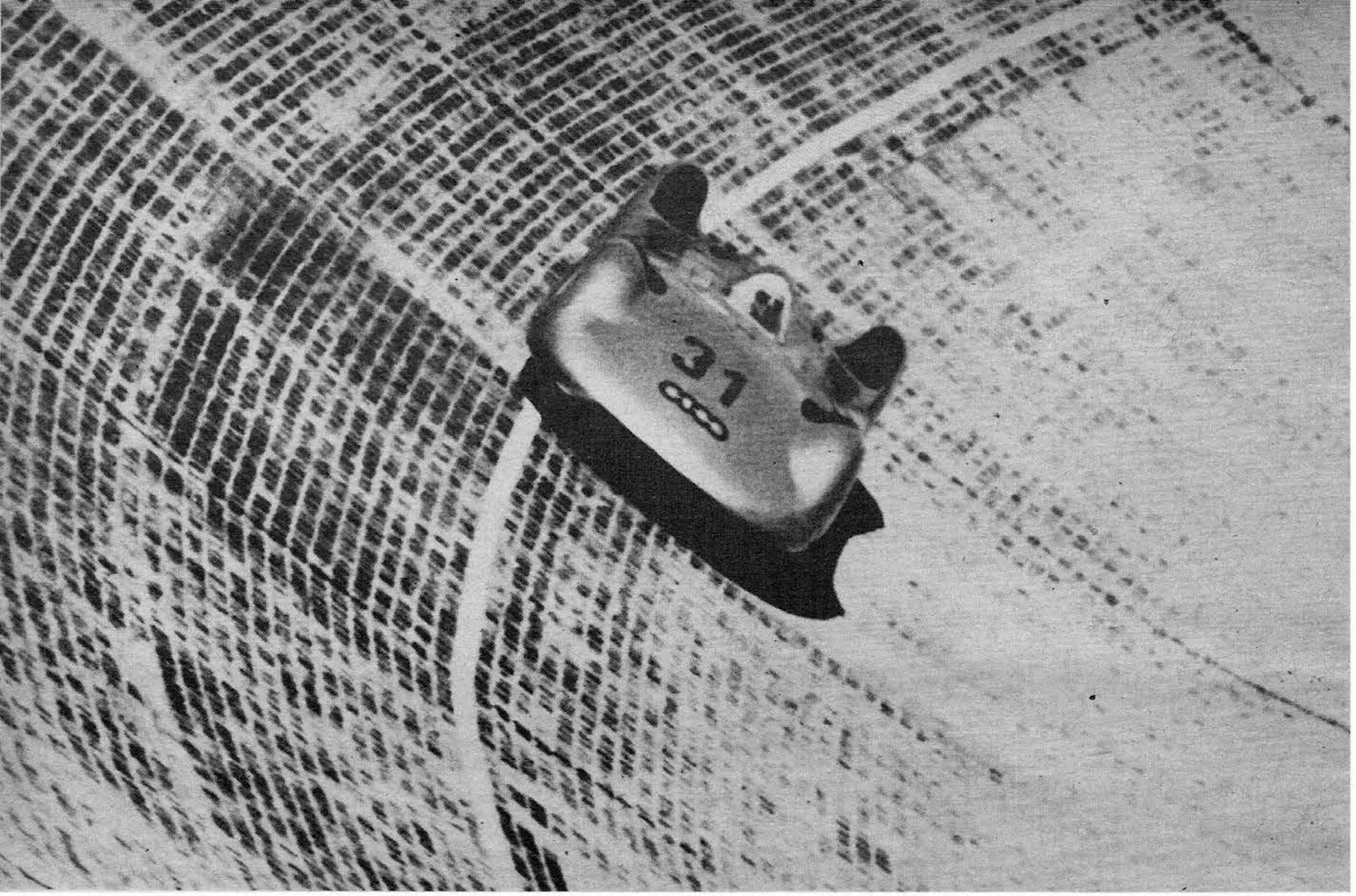

The fabulous Auto-Union as it appeared during the Avus races in 1937. Development was financed by Adolf Hitler's regime.

Is Auto-Union still the car to beat?

After 20 years, this car still is a record-holder and a standard of performance

BY ROGER HUNTINGTON

NO COMPETITION CAR in the history of the automobile has half the reputation of the fabulous pre-war Auto-Union. Its exploits are a legend on both sides of the Atlantic. The monster was conceived and financed—along with the Mercedes-Benz cars of that period—at a cost of millions by the Hitler government as a propaganda weapon; with the right driver it was one of the fastest cars around a closed road circuit ever built; it was one of the few cars of history that had the horsepower and road-holding necessary to exceed 200 mph on a normal highway; it still holds the world's absolute records for standing-start acceleration in kilometer and mile distances.

It's no wonder, then, that auto enthusiasts here in the land of wild 250-mph Bonneville streamliners and nitro-burning acceleration machines that can turn a standing quarter-mile in 10 seconds are beginning to wonder if the old Auto-Union is *still* the car to beat—after nearly 20 years of development! How does our hottest 1955 iron stack up with it on acceleration and top end? Has the American backyard engineer, working on a shoestring, finally caught up with ingenious, heavily financed German technology of 20 years ago?

Let's have a look-see . . .

Space won't permit any detailed analysis of the A-U design here, but I feel a brief description is called for to help you understand these comparisons. Essentially, the Auto-Unions were a series of rear-engine, rear-drive cars designed by Dr. Ferdinand Porsche for European Grand Prix road racing between the years 1934 and 1939. Due to a lowering of the piston displacement limit in '38, the fastest model of the series—the Type C—came in the two years before that. This is the baby that concerns us here.

It had a tubular frame with the engine set just back of the center, feeding the rear wheels through a 5-speed gearbox behind the axle and Z.F. limited-slip differential; the fuel tank was ahead of the engine (on the center of gravity), and the driver sat just ahead of this. All four wheels were independently sprung on torsion bars. The engine was a big V-16 with a single camshaft set high in the V, operating inclined valves through short pushrods and rockers; it featured aluminum construction and roller bearings throughout! A single Roots-type supercharger pumped 12-14 lbs./sq. in. boost pressure in the engine.

Speed record versions of this basic Type C engine displaced up to 385 cubic inches and would kick out upwards of *700 hp* at 5500 rpm! The whole car weighed just over 1800 lbs. dry . . . and she'd go—that's for sure!

Lined up against this fantastic machinery we have our backyard accelerators and Bonneville straightaway jobs. Construction-wise, we're much simpler. Without government backing you can't always afford independent torsion bar suspensions, light-alloy materials, and tubular frames; we have to depend largely on reworked production parts on our super-speed stuff over here. This tends to increase the weight of the car—which doesn't do a thing for performance when shooting at records.

However, as long as we're designing only for performance *in a straight line*, the handicap of limited finances and stock parts doesn't need to kill us. I've seen some beautiful tubular steel frames that have been welded up in garages . . . and I've even seen kids build up some pretty efficient independent rear ends from stock parts. Weight-wise, of course, iron and steel can never compete with aluminum and magnesium; but we know now that smart design—with maybe a little help from the old jiggle juice (nitro)—can give us weight/power ratios equal to anything ever built!

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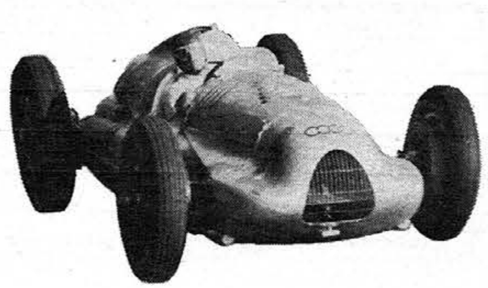
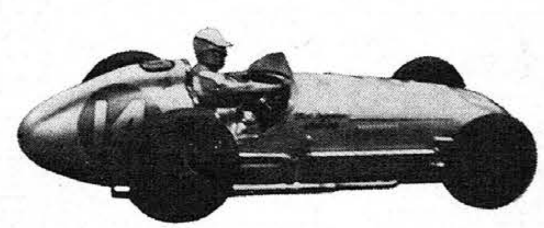
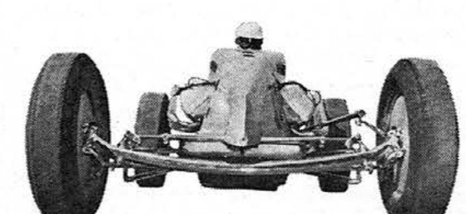


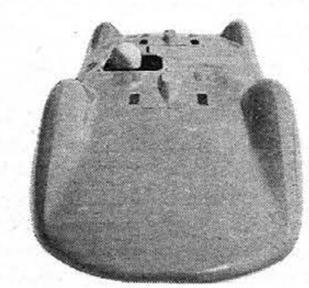
In 1938, the Auto-Union ran in this grand prix form, using a three-liter version of the engine.



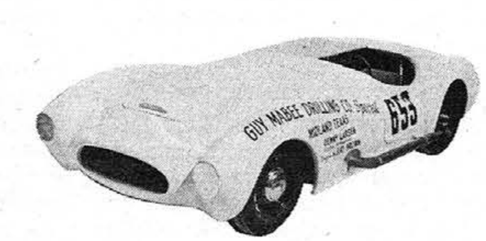
Indianapolis speedway cars—how would they stand up against the old German Auto-Union in a race?



Dragsters—maybe they could get the jump on the Auto-Union, but how far?



Bonneville streamliners—can they learn from Auto-Union?



Sports Cars—this one has done an honest 200 mph. Is this good enough?

The one thing you can't get without big money is *real "roadability"*—which includes cornering, road-holding on the straight at high speed, and braking. Time has proved that this requires: (1) Precise suspension and steering geometry; (2) maximum possible sprung/unsprung weight ratio, through elaborate independent suspensions and light-alloy construction; and (3) special arrangements for brake cooling not to be found among modern mass-produced parts—like maybe huge 16-inch Alfin drums, forced-draft ventilation with turbine discs, etc. This stuff costs money. If we had to compete against the Auto-Union in getting around a closed road circuit in the minimum possible time we'd be snowed under quick. In a straight line . . . well, we'll see in a minute how the field rates.

In regard to engines, we've got to hand it to our boys. They can get as much out of a basic stock engine unsupercharged as any European racing engineer could. They're plenty sharp on power-producing *fuels*, too. We're getting well over 400 hp from some converted automobile engines today. In terms of hp per cubic inch of displacement this would be equivalent to the very commendable figure of 1.3 or so (maybe a bit more on nitro). We're no duds when we get up into $25,000 track racing cars and dohc engines, either; the mediocre showing of the several foreign jobs that have tackled Indianapolis in the last few years proves something.

The field where American auto engineering falls flat is *supercharging*. We don't know anything about it really. Our few isolated attempts to adapt Roots-type truck blowers on Bonneville cars and others have accomplished little, and the cars are frequently clobbered by unblown rigs. Results at Indy with centrifugal blowers have been so-so. The true potentiality of the new McCulloch centrifugal unit in the modified engine field remains to be seen. AND YET SUPERCHARGING IS AN ABSOLUTE MUST FOR WORLD-BEATING PERFORMANCE WITH A PISTON ENGINE. The quicker we get on the ball the quicker we'll bring some world's unlimited speed records back to America.

But let's get to the meat: Just how does our hot American iron stack up against the Auto-Union in straight-line performance?

THE ACCELERATION PICTURE

If you had ever seen some of our 1300-pound nitro-burners take off from the starting line at a California acceleration strip you'd swear no machinery under the sun could touch 'em. They take off like they were literally shot out of a gun. The brutal truth is that the fabulous Auto-Union would get beat by a good local machine over the quarter-mile distance!

Any enthusiast knows that *traction* is far more important than brute horsepower when you first take off with a hot car. This is because many cars today have a sufficiently low weight/power ratio to spin the driving wheels up to at least 60 mph, and the useful accelerating *thrust* you get under these conditions depends entirely on the friction between tire and pavement.

TIME IN SECONDS	1955 V-8 CHEVROLET WITH POWER KIT	AUTO-UNION TYPE C
2	20 mph	30 mph
4	34 "	60 "
6	45 "	87 "
8	54 "	110 "
10	60 "	130 "
12	65 "	150 "
14	70 "	165 "
16	75 "	178 "
18	79 "	187 "
20	82 "	194 "
22	84 "	199 "
24	86 "	202 "
26	88 "	207 "
28	90 "	210 "
30	92 "	211 "

Auto-Union's fantastic acceleration from a standing start is compared here with figures from *Road & Track* magazine on a power-pack equipped 1955 Chevrolet.

Furthermore, when you're driving only on the rear wheels, obviously the greater the proportion of total car weight you can get on these wheels the more this thrust will be with a given degree of traction. (The ideal situation, of course, would be four-wheel drive, where all the weight is available for traction thrust.) This is where the A-U was limited. Having to design the car primarily for roadability, they had to have the weight distributed more or less evenly between front and rear wheels; the actual loading put about 58 per cent of the gross weight on the rear end. On a dragster, though, they can cut loose, with steering control at high speed as the only limiting factor; some have over 80 per cent of their total weight on the rear driving wheels of the machine!

Then there's the matter of actual friction (traction) between tire and road. With a solid "beam"-type rear axle, engine torque reaction on the pinion gear will try to lift the right rear wheel and press down the left. This lateral weight transfer will obviously hurt the thrust by loading one tire beyond its traction limit and lifting weight off the opposite.

You can eliminate this effect entirely by *U-jointing* the axle drive shafts to each wheel and using some form of independent or DeDion rear end. The Auto-Union had this. (Or you can use a special axle support linkage arrangement, as on the Type C and D Jaguar.)

On the other hand, methods for cancelling this lateral torque reaction are practically unknown on domestic cars. This makes their unbelievable traction all the more remarkable. My calculations suggest that some dragsters are getting over *one-third more* effective traction coefficient than the best achieved by the A-U! The secret is the tires.

Those huge asphalt slicks with soft tread layers, let down to six lbs. or so, will bite beyond the Germans' wildest dreams. This gets them off the line and half-way down the course before the A-U would be nicely rolling . . . and certainly the A-U was no slouch off the mark!

Comparing actual times and speeds for various distances from a standing start is risky. The Auto-Union, developed under the European metric system of measurement, was never tested over the quarter-mile distance. I guess about the only answer here is to collect all available standing-start acceleration figures on the A-U cars, combine them into a composite curve plotting mph against time, then calculate out the various distance times with slide rule and planimeter (an area-measuring device) on a graph.

The accompanying curve is for the world record car. My calculations on this curve show an approximate elapsed time for the full quarter-mile from a standing start of 11.3 seconds, with a terminal speed at the end of the course of about 145 mph. The best time I know of yet achieved by a hot rod under these conditions is 8.9 secs. elapsed and 144 mph respectively—turned by the Yates-Mikkelson dragster last year at Santa Ana.

But from here on . . . watch out! The A-U would be just nicely rolling. It would go like a streak a short distance beyond—and would steam right on up to around 215 mph within the next two miles. It would be doing over 200 within *one mile* from the standing start!

The A-U's world record time for the standing kilometer (3281 feet) is 19.08 seconds, with 25.96 for the standing mile. This means that the 1999 feet between the kilometer and mile posts was covered in just 6.88 secs.—or an astounding average speed of *198 mph!*

According to my calculations, the record A-U would turn a standing half-mile in 16.8 secs. and be rolling *181 mph* at the end of that distance.

(*Continued on page 54*)

THE AUTO-UNION

(Continued from page 38)

That's what a supercharger and a million bucks will do for you.

In normal road racing trim with the usual race gearing, the Type C Auto-Union would probably not touch 200 mph. It was clocked at over 190 on long straights during races, however. With standard race body, the 700-hp record engine, and proper gearing it would do around 215. With a special all-enveloping streamlined body, though, it was another story. In October, 1937, Bernd Rosemeyer drove a streamlined version of the Type C for a two-way average of 252.5 mph on the Frankfurt-Darmstadt autobahn in Germany. Incidentally, that's really moving on a normal concrete highway 23 feet wide . . . I'll bet it looked about as wide as a hair ribbon from the driver's seat!

To me, this business of building cars that were controllable at such fantastic speeds on narrow concrete highways was one of the most spectacular achievements of the German racing engineers. It speaks very well for their suspension and steering systems. We haven't even scratched this kind of engineering over here yet.

HOW ABOUT TOP SPEED?

The very highest speeds ever turned by these 6-litre German Grand Prix cars came during the national "Speed Week" in early 1938. A special streamlined 12-cylinder Mercedes-Benz with over 700 hp available made a two-way record of *268.9 mph.* When Rosemeyer attempted to crack this under poor weather conditions the A-U was caught in a stiff side gust when coming from behind a row of trees that literally flipped it off the road, killing him. He had made 266.7 mph in a test run before that. It was the last Auto-Union record attempt.

So what have we got to match this here in America today?

In a word, we've got the "seeds" of the machinery necessary to beat it—but we haven't got the official times yet to prove it. The highest two-way average speed ever turned by an American car to date under official timing is 255.41 mph. This was accomplished in 1953 by Roy Leslie at the wheel of Bill Kenz' two-engine Bonneville streamliner. This iron can still lay claim to being America's fastest car, though it came off second best at Bonneville last year. It is powered by two Ford 59A flat-head engines of 296 cubic inches each, developing a total of about 500 hp; gross weight is 3300 lbs.

Probably our next fastest car is the Shadoff Chrysler-powered Class C streamliner. This baby averaged 248 mph last year. The Chrysler Firepower engine is sleeved and destroked to 302 cubic inches to bring it within the Class C limit of 305 cubic inches (5 litres), and will pull 375 hp at 5800 rpm on a mild nitro-methanol mixture. This car features a very neat home-built DeDion rear end to aid traction under the big pull.

You're probably well aware that several builders have already cracked some A-U world records in the lower displacement classes under official AAA timing. Rosemeyer's Class C flying-mile record for engines of 183 to 305 cubic inches stood for 15 years at 219.5 mph . . . until George Hill came along with the famous Hill-Davis Bonneville streamliner in 1952 and broke it with a two-way average of 229.8 mph! He did it with only 248 cubic inches, too; the Ford engine in the H-D job ran a special Clark-Tebow overhead valve setup and put out 320 hp on fuel. Then the Shadoff Special broke this record in '53 at 236.36 mph—and went on to crack the other A-U marks.

Actually, in one way we're at a disadvantage at Bonneville. It's that old bug *traction* again. With the extremely low weight/power ratios of some of our latest streamliners, they can actually break their driving wheels loose on the top end . . . so traction suddenly becomes as important as horsepower in determining the top speed! The Germans never met with this problem. Their traction coefficient on concrete was at least two-thirds better than we can get on the salt surface on the Flats, so they never came close to breaking loose above 200 mph.

It's entirely possible that some of our latest Bonneville streamliners might go 10 or 15 mph faster if they could get a bite equal to that on pavement. We'll eventually have to take drastic steps against this traction problem if we expect to exceed 300 mph on the Flats. The most obvious answer is 4-wheel drive with independent suspension all around. The Railton-Mobil that turned 403.7 mph at Bonneville in 1947 used this layout—and I can tell you now that more than one backyard wrench-wrestler is thinking along these lines today!

On that other big factor in top speed—*drag*—we don't take any back seats. The wind resistance coefficient of the special streamlined A-U record body was said to be around .28. We've definitely bettered that on some of our streamliners; in fact, my calculations, based on their known speeds and power outputs at Bonneville, show some coefficients under .20! The Railton sported a figure barely *half* that of the A-U. We've learned lots about streamlining in the last 15 or 20 years . . . and have done plenty without the help of million-dollar wind tunnels!

In closing, I can't help but wonder how something like this C Auto-Union would do in the Mexican Road Race. Certainly it would have the field hands-down on acceleration all the way up the range; it should corner with the best of them, brake better than most, and make 'em all eat dirt on the straights with a useable top of at least 190. If they could get enough fuel on board and keep rubber on the thing . . . •