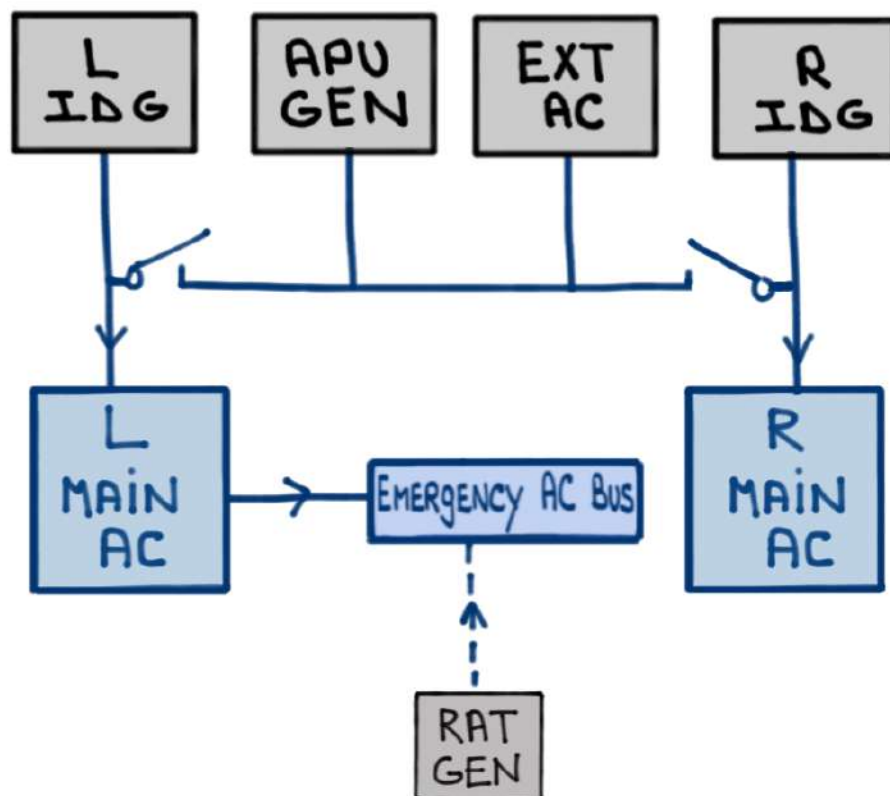


G500 ELECTRICAL SYSTEM



For study purposes only

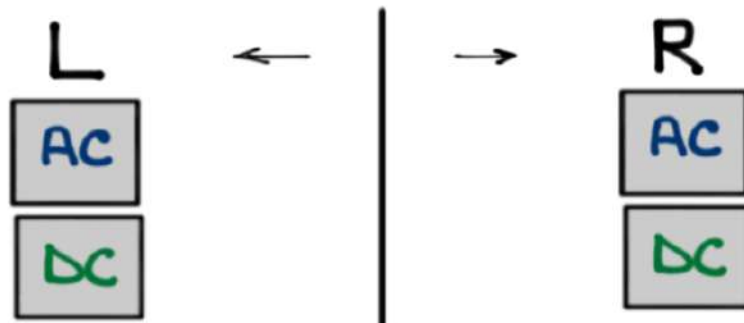
- The ELECTRICAL POWER SYSTEM produces:



- 115 Volts AC is GENERATED in order to PRODUCE 28 Volts DC via TRANSFORMER RECTIFIER UNITS (TRU)

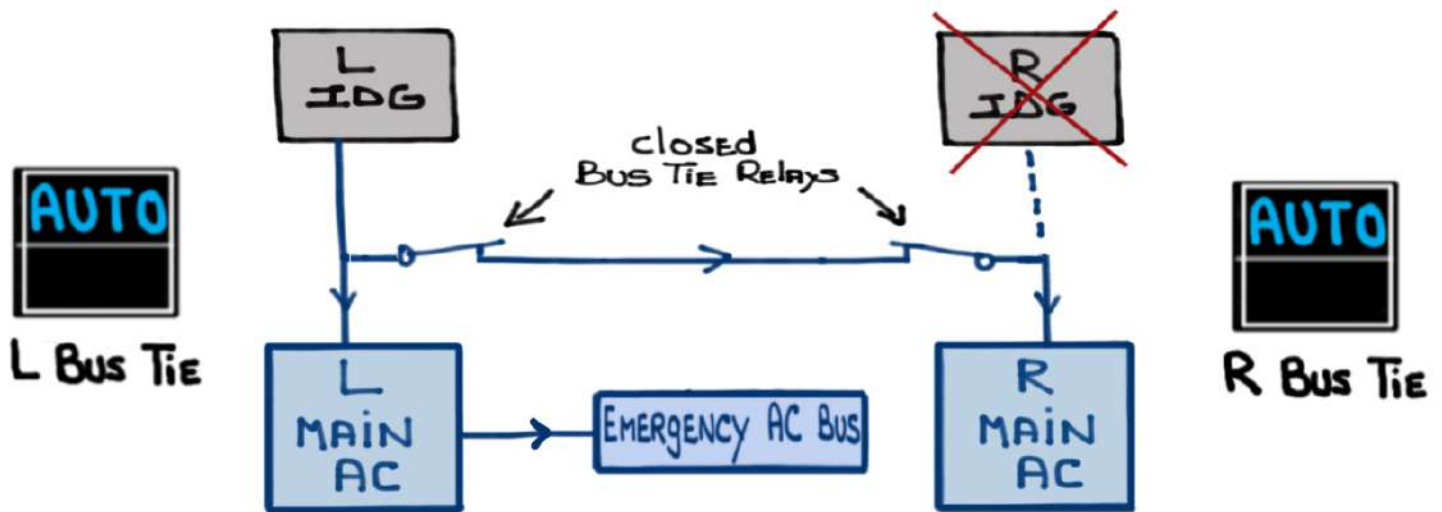


- Two (2) SEPARATE SYSTEMS/NETWORKS



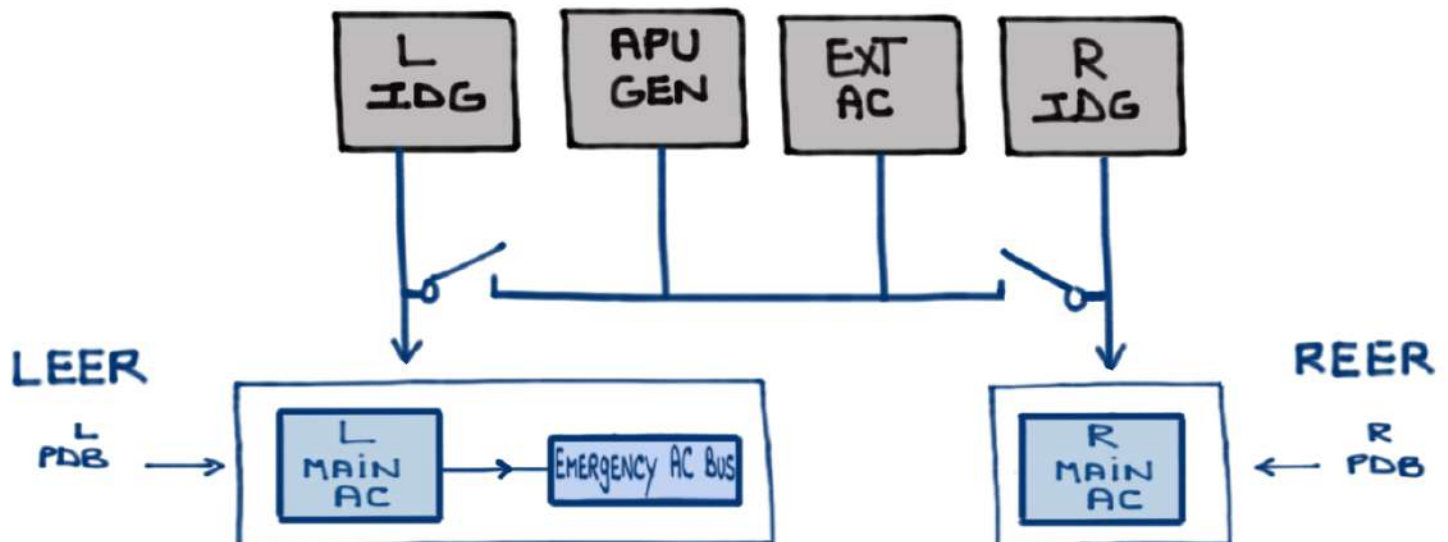
- A split bus system PREVENTS A SHORT ON ONE SIDE FROM AFFECTING THE OTHER SIDE

- OPERATIVE side CAN POWER THE INOPERATIVE side

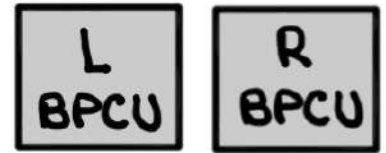


- POWER DISTRIBUTION BOXES (PDB):

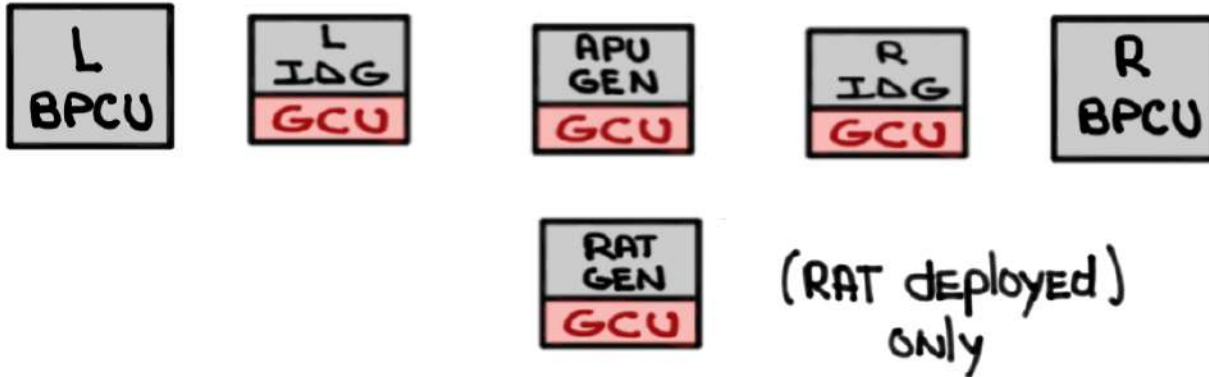
AC POWER IS FIRST SENT TO THE PDBS WHICH IS WHERE THE MAIN AC BUSES ARE LOCATED



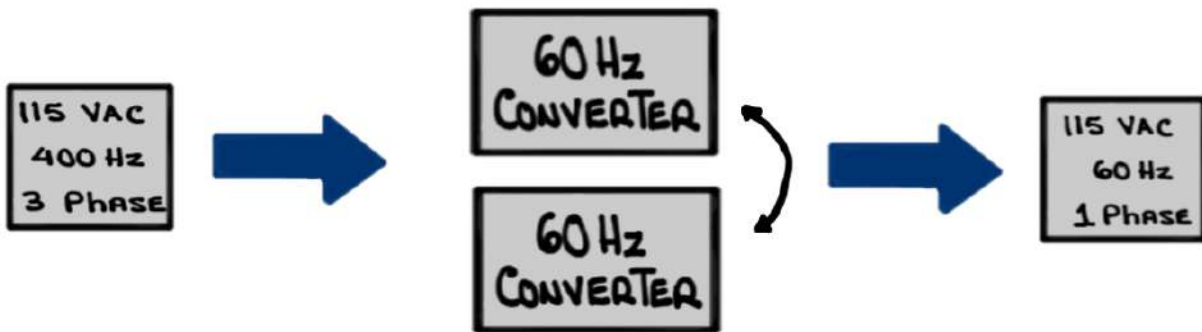
- The ELECTRICAL Power System is controlled by Two (2) BUS POWER CONTROL UNITS (BPCU)


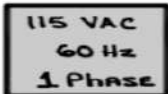


- There are six (6) computers:



- There are Two (2) 60 Hz CONVERTERS located in the Tail compartment

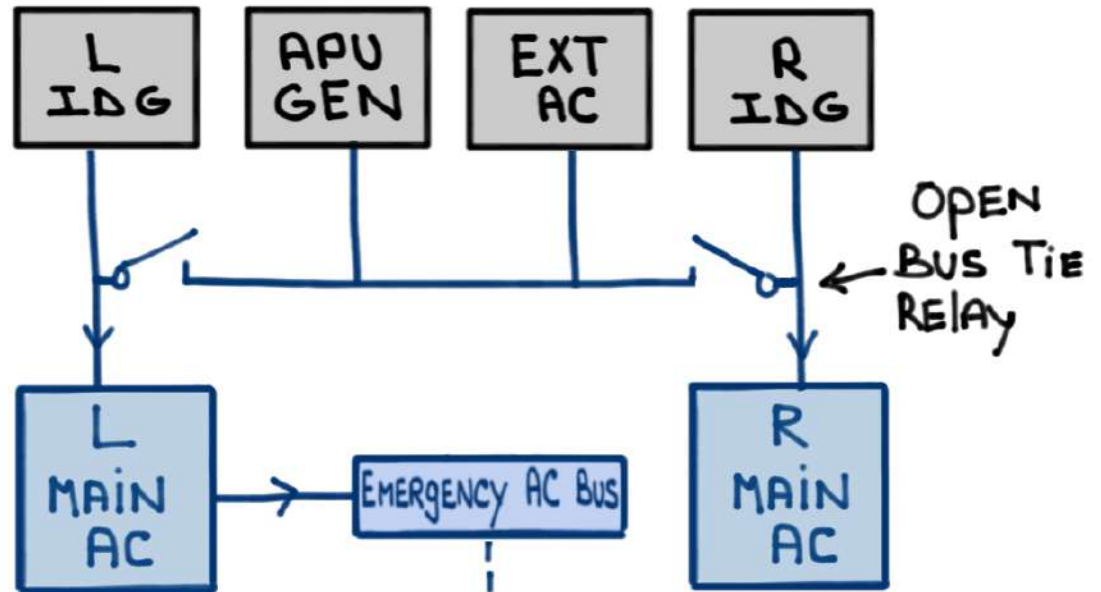


- ONE (1)  ACTIVE AND THE OTHER ON STANDBY
-  = COMMON household power

- AC SYSTEM:

115 VAC is GENERATED by:

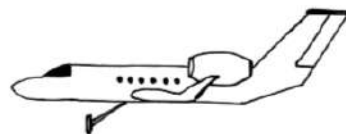
NORMAL



EMERGENCY

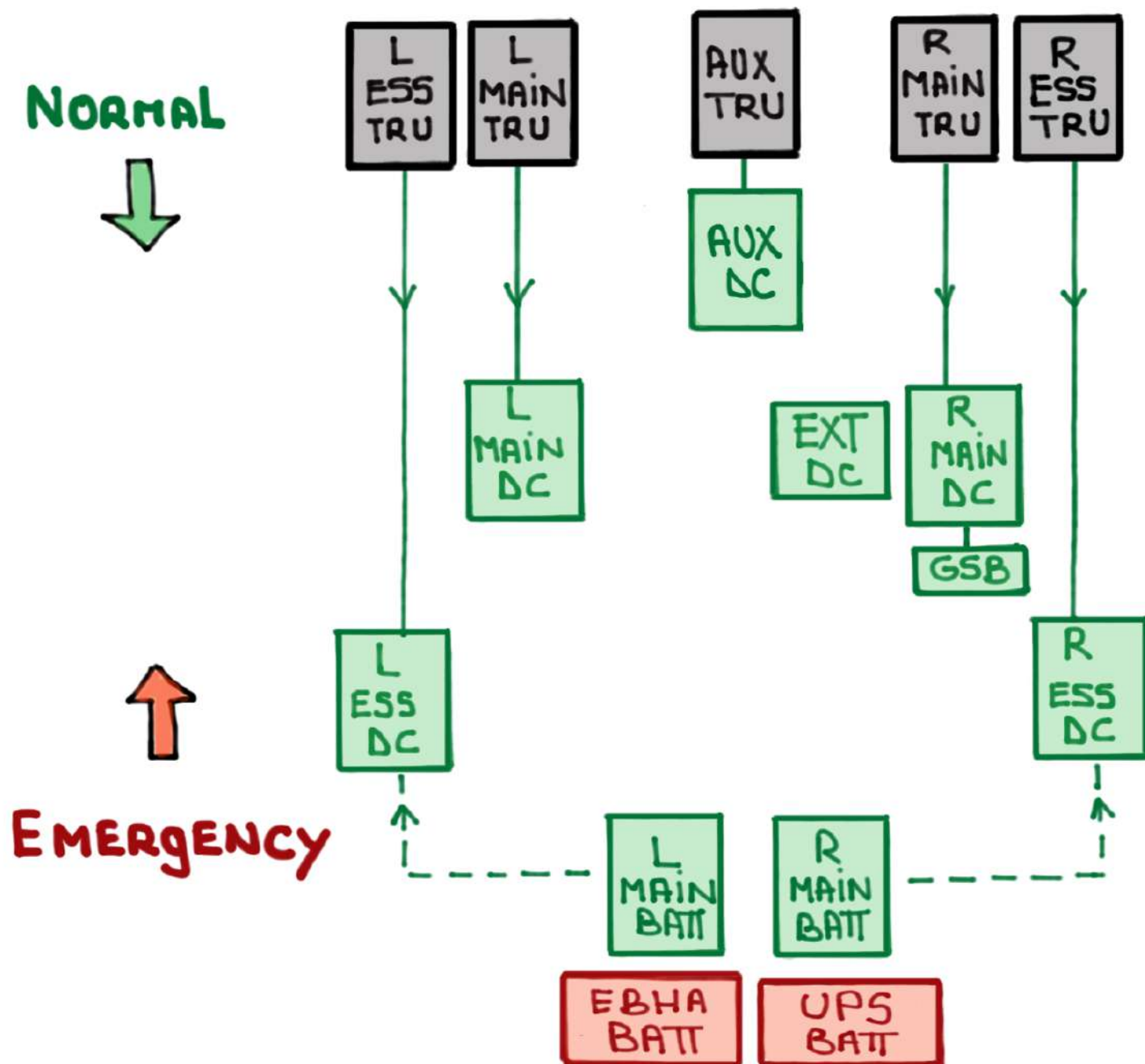


RAT



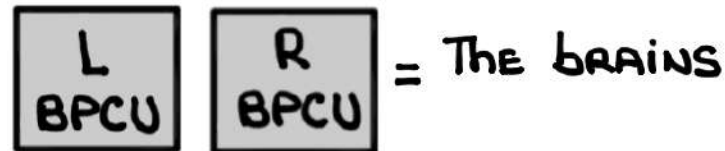
- DC SYSTEM:






28 VDC is PRODUCED by:



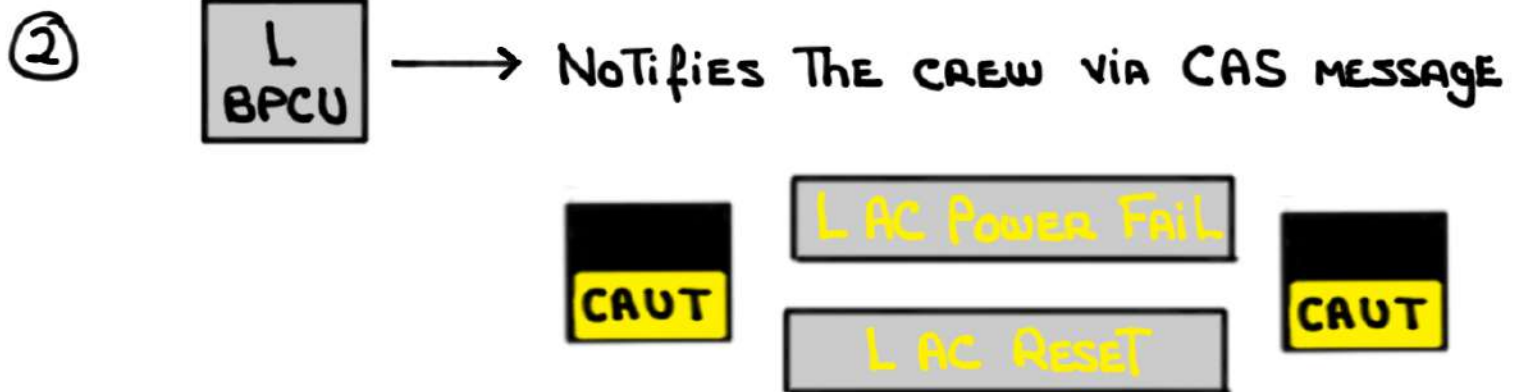
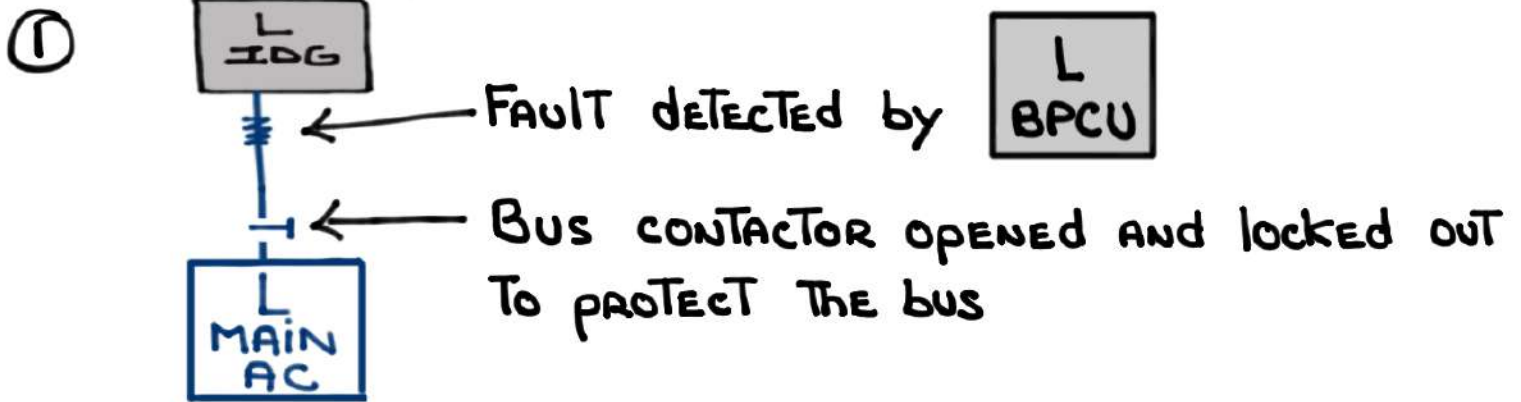
BUS POWER CONTROL UNITS (BPCU)

The ELECTRICAL POWER SYSTEM is controlled by Two (2) identical and INTERCHANGEABLE MICROPROCESSORS called BPCUs



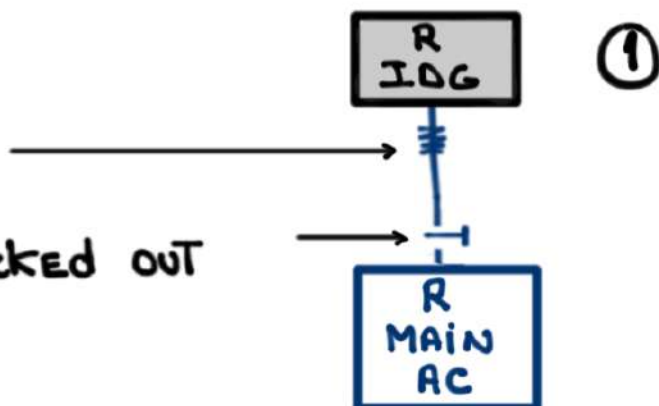
- The   CONTROL AND MAKE ALL LOGICAL DECISIONS FOR ELECTRICAL DISTRIBUTION AND PROTECTION
- TRAFFIC COPS - PROTECTORS OF THE BUSES
- CLOSE AND OPEN CONTACTORS AND/OR RELAYS TO:
 - EFFICIENTLY SUPPLY POWER TO THE BUSES
 - PROTECT AND ISOLATE THE ELECTRICAL SYSTEM FROM FAULTS
- OUTPUT CRITICAL FINDINGS TO THE CAS
- PROVIDES PROTECTION, POWER AND LOGIC TO  RESET SWITCH
- MONITOR EXTERNAL   POWER
- CONTROL THE NO BREAK POWER TRANSFER (NBPT)

- FAULT DETECTION, PROTECTION AND NOTIFICATION:



FAULT DETECTED by **R BPCU**

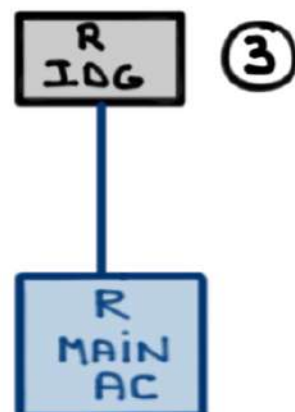
BUS CONTACTOR OPENED AND LOCKED OUT TO PROTECT THE BUS



NOTIFIES THE CREW VIA CAS MESSAGE



CAN BE RESET by THE CREW via THE **AC** SWITCH if THE FAULT is NO LONGER PRESENT. ONE TIME USE



- BPCU logic: **ESS** before **MAIN** / **L** before **R**

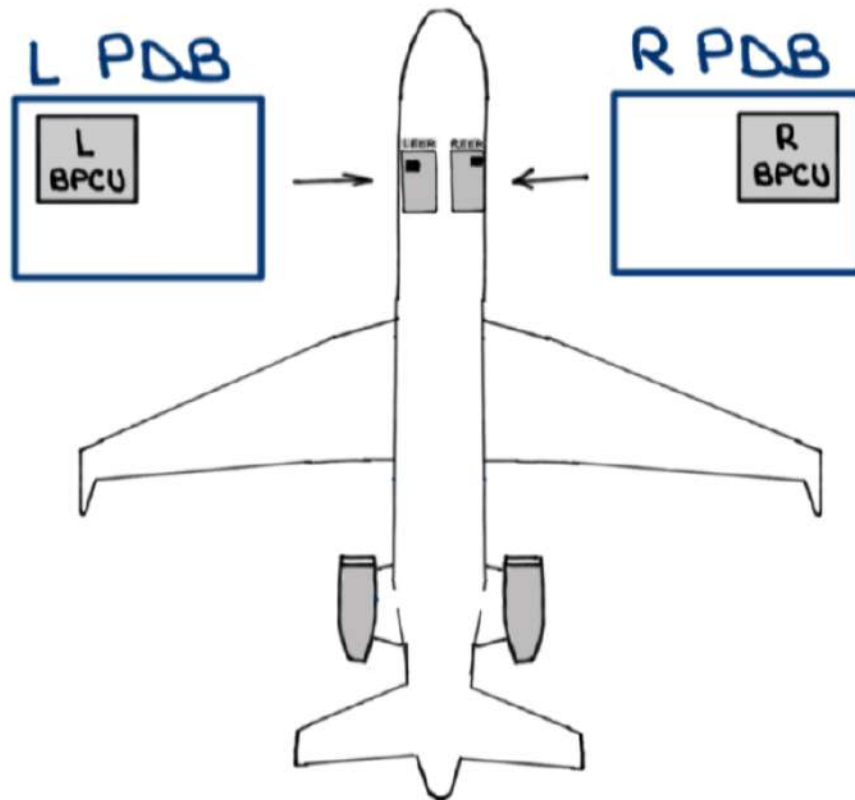
- LOCATED in:

L
BPCU

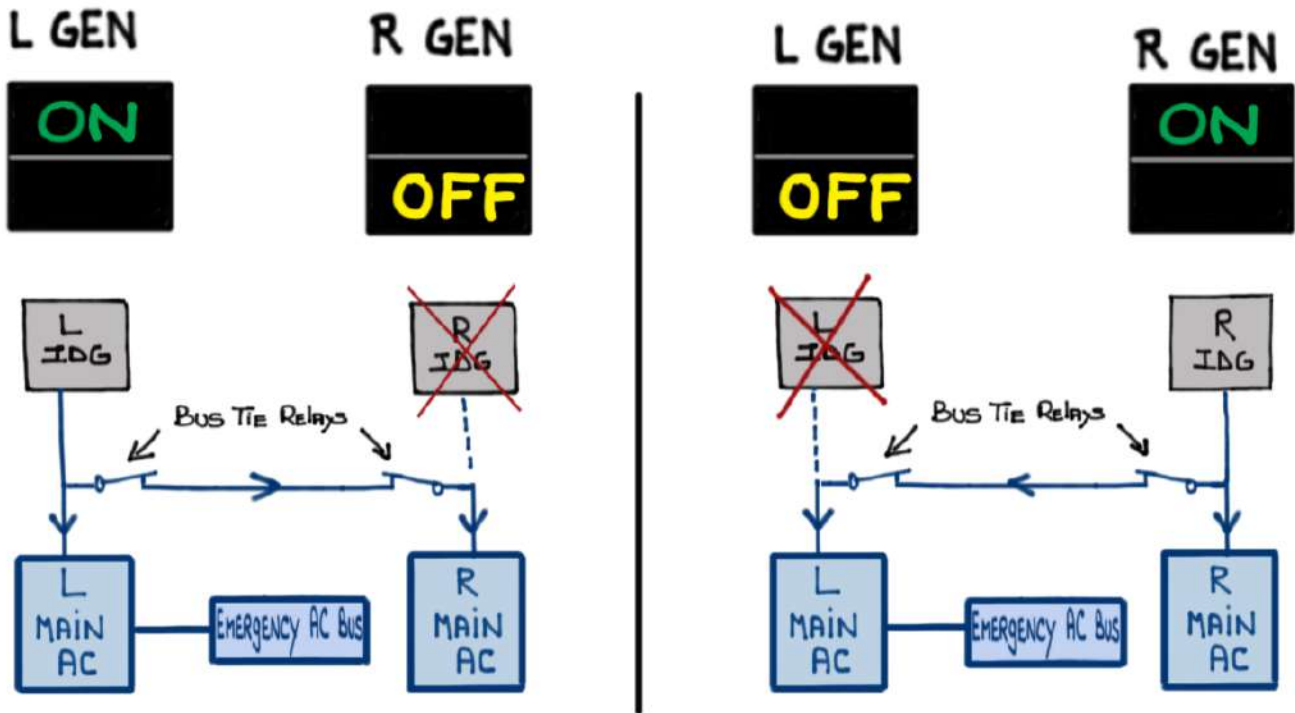
LEFT ELECTRONIC EQUIPMENT RACK (LEER)

R
BPCU

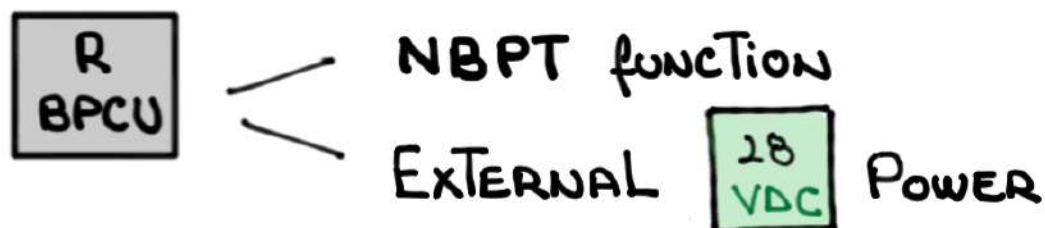
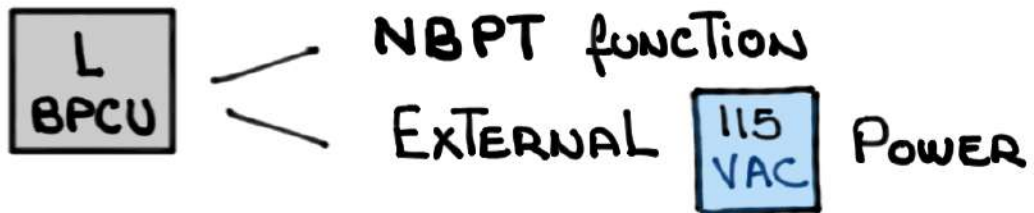
RIGHT ELECTRONIC EQUIPMENT RACK (REER)



- CONTROL THE BUS TIE RELAYS which allow operative side TO POWER THE INOPERATIVE side IN THE EVENT of A SHORT/FAULT ON ONE side



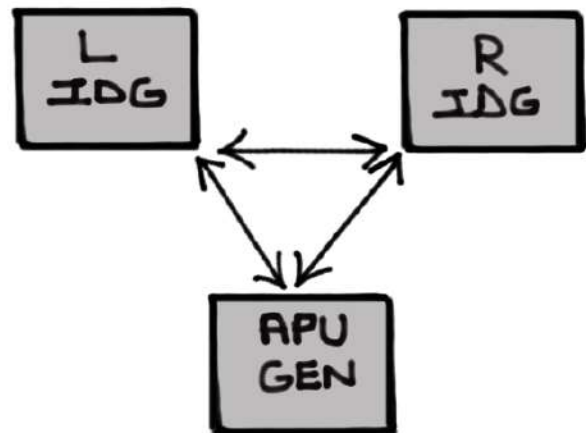
- CONTROL AND MONITOR:



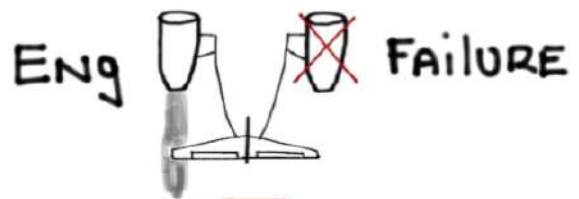
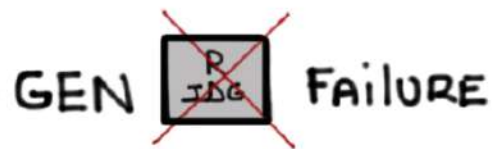
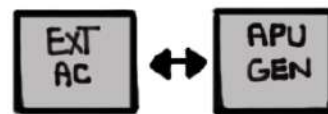
- NO BREAK POWER TRANSFER (NBPT)

- CONTROLLED by L
BPCU R
BPCU
- POWER TRANSFER WITHOUT A MOMENTARY INTERRUPTION
- MATCHES THE PHASES OF THE IDGs AND/OR APU GEN

- No BREAK
 - IDG
 - AND
 - No FAILURE



- BREAK
 - No IDG
 - AND/OR
 - FAILURE



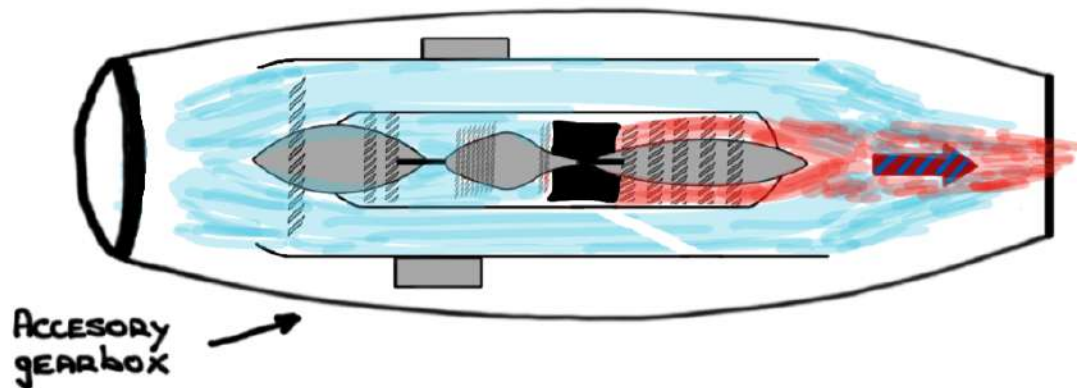
INTEGRATED DRIVE GENERATORS (IDG)

- Two (2) ENGINE-DRIVEN IDGs

L
IDG

R
IDG

- LOCATED ON THE ENGINE'S ACCESSORY GEARBOX

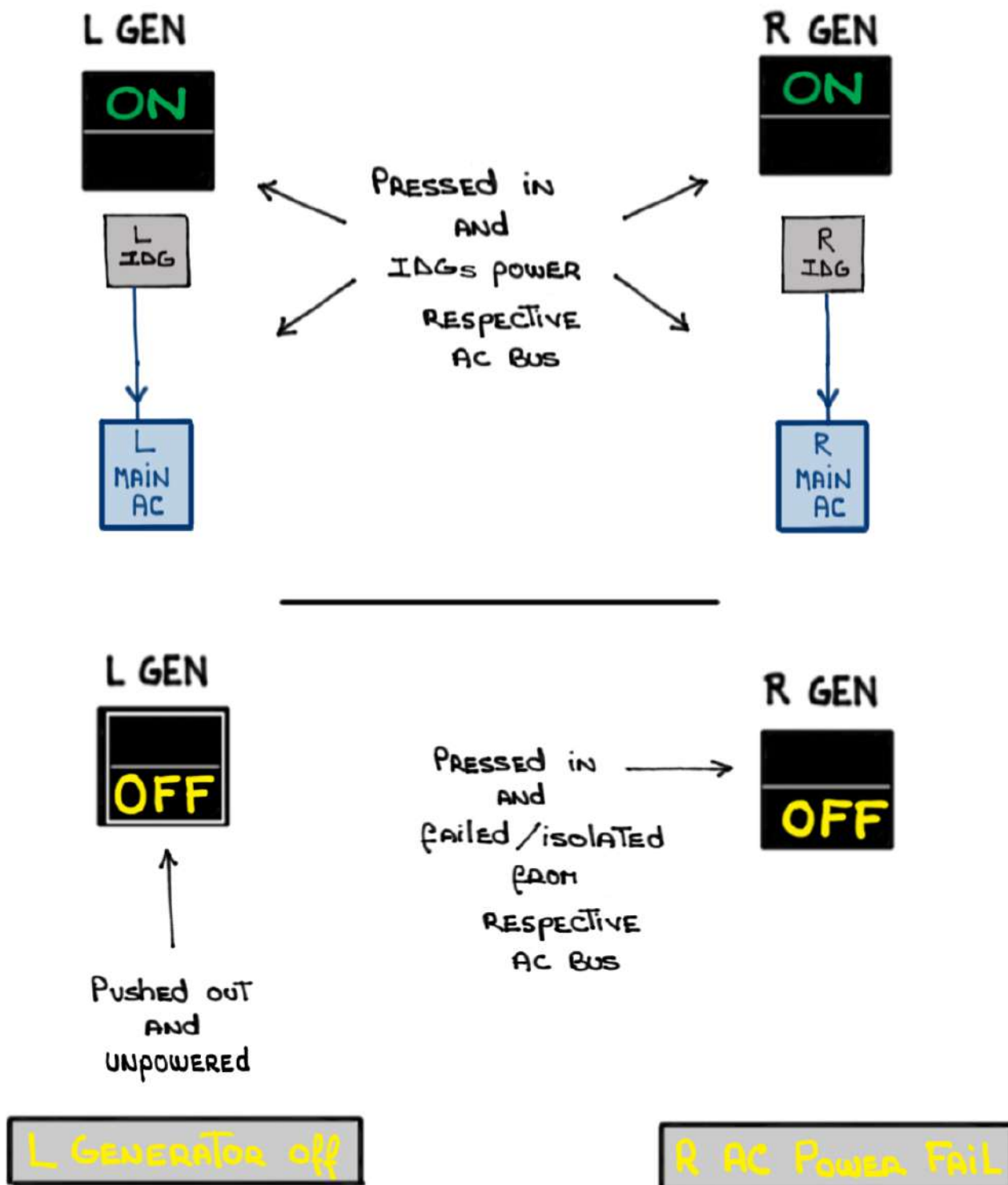


- IDG $\left\{ \begin{array}{l} \text{CONSTANT SPEED DRIVE (CSD)} \\ \text{Oil-cooled GENERATOR (oil is cooled} \\ \text{by fan air)} \end{array} \right.$

• IDG $\left\{ \begin{array}{l} \text{RATED AT } 40 \text{ KVA} \\ \text{PRODUCES: } 115 \text{ VAC} \\ 400 \text{ HERTZ} \\ 3\text{-phase} \end{array} \right.$

• CSD CONVERTS VARIABLE ENGINE SPEED TO A CONSTANT SPEED AT THE GENERATOR (12,000 RPM)

- GENERATOR SWITCHES:



Auxiliary Power Unit (APU) GENERATOR

- The APU provides an auxiliary source of:

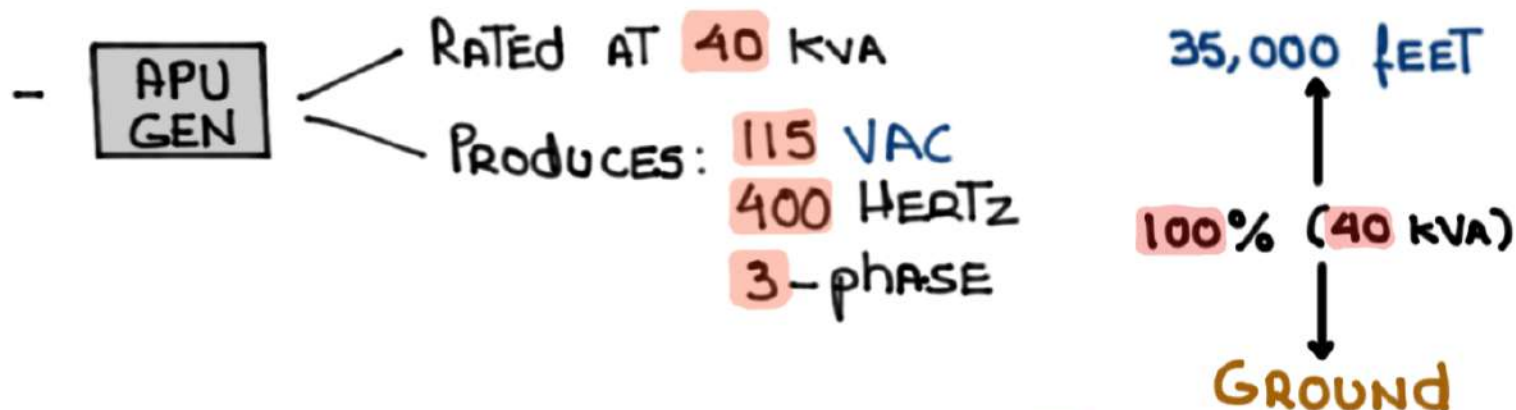
- ① Electrical **AC** power - **GROUND**
- ② Backup Electrical **AC** power - **AIR**

- The APU can be started with **L MAIN BATT** **R MAIN BATT** power

- When the APU reaches **99%** RPM + Two **(2)** seconds
The APU generator comes online and can power

All **AC** and **DC** buses

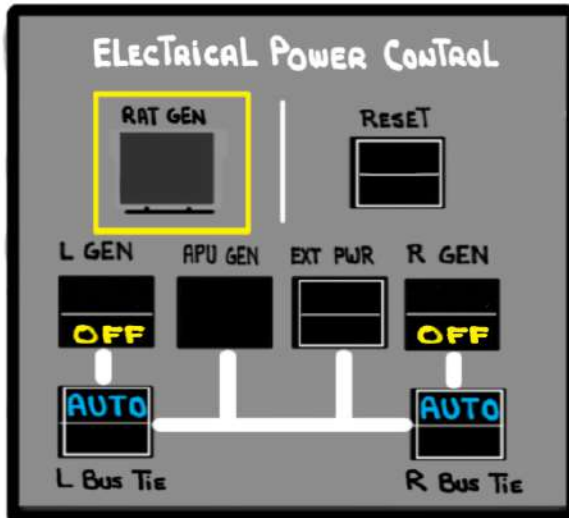
- The APU GEN is constant speed (NOT AN IDG)



If load > **55%** → DESCEND ≤ **FL350**

RAM AIR TURBINE (RAT)

- Backup AC GENERATOR

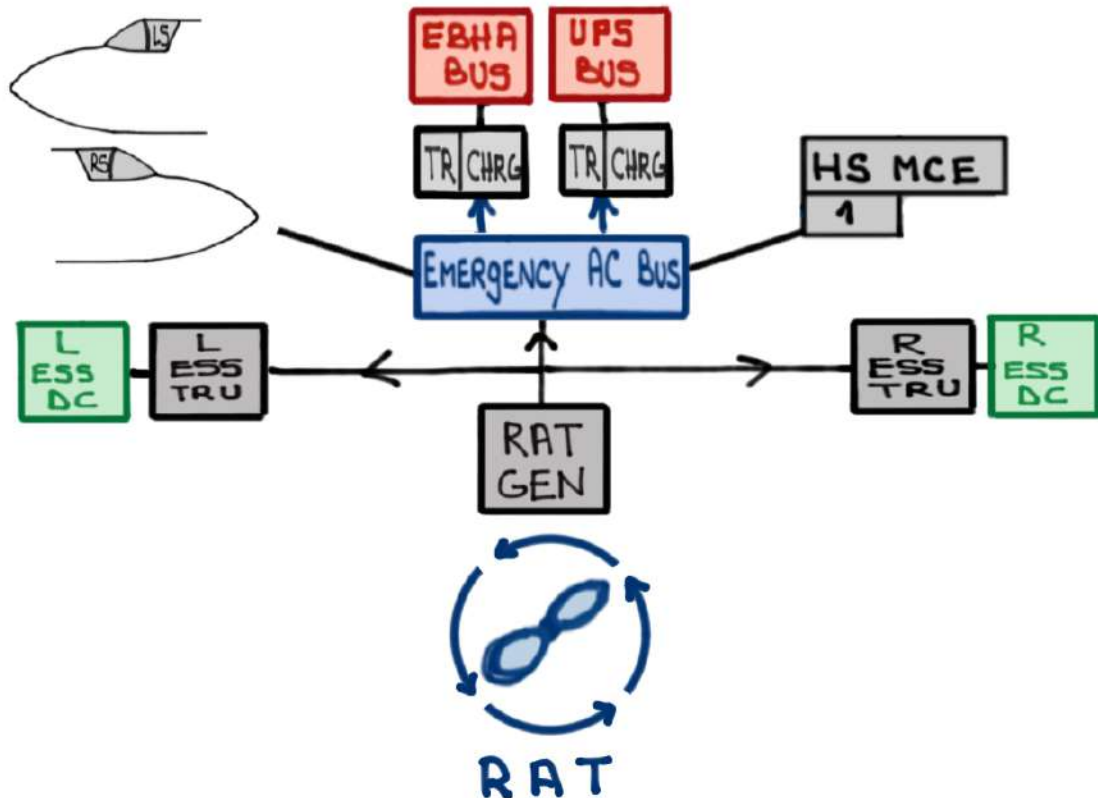


L-R AC POWER FAIL

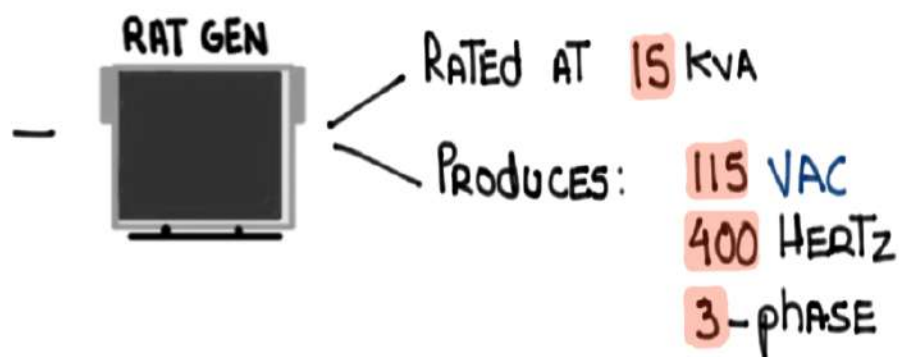
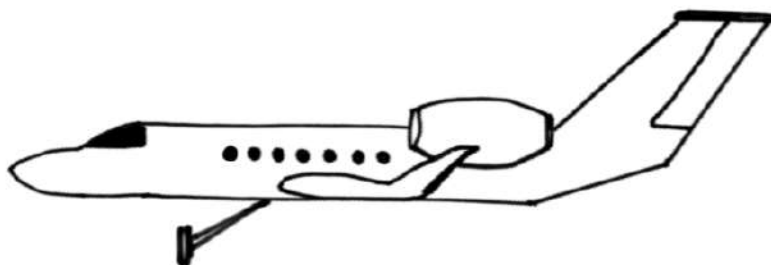
L-R AC POWER FAULT

APU POWER FAIL

RAT GENERATOR ON



- The RAT, once deployed by the crew, CONVERTS AIRSTREAM ENERGY TO ELECTRICAL ENERGY




RAT GENERATOR ON

- OPERATING ENVELOPE:

- ≥ 200 KTS — $\leq M0.925$ (Mmo)
- SEA LEVEL \rightarrow FL510

- < 200 KTS The RAT GEN drops offline AND THE L MAIN BATT R MAIN BATT POWER THE L ESS DC R ESS DC BUSES

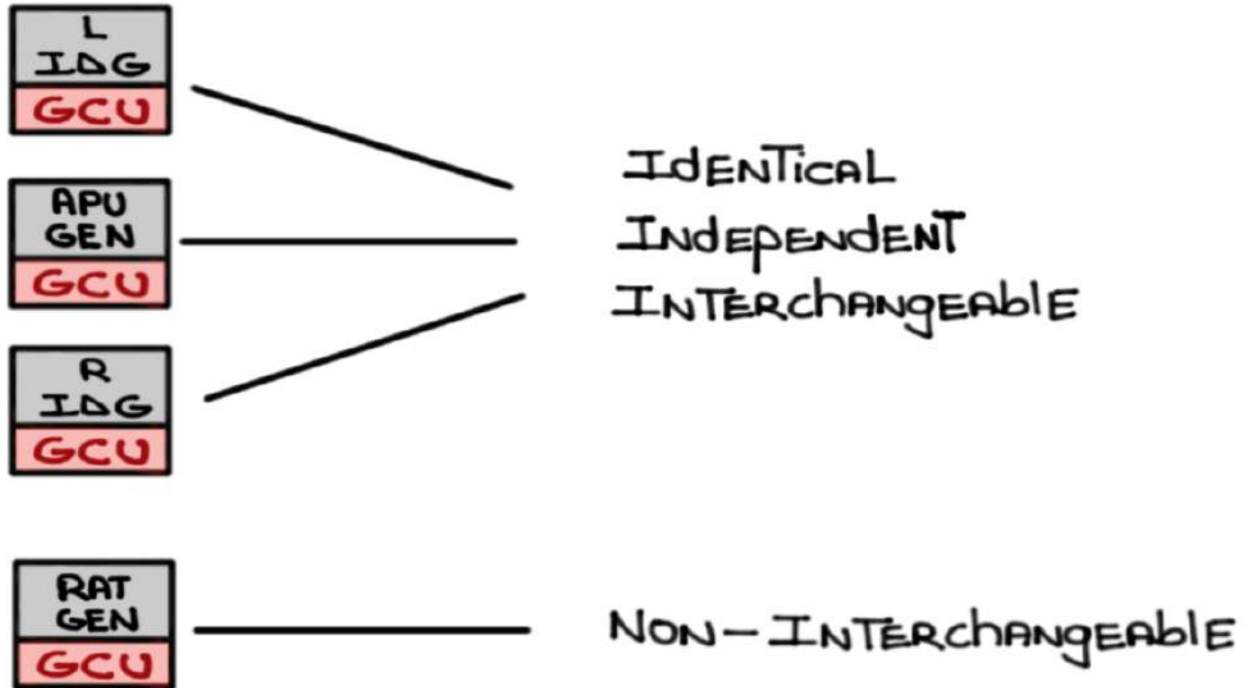
—  ROTATES COUNTER CLOCKWISE

- Six (6) PERCENT FUEL PENALTY
- RAT TEST = MAINTENANCE FUNCTION ONLY 
- ONCE DEPLOYED THE RAT CAN'T BE STOWED IN FLIGHT
- GUIDANCE PANEL: NO VERTICAL MODES (ADS 4)

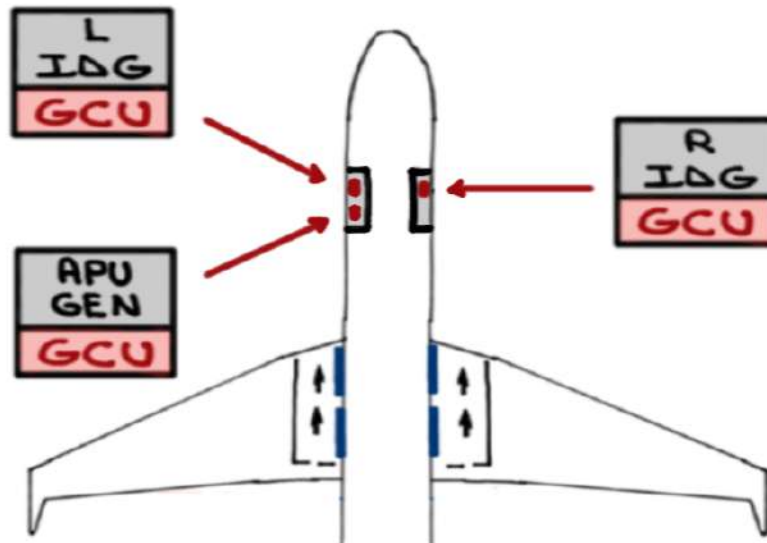
GENERATOR CONTROL UNITS (GCU)

- GCUs ARE MICROPROCESSORS THAT CONTROL GENERATOR OUTPUT (QUALITY ASSURANCE) AND PROVIDE FAULT PROTECTION

- THERE ARE (4) GCUs:



- GCUs ARE LOCATED IN THE LEER AND REER



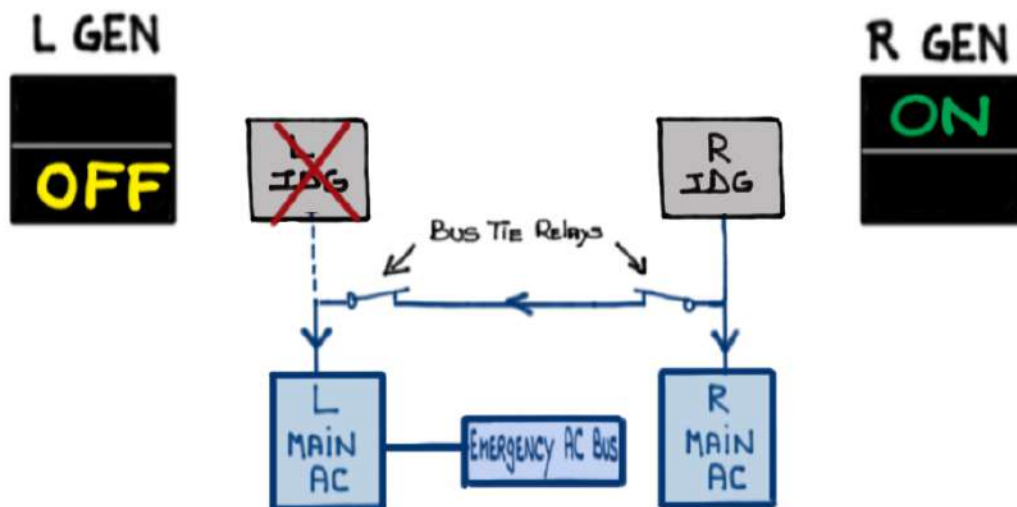
- If A GENERATOR'S:

- ①
- VOLTAGE
 - FREQUENCY
 - AMPERAGE
- OUTSIDE of PARAMETERS

②

L IDG / GCU → GCU TAKES THE GENERATOR OFFLINE

GCU NOTIFIES L BPCU



③



L BPCU — NOTIFIES THE CREW VIA CAS MESSAGE



L AC POWER FAIL

L GENERATOR FAIL

L IDG / GCU CAN BE RESET BY CYCLING THE L GEN OFF SWITCH

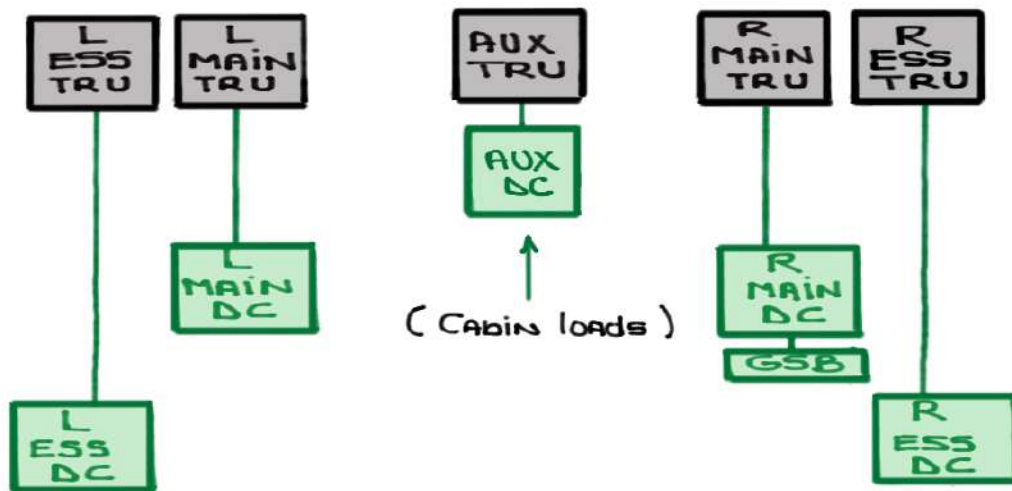
EXTERNAL AC/DC POWER

- EXTERNAL  POWER 
- RECEPTABLE IS LOCATED ON THE RIGHT SIDE OF THE FUSELAGE
 - 30 KVA, 115 VAC, 400 Hz, 3 PHASE
 - CAN POWER ALL AC BUSES AND THROUGH THE TRUS ALL DC BUSES ARE POWERED
 - BPCU CHECKS QUALITY OF POWER BEFORE ALLOWING ONTO AIRCRAFT

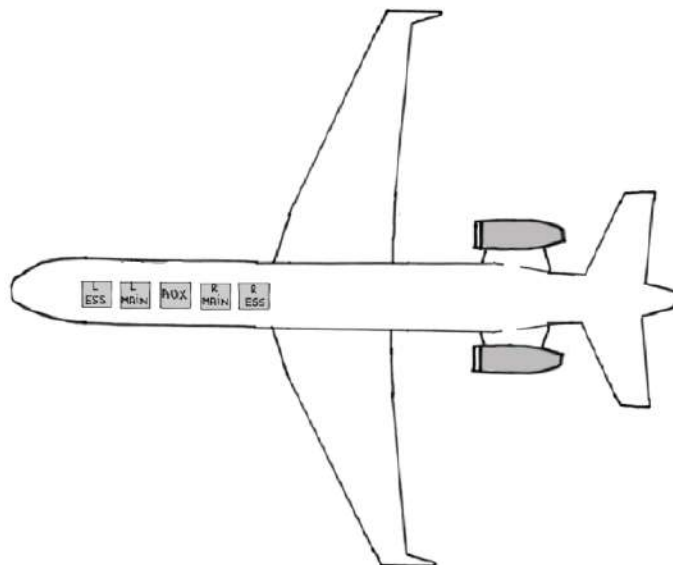
- EXTERNAL  POWER 
- RECEPTABLE IS LOCATED ON THE RIGHT SIDE OF THE FUSELAGE
 - POWERS ALL DC BUSES
 - CAN BE USED TO POWER THE GSB
 - USE OF EXTERNAL DC POWER TO START THE APU IS PROHIBITED

TRANSFORMER RECTIFIER UNITS (TRU)





- TRUs ARE POWERED by THE L
MAIN
AC R
MAIN
AC BUSES
- A TRU CONVERTS 115
VAC TO 28
VDC



- TRUs ARE LOCATED UNDERNEATH THE FLOOR



-     POWER THEIR OWN BUSES

-  POWER THE  BUS AND WILL TAKE OVER THE DUTIES OF A FAILED ~~~~ OR ~~~~ TRU USING THE FOLLOWING PRIORITY PROCESS:

 BEFORE 

 BEFORE 

① SHEDS  BUS

② 

③ 

④ 

⑤ 



GROUND SERVICE BUS

- "When you don't want to wake up the beast"

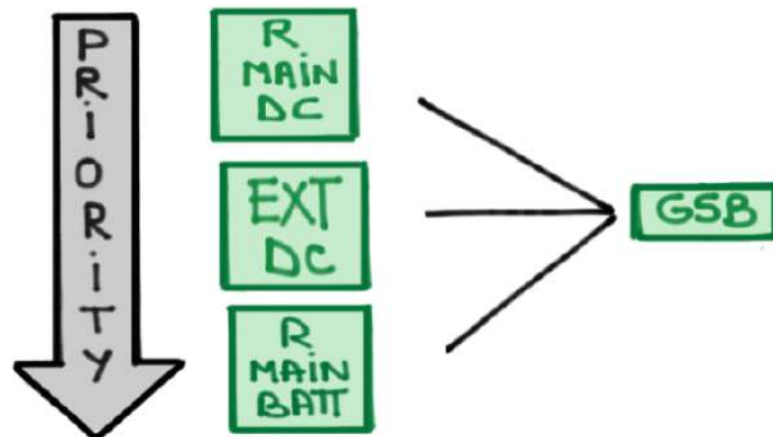
- **GROUND OPERATIONS** (APU shutdown)

- REFUELING OPERATIONS
- ENGINE OIL SERVICING
- POTABLE WATER SERVICING
- HYDRAULIC FLUID SERVICING
- OPERATION OF WHEEL WELL LIGHTS

- FOUR (4) GSB SWITCHES:

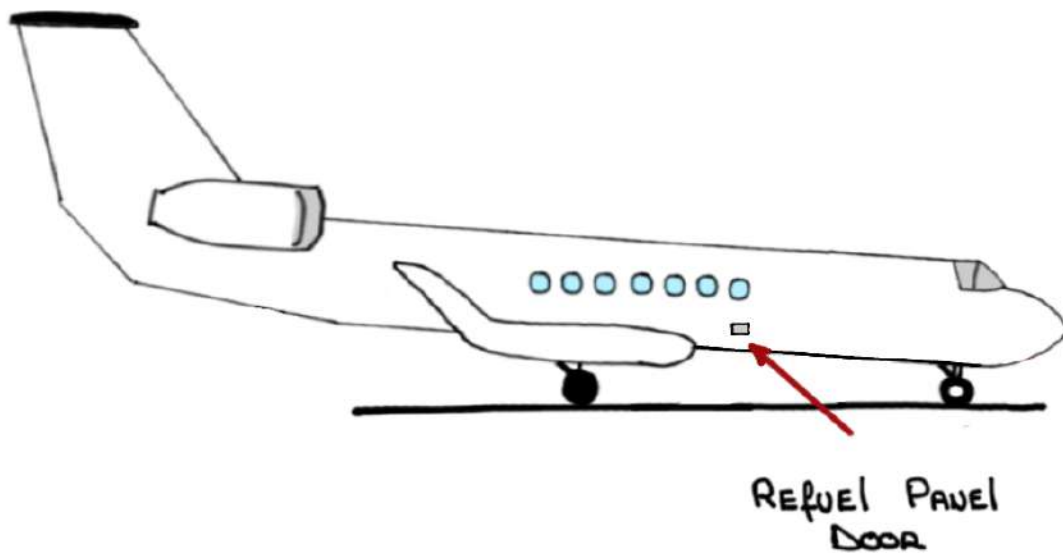
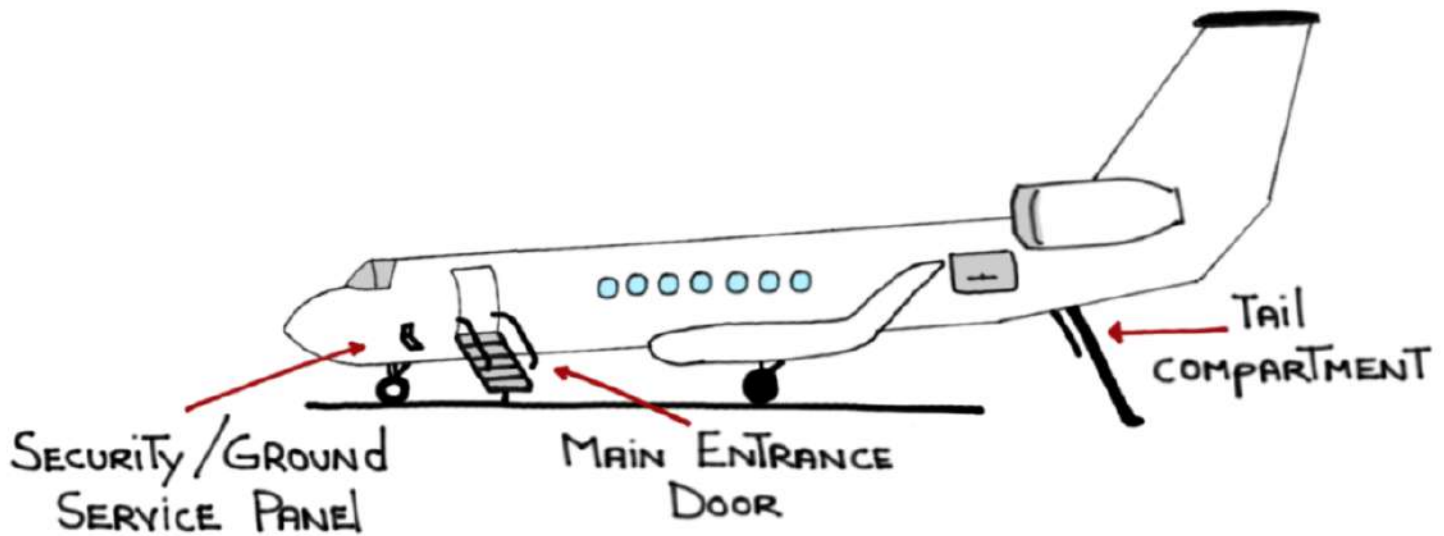
- SECURITY/GROUND SERVICE PANEL
- REER MAINTENANCE PANEL
- TAIL COMPARTMENT
- FUEL PANEL

- POWER SOURCES (PRIORITY):

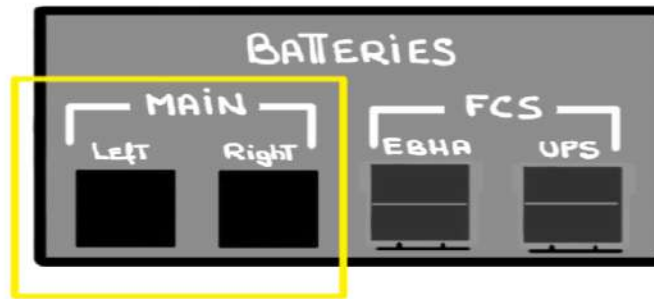


- ROTATING BEACON light is POWERED by THE **GSB** when THE **R MAIN BATT** is THE SOURCE of POWER

- AT LEAST ONE (1) of THE following MUST BE OPEN when USING ONE of THE four (4) **GSB** switches:



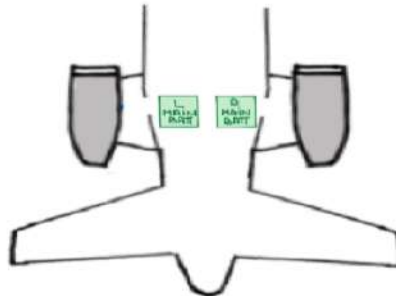
MAIN BATTERIES



- THERE ARE TWO (2) MAIN BATTERIES



- LOCATED IN THE TAIL COMPARTMENT



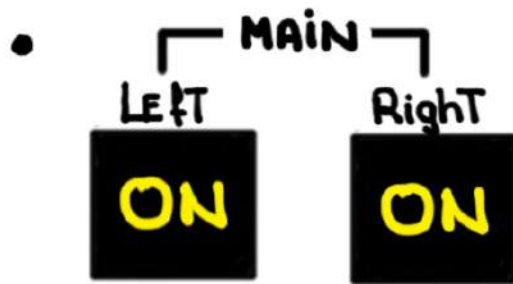
- Nicad, 21 cells, 95 pounds, 25 VDC, 53 AMP/HOUR

- PURPOSE:

- ① START THE APU - 

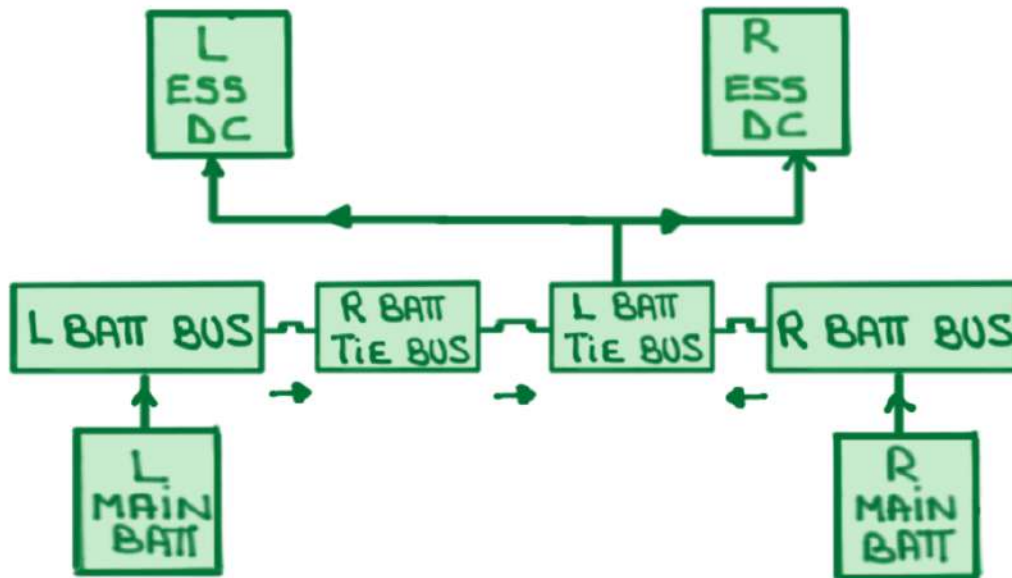
- ② OPERATE THE AUX HYDRAULIC PUMP -  

- ③ POWER THE   BUSES IF THERE IS NO OTHER SOURCE



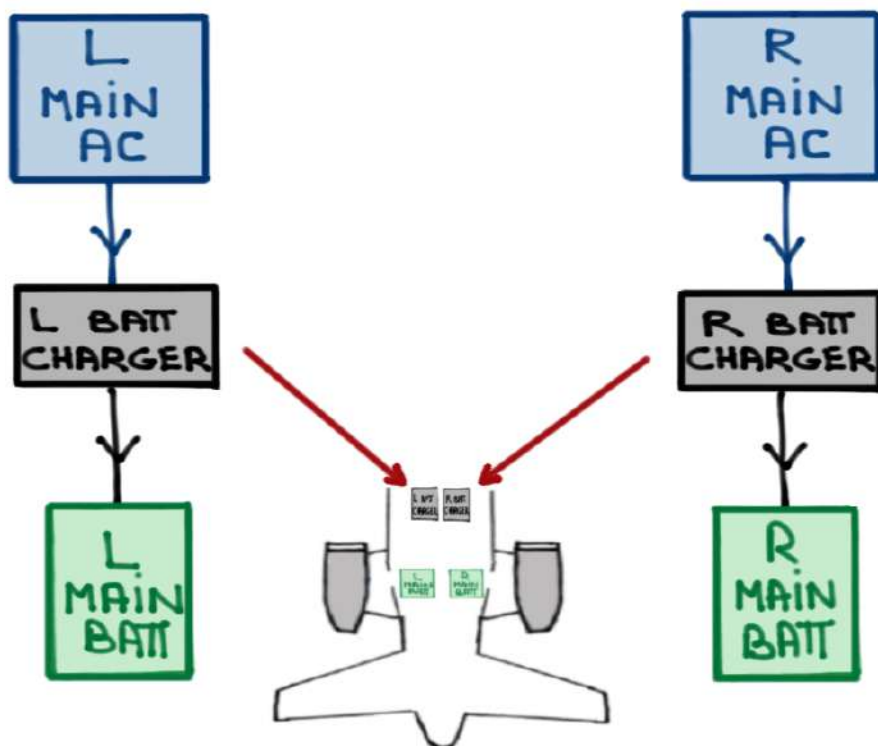
Switchlights illuminate to indicate that the batteries are:

- ① Powering the ESS DC buses (discharging)
- ② When starting the APU
- ③ When the AUX pump is activated



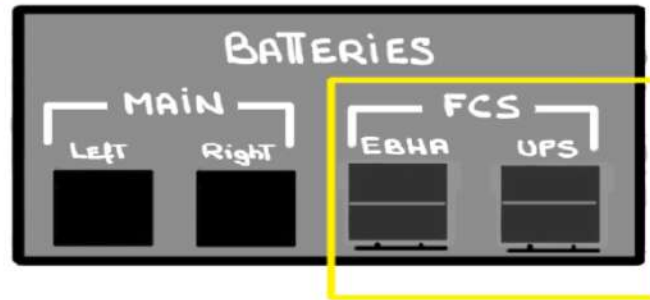
- Minimum of TEN (10) MINUTES of power with Two (2) APU START ATTEMPTS

- MUST BE REMOVED FROM AIRCRAFT IN COLD SOAKED CONDITIONS ($\leq -20^{\circ}\text{C}$) AND STORED IN A LOCATION WARMER $> -20^{\circ}\text{C}$ AND COOLER THAN $+40^{\circ}\text{C}$
- THE L
MAIN
BATT R
MAIN
BATT ARE NORMALLY RECHARGED BY THE MAIN
AC BUSES
- THE EXTERNAL BATTERY CHARGERS ARE LOCATED IN THE TAIL COMPARTMENT



- APPROXIMATELY NINETY (90) MINUTES TO RECHARGE THEM

FLIGHT CONTROL BATTERIES



THERE ARE TWO (2) Flight Control System (FCS) BATTERIES:




① ELECTRICAL Backup Hydraulic Actuator (EBHA) BATTERY

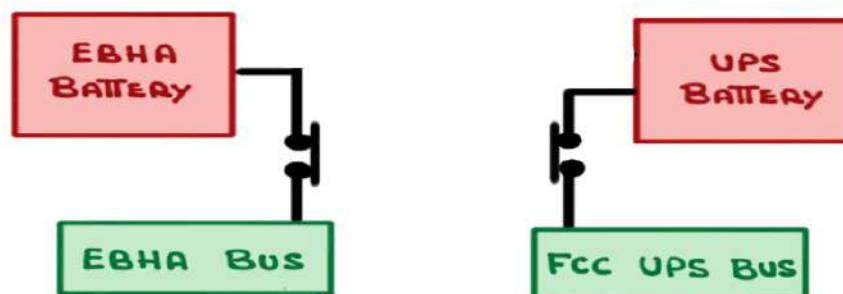


② UNINTERRUPTIBLE Power Supply (UPS) BATTERY

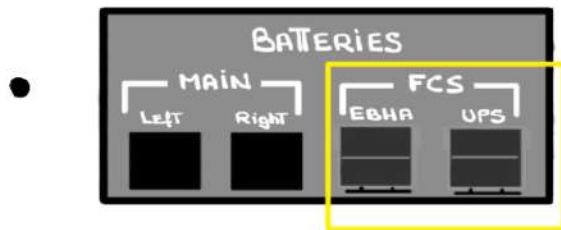


THE FCS BATTERIES CAN POWER THE FLIGHT CONTROLS FOR THIRTY (30) MINUTES

- ILLUMINATED   if NO  POWER IS BEING PRODUCED AND THEY POWER THEIR OWN BUSES (DISCHARGING)



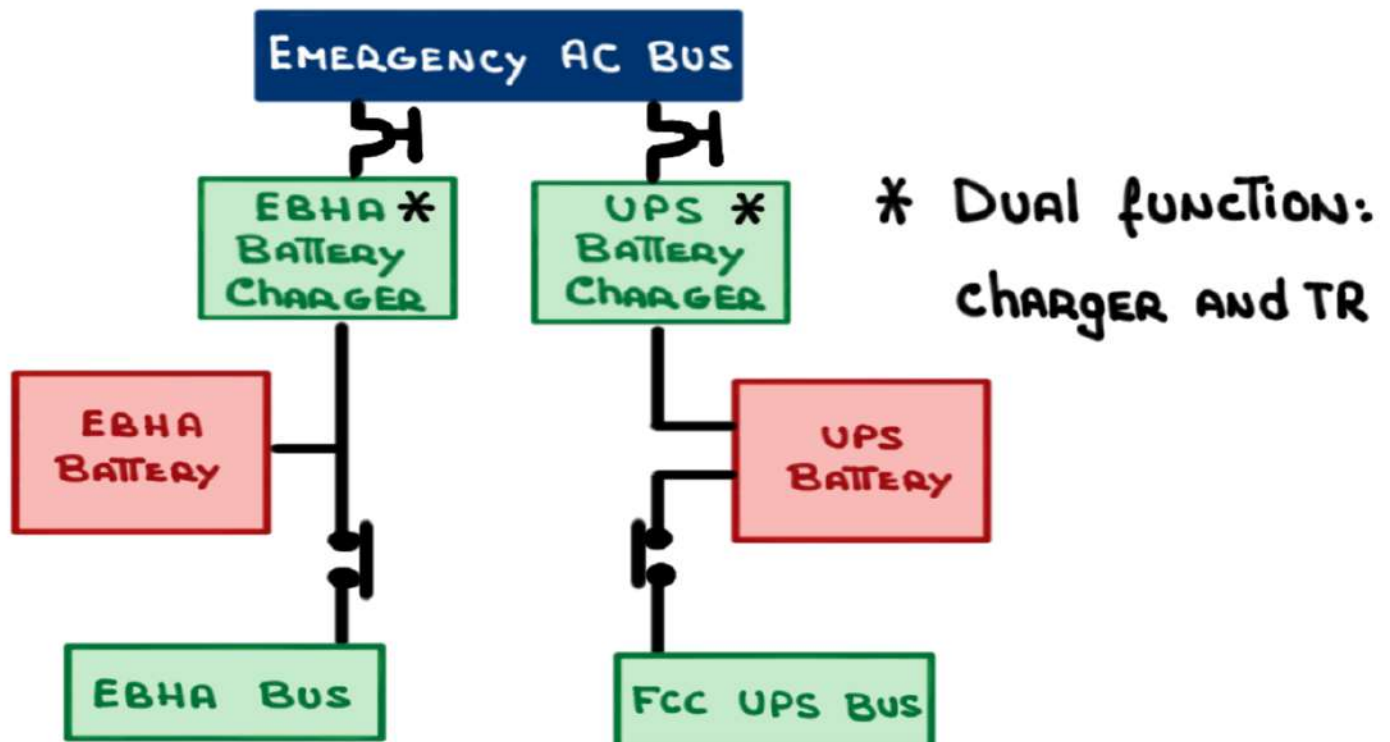
- SYSTEM POWER ON SELF TEST (SPOST)



- FORTY FIVE (45) SECOND TEST

- NO ELECTRICAL INTERRUPTIONS DURING SPOST OR A COMPLETE POWER DOWN IS REQUIRED

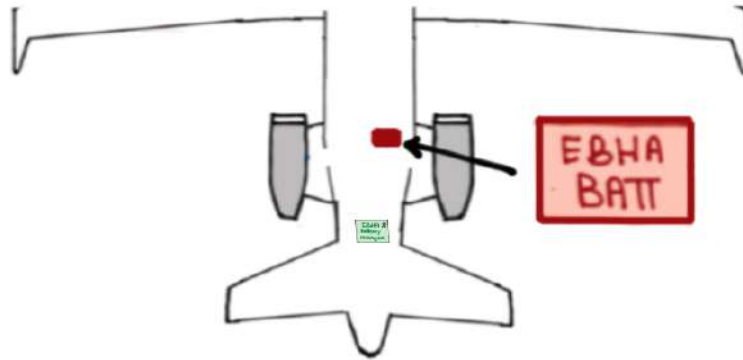
- FCS BATTERIES - CHARGER/TRANSFORMER RECTIFIER



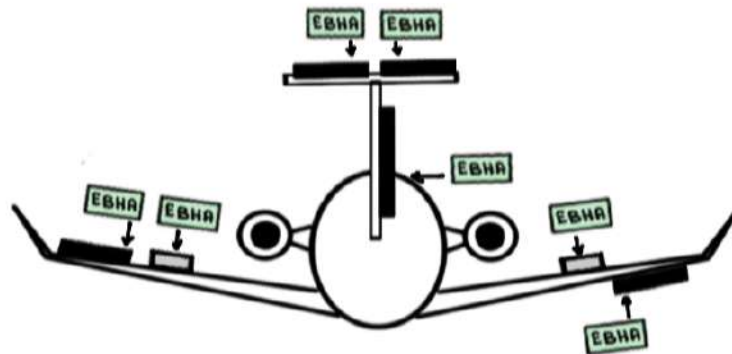
- **EBHA BATT** ELECTRICAL BACKUP HYDRAULIC ACTUATOR

- Nicad, **25** Volts, **53** AMP/HOUR

- LOCATED IN THE TAIL COMPARTMENT



- POWERS SEVEN (7) **EBHA** ACTUATORS



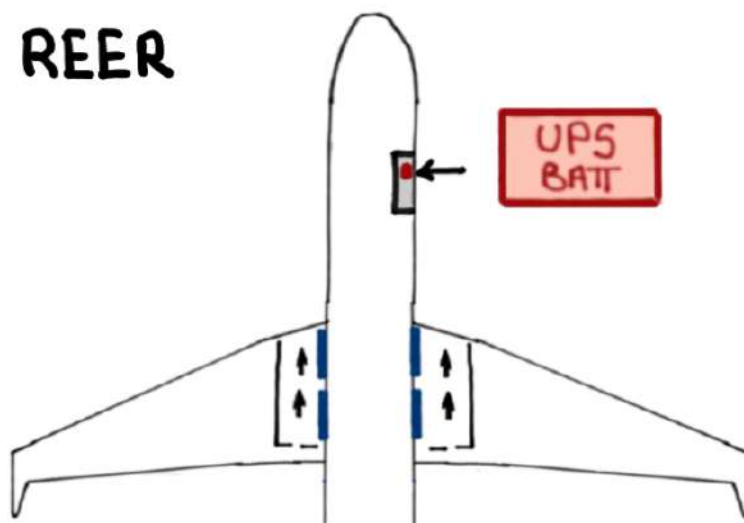
- CAN BE CHARGED BY **RAT GEN**  VIA THE **EMERGENCY AC BUS**

- MUST BE REMOVED FROM AIRCRAFT IN COLD SOAKED CONDITIONS (\leq **-20°C**) AND STORED IN A LOCATION WARMER $>$ **-20°C**

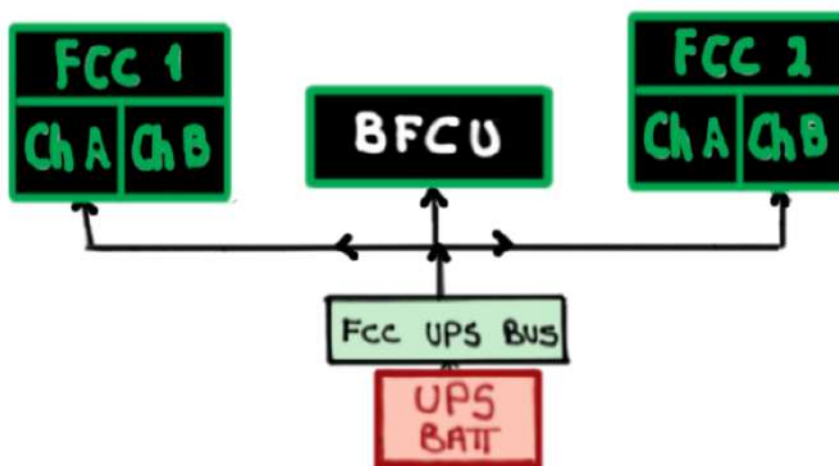
- **UPS BATT** UNINTERRUPTIBLE POWER SUPPLY (UPS)

- LEAD ACID, **24** Volts, **10.5** amp/hour

- LOCATED IN THE REER



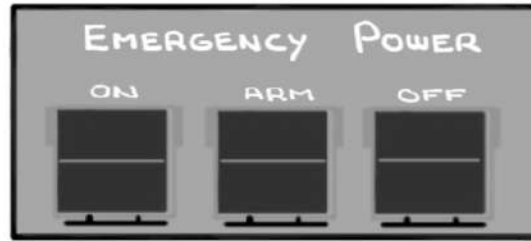
- POWERS FLIGHT CONTROL COMPUTERS channels 1A AND 2B



- SECONDARY POWER SOURCE TO **REU**

- CAN BE CHARGED BY **RAT GEN**  VIA THE **EMERGENCY AC BUS**

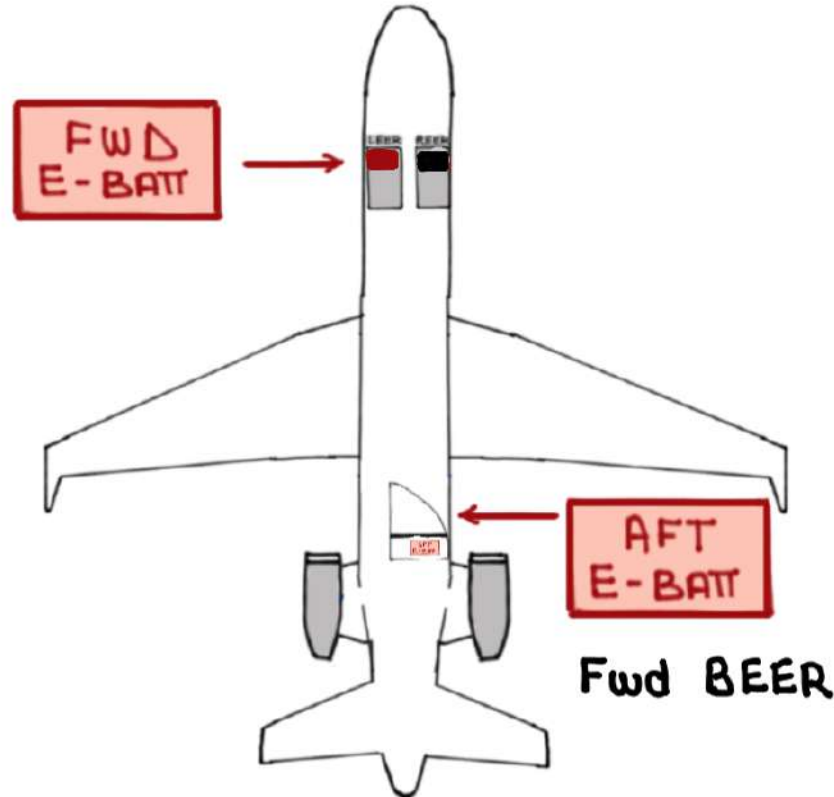
EMERGENCY BATTERIES



- THERE ARE TWO (2) E-BATTs

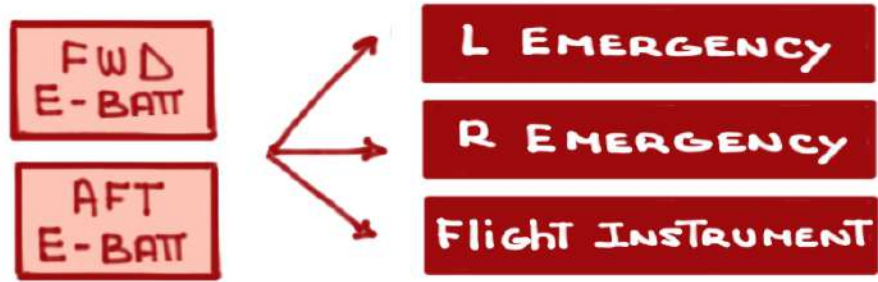
A FORWARD AND AN AFT E-BATT

• LOCATED IN:

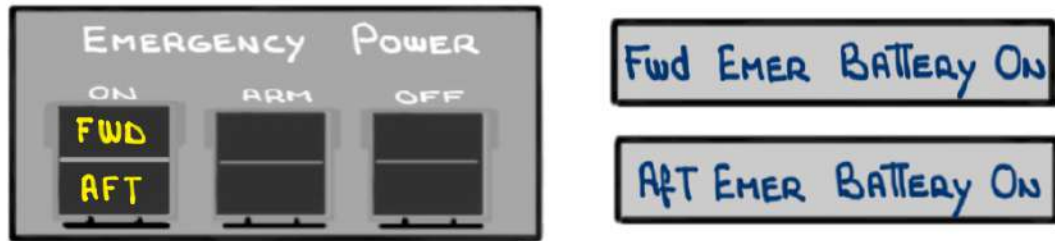


- SEALED, LEAD ACID WITH ITS OWN INTERNAL CHARGER
- 24 VOLTS, 10.5 AMP/HOUR
- FORTY FIVE (45) MINUTES DURATION, APPROXIMATELY

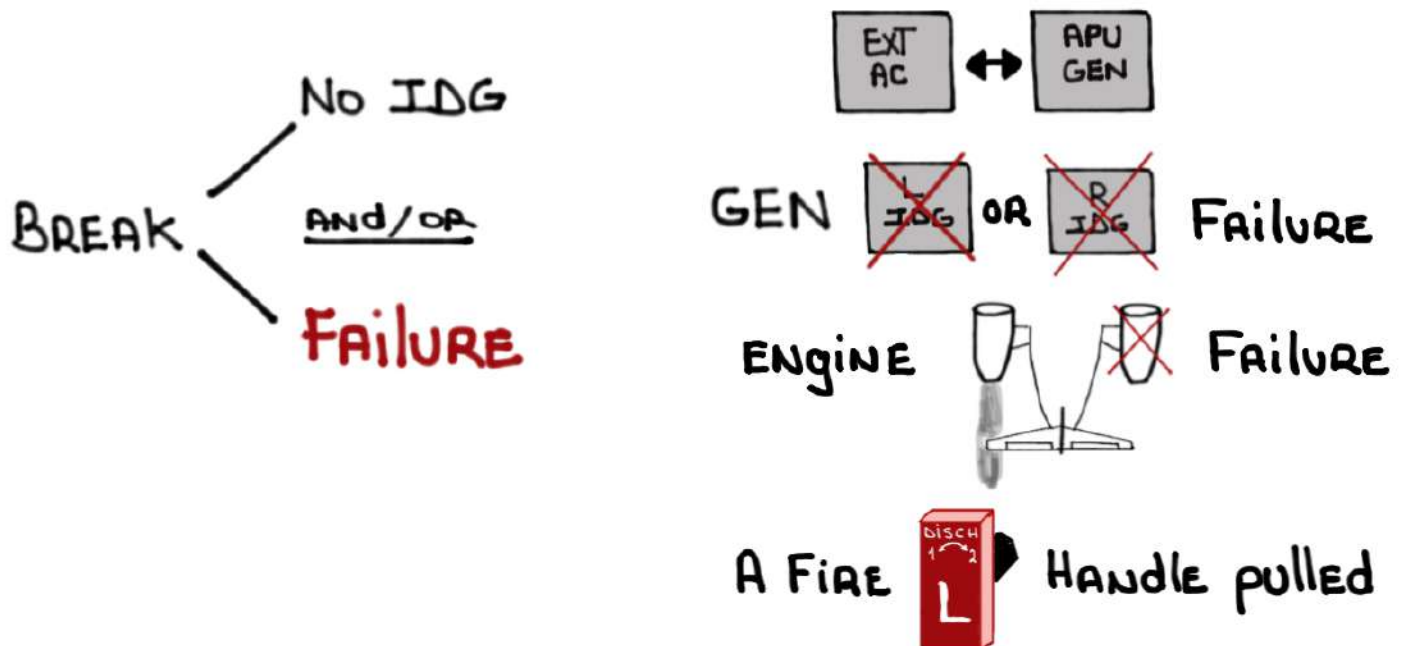
- POWERS THE following buses:



- When "ARMED" The E-BATTs COME ON automatically when power to the **L ESS DC** AND/OR **R ESS DC** drops below 20 Volts, EVEN MOMENTARILY



- AFTER A BREAK POWER TRANSFER THE E-BATTs will COME ON



- E-BATTs POWER THE following EQUIPMENT:

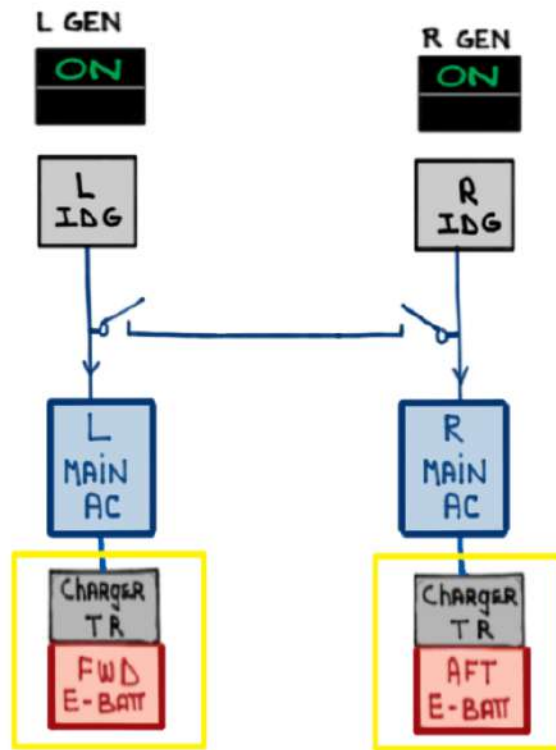
- EMERGENCY Lighting
 - └ Cabin EMERGENCY Lights
 - └ EXTERIOR EMERGENCY Lights
- STANDBY FLIGHT Displays (2)
- INERTIAL REFERENCE UNITS (3)
- VHF 1 RADIO
- TOUCH SCREEN CONTROLLERS # 2 AND # 3
(NO AIR DATA AND FUEL QUANTITY WITHOUT ESS DC)

- AN INTEGRATED CHARGER/TRANSFORMER RECTIFIER RECHARGES THE E-BATTs

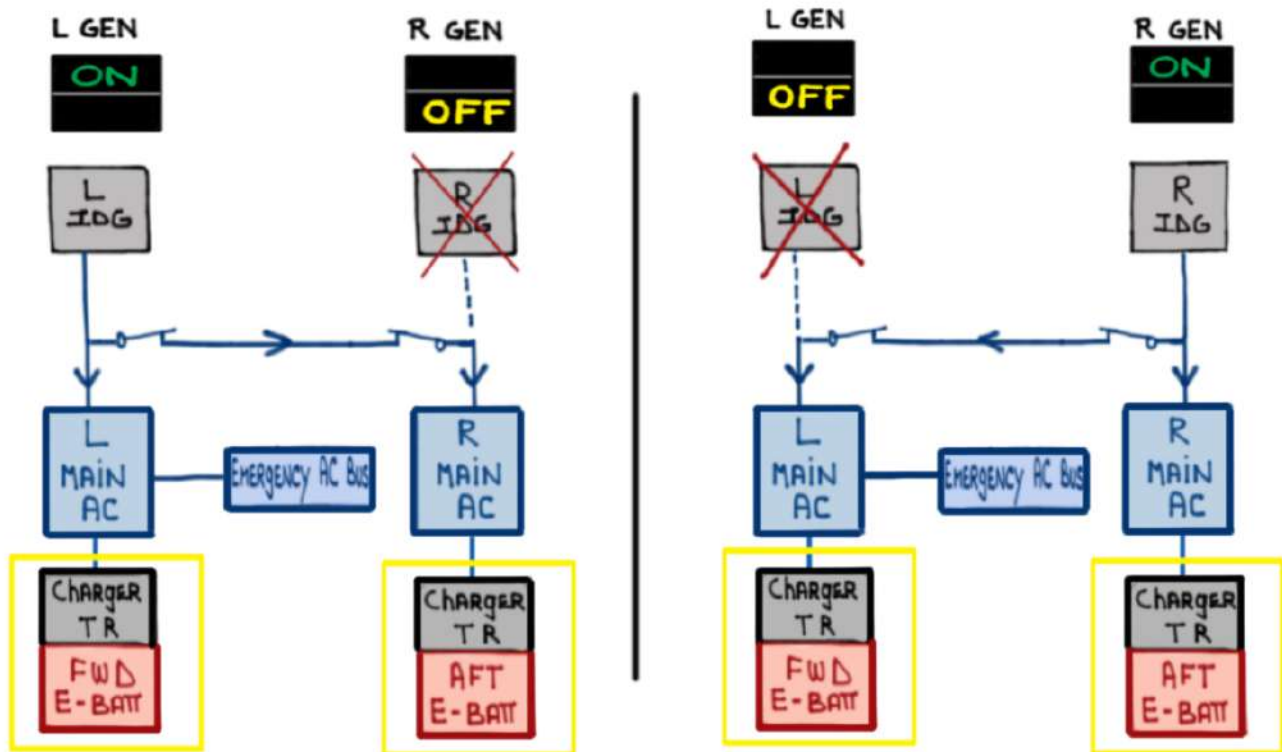


* 1.5 hours To fully charge

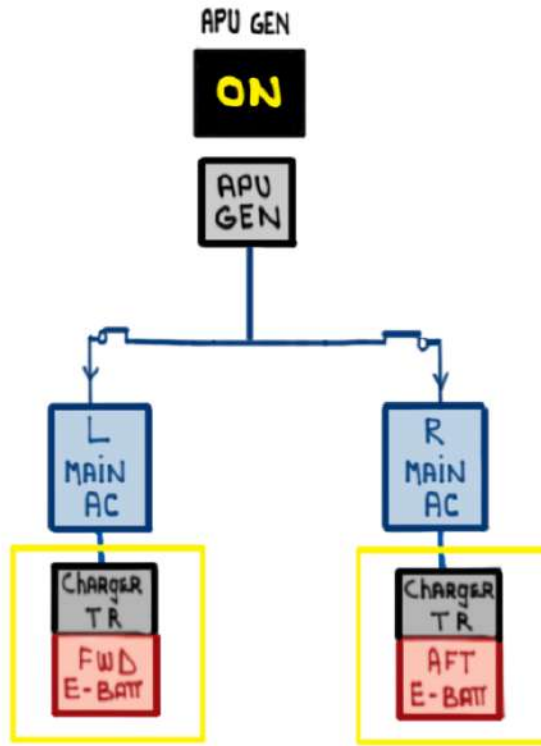
① Both IDGs



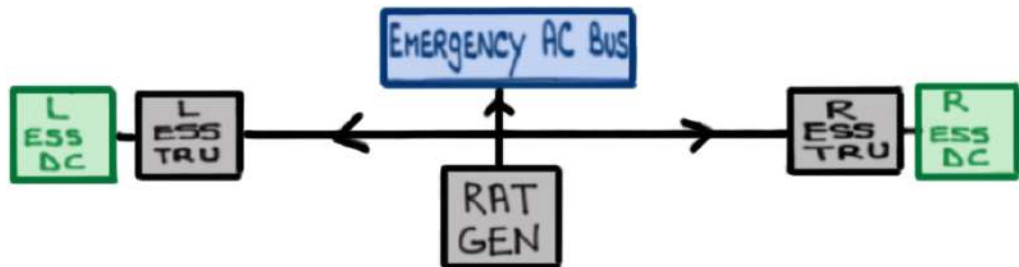
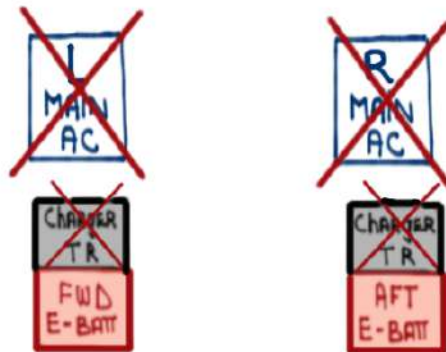
② ONE IDG only



③ APU GEN
only

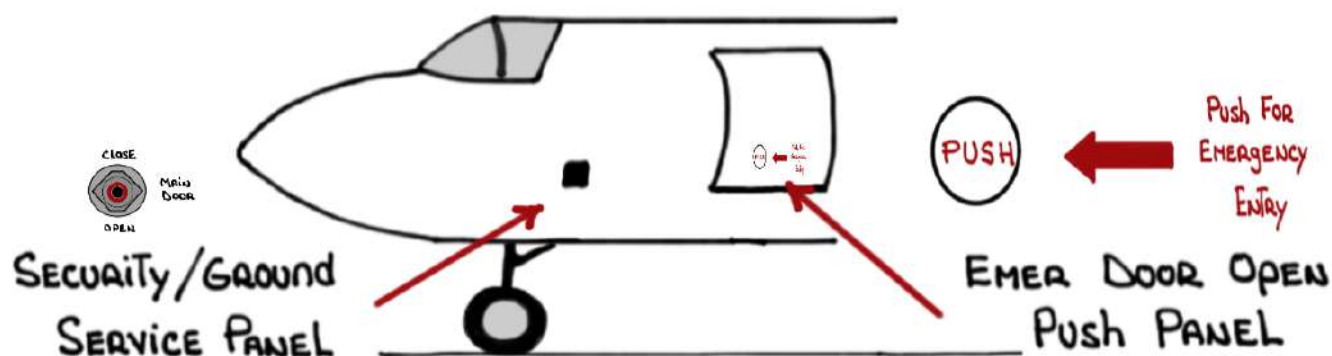


④ RAT GEN
only



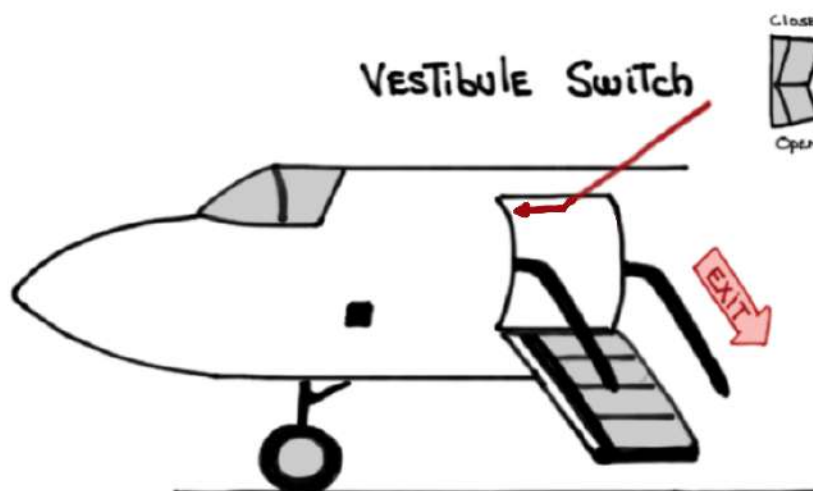
- The **FWD E-BATT** CAN BE USED IN AN EMERGENCY TO OPEN THE MAIN ENTRANCE DOOR (MED) VIA FOUR (4) SWITCHES. TWO (2) EXTERNAL AND TWO (2) INTERNAL

EXTERNAL switches:

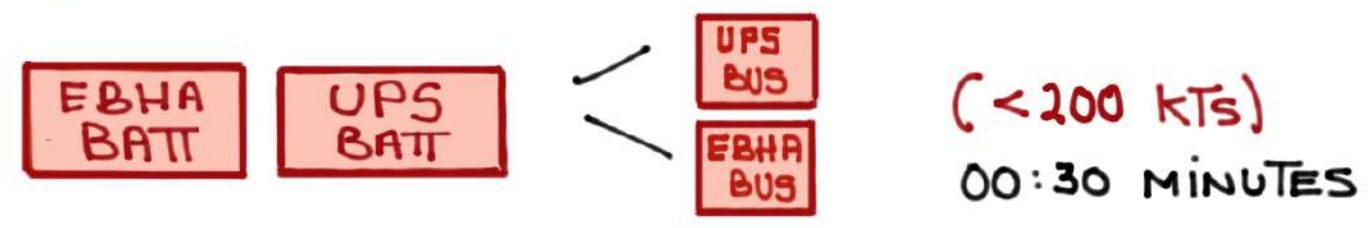
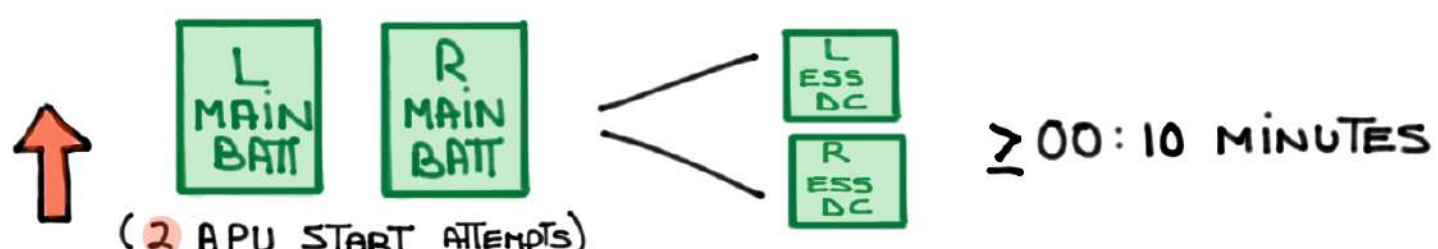
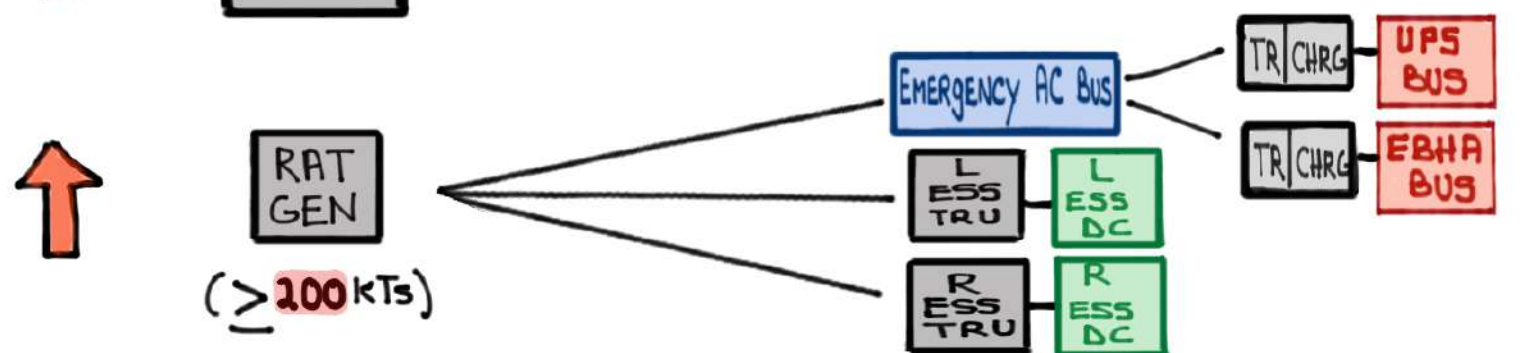
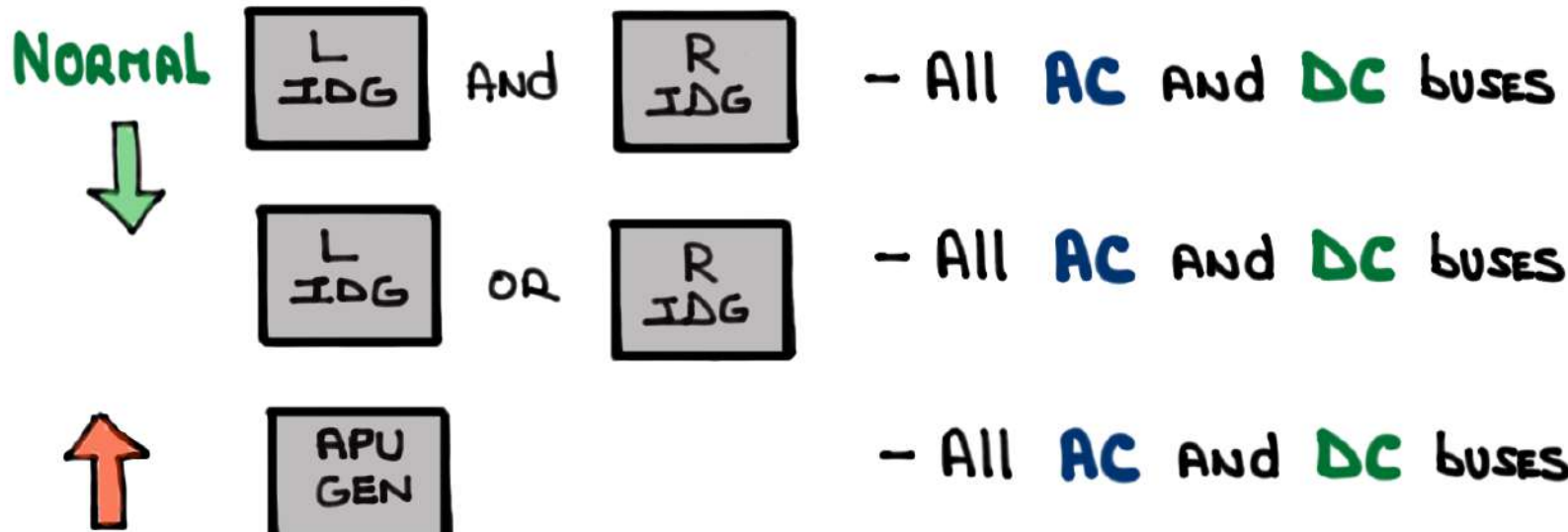


THE EMED IS OPENED VIA EITHER ONE OF THESE ON THE FIRST flight of the day TO CONFIRM THAT THE **FWD E-BATT** HAS SUFFICIENT BATTERY CHARGE

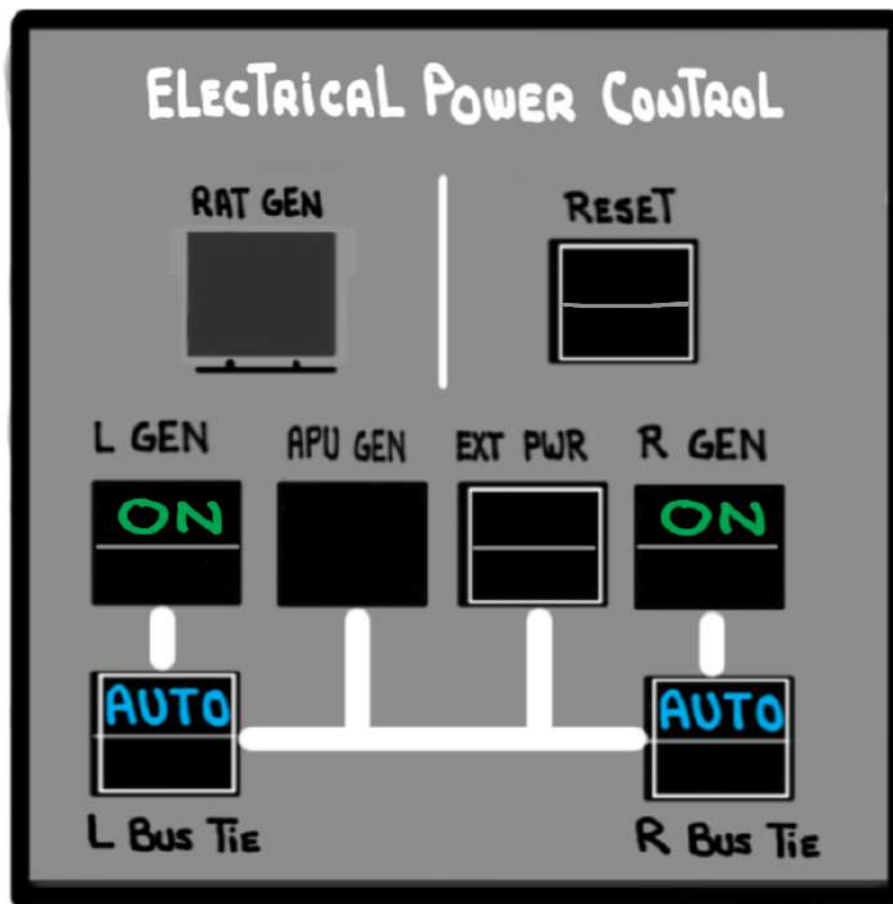
INTERNAL switch:



NORMAL - EMERGENCY




EMERGENCY



Two (2) switchlights **GREEN**

Two (2) switchlights **BLUE**

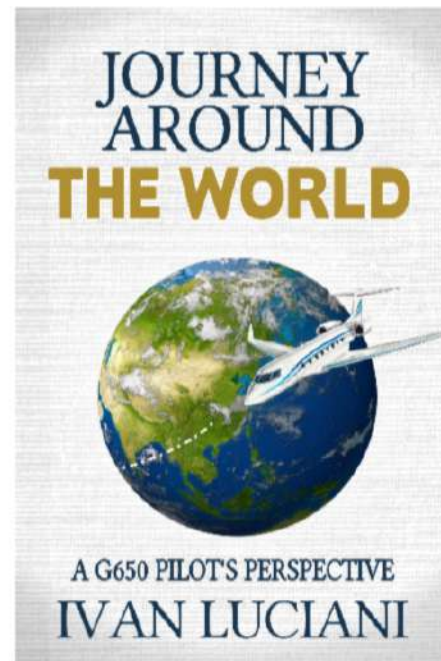
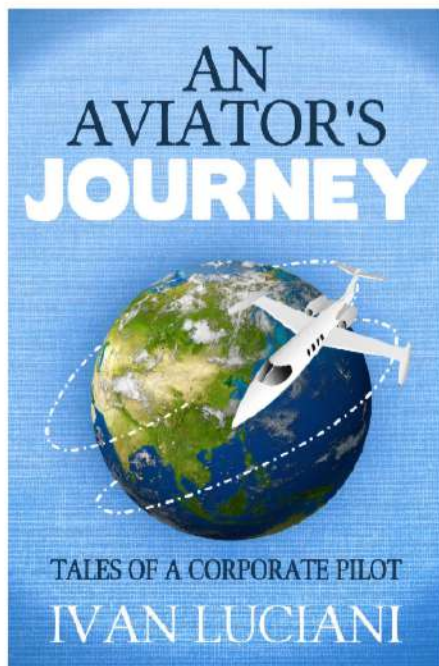
Four (4) switchlights **PRESSED IN** 
including the guarded RAT GEN switchlight

Four (4) switchlights **Pushed OUT** 

REMINDER: these system notes are intended for study purposes only. Always refer to official Gulfstream manuals and other approved references when operating your aircraft.

NOTE: these system notes are updated from time to time and what is posted on Code450.com will always be the most recent version.

Questions, comments or errors...please do send me an email:
ivan.luciani@gmail.com



Thank you!