Field Experience – Lightning Strike Damage of ANA B767

June 4, 2009
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ANA
Contents:

✓ Field Experience of Lightning Strike Damages occurred on ANA B767 Airplanes

✓ Preventive Actions taken by ANA

✓ Requested Considerations/Actions to Airplane Manufactures
ANA Overview

- Domestic Operation
  - 50 cities/130 Routes
- International Operation
  - 24 cities/36 Routes

Number of Airplanes: 214 Airplanes

“938 Flights” per Day

“596 Flights” per Week
Lightning Strike Data:

Period- from 01/01/2005 to 12/31/2006 (2 years)

Fleet- ANA’s all 767 (56 airplanes)

Damage: Lightning Strike

Resource: ANA’s maintenance control system (SAP)

Results:

✓ Total 333 Lightning damages reported
Majority of Lightning Strike occurs in Winter Season in this region.

3 Major Regions – Winter Thunder:
- West Coast of Norway
- Great Lakes
- Japan Sea Coast

Higher Energy than Summer Thunder

Cool Wind

Warm Sea Current

Northern Cool Wind

Lightning Prone Region

JAPAN SEA

PACIFIC OCEAN
767 Lightning Strike Experience

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![Map of Japan showing CTS and KMQ locations]

FWD FUSELAGE SKIN
767 Lightning Strike Experience

Melted Rivet

FWD FUSELAGE SKIN

Melted Rivet
### 767 Lightning Strike Experience

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- **JAPAN SEA**
- **PACIFIC OCEAN**

- **RH H-STAB TIP**
Fastener Hole damaged.

Shown with Tip End Panel removed.
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**767 Lightning Strike Experience**

- LH H-STAB TIP
- L1 WINDOW SHIELD

[Map showing flight路径 from ICN to JFK]

**JAPAN SEA**

**PACIFIC OCEAN**
767 Lightning Strike Experience

H-Stab Tip
Composite burned.

Window Sill
melted.

LH H-STAB TIP
L1 WINDOW SHIELD
Typical B767 Lightning Strike Damage
747-400 Lightning Strike Experience

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No. 4 ENG NOSE COWL SKIN
747-400 Lightning Strike Experience

Rivets burned.

Nose Cowl Composite Skin burned.
# A320 Lightning Strike Experience

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![Map of Japan showing the route from HND to SYO](image-url)

- **JAPAN SEA**
- **PACIFIC OCEAN**

![Diagram of A320 aircraft](image-url)

- **RH ELEV. TIP**
A320 Lightning Strike Experience

Elevator Tip Composite Skin Burned.
767 Lightning Data

333 Reports by ATA Chapters

50% of Lightning Strike Damages of Entire Structure occurs on ATA 53 Fuselage.

Ex: ATA ☐, ATA Chapter ☐, No of Damage
767 Lightning Data

ATA 53 Damages (172 Reports) by Locations

2 years data from 01/01/2005 to 12/31/2006

74% of Lightning Strike Damage of ATA 53 occurs on Sec. 41 including Radome.

Ex: Radome, 25 Radome damaged, 25 reports
333 Reports by the Dispositions

767 Lightning Data

33% of Lightning Strike Damages of Entire Structure is within Allowable Damage Limit.

Relaxation of ADL could reduce maintenance burden.

Fastener Replacement

Repair/Replace

Miscellaneous

Within Allowable Damage Limit

33%
767 Lightning Data

50% of Lightning Strike Damages of 53 is within Allowable Damage Limit.

Relaxation of ADL could reduce maintenance burden.
Our Proposal for Expansion of ADL of 41 Fuselage Skin.

Lightning Strike Damage - B767 Section 41 Fuselage Skin
(Sample between 2004 thru 2008 with maintenance record)

Current Sec. 41 ADL
(SRM 53-00-01; 15% Depth)
Proposal: ADL up to 20% Depth for Sec 41 Fuselage Skin.

Lightning Strike Damage - B767 Section 41 Fuselage Skin (Sample between 2004 thru 2008 with maintenance record)

Current Sec. 41 ADL (SRM 53-00-01; 15% Depth)

Proposed Sec. 41 ADL (SRM 53-00-01; 20% Depth)

15% Depth ADL □ if 20% Depth ADL

w/in ADL: 5 □ 15 damages □ 9 □ /15 damages

ADL: 33 %

ADL: 60%

20% depth ADL significantly reduces unexpected AOG due to Lightning Strike.
What ANA did as preventive actions:

Goal: To maintain sufficient conductivity performance

A320

We did:

1. Resistance check & correction at the Elevator Trailing Edge Strap to relax maintenance burden.

The Result was:

Before: 6 Repairs / 1 year
After: Just 1 Allowable damage / 1 year
What ANA did as preventive actions:

Goal: To maintain sufficient conductivity performance

B767

We did:

1. Resistance check and correction at the attaching points to relax maintenance burden due to Radome Repair.
The Result was:

Before: 0.2 Radome Repairs / airplane / year

After: 0.2 Radome Repairs / airplane / year

In Sec 41 Lightning Damage 42% Increased environment, Radome damage increase was restrained.

Increase of Radome Composite Repair could be restrained by conductivity correction.
Requests to Airplane Manufactures:

- Establishment of appropriate Conductivity Performance
- Establishment of appropriate Allowable Damage Limit
- Establishment of appropriate Fly-Back to Main Base criteria.
Thank you