP TEST SLIDE WIRE

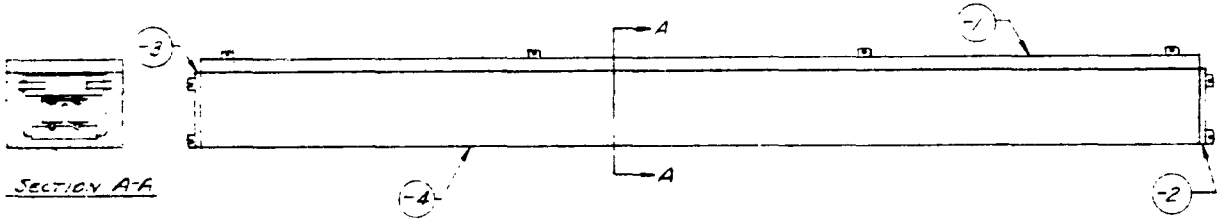
	FULL	4-3-53	
			2620

DOUGLAS AIRCRAFT COMPANY, INC. EL SEGUNDO DIVISION EL SEGUNDO, CALIFORNIA

FORM 30-250V
(7-51)

SLIDE WIRE USED IN DROP TEST OF A4D-2 NOSE GEAR AND MAIN GEARS NO. 10 AND 16





SECTION A-A

-13	2	AL SPACERS - 1/2" LONG
-9	1	BRASS ROD
-8	1	SLIDE WIRE
-7	1	TERMINAL BLOCK
-6	1	MICARTA BLOCK
-5	1	CAR ASSEMBLY
-4	1	CHANNEL
-3	1	BOTTOM COVER PLATE
-2	1	TOP COVER PLATE
-1	1	FRONT COVER PLATE

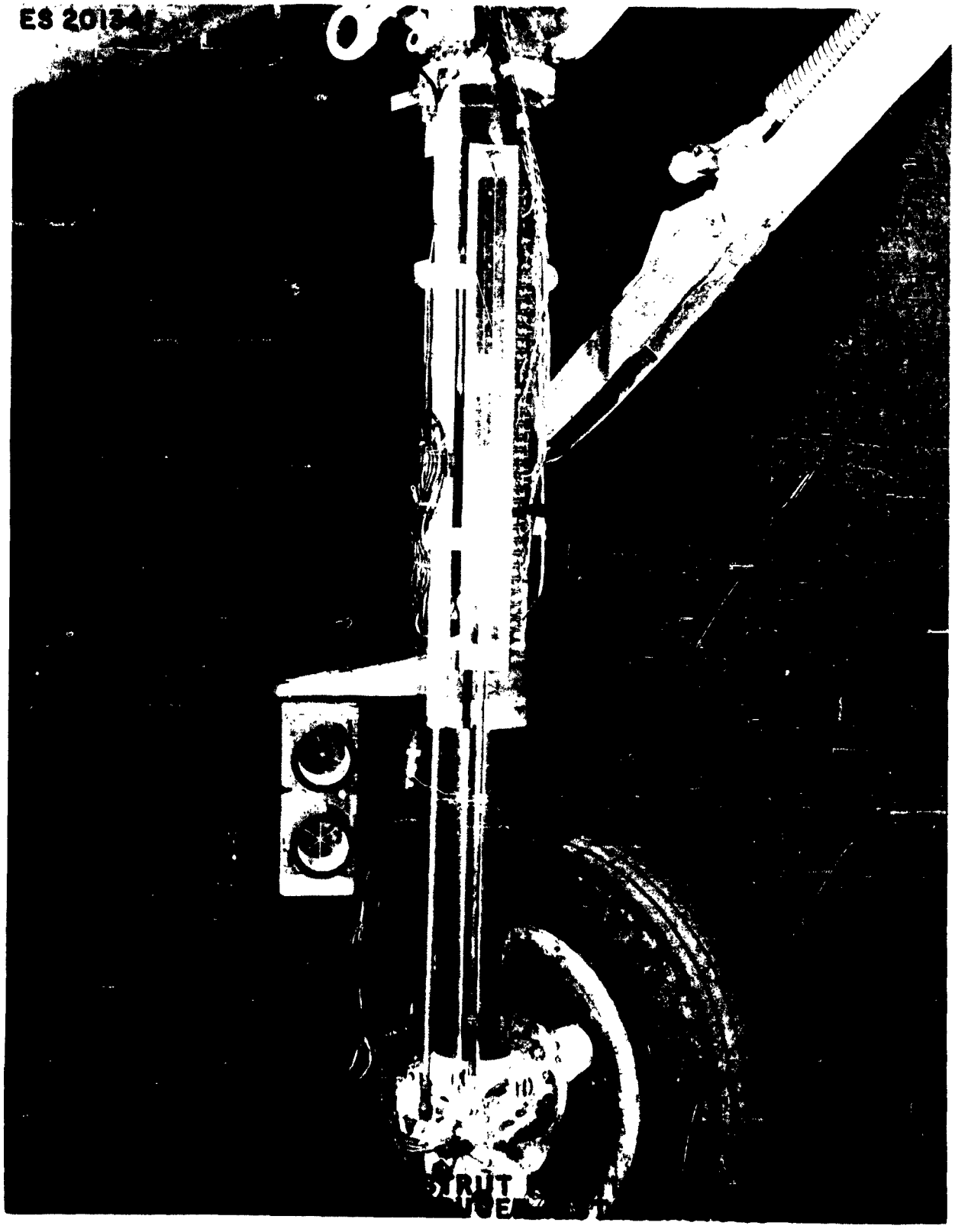
DOUGLAS AIRCRAFT CO. INC.
EL SEGUNDO CALIFORNIA
STATIC TEST

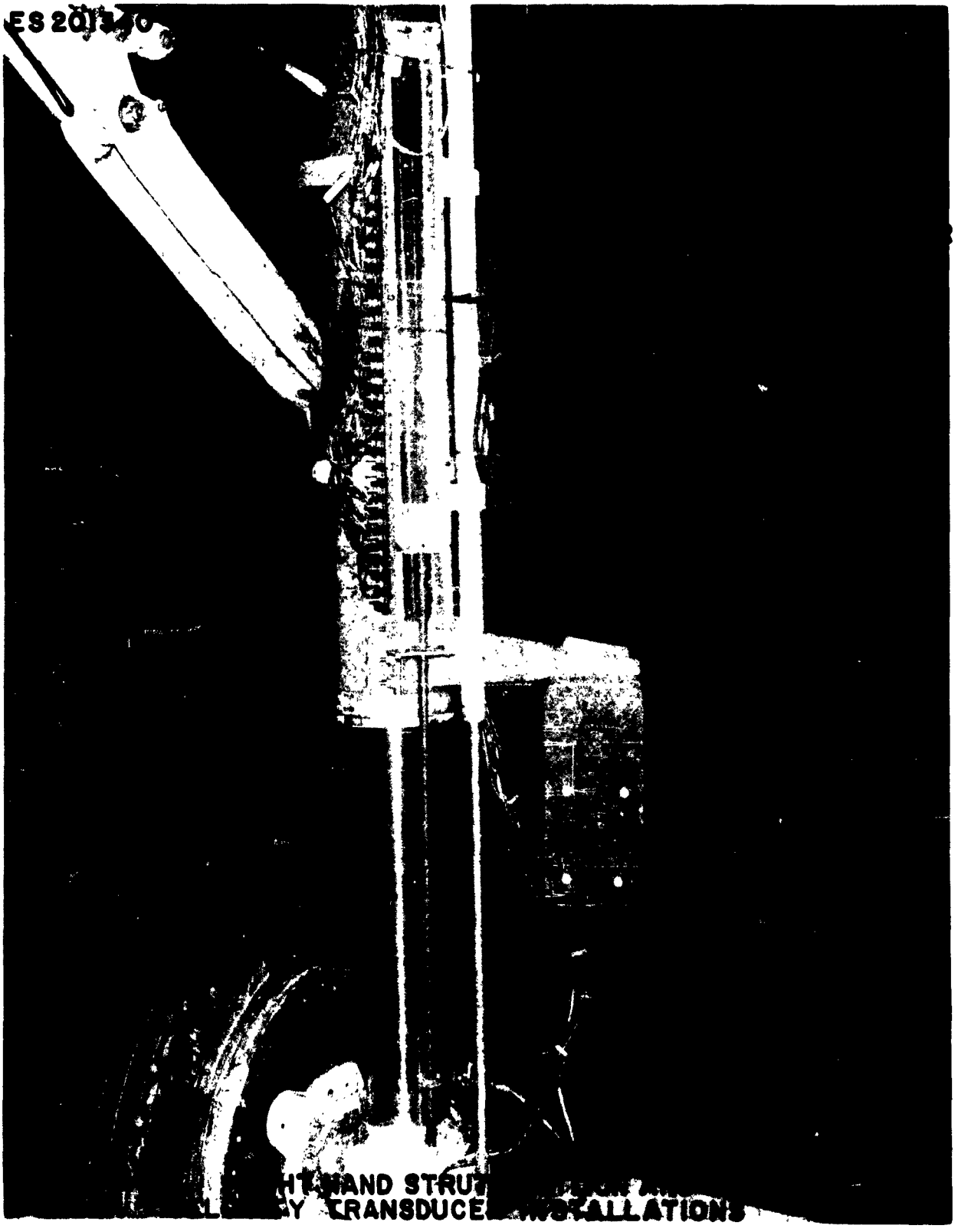
SLIDE WIRE ASSEMBLY COMPLETE

	1"=2"	6 APR 53	STOOPS
3753-51		2621	
2.1			

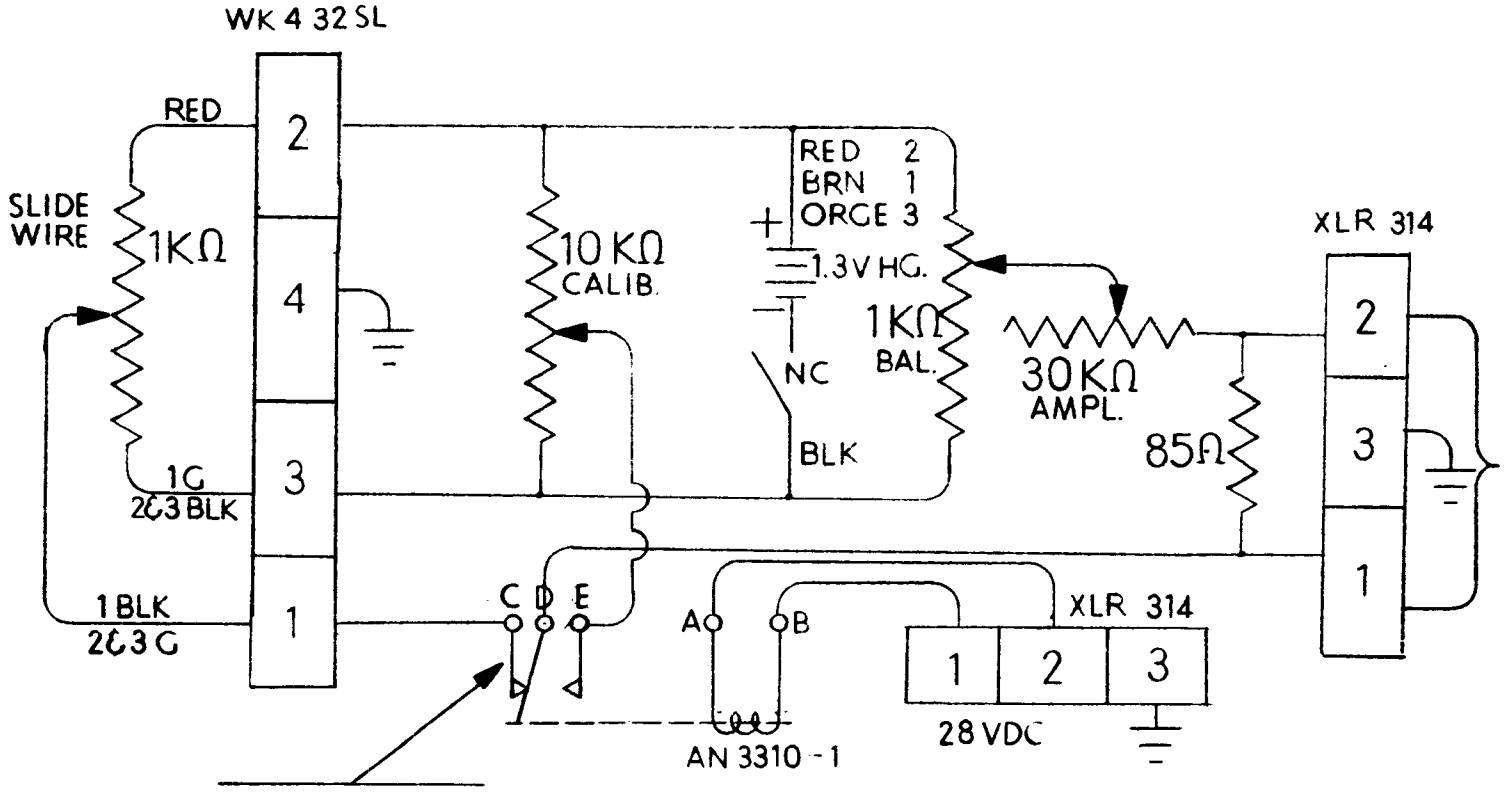
THIS DWG IS AN ASSEMBLY OF DWGS. #2617
#2618
#2619
#2620

DOUGLAS AIRCRAFT COMPANY, INC. EL SEGUNDO DIVISION EL SEGUNDO, CALIFORNIA


ES 20134
STRUT


ES 20
HT HAND STRU
Y TRANSDUCE
INSTALLATIONS

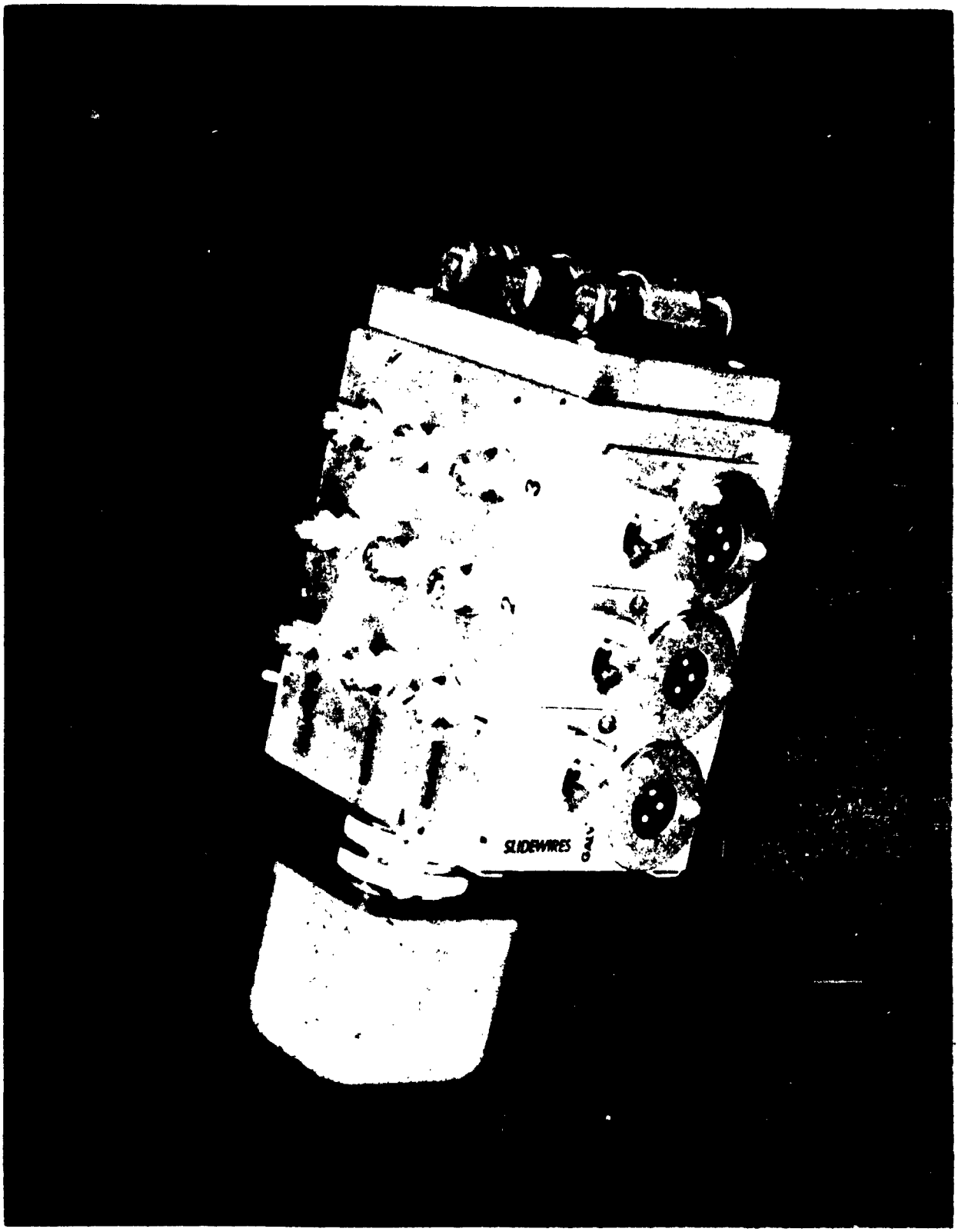
SLIDEWIRE CALIBRATION BOX



CHANNEL	TERMINAL
1 NOSE	EDC
2 RHMG	HGF
3 LHMG	LKJ

TURN BATTERY SWITCH OFF AT END OF OPERATION

CEC 7-324 GALVO


SLIDEWIRES

Strut Velocity

The collapse rate of the main landing gear strut was measured with a Sanborn magnetic type transducer. A photograph of the installation on the airplane is shown on Page 2.420. A special calibration circuit and control box were used for the transducers. A schematic and photograph of the circuit and control box appear on Pages 2.421 and 2.422 respectively. A typical oscillograph record of a calibration of a velocity generator and resulting data are shown on Pages 2.423 through 2.433.

A comparison of various types of velocity measuring devices is shown on Pages 2.434 and 2.435. The wiring diagram used with the Kollsman velocity generator is shown on Page 2.436. This device was received with landing gear No. 10, but was not utilized for the Douglas Aircraft Company program.

DESCRIPTION:

Right hand main gear strut velocity. This transducer measures relative velocity between the piston and cylinder.

CONSTANT:

Ft/Sec. = 21.34 δ/Δ / 65K Ohms Resistor Calibration

CHARACTERISTICS:

TRANSDUCER

Type - Sanborn 10 LV 17-X1

Serial No. - I-7327

GALVANOMETER

Type - 7-342

Serial No. - 4555

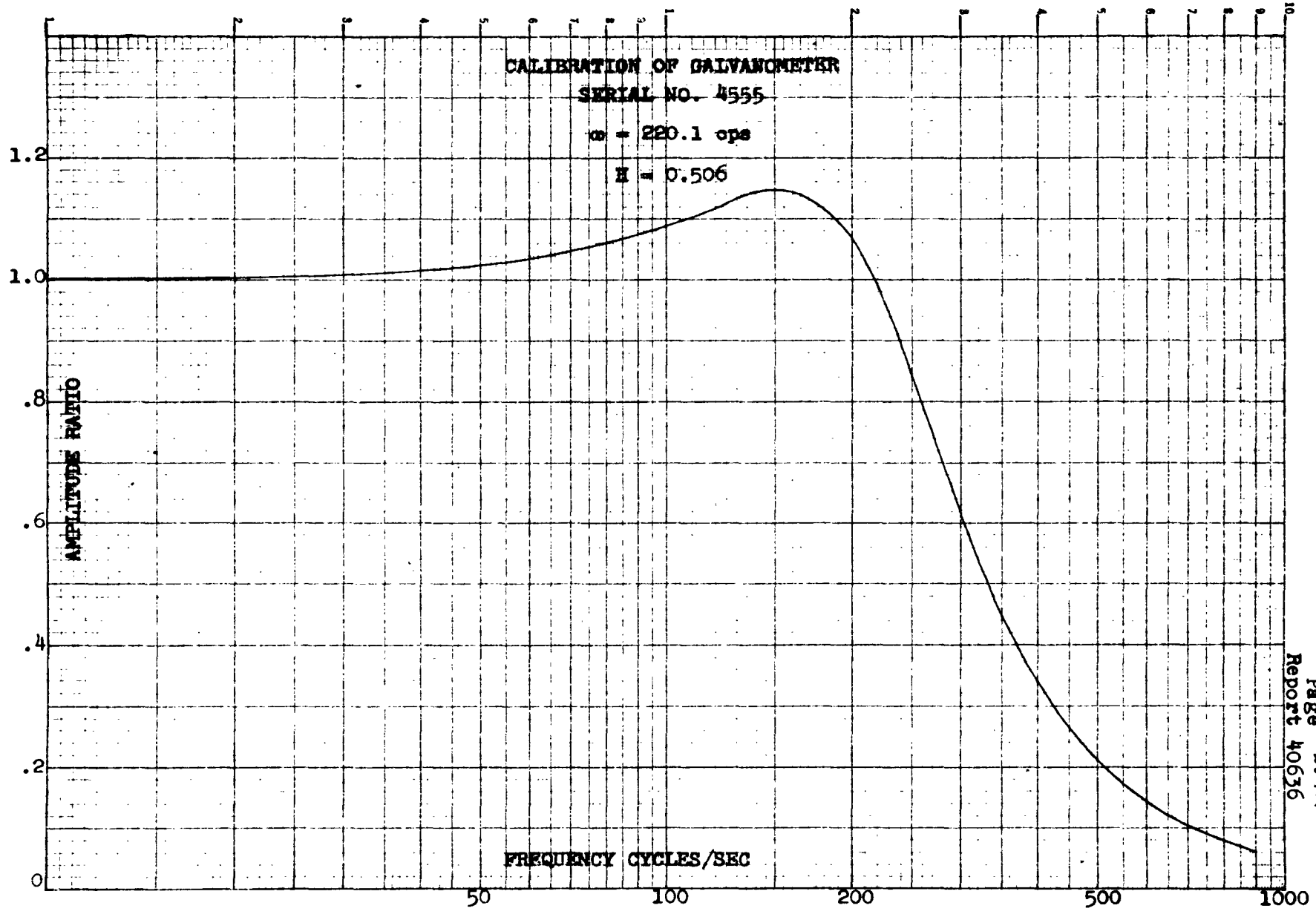
Resistance - 364.2 Ohms

Natural Frequency - 220.1 cps

Damping - 0.506

RECORDED:

Oscillograph Channel 2-7 for Drop Test


SEMI LOGARITHMIC
359T-61
CALIBRATION OF GALVANOMETER
SERIAL NO. 4555
ω = 220.1 cps
H = 0.506
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
0
.2
.4
.6
.8
1.0
1.2
50
100
200
500
1000

DESCRIPTION:

This transducer measures the left hand oleo strut velocity of compression. See photographs ES 191496 and 201341.

CONSTANT:

Velocity (FPS) = 21.73 δ/Δ

CHARACTERISTICS:

TRANSDUCER - Sanborn LVsyn

Type - 10 LV 17-X1

Serial No. - 2

Stroke - 22 inches

Working Range - 20.5 inches

GALVANOMETER - CEC

Type - 7-342

Serial No. 5097

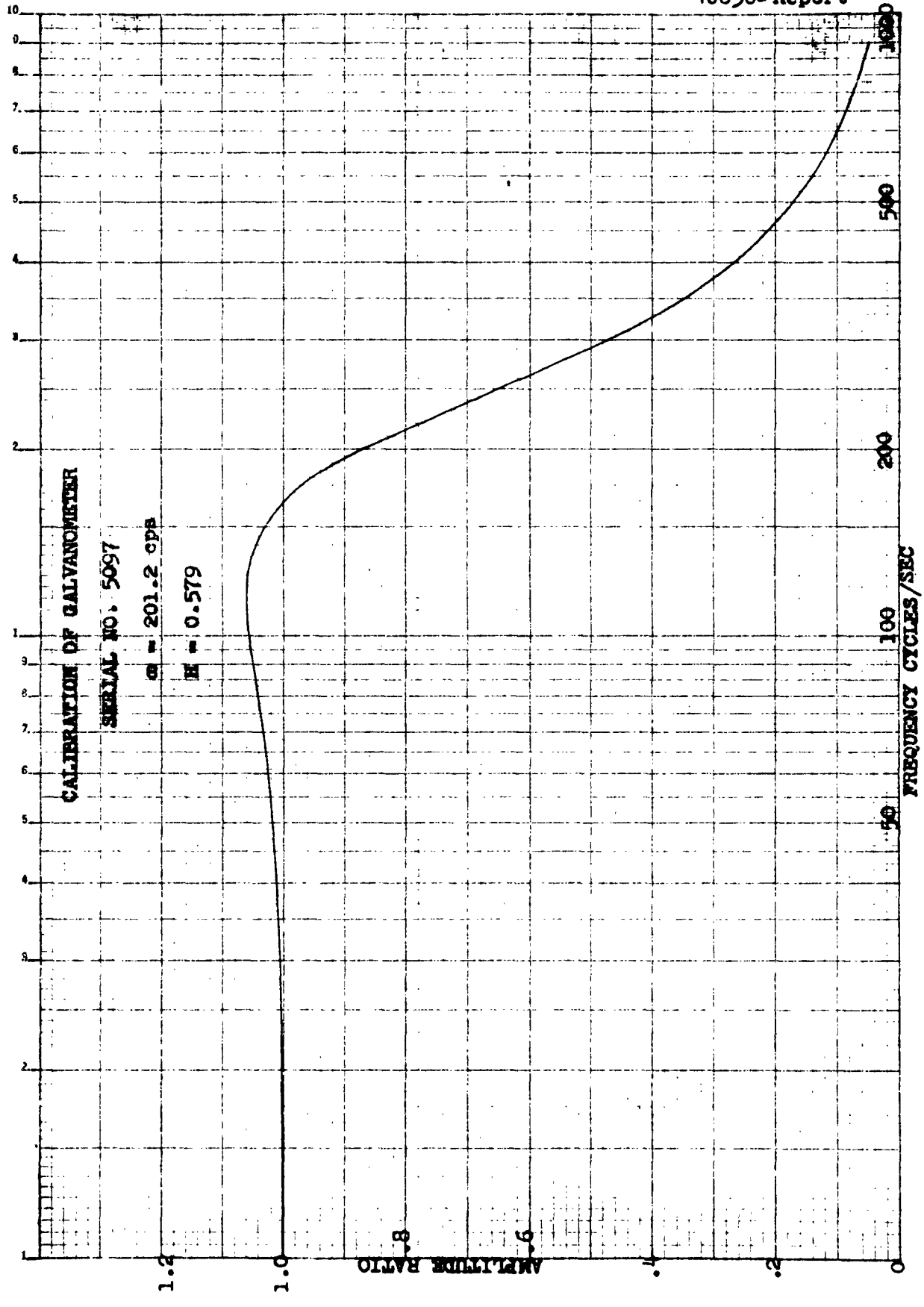
Resistance - Galvo sees 350.9 Ohms

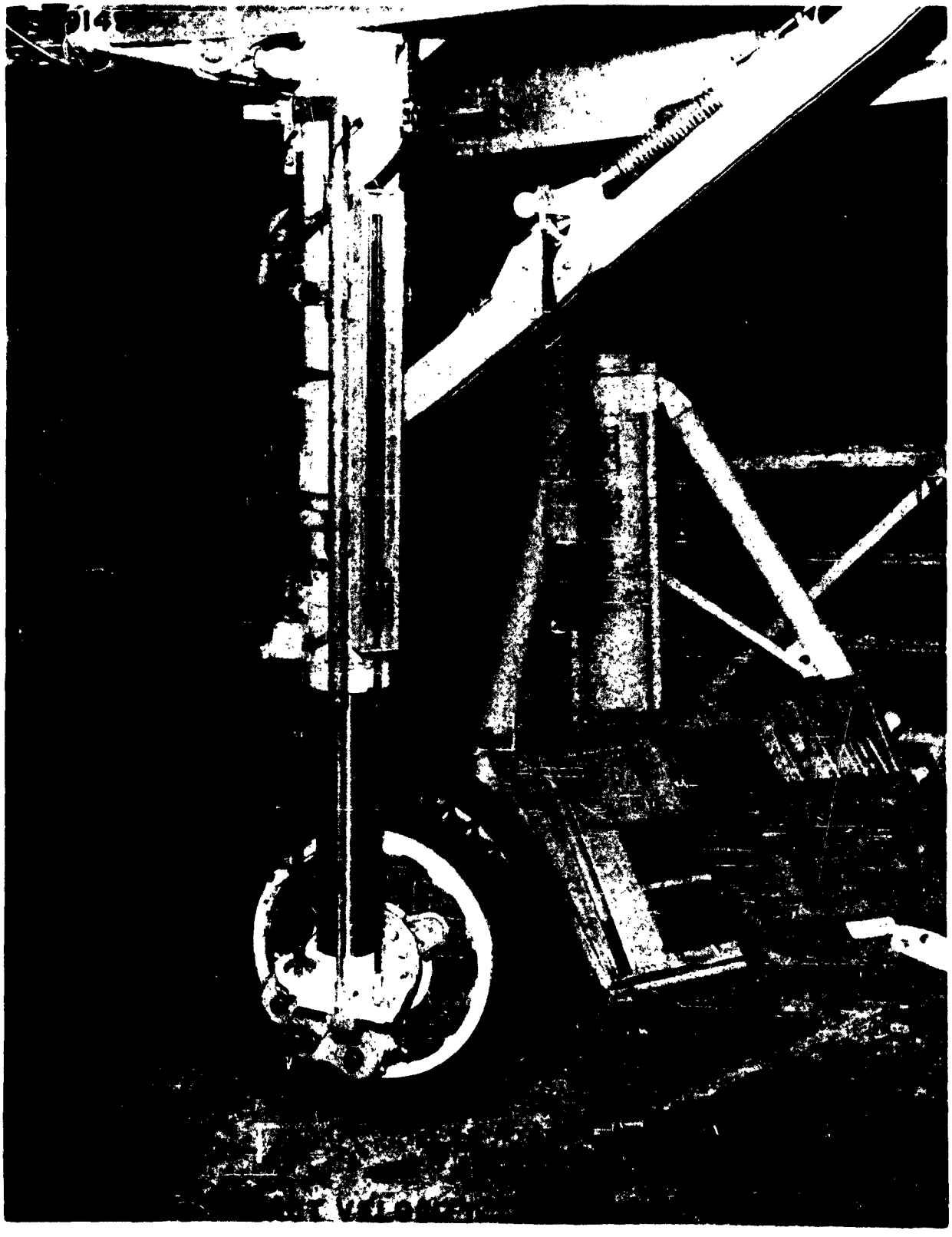
Natural Frequency - 201.2 cps

Damping - H = 0.579

RECORDED:

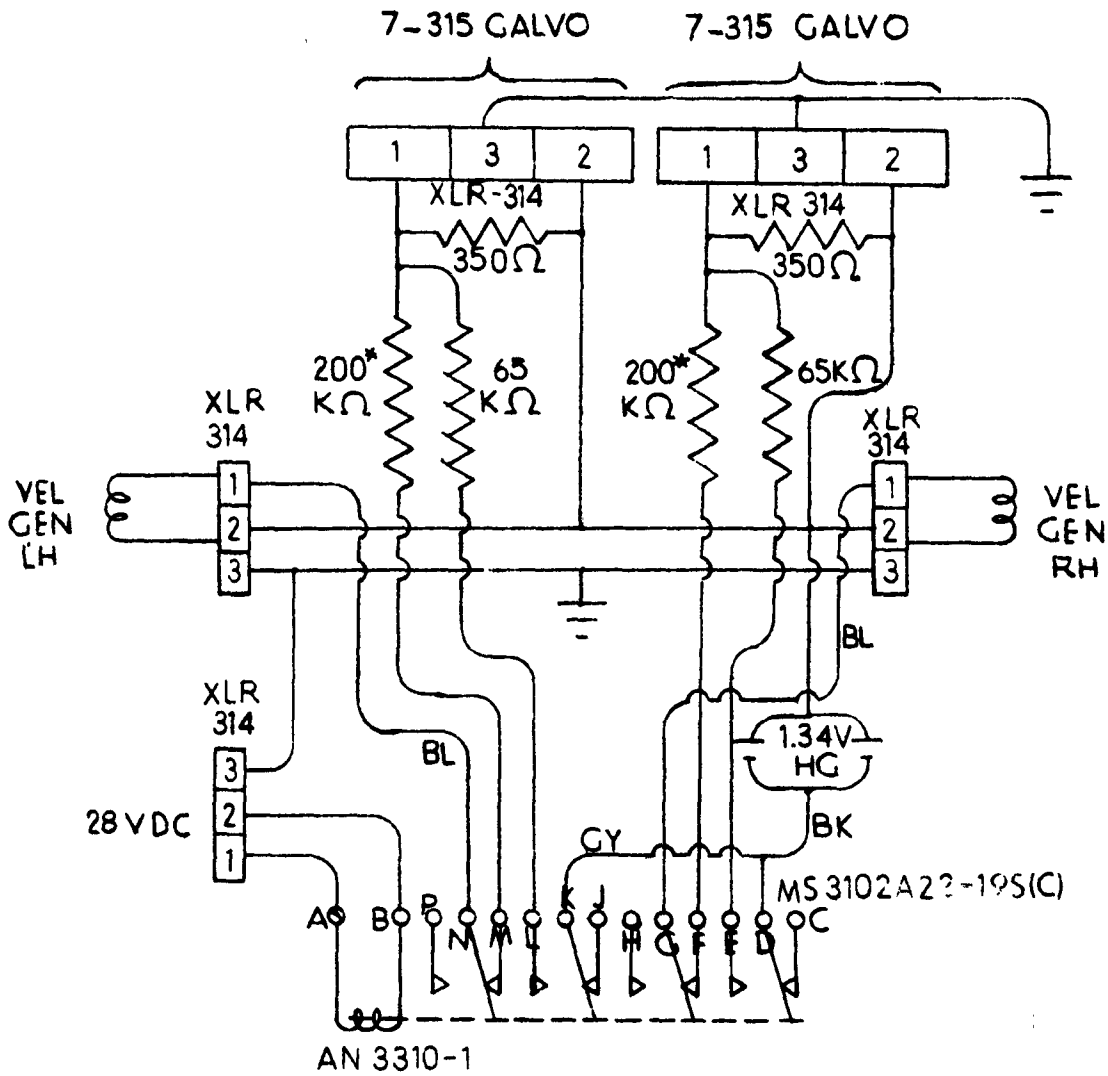
Oscillograph channel 1-7 for drop test


CALIBRATION OF GALVANOMETER
SERIAL NO. 5097
G = 201.2 cps
H = 0.579
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1.2
1.0
.8
.6
.4
.2
0
10
9
8
7
6
5
4
3
2
1
50
100
200
500
1000



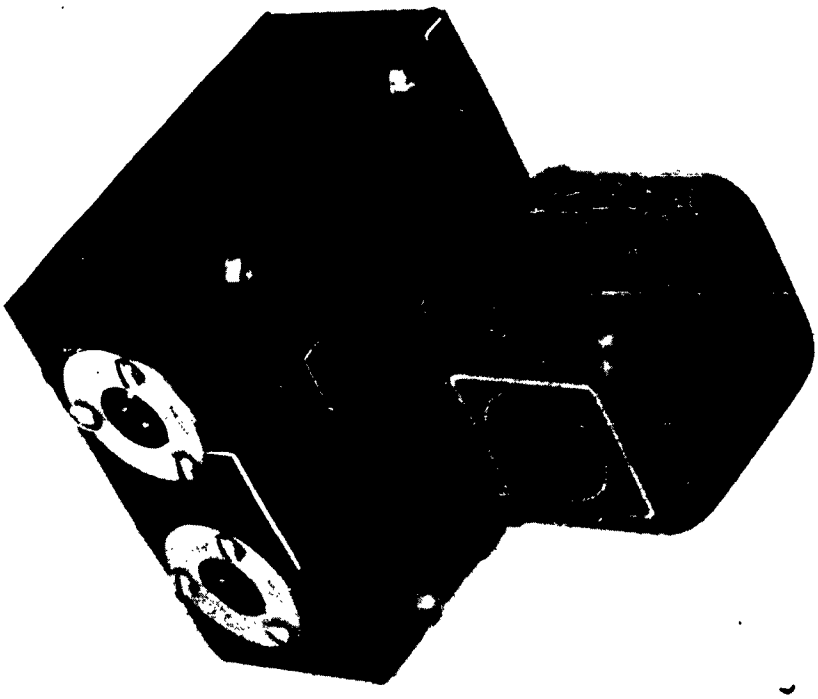
781

VELOCITY GENERATOR CALIBRATION BOX



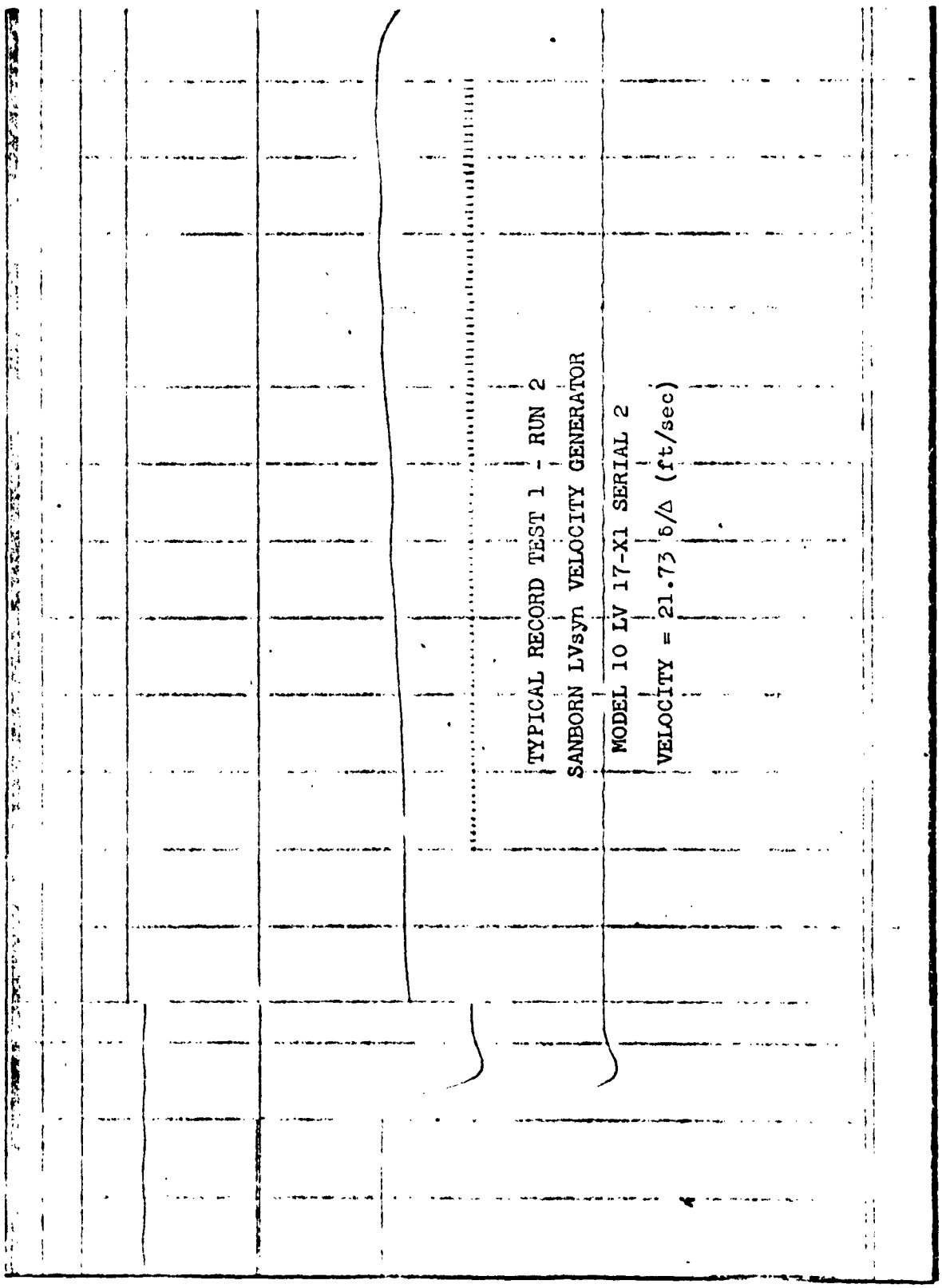
NOTE * SUBSTITUTE 1.2 MEGS WHEN ALNICO MAGNET IS USED

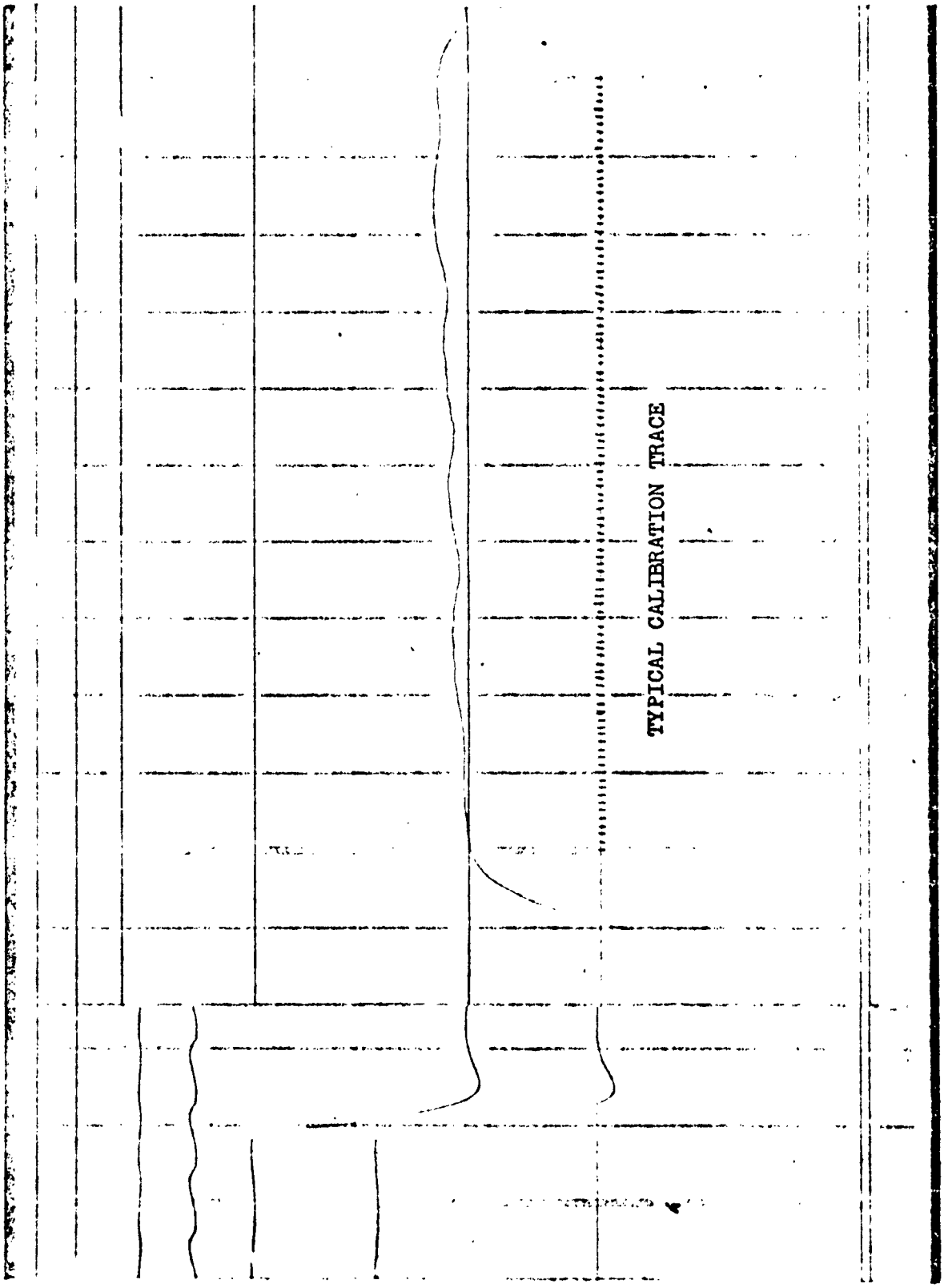
ES194130



5-1

LEFT HAND STRUT VELOCITY GENERATOR CALIBRATION BOX


TYPICAL RECORD TEST 1 - RUN 2
SANBORN LVsyn VELOCITY GENERATOR
MODEL 10 LV 17-X1 SERIAL 2
VELOCITY = 21.73 δ/Δ (ft/sec)


TYPICAL CALIBRATION TRACE

PREPARED BY H.D.MERIWETHER
DATE 15 FEB 61
TITLE LANDING LOADS INVESTIGATION

MODEL 44C-2
REPORT NO. 40636

VELOCITY GENERATOR CALIBRATION

TEST	RUN	CHANNEL	LOAD	READING	X	Y
1	2	1		393		
1	2	1	120229	432	.43505	120229
1	2	1	120551	441	.44411	120551
1	2	1	120872	447	.45015	120872
1	2	1	121194	449	.45217	121194.
1	2	1	121515	453	.45619	121515
1	2	1	121837	447	.45015	121837
1	2	1	122158	443	.45116	122158
1	2	1	122480	446	.44914	122480
1	2	1	122601	445	.44814	122601
1	2	1	123123	445	.44814	123123
1	2	1	123444	441	.44411	123444

INTERCEPT	SLOPE 1	SLOPE 2	SLOPE 3	SLOPE 4
AVE.DELTA Y	MAX.+	MAX.-	OMITTED X	
20958.556	220195.988			
1532.562	4700.477	-4265.609	.00000	
21482.177	218727.775			
1497.844	4286.736	-4214.175	.44411	
21781.976	217852.480			
1468.912	3905.768	-4167.619	.42698	
21797.531	217923.434			
1436.281	3909.688	-3537.466	.39577	
22121.080	216996.266			
1411.837	3757.953	-3499.540	.43102	

PREPARED BY H.C.MERIWETHER
DATE 15 FEB 61
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. [illegible]

VELOCITY GENERATOR CALIBRATION

TEST	RUN	CHANNEL	LOAD	READING	X	Y
1	2	1		373		
1	2	1	106085	379	.38167	106085
1	2	1	106406	378	.38066	106406
1	2	1	106728	379	.38167	106728
1	2	1	107049	380	.38570	107049
1	2	1	107370	385	.38771	107370
1	2	1	107692	389	.39174	107692
1	2	1	108013	391	.39376	108013
1	2	1	108335	392	.39476	108335
1	2	1	108656	393	.39577	108656
1	2	1	108978	395	.39779	108978
1	2	1	109299	396	.39879	109299
1	2	1	109621	403	.40584	109621
1	2	1	109942	406	.40886	109942
1	2	1	110264	411	.41390	110264
1	2	1	110585	417	.41994	110585
1	2	1	110907	418	.42095	110907
1	2	1	111228	420	.42296	111228
1	2	1	111550	425	.42800	111550
1	2	1	111871	421	.42397	111871
1	2	1	112193	422	.42598	112193
1	2	1	112514	423	.42598	112514
1	2	1	112835	421	.42397	112835
1	2	1	113157	422	.42497	113157
1	2	1	113478	421	.42397	113478
1	2	1	113800	419	.42195	113800
1	2	1	114121	420	.42296	114121
1	2	1	114443	425	.42800	114443
1	2	1	114764	432	.43505	114764
1	2	1	115086	433	.43605	115086
1	2	1	115407	435	.43807	115407
1	2	1	115729	439	.44209	115729
1	2	1	116050	437	.44008	116050
1	2	1	116372	443	.44612	116372
1	2	1	116693	439	.44209	116693
1	2	1	117015	436	.43907	117015
1	2	1	117336	433	.43605	117336
1	2	1	117658	430	.43303	117658
1	2	1	117979	428	.43102	117979
1	2	1	118300	426	.42900	118300
1	2	1	118622	425	.42800	118622
1	2	1	118943	428	.42598	118943
1	2	1	119265	429	.43202	119265
1	2	1	119586	428	.43102	119586
1	2	1	119908	433	.43605	119908

PREPARED BY H.D.MERIWETHER
DATE 15 FEB 61
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. 40636

VELOCITY GENERATOR CALIBRATION

TEST	RUN	CHANNEL	LOAD	READING	X	Y
1	2	1		993		
1	2	1	91940	323	.32528	91940
1	2	1	92261	323	.32528	92261
1	2	1	92583	323	.32528	92583
1	2	1	92904	327	.32931	92904
1	2	1	93226	323	.32528	93226
1	2	1	93547	323	.32528	93547
1	2	1	93869	323	.32528	93869
1	2	1	94190	322	.32427	94190
1	2	1	94512	328	.33031	94512
1	2	1	94833	328	.33031	94833
1	2	1	95155	332	.33434	95155
1	2	1	95476	331	.33333	95476
1	2	1	95798	333	.33535	95798
1	2	1	96119	332	.33535	96119
1	2	1	96441	331	.33333	96441
1	2	1	96762	336	.33837	96762
1	2	1	97083	338	.34038	97083
1	2	1	97405	342	.34441	97405
1	2	1	97726	346	.34844	97726
1	2	1	98048	347	.34945	98048
1	2	1	98369	348	.35045	98369
1	2	1	98691	352	.35448	98691
1	2	1	99012	352	.35448	99012
1	2	1	99334	360	.36254	99334
1	2	1	99655	359	.36153	99655
1	2	1	99977	359	.36153	99977
1	2	1	100298	361	.36354	100298
1	2	1	100620	358	.36052	100620
1	2	1	100941	367	.36959	100941
1	2	1	101263	363	.36556	101263
1	2	1	101584	366	.36853	101584
1	2	1	101905	368	.37059	101905
1	2	1	102227	375	.37764	102227
1	2	1	102548	378	.38066	102548
1	2	1	102870	381	.38369	102870
1	2	1	103191	387	.38973	103191
1	2	1	103513	388	.39074	103513
1	2	1	103834	393	.39577	103834
1	2	1	104156	391	.39376	104156
1	2	1	104477	385	.38771	104477
1	2	1	104799	383	.38570	104799
1	2	1	105120	382	.38469	105120
1	2	1	105442	379	.38167	105442
1	2	1	105763	380	.38268	105763

PREPARED BY H.D.MERIWETHER
DATE 15 FEB 61
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. 40636

VELOCITY GENERATOR CALIBRATION

TEST	RUN	CHANNEL	LOAD	READING	X	Y
1	6	1		998		
1	6	1	189024	751	.75251	189024
1	6	1	189345	752	.75351	189345
1	6	1	189667	752	.75351	189667

INTERCEPT	SLOPE 1	SLOPE 2	SLOPE 3	SLOPE 4
AVE.DELTA Y	MAX.+	MAX.-	OMITTED X	
23563.126	216545.326			
2635.381	6100.996	-5737.438	.00000	
24626.848	214928.674			
2585.222	5898.796	-5652.657	.73146	
23676.076	213334.082			
2535.528	5768.887	-5569.055	.73146	
24663.662	214686.298			
2504.908	5548.324	-5517.781	.67234	
23774.804	213265.445			
2474.980	5214.614	-5466.117	.67535	

PREPARED BY H.D.MERIWETHER
DATE 15 FEB 61
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. 40636

VELOCITY GENERATOR CALIBRATION

TEST	RUN	CHANNEL	LOAD	READING	X	Y
1	6	1		998		
1	6	1	174879	671	.67234	174879
1	6	1	175201	674	.67535	175201
1	6	1	175522	679	.68036	175522
1	6	1	175844	682	.68337	175844
1	6	1	176165	688	.68938	176165
1	6	1	176487	695	.69639	176487
1	6	1	176808	701	.70240	176808
1	6	1	177129	706	.70741	177129
1	6	1	177451	710	.71142	177451
1	6	1	177772	713	.71443	177772
1	6	1	178094	719	.71944	178094
1	6	1	178415	722	.72345	178415
1	6	1	178737	729	.73046	178737
1	6	1	179058	737	.73848	179058
1	6	1	179380	729	.73046	179380
1	6	1	179701	729	.72946	179701
1	6	1	180023	721	.72244	180023
1	6	1	180344	716	.71743	180344
1	6	1	180666	711	.71242	180666
1	6	1	180987	707	.70842	180987
1	6	1	181309	710	.71142	181309
1	6	1	181630	710	.71142	181630
1	6	1	181952	719	.71944	181952
1	6	1	182273	726	.72745	182273
1	6	1	182594	734	.73547	182594
1	6	1	182916	738	.73948	182916
1	6	1	183237	747	.74850	183237
1	6	1	183559	751	.75251	183559
1	6	1	183880	758	.75952	183880
1	6	1	184202	753	.75451	184202
1	6	1	184523	747	.74850	184523
1	6	1	184845	746	.74749	184845
1	6	1	185166	751	.75251	185166
1	6	1	185488	748	.74950	185488
1	6	1	185809	756	.75952	185809
1	6	1	186131	753	.75451	186131
1	6	1	186452	747	.74850	186452
1	6	1	186774	741	.74248	186774
1	6	1	187095	741	.74248	187095
1	6	1	187417	736	.73747	187417
1	6	1	187738	730	.73146	187738
1	6	1	188059	730	.73146	188059
1	6	1	188381	737	.73848	188381
1	6	1	188702	741	.74248	188702

PREPARED BY H.D.MERIWETHER
DATE 15 FEB 61
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. 40636

VELOCITY GENERATOR CALIBRATION

TEST	RUN	CHANNEL	LOAD	READING	X	Y
1	6	1		990		
1	6	1	160735	628	.62926	160735
1	6	1	161056	631	.63226	161056
1	6	1	161377	625	.62625	161377
1	6	1	161699	625	.62625	161699
1	6	1	162020	629	.63026	162020
1	6	1	162342	632	.63327	162342
1	6	1	162663	642	.64329	162663
1	6	1	162985	651	.65230	162985
1	6	1	163306	657	.65832	163306
1	6	1	163628	662	.66433	163628
1	6	1	163949	662	.66333	163949
1	6	1	164271	666	.66733	164271
1	6	1	164592	667	.66834	164592
1	6	1	164914	668	.66934	164914
1	6	1	165235	667	.66834	165235
1	6	1	165557	670	.67134	165557
1	6	1	165878	672	.67335	165878
1	6	1	166199	678	.67936	166199
1	6	1	166521	681	.68236	166521
1	6	1	166842	681	.68236	166842
1	6	1	167164	678	.67936	167164
1	6	1	167485	680	.68136	167485
1	6	1	167807	678	.67936	167807
1	6	1	168128	670	.67134	168128
1	6	1	168450	665	.66633	168450
1	6	1	168771	662	.66333	168771
1	6	1	169093	662	.66333	169093
1	6	1	169414	665	.66633	169414
1	6	1	169736	666	.66733	169736
1	6	1	170057	672	.67335	170057
1	6	1	170379	679	.68036	170379
1	6	1	170700	691	.69238	170700
1	6	1	171022	700	.70140	171022
1	6	1	171343	707	.70842	171343
1	6	1	171664	709	.71042	171664
1	6	1	171986	703	.70441	171986
1	6	1	172307	698	.69940	172307
1	6	1	172629	693	.69439	172629
1	6	1	172950	689	.69038	172950
1	6	1	173272	688	.68938	173272
1	6	1	173593	679	.68036	173593
1	6	1	173915	678	.67936	173915
1	6	1	174236	673	.67435	174236
1	6	1	174558	673	.67435	174558

PREPARED BY H.D.MERIWETHER
DATE 15 FEB 61
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. 40636

VELOCITY GENERATOR CALIBRATION

INTERCEPT AVE.DELTA Y	SLOPE 1 MAX.+	SLOPE 2 MAX.-	SLOPE 3 OMITTED X	SLOPE 4
32349.176 2532.270	219659.604 5831.469	-5281.136	.00000	
33637.612 2476.512	217742.258 5429.467	-5203.607	.73647	
32012.289 2435.324	219933.389 5203.973	-5139.300	.67836	
33281.513 2324.200	219051.902 5093.223	-5068.110	.73348	
34747.674 2331.770	218392.598 4919.181	-4995.925	.74248	

PREPARED BY H.D.MERIWETHER
DATE 15 FEB 61
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. 40636

VELOCITY GENERATOR CALIBRATION

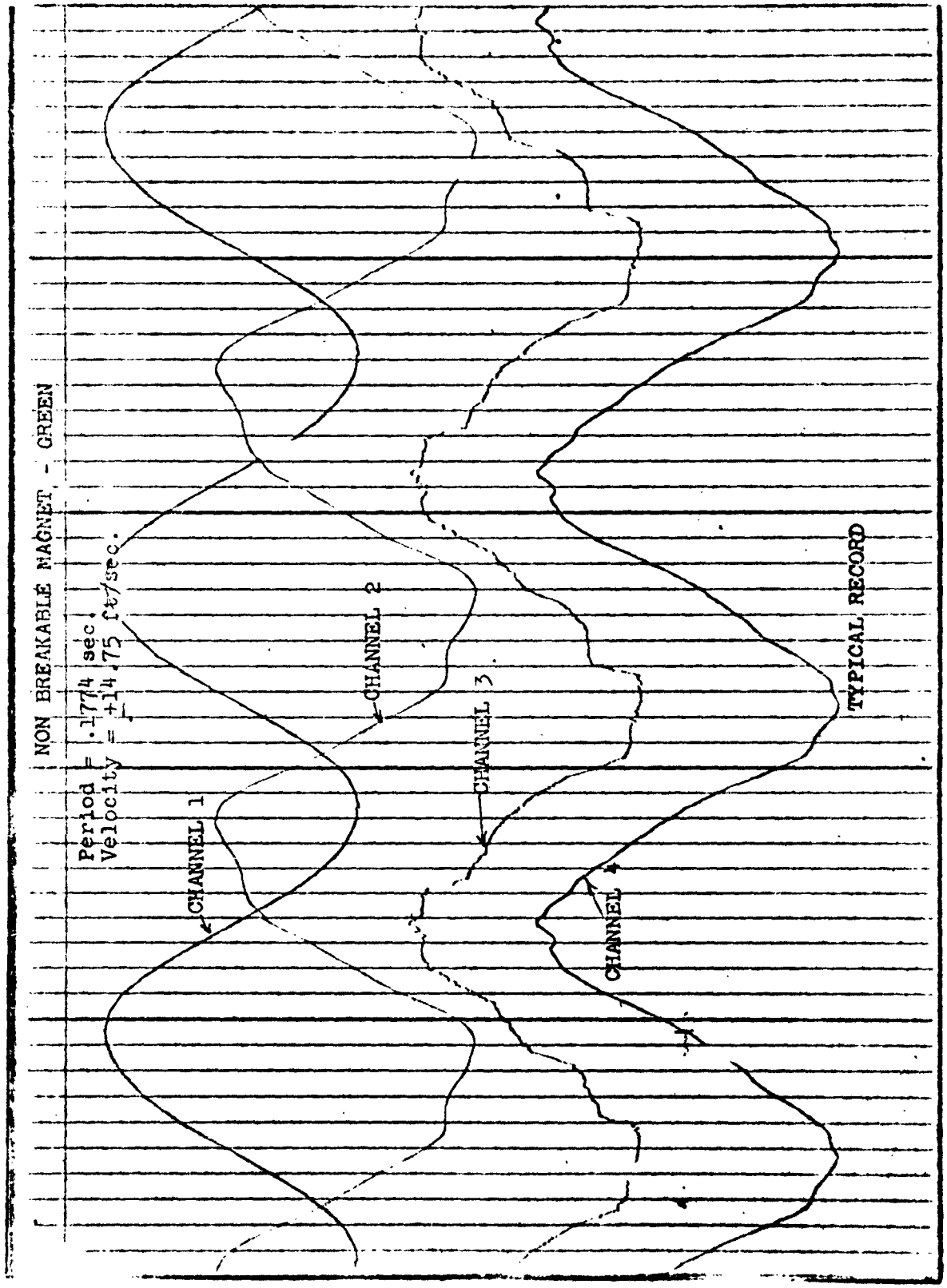
TEST	RUN	CHANNEL	LOAD	READING	X	Y
1	7	1		998		
1	7	1	189667	712	.71343	189667
1	7	1	189988	719	.72044	189988
1	7	1	190310	726	.72745	190310
1	7	1	190631	733	.73447	190631
1	7	1	190953	738	.73948	190953
1	7	1	191274	739	.74048	191274
1	7	1	191596	733	.73447	191596
1	7	1	191917	733	.73447	191917
1	7	1	192239	723	.72445	192239
1	7	1	192560	718	.71944	192560
1	7	1	192882	716	.71743	192882
1	7	1	193203	713	.71443	193203
1	7	1	193524	718	.71944	193524
1	7	1	193846	720	.72144	193846
1	7	1	194167	727	.72846	194167
1	7	1	194489	733	.73447	194489
1	7	1	194810	743	.74449	194810
1	7	1	195132	750	.75150	195132
1	7	1	195453	753	.75451	195453
1	7	1	195775	759	.76052	195775
1	7	1	196096	756	.75752	196096
1	7	1	196418	753	.75451	196418
1	7	1	196739	750	.75150	196739
1	7	1	197061	753	.75451	197061
1	7	1	197382	757	.75852	197382
1	7	1	197704	753	.75952	197704
1	7	1	198025	761	.76253	198025
1	7	1	198346	756	.75752	198346
1	7	1	198668	759	.75952	198669
1	7	1	198989	745	.74649	198989
1	7	1	199311	737	.74048	199311
1	7	1	199632	737	.73843	199632
1	7	1	199954	735	.73647	199954
1	7	1	200275	741	.74243	200275
1	7	1	200597	746	.74749	200597
1	7	1	200918	753	.75451	200918
1	7	1	201240	756	.75752	201240

PREPARED BY H.D.MERIWETHER
DATE 15 FEB 61
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. 40636

VELOCITY GENERATOR CALIBRATION

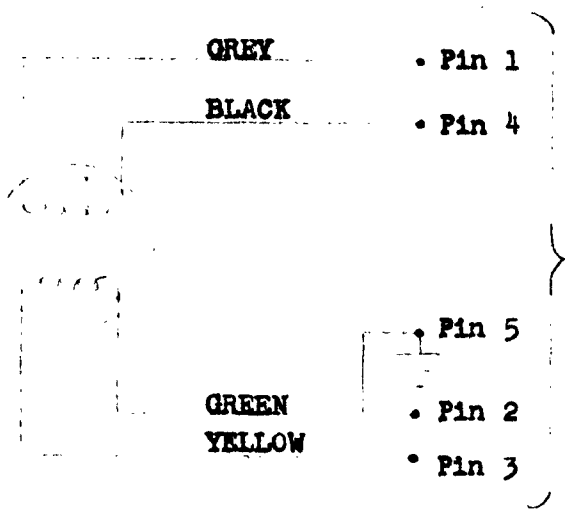
TEST	RUN	CHANNEL	LOAD	READING	X	Y
1	7	1		998		
1	7	1	175522	661	.66232	175522
1	7	1	175844	665	.66633	175844
1	7	1	176165	668	.66934	176165
1	7	1	176487	671	.67234	176487
1	7	1	176808	666	.66733	176808
1	7	1	177129	673	.67435	177129
1	7	1	177451	669	.67034	177451
1	7	1	177772	672	.67335	177772
1	7	1	178094	675	.67635	178094
1	7	1	178415	678	.67936	178415
1	7	1	178737	674	.67535	178737
1	7	1	179058	679	.68036	179058
1	7	1	179380	681	.68236	179380
1	7	1	179701	679	.68036	179701
1	7	1	180023	677	.67836	180023
1	7	1	180344	673	.67435	180344
1	7	1	180666	668	.66934	180666
1	7	1	180987	665	.66633	180987
1	7	1	181309	667	.66834	181309
1	7	1	181630	670	.67134	181630
1	7	1	181952	669	.67034	181952
1	7	1	182273	677	.67836	182273
1	7	1	182594	689	.69038	182594
1	7	1	182916	696	.69639	182916
1	7	1	183237	703	.70441	183237
1	7	1	183559	711	.71242	183559
1	7	1	183880	710	.71142	183880
1	7	1	184202	703	.70441	184202
1	7	1	184523	701	.70240	184523
1	7	1	184845	701	.70240	184845
1	7	1	185166	697	.69840	185166
1	7	1	185488	689	.69038	185488
1	7	1	185809	683	.68437	185809
1	7	1	186131	681	.68236	186131
1	7	1	186452	681	.68236	186452
1	7	1	186774	677	.67836	186774
1	7	1	187095	683	.68437	187095
1	7	1	187417	683	.68437	187417
1	7	1	187738	686	.68737	187738
1	7	1	188059	691	.69238	188059
1	7	1	188381	698	.69940	188381
1	7	1	188702	703	.70441	188702
1	7	1	189024	708	.70942	189024
1	7	1	189345	712	.71343	189345


NON BREAKABLE MAGNET - GREEN
Period = .174 sec.
Velocity = +14.75 ft/sec.
CHANNEL 1
CHANNEL 2
CHANNEL 3
CHANNEL 4
TYPICAL RECORD

KOLLSMAN VELOCITY GENERATOR

Type - 1299-04610-0

Serial No. 2182



1. 1000 cps galvanometer C.E.C. Type 7-323 used.
2. Reference phase slot was adjusted for maximum output.
3. 4 arm bridge operation used.
4. No calibration taken - readings compared to one inch on oscillograph trace.

NOT USED FOR DOUGLAS AIRCRAFT COMPANY PROGRAM.

Metering Chamber Pressure

Pressure transducers were installed in the main landing struts to measure oil pressure at the base of the metering pin support. Photographs of the installations appear on Pages 2.509 and 2.510.

The right gear metering chamber pressure transducer was inoperative during the flight test phase due to an open circuit. Repair was not attempted due to the difficulty in removing the transducer.

DESCRIPTION:

Right hand main gear metering chamber pressure. This transducer measures oil pressure at the base of the metering pin support.

CONSTANT:

P.S.I. = 4413 δ/Δ + 39.7 / 250K Ω Resistor Calibration

CHARACTERISTICS:

TRANSDUCER

Type - DAC Design E.S. 12951

Serial No. - 7B

GALVANOMETER

Type - 7-342

Serial No. - 4438

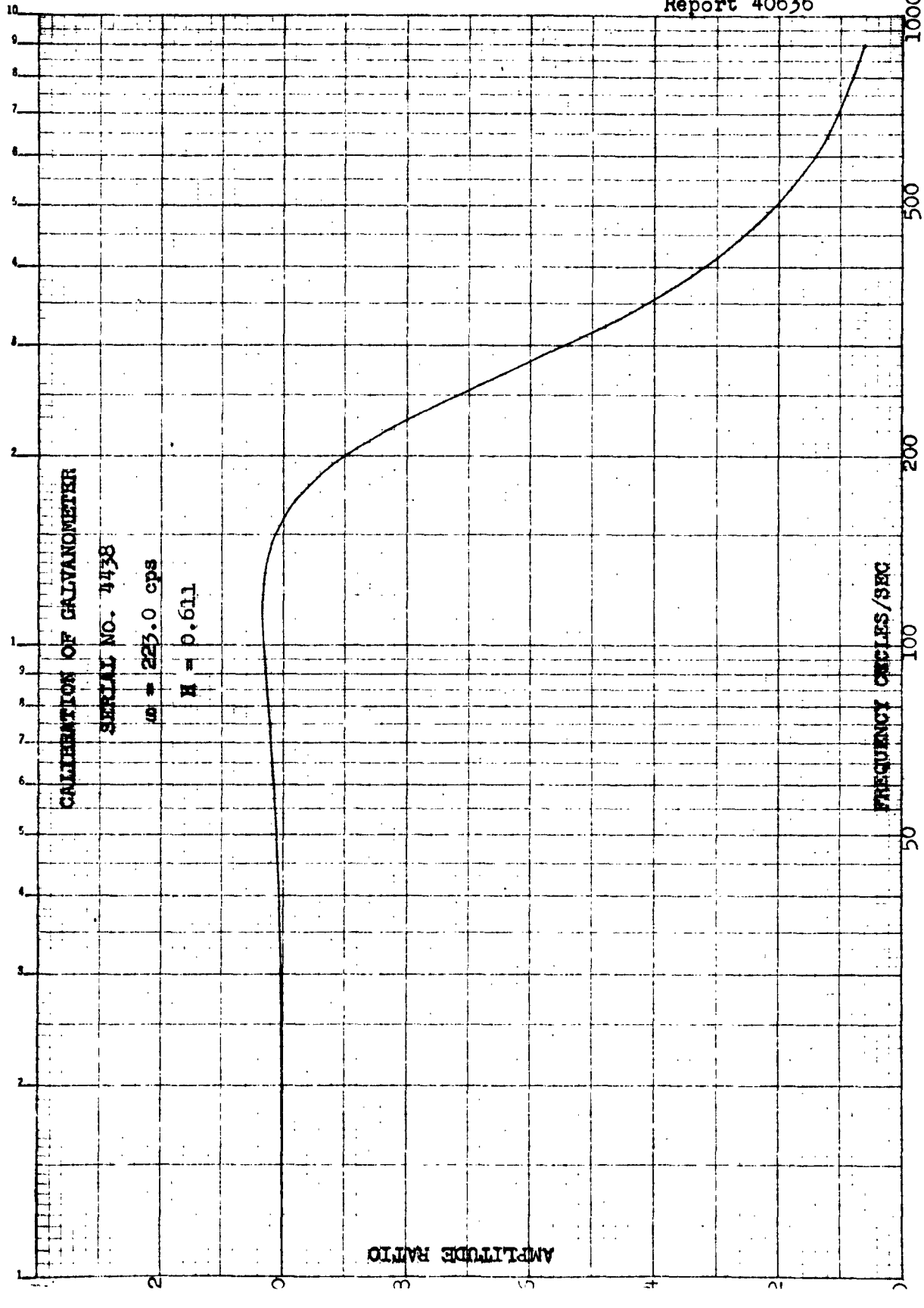
Resistance - 350.4 Ohms

Natural Frequency - 223.0 cps

Damping - 0.619

RECORDED:

Oscillograph channel 2-9 for Drop Test
Inoperative for Flight Test


CALIBRATION OF GALVANOMETER
SERIAL NO. 4438
f = 223.0 cps
H = 0.611
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1000
500
200
100
50
SEMI-LOGARITHMIC
359T-61

DESCRIPTION:

Left Hand Main Gear Metering Chamber Pressure. This transducer measures the hydraulic pressure in the oleo strut metering chamber.

CONSTANT:

Drops 1 through 14 - PSI = 4406 δ/Δ + 39.7 for 250 K Ohm Calibrating Resistor

Drops 15 and Subs. - PSI = 4358 δ/Δ + 39.7 for 250 K Ohm Calibrating Resistor

CHARACTERISTICS:

TRANSDUCER

Type - DAC Design ES 12951

Serial No. - 8A

Natural Frequency - Approx. 500 cps

GALVANOMETER

Type - CEC 7-342

Serial No. - 4915

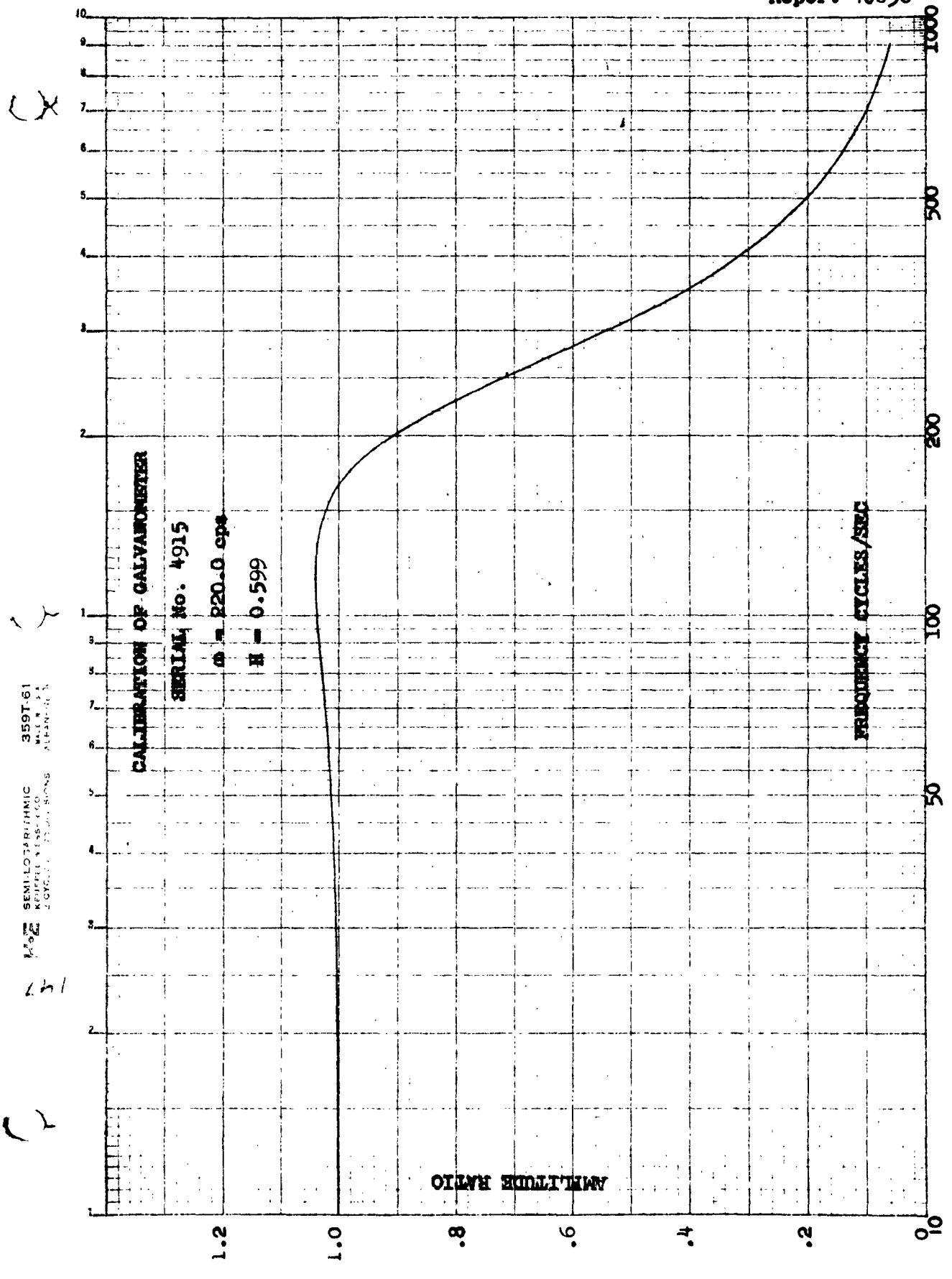
Resistance - Galvo sees 351.2

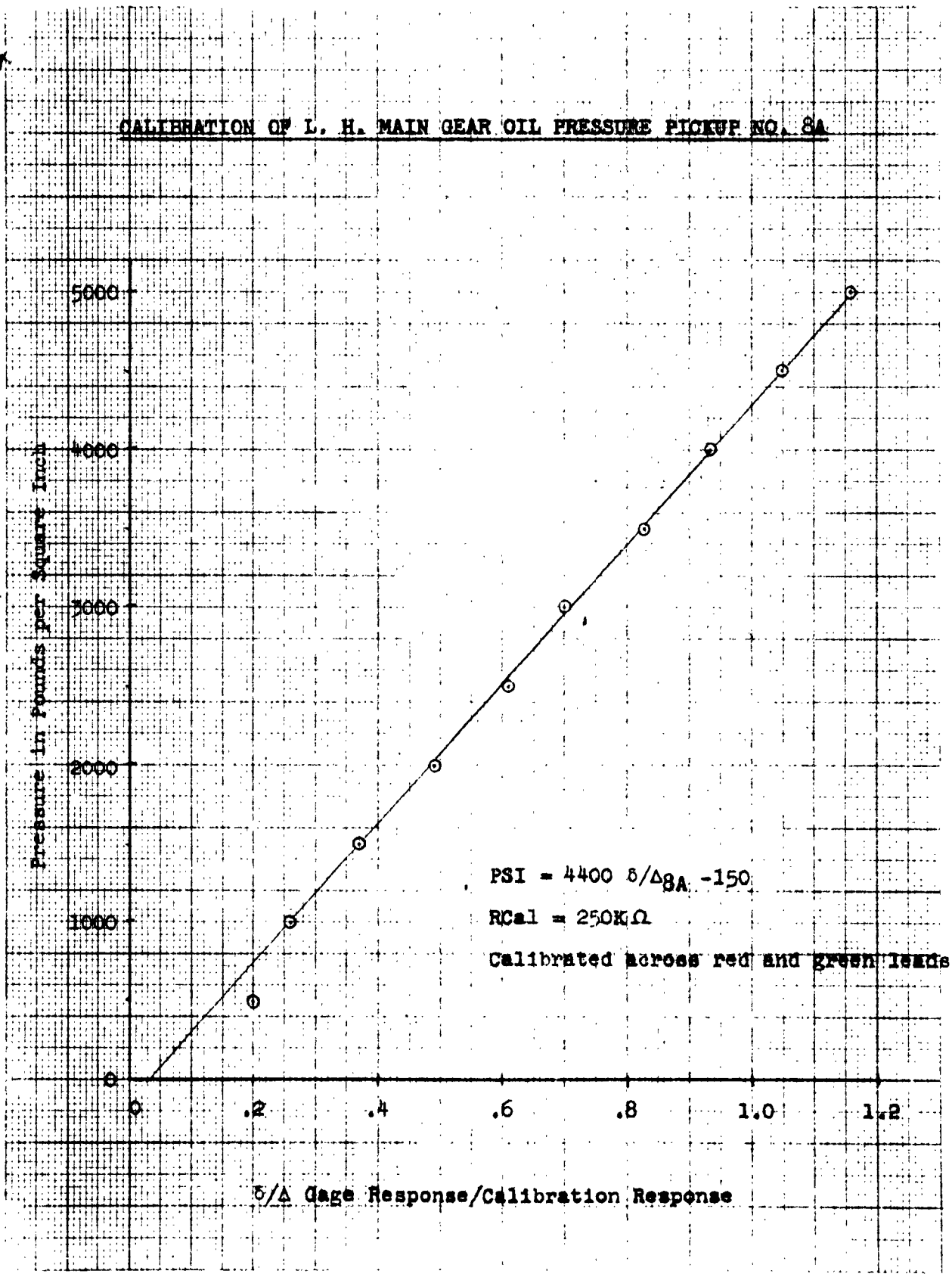
Natural Frequency - 220.0

Damping - H = 0.599

RECORDED:

Oscillograph Channel 1-9 for Drop Test
1-16 for Flight Test


CALIBRATION OF GALVANOMETER
SERIAL No. 4915
n = 220.0 cps
H = 0.599
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1.2
1.0
.8
.6
.4
.2
0
10
50
100
200
500
1000
359T-61
SEMI-LOGARITHMIC


CALIBRATION OF L. H. MAIN GEAR OIL PRESSURE PICKUP NO. 8A
Pressure in pounds per square inch
5000
4000
3000
2000
1000
0
.2
.4
.6
.8
1.0
1.2
δ/Δ Gage Response/Calibration Response
PSI = 4400 δ/Δ8A -150
RCal = 250KΩ
Calibrated across red and green leads

FORM 28-9-1
(1-51)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE 7-16-59
PREPARED BY H. D. Meriwether
TITLE Landing Loads Investigation

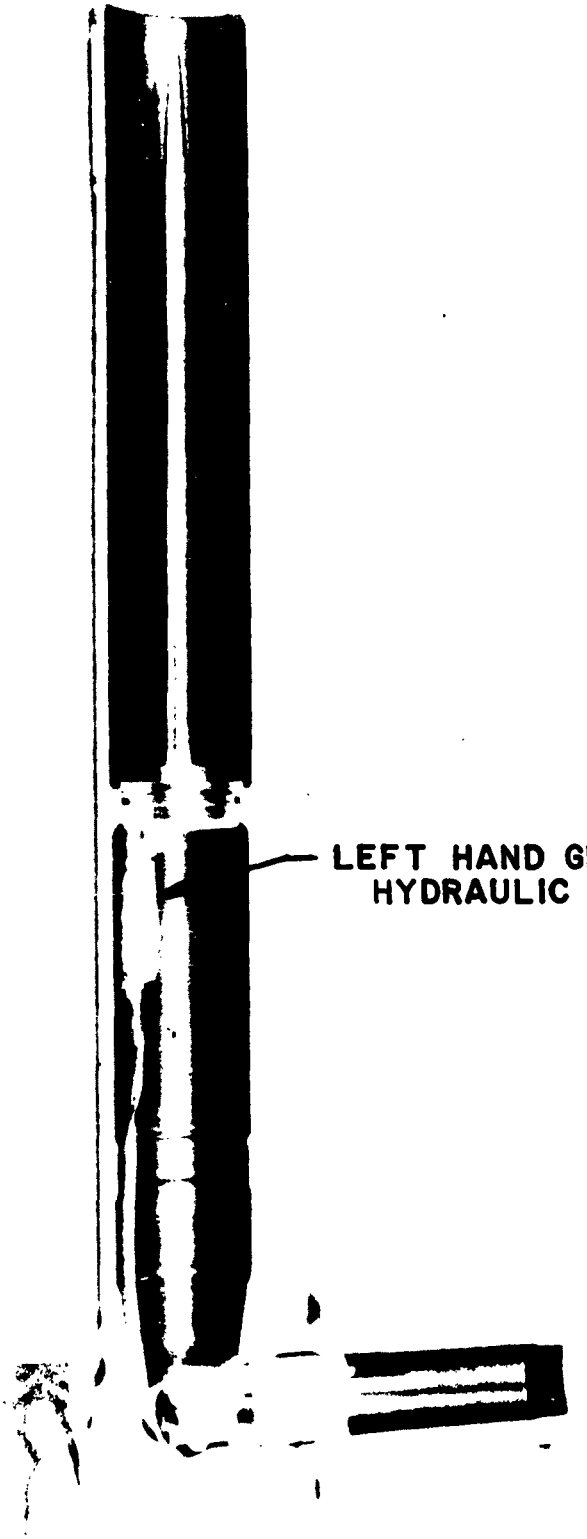
CONDITION

CALIBRATION OF L. H. MAIN GEAR OIL PRESSURE PICKUP NO. 8A

CALIBRATE BETWEEN RED AND GREEN LEADS

GAGE LOT NUMBER		CHANNEL RESPONSE IN MILLIVOLTS					
		PSI = 4400 δ/Δ_{8A} -150					
CHANNEL TITLE		LHPPUO					
CHANNEL NUMBER		1					
GAGE TYPE		AB-13					
GAGE RESISTANCE		350					
BRIDGE TYPE		FULL					
GAGE FACTOR							
BRIDGE VOLTAGE		20V					
CALIBRATION RESISTANCE		250K					
CALIBRATION RESPONSE		6.55	6.55	6.55			
	PSI	RUN 1	RUN 2	RUN 3			
ZERO	ZERO	0	0	0			
	500	1.26	1.34	1.34			
	1000	1.74	1.67	1.76			
	1500	2.41	2.46	2.46			
	2000	3.25	3.17	3.20			
	2500	3.95	4.03	4.00			
	3000	4.64	4.64	4.64			
	3500	5.57	5.43	5.45			
	4000	6.10	6.13	6.15			
	4500	6.94	6.92	6.87			
	5000	7.60	7.72	7.73			
RETURN ZERO	RETURN ZERO	+.05	+.04	+.06			

ES 189382



RS1

ES 194127

RING CHAMBER HYDRAULIC PRESS. PICKUP

Rebound Chamber Pressure

A pressure transducer was installed on the left main landing gear to measure pressure between the piston and the barrel. A photograph of the installation is shown on Page 2.514.

This instrumentation was not installed during the Flight Test phase and was used only during the drop test phase of the program.

DESCRIPTION:

Left hand gear shock strut rebound chamber pressure. This transducer measures the pressure between the main gear piston and barrel.

CONSTANT:

PSI = 5640 δ/Δ + 39.7 / 250 K Ohms Resis. Calib.

CHARACTERISTICS:

TRANSDUCER

Type - DAC Drawing 12951

Serial No. - 11 B

Natural Frequency - No measurable resonance effects

GALVANOMETER

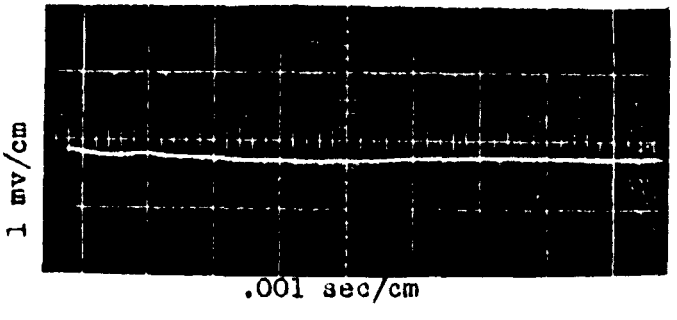
Type - 7-342

Serial No. - 7275

Resistance - 352.4 Ohms

Natural Frequency - 231.3 cps

Damping - 0.588



RECORDED:

Oscillograph channel 1-19 for Drop Test

PREPARED BY H. D. MERIWETHER
DATE 23MAY 61
TITLE LANDING LOADS INVESTIGATION

MODEL AND-2
REPORT NO. 40636

CALIBRATION OF PRESSURE PICKUP

REBOUND CHAMBER

TEST	RUN	CHANNEL	LOAD	READING	X	Y
8	1	19		878		
8	1	19	500	93	.10923	500
8	1	19	1000	1[illegible]	.16856	1000
8	1	19	1500	232	.26424	1500
8	1	19	2000	307	.34966	2000
8	1	19	2500	392	.44647	2500
8	1	19	3000	465	.52961	3000
8	1	19	3500	540	.61503	3500
8	1	19	4000	627	.71640	4000
8	1	19	4500	699	.79813	4500
8	1	19	5000	790	.90182	5000

INTERCEPT	SLOPE 1	SLOPE 2	SLOPE 3	SLOPE 4
AVE.DELTA Y	MAX.+	MAX.-	OMITTED X	
1.878	5557.593			
27.292	47.837	-68.912	.00000	
41.006	5577.772			
15.462	28.480	-34.221	.10923	
36.775	5595.179			
14.402	21.9[illegible]	-34.859	.71640	
44.602	5589.586			
10.536	17.554	-21.602	.44647	
57.999	5572.299			
7.854	14.944	-9.060	.26424	

451

REBOUND CHAMBER PRESSURE PICKUP INSTALLATION

Air Chamber Pressure

Pressure transducers were installed to measure air pressure at the top of the orifice support tube. A photograph of the installation on the left main gear is shown on Page 2.524. The components for the air chamber pressure pickup are shown in the photograph on Page 2.525. The drawings for the pressure pickup and the special fittings are shown on Pages 2.526, 2.527, and 2.528.

DESCRIPTION:

This transducer measures air pressure at the top of the orifice support tube, right gear.

CONSTANT:

PSI = 3850 δ/Δ / 50 K Ohms Res. Calib.

CHARACTERISTICS:

TRANSDUCER

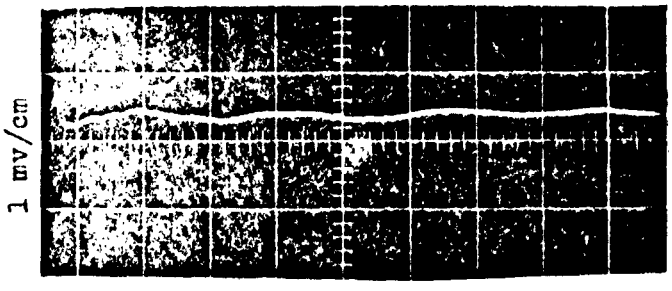
Type - DAC Design ES 12951

Serial No. - 12A

Natural Frequency - Approx. 500 cps

GALVANOMETER

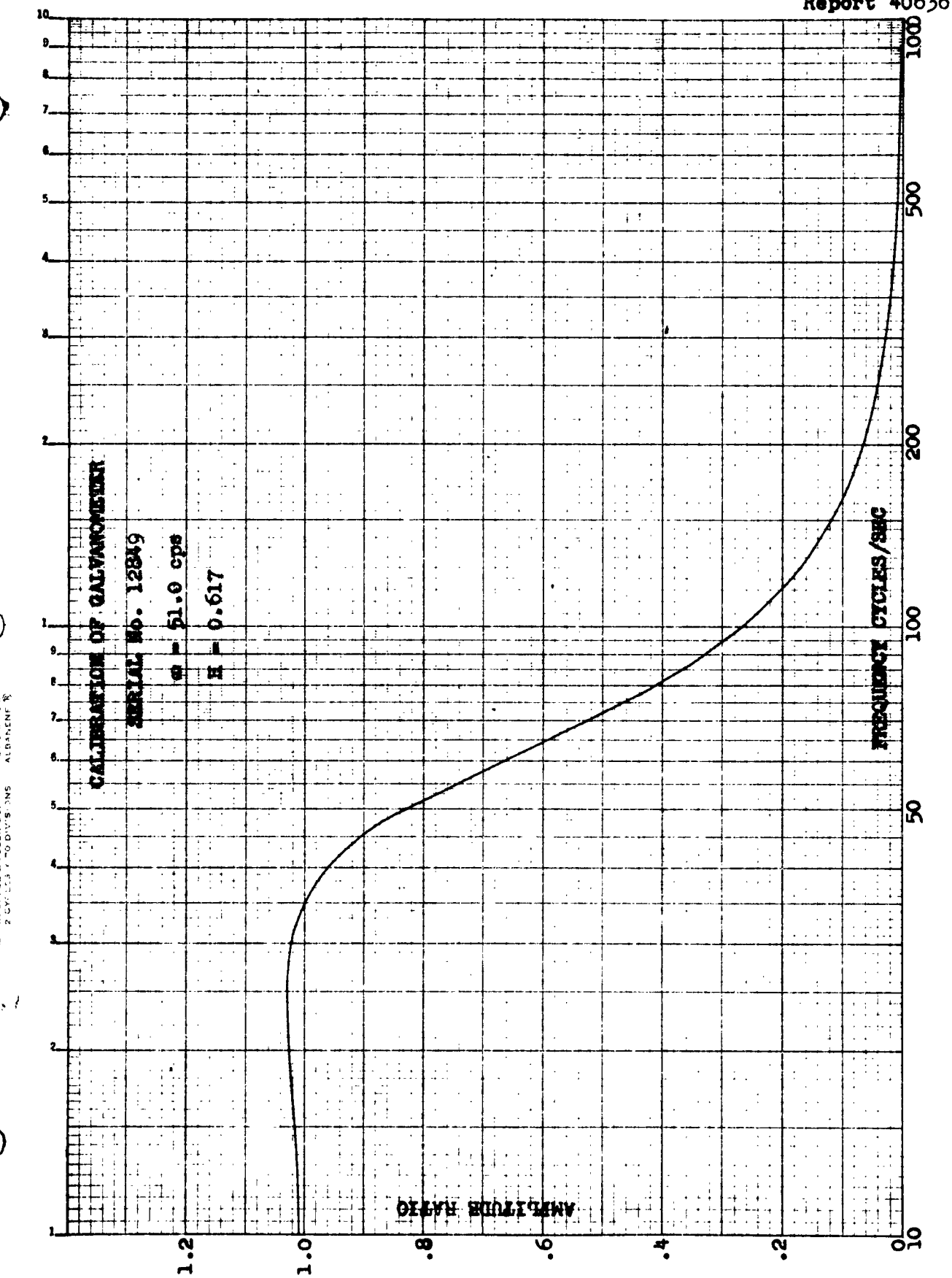
	DROP TESTS	FLIGHT TESTS
Type -	7-339	7-342
Serial No. -	12849	4678
Resistance -	352.2 Ohms	
Natural Frequency -	51.0 cps	
Damping -	0.617	

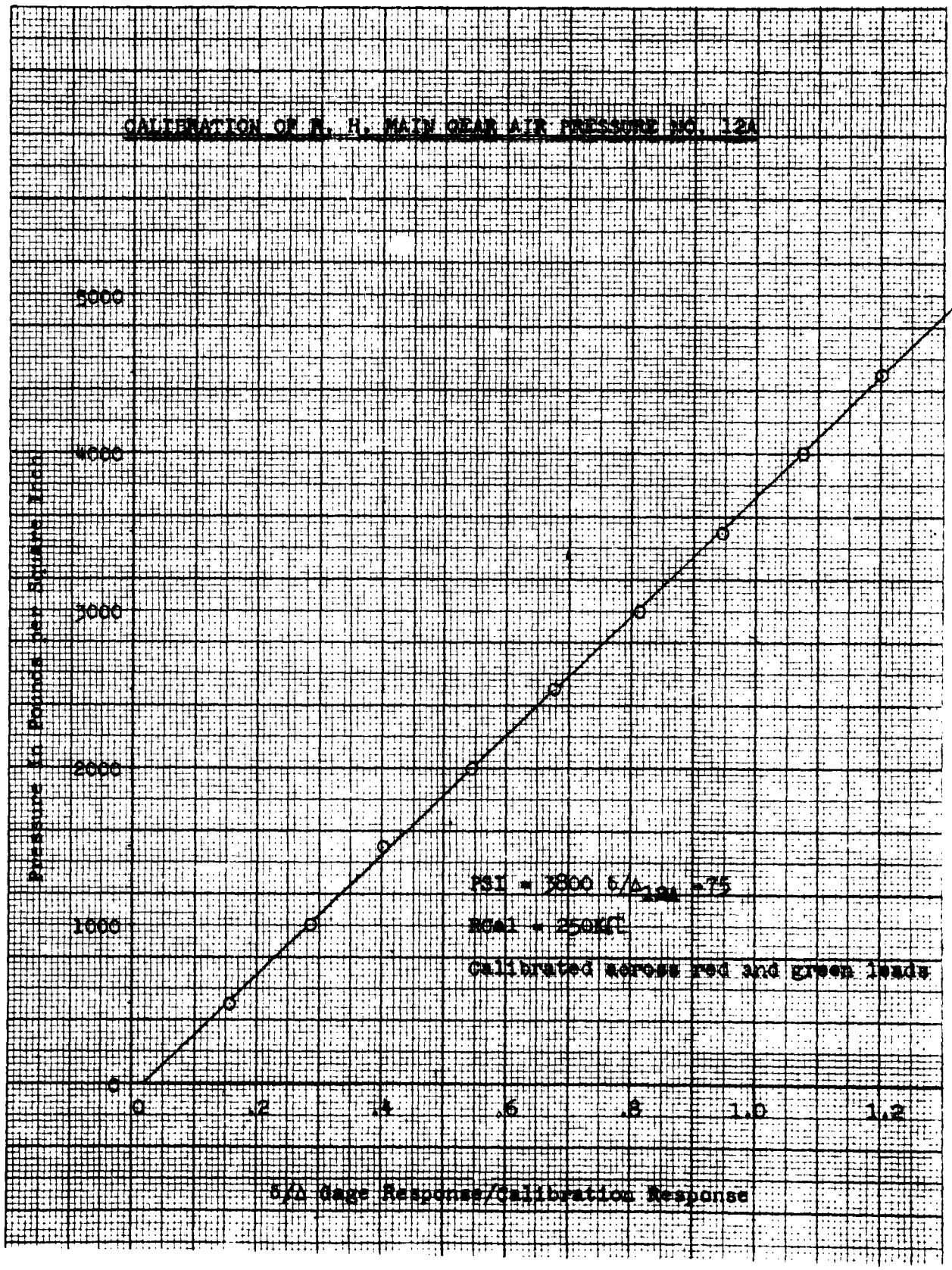


.001 sec/cm

RECORDED:

Oscillograph Channel 2-4 for Drop Test
2-34 for Flight Test


CALIBRATION OF GALVANOMETER
SERIAL No. 12849
ω = 51.0 cps
H = 0.617
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1.2
1.0
.8
.6
.4
.2
0
10
50
100
200
500
1000
SEMI-LOGARITHMIC
KEUFFEL & ESSER CO.
359T-61


CALIBRATION OF R. H. MAIN GEAR AIR PRESSURE NO. 12A
5000
4000
3000
2000
1000
Pressure in Pounds per Square Inch
0
.2
.4
.6
.8
1.0
1.2
δ/Δ Gage Response/Calibration Response
PSI = 3800 δ/Δ - .75
Real = 250KC
Calibrated across red and green leads

DOUGLAS AIRCRAFT COMPANY, INC.

DATE 17 Nov. 1959
PREPARED BY H. D. Meriwether
TITLE Landing Loads Investigation

CONDITION

CALIBRATION OF R. H. MAIN GEAR AIR PRESSURE PICKUP NO. 12A

CALIBRATE BETWEEN RED AND GREEN LEADS

GAGE LOT NUMBER		CHANNEL RESPONSE IN MILLIVOLTS					
		PSI = 3800 δ/Δ_{12A} -75					
CHANNEL TITLE		RHPPUA					
CHANNEL NUMBER		1					
GAGE TYPE		AB-13					
GAGE RESISTANCE		350					
BRIDGE TYPE		FULL					
GAGE FACTOR							
BRIDGE VOLTAGE		15V					
CALIBRATION RESISTANCE		250K					
CALIBRATION RESPONSE		4.50	4.50				
	PSI						
ZERO	ZERO	0	0				
	500	.71	.72				
	1000	1.29	1.32				
	1500	1.81	1.84				
	2000	2.45	2.45				
	2500	3.05	3.04				
	3000	3.65	3.62				
	3500	4.25	4.22				
	4000	4.84	4.81				
	4500	5.41	5.38				
	5000	6.01	5.97				
RETURN ZERO	RETURN ZERO	0	0				

DESCRIPTION:

Left Hand Strut Air Chamber Pressure Pick-up. This transducer measures the air pressure at the top of the orifice support tube. See photographs 194126 and 201344 and drawings 13868 and 13869.

CONSTANT:

PSI = 3942 δ/Δ + 39.7 for 250 K Ohm Calibrating Resistor

CHARACTERISTICS:

TRANSDUCER

Type - DAC Drawing 12951

Serial No. - 2A

Natural Frequency - Approximately 500 cps

GALVANOMETER

	DROP TEST	FLIGHT TEST LDGS. 1-72 7-342	FLIGHT TEST LDGS. 73-209 7-339
Type - 7-339			
Serial No. - 10398		4682	10398

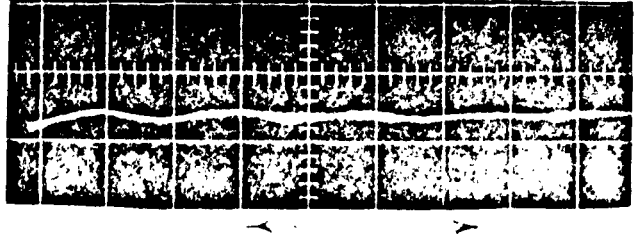
Resistance - Galvo sees 352.3 ohms

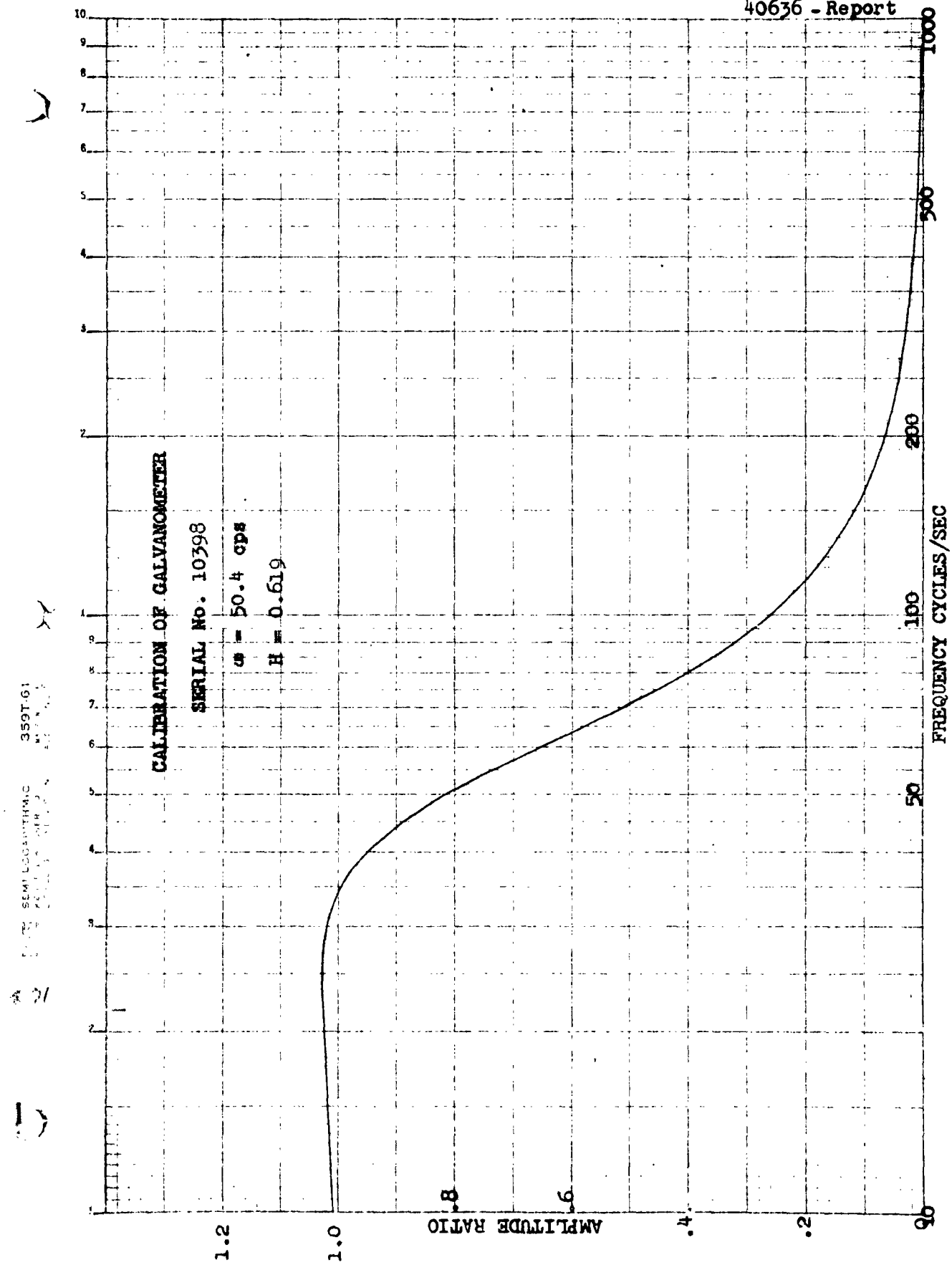
Natural Frequency - 50.4 cps

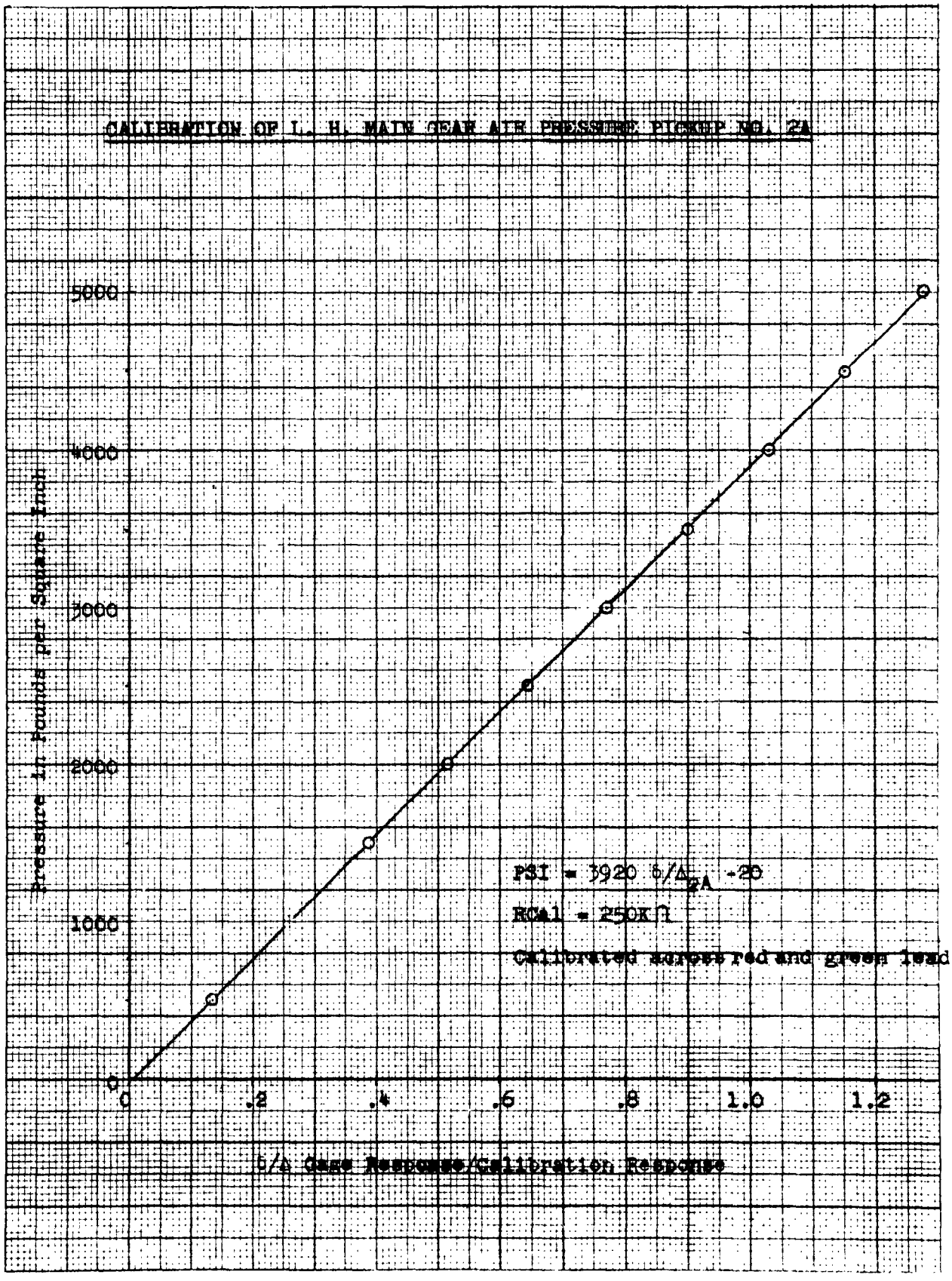
Damping - H = 0.619

RECORDED:

Oscillograph Channel 1-4 For Drop Test
2-33 For Flight Test




CALIBRATION OF GALVANOMETER
SERIAL No. 10398
s = 50.4 cps
H = 0.619
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1.2
1.0
.8
.6
.4
.2
10
9
8
7
6
5
4
3
2
1
1000
500
200
100
50
20
10


CALIBRATION OF L. H. MAIN GEAR AIR PRESSURE PICKUP NO. 2A
Pressure In Pounds per Square Inch
5000
4000
3000
2000
1000
0
0
.2
.4
.6
.8
1.0
1.2
δ/A Gage Response/Calibration Response
PSI = 3920 δ/A2A -20
RCal = 250KΩ
Calibrated across red and green leads

FORM 25 3 1
(3-51)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE 15 Oct. 1959
PREPARED BY H. D. Meriwether
TITLE Landing Gear Loads Investigation

CONDITION

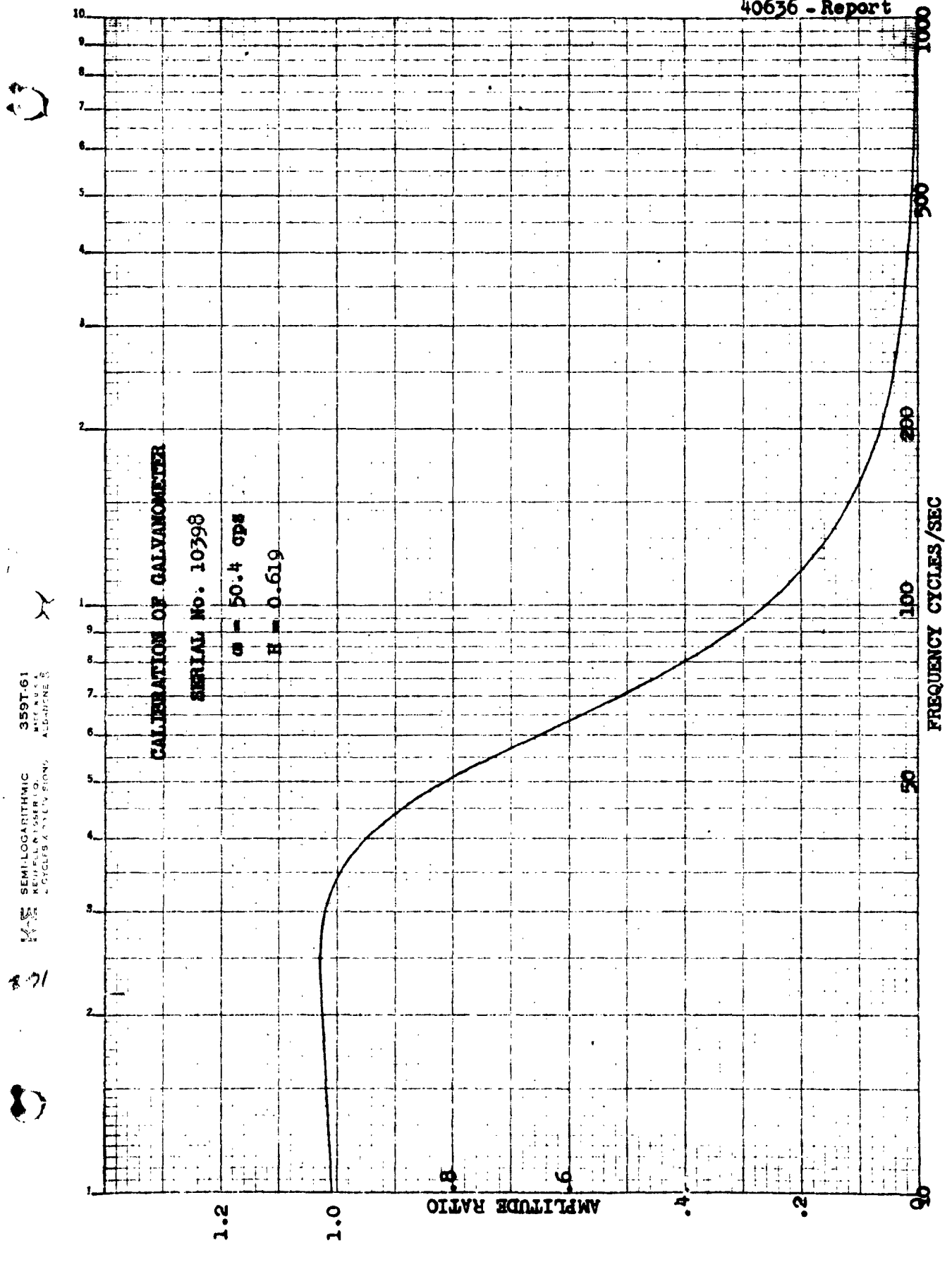
CALIBRATION OF L. H. MAIN GEAR AIR PRESSURE PICKUP NO. 2A

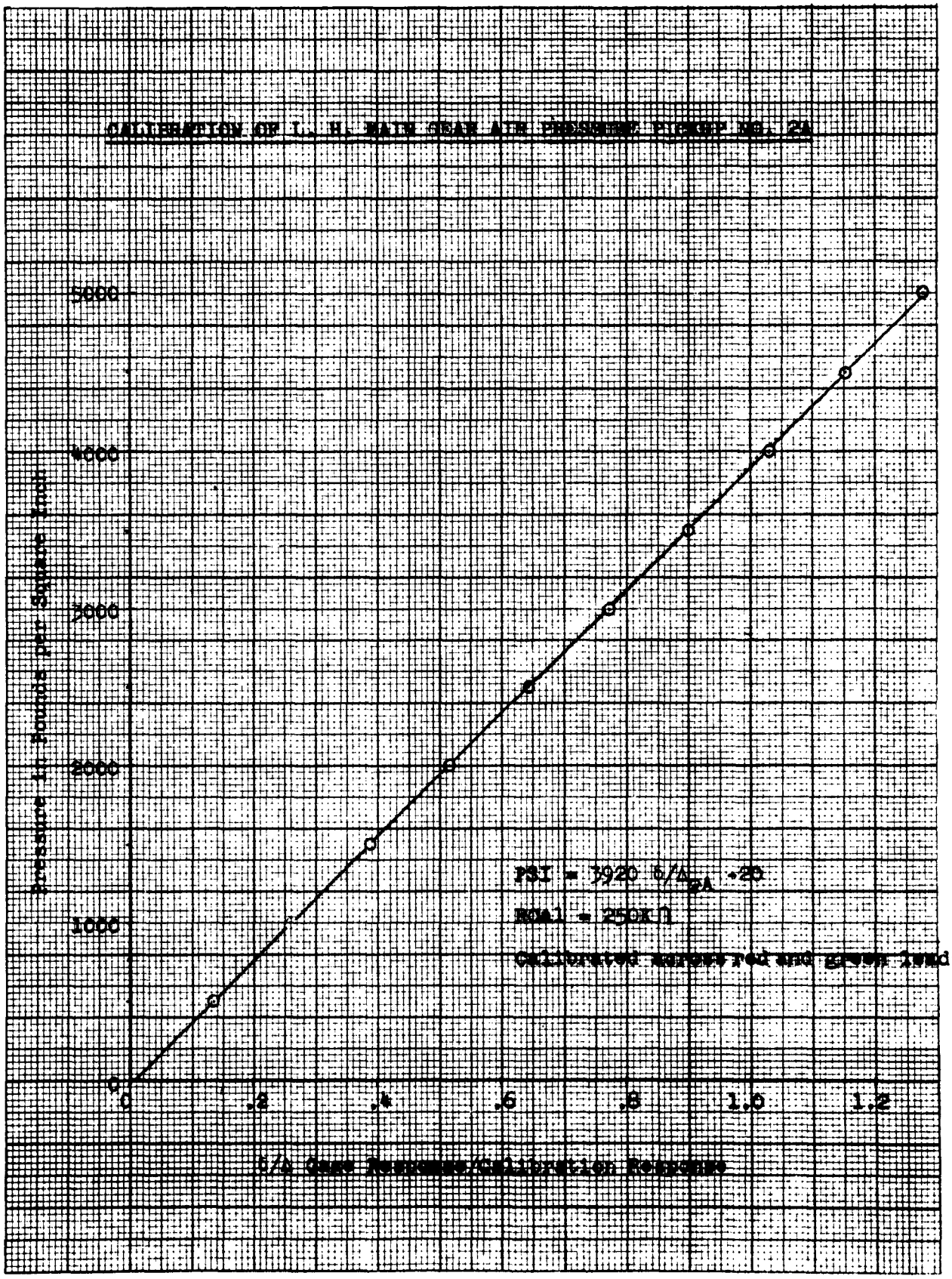
CALIBRATE BETWEEN RED AND GREEN LEADS

GAGE LOT NUMBER		CHANNEL RESPONSE IN MILLIVOLTS					
		PSI = 3920 δ/Δ_{2A} -20					
CHANNEL TITLE		LHPPUA					
CHANNEL NUMBER		1					
GAGE TYPE		AB-13					
GAGE RESISTANCE		350					
BRIDGE TYPE		FULL					
GAGE FACTOR							
BRIDGE VOLTAGE		10V					
CALIBRATION RESISTANCE		250K	250K				
CALIBRATION RESPONSE		3.34	3.32	3.31			
	PSI	RUN 1	RUN 2	RUN 3			
ZERO	ZERO	0	0	0			
	500	.455	.445	.450			
	1000	.860	.860	.865			
	1500	1.28	1.285	1.280			
	2000	1.71	1.71	1.71			
	2500	2.13	2.135	2.11			
	3000	2.65	2.564	2.55			
	3500	2.99	2.99	2.98			
	4000	3.425	3.42	3.45			
	4500	3.840	3.83	3.82			
	5000	4.24	4.24	4.19			
RETURN ZERO	RETURN ZERO	0	0	0			

ES 201344

-591


CALIBRATION OF GALVANOMETER
SERIAL No. 10398
ω = 50.4 cps
H = 0.619
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1.2
1.0
.8
.6
.4
.2
0
1000
500
200
100
50
10
359T-61
SEMI-LOGARITHMIC


CALIBRATION OF L. H. MAIN GEAR AIR PRESSURE PICKUP NO. 2A
5000
4000
3000
2000
1000
0
Air Pressure, lbs. per square inch
0
.2
.4
.6
.8
1.0
1.2
δ/Δ Gage Reference/Calibration Response
PSI = 3920 δ/Δ2A +20
RMAL = 250K Ω
Calibrated across red and green leads

FORM 28-9-1
(7-51)

DOUGLAS AIRCRAFT COMPANY, INC.

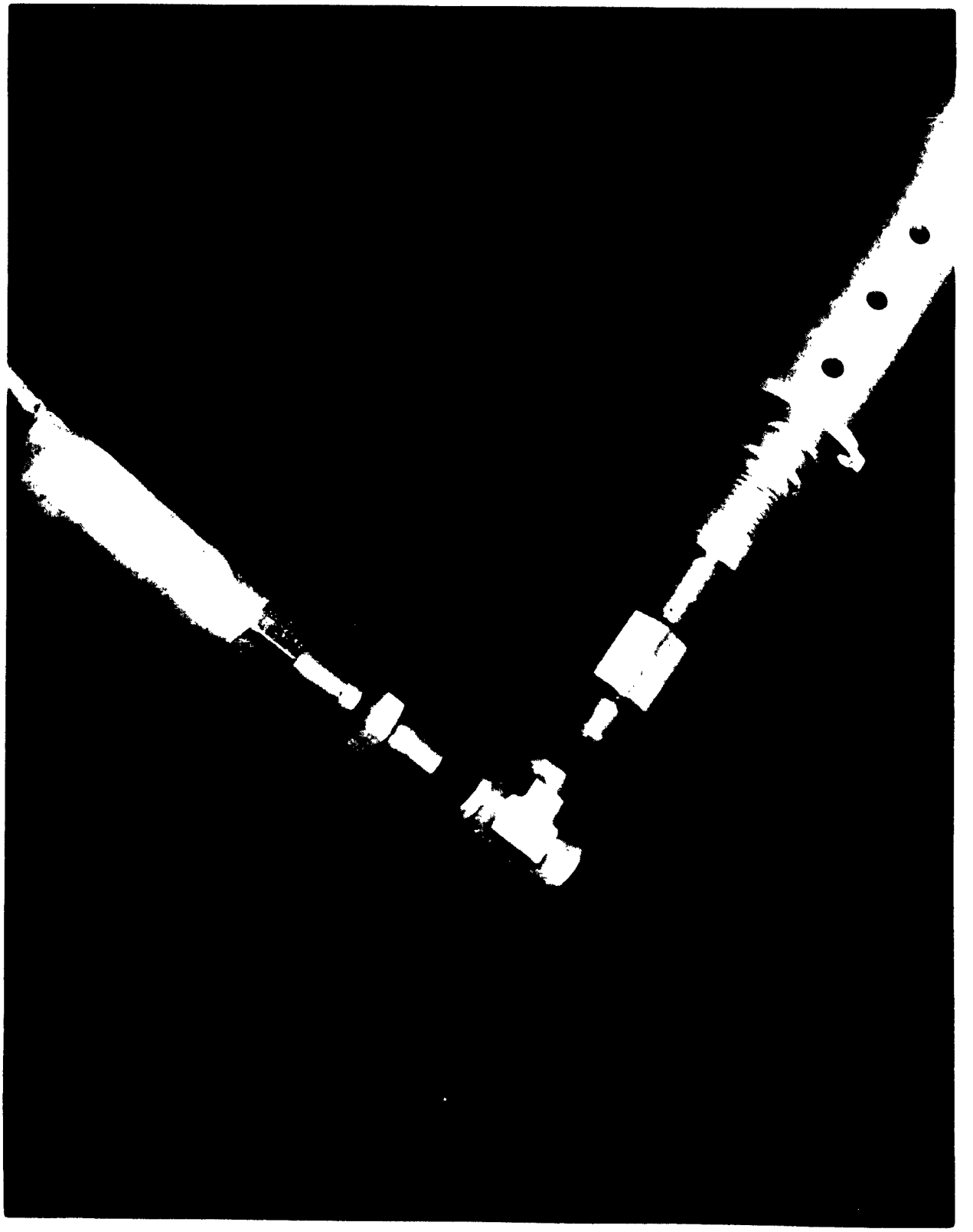
DATE 15 Oct. 1959
PREPARED BY H. D. Meriwether
TITLE Landing Gear Loads Investigation

CONDITION

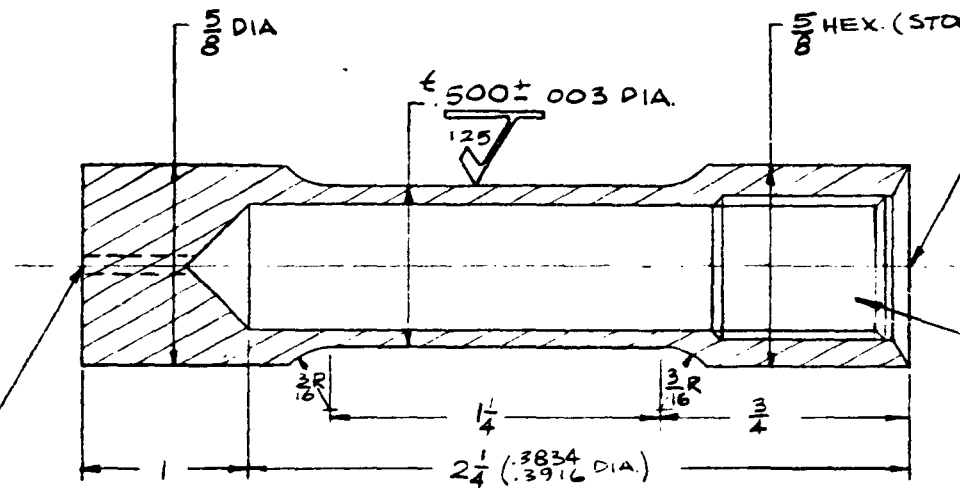
CALIBRATION OF L. H. MAIN GEAR AIR PRESSURE PICKUP NO. 2A

CALIBRATE BETWEEN RED AND GREEN LEADS

GAGE LOT NUMBER		CHANNEL RESPONSE IN MILLIVOLTS					
		PSI = 3920 δ/Δ_{2A} -20					
CHANNEL TITLE		LHPPUA					
CHANNEL NUMBER		1					
GAGE TYPE		AB-13					
GAGE RESISTANCE		350					
BRIDGE TYPE		FULL					
GAGE FACTOR							
BRIDGE VOLTAGE		10V					
CALIBRATION RESISTANCE		250K	250K				
CALIBRATION RESPONSE		3.34	3.32	3.31			
	PSI	RUN 1	RUN 2	RUN 3			
ZERO	ZERO	0	0	0			
	500	.455	.445	.450			
	1000	.860	.860	.865			
	1500	1.28	1.285	1.280			
	2000	1.71	1.71	1.71			
	2500	2.13	2.135	2.11			
	3000	2.65	2.564	2.55			
	3500	2.99	2.99	2.98			
	4000	3.425	3.42	3.45			
	4500	3.840	3.83	3.82			
	5000	4.24	4.24	4.19			
RETURN ZERO	RETURN ZERO	0	0	0			



771



DRILL ℄ .3834 / .3916 DIA HOLE
THREAD 7/16 - 20 UNF-3B 7/16 DEEP
PER MIL-S-7742
AND 10050-4 BOSS
FOR USE WITH AN 815-4
(UNION - FLARED TUBE)
OR AN 816-4 (NIPPLE - FLARED TUBE AND PIPE THREAD)

-3 -5

PART ALSO USED IN ASSYS
40533 & 40527

FOR -5 ONLY
DRILL 1/8 DIA THROUGH TO 3B HOLE
DRILL .2674 / .2754 DIA 7/32 DEEP
THREAD 5/16 - 24 UNF-3B 3/8 DEEP
PER MIL-S-7742
AND 10050-2 BOSS
FOR USE WITH
AN 814-2 PLUG OR
AN 919-1 REDUCER

GENERAL NOTES:

1. H.T. TO 125000-145000 PSI.
2. DIAMETERS MARKED THUS ℄ MUST BE CONCENTRIC WITHIN .003 F.I.R.
3. BREAK ALL SHARP EDGES
4. DO NOT CAD PLATE .500 ℄ 5/8 DIA OR I.D. INCLUDING BOSSES.

NEXT ASSEMBLY 31201

DASH NUMBER	NUMBER REQ'D	SIZE AND DESCRIPTION OF MATERIAL
-5	1	5/8 HEX x 4 IN 4130 BAR
-3	1	5/8 HEX. x 4 IN 4130 BAR

DOUGLAS AIRCRAFT CO. INC.
EL SEGUNDO, CALIFORNIA
STATIC TEST

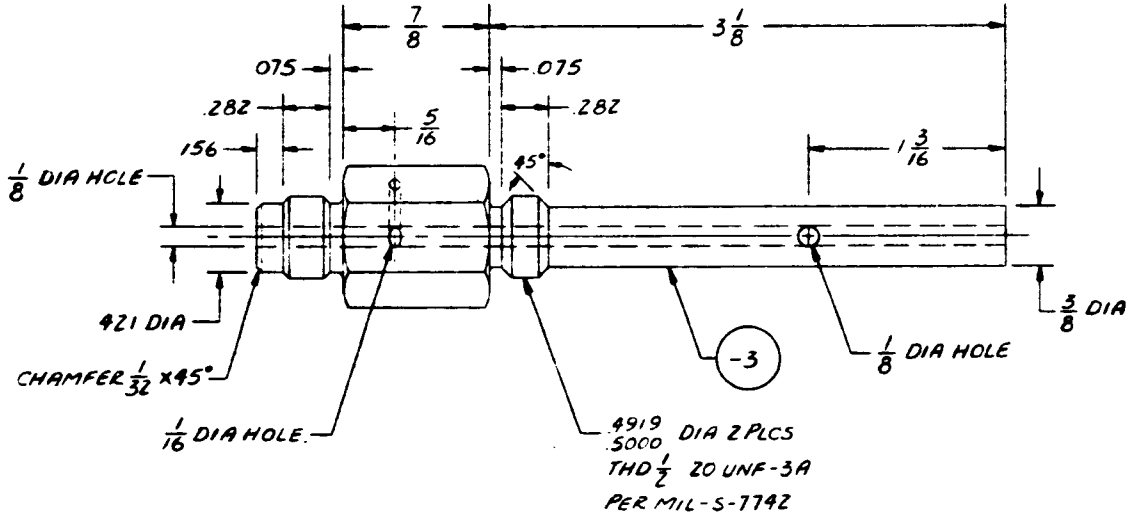
TITLE
PRESSURE PICKUP
INSTRUMENTED MAIN GEAR

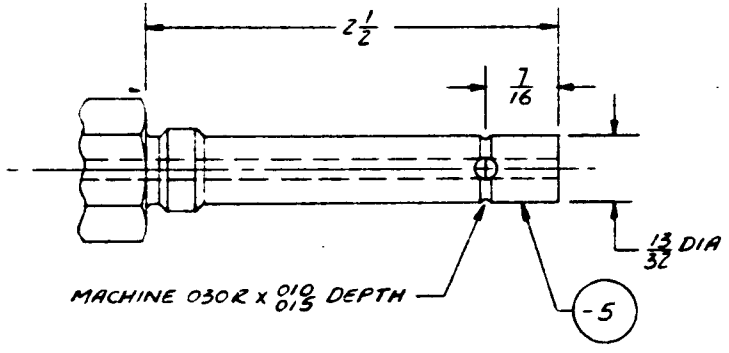
MODEL	SCALE	DATE	DRAWN BY
F4D-1	NONE	3DEC 55	MERIWETHER

S.O. 6649-9
W.O. 1-760
DRAWING NUMBER 12951

Page 2526

NOTE:
1. SURFACE AT NUT TO BE USED AS GASKET SEAL PER MS 33656-5.
2. THIS PART FITS INSIDE ORIFICE SUPPORT TUBE OF MAIN LDG. GEARS.
3. THIS PART TOGETHER WITH AN 938-5 TEE, BV4-MS 28889-1 SHRADER VALVE AND S.T. DWG 13869 FORMS AN ASSY.
4. (-3) FITS A4D-1
   (-5) FITS A4D-2, A4D-2N & A4D-5





-5 IS IDENTICAL TO -3 EXCEPT AS SHOWN

DASH NUMBER	NUMBER REQ'D	SIZE AND DESCRIPTION OF MATERIAL
-5	1	3/4 HEX X 5 2024-T4 ALUM
-3	1	3/4 HEX X 5 2024-T4 ALUM

DOUGLAS AIRCRAFT CO. INC.
EL SEGUNDO, CALIFORNIA
STATIC TEST

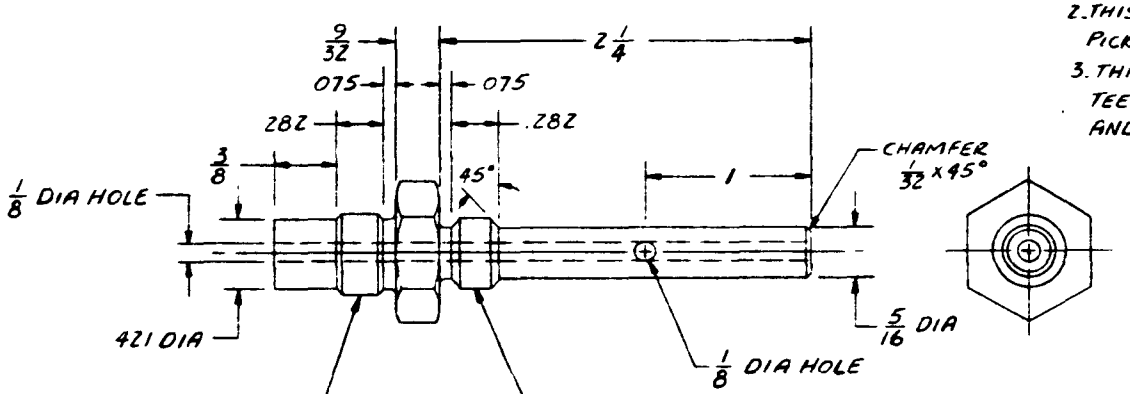
TITLE
SPECIAL FITTING FOR M.L.G. AIR CHAMBER INSTRUMENTATION

MODEL	SCALE	DATE	DRAWN BY
A4D	FULL	10-12-59	HARRISON

S.O.	DRAWING NUMBER
161168	13868
W.O. 2028	

Page 2.527

NOTE:
1. SURFACE AT NUT TO BE USED AS GASKET SEAL PER MS 33656-5
2. THIS PART FITS INSIDE PRESSURE PICKUP OF R.H. AND L.H. MAIN LDG. GEARS
3. THIS PART TOGETHER WITH AN 938-5 TEE, BV4-MS 28889-1 SHRADER VALVE AND S T DWG 13868 FORMS AN ASSY.



DASH NUMBER	NUMBER REQ'D	SIZE AND DESCRIPTION OF MATERIAL
-3	2	3/4 HEX X 3 1/2 2024-T4 ALUM

DOUGLAS AIRCRAFT CO. INC.
EL SEGUNDO, CALIFORNIA

STATIC TEST

TITLE

SPECIAL FITTING FOR M.L.G. AIR CHAMBER INSTRUMENTATION

MODEL	SCALE	DATE	DRAWN BY
A4D	FULL	10-12-59	HARRISON

S.O. 161168

W.O. 2028

DRAWING NUMBER 13869

Drag Brace Axial Loads

Strain gages were placed on the main landing gear drag braces to measure tension and compression loads. A photograph of the installation on the left hand main landing gear is shown on Page 2.614.

DESCRIPTION:

Right hand gear drag brace. This transducer measures axial load in the right hand gear drag brace.

CONSTANT:

Tension = 57626 δ/Δ/ 50K Ohms Resistor Calibration

Compression = 57638 δ/Δ / 50K Ohms Resistor Calibration

CHARACTERISTICS:

TRANSDUCER

Type - ABF 13 Strain Gages

GALVANOMETER

Type - 7-342

Serial No. - 7258

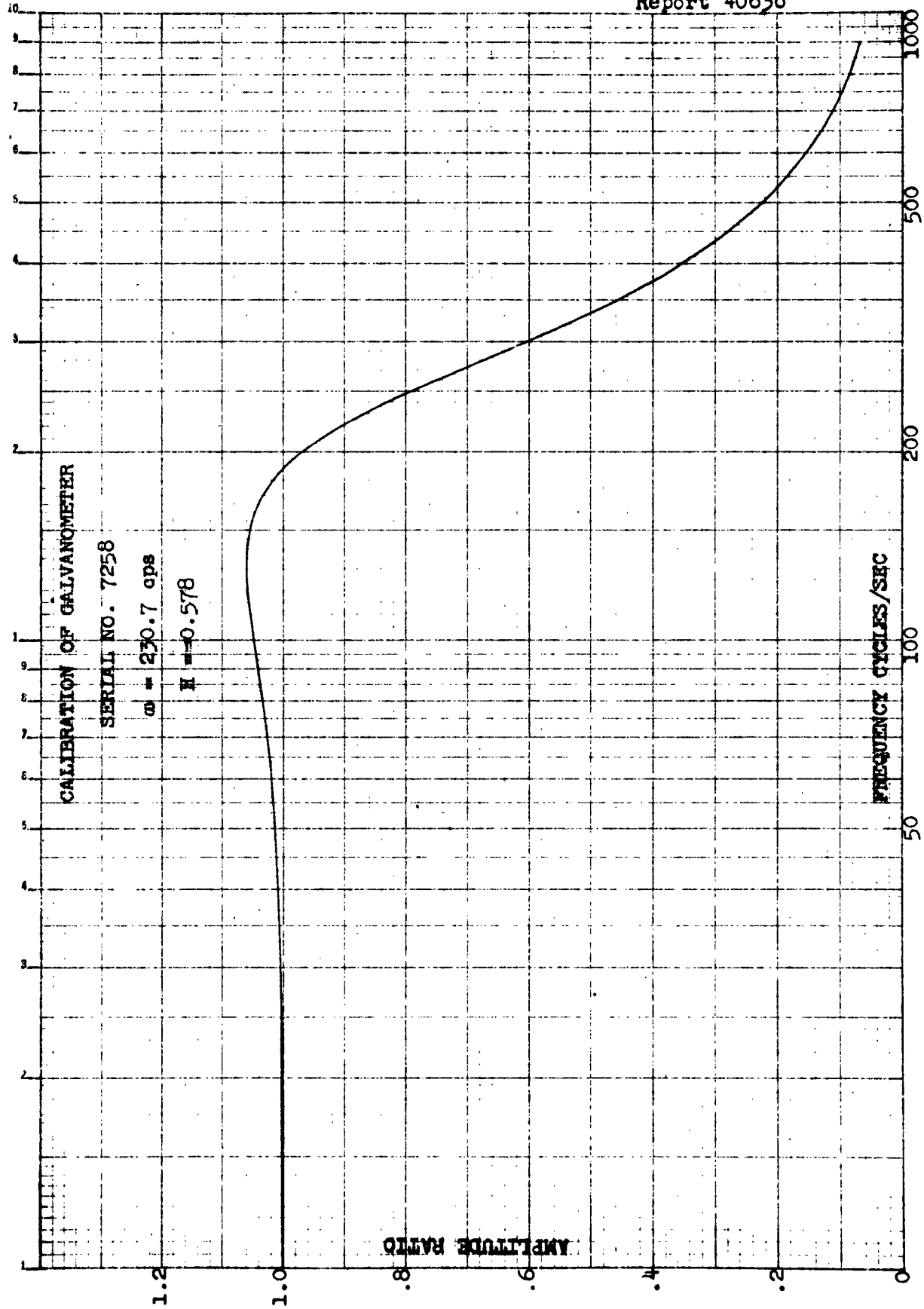
Resistance - 346.8 Ohms

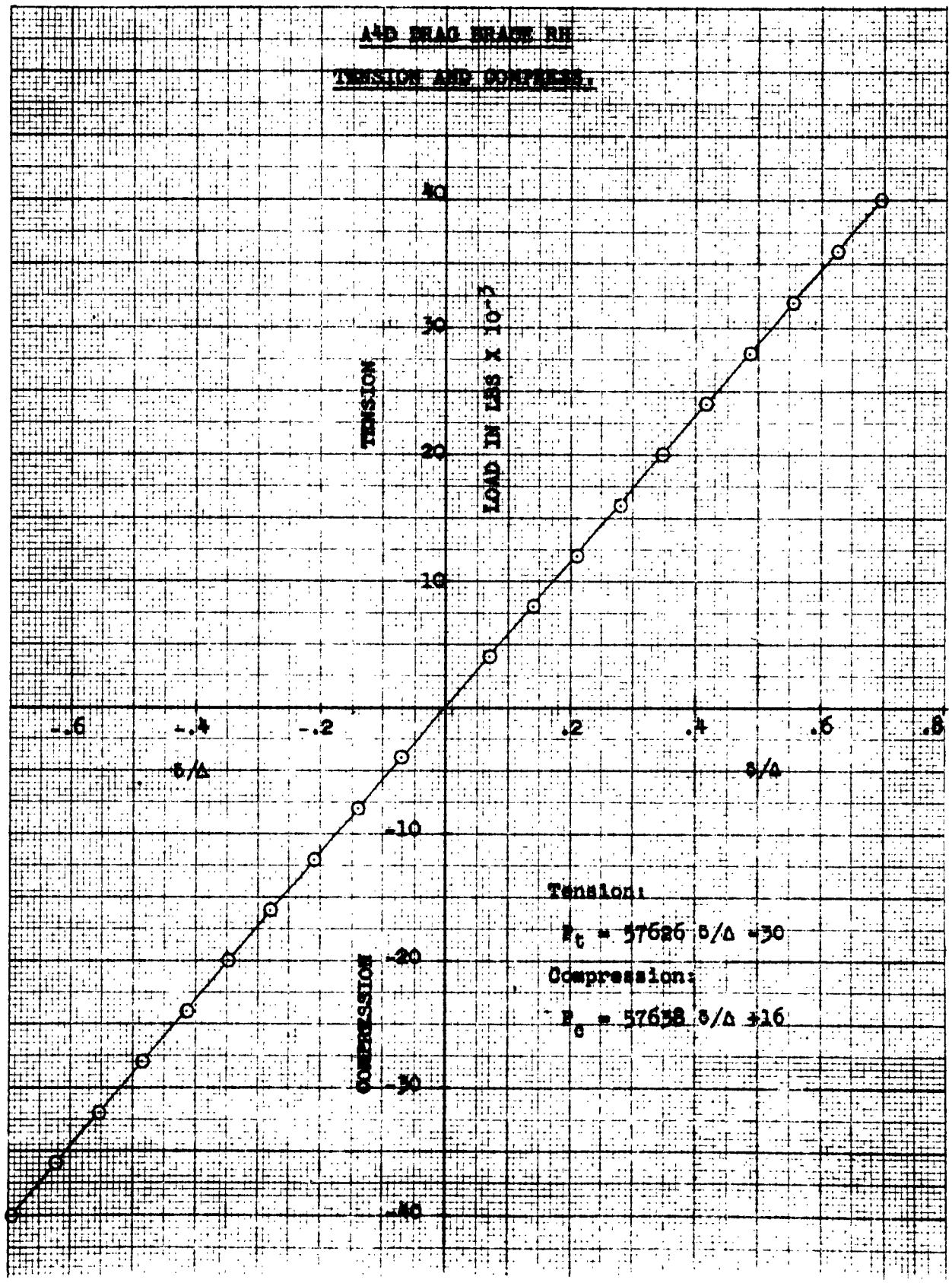
Natural Frequency - 230.7 cps

Damping - 0.578

RECORDED:

Oscillograph channel 2-15 for Drop Test
1-30 for Flight Test


CALIBRATION OF GALVANOMETER
SERIAL NO. 7258
ω = 230.7 cps
H = 0.578
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1.2
1.0
.8
.6
.4
.2
0
1000
500
200
100
50
SEMI LOGARITHMIC
359T-61


A4D DRAG BRACE RH
TENSION AND COMPRESS.
LOAD IN LBS X 10-3
TENSION
COMPRESSION
40
30
20
10
-10
-20
-30
-40
-.6
-.4
-.2
.2
.4
.6
.8
δ/Δ
δ/Δ
Tension:
P_t = 57626 δ/Δ +30
Compression:
P_c = 57638 δ/Δ +16

FORM 28-8-1
(4-51)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE 1-29-60
PREPARED BY H. Meriwether
TITLE Carrier Suit. Inst.

PAGE 2.605
MODEL A4D-2
REPORT 40636

CONDITION

A4D Drag Brace RH

TENSION

CALIBRATE BETWEEN RED AND GREEN LEADS

GAGE LOT NUMBER	CHANNEL RESPONSE IN MILLIVOLTS					
	P_t = 57626 δ/Δ -30					
CHANNEL TITLE	RHDB					
CHANNEL NUMBER	1					
GAGE TYPE	ABF-13					
GAGE RESISTANCE	350	350				
BRIDGE TYPE	Full	Full				
GAGE FACTOR	2.03	2.03				
BRIDGE VOLTAGE	6 V	6 V				
CALIBRATION RESISTANCE	50 K	50 K				
CALIBRATION RESPONSE	10.065	10.065				

		Run 1	Run 2		δ/Δ_{ave}		
ZERO	ZERO	0	0				
	4000	.710	.710		.070		
	8000	1.409	1.410		.140		
	12000	2.109	2.092		.209		
	16000	2.800	2.797		.278		
	20000	3.499	3.493		.347		
	24000	4.192	4.190		.416		
	28000	4.902	4.900		.487		
	32000	5.593	5.610		.556		
	36000	6.282	6.290		.624		
	40000	7.012	7.010		.696		
RETURN ZERO	RETURN ZERO	0	0				

FORM 29-8-1
(3-51)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE 1-29-60
PREPARED BY H. Marimuthar
TITLE Carrier Suit. Inst.

MODEL A4D-2
REPORT 40636

CONDITION

A4D Drag Brace RH

COMPRESSION

CALIBRATE BETWEEN RED AND GREEN LEADS

GAGE LOT NUMBER		CHANNEL RESPONSE IN MILLIVOLTS					
		P_0 = 57638 δ/Δ +16					
CHANNEL TITLE		RHDB					
CHANNEL NUMBER		1					
GAGE TYPE		ABF-13					
GAGE RESISTANCE		350	350				
BRIDGE TYPE		Full	Full				
GAGE FACTOR		2.03	2.03				
BRIDGE VOLTAGE		6 V	6 V				
CALIBRATION RESISTANCE		50 K	50 K				
CALIBRATION RESPONSE		10.060	10.060				
		Run1	Run 2		δ/Δ ave		
ZERO	ZERO	0	0				
	-4000	-.725	-.722		-.072		
	-8000	-1.429	-1.430		-.142		
	-12000	-2.115	-2.115		-.210		
	-16000	-2.825	-2.817		-.280		
	-20000	-3.507	-3.500		-.348		
	-24000	-4.188	-4.190		-.416		
	-28000	-4.895	-4.900		-.487		
	-32000	-5.589	-5.582		-.555		
	-36000	-6.290	-6.290		-.625		
	-40000	-6.998	-6.999		-.696		
RETURN ZERO	RETURN ZERO	0	0				

DESCRIPTION:

Left hand gear drag brace. This transducer measures axial load in the left hand gear drag brace.

CONSTANT:

Tension Lbs. = 56970 S/Δ / 50 K Ohms Res. Calib.

Compression Lbs. = 56777 S/Δ / 50 K Ohms Res. Calib.

CHARACTERISTICS:

TRANSDUCER

Type - ABF-13 Strain Gages

GALVANOMETER

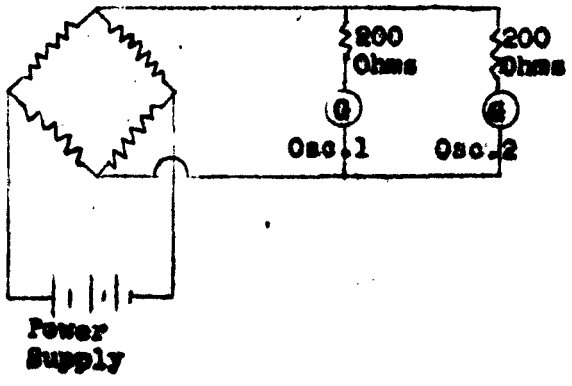
Type - 7-342

Serial No. - 7294

Resistance - 358.7 Ohms

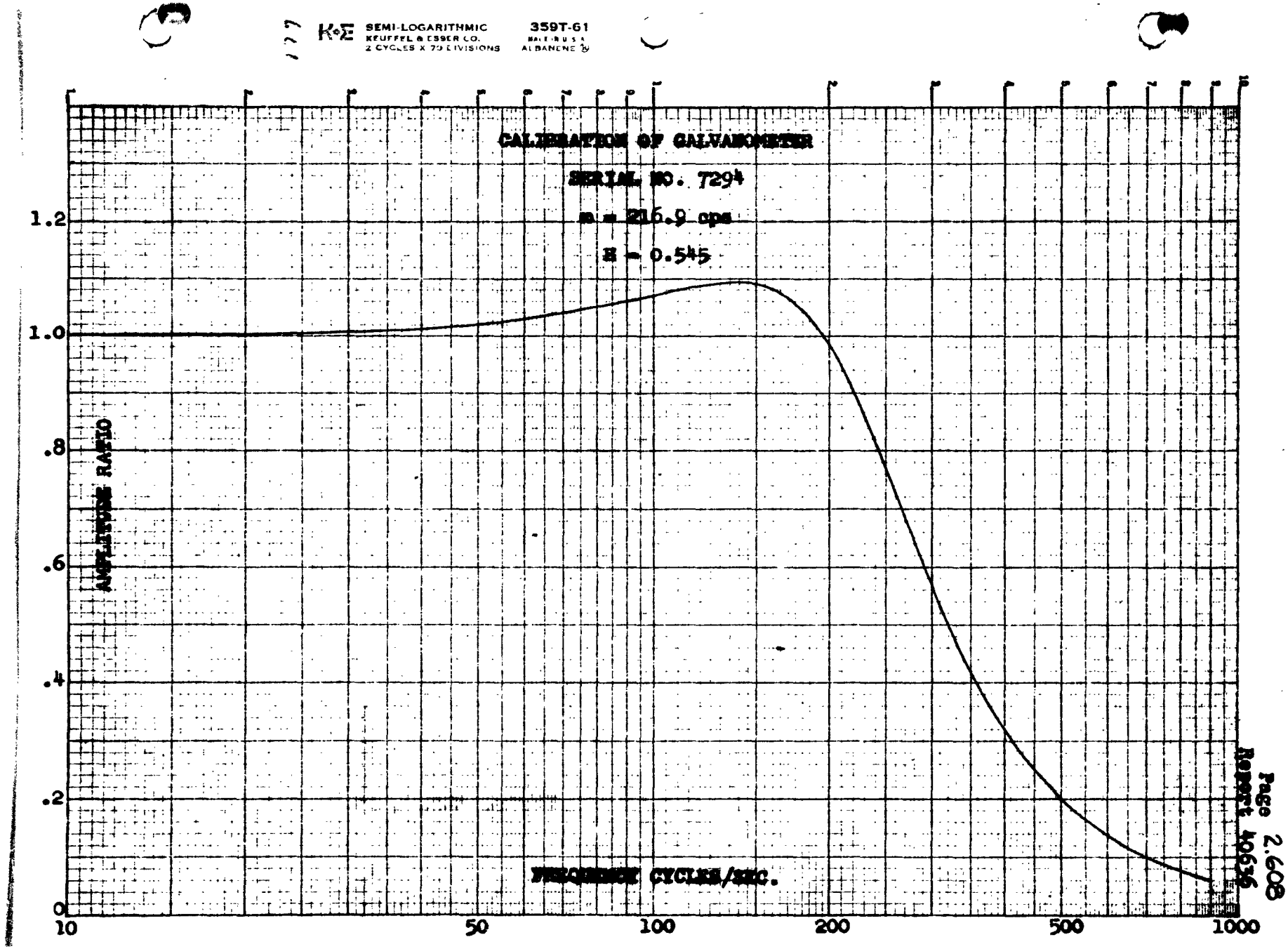
Natural Frequency - 221.5 cps

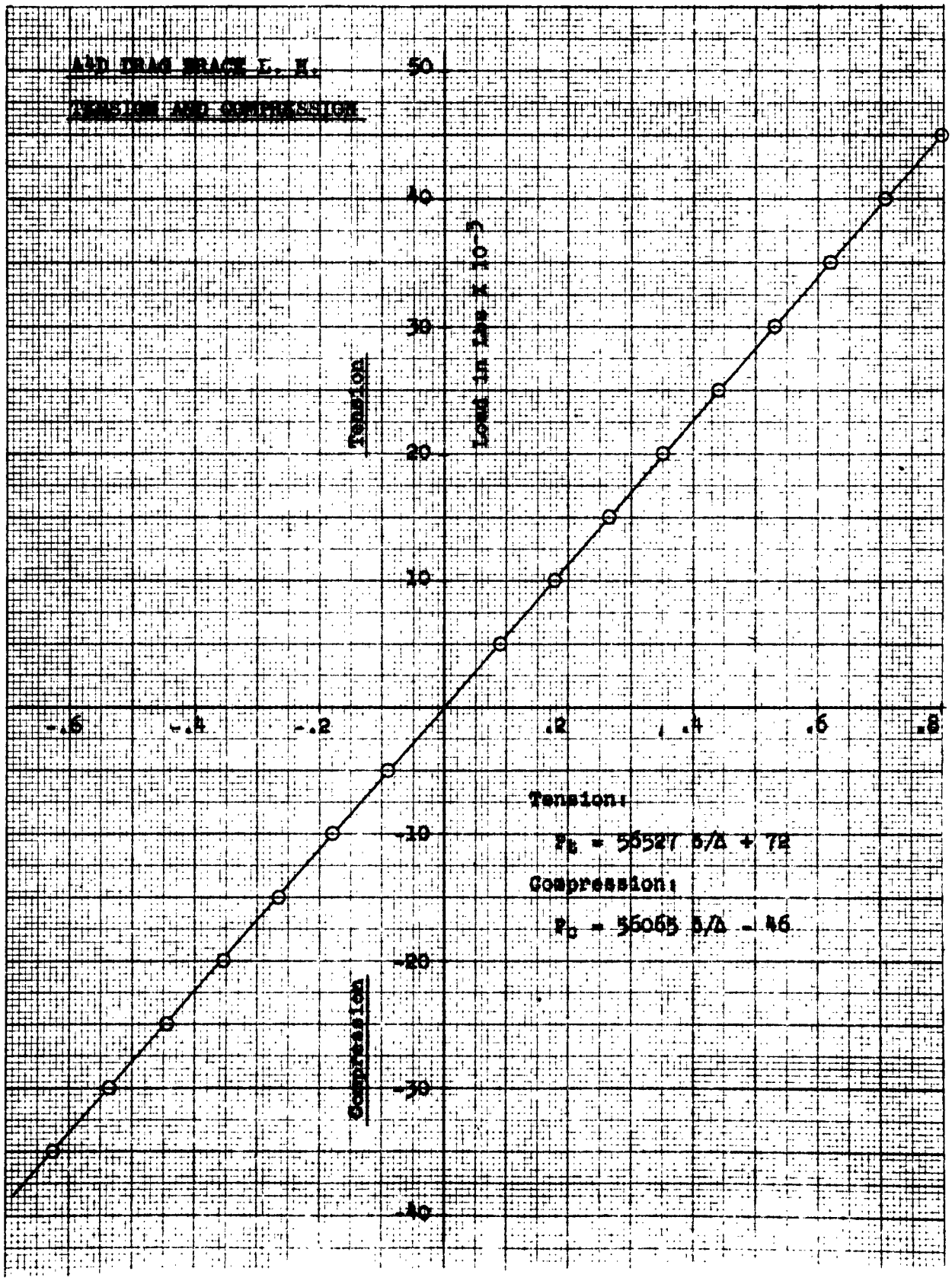
Damping - 0.545



RECORDER:

Oscillograph Channel 1-12 for Drop Test
1-29 for Flight Test


K&E SEMI-LOGARITHMIC
KEUFFEL & ESSER CO.
2 CYCLES X 70 DIVISIONS
359T-61
MADE IN U.S.A.
ALBANENE
CALIBRATION OF GALVANOMETER
SERIAL NO. 7294
n = 216.9 cps
H = 0.545
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC.
0
.2
.4
.6
.8
1.0
1.2
10
50
100
200
500
1000


A4D TRAC BRACE L. H.
TENSION AND COMPRESSION
Tension
Load in Lbs x 10-3
50
40
30
20
10
-10
-20
-30
-40
-.6
-.4
-.2
.2
.4
.6
.8
Compression
Tension:
P_t = 56527 S/A + 72
Compression:
P_c = 56065 S/A - 46

DOUGLAS AIRCRAFT COMPANY, INC.

DATE 7-23-59
PREPARED BY H. Meriwether
TITLE Ldg. Loads Investigation

CONDITION

A4D DRAG BRACE LH

TENSION

CALIBRATE BETWEEN RED AND GREEN LEADS

DWG. 22532

GAGE LOT NUMBER		CHANNEL RESPONSE IN MILLIVOLTS					
		$P_t = 56527\ \delta/\Delta + 72$					
CHANNEL TITLE		LHDB					
CHANNEL NUMBER		1					
GAGE TYPE		C-6-141					
GAGE RESISTANCE		350	350				
BRIDGE TYPE		Full	Full				
GAGE FACTOR		2.03	2.03				
BRIDGE VOLTAGE		10 V	10 V				
CALIBRATION RESISTANCE		50 K	50 K				
CALIBRATION RESPONSE		17.87	17.76				
		RUN 1	RUN 2		δ/Δ ave		
ZERO	ZERO	0	0				
	5000	1.60	1.58		.089		
	10000	3.14	3.14		.176		
	15000	4.68	4.69		.263		
	20000	6.24	6.23		.350		
	25000	7.86	7.84		.440		
	30000	9.43	9.43		.529		
	35000	11.01	11.02		.618		
	40000	12.58	12.58		.706		
	45000	14.17	14.17		.796		
	5000	15.75	15.74		.884		
RETURN ZERO	RETURN ZERO	0	0				

FORM 28-3-1 (1-51)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE 7-24-59
PREPARED BY H. Meriwether
TITLE Ldg. Loads Investigation

CONDITION

A4D DRAG BRACE LH

COMPRESSION

CALIBRATE BETWEEN RED AND GREEN LEADS

dwg. 22532

GAGE LOT NUMBER		CHANNEL RESPONSE IN MILLIVOLTS					
		P_e = 56065 δ/Δ -46					
CHANNEL TITLE		LHDB					
CHANNEL NUMBER		1					
GAGE TYPE		C-6-141					
GAGE RESISTANCE		350	350				
BRIDGE TYPE		Full	Full				
GAGE FACTOR		2.03	2.03				
BRIDGE VOLTAGE		10 V	10 V				
CALIBRATION RESISTANCE		50 K	50 K				
CALIBRATION RESPONSE		17.53	17.52				
		RUN 1	RUN 2		δ/Δ_{ave}		
ZERO	ZERO	0	0				
	-5000	-1.58	-1.59		-.091		
	-10000	-3.17	-3.15		-.180		
	-15000	-4.68	-4.68		-.267		
	-20000	-6.24	-6.22		-.355		
	-25000	-7.84	-7.83		-.447		
	-30000	-9.41	-9.41		-.537		
	-35000	-10.98	-10.97		-.626		
	-40000	-12.51	-12.51		-.714		
	-45000	-14.10	-14.08		-.804		
	-50000	-15.63	-15.63		-.892		
RETURN ZERO	RETURN ZERO	0	0				

DESCRIPTION:

Left hand gear drag brace. This transducer measures axial load in the left hand gear drag brace.

CONSTANT:

Tension Lbs = 57243 δ/Δ / 50K Ohms Resistor Calibration

Compression Lbs^2 = 56775 δ/Δ / 50K Ohms Resistor Calibration

CHARACTERISTICS:

TRANSDUCER

Type - ABF-13 Strain Gages

GALVANOMETER

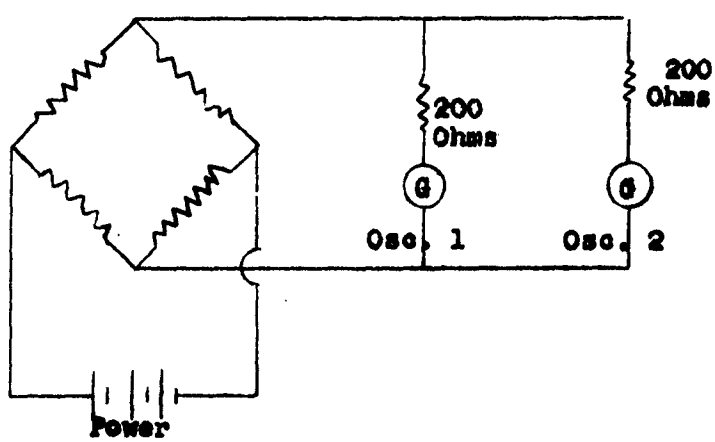
Type - 7-342

Serial No. - 4706

Resistance - 346.8 Ohms

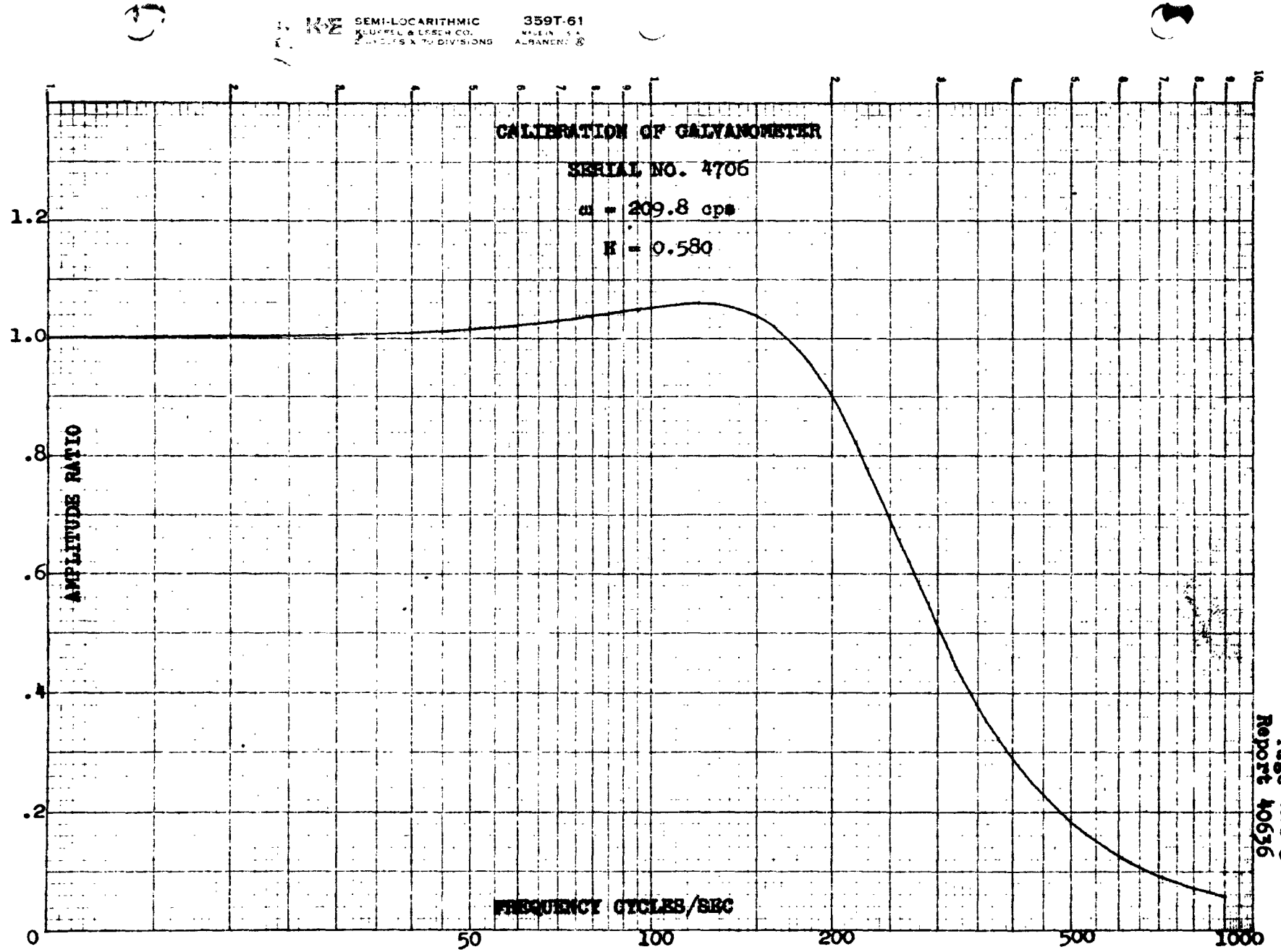
Natural Frequency - 230.7 cps

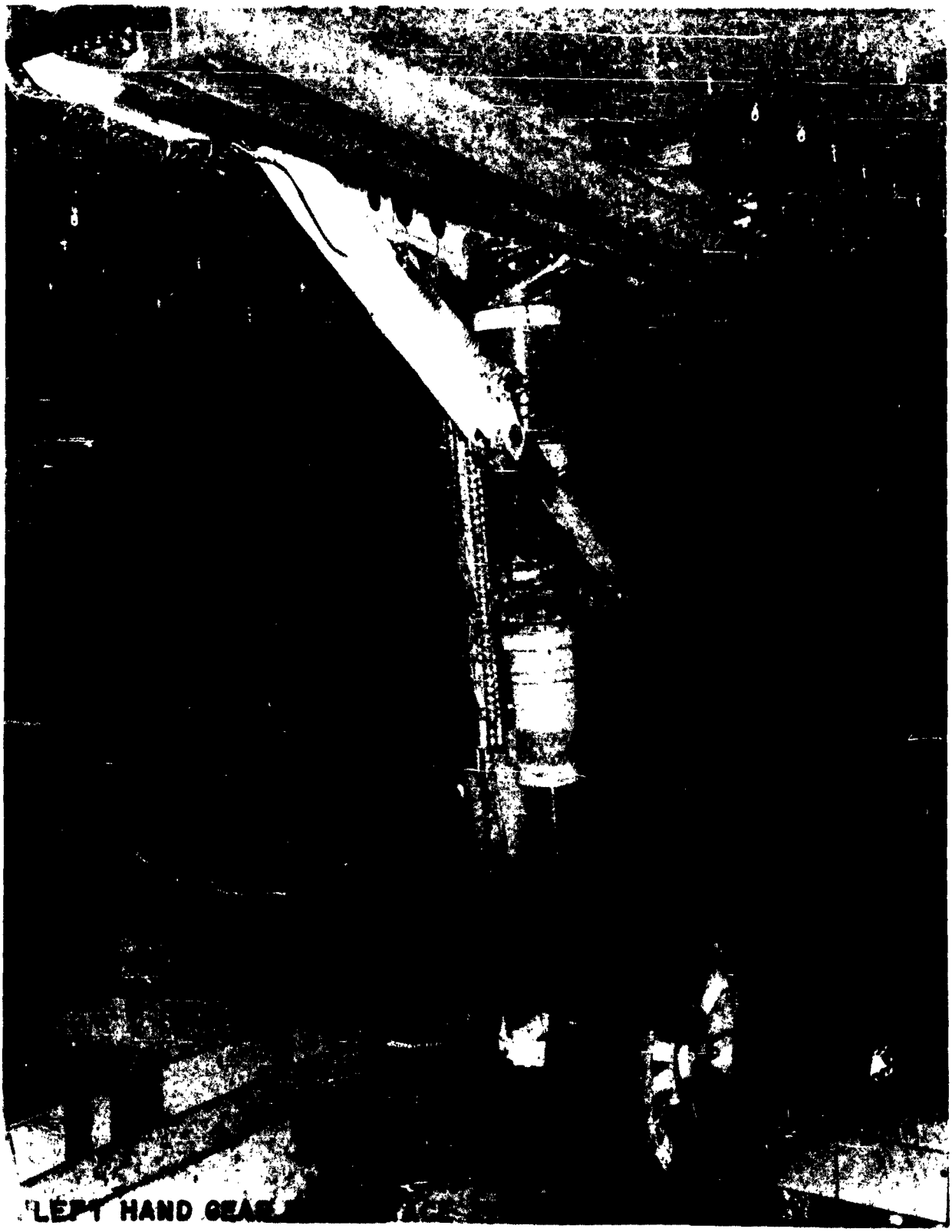
Damping - 0.580



RECORDED:

Oscillograph channel 1-19 for Drop Test


SEMI-LOGARITHMIC
359T-61
CALIBRATION OF GALVANOMETER
SERIAL NO. 4706
ω = 209.8 cps
K = 0.580
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
0
.2
.4
.6
.8
1.0
1.2
50
100
200
500
1000



E31

Nose Landing Gear

The nose landing gear was instrumented to measure strut position and upper mass normal acceleration.

Pages 3.001 through 3.008 discuss the strut position instrumentation. The strut position was measured with a slide wire device fabricated from drawings shown on Pages 3.005 through 3.008. A photograph of the installation appears on Page 3.004.

Pages 3.009 through 3.013 discuss the upper mass normal acceleration. A photograph of the installation is shown on Page 3.013.

DESCRIPTION:

Nose gear strut position. This transducer measures relative displacement between the nose gear shock strut and barrel.

CONSTANT:

Inches = 16.0 δ/Δ / Pot setting (fixed)

CHARACTERISTICS:

TRANSDUCER

Type - DAC design ES 2621

GALVANOMETER

Type - 7-324

Serial No. - 6225

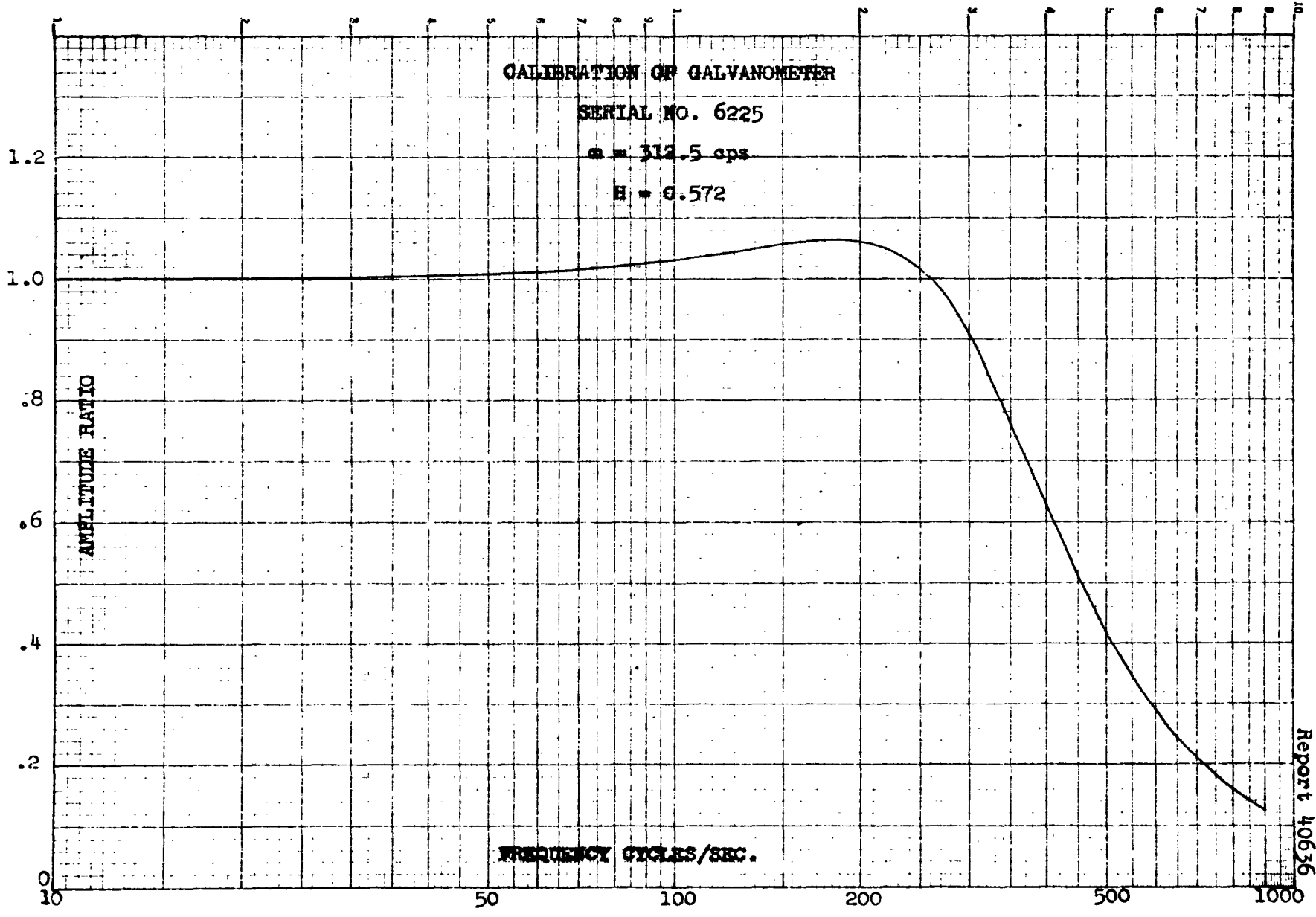
Resistance - 78.95 Ohms

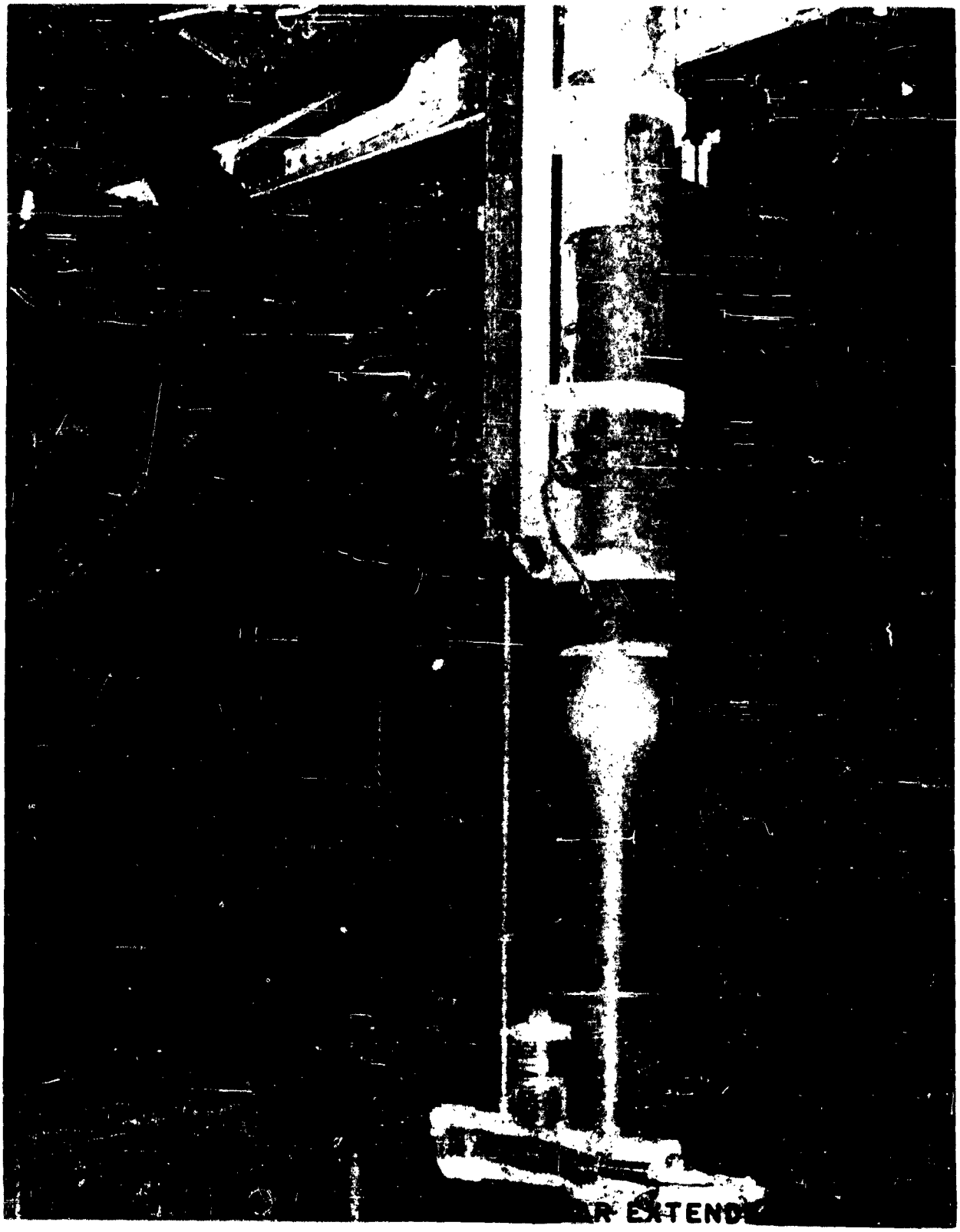
Natural Frequency - 312.5 cps

Damping - 0.572

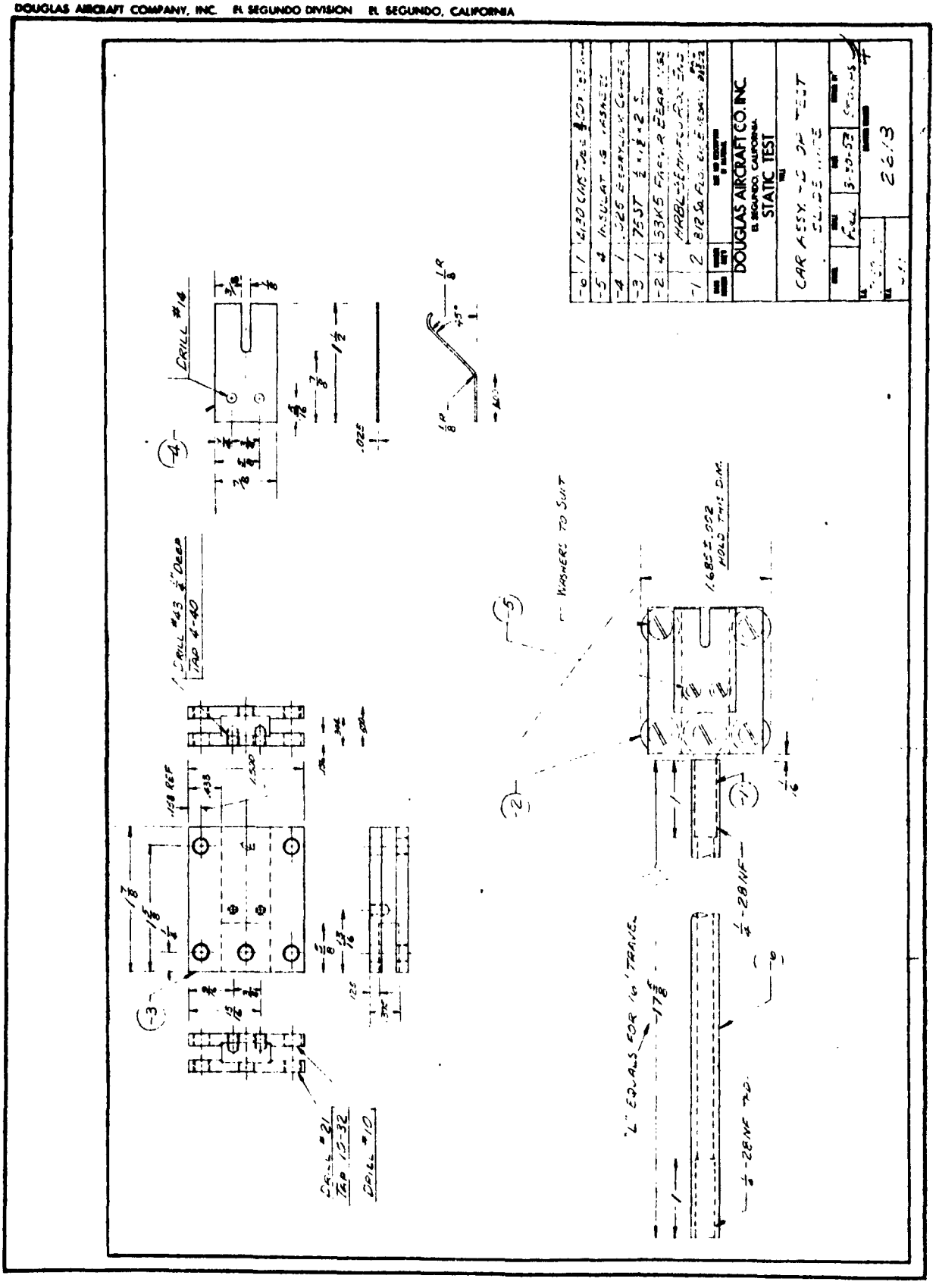
RECORDED:

Oscillograph Channel 1-23 for Drop Test
2-25 for Flight Test


SEMI LOGARITHMIC
359T-61
CALIBRATION OF GALVANOMETER
SERIAL NO. 6225
ω = 312.5 cps
H = 0.572
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC.
0
.2
.4
.6
.8
1.0
1.2
10
50
100
200
500
1000

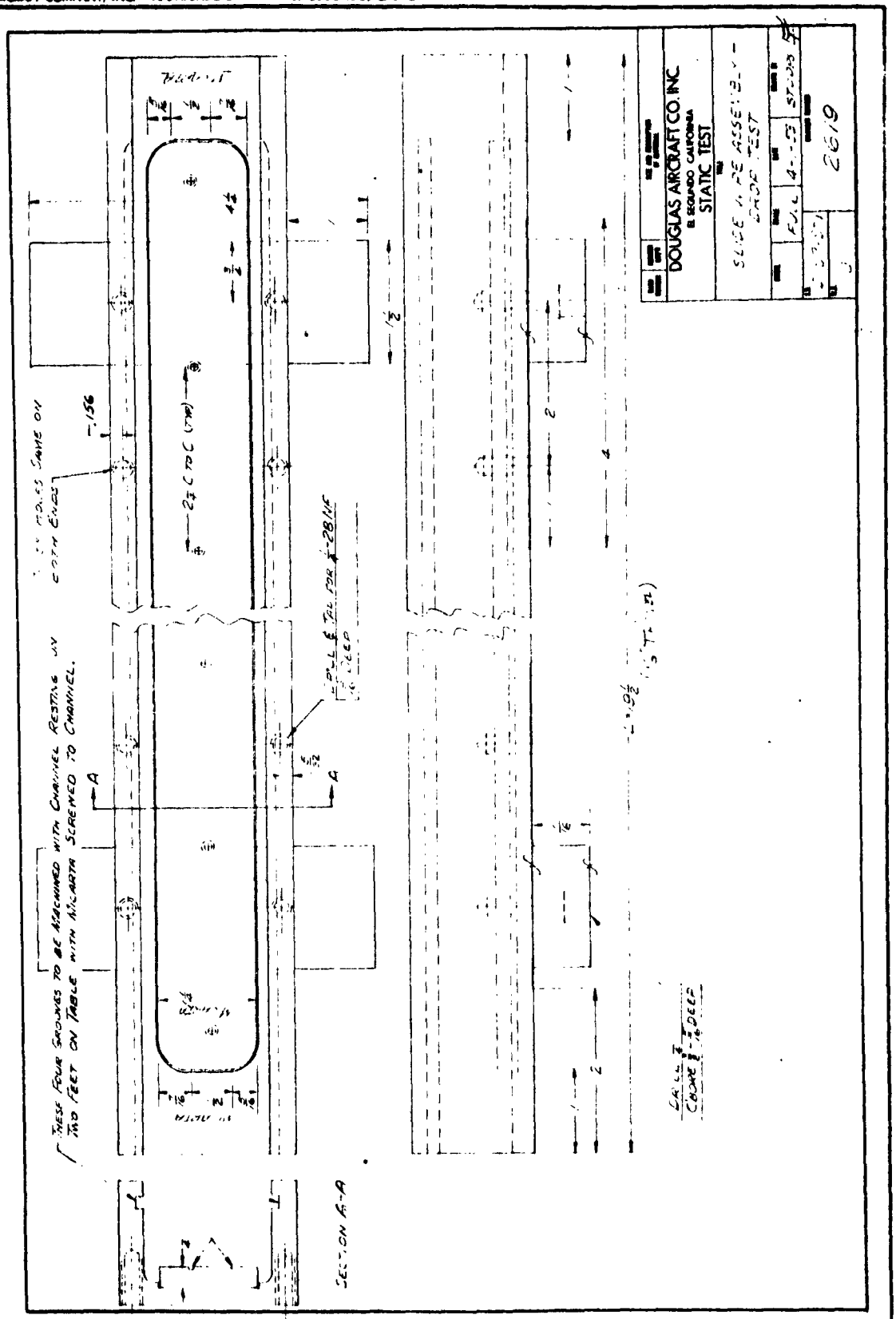

R EXTEND

DOUGLAS AIRCRAFT COMPANY, INC. EL SEGUNDO DIVISION EL SEGUNDO, CALIFORNIA



FORM 30-250V
(7-51)

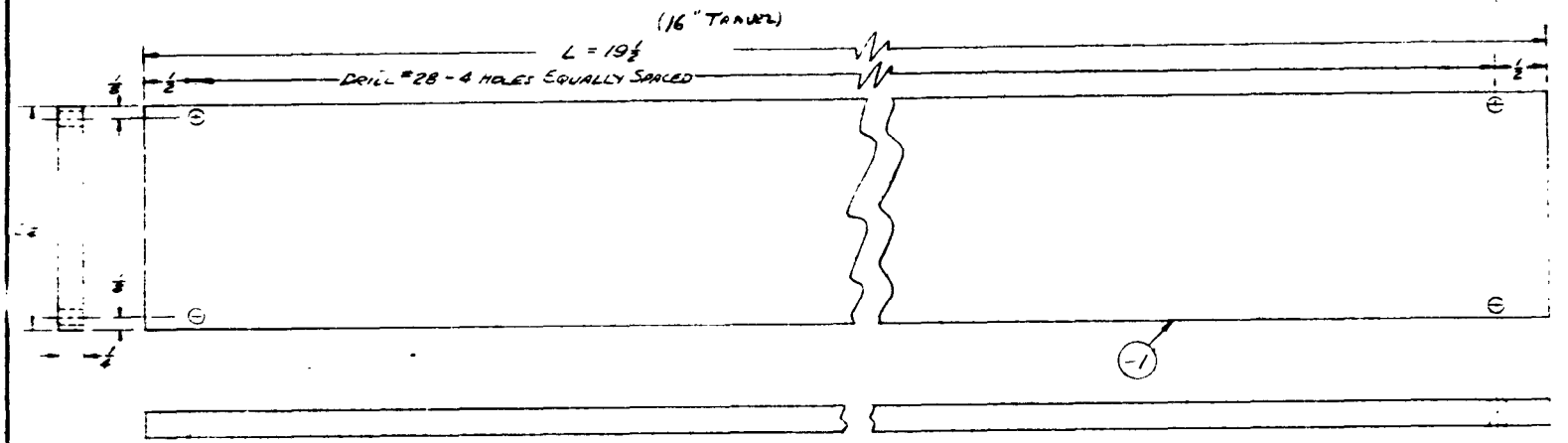
DOUGLAS AIRCRAFT COMPANY, INC. EL SEGUNDO DIVISION EL SEGUNDO, CALIFORNIA



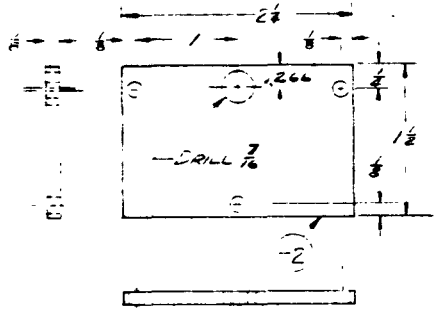
FORM 30-250V
(7-51)

FORM 30-250V
(7-51)

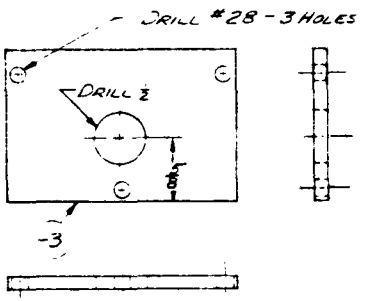
190



FRONT COVER PLATE



BOTTOM COVER PLATE



TOP COVER PLATE

-3	1	2½ × 1½ × ⅛ 24ST OR 75ST
-2	1	2½ × 1½ × ⅛ 24ST OR 75ST
-1	1	19½ × 2½ × ⅛ PLEXIGLASS

DOUGLAS AIRCRAFT CO. INC.
EL SEGUNDO, CALIFORNIA
STATIC TEST

COVER PLATES - DROP TEST SLIDE WIRE

FULL | 4-3-53 | STODDS

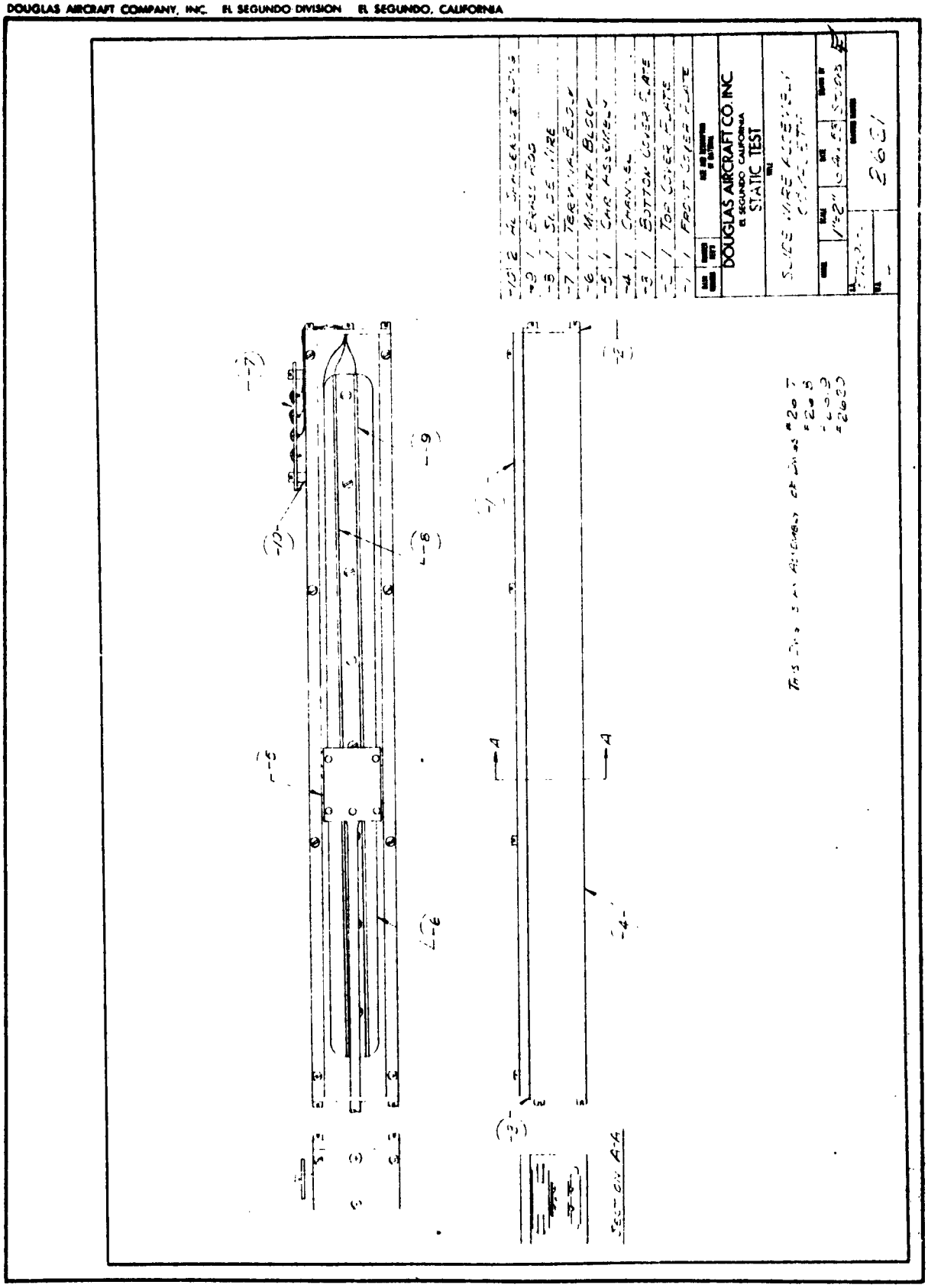
SYC9-501

2620

DOUGLAS AIRCRAFT COMPANY, INC. EL SEGUNDO DIVISION EL SEGUNDO, CALIFORNIA

Page 3.007
Report 40636

DOUGLAS AIRCRAFT COMPANY, INC. EL SEGUNDO DIVISION EL SEGUNDO, CALIFORNIA



FORM 30-2500
(7-51)

DESCRIPTION:

Nose gear upper mass vertical accelerometer. This transducer measures accelerations at aircraft stations X = 0.0, Y = 127.0 and Z = -39.1.

CONSTANT:

G's = 11.484 δ/Δ / 50 K Ohms Resis. Calib.
(up scale - mass up)

CHARACTERISTICS:

TRANSDUCER

Type - A5A-30-350

Serial No. - 3917

Natural Frequency - 382.0 cps

Damping - 0.88

no measurable supporting structure resonance

GALVANOMETER

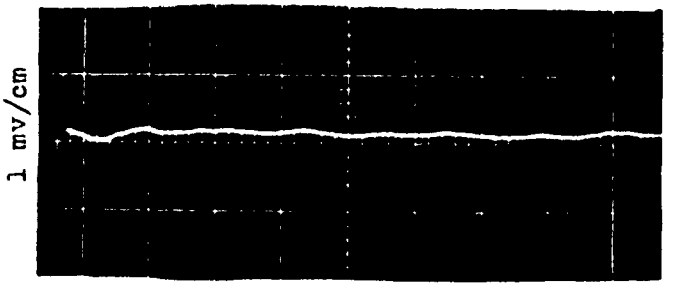
Type - 7-342

Serial No. - 4961

Resistance - 350.8

Natural Frequency - 228.4 cps

Damping - 0.600

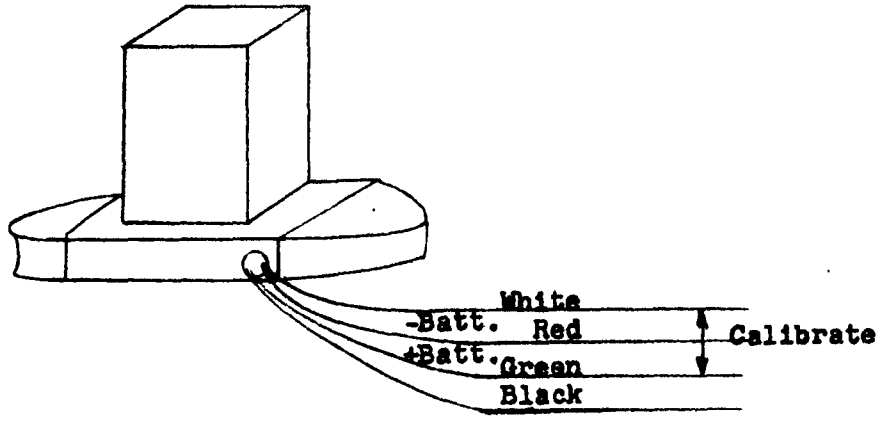


.001 sec/cm

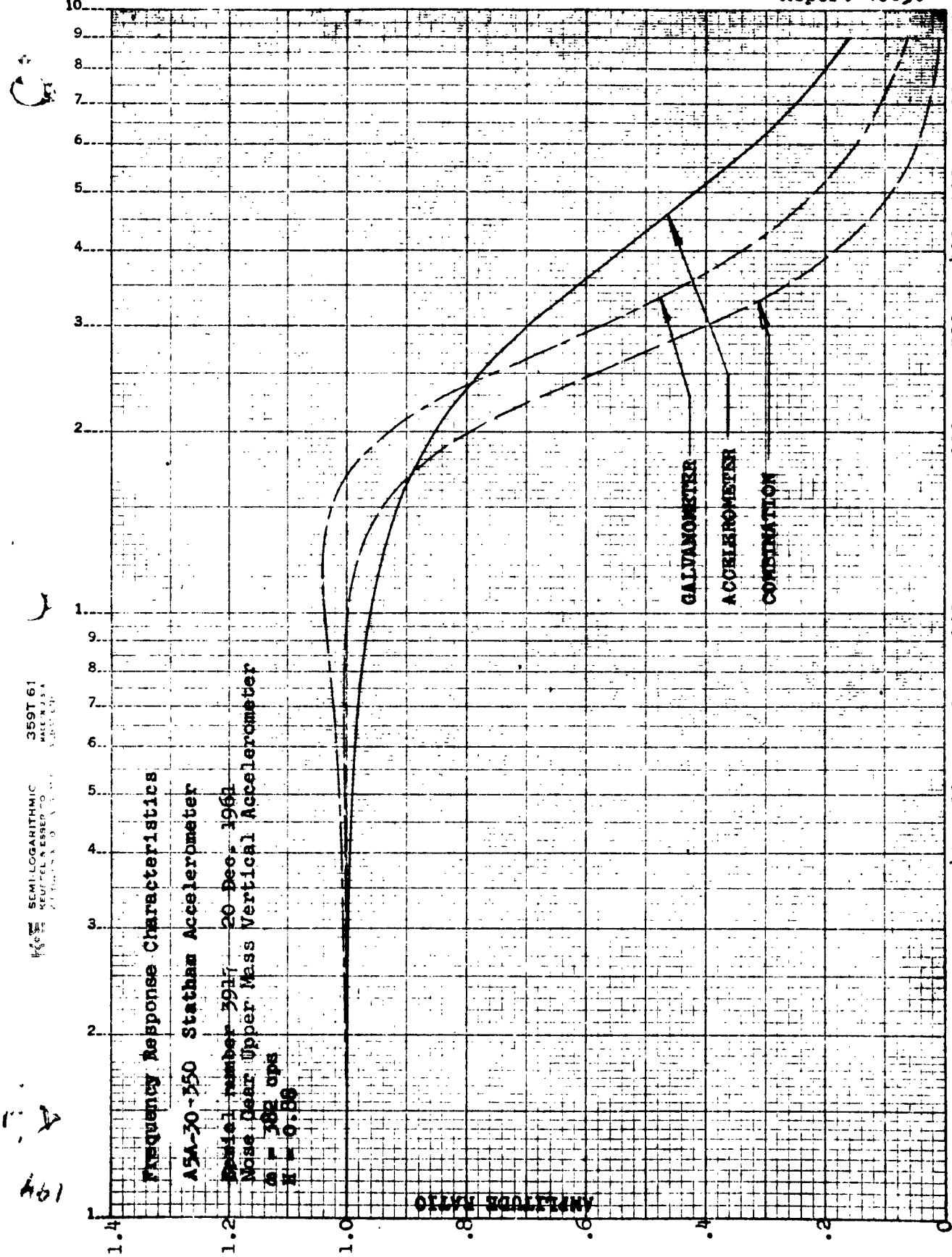
RECORDED:

Oscillograph Channel 1-24 for Drop Test
2-24 for Flight Test

NOSE GEAR UPPER MASS VERTICAL ACCELEROMETER



Label faces barrel


Frequency Response Characteristics
ASM-30-350 Statham Accelerometer
Serial number 3917 20 Dec. 1961
Nose Gear Upper Mass Vertical Accelerometer
G = 302 cps
K = 0.86
GALVANOMETER
ACCELEROMETER
COMBINATION
AMPLITUDE RATIO
FREQUENCY RESPONSE IN C.P.S.
1.4
1.2
1.0
.8
.6
.4
.2
0
10
20
30
40
50
70
100
200
300
400
500
700
1000

Page 3.012
Report 40636

TRANSDUCER CALIBRATION

SERIAL 3917
TAG 615441
D.R.O. 641067
PLANE 440089

PROGRAM E004
ANALYST
ENGR.

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STRIT A5A-3-350 ACCL. DF 0.88
NOMINAL RANGE.....±30 W_n = 382
DIMENSIONS.....GS
PERCENT UNBALANCE.....000
BRIDGE VOLTS.....5
CHANNEL NUMBER.....04
RUN NUMBER.....1
CALIBRATION DATE.....12/20/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	.68222 01 GS	/MV/V
1/RMS SLOPE	.14658 00 MV/V/ GS	
RMS INTERCEPT	-.30827 02 GS	

SHUNT CALIBRATION FACTORS

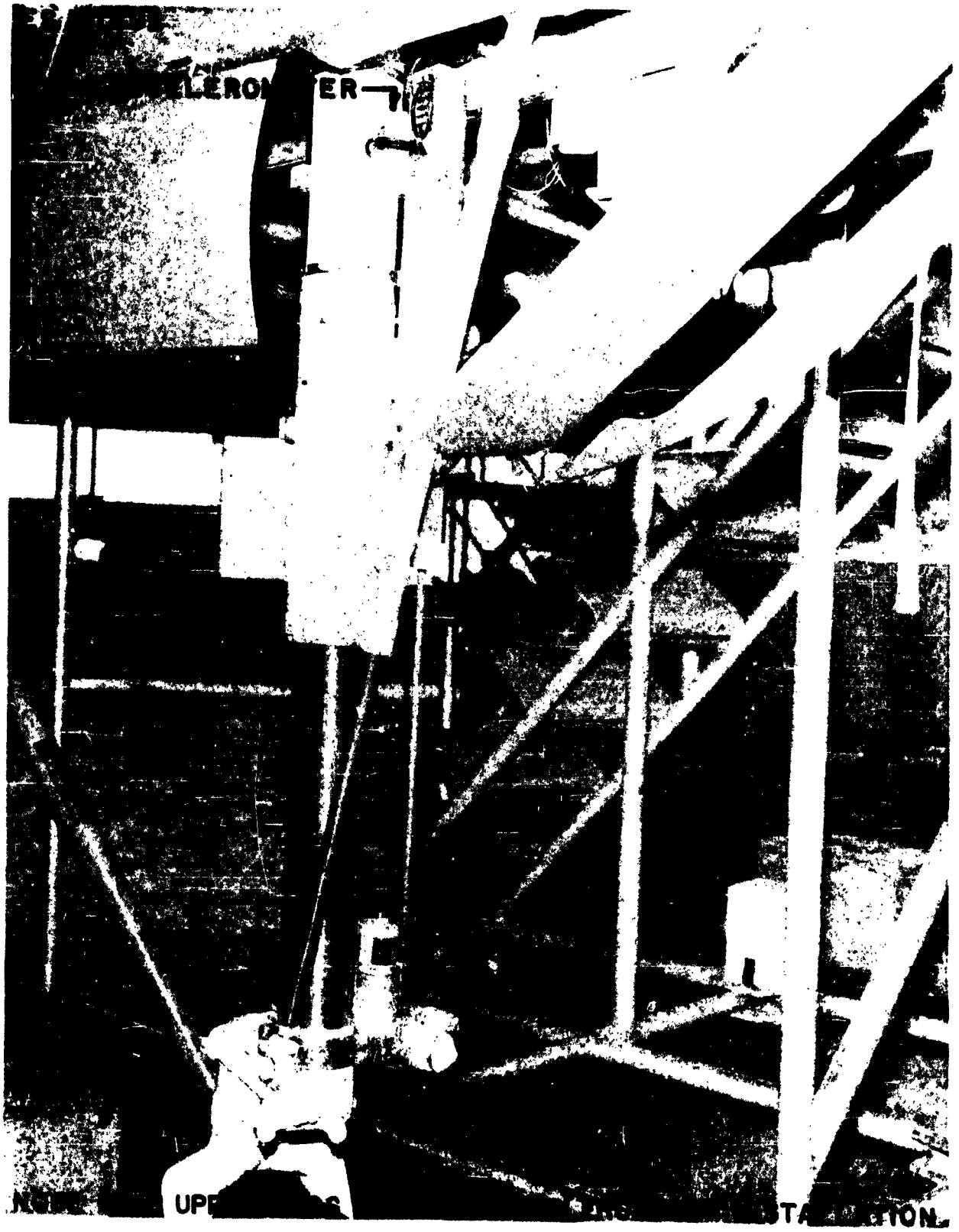
LEG	CAL-PIP EQUIVALENT	
G1-CP	.11905 02 GS	/ 50K
G1-TP	-.12164 02	
G2-TP	.11971 02	
G2-CP	-.11846 02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
.30000 02	.59932 00	.16	.14147 00	.24	.32839 00
.25000 02	.27836 00	.07	.15760 00	.27	.21913 00
.20000 02	.58640 -01	.01	.74406 -01	.01	.66523 -01
.15000 02	-.77561 -01	-.02	-.18977 00	-.32	-.13367 00
.10000 02	-.11526 00	-.03	-.24617 00	-.41	-.17870 00
.50000 01	-.16529 00	-.04	-.26632 00	-.49	-.23085 00
.00000 -39	-.15943 00	-.04	-.33023 00	-.57	-.24983 00
.50000 01	-.14723 00	-.04	-.27122 00	-.46	-.20923 00
.10000 02	-.66446 -01	-.02	-.25772 00	-.43	-.16308 00
.15000 02	.20138 00	.05	-.18918 00	-.31	.81010 -02
.20000 02	.51285 00	.13	-.22609 00	-.38	.14338 00
.25000 02	.45646 00	.12	-.15756 00	-.26	.15026 00
.30000 02	.54348 00	.14	-.14148 00	-.24	.34348 00

27 DEC. 1960

SR. CALIB 11.852

951


ER
UPP
STA
ION

AIRPLANE CENTER OF GRAVITY

Accelerometers, an attitude gyro, and a roll rate gyro were installed at or near the airplane center of gravity to measure the vertical and longitudinal accelerations, the pitch and roll angles, and the roll rate experienced by the airplane.

Accelerations at Center of Gravity

Pages 4.002 through 4.011 discuss the accelerometer installations. Two accelerometers were oriented to measure normal acceleration, one for low range and one for high range. A third accelerometer was installed to measure longitudinal acceleration. These accelerometers were mounted parallel and perpendicular to the fuselage reference plane. The accelerometer installations in the drop test airplane and in the flight test airplane are shown in the photographs on Pages 4.012 and 4.013, respectively.

DESCRIPTION:

C.G. normal accelerometer, low range. This transducer measures accelerations at aircraft stations X = 0.0, Y = 220.4 and Z = -26.3.

CONSTANT:

G's = .6117 δ/Δ / 50 K Ohms Resis. Calib.

up scale, mass down

CHARACTERISTICS:

TRANSDUCER -

Type - Statham AJ26A-1-350

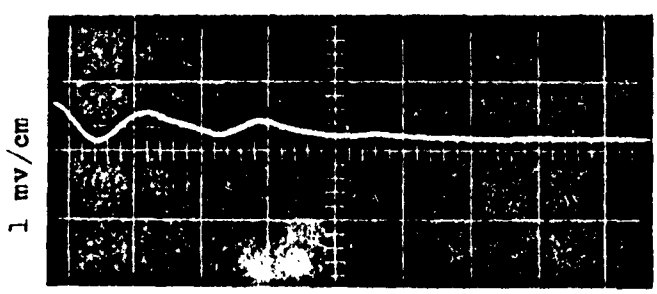
Serial No. - 331

Natural Frequency - Mount 546.6 cps

Damping - Mount 0.08

GALVANOMETER

	DROP TEST	FLIGHT TEST
Type -	7-312	7-342
Serial No. -	5768	4945
Resistance -	357.7 Ohms	
Natural Frequency -	110.6 cps	
Damping -	0.558	

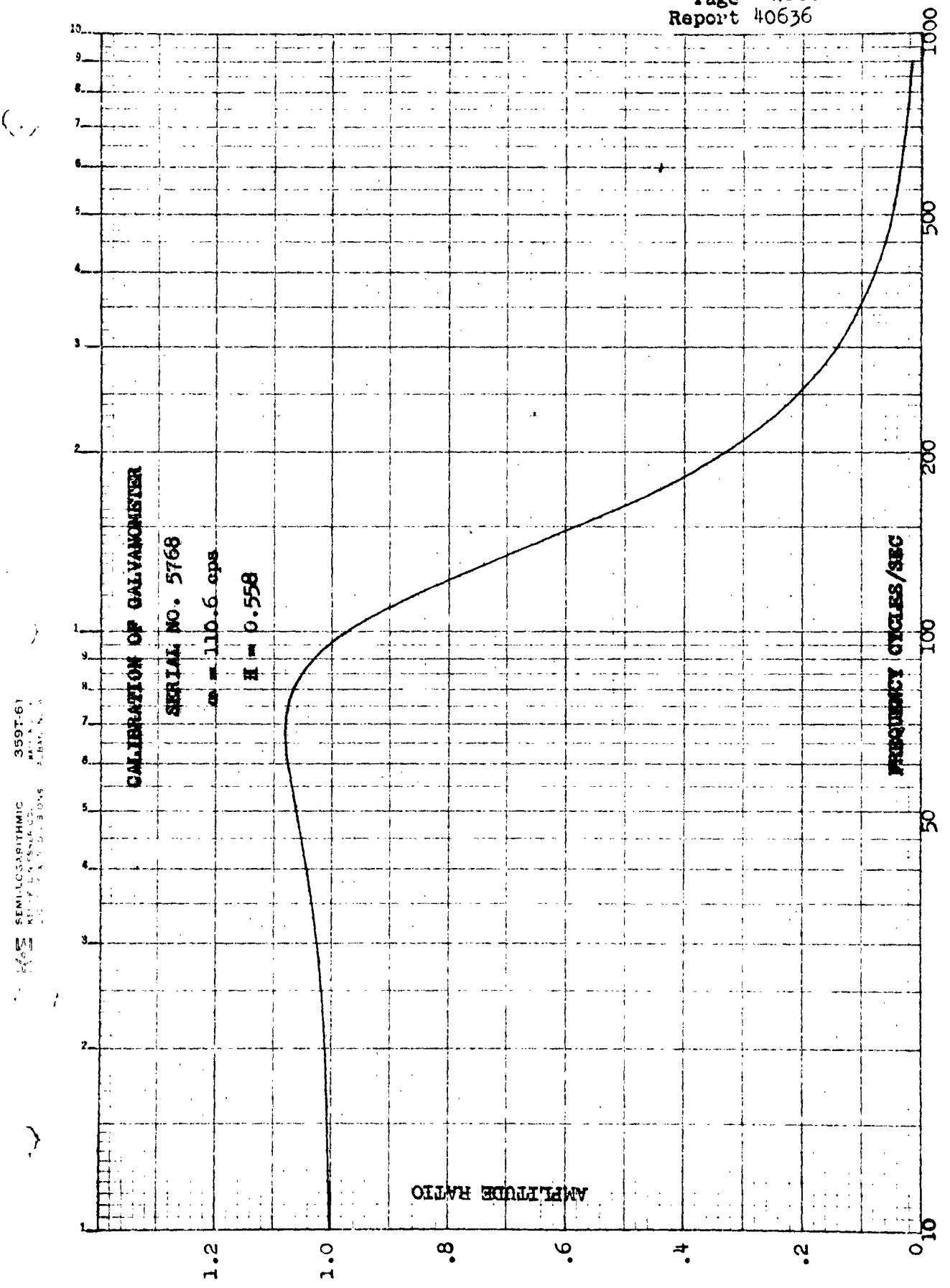


.001 sec/cm

RECORDED:

Oscillograph Channel 1-27 for Drop Test
2-11 for Flight Test

301



ADI 88-4-4
(3-61)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE
PREPARED BY I. E. Harris
TITLE Mdg. Loads Investigation

PAGE 4.004
MODEL [illegible]
REPORT [illegible]

TRANSDUCER CALIBRATION

SERIAL 331
TAG 620324
DeRaCo 641069
PLANE A4D089

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STHM AU26A-1-350 ACL. NO DAMP
NOMINAL RANGE.....+-1
DIMENSION$.....GS
PERCENT UNBALANCE.....00
BRIDGE VOLTS.....5
CHANNEL NUMBER.....03
RUN NUMBER.....1
CALIBRATION DATE.....12/16/60

PROGRAM E004
ANALYST
ENGR.

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .33960 0D G5 /MV/V

1/RMS SLOPE .29446 01 MV/V/ GS

RMS INTERCEPT -.10326 01 G5

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.60773	00 GS	/ 50K
G1-TP	-.60732	00	
G2-TP	.60752	00	
G2-CP	-.61168	00	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10000 01	-.66639 -02	-.33	-.66639 -02	-.33	-.66639 -02
-.80000 00	.30300 -02	.15	-.38335 -02	-.19	-.40177 -03
-.60000 00	.62763 -02	.31	-.34990 -02	-.17	.13887 -02
-.40000 00	.88987 -02	.44	-.35806 -02	-.18	.26591 -02
-.20000 00	.10481 -01	.52	-.51178 -02	-.26	.26817 -03
.00000 -39	.10608 -01	.53	-.49912 -02	-.25	.28082 -02
.20000 00	.99023 -02	.50	-.44487 -02	-.22	.27268 -03
.40000 00	.69771 -02	.30	-.66020 -02	-.32	-.16246 -03
.60000 00	.62036 -02	.31	-.58595 -02	-.29	.17206 -03
.80000 00	.50659 -03	.03	-.56250 -02	-.28	-.25092 -02
.10000 01	-.53984 -02	-.27	-.53984 -02	-.27	-.53984 -02

22 DEC. 1960

002

DESCRIPTION:

10 G C.G. normal accelerometer. This transducer measures accelerations at aircraft stations X = 0.0, Y = 221.3, Z = -21.6.

CONSTANT:

G's = 7.86 δ/Δ /50 K Ohms Resis. Calib.
Up scale, mass down

CHARACTERISTICS:

TRANSDUCER

Type - Statham AJ43A-10-350

Serial No. - 728

Natural Frequency - 120.0 cps no mount resonance noticeable

Damping - 0.78

GALVANOMETER

Type - 7-342

Serial No. - 4973

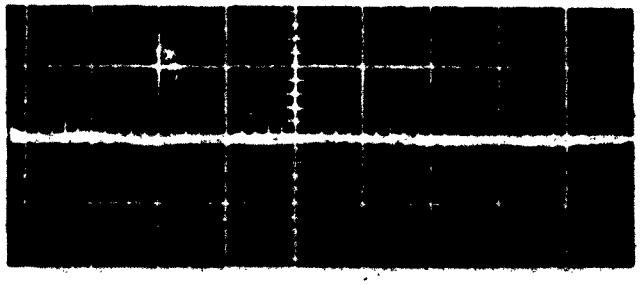
Resistance - 357.7 Ohms

Natural Frequency - 218.9 cps

Damping - 0.601

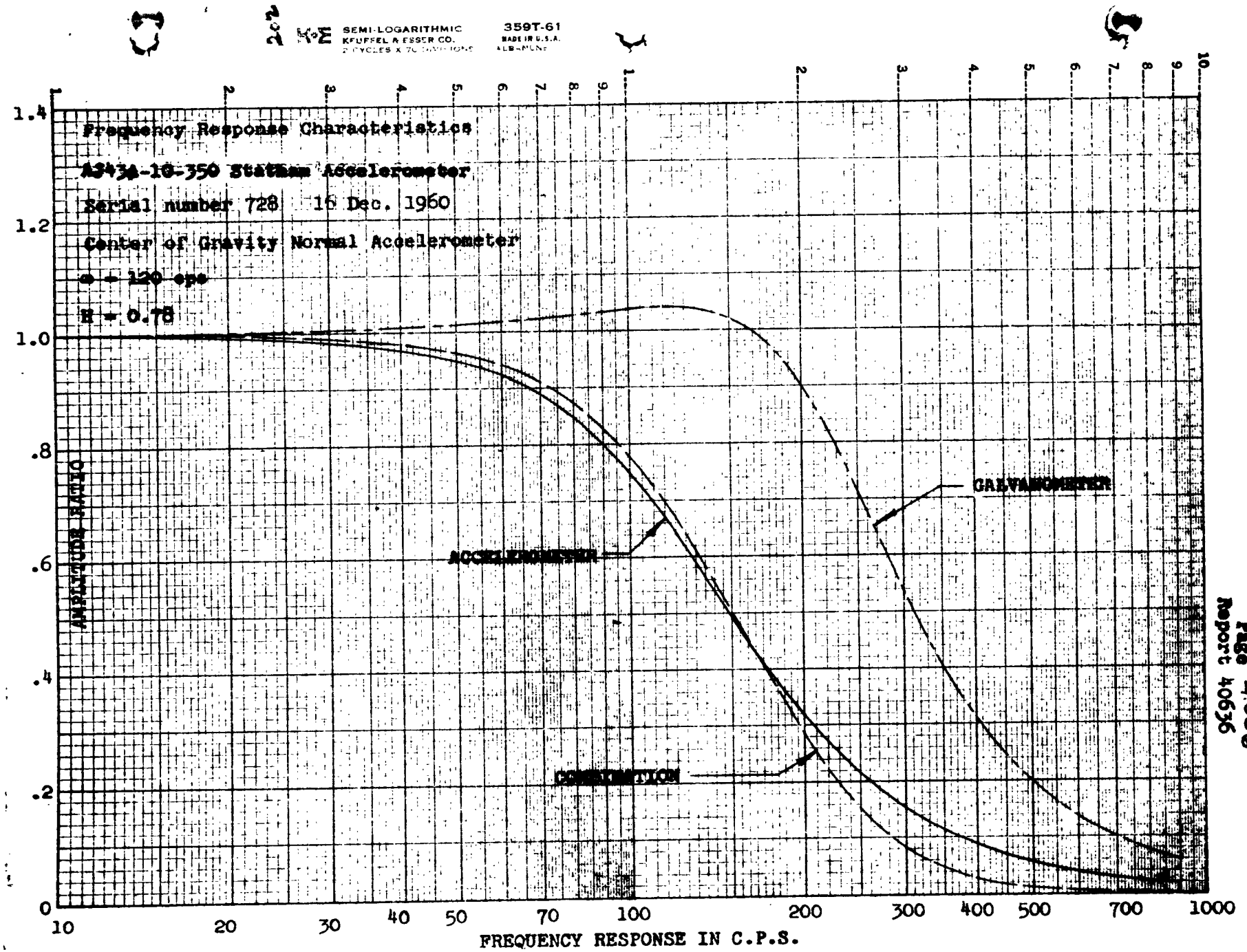
RECORDED:

Oscillograph Channel 1-31 for Drop Test
2-13 for Flight Test



1 MV/CM

.001 SEC/CM


SEMI-LOGARITHMIC
KEUFFEL & ESSER CO.
359T-61
Frequency Response Characteristics
A3434-10-350 Statham Accelerometer
Serial number 728 16 Dec. 1960
Center of Gravity Normal Accelerometer
e = 120 cps
R = 0.78
AMPLITUDE RATIO
GALVANOMETER
ACCELEROMETER
CORRECTION
FREQUENCY RESPONSE IN C.P.S.
1.4
1.2
1.0
.8
.6
.4
.2
0
10
20
30
40
50
70
100
200
300
400
500
700
1000

Page 4.007
Report 40636

TRANSDUCER CALIBRATION

SERIAL 728
TAG NATC
D.R.O. 670462
PLANE A4D-2N

CALIBRATION PRIOR TO FLIGHT TEST PHASE

PROGRAM F004
ANALYST
ENGR.

TRANSDUCER DESCRIPTION..STATHAM AJ43A-10-350 ACCEL.
NOMINAL RANGE..... +-10
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 02
RUN NUMBER..... 1
CALIBRATION DATE.....05/17/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	.44328	01 GS	/MV/V
1/RMS SLOPE	.22559	00 MV/V/ GS	
RMS INTERCEPT	-.11611	02 GS	

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.78974	01 GS	/ 50K
G1-TP	.80936	01	
G2-TP	.79944	01	
G2-CP	.77982	01	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10600 02	-.47882 -01	-.23	-.27112 -01	+.13	-.37497 -01
-.75500 01	.19271 00	.91	-.58850 -01	+.28	.66928 -01
-.62500 01	.62612 -01	.30	-.68935 -01	+.33	-.31161 -02
-.40000 01	.64773 -01	.31	-.80621 -01	+.38	-.79236 -02
-.18900 01	.79253 -01	.37	-.61526 -01	+.29	.88436 -02
.00000 -39	.67591 -01	.32	-.11704 00	-.55	-.24729 -01
.18900 01	.72084 -01	.34	-.11024 00	+.52	-.19076 -01
.40000 01	.72716 -01	.34	-.61139 -01	+.29	.57887 -02
.62500 01	.47184 -01	.22	-.47438 -01	+.22	-.12696 -03
.75600 01	.16328 -01	.08	-.39061 -01	+.18	-.11367 -01
.10600 02	.44593 -01	.21	.44593 -01	.21	.44593 -01

19 MAY 1960

Page 4.008
Report 40636

TRANSDUCER CALIBRATION

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STHM AJ434-10-350 A/C. NO. 0.74
NOMINAL RANGE..... +-10
SENSITIVITY.....PS
MEASUREMENT UNITS.....PSI
EXCITATION VOLT.....5
CHANNEL NUMBER.....03
RUN NUMBER.....1
CALIBRATION DATE.....12/10/60

VOLTAGE CALIBRATION EQUATIONS

RMS SLOPE .44194 01 PSI/MV/V

1/RMS SLOPE .22652 00 MV/V/PSI

RMS INTERCEPT -.10647 02 MV

LOAD	UP-SCALE DEVIATION	UP-SCALE ACCURACY	UP-SCALE REPEATABILITY	DOWN-SCALE ACCURACY	DOWN-SCALE REPEATABILITY	AVERAGE DEVIATION
+.10000 02	+.51378 -02	+.06	+.36044 -03	+.13	+.15497 -01	
+.80000 01	+.25567 -01	+.15	-.41317 -01	-.03	-.15527 -02	
+.60000 01	+.61778 -01	+.31	-.33650 -01	-.13	+.18813 -01	
+.40000 01	+.48776 -01	+.24	-.40441 -01	-.02	-.60661 -02	
+.20000 01	+.59865 -01	+.30	-.46625 -01	-.03	+.79955 -02	
.00000 -39	+.29642 -01	+.15	-.11472 00	-.05	-.42824 -01	
+.20000 01	+.24507 -01	+.12	-.91472 -01	-.07	-.33683 -01	
+.40000 01	+.77916 -02	+.04	-.60081 -01	-.20	+.60177 -02	
+.60000 01	+.34116 -01	+.21	-.31540 -01	-.13	+.27373 -02	
+.80000 01	+.58010 -01	+.37	+.40200 -02	+.02	+.19659 -01	
+.10000 02	+.10139 -01	+.06	-.10249 -01	+.00	+.10239 -01	

22 DEC. 1960

405

f

DESCRIPTION:

C.G. longitudinal accelerometer. This transducer measures accelerations at aircraft stations X = 0.0, Y = 221.4, Z = -22.1.

CONSTANT:

G's = .5488 δ/Δ /50 K Ohms Resis. Calib. Up scale, mass aft

CHARACTERISTICS:

TRANSDUCER

Type - Statham D-06-350

Serial No. - 4

Natural Frequency - Mount 494.8 cps

Damping - Mount 0.015

GALVANOMETER

Type - 7-312

Serial No. - 8097

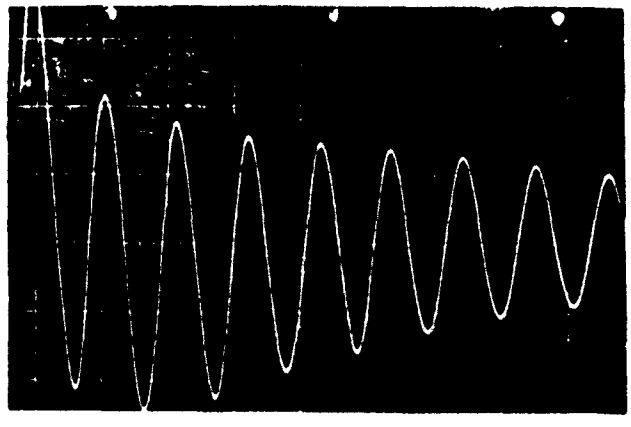
Resistance - 364.9 Ohms

Natural Frequency - 106.9 cps

Damping - 0.523

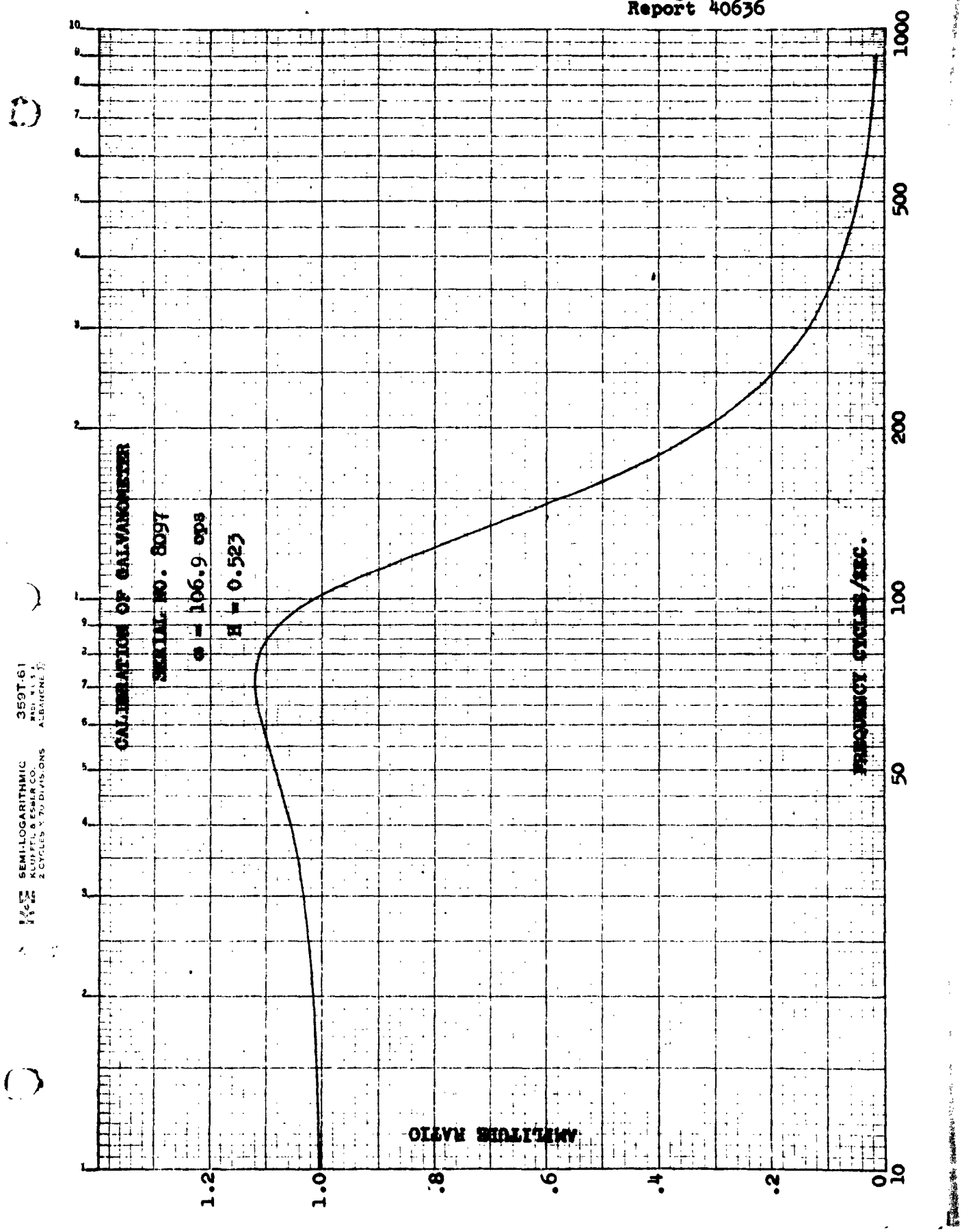
RECORDED:

Oscillograph Channel 1-29 for Drop Test



2 MV/CM

0.005 SEC/CM



SEMI-LOGARITHMIC
KEUFFEL & ESSER CO.
2 CYCLES X 70 DIVISIONS
359T-61

DESCRIPTION:

Measures longitudinal acceleration at airplane center of gravity.

CONSTANT:

0.573 G's/50 K

CHARACTERISTICS:

TRANSDUCER

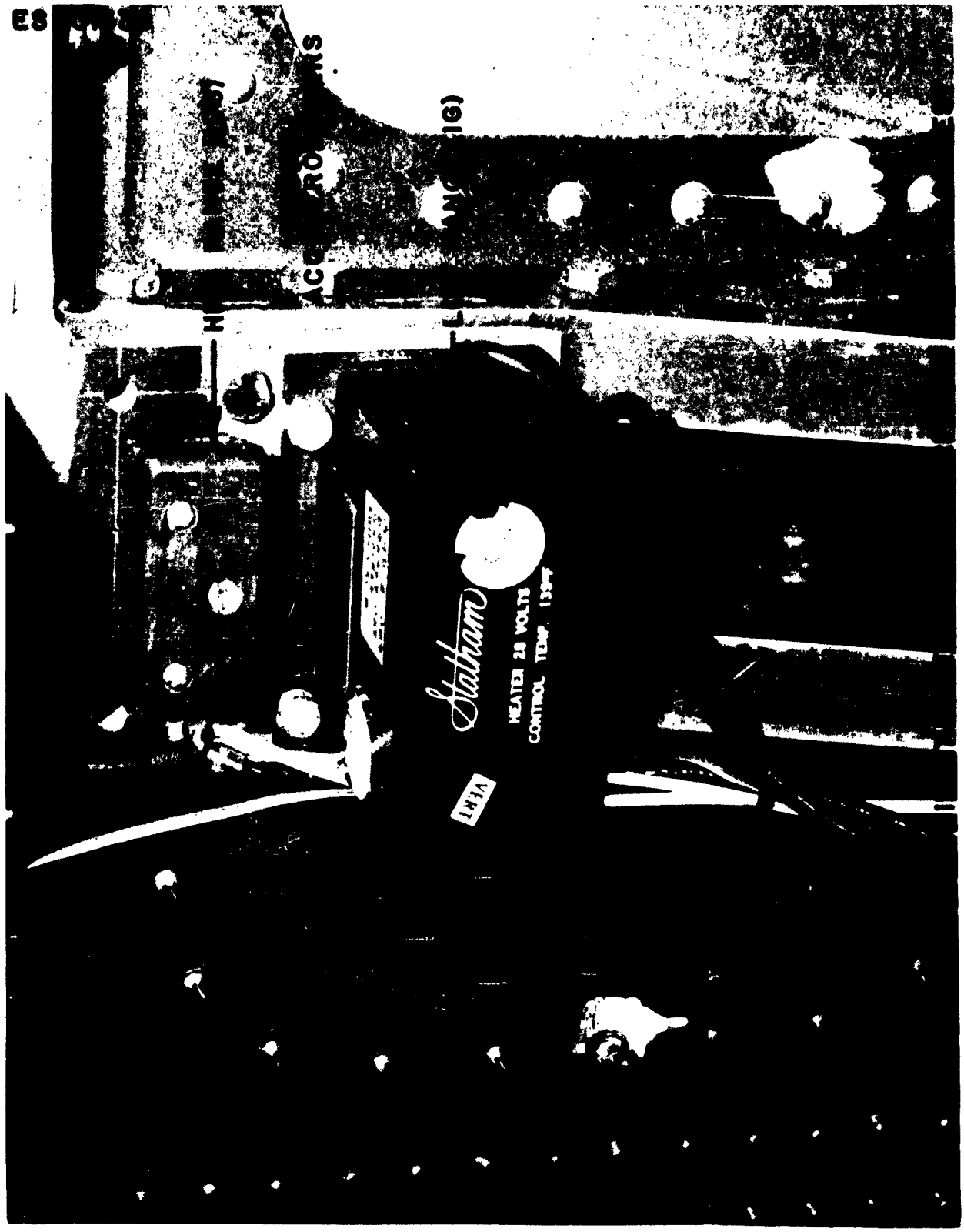
Type	Statham AJ26-1-350
Serial No.	420

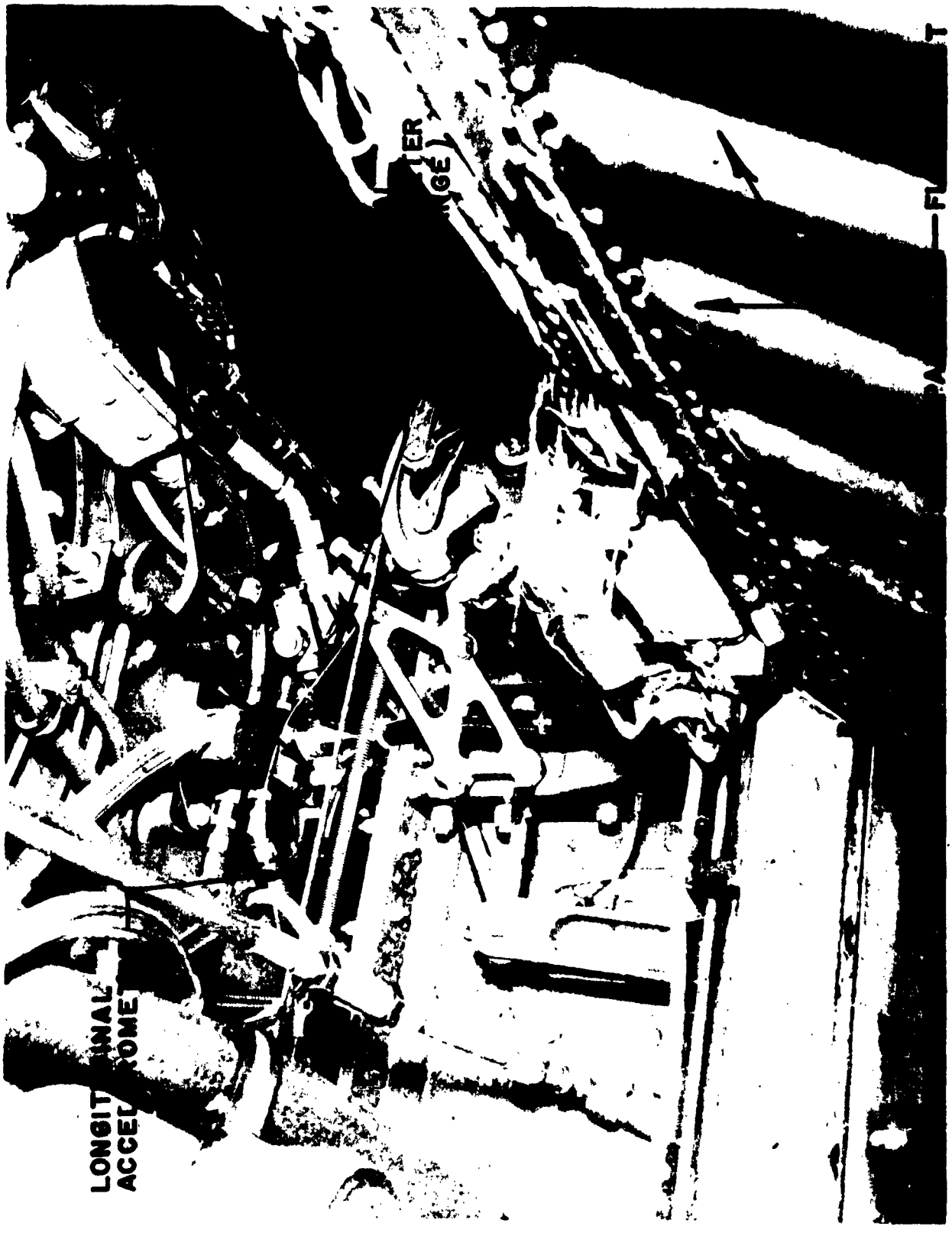
GALVANOMETER

Type	CEC 7-342
Serial No.	5033

RECORDED:

Oscillograph Channel 2-12 for Flight Test


Statham
HEATER 28 VOLTS
CONTROL TEMP 135°F
VIA


LONGITUDINAL ACCELEROMETER

Airplane Pitch and Roll Angles

Pages 4.102 through 4.119 discuss the attitude gyro installation used to measure airplane pitch and roll angles. The installations in the drop test airplane and in the flight test airplane are shown in the photographs on Pages 4.123 and 4.124.

Airplane Rate of Roll

Pages 4.120 through 4.122 discuss the rate of roll gyro installation. The rate of roll gyro was installed for the flight test phase only. A photograph of the installation appears on Page 4.124.

DESCRIPTION:

Aircraft pitch attitude. This transducer measures aircraft fuselage reference line pitch angle with respect to the horizontal.

CONSTANT:

Degrees = 3.534 δ/Δ / 500K Ohms Resistor Calibration

CHARACTERISTICS:

TRANSDUCER

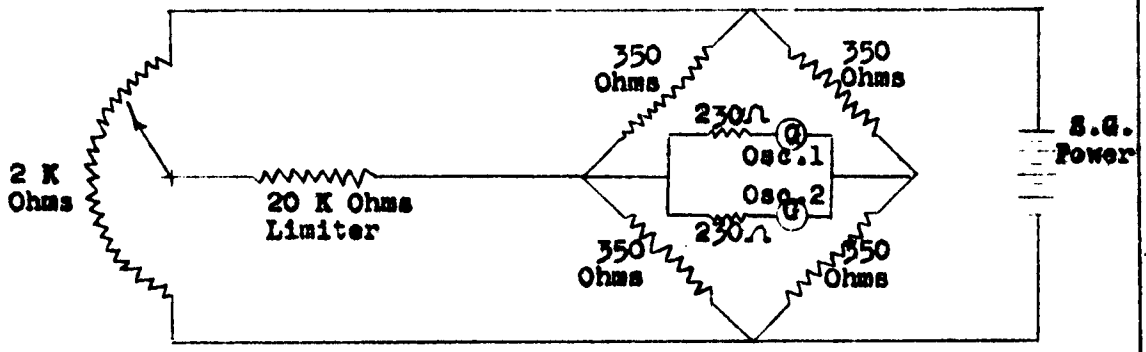
Type - Gyro DJG 7044A62

Serial No. - M4083

GALVANOMETER

Type - 7-339

Serial No. - 13213



RECORDED:

Oscillograph Channel 2-28 for Drop Test

PREPARED BY A.D. MERIWETHER
DATE 14MAR 61
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. 40636

CALIBRATION OF PITCH GYRO

TEST	RUN	CHANNEL	LOAD	READING	X	Y
3	2	25		490		
3	2	28			.00000	
3	2	28	2	290	.57143	2
3	2	27	4	540	1.10204	4
3	2	29	6	810	1.65306	6
3	2	28	8	1110	2.26531	8
3	2	28	10	1370	2.79592	10
3	2	28	12	1650	3.36735	12
3	2	29	14	1910	3.89796	14
3	2	28	16	2190	4.46939	16
3	2	28	18	2490	5.08163	18
3	2	29	16	2180	4.44898	16
3	2	28	14	1930	3.93878	14
3	2	29	12	1610	3.28571	12
3	2	28	10	1380	2.81633	10
3	2	28	8	1070	2.18367	8
3	2	28	6	820	1.67347	6
3	2	29	4	520	1.06122	4
3	2	28	2	280	.57143	2
3	2	28		-10	-.02041	
3	2	28	-2	-300	-.61224	-2
3	2	28	-4	-570	-1.16327	-4
3	2	28	-6	-870	-1.77551	-6
3	2	28	-8	-1170	-2.38774	-8
3	2	28	-6	-840	-1.71429	-6
3	2	28	-4	-560	-1.14286	-4
3	2	28	-2	-290	-.59184	-2
3	2	28		-10	-.02041	

216

PREPARED BY H.D. MCRIWETHER
DATE 14MAR 61
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. 40636

CALIBRATION OF PITCH GYRO

INTERCEPT AVE. DELTA Y	SLOPE 1	SLOPE 2 MAX.+	SLOPE 3 MAX.-	SLOPE 4 OMITTED X
.133	3.536			
.097		.310	-.153	.00000
.104	3.547			
.082		.241	-.139	-2.38776
.101	3.543			
.074		.109	-.126	3.28571
.062	3.547			
.066		.167	-.123	-1.77551
.077	3.548			
.051		.158	-.115	2.18367

DESCRIPTION:

Aircraft pitch attitude gyro.

CONSTANT:

Degrees = 3.595 δ/Δ / 500 K Ohms Resis. Calib.

Drop 8, Degrees = 2.26 δ/Δ / 500 K Ohms Resis. Calib.

CHARACTERISTICS:

TRANSDUCER

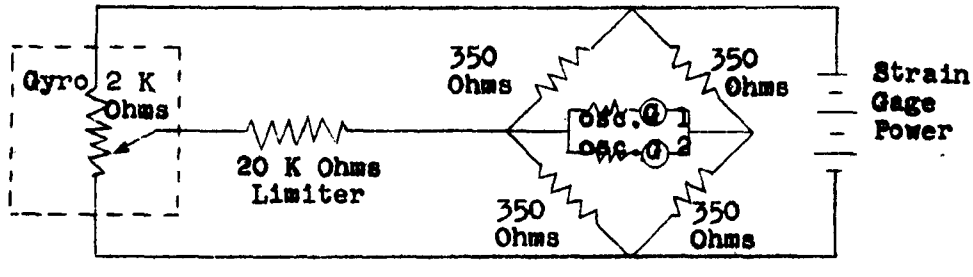
Type - D JG 7044A62

Serial No. - N 4083

GALVANOMETER

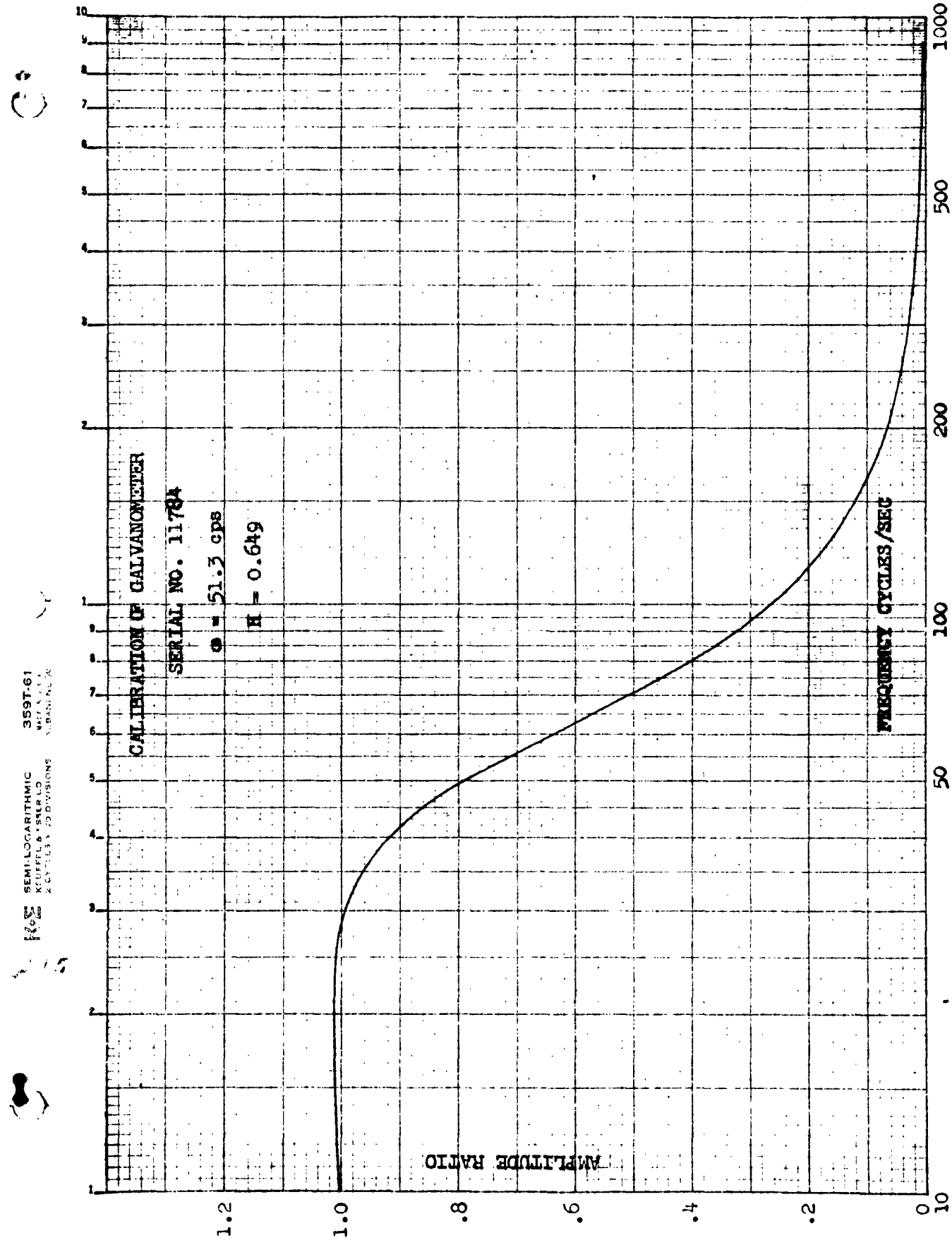
Type - 7-339

Serial No. - 11784



RECORDED:

Oscillograph Channel 1-28 for Drop Test


CALIBRATION OF GALVANOMETER
SERIAL NO. 11784
Φ = 51.3 cps
H = 0.649
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1.2
1.0
.8
.6
.4
.2
0
10
50
100
200
500
1000
SEMI-LOGARITHMIC
KEUFFEL & ESSER CO.
359T-61

PREPARED BY H.D. MERIWETHER
DATE 14MAR 61
TITLE LANDING LOADS INVESTIGATION

MODEL AND-2
REPORT NO. 40636

CALIBRATION OF PITCH GYRO

TEST	RUN	CHANNEL	LOAD	READING	X	Y
3	1	29		500		
3	1	28		10	.02000	
3	1	28	2	290	.58000	2
3	1	29	4	540	1.08000	4
3	1	29	6	850	1.68000	6
3	1	29	8	1120	2.24000	8
3	1	29	10	1380	2.76000	10
3	1	29	12	1670	3.34000	12
3	1	29	14	1930	3.86000	14
3	1	29	16	2230	4.46000	16
3	1	29	18	2510	5.02000	18
3	1	28	16	2220	4.44000	16
3	1	29	14	1950	3.90000	14
3	1	29	12	1660	3.32000	12
3	1	28	10	1390	2.78000	10
3	1	28	8	1090	2.18000	8
3	1	29	6	830	1.66000	6
3	1	29	4	520	1.04000	4
3	1	29	2	280	.56000	2
3	1	28		-10	-.02000	
3	1	29	-2	-290	-.58000	-2
3	1	29	-4	-560	-1.12000	-4
3	1	28	-6	-850	-1.70000	-6
3	1	28	-8	-1120	-2.24000	-8
3	1	28	-6	-830	-1.66000	-6
3	1	28	-4	-540	-1.08000	-4
3	1	29	-2	-290	-.58000	-2
3	1	28		10	.02000	

PREPARED BY H.D. MERIWETHER
DATE 14MAR 61
TITLE LANDING LOADS INVESTIGATION

MODEL AND-2
REPORT NO. 40636

CALIBRATION OF PITCH GYRO

INTERCEPT AVE. DELTA Y	SLOPE 1 MAX.+	SLOPE 2	SLOPE 3 MAX.-	SLOPE 4 OMITTED X
.023 .068	3.596 .237		-.140	.00000
.013 .061	3.596 .147		-.129	1.04000
.009 .056	3.595 .114		-.126	2.18000
.013 .053	3.592 .115		-.102	-1.08000
.017 .048	3.589 .107		-.099	3.86000

DESCRIPTION:

Measures airplane attitude angle, airplane fuselage reference line with respect to a horizontal plane.

CONSTANT:

5.20 deg/500 K Landings 1 through 72

5.16 deg/500 K Landings 73 through 209

DESCRIPTION:

TRANSDUCER

Type DJG 7044A62

Serial No. 1873 Landings 1 through 72
Landings 73 through 209

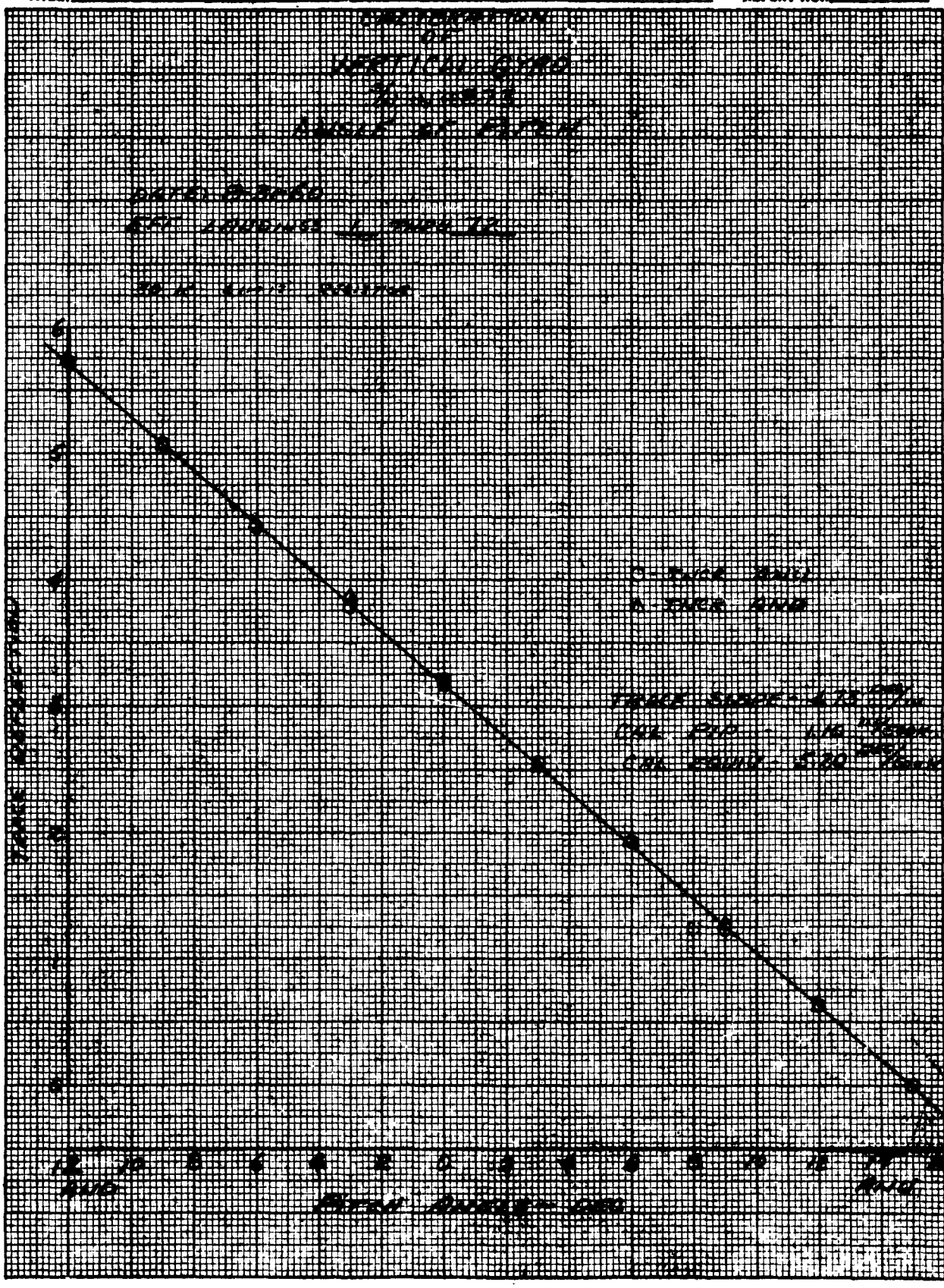
GALVANOMETER

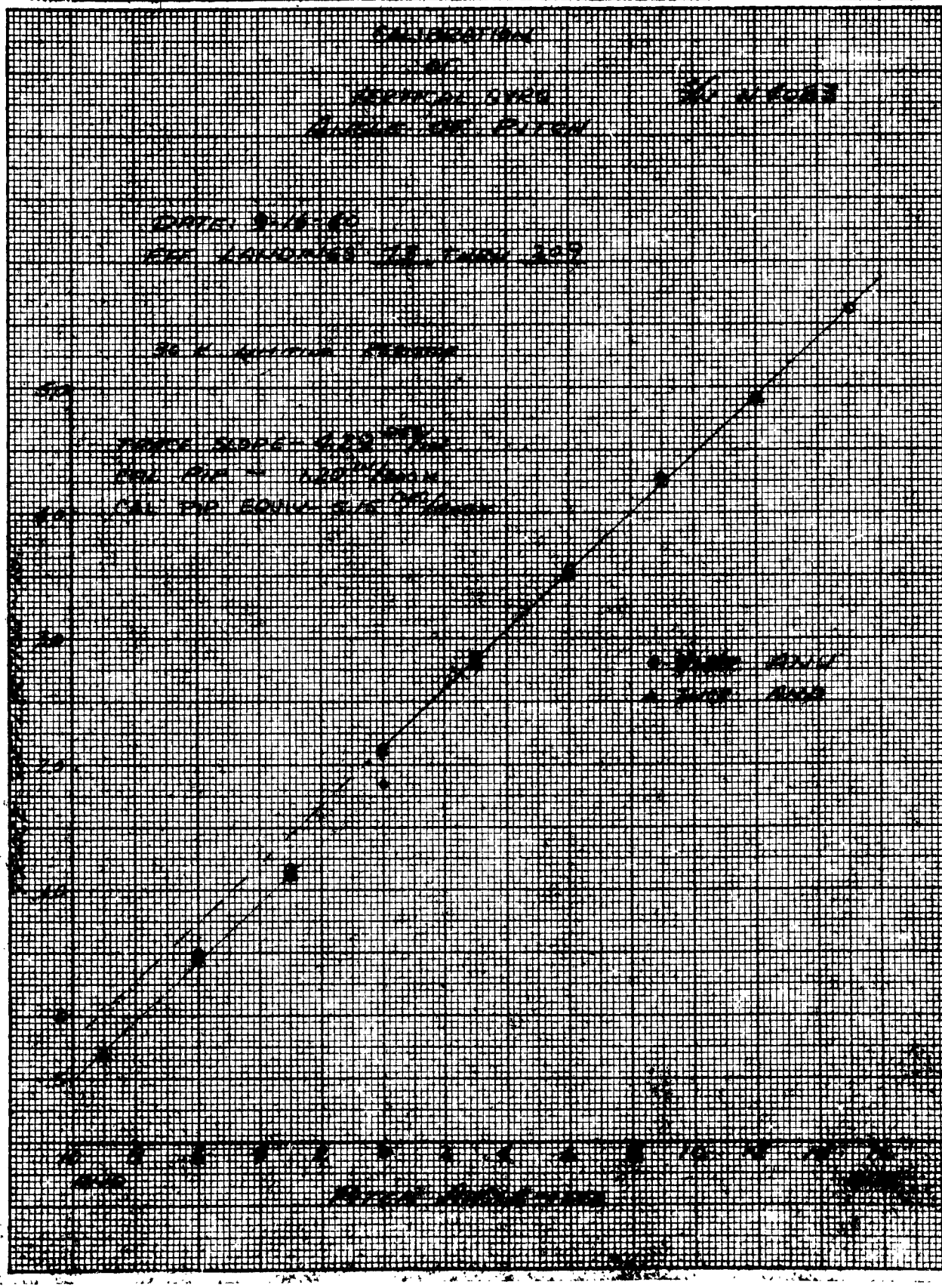
Type CEC 7-339

Serial No. 11784

RECORDED:

Oscillograph Channel 2-10 for Flight Test


C-Rack Shear
A-Rack Shear
Rack Shear - 4.25 Kips
Cal. Pro. - 4.46 Kips
Cal. Shear - 5.20 Kips
Shear Angle - Deg.


CALIBRATION
OF
VERTICAL SPEED
BUBBLE SET PITCH
DATE: 9-16-50
FOR LANDING GEAR TEST 329
36 K AIRFRAME WEIGHT
FLIGHT SPEED = 120 KTAS
ENG RPM = 1200 RPM
CAL PSI EQUIV FEET PER SECOND
VERTICAL SPEED
FEET PER SECOND

FORM 25 RB (REV. 3-54)

PREPARED BY: I.E. HARRIS

CHECKED BY:

DATE:

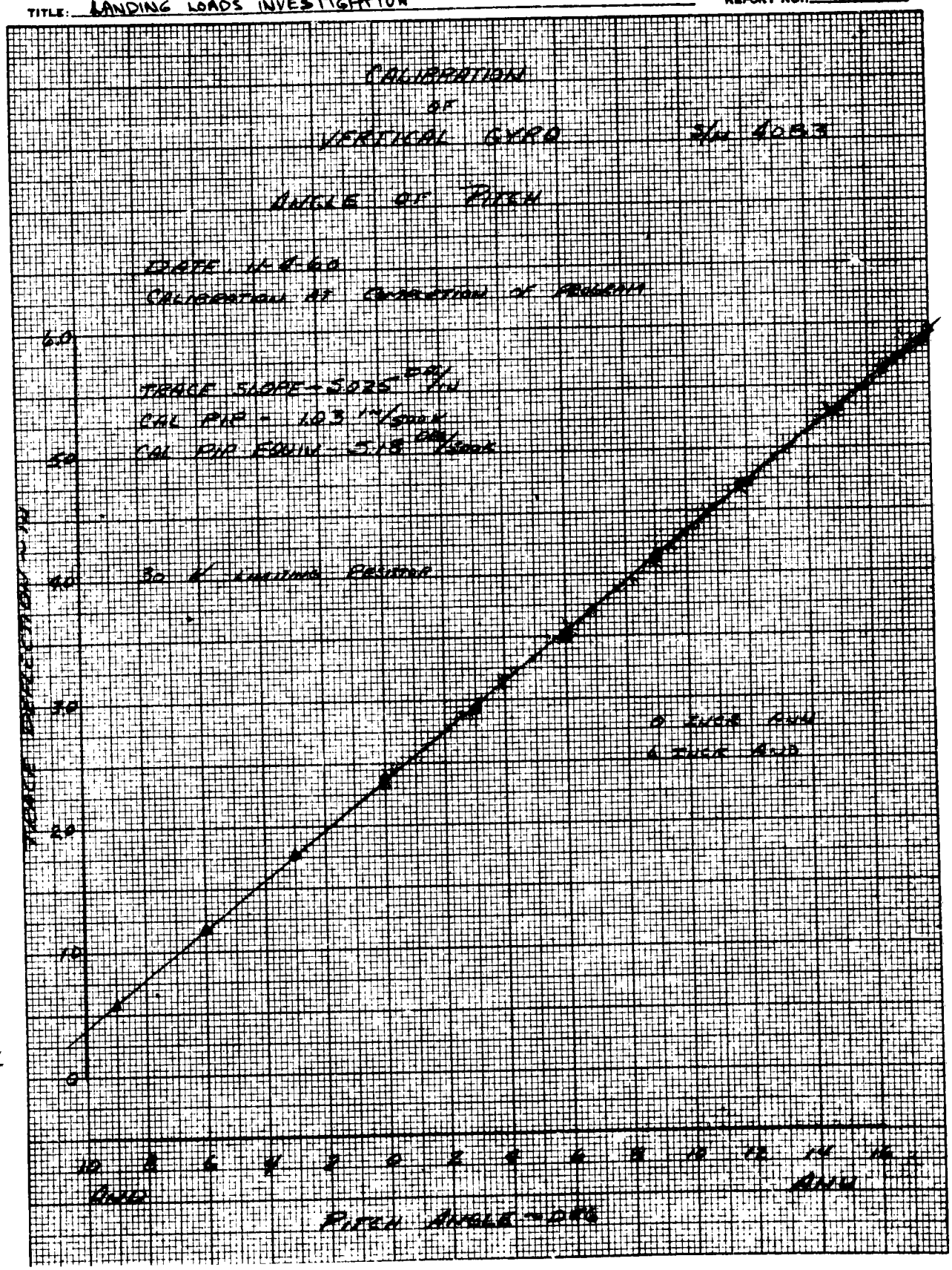
DOUGLAS AIRCRAFT COMPANY, INC.

DIVISION

MODEL: AAD-2

REPORT NO.: 40636

TITLE: LANDING LOADS INVESTIGATION



DESCRIPTION:

Aircraft roll attitude gyro.

CONSTANT:

Degrees = 11.09 δ/Δ / 500 K Ohms Resis. Calib.

CHARACTERISTICS:

TRANSDUCER

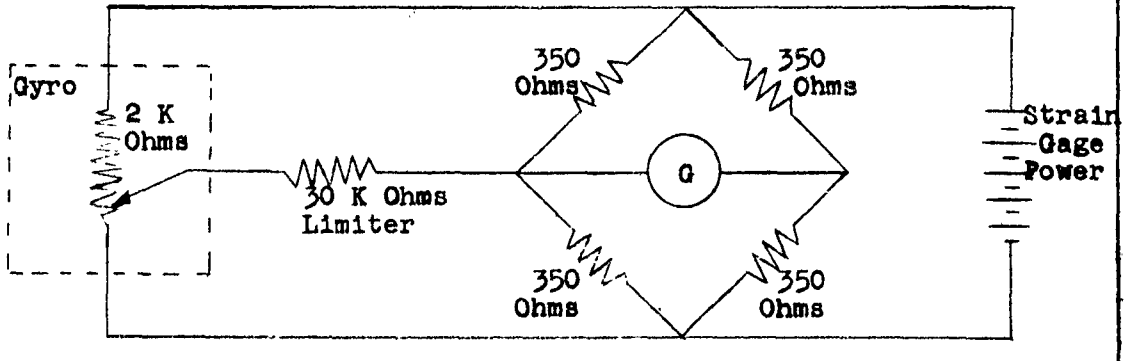
Type - DJG 7044 A 62

Serial No. - N 4083

GALVANOMETER:

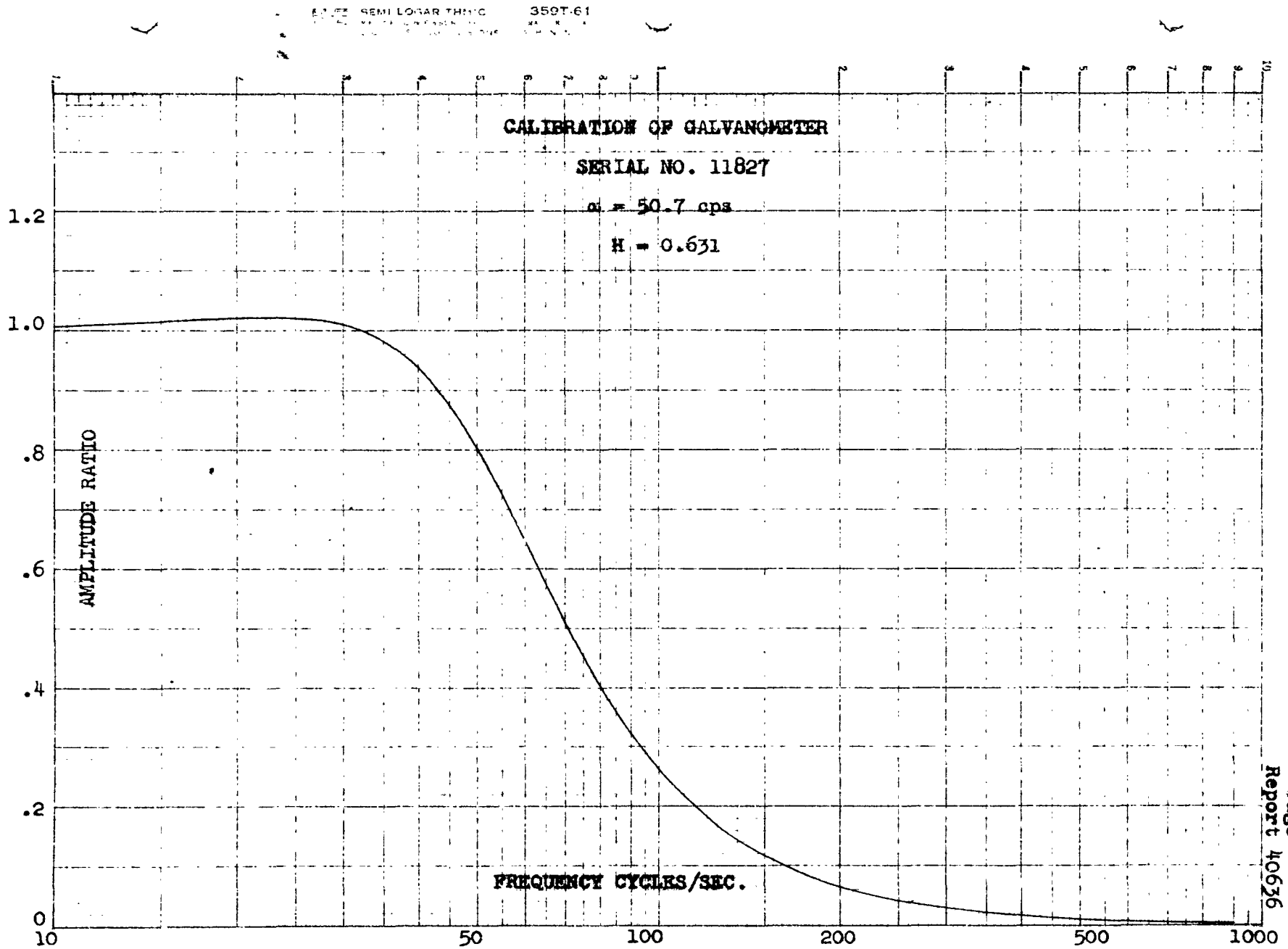
Type - 7-339

Serial No. - 11827



RECORDED:

Oscillograph Channel 1-30 for Drop Test


CALIBRATION OF GALVANOMETER
SERIAL NO. 11827
α = 50.7 cps
H = 0.631
AMPLITUDE RATIO
1.2
1.0
.8
.6
.4
.2
0
10
50
100
200
500
1000
FREQUENCY CYCLES/SEC.

DOUGLAS AIRCRAFT COMPANY, INC. EL SEGUNDO DIVISION PAGE 4.115

PREPARED BY H.D. MERIWETHER
DATE 3MARCH61
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. 49636

CALIBRATION OF BELL YRO

RIGHT WING IOAN POSITIVE

TEST	RUN	CHANNEL	LOAD	READING	X	Y
3	1	30		146		
3	1	30	2	29	.19663	2
3	1	30	4	54	.36286	4
3	1	30	6	80	.54795	6
3	1	30	8	105	.71918	8
3	1	30	10	132	.90411	10
3	1	30	12	159	1.08904	12
3	1	30	10	131	.89726	10
3	1	30		105	.71918	8
3	1	30	6	80	.54795	6
3	1	30	4	55	.36301	4
3	1	30	2	29	.19863	2
3	1	30			.00000	
3	1	30	-2	-26	-.17808	-2
3	1	30	-4	-52	-.35616	-4
3	1	30	-6	-78	-.53425	-6
3	1	30	-8	-104	-.71233	-8
3	1	30	-10	-132	-.90411	-10
3	1	30	-12	-158	-1.08219	-12
3	1	30	-11	-132	-.90411	-10
3	1	30	-8	-104	-.71233	-8
3	1	30	-6	-78	-.53425	-6
3	1	30	-4	-52	-.35616	-4
3	1	30	-2	-26	-.17808	-2
3	1	30		1	.00685	

INTERCEPT AVE.	DELTA Y	SLOPE 1 MAX.+	SLOPE 2 MAX.-	SLOPE 3 OMITTED X	SLOPE 4
+.051	11.086				
	.041	.102	-.132	.00000	
-.048	11.091				
	.046	.092	-.137	.19863	
-.037	11.092				
	.041	.082	-.068	.19863	
-.041	11.086				
	.049	.063	-.052	.89726	
-.045	11.079				
	.037	.074	-.053	.71918	

DESCRIPTION:

Measures airplane roll attitude.

CONSTANTS:

7.16 deg/500 K Landings 1 through 72

10.95 deg/500 K L ndings 73 through 209

CHARACTERISTICS:

TRANSDUCER

Type DJG 7044 A62

Serial No. 1873 Landings 1 through 72
4083 Landings 73 through 209

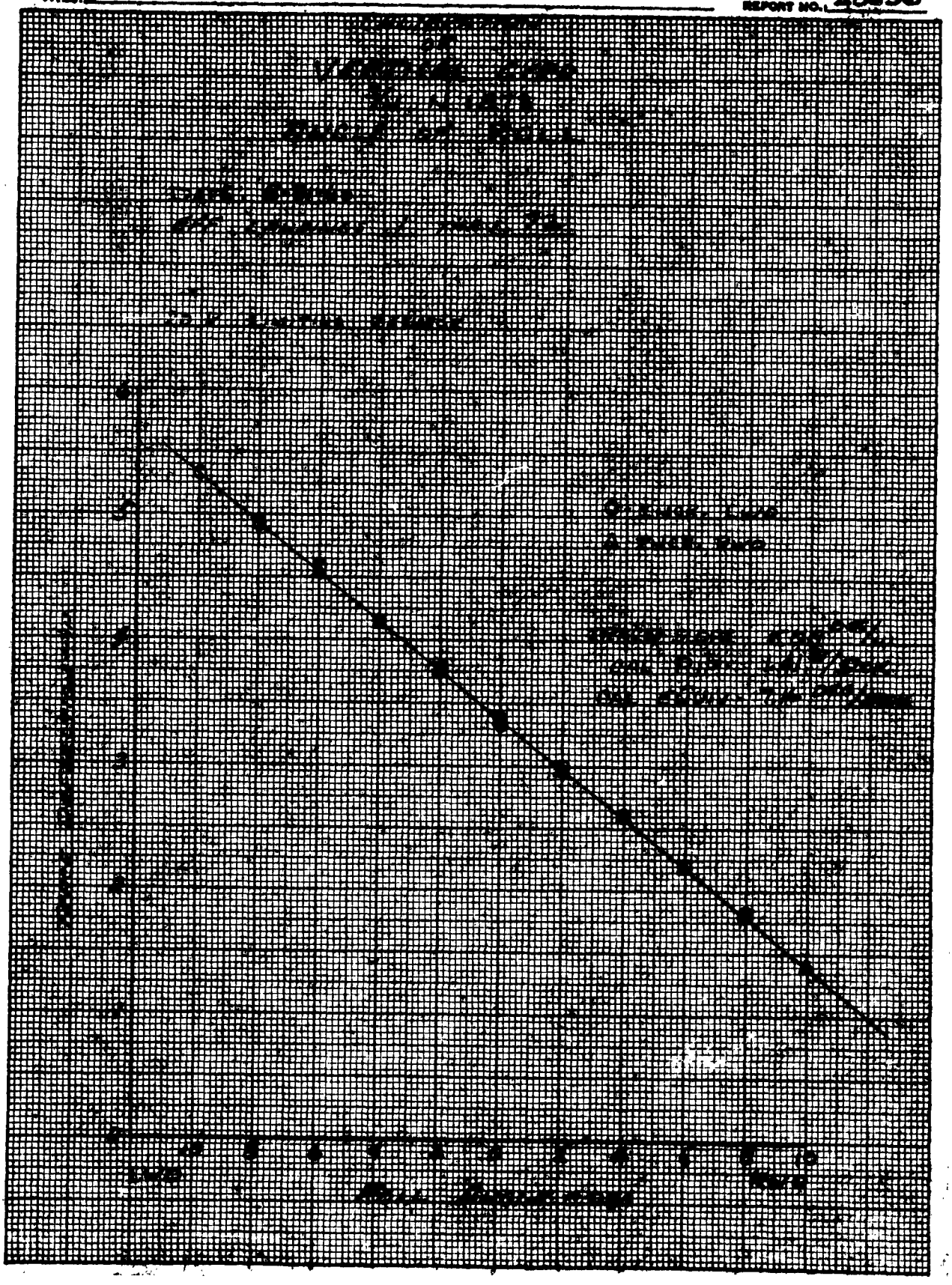
GALVANOMETER

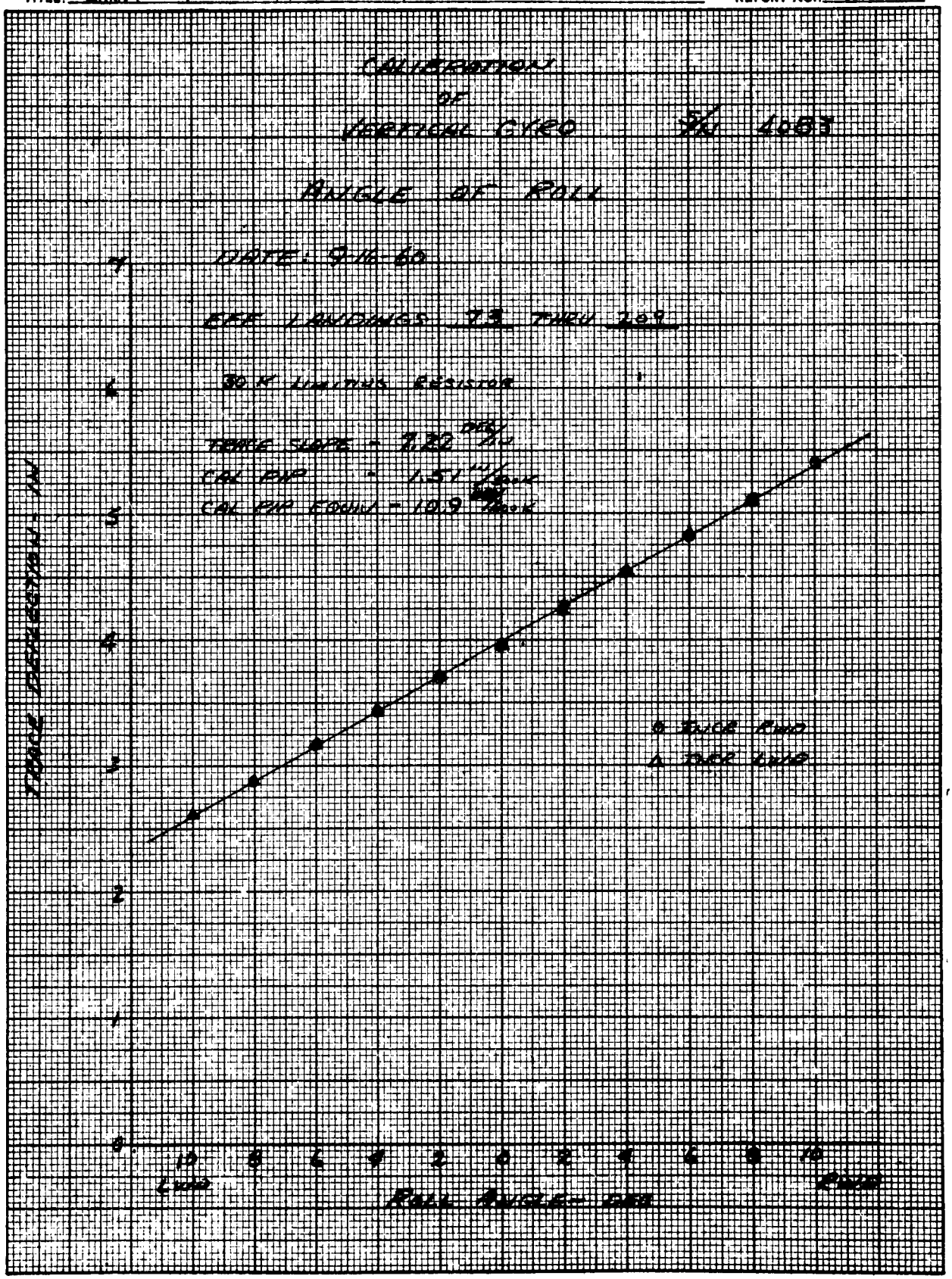
Type CEC 7-339

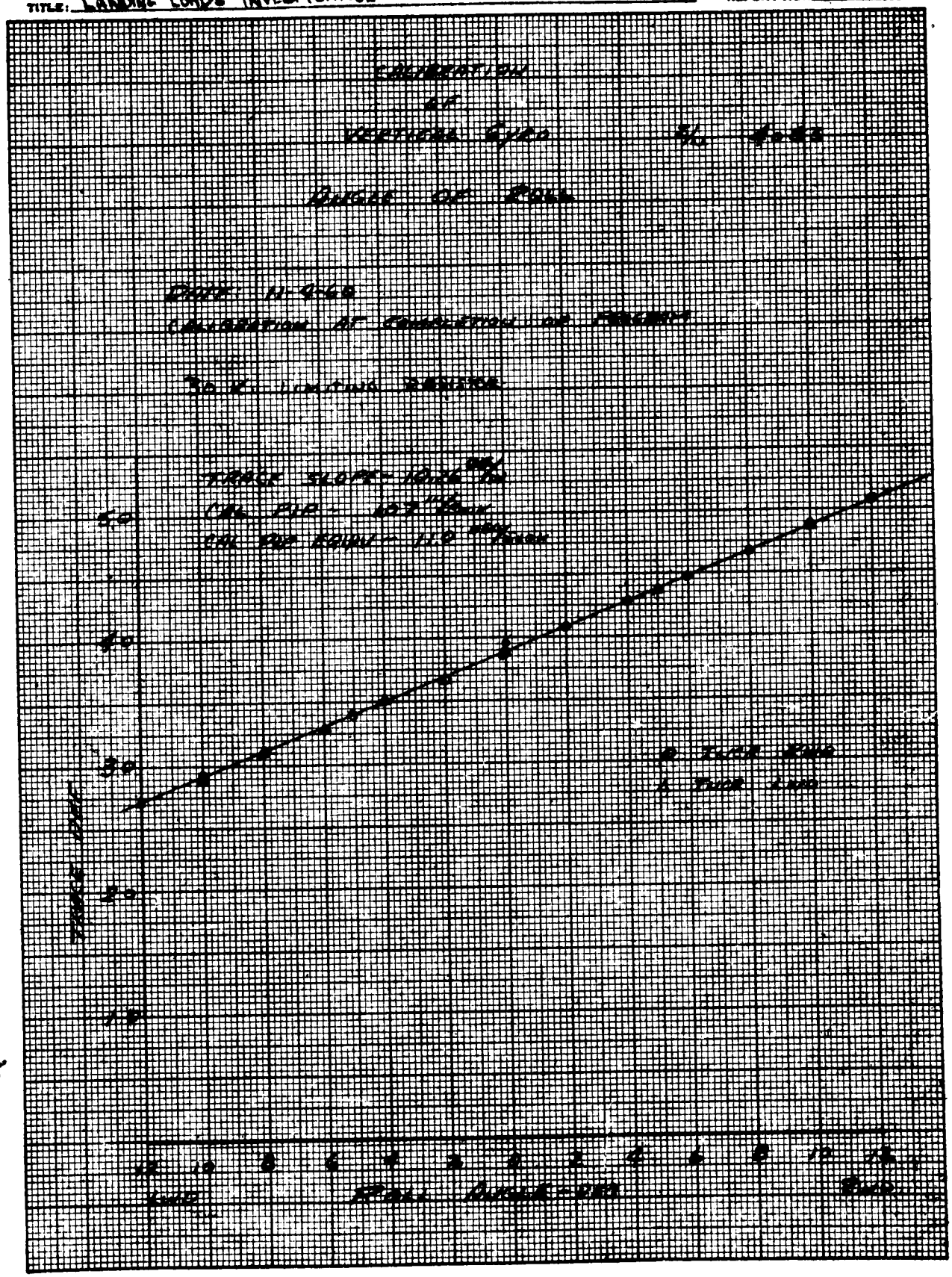
Serial No. 11827

RECORDED:

Oscillograph Channel 2-9 for Flight Test







DESCRIPTION:

Measures airplane rolling velocity.

CONSTANT:

31.3 deg/sec/50 K

CHARACTERISTICS:

TRANSDUCER

Type J07005A-7 Rate Gyro

Serial No. 4425

GALVANOMETER

Type CEC 7-315

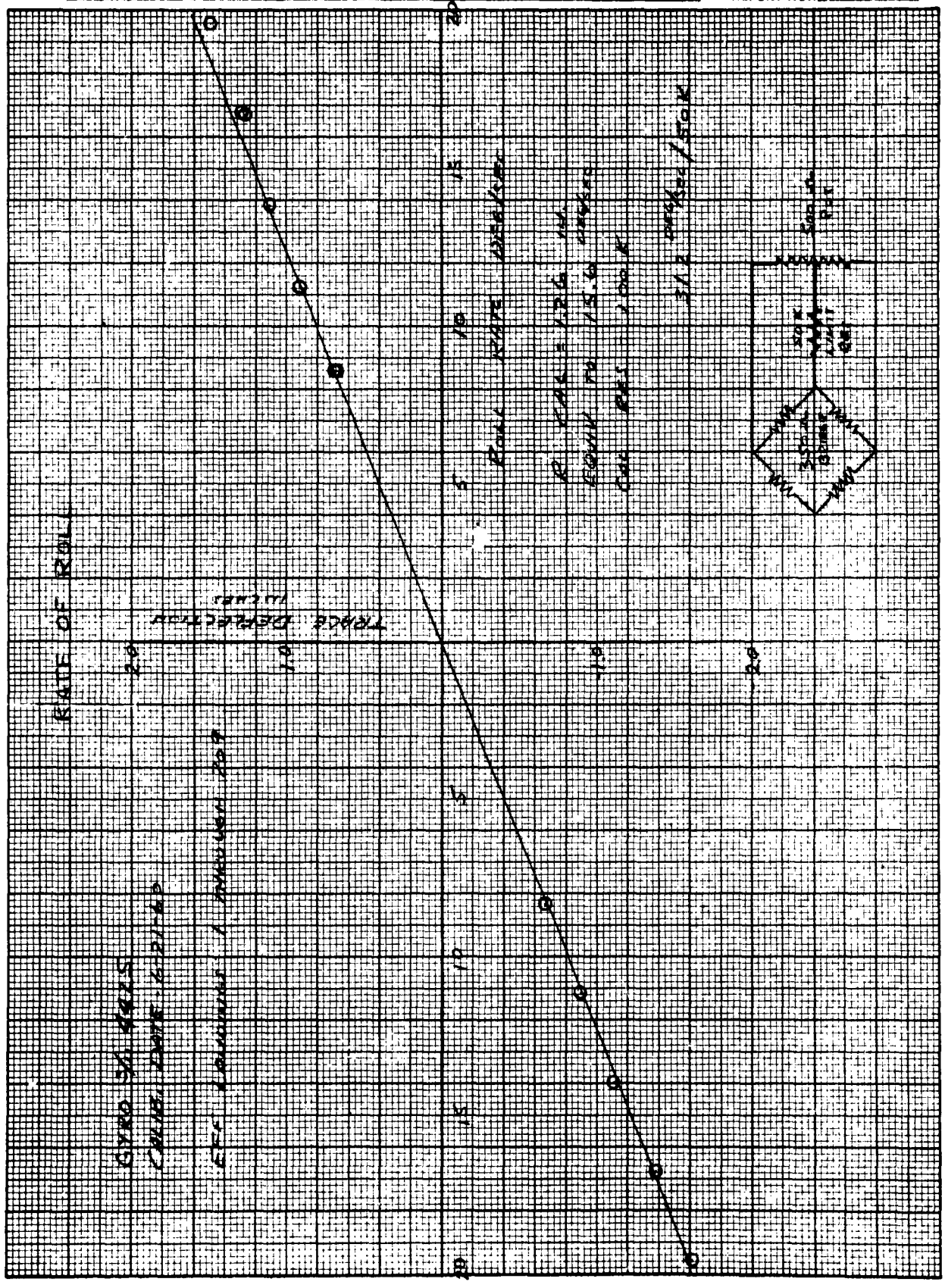
Serial No. 9562

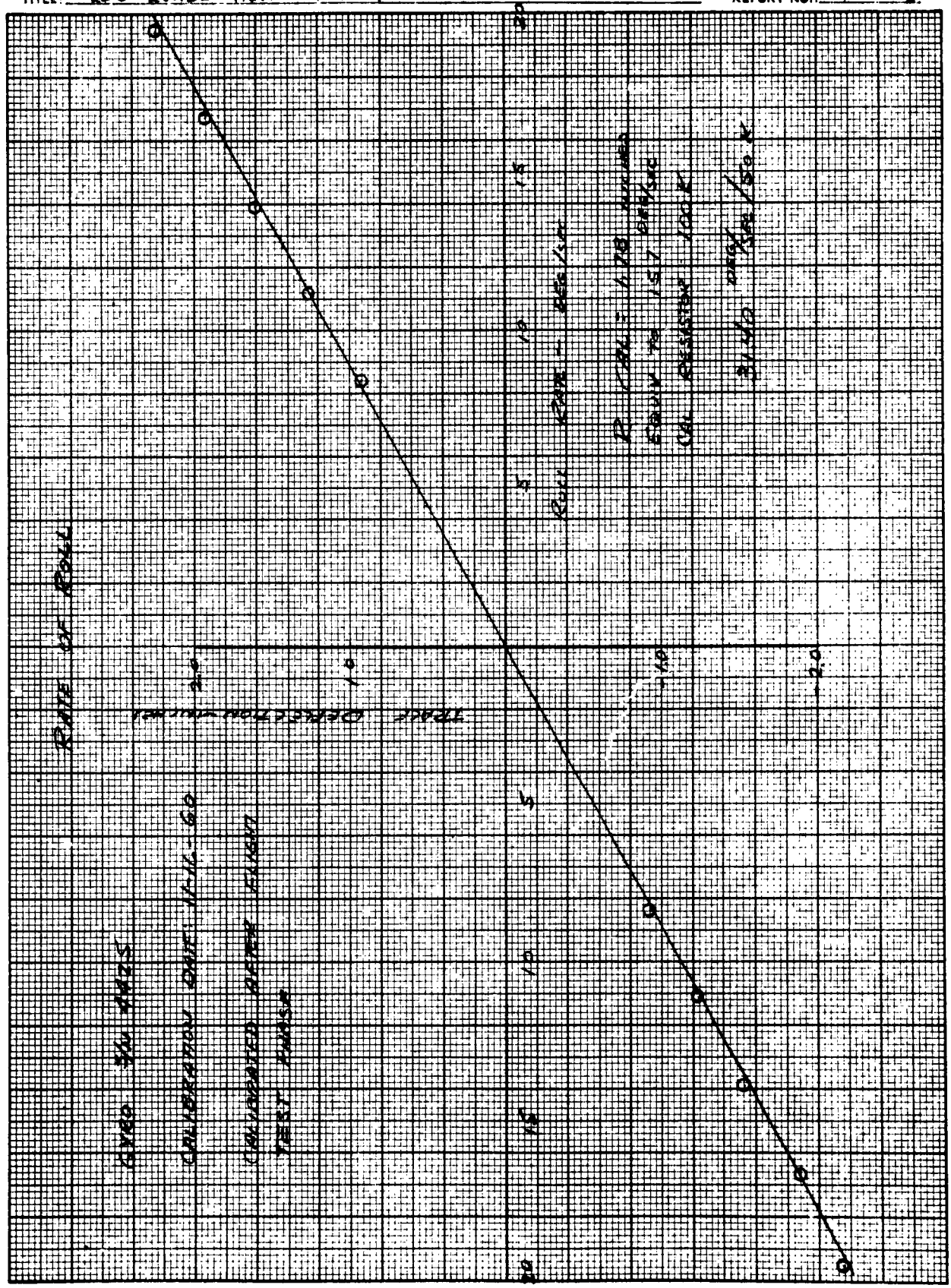
RECORDED:

Oscillograph Channel 2-20 for Flight Test

(Not recorded for the drop test phase)

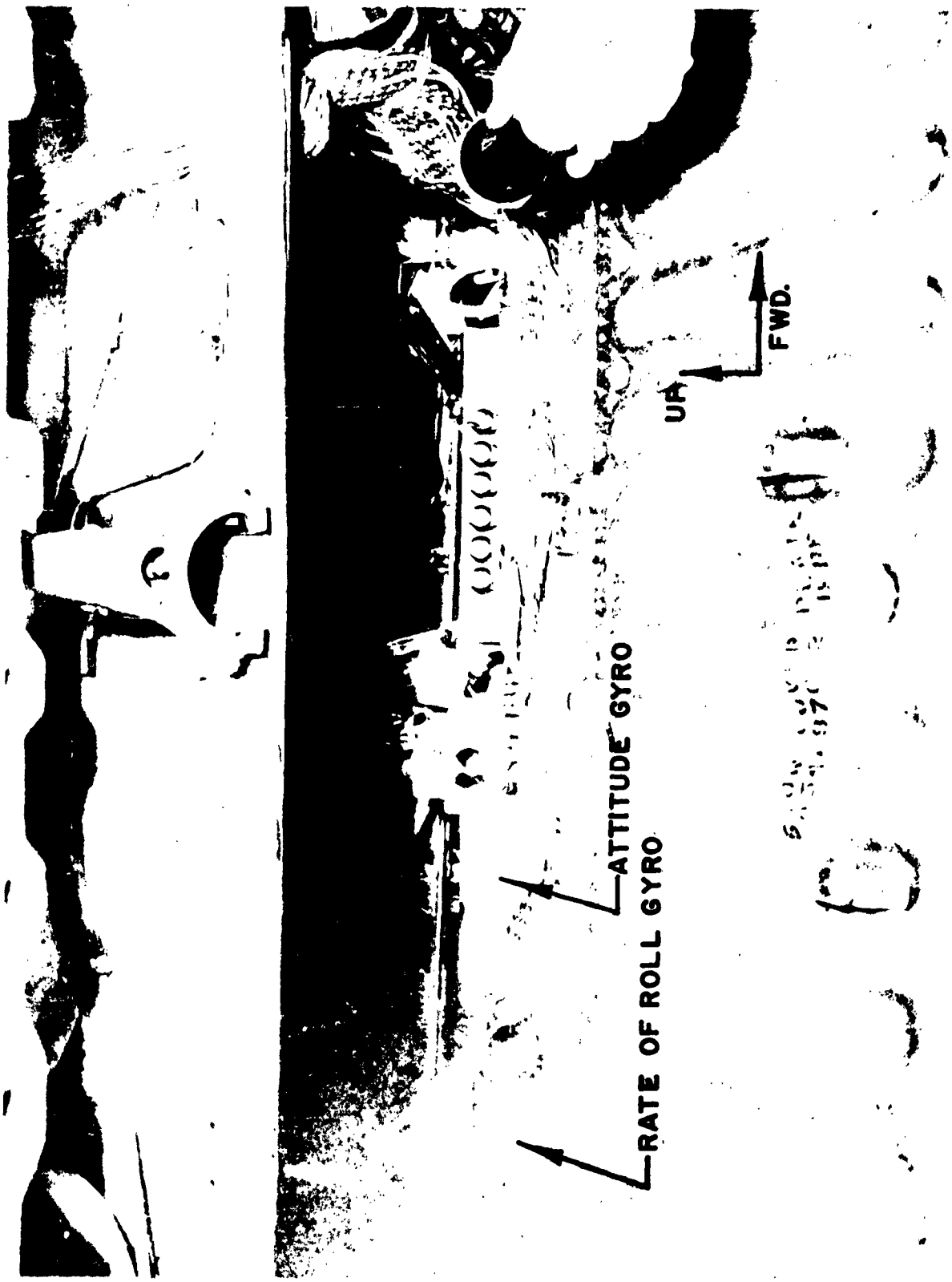
625




RATE OF ROLL
DEGREES PER SECOND
TRUE AIRSPEED - KNOTS
CALIBRATED AIRSPEED - KNOTS
CALIBRATION DATE 11-11-60
GROSS WT 44,000 LBS
TEST PILOT
Roll Rate 1 sec Lag
Roll Damping 1 sec Lag
Roll Damping 0.5 sec Lag
Roll Damping 0.25 sec Lag

PITCH AND ROLL ATTITUDE GYRO INSTALLATION — DROP TEST

266



INSTRUMENTATION INSTALLATION IN AMMUNITION COMPARTMENT — FLIGHT TEST

Wing Tip Accelerations

Accelerometers were installed in each wing tip on the closing rib of the structure to measure normal acceleration. Photographs of the installations appear on Pages 5.010 and 5.011 as installed for the drop test phase and on Pages 5.012 and 5.013 as installed for the flight test phase of the program.

L.t.C

DESCRIPTION:

Right hand wing tip accelerometer. This transducer measures vertical accelerations in a plane perpendicular to the fuselage reference line. Accelerometer located at X = 151.4, Y = 303.3, and Z = -24.1.

CONSTANT:

G's = 38.07 δ/Δ (up scale, mass down)

CHARACTERISTICS:

TRANSDUCER

Type - Statham A6A-50-350

Serial No. - 2642

Natural Frequency - Accl. = 245.0; Mount - many, but predominant at 135 and 170 cps.

Damping - 0.68

GALVANOMETER

Type - 7-342

Serial No. - 7328

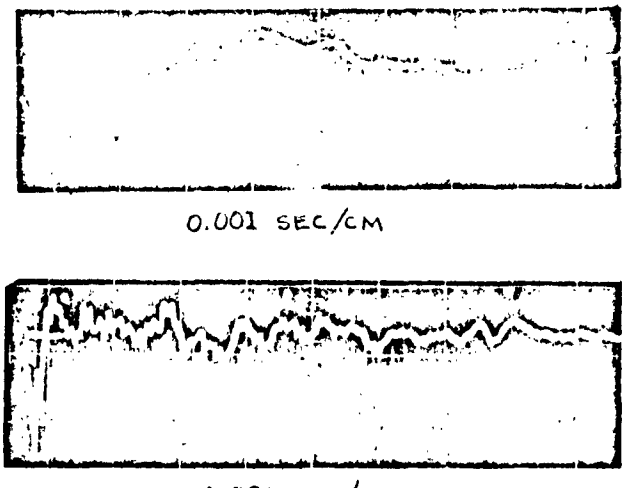
Resistance - 335.3 Ohms

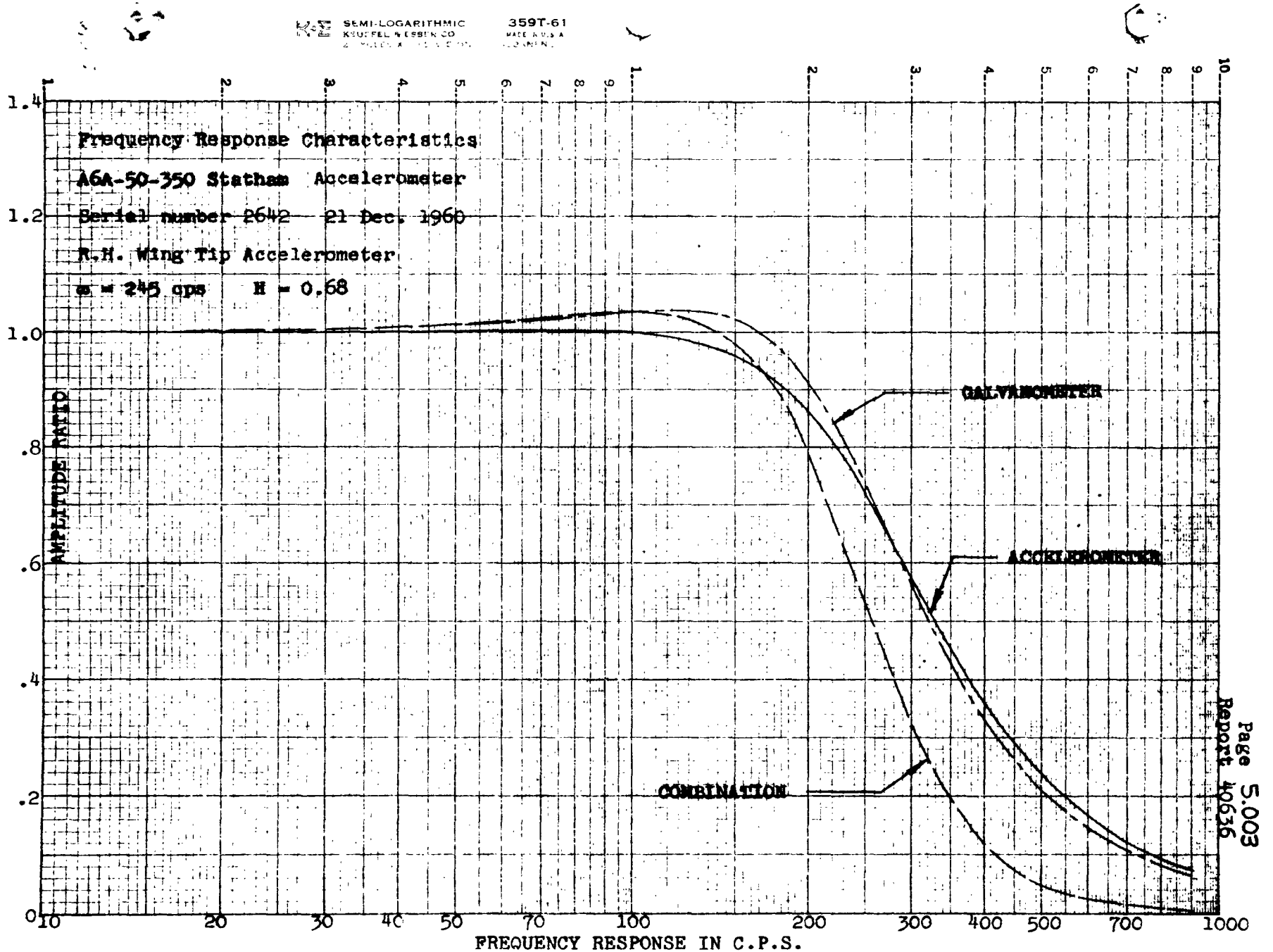
Natural Frequency - 226.5 cps

Damping - 0.607

RECORDED:

Oscillograph Channel 2-26 for Drop Test
1-28 for Flight Test




SEMI-LOGARITHMIC
KEUFFEL & ESSER CO.
359T-61
Frequency Response Characteristics
A6A-50-350 Statham Accelerometer
Serial number 2642 21 Dec. 1960
R.H. Wing Tip Accelerometer
ω = 245 cps H = 0.68
GALVANOMETER
ACCELEROMETER
COMBINATION
AMPLITUDE RATIO
FREQUENCY RESPONSE IN C.P.S.
1.4
1.2
1.0
.8
.6
.4
.2
0
10
20
30
40
50
70
100
200
300
400
500
700
1000

ADL 88.1.1 (7-51)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE

PREPARED BY L. E. Harris

TITLE Edge Loads Investigation

PAGE 5.004

MODEL A4D-2

REPORT 40636

Page 5.004
Report 40636

TRANSDUCER CALIBRATION

SERIAL 2643
TAG
U.A.C. 641069
PLANE A4D089

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STHM A6A-50-350 ACCL. DR 0.68
NOMINAL RANGE.....+-50
DIMENSIONS.....GS
PERCENT UNBALANCE.....00
BRIDGE VOLTS.....5
CHANNEL NUMBER.....03
RUN NUMBER.....1
CALIBRATION DATE.....12/21/60

PROGRAM E004
ANALYST
ENGR.

VOLTAGE CALIBRATION FACTORS

RMS SLOPE +.22854 02 GS +/MV/V

14RMS SLOPE +.43755 01 MV/V/ GS

RMS INTERCEPT -.52043 02 GS

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT	
G1-EP	.37743 02 GS	/ 50K
G1-TP	-.38684 02	
G2-TP	.38705 02	
G2-EP	-.38271 02	

LOAD	UP-SCALE DEVIATION	UP SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.50000 02	.24529 00	.25	.17128 00	.17	.20829 00
-.40000 02	.31800 00	.32	.10656 00	.11	.21228 00
-.30000 02	.26385 00	.26	-.53818 -01	-.05	.10527 00
-.20000 02	.22027 00	.22	-.20262 00	-.20	.68227 -02
-.10000 02	-.24187 -01	-.02	-.55280 00	-.55	-.28849 00
.00000 -39	-.67769 -01	-.07	-.69153 00	-.69	-.37965 00
.10000 02	-.12192 00	-.12	-.53424 00	-.53	-.32808 00
.20000 02	.56512 -01	.06	-.36659 00	-.37	-.15493 00
.30000 02	.22437 00	.22	-.10936 00	-.10	.60504 -01
.40000 02	.39224 00	.39	.17022 00	.17	.28123 00
.50000 03	.54453 00	.55	.54953 00	.55	.54953 00

27 DEC. 1960

Page 5.005
Report 40636

TRANSDUCER CALIBRATION

SERIAL 2642
TAG 211
D.R.O. 670464
PLANE A4D-2N

CALIBRATION PRIOR TO FLIGHT TEST PHASE

PROGRAM E004
ANALYST
ENGR. R. Miller

TRANSDUCER DESCRIPTION..STATHAM A6A-50-350 ACCEL
NOMINAL RANGE..... +-50
DIMENSIONS.....G S
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 02
RUN NUMBER..... 1
CALIBRATION DATE.....05/11/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	.22169 02	G S /MV/V
1/RMS SLOPE	.45108 -01	MV/V/ G S
RMS INTERCEPT	-.65203 02	G S

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT	
G1-CP	.37005 02	G S / 50K
G1-TP	.37667 02	
G2-TP	.37389 02	
G2-CP	.36715 02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
.49000 02	-.62666 00	-.64	.29092 00	.30	-.16787 00
-.39070 02	-.22092 00	-.23	-.46483 00	-.47	-.34288 00
-.30260 02	.56322 -02	.01	-.48220 00	-.49	-.23828 00
-.20250 02	.43330 00	.44	-.22875 00	-.23	.10227 00
-.10560 02	.64550 00	.66	-.39785 -01	-.04	.30286 00
.00000 -39	.74043 00	.76	-.95850 -01	-.10	.32229 00
.10560 02	.61467 00	.63	-.35766 -01	-.04	.28945 00
.20250 02	.73395 00	.75	-.11394 00	-.12	.31001 00
.30260 02	.66217 00	.68	-.81184 -01	-.08	.29049 00
.39070 02	-.19147 00	-.20	-.48184 00	-.49	-.33665 00
.49000 02	-.10634 01	-1.09	-.10634 01	-1.09	-.10634 01

18 MAY 1960

DESCRIPTION:

Left hand wing tip accelerometer. This transducer measures vertical accelerations in a plane perpendicular to the fuselage reference line. The accelerometer location is X = -151.4, Y = 302.0, Z = -24.1.

CONSTANT:

G's = 37.47 δ/Δ (up scale, mass down)

CHARACTERISTICS:

TRANSDUCER

Type - Statham A6A-50-350

Serial No. - 2648

Natural Frequency - Accel., 302 cps; Mount - many, but predominant at 820 cps with damping of 0.108

Damping - 0.53

GALVANOMETER

Type - 7-342

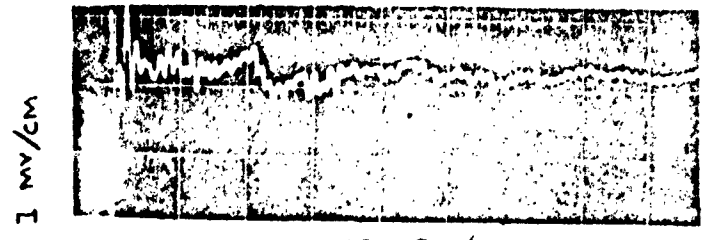
Serial No. - 7343

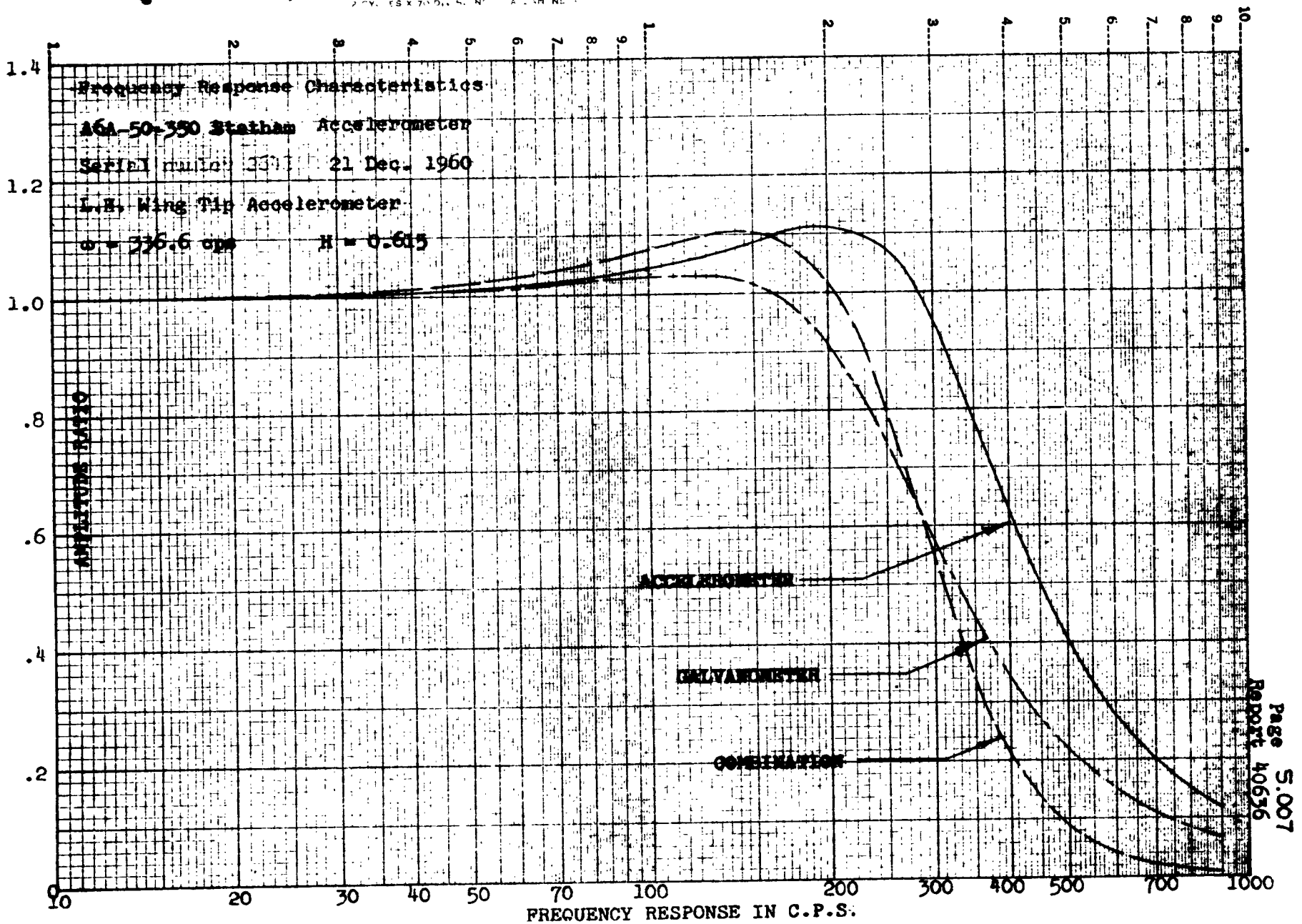
Resistance - 336.6 Ohms

Natural Frequency - 230.7 cps, Damping - 0.615

RECORDED:

Oscillograph Channel 2-27 for Drop Test
1-27 for Flight Test




K+E SEMI-LOGARITHMIC KEUFFEL & ESSER CO. 359T-61
Frequency Response Characteristics
A6A-50-350 Statham Accelerometer
Serial number 3301 21 Dec. 1960
L.H. Wing Tip Accelerometer
ω = 336.6 cps H = 0.615
AMPLITUDE RATIO
ACCELEROMETER
GALVANOMETER
COMBINATION
FREQUENCY RESPONSE IN C.P.S.
1.4
1.2
1.0
.8
.6
.4
.2
0
10
20
30
40
50
70
100
200
300
400
500
700
1000

SERIAL 2644
TAG 214
D.R.O. 641064
PLANE A40089

PROGRAM 0004
ANALYST
ENGR.

TRANSDUCER CALIBRATION

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STEM A6A-50-350 ACCL. DR 0.53
NOMINAL RANGE..... +-50
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/21/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .22603 02 GS /MV/V

1/RMS SLOPE .44243 -01 MV/V/ GS

RMS INTERCEPT +.51284 02 GS

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.37270	02 GS	/ 50K
G1-TP	-.38418	02	
G2-TP	.38573	02	
G2-CP	-.37870	02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.50000 02	.14624 00	.15	.15658 00	.16	.15141 00
-.40000 02	.21853 00	.22	.22041 -01	.02	.12023 00
-.30000 02	.83990 -01	.08	-.11250 00	-.11	-.14253 -01
-.20000 02	-.91817 -02	-.01	-.15396 00	-.15	-.81571 -01
-.10000 02	.32065 -01	.03	-.27816 00	-.28	-.12304 00
.00000 -39	.96130 -03	.00	-.31962 00	-.32	-.15933 00
.10000 02	.73252 -01	.07	-.24723 00	-.25	-.97039 -01
.20000 02	.12486 00	.13	-.24745 00	-.25	-.61285 -01
.30000 02	.10408 00	.10	-.10275 00	-.10	.66423 -03
.40000 02	.17687 00	.18	.72955 -01	.07	.12466 00
.50000 02	.25900 00	.26	.25900 00	.26	.25900 00

27 DEC. 1960

TRANSDUCER CALIBRATION

CALIBRATION PRIOR TO FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STHM A6A+-50-350ACCL.DR 0.67
NOMINAL RANGE..... +-50
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 02
RUN NUMBER..... 1
CALIBRATION DATE.....08/09/60

PROGRAM EDO4
ANALYST
ENGR. K. Miller

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	.21942 02 GS	/MV/V
1/RMS SLOPE	.45574 -01 MV/V/ GS	
RMS INTERCEPT	-.52323 02 GS	

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.36484 02 GS	/ 50K	
G1-TP	-.37369 02		
G2-TP	.37264 02		
G2-CP	-.36465 02		

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10000 02	-.38062 +03	-.00	.13627 00	.14	.67946 -01
-.40000 02	.12910 00	.13	.44006 +01	.05	.87052 -01
-.30000 02	.17448 00	.17	-.56774 -01	-.06	-.58855 -01
-.20000 02	.20936 00	.21	-.20060 00	-.20	.43797 -02
-.10000 02	.19167 00	.19	-.28195 00	-.28	-.44840 -01
.00000 -39	.47848 -01	.05	-.40416 00	-.40	-.17815 00
.10000 02	.91400 -02	.01	-.35877 00	-.36	-.17482 00
.20000 02	.13862 00	.14	-.32390 00	-.32	-.92638 -01
.30000 02	.16208 00	.16	-.14186 00	-.14	.10562 -01
.40000 02	.16632 00	.17	.50692 +01	.05	.10851 00
.50000 02	.30631 00	.31	.30681 00	.31	.30631 00

4 AUG. 1960

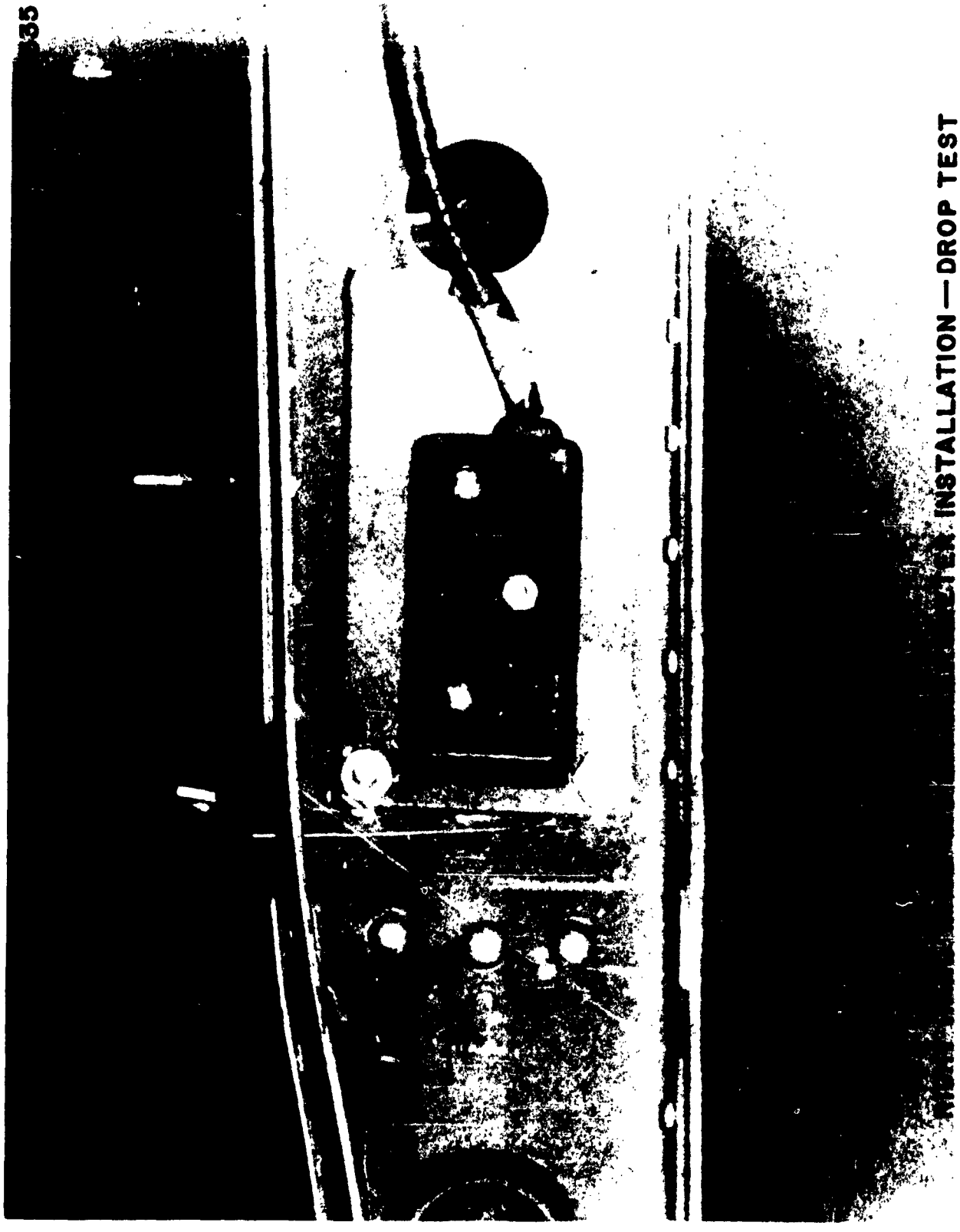
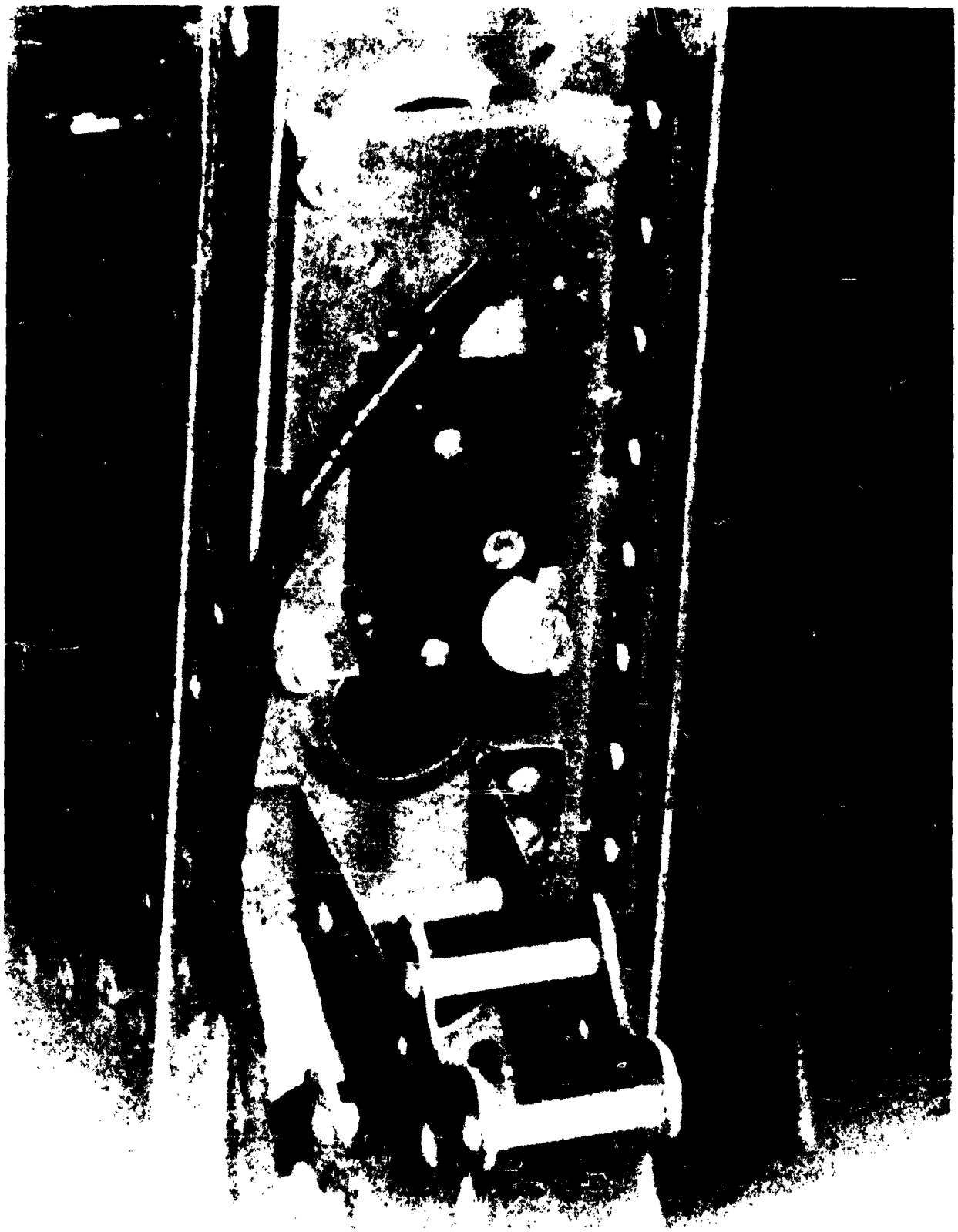
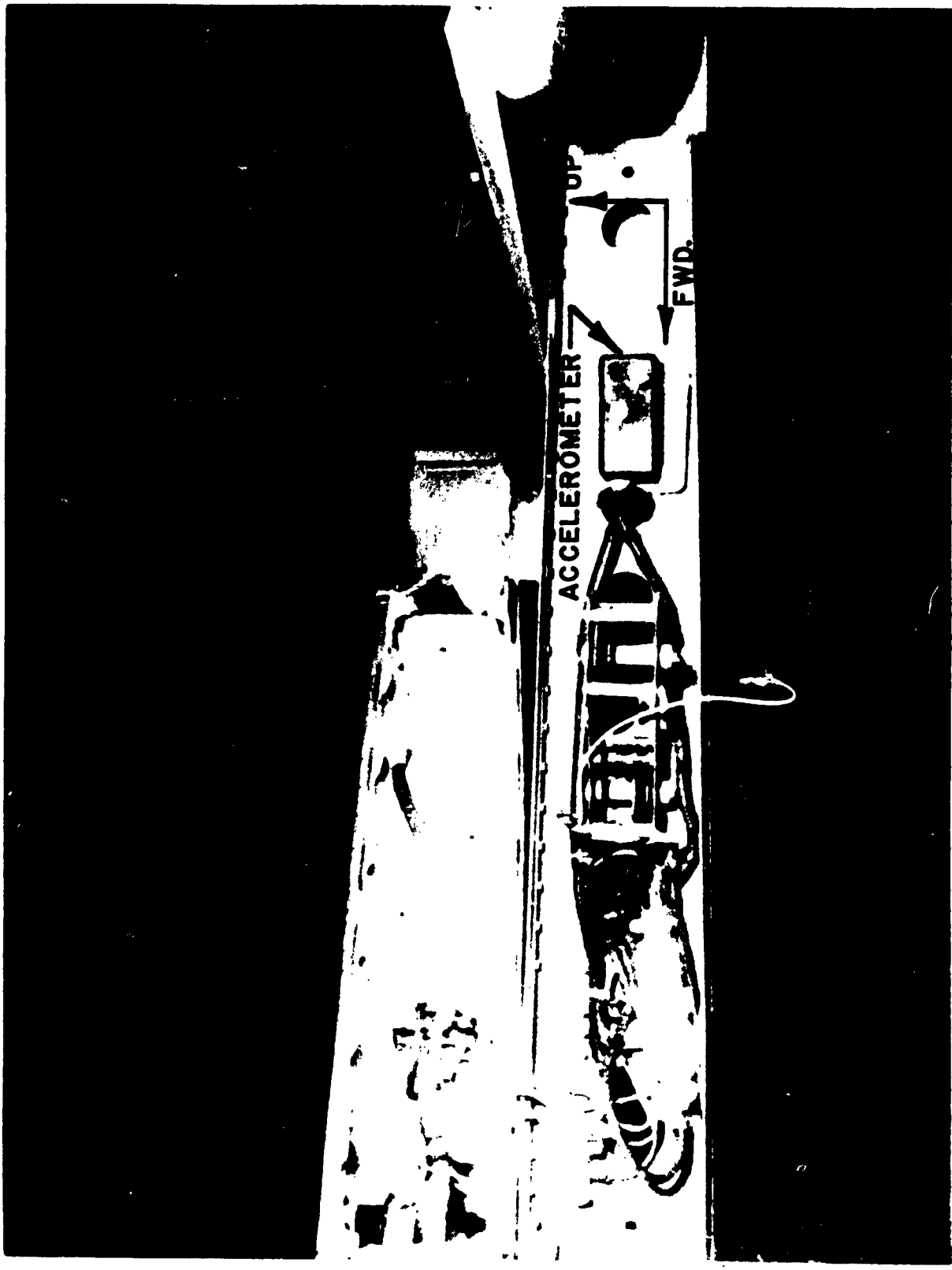


FIG. INSTALLATION — DROP TEST

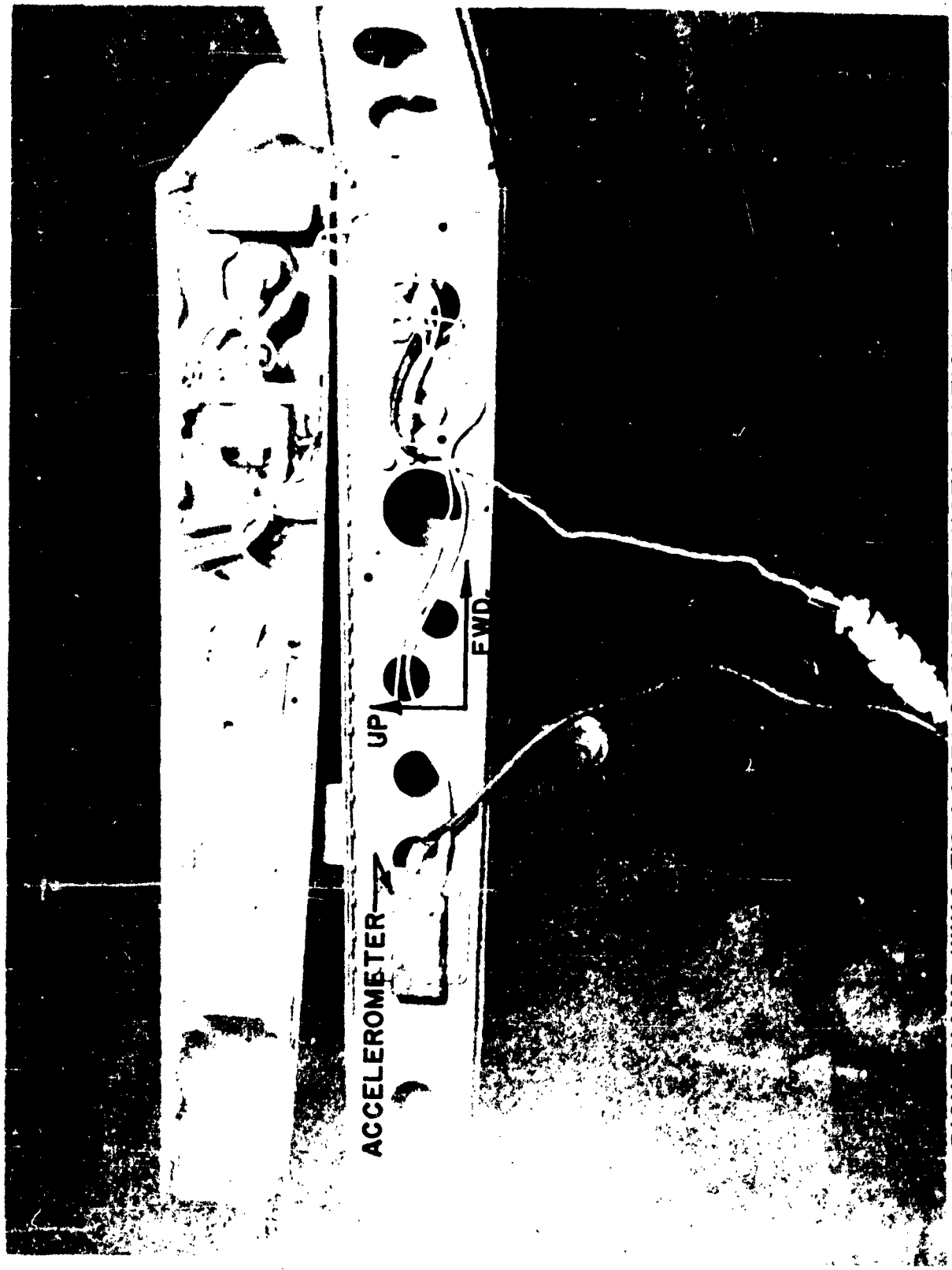


HHC



LEFT HAND WING TIP ACCELEROMETER INSTALLATION—FLIGHT TEST

345



RIGHT HAND WING TIP ACCELEROMETER INSTALLATION — FLIGHT TEST

External Fuel Tanks Accelerations

Accelerometers were installed on two 150 gallon external fuel tanks as shown in the sketch on Page 6.023. The accelerometers were aligned to measure acceleration perpendicular and parallel to the airplane fuselage reference planes. The accelerometers were held in place with straps and the alignment with respect to the fuselage reference plane was achieved by using spacers contoured to the tank as seen in the photographs on Pages 6.024 and 6.025. These tanks were mounted at Sta. 75.00 (left and right) on the airplane for the flight test phase only.

The accelerations were measured for landings 138 through 156 only.

Photographs of the external tanks with the accelerometers installed are shown on Pages 6.024 and 6.025.

DESCRIPTION:

Measures left external fuel tank longitudinal acceleration at the center of gravity of the tank (Tank Sta. 76.3).

CONSTANT:

7.909 G's/50 K

CHARACTERISTICS:

TRANSDUCER

Type - Statham AJ43-10-350

Serial No. - 813

Natural Frequency - 110 cps

Damping Ratio - 0.90

GALVANOMETER

Type - CEC 7-342

Serial No. - 5021

Natural Frequency - 222.6

Damping - 0.586

RECORDED:

Oscillograph Channel 2-27 for Flight Test

Page 6.003
Report 40636
SERIAL 819
TAG GF4573
D.R.O. 670462
PLANE A4D-2N

PROGRAM E004
ANALYST
ENGR. L. M

TRANSDUCER CALIBRATION

CALIBRATION PRIOR TO FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STATHAM AJ43A-10-350 ACCEL.
NOMINAL RANGE..... +-10
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 02
RUN NUMBER..... 1
CALIBRATION DATE.....05/17/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	.44054	01	GS /MV/V
1/RMS SLOPE	.22699	00	MV/V/ GS
RMS INTERCEPT	-.10865	02	GS

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.79310	01	GS / 50K
G1-TP	.81590	01	
G2-TP	.81502	01	
G2-CP	.78960	01	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10600 02	.48460 -01	.23	.30924 -01	.15	.39692 -01
-.75600 01	.76510 -01	.36	-.24057 -02	-.01	.37052 -01
-.62500 01	.38366 -01	.18	-.47126 -01	-.22	-.43797 -02
-.40000 01	.23923 -01	.11	-.72529 -01	-.34	-.24303 -01
-.18900 01	.31696 -01	.15	-.55988 -01	-.26	-.12146 -01
.00000 -39	.36487 -01	.17	-.12354 00	-.58	-.43525 -01
.18900 01	.23741 -01	.11	-.96825 -01	-.46	-.36542 -01
.40000 01	.46858 -01	.22	-.93436 -01	-.44	-.23289 -01
.62500 01	.23647 -01	.11	-.44308 -01	-.21	-.10331 -01
.75600 01	.38114 -01	.18	-.38610 -01	-.18	-.24796 -03
.10600 02	.15604 00	.74	.15604 00	.74	.15604 00

24 MAY 1960

TRANSDUCER CALIBRATION

CALIBRATION AFTER FLIGHT TEST PHASE

PROGRAM E004
ANALYST
ENGR.

TRANSDUCER DESCRIPTION..STHM AJ43A-10-350 ACL.DR0.90
NOMINAL RANGE..... +-10
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/16/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .44082 01 GS /MV/V
1/RMS SLOPE .22685 00 MV/V/ GS
RMS INTERCEPT -.10188 02 GS

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.78867	01 GS	/ 50K
G1-TP	-.81325	01	
G2-TP	.82083	01	
G2-CP	-.79666	01	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
.0000 02	.42242 -01	.21	.68872 -01	.34	.55557 -01
.80000 01	.34723 -01	.17	-.62469 -02	-.03	.14238 -01
.60000 01	.45641 -01	.23	-.34251 -01	-.17	.56950 -02
.40000 01	.21734 -01	.11	-.78642 -01	-.39	-.28454 -01
.20000 01	.34700 -01	.17	-.67724 -01	-.34	-.16512 -01
.00000 -39	.29230 -01	.15	-.11416 00	-.57	-.42467 -01
.20000 01	.12263 -02	.01	-.88207 -01	-.44	-.43840 -01
.40000 01	.14192 -01	.07	-.65699 -01	-.33	-.25753 -01
.60000 01	.35353 -01	.18	-.50684 -01	-.25	-.76656 -02
.80000 01	.50367 -01	.25	.13495 -01	.07	.31931 -01
.10000 02	.11455 00	.57	.11455 00	.57	.11455 00

21 DEC. 1960

GS

DESCRIPTION:

Measures left fuel tank lateral acceleration at the forward end at Tank Sta. 38.0.

CONSTANT:

7.583 G's/50 K

CHARACTERISTICS:

TRANSDUCER

Type - Statham AJ43-10

Serial No. - 1606

Natural Frequency - 116 cps

Damping Ratio - 0.68

GALVANOMETER

Type - CEC 7-342

Serial No. - 4888

RECORDED:

Oscillograph Channel 1-2 for Flight Test

Page 6.006
Report 40636

TRANSDUCER CALIBRATION

CALIBRATION PRIOR TO FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION ..... DIFF AJ43-1-350 ACCEL 60
NOMINAL RANGE ..... +-10
DIMENSIONS ..... GS
PERCENT UNBALANCE ..... .00
EXCITE VOLTS 5
CHANNEL NUMBER 02
GUN NUMBER 1
CALIBRATION DATE 07/19/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	.42358	01 GS	/MV/V
1/RMS SLOPE	.23608	00 MV/V/ GS	
RMS INTERCEPT	-.10956	02 GS	

SHUNT CALIBRATION FACTORS

LEG	CAL-RESISTOR EQUIVALENT	
G1-CP	.74147 01 GS	/ 50K
G1-IP	-.75760 01	
G2-IP	.75464 01	
G2-CP	-.74961 01	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10000 02	-.47332 +01	-.24	.47866 +01	.18	-.47484 -02
-.30000 01	-.24171 -01	-.12	.29459 +02	-.01	-.13508 -01
-.50000 01	.18183 +01	.09	.13570 +02	.03	.11785 -01
-.70000 01	.13622 +01	.07	-.68360 +02	-.05	.18929 -03
.90000 00	.69280 +02	.03	.12887 +02	.00	.17292 -02
.30000 01	.17294 +01	.03	-.41754 +01	-.16	-.72396 -02
.50000 01	.55383 -01	.28	-.13187 -01	-.11	.16918 -01
.70000 01	.46567 +01	.24	-.25049 +01	-.13	.10304 -01
.90000 01	.12141 -01	.06	-.19947 +01	-.10	-.38433 -02
.10000 02	.13977 +01	.07	-.32938 +01	-.16	-.34807 -02
.10000 02	-.97769 -02	.09	-.17769 +02	-.05	-.97769 -02

21 JULY 1960

TRANSDUCER CALIBRATION

CALIBRATION FOLLOWING FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STRN GJ+3-10-350 ACCL. DR 0.68
NOMINAL RANGE..... +-10
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/16/60

PROGRAM B004
ANALYST
ENGR.

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .42167 01 G's /MV/V

1/RMS SLOPE .29715 00 MV/V/ G's

RMS INTERCEPT -.10427 01 G's

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.73158	01	G'S / SOR
G1-TP	-.75686	01	
G2-TP	.76291	01	
G2-CP	-.74223	01	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
.10000 02	-.17728 -01	-.07	.21563 -01	.11	.21172 -02
-.40000 01	-.21785 -01	-.00	-.23197 -01	-.12	-.11708 -01
-.80000 01	.25640 -01	.13	-.18221 -01	-.09	.37140 -02
-.40000 01	.34804 -01	.17	-.38313 -01	-.19	-.17547 -02
-.20000 01	.48136 -01	.24	-.33336 -01	-.17	.73928 -02
.00000 -39	.42667 -01	.21	-.49250 -01	-.25	-.32915 -02
.20000 01	.60178 -01	.30	-.35918 -01	-.18	.12130 -01
.40000 01	.42175 -01	.21	-.43475 -01	-.22	-.65029 -02
.60000 01	.13727 -01	.07	-.35965 -01	-.18	-.11190 -01
.80000 01	.14525 -01	.07	-.16810 -01	-.08	-.11429 -02
.10000 02	-.13888 -02	-.01	-.13888 -02	-.01	-.13888 -02

27 DEC. 1960

DESCRIPTION:

Measures right external fuel tank lateral acceleration at forward end at Tank Sta. 38.0.

CONSTANT:

8.567 G's/50 K

CHARACTERISTICS:

TRANSDUCER

Type - Statham AJ43-10-350

Serial No. - 596A

Natural Frequency - 128 cps

Damping Ratio - 0.80

GALVANOMETER

Type - CEC 7-342

Serial No. - 4958

RECORDED:

Oscillograph Channel 1-3 for Flight Test

Page 6.009
Report 40636
SERIAL 596A
TAG NATC
D.R.O. 674280
PLANE A4D089

PROGRAM F004
ANALYST
ENGR. R. Mills

TRANSDUCER CALIBRATION

CALIBRATION PRIOR TO FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STHM AJ43A-10-350 ACCL.DR.55
NOMINAL RANGE..... +-10
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 02
RUN NUMBER..... 1
CALIPRATION DATE.....07/19/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	.48404	01 GS	/MV/V
1/RMS SLOPE	.20659	00 MV/V/ GS	
RMS INTERCEPT	-.10541	02 GS	"

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.84329	01 GS	/ 50K
G1-TP	-.85950	01	
G2-TP	.86185	01	
G2-CP	-.84265	01	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10000 02	-.66479 -02	-.03	.36007 -01	.18	.14680 -01
-.80000 01	.31218 -01	.16	-.30632 -01	-.15	.29331 -03
-.60000 01	.54155 -01	.27	-.90872 -01	-.45	-.18358 -01
-.40000 01	.74959 -01	.37	-.99927 -01	-.50	-.12484 -01
-.20000 01	.91498 -01	.46	-.79122 -01	-.40	.61879 -02
.00000 -39	.95240 -01	.48	-.11164 00	-.56	-.81984 -02
.20000 01	.12884 00	.64	-.12496 00	-.62	.19419 -02
.40000 01	.11552 00	.58	-.93489 -01	-.47	.11016 -01
.60000 01	.11073 00	.55	-.91880 -01	-.46	.94262 -02
.80000 01	.52624 -01	.26	-.68943 -01	-.34	-.81590 -02
.10000 02	.73133 -02	.04	.73133 -02	.04	.73133 -02

21 JULY 1960

TRANSDUCER CALIBRATION

SERIAL 5984
TAG
D.N.O. 64T063
PLANE A4D089

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..SIMM AJ43A-10-350 ACL. CR 0.80 PROGRAM E004
NOMINAL RANGE..... +-10 ANALYST
DIRECTION.....DS EROR
PERCENT OVERLOAD..... .00
SPIDER VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/16/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .48043 01 GS /MV/V
1/RMS SLOPE .20815 00 MV/V/ GS
RMS INTERCEPT -.10032 02 GS

SHUNT CALIBRATION FACTORS

	CAL-PIP EQUIVALENT
LEG	
G1-CP	.85333 01 GS / 50K
G1-TP	-.85363 01
G2-TP	.85721 01
G2-CP	-.81940 01

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10000 01	-.35018 -01	-.03	-.33097 -01	-.17	-.18300 -01
-.80000 00	.33391 -01	.39	-.34091 -01	-.27	.91399 -02
-.60000 00	.16371 00	.46	-.28259 -01	-.36	.53256 -01
-.40000 00	.13466 00	.67	-.10233 00	-.51	.11891 -01
-.20000 00	.14636 00	.91	-.34659 -01	-.47	.36370 -01
.00000 -39	.19916 00	.95	-.14632 00	-.73	.21738 -01
.20000 01	-.12297 -01	-.10	-.13345 00	-.67	-.76376 -01
.40000 01	.33736 -01	.17	-.10156 00	-.51	-.33911 -01
.60000 01	-.58362 -01	.28	-.25221 -01	-.12	-.41795 -02
.80000 01	.59475 -01	.30	-.16628 -01	-.08	.21424 -01
.10000 02	.58319 -01	.17	-.58319 -01	.27	.58319 -01

22 DEC. 1960

DESCRIPTION:

Measures left external fuel tank lateral acceleration at aft end at Tank Sta. 122.3.

CONSTANT:

7.149 G's/50 K

CHARACTERISTICS:

TRANSDUCER

Type - Statham F-10-350

Serial No. - 1905

Natural Frequency - 85 cps

Damping Ratio - 0.66

GALVANOMETER

Type - 7-342

Serial No. - 6173

RECORDED:

Oscillograph Channel 1-4 for Flight Test

ADI 88-0-1
(1-61)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE
PREPARED BY E. A. Harris
TITLE Load Investigation

PAGE 6.012
MODEL A3D-2
REPORT 4003

Page 6.012
Report 4003
SERIAL 1005
TAG NSFIT3
D.A.D. 674260
PLANE A4D087

PROGRAM 1004
ANALYST
ENGR.

TRANSDUCER CALIBRATION

CALIBRATION PRIOR TO FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION STRAIN F-10-350 ACTIVE
NOMINAL RANGE +-10
DIMENSION G
PERCENT UNBALANCE .00
EXCITE VOLTS 5
CHANNEL NUMBER 0
SGN NUMBER 1
CALIBRATION DATE 08/03/60

VOLTAGE CALIBRATION FACTORS

DC SLOPE	.42400 01	G	/MV/V
1/RMS SLOPE	.23585 00	MV/V/	G
RMS INTERCEPT	-.10420 02	G	

SHUNT CALIBRATION FACTORS

LEG	CAL-DIP EQUIVALENT	
C1-CP	.70728 01	G 50K
1-CP	-.71456 01	
2-CP	.71456 01	
C2-CP	-.70518 01	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
.40000 02	-.52688 -02	-.04	-.44778 -02	-.0-	-.48733 -02
.80000 01	.81995 -02	.04	-.36770 -01	-.17	-.12625 +01
.60000 01	.23797 -01	.12	-.23066 -01	-.11	.46590 +03
.40000 01	.43534 -01	.22	-.14834 -01	-.07	.14351 +01
.20000 01	.42631 -01	.21	-.20104 -01	-.10	.11166 +01
.00000 -39	.49506 -01	.25	-.46220 -01	-.23	.17287 +02
.20000 01	.30892 -01	.15	-.36901 -01	-.18	-.35494 +02
.40000 01	.37057 -01	.19	-.19264 -01	-.10	.87956 +02
.60000 01	.35944 -01	.18	-.33328 -01	-.17	-.16709 +02
.80000 01	.16071 -01	.08	-.27701 -01	-.14	-.91135 +02
.10000 02	-.79618 -02	-.04	-.79618 -02	-.04	-.12618 +02

4 Aug. 1960

6.C.3

TRANSDUCER CALIBRATION

SERIAL 1905
TAG
D.E.O. 64068
PLANE A4D089

CALIBRATION AFTER FLIGHT TEST PHASE

PROGRAM E004
ANALYST
ENGR.

TRANSDUCER DESCRIPTION..STHM F-10-350 ACCL. DP 0.66
NOMINAL RANGE.....+-10
DIMENSIONS.....GS
PERCENT UNBALANCE.....00
BRIDGE VOLT.....5
CHANNEL NUMBER.....03
RUN NUMBER.....1
CALIBRATION DATE.....12/16/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .41976 01 GS /MV/V

1/RMS SLOPE .23823 00 MV/V/ GS

RMS INTERCEPT -.10340 02 GS

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.69781	01 GS	/ 50K
G1-TP	-.71006	01	
G2-TP	.70944	01	
G2-CP	-.70178	01	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10000 02	-.37913 -01	-.19	-.31684 -01	-.16	-.34799 -01
-.80000 01	.12528 -01	.06	-.26920 -01	-.13	-.71959 -02
-.60000 01	.67121 -01	.34	.19369 -01	.10	.43245 -01
-.40000 01	.92648 -01	.46	-.36077 -01	-.18	.28285 -01
-.20000 01	.12440 00	.62	.14364 -01	.07	.69383 -01
.00000 -39	.85567 -01	.43	-.36006 -01	-.20	.23281 -01
.20000 01	-.23563 00	+1.18	-.[illegible]537 -01	-.35	-.15259 00
.40000 01	-.46087 -01	-.23	-.[illegible]153 -01	-.16	-.[illegible] -01
.60000 01	-.10179 -01	-.05	-.[illegible]741 -02	-.01	-.[illegible]
.80000 01	.50643 -01	.25	.[illegible]838 -01	.21	.[illegible]
.10000 02	.57484 -01	.29	.[illegible]484 -01	.29	.[illegible] -01

22 DEC. 1960

DESCRIPTION:

Measures left external fuel tank normal acceleration forward end at Tank Sta. 38.0.

CONSTANT:

18.930 G's/50 K

CHARACTERISTICS:

TRANSDUCER

Type - Statham AJ43-25-350

Serial No. - 1251

Natural Frequency - 208 cps

Damping Ratio - 0.66

GALVANOMETER

Type - CEC 7-342

Serial No. - 5097

RECORDED:

Oscillograph Channel 1-5 for Flight Test

ADI 28.4.1 (4-61)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE
PREPARED BY L. E. Harris
TITLE Eng. Loads Investigation

PAGE 6.015
MODEL
REPORT

Test 6.015
Report
SERIAL 1251
TAG NSFTP
D.R.O. 674280
PLANE A40089

TRANSDUCER CALIBRATION

CALIBRATION PRIOR TO FLIGHT TEST PHASE

PROGRAM 8004
ANALYST
ENGR.

TRANSDUCER DESCRIPTION..STIM AJ43A-25-350 ACCL DPO.52
NOMINAL RANGE..... +-25
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 02
RUN NUMBER..... 1
CALIBRATION DATE.....07/27/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .11296 02 GS V/MV/V
1/RMS SLOPE .88538 -01 MV/V/ GS
RMS INTERCEPT -.26416 02 GS

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.18586	03 GS	/ 50K
G1-TP	-.19947	03	
G2-TP	.19111	02	
G2-CP	-.18628	02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.25000 02	-.17376 -01	-.03	-.14548 -02	+.00	+.94156 -02
-.20000 02	-.22113 -01	-.04	-.11234 00	+.22	+.67224 -01
-.15000 02	.19075 00	.38	-.42771 -01	+.09	.73984 -01
-.10000 02	.24970 00	.50	-.19654 -01	+.04	.11702 00
-.50000 01	.82874 -03	.00	-.12124 00	+.24	+.60204 -01
.00000 +39	.59770 -01	.12	-.11006 00	+.22	+.28137 -01
.50000 01	.55043 -01	.11	-.10948 00	+.22	+.27219 -01
.10000 02	-.39917 -01	-.08	-.55438 -01	+.11	+.47877 -01
.15000 02	.56185 -01	.11	-.55267 -01	+.11	+.45472 -03
.20000 02	.30220 -01	.06	-.12239 -01	+.02	.99004 -02
.25000 02	.73248 -01	.15	-.73248 -01	+.15	.73248 -01

4 AUG. 1960

ADI 28.0.1
(3-51)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE
PREPARED BY I. R. Harris
TITLE Mfg. Loads Investigation

PAGE 6.016
MODEL
REPORT

TRANSDUCER CALIBRATION

TAG
DATE 6-10-60
PLANE A4D-2

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION ... 0-45-25-30 ACC. ... 0.60
NOMINAL RANGE ... 1E=25
DIMENSIONS ... G4
PERCENT UNBALANCE ... .00
BRIDGE VOLTS ...
CHANNEL NUMBER ... 03
FOR NUMBER ... 1
CALIBRATION DATE ... 12/1/60

PROGRAM 1004
ANALYST
ERROR

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .11277 02 GS / V/V
1/RMS SLOPE .8870 -01 EV/V/ G
RMS INTERCEPT -.25732 00 GS

SHUNT CALIBRATION FACTORS

	CALIBRATION EQUIVALENT	
G1-SP	.13466 02 GS	/ 100
G2-SP	-.11311 02 GS	
1-SP	.11274 01	
2-SP	-.11663 01	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
.15000 02	.24449 +01	.01	-.37527 -01	-.07	-.40714 -02
-.10000 02	.19153 +00	.38	.25000 -01	.01	.10256 00
-.15000 02	-.40655 +01	-.01	.58573 -01	.01	-.17348 -01
-.10000 02	.17499 +01	.03	-.03170 -01	-.13	-.13984 -01
-.10000 01	.18619 +01	.04	-.10000 00	-.20	-.40995 -01
.50000 -01	-.20811 +01	-.01	-.44304 -01	-.17	-.00597 -01
.50000 01	-.99016 +02	-.01	-.10837 00	-.02	-.26824 -01
.10000 02	.10500 +02	.21	-.13054 -01	-.01	.19467 -01
.15000 02	.38756 +01	.01	.76452 -01	.01	.21200 -01
.20000 02	.55493 +01	.11	.67655 -01	.01	.21118 -01
.15000 02	.41017 +01	.03	.41017 -01	.03	.41017 -01

+/- DFC= 1.000

DESCRIPTION:

Measures right external fuel tank normal acceleration at forward end at Tank Sta. 38.0.

CONSTANT:

18.356 G's/50 K

CHARACTERISTICS:

TRANSDUCER

Type - Statham AJ43-25-350

Serial No. - 1252

Natural Frequency - 210 cps

Damping Ratio - 0.72

GALVANOMETER

Type - 7-342

Serial No. - 6157

RECORDED:

Oscillograph Channel 1-6 for Flight Test

CALIBRATION AFTER FLIGHT TEST PHASE

A-28

CALIBRATION AFTER FLIGHT TEST PHASE

CONFIGURATION ... STD AD-350 -25-350 ACC. W 0.72

[illegible]	122
[illegible]	
FLAP DEFLECTION	00
RECEIVOLT	5
[illegible]	03
[illegible]	1
CALIBRATION DATE	7/21/60

VOLTAGE CALIBRATION FACTORS

[illegible] SLOPE	.11000	06	[illegible]	/DV/V	
[illegible] SLOPE	[illegible]	-01	[illegible]	DV/V	
[illegible]	[illegible]	0	[illegible]		

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVG. DEVIATION	AVG. PERCENT DEVIATION
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

DOUGLAS AIRCRAFT COMPANY, INC.

DATE

PREPARED BY T. E. Harris

TITLE Eng. Loads Investigation

PAGE 6.019

MODEL A3J-1

REPORT A3J-1

6

6.019

TRANSDUCER CALIBRATION

SERIAL 1252
TAG NSFTD
D.S.O. 67281
PLANE A40049

CALIBRATION PRIOR TO FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION STHM AJ69A-25-350 ACCL DRO.57
NOMINAL RANGE +-25
DIMENSIONS GS
PERCENT UNBALANCE .00
BRIDGE VOLTS 5
CHANNEL NUMBER 02
RUN NUMBER 1
CALIBRATION DATE 07/27/60

PROGRAM F004
ANALYST
ENGR

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	.11065 02	GS	/MV/V
1/RMS SLOPE	.90377 -01	MV/V/	GS
RMS INTERCEPT	-.26868 02	GS	

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.18108 02	GS	150K
G1-TP	-.18898 02		
G2-TP	.18882 02		
G2-CP	-.18216 02		

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.25000 02	-.23413 00	-.47	-.14273 00	+.29	+.18843 00
-.20000 02	.13134 00	.26	-.94475 -01	+.19	+.18431 -01
-.15000 02	-.24716 -01	-.05	-.12149 00	+.24	+.73105 -01
-.10000 02	.20308 -02	.00	-.87221 -02	+.02	+.38456 -02
-.50000 01	.24384 00	.49	-.17494 00	.35	.20939 00
.00000 -39	.22320 00	.44	.77031 -01	.15	.14961 00
.50000 01	.15217 00	.30	.11453 00	.23	.13335 00
.10000 02	-.38874 -02	-.01	-.20017 -01	+.04	+.11052 -01
.15000 02	.92754 -01	.19	-.15994 00	+.32	+.38503 -01
.20000 02	-.17621 00	-.35	-.11169 00	+.22	+.14395 00
.25000 02	-.11182 00	-.22	-.11182 00	+.22	+.11182 00

4 AUG 1960

-.96

C

DESCRIPTION:

Measures left external fuel tank normal acceleration at aft end at Tank Sta. 122.3.

CONSTANT:

18.980 G's/50 K

DESCRIPTION:

TRANSDUCER

Type - Statham AJ43-25-350

Serial No. - 1253

Natural Frequency - 210 cps

Damping Ratio - 0.74

GALVANOMETER

Type - CEC 7-342

Serial No. - 7317

Natural Frequency - 225 cps

Damping - 0.574

RECORDED:

Oscillograph Channel 1-34 for Flight Test

ADJ 88.1
(4-61)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE
PREPARED BY I. E. Harris
TITLE Adv. Loads Investigation

PAGE 6.021
MODEL
REPORT

6.021

TRANSDUCER CALIBRATION

CALIBRATION PRIOR TO FLIGHT TEST PHASE

SERIAL 1253
TAC INSTR
D.R.O. 674281
PLANE A40089

TRANSDUCER DESCRIPTION..STHM AJ48A-25-350 ACCL DRO.64
NOMINAL RANGE..... +-25
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 02
IRON NUMBER..... 1
CALIBRATION DATE.....07/27/60

PROGRAM R004
ANALYST
ERGS.

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .11508 02 GS /MV/V

1/RMS SLOPE .86899 -01 MV/V/ GS

RMS INTERCEPT -.26701 02 GS

SHUNT CALIBRATION FACTORS

LEG	CAL-RIP EQUIVALENT	
G1-CP	.18952 02 GS	/ 50K
G1-TP	-.19294 02	
G2-TP	-.19[illegible] 02	
G2-CP	-.19866 02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.25000 02	.23036 -01	.05	-.36874 +02	-.01	.96741 -02
-.20000 02	.84631 -01	.17	-.48953 +01	-.10	.17824 -01
-.15000 02	.76748 -01	.15	-.15307 00	-.31	-.38161 -01
-.10000 02	.20749 -01	.04	-.70096 -01	-.14	-.24667 -01
-.50000 01	.56635 -01	.11	-.56601 -01	-.11	-.62288 -02
.00000 -30	.85164 -01	.17	-.27073 +01	-.05	.39045 -01
.50000 01	.93318 -01	.19	-.36857 +01	-.07	.28177 -01
.10000 02	.70085 -01	.14	-.11766 00	-.24	-.19700 -01
.15000 02	.65867 -01	.13	-.50724 +01	-.10	.80674 -02
.20000 02	.26006 -01	.05	-.42574 +01	-.07	-.28244 -02
.25000 02	-.77014 -02	-.01	-.77014 +02	-.02	-.77014 -02

4 AUG. 1960

TRANSDUCER CALIBRATION

SERIAL 1493
TAG
D.R.O. 641066
PLANE A4D029

CALIBRATION AFTER FLIGHT TEST PHASE

PROGRAM E004
ANALYST
ENGR.

TRANSDUCER DESCRIPTION..STHM AJ43A-25-350 ACC. DR 0.74
NOMINAL RANGE.....+25
DIMENSION$.....GS
PERCENT UNBALANCE.....00
BRIDGE VOLTS.....5
CHANNEL NUMBER.....03
RUN NUMBER.....1
CALIBRATION DATE.....12/19/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .11477 02 GS /MV/V
1/RMS SLOPE .87133 -01 MV/V/ GS
RMS INTERCEPT -.26039 02 GS

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT
G1-CP	.19007 02 GS / 50K
G1-TP	-.19226 02
G2-TP	.19133 02
G2-CP	-.18971 02

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
.25000 02	.54189 -01	.11	-.54169 -01	-.11	-.54169 -01
.20000 02	.48155 -01	.10	-.96945 -01	-.11	-.43954 -02
.15000 02	.15575 00	.31	-.91232 -01	-.18	.32261 -01
.10000 02	.22131 00	.44	-.12552 00	-.25	.47897 -01
.50000 01	.22907 00	.46	-.12302 00	-.25	.53023 -01
.00000 -39	.28927 00	.58	-.32546 00	-.65	-.18048 -01
.50000 01	.18677 00	.37	-.16006 00	-.32	.13853 -01
.10000 02	.47388 -01	.09	-.26286 00	-.53	-.10764 00
.15000 02	.13929 00	.28	-.14981 00	-.30	-.52065 -01
.20000 02	.11019 00	.22	-.14731 00	-.29	-.18562 -01
.25000 02	.12319 00	.25	.12319 00	.25	.12319 00

21 DEC. 1960

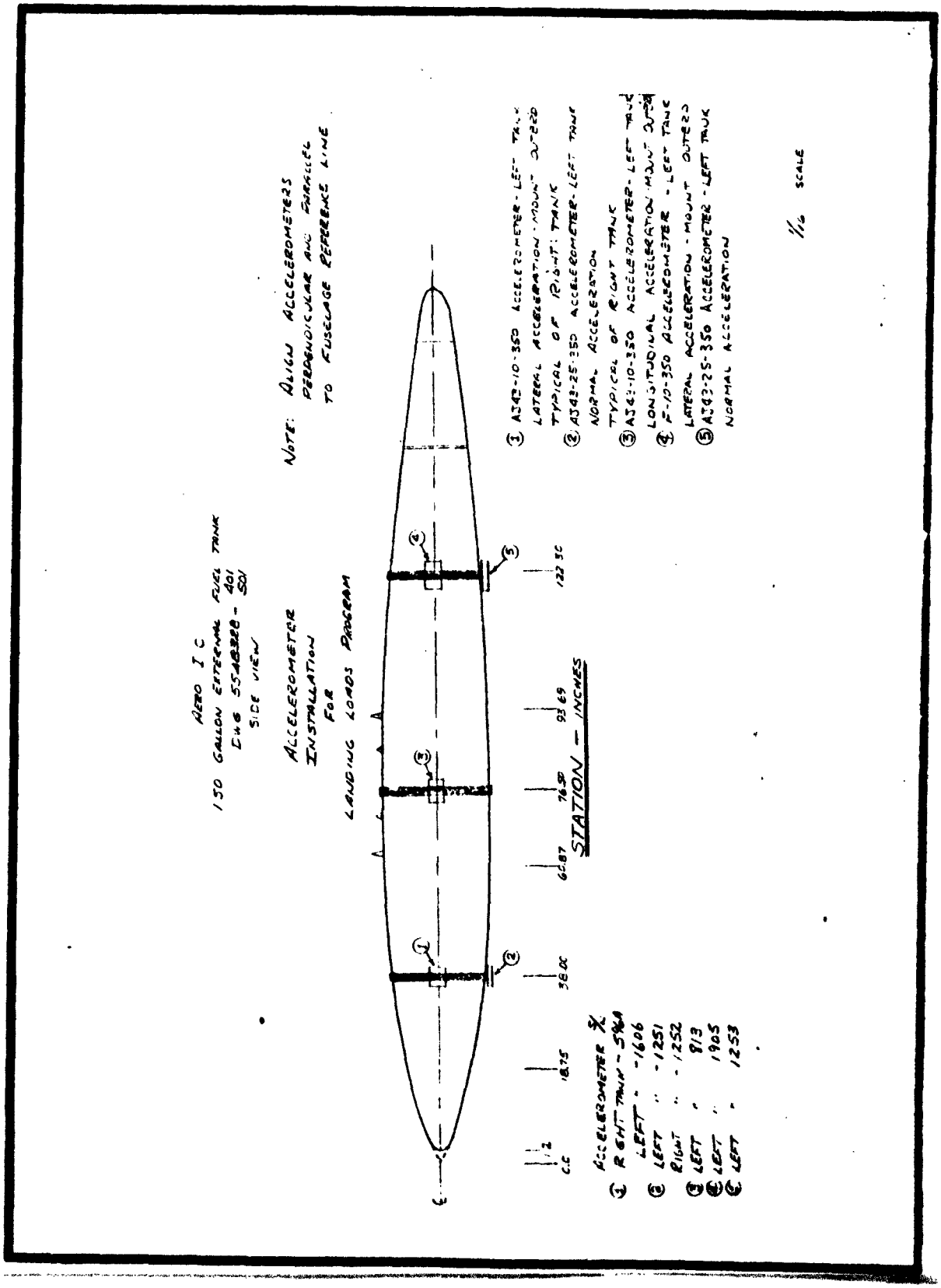
FORM LB25 5-1A
(3 52)

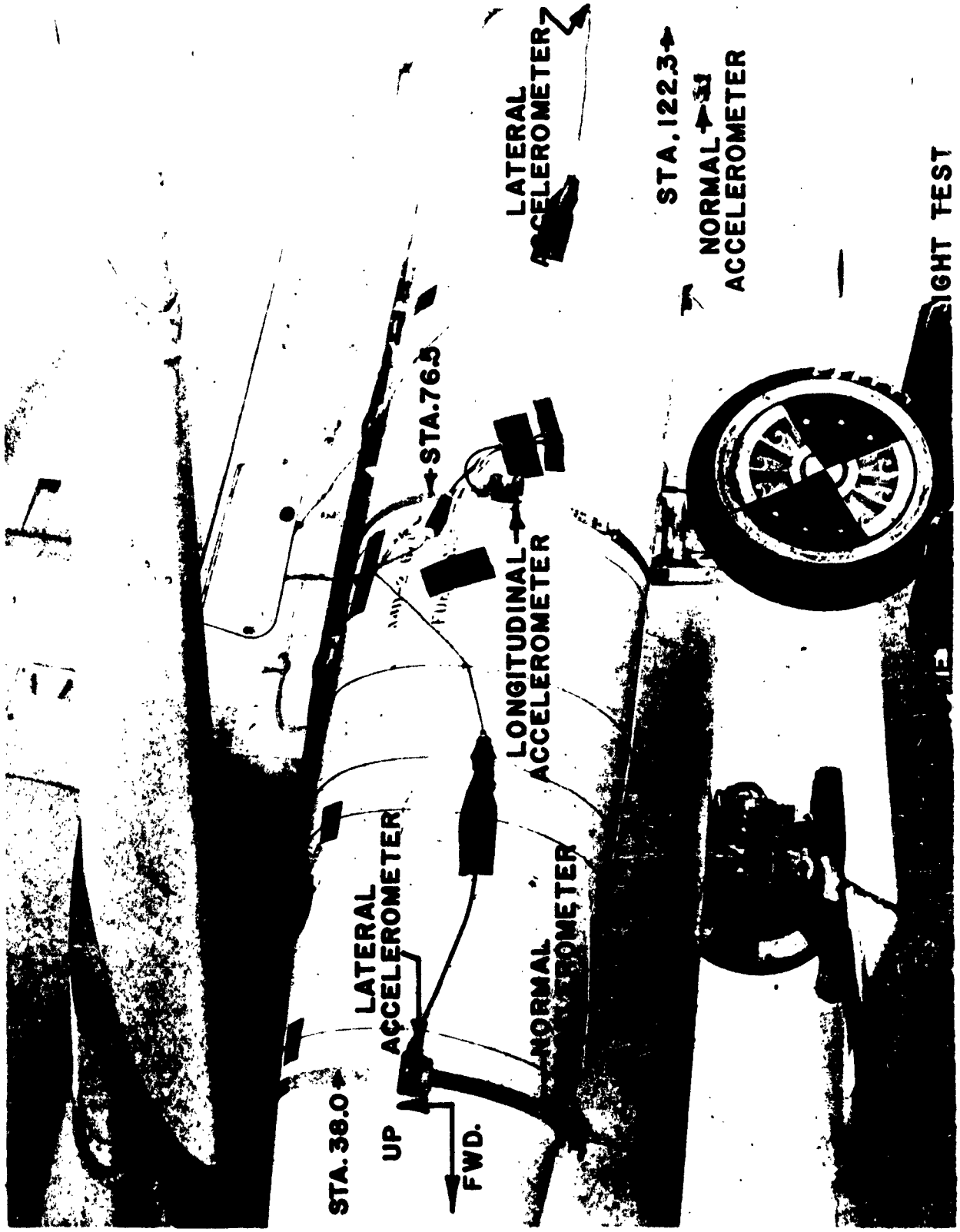
PREPARED BY: I. E. Harris DATE DOUGLAS AIRCRAFT COMPANY, INC.

CHECKED BY: _____ DATE

TITLE: Landing Loads Investigation

FILE: 6.023
MODEL: A4D-2
REPORT NO. 10636




LATERAL ACCELEROMETER
STA. 122.3
NORMAL ACCELEROMETER
STA. 76.5
LONGITUDINAL ACCELEROMETER
LATERAL ACCELEROMETER
NORMAL ACCELEROMETER
STA. 38.0
UP
FWD.
IGHT TEST

TANK ACCELEROMETER INSTALLATION—FLIGHT TEST

16C

NOSE EQUIPMENT RACK ACCELERATIONS

Accelerometers were installed in the nose of the airplane on the forward and aft ends of the equipment rack, P/N 5547318. Accelerometers were also installed on the airframe structure, Airplane Sta. 29 and 49, below the accelerometers on the equipment rack. The accelerometers were oriented to measure normal accelerations perpendicular to the fuselage reference line. Photographs of the installation are shown on Pages 7.011 and 7.012. The accelerations were measured during the flight test phase only for landings 138 through 156.

DESCRIPTION:

Measures acceleration of equipment rack, forward end.

CONSTANT:

80.73 G's/50 K

CHARACTERISTICS:

TRANSDUCER

Type- ASA-200-380

Serial No. - 3025

Natural Frequency - 1065 cps

Damping Ratio - 0.74

GALVANOMETER

Type - CEC 7-342

Serial No. - 7327

RECORDED:

Oscillograph Channel 1-23 for Flight Test

DOUGLAS AIRCRAFT COMPANY, INC.

DATE
PREPARED BY I. E. Harris
TITLE Ldg. Loads Investigation

TRANSDUCER CALIBRATION

CALIBRATION AFTER FLIGHT TEST PHASE

SERIAL 3028
TAG 1-3970
D&R O. 641067
PLANE A40089

PROGRAM F006

ANALYST
ENGR.

TRANSDUCER DESCRIPTION..STHM A9A-200-180 ACC..DRO.74
NOMINAL RANGE..... +-200
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/27/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE	.42866 02	GS	/MV/V
1/RMS SLOPE	.23329 +01	MV/V/	GS
RMS INTERCEPT	-.10360 03	GS	

SHUNT CALIBRATION FACTORS

LEG	CAL-PTP EQUIVALENT		
G1-CP	.80800 02	GS	/ 50K
G1-TP	-.80862 02		
G2-TP	.81194 02		
G2-CP	-.81672 02		

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
.10000 03	.65697 -01	.03	.65697 -01	.03	.65697 +01
.80000 02	.14620 00	.07	-.28999 00	-.14	-.71895 +01
.60000 02	.41365 00	.21	-.41720 00	-.21	-.17765 +02
.40000 02	.47838 00	.24	-.58595 00	-.29	-.56284 +01
.20000 02	.51234 00	.26	-.50544 00	-.25	.34494 +02
.00000 -39	.63439 00	.32	-.57034 00	-.29	.32026 +01
.20000 02	.61104 00	.31	-.57292 00	-.29	.19061 +01
.40000 02	.48383 00	.24	-.34701 00	-.17	.68408 +01
.60000 02	.33585 00	.17	-.42499 00	-.25	-.79570 +01
.80000 02	.20864 00	.10	-.20678 00	-.10	.93460 +03
.10000 03	.39897 -01	.02	.39897 -01	.02	.39897 +01

30 DEC. 1960

CALIBRATION PRIOR TO FLIGHT TEST PHASE

80.66 GS/50 K

DESCRIPTION:

Measures acceleration of nose equipment rack, aft end.

CONSTANT:

74.206 G's/50 K

CHARACTERISTICS:

TRANSDUCER

Type - Statham ASA-200-380

Serial No. - 3026

Natural Frequency - 1225

Damping Ratio - 0.94

GALVANOMETER

Type - CEC 7-342

Serial No. - 7302

RECORDED:

Oscillograph Channel 1-25 for Flight Test.

ADP 88-6-1
(1-51)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE
PREPARED BY T. E. Hittle
TITLE Eng. Loads Investigation

PAGE 7.005
MODEL A4D-2
REPORT 40636

TRANSDUCER CALIBRATION

SERIAL 3026
TAG T-3971
D.R.O. 641067
PLANE A4D089

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STHM ASA-200-380 ACCL.DRO.94
NOMINAL RANGE..... +-200
DIMENSIONS..... GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 6
CHANNEL NUMBER..... 3
RUN NUMBER..... 1
CALIBRATION DATE.....12 /60

PROGRAM E004
ANALYST
ENGR. T. E. Hittle

VOLTAGE CALIBRATION FACTO

RMS SLOPE .39028 02 G/ /MV/V
1/RMS SLOPE .25623 -01 MV/V/ GS
RMS INTERCEPT -.10423 02 GS

SHUNT CALIBRATION FACTORS

LEG	CAL-PIR EQUIVALENT		
G1-CP	.74052	02 GS	/ 50K
G1-TP	-.74532	02	
G2-TP	.74261	02	
G2-CP	-.74944	02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10000 03	.59257 -01	.03	-.14934 00	-.07	-.45042 -01
-.80000 02	.54740 -01	.03	.33879 -01	.02	.44310 -01
-.60000 02	.21710 00	.11	-.20010 00	-.10	.85025 -02
-.40000 02	.19172 00	.10	-.22547 00	-.11	-.16874 -01
-.20000 02	.18721 00	.09	-.22999 00	-.11	-.21391 -01
.00000 -39	.32871 00	.16	-.23451 00	-.12	.47101 -01
.20000 02	.11559 00	.06	-.25988 00	-.13	-.72145 -01
.40000 02	.31967 00	.16	-.97522 -01	-.05	.11108 00
.60000 02	.27344 00	.14	-.28978 00	-.14	-.81701 -02
.80000 02	.39467 -01	.02	-.14828 00	-.07	-.54407 -01
.10000 03	.14085 -01	.01	.14085 -01	.01	.14085 -01

30 DEC. 1960

CALIBRATION PRIOR TO FLIGHT TEST PHASE

74.360 G's/50K

DOUGLAS AIRCRAFT COMPANY, INC.

DATE
PREPARED BY L. E. Harris
TITLE Ldg. Loads Investigation

DESCRIPTION:

Measures acceleration of structure at Sta. 29.375.

CONSTANT:

72.147 G's/50 K

CHARACTERISTICS:

TRANSDUCER

Type - Statham ASA-200-380

Serial No. - 1464

Natural Frequency - 1110 cps

Damping Ratio - 0.74

GALVANOMETER

Type - CEC 7-342

Serial No. - 4903

RECORDED:

Oscillograph Channel 1-13 for Flight Test

ADL 88-1-1 (1-61)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE
PREPARED BY L. J. Harris
TITLE Lds. Loads Investigation

PAGE 7.007
MODEL
REPORT

Page 7.007
Report 40036

TRANSDUCER CALIBRATION

SERIAL 1464
TAG I-2654
D.A.No. 641067
PLANE A40089

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STHM A5A-200-400 AGCL.DRO.74
NOMINAL RANGE..... +-200
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 03
RUN NUMBER..... 1
CALIBRATION DATE.....12/27/60

PROGRAM F004
ANALYST
ENGR.

VOLTAGE CALIBRATION FACTORS

PMS SLOPE .39303 02 GS /MV/V
1YRMS SLOPE .25443 -01 MV/V/ GS
PMS INTERCEPT -.10393 03 GS

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT		
G1-CP	.72073	02 GS	/ 50K
G1-TP	-.73094	02	
G2-TP	.73094	02	
G2-CP	-.72969	02	

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
.10000 03	-.29661 -01	-.01	-.21708 00	-.11	-.12337 00
.80000 02	.18710 00	.09	-.22939 00	-.11	-.21142 -01
.60000 02	.40387 00	.20	-.42911 00	-.21	-.12622 -01
.40000 02	.60991 00	.30	-.39977 00	-.20	.10002 00
.20000 02	.44173 00	.22	-.20383 00	-.10	.11895 00
.00000 -39	.61696 00	.31	-.52850 00	-.26	.44173 -01
-.20000 02	.45877 00	.23	-.34503 00	-.20	.31868 -01
-.40000 02	.46720 00	.24	-.55311 00	-.28	-.42910 -01
-.60000 02	.24674 00	.12	-.37799 00	-.19	-.65627 -01
-.80000 02	.25526 00	.13	-.36948 00	-.18	-.57108 -01
-.10000 03	-.56533 -01	.03	-.56533 -01	.03	-.56533 -01

30 DEC. 1960

CALIBRATION PRIOR TO FLIGHT TEST PHASE

CONSTANT = 98.28 GS/50K

DOUGLAS AIRCRAFT COMPANY, INC.

DATE
PREPARED BY L. E. Harris
TITLE Ldg. Loads Investigation

DESCRIPTION:

Measures acceleration of structure at Sta. 49.375.

CONSTANT:

62.165 G's/50 K

CHARACTERISTICS:

TRANSDUCER

Type - Statham A6-100-350

Serial No. - 10019

Natural Frequency - 366 cps

Damping Ratio - 0.46

GALVANOMETER

Type - CEC 7-342

Serial No. - 7315

RECORDED:

Oscillograph Channel 1-24 for Flight Test.

TRANSDUCER CALIBRATION

INITIAL 1001
TAG
D.R.O. 641062
PLANE A4D02

PROGRAM LOOK
ANALYST
ENGR.

CALIBRATION AFTER FLIGHT TEST PHASE

TRANSDUCER DESCRIPTION..STHM A6-100-350 ACC. DR 0.46
NOMINAL RANGE..... +-100
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 08
RUN NUMBER..... 1
CALIBRATION DATE.....12/19/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .35652 02 GS /MV/V

1/RMS SLOPE .28049 -01 MV/V/ GS

RMS INTERCEPT -.10331 03 GS

SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT
G1-CP	.61591 02 GS / 50K
G1-TP	-.61159 02
G2-TP	.61512 02
G2-CP	-.62594 02

LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
.10000 03	-.18049 00	-.09	-.18049 00	-.09	-.18049 00
.80000 02	.36519 -01	.02	-.15070 00	-.08	-.57091 -01
.60000 02	.27433 00	.14	.45507 -01	.02	.15992 00
.40000 02	.38733 00	.19	.96099 -01	.05	.24172 00
.20000 02	.27151 00	.14	-.40528 -01	-.02	.11549 00
.00000 -39	.13488 00	.07	-.26037 00	-.13	-.62744 -01
.20000 02	-.43354 -01	-.02	-.25138 00	-.13	-.14737 00
.40000 02	.13562 -01	-.01	-.22159 00	-.11	-.11757 00
.60000 02	.12024 00	.06	-.33741 00	-.17	-.10859 00
.80000 02	.15001 00	.08	.66819 -01	.03	.10042 00
.10000 03	.96610 -01	.05	.96610 -01	.05	.96610 -01

27 DEC. 1960

Page 700
Report 40030

TRANSDUCER CALIBRATION

SERIAL 10019
TAG 35089
D.R.O. 674299
PLANE A4D-2N

CALIBRATION PRIOR TO FLIGHT TEST PHASE

PROGRAM F004
ANALYST
ENGR.

TRANSDUCER DESCRIPTION..STATHAM A6-100-350 D.R. 0.55
NOMINAL RANGE..... +-100
DIMENSIONS.....GS
PERCENT UNBALANCE..... .00
BRIDGE VOLTS..... 5
CHANNEL NUMBER..... 02
RUN NUMBER..... 1
CALIBRATION DATE.....07/05/60

VOLTAGE CALIBRATION FACTORS

RMS SLOPE .39578 02 GS /MV/V

1/RMS SLOPE .28107 -01 MV/V/ GS

RMS INTERCEPT -.10313 03 GS

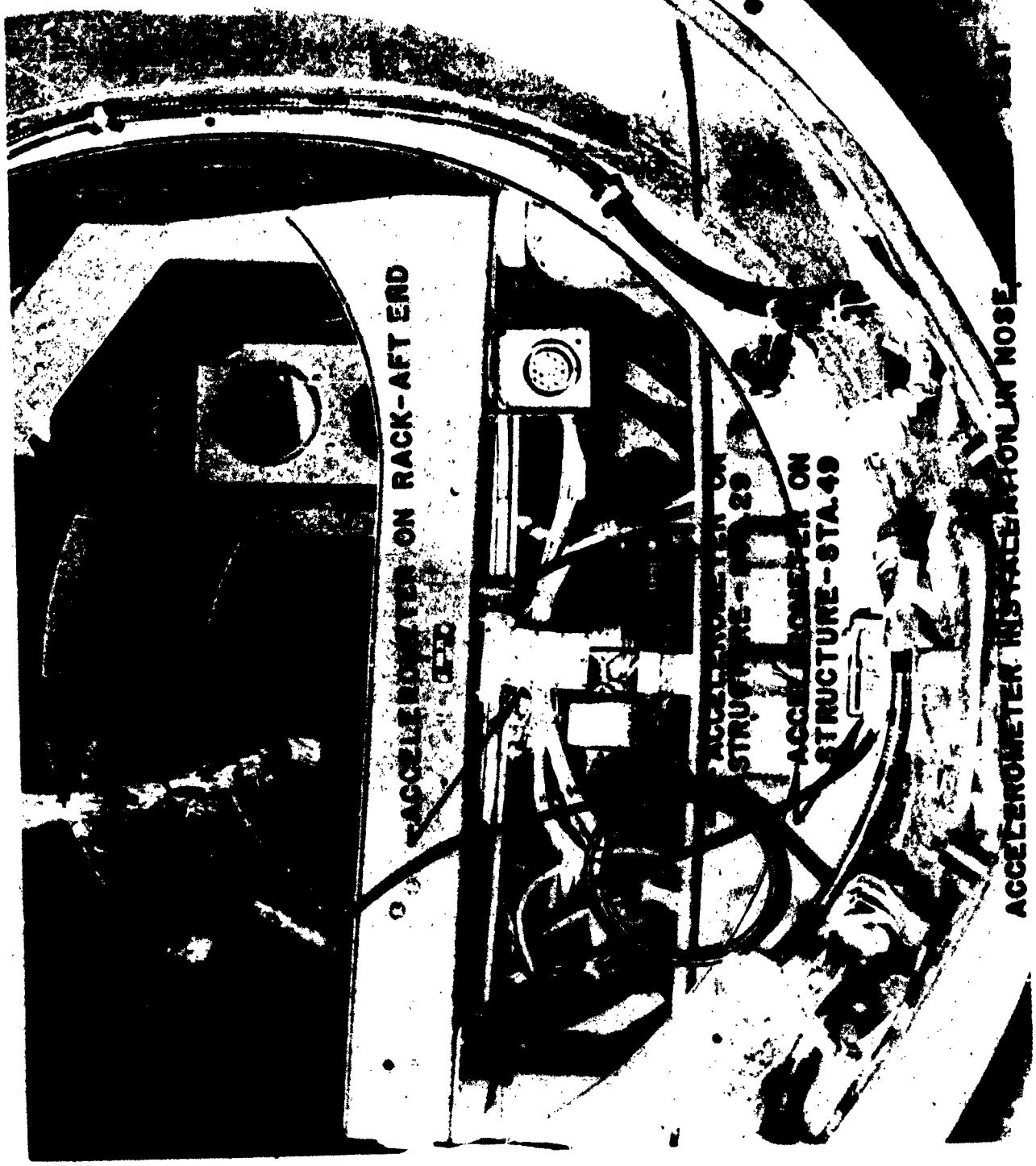
SHUNT CALIBRATION FACTORS

LEG	CAL-PIP EQUIVALENT	
G1-CP	.82340 02 GS	/ 50K
G1-TP	-.81386 02	
G2-TP	.81034 02	
G2-CP	-.81946 02	

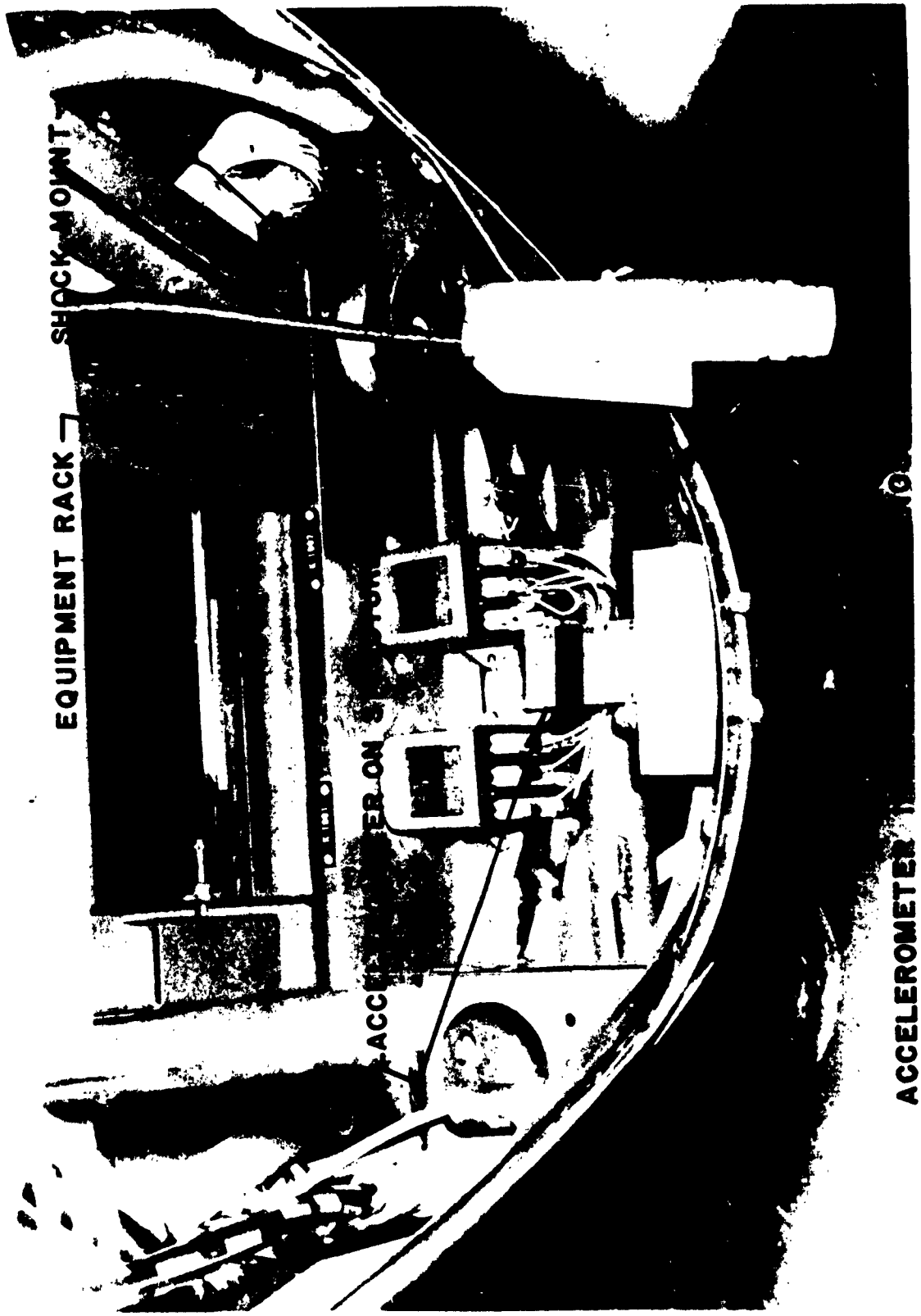
LOAD	UP-SCALE DEVIATION	UP-SCALE PERCENT DEVIATION	DOWN-SCALE DEVIATION	DOWN-SCALE PERCENT DEVIATION	AVERAGE DEVIATION
-.10000 03	-.20489 00	-.10	-.16344 00	-.08	-.18416 00
-.80000 02	.86005 -01	.04	-.18342 +01	-.02	.23831 -01
-.60000 02	.12820 00	.06	.14893 00	.07	.13857 00
-.40000 02	.33620 00	.17	.10823 00	.05	.22221 00
-.20000 02	.25405 00	.13	.12970 00	.06	.19187 00
.00000 00	.97529 -01	.05	-.18042 00	-.09	-.13897 00
.20000 02	-.17967 00	-.09	-.32475 00	-.16	-.25221 00
.40000 02	-.11675 00	-.06	-.17892 00	-.09	-.14784 00
.60000 02	-.95278 -01	-.05	-.95278 +01	-.05	-.95278 -01
.80000 02	.19562 00	.10	.71268 +01	.04	.13944 00
.10000 03	.21709 00	.11	.21709 00	.11	.21709 00

† JULY 1960

125


ACCELEROMETER ON RACK-AFT END
ACCELEROMETER ON STRUCTURE-STA.49
ACCELEROMETER ON STRUCTURE-STA.49
ACCELEROMETER INSTALLATION IN NOSE

785



F8C

FLIGHT TEST GENERAL INSTRUMENTATION

Photoscope

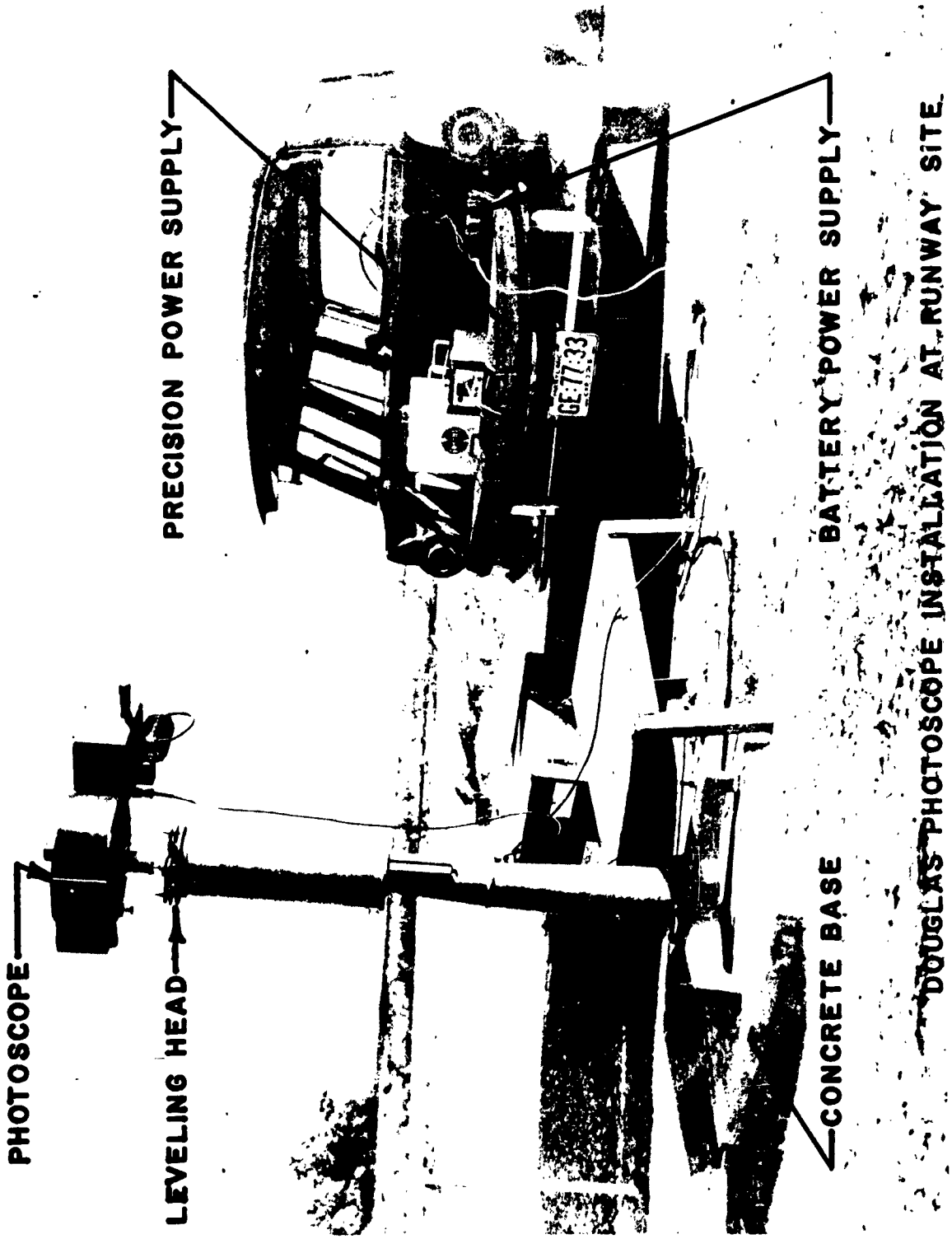
A Douglas Aircraft Company-developed photoscope was used to obtain horizontal and vertical speeds at airplane touchdown.

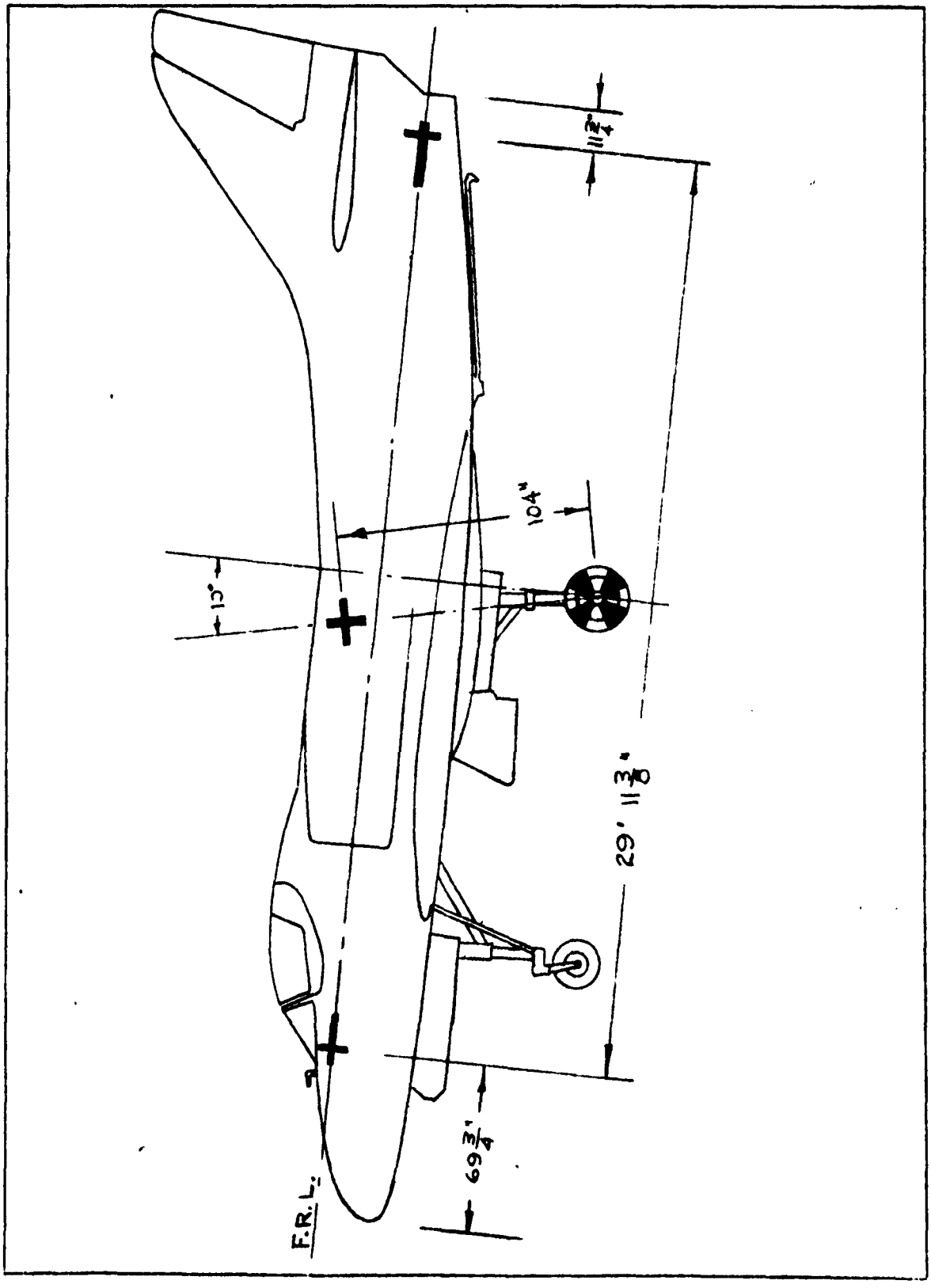
The DAC photoscope is a 35 mm camera running at a precise rate of 20 frames/sec. The speed is controlled by a precision power supply with a power requirement of 24 ± 1 volt D.C. A circular etched glass grid graduated in 2 degree increments of elevation and 1 degree increments of azimuth is located in close proximity to the film plane and the grid lines are super-imposed on the photograph of the airplane. The camera must be leveled prior to use to assure that the grid lines are perpendicular and parallel to a horizontal line in space. This grid is fixed with respect to the mounting base, and the camera body containing the lens and film rotates in a horizontal plane. The camera base (with glass grid) is locked in position after leveling and alignment. The camera has a 6 1/8 inch f4.5 lens and a shutter speed of 1/284 second. The film capacity is 100 ft. of 35 mm film.

The camera for the subject landings was located 525.5 feet from the centerline of the runway and 100 ft. on the approach side of the intended touchdown area. The camera was attached to a concrete platform to assure rigidity. A photograph of the photoscope is shown on Page 8.002.

Camera level checks were performed before and after each series of landings. These level checks were made by photographing a target board placed in turn on several points of known elevation relative to the photoscope camera.

Certain markings were placed on the airplane to provide scale checks for check purposes with the photoscope film. The tires were marked as an aid in determining the touchdown point in the photoscope film. These markings are shown on Page 8.003.


PRECISION POWER SUPPLY
BATTERY POWER SUPPLY
DOUGLAS PHOTOSCOPE INSTALLATION AT RUNWAY SITE
PHOTOSCOPE
LEVELING HEAD
CONCRETE BASE


2 3/4
104"
12"
29' 11 3/8"
69 3/4"
F.R.L.

Touchdown Rate of Descent Indicator (TRODI)

Four TRODI units were used for instantaneous reading of vertical speed of the airplane at touchdown.

Two TRODI units were placed on each side of the runway near the area of intended touchdown. The TRODI mirrors were mounted on the main landing gear of the airplane. The TRODI mirrors installation on the left and right main gears can be seen in the photographs on Pages 2.411 and 2.412.

The operation, calibration, set-up and alignment of the TRODI equipment were handled by NATC personnel.

Mitchell Camera

The Mitchell camera was used to measure horizontal and vertical speeds and was used as a back-up data source for the DAC photoscope. The Mitchell camera was operated and the data reduction from the film was completed by NATC personnel.

Speed Over Deck Indicator (SODI)

The SODI was used for instantaneous reading of horizontal speed at touchdown and was operated by NATC personnel. The SODI units were placed near the runway edge to the left of the intended touchdown point. The SODI mirrors were installed on the underside of the fuselage, left and right, near the aft end of the nose gear drag strut.

AN/SPN-12 Approach Radar

The AN/SPN-12 radar equipment was used by the LSO at the landing site to monitor the airplane approach speed and the horizontal velocity at touchdown. Set-up, calibration, and operation of the equipment were handled by NATC personnel.

Yaw and Sideslip Camera

An 16mm movie camera, designation N-9, was installed on the right side of the airplane at Sta. 86.0 to photograph a view downward. Grid lines were painted on the runway and the intent was to photograph the grid lines and determine yaw angle and drift speed at airplane touchdown. The camera operated during approximately 50% of the landings and on those landings for which film was obtained correlation with the oscillograph records was not possible. A photograph of the camera installed on the airplane is shown on Page 8.402.

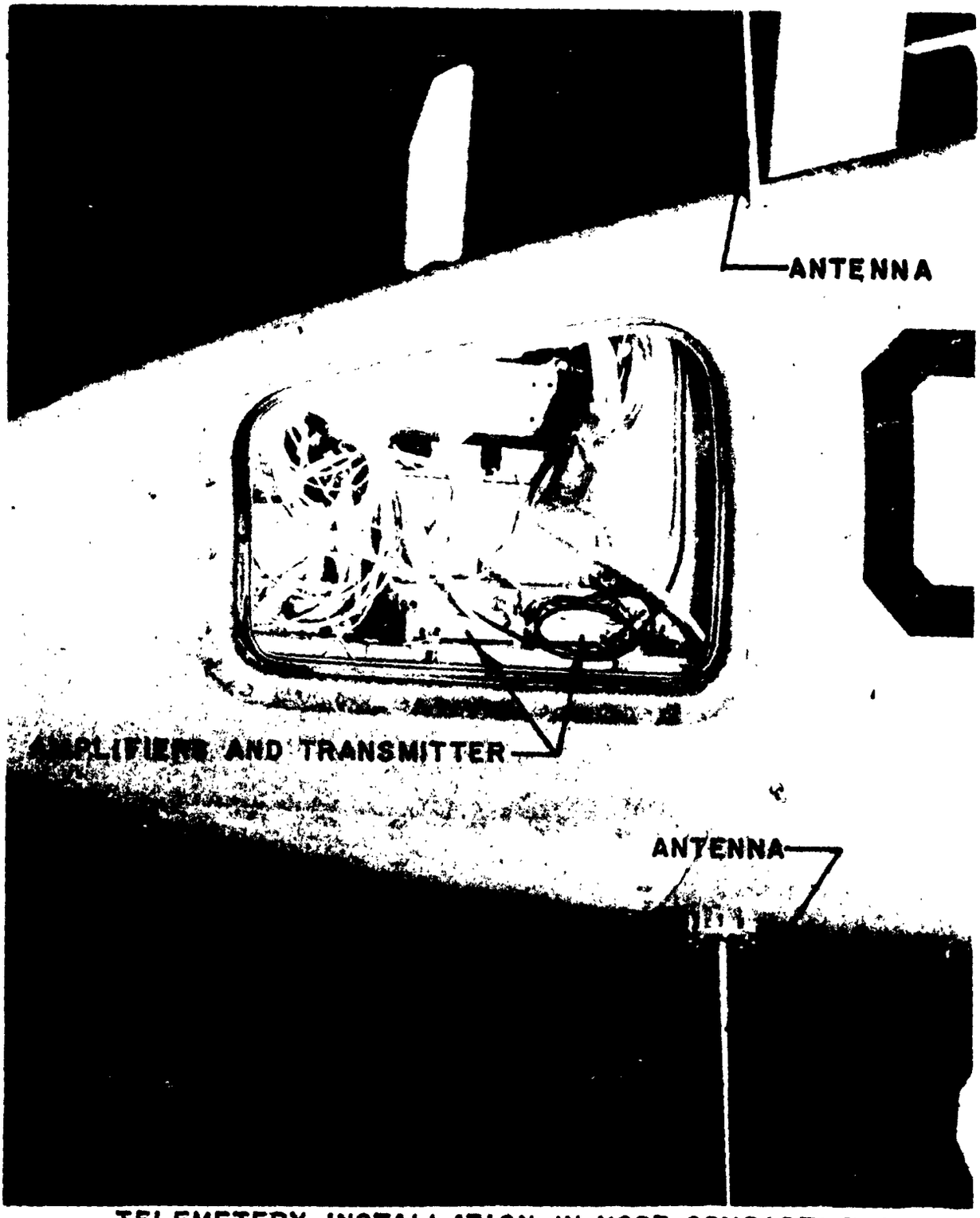
N-9 CAMERA INSTALLATION ON FORWARD FUSELAGE

160

Telemetry Equipment

Crystal type accelerometers were installed on the nose electronic equipment rack adjacent to the accelerometers discussed on Page 7.001 of this report. These accelerometers measured vertical shock loads applied to the equipment rack. Due to the high frequency expected, the results were telemetered to a ground station and collected on magnetic tape. A photograph of the airborne transmitter installed in the airplane is shown on Page 8.502.

The carrier frequency assigned to the telemetry system conflicted with a high priority project operating at the Naval Air Test Center and as a result, usable data were not obtained.



TELEMETERY INSTALLATION IN NOSE COMPARTMENT
FLIGHT TEST

Drop Test Reaction Platform Loads

For the drop test phase of the program, the ground reactions for both main landing gears and the nose landing gear were measured with reaction platforms of Douglas Aircraft Company design. These platforms (E.S. Static Test Drawing 31296) are of 60,000 lb. capacity. The platforms utilize strain gage links to measure the loads. Photographs of the two main gear reaction platforms are shown on Pages 9.005 and 9.017. A photograph of the nose gear reaction platform is shown on Page 9.028. The procedure followed for adjusting the drag preload on the platforms to eliminate a back-lash condition in the links near zero drag loads is detailed on Page 9.023.

DESCRIPTION:

Right hand gear vertical platform. This transducer measures vertical deck forces induced by the landing gear.

CONSTANT:

Lbs = 47650 S/A/250K Ohms Resistor Calibration

CHARACTERISTICS:

TRANSDUCER

Type - DAC Design E.S. 5212457

Serial No. - 2

Natural Frequency - Approx. 90 cps (Vertical)

GALVANOMETER

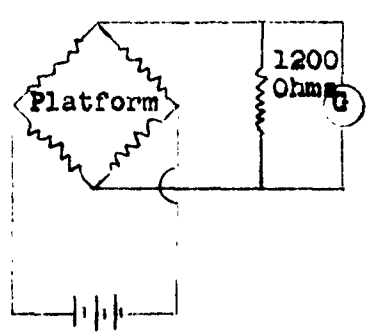
Type - 7-342

Serial No. - 4978

Resistance - 344.7 Ohms

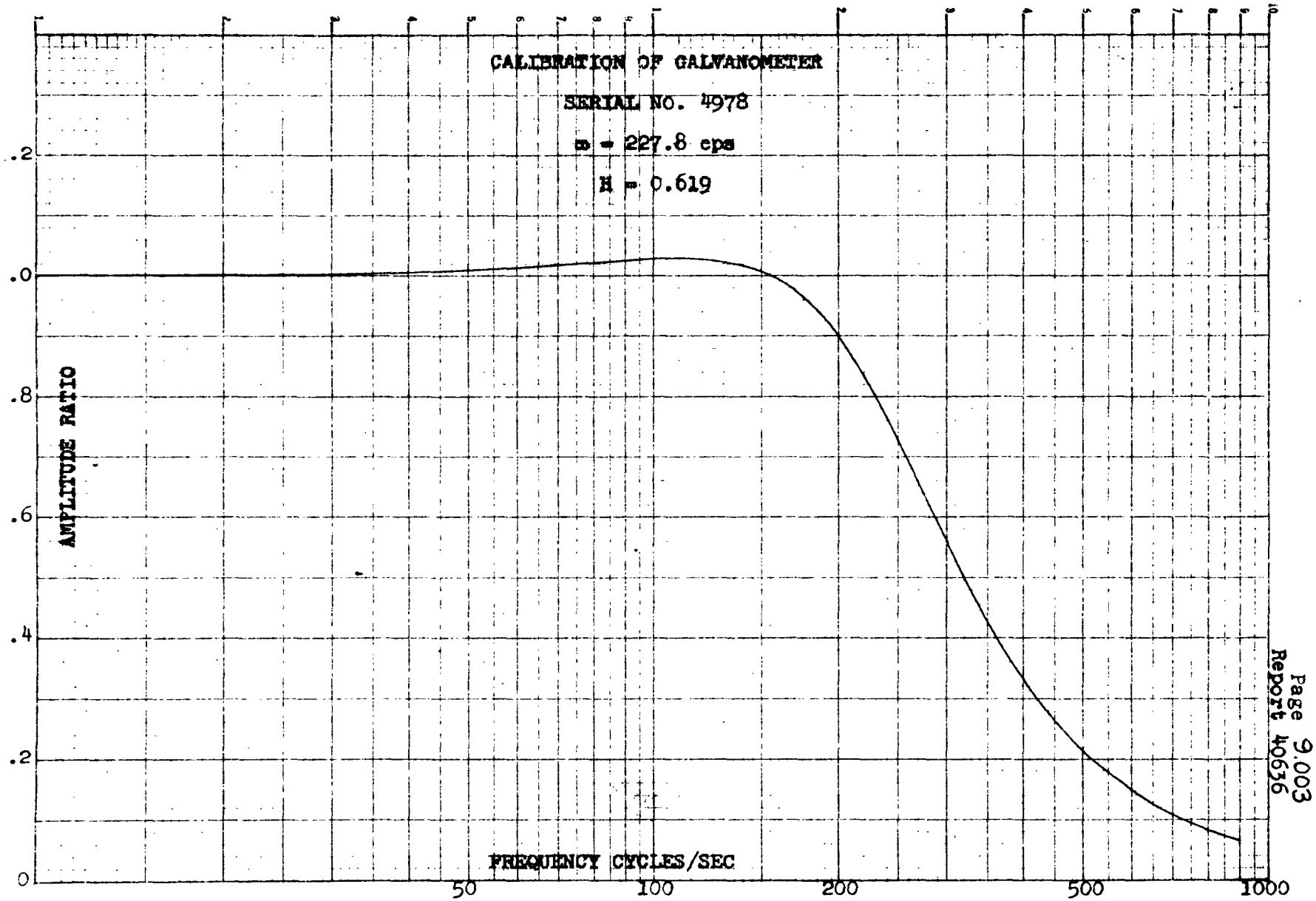
Natural Frequency - 227.8 cps

Damping - 0.619



RECORDED:

Oscillograph Channel 2-8 for Drop Test


CALIBRATION OF GALVANOMETER
SERIAL NO. 4978
ω = 227.8 cps
H = 0.619
AMPLITUDE RATIO
.2
.0
.8
.6
.4
.2
0
50
100
200
500
1000
FREQUENCY CYCLES/SEC

PREPARED BY H.D. MERIWETHER
DATE 26 MAY 1961
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. [redacted]

RECALIBRATION OF DYNAMIC REACTION PLATFORM 2

R.H. SIDE, VERTICAL LOAD

TEST	RUN	CHANNEL	LOAD	READING	X	Y
2	2	7		7470		
2	2	8	5000	793	.10683	5000
2	2	8	10000	1579	.21017	10000
2	2	8	15000	2359	.31457	15000
2	2	8	20000	3126	.41847	20000
2	2	8	25000	3904	.52316	25000
2	2	8	30000	4686	.62731	30000
2	2	8	35000	5474	.73280	35000
2	2	8	40000	6256	.83748	40000
2	2	8	45000	7056	.94453	45000
2	2	8	50000	7840	1.04953	50000

INTERCEPT	SLOPE 1	SLOPE 2	SLOPE 3	SLOPE 4
AVE.DELTA Y	MAX.+	MAX.-	OMITTED X	
-126.366	47723.709			
49.298	74.643	-95.829	.00000	
39.306	47655.991			
44.106	65.214	-56.161	.10683	
31.582	47656.052			
41.466	57.302	-43.075	.62731	
36.772	47633.674			
37.252	57.374	-48.133	.83748	
35.962	47618.498			
29.639	51.977	-44.134	.73280	

345

DESCRIPTION:

Right hand gear drag platform. This transducer measures horizontal deck forces induced by the landing gear.

CONSTANT:

Lbs. = 11411.8 δ/Δ / 250K Ohms Resistor Calibration

CHARACTERISTICS:

TRANSDUCER

Type - DAC Design E.S. 5212457

Serial No. - 2

GALVANOMETER

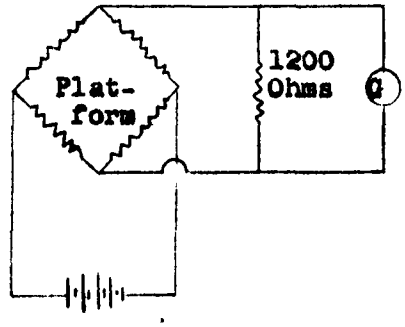
Type - 7-342

Serial No. - 4903

Resistance - 354.1 Ohms

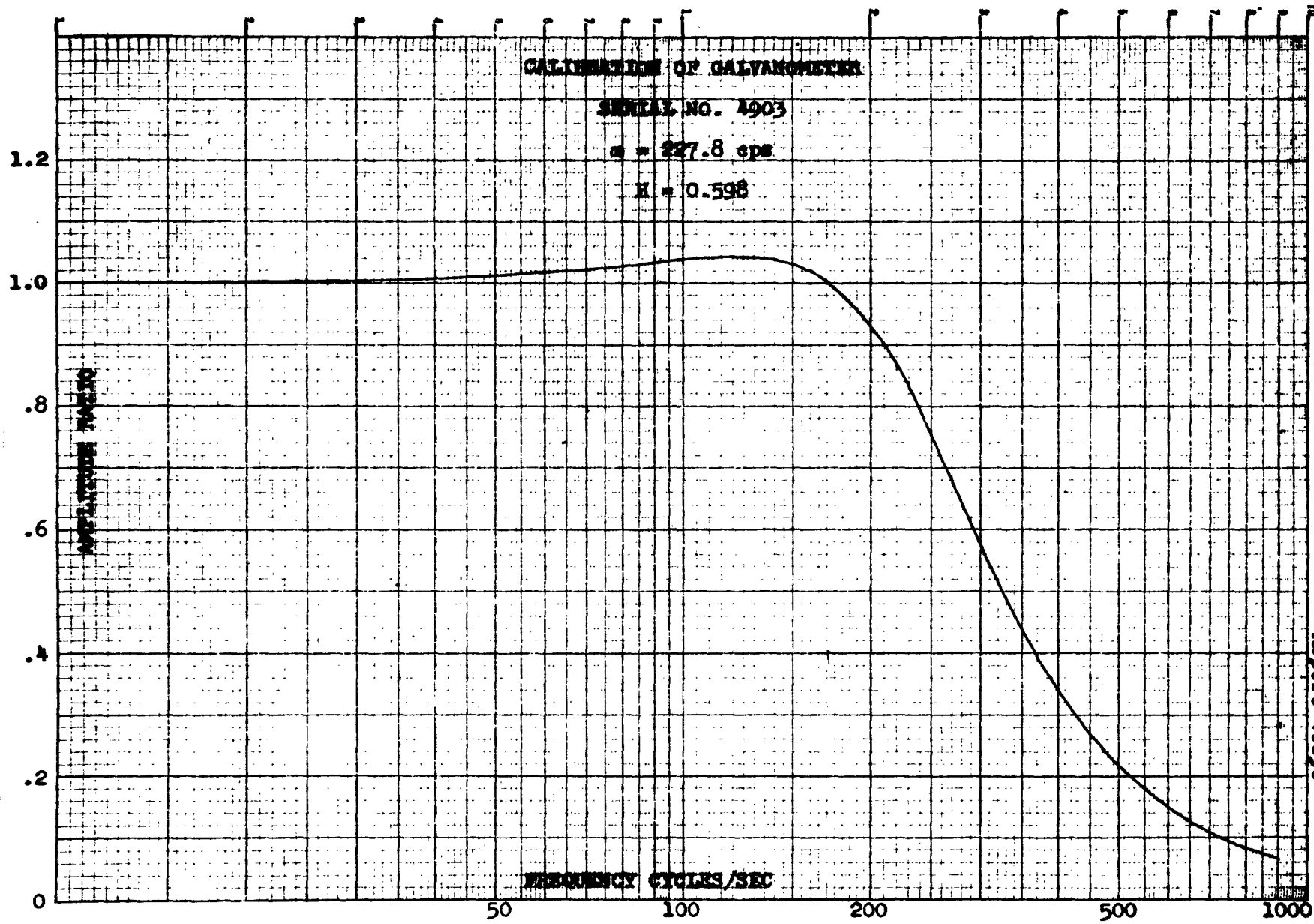
Natural Frequency - 227.8 cps

Damping - 0.598



RECORDED:

Oscillograph Channel 2-12 for Drop Test


K&E SEMI-LOGARITHMIC 359T-61
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS ALBANENE 30
CALIBRATION OF GALVANOMETER
SERIAL NO. 4903
α = 227.8 cps
H = 0.598
AMPLITUDE RATIO
1.2
1.0
.8
.6
.4
.2
0
50
100
200
500
1000
FREQUENCY CYCLES/SEC

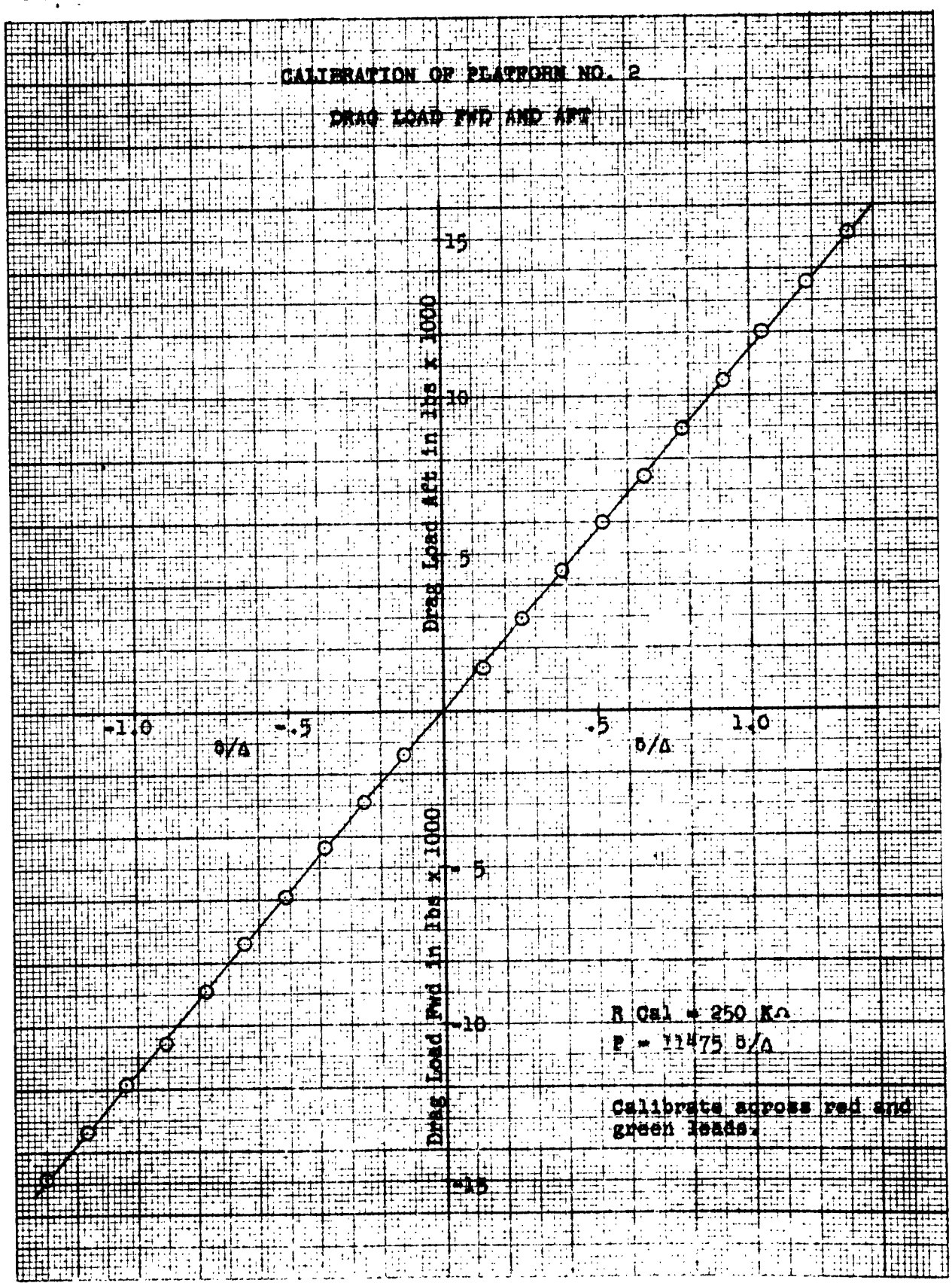
CALIBRATION OF PLATFORM NO. 2

DRAG LOAD FWD AND AFT

P = 11,475 #/Δ @ 250 K

TEST	RUN	CHANNEL	LOAD	READING	X	Y
2	1	2		1196		
2	1	2	-1425	-153	-.12793	-1425
2	1	2	-2918	-306	-.25585	-2918
2	1	2	-4366	-461	-.38545	-4366
2	1	2	-5906	-618	-.51672	-5906
2	1	2	-7400	-773	-.64632	-7400
2	1	2	-8893	-929	-.77676	-8893
2	1	2	-10564	-1086	-.90803	-10564
2	1	2	-11834	-1243	-1.03930	-11834
2	1	2	-13374	-1400	-1.17057	-13374
2	1	2	-14868	-1557	-1.30184	-14868
2	1	2	1393	152	.12709	1393
2	1	2	2975	304	.25418	2975
2	1	2	4440	462	.38629	4440
2	1	2	5998	619	.51756	5998
2	1	2	7462	779	.65134	7462
2	1	2	8974	931	.77843	8974
2	1	2	10508	1088	.90970	10508
2	1	2	12020	1242	1.03846	12020
2	1	2	13579	1410	1.17893	13579
2	1	2	15161	1573	1.31522	15161

INTERCEPT	SLOPE 1	SLOPE 2	SLOPE 3	SLOPE 4
AVE. DELTA Y	MAX.+	MAX.-	OMITTED X	
31.769	11489.517			
36.393	75.259	-162.980	.00000	
40.978	11476.698			
29.249	60.912	-106.555	-.90803	
46.866	11477.417			
23.983	54.278	-60.541	.12709	
50.396	11480.718			
21.477	47.487	-45.256	.65134	
47.055	11485.706			
19.491	45.481	-43.841	-1.03930	


CALIBRATION OF PLATFORM NO. 2
DRAG LOAD FWD AND AFT
Drag Load Aft in lbs x 1000
15
10
5
-1.0
δ/Δ
-.5
.5
δ/Δ
1.0
Drag Load Fwd in lbs x 1000
5
10
15
R Cal = 250 KΩ
P = 11475 δ/Δ
Calibrate across red and green leads.

DESCRIPTION:

Left Hand Main Gear Reaction Platform No. 1. This transducer measures the vertical deck forces induced by the landing gear. See photograph ES 201343.

CONSTANT:

Drops 1 through 14

Lbs. = 47380 δ/Δ for 250 K Ohm Calibrating Resistor

Drops 15 through 31

Lbs. = 47487 δ/Δ for 250 K Ohm Calibrating Resistor

CHARACTERISTICS:

TRANSDUCER

Type - DAC Design ES 5212457

Serial No. - 1

Natural Frequency - Approx. 90 cps (Vertical)

GALVANOMETER

Type - CEC 7-342

Serial No. - 5118

Resistance - Galvo sees 344.7 Ohms

Natural Frequency - 217.3 cps

Damping - H = 567.

RECORDED:

Oscillegraph Channel 1-8 for Drop Test (Drops 1-31)

DESCRIPTION:

Left Hand Main Gear Reaction Platform No. 6. This transducer measures the vertical deck forces induced by the landing gear. See photograph ES 201343.

CONSTANT:

Lbs. = 48450 δ/Δ for 250 K Ohm Calibrating Resister

CHARACTERISTICS:

TRANSDUCER

Type - DAC Design ES 5212457

Serial No. - 6

Natural Frequency - Approx. 90 cps (Vertical)

GALVANOMETER

Type - CEC 7-342

Serial No. - 5118

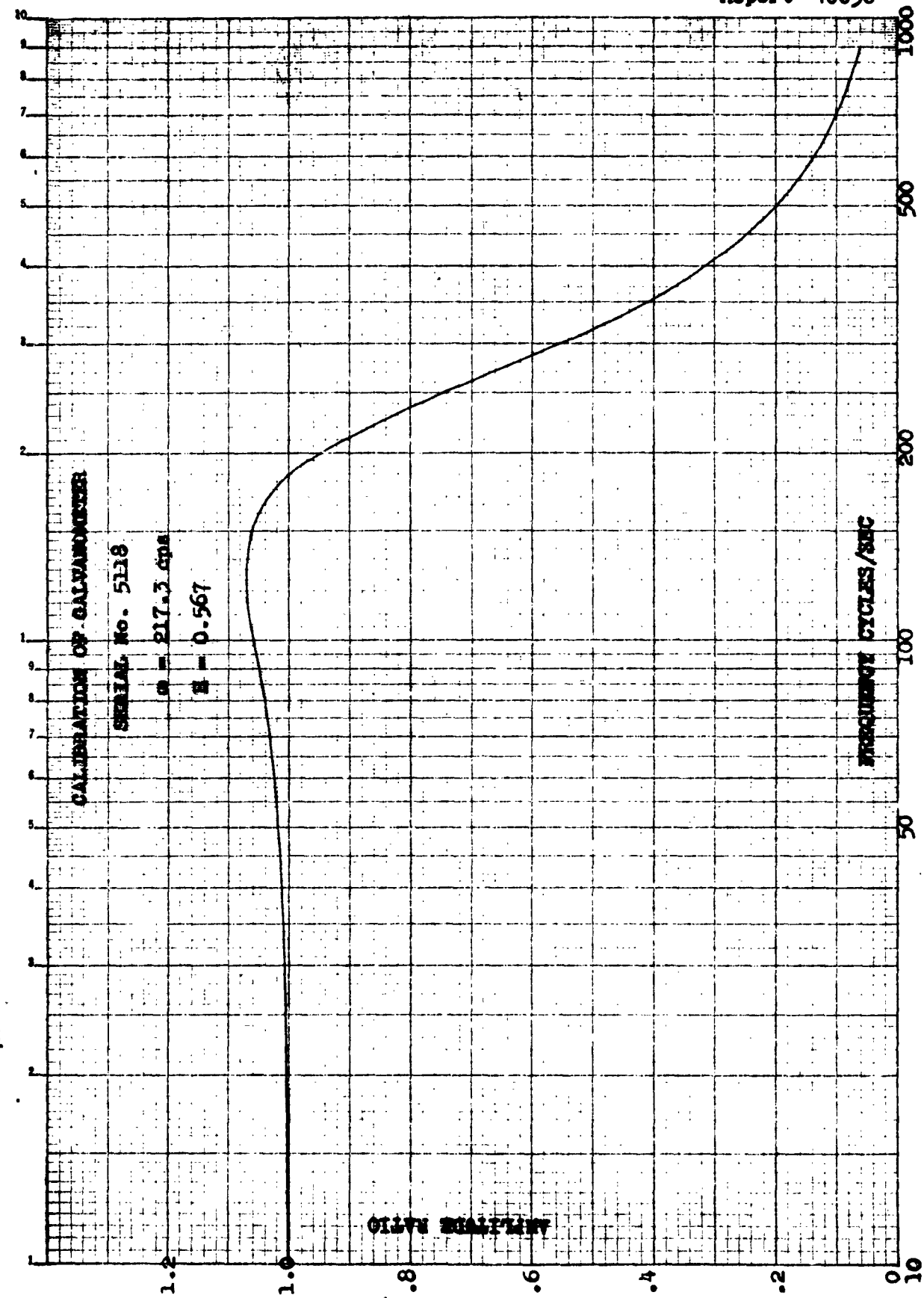
Resistance - Galvo sees 344.7 Ohms

Natural Frequency - 217.3 cps

Damping - M = 567.

RECORDED:

Oscillograph Channel 1-8 for Drop Tests (Drops 32 and Subs)


CALIBRATION OF GALVANOMETER
SERIAL No. 5118
a = 217.3 cps
ξ = 0.567
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
1.2
1.0
.8
.6
.4
.2
0
10
50
100
200
500
1000
SEMI-LOGARITHMIC
KEUFFEL & ESSER CO.
359T-61
MADE IN U.S.A.
ALBANENE

DOUGLAS AIRCRAFT COMPANY, INC.
EL SEGUNDO DIVISION

CALIBRATION OF PLATFORM NO. 1

VERTICAL LOAD

P = 47,480 δ/Δ @ 250 K

TEST	RUN	CHANNEL	LOAD	READING	X	Y
1	1	1		1125		
1	1	1	5000	117	.10400	5000
1	1	1	10000	336	.20976	10000
1	1	1	15000	352	.31378	15000
1	1	1	20000	472	.42044	20000
1	1	1	25000	589	.52356	25000
1	1	1	30000	709	.63022	30000
1	1	1	35000	829	.73689	35000
1	1	1	40000	945	.84267	40000
1	1	1	45000	1066	.94756	45000
1	1	1	50000	1184	1.05244	50000
1	1	1	55000	1304	1.15911	55000
1	1	1	60000	1427	1.26844	60000

INTERCEPT AV..DELTA Y	SLOPE 1	SLOPE 2 MAX.+	SLOPE 3 MAX.-	SLOPE 4 OMITTED X
123.010 49.768	47314.151	94.797	-148.988	.00000
98.216 32.726	47391.724	87.894	-39.945	1.26844
83.694 23.680	47430.497	43.526	-27.215	.52356
78.522 19.633	47400.917	48.124	-22.191	.63022
61.318 13.115	47417.272	34.638	-23.204	.31378

PREPARED BY H.D. MERIWETHER
DATE 24 MAY 1961
TITLE LANDING LOADS INVESTIGATION

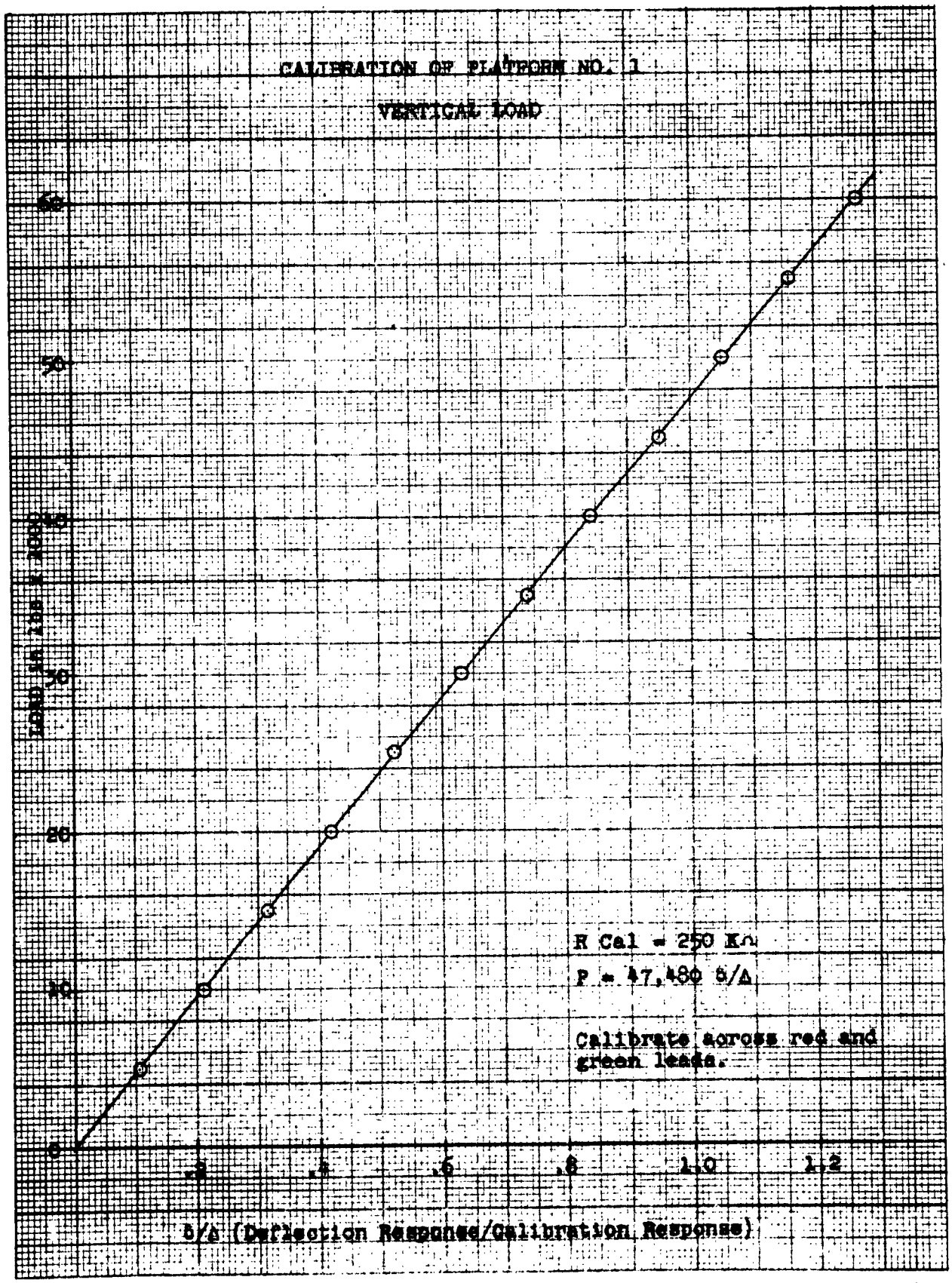
MODEL A40+2
REPORT NO. 40636

RECALIBRATION OF DYNAMIC REACTION PLATFORM 6

L.H. SIDE, VERTICAL LOAD

TEST	RUN	CHANNEL	LOAD	READING	X	Y
6	2	10		7689		
6	2	10	4980	829	.10782	4980
6	2	10	10035	1623	.21108	10035
6	2	10	14975	2421	.31487	14975
6	2	10	19925	3242	.42164	19925
6	2	10	24990	4005	.52087	24990
6	2	10	29965	4821	.62700	29965
6	2	10	34960	5666	.73690	34960
6	2	10	36600	6470	.84146	36600
6	2	10	44850	7272	.94577	44850
6	2	10	49895	8077	1.05046	49895

INTERCEPT	SLOPE 1	SLOPE 2	SLOPE 3	SLOPE 4
AVE.DELTA Y	MAX.+	MAX.-	OMITTED X	
216.058	46559.489			
611.779	769.982	-2794.091	.00000	
-13.827	47544.531			
97.592	239.066	-132.262	.84146	
-48.649	47553.579			
73.562	197.573	-98.405	.52087	
-65.738	47533.003			
48.804	74.240	-79.098	.62700	
-11.967	47466.840			
37.934	44.869	-77.014	.10782	


CALIBRATION OF PLATFORM NO. 1
VERTICAL LOAD
60
50
40
30
20
10
0
LOAD IN 1000 LBS
R Cal = 250 KΩ
P = 47,480 δ/Δ
Calibrate across red and green leads.
.2
.4
.6
.8
1.0
1.2
δ/Δ (Deflection Response/Calibration Response)

PREPARED BY H.D. MERIWETHER
DATE 24 MAY 1961
TITLE LANDING LOADS INVESTIGATION

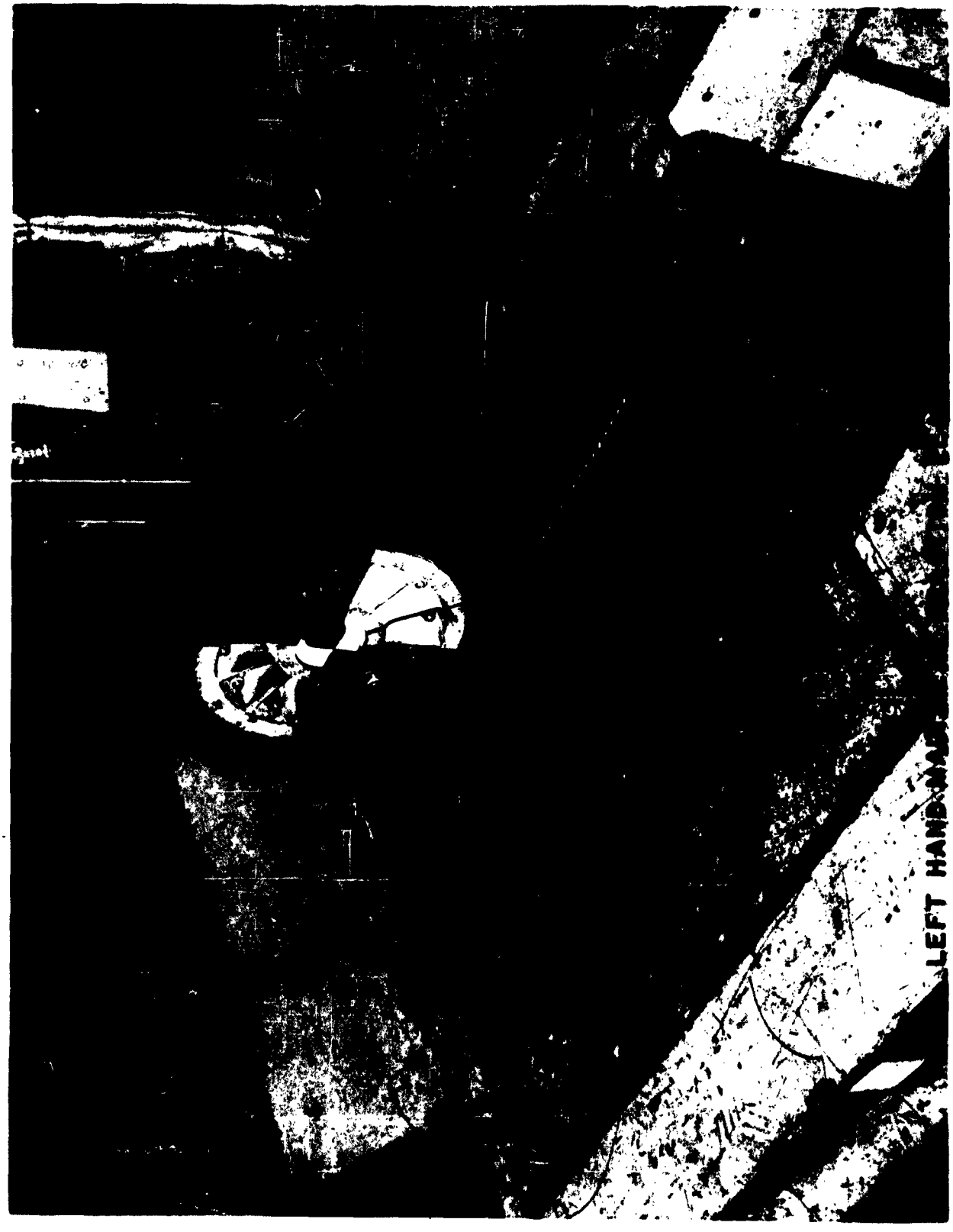
MODEL A4D-2
REPORT NO. 40636

RECALIBRATION OF DYNAMIC REACTION PLATFORM 6

L.H. SIDE, VERTICAL LOAD

TEST	RUN	CHANNEL	LOAD	READING	X	Y
6	3	10		7702		
6	3	10	5000	928	.10750	5000
6	3	10	10000	1634	.21215	10000
6	3	10	15000	2440	.31680	15000
6	3	10	20000	3246	.42145	20000
6	3	10	25000	4048	.52558	25000
6	3	10	30000	4850	.62971	30000
6	3	10	35000	5650	.73358	35000
6	3	10	40000	6464	.83926	40000
6	3	10	45000	7254	.94183	45000
6	3	10	50000	8114	1.05349	50000

INTERCEPT	SLOPE 1	SLOPE 2	SLOPE 3	SLOPE 4
AVE.DELTA Y	MAX.+	MAX.-	OMITTED X	
-109.880	47756.760			
56.840	130.974	-201.513	.00000	
-173.085	47919.699			
19.860	40.717	-44.122	1.05349	
-181.535	47948.430			
16.462	26.861	-26.281	.83926	
-201.954	47979.126			
12.693	23.053	-18.800	.10750	
-226.534	48013.992			
8.552	15.662	-8.913	.21215	


LEFT HAND

DESCRIPTION:

Left hand drag platform.

CONSTANT:

Drops 1-14	D = 11438 δ/Δ / 50 K Ohms Reais. Calib.
Drops 15-31	D = 11420 δ/Δ / 50 K Ohms Reais. Calib.
Drops 32 and Subs.	D = 11644 δ/Δ / 50 K Ohms Reais. Calib.

CHARACTERISTICS:

TRANSDUCER

Type - DAC Dwg. 5212457

Serial No. - 6, drops 32 and subsequent

GALVANOMETER

Type - 7-342

Serial No. - 7327

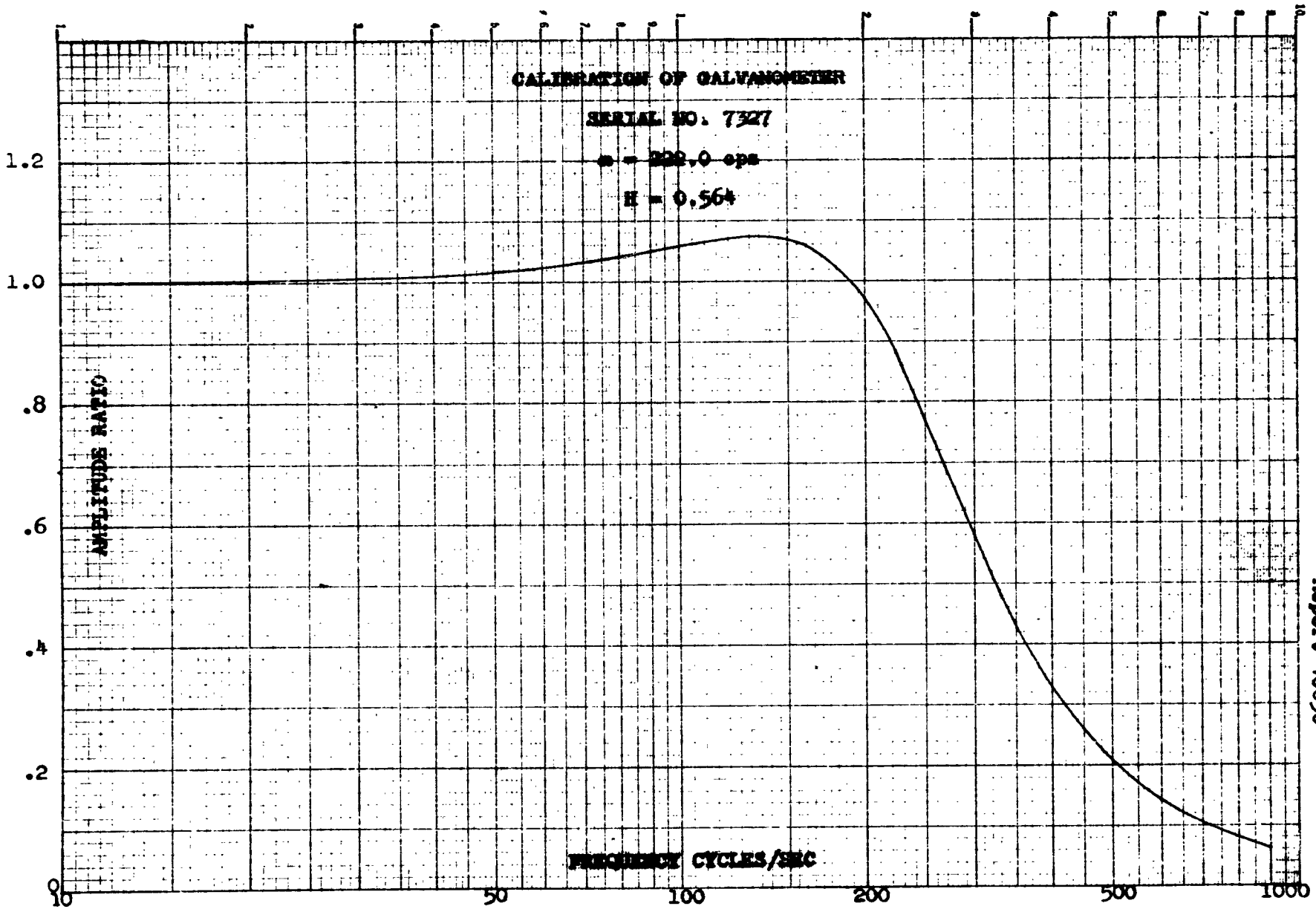
Resistance - 354.4 Ohms

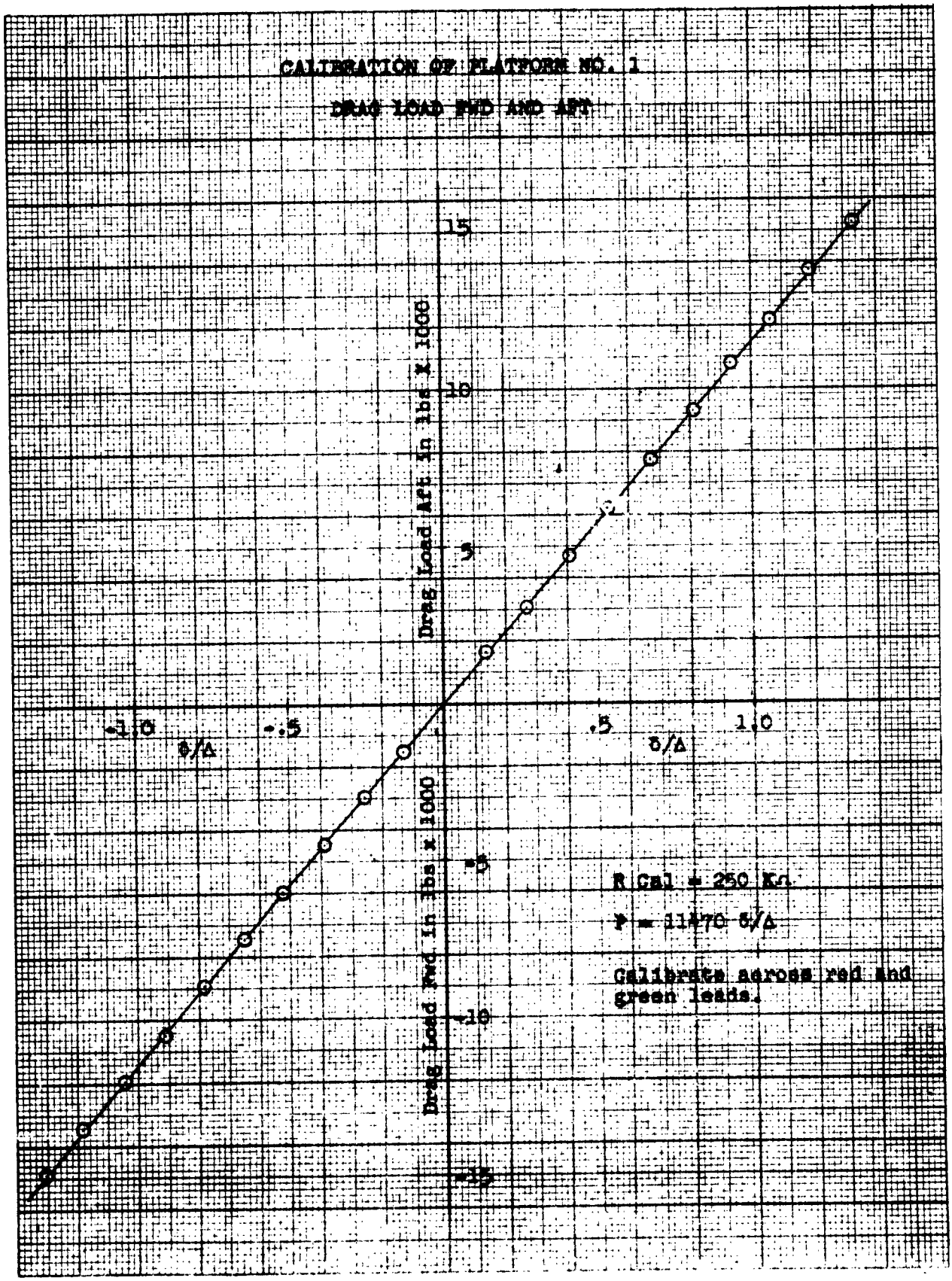
Natural Frequency - 222.0 cps

Damping - 0.564

RECORDED:

Oscillegraph Channel 1-14 for Drop Test


K+E SEMI-LOGARITHMIC 359T-61
KEUFFEL & ESSER CO. 2 CYCLES X 70 DIVISIONS
CALIBRATION OF GALVANOMETER
SERIAL NO. 7327
n = 222.0 cps
H = 0.564
AMPLITUDE RATIO
1.2
1.0
.8
.6
.4
.2
0
10
50
100
200
500
1000
FREQUENCY CYCLES/SEC


CALIBRATION OF PLATFORM NO. 1
DRAG LOAD FWD AND AFT
Drag Load Aft In lbs X 1000
15
10
5
Drag Load Fwd In lbs X 1000
-5
-10
-15
-1.0
δ/Δ
-.5
.5
δ/Δ
1.0
R Cal = 250 Kn
P = 11470 δ/Δ
Calibrate across red and green leads.

DOUGLAS AIRCRAFT COMPANY, INC.
EL SEGUNDO DIVISION

CALIBRATION OF PLATFORM NO. 1

DRAG LOAD FWD AND AFT

P = 11470 δ/Δ @ 250 K

TEST	RUN	CHANNEL	LOAD	READING	X	Y
1	1	2		1063		
1	1	2	-1530	-143	-.13452	-1530
1	1	2	-2983	-276	-.25964	-2983
1	1	2	-4461	-416	-.39135	-4461
1	1	2	-5992	-555	-.52211	-5992
1	1	2	-7444	-694	-.65287	-7444
1	1	2	-8949	-933	-.78363	-8949
1	1	2	-10505	-971	-.91345	-10505
1	1	2	-11932	-1110	-1.04421	-11932
1	1	2	-13462	-1258	-1.18344	-13462
1	1	2	-14915	-1390	-1.30762	-14915
1	1	2	1634	143	.13452	1634
1	1	2	3060	283	.26623	3060
1	1	2	4695	429	.40357	4695
1	1	2	6199	566	.53246	6199
1	1	2	7756	712	.66980	7756
1	1	2	9312	859	.80809	9312
1	1	2	10816	990	.93133	10816
1	1	2	12191	1125	1.05833	12191
1	1	2	13773	1262	1.18721	13773
1	1	2	15278	1414	1.33020	15278

INTERCEPT AVE.DELTA Y	SLOPE 1 MAX.+	SLOPE 2 MAX.-	SLOPE 3 OMITTED X	SLOPE 4
53.028 37.184	11486.858 82.707	-65.331	.00000	
48.195 33.638	11478.233 77.823	-68.374	1.18721	
43.049 30.312	11470.790 69.978	-70.027	.93133	
46.799 28.710	11464.959 59.328	-53.008	-.91345	
43.038 25.419	11472.913 47.569	-47.182	-1.18344	

PREPARED BY H.D. MERIWETHER
DATE 4/21/61
TITLE LANDING LOADS INVESTIGATION

MODEL A4D-2
REPORT NO. 40636

L.H. DRAG PLATFORM CALIBRATION

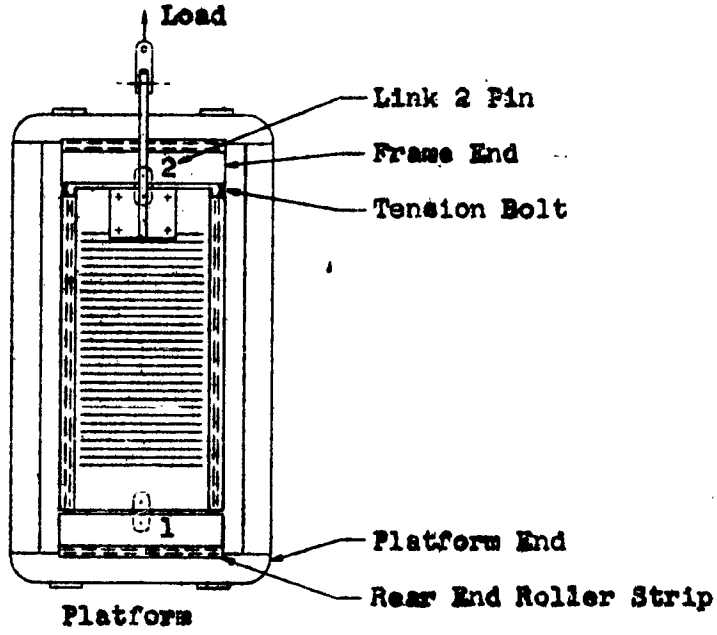
EFFECTIVE DROP 32 AND SUBS

TEST	RUN	CHANNEL	LOAD	READING	X	Y
32	6	16		718		
32	6	16	1500	96	.13370	1500
32	6	16	3000	187	.26045	3000
32	6	16	4500	283	.39415	4500
32	6	16	6000	378	.52646	6000
32	6	16	7500	473	.65877	7500
32	6	16	9000	561	.78134	9000
32	6	16	10500	653	.90947	10500
32	6	16	12000	748	1.04178	12000
32	6	16	13500	840	1.16992	13500
32	6	16	15000	933	1.29944	15000
32	6	16	-1500	-93	-.12953	-1500
32	6	16	-3000	-188	-.26184	-3000
32	6	16	-4500	-282	-.39276	-4500
32	6	16	-6000	-375	-.52228	-6000
32	6	16	-7500	-469	-.65320	-7500
32	6	16	-9000	-562	-.78273	-9000
32	6	16	-10000	-621	-.86490	-10000
32	6	16	-10500	-650	-.90529	-10500
32	6	16	-12000	-746	-1.03900	-12000
32	6	16	-13500	-836	-1.16435	-13500
32	6	16	-15000	-931	-1.29666	-15000

INTERCEPT	SLOPE 1	SLOPE 2	SLOPE 3	SLOPE 4
AVE.DELTA Y	MAX.+	MAX.-	OMITTED X	
-16.388	11535.616			
30.687	51.491	-82.981	.00000	
-11.894	11540.220			
27.026	50.005	-63.597	.65877	
-8.214	11543.354			
24.233	48.371	-51.335	.52646	
-5.596	11538.438			
22.969	42.542	-48.743	-1.16435	
-2.717	11534.370			
21.908	37.007	-43.560	-.90529	

REACTION PLATFORM DRAG LOAD CALIBRATION

PROCEDURE FOR ADJUSTING DRAG PRELOAD



1-Pull out rear end roller strip.
2-Screw tension bolts to contact with frame end.
3-Pull out link 2 pin and disconnect link 2 leads from bridge. Replace with resistors (two 500KΩ) of near equal values.
4-Load platform to preload value (7500 lbs.). Record bridge m.v. reading.
5-Remove load, reinsert link 2 pin (but do not hook up bridge) and tighten tension bolts to m.v. level attained in step 4. Secure lock nuts.
6-Remove the two resistors and hook link 2 back into bridge.
7-Replace rear end roller strip. Adjust platform end by spacing out as required for proper clearance (no end play).
8-Conduct regular calibration.

Note: The purpose for preloading the two drag links is to create more accurate oscillograph readings. This is done by eliminating a back lash condition in the links which occurs when the drag load is near zero value.

DESCRIPTION:

Nose gear vertical platform. This transducer not recorded after airplane drop test No. 32.

CONSTANT:

Lbs. = 24106 δ/Δ / 500 K Ohms Resistor Calib. Drops 1 - 14

Lbs. = 23950 δ/Δ / 500 K Ohms Resistor Calib. Drops 15 - 32

CHARACTERISITCS:

TRANSDUCER

TYPE - DAC Design ES 5212457

SERIAL No. - 6

GALVANOMETER

TYPE - 7-342

SERIAL NO. - 7302

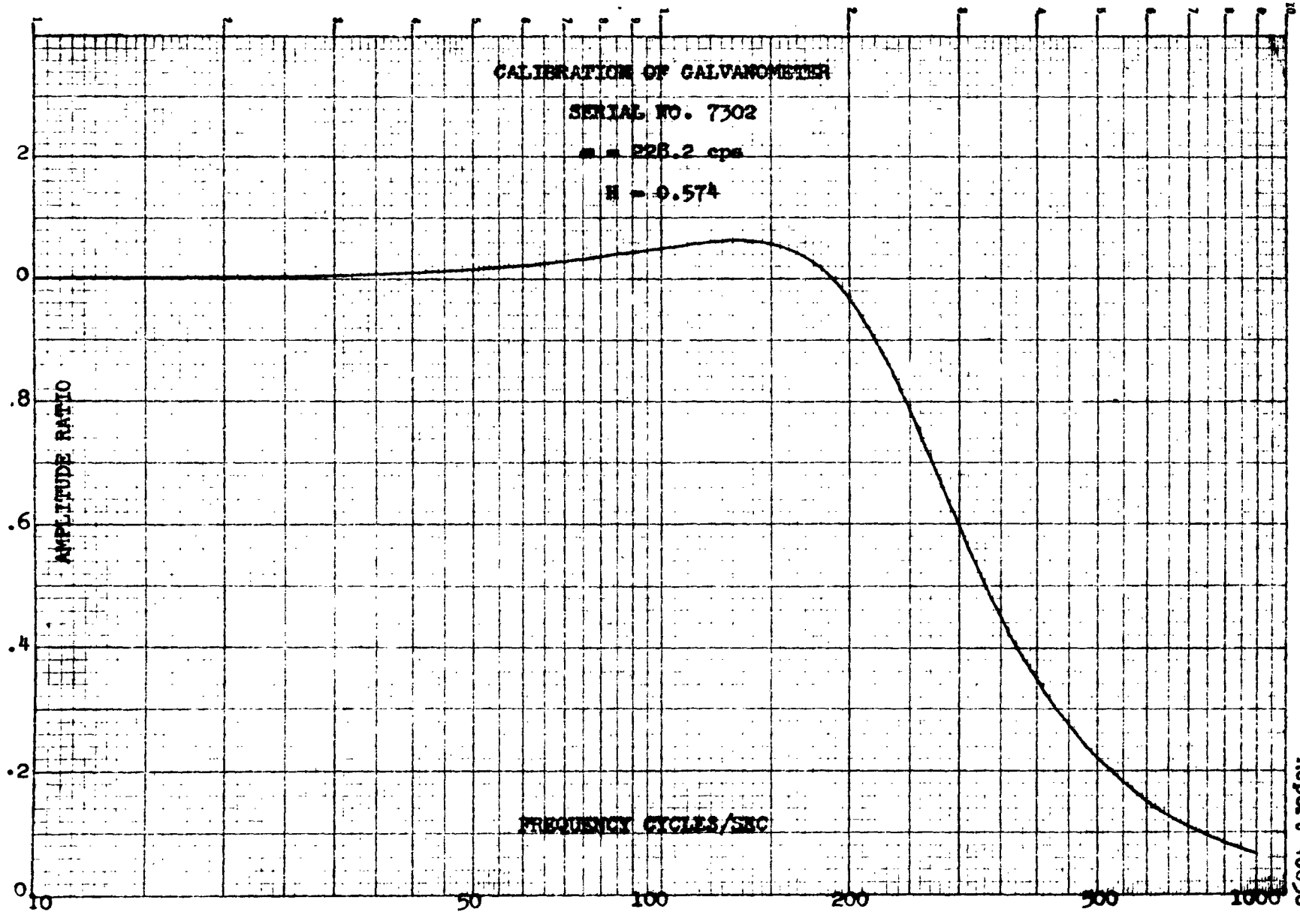
RESISTANCE - 344.6 Ohms

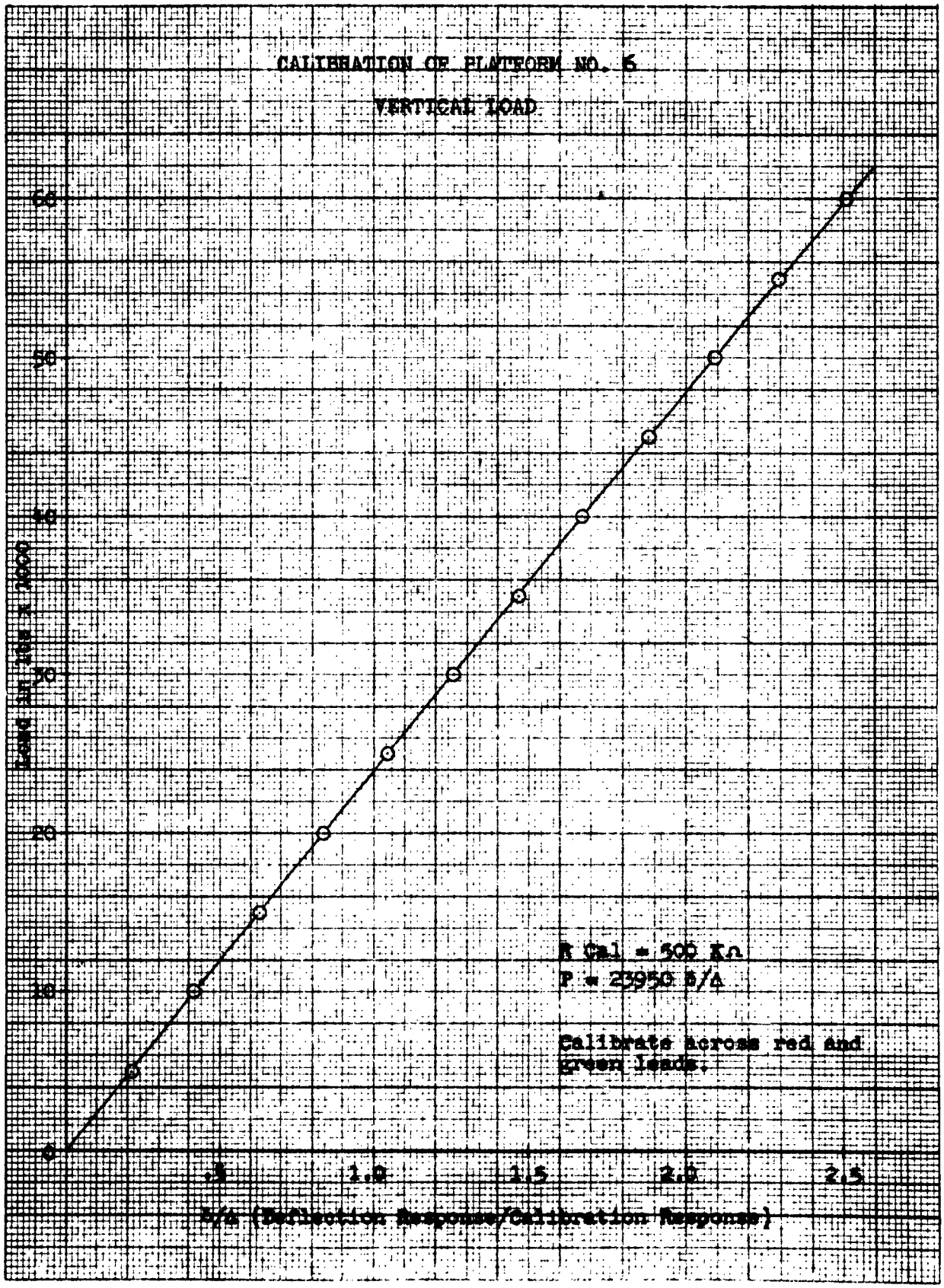
NATURAL FREQUENCY - 228.2 cps

DAMPING - 0.574

RECORDED:

Oscillegraph Channel 1-25 for Drop Test


SEMI-LOGARITHMIC
KLUFFEL & ESSER CO.
2 CYCLES X 70 DIVISIONS
359T-61
CALIBRATION OF GALVANOMETER
SERIAL NO. 7302
n = 228.2 cps
H = 0.574
AMPLITUDE RATIO
FREQUENCY CYCLES/SEC
2
0
.8
.6
.4
.2
0
10
50
100
200
500
1000


CALIBRATION OF PLATFORM NO. 6
VERTICAL LOAD
60
50
40
30
20
10
0
Load in 1000 Lbs.
R Cal = 500 KΩ
P = 23950 δ/Δ
Calibrate across red and green leads.
.5
1.0
1.5
2.0
2.5
δ/Δ (Deflection Response/Calibration Response)

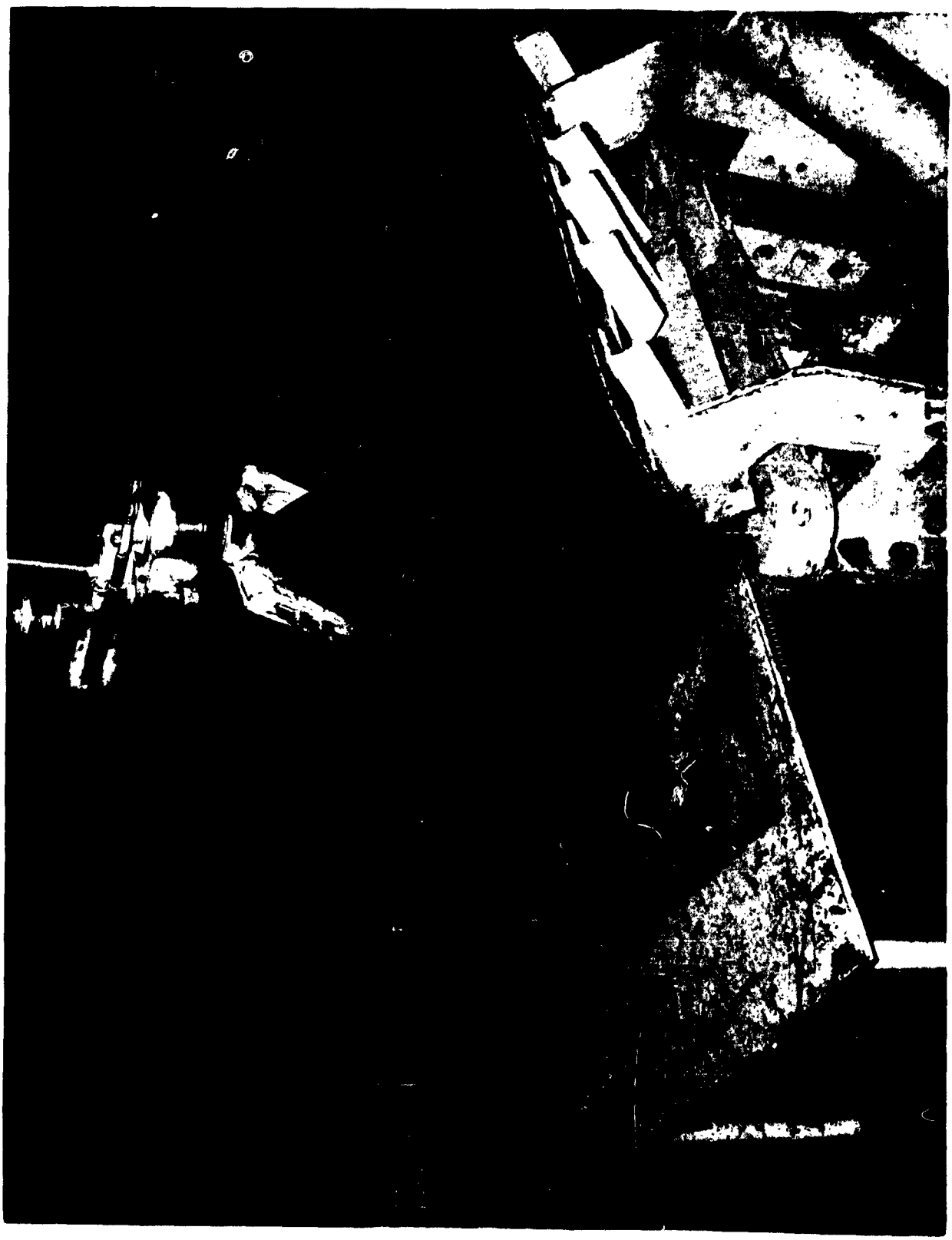
CALIBRATION OF PLATFORM NO. 6

VERTICAL LOAD

P = 23,950 #/Δ @ 500 K

TEST	RUN	CHANNEL	LOAD	READING	X	Y
6	1	1		490		
6	1	1	5000	103	.21020	5000
6	1	1	10000	204	.41633	10000
6	1	1	15000	307	.62653	15000
6	1	1	20000	409	.83467	20000
6	1	1	25000	511	1.04286	25000
6	1	1	30000	615	1.25510	30000
6	1	1	35000	717	1.46327	35000
6	1	1	40000	819	1.67143	40000
6	1	1	45000	921	1.87959	45000
6	1	1	50000	1023	2.08776	50000
6	1	1	55000	1125	2.29592	55000
6	1	1	60000	1229	2.50816	60000

INTERCEPT	SLOPE 1	SLOPE 2	SLOPE 3	SLOPE 4
AVE.DELTA Y	MAX.+	MAX.-	OMITTED X	
2.318	23936.662			
26.215	41.061.	-45.271	.00000	
7.044	23935.849			
24.046	37.700	-42.061	1.25510	
-2.159	23946.991			
20.708	32.391	-38.648	2.50816	
-.207	23948.896			
18.014	29.647	-33.940	1.46327	
18.804	23930.013			
14.670	21.474	-29.402	.21020	



Wing Lift For Drop Tests

For the drop test phase of the program, an upward force was applied to the structure at the instant the free-falling airplane contacted the reaction platforms. The upward force to be applied was based on the aircraft weight and load-factor actually encountered during the flight test phase of the program. The actual loads applied by the lift devices were measured by calibrated force links. Photographs of the right-hand and left-hand wing lift link transducer installations are shown on Pages 9.107 and 9.113 respectively.

DESCRIPTION:

Right hand wing lift link. This transducer measures wing lift applied by the right hand wing lift pot to A/C stations X = 50.5, Y = 233.7, Z = -18.0.

CONSTANT:

Lbs = 5123 δ/Δ

CHARACTERISTICS:

TRANSDUCER

Type - DAC Design

Serial No. - 44A

GALVANOMETER

Type - 7-338

Serial No. - 4365

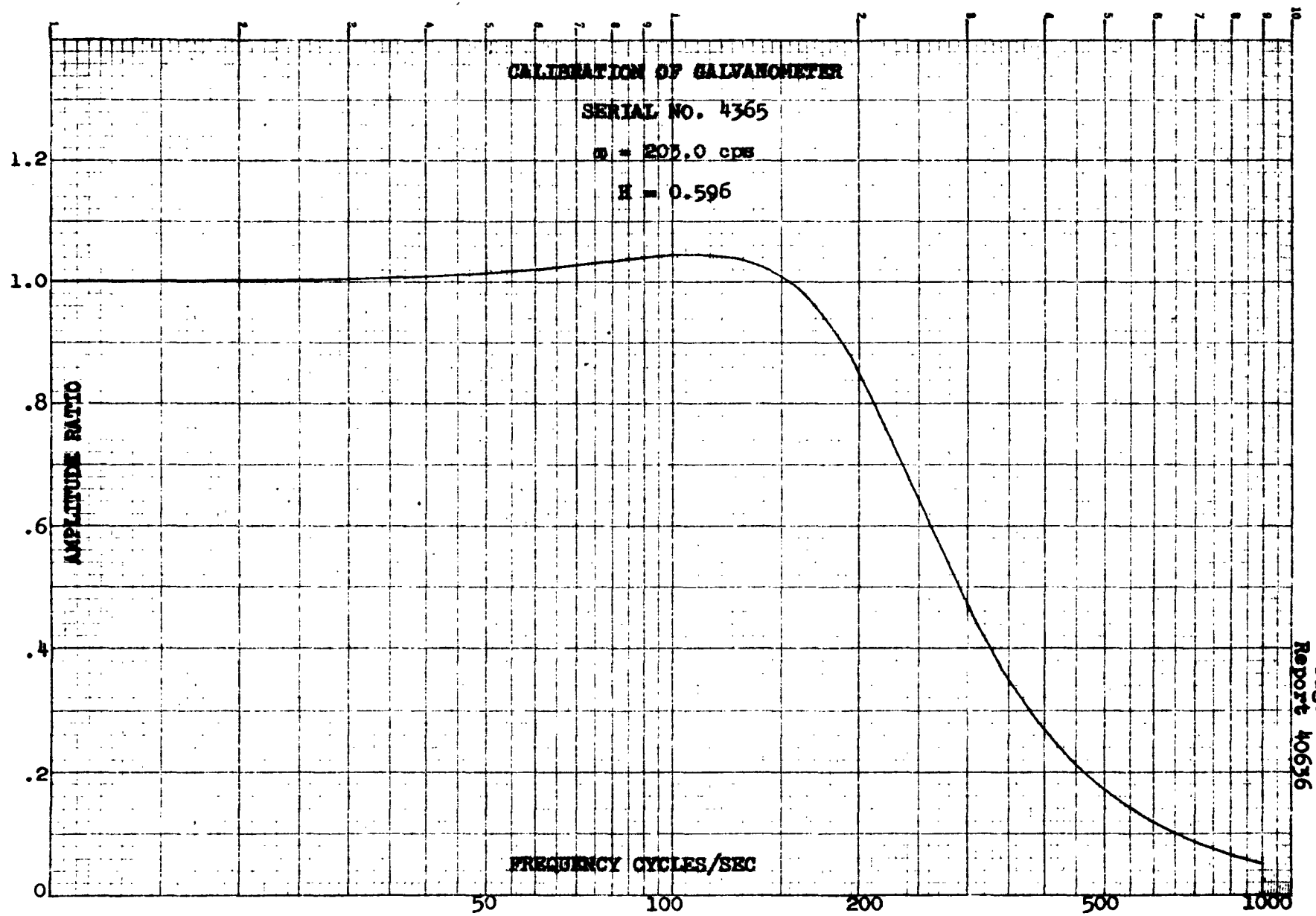
Resistance - 120.7 Ohms

Natural Frequency - 203.0 cps

Damping - 0.596

RECORDED:

Oscillograph Channel 2-24 for Drop Test


SEMI-LOGARITHMIC
359T-61
CALIBRATION OF GALVANOMETER
SERIAL NO. 4365
ω = 203.0 cps
H = 0.596
AMPLITUDE RATIO
1.2
1.0
.8
.6
.4
.2
0
FREQUENCY CYCLES/SEC
50
100
200
500
1000

DOUGLAS AIRCRAFT COMPANY, INC.

DATE 28 Dec. 1960
PREPARED BY H. D. Meriwether
TITLE Ldg. Loads Investigation

CONDITION

CALIBRATION OF R.H. LIFT POT LINK NO. 44A

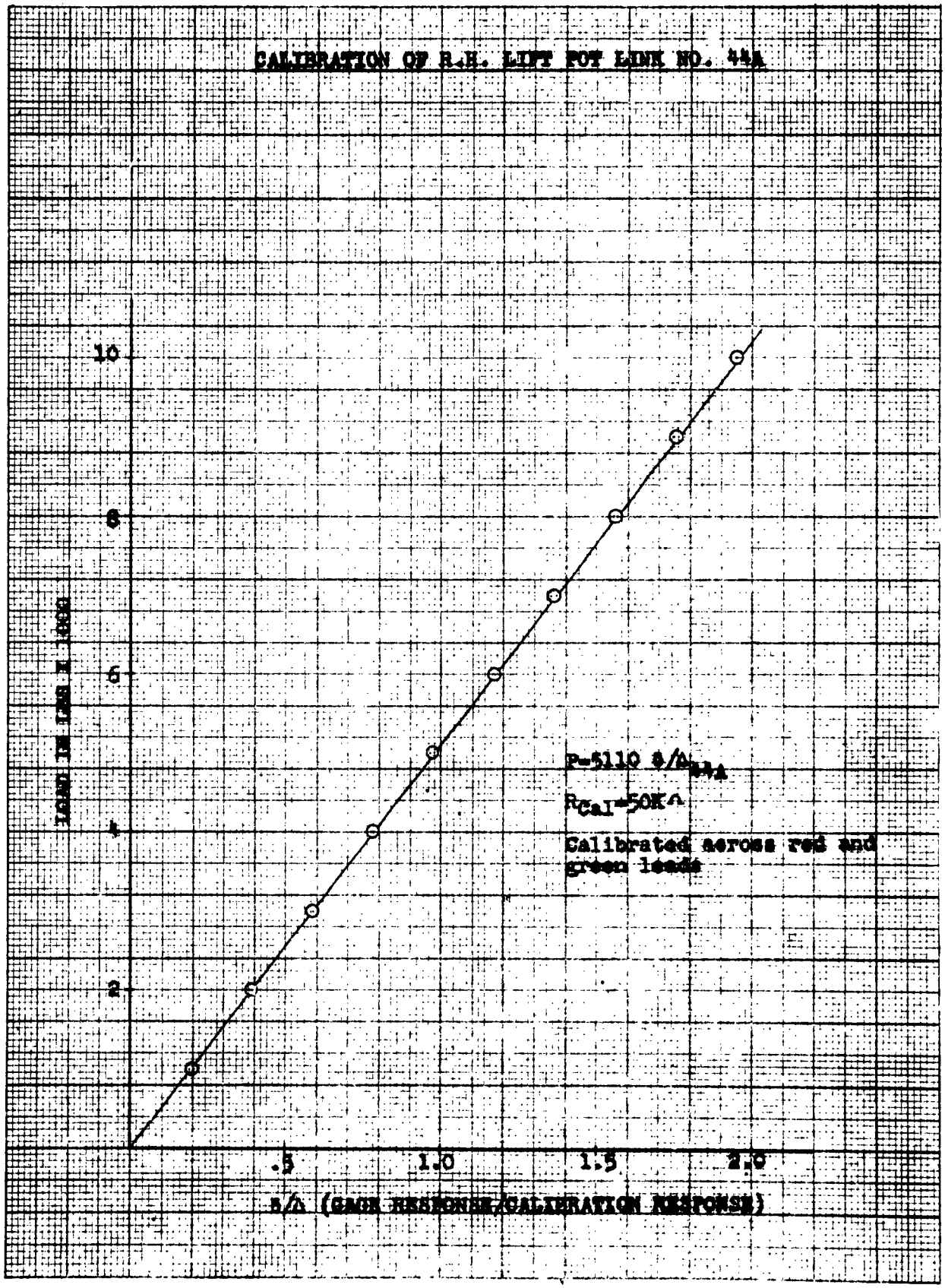
CALIBRATE BETWEEN RED AND GREEN LEADS

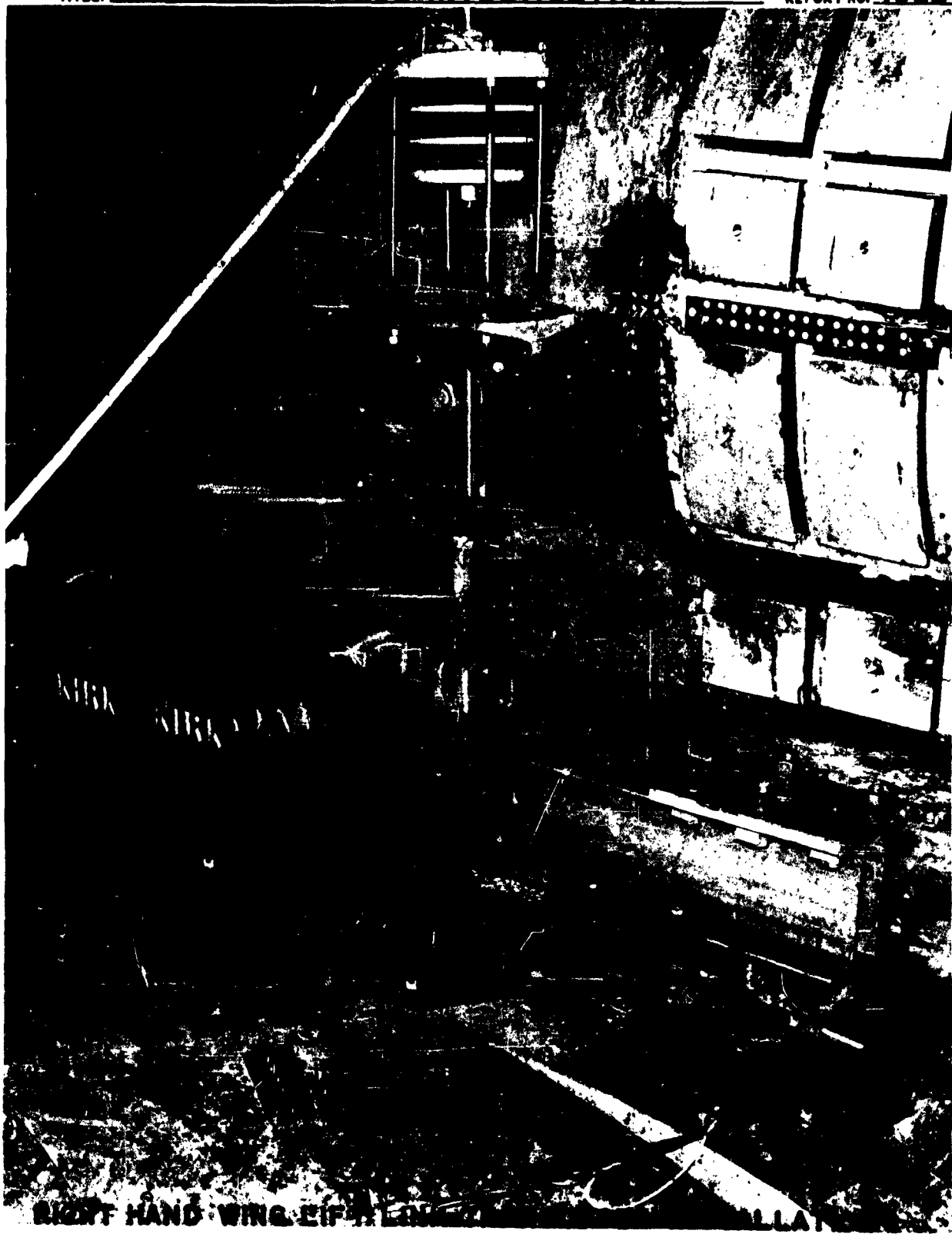
GAGE LOT NUMBER		CHANNEL RESPONSE IN MILLIVOLTS					
		$P = 5110\ \delta/\Delta_{44A}$					
CHANNEL TITLE							
CHANNEL NUMBER							
GAGE TYPE							
GAGE RESISTANCE		120					
BRIDGE TYPE		Full					
GAGE FACTOR							
BRIDGE VOLTAGE		10v	10v	10v			
CALIBRATION RESISTANCE		50K	50K	50K			
CALIBRATION RESPONSE		6.13	6.16				
	lbs.		inc. load	dec. load			
ZERO	ZERO	0	0	-.01			
	1000	1.24	1.25	1.18			
	2000	2.40	2.44	2.37			
	3000	3.61	3.63	3.57			
	4000	4.80	4.82	4.77			
	5000	5.99	6.03	5.94			
	6000	7.17	7.25	7.17			
	7000	8.40	8.42	8.33			
	8000	9.59	9.66	9.57			
	9000	10.79	10.83	10.73			
	10000	11.99	11.98	11.98			
RETURN ZERO	RETURN ZERO	-.02					

CALIBRATION OF R.H. MAIN GEAR No. 16
LIFT POT LINK NO. 44A

TEST	RUN	CHANNEL	LOAD	READING	X	Y
44	1	1		613		
44	1	1	1000	122	.19902	1000
44	1	1	2000	240	.39152	2000
44	1	1	3000	360	.58728	3000
44	1	1	4000	480	.78303	4000
44	1	1	5000	599	.97716	5000
44	1	1	6000	720	1.17455	6000
44	1	1	7000	838	1.36705	7000
44	1	1	8000	961	1.56770	8000
44	1	1	9000	1079	1.76020	9000
44	1	1	10000	1200	1.95759	10000

INTERCEPT AVG. DELTA Y	SLOPE 1 MAX.+	SLOPE 2 MAX.-	SLOPE 3 OMITTED X	SLOPE 4
-6.077	5114.752			
6.428	13.968	-12.320	.00000	
-6.090	5113.279			
5.588	9.591	-11.561	1.36705	
.958	5108.406			
3.638	7.304	-9.406	.19902	
-.079	5110.590			
3.042	6.207	-4.338	1.56770	
-1.558	5110.991			
1.911	5.214	-3.644	.97716	


CALIBRATION OF R.H. LIFT POT LINK NO. 44A
10
8
6
4
2
LOAD IN LBS X 1000
P=5110 δ/Δ 44A
RCal=50KΩ
Calibrated across red and green leads
.5
1.0
1.5
2.0
δ/Δ (GAGE RESPONSE/CALIBRATION RESPONSE)


RIGHT HAND WING

DESCRIPTION:

Left hand wing lift link. This transducer measures wing lift applied by the left hand wing lift pot to A/C stations X = -50.5, Y = 233.7, Z = -18.0.

CONSTANT:

Lbs = 5044 δ/Δ / 50K Ohms Resistor Calibration

CHARACTERISTICS:

TRANSDUCER

Type - DAC Load Link

Serial No. - 41A

GALVANOMETER

Type - 7-338

Serial No. - 4357

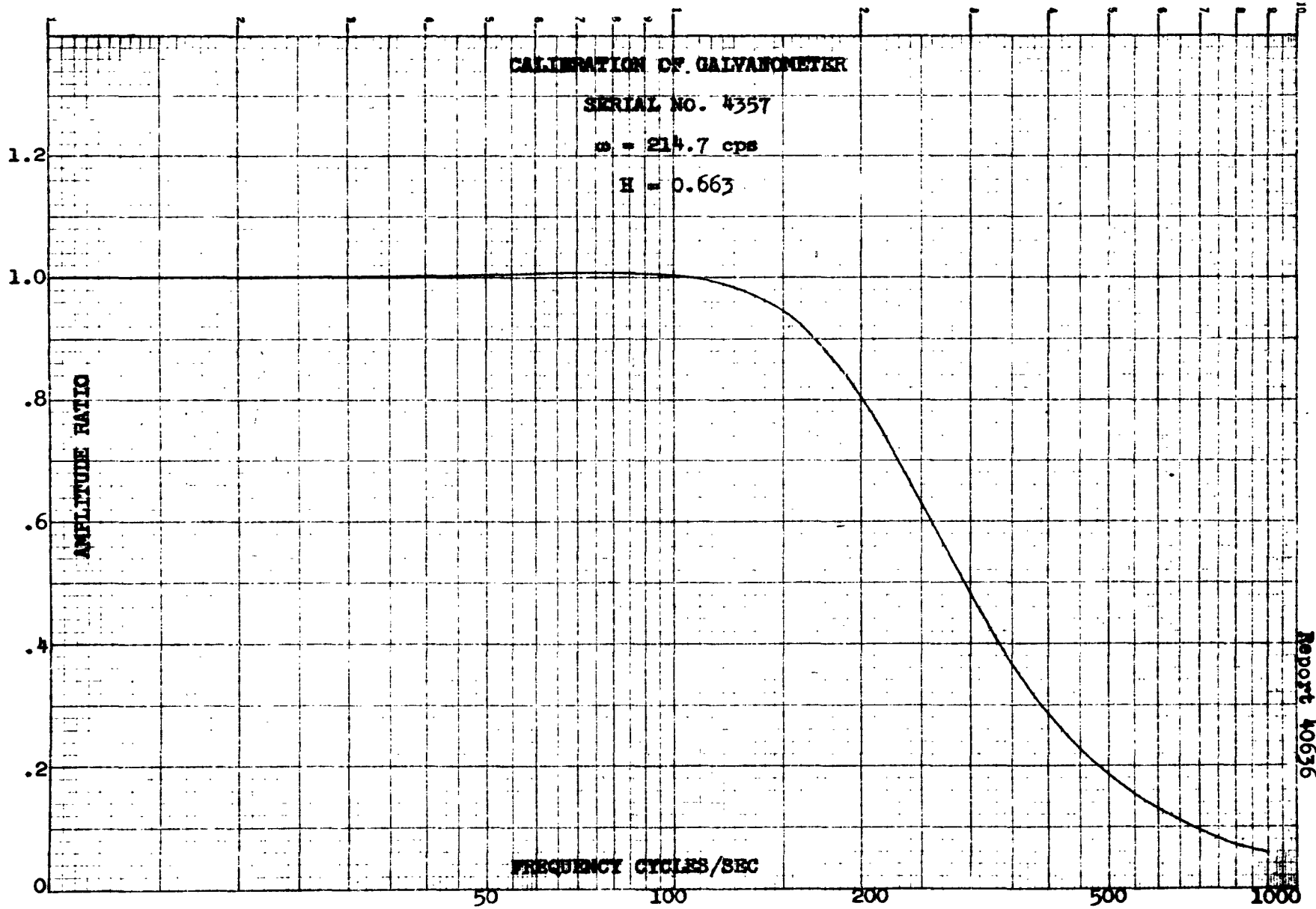
Resistance - 120.4 Ohms

Natural Frequency - 214.7 cps

Damping - 0.663

RECORDED:

Oscillograph Channel 2-23 for Drop Test


SEMI LOGARITHMIC
KEUFFEL & ESSER CO.
359T-G1
CALIBRATION OF GALVANOMETER
SERIAL NO. 4357
ω = 214.7 cps
H = 0.663
AMPLITUDE RATIO
1.2
1.0
.8
.6
.4
.2
0
FREQUENCY CYCLES/SEC
50
100
200
500
1000

FORM 35-8-1
(3-51)

DOUGLAS AIRCRAFT COMPANY, INC.

DATE 28 Dec. 1960
PREPARED BY H. Meriwether
TITLE Ldg. Loads Invest.

CONDITION

CALIBRATION OF L.H. LIFT POT LINK NO. 41A

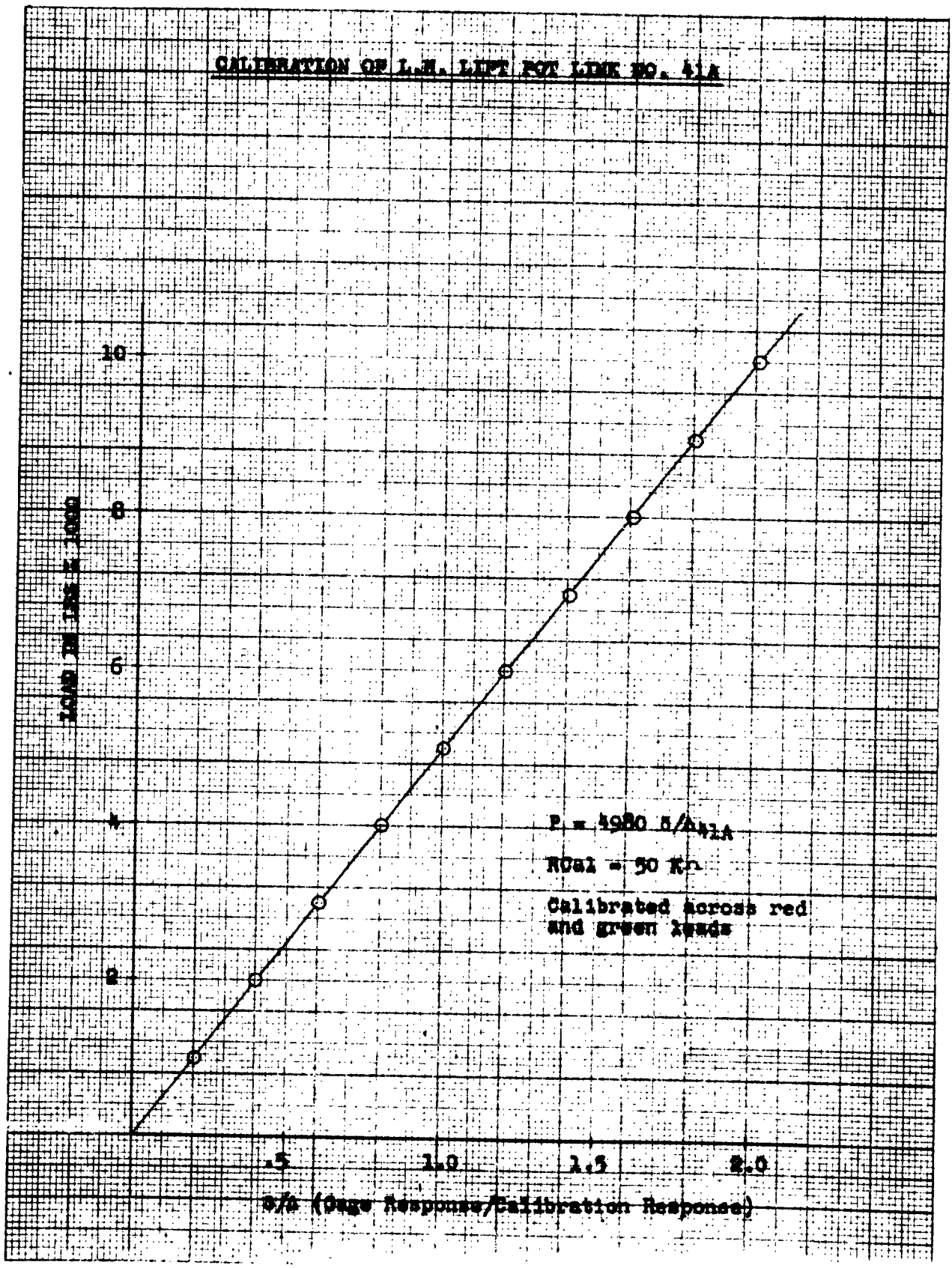
CALIBRATE BETWEEN RED AND GREEN LEADS

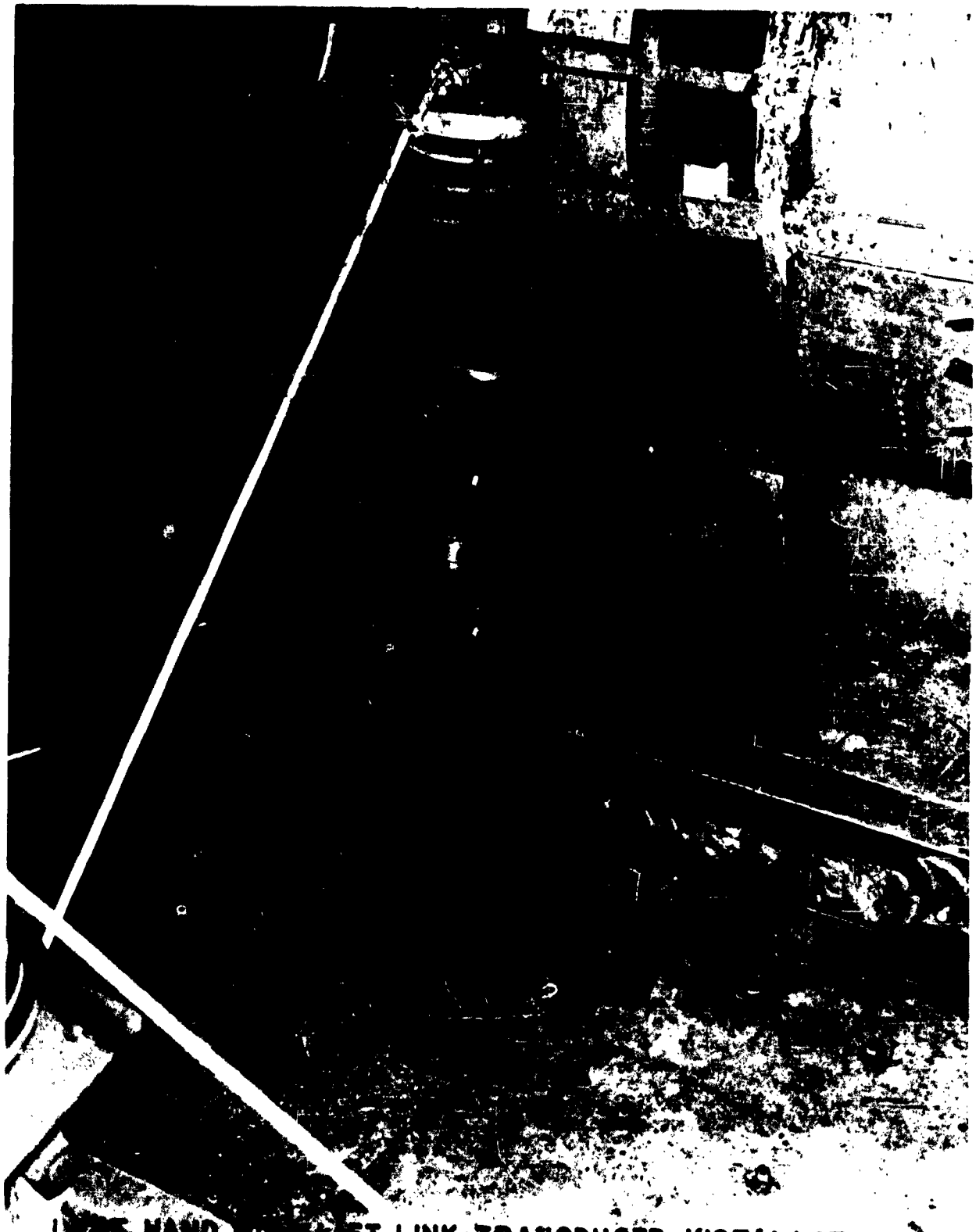
GAGE LOT NUMBER		CHANNEL RESPONSE IN MILLIVOLTS					
		$P = 4980\ \delta/\Delta_{41A}$					
CHANNEL TITLE							
CHANNEL NUMBER							
GAGE TYPE							
GAGE RESISTANCE		120					
BRIDGE TYPE		Full					
GAGE FACTOR							
BRIDGE VOLTAGE		10v					
CALIBRATION RESISTANCE		50K		50K			
CALIBRATION RESPONSE		6.17		6.17			
	lbs.	inc. load	dec. load	inc. load	dec. load		
ZERO	ZERO	0	0	0	0		
	1000	1.31	1.18	1.28	1.23		
	2000	2.53	2.42	2.53	2.44		
	3000	3.77	3.65	3.77	3.69		
	4000	4.98	4.90	4.99	4.93		
	5000	6.20	6.14	6.24	6.17		
	6000	7.44	7.39	7.48	7.40		
	7000	8.68	8.61	8.73	8.67		
	8000	9.92	9.87	10.02	9.93		
	9000	11.17	11.07	11.22	11.12		
	10000	12.37	12.37	12.42	12.42		
RETURN ZERO	RETURN ZERO						

CALIBRATION OF L.H. MAIN GEAR No. 10
LEFT POT LINK NO. 41A

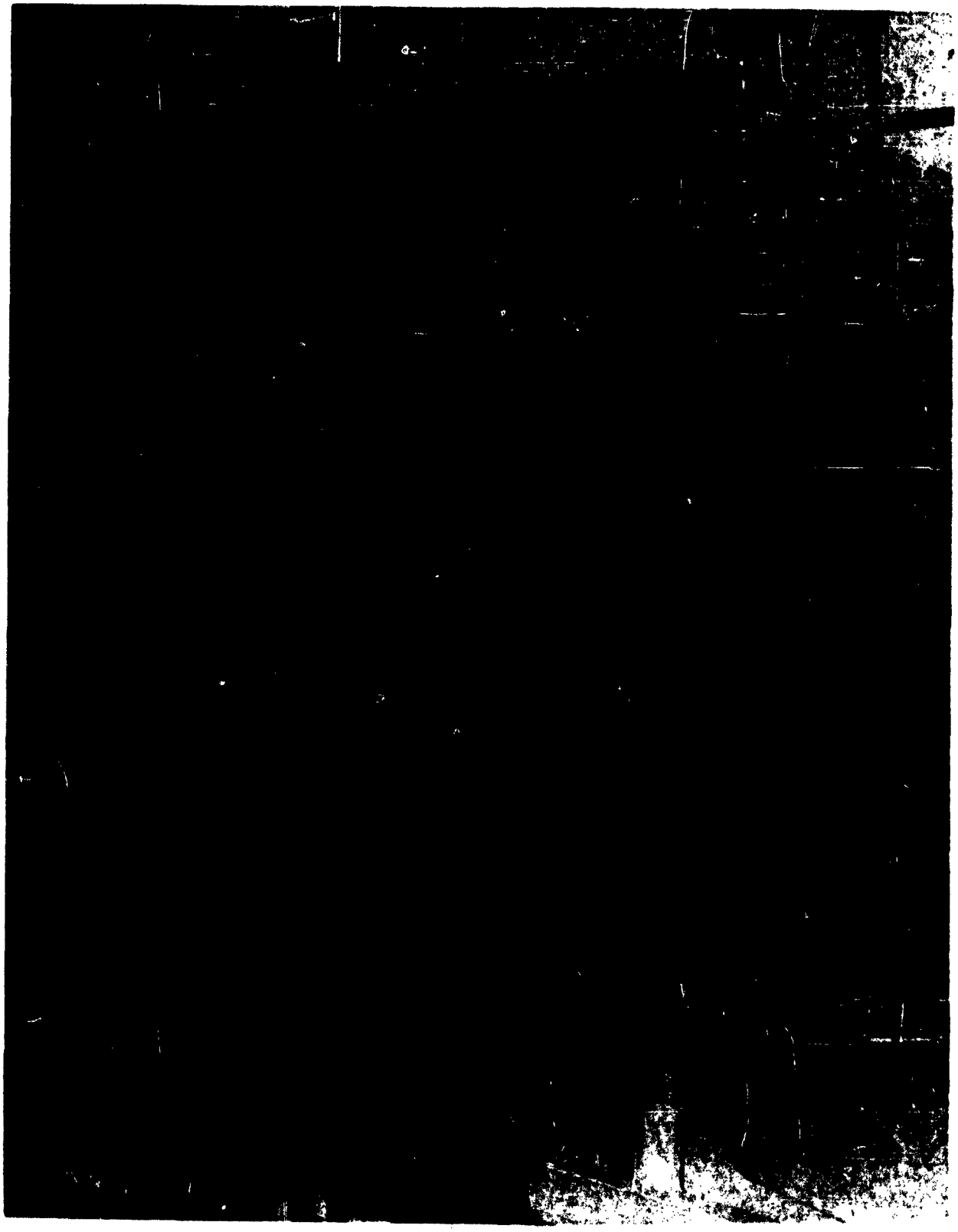
TEST	RUN	CHANNEL	LOAD	READING	X	Y
41	1	1		617		
41	1	1	1000	122	.19773	1000
41	1	1	2000	248	.40194	2000
41	1	1	3000	372	.60292	3000
41	1	1	4000	495	.80227	4000
41	1	1	5000	619	1.00324	5000
41	1	1	6000	743	1.20421	6000
41	1	1	7000	867	1.40519	7000
41	1	1	8000	993	1.60940	8000
41	1	1	9000	1115	1.80713	9000
41	1	1	10000	1239	2.00810	10000

INTERCEPT	SLOPE 1	SLOPE 2	SLOPE 3	SLOPE 4
AVE.DELTA Y	MAX.+	MAX.-	OMITTED X	
7.550	4974.081			
5.241	8.920	-12.838	.00000	
6.501	4976.443			
3.032	9.502	-6.865	1.60940	
.624	4980.506			
2.254	3.671	-3.457	.19773	
-.750	4981.211			
1.977	3.393	-2.508	.80227	
-1.798	4981.600			
1.535	2.885	-1.772	1.00324	


CALIBRATION OF L.H. LIFT POT LINK NO. 41A
LOAD IN LBS x 1000
10
8
6
4
2
.5
1.0
1.5
2.0
P = 4980 δ/δ41A
RCal = 50 Kn
Calibrated across red and green leads
δ/δ (Gage Response/Calibration Response)



LEFT HAND [illegible] LEFT LINK TRANSDUCER INSTALLATION



Drop Test Release Time

A micro-switch was installed on the drop test quick-release hook in order to record the instant of release. The details of this installation are shown on Page 9.202 and a photograph is included on Page 9.203.

Time Base

The time base used for all time measurements on the oscillograph records for the drop tests was furnished by a Hewlett Packard 205AG Oscillator with 1000 cycles per second recorded simultaneously on all the oscillographs.

For the flight test phase, a crystal controlled frequency generator unit set for 50 cps was utilized with a similar setup.

Strain Gage Voltage Moniter

The voltage applied to the test instrumentation transducers was monitored during the tests and recorded as indicated on Page 9.205.

DESCRIPTION:

This transducer indicates the time at which the aircraft was released by the quick release hook.

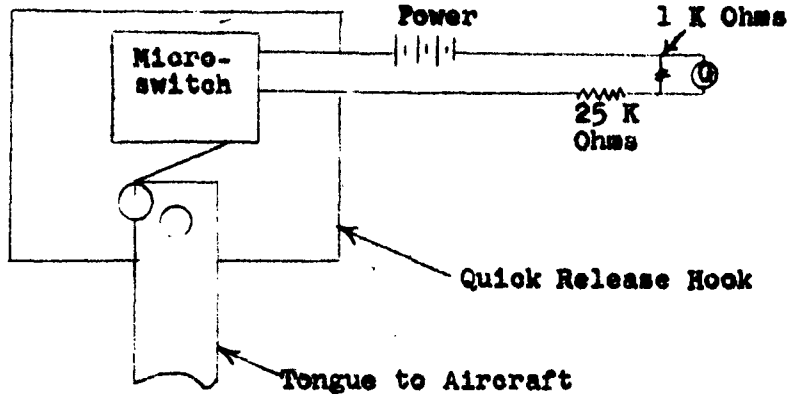
CHARACTERISTICS:

GALVANOMETER

Type - 7-323

Serial No. - 8235

Resistance - 1 K Ohms



RECORDED:

Oscillograph Channel 2-1 for Drop Test

DESCRIPTION:

Timing Clock. This transducer records time on the oscillograph record.

CONSTANT:

1000 Pips/Second

CHARACTERISTICS:

TRANSDUCER

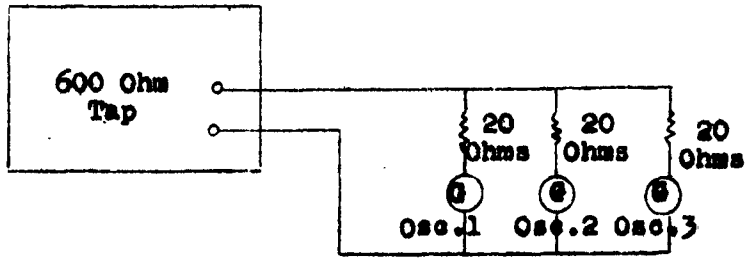
Type - Hewlett Packard 205 AG Oscillator

GALVANOMETER

Type - 7-326

Serial No. - 5225 (Oscillograph 1)

Serial No. - 7078 (Oscillograph 2)



RECORDED:

Oscillograph Channels 1-18 and 2-20 for Drop Test

DESCRIPTION:

Strain gage voltage moniter.

CONSTANT:

None - measures relative voltage.

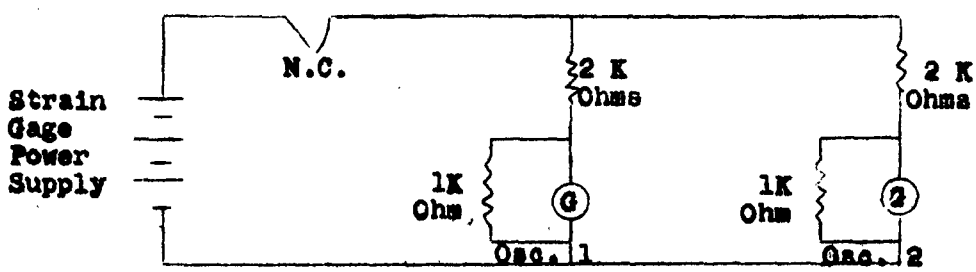
CHARACTERISTICS:

GALVANOMETER

Type - 7-323

Serial No. - 8548 (Oscillegraph No. 1)

Serial No. - 8072 (Oscillegraph No. 2)



RECORDED:

Oscillegraph Channels 1-22 and 2-22 for Drop Test

TRODI

A TRODI unit, on loan from NATC, was utilized during the drop test program to define the vertical velocity of the airplane just prior to contact with the reaction platforms. The mirror units which were installed on the landing gear during the flight test phase were also utilized for the drop test phase. A stand was fabricated to position the TRODI unit properly to record the vertical velocity just above the reaction platform. The TRODI equipment was calibrated by the use of a free-fall jig fabricated for the purpose.

OSCILLOGRAPH SCHEDULES

The oscillograph schedules used during the flight test phase and during the drop test phase of the program are included on Pages 10.002 through 10.021. These schedules list the oscillograph channels used for recording the test parameters together with the pertinent information concerning the transducers, the control panels, and the galvanometers.

FORM L825-5-1A (1-52)

PREPARED BY: I. R. Harris DATE

CHECKED BY: _____ DATE

TITLE: Landing Loads Investigation

DOUGLAS AIRCRAFT COMPANY, INC.

PAGE: 10.002

MODEL: A4D-2

REPORT NO. 40636

OSCILLOGRAPH NO. 1

A/C MODEL A4D-2 NO. 142049

EFFECTIVE REPORT NO LANDING 1 THRU 23

DATE 9-7-60 C.O.D. NO. _____

CONTROL PANEL NO. 1 S/N _____

CONTROL PANEL NO. 2 S/N _____

CONTROL PANEL NO 3 S/N _____

OSCILLOGRAPH TYPE 181-DE3 S/N _____

PAPER 400 FT. OF TYPE AS AVAILABLE

TIMING LINES .01 SEC HIGH SPEED

TIMING LAMP AS REQ'D VOLTS 12-14

GALV. LAMP " " VOLTS _____

PAPER SPEED LO _____ IN/SEC

PAPER SPEED HI 40 IN/SEC

RECORD NUMBER ING SW TO EXTERNAL

CONT. PAN CAL SW TO REMOTE

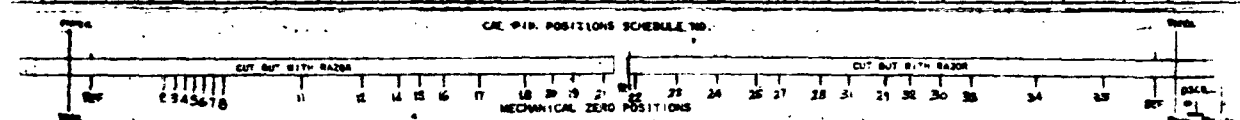
OSC SPEED SW TO HIGH SPEED

NOTES:

1. TOLERANCE ON BALANCE & SENSITIVITY IS ± 0.2 INCH.
2. DO NOT READJUST CHANNELS THAT ARE WITHIN REQUIRED TOLERANCE.
3. NOTIFY ENGINEER INS OF CHANNELS THAT REQUIRE REPEATED READJUSTMENT.

CHAN ID	MEASUREMENTS	TRANSDUCER RANGE	TRANSDUCER TYPE	TRANSDUCER S/N	TRANSDUCER CABLE	LEAD BARREL CABLE	CONTROL PANEL CABLE	CONTROL PANEL CHAN.	CONTROL PANEL CAL RES	CONTROL PANEL CAL DEFL.	UP TRACE SENSE	OSCILLOGRAPH INPUT CIRCUIT	OSCILLOGRAPH GALVO TYPE	OSCILLOGRAPH GALVO S/N	CHAN NO
1	SYNC							1-1	50K				7-342	4642	1
2	L. FUEL TANK LAT. ACCEL - FWD	±10G	AN93	6C4		3008	1-14	1-2	50K	2.0	OUTBOARD		7-342	4958	2
3	R. " " " " "	±10G	AN93	5706A		4007	1-9	1-3	50K	2.0	OUTBOARD		7-342	4958	3
4	L. FUEL TANK LAT. ACCEL - AFT	±10G	F	1908		3009	2-1	1-4	50K	2.0	OUTBOARD		7-342	5027	4
5	L. FUEL TANK VERT. ACCEL - FWD	±25G	AN93	1251		3005	1-15	1-5	50K	2.0	ALL UP		7-342	5097	5
6	R. " " " " "	±25G	AN93	1252		4005	2-3	1-6	50K	2.0	ALL UP		7-342	6151	6
7	L. FUEL TANK VERT. ACCEL - AFT	±25G	AN93	1253		3006	1-16	1-7	50K	2.0	ALL UP		7-342	6172	7
8	L. " " LONG. " - C.G.	±10G	AN93	613		3007	1-17	1-8	50K	2.0	FWD ALL		7-342	5118	8
9								1-9	100K				7-342	6201	9
10								1-10	100K				7-342	5091	10
11	L.H GEAR LWR MASS LAT ACCEL	±50G	A6A			3026	2-13	1-11	50K	MIN	OUTBOARD		7-342	6171	11
12	L.H GEAR SIDE LOAD	-	SG	410	SK	3018	2-4	1-12	50K	MIN	OUTBOARD		7-342	5045	12
13								1-13	50K				7-342	6903	13
14	L.H GEAR LWR MASS VERT ACCEL	±100G	A6A			3027	2-14	1-14	50K	2.25	ALL UP		7-342	6910	14
15	L.H GEAR VERTICAL LOAD	-	SG	5A1	V2	3020	2-5	1-15	100K	2.5	UP LOAD		7-342	6902	15
16	T. MATERIAL STRAIN DP-58	CALIBRATION TRANSDUCER				3019	2-6	1-16	50K	MAX	AS EXCITED		7-342	6915	16
17	L.H GEAR LWR MASS LONG ACCEL	±10G	A6A			3028	2-15	1-17	50K	2.0	FWD ACC		7-342	6921	17
18	L.H GEAR DRAG LOAD	-	SG	410	P2	3021	2-7	1-18	100K	1.25	AFT LOAD		7-342	7379	18
19	L.H STRUT PRESS	1500 PSIG	A6A			3044	2-8	1-19	250K			3-342	7-342	6670	19
20	IRIG GPS TIME STANDARD	50 PPS				OSC #1		BYPASS	50K				7-316	7234	20
21	S.G VOLTAGE MONITOR	45V DC						2-3	50K				7-316	8078	21
22	AFDB EQUIP RACK FWD STRUCT	±20G	ASA	1464		3025	1-1	2-4	50K	2.0	ALL UP		7-342	7271	22
23	" " " FWD RACK	±20G	ASA	3025		3026	1-2	2-5	50K	2.0	ALL UP		7-342	7327	23
24	NOSE EQUIP RACK - AFT STRUCT	±100G	A6	10019		3027	1-3	2-6	50K	2.0	ALL UP		7-342	7315	24
25	" " " AFT RACK	±20G	ASA	3028		3028	1-4	2-7	50K	2.0	ALL UP		7-342	7320	25
26								2-8	50K				7-342	7320	26
27	L.H WING TIP VERT. ACCEL	±50G	A6	2648		3001	1-19	2-9	50K	2.0	ALL UP		7-342	7349	27
28	R.H " " " "	±50G	A6	2642		4001	1-11	2-10	50K	2.0	ALL UP		7-342	7328	28
29	L.H GEAR DRAG BRACE DUAL LOAD		S.G.			3018	2-6	2-11	50K	2.0	AFT LOAD		7-342	7494	29
30	R.H " " " "		S.G.			4004	2-2	2-12	50K	2.0	AFT LOAD		7-342	7-5X	30
31	L.H GEAR UPPER MASS VERT ACCEL	±50G	ASA	3022		3023	2-11	2-13	50K	MIN	ALL UP		7-342	7275	31
32	R.H " " " "	±50G	ASA	3024		4023	2-X	2-14	50K	M.V	ALL UP		7-342	7343	32
33	L.H GEAR UPPER MASS LONG ACCEL	±30G	ASA	3899		3025	2-12	2-15	50K	2.0	FWD ACC		7-342	7356	33
34	C.H " " " "	±30G	ASA	3901		4022	2-7	2-16	50K	2.0	FWD ACC		7-342	7317	34
35	[illegible]	[illegible]				[illegible]		[illegible]					7-342	7452	35
36								2-18	50K				7-316	7241	36
37															37
38															38
39															39
40															40
41															41
42															42
43															43
44															44
45															45
46															46
47															47
48															48
49															49
50															50

CAL PLUG POSITIONS SCHEDULE NO. _____



OSCILLOGRAPH SCHEDULE NO. 14

FORM L825 S 1A
(1 52)

PREPARED BY: I.E. Harris DATE

CHECKED BY: DATE

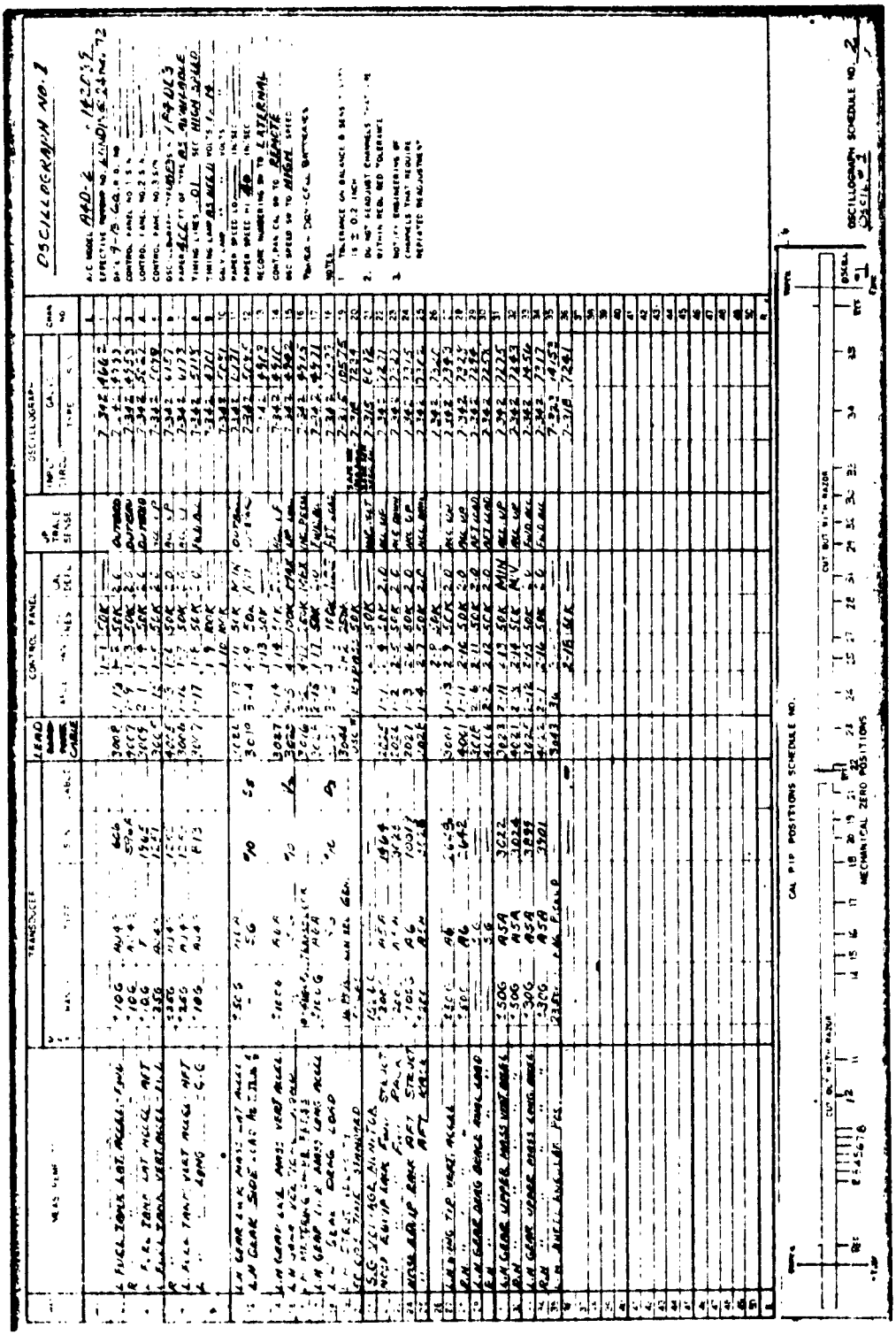
TITLE: Landing Loads Investigation

DOUGLAS AIRCRAFT COMPANY, INC.

PAGE: 10.003

MODEL: A4D-2

REPORT NO. 40636



FORM LB25 S 1A
(3 52)

PREPARED BY: I. E. Harris DATE

CHECKED BY: _____ DATE

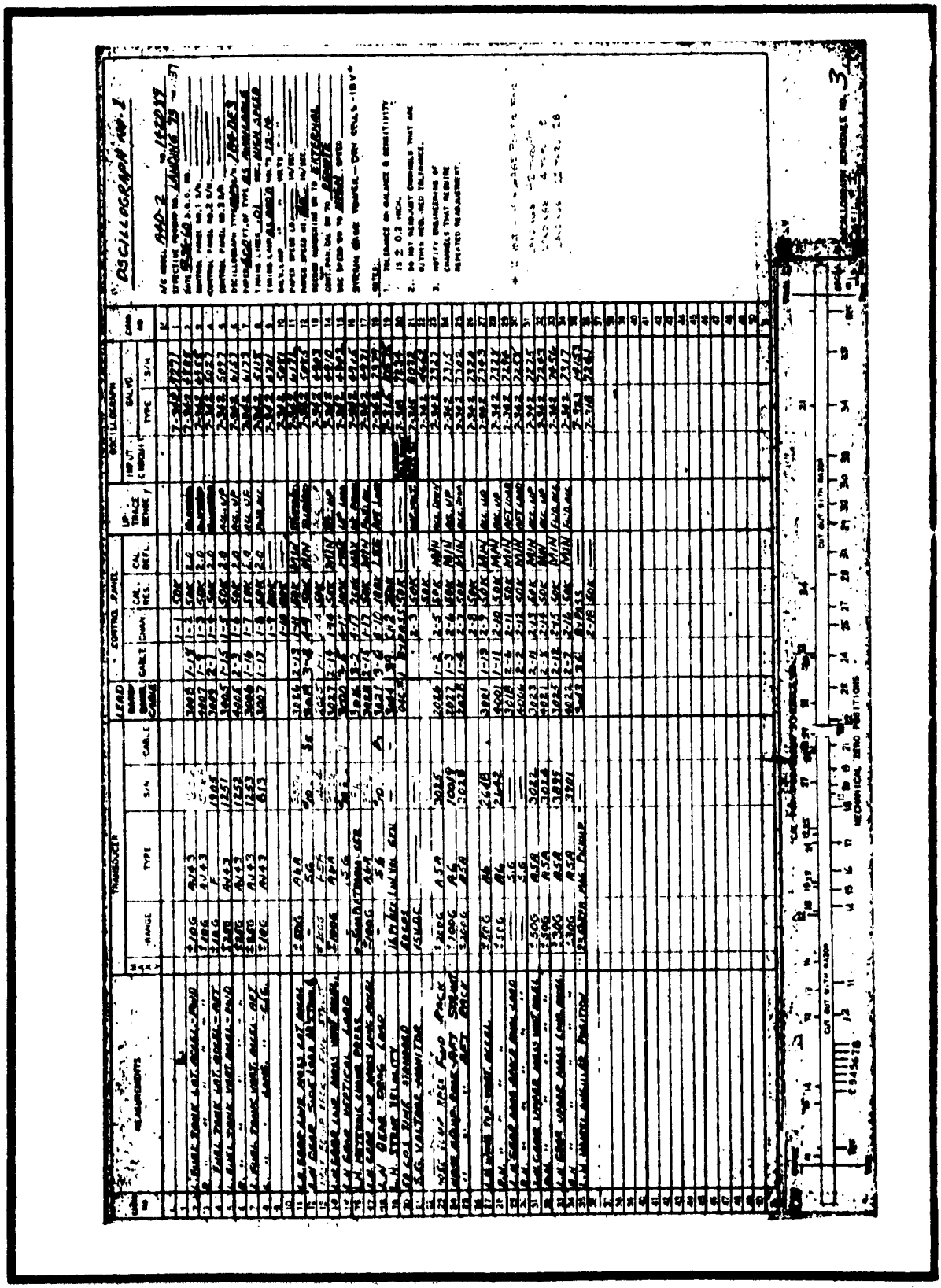
TITLE: Landing Loads Investigation

DOUGLAS AIRCRAFT COMPANY, INC.

PAGE: 10.004

MODEL: A4D-2

REPORT NO. 40636



FORM LB25 5 1A
(3-52)

PREPARED BY: I. E. Harris DATE

CHECKED BY: DATE

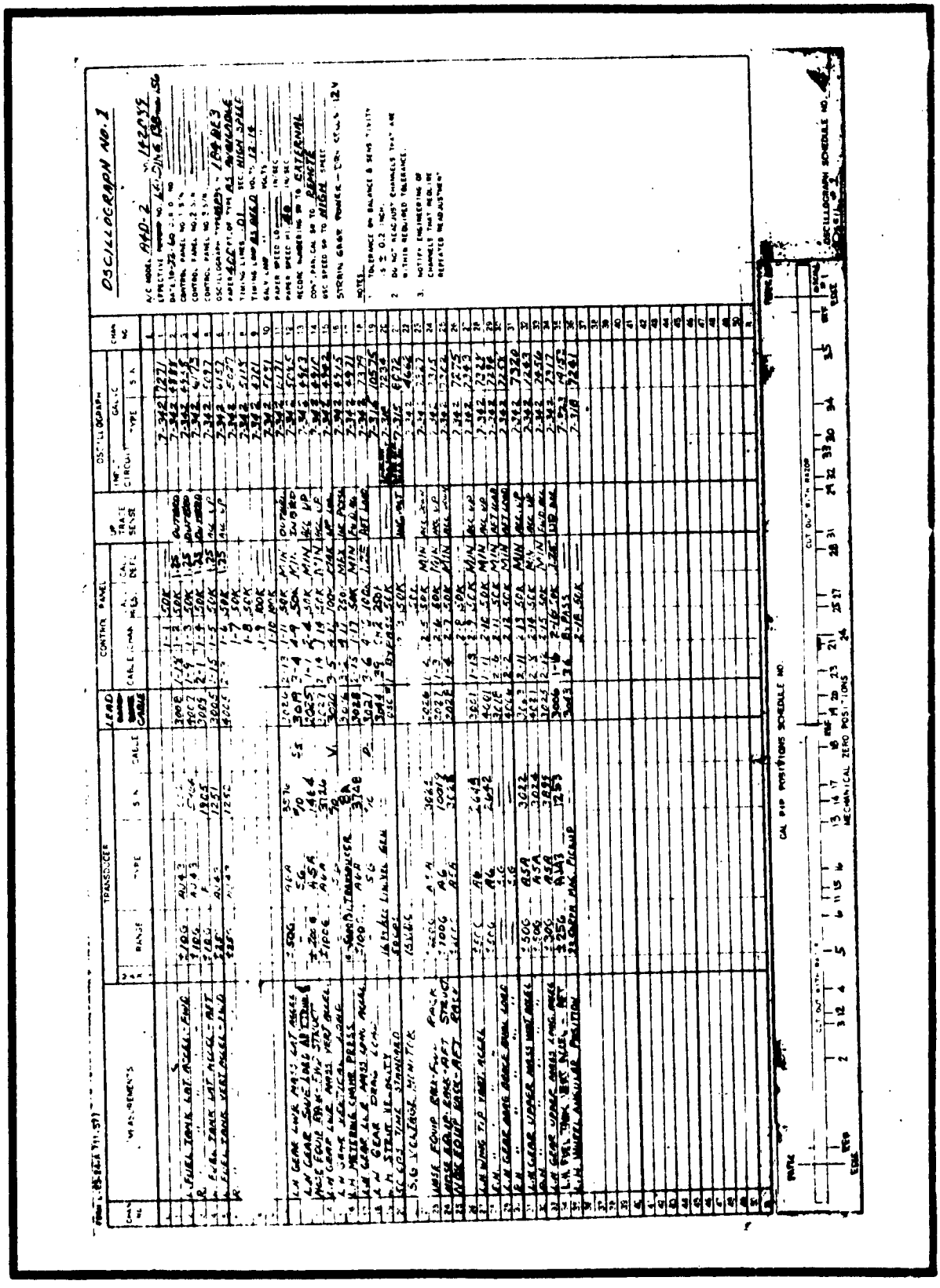
TITLE: Landing Loads Investigation

DOUGLAS AIRCRAFT COMPANY, INC.

PAGE: 10.005

MODEL: A4D-2

REPORT NO. 40636



FORM L825 (3-52) 1A

PREPARED BY: I. E. Harris DATE

CHECKED BY: DATE

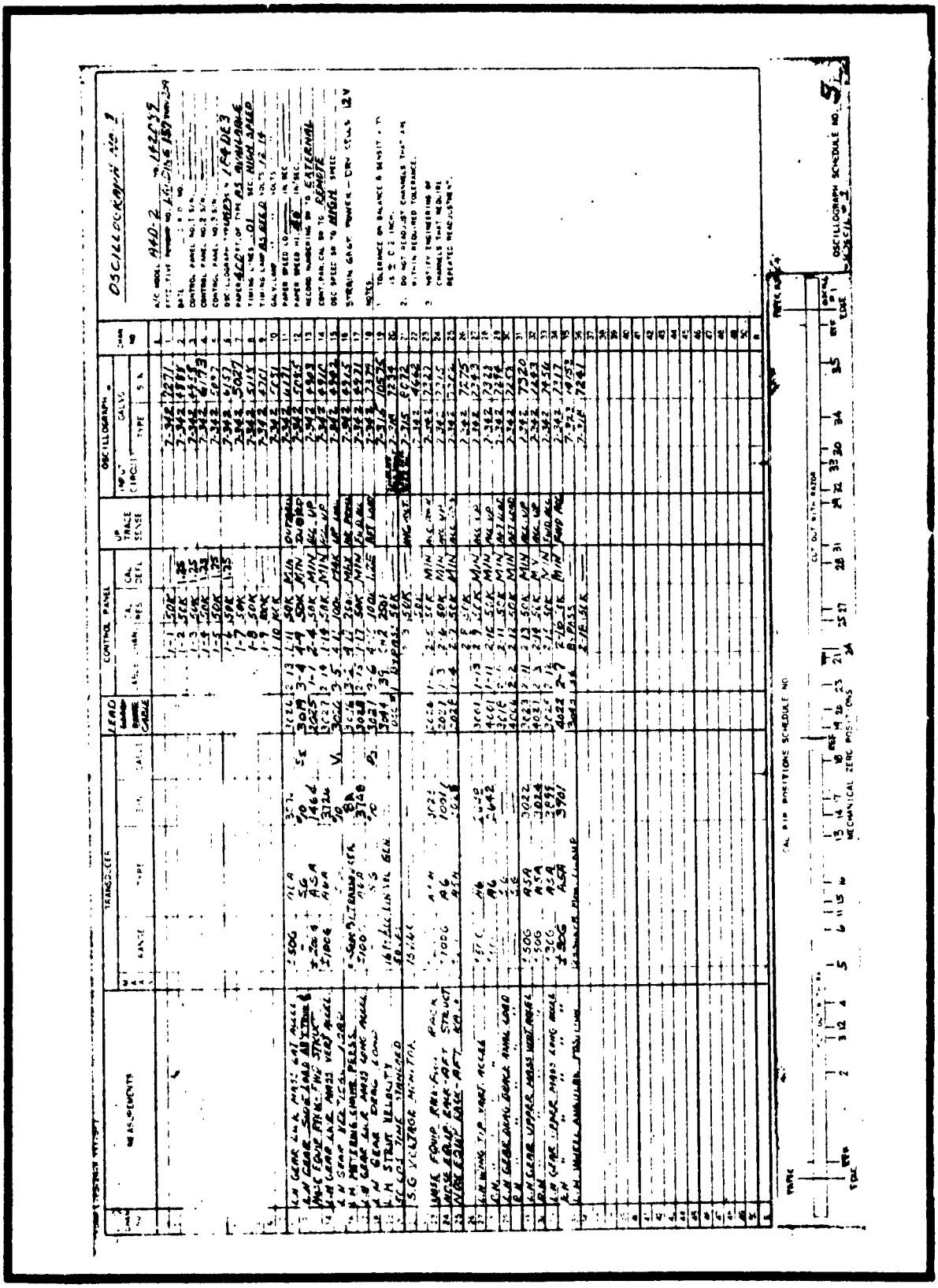
TITLE: Landing Loads Investigation

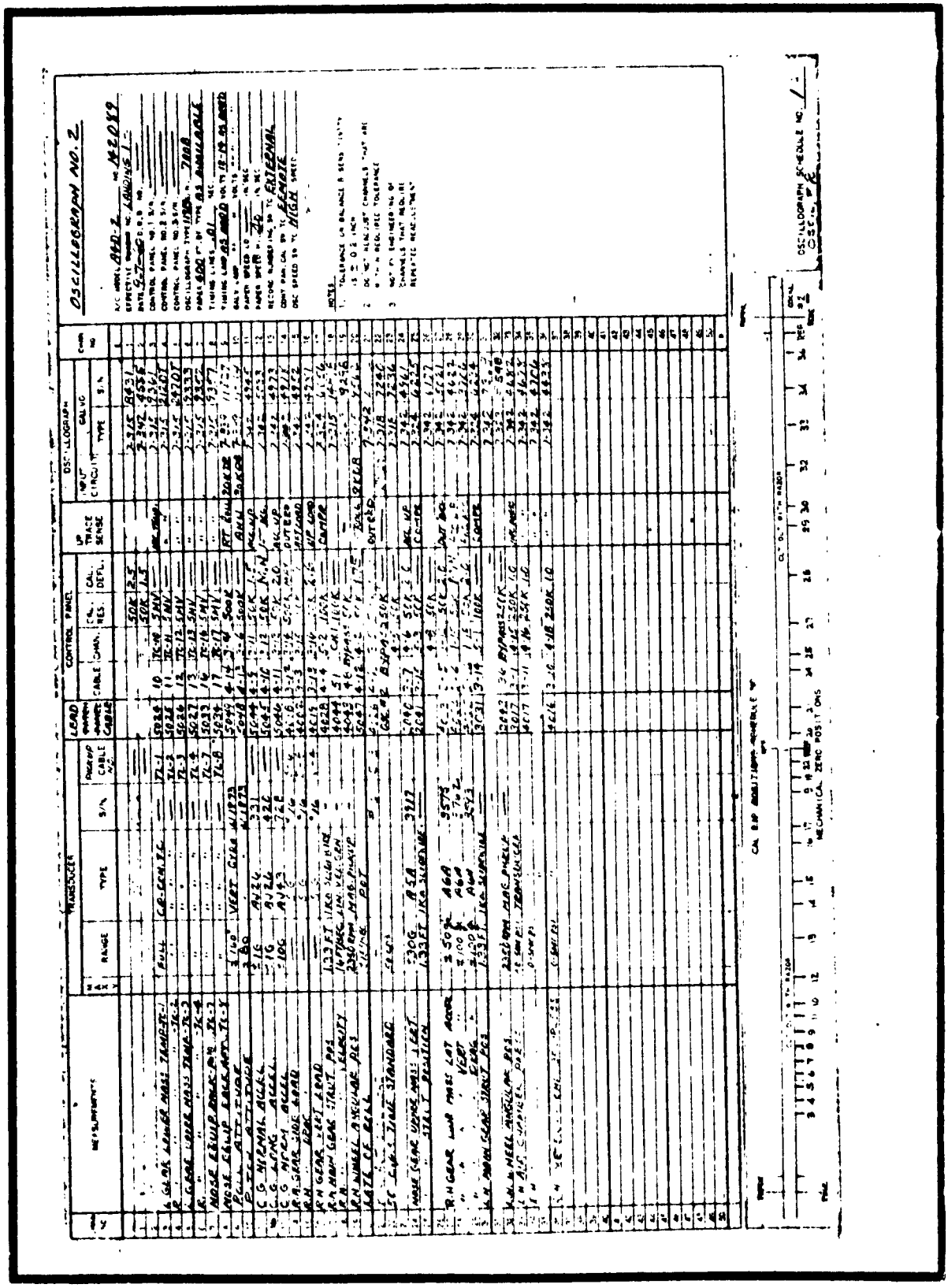
DOUGLAS AIRCRAFT COMPANY, INC.

PAGE: 10.006

MODEL: A4D-2

REPORT NO. 40636




OSCILLOGRAPH NO. 2
A4D-2
M2019
CONTROL PANEL
OSCILLOGRAPH
TRANSDUCER
LEAD
CABLE
CHAN.
CAL. RES.
CAL. DEFL.
UP TRACE SENSE
INPUT CIRCUIT
GALVO TYPE
S/N
CHAN NO
MEASUREMENT
RANGE
TYPE
S/N
PICK-UP CABLE NO.
LEAD (WHEN USED) CABLE
NOTES
OSCILLOGRAPH SCHEDULE NO. 1
OSC. NO. 2
CAL. DEF. ADJUSTING SCHEDULE NO.
MECHANICAL ZERO POSITIONS

FORM LB25 S 1A
(3-52)

PREPARED BY: L. E. Harris DATE

CHECKED BY: _____ DATE

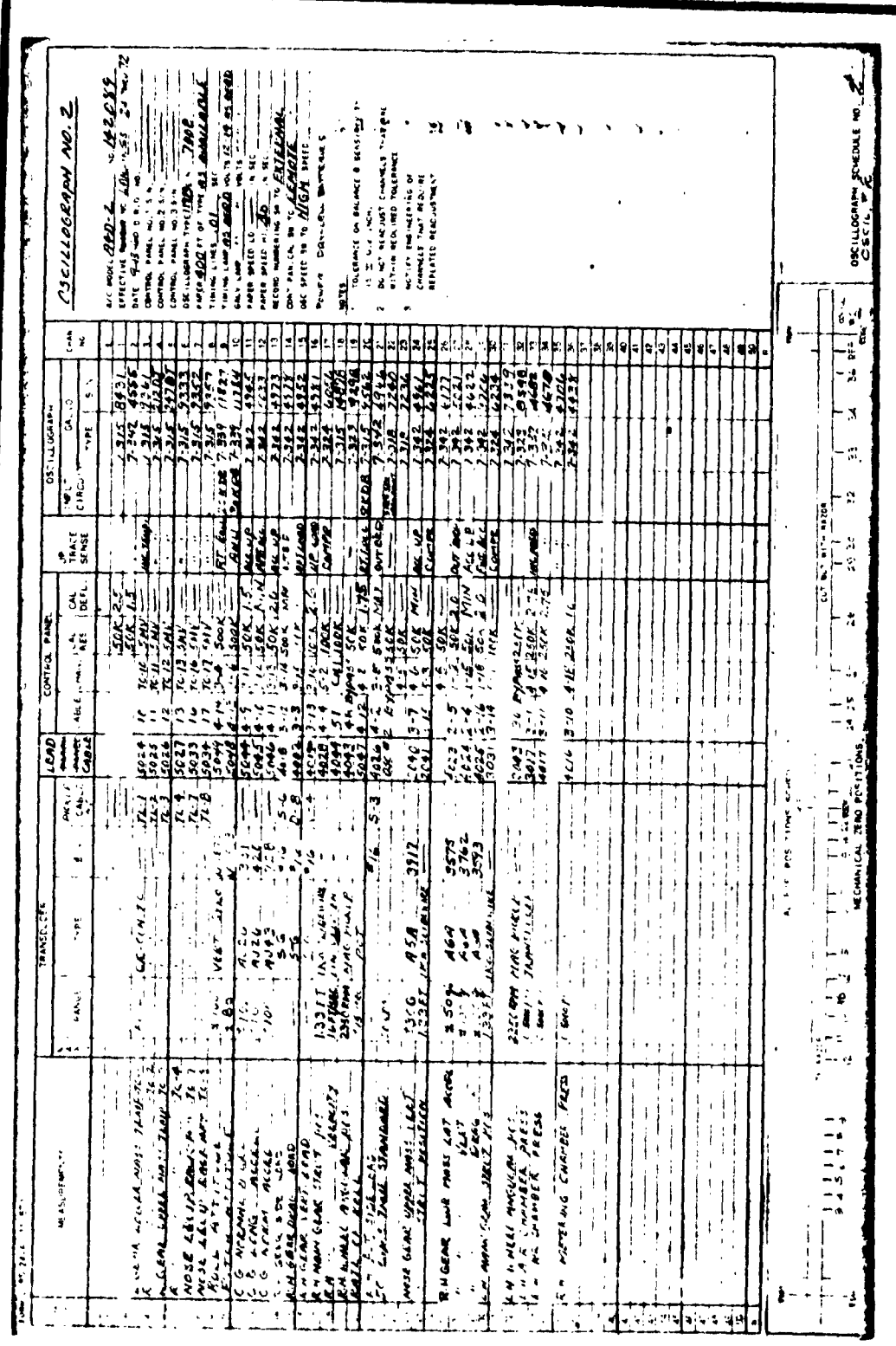
TITLE: Landing Loads Investigation

DOUGLAS AIRCRAFT COMPANY, INC.

PAGE: 10.008

MODEL: A4D-2

REPORT NO. 40636



FORM LB25 5 1A
(3 52)

PREPARED BY: I. E. Harris DATE

CHECKED BY: _____ DATE

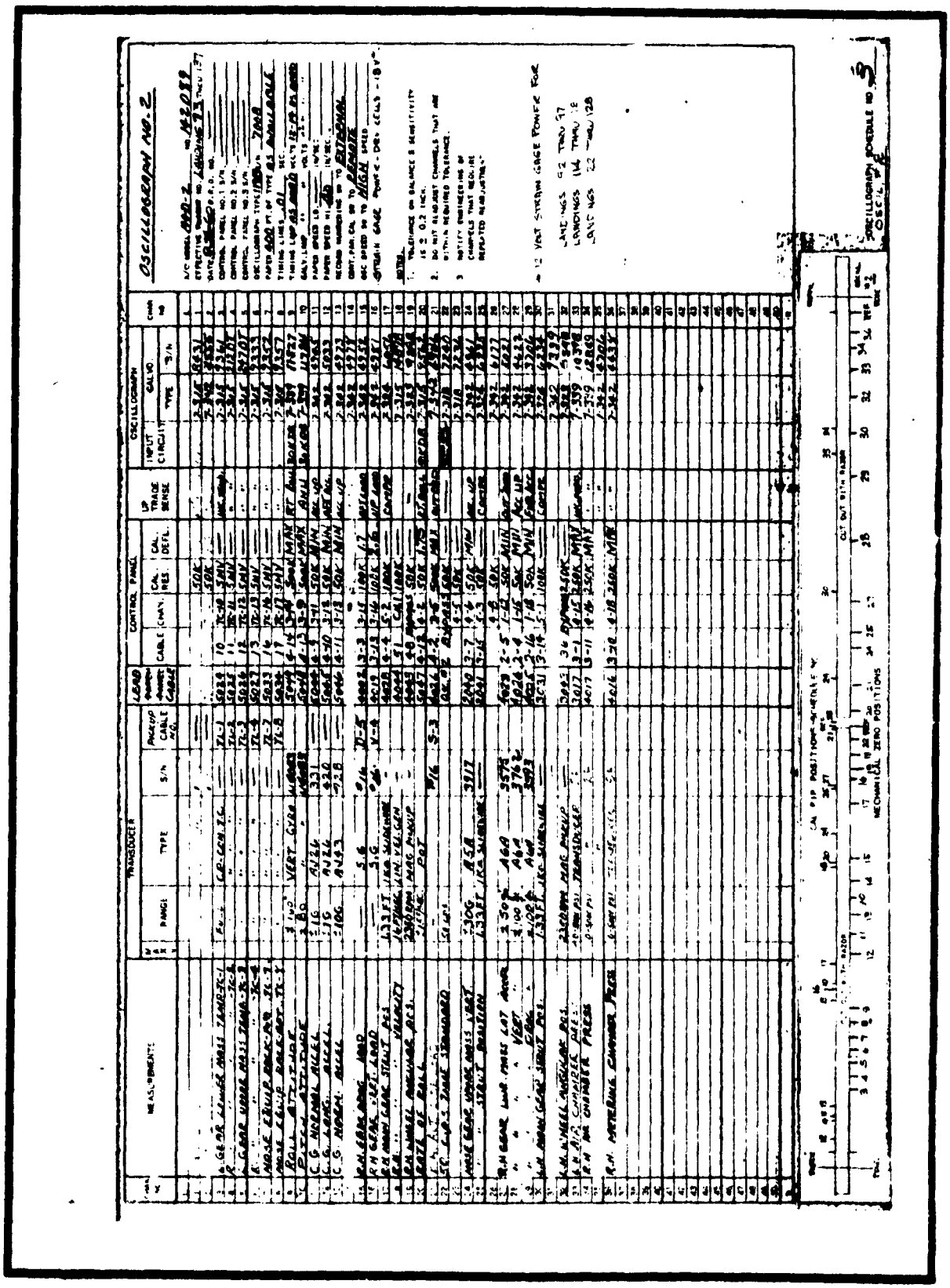
TITLE: Landing Loads Investigation

DOUGLAS AIRCRAFT COMPANY, INC.

PAGE: 10.009

MODEL: A4D-2

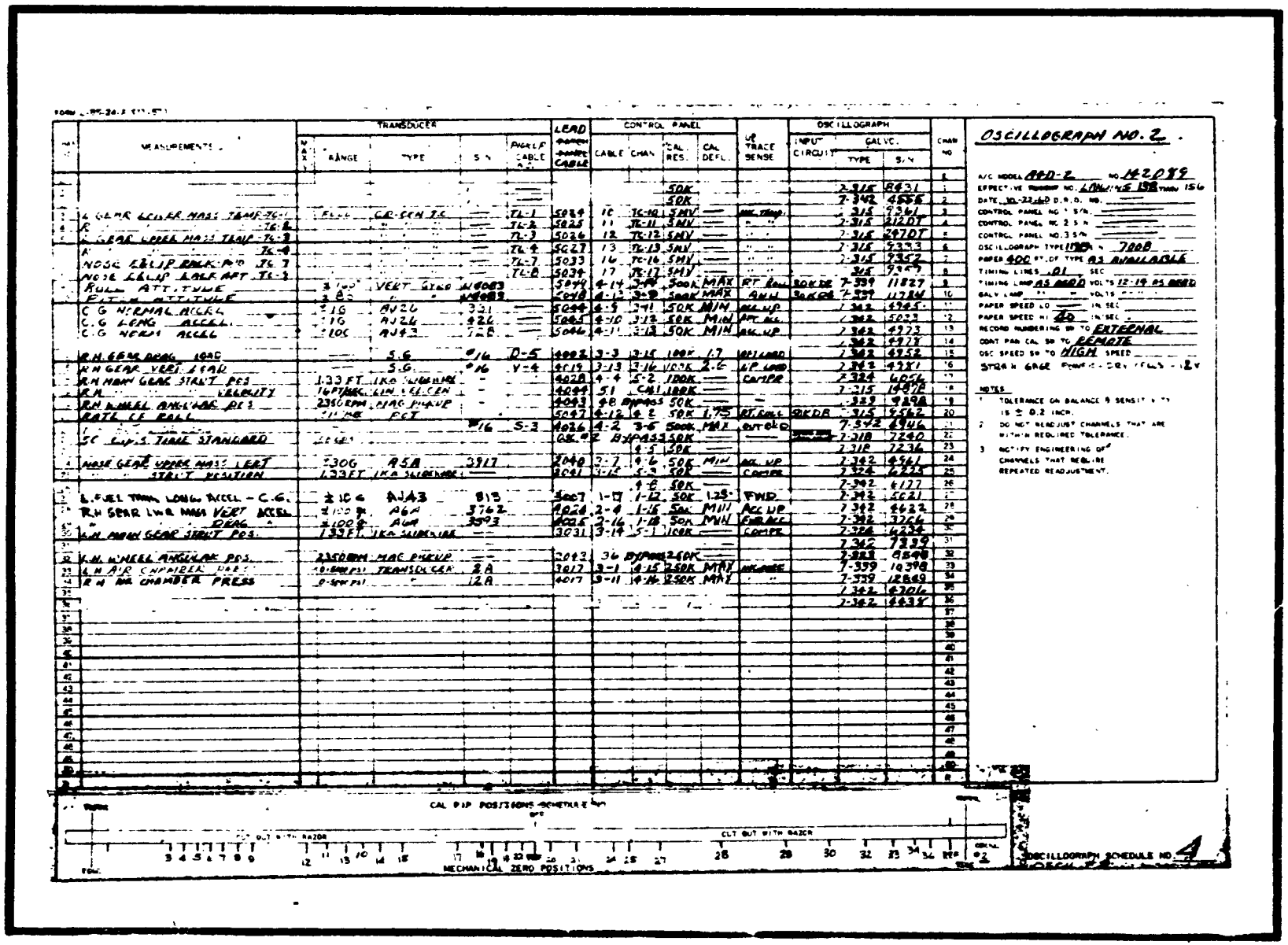
REPORT NO. 40636



PREPARED BY: I. E. Harris DOUGLAS AIRCRAFT COMPANY, INC. PAGE: 10.010

CHECKED BY: _____ DATE _____ MODEL: A4D-2

TITLE: Landing Loads Investigation DATE _____ REPORT NO. 40636



OSCILLOGRAPH NO. 2.

A/C MODEL A4D-2 NO. 142089

EFFECTIVE [illegible] NO. 1ON/145 150 THRU 156

DATE 10-22-60 D.R.D. NO. _____

CONTROL PANEL NO. 1 S/N _____

CONTROL PANEL NO. 2 S/N _____

CONTROL PANEL NO. 3 S/N _____

OSCILLOGRAPH TYPE 1508 S/N 7008

PAPER 400 FT. OF TYPE A3 AVAILABLE

TIMING LINES .01 SEC

TIMING LAMP AS REQD VOLTS 12-19 AS REQD

DAILY LAMP ** VOLTS ****

PAPER SPEED LO ____ IN/SEC

PAPER SPEED HI 40 IN/SEC

RECORD NUMBERING SW TO EXTERNAL

CONT PAN CAL SW TO REMOTE

OSC SPEED SW TO HIGH SPEED

STRAIN GAGE POWER - DRY CELLS - 12V

NOTES

1. TOLERANCE ON BALANCE & SENSITIVITY IS ± 0.2 INCH.
2. DO NOT READJUST CHANNELS THAT ARE WITHIN REQUIRED TOLERANCE.
3. NOTIFY ENGINEERING OF CHANNELS THAT REQUIRE REPEATED READJUSTMENT.

CHAN NO	MEASUREMENTS	TRANSDUCER MAX RANGE	TRANSDUCER TYPE	TRANSDUCER S/N	PICK UP CABLE	LEAD CABLE	CONTROL PANEL CABLE	CONTROL PANEL CHAN	CAL RES.	CAL DEFL.	UP TRACE SENSE	OSCILLOGRAPH INPUT CIRCUIT	OSCILLOGRAPH GALVO TYPE	OSCILLOGRAPH GALVO S/N	CHAN NO
									50K				2-315	8431	
									50K				7-342	4556	
1	L GEAR LOWER MAST TEMP TC-1	FULL	CR-CON TC		TL-1	5024	10	TC-10	5MV		MIC TEMP		315	9361	3
2	C " " TC-2	"	"		TL-2	5025	11	TC-11	5MV		" "		2-315	2120T	4
3	R GEAR LOWER MAST TEMP TC-3				TL-3	5026	12	TC-12	5MV		" "		7-315	2970T	5
	R " " TC-4				TL-4	5027	13	TC-13	5MV		" "		7-315	5393	6
	NOSE GEAR UPR MAST TC-7				TL-7	5033	16	TC-16	5MV		" "		2-315	9352	7
	NOSE GEAR LWR ART TC-8				TL-8	5034	17	TC-17	5MV		" "		315	9349	8
	ROLL ATTITUDE	3 [illegible]	VERT GYRO	W60083		5044	4-14	3-14	500K MAX		RT BANK	50K DB	7-339	11827	9
	PITCH ATTITUDE	3 "	"	W60083		5010	4-15	3-15	500K MAX		ANH	50K DB	7-339	11784	10
	C G NORMAL ACCEL	±1G	AJ26	331		5044	4-5	3-5	50K MIN		ACC UP		7-342	4945	11
	C.G LONG ACCEL	±1G	AJ26	426		5045	4-10	3-10	50K MIN		AFT ACC		7-342	5023	12
	C.G NORM ACCEL	±10G	AJ43	748		5046	4-11	3-11	50K MIN		ACC UP		7-342	4973	13
													7-342	4977	14
	R.H GEAR DRAG LOAD		S.G	#16	D-5	4002	3-3	3-15	100K	1.7	UP LOAD		7-342	4952	15
	R.H GEAR VERT LOAD		S.G	#16	V-4	4019	3-13	3-16	100K	2.6	UP LOAD		7-342	4981	16
	R.H MAIN GEAR STRUT POS	1.33 FT	IKA SLIDEWIRE			4028	4-4	5-2	100K		COMPR		7-324	4054	17
	R.H " " VELOCITY	16 FT/SEC	LIN VELGEN			4044	51	CAL	100K				7-315	10478	18
	R.H WHEEL ANGULAR POS	2350 RPM	MAC PICKUP			4043	48	BYPASS	50K		—		329	9298	19
	RATE OF ROLL	[illegible]	PCT			5047	4-12	3-12	50K	1.75	RT BANK	50K DB	315	9562	20
				#16	S-3	4026	4-2	3-6	500K	MAX	OUTBD		7-342	4946	21
	SC EXP.S. TRUE STANDARD	[illegible]				OK #2	BYPASS		50K				7-318	7240	22
							4-5		50K				2-318	7236	23
	NOSE GEAR UPPER MAST VERT	±30G	ASA	3917		2040	2-7	4-6	50K	MIN	ACC UP		7-342	4961	24
	" " STRUT POSITION	1.33 FT	IKA SLIDEWIRE			4041	3-16	5-3	50K		COMPR		7-324	4054	25
							4-6		50K				7-342	4177	26
	L.FUEL TANK LONG ACCEL - C.G.	±10 G	AJ43	813		5027	1-17	1-12	50K	1.25	FWD		7-342	5021	27
	R.H GEAR LWR MAIN VERT ACCEL	±100 G	AGH	3762		4024	2-4	1-16	50K	MIN	ACC UP		7-342	4622	28
	" " DRAG	±100 G	AGH	3993		4025	2-14	1-18	50K	MIN	FWD ACC		7-342	3764	29
	R.H MAIN GEAR STRUT POS	1.33 FT	IKA SLIDEWIRE			3031	3-14	5-1	100K		COMPR		7-324	4054	30
													7-342	7339	31
	R.H WHEEL ANGULAR POS	2350 RPM	MAC PICKUP			2043	36	BYPASS	250K				2-328	9548	32
	L.H AIR CHAMBER PRESS	10,000 PSI	TRANSDUCER	2A		3017	3-1	4-15	250K	MAX	AIR CHAMBER		7-339	10398	33
	R.H " " CHAMBER PRESS	0-5000 PSI	"	12A		4017	3-11	4-16	250K	MAX	" "		7-339	12849	34
													7-342	4206	35
													2-342	4638	36

CAL PIP POSITIONS (SCHEDULE NO. 2)

CUT OUT WITH RAZOR

CUT OUT WITH RAZOR

MECHANICAL ZERO POSITIONS

OSCILLOGRAPH SCHEDULE NO. 4

FORM LB25 S 1A
(3-52)

PREPARED BY: I. E. Harris DATE

CHECKED BY: _____ DATE

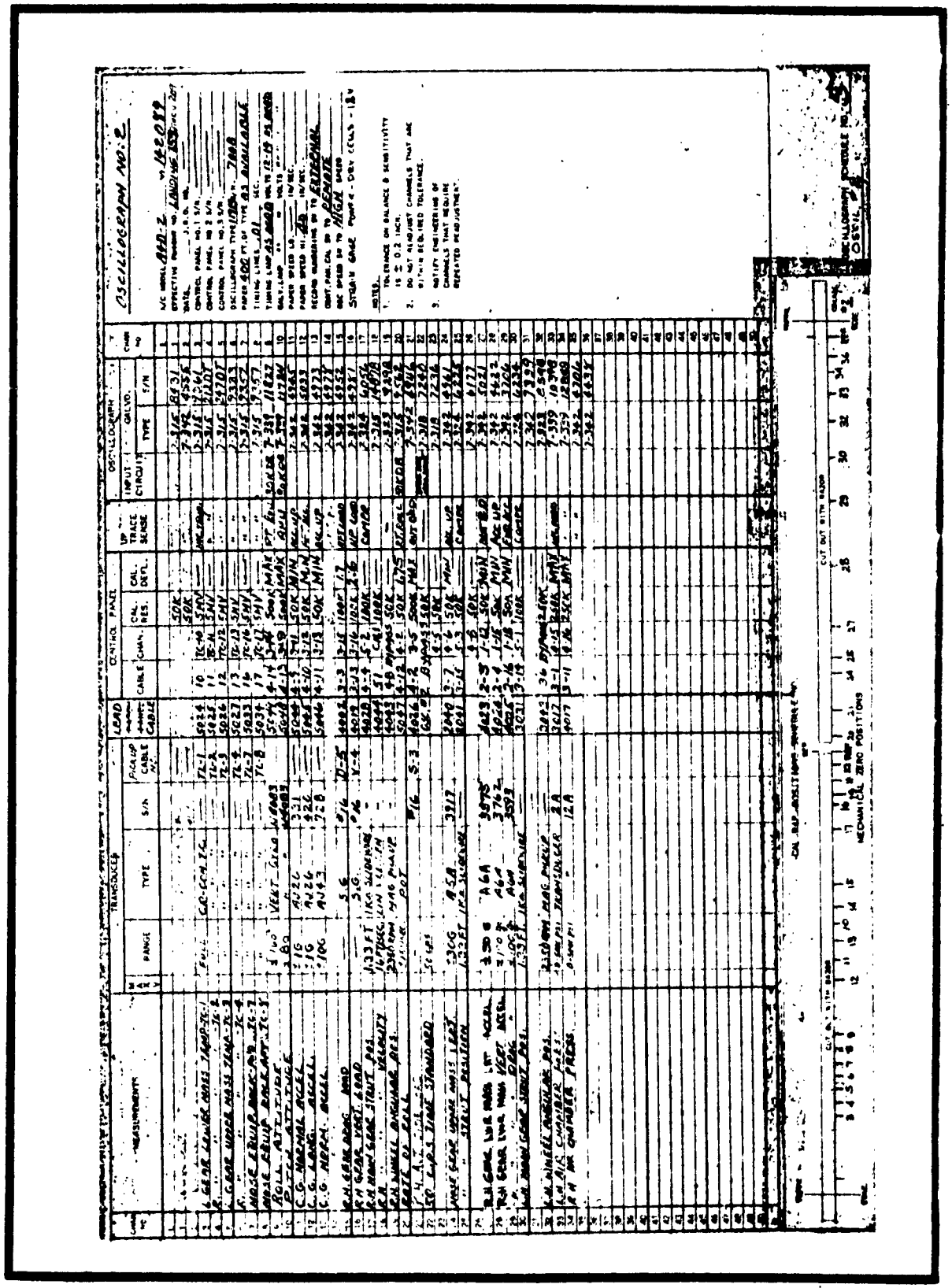
TITLE: Landing Loads Investigation

DOUGLAS AIRCRAFT COMPANY, INC.

PAGE: 10.011

MODEL: A4D-2

REPORT NO. 40636



PREPARED BY: McDonnell Douglas Aircraft Company, Inc.

CHECKED BY: _____ DATE _____

TITLE: Landing Loads Investigation

PAGE 10.012

MODEL: A300

REPORT NO. 80636

FORM L025-5 1A
11 521

CHAN NO	MEASUREMENTS	TRANSDUCER: BRIDGE	RANGE	TYPE	S/N	CABLE	PATCH PANEL	CONTROL PANEL: CABLE	CHAN.	CAL. RES.	CAL. DEFL.	UP TRACE SENSE	OSCILLOGRAPH: INPUT CIRCUIT	GALVO. TYPE	GALVO. S/N	CHAN NO
1	REFERENCE															1
2														7-382	9921	2
3														7-382	A388	3
4														7-382	6958	4
5	LH AIR CHAMBER PRESSURE	0-5 K PSI	DAC ES ST PPU	2A	3017		1-	4-15	250 K	MAX	LINCR			7-339	10288	5
6														7-315	10578	6
7	LH STRUT POSITION	0-15 IN.	DAC ES ST SW		3017		3-16	SW-1	90°	2 IN.	COMP			7-325	6918	7
8	LH STRUT WEIGHT	0-40 PSI	SANBORN	1-1328	3044		38	CH-2	65 K	FIXED	UP			7-382	9087	8
9	LH VERT ACC PLATFORM	0-60 K LBS	DAC ES ST RP	1			31A	1-8	250 K	MAX	UP		1200 SH	7-382	6116	9
10	LH METERING CHAMBER PRESSURE	0-5 K PSI	DAC ES ST PPU	3A	3016		3-2	4-17	250 K	MAX	LINCR			7-339	9815	10
11	LH REAR BRAKE GAGE	0-60 K LBS	MESSRS TO	01	3020		3-6	4-11	100 K	MAX	UP			7-382	6947	11
12	LH FWD LOWER MASS VERT ACC	±50 G'S	A6-100-350	3017	3021		2-11	2-11	50 K	MIN	/ DOWN			7-382	6010	12
13	LH DRAG BRACE (SEE NOTE 5)	0-50 K LBS	CALSTRAIN	LH 1	3015		2-6	2-11	50 K	12.2 IN	TENSION	28C 56		7-382	7299	13
14	LH GEAR LOWER MASS LONG ACC	±100 G'S	A6-100-350	3017	3025		2-15	2-17	50 K	MIN	/ FWD.			7-382	6971	14
15	LH AXLE STRAIN GAGE	0-20 K LBS	MESSRS TO	03	3021		3-8	4-15	100 K	1.5 IN	AFT			7-382	7319	15
16	LH WHEEL ANGULAR POSITION(SEE NOTE 7)	0-150 DEG	CALSTRAIN 4010		3017		38						20 SH	7-382	7245	16
17	LH DRAG PLATFORM	0-15 K LBS	DAC ES ST PP				31A	1-7	250 K	MAX	AFT		28C SH	7-382	7187	17
18														7-382	9087	18
19	1000 CPS TIME STANDARD (SEE NOTE 6)	80-20 KC	205 AG (H.P.)				31A						20 SH	7-382	6229	19
20														7-382	7279	20
21	LH GEAR SIDE BENDING MOMENT			3A	3019		4-4	4-9	50 K	MIN	INCR			7-382	9466	21
22	LH GEAR LOWER MASS LATERAL ACC	±100 G'S	A6-100-350	3017	3019		2-1	2-11	50 K	MIN	INCR			7-382	6971	22
23	STATIC SHIP VERT ACC (SEE NOTE 8)	0-5 G	250 A SERIES				DIR				INCR			7-315	9161	23
24	NOSE GEAR STRUT POSITION	0-8 IN.	DAC ES ST SW		2021		3-15	SW-3	90°	2 IN.	COMP			7-382	6235	24
25	NOSE GEAR UPPER MASS VERT ACC	±30 G'S	A5-30-350	3017	2040		3-7	4-5	90 K	MIN	/ UP			7-382	6961	25
26	NOSE GEAR VERTICAL PLATFORM	0-60 K LBS	DAC ES ST RP	6			31A	1-8	500 K	MAX	UP		1200 SH	7-382	7102	26
27														7-382	5089	27
28	F.S. NORMAL ACCELERATION	±11 G	A-28-1-350	331	5041		6-9	7-1	90 K	MIN	/ UP			7-412	5188	28
29	FS PITCH ATTITUDE (SEE NOTE 9)	±30°	F.S. GYRO	A 4051	5045	20H 3A	6-1	7-7	500 K	MAX	ANG	23D 3A		7-396	11184	29
30	F.S. LONGITUDINAL ACC	±1 G	30 A-350		5043		6-10	7-12	90 K	MIN	/ AFT			7-412	8571	30
31	A/C ROLL ATTITUDE	±60°	F.S. GYRO	A 4051	5049	30H 5A	6-14	7-15	500 K	MAX	ANG	35C 2B		7-339	11827	31
32	F.S. NORMAL ACCELERATION	±10 G'S	A-28-10-350	726	5046		6-11	6-6	90 K	MIN	/ UP			7-382	6073	32
33														7-382	6 67	33
34														7-382	7180	34
35	LH GEAR UPPER MASS VERTICAL ACC	±50 G'S	A5-50-350	3082	3085		2-11	2-13	50 K	MIN	/ DOWN			7-382	7180	35
36	LH GEAR UPPER MASS LONG ACC	±30 G'S	A5-30-350	3096	3086		2-12	2-15	50 K	MIN	/ AFT			7-382	7246	36
37														7-315	7234	37
38														7-315	7241	38
39																39
40																40
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50																50

OSCILLOGRAPH - 1 — Page Report 4063

A/C MODEL 300-B NO. 0009 TEST

EFFECTIVE FLIGHT NO. 2409 NO. 1 S 5486

DATE 3/15/61 P.C.N. NO. _____

CONTROL PANEL NO. 1 S/N _____

CONTROL PANEL NO. 2 S/N _____

CONTROL PANEL NO. 3 S/N _____

OSCILLOGRAPH TYPE 17SPS S/N 1SPS3

PAPER ROLL 800 FT OF TYPE LINE 3

TIME MARKS _____ SEC

TIME MARK AMP _____ VOLTS

GALV. AMP _____ VOLTS

PAPER SPEED LEVEL 6.1 IN/SEC

PAPER SPEED = 61 IN/SEC

PC ONE NUMBER TO BE TO EXTERNAL

CALIBRATION GO TO REMOTE

OPERATED GO TO LOW SPEED

NOTES

1. TOLERANCE ON GALVO & SENSITIVITY IS ± 0.2 INCH.
2. DO NOT READJUST CHANNELS THAT ARE WITHIN REQUIRED TOLERANCE
3. NOTIFY ENGINEERING OF CHANNELS THAT REQUIRE REPEATED READJUSTMENT.
4. STRAIN GAGE POWER SUPPLY 10 VOLTS, DRY CELLS.
5. TO BE PARALLELED TO CHN 16 OF OSCILLOGRAPH NO. 2.
6. TO BE PARALLELED TO CHN 20 OF OSCILLOGRAPH NO. 2 AND CHN 2 OSCILLOGRAPH NO 3
7. TO BE PARALLELED TO CHN 18 OF OSCILLOGRAPH NO. 2 AND CHN 34 OF OSCILLOGRAPH NO 3
8. TO BE PARALLELED TO CHN 22 OF OSCILLOGRAPH NO 2
9. TO BE PARALLELED TO CHN 28 OF OSCILLOGRAPH NO. 2

CAL PIP POSITIONS SCHEDULE NO.

OUT OUT OUT OUT	OUT OUT OUT OUT

MECHANICAL ZERO POSITIONS

*MCS GALVANOMETER

OSCILLOGRAPH SCHEDULE NO. 1

FORM LB25-5-1A
(1-52)

PREPARED BY: H.D. Merriweather DATE

CHECKED BY: _____ DATE

TITLE: Landing Loads Investigation

DOUGLAS AIRCRAFT COMPANY, INC.

PAGE: 10.013

MODEL: A4D-2

REPORT NO. 20836

CHAN NO	MEASUREMENTS	TRANSDUCER: RANGE	TRANSDUCER: TYPE	TRANSDUCER: S/N	CABLE	PATCH PANEL	CONTROL PANEL: CABLE	CONTROL PANEL: CHAN.	CONTROL PANEL: CAL RES.	CONTROL PANEL: CAL DEFL.	UP TRACE SENSE	OSCILLOGRAPH: INPUT CIRCUIT	OSCILLOGRAPH: GALVO TYPE	OSCILLOGRAPH: GALVO S/N	CHAN NO
1	ALTITUDE														1
2															2
3															3
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48															48

FORM L-68-264-5 (11-57)

Prop Report No. 5

OSCILLOGRAPH NO. 1 — ANDREW NO. 15 — DROP TEST

1. ALL MEAS. ARE EFFECTIVE AS OF DATE 9/26/57
2. CONTROL PANEL NO. 3 SAME AS CONTROL PANEL NO. 2 EXCEPT
3. CONTROL PANEL NO. 3 SAME AS CONTROL PANEL NO. 2 EXCEPT
4. OSCILLOGRAPH NO. 2 SAME AS OSCILLOGRAPH NO. 1 EXCEPT
5. FOR THE NUMBERING OF THE
6. TOLERANCE ON BALANCE & SENSITIVITY IS ± 0.2 %DR
7. DO NOT USE UNIT CHANNELS THAT HAVE A CAL. RES. TOLERANCE
8. FOR ENGINEERING OF CHANNELS THAT REQUIRE REPEATED ADJUSTMENT.
9. STRAIN GAGE POWER SUPPLY NO. 1 VOLTS, 1 KC, 3 PH CPS.
10. TO BE PARALLELED TO CHANNEL 17 OF OSCILLOGRAPH NO. 2
11. TO BE PARALLELED TO CHANNEL 18 OF OSCILLOGRAPH NO. 2 AND CHANNEL 2 OF OSCILLOGRAPH NO. 3
12. TO BE PARALLELED TO CHANNEL 19 OF OSCILLOGRAPH NO. 2 AND CHANNEL 3 OF OSCILLOGRAPH NO. 3
13. TO BE PARALLELED TO CHANNEL 20 OF OSCILLOGRAPH NO. 2
14. TO BE PARALLELED TO CHANNEL 21 OF OSCILLOGRAPH NO. 2

*GS GALVANOMETER

CAL. PIP POSITIONS SCHEDULE NO. _____

OFF-SET WITH RADIO _____ OFF-SET WITH RADIO _____

MECHANICAL ZERO POSITIONS: _____

OSCILLOGRAPH SCHEDULE NO. 2

FORM L825-5-14 (3-52)

PREPARED BY: E.L.B. Engineering DATE

CHECKED BY: DATE

TITLE: Instrumentation

DOUGLAS AIRCRAFT COMPANY, INC.

PAGE: 10 of

MODEL: A3D-2

REPORT NO.

Form L-86-24-A (11-57)

CHAN NO	MEASUREMENTS	TRANSDUCER GAGE NO	RANGE	TYPE	S/N	CABLE	PATCH PANEL	CONTROL PANEL CABLE	CHAN.	CAL. RES.	CAL DEFL.	UP TRACE SENSE	OSCILLOGRAPH INPUT CIRCUIT	GALVO. TYPE	GALVO. S/N	CHAN NO
1	REFERENCE															1
2														7-348	7271	2
3														7-342	3862	3
4														7-342	4916	4
5	LH PIP CHANGES PRESS.													7-338	10598	5
6														7-315	10571	6
7	LH STRUT POSITION		0-16 IN.	DAC ES ST 6W		3031		5-16	SW-1	POT	2 IN.	COMP		7-324	6234	7
8	LH STRUT VELOCITY		0-10 IPS	SANBORN	1-7328	4048		C	CH 2	50 K	FIXED	UP		7-348	5097	8
9	LH WHEEL PLATFORM		0-60 K LBS	DAC ES ST AP	8			D16	5-4	250 K	MAX	UP	1200 SH	7-352	5115	9
10	LH PITCHING CHAMBER PRESSURE		0-1 K PSI	DAC ES ST PP	3A	3016		3-2	5-5	250 K	MAX	INCR		7-352	5115	10
11	LH AFT STRAIN GAGE		0-5" K LBS	Micro-Measurements	21	3020		3-11	4-11	100 K	MAX	UP		7-352	5342	11
12	LH GEAR LOWER MASS VERTICAL ACC.		± 30 G'S	AS-100-350	3246	3027		2-16	1-16	50 K	MIN	✓ DOWN		7-352	5510	12
13	LH DRAG BRACE AXIAL MOTION		0-50 K LBS	Micro-Measurements	21	2018		2-11	2-11	50 K	8.2 IN.	TENS	200 SH	7-342	7298	13
14	LH GEAR LOWER MASS LONG. ACC.		± 100 G'S	AS-100-350	3246	3029		2-14	1-17	50 K	MIN	✓ FWD		7-342	4911	14
15	LH AFT STRAIN GAGE		± 20 K LBS	Micro-Measurements	D	3021		3-6	4-16	100 K	5 IN	AFT		7-342	7179	15
16	LH WHEEL ANGULAR POSITION(S) (NOTE 3)		0-150 KC	[illegible] 30 C		3063		36					20 SH	7-326	7044	16
17	LH BRAKE PRESSURE		0-3K & 0-5K	DAC ES ST AP	1-C			D14	5-6	250 K	MAX	AFT	1200 SH	7-342	7321	17
18														7-342	5097	18
19	1000 CPS TUN STANDARD (SEE NOTE 8)		90-130 VAC	400 CPS AC (H.P.)				D15					20 SH	7-326	5284	19
20	LH BLEEDING CHAMBER PRESSURE		0-5 K PSI	DAC ES ST PP	11B			D15	5-7	250 K	MAX	INCR		7-342	7217	20
21	LH GEAR SIDE BENDING MOMENT					3019			4-5	50 K	MIN	INRTB		7-342	6663	21
22	LH GEAR LOWER MASS LATERAL ACC.		± 150 G'S	AS-150-350	3246	3026		2-13	1-17	50 K	MIN	INRTZ		7-342	6 71	22
23	STRAIN GAGE VOLTAGE (SEE NOTE 7)		0-15 V	1000 K STBIES				D18				INCR		7-391	5545	23
24	REAL ICM STRUT POSITION		0-16 IN.	DAC ES ST 6W		2081		5-15	SW-1	POT	2 IN.	COMP		7-324	6 25	24
25	RIGHT REAR UPPER MASS VERTICAL ACC.		± 30 G'S	AS-30-350	3252	2042		3-13	3-13	50 K	MIN	✓ UP		7-342	6061	25
26	RIGHT REAR VERTICAL ACCELEROM		0-60 K LBS	DAC ES ST PP	4C	2042		3-7	4-7	100 K	MAX	AFT	1200 SH	7-342	5 84	26
27														7-342	5 84	27
28	C.G. NORMAL ACCELERATION		± 3 G'S	AA26-1-350	931	5045		4-9	3-11	50 K	MIN	✓ UP		7-312	5708	28
29	FSL PITCH ATTITUDE (SEE NOTE 7)		± 30°	P.R.GYRO	# 4023	5048	20 & 5A	4-13	3-7	500 K	MAX	ANU	730 SA	7-339	11784	29
30	C.G. LONGITUDINAL ACC.		± 1 G	DC 6-350		5049		4-10	3-12	50 K	MIN	✓ AFT		7-318	6097	30
31	AIR SPD. ATTITUDE		± 180°	P.R.GYRO	# 4025	5049	30 & 5B	4-14	3-14	500 K	MAX	PWD	350 DB	7-339	11827	31
32	C.G. NORMAL ACCELERATION		± 10 G'S	AA26-10-350	728	5046		4-11	4-6	100 K	MIN	✓ UP		7-342	5973	32
33														7-342	6157	33
34	LH REAR UPPER MASS VERTICAL ACC.		± 30 G'S	AS-30-350	3852	3083		2-11	2-13	50 K	MIN	✓ DOWN		7-348	7320	34
35	LH REAR UPPER MASS LONG. ACC.		± 30 G'S	AS-30-350	3835	3085		2-12	2-15	50 K	MIN	✓ AFT		7-342	7496	35
36														7-318	7234	36
37														7-318	7281	37
38	NOTE: CHANNEL NO 7 - LH STRUT VELOCITY [illegible]															38
39	CHANNEL NO. 8 - LH VERT. ACCEL															39
40	CHANNEL NO. 9 - LH VERT. ACCEL - DROPS 27 THROUGH 34, INCLUSIVE - INCLUDE TAXI BREAK IN TRACES															40
41																41
42	CHANNEL NO. 24 - STRAIN GAGE VOLTAGE CIRCUIT REVISED - DROP NO. 24 AND SUBSEQUENT															42
43																43
44																44
45																45
46																46
47																47
48																48
49																49
50																50

OSCILLOGRAPH - 1

A/C MODEL A3D-2 NO. DROP TEST

EFFECTIVE [illegible] NO. DROP NO. 26 & SUBS

DATE 8/6/56 P.O. NO.

CONTROL [illegible] NO. 1 S/N

CONTROL [illegible] NO. 2 S/N

OSCILLOGRAPH TYPE 31-DPS S/N 19063

GALVANOMETER TYPE LMB-1

TIME BASE SEC

TIME MARK VOLTS

GALV. LAMP VOLTS

PAPER SPEED NO. 4-3 IN/SEC

PAPER [illegible] NO. 63 IN/SEC

PEN CONTROL NUMBERING GO TO EXTERNAL

CAL. PIP CAL GO TO REMOTE

[illegible] TO GO TO LOW SPEED

NOTES

1. TOLERANCE ON BALANCE & SENSITIVITY IS ± 0.2 INCH
2. DO NOT READJUST CHANNELS THAT ARE WITHIN REQUIRED TOLERANCE
3. NOT TO ENGINEERING OF CHANNELS THAT REQUIRE REPEATED REBAL. STUNTS.
4. STRAIN GAGE POWER SUPPLY 15 VOLTS, DRY CELLS
5. TO BE PARALLELED TO CHANNEL 16 OF OSCILLOGRAPH NO. 2
6. TO BE PARALLELED TO CHANNEL 20 OF OSCILLOGRAPH NO 2 AND CHANNEL 2 OF OSCILLOGRAPH NO. 3
7. TO BE PARALLELED TO CHANNEL 18 OF OSCILLOGRAPH NO. 2 AND CHANNEL 35 OF OSCILLOGRAPH NO 3
8. TO BE PARALLELED TO CHANNEL 22 OF OSCILLOGRAPH NO. 2
9. TO BE PARALLELED TO CHANNEL 28 OF OSCILLOGRAPH NO. 2

CAL PIP POSITIONS SCHEDULE NO

CUT OUT WITH RADIO	CUT OUT WITH RADIO

MECHANICAL ZERO POSITIONS

* ES GALVANOMETER

OSCILLOGRAPH SCHEDULE NO. 2

FORM L-029-5-1A (1-57)

PREPARED BY: L.D. [illegible] DATE [illegible]

CHECKED BY: [illegible]

TITLE: [illegible]

DOUGLAS AIRCRAFT COMPANY, INC.

PAGE 10 OF [illegible]

MODEL [illegible]

REPORT NO. [illegible]

FORM L-29-56-6 (11-57)

CHAN NO	MEASUREMENTS	TRANSDUCER: SW	RANGE	TYPE	S/N	CABLE	PATCH PANEL	CONTROL PANEL: CABLE	CHAN.	CAL. RES.	CAL. DEFL.	UP TRACE SENSE	OSCILLOGRAPH: INPUT CIRCUIT	OSC VC. TYPE	OSC VC. S/N	CHAN NO
1	REFERENCE													7-362	7231	1
2														7-362	6858	2
3														7-362	6863	3
4	LH AIR DAMPER PRESS.		0-5 K PSI	DAC ES ST PPU	24	3017		3-1	5-15	250 K	MAX	INCR		7-339	11552	4
5														7-339	11553	5
6	LH STRUT POSITION		0-15 IN.	DAC ES ST SW		3041		3-16	SW-1	800	2 IN.	CONF		7-339	11554	6
7	LH STRUT VELOCITY		± 30 FPS	SANBORN	1-7350	3043		98	CH 2	85 K	FIXED	UP		7-362	9897	7
8	LH VERTICAL PLATFORM		0-60 K LBS	DAC ES ST PP	5			DIR	5-8	250 K	MAX	UP	1200 SH	7-362	9118	8
9	LH RETRACT CHAMBER PRESSURE		0-5 K PSI	DAC ES ST PPU	34	3016		3-1	5-5	250 K	MAX	INCR		7-362	9915	9
10	LH SIDE STRAIN GAGE		0-50 K LBS	M.L.B. 10	V1	3020		3-3	5-11	100 K	MAX	UP		7-362	9942	10
11	LH GEAR LOWER MASS VERTICAL ACC.		± 50 G'S	AS-100-100	3726	3047		3-14	5-18	50 K	MIN	/ DOWN		7-362	9910	11
12	LH DRAG BRACE (SEE NOTE 9)		± 30 K LBS	STRAIN-1	LH	3018		2-6	5-11	50 K	8.8 IN.	YEAS.	200 SH	7-362	7896	12
13	LH GEAR LOWER MASS LONG. ACC		± 100 G'S	AS-100-353	3746	3048		2-15	5-17	50 K	MIN	FWD.		7-362	6971	13
14	LH SIDE STRAIN GAGE		± 30 K LBS	M.L.B.-10	B3	3021		3-5	5-10	100 K	2.5 IN.	AFT		7-362	7379	14
15	RH VERTICAL ACCELERATION (SEE NOTE 7)		0-150 VC	ELECTRO 3010		3043		36					20 SH	7-362	7055	15
16	LH DRAG PLATFORM		0-15 K LBS	DAC ES ST PP	6			DIR	5-6	250 K	MAX	AFT	1200 SH	7-362	7377	16
17														7-362	2027	17
18	VIBR CPS TIME STANDARD (SEE NOTE 6)		20-30 VC	205 AC G.P.I.				DIR					20 SH	7-326	9225	18
19	LH RETRACT CHAMBER PRESSURE		0-5 K PSI	DAC ES ST PPU	118			DIR	5-7	250 K	MAX	INCR		7-362	7478	19
20	LH GEAR SIDE BENDING MOMENT				55	3014		3-4	4-8	50 K	MIN	INBD		7-362	4662	20
21	LH GEAR LOWER MASS LATERAL ACC.		± 100 G'S	AC-100-350	3736	3045		2-13	5-11	50 K	MIN	INBD		7-362	6171	21
22	STRAIN GAGE VOLTAGE (SEE NOTE 5)		0-18 V	250 K SERIES				DIR				INCR		7-323	8942	22
23	NOSE GEAR STRUT POSITION		0-18 IN.	DAC ES ST SW		3041		3-15	SW-3	800	2 IN.	CONF		7-[illegible]	6885	23
24	NOSE GEAR UPPER MASS VERTICAL ACC.		± 30 G'S	AS-30-300	3917	3040		3-7	5-5	50 K	MIN	/ UP		7-362	9861	24
25	NOSE GEAR VERTICAL PLATFORM		0-60 K LBS	DAC ES ST PP	1			DIR	5-8	500 K	MAX	UP	1200 SH	7-362	7388	25
26														7-362	9059	26
27	C.G. NORMAL ACCELERATION		± 5 G	AA26-1-250	231	5043		4-9	3-11	50 K	PIN	/ UP		7-312	7788	27
28	FR. PITCH ATTITUDE (SEE NOTE 9)		± 60°	F R GYRO	M NOE 1	5045	90 K SH	4-13	3-7	500 K	MAX	ANU	230 SH	7-339	11784	28
29	C.G. LONGITUDINAL ACC.		± 1 G	30. 6-250	4	5044		4-10	3-12	50 K	MIN	/ AFT		7-312	8057	29
30	AIR REAL ATTITUDE		±180°	F R GYRO	M 4081	5044	90 K SH	4-14	3-14	500 K	MAX	FWD.	350 SH	7-339	11787	30
31	C.G. NORMAL ACCELERATION		± 10 G'S	AA43-10-350	728	5046		4-11	4-6	50 K	MIN	/ UP		7-362	6971	31
32														7-362	6151	32
33	LH GEAR UPPER MASS VERTICAL ACC.		±30 G'S	AS-30-350	3022	3083		2-11	2-13	50 K	MIN	/ DOWN		7-362	7389	33
34	LH GEAR UPPER MASS LONG. ACC.		± 30 G'S	AS-30-370	3899	3085		2-12	2-14	50 K	MIN	/ AFT		7-362	7856	34
35														7-318	7219	35
36														7-318	7261	36
37																37
38																38
39	NOTE: CHANNEL NO. 24 - N.S. VERTICAL POSITION - DEACTIVATED - DROP NO. 18 AND SHORT CKT															39
40																40
41																41
42																42
43																43
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OSCILLOGRAPH - 1 Page Reports Model

O/C MODEL 406-C NO. ERROR TEST

EFFECTIVE FILM SET NO. ERROR NO. 32 0 SUBS

DATE 8/20/61 P R R. NO.

CONTROL PANEL NO. 1 S/N:

CONTROL PANEL NO. 2 S/N:

CONTROL PANEL NO. 3 S/N:

OSCILLOGRAPH TYPE 11593 S/N 1360(3)

TIMING MKS SEC

TIMING AMP VOLTS

SAL. AMP VOLTS

PAPER SPEED NO. 6.3 IN/SEC

PAPER SPEED IN 50 IN. SEC.

PULSE NUMBERING SW TO EXTERNAL

CONT PAN. CAL SW TO REMOTE

CONT PAN. CAL SW TO LOW SPEED

NOTES:

1. TOLERANCE ON BALANCE & SENSITIVITY IS ± 0.2 INCH
2. DO NOT READJUST CHANNELS THAT ARE WITHIN REQUIRED TOLERANCE
3. NOT TO ENGINEERING OF CHANNELS THAT REQUIRE REPEATED READJUSTMENT
4. STRAIN GAGE POWER SUPPLY 18 VOLTS, DRY CELLS
5. TO BE PARALLELED TO CHANNEL 16 OF OSCILLOGRAPH NO. 2
6. TO BE PARALLELED TO CHANNEL 20 OF OSCILLOGRAPH NO. 2 AND CHANNEL 1 OF OSCILLOGRAPH NO. 3
7. TO BE PARALLELED TO CHANNEL 19 OF OSCILLOGRAPH NO. 2 AND CHANNEL 35 OF OSCILLOGRAPH NO. 3
8. TO BE PARALLELED TO CHANNEL 22 OF OSCILLOGRAPH NO. 2
9. TO BE PARALLELED TO CHANNEL 28 OF OSCILLOGRAPH NO. 2

CAL PIP POSITIONS SCHEDULE NO.

CUT OUT WITH RAZOR	CUT OUT WITH RAZOR

MECHANICAL ZERO POSITIONS

* CB GALVANOMETER

OSCILLOGRAPH SCHEDULE NO. 4

PREPARED BY: R.D. Merlin/the DOUGLAS AIRCRAFT COMPANY, INC.

CHECKED BY: _____ DATE _____

TITLE: Landing Loads Investigation

PAGE: 10 of 16

MODEL: A4D-2

REPORT NO. 26626

FORM L-85-5-14 (1-52)

CHAN NO	MEASUREMENTS	TRANSDUCER: RANGE	TRANSDUCER: TYPE	TRANSDUCER: S/N	TRANSDUCER: CABLE	PATCH PANEL	CONTROL PANEL: CABLE	CONTROL PANEL: CHAN.	CONTROL PANEL: CAL. RES.	CONTROL PANEL: CAL. DEFL.	UP TRACE SENST	OSCILLOGRAPH: INPUT CIRCUIT	OSCILLOGRAPH: GALVO. TYPE	OSCILLOGRAPH: GALVO. S/N	CHAN NO
1	REFERENCE														1
2	SCALE TIME		RECORD-BRITISH	20 x SERIES - IE MARK									7-323	* 6648	2
3													7-315	10811	3
4													7-315	81201	4
5	RH AIR SHIELD PRESSURE	0-5 K PSI	DAC ES 5" PRV	12 A	4017		3-11	3-13	250 K MAX	INCR			7-339	12898	5
6													7-315	84707	6
7	RH STRUT POSITION	0-16 IN.	DAC ES 5" SW		4009		3-1	SW 2	POT 2 IN.	COMP			7-342	6956	7
8	RH STRUT VELOCITY	± 30 FPS	SANBORN	1-7377	4004		3-1	CH 1	60 K FIXED	UP			7-342	6652	8
9	RH HYDRAULIC FLOW	0-60 K LBS	DAC ES 5" PR	2			DIF	3-12	250 K MAX	UP	200 SR		7-342	6679	9
10	RH HYDRAULIC PRESSURE	0-5 K PSI	DAC ES 5" PRV	24	4018		3-18	3-15	250 K MAX	INCR			7-342	6618	10
11	RH AXIAL STRAIN GAGE	0-60 K LBS	M.L.G. 16	78	4019		3-19	3-17	100 K F.S 16 IN	UP			7-342	6681	11
12	RH GEAR - GEAR HUB VERTICAL ACC.	± 100 G'S	AS-100-350	3702	4024		2-7	1-15	50 K MIN	/DOWN			7-342	6622	12
13	RH DRAG PISTON	± 60 K LBS	DAC ES 5" PR	2			DIF	3-1	250 K MAX	APT	1200 SR		7-342	6703	13
14	RH AXIAL STRAIN GAGE	± 25 K LBS	M.L.G. 16	54	4002		3-3	3-15	100 K F.S 16 IN	APT			7-342	6924	14
15	RH GEAR - GEAR HUB LONG. ACC.	± 100 G'S	AS-100-350	2594	4005		2-16	1-15	50 K MIN	/FWD			7-342	3706	15
16	RH GEAR BRACE	± 50 K LBS	SANBORN-2	RH 1	4006		3-2	2-12	50 K F.S 16 IN	TENS			7-342	7256	16
17	RH DRAG BRACE (SEE NOTE 4)	± 50 K LBS	SANBORN-2	LH 1	3016		2-6	2-11	50 K F.S 16 IN	TENS	200 SR		7-342	4706	17
18	RH WHEEL ANGULAR POSITION	0-150 DEG	T-DAC-80 3010		4041		-6				60 SR		7-342	*30400	18
19	RH WHEEL ANGULAR POSITION (SEE NOTE 7)	0-50 DEG	T-DAC-80 3010		4041		-6				20 SR		7-342	*30400	19
20													7-321	9196	20
21	VOLTAGE STANDARD (SEE NOTE 5)	10-20 VS	205 AG (M.F.)								80 SR		7-321	7078	21
22													7-342	7339	22
23	STRUT GEAR VOLTAGE (SEE NOTE 9)	0- 5 V	250 K SERIES								INCR	150 SR	7-315	8072	23
24	RH LEFT PIT INP	0-10 K LBS	DAC ES 5"L	41 A	4008		3-4	3-7	50 K F.S. IN.	UP			7-338	* 6367	24
25	RH LEFT PIT INP	0-10 K LBS	DAC ES 5"L	44 A	4010		3-9	3-8	50 K F.S. IN.	UP			7-338	* 6365	25
26													7-315	9331	26
27	RH WING TIP ACCELEROMETER	± 50 G'S	AS-50-350	2642	4001		1-11	2-1	50 K MIN	/DOWN			7-342	7328	27
28	LH WING TIP ACCELEROMETER	± 50 G'S	AS-50-350	2643	3001		1-12	2-2	50 K MIN	/DOWN			7-342	7315	28
29	PEL [illegible] (SEE NOTE 8)	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	500 K MAX	ANG	230 SR		7-339	95166	29
30	RH GEAR UPPER HUB VERTICAL ACC.	± 50 G'S	AS-50-350	3025	4021		2-8	2-18	50 K MIN	/DOWN			7-342	7243	30
31													7-315	9352	31
32	RH GEAR UPPER HUB LONG. ACC.	± 30 G'S	AS-30-350	390	4022		2-7	2-16	50 K MIN	/AFT			7-342	7317	32
33													7-321	8548	33
34	RH AXIAL STRAIN GAGE	± 5 K LBS	M.L.G. 16	53	4026		4-2	3-5	500 K MAX	OUTBD			7-342	6773	34
35													7-342	6172	35
36	RH GEAR LOWER HUB LATERAL ACC.	± 50 G'S	AS-50-350	3575	4031		2-5	1-12	50 K MIN	/INBD			7-342	5021	36
37													7-342	5083	37
38															38
39															39
40															40
41															41
42															42
43															43
44															44
45															45
46															46
47															47
48															48
49															49
50															50

OSCILLOGRAPH - 2 Flight Report 4000

A/C MODEL A4D-2 NO _____ DROP TEST _____

EFFECTIVE WEIGHT NO ERROR NO. _____ 0 PLUS

DATE 5/18/61 A/C NO _____

CONTROL [illegible] NO 1 0 _____

CONTROL [illegible] NO 2 0 _____

CONTROL [illegible] NO 3 0 _____

DRIFT [illegible] TEST [illegible] 5 IN 1000

RANGE 500 FT OF TAPE _____ SYNC 3

[illegible] SET _____

[illegible] GAGES _____

[illegible] VOLTS _____

1 PER WHEEL [illegible] 24 IN SEC _____

PAPER [illegible] 60 IN/SEC _____

[illegible] NUMBERING BOTH TO LATERAL _____

CAMERA [illegible] BOTH TO REMOTE _____

1 PER SW TO LOOP SHEET _____

NOTES:

1. TOLERANCE ON BALANCE & SYNC TIMES IS ± 0.1 MSEC
2. DO NOT READJUST CHANNELS THAT FALL WITHIN SPEC RED TOLERANCE.
3. NOTIFY ENG MEAS NG OF CHANNELS THAT REQUIRE REPLACE-RECALIBRATE.
4. A. STRAIN GAGE POWER SUPPLY DRY CELLS, 18 VOLTS
5. TO BE PARALLELED FROM CHANNEL 12, OSCILLOGRAPH 1. SET VOLTAGE SO THAT CAL PIP EQUALS PIP OF CHANNEL 14, OSCILLOGRAPH 2
6. TO BE PARALLELED FROM CHANNEL 18 OF OSCILLOGRAPH NO. 1 AND CHANNEL 2 OF OSCILLOGRAPH NO. 3
7. TO BE PARALLELED FROM CHANNEL 15 OF OSCILLOGRAPH NO. 1 AND CHANNEL 35 OF OSCILLOGRAPH NO. 2
8. TO BE PARALLELED TO CHANNEL 22 OF OSCILLOGRAPH NO. 1
9. TO BE PARALLELED FROM CHANNEL 28 OF OSCILLOGRAPH NO. 1

CAL PIP POSITIONS SCHEDULE NO. _____

CUT OUT WITH PAPER | CUT OUT WITH PAPER

MECHANICAL ZERO POSITIONS

PEN GALVANOMETER

OSCILLOGRAPH SCHEDULE NO. 1

FORM L-829-5-1A (3-52)

PREPARED BY: E.D. Nordenberg DOUGLAS AIRCRAFT COMPANY, INC. PAGE: 10 OF

CHECKED BY: _____ DATE _____ MODEL: A3D-2

TITLE: Landing Loads Instrumentation REPORT NO. SM-

Form L-85-24-6 (11-57)

LINE NO.	MEASUREMENTS	TRANSDUCER: MFR	RANGE	TYPE	S/N	CABLE	PATCH PANEL	CONTROL PANEL: CABLE	CHANN.	CAL. RES.	CAL DEFL.	UP TRACE SENSE	OSCILLOGRAPH: INPUT CIRCUIT	CAL VO. TYPE	CAL VO. S/N	CHAN NO
1	REFERENCE															1
2	RELEASE PING			MICRO-SWITCH		20 K SERIES, 1C	SHORT						7-323			2
3													7-315			3
4	Rm AIR CHAMBER PRESSURE		0-1 K PSI	DAC ES 5" RP	-2 A	4017		3-11	5-18	250 K MIN	UNCR		7-315			4
5													7-315			5
6	Rm STROUT POSITION		0-18 IN	DAC ES 5" SH		4008		5-4	Sw 2	POT 2 IN.	CORP		7-324			6
7	Rm STRUT VELOCITY		± 30 FPS	SANBORN	1-7327	4044		51	Sw 1	65 K FIXED	UP		7-322			7
8	Rm VERTICAL PLATFORM		0-60 K LBS	DAC II 5" RP	2			DIR	5-12	250 K MAX	UP	1200 SP	7-342			8
9	Rm METER NG CHAMBER PRESSURE		0-1 K PSI	DAC ES 5" PPU	5 A	4016		3-19	5-14	250 K MAX	UNCR		7-342			9
10	Rm AXIAL STRAIN GAGE		0-60 K LBS	M.B. G. 16	V 3	4016		5-15	5-17	100 K 2.6 IN.	UP		7-342			10
11	Rm SCAN LOW'S MASS VERTICAL ACC.		± 100 G'S	AS-100-350	1762	4003		2-9	5-16	50 K MIN	↓ DOWN		7-342			11
12	Rm 2466 PLATFORM		± 15 K LBS	DAC ES 5" RP	2			DIR	5-10	250 K MAX	AFT	1200 SP	7-342			12
13	Rm AXIAL STRAIN GAGE		± 25 K LBS	M.B. G. 16	25	4002		5-3	5-15	100 K 2.2 IN.	AFT		7-342			13
14	Rm AIR OIL GAS ACCUMULATOR		± 100 G'S	AS-100-350	1593	4005		2-16	1-8	50 K MIN	↓ DOWN		7-342			14
15	Rm DRAG BRACE		± 50 K LBS	SA-178-1	BR 1	4006		2-8	5-13	50 K 2.2 IN.	TENS		7-342			15
16	AR DRAG BRACE (SEE NOTE 5)		± 50 K LBS	SA-178-1	BR 1	3018		2-8	2-11	50 K 2.2 IN.	TENS	200 SP	7-342			16
17	Rm WING ANGULAR ACC TWIN		0-150 RC	ELECTRIC 3019		4043		46				60 SP	7-326			17
18	AR WING ANGULAR POSITION (SEE NOTE 7)		0-150 RC	ELECTRIC 3019		3043		46				20 SP	7-326			18
19													7-323			19
20	1000 CPS TIME STANDARD (SEE NOTE 6)		20-20 KC	200 AC (H.P.)								20 SP	7-326			20
21													7-342			21
22	STRAIN GAGE VOLTAGE (SEE NOTE 8)		0-15 V	250 K SERIES								150 SP	7-315			22
23	Lm LEFT POT LINK		0-10 K LBS	DAC ES 5" L	A1 A	4009		3-6	5-7	50 K 2 IN.	UP		7-338			23
24	Rm LEFT POT LINK		0-10 K LBS	DAC ES 5" L	A1 A	4010		3-9	5-8	50 K 2 IN.	UP		7-338			24
25													7-315			25
26	Rm WING TIP ACCELEROMETER		± 50 G'S	AS-50-350	2642	4001		1-11	2-1	50 K MIN	↓ DOWN		7-342			26
27	AR WING TIP ACCELEROMETER		± 50 G'S	AS-50-350	2648	4001		1-13	2-5	50 K MIN	↓ DOWN		7-342			27
28	FR PITCH ATTITUDE (SEE NOTE 9)		± 80°	P.R. SYNC	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	AND	[illegible]	[illegible]	[illegible]	[illegible]	28
29	[illegible]		[illegible]	AS-50-350	3001	4001		[illegible]	2-13	50 K MIN	↓ DOWN		[illegible]	[illegible]	[illegible]	29
30													7-315			30
31	[illegible]		± [illegible] G'S	AS-50-350	3001	4022		2-7	2-16	50 K MIN	↓ AFT		7-342	7317		31
32													7-323	8468		32
33	Rm AXLE STRAIN GAGE		± 5 K LBS	M.B. G. 16	53	4026		5-2	5-5	500 K MAX	OUTBD		7-342	6173		33
34													7-342	6173		34
35	Rm GEAR LINES MASS LATERAL ACC.		± 50 G'S	AS-50-350	3575	4003		2-5	1-12	50 K MIN	↓ INBD		7-342	5081		35
36													7-342	5081		36
37																37
38																38
39																39
40																40
41																41
42																42
43																43
44																44
45																45
46																46
47																47
48																48
49																49
50																50

OSCILLOGRAPH - 2 Page Report 4002

A/C MODEL A3D-2 NO. SHOP TEST

DIRECTIVE [illegible] NO. GROUP NO. 19 6 PAGES

DATE 5/3/54 [illegible] NO.

CONTROL [illegible] NO. 1 & 4

CONTROL [illegible] NO. 2 & 3

MISCELLANEOUS TAPE 11585 S/N 7008

PANEL NO. [illegible] OF TYPE LINE 5

TIME SIGNAL [illegible] SEC

TIME SIGNAL [illegible] VOLTS

CAL. SIGNAL [illegible] VOLTS

PEN MOVED CC 0.5 IN SEC

PAPER SPEED [illegible] IN SEC

PEN NUMBERING BY "G" CATEGORY

CAL 50 TO REMOTE

CC 50 TO LOW SPEED

NOTE:

1. TOLERANCE ON BALANCE & SENS TRACES ± 0.2 INCH
2. DO NOT READJUST CHANNELS THAT ARE WITHIN REQUIRED TOLERANCE
3. NOT TO ENGINEERING OF CHANNELS THAT REQUIRE REPEATED READJUSTMENT.
4. STRAIN GAGE POWER SUPPLY DRY CELLS, 18 VOLTS
5. TO BE PARALLELED FROM CHANNEL [illegible] OSCILLOGRAPH 1. SET VOLTAGE TO MAKE CAL PIP EQUALS PIP OF CHANNEL 15, OSCILLOGRAPH NO. 2
6. TO BE PARALLELED FROM CHANNEL 18 OF OSCILLOGRAPH NO. 1 AND CHANNEL 2 OF OSCILLOGRAPH NO. 3
7. TO BE PARALLELED FROM CHANNEL 15 OF OSCILLOGRAPH NO. 1 AND CHANNEL 35 OF OSCILLOGRAPH NO. 2
8. TO BE PARALLELED TO CHANNEL 22 OF OSCILLOGRAPH NO. 1
9. TO BE PARALLELED FROM CHANNEL 28 OF OSCILLOGRAPH NO. 1

CAL PIP POSITIONS SCHEDULE NO. _____

CUT OUT WITH PA200 | CUT OUT WITH PA200

MECHANICAL ZERO POSITIONS

SEE GALVANOMETER

OSCILLOGRAPH SCHEDULE NO. 2

PREPARED BY: H.D. Mortensen DATE: DOUGLAS AIRCRAFT COMPANY, INC.

CHECKED BY: _____ DATE: _____

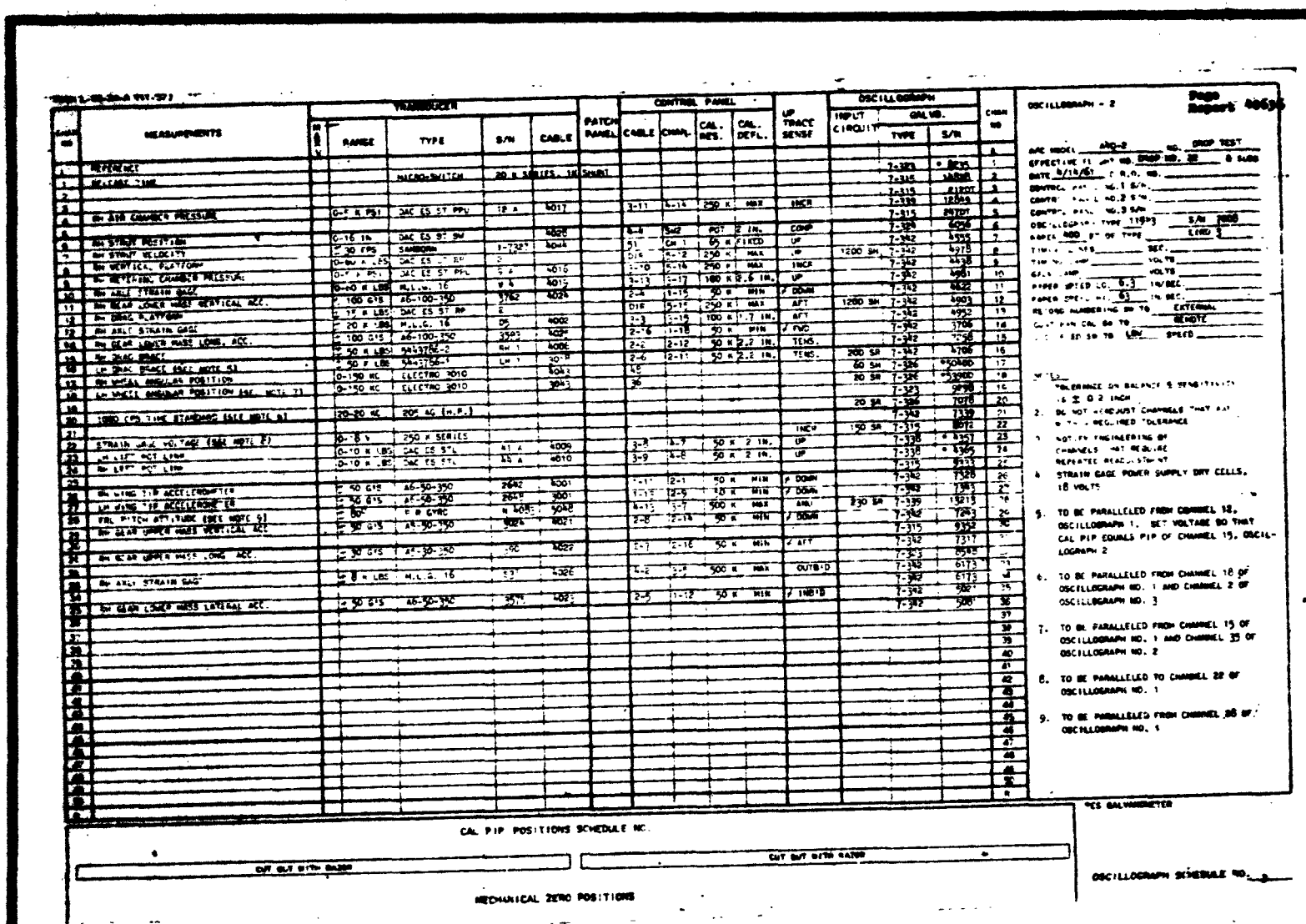
TITLE: Landing Loads Investigation

PAGE: 10.018

MODEL: A3J-1

REPORT NO. [illegible]

FORM L-0858-5-1A
13-521



CHAN NO	MEASUREMENTS	TRANSDUCER RANGE	TRANSDUCER TYPE	TRANSDUCER S/N	TRANSDUCER CABLE	PATCH PANEL	CONTROL PANEL CABLE	CONTROL PANEL CHAN.	CONTROL PANEL CAL. RES.	CONTROL PANEL CAL. DEFL.	UP TRACE SENSE	OSCILLOGRAPH INPUT CIRCUIT	OSCILLOGRAPH GALVO. TYPE	OSCILLOGRAPH GALVO. S/N	CHAN NO
1	REFERENCE												7-383	* BC45	1
2	RELAY TIME		MICRO-SWITCH	20 A SERIES, 1N SHUNT									7-385	14888	2
3													7-385	12869	3
4													7-398	12869	4
5	BH AIR CHAMBER PRESSURE	0-5 K PSI	DAC ES ST PPU	TP A	4017		3-11	4-14	250 K	MAX	INCR		7-315	8870T	5
6													7-398	6956	6
7	BH STRAIN REVERSAL	0-15 IN	DAC ES ST SW		4028		5-1	5-2	POT	2 IN.	COMP		7-342	4396	7
8	BH STRUT VELOCITY	0-30 FPS	SANBORN	1-7329	4044		51	CH 1	65 K	FIXED	UP		7-342	4438	8
9	BH VERTICAL PLATFORM	0-50 K LBS	DAC ES ST SW	5	4015		DIR	4-12	250 K	MAX	UP	1200 SH	7-342	4975	9
10	BH REVERSAL CHAMBER PRESSURE	0-5 K PSI	DAC ES ST PPU	TP A	4017		1-10	5-16	250 K	MAX	INCR		7-342	4438	10
11	BH AXLE STRAIN GAGE	0-60 K LBS	M.L.G. 16	W A	4015		5-13	1-17	180 K	9.6 IN.	UP		7-342	4961	11
12	BH REAR LOWER MAST VERTICAL ACC.	± 100 GYS	AS-100-350	3762	4026		2-4	1-15	50 K	MIN	↓ DOWN		7-342	4822	12
13	BH DRAG BRACE	± 75 K LBS	DAC ES ST BP	2			DIR	5-15	250 K	MAX	AFT	1200 SH	7-342	4903	13
14	BH AXLE STRAIN GAGE	± 20 K LBS	M.L.G. 16	D5	4002		2-3	1-15	100 K	1.7 IN.	AFT		7-342	4952	14
15	BH REAR LOWER MAST LONG. ACC.	± 100 GYS	AS-100-350	3503	4025		2-6	1-16	50 K	MIN	↓ FWD		7-342	3706	15
16	BH DRAG BRACE	± 50 K LBS	SA43756-2	RH 1	4006		2-2	2-12	50 K	2.2 IN.	TENS.		7-342	7256	16
17	BH DRAG BRACE	± 50 K LBS	SA43756-1	LH 1	4019		2-6	2-11	50 K	2.2 IN.	TENS.	200 SH	7-342	4706	17
18	LH DRAG BRACE (SEE NOTE 5)						46					80 SH	7-326	*50480	18
19	BH WING ANGULAR POSITION	0-190 MC	ELECTRO 3010		3043		36					80 SH	7-326	*53900	19
20	BH WHEEL ANGULAR POSITION (SEE NOTE 7)	0-150 MC	ELECTRO 3010		3041								7-323	2998	20
21												20 SH	7-386	7078	21
22	1000 (CPS) TIME STANDARD (SEE NOTE 6)	20-20 KC	20% AC (H.P.)										7-342	7339	22
23											INCH	150 SH	7-319	8872	23
24	STRAIN GAGE VOLTAGE (SEE NOTE 2)	0-10 V	250 A SERIES										7-338	* 8357	24
25	RH LEFT POT LINE	0-10 K LBS	DAC ES ST'L	A1 A	4009		3-8	4-7	50 K	2 IN.	UP		7-338	* 8365	25
26	RH LEFT POT LINE	0-10 K LBS	DAC ES ST'L	A5 A	4010		3-9	4-8	50 K	2 IN.	UP		7-319	8933	26
27													7-342	7328	27
28	BH WING TIP ACCELEROMETER	± 40 GYS	AS-50-350	2642	4001		1-11	2-1	50 K	MIN	↓ DOWN		7-342	7383	28
29	LH WING TIP ACCELEROMETER	± 40 GYS	AS-50-350	2824	3001		1-15	2-5	50 K	MIN	↓ DOWN		7-342	7383	29
30	FBL PITCH ATTITUDE (SEE NOTE 5)	± 80°	P R GYRO	N 4086	5048		4-15	1-7	500 K	MAX	ANU	230 SH	7-339	15215	30
31	BH GEAR UPPER MAST VERTICAL ACC.	± 50 GYS	AS-50-350	3024	4021		2-8	2-16	50 K	MIN	↓ DOWN		7-342	7263	31
32													7-315	9352	32
33	BH GEAR UPPER MAST LONG. ACC.	± 50 GYS	AS-50-350	3OC	4022		2-7	2-15	50 K	MIN	↓ AFT		7-342	7317	33
34													7-323	9585	34
35							4-2	1-8	500 K	MAX	OUTBID		7-342	6173	35
36	BH ANGL STRAIN GAGE	± 8 K LBS	M.L.G. 16	53"	4026								7-342	6175	36
37													7-342	5807	37
38	BH GEAR LOWER MAST LATERAL ACC.	± 50 GYS	AS-50-350	3577	4023		2-5	1-12	50 K	MIN	↓ INBID		7-342	5081	38
39															39
40															40
41															41
42															42
43															43
44															44
45															45
46															46
47															47
48															48
49															49
50															50

OSCILLOGRAPH - 2 Page Report 4053

DAC MODEL A4Q-2 NO. DROP TEST

EFFECTIVE FI[illegible] NO. DROP NO. 22 S SUBS

DATE 5/19/61 C.R.O. NO. _____

CONTROL PANEL NO.1 S/N: _____

CONTROL PANEL NO.2 S/N: _____

CONTROL PANEL NO.3 S/N: _____

OSCILLOGRAPH TYPE 1185J S/N 7000

PAPER SPEED AT OF TYPE LINEAR

TIMING [illegible] SEC.

TIMING AMP _____ VOLTS

GALV. AMP _____ VOLTS

PAPER SPEED LO. 6.3 IN/SEC.

PAPER SPEED HI. 63 IN/SEC.

RECORD NUMBERING BY TO EXTERNAL

CAL PIP CAL GO TO REMOTE

[illegible] GO TO LOW SPEED

NOTES:

1. TOLERANCE ON BALANCE & SENSITIVITY IS ± 0.2 INCH
2. DO NOT READJUST CHANNELS THAT ARE WITHIN REQUIRED TOLERANCE
3. NOTIFY ENGINEERING OF CHANNELS NOT REQUIRE REPEATED READJUSTMENT
4. STRAIN GAGE POWER SUPPLY DRY CELLS, 18 VOLTS
5. TO BE PARALLELED FROM CHANNEL 12, OSCILLOGRAPH 1. SET VOLTAGE SO THAT CAL PIP EQUALS PIP OF CHANNEL 15, OSCILLOGRAPH 2
6. TO BE PARALLELED FROM CHANNEL 18 OF OSCILLOGRAPH NO. 1 AND CHANNEL 2 OF OSCILLOGRAPH NO. 3
7. TO BE PARALLELED FROM CHANNEL 15 OF OSCILLOGRAPH NO. 1 AND CHANNEL 35 OF OSCILLOGRAPH NO. 2
8. TO BE PARALLELED TO CHANNEL 22 OF OSCILLOGRAPH NO. 1
9. TO BE PARALLELED FROM CHANNEL 28 OF OSCILLOGRAPH NO. 1

*ES GALVANOMETER

CAL PIP POSITIONS SCHEDULE NO. _____

CUT OUT WITH GAGE | CUT OUT WITH GAGE

MECHANICAL ZERO POSITIONS

OSCILLOGRAPH SCHEDULE NO. 3

FORM LB25-5 1A
(1 52)

PREPARED BY: H.D.Meriwether DATE — DOUGLAS AIRCRAFT COMPANY, INC.

CHECKED BY: _____ DATE

TITLE: Landing Loads Investigation

MODEL: A3D-2

REPORT NO. 40636

Chan No	MEASUREMENTS	TRANSDUCER: Rg No	RANGE	TYPE	S/N	CABLE	PATCH PANEL	CONTROL PANEL: CABLE	CHAN.	CAL. RES.	CAL. DEFL.	UP TRACE SENSE	OSCILLOGRAPH: INPUT CIRCUIT	CAL NO. TYPE	CAL NO. S/N	Chan No
1	REFERENCE															1
2	RELEASE "IN"			MICRO-SWITCH	BE SERIES, TK MOUNT								7-342	* 8835		2
3													7-315	19878		3
4													7-315	21201		4
5	AIR CHARGE PRESSURE		0-1 A PSI	DAC 15 ST PRT	12 A	4017						INCH	7-338	12899		5
6													7-315	24777		6
7	OIL STROKE POSITION		0-16 IN	DAC 15 ST SM		4024						CORR	7-342	8095		7
8			0-30 IN	SANBORN	1-7327	4044							7-342	1455		8
9			0-60 K LBS	DAC 15 ST PRT	2							UP	1205 SN	7-342	4918	9
10	AIR METERING CHAMBER PRESSURE		0-1 K PSI	DAC 15 ST PRT	1 B	4015						INCH		7-342	4819	10
11			0-60 K LBS	M.B. 16	1 B	4015						UP		7-342	4891	11
12	AIR GEAR DOOR MASS REACTION ACC.		0-100 G'S	45-50-350	1786	4024						/DOWN	1205 SN	7-342	3482	12
13			0-1 K LBS	DAC 15 ST RT	2							AFT				13
14			0-100 G'S	A-E-100-350	3521	4025		2-16		50 K	2.2 IN	/UP		7-342	3708	14
15	AIR GEAR DOOR MASS LONG. ACC.		± 50 K LBS	4613736-1	BH 1	4026		2-12		50 K	2.2 IN	TENS	200 SN	7-342	1758	15
16	AIR GEAR DOOR MASS VERT. ACC. (SEE NOTE 4)		± 50 K LBS	4613736-1	1	3010		2-9		50 K	2.2 IN	TENS	60 SN	7-342	4504	16
17	AIR WING BENDING POSITION		0-20 IN	ELECTRO 3010		4043		48					20 SN	7-326	4504	17
18	AIR WING BENDING MOMENT (SEE NOTE 4)		0-150 IN-K	ELECTRO 3010		3043		56					20 SN	7-326	4504	18
19														7-315	0673	19
20													20 SN	7-342	3015	20
21	STRAIN GAGE VOLTAGE (SEE NOTE 8)		0-1	7/16 A SERIES		4000		3-8		50 K	2 IN	INCH	150 SN	7-315	4504	21
22			0-10	DAC 15 ST				3-9		50 K	2 IN	UP		7-338	4504	22
23			0-10 K LBS	DAC 15 ST L		4017		3-2		50 K	2 IN	UP		7-338	4504	23
24														7-315	5893	24
25	AIR WING TIP ACCELEROMETER		± 50 G'S	45-50-350	2847	4001		2-1		50 K	MIN.	/DOWN		7-342	7253	25
26	AIR WING TIP ACCELEROMETER		± 50 G'S	AC-50-350	2854	3001		3-3		50 K	MIN.	/ DOWN		7-342	7253	26
27	FT. PITCH ATTITUDE (SEE NOTE 5)		± 60°	P-8 GYRO	N 4067	4041		3-13		200 K	MAX.	ANU	2,268	7-339	13219	27
28	FT. CLAM SHELL DOOR MASS VERTICAL ACC.		± 50 G'S	45-50-350	3003	4021		2-5		50 K	MIN.	/ DOWN		7-342	2453	28
29														7-315	5-36	29
30	AIR GEAR DOOR MASS LONG. ACC.		± 50 G'S	45-50-350	3301	4022		2-7		50 K	MIN.	/ AFT		7-342	3-7	30
31								2-14						7-315	9361	31
32	AIR GEAR STRAIN GAGE		± 5 K LBS	M.B. 16	337	4026		3-5		500 K	MIN.	OUTBD		7-342	0173	32
33								3-12						7-342	6173	33
34	AIR GEAR DOOR MASS VERTICAL ACC.		± 50 G'S	45-50-350	3572	4023		2-5		50 K	MIN.	/ INBD		7-342	505	34
35								3-12						7-342	505	35
36																36
37																37
38																38
39																39
40																40
41																41
42																42
43																43
44																44
45																45
46																46
47																47
48																48

OSCILLOGRAPH - 2 Page Report 40636

A/C MOD. A3D-2 DROP TEST

EFFECTIVE A/C NO. _____ DROP NO. 28 DATE 9/13/61

CHANNEL _____

COMP. _____

CONTR. _____

SEC. _____ SET _____

PANEL _____

1. REFERENCE ON BALANCE & REGISTRATION 1 IN. = _____ INCH
2. ON SEC. ADJUST CHANNELS FOR ANY ERROR EXCEEDING TOLERANCE
3. NOTE ON ENGINEERING OR CHANNELS THAT WERE IN REPEATED MALFUNCTION
4. STRAIN GAGE POWER SUPPLY DRY CELLS, 18 VOLTS
5. TO BE PARALLELED FROM CHANNEL 12, OSCILLOGRAPH NO. 1. SET VOLTAGE SO THAT CAL PIP EQUALS PIP OF CHANNEL 15, OSCILLOGRAPH NO. 2
6. TO BE PARALLELED FROM CHANNEL 16 OF OSCILLOGRAPH NO. 1 AND CHANNEL 2 OF OSCILLOGRAPH NO. 2
7. TO BE PARALLELED FROM CHANNEL 15 OF OSCILLOGRAPH NO. 1 AND CHANNEL 35 OF OSCILLOGRAPH NO. 2
8. TO BE PARALLELED TO CHANNEL 28 OF OSCILLOGRAPH NO. 1
9. TO BE PARALLELED FROM CHANNEL 26 OF OSCILLOGRAPH NO. 1

CAL PIP POSITIONS SCHEDULE NO. _____

OUT OF BITH BASE _____

OUT OUT BITH BASE _____

MECHANICAL ZERO POSITIONS

POS GALVANOMETER

OSCILLOGRAPH SCHEDULE NO. 3

Form L-88-34-A (11-57)

CHAN NO	MEASUREMENTS	TRANSDUCER SPEC	TRANSDUCER RANGE	TRANSDUCER TYPE	TRANSDUCER S/N	TRANSDUCER CABLE	PATCH PANEL	CONTROL PANEL CABLE	CONTROL PANEL CHAN.	CONTROL PANEL CAL. RES.	CONTROL PANEL CAL. DEFL.	UP TRACE SENSE	OSCILLOGRAPH INPUT CIRCUIT	OSCILLOGRAPH GALVO. TYPE	OSCILLOGRAPH GALVO. S/N	CHAN NO
A	G READING															A
B	VERTICAL TAPE			MICRO-SWITCH	20 K STRIPS IN SHUNT											B
1														7-323	* 3238	1
2														7-315	4878	2
3														7-315	2120	3
4	[illegible] DIFF PRESSURE	0-5 K PSI	DAC ES ST PPU	12 A	4017			1-11	2-13	250 K	MAX	UNCR		7-386	12868	4
5														7-315	28701	5
6	BH SYNC POSITION	0-16 IN.	DAC ES ST SM		4028			ALL	Sw 2	POT	2 IN.	CONF		7-328	6056	6
7	BH STRUT VELOCITY	± 30 FPS	SANBORN	1-1327	-004			1-1	1-2	99 K	RED	UP		7-382	4655	7
8	BH VERTICAL ACCEL	0-60 K ABS	DAC ES ST PP	2				0-8	2-12	250 K	MAX	UP	1200 Sn.	7-382	4836	8
9	BH WHEEL CHAMBER PRESSURE	0-5 K PSI	DAC ES ST PP	7 B	4016			2-10	2-14	250 K	MAX	UNCP		7-382	4836	9
10	BH AXLE STRAIN GAGE	0-60 K AB	[illegible]	4 A	4019			2-15	2-17	100 K	5.6 IN.	UP		7-382	4681	10
11	BH WING MASS VERTICAL ACC.	± 100 G'S	AS-100-350	3782	4024			2-8	2-18	50 K	MIN	DOWN		7-382	4822	11
12	BH DRAG PLATFORM	± 15 K LBS	DAC ES ST HP	6				0-8	2-16	250 K	MAX	AFT	1200 Sn.	7-382	4803	12
13	BH AXLE STRAIN GAGE	± 20 K LBS	[illegible]	5 A	4002			2-3	2-15	100 K	3.7 IN.	AFT		7-382	4956	13
14	BH GEAR BOX MASS VERT. ACC.	± 100 G'S	AS-100-350	3783	4025			2-16	2-18	50 K	MIN	FWD.		7-382	3706	14
15	BH [illegible]	± 50 K LBS	[illegible]	4A	-005			2-4	[illegible]	[illegible]	[illegible]	FWD.		[illegible]	[illegible]	15
16	[illegible] SEE NOTE 5)	[illegible]	[illegible]	[illegible]	[illegible]			1-6	2-[illegible]	50 K	2.6 IN.	FWD.	200 SR	[illegible]	[illegible]	16
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			16					90 SR	7-326	*50-00	17
18	NOSE GEAR ANGLE DEVIATION (SEE NOTE 7)	0-150 AC	ELECTRO SCI.		30-3			36					20 SR	7-326	*51960	18
19														7-323	8072	19
20	1000 CPS TIME STANDARD (SEE NOTE 8)	80-82 AC	1000 AC (M.P.)										20 SR	7-326	7078	20
21														7-382	7339	21
22	STRAIN GAGE VOLTAGE (SEE NOTE 4)	0-16 V	1250 K SHUNTS									UNCP	150 SR	7-315	8898	22
23	BH LIFT BOOM	0-10 K LBS	DAC ES STA	44 A	4005			3-6	4-7	50 K	2 IN.	UP		7-338	* 4397	23
24	BH LIFT BOOM	0-10 K LBS	DAC ES STA	44 A	4010			3-9	4-8	50 K	2 IN.	UP		7-338	* 4385	24
25														7-315	9135	25
26																26
27																27
28	TAIL BOOM ANGLE (SEE NOTE 9)	± 30°	P P CHEC	X 4085	30-9			4-15	4-17	300 K	MAX	ANG	230 SR	7-339	13215	28
29	BH GEAR BOX MASS VERTICAL ACC.	± 50 G'S	AS-50-350	4021	4021			3-10	3-14	50 K	MIN	DOWN		7-382	7261	29
30														7-315	9356	30
31	BH G.A. UPPER MAST LONG. ACC	± 50 G'S	AS-50-350	3801	4022			2-7	2-16	50 K	MIN	AFT		7-382	7217	31
32														7-315	9361	32
33	BH AXLE STRAIN GAGE	± 8 K LBS	[illegible]	6A	4026			4-6	3-5	500 K	MAX	OUTBD		7-382	6172	33
34														7-382	6731	34
35	BH GEAR BOX MAST ASYMM. ACC.	± 50 G'S	AS-50-350	3674	4023			2-5	1-12	50 K	MIN	INBD		7-382	5081	35
36														7-382	5081	36
37																37
38																38
39																39
40																40
41																41
42																42
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48																48
49																49
50																50
51																51

OSCILLOGRAPH - 2 Page Square 40836

A/C MODEL AAD-2 NO. DROP TEST

EFFECTIVE [illegible] NO. DROP NO. 88 8 9-65

DATE 1/28/66 R/T NO.

CONTROL [illegible] NO. 1 S/N

CONTROL [illegible] NO. 2 S/N

OSC LOCATION TYPE 1595 S/N 1008

SPEED AOC # OF TAPE LENG S

TIME [illegible] SEC

[illegible] VOLTS

GAL [illegible] VOLTS

PAPER SPEED 6.3 IN SEC

PAPER TRIM 62 IN SEC

TIME NUMBERING SW TO EXTERNAL

CAL PIP SW TO REMOTE

SPEED SW TO LOW SPEED

NOTES:

1. TOLERANCE ON BALANCE & SENSITIVITY ± 2 0 / INCH
2. DO NOT READJUST CHANNELS THAT ARE WITHIN REQUIRED TOLERANCE
3. NOTIFY ENGINEERING OF CHANNELS THAT REQUIRE REPEATED READJUSTMENT
4. STRAIN GAGE POWER SUPPLY DRY CELLS, 18 VOLTS
5. TO BE PARALLELED FROM CHANNEL 12, OSCILLOGRAPH NO. 1. SET VOLTAGE SO THAT CAL PIP EQUALS PIP OF CHANNEL 15, OSCILLOGRAPH NO. 2
6. TO BE PARALLELED FROM CHANNEL 18 OF OSCILLOGRAPH NO. 1 AND CHANNEL 2 OF OSCILLOGRAPH NO. 3
7. TO BE PARALLELED FROM CHANNEL 15 OF OSCILLOGRAPH NO. 1 AND CHANNEL 35 OF OSCILLOGRAPH NO. 2
8. TO BE PARALLELED TO CHANNEL 22 OF OSCILLOGRAPH NO. 1
9. TO BE PARALLELED FROM CHANNEL 46 OF OSCILLOGRAPH NO. 1

CAL PIP POSITIONS SCHEDULE NO.

CUT OFF WITH RAZOR

CUT OFF WITH RAZOR

MECHANICAL ZERO POSITIONS

*EB GALVANOMETER

OSCILLOGRAPH SCHEDULE NO. 5

PREPARED BY: [illegible] DATE

CHECKED BY: DATE

TITLE: Landing Loads Investigation

DOUGLAS AIRCRAFT COMPANY, INC.

PAGE: 10-020

MODEL: AAD-2

REPORT NO. 40836

FORM L-88-5-1A (11-57)

Douglas Aircraft Company, Inc., Aircraft Division, Long Beach, California; Report No. ES 40636, Landing Loads Investigation Instrumentation. 26 October 1962. 361 pages.

Unclassified Report

This report contains a detailed description of the instrumentation used to obtain data from landings during flight tests and drop tests performed for a landing loads investigation under Contract NOa(s) 59-6226 C.

The instrumentation was installed in a Model A4D-2 airplane for flight tests and an A4D static test article for drop tests.

The recording equipment was installed in a modified 300 gallon fuel tank mounted on the centerline station of the airplane.

This report also contains a description of the supporting ground instrumentation used during the landing loads investigation.

UNCLASSIFIED

1. Landing Loads Instrumentation
2. Airborne Instrumentation
3. Flight Tests
4. Laboratory Drop Tests

I. Contract NOa(s) 59-6226 C

II. Douglas Aircraft Co., Inc. Aircraft Division Long Beach, Calif.

III. H. D. Meriwether and I. E. Harris

IV. Aval for BuNeps

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