DIAMOND DA-42

Tell me about the DA-42?
The Diamond DA42 is a four seat, twin engine, propeller-driven airplane developed and manufactured by Austrian company Diamond Aircraft Industries.

What is the crosswind limit on the DA42?
Flaps UP 25kts
Flaps APP 20kts

Electrical system on a DA42?
DA42 has 4 batteries: 2 back up for the ECU, one main battery (24V) and one emergency battery.
It has one alternator per engine giving 28V 70A

How do you know the battery is being charged?
The ammeter will show positive when charging

Fire Detection System on the DA42?
Overheat detector in the hot area of each engine
Warning above 250º

Ice protection system on a DA42?
Liquid spray nozzles on the windshield, propeller and leading edge. They spray an anti-ice solution.
2 Independent pumps for redundancy

Landing Gear of a DA42?
Tricycle landing gear, Hydraulically operated by an electric hydraulic pump
Contains a squat switch on the RH LG in order to prevent gear retraction while on the ground
Gear downlock is spring loaded and its releases by hydraulic pressure
Emergency operations is by gravity
Limitations: VLOe 152kts / VLOr 188kts / VLE 188kts

Engine of a DA42?

- The Diamond is powered by two Austro engines E4-B
- 4 cylinders liquid cooled
- Reduction gear
- Turbocharger
- Dual digital engine control
- MAX Power 100%, 2300RPM (5 Min Limitation)
- MAX Continous 92% 2300RPM

What is a turbocharger?

A turbocharger is a turbine driven forced induction device that increases an engines efficiency and power output by forcing extra air into the combustion chamber

How does a turbocharger work?

(feeding more air, allows the engine to burn more fuel meaning
more power)

• It all starts at the turbine, which is driven by exhaust gases exiting the engine, as exhaust exits through the exhaust manifold, it passes over the turbine and spins it, the more exhaust gases that pass through, the faster the turbine spins.
• A shaft connects the turbine and the compressor, so when the turbine starts spinning as the engine is started, the compressor starts spinning too.
• The compressor is in charge of drawing air from the outside of the aircraft, compressing it and then putting it on the engine.
• Turbochargers are good at increasing the air pressure in the engines intake manifold (manifold pressure),

how do turbochargers prevent too much air from entering the engine?

(risk of damage/destroying the engine)

• Waste gates open and close to regulate the amount of air that passes over the turbine and prevent the turbine from spinning too fast

Advantages of a turbocharger?

• Better at high altitudes
• Better power to weight ratio
• Can deliver sea level power at altitude
• Compared to the supercharger, it is more efficient, uses less fuel and have less weight

How does a supercharger work?

The supercharger works on the same principle as a turbocharger, the only difference being is that it is mechanically driven by a direct connection to the engine (crankshaft) whereas a turbocharger is driven by a turbo using exhaust gases.

Advantages of a supercharger?

- Relatively cheaper than turbochargers
- They run at cooler temperatures
- Superchargers don't have any lag; the power is immediate.

Can you give a stall brief on the DA42?

HASELL check, While on the Lookout at 90º reduce power to Idle and gear down.
When stalled, pitch down to un-stall the wings and apply Full Power,When positive climb is obtained Gear UP and climb with 90kts

What happens if the pitot tube is blocked?

ASI errors, PUDSOD, a blocked pitot tube will affect the airspeed indicators in reverse. (increase of airspeed in climb, decrease of airspeed in descent) This is caused by the pressure in the pitot system remaining constant when the atmospheric pressure is changing. (capsule inside expands when there is less pressure, when there is more pressure it compresses)

What happens if the static port is blocked?

PUDSOD (will affect all three, ASI, VSI, ALTIMETER) The altimeter will be stuck on the altitude at the time of the blockage as the pressure inside isn't changing, The VSI will also read no change in pressure so it will not change. (it will go back to 0 slowly and stay there), If we descend with a blocked static port, the ASI will over-read, and if we climb the ASI will under-read.

What is the ceiling of the DA42?

18.000ft

Propellers

- DA42 consists of a three blade, constant speed, Feathering, Prop pitch is automatically set by ECU via electro-Mechanical actuator on the governor.

Governor is operated by Gearbox Oil.
Feathering by "Engine Master OFF" if RPM above 1300RPM
Feathers when gear oil pressure is lost
If RPM is below 1300, prop pitch remains above high pitch lock

Brakes
Hydraulically operated brakes, individually operated via the toe pedals

Flight control system
The ailerons, elevator and wing flaps are operated through control rods, while the rudder is controlled by cables. The flaps are electrically operated. elevator forces can be balanced by a trim tab on the elevator, which is operated by a Bowden cable. Rudder forces can be balanced by a trim tab on the rudder, which is also operated by a Bowden cable. Contains a variable elevator backstop which limits the deflection when Throttles are above 20%

What is the fuel capacity, fuel burn and endurance?
The fuel capacity of the Diamond is 50 USGal
Max Unbalance 5 USGal
Fuel Burn at 75% Power 13.2USGal
Endurance 3.8 Hours

Engine Failure Technique?
Control the aircraft first and maintain minimum 85kts
Full power on both engines, Gear UP, Flaps UP.
Identify the engine dead leg dead engine…
Throttle on failed engine IDLE
Engine Master OFF
Alternator OFF
Fuel Pump OFF
Fuel Selector OFF

Effect of CofG in a spin? Which is best?
The recovery of a spin becomes progressively more difficult as its centre of gravity moves aft, a forward centre of gravity results in greater flight stability and reduced danger of stalling (reduced stalling speed), an aft centre of gravity reduces the drag (less tail down force to maintain level flight) meaning that you can burn less fuel and better manoeuvrability and lower take-off and landing distances.

Spin Recovery?
Power to idle, ailerons to neutral, use opposite rudder to the spin, and elevator Forward.

What is a fuel injection system?

A fuel injected works differently as there is no air mixed with the fuel in the metering system. A servo regulator measures airflow entering the engine, and meters fuel accordingly for the proper mixture. At the cylinders, each fuel injector sprays fuel just outside the cylinder head at the intake manifold, this means that your fuel is vaporized and mixed with air before entering the cylinder. In-case the engine driven fuel pump fails, there is a backup electric pump. The advantages are; freedom from vaporisation ice (carb ice), fewer maintenance problems, increased engine efficiency, faster throttle response, easier cold weather starts, better fuel flow and Control.

DA42 Speeds (cruise speed is roughly 135kts)

- VS0 – 62kts
- VS1 – 69kts
- VMCA – 76kts
- VX – 82kts - FLAPS APP
- VR – 76kts
- VY – 90kts
- VYse - 85kts
- VLO – 188kts down/ 152kts up
- VFEapp - 133kts
- VFEldg - 113kts
- VNO – 151kts
- VNE – 188kts
- VREF - 84kts

WARRIOR PA-28

What is the crosswind limit on the PA28?
17 kts

Electrical system on a PA28?
12V battery
14V 60Amp alternator

How do you know the battery is being charged?
The ammeter will show the amp output of the alternator

Landing Gear of a PA28?
Tricycle landing gear, each gear with a strut air-oil type

Engine of a PA28?

- The Warrior is powered by a Lycoming O-320-D2A
- 160hp
- 2700rpm
- Air cooled
- 4 cylinder horizontally opposed

Can you give a stall brief on the PA28?
HASELL check, While on the Lookout at 90º reduce power to Idle.
When stalled, pitch down to un-stall the wings and apply Full Power. Climb with VY

What is the ceiling of the PA28?
14.000ft

Propellers
• One propeller with 2 blades

Brakes
Single disk hydraulic brakes

Flight control system
Dual flight controls via cable system
Elevator trim tab
Rudder trim tab
Manually controlled flaps which are spring loaded to go back to UP

What is the fuel capacity, fuel burn and endurance?
The fuel capacity of the Warrior is 50 USGal, but 48 usable
100LL
6.5hours sea level with reserve
10gal/h

Engine Failure Technique?
Control the aircraft first and maintain minimum 75kts
Identify a suitable landing area
Try to restart the engine
If unable, turn everything off and pray

PA28 Speeds (cruise speed is roughly 105kts)

- VS0 – 44kts
- VS1 – 50kts
- VX – 63
- VR – 55
- VY – 79
- VFE - 103
- VNO – 126
- VNE – 160kts
- VREF -