Transport Canada Transports Canada

Aviation Safety

Ultralight and Balloon

Learn from the mistakes of others and avoid making them yourself . . . **Issue 2/2000**

Recent SeaRey Accidents

During the past summer there were two very serious advanced ultralight SeaRey accidents. One occurred on the West Coast and the other in central Canada. The SeaRey is a small seaplane that is very popular both in Canada and the U.S. Both aircraft were powered by Rotax engines, but the engine was not the problem in either case.

The SeaRey shown above is similar to the aircraft involved in the accidents.

In the central Canada accident, the SeaRey was being flown by the owner when it crashed shortly after takeoff, approximately 500 m from the runway on the owner's landing strip. The events leading up to the accident included winds reported to be at least 20 mph from the west, which allowed for an uneventful takeoff. However, later during the climb, the pilot had some difficulty maintaining a positive rate of climb, possibly because of gusty wind conditions. A short time later, when the aircraft was at approximately 300–400 ft, it began to sink and the left wing dropped. Apparently the pilot was unable to arrest the descent or raise the left wing, although according to the report he applied full aft stick and full right rudder. The aircraft continued to descend to and struck the soft, plowed ground in a left-wing-down attitude, sustaining substantial damage. The pilot and passenger suffered serious injuries.

At the risk of passing judgment on this incident without having been there, I offer the following general comment based on my own experience in light aircraft. Once sink rate develops at low altitude, there are only two options: firstly, apply full power immediately; and secondly, lower the nose immediately to gain airspeed. It is understandable that pilots at low level are reluctant to lower the nose. But think about it: if the wing is stalling as a result of sinking air, lowering the nose is still the best option to keep the wing flying and, hopefully, to fly out of the sinking air bubble before hitting the ground. —Ed.

The second SeaRey accident resulted from a maintenance oversight while the owner/operator was inserting a strut bolt to hold the rear wing strut in place. The AN-17a bolt (part 11 on the diagram on p. 2) was removed to install another component and was immediately replaced. However, unnoticed by the installer, it was inserted in such a manner that it missed the hole in the main strut attachment fork (part 5 in the diagram on p. 2). As a result, the strut pulled out of the fitting and the port wing began folding immediately after takeoff as the weight of the aircraft transferred to the wings, resulting in an uncontrolled encounter with the terrain beside the runway. This type of oversight has occurred on various types of aircraft in the past (see the front page article, "Missing Bolt Fatal," in issue 2/95 and issue 1/95 "Incorrect Assembly," another article dealing with the same type of incident).

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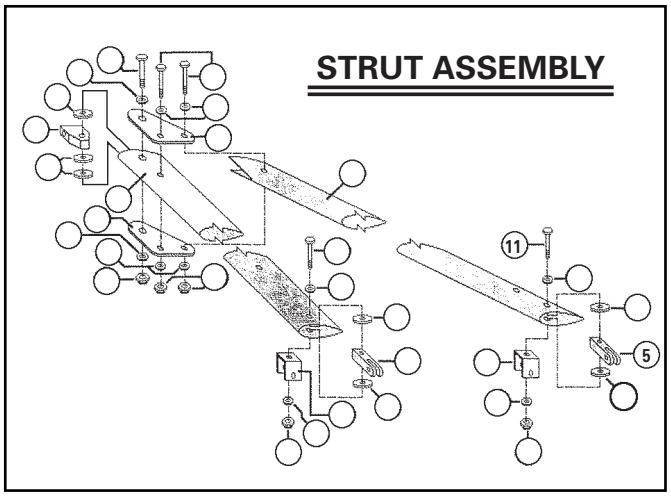
How can this type of oversight be eliminated? If working alone, as is often the case where small aircraft are concerned, the whole job must be reinspected by the owner or preferably another knowledgeable person prior to flight. In other words, completely double-check your own work against existing manuals and procedures to ensure correctness before attempting flight after maintenance. There are no regulations governing ultralight or advanced ultralight maintenance, so the aircraft owner must get it right. Double-checking maintenance is standard practice in the aviation industry where supervisors regularly inspect the work of subordinates. With the introduction of "owner maintenance" in the general aviation industry, it will become more important for owners to realize that it is a safety benefit to have work reinspected or double-checked. Unfortunately most ultralight owners and amateur-builders work alone, a practice that can set up a situation for a maintenance accident. —Ed.



The bolt identified as part 11 was inserted inadvertently missing the hole in part 5, which was vital if the rear wing strut were to be held securely. Instead, the bolt went beside part 5, allowing part 5 to pull out of the strut when the weight of the aircraft becoming airborne was transferred from the wheels to the wings, thus allowing the left wing to fold.

Analysis of Recent Incidents

Note: The appearance, flying characteristics and engines of the various recently manufactured light aircraft, in either kit or assembled form, are usually similar for products with that name; therefore, for the purpose of safety, it is important to recognize that problems affecting any one of the aircraft named in this article could be identical in another. Similarly, mistakes made by pilots will often have similar root causes, so in order to learn from flying mistakes it is not necessary to get involved with the various regulatory definitions of these small light machines. Weather is a good example—very light aircraft can be difficult to control in crosswinds during landing or when flying in heavy turbulence.

In the following article I have assembled most of the available information received within Transport Canada about ultralight accidents or incidents during the period from May to October 2000. One of the most serious concerns with ultralights is the repetitive nature of the events. While this is also true of most aircraft incidents, I feel we could eliminate many accidents if we had more incident reports from which to define trends. For example, we often see incidents as a result of engine failure, yet neither the engine type nor the cause of the engine problem are identified in the report.

At the risk of offending some of my readers, I have inserted some personal comments, based on my experience as a flight instructor in areas of the following summaries where I feel the industry could better participate in gathering information or identifying the apparent training and experience deficiencies that may have contributed to the incident. I invite you to let me know what you think of my comments, good or bad. —Ed.

The **Laron Shadow** had just taken off from a grass strip when the pilot noticed that the cylinder temperature gauge was reading high. He reduced the power and elected to return to the airport; however, the engine quit, and the pilot was required to force-land in a farmer's field. The pilot was uninjured, but the aircraft nose wheel was damaged. *In this case the pilot used good judgment in landing promptly after noticing the Rotax engine temperature was out of limits; however, a strip report with an analysis of why the engine failed might do more to help prevent recurrence. —Ed.*

The pilot of the **Lil Buzzard** ultralight was landing on the gravel strip in the Yukon when he lost control as a gust of wind picked up the left wing. The aircraft departed the right side of the runway and struck trees, resulting in damage to the wing, landing gear and propeller. The uninjured pilot had only 19 hr. of flight experience.

The pilot of an **Ultravia Pelican Club**, reported losing a door in flight. There was no further damage and the pilot landed OK.

Pelican Club similar to the aircraft involved in the Pelican incidents.

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Sécurité aérienne — Ultra-léger et Ballon est la version française de cette publication

The pilot of another **Ultravia Pelican** was less fortunate. Observers on the ground noticed the aircraft strike a taxiway light and damage the propeller before departing for Iqaluit. Upon failure to arrive at his destination, he became the object of a full-scale search.

The aircraft was subsequently located where it had crashed on the side of a hill, 49 mi. south of the destination. The weather conditions as revealed by the hourly reports at Iqaluit were conducive to instrument flight rules (IFR) at the time of the flight. The ceiling was between 100 ft scattered and 200 ft broken, and it is believed that the pilot encountered IFR weather conditions during flight. The evidence gathered by the search and rescue team at the crash site seems to confirm that the aircraft crashed following a stall. It is assumed that the pilot, who was not qualified to fly in instrument conditions, lost control of the aircraft after becoming disoriented in cloud.

A third **Ultravia Pelican Club** aircraft was on a visual flight rules (VFR) flight plan when it apparently crashed and was spotted by a local resident about 500 yards from the shoreline upside down on a shoal. No further details of this incident are available, except the TSB noted that the same pilot was involved in previous accidents in 1991, 1993, 1994 and two accidents in 1997.

Quad City Challenger similar to the aircraft involved in the Challenger incidents below.

The pilot was practising circuits and landings at a northern Manitoba airport with a **Quad City Challenger IIA**. On the second circuit the nose gear came down hard onto the runway and bent, resulting in a loss of directional control. The aircraft came to rest beside the runway with damage to the nose and nose gear.

In a second incident at the same airport, a **Challenger** suffered a blown tire after landing and had to be removed from the runway. In a third incident at the same airport, a **Challenger** with one passenger was taxiing for takeoff when the nose wheel fell off at the intersection of the two runways.

These incidents automatically point a finger at the instructor supervision if students were involved. They also raise questions about either the quality of maintenance or the design strength of the aircraft nose wheel used on aircraft involved in training students. —Ed.

The pilot/owner of a **Challenger IIA** departed the local airport for some practice soft-field landings. He selected a grass field about 10 mi. from the airport and, upon touchdown, the field was too soft and the right main landing gear collapsed. The pilot was not injured. *A reconnaissance of the field by a short automobile trip prior to landing would have been more prudent and less costly in this incident. —Ed.*

The instructor and student in **Quad City Challenger II** were practising takeoffs, circuits and landings at a private grass strip. During a landing, the student lost directional control of the aircraft and it veered off the right side of the strip, hitting trees located approximately 20 ft away. The aircraft received substantial damage; however, there were no injuries. Weather was not a factor as winds were light.

The pilot of a Rotax-equipped **Rans Coyote** was attempting a crosswind landing at his private farm airstrip in Alberta and was unable to get aligned with the strip. He attempted a go-around, at which time the engine quit. The aircraft touched down in a rapeseed crop and was substantially damaged. The pilot was not injured. No reason was given for the engine failure.

A Rans Coyote similar to the aircraft involved in the accident.

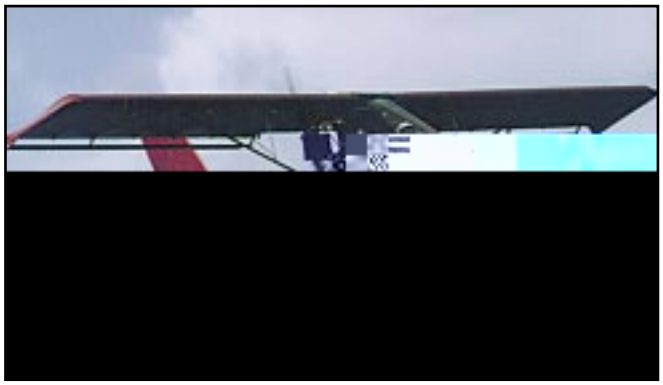
The pilot of an **Avid Flyer** with one passenger was doing circuits at the local airport when he lost control and exited the runway but was able to return to the runway unassisted with no reported damage.

The student pilot of an **Avid Flyer** was doing circuits at his home field in Alberta when, on approach about 1000 ft AGL, the right rudder cable came apart and the student lost control. The aircraft spiralled down to the ground, but the pilot was able to survive the impact without injury.

The pilot of the **Marclair Dennisair 2000** was conducting a touch-and-go landing in a southerly direction in a field near Springvale, Ont. The wind was easterly at 8–10 kt and the temperature was 28°C. Apparently the aircraft was unable to climb sufficiently, and it struck power lines past the end of the field at a height of approximately 25 ft. The aircraft nosed over and struck the ground. The pilot was pulled from the aircraft and transported to hospital with serious but non-life-threatening injuries. There was no report of engine problems or other malfunctions that contributed to the accident; however, the pilot did not hold any aviation document permitting him to legally operate the aircraft.

The pilot of another aircraft reported two small aircraft flying inside the Red Lake Airport mandatory frequency (MF) reporting area. Neither pilot contacted Thunder Bay Flight Service Station (FSS) prior to departure, and the aircraft are believed to be NORDO. It is permissible to arrive at or depart from an MF airport provided prior arrangements are made by telephone before entering or leaving an MF zone. *There is a requirement to transmit a position report five minutes before entering an MF zone and to report on leaving such a zone after departure from the airport. —Ed.*

The pilot of a Rotax-engined **Tundra**, similar to that shown in the photo, was conducting an approach to his private grass landing strip when the aircraft crashed into a wooded area. The aircraft was substantially damaged, and both the pilot and passenger sustained serious injuries and were transported to hospital.



A Tundra similar to the aircraft involved in the accident.

The inexperienced pilot of an **Windsport Edge X** powered aircraft held a recently issued student pilot permit—ultralight aeroplane, although the aircraft appeared to have no registration marks, as required by regulation. Also, he had just recently purchased the aircraft, and the Hobbs meter in the aircraft indicated a total operating time of six hours. This pilot was conducting a series of touch-and-go landings at the local airport when observers saw the aircraft pitch down and strike the ground adjacent to the runway. The aircraft was substantially damaged as it came to rest in an inverted position, seriously injuring the student pilot.

The instructor pilot of the **Yarrow Arrow** was instructing the student on stall recognition and forced landings. During stall recognition the **Rotax 503** (dual carburetors and single ignition) engine quit as power was increased to recover from slow flight. The instructor took control and made an unsuccessful attempt to restart the two-stroke engine. He set up on final approach, gliding at 45 mph toward a forced-landing area. At this point the ultralight experienced a severe and sudden drop in altitude, so the pilot revised his intended landing. He reported that he did not think he would reach his desired field and that he would hit a steep bank head-on; he resorted to a right turn and landed in a

wooded area. Both occupants suffered only minor injuries. The Yarrow Arrow was substantially damaged.

Photo of a Yarrow Arrow similar to the accident aircraft.

The pilot of a **Spectrum Beaver RX 550** was on a VFR flight out of the local airpark when he experienced a complete loss of engine power. The pilot carried out a forced landing into a small lake; however, the aircraft landed hard, and one of the amphibious floats detached. The aircraft sank in the shallow water and became partially submerged. The pilot was not injured and was able to swim to shore. The pilot suspects that a problem in the fuel system may have caused the engine, a **Rotax 582**, serial number 4015379, to stop running.

Photo of a Spectrum Beaver RX 550 similar to the accident aircraft.

At about 300 ft AGL after takeoff, the pilot of a **Murphy Maverick** noticed the engine power decreasing from 6200 to 300 RPM. He was able to make a successful landing. A portion of the muffler was found separated from the engine, but the owner did not think that this would cause such a drastic decrease in power. It was more likely carburetor ice since conditions were conducive to this problem.

There is low operating experience as this is the first Maverick to have this engine type installed—an HKS 685cc two-stroke high-performance oil-cooled racing engine that was specifically built for amateur-built aircraft. It is equipped with a Bing automatic altitude compensating unit with manual carburetor heat control. The owner reported partially stripping the engine and carburetor, but no damage or contamination was found, thus supporting the carburetor icing theory.

The **Dragonfly** departed the airport towing a hang glider and was operating in level flight at 4500 ft AGL after releasing the glider when the left wing aluminum leading edge separated from the aircraft. The sail and leading edge also departed, passing through the **Roxtax 914** composite propellers and tailplane. The pilot deployed the ballistic parachute, but it streamed, with only the top partially opening. The aircraft spiralled down with the parachute catching the top of a tall tree, which reduced the ground impact force. The pilot sustained minor injuries, but the aircraft was destroyed. The aircraft was built in Australia, during 1992, by Moyes Bailey Microlights for the purpose of towing hang gliders to altitude and was imported into Canada in 1997 for that purpose. The multiple Canadian owners inspected the leading edge and believe that the initial leading edge failure was due to metal fatigue. They believe the sail is original material. On early models, the aluminum leading edge is only partially enclosed within the sail. The owners contacted the manufacturer, who indicated that newer model leading edges are fully enclosed and that there is a service kit for modifying older models. There is no system of notifying owners of modifications or service letters except the network of Dragonfly owners, which has been notified of this incident.

The **hang glider** was under tow by an ultralight aircraft for a departure on a local training flight carrying two occupants—a student in the lower harness, and an instructor in the upper harness. It was being towed by an ultralight aircraft owned and operated by the same company with only the pilot on board. When lifting off from runway, the tow pilot noticed that the hang glider was lower than he expected, and he maintained his speed in accordance with a predetermined company procedure designed for this scenario. Subsequently, the tow pilot saw that the hang glider was to the left of the runway surface and below the tow aircraft. When the tow plane was parallel to the runway heading, the tow pilot could see in a rear view mirror that the hang glider was in a left banking turn on a southerly heading. He then saw the hang glider strike the airport's windsock support pole. On striking the pole, the hang glider spun around about 180° to the left and contacted the ground facing to the north. Both the instructor and student suffered fatal injuries.

The pilot/owner of a **Sabre 16SS 503** was commencing his first flight with his new aircraft. After liftoff, the aircraft commenced and continued a left banking turn until it had turned downwind and was crossing a tree line. As it crossed the tree line, the aircraft encountered a downdraught,

stalled and descended to strike the ground. The pilot suffered serious injuries, and he was subsequently transported to a hospital. *In this case we have a seriously injured person where more factual information about the pilot qualifications, such as previous training, experience level and currency on the type, could help prevent recurrence of a similar accident. It also raises questions about the airworthiness of the aircraft and whether the engine was developing full power. It is not normal for an aircraft to fall out of the sky while crossing a tree line, so we have a host of arguments to speculate from, including the performance standard of the aircraft for operation in the gusty winds reported by the pilot. This is an example of factual information that would help other pilots avoid the same mistake. In 1933 near Kitchener, Ont., a pilot built his own aircraft taking four years to do so then wrecked it on the first flight. Why does this type of first-flight-accident continue to occur? —Ed.*

Here is another similar recent occurrence where an unintentional flight got the pilot of a **Turner T40** into trouble. He was conducting high-speed taxi tests at the local airport and became airborne inadvertently. Unable to control the aircraft, the left wing dropped, contacting the ground and causing the aircraft to cartwheel and flip over onto its back, injuring the pilot. This accident leaves a number of unexplained factors, particularly the fact that the pilot lost control, suggesting that his experience level was not sufficient to control the aircraft in flight.

The pilot of a **Buckeye 582 DM** powered parachute was performing a demonstration flight with one passenger on board. The flight was being conducted from a private airstrip and after completing a couple of touch-and-go landings, remaining in the circuit, the engine (**Rotax 582**) stopped as a result of fuel exhaustion. The pilot force-landed into the trees surrounding the airstrip, where the parachute hung up. The pilot received minor injuries, and the passenger required hospitalization for more serious injuries.

Photo of Kitfox similar to accident aircraft described below.

The pilot of a **Denny Kitfox II** was completing his roll-out after landing at a farm grass strip when the aircraft lost the right wheel. The axle dug into the grass, and the aircraft overturned. There were no injuries, but the aircraft incurred a broken propeller, crushed cowl, collapsed lower fuselage and damaged tailfin.

According to the TSB report, the float-equipped Rotax-powered **Delisle Bush Caddy** was in the initial climb stage of a local flight when a wind gust slammed the aircraft back onto the ground. According to the pilot, the winds were varying in velocity between 20 and 30 kt, as reported in the general area. The pilot and passenger were not injured; however, the aircraft sustained damage to both wings and the propeller. This is a common error of inexperienced pilots flying very light low-powered aircraft in unstable weather conditions; however, it was reported that the pilot in this case was very experienced and may have underestimated the force of nature on that day. In fact, on the same day a **de Havilland Beaver** and a **Helio Courier**, also flown by experienced pilots, got into similar trouble as a result of the severe gusts. *So if it also happened to bush pilots flying larger light aircraft, we have a strong safety message suggesting pilots of ultralights or advanced ultralights should not become complacent or ignore the high risk of upset in gusty wind conditions. —Ed.*

It is not uncommon for severe gusts to slap small aircraft, such as ultralights, into the ground during takeoff or landing in gusty conditions.

The pilot of a **W202A** had acquired a total time of 19 hr. and was on a training flight under supervision of an instructor at the time of the occurrence. During the landing roll, a gust of wind picked up the left wing, and the right gear collapsed, causing the aircraft to skid off the runway. There were no injuries, but damage occurred to the propeller, landing gear and wing strut.

The pilot of a privately owned **Zenair CH 701** short take-off and landing (STOL) aircraft was approaching his home strip when the Rotax engine quit. The aircraft crashed into the neighbour's backyard, breaking off the main gear, a propeller blade and bending a wing. There were no injuries to the pilot.

The pilot of **Zenair 200** aircraft was landing at the local BC airfield when the left wheel assembly failed as a result of a poor weld. The pilot lost control of the aircraft and ground-looped off the runway. The aircraft suffered minor damage in the incident. There were no injuries.

The **Zenair Zodiac** was on the landing roll when a strong crosswind gust occurred, causing the aircraft to balloon. The subsequent hard landing caused the nose wheel to collapse. The aircraft then overturned and came to rest on its back on the edge of the runway. The pilot was not injured, but the aircraft sustained substantial damage.

Balloon Safety

The annual Gatineau balloonfest experienced both high winds and low ceilings, resulting in disappointment to the many balloonists who attended. To the credit of the organizers who kept safety uppermost in their minds, all the mass flights and competitions were cancelled when the weather did not improve for the launch. Tethered flight was permitted throughout the festival.

Shown above is a new idea in tethered ballooning, which appeared at the Gatineau balloonfest. The balloon is a gas-filled model and is controlled by two people holding tethered lines to assist the passenger down after flying to 100 ft altitude on the line. The machine is strictly a light or preferably no-wind operation, although it was quite solidly tethered.

Canadian Balloon Incidents from May to October 2000

The following Canadian balloon incidents were reported to TC during the period from May to October. Although no injuries or damage occurred during the incidents, most of the events may involve poor judgment on the part of the pilot.

The **Aerostar Balloon** operated by a Toronto company was on a local visual flight rules (VFR) flight when the pilot noticed that a low fuel situation existed. He made a precautionary landing on a property in the west end of the city where the landing was challenged due to lack of prior permission. There were no injuries or damage.

Another **Aerostar S60A** balloon was on a local VFR flight when the fuel supply became exhausted. The intended destination was north of Toronto; however, the pilot force-landed the balloon in a schoolyard, narrowly missing hydro lines and a portable classroom as a result of the fuel concern.

The **Cameron N-77** balloon departed downtown Toronto (reservoir near Casa Loma) on a VFR flight at 1200Z with the intention (based on the winds) to drift northbound. However, the winds changed and caused the balloon to drift towards Lake Ontario. With fuel running low, the pilot elected to land in a schoolyard.

The **Aerostar S60A** was launched at an airport in western Canada and then drifted toward the air terminal building, lifting just high enough to avoid hitting the building.

Prohibited Compound Coating

The following information was submitted by Barry Caldwell, an inspector with the Continuing Airworthiness Division of TC headquarters. An airworthiness directive (AD) from the French civil aviation authority (DGAC) pertaining to balloons has been received by TC. However, there are no DGAC-certified balloons in Canada; therefore, this DGAC AD does not apply in Canada. The subject of this AD concerns treatment of the fabric with polyurethane TONIX spray material that has been applied to the balloon envelope. This product may reduce the balloons mechanical and non-flammability characteristics. If this particular polyeurethane TONIX compound has been applied to any balloon, further flight is prohibited.

This information is distributed to balloon owners/AMEs in this publication because of the possibility that some balloon operators/maintainers may have applied this TONIX compound not knowing the flight and flammability hazards of this particular coating.

None of the following balloons that are presently in Canada are affected since these manufacturers never used the product: Cameron, Colt, Lindstrand, Thunder (UK), Aerostar, Balloon Works, Fantasy, Galaxy, Raven and Skypower (U.S.).

Worthington Propane Tank Explosion

My name is David Acton. I am a commercial fixed wing and balloon pilot, holding a Kenya commercial balloon licence. I was the chief pilot for Transworld Safaris in Kenya, and this story is about the tragic accident that occurred there involving the person who replaced me. According to the available information, four passengers were boarded. When the pilot turned on the inflation tank and lit the pilot light, the tank exploded, sending shrapnel in every direction, with fatal results to himself and serious burns to the four passengers and three groundcrew.

The heat of the fire caused the balloon to stand up, and the whole system flew off unpiloted. The balloon climbed to about 1500 ft and landed over 2000 ft away, where it remained completely destroyed by the fire as it dragged through bushes. The cause of the Worthington tank explosion remains undetermined, but I will not be using my own Worthington tanks until they are tested.

The Worthington cylinder may also be a type currently flying in many of the balloons in Canada. I hope this is taken as an advisory to inspect and test the tanks and to ensure they are within their tested date when flown, as I wouldn't want to see a repeat of this accident.

TSB Observes on Pop Rivet Construction

During the investigation of a fatal accident involving a **Storm** amateur-built aircraft, the following observations were made on the construction method, particularly the use of pop rivets in the thin skin. In this case radar tape showed the aircraft descending at 200 fpm for 1.5 min near the point where it struck the ground for undetermined reasons.

The TSB investigator at the scene noted that the aircraft skins were assembled with aluminum pop rivets. When the two skins were pulled apart by hand, the rivet holes in the thin skin did not deform. Several aluminum rivet heads that had popped as a result of the accident were found in the engine and propeller spinner area. The manufacturer of the kit supplies the purchaser with aluminum rivets for assembly.

While the aircraft showed no signs of in-flight breakup, closer examination of the construction techniques raised some safety concerns, specifically with the riveting. Laboratory analysis of the rivets used in the aircraft confirmed they were of the proper material composition. One alarming observation was the fact that skins on the ribs as recovered from the crashed aircraft could easily be pulled off, somewhat like a zipper, as the rivet heads pulled through the holes in the metal sheeting. People who specialize in amateur-built and ultralight aircraft also made some interesting points about the rivets. In some places the space between the rivets appeared excessive and measured as much as 1.5 in. None of the wing skin samples showed signs of deburring and, in some cases, the rivets used were too short. All these factors led to the aircraft coming apart on impact in an unusual way. The skins separated along the rivet lines, as previously mentioned, like a zipper, with no distortion of the rivet holes, and the majority of the rivets failed in shear. None of the .020 aluminum skins were ripped even though the impact forces were well over 50 g. It was the opinion of several industry people that the aircraft was bound to experience a structural failure eventually because of the riveting job done during construction. The aircraft had approximately 50 hr. on the airframe at the time of the accident.

This information is published with the safety observation for aircraft builders working with thin dimpled skins and pop rivets to verify their work against accepted industry standards. Although it may be an extra cost, in some cases of newly marketed kits it may be prudent to have the kit checked by a professional aircraft structure technician before purchasing it and then follow the advice obtained, particulary on the matter of rivet spacing, when assembling the kit.

The Storm accident scene.

Skin from crashed aircraft illustrating rivet spacing and holes where rivets pulled through.