

Featuring the Best Seller *Long Live the King* by Lyn Tornabene

# flighttime

AUGUST 1977

ALLEGHENY AIR SYSTEM

James Yen: Harnessing the Wind  Louise Nevelson: Greatest Living Sculptress  
Jan Stephenson: In the Golf Money  Clark Gable: The Man Behind the Legend  
Plus: Montreal, Paris of North America  Guide to Pittsburgh's Fine Dining



## DO YOU KNOW WHERE YOUR ENGINE IS?

Ever since people started building automobiles they've been arguing about where to put the engine. At first it seemed logical to mount it up front, since that's where the horses used to go, but nonconformists among the early automakers were always looking for a better way.

In 1906, for instance, there was a car called the Adams-Farwell which was powered by a weird five-cylinder rotary engine sitting right over the rear axle. What made this engine particularly strange was that its crankshaft was fixed to the frame, and the rest of it rotated around propeller-style.

Nevertheless, as cars became more sophisticated through the years, the vast majority subscribed to the common practice of putting the power plant in front, the drive wheels in back, and the occupants somewhere in between. This was the simplest and least expensive way of doing things since the two could be connected with a drive shaft, allowing the front wheels the single major function of steering.

Initially, there was plenty of room underneath for the rotating parts, but when designers started lowering cars for better aerodynamics and stability, some new problems were created. The floor pan had to be folded down around the drive train, creating a large hump over the transmission in the forward part of the passenger compartment and a raised tunnel over the whole length of the drive shaft. Thus, the lower a car was to the ground, the more passenger space was taken up inside.

One answer to this dilemma was popularized by the German designer Ferdinand Porsche in his postwar peoples' car, the Volkswagen. Porsche mounted his little H-shaped, four-cylinder, air-cooled engine behind the VW's rear axle, combining its transmission and rear axle into a single unit called a "transaxle." This permitted a low, aerodynamic front and eliminated the drive-train tunnel, allowing a flat floor for maximum passenger room inside its small, short-wheelbase, exterior package.

A few years later, a British engineer named Alec Issigonis went in the other direction when he designed a tiny, box-shaped minicar for Austin of England. Called, appropriately, the Austin Mini, this little skateboard had its in-line, four-cylinder engine mounted transversely between the front wheels, which were driven via a transaxle. This provided an even more efficient shape than that of the rear-engine VW, but was slightly more complicated, as the front wheels had to steer as well as drive.

Thus, while American designers were voting almost unanimously for the conventional front-engine, rear-drive configuration, the Europeans were split three ways between front-engine/front-drive, rear-engine/rear-drive, and the conventional setup, mostly used in large cars.

But the rear-engine design has been all but replaced by front-drive in the 1970s because it has a couple of inherent and insurmountable disadvantages. For one thing, driving a car with most of its weight in the back is a bit like trying to throw a dart feathers first—it will always try to swap ends on you. This is why VW Bugs and other rear-drive cars are unstable in crosswinds and sometimes have treacherous handling characteristics in emergency situations. Another problem is cooling, since it's difficult to pipe water from a front radiator to a rear engine. As a result, nearly all rear-mounted engines have been air-cooled. But air-cooled engines tend to develop "hot spots," making control of nitrous oxides in the exhaust increasingly difficult.

For these and other reasons, most small European cars have gone to the Issigonis-inspired front-drive configuration, and American automakers are preparing to follow suit. The first practical, front-drive American car with a transaxle was the 1917 Frontmobile. More refined versions of this design—the Cord and Ruxton automobiles—followed in the 1930s. But the only U.S.-built cars to use front-drive in recent years have been Oldsmobile's Toronado, introduced in 1966, and Cadillac's Eldorado, which debuted the following year.

Ford has just brought its German-built, front-drive Fiesta minicar over to compete with such practical little front-wheel drive imports as VW's Rabbit, Honda's Civic, Fiat's 128, Renault's Le Car, Datsun's F-10, Saab's 99, and the Subaru, whose station wagon can be converted

from front-wheel to four-wheel drive by pulling on a gear stick. U.S. manufacturers will be converting more and more to front-wheel drive as future cars are down-sized and lightened.

Chrysler Corporation will lead the way with its all-new, European-style Horizon and Omni compacts, based on the highly acclaimed Simca 1307/1308 series built by Chrysler France. When this practical pair is unveiled early next year, it will be the first new venture into front-wheel drive by a domestic manufacturer since the mid-sixties.

General Motors will follow in '79 with its new down-sized compact car lines (Nova, Phoenix, Omega, and Skylark), and Buick's Riviera luxury car will join Toronado and Eldorado in sharing a new front-drive chassis that same year. Cadillac's Seville will join the club in 1980; by the following year all of GM's small cars will have been redesigned for front-wheel drive—with the possible exceptions of the sporty Pontiac Firebird and Chevrolet Camaro. By that time, also, Ford and AMC will have jumped on the front-drive bandwagon with all-new Pinto and Gremlin models.

The advantages of front-wheel drive include both stability and traction, since there is more weight up front and over the drive wheels. But the most important design consideration in coming years will be packaging efficiency . . . and that's where front drive really shines. Obviously, the exterior dimensions of all cars must become smaller as government fuel economy regulations tighten up. But with all the power-train components up front—particularly when the engine is mounted transversely instead of fore/aft—the entire remainder of the car can be devoted to packaging people and luggage comfortably.

There are some disadvantages too: increased complexity and cost, servicing difficulties, and handling characteristics different from what most American drivers are used to. There will probably always be conventionally driven cars, mid-engine sports cars, four-wheel drive, and other alternatives. But there's no question that front drive is the wave of the future in automotive engineering. •

—by Gary Witzenburg