DO-160 Display Qualification

EMC, Lightning and ESD

CHAPTER 6

In this chapter

EMC paths, configuration and monitoring

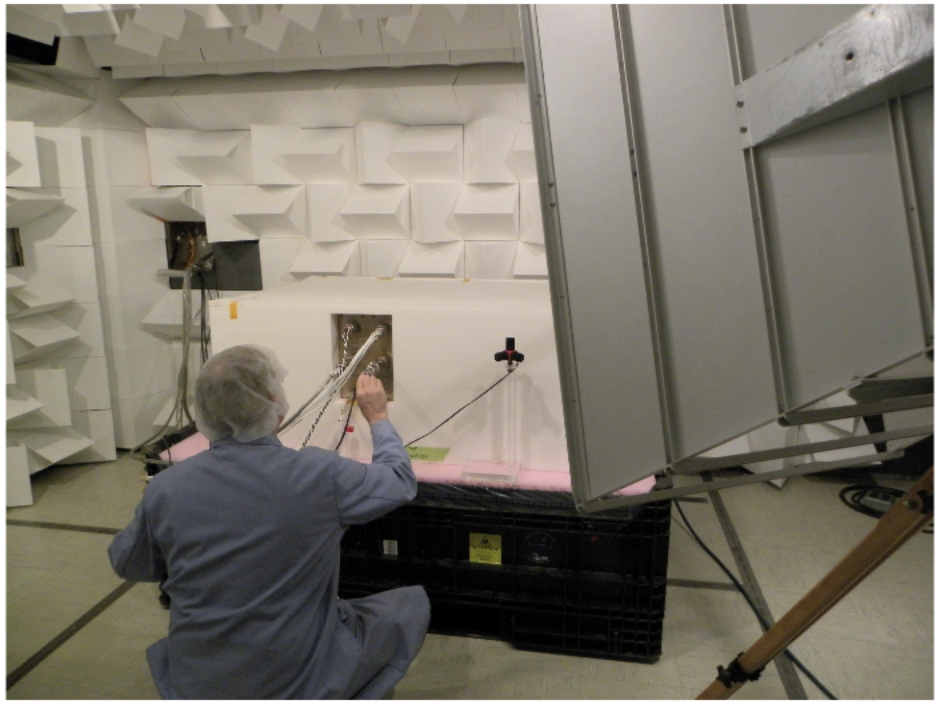
Lightning methods and installation assumptions

ESD behaviour and corrective changes



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Founder of FPD.DEV · Instructor
ASQ · American Society for Quality
Current: CMDA
Previously held: CSSBB, CMQ/OE
ASCM / APICS: CPIM, CSCP
Association for Supply Chain Management

Emissions and susceptibility



NASA Glenn Research Center; NASA imagery; generally not subject to US copyright

Section 20: response to RF disturbance

Section 21: RF energy from the display

Harness, enclosure and modes belong in the report

Equipment EMC and aircraft HIRF

01 Equipment tests establish defined capability

02 Aircraft coupling and shielding establish exposure

03 Installed compatibility closes a separate question

Equipment EMI and system E3

01 MIL-STD-461: equipment and subsystem EMI

02 MIL-STD-464: system electromagnetic effects

03 DO-160 results need a requirement-level comparison

Coupling paths through the installation

01 Cables can conduct or receive interference

02 Seams and apertures affect enclosure shielding

03 Bonding and shield termination define current paths

04 The test configuration must represent those paths

Induced signals and RF susceptibility

01 Section 19 addresses induced signals in interconnects

02 Section 20 addresses conducted and radiated RF

03 Use each method and its calibrated stimulus

04 Record performance during the applied disturbance

Emissions depend on mode and harness

01 Section 21 measures emissions from the equipment

02 Clocking, dimming and heaters can change the spectrum

03 Use representative cables and terminations

04 Compare corrected measurements with applicable limits

A trustworthy EMC monitoring channel

01 The monitoring system can disturb the test

02 Fibre links can reduce unintended conductive paths

03 Verify event timing and detection sensitivity

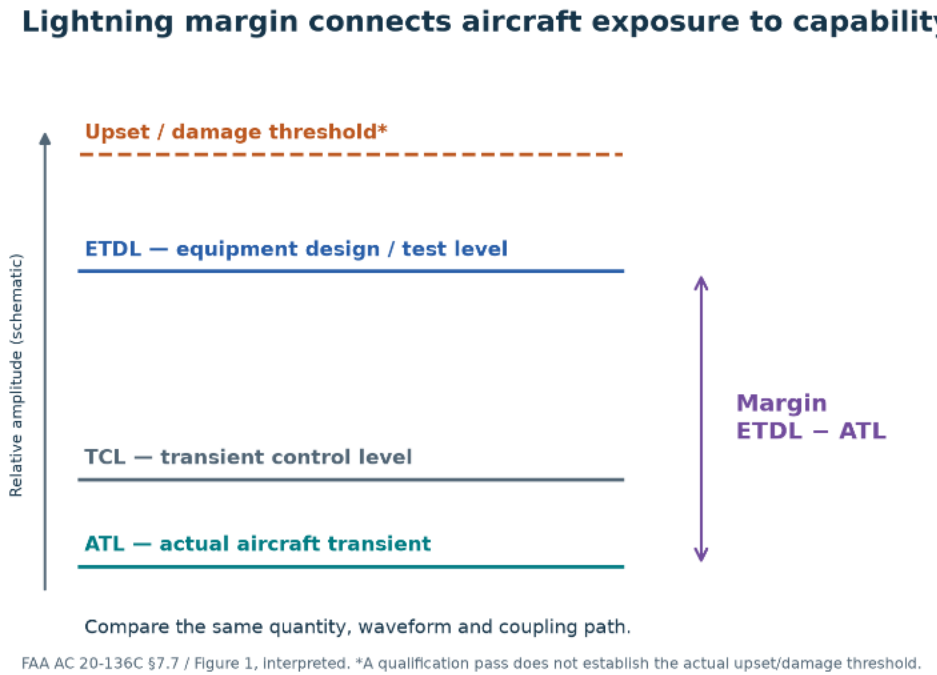
04 Distinguish product failure from monitor failure

Worked case: touch commands during RF

Record	Purpose	Related check
RF condition	Reproduce the exposure	Selected method
Touch and command logs	Locate the faulty function	False input criterion
Revised configuration	Identify the correction	Touch and EMC regression

Illustrative susceptibility investigation

Lightning capability and installed exposure



Section 22: induced transients

Section 23: direct effects

Compare matching waveforms, paths and quantities

FPD.DEV original teaching graphic; A-P02

Lightning level selection has a scope

01 FAA Table 4 concerns LCL A displays

02 Equipment and connected wiring both matter

03 A protected box can have exposed cable paths

ESD includes control-output behavior



Accessible surfaces and discharge paths

Production optical stack, bezel and bonding

False commands, resets and persistent faults

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Lightning evidence follows the interface

01 Define installation-induced exposure at the equipment

02 Match waveform, level and test method

03 Include cable shields, returns and protection paths

04 Keep equipment evidence tied to aircraft assumptions

Pin injection and cable methods

01 Pin injection assesses damage tolerance

02 Cable methods assess functional upset tolerance

03 Use the selected waveform and calibration procedure

04 Cable tests can also reveal damage

Direct effects and induced transients

01 Section 23 addresses direct lightning effects

02 Section 22 addresses induced transients

03 Installation exposure determines applicability

04 Survival of one exposure gives limited evidence

ESD at the operator interface

01 Air discharge at accessible human-contact points

02 Section 25 excludes connector pins

03 Monitor touch, controls, data and visible image

04 Check recovery and latent functional changes

Protection changes and residual risk

01 A protection device can alter capacitance and leakage

02 Shield changes can affect touch and transmission

03 Bonding changes affect transient current paths

04 Repeat the evaluations affected by the correction



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The Future of Display and Systems Development

Next chapter

Integration and Qualification Practice

I'm Diggy Breiling. Thank you for joining me.

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