

AIRBUS TRAINING  <b>A340</b> SIMULATOR FLIGHT CREW OPERATING MANUAL	<b>ELECTRICAL</b>		1.24.00	P 1
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## GENERAL

The electrical power system consists of a three phase 115/200-volt 400-hertz constant-frequency AC system and a 28-volt DC system.

Electrical transients are acceptable for equipment.

Commercial supply has secondary priority.

Normally, the system produces alternating current, some of which it then transforms into direct current for certain applications.

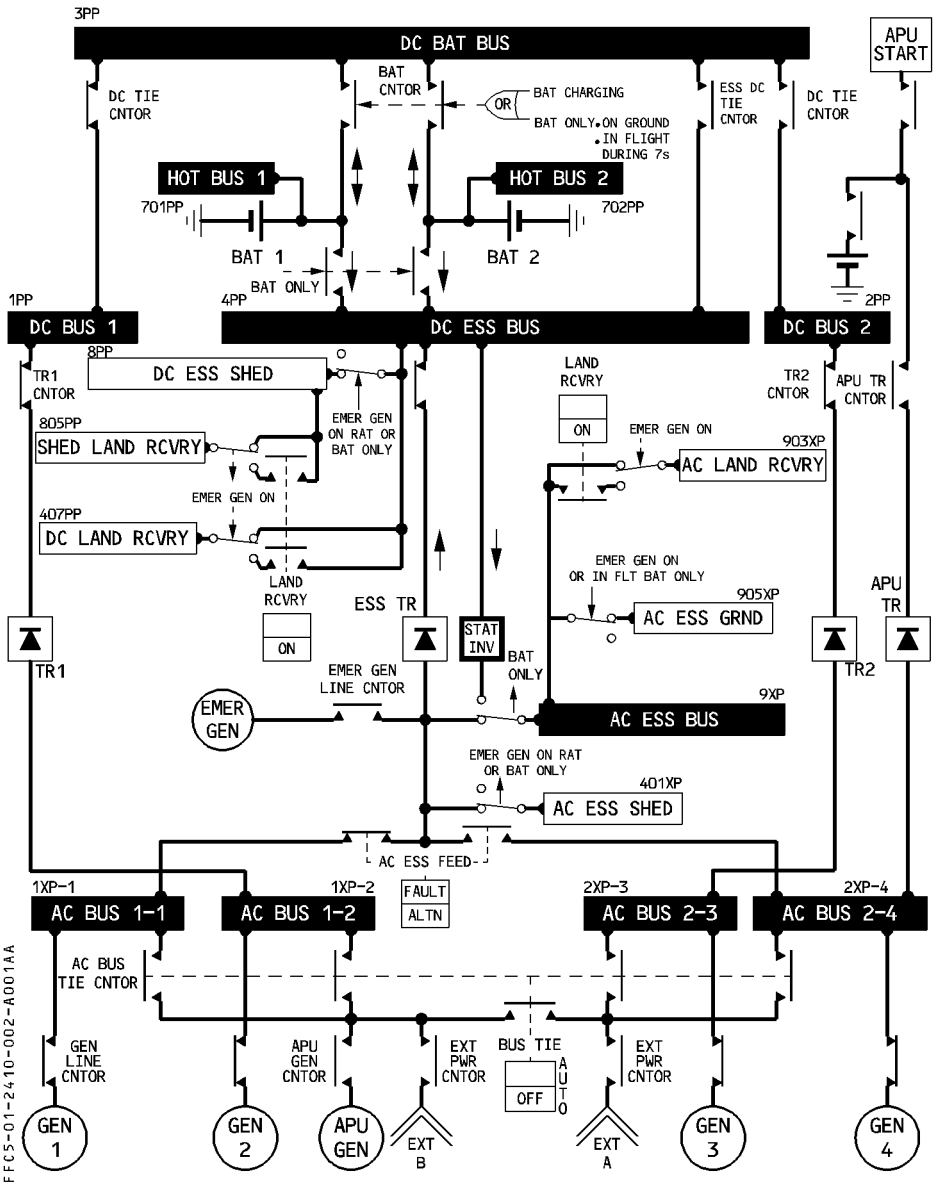
At least two generators are required to supply all electrical bus bars.

If all normal AC generation is lost, an emergency generator can supply AC power.

If all AC generation is lost, the system can transform DC power from the batteries into AC power.

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FOR INFO



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## GENERATION OF ELECTRICAL POWER

### AC GENERATION

#### MAIN GENERATORS

Four three-phase AC generators (GEN1, GEN2, GEN3 and GEN4), driven by the engine through an integrated drive, supply aircraft electrical power. Each generator can supply up to 75 KVA of three phase 115/200-volt 400 hertz power.

A fifth generator (APU GEN), driven directly by the APU and producing up to 115 KVA of three phase 115/200-volt 400 hertz power can replace one or more main engine generators at any time.

A generator control unit (GCU) controls the output of each generator. The main functions of each GCU are :

- Control the frequency and voltage of the generator output.
- Protect the network by controlling the associated generator line contactor (GLC).

#### EXTERNAL POWER

Two ground power connectors near the nose wheel allow ground power to be supplied to all bus bars (with some galleys shed in case of overload). Two ground power units (90 kVA max each) can supply the aircraft.

A Ground Power Control Unit (GPCU) :

- Protects the network by controlling the external power contactor.
- Generates a reference frequency used by GCU for synchronisation before No Break Power Transfer (NBPT).

#### EMERGENCY GENERATOR

The green hydraulic circuit drives an emergency generator that automatically supplies emergency AC power to the aircraft electrical system if all main generators fail. This generator supplies 5.5 KVA of three-phase 115/200-volts 400-hertz power, except when the Ram Air Turbine powers the green hydraulic circuit, and the aircraft speed is below 260 knot in this case, the emergency generator supplies 3.5 KVA, leading to some shedding.

A generator control unit (GCU) :

- keeps the emergency generator at a constant speed
- controls the generator's output voltage
- protects the network by the controlling the emergency generator line contactor
- controls the emergency generator start-up

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### STATIC INVERTER

A static inverter transforms DC power from the DC ESS bus into 2.5 KVA of single-phase 115-volt 400-hertz AC power, which is then supplied to part of the AC essential bus. In flight, the inverter is activated automatically if nothing but the batteries is supplying electrical power to the aircraft, regardless of the positions of the BAT 1 and BAT 2 pushbutton switches.

On the ground, the inverter is activated if nothing but the batteries is supplying electrical power to the aircraft and the BAT 1 and BAT 2 pushbutton switches are both on.

### DC GENERATION

#### TRANSFORMER RECTIFIERS (TR)

Two main Transformer Rectifiers TR1 and TR2 (200 A) and one essential TR (100 A), supply the aircraft electrical system with DC current.

A fourth TR (100A) is dedicated to APU start or APU battery charging.

Each TR controls its contactor by internal logic.

### BATTERIES

Two main batteries, each with a normal capacity of 37 Ampere-hours, are permanently connected to the two hot busses.

A third battery (37 Ah) is dedicated to APU start.

Each battery has an associated Battery Charge Limiter (BCL).

The BCL monitors battery charging and controls its battery contactor.

### CONTACTORS

Two identical Electrical Contactor Management Units (ECMUs) provide:

- AC and DC contactors control (excepted TR contactors which are controlled by the TR itself).
- Galley shedding control.
- No Break Power Transfer control (NBPT).
- Monitoring and indicating.

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For this purpose, each ECMU receives following information:

- Voltage of all normal busbars
- position of all AC and DC contactors
- availability of all generators or power source (from GCU or GPCU)
- position of all galleys contactors
- TR status
- pushbutton position (BUS TIE, GALLEY SHED and COMMERCIAL)
- flight/ground signal from associated LGCIU.

## AC AND DC CONTACTOR CONTROL

- ECMU 1 controls :
- The Generator Line Contactor (GLC) 1 and 2.
  - The AC Bus Tie Contactor (BTC) 1 and 2.
  - The APU Generator Contactor.
  - The external power B contactor
  - Both DC Tie Contactors.
  - The BUS TIE contactor

- ECMU 2 controls :
- The Generator Line Contactor (GLC) 3 and 4.
  - The AC Bus Tie Contactor (BTC) 3 and 4.
  - The external power A contactor.
  - Both DC tie Contactors.

## NO BREAK POWER TRANSFER

This function avoids busbar power interruption during supply source transfer on ground in normal configuration. It is inhibited in flight.

ECMU controls simultaneous connection of the two sources for a short time. To achieve this, both sources are synchronized on a frequency reference signal sent by the GPCU. Synchronization may take up to 15 seconds for APU GEN with GPU, and some milliseconds in all other cases.

If synchronization is not achieved within allowed time transfer is performed anyway (without simultaneous connection of the two sources). This function has a back-up in the GCU.

## MONITORING AND INDICATING

Each ECMU sends the following information to the ECAM:

- Bus bars supplied or not
- contactor status
- galley supply status, and galley switche position.

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CIRCUIT BREAKERS

All circuit breakers are in the electronic equipment bay.  
A Circuit Breaker Monitoring Unit (CBMU) monitors the circuit breaker status. It sends this information to the ECAM system.

OPERATIONS

GENERAL

Each AC BUS is supplied in priority order by :

- the corresponding engine generator.
- the APU generator or the external power A (if both are connected, the APU generator has priority for the left side bars, and the external power has priority for the right side bars).
- the external power B (if both external powers are connected, B has priority for the left side bars and A has priority for the right side bars).
- the engine generator located on the same side.
- the other side outer engine generator.

The APU generator or an external power may supply all the network.  
Two generators can supply all the network (with galley shedding in case of overload detection).  
When only one engine generator is available it supplies only its side.  
The generators cannot be connected in parallel (except on ground during No Break Power Transfers).

## NORMAL CONFIGURATION

### IN FLIGHT

Each engine driven generator supplies its associated AC BUS (1.1, 1.2, 2.3, 2.4) via its Generator Line Contactor (GLC 1 and GLC 2, GLC 3 and GLC4).

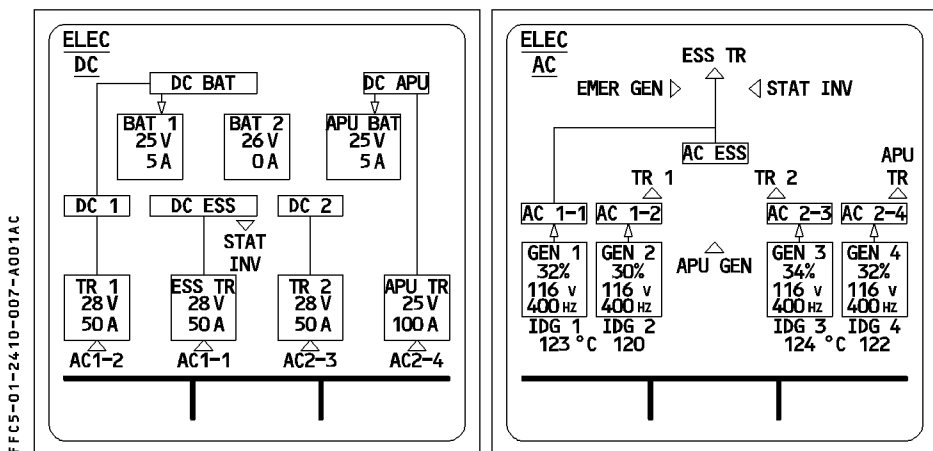
AC BUS 1.1 normally supplies the AC ESS BUS via a contactor.

AC BUS 1.2 supplies TR 1 which normally supplies DC BUS 1, DC BAT BUS.

AC BUS 2.3 supplies TR 2 which normally supplies DC BUS 2.

AC BUS 1.1 supplies ESS TR which normally supplies DC ESS BUS.

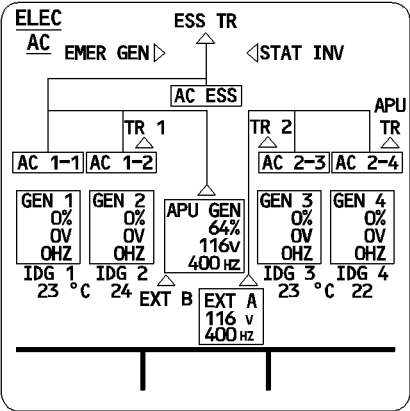
The two batteries are connected to the DC BAT BUS if they need charging. When they are fully charged the Battery Charge Limiter disconnects them.



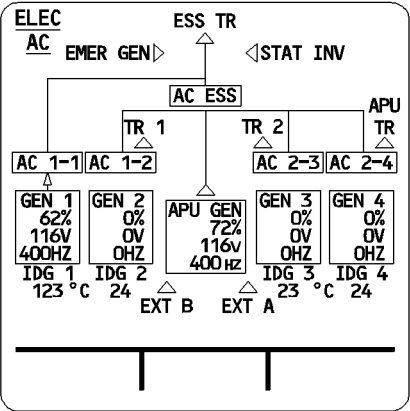


ON GROUND

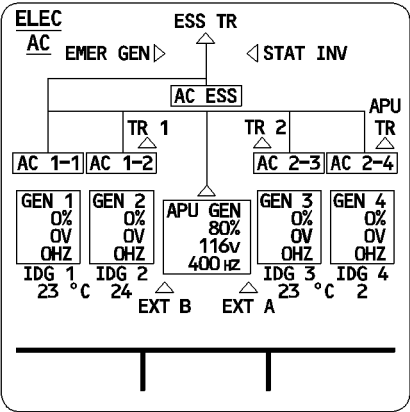
Either the APU generator or external power may supply the complete system (with some galley shedding in case of overload).



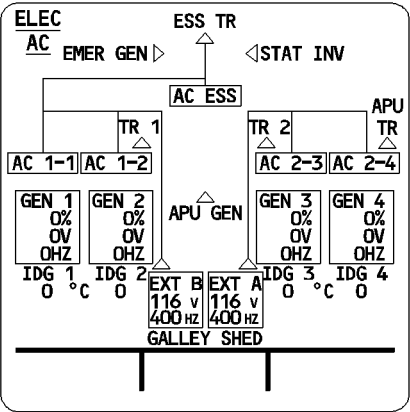
APU GEN + EXTERNAL POWER



APU GEN + GEN 1



APU GEN ONLY



EXTERNAL POWER ONLY

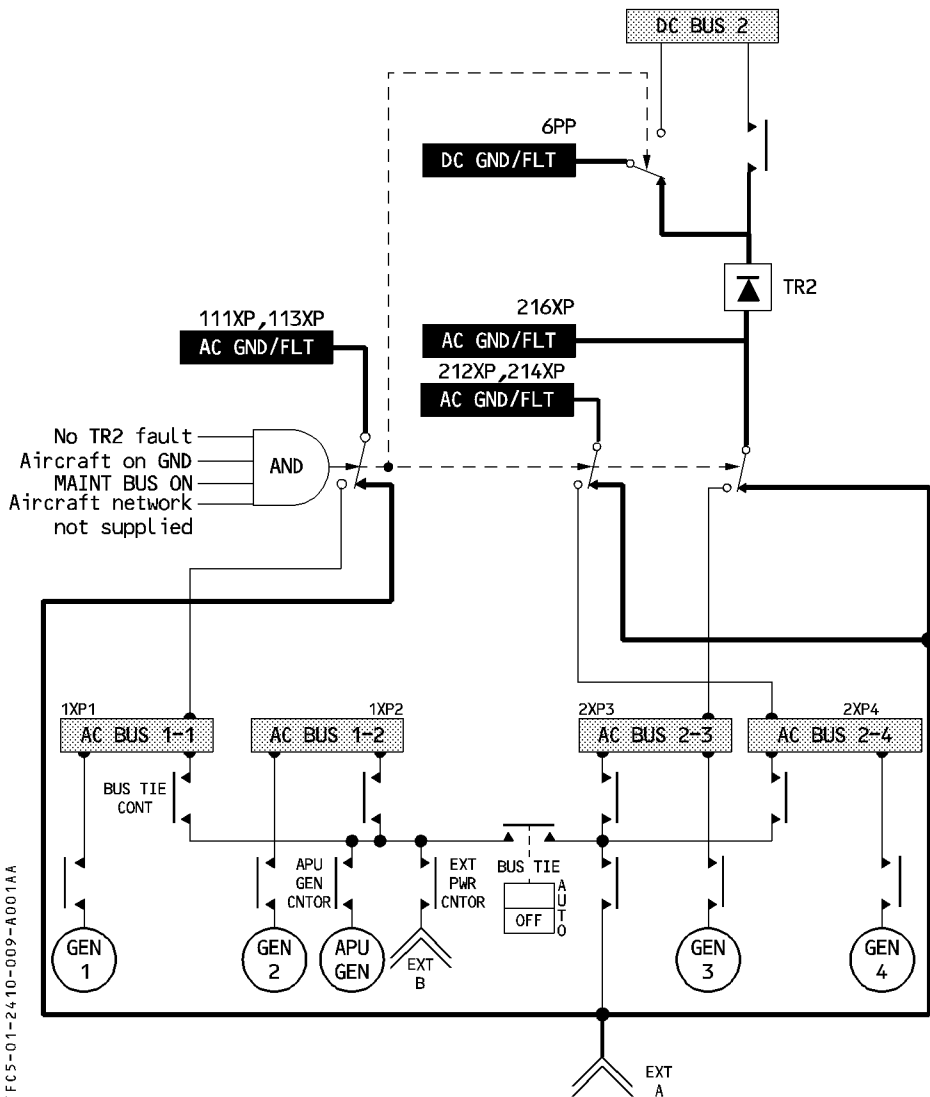
If external power A and external power B plus APU supply the complete system, the APU has priority over external power B. Situation then will be as displayed for case APU plus external power.

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On ground, when only ground services are required, external power can supply the AC and DC GND/FLT buses directly, without supplying the aircraft's entire network.  
 This configuration is selected via the MAINT BUS switch, located in the forward entrance area.

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ABNORMAL CONFIGURATIONS

ENGINE GENERATOR FAILURES

ECMU provides automatic reconfiguration.  
Complete network remains supplied provided at least two generators (including APU generator) are available.  
Some galleys are automatically shed.

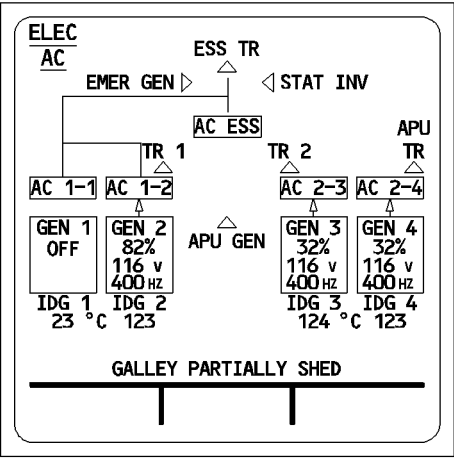
*Note : If a generator is lost due to overcurrent detection, reconfiguration does not occur and the related AC BUS is lost.*

Failure of one engine generator

The system automatically replaces the failed generator by the other engine generator of the same side, through the associated AC BUS or the APU generator if available.

Failure of two engine generators located on opposite sides

The system automatically replaces each failed generator by the other engine generator of its side, or by the APU generator if available.

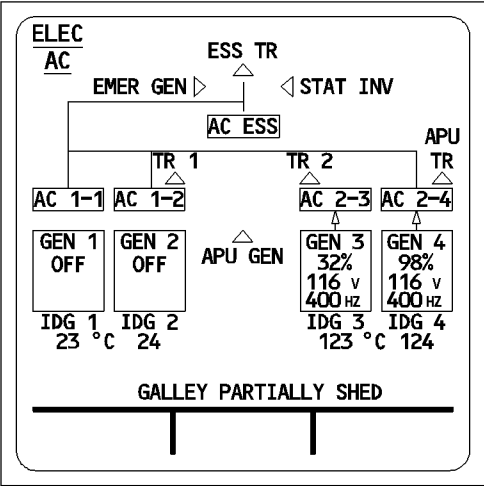


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**Failure of two engine generators located on the same side**

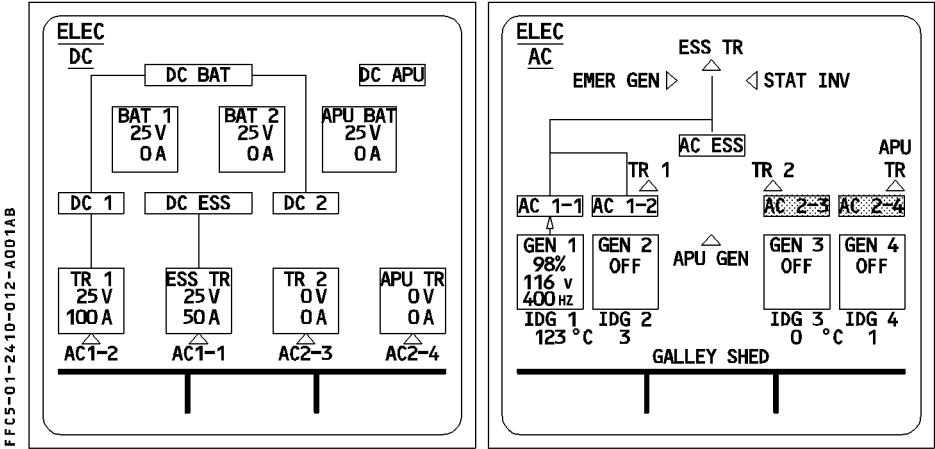
The system automatically replaces the failed generators by the outer engine generator of the other side, or by the APU generator if available.

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**Failure of three engine generators**

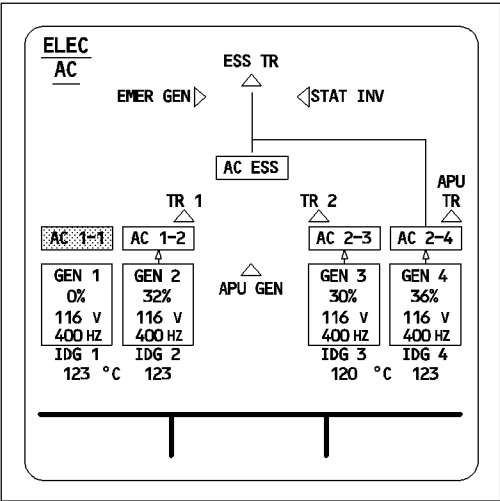
If APU generator is available it replaces all failed engine generators.  
If APU generator is not available, the AC NORM BUS on one side are lost.  
Example : GEN 1 remaining



Note : If the remaining generator is on the right side, the AC ESS BUS is automatically supplied by the AC BUS 2.4.

**FAILURE OF THE AC BUS 1.1**

The AC BUS 2.4 automatically supplies the AC ESS BUS and the ESS TR



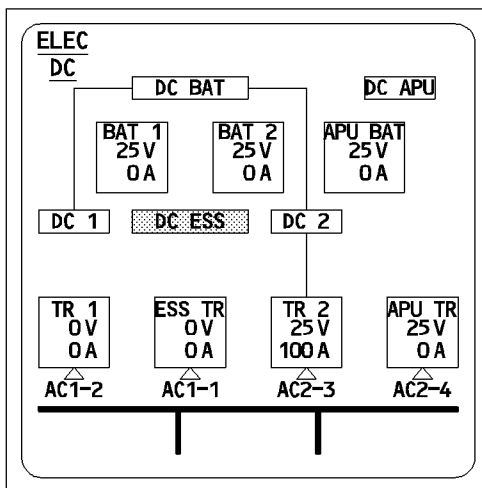
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### Failure of ESS TR and TR 1 (or TR 2)

The remaining TR supplies the two DC norm busses and the DC BAT bus.  
 The DC ESS bus is lost.

FFC5-01-2410-015-A001AA





## EMERGENCY GENERATION AFTER LOSS OF ALL MAIN GENERATORS

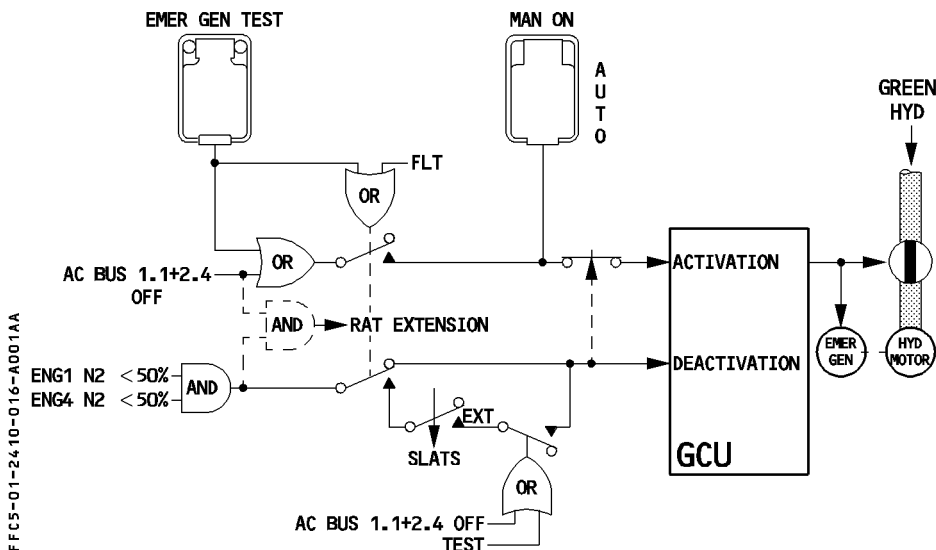
If both buses, AC1.1 and 2.4, are lost and if the engines 1 and 4 are lost, the ram-air turbine (RAT) extends automatically.

If powered by the RAT only, the emergency generator is inhibited when slats are extended. The emergency generator can be manually activated through the MAN ON pushbutton.

Emergency generator deactivation occurs only automatically :

- In flight : at slats extension if powered by the RAT only (engines 1 and 4 lost). It can be reactivated after slats retraction through the MAN ON pushbutton.
- On the ground : after engine 1 and 4 shutdown.

EMER GEN TEST pushbutton allows to activate the emergency generator and to connect it to the essential network. This test is inhibited when the slats are extended.

**FOR INFO**


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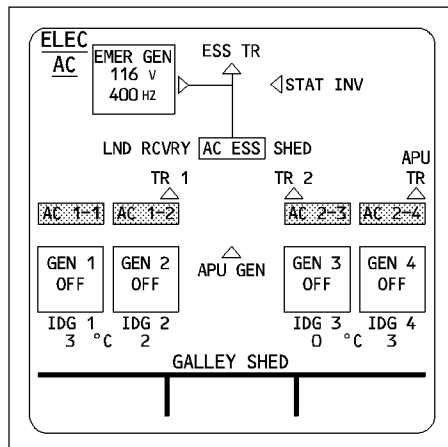
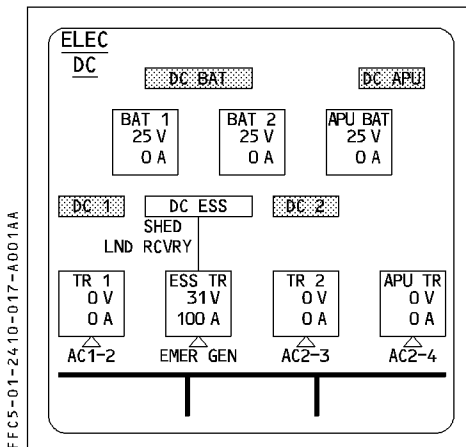
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- If the green hydraulic system, which actuates the emergency generator, is powered by an engine-driven pump, the emergency generator supplies the :
  - AC ESS BUS,
  - AC ESS SHED.
 And, through the ESS TR, the :
  - DC ESS BUS,
  - DC ESS SHED.
- If the green hydraulic system is powered by the Ram Air Turbine, the emergency generator supplies the :
  - AC ESS BUS, and
  - DC ESS BUS, through the ESS TR.

All LAND RECOVERY AC and DC BUS bars are shed. They are recovered when the LAND RECOVERY pushbutton is ON.

The AC ESS GND is lost.

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FLIGHT WITH BATTERIES ONLY

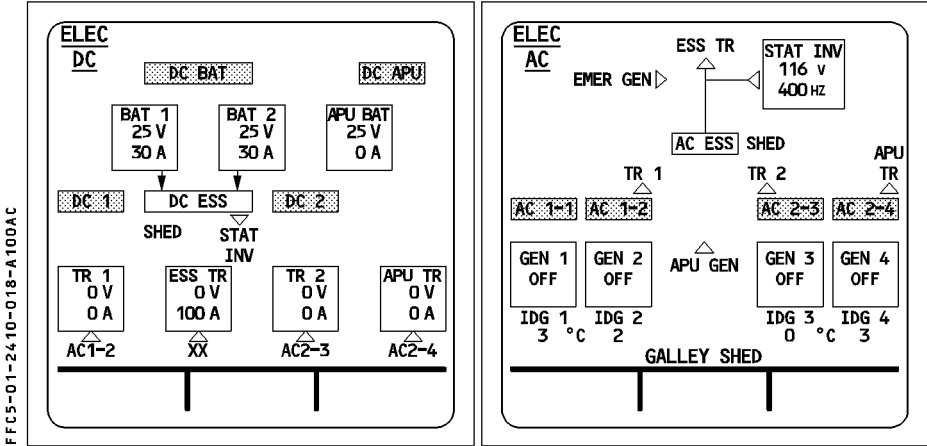
When emergency generator is not available, the batteries supply the DC ESS BUS, the DC LAND RECOVERY (whatever the LAND RECOVERY pushbutton position is) and through the STAT INV:

The AC ESS bus the AC LAND RECOVERY (whatever the LAND RECOVERY pushbutton position is)

The AC ESS SHED and the DC ESS SHED and the SHED LAND RECOVERY are not supplied.

The AC ESS GND is lost.

Example : flight with batteries only .



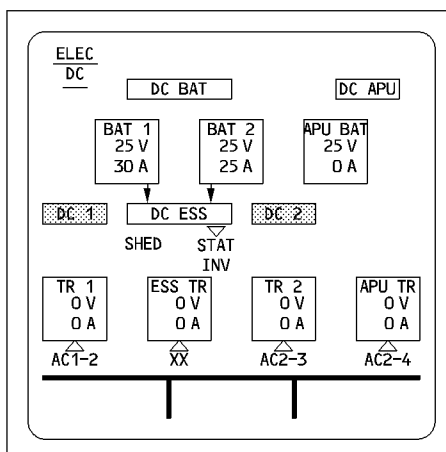
## ON GROUND, BATTERIES ONLY

Provided they are both selected AUTO, the batteries supply :

- the DC ESS BUS
  - the DC BAT BUS
  - the DC LAND RECOVERY (whatever the LAND RECOVERY pushbutton position is)
- and through the static inverter :
- the AC ESS BUS
  - the AC ESS GND
  - the AC LAND RECOVERY (whatever the LAND RECOVERY pushbutton position is)

The AC ESS SHED, the DC ESS SHED and the SHED LAND RECOVERY are not supplied.

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Note : ELEC AC ECAM page is identical to flight with batteries only case.

R DISTRIBUTION TABLE

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	AC BUS 1-1	AC BUS 1-2	AC BUS 2-3	AC BUS 2-4	AC ESS BUS	AC ESS GND	AC ESS SHED	DC BUS 1	DC BUS 2	DC BAT BUS	DC ESS BUS	DC ESS SHED
<div>NORM CONFIG</div>	GEN 1	GEN 2	GEN 3	GEN 4	GEN 1	GEN 1	GEN 1	TR 1 GEN 2	TR 2 GEN 3	TR 1 GEN 2	ESS TR GEN 1	ESS TR GEN 1
<div>GEN 1 INOP</div> <div>(GEN 2 INOP;GEN 1 replaces GEN 2)</div>	GEN 2 (3)	GEN 2	GEN 3	GEN 4	GEN 2 (3)	GEN 2 (3)	GEN 2 (3)	TR 1 GEN 2	TR 2 GEN 3	TR 1 GEN 2	ESS TR GEN 2	ESS TR GEN 2 (3)
<div>GEN 3 INOP</div> <div>(GEN 4 INOP;GEN 3 replaces GEN 4)</div>	GEN 1	GEN 2	GEN 4 (3)	GEN 4	GEN 1	GEN 1	GEN 1	TR 1 GEN 2	TR 2 GEN 4 (3)	TR 1 GEN 2	ESS TR GEN 1	ESS TR GEN 1
<div>GEN 1 AND 2 INOP</div>	GEN 4 (3)	GEN 4 (3)	GEN 3	GEN 4	GEN 4 (3)	GEN 4 (3)	GEN 4 (3)	TR 1 GEN 4 (3)	TR 2 GEN 3	TR 1 GEN 4 (3)	ESS TR GEN 4 (3)	ESS TR GEN 4 (3)
<div>GEN 3 AND 4 INOP</div>	GEN 1	GEN 2	GEN 1 (3)	GEN 1 (3)	GEN 1	GEN 1	GEN 1	TR 1 GEN 2	TR 2 GEN 1 (3)	TR 1 GEN 2	ESS TR GEN 1	ESS TR GEN 1
<div>AC BUS 1-1 Lost</div>	-	GEN 2	GEN 3	GEN 4	GEN 4	GEN 4	GEN 4	TR 1 GEN 2	TR 2 GEN 3	TR 1 GEN 2	ESS TR GEN 4	ESS TR GEN 4
<div>TR 1 FAULT</div>	NOT AFFECTED							TR 2 GEN 3 (2)	TR 2 GEN 3	TR 2 GEN 3 (2)	ESS TR GEN 1	ESS TR GEN 1
<div>TR 2 FAULT</div>								TR 1 GEN 2	TR 1 GEN 2 (2)	TR 1 GEN 2	ESS TR GEN 1	ESS TR GEN 1
<div>TR 1 + 2 FAULT</div>								-	-	-	ESS TR GEN 1	ESS TR GEN 1
<div>ESS TR</div>								TR 1 GEN 2	TR 2 GEN 3	TR 1 GEN 2	TR 1 GEN 2 (2)	TR 1 GEN 2 (2)
<div>TR 1 FAULT and ESS TR FAULT</div>								TR 2 GEN 3 (2)	TR 2 GEN 3	TR 2 GEN 3 (2)	-	-
<div>TR 2 FAULT and ESS TR FAULT</div>								TR 1 GEN 2	TR 1 GEN 2 (2)	TR 1 GEN 2	-	-

White compartments : Same supply as in normal configuration.  
Shaded compartments : Back up supply.

### **DISTRIBUTION TABLE (cont'd)**

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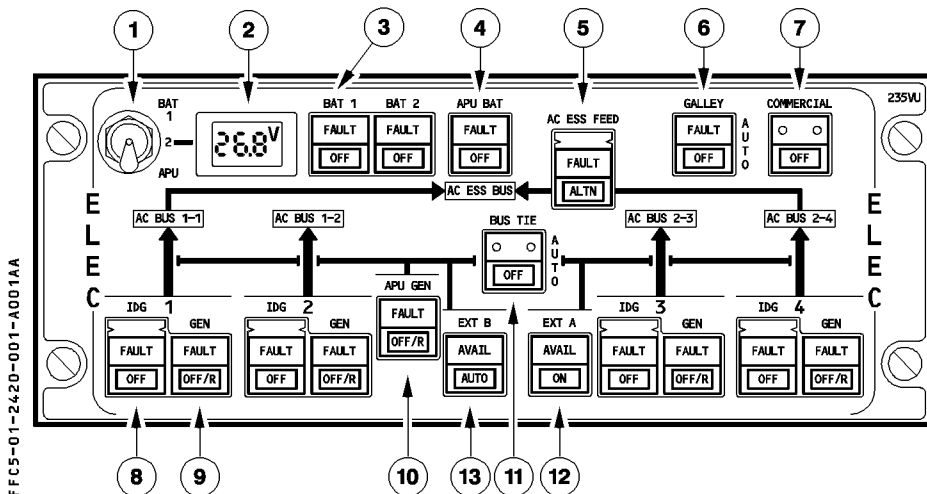
EMER CONFIG	AC BUS 1-1	AC BUS 1-2	AC BUS 2-3	AC BUS 2-4	AC ESS BUS	AC ESS GND	AC ESS SHED	AC LAND REC	DC BUS 1	DC BUS 2	DC BAT BUS	DC ESS BUS	DC ESS SHED	DC LAND REC	SHED LAND REC
• BATTERIES ONLY (in flight)	–	–	–	–	STAT INV BAT 1-2	–	–	STAT INV BAT 1-2	–	–	(4)	BAT 1-2	–	BAT 1-2	–
• EMER GEN SUPPLIED BY ENGINE DRIVEN PUMP	–	–	–	–	EMER GEN	–	EMER GEN	EMER GEN (1)	–	–	–	ESS TR EMER GEN	ESS TR EMER GEN	ESS TR EMER GEN (1)	ESS TR EMER GEN (1)
• EMER GEN SUPPLIED BY RAT	–	–	–	–	EMER GEN	–	–	EMER GEN (1)	–	–	–	ESS TR EMER GEN	–	ESS TR EMER GEN (1)	–

ON GROUND	AC BUS 1-1	AC BUS 1-2	AC ESS BUS 2-3	AC BUS 2-4	AC ESS BUS	AC ESS GND	AC ESS SHED	AC LAND REC	DC BUS 1	DC BUS 2	DC BAT BUS	DC ESS BUS	DC ESS SHED	DC LAND REC	SHED LAND REC
BAT only, V > 50 Kt	–	–	–	–	STAT INV BAT 1-2	–	–	STAT INV BAT 1-2	–	–	–	BAT 1-2	–	BAT 1-2	–
BAT only, V < 50 Kt	–	–	–	–	STAT INV BAT 1-2	STAT INV BAT 1-2	–	STAT INV BAT 1-2	–	–	BAT 1-2	BAT 1-2	–	BAT 1-2	–

- (1) Supplied when LAND RECOVERY pushbutton is at ON.
- (2) Lost in case of overcurrent on the faulty TR.
- (3) In case of differential protection failure
  - . the affected generator is not replaced
  - . the associated TR is switched off.
- (4) Lost after 7 seconds.



## OVERHEAD PANEL

① BAT 1 (2 or APU) sel

Selects the battery for voltage indication.

② BAT 1 (2 or APU) voltage indication

Selected battery voltage.



### ③ BAT 1 (2) pb sw

Controls the operation of the corresponding Battery Charge Limiter.

- Auto** : The Battery Charge Limiter controls automatically the connection and the disconnection of the corresponding battery to the DC BAT BUS by closing and opening of the battery line contactor.
- The batteries are connected to the DC BAT BUS in the following cases :
    - Battery voltage below 26.5 volt (battery charge). The charging cycle ends when battery charge current goes below 4 Amperes (for 10 seconds on ground, 30 minutes in flight).
    - On the ground (with speed below 50 knots), when batteries only are supplying the aircraft.
    - In flight DC generation lost (limited to 7 seconds).
  - The batteries are connected to the DC ESS BUS when batteries only are supplying :
    - in flight
    - on the ground (speed below 50 knots) provided they are both selected auto.

**Note** : 1. In normal configuration the batteries are disconnected most of the time.

2. A battery automatic cut off logic prevents batteries from discharging completely discharge when the aircraft on the ground (parking).

*Automatic battery contactors open when :*

- The aircraft is on the ground.
- The main power supply (external power plus all generators) is cut off.
- The battery voltage is lower than 23 volt for more than 16 seconds.


The flight crew can reset the contactors by switching the BAT pushbutton switch to OFF then AUTO.

**OFF** : The Battery Charge Limiter is not operating, the DC ESS BUS is not connected to the battery (except in flight in emergency configuration).  
OFF comes on white if the DC BAT BUS is powered.

Hot buses remain supplied.

**FAULT It** : Comes on amber accompanied by an ECAM caution, when the charging current for corresponding battery is outside limits.  
In this case the battery contactor opens.



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#### ④ APU BAT pb sw

Controls the operation of the APU Battery Charge Limiter.

**AUTO** : The APU Battery Charge Limiter automatically controls the closure/opening of the line APU BAT contactor.

The battery is connected in the following cases :

- To ensure battery charge (as for BAT 1 or 2)
- When the APU start sequence is initiated.

Note : Automatic cut off, as for BAT 1 or 2, is provided.

**OFF** : The Battery Charge Limiter is not operating, the battery line contactor is open.

OFF light illuminates.

**FAULT It** : Illuminates amber associated to ECAM caution activation as for BAT 1 or 2. In this case the battery contactor opens.

#### ⑤ AC ESS FEED pb sw

**Normal** : The AC ESS BUS is supplied from AC BUS 1.1.

It is automatically supplied by the AC BUS 2.4 when the AC BUS 1.1 is lost.

**ALTN** : The AC ESS BUS is supplied from AC BUS 2.4.

**FAULT It** : Comes on amber accompanied by ECAM activation when the AC ESS BUS is not electrically supplied.

Note : In case of total loss of main generators the AC ESS BUS is automatically supplied by the emergency generator or by the static inverter if the emergency generator is not available.


#### ⑥ GALLEY pb sw

**AUTO** : The galleys are normally supplied. The ECMU automatically controls the shedding of one or more galleys in case of generator(s) failure or in case of overload detection. On ground when APU generator or the external power supplies, all galleys are supplied provided no overload is detected.

**OFF** : All galleys are shed and water/waste (drain mast) ice protection is lost.

**FAULT It** : Illuminates amber associated with ECAM in case of overload detection if the automatic shedding is not performed.

Note : Switching OFF then AUTO resets the galleys which have been automatically shed by the ECMU.

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## ⑦ COMMERCIAL pb

OFF : The following equipment is shed :

- Galleys
- Passenger entertainment system (music and video)
- Cargo loading system
- Electrical service
- Water/waste (drain mast) ice protection
- Lavatory and cabin lights
- Water heater

## ⑧ IDG 1 (2, 3 or 4) (Integrated Drive Generator) pb

Normally springloaded out.

When pressed, the IDG is disconnected from its drive shaft and can only be reconnected by maintenance action on ground.

### CAUTION

1. If the pushbutton is pressed for more than about 3 seconds, damage may occur to the disconnection mechanism.
2. IDG disconnection is inhibited when engine N2 is below the low speed threshold.

FAULT It : It comes on amber, along with an ECAM caution, in case of :

- IDG oil outlet overheat (above 185° C), or
  - IDG oil pressure low. Inhibited at low engine speed (N2 below 14 %).
- It goes off when the IDG is disconnected.


## ⑨ GEN 1 (2, 3 or 4) pb

On : The generator field is energized and the line contactor closes, provided electrical parameters are normal.

OFF/R : The generator field is de-energized and the line contactor opens.  
The fault circuit is reset.

FAULT It : Comes on amber, along with an ECAM caution, in the event of protection trip initiated by the associated Generator Control Unit (GCU).  
The line contactor opens.

Note : If the protection trip is initiated by a differential fault, the reset action has no effect after two attempts.

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### ⑩ APU GEN pb sw

- On** : The APU generator field is energized and the line contactor closes provided parameters are normal.  
 Each bus tie contactor 1, 2, 3 and (or) 4 automatically close if its associated generator is not operative.
- OFF/R** : The generator field is de-energized and the line contactor opens. The fault circuit is reset.
- FAULT It** : Same as GEN FAULT.  
 APU GEN FAULT light is inhibited when APU speed is too low.

### ⑪ BUS TIE pb sw

- AUTO** : The five BUS TIE contactors open or close automatically according to the priority logic in order to maintain power supply to all AC buses.
- When a generator is lost, the associated AC BUS bar remains supplied through its associated BUS TIE contactor and the adjacent one which will automatically close.
  - When the aircraft is supplied only by APU generator or single ground power unit, the five contactors close.
  - When the aircraft is supplied by only two generators located on the same side the following contactors will close :
    - the two contactors associated to both lost generators
    - the contactor associated to the external running generator
    - the fifth contactor (located between left and right side).
- OFF** : The five BUS TIE contactors open.

R *Note : Selecting the BUS TIE pushbutton to OFF then AUTO on the ground inhibits the*  
 R *NBPT function.*  
 R *The function may be recovered by switching OFF all aircraft electrical sources*  
 R *and resetting GPCU with ground power unit disconnected.*

### ⑫ EXT A pb : (momentary action)

- AVAIL It** : Illuminates green provided external power parameters are normal.
- Momentarily pressed** : — If the AVAIL light was on :
  - The external power line contactor closes
  - The AVAIL light goes off
  - The ON light comes on blue
 — If the ON light was illuminated :
  - The external power line contactor opens
  - The ON light goes off
  - The AVAIL light comes on.



**⑬ EXT B pb : (momentary action)**

**AVAIL It** : Illuminates green provided external power parameters are normal.

**Momentarily pressed** : — If the AVAIL light was on :

- Provided the APU generator is off the external power line contactor closes
- The AVAIL light goes off
- The AUTO light comes on.

— If the AUTO light was on :

- The external power line contactor opens
- The AUTO light goes off
- The AVAIL light comes on.

**Note** : *The APU generator has priority over external power (A and B) for AC BUS 1.1 and AC BUS 1.2.*

*The external power A has priority over the APU GEN for AC BUS 2.3 and 2.4.*

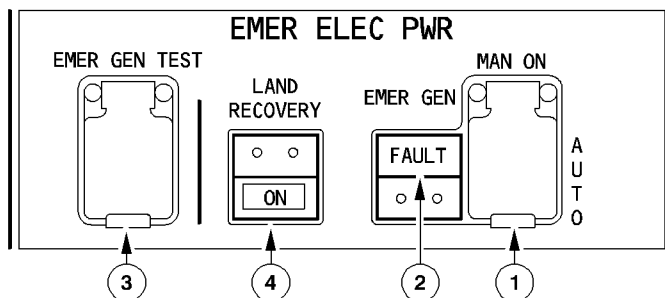
*APU generator has priority over external power B for AC BUS 2.3 and 2.4.*

*The engine generators have priority over the external powers or APU.*

*The external power B has priority over external power A for AC Bus 1.1 and AC BUS 1.2.*

*When external power B is selected AUTO, AUTO light remains illuminated even when the APU generator has taken over.*

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① MAN ON pb (guarded)

- AUTO** : In case of normal AC supply loss in flight, the emergency generator is automatically started.
- Pressed** : The emergency generator runs and is connected to the aircraft network.

② EMER GEN FAULT lt

The light comes on red, when the emergency generator is not supplying and normal AC supply is lost in flight.

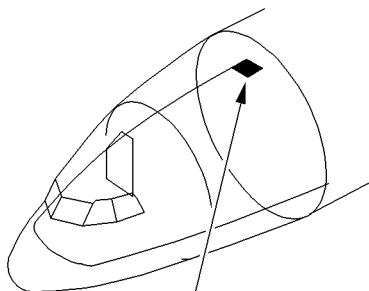
③ TEST pb (guarded)

- Pressed** : The emergency generator runs (provided the green hydraulic system is pressurized) and supplies the DC ESS BUS and the AC ESS BUS.

④ LAND RECOVERY pb

- ON** : When pressed in electrical emergency configuration, the AC LAND RECOVERY and the DC LAND RECOVERY buses are recovered and the following equipment is restored :
- LGCIU 1
  - SFCC 1 (flap channel is not recovered, if the emergency generator is powered by the RAT).
- The remaining fuel pump (if any) is lost.

*Note : The remaining fuel pump will be shed at 260 knots, if the emergency generator is powered by the RAT, or upon LAND RECOVERY selection, whichever occurs first.*

**FORWARD CABIN****MAINT BUS switch****MAINT BUS SWITCH**

This switch allows maintenance and ground service personnel to energize electrical circuits for ground servicing, without energizing the aircraft's entire electrical system.

**ON :** The selector latches magnetically, provided the external power A parameters are normal (AVAIL light is on). The AC and DC GRND/FLT busbars are supplied and the following services can be energized :

- Passenger compartment lighting
- Galley lighting
- Entrance area lights
- Lavatory lighting and service
- Vacuum cleaner outlets
- Flight compartment service outlets
- Flight compartment flood lighting
- Fuel quantity indications
- Refueling
- Lower deck cargo compartment lighting and power outlets.
- Main and nose landing gear compartment lighting
- Hydraulic compartment lighting
- Landing gear compartment service outlets
- Ground call
- Equipment compartment lights and service outlets
- Navigation lights
- Escape slide locking mechanism ice protection ◀
- Parking brake
- Cargo door hydraulic pump

The switch trips, when the external source is removed, or in case of a TR 2 fault.

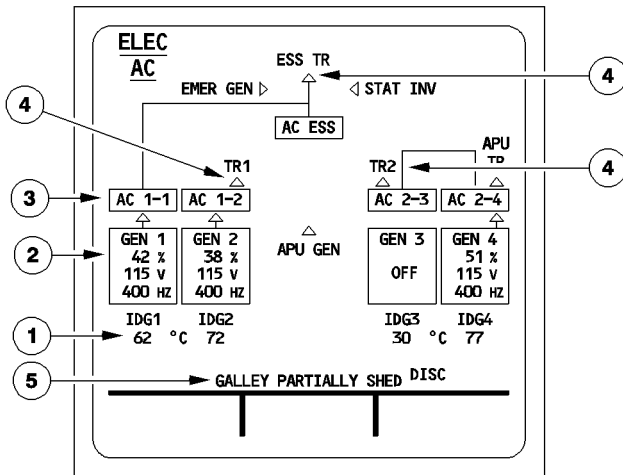
**OFF :** The AC and DC GRND/FLT busbars are connected to normal AC buses and DC BUS 2.





## ELEC AC ECAM PAGE

## FLIGHT CONFIGURATION

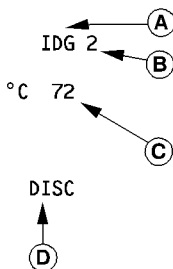


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## ① IDG indications

FFC5-01-2420-011-A001AA

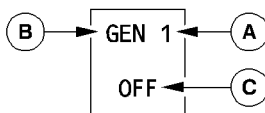


- ① A** IDG indication :
  - normally white
  - amber in case of :
    - IDG outlet temperature overheat (above 185 °C) or,
    - IDG oil low pressure or,
    - IDG disconnection.
- ① B** IDG number :
  - white if associated engine is running
  - amber if stopped.
- ① C** Outlet oil temperature :
  - Normally green.
  - Green, pulsing in case of advisory (above 142 °C).
  - Amber in case of overheat (above 185 °C).
- ① D** DISC / LO PR indication :
  - DISC appears in amber, if the IDG is disconnected.
  - LO PR appears in amber, if an oil low pressure occurs when the IDG is connected.  
It is inhibited at low engine speed (N2 below 14 %).



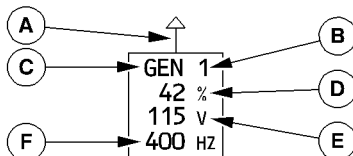
## ② GEN 1 (2, 3 and 4) indications

When the GEN pushbutton is OFF :



- ① The GEN number is white, if the associated engine is running. It becomes amber, when the associated engine stops.
- ② The GEN indication is amber.
- ③ The OFF indication is white.

When the GEN pushbutton is ON :



- ① The arrow indication is green, when the generator line contactor is in line.
- ② The GEN number is white, if the associated engine is running. It becomes amber, when the associated engine stops.
- ③ The GEN indication is normally white. It becomes amber, when the generator fails, or when the associated engine stops.
- ④ The GEN load is normally green. It becomes amber, if the load is greater than 108%, for more than 10 seconds.
- ⑤ The GEN voltage is normally green. It becomes amber below 110 V, or above 120 V.
- ⑥ The GEN frequency is normally green. It becomes amber below 390 Hz, or above 410 Hz.

③ AC 1.1 (or 1.2, 2.3, 2.4)

- normally green
- amber when the bar is not powered

④ TR

- normally white
- amber when the TR is failed or in case of abnormal current.

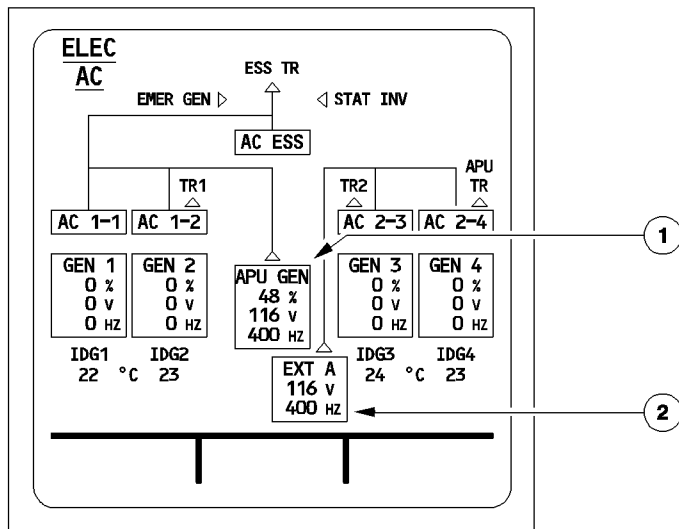
⑤ Galley indication

If applicable one of the following messages appears in white, according to the priority order of (1 : highest priority).

1. COMMERCIAL OFF
2. GALLEY SHED
3. GALLEY PARTIALLY SHED

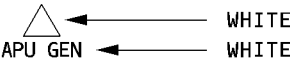
**GROUND CONFIGURATION**

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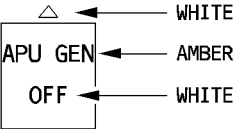


① APU Generator

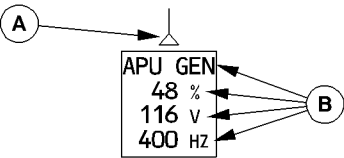
– When APU MASTER SW is off :



– When APU MASTER SW is ON and APU GEN pb sw is OFF :



– When APU MASTER SW is ON and APU GEN pb sw is on :



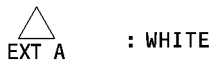
- ① – green when APU generator supplies one or more AC bus bar  
– white otherwise
- ② same logic as engine generator

② External power A (External power B symbol appears beside with the same principle) :

(only displayed when aircraft is on ground)

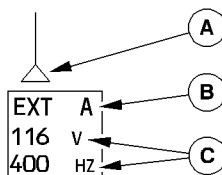
- When external power is not available

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- When external power is available

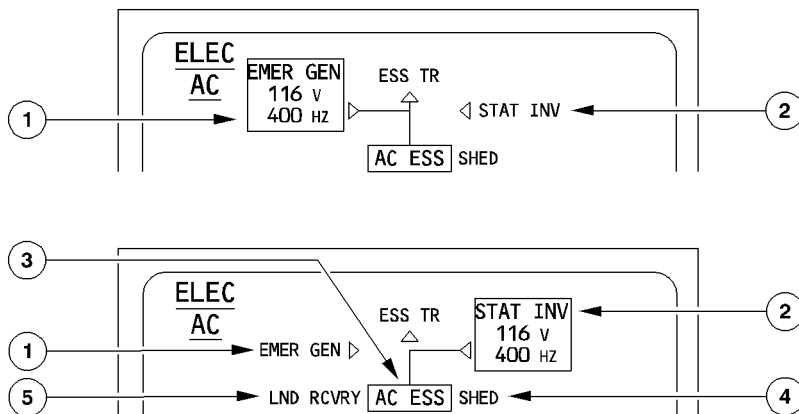
FFCS-01-2420-015-B001AA



- ① – green when external power supplies one or more bus bar  
– white otherwise
- ② white
- ③ same as engine generator

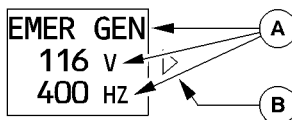


## EMER CONFIGURATION



### ① Emergency generator

- When the emergency generator contactor is closed :



Ⓐ same logic as engine generator

Ⓑ green

- When the Emer Gen Contactor is open :  
EMER GEN ▷ : white  
EMER GEN : becomes amber when faulty

### ② Static inverter

Same logic as emergency generator

### ③ AC ESS BUS

- normally green
- amber when the bus is not supplied.

④ SHED indication

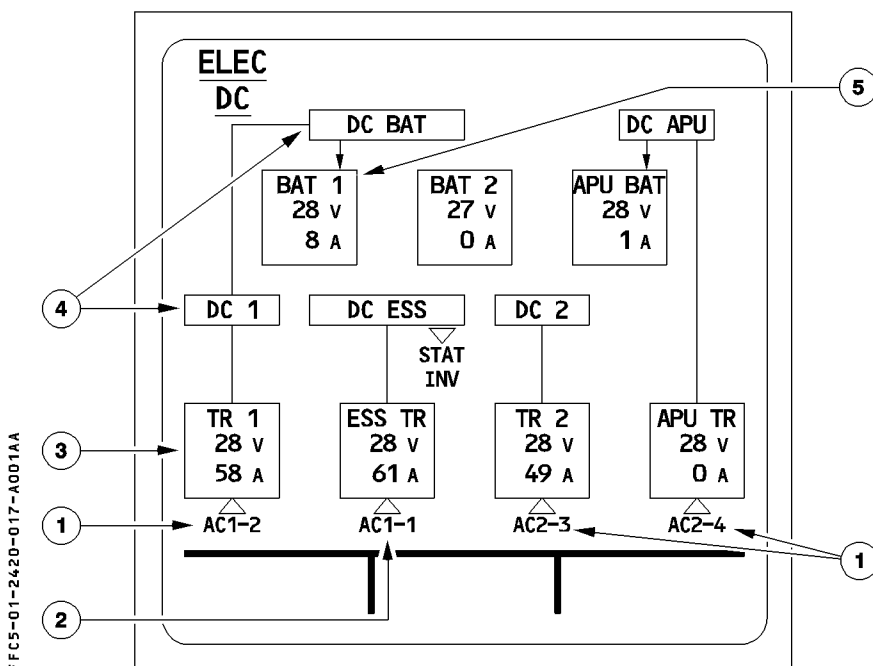
Appears in amber when AC ESS SHED BUS is not supplied.

⑤ LND RCVRY indication

Appears in green when LAND RECOVERY pushbutton is pressed.

**ELEC DC ECAM PAGE**

**NORMAL CONFIGURATION**

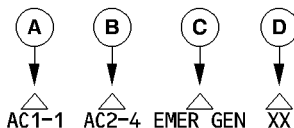


① TR 1 (or TR 2 or APU TR) power supply

- normally white
- amber when the bus bar is not powered.

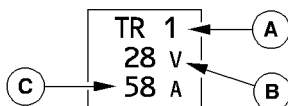


## ② ESS TR power supply



- Ⓐ Appears in white, when the AC 1-1 busbar supplies the ESS TR.
- Ⓑ Appears in white, when the AC 2-4 busbar supplies the ESS TR.
- Ⓒ Appears in white, when the emergency generator is not failed, and supplies the ESS TR.  
Appears in amber, when the emergency generator is failed, and is connected to the ESS TR.
- Ⓓ Appears in amber in all other cases (ESS TR not supplied, or information not available).

## ③ Transformer Rectifier (1, 2, APU, and ESS)



- Ⓐ TR indication :
  - Appears in white
  - Appears in amber, when the voltage or the current (value) is abnormal, or when the TR is failed (overheat, minimum current, overcurrent, open or short circuit).
- Ⓑ Voltage :
  - Appears in green
  - Appears in amber, when the voltage is less than 25V, or greater than 31V.

*Note : For APU TR, voltage indication remains green, even if abnormal during APU start.*

- Ⓒ Current :
  - Appears in green
  - Appears in amber, when the TR is failed or the current is less than 2A.

R  
R



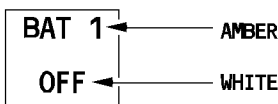
#### ④ DC BUS bars

- normally green
- amber if no voltage on the bar

#### ⑤ Batteries

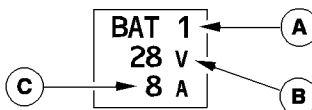
- if BAT pb is selected OFF

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- if BAT pb is selected AUTO

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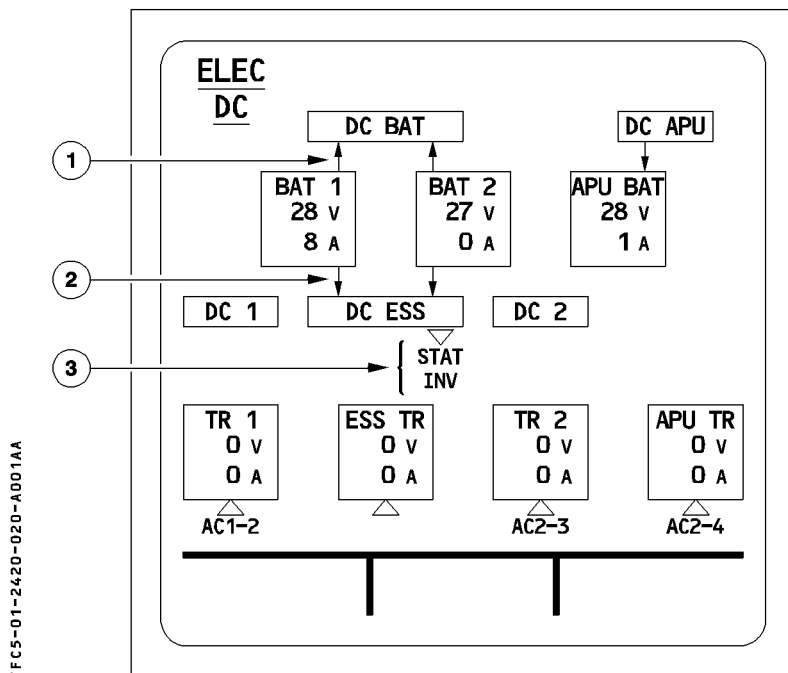
- ① BAT indication
  - normally white
  - amber if the battery is faulty
- ② Voltage
  - normally green
  - amber below 25V or above 31V
- ③ Current (charge or discharge) :
  - normally green
  - amber if discharge current is above 5A.

R

Note : For APU battery, even if voltage or current is abnormal, the values remain green during APU start.



## EMERGENCY CONFIGURATION



### ① DC BAT – BAT connection

- Battery Line Contactor open : nothing displayed
- Battery Line Contactor closed :
  - ↓ green : battery charge
  - ↑ amber : battery discharge

### ② DC ESS – BAT connection

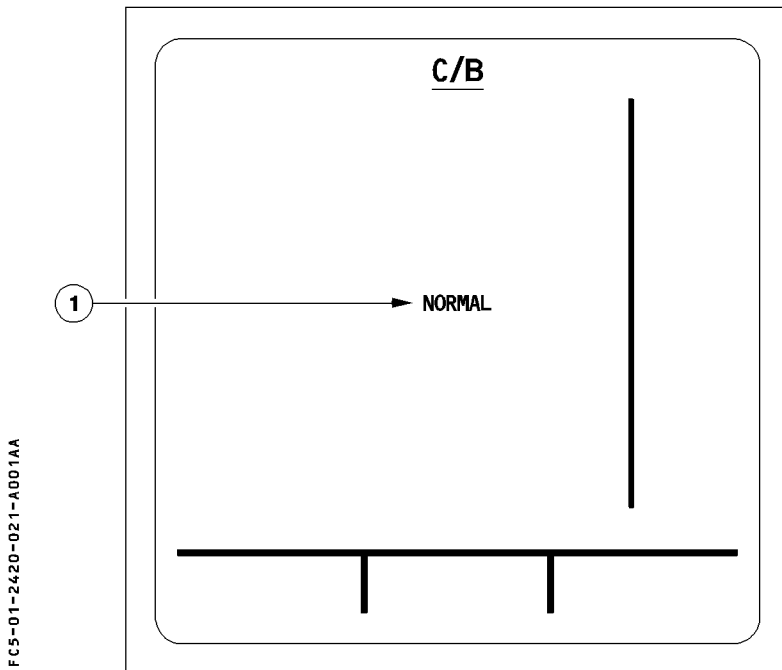
↓ amber : appears when the contactor is closed. (Batteries supplying DC ESS bus)

### ③ Static inverter

- normally white
- amber when the static inverter is faulty.

## C / B ECAM PAGE

### NO C / B PULLED

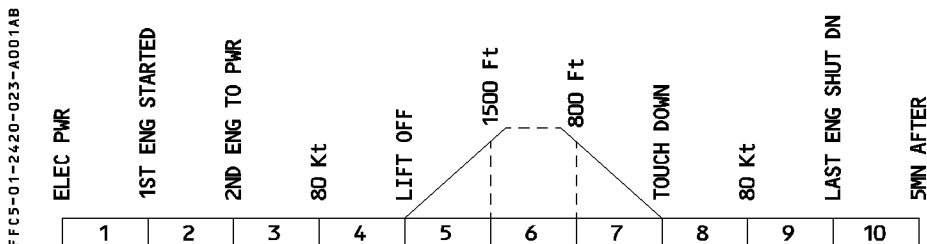


### ① NORMAL

Displayed in green when no circuit breaker is pulled.



### WARNINGS AND CAUTIONS



R

E / WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNINGS	FLT PHASE INHIB
EMER CONFIG Loss of main generators. The four normal AC BUS are lost	CRC	MASTER WARN	Nil *	EMER GEN FAULT It	4, 8
AC BUS 1-1 FAULT AC BUS 1-2 FAULT AC BUS 2-3 FAULT AC BUS 2-4 FAULT Busbar(s) is (are) no longer supplied	SINGLE CHIME	MASTER CAUT	ELEC AC	NIL	
AC ESS BUS FAULT Busbar is no longer supplied				AC ESS FEED FAULT It	
AC ESS BUS SHED Busbar is no longer supplied				NIL	
GEN 1(2) (3)(4) FAULT . Protection trip initiated by associated GCU . Or opening of line contactor with GEN pb at ON				GEN 1(2)(3)(4) FAULT It	1, 3, 4, 5, 7, 8, 10
GEN 1(2)(3)(4) OFF GEN 1(2)(3)(4) pb at OFF with no FAULT				NIL	
APU GEN FAULT . Protection trip initiated by associated GCU . Or opening of line contractor with APU GEN pb at ON				APU GEN FAULT It	3, 4, 5 7, 8
GEN 1(2)(3)(4) or APU GEN OVERLOAD Load of one generator is above 100 % of rated output				GALLEY FAULT It	
EXT PWR A (B) OVERLOAD Load of external power is above 100 % of rated output					3 to 8
IDG 1(2)(3)(4) OIL LO PR IDG oil pressure low. Inhibited if N2 < 14%				IDG 1(2)(3)(4) FAULT It	1, 4, 5, 7, 8, 10
IDG 1(2)(3)(4) OIL OVHT IDG outlet oil temp. above 185°C					
IDG 1(2)(3)(4) DISCONNECTED on ground				IDG OFF It	3 to 10
ECMU 1(2) FAULT				NIL	3, 4, 5, 7, 8

\* ELEC pages can be called up on the upper ECAM by pressing and holding the ELEC pushbutton on the ECAM control panel.

E / WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNINGS	FLT PHASE INHIB
C / B TRIPPED One C / B tripped.	SINGLE CHIME	MASTER CAUT	NIL	NIL	3, 4, 5, 7, 8
BAT 1(2) FAULT Charging current increases at an abnormal rate.			ELEC DC	BAT 1(2) FAULT It	
APU BAT FAULT Charging current increases at an abnormal rate.				APU BAT FAULT It	
DC BUS 1 FAULT DC BUS 2 FAULT DC BUS 1 + 2 FAULT DC ESS BUS FAULT Busbar(s) is (are) no longer supplied.			ELEC AC	NIL	4, 8
DC ESS BUS SHED Busbar is no longer supplied.					
DC BAT BUS FAULT Busbar is no longer supplied.					
BUS TIE OFF The BUS TIE pb is abnormally OFF.					
AC ESS BUS ALTN AC ESS BUS is abnormally supplied by AC 2-4 bus.					
PART GALLEY SHED					
BAT 1(2) or APU BAT OFF BAT pb at OFF without fault.			ELEC DC		3, 4, 5, 7, 8, 9, 10
TR 1 (2), APU TR or ESS TR FAULT					
BAT 1 (2) or APU BAT SYS FAULT			NIL		
STATIC INV FAULT					
C/B MONITOR FAULT Loss of CBMU.					
IDG 1 (2) (3) (4) MINOR FAULT					

MEMO DISPLAY

- EMER GEN is displayed in green, when the emergency generator is running.
- ELEC EXT PWR is displayed in green, if external power is available. This message becomes amber, if more than one engine is running.
- PART GALLEY SHED FOR TO is displayed in green.