0048

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JUN 2 7 1955

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
1st Review Date: 7/2/98
Authority: DOE ADD
R B Cranen
2nd Review Date: 7/13/98
Authority: ADD
Name: W Layne
Determination (Circle Number):
1. Classification Retained
2. Classification Changed to: UNCL
3. Contains No DOE Classified Information
4. Coordinate With:
5. Contains UCAI?
6. Comments:
Declassify

Case No. 635.00
Ref. Symbol: 1611 (285)
Project No. ET-1852-W

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TO: DISTRIBUTION

Re: TX-15 Interim Report - Environmental Tests of the MC-562 Fin Antenna Assembly

INVENTORIED
AUG 0 1964
3427-1

Object of Test

This report is written in order to summarize the MC-562 environmental test program, recently completed. The schedule of all of the tests as performed will be outlined and some mention will be made of the high-temperature test and the vibration test. This testing schedule was coordinated with Division 5412, who was responsible for the performance checks made at appropriate stages of the program, and with Messrs. R. Young and D. Webb who represented Division 1241, the requesting agency. No attempts are made to summarize the findings of Division 5412, other than to mention that no serious difficulties were encountered.

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Procedure and Results

Vibration (Unit Nos. 147, 146): The units were briefly checked by the 5000 Organization during vibration cycling from 60-500-60 cps at 1 g constant acceleration in axis I only. Following this, additional tests at 1 g acceleration were performed as a vibration survey. ENDEVCO crystal accelerometers were used throughout the survey to monitor the acceleration on various points of the assembly. Both a Ballantine vacuum tube voltmeter (with associated cathode follower amplifier) and a Tektronix oscilloscope were used to record the crystal output. The oscilloscope was used to insure a correct peak value acceleration was being recorded in cases where a distorted output wave form was apparent. These accelerometers were mounted on lightweight plastic blocks which in turn were cemented on to the fin assembly. They were positioned at the points indicated in the accompanying figures. No attempts were made to analyze the resulting modes of vibration excited during these tests. Only the peak values of accelerations were recorded.

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These results are shown in Figs. 1 and 2 for the first axis of vibration. The resonant frequency of the fin assembly occurred at approximately 395 cps where transverse fin motion became apparent. To assure that this transverse motion did not represent table rocking, accelerometers were placed at the edges of the table at positions 1 and 5. (Fig. 1) It will be noted (Fig. 2) that the accelerations at the edges never exceeded the input recorded at the center of the table.

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W C Layne 7/22/98
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DATED: 7/13/98

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Figure 3 shows a graph of accelerations recorded along axis II. Note the high accelerations recorded at 260 cps. With a 1 g input the maximum acceleration measured on the fin was in excess of 19 g. Some transverse motion was detected at the top of the jig assembly (Fig. 9) used for axis II vibration; hence, some of this high acceleration might be attributable to this factor. No 10 g acceleration test was performed in this axis because of this possible jig-table limitation.

Figure 4 shows some of the accelerations recorded during the survey at 10 g in axis III. In this axis the vibration jig used allowed two MC-562's, one on each side of the jig, to be vibrated simultaneously. The resonant frequency was again that which excited transverse motion. A test was also performed with a 1 g input; however, the results showed relatively the same characteristics.

The fin assembly was vibrated for one hour along axis I and axis III at the resonant points described. No such test was performed in axis II, however. The units were electrically checked following the completion of tests along each axis of vibration.

High-Temperature Tests (Unit Nos. 142, 141): Two units were subjected to 50 hours at an air temperature of +160°F as prescribed in paragraph 4.3 of 008-7. Following the test, it was noted that one of the spin tabs had fallen free from the assembly. A closer examination also disclosed what appeared to be an indication of delamination within the structure of the plastic part of the fin assembly. Since the exact condition of the structure before test was not known, Divisions 1421, 5111 and 1611 agreed to repeat the high-temperature test with two additional units. Photographs were taken prior to test, and at successive stages of the 50-hour exposure. These are shown as Figs. 5, 6, 7, and 8. There was apparently no change in the plastic structure, and no appearance of any failure in the bonding between any of the spin tabs and the respective fin assemblies. The flaws in the material appear as the white patches in the accompanying photographs. Note in Fig. 5 the top corner of the top fin shows this discoloration along the trailing edge of the spin tab. Figure 8 shows this same area to be virtually unchanged after 50 hours exposure. Other areas of the fins showing this discoloration before test also appeared unchanged.

Low Temperature and Pressure (Unit Nos. 136, 139): Since the required testing facilities of the 5000 Organization did not allow in-chamber tests, the two units were checked immediately after removal of the units from the -65°F air temperature.

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Project No. ET-1852-W

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Frost Test (Unit Nos. 136, 139): Frost immediately formed over the fin surface during the electrical checks made after the low temperature exposure. One additional fin was tested after it had been subjected to -65°F following this frost formation.

Ice Test (Unit Nos. 136, 139): These two units were coated with water while they were exposed to -65°F. An effort was made to apply the water uniformly, but the resulting ice formation, although covering the entire surface of the assembly, was slightly irregular in thickness. The fins were tested within a few minutes after removal from the chamber.

Sand and Dust Test (Unit Nos. 146, 147): Two units were subjected to the 12 hour test outlined in [illegible], paragraph 4.15. They were electrically checked four hours following the completion of the exposure test. No attempt was made to free the surface of dust before the check was made.

Rain Test (Unit No. 139): The unit was subjected to the two-hour [illegible] inches of rain per hour, exposure outlined in paragraph 4.17 of [illegible]. The unit was checked while still visibly moist.

Salt Spray (Unit No. 136): The unit only was subjected to the [illegible]-hour salt-fog test ([illegible], paragraph [illegible]). No effort was made to remove salt deposits from the fin surface prior to the electrical check.

Summary of Earlier Tests

The MC-562 assembly has been subjected to other tests earlier in the TX-15 program. An early vibration test was performed strictly to determine if the bonding between the plastic and the aluminum would hold. Several fins were also subjected to temperature shock for the same purpose.

A group of fins was also subjected to the mechanical drop tests with the following specifications. Along axis I (in both directions) a shock of 150 to 200 g with a rise time from 0.001 to 0.005-second. Along axis II a shock of [illegible] to 60 g with a rise time from 0.001 to 0.005-second. Along axis III a shock of 40 to 60 g with a rise time from 0.005 to 0.010-second. Electrical tests were made by Organization 5000 after these shock tests.

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Finally, one test (Project No. ET-1945-H, Ref. Symbol: 1611) was performed to determine the resonant frequency of the fins when attached to the TX-15 aft section. A resonant frequency of approximately 340 cps was recorded.

A special vibration test was recently performed in which more thorough electrical monitoring was available. All three axes of vibration were run. The results would indicate that no spurious firing of the proximity fuzes could be traced to the vibration of the fin antenna assembly.

Test Conducted by [illegible] - 1611-4

Approved by [illegible] - 1611-4

[illegible]:1611-4:mm

DISTRIBUTION:
1/13A [illegible] Brin, [illegible]
2/13A [illegible] Morse, [illegible]
3/13A C. C. McDonald, [illegible]
4/13A [illegible] Kammer, [illegible]
5/13A [illegible] Wagar, 1611
6/13A [illegible] Frantik, [illegible]
7/13A [illegible] Copeland, [illegible]
8/13A [illegible] Pittner, [illegible]
9/13A [illegible] Bachand, [illegible]
10/13A [illegible] McKay, [illegible]
11/13A [illegible] Gomel, [illegible]
12/13A R. K. Smeltzer, 1922-3
13/13A F. [illegible] Hale, 1922-3, Attn: Tech. Reference File

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Ref. Symbol: 1611 (255)
Project No. ET-1852-W

TABLE I

Summary of Environmental Tests of the MC562 Assembly

Unit Number	Test Schedule
150, 148	High-temperature Test, 303-7, paragraph 4.3 Temperature Shock, 303-7, paragraph 4.5 Humidity, 303-7, paragraph 4.4
147, 146	Rain of Three Axes of Vibration, 303-7, paragraph 4.9 Sand and Dust Test, 303-7, paragraph 4.15
145, 144	High-temperature Test, 303-7, paragraph 4.3 Low Temperature and Pressure, 303-7, paragraph 4.6 Drop Test Ice Test
[illegible]	Salt-fog Test, 303-7, paragraph [illegible]
[illegible]	Rain Test, 303-7, paragraph 4.17

[redacted]

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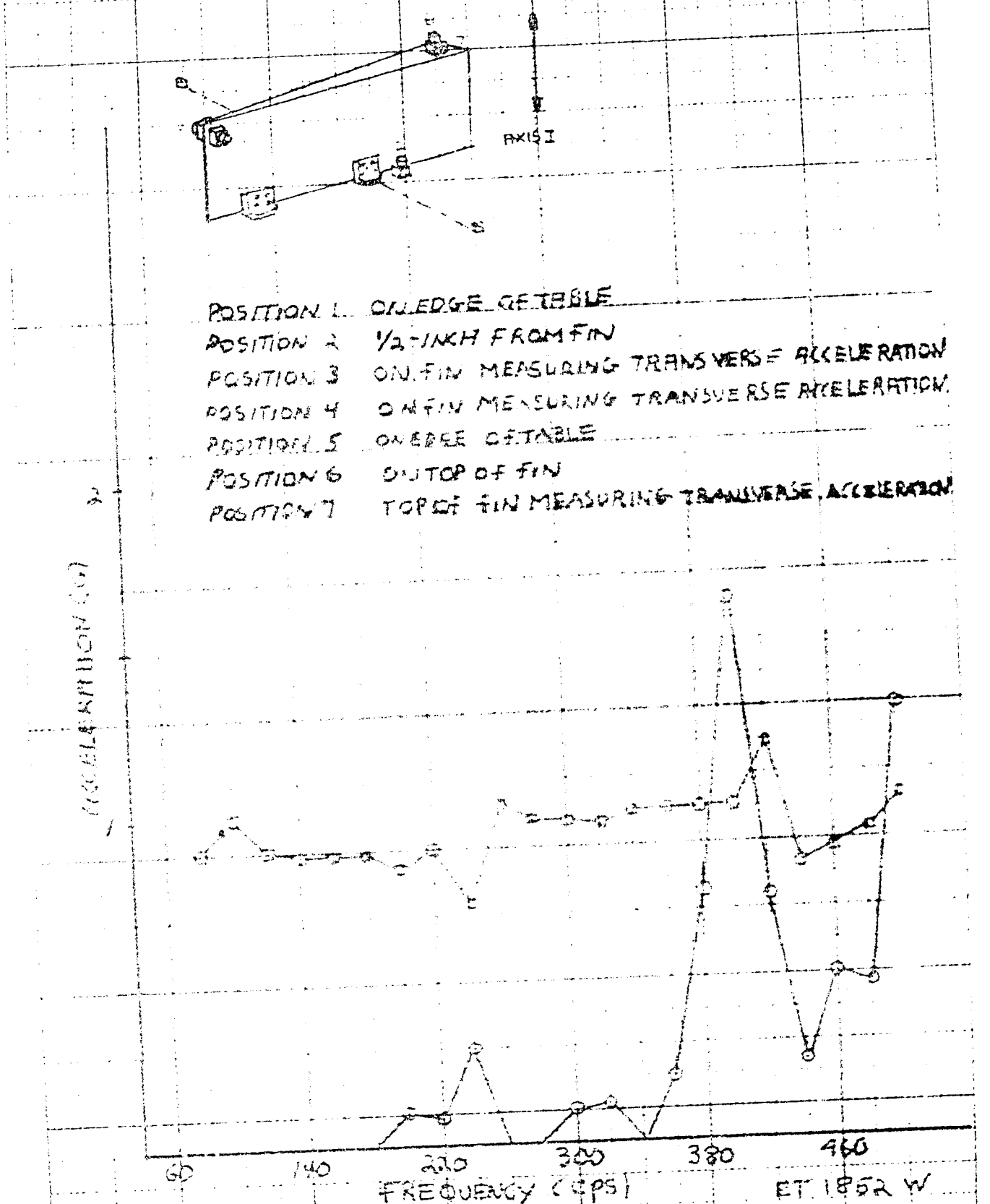

FIG 1 ONE G ACCELERATION IN AXIS I

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[redacted]

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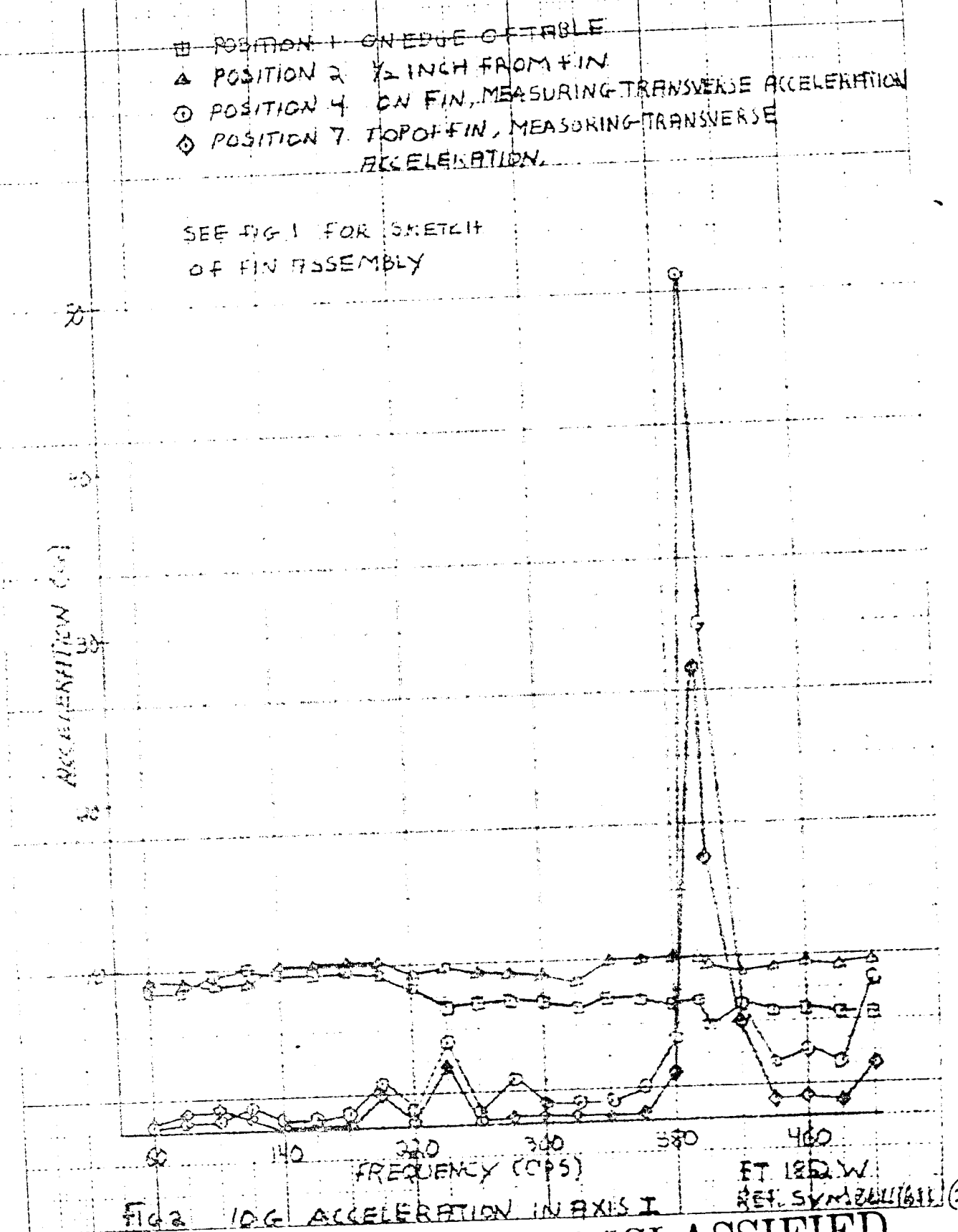

FIG 2 10G ACCELERATION IN AXIS I

FT 1852 W
REF. SYM [illegible] (28

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[redacted]

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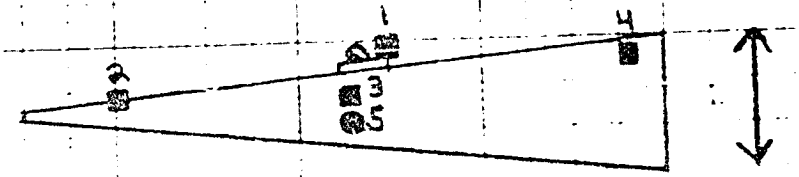

⊙ POSITION 1 ON THE BASE OF THE FIN MEASURING IN THE DIRECTION OF TABLE MOTION

⊡ POSITION 2 ON THE FIN MEASURING IN THE DIRECTION OF TABLE MOTION

△ POSITION 4 ON THE PLASTIC PORTION OF THE FIN

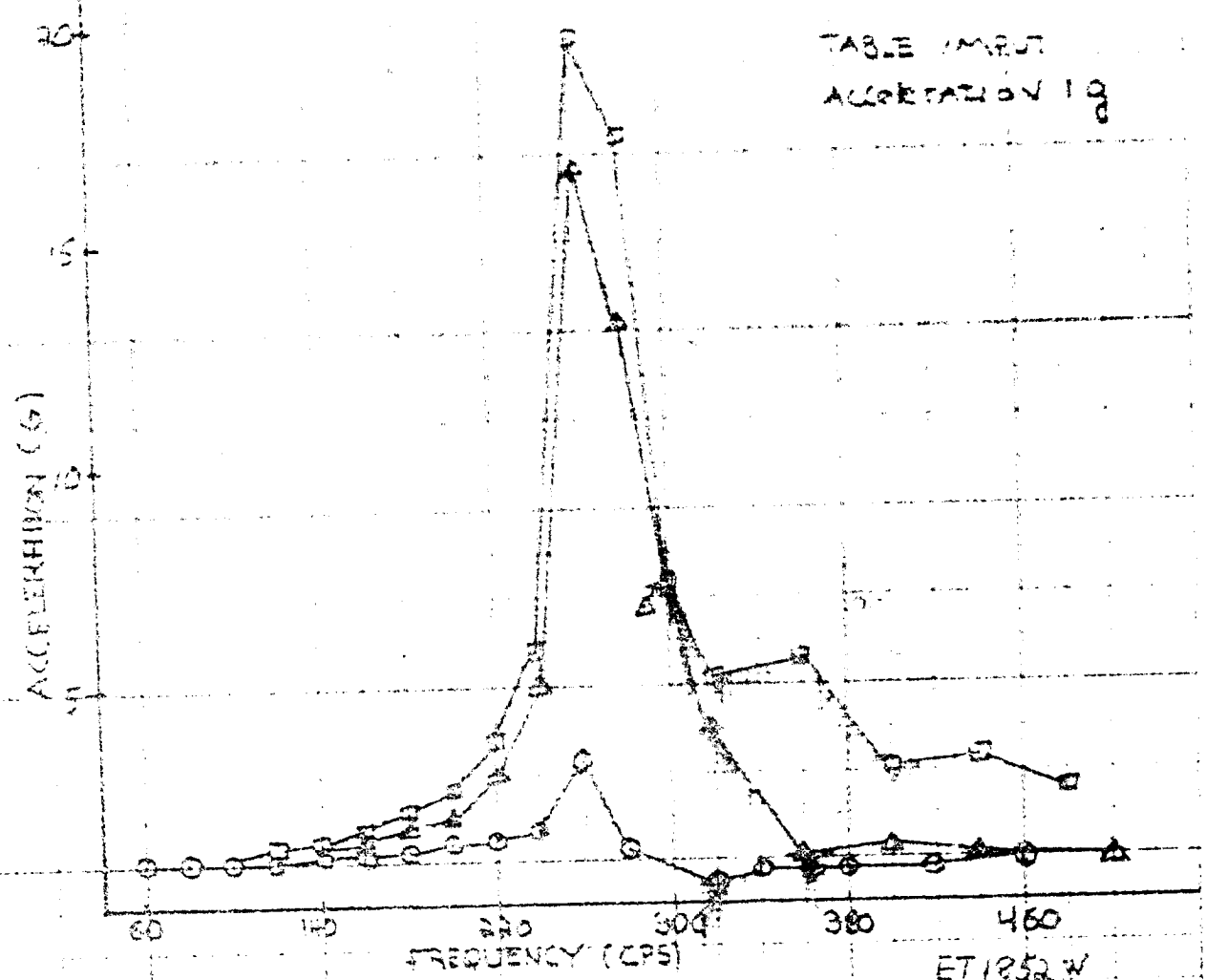

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FIG 3 ONE G ACCELERATION INPUT

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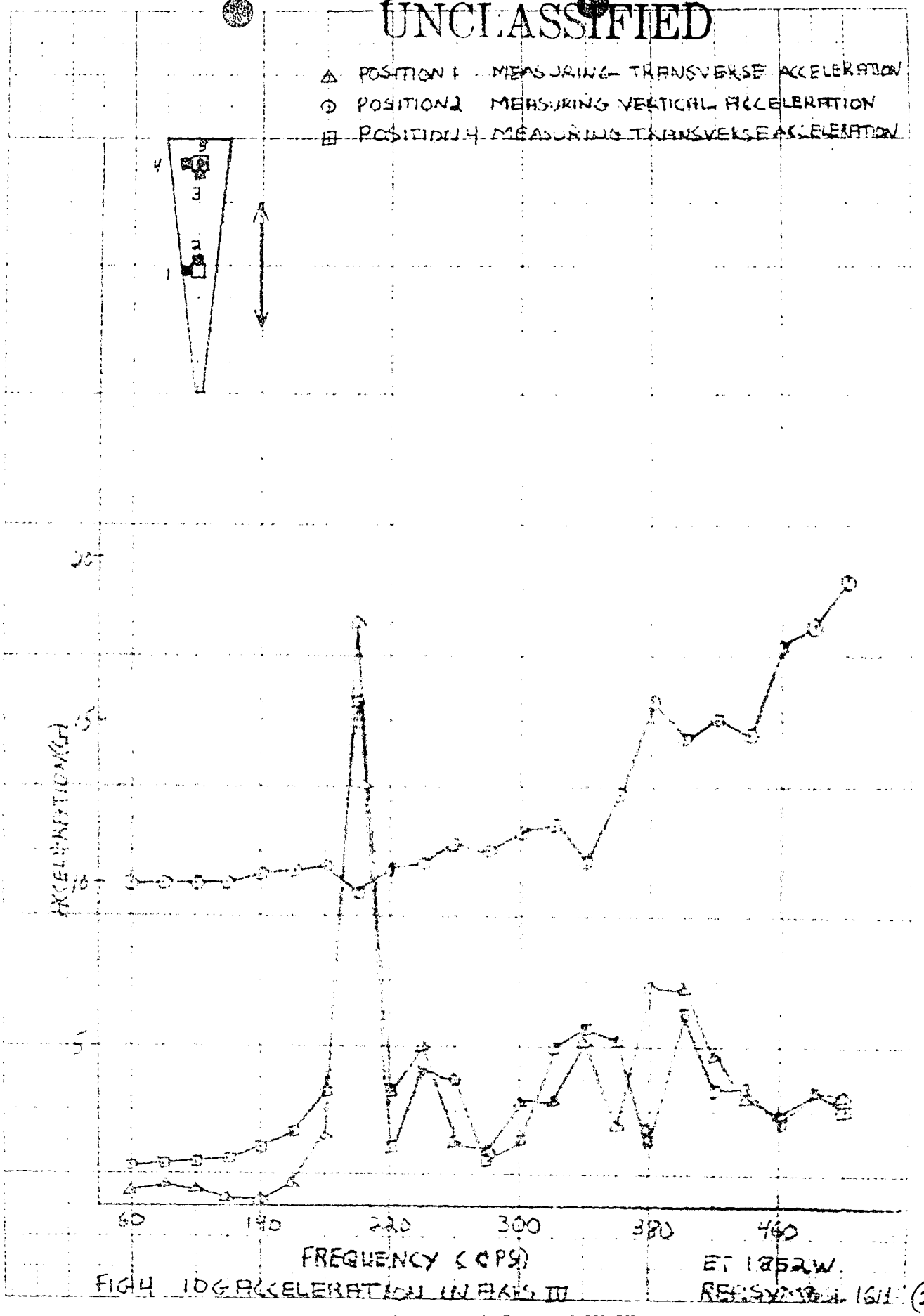

FIG 4 10G ACCELERATION IN AXIS III

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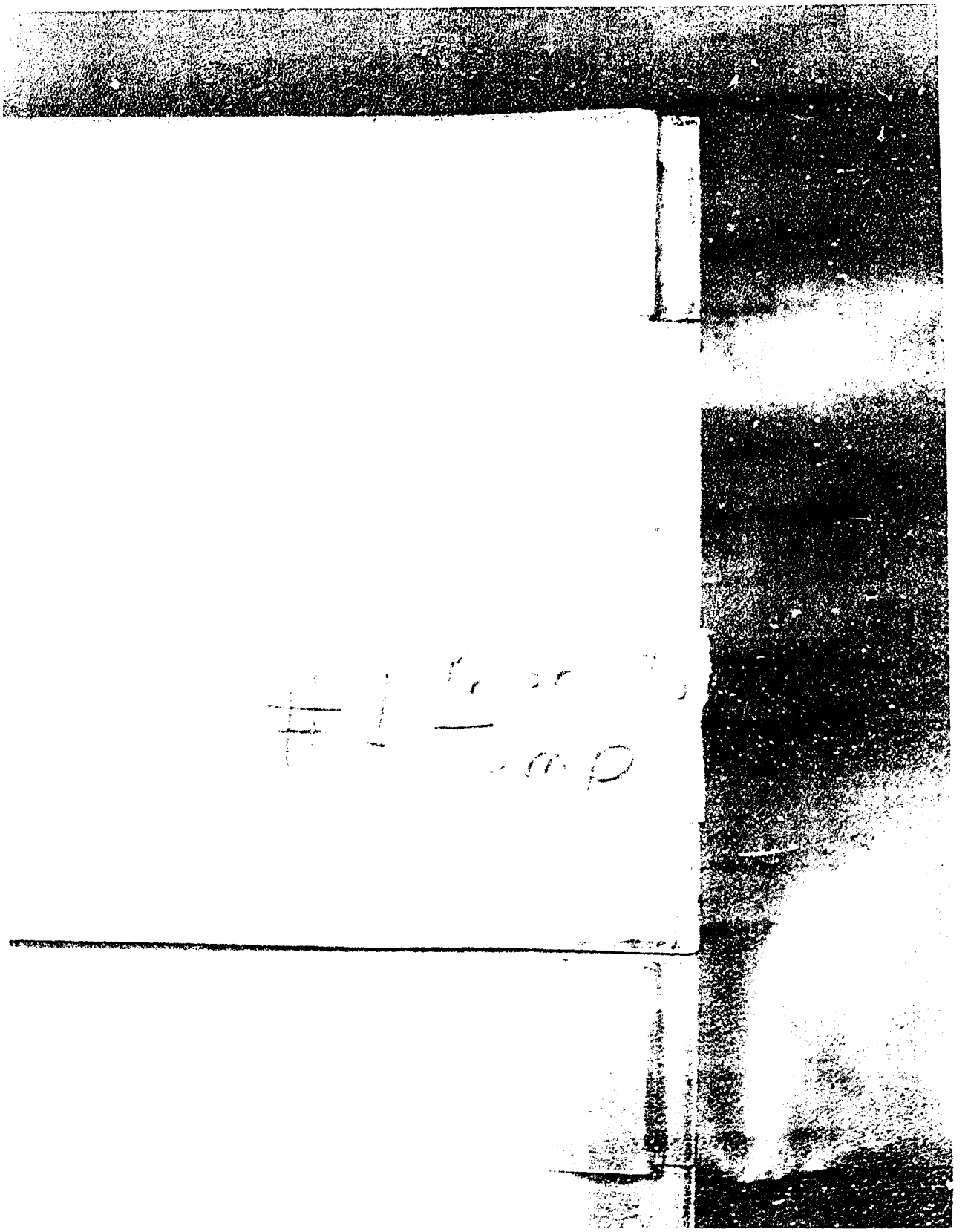

FIG. 8 SHOWING A PART OF THE TWO FINS BEFORE TEMPERATU

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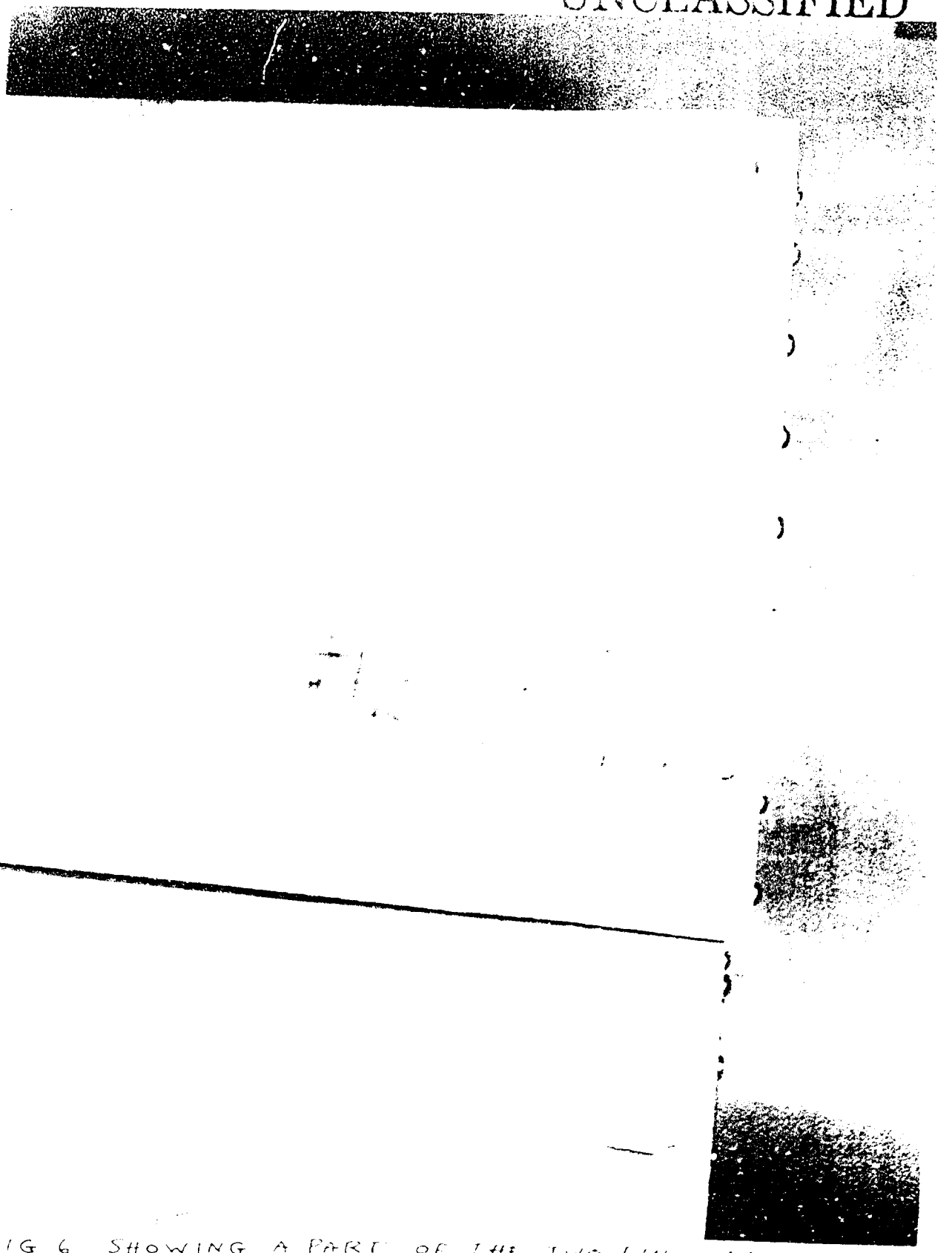

FIG 6 SHOWING A PART OF THE TWO LINES AFTER [illegible]

[redacted]

#67312.

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[redacted]

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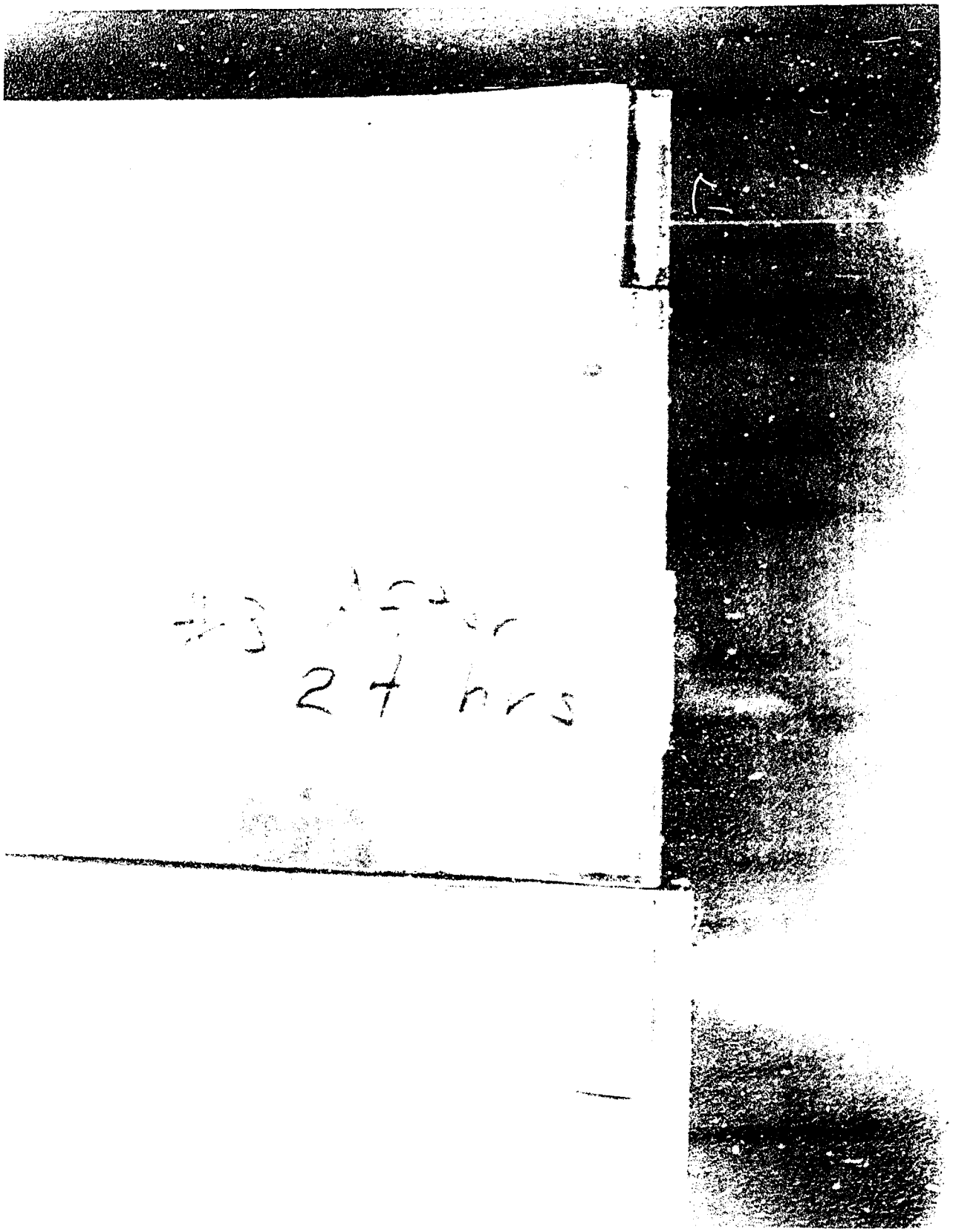

[redacted]

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FIG 8 SHOWING A PART OF THE TWO FINS AFTER 50 HOURS

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[redacted]

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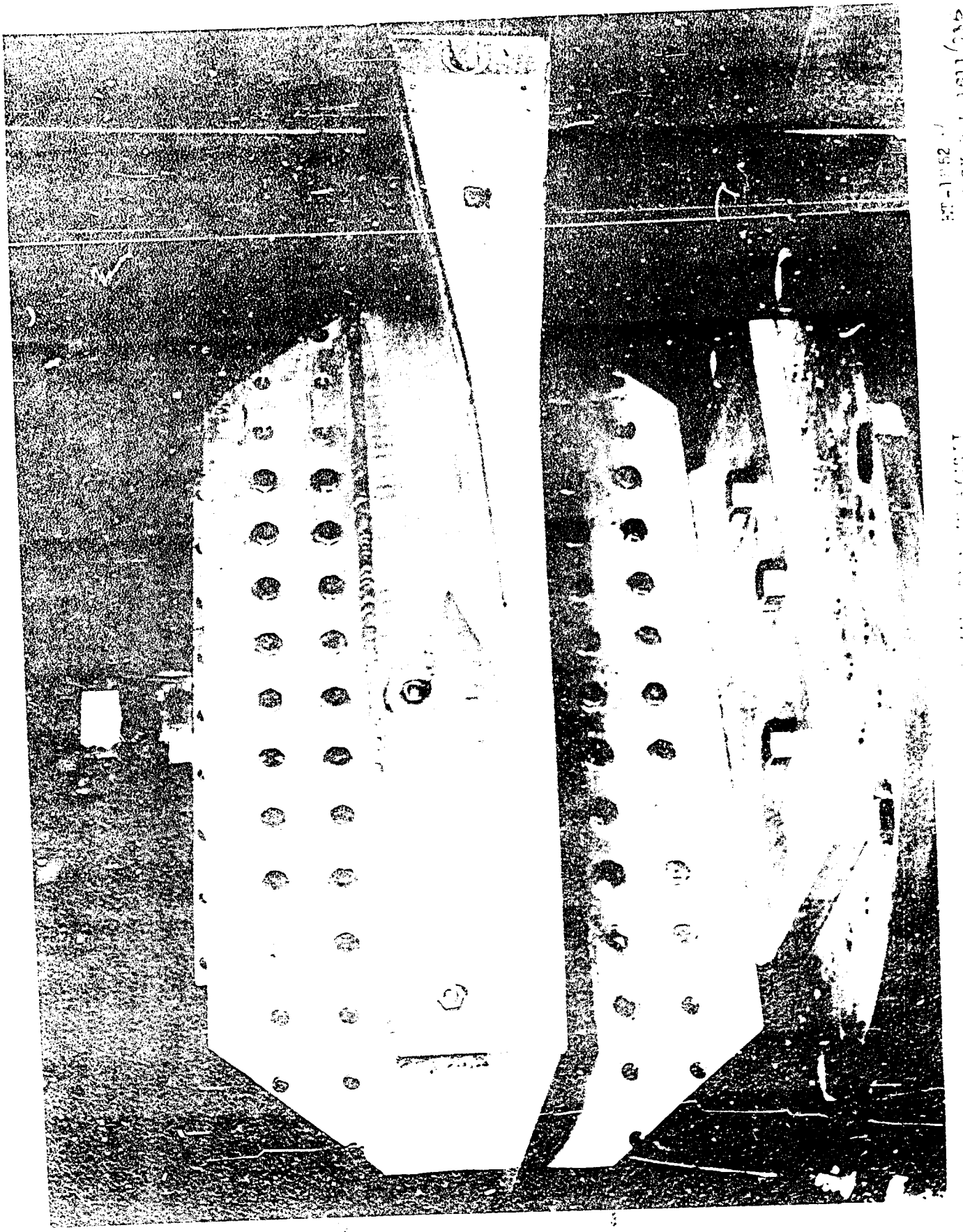

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