

2-1 AIRSPEED LIMITATIONS

V_{fe} = 75 kts./86 m.p.h. (maximum flap extended speed)

Do not extend flaps or operate with flaps extended above this speed. If V_{fe} is inadvertently exceeded with the flaps extended, slow the aircraft to an airspeed below V_{fe} before retracting the flaps.

V_a = 98 kts./113 m.p.h. (maneuvering speed)

Do not make full or abrupt control movements above this speed.

V_{no} = 144 kts./166 m.p.h. (maximum structural cruising speed)

Do not exceed this speed except in smooth air and then only with caution.

V_{ne} = 162 kts./186 m.p.h. (never exceed speed)

Do not exceed this speed in any operation

NOTE

Definitions of these airspeeds are given in FAR Part 1, Paragraph 1.2. All airspeeds are calibrated airspeeds (CAS). During flight test, the airspeed indicator should be calibrated so as to distinguish indicated airspeeds (IAS) from CAS.

NOTE

Airspeed limitations for GlaStars operated on floats are different. These are published in GlaStar Service Letter 4.

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2-2 AIRSPEED INDICATOR MARKINGS

*WHITE ARC 43–75 kts./49–86 m.p.h.
(full flap operating range)

*GREEN ARC 49–144 kts./56–166 m.p.h.
(normal operating range)

YELLOW ARC 144–162 kts./166–186 m.p.h.
(operate with caution; only in smooth air)

RED LINE 162 kts./186 m.p.h.
(maximum speed for all operations)

* Indicated gross weight stall speed with flaps for the white arc and indicated clean stall speed for the green arc are derived from tests of the Stoddard-Hamilton GlaStar prototype, N824G. Slight variations may be experienced in customer-built aircraft. Actual stall speeds should be determined from flight test of each individual aircraft, and the airspeed indicator markings should be adjusted appropriately.

2-3 CONTROL SURFACE TRAVEL LIMITS

Elevator Travel..... 23° up and 20° down ($\pm 1^\circ$)

Rudder Travel..... 25° left and right ($\pm 1^\circ$)

Aileron Travel 22.5° up and 17.5° down ($\pm 1^\circ$)

4-6.4 HIGH DENSITY ALTITUDE TAKEOFF

At high density altitude (above 4,000 ft. MSL), lean the engine during run-up for best takeoff power. Follow the leaning procedures described in the operator's manual for your powerplant.

NOTE

Since every airplane is different, accurate high density altitude takeoff distances are difficult to predict. Many factors affect takeoff performance such as gross weight, temperature, relative humidity, type of propeller, altitude, engine horsepower, pilot ability, etc. We recommend that each builder determine high density altitude takeoff performance data for his own airplane.

4-7 CLIMB

After lift-off, let the airspeed rise to at least 65 kts. (75 m.p.h.) for best angle of climb when clearing obstacles. Once clear of obstacles, or if no obstacles are present, lower the nose and let the aircraft accelerate to at least the best-rate-of-climb airspeed of 78 kts. (90 m.p.h.).

Two important considerations may dictate a climb speed faster than the best-rate speed: engine cooling and visibility. Pay close attention to engine temperatures during climb; temperatures can exceed the normal ranges if the airspeed is too low on hot days. Therefore, a higher-than-normal climb speed might be required on hot days.

Additionally, at its best-rate-of-climb airspeed, the attitude of the

GlaStar remains rather nose-high. Over-the-nose visibility is obviously important at all times, but particularly in busy traffic areas, it may be prudent to climb at a faster speed to facilitate traffic scanning.

When clear of terrain and an adequate climb rate is established, you may reduce power for noise abatement or to avoid excessive fuel burn and high engine temperatures.

4-8 STALLS

4-8.1 GENERAL

The benign stall characteristics of the GlaStar are among the aircraft's most remarkable features. The GlaStar exhibits very little tendency to depart from controlled flight in a stall; positive, three-axis control can be maintained throughout even a fully developed stall. Stall recovery technique in the GlaStar is typical of most conventional aircraft—reduce the angle of attack and add power.

With the exception of aerobatic flight—for which the GlaStar is not approved in any case—stalls have no place in “normal operating procedures.” Properly flown, there is no reason that a GlaStar should ever enter an inadvertent stall. However, stall and combination stall-spin accidents continue to be among the leading causes of general aviation accidents, and thus it is vital that the GlaStar pilot be proficient at identifying and recovering from both power-off and power-on stalls.

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WARNING

While the GlaStar has been rightly praised for its outstanding slow-speed handling characteristics and benign stall behavior, it's important to remember that, just like any other airplane, the GlaStar *can* be stalled at any airspeed and in any attitude, and that any stall results in a loss of lift that *can* be critical, depending on the conditions under which it occurs. The GlaStar's outstanding controllability and stall recovery characteristics should be thought of as a resource to draw on in the event of an emergency, not a feature to be exploited in normal flight operations or a license for recklessness.

Familiarity with the GlaStar's stall characteristics can only be attained through practicing stalls. The following sections of this manual outline proper practice stall entry techniques, stall characteristics, and recovery techniques. Practice these stalls until you are thoroughly comfortable with them, and plan on recurrent practice throughout your GlaStar ownership. All stalls should be practiced at an altitude of at least 3,000 ft. AGL, and each stall should be preceded by a thorough clearing of the surrounding airspace. Also, be sure that any baggage is well secured before practicing stalls.

WARNING

Intentional spins are prohibited in the GlaStar. Be familiar with standard spin recovery procedures in the event of an inadvertent spin entry while practicing stalls.

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4-8.2 POWER-OFF STALLS

The power-off stall simulates a stall during the approach to landing. Entry to this type of stall is best and most realistically accomplished by applying gently increasing amounts of back pressure on the stick in order to maintain altitude as the airspeed bleeds off. Power-off stalls should be practiced at each flap setting to get the feel of slight differences in the character of the stall with different flap settings.

Given a gentle stall entry as described above, the GlaStar exhibits virtually no defined stall break. As the wing stalls, the nose will fall very slightly and the aircraft will begin a "mushing" descent. The lowering of the nose will be slightly more pronounced in a clean stall than in a stall with flaps.

If the stick is held fully aft, the descent will stabilize at a rate of 700–800 ft./min. The aircraft will oscillate slightly in pitch, and the airspeed will settle at around 60 kts. (69 m.p.h.). In this configuration, the aircraft remains very controllable in all three axes. This controllability is naturally a very positive trait, but it makes it crucial that the pilot recognizes the aircraft's stalled condition. GlaStar pilots must learn to distinguish a conventional power-off glide from the mushing descent characteristic of a stabilized power-off stall.

Recovery from a power-off stall is easily accomplished by relaxing back pressure on the stick and applying power. Although full power should be used for any stall recovery, even partial power is sufficient to arrest the descent with virtually no altitude loss provided that the stick is neutralized. There is no need in the GlaStar as in some aircraft to push the stick forward to aggressively lower the nose; this procedure will

only delay the achievement of a positive rate of climb.

The GlaStar climbs extremely well at any flap setting. Therefore, it is **not** recommended to change the flap setting in a stall until a positive rate of climb has been established. Once the aircraft is climbing, ease the flaps off prior to exceeding V_{fe} (75 kts./86 m.p.h.), just as you would on a normal takeoff.

4-8.3 POWER-ON STALLS

Power-on stalls simulate stalls that might occur during the departure phase of flight. In the GlaStar as in other aircraft, power-on stalls tend to be more aggressive than power-off stalls. The stall has a more defined break, and the torque effects of the engine and propeller induce rolling and yawing forces during the power-on stall that make a wing drop more likely to occur. These yawing forces make the development of the stall into a spin more likely in the power-on case than the power-off one. However, power-on stalls in the GlaStar are still extremely predictable and controllable.

Practice power-on stalls initially at moderate power settings and proceed to higher power settings gradually, only as you become completely comfortable with the GlaStar's characteristics and your recovery technique. At full power, the GlaStar will attain a truly exhilarating nose-high attitude before stalling—higher than would ever be prudent in normal operations. For this reason, full-power stall practice is not recommended.

Enter a power-on stall by establishing and holding a climb angle until the airspeed bleeds off to the stall speed. With any but the lowest

power settings, this angle will need to be considerably nose high. The break of a power-on stall is preceded by a significant amount of airframe buffeting, which provides a clear 3–5 kt. warning period before the actual onset of the stall. Before attempting a full power-on stall, fly the aircraft into this buffet and become familiar with its feel.

Holding the nose-high attitude through the buffet will eventually cause the stall to break. The nose will drop decisively, although neither particularly abruptly nor very far. One wing or the other (typically the left wing) is likely to drop, but as with the nose drop, this occurs fairly slowly.

To recover from a power-on stall, release the back pressure on the stick to reduce the angle of attack and apply full power. If a wing has dropped, simultaneously apply “top” rudder—that is, rudder opposite the dropped wing. In any but the most extreme nose-high stalls, it is unnecessary to push the nose down actively to regain flying speed; mere relaxation of back pressure will suffice to arrest the stall with virtually no altitude loss.

WARNING

As in power-off stalls, the GlaStar retains control authority in all three axes throughout a power-on stall. This makes it tempting to use aileron rather than rudder to pick up a low wing during a power-on stall. Although this will be effective in most cases, this technique is strongly discouraged, as it will be ineffective or worse in many other aircraft. Use of rudder only to arrest wing drop during a stall is a good, standard practice to cultivate regardless of the aircraft being flown.

4-8.4 ACCELERATED STALLS

An accelerated stall is a stall caused by the application of the flight controls in such a way as to rapidly increase the angle of attack beyond the critical angle for the airfoil. Because of this rapid change in angle of attack, accelerated stalls typically occur at airspeeds considerably higher than the published stall speeds for the aircraft.

Two situations account for the majority of inadvertent accelerated stall entries. First, any aircraft will stall at a progressively higher airspeed as the angle of bank in a turn is increased. As bank angles exceed 30° , the stall speed rises exponentially. Accelerated stalls of this type are very difficult to produce in the GlaStar without imposing excessive G loading on the airframe. In the unlikely event of such a stall, however, the recovery technique is the same as for any other stall: reduce the angle of attack. In most cases, a slight relaxation of back pressure and a reduction in the angle of bank will be all that is required.

The second common way that pilots get into accelerated stalls is by pulling the stick back too abruptly while recovering from an ordinary power-on or power-off stall. This is typically done to avoid altitude loss, but of course the so-called "secondary stall" caused by the over-enthusiastic pull-up only eats up more altitude. Because secondary stalls can occur at an airspeed considerably above V_s and because they tend to be more aggressive than unaccelerated stalls, pilots must be very disciplined in not pulling too hard too soon in effecting stall recoveries. In the event of a secondary stall in the GlaStar, recover just as you would from a power-on stall: relax back pressure and pick up the dropped wing with top rudder.