

VSL Aviation

Critical Engine

A critical engine is the engine which; if lost, will most adversely affect the performance and handling characteristics of the aircraft.

4 Factors to Determine Critical Engine:

P- P-factor

A- Accelerated Slipstream

S- Spiraling Slipstream

T- Torque

Vmc

Minimum Controllable Airspeed

How Vmc is Determined:

C- Critical engine failed and windmilling

O- Operating engine at max T/O power

M- Max gross weight

B- Bank of no more than 5°

A- Aft center of gravity

T- Takeoff configuration

S- Standard temperature and pressure

Lowers Vmc (good)

Add power to Critical Engine

Reduce Drag

Reduce power on the Operating Engine

Forward CG (longer rudder arm)

Gear Down

Lower Pressure

Higher Altitude

Higher Temperature

Increases Vmc (bad)

Reducing Bank

Higher Pressure

Lower Temperature

Lower Altitude

BE95 BEECH TRAVEL AIR N677Q

ENGINE OPERATING LIMITS			
Indication	Red Low / Yellow	Green	Red High
Oil Temp	60 - 140°	140 - 245°	245° - Up
Oil Pressure	25 psi (min idle)	65 - 85 psi	85 psi - Up
Fuel Pressure	0 - 0.5 psi	0.5 - 6.0 psi	6.0 psi - Up
Cylinder Head Temp		200 - 500°	500° - Up
Prop Tach		2,000- 2,700 RPM	2,700 - Up RPM
Manifold Pressure		14.5 - 28.5"	28.5" - Up
Suction	0 - 4.5"	4.5 - 5.5"	5.5" - Up

Vs speeds MPH			
Vr	85	Vmc	84
Vx	95	Vxse	100
Vy	105	Vyse	100
Va	160	Vsse	100
Vne	240	Vle	150
Vno	185	Vfe	130
Vso	70		

FUEL (TOTAL/USEABLE)		BE95 MAX WT	
Total	112 / 106	Takeoff	4,000
Mains	50 / 44	Fwd Baggage	270
Aux	62 / 62	Aft Baggage	270
Each AUX; 31 / 31, Each MAIN; 25 / 22			

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ALTITUDE LIMITATIONS AT 4,000 lbs	
Two Engine Service Ceiling	Single Engine Service Ceiling
19,300' (100 fpm)	6,200' (50 fpm)

Engines
Specs: 2 x Lycoming O-360 A1A 4-cyl horizontally opposed, carbureted, air cooled, naturally aspirated, Max 28.5" 2 x 180 hp each = Total 360 hp Oil capacity: 6-8 qts per engine (5 qt min) Fuel burn: 10 gals / hr per side

Propellers
Specs: Two-bladed Hartzell constant speed, full feathering props. Maximum 2700 RPM Maintains constant RPM: With oil pressure through the prop governor (speeder springs / flyweights / pilot valve) Nitrogen unfeathering accumulator: Brings prop out of feather Locking pins: Prevents props from feathering when engine is < 800 RPM. Saves wear and tear on starters.

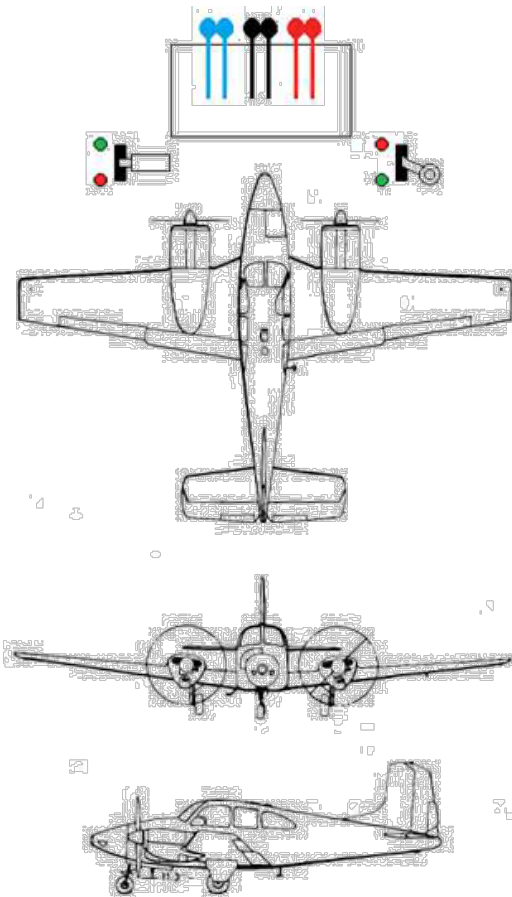
Fuel System
Fuel Capacity: 112 total (106 useable) 4 Tanks: Two MAIN: 25 gal ea (22 usable) Two AUX: 31 gal ea (all usable) 4 fuel pumps: 2 eng drive & 2 elec boost 9 fuel sumps: 4 ea wing and 1 under nose Fuel grade: 100LL (blue dyed & 6 lbs/gal) X-Feed: Emergency Only Fuel Limitations: <ol style="list-style-type: none"> 1. ALWAYS T/O & LAND on MAINS. 2. NEVER T/O with < 10 gals (yellow arc). 3. WAIT 30s before t/o after high-speed taxi.

Heater
Janitrol 35,000 BTU Combustion Heater: Located in the nose compartment. Self-contained system. Draws fuel from left main tank and ignites in the nose. Blower then circulates hot air throughout the cabin.

Electrical
28V system: 2 x 12V battery (series) 2 x 28V generators – 60 amps Circuit breakers: Protects the system Voltage regulator: Parallels Loads Gear and Flaps System: 100% electrical

Landing Gear
Sungear system: Uses a torque motor to rotate a circular disk, which is connected to push pull rods attached to the landing gear. The push pull rods push the gear and doors out and pulls them in. 'WOW' or Squat switch: On L Main Gear. Prevents the gear from retracting on ground. Other safety systems: Gear warning horn, nose gear indicator and nose gear mirror Gear hand crank: For emergency use (roughly 50 turns counterclockwise) Landing checks: "Down & Green" (verified twice and one in the mirror) Locks: Mechanical Up-Locks, and over-center linkage w/ spring locks gear down

Flaps
Micro switch: Up, Off, or Down position Full flaps: 30° (10 / 20° marks on L Flap) Flaps: Uses electric motor connected to flexible torsion cables which drive flaps down with jackscrews



Oral Exam Prep

Vmc

A thorough knowledge of Vmc is probably the most important subject on the oral exam.

1. Be able to define Vmc.
2. How does the manufacturer determine Vmc speed?
3. What happens to Vmc if the aircraft is loaded aft of the CG limit?
4. How is Vmc determined?
5. What factors affect Vmc?

Critical Engine

1. Define a critical engine?
2. What determines a critical engine?
3. Why do some airplanes have a critical engine and some don't?
4. Does the Travel Air have a critical engine?

Weight and Balance

Complete your weight & balance!

Be able to use the charts and graphs in the POH.

Explain zero fuel weight.

Aircraft Systems

Know your systems!

Fuel system

Landing gear

Electrical system

Constant speed; full feathering props

Heater system

Pressure system

Airspeeds

Red line / Vmc

Blue line / Vyse

Vy, Vx, Vyse, Vxse, Vmc, Va, Vlo,

Vle, Vso, Vsse, Vno, Vne

Performance Charts

Know your performance!

1. Takeoff distance
2. Accelerate-stop distance
3. Accelerate-go distance
4. Takeoff weight to achieve single engine climb
5. Climb performance: 2 eng, 1 eng
6. Cruise chart: TAS, fuel flow, range
7. Single engine service ceiling
8. Landing distance: flaps up, flaps down