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 N755RP

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 – 18.5 psi	19.0 psi – Up
Cylinder Head Temp		200 – 500°	500° - Up
Prop Tach		2,350-2,700 RPM	2,700 - Up RPM
Manifold Pressure		14.5 – 29.0”	29.0” - Up
Suction	0 – 4.4”	4.8 – 5.2”	5.5” - Up

Vspeeds MPH			
Vr	85	Vmc	80
Vx *	90	Vxse	98
Vy *	110	Vyse	108
Va	160	Vsse	108
Vne	240	Vle	150
Vno	185	Vfe	130
Vso	70	***Increased from POH**	

FUEL (TOTAL/USEABLE)		BE95 MAX WT	
Total	112 / 106	Takeoff	4,200
Mains	50 / 44	Fwd Baggage	270
Aux	62 / 62	Aft Baggage	270
Each AUX; 31 / 31, Each MAIN; 25 / 22			

***Vx / Vy increased for safety margin (see 6-7, 6-8)**

ALTITUDE LIMITATIONS AT 4,200 lbs	
Two Engine Service Ceiling	**Single Engine Service Ceiling**
18,100’ (100 fpm)	4,400’ (50 fpm)

Engines

Specs: 2 x Lycoming IO-360 B1B
4-cyl horizontally opposed, fuel-injected, 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
8 fuel sumps: 4 ea wing
Fuel grade: 100LL (blue dyed & 6 lbs/gal)
X-Feed: Emergency Only
Fuel Limitations:
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. **Has its own fuel pump.** Draws fuel from left main tank and ignites in the nose. Blower then circulates hot air throughout the cabin.

Electrical

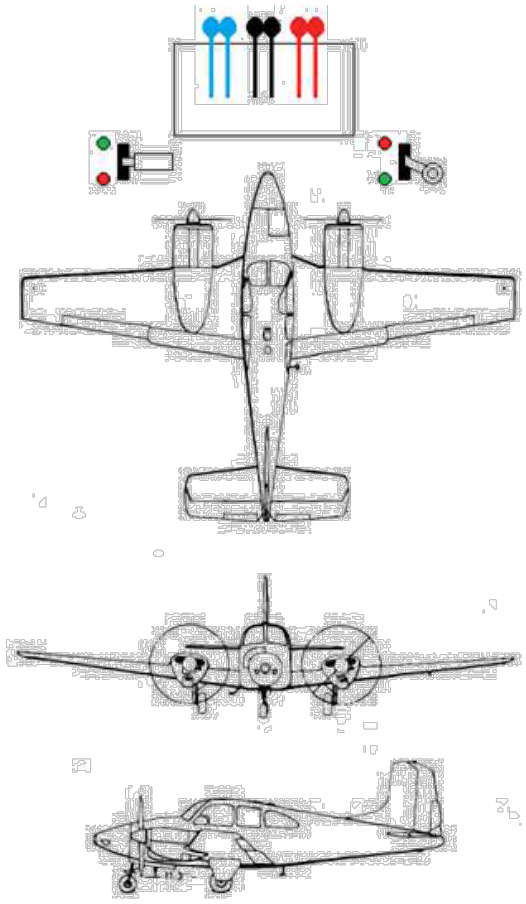
28V system: 2 x 12V battery (series)
2 x 28V alternators – 60 amps
Circuit breakers: Protects the system
Voltage regulator: Parallels Loads
Gear and Flaps System: 100% electrical

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 (NA on TA)
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