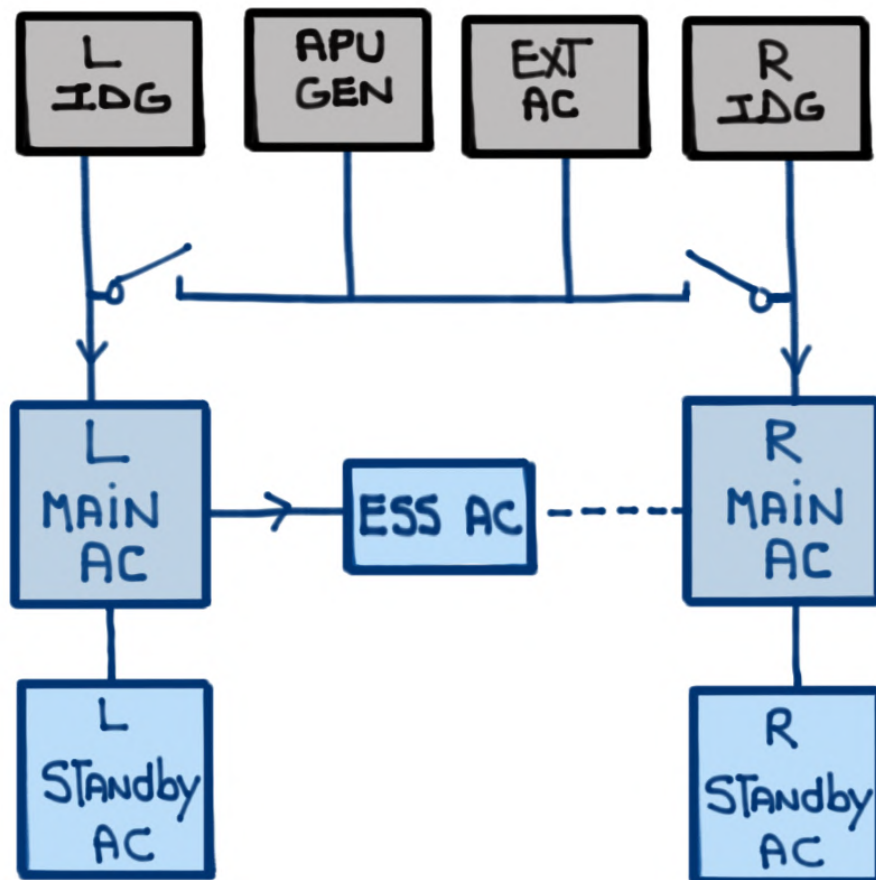


# G550 ELECTRICAL SYSTEM



For study purposes only

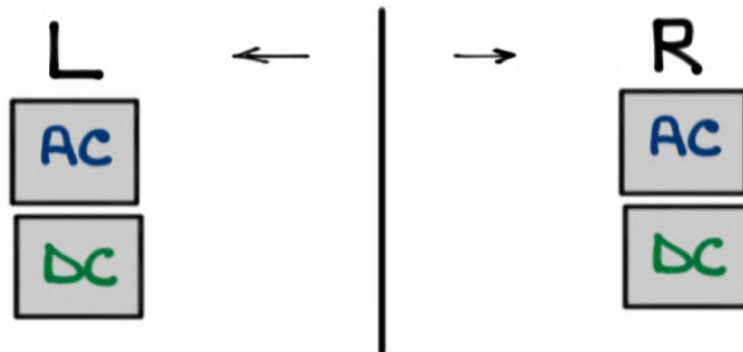
- The ELECTRICAL POWER SYSTEM produces:



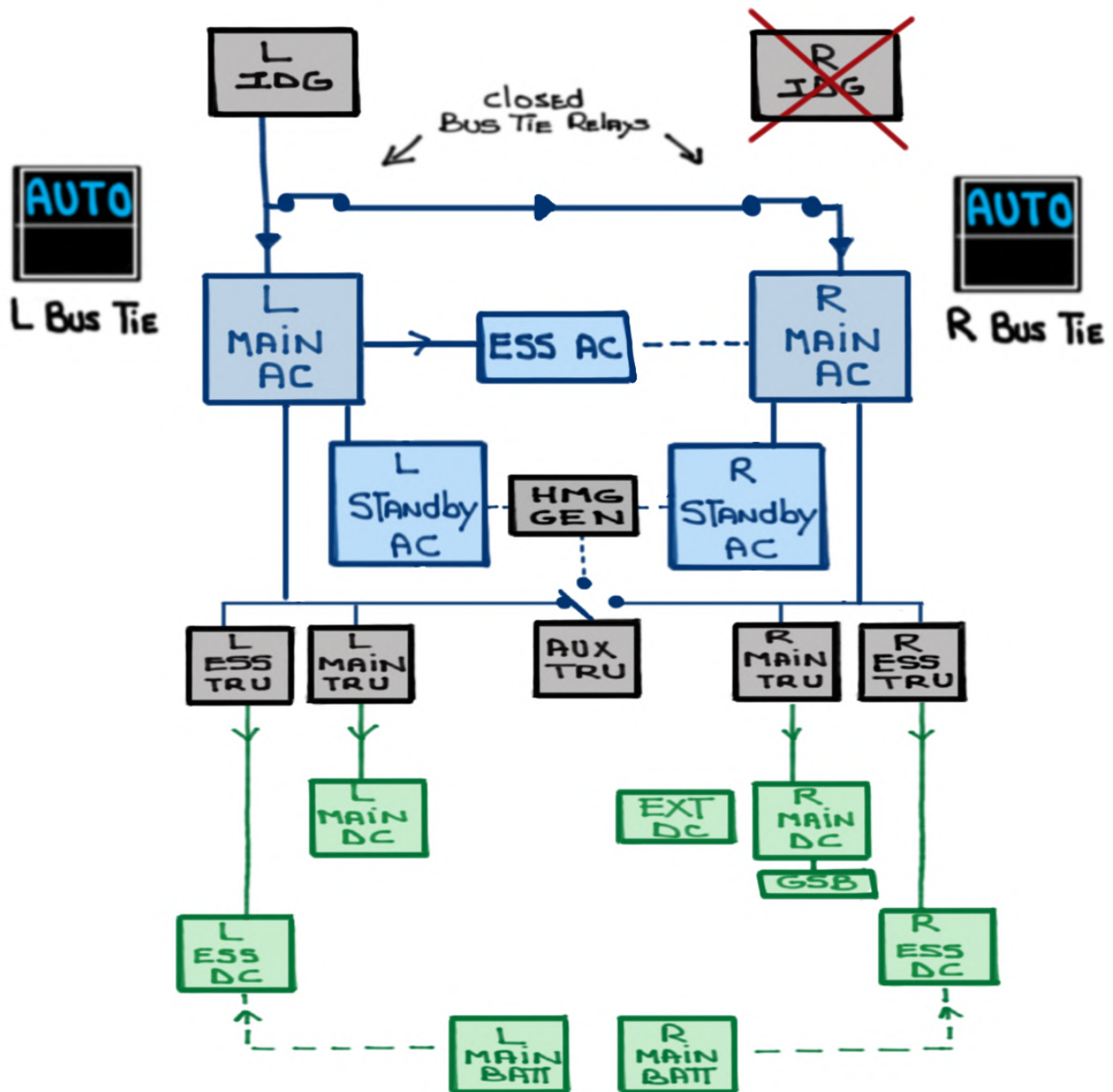
- 115 Volts AC is GENERATED in order To PRODUCE  
28 Volts DC via TRANSFORMER RECTIFIER UNITS (TRU)



- Two (2) SEPARATE SYSTEMS/NETWORKS



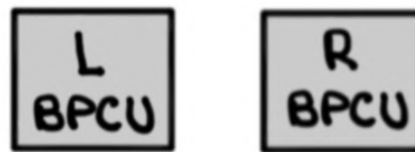
- A split bus system prevents a short on one side from affecting the other side
- Operative side can power the inoperative side



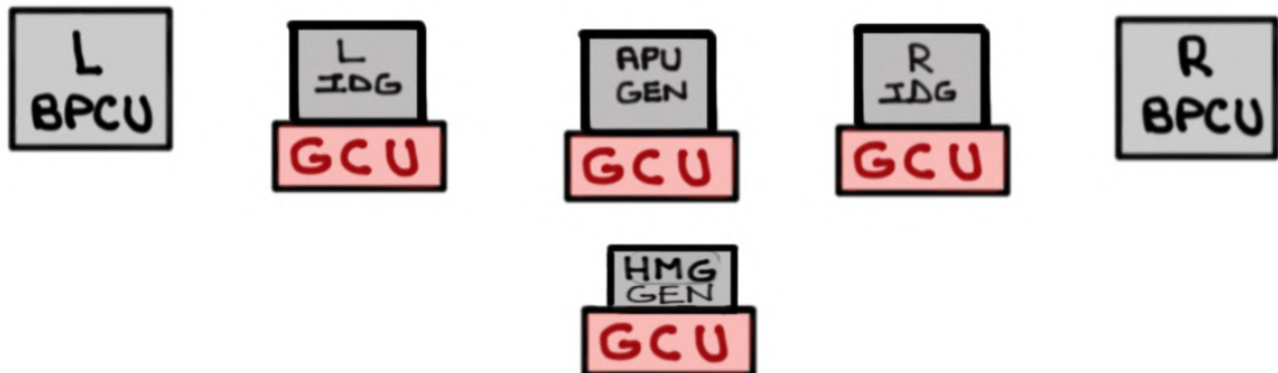
## - POWER DISTRIBUTION BOXES (PDB):



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



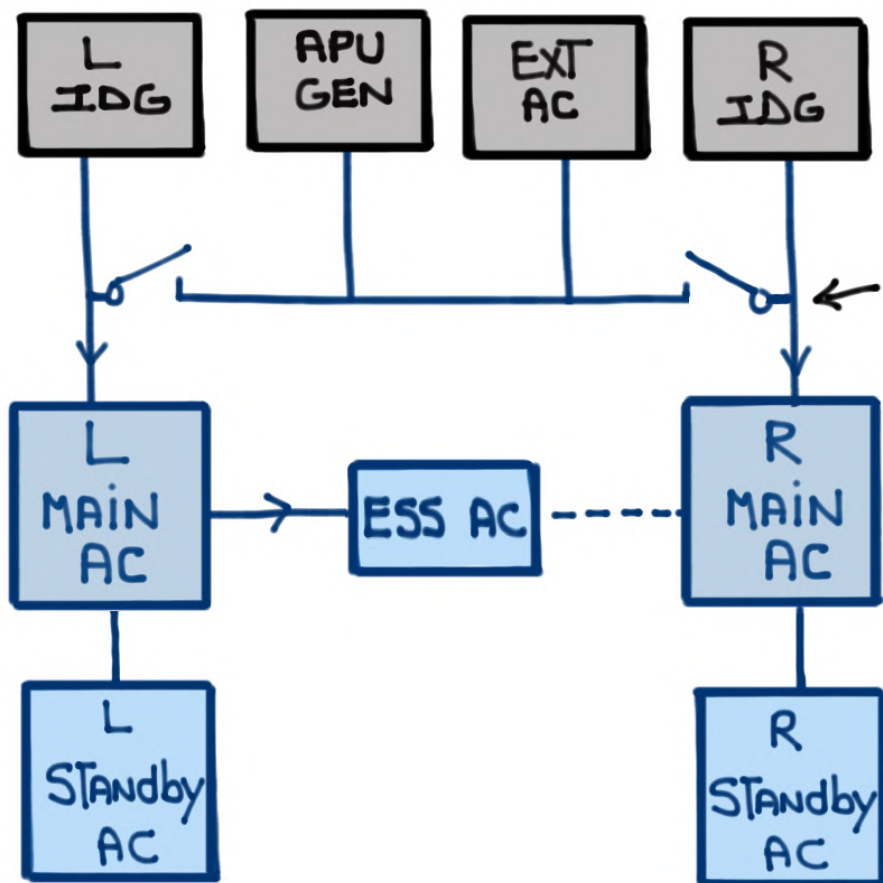
- THERE ARE SIX (6) MICROPROCESSORS (BPCUs AND GCUs):



## - AC System:

**115 VAC** is GENERATED by:

**NORMAL**



Open  
BUS Tie  
Relay



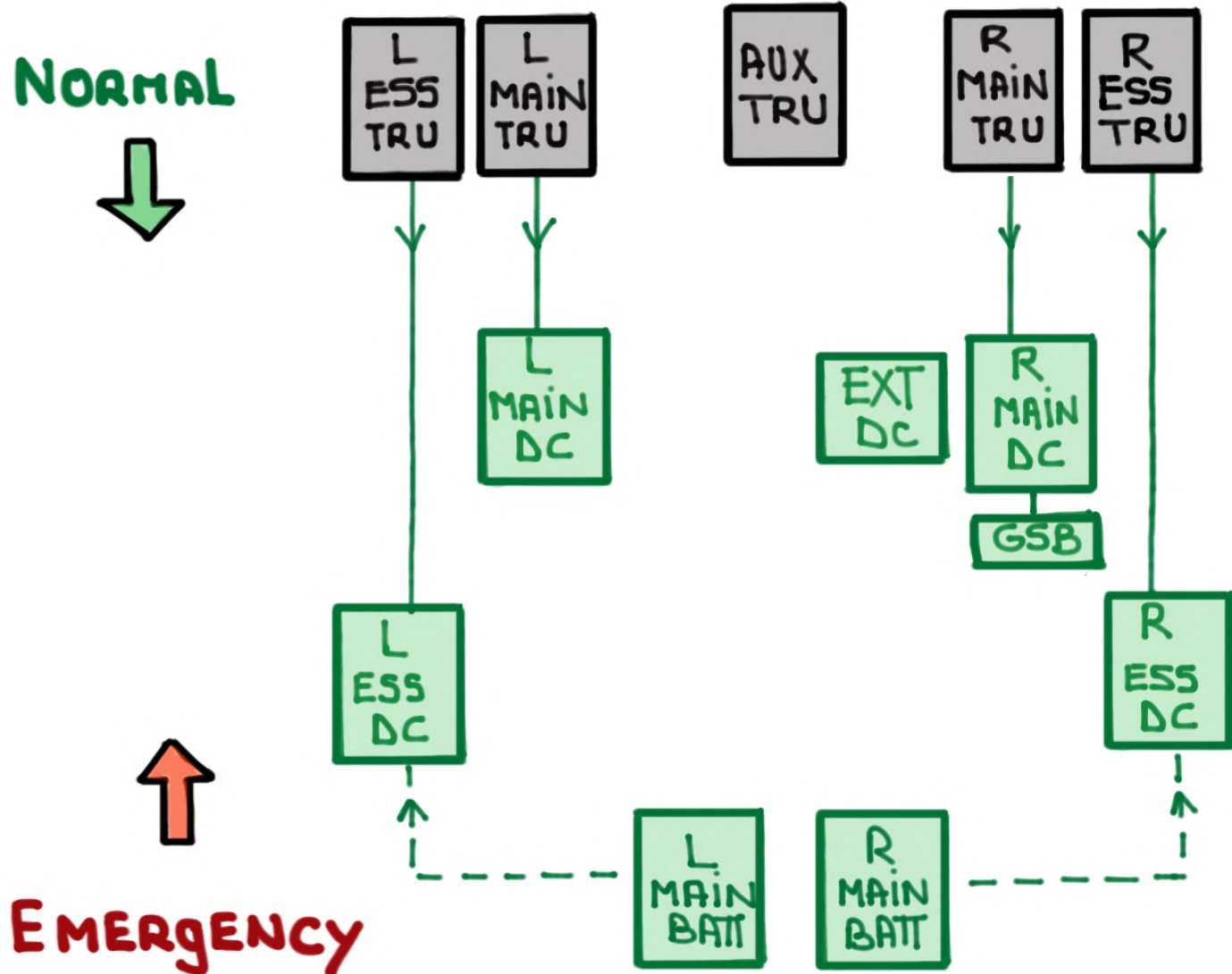
**EMERGENCY**

HMG  
GEN

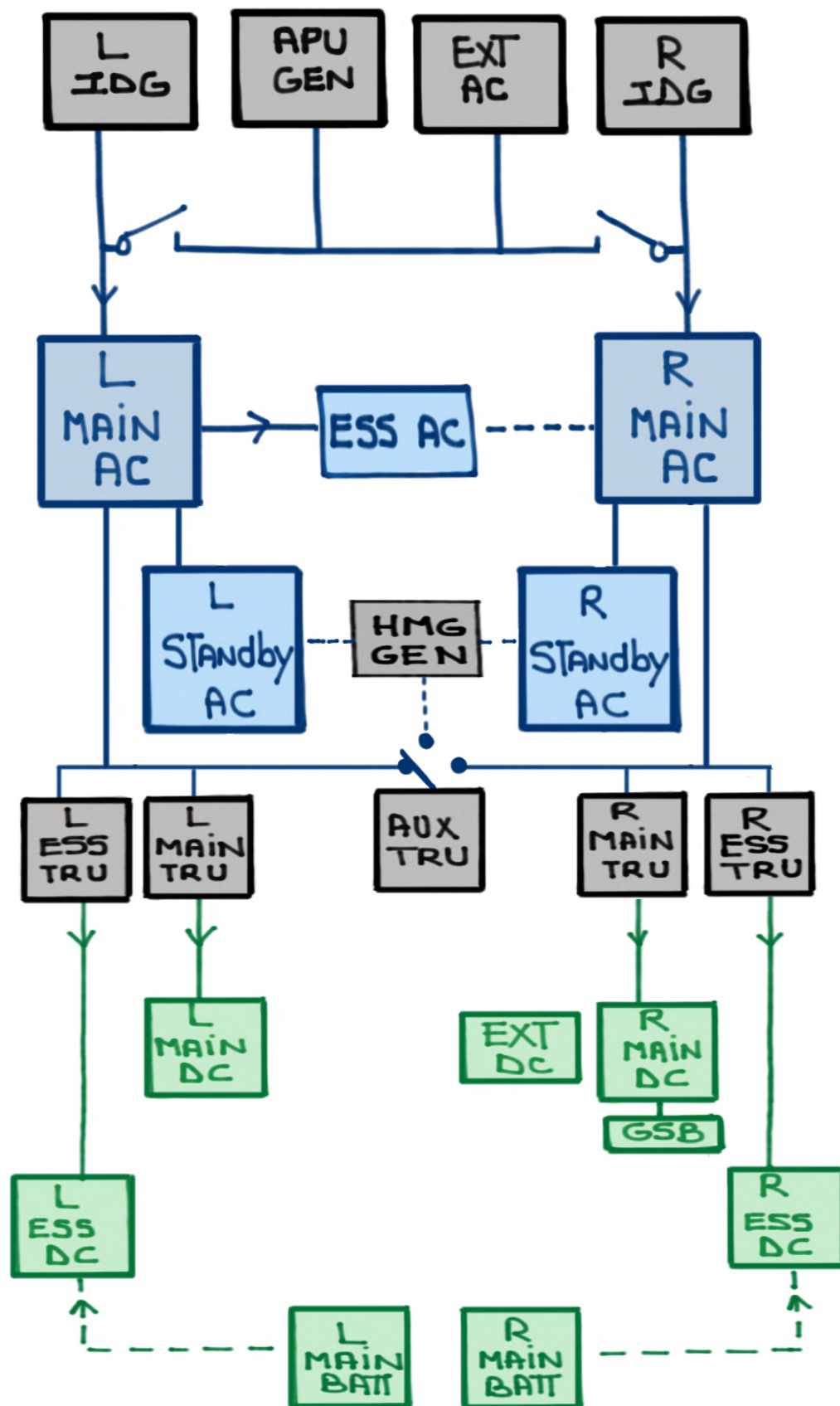


## - DC SYSTEM:

**28 VDC** is produced by:

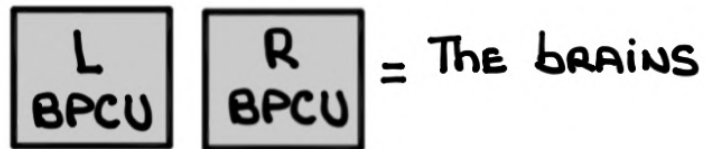







# ELECTRICAL POWER SYSTEM



# BUS POWER CONTROL UNITS (BPCU)

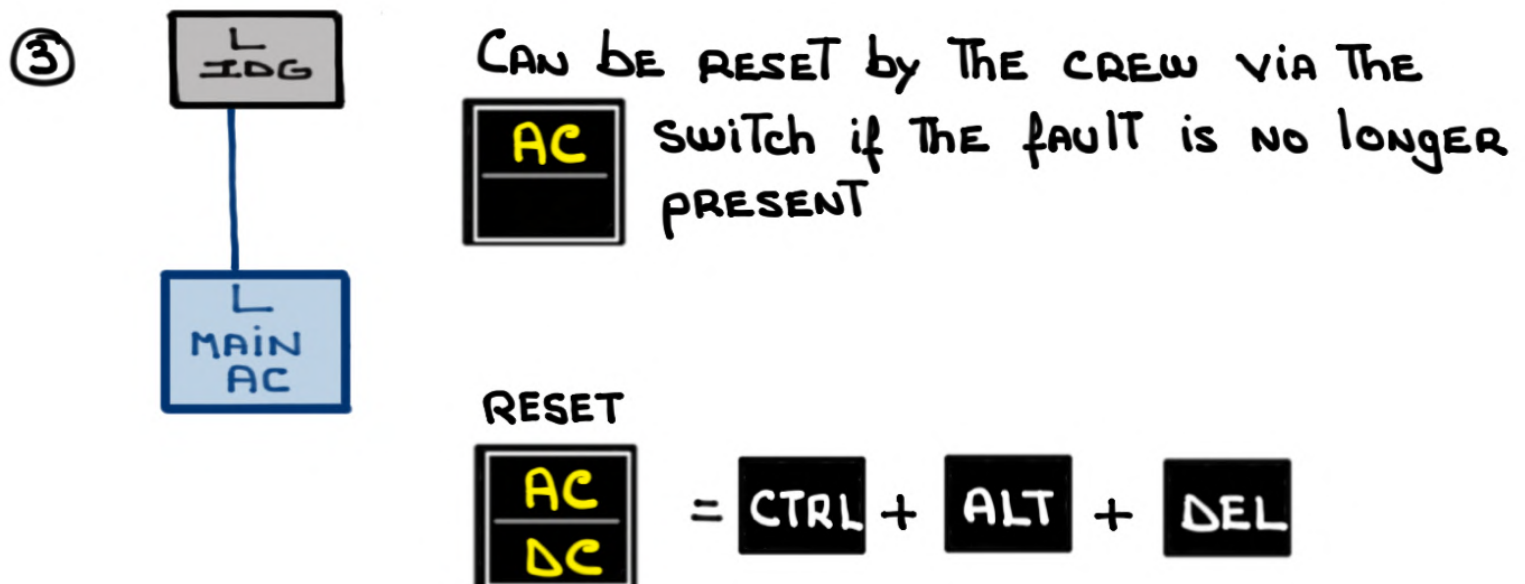
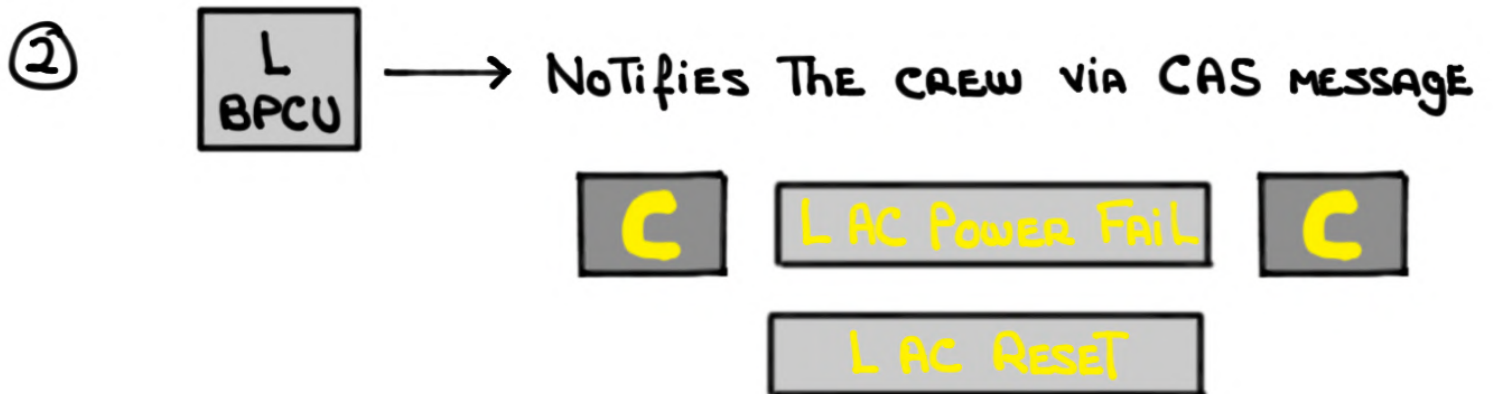
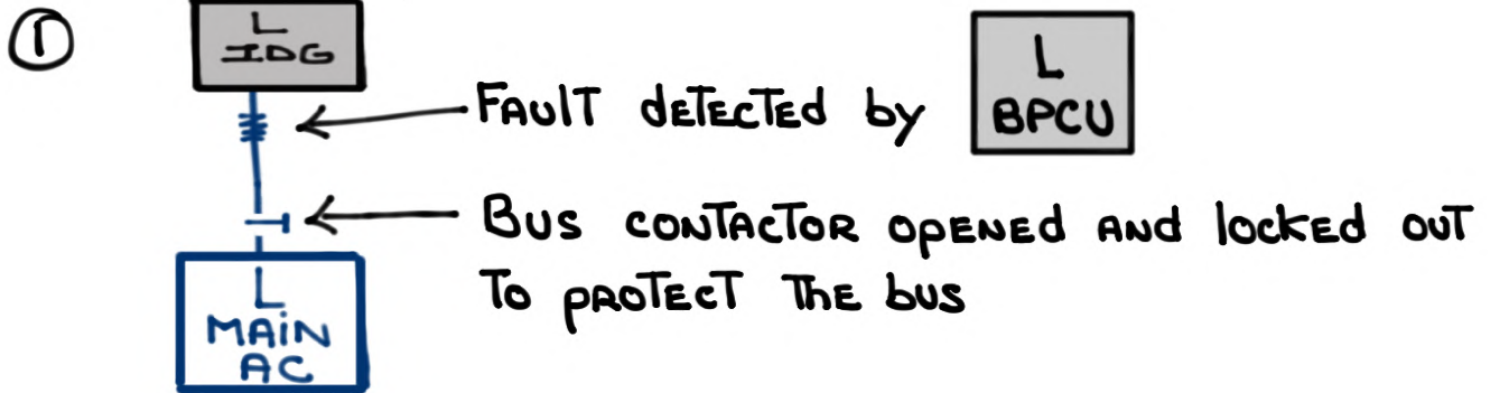
THE ELECTRICAL POWER SYSTEM IS CONTROLLED BY TWO (2) IDENTICAL AND INTERCHANGEABLE MICROPROCESSORS CALLED BPCUs

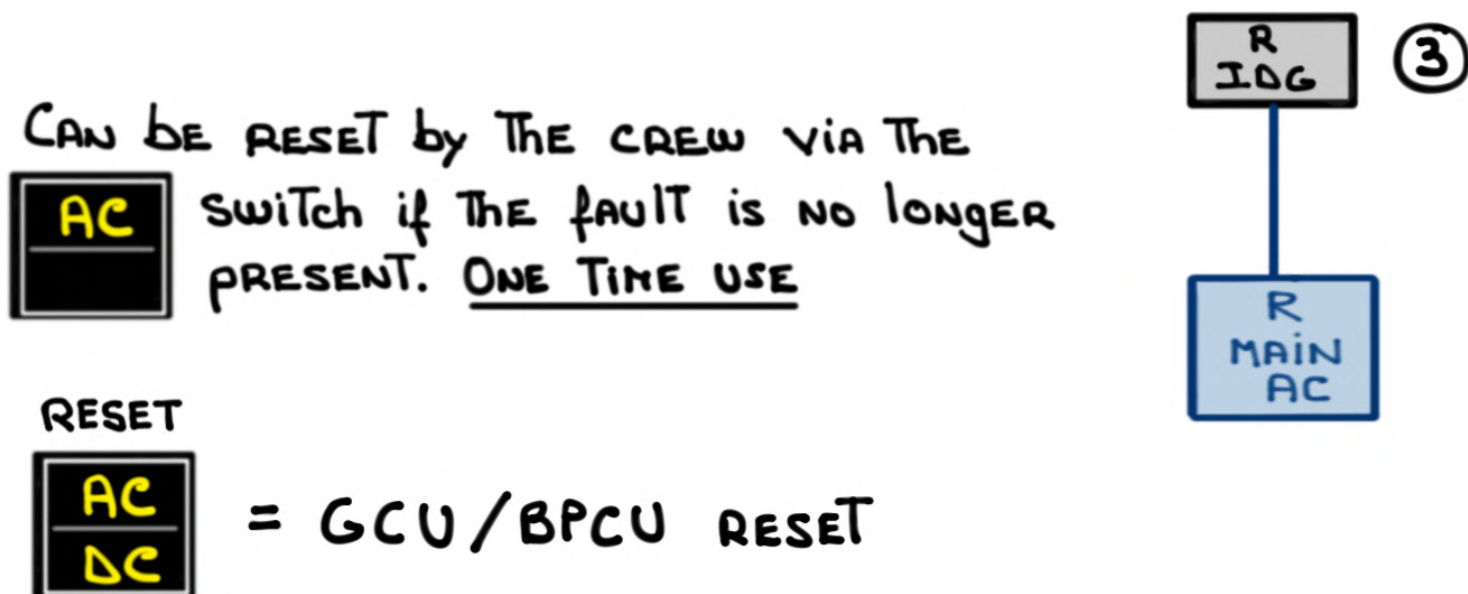
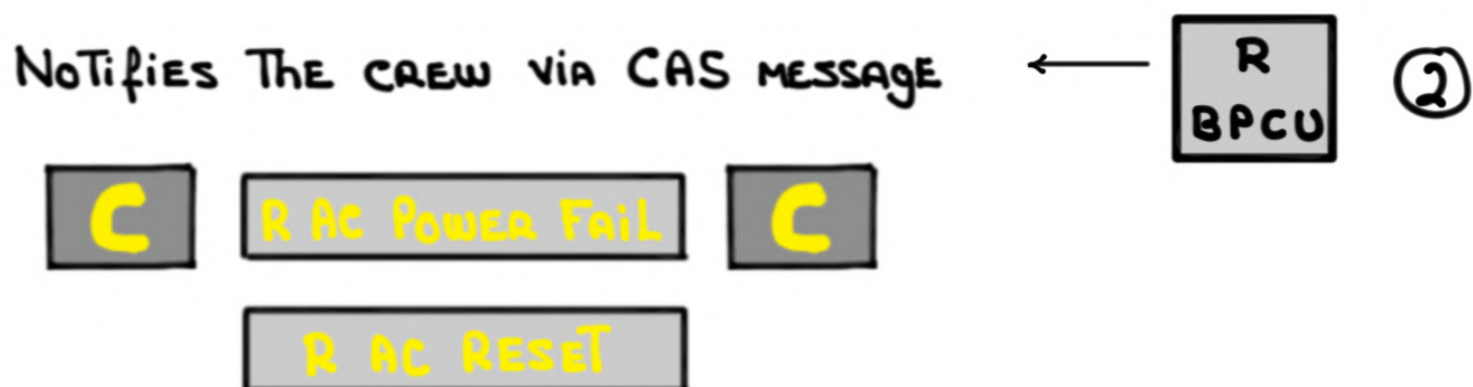
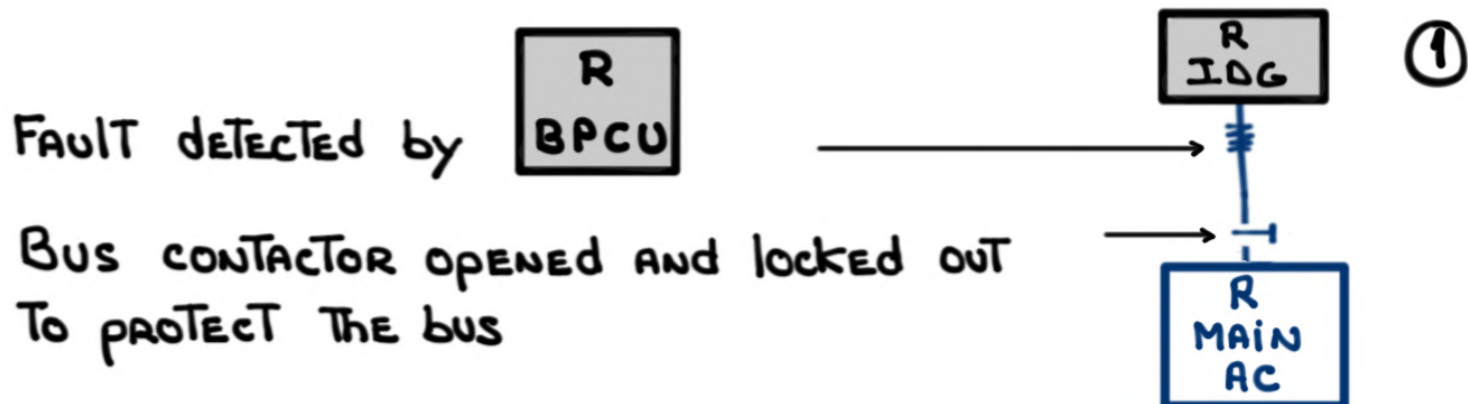


- THE   CONTROL AND MAKE ALL LOGICAL DECISIONS FOR ELECTRICAL DISTRIBUTION AND PROTECTION
- TRAFFIC COPS - PROTECTORS OF THE BUSES
- CLOSE AND OPEN CONTACTORS AND/OR RELAYS TO:
  - EFFICIENTLY SUPPLY POWER TO THE BUSES
  - PROTECT AND ISOLATE THE ELECTRICAL SYSTEM FROM FAULTS
- OUTPUT CRITICAL FINDINGS 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:



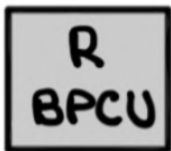


- BPCU logic: **ESS** before **MAIN** / **L** before **R**

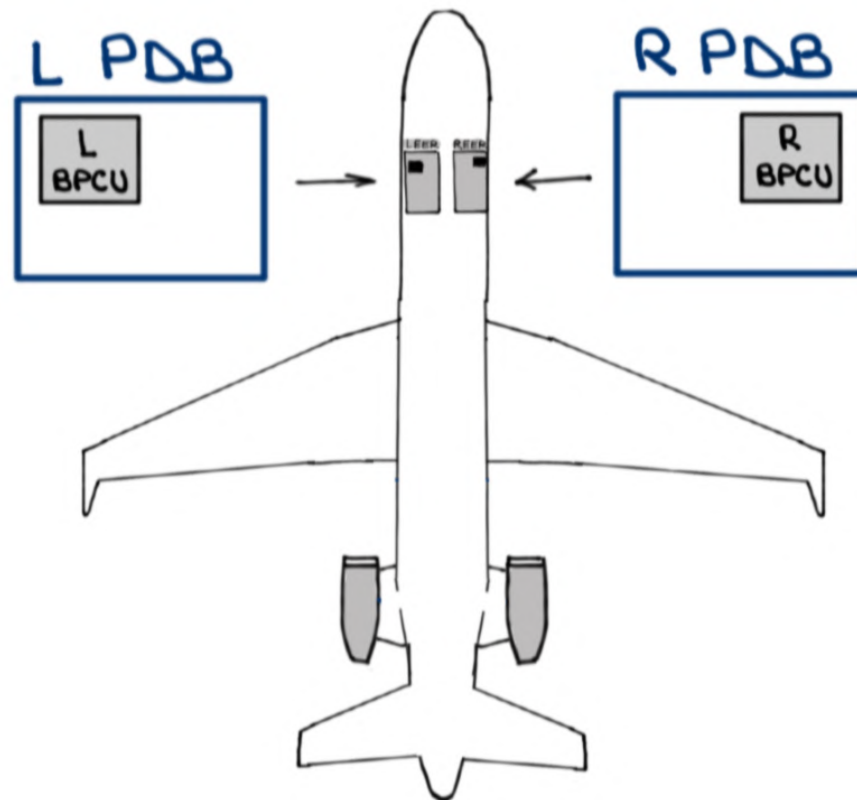
- LOCATED in:



LEFT ELECTRONIC EQUIPMENT RACK (LEER)



RIGHT ELECTRONIC EQUIPMENT RACK (REER)

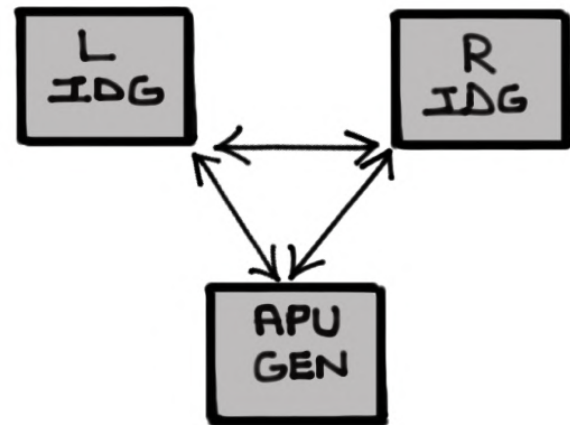


## - NO BREAK POWER TRANSFER (NBPT)

- CONTROLLED by L  
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**

EXT  
AC

↔


APU  
GEN

GEN

~~R  
IDG~~


FAILURE

ENG



FAILURE

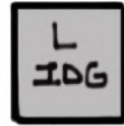
A FIRE



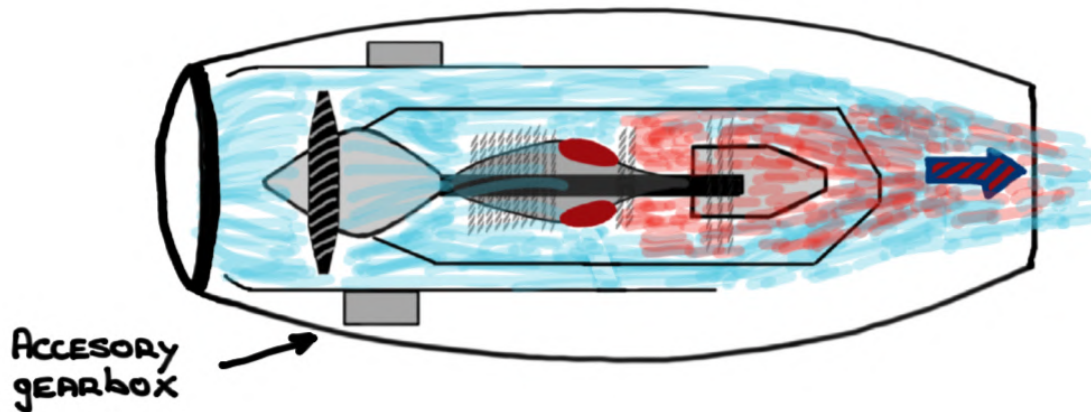
HANDLE pulled

# INTEGRATED DRIVE GENERATORS (IDG)

- Two (2) ENGINE-DRIVEN IDGs



- LOCATED ON THE ENGINE'S ACCESSORY gearbox



- IDG < CONSTANT SPEED DRIVE (CSD)  
Oil-cooled GENERATOR (oil is cooled by fan air)

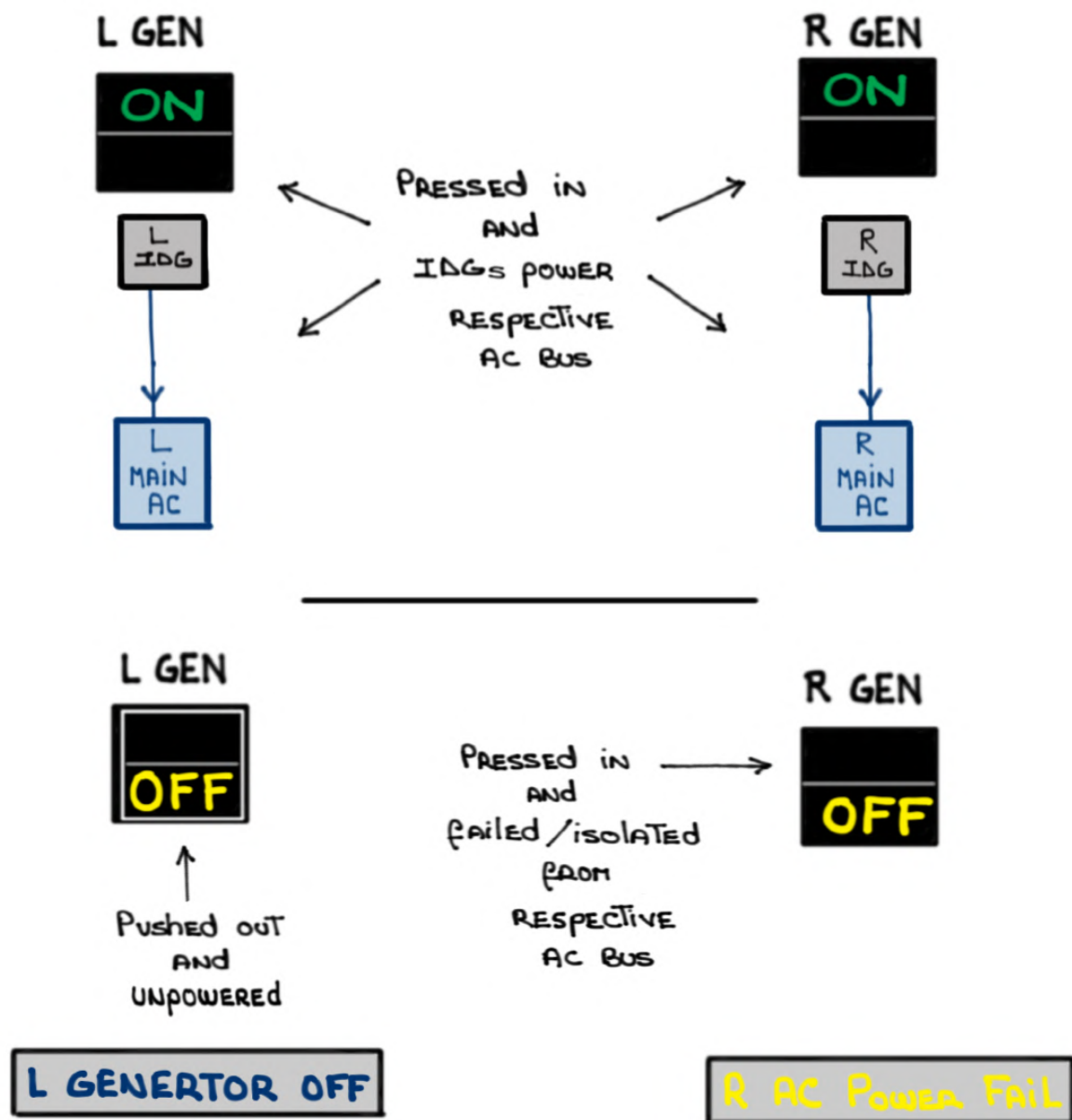
- IDG < RATED AT 40 KVA  
PRODUCES: 115 VAC  
400 HERTZ  
3-phase

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



- Dispatch with AN IDG U/S is NOT PERMITTED AS PER AFM ois **G550-2016-03** APU SEALANT

- GENERATOR SWITCHES:



- Galley buses REQUIRE:

- ONE (1) GEN SOURCE ON THE **GROUND**
- Two (2) GEN SOURCES IN THE **AIR**

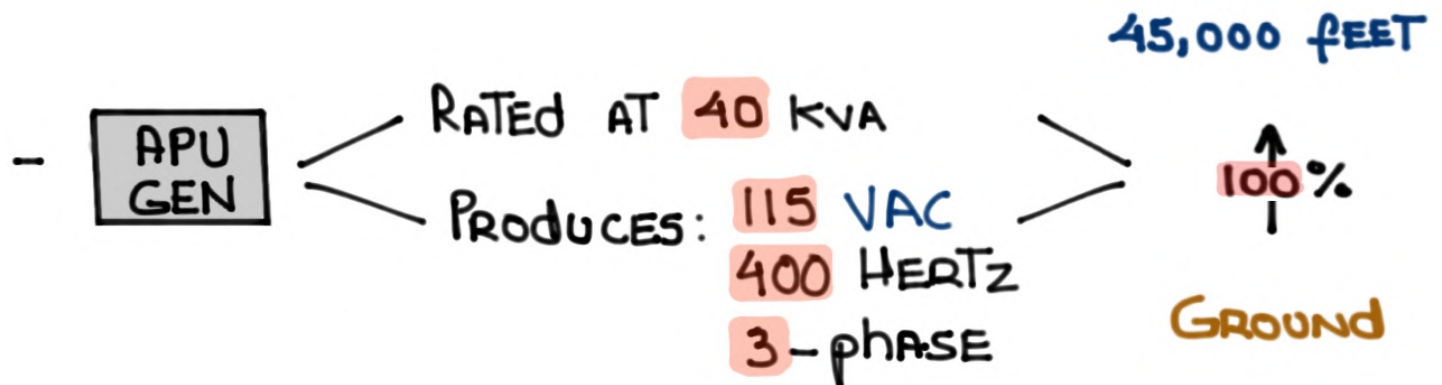
# Auxiliary Power Unit (APU) GENERATOR

- 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



PRODUCES: **115** VAC  
**400** HERTZ  
**3**-phase

**45,000 FEET**

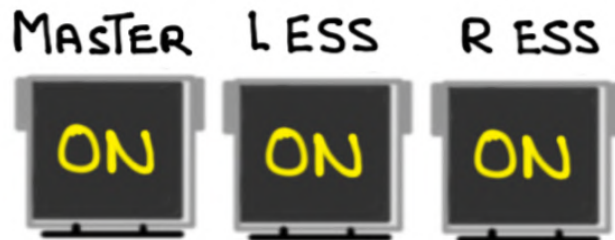
**100%**

**GROUND**

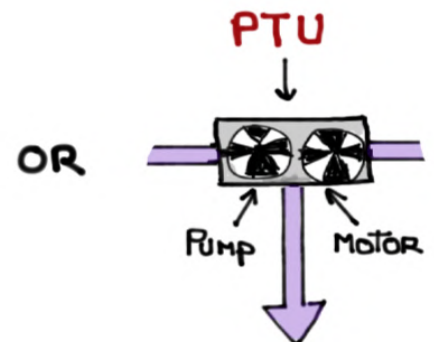
- REFER TO AFM OIS G550-2016-03 APU SEALANT  
for APU inflight operation limitations

# Hydraulic Motor GENERATOR

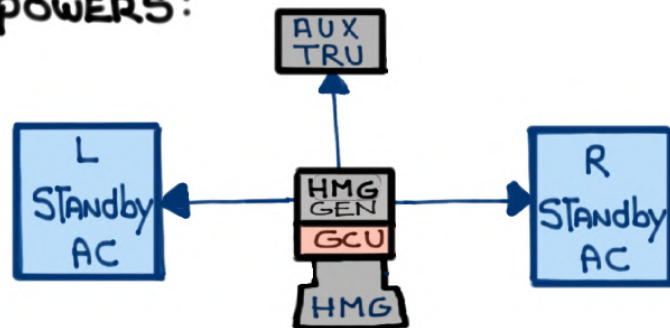
- The Hydraulic Motor GENERATOR (HMG) is a backup **AC** GENERATOR
- The HMG is PART of THE Standby Electrical Power System



- The HMG is driven by:



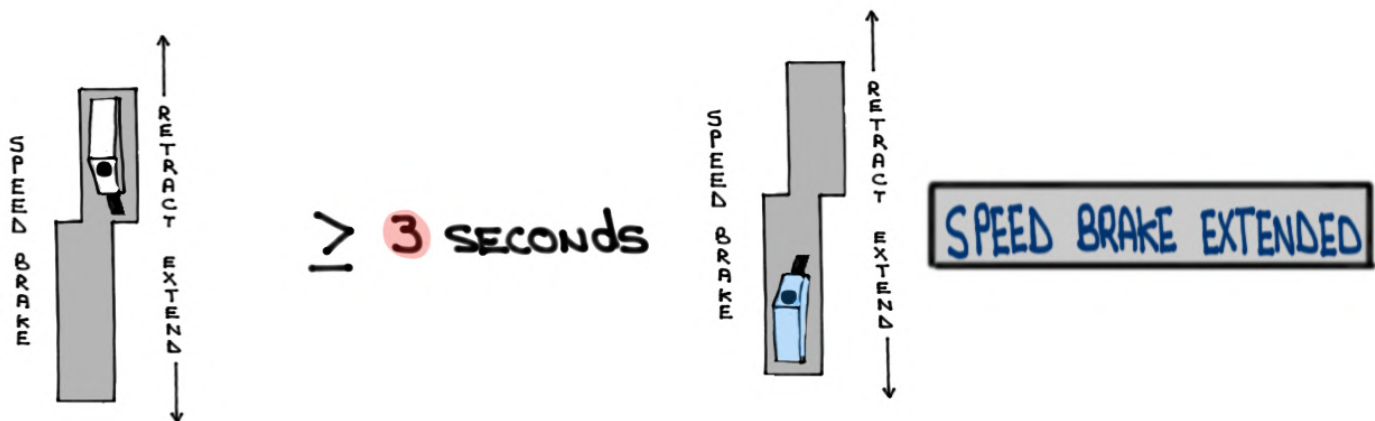
- The HMG powers:



RATED AT 10 KVA / Produces: 115 VAC  
400 HERTZ  
3-phase

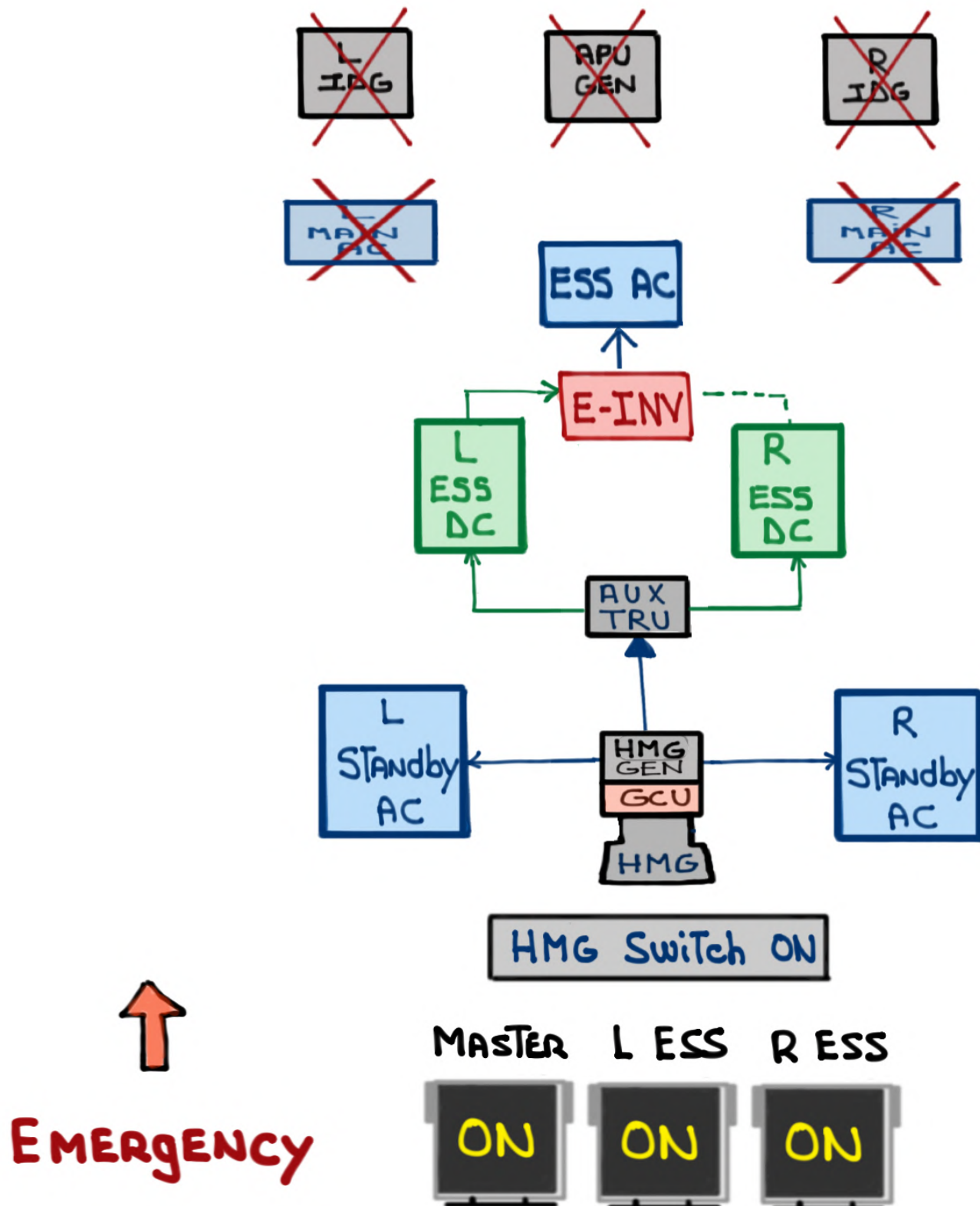
HMG Switch ON

- The HMG produces AC power in the event of a dual L IDG R IDG AND APU GEN failure
- The HMG is located in the main landing gear wheel/well
- With the HMG ON the thirty (30) minute limit on the main batteries is no longer a factor
- The AUX TRU produces DC voltage and will power the L ESS DC R ESS DC buses when selected by the crew with a ten (10) second interval between selections
- Speed brake deployment is OK as long as the handle is moved from stowed to fully extended in three (3) seconds or more





- HMG operation is permitted only when NORMAL **AC** POWER GENERATION is NOT AVAILABLE

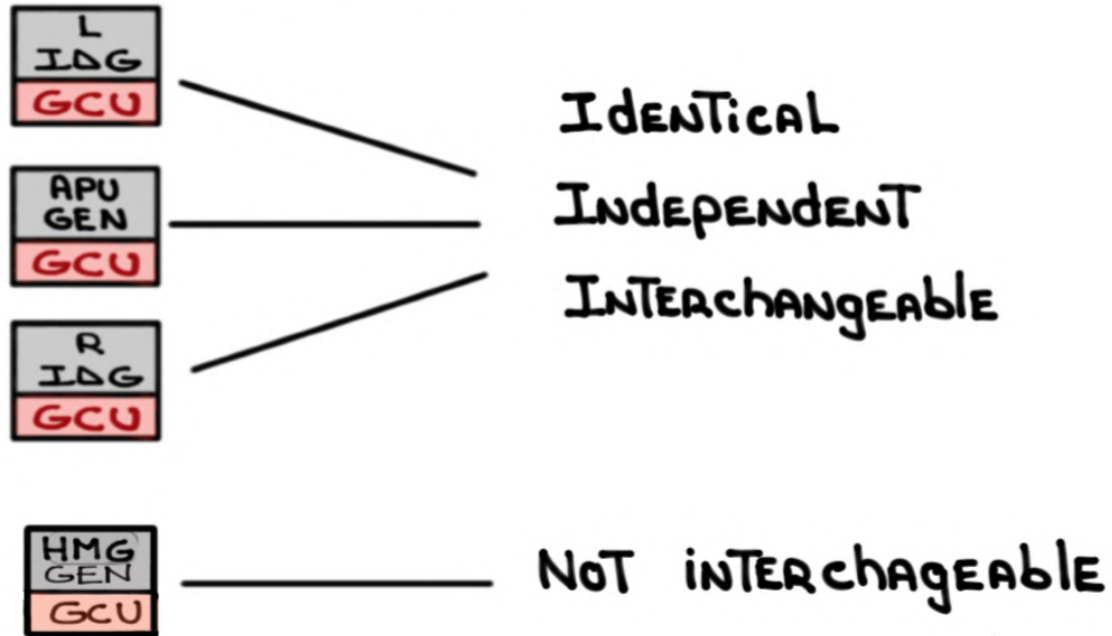




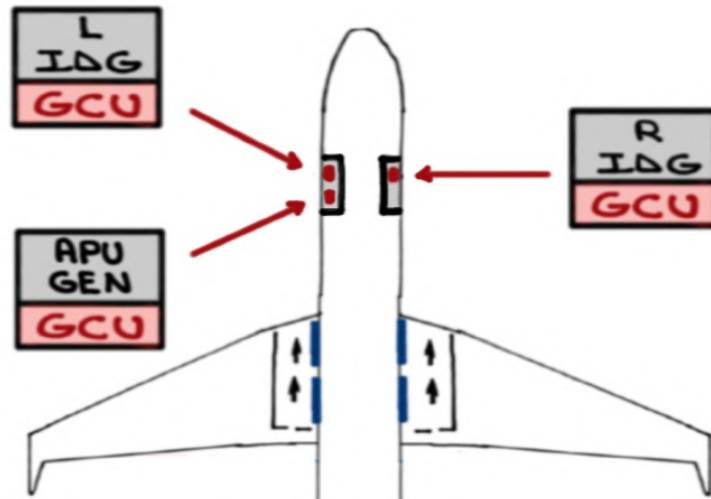
# GENERATOR CONTROL UNITS (GCU)

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

- THERE ARE FOUR (4) GCUs:



- GCUs ARE LOCATED IN THE LEER AND REER



- If GEN

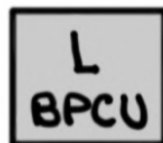
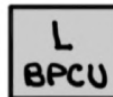
VOLTAGE
FREQUENCY
AMPERAGE

OUTSIDE  
PARAMETERS =



GCU TAKES GEN OFFLINE

GCU NOTIFIES



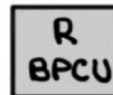
NOTIFIES CREW VIA CAS:

L AC POWER FAIL

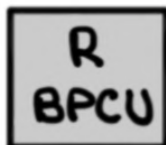
L GENERATOR FAIL

GCU TAKES GEN OFFLINE

GCU NOTIFIES



NOTIFIES CREW VIA CAS:



R AC POWER FAIL

R GENERATOR FAIL

- **GCU** CAN BE RESET by cycling ASSOCIATED GENERATOR switch

# EXTERNAL AC/DC POWER

– EXTERNAL  POWER 

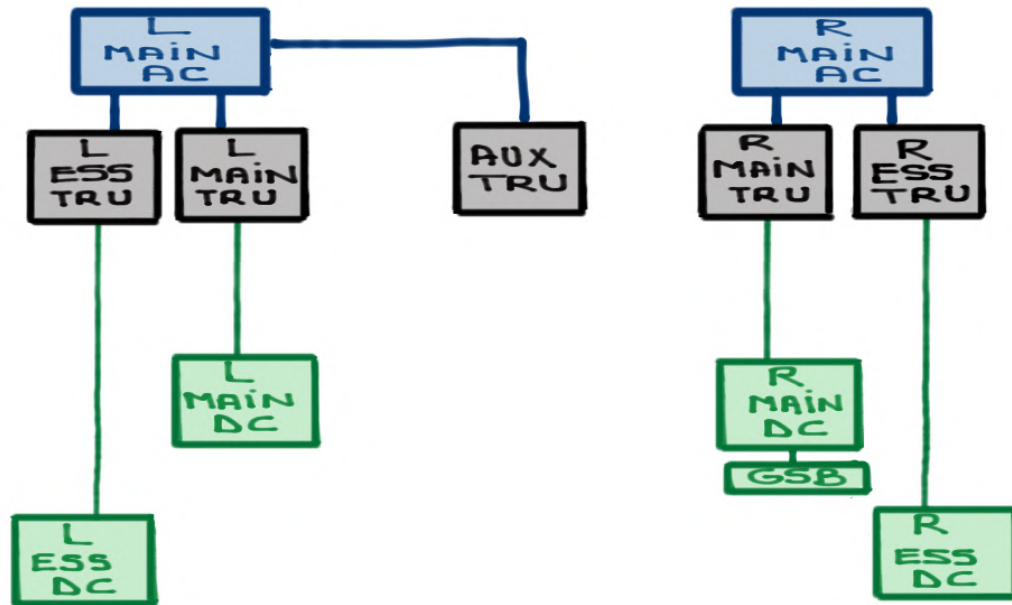
- RECEPTABLE IS LOCATED ON THE RIGHT SIDE OF THE FUSELAGE
- 30 KVA, 115 VAC, 400 Hz, 3 PHASE
- CAN POWER ALL AC BUSES AND THROUGH THE TRUS ALL DC BUSES ARE POWERED
- BPCU CHECKS QUALITY OF POWER BEFORE ALLOWING ONTO AIRCRAFT

– EXTERNAL  POWER 

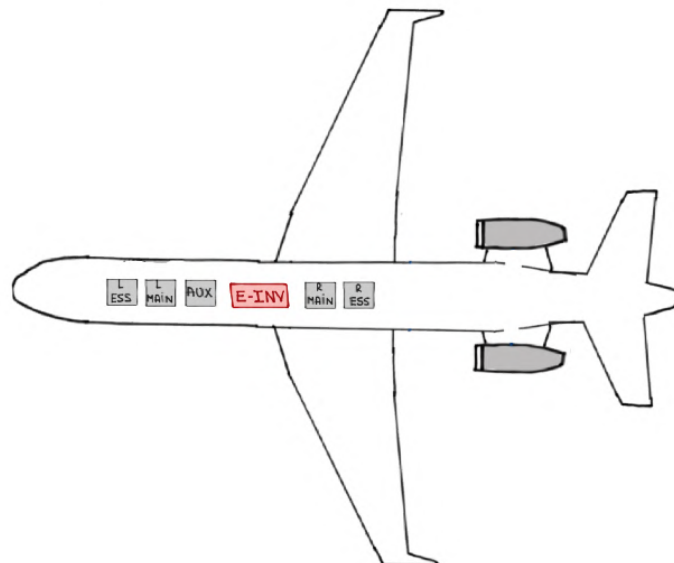
- RECEPTABLE IS LOCATED ON THE RIGHT SIDE OF THE FUSELAGE
- POWERS ALL DC BUSES
- CAN BE USED TO POWER THE GSB

# TRANSFORMER RECTIFIER UNITS (TRU)

- TRUs ARE POWERED by The **L MAIN AC** **R MAIN AC** BUSES
- A **TRU** CONVERTS **115 VAC** To **28 VDC**








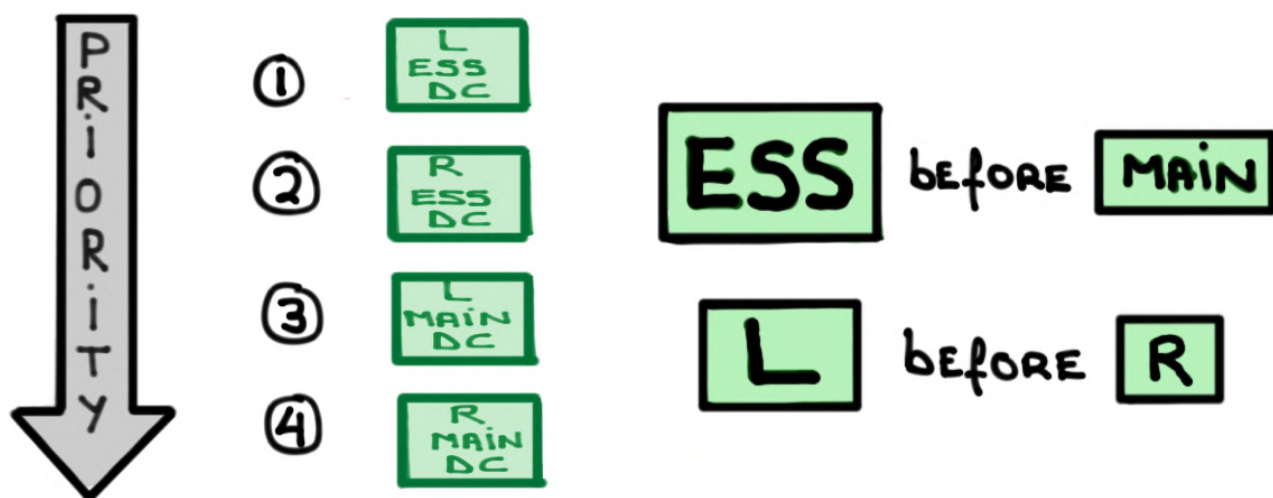
- TRUs ARE LOCATED UNDERNEATH THE floor





-     POWER THEIR OWN BUSES

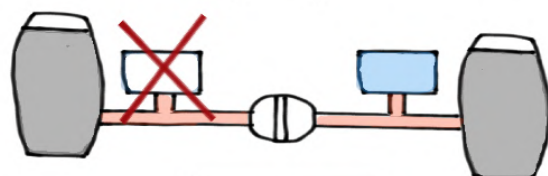
-  POWERS THE   BUSES AND WILL TAKE OVER THE DUTIES OF A FAILED ~~~~ OR ~~~~ TRU USING THE FOLLOWING PRIORITY PROCESS:



- TRU LOAD LIMITS (OM 03-02-00)



Single pack:

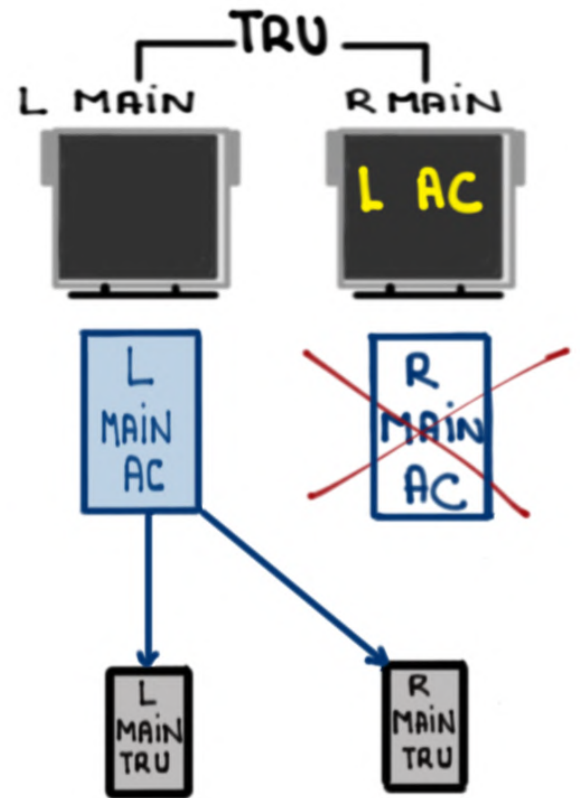
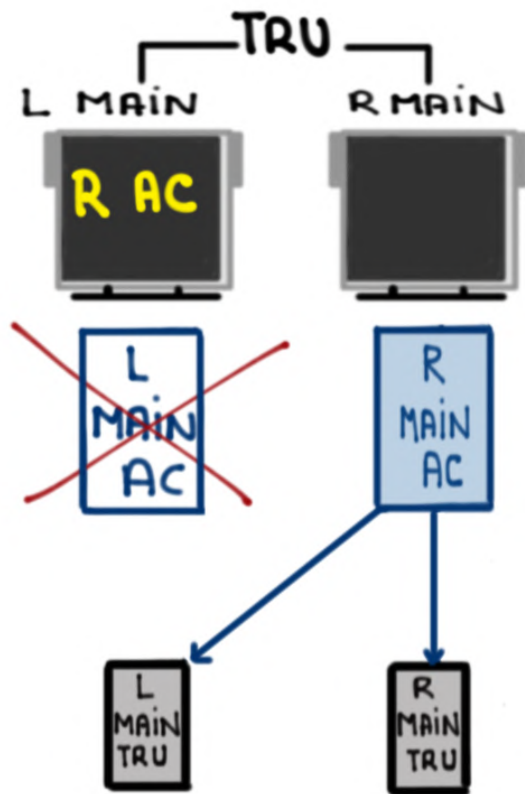


**FWD CABIN**





- TRU switches allow opposite **MAIN AC** bus To power A **MAIN TRU** THAT lost power due To The failure of its own ~~MAIN AC~~ bus



- TRUs ARE RATED AT **250** amps

# 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

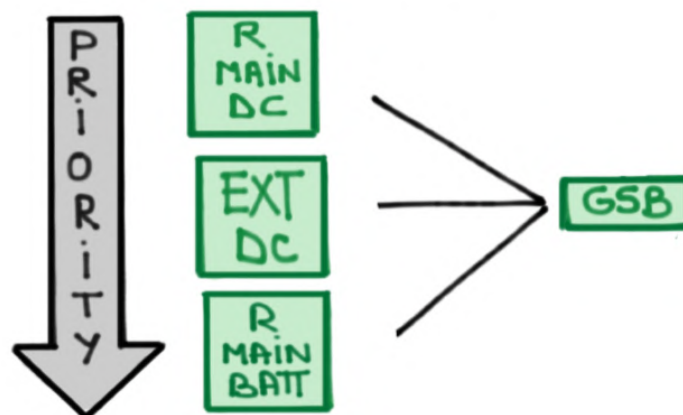
**ON**

GND SVC BUS

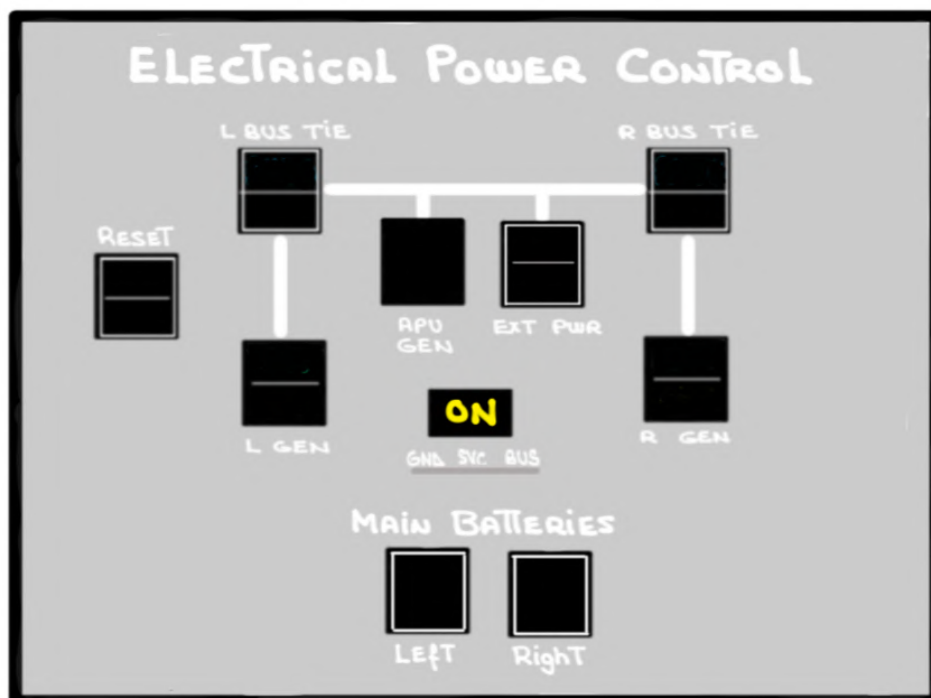
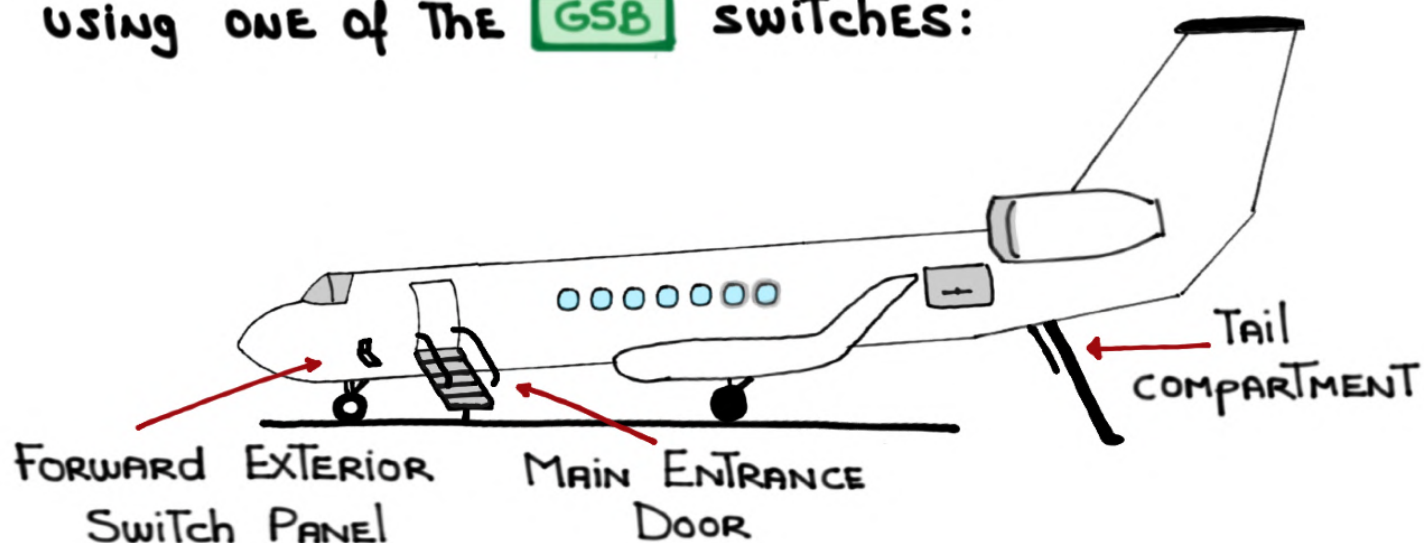
- THREE (3) **GSB** switches:

- FORWARD EXTERIOR SWITCH PANEL
- SYSTEM MONITOR/TEST PANEL
- Tail compartment

- POWER SOURCES (Priority):

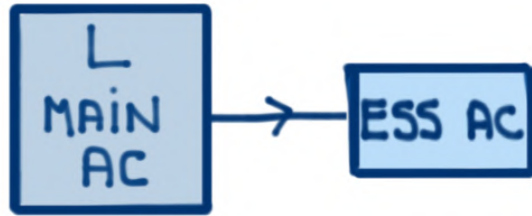


- ROTATING BEACON light is powered by The **GSB** when The **R MAIN BATT** is The source of power
- AT LEAST ONE of The following MUST be open when using one of The **GSB** switches:



# E-INVERTER

- The **ESS AC** bus is NORMALLY POWERED by The **L MAIN AC** bus



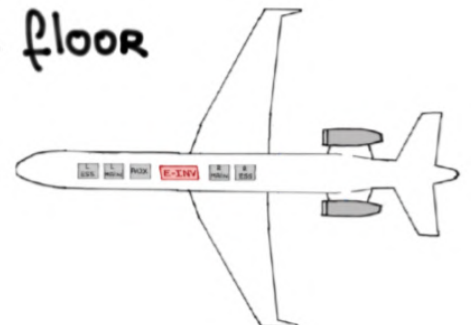
- If **L MAIN AC** bus power is NOT AVAILABLE The **ESS AC** bus CAN ALSO be POWERED by The **R MAIN AC** bus



- The **E-INV** is a backup source of **AC** power To The **ESS AC** bus (PHASE A only) by CONVERTING **28 VDC** TO **115 VAC**

- The **E-INV** is located UNDERNEATH The floor

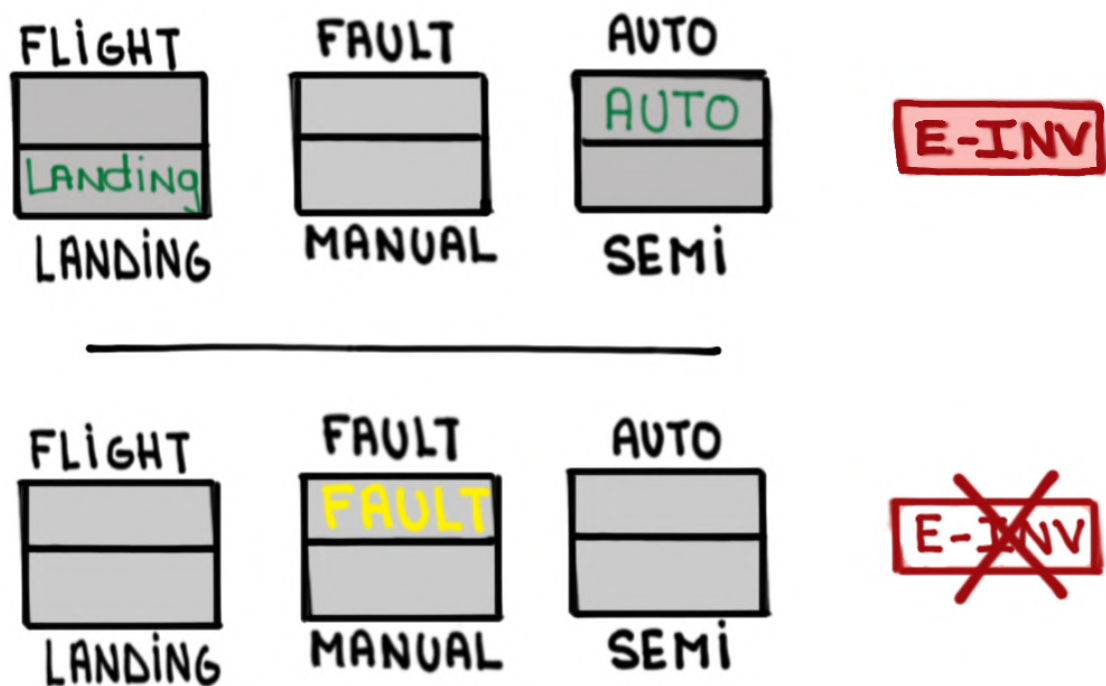
- **E-INV**
  - 115 VAC
  - 400 hz
  - 1 KVA






- The **E-INV** has been RENAMED Standby Inverter
- In The EVENT of failure The **E-INV** can be deferred in ACCORDANCE with The Minimum Equipment List (MEL)
- During The PRE-flight inspection with MAIN battery switches PRESSED IN and NO **AC** power AVAILABLE operation of The **E-INV** can be confirmed as follows:

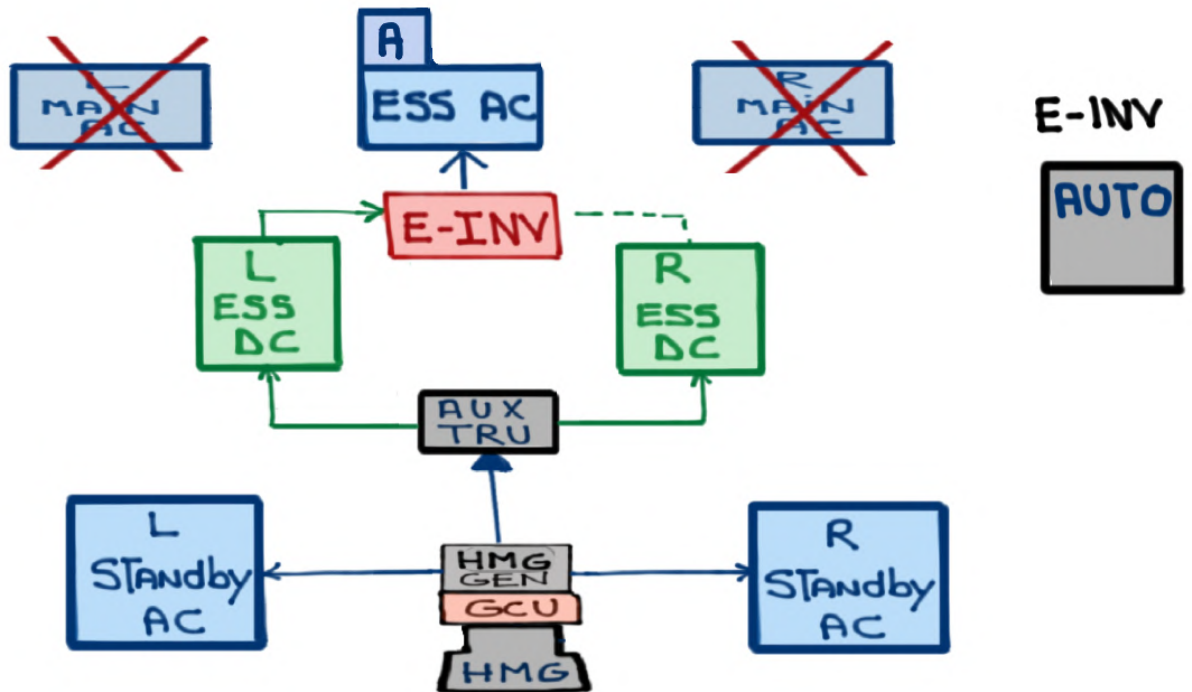
## Cabin Pressure Control




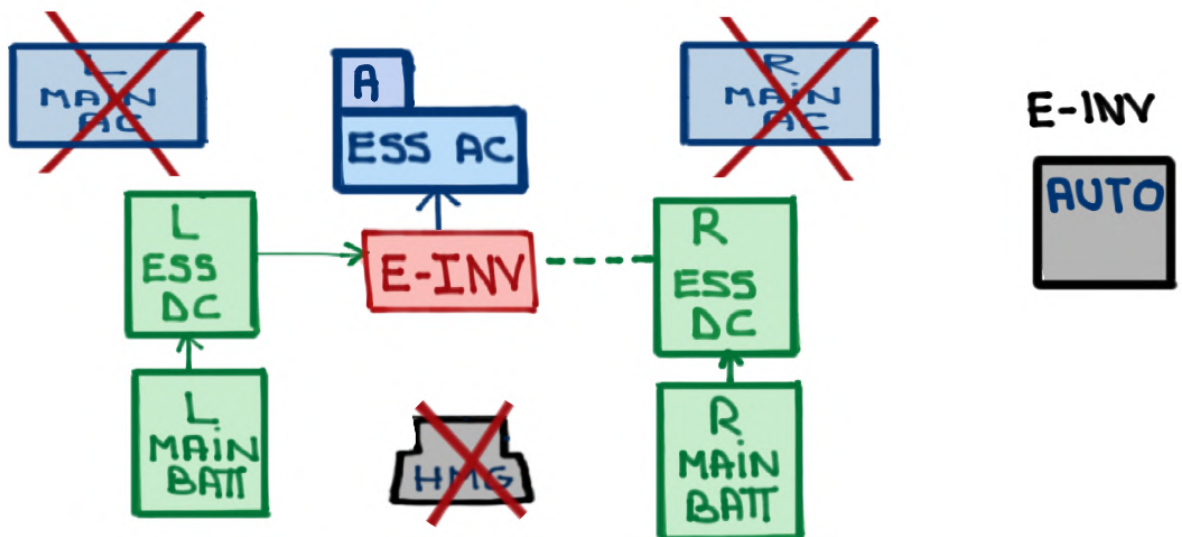
- PHASE A (ØA): Cabin Pressure Channel 1, R Pitot heater AND Standby Pitot heater



- In the unlikely event that normal (IDG) or back up AC power (APU GEN) is NOT available the  CAN CONTINUE TO power the **E-INV**



- In the unlikely event that the  is NOT available the MAIN BATTERIES CAN power the **E-INV**



# MAIN BATTERIES

- Two (2) MAIN BATTERIES



- LOCATED IN THE TAIL COMPARTMENT
- Nicad, 21 cells, 95 pounds each
- 28 VDC, 53 Amp/hour
- PURPOSE:





① START THE APU - USES  only but both

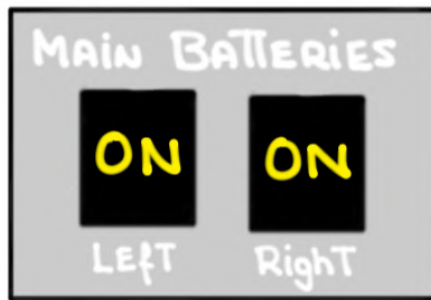


switches must be selected ON

NOTE: MINIMUM 22 VOLTS REQUIRED TO START APU

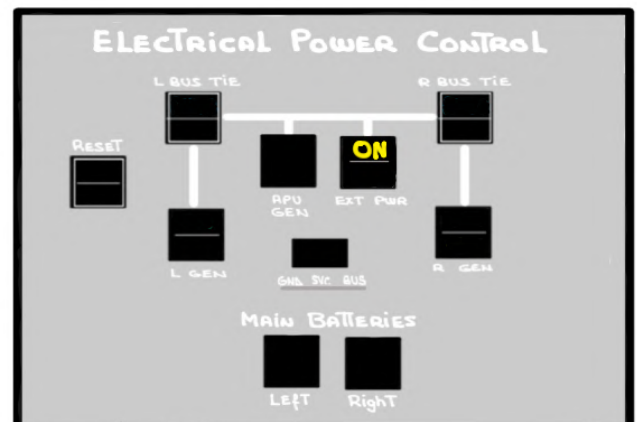
② OPERATE AUX HYDRAULIC PUMP - BOTH  

③ POWER   BUSES - BOTH   IF NO OTHER SOURCE OF DC POWER IS AVAILABLE

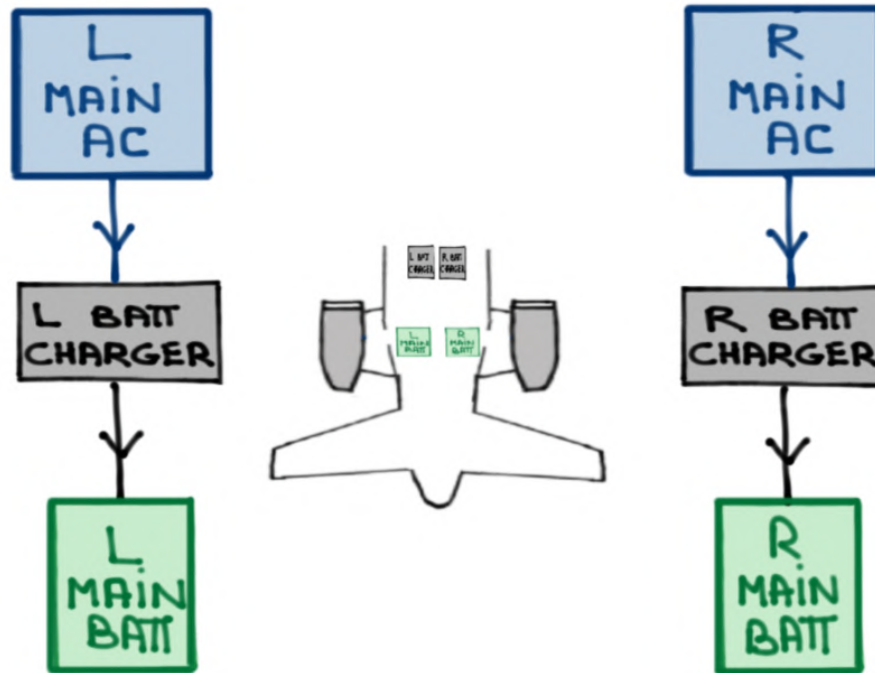


Switchlights illuminate to indicate that the batteries are discharging

- MAIN BATTERIES CAN POWER THE ESS DC BUSES FOR THIRTY (30) MINUTES AFTER TWO (2) FAILED APU START ATTEMPTS
- MUST BE REMOVED FROM THE AIRCRAFT IN COLD SOAKED CONDITIONS ( $\leq 20^{\circ}\text{C}$ ) AND STORED IN A LOCATION WARMER THAN  $-20^{\circ}\text{C}$  AND COOLER THAN  $+40^{\circ}\text{C}$
- If  $\leq 22$  VOLTS BUT NOT LESS THAN 7 VOLTS THE BATTERIES CAN BE CHARGED AS FOLLOWS:
  - EXT DC POWER CONNECTED
  - BATTERY switches ON



- The **L MAIN BATT** **R MAIN BATT** ARE NORMALLY RECHARGED by The **MAIN AC** buses



- The Main BATTERY chargers ARE located in The Tail COMPARTMENT



# EMERGENCY BATTERIES

## - EMERGENCY POWER SYSTEM



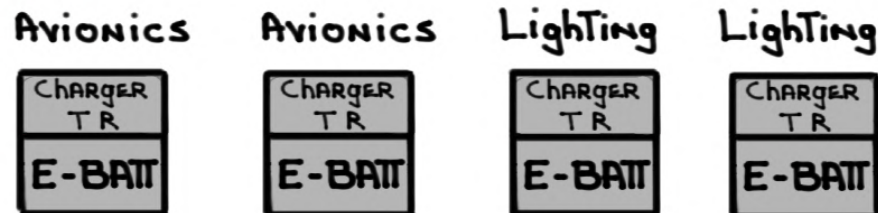
FORWARD E LTG BATTERY ON

L-R EMERGENCY BATTERY ON

AFT E LIGHTING BATTERY ON

- POWER of LAST RESOURCE
- SEALED LEAD ACID. THIRTY (30) APPROXIMATELY
- 24 Volts AC, 9 amp/hour
- ON when L  
ESS  
DC AND/OR R  
ESS  
DC BUSES < 20 Volts, EVEN MOMENTARILY

## - FOUR (4) E-BATTs:



## - POWER THE following BUSES:

L EMERGENCY  
DC BUS

ESSENTIAL FLIGHT  
INSTRUMENTS BUS

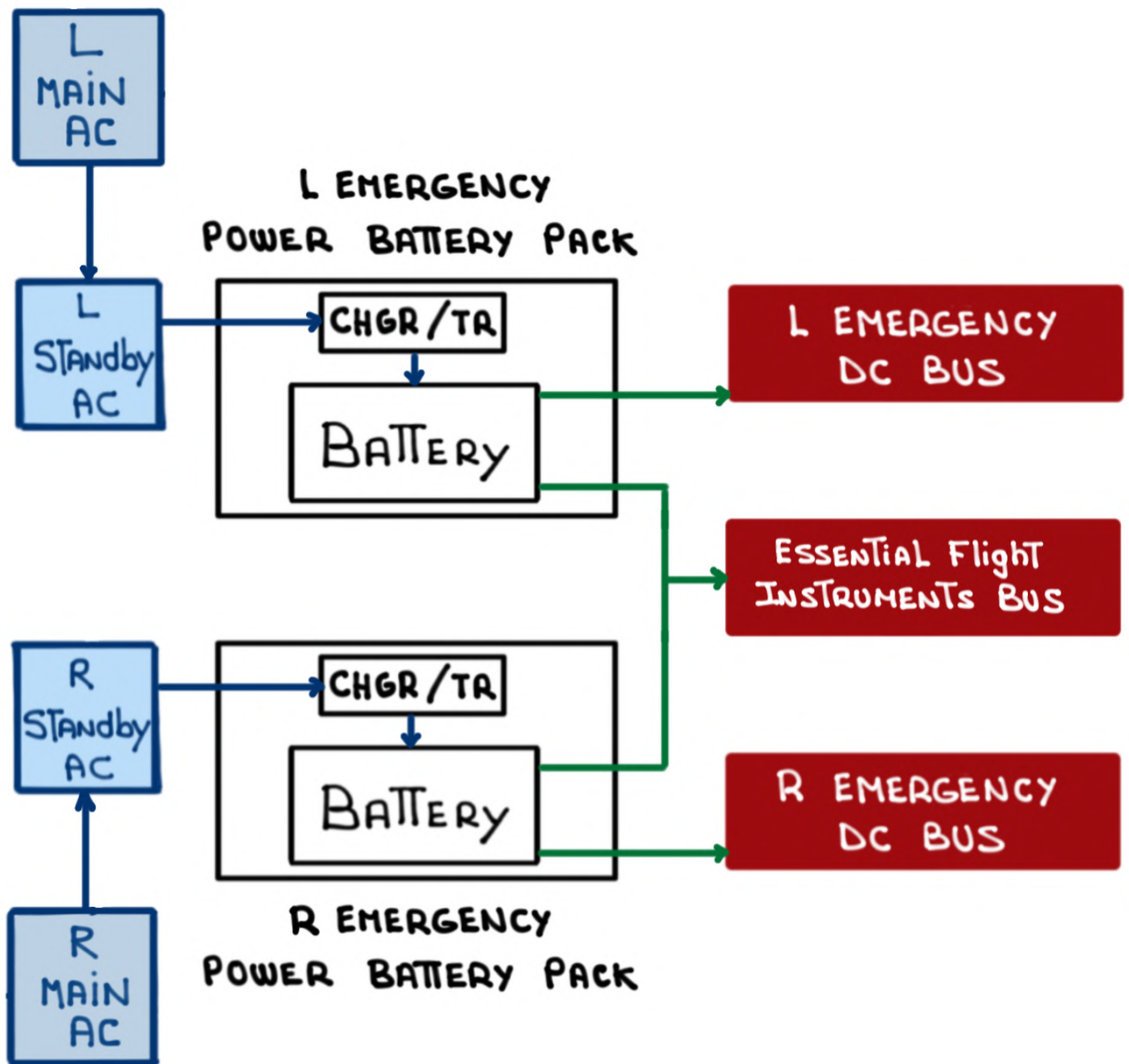
R EMERGENCY  
DC BUS

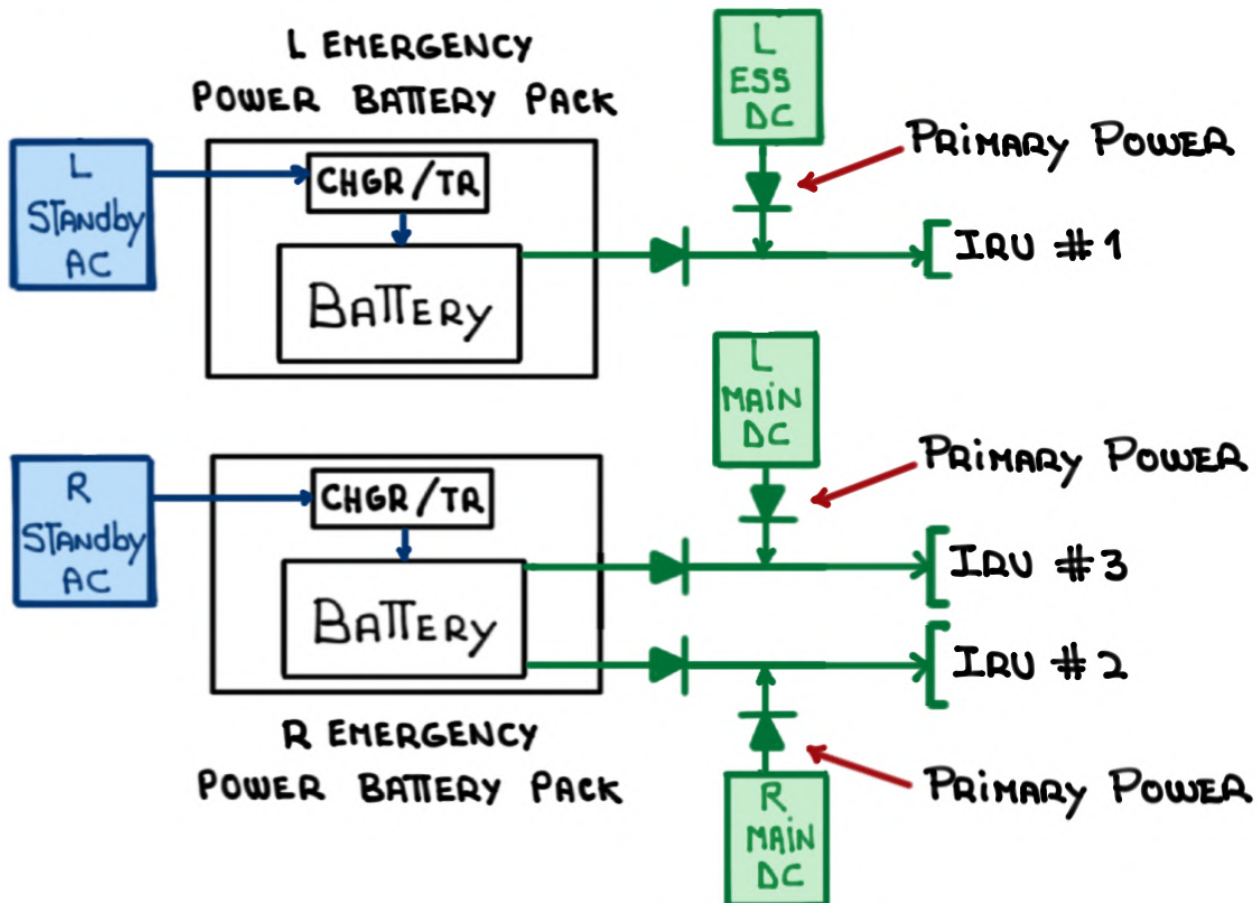
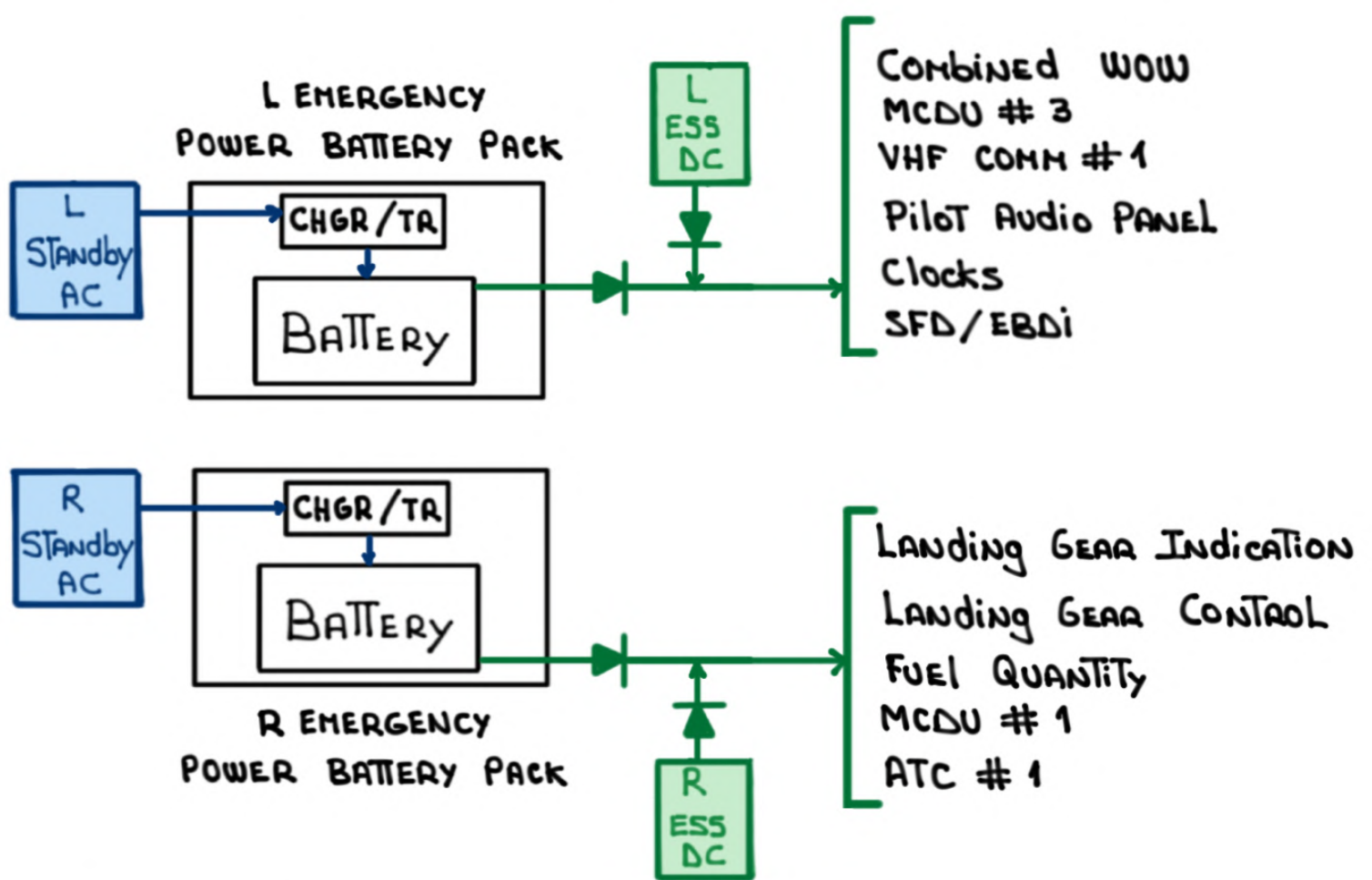
- AFTER A BREAK POWER TRANSFER THE E-BATTs  
will COME ON

- When  The following EQUIPMENT is POWERED:

- EMERGENCY LIGHTING
  - CABIN EMERGENCY LIGHTS
  - EXTERIOR EMERGENCY LIGHTS
- PILOT'S AUDIO CONTROL PANEL (ACP)
- MCDU 1 - STBY ENGINE INSTRUMENTS
- MCDU 3 - BACKUP RADIOS (VHF1/NAV1)
- Two (2) clocks
- STANDBY FLIGHT DISPLAY (SFD)
- ELECTRONIC BEARING & DISTANCE INDICATOR (EBDI)
- LANDING GEAR INDICATION

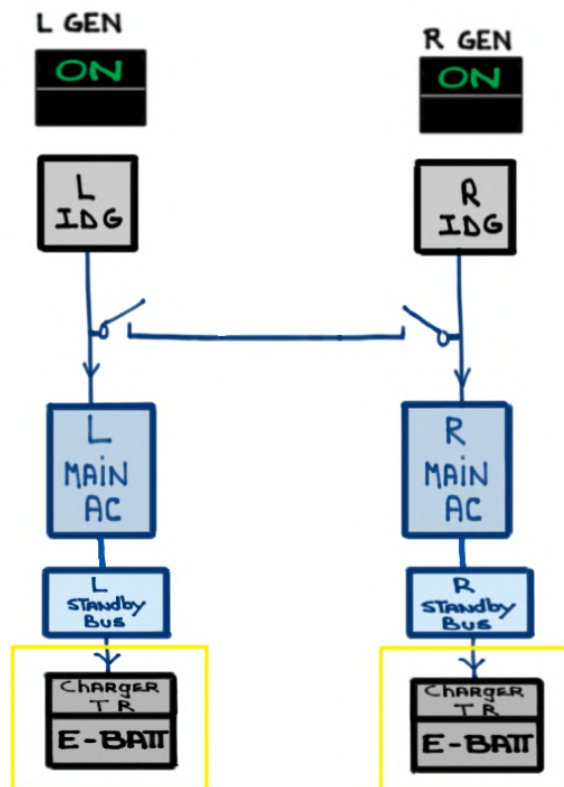
- AN INTEGRATED CHARGER/TRANSFORMER RECTIFIER  
RECHARGES THE E-BATTs



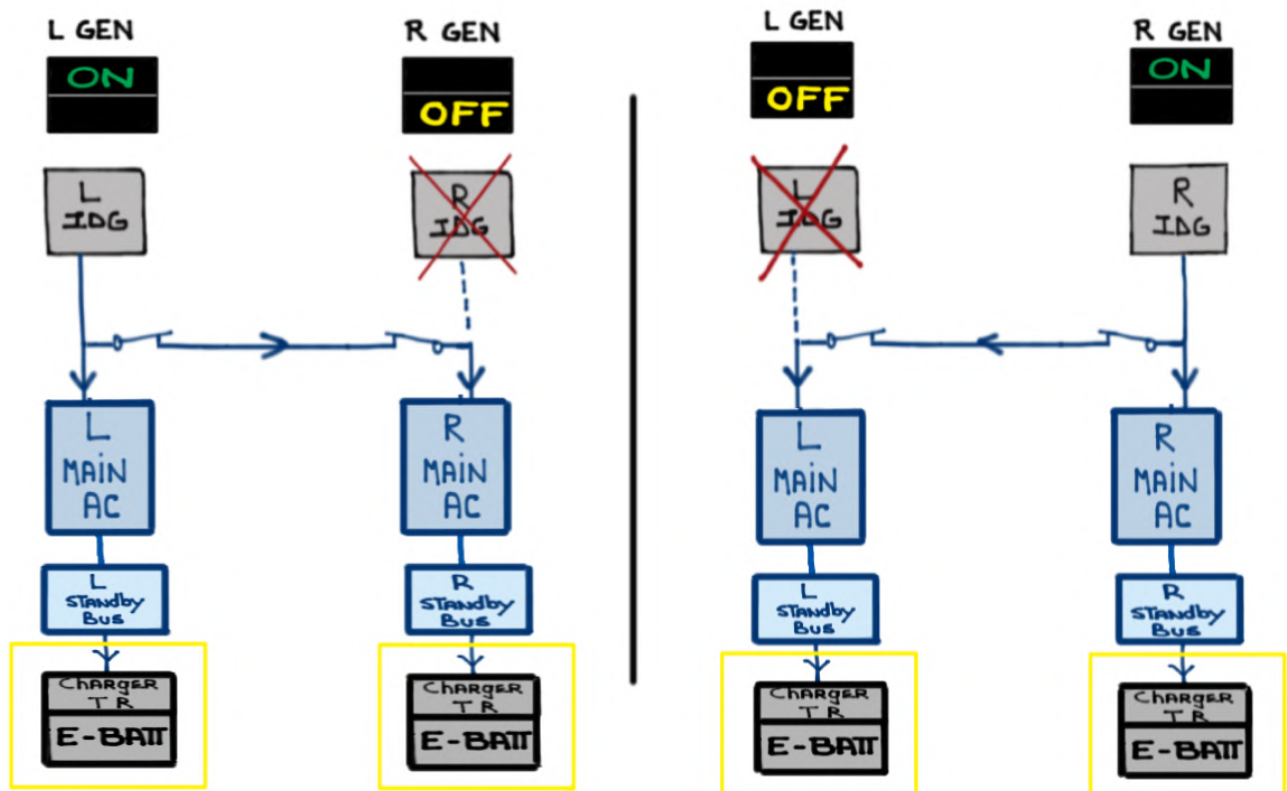




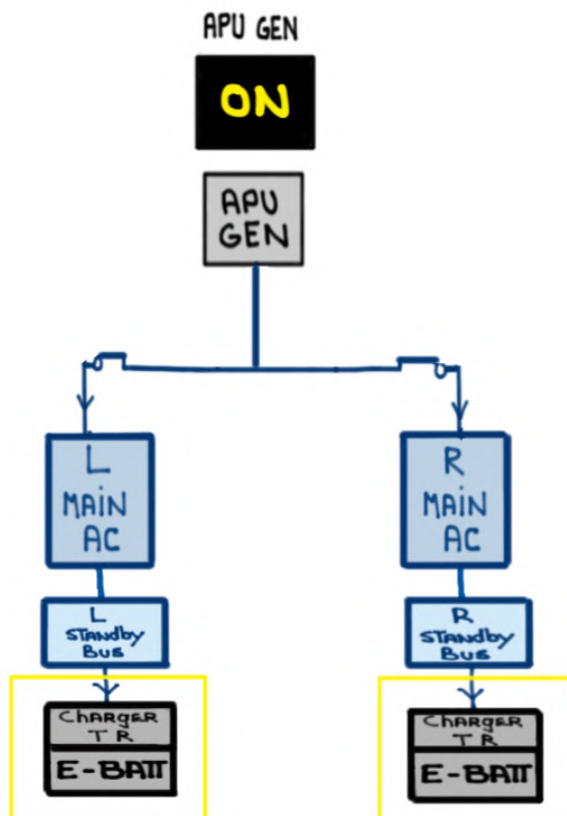
① Both IDGs



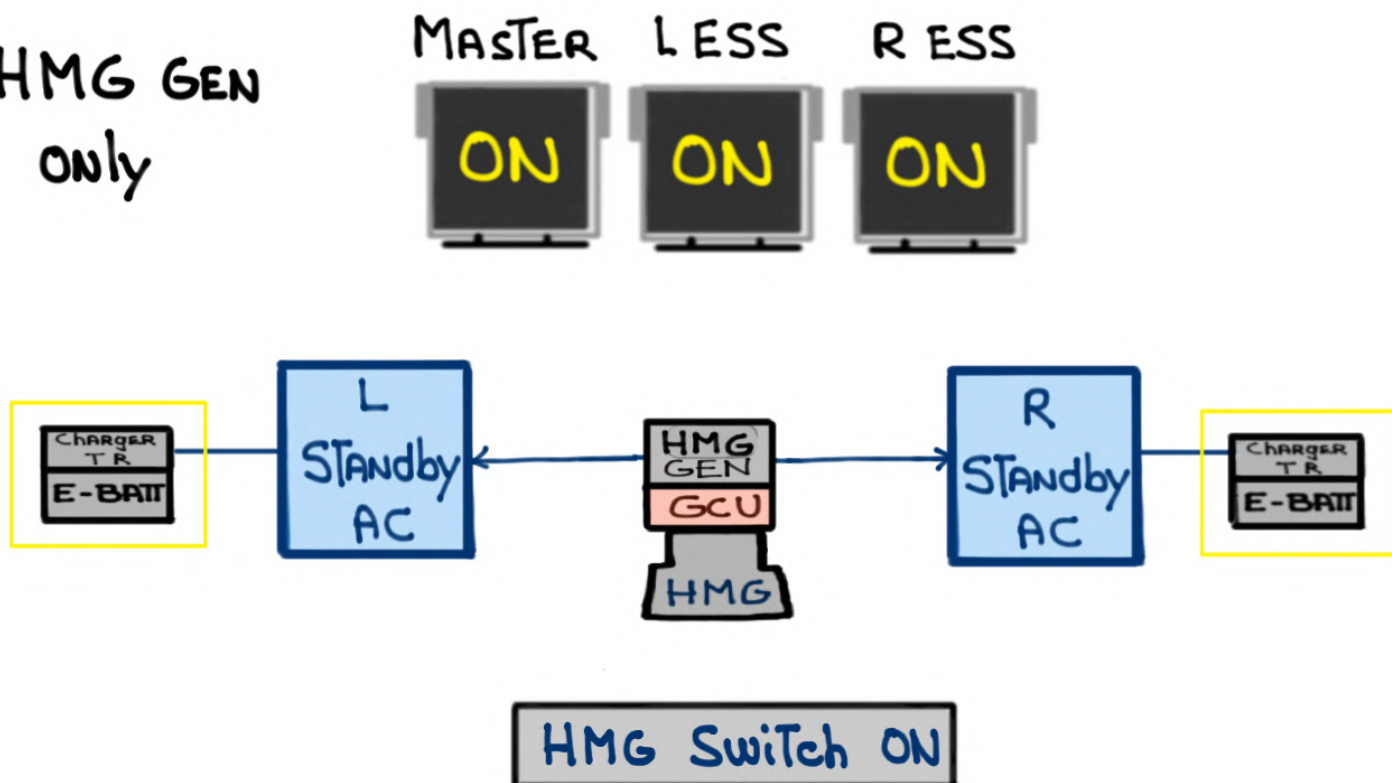
② ONE IDG only

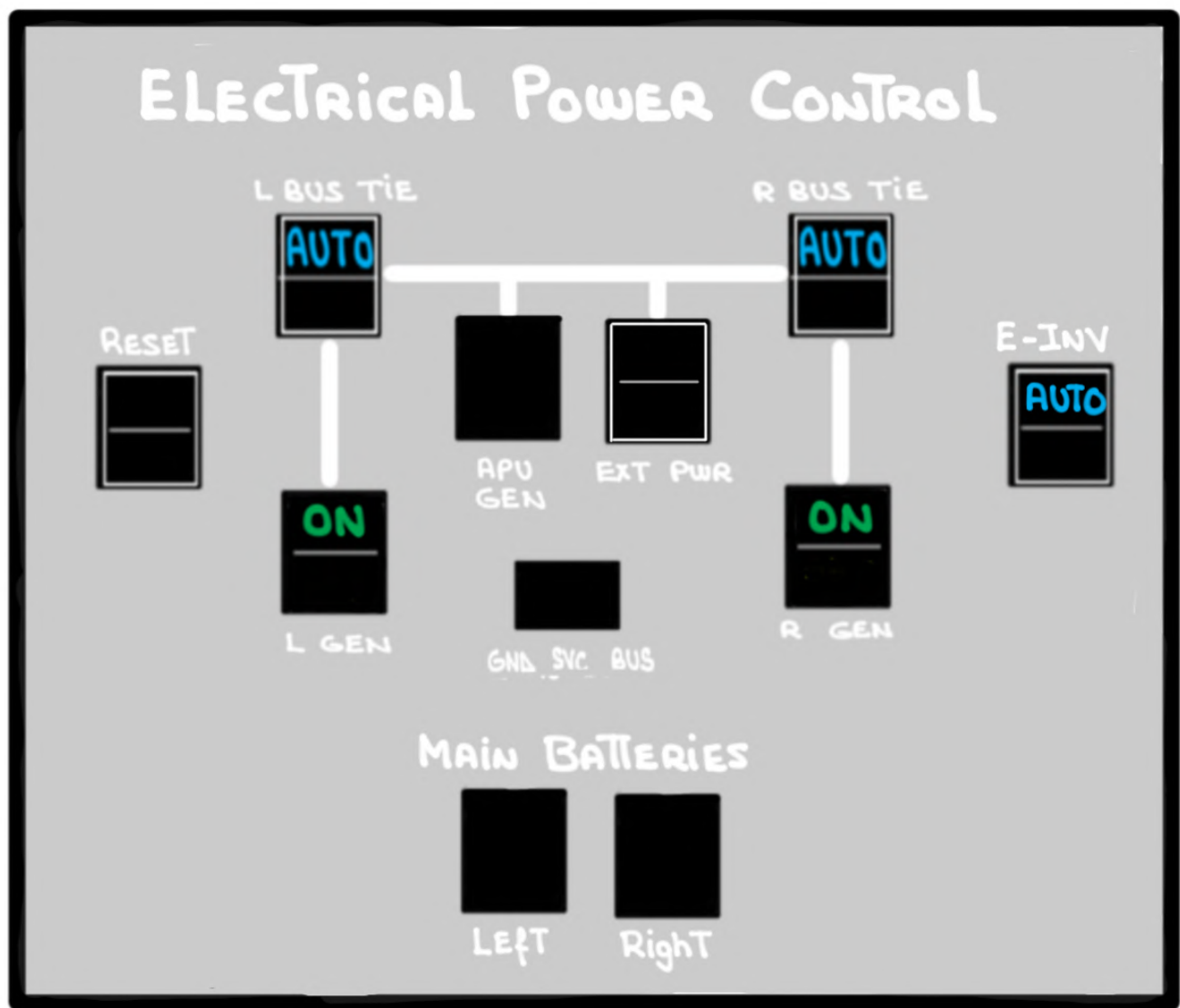


③ APU GEN  
only



④ HMG GEN  
only



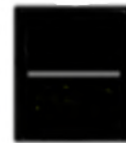


THREE (3) BLUE

TWO (2) GREEN

SIX (6) BLACK

FIVE (5) switchlights PRESSED IN



FIVE (5) switchlights PUSHED OUT



# NORMAL - EMERGENCY

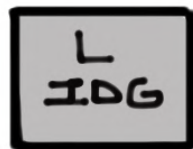
NORMAL



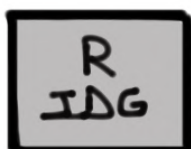
AND



- All AC AND DC buses



OR



- All AC AND DC buses



- All AC AND DC buses



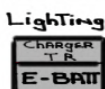
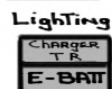
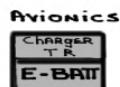
28VDC

115VAC



00:30 MINUTES

(2 APU START ATTEMPTS)



(ESS DC buses < 20 Volts)

L EMERGENCY

R EMERGENCY

FLIGHT INSTRUMENT

00:30 MINUTES  
(APPROXIMATELY)

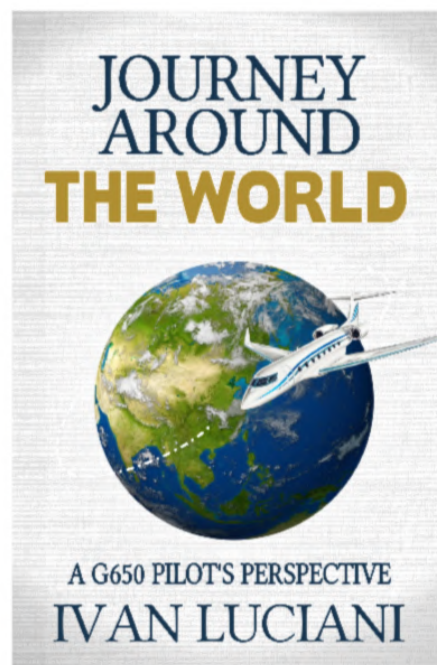
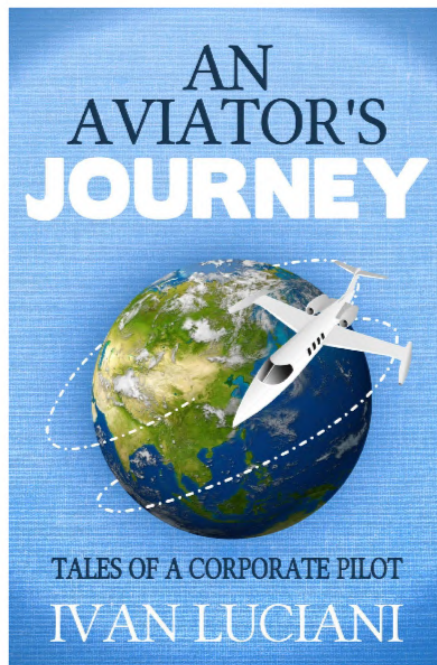
EMERGENCY



**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:  
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Thank you!