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Rutan canards stay ahead

Out of some 500 homebuilts
on display at Oshkosh, nearly
70 were designs by Burt
Rutan, not counting some
further 15 tandem-wing light-
weight Quickies, in whose
design he also played a major
part. Also prominent was his
Solitaire self-launching sail-
plane, plans for which are now
available, and the Defiant
centreline-thrust twin, which
he has now decided to market.

The invasion by VariEze,
and its later development the
LongEz, has been achieved in
six years, since the first home-
built VariEze appeared at
Oshkosh. More than 500 of
the series have been com-
pleted around the world, and
1,700 of the larger and better
payload-carrying LongEz are
said to be under construction.

Rutan's composite achieve-
ment is still one of the major
light aircraft landmarks for
many years. No production
two-seater has this sort of
performance on a 115 h.p.
Lycoming — a maximum cruise
of more than 160kt with two
people for more than 1,100
n.m., and with the inherent
stall protection of Rutan's
thoroughly-designed canard
configuration. Cost to the
homebuilder can vary from
about $6,000 to $14,000,
depending on how many pre-
fabricated parts are bought,
and on the life of the engine.

Possible long-term devel-
opments include the inves-
tigation of nosewheel steering
to improve crosswind take-off
performance, and variable-
pitch propellers.
The Solitaire self-launch-
ing sailplane won the Soaring
Society of America's design
competition last winter for
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homebuilt sailplanes, and it
has been on the homebuilt
market for a month, with
some 40 sets of plans sold.
Rutan says that he wanted
real soaring and penetration
for cross-country cap-ability
from the outset. He aimed at a
glide ratio of 1 • 32, so that the
Solitaire could be flown at
least against the US
Schweizer Sprite, plus the
slow-speed safety ability to fly
at full-aft stick without risk of
spinning—as in all of his
designs. These two aims have
certainly been achieved, and
other big advantages from the
pure sailplane aspect are good
crosswind or downwind land-
ing capability from the
tandem fixed-wheel landing
gear, and the fact that the
pilot is sitting directly on the
e.g., needing no compensating
ballast if light in weight.

Engine retraction was the
biggest problem in Solitaire's
development, and several en-
gine types were rejected
because retraction proved

impossible. Final choice is the
two-stroke Italian KFM
107E, which develops 23 h.p.
at some 6,000 r.p.m., is
electrically started, and can be
wound in or out by a small
electro-hydraulic motor. Re-
traction or extension can be
completed in less than lOsec,
and at Oshkosh we saw
Rutan's colleague Mike
Melvill make a high-speed
into-wind run with the engine
fully retracted, then pull up
and have the engine out and
running by the time he was
positioned downwind for a low
level circuit.

Take-off roll is around
700ft, and climb rate some
300ft/min. Practically all
flying to date has been from
the Rutan base at Mojave,
which in mid-summer can
have a 7,000ft density alti-
tude. Minimum sink is quoted
as 150ft/min at some 40kt,
and best L/D 1-32 at 50kt.
Rutan says that, when flown
against a Sprite, the Solitaire
loses out slightly at low speed

Left Run and break for the
Defiant and LongEz. Below
Solitaire under power

(since wing loading is higher),
but gains at high speed.
The unusual "spoilflaps"
produce no trim changes and
can be deployed at the Vne of
115kt. It has been static-
tested to 7g, when the wing-
tips deflected 47in without
failure.
Rutan's remarkable Defi-
ant, which adds twin-engined
capability to the Canard
advantages, was first at
Oshkosh in 1979. While he
seriously considered devel-
oping it as a production
aircraft, Rutan has now
launched it on the homebuilt
market in conjunction with
Alaskan-based Fred Keller,
who has constructed a second
aircraft.

With both of its 160 h.p.
fixed-pitch engines running,
Rutan's four-seat Defiant
(which has logged l,000hr to
date) cruises about 30kt faster
than any contemporary light
twin. It was once flown for
more than 15hr non-stop on
standard fuel, and to 28,000ft.
But it is in the engine-loss-on-
take-off situtation that it is
even more remarkable, since
it still has a positive climb
rate at full aft stick, and no
asymmetric problems.
The second aircraft inevita-
bly has a few detail
improvements and has been
"optimised for the home-
builder". Engines from
150-180 h.p. will be accept-
able. Rutan is still working on
plans for sale in 1984.

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