



# NASA ASRS Maintenance Reports - Part Installation Issues

InfoShare – Maintenance

Dallas, TX

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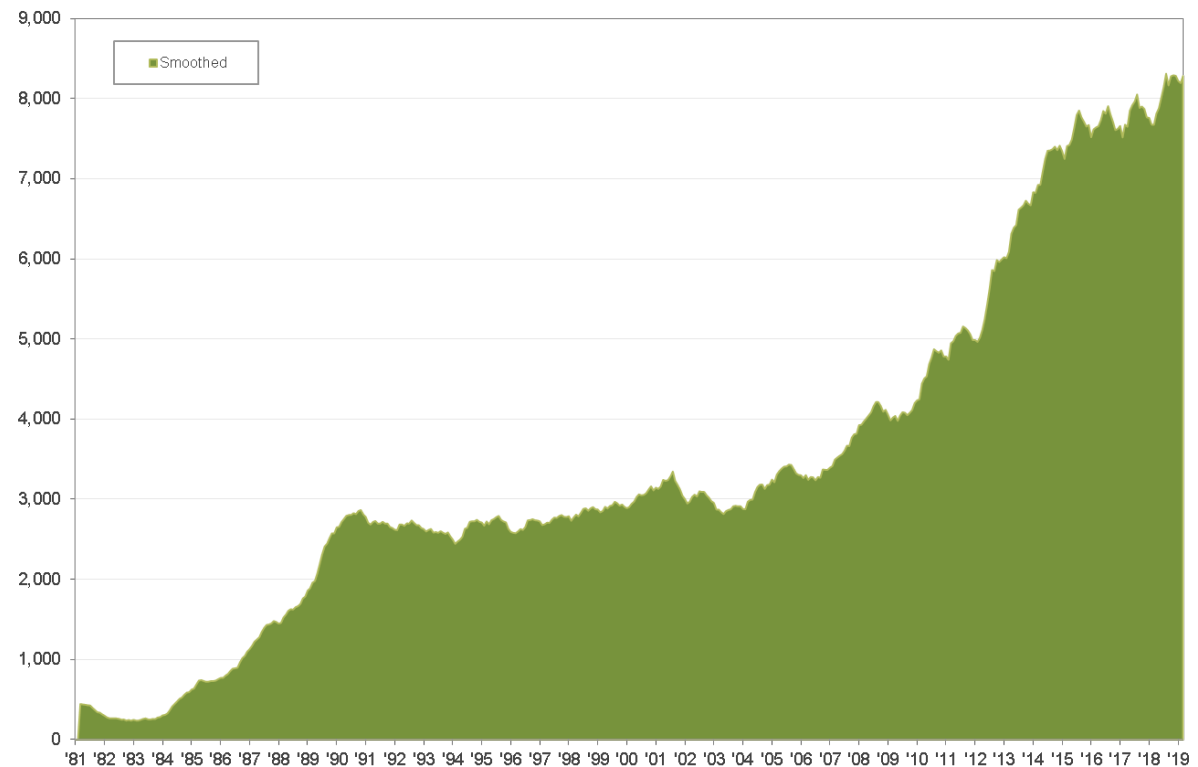
**AVIATION SAFETY  
REPORTING SYSTEM**



# ASRS Report Volume Profile

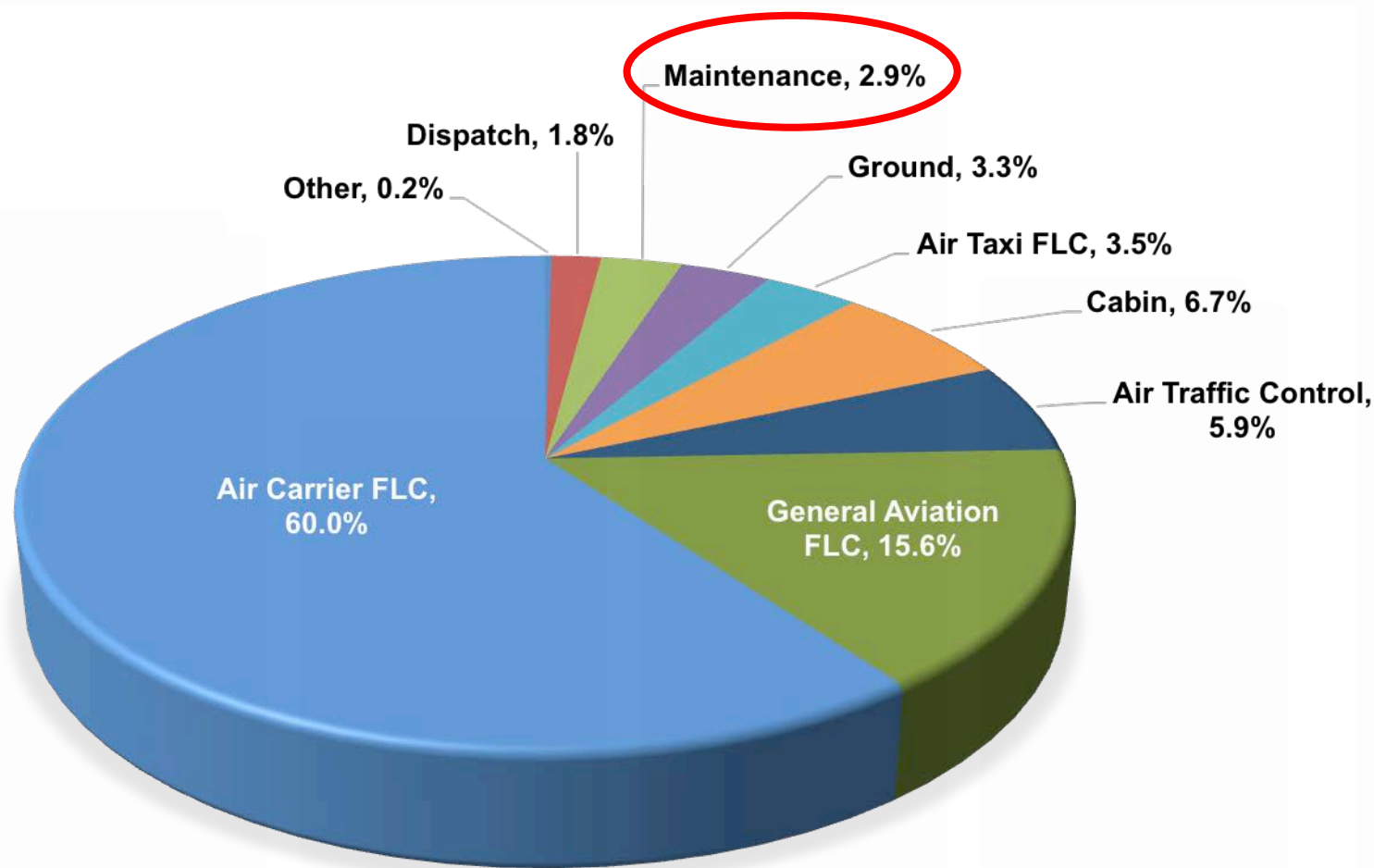
- Over 43 years of confidential safety reporting
- Over 1,631,000 reports received
- Over 6,590 alert messages issued
- Over 8,425 reports per month, or 405 per working day
- Total report intake for 2018 was 99,010
- Report intake estimate for 2019 is over 102,000

Monthly Intake  
January 1981 – March 2019



# Incident Reporter Distribution

April 2018 – March 2019



n = 101,101



Source: 100% ASRS Report Data



# ASAP Reporting to ASRS

- **ASAP Reporting**

- 263 Total Programs
- 138 Air Carriers/Operators

More programs being added continuously

- **Reporting Groups**

- 133 Pilot
- 57 Maintenance
- 46 Dispatch
- 23 Flight Attendant
- 4 Other (Including Ground Crew, etc.)

ASRS Electronic Transmission Protocol compatible with numerous software platforms

- **Majority are received through Secure Electronic Data Transmission protocols**
- **Paper form submissions continue to be received at ASRS**



24.4% of all reports are matched to unique events in 2018



# ASRS Safety Telecon Topics

September 2018 – March 2019 (Since Last Infoshare)

## Recent ASRS Telecon Topics

A320 ACARS Data Transmissions Blocks VHF

B737NG Uncommanded Roll With Spoiler Use

Aspen Evolution PFD Failure

Piper PA28 Alternator Failure

ATC Insufficient Staffing/TMU Flow Management Concerns

CRJ-200 Water in Pitot Static System

Air Ambulance Operations in IAD Class B Airspace

B737 Incorrect Arming of Evacuation Slides

CPDLC ATC Clearance Issues

MDT Airspace Issues

CE-525A Stabilizer Trim Frozen in Cruise Flight

C206 Rudder Cable Failure

A320 Flight Crew O2 Dispatch Requirements

CLT RNAV STAR BANKR2 Crossing Restrictions

FLL Class C Not Sufficient for Current Traffic Levels

CL35 False Dual Engine Fire Warning

B737-800 Broken Flight Control Cables

NMAC at Non Towered Airport



# Part Installation Related Alerts

- B787 Nose Landing Gear Pin Installation Issue
- B777 Engine Fire Panel Installation Issue
- EMB-145 Horizontal Pitch Trim Switch Improper Installation
- E170 Engine Fire Bottle Installation
- CRJ-900 PFD Display Cooling Fan Installation Procedure
- DHC-8-100 Flap Track Installation Procedure Confusion
- CE560 Mode Control Panel Installation Error
- Incorrect Installation of B737-800 Master Recall System Display



# Commonly Reported Part Installation Issues

- Incorrect or Deficient Procedures/Manuals
- Complex and/or Confusing IPCs
- Interchangeable Parts, “It fits, it must be right”
- Distractions, Interruptions, Time Pressure
- Inadequate Shift Change Briefings
- Manpower/Staffing Levels
- Stores Delivering Wrong Part
- Clone Part Numbers
- Part Labeling Deficiencies



# B787 Nose Landing Gear Pin Installation Issue

(Report 1482673)

- ASRS received a report from an air carrier Maintenance Technician describing a potential safety hazard with the installation of the B787 nose gear locking pin





# B787 Nose Landing Gear Pin Installation Issue

(Report 1482673)

- Reporter stated the pin could easily be installed in the drag brace pivot link by mistake, which could lead to a gear collapse during ground testing
- Reporter recommended corrective action be taken to prevent installation errors
- This may have contributed to the Ethiopian Airlines B787 nose gear collapse at the gate in March 2016

# Did We Get Our Wires Crossed?

ASRS received a report describing an Embraer 170 aircraft with engine fire bottle cartridges and discharge outlets installed at incorrect positions ACN 1050457



# Did We Get Our Wires Crossed?

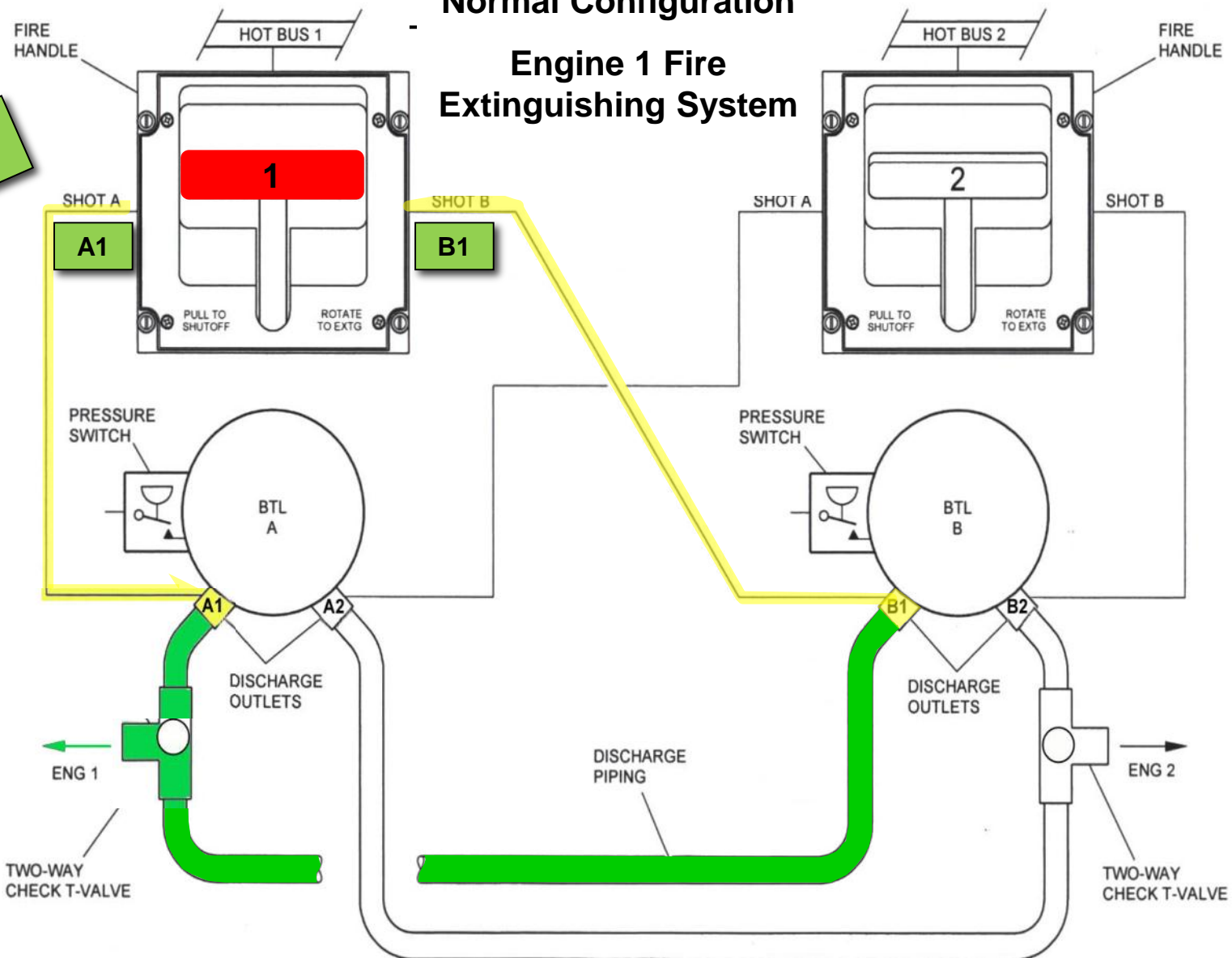
- The configuration of the fire extinguishing agent plumbing system can pose a potential challenge to maintenance personnel
- Several design features appear to have been used to mitigate a possible system misconfiguration
- However, this report shows it is still possible to install the components in the wrong position
- The reporter indicated that “in the worst case, if both bottles were affected, neither engine would have fire protection, with extreme risk for loss of life.”



# Embraer E170 Fire Bottle Installation (Report 1050457)

## Normal Configuration Engine 1 Fire Extinguishing System

Normal Operations



ENGINE FIRE EXTINGUISHING SYSTEM - SCHEMATIC

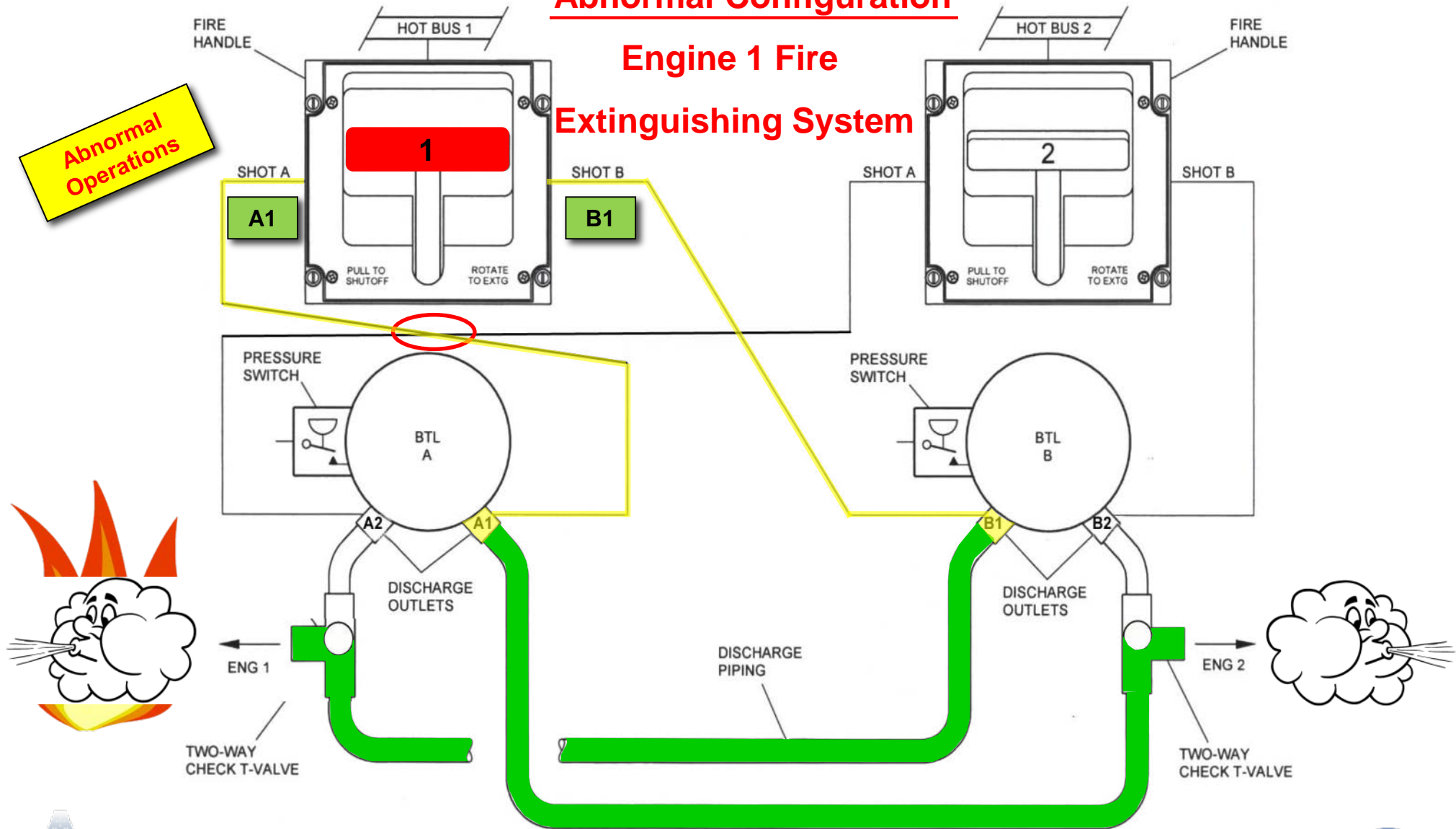
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# Embraer E170 Fire Bottle Installation (Report 1050457)

## Abnormal Configuration

### Engine 1 Fire Extinguishing System



ENGINE FIRE EXTINGUISHING SYSTEM - SCHEMATIC

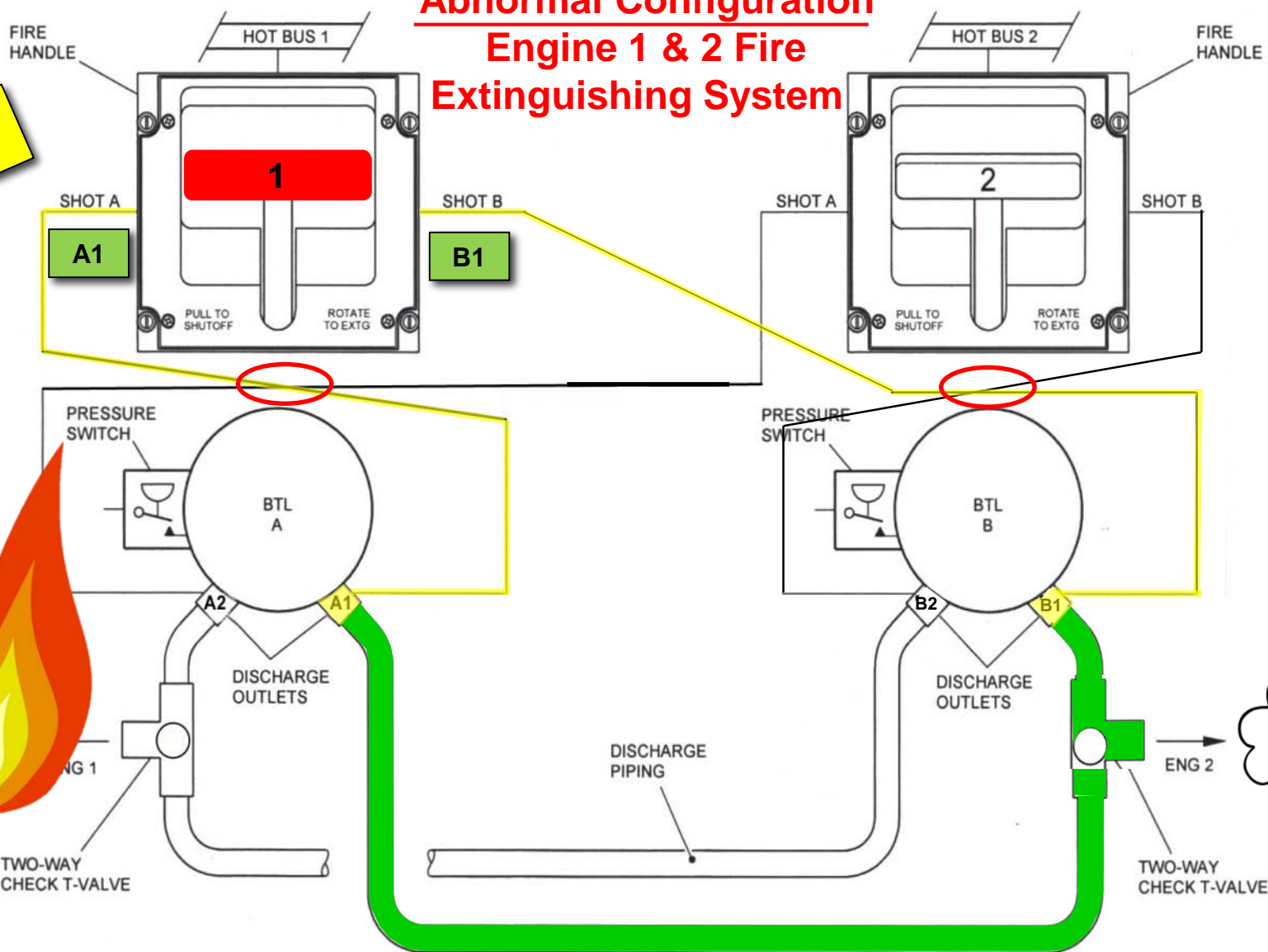
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# Embraer E170 Fire Bottle Installation (Report 1050457)

## Abnormal Configuration Engine 1 & 2 Fire Extinguishing System

Worst Case Scenario



ENGINE FIRE EXTINGUISHING SYSTEM - SCHEMATIC

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# Embraer E170 Fire Bottle Installation

## (Report 1050457)

- Currently, there is no AD for the E170 Engine or APU Fire Extinguishing System
- AD 2013-05-12 for the E170 addresses the similar problem for the forward and aft cargo compartments
- AD 2004-23-19 is applicable to E135 and E145 series airplanes to prevent the inability to put out a fire
  - General visual inspection to detect incorrect wiring
  - Modify electrical harnesses by adjusting the length
  - Install identification sleeves on the harness and connectors and matching color-coded stickers on the fire bottles



# Part Installation Issues

## *Parts Effectivity* (ACN 1602166)

- Maintenance Technician had to spend an inordinate amount of time researching whether a particular part is correct for a specific aircraft tail number
- Event Details:
  - Illustrated Parts Catalog (IPC) – Line Operations Safety Audit
  - A320 required a Spoiler Elevator Computer replacement (SEC)
  - Technician used EDOC for part effectivity research – Process was described as “...*very challenging and time consuming...*”
  - Technician spent 1.5 hours to determine part effectivity, Parts store personnel spent 1 hour working out the same issue
  - Reporter stated “*It has been documented in the past that wrong parts have been installed on aircrafts due to the inefficiencies of the IPC system.*”



# Part Installation Issues

## *The Old Shell Game* (ACN 1577311)

- B737 Maintenance crew reported that the Emergency Door Slides were inadvertently installed on the incorrect door
- Event Details:
  - Slide assemblies were removed and placed on jetway floor
  - Cleaners showed up to sanitize the aircraft – slide positions may have inadvertently been disturbed
  - *“Assemblies were re-installed/swapped into wrong positions.”*
  - It was suggested cleaners should not be allowed to access the aircraft during maintenance tasks and *“...include a sign-off requiring visual confirmation of slide case-to-correct door orientation.”*

# Part Installation Issues

*Don't Judge a Book by Its Cover* (ACN 1538518)

- Maintenance Technicians reported installing the incorrect wheel assembly on a Boeing 737-900
- Event Details:
  - Tire #4 replacement called
  - Correct part number was order from stores
  - Incorrect tire was delivered with green wheel covers
  - Technicians reportedly never looked at the part number delivered
  - Reporter stated *“We need to be more diligent in verifying correct part numbers for tire and wheel assemblies are correct before installation. 737-800 and 900 carbon brake tires will have the same green covers on wheel assemblies.”*



# Part Installation Issues

## *Part Number Mystery* (ACN 1537568)

- B767 Maintenance Technician reported that an incorrect O-ring was installed on the engine oil Magnetic Chip Detector
- Event Details:
  - Task – Several open log items and #2 engine MCD callout on a through trip
  - Difficulty identifying the correct MCD O-rings- Parts Desk Assisted, parts replaced, flight departed... no problems
  - Next night different AMTs identified different part numbers
  - Engineering confirmed wrong part installed previous day, made callout for next station to replace
  - Parts same material but very slightly smaller



# Part Installation Issues

*“The Bag May Not Inflate, but....”* (ACN 1531763)

- Lead Technician reported that an incorrect O2 mask was installed on the portable oxygen bottle in a CRJ-900
- Event Details:
  - *“...flight crew wrote up that the wrong Oxygen (O2) mask was installed at the aft portable O2 bottle.”*
  - It was discovered that *“...the 4 LPM (Liters Per Minute) bag was tagged INOP and a solid tube was sticking out of the bag, indicating that a demo O2 mask was installed.”*
  - Mask installation requires an operational check and reportedly, the 4 LPM Mask must remain connected to the bottle





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<https://asrs.arc.nasa.gov/>

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