DO-160 Display Qualification

Power and Electrical Transients

CHAPTER 5

In this chapter

Input power, interruptions and recovery

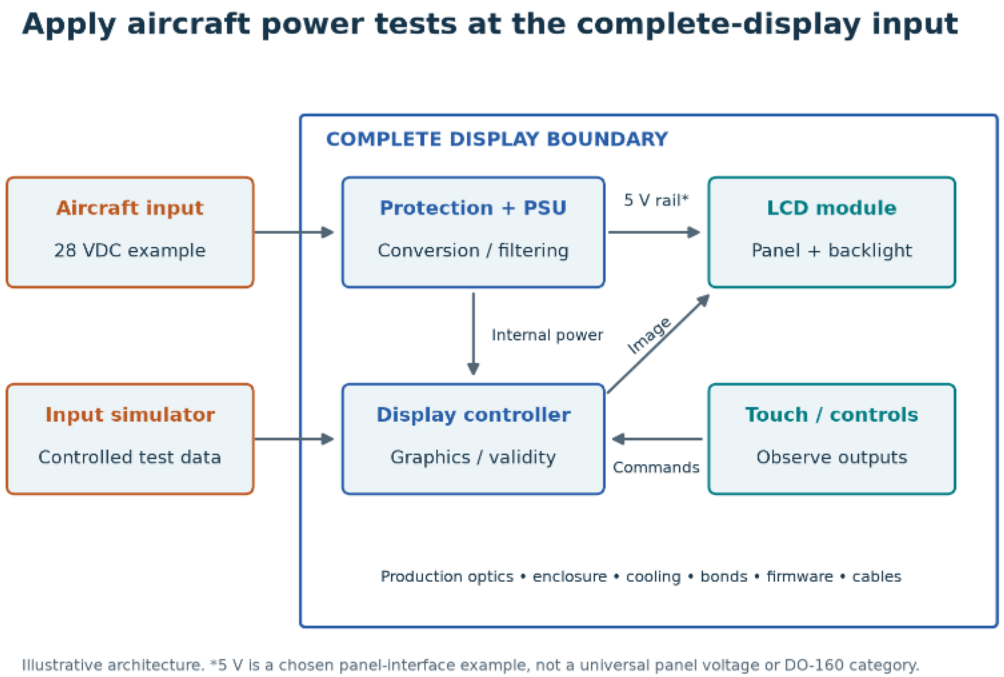
Spikes, ripple and protection behaviour

Worked power and data-validity cases



Diggy Breiling
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

Aircraft power reaches the entire display



Aircraft connector, protection and conversion

Internal rails, processing, backlight and heater

Image integrity, controls and recovery

FPD.DEV original teaching graphic; A-P02

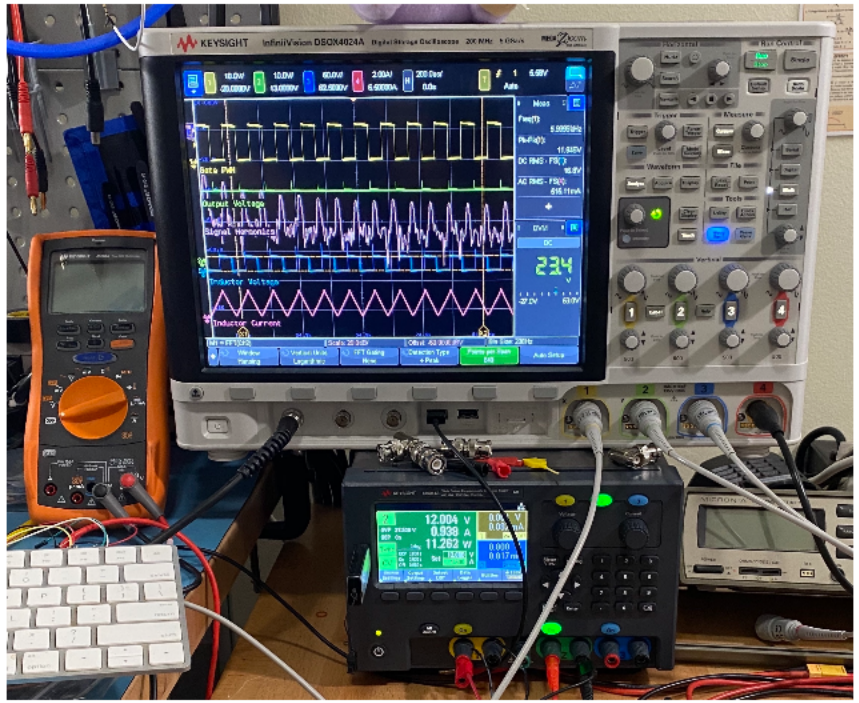
Aircraft and vehicle power requirements

01 MIL-STD-704: aircraft input-power characteristics

02 DO-160: allocated power and electrical tests

03 MIL-STD-1275: military ground-vehicle 28 VDC

Power stimulus and electrical monitoring



Supply and disturbance source

Oscilloscope and multimeter measurements

Synchronized image, reset and recovery record

Radarvector; source crop by Pittigrilli; CC BY-SA 4.0

Power qualification at the display input

01 Identify AC or DC supply and the applicable category

02 Include conversion, heater and backlight loads

03 Measure the waveform at the equipment terminals

04 Document source impedance and the test harness

Interruptions, brownouts and restart

01 Track internal rails and the visible image

02 Define permitted interruption and recovery

03 Detect frozen data after restart

04 Verify command outputs and saved configuration

Hold-up energy: an initial estimate

Assumption	Value	Calculation
Load and duration	20 W, 0.020 s	Energy = 0.40 J
Voltage window	28 V to 18 V	$28^2 - 18^2 = 460\ V^2$
Ideal capacitance	0.80 / 460 F	About 1,740 µF

Illustrative ideal calculation, before design margins

Voltage spikes and input protection

01 Identify the specified pulse at the test boundary

02 Assess clamp current and residual voltage

03 Account for wiring inductance and protection layout

04 Check function after repeated prescribed stimuli

Audio-frequency ripple on power

01 Section 18 injects interference on the power input

02 Ripple can modulate backlight or reference circuits

03 Sweep the applicable range with required loading

04 Observe image, touch and interface behaviour

Heater and backlight load transitions

01 Cold start can combine several peak loads

02 Dimming changes the electrical operating mode

03 Control transitions can disturb sensitive rails

04 A mode matrix makes the selected cases traceable

Worked case: recovery with stale data

Event	Evidence	Acceptance question
Power returns	Input and rail trace	Electrical recovery?
Image returns	Timed video	Required recovery time?
Map stays frozen	Data and display log	Valid current information?

Illustrative power interruption result



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The Future of Display and Systems Development

Next chapter

EMC, Lightning and ESD

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

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