

## ROTAX 912iS 915iS ELECTRICAL POWER SYSTEM (EXPLAINED)

### Normal Electrical Power

The alternator mounted on the 912iS and 915iS Rotax engine is made in Italy by DUCATI ENGERNIA (yep, the motorcycle company). It is a permanent magnet single phase alternator.

What is the difference between an alternator and a generator? Generators produce DC power, nice!! However, it takes a lot of energy to make it happen. Alternators produce AC power and use much less energy to do their thing. Here is the rub! The aircraft runs on DC power. No problem, many years ago someone invented a rectifier that would convert AC to DC. The next small issue was one of regulating the new DC voltage to keep in in the range we can use, around 14 VDC. Combining both units together, we have two rectifier/regulators in our aircraft. One for the A side (220 watts) and one for the B side (420 watts). They are mounted on each side of the fuse box located on top of the engine. For the sake of simplicity, we refer to the combination of the AC alternators, the rectifiers and regulators all producing DC power as “The Generators”.

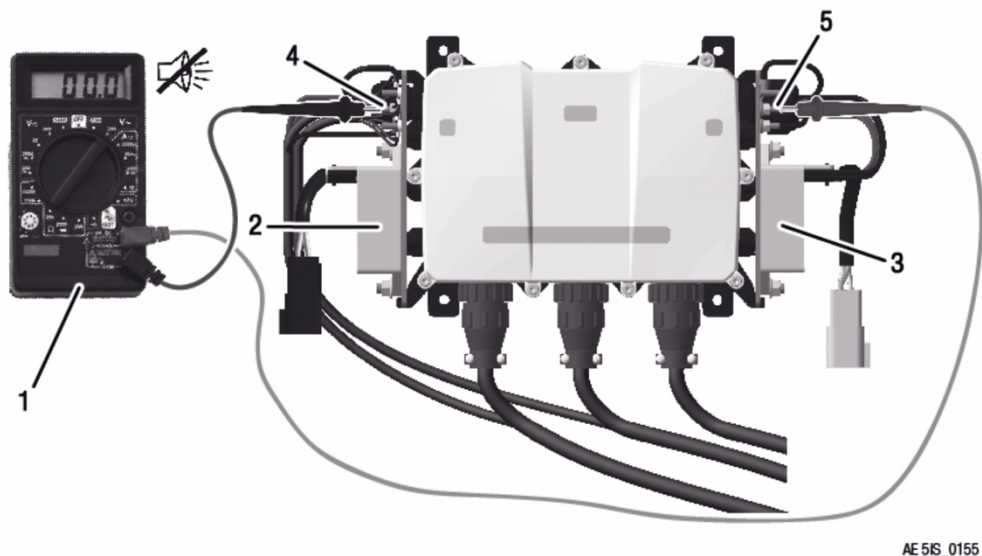


Figure 3.1: Continuity check, typical

- |   |   |   |  |
|---|---|---|--|
| 1 | Multimeter                                  | 2 | Rectifier regulator A (black wire connector) |
| 3 | Rectifier regulator B (grey wire connector) | 4 | Ground connections regulator A               |
| 5 | Ground connections regulator B              |   |  |

Back to the production of electrical power. The internal generator has two isolated coils integrated (individual generators) all on one shaft. During engine start operations, the Engine Management System (EMS) is powered by the aircraft battery. With sufficient engine speed (2500 rpm), generator B takes over. After the EMS system check has been completed, generator A takes over the supply of the EMS system (engine), if the switching threshold is exceeded. Generator B is then used to supply the aircraft instruments and for charging the aircraft battery. While the engine is running, the generator B can be used for the aircraft instrumentation.

- Generator A 14.2 V/16 A (220 W nominal capacity at 20°C/68°F)
- Generator B 14.2 V/30 A (420 W nominal capacity at 20°C/68°F)

### ATTENTION

**If generator A fails, generator B takes over its functions. The airframe electrical components and the instruments will be supplied by the battery. The battery will no longer be charged!**

### ATTENTION

**If generator B fails, the battery will no longer be charged. The engine still runs on generator A and the instruments will be supplied by the battery. The function of the instruments depends on the state of charge of the battery.**

## The Backup Battery System

The Battery Backup Switch should normally remain OFF at all times (hopefully).

It is used in a non-normal situation to keep the engine running long enough for you to get on the ground in one piece in the event of a double Alternator/Rectifier/Regulator (ARR=Generator) failure.

The Backup Battery Switch feeds the EMS system by the aircraft battery when the aircraft is on ground with engine off or in emergency procedures in case of supply failure by the internal generators A&B. Note: Do not start the engine with the Backup Battery switch in the ON position.

If Gen-B fails, (420 watts) the engine continues to use Gen-A (220 watts) to supply the ignition system and leaves you the aircraft battery for the instruments.

If Gen-A fails, (220 watts) the engine will take over Gen-B and leaves the aircraft battery for the instruments.

If both Generators fail, the engine dies, you then activate the Backup Battery Switch to get a restart and get on the ground or water as soon as possible. You will experience a complete loss of power and both Lane A&B light on. The Super Petrel has a 10-1 glide ratio. You really don't want to test this. Restart the engine and fly the aircraft. Yes, the engine will restart.

The aircraft battery has limited capacity, so shut down all unnecessary electronics/lights etc. (consider shutting off the MFD). If you have installed a Jump Smart external battery system, now is a good time to connect it (in parallel) to the system and turn it on. It will add to the aircraft battery operating time. (Amazon)

Land at nearest suitable lake or runway, your remaining flight time is now measured in minutes.

The engine will be using the main battery to power the ignition with the Backup Switch ON. Don't plan on staying airborne for more than 30 minutes on a good day. Plan to touchdown in under 15 minutes

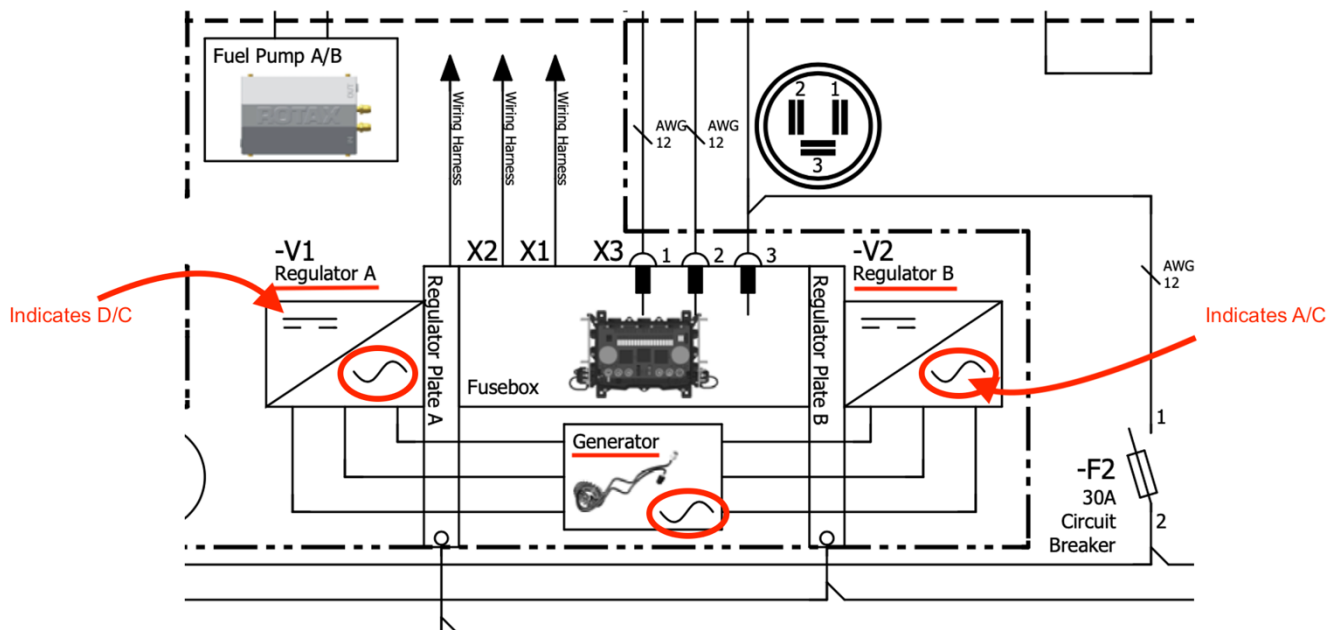


Note: Alternator and Generator are the same, they are just trying to confuse you.

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## Do Not Be Confused.

The Rotax 912iS Installation Manual makes references in their electrical diagram to “Generator and Regulators”. In fact, it is a (2) two in one Alternator and V1 & V2 that are Rectifier/Regulators.

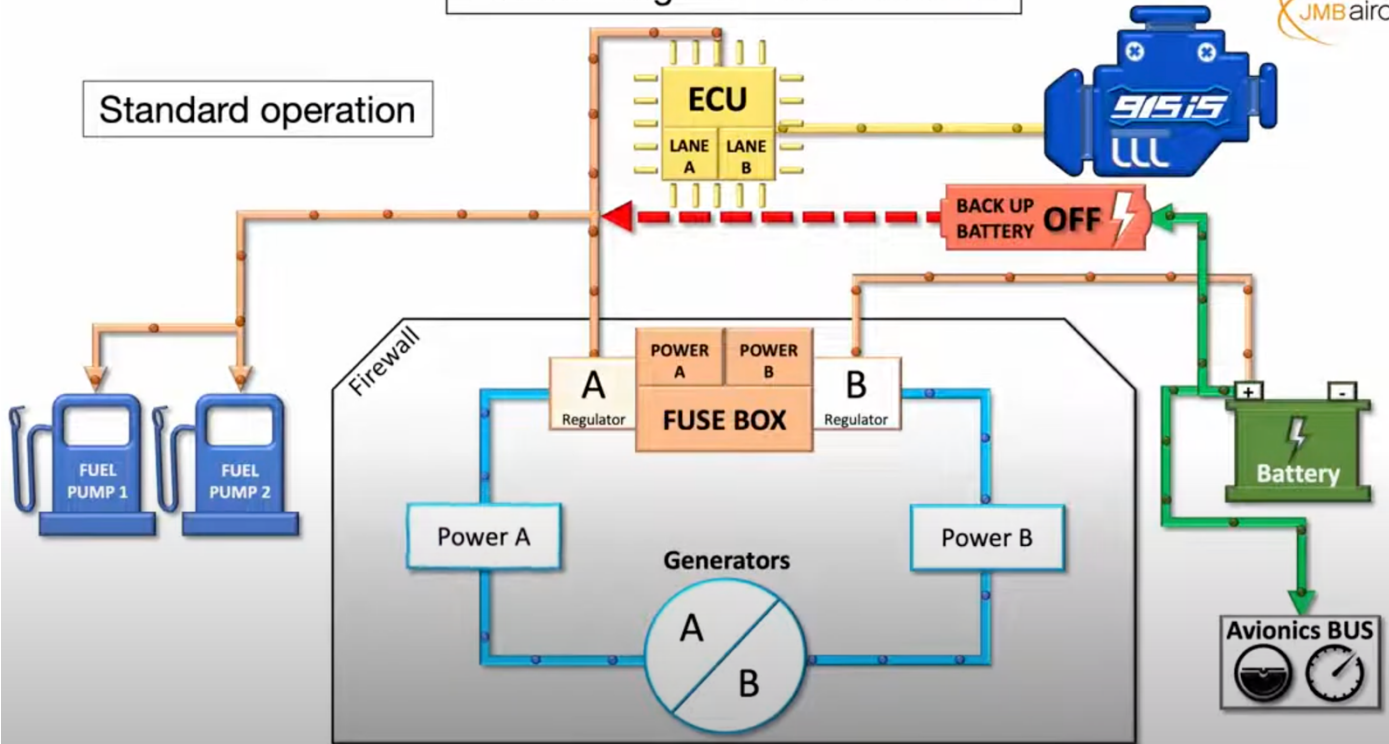


# NORMAL POWER

## Electric diagram – ROTAX 915iS



Standard operation

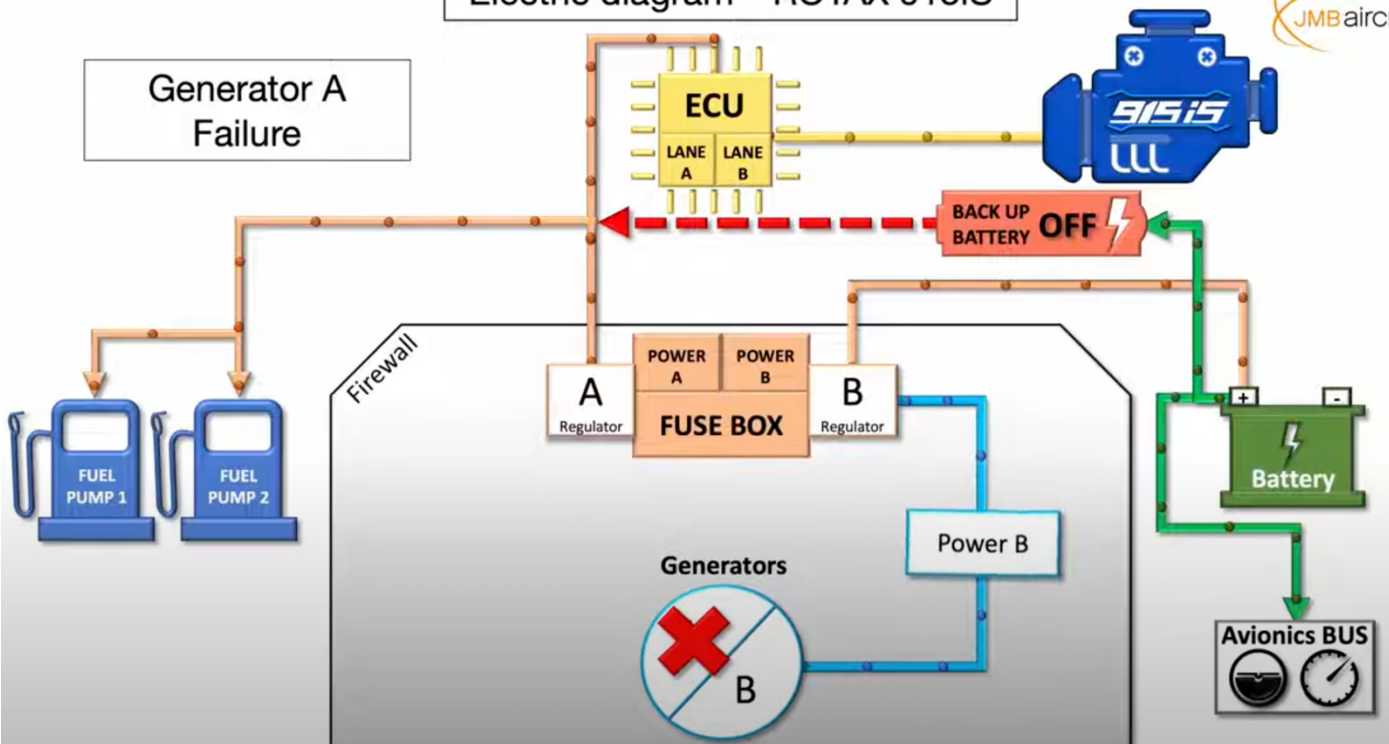


# A SYSTEM FAILURE

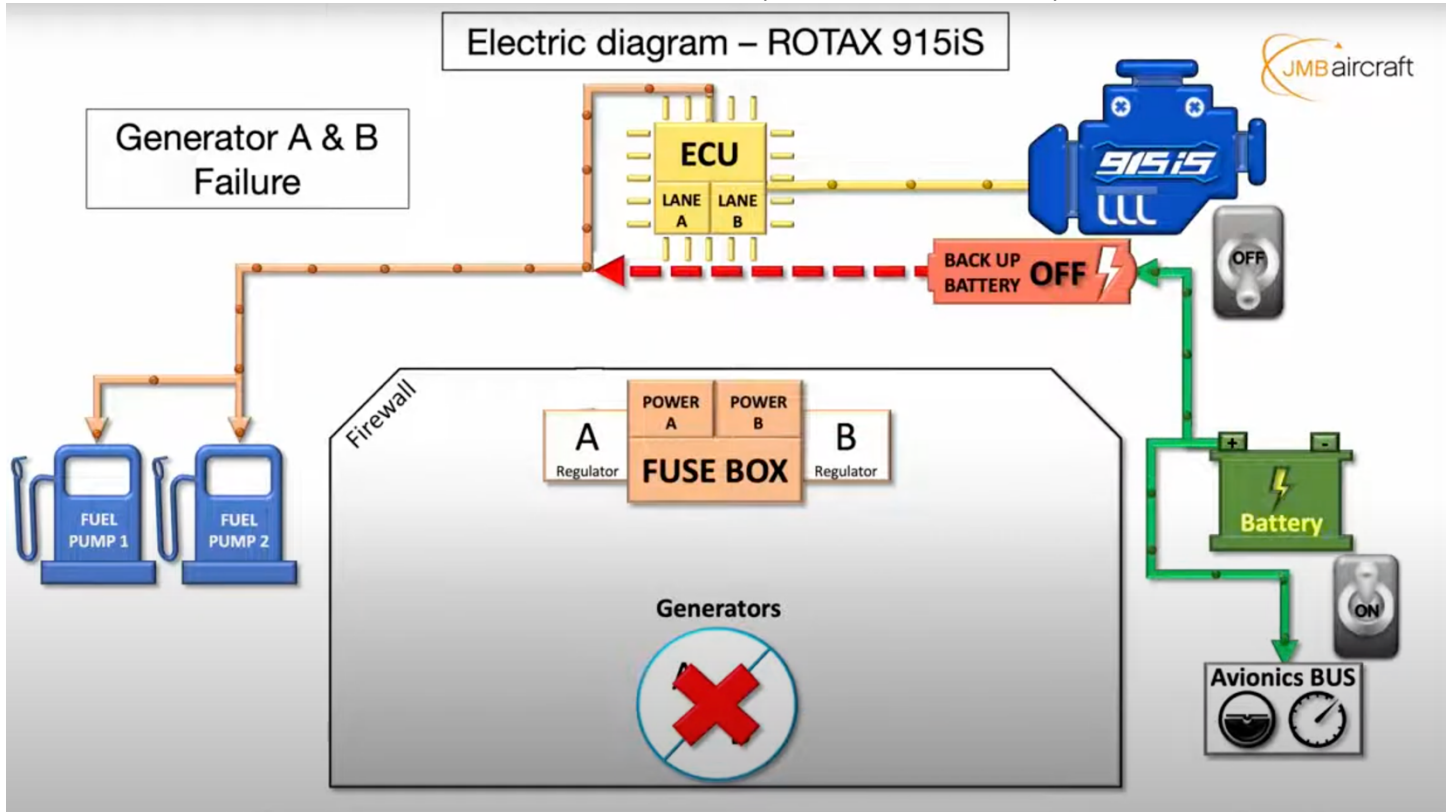
## Electric diagram – ROTAX 915iS



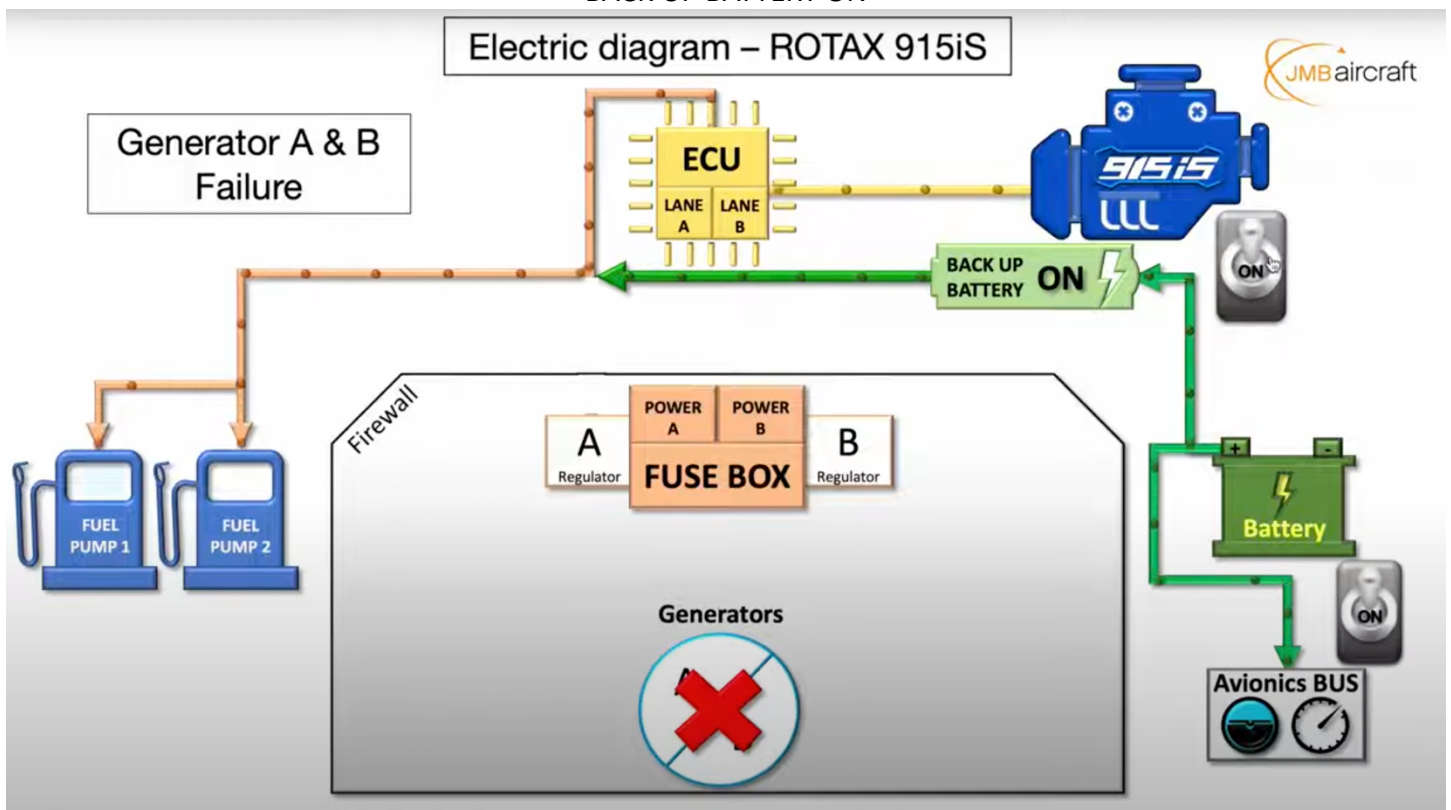
Generator A Failure



BOTH A&B SYSTEM FAILURE (BACKUP BATTERY OFF)

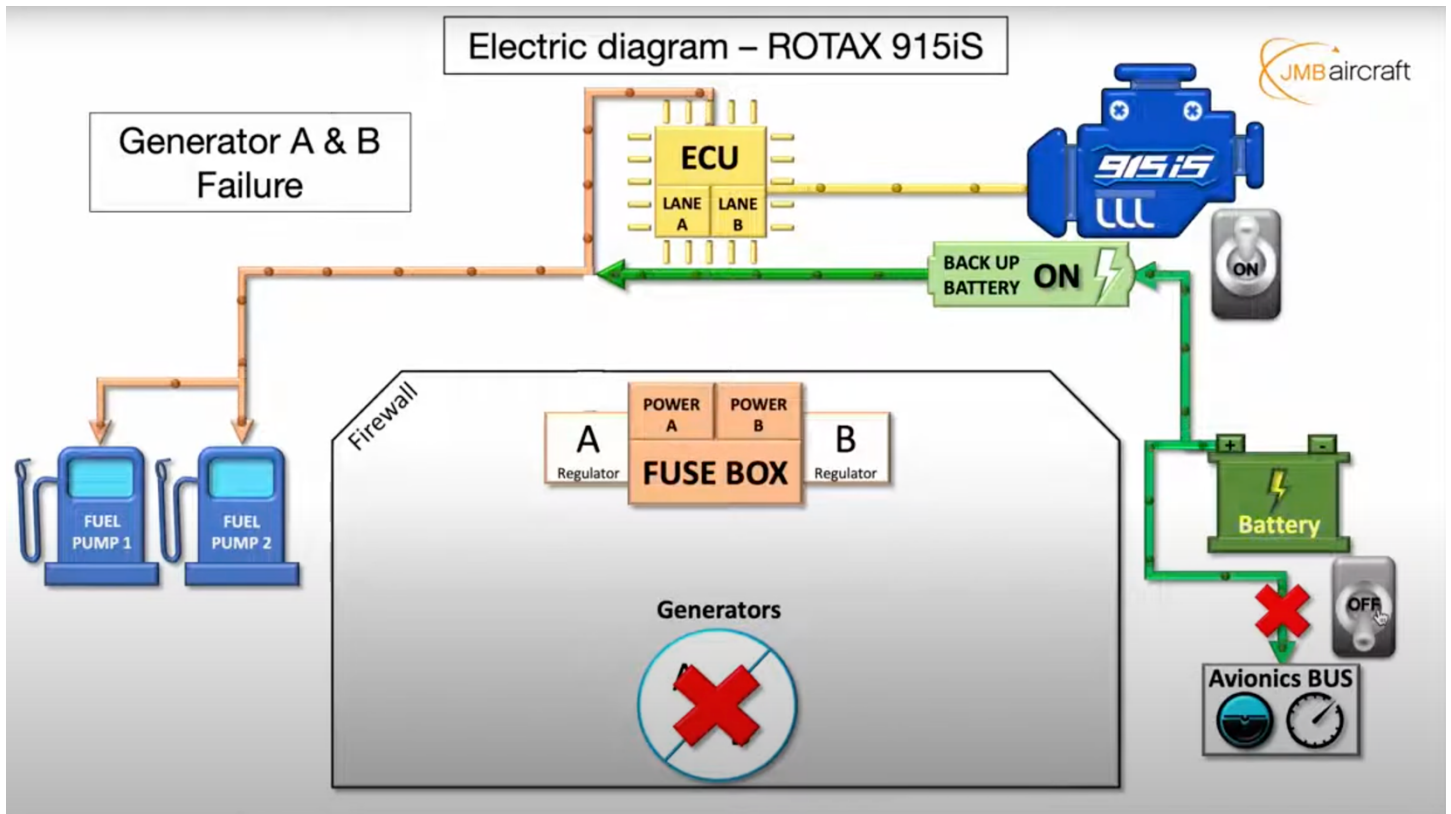


BACK UP BATTERY ON





## AVIONICS AND LIGHTS OFF



CONNECT SMART JUMP BATTERY IF AVAILABLE

