V - SPEEDS DEFINED

This information is based on data provided by Kenny Stone (DC3-603), George Leach (DC3-754), a search of the Internet and FS2000 manuals.

Numbers are usually stated, as in "Vee One" for V1. Lower case letters, many times shown as a subscript font, are referred to as "sub" as in "Vee sub a" for Va.

**V1  Takeoff Decision Speed** - maximum speed during takeoff that will allow the pilot to stop on the remaining runway in case of a rejected (aborted) takeoff.

**V2  Takeoff Safety Speed** - Speed at 35 feet AGL assuming engine failure at V1.

**Va  Maneuvering Speed** - Sometimes referred to as the "speed for maximum control deflection" or the "rough air airspeed." When flying above this speed it is unwise to make full, abrupt application of the primary flight controls and gust-induced loads can exceed the structural design limit.

**Vb  Turbulence Penetration Speed** - design speed for maximum gust intensity. Developed by the designer as a recommended turbulence penetration speed for an aircraft in severe turbulence

**Vbg  Best Power-off Glide Speed** - the CAS that provides minimum drag thus a best glide ratio, providing the greatest flight distance available from the potential energy of height.
**Vbe**  **Best Endurance Speed** - the CAS that gives the greatest airborne time for fuel aboard, i.e., the least fuel consumption per hour.

**Vbr**  **Best Range Speed** - the speed that provides a lift/drag ratio that provides minimum drag and minimum power required and consequently greatest air distance for fuel on board.

**Vc**  **Cruise Speed** - the design cruising speed or the optimum cruise speed.

**Vd**  **Design Dive Speed** - Is usually 1.4 times Vno.

**Vg**  **Best Glide Speed** - The speed that will afford the best range for a given altitude without engine power.

**Vh**  **Maximum Level Flight Indicated Speed (CAS)** - the maximum using continuous engine power.

**Vfe**  **Maximum Flap Extended Speed** - The maximum speed for flight with flaps extended. Indicated by the top end of the White Arc on the Airspeed Indicator. Higher speeds, with flaps down, may result in damage to the flaps or to the extension mechanism.

**Vle**  **Maximum Landing Gear Extended Speed** - For planes with retractable landing gear, the maximum speed at which the gear can remain extended without damage to gear doors.

**Vlo**  **Maximum Landing Gear Operating Speed** - For planes with retractable landing gear, the maximum speed at which the landing gear system can be operated (extend or retract).

**Vmc**  **Minimum Control Speed** - This is a speed the manufacturer determines based on eight factors specified by the FAA. In general, with gear down and flaps in takeoff position, it is the minimum speed where the pilot can maintain control of the aircraft with the critical engine inoperative.

**Vmd**  **Minimum Descent Speed** - The speed that results in the lowest rate of sink in a power-off glide, providing the longest duration of flight from the potential energy of height.

**Vmo**  **Maximum Operating Speed** - The speed that must not be exceeded in any flight regime.
**Vmu** - Minimum Unstick Speed - An indicated speed (CAS) used in take-off conditions where it is advisable to lift off at the lowest possible airspeed to get the tires off the surface, e.g. soft field or wet grass and safely fly in ground effect until **Vtoss** is attained.

**Vne**  **Never Exceed Speed** - The speed, which must not be exceeded in smooth air. The Red Line at the top end of the Airspeed Indicator's Yellow Arc. **Vne** is set at 90% of **Vd** to provide a "flutter" margin.

**Vno** - **Maximum Structural Cruise Speed** - When cruising at, and below, **Vno** the aircraft should not be damaged by a 30 feet/second vertical gust. It is indicated by the top end of the Airspeed Indicator's Green Arc. Smooth air only for speeds in the Yellow Arc.

**Vr**  **Rotation Speed** - The speed at which the pilot raises the nose up for takeoff.

**Vref**  **Final Approach** - A safe speed for final approach and it should be 1.3 times **Vso**

**Vs**   **Stalling Speed** - The minimum steady flight speed obtained in a specific configuration (clean) indicated by the bottom end of the Green Arc on the Airspeed Indicator.

**Vs1**  **Stalling Speed** - Same as **Vs**, except for a specific configuration.

**Vso**  **Stalling Speed Landing** - The minimum steady flight speed in the landing configuration. Bottom of the White Arc on the Airspeed Indicator.

**Vtoss**  **Minimum Takeoff Safety Speed** - An indicated speed (CAS) chosen to ensure that adequate control will still exist during initial climb after lift off under conditions of turbulence - or even engine failure. After lift off the aircraft should not be allowed to climb away until **Vtoss** is attained.

**Vx**  **Best Angle Of Climb Speed** - The speed that will produce the greatest amount of height over the shortest ground distance using maximum thrust available.

**Vxse**  **Best Angle Of Climb Speed, Single Engine** - The same as **Vx** based on a single engine.

**Vy**  **Best Rate Of Climb Speed** - The speed that will produce the most height in the shortest time using maximum power.
**Vyse Best Rate Of Climb Speed, Single Engine** - The same as Vy based on a single engine.

**Author's Note:** This document contains only the definitions for the various V - Speeds. For the actual speeds relating to the DC-3, R4D and other relative aircraft, see the companion document: DC-3-4.doc (that's not another model of the DC-3, it's the 4th Edition of this particular file).