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AEROSPACE RECOMMENDED PRACTICE

ARP 476A

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SHOCK AND VIBRATION EVALUATION OF PACKAGING

1. FOREWORD

The ultimate test of a good package is the reliability of the package in delivering undamaged equipment consistently to its destination under normal handling conditions. If all the variables in package design were completely predictable, a package could be designed on the board and need never be tested. However, when cushioning characteristics are not completely identified under dynamic conditions, it becomes necessary to test packages for dynamic effectiveness.

2. PRELIMINARY TEST

Package testing, considered as a development test, may be conducted on a prototype basis in conjunction with shock and vibration development tests of the equipment to be packaged. The fragility rating of the equipment to be packaged should be determined in terms of shock and vibration to achieve an accurate description of the capabilities of the equipment regarding natural periods and response to vibration and to shock pulses.

3. RECOMMENDED PACKAGE TEST EQUIPMENT

3.1 Determinations of Frequency and Amplitude Amplification: Use Electro-Dynamic Shaker or other machine capable of imparting the desired frequency and amplitude inputs to the package.

3.2 Shock Exposure:

3.2.1 Electro Dynamic Shaker: If the packaged equipment weight is compatible with the shock required and the force rating of the shaker.

3.2.2 Drop Tester: May be either of two types. It may consist of a hammer assembly that drops upon a test item, or it may be a device by means of which the test item can be dropped in a prescribed manner onto a suitable surface.

3.2.3 Rigid Platform: If correlation of package experience indicates a specific "drop height" criterion and duplication of package treatment is not required in terms of pulse shape, magnitude, and pulse time.

4. TESTS ON MOCK-UP EQUIPMENT

4.1 Construct mock-up of equipment, duplicating dimensions, weight, center of gravity, and the three principal moments of inertia, as nearly as possible and making provision for rigidly mounting accelerometers in the three principal axes. Internal equipment features should also be duplicated in the mock-up when these features are considered sensitive to shock and vibration.

4.2 Construct one or more prototype packages to accept the mock-up equipment.

4.3 Package mock-up equipment and accelerometers, with the pickups connected to a suitable recording system.

4.4 Conduct package tests in accordance with conditions prescribed in packaging specifications or actual handling data, if known.