## GENERAL

The Electric System generate and provides tri-phase, 115/200 Volt, 400 Hz, AC power.
For load devices requiring DC power, AC is converted into 28 Volts DC power transformer-rectifier. Battery supply DC system when main system is not energized, APU starter current is provided by the battery.
An inverter can provide AC 115V 400Hz current when no other source is available. A battery charger powered from an AC bus, maintains the battery in a charged condition.

## AC GENERATING SYSTEM

Alternating current is supplied by three AC generators, one in both engines and one in the APU. Each generator has 40 kVA power and can provide enough energy in case of malfunctioning of the other two generators.
The APU generator is mounted directly on the APU and is drive at a constant speed. The two engine generators are equipped with a CSD (constant Speed Drive), to convert the variable engine speed to a constant speed for the generator, that can produce AC at a constant frequency of 400 Hz. Each CSD has a self-contained lubrification system and can be disconnected in case of malfunctioning.

## AC DISTRIBUTION

AC distribution is divided into two systems right and left, working independently. They are supplied by the engine generators and the APU generator trough electrical bars (AC BUSES).
There's a priority control on AC distribution that works as follow:
if APU is supplying AC power to a bar and the engine generator is connected into the same bar, the APU generator is automatically disconnected; if ground power is supplying AC power to a bar, and the APU generator is connected to the same bar, the ground power is automatically disabled.

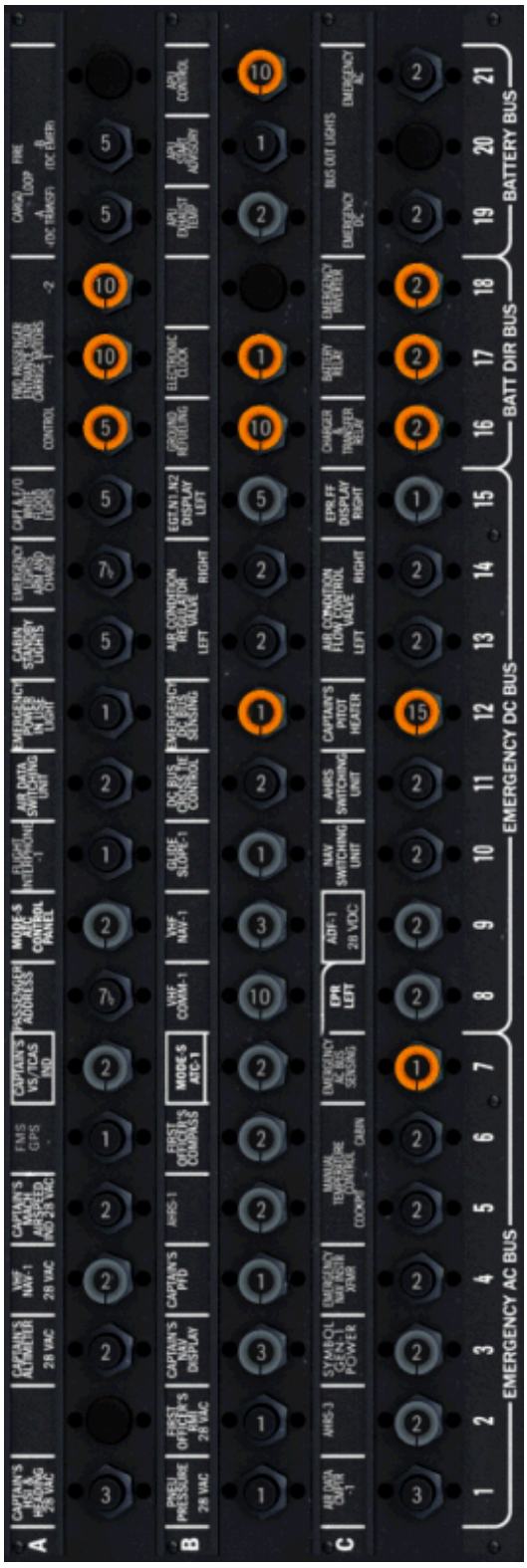
## DC DITRIBUTION

DC Distribution is like AC system, there are two systems (right and left) operating independently, that can be manually connected in case there is a fault in the transformer-rectifier of one bus. The Battery also supplies the DC system.

## CONTROLS AND INDICATORS

Electric system controls and indicators are in the overhead panel.

## CIRCUIT BRAKER PANEL – Overhead




**NOTE**: Left click with the mouse a CB to reset it, right click to trip the CB.

## ENGINE DRIVEN GENERATORS

**CSD Disconnect switches L & R:**
**DISC:** Disconnets the CSD from the corresponding engine.
**NORM:** Position for normal CSD operations.


**CSD temp rise button:** When pressed indicates oil temperature rise.

**CSD Oil temp indicators:** External scale indicates oil outlet temperature, internal scale indicates oil temperature rise through the drives.

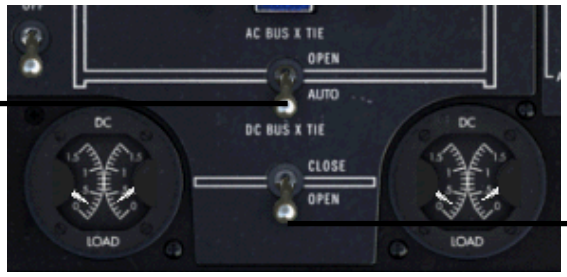
**L & R GEN OFF Lights:**
**ON:** when the generator is disconnected from the generator bus.


**GEN L & R Switches:**
**ON:** connects the generator to the corresponding electrical bar.
**OFF:** discconnects the generator from the corresponding electrical bar.
**RESET:** reset the control circuit of the corresponding generator.


**AC LOAD L, R Meters:**
Displays the load the generator is delivering to distribution system. Scale of 1.0 means the unit is working at 100% of rated load capability.

## AC & DC DISTRIBUITION SYSTEM

**AC Bus Cross-tie Switch:**
**AUTO:** position for normal operations, in case of loss of a generator it automatically closes the AC cross-tie relay.
**OPEN:** opens the AC cross-tie relay disconnecting the right and left circuit.




**DC Bus cross-tie relay:**
**CLOSE:** connects right and left DC bars.
**OPEN:** position for normal operation, disconnects the DC Bus cross-tie relay isolating the DC circuits.

**AC CROSSTIE LOCKOUT:**
**ON:** when AC cross-tie relay is in OPEN position.
**NOTE**: reset of the AC XTIE relay is accomplished, only on ground, by a guarded switch located in the breakers wall behind CM1 seat.


**L & R AC BUS OFF:**
**ON:** indicates that the corresponding electric bar is not powered.


**DC LOAD Meter:**
Display the load that respective transformers (2 per circuit) are delivering to the distribution system.
Scale of 1.0 means the unit is working at 100% of rated load capability.

## APU POWER

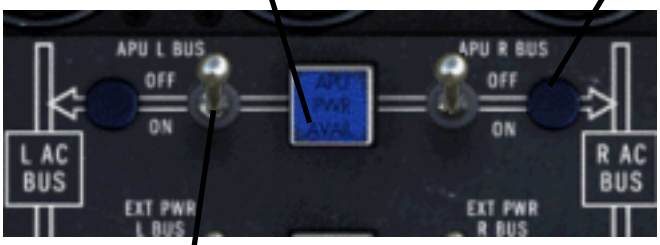
**APU GEN Switch:**
**NORM:** position for normal operations.
**RESET:** reset the circuit of the APU generator.
**NOTE**: if the APU PWR AVAIL does not illuminate when the APU is ON, resetting the APU generator may start the generator.


**APU AC LOAD Meter:**
Indicates the load the generator is delivering to distribution. Scale of 1.0 means the unit is working at 100% of rated load capability.

**APU GEN OFF Light:**
**ON:** apu generator is disconnected from the AC bus.


**APU PWR AVAIL Light:**
**ON:** apu generator is working and can supply energy to the bars.

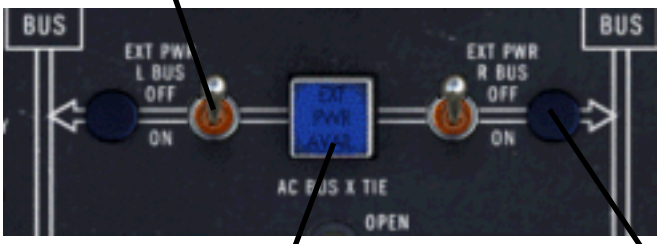
**APU Power in use light:**
APU generator is connected to the corresponding bar.




**APU Bus L, R Switches:**
**ON:** connects apu generator to the corresponding electric bar if this is not supplied by the engine. The APU generator has priority on external power.
**OFF:** disconnects apu generator from corresponding electric bar.

## EXT POWER

**EXT Bus L, R Switches:**
**ON:** Connects external power to electric bar.
**OFF:** Disconnects ground power from electric bar.




**EXT PWR AVAIL Light:**
**ON:** external power can supply AC to electric bar.

**EXT Power in use light:**
external power is connected to electric bar.

## GROUND SERVICE POWER

**APU PWR Switch:**
**ON:** Connects APU generator to ground service bus.
**OFF:** Disconnects APU generator from ground service bus.

**APU Power in use light:**
APU power is connected to ground service bus.


**APU PWR AVAIL Light:**
**ON:** APU is operating and APU power available.

**EXT Power in use light:**
external power is connected to ground service bus.

**EXT PWR AVAIL Light:**
**ON:** external power is connected and available.

**AFT OVERHEAD PANEL**

**EXT PWR Switch:**
**ON:** Connects external power to ground service bus.
**OFF:** Disconnects external power from ground service bus.

## EMERGENCY POWER

**EMER. PWR In use light:**
**ON:** indicates that emergency power circuit are activated.


**EMERGENCY PWR Switch:**
**ON:** allows electric emergency bar to receive current from inverter (linked to the battery invert DC in AC) in case of total loss of AC.
**OFF:** Exclude the battery as source of AC.

**BATTERY Switch:**
**ON:** Connects the battery to the battery bus trough the battery direct bus and allows charge of the battery.
**OFF:** Isolates the battery bus.
**NOTE:** The switch will lock in the ON position when is rotated clockwise (in MaddogX left click over the switch when it is in the ON position).

**EMERG. BUS OFF Light:**
**ON:** when the emergency bar is not powered or not working.

## AC & DC POWER INDICATORS

**AC VOLTS Meter:** Indicates the Volts of the AC selected source from Meter Selector.

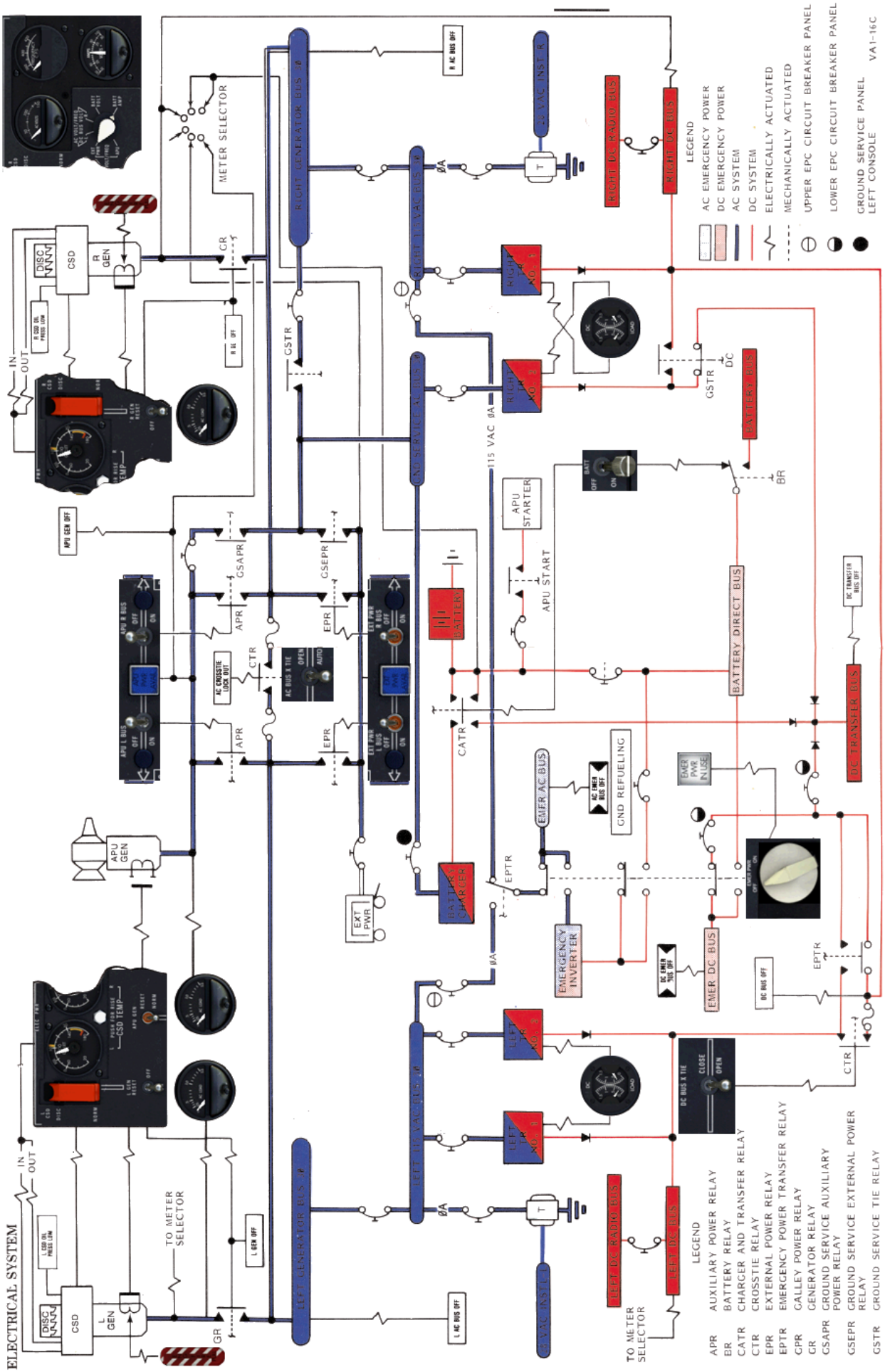

**FREQUENCY CPS Meter:** Herz (Hz) Frequency of the the AC source from Meter Selector.

**Meter Selector:** Selects power source to be monitored by the AC VOLT, FREQUENCY and DC VOLTS/AMPS Meter when placed on either L & R position, AC voltage and frequency and DC bus voltage for the selected source will be displayed. All other positions select only the single source indicated in the placards.

**DC VOLTS/AMPS Meter:** Displays in amperes on AMPS scale the charge state of the battery (left charge, right discharge). Displays, in volts in the DC VOLTS scale, voltage of the battery or DC bus.

## GALLEY POWER

**GALLEY Switch:**
**ON**: connects the galley to the distribution system.
**OFF**: disconnects the galley from the distribution system.


ELECTRICAL SYSTEM
LEGEND
AC EMERGENCY POWER
DC EMERGENCY POWER
AC SYSTEM
DC SYSTEM
ELECTRICALLY ACTUATED
MECHANICALLY ACTUATED
UPPER EPC CIRCUIT BREAKER PANEL
LOWER EPC CIRCUIT BREAKER PANEL
GROUND SERVICE PANEL
LEFT CONSOLE
VA1-16C
APR AUXILIARY POWER RELAY
BR BATTERY RELAY
CATR CHARGER AND TRANSFER RELAY
CTR CROSSTIE RELAY
EPR EXTERNAL POWER RELAY
EPTR EMERGENCY POWER TRANSFER RELAY
GPR GALLEY POWER RELAY
GR GENERATOR RELAY
GSAPR GROUND SERVICE AUXILIARY POWER RELAY
GSEPR GROUND SERVICE EXTERNAL POWER RELAY
GSTR GROUND SERVICE TIE RELAY
LEFT GENERATOR BUS
RIGHT GENERATOR BUS
APU GEN
EXT PWR
BATTERY CHARGER
BATTERY
APU START
APU STARTER
BATTERY BUS
BATTERY DIRECT BUS
EMERGENCY INVERTER
EMER AC BUS
EMER DC BUS
GND REFUELING
LEFT DC TRANSFER BUS
RIGHT DC TRANSFER BUS
LEFT DC RADIO BUS
RIGHT DC RADIO BUS
LEFT DC BUS
RIGHT DC BUS
LEFT TR NO. 1
LEFT TR NO. 2
RIGHT TR NO. 1
RIGHT TR NO. 2
LEFT 115 VAC BUS
RIGHT 115 VAC BUS
GND SERVICE BUS
115 VAC ØA
METER SELECTOR
TO METER SELECTOR
CSD
DISC
L GEN
R GEN
IN
OUT