AN ENGINEER LOOKS AT THE NEW CADILLACS
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CADILLAC MOTOR CAR COMPANY
DETROIT, MICHIGAN

STANDARD OF THE WORLD
Foreword

Progress Means Change! And motor car progress this year has been profoundly influenced by the improvements which Cadillac engineers have wrought in the magnificent new Cadillac V-8, V-12 and V-16. The following pages contain a Cadillac engineer's own story of these notable improvements. We appreciate, of course, that for a very large percentage of our clientele, this recitation of the detailed merits of Cadillac cars is unnecessary. To most people, the name Cadillac stands, within itself, as complete assurance of all that is good and desirable in a fine motor car. We are never forgetful of this... it is our greatest and most enduring inspiration. But it is likewise heartening to know that, no matter how critical or detailed the inspection, any car by Cadillac will give a practical revelation of its supremacy. ... Please go on with the story.
The new Cadillac cars have been radically improved in engineering excellence as well as in bodily beauty. Advancements of far-reaching importance make them even more comfortable to ride in... even simpler and easier to drive... even safer... even more alert and responsive in every way. These advancements may be divided into four major classifications: (1) The New Cadillac Ride; (2) Simplicity and Safety of Control; (3) Improved Multi-Cylinder Performance; (4) New Maneuverability and Convenience. For the sake of clarity, improvements will be described in this order in the ensuing pages of this book.

The New Cadillac Ride

Cadillac engineers have been using new tools. The doctor's stethoscope and manometer have taken their
places beside the engineer’s dividers and micrometers....

All for the purpose of learning what makes you comfortable and uncomfortable while riding... of determining the sensitivity of the human body to various jolts and jars... and of developing the greatest single Cadillac improvement of 1934—the new Cadillac ride.

The first step of this investigation, as we have indicated, was the passenger. Actual “patients” were placed upon a bouncing table, and bounced in every conceivable manner, while the doctor-engineer stood by and noted the physiological reactions.

The engineers’ studies went further than a mere accurate determination of the boundary between comfort and discomfort. They analyzed the causes of riding fatigue and found that certain types of motion were very tiring while others were not tiring at all. They determined the fundamentals of riding comfort. They learned just how far, how fast and in what direction a passenger might be moved and still remain entirely comfortable.

Then, by mathematical analysis, the ideal ride, as disclosed by the bouncing table, was incorporated into terms of mass distribution and spring deflection applicable to a motor vehicle... The result of much research has been the evolution of an entirely new principle, a principle the application of which has increased passenger comfort as much as the self-starter increased driver convenience.

This new Cadillac principle of riding comfort involves changes far more fundamental than merely a new spring design. Its application has necessitated a complete re-design of the entire vehicle. The weight distribution of the car is materially altered. Even such
an item as the location of the storage battery has a bearing upon riding comfort!

The new Cadillac principle of riding comfort can be adequately represented on paper only by mathematical equations; the outstandingly successful application of this principle can best be proved by a ride in the new Cadillac.

In enjoying the superlative ease of the new cars, the analytically minded person will note that, in addition to the fact that the motion is gentler, its quality has been altered. In the engineer's terminology the ride has become "flat"—the motion is vertical rather than the usual neck-cracking pitch—there are no "interference kicks" which heretofore have been the bane of the back seat passengers.

After enjoying the gentle motion of the back seat, you may obtain further proof of the Cadillac principle of riding comfort by taking the wheel. A deeply rutted frozen mud road is the most difficult test; hence, offers the best demonstration. You will marvel at the ease with which the new Cadillac swiftly glides over the worst holes and ruts.

**Simplicity and Safety of Control**

To the gliding comfort of the new Cadillac cars, Cadillac engineers have added other advances which will prove almost, if not fully, as pleasing to you . . .

. . . pronounced advances in steering efficiency—in car stability and safety—in ease of control.

The "knee-action" front suspension is one of the Cadillac principles of riding comfort. In combination with the new steering mechanism, it is largely responsible for this improved roadability and ease of control.

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*Illustrating forward pitching and neck-racking ride in conventional cars.*

*The smooth vertical ride in the new Cadillacs.*
There is no front axle; each wheel is secured to the frame by upper and lower forked arms. Simplification is effected by employing the upper arms as a means of operating the hydraulic shock absorbers, and the lower arms as a support for the frictionless helical springs which, incidentally, are half the weight of equivalent semi-elliptical springs.

A spring suspension of this type permits an improved steering mechanism. The sturdy worm and double roller steering gear mounted on the left-hand frame side member operates a steering connecting link. This is connected to and operates a bell crank supported upon the massive frame crossmember. To this bell crank are attached the two steering cross rods, each of which controls one of the front wheels.

The advantages of this form of front suspension are many. Reduction of unsprung weight is, of course, of enormous benefit in keeping the wheels in contact with the road at all times, and in permitting the use of softer springs with consequent improvement in riding comfort.

The geometrical relationship of the various parts is accurately controlled. The tendency to "wander" or pull from side to side, so typical of cars with the conventional front axle, is avoided in the design of the new Cadillacs.

You merely set the course ... the new Cadillac goes right where you aim it ... without a waver, without a hint of vibration in the steering wheel.

The Cadillac front suspension also lends itself to the design of a very much more rigid frame which adds greatly to road-steadiness.

Because a motor car frame is as rigid as its weakest part, Cadillac engineers have evolved a design of many ingenious and unusual features, a
design in which every weak link has been avoided.

The X-member is not merely a central reinforcing member; it is a complete frame in itself, providing a frame within a frame. From the junction at the center the forward members extend to the frame sidebars, then forward within the sidebars forming a rigid box section; the extended X-members are carried to the front cross member to which they are attached.

The point of greatest stress in an X-member is at the center. In the Cadillac design the front and rear members are assembled back to back, forming a section of double flange width, further reinforced by heavy plates at top and bottom. An unusual and important corollary of the back to back construction is that the webs of diametrically opposed X-members are in the same straight line—a construction adding materially to the rigidity of the assembly.

At the rear of the frame and extending across it just behind the rear axle is the ride stabilizer, a device which adds a feeling of security to that of riding comfort. The function of the ride stabilizer is to prevent disturbing sidesway or body roll on turns.

While the independently suspended front wheels are obvious evidence of the fundamental revision of the Cadillac chassis, the rear spring suspension also has been extensively, if less obviously, modified.

Spring squeaks are prevented and uniform spring action insured by graphite filled bronze inserts between the spring leaves, and by a rubber composition strip between the main and second spring leaves. The chassis is insulated from road tremors by rubber bushings in the forward spring eye and at the upper shackle bearing.

Driving and braking forces are now taken through the rear springs rather than by a torque tube. Excep-
tionally long springs, perfectly flat under normal load and having "Berlin" spring eyes, assure approximately vertical rear axle motion during spring deflection, thus avoiding geometry errors that cause the high speed instability heretofore associated with the conventional Hotchkiss drive.

All of these improvements combine to give marvelous new road-action... an absolute steadiness... which makes this the easiest of all Cadillacs to control, the safest of all Cadillacs to drive.

**Improved Multi-Cylinder Performance**

You naturally expect the highest degree of fine multi-cylinder performance in motor cars bearing the Cadillac name.

In designing these new Cadillacs, we have endeavored to widen still further the performance leadership for which Cadillac cars have long been noted.

The same famous power plants, V-8, V-12 and V-16, are continued with refinements that add materially to their power and economy.

A novel arrangement of carburetor air intake is responsible for much of the increased power. Instead of taking carburetor air from under the hood in the usual manner, cool air is taken from behind the radiator grille, is led through a passage between the radiator core and casing, thence through the air cleaner and silencer to the carburetor.

A gasoline engine is, in reality, an air engine. It derives its power directly from air—air which is drawn into the combustion chambers through the carburetor, made to deliver energy by the temperature and pressure caused by the combustion of the gasoline it carries, then
exhausted to make room for another charge of fresh air. The power derived from the air is thus proportional to the amount of air handled. A large engine of the Cadillac type delivers more power than a small one because it consumes more air. By super-charging, that is, pumping air into the cylinders under pressure, the power may be increased; this practice is employed to advantage by aviation engines where the noise of the supercharger or air pump is not objectionable.

Cadillac realizes the advantage of super-charging without using a noisy pump by using cold rather than warm air. Warm air is expanded air, hence weighs less per cubic foot than cold air. By using cold air taken from the front of the car rather than air which has been heated by passing through the radiator and over the engine, the Cadillac engine is fed a greater weight of air; hence, delivers more power.

A still further increase of power is realized by increased compression. While this does not affect the amount of air handled, it does increase the efficiency with which it is handled, thus giving not only increased power but also increased gasoline economy.

The valve springs of the Cadillac V-8 engine are now of the dual type—two for each valve—used heretofore on Cadillac V-12 and V-16 engines. This change has resulted in increased power at the higher engine speeds. For years, Cadillac has conducted research on aluminum alloy pistons. Recognizing the fundamental advantages of the lighter metal, much time and effort has been expended to overcome the disadvantages of the earlier designs. The type finally approved, after hundreds of thousands of miles of testing, is a piston free from noise and of excellent wearing qualities. The metal is a hard, tough, long-wearing alloy that has 20
per cent less heat expansion than pure aluminum. Due to flexibility provided by a T-shaped slot in the skirt, these pistons are fitted as closely as those of cast-iron. Pistons are carefully ground elliptic—six thousandths of an inch from a true circle—so that when running, expansion will make them perfectly round. The final operation in piston manufacture is an "anodic" treatment, a process that results in a chemical change of the piston surface, increasing its hardness until it is equal to that of a sapphire, or almost as hard as a diamond. This one innovation is largely responsible for the final successful use of the light alloy piston. The extreme hardness prevents scuffing and scoring and insures a long noise-free piston life.

Cadillac V-8 engines have heavier crankshafts and heavily ribbed cylinder heads, both of which add to the smoothness for which Cadillac engines are renowned.

New Maneuverability and Convenience

The passengers—particularly the back seat passengers—are most benefited by the phenomenal riding ease of the new Cadillacs. But if you drive, you will find that you have not been neglected. Many innovations have been provided for your convenience.

A new double roller steering gear with increased ratio and anti-friction bearings under the rollers and on the roller-shaft makes steering incredibly easy, parking almost effortless. The cars have amazing new maneuverability. Turning radius is so greatly reduced that you can turn your Cadillac in as small a space as that required by smaller cars of conventional design!

Front compartment floor boards are now entirely clear. No impediments interfere with your entrance from the right-hand side. The hand-brake lever is con-
veniently mounted under the left-hand side of the instrument board. It is inverted and supported from the board so as not to interfere with clutch pedal operation. The convenient position of the transmission control lever has been retained, with the base of the lever now passing through the floor board at the toe board.

Starting and cold weather driving have been simplified by the push-button starter switch mounted in the driver's side of the instrument panel—and by the semi-automatic choke which provides summer flexibility in midwinter.

The safety and convenience of Cadillac Multibeam lighting has been further increased. More light is now thrown on the road from the two filament pre-focused bulbs. Three beams, City, Country-Passing and Country-Driving, are provided; selection between City and Country beams is made by the steering wheel control, while Country-Driving and Country-Passing beams are controlled by a foot switch to the left of the clutch pedal.

Another very interesting innovation is this: Headlamp beam selection by foot switch has been objectionable in that the driver often was able to tell the position of the headlamp beam only by experimentally operating the switch, flicking the driving beam into the eyes of the oncoming driver. Embarrassing uncertainty is overcome in the new Cadillac by a novel headlamp beam indicator on the instrument board. The words “City,” or “Country-Passing,” or “Country-Driving” as the case may be, always glow from the indicator.

Nor need you worry about battery or generator in the new Cadillac. A current-controlled generator provides ample current for accessories such as heater and

The artistically designed instrument panel showing package compartment.

The multibeam lighting system provides additional safety and convenience in night driving.
radio. A unique type of winding is responsible for a generator that automatically changes the amount of current generated to suit the needs of the moment. If the electric current requirements are increased by turning on the headlamps, the generator automatically increases its output. The charging rate is also uniform through the entire range above twenty miles an hour, instead of decreasing at the higher speeds as in the past.

Air-Tone horns, concealed beneath the hood, give a powerful warning signal, yet are courteously pleasant in tone.

In every way, driving the new Cadillac is a joy. All inconvenience, all irksome effort, have been removed... only the exhilarating sport of driving remains.

In conclusion...

As you will readily appreciate, the final proof of Cadillac supremacy is to be found, not in a treatise on engineering, but in actual performance on the road. For if the Cadillac name stands as complete assurance of excellence to a large percentage of the Cadillac clientele—then, surely, Cadillac performance is the ultimate revelation of this excellence. May we not invite you to lay down this book... permit your Cadillac dealer to place a new Cadillac at your disposal... and obtain final proof that it is Standard of the World?