BOEING 737-800
TECHNICAL REVIEW - CHAPTER 6

AC ELECTRICS

There is two basic principles of operation for the 737 electrical system:
- No parralleling of the AC sources of power.
- The source of power being connected to a transfer bus automatically disconnects the existing one.

ENGINE DRIVEN GENERATORS

Primary AC power is supplied by 2 engine driven IDG (Intgrated Drive Generators) which supply three-phase, 115 volt, 400hz alternating current.

Each IDG:
- Supply power to their respective **AC TRANSFER BUS** via GCB (Generator Circuit Breaker)
- Can supply power to the opposite AC Transfer Bus when the opposite IDG is inoperative via the **TIE BUS**

TIE BUS

The TIE BUS connects the 2 AC TRANSFER BUS and can supply them with AC from any source (IDG, APU or Ground Power)

- The BUS TIE BREAKER (BTB) 1 & 2 opens when 2 sources are connected to prevent parrallel operation.
- When only ONE source of AC is connected to the TIE BUS : the BTB closes and the TIE BUS energizes both the AC TRANSFER BUS 1 & 2

BUS TIE BREAKER operation example:

If APU if connected, and NO IDG are in operation then:
- BTB closes and APU supplies power to AC TRANSFER BUS 1 & 2

If one IDG is connected then:
- The BTB opens and the IDG supplies power to its related AC TRANSFER BUS
- APU supplies power to the other AC TRANSFER BUS.

If the other IDG is connected then:
- the BTB opens and isolates the TIE BUS
- APU is automaticaly disconnected and APU GEN OFF BUS light illuminates.
- Each IDG supplies its related AC TRANSFER BUS

AC TRANSFER BUS

AC TRANSFER BUS 1 supplies power to:
- Main BUS 1
- Galley BUS (C + D)
- Ground Service BUS 1
- TR 1
- AC Standby BUS

AC TRANSFER BUS 2 supplies power to:
- Main BUS 2
- Galley BUS (A + B)
- Ground Service BUS 2
- TR 2 & 3

AUTOMATIC GENERATOR ON-LINE

In case the airplane takes off with the APU powering both transfer busses.
If the APU is either shut down or fails, the IDG are automatically connected to their related transfer busses.
This action occurs only once in flight and only under the circumstances described above.

LOAD SHEDDING:

During flight, if ONLY ONE power source becomes available the electrical system automatically removes some buses to decrease electrical load, one at a time, in order:

- Galley BUS 2
- Main BUS 2
- Galley BUS 1
- Main BUS 1
- IFE
- (If power becomes available again, these busses are automatically connected again)

APU Load Shedding: in flight if the APU is the only power source:

- ALL Galley Busses AND ALL Main Busses are shed
- If overload still exists both IFE bus are shed

AC SYSTEM ANNUNCIATOR LIGHTS

On the Ground Power and Bus Switching Panel:

- **TRANSFER BUS OFF**
  > Related TRANSFER BUS not energized

- **SOURCE OFF**
  > Related TRANSFER BUS not energized by the selected source
  > Generator does not connect to the bus
  > Connected Source has been replaced by different Source

- **GEN OFF BUS**
  > Related TRANSFER BUS not being supplied with power by its IDG
- **APU GEN OFF BUS**
  > APU Generator available but not connected (light extinguishes when connected)

- **GRD POWER AVAILABLE**
  > Ground power available (does not extinguish if ground power is selected)

DC ELECTRICS

TRANSFOMERS RECTIFIERS

The main source of DC power are 3 Transfomer Rectifiers (TR) which change 115 volts AC in 28 volts DC.

TR 1 - is supplied by AC TRANSFER BUS 1 and is the normal power source for DC BUS 1
TR 2 - is supplied by AC TRANSFER BUS 2 and is the normal power source for DC BUS 2

TR 3
- is normaly supplied by AC TRANSFER BUS 2 but AC TRANSFER BUS 1 can be used as backup
- is used as an auxilliary DC if TR 1 or TR 2 fails, it is also the normal source for the battery bus

If any of the TR fails, the remaining TRs can supply the neccessary power for normal operations.

In flight an amber TR UNIT light will illuminate if TR1 is failed or if TR2 and TR2 are both failed.
On the ground the any TR fault will cause the light to illuminate.

CROSS BUS TIE RELAY

Isolates DC BUS 1 and DC BUS 2

Upon Glideslope capture on an ILS approach the CROSS BUS TIE RELAY opens to isolate the naigation receivers and flight control computer. this prevents removal of all approach informations because of only 1 electrical failure

The relay also opens if the BUS TRANSFER switch is on the OFF position.

STANDBY POWER

The standby power system provides 115 volts AC and 24 volts DC to essential systems in the event of a loss of all engine or APU driven AC sources.

NORMAL STANDBY OPERATION (Partial loss of AC power)

- AC Standby BUS is powered by AC Transfer BUS 1
- DC Standby BUS is powered by TR 1,2,3
- Battery BUS is powered by TR 3

ALTERNATE STANDBY OPERATION (Complete loss of AC power)

- Automatic switching to Alternate Standby occurs if power is lost to either AC Transfer BUS 1 or DC BUS 1
- Both 24 Volts Nikel Camdium Main Battery and Aux Battery supply standby power for 60 minutes
    - AC Standby BUS is powered by a single static inverter.
    - DC Standby BUS, Battery BUS, Switched Hot Battery BUS, Hot Battery BUS powered by battery.

STANDBY POWER SWITCH has 3 positions:

AUTO position:
-The standby power control unit automatically switch to battery power in case of loss of normal AC power.

OFF position:
- The AC and DC standby busses and the battery bus are disconected from all power sources.

BAT position:
- Overrides automatic switching and places AC Standby BUS, DC Standby BUS, Battery BUS and Switched Hot Battery BUS under battery power.

BATTERY SWITCH has 2 positions

- The Battery Switch ON position energizes the SWITCHED HOT BATTERY BUS regardless of the Standby power switch position.

- The Battery Switch OFF position removes the Battery from the power system except from the HOT BATTERY BUS. The Hot Battery BUS is always connected to the battery.

ELECTRIC PANEL AMBER LIGHTS:

> BAT DISCHARGE : Excessive battery discharge rate (normal during APU start)
> TR UNIT : On ground : one TR has failed / In flight : TR 1 failed or TR 2 & 3 have failed
> ELEC : DC or Standby system failed