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FAST LINES
Getting MAD
by Pete Lyons [1420 words, draft 1 of October 14, 2008]

Grand Prix racing comes with a new look in 2009. Among other significant technical changes—wider cars, grooveless slicks and Kinetic Energy Recovery Systems (think “electric power-to-pass”)—there are new aero rules intended to improve a car’s ability to overtake another.

Included is this fascinating detail: Front wings will be driver-adjustable for angle of attack. That’s right—F1 is getting Movable Aerodynamic Devices.

Well, well, well.

This goes way back for me. Not that they’ve noticed, but the European politicos and I have been at loggerheads on this for nearly 40 years. It was early in 1969 when F1 regulators hastily slapped a ban on the high, suspension-mounted wings that some teams had only recently started copying from Jim Hall’s Chaparrals.

Eventually worded to forbid “moving aerodynamic devices,” the ban spread throughout the sport like rot in a bowl of fruit. It even got into my beloved Can-Am, changing and regulating the very shape of what had once been a wild-and-free frontier of unrestricted race car design.

Jim Hall was so disappointed by this clampdown on aero innovation that he quit the Can-Am. For me and for many, a light went out of racing.

The proximate cause of F1’s original ban was a pair of nasty accidents suffered by Graham Hill and Jochen Rindt in their Lotus 49s during the 1969 Spanish GP. A few laps into this dash through a city park in Barcelona, first Hill and then Rindt experienced identical failures of their strut-mounted rear airfoils.

Hill, the reigning world champion, escaped his mighty crash with minor injuries. Two laps later at the same place, Rindt—who evidently did not slow much through the accident scene—had his rear wing buckle in the same way. He slammed into the wreckage of Hill’s car, and had to put in some hospital time.

From his bed, Rindt wrote a famous open letter calling for wings to be removed completely. One of his arguments was that airfoils created turbulence that robbed the following car of downforce, thus inhibiting close racing.

The FIA’s response, handed down mid-practice at Monaco two weeks after Barcelona, was a half-measure: downforce-devices would still be allowed, but only within certain dimensions; they had to be part of the bodywork or fixed to it, and they could not move or change

angle while the car was being driven. This sketches out the basic race car we've watched in most series ever since.

Besides Jim Hall (and myself), Porsche was another party disturbed by this ruling. That year's slippery new 917 Le Mans coupe could no longer use its original suspension-linked hinged tabs that were meant to keep it stable at its very high speed. It took some big accidents and a lot of inspired development testing before that car became raceable.

To me, listening in on all the various aero debates over the years, I've sensed an almost theological element. It's not that people failed to recognize the inherent power of aerodynamics before Jim Hall started harnessing it. Downforce-inducing wings were explored on speed record cars in the 1920s (by Opel) and 1930s (Mercedes).

But in 1955, when Swiss engineer Michael May appeared at the Nurburgring with an airfoil mounted above the cockpit of a Porsche spyder, shocked officials refused to let him race it.

It blocked other drivers' vision, was one reason given. A few years later at Indy we would hear the same nonsense about the Turbine's shimmering exhaust. Some people said the real problem with May's wing was that this lowly privateer was lapping faster and looked smarter then the factory team.

I suspect May's wing and later ones violated an ingrained aesthetic sense, perhaps even a religious conception, about "what an automobile should be." We all claim to like innovation with our racing—but we don't like too much of it too fast!

Consider that officials tend to be of an older generation than hot young racecar designers. Someone who came into the sport in love with the svelte sports racers of the 1950s, say, might well have seen the angular, bewinged, vastly faster machines of the following decades as monstrosities. Surely the cry, "Automobiles are not supposed to be aeroplanes!" echoed down the corridors of power.

Honestly, I feel a tendency to such sentiments myself, and I remember it took time for me to see the beauty in the Chaparrals and other winged cars.

But not embracing continuous evolution would condemn us to watching the same old spec cars year after year.

Oh, wait…we are.

Back to wings. Although some earlier race car bodies appear to have flirted with downforce at the front, rear-end lift was a little-understood problem until 1961, when American driver Richie Ginther, formerly an aircraft mechanic, put what he called "a trim tab" on the back of a Ferrari prototype. More widely known as the "ducktail spoiler," it swept racing—over objections of some who groused that "what is spoils is the looks." They were no happier about the "chin spoilers" that came along later to nail down the front ends.

Jim Hall took the next big step in 1965, when he developed a

pivoting spoiler low on the rear bodywork of his Chaparral 2C. By pushing what looked like a clutch pedal (it wasn't—his GM-built manual transmissions had torque-converters rather than clutches) he could trim the spoiler flat for less drag on the straights. The 2C won its first race.

A year later, on a developed version of the same chassis renamed the 2E, Hall and friends at Chevrolet combined that idea with mounting an airfoil on pylons rising from the rear suspension uprights. That sent the downforce directly to the wheels, bypassing the chassis —which meant the springs didn't have to be extra-stiff to carry the additional load.

Supple over the bumps, a leech in the turns and bullet-fast on the straights, Chaparral's 2E was usually the fastest car in 1966 Can-Am qualifying, and Phil Hill headed a team one-two at Laguna Seca.

If Colin Chapman didn't see pictures of that system then, he certainly would have in 1967, when Chaparral's 2F enduro car with the same strutted airfoil won at England's Brands Hatch. In mid-1968, the Lotus 49 appeared with its own version; at the end of that year, Graham Hill clinched the championship in Mexico driving a 49 that even had a fourth foot pedal to feather the wing angle.

So far so good, but Chapman was a notorious stretcher of engineering envelopes. He made his wings bigger and bigger, and at Barcelona in 1969 he got too greedy. As well documented in Michael Oliver's book "Lotus 49, The Story of a Legend," Chapman sent both Hill and Rindt into the race with modified, untested wings too flimsy for the forces they generated.

What Lotus lacked, compared to Chaparral, was Rattlesnake Raceway, Jim Hall's private test track literally out the door of his Texas shop. But neither did Chapman, an undeniably brilliant innovator, exhibit Hall's methodical, patient approach to the unknown. In the middle of a hectic GP season, Chapman did his development at race meetings. At Barcelona, he tried it in the race itself.

The consequence of this near-disaster was a knee-jerk regulatory response that outlawed not poor engineering, but an entire nascent technology.

For four decades, now, drivers have been stuck in cars with rock-hard rides and "aerodynamic sweet spots" far narrower than necessary. Countless fans have been robbed of good races because cars couldn't be fine-tuned to changing conditions without a pit stop. Never mind the street cars with self-adjusting aerodynamics; racing's mental doors were shut.

Why, after so long, is F1 getting MAD back? Because, finally, science has been involved in the rulesmaking. Despite insisting in public that there's nothing wrong with difficult overtaking, behind the scenes F1 bosses have had a formal Overtaking Working Group devising fixes. On www.grandprix.com Joe Saward tells the whole

story; look for “Insight - Applying science and commonsense to overtaking.”

Basically, the 2009 regulations narrow and elevate rear wings (which remain fixed), while lowering and widening those on the front. The purpose is to let a car follow another more closely without losing so much downforce.

However, simulations indicated that the following car will still be unstable. Thus its driver can crank in more front wing angle—though only through a maximum of six degrees, and only once per lap (controlled by F1’s spec ECU).

So it’s a very small scrap of freedom. But let us rejoice in it. Aero is no longer evil.