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SUMMARY

This document describes all test work and test results for EWA 5-593 (Reference F).

These tests were conducted to evaluate the strength, flexibility, and sonic and thermal fatigue resistance of superalloy corrugated skin panels and the attachments of non-insulated and insulated panels to primary structures.

Panels with various methods of attachment to primary structure were evaluated. They are identified below, by their respective Boeing drawing numbers. Solution treated and aged Rene' 41 was utilized for all panel skins, corrugations, stand-offs, and attachment clip details.

25-20352 — Two non-insulated panels 23 by 36 inches were fabricated with "omega" groove breathers every six inches running in the 23" direction in an otherwise flat skin. The skin was spot welded to corrugations. Flexible clips on long edges were utilized as the attachment technique. The panels were subjected to cyclic thermal fatigue and combined shear and pressure environments.

25-20344-1 — Three non-insulated panels 23 by 18 inches, constructed identical to panels 25-20352 except for width, were subjected to sonic tests.

25-20369-1 — Three insulated panels 23 by 17 inches were constructed with Rene' 41 heat shields substituted for a refractory alloy heat shield. Shield attachment to the corrugations was effected by riveting shields and corrugations to intermediate one inch long stand-off clips. A 0.25 inch layer of Fiberfrax insulation separated the shields and the corrugations. Attachment to primary structure was accomplished by flexible clips on opposite short sides of the panel. These panels were subjected to a sonic environment.

25-20369-2 — Three panels similar to 25-20369-1 except insulation was q-felt and attachment was by direct spot welding of panel to edge beams which were supported on flexible end fittings. Sonic tests were conducted on these panels.

25-20370-1 — Two non-insulated panels 23 by 36 inches, utilizing shallow protruding beads for expansion in the long direction and for increased skin stiffness in the short direction, were constructed with the skin spot welded to corrugations. This panel was bolted to beams which utilized flexible fittings at corners for attachment to primary structure. This panel was subjected to thermal, shear, and pressure tests.

25-20370-2* — This panel was the same as 25-20370-1 except that six hat section stiffeners running in the long direction were riveted

* This is not Boeing part no. 25-20370-2. It is modified 25-20370-1.

to the corrugation crests to increase panel stiffness. This panel was subjected to thermal and pressure tests.

25-20374 Two 23 by 36 inch panels consisted of corrugations and were constructed to simulate the structural portion of an insulated panel and its attachments under shear and pressure and thermal conditions. Attachment techniques utilized consisted of integral beams on the long sides and flexible fittings at corners.

Thermal tests included symmetrical and unsymmetrical heating at various heating rates to temperatures of 1870° F. Sonic tests subjected panels to 152.5 db overall. Pressure tests were conducted to ultimate load. Shear tests were conducted to induce ¾ inch of shear deflection of the panel across the 23" edge.

Test data are summarized in the form of graphs and tabulated data. Photographs of specimens and test setups are included.

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A. Drawing 25-20344, Panel - Assembly of, Sonic Test (Test Only)

B. Drawing 25-20352, Panel Assembly, Uninsulated (Test Only)

C. Drawing 25-20369, Panel Assembly - Lower Surface (Test Only)

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G. D2-80080, Insulated Panel Development Dyna-Soar

1.0 INTRODUCTION

1.1 Background

This test program was conducted to evaluate non-insulated surface panels and the structural part of insulated panels under simulated conditions of re-entry load and environment. The concept of reliance on high temperature integrity of the panel material for sustained load-carrying capacity under aerodynamic heating distinguishes these structures from those employing cooling techniques. The panels tested were made of heat-treated Rene' 41.

1.2 Objectives

It was required to determine the effects on the panels of noise environments, cyclic heating, thermal gradients, and shear and pressure loads.

1.2.1 Sonic tests were conducted on some of the test panels in order to record the behavior of the panels to the environmental sonic conditions encountered in flight. Measurement of sound pressure level and panel motion was required for these tests.

1.2.2 A series of thermal fatigue tests, with heat applied to the outer surfaces of the panels producing a temperature gradient across the panel thickness, simulated cyclic re-entry heating. In these tests, observation of damage and measurement of deflection due to differential growth between inner and outer surfaces were required.

1.2.3 In other tests the panels were subjected to unsymmetrical heat distribution over the surface, to determine the effects of unequal edge expansion on webs and attachments.

1.2.4 The pressure tests were run to obtain ultimate pressure loads at room and elevated temperatures required to cause failure of panel corrugations and/or edge attachments.

1.2.5 In each shear test, measurement of the load necessary to produce a one-quarter inch shear deformation in the panel web was required, as well as a record of resulting damage.

2.0 TEST SPECIMEN AND INSTRUMENTATION

2.1 Test Specimen, Dwg. 25-20369-1 (Reference, Figure 229).

2.1.1 Three test insulated panels were fabricated with a flat .010" erosion shield with overall dimensions of 23.35" x 17.0". Two grooves running parallel to the 23.35" sides were formed into the shield at 1/3 span points.

2.1.2 Eleven corrugations with a pitch of 1.50" and a .75" depth were formed from a sheet of .008" material.

2.1.3 A sheet of Inconel 200 mesh wire cloth (.002" x 16.2" x 12.0") was installed between the corrugations and 1/2" Fiberfrax insulation.

2.1.4 The shield, wire cloth, Fiberfrax and corrugations were riveted together with Z clip spacer attachments.

2.1.5 Three clips were located at each end of the 17.5" edge for mounting purposes.

2.1.6 The skin, clips and corrugations were Rene' 41 (J 1610) BMS 7-95 material.

2.1.7 Photographs of a typical panel are on Figures 1 and 2, Volume I.

2.2 Test Specimen Dwg. 25-20369-2

2.2.1 Panel 25-20369-2 was similar to 25-20369-1 except for mounting support configuration, use of stabilized Q-felt insulation, and use of Inconel foil instead of mesh. Three test panels were fabricated.

2.2.1.1 One end of the panel was constructed with corner tabs for mounting.

2.2.1.2 Flexible tabs were spotwelded and bolted to the channel in a horizontal and vertical position. These tabs were designed to accept loads only in their respective planes.

2.2.1.3 A metallic foil seal extending outward 1.5" from the panel was attached across the 17.0" ends.

2.2.1.4 A sheet of .004" Inconel foil was installed between the corrugations and stabilized Q-felt insulation.

2.2.2 Photographs of a typical panel are shown on Figures 3 and 4, Volume I.

2.3 Test Specimen, Dwg. 25-20344-1 (Reference, Figure 230).

2.3.1 The panel was fabricated with a flat .008" skin which was spot-welded to a corrugated .010" stiffener web. The web had twelve parallel corrugations 0.75" high spaced 1.50" apart.

2.3.2 Overall dimensions were 23.35" x 17.50".

2.3.3 Three clips were located at each end of the 17.50" edge for mounting purposes.

2.3.4 The skin and corrugations were Rene' 41 (J 1610) BMS 7-95 material.

2.3.5 Photographs of the panel are shown on Figures 5 and 6, Volume I.

2.4 Test Specimen, Dwg. 25-20374-1 (Reference Figure 231)

2.4.1 Panel was fabricated from a corrugated .008 Rene' 41 skin with overall dimensions 23.40" x 35.16".

2.4.2 Panel contained 23 corrugations .75" high on 1.50" centers.

2.4.3 Formed .030" channel support beams were spotwelded to the corrugations and to .02" clips which in turn were spotwelded to the corrugated panel along the 35.16" sides. Twelve clips per side were used.

2.4.4 Tabs were spotwelded to the ends of one support beam, parallel to the 35.16" edge of the panel.

2.4.5 A .002" Inconel 702 foil seal was seamwelded around four sides, extending 2.7" beyond the 35.16" sides and 1.6" beyond the 23.40" sides.

2.4.5.1 The foil seal was folded and pleated to fit around the corrugations.

2.4.6 Seven .02" electronic deflection indicator clips were spotwelded to the panel; one at each corner, one at the center of each 35.16" side, and one at the center of the panel.

2.4.7 Three .020" x .50" x 1.0" channels were bolted to the support beams.

2.4.8 The corrugations, clips and support beams were Rene' 41 (J 1610) BMS 7-95 material.

2.4.9 Photographs of the panel are on Figures 7 and 8, Volume I.

2.5 Test Specimen, Dwg. 25-20374-2

2.5.1 Panel 25-20374-2 was identical to panel 25-20374-1.

2.6 Test Specimen, Dwg. 25-20710-1 (Reference Figure 232)

2.6.1 The test panel was fabricated with a flat .008" skin with overall dimensions of 23.35" x 36.00". Twenty-three beads, .06" high, and on 1.50" centers were formed into it.

2.6.2 Twenty-three corrugations, with a pitch of 1.50" and a .75" depth, were formed from a sheet of .008" material and spotwelded to the beaded skin.

2.6.3 Channels, formed of .030 material, were bolted to the 36.00" edges of the panel.

2.6.4 Two .060" attachment plates, one on each end of one channel and parallel to the 36.00" side, were attached to the channel.

2.6.5 Electronic deflection indicator clips were spotwelded to the panel at six locations.

2.6.6 Skin, corrugations, channels, clips and attachment plates were made from Rene' 41 (J 1610) BMS 7-95 material.

2.6.7 Photographs of the panel are on Figures 9, 10 and 11, Volume I.

2.7 Test Specimen, Dwg. 25-20370-2

2.7.1 Panel 25-20370-2 was identical to panel 25-20370-1, except that the panel was modified for two tests, LT-5593-2-6B and -4-4.

2.7.1.1 Six hat-section stiffeners were riveted to the corrugation crests to increase panel rigidity.

2.7.1.2 A photograph of the modified panel is shown on Figure 12, Volume I.

2.8 Test Specimen, Dwg. 25-20352-1 (Reference, Figure 233).

2.8.1 The test panel was fabricated with a .008" skin into which five creases, .20" deep, and on 6.00" centers, were formed. Overall finished dimensions were 36.00" x 23.35".

2.8.2 Twenty-three corrugations, with a pitch of 1.50" and a .75" depth, were formed from a sheet of .008" material and spotwelded to the creased skin.

2.8.3 Six .020" support clips were spotwelded and riveted to each 36.00" side.

2.8.4 Two formed channels, .032" x 2.00" x .75", were bolted to the support angles parallel to the 36.00" sides.

2.8.5 Skin, corrugations, support angles and channels were made from Rene' 41 (J 1610) BMS 7-95 material.

2.8.6 Photographs of the panel are shown on Figures 13 and 14, Volume I.

2.9 Test Specimen, Dwg. 25-20352-2

2.9.1 Panel 25-20352-2 was identical to panel 25-20352-1 except the two .032" x .75" x 2.00" channels were not included.

2.9.2 Photographs of the panel are shown on Figures 15 and 16, Volume I.

2.10 INSTRUMENTATION

2.10.1 Test LT-5593-1 Sonic Test (Panels 25-20344 and 25-20369-1, -2)

2.10.1.1 Two Altec 21 BR-200 microphones were used to monitor the sound level.

2.10.1.1.1 One microphone was placed inside the progressive wave chamber to monitor the sound level at the face of the specimen.

2.10.1.1.2 The second microphone was located on the opposite side of the specimen external to the progressive wave chamber.

2.10.1.2 Three non-contact deflection pickups were used to monitor the RMS deflections of the panel.

2.10.1.2.1 One deflection pickup was mounted along the centerline of the 23.5" edge at 1/4 point.

2.10.1.2.2 A second deflection pickup was along the centerline of the 17.5" edge at 1/4 point.

2.10.1.2.3 A third deflection pickup was mounted at the center of the panel.

2.10.1.3 Photographs showing microphone and deflection pickups are shown on figures 17 and 18, Volume I.

2.10.1.4 The test panels were instrumented with 6 chromel-alumel control thermocouples for the heating cycle phase of the test. See Figure 65, Volume I.

2.10.2 Test LT-5593-2 Thermal Cycle Tests

2.10.2.1 Test LT-5593-2-1 (Panel 25-20374-1)

2.10.2.1.1 Fifty-four chromel-alumel thermocouples were spotwelded to the panel and beaded seals. See Figures 66, 67 and 68, Volume I.

2.10.2.1.2 Electronic deflection indicators were attached at seven locations to measure vertical deflections. Locations are shown on Figure 69, Volume I.

2.10.2.1.3 Electronic deflection indicators were attached at three locations to measure horizontal deflections at the ends and midpoint of one 35.6" side.

2.10.2.2 Test LT-5593-2-2 (Panel 25-20374-2)

2.10.2.2.1 Eleven chromel-alumel thermocouples were spotwelded to the panel. Thermocouple locations are shown on Figure 70, Volume I.

2.10.2.2.2 Electronic deflection indicators were attached at five locations to measure vertical deflections. Locations are shown on Figure 71, Volume I.

2.10.2.3 Test LT-5593-2-3 (Panel 25-20352-1 and 25-20374-1)

2.10.2.3.1 Ten chromel-alumel thermocouples were spotwelded to the 25-20352-1 panel, as shown on Figure 72, Volume I.

2.10.2.3.2 Eight chromel-alumel control thermocouples were spotwelded to the 25-20374-1 panel as shown on Figure 73, Volume I.

2.10.2.3.3 Electronic deflection indicators were attached at five locations as shown on Figure 74, Volume I. Quartz rods were used to actuate the electronic deflection indicators D02, D04 and D06.

2.10.2.4 Test LT-5593-2-4 (Panel 25-20352-2)

2.10.2.4.1 Instrumentation for this test was identical to that for LT-5593-2-3.

2.10.2.5 Test LT-5593-2-5 (Panel 25-20370-1)

2.10.2.5.1 Instrumentation for this test was identical to that for LT-5593-2-3.

2.10.2.6 Test LT-5593-2-6 (Panel 25-20370-2)

2.10.2.6.1 Instrumentation for this test was identical to that for LT-5593-2-3.

2.10.2.7 Test LT-5593-2-6B (Panel 25-20370-2)

2.10.2.7.1 Ten chromel-alumel monitor thermocouples were spotwelded to the panel in the locations shown on Figure 75, Volume I.

2.10.2.7.2 Seven chromel-alumel control thermocouples were spotwelded to the panel in the locations shown on Figure 75, Volume I.

2.10.2.7.3 Five electronic deflection indicators were attached to the panels as shown on Figure 76, Volume I.

2.10.3 Test LT-5593-3 Shear Tests

2.10.3.1 Test LT-5593-3-1 (Panel 25-20374-1)

2.10.3.1.1 Eleven chromel-alumel monitor thermocouples were spotwelded to the panel in the locations shown on Figure 77, Volume I.

2.10.3.1.2 Nine chromel-alumel control thermocouples were spotwelded to the panel in the locations shown on Figure 78, Volume I.

2.10.3.1.3 Five electronic deflection indicators were attached to the panel at the locations shown on Figure 78, Volume I to measure vertical deflections.

2.10.3.2 Test LT-5593-3-2 (Panel 25-20352-2)

2.10.3.2.1 Thermocouple installations and locations were identical to those of Test LT-5593-3-1.

2.10.3.2.2 Eight electronic deflection indicators were attached at the four panel corners as shown on Figure 79, Volume I.

2.10.3.3 Test LT-5593-3-3 (Panel 25-20370-1)

2.10.3.3.1 Thermocouple installations and locations were identical to those of Test LT-5593-3-1.

2.10.3.3.2 Eight electronic deflection indicators were attached to the panel at three corners as shown on Figure 80, Volume I.

2.10.4 Test LT-5593-4 Pressure Tests

2.10.4.1 Test LT-5593-4-1 (Panel 25-20374-1)

2.10.4.1.1 Thermocouple installations and locations were identical to those of Test LT-5593-3-1.

2.10.4.1.2 Five electronic deflection indicators were attached to the panel at the locations shown on Figure 78, Volume I.

2.10.4.2 Test LT-5593-4-2 (Panel 25-20374-2)

2.10.4.2.1 Eleven chromel-alumel monitor thermocouples were spotwelded to the panel in the locations shown on Figure 77, Volume I.

2.10.4.2.2 Nine chromel-alumel control thermocouples were spotwelded to the panel as shown on Figure 78, Volume I.

2.10.4.2.3 Five electronic deflection indicators were attached to the panel at the locations shown on Figure 78, Volume I.

2.10.4.3 Test LT-5593-4-3 (Panel 25-20352-1)

2.10.4.3.1 Thermocouple installations and locations, and electronic deflection indicator attachment locations are identical to those of LT-5593-4-2.

2.10.4.4 Test LT-5593-4-4 (Panel 25-20370-2)

2.10.4.4.1 Thermocouple installations and locations, and electronic deflection indicator attachment locations are identical to those of LT-5593-4-2.

2.10.4.5 Test LT-5593-4-5 (Panel 25-20352-2)

2.10.4.5.1 Electronic deflection indicator number and location was identical to that of LT-5593-4-2.

2.10.4.5.2 No thermocouples were used as this test was at room temperature.

2.10.4.6 Test LT-5593-4-6 (Panel 25-20370-1)

2.10.4.6.1 Electronic deflection indicator number and location was identical to that of LT-5593-4-2.

2.10.4.6.2 No thermocouples were used as this test was at room temperature.

2.10.5 Test LT-5593-5 Sonic Test (Panel 25-20344)

2.10.5.1 Four Altec 21BR-200 microphones were used to monitor sound level.

2.10.5.1.1 The microphones were located as follows:

Microphone	Location
1	Center of 24" edge nearest horn with panel in 0° position.
2	Center of panel - outside face.
3	Center of 24" edge farthest from horn with panel in 0° position.
4	Center of panel - inside anechoic box.

2.10.5.2 Three non-contact deflection pickups were used to monitor the RMS deflections of the panel in an identical manner to that used in LT-5593-1.

3.0 TEST SETUP

3.1 Test Setup for LT-5593-1

3.1.1 Sonic test panels 1477, 1478, 1479 (Panels 25-20344) were mounted through the end clips to a pair of .040 gage Rene' 41 channels with 3/16" dia. bolts. The Rene' 41 channels in turn were attached at each end by 1/2" dia. bolts to the steel frame around the 24" opening in the progressive wave test chamber. The 23.5" edge of the specimens was unsupported.

3.1.2 Two Altec-Lansing Model 6786 electro-pneumatic transducers mounted at the throat of the progressive wave chamber served as the sound source. The electrical signal to the transducers was provided by an Allison 3MAN9 noise generator and octave band equalizer through a dual channel McIntosh amplifier. Refer to Figure 19, Volume I, for a photograph of the sonic test setup.

3.1.3 Sonic test panels No. 1493, 1494, and 1495 (panels 25-20369-1) were mounted through the end clips to a pair of .040 gage Rene' 41 channels with 3/16" dia. bolts. The Rene' 41 channels were attached at each end by a 1/2" dia. bolt to the steel frame of the 24" opening in the progressive wave chamber. The 23.35" edge was unsupported.

3.1.4 Sonic test panels No. 1497, 1498, and 1499 (panels 25-20369-2) were mounted at one end by bolting a .040 Rene' channel with six 3/16' bolts to the three tabs provided. Each end of the channel was then bolted to the frame of the test chamber with two 1/2" bolts. The opposite end of the panel (17.0" edge) was secured to the test frame by flexible plates in horizontal and vertical positions. The edge of the foil seal was clamped between the test frame and a 1/4" x 1/4" bar with five 5/32" bolts. See Figure 20, Volume I, for mounting details.

3.1.5 Four Altec-Lansing Model 6786 electro-pneumatic transducers mounted at the throat of the progressive wave chamber served as the sound source. The electrical signal to the transducers was provided by an Allison 3MAN9 noise generator and octave band equalizer through a dual channel McIntosh amplifier.

3.2 Test Setup for LT-5593-2

3.2.1 Test Setup for LT-5593-2-1 (Panel 25-20374-1)

3.2.1.1 The test panel was mounted on a vacuum box lined from top to bottom with 2.5" thick K-30 insulation brick. A sketch of the box is shown on Figure 82, Volume I. A photograph of the panel installation is on Figure 21, Volume I.

3.2.1.2 Two 25-20344 panels were placed 10.6" below the test panel in the vacuum box to simulate a proposed upper wing panel.

3.2.1.3 Thirty-seven high density radiant heat lamps were mounted above the test panel and were controlled from eight zones, shown on Figure 78, Volume I. The lamp locations are shown on Figure 81, Volume I.

3.2.1.4 A beaded seal was spotwelded to the box as shown on Figure 22, Volume I.

3.2.1.5 An overall view of the specimen test setup is shown on Figure 23, Volume I.

3.2.2 Test Setup for LT-5593-2-2 (Panel 25-20374-2)

3.2.2.1 This test setup was identical to the one used for LT-5593-2-1, except a 2.0" thick layer of Fibre Frax batt was placed approximately two inches below the support channels of the test panel.

3.2.3 Test Setup for LT-5593-2-3 (Panel 25-20352-1)

3.2.3.1 The test panel was mounted below a re-radiating panel as shown on Figures 82 and 24, Volume I.

3.2.3.2 The heat lamp setup and arrangement was identical to that of LT-5593-2-1.

3.2.4 Test Setup for LT-5593-2-4 (Panel 25-20352-2)

3.2.4.1 Test panel mounting and heat lamp setups were identical to those of LT-5593-2-3.

3.2.5 Test Setup for LT-5593-2-5 (Panel 25-20370-1)

3.2.5.1 Test panel mounting and heat lamp setups were identical to those of LT-5593-2-3.

3.2.6 Test Setup for LT-5593-2-6 (Panel 25-20370-2)

3.2.6.1 Test panel mounting and heat lamp setups were identical to those of LT-5593-2-3.

3.2.7 Test Setup for LT-5593-2-6B (Panel 25-20370-2)

3.2.7.1 The test panel was mounted in the vacuum box as shown on Figure 83, Volume I.

3.2.7.2 The heat lamp setup and arrangement was identical to that of LT-5593-2-1.

3.3 Test Setup for LT-5593-3

3.3.1 Test Setup for LT-5593-3-1 (Panel 25-20374-1)

3.3.1.1 An H52-1B hydraulic ram was attached to one corner of the test panel in order to apply a load parallel to the long dimension of the panel.

3.3.1.2 The panel was mounted in the vacuum box by rigidly fastening the corner opposite the loading point to the vacuum box, using a welded up fixture of .37" Inconel X plates.

3.3.1.3 The loaded corner was restricted to motion in the direction of loading by attaching it to the box with a .050" Rene' 41 'Z' shaped fitting.

3.3.1.4 The general arrangement of the panel mounting is shown on Figure 84, Volume I.

3.3.1.5 The hydraulic ram setup and the vacuum box were rigidly mounted to the tie down rails in the floor of the test area.

3.3.1.6 The heat lamp setup and arrangement was identical to that of LT-5593-2-1.

3.3.1.7 A photograph of the setup is shown on Figure 25, Volume I.

3.3.2 Test Setup for LT-5593-3-2 (Panel 25-20352-2)

3.3.2.1 The entire test setup was identical to that for LT-5593-3-1.

3.3.3 Test Setup for LT-5593-3-3 (Panel 25-20370-1)

3.3.3.1 The entire test setup was identical to that for LT-5593-3-1.

3.4 Test Setup for LT-5593-4

3.4.1 Test Setup for LT-5593-4-1 (Panel 25-20374-1)

3.4.1.1 The test setup was identical to that of LT-5593-2-1, except that a model 600 Jaeger compressor was used as a vacuum pump to apply uniform loading to the test panel surface by creating a pressure differential across the top and bottom panel surfaces.

3.4.2 Test Setup for LT-5593-4-2 (Panel 25-20374-4)

3.4.2.1 The test panel was mounted in the vacuum box as shown on Figure 85, Volume I.

3.4.2.2 Inconel 702 foil seals were spotwelded to the panel and to the vacuum box to provide a seal for the pressure tests, but were omitted in the unsymmetrical heat cycles.

3.4.2.3 A two-inch thick Fibre Frax blanket was placed below the panel in all tests to block the flow of heat to the bottom of the vacuum box.

3.4.2.4 The pressure loading setup was identical to that of LT-5593-4-1.

3.4.2.5 The heat lamp setup and arrangement was identical to that of LT-5593-2-1.

3.4.3 Test Setup for LT-5593-4-3 (Panel 25-20352-1)

3.4.3.1 The test setup was identical to that for LT-5593-4-2.

3.4.4 Test Setup for LT-5593-4-4 (Panel 25-20370-2)

3.4.4.1 The test setup was identical to that for LT-5593-4-2.

3.4.5 Test Setup for LT-5593-4-5 (Panel 25-20352-2)

3.4.5.1 The test setup was identical to that for LT-5593-4-2 except no heat lamps or fibrefrax insulation was used since the test was to be run at room temperature.

3.4.6 Test Setup for LT-5593-4-6 (Panel 25-20370-1)

3.4.6.1 The test setup was identical to that for LT-5593-4-5.

3.5 Test Setup for LT-5593-5

3.5.1 Panel 25-20344-1, sonic test panel No. 1477, was mounted through the end clips to a pair of .040 gage Rene' 41 channels with 3/16" dia. bolts. The Rene' 41 channels in turn were attached at each end by 1/2" dia. bolts to a steel "picture frame" jig. The 23.5" edge of the specimen was unsupported. An anechoic box was attached to the underside of the "picture frame" jig to attenuate the sound level at the inside surface of the specimen. The panel mounting fixture was built so that the angle of sound with respect to the panel could be continuously varied at any angle from 0 to 90°. The exponential steel horn was rolled up to the panel mounting fixture with the axis of the horn bisecting the 23.5" panel edge.

3.5.2 Two Altec-Lansing Model 6786 electropneumatic transducers mounted on the exponential horn served as the noise source. The electrical signal to the transducers was provided by an Allison 3MAN9 noise generator and octave band equalizer through a dual channel McIntosh amplifier.

3.5.3 The microphones were monitored with a Ballantine true rms meter and a General Radio octave band analyzer. The outputs of the displacement pickups were also measured with the Ballantine meter. The output of both the microphones and the displacement pickups was tape recorded on a 4 sec. continuous loop tape for each condition.

4.0 TEST PROCEDURE

4.1 Test procedure for LT-5593-1 (Panels 25-20344-1, No's. 1477, 1478, 1479)

4.1.1 Each of three panels was sonic tested for five minutes at an overall sound level of 152 db. The output of the microphones was analyzed on a General Radio octave band analyzer and also recorded on magnetic tape. The microphone output octave band analysis was compared to the theoretical design spectrum. The output of the non-contact amplitude pickups were also recorded on magnetic tape.

4.1.2 After completing five minutes of sonic testing, the panels were inspected for failures and then sent to the Structures Laboratories Heat Lab. for a 15 minute 2000°F heat cycle test. (Ref. Figure 143).

4.1.3 The panels were returned to the Sonic Laboratory, inspected for failures and photographed. Each panel was reinstalled in the progressive wave chamber and sonic tested to the same spectrum for an additional 55 minutes. Microphone output was analyzed on the General Radio octave band analyzer and tape recordings made of the microphones and deflection pickups at the beginning and end of the 55 minute period. Each panel was removed from the progressive wave chamber and visually inspected for additional failures at 15 to 20 minute intervals and at the end of the test.

4.2 Test procedure for LT-5593-1 (Panels 25-20369-1, No's. 1493, 1494, 1495 and 25-20369-2, No's. 1497, 1498, 1499)

4.2.1 Each of six panels was sonic tested for five minutes at an overall sound level of 152.5 db. The output of the microphones was analyzed on an octave band analyser and compared to the theoretical design spectrum. The output of the microphones was also recorded on magnetic tape. Spectral density analyses were made from these tapes.

4.2.2 After completing five minutes of sonic testing, the panels were inspected for failures and sent to the Structures Laboratories Heat Lab. for the heat environment cycle defined in Paragraph 4.1.2.

4.2.3 The panels were then returned to the Sonic Laboratory, inspected for failures, and photographed. Each panel was reinstalled in the progressive wave chamber and sonic tested to the same spectrum for an additional 55 minutes. Microphone output was analyzed on the octave band analyzer and tape recordings made of the microphones and deflection pickups at the beginning and end of the 55 minute period. The test plan was changed during this phase of the program to include a 30 second test at an increased sound level of 157.5 db and another 30 second test at an increased level of 162.5 db. Data were recorded during each new level. Panels 1497, 1498, and 1499 were subjected to the revised sonic levels. Each panel was removed from the progressive wave chamber and visually inspected for failures at 15 to 20 minute intervals and at the end of the test.

4.3 Test procedure for LT-5593-2

4.3.1 Test procedure for LT-5593-2-1 (Panel 25-20374-1)

4.3.1.1 The simulated and test panels were subjected to a heating program consisting of ten cycles of symmetrical heat application to a maximum of 1750°F, plus an unsymmetrical heating cycle, also to 1750°F, as shown on Figure 89, Volume I. A linear temperature gradient was maintained from one long edge to the other.

4.3.1.2 Vertical and horizontal deflections were recorded during the heat cycling.

4.3.1.3 The digital data system was employed to record and reduce the data.

4.3.2 Test procedure for LT-5593-2-2 (Panel 25-20374-2)

4.3.2.1 The test panel was subjected to a heating program consisting of ten cycles of symmetrical heat application to 1370°F maximum plus an unsymmetrical heating cycle, also to 1870°F, as shown on Figure 90, Volume I. A linear temperature gradient was maintained from one long edge to the other.

4.3.2.2 The eleven monitor thermocouples were recorded at 24-second intervals utilizing a Leeds and Northrup strip chart recorder and a Boeing-designed stepping switch. The outputs from the five electronic deflection indicators were recorded during the first and last 25 minutes of testing on Electro Instruments' X-Y plotters.

4.3.3 Test procedure for LT-5593-2-3 (Panel 25-20352-1)

4.3.3.1 The 25-20374 panel, mounted in the outer, or upper, position on the vacuum box, was heated from above and re-radiated its heat to the test panel in the inner, or lower, position in the box.

4.3.3.2 The test panel heat program is shown on Figure 91, Volume I.

4.3.3.3 Thermocouple 4A, on the crest of an inner panel corrugation (see Figure 72, Volume I), was used to follow temperature on a manually controlled preliminary survey. Control thermocouple data from this survey was used to establish the program curves for the actual test.

4.3.3.4 Vertical panel deflections were recorded during the test.

4.3.4 Test procedure for LT-5593-2-4 (Panel 25-20352-2)

4.3.4.1 Test LT-5593-2-4 was run in a manner identical to that of test LT-5593-2-3.

4.3.5 Test procedure for LT-5593-2-5 (Panel 25-20370-1)

4.3.5.1 Test LT-5593-2-5 was run in a manner identical to that of test LT-5593-2-3.

4.3.6 Test procedure for LT-5593-2-6 (Panel 25-20370-2)

4.3.6.1 Test LT-5593-2-6 was run in a manner identical to that of LT-5593-2-3.

4.3.7 Test procedure for LT-5593-2-6B (Panel 25-20370-2)

4.3.7.1 Panel 25-20370-2 was subjected to an unsymmetrical heat condition consisting of a 250°F thermal gradient from one long edge of the panel to the other. Maximum temperature was 1200°F. See Figure 92, Volume I.

4.3.7.2 The panel was heated at a rate of 15°F/sec along one edge and at 13°F/sec along the opposite edge.

4.3.7.3 Vertical deflections were measured during the heat condition.

4.3.7.4 Two heat cycles were run.

4.4 Test procedure for LT-5593-3

4.4.1 Test procedure for LT-5593-3-1 (Panel 25-20374-1)

4.4.1.1 The test panel was heated symmetrically to 1870°F at a rate of 5°F/sec.

4.4.1.2 After the panel had reached test temperature, a shear load was applied at a rate of 100 lb/min. until failure of the panel occurred.

4.4.1.3 Electronic deflection indicator readings were recorded during the test.

4.4.2 Test procedure for LT-5593-3-2 (Panel 25-20352-2)

4.4.2.1 Test procedure for LT-5593-3-2 was identical to that of LT-5593-3-1 except the panel was not loaded to failure.

4.4.2.1.1 Loading was discontinued when deflection of the panel at the loading point had reached approximately .40".

4.4.3 Test procedure for LT-5593-3-3 (Panel 25-20370-1)

4.4.3.1 Test procedure for LT-5593-3-3 was identical tothat of LT-5593-3-2.

4.5 Test procedure for LT-5593-4

4.5.1 Test procedure for LT-5593-4-1 (Panel 25-20374-1)

4.5.1.1 The heating rate was to have been 3 degrees/second until the test temperature of 1750°F was reached. The panel temperatures were then to have been allowed to stabilize after which a load rate of 1 PSI/minute was to have been applied to the panel until failure occurred.

(See paragraph 6.4.1 for actual test conduct.)

4.5.1.2 To prevent the seals from buckling and overheating as they neared the lamps, a uniform load of approximately 0.50 PSI was applied to the test panel before and during the heating period.

4.5.1.3 An Electro Instruments X-Y plotter was used to continuously record the pressure differential. The pressure transducer was located near the bottom center of the vacuum box (reference Figure 71, Volume I). Eleven monitor thermocouples were recorded at 24 second intervals utilizing a Leeds & Northrup strip chart recorder and a Boeing designed stepping switch. Five electrical deflection indicators were also recorded continuously on Electro Instruments X-Y plotters.

4.5.2 Test procedure for LT-5593-4-2 (Panel 25-20374-2)

4.5.2.1 The test panel was symmetrically heated to 1870°F at a rate of 5°F/sec.

4.5.2.2 A pressure of .50 PSI was applied before and during heating period to avoid buckling and overheating the seals during heating.

4.5.2.3 After heating stabilization, test pressure was applied at the rate of 1.0 PSI/min. until failure.

4.5.2.4 Load was measured by a pressure transducer and automatically recorded on an X-Y plotter.

4.5.2.5 Vertical deflections were measured during the test.

4.5.3 Test procedure for LT-5593-4-3 (Panel 25-20352-1)

4.5.3.1 The test panel was given an unsymmetrical heat cycle by heating to 2000°F along one long edge at a rate of 15°F/sec, and heating to 1750°F along the opposite edge at a rate of 13°F/sec.

4.5.3.2 Deflection readings were taken during the heating cycle.

4.5.3.3 The test panel was then cooled to room temperature.

4.5.3.4 The test panel was then given a symmetrical heat cycle to 1870°F at a rate of 5°F/sec.

4.5.3.5 After the panel had reached test temperature, test pressure was applied at a rate of 1.0 PSI/min. until panel failure.

4.5.3.6 Deflection readings were taken during loading.

4.5.3.7 Load was measured by a pressure transducer and automatically recorded on an X-Y plotter.

4.5.4 Test procedure for LT-5593-4-4 (Panel 25-20370-2)

4.5.4.1 The test procedure for LT-5593-4-4 was identical to that of LT-5593-4-3.

4.5.5 Test procedure for LT-5593-4-5 (Panel 25-20352-2)

4.5.5.1 Test pressure was applied at a rate of 1.0 PSI/min. until panel failure.

4.5.5.2 Load was measured by a pressure transducer and automatically recorded on an X-Y plotter.

4.5.5.3 Vertical deflections were measured during the test.

4.5.6 Test procedure for LT-5593-4-6 (Panel 25-20370-1)

4.5.6.1 The test procedure for LT-5593-4-6 was identical to that of LT-5593-4-5.

4.6 Test procedure for LT-5593-5 (Panel 25-20344-1, No. 1477)

4.6.1 The panel response was measured at two overall sound levels, 140 db and 147 db. The spectrum was shaped to the design octave band spectrum using the Allison equalizer with the panel at 0° sound incidence. Tape recordings of the microphone and pickup output were made at each specified angle of sound incidence. A power spectral density analysis was run on each recording and a peak count analysis was made of five selected recordings.

4.7 Panel Testing Summary

Panel Drawing Number	Panel Number	Testing Sequence
25-20344-1	1477	LT-5593-5, -1
	1478	LT-5593-1
	1479	LT-5593-1
25-20369-1	1493	LT-5593-1 [1]
	1494	LT-5593-1
	1495	LT-5593-1 [1]
25-20369-2	1497	LT-5593-1
	1498	LT-5593-1
	1499	LT-5593-1
25-20352-1	One Panel Tested	LT-5593-2-3, -4-3
25-20352-2	One Panel Tested	LT-5593-2-4, -3-2, -4-5
25-20370-1	One Panel Tested	LT-5593-2-5, -3-3, -4-6
25-20370-2	One Panel Tested	LT-5593-2-6, -2-6B, -4-4
25-20374-1	One Panel Tested	LT-5593-2-1, 4-1, 3-1
25-20374-2	One Panel Tested	LT-5593-2-2, -4-2

[1] Panel was subsequently subjected to vibration and acceleration tests as detailed in D2-80080, "Insulated Panel Development Dyna-Soar".

5.0 TEST RESULTS

5.1 Test results, LT-5593-1

5.1.1 Panels 25-20344, No's. 1477, 1478, 1479

5.1.1.1 The individual panel test logs with inspection records are shown on Figures 93 through 95, Volume I.

5.1.1.2 45 power spectral density analyses were made from the magnetic tape records. See Figures 96 through 140, Volume I.

5.1.1.3 Time-temperature graphs of the heat cycle on each panel are plotted on Figures 141 through 143, Volume I.

5.1.1.4 Microphone output compared to design spectrum is shown on Figures 144 through 146, Volume I.

5.1.2 Panels 25-20369-1, No's. 1493, 1494, 1495 and 25-20369-2, No's 1497, 1498, 1499

5.1.2.1 The individual panel test logs with inspection records are shown on Figures 147 through 152, Volume I.

5.1.2.2 TPC power spectral density analyses of sound and panel amplitude plots and peak counts were made from the tape recordings. See Figures 153 through 222, Volume I.

5.1.2.3 Microphone output compared to design spectrum is shown on Figures 223 through 228, Volume I.

5.2 Test results, LT-5593-2

5.2.1 Test results, LT-5593-2-1 (Panel 25-20374-1)

5.2.1.1 Seven vertical deflections were recorded to determine the vertical deflections of the 25-20374 panel center and the centers of the long edges with respect to the panel corners. The maximum vertical deflection occurred during the early cycles at the panel center and was approximately 0.40 inches. See Figures 1 through 46, Volume II.

5.2.1.2 Horizontal deflections of the long edge (heated to 1500°F maximum) mid point and ends were measured. No significant deviation among the three measurements was observed. Maximum horizontal deflections reached 0.11 inches during the first ten cycles and 0.09 inch during the unsymmetrical heating cycle. See Figures 7 and 8, Volume II.

5.2.1.3 Temperature data is included on Figures 9 through 40, Volume II.

5.2.2 Test results, LT-5593-2-2 (Panel 25-20374-2)

5.2.2.1 Thermocouple data is included on Figures 41 through 66, Volume II.

5.2.2.2 Deflection curves are included on Figures 67 through 71, Volume II.

5.2.3 Test results, LT-5593-2-3 (Panel 25-20352-1)

5.2.3.1 Deflection of the inner, or test, panel was measured at three points.

5.2.3.1.1 Deflections at two corners were measured to provide references for panel center deflections. Maximum deflection occurred at the panel center (EDI D04) and was 0.24".

5.2.3.1.2 Deflection vs. time records are included on Figures 72 through 76, Volume II.

5.2.3.2 Temperature vs. time records are included on Figures 77 through 104, Volume II.

5.2.4 Test results, LT-5593-2-4 (Panel 25-20352-2)

5.2.4.1 Deflection of the inner, or test, panel was measured at three points.

5.2.4.1.1 Deflections at two corners were measured to provide references for panel center deflections. Maximum deflection occurred at the panel center (EDI D04) and was 0.21".

5.2.4.1.2 Deflection vs. time records are included on Figures 105 through 109, Volume II.

5.2.4.2 Temperature vs. time records are included on Figures 110 through 137, Volume II.

5.2.5 Test results, LT-5593-2-5 (Panel 25-20370-1)

5.2.5.1 Deflection of the inner, or test, panel was measured at three points.

5.2.5.1.1 Deflections at two corners were measured to provide references for panel center deflections. Maximum deflection occurred at the panel center (EDI D04) and was 0.38".

5.2.5.1.2 Deflection vs. time records are included on Figures 138 through 142, Volume II.

5.2.5.2 Temperature vs. time records are included on Figures 143 through 168, Volume II.

5.2.6 Test results, LT-5593-2-6 (Panel 25-20370-2)

5.2.6.1 Deflections of the inner, or test, panel were measured at three points.

5.2.6.1.1 Deflections at two corners were measured to provide references for panel center deflections. Maximum deflection occurred at the panel center (EDI D04) and was 0.45".

5.2.6.1.2 Deflection vs. time records are included on Figures 169 through 173, Volume II.

5.2.6.2 Temperature vs. time records are included on Figures 174 through 197, Volume II.

5.2.7 Test results, LT-5593-2-6B (Panel 25-20370-2)

5.2.7.1 A record of peak test temperatures is given on Figure 75, Volume I, for both cycles.

5.2.7.2 Maximum deflection of the panel occurred at the center of the panel 3.75 minutes after the start of each cycle and was .465" in cycle one, and .490" in cycle two.

5.2.7.3 Deflections at all EDI locations at 3.75 minutes are given for both cycles on Figure 76, Volume I.

5.2.7.4 Deflection vs. time records are included on Figures 198 through 202, Volume II.

5.3 Test results, LT-5593-3

5.3.1 Test results, LT-5593-3-1

5.3.1.1 No data was taken on this test.

5.3.2 Test results, LT-5593-3-2 (Panel 25-20352-2)

5.3.2.1 Deflection vs. load curves are included on Figures 203 through 210, Volume II.

5.3.3 Test results, LT-5593-3-3 (Panel 25-20370-1)

5.3.3.1 Deflection vs. load curves are included on Figures 211 through 218, Volume II.

5.4 Test results, LT-5593-4

5.4.1 Test results, LT-5593-4-1 (Panel 25-20374-1)

5.4.1.1 The pressure applied to the panel remained nearly constant during the tests (reference Figure 219, Volume II). Deflection curves are shown on Figures 220 through 224, Volume II. The maximum recorded deflection was 1.02 inches measured near the panel center. Monitor thermocouple temperatures during power and panel failures are represented on Figure 225, Volume II.

5.4.1.2 Time vs. temperature curves are included on Figures 226 through 233, Volume II.

5.4.2 Test results, LT-5593-4-2 (Panel 25-20374-2)

5.4.2.1 The test panel failed at a load of 1.1 PSI.

5.4.2.2 Panel center deflection immediately preceding failure was .38" measured from the panel position at temperature without load.

5.4.2.3 Deflection vs. pressure data are included on Figures 234 through 238, Volume II.

5.4.3 Test results, LT-5593-4-3 (Panel 25-20352-1)

5.4.3.1 Maximum deflection during the unsymmetrical heat cycle was .33" at the center of the panel at maximum temperature.

5.4.3.2 During the pressure phase, the panel failed at a load of 2.05 PSI.

5.4.3.3 The deflection of the panel center, immediately prior to failure, was .78" measured from panel position at temperature without load.

5.4.3.4 Deflection vs. pressure data are included on Figures 239 through 243, Volume II.

5.4.4 Test results, LT-5593-4-4 (Panel 25-20370-1)

5.4.4.1 The maximum deflection during the unsymmetrical heating cycle at the panel center was approximately .8".

5.4.4.2 The pressure test caused panel failure by buckling at 2.05 PSI.

5.4.4.3 Maximum center deflection, at instant of failure, was approximately 1.0".

5.4.4.4 Deflection vs. pressure data are included on Figures 244 through 248, Volume II.

5.4.5 Test results, LT 5593-4-5 (Panel 25-20352-2)

5.4.5.1 Deflection vs. pressure curves are included on Figures 249 through 253, Volume II.

5.4.6 Test results, LT-5593-4-6 (Panel 25-20370-1)

5.4.6.1 Deflection vs. pressure curves are included on Figures 254 through 258, Volume II.

5.5 Test results, LT-5593-5 (Panel 25-20344-1, No. 1477)

5.5.1 The effect of sound angle of incidence on panel amplitude at 140 db and 147 db is shown on Figure 259, Volume II. In addition, 49 power spectral density analyses were made. See Figures 260 through 308, Volume II.

5.5.2 Microphone output compared to design spectrum is shown on Figures 309 and 310, Volume II.

5.6 The following is a tabulation of types of tests run and panels tested.

LT-5593-1	Sonic Tests	Panel 25-20344
	Sonic Tests	Panel 25-20369-1, -2 [1]
LT-5593-2-1	Thermal Cycle Tests	Panel 25-20374-1
LT-5593-2-2	Thermal Cycle Tests	Panel 25-20374-2
LT-5593-2-3	Thermal Cycle Tests	Panel 25-20352-1
LT-5593-2-4	Thermal Cycle Tests	Panel 25-20352-2
LT-5593-2-5	Thermal Cycle Tests	Panel 25-20370-1
LT-5593-2-6	Thermal Cycle Tests	Panel 25-20370-2
LT-5593-2-6B	Thermal Cycle Tests	Panel 25-20370-2
LT-5593-3-1	Shear Tests	Panel 25-20374-1
LT-5593-3-2	Shear Tests	Panel 25-20352-2
LT-5593-3-3	Shear Tests	Panel 25-20370-1
LT-5593-4-1	Pressure Tests	Panel 25-20374-1
LT-5593-4-2	Pressure Tests	Panel 25-20374-2
LT-5593-4-3	Pressure Tests	Panel 25-20352-1
LT-5593-4-4	Pressure Tests	Panel 25-20370-2
LT-5593-4-5	Pressure Tests	Panel 25-20352-2
LT-5593-4-6	Pressure Tests	Panel 25-20370-1
LT-5593-5	Sonic Tests	Panel 25-20344

[1] Two 25-20369-1 panels were subsequently subjected to vibration and acceleration tests as detailed in D2-80080, "Insulated Panel Development Dyna-Soar".

6.0 TEST OBSERVATIONS

6.1 Test observations, LT-5593-1

6.1.1 Panels 25-20344, No's. 1477, 1478, 1479

6.1.1.1 No failures were detected at the end of the first five minutes of sonic testing. At the end of the 15 minute heat test, the panel skins had assumed a general waffle-like appearance and numerous spotweld failures and skin cracks occurred along the supported edges of the specimen. At each inspection interval during the 55 minute sonic test, additional spotweld failures and skin cracks were detected.

6.1.1.2 Diagrams indicating spotweld failures and skin cracks due to heat and sonic testing are presented on Figures 86, 87 and 88, Volume I.

6.1.1.3 Photographs of the specimens after the 5 minute sonic test and 2000°F. heat test, but prior to the 55 minute sonic test, are shown on Figures 26, 27 and 28, Volume I, with the failures marked with an inking pen.

Photographs of the specimen after the 55 minute sonic test are on Figures 29, 30 and 31, Volume I.

6.1.1.4 The reasons that the heat cycles differed for each panel were as follows:

6.1.1.4.1 Panel 1477 - During the increase from 1300°F. to 2000°F., a bad Thyratron in Phase II of the power unit for Zone 2 caused Zone 2 to have a slower heat rate than Zone 1.

6.1.1.4.2 Panel 1478 - After the temperature had been at 2000°F. for 25 seconds, a malfunction of equipment cutoff power to the heat lamps. The temperature decreased to ambient and Dyna-Soar personnel inspected the panel. The panel was then heated to 2000°F. and held there for 15 minutes.

6.1.1.4.3 Panel 1479 - All test conditions were completed according to the predetermined time-temperature program.

6.1.2 Panels 25-20369-1, No's. 1493, 1494, 1495 and 25-20369-2, No's. 1497, 1498, 1499

6.1.2.1 No failures were detected at the end of the first 5 minutes of sonic testing. Sonic testing of the panels after the heat test produced no detectable structural failures on visual inspection in the Sonic Lab. Small fragments of the Fiberfrax insulation crumbled and vibrated from between the skin structure and wire mesh backing along the exposed edges of panels.

6.1.2.2 Photographs of the specimens after the 5 minute sonic test and the 2000°F. heat test, but prior to the 55 minute sonic test, are shown on Figures 32 through 43, Volume I.

6.1.2.3 Panel 1494 was burned so badly during the heat test that further sonic testing was not completed on this panel.

6.2 Test observations, LT-5593-2

6.2.1 Test observations, LT-5593-2-1, Panel 25-20374-1

6.2.1.1 Thermocouples on the beaded seal indicated temperatures in excess of 2000°F during the first cycle and necessitated the disconnection of seven lamps in this area for the remainder of the test. The beaded seal temperatures were then observed to have a maximum gradient of approximately 700°F and did not exceed 1700°F. One corner of the 25-20374 panel was consistently 200°F below the rest of the panel at maximum temperature.

6.2.1.2 Thermocouples show that a non-linear lateral temperature distribution during the unsymmetrical heating cycle subjected the 25-20374 panel to more thermal stress than if the required linear distribution could have been produced.

6.2.1.3 Surface panel damage if any, could not be detected. Only broken spotwelds between the panel seal and the beaded seal were evident.

6.2.2 Test observations, LT-5593-2-2 (Panel 25-20374-2)

6.2.2.1 Thermocouple data indicate that maximum panel surface temperature deviations from the required temperatures occurred during the 11th or unsymmetrical heating cycle.

6.2.2.1.1 Thermocouple No. 7 reached a maximum of 1630°F during this cycle versus the 1870°F stipulated. Simularly, during the 11th cycle, thermocouples no. 4 required a 1685°F maximum and no. 40 required a 1500°F maximum. They reached maximums of 1720°F and 1545°F respectively. A panel surface temperature (thermocouple no. 7) of 1660°F maximum was indicated as the largest deviation from the required temperature of 1870°F from the symmetrical heating cycles reported.

6.2.2.2 The surface of the Fiberfrax batt nearest the test panel reached a maximum of 1455°F forty-nine minutes after the start of the test. The gradient through the two inch thick insulation at this time was 520°F.

6.2.2.3 Temperature readings for the lower crest of the corrugation at the panel center (reference corrugation at the panel center, Figure 41, Volume II, thermocouple no. 3) are not reported due to a faulty thermocouple.

6.2.2.4 Deflection curves indicate that a maximum vertical deflection of 0.37 inches occurred during the first heating cycle near the center of the panel. See Figure 70, Volume II.

6.2.2.5 Buckling of the seals caused spotweld failures and some damage to the panel seal. One-half inch diameter Inconel 702 foil disks, spotwelded to the panel seal in an attempt to repair holes or damage incurred during fabrication, loosened considerably.

6.2.3 Test observations, LT-5593-2-3 (Panel 25-20352-1)

6.2.3.1 Due to limitations of the X-Y plotters it was necessary to block out the time base on the deflection record during some of the cycles on each test. The deflection curve for each of these cycles is represented by a straight vertical line from which only maximum and minimum deflections can be read.

6.2.3.2 Examination of the deflection curves and the tested panel revealed that no damage resulted from the tests.

6.2.4 Test observations, LT-5593-2-4 (Panel 25-20352-2)

6.2.4.1 Examination of the deflection curves and the tested panel revealed that no damage resulted from the tests.

6.2.5 Test observations, LT-5593-2-5 (Panel 25-20370-1)

6.2.5.1 Due to limitations of the X-Y plotters, it was necessary to block out the time base on the deflection record during some of the cycles on each test. The deflection curve for each of these cycles is represented by a vertical line from which only maximum and minimum deflections can be read.

6.2.5.2 Deflection of one panel corner was indicated by the plotter as being approximately 0.25" on cycles 5 and 6. (See curve for EDI D01). Since this corner is limited in vertical motion by brackets attached to the vacuum box, (see plan view, Figure 82, Volume I), this data is questionable. Examination of the bracket installation after test showed no failure of this attachment that could have allowed this much deflection. Also an operational check of the recording equipment indicated normal performance.

6.2.6 Test observations, LT-5593-2-6 (Panel 25-20370-2)

6.2.6.1 Examination of the deflection curves and the tested panel revealed that no damage resulted from the tests.

6.2.7 Test observations, LT-5593-2-6B (Panel 25-20370-2)

6.2.7.1 A visual examination of the panel following the test did not reveal any damage.

6.3 Test observations, LT-5593-3

6.3.1 Test observations, LT-5593-3-1 (Panel 25-20374-1)

6.3.1.1 Panel deflections went beyond calibration range of the EDI's.

6.3.1.1.1 Calibrated range of the EDI's was .25". Panel deflections exceeded 1.0" under heat and load.

6.3.1.2 No valid data was taken and none is presented. Failure of the panel under load prevented a rerun of the test.

6.3.2 Test observations, LT-5593-3-2 (Panel 25-20352-2)

6.3.2.1 A visual examination of the panel following the test did not reveal any damage.

6.3.3 Test observations, LT-5593-3-3 (Panel 25-20370-1)

6.3.3.1 A visual examination of the panel following the test did not reveal any damage.

6.4 Test observations, LT-5593-4

6.4.1 Test observations, LT-5593-4-1 (Panel 25-20374-1)

6.4.1.1 The test was conducted as planned with a uniform load of 0.50 PSI and a heating rate of approximately three degrees/second being applied until a plant power failure occurred 577 seconds after the start of the test. This power failure caused heat to be lost from the eight control zones shown on Figures 225 through 233, Volume II. Following power return to the heating lamps, the panel was heated at a rate over one-hundred degrees/second as the computer attempted to return to the heating curve.

6.4.1.2 Between the time of power failure and return to the heating curve the corrugations of 1/2 the panel (zone 5) buckled at the upper crests at their beam centerline. Because power to the lamps of the different zones could not be restored to the panel concurrently, temperature gradients may have induced enough thermal stress to cause the failure in zone 5. The maximum gradient, approximately 1040°F, occurred between zone 1 and zone 5 at the test time of 602 seconds. Note that the control thermocouple temperature curve on Figure 229, Volume II, represents the temperature of the zone 4 region adjacent to zone 6 only.

Additional study of the data indicates the possibility of panel failure occurring in zone 5 prior to the failure time as indicated by a deflection indicator (reference Figure 223, Volume II) located near the center of the panel. Flagnote 1 on Figure 230, Volume II, points out that the control thermocouple for zone 5 indicates that the panel lost temperature as it was being reheated following the restoration of plant power.

6.4.1.2 (Continued)

One probable explanation is that the control thermocouple moved away from the heat lamps as the corrugations failed in the area of zone 5. The failure of the corrugations in zone 5, detected in this manner, would then have occurred approximately 29 seconds prior to the failure as indicated by the deflection near the center of the panel nine inches away.

6.4.2 Test observations, LT-5593-4-2 (Panel 25-20374-2)

6.4.2.1 The panel failure consisted of buckling of the corrugations and "caving in" of the panel.

6.4.2.2 Photographs of panel damage are on Figures 44 through 48, Volume I.

6.4.3 Test observations, LT-5593-4-3 (Panel 25-20352-1)

6.4.3.1 The unsymmetrical heat cycle produced no visible damage.

6.4.3.2 Panel damage due to pressure is shown in the photographs, Figures 49 through 52, Volume I.

6.4.4 Test observations, LT-5593-4-4 (Panel 25-20370-2)

6.4.4.1 The unsymmetrical heat cycle resulted in damage as shown on Figures 53 and 54, Volume I.

6.4.4.2 Panel damage is shown in the photographs on Figures 55, 56 and 57, Volume I.

6.4.5 Test observations, LT-5593-4-5 (Panel 25-20352-2)

6.4.5.1 The test panel failed under pressure as shown on Figures 58, 59 and 60, Volume I.

6.4.6 Test observations, LT-5593-4-6 (Panel 25-20370-1)

6.4.6.1 The test panel failed under pressure as shown on Figures 61 through 64, Volume I.

6.5 Test observations, LT-5593-5 (Panel 25-20344-1, No. 1477)

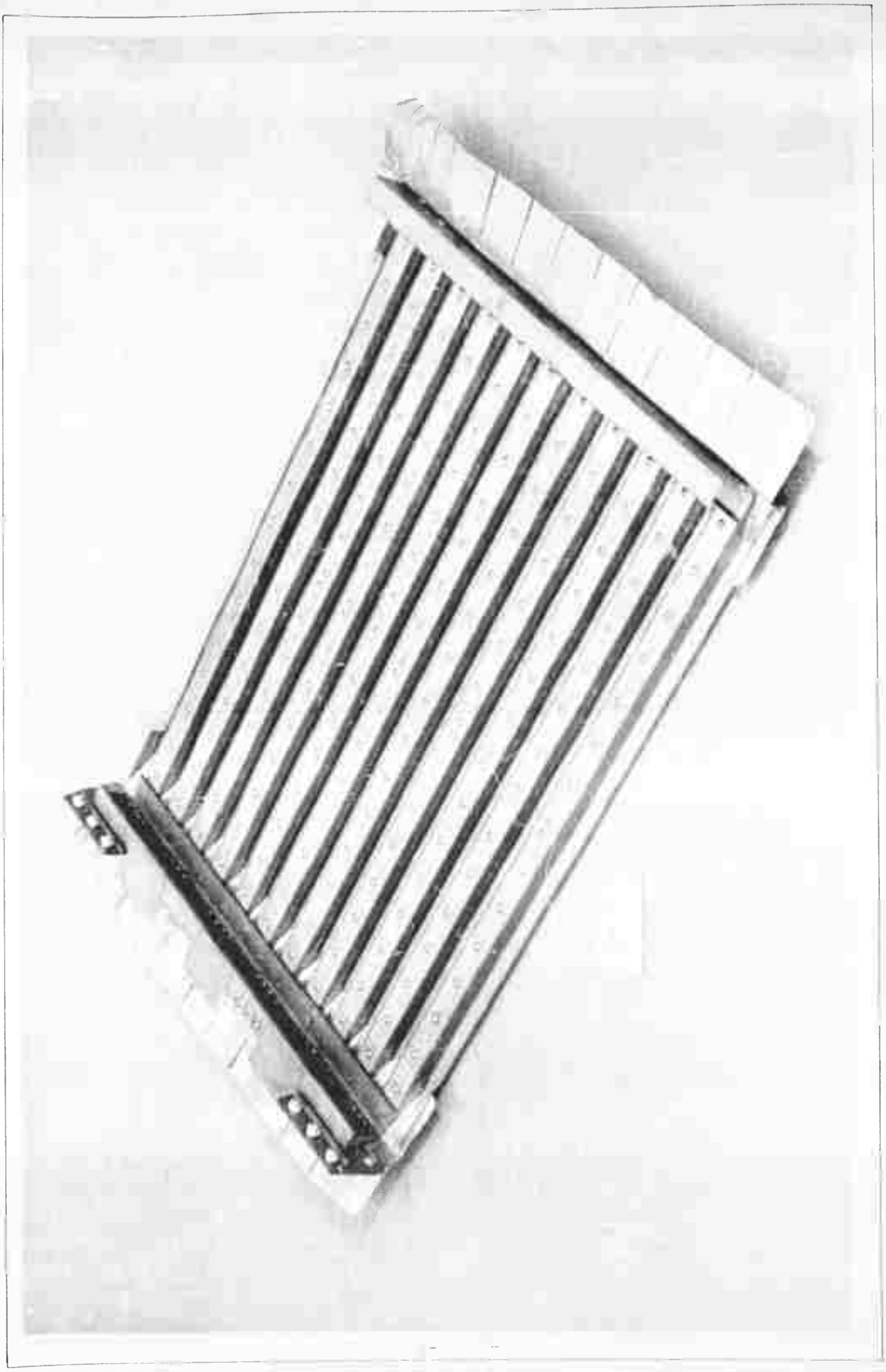
6.5.1 Figure 259, Volume II, shows the effect of sound angle of incidence on panel amplitude response. The Dyna-Soar sonic fatigue program has been setup to test specimens at 0° (grazing) incidence.



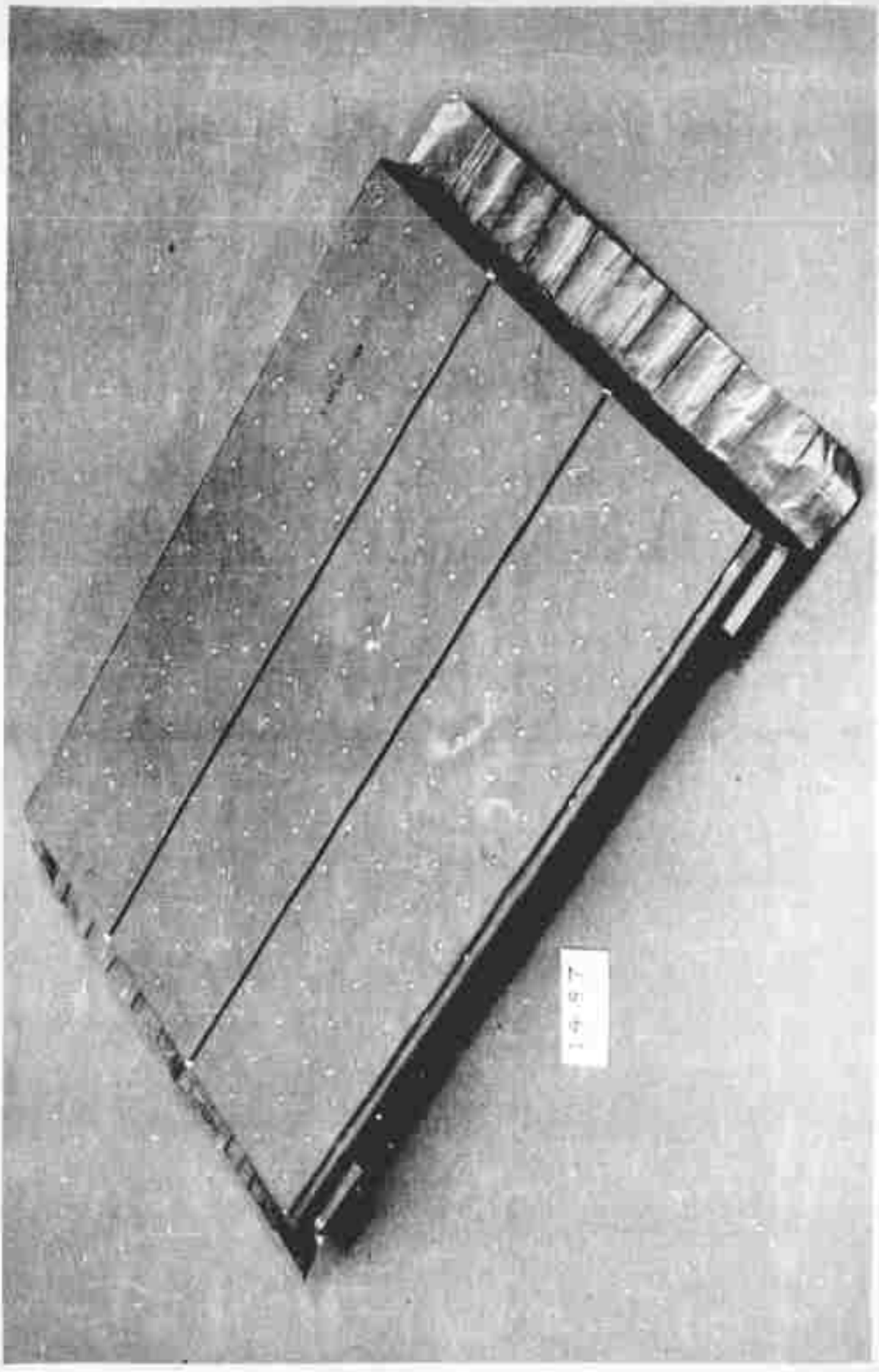
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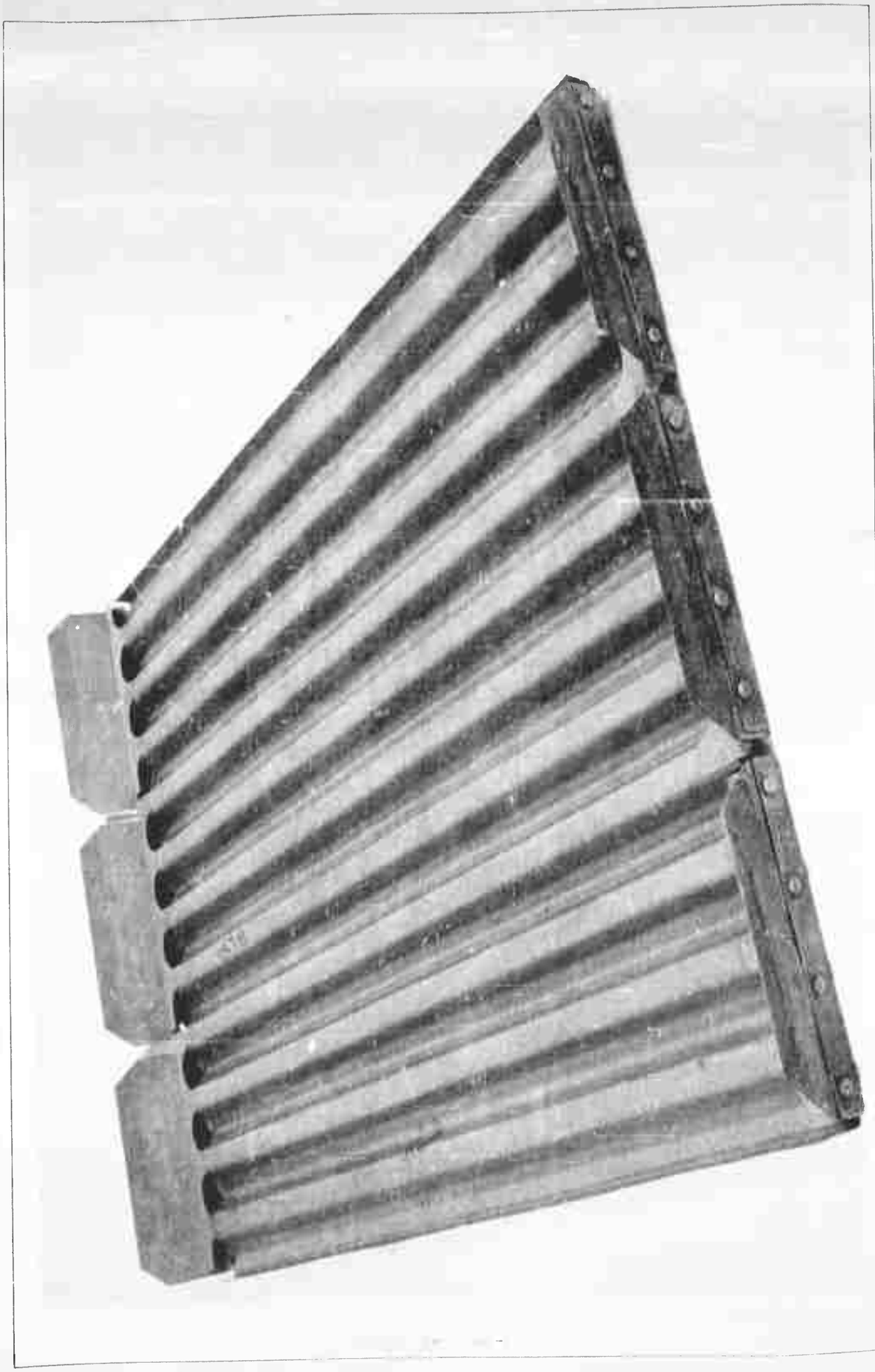
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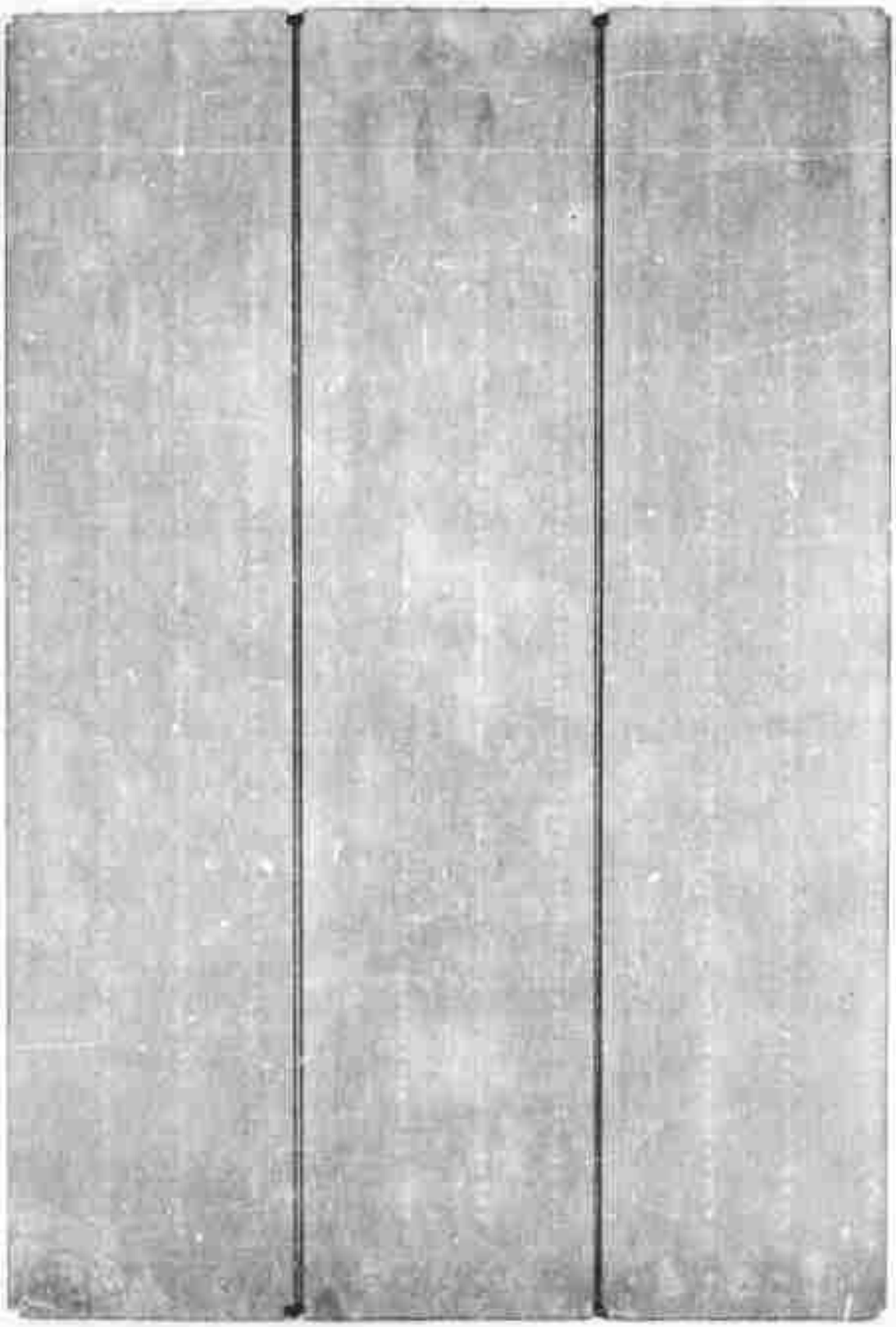
EMA - S-503 PANEL ATTACHMENT - TYPE I PRELIM. 2A6994B
SONIC TEST 5-1-61



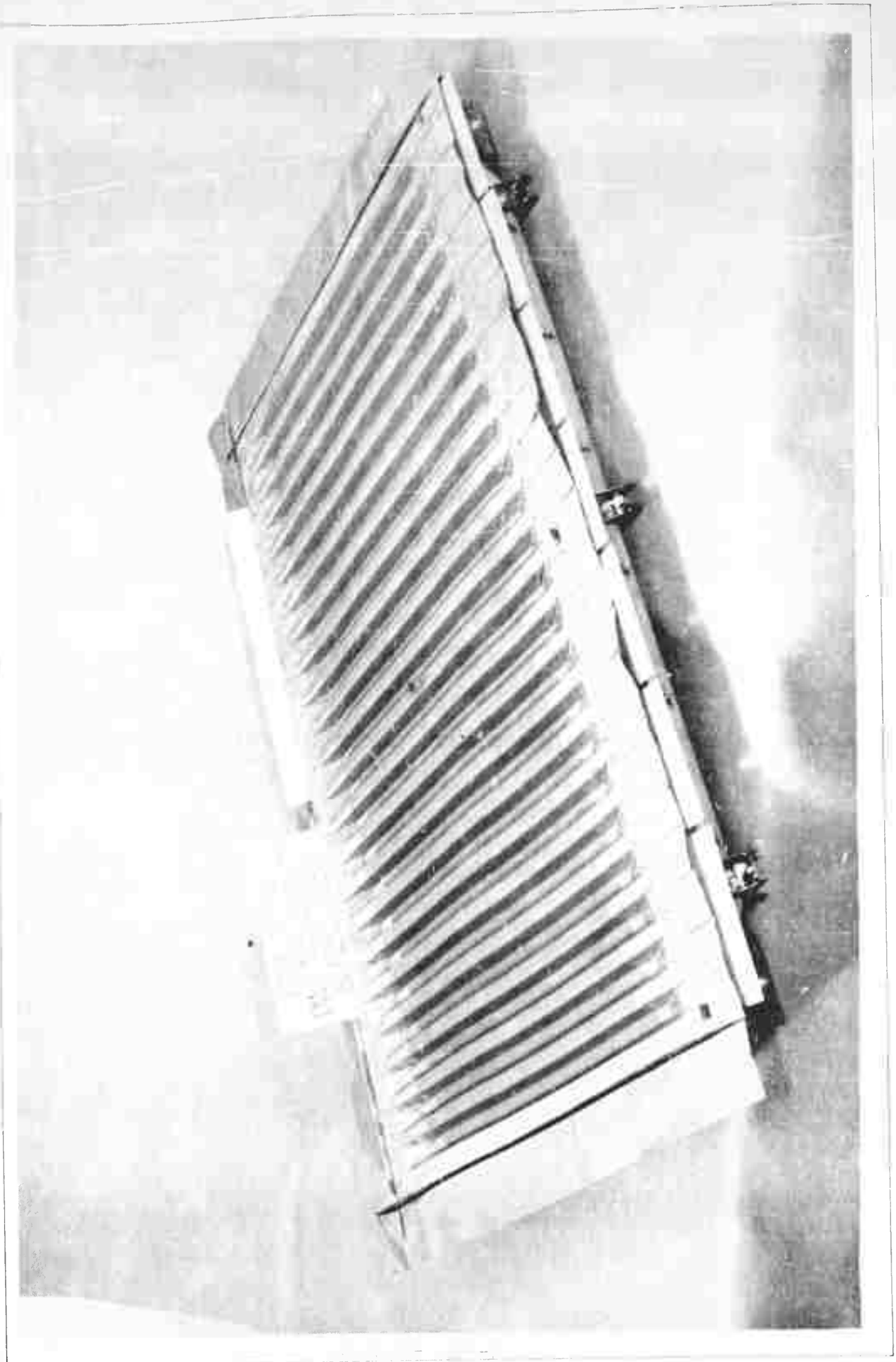
EWA 5-593 PANEL ATTACHMENT - TYPE I PRELIM. 2A65944
SONIC TEST.
5-1-61



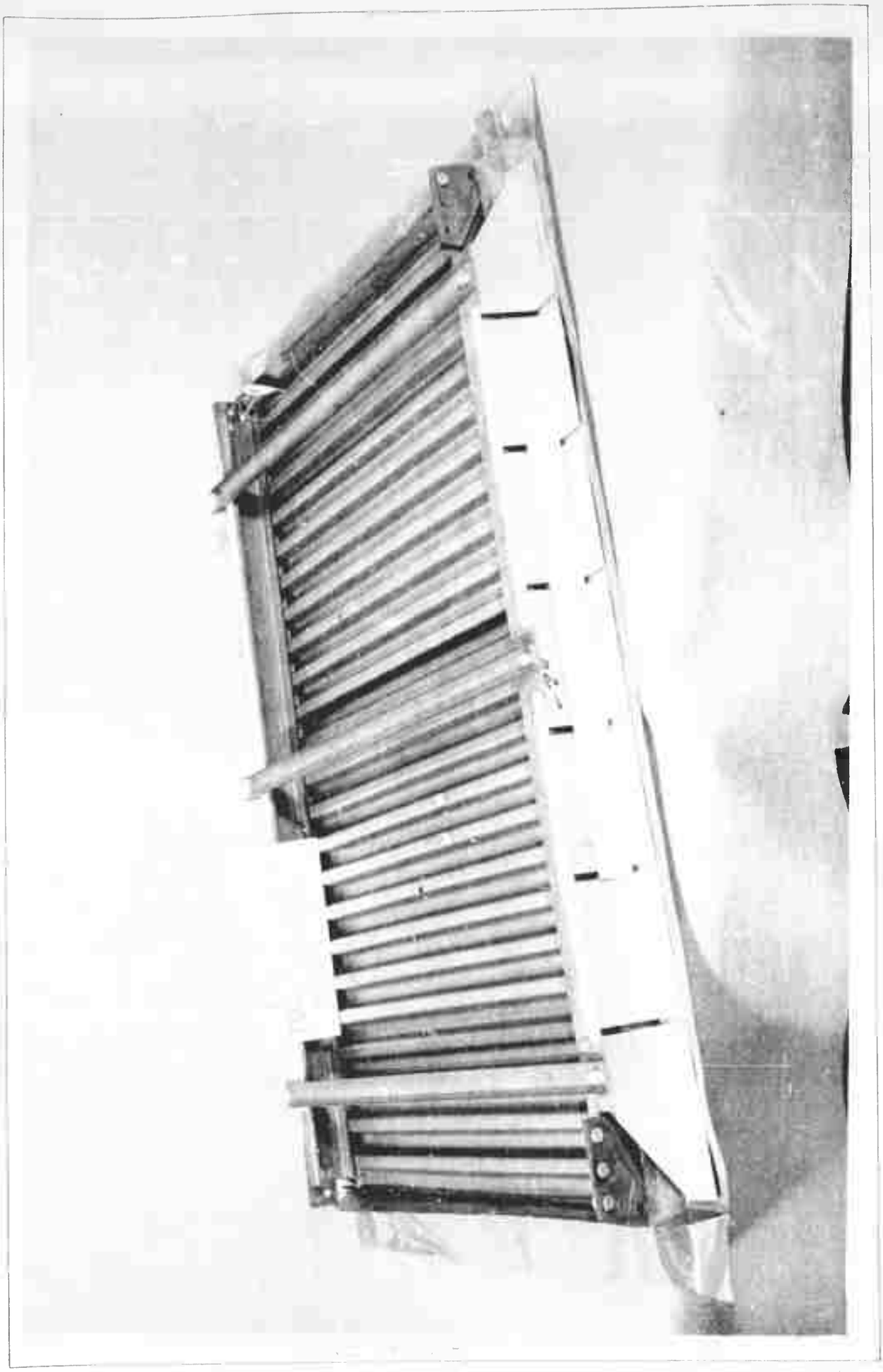
DYNASOAR NON-INSULATED PANEL TEST SPECIMEN
AND SONIC TEST 12-7-60 (RENE 41) 2455544



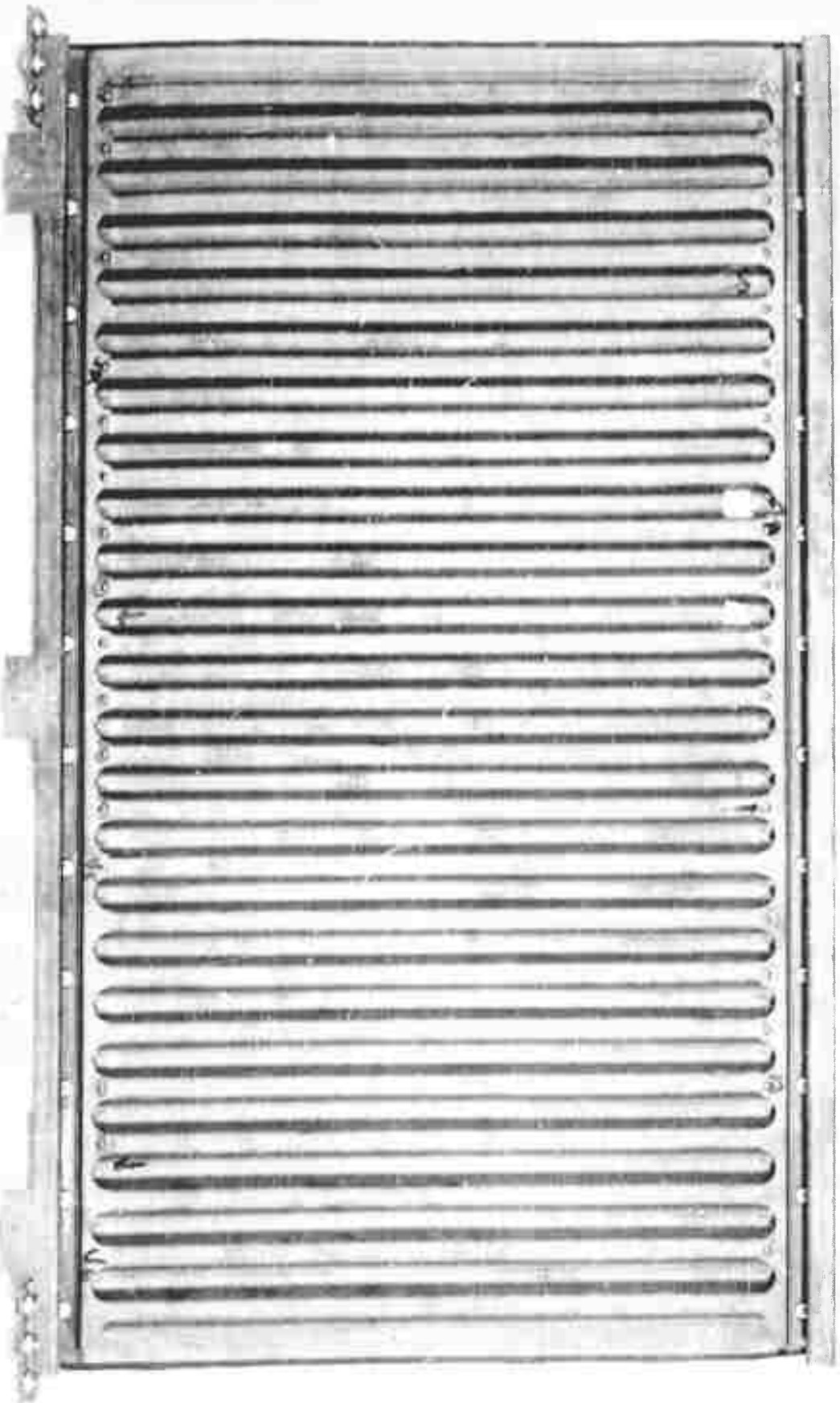
DYNASOAR NON-INSULATED PANEL TEST SPECIMEN 2A55542
AND SONIC TEST 12-7-60 (RENE 41)



DS-1 - REPR 42 WING PANELS EWA 1-5693 BAC 1546

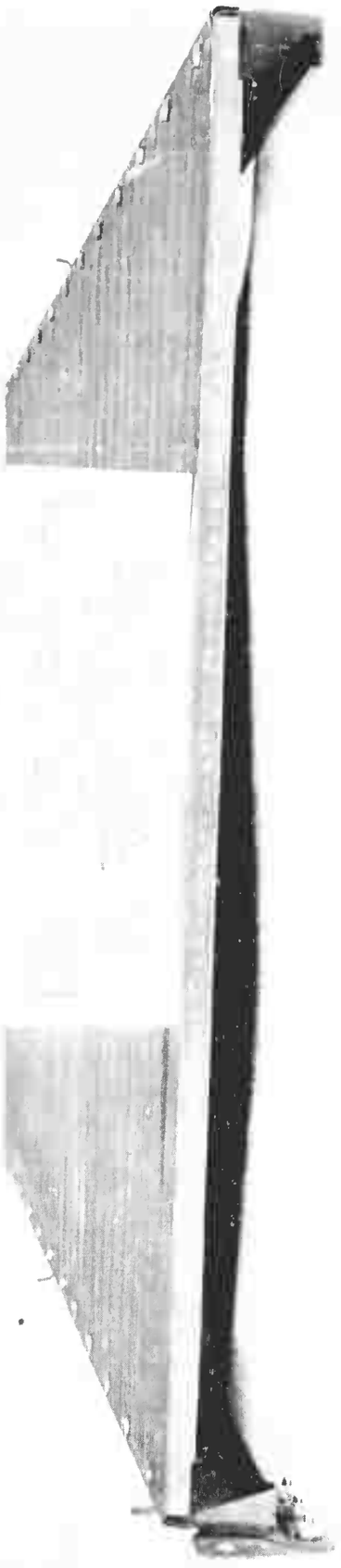


U3-4071-1000 (was BAC 1546-L-R3)



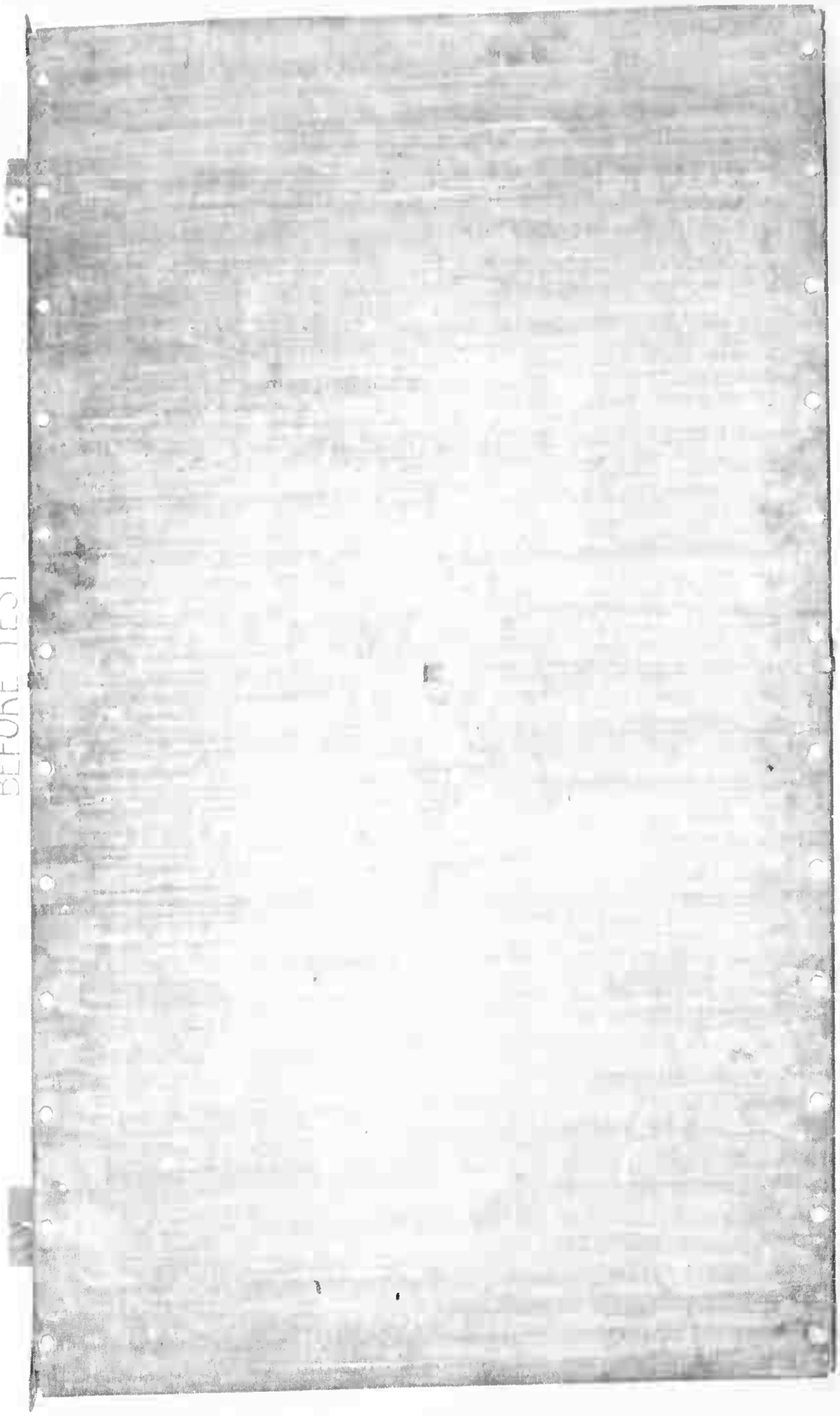
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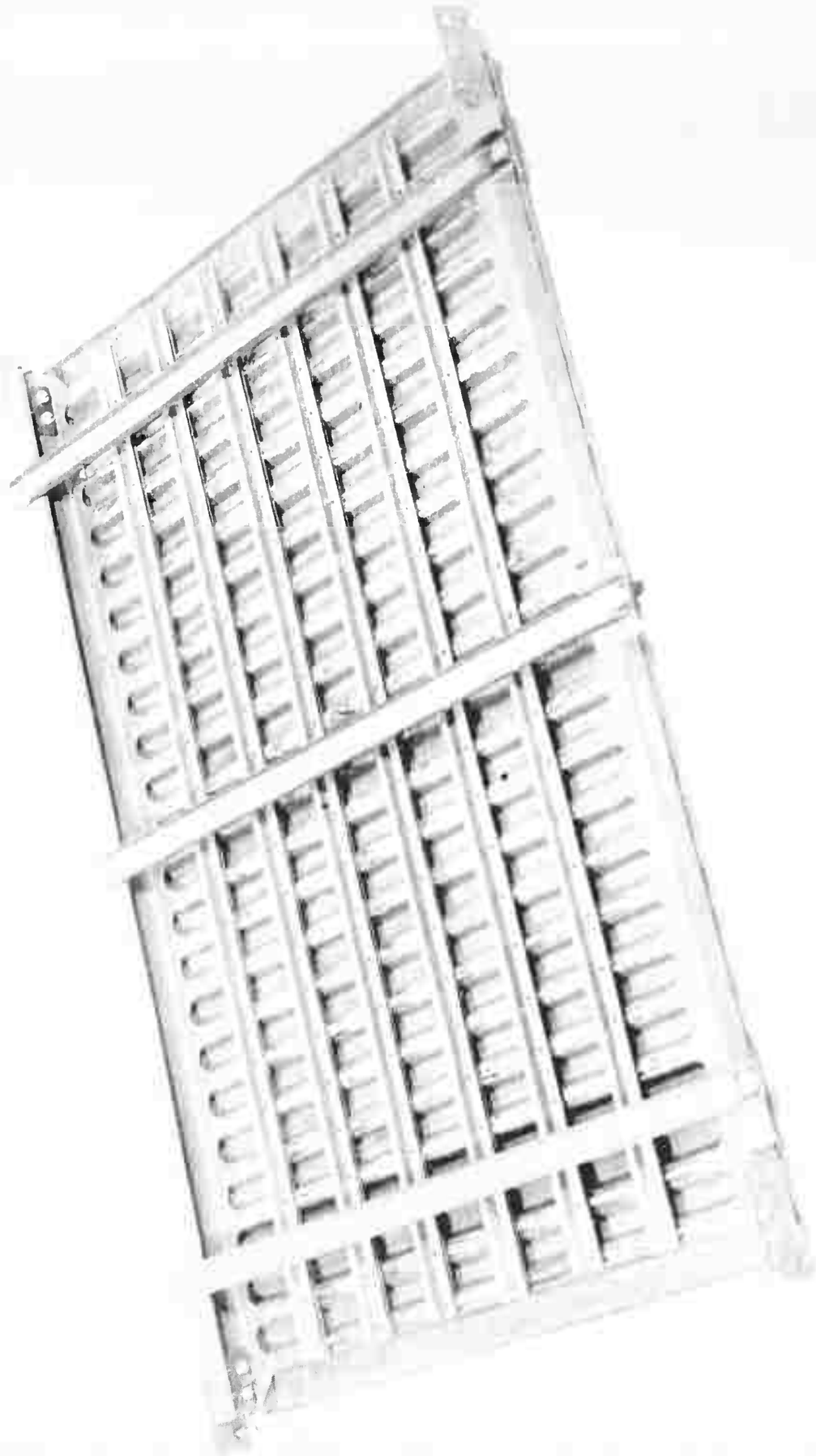
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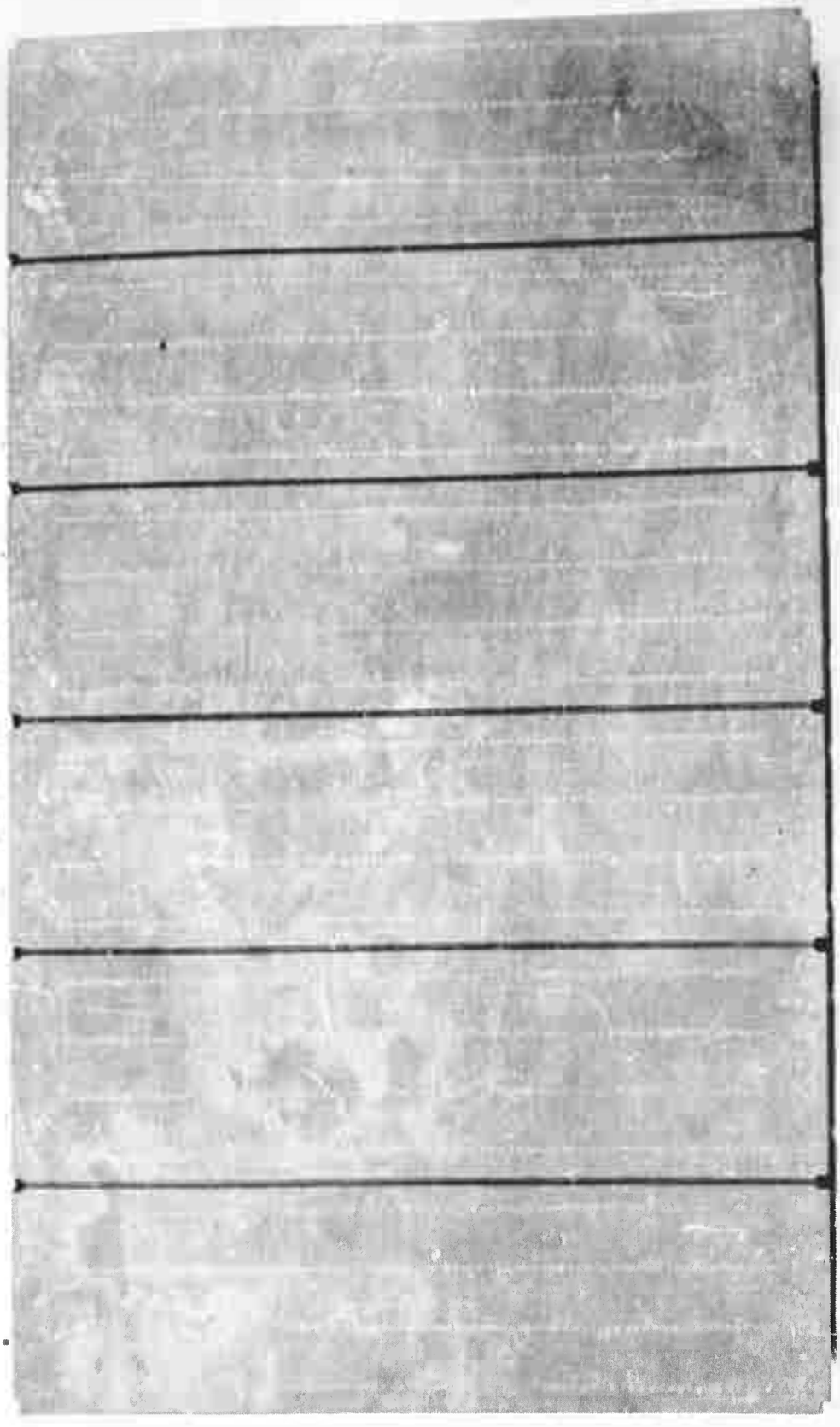
EWA 5-593
DWG. #25-20370 #1
BEFORE TEST

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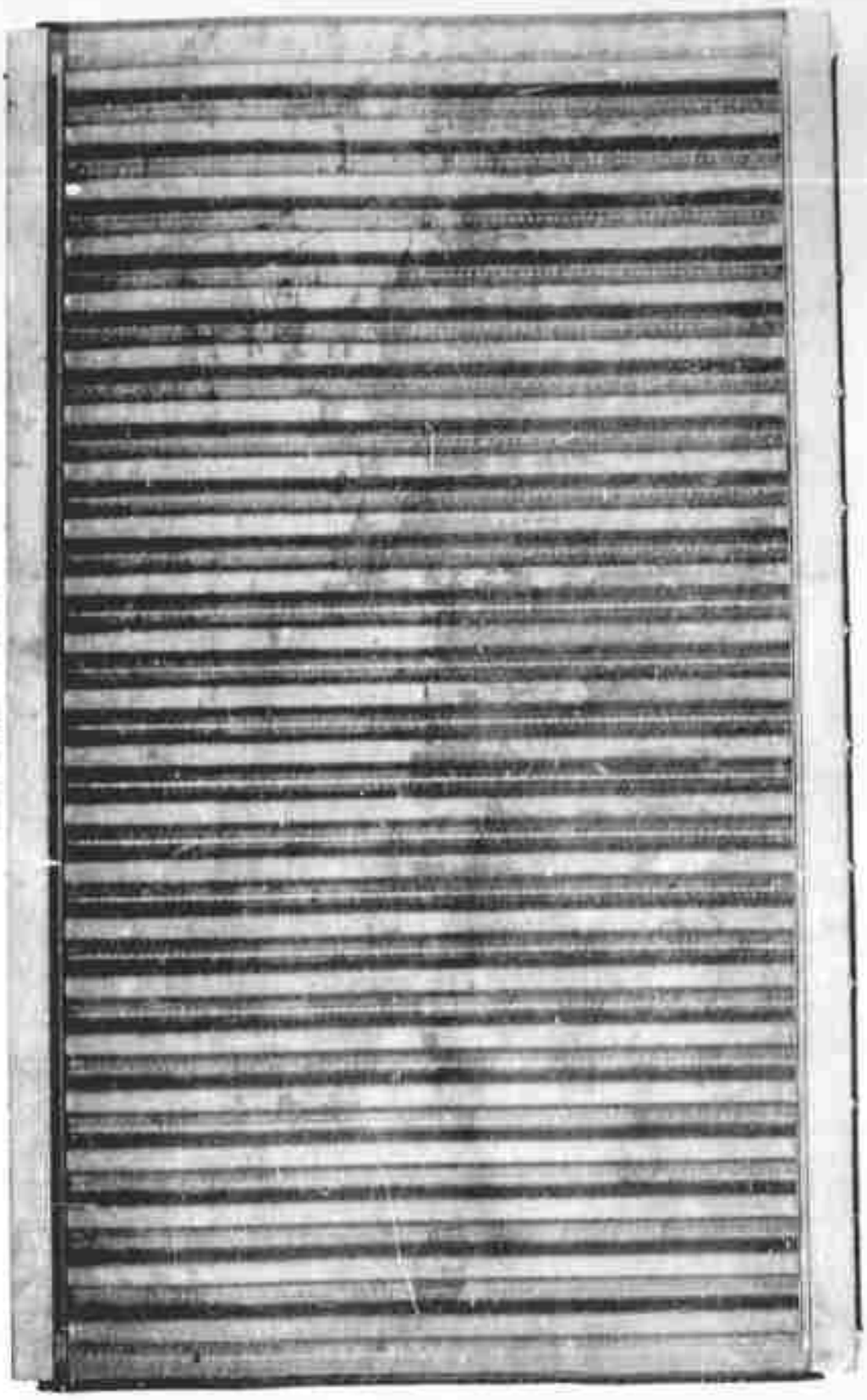
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DYNAMAT PANEL TYPE 1 11-14-61 2403065



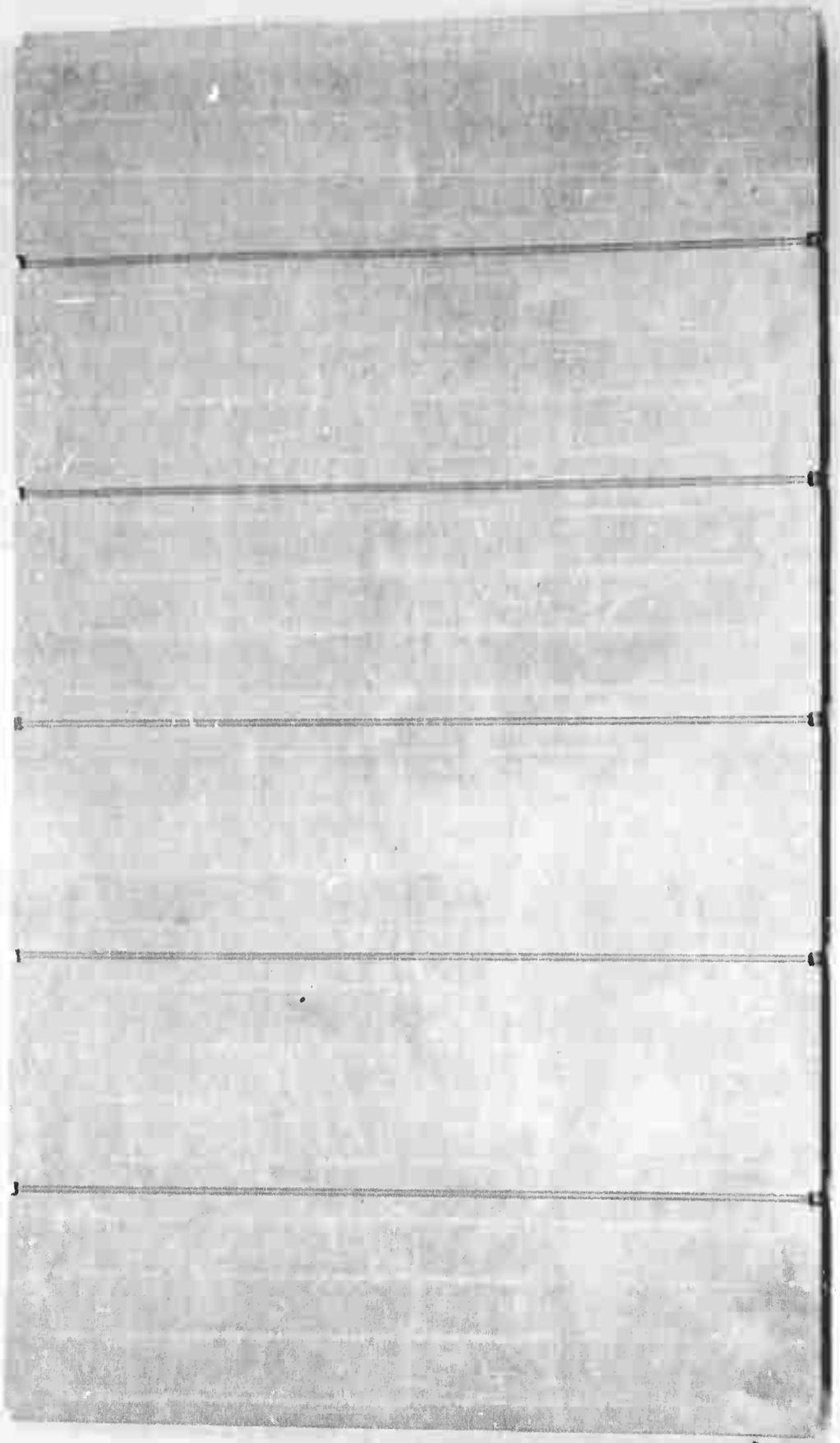
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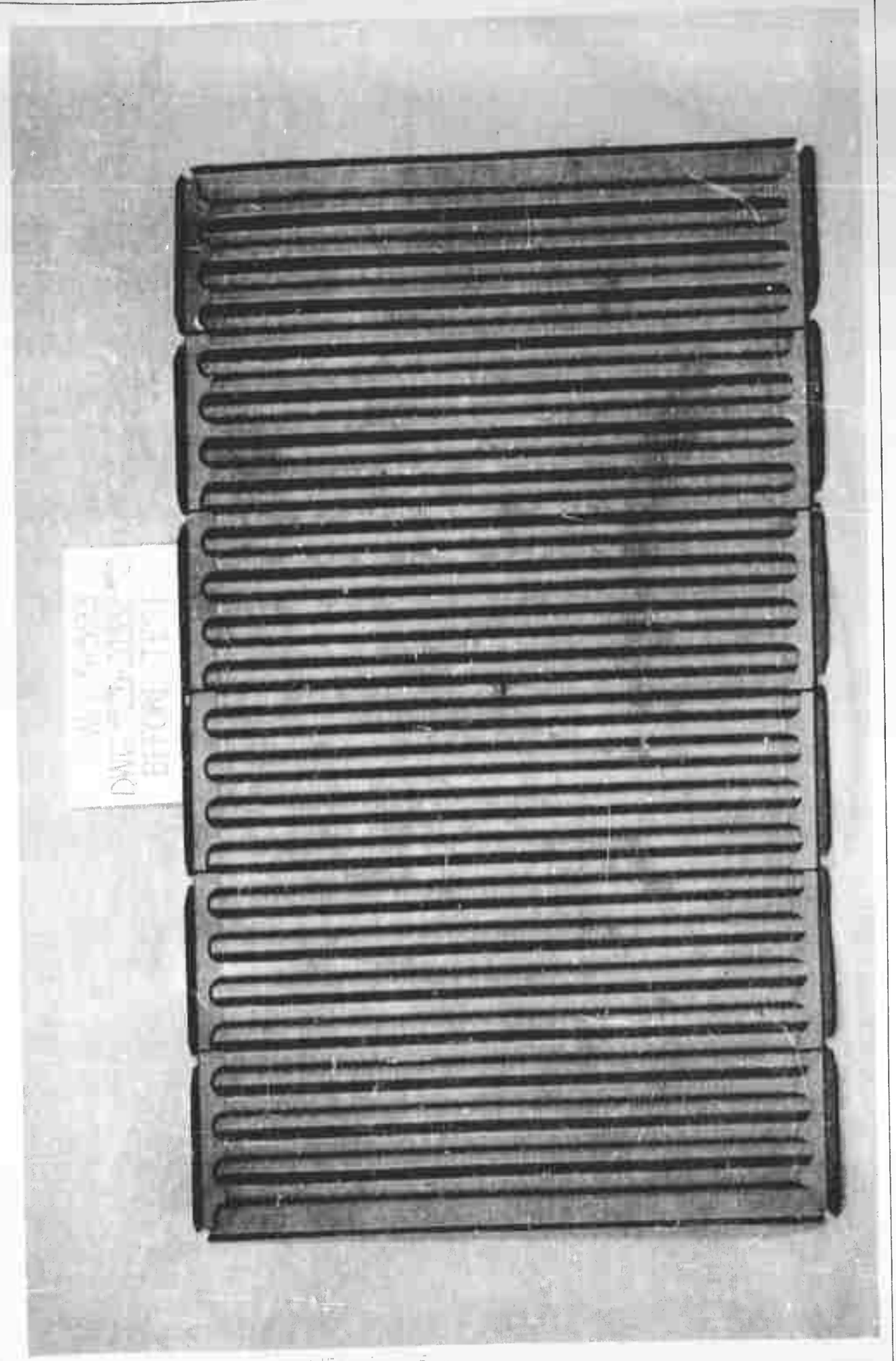
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BEFORE TEST

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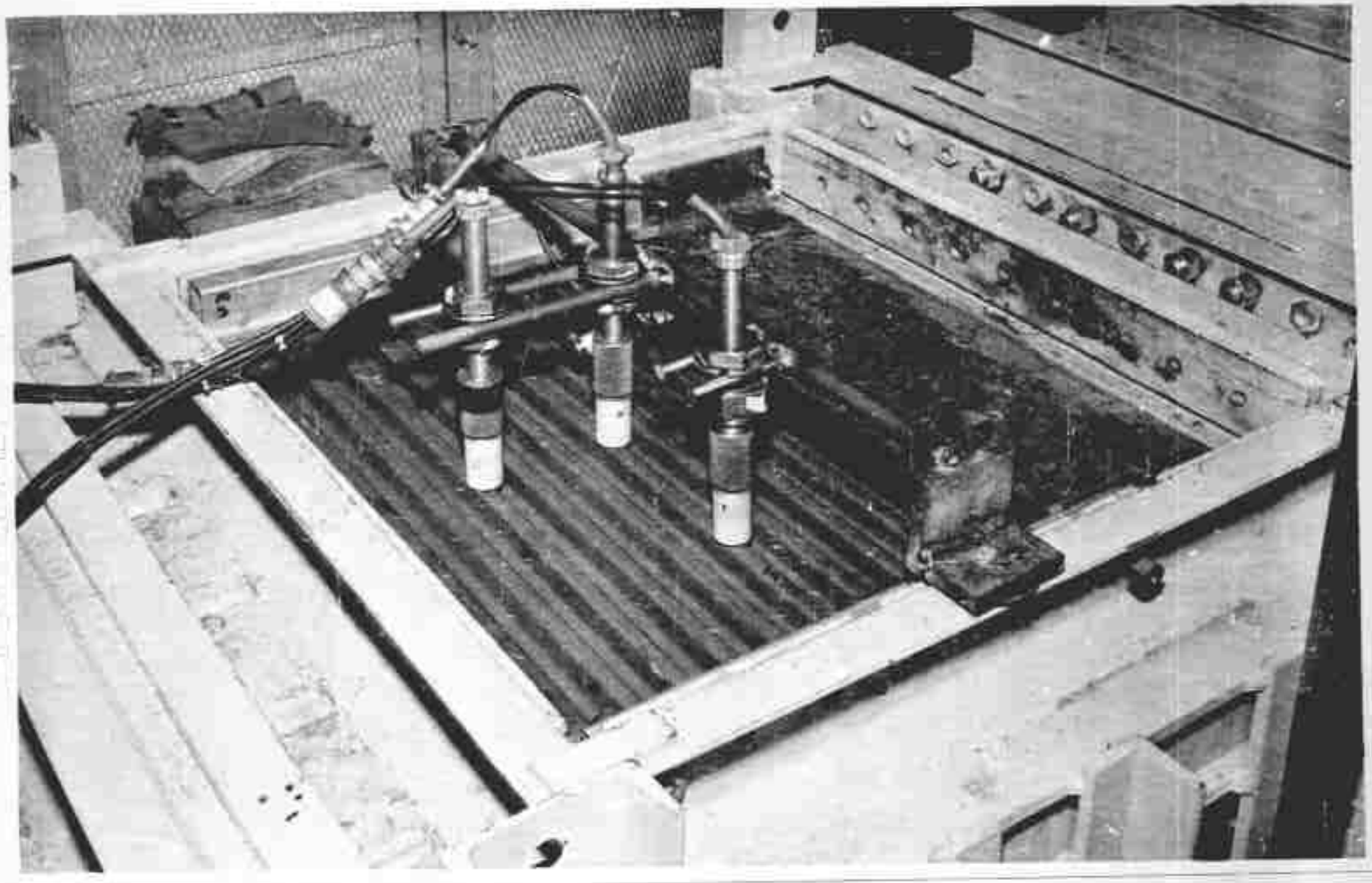
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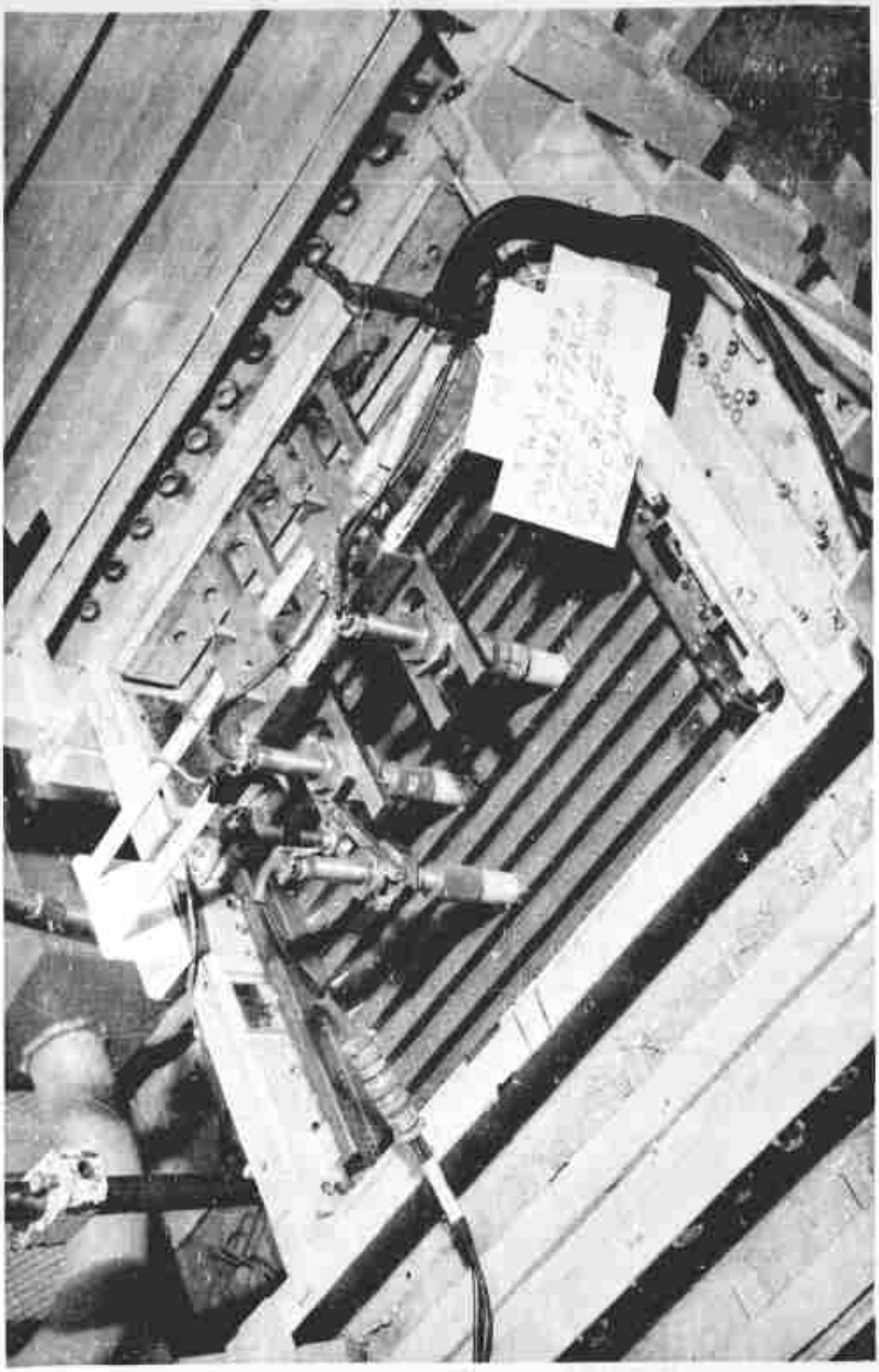
DS-I WING PANELS EWA 5-593 3-16-61 2A05045



DYNASOAR NON-INSULATED PANEL SONIC TEST SETUP 12-9-60 2A53510



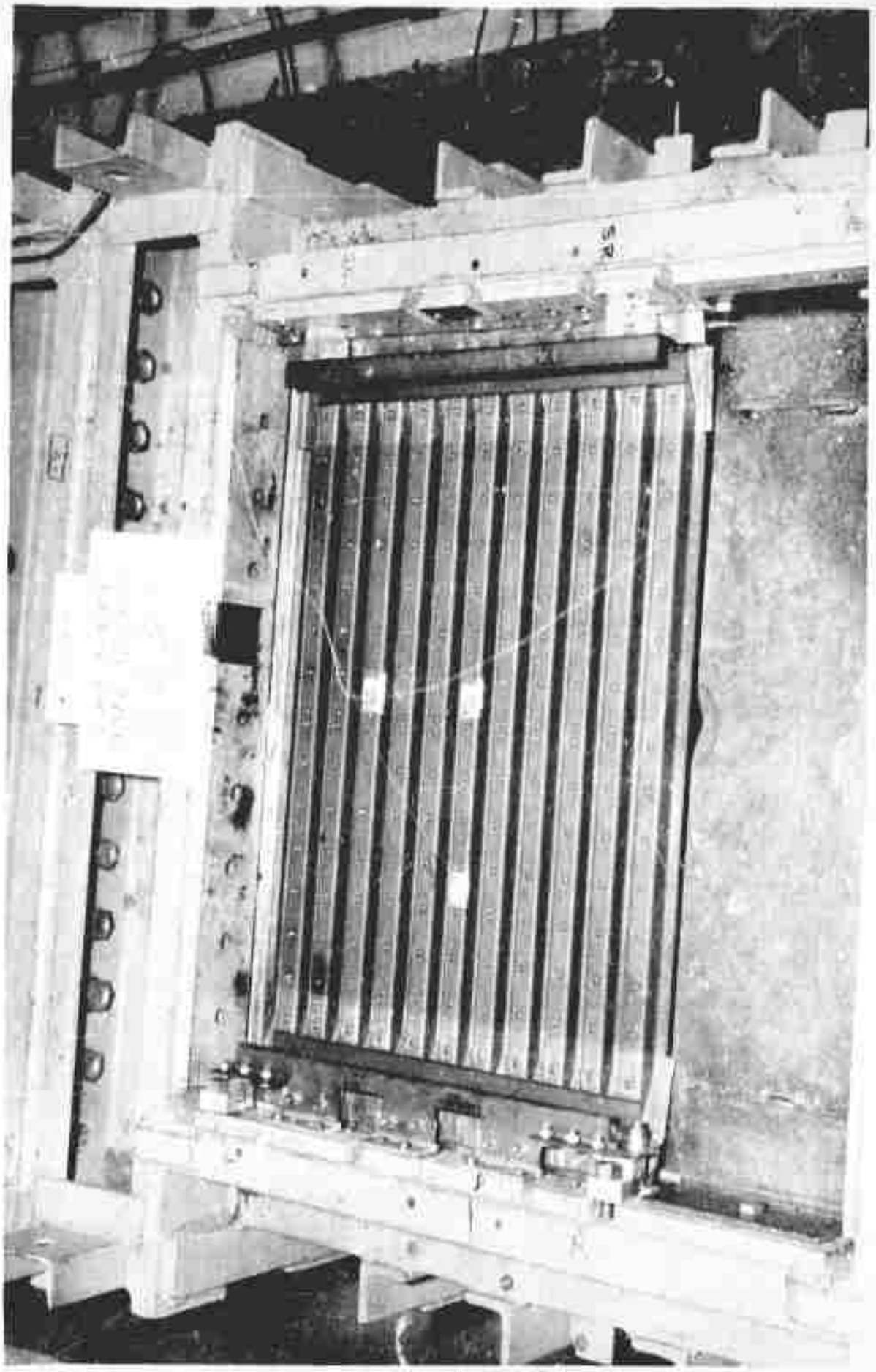
BOEING
VOL I



DS-1 EWA 5-593 PANEL 1499 TEST SETUP 2A06576
5-10-61

DYNASOAR NON-INSULATED PANEL SONIC TEST SETUP 2A53509
12-9-63

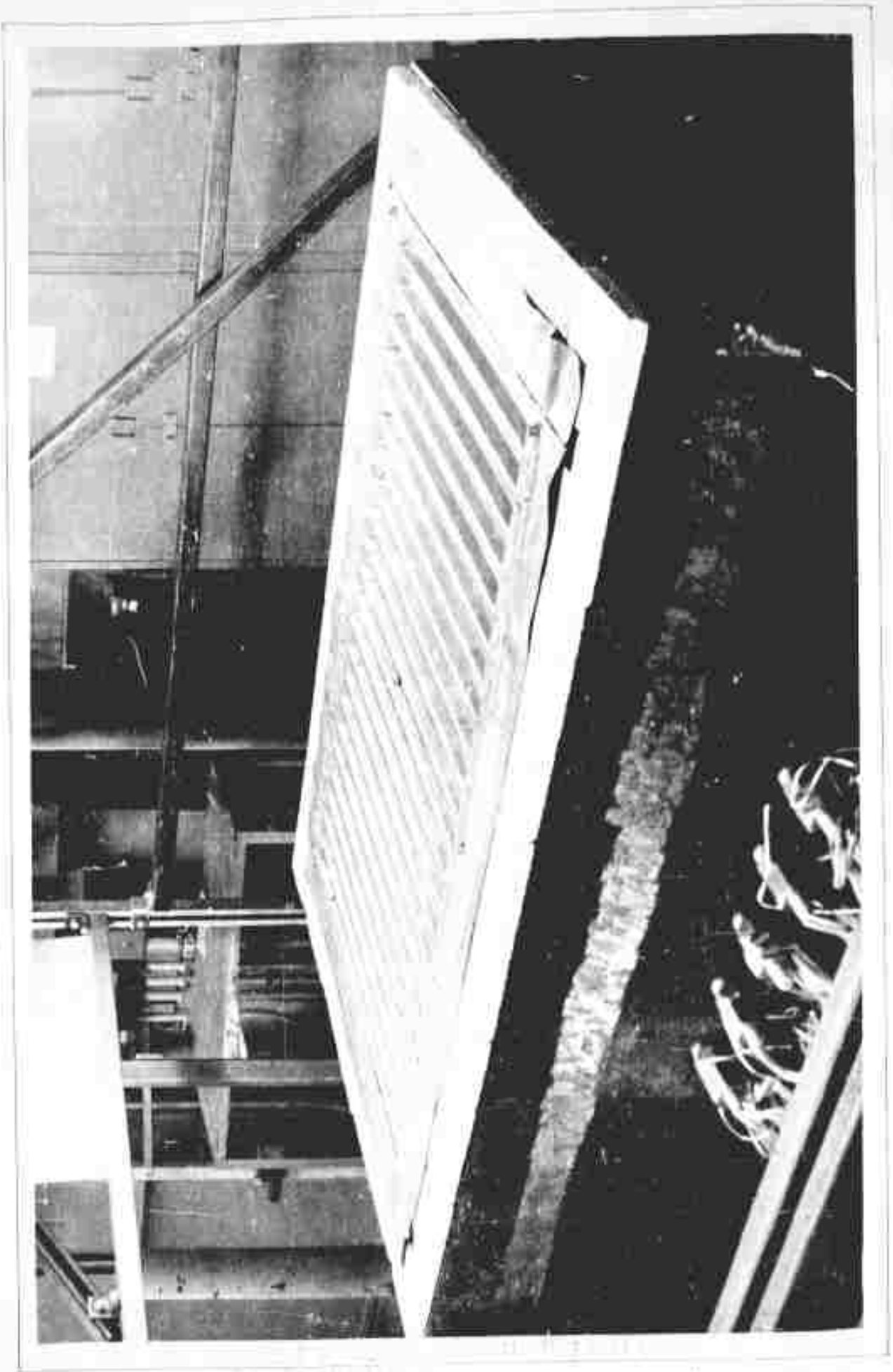
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DS-I EWA 5-593 PANEL 1499 TEST SETUP
5-10-61

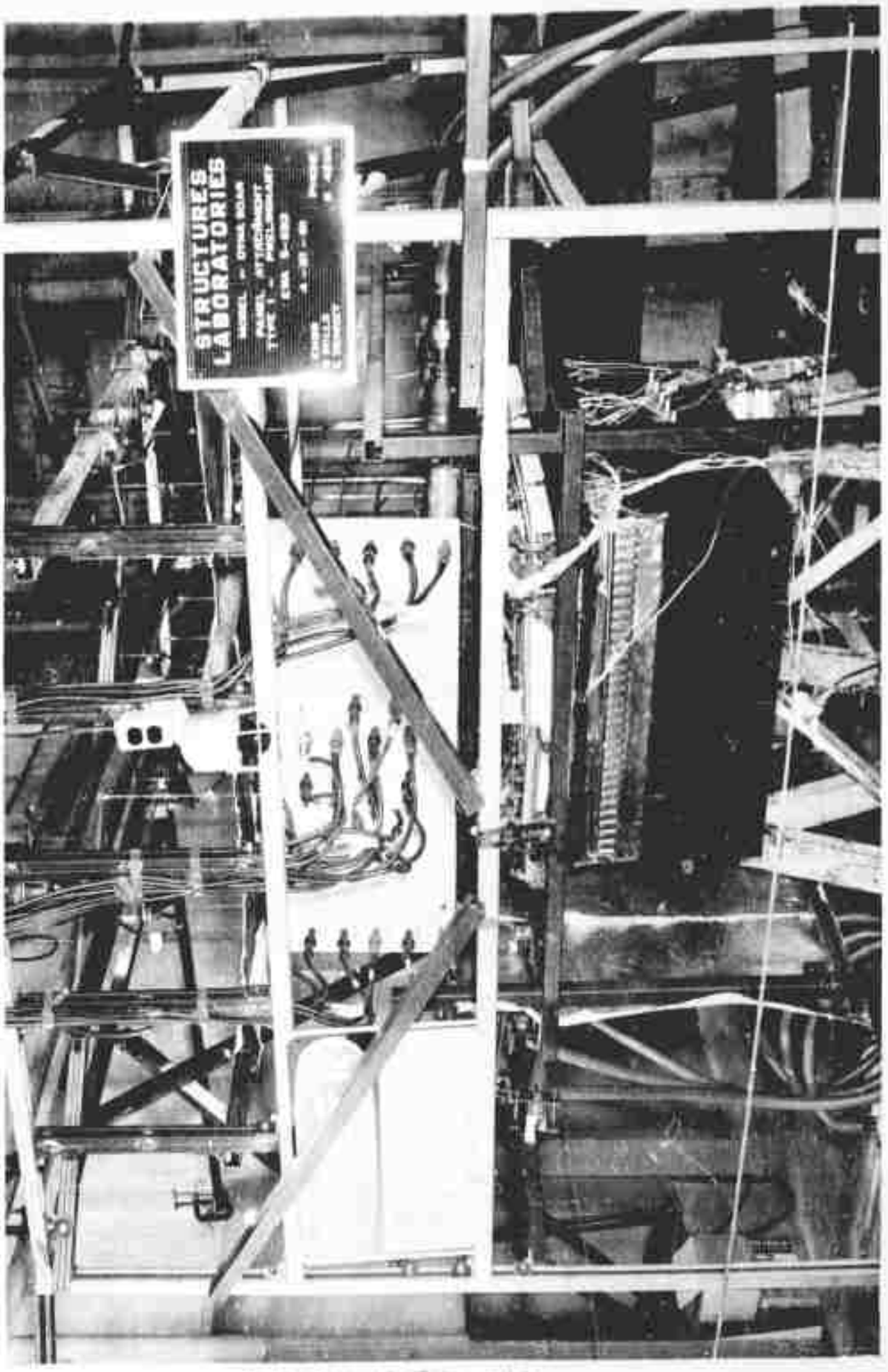
2A66675

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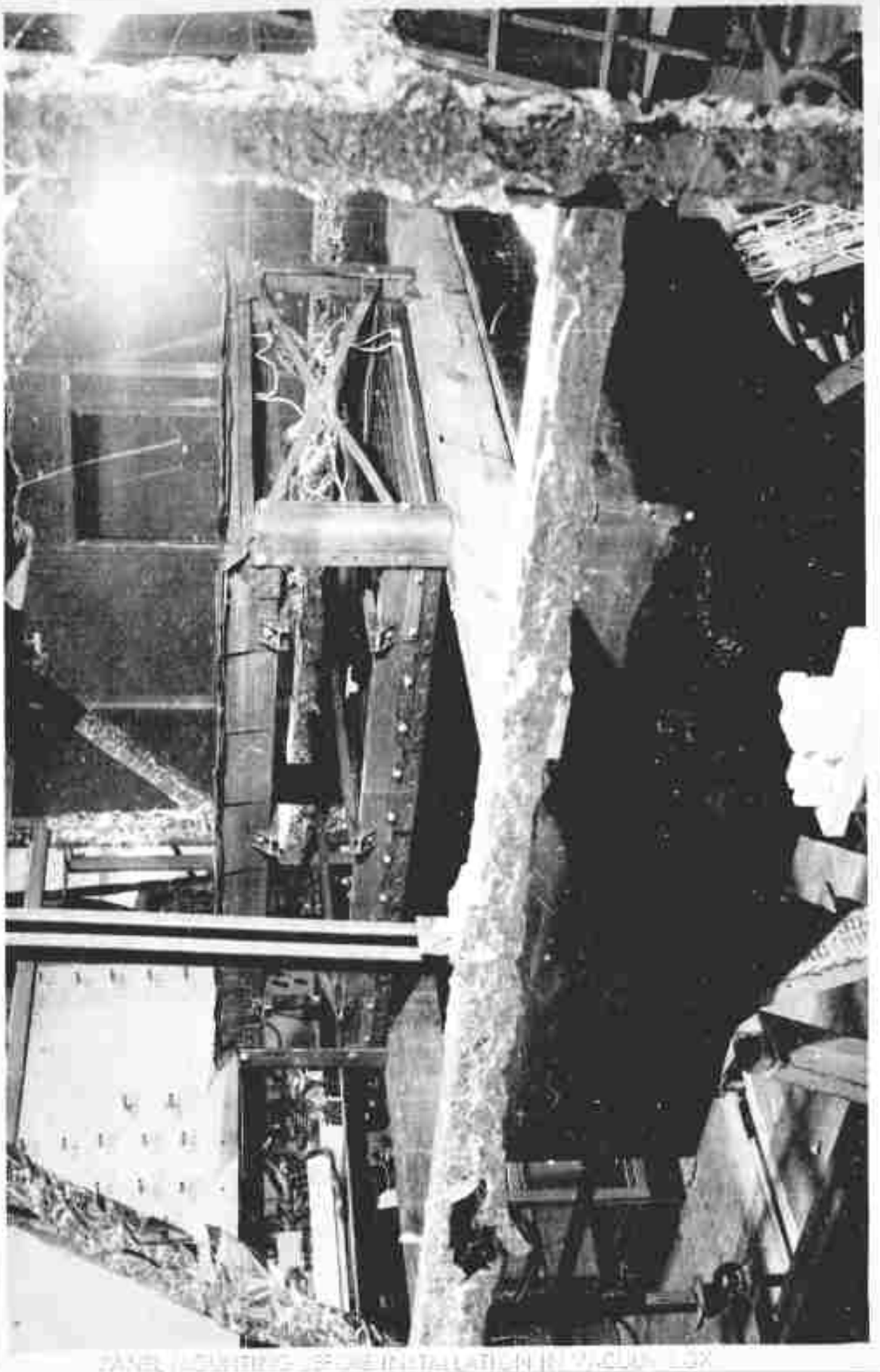
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DS-I - WING PANEL TEST SETUP EWA 5-593 4-7-61 A65684

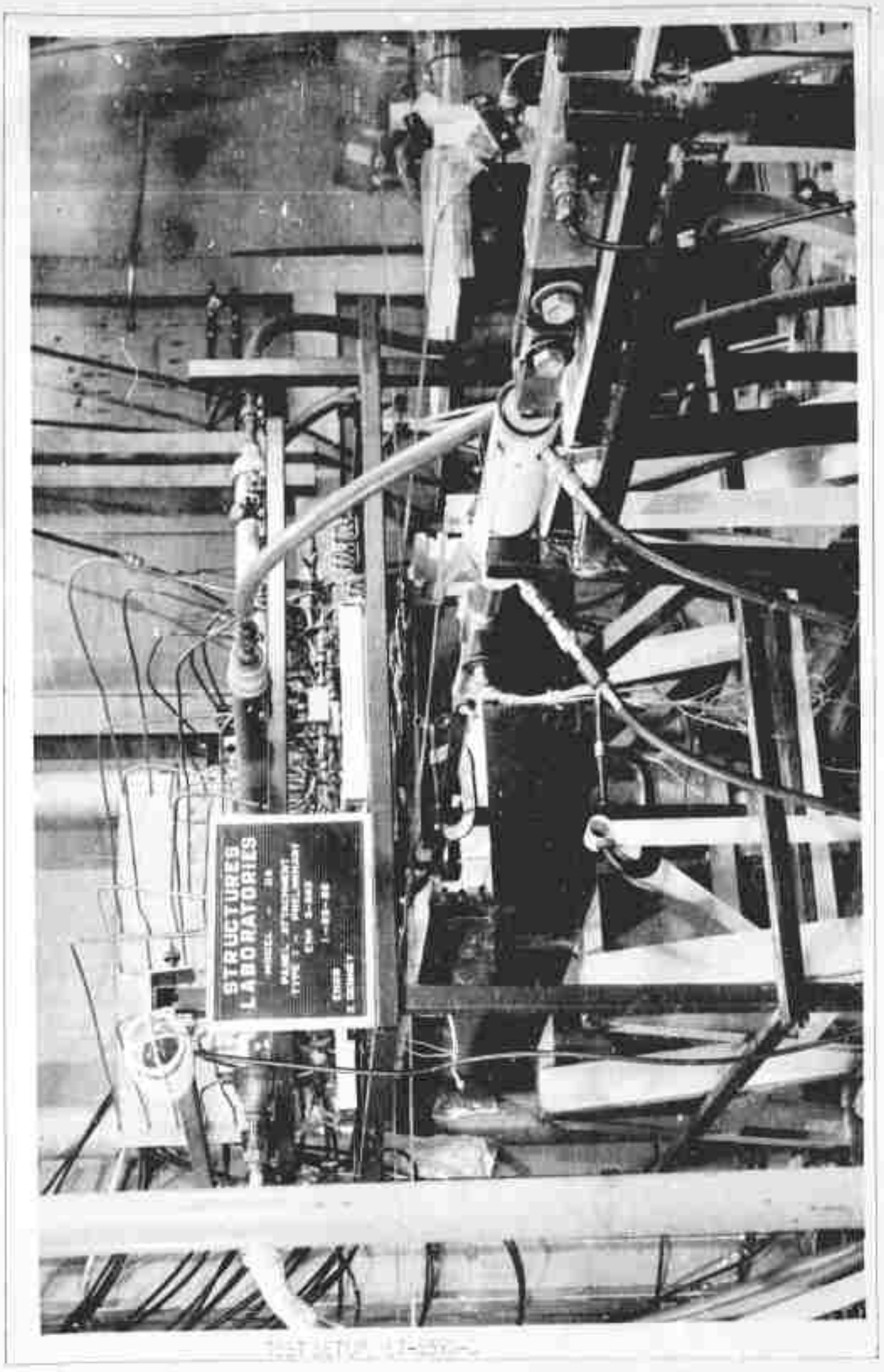


DS-1 WING PANEL TEST SETUP EMA 5-593 5-2-61 2A65952

TEST SETUP, LT-55[illegible] and -4

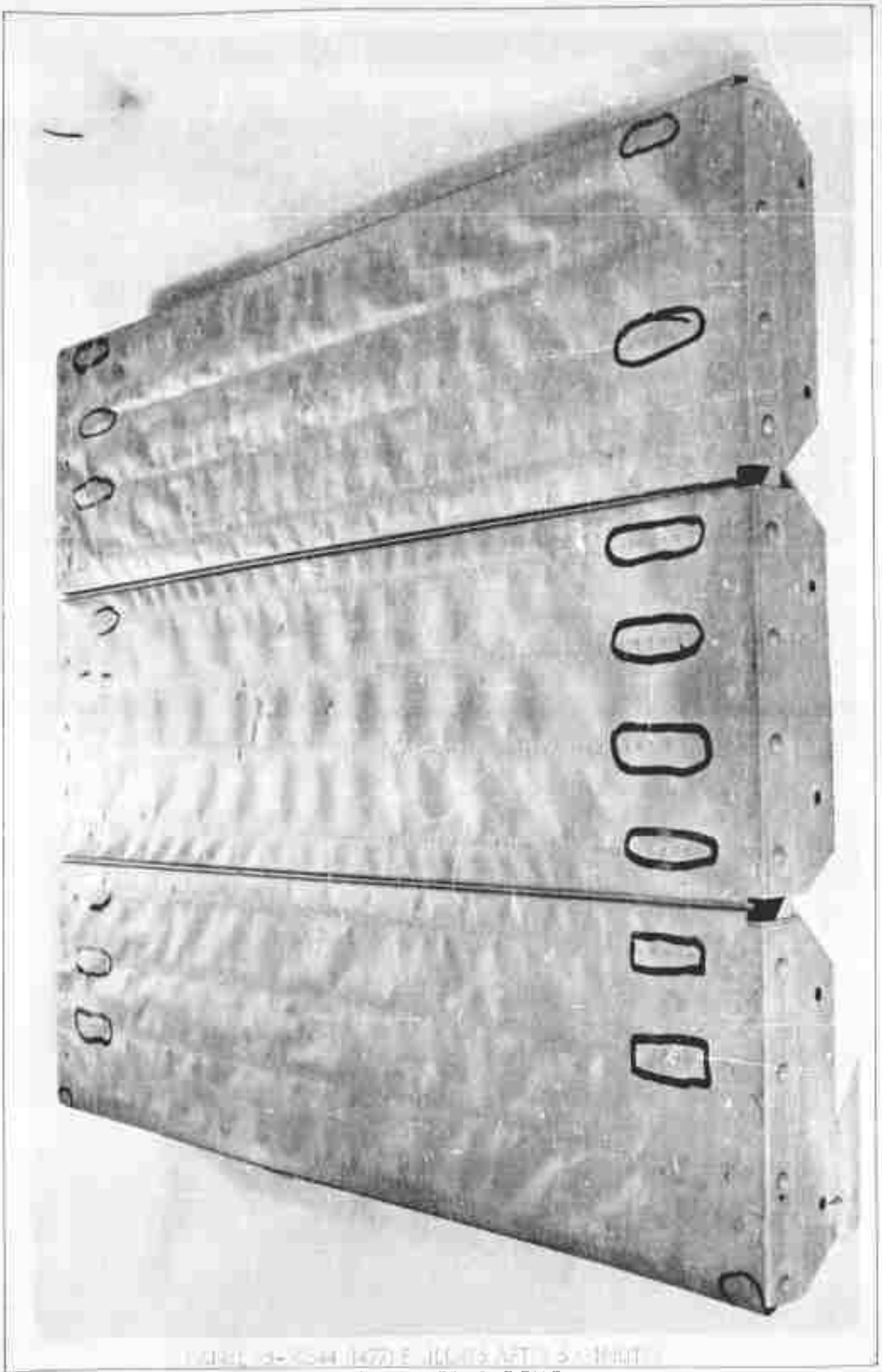


THERMO-FATIGUE TEST OF SIMULATED WING PANEL 2A9684-8
DS-I 8-21-61



DS-1 WING PANEL SHEAR TEST 1-26-62 2A1000019

U3-4071-1000 (was BAC 1546-L-R3)

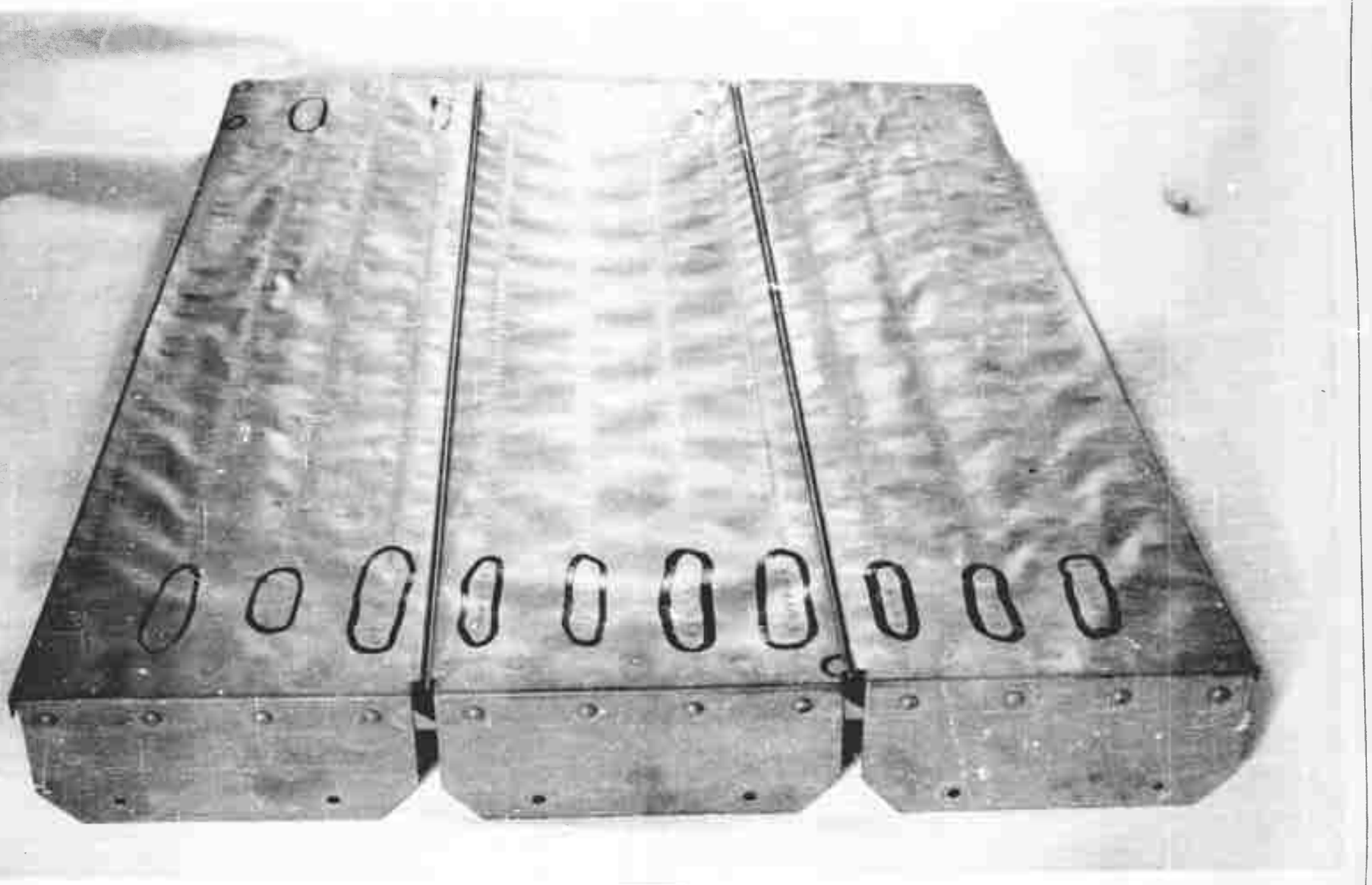


DYNASOAR SONIC TEST PANEL #1477 FAILURE
DIAGRAM #2A
12-20-60
2453856

U3-4071-1000 (was BAC 1546-L-R3) SONIC TEST AND 15 MINUTE HEAT TEST

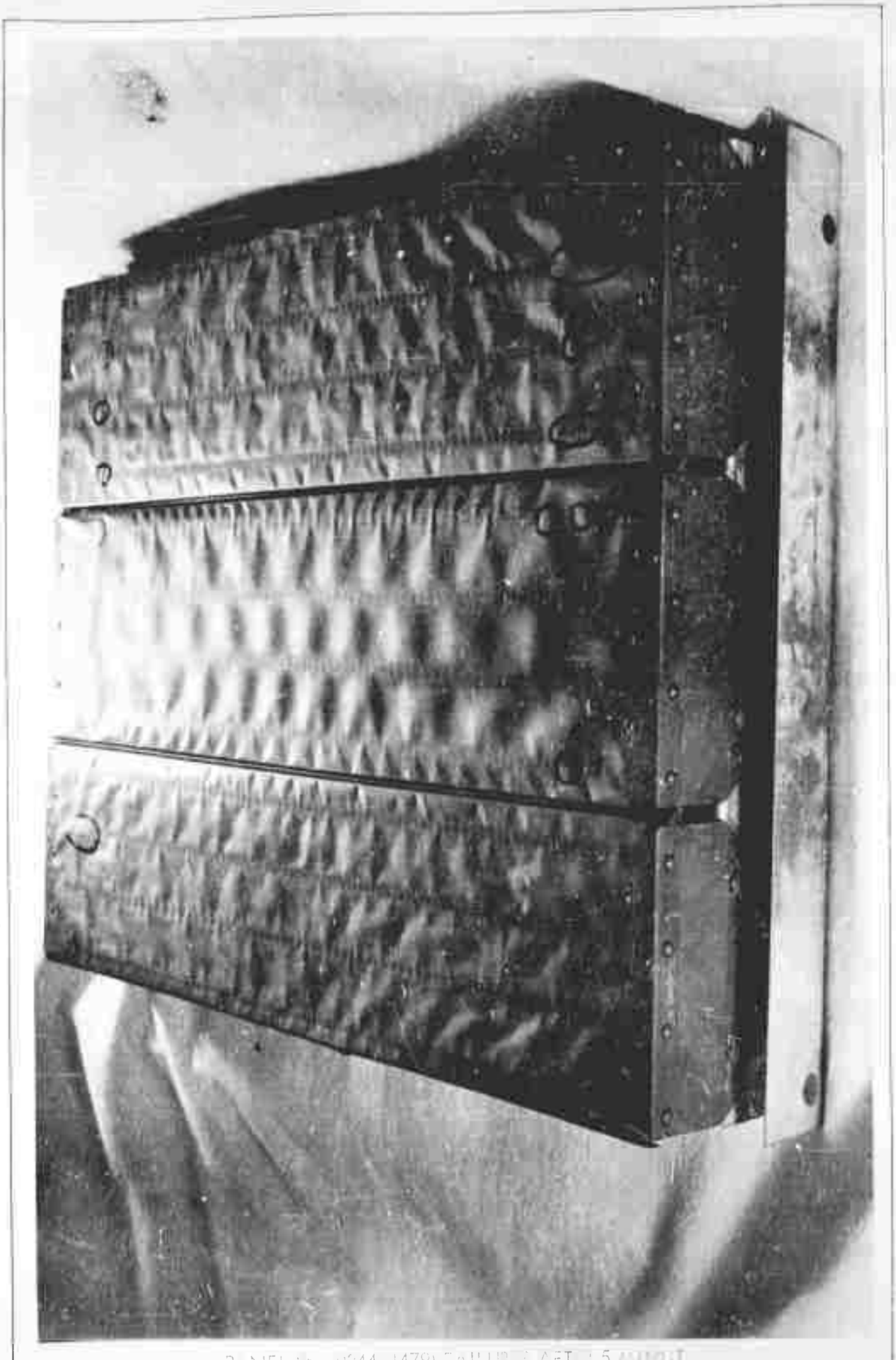
DYNASOAR SONIC TEST PANEL #1478 FAILURE
DIAGRAM #2A 12-20-60

2A53857



PANEL 5- 0.44 (478) FAILURE AFT R.S. INUT
SONIC TEST AND ISP. INUT TEST ST

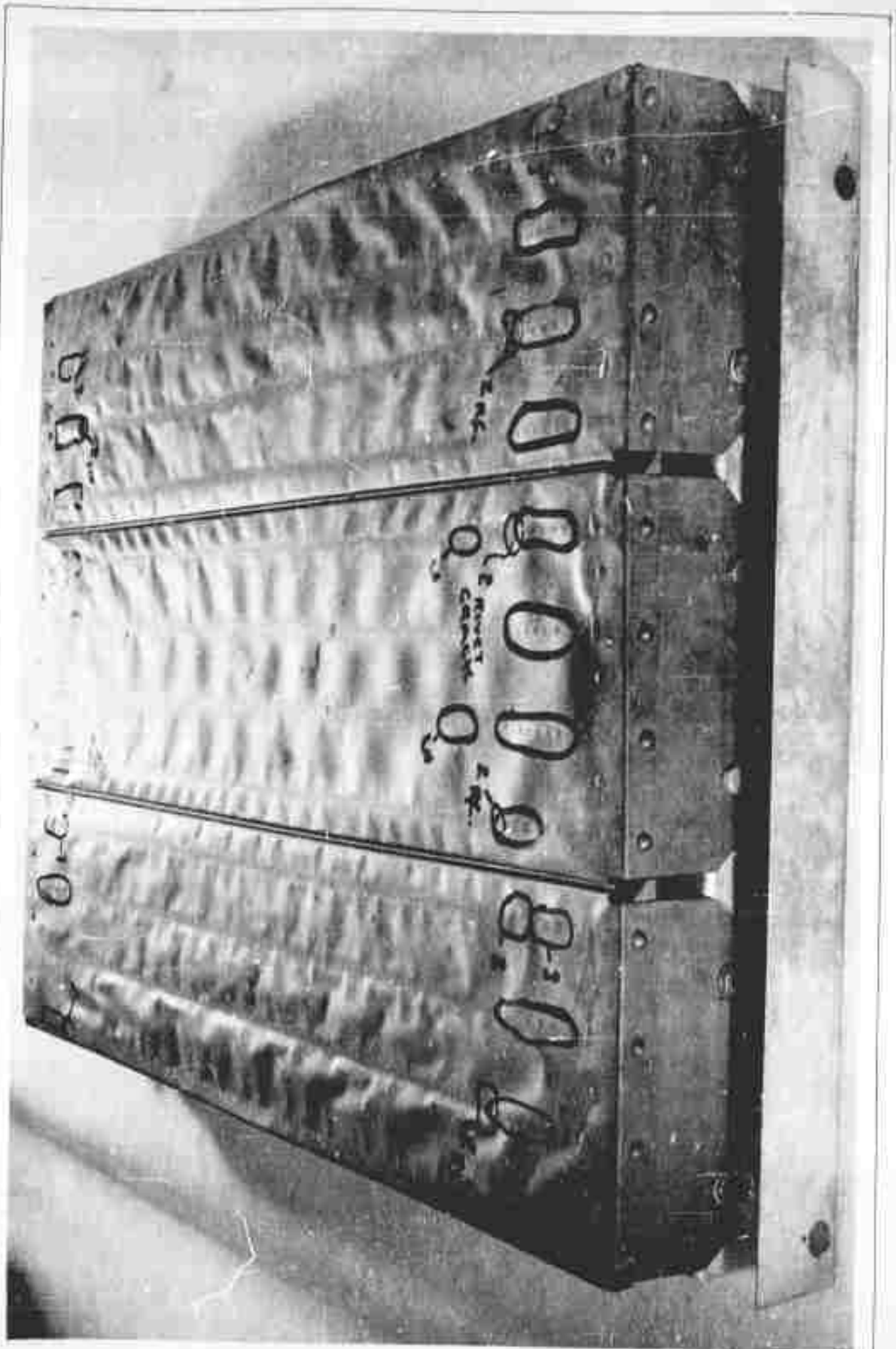
U3-407(1-000 (REV BAC 1546-L-R3)



PANEL 25-0344 (479) FAILURE AFTER 5 MINUT
SONIC TEST AND 15 MINUTE HEAT TEST

DYNASOAR SONIC TEST PANEL FAILURE - HEAT PANEL 2A53842
NO. 3 RE-TEST
12-19-60

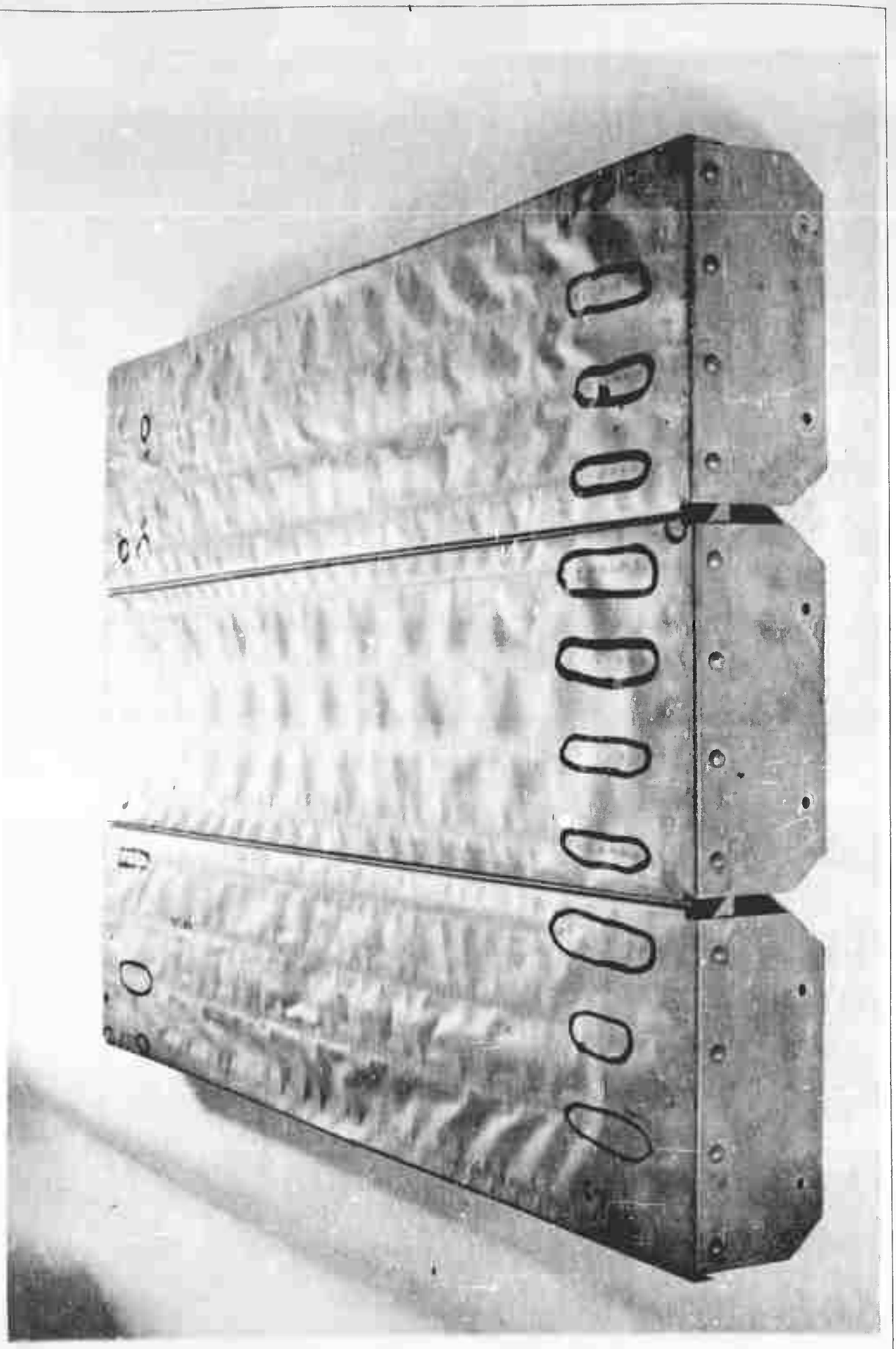
U3-4071-1000 (was BAC 1546-L-R3)



PANEL 5-10344 (1477) FAILURE AFTER 30 MINUTE SONIC TEST AND 15 MINUTE HEAT TEST

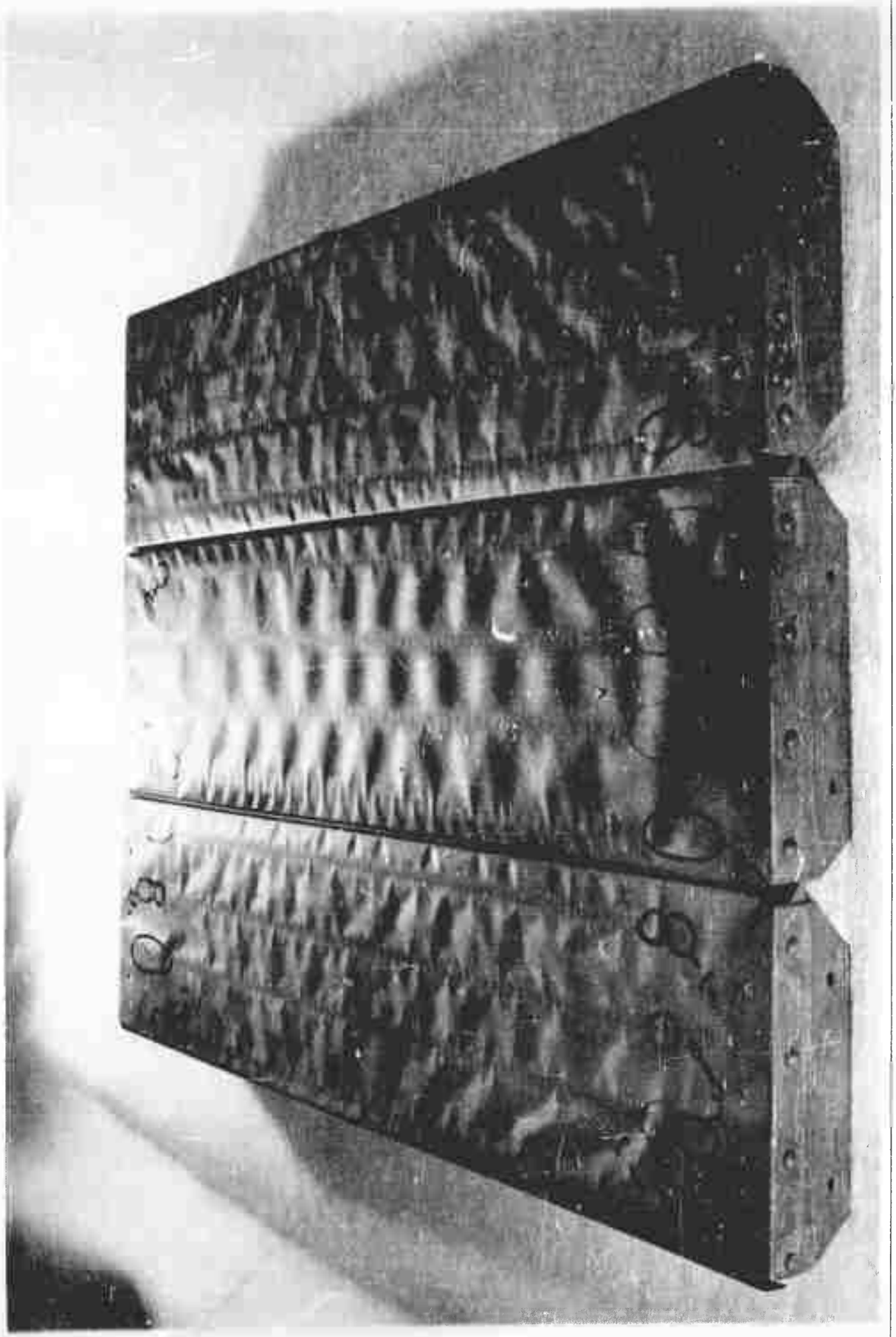
DS-1 PANEL #1477 SONIC TEST FAILURE DIAGRAM 2454930
12-28-60

U3-4071-1000 (was BAC 1546-L-R3)



DS-1 PANEL #1478 SONIC TEST FAILURE DIAGRAM 2A54931
12-28-60

PANEL DS-1 (1344 1478) FAILURES AFTER 30 MINUTES
SONIC TEST AND 15 MINUTES AT TEST



PANEL L5-0044 (147%) FAILURES AFTER 60 MINUT. SONIC TEST AND 15 MINUTE HEAT TEST

DS-1 PANEL #1479 SONIC TEST FAILURE DIAGRAM 12-28-60

2454932

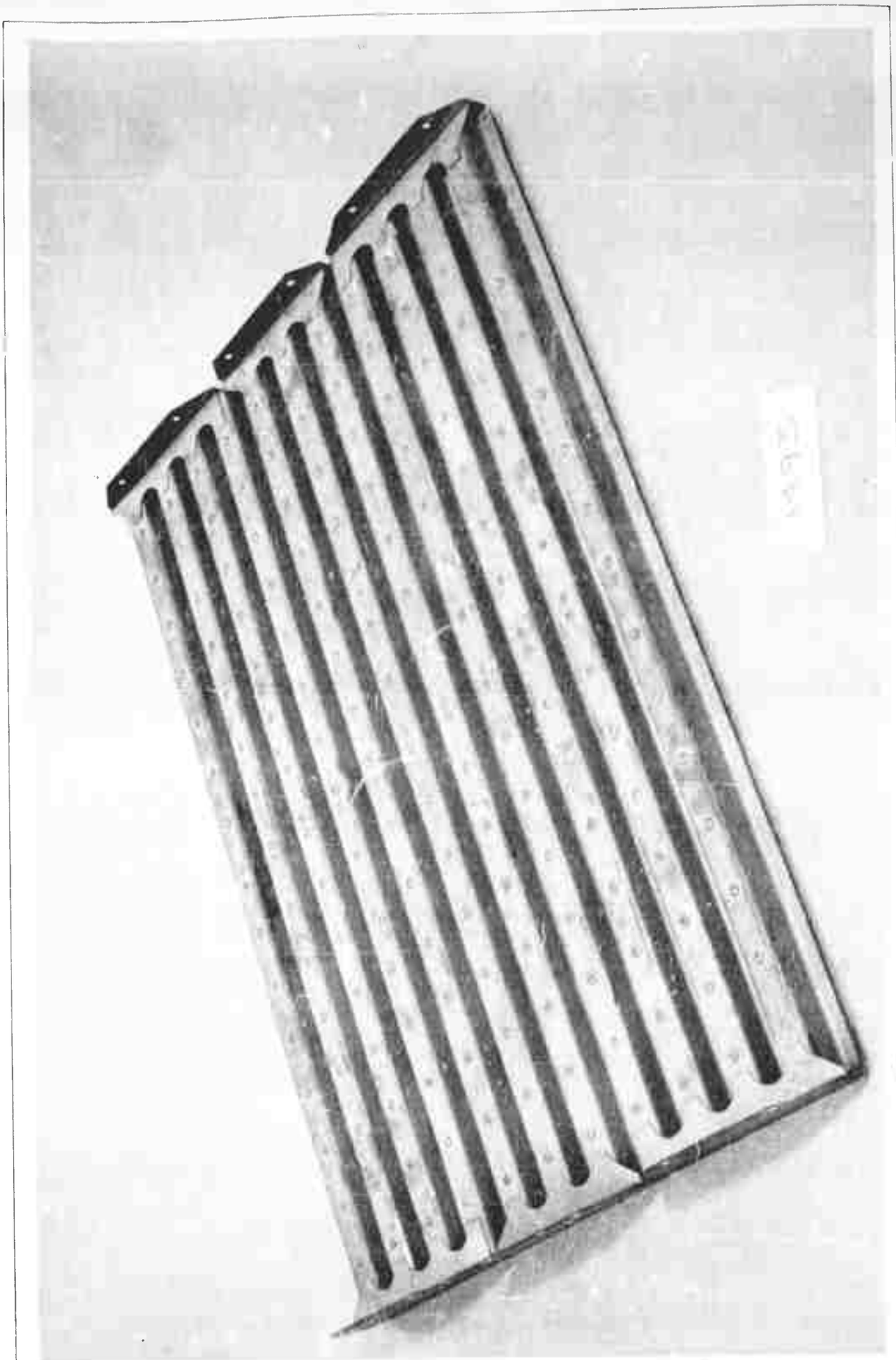
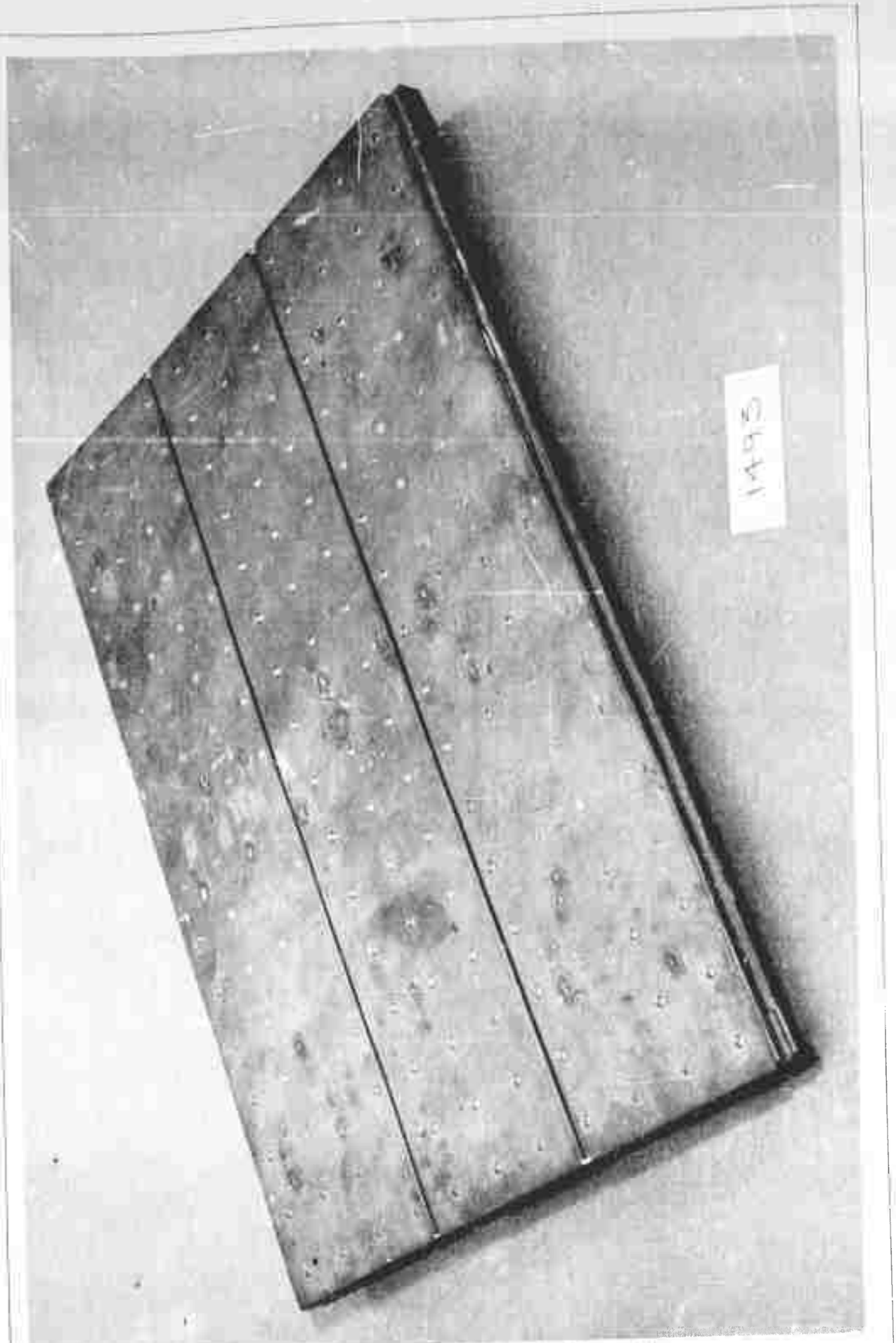


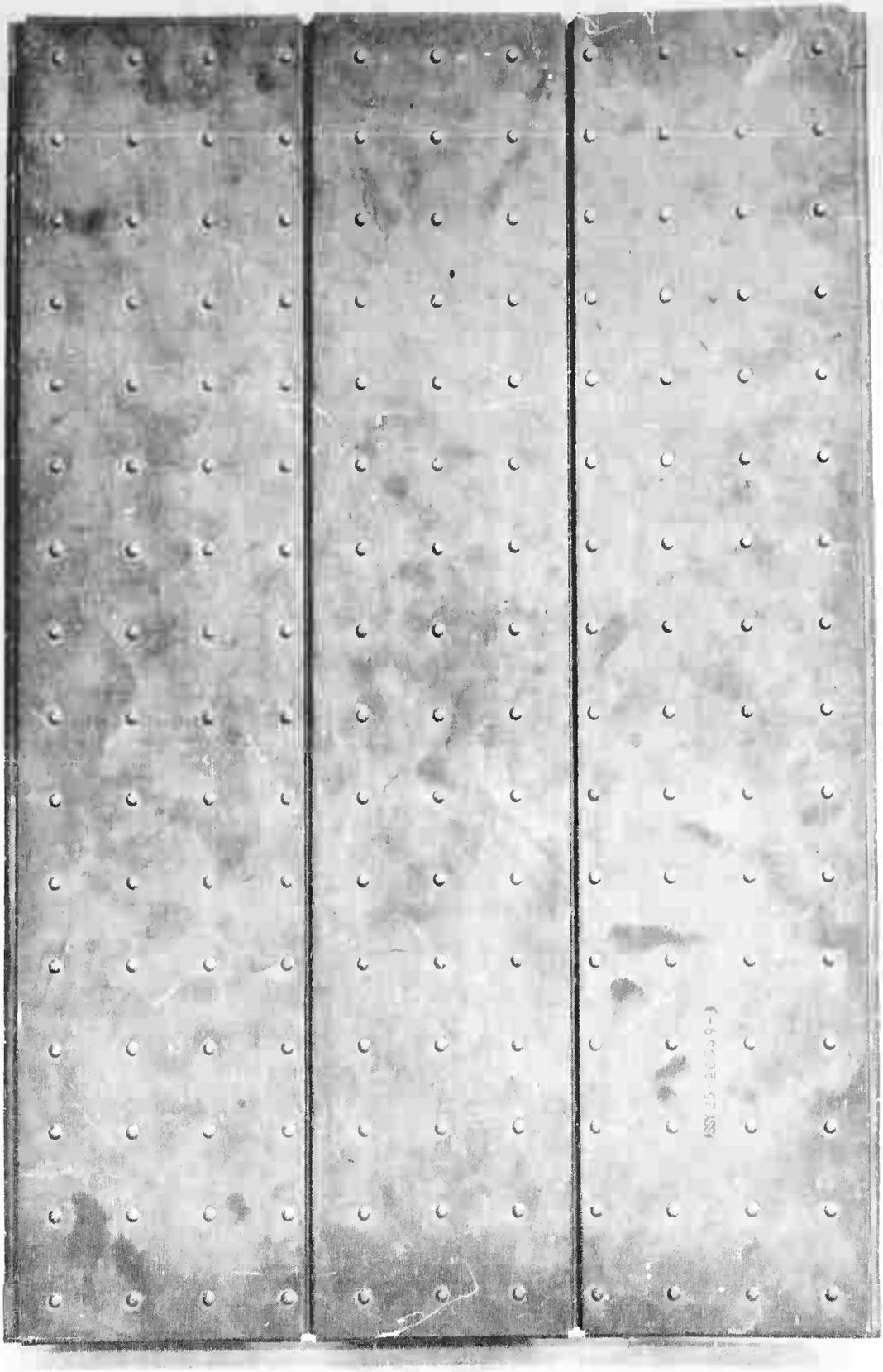
FIGURE D2-[illegible]-1493 AFTER 3 MINUTE SONIC
TEST AND HEAT TEST (TOP VIEW)

S-I BWA 5-593 AFTER HEAT & SONIC TESTING A66658
5-9-61



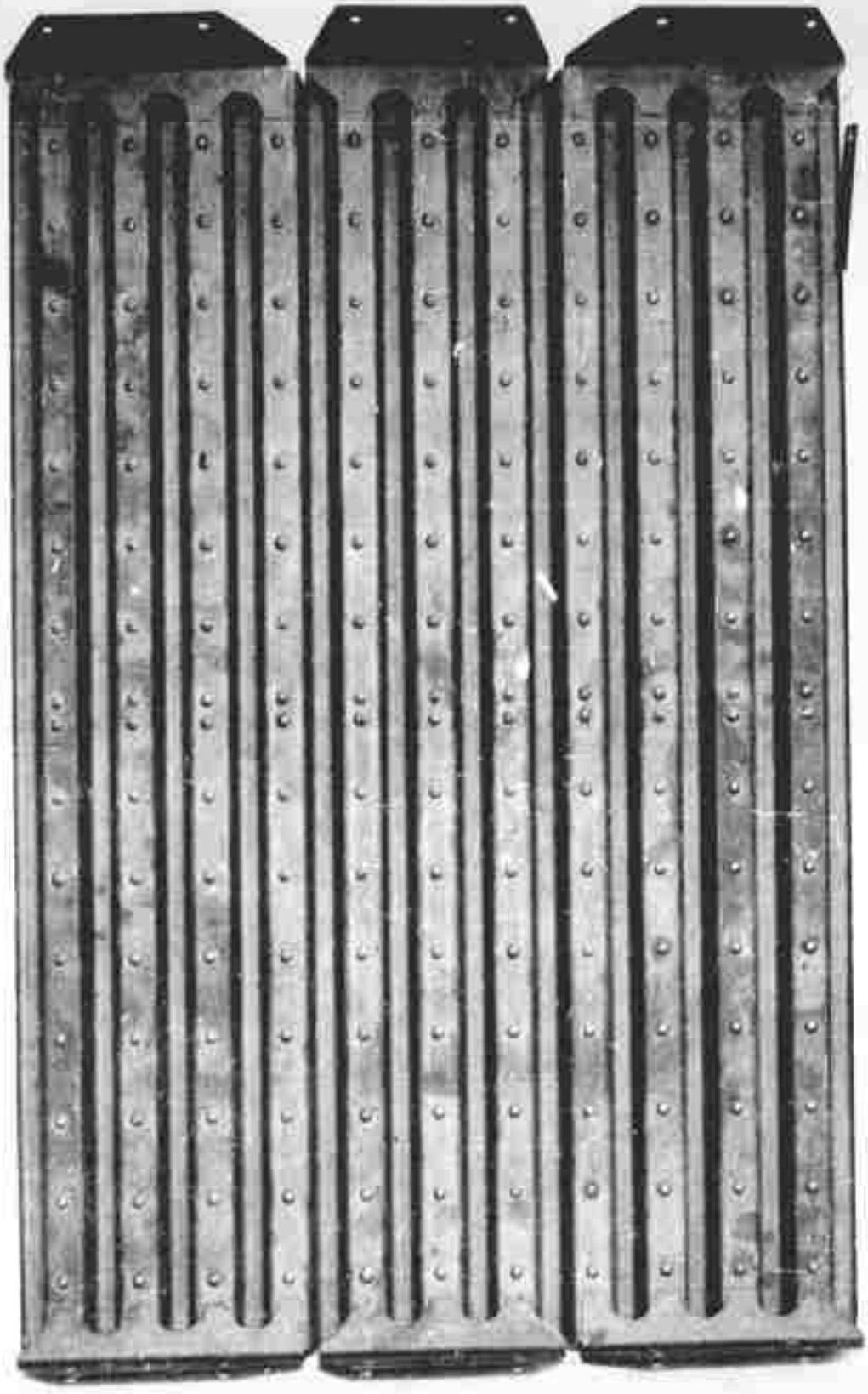
PANEL B-3-3534-1 (1493) AFTER 5 HR UTI SONIC
TEST AND HEAT TEST (BOTTOM VIEW)

US-I EWA 5-593 AFTER HEAT & SONIC TESTING 5-9-61 2A6-55



DS-I INSULATED PANEL # 1494 PWA 1598 - 3-28-61 2A 377C

PANEL 25-20359-1 (1494) AFTER 5-1/2 MINUTE SONIC TEST AND HEAT TEST (TOP VIEW)



PANEL 25-20659-1 [illegible] FT. [illegible]-MINUTE SONIC
TEST AND HEAT TEST BOTTOM VIEW

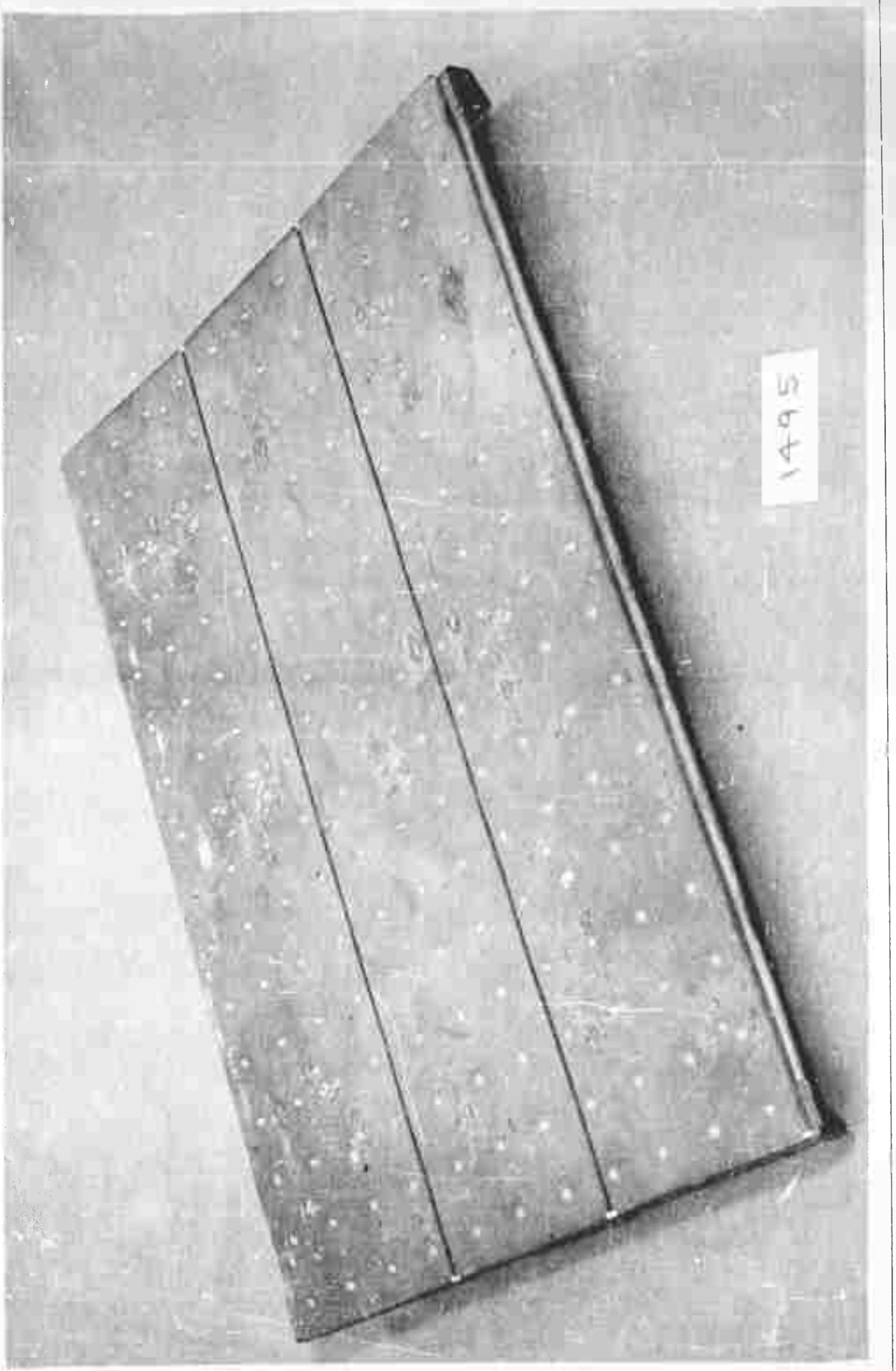
DS-1 INSULATED PANEL #1494 DWA 5598- SONIC 2463771
TEST 3-28-61



PANEL D5-10039-1 (495) AFTER SONIC
TEST AND HEAT TEST (TOP VIEW)

DS-1 FWA 5-593 AFTER HEAT & SONIC TESTING 5-9-61 A66516

U3-4071-1000 (was BAC 1546-L-R3)



PANEL 15-7369-1 (1495) AFTER 5 MINUTE SONIC TEST AND HEAT TEST (BOTTOM VIEW)

DS-I INSULATION PANEL AFTER HEAT AND SONIC TEST PANEL 1497 EWA 5-593 7-3-61

2A82706



U3-407.1-1000 (was BAC 1546-L-R3)

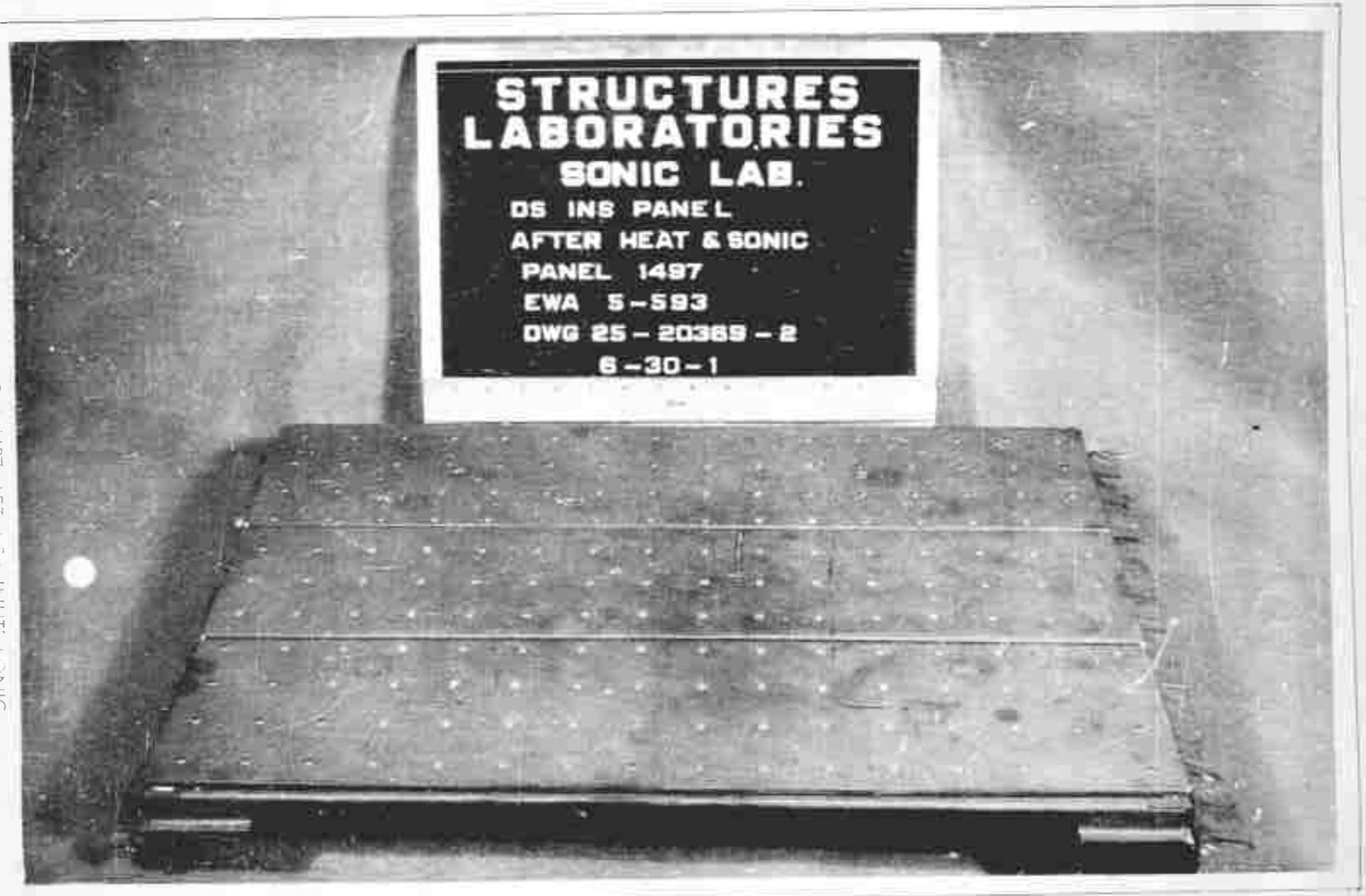
BOEING

VOL I

NO. D2-[illegible]

PAGE FIG. [illegible]

DS-I INSULATION PANEL AFTER HEAT AND SONIC TEST PANEL 1497 EWA 5-593 7-3-61 2A82705



PANEL 5-0399-1 (1497) AFT R.S. INNUT SONIC TEST AND HEAT TEST (BOTTOM VIEW)

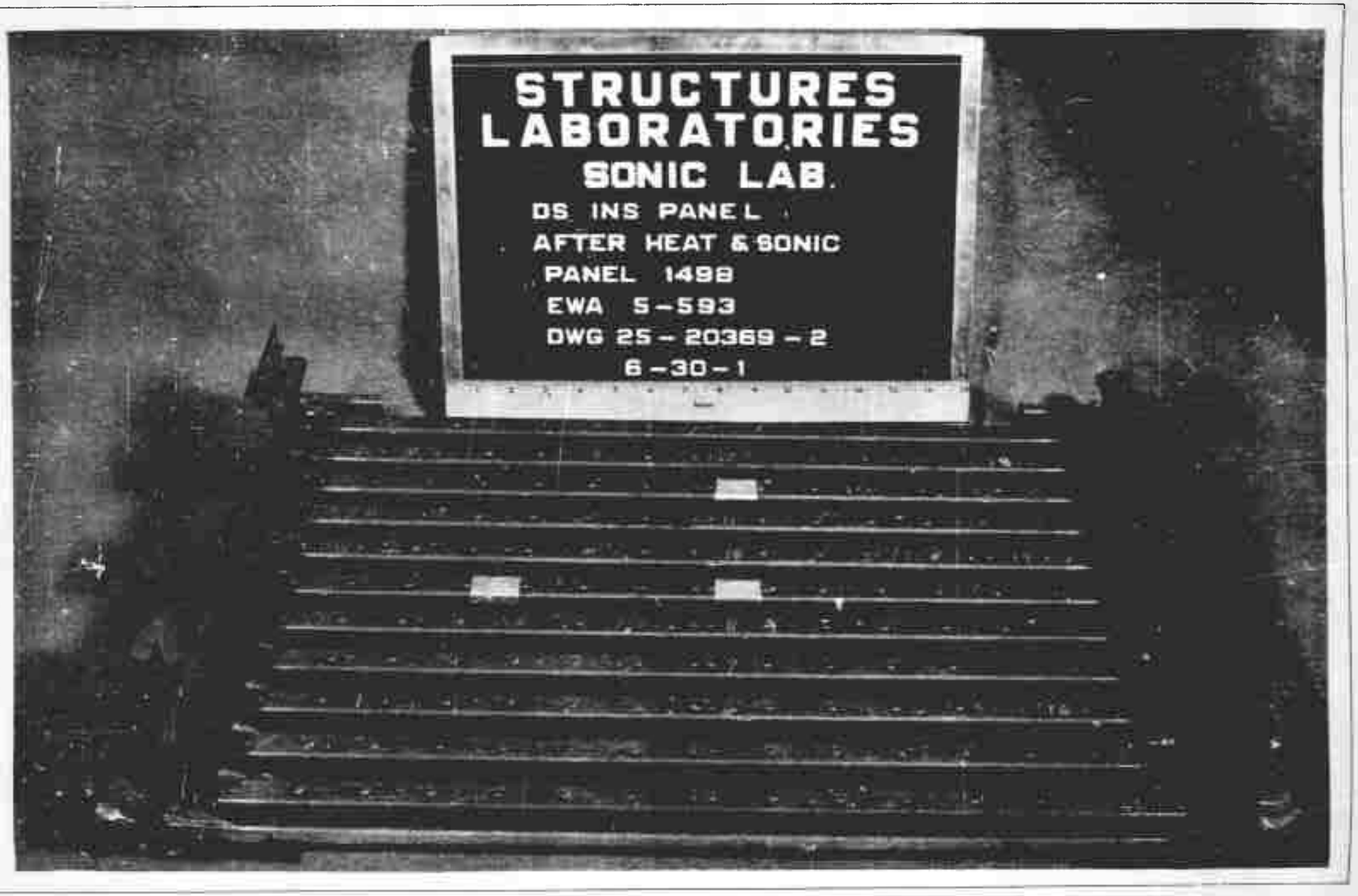
U3-4071-1000 (was BAC 1546-L-R3)

BOEING VOL I

NO. D2-00[illegible]

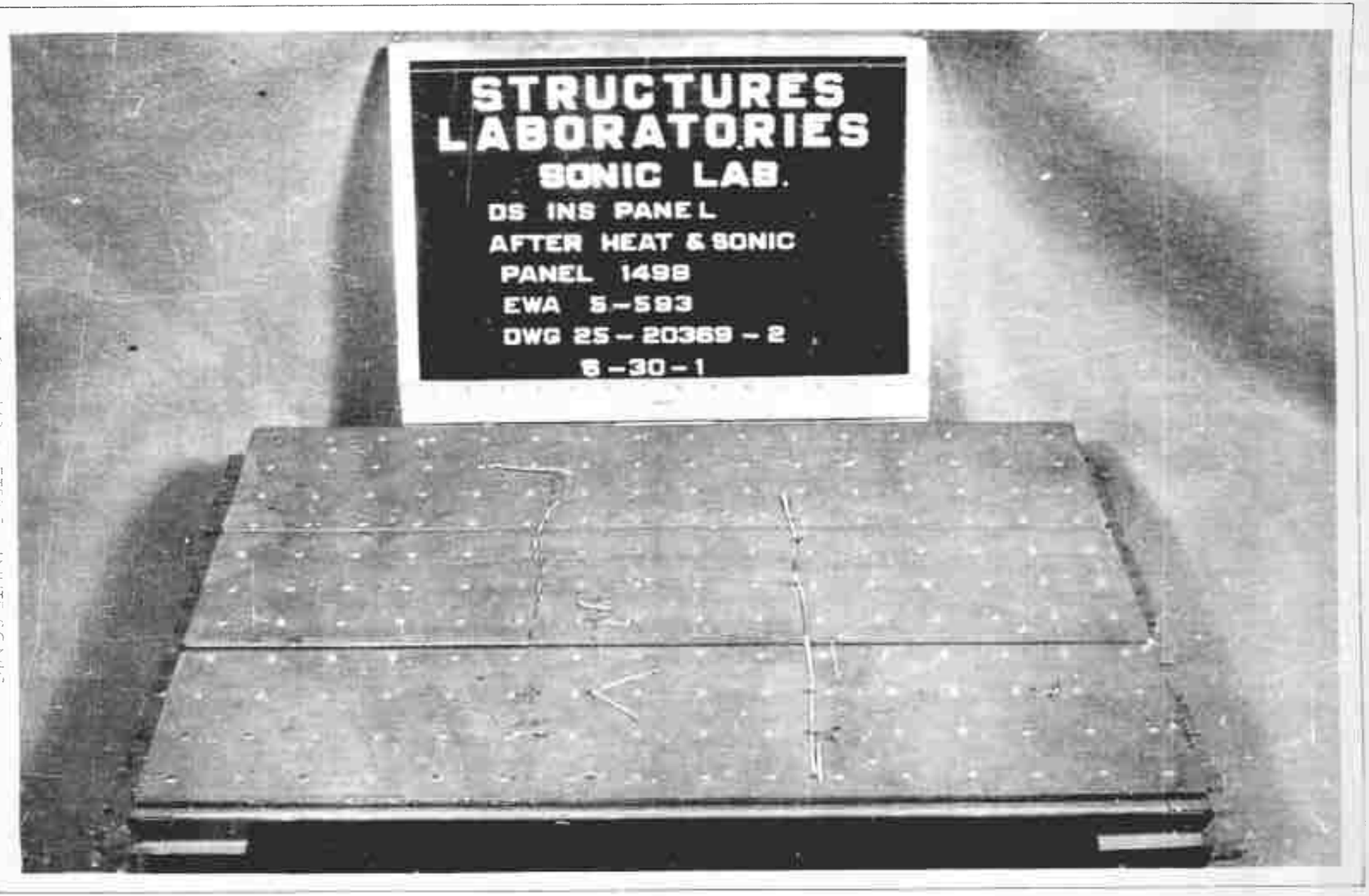
PAGE FIG. 39

DS-I INSULATION PANEL AFTER HEAT AND SONIC TEST 2A82703
PANEL 1498 EWA 5-593 7-3-61



U3-407.1-1000 (was BAC 1546-L-R3)
BOEING
VOL I
NO 22-10004
PAGE 216-40

DS-I INSULATION PANEL AFTER HEAT AND SONIC TEST 2A82704
PANEL 1498 EWA 5-593 7-3-61



PANEL 5-5599-1498 AFTER 5 MINUTE SONIC
TEST AND HEAT TEST (BOTTOM VIEW)

U3-407I-1000 (was BAC 1544-L-R3)

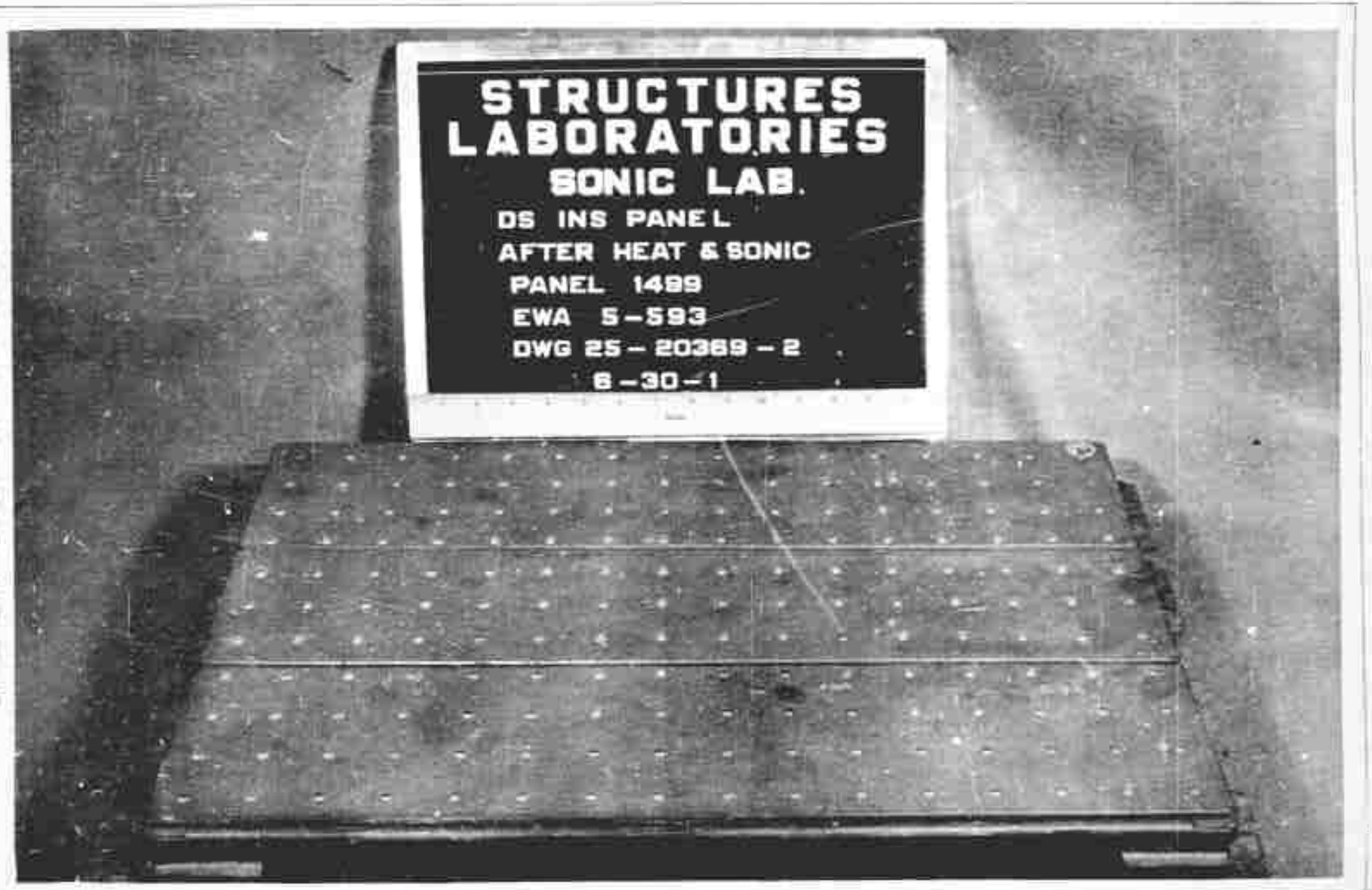
BOEING
VOL I
NO. D2-00004
PAGE FIG. 41

DS-I INSULATION PANEL AFTER HEAT AND SONIC TEST 2A82708
PANEL 1499 EWA 5-593 7-5-61

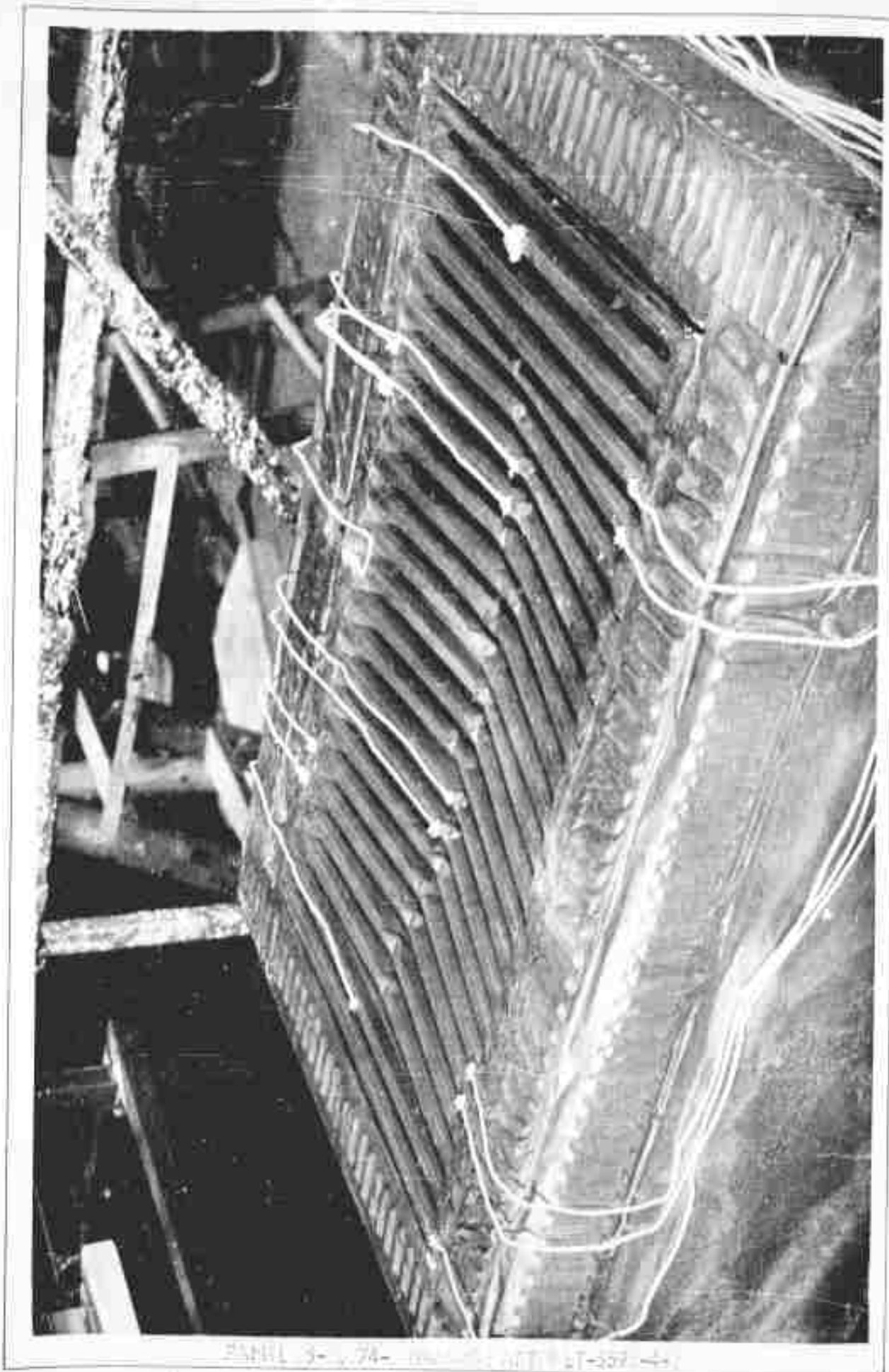


U3-4071-1000 (REV. 8-61) (8-61)
BOEING
VOL. I
PAGE

DS-I INSULATION PANEL AFTER HEAT AND SONIC TEST CAS2703
PANEL 1499 EWA 5-593 7-3-61



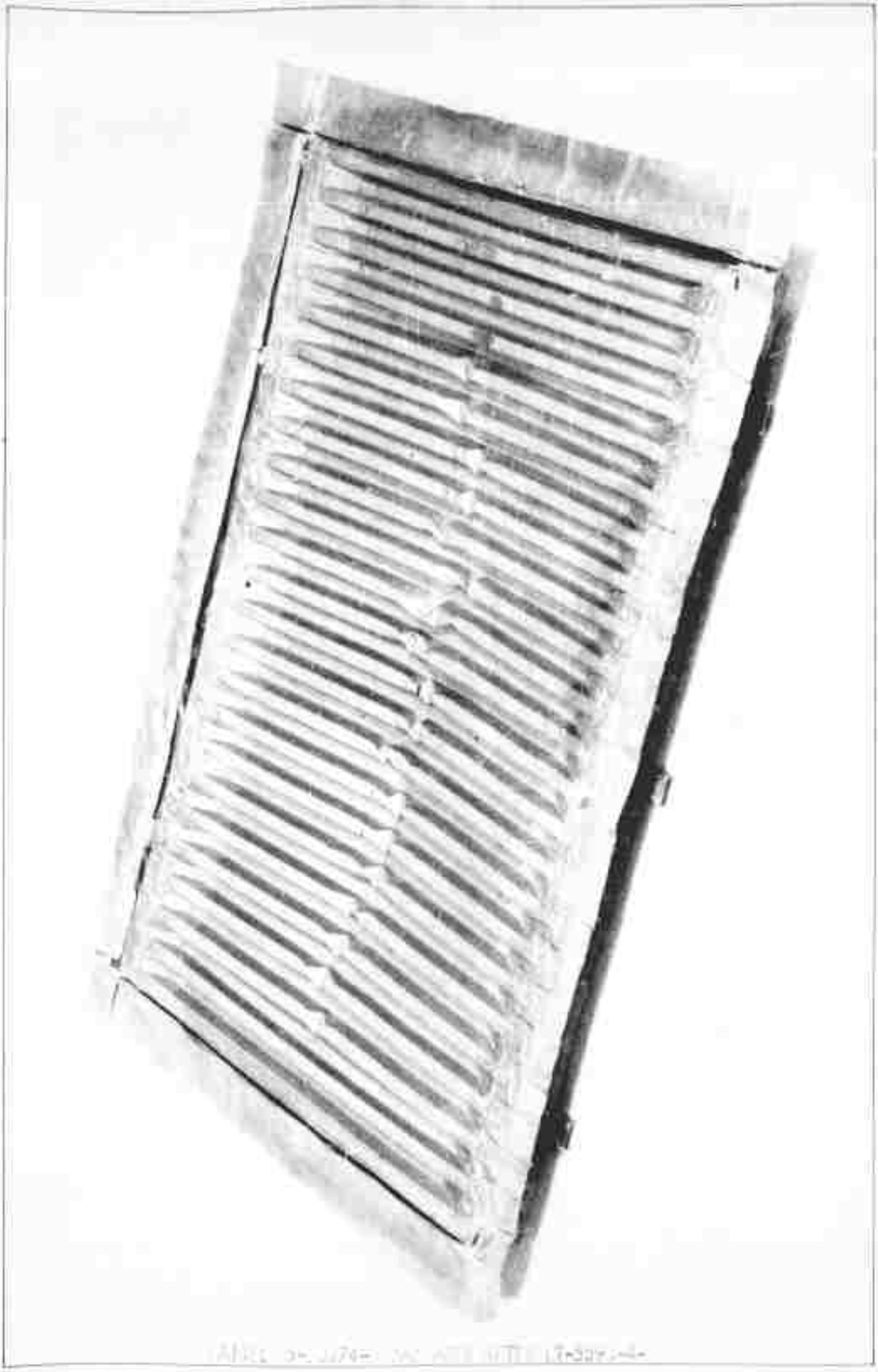
BOEING
VOL I



COL. D-18 BLDG 9-101 E.C. - DS-I PANEL 25-20374-2 2A94228
PRESSURE TEST FAILURE 12-8-61

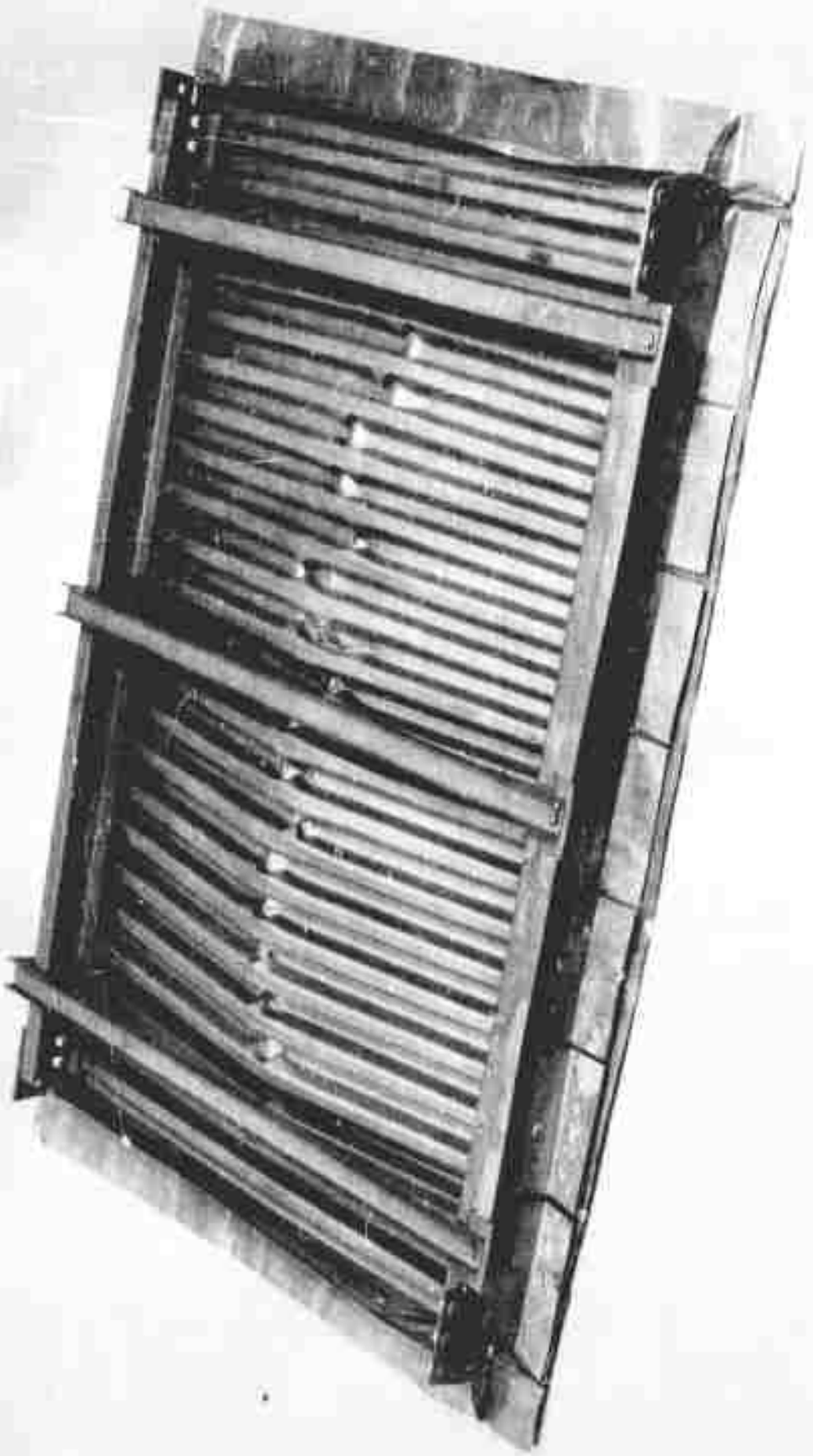
U3-4071-1000 (was BAC 1546-L-R3)

BOEING VOLT



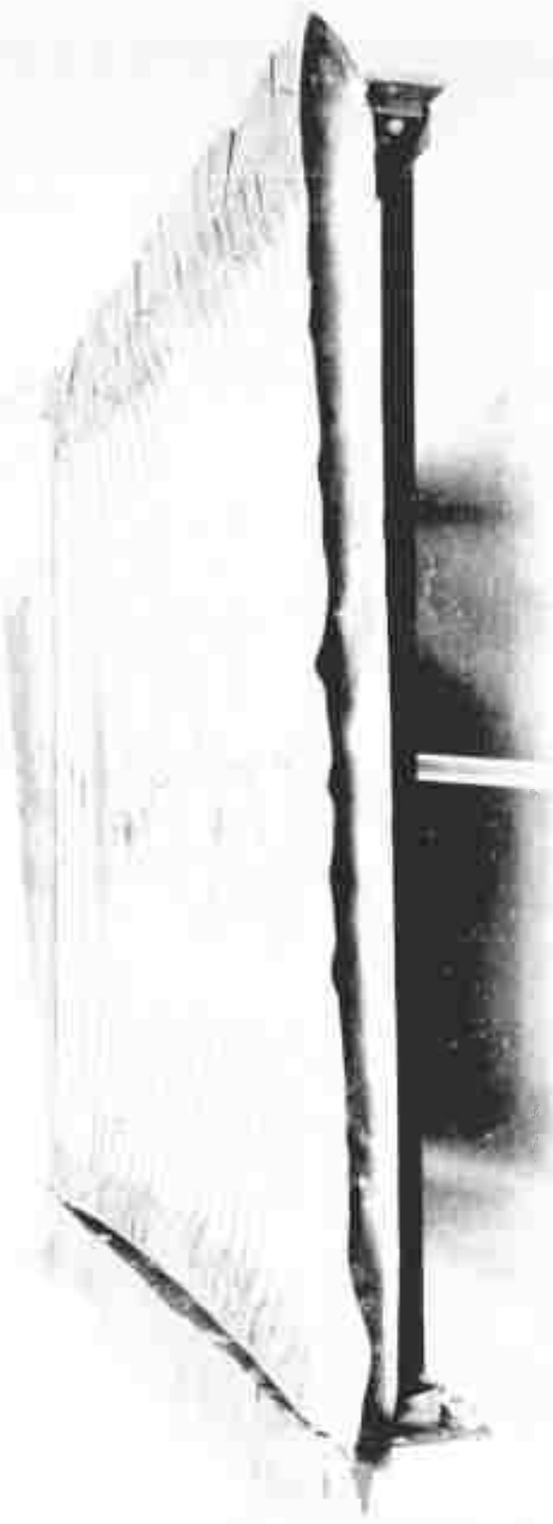
DYNASOAR WING PANEL FAILURE TOP VIEW 12-20-61 2494984

U3-4071-1000 (was BAC 1546-L-R3)



DYNASOAR WING PANEL FAILURE 25-20374-2 2494985
BOTTOM VIEW 12-20-61

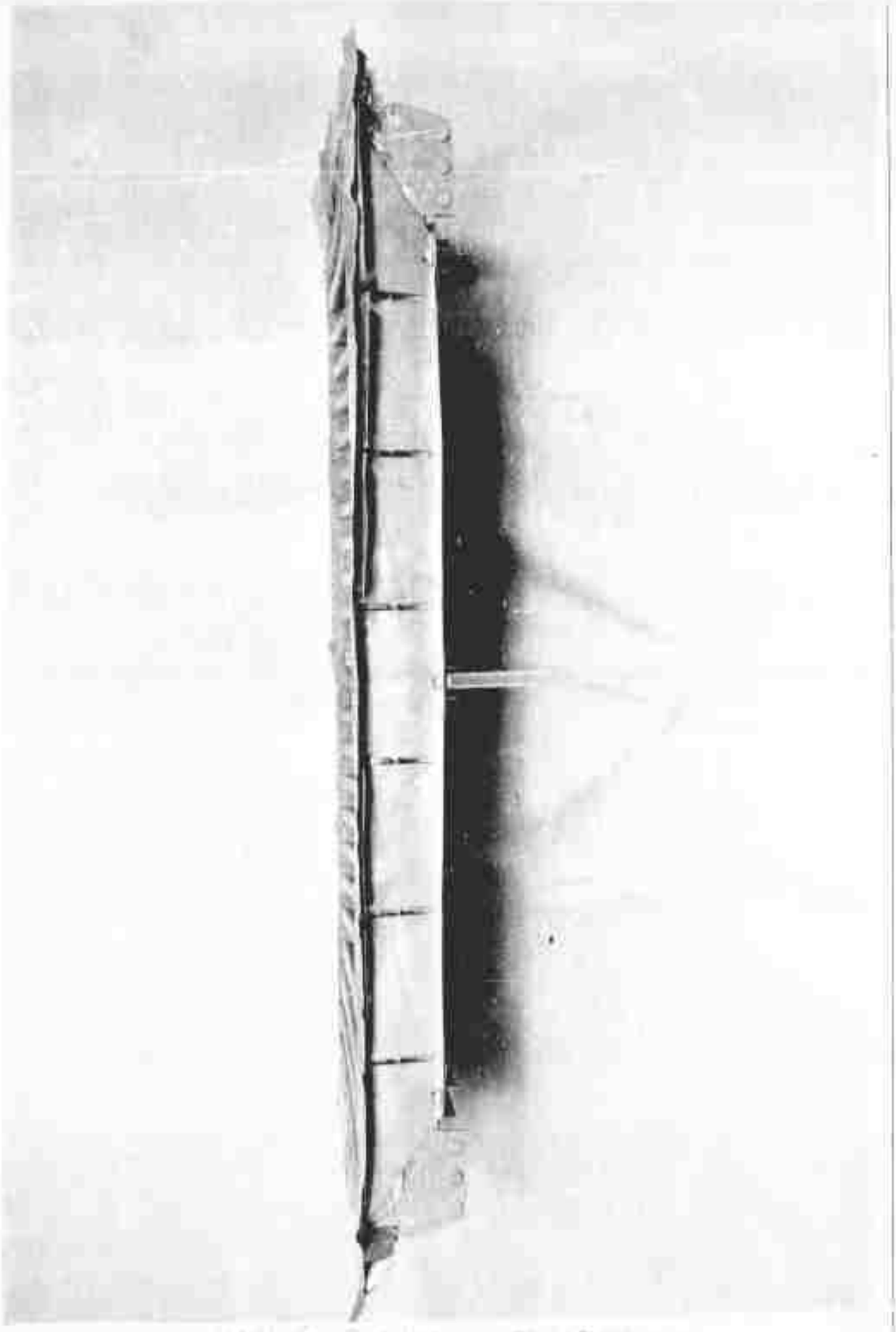
U3-4071-1000 (was BAC 1546-L-R3)



DYNASOAR WING PANEL FAILURE END VIEW 2494987
12-20-61

PANEL 70-0374-

U3-4071-1000 (was BAC 1546-L-R3)



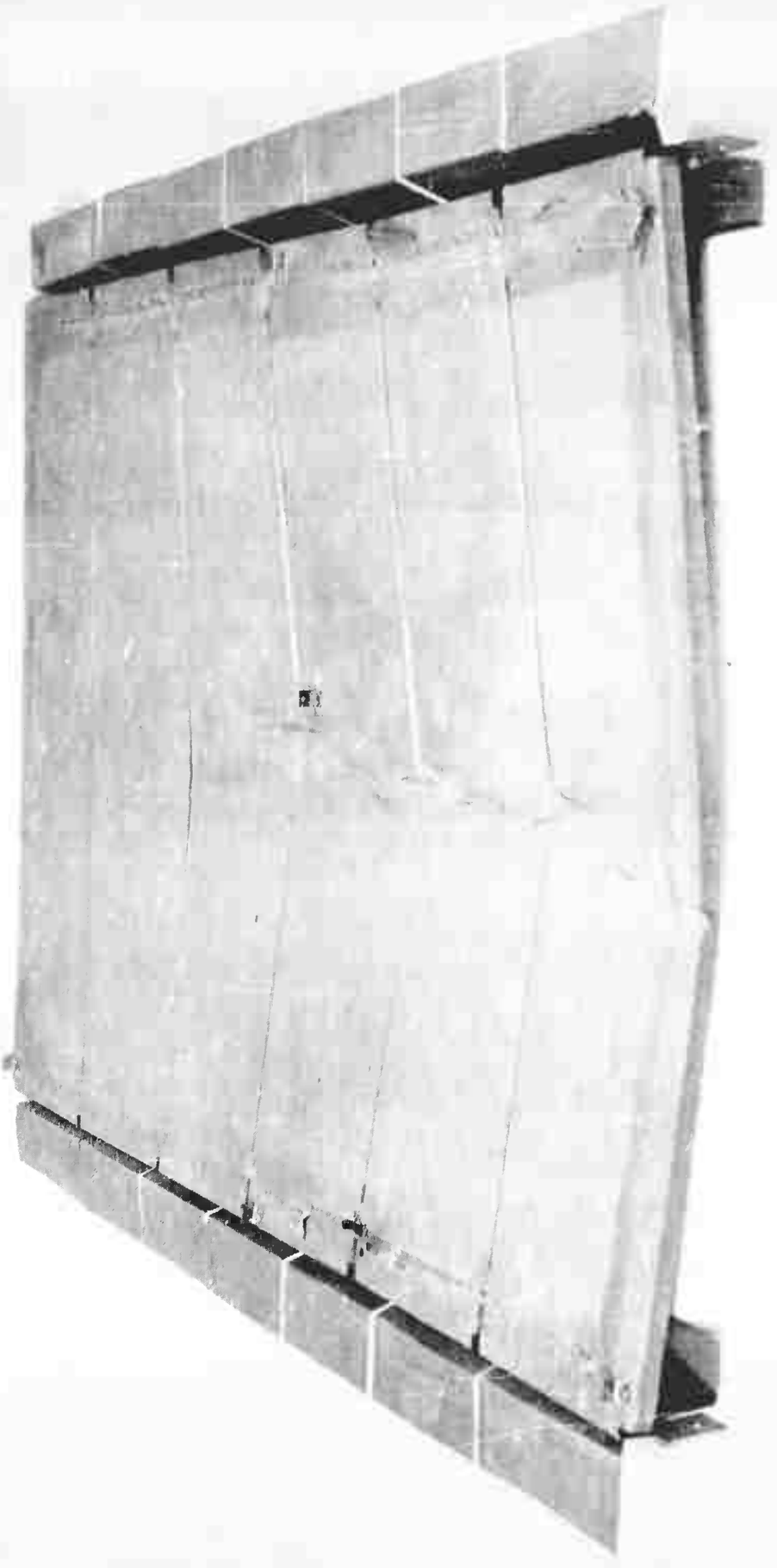
DYNASOAR WING PANEL FAILURE SIDE VIEW 249-986
12-20-61



DS-1 WING PANEL FAILURE - TOP VIEW
1-3-62

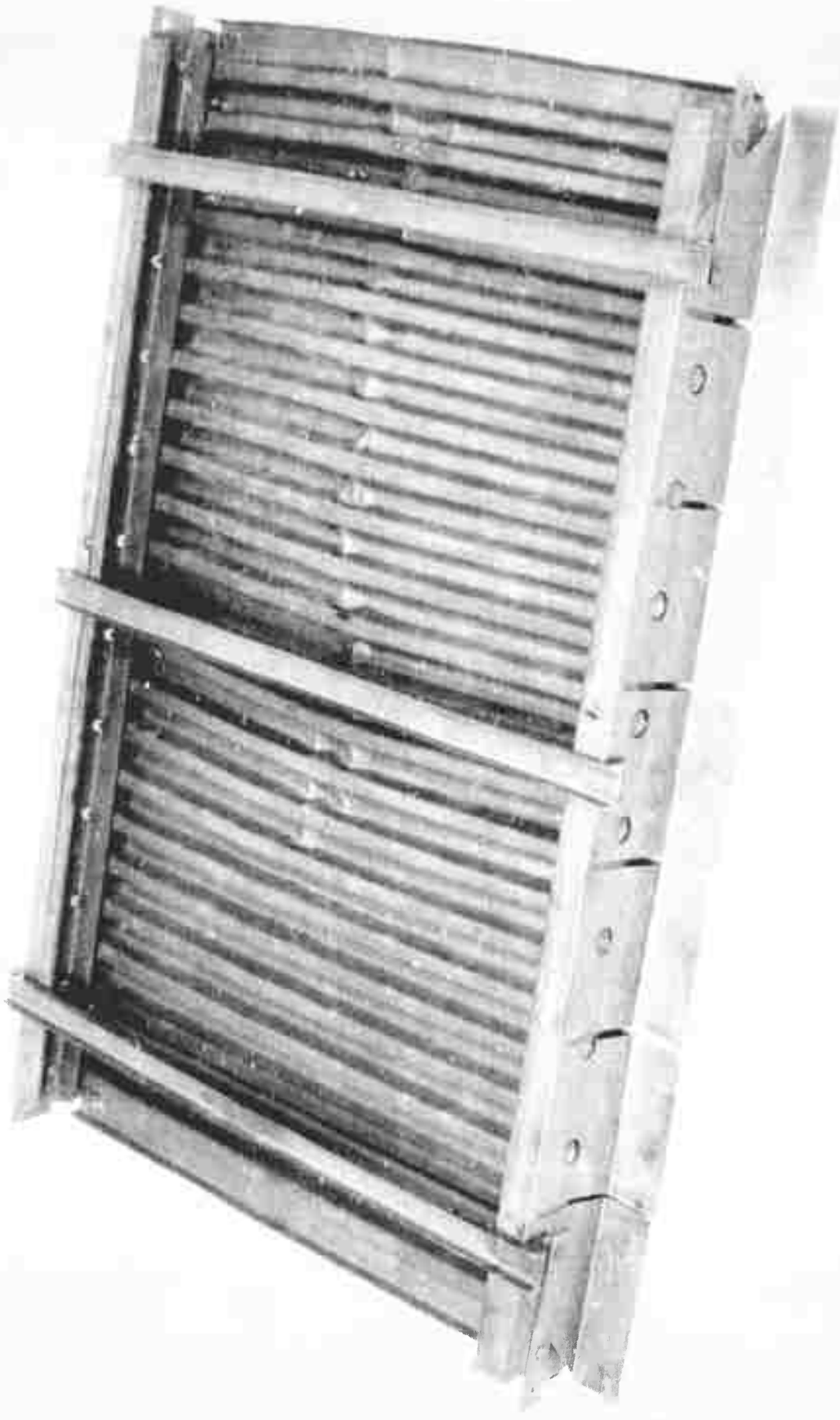
2A95304

U3-4071-1000 (was BAC 1546-L-R3)



SST - WING PANEL FAILURE - BAC TEM 1-5-62 2455595

U3-4071-1000 (was BAC 1546-L-R3)



SST - WING FATIGUE FAILURE - BOTTOM VIEW 1-3-62 2495593

LT-5[illegible]

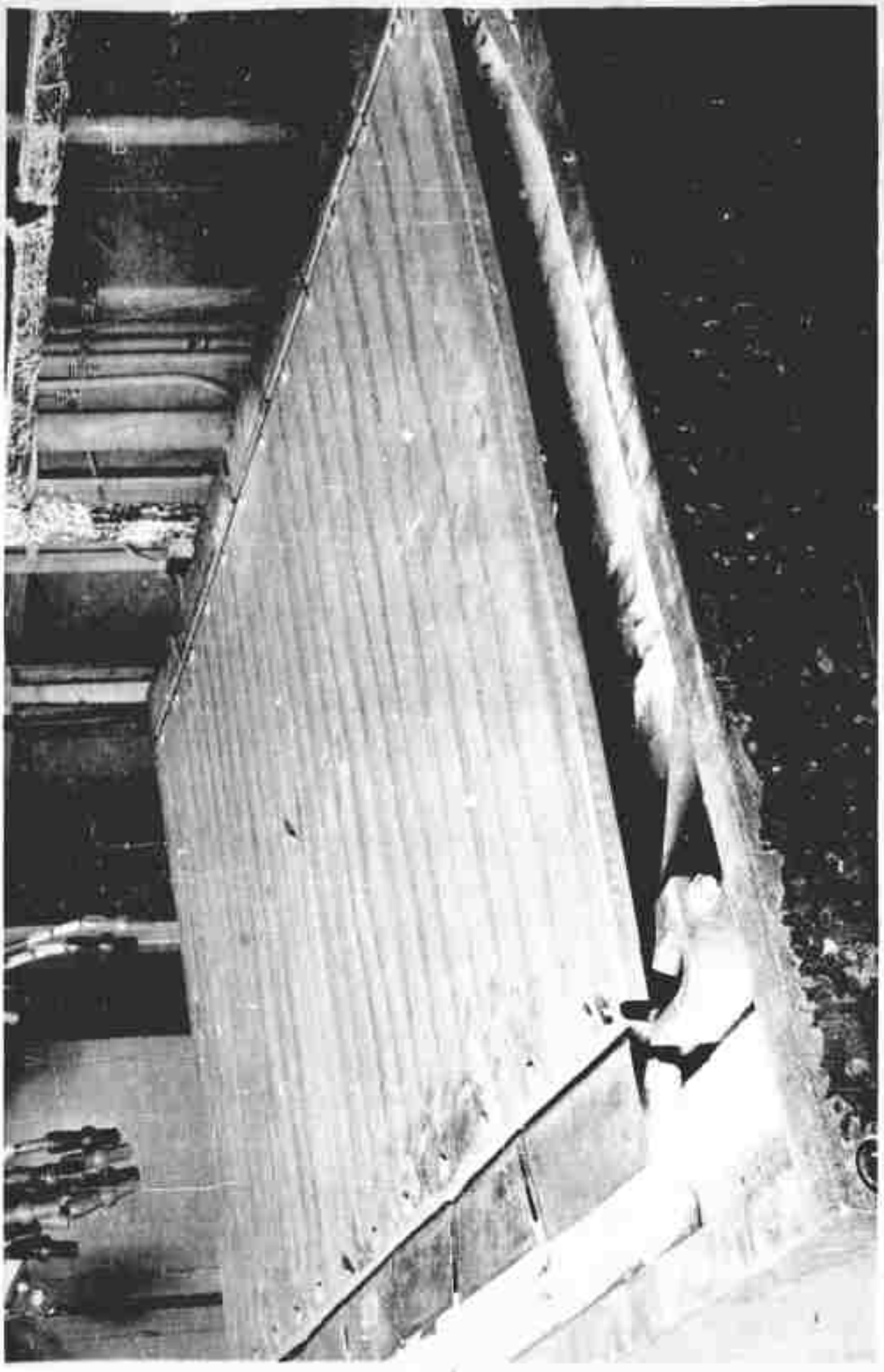
U3-4071 1000 (was BAC 1546 L-R3)



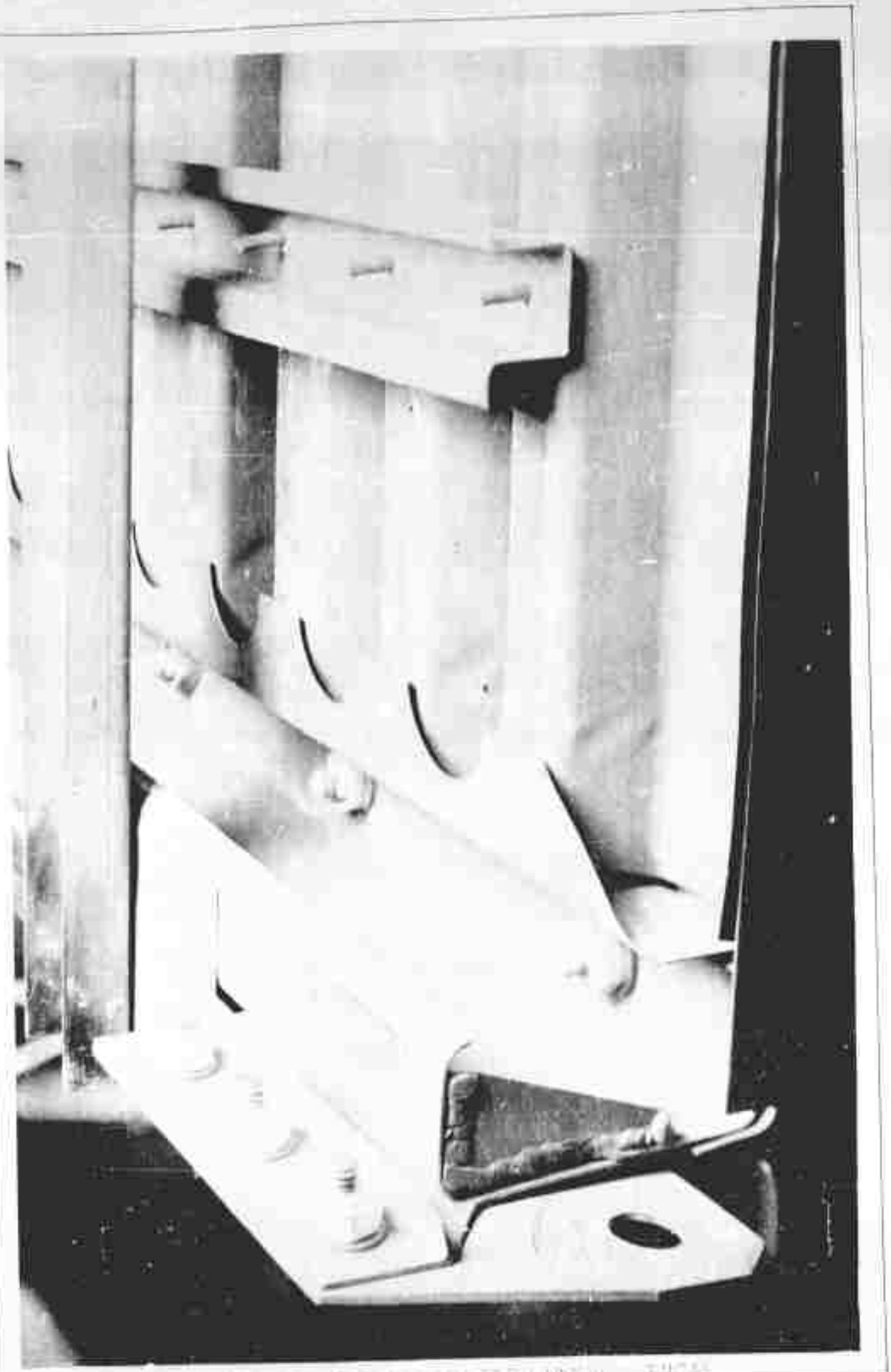
DSI - WING PANEL FAILURE - SIDE VIEW
1-3-62

2495392

U3-4071-1000 (was BAC 1546-L-R3)



3-1 WING PANEL FAILURE PANEL #25-20370-2
OP VIEW SHOWING WRINKLES
1-5-62
2493674



DS-1 WING PANEL FAILURE PANEL
SHOWING #25-20370-2 SHOWING #RINGLES
ON CORNER 1-5-62

2495676

U3-4071-1000 (was BAC 1546-L-R3)

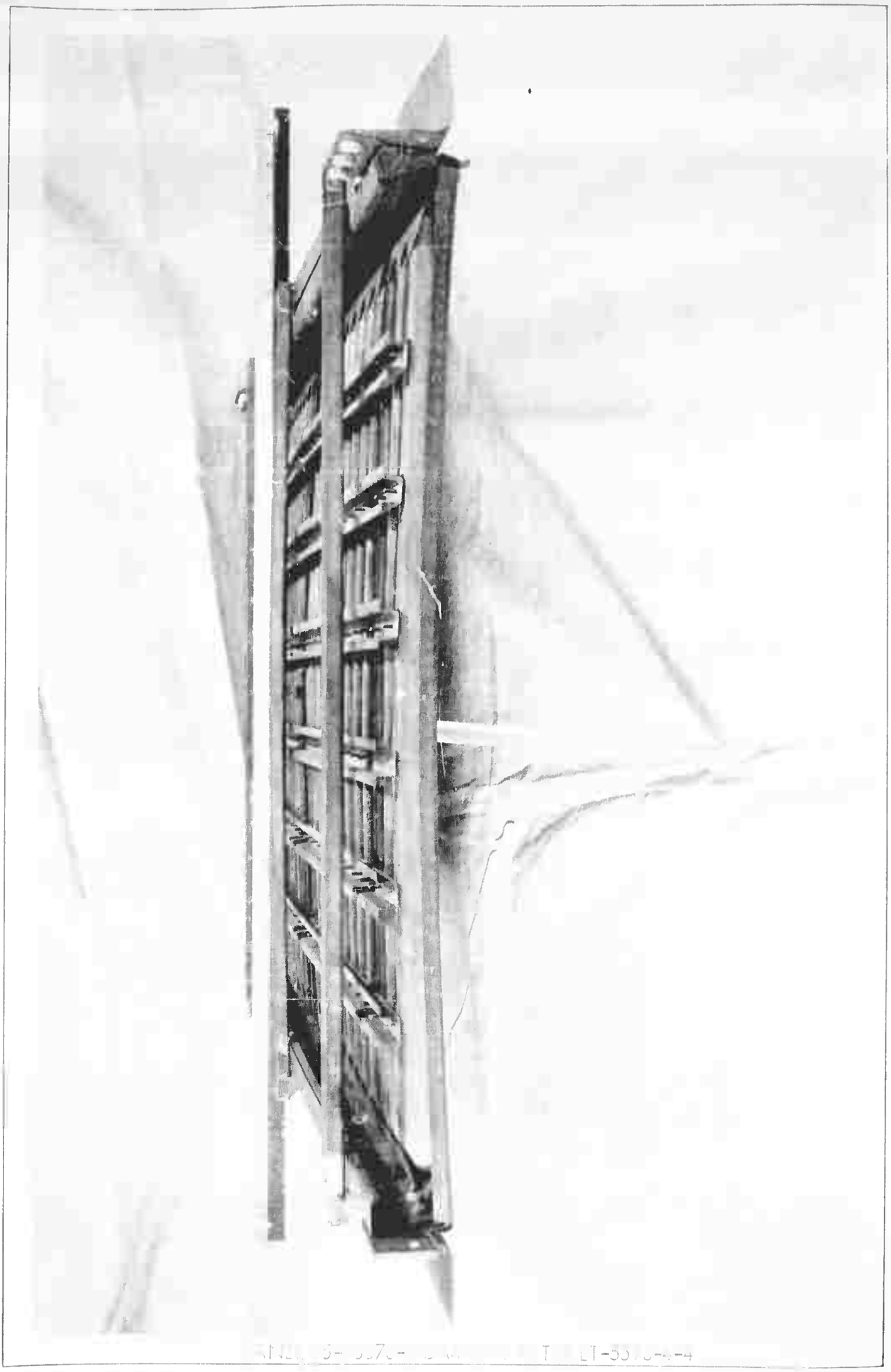


DS-1 - WING PANEL FAILURE 1-15-62
PANEL 25-20352 - TOP VIEW

2496116

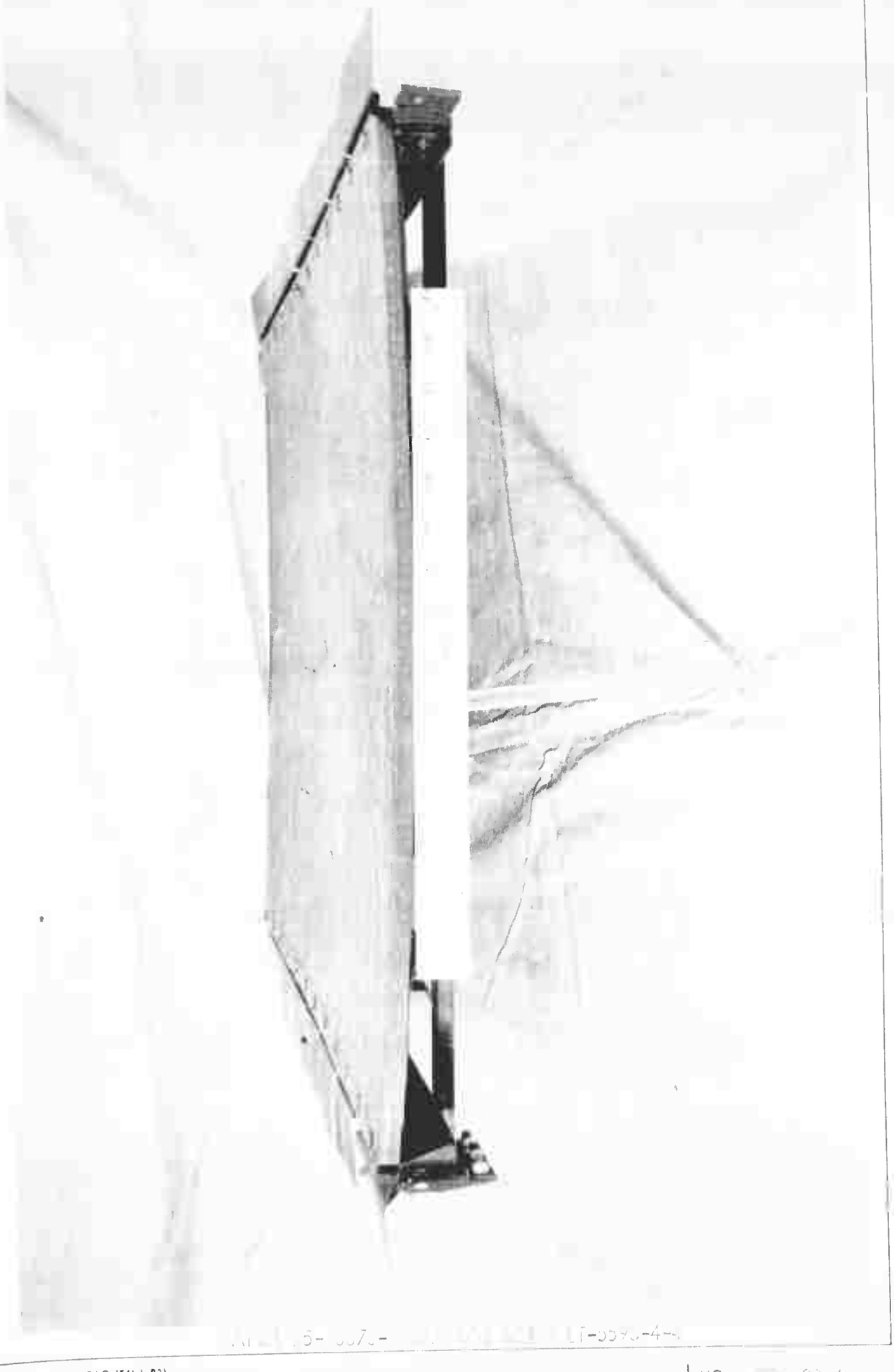
PANEL D-[illegible]-[illegible] AIRCRAFT NO. L-555-4-4

U3-4071-1000 (was BAC 1546-L-R3)



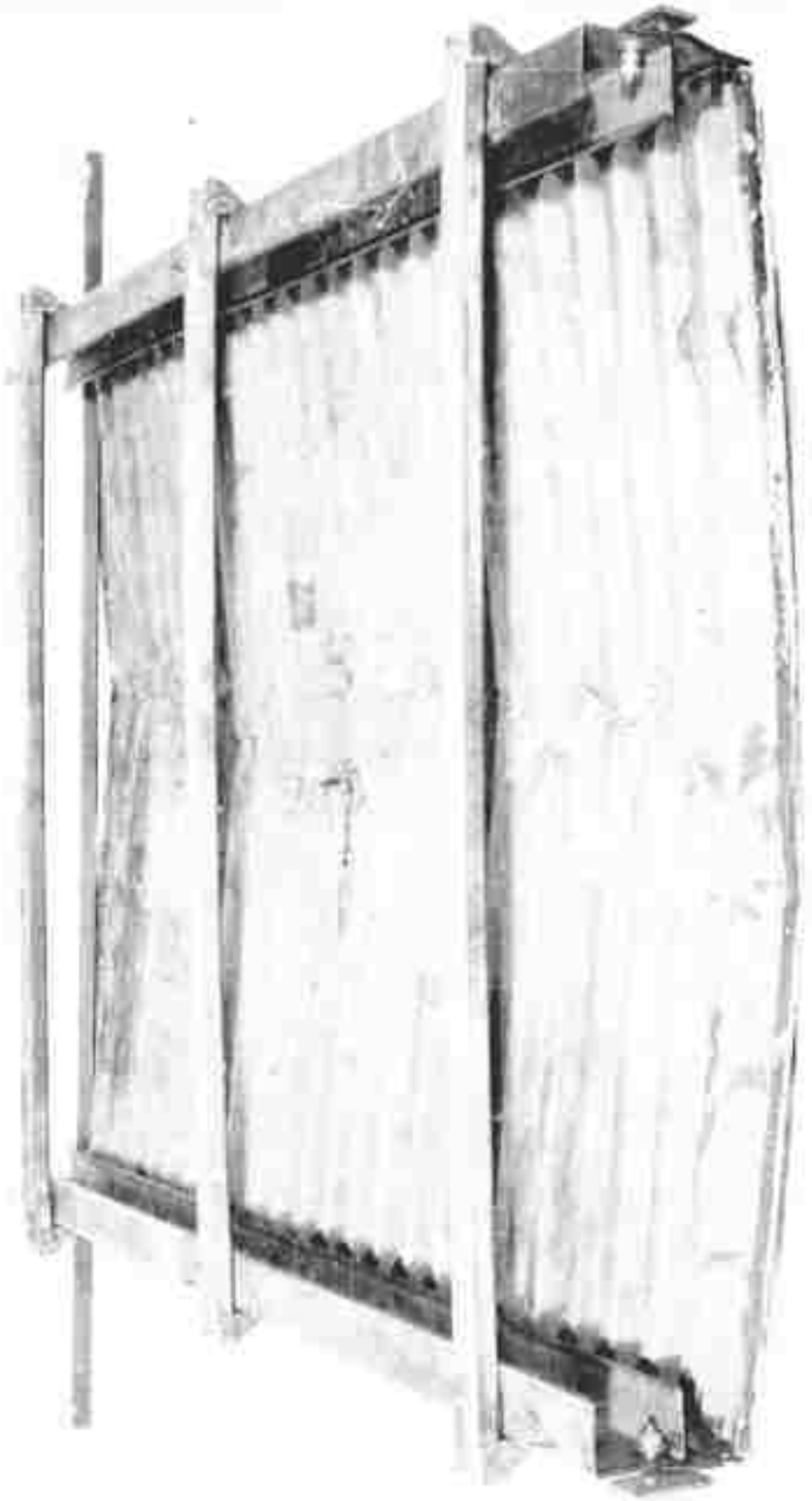
DS-1 - WING PANEL FAILURE
PANEL 25-20352- END VIEW 1-15-62 2496117

U3-4071-1000 (was BAC 1546-L-R3)



DS-1 - WING PANEL FAILURE
PANEL 25-20352 - END TOP VIEW 1-15-62

2A90118



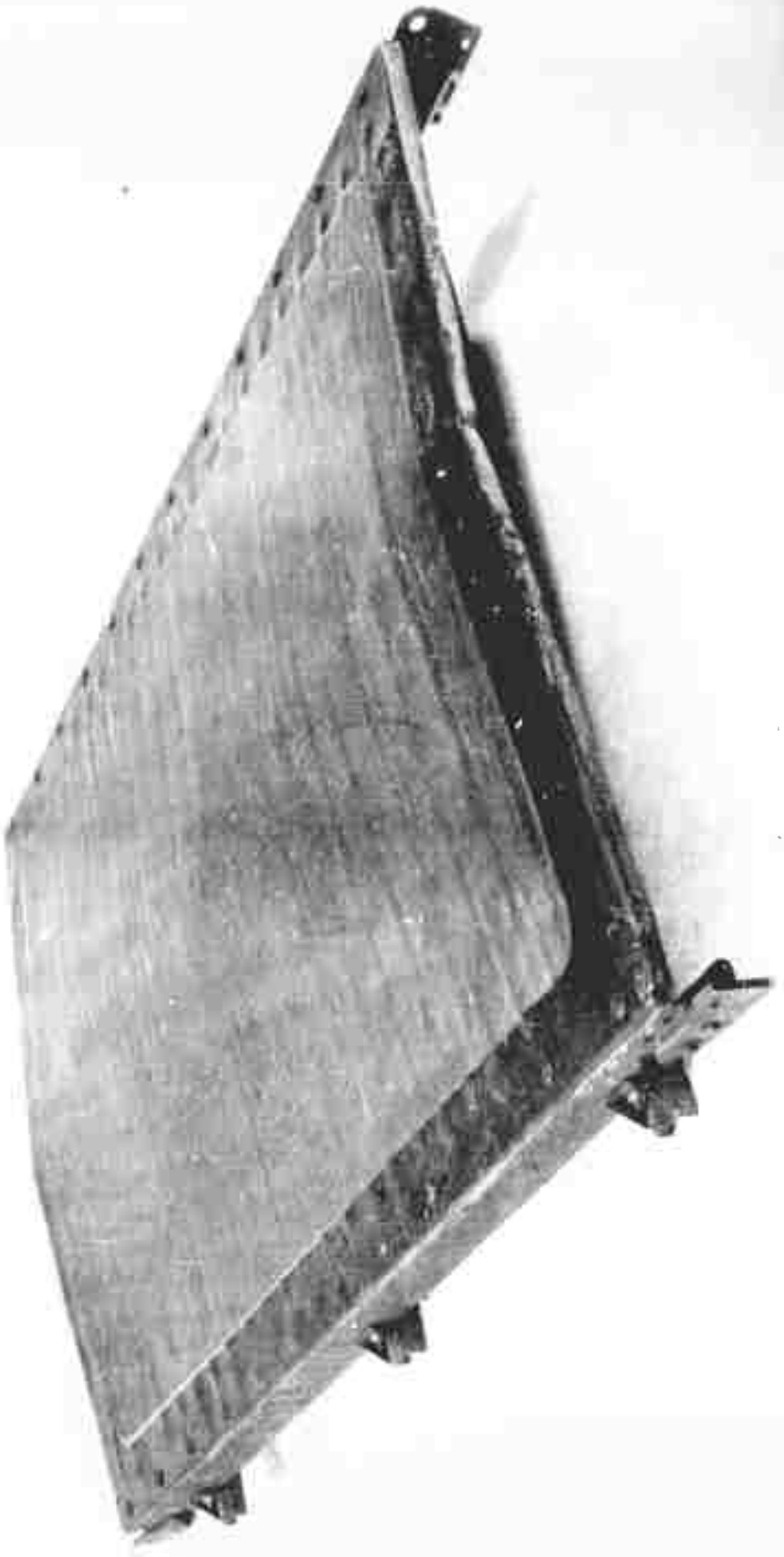
DS-1 PANEL 25-20352 R.T. AFTER PRESSURE TEST 2A1C6C20
BOTTOM END VIEW - 3-6-62

U3-4071-1000 (was BAC 1546-L-R3)

DS-1 PANEL 25-20352 R-1. AFTER PRESSURE TEST 2A102624
TOP END VIEW - 3-6-62



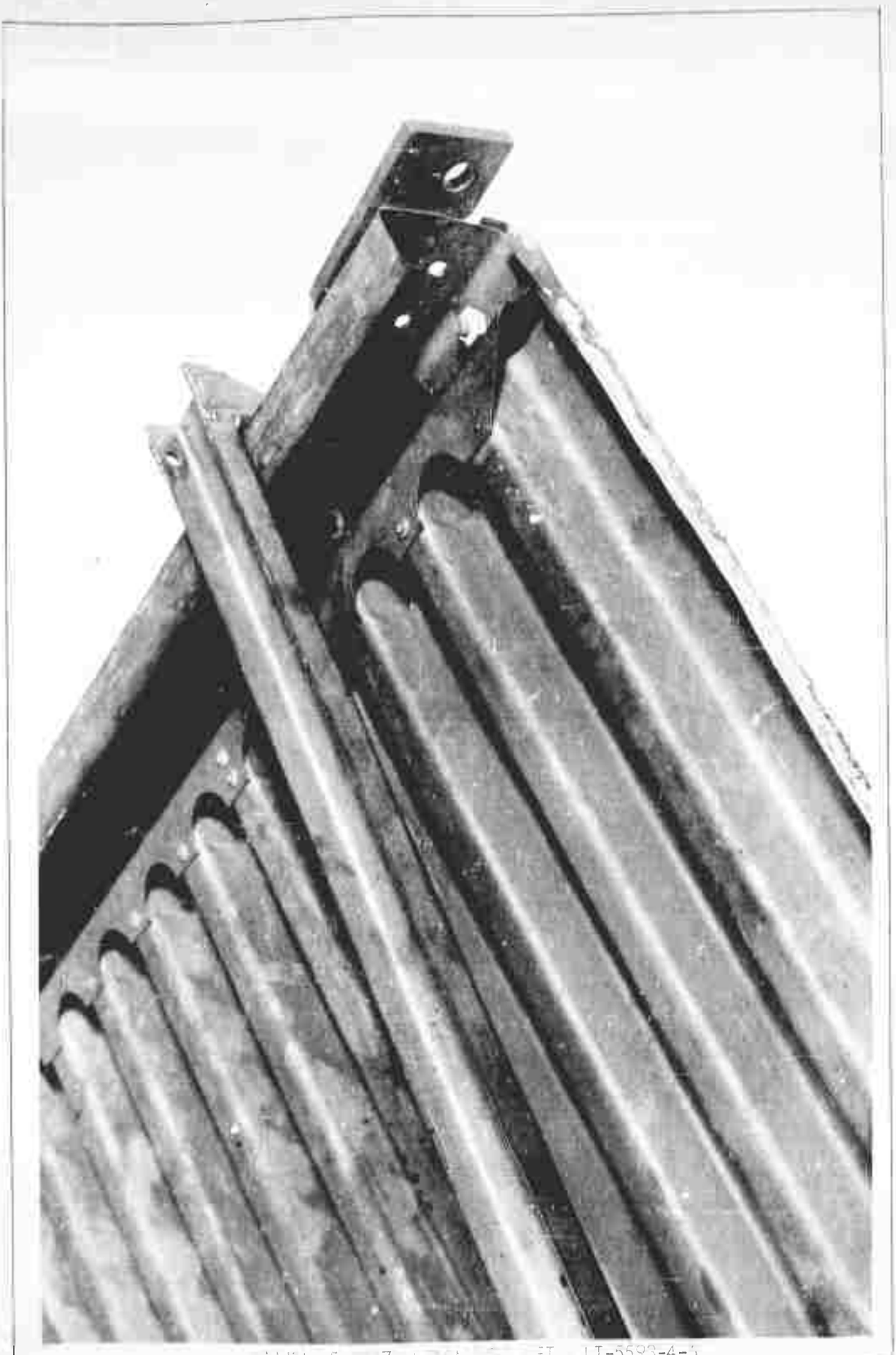
DS-I PANEL 25-20352 R.T. AFTER PRESSURE TEST 2A102623
TOP VIEW - 3-6-62



U3-4071 1000 (was BAC 1546-L-R3)



DS-I WING PANEL #2[illegible] - PRESSURE TEST [illegible]
FAILURES



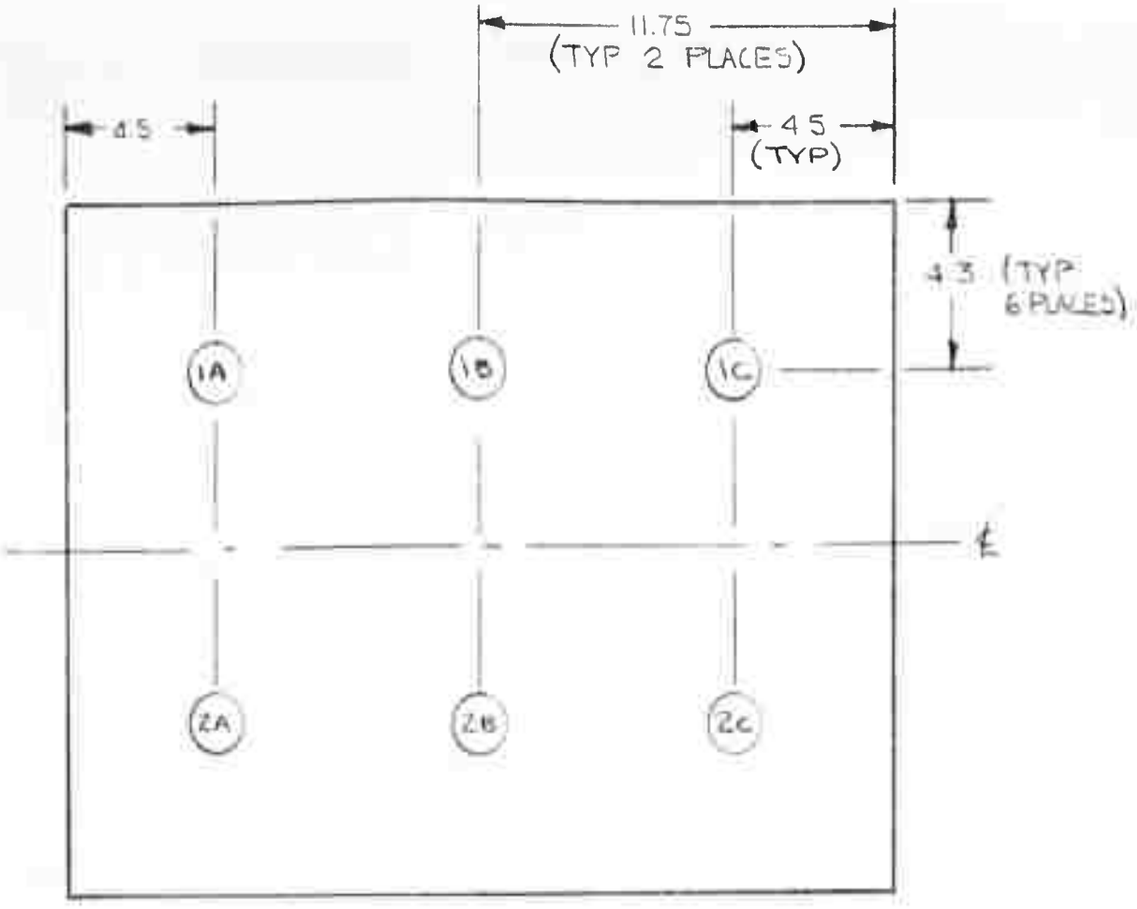
PANEL 25-20370-1 AFT. LT-5593-4-3

DS-1 WING PANEL #25-20370 - PRESSURE TEST 2A104150
FAILURES
3-12-62

U3-4071-1000 (was BAC 1546-L-R3)



D8-I WING PANEL #25-20370 - PRESSURE TEST 2A104151
FAILURES
3-12-62



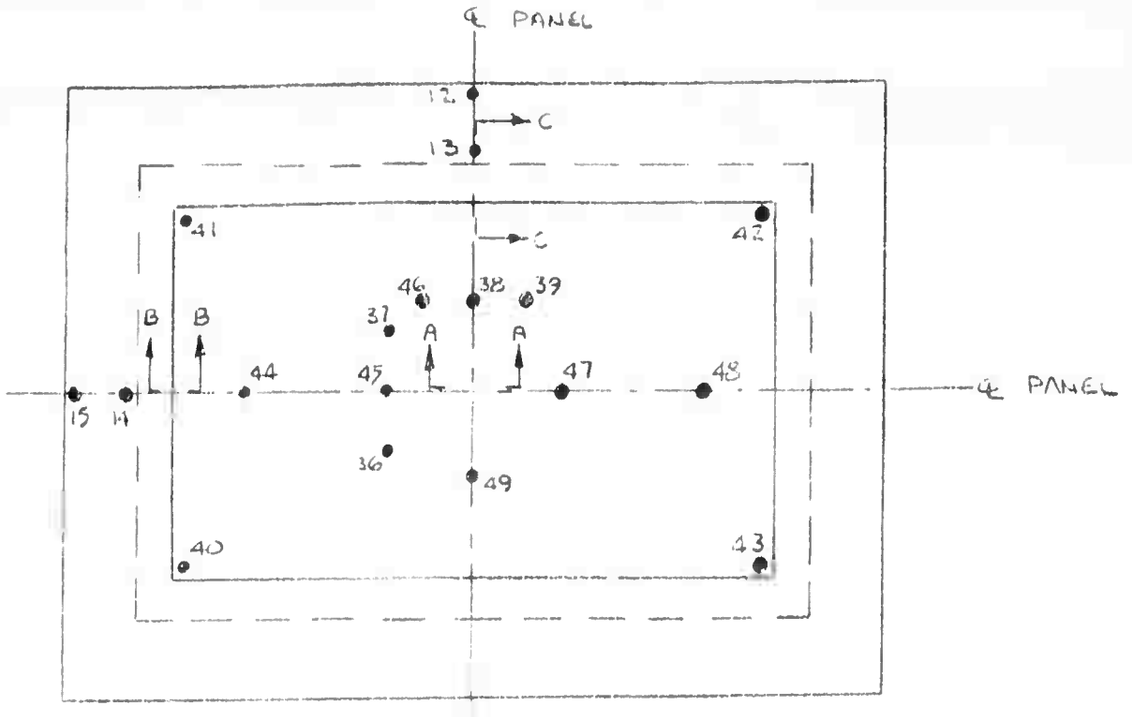
PANEL
(OUTSIDE SKIN SHOWN)



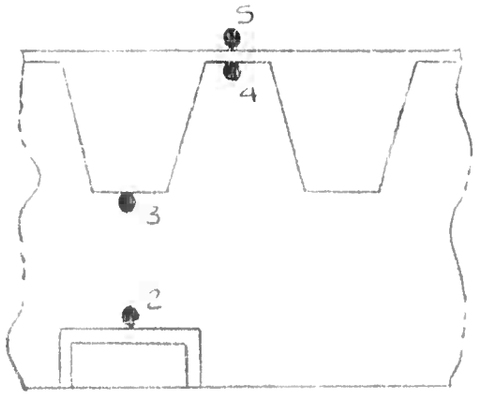
NOTE: ALL THERMOCOUPLES SHOWN ARE CONTROLS, AND ARE ATTACHED TO OUTSIDE SKIN ONLY.

CALC Schmidt 7-63	REVISED	DATE	CONTROL THERMOCOUPLE LOCATIONS LT-5593-1	VOL I D2-80084
CHECK				
APPD			BOEING AIRPLANE COMPANY	PAGE FIG 65
APPD				

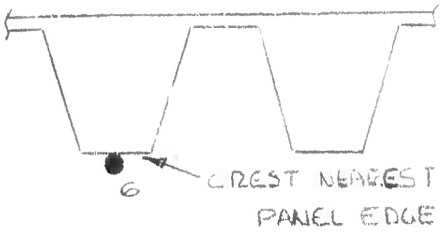
BAC 973 D R3



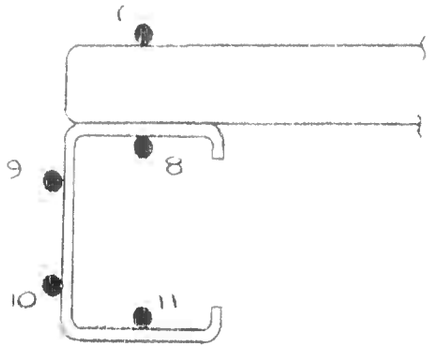
TEST PANEL 25-20374-1



VIEW A-A



VIEW B-B



VIEW C-C
ROTATED 90° COUNTERCLOCKWISE

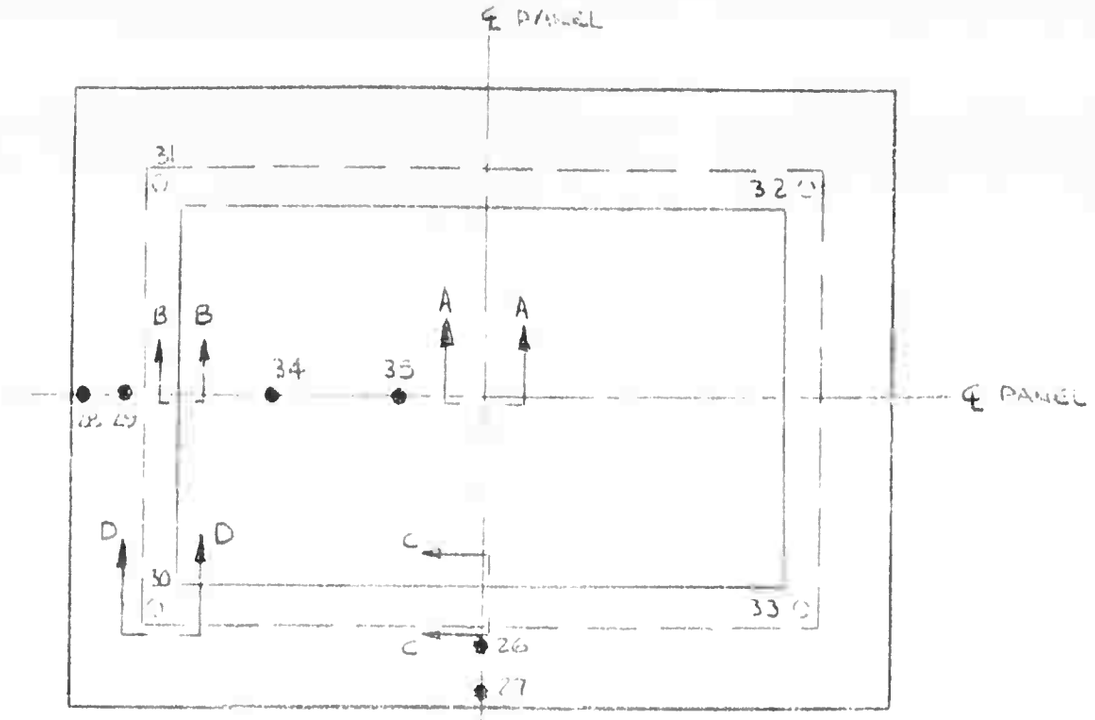
SCALE 7-63

THERMOCOUPLE LOCATIONS
TEST PANEL 25-20374-1
LT-5593-2-1

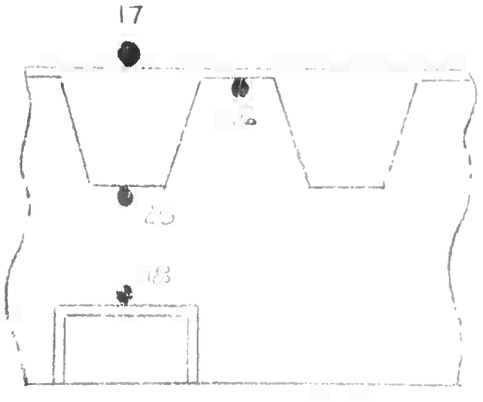
D2-00084

THE BOEING COMPANY

FIG 6



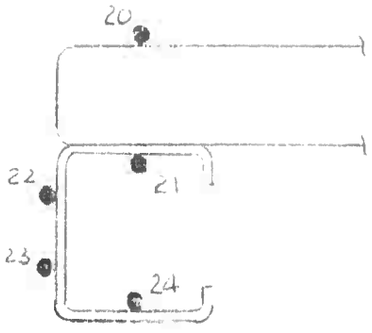
RE-RADIATING PANEL



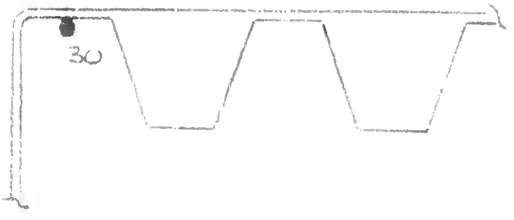
VIEW A-A



VIEW B-B



VIEW C-C
ROTATED 90° CLOCKWISE



VIEW D-D

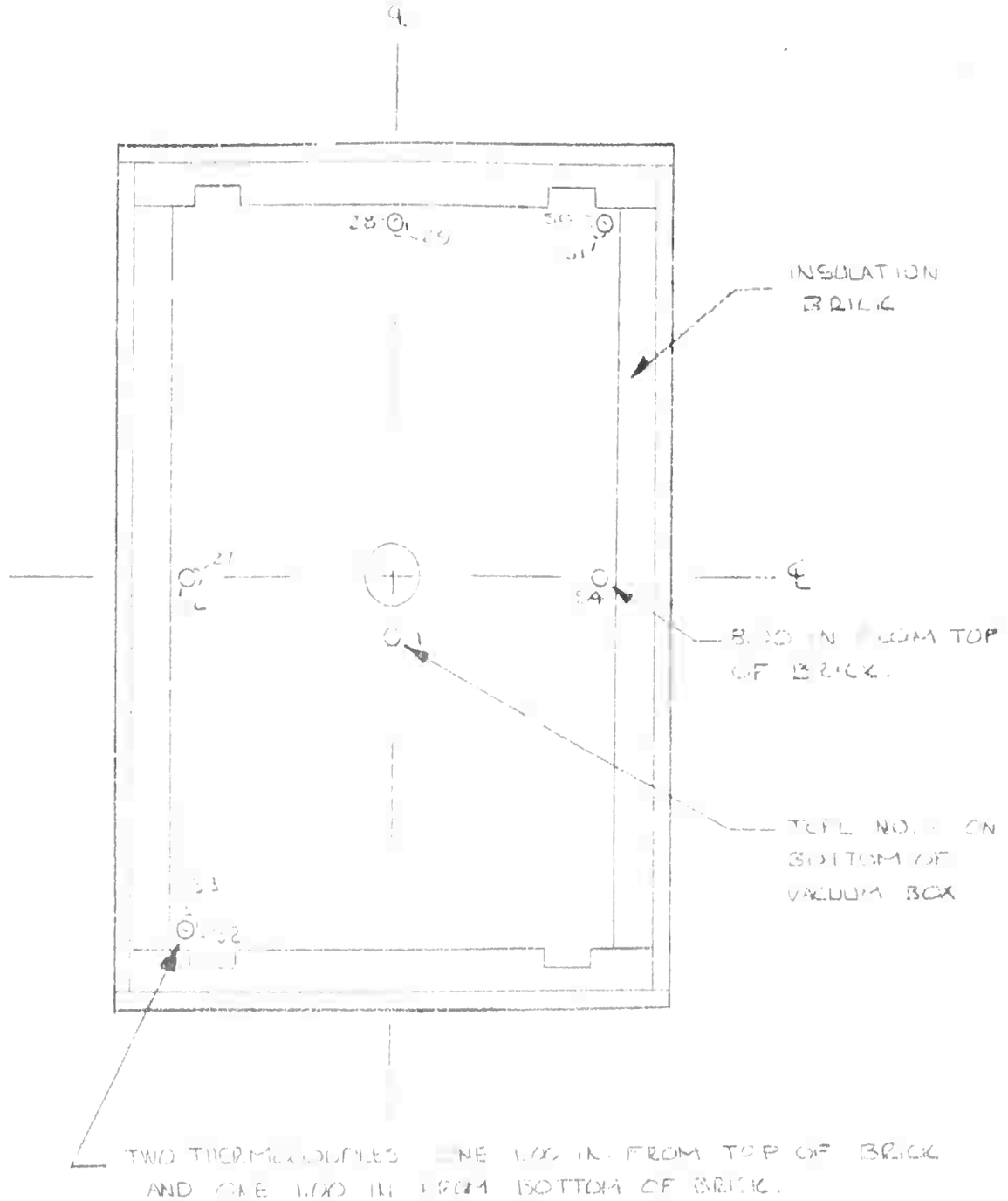
Schneider 7-63

THERMOCOUPLE LOCATIONS
RE-RADIATING PANEL
LT-3593-2-1

D2-80084

[illegible] COMPANY

FIG.

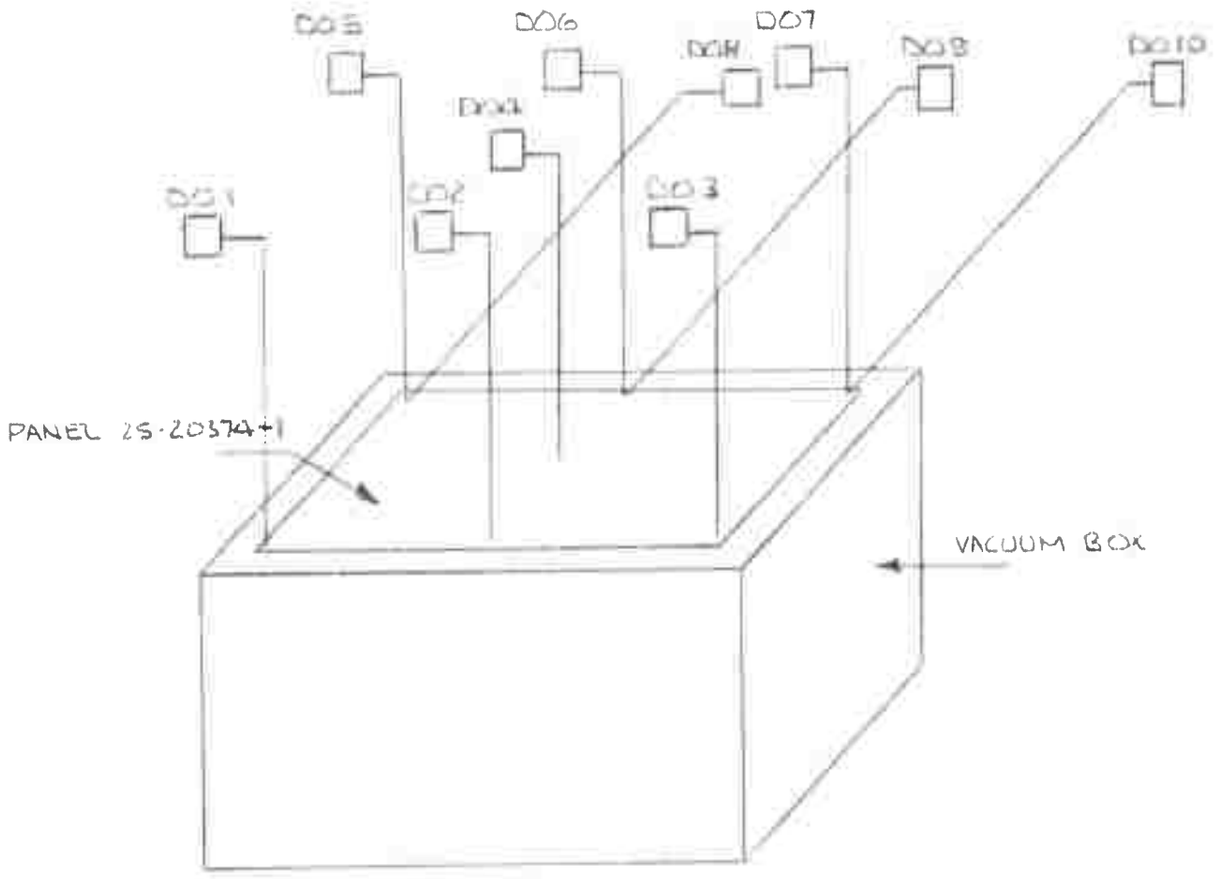


Schmidt 7-63

THERMOCOUPLE LOCATIONS
VACUUM BOX
LT-6593-Z-1

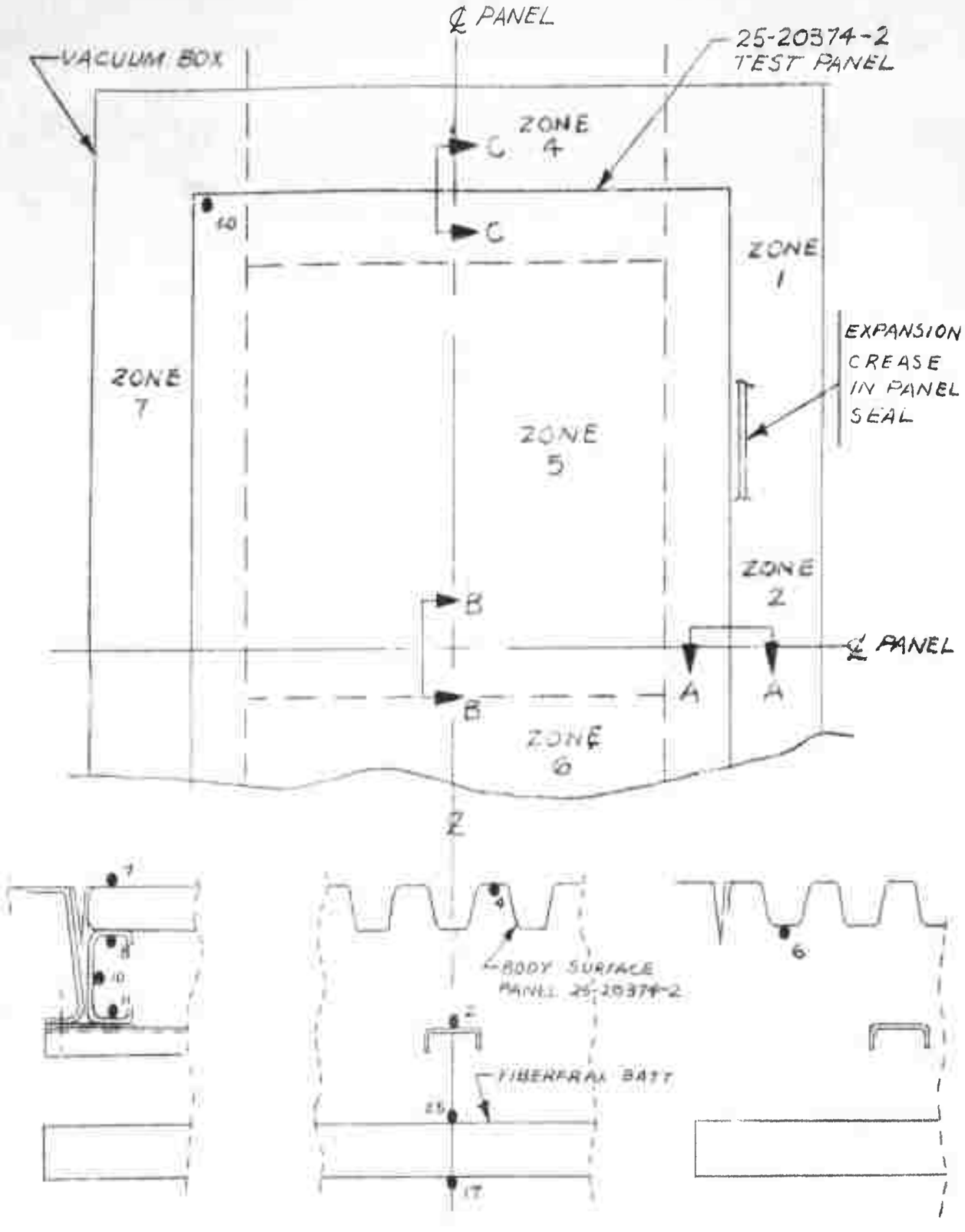
02 50084

Fig



CALC Schmidt 7-63 REVISED DATE	DEFLECTION GAGE LOCATIONS	UNIT
CHECK	LT-5593-2-1	D2-80084
APPD	BOEING AIRPLANE COMPANY	PAGE Fig 69
APPD		

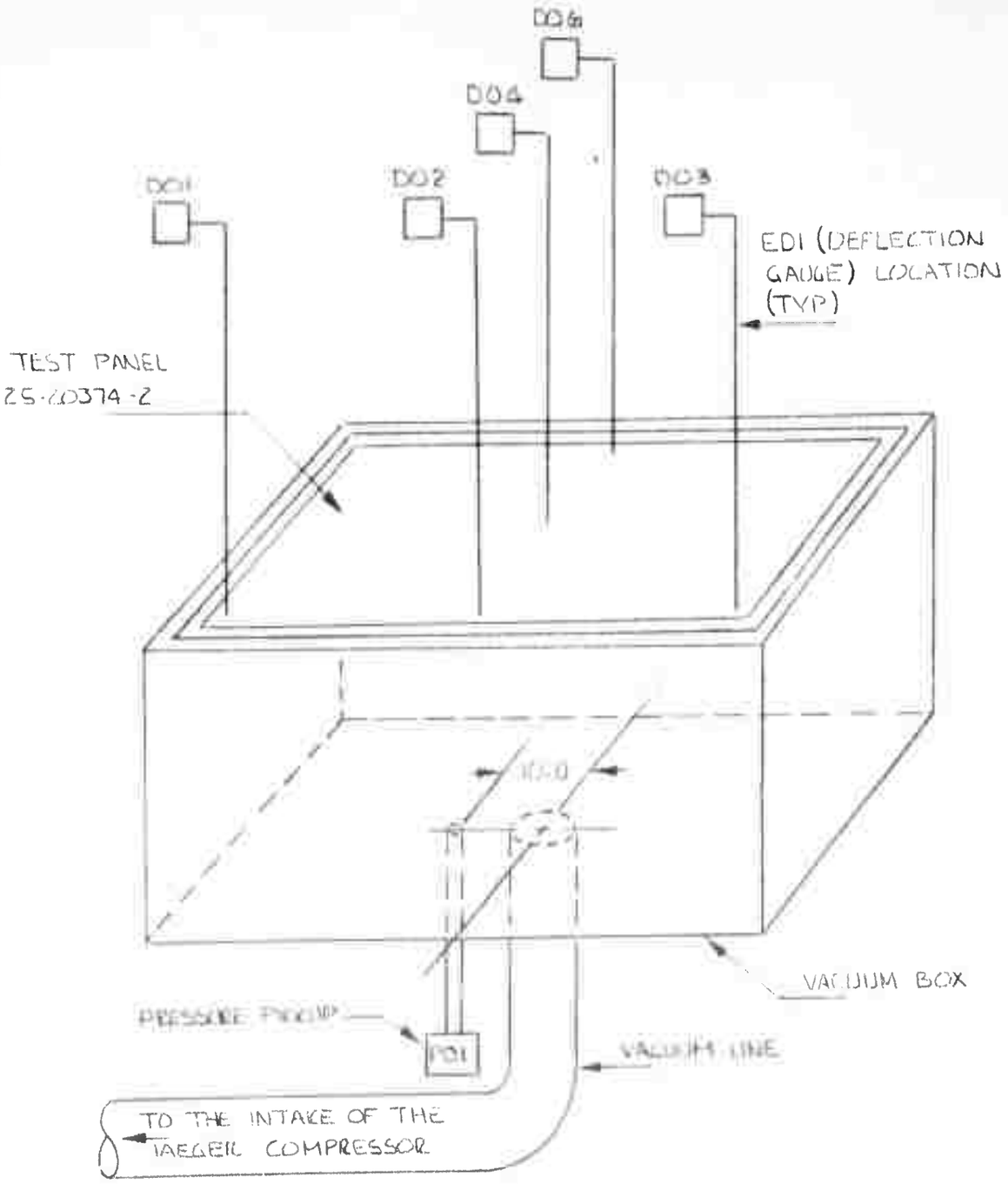
BAC 973 D R3



CALC	G. MILLS	7/17/61	REVISED	DATE	MONITOR THERMOCOUPLE LOCATIONS LT 2-2	Vol 1
CHECK	Eberney	7/17/61				D2-80084
APR						
APR					BOEING AIRPLANE COMPANY	PAGE FIG 10

U3 4038 8000 (WAS BAC 1017 RB)

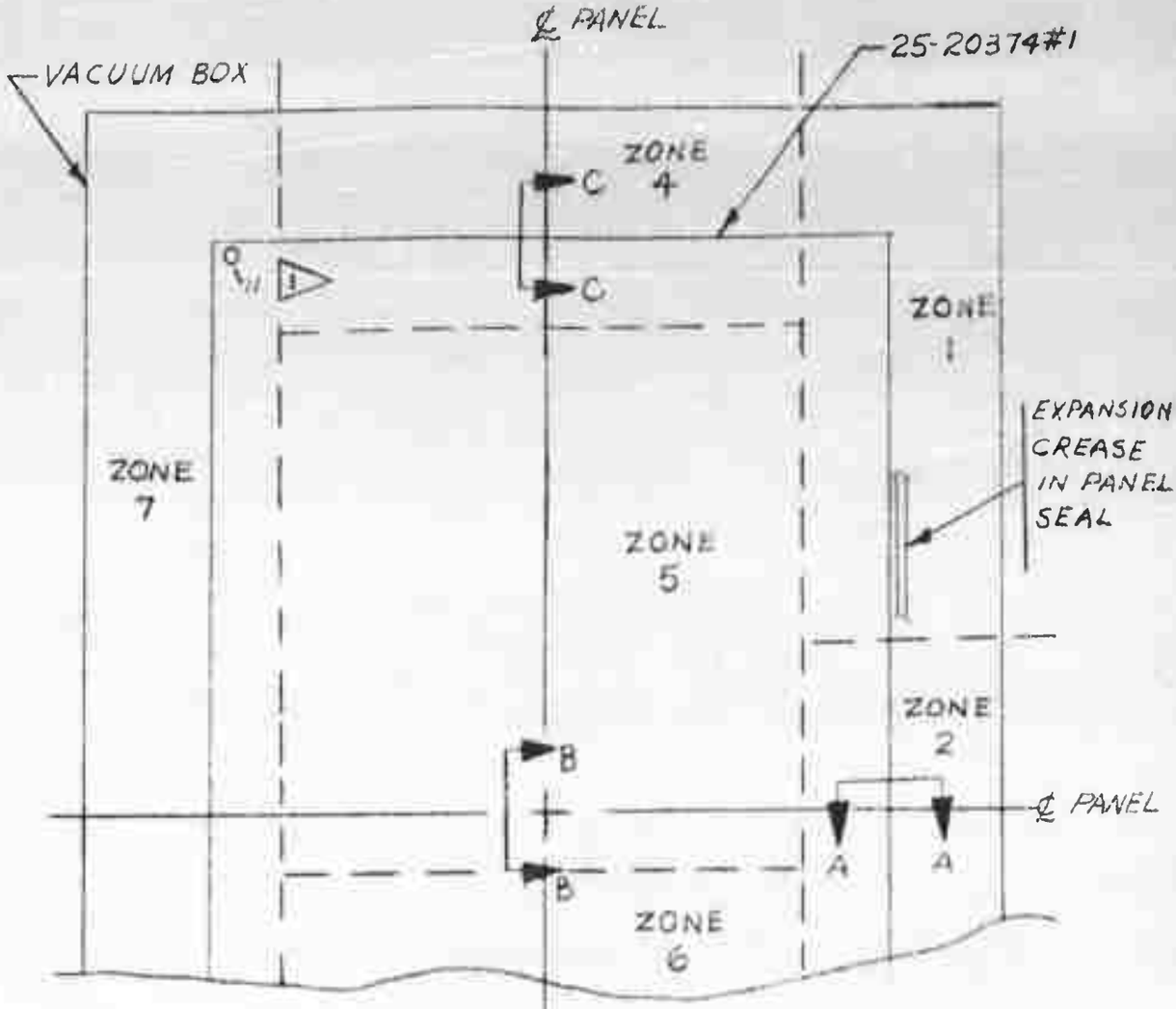
2-7000

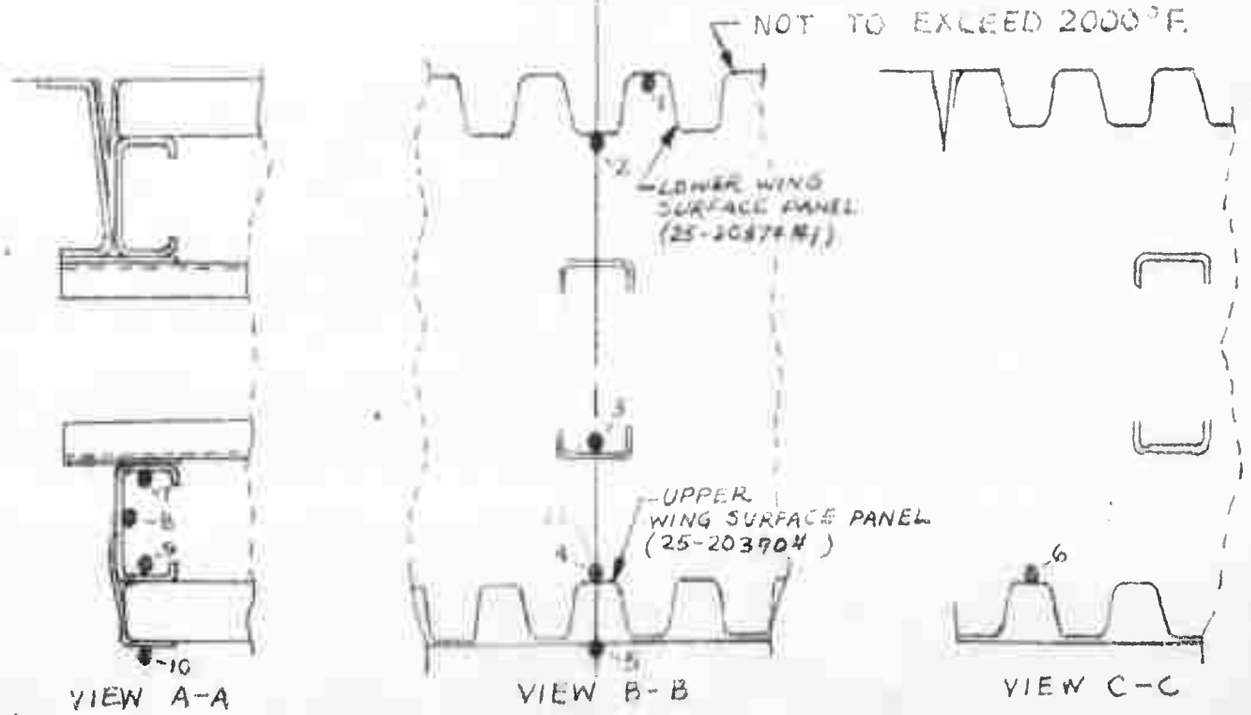


CALC	Schneider 5-31-63	REVISED	DATE	DEFLECTION AND PRESSURE MEASUREMENT LOCATIONS WING PANEL TEST LT-2-2
CHECK				
APPD				
APPD				

VOL 1
D2-80084
PAGE Fig. 71
THE BOEING COMPANY

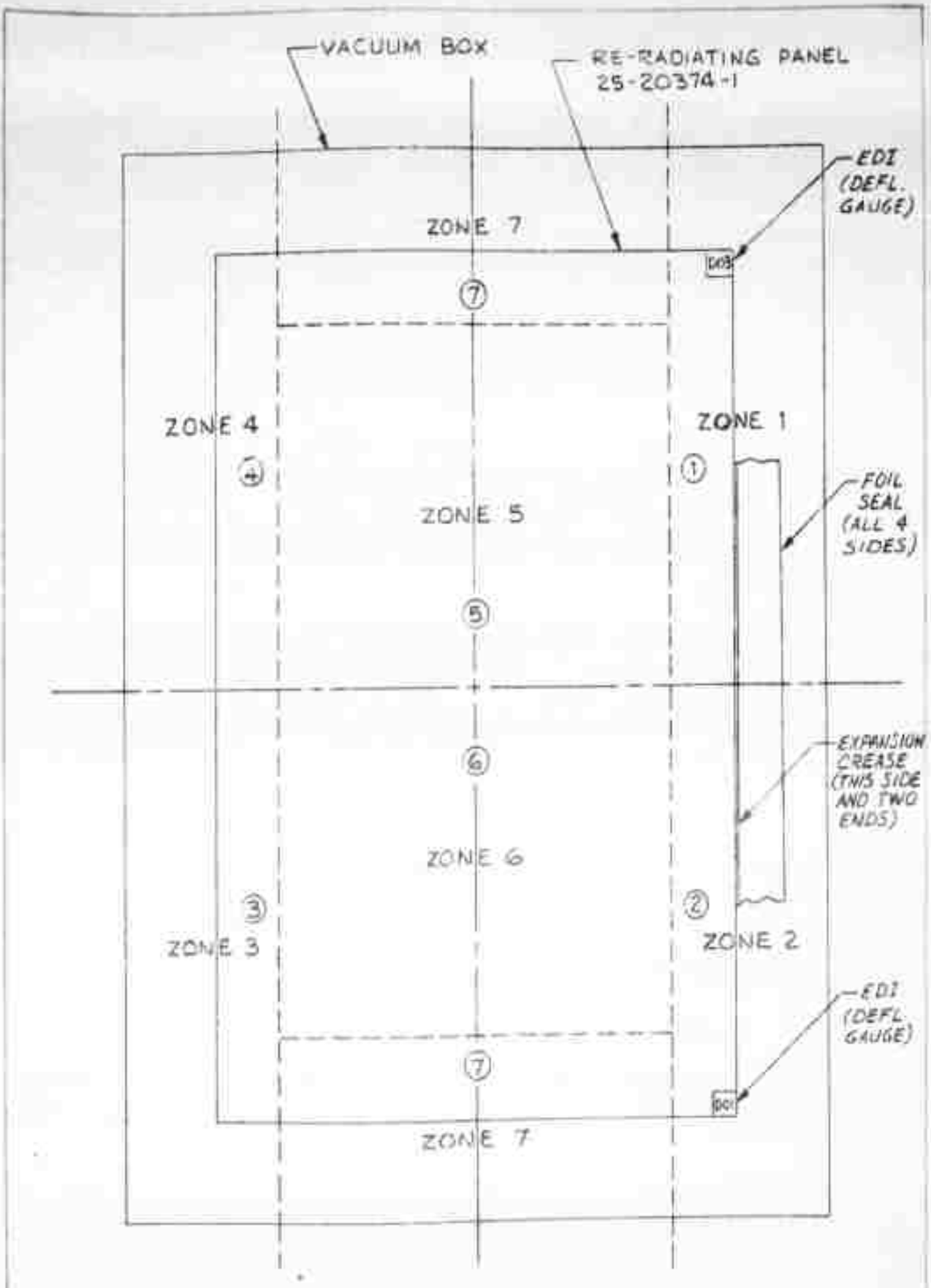
U3 4036 3000 REQ 10388





1 THERMOCOUPLE #11 LOCATED ON 25-20370 PANEL SKIN.

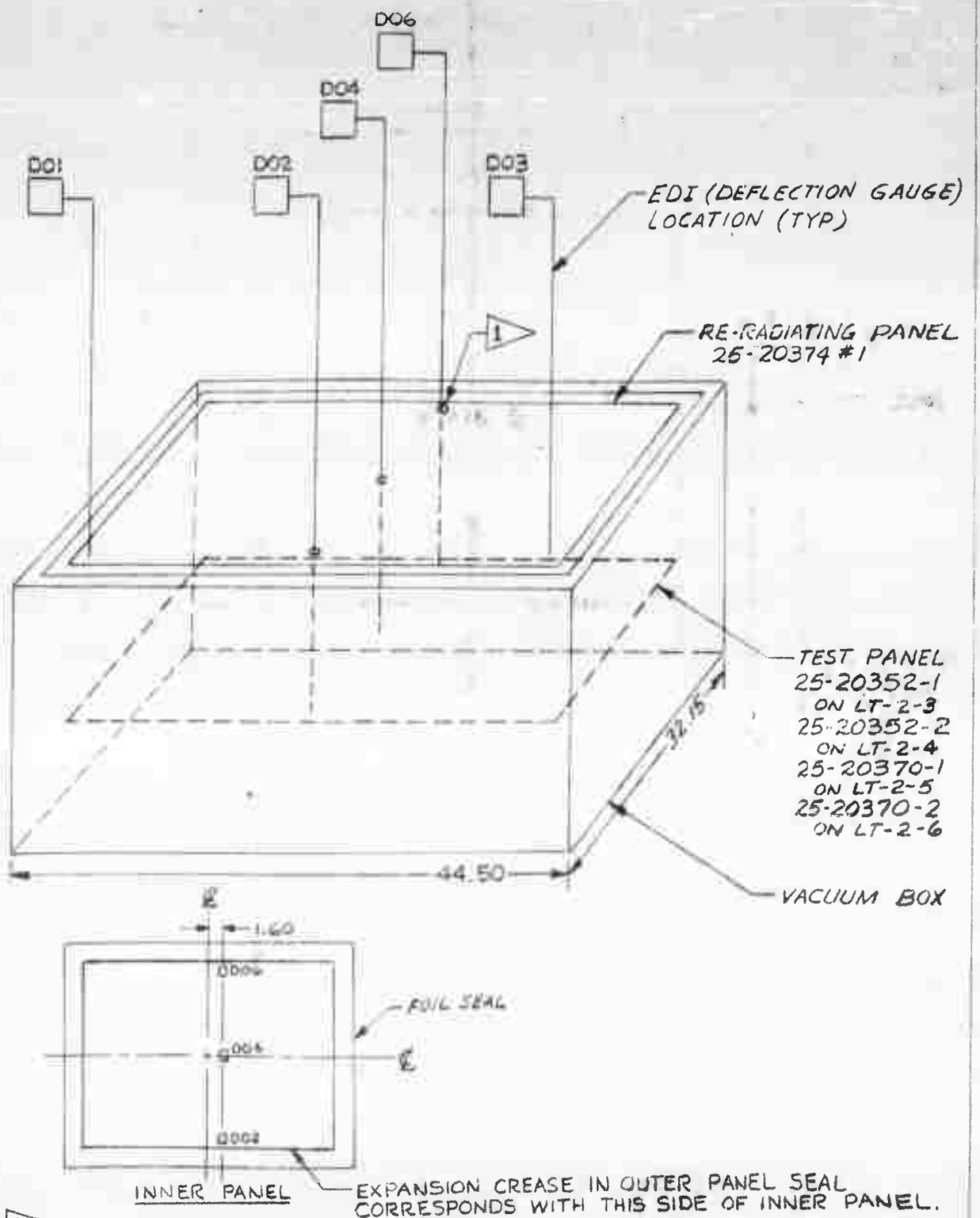
CALC	G. MILLS	8/22/61	REVISED	DATE	MONITOR THERMOCOUPLE LOCATIONS TEST LT-2-6 THRU LTZ-6 — Vol 1 — D2-80084
CHECK					
APR					
APR					BOEING AIRPLANE COMPANY — PAGE F-6 TZ



DRAWN E Denney 9/29/61	ZONE LAYOUT - EDI & T.C. LOCATIONS, OUTER PANEL 25-20374-1 LT-2-3 THRU LT-2-6	VOL 1
CHECK		D2-80084
APPD	BOEING AIRPLANE COMPANY	PAGE FIG 72

BAC 973 D R3

2 7000

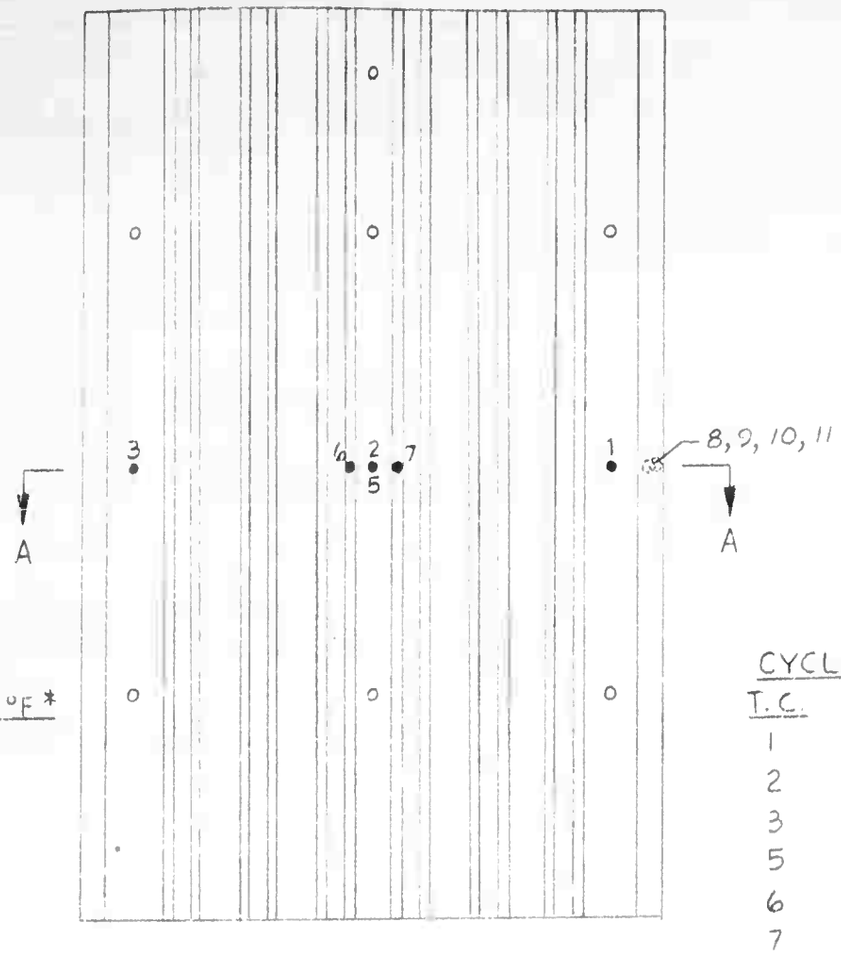


1 CLEARANCE HOLE IN OUTER PANEL FOR EDI ROD ATTACHED TO INNER PANEL (3 PLACES)

CALC Edenney 9/18/61 REVISED DATE	DEFLECTION GUAGE LOCATIONS TESTS LT-2-3 THRU LT-2-6	VOL I	
CHECK		D2-[illegible]	
APPD	BOEING AIRPLANE COMPANY	PAGE FIG 7A	
APPD			

BAC 973 D R3

2 1000

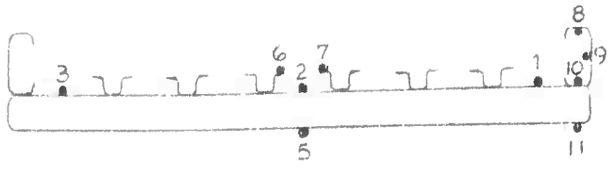


CYCLE 1

T.C.	TEMP.~°F*
1	1180
2	920
3	850
5	760
6	970
7	1050
8	1100
9	840
10	890
11	780

CYCLE 2

T.C.	TEMP.~°F*
1	1160
2	1000
3	930
5	810
6	1030
7	1060
8	1090
9	860
10	910
11	800



A-A

● MONITOR THERMOCOUPLES

o CONTROL THERMOCOUPLES

* AT PEAK OF CYCLE

CALC	Ellenway 1-16-62	REVISED	DATE
CHECK			
APPD			
APPD			

THERMOCOUPLE LOCATIONS & PEAK TEST TEMPS. ~ UNSYMMETRICAL HEAT TEST LT-2-6B

VOL I

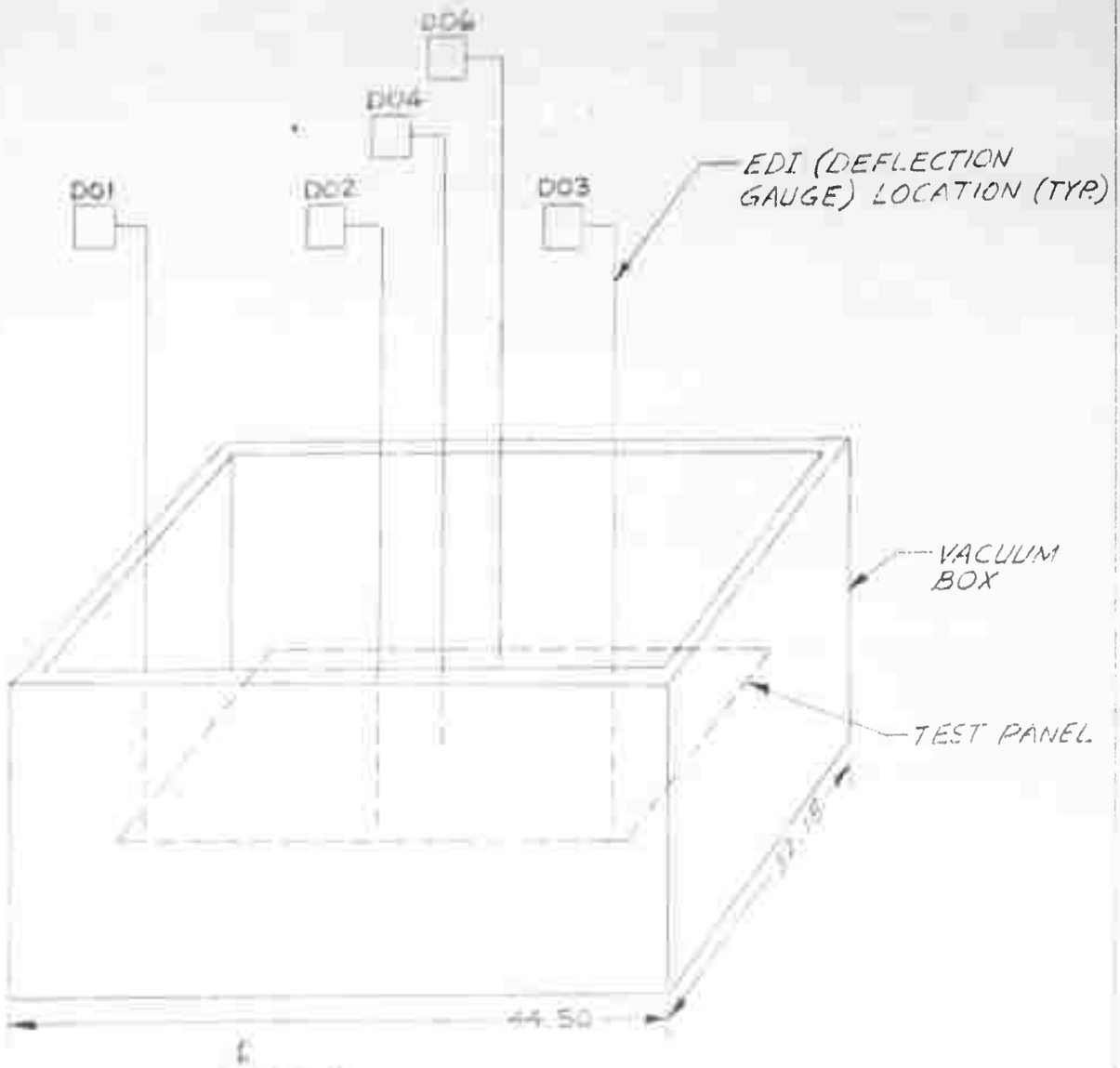
D2-80084

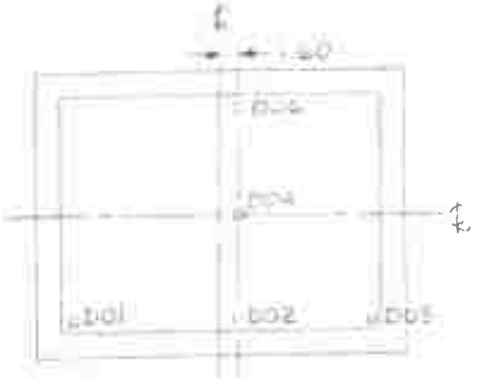
BOEING AIRPLANE COMPANY
SEATTLE 24 WASHINGTON

PAGE F-16 75

BAC 973 D R3

2-7000

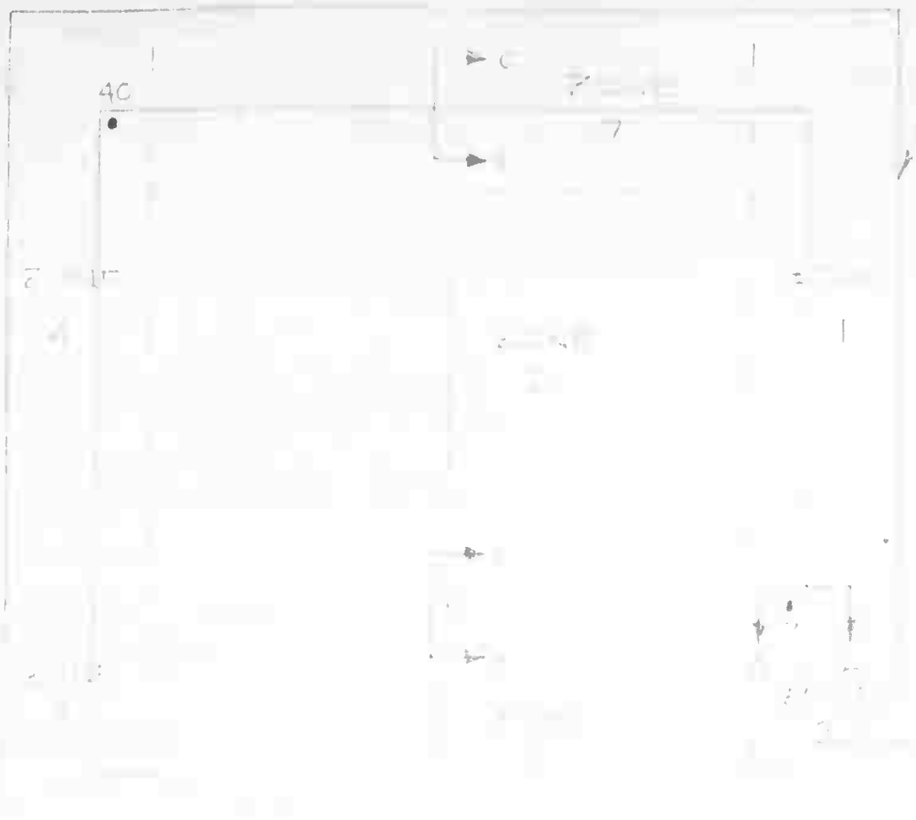




PEAK DEFLECTIONS

CYCLE 1 EDI #	CYCLE 1 DEFL @ 3.75 min.	CYCLE 2 EDI #	CYCLE 2 DEFL @ 3.75 min.
D01	.010	D01	.025
D02	.295	D02	.310
D03	-.010	D03	-.023
D04	.465	D04	.490
D06	.260	D06	.300

CALC E Benney 1-23-2	REVISED	DATE	DEFLECTION GUAGE LOCATIONS UNSYMMETRICAL HEAT TEST LT-2-6B
CHECK			BOEING AIRPLANE COMPANY
APPD			VOL 1 D2-BCCB4 PAGE FIG 99
APPD			



HOTTER SIDE IN UNSYM. HEAT TESTS





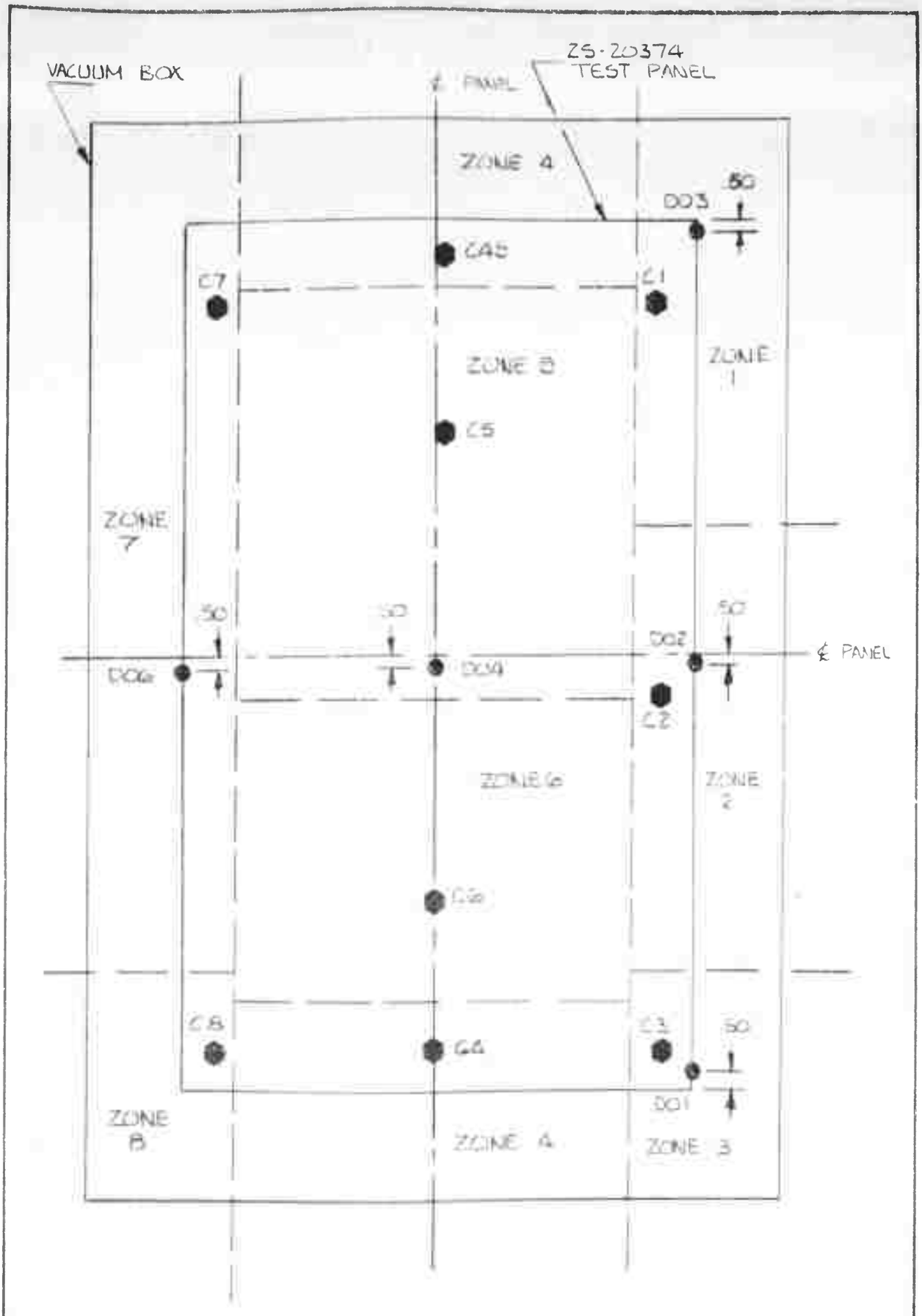
VIEW A-A

VIEW B-B

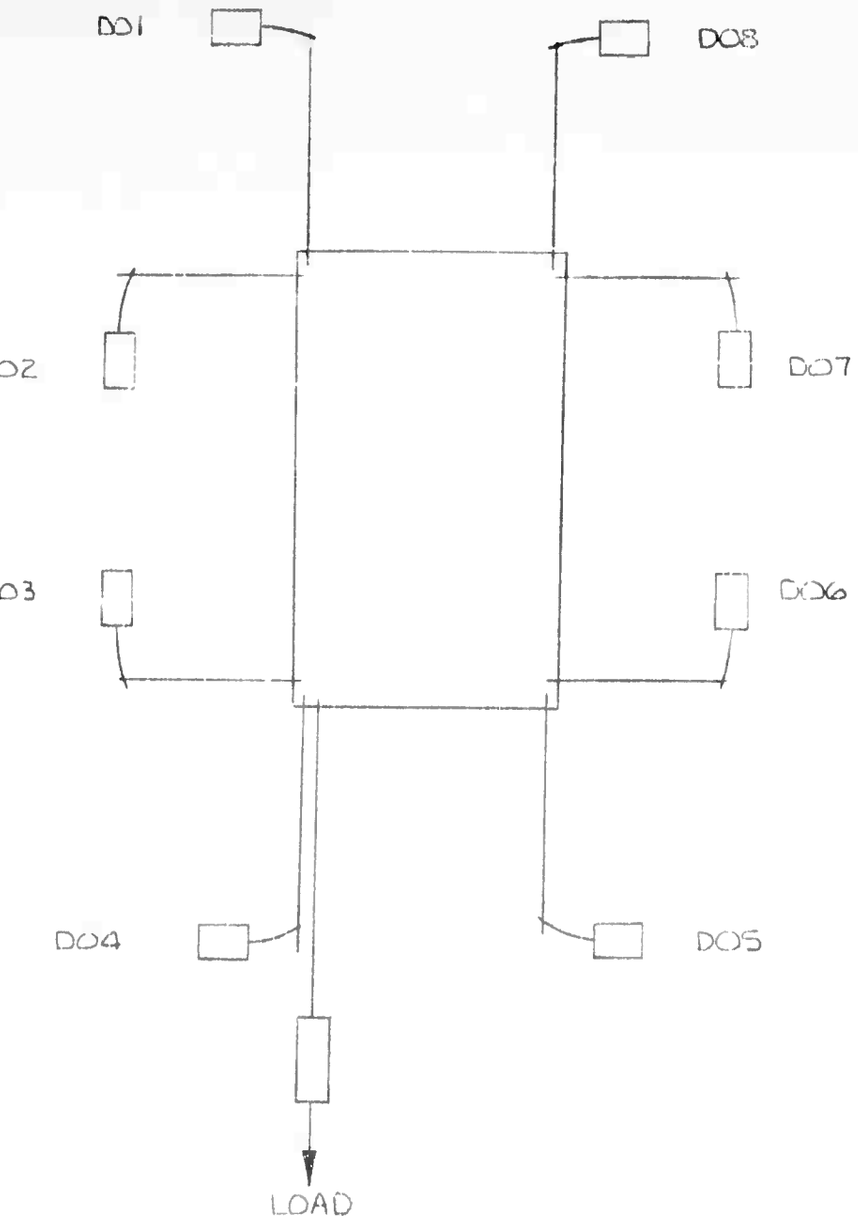
VIEW C-C

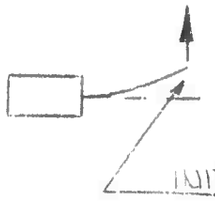
1

CALC			REVISED	DATE		VOL I
CHECK						
APR						D2-80084
APR					BOEING AIRPLANE COMPANY	
						PAGE



CALC	S. Gamein	5-31-63			DEFLECTION AND CONTROL THERMOCOUPLE LOCATIONS WING PANEL TESTS LT-3-1, 4-1, 4-2
CHECK					
APPD					
APPD					THE BOEING COMPANY





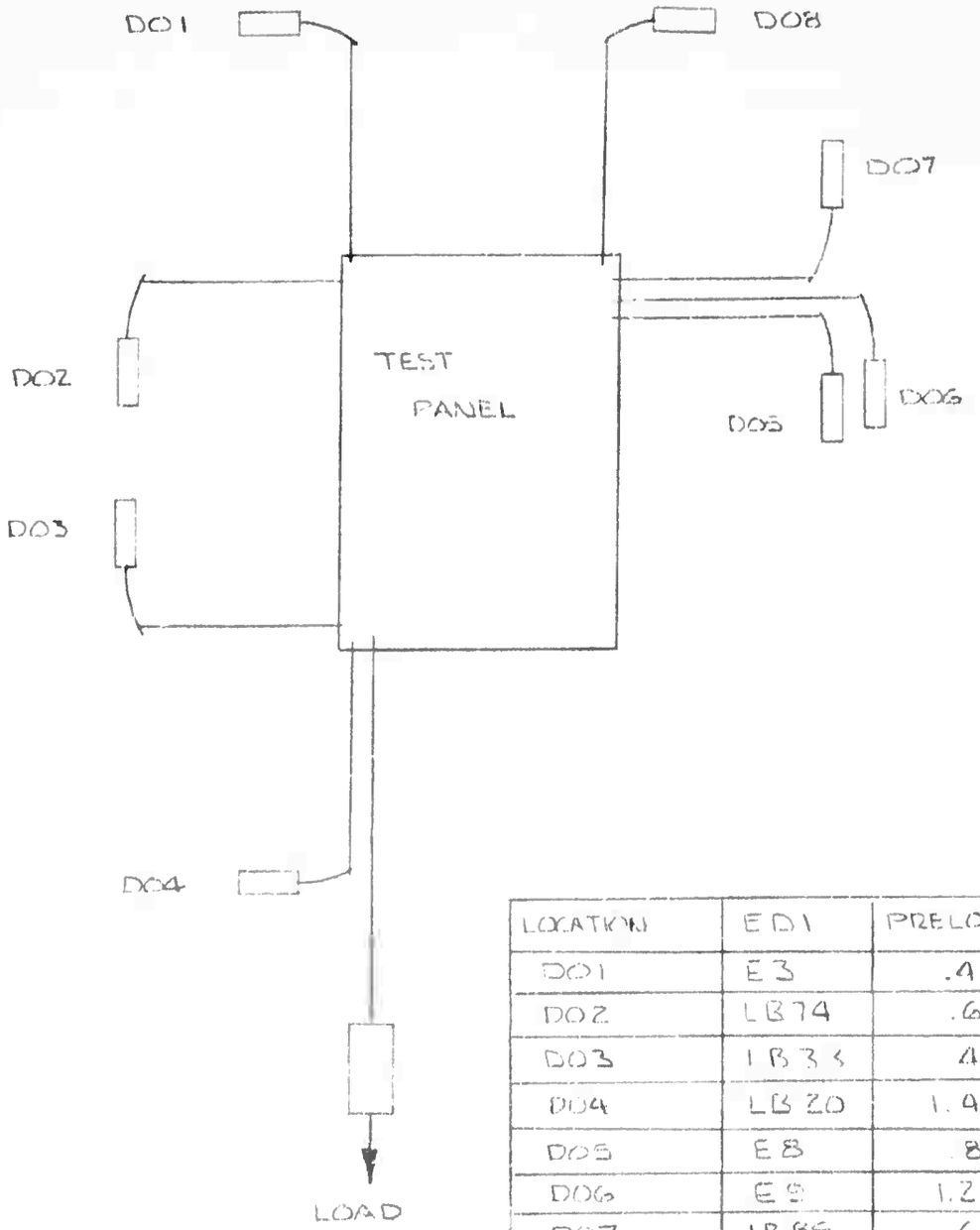
MOTION IN THIS DIRECTION WITH RESPECT TO THE EDI-BEAM-INITIAL-DISPLACEMENT IS POSITIVE (UPWARD ON LOAD ~ DEFLECTION PLOTS)

INITIAL DISPLACEMENT

CALC	Schneider 6-63	REVISED	DATE	EDI LOCATIONS TEST LTS-593-3-2
CHECK				
APPD				
APPD				
				THE BOEING COMPANY

VOL 2
D2-80094
T-34

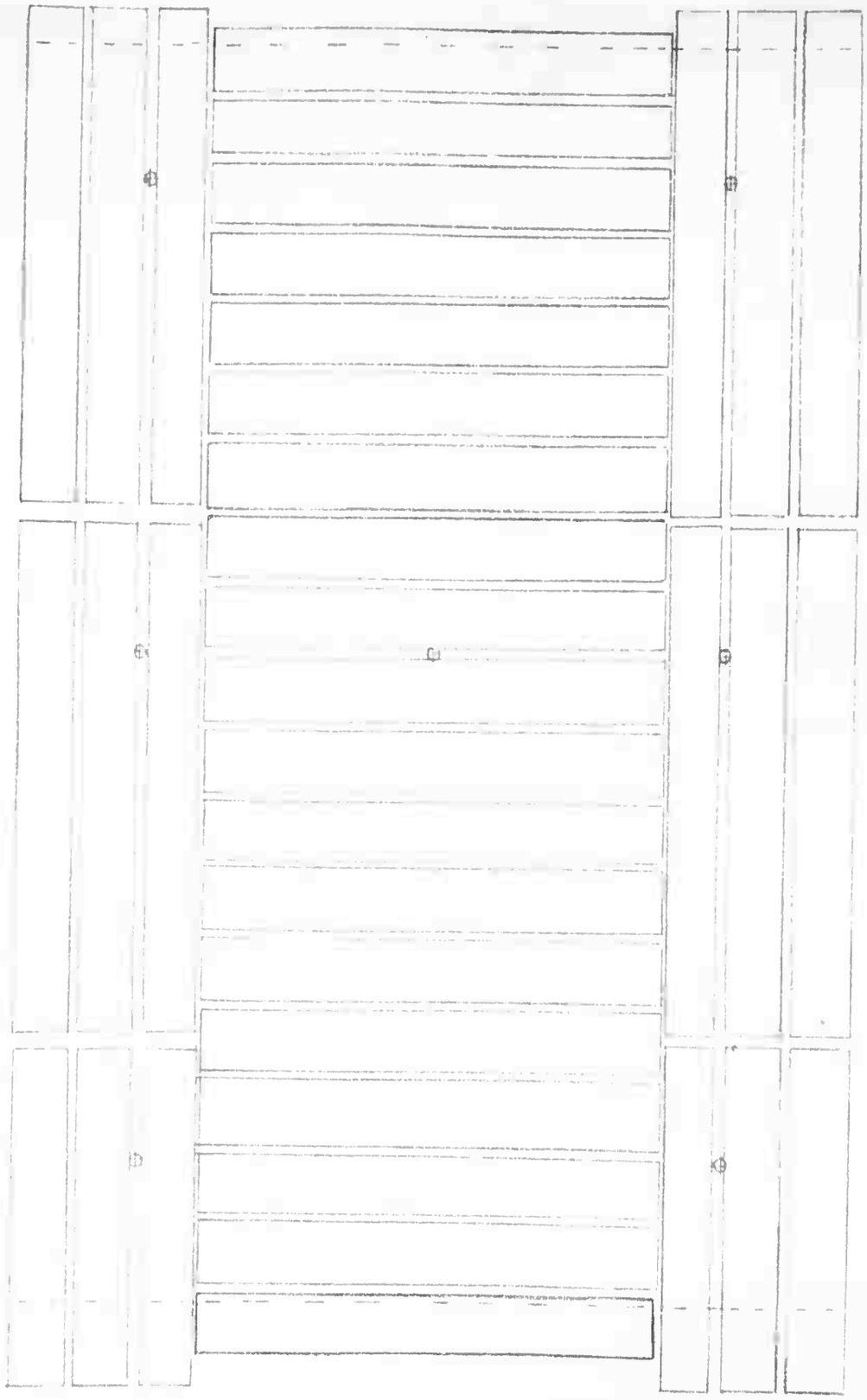
U3 4036 3000 REQ 10388

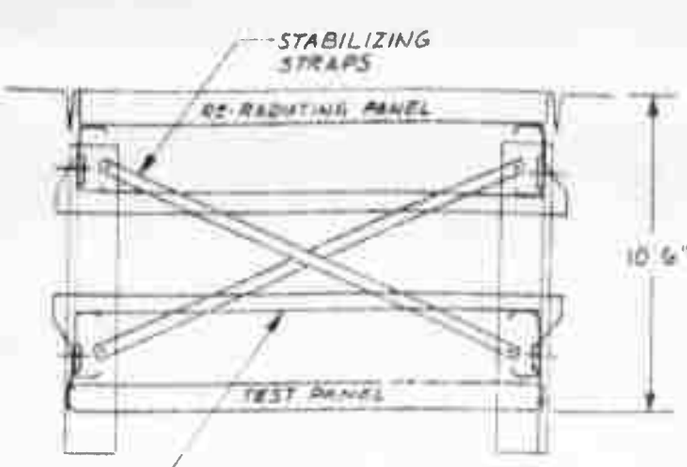


LOCATION	EDI	PRELOAD
DO1	E3	.4
DO2	LB74	.6
DO3	LB34	.4
DO4	LB20	1.4
DO5	E8	.8
DO6	E9	1.2
DO7	LB55	.6
DO8	E12	.4

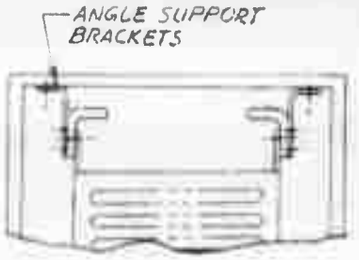
CALC	Schmaich 5-31-83	REVISED	DATE	EDI LOCATIONS	Vol 2
CHECK				TEST LT 5-593-3-3	D2-80084
APPD					
APPD				THE BOEING COMPANY	PAGE D-50

U3 4036 3000 REQ 10388

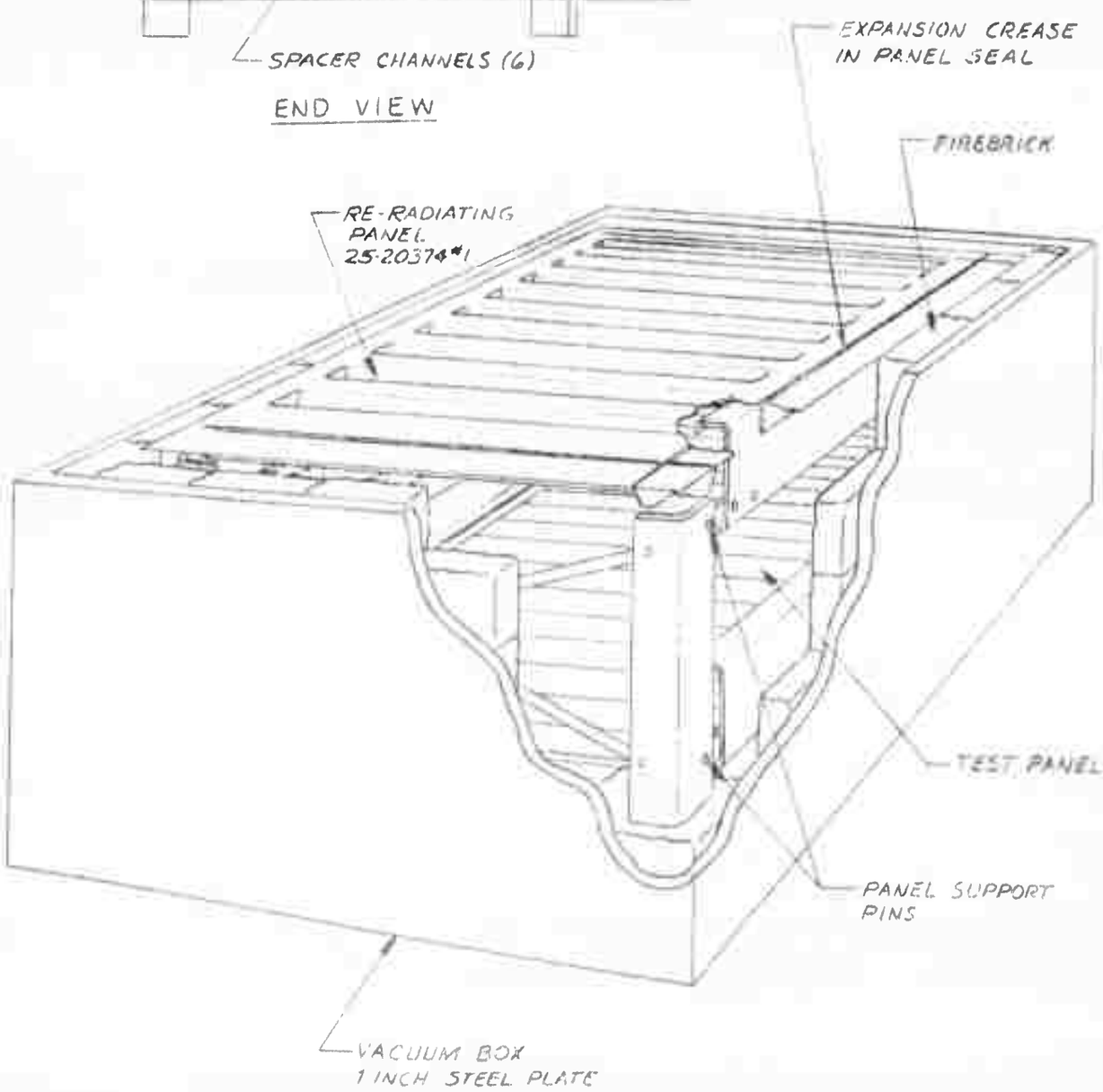




END VIEW



PLAN VIEW - FIXED END

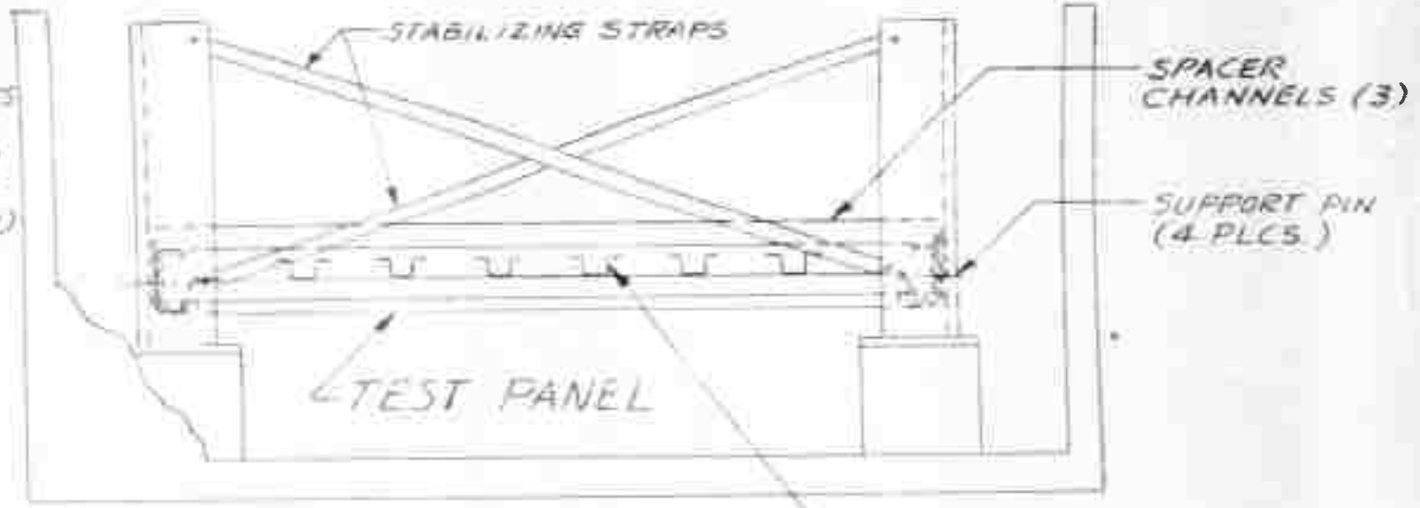


CALC Preliminary 11/2/61	REVISED	DATE	TEST PANEL INSTALLATION THERMAL FATIGUE TESTS LT-2-3 THRU LT-2-6
CHECK			D2-80084
APPD			BOEING AIRPLANE COMPANY SEATTLE 24 WASHINGTON
APPD			PAGE

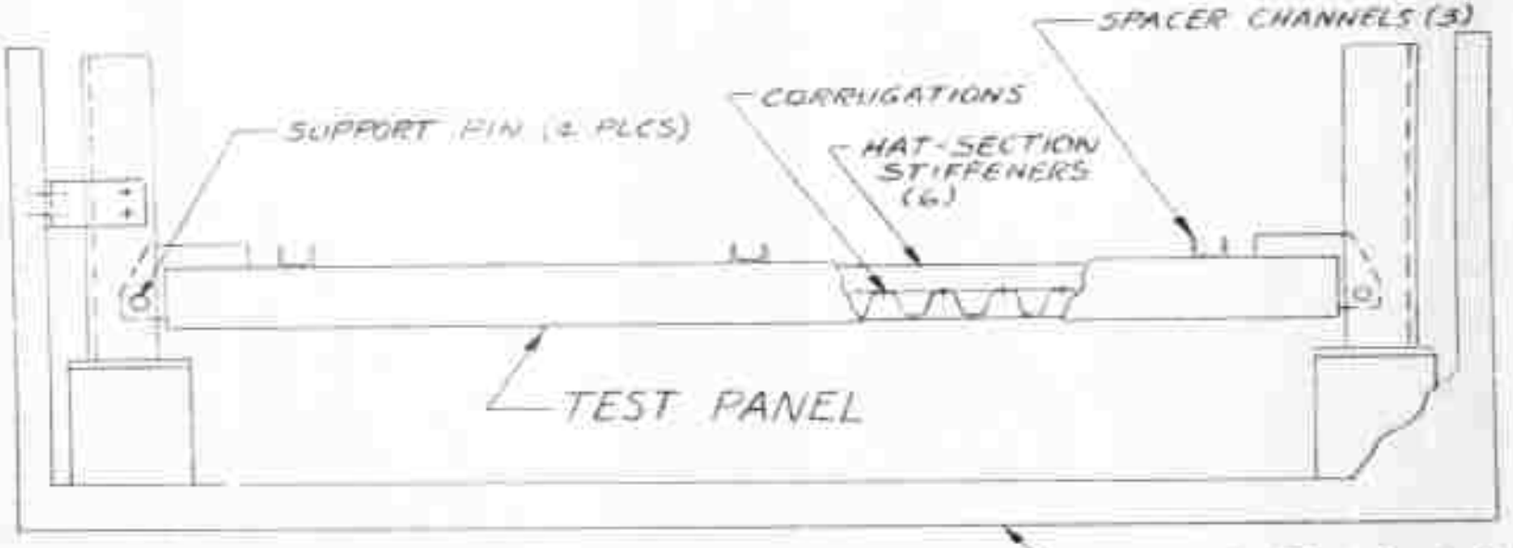
BAC 973 D R3

2-7000

NOTE: INSIDE WALLS & TOP EDGES OF VACUUM BOX WERE LINED WITH 2" OF K-30 FIRE BRICK (NOT SHOWN)



END VIEW



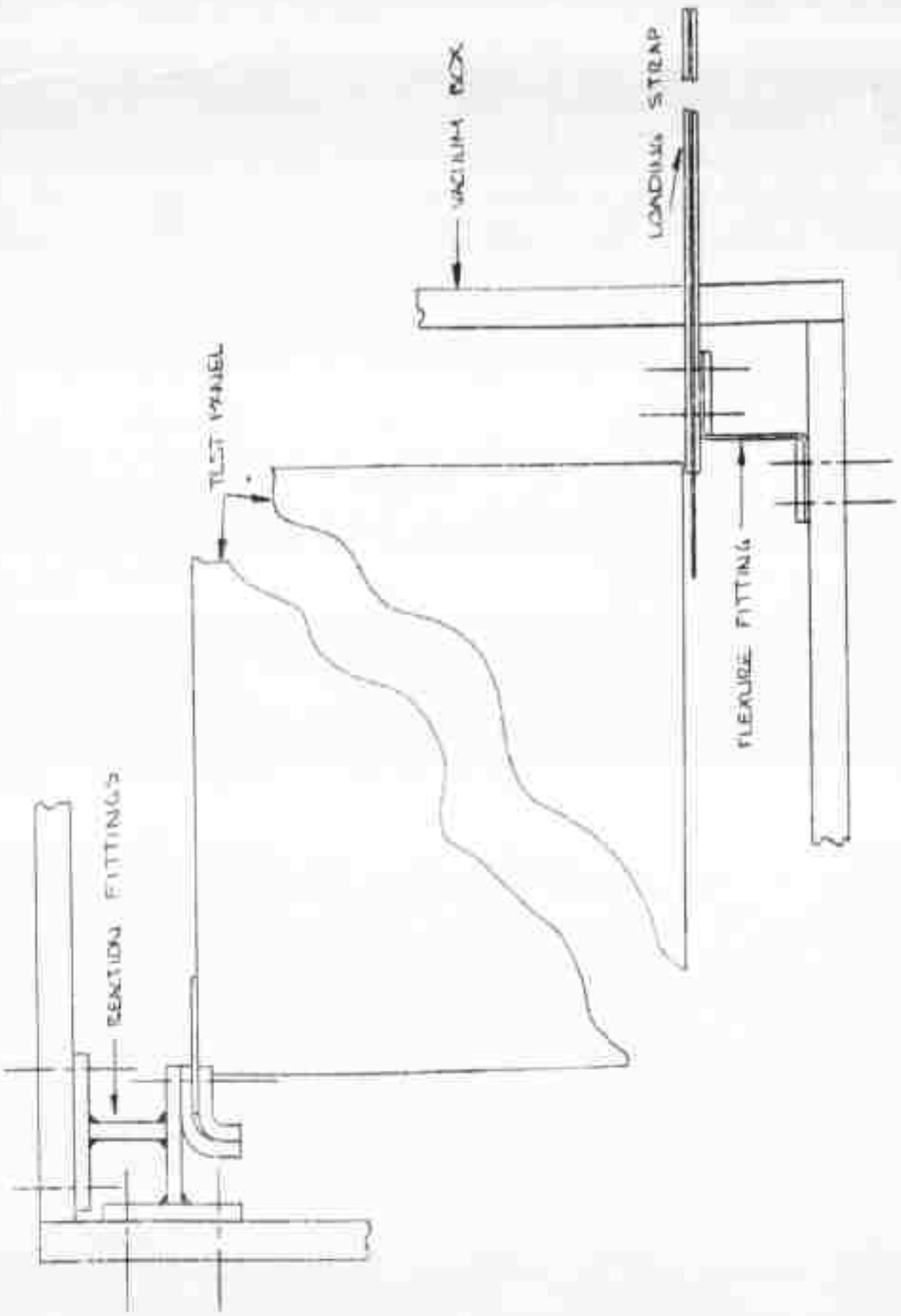
SIDE VIEW

TEST INSTALLATION DETAILS
DS-1 PANEL UNSYMMETRICAL
HEAT TEST LT-2-6B

BOEING AIRPLANE COMPANY

D2-80084

FIG



CALC	Schneider 6-10-63	REVISED	DATE
CHECK			
APPD			
APPD			

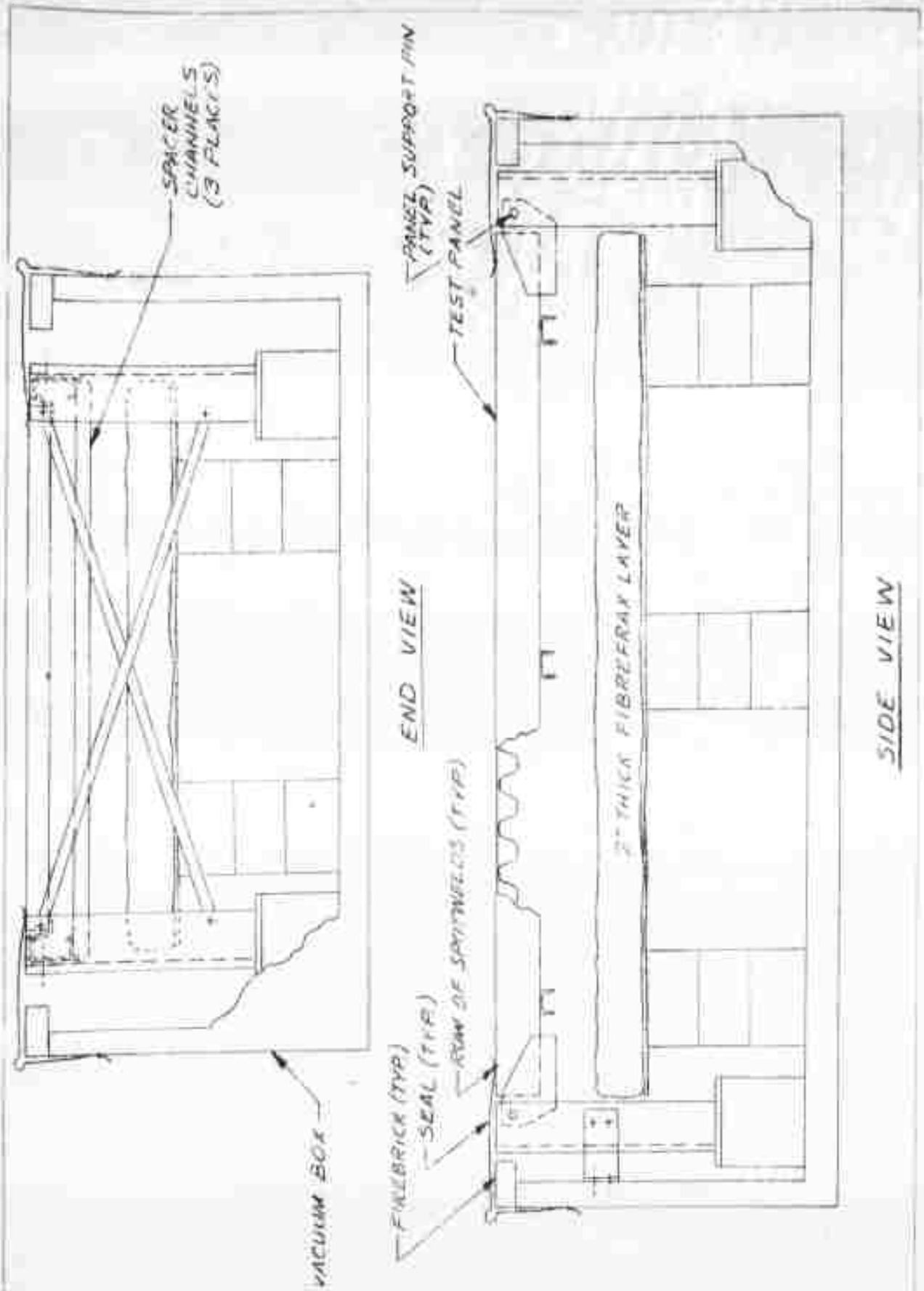
TEST PANEL MOUNTING GENERAL ARRANGEMENT, LT-5593-3

D2-80084

THE BOEING COMPANY

PAGE

U3 4036 3000 REQ 10388



CALC Eldenney 1-31-2

CHECK

APPD

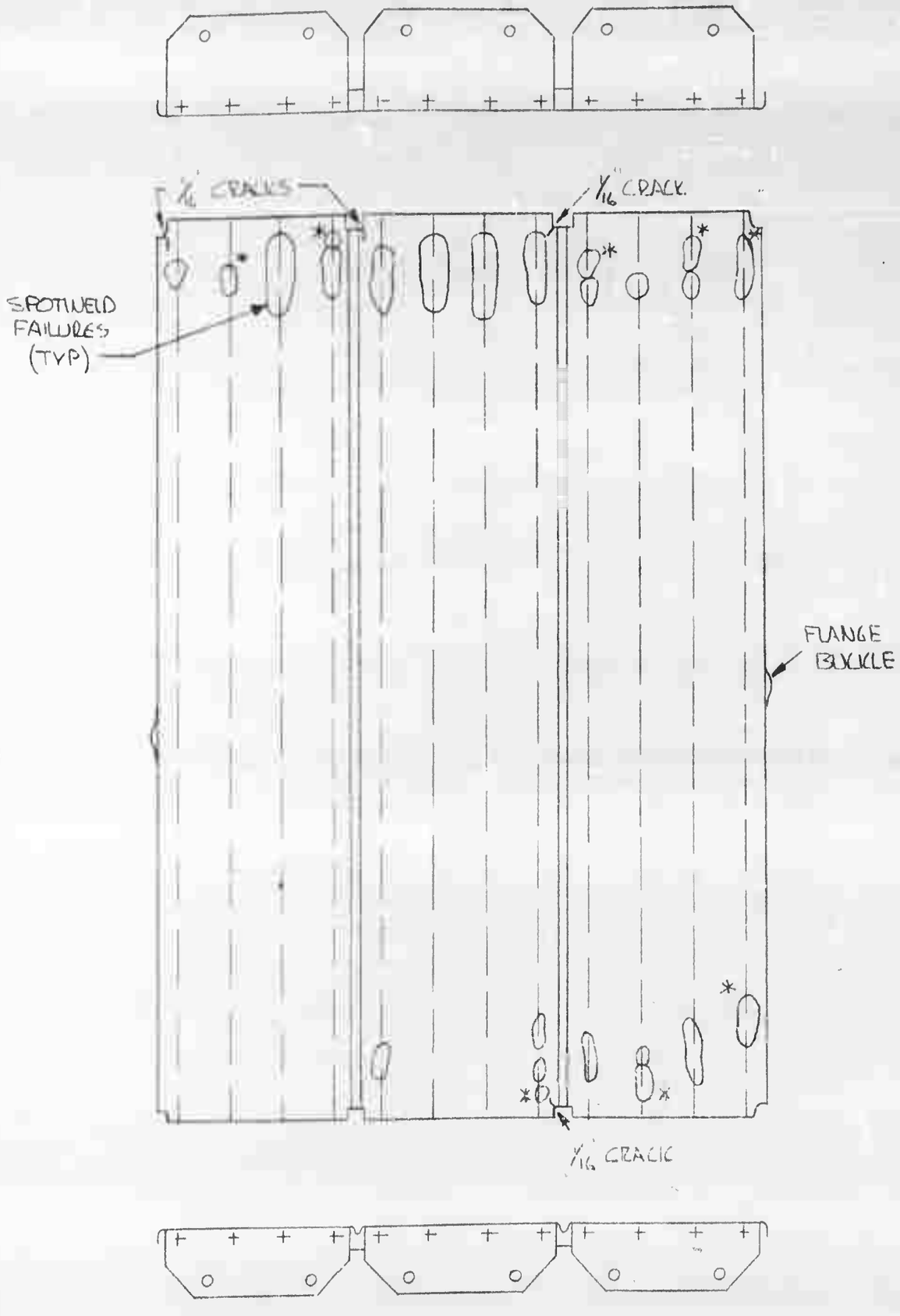
APPD

REPRESENTATIVE PANEL INSTALLATION TESTS LT-4-2, -4-3 & -4-4 ~DS WG. PANEL UNSYM. HEAT & PRESSURE TESTS

Vol 2

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PAGE



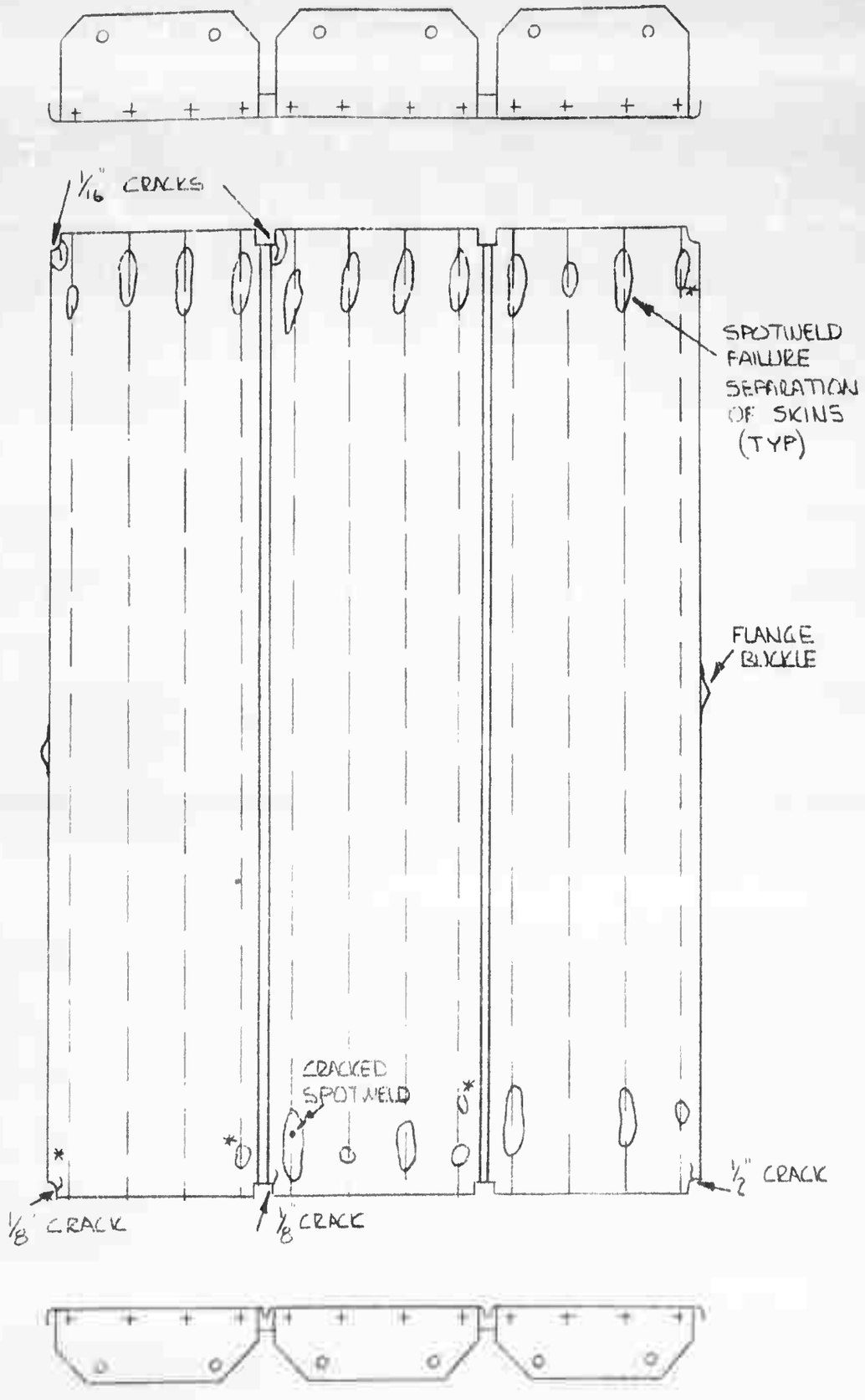
* FAILURE DUE TO SONIC TESTING

CALC	Schmeiser 6-7-63	REVISED	DATE	PANEL 25-20344-1 AFTER HEAT AND SONIC TESTING PANEL 1479
CHECK				
APPD				
APPD				THE BOEING COMPANY

D2-80088

PAGE

U3 4036 3000 REQ 10388



* FAILURE DUE TO SONIC TESTING

CALC	[signature]	6-7-63	REVISED	DATE
CHECK				
APPD				
APPD				

PANEL 25-20344-1 AFTER HEAT AND SONIC TESTING
PANEL 1478

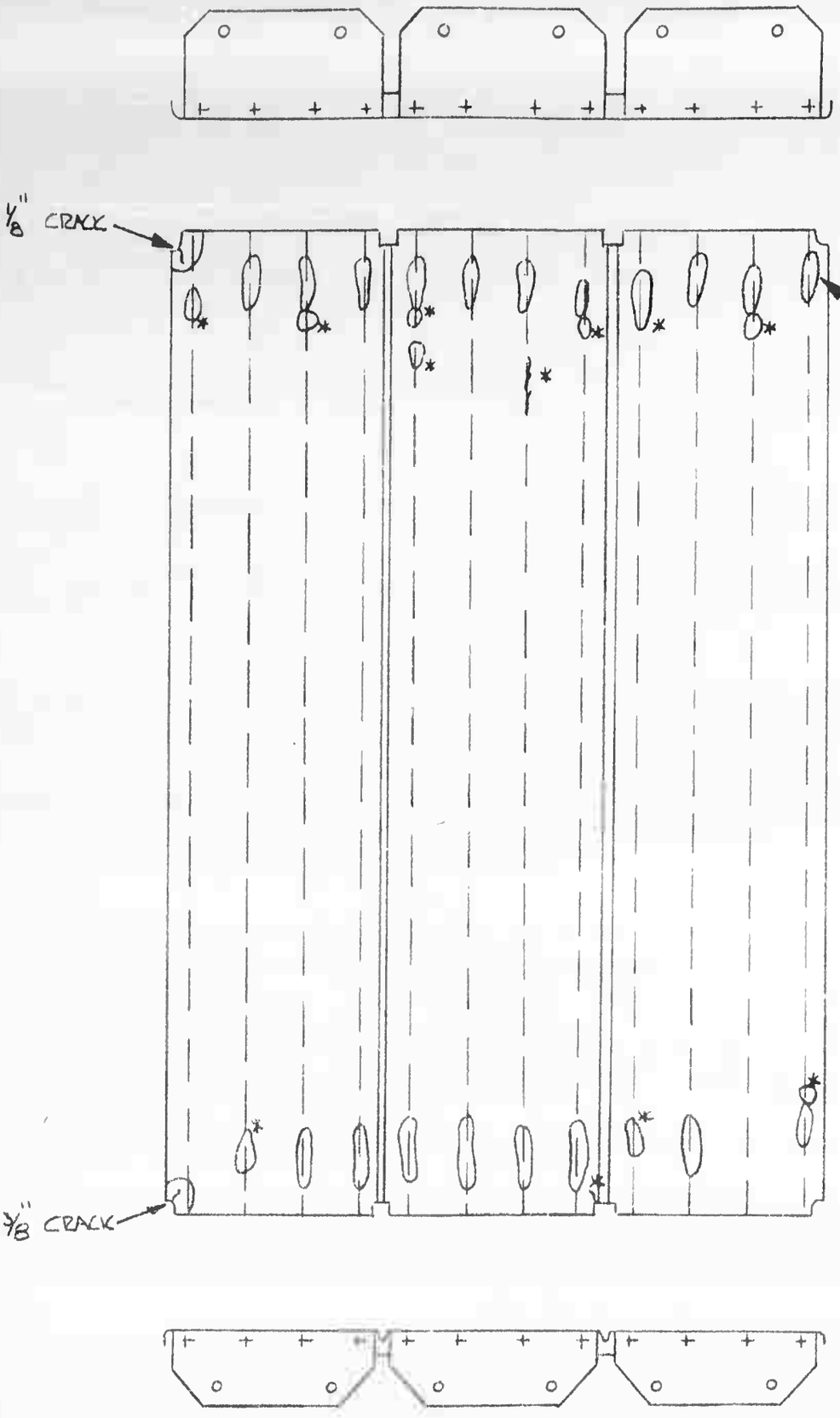
THE BOEING COMPANY

Ver. 1

D2-80084

PAGE FIN ST

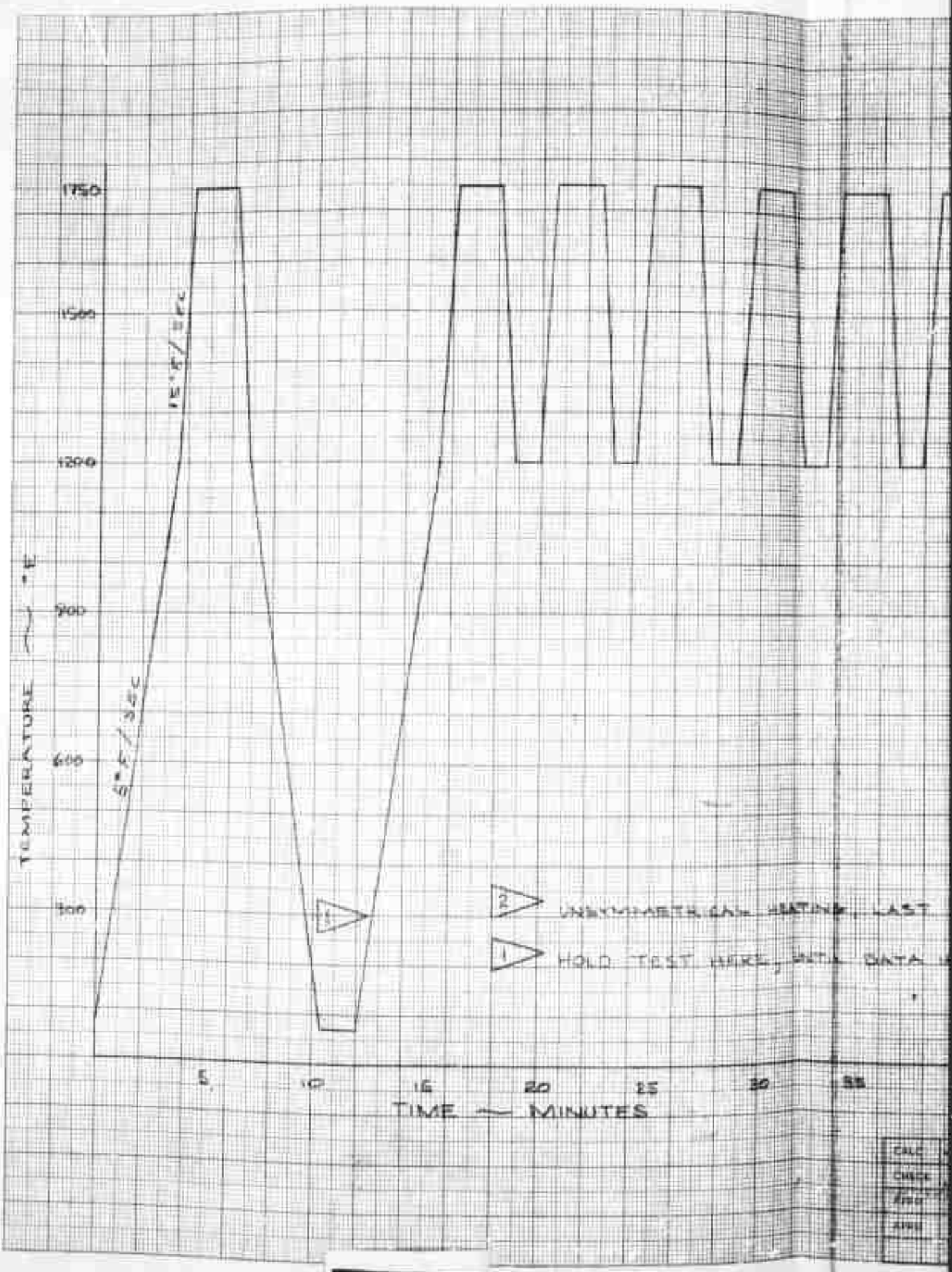
U3 4036 3000 REQ 10388

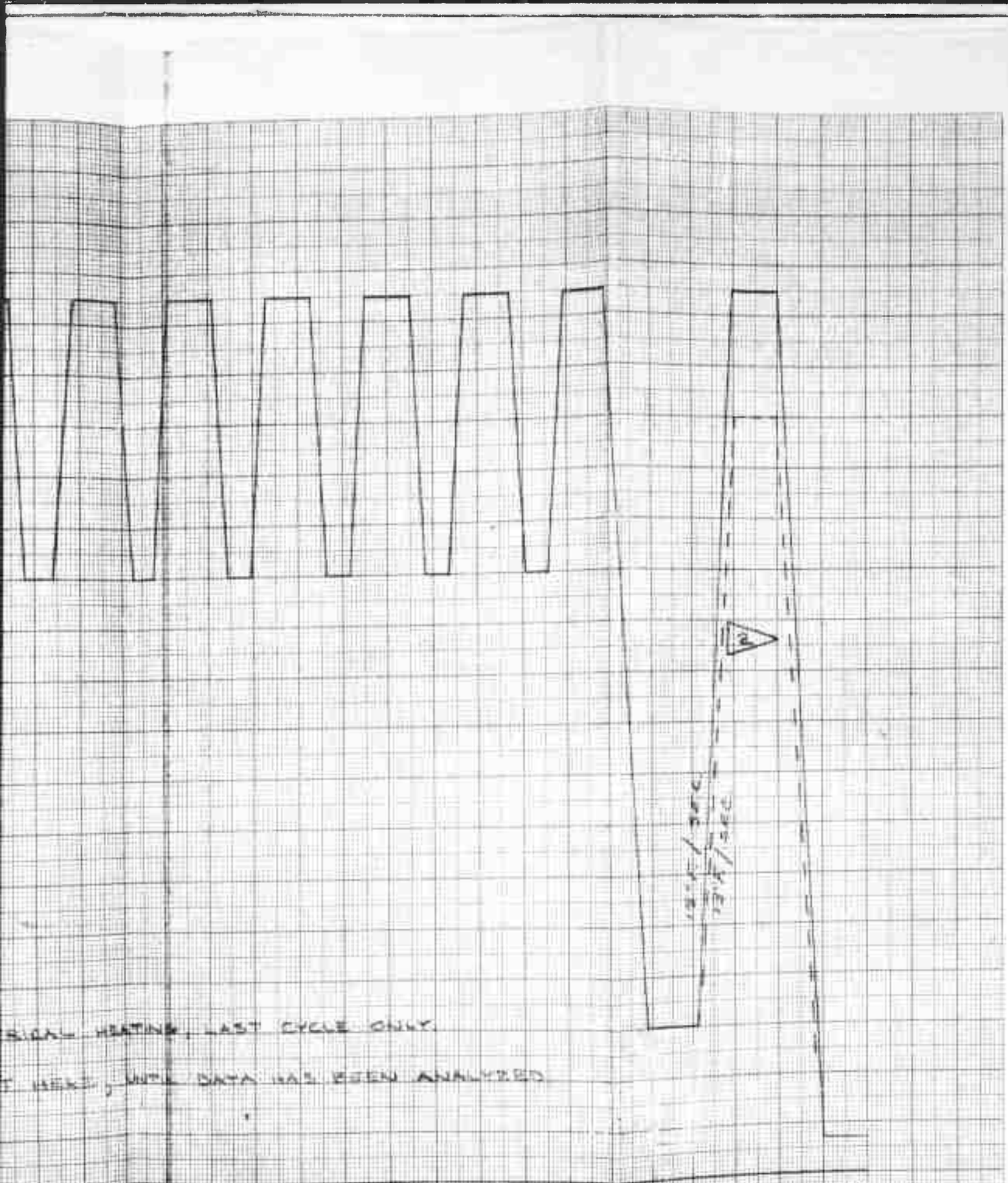


* FAILURES DUE TO SONIC TESTING

CALC	Schmidt	6-7-63	REVISED	DATE	PANEL 25-20344-1 AFTER HEAT AND SONIC TESTING	Ver 1
CHECK					PANEL 1977	D2-80084
APPD					THE BOEING COMPANY	PAGE
APPD						

U3 4036 3000 REQ 10388


1750
1500
1200
900
600
300
TEMPERATURE (-) °F
15°F/MIN
5°F/MIN
5
10
15
20
25
30
35
TIME — MINUTES
2
UNSYMMETRICAL HEATING, LAST
1
HOLD TEST HERE, INITIAL DATA
CALC
CHECK



SIGNAL HEATING, LAST CYCLE ONLY.

T HERE, UNTIL DATA HAS BEEN ANALYZED.

30 35 40 45 50 55 60 65

CALC	NEIGHBORE	8-7-61	ADDED	DATE
CHECK	JENSEN	14-11-61		

TEST PROGRAM
LT 5-593-2-1
SK 1-95782

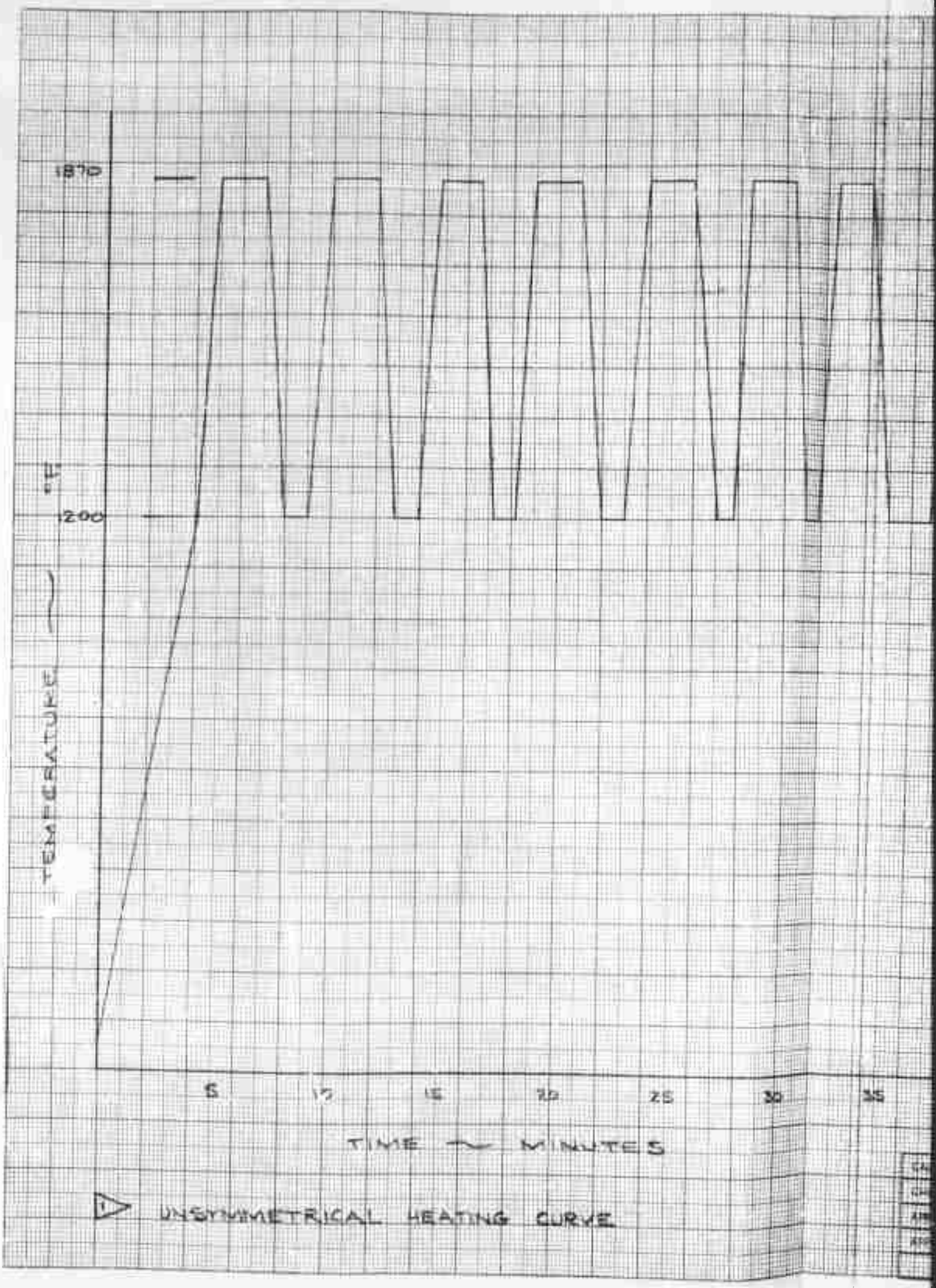
BOEING AIRPLANE COMPANY

D2-8008A

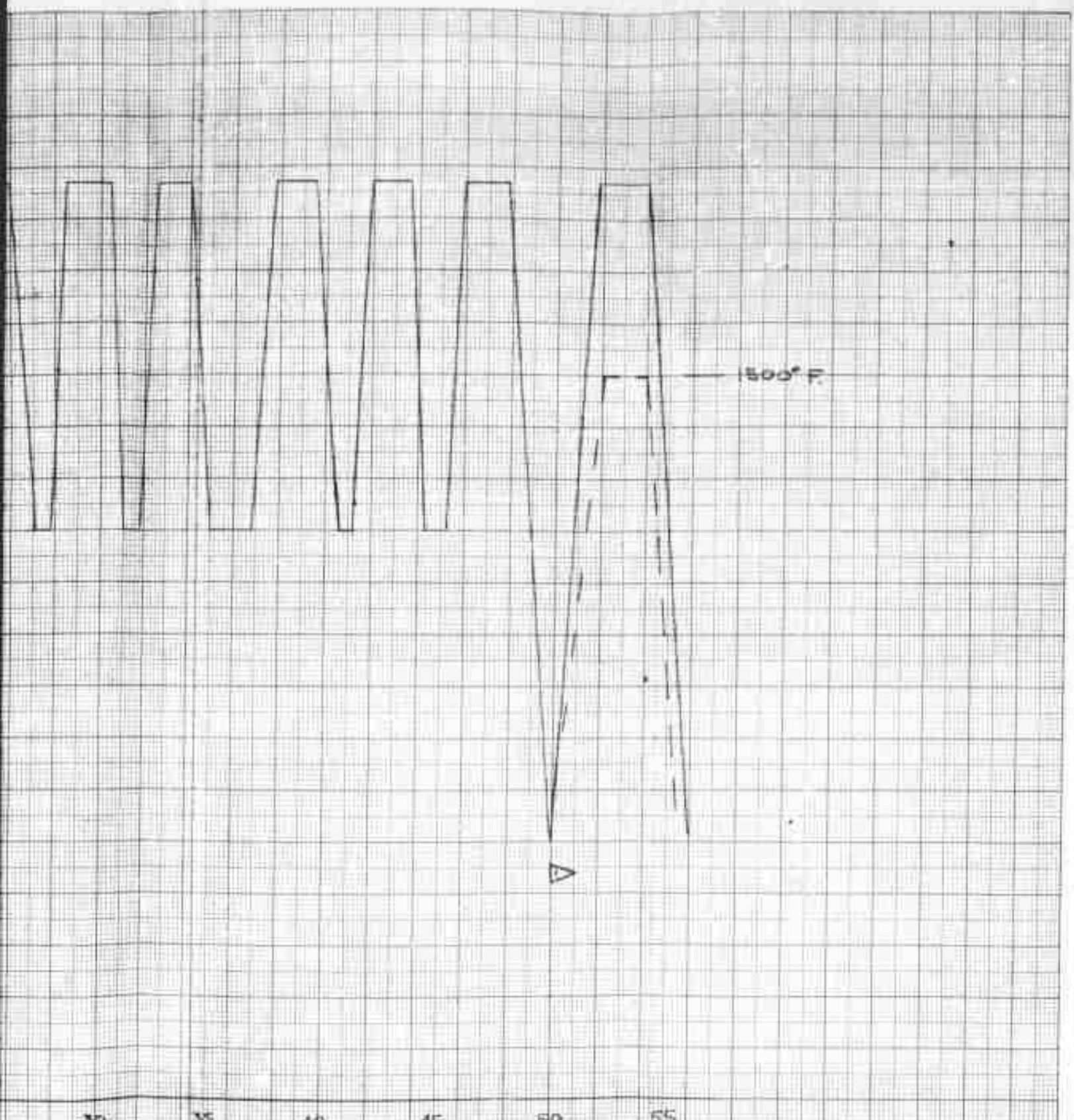
PAGE F14-19

BAC 1033-6

NAT ALBUQUERQUE



1 UNSYMMETRICAL HEATING CURVE

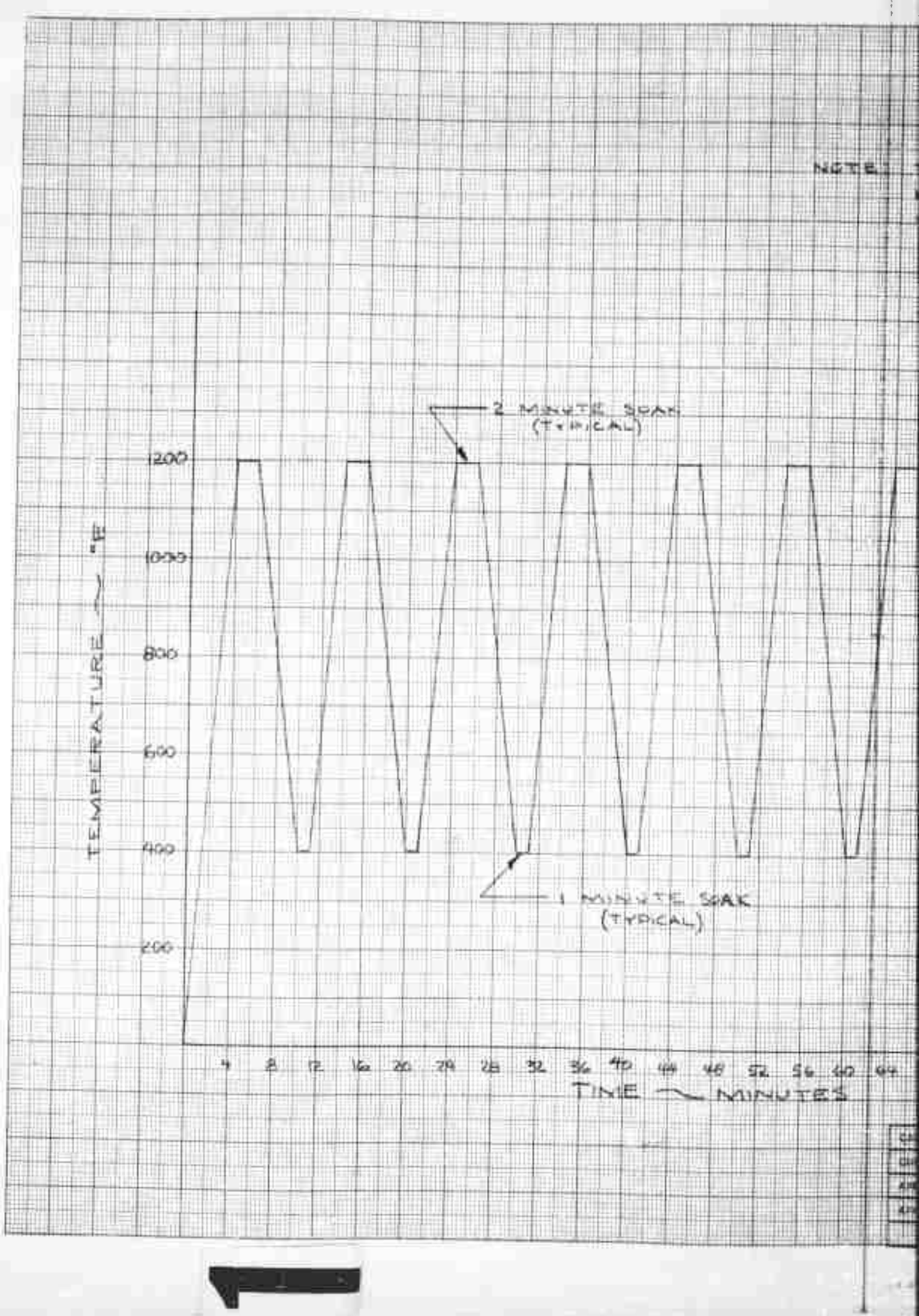


DRAWN	ED N.		
CHECK			
APPR'D			
APPR'D			

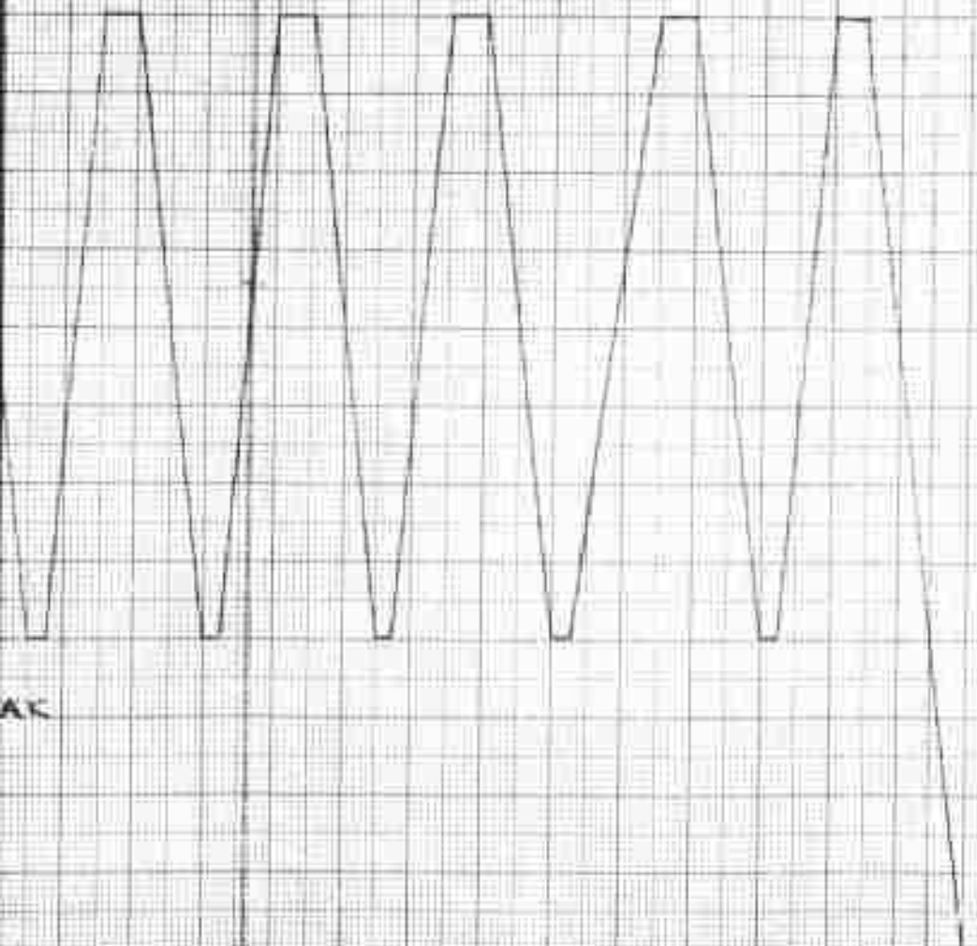
PANEL ATTACHMENT
TYPE 1 PRELIMINARY
LT 5-593-2-2

Vol. 1
DI-80084
PAGE
Fig. 30

ALBANENE 1961


NOTE:
2 MINUTE SOAK (TYPICAL)
1 MINUTE SOAK (TYPICAL)
TEMPERATURE — °F
1200
1000
800
600
400
200
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
TIME — MINUTES

NOTE: THIS HEAT PROGRAM IS FOR LOWER PANEL.
HEAT RATE IS 5°F/SECOND
UPPER PANEL TEMPERATURE IS 1100°F (MAXIMUM)
COOLING RATE IS NATURAL COOLING NO HEAT APPLIED.



AK

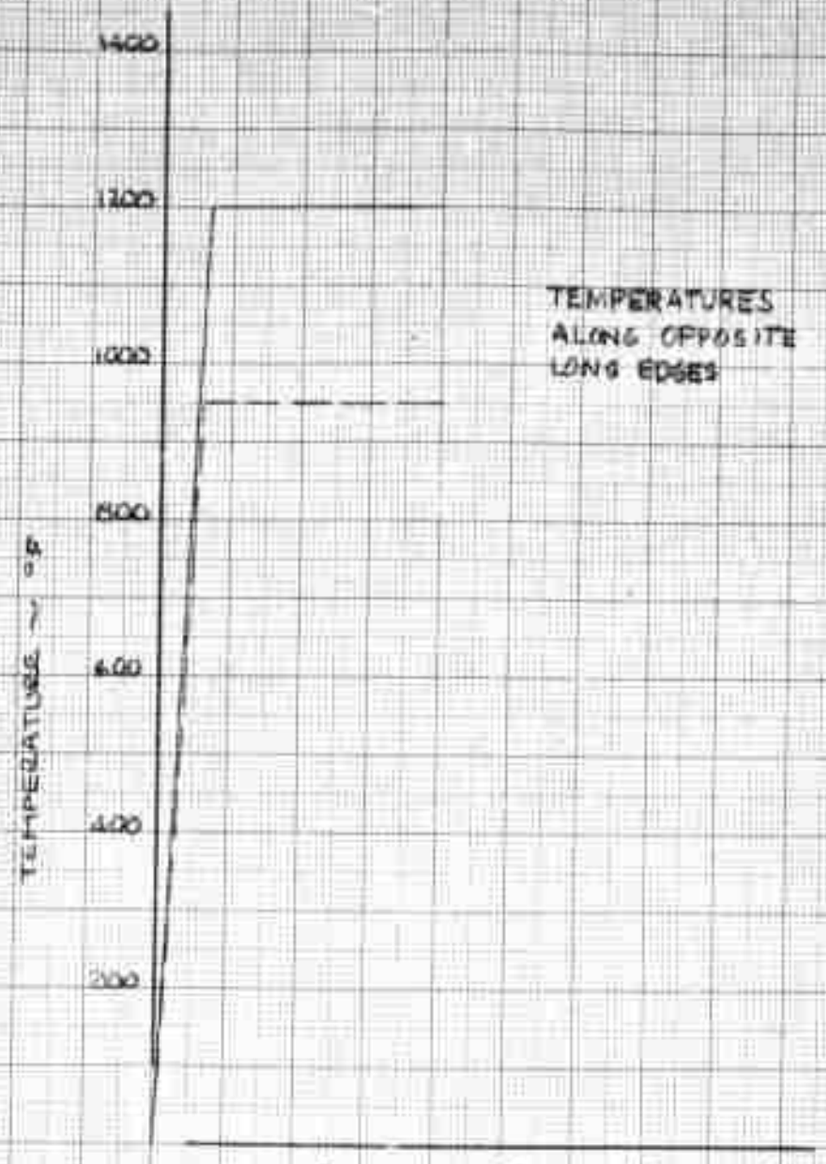
52 56 60 64 68 72 76 80 84 88 92 96 100 104
MINUTES

CALC	ED NJ	3/27/81	NUMBER	DATE
CHECK				
APPR				
APPR				

PANEL ATTACHMENT
LT S-593-2-3, -4, -5, -6

Ver 1
D2-B0084
PAGE
Fig 21

KEUFFEL & ESSER CO. MADE IN U.S.A.
KE KEUFFEL & ESSER CO. 1981 11164



CALC	[illegible]	7-63	REVISED	DATE	HEATING PROGRAM	Vol. I
CHECK					LT-5593-2-68	D2-90084
APP						
APP					THE BOEING COMPANY	PAGE Fig. 9

K+E ALBANENE® TRACING PAPER 70737

Total Test Time		Test Time	Freq.	Heat Cooling Press	Spread Level	Peak to Peak Amplitude	
Hrs	Min.	Min.	cps		gs	Inches	
0	05	05	RANDOM		15.2		NO [illegible] FAILURE
							PANEL REMOVED TO HEAT LAB FOR
							15 MIN. 600° HEAT CYCLE
							HEAT TEST CAUSED NUMEROUS SPOT WELD
							FAILURES AND BUCKLING IN ADDITION, PANEL
							DISPLAYED GENERAL WAVINESS LIKE
							APPEARANCE AFTER TEST. FAILURES
							MARKED WITH PEN.
0	20	15			10.2		3 SPOT WELDS ON SEAM W-1 (MARKED -1)
0	40	20			5.1		NEW CRACK AT SPOT WELDS. SOME NEW BUCKLING (MARKED -2) (ON PANEL SPOT WELD CRACK)
1	0	20			15.2		

A	CP	1/10/66	PANEL 1417 TEST LOG EWA 5-593-1		D2-80084 VOL I
LTR					
ADR					

FORM 1017 P.S.

Total Test Time		Test Date	Freq.	Horn Quality Pass	Sound Level dB	Final Double Artifact	Comments
Hr	Min	Min	cps		dB	Inches	
0	5	5		—			
1	05						

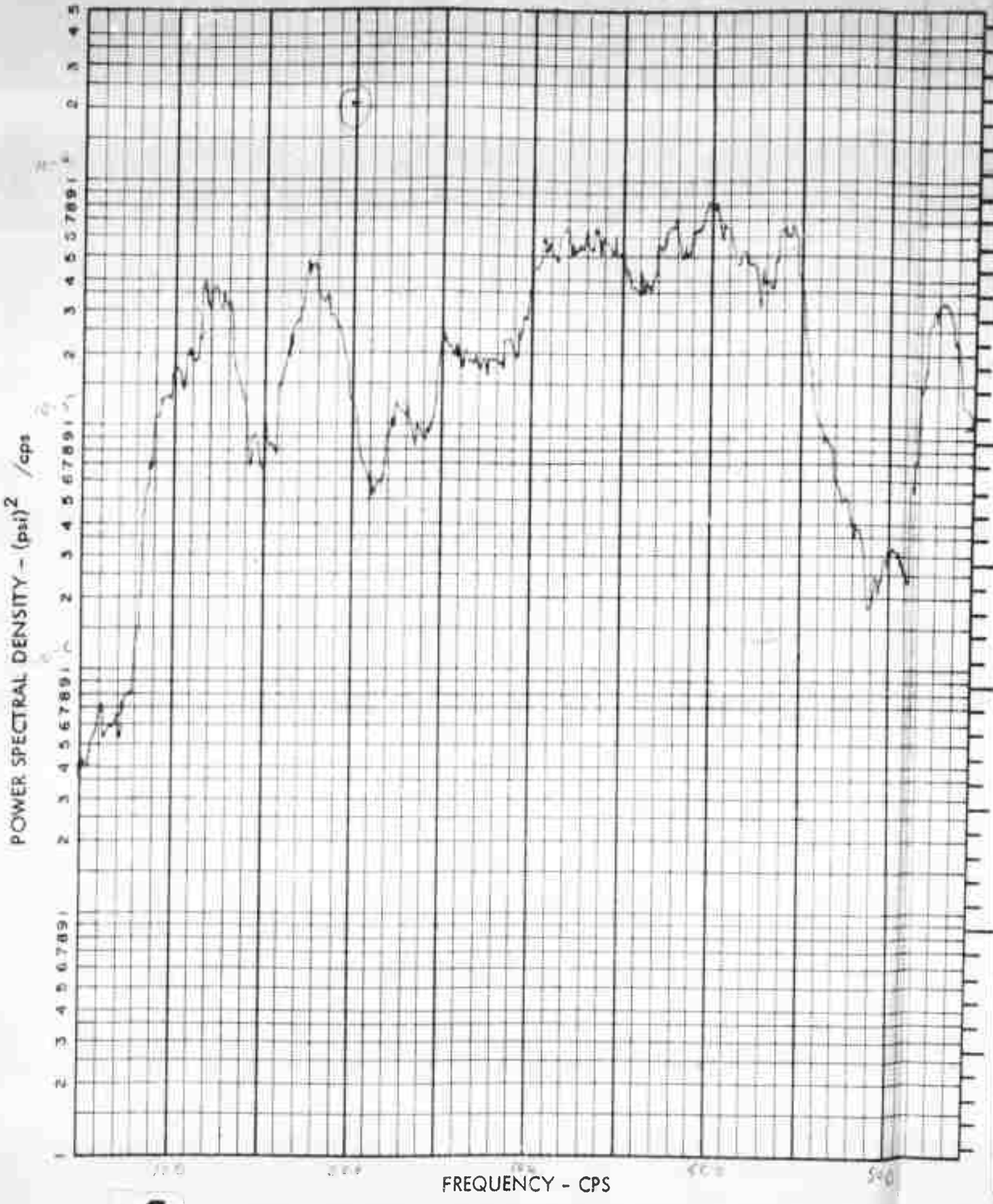
D2-B0084
Vol I

Test Time	Test Hours	Event	Event Count	Event Level	Event Duration	
	Hr			dB	Inches	
0 5	5					NO CHANGES OF CONDITION

PANEL REMAINED IN PLACE FOR REMAINDER OF THERMAL CYCLE

0 20	15	RANDOM				SINUSOIDAL SPECIMEN PANEL FAILURE (FAILURES RANKED)

SPECIMEN SPOTTED FAILURE



1

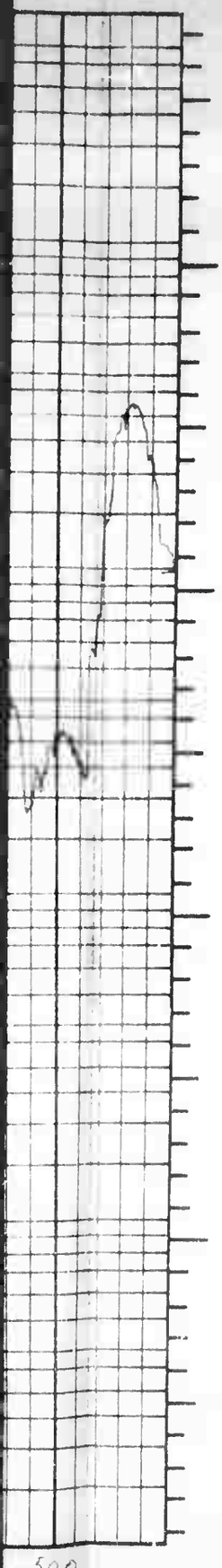
ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 125 cps/Sec.
Loop Length 4 Sec.

CALC
CHECK
APR.
APR



DATA IDENTIFICATION

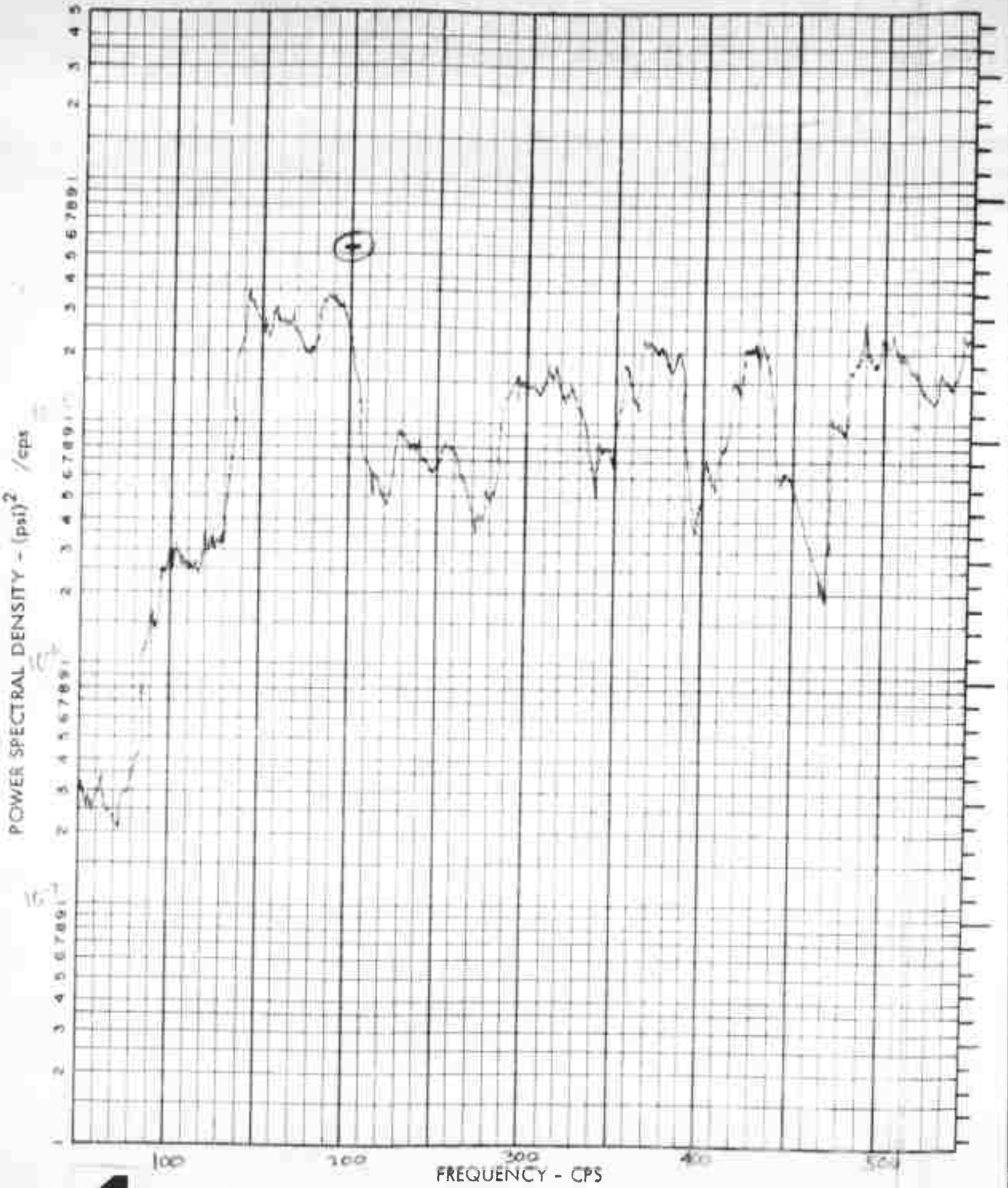
Test Title: PANEL ATTACH TYPE I PREL. T		
EWA No. 55131	Panel or Specimen No. 1477	
Tape No. 1	Tape Channel 2	Mic. No. 1
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.	Tape Channel	Data Tape RMS Volt V_R = 0.345
Calibration Voltage V_a = V_{rms} into Line Amp.; V_c = V_{rms} on Tape @ 3 cps		
Line Amplifier Settings For Calibration G_c = 0.1 ; for Data G_d = 0.1		
Lab. Gain LG =	Tape Monitor Gain TMG = $\frac{G_d}{G_c}$ =	
Microphone Sensitivity S = psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = 0.345 (0.2) = 0.069		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2$ = [illegible] = [illegible] psi^2/cps		
Analyzer Attenuator Setting -30 db	Log Converter Setting db	
Calibration Plotted at 2 [illegible] psi^2/cps		
Overall Pressure Level Data RMS pressure Level $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = = psi	Equiv. to 152 db SPL	

2

CALC	[illegible]	[illegible]	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	Vol I
CHECK	[illegible]	[illegible]				D2-80084
APP.					1477 MIC NO 1	
APP					THE BOEING COMPANY	PAGE Fig 96



1

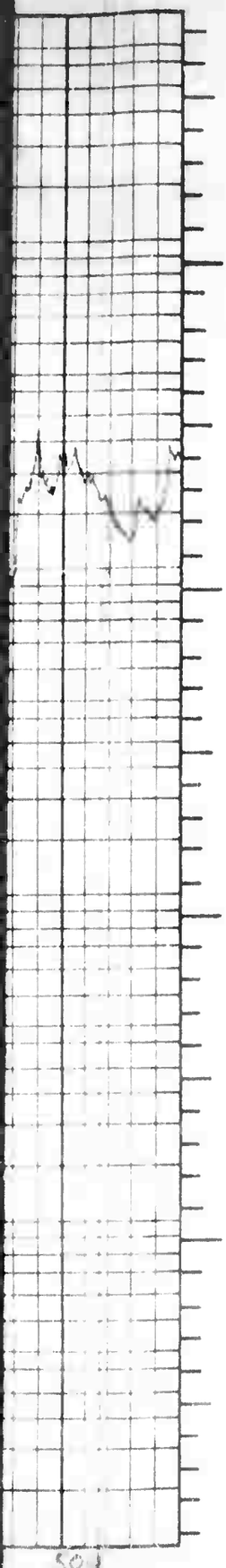
ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

Tc 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CALC	
CHECK	
APR	
APR	



SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

DATA IDENTIFICATION

Test Title: FAIEL ATTACH TYPE I PRELIM		
EWA No.: 550X-1	Panel or Specimen No.: 1477	
Tape No.: 11	Tape Channel: 3	Mic. No.: 2
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 11	Tape Channel: 1	Data Tape RMS Volt V_R = .350
Calibration Voltage V_a = V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .2		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2	
Microphone Sensitivity S = .290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = .5 × .145		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2$ = $\left[\frac{.145}{2 \times 1}\right]^2$ = 5.26×10^{-3} psi²/cps		
Analyzer Attenuator Setting -20 db	Log Converter Setting db	
Calibration Plotted at 5.26×10^{-3} psi²/cps		
Overall Pressure Level Data RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = psi	Equiv. to db SPL	

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	Vol I
CHECK					1477 Mic No 2	D2-8004A
APP					THE BOEING COMPANY	PAGE FIG 27
APP						



1

ANALYSIS VARIABLES

Bandwidth
5 cycles from 50 to 550 cps
— cycles from — to — cps
— cycles from — to — cps

T_e 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CAL
CHG
APR.
APR.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5503-1	Panel or Specimen No.: 1977	
Tape No.: 11	Tape Channel: 9	Displacement Pickup: 1
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 11	Tape Channel: 1	Data Tape RMS Volt V_R = 3.75

Calibration Voltage
V_a = V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape 200cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .2

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2

Displacement Pickup Sensitivity
S = .0708 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = (0.5) (.0708) 0.0354

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = $\left[\frac{0.0354}{(2)(1)}\right]^2$ = 3.13×10^{-9} in.^{2}/cps

Analyzer Attenuator Setting −20 db	Log Converter Setting db

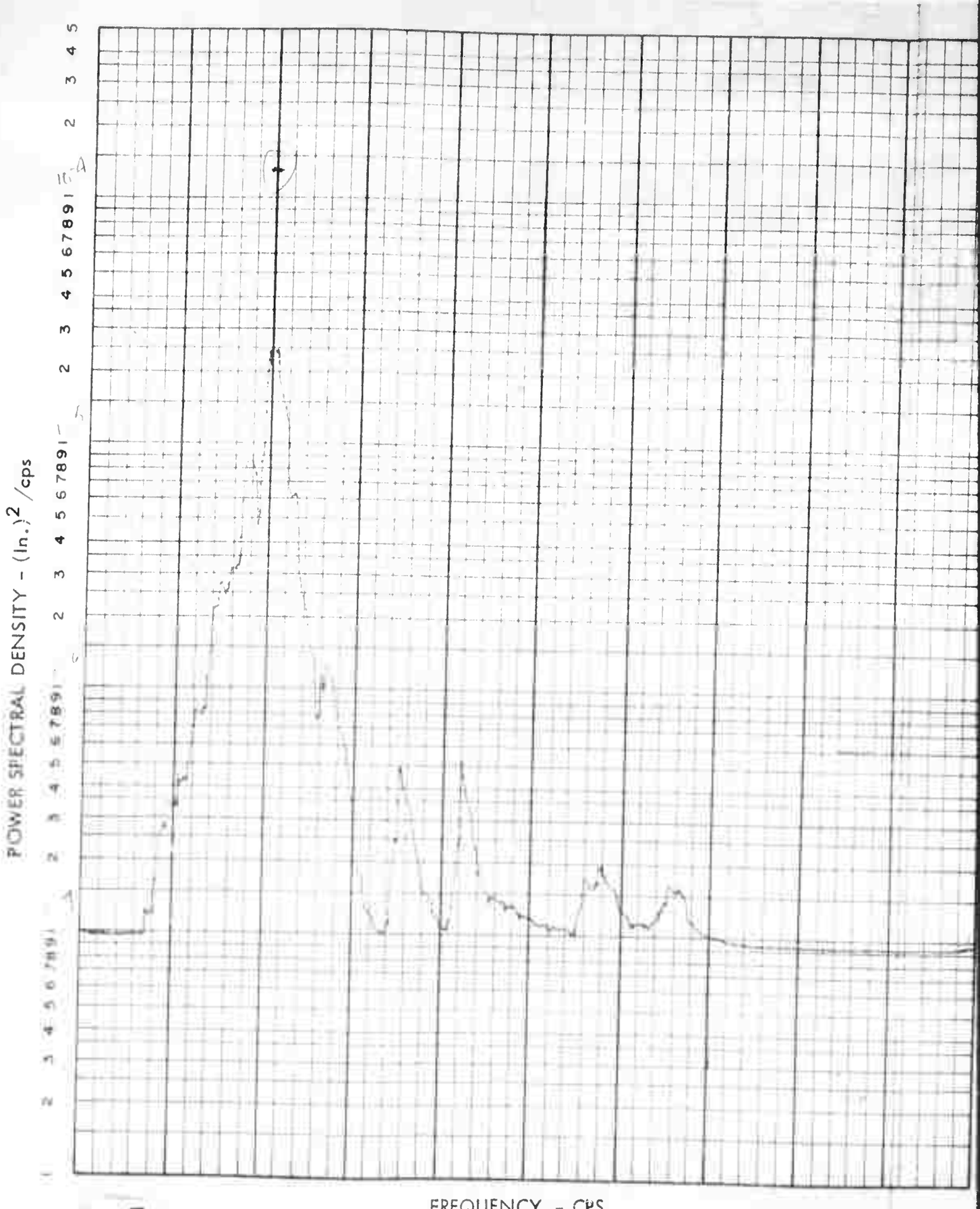
Calibration Plotted at
3.13×10^{-6} in.^{2}/cps

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

= _____ = psi

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	Vol I
CHECK					1977 P/U no 1	D2-50054
APR					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE F-G 38
APR						



1

ANALYSIS VARIABLES

Bandwidth
5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PREDIM		
EWA No. 5593-1	Panel or Specimen No. 1977	
Tape No. 11	Tape Channel 5	Displacement Pickup # 5
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No. 11	Tape Channel 1	Data Tape RMS Volt V_R = 0.215

Calibration Voltage
V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 200cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = .0708 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = (.5)(.0708) .0354

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = [.0354 / (1)(1)]² = 1.25 × 10⁻³ in.²/cps

Analyzer Attenuator Setting −10 db	Log Converter Setting db

Calibration Plotted at in.²/cps

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

= _____ = psi

2

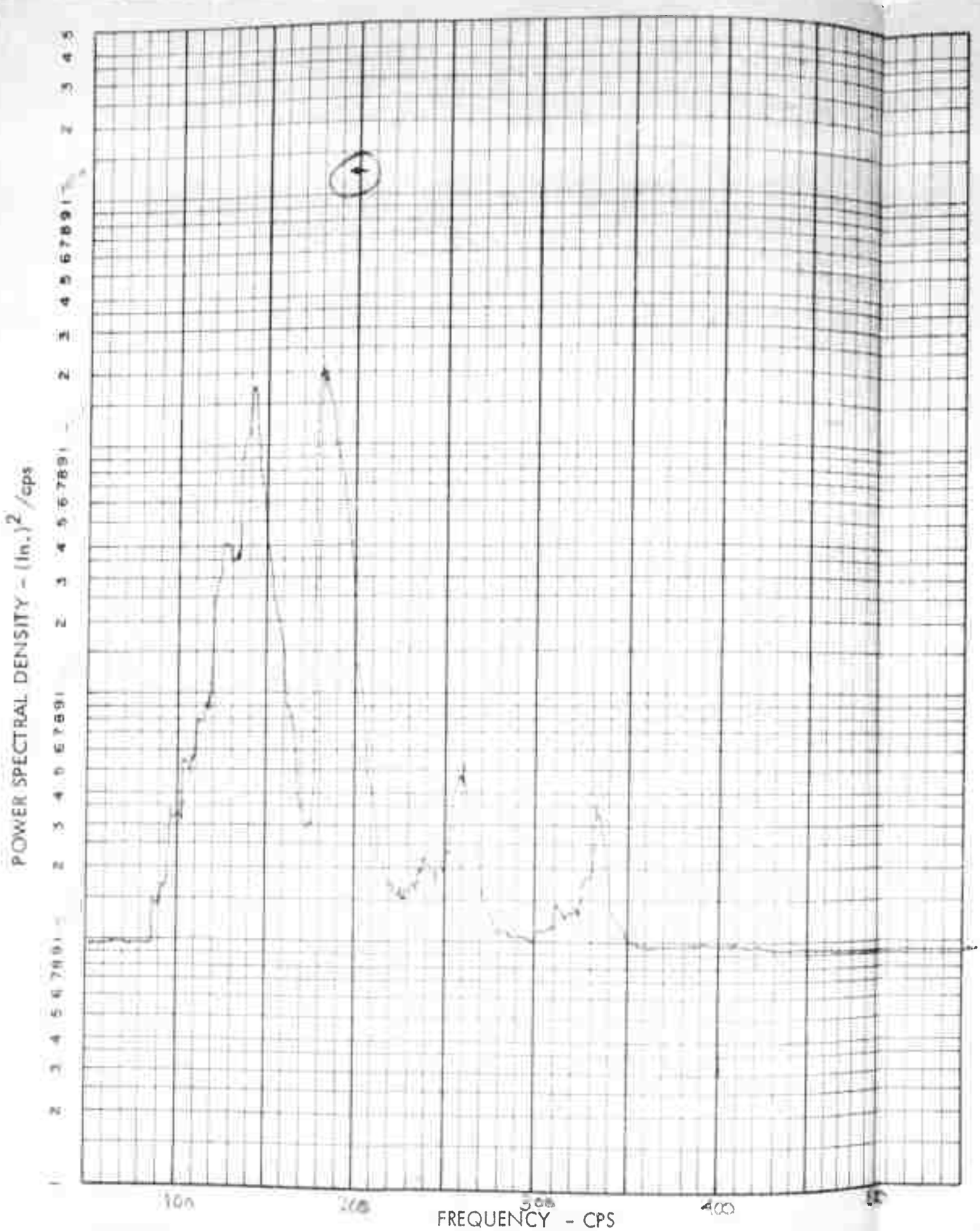
CALC	R.E.S.	4-7-70	REVISED	DATE
CHECK	F.M.S.	4-7-70		
APR.				
APR				

POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP

1977 P/U NO. 5

THE BOEING COMPANY
SEATTLE 24, WASHINGTON

Vol I
D2-80084
PAGE Fig 99



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

__ cycles from __ to __ cps

__ cycles from __ to __ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No. 5593-1	Panel or Specimen No. 1977	
Tape No. 11	Tape Channel 6	Displacement Pickup 6
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No. 11	Tape Channel 1	Data Tape RMS Volt V_R = .245

Calibration Voltage
V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 200 cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = .0708 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = (.5)(.0708) .0354

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = $[.0354]^2$ = 1.25×10^{-3} $in.^2/cps$

Analyzer Attenuator Setting -10 db	Log Converter Setting db

Calibration Plotted at $in.^2/cps$

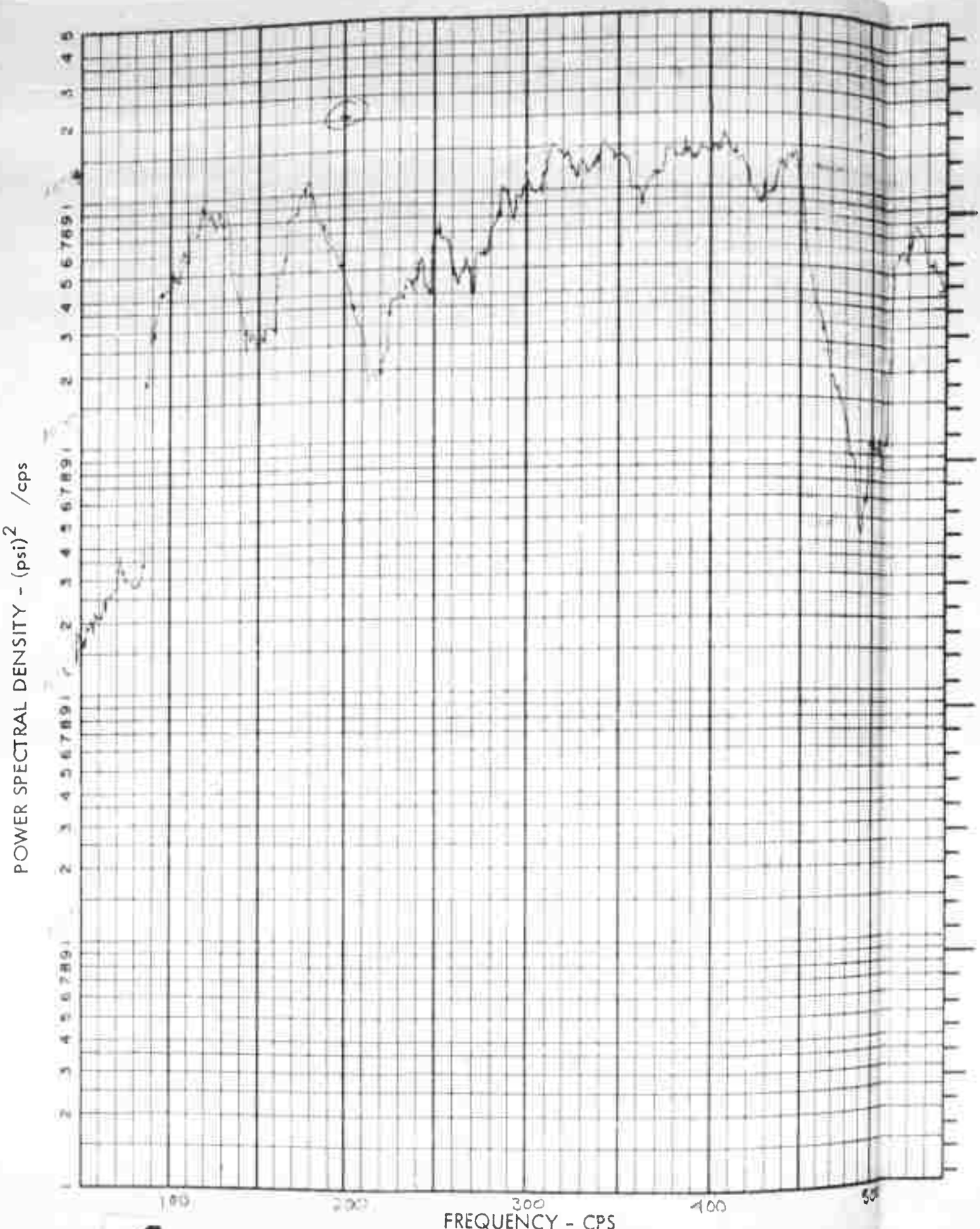
Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

= _____ = psi

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
CHECK	RJS	10 2 3			1977 P/U 6
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON
APR					

Vol. I
D2-80084
PAGE FIG. 100



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 9 Sec.

CALC	
CHECK	
APR.	
APR	

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM.		
EWA No.: 5593-1	Panel or Specimen No.: 1478	
Tape No.: 12	Tape Channel: 2	Mic. No.: 1
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 12	Tape Channel: 2	Data Tape RMS Volt V_R = .

Calibration Voltage
V_a = V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Microphone Sensitivity
S = .290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = (.5) (.290) 0.145

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{1 \times 1}\right]^2 = 2.10 \times 10^{-2}$ psi^2/cps

Analyzer Attenuator Setting: -20 db	Log Converter Setting: db

Calibration Plotted at psi^2/cps

Overall Pressure Level Data
RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} =$ psi

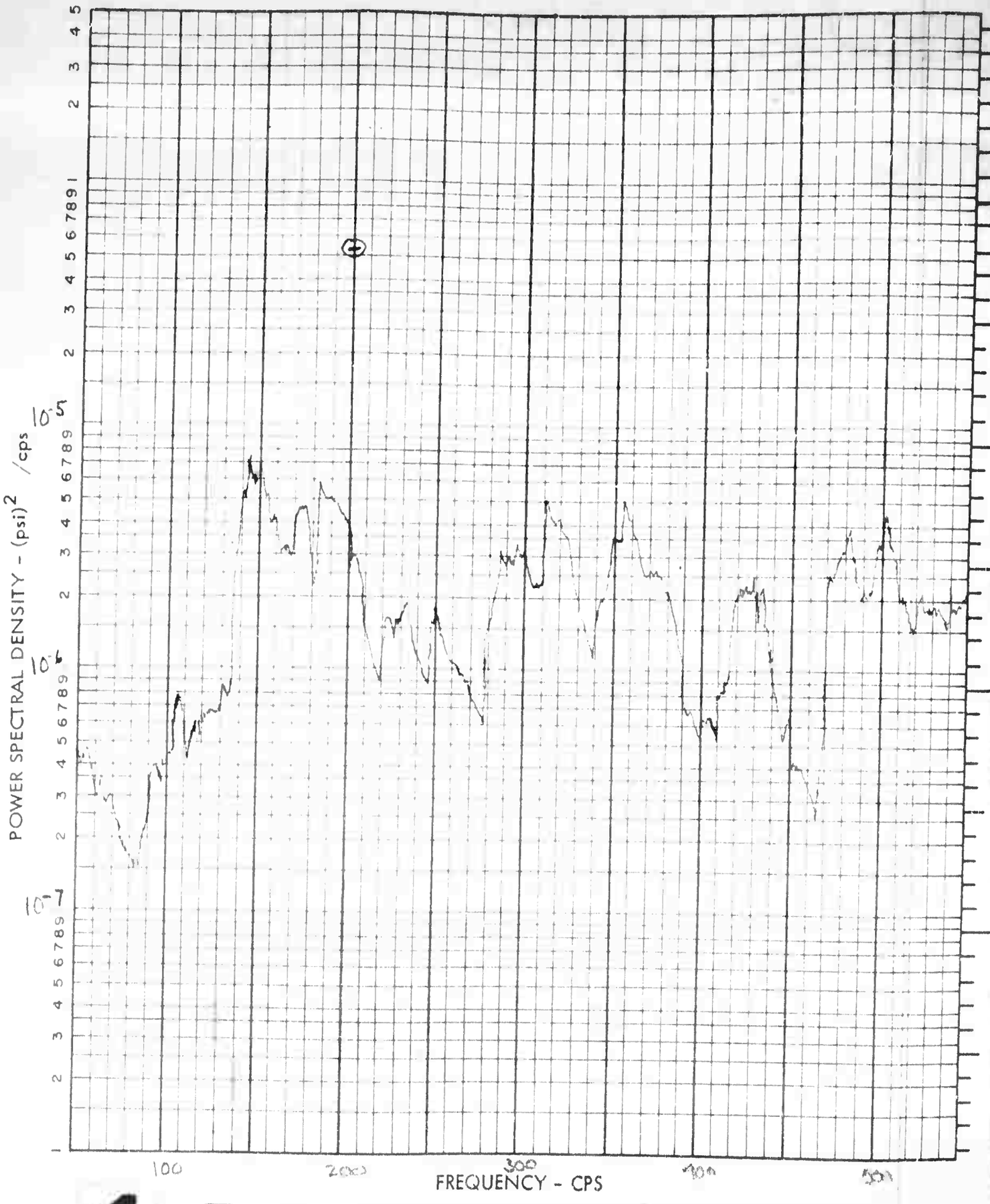
Equiv. to db SPL

2

SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

500

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	
CHECK						
APR.					1478 Mic 1	
APR					THE BOEING COMPANY	PAGE



1

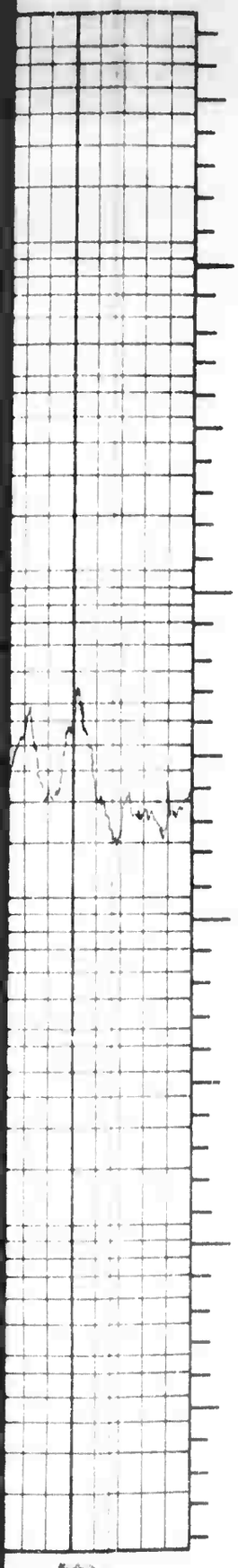
ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 9 Sec.

CALC
CHECK
APR.
APR.



2

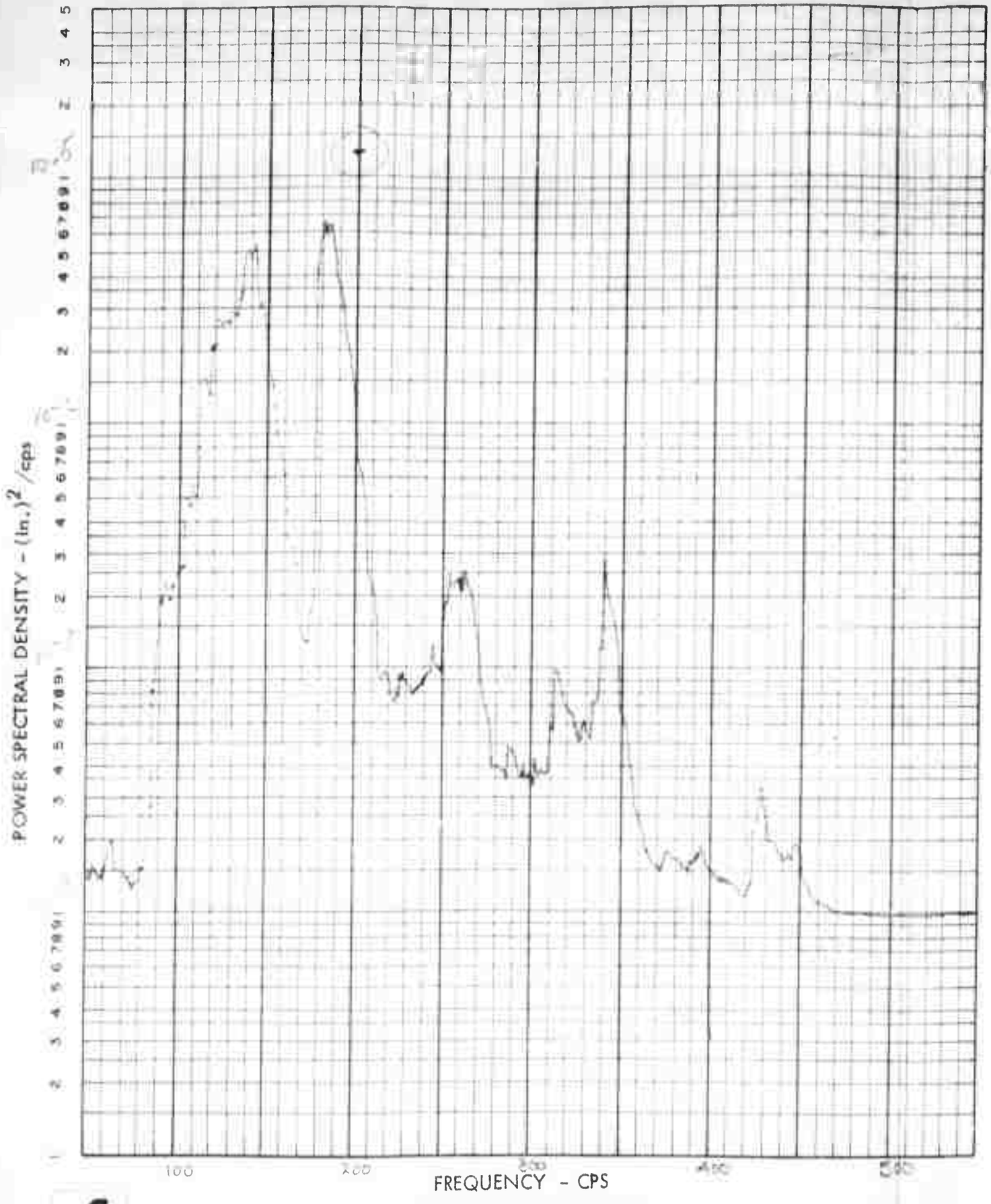
DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5503-1	Panel or Specimen No.: 1478	
Tape No.: 12	Tape Channel: 3	Mic. No.: 2
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 12	Tape Channel: 1	Data Tape RMS Volt V_R =
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .2		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2	
Microphone Sensitivity S = .290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = (.5)(.290) = .195		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2$ = $\left[\frac{.195}{2 \times 1}\right]^2$ = 5.26×10^{-3} psi²/cps		
Analyzer Attenuator Setting −20 db	Log Converter Setting db	
Calibration Plotted at 5.26×10^{-5} psi²/cps		
Overall Pressure Level Data RMS pressure Level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = psi	Equiv. to db SPL	

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	VOL 3
CHECK	R.E.S	10 Dec 63			1478 M.C 2	D2 80084
APP.					THE BOEING COMPANY	PAGE Fig 102
APP.						



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5593 -1	Panel or Specimen No.: 1478	
Tape No.: 12	Tape Channel: 4	Displacement Pickup: 1
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 12	Tape Channel: 1	Data Tape RMS Volt V_R = .175

Calibration Voltage
V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 200 cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = .0708 in./Volt

Equivalent of Calibration - In.
$D_c = V_a \cdot S = (.5)(.0708) = .0354$

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = [.0354]^2 = 1.25 \times 10^{-3}$ $in.^2/cps$

Analyzer Attenuator Setting -20 db	Log Converter Setting db

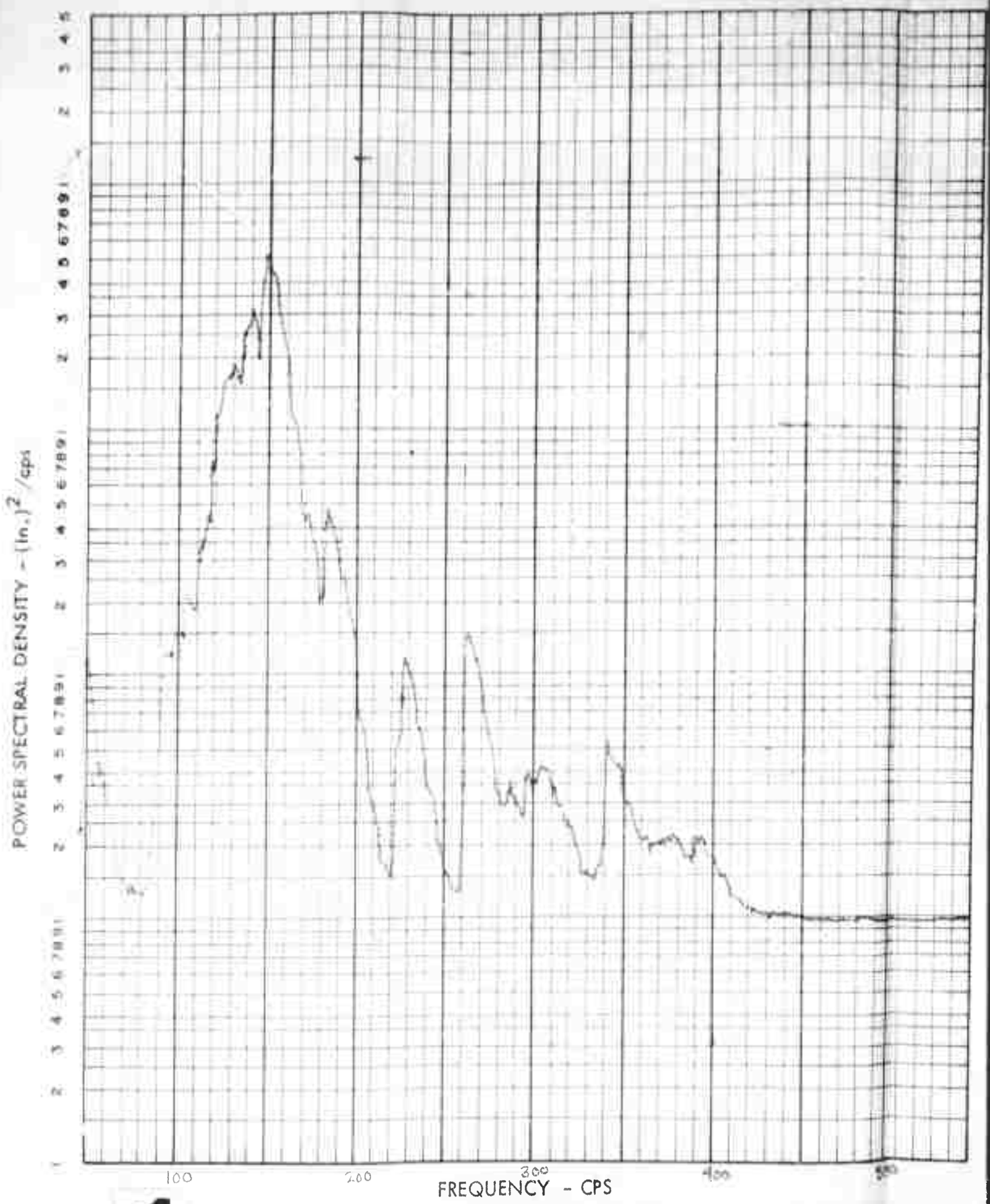
Calibration Plotted at $in.^2/cps$

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =
= _____ = psi

2

540

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	Vol I
CHECK	ROC	10-23				
APR.					1478 P/U 1	D2-80084
APR					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE Fig 103



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM.		
EWA No.: 5593-1	Panel or Specimen No.: 1478	
Tape No.: 12	Tape Channel: 5	Displacement Pickup #: 5
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 12	Tape Channel: 1	Data Tape RMS Volt V_R =

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape 200cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = .0708 in./Volt

Equivalent of Calibration - In.
$D_c = V_a \cdot S$ = (.5) .0708 .0254

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0254}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ in.^{2}/cps

Analyzer Attenuator Setting: -10 db	Log Converter Setting: db

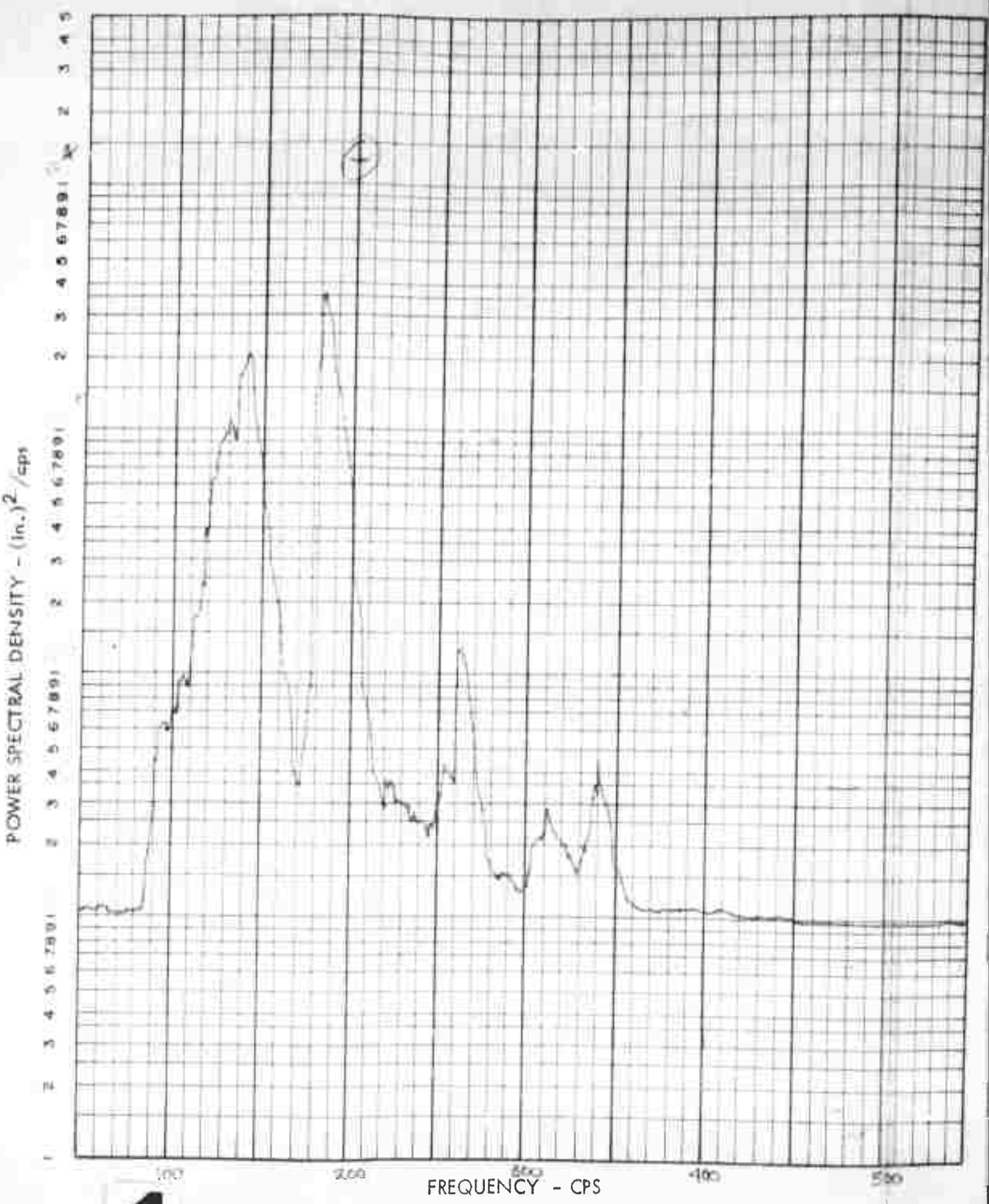
Calibration Plotted at in.^{2}/cps

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

= _____ = psi

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	VOL I
CHECK	RDS	10-2-3			1478 P/U 5	D2-80084
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE FIG 104
APR						



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 55	Panel or Specimen No.: 1478	
Tape No.: 12	Tape Channel: 6	Displacement Pickup #: 6
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

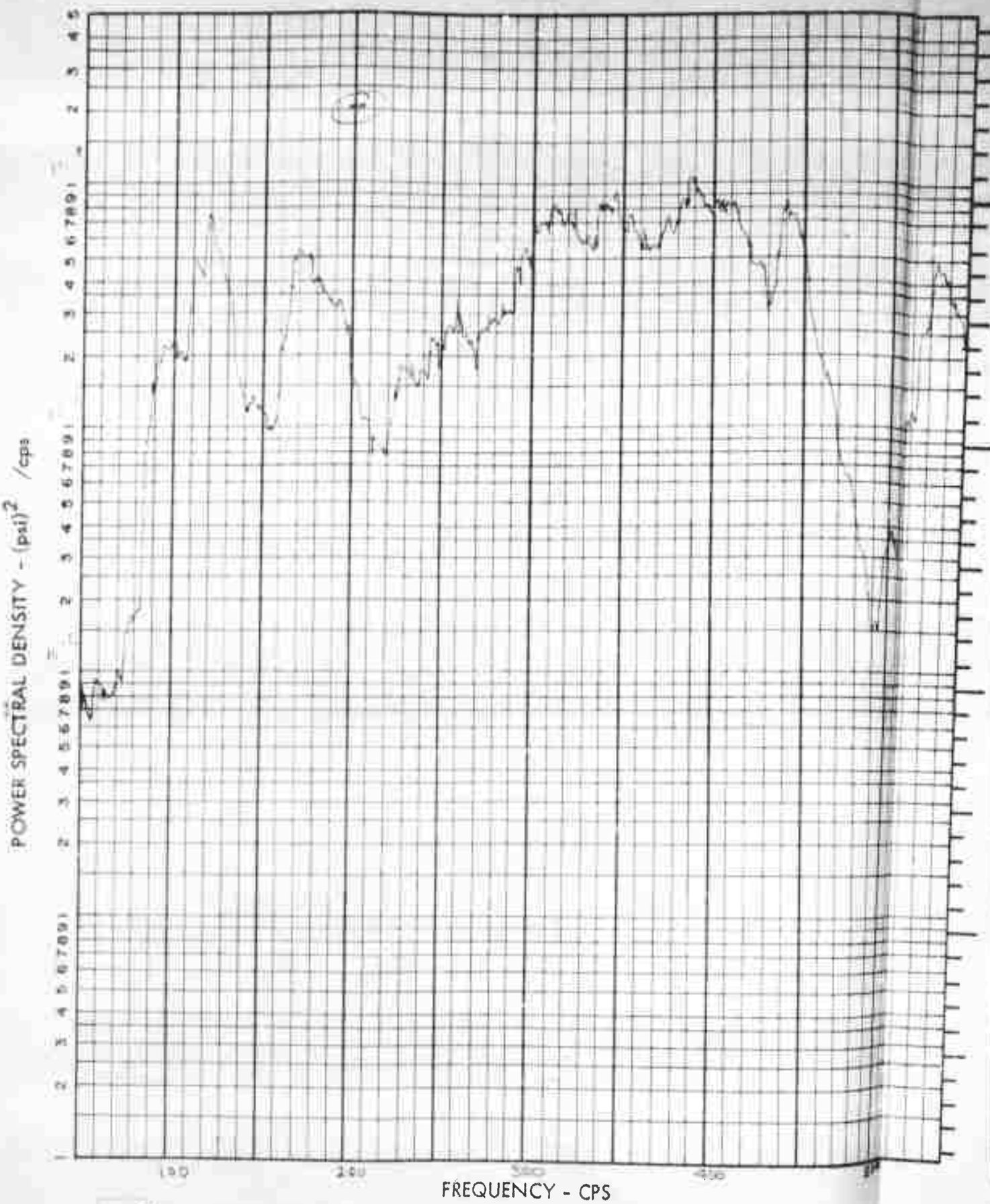
CALIBRATION

Tape No.: 12	Tape Channel: 1	Data Tape RMS Volt V_R = 2.30
Calibration Voltage V_a = .5 V_{rms} Into Line Amp.; V_c = 5 V_{rms} on Tape 200cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain TMG = $\frac{G_d}{G_c}$ = 1	
Displacement Pickup Sensitivity S = .0708 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S = (.5)(.0708) = .0354$		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ in.^{2}/cps		
Analyzer Attenuator Setting −10 db	Log Converter Setting db	
Calibration Plotted at in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = ____ = psi		

2

500

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	Vol I
CHECK	RDS	10-23				
APR.					1478 P/U 6	D2-80084
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE Fig 105



1

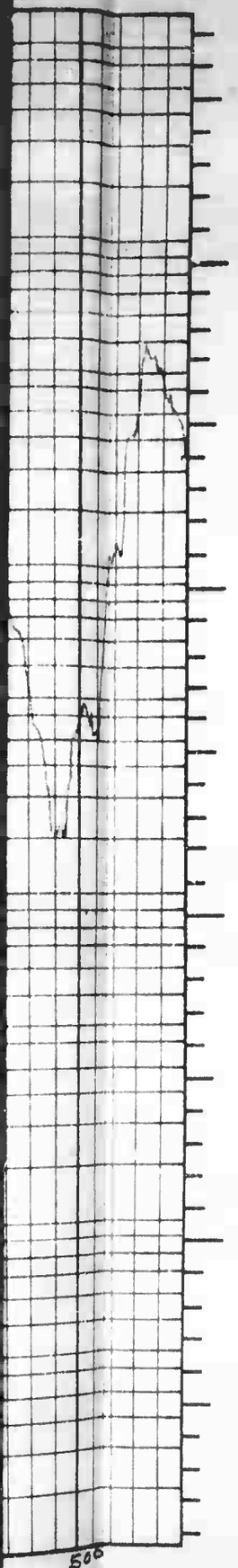
ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CALC	
CHECK	
APR.	
APR.	



DATA IDENTIFICATION

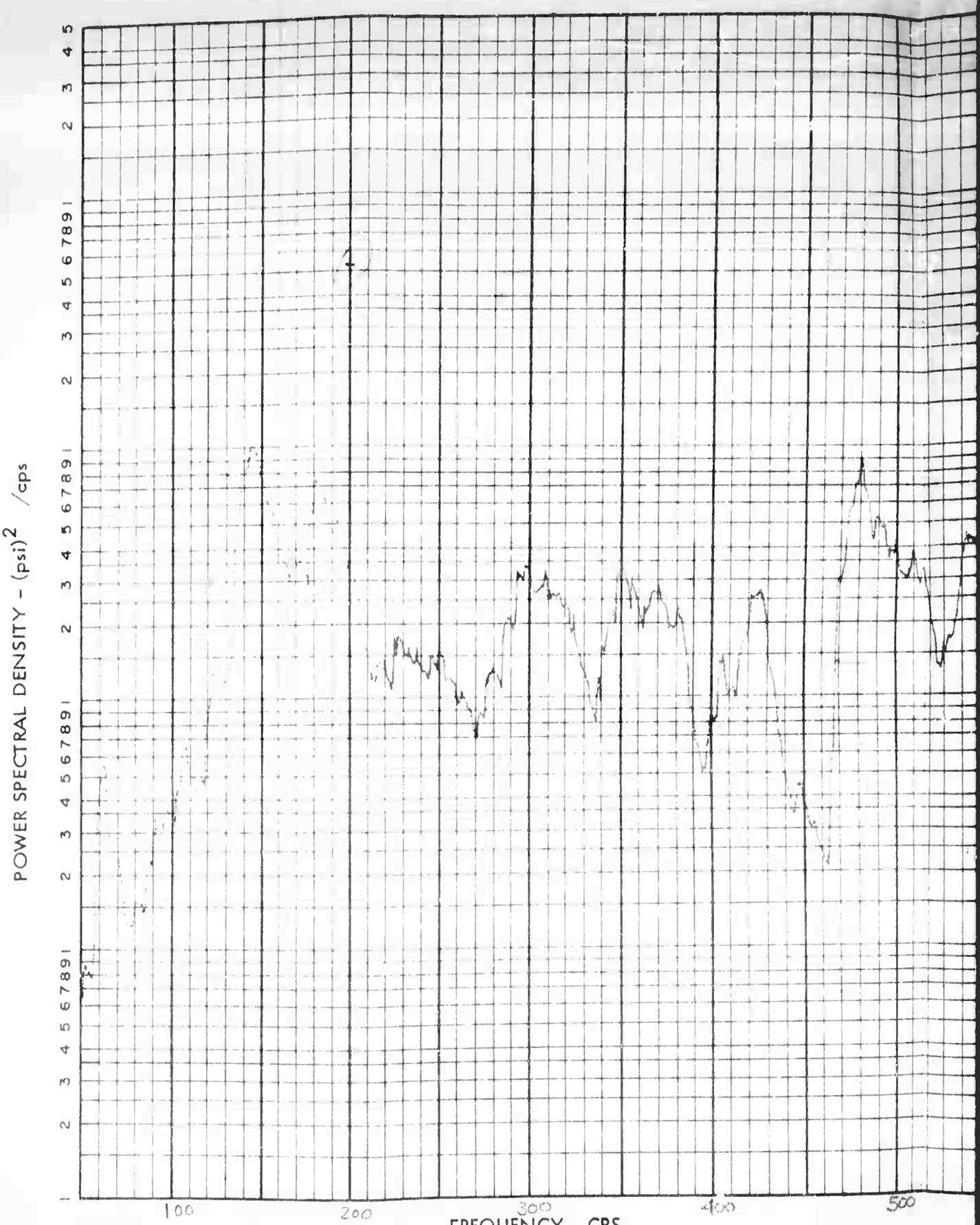
Test Title: PANEL ATTACH. TYPE I PRELIM		
EWA No.: 5593-1	Panel or Specimen No.: 1479	
Tape No.: 13	Tape Channel: 2	Mic. No.: 1
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 13	Tape Channel: 1	Data Tape RMS Volt V_R = . 5
Calibration Voltage $V_a = .5 V_{rms}$ into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1	
Microphone Sensitivity S = .290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S = (.5)(.290)$ .145		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{1 \times 1}\right]^2$ 2.10×10^{-2} psi^2/cps		
Analyzer Attenuator Setting db	Log Converter Setting db	
Calibration Plotted at psi^2/cps		
Overall Pressure Level Data RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} =$ psi	Equiv. to db SPL	

2

CALC	RFS	9/6/63	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	Vol I
CHECK	KDS	9/6/63			1479 Mic 1	D2-8008A
APR.					THE BOEING COMPANY	PAGE Fig 106
APR.						



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.



DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5593-1	Panel or Specimen No.: 1479	
Tape No.: 13	Tape Channel: 3	Mic. No.: 2
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

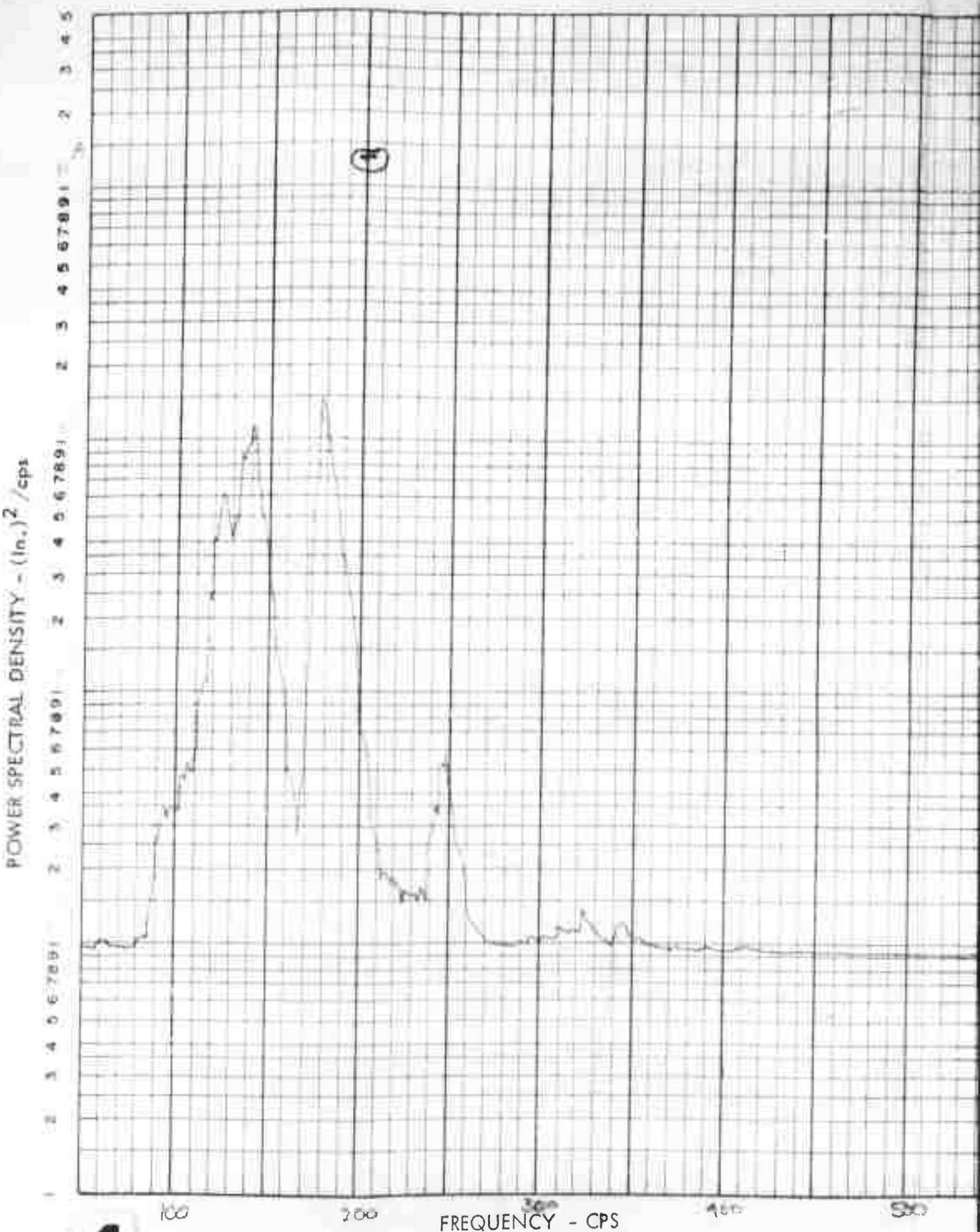
CALIBRATION

Tape No.: 13	Tape Channel: 1	Data Tape RMS Volt V_R =
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = 5 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .2		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2	
Microphone Sensitivity S = .290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S = (.5)(.290)$ .145		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{2 \times 1}\right]^2 = 5.26 \times 10^{-3}$ psi^2/cps		
Analyzer Attenuator Setting −20 db	Log Converter Setting db	
Calibration Plotted at psi^2/cps		
Overall Pressure Level Data RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} =$ psi	Equiv. to db SPL	

2

CALC	RDS	9/20/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT 1479 MIC 2 THE BOEING COMPANY
CHECK	RDS	10/3			
APR.					
APR					

Vol I
D2-80094
PAGE Fig 107



1

ANALYSIS VARIABLES

Bandwidth
5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5503-1	Panel or Specimen No.: 1479	
Tape No.: 13	Tape Channel: 9	Displacement Pickup: 1
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 13	Tape Channel: 1	Data Tape RMS Volt V_R = 6.230

Calibration Voltage
V_a = 5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape 200 cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = .0708 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S = (.5)(.0708) = .0354$

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ $in.^2/cps$

Analyzer Attenuator Setting: -10 db	Log Converter Setting: db

Calibration Plotted at
1.25×10^{-3} $in.^2/cps$

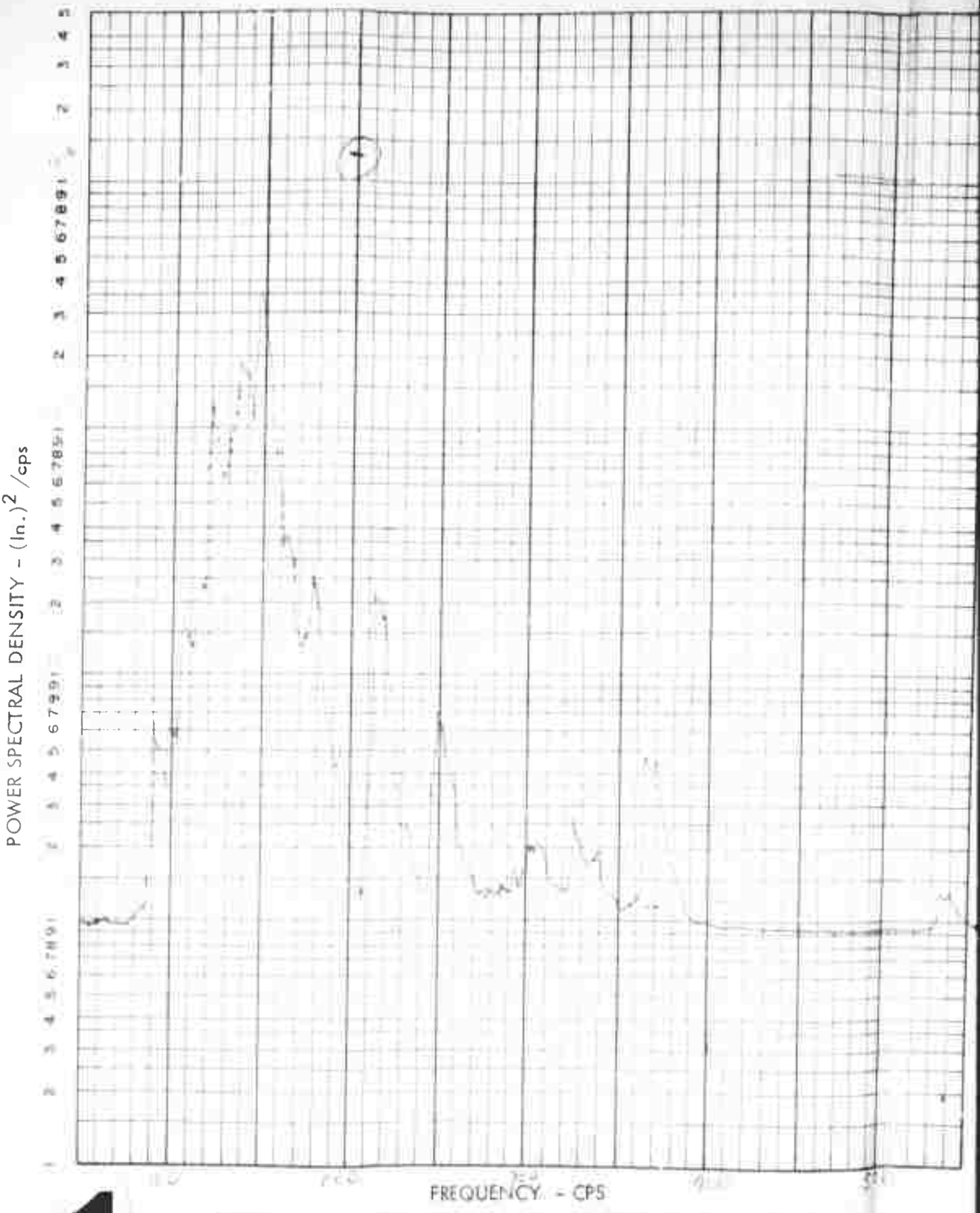
Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

= _____ = psi

2

500

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	Vol I
CHECK	[illegible]	[illegible]			1479 P/U 1	D2-80084
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE FIG 108
APR						



1

ANALYSIS VARIABLES

Bandwidth
5 cycles from .10 to .50 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T = 4 Sec.
Anal. Rate .25 cps/sec.
Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE 1 PRELIM		
EWA No.: 5593-1	Panel or Specimen No.: 1479	
Tape No.: 13	Tape Channel: 2	Displacement Pickup: 5
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 12	Tape Channel: 1	Data Tape RMS Volt V_R = 1.223

Calibration Voltage
V_a = V_{rms} into Line Amp.; V_c = [illegible] V_{rms} on Tape [illegible] cps

Line Amplifier Settings
For Calibration G_c = 0.1 ; for Data G_d = 0.1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = [illegible] in./Volt

Equivalent of Calibration - In.
$D_c = V_a \cdot S$ = [illegible]

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = [illegible] $in.^2/cps$

Analyzer Attenuator Setting [illegible] db	Log Converter Setting db

Calibration Plotted at [illegible] $In.^2/cps$

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

[illegible] = psi

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	VOL I
CHECK					1479 PNL 5	D2-5604
APR					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE FIG 109
APR						



1

ANALYSIS VARIABLES

Bandwidth
5 cycles from 50 to 550 cps
— cycles from — to — cps
— cycles from — to — cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM.		
EWA No.: 5592-1	Panel or Specimen No.: 1479	
Tape No.: 13	Tape Channel: 6	Displacement Pickup #: 6
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

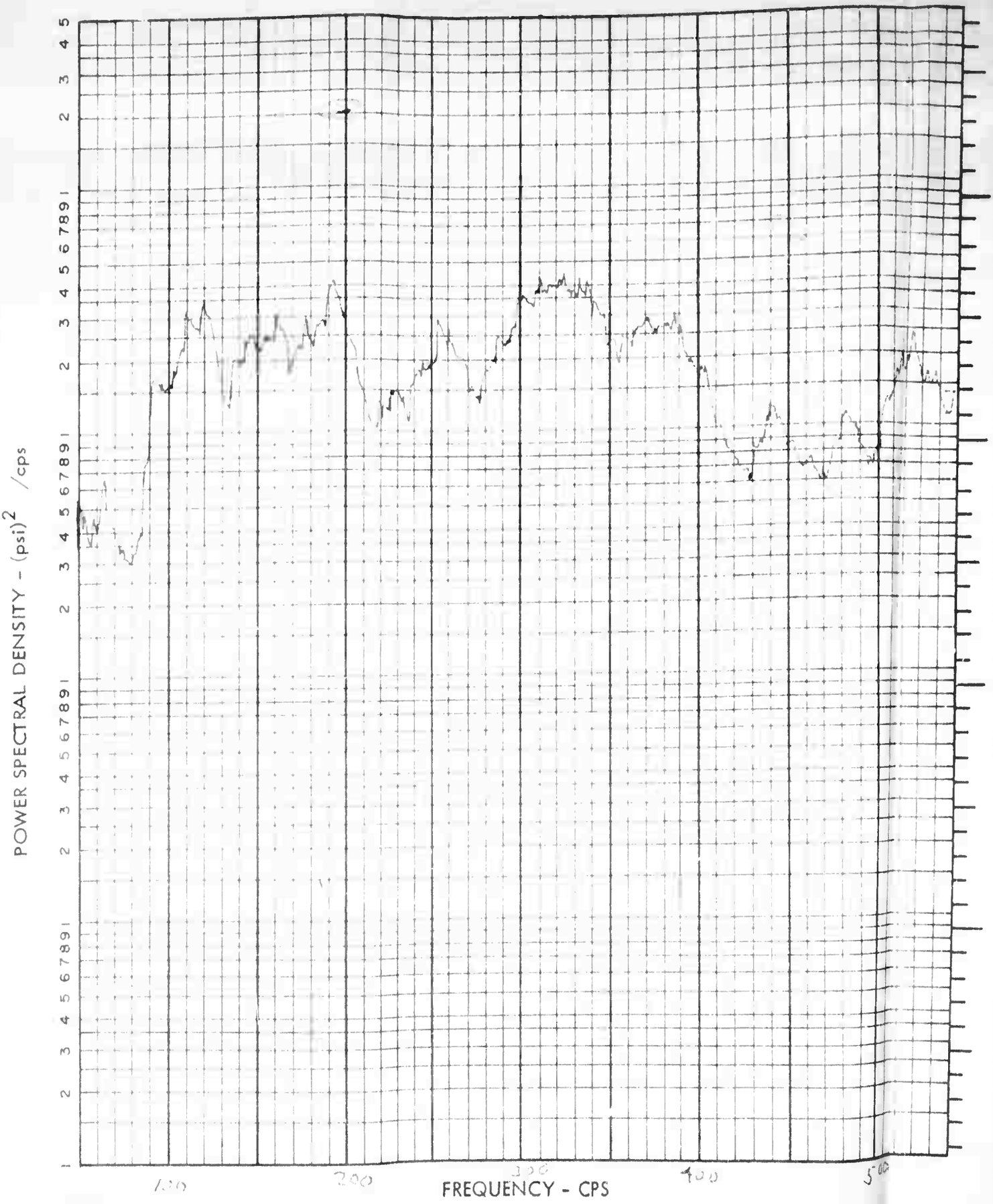
CALIBRATION

Tape No.: 13	Tape Channel: 1	Data Tape RMS Volt V_R = 0.300
Calibration Voltage V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 200cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1	
Displacement Pickup Sensitivity S = .0708 in./Volt		
Equivalent of Calibration - In. $D_c = V_a \cdot S = (.5)(.0708) = .0354$		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ in.^{2}/cps		
Analyzer Attenuator Setting db	Log Converter Setting db	
Calibration Plotted at 2 x 10^{-3} in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = ____ = psi		

2

560

CALC	KEE		REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	Vol I
CHECK	RDS					
APR					1479 P/U 6	D2-30094
APR					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE FIG 110



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CALC
CHECK
APP.
APP.

DATA IDENTIFICATION

Test Title: PANEL ATTCH TYPE I PRELIM.		
EWA No.: 5593-1	Panel or Specimen No.: 1479	
Tape No.: 14	Tape Channel: 2	Mic. No.: 1
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

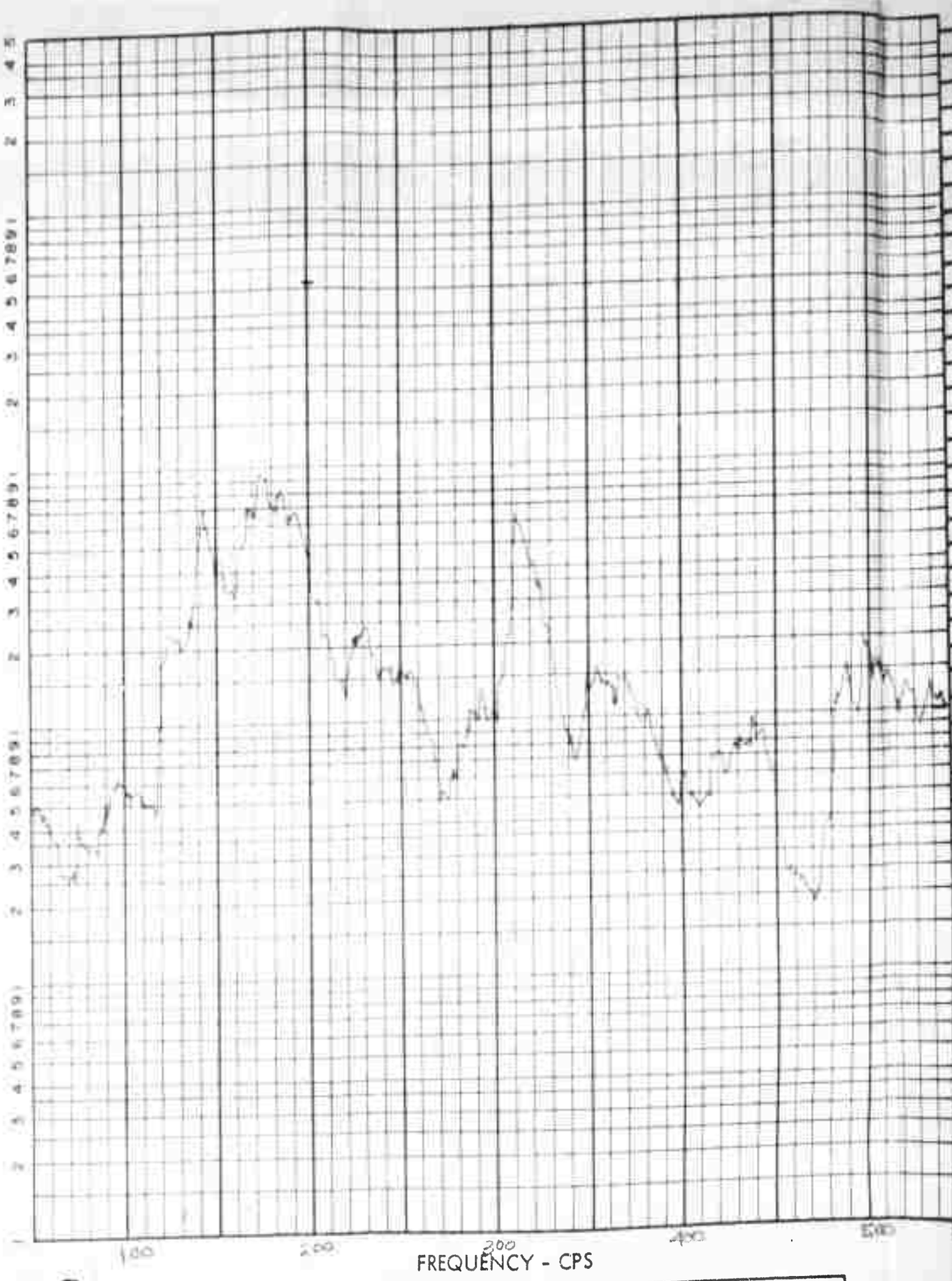
CALIBRATION

Tape No.: 14	Tape Channel: 1	Data Tape RMS Volt V_R = 380
Calibration Voltage V_a = V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = .1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1	
Microphone Sensitivity S = .297 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = (.5)(.297) = .145		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{.1}\right]^2 = 2.10 \times 10^{-2}$ psi^2/cps		
Analyzer Attenuator Setting -20 db	Log Converter Setting 0 db	
Calibration Plotted at 2.10×10^{-4} psi^2/cps		
Overall Pressure Level Data RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = psi	Equiv. to db SPL	

SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	VOL I
CHECK					1479 MIC 1	D2 80082
APR.					THE BOEING COMPANY	PAGE Fig III
APR						



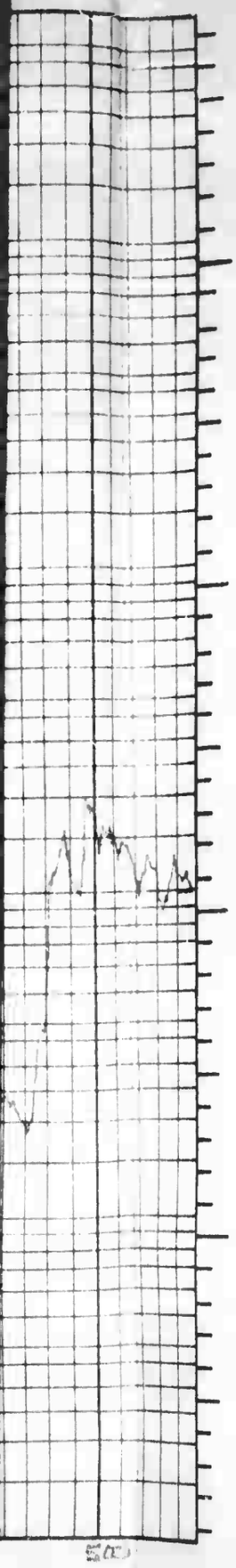
1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.



SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM.		
EWA No.: 5593-1	Panel or Specimen No.: 1479	
Tape No.: 14	Tape Channel: 3	Mic. No.: 2
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 14	Tape Channel: 1	Data Tape RMS Volt V_R = .220
Calibration Voltage $V_a = .5 V_{rms}$ into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .2		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2	
Microphone Sensitivity S = .290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = (.5)(.29) = .145		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{2 \times 1}\right]^2 = 5.26 \times 10^{-5}$ psi^2/cps		
Analyzer Attenuator Setting 20 db	Log Converter Setting 0 db	
Calibration Plotted at 5.26×10^{-5} psi^2/cps		
Overall Pressure Level Data RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} =$ psi	Equiv. to db SPL	

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	VOL I
CHECK	RLM	1-2			1479 MIC 2	D2-8008-4
APP.					THE BOEING COMPANY	PAGE Fig 112
APP						



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No. 5593-1	Panel or Specimen No. 1479	
Tape No. 14	Tape Channel 4	Displacement Pickup # 1
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No. 14	Tape Channel 1	Data Tape RMS Volt V_R =

Calibration Voltage
V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape? ?cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = .0708 in./Volt

Equivalent of Calibration - In.
$D_c = V_a \cdot S$ = (.5)(.0708) = .0354

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ in.^{2}/cps

Analyzer Attenuator Setting -10 db	Log Converter Setting db

Calibration Plotted at
[illegible] in.^{2}/cps

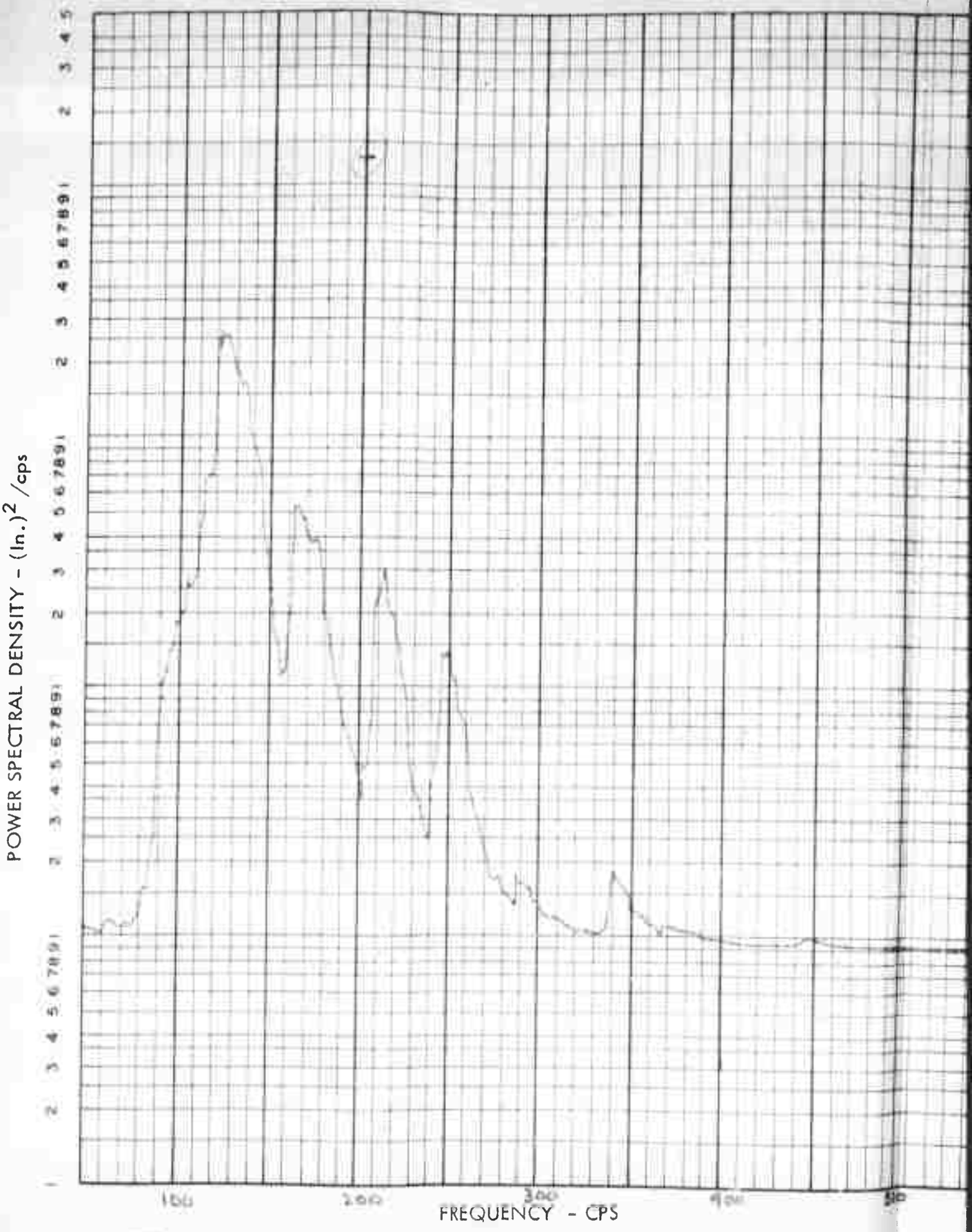
Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

= _____ = psi

2

CALC	KFS	9-10-62	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
CHECK	RDS	10-10-62			1479 P/U 1
APR					THE BOEING COMPANY SEATTLE 24, WASHINGTON
APR					

Vol I
D2-8008
PAGE FIG 113



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

— cycles from — to — cps

— cycles from — to — cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

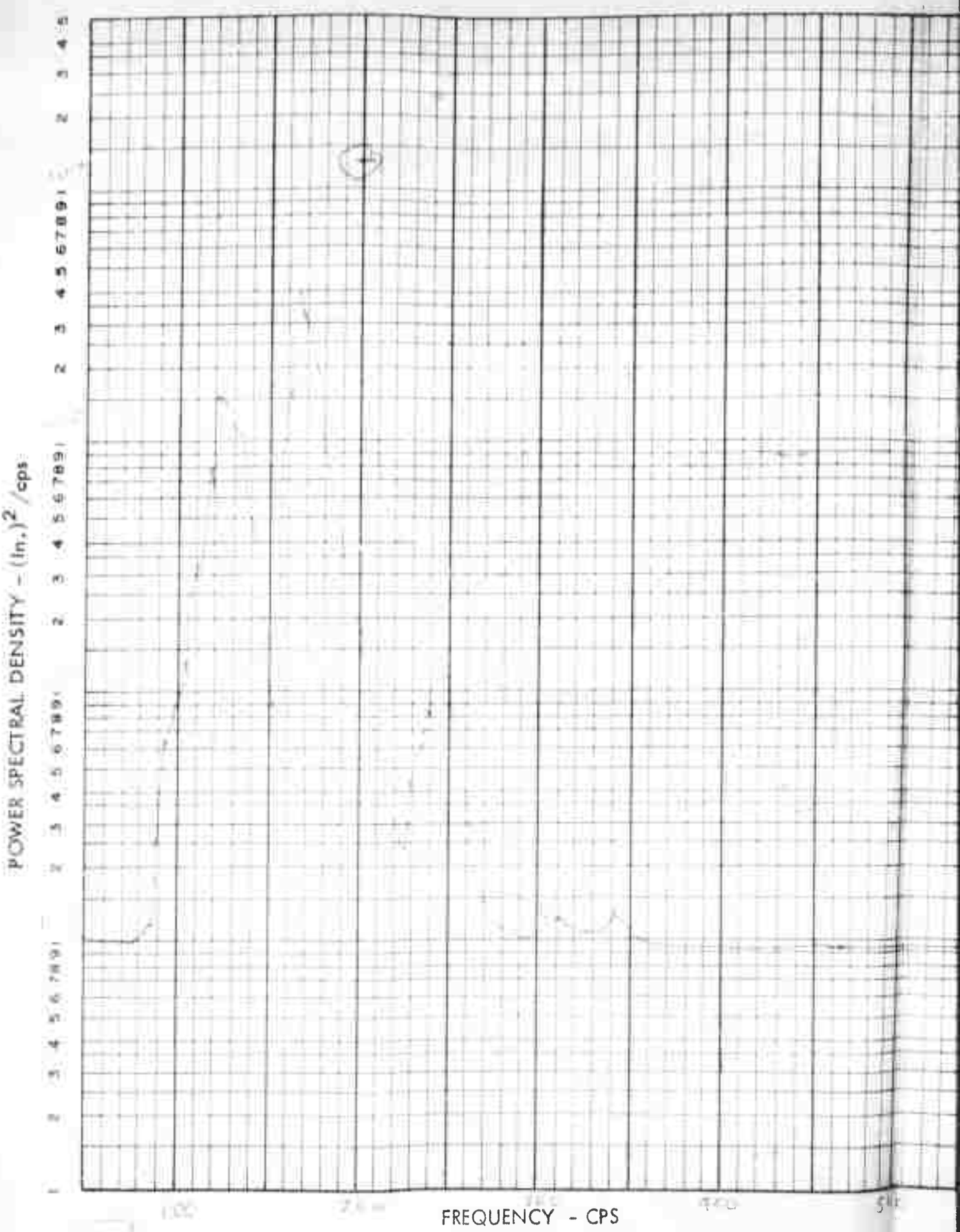
Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5592-1	Panel or Specimen No.: 1479	
Tape No.: 14	Tape Channel: 5	Displacement Pickup #: 5
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 14	Tape Channel: 1	Data Tape RMS Volt V_R =
Calibration Voltage V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1	
Displacement Pickup Sensitivity S = .0708 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = (.5) (.0708) = .0354		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = $\left[\frac{.0354}{1 \times 1}\right]^2$ = 1.25×10^{-3} in.^{2}/cps		
Analyzer Attenuator Setting -1 db	Log Converter Setting db	
Calibration Plotted at in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = ____ = psi		

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	Vol I
CHECK					1479 P/U 5	D2-82084
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE Fig 114
APR.						



1

ANALYSIS VARIABLES

Bandwidth

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c ___ Sec.

Anal. Rate ___ cps/sec.

Loop Length ___ Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No. 5593-1	Panel or Specimen No. 1429	
Tape No. 14	Tape Channel 6	Displacement Pickup 6
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No. 14	Tape Channel 1	Data Tape RMS Volt V_R = 0.260

Calibration Voltage
V_a = V_{rms} into Line Amp.; V_c = 0.5 V_{rms} on Tape cps

Line Amplifier Settings
For Calibration G_c = 0.1 ; for Data G_d = 0.1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = 0.270 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = (0.5)(0.270) = 0.0354

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = [illegible] in.^{2}/cps

Analyzer Attenuator Setting -10 db	Log Converter Setting db

Calibration Plotted at [illegible] in.^{2}/cps

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

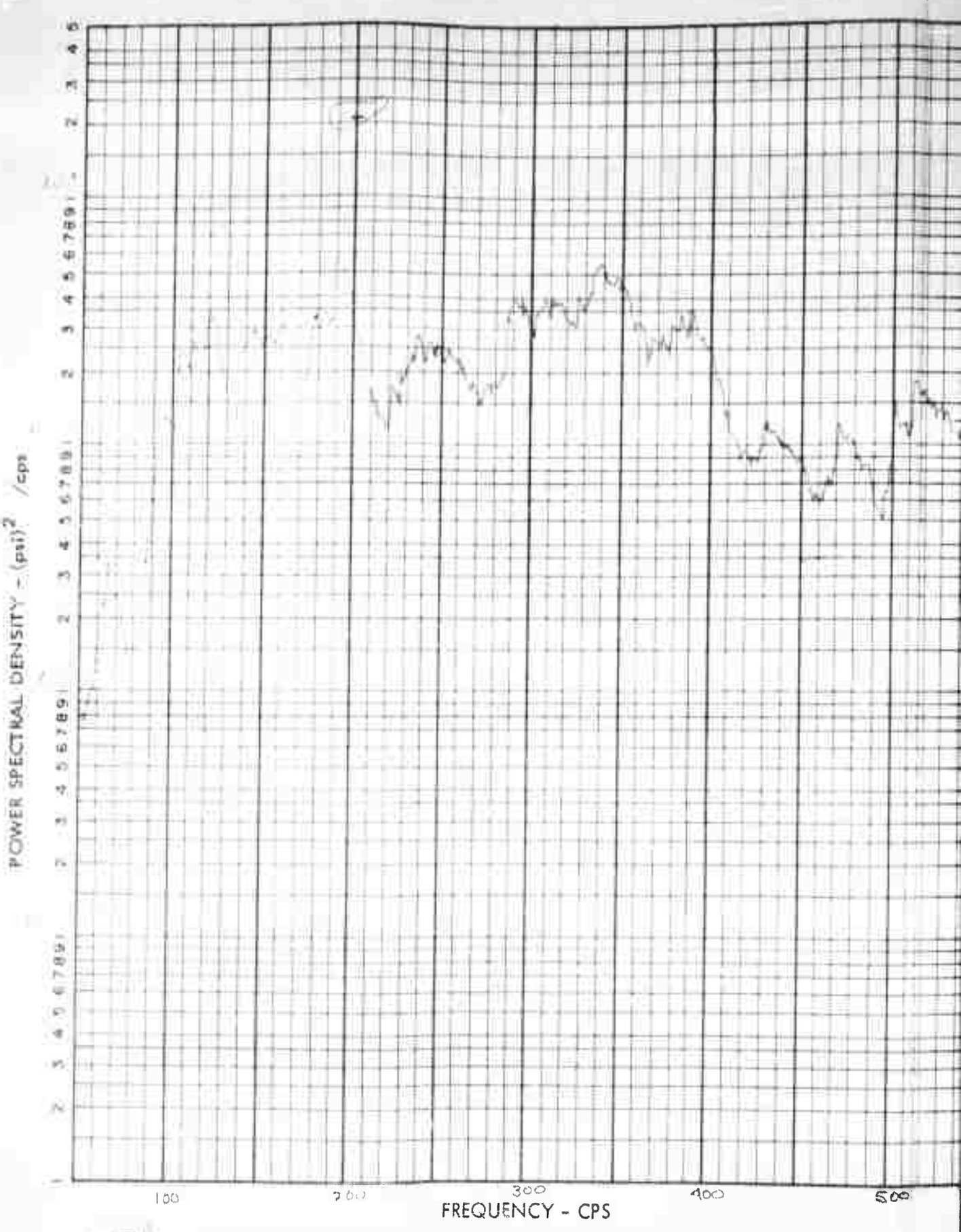
= _____ =

psi

2

CALC	RFS	9/30/70	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
CHECK	RDS	10-23			1479 P/U 6
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON
APR					

Vol I.
D2-80084
PAGE FIG 115



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM		
EWA No.: 55933-1	Panel or Specimen No.: 1479	
Tape No.: 15	Tape Channel: 2	Mic. No.: 1
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 15	Tape Channel: 1	Data Tape RMS Volt V_R =

Calibration Voltage
$V_a = .5 V_{rms}$ into Line Amp.; V_c = .5 V_{rms} on Tape @ 1.00 cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c} = 1$

Microphone Sensitivity
S = .290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = (.5) (.290) = .145

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{1 \times 1}\right] = 2.1 \times 10^{-2}$ psi^2/cps

Analyzer Attenuator Setting db	Log Converter Setting db

Calibration Plotted at 4 psi^2/cps

Overall Pressure Level Data
RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} =$ psi

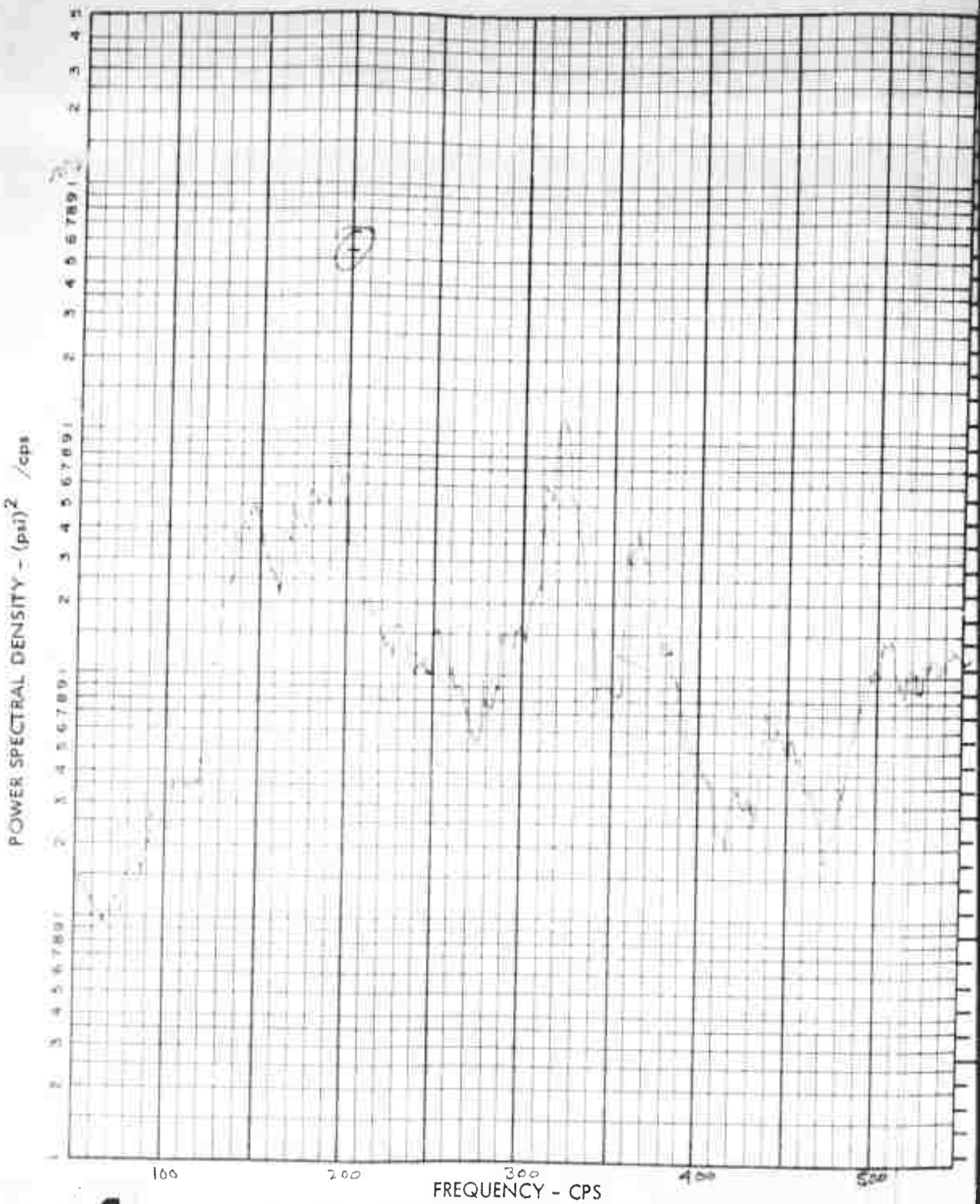
Equiv. to db SPL

SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

2

500

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	Vol 1
CHECK						
APR.					1479 Mic 1	
APR.					THE BOEING COMPANY	PAGE Fig 116



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CALC
CHEC
APR.
APR

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM		
EWA No.: 5593-1	Panel or Specimen No.: 1479	
Tape No.: 15	Tape Channel: 3	Mic. No.: 2
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 15	Tape Channel: 3	Data Tape RMS Volt V_R = .155

Calibration Voltage
$V_a = .5 V_{rms}$ into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .2

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c} = 2$

Microphone Sensitivity
S = .290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S = (.5)(.290) = .145$

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{2 \times 1}\right]^2 = 5.26 \times 10^{-2}$ psi^2/cps

Analyzer Attenuator Setting - ? db	Log Converter Setting db

Calibration Plotted at 5.26 x 10^{-2} psi^2/cps

Overall Pressure Level Data — Equiv. to db SPL

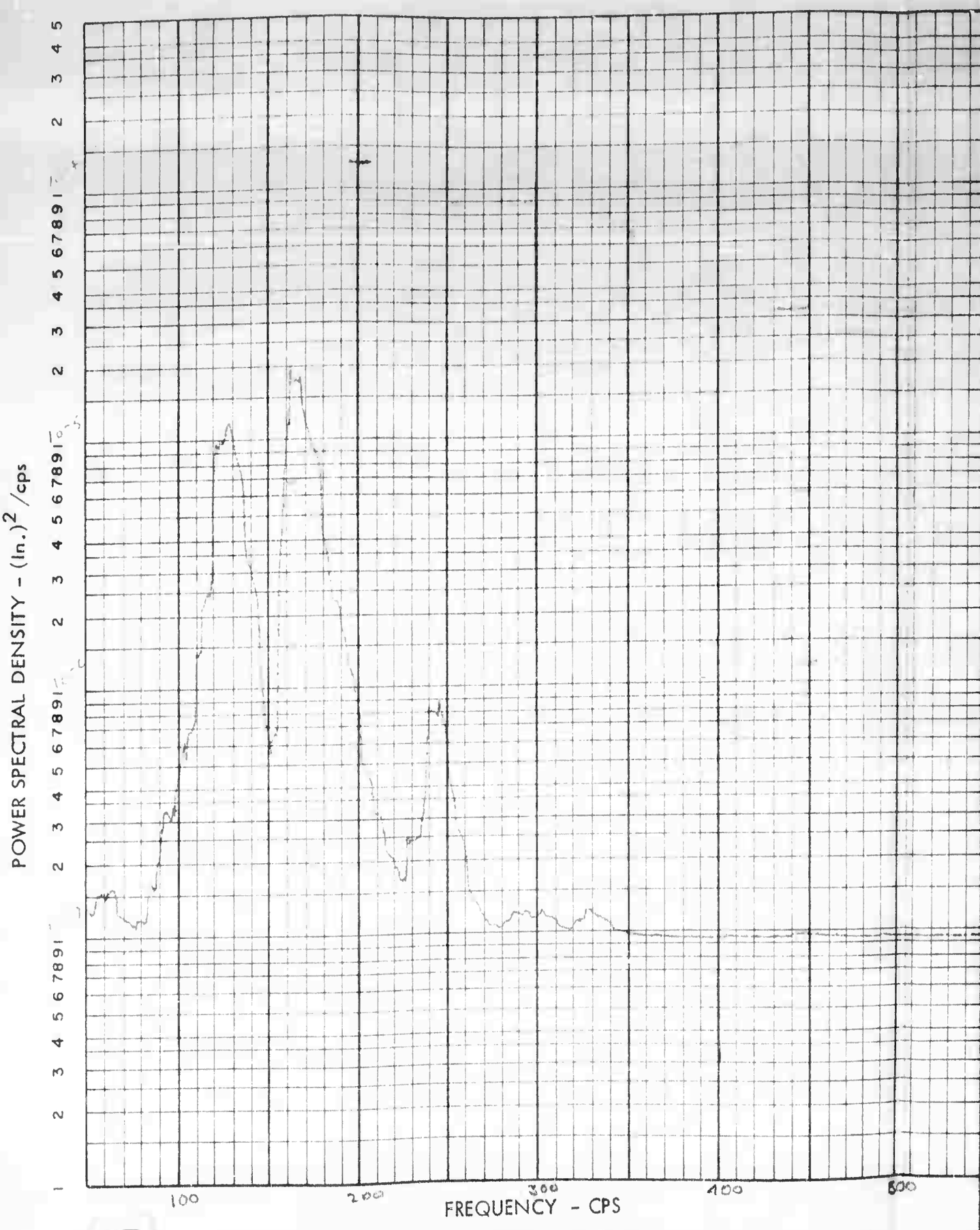
RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} =$ psi

SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

2

500

CALC	[illegible]	[illegible]	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	Vol I
CHECK	RDS	10-3				
APR					1479 Mic. 2	D2-5353-4
APR					THE BOEING COMPANY	PAGE Fig 117



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

__ cycles from __ to __ cps

__ cycles from __ to __ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5503-1	Panel or Specimen No.: 1479	
Tape No.: 15	Tape Channel: 4	Displacement Pickup #: 1
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 15	Tape Channel: 1	Data Tape RMS Volt V_R = 2.50

Calibration Voltage
V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 200cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = .0708 in./Volt

Equivalent of Calibration - In.
$D_c = V_a \cdot S$ = (.5)(.0708) .0354

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ in.^{2}/cps

Analyzer Attenuator Setting: -10 db	Log Converter Setting: db

Calibration Plotted at 1.25 X 10^{-3} In.^{2}/cps

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

= _____ = psi

2

800

CALC	RCB	9/10/62	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
CHECK	RLS	9-12-62			
APR.					1479 P/U 1
APR					THE BOEING COMPANY SEATTLE 24, WASHINGTON

Vol I
D2-80094
PAGE Fig 118



1

ANALYSIS VARIABLES

Bandwidth
5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_e .4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 9 Sec.

DATA IDENTIFICATION

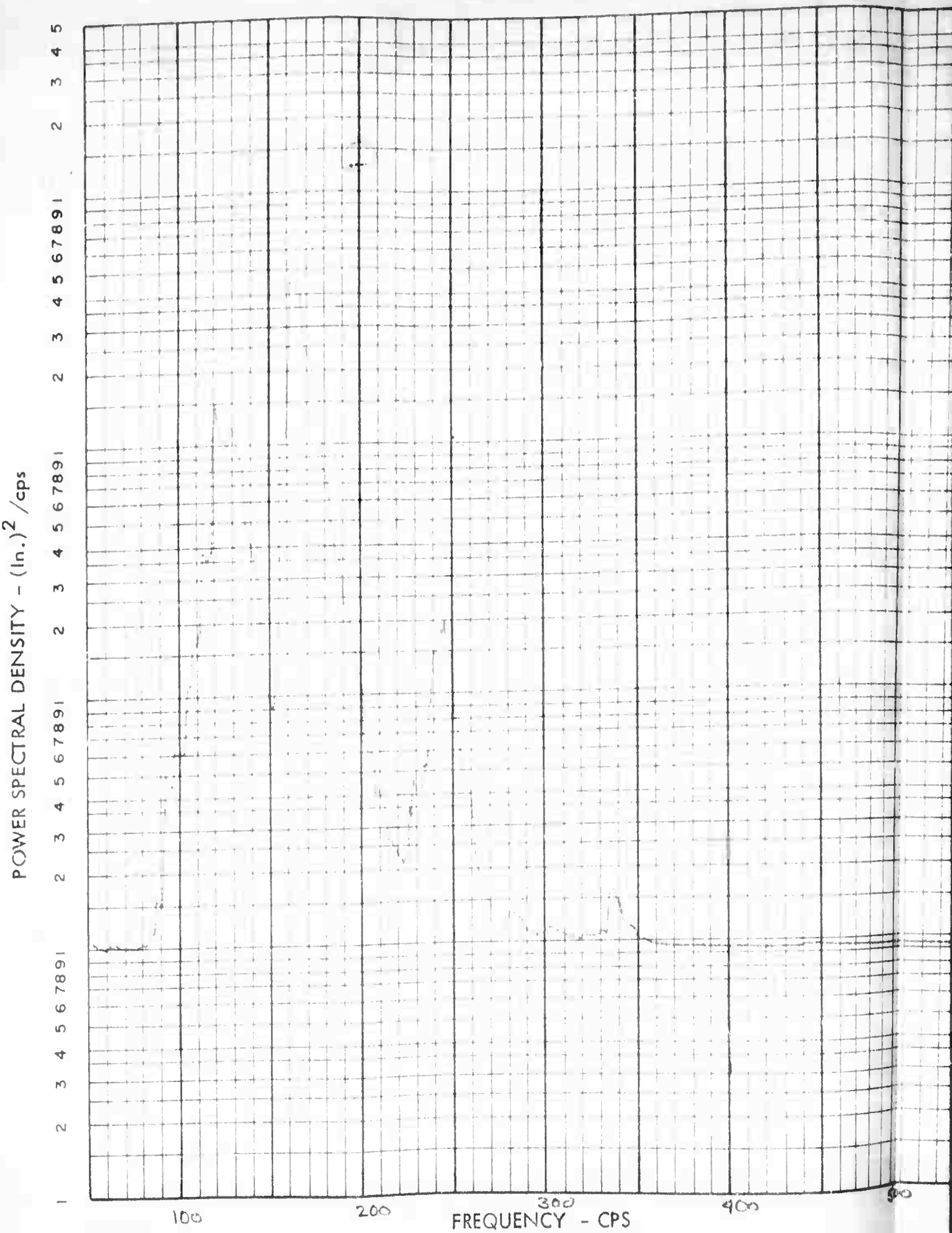
Test Title: PANEL ATTACH TYPE I PREUM		
EWA No. 5593-1	Panel or Specimen No. 1479	
Tape No. 15	Tape Channel 5	Displacement Pickup 5
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No. 15	Tape Channel 1	Data Tape RMS Volt V_R =
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1	
Displacement Pickup Sensitivity S = .0708 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = (.5)(.0708) = .0354		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ in.^{2}/cps		
Analyzer Attenuator Setting -20 db	Log Converter Setting db	
Calibration Plotted at 1.25 x 10^{-3} in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = ____ = psi		

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	VOL I
CHECK						DZ-8000
APR.					1479 P/U 5	
APR					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE FIG 119



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

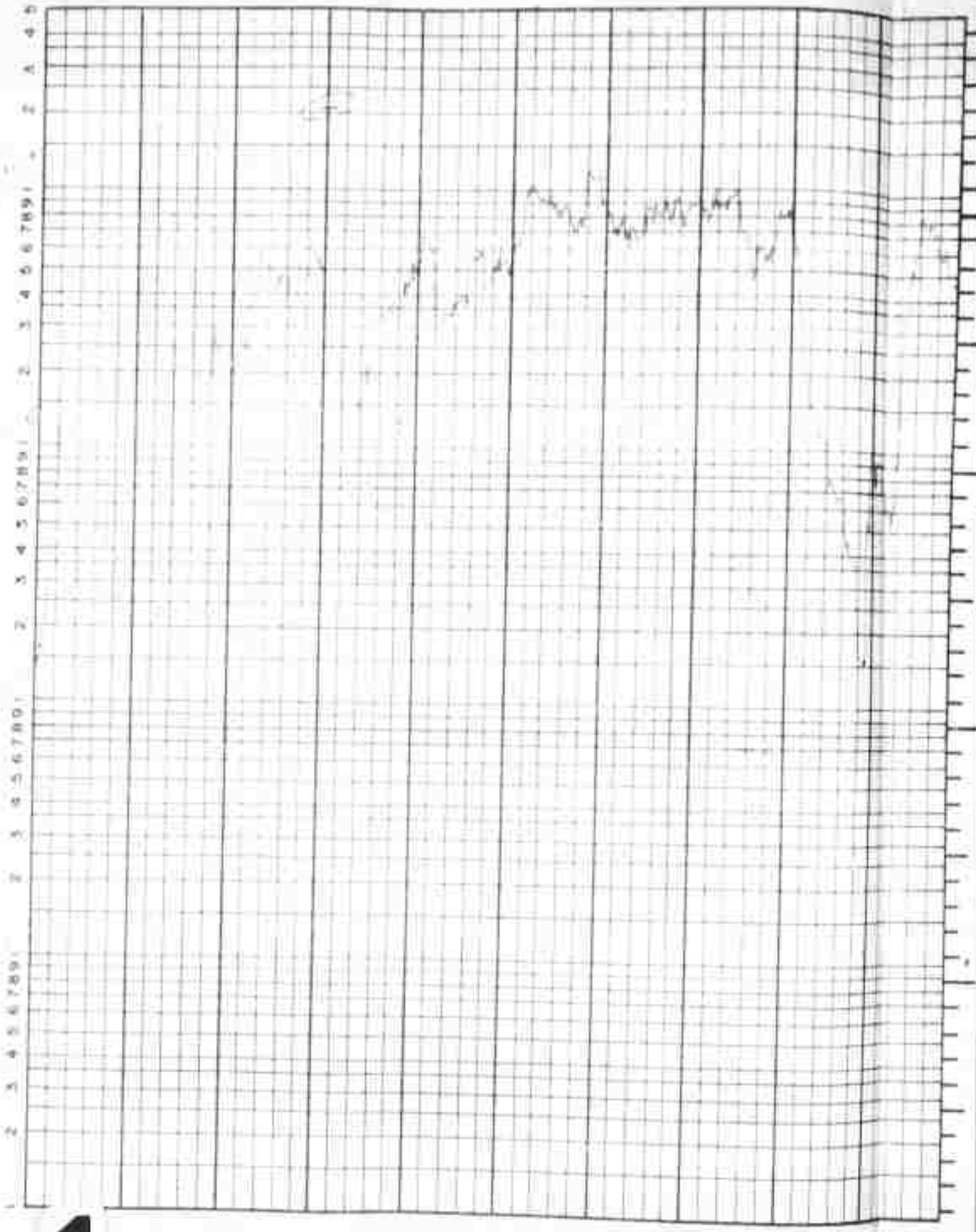
Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No. 5593-1	Panel or Specimen No. 1479	
Tape No. 15	Tape Channel 6	Displacement Pickup 6
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No. 15	Tape Channel 1	Data Tape RMS Volt V_R =
Calibration Voltage V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 2000cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1	
Displacement Pickup Sensitivity S = .0708 in./Volt		
Equivalent of Calibration - In. $D_c = V_a \cdot S$ = (.5)(.0708) = .0354		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ in.^{2}/cps		
Analyzer Attenuator Setting db	Log Converter Setting db	
Calibration Plotted at in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = ____ = psi		

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	Vol I
CHECK						
APR.					1479 P/U 6	D2-50089
APR					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE F-6.120



1

ANALYSIS VARIABLES

Bandwidth

___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T= ___ Sec.
Anal. Rate ___ cps/Sec.
Loop Length ___ Sec.

CALC
CHECK
APR
APR

SPECTRUM LEVEL – DECIBELS (Re 0.0002 Microbar)

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE 1 PRELIM		
EWA No.: 5[illegible]-1	Panel or Specimen No.: 14[illegible]	
Tape No.: 16	Tape Channel: 2	Mic. No.: 1
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

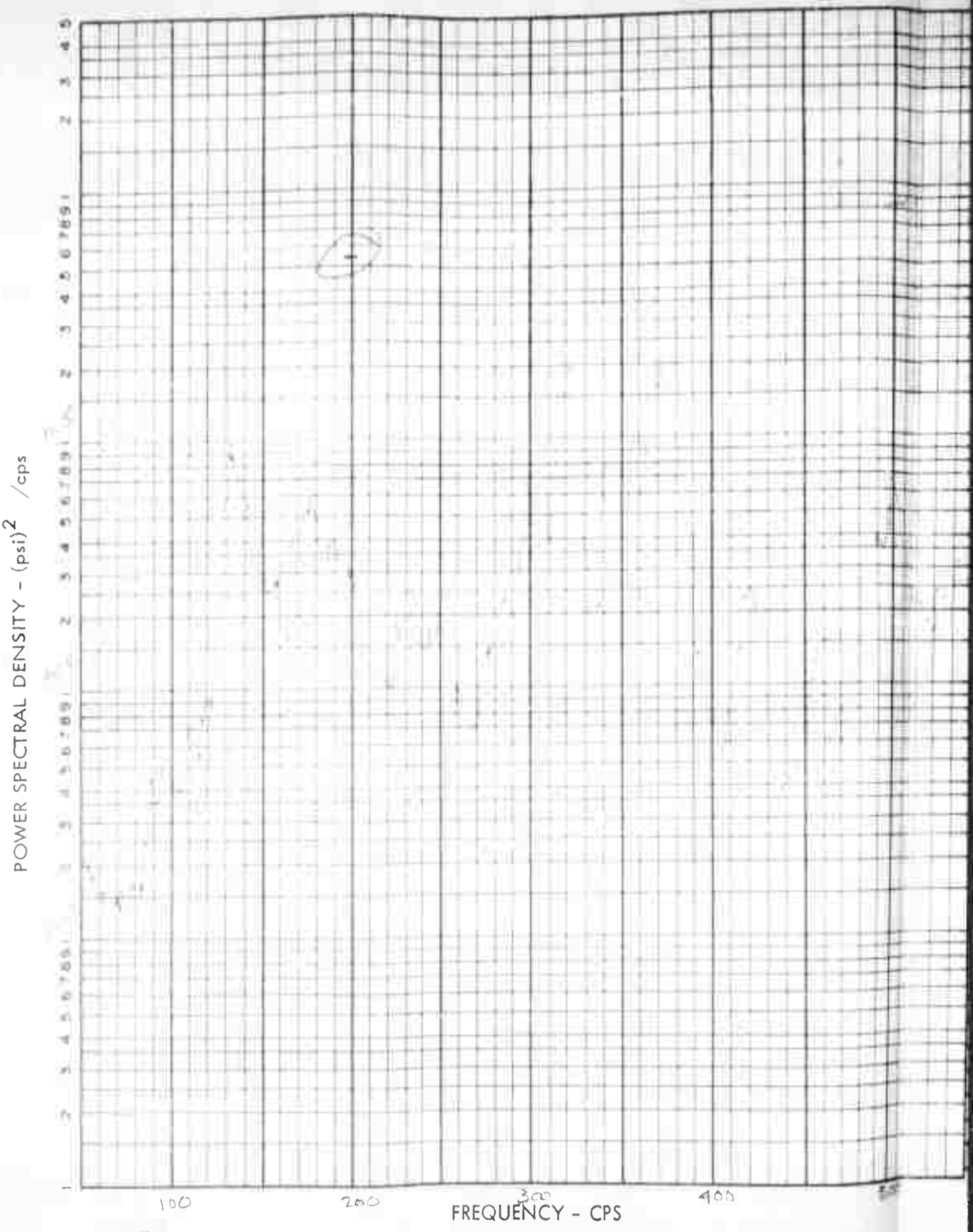
CALIBRATION

Tape No.: 16	Tape Channel: 1	Data Tape RMS Volt V_R = 0.9[illegible]
Calibration Voltage V_a = [illegible] V_{rms} into Line Amp.; V_c = 2.5 V_{rms} on Tape @ [illegible] cps		
Line Amplifier Settings For Calibration G_c = 0 1 ; for Data G_d = 0 1		
Lab. Gain LG = 1	Tape Monitor Gain TMG = $\frac{G_d}{G_c}$ = 1	
Microphone Sensitivity S = [illegible] psi/Volt or 1 Volt rms = 166 db SPL		
Equivalent of Calibration – psi $P_c = V_a \cdot S = (0.5)(0.290) = 0.145$		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{0.145}{1 \times 1}\right]^2 =$ [illegible] psi^2/cps		
Analyzer Attenuator Setting −20 db	Log Converter Setting db	
Calibration Plotted at [illegible] psi^2/cps		
Overall Pressure Level Data RMS pressure Level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = psi	Equiv. to db SPL	

2

CALC	R E S	[illegible]	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT 14[illegible] Mic 1
CHECK	[illegible]	[illegible]			
APR.					
APR					
					THE BOEING COMPANY

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D2-80[illegible]
PAGE Fig 12.1



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM		
EWA No.: 5503-1	Panel or Specimen No.: 1478	
Tape No.: 16	Tape Channel: 3	Mic. No.: 2
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 16	Tape Channel: 1	Data Tape RMS Volt V_R = 0.355
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .2		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2	
Microphone Sensitivity S = .210 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S = (.5)(.210) = .145$		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{2 \times 1}\right] = 5.5 \times 10^{-3}$ psi^2/cps		
Analyzer Attenuator Setting -30 db	Log Converter Setting db	
Calibration Plotted at 5 psi^2/cps		
Overall Pressure Level Data RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} =$ psi	Equiv. to db SPL	

SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

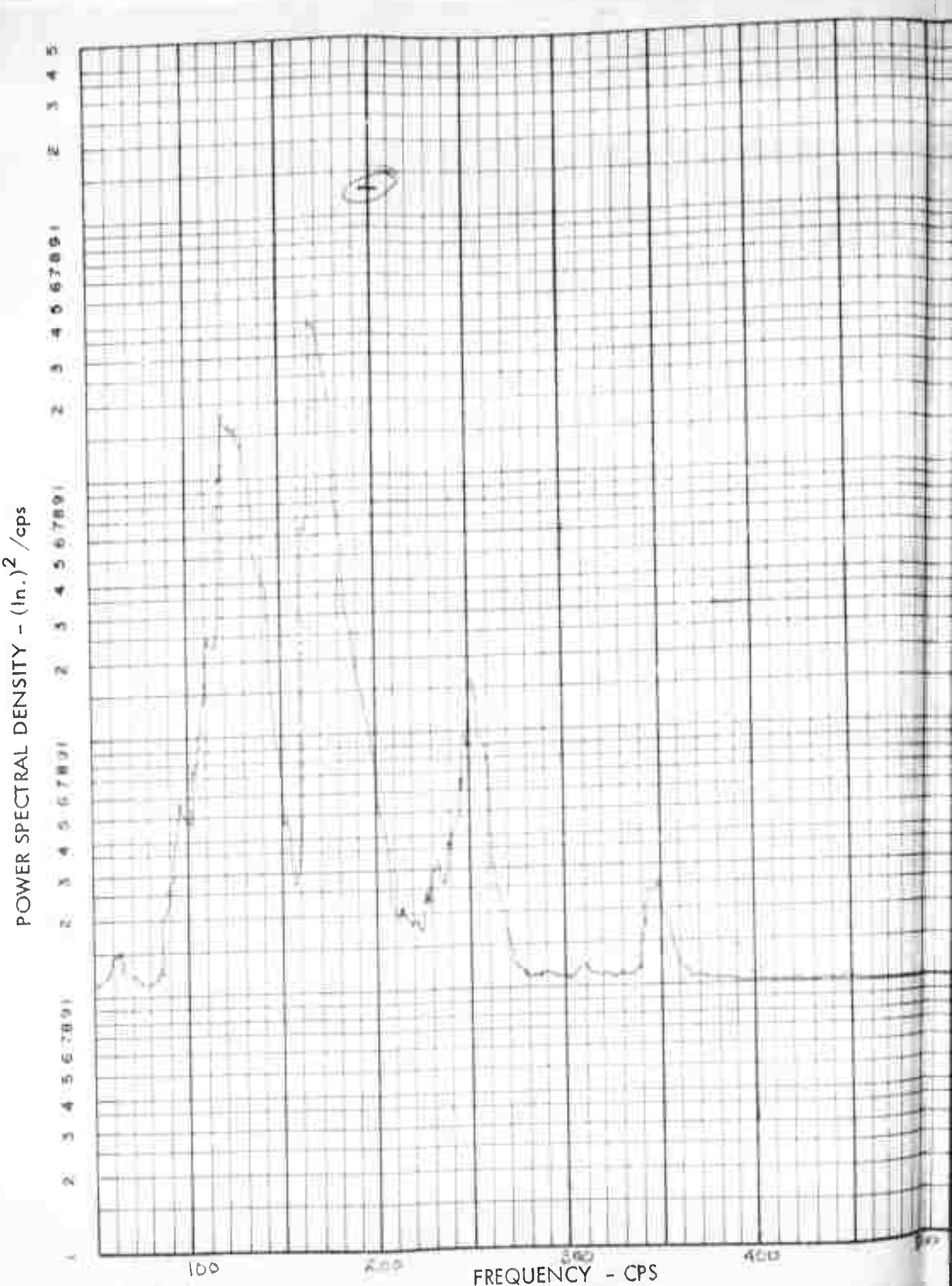
2

CALC	[illegible]	[illegible]	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT
CHECK	[illegible]	[illegible]			
APR					1478 Mic 2
APR					THE BOEING COMPANY

Vol. I

D2-[illegible]

PAGE [illegible]



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_e 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH, TYPE I PRELIM.		
EWA No. 5593-1	Panel or Specimen No. 1478	
Tape No. 16	Tape Channel 4	Displacement Pickup 1
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No. 16	Tape Channel 1	Data Tape RMS Volt V_R = 8

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape 240 cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = .0708 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S = (.5)(.0708) = .0354$

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ in.^{2}/cps

Analyzer Attenuator Setting -10 db	Log Converter Setting db

Calibration Plotted at 1.25 x 10^{-3} in.^{2}/cps

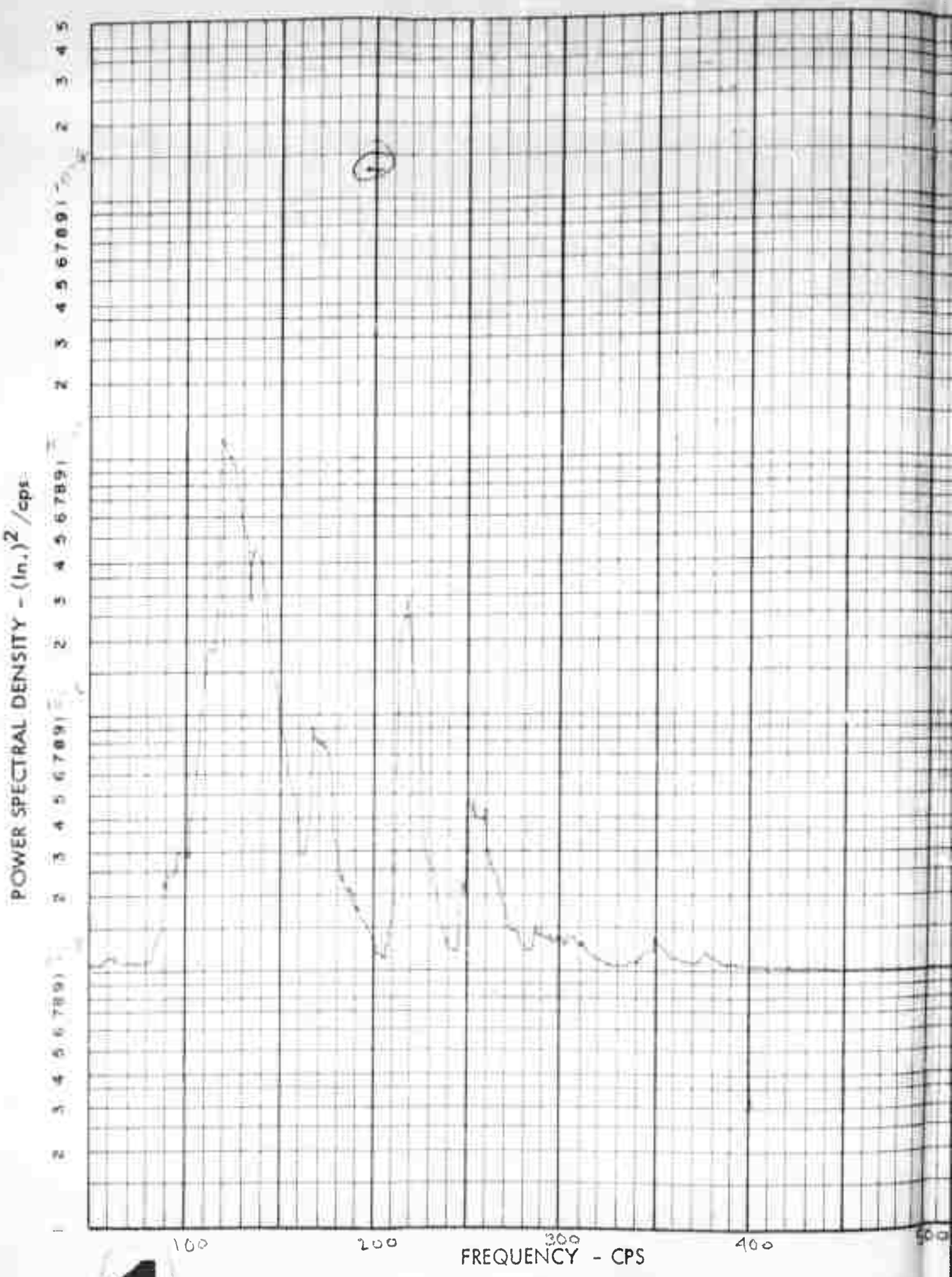
Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

= _____ = psi

2

CALC	RDS	7/24/63	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
CHECK	RDS	10-3			
APR.					1478 P/U 1
APR					THE BOEING COMPANY SEATTLE 24, WASHINGTON

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PAGE Fig 123



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM.		
EWA No. 5582-1	Panel or Specimen No. 1478	
Tape No. 16	Tape Channel 5	Displacement Pickup # 5
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

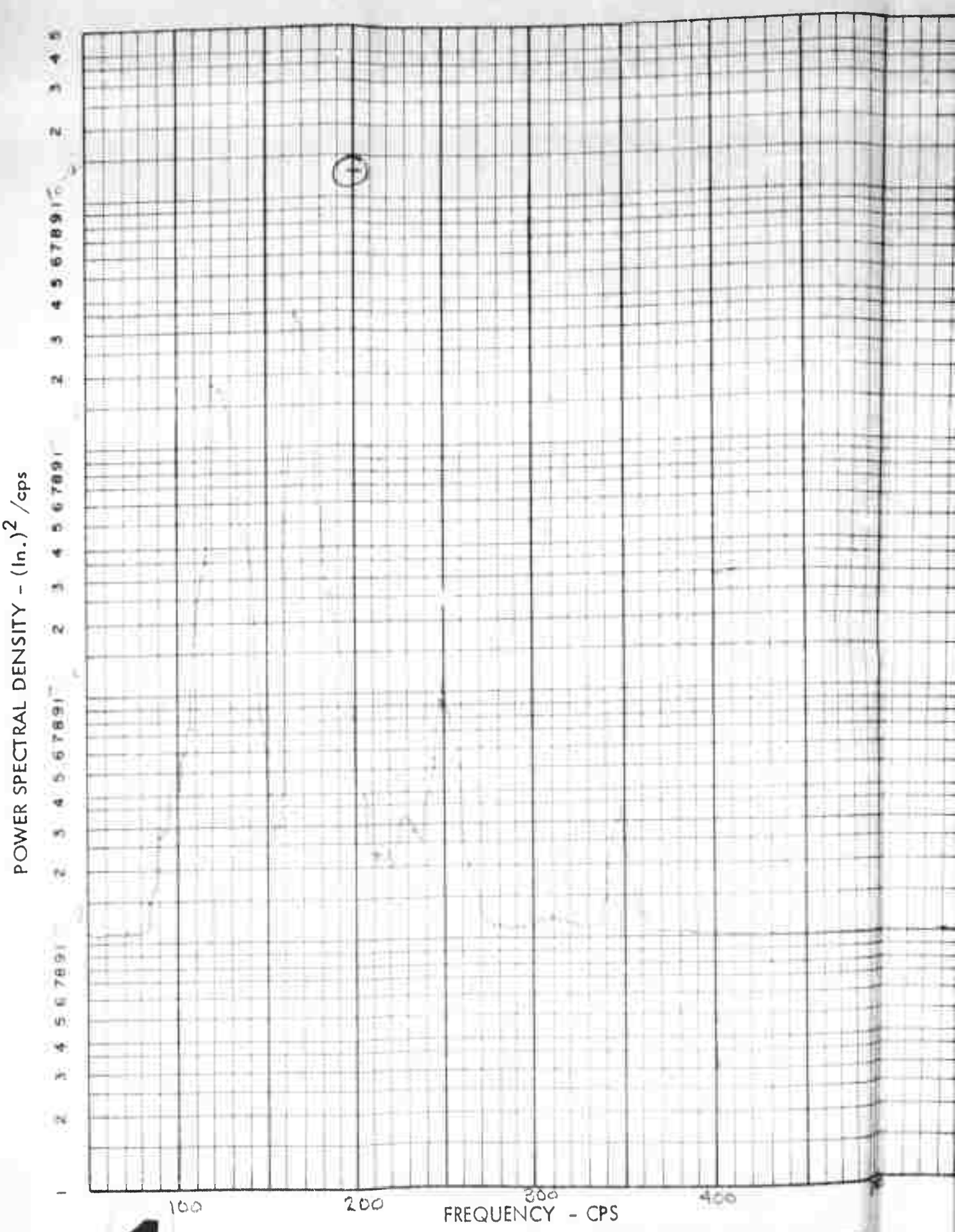
CALIBRATION

Tape No. 16	Tape Channel 1	Data Tape RMS Volt V_R = 0.175
Calibration Voltage V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1	
Displacement Pickup Sensitivity S = .0708 in./Volt		
Equivalent of Calibration - In. $D_c = V_a \cdot S$ = (.5)(.0708) = .0354		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ in.^{2}/cps		
Analyzer Attenuator Setting -10 db	Log Converter Setting db	
Calibration Plotted at 1.25×10^{-1} in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = = _____ = psi		

2

500

CALC	R.I.S	9/27/63	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	VOL I
CHECK	R.D.S	10-2-63			1478 P/U 5	D2-80084
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE FIG 124
APR						



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ANALYSIS VARIABLES

Bandwidth
5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_r 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM.		
EWA No.: 5533-1	Panel or Specimen No.: 1478	
Tape No.: 16	Tape Channel: 6	Displacement Pickup #: 6
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 16	Tape Channel: 1	Data Tape RMS Volt V_R = 0.260

Calibration Voltage
V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 20 cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = .0708 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S = (.5)(.0708) = .0354$

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right] \cdot 1.25 \times 10^{-3}$ in.^{2}/cps

Analyzer Attenuator Setting: -10 db	Log Converter Setting: db

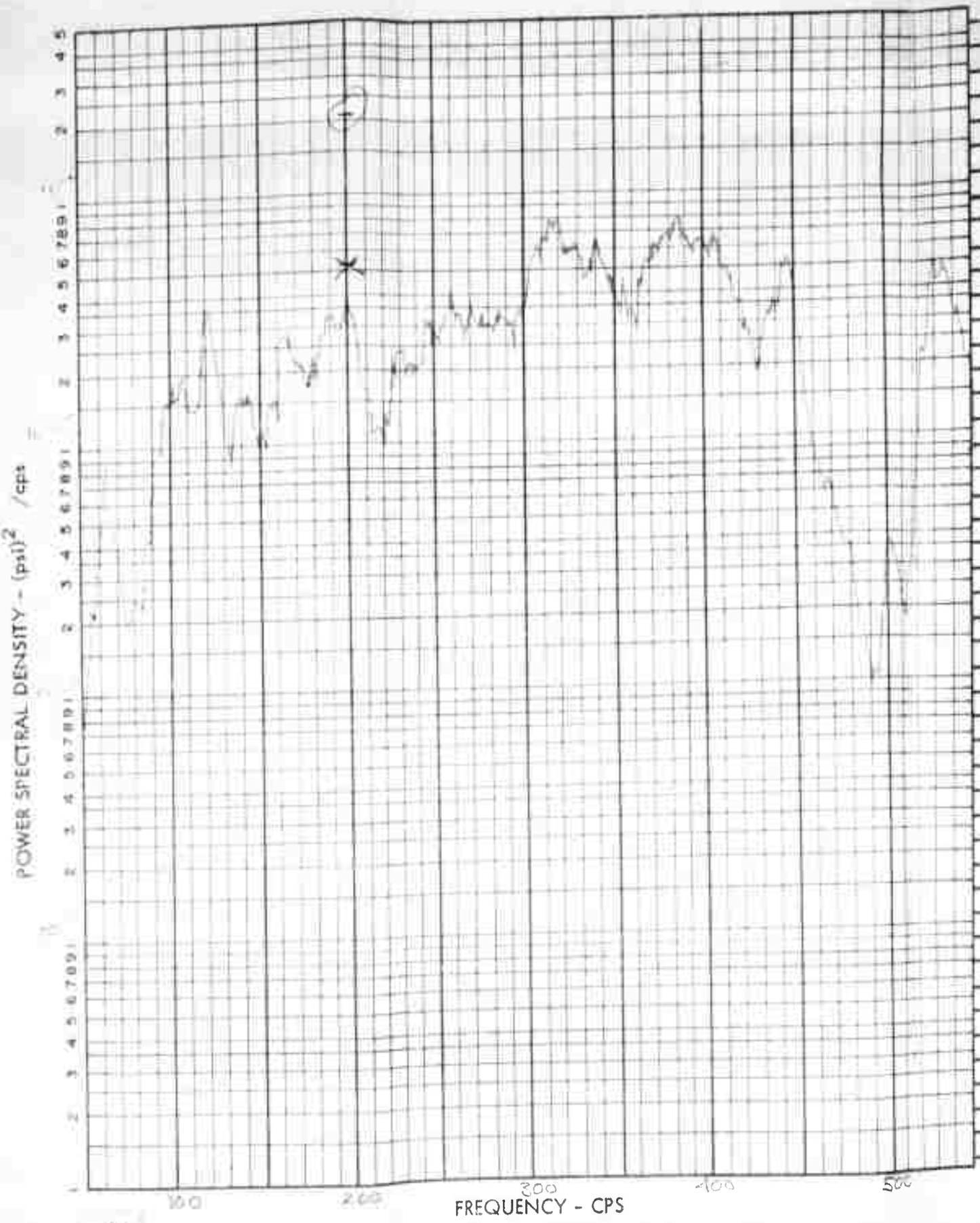
Calibration Plotted at 1.25 x 10^{-3} In.^{2}/cps

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

= _____ = psi

2

CALC	R E S	9/26/63	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	VOL I
CHECK	D L S	10 7 3			1478 P/U 6	D2-80084
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE FIG 125
APR						



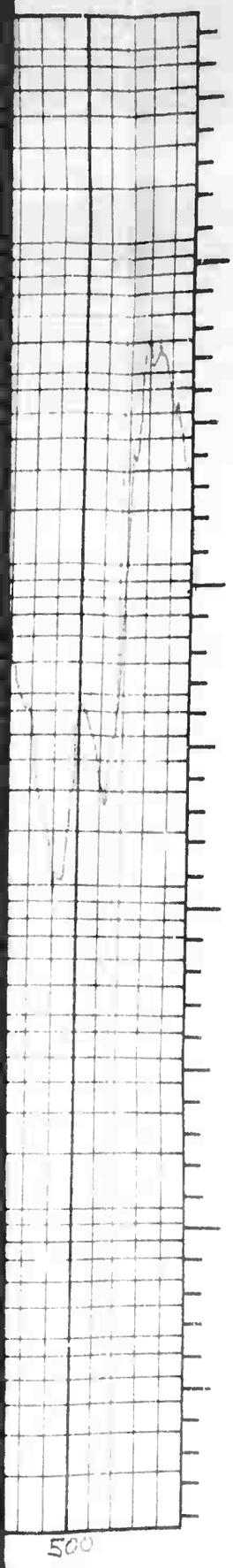
1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.



DATA IDENTIFICATION

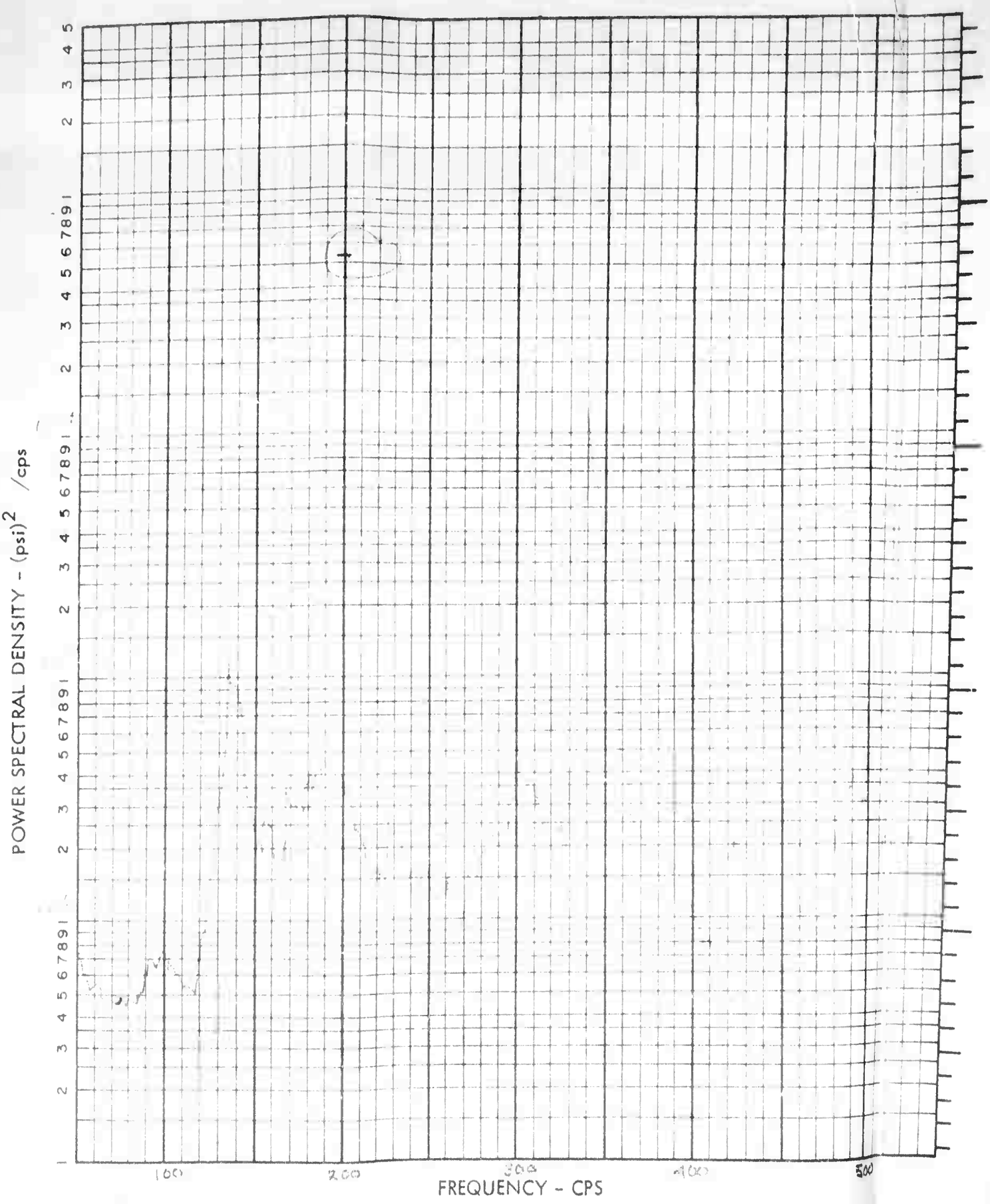
Test Title: PANEL ATTACH. TYPE I PRELIM		
EWA No.: 5593-1	Panel or Specimen No.: 1478	
Tape No.: 17	Tape Channel: 2	Mic. No.: 1
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 17	Tape Channel: 1	Data Tape RMS Volt V_R = 0.410
Calibration Voltage $V_a = .5 V_{rms}$ into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1	
Microphone Sensitivity S = .290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = .5(.290) = .145		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{1 \times 1}\right]^2 = 2.10 \times 10^{-2}$ psi^2/cps		
Analyzer Attenuator Setting -30 db	Log Converter Setting db	
Calibration Plotted at 2.10×10^{-4} psi^2/cps		
Overall Pressure Level Data RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = psi	Equiv. to db SPL	

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	Vol 1
CHECK						
APR.					1478 M-1	
APR					THE BOEING COMPANY	PAGE F-4 126



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CALC	
CHECK	
APR	
APR	

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5502-1	Panel or Specimen No.: 1478	
Tape No.: 17	Tape Channel: 3	Mic. No.: 2
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

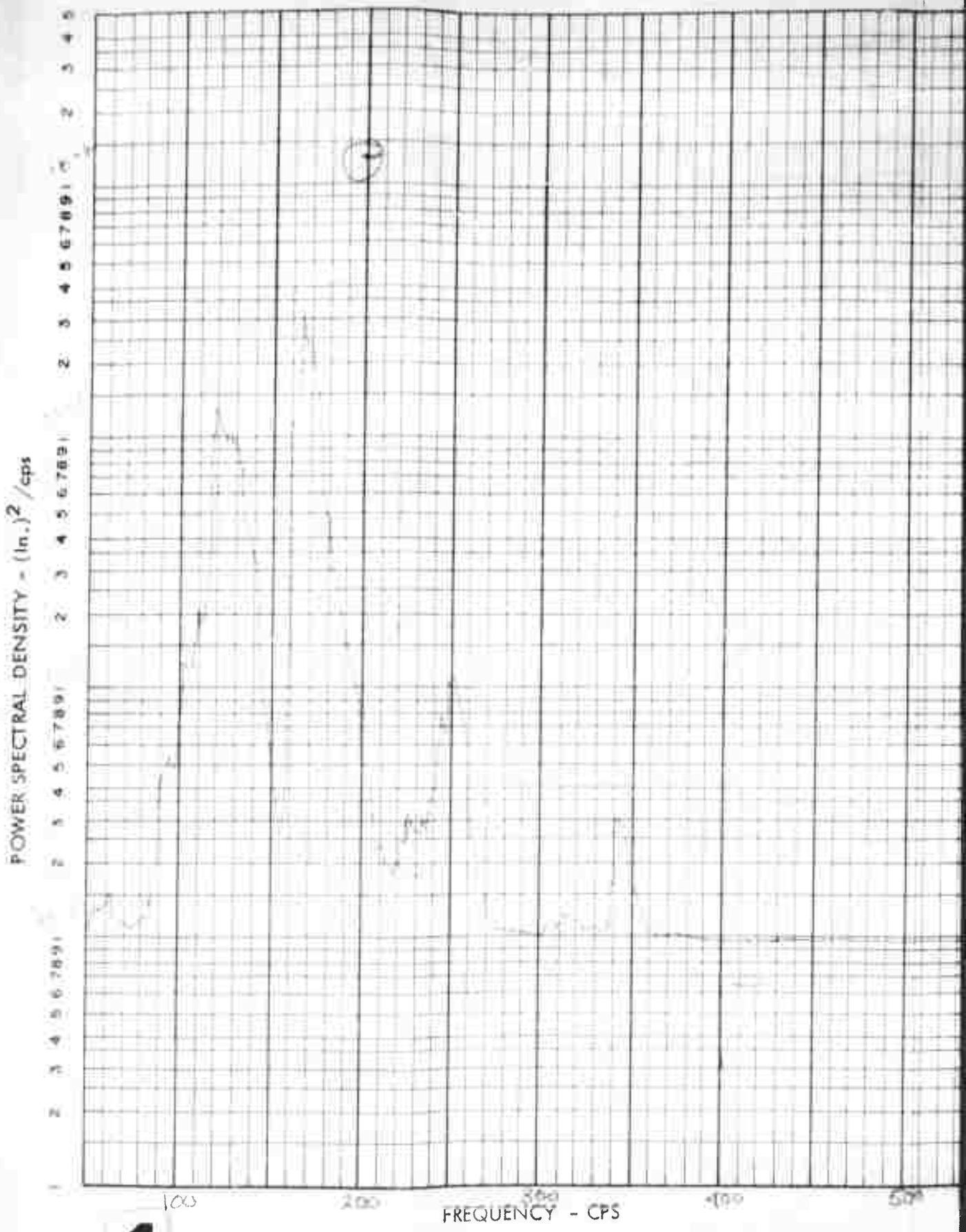
Tape No.: 17	Tape Channel: 1	Data Tape RMS Volt V_R = 0.250
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = ; for Data G_d =		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2	
Microphone Sensitivity S = 290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = .5(.290) = .145		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{2 \times 1}\right]^2 = 5.26 \times 10^{-1}$ psi²/cps		
Analyzer Attenuaror Setting -10 db	Log Converter Setting db	
Calibration Plotted at 5.26×10^{-1} psi²/cps		
Overall Pressure Level Data RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = psi	Equiv. to db SPL	

SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

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2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT
CHECK					
APE					THE BOEING COMPANY
APE					



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

__ cycles from __ to __ cps

__ cycles from __ to __ cps

T_e 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

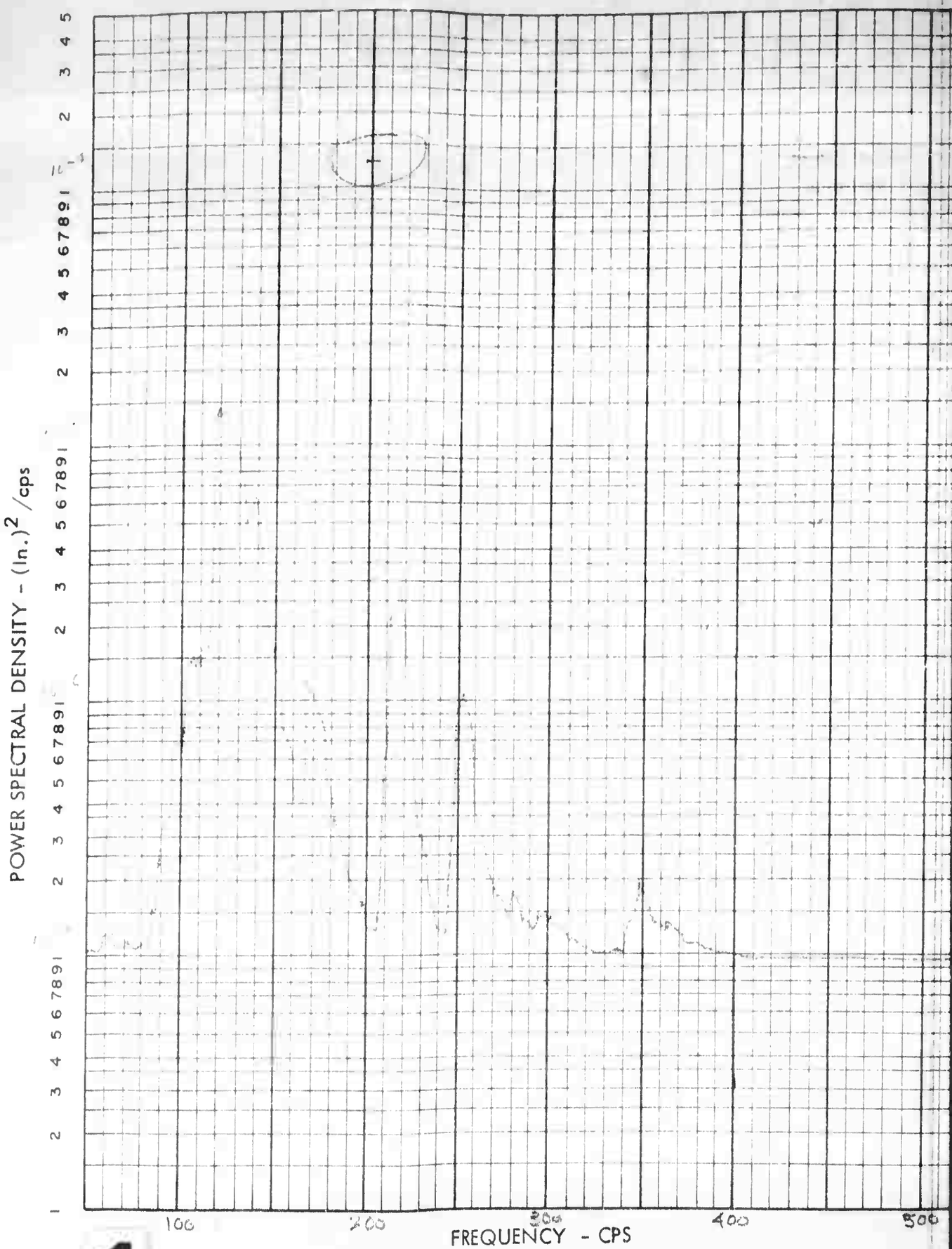
Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5503	Panel or Specimen No.: 1478	
Tape No.: 17	Tape Channel: 4	Displacement Pickup: 1
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.	Tape Channel	Data Tape RMS Volt V_R = .26
Calibration Voltage V_a = 5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape 20 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain TMG = $\frac{G_d}{G_c}$ = 1	
Displacement Pickup Sensitivity S = .0708 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = (.5)(.0708) = .0354		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{(1)(1)}\right]^2 = 1.25 \times 10^{-3}$ in.^{2}/cps		
Analyzer Attenuator Setting −10 db	Log Converter Setting db	
Calibration Plotted at 1.25 x 10^{-3} in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = ____ = psi		

2

CALC	RES	10-23	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	Vol I
CHECK	WAS	10-23				
APR.					1478 P/U 1	D2-80084
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE Fig 128



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5593-1	Panel or Specimen No.: 1478	
Tape No.: 17	Tape Channel: 5	Displacement Pickup: 5
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 17	Tape Channel: 1	Data Tape RMS Volt V_R = 0.197

Calibration Voltage
V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 200 cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = .0708 in./Volt

Equivalent of Calibration - In.
$D_c = V_a \cdot S = (.5)(.0708) = .0354$

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ $in.^2/cps$

Analyzer Attenuator Setting: −10 db	Log Converter Setting: db

Calibration Plotted at
1.25×10^{-3} $in.^2/cps$

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

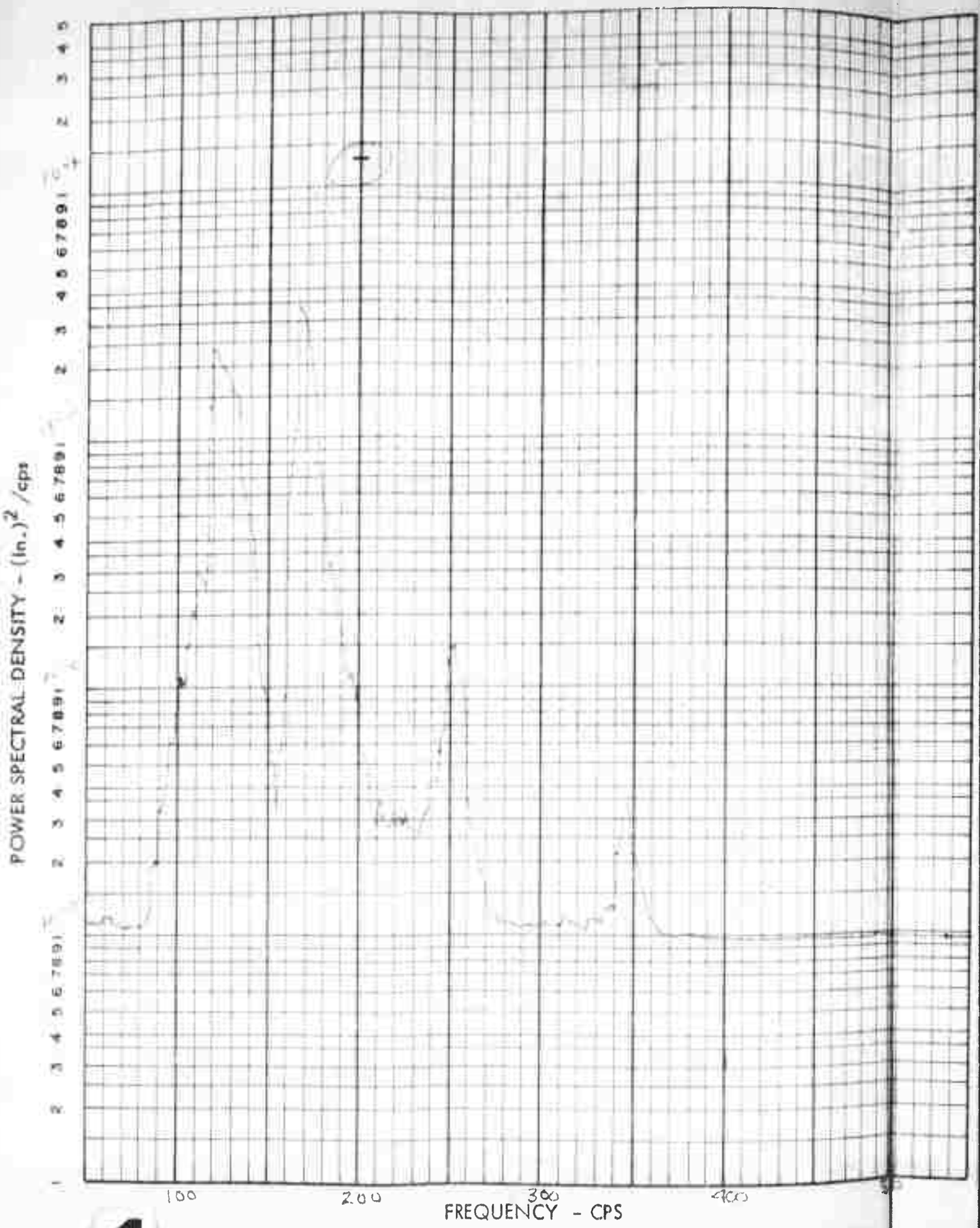
= _____ = psi

2

500

CALC	RFS	9/26/62	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
CHECK	RFS	10-23			1478 P/U 5
APR.	-				THE BOEING COMPANY SEATTLE 24, WASHINGTON
APR					

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PAGE FIG 129



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

__ cycles from __ to __ cps

__ cycles from __ to __ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5593-1	Panel or Specimen No.: 1478	
Tape No.: 17	Tape Channel: 6	Displacement Pickup #: 6
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

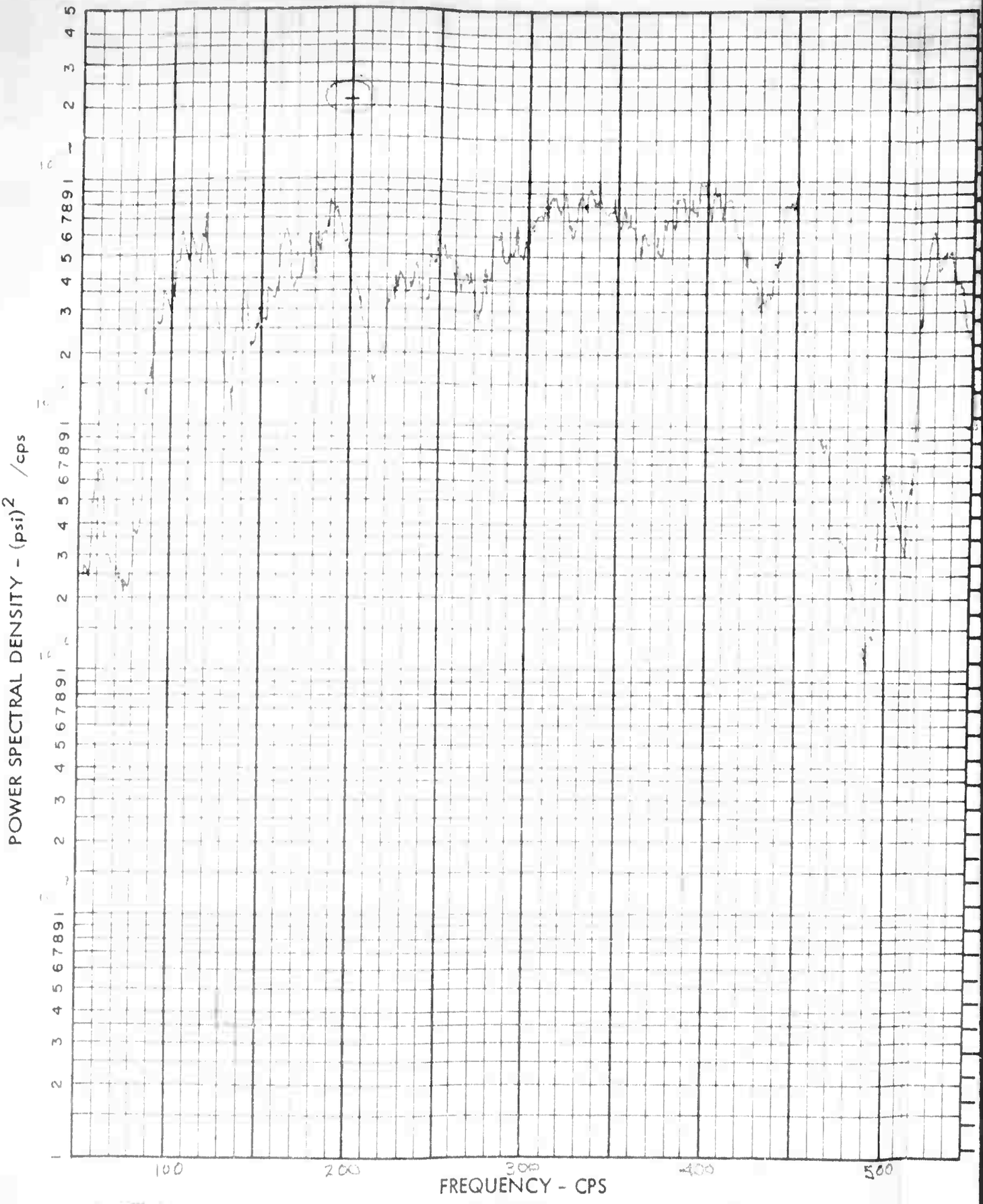
Tape No.: 17	Tape Channel: 1	Data Tape RMS Volt V_R = .285
Calibration Voltage V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 200cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1	
Displacement Pickup Sensitivity S = .0708 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S = (.5)(.0708) = .0354$		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ in.^{2}/cps		
Analyzer Attenuator Setting −10 db	Log Converter Setting db	
Calibration Plotted at in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level $= \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = = psi		

2

CALC	[illegible]	[illegible]	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
CHECK	LDS	10-63			1478 P/U 6
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON
APR					

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D2-800084
PAGE Fig 130

sec.



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CAL
CHE
APR
APR

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5593-1	Panel or Specimen No.: 1477	
Tape No.: 18	Tape Channel: 2	Mic. No.: 1
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 18	Tape Channel: 1	Data Tape RMS Volt V_R = .

Calibration Voltage
$V_a = .5 V_{rms}$ into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c} = 1$

Microphone Sensitivity
S = .290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S = (.5)(.290) = .145$

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{1 \times 1}\right]^2 = 2.10 \times 10^{-2}$ psi^2/cps

Analyzer Attenuator Setting: -20 db	Log Converter Setting: db

Calibration Plotted at 2.1 x 10^{-4} psi^2/cps

Overall Pressure Level Data
RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} =$ Equiv. to db SPL

psi

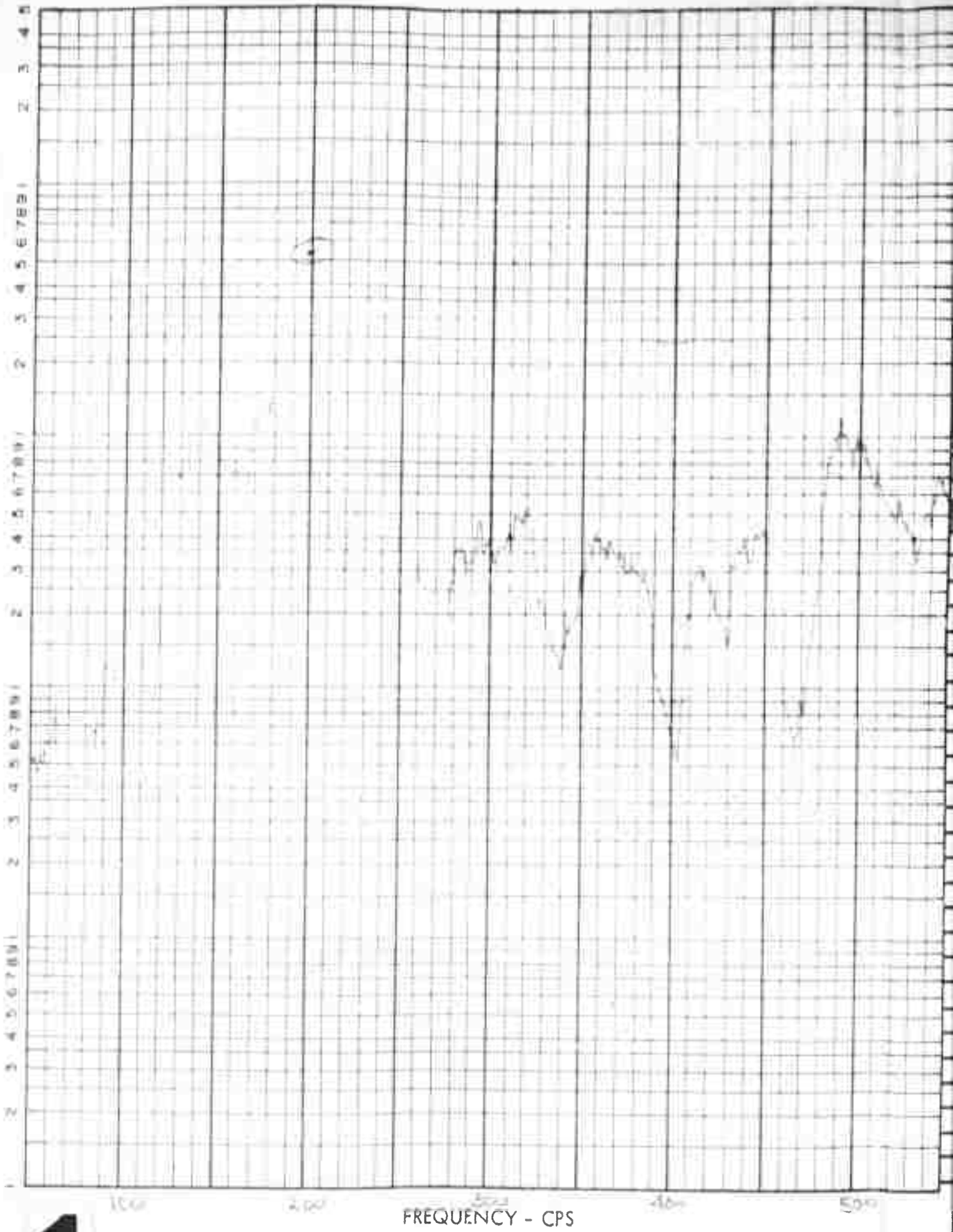
SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

2

500

CALC	R.C.	9-20-63	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT 1477 Mic 1 THE BOEING COMPANY
CHECK	G.P.D.	10-2-63			
APR.					
APR					

Vol I
D2-80084
PAGE Fig 131



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5593-1	Panel or Specimen No.: 1977	
Tape No.: 18	Tape Channel: 3	Mic. No.: 2
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

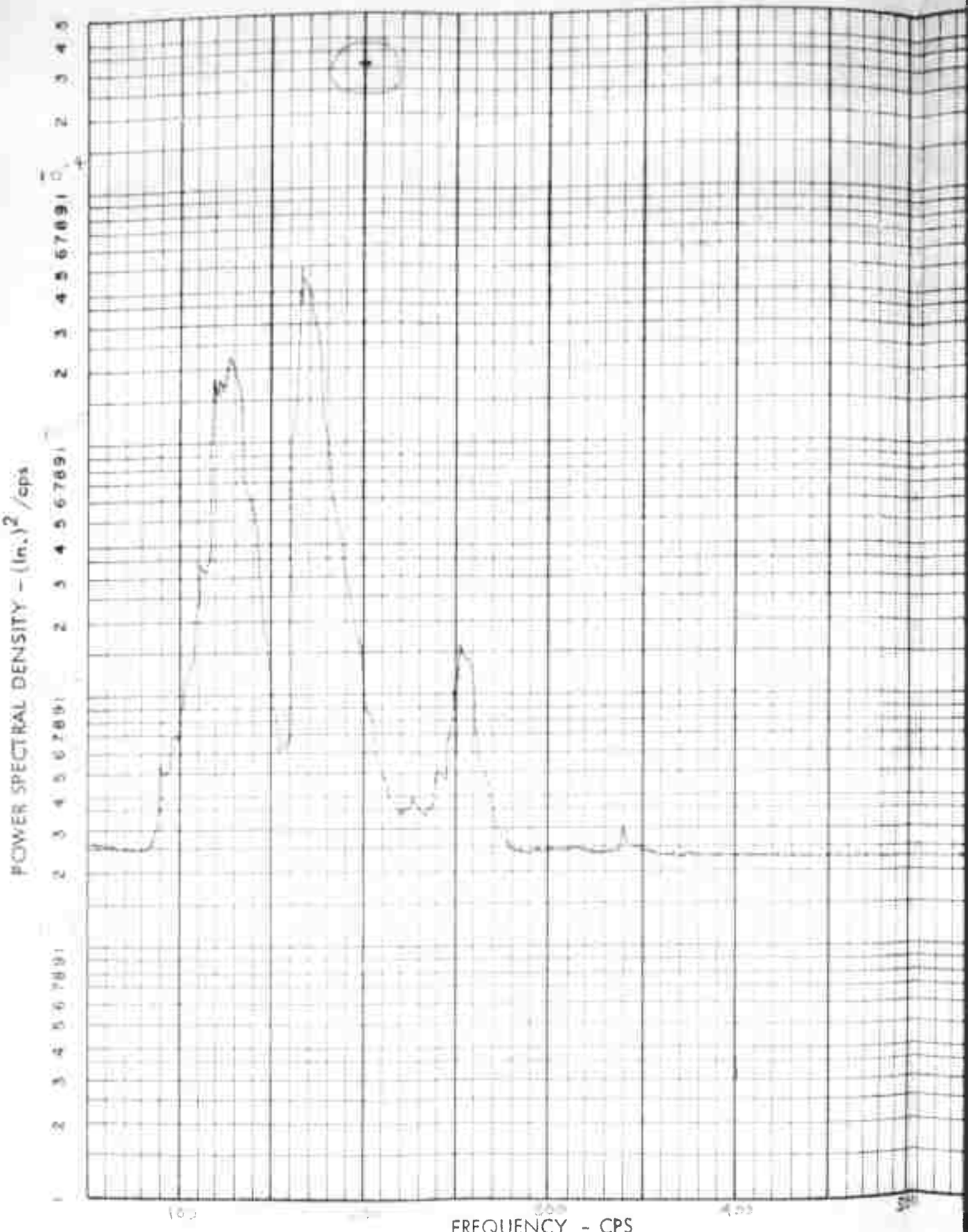
CALIBRATION

Tape No.: 5	Tape Channel: 1	Data Tape RMS Volt V_R = 0.445
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 320 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .2		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2	
Microphone Sensitivity S = 1.10 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = .5 (1.10) = .145		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2$ = [.145 / (2)(1)]² = 5.5 x 10⁻² psi²/cps		
Analyzer Attenuator Setting -20 db	Log Converter Setting db	
Calibration Plotted at psi²/cps		
Overall Pressure Level Data RMS pressure Level $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = ____ = psi	Equiv. to db SPL	

SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	VOL I
CHECK	WDS	10 CS				D2-50554
APP.					1977 MIC 2	
APP					THE BOEING COMPANY	PAGE FIG 132



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 9 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM		
EWA No.: 5593-1	Panel or Specimen No.: 1477	
Tape No.: 18	Tape Channel: 4	Displacement Pickup: 1
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 18	Tape Channel: 1	Data Tape RMS Volt V_R = 0.50 c

Calibration Voltage
V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 200cps;

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .2

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2

Displacement Pickup Sensitivity
S = 0708 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = (.5)(.0708) = .0354

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = [illegible] = 3.14×10^{-4} $in.^2/cps$

Analyzer Attenuator Setting: 0 db	Log Converter Setting: db

Calibration Plotted at [illegible] $in.^2/cps$

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

= _____ = psi

2

CALC	R.E.S	9/26/63	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP · 1477 P/U 1
CHECK	R.O.S	10-2-3			
APR					
APR					

THE BOEING COMPANY
SEATTLE 24, WASHINGTON

VOL I
D2-80084
PAGE Fig 133



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: HAUBL ATTACH TYPE I PRELIM		
EWA No. 5592-1	Panel or Specimen No. 1417	
Tape No. 18	Tape Channel 5	Displacement Pickup # 5
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.	Tape Channel	Data Tape RMS Volt V_R =

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape; 200 cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain
LG = 1

Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = .0709 in./Volt

Equivalent of Calibration - In.
$D_c = V_a \cdot S$ = .5 [illegible] .0354

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = [illegible] = [illegible] in.^{2}/cps

Analyzer Attenuator Setting: −10 db	Log Converter Setting: db

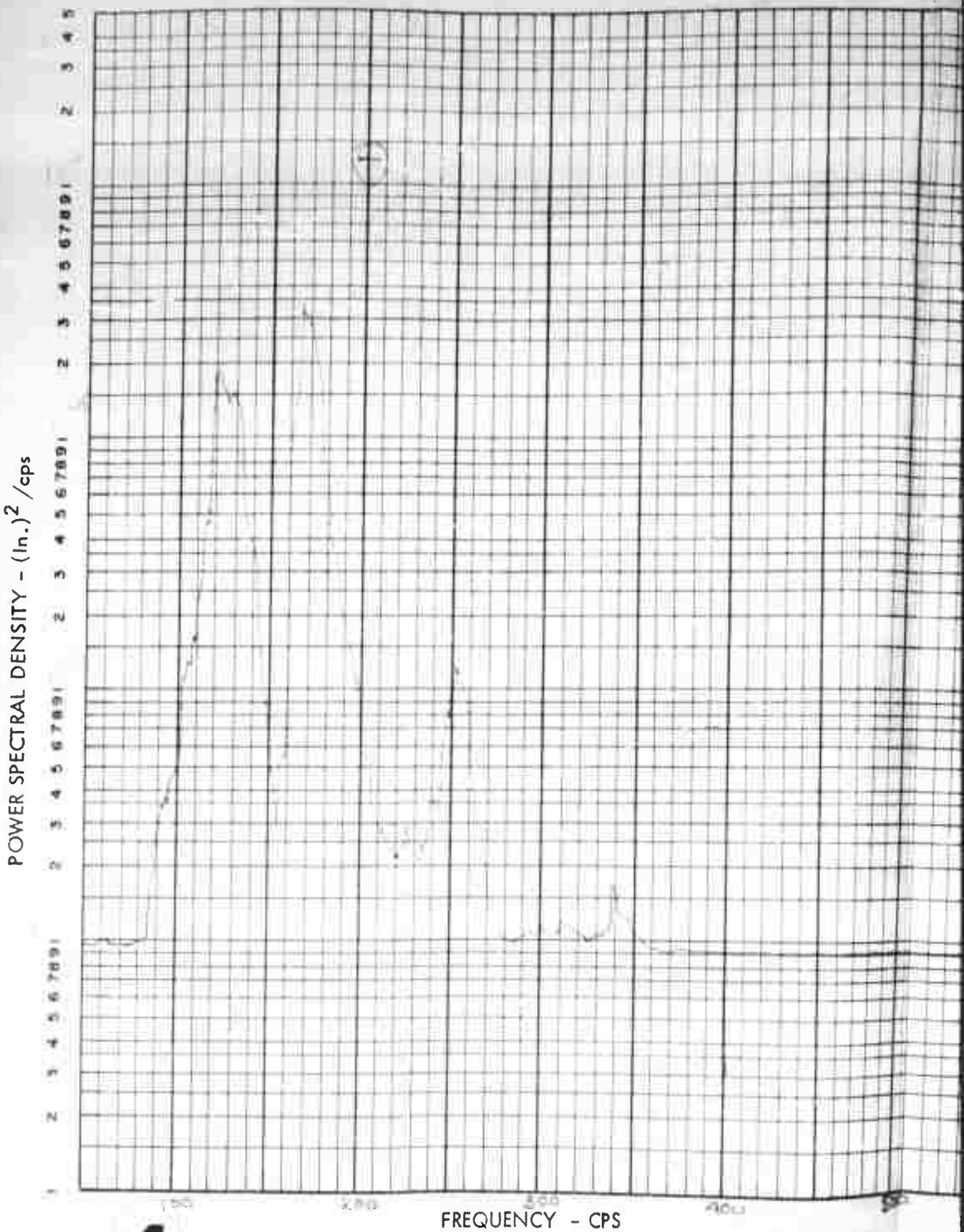
Calibration Plotted at
[illegible] 4 · in.^{2}/cps

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

= _____ = psi

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	Vol I
CHECK		10-23			1417 P/U 5	D2-80084
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE F-G 134
APR						



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

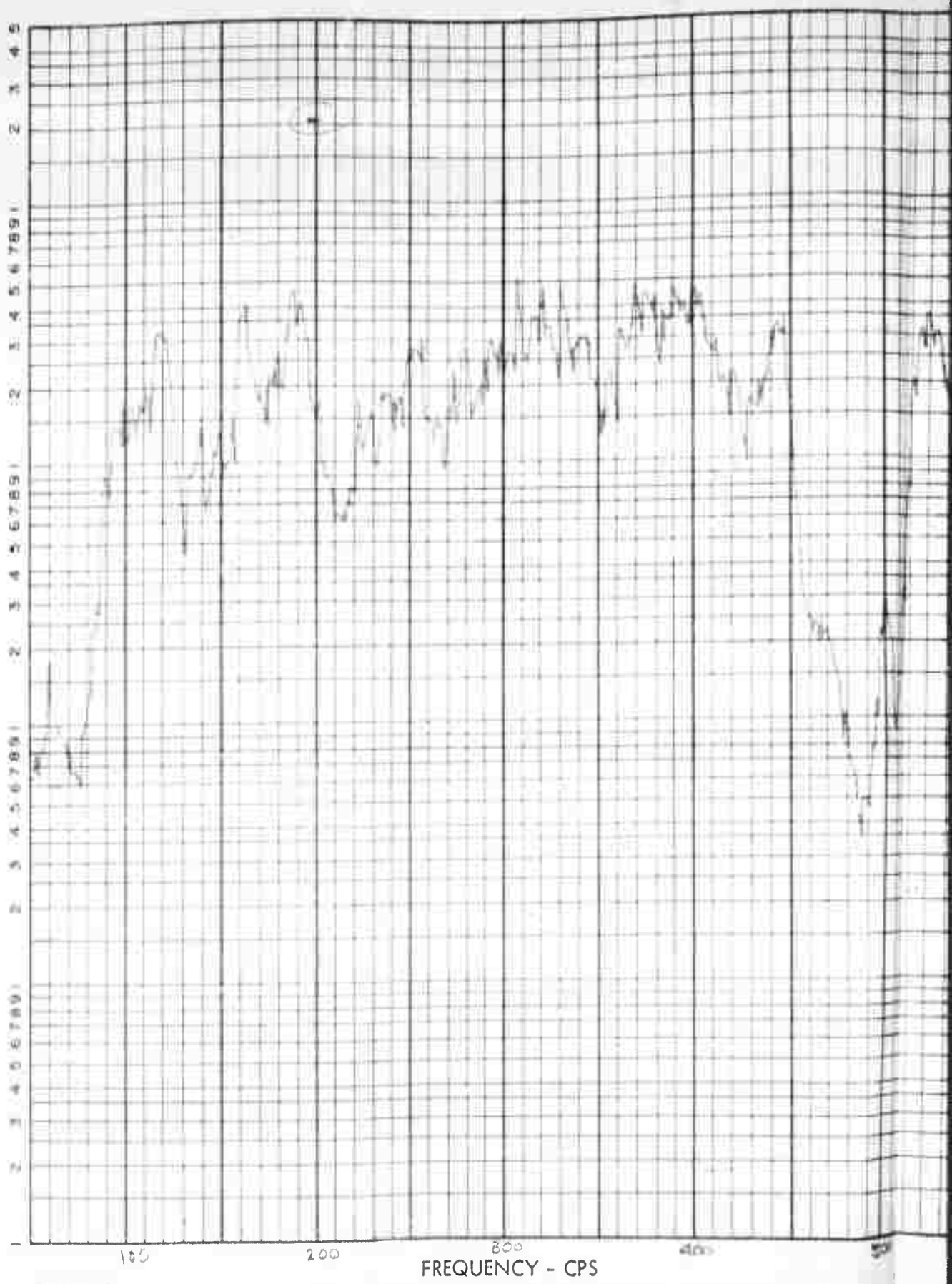
Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No. 5593-1	Panel or Specimen No. 1477	
Tape No. 18	Tape Channel 6	Displacement Pickup # 6
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No. 18	Tape Channel	Data Tape RMS Volt V_R =
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain TMG = $\frac{G_d}{G_c}$ = 1	
Displacement Pickup Sensitivity S = .0708 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = (.5)(.0708) = .0354		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{1 \times 1}\right]^2 = 1.25 \times 10^{-3}$ in.^{2}/cps		
Analyzer Attenuator Setting db	Log Converter Setting db	
Calibration Plotted at / in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = ____ = psi		

2

CALC	RJ		REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	VOL I
CHECK	RDS	10 2-3			1477 P/U 6	D2-80089
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE FIG 135
APR.						



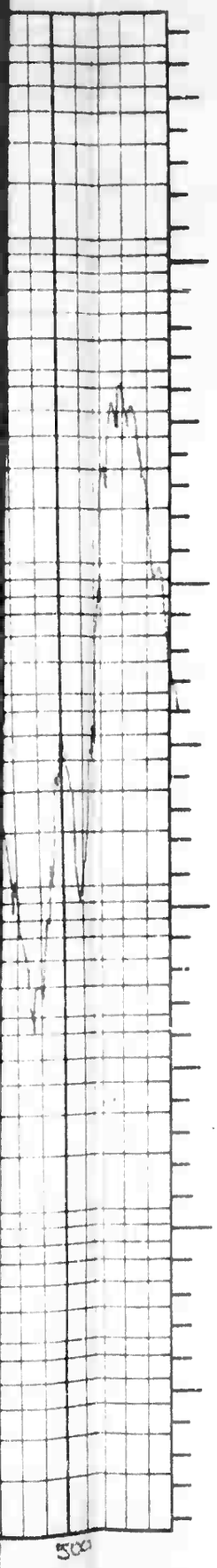
1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 128 cps/Sec.
Loop Length 4 Sec.



DATA IDENTIFICATION

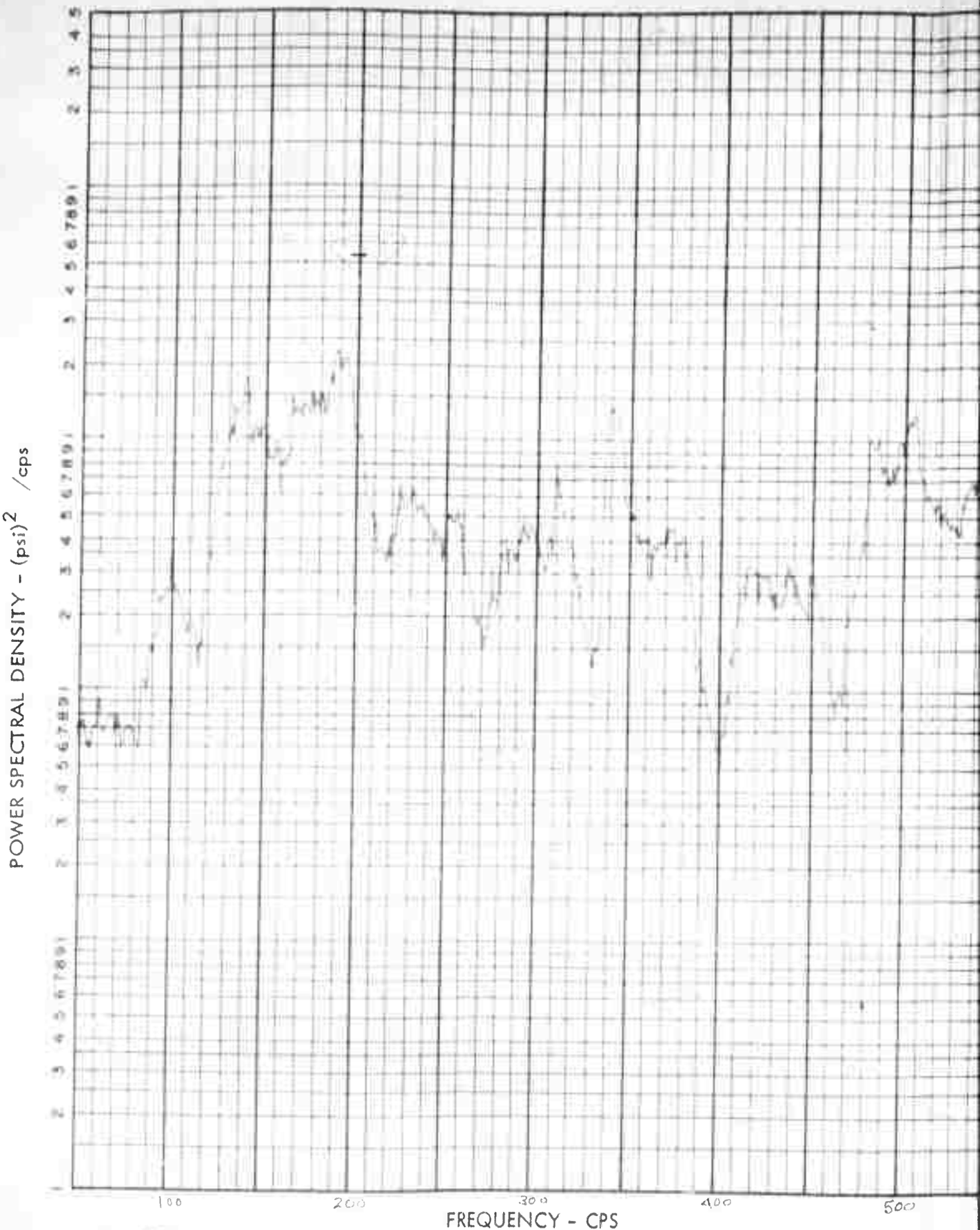
Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5553[illegible]-1	Panel or Specimen No.: 1477	
Tape No.: 19	Tape Channel: 2	Mic. No.: 1
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 19	Tape Channel: 1	Data Tape RMS Volt V_R = [illegible]
Calibration Voltage $V_a = .5 V_{rms}$ into Line Amp.; V_c = 5 V_{rms} on Tape @ [illegible] cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c} = 1$	
Microphone Sensitivity S = .[illegible] psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = [illegible] .145		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2$ = [illegible] = 2.10 x 10[illegible] psi^2/cps		
Analyzer Attenuator Setting db	Log Converter Setting db	
Calibration Plotted at psi^2/cps		
Overall Pressure Level Data RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} =$ psi	Equiv. to db SPL	

2

CALC	[illegible]	[illegible]	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	Vol I
CHECK	MJS	R.C.B.				D2-80084
APR.					1477 Mic 1	
APR					THE BOEING COMPANY	PAGE Fig 136



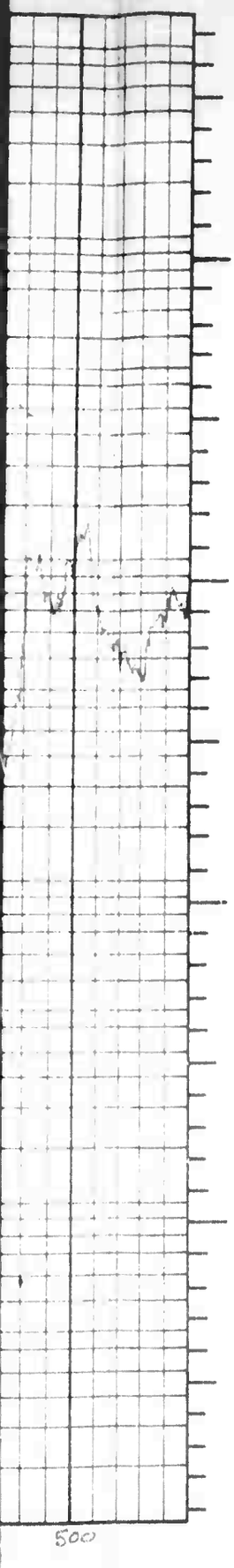
1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 1 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 1 Sec.



DATA IDENTIFICATION

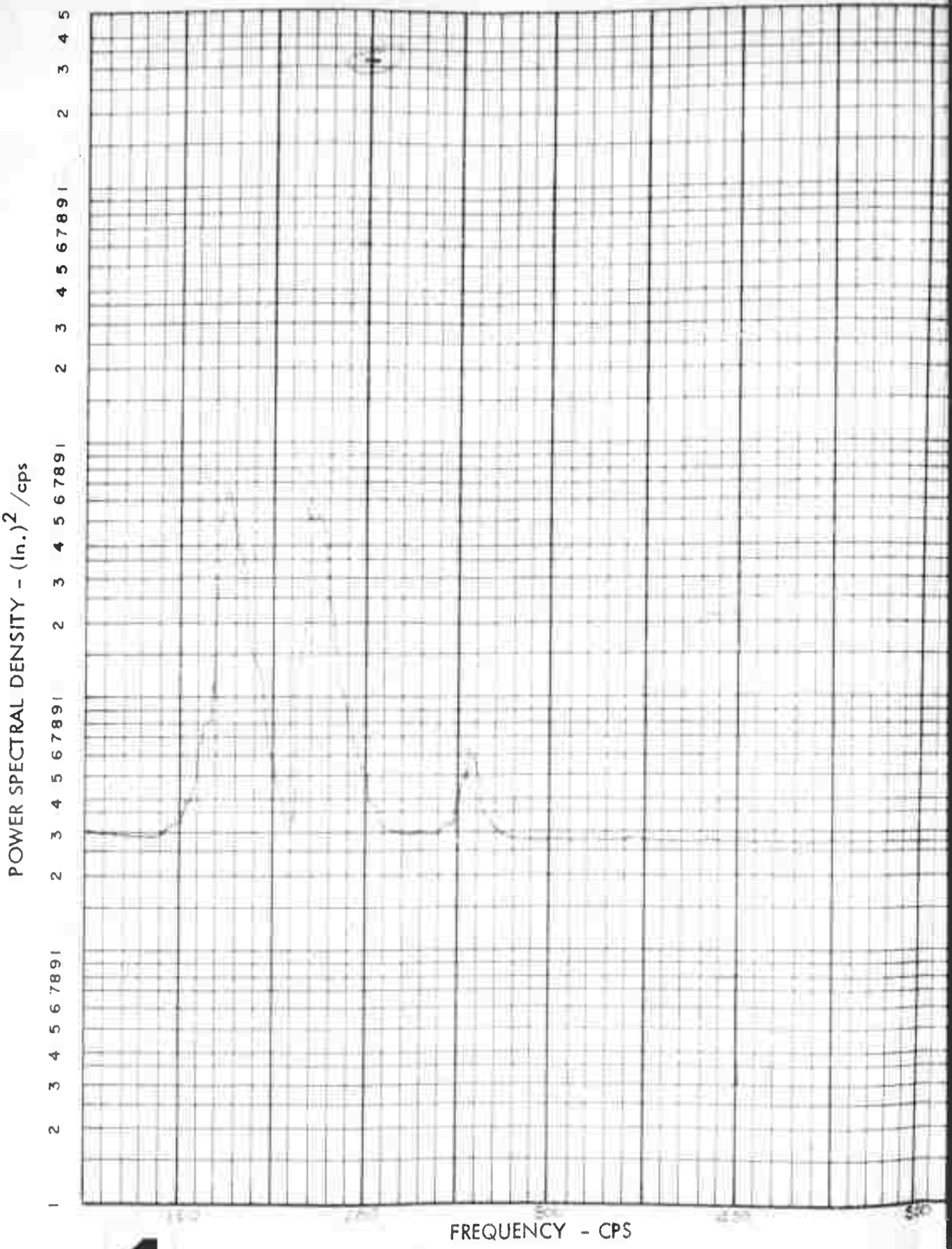
Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5593-1	Panel or Specimen No.: 1477	
Tape No.: 19	Tape Channel: 3	Mic. No.: 2
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No.: 19	Tape Channel: 1	Data Tape RMS Volt V_R = .24
Calibration Voltage $V_a = 5 V_{rms}$ into Line Amp.; V_c = 5 V_{rms} on Tape @ cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .2		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2	
Microphone Sensitivity S = .290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = .5 . .29 = .145		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{2 \times 1}\right]^2 = 5.25 \times 10^{-2}$ psi^2/cps		
Analyzer Attenuator Setting db	Log Converter Setting db	
Calibration Plotted at psi^2/cps		
Overall Pressure Level Data RMS pressure Level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} =$ psi	Equiv. to db SPL	

2

CALC	[illegible]	[illegible]	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	Vol I
CHECK	KDS	10-23				D6-60084
APR.					1477 Mic 2	
APR					THE BOEING COMPANY	PAGE F-C-137



1

ANALYSIS VARIABLES

Bandwidth
5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM.		
EWA No. 5592-1	Panel or Specimen No. 1477	
Tape No. 19	Tape Channel 4	Displacement Pickup # 1
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

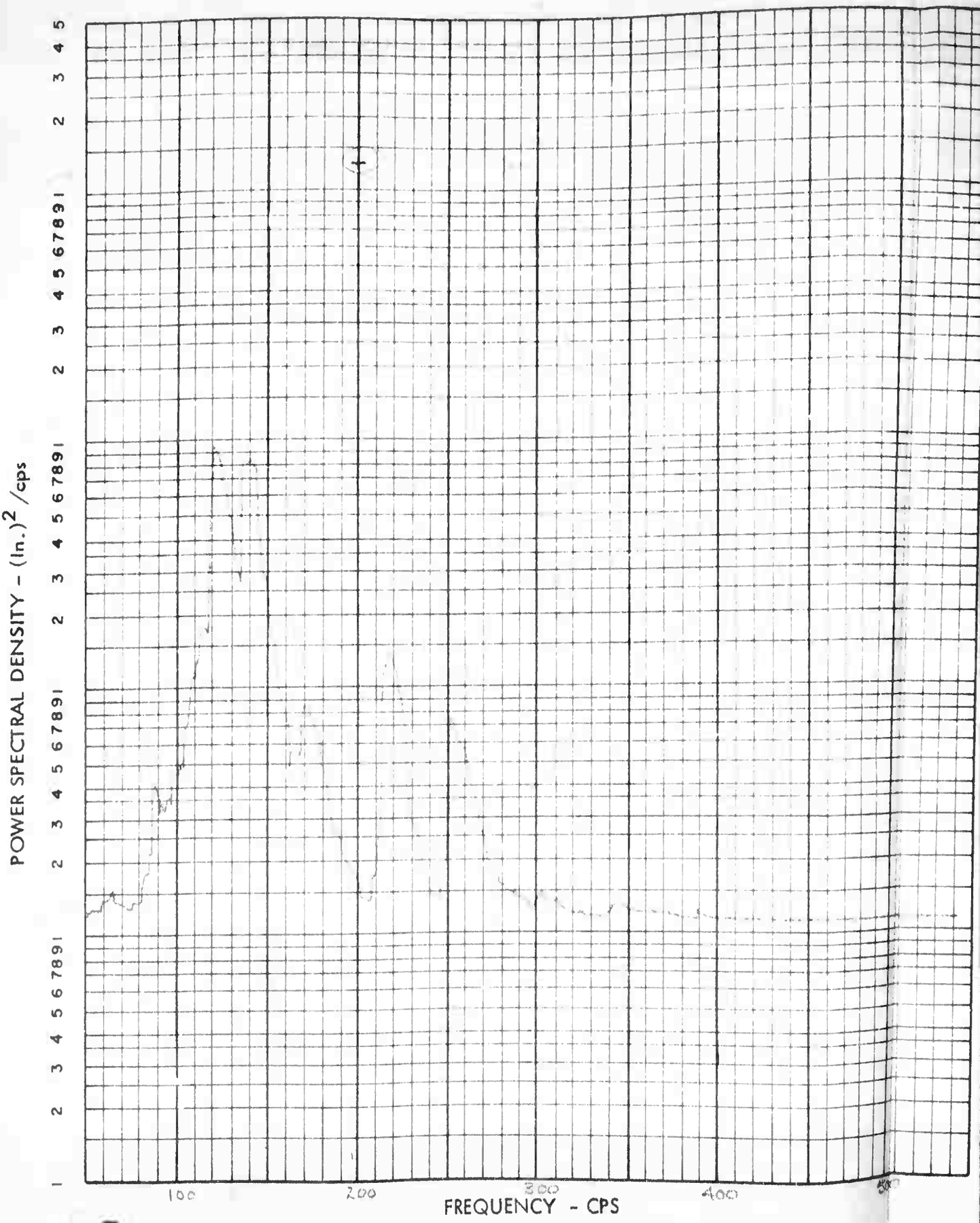
Tape No.	Tape Channel	Data Tape RMS Volt V_R = .450
Calibration Voltage V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 200cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .2		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2	
Displacement Pickup Sensitivity S = .0508 in./Volt		
Equivalent of Calibration - In. $D_c = V_a \cdot S$ = .5 (.0508) = .0254		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = [illegible] = [illegible] $in.^2/cps$		
Analyzer Attenuator Setting +10 db	Log Converter Setting db	
Calibration Plotted at 3.74 E-3 $in.^2/cps$		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = = ____ = psi		

2

500

CALC	[illegible]		REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
CHECK	[illegible]	10-23			1477 P/U 1
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON
APR					

Vol I
D2-30084
PAGE Fig 138



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 1 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

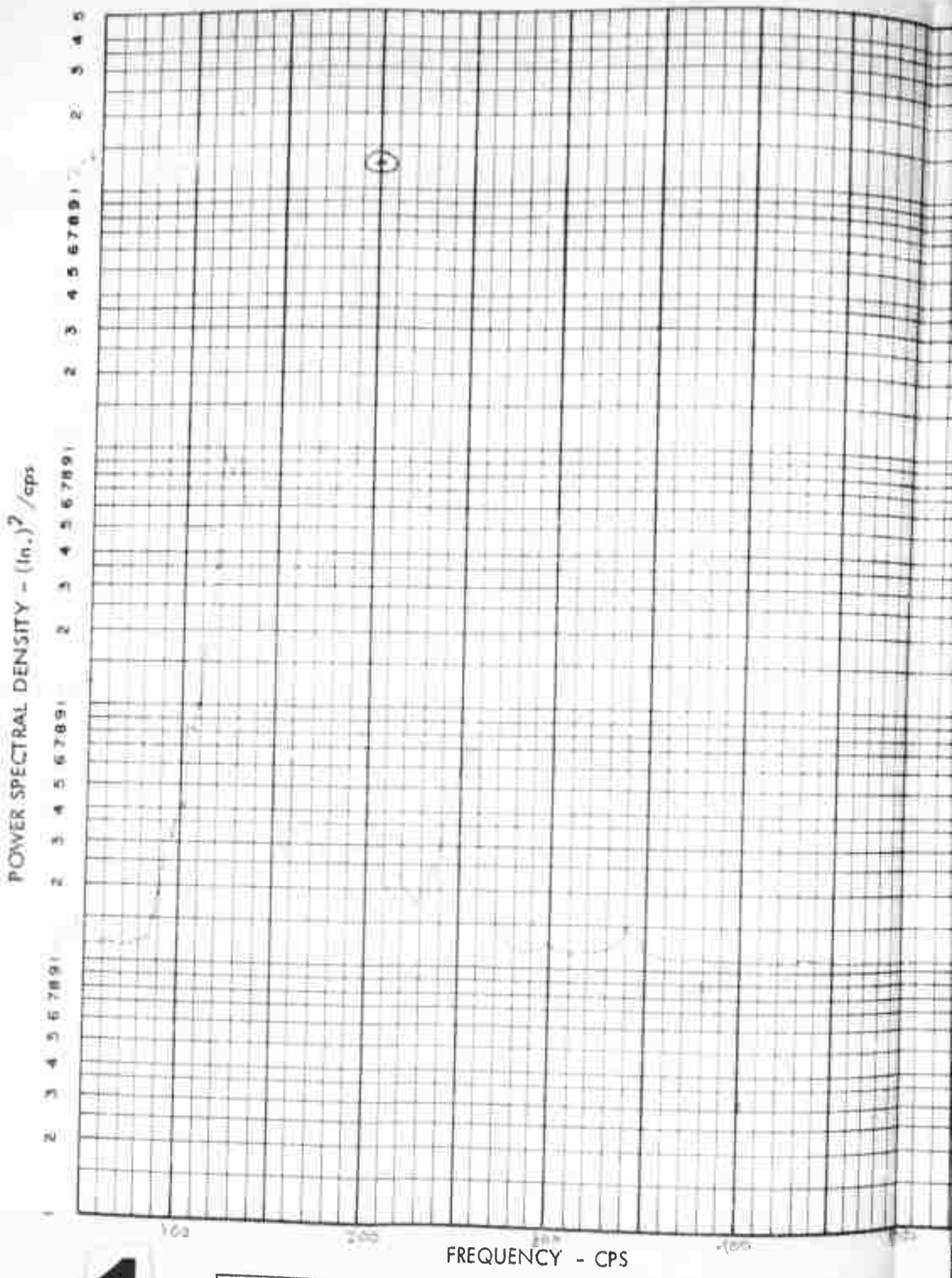
Test Title: PANEL ATTACH. TYPE I PRELIM.		
EWA No. 5503-1	Panel or Specimen No. 1477	
Tape No. 19	Tape Channel 5	Displacement Pickup # 5
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No. 19	Tape Channel 1	Data Tape RMS Volt V_R =
Calibration Voltage V_a = 5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape 200 cps		
Line Amplifier Settings For Calibration G_c = .1 ; for Data G_d = .1		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1	
Displacement Pickup Sensitivity S = .0103 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = (.5)(.0103) = .0051		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = [illegible] in.^{2}/cps		
Analyzer Attenuator Setting db	Log Converter Setting db	
Calibration Plotted at in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = = ____ = psi		

2

CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	Vol I
CHECK	RDS	10 L 3				
APR.					1477 P/U 5	L2-80084
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE Fig 139



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_e 4 Sec.

Anal. Rate 1.25 cps/sec.

Loop Length 4 Sec.

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM		
EWA No. 5593-1	Panel or Specimen No. 1477	
Tape No. 19	Tape Channel 6	Displacement Pickup # 6
Elapsed Test Time	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No. 19	Tape Channel 1	Data Tape RMS Volt V_R =

Calibration Voltage
V_a = .5 V_{rms} Into Line Amp.; V_c = .5 V_{rms} on Tape 200 cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1

Displacement Pickup Sensitivity
S = .0708 In./Volt

Equivalent of Calibration - In.
$D_c = V_a \cdot S$ = (.5)(.0708) = .0354

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = (.0354)(.0354) = 1.25 x 10^{-3} in.^{2}/cps

Analyzer Attenuator Setting 10 db	Log Converter Setting 4 db

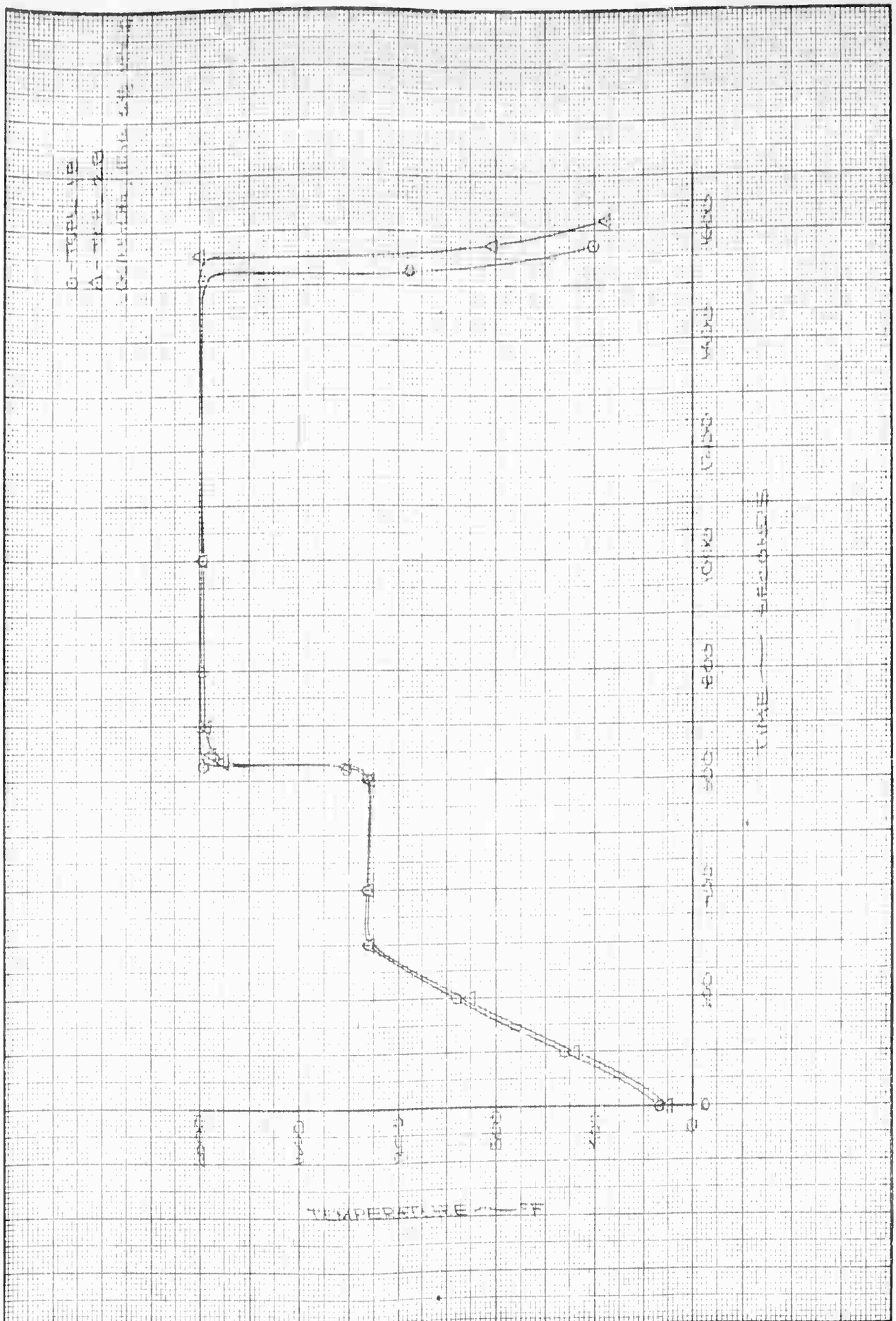
Calibration Plotted at 1.25 x 10^{-3} In.^{2}/cps

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ =

= _____ = psi

2

CALC	R E [illegible]	[illegible]	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	Vol I
CHECK	RDS	10-2-3				D2-80004
APR.					1477 P/U 6	
APR.					THE BOEING COMPANY SEATTLE 24, WASHINGTON	PAGE FIG 140



CALC			REVISED	DATE
CHECK				
APR				
APR				

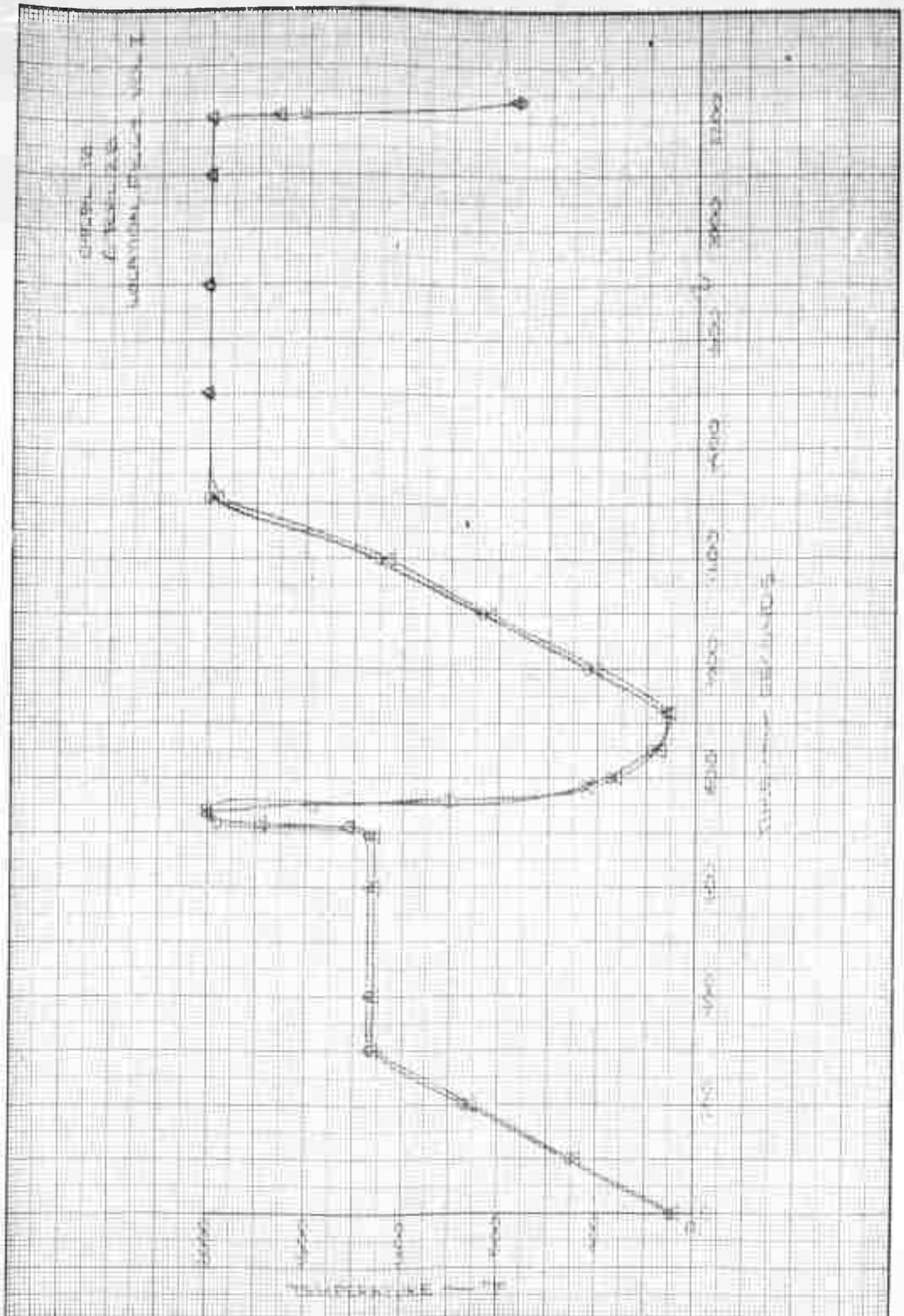
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

D2-80084

PAGE Fig 141

BAC 461 C-R4

K+E ALBANENE 1951 60629



			REVISED	DATE
CALC				
CHECK				
APP				
APR				

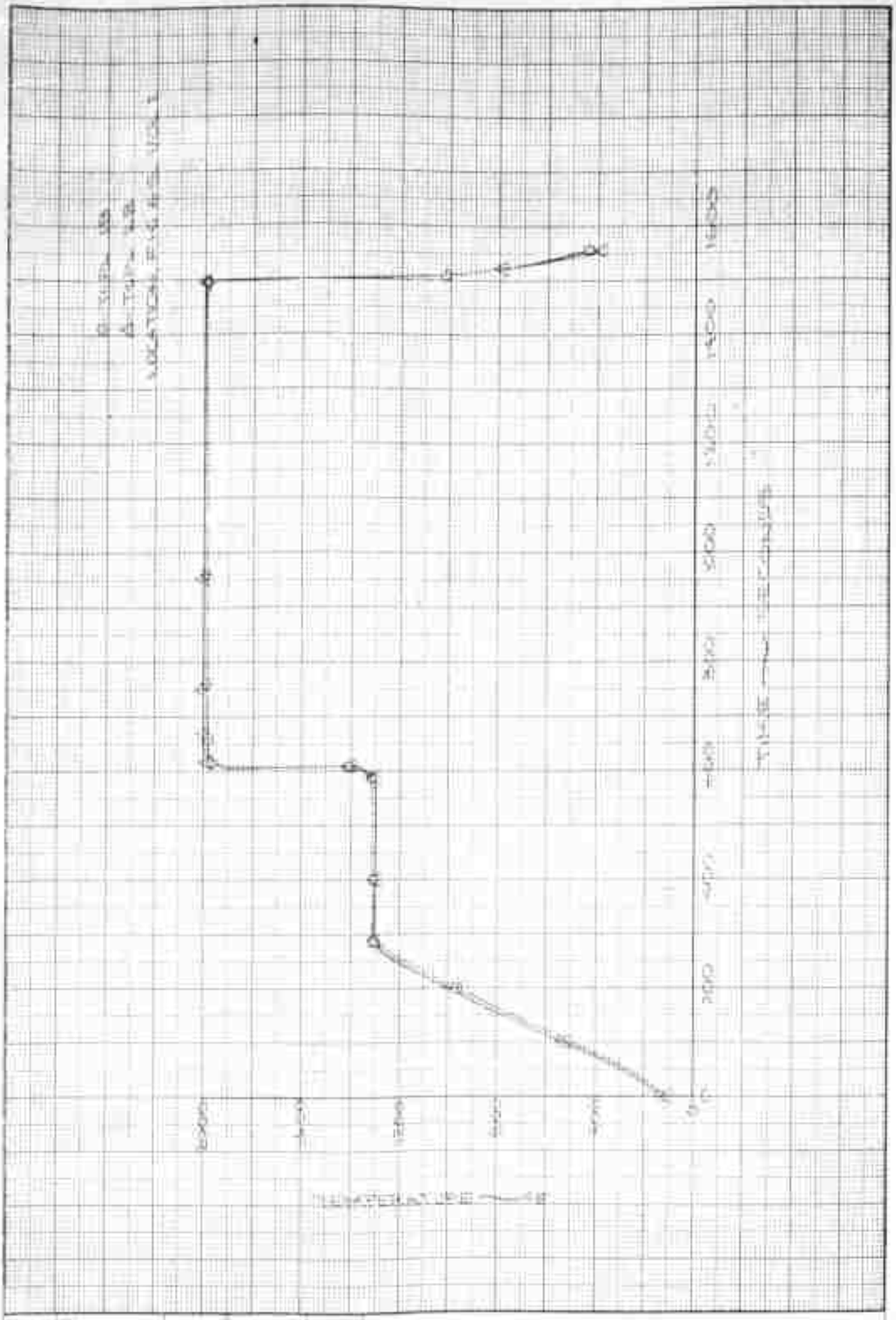
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

DZ-80084

PAGE

BAC 461 C-R4

ΚΔΣ ALBANENE 1951 TRACING PAPER 60629



			REVISED	DATE
CALC				
CHECK				
APP				
APP				

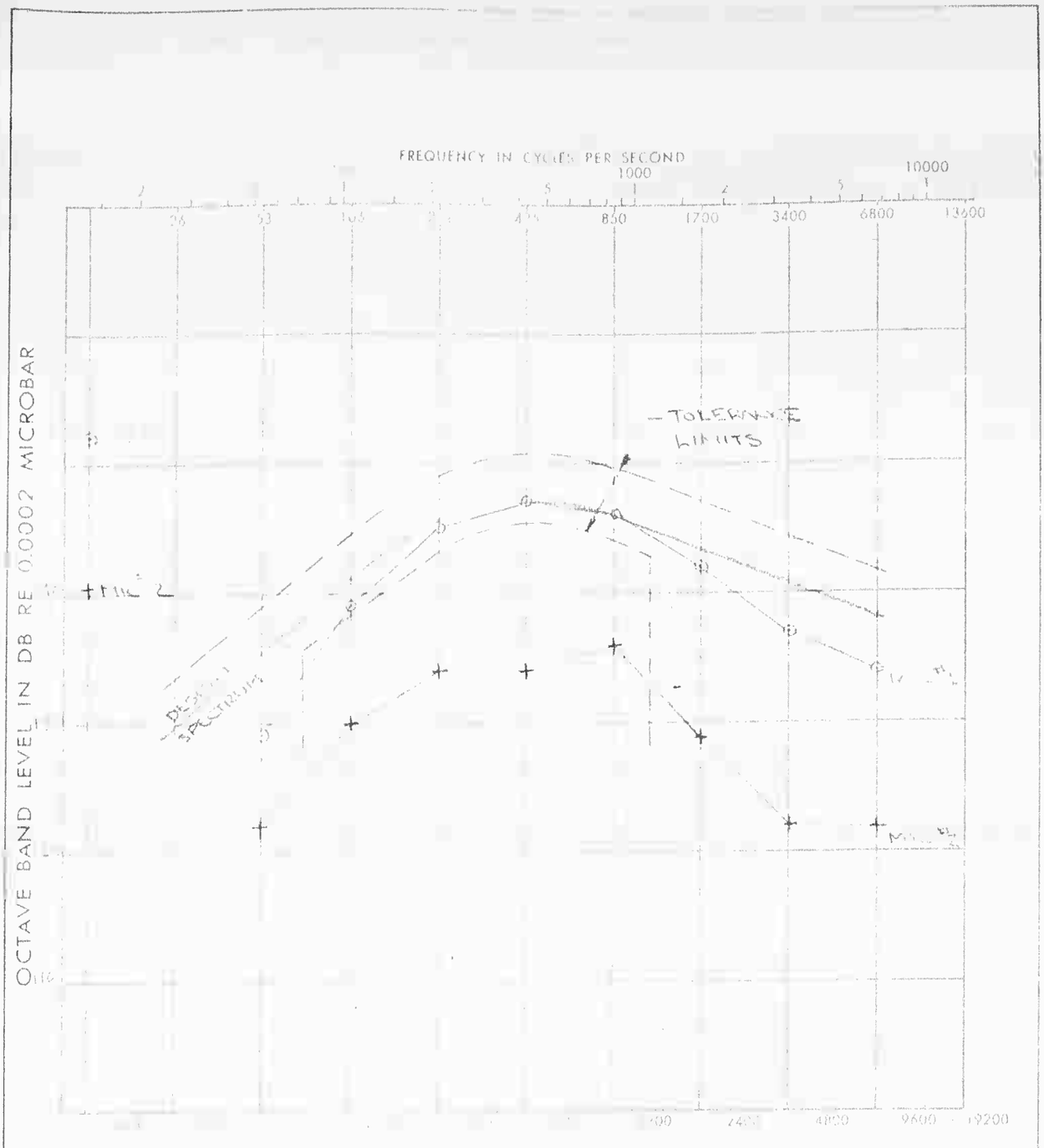
D2-80084

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3AC 461 C-R4

ALBANENE 1951 RACING PAPER

60629

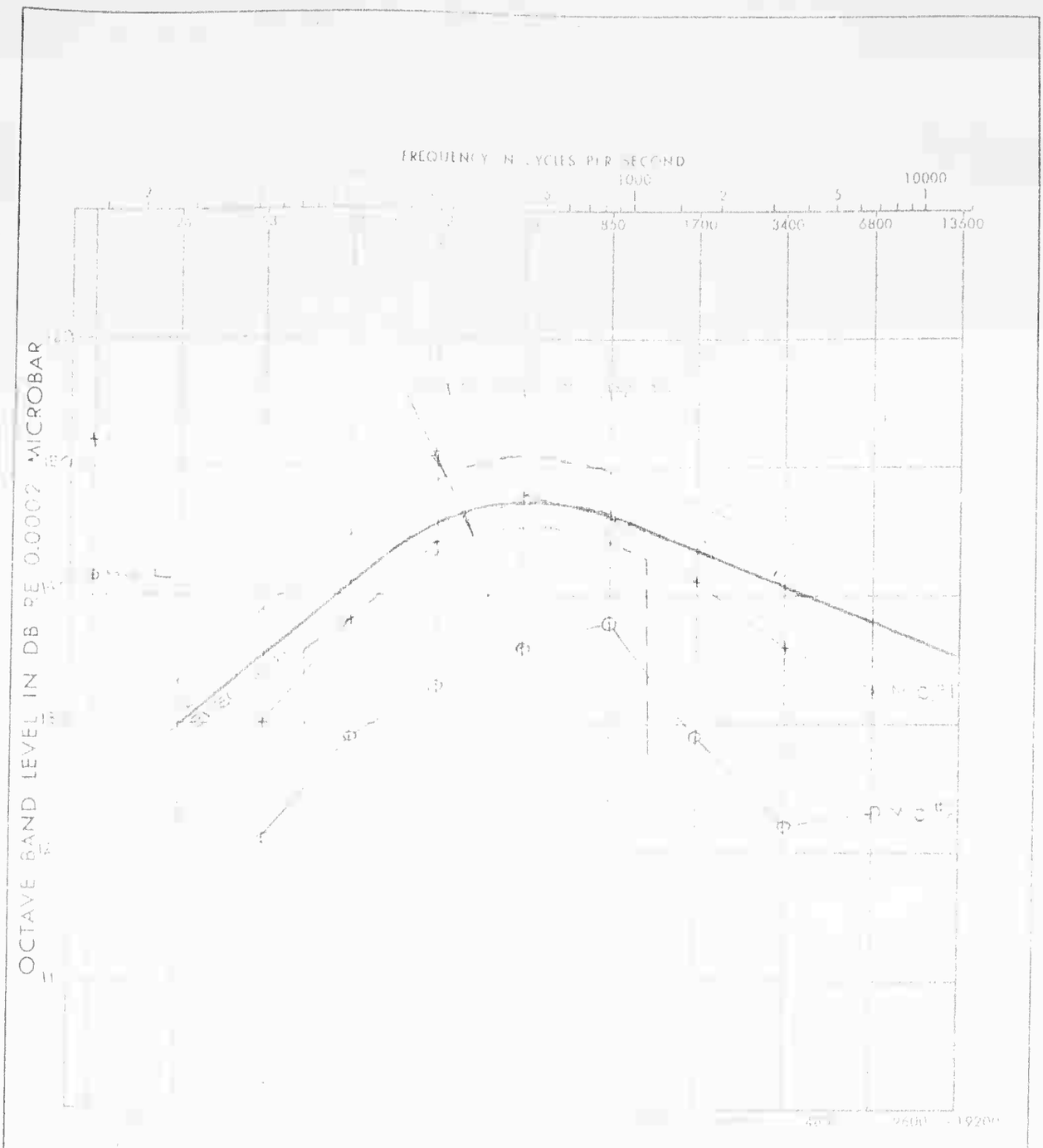


PANEL # 1477 SOUND SPECTRUM
AT [illegible]° HEAT TEST
BEFORE 55 MIN. TEST
EWA 5593-1 12-22-60

Vol I

BOEING NO D2-80084

PAGE Fig 144



OCTAVE PASS BAND

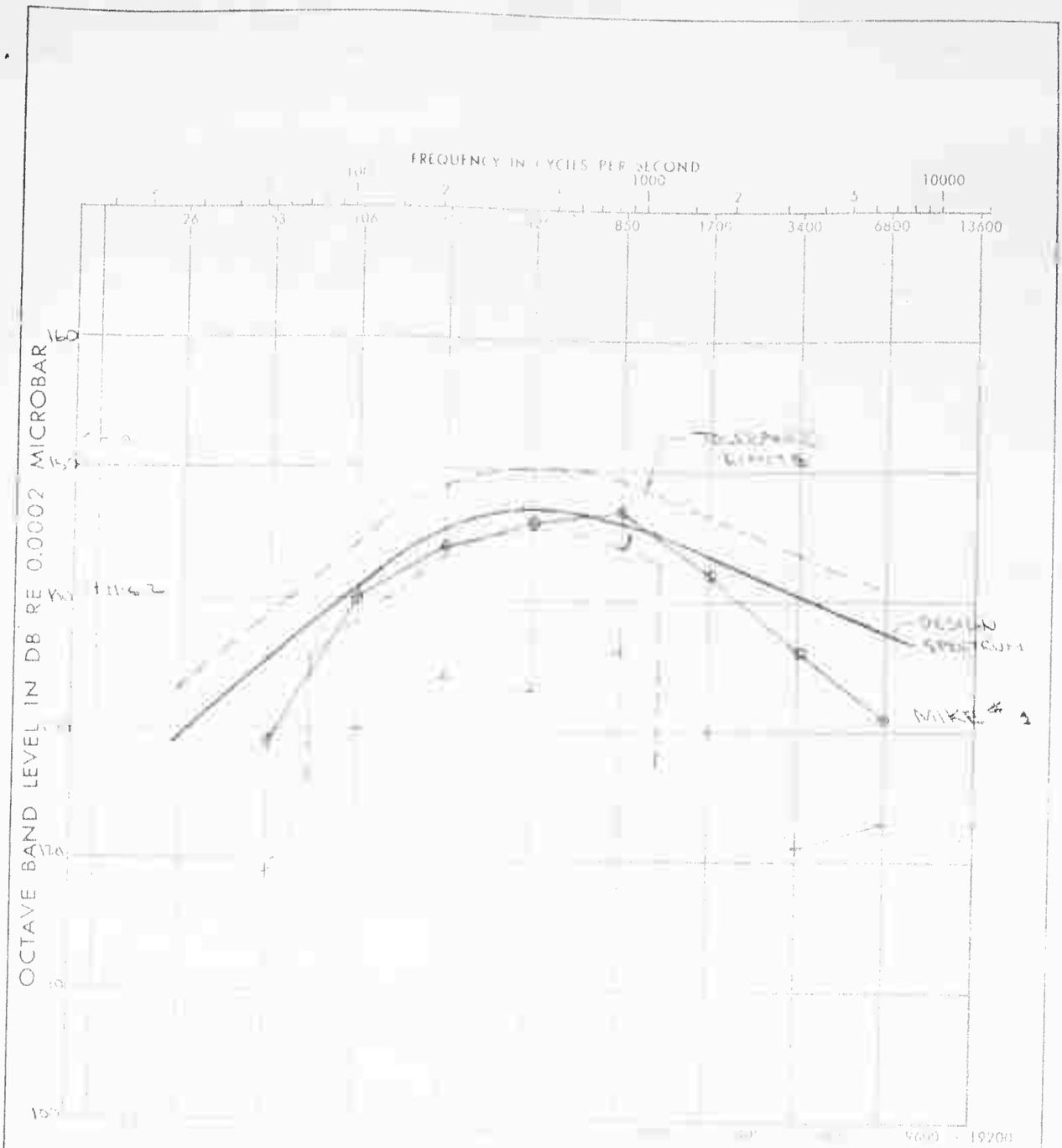
20	15
75	150
150	19
600	15
2400	
4800	

PANEL # 1478 SOUND SPECTRUM
AFTER 2000 HEAT TEST
BEFORE 55
EWA 5593-1

VOL I

BOEING NO D2-80094

PAGE FIG 149



PANEL # 1479 SOUND SPECTRUM
AFTER 2000° HEAT TEST
BEFORE 5C N.M. TEST
S.A. 5573-1
12-20-60

PANEL [illegible]

Total Test Time		Test Time	Event	Mem Reset Point	Load Level	Panel Double Amplitude
Hrs	Min	Min			db	Inches
[illegible]		[illegible]	[illegible]		[illegible]	—
0	5	15	VI		152	—
0	30	25	"		153	—
0	40	26	"		[illegible]	—
1	40					

NO [illegible]

NO NEW FAILURE

" " "

[illegible] LOOSE RIVETS

NO NEW METAL FAILURE

[illegible]

[illegible]

TEST LOG

[illegible]

DSPW 190 db Cell

Vol. 1 D2-80284

Fig 147

EAC 1017 9-5

PANEL No. 1494

Total Test Time		Test Time	Freq.	Horn Chamber Press	Sound Level	Panel Relative Amplitude	Remarks
Hrs	Min	Min.	cps		db	Inches	
0	5	5	RANDOM	3.5	152	—	NO VISIBLE FAILURE
PANEL DESTROYED DURING HEAT LAB PHASE OF TEST							

CH. ENGR	D.E.	5/6/61		DS PANEL 1494 PWA 8593 TEST LOG	DSPW-1490 Cell	VOL I
APR						02-80084
APR						

Fig 148

BAC 1017 R5

PANEL ASSEMBLY 1495

Total Test Time		Test Time	Freq.	Horn Chamber Press	Sound Level	Panel Double Amplitude	mark
Hrs	Min.	Min.	cps		db	Inches	
0	5	5	RANDOM	—	152	—	NO MECHANICAL FAILURES (2/20/61)
0	30	25	"	—	152	—	NO NEW FAILURE
1	00	30	"	—	152		" " "

CAL AP 3/8/61

U.S PANEL 1495
TEST LOG

VOL I
D2-80084

APR

APR

Fig 149

BAC 1817-65

PANEL NO. 1477

Total Test Time		Test Time	Freq.	Ambient Chamber Press	Sound Level	Panel Double Amplitude	
Hrs	Min	Min.	cps		db	Inches	
0	5	5	RANDOM	40	152.	—	NO VISIBLE FAILURES
0	20	15	"	40	152.	—	
0	40	20	"	40	"	—	NO VISIBLE FAILURES
0	60	20	"	40	"	—	
0	60.5	0.5	"	40	151	—	
0	61.0	0.5	"	40	16[illegible]	—	NO VISIBLE FAILURES

CAL CHECK AIR APR	A.B. 5/9/61	D.S. PANEL 1477	DSPW 190 db.	VOL I
		FWA 5-593 TEST LOG		D2-80084
			FT 150	

BAC 1017 (6-5)

PANEL RUN # 1418

Total Test Time		Test Time	Freq.	Horn Chamber Press	Sound Level	Panel Trouble Area/Rad.	
Hrs	Min.	Min.	c/s	.	db	Inches	
0	05	5	RANDOM	40	152	—	NO VISIBLE FAILURE
0	25	20	RANDOM	40	152	—	LOOSE TAPE FRAME ON CIRCUMFERENCE LOOSE FIBER TRAY ON CORRUGATION
0	45	20	RANDOM	40	152	—	LOOSE FIBER TRAY ON CORRUGATION
0	60	15	RANDOM	40	152		
0	60.5	0.5	RANDOM	40	151		NO CHANGE
0	61.0	0.5	RANDOM	40	162		NO CHANGE

CAPT. [illegible] DC-1 Flight 1418 Dsn Vol I

CHIEF [illegible] AVA [illegible] 1418 ~ TEST LOG Cell DZ-80084

AFR

AFR

Fig 151

35

NAC 1017 R3

PANEL NUMBER 1499

Total Test Time		Test Time	Freq.	Horn Chamber Press	Sound Level	Panel Double Amplitude	
Hrs	Min.	Min.	cps		db	Inches	
		5	RANDOM	—	152	—	NO VISIBLE FAILURE
		5	RANDOM	40	152	—	LOOSE FIBER FRAX ON CORRUGATION
0	10	15	"	40	152	—	LOOSE FIBER FRAX ON CORRUGATIONS
0	25	20	"	40	152	—	LOOSE FIBER FRAX ON CORRUGATIONS
0	45	15	"	40	152	—	LOOSE FIBER FRAX ON CORRUGATION
0	60						
0	60.5	0.5	RANDOM	40	157	—	LOOSE FIBER FRAX ON CORRUGATION
0	61.0	0.5	RANDOM	40	162	—	LOOSE FIBER FRAX ON CORRUGATION

CAL. CHK'K APR APR

A.B. 5/10/61

PANEL 1499

TEST LOG

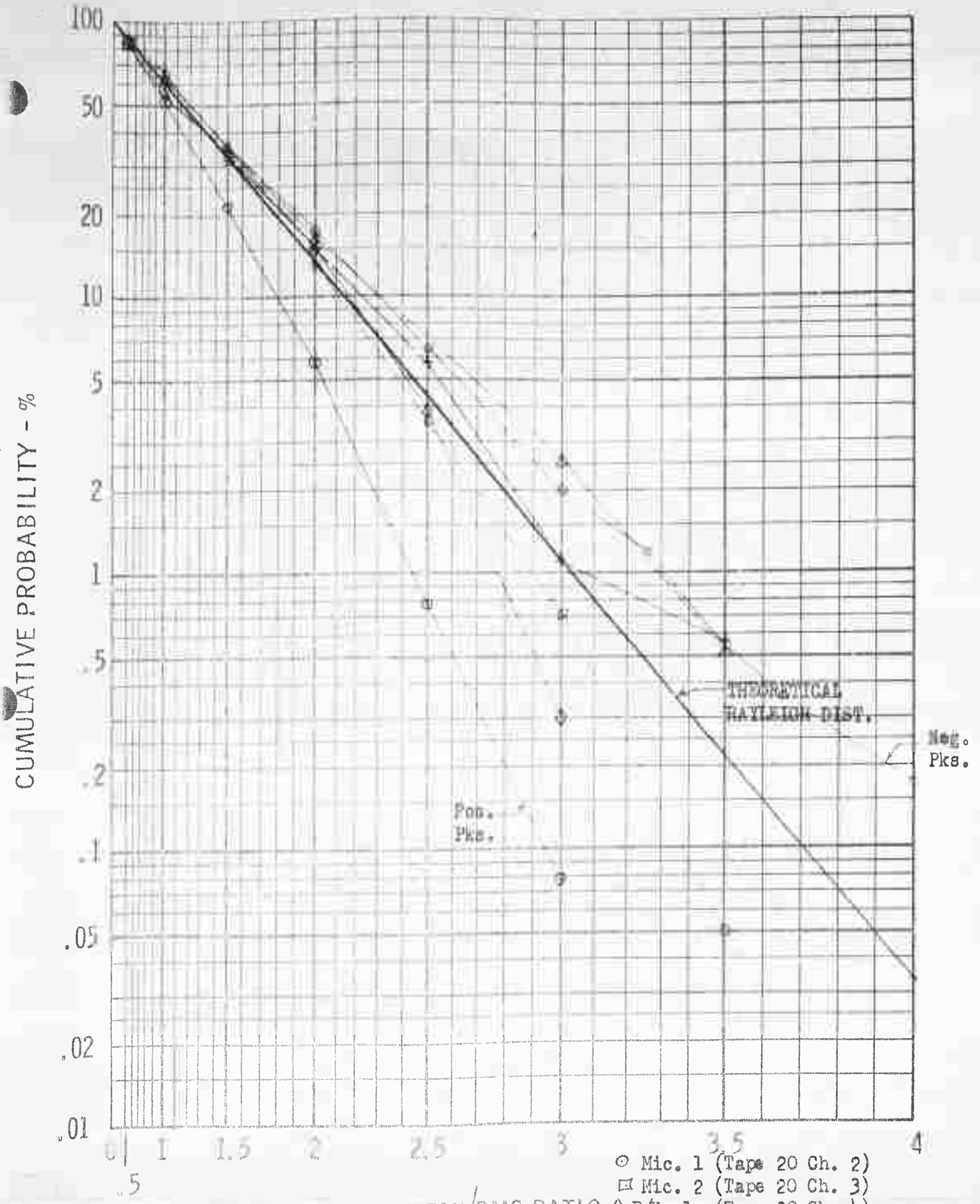
Horn DSPM 14016 Call

FIG 152

VOL I

D2-80084

BAC 1017 R5

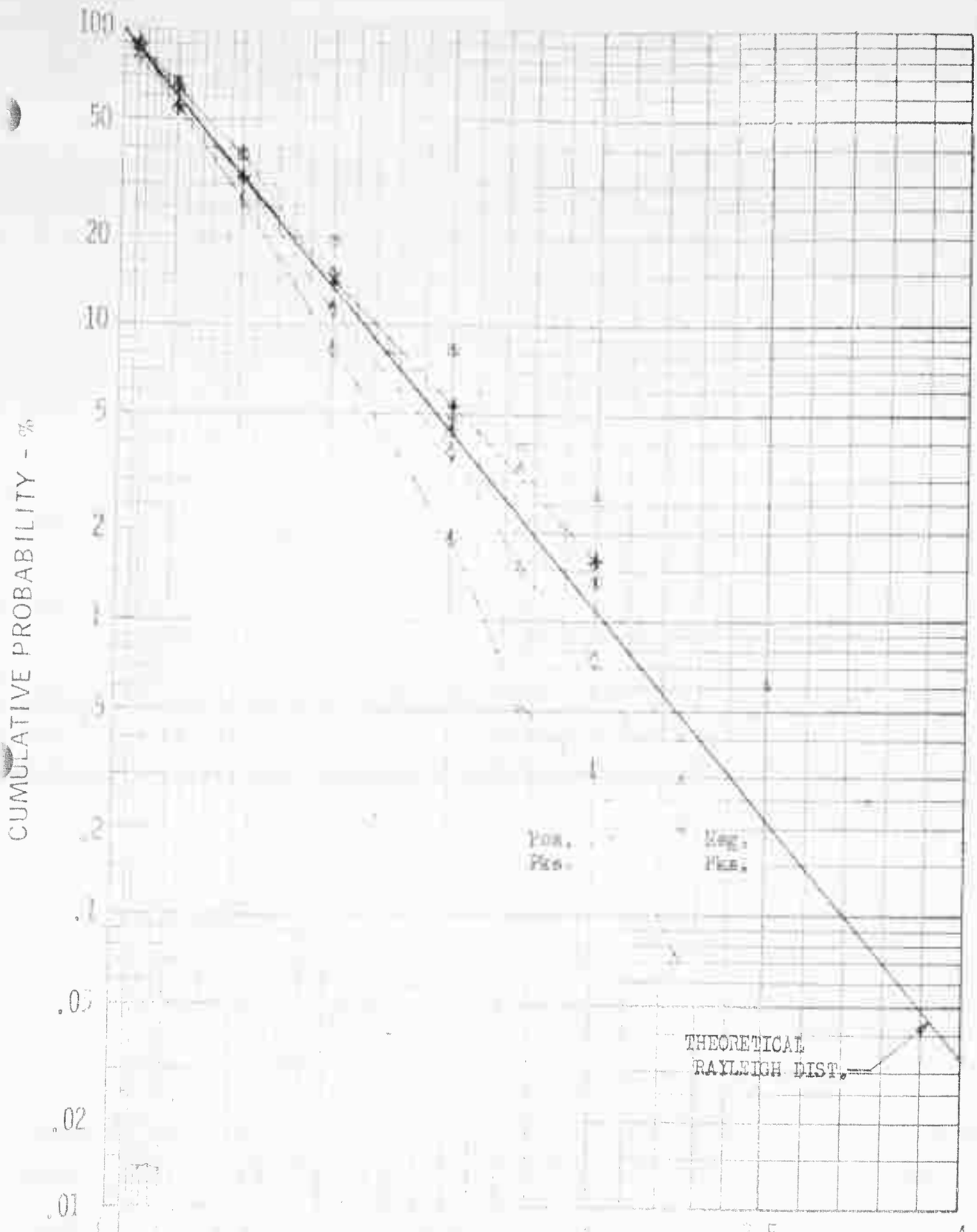


CALC	[illegible]	7-7-1	REVISED	DATE	AMPLITUDE DISTRIBUTION
CHECK	[illegible]	[illegible]			Panel 1493 Phase A
APPD					BOEING AIRPLANE COMPANY
APPD					

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2-7000

2-5353-7-1



◇ Mic. 1 (Tape 21A Ch. 6)
○ Mic. 2 (Tape 21A Ch. 2)
+ P/U 1 (Tape 21A Ch. 3)
□ P/U 5 (Tape 21A Ch. 4)
△ P/U 6 (Tape 21A Ch. 5)

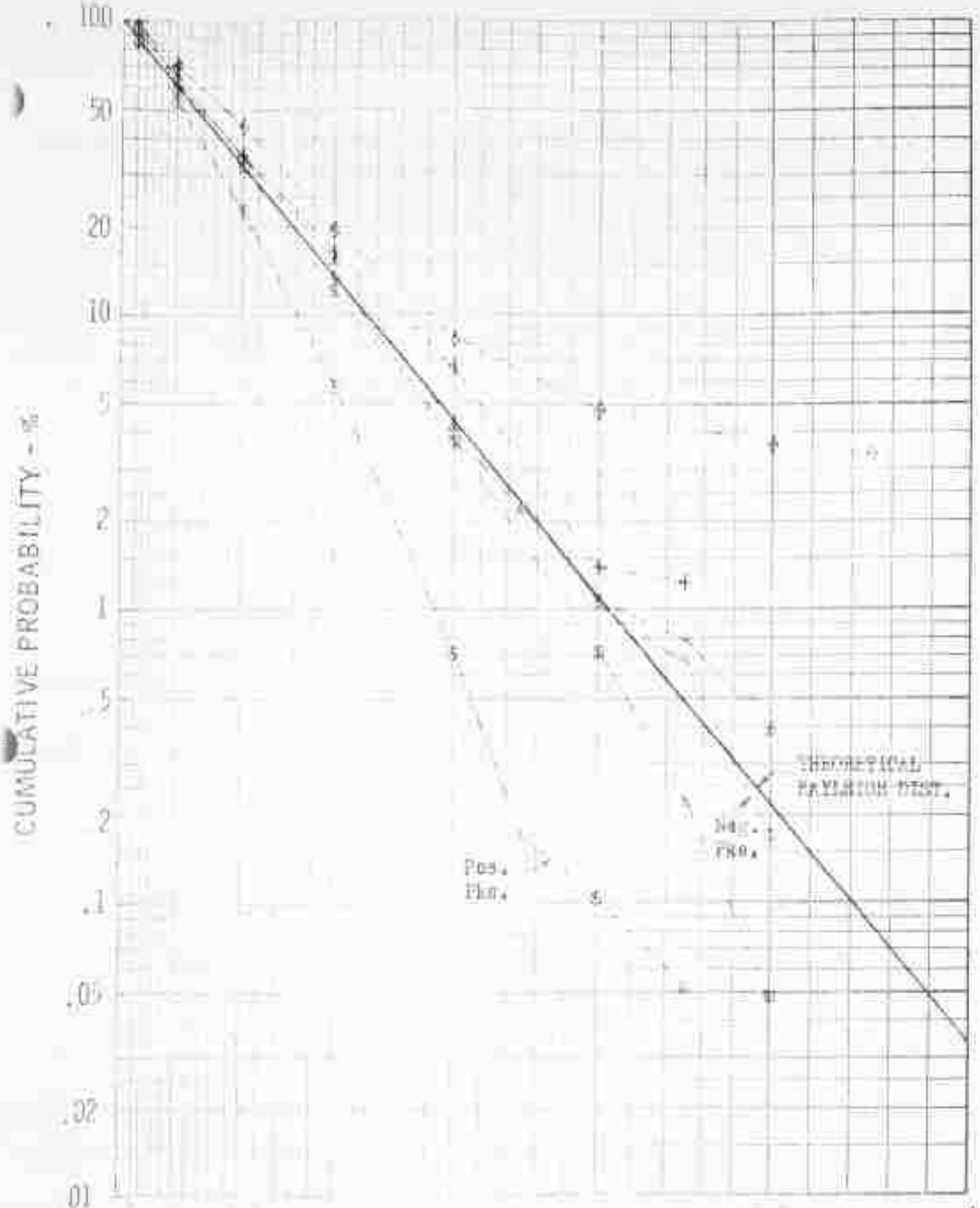
CALC
CHECK
APPD
APPD

AMPLITUDE DISTRIBUTION

Panel 1494 Phase A

AIRPLANE COMPANY

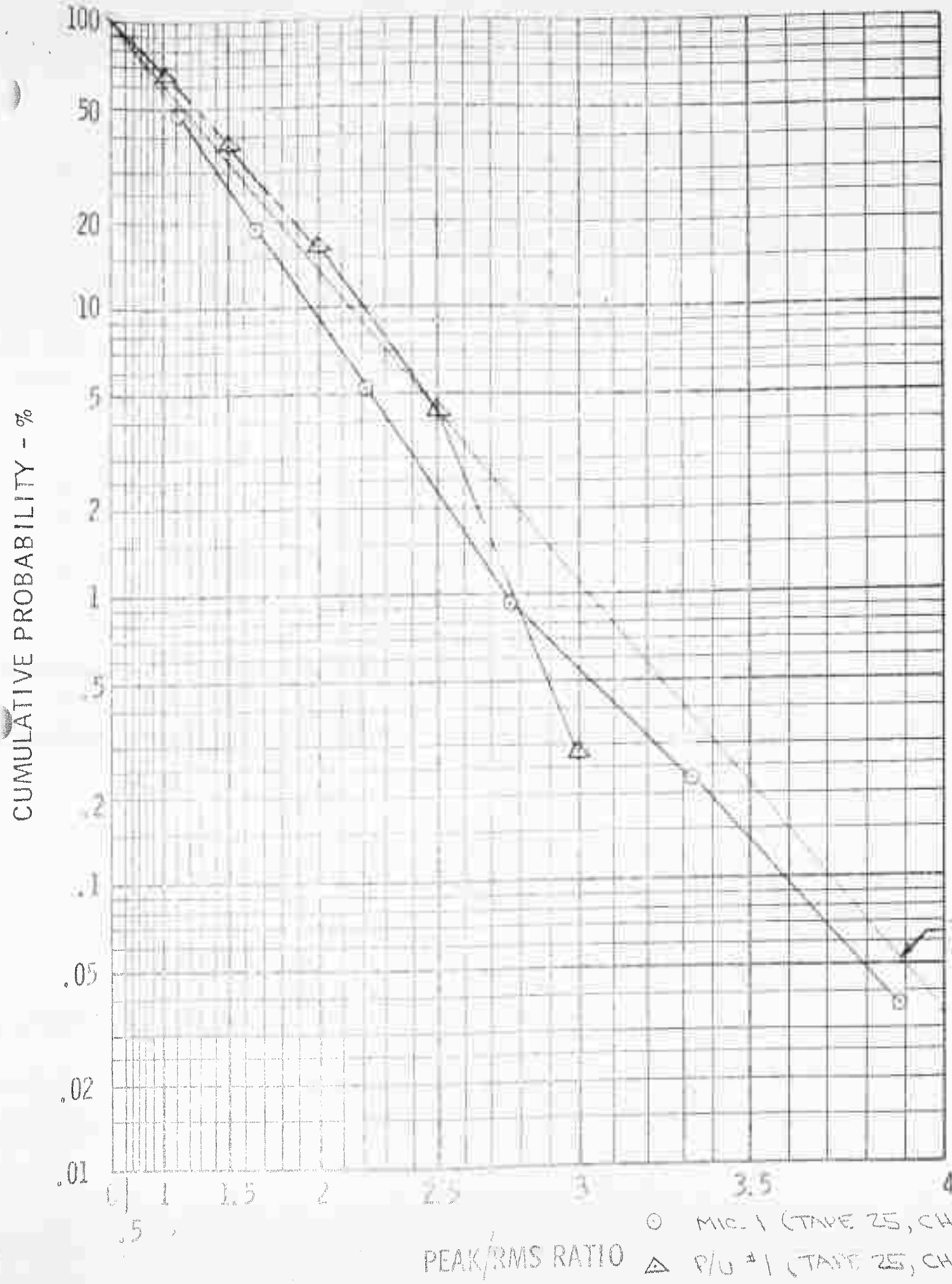
2-5353-7-1



○ Mic. 1(Tape 21 Ch. 2)
△ Mic. 2(Tape 21 Ch. 3)
□ P/L 1(Tape 21 Ch. 4)
◇ P/J 5(Tape 21 Ch. 5)
+ P/U 6 (Tape 21 Ch. 6)

CALC	AMPLITUDE DISTRIBUTION	
CHECK		
APPD	Panel 1495 Phase A	
APPD	BOEING AIRPLANE COMPANY	

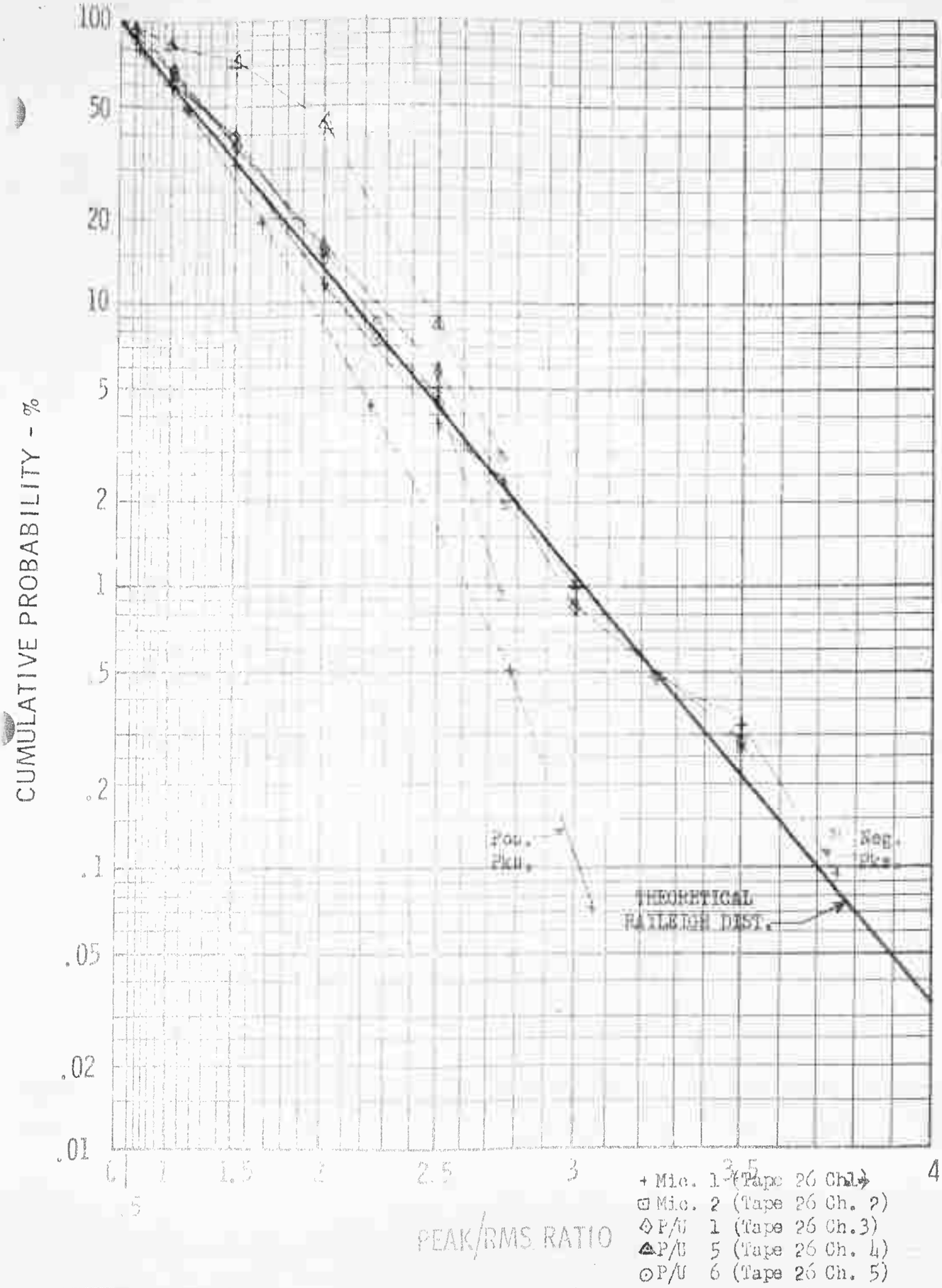
2-5353-7-1



CALC		REVISED	DATE	AMPLITUDE DISTRIBUTIONS	Vol. I
CHECK				PANEL 1495 PHASE B	D2-80024
APPD				BOEING AIRPLANE COMPANY	PAGE FIG 156
APPD					

2-7000

2-5353-7-1



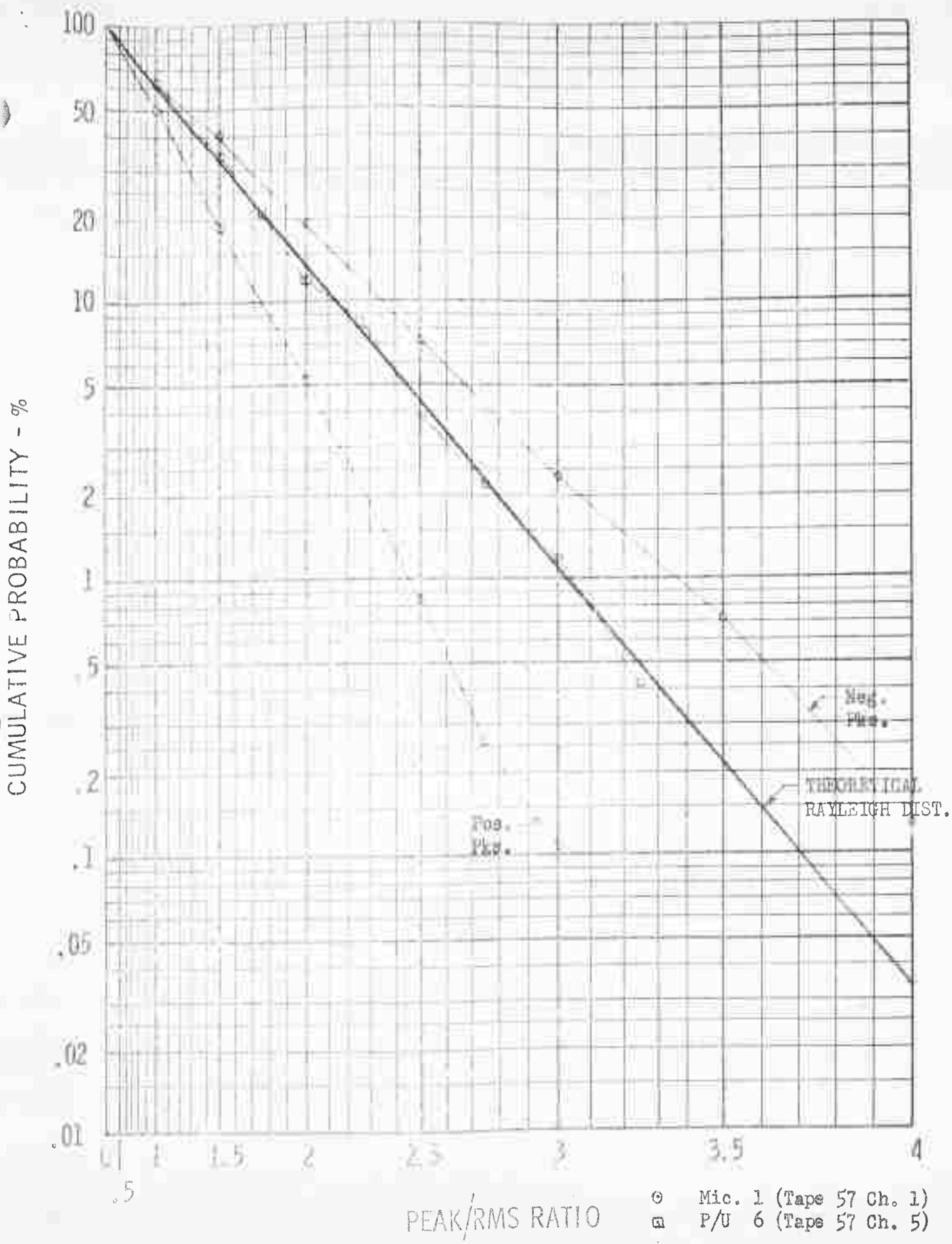
CALC		REVISED DATE	AMPLITUDE DISTRIBUTION
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APPD			BOEING AIRPLANE COMPANY
APPD			

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2-7000



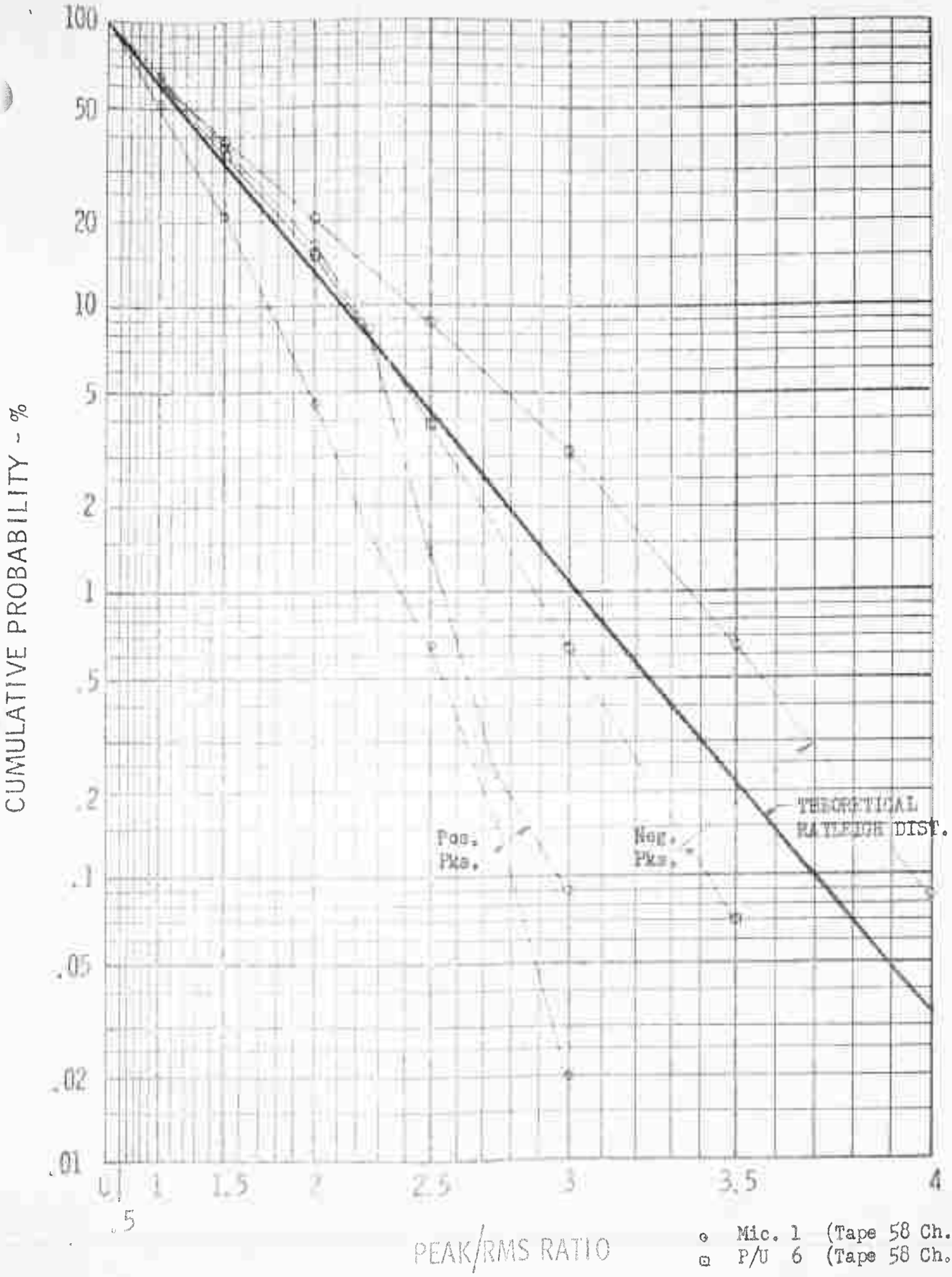
⊙ Mic. 1 (Tape 57 Ch. 1)
⊡ P/U 6 (Tape 57 Ch. 5)

CALC	REVISED	DATE	AMPLITUDE DISTRIBUTION
CHECK			Panel 1497 Phase C
APPD			BOEING AIRPLANE COMPANY
APPD			

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PAGE F-a 158

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○ Mic. 1 (Tape 58 Ch. 1)
□ P/U 6 (Tape 58 Ch. 5)

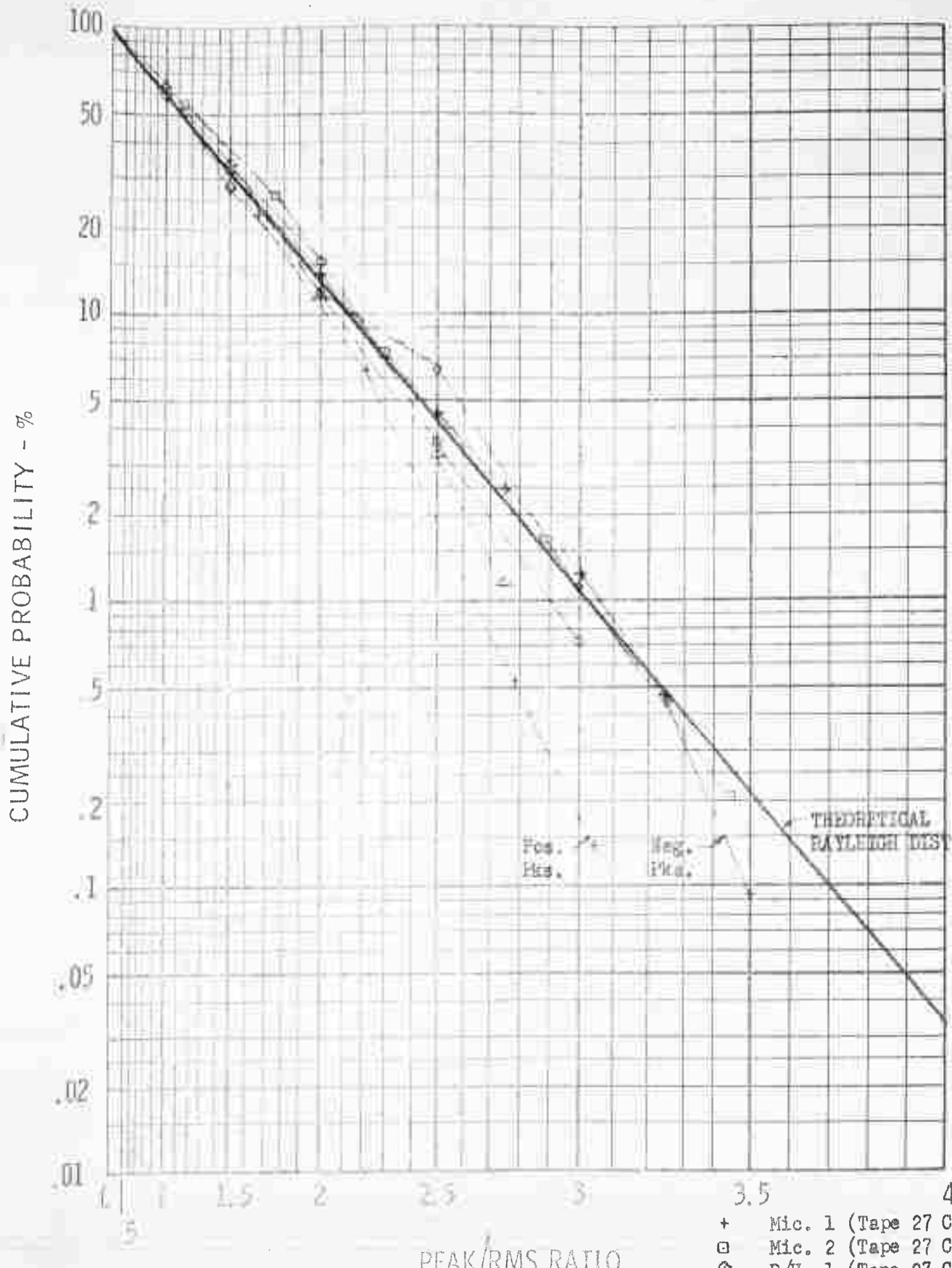
CALC	DCA		REVISED	DATE	AMPLITUDE DISTRIBUTION
CHECK					Panel 1497 Phase D
APPD					BOEING AIRPLANE COMPANY
APPD					

D2-90054

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CALC	SKA	REVISED	DATE
CHECK			
APPD			
APPD			

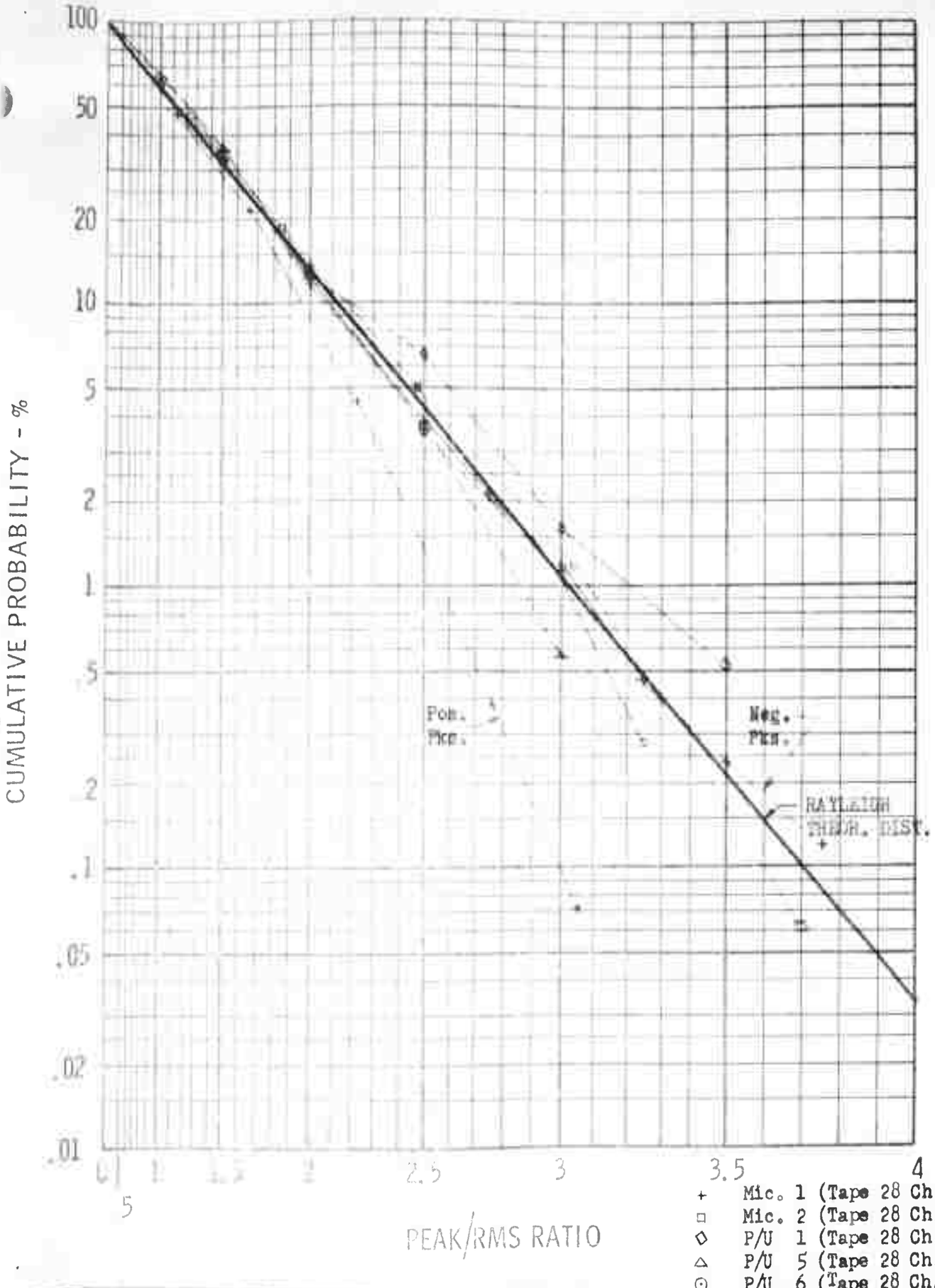
AMPLITUDE DISTRIBUTION

Panel 1498 Phase A

BOEING AIRPLANE COMPANY

2-7000

2-5353-7-1



+ Mic. 1 (Tape 28 Ch. 1)
□ Mic. 2 (Tape 28 Ch. 2)
◇ P/U 1 (Tape 28 Ch. 3)
△ P/U 5 (Tape 28 Ch. 4)
⊙ P/U 6 (Tape 28 Ch. 5)

AMPLITUDE DISTRIBUTION

Panel 1499 Phase A

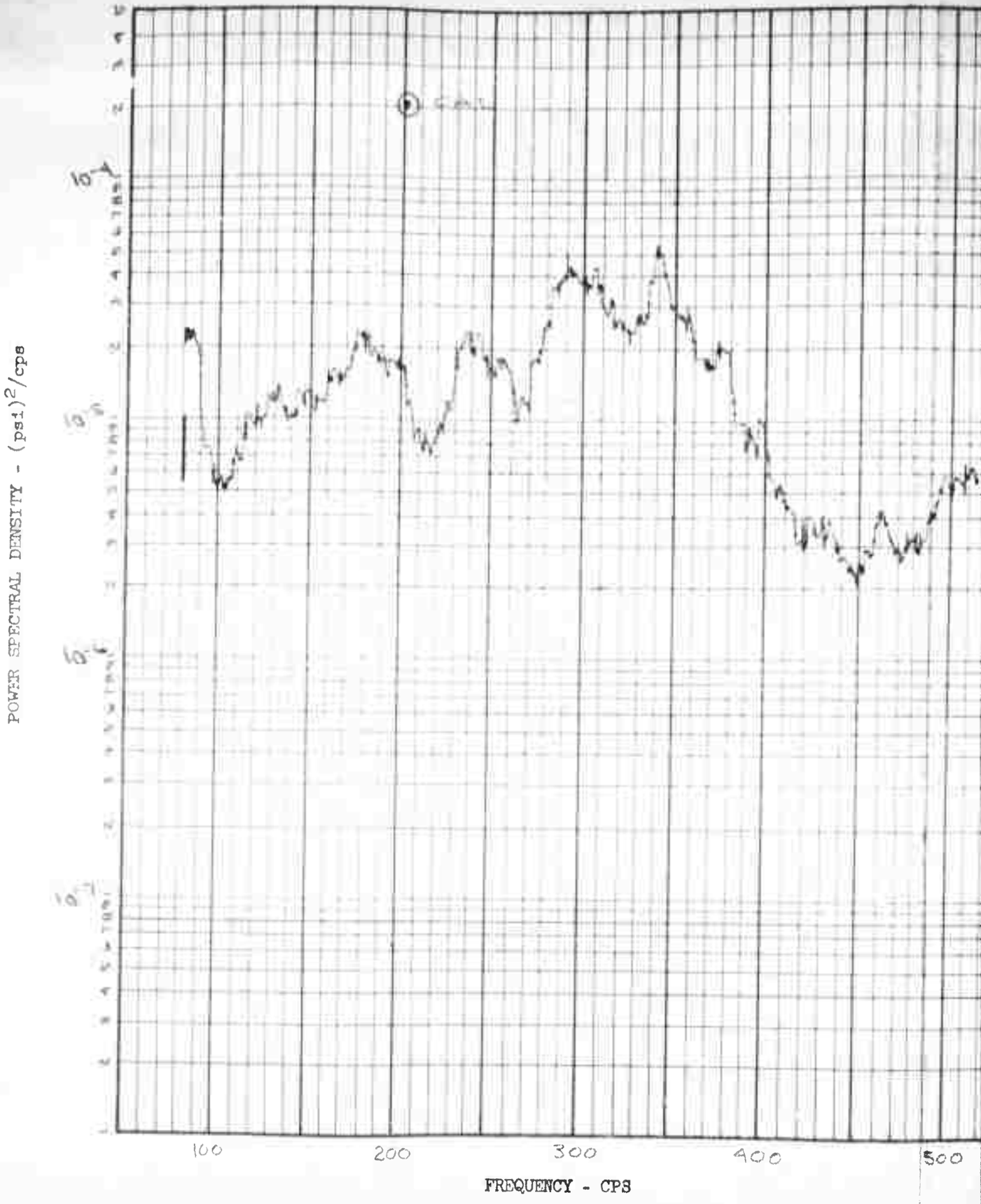
BOEING AIRPLANE COMPANY

Vol. I-593

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2-7000

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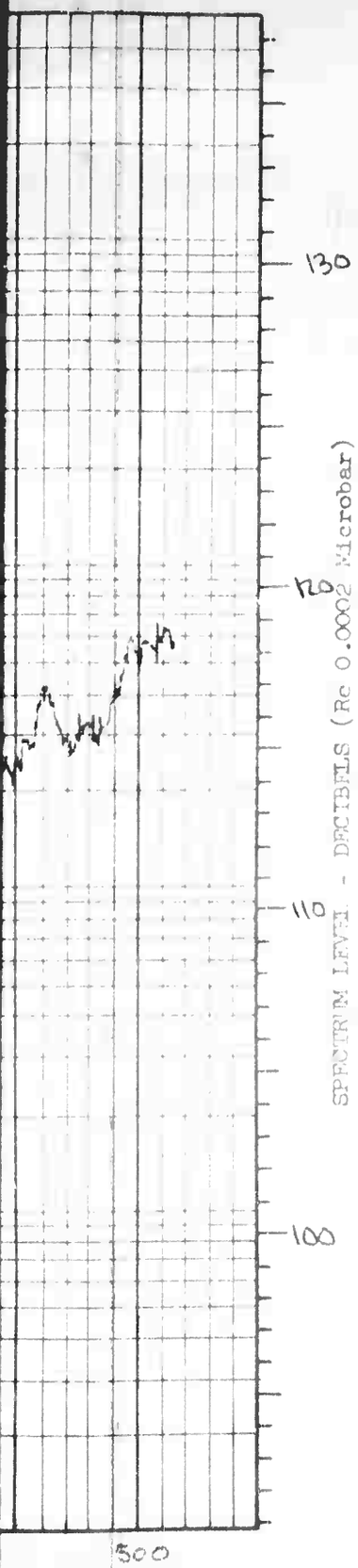
ANALYSIS VARIABLES

Bandwidth

5 cycles from 80 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CALC	
CHECK	
APR	
APR	



DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM.		
EWA No.: 5-593	Panel or Specimen No.: 1493	
Tape No.: 20	Tape Channel: 2	Mic. No.: 1
Elapsed Test Time: +5 MIN.	Mic. RMS Level at Sonic Lab.: V_L = .415 Volts	

CALIBRATION

Tape No.: 20	Tape Channel: 1	Data Tape RMS Volt: V_R = 400

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .50 V_{rms} on Tape @200cps

Line Amplifier Settings
For Calibration G_c = .100 ; for Data G_d = .100

Lab. Gain: LG = 10	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = 1.0

Microphone Sensitivity
S = .290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = .145

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{(1)(10)}\right]^2 = 2.1 \times 10^{-2}$ psi^2/cps

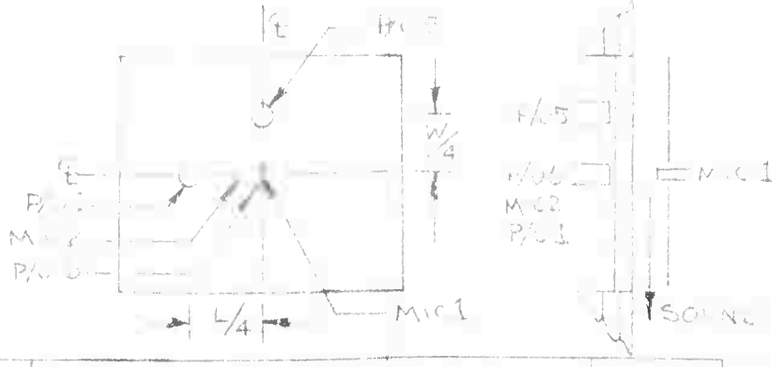
Analyzer Attenuator Setting: -20 db	Log Converter Setting: 0 db

Calibration Plotted at $2.1(10^{-4})$ psi^2/cps

Overall Pressure Level Data — Equiv. to 152.3 db SPL

RMS pressure level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$

$= \frac{(.145)(400)}{(10)(10)(.5)} = .116$ psi

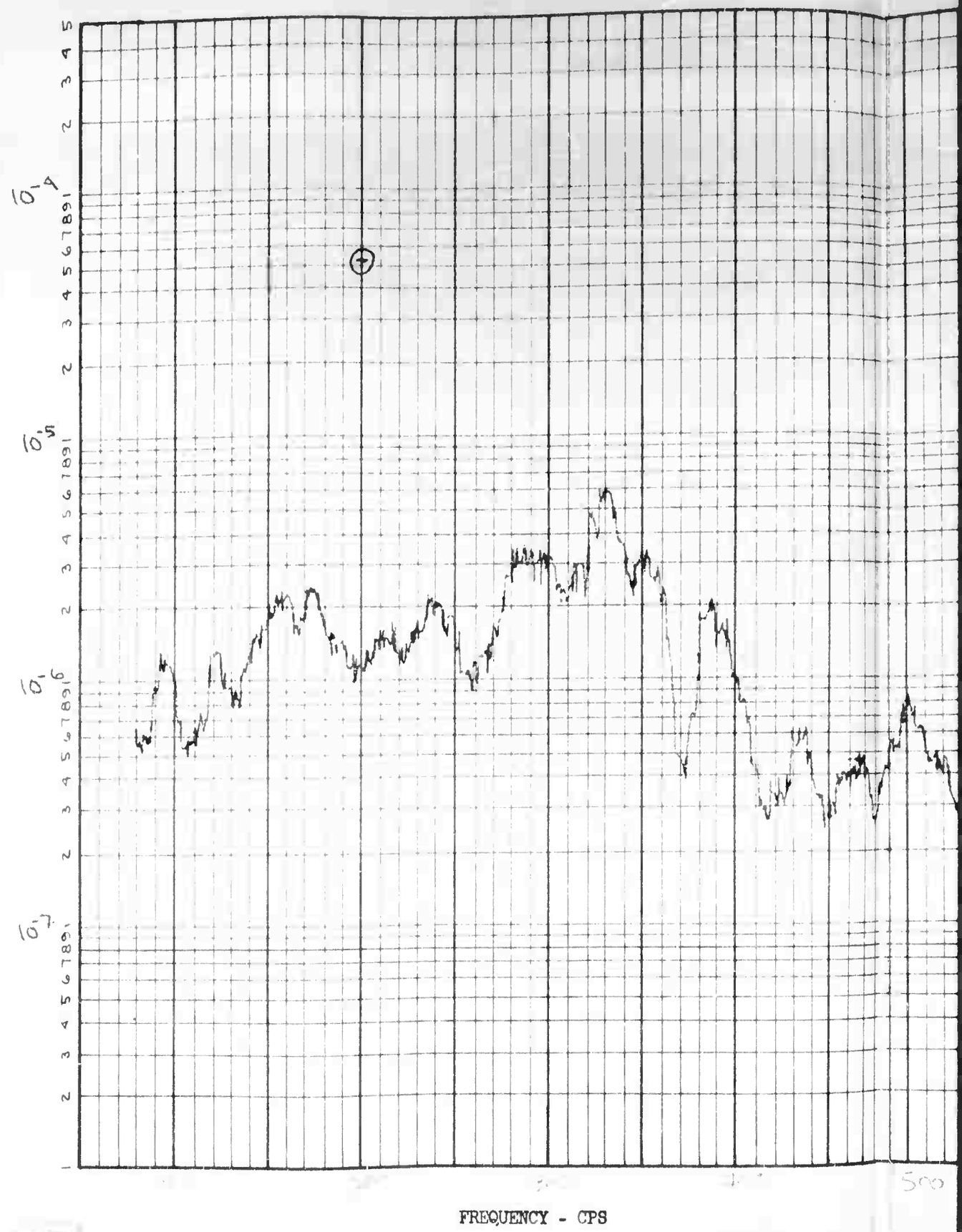


2

CALC	[illegible]	6/22/61	REVISED	DATE
CHECK	C.B.T.	6/22/61		
APR.				
APR.				

POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT
5 MIN TEST
MIC 1 PANEL 1493 PHASE A
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

VOL I
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PAGE FIG 162



1

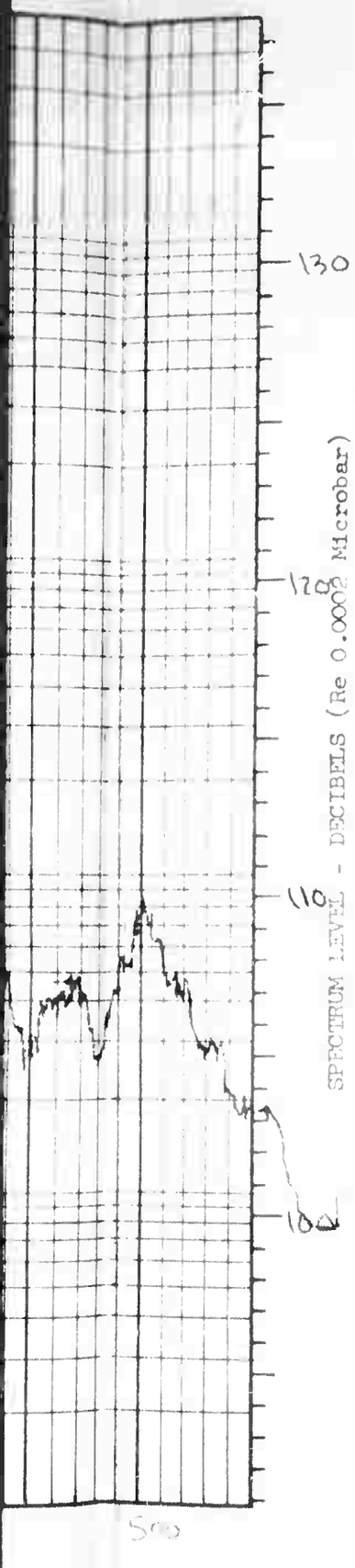
ANALYSIS VARIABLES

Bandwidth

5 cycles from 80 to 551 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CALC	C.T.
CHECK	SOA
APR.	
APR	

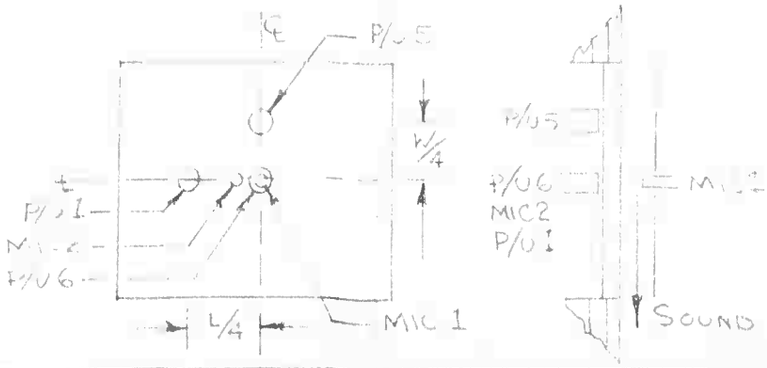


DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: SEG:	Panel or Specimen No.: 1493	
Tape No.: 20	Tape Channel: 3	Mic. No.: 2
Elapsed Test Time: +5 MIN	Mic. RMS Level at Sonic Lab. V_L = .115 Volts	

CALIBRATION

Tape No.: 20	Tape Channel: 1	Data Tape RMS Volt V_R = .212
Calibration Voltage: V_a = .5 V_{rms} into Line Amp.; V_c = .50 V_{rms} on Tape @ 200cps		
Line Amplifier Settings: For Calibration G_c = .100 ; for Data G_d = .200		
Lab. Gain: LG = 10	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = 2	
Microphone Sensitivity: S = .290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi: $P_c = V_a \cdot S$ = .145		
Equivalent of Calibration for PSD Plots: $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{1}\right]^2 \cdot 5.25\ (10^{-3})$ psi²/cps		
Analyzer Attenuator Setting: −25 db	Log Converter Setting: 0 db	
Calibration Plotted at: 5.25 (10^{-3}) psi²/cps		
Overall Pressure Level Data: RMS pressure level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.145)(.212)}{(2)(1)(.5)} = .0307$ psi	Equiv. to 140.5db SPL	

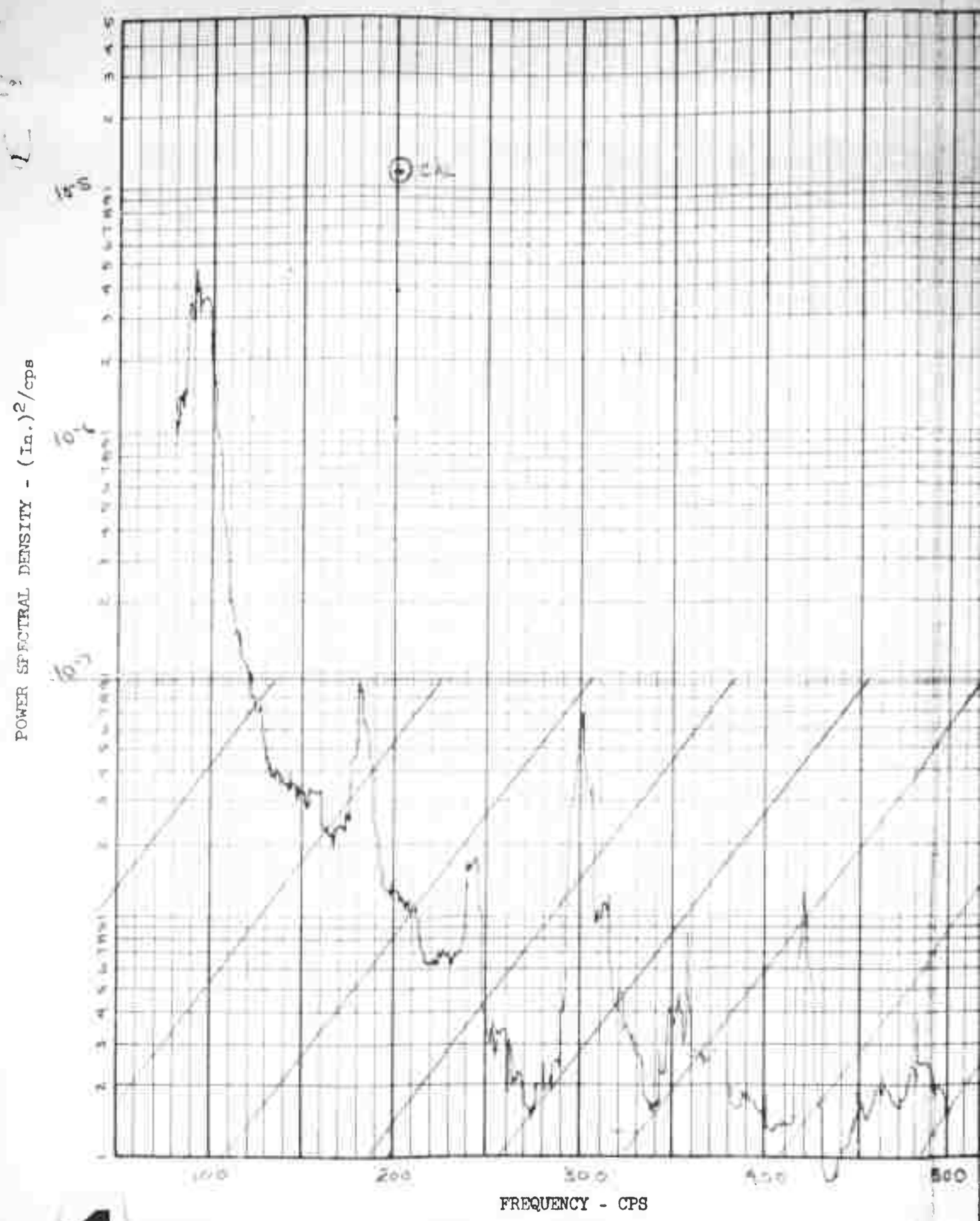


2

CALC	C.T.	6/2/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT 5 MIN TEST
CHECK	SOA	6/23/61			MIC 2 PANEL 1493 PHASE A
APR.					BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
APR					

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D-5353-7-3



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 80 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CALC
CHECK
APR
APR

DATA IDENTIFICATION

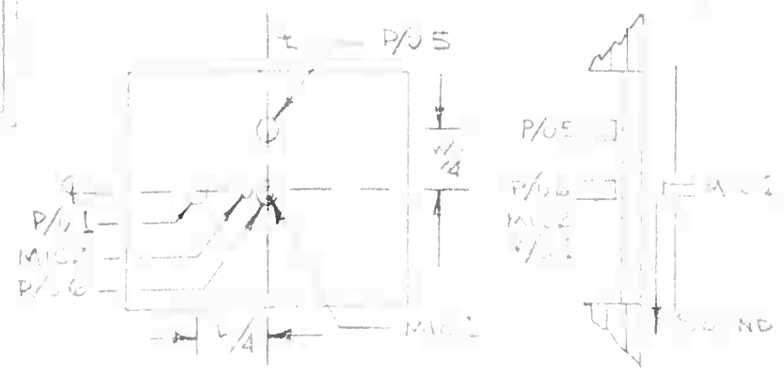
Test Title		
PANEL ATTACH. TYPE I PRELIM.		
EWA No. C-593	Panel or Specimen No. 1493	
Tape No. 20	Tape Channel 4	Displacement Pickup # 1
Elapsed Test Time +5 MIN	P/U RMS Level at Sonic Lab. V_L = .140 Volts	

CALIBRATION

Tape No. 20	Tape Channel 1	Data Tape RMS Volt V_R = .142
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .50 V_{rms} on Tape @ 200cps		
Line Amplifier Settings For Calibration G_c = .100 ; for Data G_d = .100		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0	
Displacement Pickup Sensitivity S = .070 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = .03535		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.03535}{(1.0)(1.0)}\right]^2$ = 1.225×10^{-3} in.^{2}/cps		
Analyzer Attenuator Setting −20 db	Log Converter Setting 0 db	
Calibration Plotted at 1.225×10^{-5} in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0353)(.142)}{(1)(1)(.5)}$ = .0100 in.		

2

FOR FREQUENCIES ABOVE 150 CPS USE PAGE 165



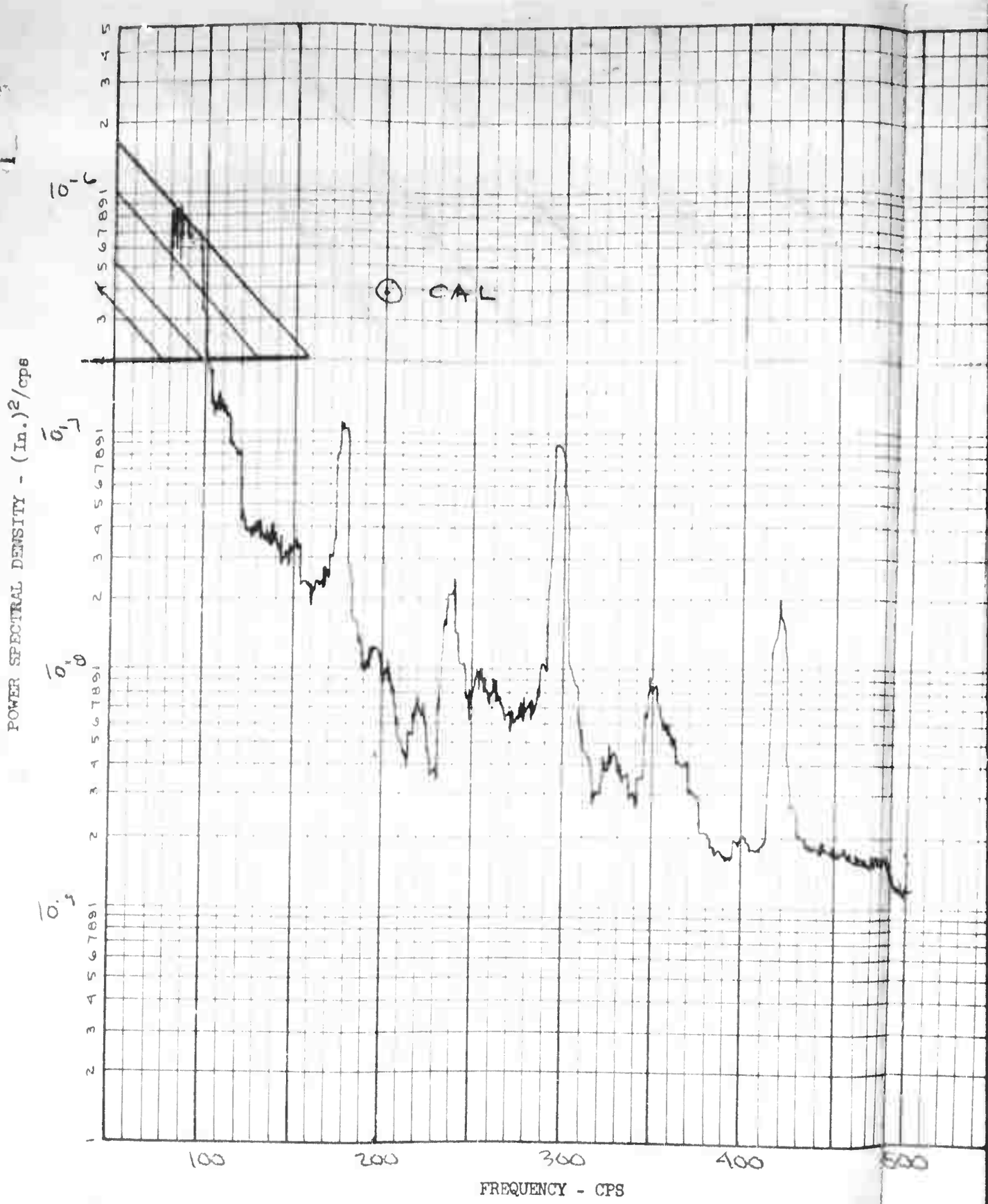
500

			REVISED	DATE
CALC				
CHECK	SOA	6-22-61		
APP.				
APP.				

POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
STATIC TEST
P/U 1 PANEL 1493 PHASE A
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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PAGE Fig 164

2-5353-7-9



ANALYSIS VARIABLES

Bandwidth

5 cycles from 80 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CALC		
CHECK	30A	
APR		
APR		

DATA IDENTIFICATION

Test Title		
PANEL ATTACH TYPE I PRELIM.		
EWA No. 5593	Panel or Specimen No. 1493	
Tape No. 20	Tape Channel 4	Displacement Pickup # 1
Elapsed Test Time +5 MIN	P/U RMS Level at Sonic Lab. V_L = .140 Volts	

CALIBRATION

Tape No. 20	Tape Channel 1	Data Tape RMS Volt V_R = .142

Calibration Voltage

V_a = .5 V_{rms} into Line Amp.; V_c = 50 V_{rms} on Tape @200cps

Line Amplifier Settings

For Calibration G_c = .100 ; for Data G_d = .100

Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0

Displacement Pickup Sensitivity

S = .0507 in./Volt

Equivalent of Calibration - in.

$D_c = V_a \cdot S$ = .03535

Equivalent of Calibration for PSD Plots

$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.03535}{(1.0)(1.0)}\right]^2 = 1.225 \times 10^{-3} \text{ in.}^2/\text{cps}$$

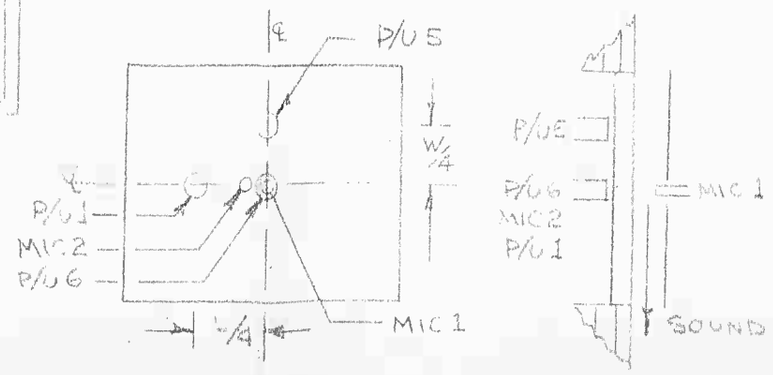
Analyzer Attenuator Setting -35 db	Log Converter Setting 0 db

Calibration Plotted at 3.87 (10^{-7}) in.^{2}/cps

Overall Deflection Level of Data

$$\text{RMS Defl. Level} = \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.03535)(.142)}{(1)(1)(50)} = .0100 \text{ in.}$$

FOR FREQUENCIES BELOW 150 CPS USE PAGE 164



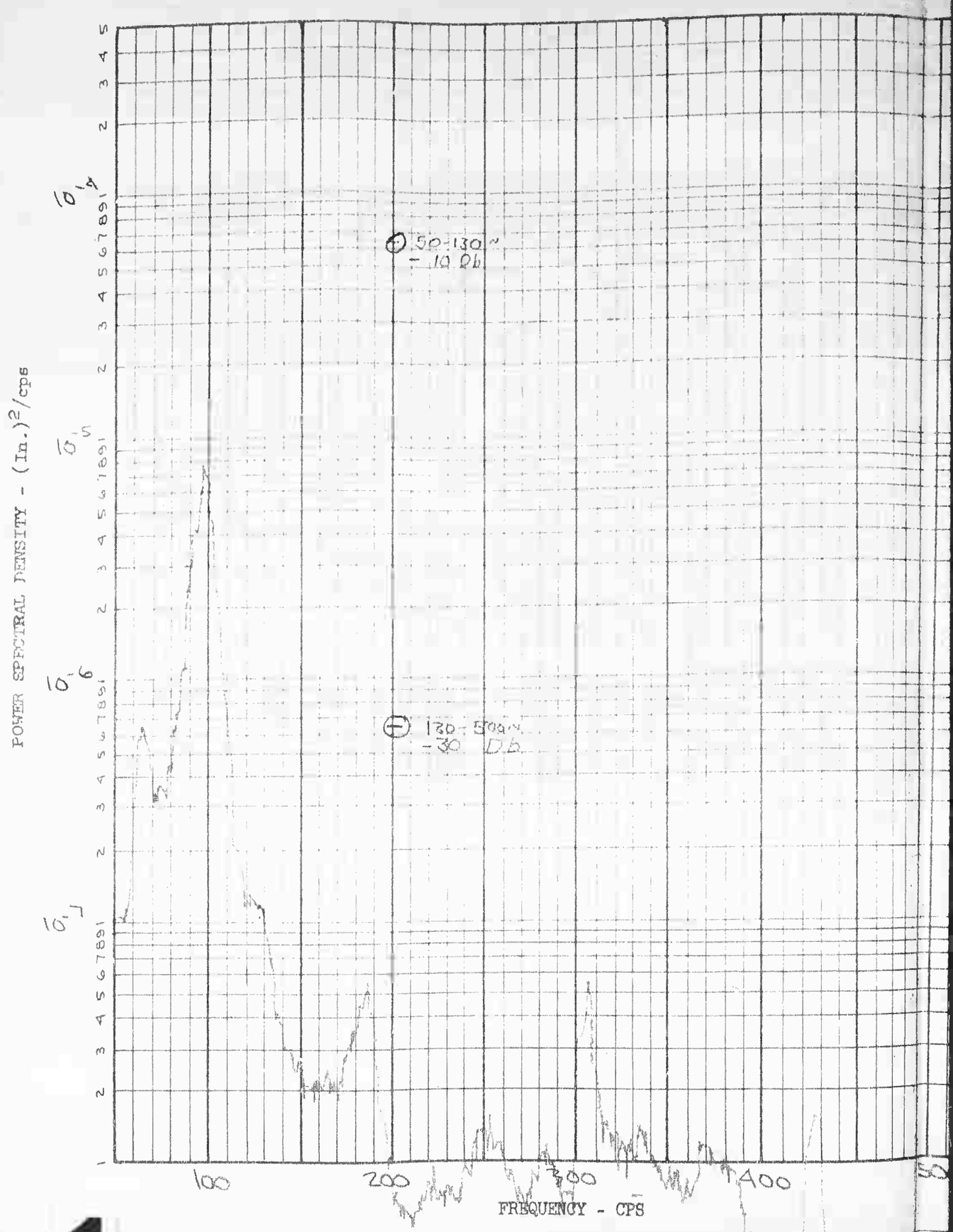
CALC	[illegible]	6-22-61	REVISED	DATE
CHECK	SOA	6/23/61		
APR.				
APR.				

POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
5 MIN TEST
P/U 1 PANEL 1493 PHASE A
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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PAGE Fig 165

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2



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CALC	
CHECK	50
APR.	
APR.	

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I - PRELIM		
EWA No.: 5-593	Panel or Specimen No.: 1493	
Tape No.: 20	Tape Channel: 5	Displacement Pickup #: 5
Elapsed Test Time: +5 MIN	P/U RMS Level at Sonic Lab.: V_L = .090 Volts	

CALIBRATION

Tape No.: 20	Tape Channel:	Data Tape RMS Volt: V_R = .215

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps

Line Amplifier Settings
For Calibration G_c = .100 ; for Data G_d = .200

Lab. Gain: LG = 1.0	Tape Monitor Gain: $TMG = \frac{G_d}{G_c} = 2$

Displacement Pickup Sensitivity
S = .100 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = .050

Equivalent of Calibration for PSD Plots

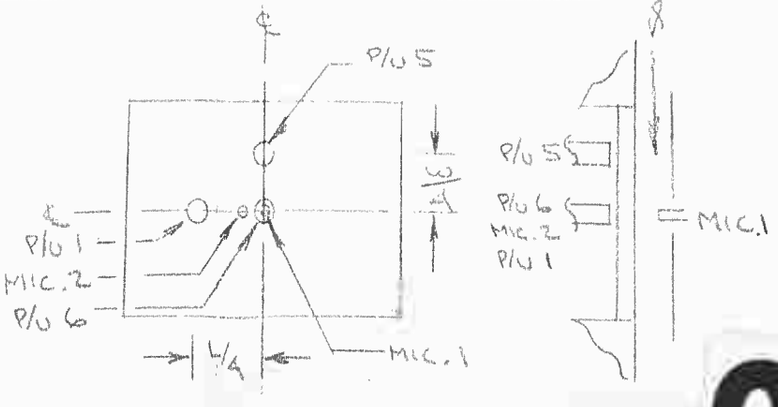
$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left(\frac{.050}{(2)(1)}\right)^2 = 6.25 \times 10^{-4} \text{ in.}^2/\text{cps}$$

Analyzer Attenuator Setting	Log Converter Setting
50 - 130 ~ -10	db
130 - 500 ~ -30	

Calibration Plotted at
6.25 (10^{-4}) in.^{2}/cps

Overall Deflection Level of Data

$$\text{RMS Defl. Level} = \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.050)(.215)}{(2)(1)(.5)} = .0107 \text{ in.}$$



CALC			REVISED	DATE
CHECK	[illegible]	6/16/61		
APR.				
APR.				

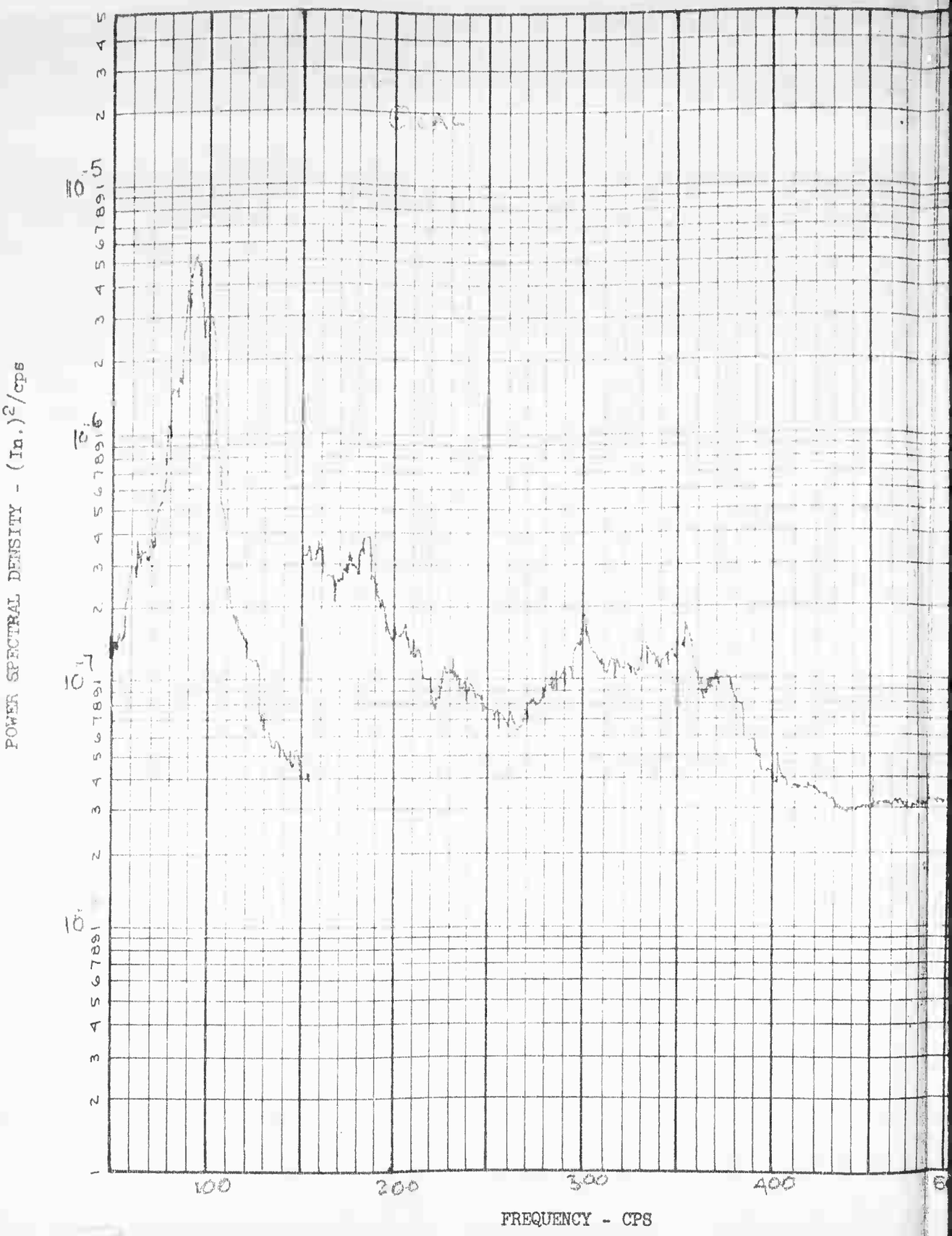
POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
P/U #5 PANEL 1493 PHASE A 5 MIN TEST

BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 150 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate .25 cps/sec.
Loop Length 4 Sec.

CALC
CHECK
APR.
APR.

DATA IDENTIFICATION

Test Title		
VARIABLE ATTACH TYPE I PANEL		
EWA No.	Panel or Specimen No.	
[illegible]	1493	
Tape No.	Tape Channel	Displacement Pickup #
20	6	6
Elapsed Test Time	P/U RMS Level at Sonic Lab.	
4 5 MIN	V_L = .120 Volts	

CALIBRATION

Tape No.	Tape Channel	Data Tape RMS Volt
20	1	V_R = .108

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200cps

Line Amplifier Settings
For Calibration G_c = .1 ; for Data G_d = .1

Lab. Gain	Tape Monitor Gain
LG = 1.0	$TMG = \frac{G_d}{G_c}$ = 1.0

Displacement Pickup Sensitivity
S = .0876 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = .0438

Equivalent of Calibration for PSD Plots

$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left(\frac{.0438}{(1)(1)}\right)^2 = 1.92 \times 10^{-3} \text{ in.}^2/\text{cps}$$

Analyzer Attenuator Setting	Log Converter Setting
-20 -30 db	db
Calibration Plotted at	1.92×10^{-5}
	1.92×10^{-6} in.^{2}/cps

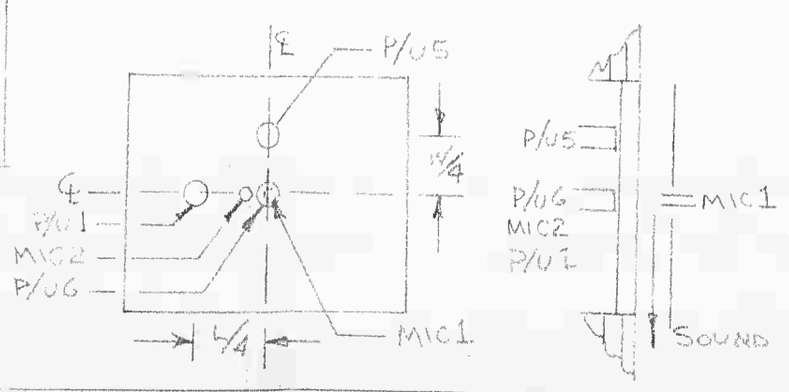
Overall Deflection Level of Data

$$\text{RMS Defl. Level} = \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0438)(.108)}{(1)(1)(.5)} = .0095 \text{ in.}$$

10^{-6} 10^{-7} 10^{-8} 10^{-9}

TC 150 CPS USE LEFT SCALE, 150 500 CPS USE RIGHT SCALE

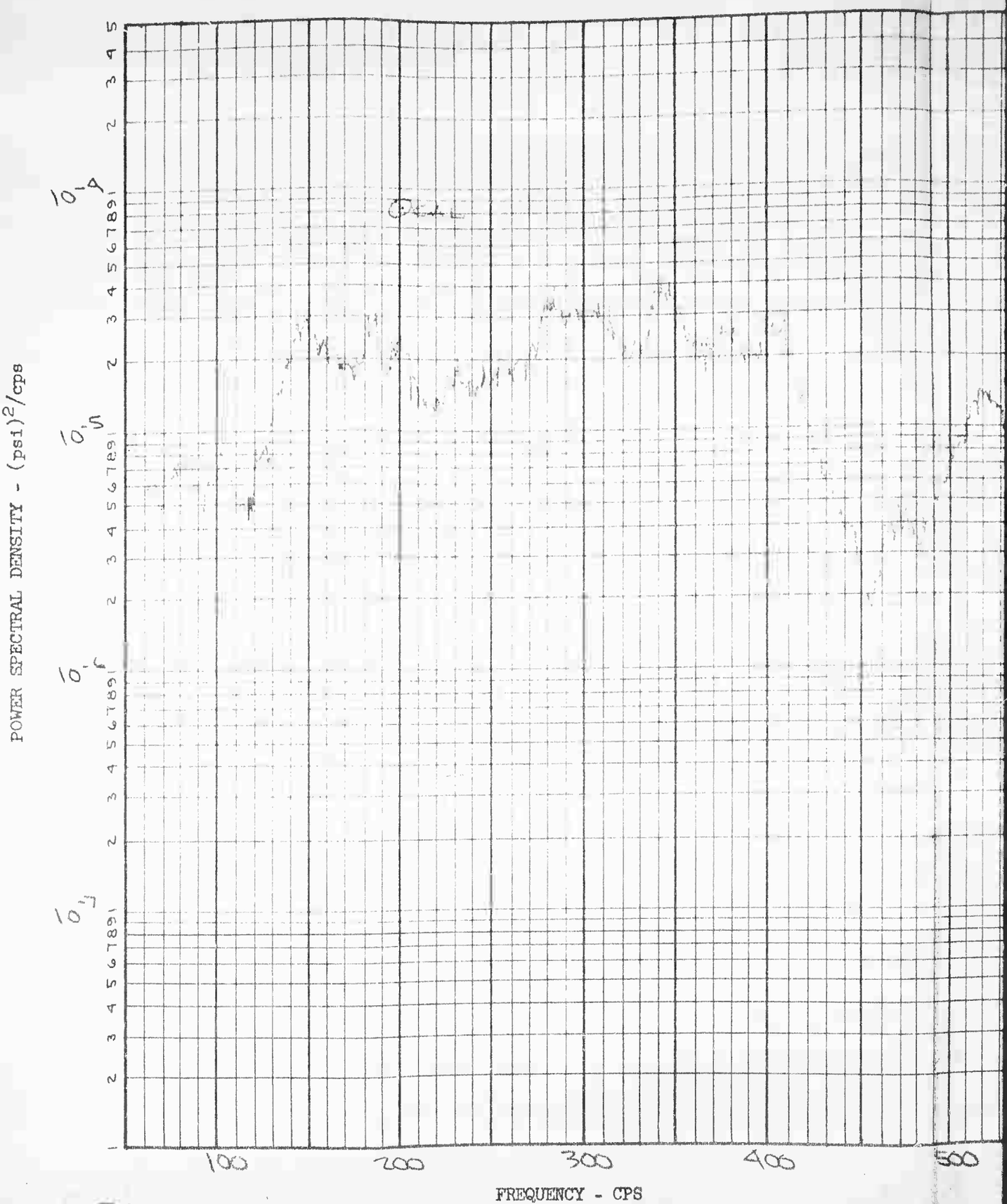
600



CALC	C.T.	6/22/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP 5 MIN TEST
CHECK	JOA	6/23/61			P/U 6 PANEL 1493 PHASE A
APR.					BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
APR.	[illegible]	6/23/61			Vol I D2-80084 PAGE FIG 167

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

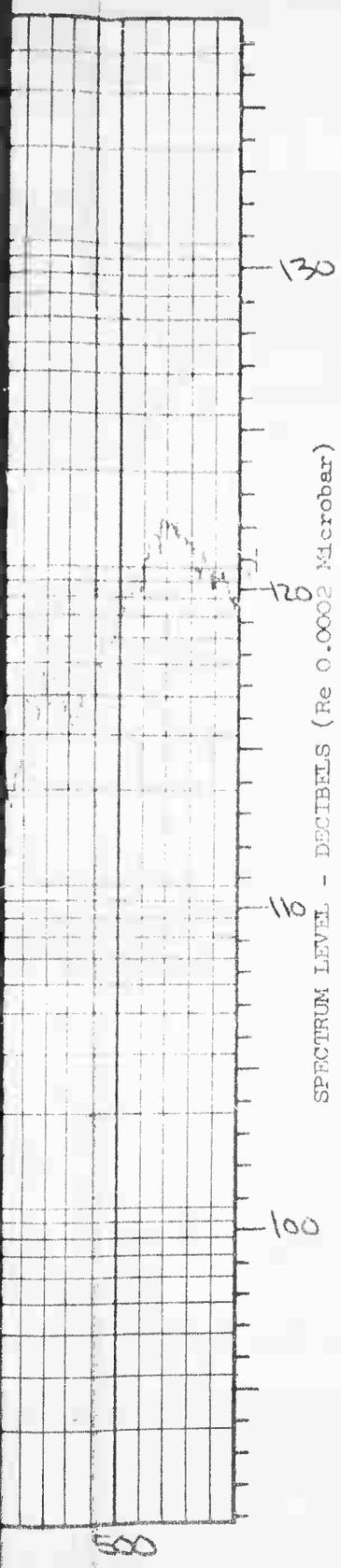
CALC	C.T.
CHECK	JOA
APR.	
APR	
	D/C.

DATA IDENTIFICATION

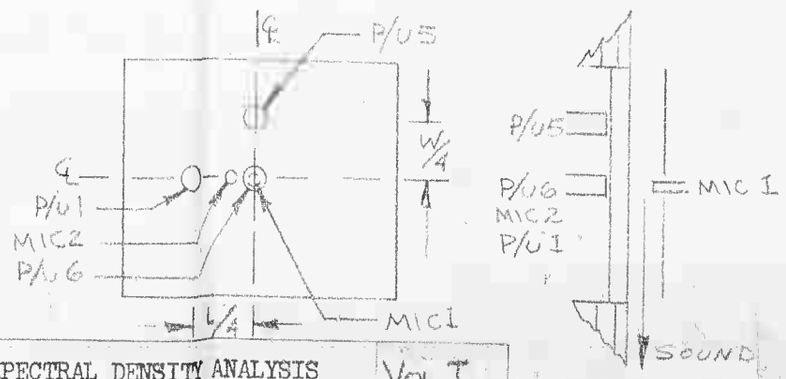
Test Title: PANEL A (493) TYPE I TEST		
EWA No.	Panel or Specimen No.	
Tape No. 23	Tape Channel 1	Mic. No. 1
Elapsed Test Time	Mic. RMS Level at Sonic Lab. V_L = —— Volts	

CALIBRATION

Tape No. 23	Tape Channel 7	Data Tape RMS Volt V_R = .192
Calibration Voltage V_a = . V_{rms} into Line Amp.; V_c = . V_{rms} on Tape @ 200cps		
Line Amplifier Settings For Calibration G_c = .200; for Data G_d = .100		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = .50	
Microphone Sensitivity S = .290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = .145		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{(.5)(1.0)}\right]^2 = 8.41 \times 10^{-2}$ psi²/cps		
Analyzer Attenuator Setting 30 db	Log Converter Setting db	
Calibration Plotted at 8.41×10^{-2} psi²/cps		
Overall Pressure Level Data RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ $= \frac{(.145)(.192)}{(.5)(1)(.5)}$ = .112 psi	Equiv. to 151.8 db SPL	



2



CALC	C.T.	6/22/61	REVISED	DATE
CHECK	JOA	6/23/61		
APR.				
APR				
	D.C.	6/22/61		

POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT

55 MIN TEST

MIC. 1 PANEL 1493 PHASE B

BOEING AIRPLANE COMPANY

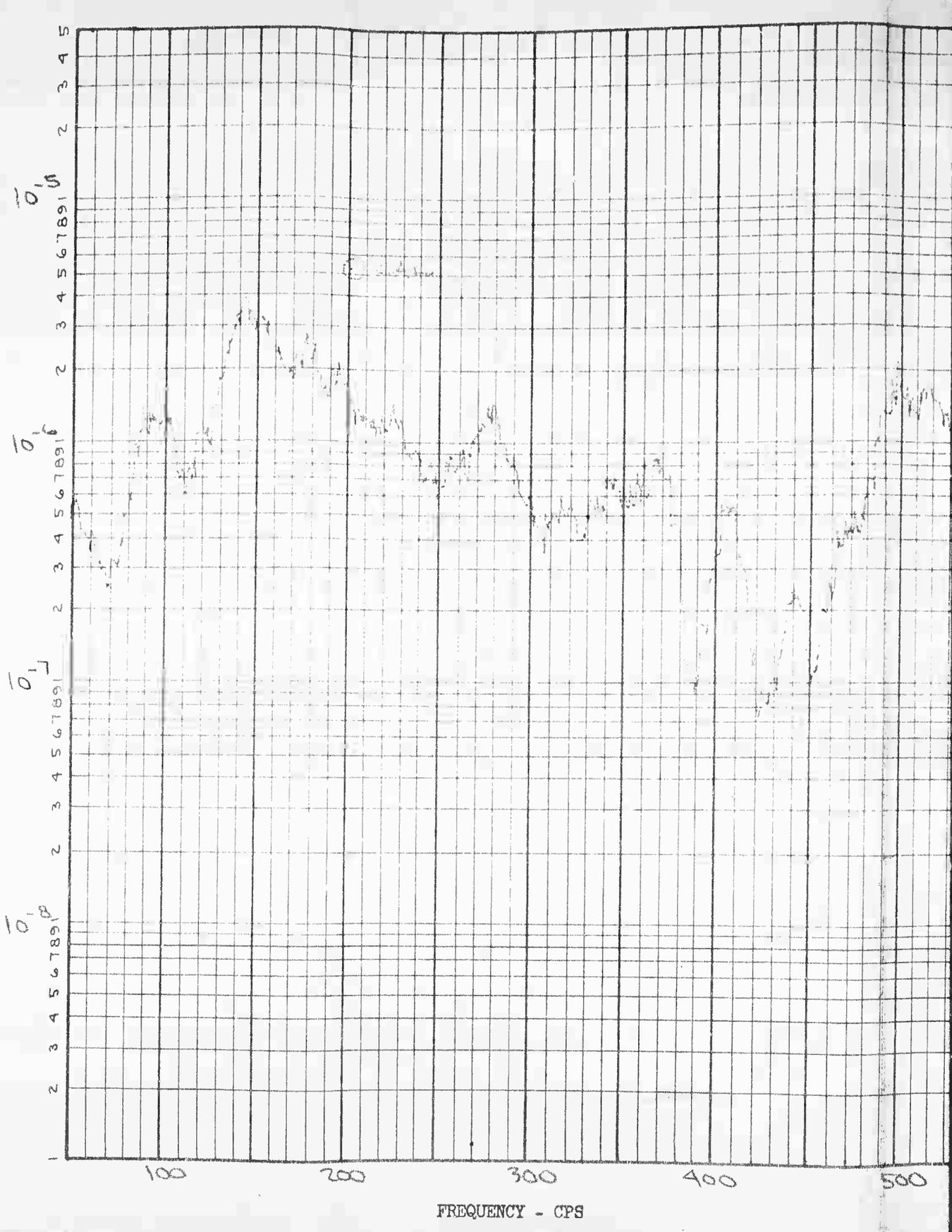
SEATTLE 24, WASHINGTON

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
____ cycles from ____ to ____ cps
____ cycles from ____ to ____ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CALC	C.T.
CHECK	JOA
APR.	
APR.	

DATA IDENTIFICATION

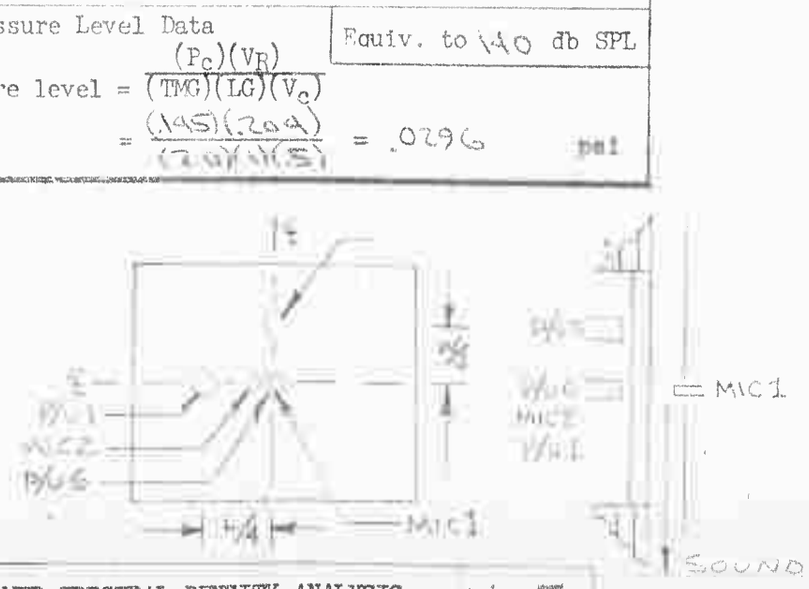
Test Title: PANEL ACOUS. TEST I [illegible]		
EWA No.	Panel or Specimen No. 1493	
Tape No.	Tape Channel	Mic. No. 2
Elapsed Test Time [illegible]	Mic. RMS Level at Sonic Lab. V_L = — Volts	

CALIBRATION

Tape No.	Tape Channel 1	Data Tape RMS Volt V_R = .204
Calibration Voltage V_a = [illegible] V_{rms} into Line Amp.; V_c = [illegible] V_{rms} on Tape @200cps		
Line Amplifier Settings For Calibration G_c = [illegible]; for Data G_d = [illegible]		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = [illegible]	
Microphone Sensitivity S = [illegible] psi/Volt or 1 Volt rms = [illegible] db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = [illegible]		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2$ = [illegible] psi^2/cps		
Analyzer Attenuator Setting [illegible] db	Log Converter Setting [illegible] db	
Calibration Plotted at [illegible] psi^2/cps		
Overall Pressure Level Data RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = $\frac{(.145)(.204)}{(200)(1.0)}$ = .0296 psi	Equiv. to 140 db SPL	

SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

120
110
100
90
500



CALC	C.T.	6/22/61	REVISED	DATE
CHECK	SOA	6/23/61		
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APR				

POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT
SONIC TEST
MIC. #2 PANEL 1493 PHASE B

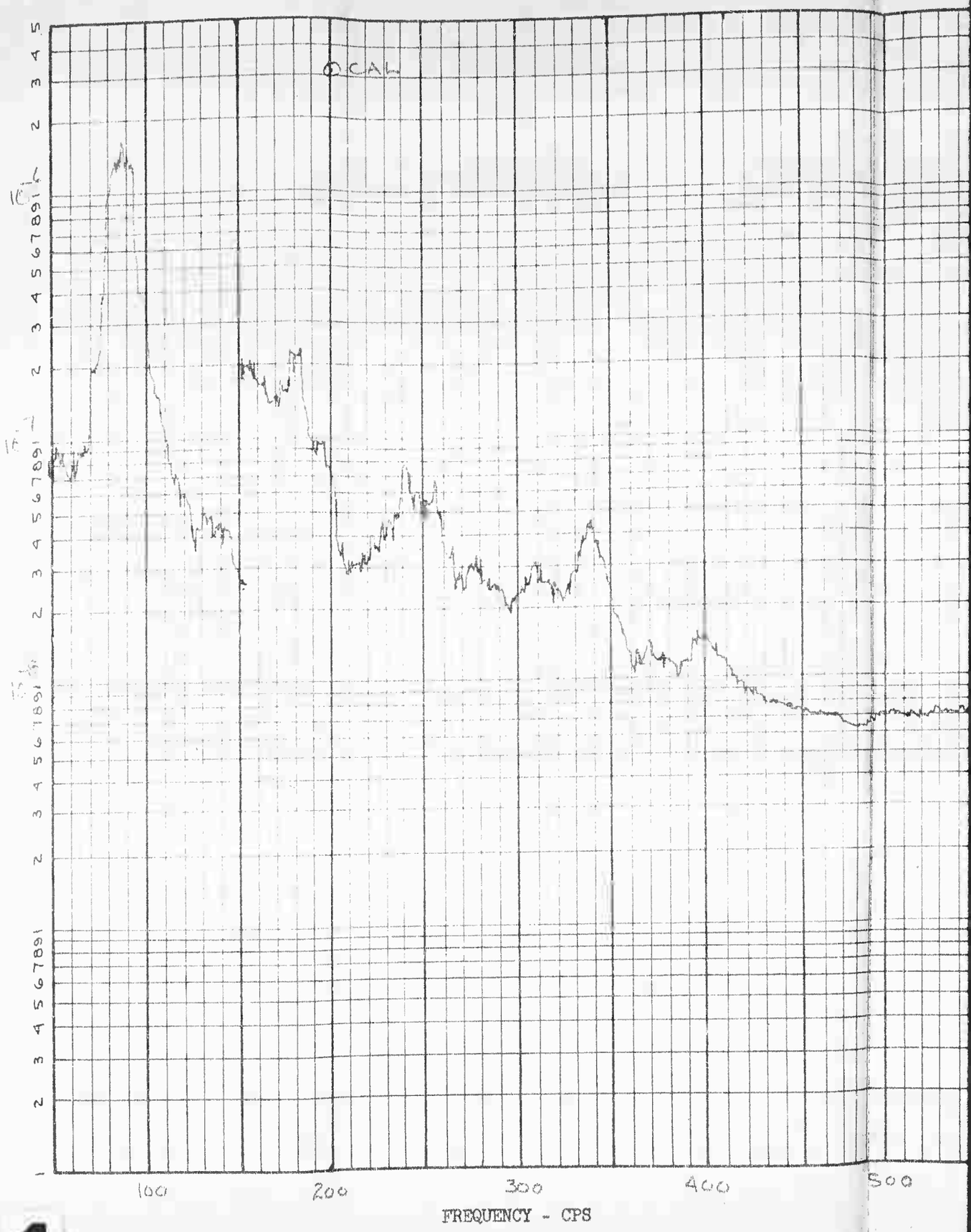
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SEATTLE 24, WASHINGTON

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CALC	C.T.
CHECK	30A
APR.	
APR	

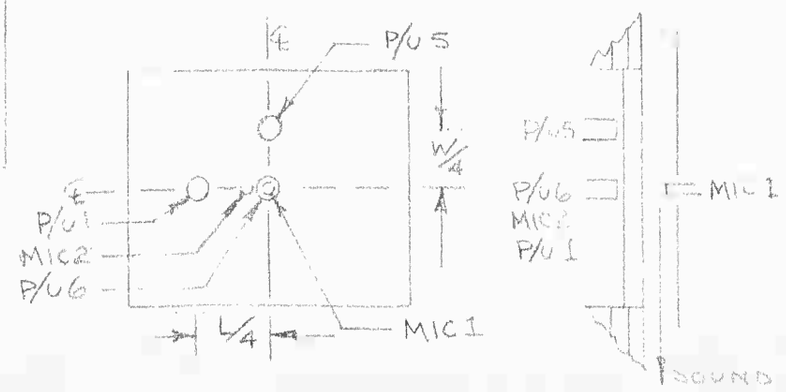
DATA IDENTIFICATION

Test Title		
PANEL ATTACH. TYPE I PRELIM.		
EWA No. 5-593	Panel or Specimen No. 1493	
Tape No. 23	Tape Channel 3	Displacement Pickup # 1
Elapsed Test Time +58	P/U RMS Level at Sonic Lab. V_L = .160 Volts	

CALIBRATION

Tape No. 23	Tape Channel 7	Data Tape RMS Volt V_R = .156
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200cps		
Line Amplifier Settings For Calibration G_c = .200; for Data G_d = .200		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0	
Displacement Pickup Sensitivity S = .0354 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = .0177		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0177}{(1)(1)}\right]^2$ = 3.13×10^{-4} in.²/cps		
Analyzer Attenuator Setting db	Log Converter Setting db	
Calibration Plotted at in.²/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0177)(.156)}{(1)(1)(.5)}$ = .0056 in.		

TO 150 CPS USE LEFT SCALE
150-550 CPS USE RIGHT SCALE

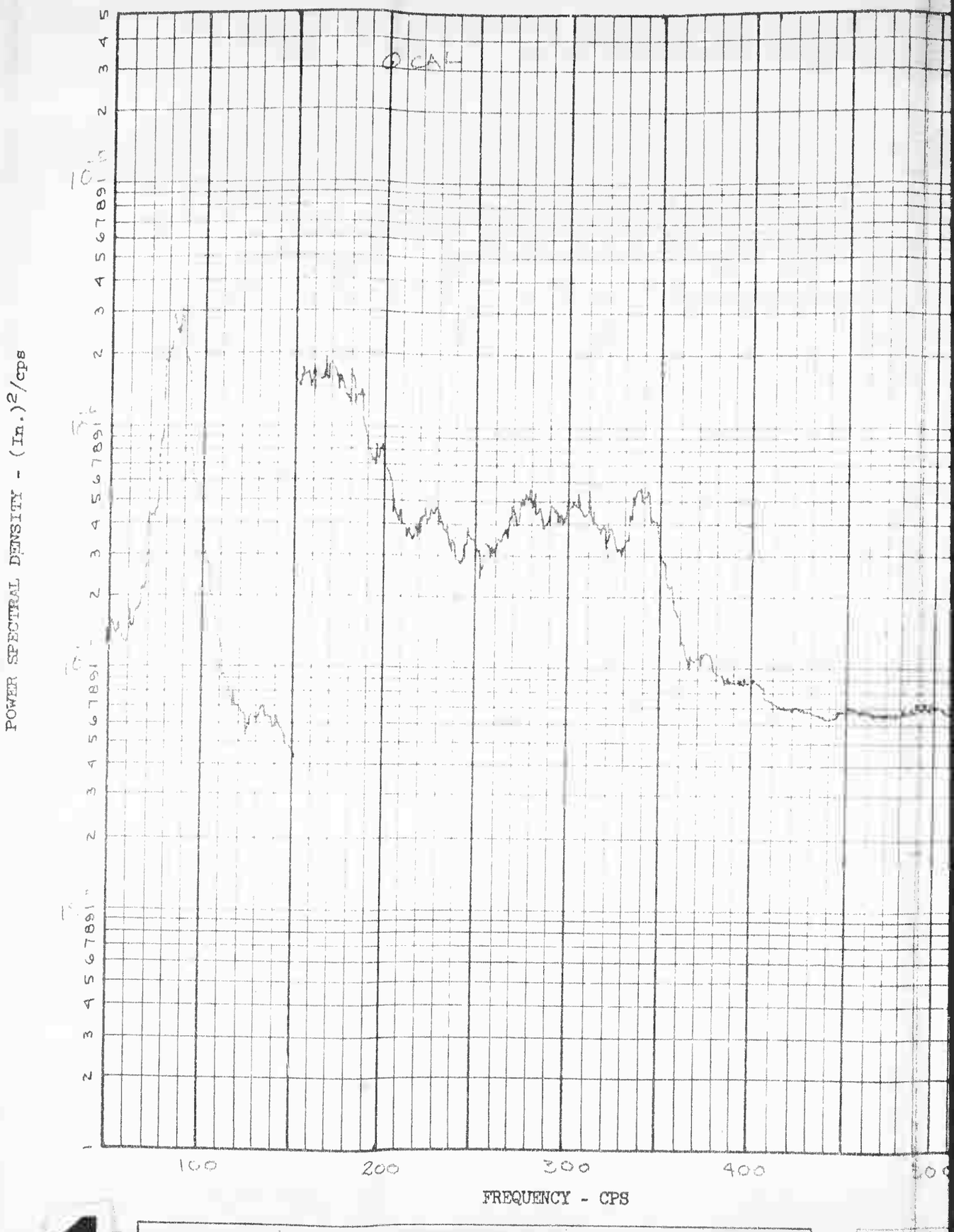


CALC	C.T.	6/12/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP SSMin Test P/U 1 PANEL 1423 PHASE B BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
CHECK	JOA	6/13/61			
APR.					
APR					

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CALC
CHECK
APR
APR

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM.		
EWA No.: 5-573	Panel or Specimen No.: 1493	
Tape No.: 23	Tape Channel: 4	Displacement Pickup #: 5
Elapsed Test Time: +58	P/U RMS Level at Sonic Lab.: V_L = .210 Volts	

CALIBRATION

Tape No.: 23	Tape Channel: 7	Data Tape RMS Volt: V_R = 200

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .50 V_{rms} on Tape @200 cps

Line Amplifier Settings
For Calibration G_c = .200 ; for Data G_d = .200

Lab. Gain
LG = 1.0

Tape Monitor Gain $TMG = \frac{G_d}{G_c} = 1.0$

Displacement Pickup Sensitivity
S = .0354 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S = .0177$

Equivalent of Calibration for PSD Plots

$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0177}{(1)(1)}\right]^2 = 3.13(10^{-4}) \text{ in.}^2/\text{cps}$$

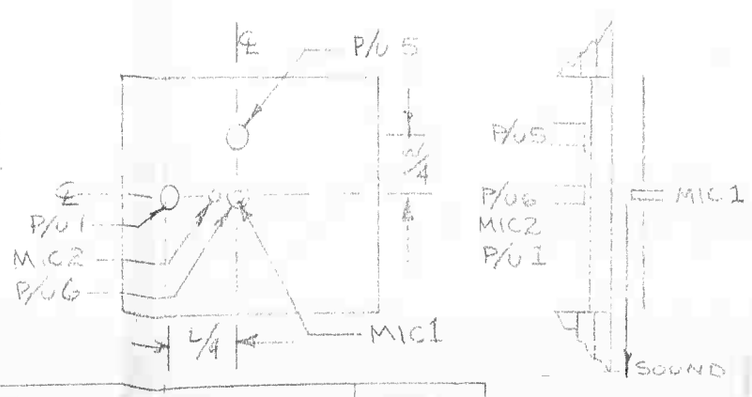
Analyzer Attenuator Setting: −10 dB, −35 dB
Log Converter Setting: db

Calibration Plotted at: 3.13×10^{-5}, 3.13×10^{-4} in.^{2}/cps

Overall Deflection Level of Data

$$\text{RMS Defl. Level} = \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{.0177(200)}{(1)(1)(50)} = .0071 \text{ in.}$$

TO 150 CPS USE LEFT SCALE
150-500 CPS USE RIGHT SCALE



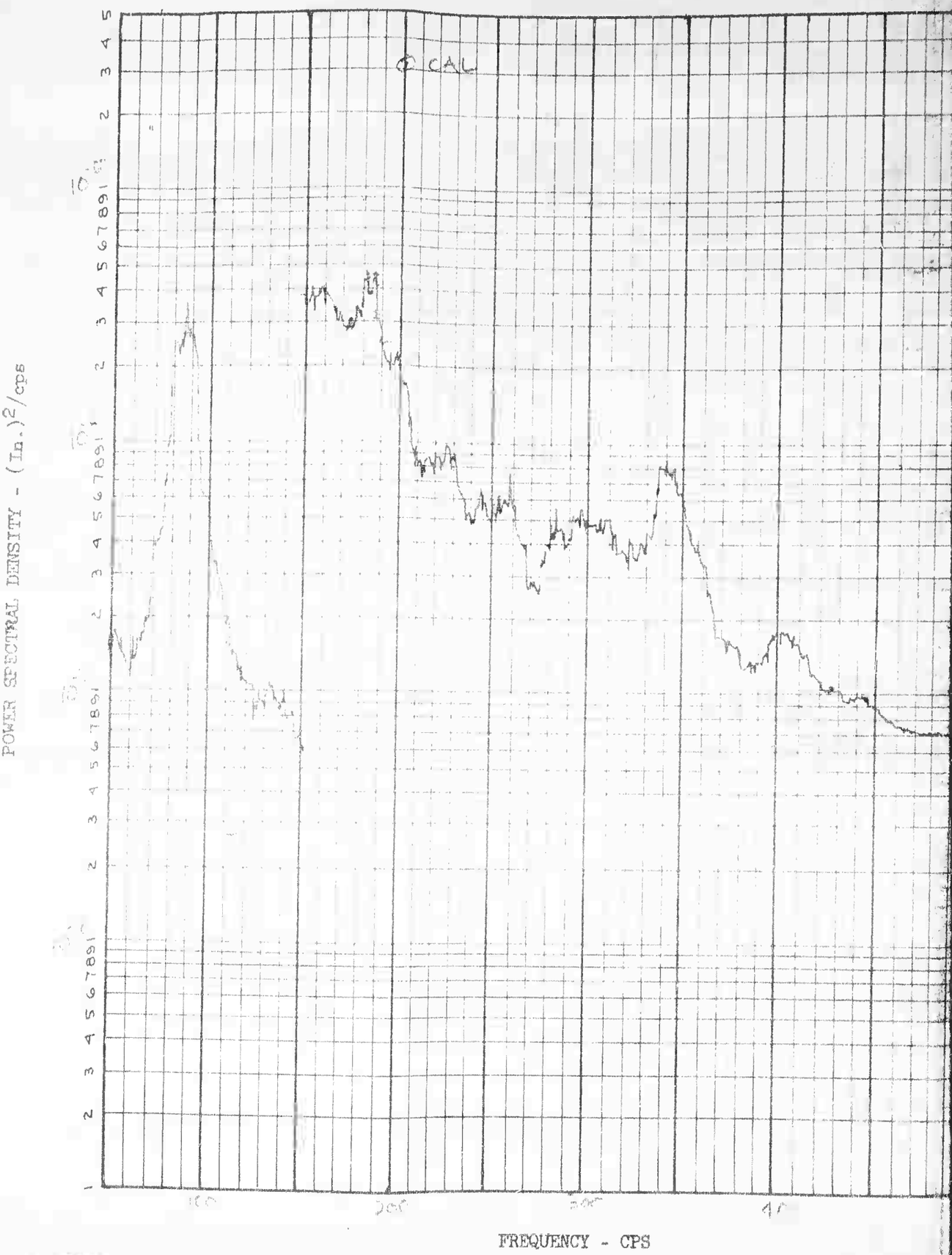
CALC	[illegible]	6/23/61	REVISED	DATE
CHECK	SOA	6/24/61		
APP				
APP	[illegible]	6/27/61		

POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
P/U 5 PANEL 1493 PHASE II 55 MIN TEST
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SEATTLE 24, WASHINGTON

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ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 125 cps/sec.
Loop Length 4 Sec.

CALC
CHECK
APP
APP

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I [illegible]		
EWA No. [illegible]	Panel or Specimen No. 1493	
Tape No. 22	Tape Channel 5	Displacement Pickup # 6
Elapsed Test Time 4 58	P/U RMS Level at Sonic Lab. V_L = [illegible] Volts	

CALIBRATION

Tape No. [illegible]	Tape Channel 7	Data Tape RMS Volt V_R = .215

Calibration Voltage

V_a = .5 V_{rms} into Line Amp.; V_c = [illegible] V_{rms} on Tape @ [illegible] cps

Line Amplifier Settings

For Calibration G_c = [illegible]; for Data G_d = [illegible]

Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0

Displacement Pickup Sensitivity

S = [illegible] in./Volt

Equivalent of Calibration - in.

$D_c = V_a \cdot S$ = [illegible]

Equivalent of Calibration for PSD Plots

$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = [illegible] $in.^2/cps$

Analyzer Attenuator Setting [illegible] db	Log Converter Setting db

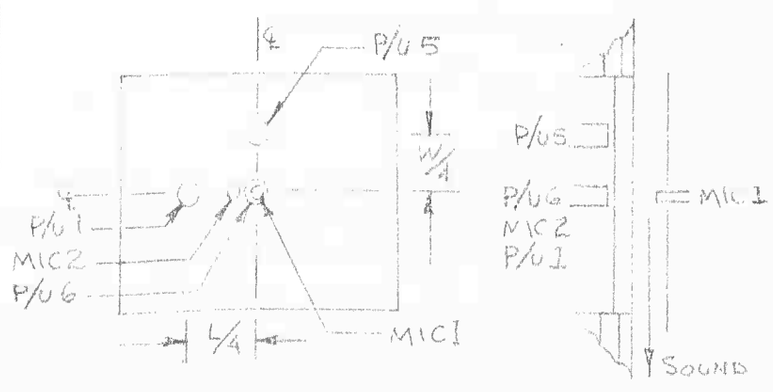
Calibration Plotted at

[illegible] $in.^2/cps$

Overall Deflection Level of Data

RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = [illegible] = .0761 in.

FOR 150 CPS USE LEFT SCALE
150-550 CPS USE RIGHT SCALE

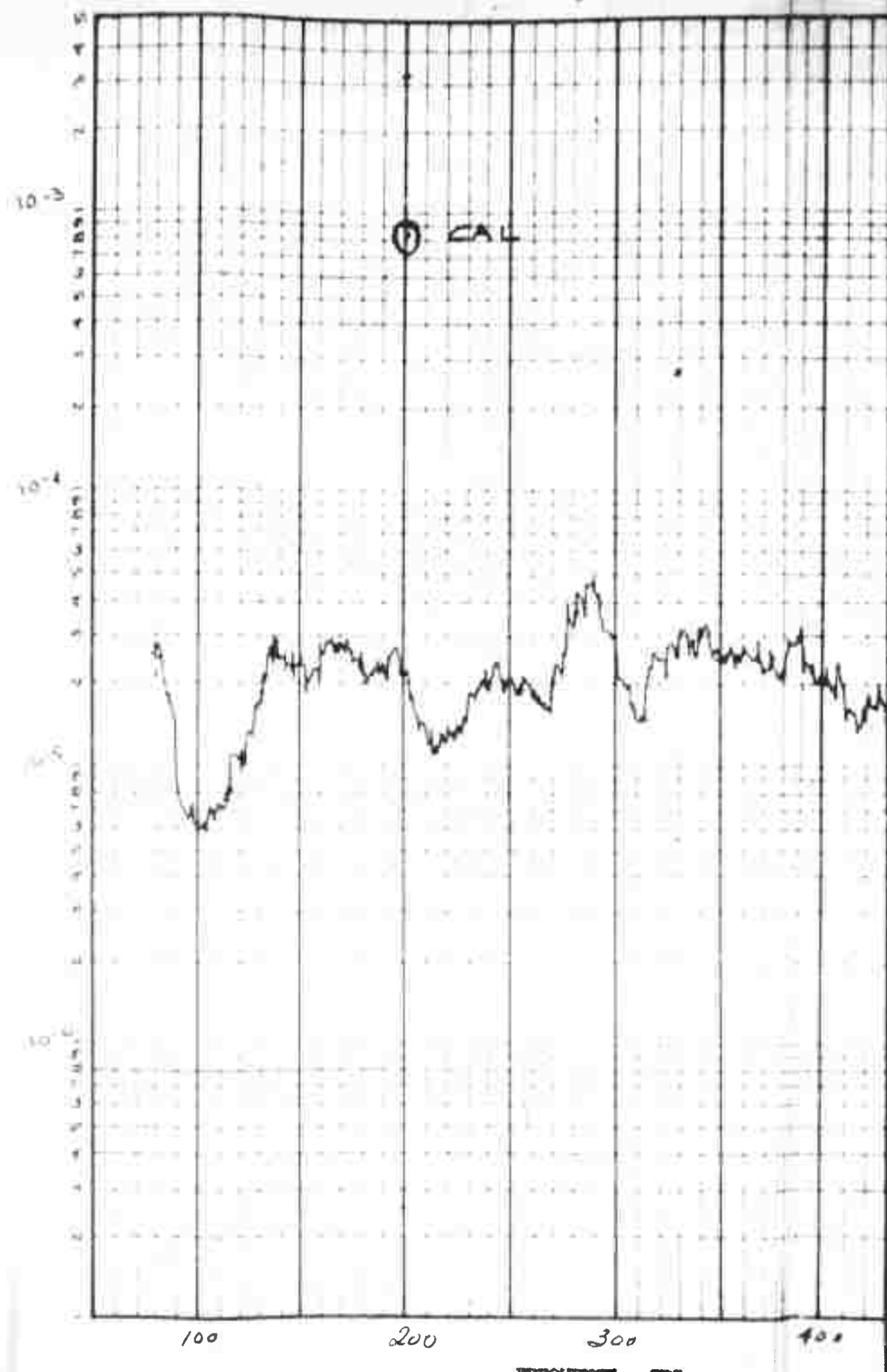


CALC	[illegible]	6/23/6	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP P/U 6 PANEL 1493 55 M TEST TUBE 5
CHECK	[illegible]	6/24/6			
APP					
APP	[illegible]	6/22/6			

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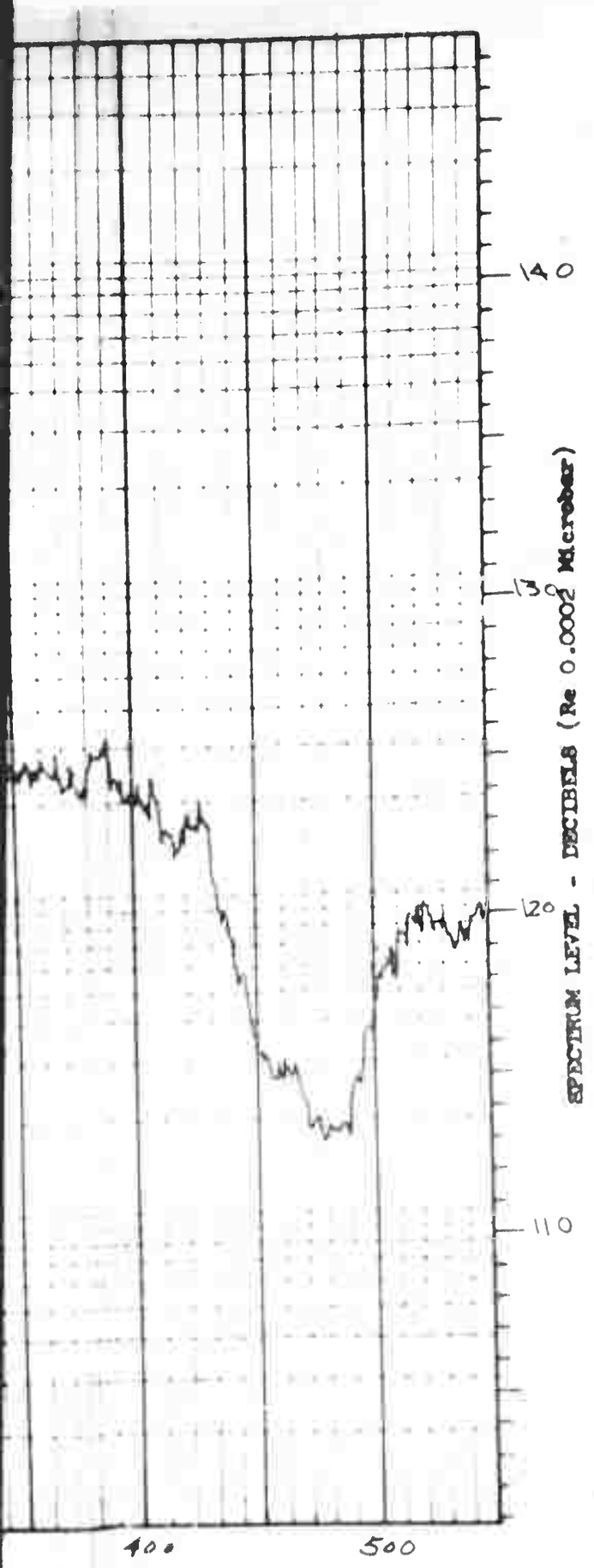
1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 80 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_o 4 Sec.
Anal. Rate 625 cps/Sec.
Loop Length 4 Sec.



DATA IDENTIFICATION

Test Title PANEL ATTACH. TYPE I PRELIM.		
EWA No. 5-593	**Panel or Specimen No.** 1494	
Tape No. 21A	**Tape Channel** 6	**Mic. No.** 1
Elapsed Test Time +5 MIN.	**Mic. RMS Level at Sonic Lab.** V_L = .398 Volts	

CALIBRATION

Tape No. 21A	**Tape Channel** 7	**Data Tape RMS Volt** V_R = .200

Calibration Voltage
$V_a = .5\,V_{rms}$ into Line Amp.; $V_c = .5\,V_{rms}$ on Tape @200cps

Line Amplifier Settings
For Calibration G_c = .200; for Data G_d = .100

Lab. Gain LG = 1.0	**Tape Monitor Gain** $TMG = \frac{G_d}{G_c} = .5$

Microphone Sensitivity
S = .290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S = .145$

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{.5(10)}\right]^2 = 8.41\,(10^{-2})$ psi²/cps

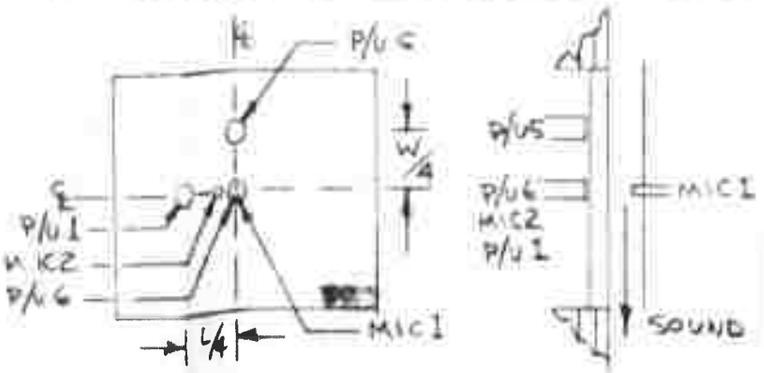
Analyzer Attenuator Setting −20 db	**Log Converter Setting** 0 db

Calibration Plotted at 8.41 (10⁻²) psi²/cps

Overall Pressure Level Data — Equiv. to 152.2 db SPL

RMS pressure level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$

$= \frac{.145\,(.200)}{(.5)(1)(.5)} = .116$ psi



2

C.T 6/20/21
RAL 6-20-1

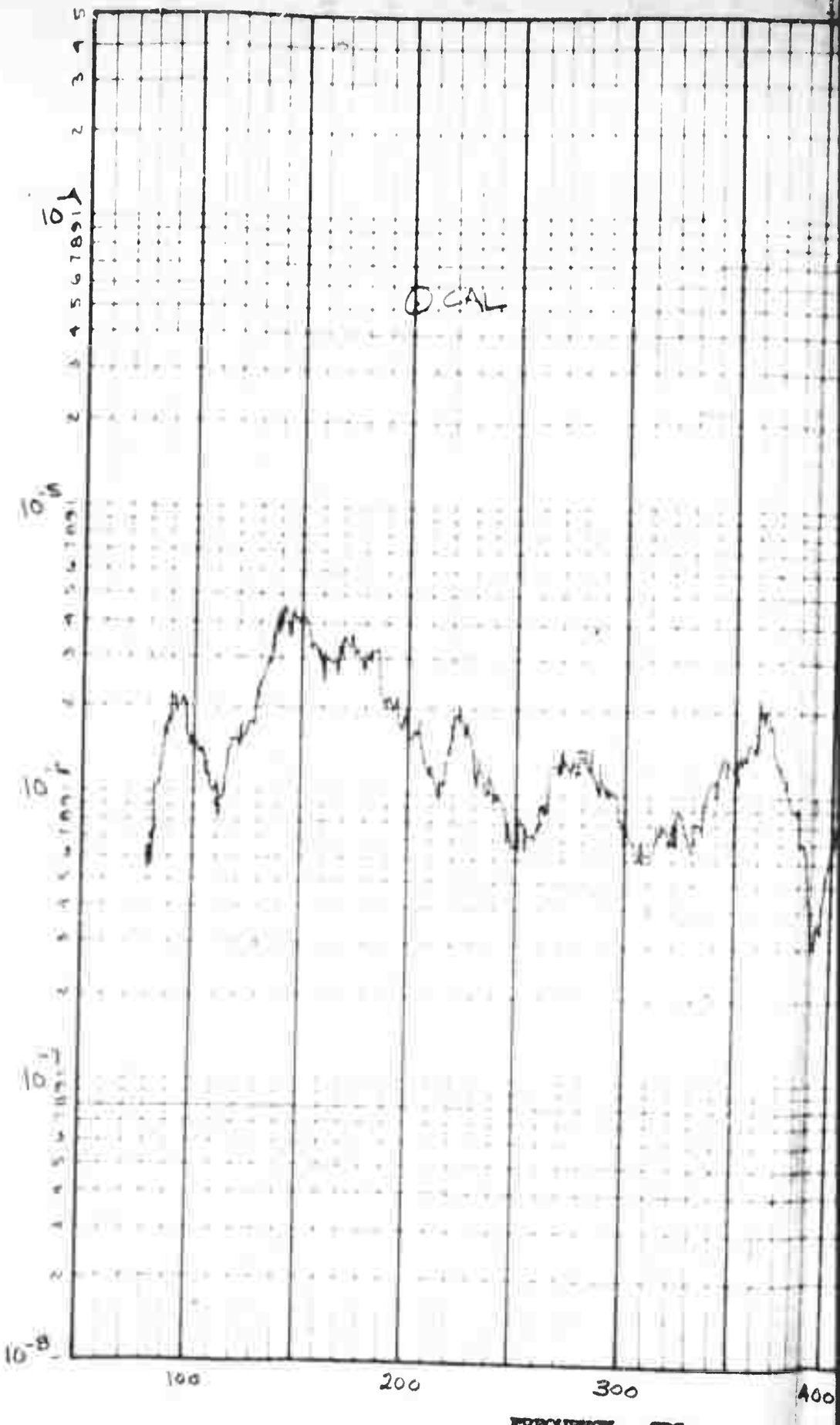
POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT

MIC #1 PANEL 1494 PHASE A

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SEATTLE 24, WASHINGTON

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.125 cps/Sec.
4 Sec.



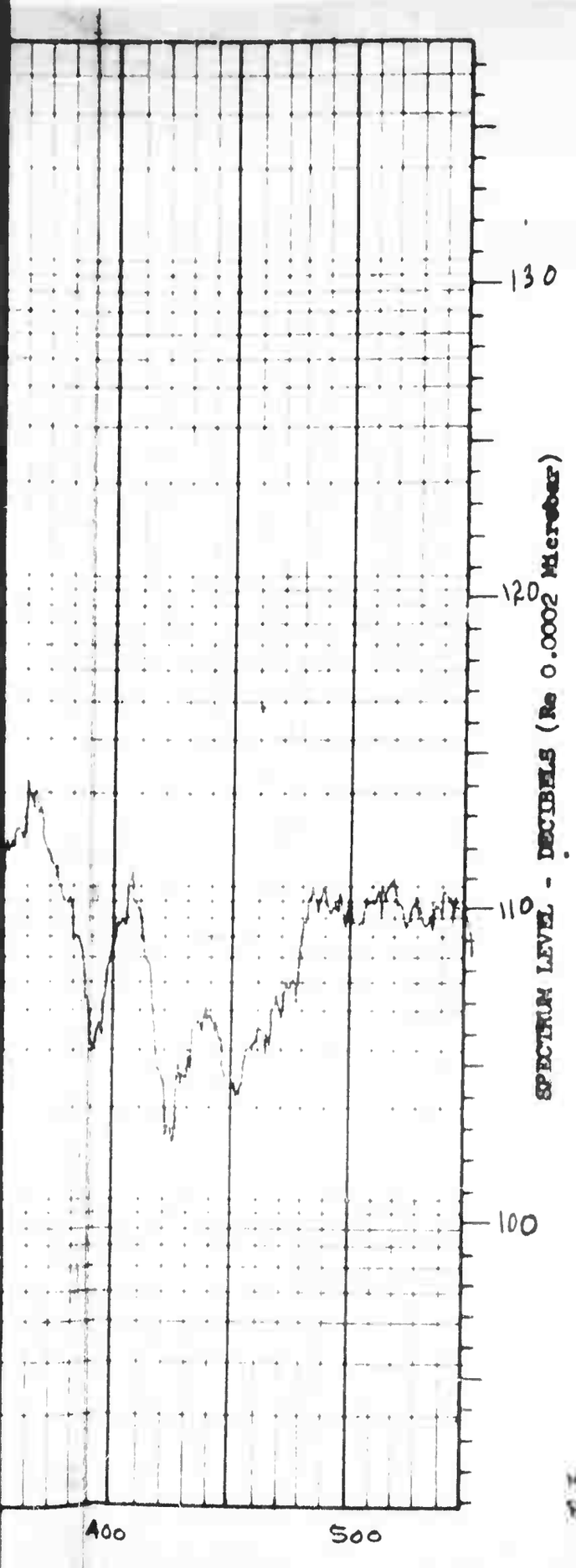
1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 80 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_e 4 Sec.
Anal. Rate 1.25 cps/Sec
Loop Length 4 Sec.

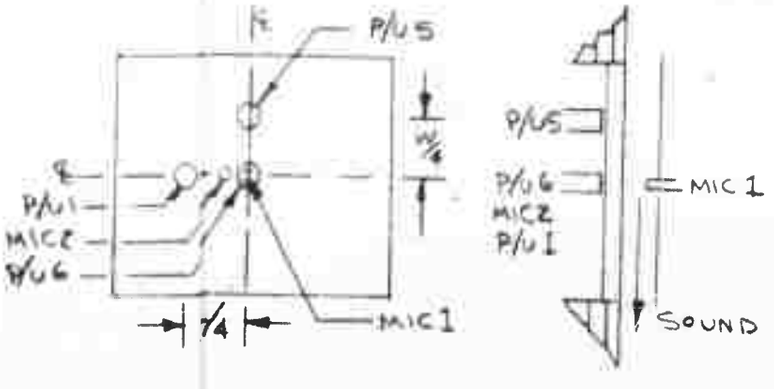


DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM.		
EWA No.: 5-593	Panel or Specimen No.: 1494	
Tape No.: 21A	Tape Channel: 2	Mic. No.: 2
Elapsed Test Time: +5 MIN.	Mic. RMS Level at Sonic Lab.: V_L = .112 Volts	

CALIBRATION

Tape No.: 21A	Tape Channel: 7	Data Tape RMS Volt: V_R = .225
Calibration Voltage: V_a = .5 V_{rms} into Line Amp.; V_e = .5 V_{rms} on Tape @ 200cps		
Line Amplifier Settings: For Calibration G_c = .200; for Data G_d = .400		
Lab. Gain: LG = 1.0	Tape Monitor Gain: TMG = $\frac{G_d}{G_c}$ = 2.0	
Microphone Sensitivity: S = .290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi: $P_c = V_a \cdot S$ = .145		
Equivalent of Calibration for PSD Plots: $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{(2.0)(1.0)}\right]^2 = 5.26(10^{-3})$ psi²/cps		
Analyzer Attenuator Setting: -20 db	Log Converter Setting: 0 db	
Calibration Plotted at: 5.26 (10^{-5}) psi²/cps		
Overall Pressure Level Data: RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_e)}$ = $\frac{(.145)(.225)}{(2)(1.0)(.5)}$ = .0326 psi	Equiv. to 141.1 db SPL	



2

.25 cps/Sec.
4 Sec.

BY	C.T.	6/20/61
CHECK	RAL	6-20
APP		
APP	DK	6/20/61

REVISED DATE

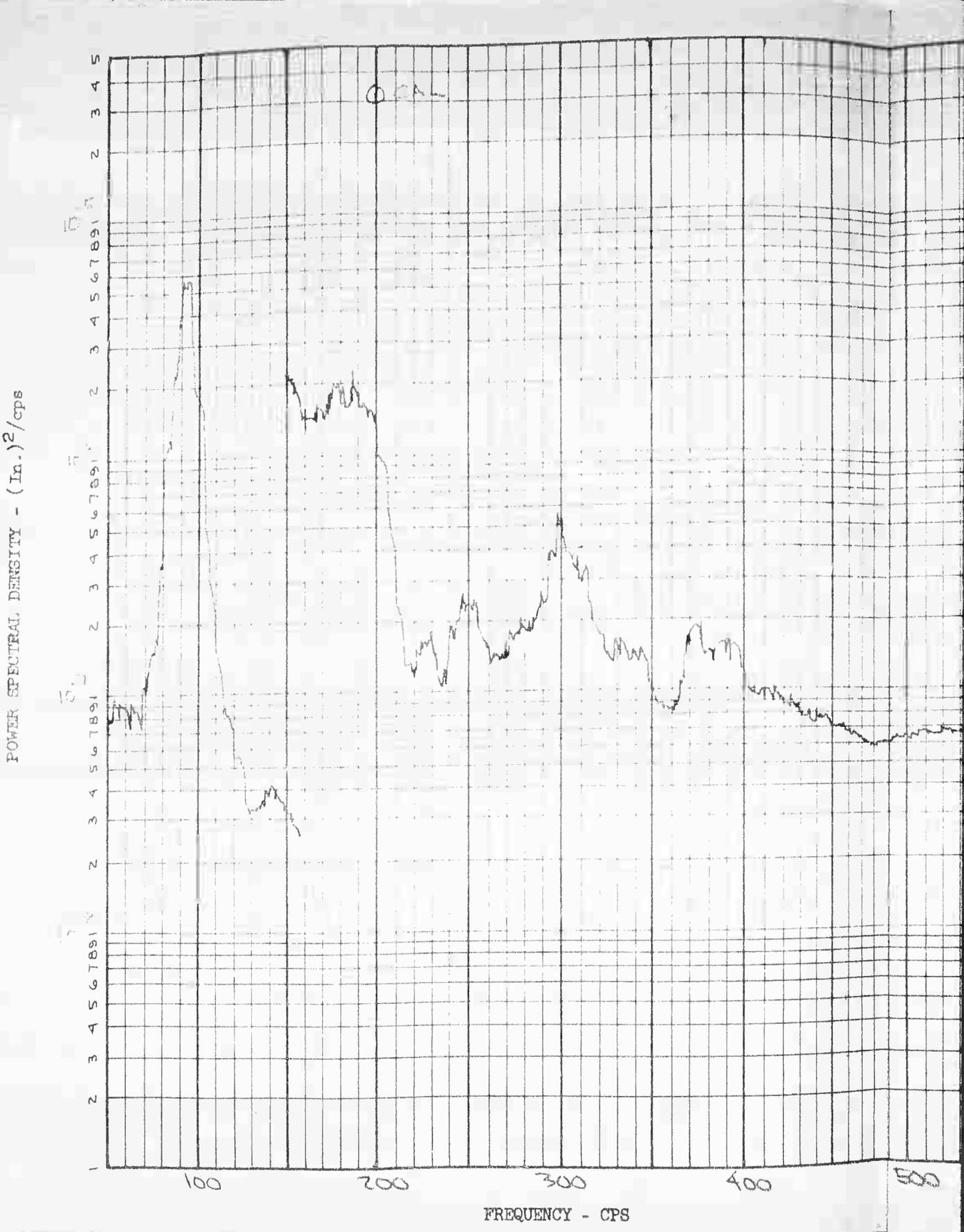
POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT

MIC #2 PANEL 1494 PHASE A

BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

TEST

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FIG 174



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CALC	CBT
CHECK	SDA
APR.	
APR.	

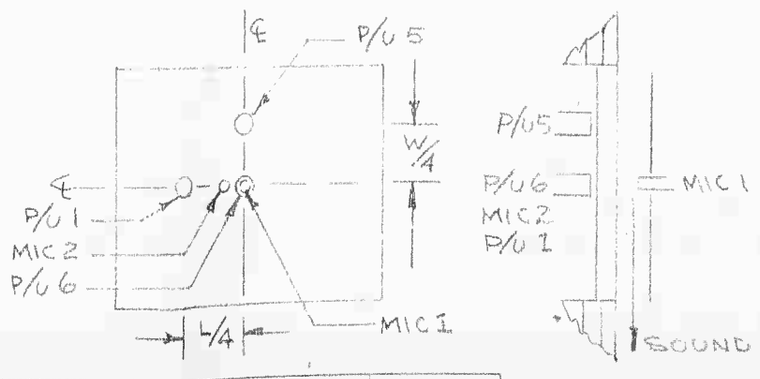
DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM.		
EWA No. 5-593	Panel or Specimen No. 1494	
Tape No. 21A	Tape Channel 3	Displacement Pickup # 1
Elapsed Test Time +5 MIN	P/U RMS Level at Sonic Lab. V_L = .250 Volts	

CALIBRATION

Tape No. 21A	Tape Channel 7	Data Tape RMS Volt V_R = .245
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .1 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = .200 ; for Data G_d = .200		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0	
Displacement Pickup Sensitivity S = .0354 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = .0177		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left(\frac{.0177}{(1.0)(1.0)}\right)^2 = 3.13 \times 10^{-4}$ in.^{2}/cps		
Analyzer Attenuator Setting ___ db	Log Converter Setting ___ db	
Calibration Plotted at 3.13×10^{-5} / 3.13×10^{-7} in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = .0177 × 2.45 / 1.0 × 1.0 × .25 = .0431 in.		

TO 150 CPS USE LEFT SCALE
150-550 CPS USE RIGHT SCALE

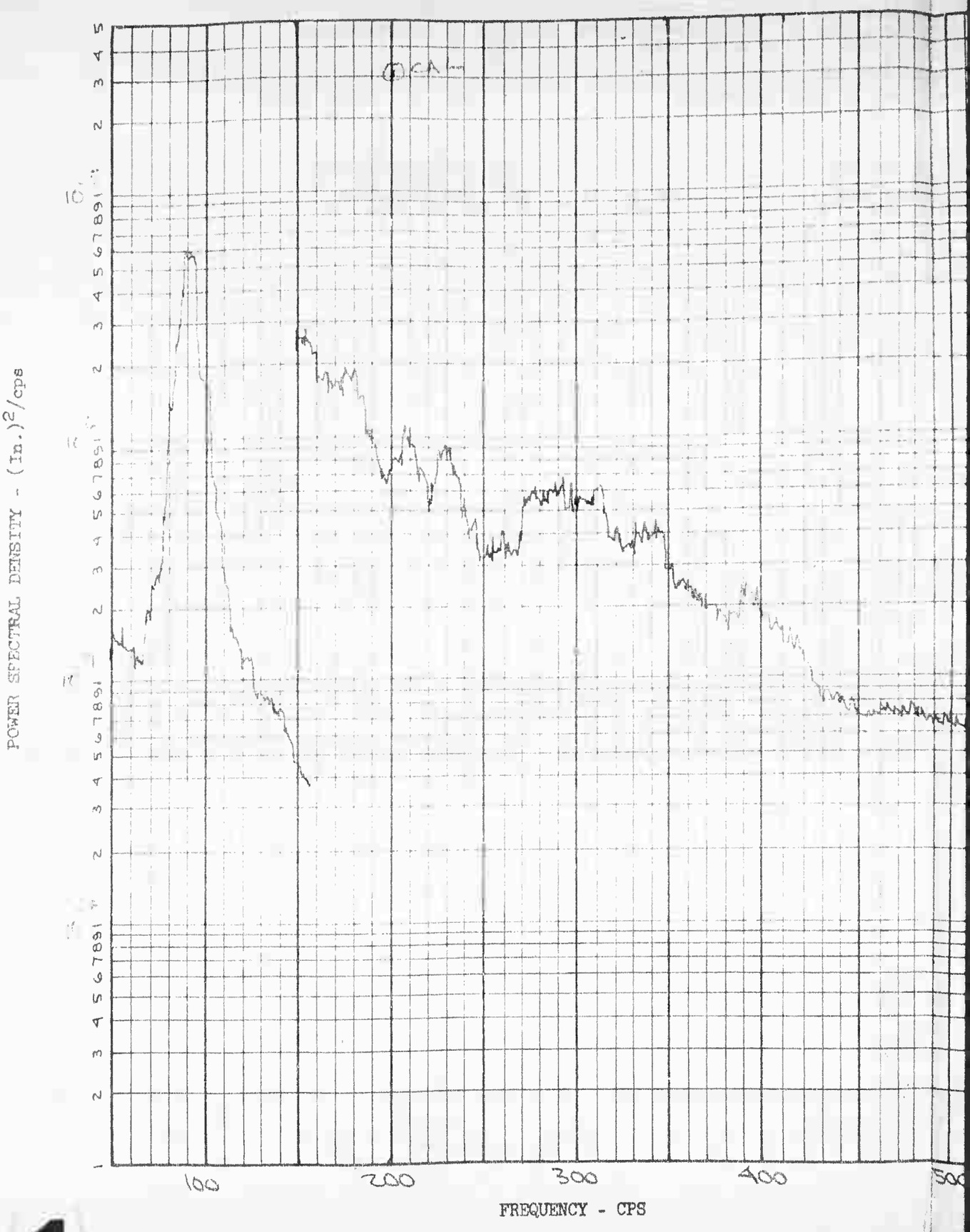


CALC	CBT	6/27/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP P/U #1 PANEL 1494 PHASE A 5 MIN. TEST
CHECK	JOA	6/26/61			
APR.					
APR.					
		6/28/61			BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON

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2



ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CALC	C B
CHECK	TC
APR.	
APR	

DATA IDENTIFICATION

Test Title		
PANEL ATTACH. TYPE I PRELIM		
EWA No. 5-593	Panel or Specimen No. 149A	
Tape No. 21A.	Tape Channel 4	Displacement Pickup # 5
Elapsed Test Time +5 MIN	P/U RMS Level at Sonic Lab. V_L = 260 Volts	

CALIBRATION

Tape No. 21A.	Tape Channel 7	Data Tape RMS Volt V_R = .465

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200cps

Line Amplifier Settings
For Calibration G_c = 200; for Data G_d = 200

Lab. Gain
LG = 1.0

Tape Monitor Gain $TMG = \frac{G_d}{G_c} = 1.0$

Displacement Pickup Sensitivity
S = .0354 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S = .0177$

Equivalent of Calibration for PSD Plots

$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left(\frac{(.0177)}{(1.0)(1.0)}\right)^2 = 3.13 \times 10^{-4} \text{ in.}^2/\text{cps}$$

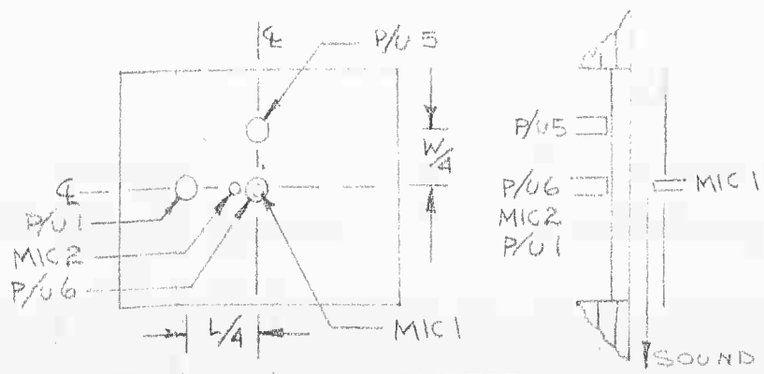
Analyzer Attenuator Setting ____ db
Log Converter Setting 0 db

Calibration Plotted at
3.13 × 10⁻⁴ in.²/cps

Overall Deflection Level of Data

$$\text{RMS Defl. Level} = \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0177)(.465)}{(1.0)(1.0)(.5)} = .0164 \text{ in.}$$

TO 150 CPS USE LEFT SCALE
150-550 CPS USE RIGHT SCALE



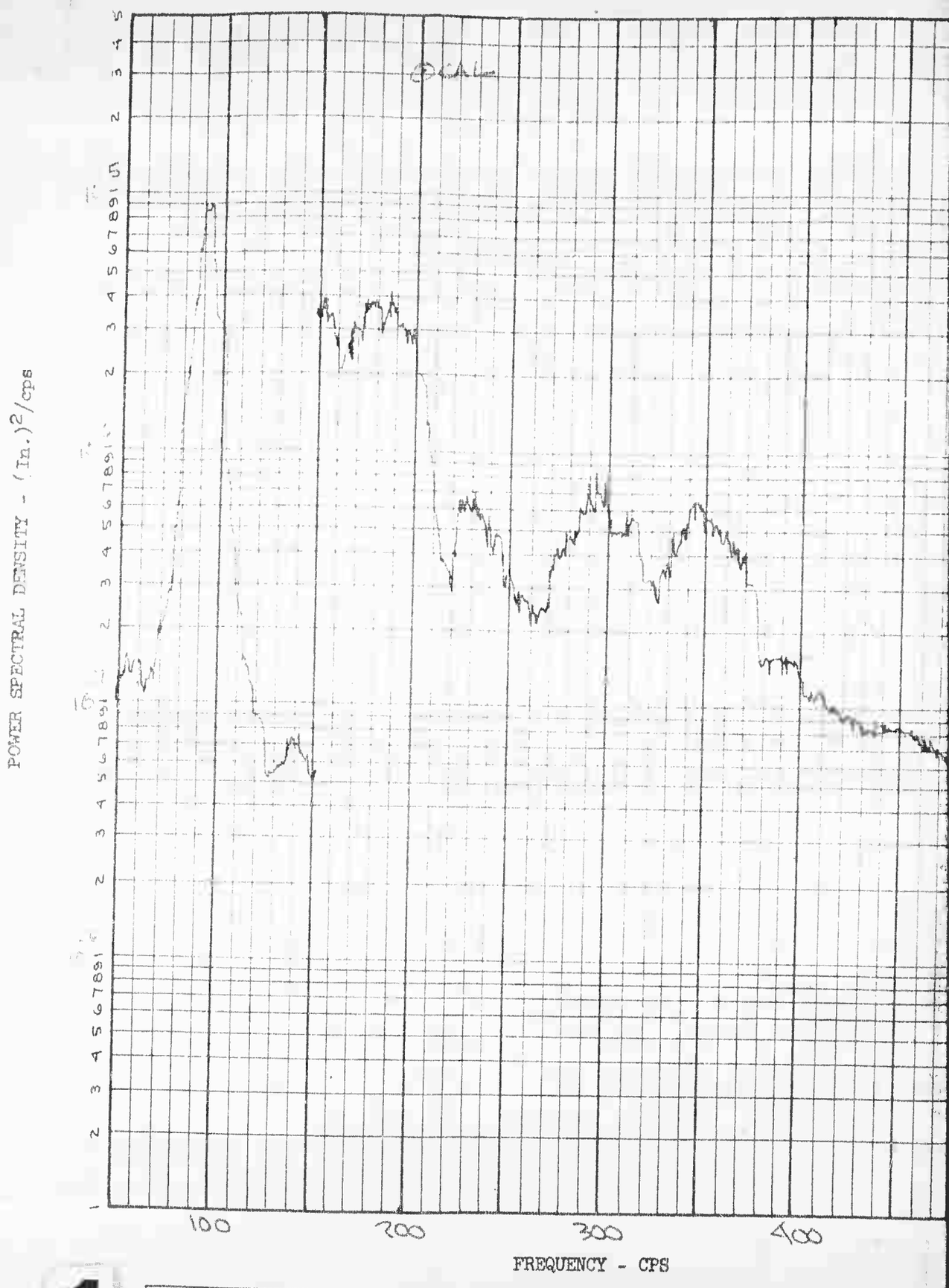
CALC	CBT	6/23/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP P/U #5 PANEL 149A PHASE A 5 MIN TEST
CHECK	TSOA	6/24/61			
APR.					
APR					
		6/30/61			

BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate .25 cps/sec.
Loop Length 4 Sec.

CALC
CHEC
APR.
APR.

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM		
EWA No.: 5-593	Panel or Specimen No.: 1494	
Tape No.: 21A	Tape Channel: 5	Displacement Pickup #: 6
Elapsed Test Time: +5 MIN	P/U RMS Level at Sonic Lab. V_L = .290 Volts	

CALIBRATION

Tape No.: 21A	Tape Channel: 7	Data Tape RMS Volt V_R = [illegible]

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @200cps

Line Amplifier Settings
For Calibration G_c = 200 ; for Data G_d = 200

Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c} = 1.0$

Displacement Pickup Sensitivity
S = .0354 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S = .0177$

Equivalent of Calibration for PSD Plots
$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left(\frac{.0177}{(1.0)(1.0)}\right)^2 = 3.13 \times 10^{-4} \text{ in.}^2/\text{cps}$$

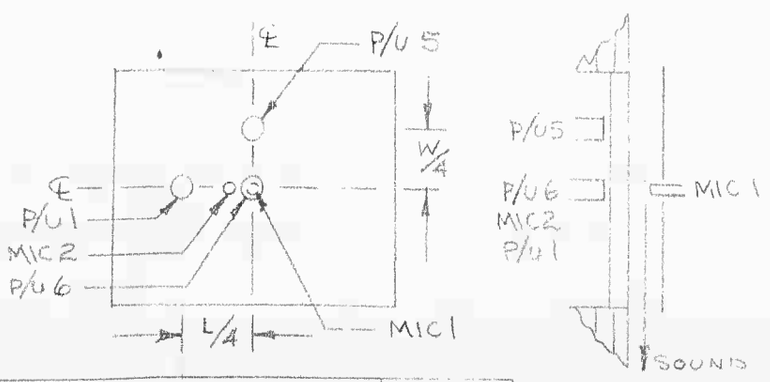
Analyzer Attenuator Setting [illegible] db Log Converter Setting [illegible] db

Calibration Plotted at [illegible] in.^{2}/cps

Overall Deflection Level of Data

RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = [illegible] = .0115 in.

TO 150 CPS USE LEFT SCALE
150-550 CPS USE RIGHT SCALE

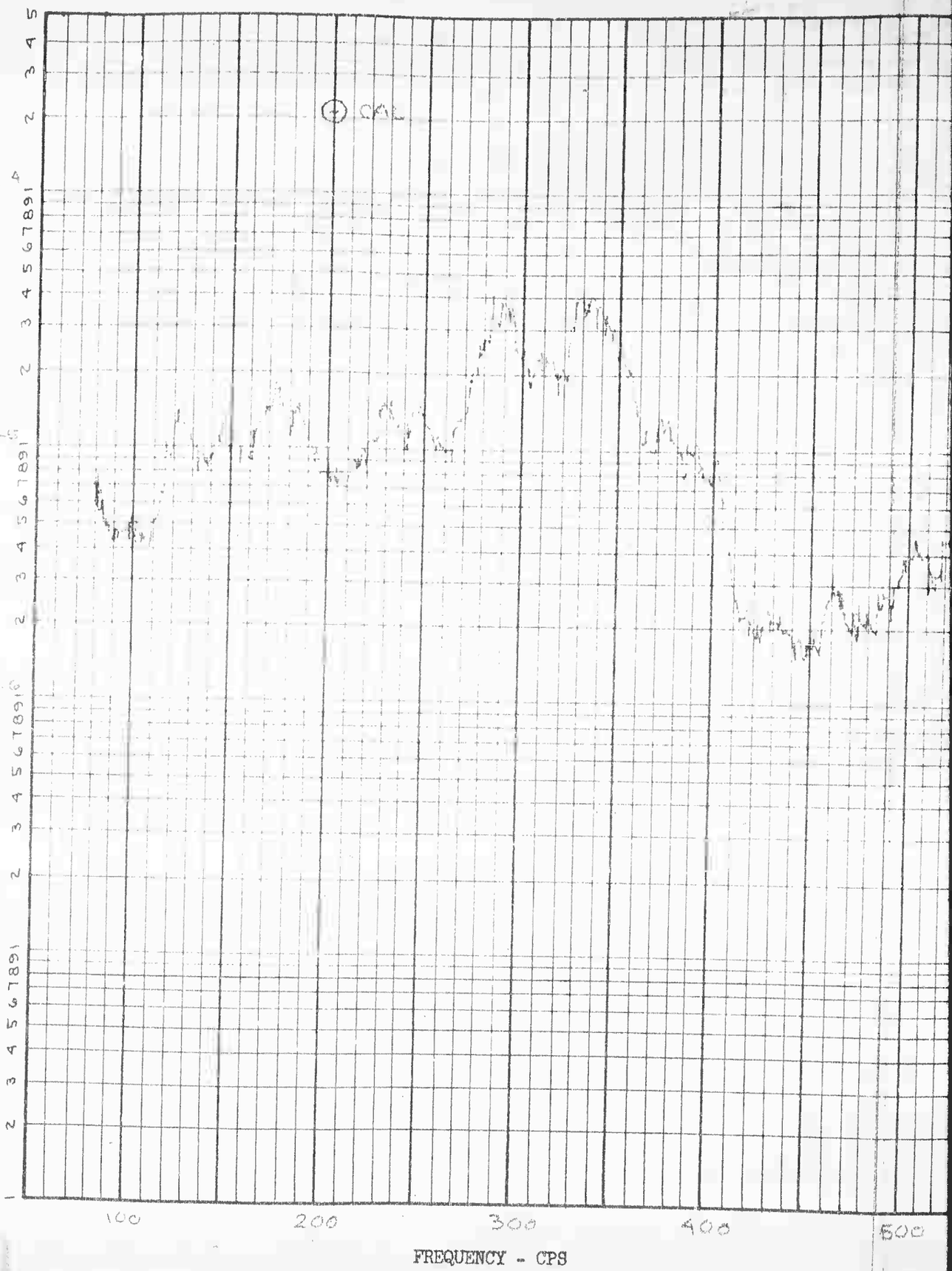


CALC	CBT	4/22/64	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP 5 MIN TEST P/U # 6 PANEL 1494 PHASE A
CHECK	SOA	4/24/64			
APR.					
APR.	[illegible]	4/27/64			

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SEATTLE 24, WASHINGTON
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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate .25 cps/Sec.
Loop Length 4 Sec.

CALC	
CHECK	JOA
APR.	
APR.	

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM.		
EWA No.: 5-592	Panel or Specimen No.: 1495	
Tape No.: 21	Tape Channel: 2	Mic. No.: 1
Elapsed Test Time: +5	Mic. RMS Level at Sonic Lab. V_L = .420 Volts	

CALIBRATION

Tape No. 21	Tape Channel 1	Data Tape RMS Volt V_R = .355

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .47 V_{rms} on Tape @ 200 cps

Line Amplifier Settings
For Calibration G_c = .100 ; for Data G_d = .100

Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0

Microphone Sensitivity
S = .270 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = .145

Equivalent of Calibration for PSD Plots

$$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{(1)(1)}\right]^2 = 2.1\,(10^{-2}) \quad psi^2/cps$$

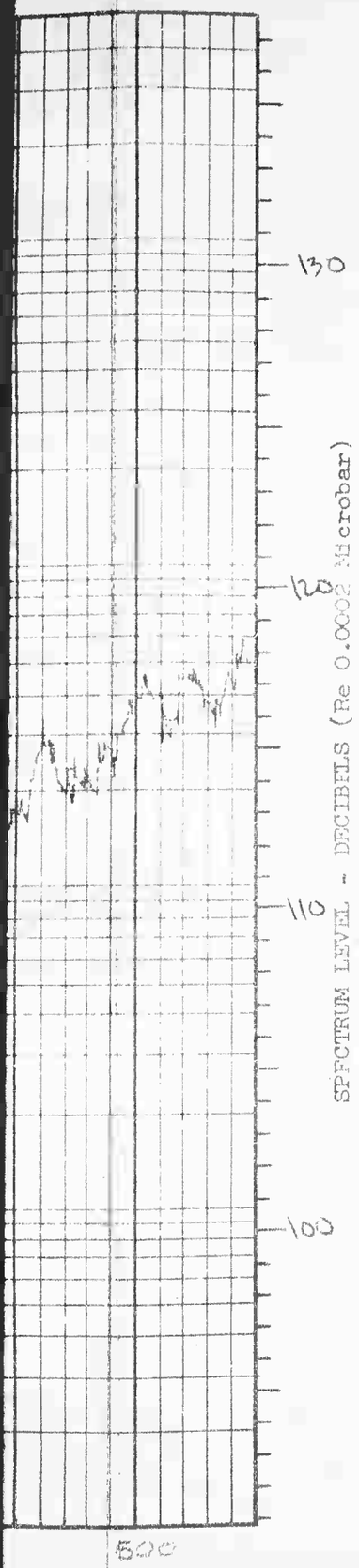
Analyzer Attenuator Setting: -20 db	Log Converter Setting: 0 db

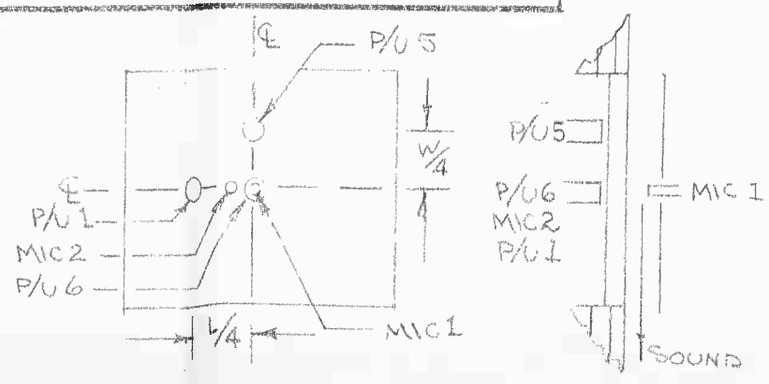
Calibration Plotted at 2.1 /10^{-4} psi^2/cps

Overall Pressure Level Data — Equiv. to 151.6 db SPL

RMS pressure level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$

$= \frac{.145\ (.355)}{(1)(1)\ (.47)} = .1095$ psi

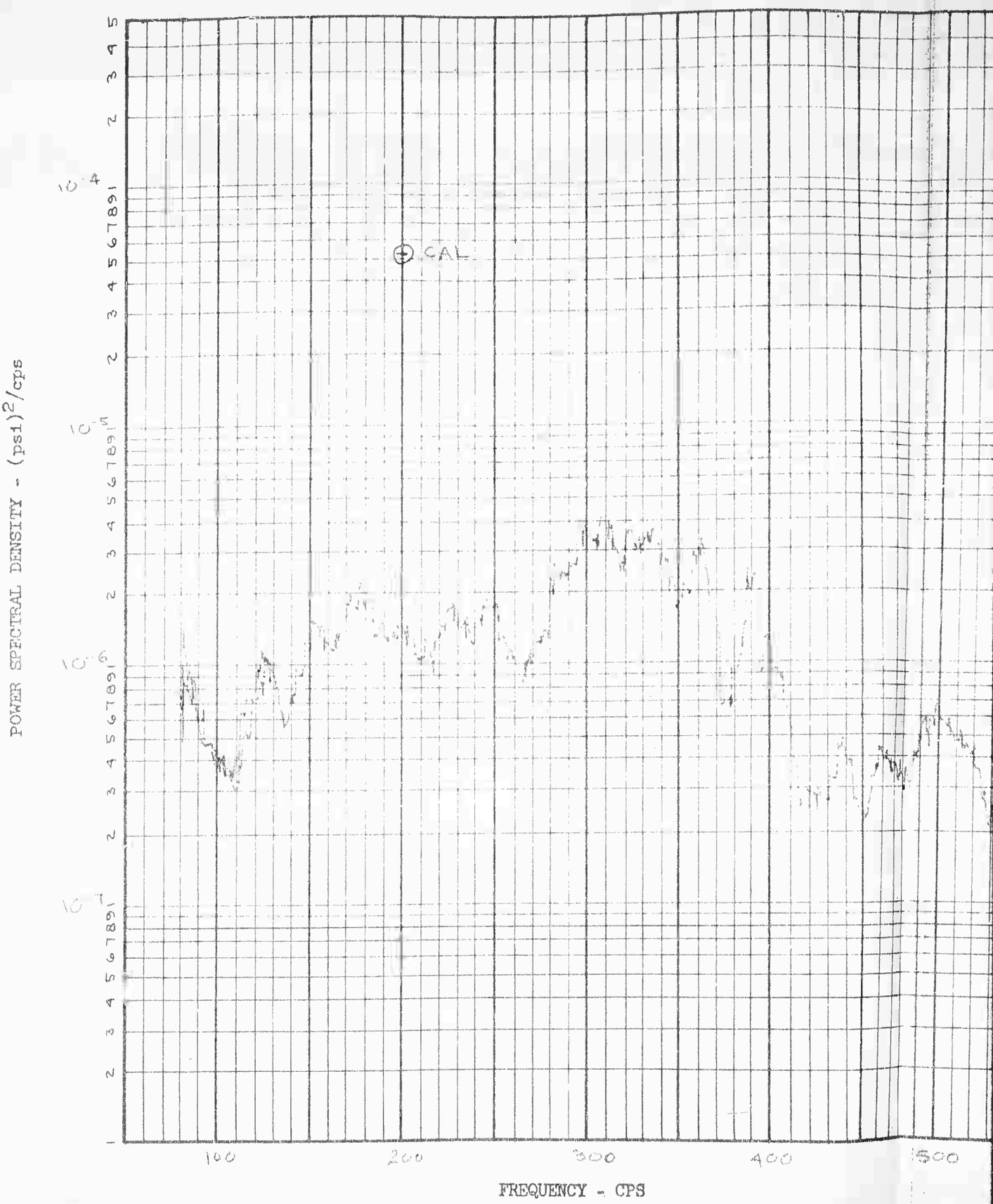




CALC	[illegible]	4-20	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT — Vol. I
CHECK	SOA	4/24/61			5 MIN TEST. — D2-80084
APR.					MIC 1 PANEL 1495 PHASE A — PAGE F16 178
APR.					BOEING AIRPLANE COMPANY, SEATTLE 24, WASHINGTON

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2



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 80 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 125 cps/Sec.
Loop Length 4 Sec.

CALC
CHECK
APR.
APR.

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM		
EWA No.: 5-593	Panel or Specimen No.: 1495	
Tape No.: 21	Tape Channel: 3	Mic. No.: 2
Elapsed Test Time: +5	Mic. RMS Level at Sonic Lab. V_L = .116 Volts	

CALIBRATION

Tape No.: 21	Tape Channel: 1	Data Tape RMS Volt V_R = .200

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .471 V_{rms} on Tape @ 2 kcps

Line Amplifier Settings
For Calibration G_c = .100 ; for Data G_d = .200

Lab. Gain: LG = 1.0	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = 2.0

Microphone Sensitivity
S = .290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = .145

Equivalent of Calibration for PSD Plots

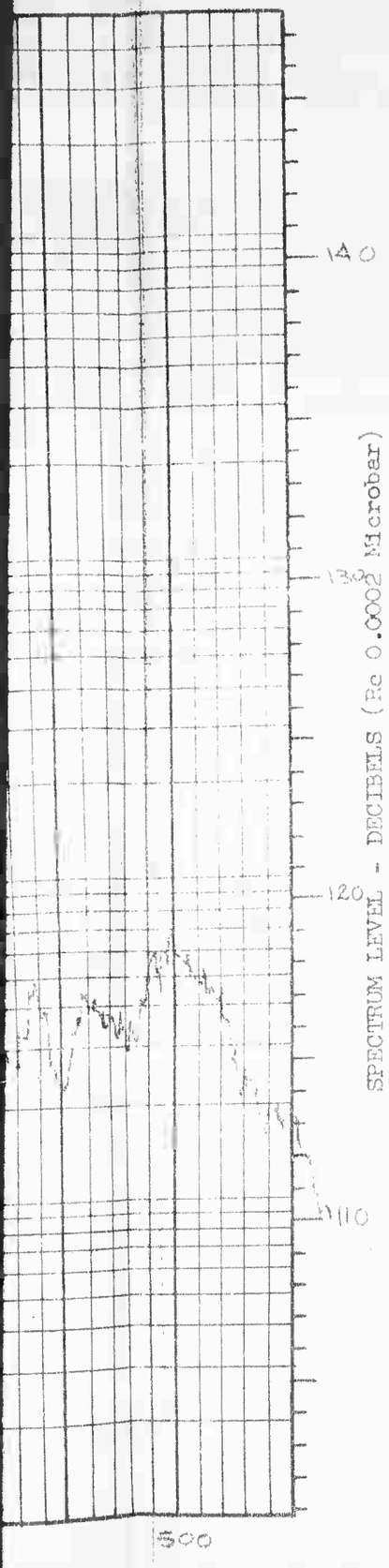
$$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{(2)(1)}\right]^2 = 5.25\,(10^{-3})\ psi^2/cps$$

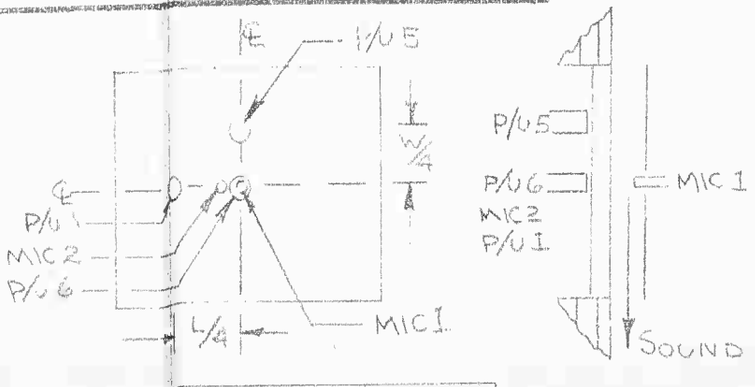
Analyzer Attenuator Setting: -20 db	Log Converter Setting: 0 db

Calibration Plotted at 5.25 (10-3) psi^2/cps

Overall Pressure Level Data — Equiv. to 140.5 db SPL

$$\text{RMS pressure level} = \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.145)(.200)}{(2)(1)(.471)} = .0308\ psi$$





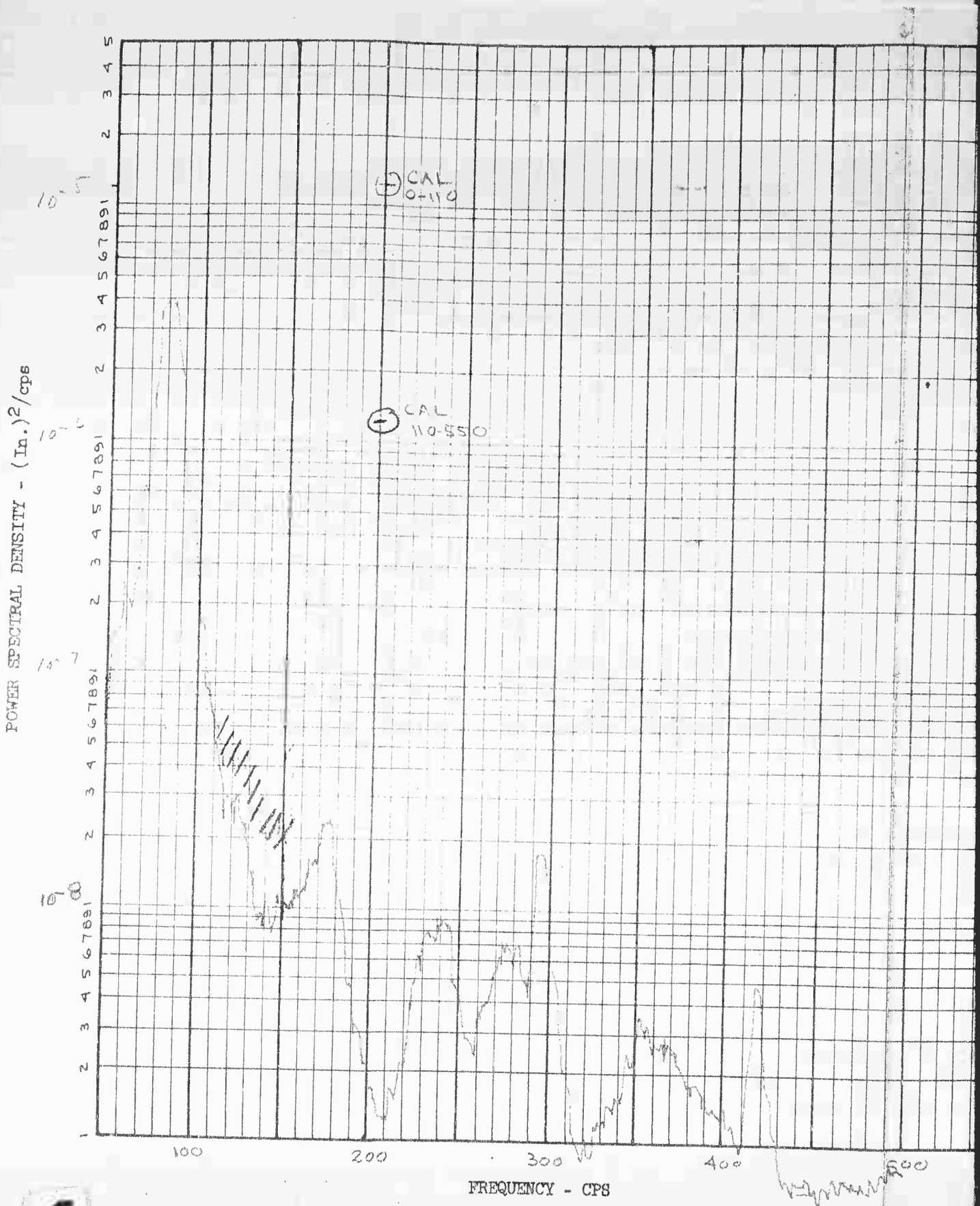
CALC			REVISED	DATE
CHECK				
APR.				
APR				

POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT
5 MIN TEST
MIC 2 PANEL 1495 PHASE A
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2



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CALC	
CHECK	SOA
APR.	
APR.	

DATA IDENTIFICATION

Test Title		
PANEL ATTACH TYPE I PRELIM.		
EWA No. 5-593	Panel or Specimen No. 1495	
Tape No. 21	Tape Channel 4	Displacement Pickup # 1
Elapsed Test Time +5 MIN	P/U RMS Level at Sonic Lab. V_L = .130 Volts	

CALIBRATION

Tape No. 21	Tape Channel 1	Data Tape RMS Volt V_R = .115

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .47 V_{rms} on Tape @ 200cps

Line Amplifier Settings
For Calibration G_c = .100; for Data G_d = .100

Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0

Displacement Pickup Sensitivity
S = .0107 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = .0354

Equivalent of Calibration for PSD Plots

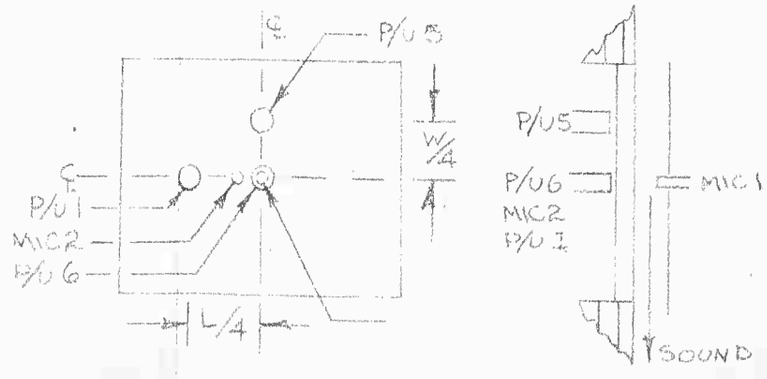
$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{(1)(1)}\right]^2 = 1.255\,(10^{-3}) \text{ in.}^2/\text{cps}$$

Analyzer Attenuator Setting	Log Converter Setting
-20 0-110 db -30 110-550	0 db

Calibration Plotted at 1.255 (10⁻³) 0-110
1.255 (10⁻⁶) 110-550 in.²/cps

Overall Deflection Level of Data

$$\text{RMS Defl. Level} = \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0354)(.115)}{(1)(1)(.47)} = .0087 \text{ in.}$$



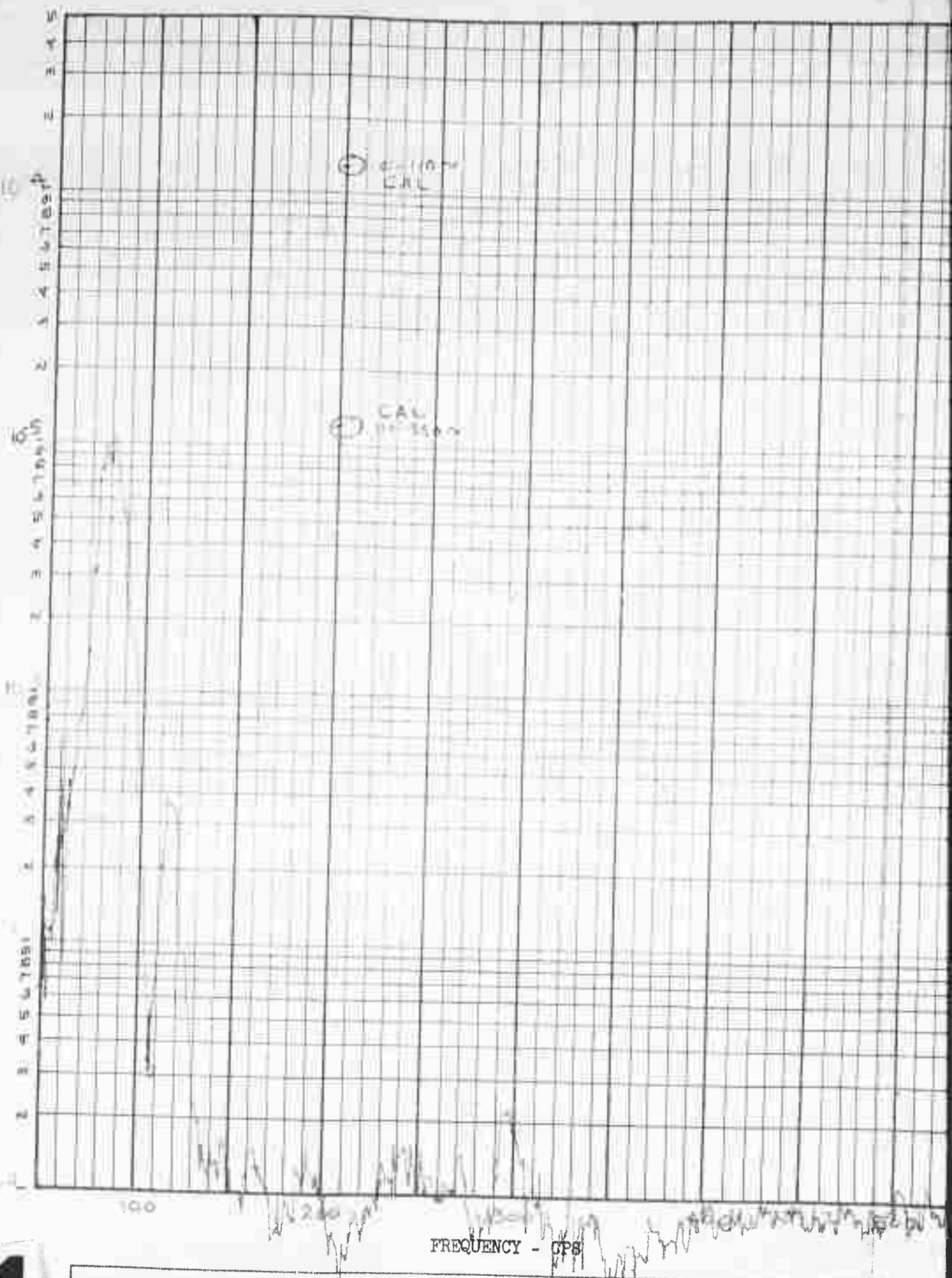
CALC	[illegible]	[illegible]	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP P/U 1 PANEL 1495 PHASE A 5 MIN TEST BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
CHECK	SOA	[illegible]			
APR.					
APR.					

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2

POWER SPECTRAL DENSITY - $(In.)^2/cps$



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

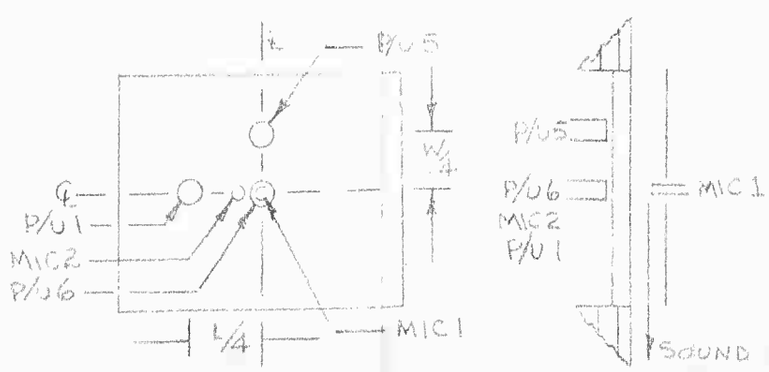
CALC	
CHECK	
APR.	
APR.	

DATA IDENTIFICATION

Test Title		
PANEL ATTACH TYPE I PRELIM		
EWA No. 5-593	Panel or Specimen No. 1495	
Tape No. 21	Tape Channel 5	Displacement Pickup # 5
Elapsed Test Time +5	P/U RMS Level at Sonic Lab. V_L = .245 Volts	

CALIBRATION

Tape No. 21	Tape Channel 1	Data Tape RMS Volt V_R = .180
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .47 V_{rms} on Tape @200cps		
Line Amplifier Settings For Calibration G_c = .100; for Data G_d = .100		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0	
Displacement Pickup Sensitivity S = .0101 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = .0254		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0254}{(1)(1)}\right]^2 = 1.255\,(10^{-3})$ in.^{2}/cps		
Analyzer Attenuator Setting -1C 0-1 V -2C 1-10 V dB	Log Converter Setting 0 db	
Calibration Plotted at 1.255 (0-1) 0-1 V 1.255 (10-3) 10 mV in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0254)(.18)}{(1.0)(.47)} = .0096$ in.		

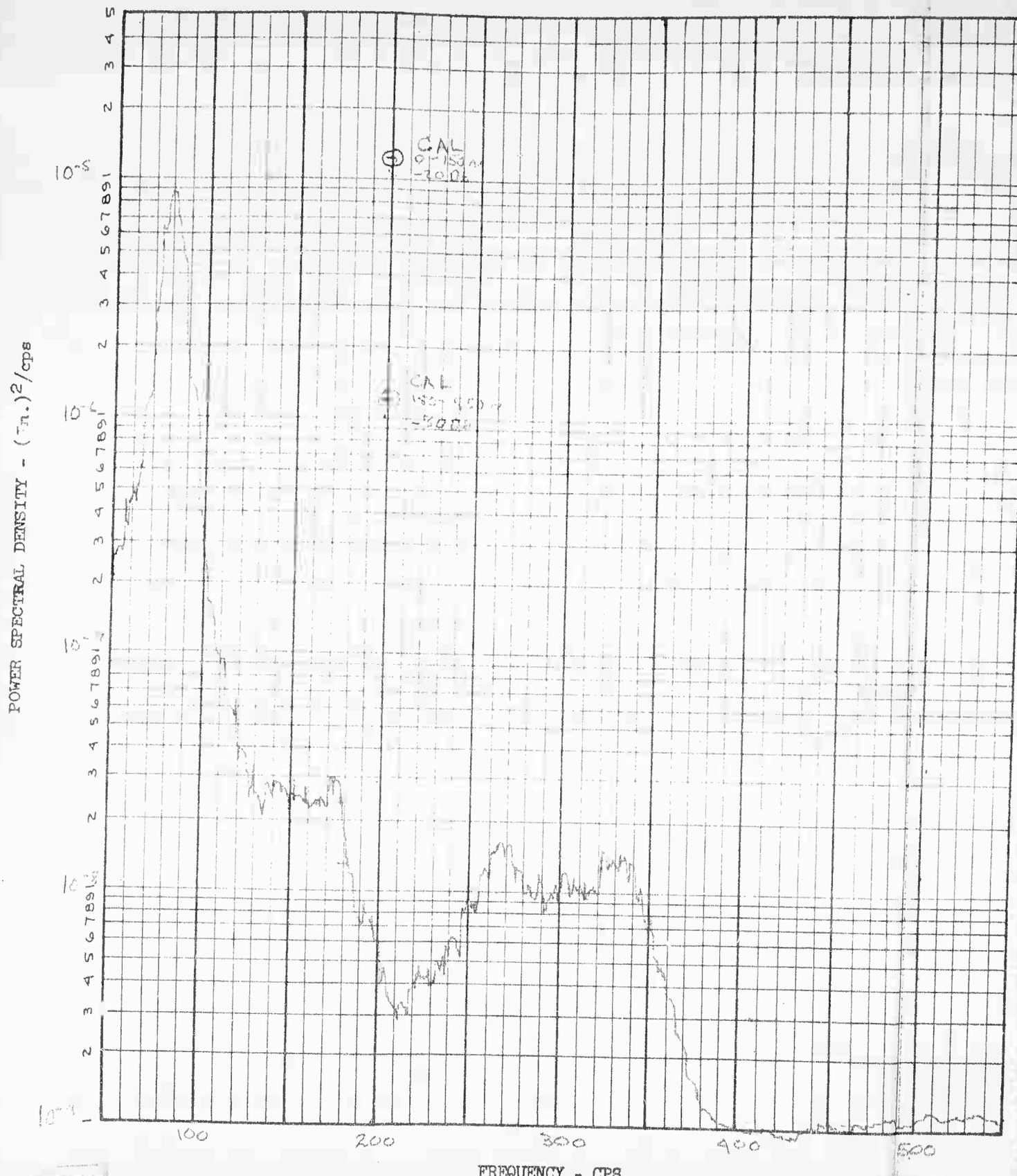


CALC	MCM	6-23	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP SONIC TEST P/U 5 PANEL 1495 PHASE A BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
CHECK	TSA	6/24/61			
APR.					
APR					

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2



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
____ cycles from ____ to ____ cps
____ cycles from ____ to ____ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

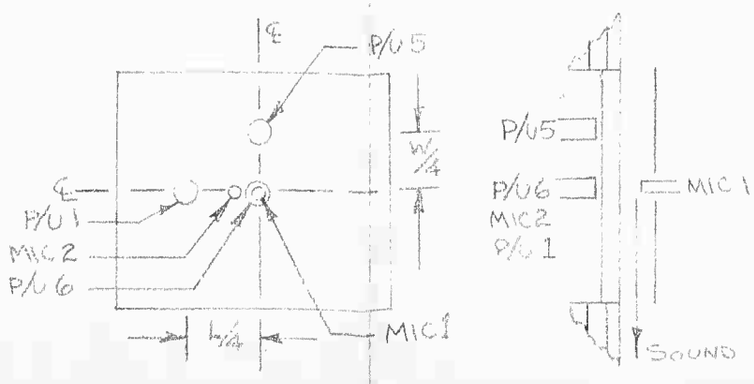
CALC	MCM	6/2
CHECK	JOA	6/2
APR.		
APR.		

DATA IDENTIFICATION

Test Title		
PANEL ATTACH. TYPE I PRELIM.		
EWA No. 5-593	Panel or Specimen No. 1495	
Tape No. 21	Tape Channel 6	Displacement Pickup # 6
Elapsed Test Time +5	P/U RMS Level at Sonic Lab. V_L = .180 Volts	

CALIBRATION

Tape No. 21	Tape Channel 1	Data Tape RMS Volt V_R = .155
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .470 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = .100 ; for Data G_d = .100		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0	
Displacement Pickup Sensitivity S = .0707 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = .0354		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0354}{(1)(1)}\right]^2 = 1.255\,(10^{-3})$ in.^{2}/cps		
Analyzer Attenuator Setting −20 0-150 −30 150-250 db	Log Converter Setting 0 db	
Calibration Plotted at 1.255 (10^{-3}) 0-150 1.055 (10^{-3}) 150-250 in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{.0354\,(.155)}{(1)(1)(.47)}$ = .0117 in.		

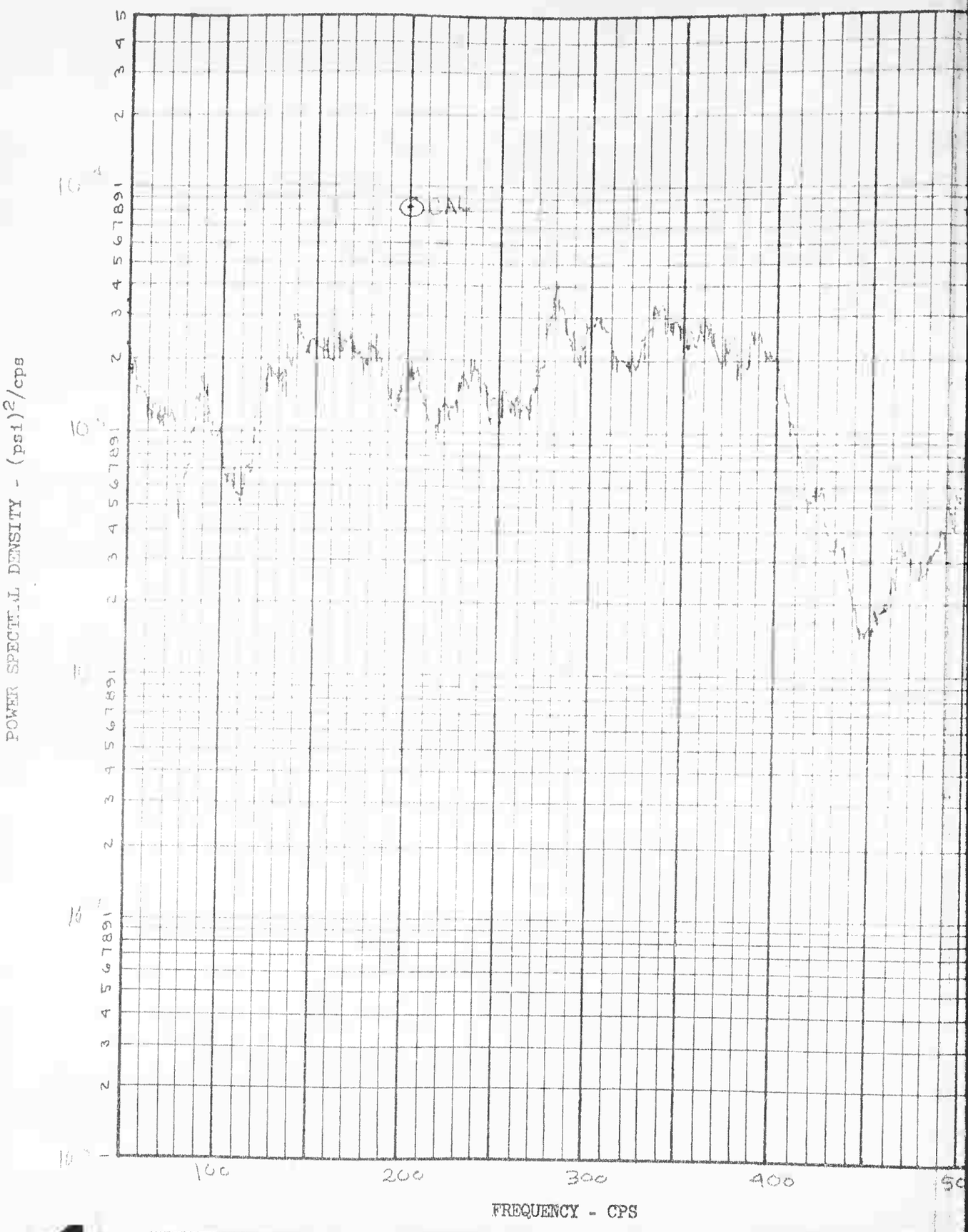


CALC	MCM	6/23	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
CHECK	SOA	6/24/11			5 MIN TEST
APR.					P/U 6 PANEL 1495 PHASE A
APR					BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON

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ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
____ cycles from ____ to ____ cps
____ cycles from ____ to ____ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CALC	
CHECK	
APR.	
APR.	

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I PRELIM.		
EWA No.: S-593	Panel or Specimen No.: 1495	
Tape No.: 25	Tape Channel: 1	Mic. No.: 1
Elapsed Test Time: +55	Mic. RMS Level at Sonic Lab. V_L = .192 Volts	

CALIBRATION

Tape No.: 25	Tape Channel: 1	Data Tape RMS Volt V_R = .187

Calibration Voltage
$V_a = .5\ V_{rms}$ into Line Amp.; $V_c = .5\ V_{rms}$ on Tape @ 200 cps

Line Amplifier Settings
For Calibration G_c = .500 ; for Data G_d = .250

Lab. Gain: LG = 1.0	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = .50

Microphone Sensitivity
S = .250 psi/Volt or 1 Volt rms = 100 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S = .145$

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{(.5)(1)}\right]^2 = 8.41\ (10^{-2})$ psi²/cps

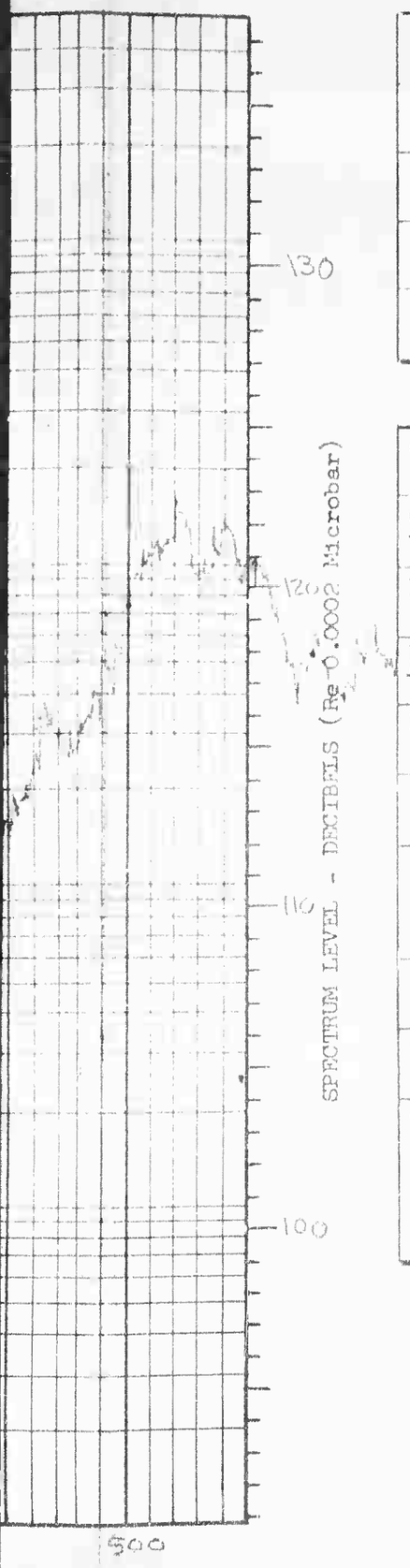
Analyzer Attenuator Setting: -30 db	Log Converter Setting: 0 db

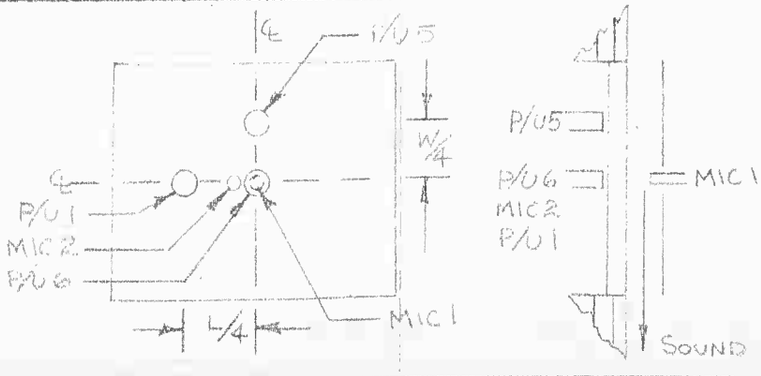
Calibration Plotted at 8.41 (10^{-2}) psi²/cps

Overall Pressure Level Data — Equiv. to 151.5 db SPL

RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$

$= \frac{.145(.187)}{(.5)(1)(.5)} = .1085$ psi





CALC	MCM	6-23	REVISED	DATE
CHECK	SOA	6/26/61		
APR.				
APR				

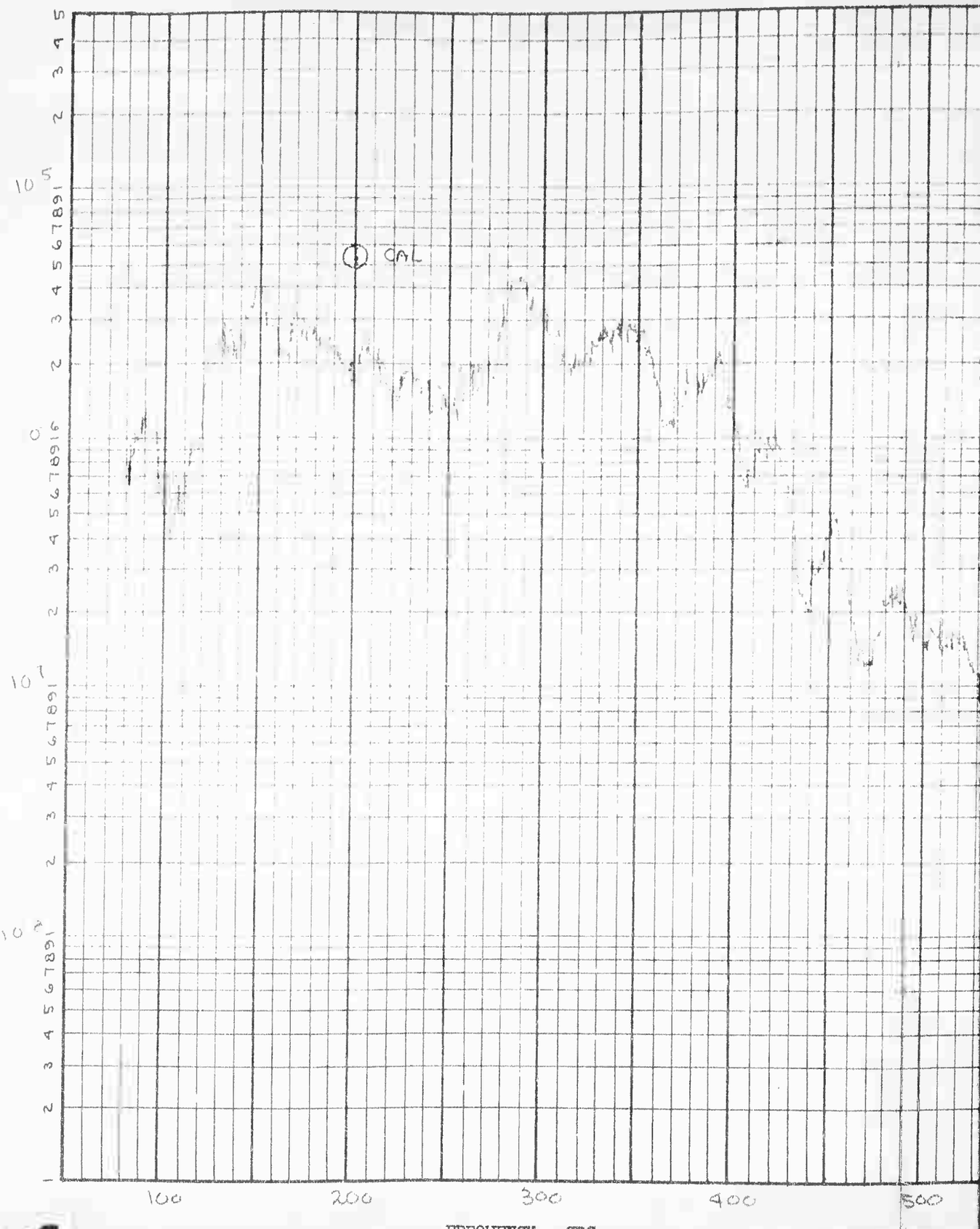
POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT
55 MIN TEST
MIC 1 PANEL 1495 PHASE B

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SEATTLE 24, WASHINGTON

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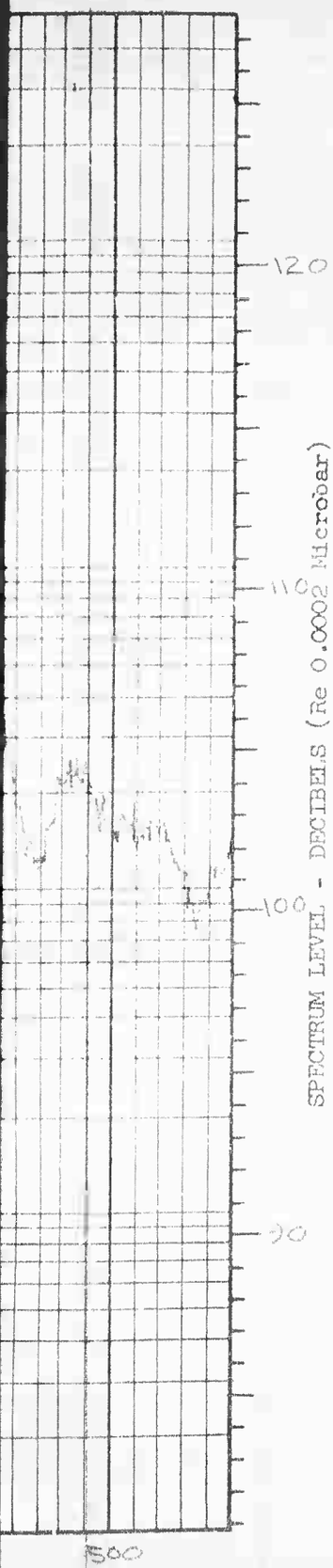
ANALYSIS VARIABLES

Bandwidth

5 cycles from 80 to 550 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CALC	BGGE
CHECK	SOA
APR.	
APR.	



DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM.		
EWA No.: 5-592	Panel or Specimen No.: 1495	
Tape No.: 25	Tape Channel: 2	Mic. No.: 2
Elapsed Test Time: +55	Mic. RMS Level at Sonic Lab. V_L = — Volts	

CALIBRATION

Tape No. 25	Tape Channel "	Data Tape RMS Volt V_R = .228

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps

Line Amplifier Settings
For Calibration G_c = .500 ; for Data G_d = 1.000

Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2.0

Microphone Sensitivity
S = .290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = .145

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{(2.0)(1.0)}\right]^2 = 5.25\,(10^{-3})$ psi²/cps

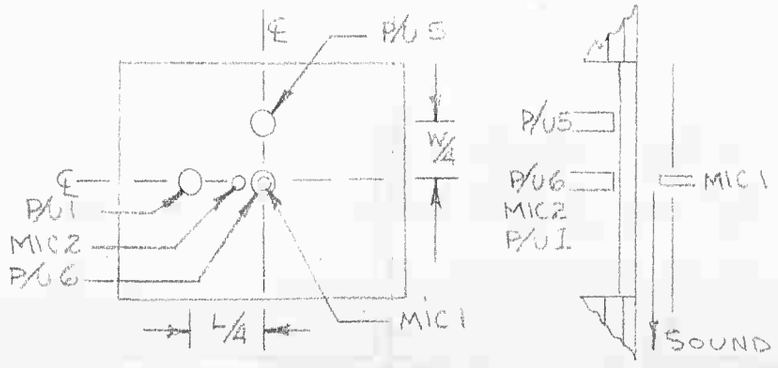
Analyzer Attenuator Setting -30 db	Log Converter Setting 0 db

Calibration Plotted at 5.25×10^{-6} psi²/cps

Overall Pressure Level Data — Equiv. to 141.2 db SPL

RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$

$= \frac{.145\,(.228)}{(2)(1)(.5)} = .03231$ psi



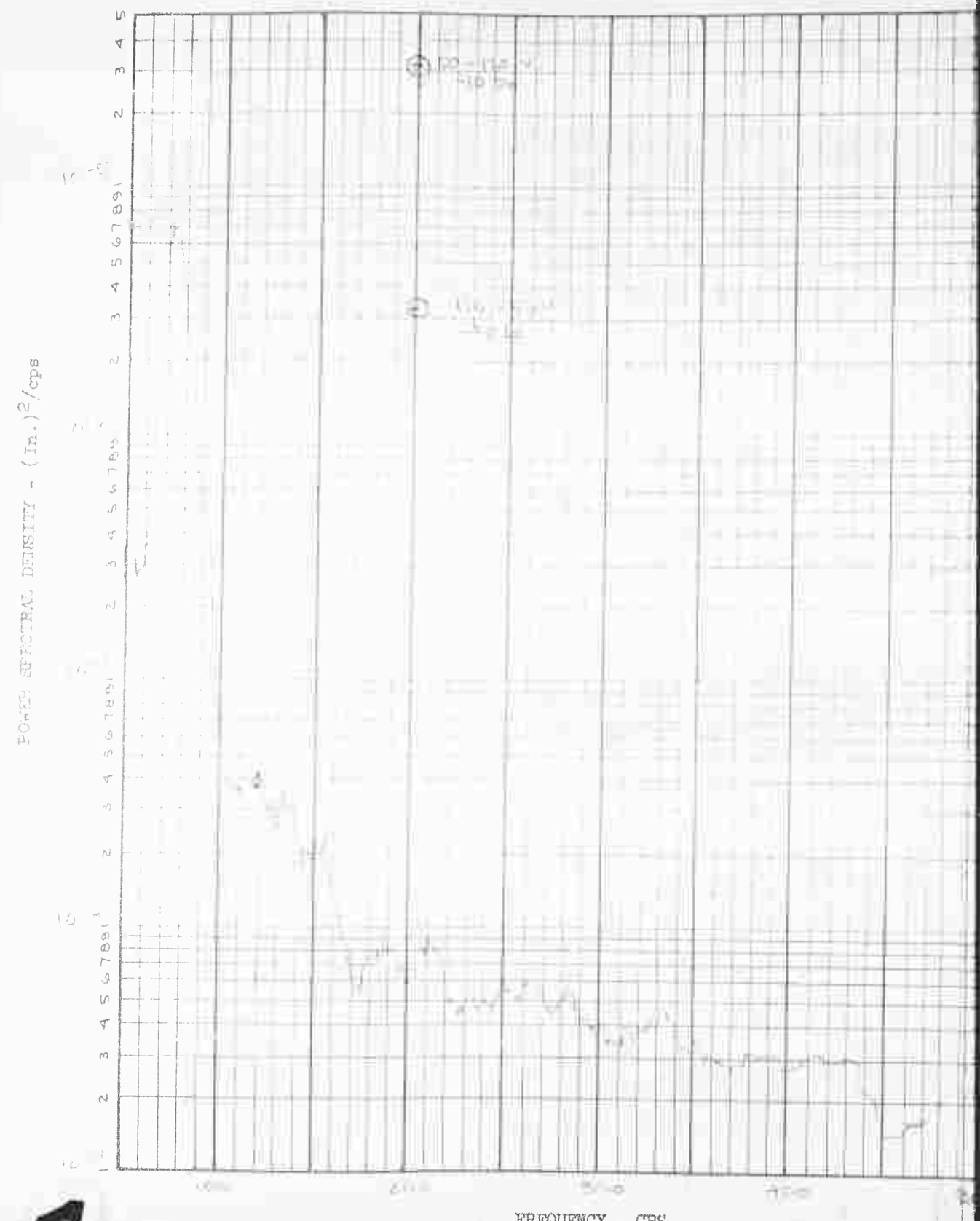
CALC	[illegible]	[illegible]	REVISED	DATE
CHECK	SOA	4-26-61		
APR.				
APR.				

POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT
55 MIN TEST
MIC 2 PANEL 1495 PHASE II
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CALC
CHECK
APR.
APR

DATA IDENTIFICATION

Test Title		
PANEL ATTACH - TYPE I [illegible]		
EWA No. 5-5[illegible]	Panel or Specimen No. 1425	
Tape No. 25	Tape Channel 2	Displacement Pickup # 1
Elapsed Test Time +[illegible]	P/U RMS Level at Sonic Lab. V_L = .2[illegible] Volts	

CALIBRATION

Tape No. 25	Tape Channel 7	Data Tape RMS Volt V_R = .[illegible]

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .5 rms on Tape [illegible] cps

Line Amplifier Settings
For Calibration G_c = .500; for Data G_d = .5[illegible]

Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.[illegible]

Displacement Pickup Sensitivity
S = .[illegible] in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = .[illegible]

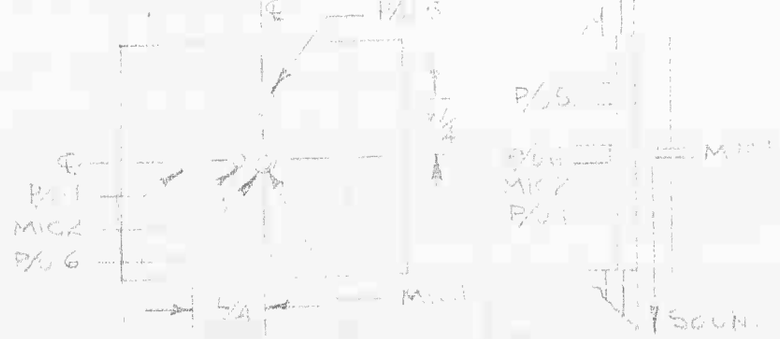
Equivalent of Calibration for PSP Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = [illegible] in.^{2}/cps

Analyzer Attenuator Setting [illegible] db	Log Converter Setting 0 db

Calibration Plotted at [illegible] ~ [illegible] ~ [illegible] in.^{2}/cps

Overall Deflection Level of Data

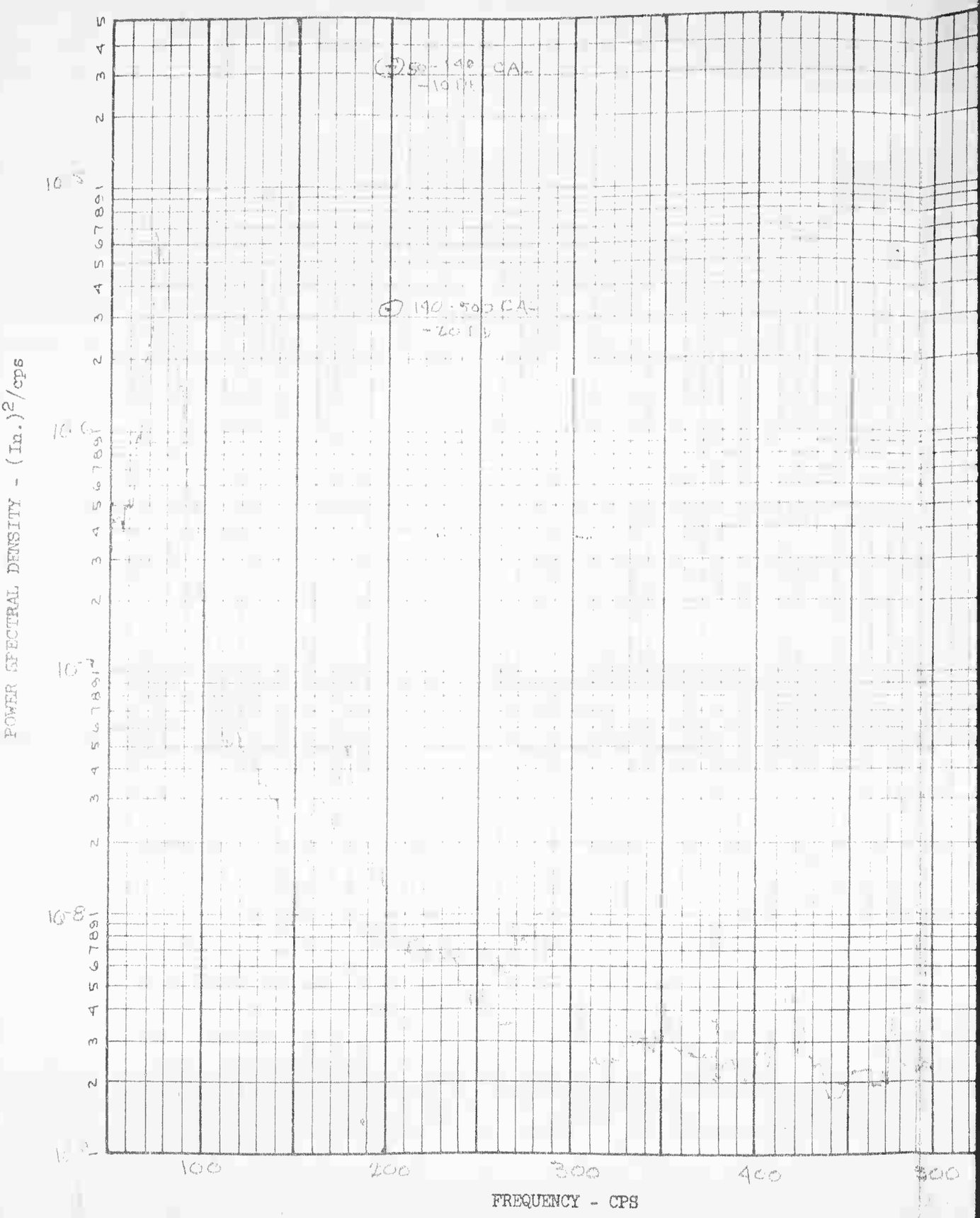
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = [illegible] in.



			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	VOL I
CALC	[illegible]	[illegible]				
CHECK	TSOA	6/24/61			P/U 1 PANEL 1425 [illegible] TEST	
APR.					BOEING AIRPLANE COMPANY	PAGE [illegible]
APR.					SEATTLE 24, WASHINGTON	

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ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 125 cps/sec.
Loop Length 4 Sec.

CALC
CHECK
APR
APR

1

DATA IDENTIFICATION

Test Title		
PANEL ATTACH TYPE F [illegible]		
EWA No. 5-595	Panel or Specimen No. 1495	
Tape No. 25	Tape Channel 4	Displacement Pickup # 5
Elapsed Test Time +55	P/U RMS Level at Sonic Lab. V_L = .300 Volts	

CALIBRATION

Tape No. 25	Tape Channel 7	Data Tape RMS Volt V_R = .285

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200cps

Line Amplifier Settings
For Calibration G_c = .500 ; for Data G_d = .500

Lab. Gain
LG = 1.0

Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0

Displacement Pickup Sensitivity
S = [illegible] in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = .0177

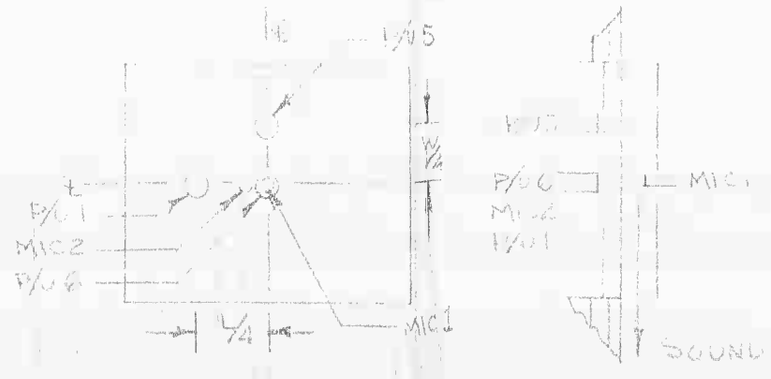
Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = [illegible] = 3.1? (10^{-4}) $in.^2/cps$

Analyzer Attenuator Setting [illegible] db
Log Converter Setting [illegible] db

Calibration Plotted at [illegible] $in.^2/cps$

Overall Deflection Level of Data

RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = [illegible] = .010 in.



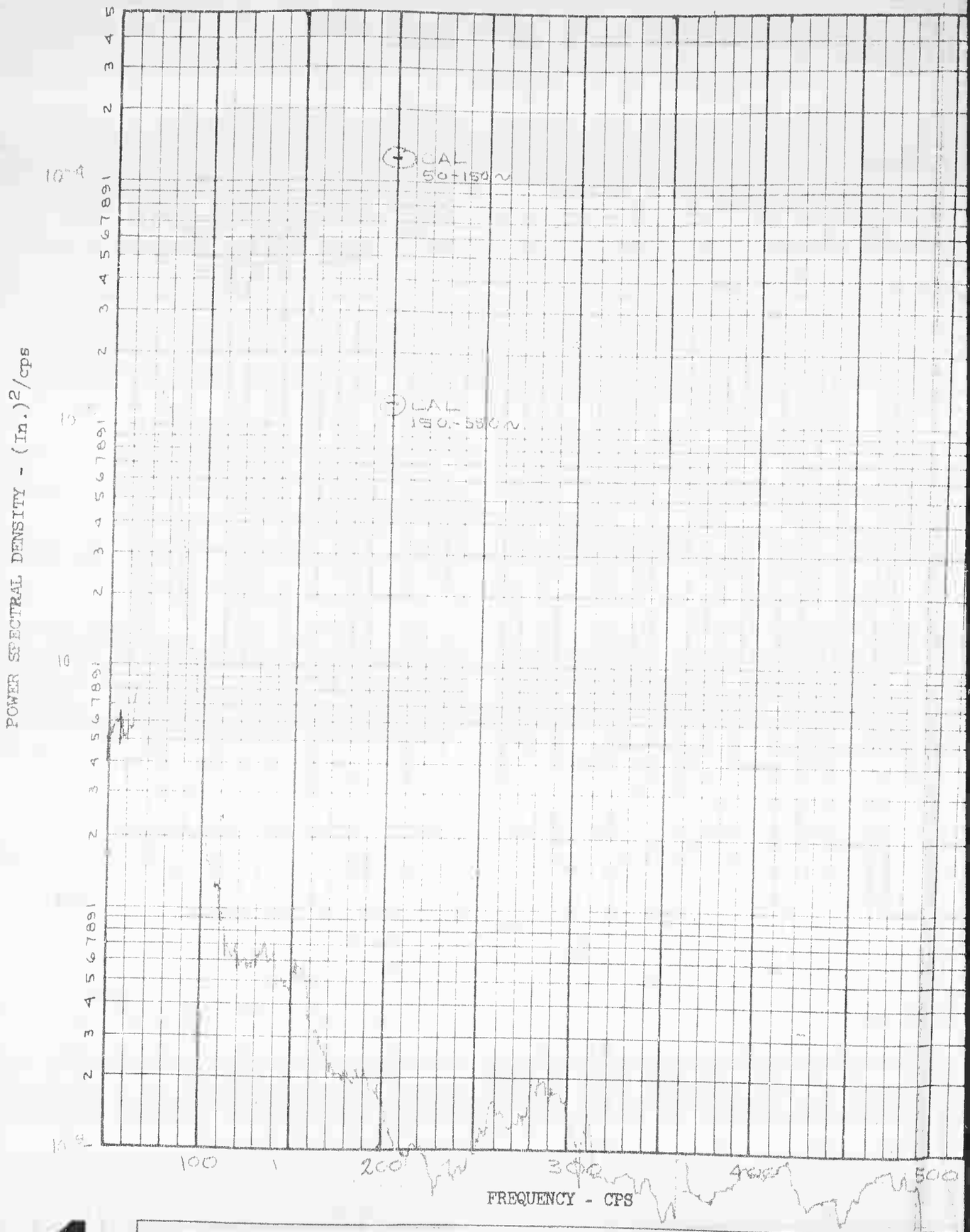
			REVISED	DATE
CALC	[illegible]	6-2		
CHECK	[illegible]	6/9/61		
APR				
APR				

POWER SPECTRAL DENSITY ANALYSIS
OF DISPLACEMENT PICKUP
P/U 5 PANEL 1495 Bldg. [illegible]
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1125 cps/sec.
Loop Length 4 Sec.

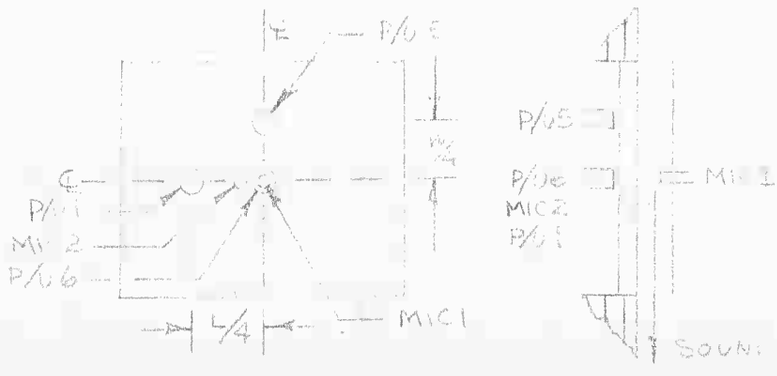
CALC	
CHECK	
APR.	
APR.	

DATA IDENTIFICATION

Test Title		
PANEL ATTACH TYPE I PRELIM.		
EWA No. 5-593	Panel or Specimen No. 1495	
Tape No. 25	Tape Channel 5	Displacement Pickup # 6
Elapsed Test Time +55	P/U RMS Level at Sonic Lab. V_L = .320 Volts	

CALIBRATION

Tape No. 25	Tape Channel 7	Data Tape RMS Volt V_R = .210
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @200cps		
Line Amplifier Settings For Calibration G_c = .500; for Data G_d = .250		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = .50	
Displacement Pickup Sensitivity S = .0234 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = .0117		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left(\frac{.0117}{(.5)(1)}\right)^2 = 1.25(10^{-4})$ in.^{2}/cps		
Analyzer Attenuator Setting 10 db	Log Converter Setting 0 db	
Calibration Plotted at 1.225×10^{-4} (50-500) 1.225×10^{-5} (100-500) in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0117)(.210)}{(.5)(1)(.5)}$ = .0049 in.		



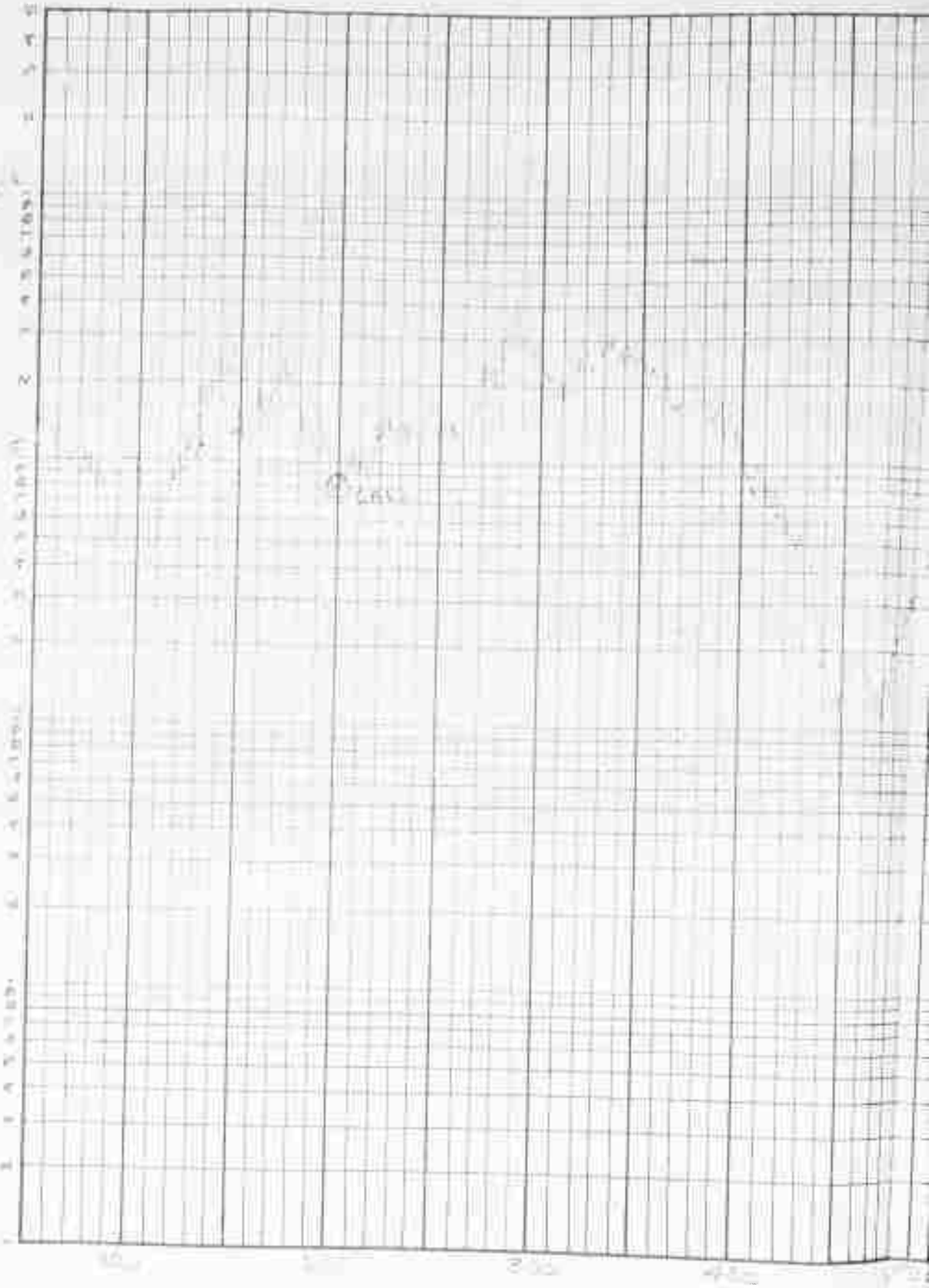
2

CALC			REVISED	DATE
CHECK				
APR.				
APR				

POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
50 MIN. TEST
P/U 6, PANEL 1495 PHASE I
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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POWER SPECTRAL DENSITY - $(psi)^2/cps$



FREQUENCY - CPS

1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 300 cps — T_c 4 Sec.

___ cycles from ___ to ___ cps — Anal. Rate 1.25 cps/Sec.

___ cycles from ___ to ___ cps — Loop Length 4 Sec.

CALC

CHECK

APR.

APR

DATA IDENTIFICATION

Test Title: [illegible] PANEL ATTACHMENT - TYPE I		
EWA No. [illegible]	Panel or Specimen No. 1A1	
Tape No. 26	Tape Channel 1	Mic. No. 1
Elapsed Test Time 5 MIN	Mic. RMS Level at Sonic Lab. V_L = .2[illegible] Volts	

CALIBRATION

Tape No. 26	Tape Channel 7	Data Tape RMS Volt V_R = .17[illegible]

Calibration Voltage
V_a = .[illegible] V_{rms} into Line Amp.; V_c = .4[illegible] V_{rms} on Tape [illegible] cps

Line Amplifier Settings
For Calibration G_c = [illegible]; for Data G_d = [illegible]

Lab. Gain LG = 1.0	Tape Monitor Gain TMG = $\frac{G_d}{G_c}$ = [illegible]

Microphone Sensitivity
S_a = .270 psi/Volt or 1 Volt rms = [illegible] db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = 0.1[illegible]

Equivalent of Calibration for ISD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2$ = [illegible] psi^2/cps

Analyzer Attenuator Setting [illegible] db	Log Converter Setting [illegible] db

Calibration Plotted at [illegible] psi^2/cps

Overall Pressure Level Data	Equiv. to [illegible] db SPL

RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$

= [illegible] = .[illegible] psi

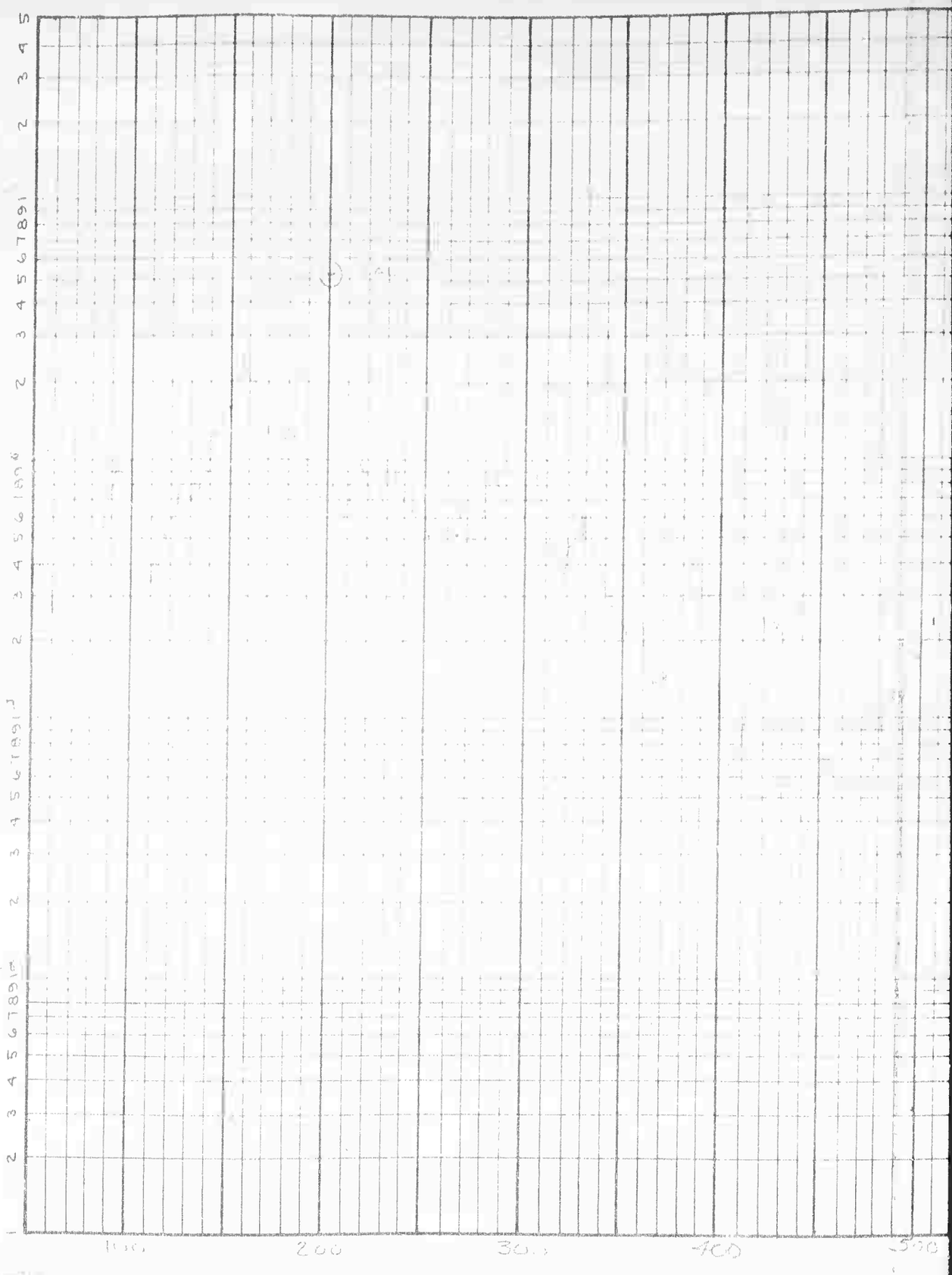
SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

CALC		REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT
CHECK	6-26			MIC #1 PANEL A97 PHASE [illegible]
APR.				BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
APR				

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PAGE [illegible]

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FREQUENCY - CPS

1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 45 to 50 cps T_c 4 Sec.
____ cycles from ____ to ____ cps Anal. Rate 1.25 cps/Sec.
____ cycles from ____ to ____ cps Loop Length 4 Sec.

CALC
CHECK
APR.
APR.

DATA IDENTIFICATION

Test Title: D.E. PANEL AT VA HWL - TYPE 1		
EWA No. 5-5[illegible]	Panel or Specimen No. 1A[illegible]	
Tape No. 2[illegible]	Tape Channel 2	Mic. No. 2
Elapsed Test Time [illegible] MIN.	Mic. RMS Level at Sonic Lab. V_L = [illegible] Volts	

CALIBRATION

Tape No. 2[illegible]	Tape Channel [illegible]	Data Tape RMS Volt V_R = [illegible]

Calibration Voltage
V_a = [illegible] V_{rms} into Line Amp.: V_c = [illegible] V_{rms} on Tape [illegible] cps

Line Amplifier Settings
For Calibration G_c = [illegible] ; for Data G_d = [illegible]

Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = [illegible]

Microphone Sensitivity
S = .20[illegible] psi/volt or 1 Volt rms = [illegible] lb/ft²

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = [illegible]

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2$ = [illegible] psi^2/cps

Calibrator Attenuator Setting [illegible] db	Log Converter Setting [illegible] db

Calibration Plotted at [illegible] ($10^{-[illegible]}$) psi^2/cps

Overall Pressure Level Data
$\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = [illegible] psi

Equiv. to [illegible] dB SPL	

RMS pressure level = [illegible] psi

SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

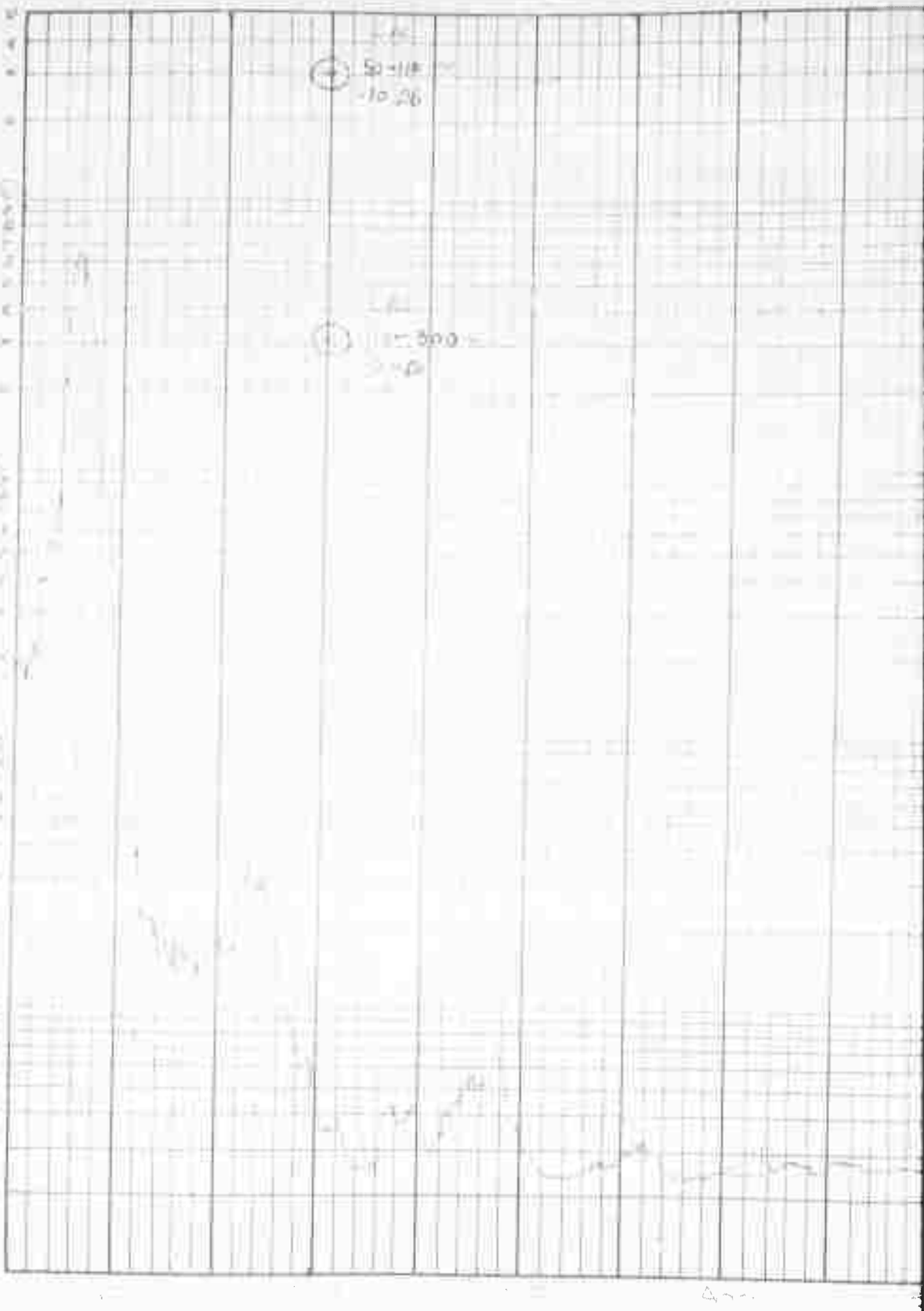
120

SEC

2

CALC	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	Vol I
CHECK			MIC # 2 PANEL A7 PHASE A	
APR.			BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON	PAGE [illegible]
APR.				

D-5353-7-3



FREQUENCY - CPS

1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps T_c 4 Sec.
___ cycles from ___ to ___ cps Anal. Rate 1.25 cps/sec.
___ cycles from ___ to ___ cps Loop Length 4 Sec.

CALC
CHEC
APR.
APR.

DATA IDENTIFICATION

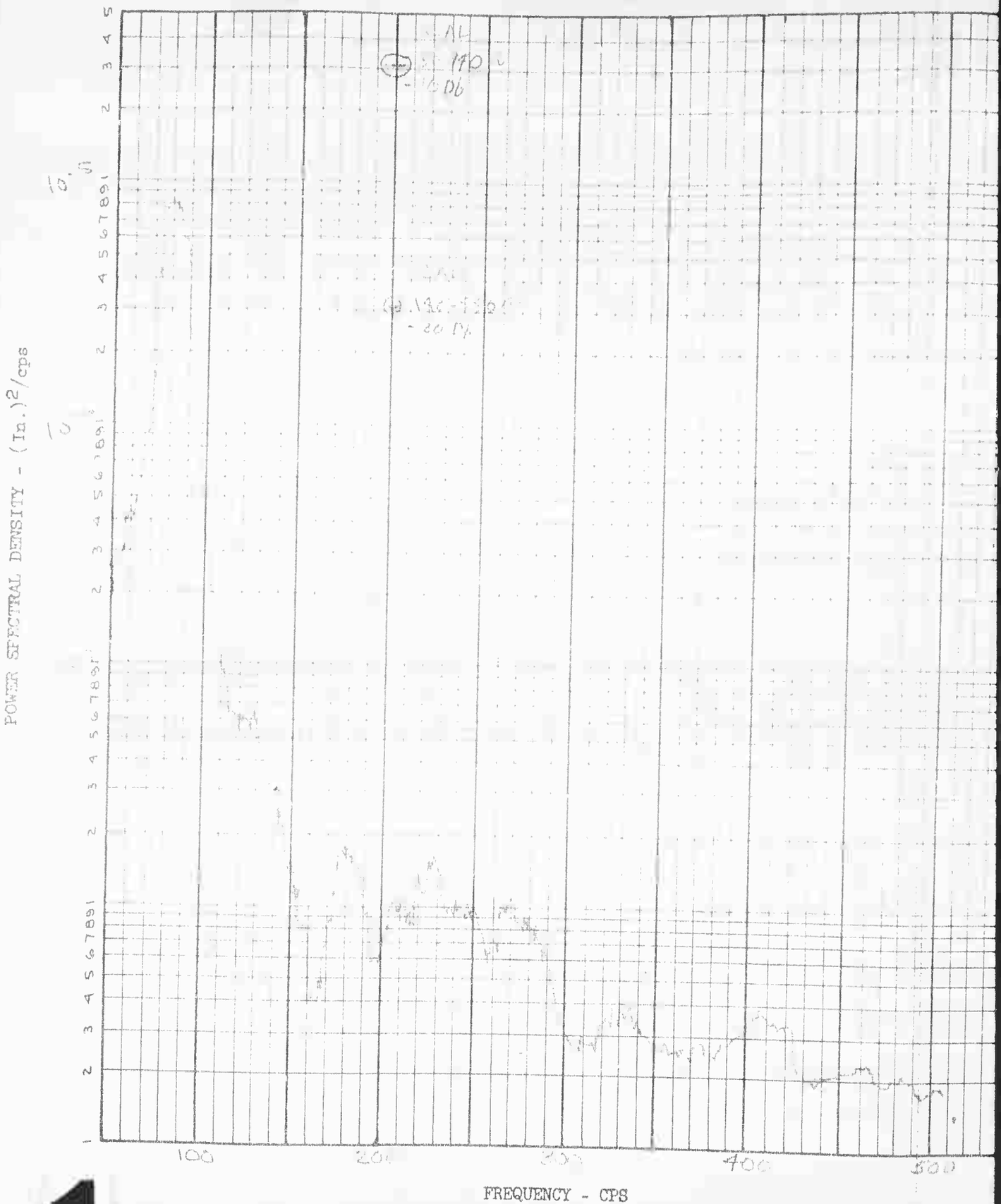
Test Title		
D.S. PANEL ACOUS. TEST I		
EWA No.	Panel or Specimen No. M37	
Tape No.	Tape Channel	Displacement Pickup # 1
Elapsed Test Time 5 MIN	P/U RMS Level at Sonic Lab. V_L = .2 Volts	

CALIBRATION

Tape No.	Tape Channel	Data Tape RMS Volt V_R = .265
Calibration Voltage V_a = Vrms into Sine Amp.; V. = .295 Vrms on Tape		cps
Sine Amplifier Settings For Calibration: [illegible]		Tape Data D_a = .5
Lab. Gain LG = 10	Tape Monitor Gain	G_a = 10
Displacement Pickup Sensitivity S = .0075 in./Volt		
Equivalent of Calibration = in $D_e = V_a$ [illegible]		
Equivalent of Calibration for PSD Plots [illegible]		
[illegible] Tape Speed [illegible]	Low Converter [illegible]	
[illegible]		
Zero Deflection Level of Data		
RMS Defl. Level = $\frac{(D_e)(V_R)}{(TMG)(LG)(V_a)}$ = [illegible]		in

2

CALC	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	Vol I
CHK				
APR.			P/U #1 PANEL M37 PHASE A	
APR			BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON	PAGE F16 150



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

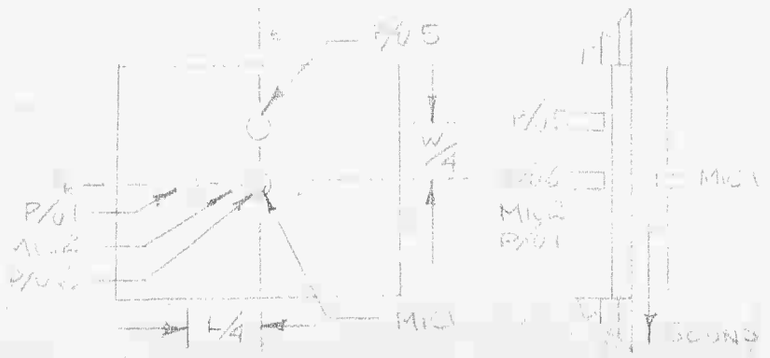
CALC MCM
CHECK CBT
APR
APR

DATA IDENTIFICATION

Test Title: D.S. PANEL ATTACHMENT - TYPE I		
EWA No.: 5 573	Panel or Specimen No.: 1417	
Tape No.: 26	Tape Channel: 4	Displacement Pickup #: 5
Elapsed Test Time: 5 MIN.	P/U RMS Level at Sonic Lab. V_L = .350 Volts	

CALIBRATION

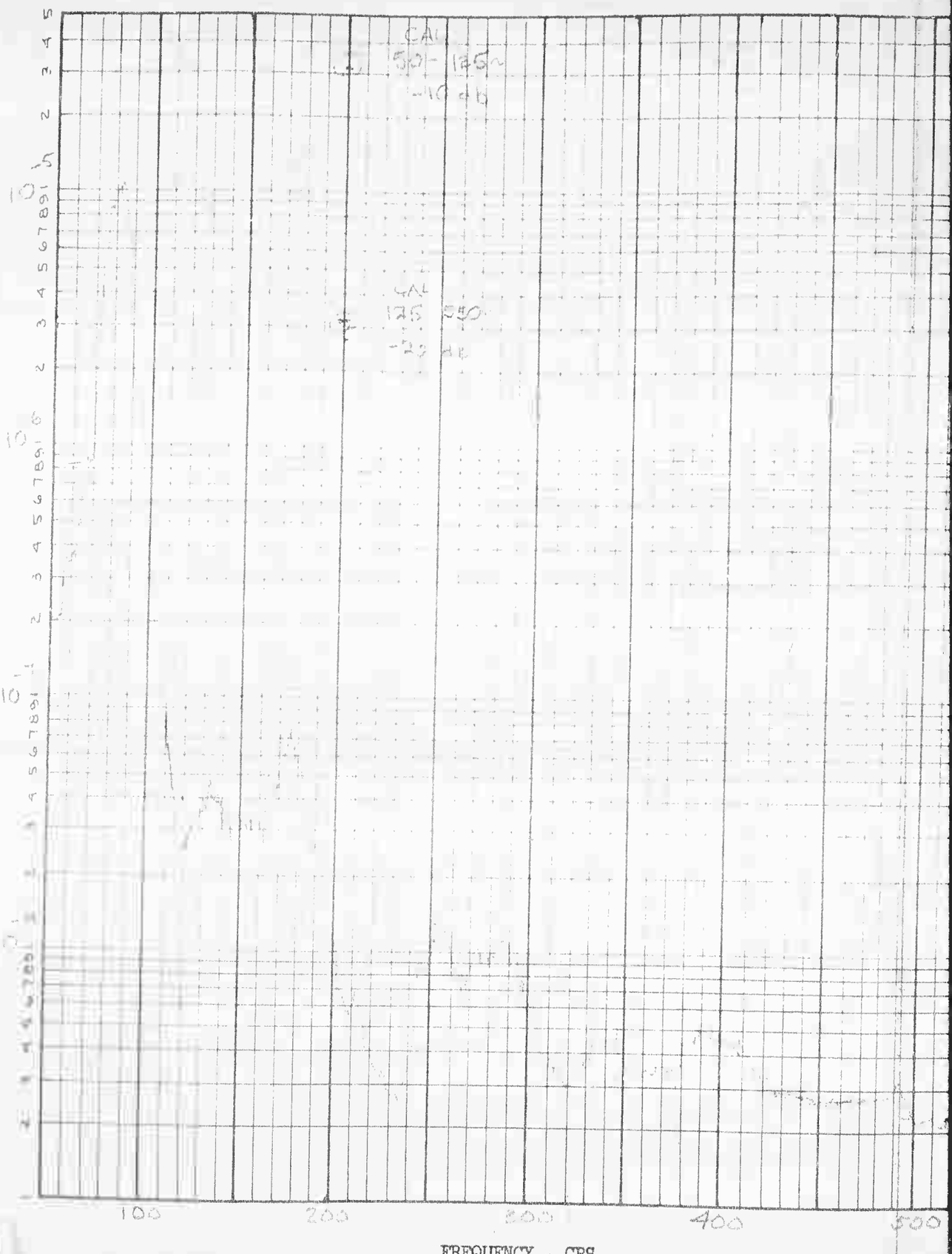
Tape No.: 26	Tape Channel: 7	Data Tape RMS Volt V_R = .340
Calibration Voltage: V_a = .5 V_{rms} into Line Amp.; V_c = .490 V_{rms} on Tape @ 300 cps		
Line Amplifier Settings: For Calibration G_c = .500 ; for Data G_d = .5		
Lab. Gain: LG = 1.0	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = 1.0	
Displacement Pickup Sensitivity: S = .035 in./Volt		
Equivalent of Calibration - in.: $D_c = V_a \cdot S$ = .0175		
Equivalent of Calibration for PSD Plots: $\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = 3.06 x 10^{-4} in.^{2}/cps		
Analyzer Attenuator Setting: 10 db	Log Converter Setting: 0 db	
Calibration Plotted at: in.^{2}/cps		
Overall Deflection Level of Data: RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = .35 in.		



CALC BCM 6-23	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP P/U #5 PANEL #61 PHASE "A"	Vol I
CHECK DET 6-21-61			BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON	D2-3700
APR.				PAGE FIG 191
APR				

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2



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
____ cycles from ____ to ____ cps
____ cycles from ____ to ____ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CALC	CBT
CHECK	
APR.	
APR.	

DATA IDENTIFICATION

Test Title: L.S. PANEL ATTACHMENT - TYPE I		
EWA No.: 5-573	Panel or Specimen No.: M-37	
Tape No.: 26	Tape Channel: 5	Displacement Pickup #: 6
Elapsed Test Time: 5 MIN.	P/U RMS Level at Sonic Lab. V_L = .370 Volts	

CALIBRATION

Tape No.: 26	Tape Channel: 7	Data Tape RMS Volt V_R = 370
Calibration Voltage: V_a = .50 V_{rms} into Line Amp.; V_c = [illegible] V_{rms} on Tape @ [illegible] cps		
Line Amplifier Settings: For Calibration G_c = [illegible]; for Data G_d = [illegible]		
Lab. Gain: LG = 1.0	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = [illegible]	
Displacement Pickup Sensitivity: S = .035 in./Volt		
Equivalent of Calibration - in.: $D_c = V_a \cdot S$ = .0175		
Equivalent of Calibration for PSD Plots: $\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = [illegible] $in.^2/cps$		
Analyzer Attenuator Setting: [illegible] db	Log Converter Setting: [illegible] db	
Calibration Plotted at: [illegible] $in.^2/cps$		
Overall Deflection Level of Data: RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = [illegible] in.		



CALC	BT	6/27/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
CHECK					P/U #6 PANEL M37 PHASE A
APR.					BOEING AIRPLANE COMPANY
APR.					SEATTLE 24, WASHINGTON

PAGE FIG 1-2

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2

POWER SPECTRAL DENSITY - $(psi)^2/cps$



FREQUENCY - CPS

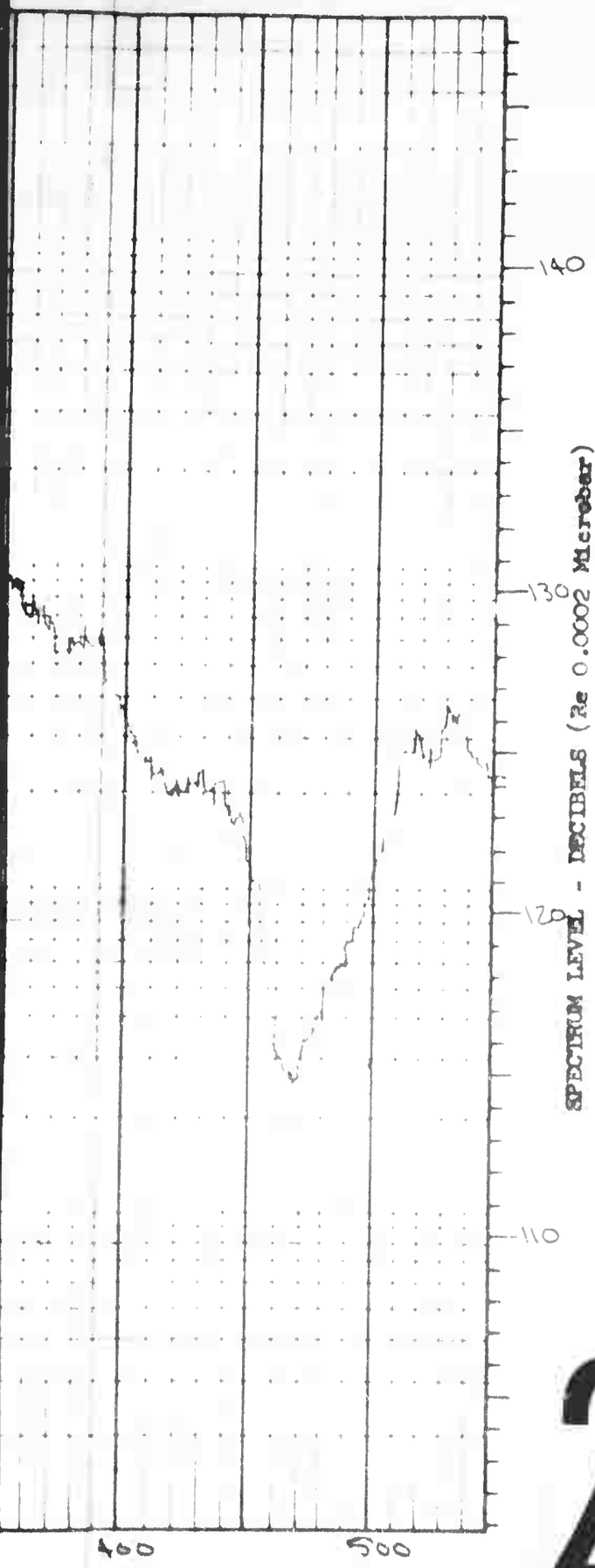
1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_a 15 Sec.
Anal. Rate 333 cps/Sec.
Loop Length 15 Sec.



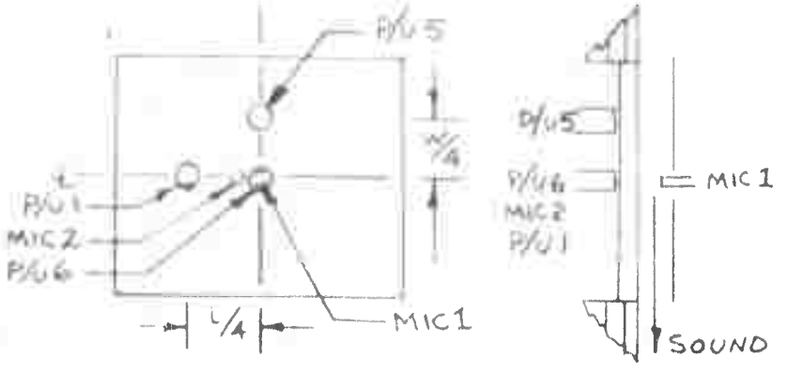
DATA IDENTIFICATION

Test Title: D S PANEL ATTACHMENT TYPE 1		
EWA No.: 5-593	Panel or Specimen No.: 1497	
Tape No.: 57	Tape Channel: 1	Mic. No.: 1
Elapsed Test Time: 60 MIN.	Mic. RMS Level at Sonic Lab.: V_L = .700 Volts	

CALIBRATION

Tape No.: 57	Tape Channel: 6	Data Tape RMS Volt: V_R = .134
Calibration Voltage: V_a = .50 V_{rms} into Line Amp.; V_c = .50 V_{rms} on Tape @ 200cps		
Line Amplifier Settings: For Calibration G_c = 500; for Data G_d = 100		
Lab. Gain: LG = 1	Tape Monitor Gain: TMG = $\frac{G_d}{G_c}$ = .2	
Microphone Sensitivity: S = 290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi: $P_c = V_a \cdot S$ = .145		
Equivalent of Calibration for PSD Plots: $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{(.2)(1)}\right]^2$ = .525		psi^2/cps
Analyzer Attenuator Setting: −30 db	Log Converter Setting: db	
Calibration Plotted at: .525 × 10^{-4}		psi^2/cps
Overall Pressure Level Data: RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = $\frac{(.145)(.134)}{(.2)(1)(.50)}$ = .1045 psi	Equiv. to 156.8 db SPL	

2



POWER SPECTRAL DENSITY ANALYSIS
OF MICROPHONE OUTPUT

PANEL 1497 PHASE C

BOEING AIRPLANE COMPANY

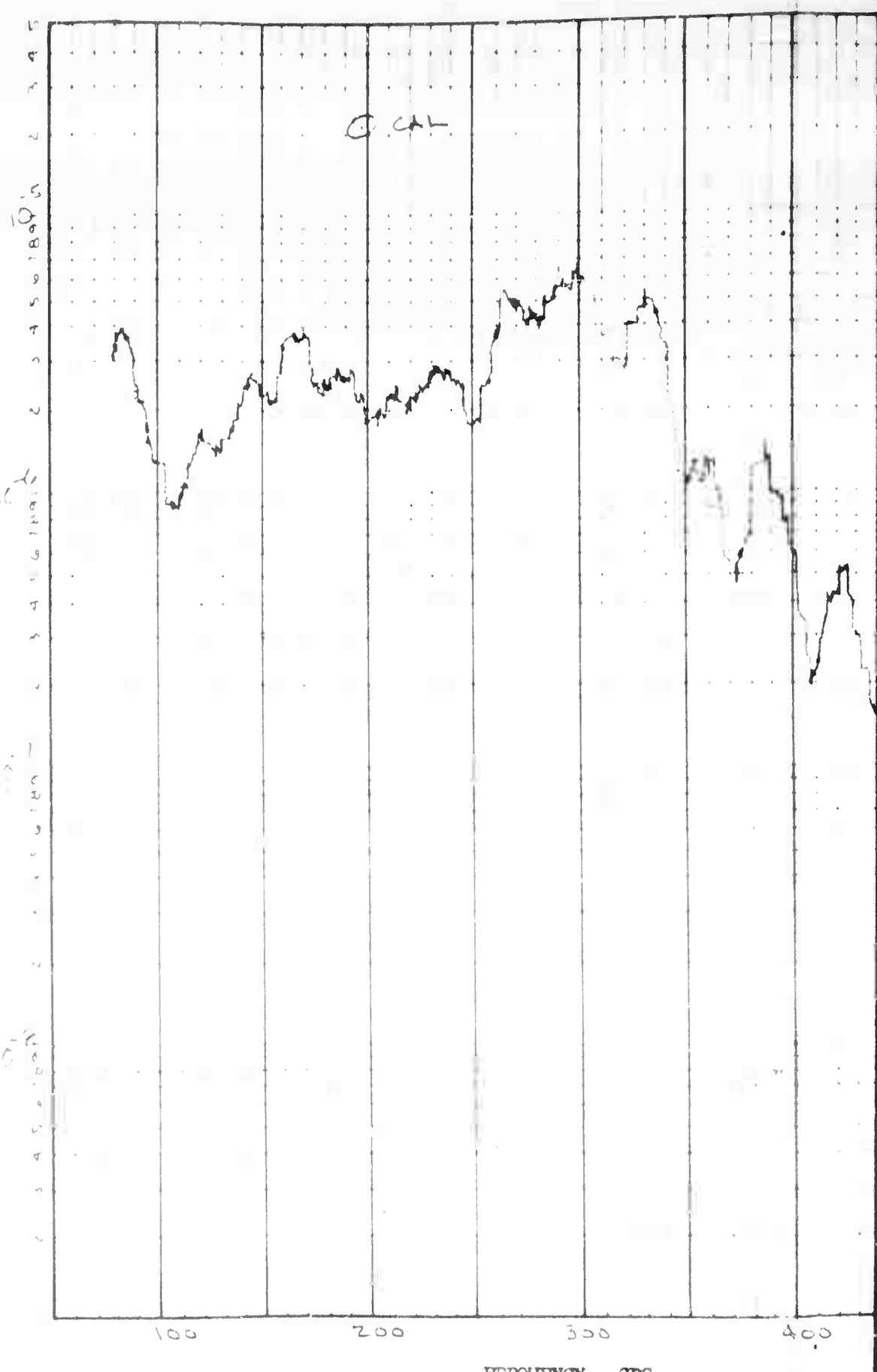
6/23/61

6/21/61

.33 cps/Sec.
.5 Sec.

D2-30084

PAGE
FIG 193



POWER SPECTRAL DENSITY - $(psi)^2/cps$

1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps

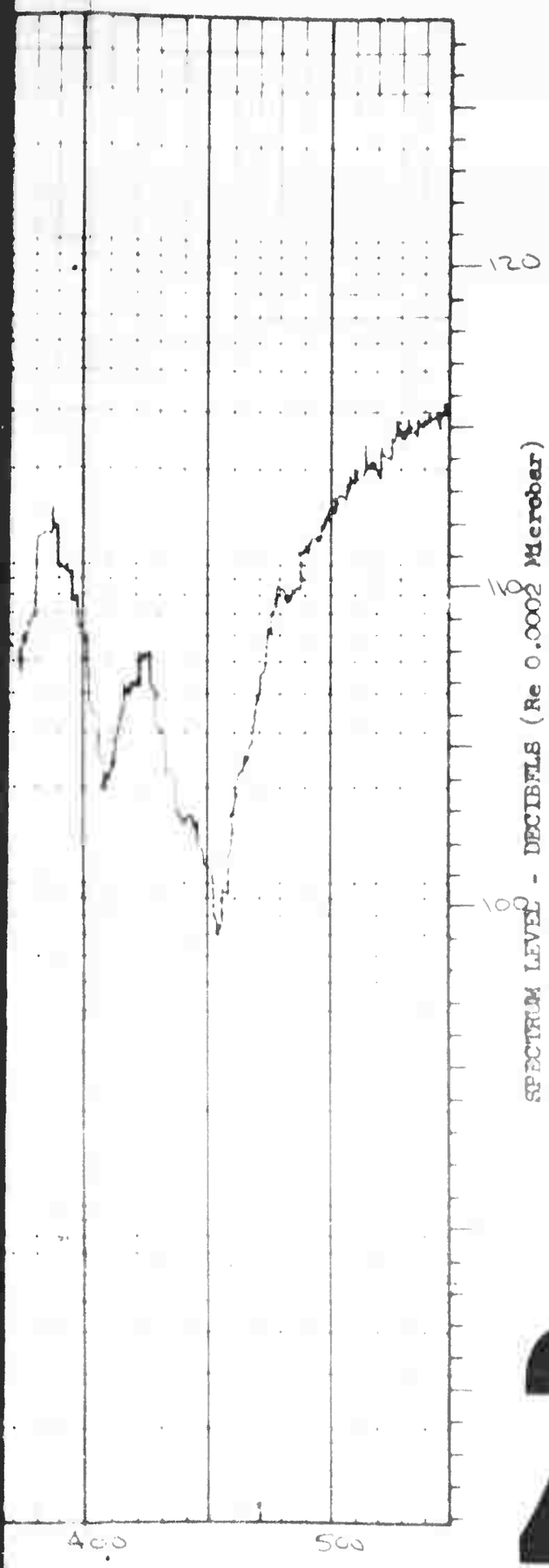
___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 15 Sec.

Anal. Rate 33⅓ cps/Sec.

Loop Length 15 Sec.



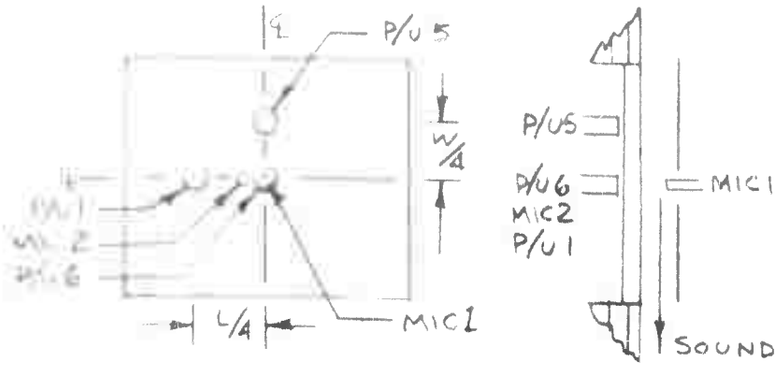
DATA IDENTIFICATION

Test Title: D.S. PANEL ATTACHMENT - TYPE 2		
EWA No.: S-593	Panel or Specimen No.: 1497	
Tape No.: 57	Tape Channel: 2	Mic. No.: 2
Elapsed Test Time: +60 MIN.	Mic. RMS Level at Sonic Lab.: V_L = .145 Volts	

CALIBRATION

Tape No.: 57	Tape Channel: 6	Data Tape RMS Volt: V_R = .147
Calibration Voltage: V_a = .50 V_{rms} into Line Amp.; V_c = .50 V_{rms} on Tape @ 20 cps		
Line Amplifier Settings: For Calibration G_c = 500 ; for Data G_d = 500		
Lab. Gain: LG = 1	Tape Monitor Gain: TMG = $\frac{G_d}{G_c}$ = 1	
Microphone Sensitivity: S = .290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi: $P_c = V_a \cdot S$ = .145		
Equivalent of Calibration for PSD Plots: $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{(1)(1)}\right]^2$ = .021 psi²/cps		
Analyzer Attenuator Setting: -20 db	Log Converter Setting: db	
Calibration Plotted at: 2.1×10^{-5} psi²/cps		
Overall Pressure Level Data: RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = $\frac{(.145)(.147)}{(1)(1)(.50)}$ = .0427 psi	Equiv. to 143.4 db SPL	

2



POWER SPECTRAL DENSITY ANALYSIS
OF MICROPHONE OUTPUT

PANEL 1497 PHASE C

BOEING AIRPLANE COMPANY

PAGE
FIG 194

cps/Sec.
Sec.



1

ANALYSIS VARIABLES

Bandwidth

___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 15 Sec.
Anal. Rate .333 cps/sec.
Loop Length 15 Sec.

CALC	MRM
CHECK	CBT
APR.	
APR	

DATA IDENTIFICATION

Test Title		
D.E. PANEL ATTACHMENT - TYPE I		
EWA No. 5-593	Panel or Specimen No. 1437	
Tape No. 57	Tape Channel 3	Displacement Pickup # 1
Elapsed Test Time 60 MIN.	P/U RMS Level at Sonic Lab. V_L = .265 Volts	

CALIBRATION

Tape No. 57	Tape Channel 6	Data Tape RMS Volt V_R = 1.65
Calibration Voltage V_a = .50 V_{rms} into Line Amp.; V_c = .50 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = 500 ; for Data G_d = 250		
Lab. Gain LG = 1	Tape Monitor Gain TMG = $\frac{G_d}{G_c}$ = .5	
Displacement Pickup Sensitivity S = .0354 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = .0177		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = $\left[\frac{.0177}{(.5)(1)}\right]^2$ = 1.25 x 10^{-3} in.^{2}/cps		
Analyzer Attenuator Setting -20 -40 db	Log Converter Setting 0 db	
Calibration Plotted at 1.25 (10^{-3}) in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = [illegible] in.		

5

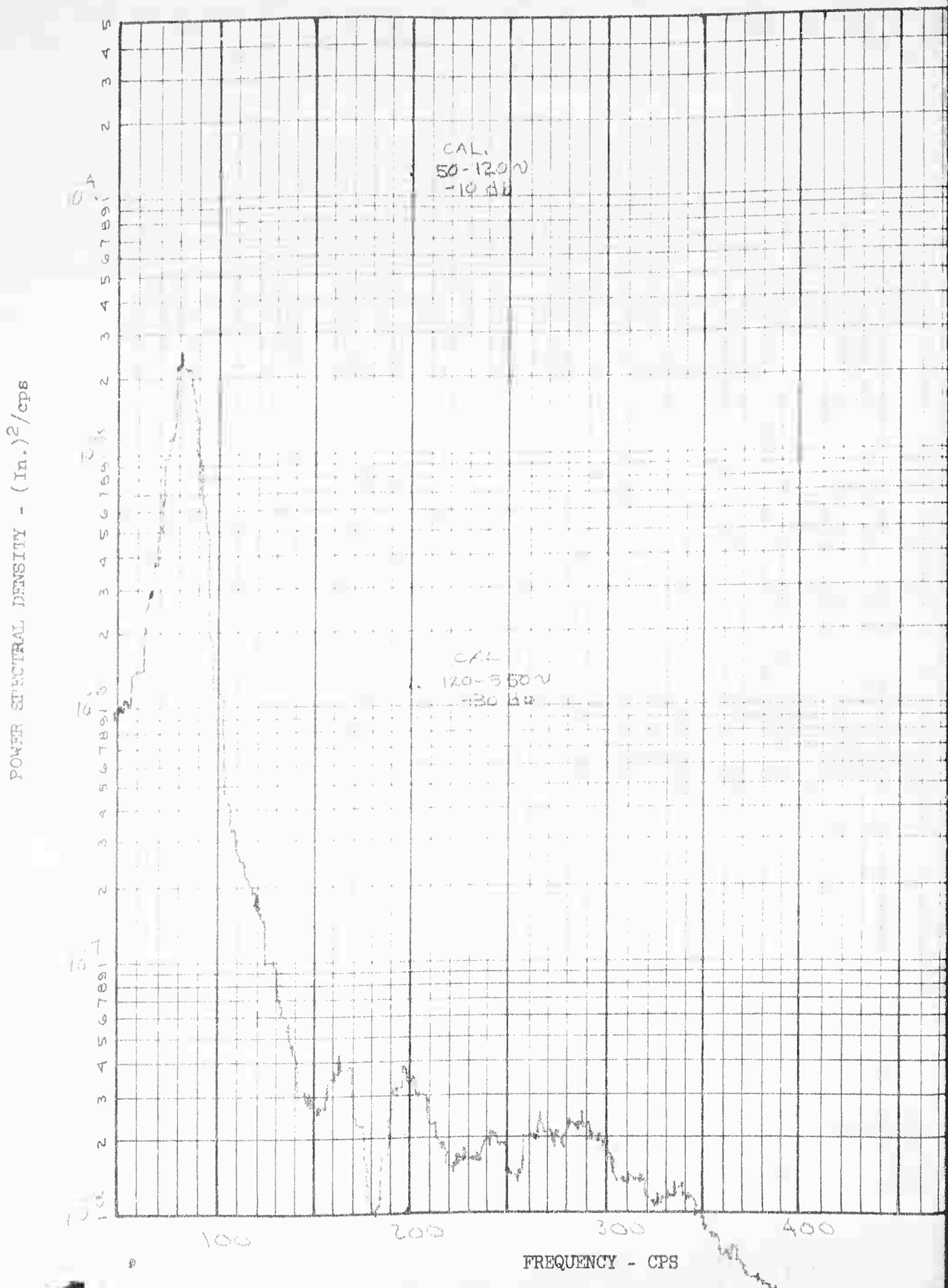
500

2

CALC	MRM	6-2-64	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
CHECK	CRT	6/2/64			2.5 MINTEST 151.5 db
APR.					P/U #1 PANEL 1437 FRAME 5
APR					BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON

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ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 15 Sec.
Anal. Rate .333 cps/sec.
Loop Length 15 Sec.

CAL
CHE
APP
APP

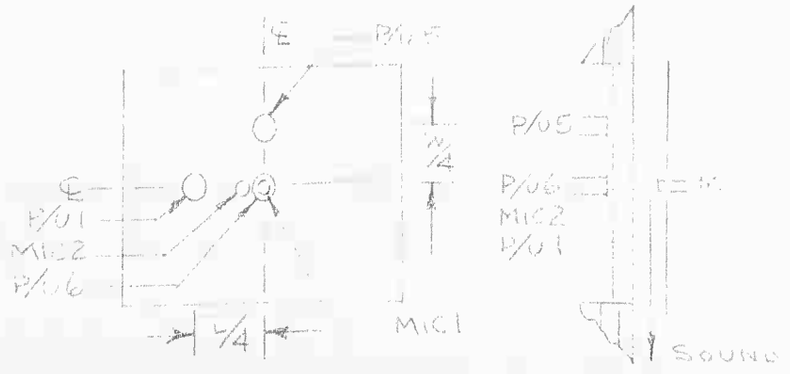
1

DATA IDENTIFICATION

Test Title: D.S. PANEL ATTACHMENT -TYPE 1		
EWA No.: 5-593	Panel or Specimen No.: 1497	
Tape No.: 57	Tape Channel: 4	Displacement Pickup #: 5
Elapsed Test Time: 60 MIN.	P/U RMS Level at Sonic Lab. V_L = .500 Volts	

CALIBRATION

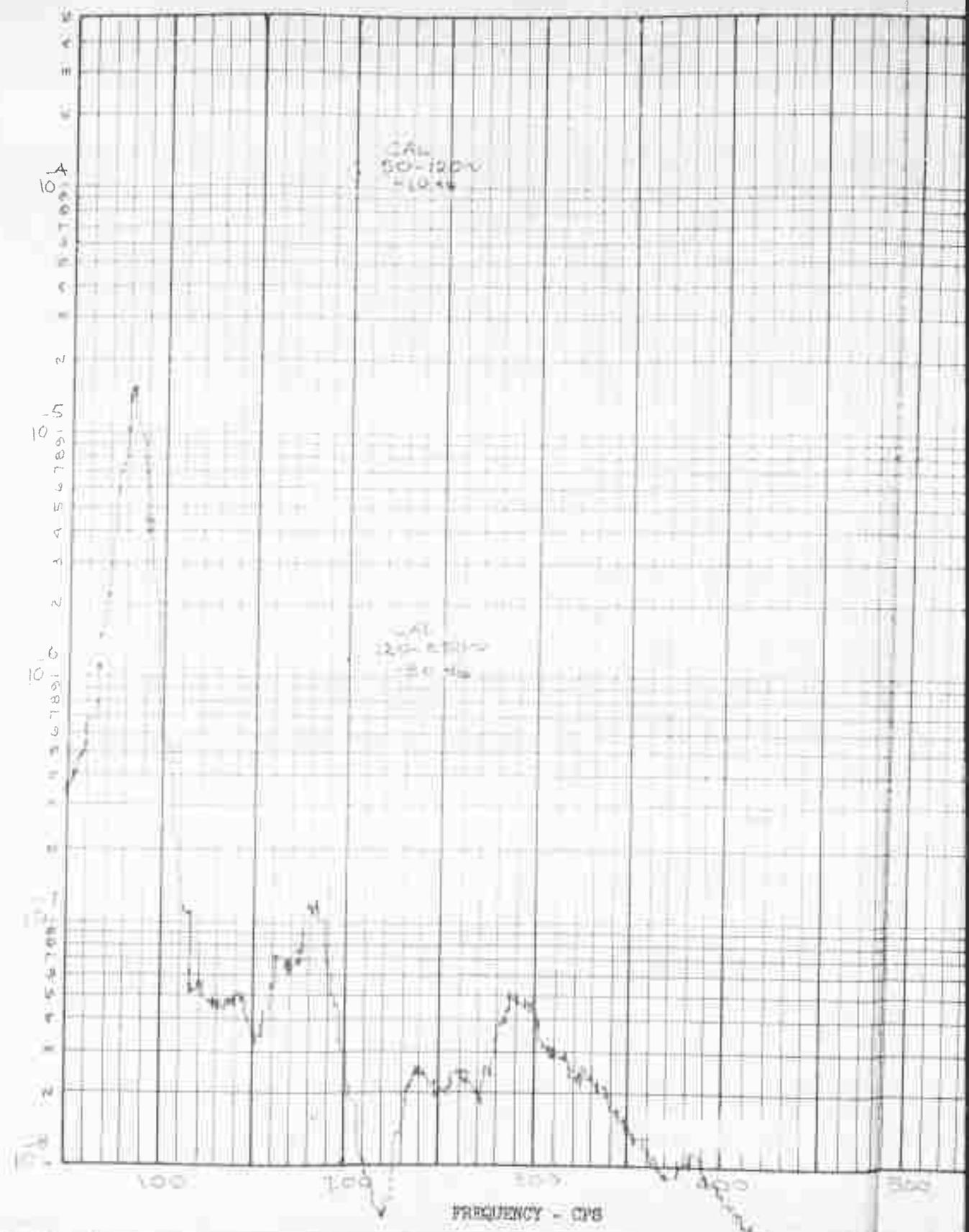
Tape No.: 57	Tape Channel: 6	Data Tape RMS Volt V_R = .790
Calibration Voltage: V_a = .50 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200cps		
Line Amplifier Settings: For Calibration G_c = 5.00; for Data G_d = 2.50		
Lab. Gain: LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = .5	
Displacement Pickup Sensitivity: S = .0254 in./Volt		
Equivalent of Calibration - in.: $D_c = V_a \cdot S$ = .0177		
Equivalent of Calibration for PSD Plots: $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0177}{(.5)(1)}\right]^2$ = 1.25 x 10^{-3} in.^{2}/cps		
Analyzer Attenuator Setting: db	Log Converter Setting: db	
Calibration Plotted at: 1.25 x 10^{-4} in.^{2}/cps; 1.25 x 10^{-6} in.^{2}/cps		
Overall Deflection Level of Data: RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0177)(.79)}{(.5)(1)(.5)}$ = .056 in.		



CALC: CBT 6/19/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP 05 MIN TEST 157.5dB P/U 5 PANEL 1497 PANEL 5		Vol I D2-80124
CHECK					
APP.					
APP.			BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON		PAGE FR 196

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2



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 15 Sec.
Anal. Rate .333 cps/sec.
Loop Length 15 Sec.

DATA IDENTIFICATION

Test Title: D.S. PANEL ATTACHMENT - TYPE I		
EWA No.: S-533	Panel or Specimen No.: 1497	
Tape No.: 57	Tape Channel: 5	Displacement Pickup #: 6
Elapsed Test Time: 60 MIN.	P/U RMS Level at Sonic Lab. V_L = 4.80 Volts	

CALIBRATION

Tape No.: 57	Tape Channel: 6	Data Tape RMS Volt V_R = .230

Calibration Voltage
V_a = 5.0 V_{rms} into Line Amp.; V_c = .50 V_{rms} on Tape @ 300 cps

Line Amplifier Settings
For Calibration G_c = 500 ; for Data G_d = 250

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c} = .5$

Displacement Pickup Sensitivity
S = .0354 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S = .0177$

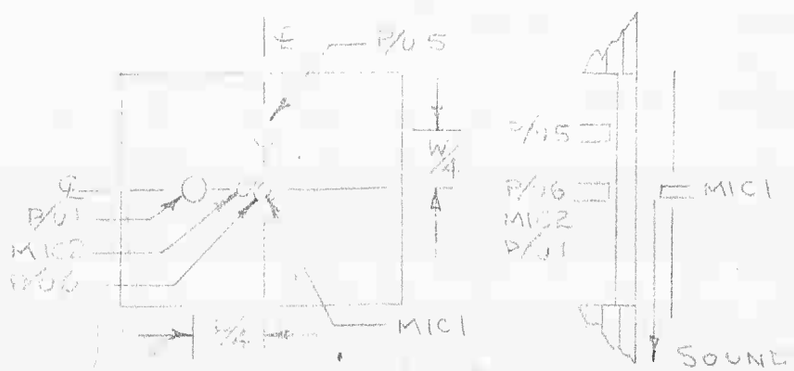
Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left(\frac{.0177}{(.5)(1)}\right)^2 = 1.25 \times 10^{-3}$ in.^{2}/cps

Analyzer Attenuator Setting: 50-1200 cps -10 -30 db; 12-500 cps
Log Converter Setting: db

Calibration Plotted at: 1.25×10^{-3} 50-1200 cps; 1.25×10^{-4} 12-500 cps in.^{2}/cps

Overall Deflection Level of Data

RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0177)(.230)}{(.5)(1)(.5)} = .0163$ in.



CALC. CBT	6/26/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP 0.5 MIN TEST 157 Sec	Vol. I
CHECK				P/U #6 PANEL 1497 PHASE C	D2-8064
APR.				BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON	PAGE F16 197

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2



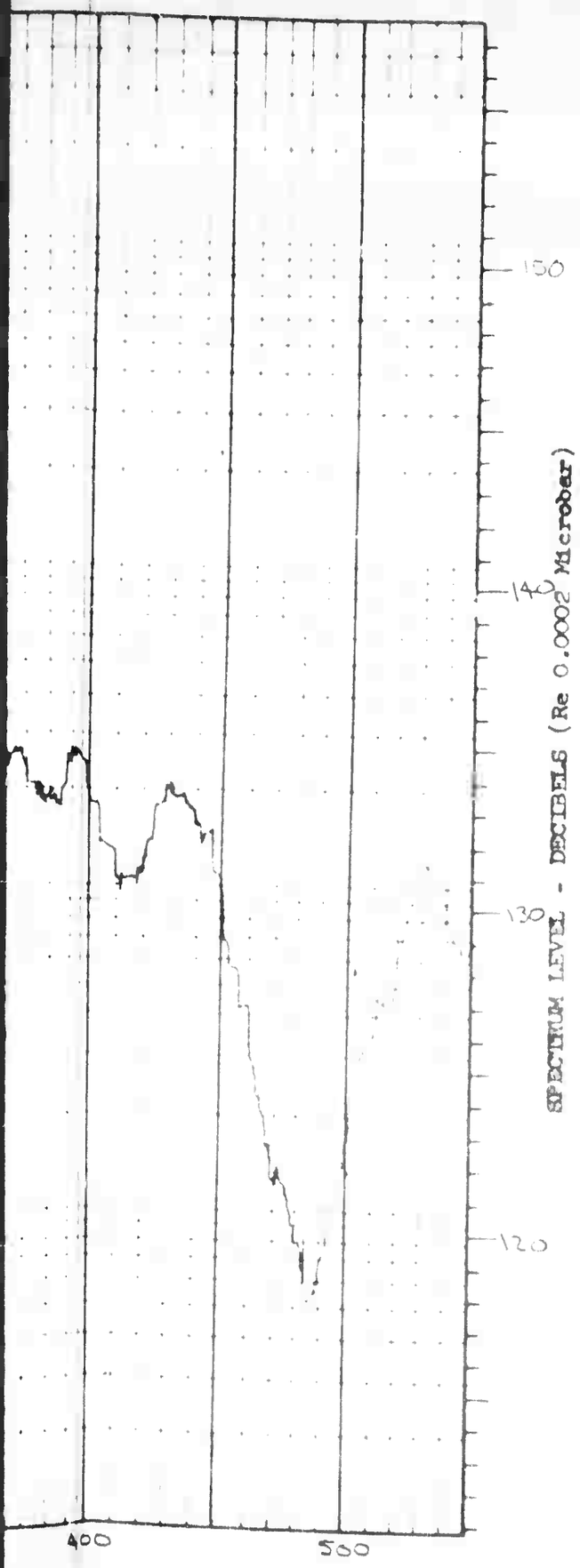
1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
____ cycles from ____ to ____ cps
____ cycles from ____ to ____ cps

T_c 15 Sec.
Anal. Rate .333 cps/Sec.
Loop Length 15 Sec.

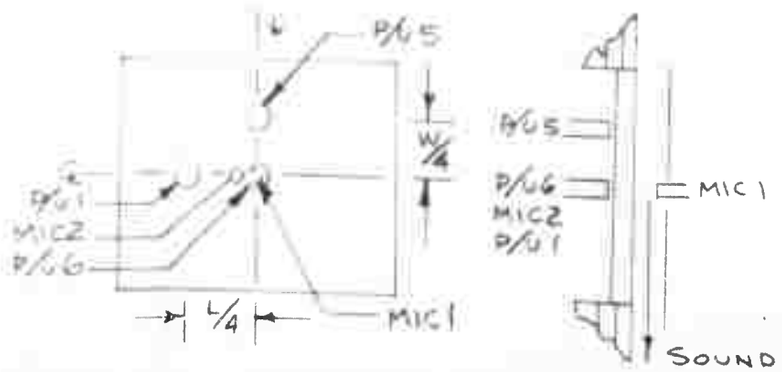


DATA IDENTIFICATION

Test Title: D.S PANEL ATTACHMENT - TYPE I		
EWA No.: 5593	Panel or Specimen No.: 1497	
Tape No.: 58	Tape Channel: 1	Mic. No.: 1
Elapsed Test Time: 60.5 MIN.	Mic. RMS Level at Sonic Lab.: V_L = 1.27 Volts	

CALIBRATION

Tape No.: 58	Tape Channel: 6	Data Tape RMS Volt: V_R = .230
Calibration Voltage: $V_a = .50 V_{rms}$ into Line Amp.; $V_c = .50 V_{rms}$ on Tape @ 200cps		
Line Amplifier Settings: For Calibration G_c = 500 ; for Data G_d = 100		
Lab. Gain: LG = 1	Tape Monitor Gain: $TMG = \frac{G_d}{G_c} = .2$	
Microphone Sensitivity: S = 290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi: $P_c = V_a \cdot S = .145$		
Equivalent of Calibration for PSD Plots: $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{(.2)(1)}\right]^2 = .525$ psi²/cps		
Analyzer Attenuator Setting: db	Log Converter Setting: 0 db	
Calibration Plotted at: [illegible] psi²/cps		
Overall Pressure Level Data: RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.145)(.230)}{(.2)(1)(.50)} = .334$ psi	Equiv. to 161.3 db SPL	



2

POWER SPECTRAL DENSITY ANALYSIS
OF MICROPHONE OUTPUT

PANEL 1497 PHASE D

BOEING AIRPLANE COMPANY
SEATTLE, WASHINGTON

D2-30084
PAGE
D1G 198

6/24/61
6/25/61

3 cps/Sec.
Sec.



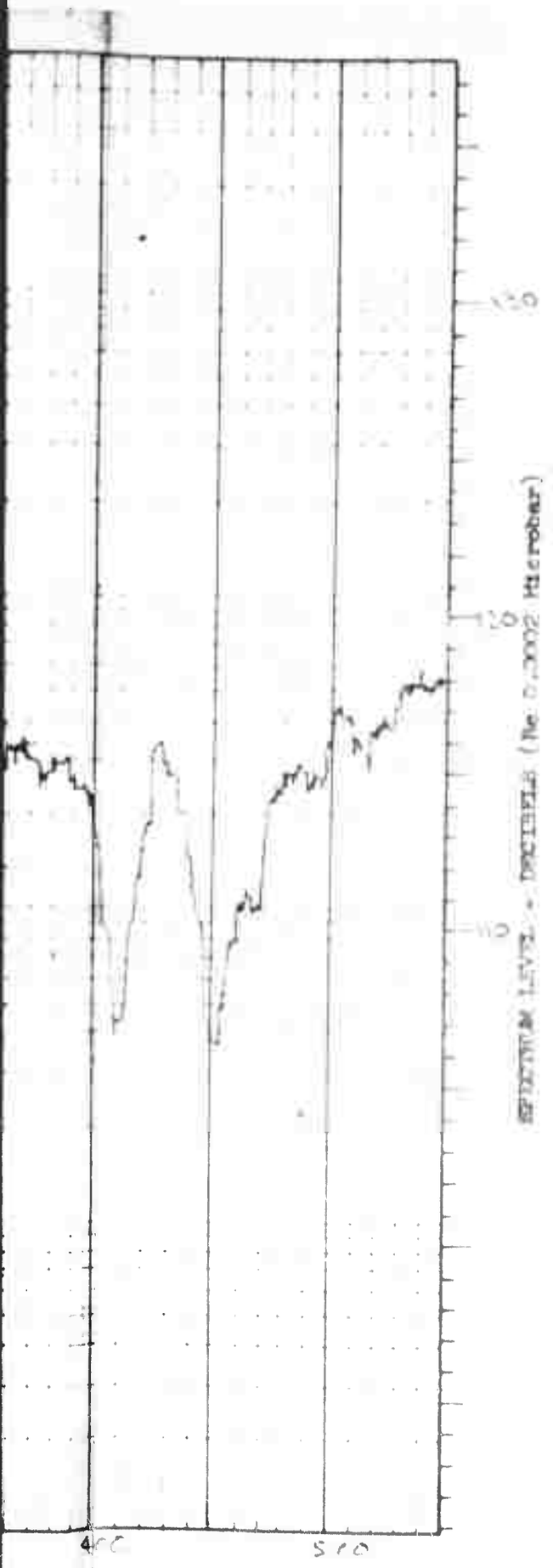
1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 15 Sec.
Anal. Rate 1333 cps/Sec.
Loop Length 15 Sec.

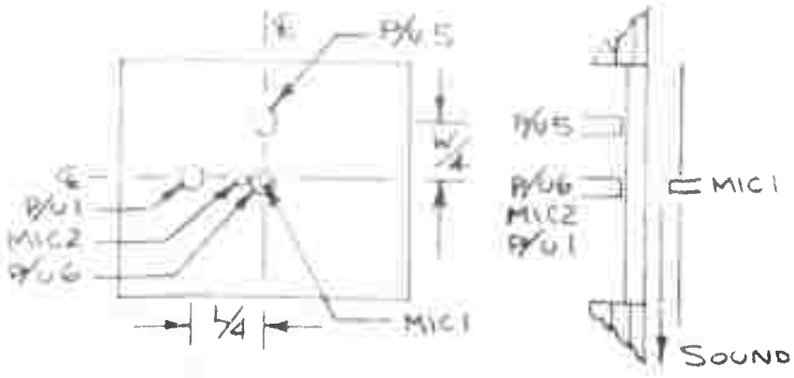


DATA IDENTIFICATION

Test Title: D.C PANEL ATTACHMENT - TYPE I		
EWA No.: E 193	Panel or Specimen No.: 1497	
Tape No.: 5E	Tape Channel: 2	Mic. No.: 2
Elapsed Test Time: 60.5 MIN	Mic. RMS Level at Sonic Lab. V_L = .225 Volts	

CALIBRATION

Tape No.: 5E	Tape Channel: 6	Data Tape RMS Volt V_R = .215
Calibration Voltage: V_a = .500 V_{rms} into Line Amp.; V_c = .500 V_{rms} on Tape @ 1000 cps		
Line Amplifier Settings: For Calibration G_c = 500 ; for Data G_d = 500		
Lab. Gain: LG = 1	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = 1	
Microphone Sensitivity: S = .290 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi: $P_c = V_a \cdot S$ = .5 (.290) = .145		
Equivalent of Calibration for PSD Plots: $\left(\frac{P_c}{(TMG)(LG)}\right)^2$ = (.145)² = .021 psi²/cps		
Analyzer Attenuator Setting: 20 db	Log Converter Setting: 0 db	
Calibration Plotted at: 2.1×10^{-4} psi²/cps		
Overall Pressure Level Data: RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = $\frac{(.145)(.215)}{(1)(1)(.5)}$ = .0624 psi	Equiv. to 146.0 db SPL	



2

POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT

PANEL 1497 PHASE D.

BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

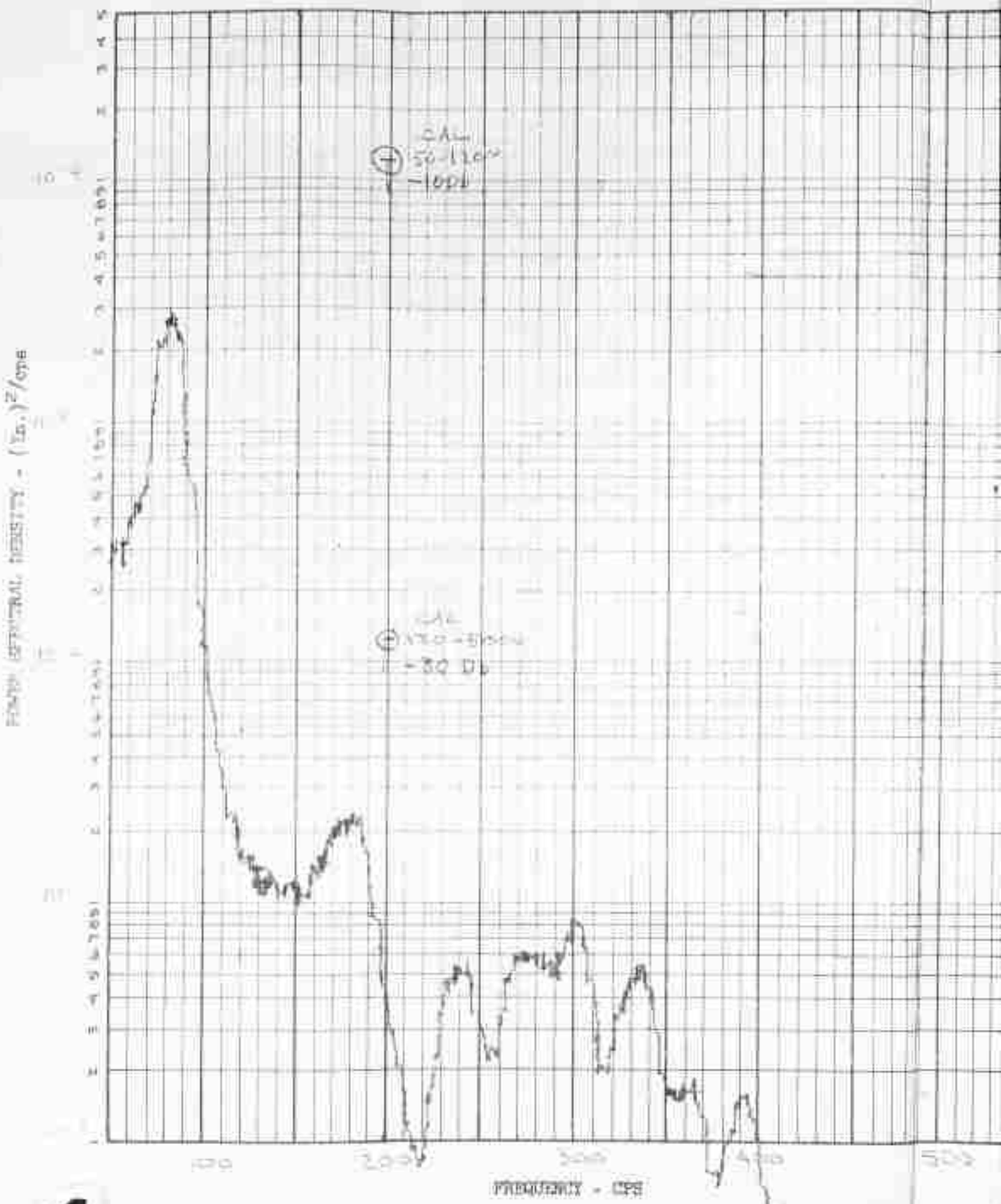
D2-82008A

PAGE F16199

CBT 6/22/61
6/21/61

DK 6/21/61

cps/sec.
Sec.



1

ANALYSIS VARIABLES

Bandwidth

___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c ___ Sec.
Anal. Rate ___ cps/sec.
Loop Length ___ Sec.

CALC
CHECK

DATA IDENTIFICATION

Test Title		
DS PANEL ATTACHMENT - TYPE 1		
EWA No. 5-593	Panel or Specimen No. 1437	
Tape No. 58	Tape Channel 3	Displacement Pickup # 1
Elapsed Test Time 60.5 min	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No. 58	Tape Channel 6	Data Tape RMS Volt V_R =

Calibration Voltage

V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 250 cps

Line Amplifier Settings

For Calibration G_c = 250 ; for Data G_d = 250

Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = .5

Displacement Pickup Sensitivity

S = 0.354 in./Volt

Equivalent of Calibration - in.

$D_c = V_a \cdot S$ = .0.177

Equivalent of Calibration for PSD Plots

$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0177}{(.5)(1)}\right]^2 = 1.26 \times 10^{-3} \text{ in.}^2/\text{cps}$$

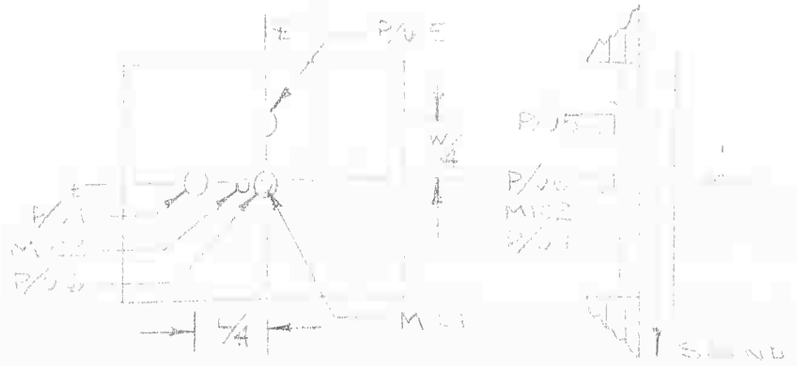
Analyzer Attenuator Setting db — Log Converter Setting db

Calibration Plotted at 4.26 (4") in.^{2}/cps

2.6 (2") in.^{2}/cps

Overall Deflection Level of Data

$$\text{RMS Defl. Level} = \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0177)(7.46)}{(.5)(1)(.5)} = .0.531 \text{ in.}$$



500

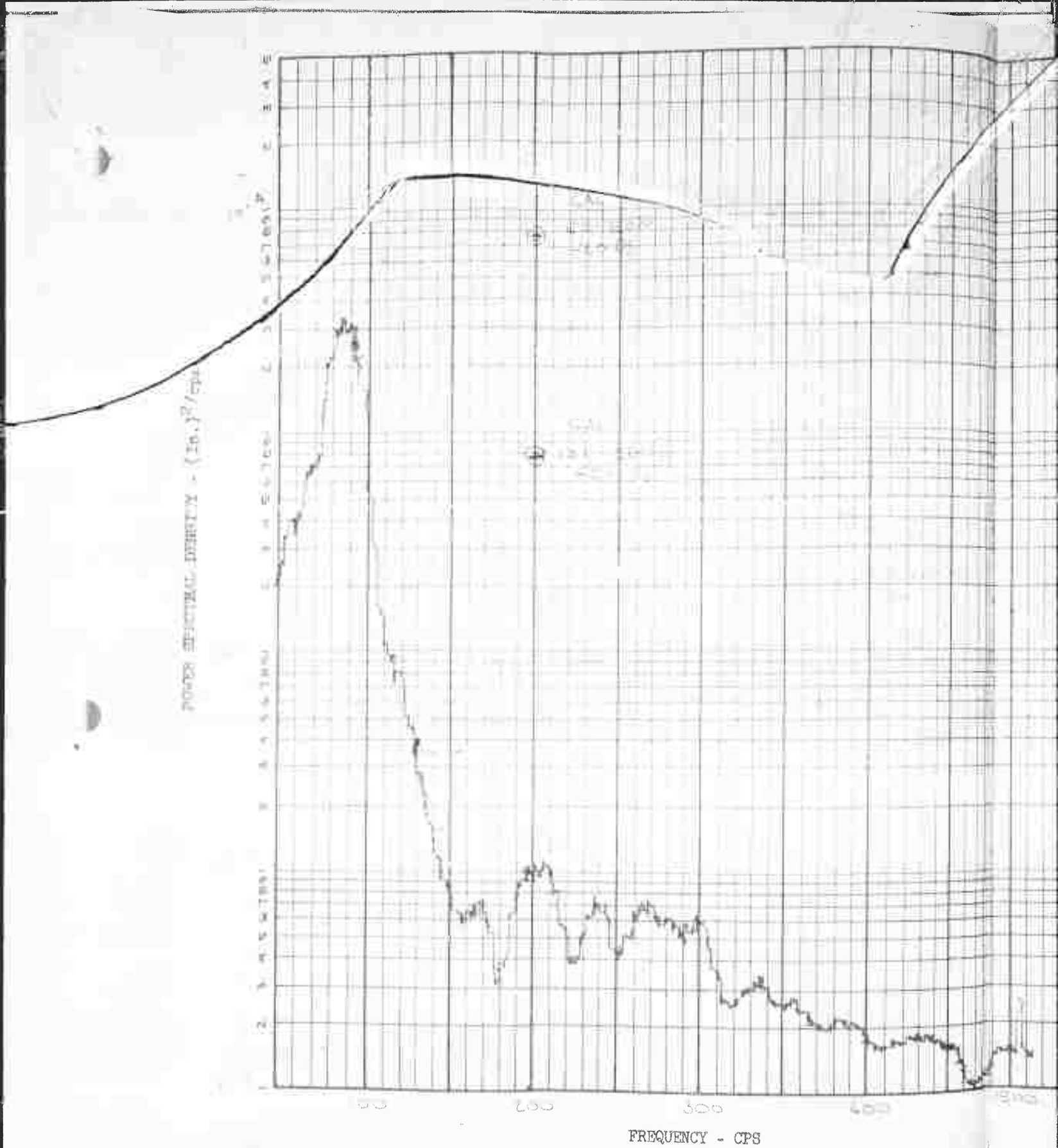
CALC			REVISED	DATE
CHECK	CBT	4/24/61		
APR.				
APR				

POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
0.5 MIN TEST 1&2 SET
P/U 1 PANEL 1437 PHASE D
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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2



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 15 Sec.
Anal. Rate .333 cps/sec.
Loop Length 15 Sec.

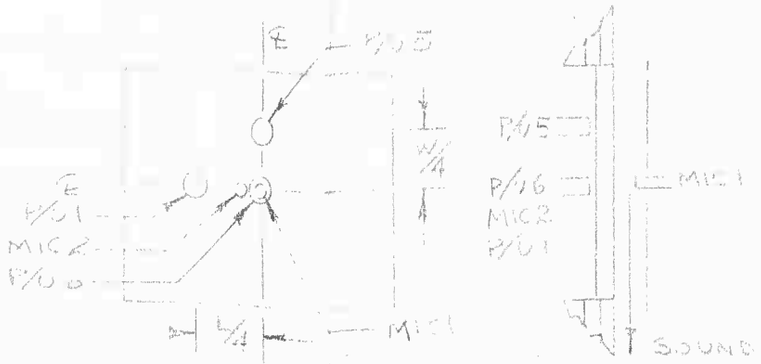
CALC
CHEC CBT
APR.
APR.

DATA IDENTIFICATION

Test Title: D5. PANEL - ATTACHMENT - TYPE I		
EWA No.: 5-593	Panel or Specimen No.: 1497	
Tape No.: 58	Tape Channel: 4	Displacement Pickup #: 5
Elapsed Test Time: 60.5 MIN	P/U RMS Level at Sonic Lab. V_L = ____ Volts	

CALIBRATION

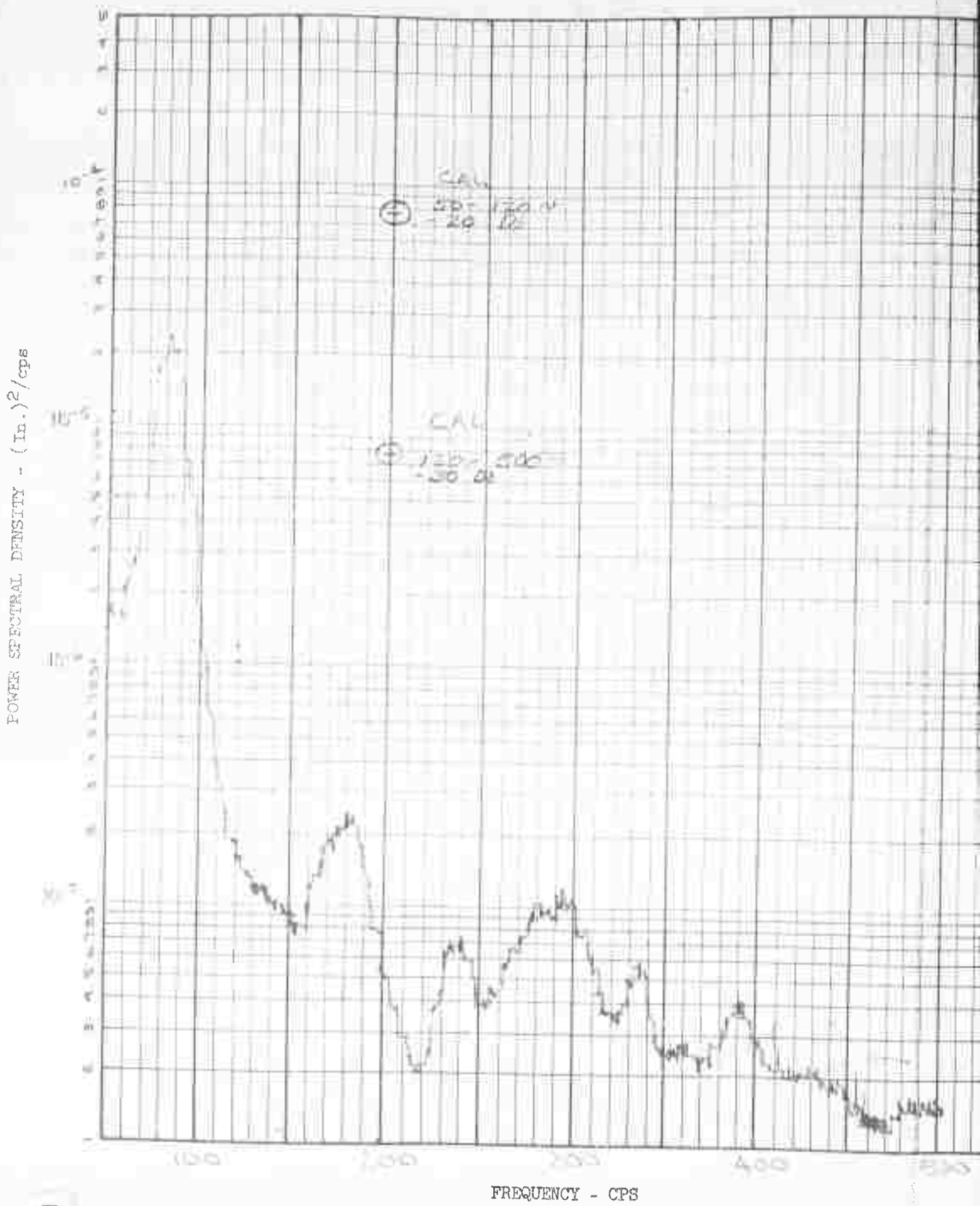
Tape No.: 58	Tape Channel: 5	Data Tape RMS Volt V_R = 16
Calibration Voltage: V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 300 cps		
Line Amplifier Settings: For Calibration G_c = 300; for Data G_d = 1		
Lab. Gain: LG = 1	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = .2	
Displacement Pickup Sensitivity: S = .0256 in./Volt		
Equivalent of Calibration - in.: $D_c = V_a \cdot S$ = .0077		
Equivalent of Calibration for PSD Plots: $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0077}{(.2)(1)}\right]^2$ = 7.32 (10⁻⁵)		in.²/cps
Analyzer Attenuator Setting: -20 db 50-130 cps; -30 db 30-55 cps	Log Converter Setting: db	
Calibration Plotted at 7.32 (10⁻⁵) 50-130 cps; 7.32 (10⁻⁴) 30-55 cps		in.²/cps
Overall Deflection Level of Data: RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = .0077 (16) / (.2)(1)(.5) = .1232		in.



CALC	[illegible]	6-22	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP 05 MIN TEST 1625 dat P/U #5 PANEL 1497 PHASE D
CHECK	LBT	6/23/61			BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
APR.					Vol I 02-80084 PAGE FIG 201
APR.					

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2



POWER SPECTRAL DENSITY - (In.)2/cps

FREQUENCY - CPS

1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 15 Sec.
Anal. Rate .333 cps/sec.
Loop Length 15 Sec.

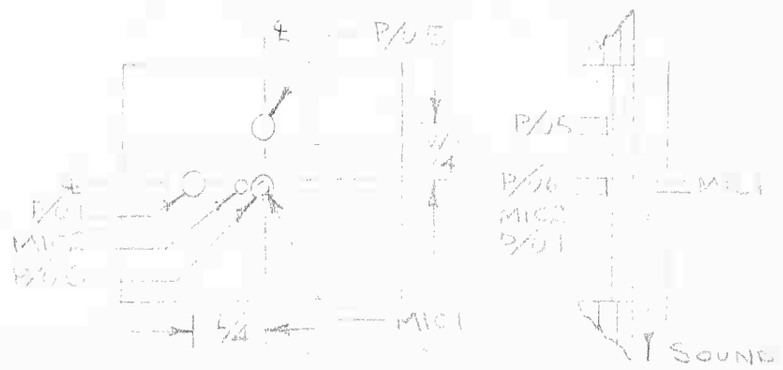
CALC	
CHECK	CBT
APR.	
APR	

DATA IDENTIFICATION

Test Title: D.S. PANEL ATTACHMENT - TYPE I		
EWA No.: 5-593	Panel or Specimen No.: 1427	
Tape No.: 58	Tape Channel: 5	Displacement Pickup #: 6
Elapsed Test Time: 60.5 MIN.	P/U RMS Level at Sonic Lab. V_L = ____ Volts	

CALIBRATION

Tape No.: 58	Tape Channel: 6	Data Tape RMS Volt V_R = .118
Calibration Voltage: V_a = .50 V_{rms} into Line Amp.; V_c = .50 V_{rms} on Tape @ 2,000 cps		
Line Amplifier Settings: For Calibration G_c = [illegible]; for Data G_d = 100		
Lab. Gain: LG = 1	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = .2	
Displacement Pickup Sensitivity: S = [illegible] in./Volt		
Equivalent of Calibration - in.: $D_c = V_a \cdot S$ = .0177		
Equivalent of Calibration for PSD Plots: $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0177}{.2 \cdot 1}\right]^2$ = 7.85 [illegible] 10^{-5} in.^{2}/cps		
Analyzer Attenuator Setting: 50-120 −20 db; 130-500 −30 db	Log Converter Setting: 0 db	
Calibration Plotted at: 7.85 (10^{-5}) in.^{2}/cps		
Overall Deflection Level of Data: RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = [illegible] in.		

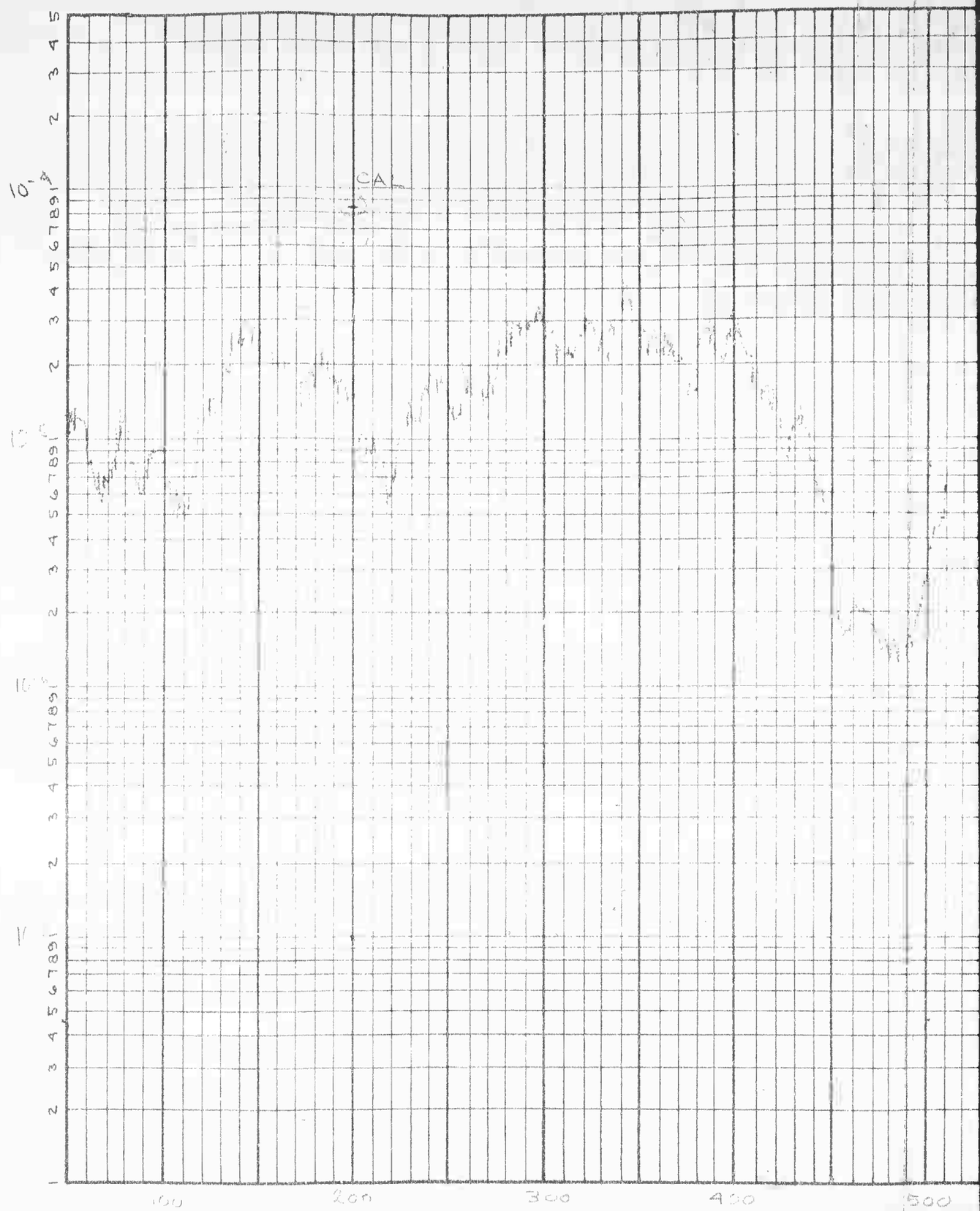


CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP 0.5 MIN. TEST AT 6.5 PSI P/U 6 PANEL 1427 PHASE 2 BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
CHECK	C.R.T.	6/28/61			
APR.					
APR					

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CALC	
CHECK	
APR.	
APR.	

DATA IDENTIFICATION

Test Title: PANEL ATTACH, TYPE I PRELIM		
EWA No.: 5-593	Panel or Specimen No.: 1498	
Tape No.: 27	Tape Channel: 1	Mic. No.: 1
Elapsed Test Time: +5	Mic. RMS Level at Sonic Lab. V_L = .410 Volts	

CALIBRATION

Tape No.: 27	Tape Channel: 6	Data Tape RMS Volt V_R = .196

Calibration Voltage
V_a = 5 V_{rms} into Line Amp.; V_c = .52 V_{rms} on Tape @ 200cps

Line Amplifier Settings
For Calibration G_c = .500 ; for Data G_d = .250

Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = .5

Microphone Sensitivity
S = .200 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = .145

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2$ = (.145 / (.5)(1.0))² = 8.41 (10⁻²) psi²/cps

Analyzer Attenuator Setting: -30 db	Log Converter Setting: 0 db

Calibration Plotted at 8.41 (10⁻²) psi²/cps

Overall Pressure Level Data — Equiv. to 151.6 db SPL

RMS pressure level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$

$= \frac{(.145)(.196)}{(.5)(1)(.52)}$ = .110 psi

SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

130
120
110
100

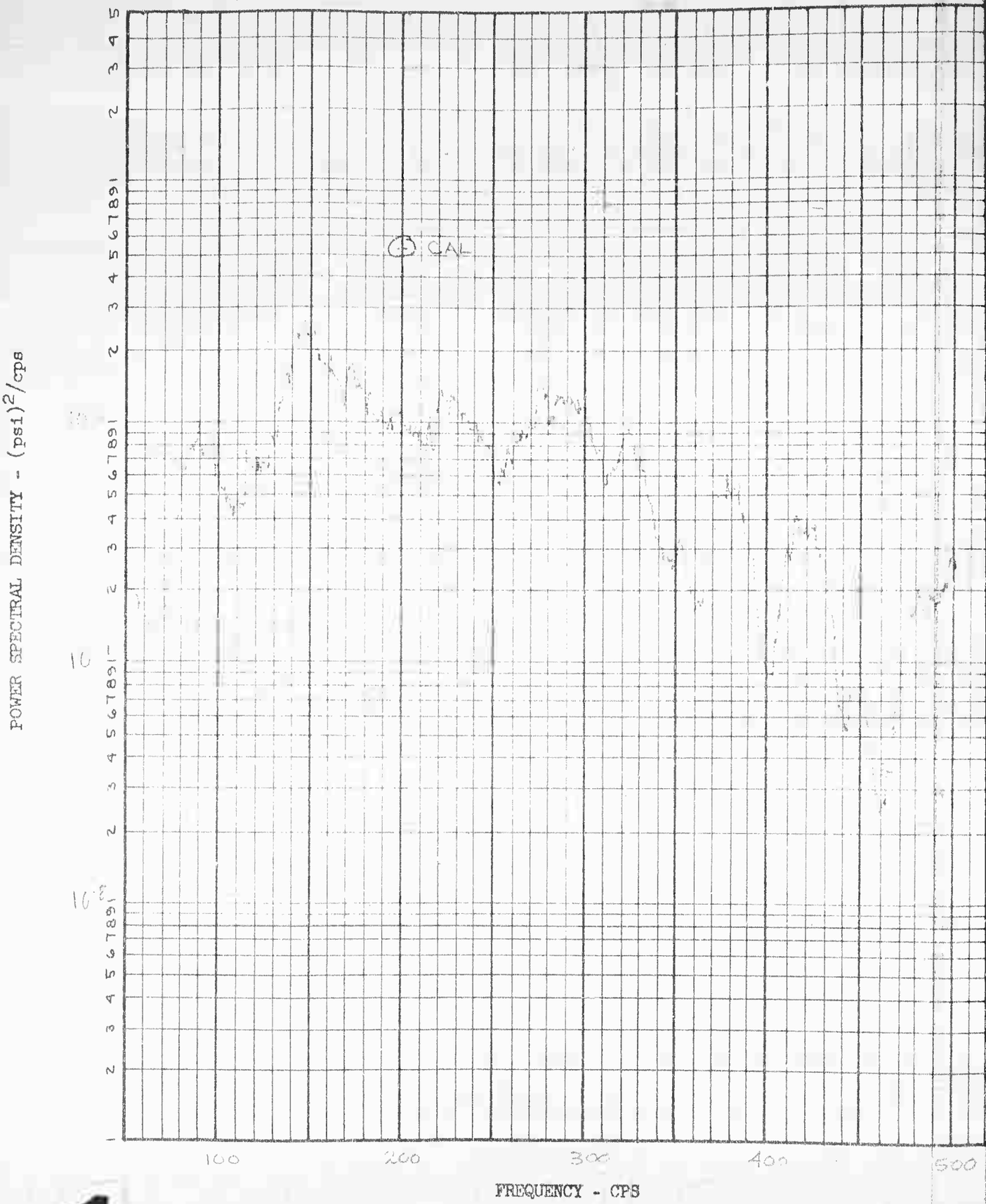
500



CALC			REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT 5 MIN TEST MIC 1 PANEL 1498 PHASE A. BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
CHECK	JOA	6/9/61			VOL I. D2-5X84 PAGE Fig 2-3
APR.					
APR					

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ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps

___ cycles from ___ to ___ cps

___ cycles from ___ to ___ cps

T_c 4 Sec.

Anal. Rate 1.25 cps/Sec.

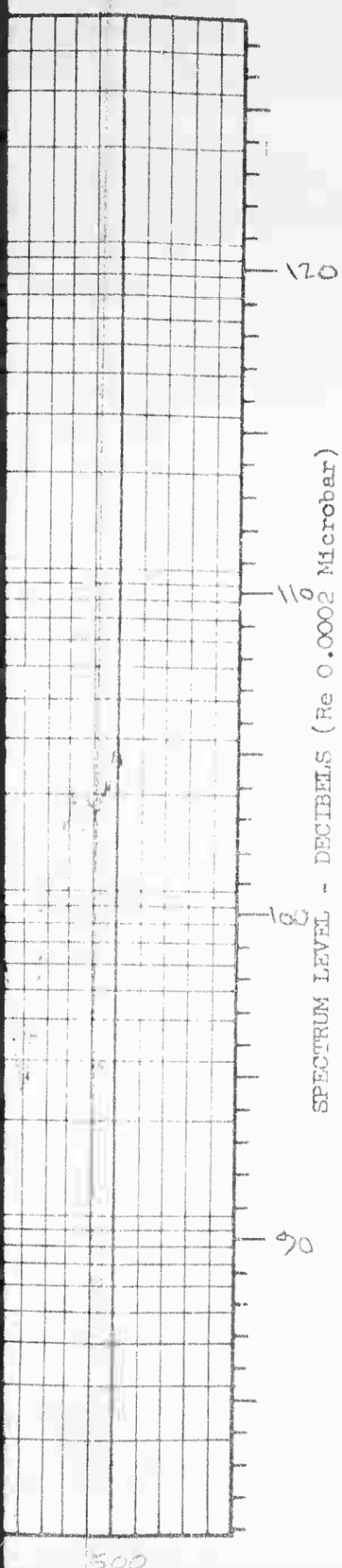
Loop Length 4 Sec.

CALC

CHECK SOA

APR.

APR.



DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PRELIM.		
EWA No.: S-593	Panel or Specimen No.: 1498	
Tape No.: 27	Tape Channel: 2	Mic. No.: 2
Elapsed Test Time: +5	Mic. RMS Level at Sonic Lab. V_L = .090 Volts	

CALIBRATION

Tape No.: 27	Tape Channel: 6	Data Tape RMS Volt V_R = .145

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200cps

Line Amplifier Settings
For Calibration G_c = .500 ; for Data G_d = 1.000

Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2.0

Microphone Sensitivity
S = .290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = .145

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \frac{(.145)^2}{(2)(1)} = 5.25 (10^{-3})$ psi²/cps

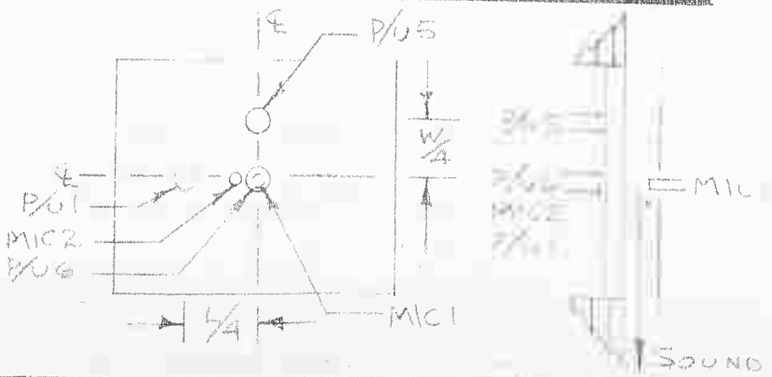
Analyzer Attenuator Setting: -20 db	Log Converter Setting: 0 db

Calibration Plotted at 5.25 (10^{-3}) psi²/cps

Overall Pressure Level Data — Equiv. to 130 db SPL

RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$

$= \frac{(.145)(180)}{(2)(1)(.52)} = .025$ psi



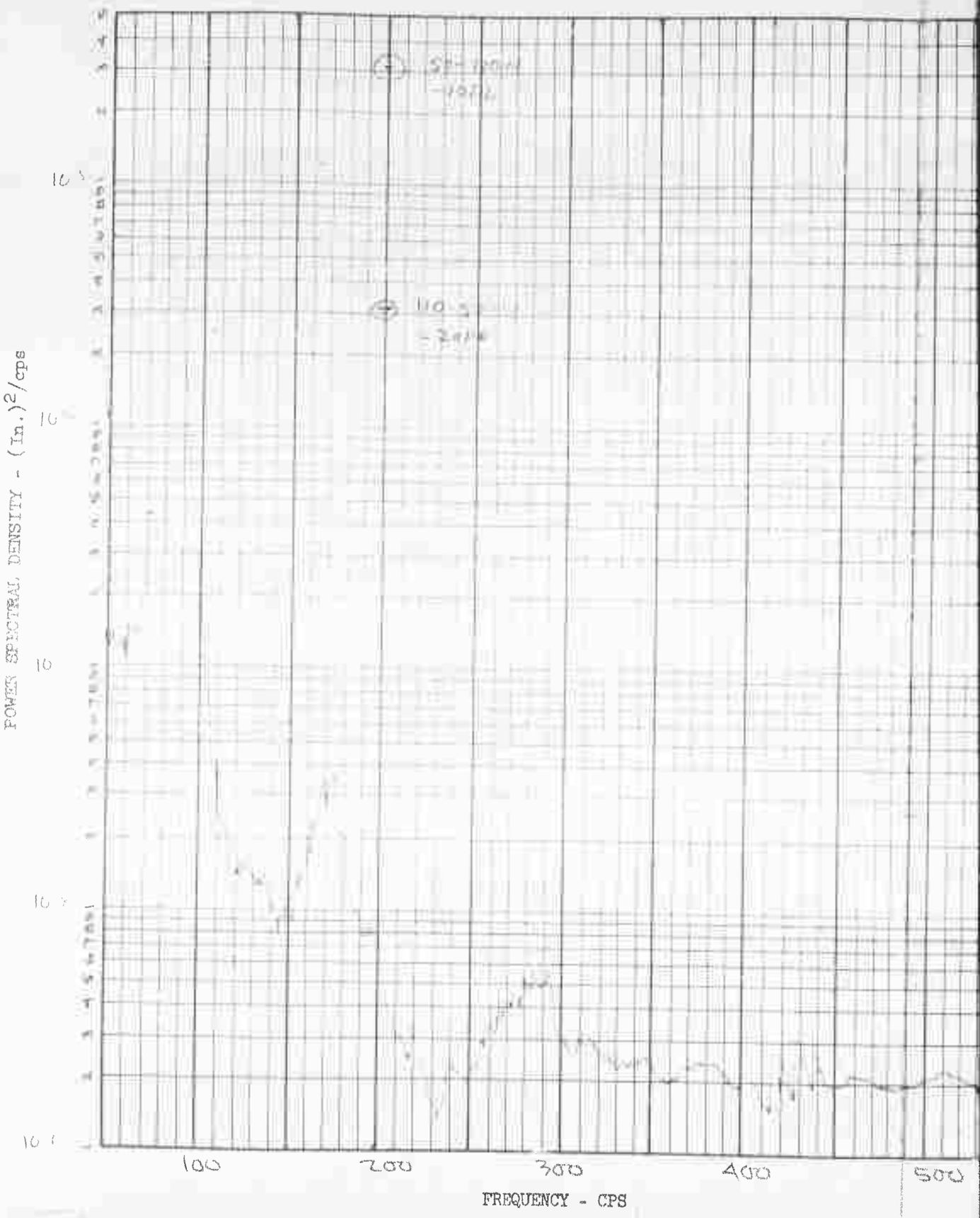
CALC			REVISED	DATE
CHECK	SOA	6/21/61		
APR.				
APR				

POWER SPECTRAL DENSITY ANALYSIS
OF MICROPHONE OUTPUT
5 MIN TEST
MIC 2 PANEL 1498 PHASE A
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CALC	
CHECK	SOA
APR.	
APR	

DATA IDENTIFICATION

Test Title		
PANEL ATTACH TYPE I PRELIM		
EWA No. 5593	Panel or Specimen No. 1498	
Tape No. 27	Tape Channel 3	Displacement Pickup # 1
Elapsed Test Time +5 MIN.	P/U RMS Level at Sonic Lab. V_L = .250 Volts	

CALIBRATION

Tape No.	Tape Channel	Data Tape RMS Volt
27	6	V_R = .245

Calibration Voltage
V_a = 5 V_{rms} into Line Amp.; V_c = .52 V_{rms} on Tape @ 200cps

Line Amplifier Settings
For Calibration G_c = .500 ; for Data G_d = .500

Lab. Gain
LG = 1.0

Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0

Displacement Pickup Sensitivity
S = 0354 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = .0177

Equivalent of Calibration for PSD Plots

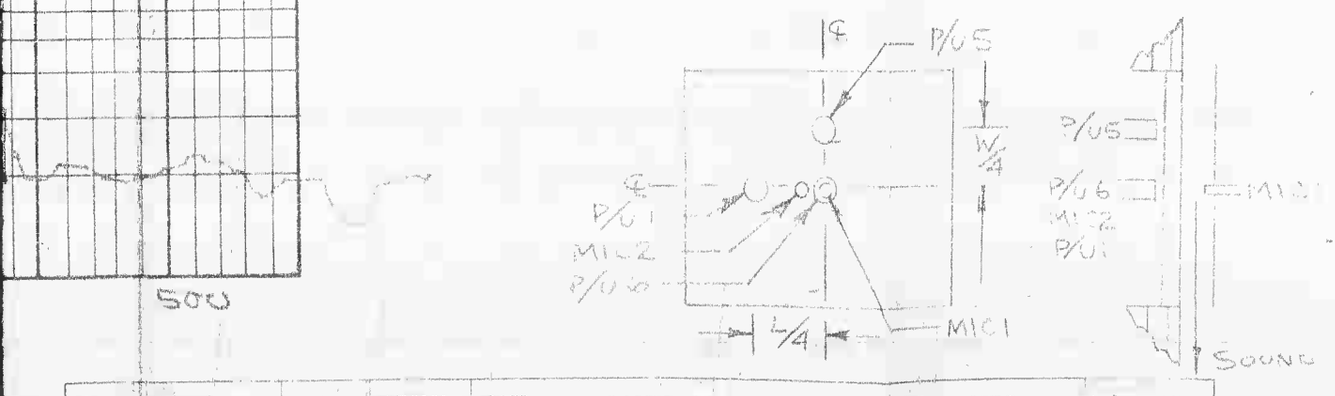
$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0177}{(1)(1)}\right]^2 = 3.13 \times 10^{-4} \text{ in.}^2/\text{cps}$$

Analyzer Attenuator Setting	Log Converter Setting
-10 db (50-1100 cps)	0 db

Calibration Plotted at 3.13×10^{-5} in.^{2}/cps (50-1100 cps)

Overall Deflection Level of Data

$$\text{RMS Defl. Level} = \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0177)(.245)}{(1)(1)(.52)} = .0083 \text{ in.}$$



CALC		REVISED	DATE
CHECK	500 6/20/61		
APR.			
APR			

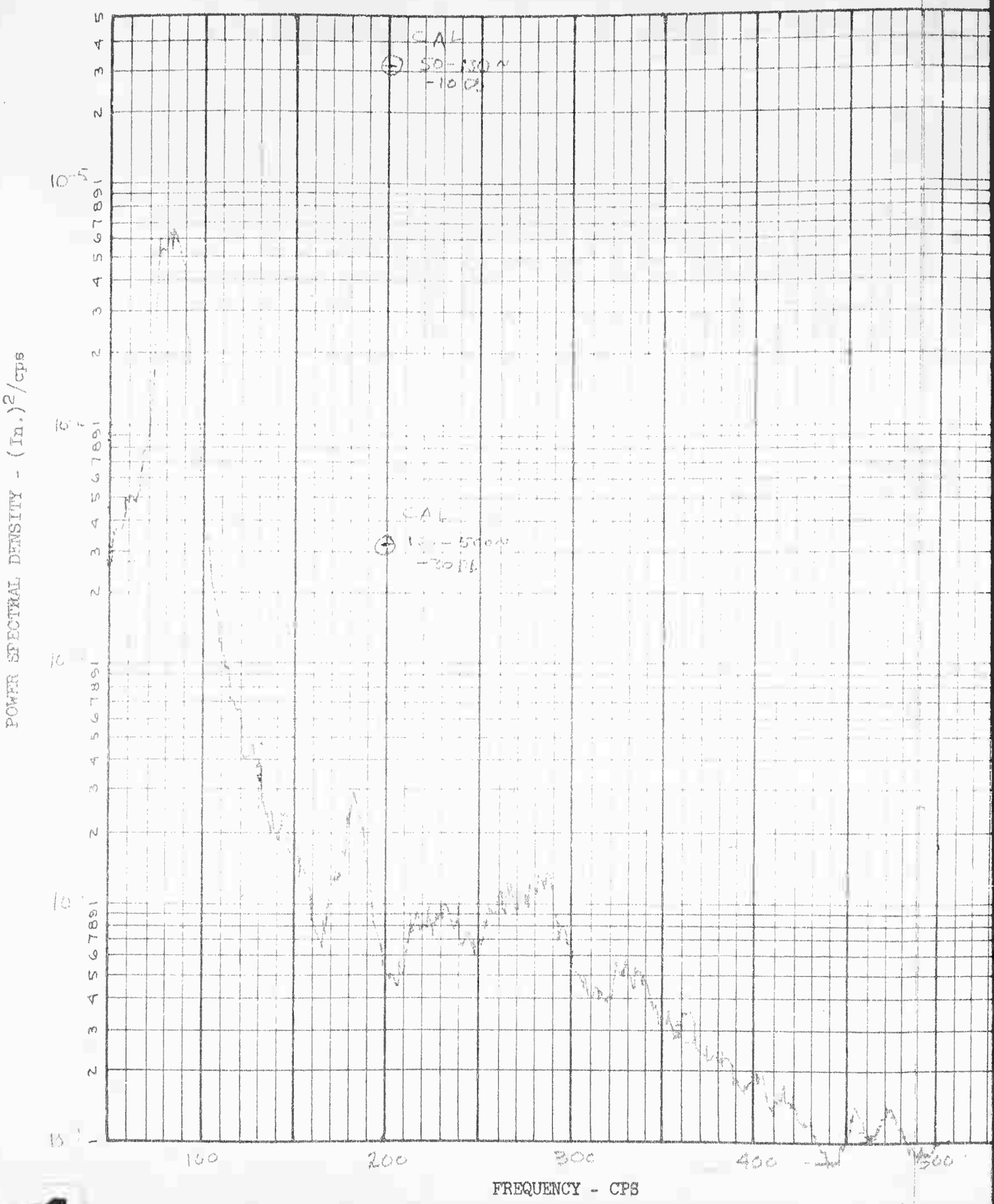
POWER SPECTRAL DENSITY ANALYSIS
OF DISPLACEMENT PICKUP
P/U 1 PANEL 1498 PHASE A 5 MIN TEST

BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 125 cps/sec.
Loop Length 4 Sec.

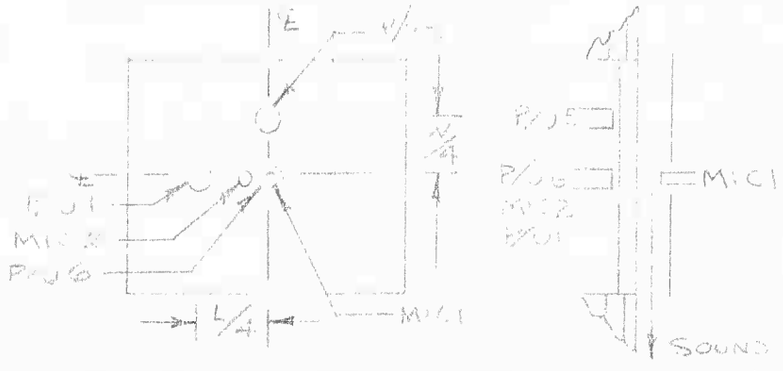
CALC	
CHECK	SOA
APR.	
APR.	

DATA IDENTIFICATION

Test Title		
PANEL ATTACH TYPE I PDEL#1		
FWA No. 5-593	Panel or Specimen No. 1428	
Tape No. 27	Tape Channel 4	Displacement Pickup # 5
Elapsed Test Time +5	P/U RMS Level at Sonic Lab. V_L = .320 Volts	

CALIBRATION

Tape No. 27	Tape Channel 6	Data Tape RMS Volt V_R = .340
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .52 V_{rms} on Tape @200 cps		
Line Amplifier Settings For Calibration G_c = .500 ; for Data G_d = .500		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0	
Displacement Pickup Sensitivity S = .0354 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = .0177		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0177}{(1.0)}\right]^2 = 3.13(10^{-4})$ in.²/cps		
Analyzer Attenuator Setting -10 db	Log Converter Setting 0	
Calibration Plotted at 3.13 in.²/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0177)(.340)}{(1.0)(.52)}$ = .0116 in.		

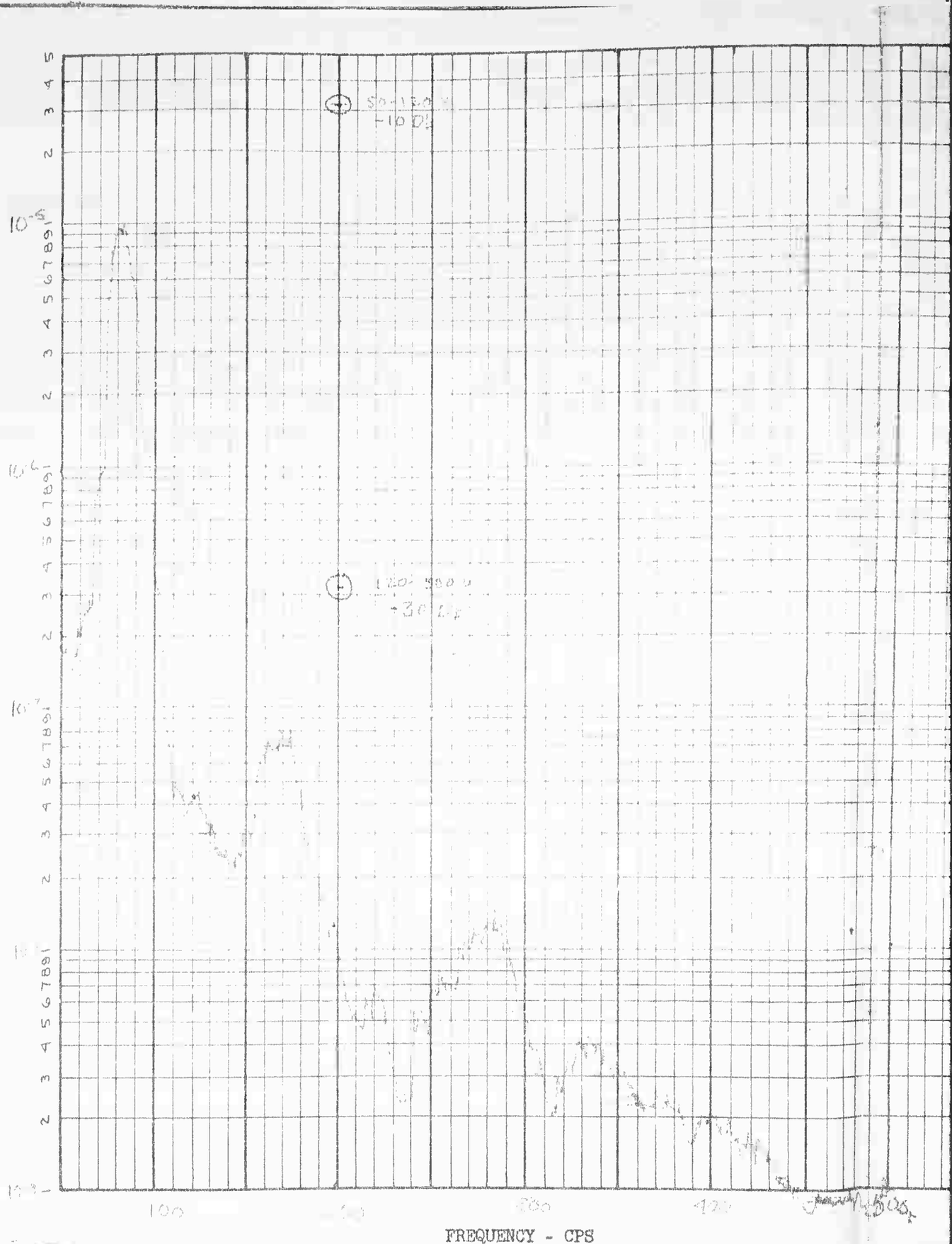


CALC	[illegible]	[illegible]	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP 5 MIN. TEST P/U 5 PANEL 1428 PLESEA BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
CHECK	SOA	4/27/61			
APR.					
APR					

Ver. I
DK 8X84
PAGE FIG 206

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

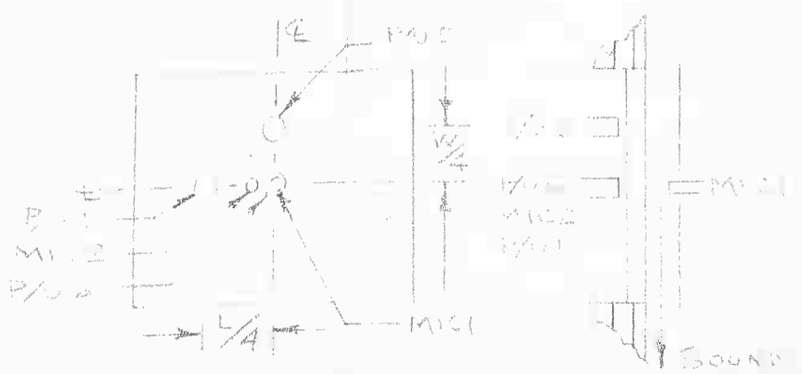
CALC	MRM
CHECK	JSA
APR	
APR	

DATA IDENTIFICATION

Test Title		
PANEL ATTACH TYPE I PANEL 1		
EWA No. 5324	Panel or Specimen No. 1498	
Tape No. 27	Tape Channel 5	Displacement Pickup # 6
Elapsed Test Time +5	P/U RMS Level at Sonic Lab. V_L = .360 Volts	

CALIBRATION

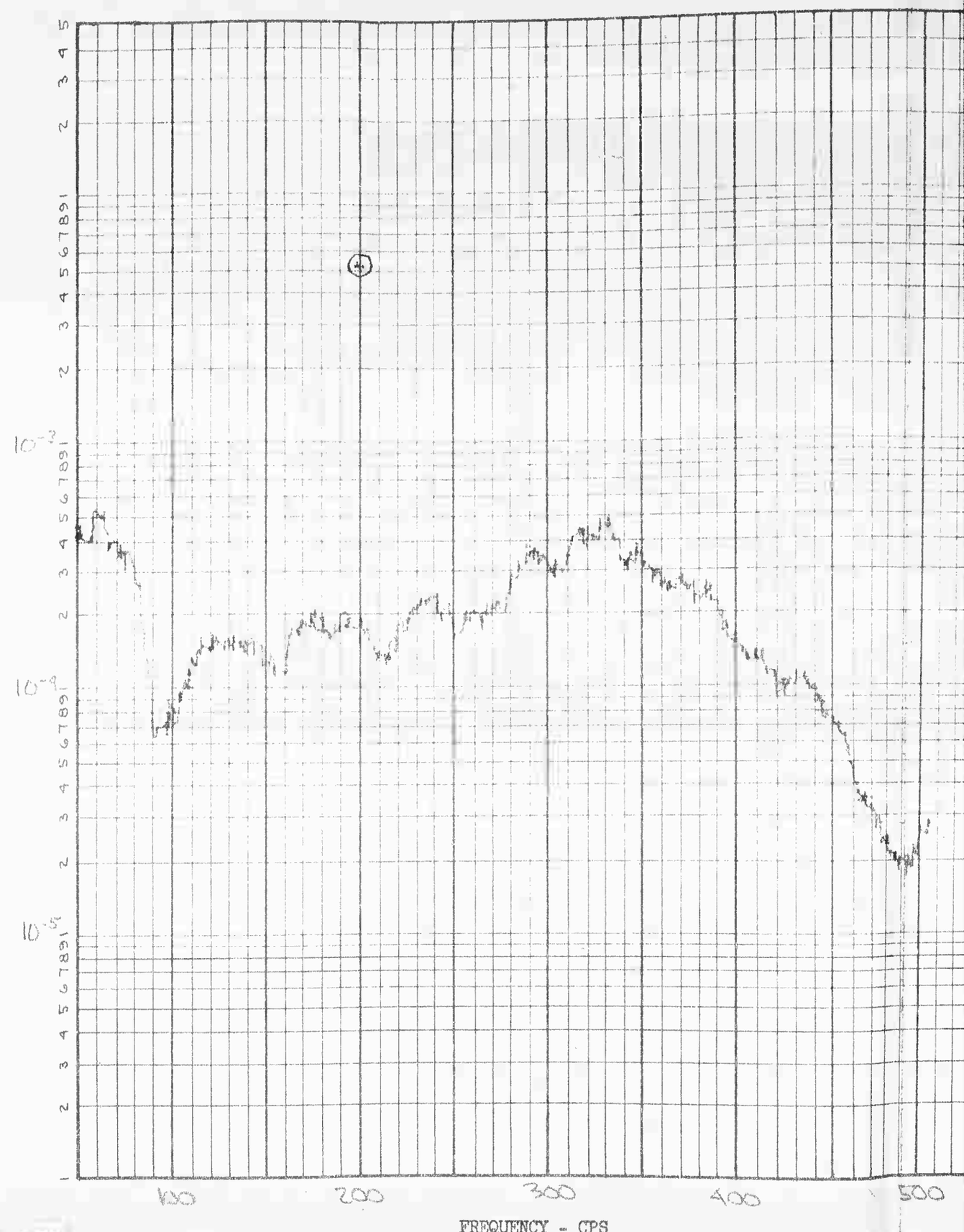
Tape No. 27	Tape Channel 6	Data Tape RMS Volt V_R = .355
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .52 V_{rms} on Tape @ 200 cps		
Line Amplifier Settings For Calibration G_c = .500 ; for Data G_d = .500		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0	
Displacement Pickup Sensitivity S = .0554 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = .0277		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0277}{(1)(1)}\right]^2$ = 3.13(10⁻⁴) in.²/cps		
Analyzer Attenuator Setting −10 db	Log Converter Setting 0 db	
Calibration Plotted at 3.13(10⁻⁴) in.²/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0277)(.355)}{(1)(1)(.52)}$ = .0191 in.		



CALC	MPM	6-26	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP	VOL I
CHECK	[illegible]	6/27/61			5 MIN TEST	02-80084
APR					P/U 6 PANEL 1498 PHASE A	
APR					BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON	PAGE Fig 207

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ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 15 Sec.
Anal. Rate 33 cps/Sec.
Loop Length 15 Sec.

CALC 3.0.9
CHECK
APR.
APR.

1

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I ~ PRELIM.		
EWA No.: 5-593	Panel or Specimen No.: 1498	
Tape No.: 61	Tape Channel: 1	Mic. No.: 1
Elapsed Test Time: +605 MIN.	Mic. RMS Level at Sonic Lab. V_L = 1.25 Volts	

CALIBRATION

Tape No.: 61	Tape Channel: 6	Data Tape RMS Volt V_R = .225

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .48 V_{rms} on Tape @200cps

Line Amplifier Settings
For Calibration G_c = .500; for Data G_d = .100

Lab. Gain: LG = 10	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = .2

Microphone Sensitivity
S = .290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = .145

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left(\frac{.145}{.2(10)}\right)^2 = 5.2 \times 10^{-1}$ psi^2/cps

Analyzer Attenuator Setting: −20 db	Log Converter Setting: 0 db

Calibration Plotted at 5.2 (10^{-1}) psi^2/cps

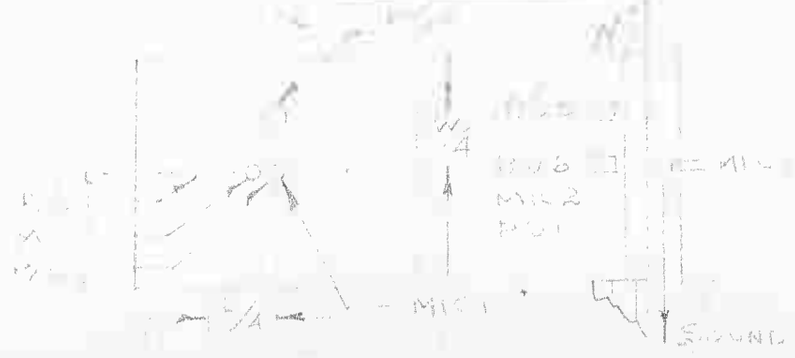
Overall Pressure Level Data — Equiv. to 161.5 db SPL

RMS pressure level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$

$= \frac{(.145)(.225)}{(.2)(10)(.48)} = .340$ psi

SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

500



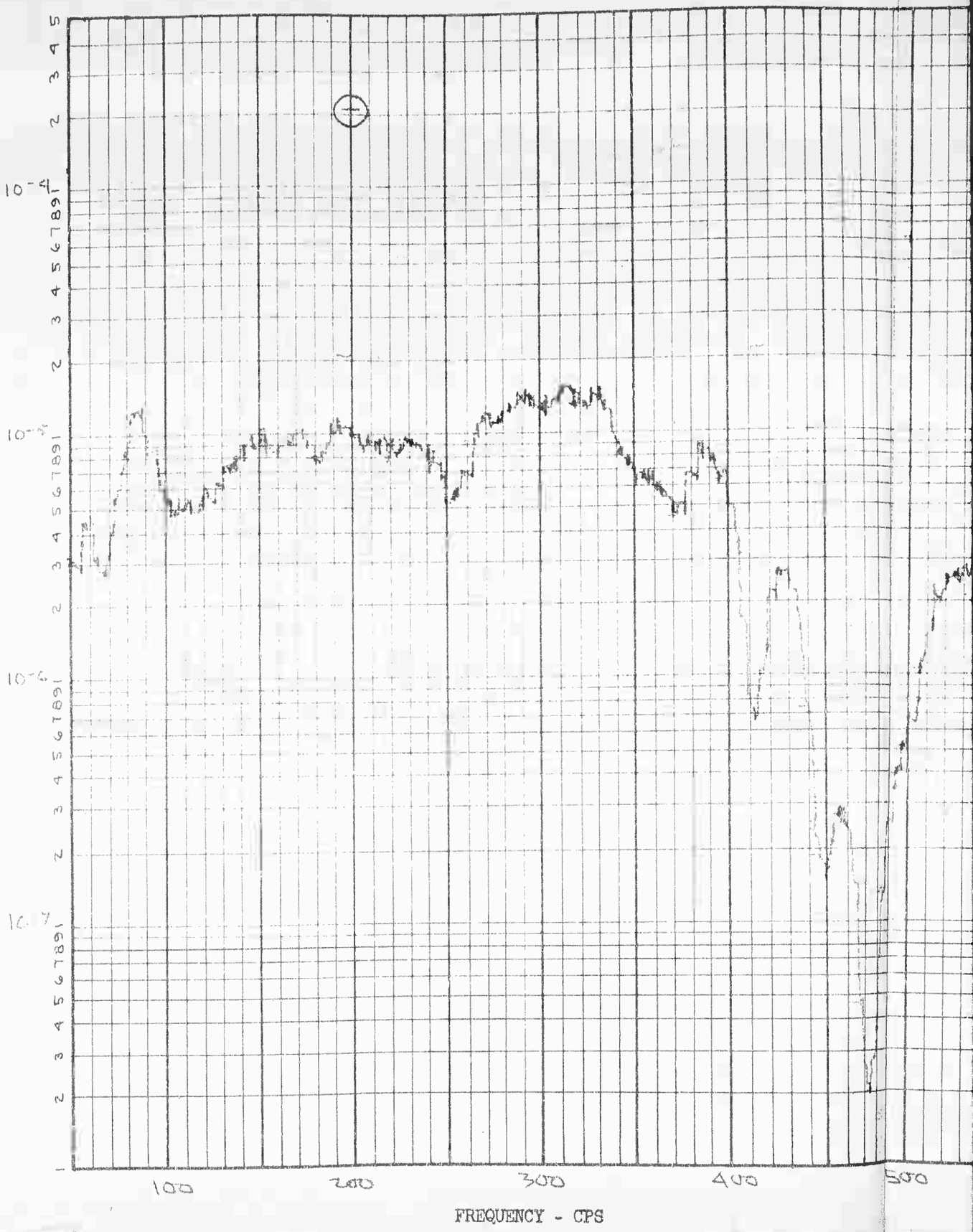
CALC	SOA	6/21/61	REVISED / DATE
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APR.			

POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT 161.5 db
B-5 Sonic Test "D"
MIC #1 PANEL 1498 PHASE "D"
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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PAGE FIG 208

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2



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 15 Sec.
Anal. Rate 33 cps/Sec.
Loop Length 15 Sec.

CALC	30A
CHECK	
APR.	
APR.	

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I ~ PRELIM'		
EWA No. 5-593	Panel or Specimen No. 1498	
Tape No. 61	Tape Channel 2	Mic. No. 2
Elapsed Test Time +60.5 MIN.	Mic. RMS Level at Sonic Lab. V_L = .250 Volts	

CALIBRATION

Tape No. 61	Tape Channel 6	Data Tape RMS Volt V_R = .230

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .48 V_{rms} on Tape @ 7½ ips

Line Amplifier Settings
For Calibration G_c = .500 ; for Data G_d = .500

Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0

Microphone Sensitivity
S = 290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = .145

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left(\frac{.145}{(1)(1)}\right)^2 = 2.1 \times 10^{-2}$ psi^2/cps

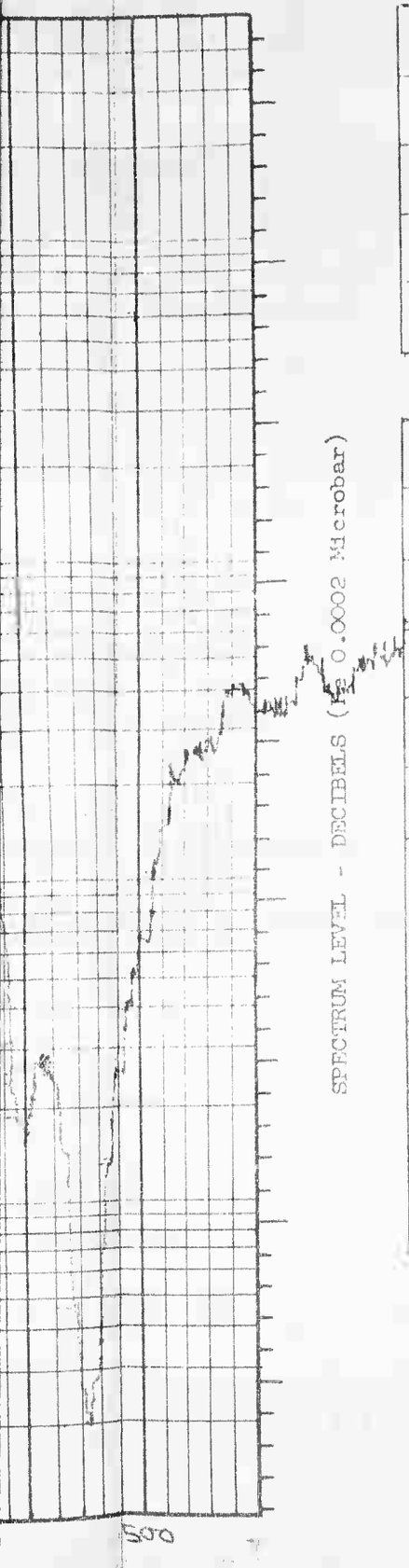
Analyzer Attenuator Setting -20 db	Log Converter Setting 0 db

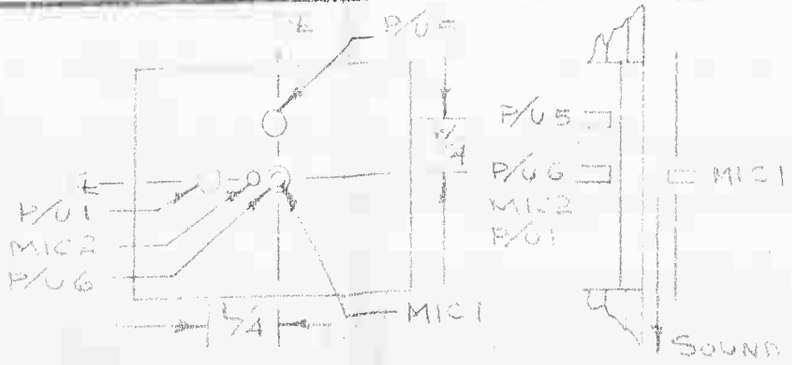
Calibration Plotted at 2.1 (10-2) psi^2/cps

Overall Pressure Level Data — Equiv. to 147.6 db SPL

RMS pressure level $= \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$

$= \frac{(.145)(.230)}{(1.0)(1)(.48)}$ = .070 psi



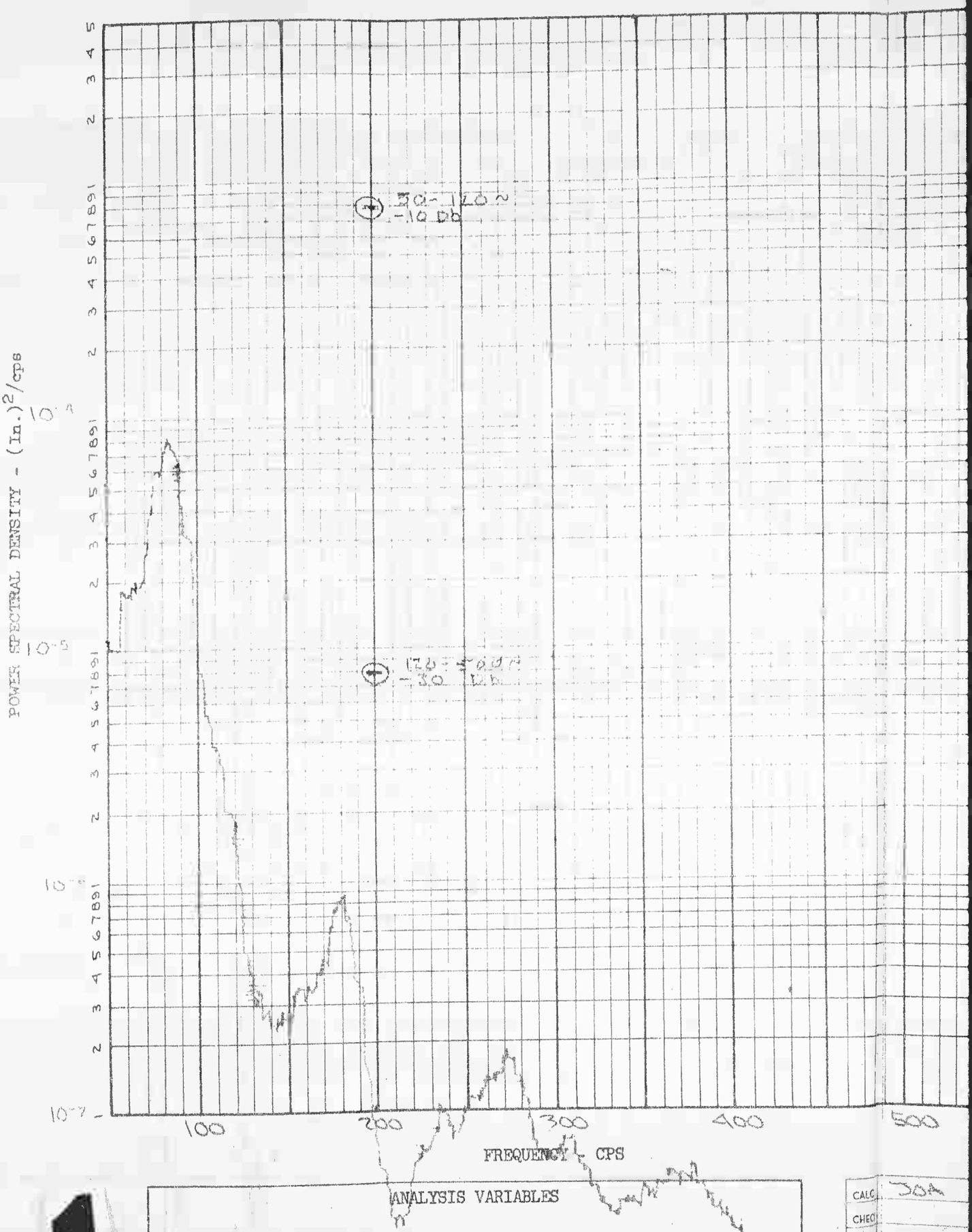


CALC	SOA	6/21/61	REVISED	DATE
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APR.				

POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT 162.5 db O.A. MINTES - Vol. I
MIC #2 PANEL 1498 PHASE "D" D2-80084
BOEING AIRPLANE COMPANY PAGE FIG 209
SEATTLE 24, WASHINGTON

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2



ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 15 Sec.
Anal. Rate 33 cps/sec.
Loop Length 15 Sec.

CALC
CHEC
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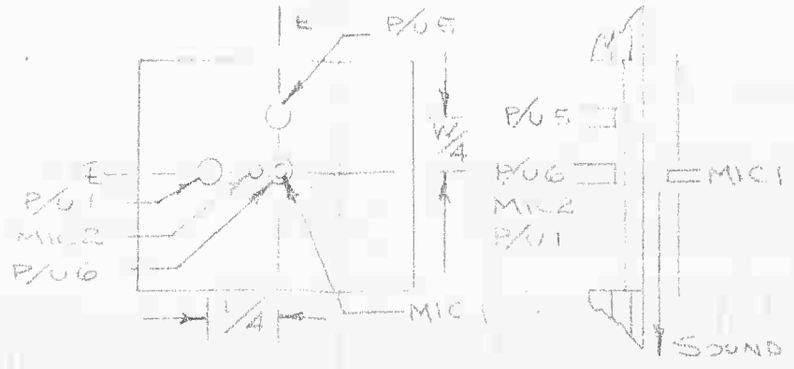
1

DATA IDENTIFICATION

Test Title: PANEL ATTACH. TYPE I - PRELIM.		
EWA No. 5-593	Panel or Specimen No. 1498	
Tape No. 61	Tape Channel 3	Displacement Pickup # 1
Elapsed Test Time +60.5 MIN	P/U RMS Level at Sonic Lab. V_L = .870 Volts	

CALIBRATION

Tape No. 61	Tape Channel 6	Data Tape RMS Volt V_R = .170
Calibration Voltage: V_a = .5 V_{rms} into Line Amp.; V_c = .48 V_{rms} on Tape @200 cps		
Line Amplifier Settings: For Calibration G_c = 500; for Data G_d = 100		
Lab. Gain LG = 1	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = .2	
Displacement Pickup Sensitivity: S = .0354 in./Volt		
Equivalent of Calibration - in.: $D_c = V_a \cdot S$ = .0177		
Equivalent of Calibration for PSD Plots: $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left(\frac{.0177}{(.2)(1)}\right)^2 = 78 \times 10^{-3}$ in.²/cps		
Analyzer Attenuator Setting: -10 -30 db (50-120 Hz, 120-500 Hz)	Log Converter Setting: 0 db	
Calibration Plotted at: 7.8 (10^{-4}) in.²/cps		
Overall Deflection Level of Data: RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0177)(.170)}{(.2)(1)(.48)}$ = .0314 in.		



500

CALC	3004	6/30/61	REVISED	DATE
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APR				

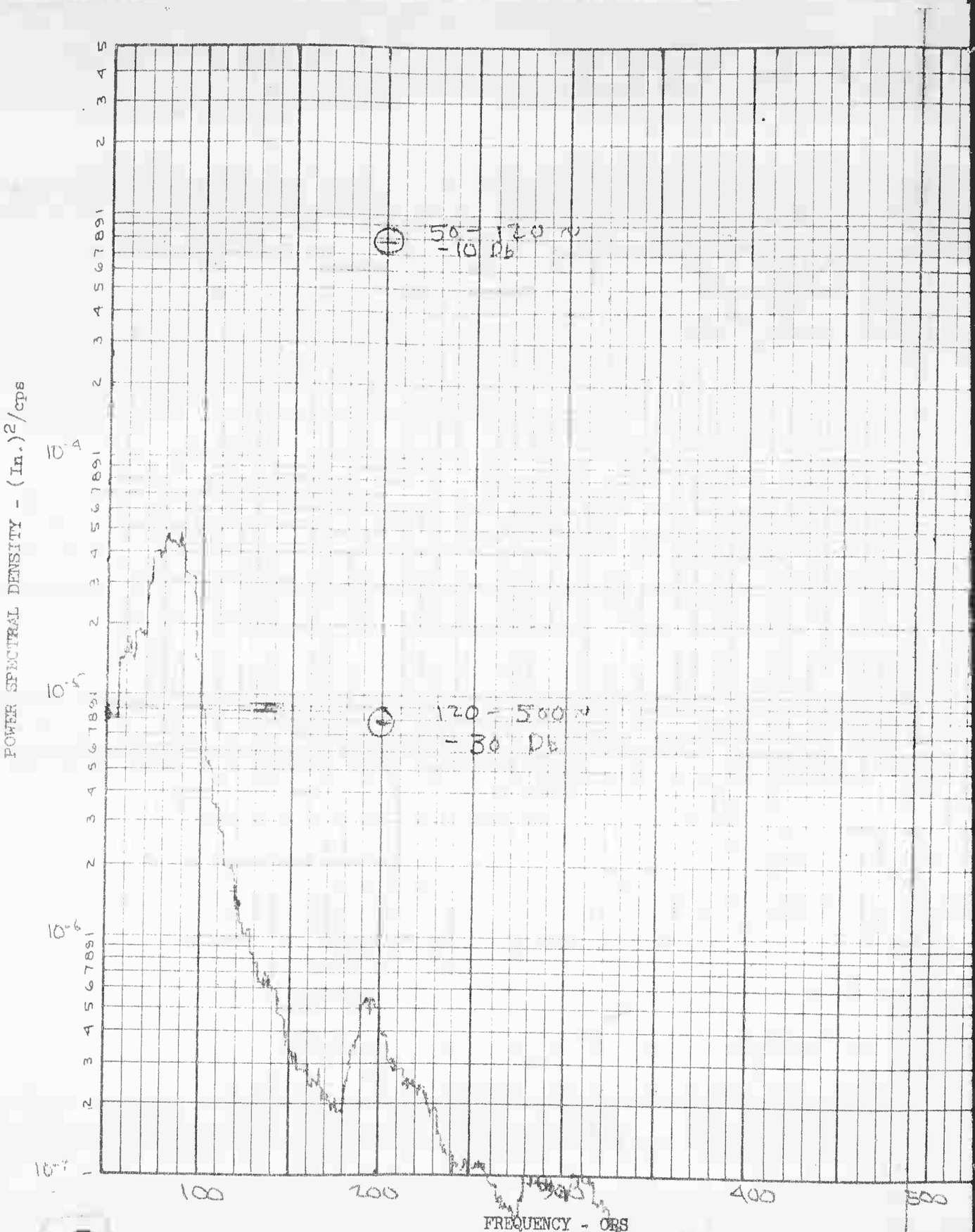
POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
P/U #1 PANEL 1493 PHASE II 2.80 KSI 05 MIN TEST 162 cps

BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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2



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 15 Sec.
Anal. Rate 33 cps/sec.
Loop Length 15 Sec.

CALC	30A
CHECK	
APR.	

DATA IDENTIFICATION

Test Title		
PANEL ATTACH TYPE I ~ PRELIM.		
EWA No. 5-593	Panel or Specimen No. 1498	
Tape No. 61	Tape Channel 4	Displacement Pickup # 5
Elapsed Test Time +60.5 MIN	P/U RMS Level at Sonic Lab. V_L = Volts	

CALIBRATION

Tape No. 61	Tape Channel 6	Data Tape RMS Volt V_R = .210

Calibration Voltage

V_a = .5 V_{rms} into Line Amp.; V_c = .485 V_{rms} on Tape @ 240 cps

Line Amplifier Settings

For Calibration G_c = 500 ; for Data G_d = 100

Lab. Gain	Tape Monitor Gain
LG = 10	$TMG = \frac{G_d}{G_c}$ = .2

Displacement Pickup Sensitivity

S = .0354 in./Volt

Equivalent of Calibration - in.

$D_c = V_a \cdot S$ = .0177

Equivalent of Calibration for PSD Plots

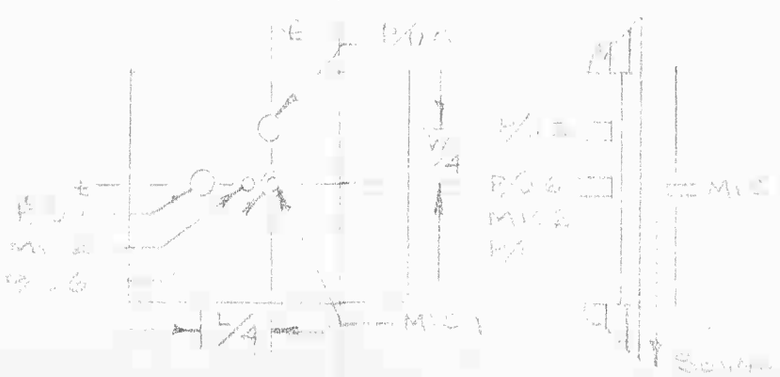
$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left(\frac{.0177}{(.2)(10)}\right)^2 = 7.9 \times 10^{-3} \text{ in.}^2/\text{cps}$$

Analyzer Attenuator Setting		Log Converter Setting	
-30	db	0	db

Calibration Plotted at (1.0 - 4) in.^{2}/cps

Overall Deflection Level of Data

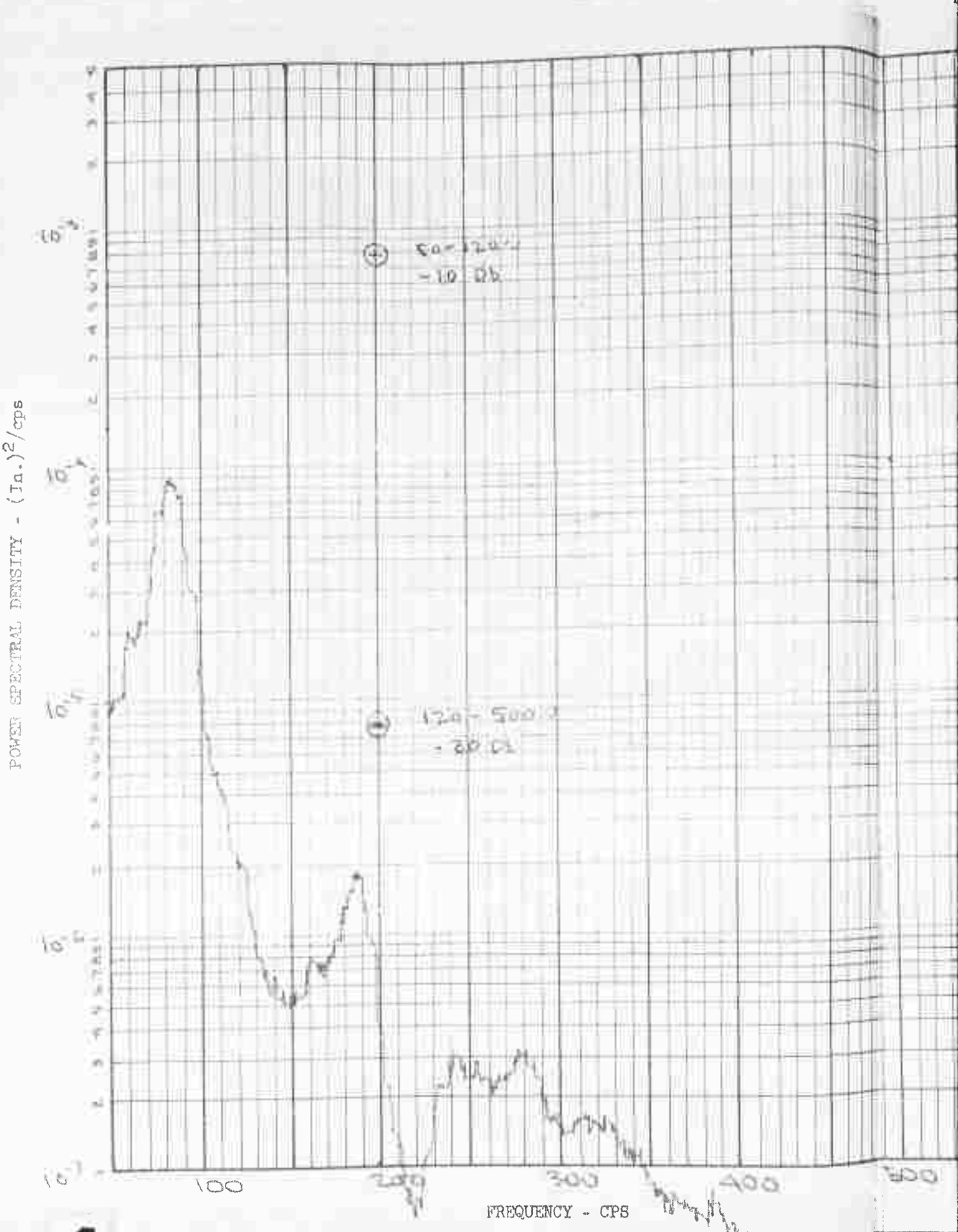
$$\text{RMS Defl. Level} = \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0177)(.210)}{(.2)(10)(.485)} = .0383 \text{ in.}$$



CALC	JOA	6/27/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP P/U #5 PANEL 1498 PHASE "D"
CHECK					BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
APR.					Vol I D2-80051 PAGE FIG 2.1

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 15 Sec.
Anal. Rate 33 cps/sec.
Loop Length 15 Sec.

CALC SOA
CHECK
APR.

DATA IDENTIFICATION

Test Title		
PANEL ATTACH. TYPE I ~ PRELIM.		
EWA No. 5-593	Panel or Specimen No. 1498	
Tape No. 61	Tape Channel 5	Displacement Pickup # 6
Elapsed Test Time +60.5 MIN.	P/U RMS Level at Sonic Lab. V_L = 1.40 Volts	

CALIBRATION

Tape No. 61	Tape Channel 6	Data Tape RMS Volt V_R = .250

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .485 V_{rms} on Tape @ 20 cps

Line Amplifier Settings
For Calibration G_c = 500; for Data G_d = 100

Lab. Gain	Tape Monitor Gain
LG = 1.0	$TMG = \frac{G_d}{G_c}$ = .2

Displacement Pickup Sensitivity
S = .0354 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = .0177

Equivalent of Calibration for PSD Plots

$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left(\frac{.0177}{(.2)(1)}\right)^2 = 7.9 \times 10^{-3} \text{ in.}^2/\text{cps}$$

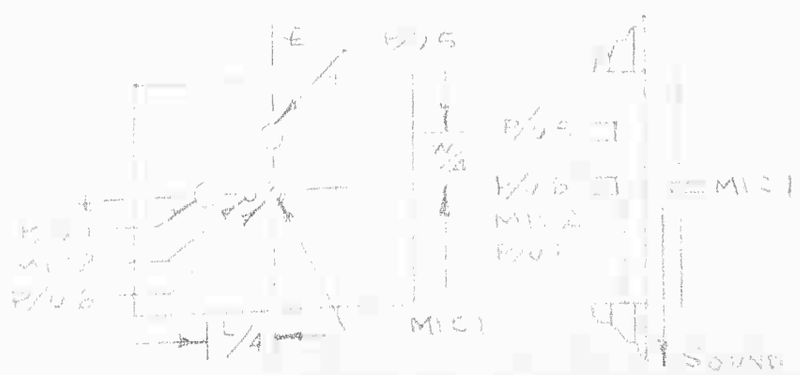
Analyzer Attenuator Setting -10 -30 db

Log Converter Setting Source 100 300 ○ db

Calibration Plotted at 7.9 (10^{-3}) in.^{2}/cps

Overall Deflection Level of Data

$$\text{RMS Defl. Level} = \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0177)(.250)}{(.2)(1)(.485)} = .0455 \text{ in.}$$



500

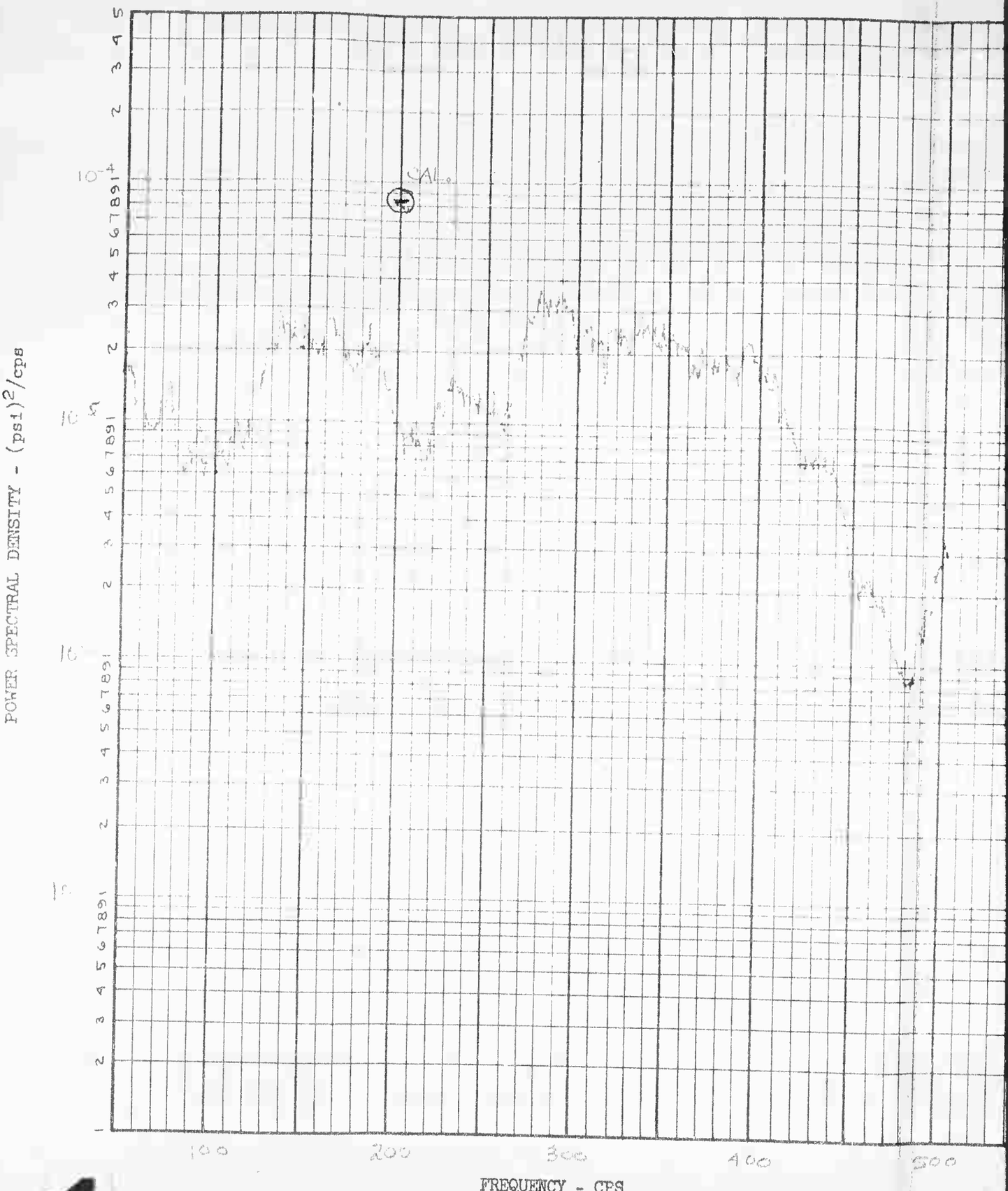
CALC	SOA	Chalk	REVISED	DATE
CHECK				
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POWER SPECTRAL DENSITY ANALYSIS
OF DISPLACEMENT PICKUP
P/U #6 PANEL 1498 PHASE "D"
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

VOLT 5
PAGE FIG 212

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2



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/Sec.
Loop Length 4 Sec.

CALC. [illegible]
CHECK CBT
APR.
APR

DATA IDENTIFICATION

Test Title: PANEL ATTACH TYPE I PANEL		
EWA No.: 5-573	Panel or Specimen No.: 1499	
Tape No.: 28	Tape Channel: 1	Mic. No.: 1
Elapsed Test Time: +5	Mic. RMS Level at Sonic Lab. V_L = ——— Volts	

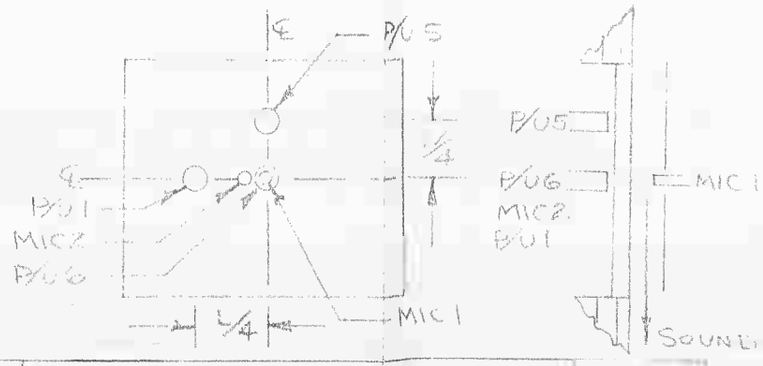
CALIBRATION

Tape No. 28	Tape Channel 6	Data Tape RMS Volt V_R = .192
Calibration Voltage: V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200cps		
Line Amplifier Settings: For Calibration G_c = .500 ; for Data G_d = .250		
Lab. Gain: LG = 1.0	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = .50	
Microphone Sensitivity: S = .270 psi/Volt or 1 Volt rms = 160 db SPL		
Equivalent of Calibration - psi: $P_c = V_a \cdot S$ = .145		
Equivalent of Calibration for PSD Plots: $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{(.5)(1.0)}\right]^2 = 8.41\,(10^{-5})$ psi²/cps		
Analyzer Attenuator Setting: −30 db	Log Converter Setting: 0 db	
Calibration Plotted at: 8.41 (10^{-5}) psi²/cps		
Overall Pressure Level Data: RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$	Equiv. to 151.5 db SPL	
= $\frac{(.145)(.192)}{(.5)(1.0)(.5)}$ = 0.1113 psi		

SPECTRUM LEVEL - DECIBELS (Re 0.0002 Microbar)

130 120 110 100 90

200



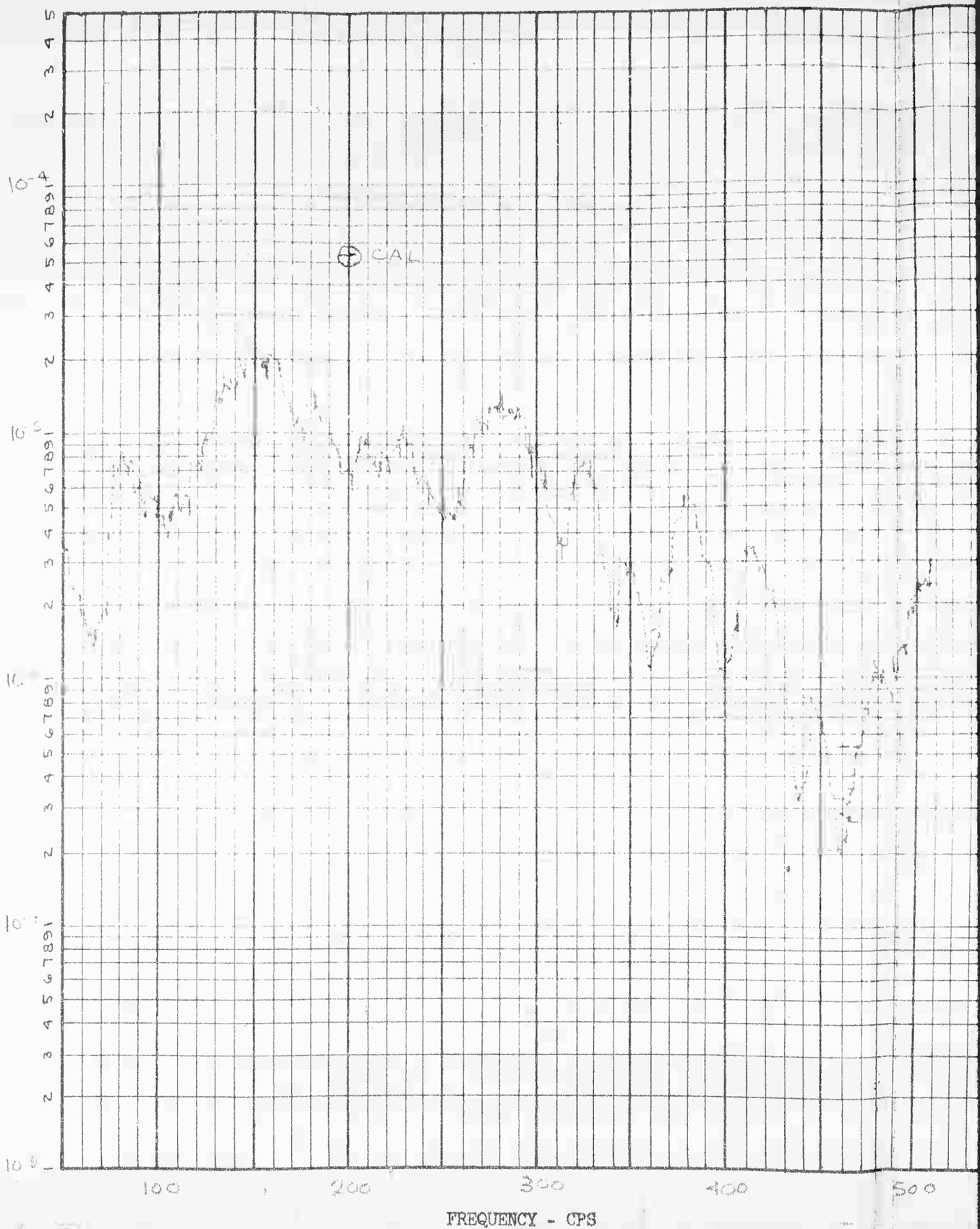
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CALC	[illegible]	[illegible]		
CHECK	[illegible]	6/3/61		
APR.				
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POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT
5 MIN TEST
MIC 1 PANEL 1499 PHASE A
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
____ cycles from ____ to ____ cps
____ cycles from ____ to ____ cps

T_c 4 Sec.
Anal. Rate 125 cps/Sec.
Loop Length 4 Sec.

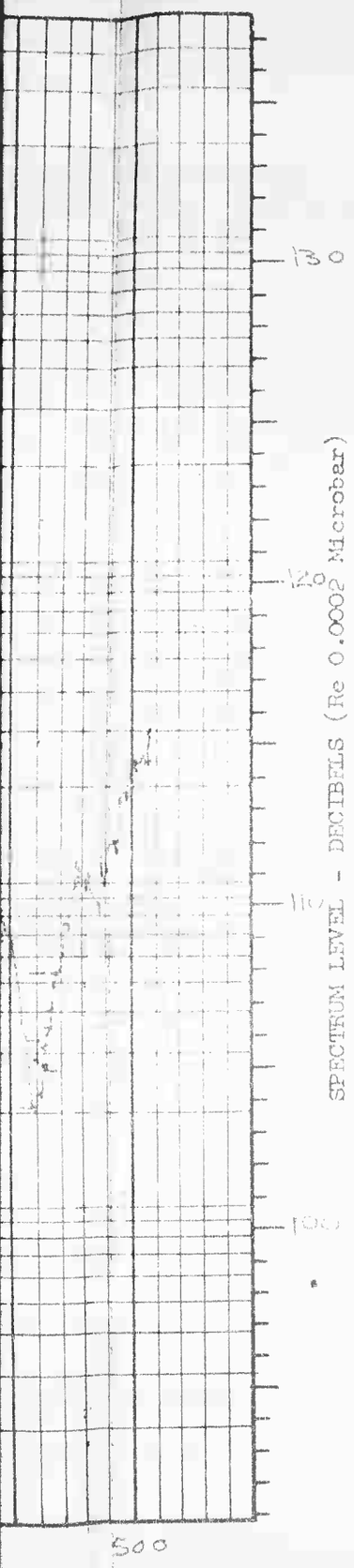
CALC	
CHECK	CEST
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APR.	

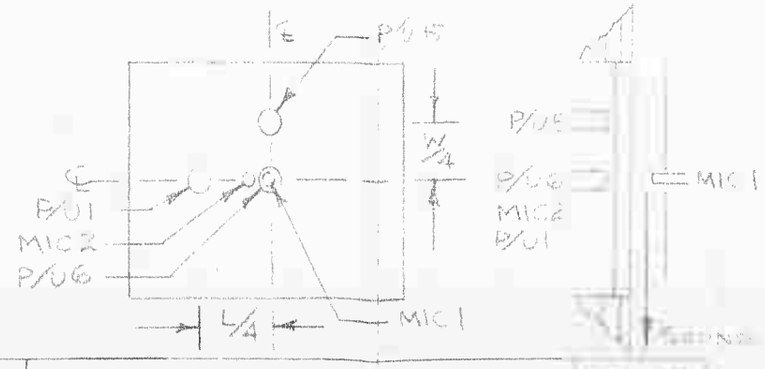
DATA IDENTIFICATION

Test Title		
PANEL ATTACH TYPE I PRELIM		
EWA No. 5-525	Panel or Specimen No. 499	
Tape No. 28	Tape Channel 2	Mic. No. 2
Elapsed Test Time 45	Mic. RMS Level at Sonic Lab. V_L = ——— Volts	

CALIBRATION

Tape No. 28	Tape Channel 2	Data Tape RMS Volt V_R = .164
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .510 V_{rms} on Tape @ 100 cps		
Line Amplifier Settings For Calibration G_c = .500; for Data G_d = 1.000		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 2.0	
Microphone Sensitivity S = .250 psi/Volt or 1 Volt rms = 150 db SPL		
Equivalent of Calibration - psi $P_c = V_a \cdot S$ = .145		
Equivalent of Calibration for PSD Plots $\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left(\frac{.145}{(2)(1.)}\right)^2$ = 5.25 (10^{-3}) psi^2/cps		
Analyzer Attenuator Setting -30 db	Log Converter Setting 0 db	
Calibration Plotted at 5.25 (10^{-5}) psi^2/cps		
Overall Pressure Level Data RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$ = $\frac{.145\ (.164)}{(2)(1.)(.510)}$ = 0.0233 psi	Equiv. to 138.0db SPL	





			REVISED	DATE
CALC	[illegible]	6-26		
CHECK	CEST	6/30/61		
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APR				

POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT

5 MIN TEST

MIC 2 PANEL 499 PHASE A

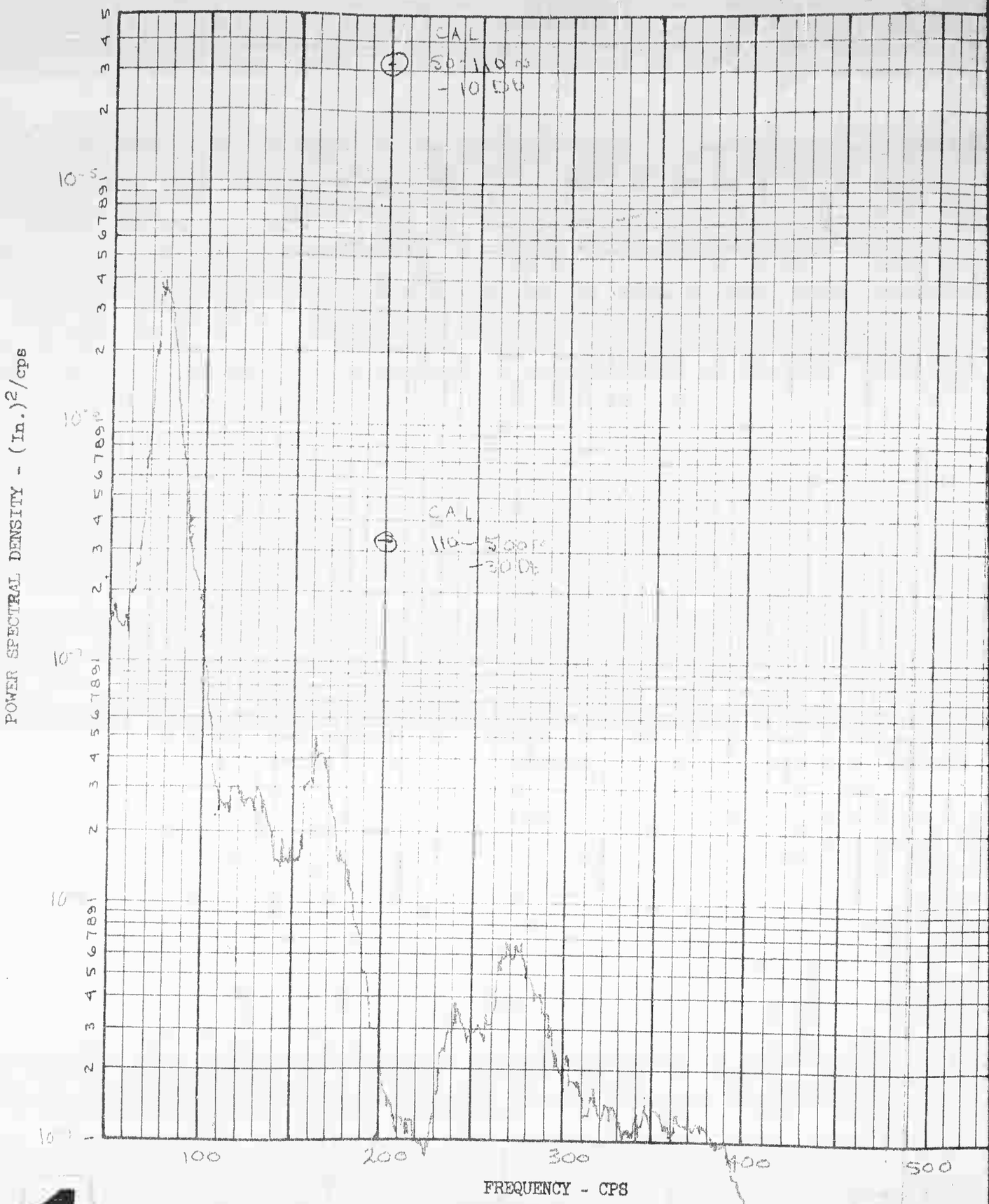
BOEING AIRPLANE COMPANY

SEATTLE 24, WASHINGTON

Vol. I
Pages
Fig. 214

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2



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
____ cycles from ____ to ____ cps
____ cycles from ____ to ____ cps

T_c 4 Sec.
Anal. Rate .125 cps/sec.
Loop Length 4 Sec.

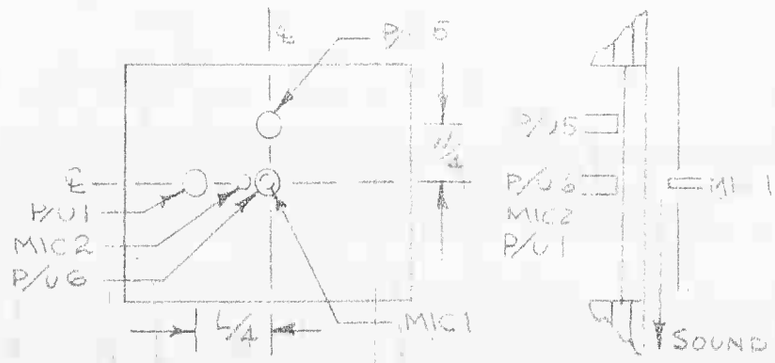
CALC	[illegible]
CHECK	CRT
APR.	
APR.	

DATA IDENTIFICATION

Test Title		
PANEL ATTACH TYPE I PRELIM.		
EWA No. 5-593	Panel or Specimen No. 1499	
Tape No. 28	Tape Channel 3	Displacement Pickup # 1
Elapsed Test Time +5	P/U RMS Level at Sonic Lab. V_L = .210 Volts	

CALIBRATION

Tape No. 28	Tape Channel 6	Data Tape RMS Volt V_R = .230
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .510 V_{rms} on Tape @ 300 cps		
Line Amplifier Settings For Calibration G_c = .500; for Data G_d = .500		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0	
Displacement Pickup Sensitivity S = .0334 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = .0177		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0177}{1.0}\right]^2 = 3.13(10^{-4})$ in.^{2}/cps		
Analyzer Attenuator Setting -10db Position db	Log Converter Setting 0 db	
Calibration Plotted at 3.13 (10^{-4}) 0-10 Position 3.13(10^{-2}) 10-60 Position in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = .0177 (.230) / (1.0)(.510) = .00798 in.		

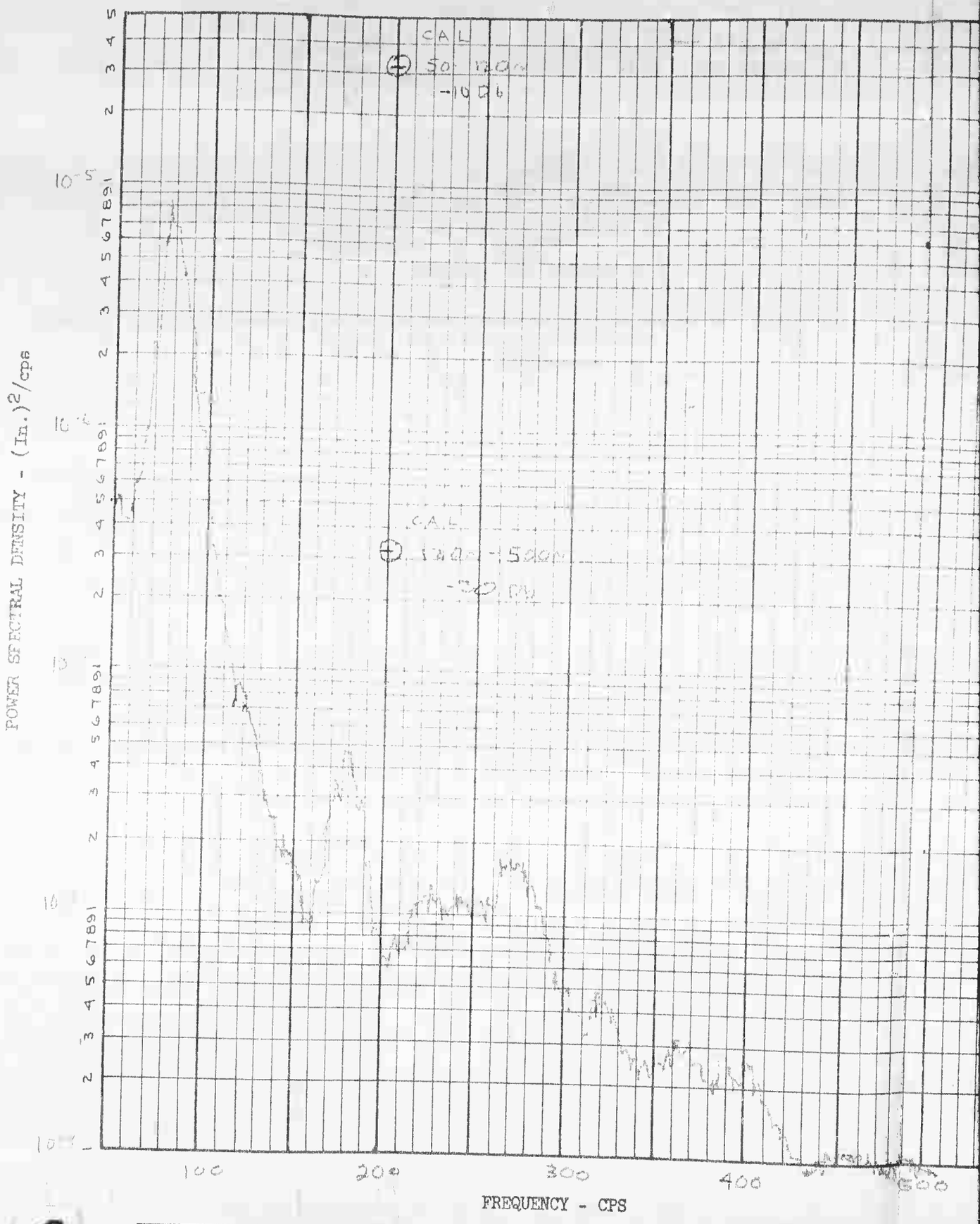


500

CALC.		6-4-6	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
CHECK	CBT	6/30/61			P/U 1 PANEL 1429 PHASE A BMIN TEST
APR.					BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
APR.					Vol I, D2-82084, PAGE FIG 215

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
____ cycles from ____ to ____ cps
____ cycles from ____ to ____ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

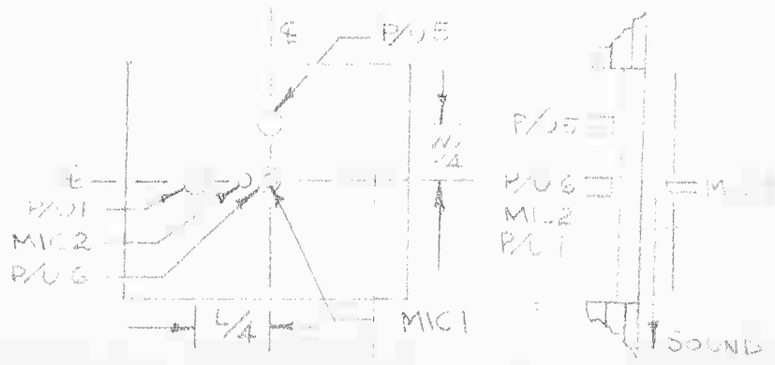
CALC	
CHECK	CBT
APR.	
APR.	

DATA IDENTIFICATION

Test Title		
PANEL ATTACH TYPE I PRELIM		
EWA No. 5-592	Panel or Specimen No. 1499	
Tape No. 28	Tape Channel 4	Displacement Pickup # 5
Elapsed Test Time +5	P/U RMS Level at Sonic Lab. V_L = .355 Volts	

CALIBRATION

Tape No. 28	Tape Channel 6	Data Tape RMS Volt V_R = .350
Calibration Voltage V_a = .5 V_{rms} into Line Amp.; V_c = .505 V_{rms} on Tape @200 cps		
Line Amplifier Settings For Calibration G_c = .500; for Data G_d = .500		
Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0	
Displacement Pickup Sensitivity S = .0854 in./Volt		
Equivalent of Calibration - in. $D_c = V_a \cdot S$ = .0177		
Equivalent of Calibration for PSD Plots $\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0177}{(1.0)(1.0)}\right]^2 = 3.13(10^{-4})$ in.^{2}/cps		
Analyzer Attenuator Setting -10db -5db -2db -1db 0 db	Log Converter Setting 0 db	
Calibration Plotted at -10db (.1) -5db 2 -2db 3.13(10^{-4}) -1db 5 0db 10 in.^{2}/cps		
Overall Deflection Level of Data RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0177)(350)}{(1)(1)(505)}$ = .023 in.		

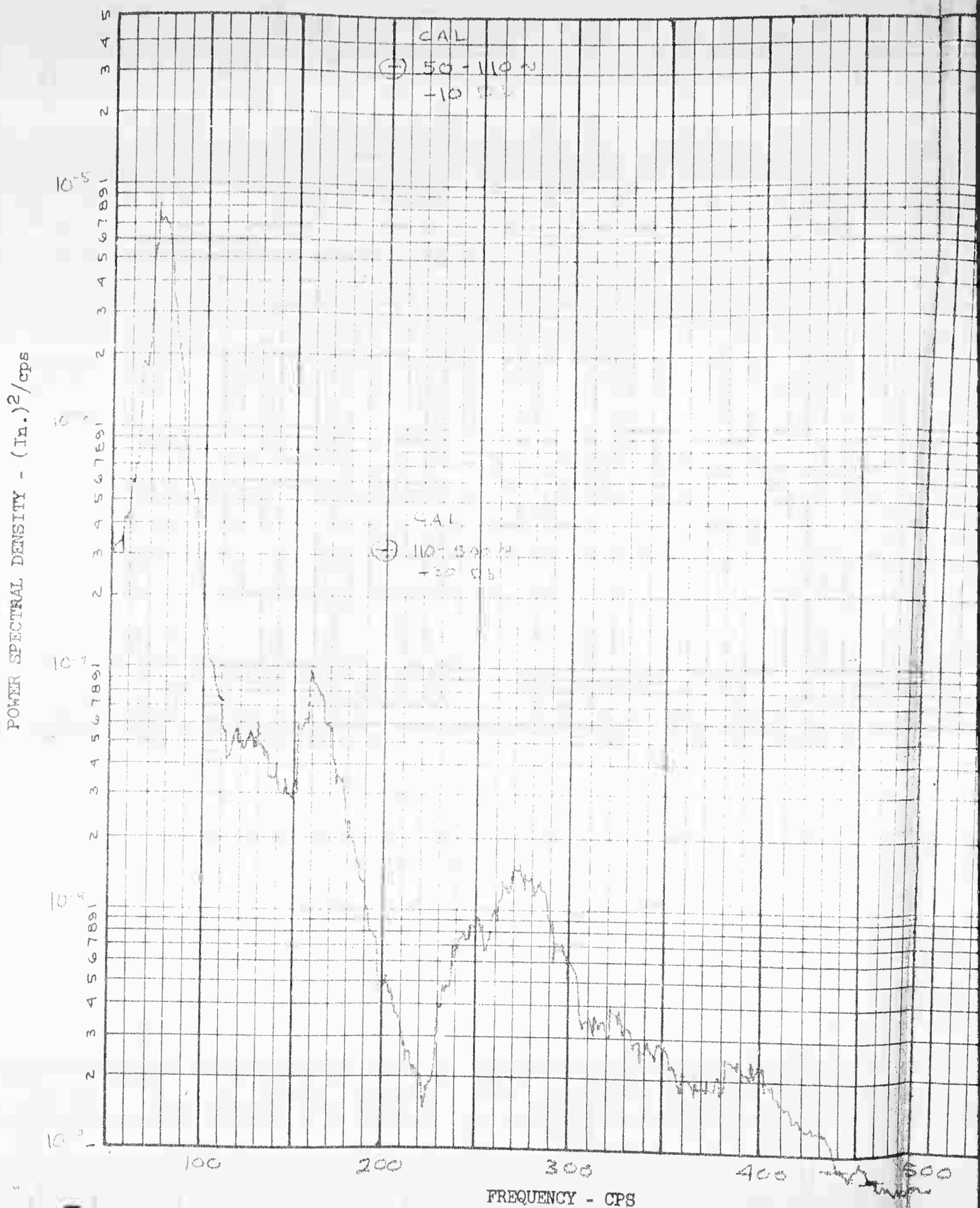


2

			REVISED	DATE
CALC	MTM	6-6		
CHECK	CBT	6/9/61		
APR.				
APR.				

POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
P/U 5 PANEL 1499 PHASE A
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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PAGE FIG 216



1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 4 Sec.
Anal. Rate 1.25 cps/sec.
Loop Length 4 Sec.

CALC	
CHECK	
APR.	
APR.	

DATA IDENTIFICATION

Test Title		
PANEL ATTACH. TYPE I PHASE A		
EWA No. 5-593	Panel or Specimen No. 1499	
Tape No. 28	Tape Channel 5	Displacement Pickup # 6
Elapsed Test Time +5	P/U RMS Level at Sonic Lab. V_L = .310 Volts	

CALIBRATION

Tape No. 28	Tape Channel 6	Data Tape RMS Volt V_R = .315

Calibration Voltage
V_a = .5 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps

Line Amplifier Settings
For Calibration G_c = .500 ; For Data G_d = .500

Lab. Gain LG = 1.0	Tape Monitor Gain $TMG = \frac{G_d}{G_c}$ = 1.0

Displacement Pickup Sensitivity
S = .0254 in./Volt

Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = .0177

Equivalent of Calibration for PSD Plots

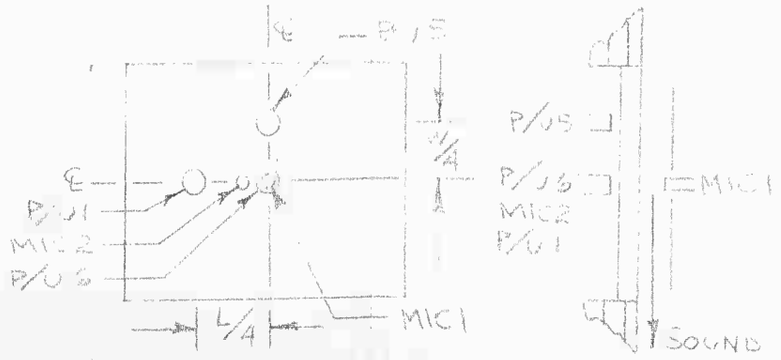
$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0177}{(1)(1)}\right]^2 = 3.13\,(10^{-4})$$ in.²/cps

Analyzer Attenuator Setting 10 db; Low Converter Setting 0 db

Calibration Plotted at [illegible] in.²/cps

Overall Deflection Level of Data

$$\text{RMS Defl. Level} = \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0177)(.315)}{(1)(1)(.500)} = .0111 \text{ in.}$$



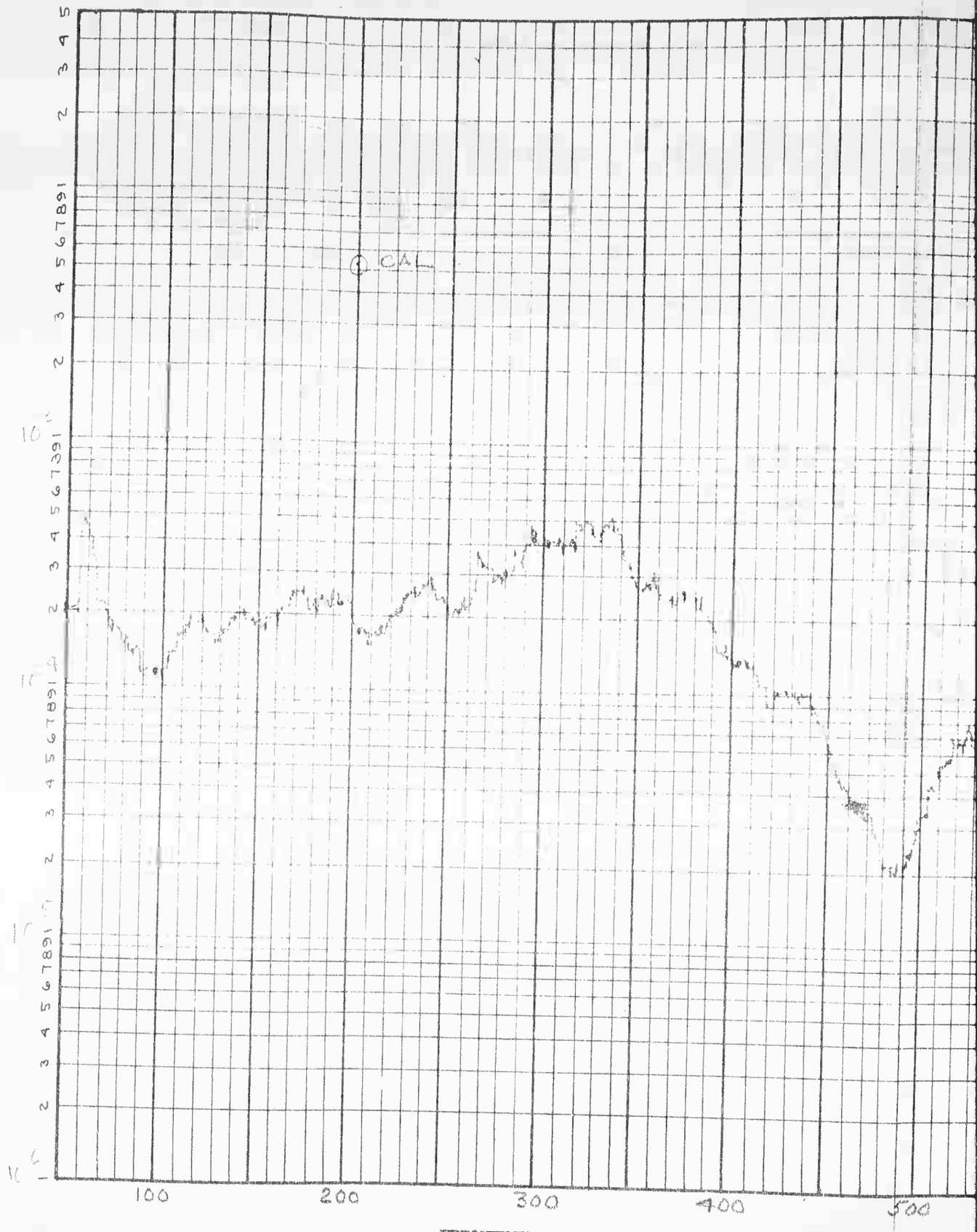
			REVISED	DATE
CALC	[illegible]	6-24		
CHECK	C B I	6/24/61		
APR.				
APR.				

POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP
SONIC TEST
P/U 6 PANEL 1499 PHASE A
BOEING AIRPLANE COMPANY
SEATTLE 24, WASHINGTON

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1

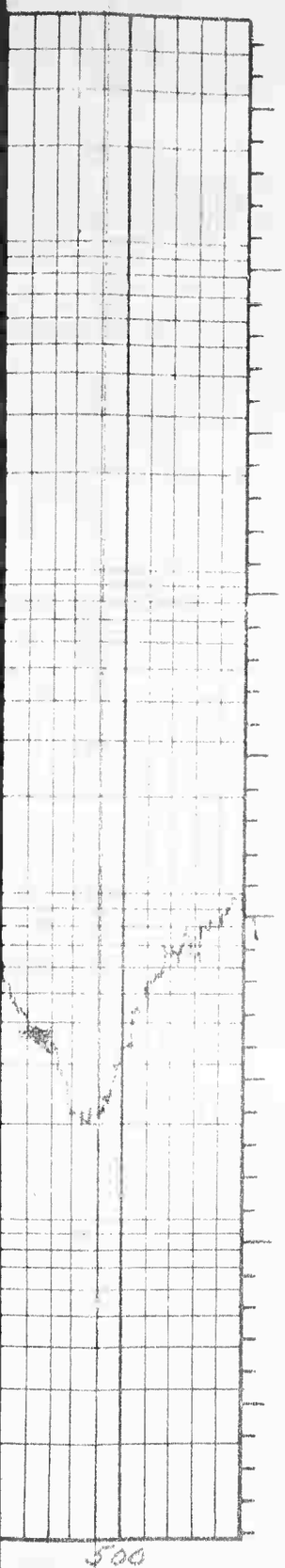
ANALYSIS VARIABLES

Bandwidth

.5 cycles from 50 to 500 cps
____ cycles from ____ to ____ cps
____ cycles from ____ to ____ cps

T_c 15 Sec.
Anal. Rate .333 cps/Sec.
Loop Length 15 Sec.

CALC	CBI
CHECK	
APR.	
APR.	



DATA IDENTIFICATION

Test Title: PANEL ATTACHMENT - TYPE I		
EWA No.: 5-593,	Panel or Specimen No.: 1499	
Tape No.: 64	Tape Channel: 1	Mic. No.: 1
Elapsed Test Time: 60.5 MIN	Mic. RMS Level at Sonic Lab.: V_L = 1.27 Volts	

CALIBRATION

Tape No.: 64	Tape Channel: 6	Data Tape RMS Volt: V_R = .237

Calibration Voltage
V_a = .50 V_{rms} into Line Amp.; V_c = .1 V_{rms} on Tape @ 200 cps

Line Amplifier Settings
For Calibration G_c = .500 ; for Data G_d = .100

Lab. Gain: LG = 1.0	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = .20

Microphone Sensitivity
S = .290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = 0.145

Equivalent of Calibration for PSD Plots
$\left(\frac{P_c}{(TMG)(LG)}\right)^2$ = 5.25×10^{-1} psi^2/cps

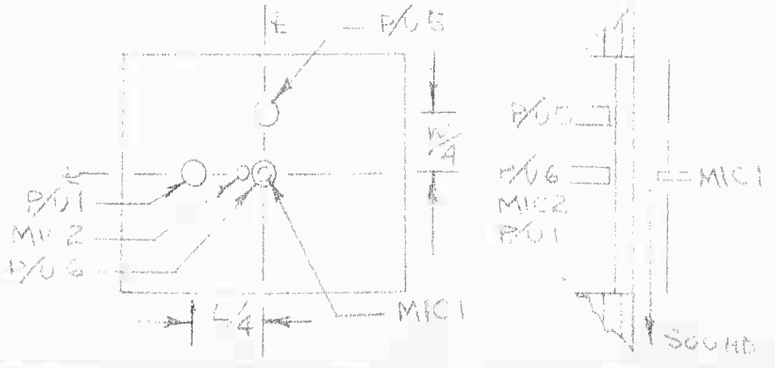
Analyzer Attenuator Setting: db	Log Converter Setting: db

Calibration Plotted at 5.25×10^{-3} psi^2/cps

Overall Pressure Level Data — Equiv. to 164.3db SPL

RMS pressure level = $\frac{(P_c)(V_R)}{(TMG)(LG)(V_c)}$

$= \frac{(.145)(.237)}{(.2)(1)(.500)}$ = 0.344 psi

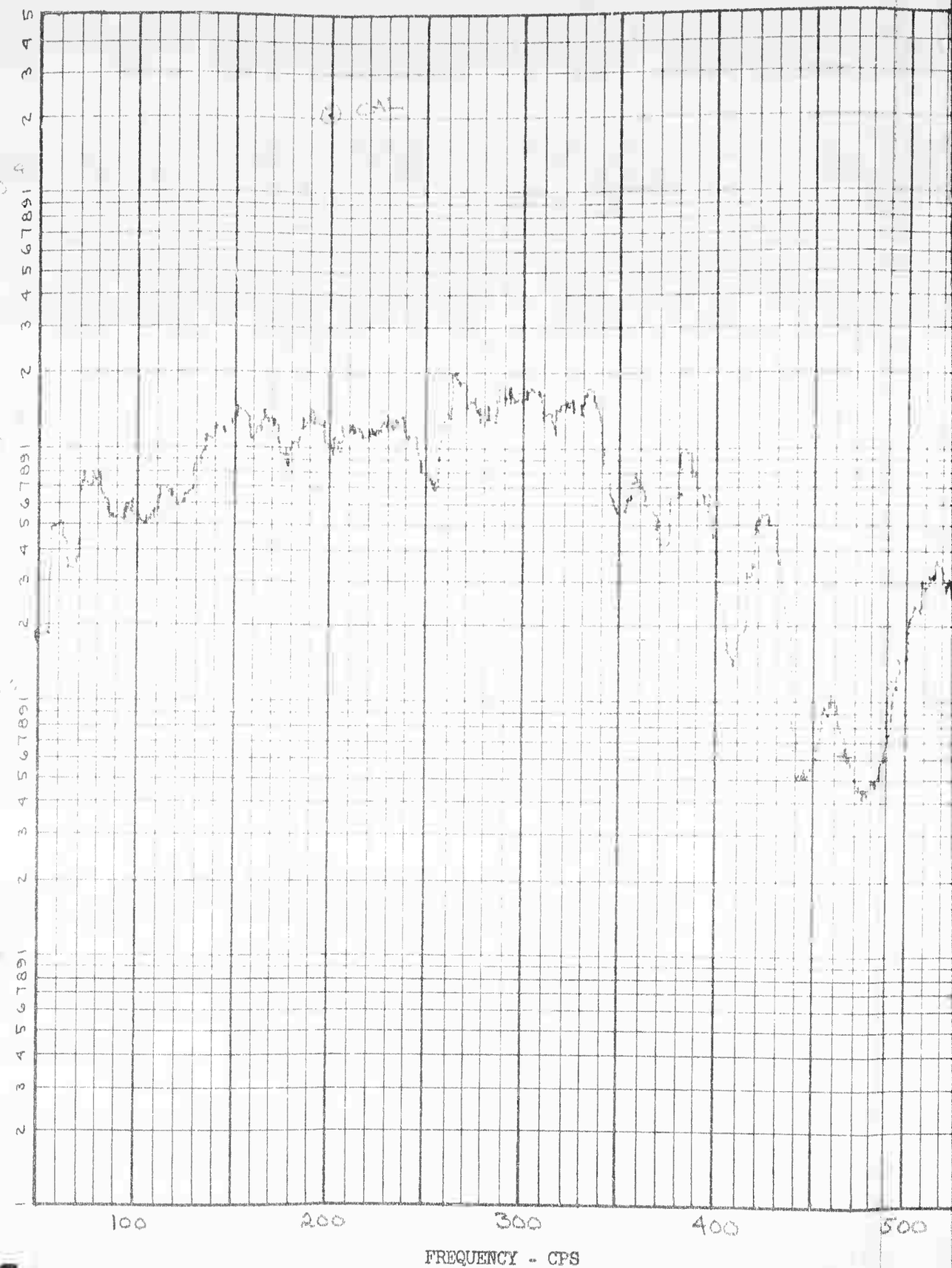


CALC	CBT	6/20/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT 165db 5.5 min Test MIC. #1 PANEL 1499 PHASE "D" BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
CHECK					
APR.					
APR		6/27/61			

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1

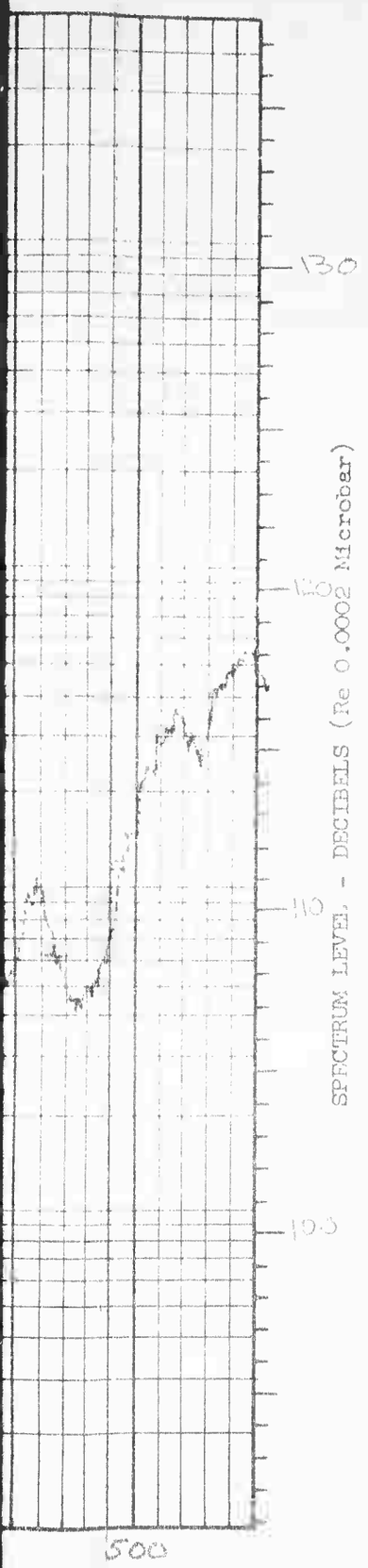
ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
____ cycles from ____ to ____ cps
____ cycles from ____ to ____ cps

T_c 15 Sec.
Anal. Rate .333 cps/Sec.
Loop Length 15 Sec.

CALC	
CHECK	
APR.	
APR.	



DATA IDENTIFICATION

Test Title: PANEL ATTACHMENT - TYPE I		
EWA No.: 5-593	Panel or Specimen No.: 1499	
Tape No.: 64	Tape Channel: 2	Mic. No.: 2
Elapsed Test Time: 60.5 MIN.	Mic. RMS Level at Sonic Lab.: V_L = .250 Volts	

CALIBRATION

Tape No.: 64	Tape Channel: 6	Data Tape RMS Volt: V_R = .252

Calibration Voltage
V_a = .50 V_{rms} into Line Amp.; V_c = .5 V_{rms} on Tape @ 200 cps

Line Amplifier Settings
For Calibration G_c = .500 ; for Data G_d = .500

Lab. Gain: LG = 1.0	Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = 1.0

Microphone Sensitivity
S = .290 psi/Volt or 1 Volt rms = 160 db SPL

Equivalent of Calibration - psi
$P_c = V_a \cdot S$ = 0.145

Equivalent of Calibration for PSD Plots

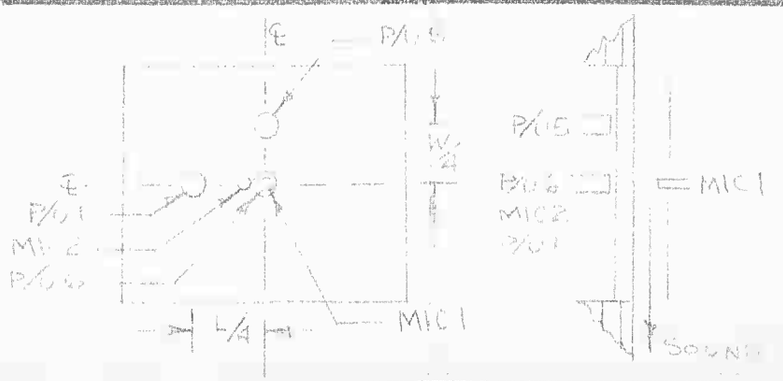
$$\left(\frac{P_c}{(TMG)(LG)}\right)^2 = \left[\frac{.145}{(1)(1)}\right]^2 = 2.1 \times 10^{-2} \text{ psi}^2/\text{cps}$$

Analyzer Attenuator Setting: -20 db	Log Converter Setting: db

Calibration Plotted at: 2.1×10^{-4} psi²/cps

Overall Pressure Level Data	Equiv. to 143 db SPL

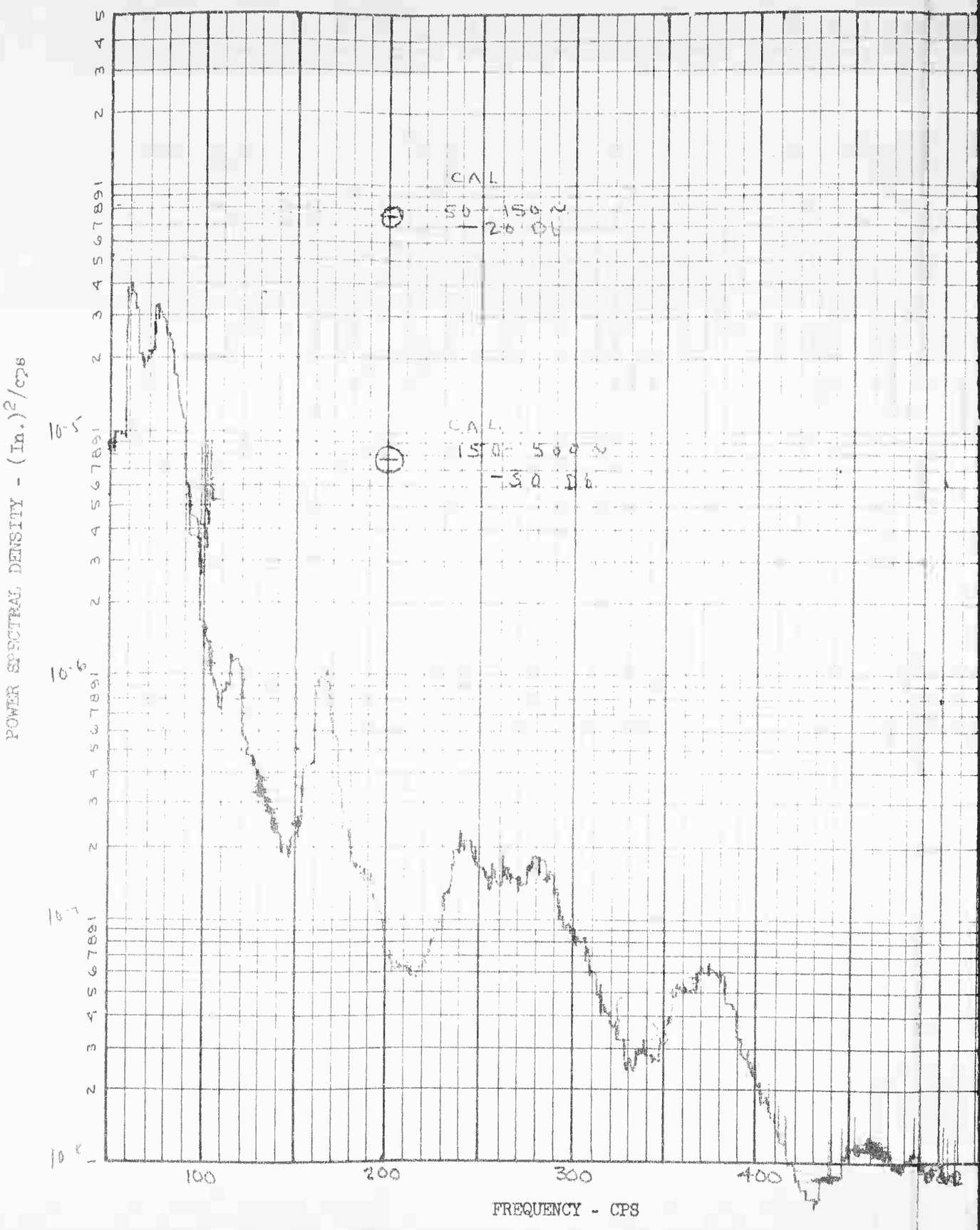
$$\text{RMS pressure level} = \frac{(P_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.145)(.252)}{(1)(1)(.500)} = 0.07321 \text{ psi}$$



CALC	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF MICROPHONE OUTPUT	Vol. I
CHECK			0.5 MIN TEST	D2-5xxx
APR.			MIC # 2 PANEL 1499 PHASE "D"	
APR.			BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON	PAGE Fig 213

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ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps — T_c 15 Sec.

____ cycles from ____ to ____ cps — Anal. Rate .333 cps/sec.

____ cycles from ____ to ____ cps — Loop Length 15 Sec.

CALC	CB
CHECK	
APR.	
APR.	
	SA

DATA IDENTIFICATION

Test Title		
PANEL ATTACHMENT TYPE I.		
EWA No. 5-573	Panel or Specimen No. 1499	
Tape No. 64	Tape Channel 3	Displacement Pickup # 1
Elapsed Test Time 60.5 MIN.	P/U RMS Level at Sonic Lab. V_L = 1.05 Volts	

CALIBRATION

Tape No. 64	Tape Channel 6	Data Tape RMS Volt V_R = .175

Calibration Voltage

V_a = .50 V_{rms} into Line Amp.; V_c = .48 V_{rms} on Tape @ 200 cps

Line Amplifier Settings

For Calibration G_c = .500 ; for Data G_d = .100

Lab. Gain	Tape Monitor Gain
LG = 1.0	$TMG = \frac{G_d}{G_c}$ = .2

Displacement Pickup Sensitivity

S = .035 in./Volt

Equivalent of Calibration - in.

$D_c = V_a \cdot S$ = .0175"

Equivalent of Calibration for PSD Plots

$$\left(\frac{D_c}{(TMG)(LG)}\right)^2 = \left[\frac{.0175}{(.2)(1)}\right]^2 = 7.65 \times 10^{-3} \text{ in.}^2/\text{cps}$$

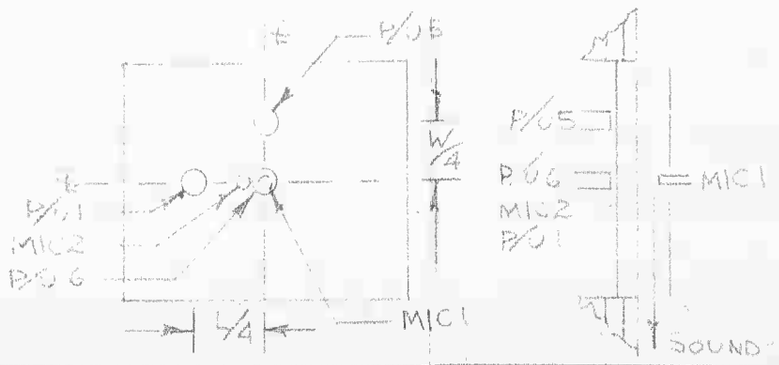
Analyzer Attenuator Setting	Log Converter Setting
[illegible] db	0 db

Calibration Plotted at

7.65 (10^{-3}) in.^{2}/cps

Overall Deflection Level of Data

$$\text{RMS Defl. Level} = \frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0175)(1.15)}{(.2)(1)(.48)} = .0319 \text{ in.}$$

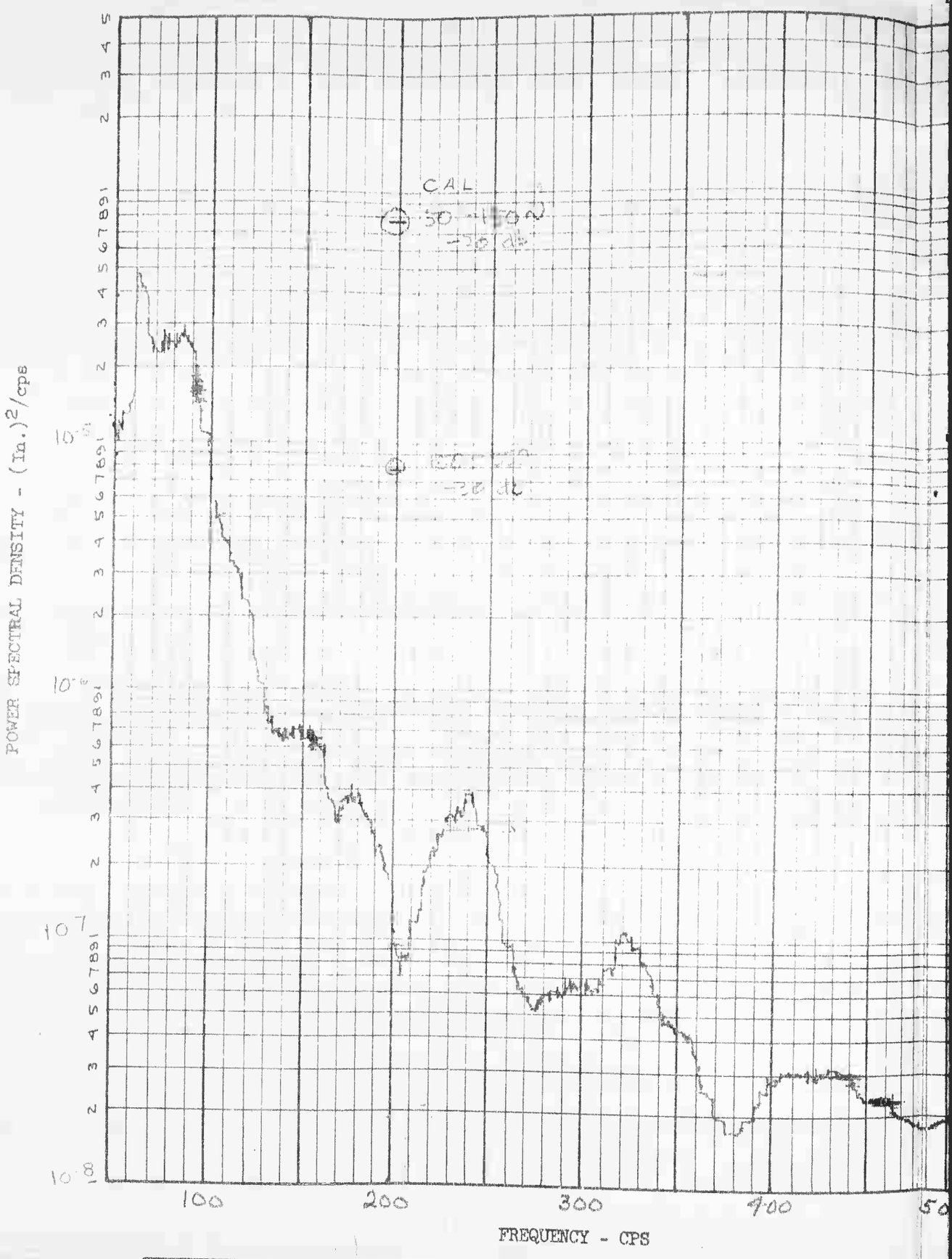


CALC	CBT	6/30/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP 162.5 db 0.5 MIN TEST
CHECK					P/U #1 PANEL 1499 PHASE "D"
APR.					BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
APR.	S.A. Pinto	6/30/61			

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ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
____ cycles from ____ to ____ cps
____ cycles from ____ to ____ cps

T_c 15 Sec.
Anal. Rate .333 cps/sec.
Loop Length 15 Sec.

CALC
CHECK
APR.
APR.

1

DATA IDENTIFICATION

Test Title: PANEL ATTACHMENT - TYPE I		
EWA No.: 5-593	Panel or Specimen No.: 1499	
Tape No.: 64	Tape Channel: 4	Displacement Pickup #: 5
Elapsed Test Time: 60.5 MIN	P/U RMS Level at Sonic Lab.: V_L = 1.00 Volts	

CALIBRATION

Tape No.: 64	Tape Channel: 6	Data Tape RMS Volt: V_R = .190

Calibration Voltage

V_a = .50 V_{rms} into Line Amp.; V_c = .48 V_{rms} on Tape @ 200 cps

Line Amplifier Settings

For Calibration G_c = .500 ; for Data G_d = .100

Lab. Gain: LG = 1.0

Tape Monitor Gain: $TMG = \frac{G_d}{G_c}$ = .2

Displacement Pickup Sensitivity

S = .035 in./Volt

Equivalent of Calibration - in.

$D_c = V_a \cdot S$ = 0.0175

Equivalent of Calibration for PSD Plots

$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = 7.65×10^{-3} $in.^2/cps$

Analyzer Attenuator Setting: ~~-20 50 40 50~~ db

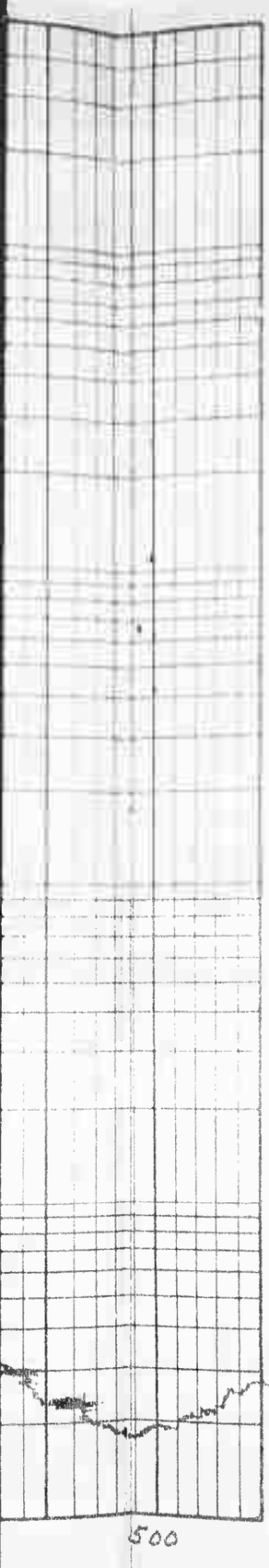
~~-3 2 1 20 10~~

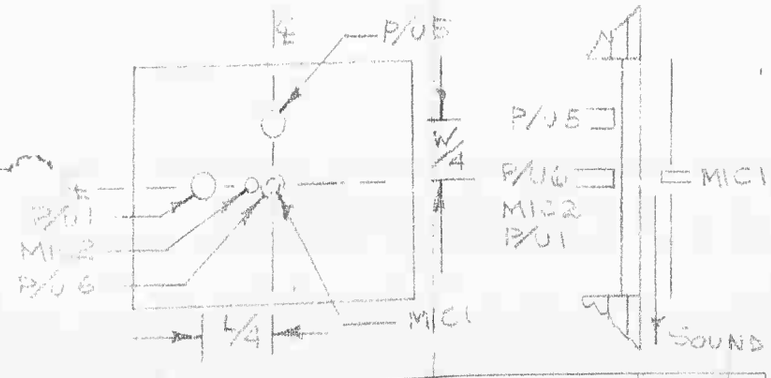
Log Converter Setting: 0 db

Calibration Plotted at: 7.65 (10^{-3}) $in.^2/cps$

Overall Deflection Level of Data

RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)}$ = $\frac{(.0175)(.190)}{(.21)(.48)}$ = .034 in.



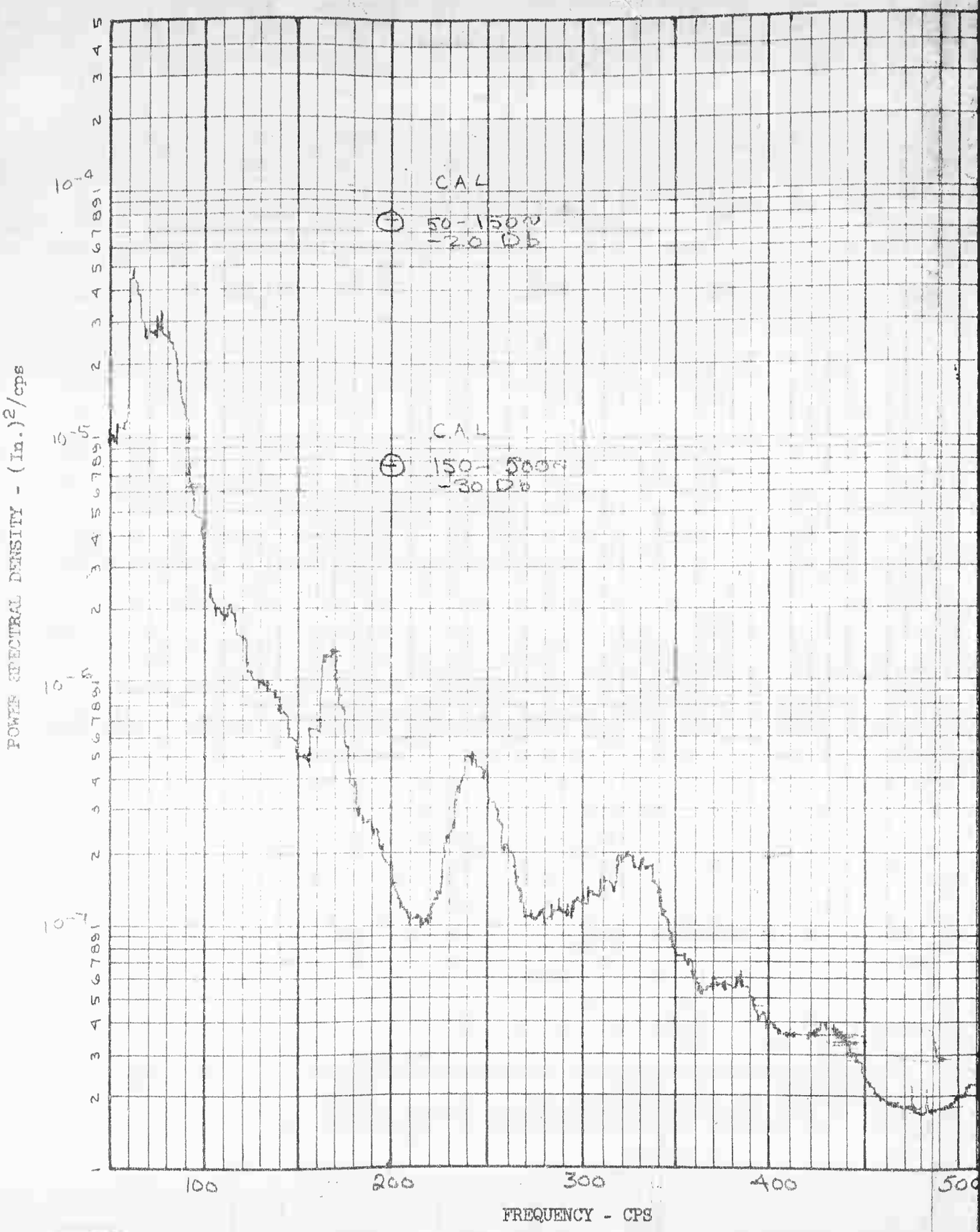


CALC	CBT 6/30/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP 162.5db S.S. WIND TEST "0"
CHECK				P/U # 5 PANEL 1499 PHASE "0"
APR.				BOEING AIRPLANE COMPANY
APR.	SA for 6/30/61			SEATTLE 24, WASHINGTON

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1

ANALYSIS VARIABLES

Bandwidth

5 cycles from 50 to 500 cps
___ cycles from ___ to ___ cps
___ cycles from ___ to ___ cps

T_c 15 Sec.
Anal. Rate .333 cps/sec.
Loop Length 15 Sec.

CALC	
CHECK	
APR.	
APR	

DATA IDENTIFICATION

Test Title: PANEL ATTACHMENT – TYPE I		
EWA No.: 5-593	Panel or Specimen No.: 1499	
Tape No.: 64	Tape Channel: 5	Displacement Pickup #: 6
Elapsed Test Time: 60.5 MIN.	P/U RMS Level at Sonic Lab.: V_L = .900 Volts	

CALIBRATION

Tape No.: 64	Tape Channel: 6	Data Tape RMS Volt: V_R = .180

Calibration Voltage
V_a = .50 V_{rms} into Line Amp.; V_c = .98 V_{rms} on Tape @ 200 cps

Line Amplifier Settings
For Calibration G_c = .500 ; for Data G_d = .100

Lab. Gain
LG = 1.0

Tape Monitor Gain $_{TMG} = \frac{G_d}{G_c}$ = .20

Displacement Pickup Sensitivity
S = .035 in./Volt

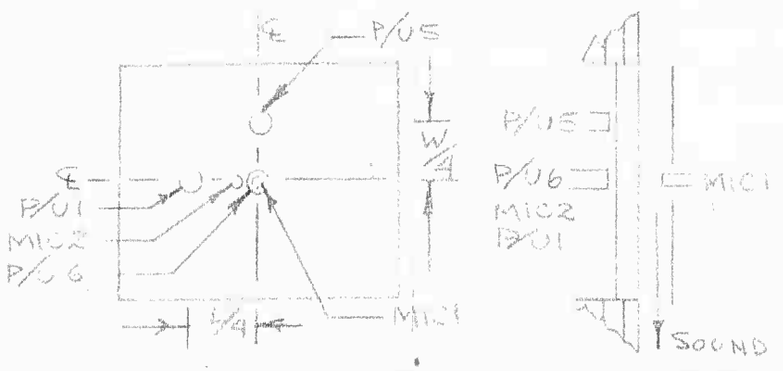
Equivalent of Calibration - in.
$D_c = V_a \cdot S$ = .0175

Equivalent of Calibration for PSD Plots
$\left(\frac{D_c}{(TMG)(LG)}\right)^2$ = 7.65×10^{-3} $in.^2/cps$

Analyzer Attenuator Setting: -20 / -30 db Log Converter Setting: 0 db

Calibration Plotted at
$7.65 \times (10^{-3})$ $in.^2/cps$

Overall Deflection Level of Data
RMS Defl. Level = $\frac{(D_c)(V_R)}{(TMG)(LG)(V_c)} = \frac{(.0175)(.90)}{(.20)(1.0)(.98)}$ = .0328 in.



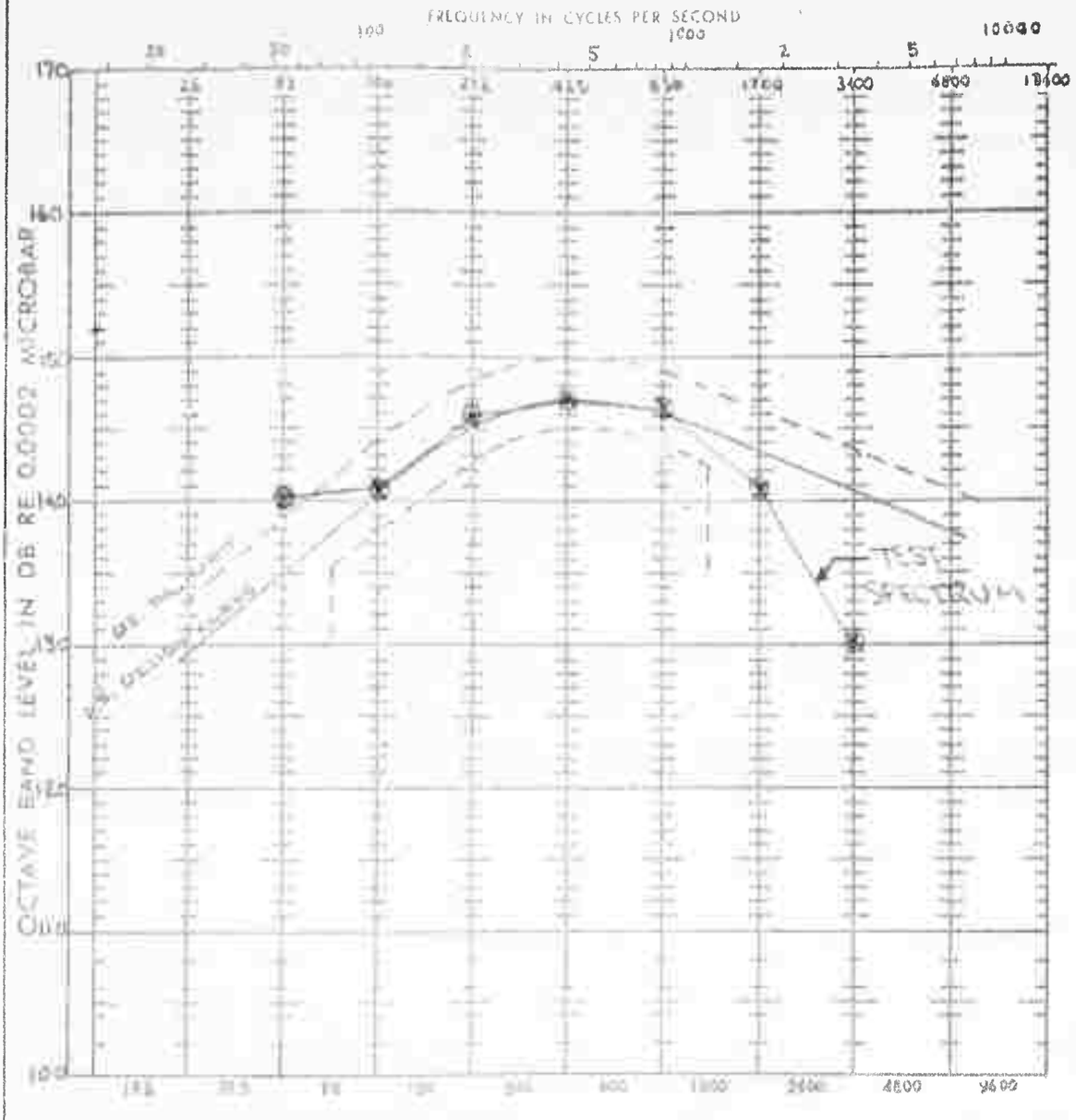
CALC	CBT	6/20/61	REVISED	DATE	POWER SPECTRAL DENSITY ANALYSIS OF DISPLACEMENT PICKUP P/U #6 OSMIN TEST PHASE "D"
CHECK					BOEING AIRPLANE COMPANY SEATTLE 24, WASHINGTON
APR.					
APR	SA	7-6-61			

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EWA 5-593



1/3 OCTAVE PASS BANDS IN CYCLES PER SECOND

EQUILIZER SETTINGS	
20 - 75	20.5
75 - 150	24.0
150 - 300	17.0
300 - 600	7.0
600 - 1200	3
1200 - 2400	-1.0
2400 - 4800	-2
4800 - 9600	-2

3 AMPS 28 PSI

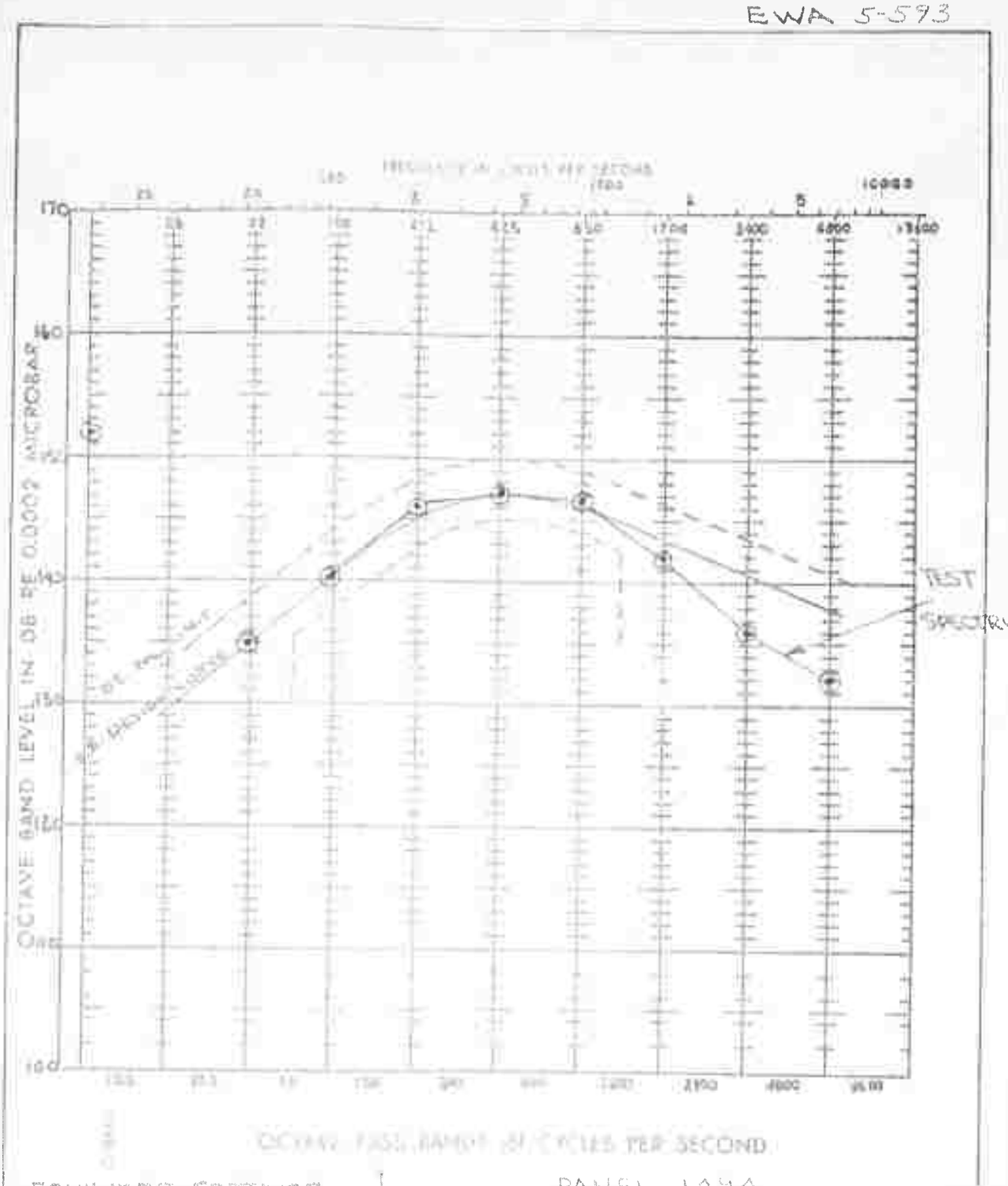
PANEL 1493
EWA 5-593
MIKE #1

CALC DATE Vol I

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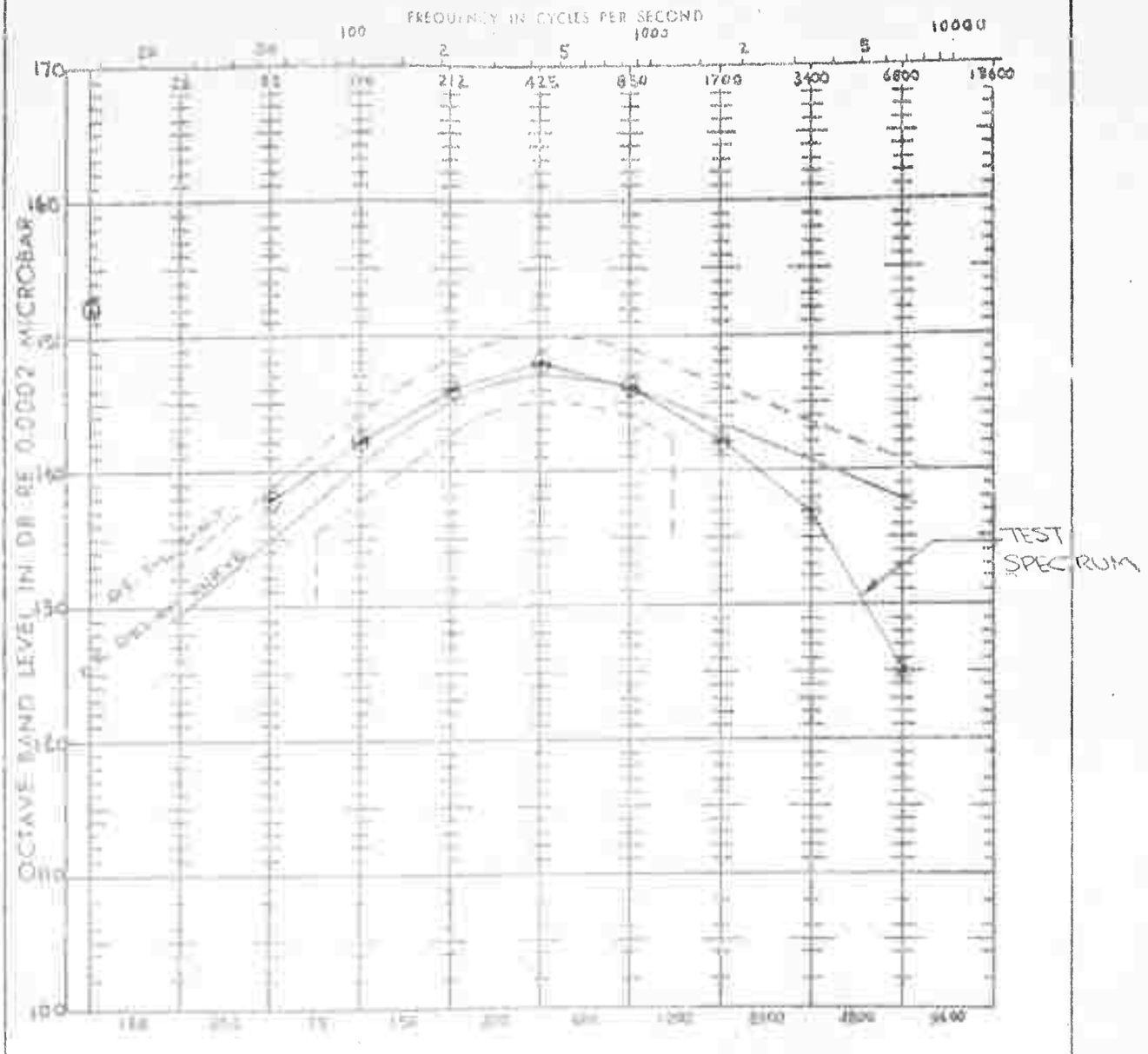
EQUILIZER SETTINGS	
20 - 75	20.5
75 - 150	24.0
150 - 300	17.0
300 - 600	7.0
600 - 1200	3.0
1200 - 2400	-1.0
2400 - 4800	∞
4800 - 9600	∞

3.2 AMPS 35 PSI

PANEL 1414
MIC.# 1 (INSIDE HORN)

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SONIC LAB. PAGE Fig 22.4

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EQUILIZER SETTINGS	
20 - 75	
75 - 150	
150 - 300	
300 - 600	7.0
600 - 1200	
1200 - 2400	
2400 - 4800	
4800 - 9600	

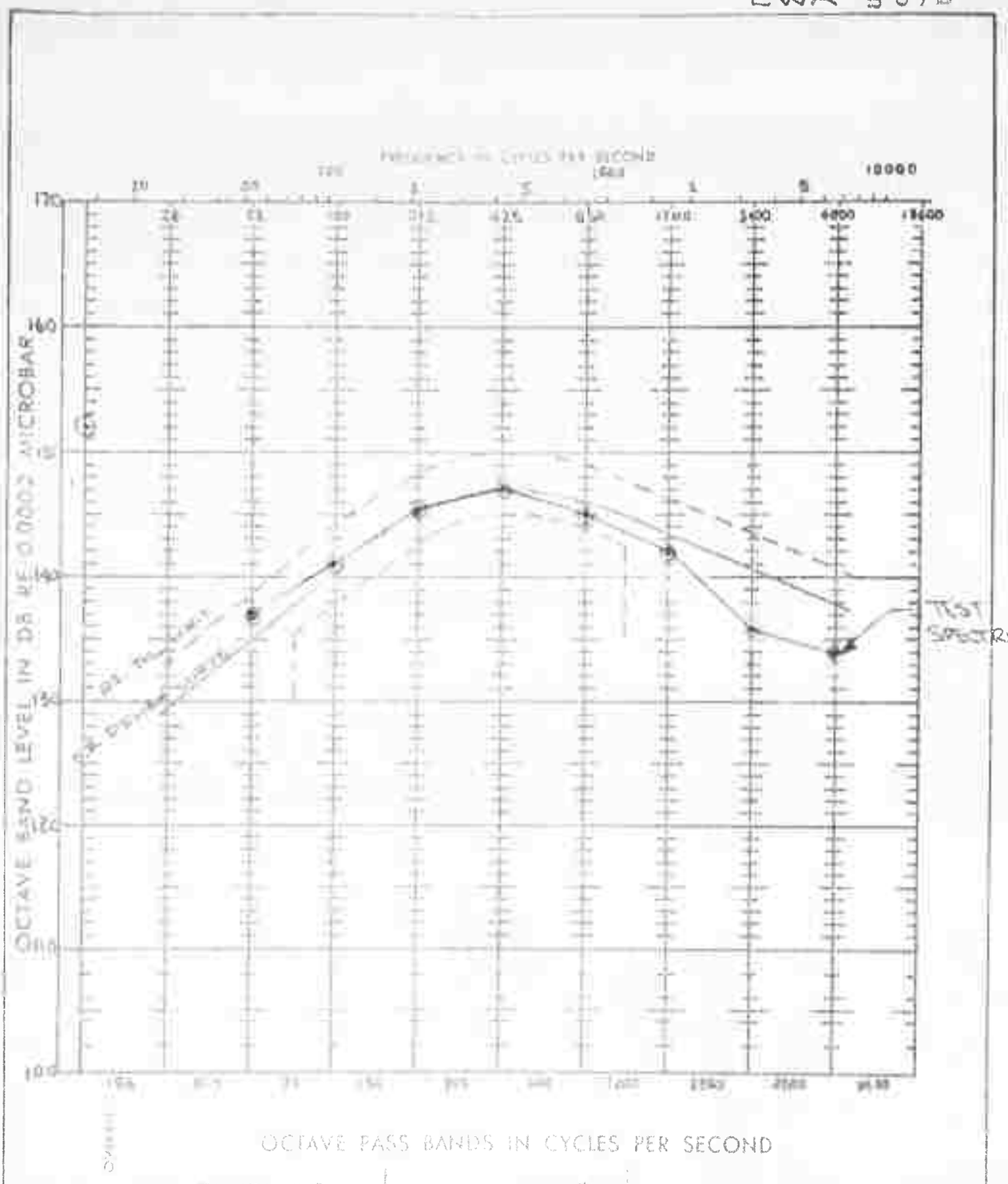
3.2 AMPS 25 PSI

CALC A.B. DATE 5/8/61 VOLT

BOEING NO D2-80084

SONIC LAB. PAGE FIG 25.

EWA 5-513



EQUILIZER SETTINGS	
20 - 75	20.5
75 - 150	24.0
150 - 300	17.0
300 - 600	7.0
600 - 1200	-1.0
1200 - 2400	-1.0
2400 - 4800	00
4800 - 9600	01

3.0 AMPS 35 PSI

MIC. #1

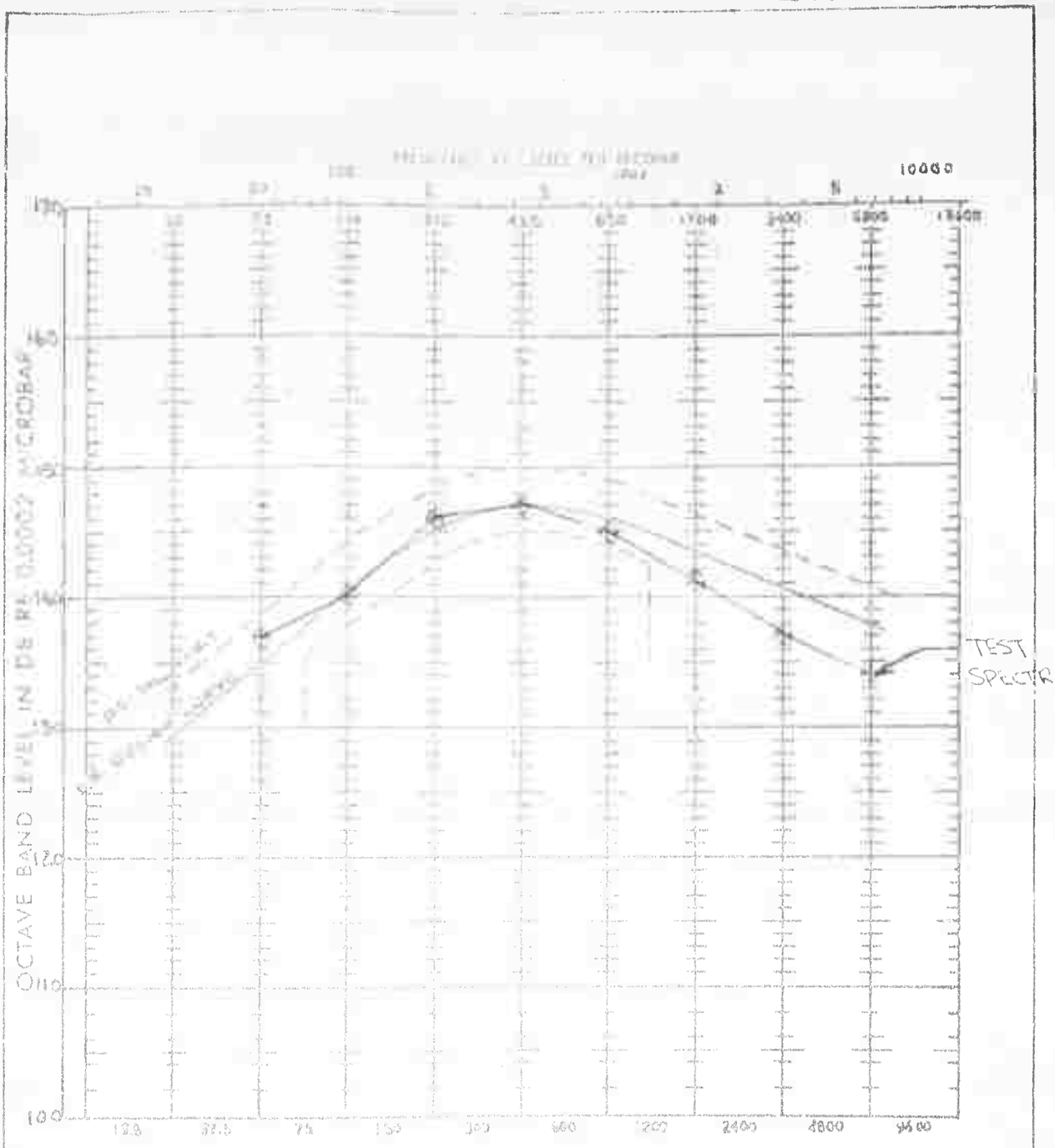
PANEL 1417

CALC A.B. DATE 5/9/61 VOLT

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EWA



EQUILIZER SETTINGS	
20 - 75	
75 - 150	
150 - 300	
300 - 600	
600 - 1200	
1200 - 2400	
2400 - 4800	
4800 - 9600	

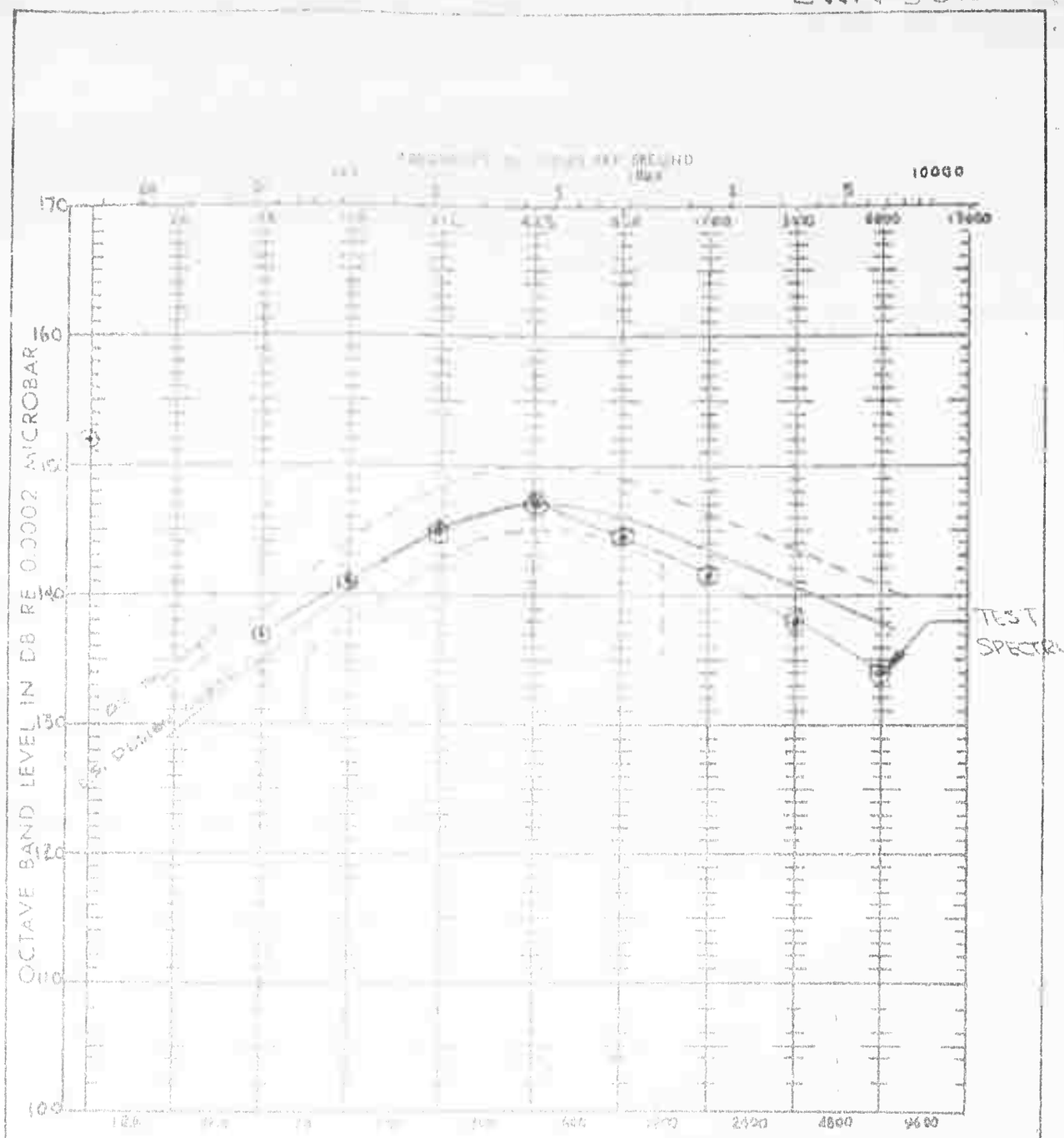
3 AMPS 40 PSI

DATE

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SONIC LAB. PAGE F16 227

EWA 5-573



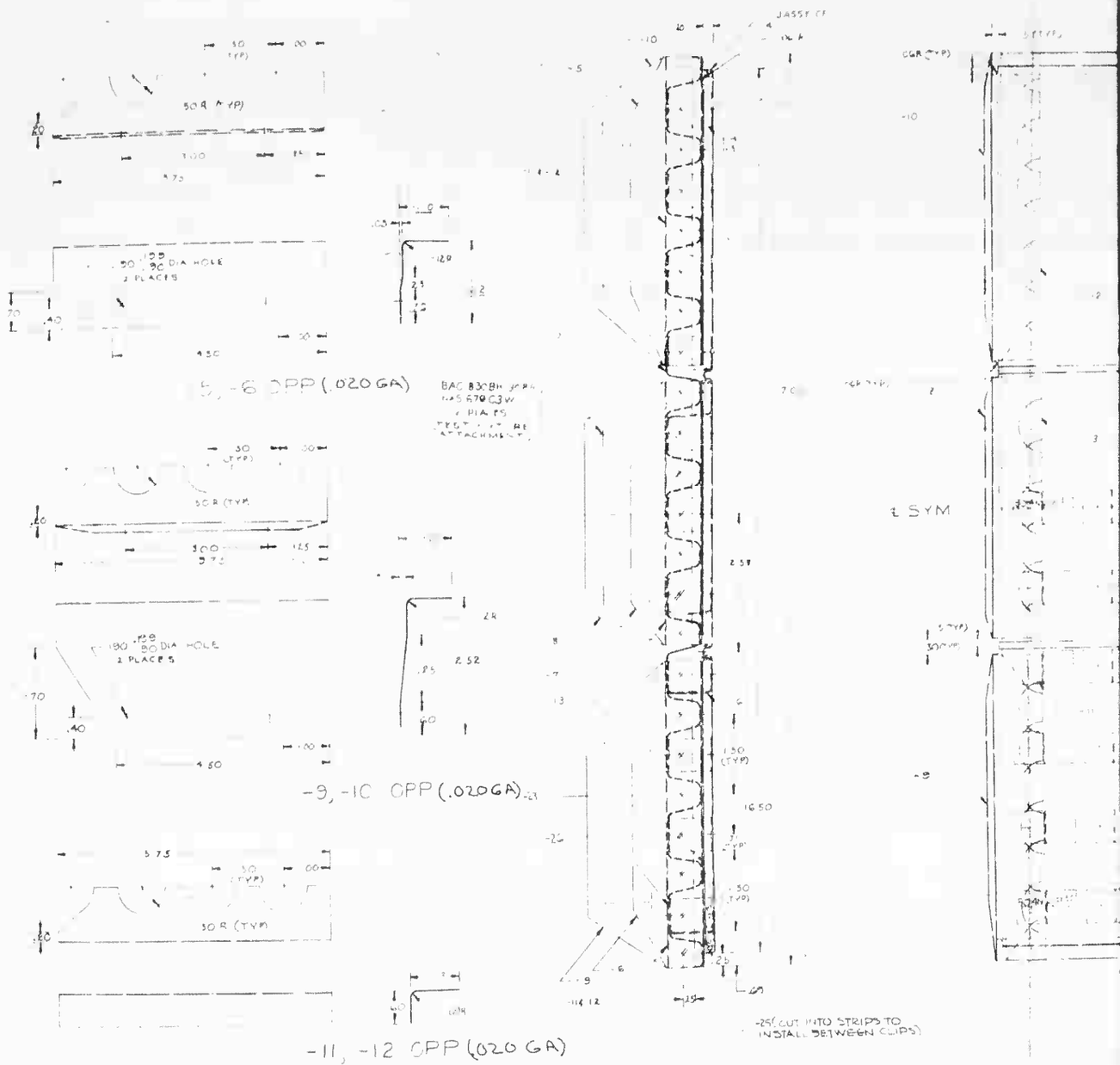
EQUALIZER SETTINGS	
20 - 75	5
75 - 150	2.5
150 - 300	7
300 - 600	7.5
600 - 1200	-1.5
1200 - 2400	2.5
2400 - 4800	5
4800 - 9600	10

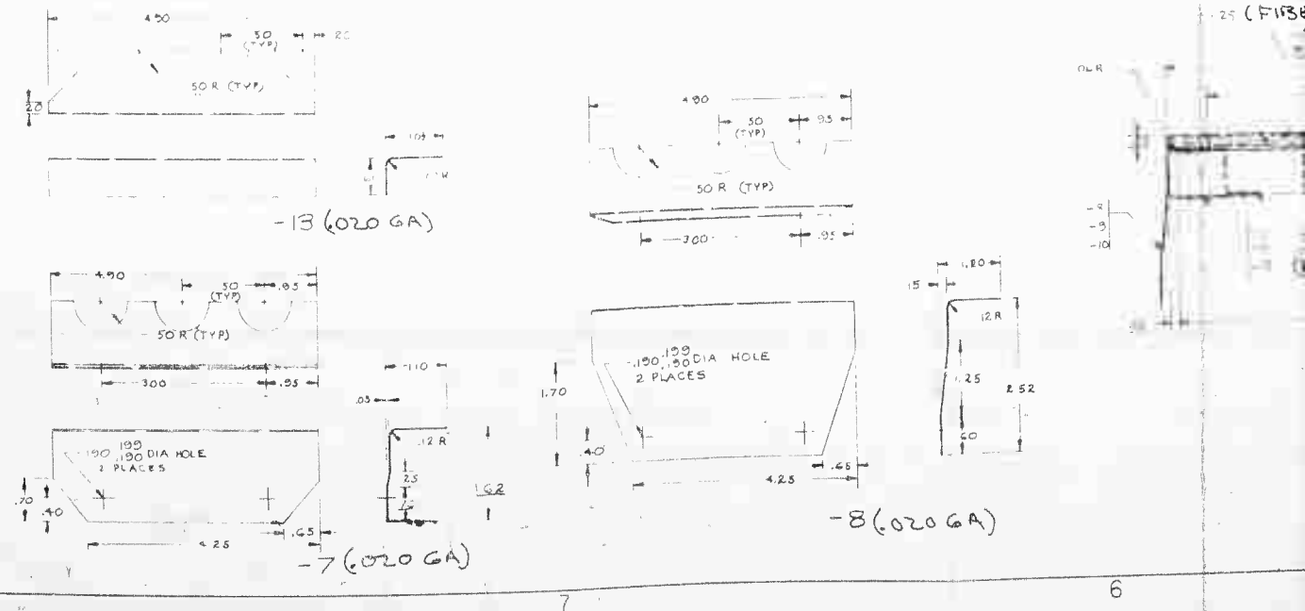
3.2 AMPS 35 PSI

CASE A-5 DATE 5/10/61 VOL I

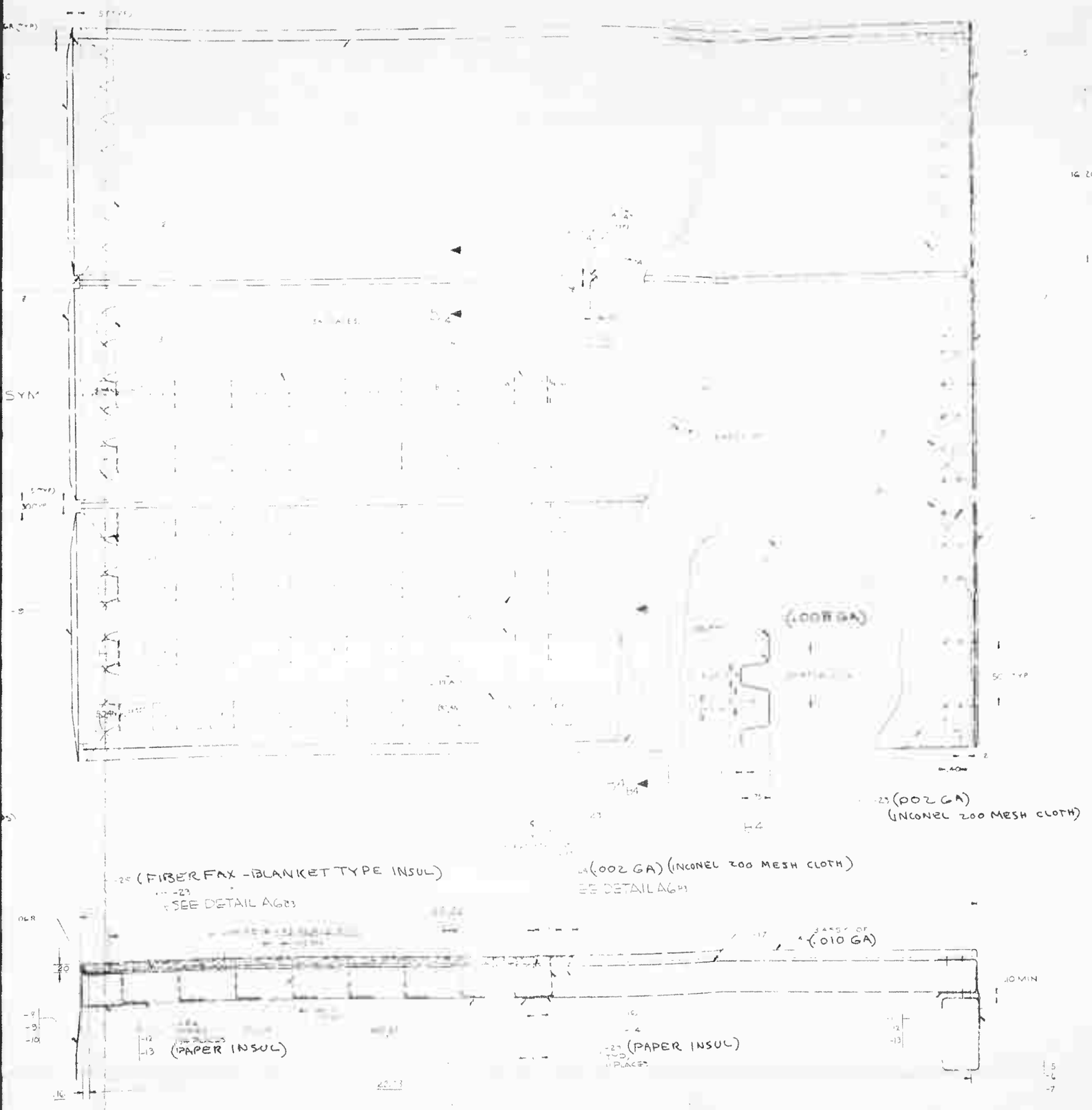
BOEING NO. D2-80084

SONIC LAB. PAGE FIG 228


-5, -6 OPP (.020 GA)
-9, -10 OPP (.020 GA)
-11, -12 OPP (.020 GA)
-25 (CUT INTO STRIPS TO INSTALL BETWEEN CLIPS)
℄ SYM


-13 (.020 GA)
-7 (.020 GA)
-8 (.020 GA)

1



PANEL A [illegible] OF 25-20369-1

ZONE SYM	REVISION DESCRIPTION	DATE	APPROVAL



SEW BOTH 23 SCREEN SECTIONS TOGETHER AFTER INSTALLING SEPARATELY OVER -4 -152 - 2 CLIPS SHOWN -24 SCREEN STRIPS AS SHOWN USE .002 WIRE

℄ SYM

DETAIL AG
ASSY OF -231-24 TO 25-20369-152
HALF SIZE



-16 (.020 GA)



-15 (.020 GA)



-14 (.020 GA)

NOTE: ALL PARTS FABRICATED FROM RENE' 41 EXCEPT AS NOTED.

3

SEE SHEET 1 FOR LIST OF MATERIAL AND NOTES

USED ON	DRAWN	DATE
TEST	B. SCHMIDT	2-26-60
	CHECKED	
	ENGR	
	ENGR	
	DRAFTING APPD	
SECT NO	PROJ APPD	

PANEL - SONIC TEST, ASSEMBLY OF (TEST ONLY)

SCALE

BOEING AIRPLANE CO AERO-SPACE DIV SEATTLE 24 WASH

25-20369

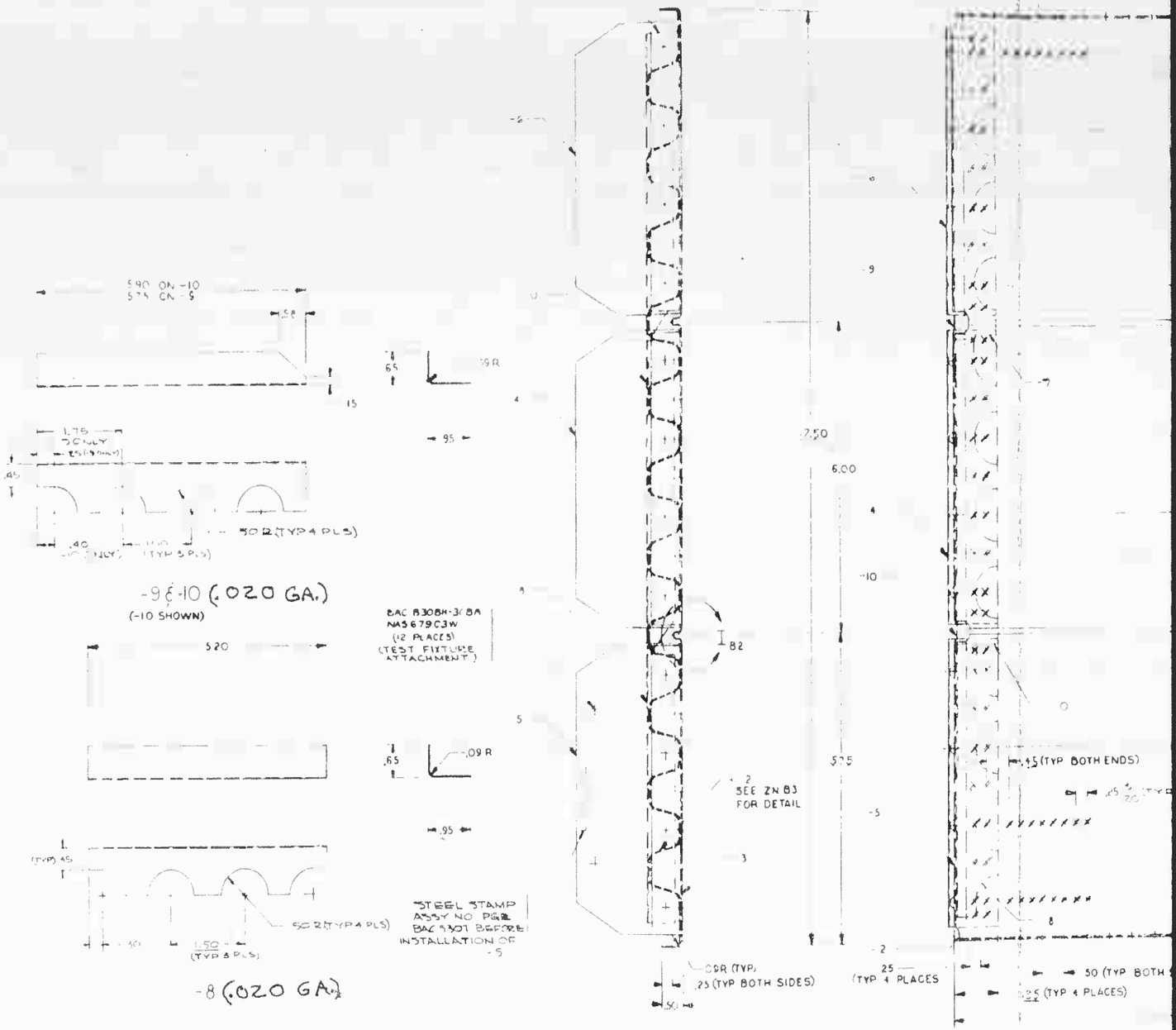
CODE IDENT NO 81205 SH 2

CHANGE NO FVVA 5-593

DRAWING ORIGINATED IN ISSUE 1

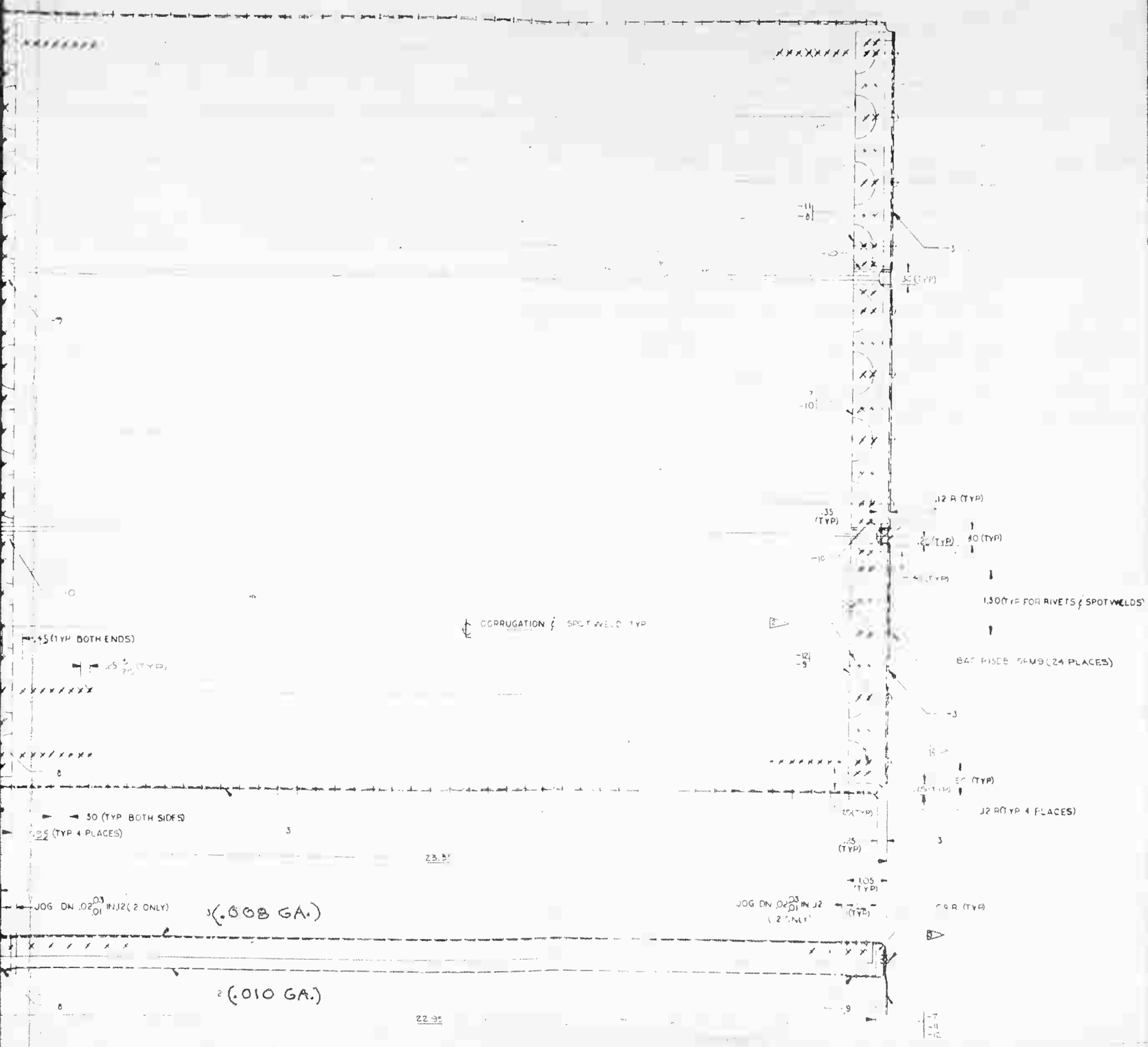
DYNA SOAR AIR FRAME WING & CONTROL SURFACE

FIG. 229



PART NUMBER	"A"	"B"	"C"
-4	5.20	2.53	1.13
-5 & -6 OPP	5.45	2.53	1.13
-7	5.70	1.68	1.03
-11 & -12 OPP	5.45	1.68	1.03

1



25-20344-1 ASSEMBLY OF

2

5 4 3

REVISION			
SYMBOL	DESCRIPTION	DATE	APPROVAL

NOTE: ALL PARTS FABRICATED FROM RENE' 41.

F FOR RIVETS & SPOT WELDS)

GEM 9 (24 PLACES)

.25 FLAT (TYP)

.13 R (TYP)

2

.73 DEPTH

1.50 PITCH

P 4 PLACES)

TYPICAL CORRUGATION SECTION

.20 R (TYP)

.20

TWICE SIZE

DETAIL I

(TYP TWO PLACES)

SEE SHEET 1 FOR LIST OF MATERIAL AND NOTES

USED ON	DRAWN	DATE
	W.C. METT	2/2/60
	CHECKED	
	ENGR.	
		4/1/60
		4/23/60
SECT NO —		

PANEL-ASSEMBLY OF, SONIC TEST (TEST ONLY)

BOEING AIRPLANE CO AERO-SPACE DIV SEATTLE 24 WASH

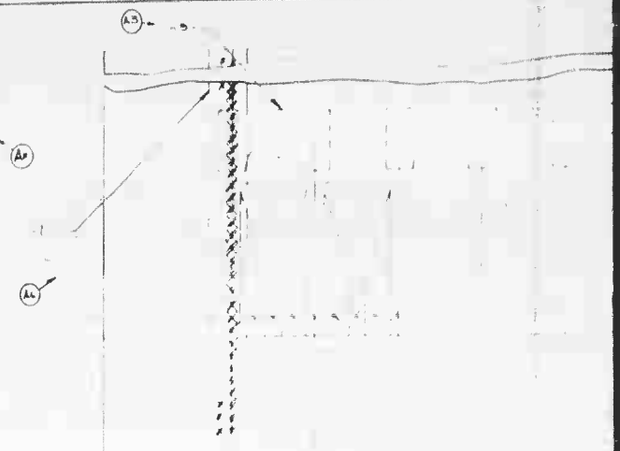
25-20344

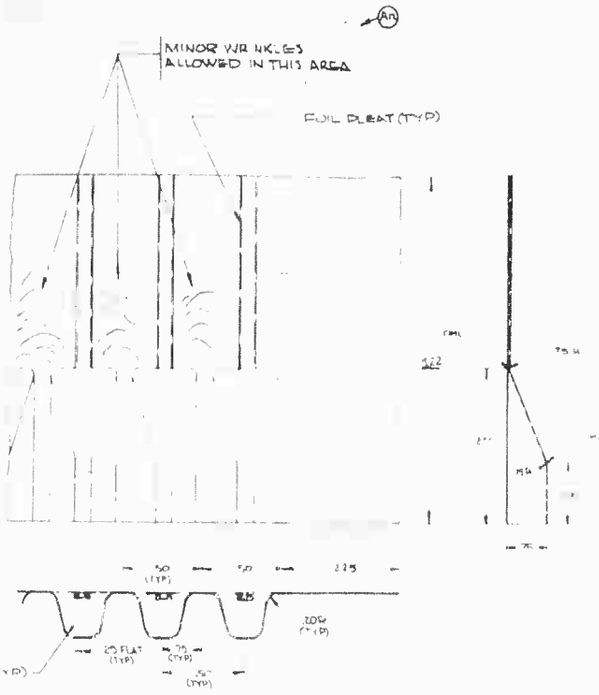
SCALE FULL & NOTED | CODE | SHEET 2 OF 2

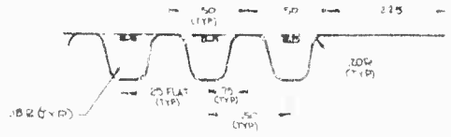
CHANGE NO EMA 5-593 1

DYNASOAR AIRFRAME - WING AND CONTROL SURFACES

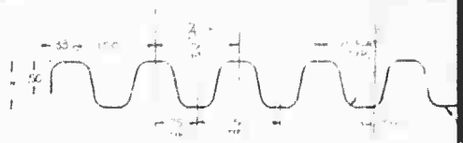
FIG. 230





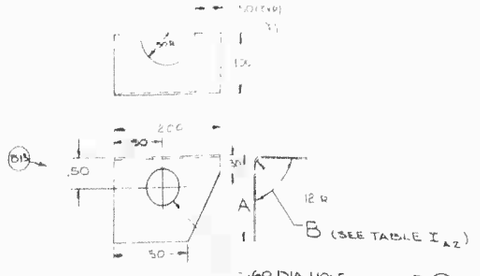


-7 (.008 GA.)



B7

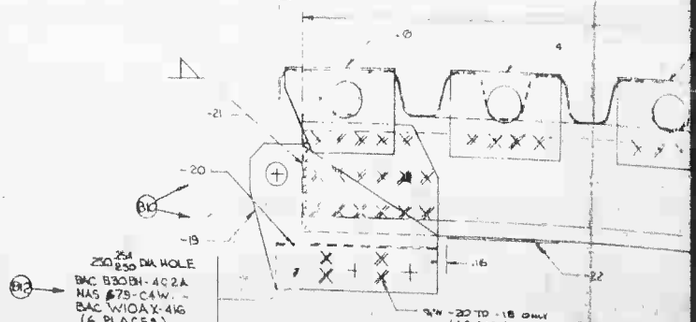
-3 (.008 GA.)

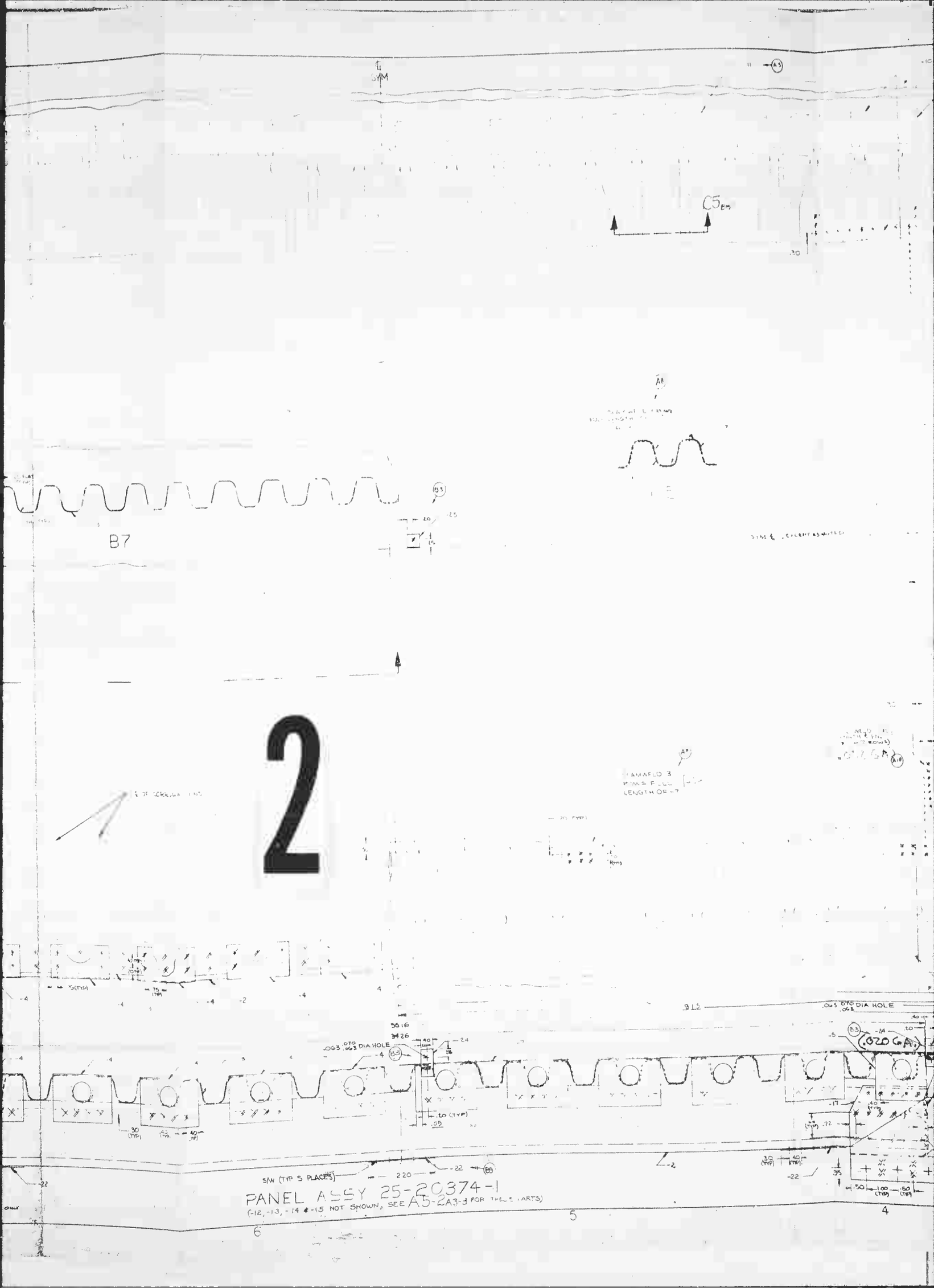


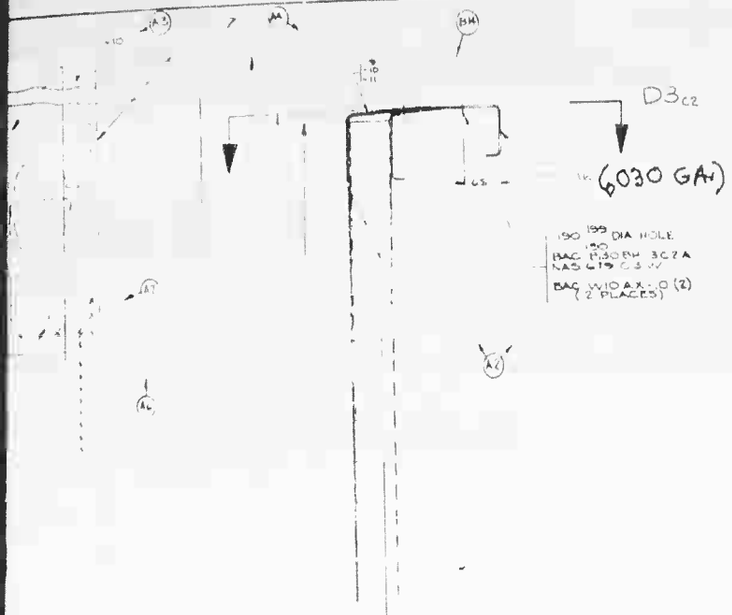
-5 SHOWN (.020 GA TYP.)
-6 OPP
-9
-10 OPP

1

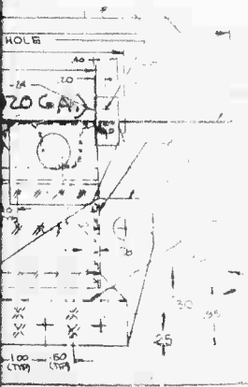


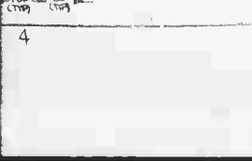



B7
2
PANEL ASSY 25-20374-1
(-12, -13, -14 & -15 NOT SHOWN, SEE A5-2A3-3 FOR THESE PARTS)
S/W (TYP 5 PLACES)
.020 GA
.063 DIA HOLE

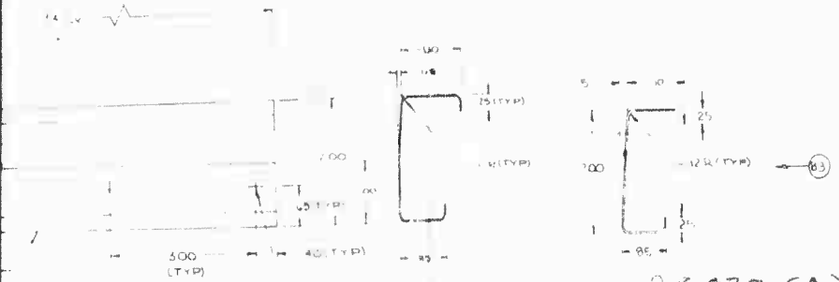

D3 C2
(.030 GA.)
.190 .199 DIA HOLE
.150
BAC B30BH 3C2A
NAS 679 C3 VV
BAC VV10AX-0 (2)
(2 PLACES)




HOLE
.020 GA.)



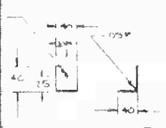
REVISION		
TO NEXT	SYM	DESCRIPTION
		EWA 5 553 (57424) VAR. REASON: TO COMPLY WITH DESIGN REQMTS OF SKIN SUPT BEAM & SEALING (1) ADD -4, 5, 4-6 TO INCLUDE -9, -10, & -11 (2) REDESIGNED SUPT BEAM (3) CALLED OUT -9-10, & -11 DETAILS (4) MOVED CALLOUT -7 (5) REMOVED DIM .719 (6) LENGTHENED -8 (7) ADDED SEAM WELDS (8) ADDED CALLOUT "3 ROWS" (9) ADDED CALLOUT -8 (10) REMOVED (11) REMOVED NOTE "SEE DETAIL - - - - - FOLDING" (12) ADDED NOTE "MINOR - - - - - - - - - AREA
	A	
	B	REF DCN (EWA 5-553)



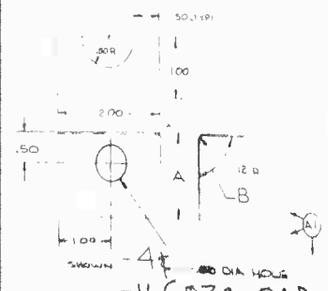
D3
(ROTATED 90°)
-16 ONLY

-2 (.030 GA.)

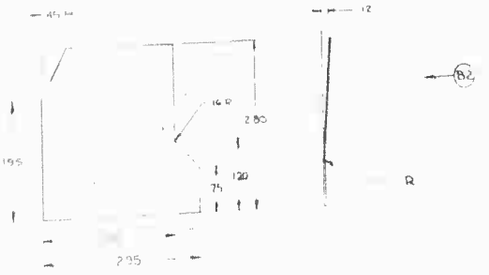
NOTE: ALL PARTS FABRICATED FROM RENE' 41.



-23 (.020 GA.)



-4
-11 (.020 GA.)



-17 SHOWN (.030 GA.)
-18 OPP

4

A	DET	B
1.40	-4	94.54
1.40	-5	94°
1.40	-6	94°
1.25	-9	94°
1.25	-10	94°
1.25	-11	94°

TABLE I



-20 (.016 GA.)



-19 (.060 GA.)



CHAMFER .12 x 45°

-21 (.030 GA.)

SEE SHEET 1 FOR LIST OF MATERIAL AND NOTES

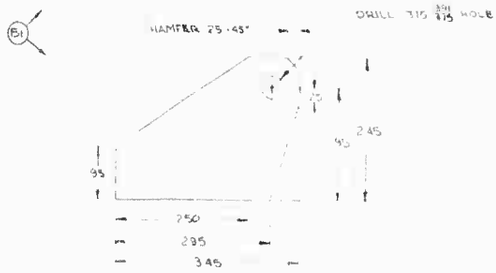
PANEL - THERMAL CYCLE TEST ASSEMBLY OF - (TEST ONLY)	BOEING AIRPLANE CO AERO-SPACE DIV SEATTLE 24, WASH
SCALE FULL	CODE — SH 2
DYNA SOAR AIRFRAME-CONTROL SURFACES	25-20374

FIG. 231

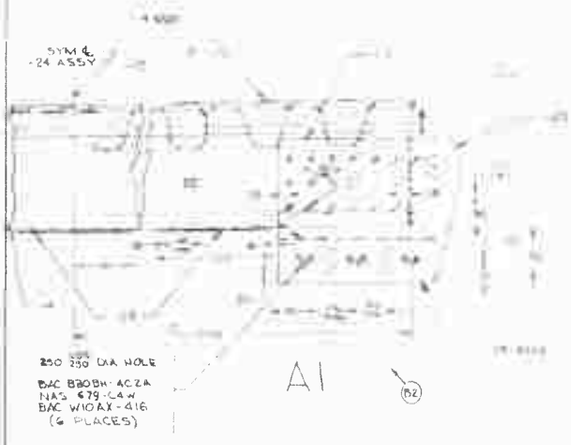
52-50314 SHT 2
ENGR. VAULT

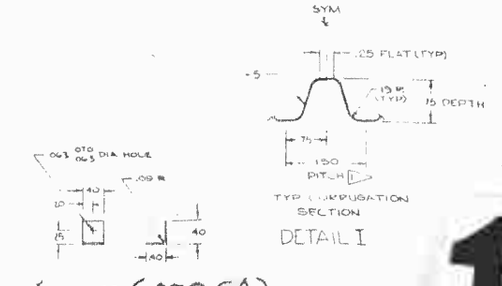


25 (.010 GA.)

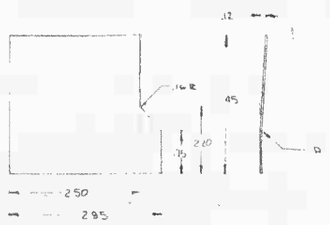


.20 (.060 GA.)





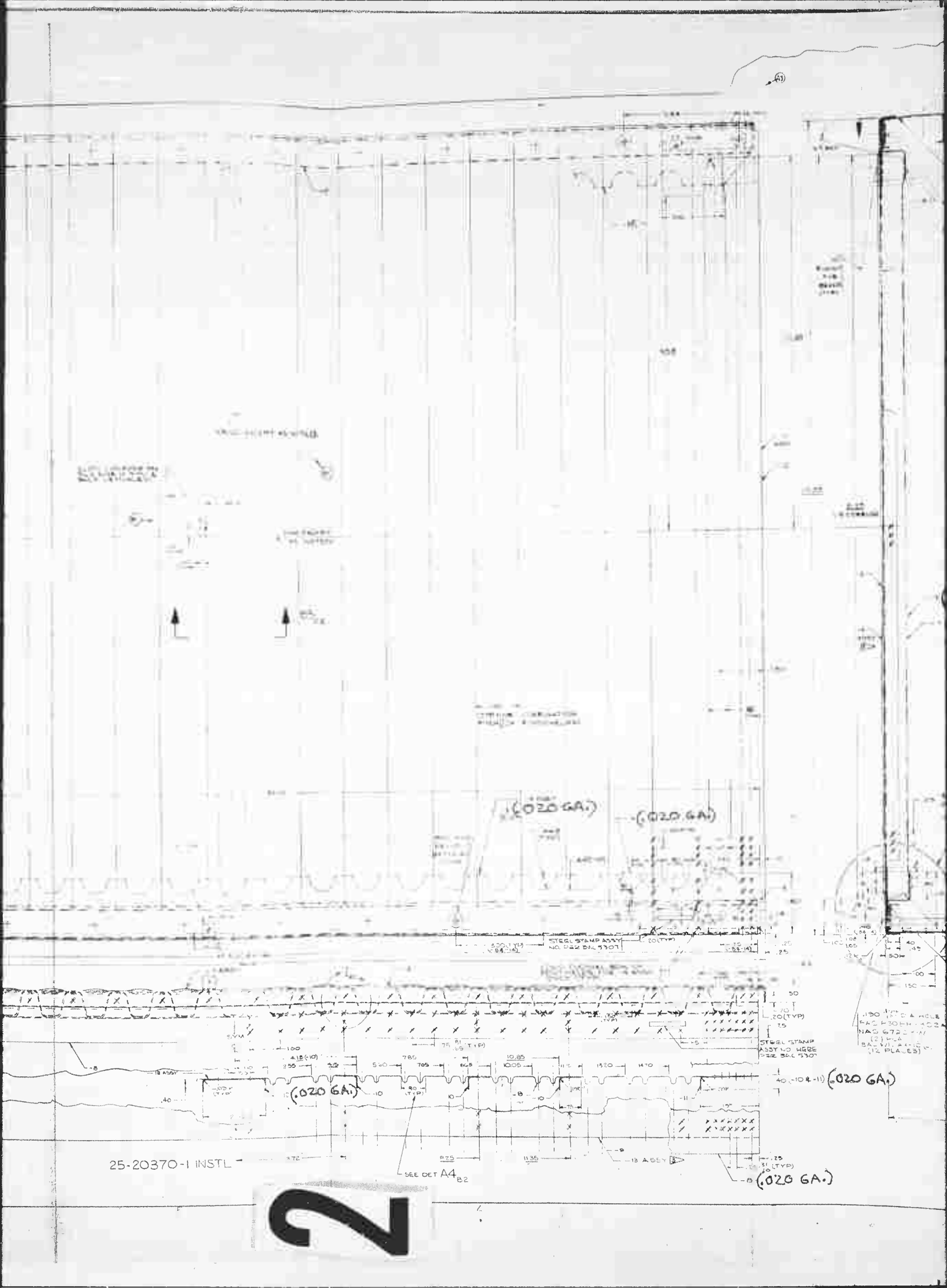
-26 (.020 GA.)

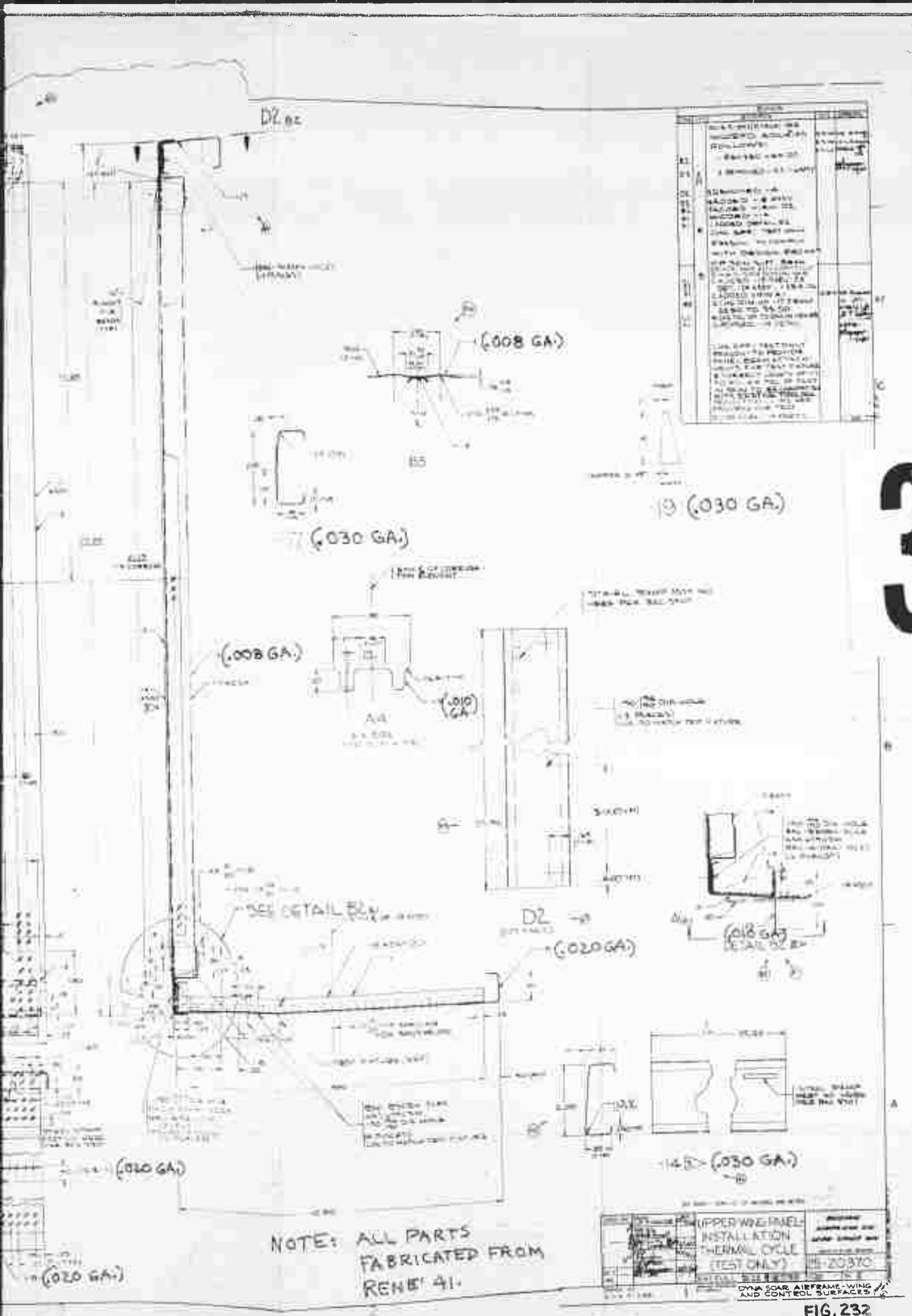


-21 SHOWN (.030 GA.)
-22 OPP

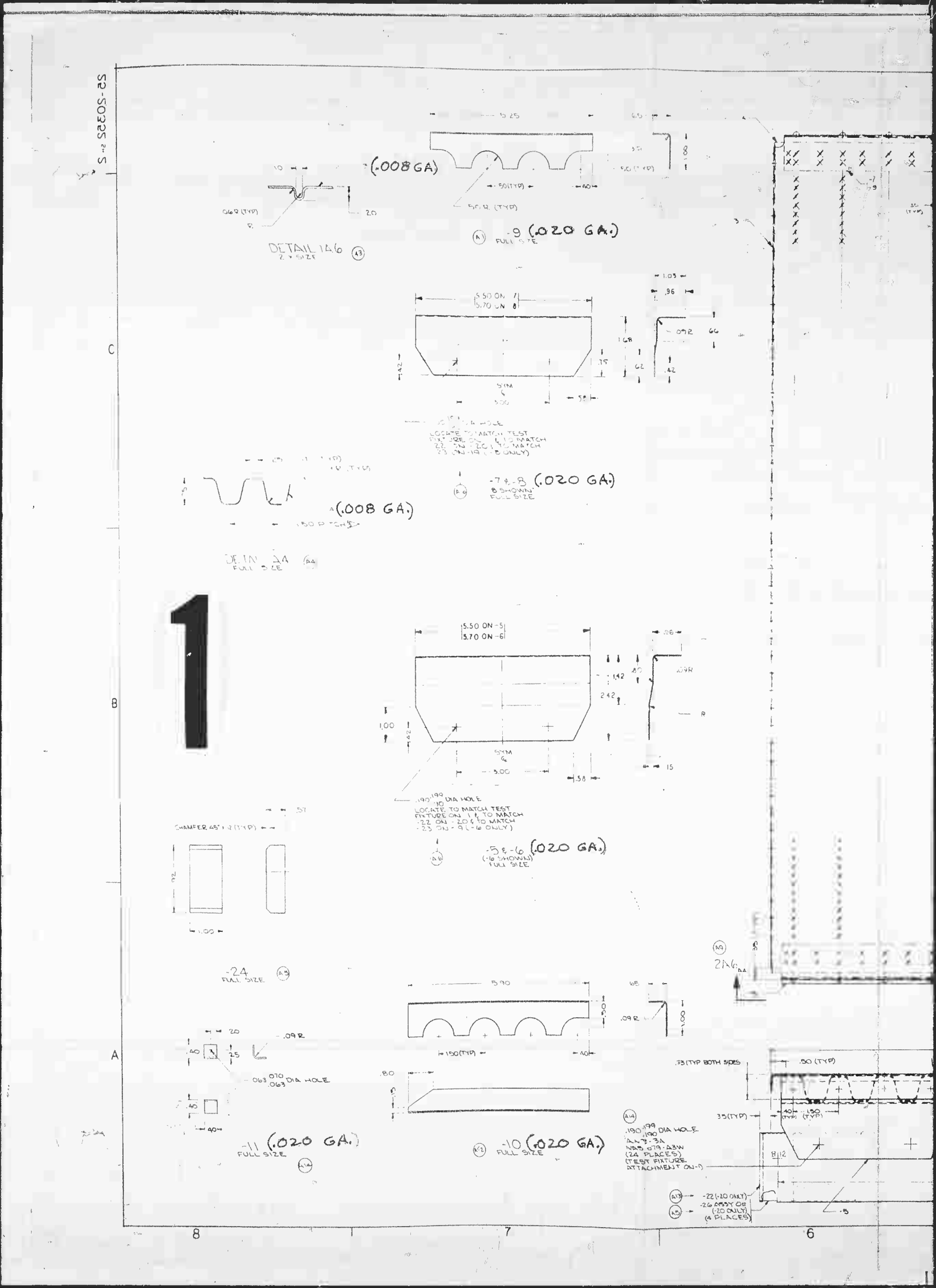
1




(.020 GA.)
(.020 GA.)
STEEL STAMP ASSY NO. D22 BAC 5307
STEEL STAMP ASSY NO. HERE PER BAC 5307
(.020 GA.)
(.020 GA.)
(.020 GA.)
SEE DET A4 B2
25-20370-1 INSTL


D2
(.008 GA.)
(.030 GA.)
(.030 GA.)
(.008 GA.)
(.010 GA.)
A-A
D2
(.020 GA.)
(.018 GA.)
DETAIL B2
SEE DETAIL B2
(.020 GA.)
(.030 GA.)
(.020 GA.)
NOTE: ALL PARTS FABRICATED FROM RENE' 41.
UPPER WING PANEL INSTALLATION THERMAL CYCLE (TEST ONLY)
DYNA SOAR, AIRFRAME - WING AND CONTROL SURFACES
FIG. 232

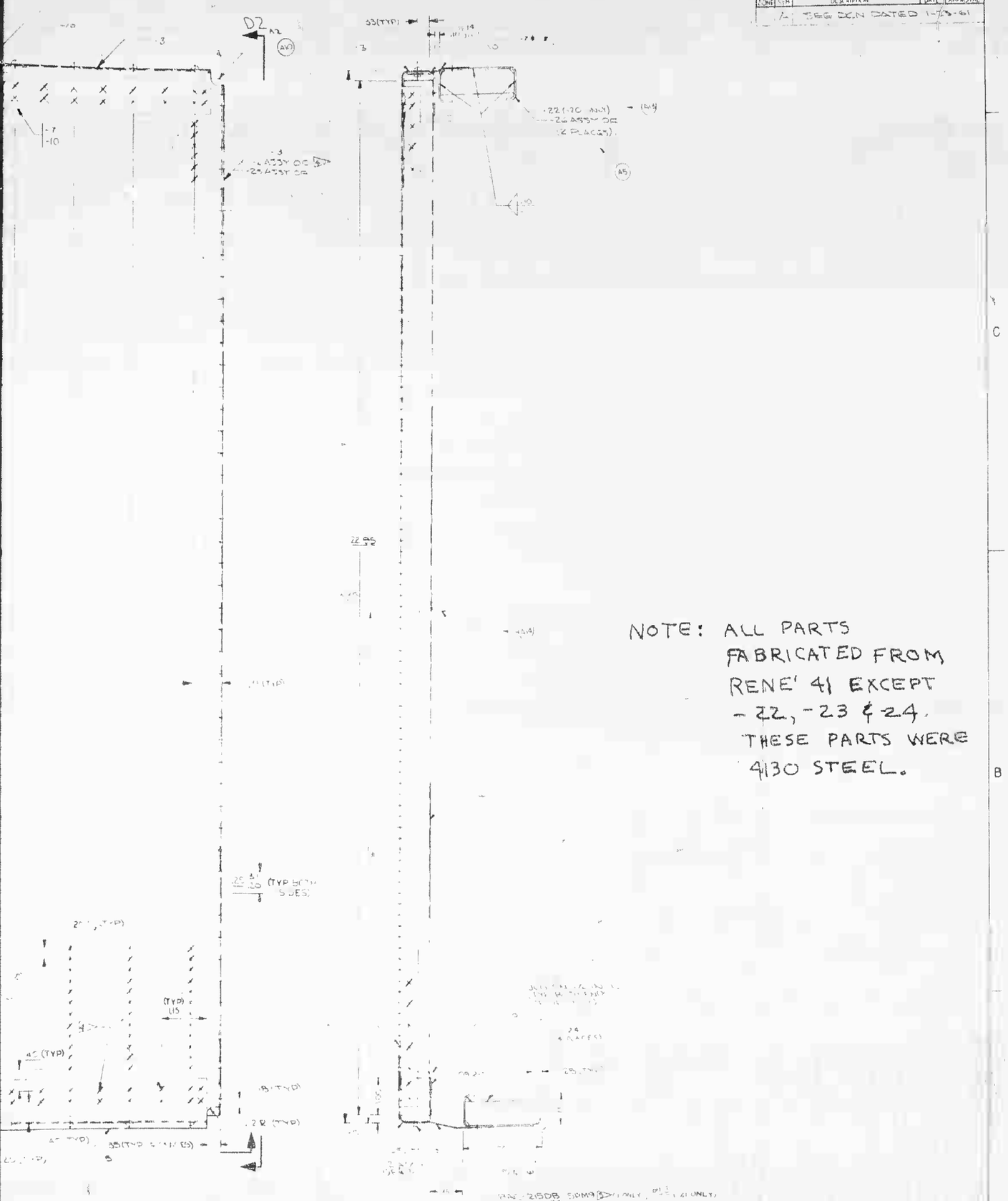
3

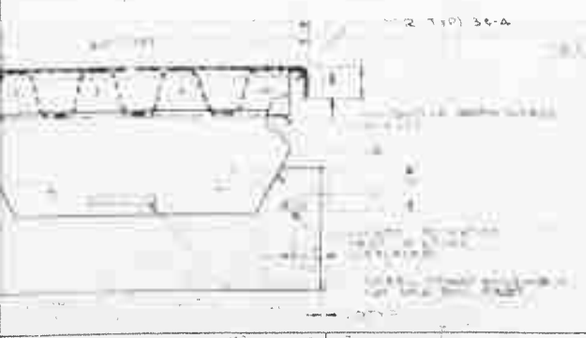

(.008 GA.)
DETAIL 14.6
2 × SIZE
A3
-9 (.020 GA.)
FULL SIZE
A1
-7 & -8 (.020 GA.)
-8 SHOWN
FULL SIZE
A6
(.008 GA.)
DETAIL 24
FULL SIZE
A4
1
-5 & -6 (.020 GA.)
(-6 SHOWN)
FULL SIZE
A6
CHAMFER 45° × .2 (TYP)
-24
FULL SIZE
A9
-11 (.020 GA.)
FULL SIZE
A14
-10 (.020 GA.)
FULL SIZE
A12
.190/.199 DIA HOLE
ANSI B 18.2.3.1M
NAS 679-A3W
(24 PLACES)
(TEST FIXTURE
ATTACHMENT ONLY)
-22 (-10 ONLY)
-26 ASSY OF
(-20 ONLY)
(4 PLACES)
A13
A10
A9
2X 6
A4
8
7
6
C
B
A


2
ASSEMBLY OF (25) (735.2-15 - 1
FULL SIZE
(26 PART OF NOT SHOWN)
AA
3

REVISION				
SYM	LTR	DESCRIPTION	DATE	APPROVAL
	A	DEC DCN DATED 1-23-61		

NOTE: ALL PARTS FABRICATED FROM RENE' 41 EXCEPT -22, -23 & -24. THESE PARTS WERE 4130 STEEL.





SEE SHEET 1 FOR LIST OF MATERIAL AND NOTES (A7)

USED ON	DRAWN	DATE
	M. METT	9-26-60
	CHECKED	
SECT NO		

PANEL ASSEMBLY-
UNINSULATED

(TEST ONLY)

SCALE NOTED

BOEING AIRPLANE CO AERO-SPACE DIV SEATTLE 24 WASH

25-20352

CODE | SIZE

DWG NO EWA 5-533 3-431

DYNA SOAR AIRFRAME - WING AND CONTROL SURFACES

FIG. 233

UNCLASSIFIED

UNCLASSIFIED