Glider Towing Hooks And Releases

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I. INTRODUCTION

Gliders have to be towed or catapulted off the ground. For this a hook and a release are needed on the glider.

The hook is usually situated at the nose of the glider or slightly aft of the nose on the underside of the fuselage.

II. HOOK TYPES

1. Simple Open Hook

As long as the elastic catapult start was used exclusively the only kind of hook necessary was of the simplest type, an open claw as shown on Figure 1, from which the cable or bungee releases automatically when it becomes slack. This is still the best kind of hook for the catapult or elastic launch. The hook illustrated is that used on the Dagling primary glider and is simply a 1/8 inch mild steel plate bolted to the nose of the glider.

When car and aerotowing and winching were introduced the simple hook was not sufficient. It became desirable for the pilot to be able to release when he wished to do so, whether the rope or cable was slack or not. In addition, the steep angles of ascent used in these methods made the open hook impracticable, as the cable would sometimes slip off even when taut. For training where such steep angles are avoided, opinion on the value of open hooks for tow car or winch launching is still divided. Some consider the open hook to be the only safe method whereas others most definitely demand a hook controlled by the glider pilot.

2. Dual Purpose Hooks

As a result, various release methods were devised, the Dutch "All-Round Haak" of about 1934 being typical. This hook is shown in Figure 2 and was a dual purpose hook, having two latches. It could be used as an open hook with a release and as a closed hook with a release. The main disadvantage of this kind of hook is the release mechanism. When the hook is heavily loaded there is considerable friction at the latch and the hook requires considerable force to release. It may even become impossible to release if the load is very high. It is in exactly such circumstances that a sure and easy release is necessary.

In the same category as the All-Round Haak is the hook shown in Figure 3 which has been used for winch launching. The spring holds lever and hook close together, keeping the mating surfaces at B in contact. To release, the lever is pulled until the mating surfaces clear each other when the hook is free to open. When used as an open hook, point A is rotated to point C and a bolt passed through. The release lever is then ineffective. The chief faults of this hook release are

—The mating surfaces wear easily;

—Friction on mating surfaces can cause difficulty in releasing.

—The spring tends to get stretched during the release.

Figure 4 shows an extremely simple alternate hook used by Slingsby. As illustrated, the open hook is clearly shown and there is no release operation necessary. However, if the release lever is pulled the hook will rotate and release quite easily. The closed version is not really closed. If a cable end is set in the upper hook, it cannot drop out, but will pull out easily when the lever is operated. This "closed" hook assumes that the glider is higher than the tug when aero-towed which is the usual position. The disadvantage is the same as those illustrated in Figure 2 and Figure 3, a latch mechanism liable to wear and friction-jamming.

3. Internal Hooks

At an early stage in the development of release hooks it was pointed out that the mechanism should be internal because accidents due to fouling had occurred on external hooks and releases. The hooks shown in Figure 3 and Figure 4 are examples of easily fouled layouts.

This led to the development of the German DLV hook (Deutsche Luftsport Verband, not to be confused with DVL, Deutsche Versuchsanstalt fuer Luftfahrt) which in its early form is shown at Figure 5. It depended on the use of a tow cable with two rings at the end, as shown in Figure 15. One ring was attached to the hook, while the other and larger ring bore on the sides of another ring which formed part of the hook. This hook could be released with the same ease regardless of the direction of the pull and in this respect was a considerable advance. In addition the entire hook was internally accommodated.

The disadvantage of the mechanism as shown in Figure 5 was the same as that discussed above: the release load increased as the hook load increased. This was cured by revising the mechanism as shown in Figure 6 by the use of a toggle instead of a latch. This has the advantage that

(a) There is hardly any variation of release load with hook load.
(b) There are no latches to wear.
(c) There is a good long release travel.

The disadvantage is that there are more parts and more bearings, there being a total of 4 bearings as against one in the early design.

Due to the dead-center arrangement the hook could be so shaped that the ring would pull it open as soon as the toggle was released. On the earlier version the hook could not be so shaped. The hook shapes on Figure 5 and 6 may be compared with this point in mind.

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