

Race to the Swift

A Cost-Conscious Design, Which Is Not to Say Less Than State of the Art ...

By John Rorquist

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Sound like the ingredients for a Runoffs victory in the making? Hardly. But in fact the result was a Cinderella story: Californian Bob Earl and the previously unraced ADF FF took everything Road Atlanta had to offer that week in 1973 — from fastest lap each day to checkered flag.

Ten years later, the ADF principals, Paul White and Dave Bruns, are at it again. Times have changed, though, and thinking has changed. The ADF was a once-in-a-lifetime opportunity to build a cost-be-damned FF, they say, and the path isn't wide enough to retrace those steps. Instead, the pair's hopes for another silver slipper are shouldered on an encore design called the Swift — a very soon to be realized production (heavy on that word) Formula Ford. We mentioned the car in the May issue; continuing on with the series this month, it's time for some details

Philosophy and Design Foundation

The Swift Group philosophy — for the Swift is the result of the meeting of minds, White and designer Bruns joined by FF racers R.K. Smith and Alex Cross for this endeavor — appears to be markedly different from its British counterpart.

The English FF constructors have found that the secret to sales success lies in the old Detroit adage of change for change's sake and regular fall facelifts.

Sometimes the changes are cosmetic; more often these days they are major. The top drivers buy or are loaned new cars every year and because they are the top drivers they, of course, win. Potential winners must therefore have the latest too, or so the sales thinking goes.

By that measure, the Swift Group's three-year plan marks a major difference in philosophy.

British hardware emanates from a well-oiled cottage industry; Reynard-fabricated parts, for instance, are found on Royale (and other) cars. Lack of same invariably puts American-built machinery at a cost disadvantage but the Swift Group has planned ahead for that: The car will not employ any interchangeable-with-other-marque parts but will be cost effective. The three year plan is thus explained, as is the importance attached to getting the design sums right in the first place

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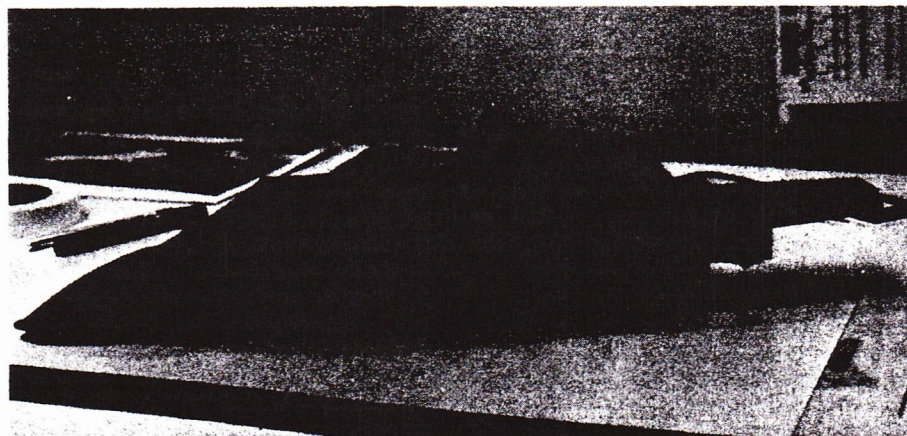
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The proof, as they say, will be in the pudding. If there exists a common pattern in American Formula Ford racing it might be, as was suggested in the introduction to this series two months ago, that the sales dominant British chassis win a large portion of the Nationals but seem to be beaten regularly at Road Atlanta's CSPRRC by low volume American machines.

Design Focus

The Swift is not a "new ADF" despite the obvious family look. While the ADF was designed for low lap times, attempting to break new ground in every area, the Swift's focus is on straight line speed. The design treads no new technological ground; quality at British prices was the major restraint on designer Bruns and within those boundaries exotic materials and construction techniques were out. The design's evolution followed a logical path: conceptualize, eliminate all unnecessary parts, relocate components to more efficient locations.

Bruns is quite clear on what separates a good design from one less



Bruns' first clay model of the new Swift: "We couldn't wait to see what it would look like...!"

Don Fuller photos

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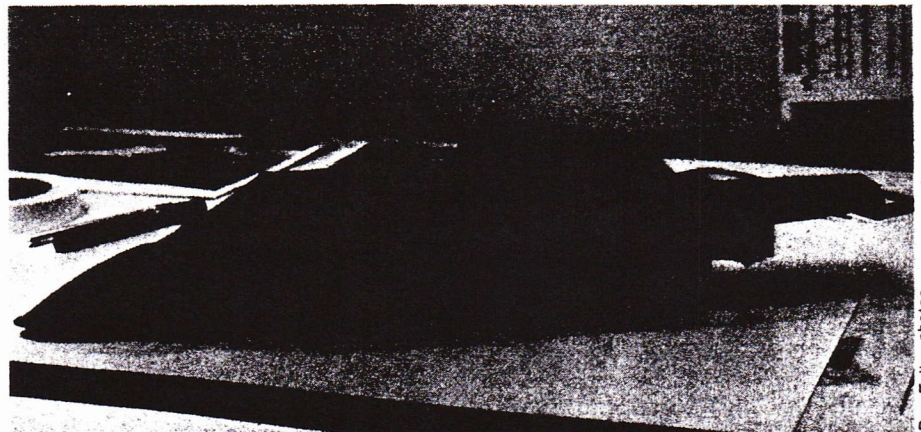
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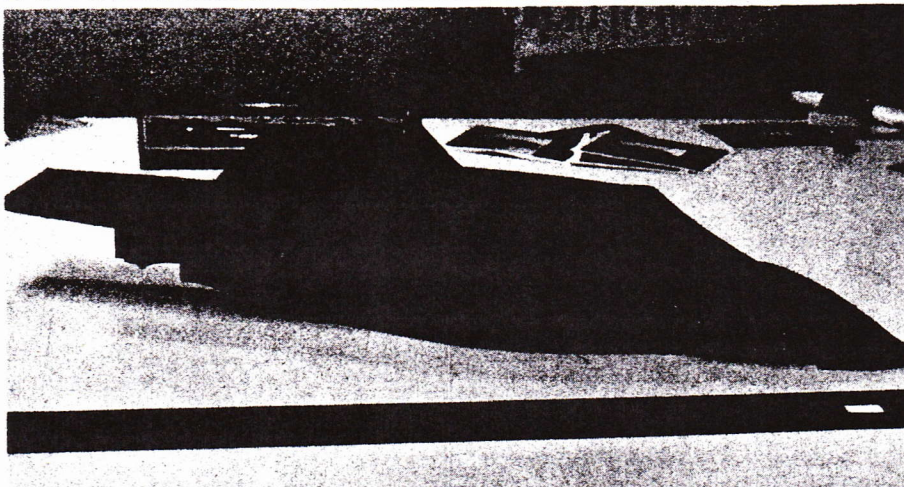
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Right side was sculpted clean so duct locations could be "toyed" with.

so. Some areas explored and started on the ADF have been refined and appear on the Swift.

Downforce, for instance, plays a role in the shape of the car. This need coupled with the "Viking low-drag treatment" has determined the final appearance. The fully enveloping bodywork and long rear tray suggest the ADF's lines but are significantly smaller entities. Clean air management, with narrow body front and rear and with the rear tray to stabilize the air flow, was the concept. All this clean air is intended to aid straight line speed and, secondly, cornering speed.

Generally speaking, cars fast in a straight line are not particularly good in low speed corners; the tradeoffs are many. Historically, high speed implies a narrow track, cornering a wide one and the frequently seen compromise is wide track with bodywork out close to the wheels which works to some degree.

The Swift solution will seem very familiar to those who have seen Harvey Templeton's Tennessee homebuilt: an extremely wide track and extremely narrow body. With "suspension clutter" minimized, air passes unobstructed along the sides of the car. Low drag on the straights and wide track for the corners...the balance Bruns wants.

Suspension geometry is seen by many, hard as it is to believe, as a secondary function. Tuning the car with springs and anti-sway bars because it responds to those frequency changes and stiffness is an easier solution than long hours at a drawing board. "A suspension that 'doesn't move' doesn't necessarily imply a geometry problem," says Bruns, "but a softer setup is a definite asset."

So a computer analysis of suspension movement was developed as part of the Swift's overall analysis. The program depicts results as a function of roll, capable of following roll centers and camber curves throughout the path of suspension travel. Many of the British suspensions Bruns has analyzed in this

manner, he claims, have not been fully optimized.

What does all this mean? Bruns claims that ride height changes will not significantly alter his new car's handling characteristics. Drivers will get less muddled feedback, less of an advantage, perhaps, to an experienced driver but clearly an asset for a newcomer.

State of the Art

The Swift, despite its cost conscious restraints, is intended to be a state-of-the-art car, this largely through judicious and clever placement of components.

The chassis itself is fairly conventional if extremely narrow, utilizing a mixture of square and round tubing. The mild steel spaceframe (ChromeMoly as on the ADF does not fit the cost conscious theme...) is broken into three sections defined by a pair of triangulated braces: footbox, driver's compartment and engine bay. Longitudinally, both halves are mirrored by a common center tube.

The main rollover hoop is triangulated into the upper bracing of the driver's compartment. This configuration offers maximum driver protection without interfering with ingress/egress.

Front suspension is double rocker arm, featuring outboard brakes and inboard coilover shocks/springs. The fashionable, F1-style pull-rod/push-rod system was ruled out for a number of reasons, among them unnecessary high rising rate characteristics and the high degree of sophistication needed for set-up.

Pull-rods also compromised Bruns' aerodynamic concept...that narrow footbox, remember. In fact, staying true to his theory, there was no room for coilovers in *any* conventional location! So they were put elsewhere and will lie above the driver's shins with fixed chassis pick-ups on the front (instrument panel) rollover hoop.

Rear suspension, like the front, is

double rocker. Coilover shocks are located within the bellhousing — well out of the airstream, of course, freeing up a few more inches for narrowing the wraparound bodywork. This significant feature, while new to FF, is to be found on cars in other classes like the F1 Lotus, F3/FSV Anson and Group C EMKA Aston Martin. Sharing bellhousing space with the shocks, springs and pinion shaft will be the oil tank. There's no wasted space back there

The radiator is located amidships, following the lead of the Viking and Crossle 50F in attempting to reduce drag.

The engine and gearbox are fully stressed components following common practice. Stressing takes advantage of their weight and torsional stiffness attributes while dispensing with extra chassis tubes and bracing.

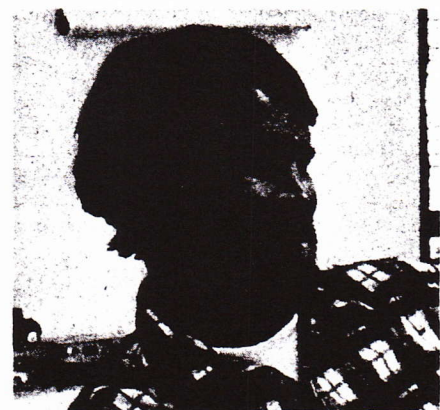
Long Hours

Visually tying together all the major pieces is a "driver's bay mockup". This is nothing elaborate, a few pieces of plywood on stands, held together by tubing which represents primary frame rails. Long hours have been spent with it and each major idea was tried here first.

The scope of the Swift's construction is perhaps analogous to this wooden buck. That is to say, work done within cost constraints, labor, while not fancy at least thorough. The car will emerge as a result of 26 WhiteBruns years of experience and observation...both good teachers.

White expresses the idea that race car design and manufacture is a conservative business. A designer is only as good as his last effort and the same goes for a constructor. Thus, reputations are at stake here — individual as well as corporate.

Well aware of the obstacles, the principals have chosen a patient, deliberate timetable. The prototype is coming along well as this is written, already recognizable for what it will be. Next month, in keeping with that schedule leading towards the CSPRRC, a look at the individual components and the steps involved in their manufacture.



The designer.