INCIDENT REPORT: LANDING SHORT OF THE RUNWAY THRESHOLD

Date of Incident: June 21, 2023
Time: 12:11 hours
Surface Wind: 6 knots at 170 degrees
Active Runway: 18

The Minnesota Soaring Club (MSC) fosters a culture of safety by encouraging pilots to report their aviation mistakes. To foster this attitude the MSC replicates NASA's Aviation Safety Reporting System by 1. Concealing, in incident reports, the identify of pilots who report errors, and 2. Not disciplining pilots who report errors unless the error was deliberate or criminal. This non-discipline stand does not preclude actions to improve pilot skills and knowledge by recommending additional flight instruction.

The pilot flying the pilot who flew the ASK 21 B will be referred to as the Pilot.

The passenger during this flight will be referred to as the Camper.

CONTACTS & INTERVIEWS

06/21/2022 I viewed the incident from the ground

06/21/2023 Interview of Pilot

06/21/2023 Interview of passenger

06/21/2023 Discussions with flight instructors on the field at the time of the impact

06/24/2023 Discussion with Bob Wander about the damage to the ASK 21 B

06/24/2023 Discussion with Director of Operations, Dan Shallbetter at the impact site

07/01/2023 Discussion with Stanton Sport Aviation mechanic Tom Kuhfeld

INFORMATION REVIEWED

Ground where the ASK 21 B impacted

The damaged main fairing

Federal Aviation Regulations, §830

Flight Manual of the ASK 21 B

THE INCIDENT

The Minnesota Soaring Club (MSC) was providing glider rides to the Minnesota Aviation Career Education Camp campers on June 21, 2023. Flight instructors gave rides to the campers.

Prior to the flight, the Camper stated that he weighed 240 pounds, but was unclear about his exact weight. Given that the ASK 21 has a maximum front seat weight of 242 pounds, while the ASK 21 B has front seat maximum weight of 286 pounds, the Camper was assigned to ride in the ASK 21 B.

There was knee high corn growing in the farm field north of Stanton Airfield. The Pilot landed in the corn 42 inches short of the runway and rolled into a four-inch rise of dirt that formed the runway edge. The main-wheel fairing impacted the four-inch rise and was torn off the glider. The wheel rolled over the rise and continued down the runway, stopping on the eastern edge of the runway.

Both the Pilot and the Camper stated they were without injury.

I thoroughly inspected the ASK 21 B on the field and found no indication of damage and deemed it fit to return to service.

I then talked with the Pilot and determined that he: 1. Understood that he made a mistake and what it was; 2. Evidenced a humble attitude about his mistake—evidenced no Hazardous Attitude; and 3. Was capable of continuing safe flight. I authorized his continued flying and he flew the remainder of the day without incident.

Bob Wander subsequently inspected the ASK 21 B and determined it was without damage and fit for service.

THE MAIN WHEEL FAIRING

Tom Kuhfeld, a former MSC glider pilot, and current mechanic at Stanton Sport Aviation stated that years ago he discussed the problem with main wheel fairings being ripped from ASK 21s (a problem that occurs in Europe), following the main wheel fairing being ripped from MSC's ASK 21. The mechanic advised Tom that the remedy was to raise the fairing several inches, and then showed Tom how to do so. Tom made this modification on MSC's ASK 21 fairing, and stands ready to do so for our damaged fairing on the ASK 21 B.

The longer fairing provides less wind resistance in flight. But the advantage of the shorter fairing is that there is less chance for impact damage.

OBSERVATION AND SUBSEQUENT INVESTIGATION

The Pilot stated that he was low on turn to final, and accordingly maintained best speed to fly. He noted that he had difficulty raising the nose on final flare despite back stick movement.

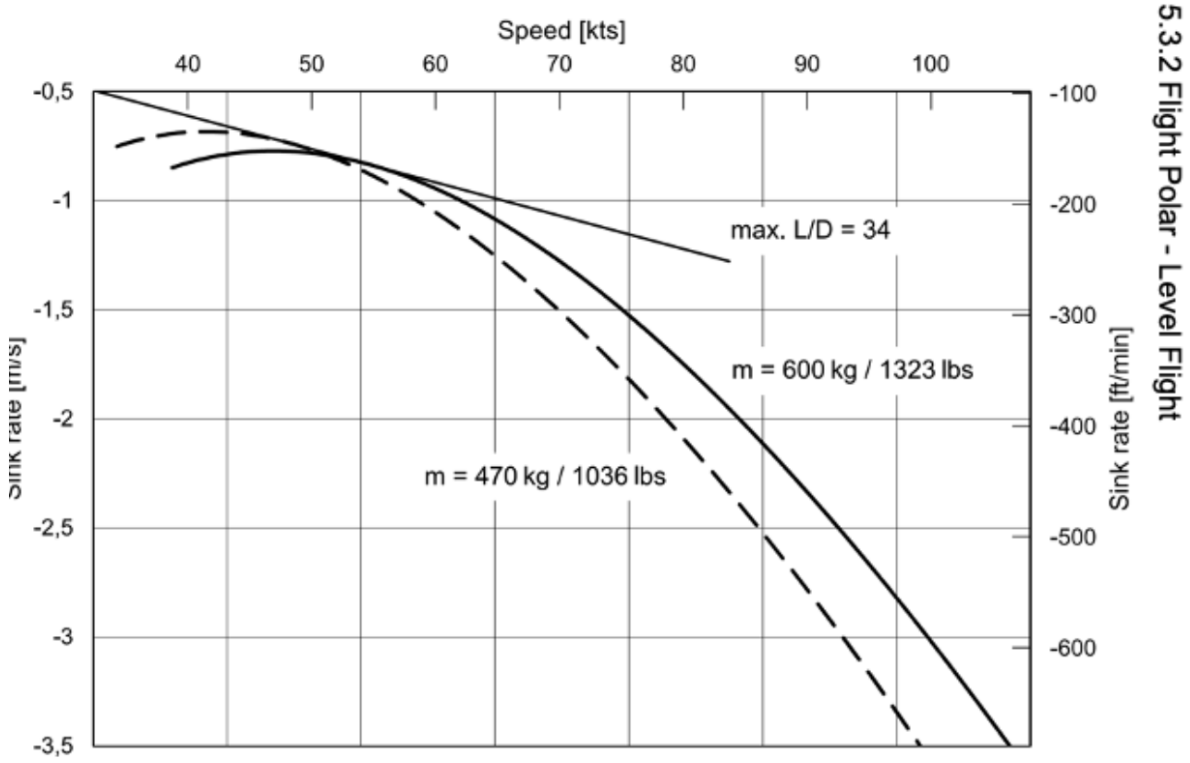
The Pilot touched down in a full stall and impacted the four-inch rise in the horizontal direction. The rise tore off the fairing, which was left at the edge of the field. The ASK 21 B did not go airborne after hitting the rise—an indication that the glider was fully stalled.

The dirt where the ASK 21 B touched down had a quarter inch impression in the dust consistent with a normal touchdown.

A flight instructor on the field noted that the spoilers were about a third open on final.

SPEEDS TO FLY

The ASK 21 B polar notes there is a five-knot difference in best speeds to fly between maximum weight (which was approximately the weight during this flight) and single flight load.



WEIGHT AND BALANCE

The ASK 21 B *Flight Manual* states that any weight over 242 pounds in the front seat reduces the rear seat maximum weight by a multiple of five.

There are twelve one-kilogram trim weights available for use in the front seat. Because of the arm, each weight is equivalent to 2.75 pounds front seat weight. There were six trim weights in place for the flight. This created a moment (arm x weight) of 16.50 pounds, which reduced the rear seat maximum weight by 72.5 pounds, for a maximum rear seat weight of 169.5 pounds.

240 lbs camper weight + 16.5 lbs trim weight – 242 lbs front seat weight = 14.5 lbs
14.5 lbs x 5 = 72.5 lbs
242 lbs – 72.5 lbs = 169.5 lbs maximum rear seat weight

240 lbs Camper weight+ 169.5 Pilot weight + 16.5 trim weight = 426 lbs

This load is less than the 458 lb maximum and would have been within acceptable center of gravity limits.

Had the Camper provided inaccurate information about his weight, and perhaps he weighed 250 pounds then the calculations change:

250 lbs camper weight + 16.5 lbs trim weight – 242 lbs front seat weight = 23.5 lbs

23.5 lbs x 5 = 117.5 lbs
242 lbs – 117.5 lbs = 124.5 lbs maximum rear seat weight

250 lbs Camper weight + 169.5 lbs Pilot weight+ 16.5 trim weight = 436 lbs

This greater weight would have moved the moment arm forward of acceptable center of gravity limits.

NOTIFICATION AND REPORTING OF AIRCRAFT ACCIDENTS OR INCIDENTS

FAR §830 states that a report to the National Transportation Safety Board is required if there is a serious injury or substantial damage following an aircraft accident or incident. FAR §830.2 defines substantial damage as:

> Damage or failure which adversely affect the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component.

This event did not meet the reporting criteria. No report was made.

ANALYSIS

The Pilot failed to maintain an adequate glide ratio during final. Further, it is likely given the heavier load the best speed to fly was increased by five knots, and the Pilot would have benefited from a faster landing speed given the altitude available. Airbrakes were deployed during final, and less airbrake would have resulted in a landing on the runway.

Landing a glider is an exercise in energy management. Glider energy comes from two sources: airspeed and altitude. The goal is to **always** have extra energy when turning onto final, and again when flaring. It is difficult to overrun a 2,582-foot grass strip (the length of Runway 18) with reasonable pilotage, and therefore extra altitude is virtually never an issue. But the event of sink, strong gusting head winds, unforeseen traffic (aircraft, person, or golf cart) on the runway, or misjudgment by the pilot can turn a low-energy landing into an incident.

The glider had a higher glide ration near the surface due to ground effect. Accordingly, the Pilot needed only six additional inches of altitude to have made the runway (four inches for the four-inch rise, and two inch to cover the remaining 42 inches of corn field). He was very close to a safe landing, but this closeness is a lesson in why it is prudent to have an aiming point further down the field.

The impact force came from the glider hitting the rise in a horizontal direction.

The weight of a heavy passenger in the front seat diminishes the ability of the elevator to raise the nose at slow speeds (such as the speeds that are flown near to stall). With heavier passengers it would be prudent to maintain a higher pattern speeds, around 10 additional knots would be sensible, and maintain this airspeed until flaring.

The ASK 21 Weight and Balance sheet that is taped to the Field Operations Officer (FOO) cart is attached in the appendix as a reminder of how a given weight in the front seat has five times the impact on weight and balance as does the same weight in the rear seat. Weights above 242 pounds in the front seat weight should be allowed only with caution and foresight as to all aspects of the flight, but especially take-off and landing. Further, with the weight of a heavy passenger in the front seat, it would be prudent to select an aiming point slightly down the field and accept a longer ground roll. It would likewise be prudent to remove all trim weights (heel weights) to reduce the maximum passenger moment arm, even if the aircraft is within weight and balance with the weights in place.

Some people are reluctant to admit their actual weight, and it might be pragmatic to assume that everyone will provide inaccurate information about their weight, with a tendency to underreport their weight, and to factor weight and balance decisions accordingly. This is a form of the pilot in command erring on the side of caution and might politely be done without announcing the reason for this action.

Flying gliders is a complex task. Complex tasks need frequent repetitions for a pilot to remain at peak skill. Peak skill is not necessary for the average landing when things are going well as much as it is for extraordinary events when speed of thought, and agility of cognition becomes vital to the safe outcome of the flight.

Ultimately, this report is about edges. How close to the edge of weight and balance can a pilot go. How close to the edge of the field can a pilot chose as an aiming point. The more edges a pilot bumps against the greater the chance of an incident. What happened to this Pilot could happen to any of us. All pilots would be served by attending to the edges of their flight and reducing or eliminating them.

I applaud the Pilot for his safe attitude and willingness to learn from his mistakes. I similarly celebrate the MSC for its focus on safety, which includes an emphasis on learning from mistakes rather than punishment.

RECOMMENDATIONS

1. Review the weight and balance sheet on the FOO cart or the gliders flight manual any time a heavier passenger will be given a ride.

2. Consider placing heavier passengers in the rear seat.

3. When possible, avoid flying at the forward limit of center of gravity by removing trim weights.

4. Establish aiming points further down the runway with heavier payloads.

5. Establish a higher landing speed, especially on final with heavier payloads.

6. Fly frequently enough to maintain competency—as opposed to currency which requires three flights in 90 days.

Respectfully submitted,

Stephen Nesser, CFI-G
Chief Flight Instructor
Minnesota Soaring Club

August 16, 2023

WEIGHT & BALANCE OF ASK 21's

ASK 21 B

Maximum Payload (pilots & gear)	458 pounds
Maximum in Each Baggage Compartment	22 pounds
Maximum Weight Either Seat	286 pounds
Minimum Front Seat Weight*	155 pounds

If the front pilot exceeds 242 pounds

For each pound over 242 pounds, 5 pounds is subtracted from the back seat weight of 242 pounds. Therefore, with 262 pounds in front, the maximum back seat weight is 142 pounds.

If the rear pilot exceeds 242 pounds

For each pound over 242 pounds, 1 pound is subtracted from the maximum front seat weight of 242 pounds. NOTE: the maximum payload may not be exceeded, despite these calculations.

How the rear pilot's weight impacts the front pilot's weight and balance

30% of the rear pilot's weight can be added to the front pilot station. Therefore, if the rear pilot weighs 200 pounds, the minimum front pilot weight is reduced by 60 pounds to 95 pounds.*

ASK 21

Maximum Payload	450 pounds
Maximum Weight Either Seat	242 pounds
Minimum Payload Front Seat*	140 pounds

While no maximum weight is published for each baggage compartment, prudence would limit the weight at 22 pounds, which is permissible per the *Flight Manual*.

BOTH GLIDERS

***NOTE:** At very light front pilot weights the glider spins in an unusual and upsetting way—therefore, it is recommended to fly with no less than 170 pounds in the front pilot station.

Each heel weight is the equivalent of 2.75 pounds front seat pilot weight.