

Coda cx1 Vibration Test Procedure

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1. Introduction

1.1 Activity Description

This document is intended to specify requirements for workmanship screen vibration testing. The tests are to be performed on the Coda cx1 sensor unit, 8-marker drive boxes and markers in accordance with the details given in Section 3.

2. Requirements

2.1 Context

This procedure is supported by the activities contained in the Short Form Functional Test Procedure (CDL 1-TP07-0100:0208) and the Long Form Functional Test Procedure (CDL 1-TP07-0500:0211).

2.2 List of Hardware Under Test

Coda cx1 sensor unit
Externally powered 8-marker drive box
8 markers

2.3 List of Support Hardware Items

Internally powered 8 marker drive box complete with 1 marker
Mini hub adapted for current monitoring
Host PC with RS-422 serial card
Power supply for marker drive boxes
Coda interface cable
Serial cable
Derritron VP700 vibration shaker and associated test fixture
Digital multi-meter
Marker disc

2.4 List of Software Requirements

Coda Motion Analysis Software V6.56
Coda cx1 calibration files
Coda cx1 configuration file
SHARC DSP system file V3.02

2.5 List of Additional Documentation

3 Copies of the Coda cx1 Short Form Functional Test Procedure (CDL 1-TP07-0100:0208)
2 Copies of the Coda cx1 Long Form Functional Test Procedure (CDL 1-TP07-0500:0211)

3. Configuration

3.1 General Constraints

Electrostatic discharge (ESD) protection procedures per MIT 99-01003 shall be observed.

Connector mating/demating procedures per MIT 99-03002 shall be observed. Except that a mate/demate log will not be required.

3.2 Test Configuration

A medium power vibration shaker (Derritron VP700) is to be used for both qualification and acceptance testing. An associated test fixture provides a suitable interface to secure the test items to the vibration equipment for the duration of testing. The fixture is essentially a thick aluminium slab (1200mm x 400mm x 50mm) complete with holes, into which various clamping brackets can be bolted.

To facilitate the test, first bolt the fixture to the vibration table with a minimum torque of 520 pound-force inch lbf.in (58.75 Nm). Then, fit one control and one response accelerometer close to the mounting point on the vibration table. The control and response accelerometers will be used to monitor the vibration spectrum imposed during testing.

Clamp the Coda cx1 sensor unit (complete with mask cover) and externally powered 8-marker drive box to the test fixture with a minimum torque of 520 pound-force inch lbf.in (58.75 Nm). Ensure the end-cap of the MIL-C-38999 connector is securely fitted on the sensor unit and there is padded tape under the chain. Finally, fasten shut the mask cover using the Velcro tape.

3.3 Test Specification

3.3.1 Qualification Vibration Test

The qualification vibration test is to be run on the first deliverable Coda cx1 system in accordance with the details given in Table 1. The excitation is random, 6.1g rms (root mean square) for a duration of 60 seconds in each of three axes defined in Appendix 1. The order of testing is not important. The units are unpowered during vibration. The Short Form Functional Test Procedure (CDL 1-TP07-0100:0208) is to be conducted following each vibration test and the completed documents attached to this report.

Frequency Range (Hz)	Minimum Power Spectral Density (g²/Hz)
20	0.01
20 – 80	+3.0 dB/Octave – Slope
80 – 350	0.04
350 – 2000	-3.0 dB/Octave – Slope
2000	0.007
Duration	60 seconds
Composite	6.1 g rms

Table 1. Random vibration workmanship qualification test levels

3.3.2 Acceptance Vibration Test

The acceptance vibration test is to be run on the remaining deliverable Coda cx1 systems in accordance with the details given in Table 2. The excitation is random, 4.4g rms (root mean square) for a duration of 60 seconds in each of three axes. The units are unpowered during vibration. The Short Form Functional Test Procedure (CDL 1-TP07-0100:0208) is to be conducted following each vibration test and the completed documents attached to this report.

Frequency Range (Hz)	Minimum Power Spectral Density (g²/Hz)
20	0.005
20 – 70	+5.0 dB/Octave – Slope
70 – 200	0.04
200 – 2000	-3.9 dB/Octave – Slope
2000	0.002
Duration	60 seconds
Composite	4.4 g rms

Table 2. Random vibration workmanship acceptance test levels

4. Procedures

Administrative information for this test is to be recorded in the space provided in Section 4.1. In addition, the test conductor may annotate the procedures to more accurately document the course of the test whether routine or anomalous. The following pages, plus test data generated by the host PC, will be attached to the test report which is completed every time this test is conducted. The test conductor is assumed to have reasonable familiarity and competence in navigating through software applications which observe standard Windows conventions.

4.1 Identification of Equipment and Personnel

Coda cx1 sensor unit	_____
8 Coda markers	_____
Coda externally powered 8-marker drive box	_____
Test Conductor	_____
Test Date	_____
Test Location	_____
QA Representative	_____
Other individuals	_____

4.2 Long Form Functional Test (Pre-vibration)

Perform the Coda cx1 Long Form Functional Test (CDL 1-TP07-0500:0211), and attach the completed document to this report.

Pass	Fail	Time	Initial

4.3 Vibration Tests

With the Coda cx1 sensor unit and externally powered 8-marker drive box clamped in the test fixture, perform either the Qualification Vibration Test (first flight system only) or the Acceptance Vibration Test in the first of the three axis. On completion, remove the items and visually inspect the exterior for structural damage, backed out screws or other abnormalities. Rotate the Coda sensor unit and 8-marker drive box and listen for loose particles. The system is deemed to have passed this test if no abnormalities are found.

Visual Inspection (Axes)	Pass	Fail	Time	Initial
X				
Y				
Z				

If the Coda sensor unit or 8-marker drive box fails the visual inspection, stop testing and seek further assistance.

If the system passes the visual inspection, perform the Coda cx1 Short Form Functional Test (CDL 1-TP07-0100:0208), and attach the completed document to this report. Also, attach a copy of the vibration spectrum imposed on the system from the facility control and response accelerometers.

Short Form Test (Axes)	Pass	Fail	Time	Initial
X				
Y				
Z				

Repeat the above procedure for each of the three axes.

4.4 Long Form Functional Test (Post-vibration)

Perform the Coda cx1 Long Form Functional Test (CDL 1-TP07-0500:0211), and attach the completed document to this report.

Pass	Fail	Time	Initial

5. Test Operator Information

5.1 In the Event of Test Failure

Problems are covered in a similar section of the Short Form Test Procedure so are not repeated here.

6. Appendices

Appendix 1: Definition of Coda Test Axis

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