Rod Machado's Private Pilot Workbook

Written by
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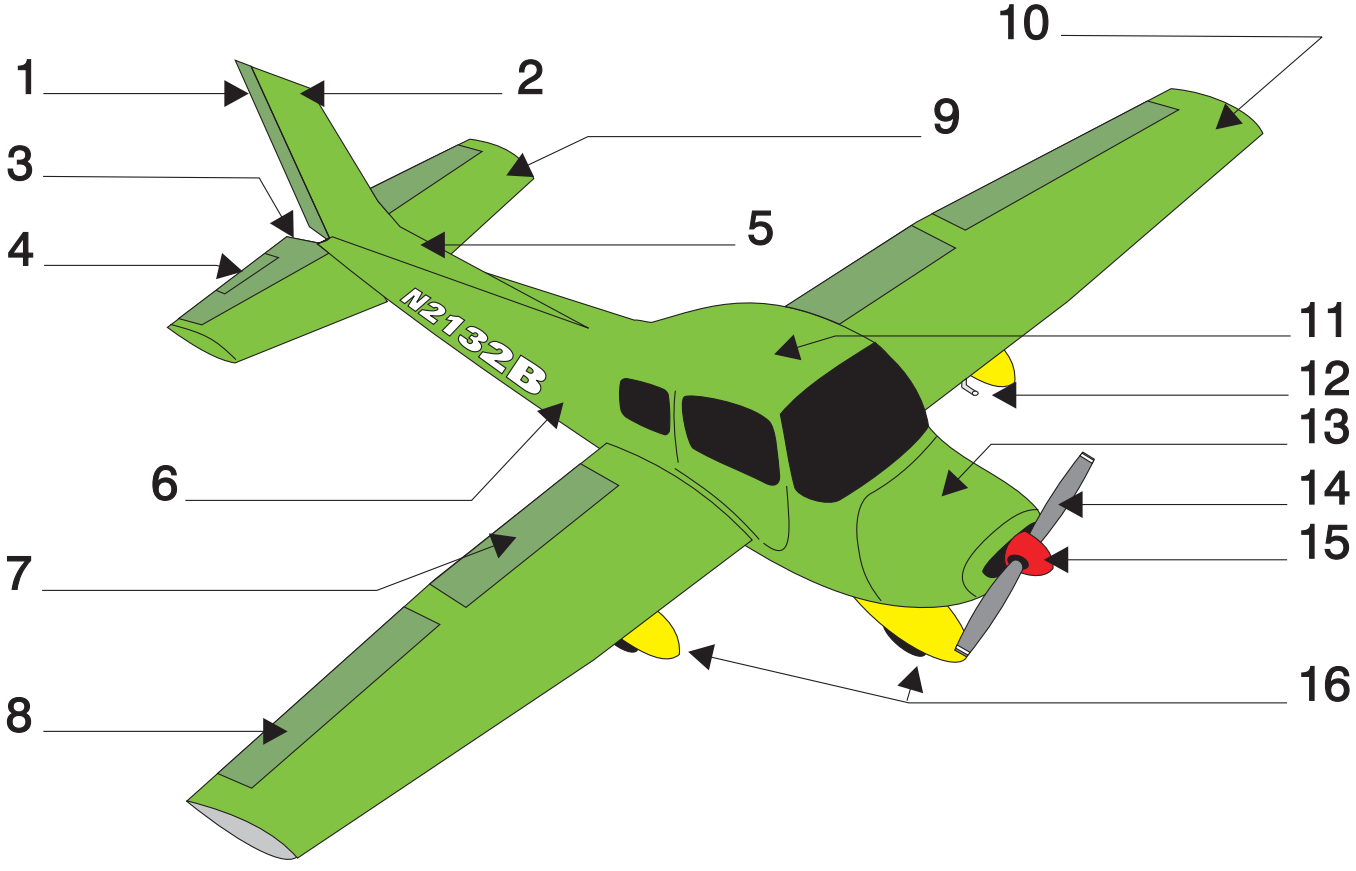
CONTENTS

Chapter One

Airplane Components:

Getting to Know Your Airplane

Label the individual parts of the airplane:



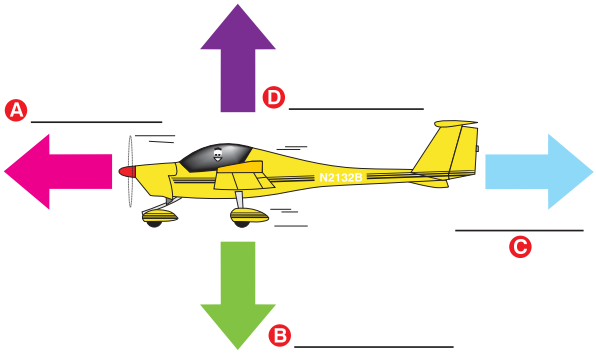
Chapter Two

Aerodynamics: The Wing Is the Thing

May the Four Forces Be With You

1. [B1/3/2]
The four forces acting on an airplane in flight are
A. lift, weight, thrust, and drag.
B. lift, weight, gravity, and thrust.
C. lift, gravity, power, and friction.

2. [B1/Figure 1] Fill in the four forces:



3. [B2/2/2]
When are the four forces that act on an airplane in equilibrium?
A. During unaccelerated flight.
B. When the aircraft is accelerating.
C. When the aircraft is in a stall.

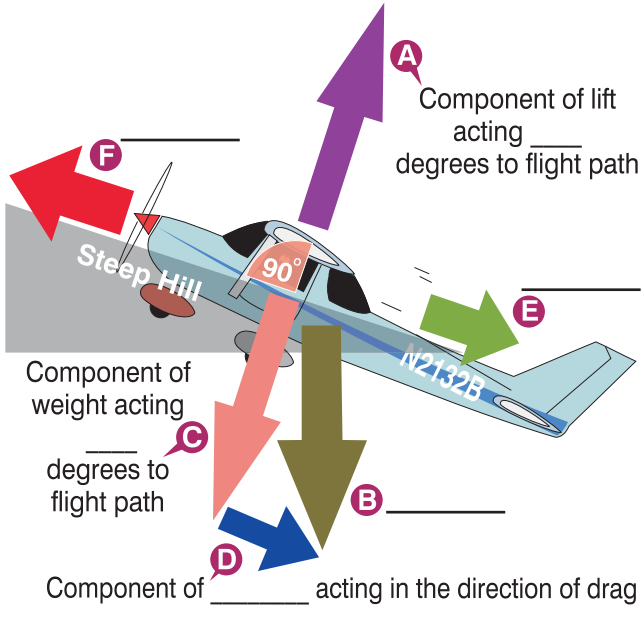
4. [B2/2/2 & B2/3/2]
What is the relationship of lift, drag, thrust, and weight when the airplane is in straight-and-level flight?
A. Lift equals weight and thrust equals drag.
B. Lift, drag, and weight equal thrust.
C. Lift and weight equal thrust and drag.

Climbs

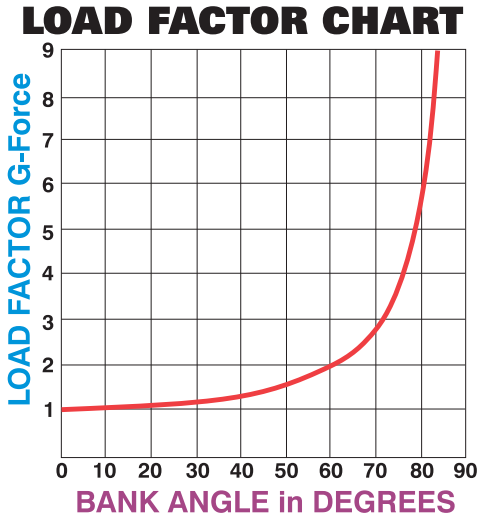
5. [B3/2/1]
Airplanes climb because of _____
A. excess lift.
B. excess thrust.
C. reduced weight.

6. [B4/Figure 5]
Lift acts at a _____degree angle to the relative wind.
A. 180
B. 360
C. 90

7. [B4/Figure 5] Fill in the blanks for the forces in a climb:



49. [B18/2/3]
Which basic flight maneuver increases the load factor on an airplane as compared to straight-and-level flight?
A. A climb.
B. A turn.
C. A stall.



50. [B18/3/2]
Referring to the load factor chart above, if an airplane weighs 2,300 pounds, what approximate weight would the airplane structure be required to support during a 60 degree banked turn while maintaining altitude?
A. 2,300 pounds.
B. 3,400 pounds.
C. 4,600 pounds.

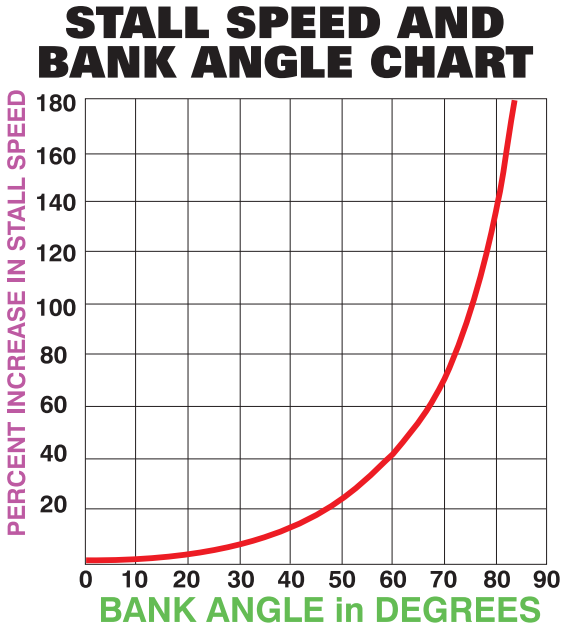
51. [B18/3/2]
Referring to the load factor chart above, if an airplane weighs 3,300 pounds, what approximate weight would the airplane structure be required to support during a 30 degree banked turn while maintaining altitude?
A. 1,200 pounds.
B. 3,100 pounds.
C. 3,960 pounds.

52. [B18/3/2]
Referring to the load factor chart above, if an airplane weighs 4,500 pounds, what approximate weight would the airplane structure be required to support during a 45 degree banked turn while maintaining altitude?
A. 4,500 pounds.
B. 6,750 pounds.
C. 7,200 pounds.

53. [B18/3/3]
If the airplane “feels” twice as heavy as it actually is, then the lift must _____ if the airplane is to maintain altitude.
A. remain the same
B. decrease
C. double

54. [B19/1/2,3]
An increased load factor will cause the airplane to
A. stall at a higher airspeed.
B. have a tendency to spin.
C. be more difficult to control.

55. [B19/2/3 & Figure 32]
Based on the stall speed and bank angle chart below, at a 60 degree bank in level flight, the stall speed increases by
A. 67%
B. 40%
C. 2%



56. [B20/1/2]
When the bank increases, the nose wants to _____
A. raise up automatically, which puts the airplane near a stall if the pilot doesn't do something.
B. pitch forward, which automatically sends the airplane into a diving, unrecoverable spiral.
C. pitch down, which results in the pilot pulling on the elevator to maintain altitude, causing an increased angle of attack.

57. [B20/1/3]
Why it important for a pilot to be especially sensitive to the amount of G-force he or she is experiencing while maneuvering the airplane?
A. G-force always causes the airplane to move in a different trajectory than planned by the pilot.
B. Increasing G-force always means an increase in stall speed.
C. G-force can cause embarrassment by pulling a student's dentures out of their mouth.

58. [B20/1/3]
What are the most important parts of your anatomy for avoiding stalls?
A. Your brain, for planning to avoid steep turns near the ground and your derrière for sensing G-force which helps alert you to an increase in stall speed.
B. Your derrière for thinking and your brain for feeling G-force.
C. Your hands, since they are the things that pulled back on the elevator and got you in trouble in the first place.

DRAG

What a Drag

59. [B20/2/3]
Drag is the airplane's natural response to an object's movement through the
A. slipstream.
B. wing's downwash.
C. air.

Horizontal and Vertical Movement of Air

60. [B20/3/3]
Wings are designed to deflect air _____ while offering very little _____ resistance.
A. horizontally, vertical
B. vertically, horizontal
C. sideways, diagonal

61. [B20/3/4]
The two basic forms of drag are:
A. parasite and induced drag.
B. planform and interference drag.
C. good and bad drag.

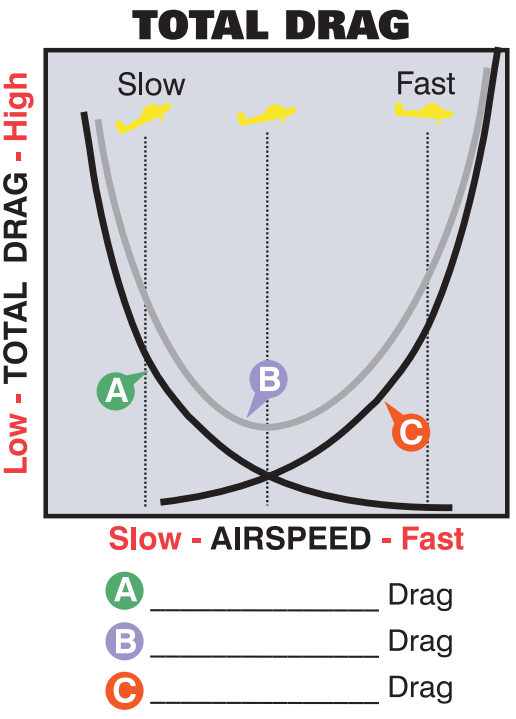
62. [B21/1/2]
Parasite drag is the result of
A. friction.
B. the development of lift.
C. small bugs living on the wing.

63. [B21/1/2]
As airspeed doubles, parasite drag _____.
A. doubles
B. triples
C. quadruples

64. [B21/1/3]
Induced drag is resistance to motion induced by the wing turning some of its _____ into _____.
A. drag, lift
B. thrust, upwash
C. lift, drag

Total Drag and Your Go Far Speed

65. [B21/Figure 36] Label the three drag curves below:



66. [B21/2/3]
As the airplane speeds up, induced drag _____ while parasite drag _____.
A. increases, decreases
B. decreases, increases
C. remains the same, increases

67. [B21/2/4]
When the induced and parasite drag curves are added together, they produce the _____ curve.
A. interference drag
B. straight line
C. total drag

68. [B21/2/4]
The lowest spot in the total drag curve is your magic number, a specific airspeed known as the
A. best power speed.
B. best L/D speed.
C. best cruise speed.

69. [B21/2/4 & B21/3/1,2]
The sum of the parasite and induced drag curves reveals a point on the total drag curve (curve B above) where drag is at a minimum. The speed associated with this point is
A. the airplane's maximum power-off glide range.
B. the minimum speed to use for turbulence penetration.
C. the speed that results in maximum fuel consumption in forward flight.

Pitch Changes In and Out of Ground Effect

84. [B25/See Different Designs sidebar]
What causes an airplane (except a T-tail) to pitch nose down when power is reduced and controls are not adjusted?
A. The CG shifts forward when thrust and drag are reduced.
B. The downwash on the elevators from the propeller slipstream is reduced and elevator effectiveness is reduced.
C. When thrust is reduced to less than weight, lift is also reduced and the wings can no longer support the weight.

85. [B25/2/1]
As the airplane becomes airborne and flies out of ground effect, the wing's downwash _____.
A. decreases
B. remains the same
C. increases

86. [B25/2/1]
It's possible, when attempting to climb out of ground effect, to become airborne without sufficient climb speed, then attempt to climb and have the nose _____ slightly.
A. pitch down
B. pitch up
C. pitch sideways

87. [B25/2/2]
During landing, as the airplane enters ground effect and the downwash diminishes, the nose tends to pitch _____.
A. upward
B. sideways
C. downward

88. [B25/2/2]
Low wing airplanes experience _____ ground effect than their high wing cousins.
A. much less
B. less
C. more

Flap Over Flaps

89. [B25/2/3]
Extending or retracting flaps changes the wing's _____ and _____ characteristics.
A. masculine, feminine
B. lift, drag
C. weight, thrust

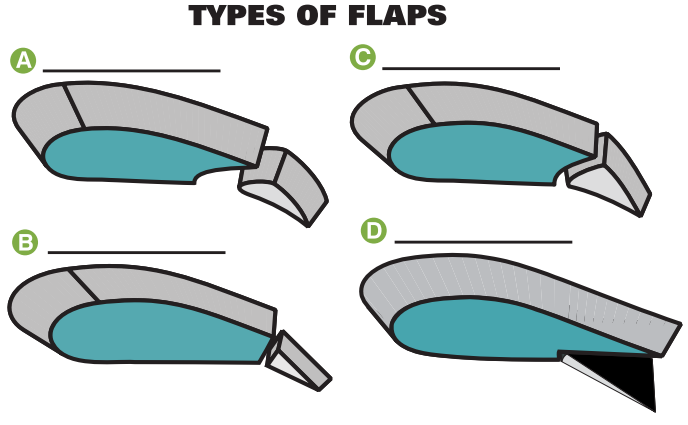
90. [B25/2/4]
Lowering flaps lowers the trailing edge of the wing, _____ the angle the chord line makes with the relative wind. This increases the wing's lift.
A. eliminating
B. increasing
C. decreasing

91. [B25/2/4]
When the flaps are lowered, the lowered trailing edge _____ the curvature on part of the wing, resulting in increased air velocity over the wing's upper surface.
A. eliminates
B. decreases
C. increases

92. [B26/1/1]
Because of the larger angle of attack and greater curvature, flaps provide you with _____ lift for a given airspeed.
A. more
B. less
C. similar

Flap Varieties

93. [B26/1/3 & 4] Name the four basic varieties of flaps:

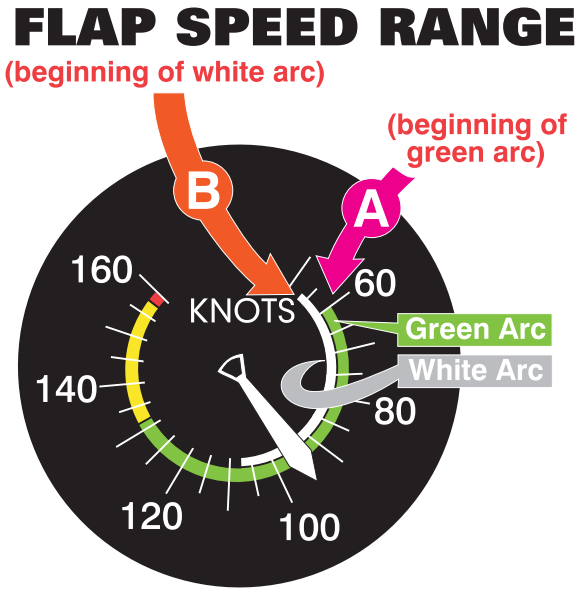


Why Use Flaps?

94. [B26/1/5]
What's the reason for putting flaps on airplanes?
A. To create the lift necessary to maintain flight at slower airspeeds.
B. To allow the airplane to fly at cruise speeds with less power.
C. To prevent excessive overspeed conditions in turbulence.

95. [B26/2/2]
If the wind is gusty, you might use _____ flap extension than in non-gusty conditions.
A. the same
B. more
C. less

96. [B26/2/3 & Figure 45]
The beginning of the white arc (B) as shown on the airspeed indicator at the top of the next page is known as the
A. power-off, full-flap stalling speed.
B. power-on, full-flap stalling speed.
C. power-off, no-flap stalling speed.



97. [B26/2/3 & Figure 45]
In the airspeed indicator shown above, the airplane will fly when _____ knots of wind blow over the wings (full flaps extended) if the wings are below their critical angle of attack.
A. 46
B. 60
C. 53

98. [B26/2/4 & Figure 45]
In the airspeed indicator shown above, the high speed end of the white arc is the maximum speed you may fly with flaps
A. fully extended.
B. fully retracted.
C. partially extended.

99. [B27/1/2 & 3]
What is one purpose of wing flaps?
A. To enable the pilot to make steeper approaches to a landing without increasing the airspeed.
B. To relieve the pilot of maintaining continuous pressure on the controls.
C. To decrease wing area to vary the lift.

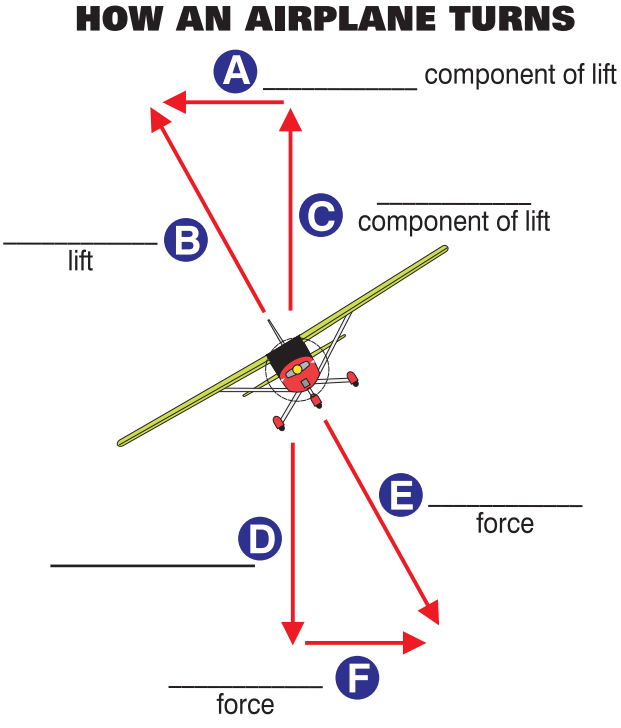
100. [B27/1/3]
One of the main functions of flaps during approach and landing is to
A. decrease the angle of descent without increasing the airspeed.
B. permit a touchdown at a higher indicated airspeed.
C. increase the angle of descent without increasing the airspeed.

101. [B27/3/1]
During a go-around, retract the flaps
A. immediately to their fully-retracted position.
B. in increments.
C. at your convenience when the airplane is stable.

How Airplanes Turn

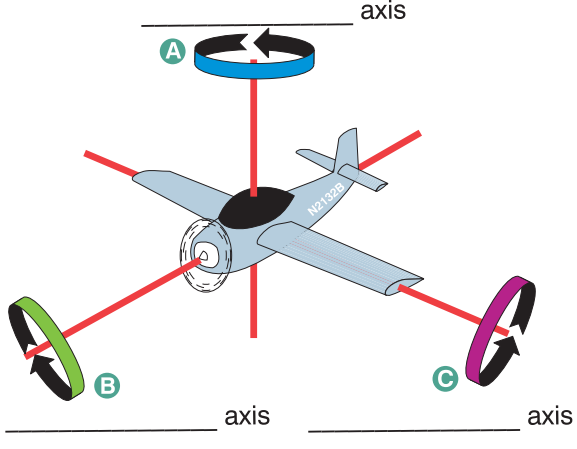
102. [B28/1/6]
What force makes an airplane turn?
A. The horizontal component of lift.
B. The vertical component of lift.
C. Centrifugal force.

103. [B28/Figure 46B] Write in the names of the force vectors an airplane experiences in a turn:



104. [B28/1/7]
Tilting the total lift force while in a turn means _____ lift is available to act vertically against the airplane's weight.
A. more
B. less
C. horizontal

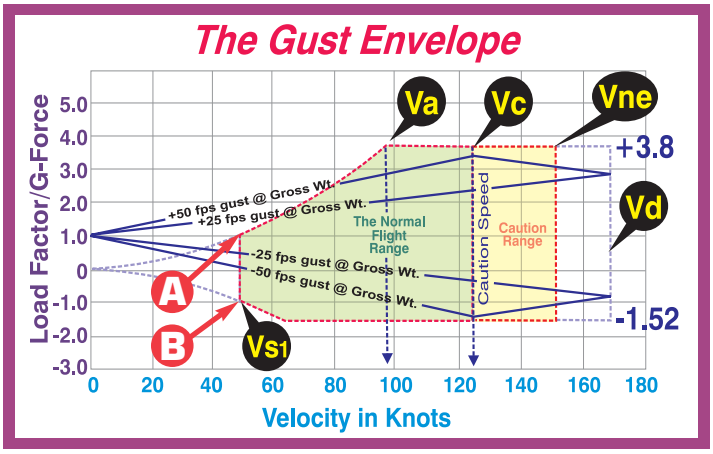
105. [B28/Figure 47] Label the axes below:



Postflight Briefing 2-7: The V-g Diagram

149. [B52/1/5]
The amount of excessive load that can be imposed on the wing of an airplane depends upon the
A. Position of the CG.
B. speed of the airplane.
C. abruptness at which the load is applied.

150. [B49/2/3]
Referring to the V-G diagram below, a positive load factor of 3 at 80 knots would cause the airplane to
A. stall.
B. break apart.
C. enter its caution range.



151. [B51/1/1]
Referring to the V-G diagram above, what load factor would be experienced if positive 25 FPS gusts were encountered at 120 knots?
A. 3.0
B. 3.3
C. 2.3

152. [B48/2/3]
Referring to the V-G diagram above, the airspeed indicated by point A and B is
A. maneuvering speed.
B. stall speed.
C. velocity of normal operation.