

Real emergencies are flown from the checklist and from trained memory items — not from a study note. What this chapter does is fix the *principles* and the type-specific numbers in your head, so that when you open the checklist under pressure, it confirms what you already understand. The engine-failure logic is the heart of it.

9.1 Engine failure — the multi-engine discipline

An engine failure on a twin is a controllability problem first and a performance problem second. The sequence never changes: **maintain control, identify, verify, and only then secure**.

- **Control:** keep straight with rudder and fly the speed. On one engine the target is the **blue line**, V_{YSE} **85 KIAS**; never let it decay towards V_{MCA} 76.
- **Identify:** "dead foot, dead engine" — the leg doing no work is on the failed side.
- **Verify:** confirm with the power lever before you touch anything, so you don't shut down the good engine.
- **Secure / feather:** feather the failed propeller to kill the drag, and shut that engine down with its ENGINE MASTER, fuel selector to OFF.

THE FEATHERING WINDOW

Feathering only works above about **1300 propeller RPM**. That is why you feather promptly, while the propeller is still turning fast — a windmilling propeller you leave too long may drop below the window and refuse to feather, leaving you with the drag of a flat disc.

WHY BLUE LINE, ALWAYS

V_{YSE} is the speed that gives the best climb the aeroplane can manage on one engine, and it sits safely above the minimum control speed. Fly it exactly and you keep both control and every last foot of climb performance. This is the number that decides whether an engine failure is an inconvenience or an accident.

9.2 Restart and unfeather

If the failure was recoverable, an in-flight restart is possible: setting the ENGINE MASTER back on lets the pressure accumulator push the blades out of feather so the propeller windmills and the

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engine can be brought back to life. The accumulator is charged during normal running — which is one reason you don't casually shut engines down and restart them.

9.3 Fire, and the other big-ticket items

An engine-bay overheat above about **250 °C** gives a fire warning on the display. The response is to secure that engine — cut its fuel and shut it down — and land as soon as practicable. Smoke, electrical fire and similar events are all handled from the checklist, but the theme is the same: isolate the source, secure it, get on the ground.

9.4 Electrical failures

A single alternator failure (L/R ALTN FAIL) is manageable — the other alternator and the battery carry the load, and you reduce non-essential consumers. The one to respect is a **double** alternator failure: now the ECU backup batteries are running the engines, and they last only about **30 minutes** before both engines may stop. Treat it as a firm "land within 30 minutes" emergency, and shed every electrical load you can to stretch it.

9.5 Gear and abnormal G1000 messages

If the gear won't come down normally, you have the gravity free-fall extension: selector DOWN, then pull the emergency lever, and let the gear fall and lock. Beyond that, the G1000 caution messages each point to a specific abnormal — a few worth recognising:

Caution	What it's telling you
L/R ECU A/B FAIL	A fault in one engine computer — the other should take over.
L/R FUEL LOW	That tank is down to about 4 US gal usable.
L/R VOLTS LOW / ALTN FAIL	Electrical trouble on that side (see above).
L/R COOL LVL	Engine coolant level low.
STICK LIMIT	The variable elevator stop has failed.
CHECK GEAR	Gear not down and locked.

REMEMBER FOR THE EXAM

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Control–identify–verify–secure · fly the blue line (85) on one engine, never towards the red (76) · feather only works above ~1300 RPM · fire warning above ~250 °C · double alternator failure = ~30 minutes on ECU batteries, land now · gear free-fall = selector DOWN then pull the lever.

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