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Ground Launching Of Gliders

1. General

This Advisory Circular provides guidance and information concerning winch and autotow launching of gliders and sailplanes. This information does not supercede any previously issued Regulatory requirements and provides Owner and Operators with additional guidance on how be in compliance with those Regulations.

2. Background

Ground launching of gliders requires the coordination of both ground and flight crews to ensure the safety of the launch. Launching of gliders by either the winch or autotow method also requires that properly built and maintained equipment be used.

3. Winch and autotow launching

Vehicle requirements

Any vehicle used for launching gliders, whether winch or towcar, must have adequate protection for the driver and co-driver against the ingress of launching wire, especially that occurring under tension such as a cable-break. Such protection must consist of a combination of sheet metal, wire cage material and armored transparencies (e.g. polycarbonate or toughened glass) appropriate to the design and dimensions of the winch or launching vehicle.

Winch-drivers must ensure that members of the public are not permitted to remain in close proximity to the winch when launching is in progress.

The winch or autotow vehicle, together with its associated wires or ropes, must receive a Daily Inspection before flying commences. This inspection must consist of, as a minimum, checking that there is sufficient fuel, oil and water in the vehicle and that the engine is warmed up and running properly. The vehicle must be fitted with a serviceable fuel contents gauge or simple dipstick.

There must be provision for cable cutting or releasing. The equipment for this purpose must be serviceable, effective and capable of being operated without leaving the safety of the cab.

Launching wires/ropes

The glider end of winch and autotow wires or ropes must be fitted with linked rings of a design approved by the glider manufacturer or ECAA. The rings must be inspected before flying commences and must not be used if damaged or distorted.

If solid wire is to be used, the recommended standard for such wire must be "Range 2 Spring Steel". The two common diameters of this material in use for glider-launching purposes are 2.8mm and 3.15mm.

The launching wire or rope must be inspected at least daily and determined to be in a safe condition.

If a drogue parachute is fitted to the launching wire, the minimum distance between the drogue and the rings shall be 5 meters. The drogue parachute must be of such a design that it has no tendency to fully or partially open during the launch.

If a two-drum winch is used, only one glider may be attached to a cable at any one time. The idle cable must be separated from the live cable by at least one wingspan and it must be securely anchored.

In a multiple-cable operation, the cables must be laid out, and the first glider to be launched must be so positioned that the first cable pulls apart from the second cable under tension. This ensures that there is no risk of cables becoming crossed during the launching process.

Weak links

A weak link is mandatory and the specified breaking strength placarded in the glider cockpit and on the glider's external surface adjacent to each release hook. The weak link

must be placed on the glider side of the drogue, so that the drogue is pulled well clear of the glider in the event of a weak link break.

The "Tost" weak link system is recommended. Knots in wire may only be used instead of a weak link if the knotted wire has been tested and the results are available for inspection. Each new batch of wire must be separately tested.

4. Ground signals for winch and autotow

These signals are defined as follows:

"**Take up slack**" (self-explanatory).

"**All out**" This signal means all the slack is out of the wire and the launch may proceed.

"**Stop**" (self-explanatory).

Hand signals from the pilot to the wingtip holder are not recommended, on the basis that they distract the pilot from keeping control of the glider when things can be happening very quickly and they also detract from the ability to release the cable quickly should the need arise.

The following is the standard procedure to be used:

I. After attaching the cable and ensuring all clear above and behind, pilot signifies ready for take-off by giving a thumb-up signal with the left hand. This is confirmed verbally by the expression "pilot ready for take-off".

II. Crewmember (who must be adequately trained or under supervision) raises wingtip and gives take-up-slack signal if satisfied that it is still clear. This signal should be given verbally as well as visually, to ensure that all persons around the launch point are in no doubt that a launch is taking place. Pilot keeps left hand as close to release as possible.

III. When cable has tightened sufficiently, wingtip holder gives all-out (full power) signal, again verbal as well as visual. The pilot will have no input to this signal.

6. Launching responsibilities and information

- The launch operator must be aware of the maximum permissible launch speed for the glider and should be briefed on the most suitable launch speed for the type of glider and any other requirements the glider pilot may have.
- Pilots should ensure only non-compressive foam cushions (e.g. Energy Absorbing Foam) are used behind them to avoid moving aft under initial launch acceleration.
- The pilot must be ready for launch prior to accepting the cable/rope for hook on.
- The wing runner is responsible for attaching the cable or towrope to the correct tow hook for the type of launch being conducted.
- The pilot is responsible for releasing the cable at any time they consider the safety of the launch is being compromised - e.g. a cable over-run, a wing drop or a veer on the take-off roll.
- The stop signal may be given by anyone who believes that the launch should not take place for any reason. It may be given by the pilot, the wingtip holder or by a bystander who sees something that nobody else has noticed. No person should hesitate to give a stop signal if in any doubt about the safety of the operation. When a stop signal is given, the pilot releases the cable immediately.
- To help the launch operator to clearly see when the cable is released, the glider end of the cable must be made visible by a parachute. The parachute must not be so large that it could engulf the nose of the glider in the event of a cable break.
- A winch and a tow-car must be provided with a suitable cage or screen to protect the operator.
- A “safety zone” is to be established around a winch to ensure people not involved with the operation remain well clear.
- The winch engine must not be run while work is being carried out on a cable.
- Where a multi-drum winch, or more than one winch are in operation and cable runs are closer than 60m apart, only one glider may be attached to a cable at any time. After each launch the used cable must be drawn into the winch before another cable is used.

- All cables are to be treated as “live” during a winch or autotow launch and must not be crossed, touched or stepped on.

7. Communication between launch point and winch/towcar

An adequate method of communication must be established between the launch point and the winch or tow-car, to relay the above signals. The alternative methods of signaling are listed here.

Radio.

If used for launch signals, the radio must be external to the glider. In this way, problems external to the glider and unseen by the pilot can be detected and the launch stopped (e.g. airbrakes unlocked). For this reason, the use of the glider's internal radio for launch signals is prohibited. Terminology to be used is as described above.

For autotowing, a normal loudspeaker in the vehicle is usually adequate to enable the tow-car driver to hear the signals clearly. For winch-launching, the noise level may be too high for this to be relied upon and a headset is recommended. It is especially important to be able to hear a stop signal, which may be given after full power has been applied.

Telephone.

Terminology is the same as for radio and the same principles apply to the use of headsets in a high-noise environment.

Single bat (paddle).

"Take up slack" - Bat moved from side to side in an underarm motion across the body.
"All out" ("Full power") - Bat moved from side to side over the head.
"Stop" - Bat held stationary above the head.

Two bats (paddle).

"Take up slack" - One bat moved up and down alongside the body.
"All out" - Two bats moved up and down each side of the body.
"Stop" - Two bats held up over the head.

The single bat method is generally easier than the two bat method. However, in summer conditions where mirage effects may distort signals, the two bat system may have advantages in making signals less confusing over winch-launch distances. Bats should be large and of a color contrasting with the local environment.

Lights.

"Take up slack" - Morse dashes.
"All out" - Morse dots.
"Stop" - Steady light.

A single "Aldis" type light is ideal for signaling over long distances. In mirage conditions, a second light may be added, in which case the "All out" signal becomes morse dashes on two lights instead of one. As with two bats, this eliminates confusion. Car headlights work very well for signaling, but obviously this removes the option of doubling up in difficult signaling conditions.

Wing-waggling.

"Take up slack" - Glider rocked laterally by moving wingtip up and down.
"All out" - Wings held level.
"Stop" - Wing down.

Wing-waggling must not be used unless a back-up stop signal is available (e.g. bat), to cover the case of a stop signal being required after the wing has left the wingtip holder's hand. An example of where this might occur is the case of a glider's tailskid picking up the second wire of a pair on a crosswind take-off.

Winch/autotow signals during launch:

Too fast - while still below upper speed limit, glider yawed until response obtained from winch/car driver. If no response and speed continues to rise toward limit, glider releases.

Too slow - while still above 1.3Vs, glider nose lowered and the glider rolled from side to side. If no response and speed continues to fall toward 1.3Vs, glider releases.

8. Winch/autotow airfield specifications.

The minimum field length for winch launching is 1,200 meters. The airfield should be clear of obstructions in the take-off and landing directions.

The minimum field length for autotow operations is 1,600 meters. The strip should be smooth enough to drive a car or truck at 100km/hr. Obstruction requirements as for winch launching.

Consideration will be given to reducing the above strip length for autotowing if the operational situation warrants it. An example of a case for reduction of strip length is autotowing with polypropylene rope, which does not need a drogue to stabilize it after release. This eliminates the need for a long "run-off" to keep tension in the rope after release and potentially reduces the strip requirement by up to 250 meters. The ECAA has discretionary power to vary strip length in any individual case.

Winch launching is more awkward. There will normally be no concession against the 1,200 meter requirement, because of the risk that a short strip can promote early rotations into excessively steep climbs. Any concession that may be granted will be a very minimal one.

9. Winch/autotow drivers

Winch and tow-car drivers must be properly trained with appropriate experience and must remain under supervision until all emergency situations have been experienced or adequately simulated. Appendix "A" contains recommended training syllabi. Winch or tow-car drivers who are under training are not permitted to launch gliders on revenue flights. The Owner/Operator must train and approve launch operators engaged in winch or auto-tow launching. An approved winch/auto launch operator shall not undertake unsupervised launches unless they have completed at least 3 launches by the same method in the preceding 6 months.

10. Winch/auto launch emergency training (pilots)

During pre- and post-solo training, all likely launch failure cases, e.g. wire/rope breaks and engine failures must be adequately simulated during the launch. These exercises must be carried out at a variety of heights, to ensure flexibility of response on the part of pilots under training. It is not sufficient to carry out this training solely by simulating the failure cases in free flight at altitude.

11. "Kiting" during winch-launching

The practice of kiting during winch-launching potentially endangers members of the public who have nothing to do with the gliding operation. As kiting is only possible during strong wind conditions, a cable-break (or running to the end of the cable on the winch) means the certainty of the cable drifting downwind well outside the confines of the gliding site, crossing public roads or becoming entangled with power-lines outside the airfield. Innocent parties may thereby become electrocuted or otherwise killed or maimed. For this reason, the practice of "kiting" is prohibited.

12. Airworthiness

- A glider shall not be flown unless it has a current Flight Permit Certificate of Airworthiness and a current Maintenance Release.
- An authorized inspector shall inspect all gliders and the inspection certified prior to the first flight of each day and following rigging or the completion of maintenance.
- A glider pilot shall, if he/she is aware of circumstances that cast doubt on the airworthiness of a glider, report the fact to an authorized inspector and request that the glider be inspected.

- The launch vehicle (which includes tow planes, winches and tow cars) must be fitted with a tow release mechanism. Such a release mechanism must allow the launch operator to release or cut the towline or cable without delay or hazard when required.
- The launch vehicle must have a daily inspection by a person approved by the ECAA. The Owner/Operator shall establish a suitable inspection schedule to ensure all launch equipment is checked for its serviceability prior to use. Appendix "B" contains an example of a Daily Inspection, but does not supercede information provided by the manufacture or the Approved Maintenance Program of the glider.
- The release mechanism on both the glider and launch vehicle shall be tested prior to the first flight of each day. Where a guillotine is used as the primary release mechanism, it is not necessary to check the operation of the guillotine each day. However, the launch operator must be satisfied that the general integrity and functionality of the mechanism is acceptable. The tow release system inspection shall include:
  - Check security of attachment of tow releases.
  - Clean and lubricate as necessary.
  - Check that wear or corrosion of the release mechanism is within acceptable limits.
  - Visually check to ensure that neither leg of the return spring is broken.
  - Check for condition and security of release actuating system. (Cables, pulleys, fairleads and bellcranks).
  - Check at the release knob for broken cable strands, and
  - Test operation of release under load. Release forces must not be excessive.
- The glider end of all launch cables and towropes must be fitted with double rings meeting the manufacturer specifications or approved by the ECAA. Rings at the glider end of the cable or towrope must be inspected prior to each flight.
- A weak link must be incorporated in the towrope or cable. In no circumstances should it exceed the weak link strength recommended in the glider's Flight Manual. Where no specific strength is given, maximum strength of the weak link should be approximately one and one-third times the gross weight of the glider being launched. For cables, the weak link must be incorporated at the glider end of the cable between the glider and the parachute.

Appendix A
Recommended Training Syllabus

WINCH OPERATOR TRAINING SYLLABUS

WINCH DRIVING
Location and use of Safety Gear
Use of Guillotine
Check of Winch Logbook
Daily Inspection of Winch
Locating and Stabilizing Winch
Start, Warm-up and Shut-down
Wire Check and Joining
Rigging Safety Links
Parachute
Tow-out of Cable
Use of Brake
Radio and Signal Procedures
Taking up Slack
All Out and Initial Climb
Speed Control
Top of Launch
Release and Wire Recovery
Launch With Crosswinds
Simulating Launch Failures
Changing Winch Driver: Briefing

RETRIEVE VEHICLE OPERATIONS
Daily Inspection of Vehicle
Airfield Driving Rules
Retrieving Cable
Fixing Wire Breaks

NON-NORMAL SITUATIONS
Wire Break at Low Level
Wire Break in Full Climb
Wire Break at Top of Launch
Loss of Winch Power during Launch
Launch Hang-up

TOWCAR DRIVER TRAINING SYLLABUS

TOWCAR DRIVING
Location and use of Safety Gear
Use of Guillotine / Release System
Check of the Towcar Logbook
Daily Inspection of Towcar
Towcar Operating Area
Start, Warm-up and Shut-down
Wire Check and Fixing Breaks
Rigging Safety Links
Parachute
Tow-out of Cable
Use of Brake
Radio and Signal Procedures
Taking up Slack
All Out and Initial Climb

Speed Control
Top of Launch
Release And Wire Recovery / Retrieve
Launch With Crosswinds
Simulating Launch Failures
Changing Car Driver: Briefing

NON-NORMAL SITUATIONS

Wire Break at Low Level
Wire Break in Full Climb
Wire Break at Top of Launch
Power Failure
Launch Hang-up

APPENDIX B
DAILY INSPECTION SCHEDULE.
Clean the glider. Use a soft rag or chamois and a little water. Wipe dry.

Note: Not complete for a Powered Glider.

The actual Daily Inspection will include, as a minimum, the following:--

(1) Start at the cockpit.

Check the Technical Log for:

Correct glider,
Validity of dates,
Reported faults.
Identify that the correct documents are in the correct glider.

(2) Cockpit.

Checking for:
Condition of interior of the cockpit. No dirt etc.
Seats, cushions and straps, in good order.
No loose objects in cockpit or on luggage shelf.
Battery(s) in and secure, Instruments set and correct reading.
Radio, Transponder, on and working, then turn off.
Instruments, no broken glass, all pointers at zero, turn altimeter baro-scale adjust knob to zero all three pointers, then set QNH.
Removable Ballast requirements and securing.
All controls are full and free.
Lock brakes open.
Canopy for cleanness and correct locking. (Then close and lock it.)
Nose wheel/main wheel for correct inflation and any damage.
Tow Release, cleanliness and operation.

(3) Center Section.

Checking for:
Main and drag wing pins home, secure and locked.
All control connectors correctly attached and locked.
Ailerons, Airbrakes, Flaps etc. Check safety locking!

(4) Move to the wing root, checking wing joint tape.

Walk along the wing with one hand on the leading edge checking for damage.
Look along the top of the wing as you go, check the dive brake caps and arms for play and security, look inside air brake boxes for foreign objects, water, etc, then under the wing checking for damage, check inside inspection covers.

(5) At the tip, check for ground contact damage, and tip skid.

Look along the bottom of the wing looking for discontinuity's.
At the aileron tip check for ground damage, and damage to outer hinge.

(6) Walk along trailing edge of wing checking;

Aileron hinges, control horns, flap hinges for play and security.
Check attachment of control seals, and mylar tapes.
Top wing surface for unevenness, damage.

(7) Moving along rear fuselage, check for;

Damage to rear fuselage, and static ports not blocked. (Or taped over.)
At fin, Pitot and Static tubes secure.
Attachment of tailplane
Tailplane play.

(8) Walk around tail, checking;

Tailplane security and locking.
Elevator and trim tab hinges and control connections. (Safety locking?)
Rudder hinges and cables or pushrod connections.
Tailplane to fin joint tape or fairings.

(9) Back along second side of fuselage, as per 7. above, in reverse.

(10) Out along wing, as in 6. 5, and 4. above, in reverse.

(11) Back to leading edge wing root, checking along nose, (static holes clear).

(12) Nose Tow Release, cleanliness and operation.
And back to cockpit.

(13) Carry out full control movement check, this time using a second person to apply resistance at the control surfaces, to ensure correct attachment.

(14) Minor faults (such as gelcoat chips, etc.) which do not ground the glider, should be written up in the Technical Log.

(15) Enter information and sign Technical Log as "Serviceable" (S).
or if defects are found, as "Unserviceable" (U/S).