AIR FACTS The Magazine for Pilots
March 1949

THE PIPER CLIPPER
By Leighton Collins

In pursuing further his long-held thesis that rather than getting bigger and heavier all the time the strictly personal airplane should be getting smaller and lighter, Howard Piper has most likely set private flying off on an entirely new cycle.

The Pipers have a new airplane now, the Clipper, or PA-16, which weighs only 850 pounds, including starter, generator and battery. The construction is not lighter; in fact it appears to have gone the other way. But the total weight is down —simply because the size is down—the airplane just isn't big enough to weigh much. And weight is important for, after all, airplanes are so much a pound: 850 pounds @ $3.52 per pound is only $2995.00. But that is hardly more than the half of it. Believe it or not, this airplane will carry 800 pounds of useful load, or almost its own weight! Such a ratio as that has not been approached before except in the air transport category, but for the private flyer it pays off just as well as it does for the ton-mile people: for $2995 you get a spectacular two-place, only a little less spectacular three-place, and a good around-the-airport or short range (2 1/2 hr.) four-place. That's a mighty lot of airplane for $2995 and is unquestionably going to have a far reaching effect on both private and rental flying.

It wouldn't, however, if the airplane didn't have far more than price and performance to offer. Fortunately it has. For instance, on the coldest day you'll find yourself flying it in comfort without an overcoat on. And you'll find yourself sitting in high-back seats that are extremely comfortable and plenty wide for you and your passenger alongside. You'll find, too, that the noise level, while not the lowest, has had the edge taken off it and that there's enough Air Foam padding in the seats to prevent the engine vibration from working on your back. Behind the rear seat there's a 50 pound baggage space which will hold a couple of medium size suitcases. The front seat can be moved fore and aft about 4". In about half a minute the entire rear seat can be folded out of the way making the rear of the cabin and baggage compartment available for up to 400 pounds of cargo. Other items could be mentioned, but the point is that as you keep looking around you keep finding refinements that you just wouldn't expect in the lowest price four-place. Not expensive things — just little things that make you feel that the man who built the airplane intended using it himself.

The idea of a right front door and a left rear door may strike you as odd. Actually, you can get in the rear seat-, through the right front door as the backs of the front seats are hinged, and at first you may find yourself forgetting about the left rear door and going in

that way if the right front seat is unoccupied. But that other door is the pay-off on getting in and out of the back of an airplane of this type. The door is so wide and low that you simply sit on the seat while standing on the ground and then swing your legs in and slide over. The door, like the front one, closes snugly and with a sound befitting a far more expensive airplane. This is important. From lack of attention to little items like this many a first-rider gets the impression that airplanes are too flimsy to be safe.
The airplane is offered in two models, Standard and De Luxe. The standard was not flown, but due to the bare fabric interior like the Vagabond's, it is said to be too noisy. This is, of course, the one that will be bought mainly by operators for rental purposes, but you wonder whether it's really the best investment for them in the long run. At any rate, have it, but also a De Luxe for those who want to pay the additional $100.00. The De Luxe has nice interior trim and upholstering, extra foam in the seats, carpet, an attractive cream color with fuselage stripe and gives you quite a different impression than the bare model, especially if you can see an additional $58.50 for wheel pants.

It was extremely interesting to observe the reaction of the Piper Distributors to this airplane. Most of them had no advance news of it before the annual Distributors' Meeting in Lock Haven early in February.

As you know, new airplanes do not get much of a break — the first thing pilots do is start picking them to pieces. This one got off lighter than most — but don't think those Distributors are tender hearted on the subject; of all people they can't afford to be, they have to sell the airplane.

First, you'd see their reaction to the general appearance of the airplane as they'd circle around it. With its trim and graceful lines the little Clipper took that round easy, in every case.

Then they'd start climbing in, four at a time, and somehow Piper Distributors aren't exactly small. When they'd all get in and shut the doors their eyebrows would gradually start rising and in a minute you'd be wondering what in the hell they were all so happy and smiling about. Well, it's just a case of the cabin having a shoulder width of 39" front and 37" back, the seats being really comfortable, and there being plenty of head and leg room.

But pilots will be pilots — after they'd get out and then look at the wing again they'd shake their heads and just know it couldn't possibly get off all right with four in it. That seemed to be the main thing on their minds, "How does it get off with four in it?" Beverly Howard was one exception to that: he said what he wanted to see first was whether with full load the flare was critical, due to the expected high rate of sink. In other words, if you flared a little early would it fall out from under you or if you were a little late in flaring could you stop your descent in time not to hit too hard.

Article by Leighton Collins for Air Facts Magazine, March 1949
Reprinted with Permission from Richard Collins
By ShortWingPipers.Org

The chance to fly the airplane and find out about these things came when the Distributors went back into their meeting and the De Luxe Model was moved from the display hangar onto the field. There was several inches of snow on the runway, a ground wind of 20-25, temperature about 25°, barometer 30.50°. The field elevation is about 500'.
Usually with Piper aircraft they don't tell you anything at all, and didn't this time except where to find the starter button. It is a good thing they did for it is in a very unusual place. It is up underneath the front of the left seat and you push up, which recesses the button into a guard. That's a good location in view of the fact that the starter button is hot whether the master switch is on or off.

The gas situation involves a 12-gallon tank up underneath the instrument panel which has a readily visible Model A Ford gauge, and an 18-gallon left wing tank with a float type tubular gauge projecting down out of the bottom of the wing. The selector valve is on the back of the fuselage tank and you can have either tank or off. There are some words beside the valve which were taken to mean that the wing tank must be run dry before the fuselage tank is used, but you can just forget this placard unless you happened to be flying one of these which had no starter, generator or battery. No question of fuel flow is involved, but without the starter and generator weight up front the *cg* situation becomes marginal if the wing tank is full and the fuselage tank empty and you have 400 pounds in the back. But in the Standard and De Luxe models, forget the placard's on there and use either tank you please for take-off or at any other time. (It is handy to remember that in a De Luxe model with wheel pants and say a two-way radio, the fuselage tank is all the gas you should have with four 170 pounders in the ship. Anything they averaged under that
could go-into the wing tank @ 6 lbs. per gallon and into the baggage compartment, up to its 50 lb. limit. In a standard model without radio or pants, with only the fuselage tank filled you could carry four 170 pounders and 40 lbs. of baggage, or if there were no baggage, then 6 gallons in the wing tank, making a total of 18 gallons).

The first flight was made with two in the ship, in front, and considering the amount of power which it had been necessary to use in order to taxi through the snow, the acceleration in the take-off run was quite a surprise. It really gets going. The run in seconds is so short that it causes you to feel the distance is equally short. In any event, it is not long and in no time at all you feel the ship light on the wheels, the rudder a little lively and you are off and on your way. And in a big way, for at 80 m.p.h. you are climbing certainly a good solid 1,000 f.p.m. and with your nose way up there. Maybe it is all in what you are used to, but that much climb in a small airplane is going to be a most invigorating experience to a lot of pilots.
In moderately rough air the airplane rolls a little more than a longer-span ship might, but the roll is accompanied by very little yaw and consequently the ride is much better

than you expect considering the short fuselage. You find, too, that the airplane is a good rudder ship and that you'd do most of your cross country flying mainly with the pedals.

Directionally the ship is rather unusual. Push the rudder and release it in level flight and the nose literally snaps back with virtually no over-swing or oscillation.

There's an interesting feature of this ship's longitudinal stability. They had trouble with it at first because if you keep adding power to an airplane without increasing its size the propeller finally begins to have a de-stabilizing effect at high power, as in a climb. You can think of it in terms of a projection of the propeller blade in the horizontal and vertical planes, in effect, adding a fin and stabilizer surface to the nose of the airplane — which would have the same effect as reducing the size of the fin and stabilizer on the tail. In addition to this effect, they also had the problem that the bungee spring they have to use to get enough up-elevator in a hands off power-glide to meet CAA trim requirements is within itself a de-stabilizer. The problem was cured by using a double-acting bungee, which, fortunately not only cured their lack of stability but actually increased the stability. If you run the overhead trim crank sitting on the ground sometimes you'll notice that the stick follows the trim and that any time you move it either fore or aft it goes against the bungee springs. The airplane can now be trimmed to climb hands off at any speed you want up to the stall and holds its trim speed quite closely, returning to it if disturbed. And, of course, its speed-keeping tendency is even better, power-off.

All in all, in rough air, you'd probably have to say that the airplane gives a very good ride, one somewhere in between the Family Cruiser and the Vagabond, but much closer to the former.

At 2400 r.p.m. the indicated airspeed was 110-115 and there's no reason to doubt the top speed of these, lightly loaded, is close to 130. Even at 2200 r.p.m. (this was a cruising prop) the ship would indicate 100 m.p.h., which would mean about 51/2 g-p-h-at close to 50% power, if you like to throttle way back.

The really big surprise in flying the Clipper, however, comes in examining the stall and slow flight control characteristics with two in front. You rather expect a short span, short coupled airplane to be pretty lively, but this time the Pipers really went after good behavior at the stall. With only two in the ship, in front, the little Clipper is on a par with the very best.

In your straight, slowly approached power stall you get the SFI horn (standard equipment) at about 50 with the nose inordinately high and a lot of back-stick pressure required to hold it up there (in cruising trim). But to get the stall you have to go on up for 40 indicated, where she shudders and shakes and lowers her nose (stick full back)

but will not roll off towards a down aileron. Actually, you find you have just enough aileron control to level the ship if you want to, but not enough to stall either of the wings with down aileron. Rudder jockeying at the stall gives even more positive lateral control and the ship bobs around like a cork, pitching a little, rolling a little, but without any loss of control or suggestion of it, other than, of course, a rather considerable rate of descent.

In turning flight with power the situation is even better: you can't stall it if you go after it gradually. By the time you get down to about 60 indicated the stick is as far back as you can pull it with one hand and if you use both you finally get to a stick-back steep turn at about 50 indicated with about 70° bank. In this turn you can move the ailerons abruptly without putting the ship out of control, and, in fact, with full aileron deflection get only a very slow rate of roll. Then you can start pushing bottom rudder and crossing with opposite aileron to keep the bank constant at 70°. No sale. You finally wind up with full aileron to unbank and any more bottom rudder than you have will simply override the aileron and increase the bank. This is extremely important: when you get an airplane that will keep flying like this with fully crossed controls in a tight, steep turn you've got something the customer's going to get along all right with.

Power off, you glide along straight at about sixty with the nose up and the wing making quite a noticeable angle with the horizon. Finally you get to a point just below 50 and find yourself gliding along with the stick all the way back and that's all there is to it. You are settling so fast the elevator won't push the tail down enough to get a stall. At this point the ailerons are light, but still in business and devoid of any reversal characteristics. You can glide off into a spiral at this minimum speed and still don't stall — just a high rate of sink and sluggish controls.

Having found the airplane to be completely free of any tendency to hit back as a result of misapplication of controls in the stall when flown as a two-place, the big question immediately became how it would be with rearward *c.g.* With a passenger in the rear, it looked at first as if there was not going to be any difference, and in the power off situations there wasn't. But after a number of power stalls in cruising trim the stabilizer was run all the way down, as that would probably give the same trim angle as if you had 400 pounds in the back and were in, say cruising trim. Even then it took several tries to get the ship to roll off towards a down aileron. It would often start, but pick itself up and fly out before there had been much change in either heading or bank. But, as stated, finally it did roll off and go rather rapidly to the spin attitude due solely to full deflection of the ailerons in a straight power stall.

In none of the other flight conditions, power on or off, did the passenger in the back plus tail heavy trim have any adverse effects, so the one condition in which the ailerons aren't perfect is apparently with a considerable rearward *c.g.* at the straight power stall

— with some possibility that even this wouldn't apply if the ship were being stalled with the stabilizer set in the cruising position. All in all, if you were going to weigh or rate the importance of where the ailerons should always work, you would have to give about 95 points to the turning flight condition and only five to straight flight. On that basis this airplane is mighty close to being as stall resistant as it is possible to make one — and with the resistance where it counts the most — in the turns.

Approaches in the Clipper are really enjoyable — they are extremely accurate. As you throttle back there's enough nose heaviness to call for trimming, first to about 80 without stick load, then to 70. Notice, however, that the airplane is by no means trimmed full tail heavy — and that it never should be.

Gliding at 70, or rather as you hit 70, there is noticeable increase in the rate of sink. Slowing to 65 gives a still further noticeable increase. Just over 70 and it is reaching out again. So you see right off you've got a very powerful glide path control with your stick. Simply watch your airspeed and your rate of sink. If you are a little high, slow a little and you'll come right on down, or if you are getting low, speed up.

The glide path at 65-70 is moderately steep and, in consequence it is quite easy to pick out the spot on the end of the runway that you're interested in. Under the wind conditions at the time, the steepness of the path was exaggerated considerably, but even then was not objectionably steep. The main thing is the way you can make it steeper or shallower with speed changes: stick back to go down, stick forward to go farther.

The flare does not appear to be critical. If anything is, it is the approach speed, if you get way too slow. If you come in at around 70 you are just about right: you can flare high, say hitting 60 at 30', and start getting the tail down steadily from there on. You'll land with only a light thump. If you flare close to the ground starting with 70 you'll find it floats just a little and then nestles down to an incredibly soft landing. It has an unusual lot of feel in the stick and also in a three-point attitude the ship is not quite as close to the stall as is usually the case, so you don't have to stall it and therefore start dropping in order to get a three-point. It also has the usual Piper stability flying in the ground cushion. When you make only one really good landing a year in your own airplane, you can't help being impressed when it is possible to paint on 14 out of a total of 15 landings in an airplane you've never been in before. Obviously, it's all in the airplane.

Now as to coming in too slow. You wouldn't lose control. You just wouldn’t stop your rate of sink when you flared. The ship stalls at an indicated 42, approximately, the stall horn blows at 50, and if you came in just enough above 50 not to get the stall horn you'd probably need a new gear because it would settle right on through even though

you pulled the stick all the way back. You wouldn't have stalled, you wouldn't have lost control, you'd just have come in too slow.

Actually, this is not likely to happen because a high rate of sink is one of the best of all warnings, both of stall and of too slow approach speed. It is hard to imagine anyone being able to glide one of these much under 65 and be happy about the way the ground would be coming up. The mass being low, it responds almost instantaneously to throttle, not to mention the perennial benefits of nosing down a little.

This approach speed situation has developed quite a discussion between the factory and Dr. (SFI) Greene, and illustrates the extent to which the conditions, limitations and exceptions in flying often wag the dog. Dr. Greene urges that SFI's be set at 3-5 miles above the stall and in every airplane so far he has been right on that. With the Clipper setting now 8 miles above the stall he is unhappy: if the horn blows too far above the stall he feels people will start ignoring it (actually with this setting it gives only one short toot just after touchdown in a normal landing). The Pipers are wondering if maybe it shouldn't be set at 60 — 18 miles above the indicated stalling speed: they want it to tell you when you are beginning to go too slow. This possibility should be explored fully. There's certainly no point in climbing the airplane at less than 60, and certainly no one should be approaching under 60. The SFI is, in reality, an angle of attack indicator. With this airplane the practical consideration is not the stall (at 42) but the minimum healthy gliding speed or angle of attack — which in this case is way above the stall and which the SFI can indicate very accurately, even though it is departing from its usual function in doing so.

Flying the ship with three in it did not seem to make any appreciable difference in take-off and climb. Instead of 800' over the factory it was about 600 this time. The approach also seemed little different, but the landing speed seemed up a little. (It lands at 50 with a full load in standard air at sea level, which is about 5 miles faster than the Family Cruiser fully loaded).

When you finally get loaded up with four, you feel that this is asking a lot for both the money and the horsepower and also that small wing. But climb is a question of power available for climb. What you have to climb with is the difference between the power it takes to fly level at minimum controllable speed and how much power you can get while climbing wide open at your best climbing speed. In this case they've raised the ante on the power available at climbing speed by a special crossover exhaust system they devised. It doesn't increase the rpm in full throttle level flight but does raise substantially what you can turn while in a climb: each cylinder's exhaust gases are sort of pulled along by the gases of the cylinder on the other side of the engine which fired just ahead of it. The net result is that if you didn't have this crossover exhaust manifold system

you'd have to have an engine with approximately ten more horsepower to get the same climb.

It gets up very well with four in it. None of the distributors who flew the ship with four seemed unhappy when they came down. You can't tell, of course, for sure what drop in performance there may be between a cold, windy winter day and a muggy summer day. Some ships lose their poop at 80°, some at 90°, some at 100°, and some not at all, or at least not all of it. It's not a good thing to guess on, but the distributors certainly weren't getting kidded. The take-offs were being made in several inches of snow with a prop that would turn only 2150 on the ground.

At Lock Haven they always get approval on the steepest pitch prop they can meet minimum climb and maximum head temperature requirements with, and then on the flattest pitch prop they can use. After that then ' they can use anything in between without further approvals. The 2150 prop was the steepest pitch one they could climb with at the necessary 12:1 ratio (100 feet high 1200 feet from point of take-off) with gross load, which works out 600 f.p.m. at 75 m.p.h. It seems reasonable that the distributors aren't going to see much less full-load climb in July than they saw in February: the production jobs will have props turning around 2250 static. As mentioned, they all seemed to have found far more full-load performance than they expected and in fact to have been well pleased on that score. In testing the ship at Lock Haven last summer they were always able to climb with the Family Cruiser, both ships fully loaded. Summer effect can also be further taken care of with the McCauley, Aeromatic, and Sensenich Sky Blade as they will all be approved by then, and all give approximately 150 pounds more static thrust at the start of the take-off. The Aeromatic and Sensenich will also permit 2800 r.p.m. for one minute on take-off, which is 115 h.p. Maximum continuous operating horsepower is 108 at 2600 r.p.m.

All that's left is that it has a Monocoupe-type shock cord gear, dual controls, hydraulic toe brakes with parking brake, steer able tail wheel, idle mixture cut-off, it doesn't slip so well (it unbanks) but doesn't need to, and the SFI is wired through the master switch whereas it should go direct to the battery with a fuse of its own, otherwise people will be shutting it off,—their best friend.
All in all, the Clipper is by far the Pipers' best looking, most comfortable, best flying airplane yet and bids fair to be a worthy successor to the J-3.

Article by Leighton Collins for Air Facts Magazine, March 1949
Reprinted with Permission from Richard Collins
By ShortWingPipers.Org