

## Applies To:

All models equipped with reflex support bridles

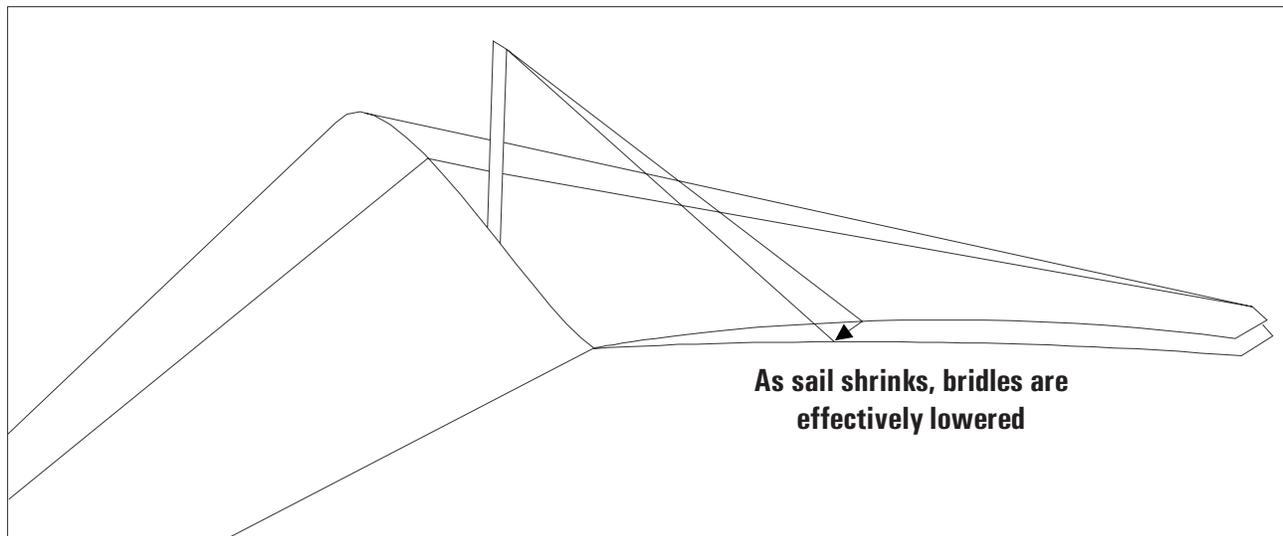
## Background

For those gliders equipped with reflex support bridles, these bridles are a critical component in the glider's stability system. Proper and precise adjustment of the bridles is critical to ensuring that the glider maintains the levels of pitch stability which were present in the original design and which are required for an adequate level of air worthiness. The bridles do most of their job outside of the normal operating range of angles of attack, however, and therefore there may be no change to the glider's flight characteristics if the bridles are not properly adjusted which would indicate to the pilot that lack of proper adjustment.

Furthermore, there are things which happen naturally in the aging process of the glider which will cause the bridles to go out of adjustment. One of the most important of these is the span wise shrinkage of the sail along the trailing edge, which moves the bridle attachment points inboard with the result that the trailing edge of the sail at the attachment points is lowered, reducing the level of nose up moment induced by this support.

It is therefore necessary that an active program of bridle adjustment maintenance be carried on throughout the life of the glider in order to preserve the proper level of pitch stability for the glider. Failure to do so may render the glider less stable in pitch, and may therefore increase the probability of a pilot induced or turbulence induced loss of control or tumble, or other dangerous incident.

Because of this trailing edge shrinkage, proper adjustment of the bridles cannot be verified on an older gliders by measuring the distance from the top of the kingpost to the bridle attachment point of the trailing edge. This measurement will not change as the sail shrinks, even though the trailing edge will become supported at a lower height as the attachment point moves inboard.



## Inspection / Service Requirement

Proper adjustment of the bridles can best be verified by sighting the birdles for slackness in flight. Specific instructions for doing so are included in the glider flight manual. In general, the following applies:

Bridles should not be adjusted looser than "Just Slack" as described below. On gliders equipped with VG, the bridles will be tighter when the VG is tight, and looser when the VG is loose. The just slack criteria would therefore apply to the VG tight adjustment. On some gliders, one or more bridles may be snug when the glider is between VG  $\frac{3}{4}$  and VG tight.

In order to sight the bridles, use the following procedure:

For each VG setting (if the glider is so equipped), check the bridles by flying multiple, shallow banked turns at minimum sink speed, sighting the shadow of the bridles on the sail as the glider turns to the proper orientation to the sun.

To sight a bridle line, shake the control bar sharply in pitch with an amplitude of four to six inches. Watch the response of the bridle line, and judge the adjustment as follows:

Tight	No movement in the line, the line is straight and appears under tension.
Snug	Minimal movement, no apparent curve in the line but no apparent tension.
Just Slack	The center of the bow in the line moves one to two inches either side of its rest position. Some apparent curve in the line may be seen without shaking the bar.
Slack	The center of the bow in the line moves two to four inches either side of its rest position. Definite slack in the line can be seen without shaking the bar.
Quite Slack	The center of the bow in the line moves four or more inches either side of its rest position. Slack in the line can be easily seen without shaking the bar.

Improper adjustment of the bridles will affect the glider's pitch stability and flight characteristics in the following ways:

### **Bridles Too Loose**

If the bridles are adjusted too loose, it will not affect the glider in normal flight at VG settings between full loose and VG 1/2, as the bridles are always slack in this range anyway. At VG settings between VG 1/2 and VG full tight, there will be a slight reduction in pitch bar pressure, and a slight increase in maximum sustainable steady state pilot full forward flying speed. At angles of attack below normal flight, there will be a reduction in pitch stability proportional to the amount by which the bridles are looser than they are supposed to be. This stability reduction could increase the probability of a turbulence induced tumble or other in-flight stability related loss of control.

### **Bridles Too Tight**

If the bridles are adjusted too tight, it will compromise the flight characteristics of the glider. The effects of too tight bridles are as follows:

- a) A large pitch trim change from VG loose to VG tight. Normally, the trim speed slows down only by two or three mph between VG loose and VG tight. If the bridles are too tight, to the point where the midspan bridle is going tight as the VG is pulled on, the glider's trim will slow down by several mph and there will be substantial pitch force required to hold the glider out of a stall.
- b) Significant increase in roll control pressures and reduction of roll control rate at VG settings tighter than when the bridles first begin to come tight.

### **Other factors of glider geometry which affect bridle adjustment and effectiveness**

The effective adjustment of the bridles is also affected by other aspects of the glider geometry. For example, if the bottom side wires are too long, it will allow the wings to rise and slacken the bridles in normal flight. If they are too short, it will pull the wings down, and tighten the bridles in normal flight.

If the top side wires are too short, it will reduce the amount the wings can "fold" downwards as the glider unloads at low angles of attack, thereby reducing the effectiveness of the bridles.

Changes from proper length to the top or bottom side wires will also change the relative adjustment of the inner, middle, and outer bridles to each other, and change the way they operate.