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EVALUATION OF HONEYCOMB TECHNIQUE FOR PACKAGING ELECTRONIC COMPONENTS (U)

Organization 7300 Environmental Test Report

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EVALUATION OF HONEYCOMB TECHNIQUE FOR PACKAGING ELECTRONIC COMPONENTS (U)

Introduction

A test program including a series of mechanical shock tests was conducted to evaluate a method of packaging small electronic components. It was of particular interest to determine if the technique of packaging the electronic components would enable them to survive the most severe requirements specified for the Tacos Radar which is incorporated in the Bagpipe vehicle.

The tests herein reported upon were a continuation of those carried on under Environmental Test Report No. T-25944. A report covering previous work in this area was issued under the above referenced T-number, RS-7332/8, dated January 26, 1965.

This test was requested by E. C. Niedel, 1422, on December 22, 1964. C. E. Simpson, 7332, was the Test Coordinator. The test items were received when available and the test was completed February 12, 1965.

Summary

Three types of modules (six output modules, five stretcher-filter amplifier modules, and one low band amplifier module) were subjected to mechanical shock. Eleven units were subjected to one shock pulse at amplitudes ranging from 19,400 to 26,000g with durations ranging from 1.0 to 1.6 milliseconds. Two units were subjected to several shock pulses having an amplitude of 10,000g with a duration of 0.2 millisecond. It was noted during the 20,000g shock test that the potting material on four of the modules cracked causing the units to fail mechanically and electrically. The remaining units survived the shock tests.

Procedure and Results

Three types of modules were subjected to shock environments which were specified by the consultant as simulating actual use conditions. The types of modules and the environments to which they were subjected are discussed below.

Mechanical Shock No. 1

Four output modules (Nos. 17, 19, 20, and 22), five stretcher-filter amplifier modules (Nos. 8, 9, 10, 11, and 12), and one low band amplifier module (No. 1) were subjected to one shock pulse which was approximately triangular in shape. Amplitudes of the shock inputs to the various units ranged from 19,400 to 26,000g with durations ranging from 1.0 to 1.6 milliseconds.

Modules 1, 8, 9, 11, 17, and 20, were shocked in the X-axis, modules 22 and 10 were shocked in the Y-axis, and modules 11, 12, and 19, were shocked in the Z-axis. Refer to Figure 1 for a definition of the axes.

The potting material on modules 10, 19, 20, and 22 cracked during the mechanical shock test causing the units to fail mechanically and electrically. The remaining units survived the shock test. Functional measurements were performed by the requesting organization after each shock test.

Mechanical Shock Test No. 2

Two output modules (Nos. 18 and 21) were each subjected to several shock pulses which were approximately triangular in shape. The amplitude of all the shock pulses was approximately 10,000g with a duration of 0.2 millisecond. Module No. 18 was subjected to three shock pulses applied parallel to the krytron axis. Module No. 21 was shocked seven times perpendicular to the krytron axis.

The output module circuits on units 18 and 21 were monitored for premature output pulses during this test by the requesting organization (1422). No prematures occurred due to the 10,000g shocks. A premature did occur when module No. 21 broke loose from its base plate as a result of the second shock applied to this unit. This same module broke loose a second time as a result of the last applied shock but did not premature. Also, module No. 18 broke loose from the mounting plate as a result of the last applied shock but did not premature.

Module No. 21 was reattached to its base plate and subjected to mechanical shock test No. 1. The amplitude of the shock pulse was 19,400g with a duration of 1.4 milliseconds. The unit was monitored during this test. No premature occurred.

The complete results of the tests are discussed in Memorandums 1422/1524 written by R. C. Lindsey, and 1422/1523 written by E. C. Neidel.

The 10,000g shock tests were performed on shock facility No. 10, and the 20,000g shocks were performed on the air gun. Both machines are located in Area I, Building 882.

The mechanical shock test was performed in accordance with SC-4452C(M).

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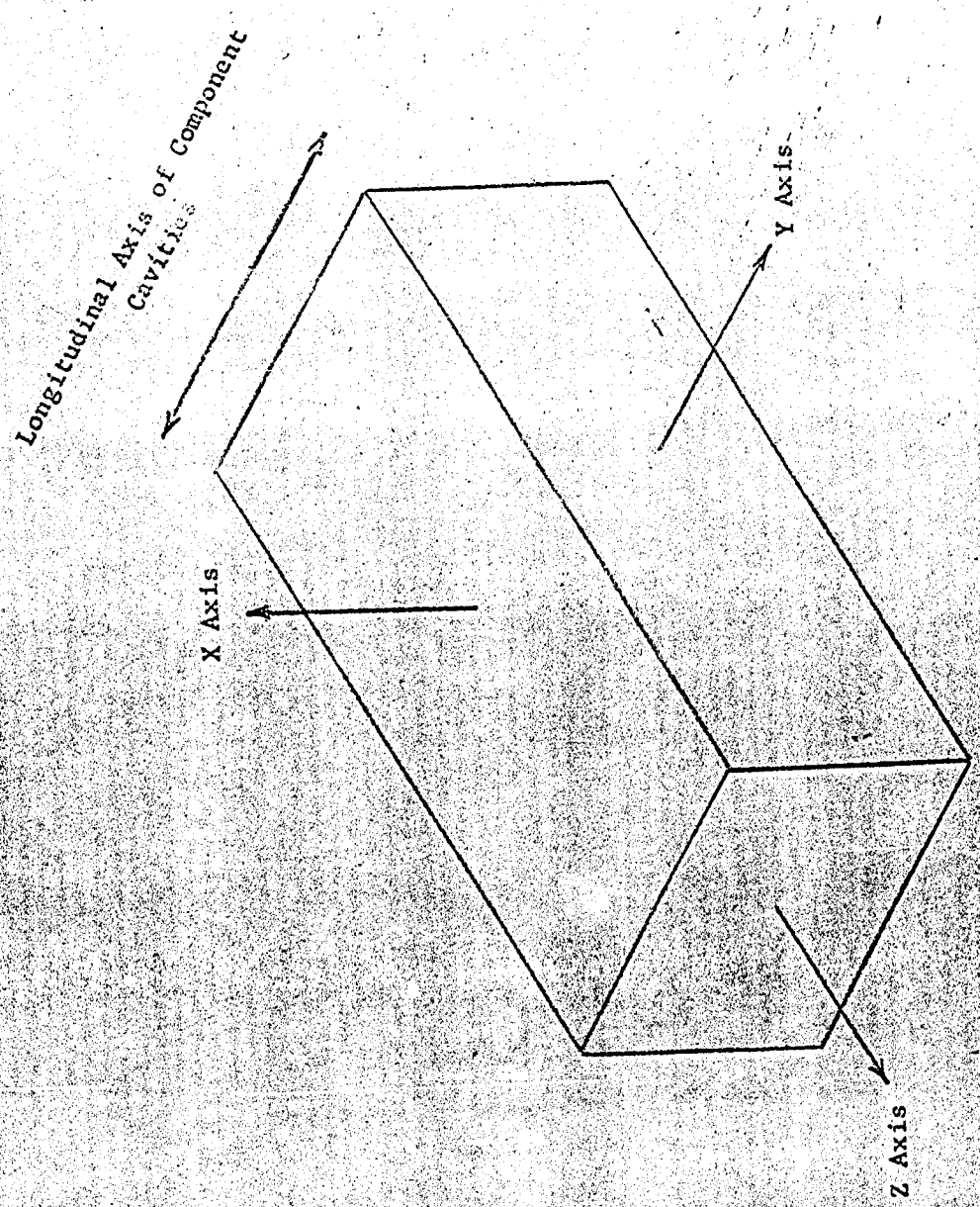

Figure 1

Directions of Acceleration During Mechanical Shock and Vibration