

On a normal piston trainer the electrics run the radios and the lights, and a total failure is a nuisance. On the DA-42 NG the electrics also keep the engine computers alive — so here, electrical health is engine health. That single fact is the theme of this chapter. Learn the voltage, the sources, and what keeps the engines running when the alternators quit.

## 4.1 A 28-volt DC system in four parts

The aeroplane runs a 28-volt direct-current system. It's easiest to remember in four blocks: **generation** (the alternators), **storage** (the batteries), **distribution** (the busbars) and **consumers** (everything that draws power).

## 4.2 Generation — the alternators

Power comes from two **70-ampere** alternators, one belt-driven on each engine. The left alternator feeds the left main busbar and the right feeds the right, each through its own relay and a 60-ampere protective breaker. The two main busbars tie to a central battery busbar through a 90-ampere breaker. Each alternator has its own control unit that regulates output voltage and warns you, with an ALTN FAIL caution, if it goes over- or under-voltage or fails outright.

## 4.3 Storage — three kinds of battery

There are three distinct battery sources, and knowing what each does is exam gold:

| Battery                                                 | Job                                                                                                                                                    |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Main battery (24 V, 13.6 Ah)                            | Starts the engines and powers the aircraft before the alternators come online. Connected through the ELECT. MASTER switch.                             |
| ECU backup batteries (12 V each, in series, per engine) | Keep the engine computers alive if the main battery fails — good for about <b>30 minutes</b> of engine running in a complete electrical failure.       |
| Emergency dry battery (non-rechargeable)                | Powers the standby attitude instrument and flood light for at least <b>1.5 hours</b> when the EMERGENCY switch is ON — independent of everything else. |

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#### WHY IT MATTERS — THE 30-MINUTE NUMBER

This is the single most important electrical fact on the type. If both alternators fail and the main battery cannot help, the ECU backup batteries run the engines for roughly **30 minutes** — and then both engines may stop. A double-alternator failure is therefore a "land within 30 minutes" emergency, not a "carry on to destination" one. That is why the type is flown with a healthy respect for its electrics.

## 4.4 Distribution — the busbars

You don't need to memorise the wiring diagram, but you should know the busbars and what hangs off each:

- **Hot Battery Bus** — wired straight to the main battery and never switched off; feeds a map/reading light and the ELT unit.
- **Battery Bus** — connected to the main battery through the battery relay (the ELECT. MASTER switch); feeds the main busbars and heavy current to both starters.
- **ECU Bus (left/right)** — supplies the engine computers, with the ECU backup batteries tied on for resilience.
- **Main Bus (left/right)** — feeds most consumers; the right main bus also feeds the avionics.
- **Avionic Bus** — connected to the right main bus through the AVIONIC MASTER switch; feeds the radios, transponder and autopilot.

## 4.5 Monitoring and warnings

A voltmeter shows system voltage (alternator voltage normally, battery voltage if the alternators are gone) and an ammeter shows how much current each alternator is supplying. The alerts you must recognise:

| Message       | Meaning                                  |
|---------------|------------------------------------------|
| L/R VOLTS LOW | That bus is below 25 volts.              |
| L/R ALTN FAIL | That alternator has failed.              |
| L/R ALTN AMPS | That alternator's load is above 70 amps. |

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### REMEMBER FOR THE EXAM

28 V DC · two 70 A alternators (one per engine) · main battery 24 V / 13.6 Ah for starting · ECU backup batteries give ~30 minutes of engine running in a total electrical failure · emergency dry battery gives 1.5 hours to the standby instrument · VOLTS LOW below 25 V.

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