Glider Towing Hooks And Releases

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4. Over-running or Automatic Aft Releases

Within recent years some accidents have occurred due to the pilot forgetting to release his end of the cable. The cable has then dragged behind and caught on some obstruction and pulled the glider to the ground. Accidents, in Britain, U. S. A. and Germany, have led to the desire for a hook which may be as easily released as the DLV hook under a forward and downward pull but which will automatically release under a straight aft or aft and side pull combined.

A typical hook of this variety is the Pelican type as exemplified by those due to Schweizer, Dawydoff, Schultz (ABC), Laister-Kauffmann and a Canadian version developed by the De Havilland Gliding Club shown on Figures 11 and 12.

The development of the Pelican and other backward release hooks is in its very early stages. The urge to obtain automatic aft release has apparently blinded the designers to the pitfalls discovered in the earlier hooks and releases, some of which were described above. For instance, the mechanisms are mostly external, bolt heads, nuts, even the release cable are danger points for fouling. In addition:

(a) The release load increases with hook load—the old latch trouble.
(b) Side loads on hook make release difficult.
(c) There is no positive releasing movement given to the hook. The cable pulls it open after release.
(d) Pressure required to release backwards varies widely with hook load and angle of application of load.
(e) After release the hook dangles externally.

Only one of the 4 versions of this hook examined had a roller contact between hook and release link.

These difficulties are considerable, and in the ABC release (Figure 12) careful attention has been given to side loads. There are stellite inserts on the release link and on the hook where they rub together. The section shown of the release link shows that it has a wide top bearing to minimize distortion under side load. Even so the release loads are not low. For the ABC hook the handload is 44 lbs. corresponding to a cable load of 475 lbs. Records of a DLV hook give a handload of 17.6 lbs. to release a cable load of 660 lbs.

A development of the Pelican type of hook by Laister-Kauffmann in an attempt to avoid some of these disadvantages is of interest. This is shown in Figure 12. The hook is free to rotate about a horizontal axis so that even when the tow rope is pulling sideways there is no side bending on the hook. However, the main disadvantage, that of increased releasing load with increase of cable load, still remains.

A hook of greater interest is an English modification of the DLV hook which makes an automatic release possible. As shown in Figure 13, the Ottfur release is the same in geometry as the DLV release except for the use of an additional swinging link. This link consists of the bearing ring and attachment. With the plane of the bearing ring horizontal or nearly so, it is constrained from moving forward, but can move aft under spring pressure. In swinging aft it enables the cable ring to clear the hook and fall off. This design of hook is very attractive except that it has to be mounted with the bearing ring horizontal or nearly so, which puts quite a large offset load on the towing ring and on the bearing ring. The normal DLV hook is mounted with bearing ring almost vertical, so that the load comes almost directly on the hook. The Ottfur hook shown indicates a useful characteristic found on other DLV hooks. It will be noted that there is a shoulder on the hook which on opening tends to force the ring out.

The German effort to achieve automatic aft release is illustrated in Figure 14 and is of the Rube Goldberg type. It consists of adding an external yoke to the standard DLV hook. When the tow rope angle becomes very steep, say 75°-80° it bears on the yoke which moves back under the load and by a suitable linkage trips the hook.

This scheme has the advantage that it does not involve installing the bearing ring horizontally, but it is so dirty externally that it may be considered somewhat dangerous.

All hooks of the ring type (DLV, Ottfur, etc.) have the disadvantage that they are sensitive to ring size. The cable must be ended with two rings, the smaller of which is attached to the hook. On Figure 15 are shown three ring sizes now in use. These are developed for certain definite sizes of hooks. For instance the Swiss rings shown on Figure 15 are linked to definite hook dimensions as laid down on Swiss Aeronautical Standard Sheet SNV-L 26601 shown in Figure 16. In other words you must have the right rings for your hook. This has caused difficulties when various gliders with various hooks have tried to operate from one winch or tow car. There has thus been some reaction away from such hooks in the U. S. A.

5. New Hooks

There is certainly scope for hooks with automatic aft releases which are better than any described and as an incentive to the interested gadgeteer the following suggestions are placed on record.

A hook may be designed which is externally not unlike the Pelican type but which releases by toggle and in which the aft automatic release is quite independent of the hook load. This is illustrated in Figure 17. The toggle releases the hook which when released is retracted into the aircraft. At the same time the aft release retracts due to the changed eccentricity of the spring. When the aft release is operated by backward