Class E Cargo Compartment Smoke Detection

Federal Aviation Administration

Presented to: Sixth Triennial Aircraft Fire and Cabin Safety Conference. Atlantic City, NJ

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Date: October 25-28, 2010


UPS DC-8
Feb. 7, 2006
Philadelphia, PA
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Cockpit Voice Recorder Transcript[1]

2333:44 Aircraft cleared to descend from FL 330 to FL 240

2334:39 “Smell like wood burning”

2335:40 “It’s pretty strong now”

2335:54 Cockpit door opened “It’s more in the back”

2338:39 One pack turned off

2343:18 “Fume evacuation”

2343:27 Packs on max flow, recirc fan off

2347:59 Cockpit door opened again “It’s definitely stronger in the back. No haze or smoke when I shined my light back there” At FL 40

2354:42 “Cargo smoke detectors on” At FL 20

2355:48 Landing gear down

2355:57 “Lower cargo compartment aft smoke detectors on”

2359:00 Touch down

2359:02 “Smoke in cockpit”

2359:45 End of transcript. Crew evacuated through L1 door

[1] Source: NTSB Accident Report

NTSB Recommendation A-07-98 to the FAA.

“Ensure that the performance requirements for smoke and fire detection systems account for the effects of cargo and cargo containers on airflow around the detection sensors and on the containment of smoke from a fire inside a container and should establish standardized methods of demonstrating compliance with those requirements. (A-07-98) “

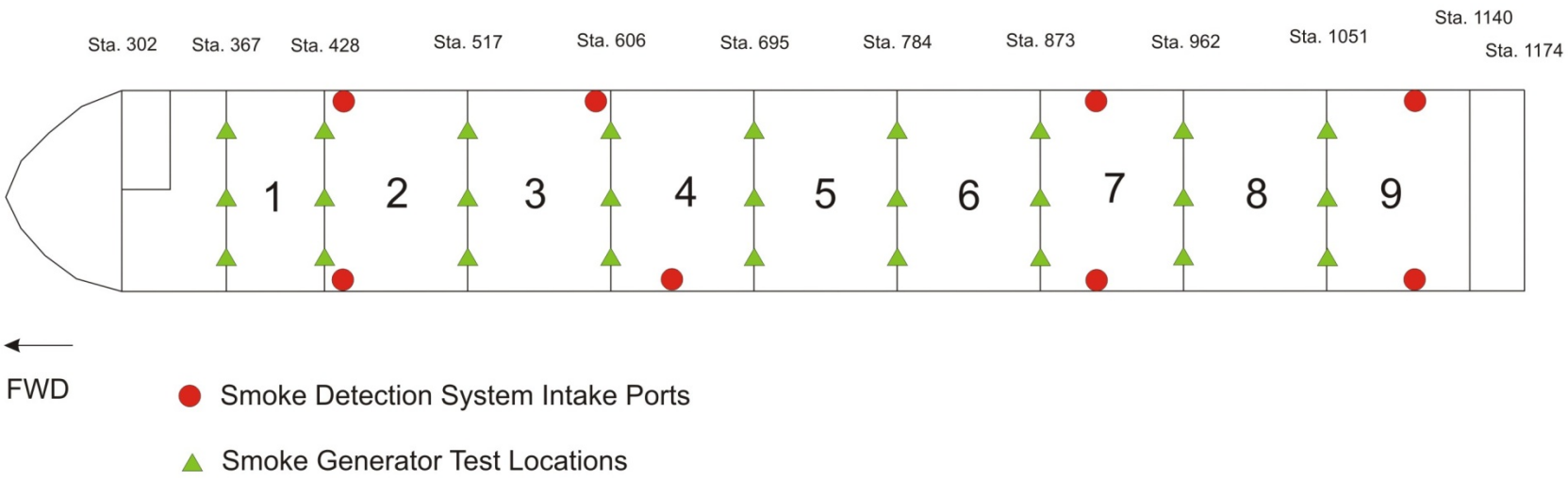
727 Freighter

Main Deck Airflow approximately one air change every 5.1 minutes (11.8 air changes/hour). Air from one pack supplied with APU bleed air.

4 Aspirated Photoelectric Smoke Detectors (94-96% light transmission/ft alarm point)

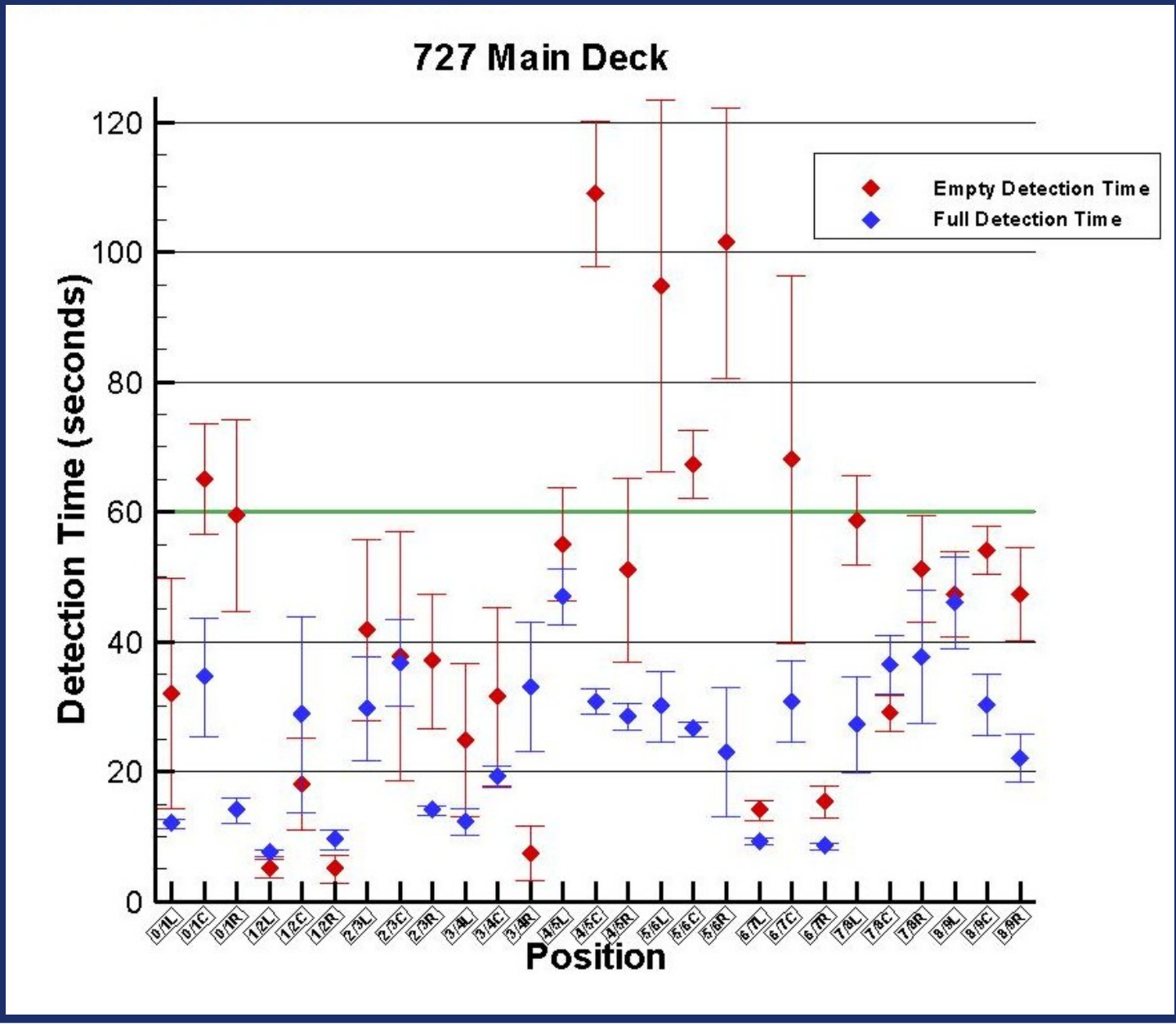
Certified to one minute detection time (FAR 25.858)

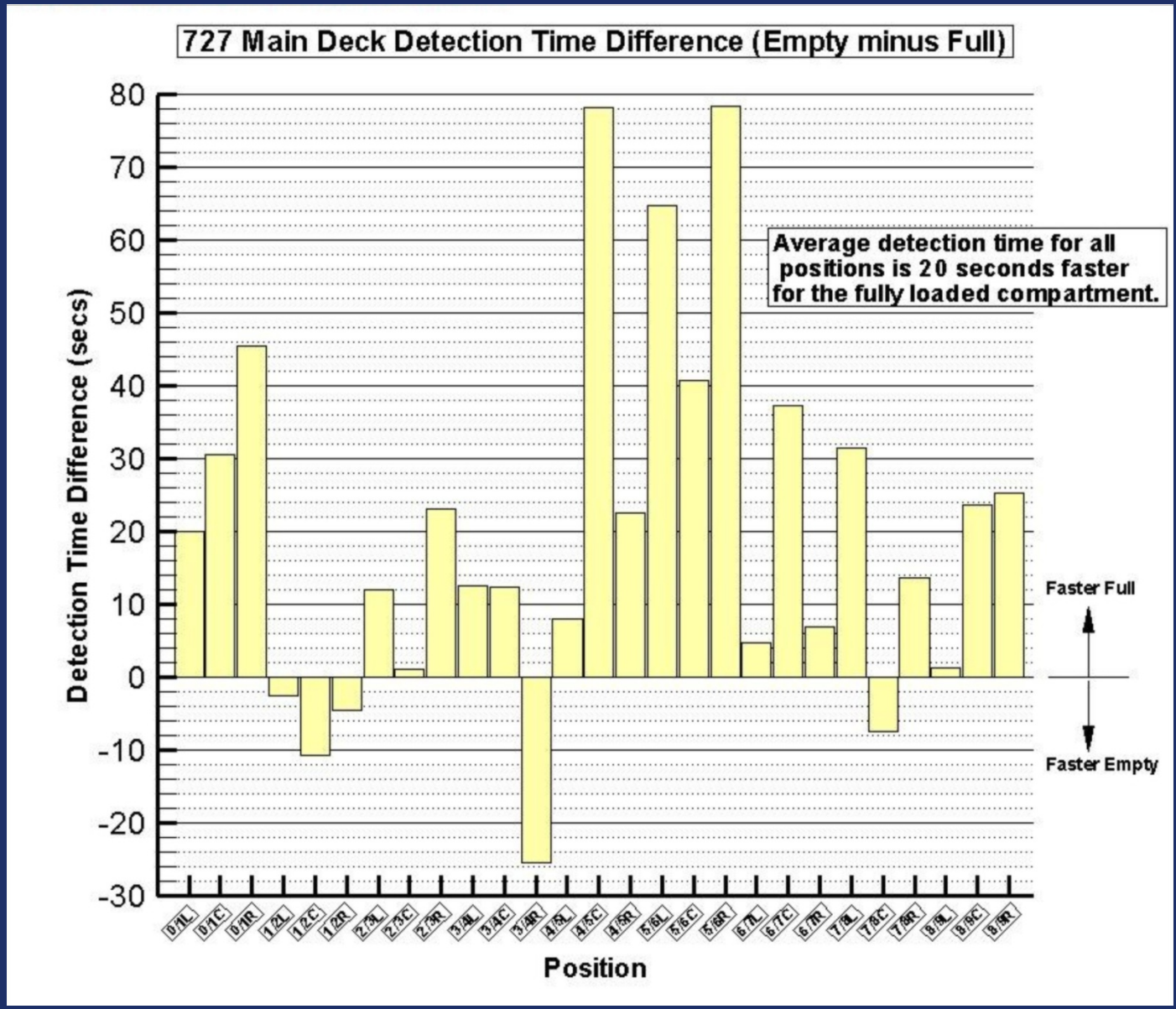

POSITION 7
MAXIMUM-DEMI-W



727 Freighter 88” cargo container positions


9

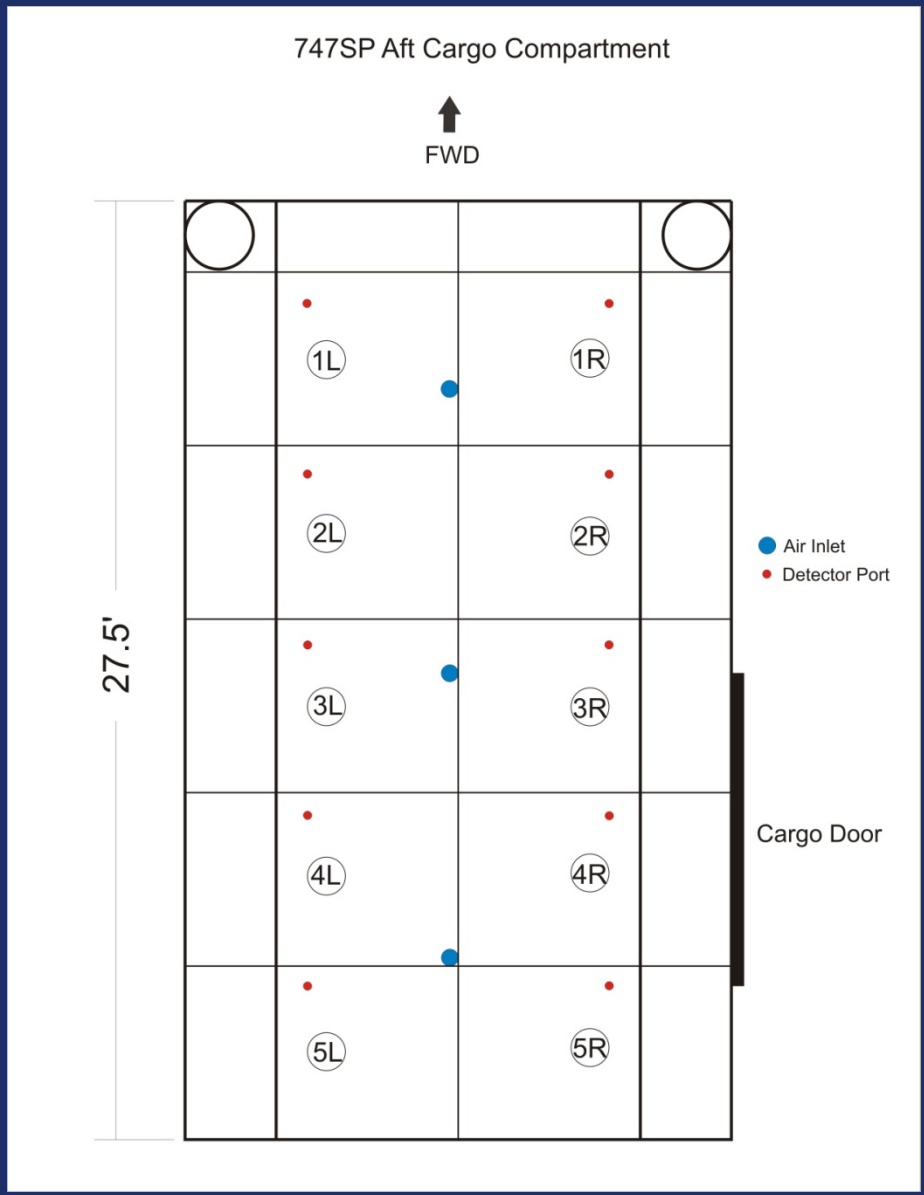

727 Main Deck
Detection Time (seconds)
120
100
80
60
40
20
0
Empty Detection Time
Full Detection Time
0/1L
0/1C
0/1R
1/2L
1/2C
1/2R
2/3L
2/3C
2/3R
3/4L
3/4C
3/4R
4/5L
4/5C
4/5R
5/6L
5/6C
5/6R
6/7L
6/7C
6/7R
7/8L
7/8C
7/8R
8/9L
8/9C
8/9R
Position


727 Main Deck Detection Time Difference (Empty minus Full)
Detection Time Difference (secs)
80
70
60
50
40
30
20
10
0
-10
-20
-30
Average detection time for all positions is 20 seconds faster for the fully loaded compartment.
Faster Full
Faster Empty
0/1L
0/1C
0/1R
1/2L
1/2C
1/2R
2/3L
2/3C
2/3R
3/4L
3/4C
3/4R
4/5L
4/5C
4/5R
5/6L
5/6C
5/6R
6/7L
6/7C
6/7R
7/8L
7/8C
7/8R
8/9L
8/9C
8/9R
Position

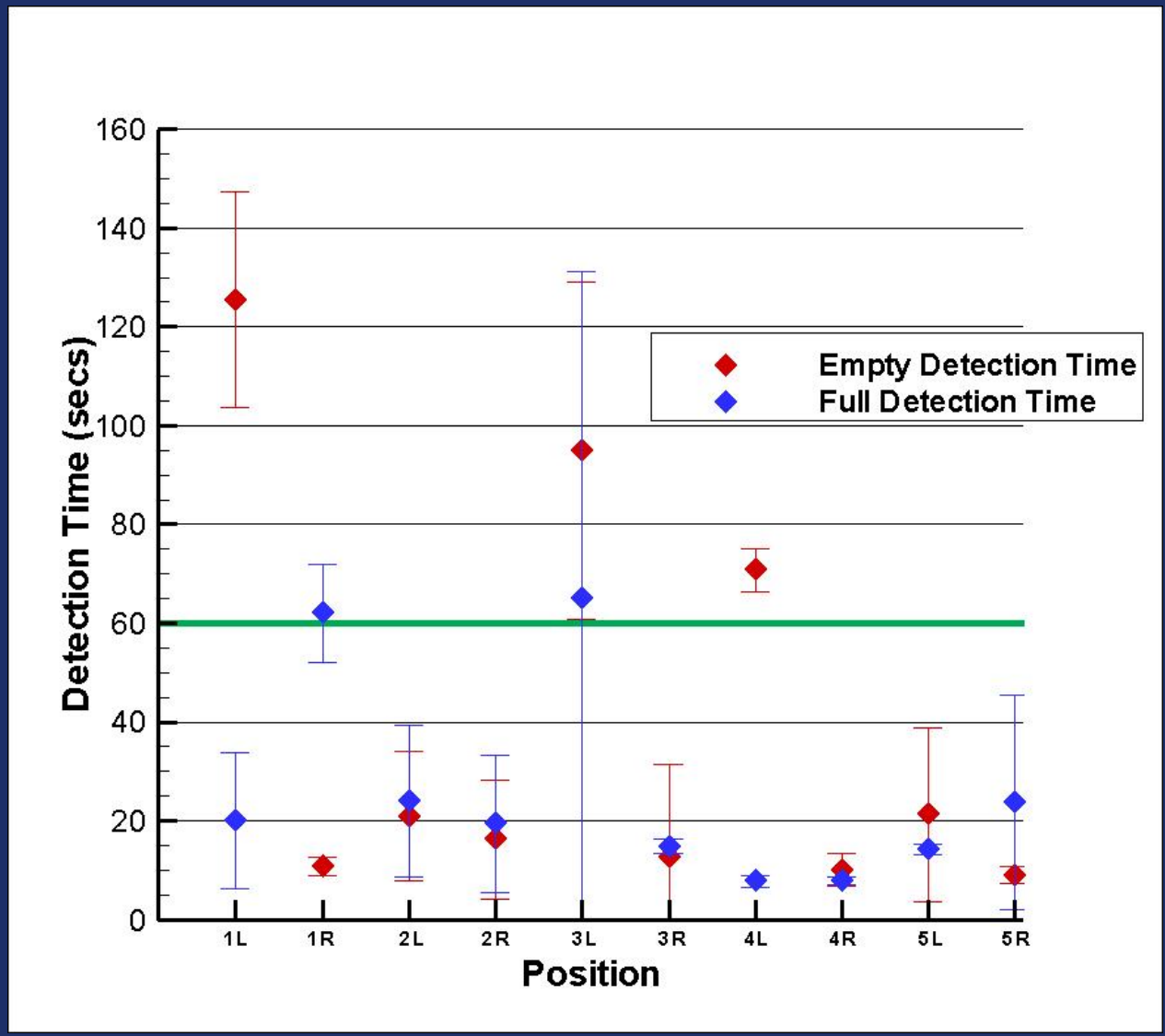
747SP Below Floor Compartment

Ventilation airflow provided one air change approximately every 6 minutes (10 air changes per hour). Air source was 2 air conditioning packs supplied with bleed air from the APU

2 Aspirated photoelectric smoke detectors. Calibrated to alarm at 90.6 +/- 1 percent light transmission per foot.

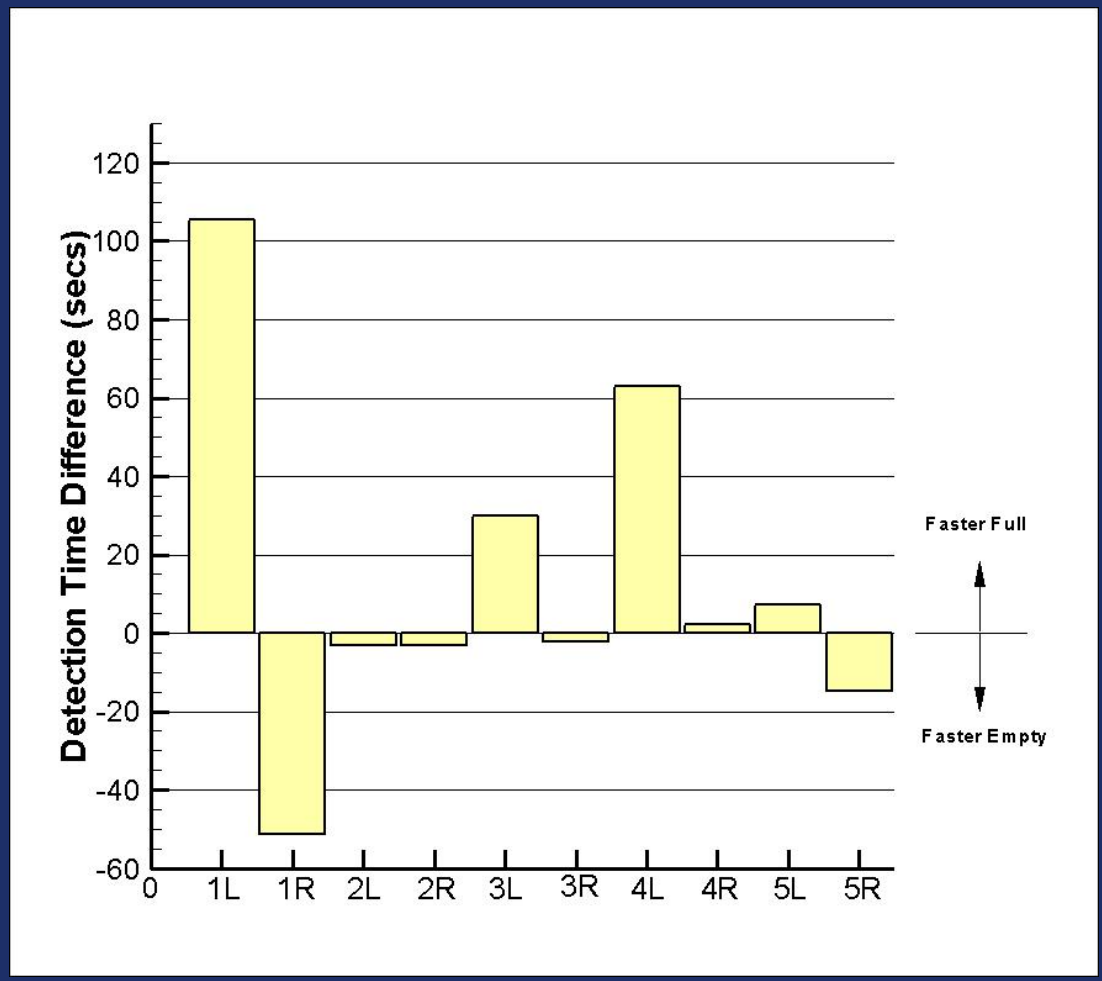

747SP Aft Cargo Compartment
FWD
1L
1R
2L
2R
3L
3R
4L
4R
5L
5R
27.5'
Air Inlet
Detector Port
Cargo Door

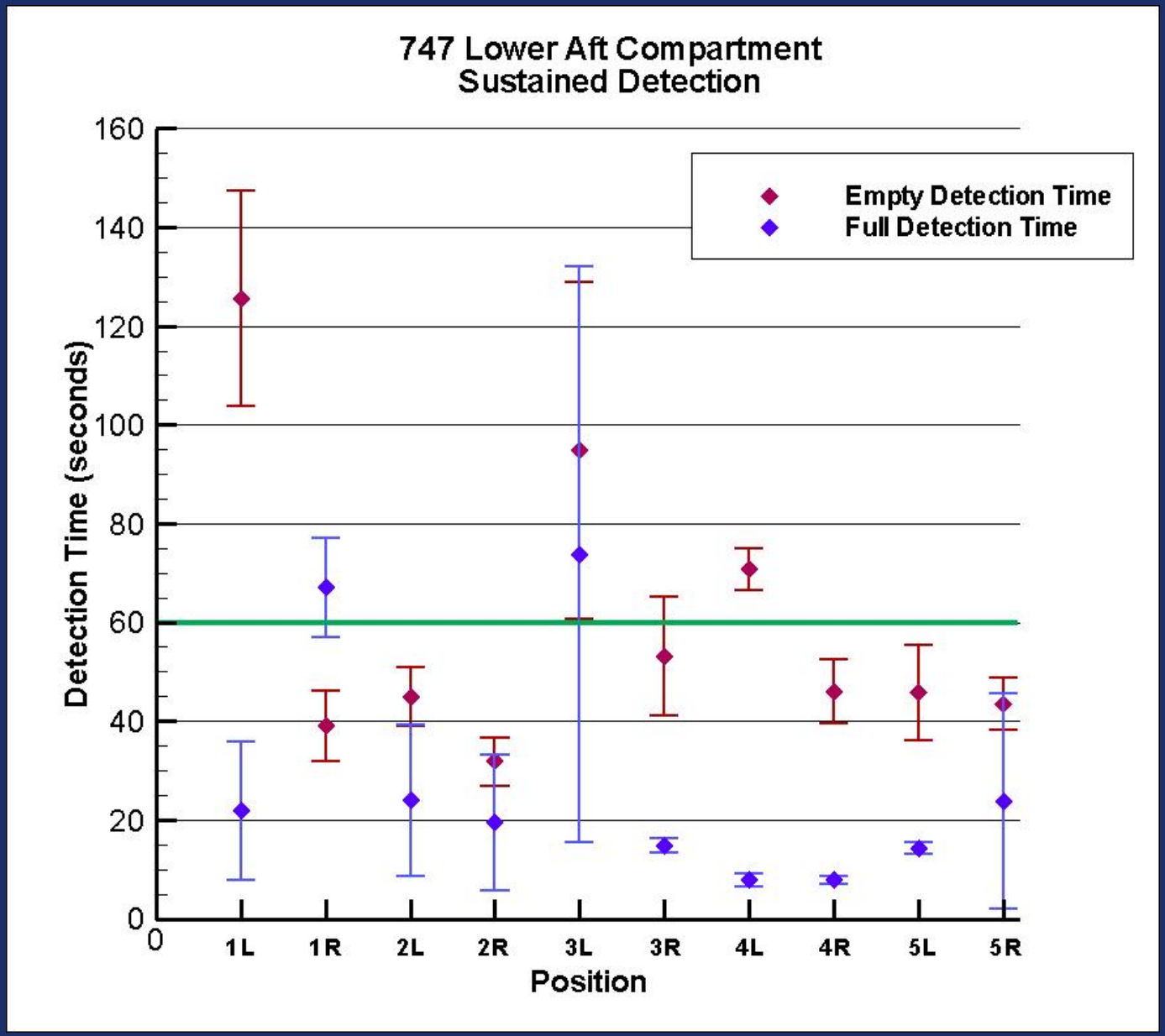
747 Time of Initial Alarm Regardless of Duration



747 Time of Initial Alarm Regardless of Duration

Average detection time for all positions tested is 13 seconds faster for the fully loaded compartment.




747 Lower Aft Compartment
Sustained Detection
Empty Detection Time
Full Detection Time
Detection Time (seconds)
160
140
120
100
80
60
40
20
0
0
1L
1R
2L
2R
3L
3R
4L
4R
5L
5R
Position

Final report has been published and is available on the FAA Fire Safety website at:

www.fire.faa.tc.gov