

The 25 Best Cars Under \$50,000

Because you're not Floyd Mayweather.

10 Umbrellas to Stay Dry in Style

Because the rainy season is here.

18 Dive Watches Under \$1,000

Because the water's warming up.

The 10 Best Pocket Notebooks

Because they won't run out of battery power.

MAY 13, 2015

THE GUIDE TO LIFE VOL. 2

GEAR PATROL



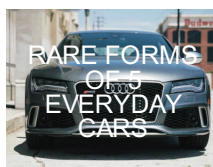
ON LOCATION AT THE MIAMI EPRIX

Is the Future of Auto Racing Electric?

CARS By JAN TEGLER on 5.6.15

20 single-seat racing cars took the green flag and came charging toward us in Turn 1. The vibrant colors on their carbon-kevlar bodywork popped in tropical sunlight as the machines fanned out under TAG Heuer signage approaching the braking zone. Wheels locked, tires smoked and the crowd rose to its feet as drivers risked contact jockeying for position. But something was missing.

More Automobiles



Apart from the slight screeching of spec-Michelin rubber and a faint whistling,

there was no roar, no wail, no thunder — very little sound at all — from the pointy-nosed **Formula 1**-style racers that turned left off of Biscayne Boulevard onto 11th Street in downtown **Miami**.

It was an odd sensation for anyone steeped in motorsports, accustomed to the excitement of hearing powerful engines screaming at high rpm under hard acceleration. But this wasn't Formula 1 or IndyCar. We were witnessing the first-ever **Miami ePrix**, the halfway point of the inaugural season of the FIA Formula E Championship.

Launched in September 2014 with its first event in Beijing, China, Formula E is a global racing series with the stated ambition “to represent a vision for the future of the motor industry, serving as a framework for R&D around the electric vehicle, accelerating general interest in these cars and promoting clean energy and sustainability.”

Instead of a traditional pit stop for fuel and tires, drivers actually change cars, jumping from their depleted machine to an identical fully charged second car to complete the 50-minute race distance.

Round five in Miami was one of two US races on the championship's 10-race calendar. Next stop is the Long Beach ePrix in California on April 4. Then it's on to **Monaco**, Berlin, Moscow and **London** for the final four contests.

The buzz surrounding the series is unusual. Though it's not a household name, Formula E already has considerable gravitas in the worldwide racing community. Top teams led by famous names — including four-time Formula One Drivers' Champion Alain Prost, Virgin Group founder Richard Branson and IndyCar champion Michael Andretti — are present.

The roster of participating drivers rivals any racing series on the planet. A large, international cadre of ex-Formula One pilots with recent experience vies with top names from **Le Mans**-style sports car racing and German Touring Car (DTM) racing.

Motorsports giants and global automakers were also in Miami getting an up-close and personal look at the FIA's strictly cost-controlled version of electric racing. Roger Penske, Emerson Fittipaldi and WEC CEO Gerard Neveu rubbed elbows with contingents from **Volkswagen** and Ford — all looking to see what might be in it for them.

That's an amazing amount of wattage for a series so little known as of yet. To understand what Formula E is and isn't, and what potential it may have let's peek beneath the series' bodywork.

Spark Racers

“One of the things I noticed standing on the pit wall at Donnington (UK circuit) as

we were developing these racers, was that as a car went past not only did you hear each gearshift — you actually heard the air coming out of the shift solenoid with each shift”, recalls Roger Griffiths, Andretti Autosport Race Engineer.

Serving most recently technical director for Honda Performance Development (HPD) before joining Andretti in 2014, Griffiths has vast experience in open-wheel and sports car racing. He reminds us that while Formula E lacks the aural fury of conventional racing, the machines competing are more familiar than foreign.

“The basic car, from the back of the monocoque forward, is fundamentally the same as any other single-seater out there, whether it’s GP2 or GP3 or even IndyCar. They have a conventional front suspension, conventional steering and a conventional safety cell. It’s behind the rear bulkhead where you see changes. Even the bodywork is conventional.”

The real differences between the 20 identical Spark-Renault SRT_01E cars that make up the Formula E grid and other open-wheel racers begin in the spot where a conventional engine would reside. There, a Rechargeable Energy Storage System (RESS) or battery cell storage unit serves as a stressed member of the chassis crafted by Italian constructor, [Dallara](#).



Designed and produced by Williams Advanced Engineering (an arm of Williams F1), the 28-kilowatt-hour battery units are identical, capable of producing 200 kilowatts (270 horsepower) briefly in “qualifying mode” and 150 kilowatts (202.5 horsepower) in power-saving “race mode”.

Lithium nickel manganese cobalt cells in series (Williams won’t say how many due to intellectual property concerns) store enough energy to run in race mode for approximately 25 minutes. Once depleted, the battery storage units cannot be changed on the fly. Consequently, there is no refueling in Formula E. Instead of a traditional pit stop for fuel and tires, drivers actually change cars, jumping from their depleted machine to an identical fully charged second car to complete the 50-minute race distance.

Atop the RESS is a “power inverter” which sends the batteries’ energy to a “motor

generator unit” — an electric motor that also acts as a generator — from [McLaren Electronic Systems](#) (a sister company to McLaren’s F1 team). The MGU, a compact, reasonably high-speed motor with low torque sits inside the housing of a series-standard five-speed sequential gearbox from Hewland.

Electric Racing Realities

“They’re similar in speed to F3 cars in qualify mode”, says Virgin Racing driver Sam Bird. Typical of the experienced racers in Formula E, the Englishman has a long history in open-wheel racing, having served as a test driver for the Williams F1 team. He currently competes in the hotly contested GP2 series, one of the stepping stones to Formula 1.

Like his Formula E adversaries, Bird admits the series’ racers are slow by open-wheel standards. But he’s quick to note: “We’re in the early days of this championship.”

“They’re very heavy, 896 kilos (1,975 pounds), so you can imagine the impact that has. You’ve got to remember, we’re on road tires and dusty street circuits which don’t get a lot of our rubber down on them. Combine those three things and that’s why they probably don’t look so agile. In-car they’re not so bad.”

Currently third in the championship standings behind leader Nicolas Prost (Alain Prost’s son) Bird compares the Spark Renault electrics to cell phones of 10 years ago.

“They barely had color screen displays”, he quips. “Now, you don’t even need a computer. You can do everything on your phone. So think where we’ll be in 10 years’ time looking back at this technology.”

The jury is out on how quickly electric technology will advance, even with the impetus of Formula E, but all drivers in the championship agree that driving the cars of this new championship is at once the same and different from any other racer they’ve piloted.

Braking, for example can be far less consistent than a racer might like, Bird notes. That’s because while each car expends battery energy, it also regenerates, or “regens” energy via braking.

“Braking changes lap to lap”, Bird affirms. “It can be very strange with the regen. If the battery loses charge, the regen gets stronger. If temperature escapes the batteries, then the car becomes slower and slower — or if they overheat, same thing.”

“Basically, anytime that you’re off the throttle, you turn the motor into a generator”, Roger Griffiths explains.

That means energy is harvested primarily under braking. As drivers slow for corners regenerative energy is collected and fed back into the RESS through the

MGU. The Spark-Renault cars regen solely via the car's rear brakes (a cost-control measure) with the side-effect that as more or less regenerative energy is demanded, brake bias changes significantly. Griffiths stresses that management of energy, whether expended or collected, is key to Formula E racing.

Michael Andretti is “very impressed” by what he has seen so far as a pioneer team owner in Formula E.

“The main thing you’re monitoring is energy used per lap. In a conventional race you have a quantity of fuel, and calculate when to refuel and go back out. In IndyCar if you get to three laps from the end and you’ve miscalculated, you can always come in and do a quick splash and dash and go back out. In Formula E you can’t do that. You’re carrying onboard all of the energy you have. There are strict regulations about what happens if you use more than your energy allocation.”

Every Formula E race is a fuel-strategy race in conventional terms. Drivers drive to an “energy target”, managing the amount of energy they expend or gather either by adjusting their driving style or via steering wheel switches that govern torque from the MGU and the amount of regen desired.

Battery temperature management is also critical. An over-temperature RESS depletes quickly and won’t accept regen. Under-temperature batteries won’t provide optimum power. Consequently, drivers and race engineers focus on thermal management. But they have a safety net in the form of Williams’ battery management system (BMS).

“Our battery management system is quite sophisticated”, Okan Tur, Williams’ Chief Technical Specialist for Hybrid Systems, explains. “We monitor the voltage and temperature of each and every cell. Those values are used in different functions in the BMS. We protect every cell thermally and the system keeps cell temperatures below limits. We use a special dielectric fluid system for cooling, and our BMS controls all of those parameters, including the level of regen the battery will accept from the electric motor.”

The “Green Racing” Savior

Michael Andretti is “very impressed” by what he has seen so far as a pioneer team owner in Formula E. While many in the racing community are skeptical and think of Formula E more as an exhibition than real racing as currently constituted, Andretti disputes the notion.

“If you’ve seen the races so far they’ve been exciting”, he contends. “Older people, yes, they may not think it’s racing. Even my dad [Mario Andretti], he’s not looking at the future. He’s looking at the now. He’s used to the old V8s. That’s not part of our future. This is part of our future and if we don’t get racing fans hooked now, we’re not going to have them. The next thing you know, racing’s going to become extinct.”

“We’ve got to get the kids now, the kids who will go out and buy an electric car as their first car. Then they’re an electric car driver for the rest of their life and they can follow an electric car racing series.”

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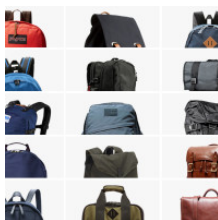
TheBriefing



WHAT'S NEW, NOW

Today in Gear: May 13, 2015

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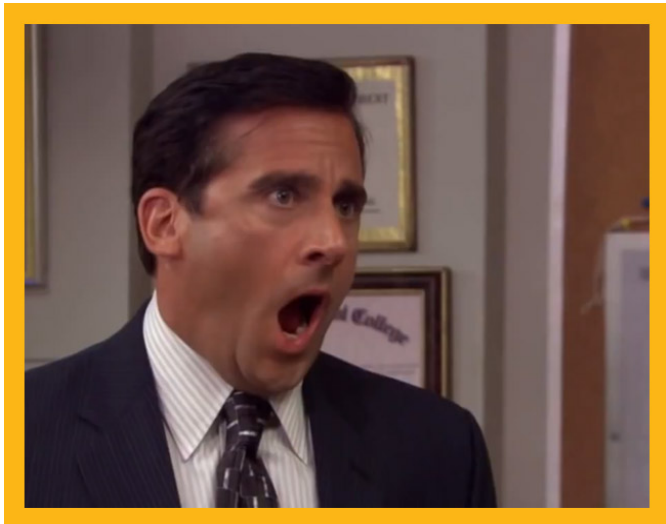
Cars of the Corporate Ladder

These sedans bring the office party, no matter what your title.



Your 2015 Summer Reading List

10 newly released or yet-to-be-released books to keep on your shortlist.



THE BUCK STOPS HERE

How to Say No Politely

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How to Remove Scratches from Your Watch Face

The full guide on a DIY fix.

Take Back 30 Minutes Each Day

Tips for gaining back life's most precious resource.

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Adam Senatori's Aerial Photography Goes Big

Hi-res at hi-altitude.

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Transform a cheaper cut into a knockout dish.

8 Rugby Shirts Worthy of the Scrum, Trail or Home

Tough shirts that don't tear or wear.

Why You Should Carry Luggage By Hand

Shed the training wheels.

Craft's Most Important Beer

Defining the American craft lager.

The Complete Guide to 2015's Best Summer Movies

The reboots, new installments, and fresh faces of blockbuster season.

5 Trucks Making a Case for the Mid-Size Pickup

Keeping up with the big boys.

STAFF PICKS



CAN THIS HOG FLY ON?

10 Military Field Jackets to Sport on the Streets



THE PERFECT FRIED EGG

15 Best Day Hikes: Readers' Choice Edition



SPEND \$60, GET KILLER SHADES

WE ASKED AND YOU ANSWERED



The field coat has a long-standing pedigree in military history. Here are 10 iterations that look good enough to wear every day.



Here they are: the 15 best day hikes, as told by you, our readers. All of the words and images below are straight from your submissions.

Today's Contents

Feature Story

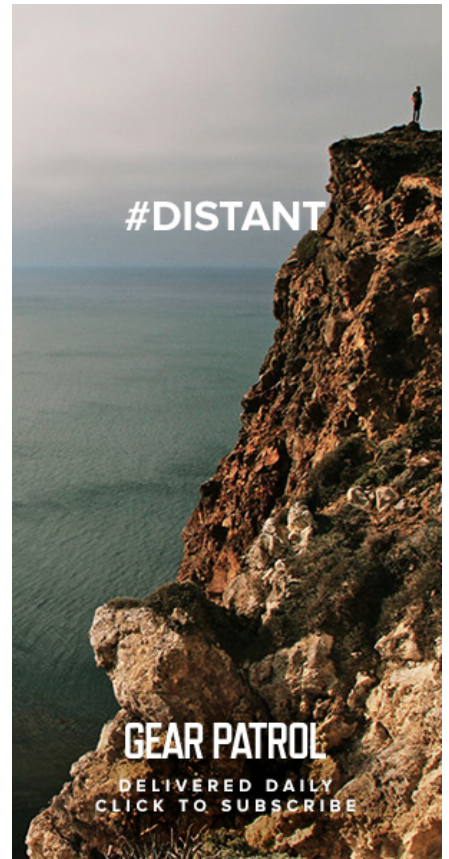


DRESS BETTER, ONLINE AND OFF

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