Flying the Vertical Mush

by Jan W. Steenblik

"[The Kasperwing's] most unique and valuable feature is its ability to 'mush' or fly below the stall without spinning or dropping the nose. The machine can literally 'parachute' straight down at about 600-800 fpm . . . the machine can be turned and controlled while in a vortex descent . . . It cannot be overemphasized how important this feature can be if the pilot is ever faced with an engine failure just after takeoff. It is actually possible to 'mush' the machine onto the top of a flat-roofed building or into some other small, confined area if the situation demands. This virtually eliminates the notorious stall/spin accident which has claimed so many pilots in the past."

-Cascade Ultralites brochure on the Kasperwing

The Bell JetRanger helicopter zooms over the funky grass strip east of Seattle, then suddenly circles back. Bleeding off speed in a steep, nose-high descent, the pilot finesses his sensitive machine to a feathersoft touchdown on the grass, careful to keep the violence of the JetRanger's swirling rotorwash a safe distance from the ultralights and sailplanes scattered on the field.

The pilot and his photographer — together a film crew from North Carolina — climb out. The cameraman, a hang glider pilot shopping for an ultralight he can soar, is visibly excited by his chance encounter with Steve Grossruck and his Kasperwing ultralight at Issaquah's turf airfield. Would Steve . . . ?

Grossruck obligingly wriggles into his harness, straps on his parachute, gives the wing a dramatic if cursory preflight shake, yanks the engine to life, and knocks out his summary show: several quick pirouettes and figure eights on the grass, a maximum-performance takeoff and climbout, a couple wingovers, and a tight figure eight reversal. Now he dives for speed, pushes up into a loop attempt that as usual flops off the top into a barrel roll.

Finally, the *coup de grace*, the vertical mush: starting several hundred feet up, Grossruck shuts the engine off, slows, and sinks out of the sky almost straight down. Opening one wing tip rudder at a time, he turns slow 360s left, then right. Sinking through 60 feet, he abruptly dives forward out of the mush and, pumping the nose high again with his legs, flares to a full-stall landing, the Kasperwing dropping in a clatter of flexing parts at his audience's feet.

Grossruck gets out, grinning like a shark. A brilliantly iridescent green fly, a wild jewel unwittingly plucked from the sky, is tangled in his thick dark beard.

Lake Sammamish is slate gray and calm, unlike my stomach. It is cold and a little bumpy up here at 3,000 feet; I am in a vast hole at cloudbase, holding a northwest heading into the wind.

I retard the throttle until the smooth ripping sound of the engine behind me breaks into an idling *pop-pop-pop-pop-pop*. Tensing my quivering thighs, I slowly push back against the nosewheel steering horns until the Kasperwing is bobbing gently at the edge of a conventional stall.

Now I rock the steering yoke up, opening both tip rudders; the bobbing increases slightly in amplitude. As the nose dips to the bottom of one oscillation, I quickly scuttle back to the rear of the cockpit, holding the yoke up with my outstretched arms. The nose rises precipitously, then drops in a sharp stall break. The right wing drops as well, and the Kasperwing rolls into a right spin entry.

Stomach in knots, I pull myself forward, roll in left rudder to level the wings, and pull out of the dive. Steve had warned me this might happen, that the gray area between the lower limit of conventional flight (about 11 to 12 mph) and the fully-developed vertical mush utilizing "vortex lift" is a region in which a Kasperwing pilot ought not to long dwell. In that no man's land, pilot control is minimal, particularly in rowdy air.

Too soon, I have climbed back to 3,000 feet; heart pounding, I decide to give it one more try. This time, as I rush to the rear office, holding the yoke at arm's length, the nose pitches way up, then way down, perhaps 60 degrees below the horizon (30 degrees above or below the horizon meets the accepted definition of an aerobatic maneuver).

After a couple of oscillations, the Kasperwing settles down to a slight bobbing. I close the rudders and sink quietly at 800 feet per minute (according to Grossruck). With the rudders open, he says, I would sink at 1,200 feet per minute. I look down past my knees at the fir and spruce, wondering if this is indeed The Mush. The Kasperwing appears to be sinking straight down, but I know I have a slight headwind, and had expected to creep backward over the ground.

The Kasperwing can be steered — it turned! — while in a vertical mush by opening one wing tip rudder with the steering yoke. If the bank angle in the mush exceeds 20 to 30 degrees, however, the Kasperwing will try to tighten up in a high-speed spiral.

The first time I saw Steve Grossruck mush the Kasperwing, I had visions of dropping with insouciant grace into postage-stamp landing sites. In fact, Cascade Ultralites' brochures and advertisements promised helicopterlike vertical descents into the smallest fields.

Fact is, however, Steve Grossruck *has* very much overemphasized the value of the vertical mush — at least in his earlier advertisements. For several reasons, it is *not* an ace in the hole to use in in-flight emergencies such as engine failure shortly after takeoff.

For one thing, establishing the vertical mush takes time and altitude, rare commodities in low-level engine failures. Furthermore, an experienced Kasperwing pilot may have more control at low forward speeds than a pilot of a conventional ultralight, but even the Kasperwing is vulnerable to upset by gusts and thermals at low airspeeds.

Like more conventional craft, the Kasperwing offers much better control at higher airspeeds; in fact, Grossruck recommends that a pilot landing in turbulence come in hot (35 mph), dive at the intended touchdown point and control the glide path by deploying both rudders simultaneously, as dive brakes. This high-drag approach allows the Kasperwing to land in a very short space without employing the riskier mush.

Though the Kasperwing in a controlled vertical mush sinks at a rate quite acceptable by parachute standards, it is too high to intentionally carry all the way to the ground except in an emergency: you *must* dive back through the gray area of minimal control, pick up some airspeed, then flare — like other mortals.

So what good is the vortex-lift vertical mush?

Perhaps it should be considered a fun stunt; an aerobatic novelty to play with in light air; at altitude. I'd love to see a formation mush routine at an airshow, three or four Kasperwings sinking out of the sky together.

The helicopter was gone by the time I returned from my timid first explorations into the mysteries of the mush. Before my flight, the cameraman had asked me, "What do you think of the Kasperwing?" I had told him that I was enjoying it immensely, and that I thought its virtues greatly exceeded its shortcomings.

Now I wished he was still around to hear my postscript: "I like it — I think Steve's tried too hard to sell the mush. The Kasperwing would be worthy of your interest even if you never ventured into the vortex lift regime.

"But if you really want 'helicopterlike descents' — all the way to the ground, with full control independent of forward airspeed and a soft touchdown sink rate, stick with your JetRanger. No flying machine in the heavens but a helicopter or a VTOL craft can give you that — not even a Kasperwing. ■

KASPERWING 1-80 SPECIFICATIONS

The Kasperwing 1-80 is also available as the 1-80 BX, an option which adds pilot pod, wheel pants, larger fuel tank and electric start.

	Kasperwing 1-80	
Airframe	Empty weight	175 lbs
	Wingspan	35 ft
	Wing area	180 sq ft
	Height	7 ft 6 in
	Length	12 ft 8 in
	Fuel capacity	2.5 gal (5 gal optional)
	Seats	One, supine harness system
	Construction	Aluminum and Dacron
	Portability	Cartop
	Setup time	30 minutes, one person, handtools
Powerplant	Engine	Zenoah
	Output	23 hp
	Thrust	170 lbs
	Drive type	V-belt reduction, 2.5-to-1
	Propeller	54x27, wood
	Fuel consumption	1 gph (cruise)
Performance	Stall	22 mph
	Cruise	35-45 mph
	Top speed	55 mph
	Vne	60 mph
	Gross weight	450 lbs
	Design load factor	+7 Gs, −4 Gs
	Climb rate	800 fpm
	L/D	10-to-1 (with pod: 12-to-1)
	Wing loading	2.5 lbs/sq ft
	Power loading	13.5 lbs/hp
	Field requirements	Short field
Buying Information	Suggested retail price	$4,450 (kit) $5,250 (assembled and test flown) $5,665 (BX kit)
	Manufacturer's address	Cascade Ultralites 1490 19th Ave. N.W. Issaquah, WA 98027 (206) 392-0388

GLIDER RIDER ULTRALIGHT REPORT CARD

Ground handling	B
Comfort	B−
Roll response	B+
Pitch stability	A−
Crosswind capability	C
Quality of finish	B−
Low noise level	B
Rough field capability	D
Beginner suitability	A−
Cross-country capability	B
Overall Rating	**B−**

Evaluator:

Jan W. Steenblik

Grading System

A = excellent, B = good, C = fair, D = poor, F = unacceptable

Definitions

Ground handling — Ability of the pilot to adapt easily to the aircraft on the ground: feeling of control; comfortable ride. Any discomforts should be considered.

Comfort — Overall pilot comfort: ease of entry; seat comfort; location of controls. How well the machine accommodates the pilot, including restraint systems.

Roll response — Rated for both authority and response time in the roll axis.

Pitch stability — The ability of the aircraft to be flown with little attention to pitch. The tendency to return to a given airspeed after the controls are displaced.

Crosswind capability — Not necessarily dependent upon full split-axis controls. Based on actual flight experience. A subjective rating.

Quality of finish — Overall attention to detail in finishing the aircraft. Appearance. For homebuilt or kit-constructed craft, the finish quality of materials supplied.

Low noise level — A combined rating for both the pilot station and a position on the ground during flight.

Rough field capability — Ground and propeller clearance, shock absorption and pilot protection.

Beginner suitability — An overall rating, based on pitch stability, power matching and powerplant reliability. Ease of communication (low noise level) and a suitable sturdy restraint system are desirable.

Cross-country capability — A combined rating of rough field capability, endurance, pilot comfort (especially low vibration level) and cruise speed (penetration).

Overall rating — The evaluator's honest opinion of the craft as to how well it *meets design goals*.