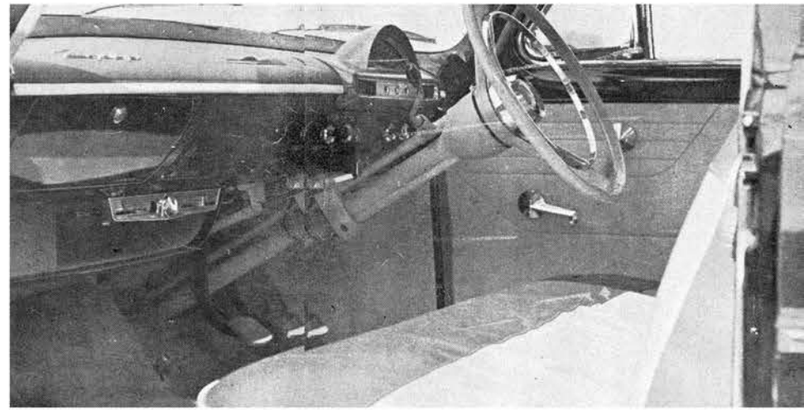
GALE FORCE FOR THE ZEPHYR

A simple bolt-on kit can make Ford's Zephyr go like its big brothers from Detroit. All this and economy too - what more can you ask?

Mays-treated test car differed from standard Mays setup by having the larger (2H6) carbs delivering 11 hp extra. Stock R.M. layout uses SU (2H4) carbs.



Visibility from Zephyr's driving seat is equal to current Detroit standard, better than British. Wheel angle is restful, gives good control at high speed.

Wide compartment gives good accessibility to plugs, valve gear etc. Kit is slated to be marketed here in very near future.

Kit includes high compression, aluminum alloy head, dual semidowndraft SU carbs, header system, oversize valves, tube push rods.

FORD ZEPHYR WITH RAYMOND MAYS CONVERSION

PERFORMANCE

TOP SPEED:

	R. M. Conversion	Stock
Two-way average	102.2 mph	86.0
Fastest one-way run	103.4 mph	—

ACCELERATION:

From zero to	R. M. Conversion	Stock
30 mph	4.0 secs.	—
40 mph	5.1 secs.	—
50 mph	8.6 secs.	12.3
60 mph	10.3 secs.	17.9
70 mph	15.0 secs.	25.4
80 mph	19.4 secs.	35.8
90 mph	23.3 secs.	—
	R. M. Conversion	Stock
Standing ¼ mile	18.4 secs.	20.5 secs.
Speed at end of quarter	78 mph	63 mph

SPEED RANGES IN GEARS:

I	0 to 32 mph
II	7 to 60 mph
III	10 to 103.4 mph

SPEEDOMETER CORRECTION:

Indicated	Actual
30	27
40	36
50	46
60	55
70	67
80	75
90	85
100	95

FUEL CONSUMPTION:

Hard driving	15.8 miles per U.S. gallon
Average driving (under 60 mph)	See text.

BRAKING EFFICIENCY:

(10 successive emergency stops from 60 mph, just short of locking wheels.)

1st stop	70
2nd stop	71
3rd stop	72
4th stop	71
5th stop	70
6th stop	69
7th stop	64
8th stop	64
9th stop	66
10th stop	65

By DENNIS MAY

KEN WHARTON's last race in his native land, before crashing fatally at the wheel of a Ferrari at Ardmore, New Zealand, early in January, made a sharp impression on intellects that don't impress too easily. This was a ten lap event for stock and modified sedans over the weavey Oulton Park circuit, 2¾ miles around, in Cheshire, England. Wharton, vacationing from the FI and sports-racing cars that had latterly occupied most of his time, drove a Ford Zephyr and won any way he liked. *Autocar* described the Zep as "incredibly fast . . . and very stable," *Autosport* adding that it "handled and sounded like a Formula I car."

Wharton's race average was 69.44 mph, which, considering nobody gave him a run for his money, compared favorably with Ivor Bueb's 74.39 per in the concurrent *Gran Turismo* contest on the fastest 300SL Merc in the country.

This, of course, couldn't be any ordinary Zephyr, and it wasn't. One clue to its Q-ship character was that Formula I dialect noted by *Autosport*. Another, viewing it from astern, was its dual exhaust system. Otherwise, unless you lifted the lid, Ken's car was indistinguishable from the commonalty of Zephyrs issued by Ford's English plant at Dagenham, Essex.

Source of the extra virility was an engine makeover designed and developed by the technical associates of Raymond Mays, the veteran race driver, and made and marketed by Rubery Owen and Co., Ltd., of Bourne, Lincolnshire, England. For *SCI*'s public, the facts of this pack's parentage are significant insofar as Rubery Owen are now on the scent for U. S. dealerships. By the time this issue is on sale it's probable that the Raymond Mays conversion, as it is called, will be available to U. S. owners of the mechanically identical Zephyr and Zodiac sixes from domestic sources.

But before playing over this variation on the Ford engine theme we'd better take time for a brief rendition of the theme itself. This unit, then, is a pushrod ohv six with more bore than stroke—3.25 by 3.125 inches—and a displacement of 155.8 cu. in., i.e., a mite over 2½ litres. The crankcase-cum-cylinder carcase is an iron casting, and so is the detachable head. The valves are in line but inclined at 14 deg. to the vertical. Inlet and exhaust ports, the former siamised and the latter separate, are both on the left side of the head. Carburetion is by a single downdraft Zenith 34WIA and spent gas makes a rather uneasy exit into an exhaust pipe pierced with holes corresponding to the ports and clamped directly to the head (there is no manifold in the ordinary sense). The crankshaft is cast iron and runs in five bearings; journal and crankpin diameters are 2⅜ and 2 inches respectively.

With the standard compression ratio of 7.8 to 1, this powerplant develops 86 horsepower at 4200 rpm and a maximum torque of 136 lb/ft at 2000 per minute.

Kernel of the R.M. conversion is an aluminum alloy cylinder head in a material known as DTD424, the same metal that Jaguar used on all the XK variants and derivatives. Except insofar as the depth of the wedge shaped combustion chambers is reduced to give a higher compression ratio, the interior form of this head is similar to Ford's own; direction of squish is towards the 14 millimeter spark plugs, which are on the remote side from the ports and set at a slightly downward slant. The porting, however, breaks right away from Dagenham's design. Inlet tracts have a semidowndraft inclination of 45 degrees, and this, in conjunction with valves at the decreased angle of 4 deg. to the perpendicular, makes for very free flowing passages.

The inlet manifold too is an alloy casting and mounts dual SU carburetors at a slope that continues the line of the ports. The manifold has a center dividing wall with a connecting drillway to balance the ration of charge between the two groups of cylinders.

In the offtake department, Ford's rudimentary plumbing

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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 downpipe to a Servais sound-absorbtion 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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Zephyr Conversion

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tribute a further 18 horsepower, assert R.O.

As evidence of Rubery Owen's determination to persevere until a Zephyr engine finally blows up in their faces, we saw one of these mills on the test bench with three enormous dual-choke Weber carbs fitted. Assuming it also had the hot camshaft (the exercise was purely experimental and inquisitions were discouraged), this tinderbox might ultimately be expected to peak at well over 160 bhp.

Although obviously a radical improvement on Ford's conception of exhaust manifolding, the two cast iron collectors of the Mays conversion still fall short of racing practice as regards freedom of gas flow. So, in the course of our snoop around the test shop at Folkingham airfield, the Bourne outpost where most of Rubery Owen's proving work is done, it was interesting to come upon an authentic banana cluster exhaust system in Zephyr measurements. This comprised two fabricated assemblies instead of castings and was a model of delectably merging curvatures. Presently and in the forseeable future, it is not for sale.

Although relatively inexpensive, the Mays conversion hits a high standard of workmanship and finish. That isn't surprising when you consider that the man primarily responsible for it has for many years devoted nine tenths of his time to pure race projects, mostly conducted in a cost-no-object climate. He is Peter Berthon, head of the team that designed and is still developing Britain's fastest Formula I car, the 2½ litre BRM. (Experience fortunately suggests that the warmed up Ford doesn't share the BRM's mercurial temperament). Alfred Owen, millionaire head of the Rubery Owen industrial group, is also of course the cashbox of the Owen Racing Organization, which owns and operates the Grand Prix BRMs.

Using a converted Zephyr supplied by R.O., we have made a first-hand evaluation of this enterprising metamorphosis. The performance figures tell their own story, and a remarkable one it is. They nevertheless lose most of their significance unless related to statistics for the stock Zephyr, which has not been roadtested by *SCI*.

Startling as these figures seem, they come as no surprise to a driver who has tried both stock and converted Fords. The Raymond Mays treatment literally transforms the car, giving it a bounding exuberence that lifts it way out of the ruck of English sedans in the 2 to 3 liters bracket.

The Mays setup on the test car differed from standard in having the larger (2H6) carburetors, which are reckoned to be worth 11 bhp extra. Rubery Owen states, however, that this gain comes at the top end of the power range, the torque low down being if anything inferior. This seems to be corroborated by the facts that our maximum speed was up by about two mph on a contemporary's findings with the smaller SUs, whereas all our acceleration figures were down by assorted nuances.

The car on test was also fitted with Borg Warner semiautomatic overdrive, which is one of Dagenham's transmission options. This particular B.W. application is engineered to make its up-shifts at 31 mph, whether out of low, second or high; so, as 31 mph is exceedable in low, it follows that six ratios are on call, which in theory should lend the thing wings in timed acceleration tests. In practice, though, it doesn't work that way, due to the measured pause punctuating the shifts. After timing runs with and without benefit of Borg Warner we came to the conclusion that two mauling manual changes, and just that, incurred a smaller penalty than the alternative, in spite of the wide spacings involved.

Normal high on the test car was 4.1 to 1, giving 17.6 mph per 1000 rpm. Corresponding speed on overdrive high was 25.2 mph, from which it will be deduced, and rightly, (a) that overdrive adds a lot to restfulness when cruising fast and far, and (b) that maximum speed in this ratio, except with a following wind or going downhill, falls short of direct top maximum.

There is a connection, incidentally, between the B.W. overdrive and the retention of single valve springs in this conversion. Although the Mays job, with big carbs as tested, reaches its power peak 800 rpm further up the scale than a stock Zephyr, the former makes it plain that it would rev faster still, and like it, if its valve springs would let it. At or around a corrected 60 mph in second, for instance, the valve gear quite suddenly starts yammering like a ruptured fairy. We commented on this to a Rubery Owen luminary and were told that the decision to stick to single springs had been partly dictated by isolated cases of a hamfooted driver inadvertently going beyond the full throttle travel and kicking himself out of overdrive when making say 80 per in o/d second, or some unprintable speed downhill in o/d high. When this happened, double springs broke up but single ones didn't. Presumably the range of bounce allowed by single springs is insufficient to cause piston/valve collisions.

Our test itinerary being much curtailed by fuel rationing, it wasn't possible to get separate sets of mpg figures for hard *and* average driving over significant mileages: by the time we were through driving hard, it was time to stop driving at all. All we can add to the solitary consumption return shown in the table, therefore, is that Rubery Owen claims that the conversion with big bore carburetors gives approximately the same mpg as the stock Zephyr at equivalent speeds and goes slightly further per gallon when using the 1½ inch carbs.

In every other aspect of behaviour the converted engine is in our opinion either equal to or better than its standard counterpart. It starts instantly, whether cold or when freshly switched off after serial full-bore acceleration bursts; it idles sweetly and regularly, hot or cold; the level of mechanical noise, except when valve yammer is allowed to develop, is moderate—certainly no worse than the iron head job; most important of all, this is, for its displacement, a flexible engine with good pulling power at low to medium turnover. In common with the unmolested version, it gives very easy access to all departments liable to need periodic attention—carburetors, spark plugs, tappets, distributor, etc. The alloy head itself is 28 pounds lighter than the normal one, but the extra weight of such items as the cast iron exhaust manifolds, two carbs and air cleaners instead of one, and so forth, pretty well restores the status quo.

Exhaust noise from the basic Raymond Mays system, using a single tailpipe, is surprisingly subdued, scarcely louder than with Dagenham's own plumbing and far lower output.

Ford of England, in common with Vauxhall, the only other British marque with American affiliations, persist in the un-English practice of omitting a fourth ratio from their gearbox. No doubt a proportion, maybe a majority, of the R.M.-converted Zephyrs and Zodiacs that ultimately go into service in the U. S. will be fitted with Borg Warner overdrive, and thus have six speeds on call. However, having driven the loaned car with its overdrive locked out of action for more than half of our test mileage, we can fairly evaluate the combination of a manual three-speed transmission with the engine characteristics that the Mays recipe produces. On average British roads and in typical British traffic densities, which dictate a more fitful motoring tempo than most U. S. drivers are accustomed to, a three-speeder labors under an inherent handicap—unless its engine has really useful mid-range torque. This the R.M. Zephyr certainly does have, which very largely compensates for the absence of a fourth cog.

The point can be illustrated by comparisons with another British sedan of roughly equal displacement that SCI has roadtested. The 2.4 Jaguar, with four speeds and a handier and more positive acting gearshift, is 2.2 seconds slower than the Ford from zero to 70 mph.

With a gap of 2.3 ratios between second and high in the Ford drive train, it could be forgiven if up-shifts between these stages produced momentary power doldrums. In practice they don't. On the contrary, when the revs are taken to the brink of valve bounce in second, top comes in with a vigor that leaves a brief wheelspin smudge on dry concrete.

The shift itself, of course, is on the steering post, and, as these devices go, it isn't at all bad. Its range of travel is reasonable, and the synchromesh on second and third works well and isn't all the time panting "Hey, wait for me."

For customers who feel that the non-standard performance of the converted Zep calls for non-standard aids to safety and road holding, Rubery Owen offers, at extra cost, harder brake linings and heavier duty Armstrong dampers for the back springs. *SCI's* test car had the latter (which Armstrong has engineered in consultation with R.O. specially for this car), but not the former. As our braking efficiency percentages show the normal linings stood up pretty well to *SCI's* regular gruel of ten hard stops from sixty in rapid succession. Pedal pressures were reasonable but the last few detentions produced unavoidable locking of one rear wheel or the other.

If it is true — which it isn't literally, of course — that the R. M. Zephyr "handles

like a Formula I car," much of the credit belongs to the stringent damping at the rear end. It's remarkable how far this single suspension adjunct goes towards imparting sports car feel and cornering characteristics to what is normally a billowy and, by European standards, roll prone family conveyance. Earlier experience on a Zephyr with original pattern shocks had shown that with no center armrest to keep the driver and his neighbor apart on left-hand corners (the car had righthand steering, of course), the latter was apt to become the plaything of transverse G and wind up literally in the conductor's lap. This apparently was the price that had to be paid for a very comfortable ride in a straight line and over bad surfaces. The R. M. Zephyr too lacks a center armrest, but it is hardly missed. The supplementary damping puts lateral stability onto an entirely different plane and, by preventing an exaggerated angle of lean on turns, indirectly improves cornering power very markedly.

At any speed within its scope, this Ford holds a true course during straight running, answering the helm in a consistently predictable way, even if the steering linkages do convey a hint of the prevailing modern flaccidity. The same as in unmodified form, there is an acceptable trace of understeer. Three turns of the wheel winch her from lock to lock, which isn't excessive, but the turning diameter of 36 feet is too big for maximum convenience in the tight maneuvers demanded by rally tests. A rally man with the Mays appurtenances under his hood has the answer to that problem, though: he can use his power bonus to steer through the back wheels.

Dennis May

"And all he wanted to do was get an American car."