Pilot Flight Check:

HELIO'S STALLION

Typical demonstration takeoff of the Helio Stallion at the company's production plant in Pittsburg, Kan. Note deflection of full right rudder and 30 degrees of flap.

Photos by Don Downie

Helio's superpowered "Stallion" has little use for an airport. The turboprop Stallion, an overgrown, overpowering version of Helio's reciprocating-powered Courier, just doesn't need conventional airports. Any old cow pasture, sandbar, short section of dirt road, or wide spot between the boulders that's over 320 feet long and smooth enough for a dune buggy is target-for-today with a Stallion. Just about the only time you might see a Stallion operating from a conventional airport would be to pick up people and/or supplies for deposit in the back country.

The stark, rugged, FAA-approved Stallion isn't a thing of beauty unless you happen to love high-performance, sensitive machines that will operate into areas that are off-limits to anything except a helicopter. The Helio Stallion won't quite land or take off vertically; you'll need about 320 feet of "something" to get into the air at full gross and another 250 feet to get stopped where maximum braking and full-reverse prop can be used. This airplane, however, will carry more weight faster and cheaper, and land slower and shorter, than just about anything in the air.

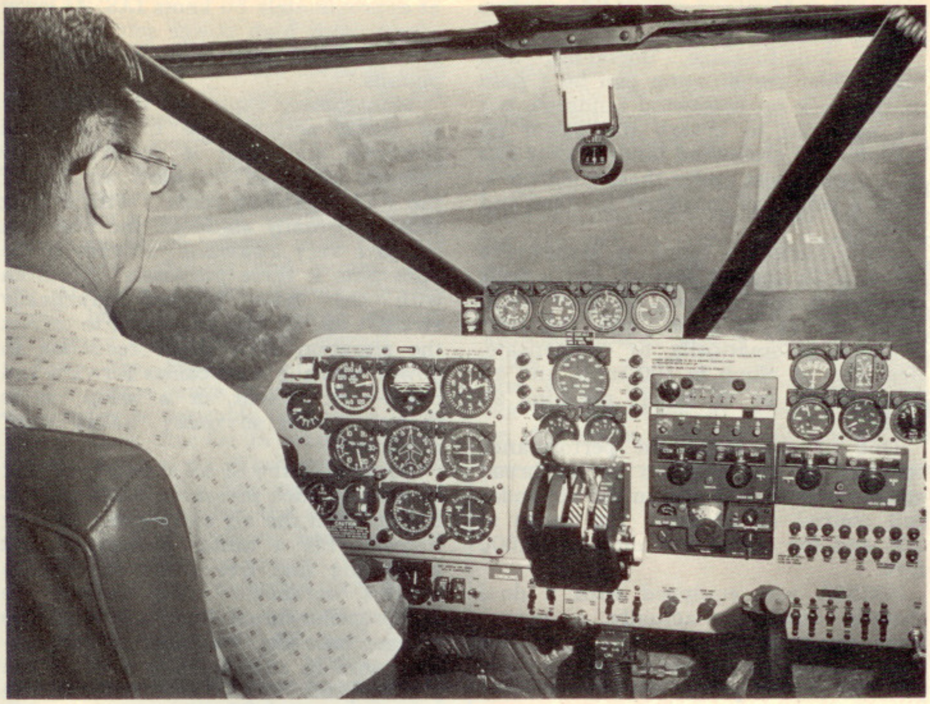
The "C" in Helio's "C/STOL" designation of the Stallion stands for "controllable" slow-speed flight. At 5,100 pounds gross weight, there's a useful load of 2,240 pounds, but the military flies these aircraft at 6,300 pounds with a useful load of 3,070 pounds. To date, 18 Stallions have been built. Fifteen have gone to the military (AU24A) for special uses. The first three Stallions were used for static- and flight-testing.

The first Helios were designed and built at Norwood, Mass., in 1948, by Professor Otto Koppen of the Massachusetts Institute of Technology and Dr. Lynn L. Bollinger of Harvard. The company has since moved its corporate offices to Hanscom Field, Bedford, Mass. Nearly 500 Helio "Couriers," with a

Helio Stallion H-550A Specifications And Performance

Engine	680-shp P&W PT6A-27
Wingspan (ft)	41
Length (ft)	39.6
Height (ft)	9.25
Gross weight (lb)	5,100
Empty weight (lb)	2,860
Useful load (lb)	2,240
Fuel capacity (std, gal)	120
Takeoff ground roll (ft, sea level)	320
Over 50-ft obstacle (ft, sea level)	660
Landing roll (ft, sea level)	250
Over 50-ft obstacle (ft, sea level)	750
Rate of climb (fpm, sea level)	2,200
Speed (mph)	
Minimum (sea level)	42
Maximum (10,000 ft)	216
Performance cruise	206
Economy cruise	160
Service ceiling (ft)	25,000
Range (sm, std fuel)	640
Base Price	N/A*

* Price for 1973 model not established by company as of press time.



On a short final approach for Runway 16 at Atkinson Airport, Pittsburg, Kan. Larry Montgomery, Helio's director of technical services, is at the controls.

by DON DOWNIE / AOPA 188441

Talk about STOL characteristics! This back-country workhorse can fly at 42 mph, take off in 320 feet, and land in 250

series of reciprocating engines, have been completed. Production was moved to Pittsburg, Kan., in 1955. Pittsburg is some 25 miles northwest of Joplin, Mo.—the nearest airline stop—and sectional charts indicate a fine 4,000-foot airport (Atkinson) and an adjacent circle with a big red "R" marked "Helio-Pvt." With 1,100 feet of "runway," there are few fly-in visitors at the factory unless they happen to be Helio owners.

"Actually, we have 1,400 feet of cornfield adjoining the factory, but only 1,100 feet is usable," explained Larry Montgomery (AOPA 92875), Helio's director of technical services. Montgomery first heard about the Helio while flying as a missionary jungle pilot—10 years in Latin America and, later, in the Philippines. Larry and another missionary pilot ferried the first Courier to South America. Half of Larry's 16,000 hours in the air has been in Helios.

A low ceiling and three-mile visibility changed our game plan slightly. Since the weather was forecast to improve later in the day, we rolled a two-year-old Courier—N6463V—out of the hangar for a brief refresher in C/STOL flying. The Super Courier had a 295-hp geared Lycoming powerplant, full instrumentation, and a Goodyear crosswind landing gear.

Rather than demonstrate the breathtaking performance of C/STOL, Montgomery put me in the left-hand seat and merely did the talking. He's a good talker, too! My first shot at Helio's "Cornfield International" was over a 40-foot-high row of trees. As we touched down, I applied heavy braking, but there was no tendency for the Helio to nose over. As we skidded toward a stop, I intentionally made a partial groundloop so that we came to a stop at 90 degrees to the "runway." Total distance past the trees was perhaps 450 feet. "You can cut that in half with some practice," said Montgomery.

Soon I was making maximum-performance takeoffs, followed by a close-in turn around the corner of the factory building with a wingtip fairly close to the ground.

"Go ahead and steepen it up," encouraged Montgomery. "You can't scare me!" Not true! Montgomery is an extremely cautious pilot, but he's well aware of the Helio's capabilities.

As the weather improved a bit, we rolled a big Helio Stallion—N9550A—out of the hangar. Up front there are 275 pounds of Pratt & Whitney PT6A-27 that crank out 680 shp. Time between overhauls (TBO) for the Turbo Helio is 2,100 hours, but that is expected to go up shortly, since some commuter airlines are now going between 4,000 and 6,000 hours. The 101-inch, completely reversing, three-blade Hartzell prop weighs 115 pounds. The comparatively light weight of the Stallion's power package results in a long, thin nose cowling. List price for that engine and prop is $50,000, but Montgomery pointed out that "maintenance is drastically less on this engine than on a piston model. When you're flying an airplane designed for the back country, you don't want to worry about the powerplant."

Helio's chief executive, Robert Kimnach, said a firm price had not yet been established for 1973 Stallions. The price, however, was anticipated to be considerably higher than the 1971 price tag of $138,500, due to higher costs for engines and other parts. Kimnach said the base price for 1973 Stallions would be announced later this year, but that the company was accepting advance orders for the aircraft. Total production capacity during the first part of the year was being devoted to filling a backlog of orders for Couriers and parts for Couriers, he said.

Exhaust stacks for the PT6A-27 have been extended and streamlined to keep fumes and heat away from the fuselage when the doors are open. As with all other turbines, however, you can still smell kerosene on the ground and at low idle of the engine.

The landing gear drags back at a 41-degree angle to put the main oleo shock struts in the engine compartment for easy access. The engine mount and cockpit area back to the wing attach points are made of heavy steel tubing. From that point aft, everything is heavy-gauge aluminum.

It's only when you climb aboard that you realize the Stallion is a BIG airplane: 41 feet across the wings, and 39 feet 7 inches long. With the tailwheel on the ground, your eye-level is almost 8½ feet above the turf. Over-the-nose visibility is excellent, since the narrow cowling is canted five degrees nose-low so that the thrust line of the propeller will be more nearly in level flight during takeoff.

Takeoff procedure calls for full power, according to Montgomery, who has checked out more than 300 pilots in various versions of the Helio in the past 17 years. Full throttle is 98 percent of turbine speed (up to 101.5 percent for short periods of time), and to stay within engine-operating limits it is governed on a hot day by the maximum ITT (inter-turbine temperature) of 725°C or, on a cooler day, by 53 psi on the torque meter. Propeller redline is at 2,200 rpm forward and 2,090 rpm in reverse ("beta").

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At full power, there's so much slipstream that the two inboard slats may pop open before the aircraft has begun to move. The Helio has two independent, air-loaded leading-edge slats on each wing. It isn't unusual to see the slats on the inside wing pop open in a tight turn, while those on the faster-moving wing on the outside of the turn remain closed. In flight, but not during runup on the ground, the inner slats tend to open last, due to the influence of the big 101-inch propeller. If there's a malfunction or sticking flap, Montgomery suggested, "Add about 10 mph to the airspeed and proceed as usual. Should severe icing freeze the slats shut (and this has happened), the wing is flown with some additional airspeed and provides about the same performance as a conventional wing under similar conditions."

Short-field takeoff calls for 30 degrees of flap (flaps comprise 72 percent of the trailing-edge span of the wing), brakes locked, power to maximum limits, release brakes, allow the tail to come up slightly (three to four seconds at light weight and six to seven seconds at full gross), and haul back on the stick as the airspeed hits 40 mph.

It takes just one takeoff to realize why the Stallion has such a large dorsal fin (37 square feet). With its long fuselage and high rudder, the Stallion still takes FULL (and I mean FULL) right rudder for takeoff. On a couple of takeoffs, I had to tap a little right brake to keep the nose up front, but the takeoff roll is so short that there's really very little time to get too far out of line. A tailwheel lock is available as an option, but Montgomery said he prefers not to use it.

The long-fuselage, dorsal-fin, and high-rudder combination can be a pain in the neck on crosswind landings, but it's essential to absorb the power on takeoff. The crosswind landing gear can be a great assist under these conditions, once a pilot has mastered its care and feeding.

Deck angle on climb is somewhere between 25 and 30 degrees, but it feels as though you're lying on your back. Flaps up at 60 mph, and the trim changes automatically to compensate. Best rate of climb is 100 mph, and all flaps should be up before reaching 95 mph.

One of the important performance features of the Stallion is its broad speed range. It will stay in the air under full control at 42 mph, yet cruise at 206 and top out at 216 mph at 10,000 feet.

N9550A was equipped with a dual throttle quadrant—actually a power-lever quadrant—with single prop and fuel controls in the center of the cockpit. The second power lever is mounted on the left of the instrument panel, a location welcomed by pilots accustomed to flying a stick with the right hand and making power changes with the left.

Stick forces are high during flareout for landing because of an SFAS (stick-force augmentation system) or "stick pusher." The FAA flight manual explains: "At airspeeds below approximately 60 knots IAS, the servo force (SFAS) gradually increases, with decreasing airspeed, from zero pounds to a maximum value of 50 pounds at approximately 42 knots IAS . . . When airspeed is increased, the process is reversed . . . In the event the stick-force augmentation system is inoperative . . . a very-light-to-neutral stick force results at approximately 50 knots IAS. At lower speeds with high power settings, stick-force reversal may reach or exceed 40 pounds."

Montgomery explained the Helio has so much performance in a so-called power-on stall that it doesn't fit the "normal airplane" standard wording of the FAA regarding stalls. "With a wing that is virtually stall-less, the nose can get to a very awkward attitude if the pilot puts it there purposely . . . Even with the nose pointed practically straight up, all that is needed to correct the situation is a slight reduction in power, and the nose comes forward and down—not violent, or a 'whip,' as is the case with so many 'naked wing' airplanes."

Because of the SFAS system, you find increasing stick pressures while practicing stalls in the air and during landing flareout. It's a minor annoyance, but something that five hours of practice in this workhorse would cure. Since the propeller-thrust line is pointed five degrees nose-low, you can use considerable nose-up trim to take some of the pressure off SFAS and still not be trimmed so nose-high that a go-around would present a pitch-up problem. Actually, during one of our C/STOL approaches, I wasn't lined up the way I wanted to be, so I made a go-around with full power. It took surprisingly little forward stick pressure to take care of the power.

The Stallion uses a military-type trim tab, a small button on top of the stick that handles both elevator and aileron trim. Rudder trim and a manual backup elevator (stabilator) trim are mounted on the cabin roof at the aft of the windshield.

Simple, 25-inch-long spoilers—Helio calls them "interceptors"—extend up to about 2½ inches to cut lift and increase

The vane at the left of the Turbo Stallion's wing activates a stick-force augmentation system (SFAS). Note the long flaps (72 percent of the trailing-edge span).

drag only when the aileron is in the up (wing down) position. This spoiler action is most effective at slow STOL speeds when the slats are open. At high speeds, only small movement of the ailerons is needed, and the spoilers remain buried inside the wing. The spoiler/aileron combination is a vital part of Helio's excellent slow-speed control.

We shot a series of "touch and goes," —perhaps better referred to as they are in Canada, "circuits and bumps,"—at the Atkinson Airport. Except for the "beef" imposed by the SFAS system, everything was completely normal.

Since the Helios are taildraggers, previous experience in Stearmans and AT-6 types is desirable. For those of us who go back that far in aviation, Montgomery explained: "The groundlooping tendencies of the Stallion are not as probable as in either the Stearman or the AT-6. The Stallion, however, has Goodyear's crosswind gear that smooths out many of these potential problems."

The crosswind gear is a fine piece of machinery when you get used to it. Particularly when you're taxiing in a strong crosswind, it's great sport to kick the gear out to its 20-degree deflection and taxi with 110 percent forward visibility and the nose far to the upwind side. I did have a problem on one landing, however, where the crosswind gear helped trap me. My approach had been normal, but a slight crosswind drifted us to the left of centerline. After flare and touchdown, the ship wanted to continue drifting to the left with the crosswind gear unlocked. I applied right brake and promptly activated the gear. This kicked the nose off to the right, but we were still drifting toward the left side of the strip—and the runway lights.

"Get on both brakes and reverse the prop," Montgomery snapped. This was the only time in over two hours in the air that he spoke quickly. I stood on the brakes and came back into reverse pitch with the power lever. After sliding to a stop in too-close proximity to the edge of the runway, I suggested locking out the crosswind gear to eliminate one of the variables that a new pilot encounters in the big C/STOL turboprop.

Key to C/STOL landings is a planned approach. The air-loaded slats come out at about 60 mph (somewhat higher with heavier loads) and double the effective lift. Fowler-type flaps extend both down and aft to increase the effective wing area, just as they do in today's jet transports. The electric flaps take about seven seconds to reach a full 40 degrees. There's a slight nose pitch-up as the flaps extend, but the flap interconnect system does about two-thirds of the trim work.

Montgomery's graduation obstacle course is a 280-foot patch of turf between Runway 10 and the south taxiway, adjoining the big tetrahedron at the Atkinson Airport. I finally tried it for size and almost got the job done. The approach was satisfactory, and I could both feel and hear the slats pop out. I wrestled with the SFAS stick pusher and finally planted the tailwheel on the edge of the runway just short of my spot. Tailwheel-first landings are not unusual in the C/STOL, but it's a "no-no" in the back country if you undershoot your spot, since you might leave your tail feathers on a stump or in a ditch.

As we rolled onto the grass, I applied hard braking and noted no tendency for the tail to come up, despite our light loading. Then came full reverse on the power lever. The PT6A-27 let out a muffled roar as the blades switched angle, and a shower of cut grass came up off the turf. We stopped and would have backed up if I had not cut the power by pushing forward on the power lever into idle range. We almost stayed within Montgomery's 280-foot target. With another hour of landing practice, I believe I could have stayed in the ballpark three landings out of four.

Even in the flat country of Kansas, the Stallion is an impressive airplane, but in the back country for which it was really designed, it's undoubtedly even more impressive.

The C/STOL characteristics of the Stallion are far removed from flight characteristics of the "naked wing" aircraft. One could write flight evaluations or study brochures for weeks without having a feel for what this big workhorse will do. You really have to see it at work, then fly it yourself, to become a card-carrying convert to C/STOL. □

Traffic Pattern Rule Still Holding

■■ Despite earlier plans to have the long-sought standard traffic pattern rule implemented at nontower airports by early 1973, FAA was still kicking a draft of a final rule around at press time. The delay apparently stems from problems concerning aircraft making instrument approaches in VFR weather and excess speed in the pattern. When the original draft of the final rule was circulated late last year [Oct. 1972 PILOT, page 26], AOPA and others told FAA these problems had to be addressed in any final traffic pattern rule.

At that time FAA held that any restriction of instrument approaches in VFR conditions was beyond the scope of the original notice. Since that time, however, ". . . the lawyers have decided that it's within the scope of the notice . . ."

The present draft rule requires aircraft making instrument approaches at nontower airports to break the approach off and enter the standard pattern if VFR conditions are encountered, according to a source within FAA. "They [the FAA attorneys] decided to draft the thing and send it through for final coordination [within FAA] and make an official determination at that time," the FAA source added.

Asked about a possible pattern speed limit in the present draft rule, The PILOT was told FAA had elected to stay with the terms of the original notice—156 knots for reciprocating-engine aircraft and 200 knots for turbine-powered aircraft. FAA's Ward Taylor, of the Air Traffic Service, made this observation about additional speed restrictions at this time:

"I think the biggest problem is to define where the traffic pattern begins and ends." Taylor went on to say that FAA would continue to look at the speed issue, and supplemental rulemaking would be initiated if it appears to be required.

Michael V. Huck, director, AOPA Air Traffic Control Department, said the Association possibly would petition FAA for the supplemental rulemaking if the final draft of the rule doesn't cover the point. "It's dangerous to be hanging in the pattern and have somebody go whizzing past you like you were parked. Without some kind of restriction it's just like allowing cars to blast through an intersection at 80 mph!"

Earlier word from FAA indicated the agency was going to opt for a 1,000-foot-agl standard traffic pattern altitude. An FAA spokesman recently said, however, that that figure was not completely set in cement.

"This is a determination I believe that we will make after we get complete returns from the [FAA] regions, and get an indication from them as to what they feel is going to be the most popular. It looks as though, at this point, 800 feet will be more a standard than 1,000 feet.

"Really, a standard boils down to one thing—whatever is used most will be more or less accepted as standard, and exceptions will be charted. . . ."

What's the latest word on the timing of any traffic pattern rule?

Well, The PILOT was told that the draft rule had gone to the FAA General Counsel's office for drafting and would be circulated within FAA for coordination. The FAA Regulatory Council must pass on the final draft before it can be implemented.

An FAA official put it this way:

"It will all depend on their workload . . . It's just a matter of time now, and final coordination." —P.V.O.