

SCI ROAD TEST: **LANCIA**



Owner demonstrates Spyder's speed and stability on test curve. At this point car is doing between 65-70 mph, remains flat. Michelin X tires helped Lancia stay glued with minimum tire squeal.

IT'S EASY to say without hesitation or reservation that this is one of the finest cars being built in the world today. Its excellence is total, as it should be: the "super-fine mechanism" is a deliberate, self-conscious work of art showing everywhere the touch of the fine Italian hands of Gianni Lancia, Vittoria Iano and Pinin Farina, each at his best.

The harshest criticism that can be made of this car, one you hear often from the unenlightened, is that "it doesn't look like that much money." But this is in the Lancia tradition of restrained good taste and clean, simple line. The only non-functional adornment on this body is a single chrome strip on each side, the deletion of which could improve its integrity as a sculptural form. The beauty of the body is subtle rather than spectacular and this is in harmony with the other aspects of this connoisseur's delight.

Under its skin the Aurelia is an engineering masterpiece and, again in the tradition of the house, the V-6 power plant, rear-axle transmission, and running gear are unique. Beyond that, each component performs its task perfectly and the finish is fine throughout. The car is spectacular for its engineering, roadability and impeccable finish. And this is where the money goes.

The first Aurelia G. T. two-seaters came to the U. S. in '55 and many detail improvements have been made since then. The originals did not have roll-up windows and their

bumpers were on the skimpy side. These two shortcomings by U. S. standards have been corrected and E. Forbes-Robinson, purchaser of one of the first of the more luxurious "America" models, made it available to SCI for test as soon as he had clocked 2000 miles, including a couple of days' racing at Palm Springs. As he turned over the keys Robbie said, "Keep in mind that this machine wasn't designed to beat Ferraris. It's a high-quality road machine with respectable speed and dig. It's capable of sustaining higher than average road speeds because of an absolutely fantastic side-bite and perfect handling and brakes. Judge it as a road car, not a race car."

True, but the better Italian designers recognize very little difference in the two types; each has to stop, go, corner and brake excellently if it's to be a good car. When Iano designed the 2.3 Alfa-Romeo touring car in the early '30's it turned out to be a hard race car to beat and few changes were required to transform it into the P3 Monoposto. His Aurelia has a similar history. This conservative-looking touring car won its class in the '51 Mille Miglia ahead of two-liter Ferraris and was second overall, bested only by a Ferrari 4.1. Aurelias have scored literally countless racing successes since then, including a 1-2-3 in the Targa Florio and class win at Le Mans. And, as the old 2.3 Alfa engine was developed into one of the greatest racing power plants, the V6 of the Aurelia served as the basis for the engines of the all-

Chrome strip at bottom of door is only bright work on car. Body is steel in unit with frame. Hood and deck lid are aluminum, and free of drumming. Fuel tank is set aft of seats making luggage compartment roomy.

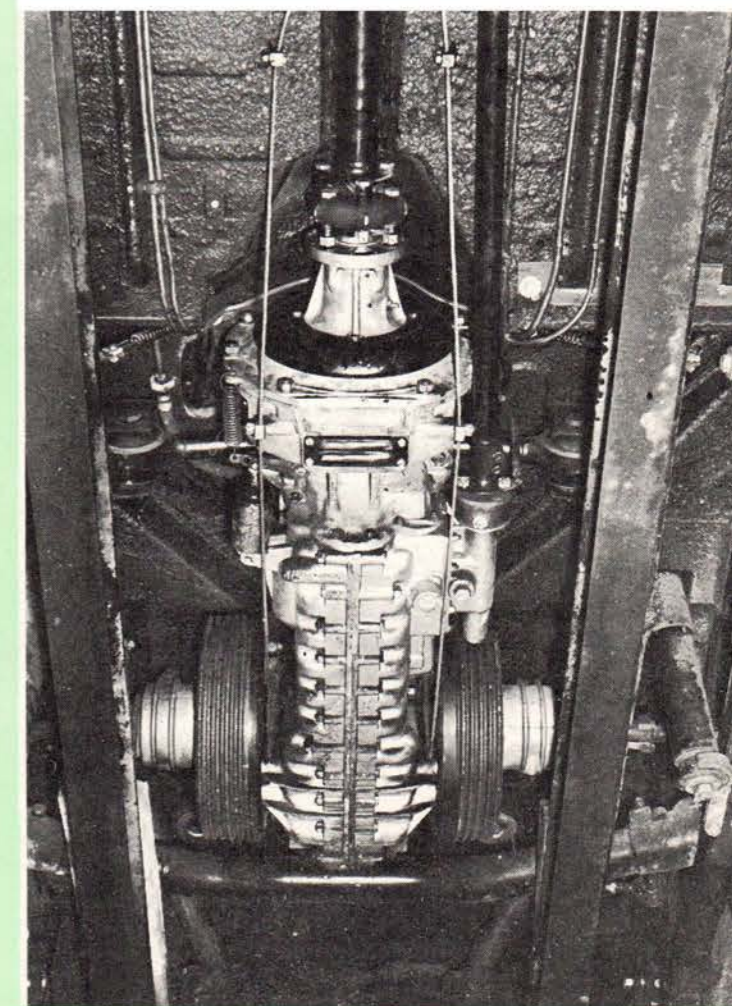


out competition cars that won the '53 Panamericana 1-2-3 and were later taken over by Ferrari. So the standard Aurelia is a good deal more than "just a road machine" and has much in common with the designed-from-scratch race car.

You open the rather shallow door and step far down to the floor-panel. The seats are deeply padded, covered with soft, pleated leather, and have a wide range of adjustment both fore and aft and of rake of the seat back. The steering wheel is a jewel of machined aluminum with a thin hardwood rim and it's adjustable. The starter is activated by pressing the ignition key and the engine fires readily. In place of an automatic choke there is a manual control, a lever that hangs just behind and below the instrument panel. Beside it is a similar hand-throttle lever. When the choke is opened even slightly a red warning light burns on the tachometer face. The engine idles at about 800 rpm with absolutely no rocking on its four-point rubber mounting, with barely a sound and no vibration. With a hand on a rocker cover you can run the engine up to its 5300-rpm red line and still feel no vibration.

The big, rigid steel-tube shift lever is typically Italian. The shift pattern is standard "H" with reverse off at the lower right, making downshifts to second foolproof. The "H" is very narrow and the lever is rather heavily spring-loaded to keep it on the 3-4 side, and this takes a small amount of getting used to. The clutch operates with moderate but not light pressure. First can be engaged at standstill without clashing gear teeth and is easy to double-kick down to. The lever can be sliced through the three synchro gears like the proverbial hot knife through butter, even though the gearbox is in unit with the rear axle.

Getting under way, even during acceleration tests, we experienced no wheelspin, thanks partly to the semi-independent rear suspension and partly to the effect of three elastic couplings in the two-piece drive shaft. Even first gear is extremely quiet and the only noise even slightly noticeable is a smooth audible whirr from the engine that becomes audible at around 3000 rpm. The mufflers silence the exhaust completely as far as the occupants of the car are concerned and this, plus the smoothness of the engine and almost total insulation against road shock, gives an impression at 100 mph of floating along at 25 in a turbine-powered vehicle. The Aurelia's ride is a remarkable thing that somehow com-



Driveshaft connects to clutch housing through elastic coupling. Four-speed transmission, final drive are one unit. Large inboard brake drums straddle rear drive. "Propulsion unit" mounted on body-frame, insulated by rubber blocks. Springing is by semi-elliptics.



Rear wheel with lug wrench, hub cap and special wrench, and outer U-joint cover which is retained by large nuts. To keep friction losses low, and extend life of joint, Lancia locates external U-joints outside of the wheels. Greater length of half-shafts reduces angular deflections in joints.

binest the best of Detroit-creampuff with race car flatness and firmness. It's simultaneously a luxury ride and a competition ride.

When I first took the Aurelia over the familiar turns of the test course I immediately assumed that its speedometer was something like 10 mph fast. It had to be, I thought, because awfully fast speeds were being indicated yet there was not a trace of tire squeal, the body stayed dead flat and each maneuver was completely effortless — as effortless as tooling along in a straight line. Then we calibrated the speedometer and found it to be very close to the facts. Forbes-Robinson, who knows what his car will do on a race course as well as on the open road, expresses its handling like this:

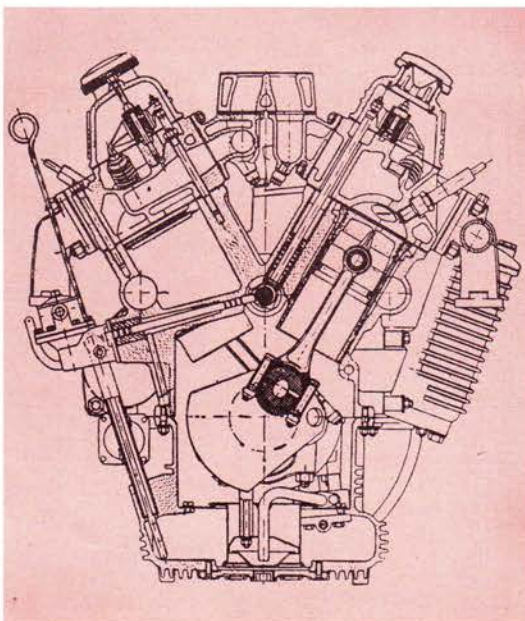
"Here's a car that handles so well that the average Sunday



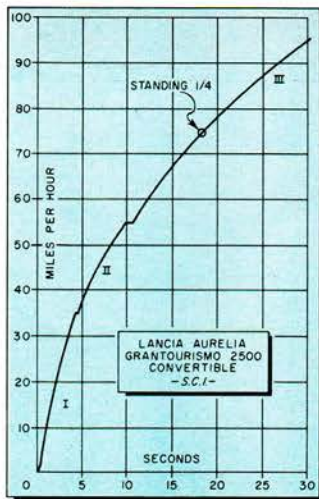
Cornering hard through test bend, Spyder leaves traces of rubber. This "stage three" cornering at speed produces 4 wheel drift.

driver can stick it into a turn well over the normal correction speed and yet still be *driving* the Lancia. You can go around a corner on rails where the average car is in a slide; how they've engineered it I don't know, but it's there, all right. I call the "on rails" range Stage One. The instant you get over that in the Lancia it starts to mush the front end just a tiny bit. All you have to do then to get back in your lane is to back off slightly on the throttle. That's Stage Two and it's simple even for the novice to handle. There's a third stage beyond that but you have to be going awfully fast to reach it. You get into a turn at this speed, cock the front end and the back end starts to go and then all four wheels drift sideways. This is perfectly controllable but it gets a bit tricky and exciting up there. This technique should only be used under the relatively safe and predictable conditions of a race course and the driver that tries it had better know what he's doing."

Lake Jano's classic Alfas, the Aurelia uses worm and wheel



Front view cutaway of the unique V-6 engine. Block, sump, and cylinder heads are light alloy. Engine weighs only 353 pounds.



Engine compartment is small, cramped. Mill itself is mounted at four points on rubber blocks, is vibration-free. "America" model is equipped with Nardi manifold, two dual-throat downdraft Weber carbs.



steering and like the Alfas, it seems to steer itself around corners. Its $3\frac{3}{4}$ turns from lock to lock may sound slow but very small wheel movements are required. The steering is as feathery as the power-assist kind, the feel is very light and there is almost no caster action, at least as Robbie's car was set up. The steering is reversible to some extent and road shocks are transmitted back to the wheel — a small price to pay for this exceptional steering.

The Aurelia's brakes are superb and have a far greater ratio of friction area to car weight than those of any touring vehicle we have tested. The front brakes are cooled by means of large air scoops in the backing plates while the inboard rear brakes sit right in the air stream. These binders are without vices. They do not pull to the side nor lock up and the front end does not dip. Aside from a slight loss of effi-

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LANCIA AURELIA GRAN TURISMO 2500 CONVERTIBLE.
Also called "America" model.

PERFORMANCE

TOP SPEED:

Two-way average 108.8 mph.
Fastest one-way run 110.1 mph.

ACCELERATION:

From zero to Seconds
30 mph. 3.9
40 mph. 5.5
50 mph. 8.4
60 mph. 12.4
70 mph. 16.3
80 mph. 21.0
90 mph. 27.1
100 mph. 35.0
Standing $\frac{1}{4}$ mile 18.3
Speed at end of quarter 74.8 mph.

SPEED RANGES IN GEARS:

(1) I zero to 35 mph.
II 7 to 55 mph.
III 11 to 80 mph.
IV 14 to max.

SPEEDOMETER CORRECTION:

Indicated	Actual
30	28
40	38
50	47
60	57
70	66
80	77
90	88
100	100

FUEL CONSUMPTION:

Hard driving 15.3 mpg. during speed & acceleration tests.
Average driving (under 60 mph.) .. 21 mpg. plus

BRAKING EFFICIENCY (10 successive emergency stops from 60 mph, just short of locking wheels):

	per cent
1st stop	70
2nd	79
3rd	64 — no further fade.

SPECIFICATIONS

POWER UNIT:

Type V6-60°
Valve Arrangement vee-inclined, pushrod
Bore & Stroke (Engl. & Met.) 3.06 x 3.36 ins.; 78 x 85.5 mm.
Bore/Stroke Ratio 1.10
Displacement (Engl. & Met.) 149.6 cu. ins.; 2451 cc.
Compression Ratio 8.4 to one.
Carburetion by Dual two-throat Weber downdrafts.
Max. bhp. @ rpm. 130 @ 5300
Max. Torque @ rpm. 137 lbs. ft. @ 3500
Idle Speed 700-800 rpm.

DRIVE TRAIN:

Transmission ratios I 3.093
II 2.058
III 1.415
IV 1.000
Final drive ratio (test car) 3.73 Gleason Hypoid
Other available final drive ratio —
Axle torque taken by De Dion tube and body-frame.

CHASSIS:

Wheelbase 96.5 ins.
Front Tread 50.4 ins.
Rear Tread 51.2 ins.
Suspension, front Lancia sliding pillar; beam axle and coil springs.
Suspension, rear De Dion with semi-elliptic springs.
Shock absorbers Telescopic, adjustable at front.
Steering type Worm and wheel.
Steering wheel turns L to L 3 $\frac{3}{4}$
Turning diameter 32 ft. 10 ins.
Brake type 2 leading shoe F; one leading, one trailing at rear.
Brake lining area 300 sq. ins.
Tire size 550 x 16/165 x 400.

GENERAL:

Length 166.5 ins.
Width 61.25 ins.
Height 46 ins. to top of windshield;
50 ins. with top up.
Weight, test car 2760 lbs.
Weight distribution, F/R 46/54
Fuel capacity—U. S. gallons 15.3, incl. 2-gal. reserve.

RATING FACTORS:

Bhp. per sq. in.87
Bhp. per sq. in. piston area 2.95
Torque (lb-ft) per cu. in.92
Pounds per bhp. — test car 21.2
Piston speed @ 60 mph. 1663 fpm.
Piston speed @ max. bhp. 2968 fpm.
Brake lining area per ton (test car) 217.4 sq. ins.

Lancia R. T.

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ciency on the third of ten consecutive emergency stops from 60 mph the brakes were unaffected by continuous hard use.

Lancia undoubtedly could sell more cars by adopting a more razzle-dazzle styling policy and by making its products hotter. But both the acceleration and the speed of the Gran Turismo Aurelia are held to what the manufacturer evidently considers adequate levels—quite enough but not too much for average buyers of luxury sports cars. A significant point here is this engine's low speed torque. It lugs smoothly in top gear at idle rpms and will accelerate smoothly from that speed when the throttle is opened—the turbine effect again.

The V6 engine in 150 cu. in. form certainly is capable of much higher power output. The original Aurelia Spyder of 1955 was rated at 118 bhp at 5100 rpm and with 8 to one compression. Now the America has two dual-throat Weber carbs instead of one, has its compression upped to 8.4, pulls about 130 bhp at 5300. With a yield of only .87 bhp per cu. in. this engine is nowhere near its potential; also it is very lightly stressed and should give unusually reliable, durable service, and this also is part of the Lancia tradition.

The provision of the second carburetor improves the two-seater's performance only in the upper rpm range where extra breathing ability becomes critical. Acceleration times from zero to 70 mph and over show marked improvement and about 5 secs. are lopped from the zero to 100 time. Top speed is increased by only a couple of mph but it must be pointed out that Robbie's engine was running lean during our tests.

Back in 1951 I asked the chief engineer of one of Detroit's Big Three for his opinion of the V6 engine. "Oh, we've checked that out," he said, "and rejected it. Unless you go the prohibitive cost of geared counterweights it's impossibly rough for the American market." Well, the six-throw, four-main crank of Lancia's V-6 has only integral counterweights, no vibration dampener and as we've said it's a model of smoothness. Authority isn't necessarily authoritative.

The whole engine weighs about 350 lbs.; block, sump and heads are light alloy, wet cylinder liners, valve seats and guides are cast iron. Vee-inclined overhead valves lie in a fore-and-aft plane instead of assuming the conventional athwartships position in the hemispherical combustion chambers. The camshaft rides in the block just above the crankshaft and actuates the valves through light alloy tubular pushrods, rockers and concentric valve springs.

Two ties with the vintage period are interesting. Like the Lancia Lambda of 1923 the Aurelia uses five rings per piston—three for compression and two for oil. This is in opposition to the general use today of three-ring pistons which swap reduced friction and wear for increased

blow-by and crankcase contamination. The other carryover from the good old days is a set of thermostatically-operated radiator shutters. This feature is in addition to the conventional thermostatic valve within the cooling system and indicated Lancia's willingness to go all the way in its quest for doing things the right way.

At the rear of the engine is a small sheet metal housing which encloses the flywheel and starter ring gear. Aft of this is a light alloy coupling containing rubber pads, by which the drive shaft is joined to the output end of the engine. The drive shaft turns at engine speed, making it a source of undesirable vibration. By making it in two short lengths instead of one long one this defect is reduced. By using elastic couplings at all three joints and by providing a rubber-mounted self-aligning steady bearing at the center of the shaft it is eliminated.

The drive shaft is coupled to what Lancia calls the "*gruppo propulsore*." In one beautiful cast light alloy assembly are gathered the clutch, transmission, and final drive with its own oil pump for lubricating its contents. This arrangement has two main advantages. The absence of a transmission hump in the front floor panel makes for optimum foot room and moving this mass to the rear reduces loading of the front wheels. Rear suspension of the original Aurelia was by swing axles and coil springs but this was replaced by a de Dion layout using conventional leaf springs.

Huge brake drums are located on either side of the differential and the axle shafts are carried in sliding-nut couplings at their internal ends. These couplings are lubricated by oil carried in revolving casings which enclose the couplings. The half-shafts terminate in universal joints which are located *outside* of the rear wheels in order to hold U-joint deflection at a minimum, thereby reducing friction losses and wear. With this rear suspension there are none of the oversteer tendencies common to many full-independent systems. The rear propulsion unit is mounted on the body-frame structure but is perfectly insulated from it by rubber blocks.

Most cars that, like the Aurelia, are just one step removed from genuine racing machines have a certain truck-like brutishness: a heaviness in the gearbox or steering, a harsh clutch, a harsh ride and plenty of noise from various organs. The Lancia Aurelia, for all its uncompromising thoroughbred-ness, is not this way. Everything it does it does quietly but with total competence—and with style. Take the body, for example. The fit of the panels (steel except for aluminum hood and rear deck) is perfect. The doors, hood and lid function smoothly and crisply. They are among the little things that contribute to the overall aura of 24-karat quality and high style.

Compromise is the key word in judging the Lancia Aurelia for the single, remarkable reason that this is one of the world's few uncompromising cars. It is designed and built to the best standard its makers can conceive. When you study the question you wonder how so much art, care and engineering can be made to sell at such a modest price.

Griff Borgeson

Zephyr Conversion

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is replaced by two separate cast iron exhaust manifolds, each collecting from three ports and discharging into its own down-pipe to a Servais sound-absorbent silencer. The upper faces of these manifolds are in contact with the bottoms of two square section wells formed in the floor of the intake gallery; functions of the wells are to act both as hotspots and traps for any liquid fuel that may invade the system as a result of over liberal use of the mixture control during warmups.

Both rows of valves are oversize and of nonstandard material. Head diameter of the inlets is 1.65 inches, exhausts 1.29. Steel for the former is to specification EN110, the latter EN59, a highly durable and heat resistant silicon chrome alloy. Port sections too are increased, and the 2H4 carburetors normally fitted have 1½ inch throats. A single spring per valve is retained but the strength is in excess of the Ford pattern.

The whole bottom end, including the camshaft, stays unmodified, but reciprocating weight in the valve gear is cut by replacing the solid pushrods with tubular ones. By compensatory design work the original rocker geometry is maintained in spite of the altered valve angle.

Experiment and development is in constant progress at Bourne, and already there are several embellishments on the basic conversion that can be specified. In the form outlined above, however, and with the regular compression ratio of 8.75 to 1, the Mays-treated Zephyr engine turns 127 bhp at 4750 rpm. Maximum torque in this trim is 153 lb/ft at 3000 rpm. Pending the establishment of U. S. agencies, Rubery Owen welcomes direct enquiries at Bourne. Pricewise, all that can be said at this writing is that in Britain the pack sells for the sterling equivalent of around \$400.00. There is an additional installing charge in the U.K. approximating to \$35.00 but detailed fitting instructions are supplied free and this isn't a job to daunt any average competent amateur mechanic.

Of the various measures used to boost output beyond the 127 horsepower level, all except one, viz., an optional compression ratio of 9.2 to 1, incur a surcharge of some kind. This high ratio, claimed to yield an extra 5 bhp, adds nothing to the price but calls for 100 octane gas. Wharton's car at Oulton Park, which was the makers' prototype, entered to whet public interest in advance of production, was running at 9.2 to 1 and had its exhaust pipes duplicated throughout their length, instead of only as far as the silencer. Figures to show the specific bhp value of dual flues are not available, but this system certainly talks your ear off at anything over half throttle.

Other price-inflating options are oversize carburetors (type 2H6 SUs with 1¾ inch throats), said to raise the power to 138 at 5000 rpm; and full race cams of evidently brutal characteristics—they con-

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