My generation?
Cirrus's superb SR22 Generation 6

Maxi's Spitfire Part 2
Formation flying & meeting ATA pilot Mary

Pilot

December 2017 £4.25

Pilot 50 YEARS OF SUCCESS 1967-2017

Britain's best-selling GA magazine

WIN!
Five hours of helicopter flight training worth £1,800

Spacek SD-1

It's all in the numbers! £30k factory-built that does 100mph at 100mpg

PLUS

- 8.33 radio update
- Looking back over fifty years of *Pilot* magazine
- African Skies: ferry flight drama and Flashheart's Display Authorisation

www.pilotweb.aero

Cirrus SR22 Generation 6 p26

ON THE COVER

PHOTO KEITH WILSON

Spacek SD-1 Minisport p40

PHOTO KEITH WILSON

FEATURES

REGULARS

Mini size, maximum fun

Whether you build it or buy it ready to fly, this Czech designed SSDR will put a big grin on your face

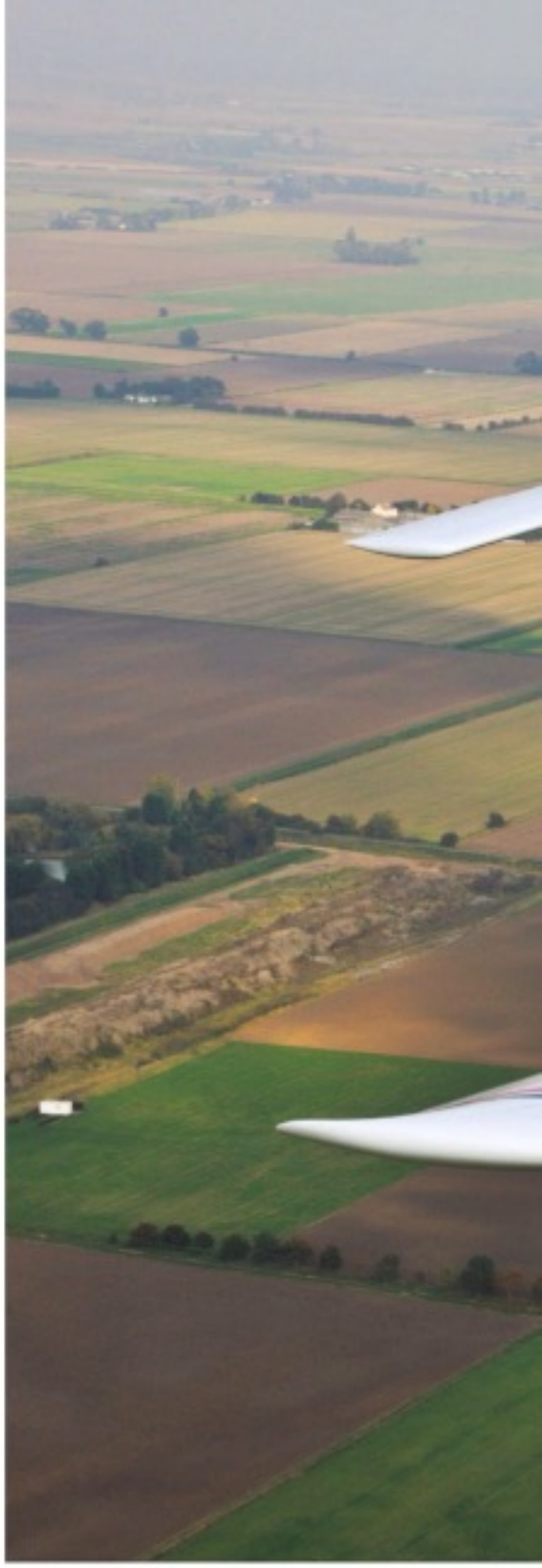
Words *Dave Unwin* **Photos** *Keith Wilson*

Having strapped on the SD-1 (well, that's what it feels like) I gestured at the fuel sight tube: "Looks like around twenty litres Jiri, so how much playtime do I have – about an hour and a half?" "Approximately four hours," he replied with a grin. Now, I'd subconsciously included the thirty minutes 'day VFR' reserve in my guesstimation, but still…

As some sectors of UK general aviation seem determined to price themselves out of existence, it's always refreshing to discover a new, fun type that is also genuinely affordable. Having flown several interesting single-seaters (and being the owner of a Jodel D.9) the smart little SD-1 really caught my eye at the 2017 LAA Rally at Sywell. Once I learned a brand-new example could be 'flown away' for around £22,000, I wasted no time in setting up a flight test – and UK agent Jiri Krajca obligingly flew it to Fenland one afternoon last month.

As it taxied across the grass the SD-1 looked a little reminiscent of the Mini-Max, probably because of the canopy, although it is actually a clean-sheet design from Igor Spacek, and intended to meet SSDR rules whilst also being competitively priced and – of course – fun to fly! My initial thoughts are that the build quality is very good; even close-up the wing and fuselage are so smoothly finished they look like they are made from composite (but are actually ply skinned). Although a relatively simple aircraft to build and fly, the SD-1 is not the easiest to write about, as it is available with three different undercarriage arrangements, five different engines, and even an enlarged fuselage. Consequently, this report will focus on the actual aircraft tested, G-CJLU.

Power comes from a 820cc aircooled V twin – bikers will understand the Moto Guzzi reference



Starting at the spinner, the propeller is a Helix H30F two-blade composite unit, which is spun by a closely-cowled SE-33 air-cooled V-twin. This 820cc engine is based on a Briggs & Stratton design usually found in industrial applications. It produces 33hp at 3,600rpm, weighs a creditable 32kg, and is fed from a 35 litre fibreglass-PVC foam sandwich tank, located immediately aft of the firewall. Unusually, each cylinder has its own magneto, while the twelve-volt electrical system uses a lightweight lithium-ion battery charged by an alternator. The fixed tricycle undercarriage features a castoring

nosewheel fitted with a friction damper, while the 300x100 main wheels feature cable-actuated drum brakes and are carried by pultruded fibreglass legs. All three wheels are closely spatted.

The mainplane is a two-piece unit, and Jiri tells me that it can be easily de-rigged by one person in around five minutes. One of the reasons it can be done without help is that, at only twelve kilogrammes, each wing is incredibly light. The wing uses a GA 37U-A315 aerofoil section and consists of a composite main spar with carbon caps, which carries ribs made of extruded polystyrene, glued in place and covered with 1mm-thick plywood. The upturned wingtips are entirely composite. Almost the entire trailing edge of each wing consists of full-span flaperons which have three settings: 'Up', 'T/O' (7°) and 'Land' (20°).

The mainplane is a two-piece unit... de-rigged by one person in around five minutes

The truss-type wooden fuselage is covered with plywood varying between 0.8 to 3mm thickness and has a Galaxy GRS

The get-out clause: a BRS parachute is an option (alternatively you can make this an additional baggage bay)

4/240 ballistic (parachute) recovery system attached to the fuselage bulkhead behind the cockpit, with the front straps attached to the upper engine mount. The BRS is optional and this space can also be used for baggage if you choose not to have the 'chute. The baggage bay is behind the raked seat back and can carry up to a maximum of ten kilogrammes. The actual amount varies according to the pilot's weight and fuel quantity. I'm not thin and, with no baggage, can fill the tank completely, but with maximum baggage I'd be restricted to 21 litres (which, you may recall, is still around four hours, no reserve).

The all-flying tail or stabilator is statically balanced and features a large anti-servo tab. Its construction (and also the fin and rudder) is essentially the same as the wings – a composite spar with carbon caps, polystyrene ribs and plywood skin. The flaperons and stabilator are actuated by a combination of pushrods and bellcranks, with the mixer for the flaperons under the seat. Cables actuate the rudder, while springs (also under the seat) are used for pitch trim.

As I examine the aircraft more thoroughly, Jiri confirms the salient facts and figures. It has an empty weight of 130kg and a maximum all-up weight of 240, which provides a 110kg useful load. It is 4.35m long, 1.23m tall, with a wingspan of 11.1m, and has a power loading of 9.60kg/kW and a wing loading of 39.34kg/sq m. It stalls at 34 knots, has a V_{ne} of 119 and can cruise at 85kt while burning under five litres per hour.

Operated by pushrod, the stabilator (all-moving tailplane) is fitted with a large anti-servo tab

As is usual for small single-seaters, getting in requires a bit of a knack. The composite canopy is hinged to starboard and features a NACA inlet for ventilation. Having wriggled into position (the seat is fixed but the pedals adjust) I examine the instruments and controls. One of the great things about an SSDR is that you can fit as many – or as few – instruments as you want. Lima Uniform's is an object lesson in digital minimalism: the 'glass panel'

Simple tricycle undercarriage features a GRP bow. The aircraft can also be configured as a taildragger

'Getting in requires a bit of a knack' – but Dave looks comfortably ensconced here. A bulged canopy is available to suit taller pilots

diplays are an iPad and a back-up iPhone, with engine monitoring handled by an MGL Stratomaster Infiniti E3 – and that's it! The iPad and iPhone are connected to the pitot/static system via a Talos Aeolus-Sense 3A, which receives dynamic and static pressure information, converts it into a digital format and sends it via Wi-Fi to the iPad and iPhone, allowing airspeed, altitude, and vertical speed to be displayed in whichever units you prefer. (If you're not an Apple fan, Talos also works on the Android operating system.) A moving map, compass heading, OAT, TAS etc can also be displayed. The Stratomaster E3 is a very capable little unit that can display (and record) a plethora of parameters. On the test aircraft, it showed both CHTs, rpm and oil temperature, with the status of the oil pressure only shown by a red LED warning above the MGL engine monitor. A red light set into the Stratomaster illuminates whenever any of the pre-set max/min values are exceeded.

You can fit as many – or as few – instruments as you want

Personally, I'd also put the oil pressure through the Stratomaster, as it is one of the best indicators of an engine's health. Apart from the big red 'Start' button

To the right of the reclined seat are the flap lever and BRS pull handle...

...and to the left are the trimmer (green knob) and throttle

Glass cockpit, SSDR style: iPad and iPhone doing the honours. One or two humorous touches raise a smile – do you really need that huge fancy car starter button?

(which seemed unnecessarily large, although it does also hold the bracket for the ICOM transceiver), all the electrical switches are in a neat row on the far left of the panel, and consist of a guarded 'Mag' switch (it selects both magnetos), battery master, Talos and fuel pump, with the relevant fuse above each switch. An anomaly is the switch for the electric oil pump. Although increasingly common on large piston-powered warbirds (the last aircraft that I flew fitted with one was a Merlin-powered Mustang) it seemed somewhat out of place in an 820cc vee-twin. Jiri explained that pre-oiling is simply a way to reduce wear by raising the oil pressure before start-up, particularly if the engine hasn't run for a while. Once the engine is running the mechanical oil pump takes over. The port cockpit sidewall carries the throttle, choke and elevator trim, with the flap lever and BRS handle on the opposite side. Personally, I'd prefer the flap lever to be on the same side as the throttle, but was pleased to see the choke well separated from the throttle. There is no carb heat.

One thing I didn't like was the fuel sight tube. Not only would a bit of wire poking out of the filler cap and attached to a float be perfectly adequate, but the current arrangement must make removing the panel more complicated than it needs to be. Finally, a simple slip ball was noticeable by its absence, (it can be shown on the iPad) – but one of the joys of kitplanes is that the panel can be truly bespoke.

We do prefer mechanical trim systems like the neat one fitted to the SD-1

Closing the canopy generated my usual grumble about the lack of a direct vision panel, (in fact, what this thing really needs is a sliding bubble canopy) and, with the big vee-twin rumbling away, I followed the C172 cameraship out towards Fenland's Runway 08. Even though I was taxying on grass in quite a light wind, regular application of the powerful rudder was required, along with an occasional jab of heel brake, which made me think that the nosewheel friction damper needed tightening. In fact, a long crosswind taxi on tarmac would necessitate frequent use of the downwind brake, and if the aircraft was to be based on a hard-surface airfield I'd recommend some sort of nosewheel lock. The field of view while taxying is good, although I did wonder if perhaps the bulged top cowling would be intrusive on the taildragger variant.

I've never really thought of a Cessna 172 as generating wake turbulence before, but as it starts its takeoff roll and I taxi into position it suddenly occurs to me that wake turbulence is relative, and the machine I'm in is less than 25% of the mass of a 172! Consequently I give the Cessna a head start, and also position on the upwind side of the runway. Jiri has recommended using a soft-field technique with takeoff flap, so I slowly open the throttle with the stick on the backstop, and then just ease it forward as the elevator starts to bite, the aim being to hold the nosewheel just clear of the ground. The ambient conditions are close to ISA (Fenland is only six feet above sea level) with a gentle north-easterly, and that, and the propeller's direction of rotation, generate a slight swing to port as the

nosewheel lifts off, which is easily corrected with a small dab of rudder.

The SD-1 skips into the sky in the first third of the runway and accelerates nicely, but a potential 'gotcha' at this juncture is the low flap limiting speed, so I quickly change hands, whip the flap up and set off after the 172, with plenty of geometric cut-off for a quick join up. All three primary controls feel crisp, taut and powerful, the field of view is fine and within minutes I'm sliding into a close echelon port. During the briefing photographer Keith had reminded me that the SD-1's diminutive size meant I'd have to get closer than usual – so I do. Fenland's cheery CFI Steve Brown does an excellent job of chasing the limited amount of sunlight around, and we soon have the shoot in the can, although on the first 'break' the spritely roll-rate only allows Keith to take two pictures, instead of the dozen or so he usually gets. Suitably chastened, I break considerably more slowly the second time.

Leaving the 172 to return to Fenland I get on with the rest of the test, starting with a more in-depth evaluation of the general handling and stick-free stability. The handling really is very good, with plenty of control authority around all three axes and no discernible breakout forces. My tests of stability reveal it to be positive directionally, neutral laterally and just barely positive longitudinally. In fact, having pitched up to lose ten knots from a comfortable eighty-knot cruise and then released the stick, I wonder for a couple of seconds if the SD-1 is actually divergent in pitch, as the ground begins to loom through the windscreen. Anyway, just about the time I figure that as the airspeed is still increasing, perhaps I'd better intervene, the nose slowly rises and after several high amplitude short wavelength phugoids it reluctantly returns to the trimmed speed. Of course, the SD-1 really is quite short-coupled, and the slightly 'soft' longitudinal stability is probably exacerbated by the all-flying tail.

Moving on for a look at the cruise, the SD-1 is particularly impressive. At around 3,000rpm (to be honest this was difficult to judge, as the indicated rpm fluctuates due to RF) the IAS is a comfortable 80kt at 3,500ft, giving a true air speed of 87 and a fuel flow of less than five litres per hour. Those of you who are particularly adept at converting nautical miles to statute miles, and litres to gallons have probably just reached the same conclusion I did while writing up my notes – that's about 100 air miles per gallon!

Slowing down for a look at the stall takes a while. It's a slippery little beast,

Full-span flaperons make for sprightly handling at speed but give mushy lateral control near the stall with flaps down

80kt IAS at 3,500ft... fuel flow less than five litres per hour

and the low V_{fe} (56kt) doesn't help. For the first stall I leave the flaps up, and at around 45 it starts to 'mush' earthwards with an increasing sink rate, while a departure stall with takeoff flap and power is also quite innocuous. However, the full flap stall is a little disconcerting – not for how the aircraft behaves, but for how it *feels*. Basically, the problem with flaperons is that there is a definite degradation in roll authority at slow speeds. As the IAS drops below 45, lateral control diminishes exponentially – and as I'd left a little power on to see how slow it would go, by the time the speed gets down to below 35 it feels as if the metal rods that connect the stick to the flaperons have been replaced by elderly rubber bands!

I must emphasise here that this was a flight test, and that there really isn't any reason why most SD-1 owners should have to venture anywhere near this particular corner of the envelope. Furthermore, another reason for the unsettling feeling is that above 70kt the handling is so taut and crisp that when you do let it get very slow it's a "hmmm, has something become disconnected?" moment. An early-model Kitfox feels very similar. It's certainly not an exercise I'd recommend on a bumpy day, and once the nose does eventually drop you've got to be careful not to exceed Vfe. My advice? Keep the speed above 45kt until you're ready to flare.

Back in the circuit I take care to ensure the speed is below sixty, and also apply plenty of nose-up trim before lowering the first stage of flap. In crosswinds or turbulence, the POH recommends only using the first stage of flap, and keeping the speed around 55. For pilots converting onto the SD-1 from more traditional types such as Cessnas and Pipers, it cannot be emphasised enough that the time-honoured formula of using 1.3 x V_{s1} on the approach simply doesn't work, and that V_{s1} x 1.5 or even 1.6 is much more appropriate. Unfortunately, even on a calm day when fifty is appropriate, you're only seven knots below V_{fe}, so the speed must be monitored carefully and the flaps retracted promptly in the event of a missed approach. The field of view all round is excellent and the SD-1 slides down towards the runway as if on rails. As is often the case my first landing is eminently satisfying, so with plenty of runway remaining it's full power, change hands – flaps to T/O, change hands, rotate, change hands, flaps up, change hands... and now you know why I'd rather have the flap lever on the left.

Halfway along the downwind leg and the SD-1 is about to give me my second ➡

"hmmm" moment. I decide to try a glide approach so, abeam the numbers, slowly pull the throttle right back to the stop. Jiri had told me that the engine was a little 'lumpy' at flight idle, and indeed it is. If you've ever ridden a 1970's Moto Guzzi 850 T3 you'll know what I mean, and initially it is vaguely unsettling.

Anyway, having turned in slightly too early, slipped off a load of height on base (incidentally, it slips nicely) and rolled out onto final, I realise I've slipped off a bit too much height and decide to add a pinch of power. The throttle definitely moves under my hand, but the engine doesn't pick up. Slightly perturbed, I move the throttle a little bit more – still nothing. By now I'm beginning to think that the engine has stopped and the prop's just windmilling, but a proper shove on the throttle produces a healthy burst of power promptly putting the SD-1 back on the glideslope. It would seem that the first three centimetres of angular movement through the throttle quadrant doesn't do much.

After another smooth landing, I retract the flaps fully during the touch-and-go and can't really discern that much difference in the takeoff performance.

I could've cheerfully spent all afternoon performing touch-and-goes on Fenland's delightful grass runways but, with some reluctance, conclude that perhaps I'd better let Jiri get home in the daylight, as Lima Uniform doesn't have lights. For the final landing, I deliberately land slightly long, completely ignore the brakes and still have to add power to turn onto the taxiway that parallels 36/18. You don't need much runway with an SD-1.

A 21st Century Jodel D.9

I really was rather taken with the Minisport, which could well be described as a '21st Century D.9', and would love to own one. I'd probably go 'old school' and have an open cockpit (if possible), tailwheel undercarriage and analogue instruments – but I'd enjoy the SD-1's electric starter! ■

LOTS OF OPTIONS!

The SD-1 can be bought and built in various formats. These include: undercarriages fitted with a steerable tailwheel, castoring or steerable nosewheel; and engine choices (both two- and four-stroke) ranging in power from 24 to 50hp. There's the standard canopy, a bubble canopy and the XL cockpit, which can accommodate pilots up to 2m tall. In the UK the MAUW can be up to 245kg. Kits range from 'Basic' (essentially just the main spars and plans) via '51%' and 'Quick Build' options up to 'Ready To Fly'. Pricing obviously varies accordingly and significantly.

SPECIFICATION

SPACEK SD-1 MINISPORT
£29,500 (AS TESTED)

DIMENSIONS

Length	4.35m
Height	1.23m
Wingspan	5.98m
Wing Area	6.10sq m

WEIGHTS AND LOADINGS

Empty weight (inc BRS)	130kg
Max AUW	240kg
Useful load	110kg
Wing loading	39.34kg/sq m
Power loading	9.60kg/kW
Fuel capacity	35 lit

PERFORMANCE

V_{ne}	119kt
Cruise	85kt
Stall	34kt
Climb rate	750fpm
Takeoff to 50ft	260m
Land over 50ft	260m

ENGINE AND PROPELLER

SE-33 air-cooled, four-stroke V-twin, producing 33hp (25kW) at 3,600rpm driving a Helix composite two-blade, fixed-pitch propeller

MANUFACTURER

Spacek s.r.o., Lesní 25, CZ-695 01 Hodonín, Czech Republi.

UK AGENT

JK Aviation, Plaistows Farm, Chiswell Green, St Albans AL2 3NT
Tel: +44 (0) 7895 387819
email: *info@sdplanes.co.uk*
Web: *www.sdplanes.co.uk*