BOEING 737

Management Reference Guide

Edition CL (3/4/500) + NG (6/7/8/900)

Captain Pat BOONE • April 2005 • www.b737mrg.net

ICON LEGEND

 Critical

 Caution

 Information

 Possible Cause(s)

 Perform - Accomplish

 Definition - Clarification

 Key Point - Rule of Thumb

 System Review

 Circuit Breaker

 Power Source

 Subsequent Failure

 NNC Detail - Topic

 Continued on Next Page

TITLE

Title corresponds to  NNC

TITLE

Failure or information for which
a specific  NNC does not exist

TITLE 700

Applies only to specified aircraft type
or specified system

RESOURCES

DDPG-MEL	Dispatch Deviations Procedures Guide - Minimum Equipment List
DDPG-CDL	Dispatch Deviations Procedures Guide - Configuration Deviation List
DDPG-FER	Dispatch Deviations Procedures Guide - Ferry
DDPG-MISC	Dispatch Deviations Procedures Guide - Miscellaneous
FCOM	Flight Crew Operating Manual
FCTM	Flight Crew Training Manual
FPPM	Flight Planning & Performance Manual
RTOM	Regulated Takeoff Mass Book
OPS-A	JAR-OPS 1 - Part A
OPS-B	JAR-OPS 1 - Part B
OPS-C	JAR-OPS 1 - Part C
CAM	Cabin Attendant Manual
L	OM - Limitations
SP	OM - Supplementary Procedures
CI	QRH - Checklist Introduction
NNC	QRH - Non-normal Checklist
NNM	QRH - Non-normal Maneuvers
PI	QRH - Performance Inflight [JAA] = PD - Performance Dispatch [FAA]
MRG	B737 Management Reference Guide

Note

Page and section numbers differ from edition to edition and may therefore be different from numbers mentioned in this guide.

Demo 1

the b737 mrg
covers all QRH items
and many more

AUTO SLAT FAIL

ELEVATOR TAB VIBRATION — NG

FSEU INOP — NG

APU LOW OIL PRESSURE

APU DOES NOT SHUT DOWN WHEN SELECTING MCS TO OFF

HYDRAULIC PUMP LOW PRESSURE

ELECTRIC MOTOR DRIVEN PUMP DOES NOT ENGAGE WHEN SELECTED ON

GEAR LEVER WILL NOT MOVE UP AFTER TAKEOFF

PARKING BRAKE WARNING RED LIGHT DOES NOT ILLUMINATE

HIGH ALTITUDE LANDING INOP — As Installed

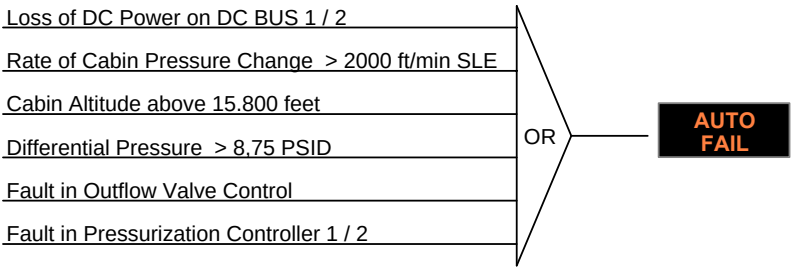
EQUIPMENT COOLING OFF

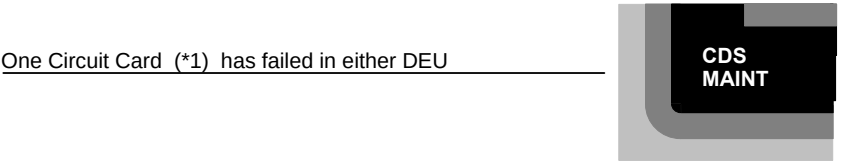
HIGH DUCT PRESSURE

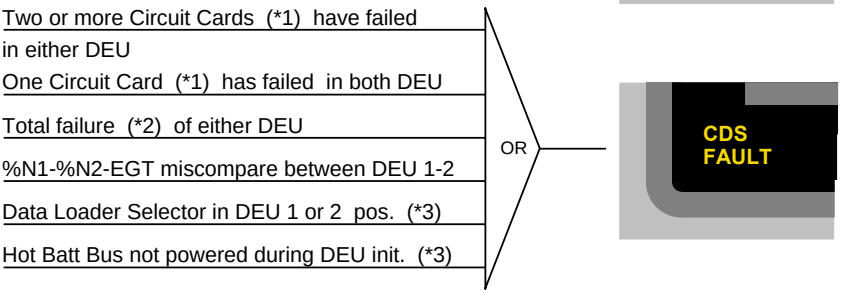
TRIM AIR FAILURE — 400-800-900

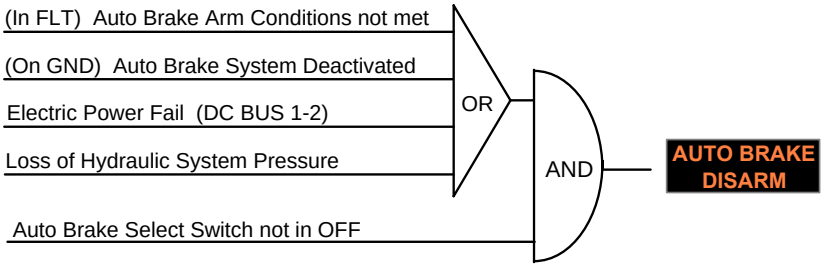
Demo 2

the b737 mrg
shows flow chart
for all amber caution lights


Loss of DC Power on DC BUS 1 / 2
Rate of Cabin Pressure Change > 2000 ft/min SLE
Cabin Altitude above 15.800 feet
Differential Pressure > 8,75 PSID
Fault in Outflow Valve Control
Fault in Pressurization Controller 1 / 2
OR
AUTO FAIL

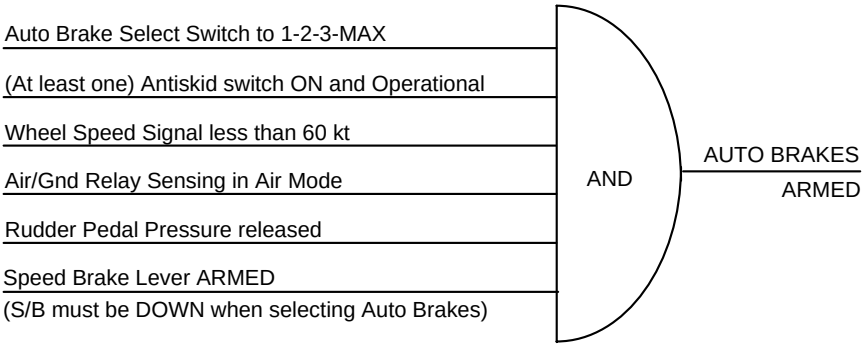

One Circuit Card (*1) has failed in either DEU
CDS MAINT

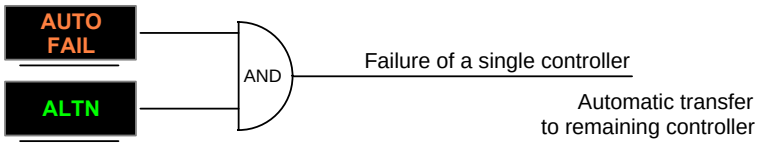

Two or more Circuit Cards (*1) have failed in either DEU
One Circuit Card (*1) has failed in both DEU
Total failure (*2) of either DEU
%N1-%N2-EGT miscompare between DEU 1-2
Data Loader Selector in DEU 1 or 2 pos. (*3)
Hot Batt Bus not powered during DEU init. (*3)
OR
CDS FAULT

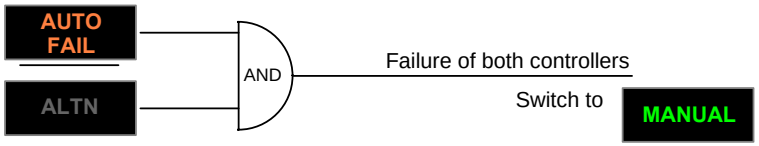

(In FLT) Auto Brake Arm Conditions not met
(On GND) Auto Brake System Deactivated
Electric Power Fail (DC BUS 1-2)
Loss of Hydraulic System Pressure
Auto Brake Select Switch not in OFF
OR
AND
AUTO BRAKE DISARM

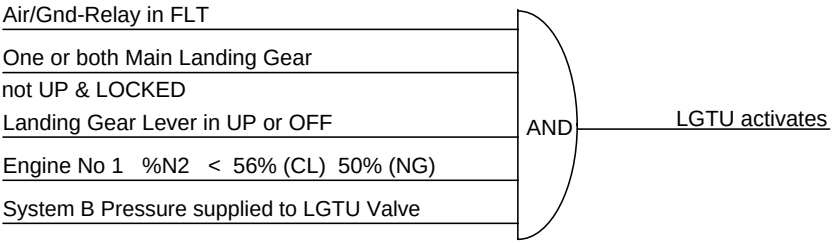
Demo 3

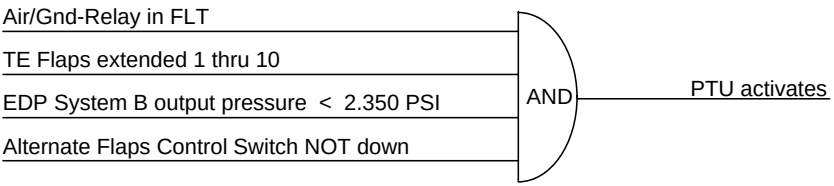
the b737 mrg
displays a flow diagram
for many systems operation


Auto Brake Select Switch to 1-2-3-MAX
(At least one) Antiskid switch ON and Operational
Wheel Speed Signal less than 60 kt
Air/Gnd Relay Sensing in Air Mode
Rudder Pedal Pressure released
Speed Brake Lever ARMED
(S/B must be DOWN when selecting Auto Brakes)
AND
AUTO BRAKES
ARMED


AUTO
FAIL
ALTN
AND
Failure of a single controller
Automatic transfer
to remaining controller

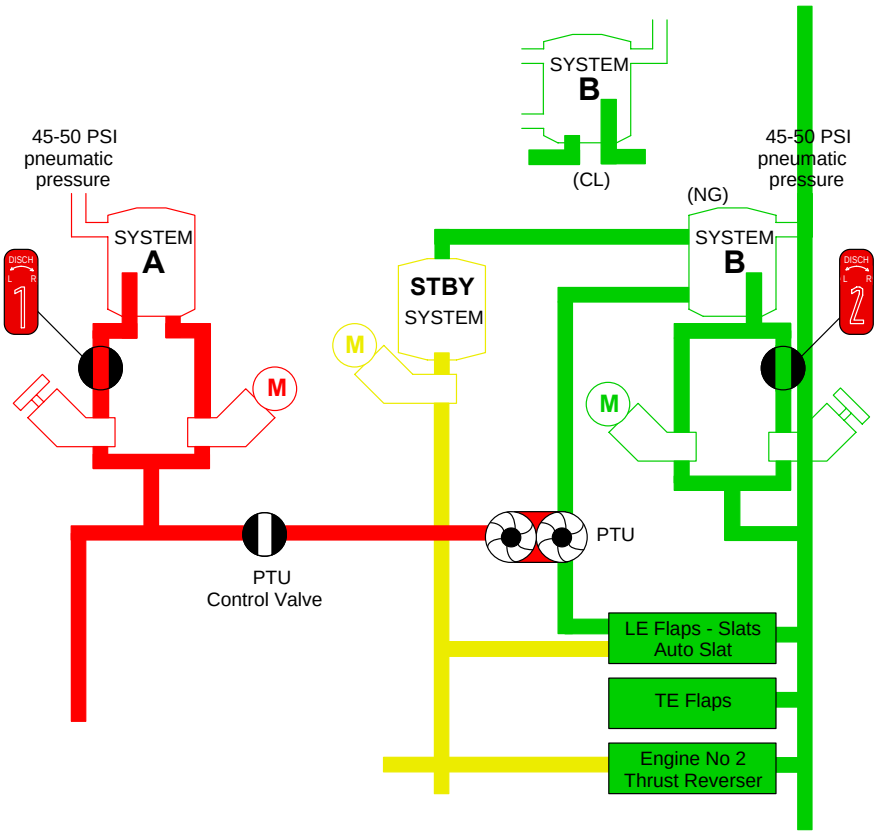

AUTO
FAIL
ALTN
AND
Failure of both controllers
Switch to
MANUAL

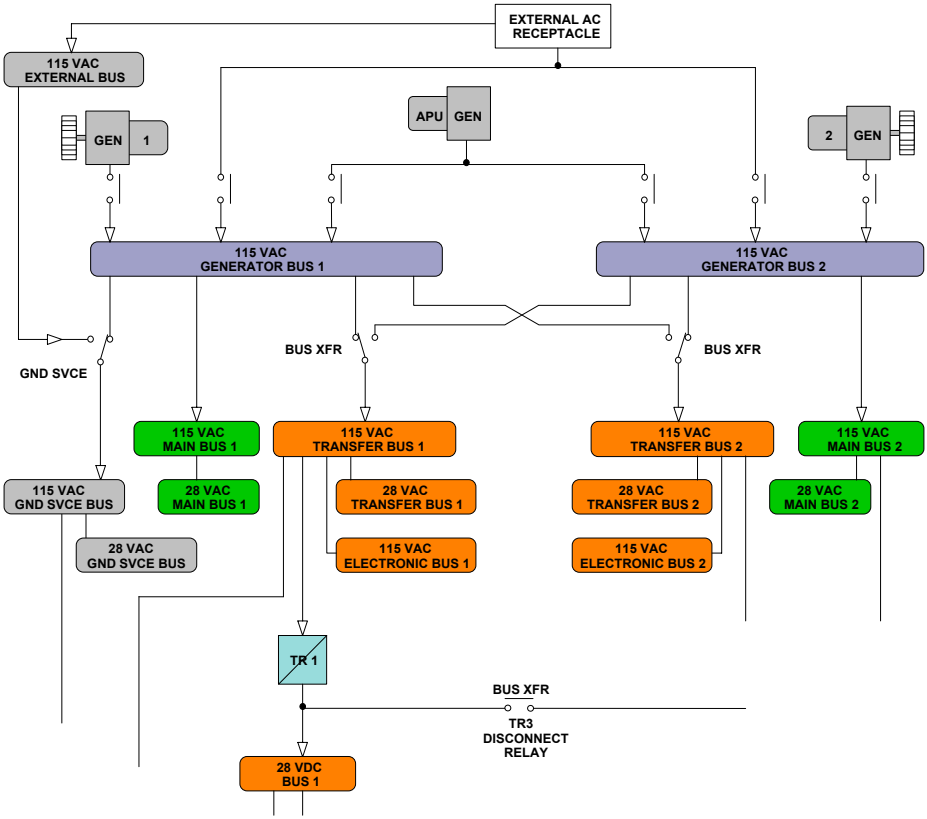

Air/Gnd-Relay in FLT
One or both Main Landing Gear
not UP & LOCKED
Landing Gear Lever in UP or OFF
Engine No 1 %N2 < 56% (CL) 50% (NG)
System B Pressure supplied to LGTU Valve
AND
LGTU activates

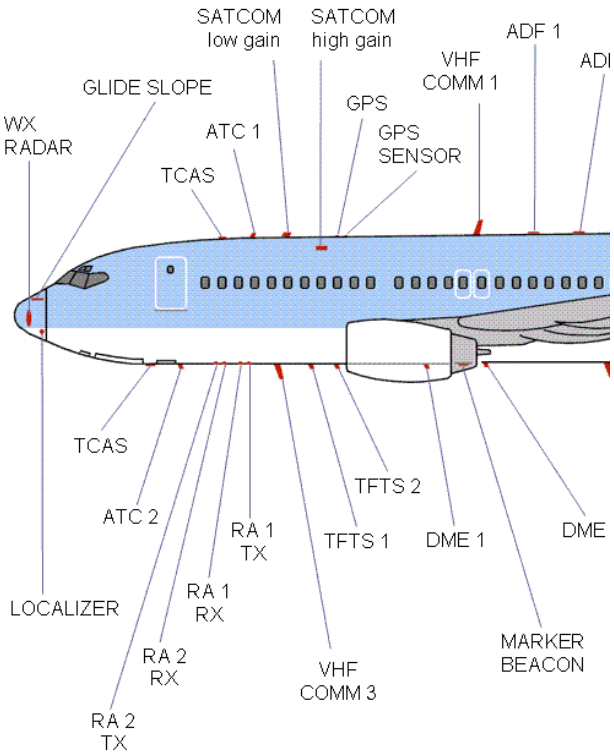

Air/Gnd-Relay in FLT
TE Flaps extended 1 thru 10
EDP System B output pressure < 2.350 PSI
Alternate Flaps Control Switch NOT down
AND
PTU activates

Demo 4

the b737 mrg
contains many color drawings

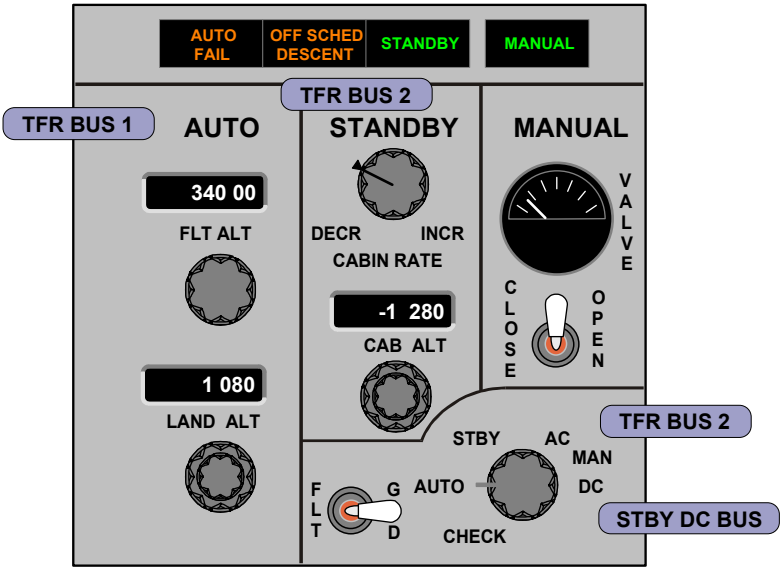

SYSTEM
B
(CL)
45-50 PSI
pneumatic
pressure
(NG)
45-50 PSI
pneumatic
pressure
SYSTEM
A
STBY
SYSTEM
SYSTEM
B
DISCH
L R
1
DISCH
L R
2
M
M
M
PTU
PTU
Control Valve
LE Flaps - Slats
Auto Slat
TE Flaps
Engine No 2
Thrust Reverser

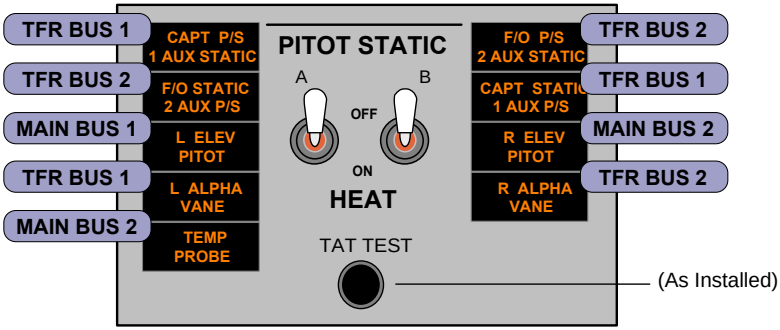

EXTERNAL AC RECEPTACLE
115 VAC EXTERNAL BUS
GEN 1
APU GEN
2 GEN
115 VAC GENERATOR BUS 1
115 VAC GENERATOR BUS 2
BUS XFR
BUS XFR
GND SVCE
115 VAC MAIN BUS 1
115 VAC TRANSFER BUS 1
115 VAC TRANSFER BUS 2
115 VAC MAIN BUS 2
115 VAC GND SVCE BUS
28 VAC MAIN BUS 1
28 VAC TRANSFER BUS 1
28 VAC TRANSFER BUS 2
28 VAC MAIN BUS 2
28 VAC GND SVCE BUS
115 VAC ELECTRONIC BUS 1
115 VAC ELECTRONIC BUS 2
TR 1
BUS XFR
TR3 DISCONNECT RELAY
28 VDC BUS 1

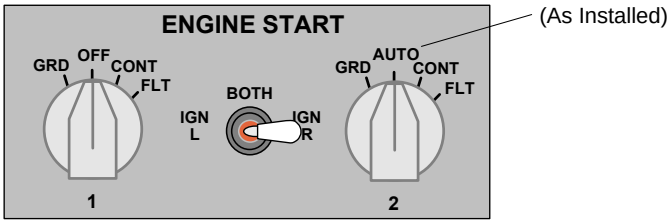

SATCOM
low gain
SATCOM
high gain
ADF 1
VHF
COMM 1
ADI
GLIDE SLOPE
GPS
WX
RADAR
ATC 1
GPS
SENSOR
TCAS
TCAS
TFTS 2
ATC 2
RA 1
TX
TFTS 1
DME 1
DME
RA 1
RX
LOCALIZER
MARKER
BEACON
RA 2
RX
VHF
COMM 3
RA 2
TX

Demo 5

the b737 mrg
contains major panel drawings


AUTO FAIL
OFF SCHED DESCENT
STANDBY
MANUAL
TFR BUS 1
TFR BUS 2
AUTO
STANDBY
MANUAL
340 00
FLT ALT
1 080
LAND ALT
DECR
INCR
CABIN RATE
-1 280
CAB ALT
VALVE
CLOSE
OPEN
TFR BUS 2
STBY
AC
MAN
AUTO
DC
FLT
G
D
CHECK
STBY DC BUS


TFR BUS 1
TFR BUS 2
MAIN BUS 1
TFR BUS 1
MAIN BUS 2
CAPT P/S 1 AUX STATIC
F/O STATIC 2 AUX P/S
L ELEV PITOT
L ALPHA VANE
TEMP PROBE
PITOT STATIC
A
B
OFF
ON
HEAT
TAT TEST
F/O P/S 2 AUX STATIC
CAPT STATIC 1 AUX P/S
R ELEV PITOT
R ALPHA VANE
TFR BUS 2
TFR BUS 1
MAIN BUS 2
TFR BUS 2
(As Installed)


ENGINE START
GRD
OFF
CONT
FLT
IGN L
BOTH
IGN R
AUTO
GRD
CONT
FLT
1
2
(As Installed)

Demo 6

the b737 mrg
explains how to manage
a failure or malfunction

Section	Remarks
Approach	Request Radar Vectors for 15 miles final with wide turns due to 15° bank angle limit
	With a published procedure turn, adjust outbound leg heading or timing due to limited bank !
	Expect impression to be high on profile due to a high nose-up attitude
Landing	Burn-off Fuel to practical minimum in order to reduce Landing Weight
	Choose RWY : - Weather forecast at ETA (= after fuel burn-off) and landing minima (200 ft / 700 m) - Refer to PI [NON-NORMAL CONFIG LANDING DISTANCE] - No X-wind - Avoid Wet Runway - Verify obstacles for straight out Go-Around
	Autobrakes are not recommended, use maximum reverse thrust and gentle positive braking
	High Speed Tires maximum 195 kts ground speed. Verify tire condition with PNF external inspection
	Be ready to take-over with Nose Wheel steering for directional control upon roll-out
	No flare, positive landing. Apply forward column pressure after touchdown !
Go-Around	Go-Around with Flaps UP
	Limit Bank Angle to 15° when below 210 kts (or 220 kts)
Diversion	With the LE Devices extended, limit airspeed to 230 kts and remain below FL 200
	With System B Pressure available, however, **the LE devices can be retracted by positioning the Alternate Flaps Master Switch back to OFF**
	Compute Alternate Fuel with penalty 10% with LE devices in Full Extend

(continued next page)

ATC	"PAN-PAN : Technical problem - No flaps for landing - Landing at high speed"
	Request : - Weather forecast at ETA (= after fuel burn-off) - Straight ahead Go-Around due to limited bank - Fire brigade to inspect Landing Gear at landing roll-out
	Report : - Holding time required to burn-off fuel and prepare for approach - Persons on Board - Fuel upon landing - Any or No Dangerous Goods on Board
Cabin Crew	Prepare for emergency landing and possible emergency evacuation (Optional – depending on company procedures)
	Brief passengers for landing. ('Brace' is optional depending on RWY length and condition)
	Cabin Crew must report "Cabin Secure" when ready for approach
Passengers	"Technical problem, airplane under control. Remain in holding for x time to reduce fuel. Follow Cabin Crew instructions."
	FO call at 400 ft AGL : "Brace-Brace" (optional)

Demo 7

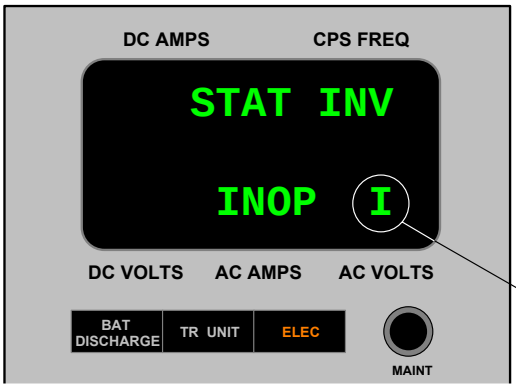
the b737 mrg
leads you through basic maintenance
tips & tricks to obtain more info
on a failure

The ELEC amber light indicates a fault in the DC or STBY power system. The ELEC amber light operates on GND only.

Additional information on the electrical fault can be obtained from the LAD on the Electrical Panel as follows :

Select **both AC and DC Meter Selectors to TEST** and temporarily push the MAINT switch. The BITE will first illuminate all segments of the LAD (takes about 15 seconds) and then show the fault information. To bypass the BITE display test, push the MAINT switch just after test begins. If there are no faults, the message **NO FAULTS STORED** will appear.

When pushing the MAINT switch again, the next fault will be displayed, if any. Continue until all faults have been displayed and **HOLD BUTTON CLEAR FAULTS** is announced. Pressing the MAINT switch for a few seconds will reset all faults, however this is considered as being a maintenance procedure.



To easily determine which Electrical Bus has failed, refer to the illumination of the four Main Tank Fuel Boost Pump Low Pressure amber Light as described below.
One or several Low Pressure amber lights will illuminate when either the Fuel Boost Pump or the Fuel Boost Pump Control has lost its AC respectively its DC power source.

Loss of TFR BUS 1 (confirmed by the TFR BUS OFF amber light, unless its circuit breaker has tripped)

Loss of TFR BUS 2 (confirmed by the TFR BUS OFF amber light, unless its circuit breaker has tripped)

Loss of MAIN BUS 1 (and GEN BUS 1 if BUS OFF amber light is illuminated)

Loss of MAIN BUS 2 (and GEN BUS 2 if BUS OFF amber light is illuminated)

Demo 8

the b737 mrg
alerts for subsequent failures

SUBSEQUENT FAILURE(S)

PACK TRIP OFF / PACK opposite side

Position the failed Pack Switch in OFF, causing the Isolation Valve to open. Use the remaining Pack with the opposite engine

WING BODY OVERHEAT opposite side

Checklist calls to switch off the affected Engine Bleed Air. However, since this will result in a loss of both packs and thus loss of pressurization, it is recommended to :

- Left WING BODY OVERHEAT :
  - Retard thrust on the respective engine
  - PAN-PAN call
  - Descend to FL 100 in airway
  - Perform NNC [WING BODY OVERHEAT]
  - Continue unpressurized to destination or diversion field

- Right WING BODY OVERHEAT :
  - Retard thrust on the respective engine
  - PAN-PAN call
  - Descend to FL 170 in airway
  - Perform NNC [WING BODY OVERHEAT]
  - Use the APU as an alternate air source

With a low actual Cabin Altitude (intermediate cruising level or while in climb), you can indeed switch off the Affected Engine Bleed Air.
The Cabin Altitude will increase by approximately 1500 ft/min SLE, it should not reach 10.000 feet before the airplanes altitude is 10.000 feet.

ENGINE FAILURE or **BLEED TRIP OFF** opposite side

- Pressurization is lost
- Main Outflow Valve will drive to full close
- Cabin Pressure Rate of Climb will be between 1000 and 2500 ft/min
- PAN-PAN call - Descent in airway
- Descent to 1# INOP service altitude or 17.000 feet where the APU may be used as an alternate air source
- The Eng. No 1 Bleed Air may be selected OFF to extinguish the DUAL BLEED amber light

Demo 9

the b737 mrg
proposes methods
to work around a problem

On GND If Hydraulic System A or System B oil quantity indicates below RFL (CL) - RF (NG) the Hydraulic System should be topped by maintenance with oil.


In case of very low quantity, a leak must be suspected and an extra Pre-Flight inspection is recommended.


However, if no maintenance available and a leak is not suspected, you can transfer hydraulic fluid from one System to the other System via Brakes or Reverser Return Lines. Each cycle will transfer approximately 0,50 USG.

TO TRANSFER HYDRAULIC FLUID FROM SYSTEM A TO SYSTEM B


Verify Aircraft Chocks in place, verify area under Stabilizer is clear

System A EMDP…….. ON

System B EMDP…….. OFF

System B Pressure…….. DEPRESSURIZE
Move Stabilizer up/down
Parking Brakes…….. SET
Uses hydraulic fluid from System A
Parking Brakes…….. RELEASE
Returns hydraulic fluid to System B

TO TRANSFER HYDRAULIC FLUID FROM SYSTEM B TO SYSTEM A


Verify area around Engine No. 1 Thrust Reverser is clear

System A EMDP…….. OFF

System B EMDP…….. OFF

System A Flight Control Switch…….. STBY RUD

Engine No 1 Thrust Reverser…….. DEPLOY
Uses hydraulic pressure from Standby System
System A Flight Control Switch…….. ON

System A EMDP…….. ON

Engine No 1 Thrust Reverser…….. STOW
Uses hydraulic pressure from System A

Demo 10

the b737 mrg
refers to DDPG-MEL,
JAR– FAA, QRH-NNC, OPS

START VALVE DOES NOT CLOSE

Shutdown Engine NNC [START VALVE OPEN]

- Starter Valve Breaker popped P6-2A (CL) P18-2B P6-2C (NG)

Apply DDPG-MEL 80-3 [MANUAL START PROCEDURE]

APU FAILURE DURING ENGINE START

OPS-B 3.10.1.3

APU failure during first Engine Start :

- Select Standby Power to BAT to obtain Engine Indications !
- If Engine did not reach self sustaining speed, it must be shut down. The Engine must than be motored for 60" as soon as ASU is available
- Perform APU NNC [OVERSPEED] or [LOW OIL PRESSURE]
- Check APU P18-5C (CL)
- Check DDPG-MEL 49-1 to dispatch aircraft without APU
  Refer to MRG [DISPATCH WITH APU INOP]
- Start both Engines with ASU

APU failure after a successful start of first Engine :

- Select GEN on BUS
- Perform APU NNC [OVERSPEED] or [LOW OIL PRESSURE]
- Check APU P18-5C (CL)
- Check DDPG-MEL 49-1 to dispatch aircraft without APU
  Refer to MRG [DISPATCH WITH APU INOP]
- Use SP 7.3 [ENGINE CROSSBLEED START] to start Eng. No 1
- Switch to SP 2.7 [UNPRESSURIZED T/O] in case a NO BLEED Takeoff was scheduled.

Demo 11

the b737 mrg
contains many tables
with valuable numbers

HYDRAULIC SYSTEM

	(CL)			(NG)			
Sys	**USG**	**Indication**		**USG**	**Ind.**	**Pressure**	**Status**
A				6,80	106%		Max. Capacity - Overfill
	4,80	F	100%	5,70	100%	3000 PSI	Full
	4,20	RFL	88%	4,70	76%	3000 PSI	Refill Limit
	4,00		83%	4,00	70%	3000 PSI	In Flight Gear Up
	1,80	<1/4	22%	2,30	20%	3000 PSI	Leak in EDP System OK
	1,00	0	0%	1,00	0%	> 0 PSI	Zero QTY indication
	0,00			0,00		0 PSI	Leak in EMDP or lines Loss of System A
B				10,70	106%		Max. Capacity - Overfill
	7,20	F	100%	8,20	100%		Full
	6,40	RFL	88%	6,90	76%	3000 PSI	Refill Limit
	4,95	>1/2	64%	6,60	72%	3000 PSI	Leak in STBY System Loss of STBY System
	3,50	<1/2	40%	1,30	0%	3000 PSI (CL)	Leak in EDP System OK (CL)
	1,30	>0	5%			> 0 PSI	Leak in EMDP or lines
							Loss of System B but sufficient for PTU
	1,00	0	0%			> 0 PSI	Zero QTY indication
	0,00			0,00		0 PSI	Leak in PTU Loss of System B + PTU
STBY	2,80			3,60			
	1,40	LOW QTY		1,80	LOW		Loss of STBY System

ENGINE

CL

Instrument	CB	non-EIS Powered by	MEL	Remark
N1%	P6-2D	BATT BUS	77-2	Digital indication not required, analog NOGO
EGT	P6-2A	DC STDBY BUS	77-6	Digital indication not required, analog NOGO
N2%	P6-2D	DC STDBY BUS	77-3	Required on Eng. No 1 due to LGTU (*)
FF	P6-3A	DC BUS 1/2	73-5	One may be INOP provided…
OIL PRESS	P6-2D	TFR BUS 1/2	79-5	NOGO - Both required
OIL TEMP	P6-2D	TFR BUS 1/2	79-3	NOGO - Both required

DISPATCH WITH ANTISKID INOP TAKEOFF COMPUTATION

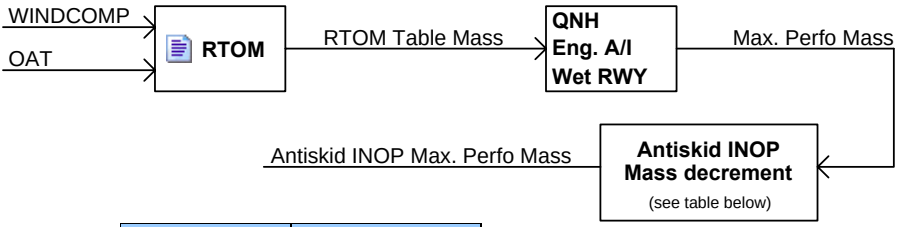
- Runway may not be **wet** or **contaminated**

- Check **Landing distance** at destination and Takeoff alternate
  PI [Advisory Information – Non-Normal Configuration Landing Distance]

- Aircraft is CAT I (200ft – 700m) ; check WX-minima at destination, Takeoff alternate and enroute. PI [Table of Requirements]

- No improved climb

MASS



Type		
300	20K	-7000
	22K	-7800
400	22K	-7700
	23.5K	-7500
500	18.5K	
	20K	-7500

Based on PI Introduction Text

Demo 12

the b737 mrg
contains listing of all
circuit breakers and power sources

(not available for B737-1/200)

TRANSFER BUS 1 - 115 VAC

Air Cond Isolation Valve
APU SCU
CDU 1 (*)
Engine 1 EEC
Equip Cool Supply Fan Power Altn
Galley Bus C-D
GPWS
Hyd Sys EMDP 1 Sys B
Radio Navigation DME 1 (*)
Radio Navigation Radio Altm 1
TCAS
TRU 1
Vacuum Waste Blower
Yaw Damper Indicator

XFR BUS 1 SECT 1 - 115 VAC

AFCS Stabilizer Trim
AFCS Sys A Mach Trim AC

MAIN BUS 1 - 115 VAC

Door Area Heater Aft
Door Area Heater Fwd
Heaters Drain Mast - Air Mode
Hose Heaters
Lavatory Water Heater A-D-E
Lights – Ext. Logo Illum
Overwing Door Heater Blankets
Potable Water Compressor
Recirc Fan Left Cabin Air (800-900)
Shaver Outlet 115VAC

XFR BUS 1 IFE/PASS SEAT PWR

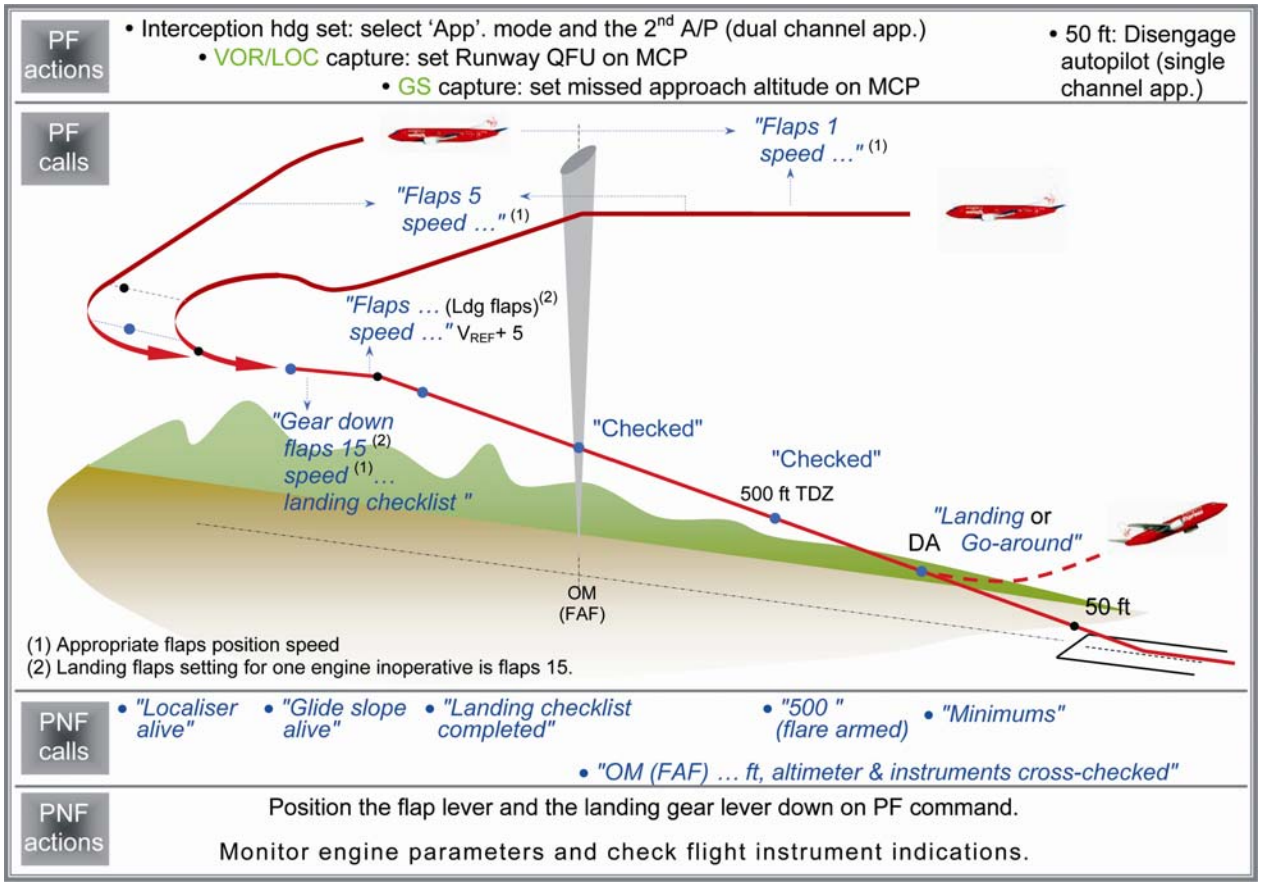
ACARS Printer

1 Airplane General, Emergency Equipment, Doors, Windows

Aft Cargo Loader Cont	P6-11	D8
Aft Cargo Loader Drive	P9-	E8
Door Area Htr-Aft	P91	A14
Door Area Htr-Fwd	P91	A16
Door Lock Cabin	P6-3	E1
Drain SOV	P6-12	B4
Fwd Airstair Actuator	P6-4	B17

Demo 13

the b737 mrg
contains learning tools


PF actions
• Interception hdg set: select 'App'. mode and the 2nd A/P (dual channel app.)
• VOR/LOC capture: set Runway QFU on MCP
• GS capture: set missed approach altitude on MCP
• 50 ft: Disengage autopilot (single channel app.)
PF calls
"Flaps 1 speed …" (1)
"Flaps 5 speed …" (1)
"Flaps … (Ldg flaps)(2) speed …" VREF+ 5
"Gear down flaps 15 (2) speed (1) … landing checklist "
"Checked"
"Checked"
500 ft TDZ
"Landing or Go-around"
DA
OM (FAF)
50 ft
(1) Appropriate flaps position speed
(2) Landing flaps setting for one engine inoperative is flaps 15.
PNF calls
• "Localiser alive"
• "Glide slope alive"
• "Landing checklist completed"
• "500 " (flare armed)
• "Minimums"
• "OM (FAF) … ft, altimeter & instruments cross-checked"
PNF actions
Position the flap lever and the landing gear lever down on PF command.
Monitor engine parameters and check flight instrument indications.

Demo 14

the b737 mrg
contains many thumb-rules

MAXIMUM X-WIND AND TAILWIND

Braking Action		POOR				P / M				MEDIUM							M / G				GOOD		
		91				92				93							94				95		
Coefficient µ x 100		0	10	20	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	50	100	
Max. X-WIND	RWY < 2000m	5				10				15							20				30		
	Other RWY	10				15				20							25				34		

Rule of Thumb :

Max X-WIND = (**BA Coefficient** x 100) **- 15** - 5 (short runway)

AUTO FAIL
UNSCHEDULED PRESSURIZATION CHANGE

CPCS

Thumb rule to define whether Cabin Pressure can follow Airplane descent

CABIN ALT / 100 = NAUTICAL MILES REQUIRED

e.g. The Cabin Altitude Pressure shows 4000 feet, then the controller requires circa 40 NM to descent to Sea Level
If distance to destination is 40 NM or more, remain in Auto Mode. If track miles to destination is less than 40 NM, select Standby Mode and increase rate of descent.

If destination elevation is well above SL, subtract Land ALT from the Cabin ALT :

(**CABIN ALT – LAND ALT) / 100 = NAUTICAL MILES REQUIRED**

e.g. The Cabin Altitude Pressure shows 4000 feet and destination elevation is 1500 feet, then the controller requires circa 25 NM to descent to Airport Elev.

21) R/D required to be down at certain point

R/D (feet/min) = speed number x altitude (feet) / distance (NM)

Descent 17000 feet in the next 28 NM TAS 240 kt
R/D = 4 x 17000 / 28 = 2400 feet/min

22) Vertical speed by changing Body Attitude (valid for high speeds)

R/D (feet/min) = Mach x ∆BA (°)

Mach 0.74 → One degree BA results in 740 feet/min

23) Vertical speed by changing Body Attitude (valid for lower speeds)
Use TAS or IAS in approach

R/D (feet/min) = speed number x ∆BA (°)

Speed TAS 420 kt BA 3 degrees down
R/D = 7 x 3 = 2100 feet/min

24) Distance required if you want to maintain a certain R/D profile

Distance (NM) = speed number x altitude (feet) / R/D

Descent 23000 feet at 1000 feet/min TAS 300 kt
Distance = 5 x 23 = 115 NM

25) Wind correction for descent distance

Wind Corr (NM) = 10% for each 40 kt component

Example Thumbrule 20) with 20 kts Tailwind
Add 58 to 87 = 92 NM

Demo 15

the b737 mrg
gives guidelines to many subjects

FIRE DRILL

 Veirfy Cockpit Door locked due to smoke and to avoid passengers in panic from entering the Flight Deck !

 Set-up a Cabin Crew Fire Team :

- No 1 is the Fire Fighter that will extinguish the fire. He/she wears a Smokehood and holds a fire-extinguisher.
- No 2 is the Back-Up Fighter who stands behind the Fire Fighter. In situations with poor visibility due to heavy smoke, the Back-Up Fighter maintains physical contact at all times through his/her arm on the Fire Fighter's shoulder. He/she also wears a Smokehood and holds a fire-extinguisher.
- No 3 is the Crowd Controller that will direct ABP's to move away from the fire. At least 3 rows should be evacuated. Lift seat arm to place 5 ABP's on 3 seats.

The Crowd Controller should not wear a Smokehood in order to keep his credibility that everything is safe.

Unwilling or unconscious passengers should be left behind in their seat or on the ground. They can be protected by putting the seat head-cover in their mouth.

In the meantime, he/she informs the captain via interphone on a regular basis :

- type of incident (fire and/or smoke)
- precise location
- amount
- actions that are undertaking by the crew

 Never focus on an unwilling passenger, always fight the Fire/Smoke first ! Before moving an unconscious passenger, first check if he or she isn't dead.

 The BCF Extinguisher :

- only to be used on visible flames, never on smouldering fire or smoke (except for smoke sorting from side panels)
- always to be kept in upright position
- is most effective to fight open flames at a distance of 3 or 4 metres
- always to be used in shots of max 1 or 2 seconds

 Before approaching the fire, first test the Extinguisher by a short shot !

 Before opening any door or locker, touch it with the back-side of the hand to sense the heat. Never remove your Smokehood until all items in vicinity are checked.