

DESIGN FOR POWER.—Twin overhead camshafts, hemispherical combustion chambers, a light-alloy cylinder head and a seven-bearing crankshaft are amongst the notable features of the new $3\frac{1}{2}$ -litre six-cylinder Jaguar engine which develops 160 b.h.p. A four-cylinder edition of 2-litre capacity is also available.

1949 CARS

JAGUARS RE-ENTER

WHEN, scarcely a month ago, Lt.-Col. A. T. Goldie Gardner, M.C., broke various International Records in the 2-litre class at speeds ranging up to 176.649 m.p.h. and it was announced that the engine used was an unblown prototype Jaguar unit, the knowing ones wagged their heads and said that it would not be long before the Jaguar concern would supplement its range of saloons with a model to take the place of the famous Jaguar "100" of pre-war days. And when, in a speech introducing the new saloons on September 30, Mr. W. Lyons, managing director of Jaguar Cars, Ltd., made a direct reference to the intention to produce a sports car, the suspicion became a virtual certainty. What was not generally anticipated was that the new sports model would be at the Motor Show.

The engine used by Goldie Gardner was a four-cylinder twin-overhead camshaft 2-litre unit and a production edition, developing 95 b.h.p. at 5,000 r.p.m., forms one of the alternative engines fitted to the new car. The other is precisely similar in general design but is of the six-cylinder type and of $3\frac{1}{2}$ -litre capacity, with the exceptionally high output of 160 b.h.p. at the same speed. Apart from gear ratios, the cars are otherwise identical and both are priced at the astonishingly

low basic figure of £988, which is the same as the price of the saloon.

These new models are known as the "XK 100" and "XK 120" respectively, the "XK" being the type designation of the new engine and the figures representing a close approximation to the maximum speeds of which the cars are claimed to be capable.

The chassis used is a modified and slightly abbreviated version of the new i.f.s. type employed for the recently announced saloon models and the open two-seater coachwork is thoroughly post-war and extremely attractive in a way at once satisfying to the modernists and acceptable to those of more conservative tastes.

As the two new cars are identical in general form and differ in engine specification principally in the number, bore and stroke of their cylinders, it is proposed for simplicity to devote this detailed description to the $3\frac{1}{2}$ -litre car and to refer readers to the data panel for information regarding the dimensions and performance factors of the 2-litre type.

To the general design of the chassis (engine, of course, excepted) it is not proposed to devote much space here, since a very comprehensive description was included in "The Motor" as recently as October 6, and

Motor Show Surprise is a Striking Two-seater Sports Car with Entirely New Twin o.h.c. Engine available in 6-cylinder 3½-litre (160 b.h.p.) and 4-cylinder 2-litre (95 b.h.p.) Form. Price £988

the sports edition differs in little except dimensions and gear ratios. The frame has been shortened 18 ins. and narrowed proportionately to give a slight crab track as opposed to the opposite layout on the saloon edition. For comparative purposes, the wheelbase and track measurements of the two versions are appended, the saloon dimensions being given in parentheses in each case:—Wheelbase, 8 ft. 6 ins. (10 ft.); front track, 4 ft. 3 ins. (4 ft. 8 ins.); rear track, 4 ft. 2 ins. (4 ft. 9 ins.).

These changes, allied to light coachwork, should make for even better handling properties as well as effecting a very considerable saving in weight. The latter is given as 22 cwt. in dry form and this results in the exceptionally high power/weight ratio of 145 b.h.p. per ton.

110 at 5,000

Obviously, high gearing is to be expected with a power/weight ratio of this order and a top of 3.643 to 1 has been chosen, backed by a close third and second. Calculations show that peak engine speed (5,000 r.p.m.) is equivalent to 110 m.p.h., 80.5 m.p.h., 55.5 m.p.h. and 33.0 m.p.h. respectively on top, third, second and bottom (the speed on the latter being rather interesting in the light of its possibilities at traffic lights in built-up areas!). It is worth noting, however, that although the actual peak speed is 5,000 r.p.m., the power curve is almost flat at the top end, the output remaining very close to the maximum from 4,900 r.p.m. to 5,400 r.p.m.

Although the peak speed of the engine is high, special attention has been paid to obtaining a good low-speed torque and this characteristic, coupled with the unusual litres-per-ton-mile figure of 4,250 based on the dry weight, should give outstanding top-gear performance throughout the range, although, with a handy remote control gear lever and close supporting ratios, owners

Lubrication is, of course, on the full force-feed principle and each main receives an individual supply from the main oil gallery which runs the length of the crankcase and draws its supply direct from the gear-type pump via a Tecalemit filter. The mains have eccentric grooves machined in their housings behind the steel-backed white-metal bearing shells, thus enabling lubricant to be fed to each bearing at four points. The big ends are fed from the adjacent mains and the supply is then carried on to the little ends via copper pipes

JAGUAR DATA

Model	"XK 120" Sports	"XK 100" Sports
Engine Dimensions :		
Cylinders	6	4
Bore	83 mm.	80.5 mm.
Stroke	106 mm.	98 mm.
Cubic capacity .. .	3,442 c.c.	1,995 c.c.
Piston area	50.4 sq. ins.	31.6 sq. ins.
Valves	Overhead	Overhead
	(twin o.h. camshaft)	(twin o.h. camshaft)
Compression ratio ..	7 to 1	7 to 1
Engine Performance :		
Max. b.h.p.	160	95
at	5,000 r.p.m.	5,000 r.p.m.
Max. b.m.e.p.	140 lb./sq. in.	140 lb./sq. in.
at	2,500 r.p.m.	3,000 r.p.m.
B.h.p. per sq. in. piston area	3.175	3.01
Peak piston speed, ft. per min.	3,490	3,220
Engine Details :		
Carburettor	Two SU horizontal	Two SU horizontal
Ignition	12-volt coil	12-volt coil
Plugs : Make and type	Champion NAB	Champion NAB
Fuel pump	Two SU electric	Two SU electric
Fuel capacity	15 gallons	15 gallons
Oil filter (make, by-pass or full flow) ..	Tecalemit full-flow	Tecalemit full-flow
Oil capacity	3 gallons 1 pint	1 gallon 7 pints
Cooling system	Pump, fan and thermostat	Pump, fan and thermostat
Water capacity	3 gallons 1½ pints	1½ gallons
Electrical system .. .	Lucas 12-volt c.v.c.	Lucas 12-volt c.v.c.
Battery capacity	64 amp./hrs.	64 amp./hrs.
Transmission :		
Clutch	10-in. Borg and Beck	10-in. Borg and Beck
Gear ratios :		
Top	3.643	4.09
3rd	4.98	5.59
2nd	7.23	8.1
1st	12.3	13.79
Rev.	12.3	13.79
Prop. shaft	Hardy Spicer	Hardy Spicer
Final drive	Hypoid	Hypoid
Chassis Details :		
Brakes	Girling hydraulic (2 LS on front)	Girling hydraulic (2 LS on front)
Brake drum diameter	12 ins.	12 ins.
Friction lining area ..	184 sq. ins.	184 sq. ins.
Suspension :		
Front	Independent (torsion bar)	Independent (torsion bar)
Rear	Semi-elliptic	Semi-elliptic
Shock absorbers	Hydraulic	Hydraulic
Wheel type	Bolt-on disc	Bolt-on disc
Tyre size	6.00 x 16 ins.	6.00 x 16 ins.
Steering gear	Burman high-efficiency	Burman high-efficiency
Steering wheel	18 ins.	18 ins.
Dimensions :		
Wheelbase	8 ft. 6 ins.	8 ft. 6 ins.
Track :		
Front	4 ft. 3 ins.	4 ft. 3 ins.
Rear	4 ft. 2 ins.	4 ft. 2 ins.
Overall length	14 ft.	14 ft.
Overall width	5 ft. 1 in.	5 ft. 1 in.
Overall height	4 ft. 2 ins.	4 ft. 2 ins.
Ground clearance	7½ ins.	7½ ins.
Turning circle	—	—
Dry weight	22 cwt.	21½ cwt.
Performance Data :		
Piston area, sq. ins. per ton	45.8	29.4
Brake lining area, sq. ins. per ton	167	171
Top gear m.p.h. per 1,000 r.p.m. .. .	22	19.6
Top gear m.p.h. at 2,500 ft./min. piston speed	79.3	76.5
Litres per ton-mile, dry	4,250	2,840

the 100 m.p.h. CLASS

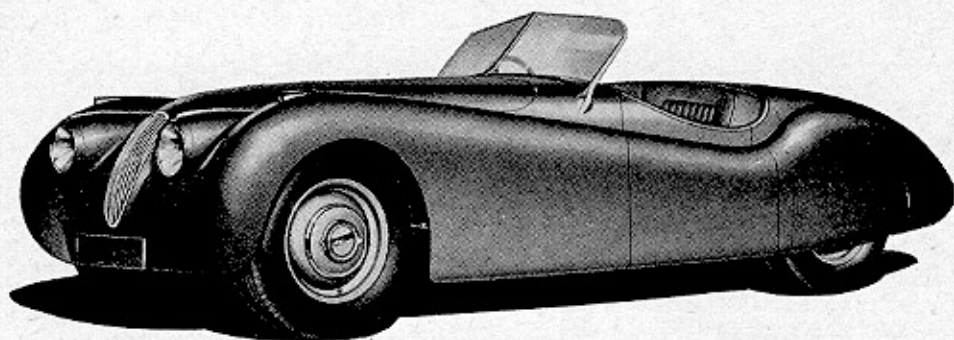
will have no excuse for hanging on to top when in a real hurry.

The bore/stroke ratio is 1 to 1.28, and this, in conjunction with the axle ratio used, gives the high cruising speed of just on 80 m.p.h. at 2,500 ft. per minute piston speed. Peak piston speed is 3,490 ft. per minute and the fast-revving potentialities of the engine are matched by ample evidence of the greatest care having been taken to achieve sustained reliability at high speeds, no concessions having been made to cheapness of production at the expense of this aim.

Thus, a particularly rigid crankcase is used and the crankshaft is a massive forging with main bearings bracketing each big end. The large diameter of the mains (2.75 ins.) and big-end journals (2.086 ins.) not only provides a large bearing area but also gives a considerable sectional overlap between adjacent bearings which adds considerably to the stiffness of the shaft. Counterweights are used for balance (the shaft is, of course, balanced statically and dynamically) and an interesting design detail is that, by means of large-diameter drillings sealed with suitable plugs which are frozen in position, the big-end journals are considerably lightened; the drillings (which are diagonal) serve the additional function of sludge traps.

Jaguar Sports - Contd.

NEW STYLING.—This three-quarter front view of the new Jaguar sports model gives a good idea of the modern frontal treatment and good aerodynamic form.



fitted into special channels formed in the connecting rods. Thus the little ends are lubricated under pressure and are not dependent on oil mist. The gudgeon pins are of the fully-floating type, retained in the Aerolite pistons by circlips, and the top rings are chromium-plated to increase bore life.

The valves are set at an angle of 70 degrees in the hemispherical combustion chambers and seat on austenitic cast-iron inserts (which have a high coefficient of expansion) in the aluminum alloy cylinder head. They are operated by twin overhead camshafts (of cast iron with chilled cams for hard wear) through the medium of piston-shaped tappets which slide in cast-iron guides and serve to take the side thrust. Dual springs are used and adjustment is by means of hardened steel biscuits of appropriate thickness under the heads of the hollow tappets.

Lubrication of each camshaft is by means of a pressure feed to the four steel-backed white-metal bearings, surplus escaping into a well which is formed in the head casting. This oil bath, into which the cams just dip, serves to lubricate the cams and tappets, drain holes being arranged to maintain the correct level.

A two-stage duplex roller chain drive is used to operate the camshafts, the primary chain (which is tensioned by a spring-blade tensioner with a fibre block adjacent to the opposite run to damp out flutter) conveys the drive to an intermediate pair of sprockets. Thence a further chain, which passes over both camshaft sprockets and an idler interposed between, completes the drive. The idler sprocket is eccentrically mounted for chain adjustment.

Service Subtleties

In order to avoid the need for disturbing the timing when the head is removed for decarbonizing, the central boss of each camshaft sprocket is provided with a threaded extension so arranged that when the sprocket is unbolted from the camshaft flange it is retained in position by a special cast bracket which is slotted to receive the boss. The thread on the latter enables the sprocket to be firmly bolted to the bracket whilst work proceeds. By this means chain removal is avoided and the chain cannot become disengaged from its sprockets.

Initially, the timing is set at the factory by means of a serrated adjustment incorporated in the composite camshaft sprockets, these consisting of an inner portion which bolts on to the camshaft flange and an outer portion which carries the teeth and fits over serrations on the inner part. The outer portion is located axially by a flange and a circlip, but there is no need to disturb this adjustment during routine maintenance.

The valve layout allows of particularly free port design, each cylinder having separate ports leading direct into the manifolds. The exhaust ports are of elongated section adjacent to the valves with the double object of providing easy flow and reducing the amount of heat transferred to the guides.

On the inlet side of the head (the design of which incorporates Weslake patents) the ports are shaped to promote gas swirl for efficient combustion and smooth slow-running characteristics and they mate with a cast light-alloy manifold to which the two horizontal S.U. carburettors are bolted direct, an interesting point being that the manifold is water-jacketed throughout its length; owing to the use of a thermostat, normal running temperature is rapidly attained after a cold start and remains more constant than is the case with the more usual exhaust-heated hot-spot arrangement.

Cooling and Lubrication

A centrifugal pump and five-blade cast-aluminium fan are incorporated in the cooling system and water from the radiator is fed to a special internally cast duct in the exhaust side of the block, whence it passes upwards to the head, where special care has been taken to provide ample water spaces round the exhaust valves; the flow is then across the head to the inlet side and, via the inlet manifold jacket, back to the radiator. Static water is employed in the cylinder jackets (which are continuous round each-bore).

Some details of the lubrication system have already been given and it remains only to mention that special provision is made for ensuring a copious supply of lubricant to the timing chains, that filtering precautions include the use of a float-type pick-up to ensure sludge-free oil as well as the use of a full-flow Tecalemit filter bolted to the off-side of the crankcase, and that the aluminium alloy sump is ribbed internally as well as externally for cooling purposes. A refinement which will be appreciated is the fitting of an electric level gauge connected to a dial on the fascia board.

This item gives a key to the equipment, which is on the usual lavish Jaguar scale. The fascia is dominated by a large-dial 120-m.p.h. speedometer and a matching rev. counter, and other instruments include petrol and oil gauges, ammeter, thermometer and clock. A detail item of note is an electrically operated reserve tap with a warning light to remind the driver when the car is running on the reserve supply.

The body, which is aluminium panelled on a laminated ash frame, is intended solely as a two-seater with ample space in the extended tail for luggage appropriate to Continental touring. Access to this space is via a top-hinged rear panel which also discloses a spare wheel compartment below the luggage floor.

Of the styling of the car, nothing need be said here, since the photograph tells its own attractive tale, but it is worth drawing attention to the head lamps, which are of larger size than is frequently the case when these items are built-in. The hood is arranged to disappear into an aperture between the seat squab and the tail, where it is concealed by a neat fabric cover.

Altogether, the Jaguar "XK 120" is quite one of the most interesting new models to be seen at the Show and one which (with the "XK 100") is a very fitting successor to previous sports models of this marque.