

MPS FSTD - IOS – System failures

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FSTD: B737 FTD

3.3 Outflow Valve Fail In Position

25AUG11

Failure Description	Outflow valve cannot be moved at all, regardless of AUTO or MANUAL mode selection, causing erratic cabin pressurization.
Failure Effects / Indications	<ul style="list-style-type: none">• Outflow Valve indicator shows needle in fixed position• Selecting the alternate or manual mode has no effect• Cabin pressure is a resultant of current outflow valve position, altitude, differential pressure and amount of air pressure entering the cabin through the packs
Failure Check	<ol style="list-style-type: none">1. Effect is visible when climbing or descending and changing thrust settings2. Activate failure; observe mentioned effects3. Deactivate failure; cabin pressure should return to normal

3.4 Auto Fail – ALTN available / ALTN not available @

25AUG11

Failure Description

ALTN available:

Primary pressurization controller failed but the secondary pressurization controller controls pressurization.

ALTN not available:

Both pressurization controllers have failed and only MANUAL mode is available for pressurization control. Pressurization may fluctuate.

Failure Effects / Indications

ALTN available:

- AUTO FAIL It illuminates, and:
 - MASTER CAUTION Its illuminate
 - RCP: AIR COND It illuminates
- Cabin pressurization is normal, controlled by secondary controller

ALTN not available:

- ALTN It illuminates
- AUTO FAIL It illuminates, and:
 - MASTER CAUTION Its illuminate
 - RCP: AIR COND It illuminates
- Cabin pressurization control is only available in MANUAL mode
- Outflow valve remains at the last controlled position
- Pressurization may fluctuate depending on altitude, pack supply and differential pressure

Failure Check

1. Aircraft may be positioned at any altitude
2. Activate failure; observe mentioned effects
3. Deactivate failure; indications return to normal

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3.5 Pack Trip Off – Resettable / Not Resettable @

25AUG11

Failure Description	Internal overheat causes related pack to trip off in closed position. Multiple options: Left and Right packs
Failure Effects / Indications	<ul style="list-style-type: none">• Pack valve closes• Pack supply air pressure is zero• Failure cannot be reset with TRIP RESET until failure is cleared• PACK It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: AIR COND It illuminates
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure for Left pack3. Verify zero pressure via the Duct Pressure indicator4. Press TRIP RESET; verify failure remains active5. Deactivate failure6. Press TRIP RESET; verify failure is cleared7. Verify normal pressure via the Duct Pressure indicator8. Repeat test for Right pack

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3.6 Bleed Trip Off – Resettable / Not Resettable @

25AUG11

Failure Description	Internal overheat causes related engine bleed valve to trip off in closed position. Multiple options: Left and Right engine bleed valves
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Failure Effects / Indications	<ul style="list-style-type: none">• Bleed valve closes• Bleed and related pack supply air pressure is zero• Failure cannot be reset with TRIP RESET until failure is cleared• BLEED TRIP OFF It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: AIR COND It illuminates
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure for Left bleed3. Verify zero pressure via the Duct Pressure indicator4. Press TRIP RESET; verify failure remains active5. Deactivate failure6. Press TRIP RESET; verify failure is cleared7. Verify normal pressure via the Duct Pressure indicator8. Repeat test for Right bleed
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3.7 Wing Body Overheat

25AUG11

Failure Description	Leak in pneumatic duct on the wing leading edge. Multiple options: Left and Right wing
Failure Effects / Indications	<ul style="list-style-type: none">• Duct pressure indicator shows 10 psi decrease in pressure on related side• WING BODY OVERHEAT It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: AIR COND It illuminates
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure for Left wing; observe mentioned effects3. Deactivate failure4. Verify normal pressure via the Duct Pressure indicator5. Repeat test for Right wing

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3.8 Engine Bleed Valve Failed Closed

25AUG11

Failure Description	Engine Bleed Valve fails in the closed position due to mechanical failure. Multiple options: Left and Right engine bleed
Failure Effects / Indications	<ul style="list-style-type: none">• Duct pressure in related duct is zero when isolation valve is closed and no APU bleed is active
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure for Left engine bleed; observe mentioned effects3. Deactivate failure; duct pressure should return to normal4. Activate failure for Right engine bleed; observe mentioned effects5. Deactivate failure; duct pressure should return to normal

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3.9 APU Bleed Valve Failed Closed

25AUG11

Failure Description	APU bleed valve fails in the closed position
Failure Effects / Indications	<ul style="list-style-type: none">• No duct pressure available from APU bleed
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground with APU running2. Switch both engine bleed switches OFF3. Switch APU bleed switch ON4. Activate failure; observe mentioned effects5. Deactivate failure; observe duct pressure increase

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3.10 Cabin Altitude False Warning

25AUG11

Failure Description	A fault in the Cabin Altitude Warning circuitry triggers a false Cabin Altitude Warning
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Failure Effects / Indications	<ul style="list-style-type: none">• CABIN ALTITUDE Its illuminate• Intermittent horn sounds• Pressurization indications are normal
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Deactivate failure; false warning is removed
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3.11 Isolation Valve Failed Closed

25AUG11

Failure Description	Bleed air isolation valve fails in closed position
Failure Effects / Indications	<ul style="list-style-type: none">• Left and right bleed ducts remain separated regardless of Isolation Valve switch• Engine crossbleed start is not possible• R Engine start is not possible on APU bleed
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Switch Isolation Valve switch CLOSED3. Switch Engine 2 bleed switch OFF; observe right duct pressure zero4. Activate failure5. Switch Isolation Valve switch OPEN; observe no increase in right duct pressure6. Deactivate failure; left and right duct pressures equalize

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3.12 Zone Temp Light – Single / Dual Channel Fail @

25AUG11

Failure Description	<p>Single Channel Fail: Single temperature controller channel failure. Affected zone is the Control Cabin.</p> <p>Dual Channel Fail: Double temperature controller channel failure. Affected zone is the Control Cabin.</p>
Failure Effects / Indications	<p>Single Channel Fail:</p> <ul style="list-style-type: none">• Cont Cab ZONE TEMP It illuminates only when Recall Panel is pressed, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: AIR COND It illuminates• ZONE TEMP It extinguishes when MASTER CAUTION is pressed• TRIP RESET will reset the circuit when failure is cleared <p>Dual Channel Fail:</p> <ul style="list-style-type: none">• Cont Cab ZONE TEMP It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: AIR COND It illuminates• TRIP RESET will reset the circuit when failure is cleared
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate Single Channel failure; observe mentioned effects3. Deactivate failure4. Activate Dual Channel failure; observe mentioned effects5. Press TRIP RESET; observe no change6. Deactivate failure7. Press TRIP RESET; observe extinguishing of ZONE TEMP It

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3.13 Equipment Cooling Fan Fail – Supply / Exhaust

25AUG11

Failure Description	Overheat condition detected in the related equipment cooling fan. Multiple options: Normal Supply Fan and Normal Exhaust Fan
Failure Effects / Indications	Supply Fan: <ul style="list-style-type: none">• Equipment Cooling SUPPLY OFF It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: OVERHEAD It illuminates• Equipment Cooling SUPPLY OFF It extinguishes after 10 sec delay when ALTERNATE fan is selected Exhaust Fan: <ul style="list-style-type: none">• Equipment Cooling EXHAUST OFF It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: OVERHEAD It illuminates• Equipment Cooling EXHAUST OFF It extinguishes after 10 sec delay when ALTERNATE fan is selected
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate Supply Fan failure; observe mentioned effects3. Switch Equipment Cooling SUPPLY switch to ALTERNATE; observe OFF It extinguishes after 10 sec4. Activate Exhaust Fan failure; observe mentioned effects5. Switch Equipment Cooling EXHAUST switch to ALTERNATE; observe OFF It extinguishes after 10 sec6. Deactivate both failures; Switch both fan selectors to NORMAL

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4 Anti-Ice

4.1 Engine Anti-Ice Valve Fail In Position @

25AUG11

Failure Description	Engine cowl anti-ice valve fails in position Multiple options: Left and Right engine
Failure Effects / Indications	<ul style="list-style-type: none">• Engine COWL VALVE OPEN Its illuminate bright when engine anti-ice valve position disagrees with the engine anti-ice switch setting• Duct pressure indicator remains stable when cowl anti-ice system is commanded to a different state• TAI indicator on Primary Engine Display turns amber after 8 sec when valve and switch positions disagree <p>If the valve is failed open and the thrust levers are advanced to more than 70% N1:</p> <ul style="list-style-type: none">• Engine COWL ANTI-ICE It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ANTI-ICE Its illuminate
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Switch Left engine ANTI-ICE switch ON3. Activate Left engine anti-ice failure; observe mentioned effects4. Switch Left engine ANTI-ICE switch OFF; observe mentioned effects5. Advance thrust levers to 75% N1; observe mentioned effects6. Deactivate failure; indications return to normal7. Repeat test for Right engine anti-ice

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4.2 Window Heat Overheat @

25AUG11

Failure Description	Overheat condition is detected on a cockpit window. Multiple options: Left side / Right side / Left FWD / Right FWD windows
Failure Effects / Indications	<ul style="list-style-type: none">• Related window heat OVERHEAT It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ANTI-ICE Its illuminate• Related window heat ON It extinguishes 70 sec after initial overheat
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Switch all window heat switches ON3. Activate failure for Left side window; observe mentioned effects4. Switch Left side window window heat switch OFF; observe OVERHEAT It extinguishes5. Deactivate failure; indications return to normal6. Repeat for other three windows

4.3 Pitot Probe Heat Fail – CAPT / F/O @

25AUG11

Failure Description	Pitot probe heater fails. Multiple options: Captain / First Officer Pitot heat
Failure Effects / Indications	<ul style="list-style-type: none"> • CAPT PITOT or F/O PITOT It illuminates, and: <ul style="list-style-type: none"> ○ MASTER CAUTION Its illuminate ○ RCP: ANTI-ICE Its illuminate • If captain’s and F/O’s airspeed differs by more than 5 KIAS for more than 5 seconds, IAS DISAGREE displays on both speed tapes • When climbing, malfunctioning airspeed indicator will increase • When descending, malfunctioning airspeed indicator will decrease
Failure Check	<ol style="list-style-type: none"> 1. Reposition aircraft to 10.000 FT with icing active 2. Activate Captain pitot heater failure; observe mentioned effects 3. Increase altitude; observe mentioned effects 4. Decrease altitude to below 10.000 FT; observe mentioned effects 5. Deactivate failure; indications return to normal 6. Repeat for First Officer pitot heat

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4.4 TAT Probe Heat Fail @

25AUG11

Failure Description	TAT probe heater fails.
Failure Effects / Indications	<ul style="list-style-type: none">• TEMP PROBE It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ANTI-ICE Its illuminate• TAT slowly drops to equal OAT by 1 degree per 15 seconds
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 10.000 FT with icing active2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

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4.5 Wing Anti-Ice Valve Fail In Position @

25AUG11

Failure Description	Wing leading edge anti-ice valve fails in position. Multiple options: Left / Right wing
Failure Effects / Indications	<ul style="list-style-type: none">• Wing anti-ice VALVE OPEN It illuminates bright when valve disagrees with wing anti-ice switch position• Duct pressure remains stable when wing anti-ice switch is changed
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Wing anti-ice switch OFF3. Activate Left wing failure4. Select Wing anti-ice switch ON; Left wing It illuminates bright, Right wing It illuminates bright then dim5. Deactivate failure; observe Left wing It dim6. Activate Right wing failure7. Select Wing anti-ice switch OFF; Right wing It illuminates bright, Left wing It illuminates bright then extinguishes8. Deactivate failure; Right wing It extinguishes

5 Autoflight

5.1 FCC Fail – A / B @

25AUG11

Failure Description	FCC failure results in autopilot and flight director failure. Multiple options: FCC A / FCC B
Failure Effects / Indications	<p>FCC A:</p> <ul style="list-style-type: none"> • A/P CMD A and CWS A disconnects (if engaged) • A/P CMD A and CWS A cannot be engaged • FD flag displays on CAPT PFD • FD bars on CAPT PFD disappear • Both A/P red disengagement lts flash (if A/P was engaged) • A/P disengage warning sounds (if A/P was engaged) • FCC Master switches to FCC B • FMA indications on both PFDs controlled by FCC B <p>FCC B:</p> <ul style="list-style-type: none"> • A/P CMD B and CWS B disconnects (if engaged) • A/P CMD B and CWS B cannot be engaged • FD flag displays on F/O PFD • FD bars on F/O PFD disappear • Both A/P red disengagement lts flash (if A/P was engaged) • A/P disengage warning sounds (if A/P was engaged) • FCC MAster switches to FCC A • FMA indications on both PFDs controlled by FCC A <p>Both selected:</p> <ul style="list-style-type: none"> • SEL SPD displays above CAPT & F/O airspeed indicator • Airspeed cursor removed • SPEED TRIM and MACH TRIM lts illuminate • Altitude Alert warning (aural and visual) is not available • FMA blanks on both PFDs • FCC MAster indication lights extinguish
Failure Check	<ol style="list-style-type: none"> 1. Reposition aircraft to 10.000 FT 2. Engage A/P A in CMD 3. Activate FCC A failure; observe mentioned effects 4. Select A/P A in CWS; A/P will not engage 5. Select A/P A in CMD; A/P will not engage 6. Activate FCC B failure; observe mentioned effects including effects when both failures active 7. Select A/P B in CWS; A/P will not engage 8. Select A/P B in CMD; A/P will not engage 9. Deactivate FCC B failure; observe effects for both failures active disappear 10. Select A/P B in CMD; A/P engages 11. Deactivate FCC A failure; 12. Select A/P A in CMD; A/P switches to A/P A

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5.2 Flight Director Fail – A / B @

25AUG11

Failure Description	Flight director fails due to FD switch failure Multiple options: FD A / FD B
Failure Effects / Indications	FD A: <ul style="list-style-type: none">• FD flag displays on CAPT PFD• FD bars disappear on CAPT PFD• A/P CMD A is still available• No response to CAPT FD switch selection• FD A cannot be engaged FD B: <ul style="list-style-type: none">• FD flag displays on F/O PFD• FD bars disappear on F/O PFD• A/P CMD B is still available• No response to F/O FD switch selection• FD B cannot be engaged
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate FD A failure3. Cycle FD A switch; observe mentioned effects4. Activate FD B failure5. Cycle FD B switch observe mentioned effects6. Deactivate failures; indications return to normal

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5.3 Autothrottle Computer Fail @

25AUG11

Failure Description	Autothrottle computer fails.
Failure Effects / Indications	<ul style="list-style-type: none">• A/T disengages (if engaged), A/T ARM switch solenoid moves to OFF• A/T cannot be engaged, A/T ARM solenoid will not latch to ARM• Red A/T It flashes on both sides• FMA A/T mode blanks on both PFDs
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

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5.4 TO/GA Switches Fail

25AUG11

Failure Description	Both thrust lever TO/GA switches are inoperative.
Failure Effects / Indications	<ul style="list-style-type: none">• Pressing either TO/GA switch has no effect• APFD takeoff and go-around modes cannot be activated
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure3. Press left TO/GA switch; observe no effect4. Press right TO/GA switch; observe no effect5. Deactivate failure6. Press either TO/GA switch; observe activation of takeoff modes

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5.5 Autopilot Disengage Switches Fail @

25AUG11

Failure Description	FCCs do not accept disengage signal from either control wheel disengage switches.
Failure Effects / Indications	<ul style="list-style-type: none">• Pressing either control wheel disengage switch has not effect; A/P remains engaged• A/P can be disengaged by:<ul style="list-style-type: none">○ Pushing down MCP disengage bar○ Applying electric stabilizer trim○ Switching Stabilizer Trim AUTOPILOT Cutout switch CUTOUT
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 10.000 FT2. A/P CMD A active3. Activate failure4. Press left and right control wheel A/P disengage switches; observe A/P remains engaged5. Push down on MCP disengage bar; observe A/P disengages6. Deactivate failure

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5.6 Flare Mode Fail

25AUG11

Failure Description	During a dual channel autoland, FLARE mode does not activate at 50 ft radio altitude. Failure is applicable to FCC A and B simultaneously.
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Failure Effects / Indications	<ul style="list-style-type: none">• FMA FLARE (armed) indication appears as normal• At 50 ft RA, FLARE does not activate on FMA• A/P flare maneuver is not executed and the aircraft will continue to the runway without a pitch adjustment• A/T RETARD mode activates normally at 27 ft RA
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ILS 6 NM2. Establish dual A/P ILS approach for autoland3. Activate failure; observe mentioned effects4. Deactivate failure; indications return to normal
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5.7 ALT ACQ + ALT HOLD Fail @

25AUG11

Failure Description	Internal FCC failure causes failure of altitude capture and climb or descent continues (as if MCP altitude is set at 50.000 ft for climb or 0 ft for descent). Effect only occurs in V/S or LVL CHG modes. Failure is inserted in both FCCs simultaneously.
Failure Effects / Indications	<ul style="list-style-type: none">• When approaching selected MCP altitude, no altitude capture occurs• FMA indications show no change• Manual ALT HOLD selection is available
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft 10.000 ft2. Set MCP altitude 11.000 ft and select LVL CHG3. Activate failure; observe aircraft climbs through 11.000 ft4. Select ALT HOLD; observe aircraft levels off at altitude when ALT HOLD was selected5. Select V/S descent (1000 fpm); observe aircraft descends through 11.000 ft6. Set MCP altitude 10.000 ft7. Deactivate failure; observe aircraft levels off at 10.000 ft

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5.8 LOC Capture Fail

25AUG11

Failure Description	Internal FCC failure causes failure to intercept the selected localizer and APFD continues on selected heading or LNAV track. Failure is inserted in both FCCs simultaneously.
Failure Effects / Indications	<ul style="list-style-type: none">• VOR/LOC does not activate on a LOC approach with VOR/LOC or APP selected• Aircraft continues on selected heading or LNAV track (whichever is active)
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ILS intercept heading2. Use HDG SEL for intercept and select APP mode3. Activate failure; observe aircraft flies through localizer4. Deactivate failure; indications return to normal

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5.9 G/S Capture Fail

25AUG11

Failure Description	Internal FCC failure causes failure to intercept the selected glideslope. Failure is inserted in both FCCs simultaneously.
Failure Effects / Indications	<ul style="list-style-type: none">• When on an approach with localizer captured and G/S armed, G/S does not capture (remains armed)• Aircraft continues on last altitude or vertical path
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ILS 9 NM2. Select CMD A and ALT HOLD3. Select APP mode and confirm VOR/LOC is captured4. Activate failure; observe G/S does not capture and ALT HOLD remains active5. Deactivate failure; indications return to normal

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6 Communications

6.1 VHF Comm Transceiver Fail @

25AUG11

Failure Description	VHF transmitter / receiver fails. Multiple options: VHF 1 / VHF 2
Failure Effects / Indications	<ul style="list-style-type: none">• No transmission or reception possible on VHF COMM• Selected VHF channel shows “INOP” on both displays when selected on tuning panel
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

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7 Electrical

7.1 Engine Generator Drive Low Oil Pressure @

25AUG11

Failure Description	Engine driven generator drive provides warning due to low oil pressure but remains operative for 5 minutes. Multiple options: Left engine / Right engine
Failure Effects / Indications	<ul style="list-style-type: none">• Respective DRIVE It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ELEC It illuminates• If after 5 minutes the respective GEN DRIVE DISCONNECT switch has not been actuated, the Generator Drive fails (see applicable failure)
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate both failures; observe mentioned effects3. Deactivate failures; indications return to normal

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7.2 Engine Generator Drive Fail @

25AUG11

Failure Description Engine driven generator drive shuts down due to a sheared shaft.
Multiple options: Left engine / Right engine

Failure Effects / Indications

- Respective DRIVE It illuminates, and:
 - MASTER CAUTION Its illuminate
 - RCP: ELEC It illuminates
- Respective GEN OFF BUS It illuminates
- Respective SOURCE OFF It illuminates
- Respective AC indications blank FREQ, 0 AMPS and 0 VOLTS
- Generator cannot be put online while failure is active

Failure Check

1. Reposition aircraft on ground
2. Activate Left engine failure; observe mentioned effects
3. Deactivate failure; indications return to normal only
4. Repeat for Right engine generator

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7.3 Engine Generator Disconnect @

25AUG11

Failure Description Engine driven generator trips off due to a voltage out of limits. Instructor can influence resettability by clearing or maintaining the failure.

Multiple options: Left engine / Right engine

Failure Effects / Indications

- Respective DRIVE It illuminates, and:
 - MASTER CAUTION Its illuminate
 - RCP: ELEC It illuminates
- Respective GEN OFF BUS It illuminates
- Respective SOURCE OFF It illuminates
- Respective AC indications normal
- Generator cannot be put online while failure is active

Failure Check

1. Reposition aircraft to above FL330
2. Activate failure; observe mentioned effects
3. Deactivate failure; indications return to normal

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7.4 Loss Of Both Engine Generators @

17SEP12

Failure Description

The Generator Control Breaker trips for each Engine Driven Generator, caused by a temporary voltage spike.

Failure Effects / Indications

- Both TRANSFER BUS OFF Its illuminate, and:
 - MASTER CAUTION Its illuminate
 - RCP: ELEC It illuminates
- Both SOURCE OFF Its illuminate
- Both GEN OFF BUS Its illuminate
- AC indications are blank FREQ, 0 VOLTS, 0 AMPS
- Only items powered by Standby Power are available
- Generators are resettable

- List of inoperative items (non-exhaustive)
 - Both A/Ps (will disconnect if connected)
 - Both transponders
 - GPWS including altitude callouts (GPWS INOP It illuminates)
 - Wing anti-ice (Its will not illuminate if selected)
 - Electric stabilizer trim
 - Flap indicator (stuck at current pos)
 - Electric hydraulic pumps (Its illuminate)
 - All fuel pumps (Its illuminate)
 - Both packs (PACK Its not illuminated)
 - All probe heats (but only L ELEV PITOT, L ALPHA VANE and TEMP PROBE Its illuminate)
 - All window heat (but only L SIDE and R FWD OVERHEAT Its illuminate)
 - Both radio altimeters (RA flag on operative PFD)
 - Yaw damper (YAW DAMPER It does not illuminated)
 - Bleed air duct pressure indication (shows zero)
 - Aileron trim
 - Rudder trim
 - Auto speedbrake
 - Auto pressurization (AUTO FAIL It on, ALTN It off, MAN still possible)
 - DUs: F/O PFD+ND, Lower DU
 - R CDU
 - R VHF NAV
 - R VHF COMM
 - Both IRS ON DC Its illuminate
 - After 5 minutes ON DC, the R IRS switches off
 - Anti-skid (ANTI SKID INOP It illuminates)
 - All ZONE TEMP (but only CONT CAB ZONE TEMP It illuminates)
 - Cargo Fire Detection (DETECTOR FAULT It illuminates)

Note: for some inoperative systems, the annunciator which normally displays the system inoperativeness is also not powered.

Failure Check

1. Reposition aircraft on ground
2. Activate failure; observe mentioned effects
3. Deactivate failure; indications return to normal

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7.5 APU Generator Disconnect @

25AUG11

Failure Description	APU generator trips off due to a voltage out of limits. Instructor can influence resettability by clearing or maintaining the failure.
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Failure Effects / Indications	(1) If APU Generator is NOT the only active AC source: <ul style="list-style-type: none">• APU GEN OFF BUS It illuminates (2) If APU Generator is the only active AC source: <ul style="list-style-type: none">• APU GEN OFF BUS It illuminates• Both TRANSFER BUS OFF Its illuminate• Both SOURCE OFF Its illuminate, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ELEC It illuminates• All AC Transfer Bus powered items are unpowered
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground with Ground Power ON2. Activate failure; observe above indications (1)3. APU GEN switches ON; observe no reaction4. Deactivate failure5. APU GEN switches ON; observe APU GEN OFF BUS It extinguishes6. Activate failure; observe above indications (2)7. Deactivate failure; indications return to normal
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MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

7.6 AC Transfer Bus Fail

17SEP12

Failure Description	Short circuit in an AC Transfer Bus causes loss of the transfer bus for the duration of the failure. Multiple options: AC Transfer Bus 1 / AC Transfer Bus 2
Failure Effects / Indications	<ul style="list-style-type: none">• Respective TRANSFER BUS OFF It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ELEC It illuminates <p>List of inoperative items (non-exhaustive):</p> <ul style="list-style-type: none">• AC Transfer Bus 1:<ul style="list-style-type: none">○ Both A/P and A/T○ GPWS including altitude callouts (INOP It illuminates)○ Hydraulic SYS B electric pump (It illuminates)○ Fuel pumps tank 1 FWD, tank 2 AFT, center L (Its illuminate)○ L Pack (no It)○ Isolation valve stuck○ Wing anti-ice (Its do not come on when selected)○ Probe heats: elev pitot L, temp probe, alpha vane L (Its illuminate)○ Window heat: L SIDE / R FWD inop (ON Its not illuminated, OVERHEAT Its illuminated)○ TCAS○ Radio altimeter 1 (RA flag on left PFD)○ Yaw damper (solenoid off, OFF It illuminates)○ TR UNIT and ELEC Its illuminate○ Flight recorder OFF It illuminates○ ZONE TEMP It for AFT CABIN illuminates• AC Transfer Bus 2:<ul style="list-style-type: none">○ Hydraulic SYS A electric pump (It illuminates)○ Electric stabilizer trim○ Trailing edge flap indicator (stuck at current pos)○ R Pack (no It)○ Bleed air duct pressure indication (shows zero)○ Aileron and rudder trim○ Probe heats: F/O pitot, aux pitot, elev pitot R, alpha vane R (Its illum)○ Nose wheel steering○ CDU 2○ VHF NAV 2 + VHF COMM 2○ Radio altimeter 2 (RA flag on right PFD)○ Equip Cooling Supply OFF It illuminates when switch in NORM○ TR UNIT and ELEC Its illuminate○ Window heat: L FWD / R SIDE inop (ON Its not illuminated, OVERHEAT Its illuminated)○ ZONE TEMP Its for CONT CAB and FWD CABIN illuminate
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

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FSTD: B737 FTD

7.7 AC Main Bus Fail

25AUG11

Failure Description	AC Main bus is off due to overcurrent. Multiple options: Main Bus 1 / Main Bus 2
Failure Effects / Indications	Main Bus 1 Fail: <ul style="list-style-type: none">• L Recirculation fan inoperative Main Bus 2 Fail: <ul style="list-style-type: none">• R Recirculation fan inoperative
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure for each Main Bus; observe mentioned effects3. Deactivate failure for each Main Bus; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

7.8 Standby Power Auto Transfer Fail

25AUG11

Failure Description	Internal failure in Standby Power Control Unit.
Failure Effects / Indications	<ul style="list-style-type: none">• Standby Power is not available when AC power is lost• STANDBY PWR OFF It illuminates when AC power is lost, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ELEC It illuminates• STANDBY PWR OFF It extinguishes when STANDBY PWR switch is placed to BAT
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. STANDBY PWR switch AUTO3. Activate failure4. Disconnect all AC Generators; observe loss of AC and standby power items5. Set STANDBY PWR switch BAT; observe activation of standby power items6. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

7.9 Battery Discharged

25AUG11

Failure Description	Both MAIN and AUX batteries are completely discharged.
Failure Effects / Indications	<ul style="list-style-type: none">• Both battery indications on the electric metering panel DC Volts indicate zero. When all aircraft is powered by batteries only:• All battery buses are unpowered• All lights are extinguished• APU will not start• Battery is charged when failure is cleared
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, dark cockpit2. Activate failure3. Select BAT switch ON; observe no battery power available4. Select APU switch START; observe no APU start5. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

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FSTD: B737 FTD

7.10 T/R Unit Fail

25AUG11

Failure Description	TR unit internal failure. Multiple options: TR1 / TR2 / TR3
Failure Effects / Indications	<ul style="list-style-type: none">• TR UNIT It illuminates for any single TR unit failure on the ground or for a TR1 unit or dual TR2/TR3 failure in the air, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ELEC It illuminates• Selected TR DC AMPS indicate zero, TR DC VOLTS indicates normal power voltage except for TR3 malfunction (which indicates zero)
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure for each TR; observe mentioned effects3. Deactivate failure for each TR; indications return to normal4. Reposition aircraft at 10.000 ft5. Activate failure for each TR; observe that TR UNIT It only illuminates when both TR2 and TR3 are failed6. Deactivate failure for each TR; indications return to normal

MPS FSTD - IOS – System failures

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FSTD: B737 FTD

7.11 Battery Bus Off

25AUG11

Failure Description	A short circuit in the Battery Bus causes the bus to become disconnected from the Standby Power Control Unit.
Failure Effects / Indications	<ul style="list-style-type: none">• STANDBY POWER OFF It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ELEC It illuminates• BAT BUS DC VOLTS indicates zero• Battery bus powered components are unpowered
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

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FSTD: B737 FTD

8 Engines & APU

8.1 Engine Flameout – No Auto-Relight @

25AUG11

Failure Description	Engine flames out due to HMU failure causing fuel supply to the engine to be interrupted. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• Engine flames out• Engine spools down normally• ENG FAIL message appears on EGT dial when N2 < 50%• Auto-relight system is unsuccessful in restarting the engine• Engine cannot be restarted while failure is active
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 10.000 ft2. Activate failure on ENG 1; observe mentioned effects3. Attempt restart; observe inability to restart the engine4. Deactivate failure and perform engine quickstart; indications return to normal

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8.2 Engine Flameout – Auto-Relight

25AUG11

Failure Description	Engine flames out due to temporary HMU fault, causing interruption in fuel flow. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• Engine flames out• Engine spools down normally• Auto-relight system energizes igniters at 65% N2• Engine will relight unless N2 drops below 50% or igniters were active for 30 sec without relight• ENG FAIL message appears on EGT dial if N2 < 50%• Engine can be restarted while failure is active
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 10.000 ft2. Activate failure on ENG 1; observe mentioned effects3. Deactivate failure and perform engine quickstart; indications return to normal4. Activate failure on ENG 2; observe mentioned effects5. Deactivate failure and perform engine quickstart; indications return to normal

MPS FSTD - IOS – System failures

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FSTD: B737 FTD

8.3 Engine Seizure @

25AUG11

Failure Description	Engine N1 rotor seizes, causing engine flameout. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• Loud bang is heard• Engine N1 instantly drops to 0• Engine thrust instantly decreases to zero• Engine vibration increases to 4.9 units abruptly and one second later decreases to 0• ENG FAIL appears on EGT indicator• Engine N2 spools down, other parameters follow• If on ground, ENG CONTROL It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ENG It illuminates
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 10.000 ft2. Activate failure on ENG 1; observe mentioned effects3. Deactivate failure and perform engine quickstart; indications return to normal4. Activate failure on ENG 2; observe mentioned effects5. Deactivate failure and perform engine quickstart; indications return to normal

MPS FSTD - IOS – System failures

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FSTD: B737 FTD

8.4 Engine Separation @

25AUG11

Failure Description	Engine separates from the wing. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• Loud bang is heard• N1, N2 and VIB show 0.0 indication• All other engine indications are completely removed• ENG FAIL appears on EGT indicator• No thrust, weight, drag factors from separated engine
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 10.000 ft2. Activate failure on ENG 1; observe mentioned effects3. Deactivate failure and perform engine quickstart; indications return to normal4. Activate failure on ENG 2; observe mentioned effects5. Deactivate failure and perform engine quickstart; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

8.5 Engine Surge / Stall – Recoverable / Not Recoverable @

25AUG11

Failure Description	Engine stalls/surges. Multiple options: ENG 1 / ENG 2 Multiple options: Recoverable / Not Recoverable
Failure Effects / Indications	Recoverable: <ul style="list-style-type: none">• As long as thrust levers are set to command > 70% N1, stall indications continue• Bangs are heard whenever engine N1 drops by 35% instantly and then returns to original setting with 1-3 sec random intervals; other engine indications and thrust follow correspondingly• EGT increases by 30 degrees for each surge and will cause EGT Over Limits when no appropriate action is taken by the pilots Not Recoverable: <ul style="list-style-type: none">• Bangs are heard whenever engine N1 drops by 35% instantly and then returns to original setting with 1-3 sec random intervals; other engine indications and thrust follow correspondingly• EGT increases by 30 degrees for each surge and will cause EGT Over Limits when no appropriate action is taken by the pilots• Thrust lever response is nil
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 10.000 ft2. Activate failure on ENG 1 - Recoverable; observe mentioned effects whenever thrust lever position commands > 70% N1, engine performance is normal below 70% N1 with EGT slowly stabilizing3. Deactivate failure; indications return to normal4. Activate failure on ENG 1 – Not recoverable; observe mentioned effects regardless of thrust lever position5. Deactivate failure; indications return to normal6. Perform items 2 through 5 on ENG 2.

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MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

8.6 Engine Turbine Blade Separation

25AUG11

Failure Description	A fan blade attached to the low pressure turbine separates at the root and is ingested by the engine. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• Loud bang is heard• EGT rises rapidly by 220 degrees• At 100% N1, 4.5 units vibration is indicated, at 40% N1, 2.5 units vibration is indicated with a linear slope in between• N1 efficiency decreases so that at the same N2, N1 is now 9% lower and produces equivalent less thrust
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 10.000 ft2. Activate failure on ENG 1; observe mentioned effects3. Deactivate failure and perform engine quickstart; indications return to normal4. Activate failure on ENG 2; observe mentioned effects Deactivate failure and perform engine quickstart; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

8.7 Engine Hot Start @

25AUG11

Failure Description	EGT exceeds limits during engine start due to an error in the FADEC causing fuel flow to be too high. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• Engine starts normally but EGT increases too rapidly and a HOT start is detected• EGT digital readout flashes when HOT start is detected until ENG START LEVER is placed to CUTOFF• If EGT reaches 725°C and start is not manually aborted, EEC shuts down the engine (on ground only)• Fuel flow indicates zero because the EEC closed the HMU Fuel Metering Valve, however, the SPAR en ENG VALVE valves are still open and the corresponding annunciators are still extinguished• If EGT exceedance has occurred, EGT box is displayed red• If on ground: ENG CONTROL It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ENG It illuminates
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines OFF, APU ON2. Activate failure on ENG 13. Perform normal engine start procedure4. ENG START LEVER to CUTOFF before EGT exceeds start limit5. ENG START SWITCH to OFF6. Activate failure on ENG 27. Perform normal engine start procedure8. Observe EGT exceed start limit and EEC shutting off fuel supply9. Observe other mentioned effects10. ENG START LEVER to CUTOFF11. ENG START SWITCH to OFF12. Deactivate both failures

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

8.8 Engine Hung Start @

25AUG11

Failure Description	Engine is unable to achieve minimum N2 RPM due to a lower than normal fuel flow commanded by the EEC. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• After EGT rise, engine accelerates slower than normal• Engine does not reach more than approximately 50% N2 and remains at that value
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines OFF, APU ON2. Activate failure on ENG 13. Perform normal engine start procedure4. Observe mentioned effects5. ENG START LEVER to CUTOFF6. ENG START SWITCH to OFF7. Deactivate failure8. Perform steps 2 to 7 for ENG 2

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8.9 Engine Wet Start @

25AUG11

Failure Description	Due to failure of the selected igniter(s), light-up cannot be achieved. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• After selecting ENG START LEVER to IDLE, no EGT rise is observed• N2 stabilizes at max motoring speed (around 30%)• Fuel flow is normal• If ENG START LEVER is not placed in CUTOFF within 15 sec of moving it to IDLE (20 sec when OAT < 2°C), the EEC will shut down fuel supply by closing the HMU Fuel Metering Valve; the SPAR and ENG VALVE valves are not closed
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines OFF, APU ON2. Activate failure on ENG 13. Perform normal engine start procedure4. Observe mentioned effects5. ENG START LEVER to CUTOFF after 30 sec6. ENG START SWITCH to OFF7. Deactivate failure8. Perform steps 2 to 7 for ENG 2

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8.10 Engine Start Valve Fail In Position @

25AUG11

Failure Description

Engine start valve fails in current position.

Multiple options: ENG 1 / ENG 2

Failure Effects / Indications

Failed while closed:

- START VALVE OPEN does not display on Upper DU
- No change in N1 / N2

Failed while open (during engine start):

- Engine starts successfully
- ENG START SWITCH releases back to OFF at starter cutout speed (56% N2)
- START VALVE OPEN flashes for 10 sec and then remains displayed steady on Upper DU when starter cutout speed has been reached (START VALVE OPEN flashes for 10 sec and then steady whenever the start valve is not closed and the ENG START SWITCH is not in GRD)
- OIL FILTER BYPASS and LOW OIL PRESSURE boxes also blink for 10 sec but without text label (filled box only) then extinguish
- NOTE: Blinking is inhibited:
 - during takeoff between 80 kts to 400 ft RA, or 30 sec after reaching 80 kts, whichever occurs first
 - during landing below 200 ft RA until 30 sec after touchdown
 - when blinking is inhibited, alerts illuminate steady

Failure Check

1. Reposition aircraft on ground, engines OFF, APU ON
2. Activate failure on ENG 1
3. ENG START SWITCH (1) to GRD
4. Observe mentioned effects
5. ENG START SWITCH to OFF
6. Deactivate failure
7. ENG START SWITCH (1) to GRD
8. Observe mentioned effects
9. Deactivate failure
10. Perform steps 2 to 9 for ENG 2

8.11 Volcanic Ash @

25AUG11

Failure Description

Aircraft enters a volcanic ash cloud

Failure Effects / Indications

- Aircraft enters a continuous volcanic ash cloud when failure is activated
- If not already pre-programmed, visibility deteriorates to 90 m
- After 90 sec, for both engines:
 - N1, N2 and thrust decline: ENG 1: 1% N1/sec, ENG 2: 0.8% N1/sec
 - EGT increases: ENG 1: 15°/sec, ENG 2: 13°/sec
 - Thrust lever response is zero (no reaction)
 - Engines flame out when EGT limit is reached (950°C)
- F/O pitot tube becomes clogged (regardless of probe heat status) 30 sec after entering ash cloud and now acts as an altimeter; KIAS indication increases by 2 kts for every 100 ft climb and vice versa
- Whenever an engine is flamed out or shut down manually, EGT decreases

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slowly by 10°/sec to outside air temperature

- ENG 1 restarts result in a hung start above 20.000 ft
 - ENG 2 restarts result in a hung start above 14.000 ft
-

Failure Check

1. Reposition aircraft to above FL330
2. Activate failure; observe mentioned effects
3. Deactivate failure
4. Select full aircraft reset

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8.12 EEC ALTN Mode

25AUG11

Failure Description	Engine EEC reverts to soft ALTN mode due to an invalid input signal. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• After 15 sec: respective engine EEC ALTN It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ENG It illuminates• Engine will revert to hard ALTN mode when respective thrust lever is pulled back to less than 19 degrees thrust lever angle above idle• Commanded N1/N2 vary because commanded N1 is now based on a Mach number based on:<ul style="list-style-type: none">○ SOFT ALTN: standard temperature and the ISA deviation at the time of failure○ HARD ALTN: fixed outside air temperature which produces the highest thrust limit○ If ISA deviation changes, engine exceedances may occur
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to above FL3302. Activate failure for ENG 1; observe mentioned effects3. Deactivate failure; indications return to normal4. Perform steps 2 and 3 for ENG 2

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8.13 FADEC Fault

25AUG11

Failure Description	Both EEC channels fail for respective engine. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• Fuel flow, oil press, oil temp and EGT indications blank• Engine flames out• Thrust lever control is zero (no reaction)• ENG FAIL appears on EGT indicator• ENG FAIL disappears when N2 < 50%
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines OFF, APU ON2. Activate failure on ENG 13. Observe mentioned effects4. Deactivate failure; perform quickstart on ENG 1; indications normal5. Perform steps 2 to 4 for ENG 2

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8.14 Reverser Unlocked

25AUG11

Failure Description	Due to mechanical failure, respective thrust reverser sleeve unlocks and opens slightly. Auto-restow function cannot completely close reverser sleeve due to mechanical failure.
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Multiple options: ENG 1 / ENG 2

Failure Effects / Indications	<ul style="list-style-type: none">• EEC commands idle thrust• Rumble/vibration occurs• Amber REV indication above N1 indicator• REVERSER It illuminates on aft overhead panel, and after 13 sec:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ENG It illuminates
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to above FL3302. Activate failure on ENG 13. Observe mentioned effects4. Deactivate failure; indications normal5. Perform steps 2 to 4 for ENG 2
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FSTD: B737 FTD

8.15 Reverser Light Illuminated

25AUG11

Failure Description	Failure in thrust reverser sleeve lock sensor, permanently detecting an unlock state.
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Multiple options: ENG 1 / ENG 2

Failure Effects / Indications

- Thrust reverser operates normally
- REVERSER It illuminates on aft overhead panel, and after 13 sec:
 - MASTER CAUTION Its illuminate
 - RCP: ENG It illuminates

Failure Check

1. Reposition aircraft on ground, engines OFF, APU ON
2. Activate failure on ENG 1
3. Observe mentioned effects
4. Deactivate failure; indications normal
5. Perform steps 2 to 4 for ENG 2

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8.16 High Engine Vibration @

25AUG11

Failure Description	Engine vibration increases to more than 4.0 units at higher N1 settings Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• After activation, engine vibration increases by 0.1 units per sec to 4.4 units at 85% N1 (+0.2 units for every 10% N1 higher and vice versa)• Lower DU engine page pops up when VIB reaches 4.0 units (if not already displayed)• Rumble/vibration is present
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to above FL3302. Activate failure for ENG 1; observe mentioned effects3. Deactivate failure; indications return to normal4. Perform steps 2 and 3 for ENG 2

MPS FSTD - IOS – System failures

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8.17 Engine Oil Filter Bypass

25AUG11

Failure Description	Due to contamination in the engine oil system, the oil filter becomes clogged, causing the filter to be bypassed. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• OIL FILTER BYPASS flashes for 10 sec and then remains displayed steady on Upper DU• START VALVE OPEN and LOW OIL PRESSURE boxes also blink for 10 sec but without text label (filled box only) then extinguish• NOTE: Blinking is inhibited:<ul style="list-style-type: none">○ during takeoff between 80 kts to 400 ft RA, or 30 sec after reaching 80 kts, whichever occurs first○ during landing below 200 ft RA until 30 sec after touchdown○ when blinking is inhibited, alerts illuminate steady
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines ON2. Activate failure for ENG 1; observe mentioned effects3. Deactivate failure; indications return to normal4. Perform steps 2 and 3 for ENG 2

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

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8.18 Engine Oil Low Pressure @

25AUG11

Failure Description

Failure of the engine oil supply pump.
Multiple options: ENG 1 / ENG 2

Failure Effects / Indications

- Engine oil pressure drops to 6 psi in 60 secs after failure is activated
- Lower DU engine page pops up (if not already displayed) as oil pressure indication reaches amber range (< 13 psi)
- Engine oil temperature rises slowly to reach 160 deg C in 2 minutes after failure is activated, at which time the box and digit indication becomes red (box and digit become amber above 140 deg C)
- LOW OIL PRESSURE flashes for 10 sec when oil pressure reaches 13 psi and then remains displayed steady on Upper DU
- START VALVE OPEN and OIL FILTER BYPASS boxes also blink for 10 sec but without text label (filled box only) then extinguish
- NOTE: Blinking is inhibited:
 - during takeoff between 80 kts to 400 ft RA, or 30 sec after reaching 80 kts, whichever occurs first
 - during landing below 200 ft RA until 30 sec after touchdown
 - when blinking is inhibited, alerts illuminate steady
- 3 minutes after failure is activated, if engine is not manually shut down, engine seizure failure activates for respective engine

Failure Check

1. Reposition aircraft on ground, engines ON
2. Activate failure for ENG 1; observe mentioned effects
3. Deactivate failure; indications return to normal
4. Perform steps 2 and 3 for ENG 2

MPS FSTD - IOS – System failures

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FSTD: B737 FTD

8.19 Engine Oil Leak

25AUG11

Failure Description	Engine oil leak inside engine nacelle. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• Engine OIL QTY decreases to zero in 60 sec after failure activation• Engine seizure failure activates 60 sec after OIL QTY reaches zero (if engine was not already shut down)• Engine oil pressure drops to zero in 10 sec, starting at 50 sec after failure activation• Lower DU engine page pops up (if not already displayed) as oil pressure indication reaches amber range (< 13 psi)• Engine oil temperature rises slowly to reach 120 deg C in 1 minute after failure is activated• LOW OIL PRESSURE flashes for 10 sec when oil pressure reaches 13 psi and then remains displayed steady on Upper DU• START VALVE OPEN and OIL FILTER BYPASS boxes also blink for 10 sec but without text label (filled box only) then extinguish• NOTE: Blinking is inhibited:<ul style="list-style-type: none">○ during takeoff between 80 kts to 400 ft RA, or 30 sec after reaching 80 kts, whichever occurs first○ during landing below 200 ft RA until 30 sec after touchdown○ when blinking is inhibited, alerts illuminate steady
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines ON2. Activate failure for ENG 1; observe mentioned effects3. Deactivate failure; indications return to normal4. Perform steps 2 and 3 for ENG 2

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8.20 Engine Oil High Temp

25AUG11

Failure Description	Failure of the fuel/oil heat exchanger causes rise in oil temperature. Multiple options: ENG 1 / ENG 2
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Failure Effects / Indications	<ul style="list-style-type: none">• Engine oil temperature rises to 160°C in 120 sec• OIL TEMP indicator turns red as 140°C is reached
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines ON2. Activate failure for ENG 1; observe mentioned effects3. Deactivate failure; indications return to normal4. Perform steps 2 and 3 for ENG 2
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8.21 Engine Control Light Illuminated

25AUG11

Failure Description	A fault in the EEC causes a non-dispatchable situation on the ground. Multiple options: ENG 1 / ENG 2 Note: Effects are only visible on ground
Failure Effects / Indications	<ul style="list-style-type: none">• ENGINE CONTROL It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ENG It illuminates• Failure can be activated at any time but will only provide annunciation when:<ul style="list-style-type: none">○ respective engine is running○ airplane on the ground < 80 kts on takeoff or 30 sec after touchdown
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines ON2. Activate failure for ENG 1; observe mentioned effects3. Deactivate failure; indications return to normal4. Perform steps 2 and 3 for ENG 2

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FSTD: B737 FTD

8.22 Engine EGT Over Limits @

25AUG11

Failure Description	Engine EGT increases to above 950°C limit. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• EGT increases to 1052 deg C in 30 sec after failure activation• EGT readout box and digits, dial, pointer and shading turn red if EGT redline is exceeded by 10°C or 3°C for more than 20 sec• After engine shutdown on ground (N2 < 12%), the EGT readout box remains red boxed until failure is deactivated
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines OFF, elec on GRD PWR2. Activate failure for ENG 1 and ENG 2; observe mentioned effects3. Shut down both engines; observe mentioned effects4. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

8.23 APU INOP @

25AUG11

Failure Description	APU start function has been disabled but has no effect on running APU.
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Failure Effects / Indications	<ul style="list-style-type: none">• APU start cannot be accomplished
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines ON2. Activate failure3. APU START sw to START4. Observe mentioned effects5. Deactivate failure6. APU START sw to START7. APU starts normally
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MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

8.24 APU Fault

25AUG11

Failure Description	APU FAULT occurs due to fault in ECU.
Failure Effects / Indications	<ul style="list-style-type: none">• APU FAULT It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: APU It illuminates• APU shuts down• 5 minutes after APU sw is set to OFF, FAULT It extinguishes
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, APU ON, elec on GRD PWR2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

8.25 APU Overspeed

25AUG11

Failure Description	APU overspeed occurs due to failure in the fuel control torque motor.
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Failure Effects / Indications**APU not started – when starting APU:**

- APU EGT rise and timing normal for APU start
- APU OVERSPEED It illuminates as EGT reaches peak, and:
 - MASTER CAUTION Its illuminate
 - RCP: APU It illuminates
- APU shuts down
- 5 minutes after APU sw is set to OFF, OVERSPEED It extinguishes

APU already started:

- APU FAULT It illuminates, and:
 - MASTER CAUTION Its illuminate
 - RCP: APU It illuminates
- APU shuts down
- 5 minutes after APU sw is set to OFF, FAULT It extinguishes

Failure Check

1. Reposition aircraft on ground, elec on GRD PWR, APU OFF
2. Activate failure
3. Start APU; observe mentioned effects
4. Deactivate failure
5. Start APU; APU starts normally (or perform APU quickstart)
6. Activate failure; observe mentioned effects
7. Deactivate failure

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

8.26 APU Low Oil Pressure

17SEP12

Failure Description	APU oil pressure drops due to failure in oil pressure pump.
Failure Effects / Indications	<ul style="list-style-type: none">• APU LOW OIL PRESSURE It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: APU It illuminates• APU shuts down after 20 seconds and APU FAULT It illuminates• 5 minutes after APU sw is set to OFF, LOW OIL PRESSURE It extinguishes
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, APU ON, elec on GRD PWR2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

8.27 APU Switch – OFF INOP

25AUG11

Failure Description	APU switch OFF position malfunctions.
Failure Effects / Indications	<ul style="list-style-type: none">• Switching APU sw OFF does not shut down APU• APU must be switched off by pulling the APU Fire Switch or selecting BAT sw OFF
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, APU ON, elec on GRD PWR4. Activate failure5. Set APU sw OFF; APU does not shut down6. APU Fire Switch OVERRIDE and PULL; APU shuts down7. APU Fire Switch PUSH8. Quickstart APU9. BAT sw OFF; APU shuts down10. Deactivate failure

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

8.28 APU Low Bleed Air Pressure

25AUG11

Failure Description	APU supplies only low pressure bleed air due to defective Inlet Guide Vane.
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Failure Effects / Indications	<ul style="list-style-type: none">• APU bleed air pressure is only 20 psi (packs OFF)• APU bleed air pressure is insufficient to start engines
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, APU ON, elec on GRD PWR2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal
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9 Fire Protection

9.1 Engine Fire – 1 Bottle / 2 Bottles / Unextinguishable @

25AUG11

Failure Description	Fire is detected in an engine nacelle. Multiple options: ENG 1 / ENG 2 Multiple options: 1 Bottle / 2 Bottles / Unextinguishable
Failure Effects / Indications	<ul style="list-style-type: none"> • ENG FIRE SWITCH illuminates and unlocks for pulling • ENG OVERHEAT It illuminates, and: <ul style="list-style-type: none"> ○ MASTER CAUTION Its illuminate ○ RCP: OVHT/DET It illuminates ○ MASTER FIRE WARN Its illuminate • Fire bell sounds, silenced when: <ul style="list-style-type: none"> ○ FIRE WARN sw pushed ○ BELL CUTOOUT sw pushed ○ Fire is no longer present • When the ENG FIRE SWITCH is pulled: <ul style="list-style-type: none"> ○ Engine shuts down ○ DRIVE, GEN OFF BUS, SOURCE OFF Its illuminate ○ MASTER CAUTION, RCP: ELEC It illuminates ○ ENG VALVE CLOSED, SPAR VALVE CLOSED Its illuminate ○ Hyd ENG pump LOW PRESSURE light is disabled ○ Bleed pressure output is zero • When the ENG FIRE SWITCH is rotated to discharge an extinguisher: <ul style="list-style-type: none"> ○ L or R BOTTLE DISCHARGE It illuminates after 5 sec • Fire and overheat indications are removed: <ul style="list-style-type: none"> ○ 1 Bottle option: 15 sec after first bottle is discharged ○ 2 Bottles option: 15 sec after second bottle is discharged ○ Unextinguishable: Never (until failure is deactivated) • Respective green squib light does not illuminate anymore when subsequent squib test is performed
Failure Check	<ol style="list-style-type: none"> 1. Reposition aircraft on ground, engines ON, elec on APU, APU ON 2. Activate failure for ENG 1, 2 Bottles; observe mentioned effects 3. Silence fire bell by pressing FIRE WARN sw 4. Pull ENG FIRE SWITCH; observe mentioned effects 5. Rotate ENG FIRE SWITCH left; fire does not extinguish 6. Test squibs LEFT; observe L green light does not illuminate 7. Rotate ENG FIRE SWITCH right; fire extinguishes 8. Test squibs RIGHT; observe R green light does not illuminate 9. Deactivate failure, reset ENG FIRE SWITCH, reset fire bottles and quickstart ENG 1 10. Activate failure for ENG 2, 1 Bottle; observe mentioned effects 11. Silence fire bell by pressing BELL CUTOOUT sw 12. Pull ENG FIRE SWITCH; observe mentioned effects 13. Rotate ENG FIRE SWITCH right; fire extinguishes 14. Complete procedure as above and for unextinguishable situation

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

9.2 Engine Fire + Flameout – 1 Bottle / 2 Bottles / Unextinguishable @

25AUG11

Failure Description	Fire is detected in an engine nacelle and engine flames out simultaneously. Multiple options: ENG 1 / ENG 2 Multiple options: 1 Bottle / 2 Bottles / Unextinguishable
Failure Effects / Indications	<ul style="list-style-type: none">• Engine flames out• ENG FIRE SWITCH illuminates and unlocks for pulling• ENG OVERHEAT It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: OVHT/DET It illuminates○ MASTER FIRE WARN Its illuminate• Fire bell sounds, silenced when:<ul style="list-style-type: none">○ FIRE WARN sw pushed○ BELL CUTOFF sw pushed○ Fire is no longer present• DRIVE, GEN OFF BUS, SOURCE OFF Its illuminate, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: ELEC It illuminates• Bleed pressure output is zero• When the ENG FIRE SWITCH is pulled:<ul style="list-style-type: none">○ ENG VALVE CLOSED, SPAR VALVE CLOSED Its illuminate○ Hyd ENG pump LOW PRESSURE light is disabled• When the ENG FIRE SWITCH is rotated to discharge an extinguisher:<ul style="list-style-type: none">○ L or R BOTTLE DISCHARGE It illuminates after 5 sec• Fire and overheat indications are removed:<ul style="list-style-type: none">○ 1 Bottle option: 15 sec after first bottle is discharged○ 2 Bottles option: 15 sec after second bottle is discharged○ Unextinguishable: Never (until failure is deactivated)• Respective green squib light does not illuminate anymore when subsequent squib test is performed
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines ON, elec on APU, APU ON2. Activate failure for ENG 1, 2 Bottles; observe mentioned effects3. Silence fire bell by pressing FIRE WARN sw4. Pull ENG FIRE SWITCH; observe mentioned effects5. Rotate ENG FIRE SWITCH left; fire does not extinguish6. Test squibs LEFT; observe L green light does not illuminate7. Rotate ENG FIRE SWITCH right; fire extinguishes8. Test squibs RIGHT; observe R green light does not illuminate9. Deactivate failure, reset ENG FIRE SWITCH, reset fire bottles and quickstart ENG 110. Activate failure for ENG 2, 1 Bottle; observe mentioned effects11. Silence fire bell by pressing BELL CUTOFF sw12. Pull ENG FIRE SWITCH; observe mentioned effects13. Rotate ENG FIRE SWITCH right; fire extinguishes14. Complete procedure as above and for unextinguishable situation

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

9.3 Engine Overheat @

25AUG11

Failure Description	Engine overheat occurs due to bleed duct leak. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• ENG OVERHEAT It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: OVHT/DET It illuminates• Overheat condition is removed when:<ul style="list-style-type: none">○ 20 sec after engine shutdown○ 20 sec after N1 < 40% (reoccurs when N1 > 40%)
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL1002. Activate failure on ENG 1; observe mentioned effects3. Retard left thrust lever to idle; overheat condition is removed4. Increase thrust to > 40% N1; overheat condition returns5. Shutdown engine; overheat condition is removed6. Deactivate failure and quickstart ENG 1; indications return to normal7. Perform steps 2 to 6 for ENG 2

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

9.4 Engine Bottle Fails To Discharge

25AUG11

Failure Description	Fire extinguisher bottle does not discharge due to improper bottle installation and will also result in an unsatisfactory squib test even before discharge attempt. Multiple options: L bottle / R bottle
Failure Effects / Indications	<ul style="list-style-type: none">• Respective green squib light does not illuminate during squib test• In case of fire, respective fire bottle does not discharge• L / R BOTTLE DISCHARGE It does not illuminate• Fire cannot be extinguished using selected bottle
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL1002. Activate failure on L bottle3. Perform squib test (both sides); L green light does not illuminate for both sides4. Activate Engine Fire failure on ENG 25. Pull ENG FIRE SWITCH and rotate Left; observe mentioned effects6. Rotate ENG FIRE SWITCH Right; fire is extinguished7. Deactivate failure, reset ENG FIRE SWITCH, reset fire bottles8. Activate failure on R bottle9. Perform squib test (both sides); R green light does not illuminate for both sides10. Activate Engine Fire failure on ENG 111. Pull ENG FIRE SWITCH and rotate Right; observe mentioned effects12. Rotate ENG FIRE SWITCH Left; fire is extinguished13. Deactivate failure, reset ENG FIRE SWITCH, reset fire bottles

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

9.5 Engine Detection Loop Fail

25AUG11

Failure Description	Engine fire detection loop failure. Multiple options: ENG 1-A / ENG 1-B / ENG 2-A / ENG 2-B
Failure Effects / Indications	One loop failed per engine: <ul style="list-style-type: none">• OVHT DET switch position:<ul style="list-style-type: none">○ NORMAL: No change on FAULT/INOP test or engine fire○ A:<ul style="list-style-type: none">▪ If ENG A loop is failed, engine fire will not be detected and FAULT/INOP test results in FAULT It▪ If ENG B loop is failed, no change in FAULT/INOP test or engine fire○ B:<ul style="list-style-type: none">▪ If ENG B loop is failed, engine fire will not be detected and FAULT/INOP test results in FAULT It▪ If ENG A loop is failed, no change in FAULT/INOP test or engine fire Two loops failed per engine: <ul style="list-style-type: none">• Regardless of OVHT DET switch position:<ul style="list-style-type: none">○ FAULT It illuminates on failure activation○ engine fire will not be detected
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines ON, APU ON, elec on APU2. Activate failure ENG 1-A3. ENG 1 OVHT DET sw NORMAL4. Activate ENG 1 FIRE; normal fire indications5. Deactivate ENG 1 FIRE6. Perform FAULT/INOP test; no failure indications7. ENG 1 OVHT DET sw A8. Activate ENG 1 FIRE; no fire detected9. Deactivate ENG 1 FIRE10. Perform FAULT/INOP test; FAULT It illuminates11. ENG 1 OVHT DET sw B12. Activate ENG 1 FIRE; normal fire indications13. Deactivate ENG 1 FIRE14. Perform FAULT/INOP test; no failure indications15. ENG 1 OVHT DET sw NORMAL16. Deactivate failure ENG 1-A17. Perform steps 2 – 16 for ENG 1-B (opposite response), ENG 2-A and ENG 2-B (opposite response)

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

9.6 APU Fire – Extinguishable / Unextinguishable @

25AUG11

Failure Description	APU fire detected in APU compartment. Multiple options: Extinguishable / Unextinguishable
Failure Effects / Indications	<ul style="list-style-type: none">• APU shuts down automatically• APU FIRE SWITCH illuminates, unlocks for pulling, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ FIRE WARN Its illuminate• Fire bell sounds, silenced when:<ul style="list-style-type: none">○ FIRE WARN sw pushed○ BELL CUTOFF sw pushed○ Fire is no longer present• Fire indications are removed:<ul style="list-style-type: none">○ Extinguishable: 15 sec after bottle is discharged○ Unextinguishable: Never (until failure is deactivated)• When the APU FIRE SWITCH is rotated to discharge an extinguisher:<ul style="list-style-type: none">○ APU BOTTLE DISCHARGE It illuminates after 5 sec
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, elec on GRD PWR, APU ON2. Activate failure, extinguishable; observe mentioned effects3. Silence fire bell by pressing FIRE WARN sw4. Pull APU FIRE SWITCH; observe mentioned effects5. Rotate APU FIRE SWITCH left; fire extinguishes6. Test squibs LEFT/RIGHT; observe APU green light does not illuminate7. Deactivate failure, reset APU FIRE SWITCH, reset fire bottles and quickstart APU8. Activate failure, unextinguishable; observe mentioned effects9. Silence fire bell by pressing BELL CUTOFF sw10. Pull APU FIRE SWITCH; observe mentioned effects11. Rotate APU FIRE SWITCH right; fire extinguishes12. Test squibs LEFT/RIGHT; observe APU green light does not illuminate13. Deactivate failure, reset APU FIRE SWITCH, reset fire bottles and quickstart APU

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

9.7 APU Bottle Fails To Discharge

25AUG11

Failure Description	APU fire extinguisher bottle does not discharge due to faulty squib.
Failure Effects / Indications	<ul style="list-style-type: none">• APU fire extinguisher does not discharge• Faulty response to squib test (green APU light does not illuminate on L and R tests)• APU fire cannot be extinguished• APU BOTTLE DISCHARGE It will not illuminate
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, elec on GRD PWR, APU ON2. Activate failure3. Test squibs LEFT/RIGHT; observe APU green light does not illuminate4. Activate APU FIRE5. Silence fire bell by pressing FIRE WARN sw6. Pull APU FIRE SWITCH7. Rotate APU FIRE SWITCH left; fire does not extinguish8. Rotate APU FIRE SWITCH right; fire does not extinguish9. Deactivate failures, reset APU FIRE SWITCH, reset fire bottles and quickstart APU

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

9.8 APU Detection Loop Fail

25AUG11

Failure Description	APU fire detection loop failure.
Failure Effects / Indications	<ul style="list-style-type: none">• APU fire will not be detected• APU DET INOP It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: OVHT/DET It illuminates
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, elec on GRD PWR, APU ON2. Activate failure; observe mentioned effects3. Activate APU FIRE; fire is not detected4. Deactivate failures

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

9.9 Cargo Fire – FWD / AFT – Extinguishable / Unextinguishable @

25AUG11

Failure Description	Fire detected in forward or aft cargo compartment. Multiple options: FWD / AFT Multiple options: Extinguishable / Unextinguishable
Failure Effects / Indications	<ul style="list-style-type: none">• FWD or AFT It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ FIRE WARN Its illuminate• Fire bell sounds, silenced when:<ul style="list-style-type: none">○ FIRE WARN sw pushed○ BELL CUTOOUT sw pushed○ Fire is no longer present• Fire indications are removed:<ul style="list-style-type: none">○ Extinguishable: 15 sec after bottle is discharged○ Unextinguishable: Never (until failure is deactivated)• When FWD or AFT sw is pushed, ARMED is displayed on sw• When the DISCH sw is pushed to discharge an extinguisher:<ul style="list-style-type: none">○ DISCH It illuminates after 20 sec• After extinguishing, respective FWD or AFT squib test light will not illuminate during squib test• Only single bottle option is modeled (but in operation, dual bottle option does not provide control over bottles separately)
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, elec on GRD PWR, APU ON2. Activate failure, FWD, extinguishable; observe mentioned effects3. Silence fire bell by pressing FIRE WARN sw4. Push FWD sw; observe mentioned effects5. Push DISCH sw; fire extinguishes and observe mentioned effects6. Test squibs; observe FWD green light does not illuminate7. Deactivate failure, reset FWD sw, reset fire bottles8. Activate failure, AFT, unextinguishable; observe mentioned effects9. Silence fire bell by pressing FIRE WARN sw10. Push AFT sw; observe mentioned effects11. Push DISCH sw; fire does not extinguish; observe mentioned effects12. Test squibs; observe AFT green light does not illuminate13. Deactivate failure, reset AFT sw, reset fire bottles

9.10 Wheel Well Fire @

25AUG11

Failure Description	Fire is detected in the wheel well.
Failure Effects / Indications	<ul style="list-style-type: none">• WHEEL WELL FIRE It illuminates, and:<ul style="list-style-type: none">○ FIRE WARN Its illuminate• Fire bell sounds, silenced when:<ul style="list-style-type: none">○ FIRE WARN sw pushed○ BELL CUTOOUT sw pushed○ Fire is no longer present• Wheel well fire extinguishes 60 sec after landing gear is extended

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

Failure Check

1. Reposition aircraft to above FL330
2. Activate failure; observe mentioned effects
3. Extend landing gear; observe fire extinguishes in 60 sec
4. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10 Flight Controls

10.1 N/A

13OCT11

Failure Description	N/A
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Failure Effects / Indications	<ul style="list-style-type: none">N/A
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Failure Check	1. N/A
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MPS FSTD - IOS – System failures

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FSTD: B737 FTD

10.2 N/A

13OCT11

Failure Description N/A

Failure Effects / Indications • N/A

Failure Check 1. N/A

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.3 Jammed Stabilizer @

25AUG11

Failure Description	Mechanical failure in electric stabilizer motor causes jam of stabilizer trim.
Failure Effects / Indications	<ul style="list-style-type: none">• Main electric and autopilot trim are inoperative• Manual trim is available with enough force to override the clutch (ca. 46 lb)
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to above FL1002. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.4 Runaway Stabilizer – Autopilot / Main Electric @

17SEP12

Failure Description	Internal motor malfunction causes main electric or autopilot stabilizer trim motor to run away. Multiple options: Autopilot / Main Electric
Failure Effects / Indications	Main Electric: <ul style="list-style-type: none">• Stabilizer trim runs away at first actuation of trim switches in the selected direction• Autopilot and manual trim systems remain operative• Runaway can be stopped by:<ul style="list-style-type: none">○ moving the control column in the opposite direction, however runaway will continue when control column input is removed○ MAIN ELEC STAB TRIM sw CUTOUT Autopilot: <ul style="list-style-type: none">• Stabilizer trim runs away when autopilot activates stabilizer trim, in the direction of autopilot trim selection• Main electric and manual trim systems remain operative• Runaway can be stopped by:<ul style="list-style-type: none">○ moving the control column in the opposite direction, however runaway will continue when control column input is removed○ AUTOPILOT STAB TRIM sw CUTOUT○ disengaging the autopilot
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL100, Autopilot OFF2. Activate failure, Main Electric3. Trim nose UP using control wheel trim switches; observe runaway4. Move control column forward; observe runaway stops5. Release control column; observe runaway continues6. Trim nose DOWN using control wheel trim switches; observe runaway7. Select MAIN ELEC STAB TRIM sw CUTOUT; observe runaway stops8. Deactivate failure9. Engage autopilot in ALT HOLD, A/T in MCP SPD10. Activate failure, Autopilot11. Increase MCP speed12. As autopilot trims nose DOWN, observe runaway13. Disengage autopilot; observe runaway stops14. Re-engage autopilot in ALT HOLD15. Decrease MCP speed16. As autopilot trims nose UP, observe runaway17. Select AUTOPILOT STAB TRIM sw CUTOUT18. Observe autopilot disengages, runaway stops19. Deactivate failure

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.5 Yaw Damper Fail

25AUG11

Failure Description	Yaw Damper power is interrupted, causing failure of the yaw damper.
Failure Effects / Indications	<ul style="list-style-type: none">• Yaw Damper is inoperative, may cause dutch roll and other associated aerodynamic effects• YAW DAMPER It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: FLT CONT It illuminates
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL1002. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.6 Elevator Feel Computer Fail – Single / Dual

25AUG11

Failure Description	Internal elevator feel computer failure. Multiple options: Single / Dual
Failure Effects / Indications	Single EFC failure: <ul style="list-style-type: none">• FEEL DIFF PRESS It illuminates after 30 sec, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: FLT CONT It illuminates• No other indications Dual EFC failure: <ul style="list-style-type: none">• No annunciations or indications• Elevator feel pressure (column forces) decrease to minimum causing extremely light forces; danger of overstressing the aircraft
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to above FL1002. Activate failure, Single; observe mentioned effects3. Deactivate failure4. Activate failure, Dual; observe mentioned effects5. Deactivate failure

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.7 Mach Trim Fail

25AUG11

Failure Description	Internal computer failure (dual channel) causes failure of mach trim
Failure Effects / Indications	<ul style="list-style-type: none">• MACH TRIM FAIL It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: FLT CONT It illuminates• Elevator neutral shift and mach tuck compensation are inoperative
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to above FL330, M.8002. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.8 Speed Trim Fail

25AUG11

Failure Description	Internal computer failure (dual channel) causes failure of speed trim
Failure Effects / Indications	<ul style="list-style-type: none">• SPEED TRIM FAIL It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: FLT CONT It illuminates• Elevator neutral shift and mach tuck compensation are inoperative
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL100, 180 KIAS, Flaps 5, Autopilot OFF2. Activate failure; observe mentioned effects3. Increase airspeed by adding thrust and keep altitude without trimming, resulting in forward column force; verify no automatic electric trimming occurs4. Deactivate failure; automatic electric trimming occurs in nose UP direction, causing increased forward column force required to maintain altitude

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.9 Trailing Edge Flaps Fail In Position @

25AUG11

Failure Description	Due to FSEU fault, flap shutoff valve is actuated and trailing edge flaps remain in current position, regardless of flap lever position. Leading edge flaps/slats can move according to flap lever position. Use of Alternate Flaps is possible.
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Failure Effects / Indications	<ul style="list-style-type: none">• All trailing edge flaps remain in current position• Trailing edge flaps do not react to flap lever movement• LE flaps/slats still react to flap lever movement• Alternate flaps available
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to above FL1002. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal4. Repeat above steps for several flap settings
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MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.10 Flap Position Indicator Fail

25AUG11

Failure Description	Internal failure of flap indicator gauge.
Failure Effects / Indications	<ul style="list-style-type: none">• Flap indicator freezes both needles• LE devices panel in aft overhead panel operates normally• Flap speed indications on PFD speed tape operate normally• Flaps operate normally
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL100, Flaps UP2. Activate failure3. Set Flaps 40; observe mentioned effects4. Set Flaps UP5. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.11 Trailing Edge Flaps Asymmetry

25AUG11

Failure Description	Mechanical failure of the torque tube connecting the left and right wing trailing edge flaps causes asymmetry.
Failure Effects / Indications	<ul style="list-style-type: none">• When flaps are extended or retracted, the right wing trailing edge flaps freeze at time of failure activation• When asymmetry threshold is exceeded, FSEU will freeze all trailing edge flap movement until failure is reset• Flap indicator shows split needle indication; the amount of split needle angle is about half of the distance/angle between the two closest indicator positions; this is not necessarily the amount of asymmetric flaps; the indication may be exaggerated to indicate an asymmetry situation• No asymmetry protection is available when using alternate flaps• Aerodynamic effects occur
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL100, Flaps UP2. Activate failure3. Set Flap 5; observe TE Flaps L needle moves to halfway between UP and 1 position and TE Flaps R needle is frozen4. Set Flap 15, then Flaps UP; observe flaps are not moving5. ALTERNATE FLAPS MASTER sw ARM6. ALTERNATE FLAPS sw DOWN; observe TE Flaps L needle moves7. ALTERNATE FLAPS MASTER sw OFF8. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.12 LE Flaps Transit Light On @

25AUG11

Failure Description	Malfunction in the FSEU illuminates LE FLAPS TRANSIT It when flaps are not up.
Failure Effects / Indications	<ul style="list-style-type: none">• LE FLAPS TRANSIT It illuminates when flaps are not up• LE FLAPS EXTENDED It does not illuminate• No other effects; flaps operate normally
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Flaps UP3. Activate failure4. Select Flaps 1; observe mentioned effects5. Deactivate failure; LE FLAPS TRANSIT It extinguishes and LE FLAPS EXTENDED It illuminates

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.13 Autoslat Fail

25AUG11

Failure Description	Autoslat computers (dual channel) fail.
Failure Effects / Indications	<ul style="list-style-type: none">• Autoslats are inoperative• AUTOSLAT FAIL It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: FLT CONT It illuminates
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL100, Flaps 1, 180 KIAS2. Activate failure; observe mentioned effects3. Decrease airspeed until stick shaker occurs4. Observe that LE slats remain in EXTEND position during speed reduction and do not move to the FULL EXTEND position5. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.14 Speed Brake Do Not Arm Light Illuminated @

25AUG11

Failure Description	Malfunction in auto speedbrake actuator.
Failure Effects / Indications	<ul style="list-style-type: none">• SPEEDBRAKE DO NOT ARM It illuminates when speed brake lever is armed or extended
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL1002. Activate failure3. SPEED BRAKE LEVER to ARM; observe mentioned effects4. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.15 Speed Brake Extended Light False Indication

25AUG11

Failure Description	False indication that speed brakes are extended when they are down.
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Failure Effects / Indications	<ul style="list-style-type: none">• SPEEDBRAKE EXTENDED It illuminates
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL1002. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal
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MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

10.16 Auto Speed Brake Fail @

25AUG11

Failure Description	Mechanical malfunction in the auto speedbrake module.
Failure Effects / Indications	<ul style="list-style-type: none">• Auto speedbrake inoperative• No other indications except SPEEDBRAKE DO NOT ARM It illuminates when the auto speedbrake should operate:<ul style="list-style-type: none">○ on touchdown with speedbrakes armed○ on ground when selecting reverse thrust○ speedbrake stow when advancing thrust levers on ground
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure3. Select reverse thrust; observe mentioned effects4. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

11 Flight Instruments & Displays

11.1 DU Fail @

25AUG11

Failure Description

Failure in DU power supply.

Multiple options: Capt INBD / Capt OUTBD / F/O INBD / F/O OUTBD / Upper / Lower

Failure Effects / Indications

- Selected DU blanks
- If all Display Select switches are NORM:
 - Failure of an OUTBD DU will display the PFD on the INDB DU automatically
 - Failure of an Upper DU will display Primary Engine parameters on Lower DU

Failure Check

1. Reposition aircraft on ground
2. Activate failure for all options; observe mentioned effects
3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

11.2 DEU Fail

25AUG11

Failure Description	DEU power supply failure. Multiple options: DEU 1 / DEU 2
Failure Effects / Indications	<ul style="list-style-type: none">• DEU becomes inoperative• DSPLY SOURCE flag displays on PFDs with engines running• CDS FAULT flag displays on PFDs when one or both engines are OFF and aircraft on ground• EEC ALTN lts illuminate 15 sec after failure activation• DEU fails on same side as engaged A/P during climb/descent:<ul style="list-style-type: none">○ Pitch mode reverts to CWS P○ FD pitch bars are removed on both PFDs until ALT ACQ or VNAV ALT/PTH• DEU fails on same side as engaged A/P during level flight:<ul style="list-style-type: none">○ Climb/descent to new MCP altitude is not possible in LVL CHG, V/S or VNAV with current autopilot• DEU fails on same side as engaged A/P during approach:<ul style="list-style-type: none">○ FD pitch and roll bars are removed on the failed side PFD• DEU fails on opposite side as engaged A/P or manual FD during climb/descent:<ul style="list-style-type: none">○ FD pitch bars are removed on the failed side PFD until ALT ACQ or VNAV ALT/PTH○ Climb/descent to new MCP altitude is possible in LVL CHG, V/S or VNAV with current autopilot
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines ON, Display Select/Source sws NORMAL/AUTO2. Activate failure for DEU 1; observe mentioned effects3. Select DISPLAYS SOURCE sw to ALL ON 2; observe no change4. Select DISPLAYS SOURCE sw to ALL ON 1; all DUs blank5. Deactivate failure and select DISPLAYS SOURCE sw to AUTO6. Observe CDS FAULT flag disappears after 90 sec7. Perform steps 2 – 6 for DEU 28. Deactivate failure; indications return to normal9. Reposition aircraft to FL100, Autopilot CMD A ON, LVL CH climb to FL15010. Activate failure for DEU 1; observe effects, also during leveloff11. Attempt to climb to higher altitude; observe that LVL CH or V/S cannot be engaged12. Engage CMD B13. Select LVL CH; observe aircraft now climbs to new altitude14. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

11.3 EFIS Control Panel Fail

25AUG11

Failure Description	EFIS Control Panel power supply failure. Multiple options: Capt / F/O
Failure Effects / Indications	<ul style="list-style-type: none">• EFIS Control Panel is inoperative• No data transmission to DEU and WX Radar <p>On affected side, the following defaults are set:</p> <ul style="list-style-type: none">• Expanded MAP mode• 40 nm zoom range• TFC ON• WXR ON in air, OFF on ground• ARPT, STA, WPT, POS, DATA OFF• Altimeter display blanks and ALT flag appears• BARO MINS value and indication disappear• DISPLAYS CONTROL PANEL message displays• When both EFIS Control Panels are failed or the DISPLAYS: CONTROL PANEL switch is manually set to the failed side, above effects are displayed on both sides. The [A/T LIM] flag (white boxed) appears in the Thrust Management Annunciation (top of Upper DU), N1 reference readouts display “---.-” above the N1 indicators and the N1 reference bugs are not displayed
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure on Capt side; observe mentioned effects3. Capt EFIS CP inoperative, F/O EFIS CP operates F/O side4. Captain Displays Select panel operates normally5. Select DISPLAYS: CONTROL PANEL sw to BOTH ON 26. Capt EFIS CP inoperative, F/O EFIS CP operates both sides7. DISPLAYS CONTROL PANEL msg blanks on Capt PFD8. Deactivate failure; indications return to normal9. Perform steps 2 – 8 for opposite side and then both sides

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

11.4 ISFD Fail @

25AUG11

Failure Description	Power supply failure to Integrated Standby Flight Display (ISFD)
Failure Effects / Indications	<ul style="list-style-type: none">• ISFD blanks• When power is restored (failure is deactivated), ISFD shows black screen with an amber, boxed, centered [INIT 90s] counting down as the system goes through an alignment cycle
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL1002. Activate failure; observe mentioned effects3. Deactivate failure; ISFD starts align sequence and returns to normal operation within 90 sec

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

11.5 ISFD ATT Fail

25AUG11

Failure Description	Both roll and pitch indications on the ISFD fail.
Failure Effects / Indications	11 sec after failure activation: <ul style="list-style-type: none">• Attitude indicator, A/C symbol disappear• Altitude, heading and airspeed are still displayed• 10 second attitude re-alignment occurs and amber, non-boxed, centered ATT 10s counting down displays, after which normal indications return
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL1002. Activate failure; observe mentioned effects3. Deactivate failure; ISFD starts align sequence and returns to normal operation within 10 sec

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12 Flight Management & Navigation

12.1 FMC Fail @

25AUG11

Failure Description	Internal power failure in FMC. Note: Single FMC configuration is simulated
Failure Effects / Indications	<ul style="list-style-type: none">• CDUs display MENU page• After 3 sec: FMC prompt is removed from CDU MENU page• FMC alert It illuminates on Autoflight Status Annunciator• VTK flag displays on both NDs• After 35 sec: MAP contents disappears and MAP flag appears• White boxed [A/T LIM] flag is displayed on Upper DU• N1 reference values show “---.”• N1 reference bugs stay at last valid position• LNAV and VNAV modes are inoperative, A/P will revert to CWS R and CWS P if active• When power is restored (failure is deactivated), FMC will be fully operational after 20 sec; all FMC data will be erased
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL1002. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.2 CDU Fail @

25AUG11

Failure Description

CDU power supply failure.

Multiple options: Capt CDU / F/O CDU

Failure Effects / Indications

- CDU display blanks
- Amber FAIL It on CDU illuminates

Failure Check

1. Reposition aircraft on ground
2. Activate failure for Capt CDU; observe mentioned effects
3. Deactivate failure; indications return to normal
4. Perform steps 2 and 3 for F/O CDU

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.3 G/S Receiver Fail @

25AUG11

Failure Description	ILS glideslope receiver failure. Multiple options: Receiver 1 / Receiver 2
Failure Effects / Indications	Receiver 1 failure: <ul style="list-style-type: none">• G/S flag displays on Capt PFD and ND (if in APP mode)• G/S scale and deviation pointer blank• G/S flag displays on ISFD after 11 sec• G/S deviation pointer on ISFD blanks• APP mode not available for CMD A, FD A or dual autopilot Receiver 2 failure: <ul style="list-style-type: none">• G/S flag displays on F/O PFD and ND (if in APP mode)• G/S scale and deviation pointer blank• APP mode not available for CMD B, FD B or dual autopilot
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 3 NM ILS approach and set correct ILS nav2. Set NDs on CTR APP and select ISFD APP3. Activate failure for Receiver 1; observe mentioned effects4. Deactivate failure; indications return to normal5. Perform steps 3 and 4 for Receiver 2

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.4 LOC Receiver Fail @

25AUG11

Failure Description	ILS localizer receiver failure. Multiple options: Receiver 1 / Receiver 2
Failure Effects / Indications	Receiver 1 failure: <ul style="list-style-type: none">• LOC flag displays on Capt PFD and ND (if in APP mode)• LOC scale and deviation pointer blank• LOC flag displays on ISFD after 11 sec• LOC deviation pointer on ISFD blanks• APP, LOC mode not available for CMD A, FD A or dual autopilot Receiver 2 failure: <ul style="list-style-type: none">• LOC flag displays on F/O PFD and ND (if in APP mode)• LOC scale and deviation pointer blank• APP, LOC mode not available for CMD B, FD B or dual autopilot
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 3 NM ILS approach and set correct ILS nav2. Set NDs on CTR APP and select ISFD APP3. Activate failure for Receiver 1; observe mentioned effects4. Deactivate failure; indications return to normal5. Perform steps 3 and 4 for Receiver 2

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.5 VOR Receiver Fail

25AUG11

Failure Description	VOR receiver failure. Multiple options: Receiver 1 / Receiver 2
Failure Effects / Indications	Receiver 1 failure: <ul style="list-style-type: none">• VOR 1 flag displays on both NDs (when VOR 1 selected on EFIS CP)• VOR scale and deviation pointer blank on Capt ND VOR modes• VOR 1 needle and POS data blank on both NDs• VOR mode not available for CMD A, FD A or dual autopilot Receiver 2 failure: <ul style="list-style-type: none">• VOR 2 flag displays on both NDs (when VOR 2 selected on EFIS CP)• VOR scale and deviation pointer blank on Capt ND VOR modes• VOR 2 needle and POS data blank on both NDs• VOR mode not available for CMD B, FD B or dual autopilot
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL100 and tune nearby VOR on both receivers2. Set NDs on VOR APP3. Activate failure for Receiver 1; observe mentioned effects4. Deactivate failure; indications return to normal5. Perform steps 3 and 4 for Receiver 2

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.6 ADF Receiver Fail

25AUG11

Failure Description	ADF receiver failure.
Failure Effects / Indications	<ul style="list-style-type: none">• ADF 1 flag displays on both NDs (when ADF selected on EFIS CP)• ADF 1 needle blanks on both NDs
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL100 and tune nearby ADF2. Set NDs on CTR MAP3. Activate failure; observe mentioned effects4. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.7 TCAS Fail

25AUG11

Failure Description	TCAS computer power supply failure.
Failure Effects / Indications	<ul style="list-style-type: none">• TCAS FAIL appears on both NDs• TCAS advisories are no longer provided• Note that only one TCAS computer is installed and is not dependent on transponder 1 or 2 selection
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.8 WX Radar Fail

25AUG11

Failure Description	WX Radar computer interface failure.
Failure Effects / Indications	<ul style="list-style-type: none">• WXR FAIL flag shows on both NDs• PWS FAIL flag shows on both NDs• WX Radar returns are no longer displayed• Normal WXR labels are no longer displayed on NDs
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL1002. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.9 Radio Altimeter Fail

25AUG11

Failure Description	Radio altimeter failure Multiple options: RA 1 / RA 2
Failure Effects / Indications	<ul style="list-style-type: none">• RA flag appears on respective PFD• PWS FAIL appears on respective ND• Rising runway symbol not available (if applicable)• Autopilot will disconnect 2 sec after G/S capture in APP mode
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 2000 ft2. Observe RA displays 2000 ft (or less if ground elevation is not zero)3. Activate failure; observe mentioned effects4. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.10 IRS Fail

25AUG11

Failure Description	IRS function of ADIRU failed. Multiple options: IRS L / IRS R
Failure Effects / Indications	IRS L or IRS R fail: <ul style="list-style-type: none">• Respective PFD:<ul style="list-style-type: none">○ ATT flag displayed; attitude indicator removed○ HDG flag displayed; compass removed○ FPV flag displayed○ VERT flag displayed; vertical speed indicator removed• Respective ND (when not in PLAN mode):<ul style="list-style-type: none">○ HDG flag displayed; compass ring/values removed○ MAP flag displayed; MAP data removed (in MAP mode)○ Ground track line removed○ TERR FAIL flag displayed when TERR selected• FAULT It illuminates on IRS MSU, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ IRS It illuminates• IRS STS displays codes “02” and “37” on respective ISDU; press CLR button to alternate between codes• Autopilots cannot be engaged IRS L fail only: <ul style="list-style-type: none">• ISFD, after 11 sec: HDG flag displayed; compass removed
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL100, A/P ON2. Activate failure on IRS L; observe mentioned effects, A/P disengages3. Set IRS TRANSFER sw BOTH ON R4. Flags are removed; INSTR SWITCH flag displayd on both PFDs5. Set IRS TRANSFER sw BOTH ON L; all ATT/HDG info lost6. Set IRS TRANSFER sw NORMAL7. Deactivate failure and perform IRS quick align; indications return to normal8. Perform steps 2 – 7 for IRS R

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.11 IRS Nav Mode Lost

25AUG11

Failure Description	Internal IRS failure causing loss of NAV mode. Attitude mode is selectable. Multiple options: IRS L / IRS R
Failure Effects / Indications	<p>IRS L or IRS R fail:</p> <ul style="list-style-type: none">• Respective PFD:<ul style="list-style-type: none">○ ATT flag displayed; attitude indicator removed○ HDG flag displayed; compass removed○ FPV flag displayed○ VERT flag displayed; vertical speed indicator removed• Respective ND (when not in PLAN mode):<ul style="list-style-type: none">○ HDG flag displayed; compass ring/values removed○ MAP flag displayed; MAP data removed (in MAP mode)○ Ground track line removed○ TERR FAIL flag displayed when TERR selected• FAULT It illuminates on IRS MSU, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ IRS It illuminates• IRS STS displays codes “02” and “37” on respective ISDU; press CLR button to alternate between codes• Autopilots cannot be engaged <p>IRS L fail only:</p> <ul style="list-style-type: none">• ISFD, after 11 sec: HDG flag displayed; compass removed <p>ATT re-alignment procedure:</p> <ul style="list-style-type: none">• Select ATT on respective MSU• Fault codes are cleared on ISDU• Respective ALIGN It illuminates• Fly straight-and-level, unaccelerated flight for 30 sec• After 25 sec, ATT, HDG, VSI indication normal, except on ISFD• Enter magnetic heading on ISDU or CDU POS INIT page• HDG indication normal on ISFD• Heading will drift up to 15°/hr• MAP flag remains and MAP data is not available
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL1002. Activate failure for IRS L; observe mentioned effects3. Perform ATT re-alignment procedure4. Deactivate failure and perform IRS L quick align; indications return to normal5. Perform steps 2 – 4 for IRS R

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.12 ADIRU AC Power Fail

25AUG11

Failure Description	AC power fails to ADIRU and DC power is available. Multiple options: ADIRU L / ADIRU R
Failure Effects / Indications	ADIRU 1 or ADIRU 2: <ul style="list-style-type: none">• ON DC It illuminates:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: IRS It illuminates• Ground service horn sounds after 20 sec (on ground only) ADIRU 2 only: <ul style="list-style-type: none">• IRS 2 shuts down after 5 minutes
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure for ADIRU L; observe mentioned effects3. Deactivate failure; indications return to normal4. Perform steps 2 and 3 for ADIRU R

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.13 ADIRU DC Power Fail

25AUG11

Failure Description

DC power to respective ADIRU is lost.
Multiple options: ADIRU L / ADIRU R

Failure Effects / Indications

- DC FAIL It illuminates, and:
 - MASTER CAUTION Its illuminate
 - RCP: IRS It illuminates
- ADIRU operates normally when AC power remains available:
 - ADIRU L: AC Standby Bus
 - ADIRU R: AC Transfer Bus 2

Failure Check

1. Reposition aircraft on ground
2. Activate failure for ADIRU L; observe mentioned effects
3. Switch STANDBY POWER sw OFF; observe ADIRU shutdown
4. Deactivate failure, perform IRS quick align; indications return to normal
5. Activate failure for ADIRU R; observe mentioned effects
6. Switch BUS TRANSFER sw OFF
7. Remove AC source for AC Transfer Bus 2; observe ADIRU shutdown
8. Deactivate failure, perform IRS quick align; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.14 IRS Drift @

25AUG11

Failure Description	Malfunction in IRS L accelerometer auto-bias feature, causing increased position error (direction south) on IRS L at a rate of 15 nm/hr.
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Failure Effects / Indications	<ul style="list-style-type: none">• TK/GS values on ISDU incorrect for IRS L• PPOS drifts at 10 nm/hr to the south for IRS L• FMC POS REF page: incorrect values for IRS L• Capt PFD/ND, incorrect:<ul style="list-style-type: none">○ Groundspeed○ Position○ Track○ Drift indication• CDU scratchpad message (inhibited when APP mode active):<ul style="list-style-type: none">○ Drift > 10 nm: VERIFY POS: IRS-IRS○ ANP > RNP: UNABLE REQD NAV PERF-RNP• RNP defaults:<ul style="list-style-type: none">○ Oceanic 12.0 nm○ Enroute 2.0 nm○ Terminal 1.0 nm○ Approach 0.5 nm
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL1002. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal
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MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.15 GPS Fail

17SEP12

Failure Description

Dual GPS failure.

Failure Effects / Indications

- GPS Lt illuminates on ADIRU MSU, and:
 - MASTER CAUTION Lts illuminate
 - RCP: IRS Lt illuminates
- FMC POS REF page: GPS positions blank
- CDU scratchpad message: GPS FAIL
- CDU scratchpad message (inhibited when APP mode active):
 - Drift > 10 nm: VERIFY POS: FMC-GPS
- RNP defaults:
 - Oceanic 12.0 nm
 - Enroute 2.0 nm
 - Terminal 1.0 nm
 - Approach 0.5 nm
- UTC time on both clocks shows dashes

Failure Check

1. Reposition aircraft on ground
2. Activate failure; observe mentioned effects
3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.16 ALL Glideslope Stations Fail @

25AUG11

Failure Description	IOS function to disable all glideslope signals.
Failure Effects / Indications	<ul style="list-style-type: none">• G/S deviation pointers are removed from PFDs and NDs• APP mode is available but G/S will not be captured
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft 6 NM ILS and set correct ILS setup2. Set ND APP mode3. Activate failure; observe mentioned effects4. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

12.17 ALL Localizer Stations Fail @

25AUG11

Failure Description	IOS function to disable all localizer signals.
Failure Effects / Indications	<ul style="list-style-type: none">• LOC deviation pointers are removed from PFDs and NDs• G/S deviation pointers are available (but not usable)• VOR/LOC and APP modes are available but LOC and G/S will not be captured• ILS identifier on PFD approach block is not displayed, instead frequency is shown
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft 6 NM ILS and set correct ILS setup2. Set ND APP mode3. Activate failure; observe mentioned effects4. Deactivate failure; indications return to normal

13 Fuel

13.1 Fuel Pump Fail @

25AUG11

Failure Description	Mechanical pump failure. Multiple options: 1 AFT / 1 FWD / 2 AFT / 2 FWD / CTR L / CTR R
Failure Effects / Indications	<p>One pump per tank failed:</p> <ul style="list-style-type: none"> • LOW PRESSURE It illuminates • ON RECALL: <ul style="list-style-type: none"> ○ MASTER CAUTION Its illuminate ○ RCP: FUEL It illuminates • CTR tank: LOW PRESSURE It only illuminates when pump is selected to ON • No other implications, but imbalance may occur when one CTR tank pump is failed while the other one is operating with CROSSFEED valve closed <p>Two pumps per tank failed:</p> <ul style="list-style-type: none"> • LOW PRESSURE Its illuminate, and: <ul style="list-style-type: none"> ○ MASTER CAUTION Its illuminate ○ RCP: FUEL It illuminates • CTR tank: LOW PRESSURE It only illuminates when pump is selected to ON • At high altitudes, if the respective (main) tank is the only tank supplying suction feed fuel to the respective engine, high thrust settings may not be possible and flameout may occur
Failure Check	<ol style="list-style-type: none"> 1. Reposition aircraft on ground, 12.000 KG fuel in tanks 2. Activate failure for 1 AFT; observe mentioned effects 3. Observe MC illuminates on recall 4. Activate failure for 1 FWD; observe mentioned effects 5. Observe MC illuminates automatically 6. Deactivate failures; indications return to normal 7. Perform steps 2 – 6 for R MAIN tank and CTR tank

13.2 Fuel Filter Bypass @

25AUG11

Failure Description	Contamination in the fuel system causes the fuel filter to become clogged, resulting in fuel filter bypass occurring or impending. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none"> • FILTER BYPASS It illuminates, and: <ul style="list-style-type: none"> ○ MASTER CAUTION Its illuminate ○ RCP: FUEL It illuminates • No other implications
Failure Check	<ol style="list-style-type: none"> 1. Reposition aircraft on ground 2. Activate failure; observe mentioned effects 3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

13.3 Fuel Tank Leak – Slow / Fast @

25AUG11

Failure Description

Leak in fuel tank.

Multiple options: MAIN tank 1 / MAIN tank 2 / CTR tank

Multiple options: Slow / Fast

Failure Effects / Indications

- Two leak speeds:
 - Slow: 100 KG / minute
 - Fast: 250 KG / minute
- Quantity indication decreases on fuel indicators
- MAIN tank 1 and 2: LOW alert displayed when fuel < 453 KG in tank
- IMBAL alert displayed when fuel between MAIN tank 1 and 2 > 453 KG (inhibited on ground or when LOW alert exists)
- When fuel pumps on and tank empty:
 - Both respective fuel pump LOW PRESSURE Its illuminate
 - MASTER CAUTION Its illuminate
 - RCP: FUEL It illuminates
- Engine will flameout if no fuel is supplied to the engine

Failure Check

1. Reposition aircraft to above FL100, 12.000 KG fuel in tanks
2. Activate failure for MAIN tank 1; observe mentioned effects
3. Deactivate failure
4. Perform steps 2 and 3 for MAIN tank 2 and CTR tank

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

13.4 Engine Line Leak

25AUG11

Failure Description	Fuel leak in supply line between SPAR VALVE and ENG VALVE. Multiple options: ENG 1 / ENG 2
Failure Effects / Indications	<ul style="list-style-type: none">• Leak speed: 250 KG / min• Quantity indication decreases on fuel indicators• MAIN tank 1 and 2: LOW alert displayed when fuel < 453 KG in tank• IMBAL alert displayed when fuel between MAIN tank 1 and 2 > 453 KG (inhibited on ground or when LOW alert exists)• When fuel pumps on and tank empty:<ul style="list-style-type: none">○ Both respective fuel pump LOW PRESSURE Its illuminate○ MASTER CAUTION Its illuminate○ RCP: FUEL It illuminates• Engine will flameout if no fuel is supplied to the engine• Leak cannot be stopped except by shutting down the engine, which closes the SPAR and ENG VALVES; fuel can then be used to the other engine via crossfeed
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL1002. Activate failure for ENG 1; observe mentioned effects3. ENG START LEVER 1 to CUTOFF; leak stops4. Deactivate failure, quick start ENG 1; indications return to normal5. Perform steps 2 – 4 for ENG 2

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

13.5 Crossfeed Valve Fail In Position @

25AUG11

Failure Description	Mechanical failure causes crossfeed valve to remain in last position.
Failure Effects / Indications	<p>Valve failed OPEN:</p> <ul style="list-style-type: none">• CROSSFEED VALVE sw OPEN: VALVE OPEN It illuminates DIM• CROSSFEED VALVE sw CLSD: VALVE OPEN It illuminates BRIGHT• Crossfeed valve is open and fuel can pass through crossfeed <p>Valve failed CLSD:</p> <ul style="list-style-type: none">• CROSSFEED VALVE sw OPEN: VALVE OPEN It illuminates BRIGHT• CROSSFEED VALVE sw CLSD: VALVE OPEN It is extinguished• Crossfeed valve is closed and fuel cannot pass through crossfeed
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines ON, 6000 KG fuel in tanks2. CROSSFEED VALVE sw OPEN3. Activate failure4. CROSSFEED VALVE sw CLSD; VALVE OPEN It illuminates BRIGHT5. Set MAIN tank 1 fuel level to ZERO6. Observe ENG 1 keeps running (through open crossfeed)7. Set MAIN tank 1 fuel level to 3000 KG8. Deactivate failure; VALVE OPEN It extinguishes as valve closes9. Activate failure10. CROSSFEED VALVE sw OPEN; VALVE OPEN It illuminates BRIGHT11. Set MAIN tank 1 fuel level to ZERO12. Observe ENG 1 flames out (fuel starvation)13. Set MAIN tank 1 fuel level to 3000 KG14. CROSSFEED VALVE sw CLSD: VALVE OPEN It extinguishes immediately15. Deactivate failure, quickstart ENG 1

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

13.6 Spar Valve Fail In Position

25AUG11

Failure Description

Spar fuel valve fails in last position due to mechanical failure.

Multiple options: ENG 1 / ENG 2

Failure Effects / Indications

Spar valve failed CLOSED:

- Engine cannot be started
- ENG START LEVER IDLE or ENG FIRE SWITCH PULLED:
 - SPAR VALVE CLOSED It illuminates BRIGHT
- ENG START LEVER CUTOFF or ENG FIRE SWITCH DOWN:
 - SPAR VALVE CLOSED It illuminates DIM

Spar valve failed OPEN:

- Engine is shut down by closure of ENG VALVE
- Engine can be started subsequently
- ENG START LEVER IDLE or ENG FIRE SWITCH PULLED:
 - SPAR VALVE CLOSED It extinguished
- ENG START LEVER CUTOFF and ENG FIRE SWITCH DOWN:
 - SPAR VALVE CLOSED It illuminates BRIGHT

Failure Check

1. Reposition aircraft on ground, engines OFF
2. Activate failure on ENG 1
3. Perform engine start on ENG 1; observe engine cannot be started
4. Remove failure on ENG 1
5. Quick start ENG 1
6. Activate failure on ENG 1
7. ENG START LEVER 1 to CUTOFF; observe engine shuts down but Spar Valve does not close
8. Deactivate failure; indications return to normal
9. Perform steps 2 – 8 for ENG 2

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

14 Hydraulics

14.1 Hydraulic Pump Fail – Engine Driven Pump @

25AUG11

Failure Description	Mechanical failure in HYD Engine Driven Pump Multiple options: SYS A / SYS B
Failure Effects / Indications	<ul style="list-style-type: none">• Respective LOW PRESSURE It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: HYD It illuminates
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, engines ON2. HYD ELEC 1 and 2 pump sws OFF3. Activate failure on SYS A4. Observe SYS A pressure decays to ca. 80 psi5. Activate failure on SYS B6. Observe SYS B pressure decays to ca. 80 psi7. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

14.2 Hydraulic Pump Fail – Electric Motor Pump @

25AUG11

Failure Description	Mechanical failure in HYD Engine Motor Driven Pump Multiple options: SYS A / SYS B
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Failure Effects / Indications	<ul style="list-style-type: none">• Respective LOW PRESSURE It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: HYD It illuminates
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Failure Check	<ol style="list-style-type: none">8. Reposition aircraft on ground, engines ON9. HYD ENG 1 and 2 pump sws OFF10. Activate failure on SYS A11. Observe SYS A pressure decays to ca. 80 psi12. Activate failure on SYS B13. Observe SYS B pressure decays to ca. 80 psi14. Deactivate failure; indications return to normal
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MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

14.3 Loss Of Hydraulic System A @

25AUG11

Failure Description	Catastrophic reservoir leak, causing complete loss of hydraulic fluid in HYD SYS A.
Failure Effects / Indications	<ul style="list-style-type: none">• HYD QTY shows zero• HYD PRESS show zero psi• Both SYS A HYD PUMP LOW PRESSURE Its illuminate, and<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: HYD It illuminates○ ELEC PUMP OVERHEAT It illuminates after 45 sec• Inoperative items:<ul style="list-style-type: none">○ Alternate brakes○ Ground spoilers○ Several flight spoilers (2, 4, 9, 11)○ A/P A○ Normal nose wheel steering○ Normal landing gear operation• FEEL DIFF PRESSURE, Flt control A LOW PRESSURE Its illuminate, and<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: FLT CONT It illuminates
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

14.4 Loss Of Hydraulic System B @

25AUG11

Failure Description	Catastrophic reservoir leak, causing complete loss of hydraulic fluid in HYD SYS B.
Failure Effects / Indications	<ul style="list-style-type: none">• HYD QTY shows zero• HYD PRESS show zero psi• Both SYS B HYD PUMP LOW PRESSURE Its illuminate, and<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: HYD It illuminates○ ELEC PUMP OVERHEAT It illuminates after 45 sec• Inoperative items:<ul style="list-style-type: none">○ Normal brakes, including autobrakes○ Yaw damper○ Several flight spoilers (3, 5, 8, 10)○ A/P B○ Alternate nose wheel steering○ Normal flap operation (LE backup by PTU, TE by ALTN sys)• FEEL DIFF PRESSURE, Flt control B LOW PRESSURE Its illuminate, and<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: FLT CONT It illuminates
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

14.5 Hydraulic Electric Pump Overheat @

25AUG11

Failure Description	Mechanical failure in HYD Engine Motor Driven Pump causes overheat condition. Multiple options: SYS A / SYS B
Failure Effects / Indications	<ul style="list-style-type: none">• OVERHEAT It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: HYD It illuminates• Pump fails 60 sec after failure activation
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure for SYS A; observe mentioned effects3. Deactivate failure; indications return to normal4. Perform steps 2 and 3 for SYS B

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

14.6 Reservoir Leak – Electric Motor Driven Pump Line

25AUG11

Failure Description

Leakage of 1 gal per minute between EMDP line and pressure module.

Multiple options: SYS A / SYS B

Failure Effects / Indications

- 100% HYD quantity equals:
 - SYS A: 5.85 gal
 - SYS B: 8.34 gal
 - STBY: 3.45 gal
- 0% HYD quantity equals:
 - SYS A: 1.42 gal
 - SYS B: 2.66 gal
 - STBY: 1.83 gal
- Leak speed: 1 gal/min
- HYD quantity target to:
 - SYS A: 0 gal
 - SYS B: 1.29 gal
- Both Electric and Engine Driven HYD pump LOW PRESSURE Its illuminate when target reached, and:
 - MASTER CAUTION Its illuminate
 - RCP: HYD It illuminates
- SYS B leak: PTU is still available
- System hydraulic pressure is lost

Failure Check

1. Reposition aircraft on ground
2. Activate failure for SYS A; observe mentioned effects
3. Deactivate failure, reset hyd fluid; indications return to normal
4. Perform steps 2 and 3 for SYS B

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

14.7 Reservoir Leak – Engine Driven Pump Line

25AUG11

Failure Description

Leakage of 1 gal per minute between EDP line and pressure module.

Multiple options: SYS A / SYS B

Failure Effects / Indications

- 100% HYD quantity equals:
 - SYS A: 5.85 gal
 - SYS B: 8.34 gal
 - STBY: 3.45 gal
- 0% HYD quantity equals:
 - SYS A: 1.42 gal
 - SYS B: 2.66 gal
 - STBY: 1.83 gal
- Leak speed: 1 gal/min
- HYD quantity target to:
 - SYS A: 2.25 gal
 - SYS B: 1.29 gal

SYS A:

- Only Engine Driven HYD pump LOW PRESSURE Its illuminate when target reached, and:
 - MASTER CAUTION Its illuminate
 - RCP: HYD It illuminates
- Electric Motor Driven Pump remains available with pressure and overheat conditions normal

SYS B:

- Both Electric and Engine Driven HYD pump LOW PRESSURE Its illuminate when target reached, and:
 - MASTER CAUTION Its illuminate
 - RCP: HYD It illuminates
- PTU is still available
- SYS B hydraulic pressure is lost

Failure Check

1. Reposition aircraft on ground
2. Activate failure for SYS A; observe mentioned effects
3. Deactivate failure, reset hyd fluid; indications return to normal
4. Perform steps 2 and 3 for SYS B

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

15 Landing Gear & Brakes

15.1 Air / Ground Sensor Fail In Ground Mode

25AUG11

Failure Description	Multiple AIR/GND sensors are failed in the ground mode causing overall system status to be in ground mode.
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Failure Effects / Indications	<ul style="list-style-type: none">• Landing gear lever solenoid prevents gear retraction while airborne.• Other operational items:<ul style="list-style-type: none">○ RAM DOORS OPEN lts remain illuminated○ Engines: minimum idle setting is GROUND IDLE○ Autoslats INOP○ FMC uses only GPS position○ Stick shaker is inhibited○ FMC remains in ground mode
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to FL100, gear DOWN2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal
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MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

15.2 Gear Collapse

25AUG11

Failure Description	Mechanical failure causes complete collapse of a gear strut. Multiple options: LEFT / RIGHT / NOSE
Failure Effects / Indications	<ul style="list-style-type: none">• Gear collapses on touchdown (or at time of activation if on ground) with corresponding visual, aural and aerodynamic effects• Red GEAR It illuminates
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure for LEFT GEAR; observe mentioned effects3. Deactivate failure, perform total reset and reposition on ground; indications return to normal4. Perform steps 2 and 3 for RIGHT and NOSE GEAR

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

15.3 Gear Uplock Fail

25AUG11

Failure Description	Gear does not lock up because of a mechanical failure in the uplock. Multiple options: LEFT / RIGHT / NOSE
Failure Effects / Indications	<ul style="list-style-type: none">• When gear lever is UP or OFF, Red GEAR It illuminates• Gear is kept up due to hydraulic power from SYS A
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 2000 FT, gear DOWN2. Activate failure for LEFT GEAR3. Select GEAR UP; observe left red GEAR It illuminates4. Both HYD SYS A pumps OFF; observe LEFT GEAR extends5. Both HYD SYS A pumps ON; observe LEFT GEAR retracts but does not lock6. Deactivate failure; indications return to normal7. Perform steps 2 – 6 for RIGHT and NOSE GEAR

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

15.4 Gear Uplock Release Fail @

25AUG11

Failure Description	Landing gear uplock release actuator is mechanically failed. Multiple options: LEFT / RIGHT / NOSE
Failure Effects / Indications	<ul style="list-style-type: none">• When gear lever is DOWN, selected gear does not extend and red GEAR It is illuminated• GEAR HORN may sound under certain conditions• Manual extension of the selected gear is possible
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 2000 ft, gear UP2. Activate failure for LEFT GEAR3. Select GEAR DOWN; observe LEFT GEAR does not extend4. Open MANUAL GEAR EXT ACCESS DOOR5. Pull LEFT GEAR MANUAL EXTENSION handle6. Observe LEFT GEAR extends and locks7. Deactivate failure8. Perform steps 2 – 7 for RIGHT and NOSE GEAR

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

15.5 Gear Downlock Fail @

25AUG11

Failure Description	Landing gear down lock failure. Multiple options: LEFT / RIGHT / NOSE
Failure Effects / Indications	<ul style="list-style-type: none">• When gear lever is DOWN, selected gear does extends but green GEAR It remains extinguished and red GEAR It is illuminated• GEAR HORN sounds under certain conditions• Gear is down and behaves as if locked (no collapse on touchdown)• No action to fix is possible
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 3 NM ILS, gear UP2. Activate failure for LEFT GEAR3. Select GEAR DOWN; observe mentioned effects4. Land the aircraft5. Deactivate failure6. Perform steps 2, 3 and 5 for RIGHT and NOSE GEAR

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

15.6 Gear Selector Valve Fail

25AUG11

Failure Description	Gear selector valve is failed.
Failure Effects / Indications	<p>Gear is up:</p> <ul style="list-style-type: none">• Only manual extension is possible• Red GEAR Its illuminate when gear lever is DOWN <p>Gear is down:</p> <ul style="list-style-type: none">• Retraction is not possible• Red and green GEAR Its illuminate when gear lever is not DOWN
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 2000 ft, gear DOWN2. Activate failure3. Select GEAR UP; observe mentioned effects4. Deactivate failue; gear retracts5. Activate failure6. Select GEAR DOWN; observe mentioned effects7. Deactivate failure; gear extends

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

15.7 Nosewheel Steering Fail

25AUG11

Failure Description	Normal nosewheel steering control is failed.
Failure Effects / Indications	<ul style="list-style-type: none">• Nosewheel steering is not available on ground using nosewheel steering tiller or rudder pedals; tiller and pedals can be moved but no effect• Alternate nosewheel steering is available
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects during taxiing3. Select NOSE WHEEL STEERING sw to ALTN4. Observe nosewheel steering is available5. Select NOSE WHEEL STEERING sw to NORM6. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

15.8 Normal Brakes Fail

25AUG11

Failure Description	Failure in the normal brake system prevents normal brakes and autobrakes.
Failure Effects / Indications	<ul style="list-style-type: none">• On ground, normal braking is not available through toebrakes, autobrakes• No indication prior to landing• Alternate brakes only available when HYD SYS B pressure is lost
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Both HYD B pumps OFF; observe activation of alternate brakes4. Both HYD B pumps ON5. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

15.9 Brake Pressure Indicates Zero

25AUG11

Failure Description	Brake pressure indicator failure.
Failure Effects / Indications	<ul style="list-style-type: none">• Brake pressure indicator shows zero psi• Normal brake operation possible; only noticeable when actually braking on ground, no other indications
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects when braking3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

15.10 Anti-Skid Fail

25AUG11

Failure Description	Failure of the anti-skid system.
Failure Effects / Indications	<ul style="list-style-type: none">• ANTI-SKID INOP It illuminates• No anti-skid protection available (in both normal and alternate brake systems)• No autobrakes available, AUTOBRAKE DISARM It illuminates when autobrake selector not in OFF• Deteriorated braking occurs on slippery runway
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

15.11 Autobrakes Fail @

25AUG11

Failure Description	Failure in autobrake system.
Failure Effects / Indications	<ul style="list-style-type: none">• AUTOBRAKE DISARM It illuminates when autobrake switch not in OFF• No autobraking available
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

16 Warning Systems

16.1 EGPWS Fail

25AUG11

Failure Description	Failure of the Ground Proximity Warning Computer.
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Failure Effects / Indications	<ul style="list-style-type: none">• GPWS INOP It illuminates• No GPWS aural and visual warnings• GPWS test fails (test available on ground only)
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Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure3. GPWS test not available4. Observe mentioned effects5. Deactivate failure; indications return to normal
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MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

16.2 False Terrain Warning

25AUG11

Failure Description	False terrain warning from the GPWC.
Failure Effects / Indications	<ul style="list-style-type: none">• PULL UP message displayed on PFDs• “TERRAIN – PULL UP” aural warning sounds• Warning terminates after 300 ft climb• One-time warning, does not reoccur unless failure reselected• Available at any altitude
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft to 2000 ft2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

16.3 False Windshear Warning

25AUG11

Failure Description	False windshear warning from the GPWC.
Failure Effects / Indications	<ul style="list-style-type: none">• WINDSHEAR message displayed on PFDs• “WINDSHEAR” aural warning sounds• Warning terminates after 300 ft climb• FD WINDSHEAR functionality available• One-time warning, does not reoccur unless failure reselected• Available at any altitude
Failure Check	<ol style="list-style-type: none">4. Reposition aircraft to 2000 ft5. Activate failure; observe mentioned effects6. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

16.4 Terrain Display Mode Fail

25AUG11

Failure Description	Terrain mode failure from GPWC.
Failure Effects / Indications	<ul style="list-style-type: none">• TERR FAIL flag displays on both NDs (if TERR selected)• Terrain data not displayed on NDs
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground, preferably in mountainous terrain2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

16.5 PSEU Light Illuminated

25AUG11

Failure Description	PSEU light illuminates due to faulty overhead exit gear lock.
Failure Effects / Indications	<ul style="list-style-type: none">• Available on ground only• PSEU It illuminates, and:<ul style="list-style-type: none">○ MASTER CAUTION Its illuminate○ RCP: OVERHEAD It illuminates
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Reposition aircraft at 2000 ft; observe PSEU It extinguishes4. Deactivate failure; indications return to normal

MPS FSTD - IOS – System failures

MPS Proprietary data – Reproduction not authorized

FSTD: B737 FTD

16.6 False Stick Shaker Activation

25AUG11

Failure Description	Due to error in SMYD, both stick shakers activate.
Failure Effects / Indications	<ul style="list-style-type: none">• Stick shakers on both control columns activate for the duration of the failure• Can be disabled by pulling the appropriate stick shaker CBs
Failure Check	<ol style="list-style-type: none">1. Reposition aircraft on ground2. Activate failure; observe mentioned effects3. Deactivate failure; indications return to normal