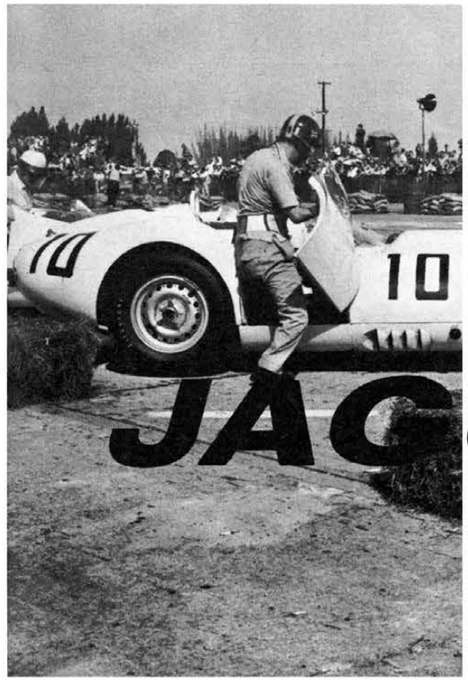
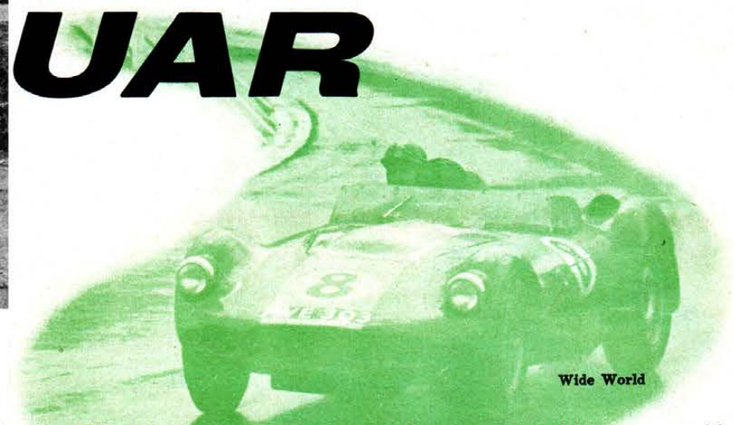


SCI **TECHNICAL REPORT**

Lacking the long-awaited E-type, Coventry's hopes rest with the

LISTER-JAGUAR



Wide World

....though the CheV-8 model will be more popular in USA

by Stephen F. Wilder and Karl Ludvigsen

WELL, THERE'S NO DENYING IT. The American debut of the Lister-Jaguar at Sebring was a bit of a thud. No sooner had Archie Scott-Brown dusted Gendebien's Englebert tire prints off his shoulder, than Eddie Crawford came cruising into the pits with engine problems. Both cars out in the first thirty minutes, and both through no fault of the chassis. To drive the latter point home with clarity, Cunningham's remaining entry and both the Scottish entries, all 3.0 D-types, were soon suffering valve maladies of their own, the lot of them retiring before mid-race.

There's a silver lining to every cloud, though. A month later, when a tried and true 3.8 Jaguar engine had replaced the midget three liter mill, Walt Hansgen was able to walk off with the President's Cup at the Marlboro merry-go-round. And this brings us to a very significant point about the Lister. The word twisty just doesn't do justice to this Maryland circuit. Two and a fraction miles per lap, its longest straight is but a shade over a quarter-mile. The ideal car for such a circuit is one that can be tossed around corners with ease and accelerate out of them like the proverbial scalded feline. This is precisely where the Lister's English breeding pays off, and handsomely.

The latest in a series of sports cars designed more or less expressly for the amazing Scott-Brown, Brian Lister's 1958 model is definitely at home on such tracks. It is made in Cambridge, just forty miles down the road from the 2.7 mile Snetterton race course. Here, as at Oulton Park, Archie is absolute king, regularly trampling the opposition under his wheels. To the best of our memory, he has been doing this for several years now, in a procession of Listers powered by a variety of engines.

Skipping the Austin Seven stage that most British designers cut their teeth on, Brian Lister's first car was powered by the ubiquitous highly tuned MG TC engine. This was in 1954. Before the year was out, he had moved to the 1991 cc Bristol engine, enabling Scott-Brown to mow down even the high-priced opposition from the continent at that year's Silverstone International meeting. This was the model which put Brian in business of building cars as well as ornamental ironware, but still unsatisfied, he bought a Maserati engine of the same size in an extravagant attempt to reduce the car's frontal area. (The Bristol, though highly receptive to skilled tuning, is one of the tallest engines around.) This car never materialized as the threat that it appeared to be on paper, perhaps because even the most skillful tuner requires time to learn his way around a strange engine – and also, perhaps, because with Maser parts as scarce as hen's teeth in England, a certain amount of caution may have been exercised.

Having laid an egg for the 1956 season, Brian Lister knew better than to try to hatch it. Instead he went native, and in a big way. For the 1957 campaign, he came up with a D-type Jaguar-engine bolide that provided Archie with some of the rides of his life. In 14 races entered, he and this first Lister-Jaguar won 11 of them. In every case he equalled or bettered the existing lap record for sports cars.

When, in the latter part of that year, the FIA made their controversial announcement that the 1958 Sports Car Championship would be limited to three liters (183 cubic inches), not everyone could pull an Enzo and dip into a bagful of old bores and strokes. Briggs Cunningham, who had been carrying the Jaguar banner in the United States just as successfully as the Ecurie Ecosse had in Europe, found himself in a quandary. Even at the beginning of that season, he had had good reason to wonder about his chances with the several-years-old D's. But with the able assistance of Alfred Momo, who had led the way to the 3.8 liter version of the "works D" engine, he was able to enter at least one perfectly prepared car in nearly every SCCA event. And with Walt Hansgen at the wheel, this brilliant car/driver combination outpointed the more showy but less durable opposition.

But if the engine now had to be *reduced* in order to compete internationally, the D-type just wasn't the car to put it in. At Sebring '57, a 3.0 Maserati easily out-distanced the 3.8 injected D. A de-stroked 3.0 could hardly be expected to do better. Reliable to a fault, the D's are simply too heavy for their power to compete any longer.

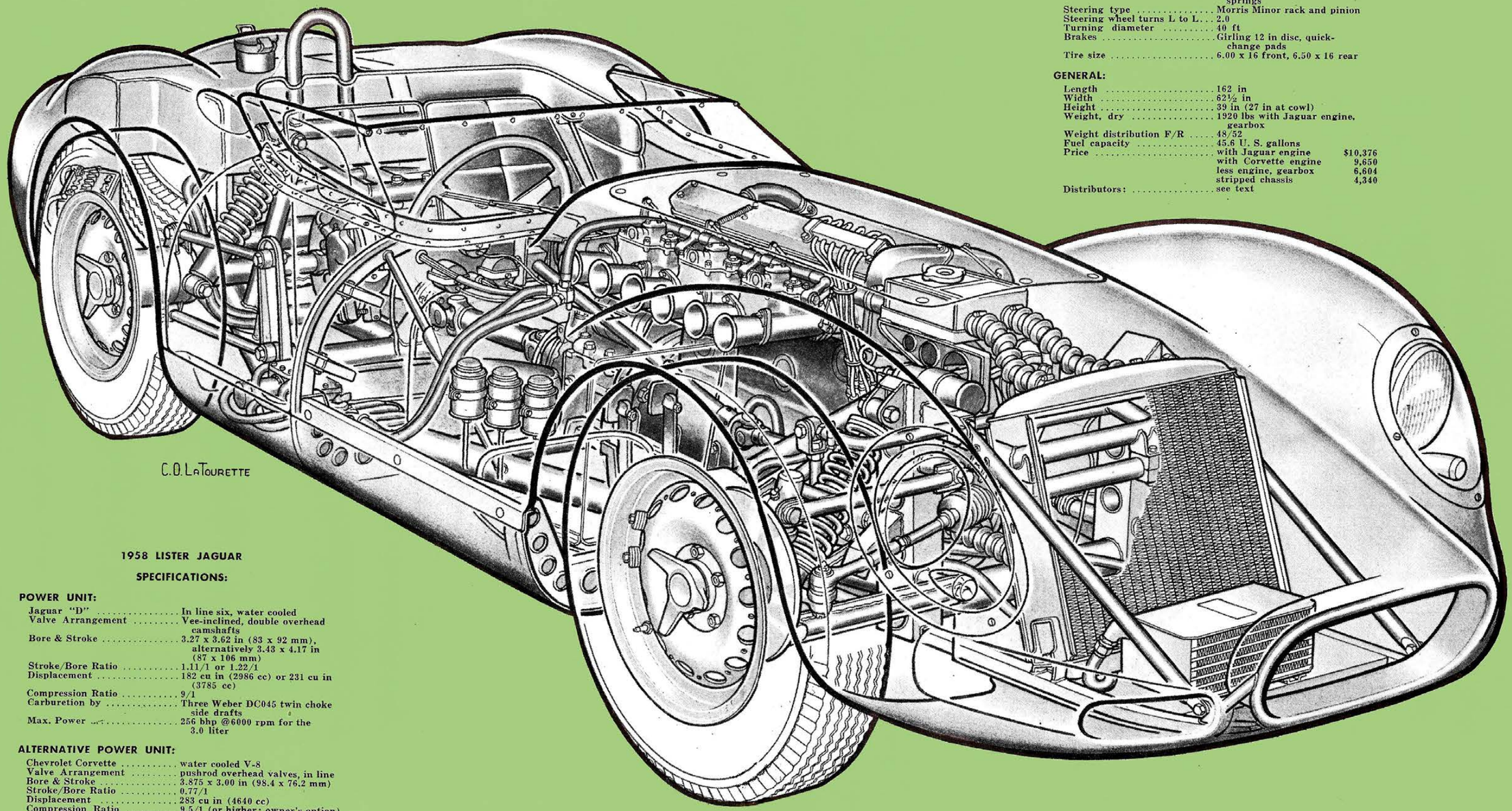
Cunningham's private experiments, based on the C6R chassis dating back to 1955, had sadly not yielded anything worth following up. This complex Weaver-designed machine destroyed its three-liter Offy engine in an Elkhart Lake practice session and lay dormant and dust-covered through 1956. A promising plan to install a Chevy V-8 fell through, and a Jaguar six was finally fitted. It appeared in this form for many 1957 practice runs, but was never raceworthy. A D-type nose section was grafted on, and ducting cut in to ventilate the final drive/inboard brake unit, but compared to a D, the C6R always suffered from poor braking and indefinite steering. This was too bad, because the C6R has what the D-type needs: some 200 less pounds overall and lighter unsprung members at the back.

Knowing that the Lister-Jaguar's record in English racing was achieved not only by Archie Scott-Brown's remarkable driving, but also by the car's excellent traction, its "stickability" at the rear, and not least, by its weight, quoted at several hundred pounds under that of the D's, Briggs Cunningham decided that the Lister might be what he needed to revitalize his flagging racing program. (At the '57 National at Watkins Glen, Holbert was a too-close second in a 1½ liter Porsche, while at Riverside, Hansgen got it from the other side, finishing fourth to four-plus liter Maseratis and Ferraris.) To Briggs, the Lister looked like the E-type that was required but not forthcoming from the Coventry factory.

In connection with arrangements for the forthcoming America's Cup sailing contest, Briggs visited England in the fall of '57 with Alf Momo and Walt Hansgen in tow. They found Brian Lister's car-building facilities very small but neat, and only part of a substantial iron-working and engineering business. While still adequate, much of the machinery dates back to the 1890's, when Brian's grandfather started the concern.

The 1957 Lister-Jaguar was trailered out to the short Snetterton course, and turned loose in the hands of Scott-Brown and Hansgen. Walt liked the car very much—partic-

(Continued on page 36)



1958 LISTER JAGUAR

SPECIFICATIONS:

POWER UNIT:

Jaguar "D"	In line six, water cooled
Valve Arrangement	Vee-inclined, double overhead camshafts
Bore & Stroke	3.27 x 3.62 in (83 x 92 mm), alternatively 3.43 x 4.17 in (87 x 106 mm)
Stroke/Bore Ratio	1.11/1 or 1.22/1
Displacement	182 cu in (2986 cc) or 231 cu in (3785 cc)
Compression Ratio	9/1
Carburetion by	Three Weber DC045 twin choke side drafts
Max. Power	256 bhp @6000 rpm for the 3.0 liter

ALTERNATIVE POWER UNIT:

Chevrolet Corvette	water cooled V-8
Valve Arrangement	pushrod overhead valves, in line
Bore & Stroke	3.875 x 3.00 in (98.4 x 76.2 mm)
Stroke/Bore Ratio	0.77/1
Displacement	283 cu in (4640 cc)
Compression Ratio	9.5/1 (or higher; owner's option)
Carburetion by	Rochester fuel injection
Max. Power	290 bhp @ 6200 rpm
Max. Torque	290 lbs-ft @ 4400 rpm

DRIVE TRAIN:

	Jaguar	Chevrolet
Transmission ratios		
I	2.15	1.87
II	1.65	1.54
III	1.28	1.22
IV	1.00	1.00
Final drive ratios	2.93, 3.31, 3.54, 3.77, 4.09, 4.27, 4.55, 4.78	
Axle torque taken by	differential casing	

CHASSIS:

Frame	Welded tubular steel frame
Wheelbase	90¾ in
Tread front and rear	52 and 53½ in
Suspension, front	Parallel, equal length wishbones, coil springs
Suspension, rear	de Dion tube, four trailing arms, coil springs
Shock absorbers	telescopic, in unit with coil springs
Steering type	Morris Minor rack and pinion
Steering wheel turns L to L	2.0
Turning diameter	40 ft
Brakes	Girling 12 in disc, quick-change pads
Tire size	6.00 x 16 front, 6.50 x 16 rear

GENERAL:

Length	162 in	
Width	62½ in	
Height	39 in (27 in at cowl)	
Weight, dry	1920 lbs with Jaguar engine, gearbox	
Weight distribution F/R	48/52	
Fuel capacity	45.6 U. S. gallons	
Price	with Jaguar engine	$10,376
	with Corvette engine	9,650
	less engine, gearbox	6,604
	stripped chassis	4,340
Distributors:	see text	

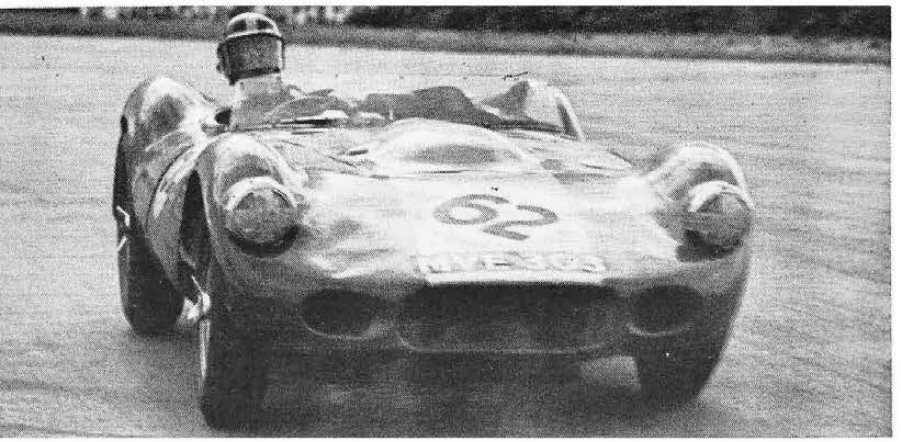
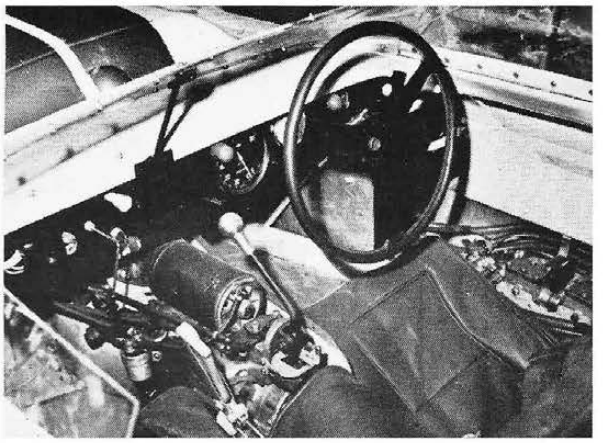
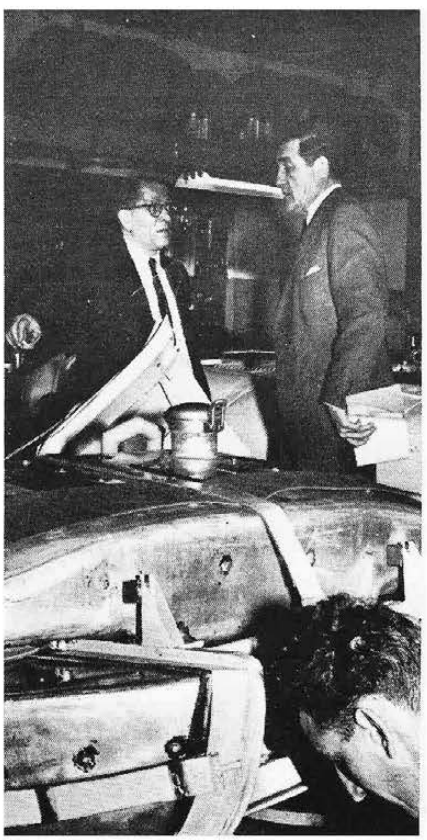


Photo : Wide World

Last year, Archie Scott-Brown won 11 out of 14 races in England with the first of the Lister-Jaguars.



Twin pumps and fuel shut-off valve to the right, accessible starter (for emergency repairs) to left. Convenient lever shifts gears remotely.



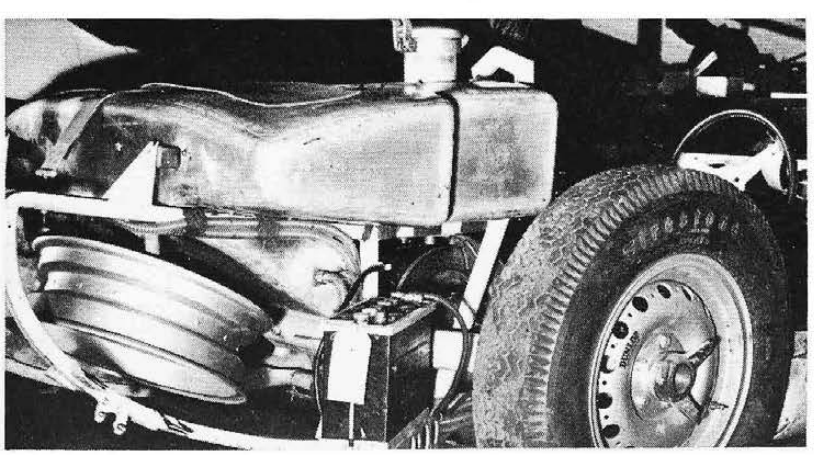
As soon as the first two Lister-Jaguars arrived, Briggs Cunningham, right, gave them to Alfred Momo, left, to check.

ularly its high cornering speed and the de Dion rear's traction – and posted a time just a second longer than Archie's best for the course. Scott-Brown in turn expressed relief that Hansgen wasn't staying over there to run against him!

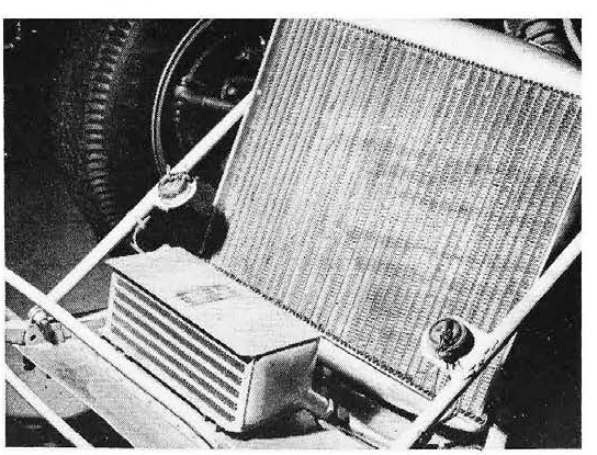
All parties satisfied, Cunningham placed an order for three cars, two to accommodate a Jaguar engine and the other – at last – to be built around the larger yet lighter Chevrolet V-8. The first two showed up at Sebring and the Chevy version is expected to arrive in June or July.

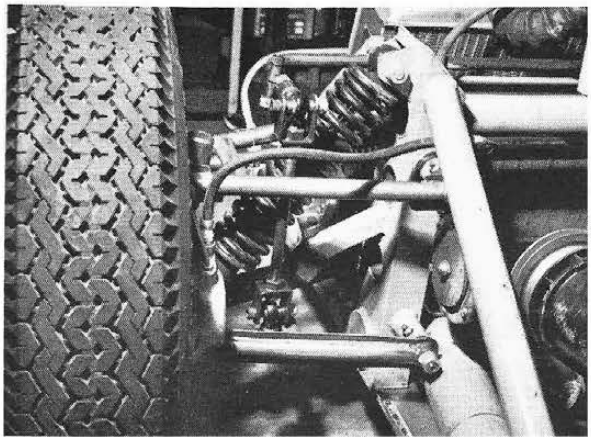
The word got around back here in the States and the following jumped to sign themselves up as distributors: Tom Carstens of Tacoma, Washington; Carroll Shelby of Dallas, Texas; and Auto Engineering of Lexington, Mass. They are all more interested in the CheV-8 version, the first of which will be in this country by the time you read this. It will be in the hands of Red Byron under the sponsorship of Kelso Autodynamics, and with Red's extensive experience in pro racing circuits, it should really get out and move. With all the car orders that have been rolling in, it looks as if Brian Lister (Light

Momo's first change was to move battery away from the gas lines. Next he attached spare tire with knock-off cap.

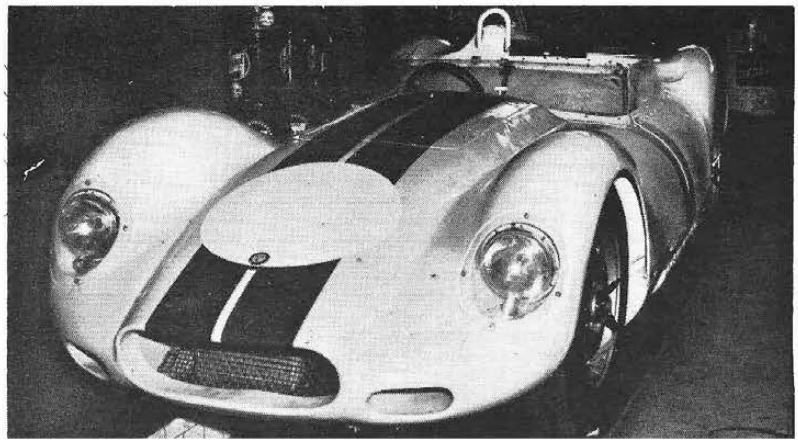


Two Marston radiators, small one a cross-flow oil cooler, perch way out front. Multi-pin plugs for headlights permit nose shell's quick removal.





Parallel, equal-length tubular wishbones are well gusseted. Shackles, anti-roll bar are adjustable to enable "racking" in US track racing style.



Outer slots in sleek nose blow air on front brakes; screen in center one protects oil cooler, radiator.

Engineering) Ltd. will soon be forced right out of the ornamental ironwork business!

The 1958 Lister is a refined version of the '57 car whose successes have already been mentioned. Changes were based not only on Lister's experience but also on certain suggestions of Alfred Momo. Basically it is still the same as its predecessors, being characterized by a tubular steel frame with unequal wishbones at the front, a de Dion set-up at the rear, and coil springs and telescopic shock absorbers all around. This sounds like the magic formula for successful road racing machinery these days, but it's not as easy as all that to build a champion.

Like most successful specials, the basic car is very simple. Two main side tubes outline the frame, which is widest just under the seats. It tapers sharply inward at the rear and more gradually up to two boxed uprights at the front. These are joined by two cross tubes, and there are two more under the seats.

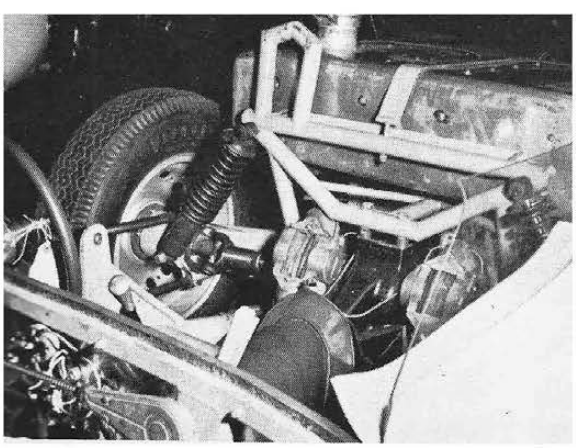
Main tube diameter on the '57 Lister was the same as in the MG and Bristol powered cars: three inches. Gauge was increased from 16 to 14, however. Designed for more rugged, long-distance

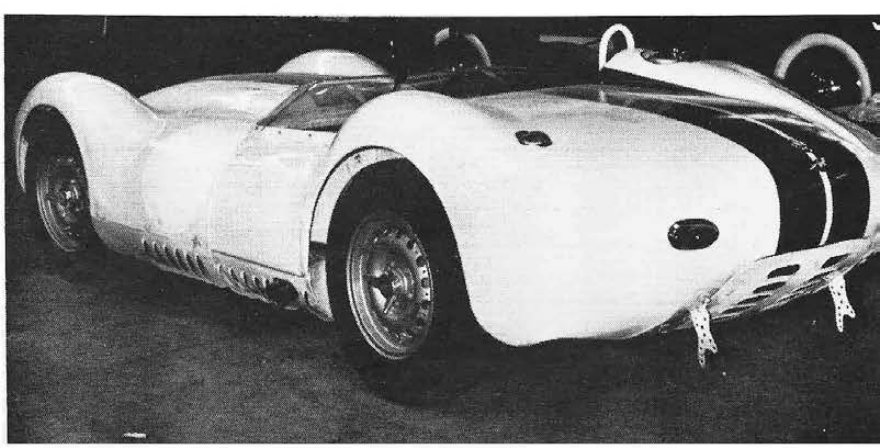
(Continued on page 63)

Crawford, during practice at Sebring. Last-minute changes included forward-facing scoop to get more air to brakes.

Monstrous Girling discs are clustered about the Salisbury final drive. Canted coil-shocks simplify tubular frame's superstructure.

Bustle back design reduces turbulence back of cockpit. Still wondering how Gendebien climbed on it.





BLOWERS

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—Karl Ludvigsen

LISTER-JAG

use the '58 tubes are four inches across and still 14 gauge. Alf Momo felt that 16 gauge was adequate, and Lister agreed; but mild steel to that specification could not be located in time.

Springing all around is by the popular Girling tubular shock plus coil spring system, the concentric units being canted inward roughly 40 degrees at front and rear. Compared to the Bristol cars, the rear coils have been increased in diameter and leaned inward more sharply — both measures to decrease the height of the tail section (increasing coil diameter allowed a reduction in length). Rear springing units are also anchored in a triangulated framework instead of boxed or tubular uprights, as before.

Parallel, equal-length wishbones attached to MGA spindles guide the front wheels. These A-frames are neatly fabricated of tubing, and precisely pivoted on bronze bushings at the frame. There is no torsion anti-roll bar, which keeps the two front wheels fully independent. The steering box, mounted ahead of the suspension, is a Morris Minor rank and pinion gear giving but two turns lock to lock.

In 1957, production-type Girling disc brakes were fitted all around, with 11 inch front discs and 10 inch discs inboard at the rear. For long-distance racing, the quick-change pads were needed, but these Girling units were sewed up tight by Aston-Martin. Suitable negotiations by Briggs himself cleared up this difficulty and the '58 cars will have these items, fitted to twelve inch discs front and rear.

For short races, unsprung weight was held down by attaching the Dunlop alloy disc wheels with bolts but this year, for long distance races at least, three-eared hub caps will be used.

Rear suspension on the Lister is by a now-classic form of the de Dion pattern. Parallel trailing arms locate each hub fore and aft, while a bronze block on the axle tube slides between vertical guides to give the wheels lateral placing relative to the frame. The three inch de Dion tube bends behind the differential and is fabricated of three straight sections, the center one being but half a foot long. Welds joining the sections are buttressed by gussets, as are the ends of the radius rods, the wishbones, and other such highly stressed members.

Half shafts are short and simple, with Hardy Spicer universal joints and splines.

(Continued on page 64)

LISTER-JAG

(Continued from page 63)

A Salisbury final drive unit with hypoid gears and a Dana limited-slip differential ("Positraction," etc.) is bolted to the frame. Across its top is a diamond-shaped plate carrying the calipers for the mechanical hand brakes.

For this year the big Lister's tail section has been redesigned to hold a 45.6 U.S. gallon tank of fuel in addition to a six gallon oil tank for the D-type's dry sump system. This has raised the height of the tail to the level of the windshield top, reminiscent of the first prototype of the Porsche Spyder. Cunningham's cars will have split-proof rubberized fuel tanks just as used on his Jaguars. The windshield, though conforming to the FIA rules for height, is a bit of a "cheater" as the tall engine bulge stops just short of the foot of it, enabling its height to be measured from a lower point than one would expect with the fairly tall XK engine. Brian Lister has always been interested in reducing frontal area on his cars; that he has succeeded is indicated by his claim that the '58 L-J has less frontal area than some current English 1100s. This may be so, but it should also be pointed out that "some English 1100s" have much better shapes aerodynamically than the Lister and it's the product of area times drag coefficient that counts.

Throughout the body, the aluminum skin is riveted to a framework of half-inch 20 gauge tubing which adds stiffness to the whole structure. This is especially the case around the engine compartment and in the nose section, which Williams and Pritchard, Ltd. of Edmonton have managed to make even lower than last year's.

A Marston radiator, with an oil cooler in front of it, is canted steeply back to facilitate the escape of the warm air at the bottom of the car. Two ducts next to the radiator intake pipe air to the front brake discs.

As mentioned, two of the Cunningham Listers are fitted with the Jaguar engine and the matching D-type gearbox. For SCCA racing a big 3.8 liter Momo modified plant is being dropped in, probably with Weber gasworks. At Sebring, though, they had three liter editions of the famous six.

Calculations based on experience with the engine, and on a conversion by "Wilkie" Wilkinson of Ecurie Ecosse, showed that ultimate power output would be higher with a destroked 3.5 block than with the extremely oversquare proportions of a bored-out 2.5 engine. Of course the latter would have required brutal coring changes, too.

At first the Momo Corporation was considered for the task of making up the new crank and rods needed, but Sir William Lyons said that Jaguar would take on the job. Momo and Cunningham are busy enough preparing, entering and racing Jaguar-engined cars in the U.S.A.

The potential output of the 3.0 Jag engine will probably be 255 to 260 bhp (at Sebring, they were quoted at 256 bhp at 6000 rpm). If the Listers which Cunningham received had been as light as expected, namely 1620 pounds dry (no oil, water or gas), the cars should have

(Continued on page 66)

Classified

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LISTER-JAG

(Continued from page 64)

been roughly competitive with the Ferraris and Astons. But they didn't, and they weren't. To everyone's disappointment at the Woodside establishment, the cars tipped the scales at 1920 pounds, putting them back within 50 or 100 pounds of the obsolescent D's. This three hundred pound difference cannot all be blamed on the two gauge heavier frame tubing so it looks from here as if the Listers will not figure strongly, if at all, in International three liter racing. With the well proven 3.8 mill, it will be a different story (as it was in the President's Cup Race), but with the Chervolet V-8, we should see Briggs (and others) pick up where the Corvette SS left off. There's more than a superficial resemblance between these cars, by the way.

In Cunningham's case the engine and transmission unit were supplied directly by Chevrolet, exact duplicates of those used in the SS (SCI, August, '57). Since no further development work has been carried out on the aluminum heads, the original iron parts were fitted to ensure reliability. The V-8 has been in Lister's shop since October of '57, allowing plenty of time for necessary detail chassis changes to be made. The car's engine room is set well back from the front wheels and is uncluttered, so there should be no major snags.

At first glance it's legitimate to question the use of a Lister for long-distance racing, since it was originally designed for English sprint events. This is partly counteracted by basic design changes — the heavy-duty frame, quick-change brakes and knock-off hubs, and larger rubber fuel tanks — and should be fully made up by the detail changes and preparation of Momo in New York.

Cunningham's team plans for this year include the Lister-Jaguars, a Lister-Chevrolet, and the one 3.8 liter injected D-Type. One of the remaining D's will retire to the Cunningham museum in Connecticut, while the last two will be returned to Coventry, with thanks.

Why the Lister chassis for this new experiment? Those who have driven Archie's car say that its most outstanding feature is its road-clutching traction. Full throttle can be applied at any speed in any gear without spinning wheels; excellent usable acceleration results. The same was the case with the Mercedes 300SLR chassis, and for the same reasons: 52 percent of the weight is on the rear wheels when dry, and much more when fully fueled. The Dana differential and low unsprung weight also help out under bumpy and cornering conditions. Torque the Chevy engine has, and the Lister should apply it to the road with spectacular results.

1958 marks the beginning of an experimental association with Lister, the D-Jaguar acting as a control through the whole program. If reliability is high, drivers are as good as Hansgen, and the Chevy engine's potential is fully explored, this should be a successful and technically interesting season for the white and blue cars.

Karl Ludvigsen and Stephen Wilder