

Smaller Willys-Knight Six Has a High Speed Small Bore Engine

Offered in Sedan and Touring Model Only

IN presenting at the New York show a new light six Willys-Knight to be a companion model to the larger sleeve valve six introduced exactly one year ago, the latest product of the Willys-Overland, Inc., is expected will prove the most popular car to be sold through their dealer organization. Both the four and six-cylinder Overlands will appear without any important mechanical changes and except for the addition of a touring car on the six chassis, the line-up of the bodies will be the same as previously.

Prices on the new car will be announced later but it is understood they will be considerably lower than those on the present Knight six.

Two body styles, a sedan and touring will be offered on the Knight engined chassis—known as the "70"—which follows closely the general design of the larger six, model "66" and incorporates such features as mechanical four-wheel brakes, air cleaner and a seven bearing crankshaft. The radiator design of the larger six is retained on the lighter model while the bodies have the same characteristic lines employing the double belt beading although they have a lower and more rakish appearance. Wheel-base for both body models is 113¼ in. and the six ply balloon tires are 30 by 5.25 in.

180-Inches Displacement

That the engine of the newcomer represents an advance in sleeve valve development is apparent when the bore and stroke of 2 15/16 by 4¾ in. is compared with the unusual road performance for a car of these dimensions. On many of the famous test hills, the car with full load has bettered 30 m. p. h. over the top from a standing start—the maximum speed is greater than 60 m. p. h. and the rate of acceleration is above the average. While the bore is said to be the smallest in the country embodying the Knight principle, the engine is claimed to develop the highest torque per cu. in. of piston displacement of any automobile with the possible

exception of a single Knight engined car in Europe.

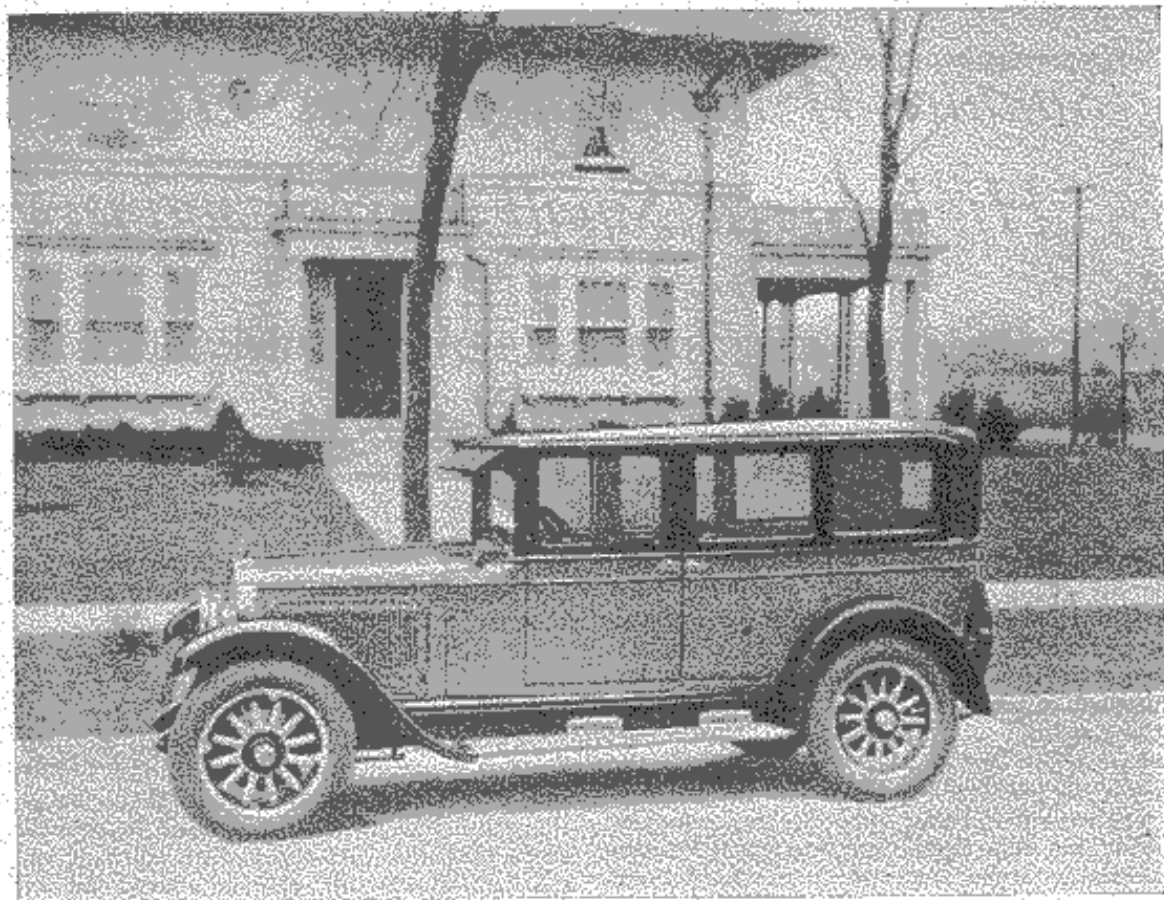
With an N. A. C. C. rating of 20.67 and a piston displacement of 180 cu. in., 53 brake hp. is obtained at 3,100 r. p. m. while the standard torque rating is 117 ft. lb. at 1,200 r. p. m.

At both front and rear the engine is secured to the frame through heavy gage steel plates forming the regular four point type of suspension. The cast iron cylinder block is separate from the aluminum crankcase, the latter being carried 2½ in. below the centerline of the crankshaft to provide extra stiffness. At the lowest point of the cast aluminum oil pan is placed an oil strainer which can be removed by the loosening of a single nut. The strainer is secured to a large plug which is held against a flange on the oil pan by the nut mentioned.

Multi-Step Ring

Individual cylinder heads of die cast aluminum, each employing a multi-step junk ring, are of the same general design as the larger six, being secured to the block by studs. The combustion chamber is of the globular type carrying a ⅞-in. spark plug in the center. Water entirely surrounds the cylinder heads which are divided into two sections that register with openings on the inside of the water cover. The latter is of die-cast aluminum held down by six nuts screwing on the central section of the cylinder heads. Cooling water enters the jackets through the pump located on the front of the block and leaves through an outlet between cylinders 3 and 4 on the water cover. On account of the unusually effective cooling system the engine operates on a comparatively high compression ratio and at low speeds shows no tendency to knock when laboring.

Seven interchangeable type bronze back babbitt bearings are used to carry the plain crankshaft which has a main journal diameter of 2¼ in. Lengths of the bearings follow: Front, 2 in.; intermediates



The Sedan is finished in pyramid grey lacquer

2 7/16 in.; rear 2 1/2 in. The crank shaft is completely balanced dynamically, and the bearing caps are recessed into the crankcase webs to secure utmost rigidity.

Tubular drop forged connecting rods of carbon steel with a center to center length of 10 in. are employed. They are drilled from both ends, the smaller diameter being at the lower end. The big ends having the bearings babbitted in place are 2 in. in diameter by 1 15/16 in. long. At the upper end, the hollow piston pin of 3/4 in. dia. by 2 11/16 in. length is held in the rod by a 5/16 in. bolt. Pistons are a special aluminum alloy die cast with three rings 1/8 in., all above the pin. From the pin center to the top of the head is 2 in. with the overall length 3 3/4 in. The skirt is of the split type.

Link-Belt Chain

A Link-Belt chain of 3/8 in. pitch and 1 1/4 in. wide operates the generator and eccentric shaft. An automatic spring idler is placed between the sprockets on the crankshaft and generator, and eliminates the necessity of manual adjustment to compensate for stretching. The eccentric shaft is carried in seven bearings whose diameters range from 1.97 in. to 1.92 in. except the front bearing which is 2.18 in. dia. Lengths

are front, 1 3/4 in.; center and rear, 1 1/4 in. and the intermediates 3/4 in. Porting arrangements and areas follow closely those employed on the "66" engine. Sleeves of cast iron ground both internally and externally are fitted to a .002 to .0025 in. clearance.

Tubular Connecting Rods

At the front end of the accessory shaft a spiral gear drives a vertical shaft which carries the ignition distributor above and the externally placed oil pump below. The latter is of special design with an internal gear meshing with a pinion mounted eccentrically in the pump housing. Oil is distributed to the main bearings by a manifold secured to the bearing caps. Through ducts drilled through the crankshaft oil is fed to the connecting rod bearings while the timing chain sprockets are also lubricated under pressure. The oil pipes drawing lubricant from the screen and the pipe leading to the oil manifold connection from the pump are all located externally and in an accessible position. To give lubrication in proportion to the work of the engine, the main pressure is automatically increased or lessened by a spring loaded relief valve controlled by the opening of the throttle.

The eight quart capacity of the engine is shown by an indicator on the left side of the engine.

Pump Circulation

Circulation of the cooling water is through a centrifugal water pump formed in unit with the fan and secured on the front of the block. In the outlet on the water cover a thermostat control is placed. A bracket formed with the pump cover carries the front end of the combined fan and pump shaft on a single ball bearing. At the rear the shaft is provided with a bronze packing nut. The fan and pump unit are driven by a "vee" belt off the crankshaft, the adjustment being provided for by eccentric movement. The radiator is of the brass ribbon cellular type with a frontal area of 357 sq. in. Water capacity of the entire system is 4½ gal. From the center of the radiator near the top, two stout steel rods branch out, one being secured on each side of the dash to form a triangular brace providing rigidity and affording a method for aligning the hood.

Air Cleaner Fitted

A Tillotson 1-in. carburetor of the top outlet type is attached directly to a short neck which passes through a bulbed section of the exhaust and from there on to the high turbulence abrupt ended intake manifold. The latter is of large cross section and has its center line slightly above the centers of the valve ports allowing a gravity flow of the mixture into the combustion chambers. An A-C make of inertia air cleaner similar to the type just adopted on the larger six is regular equipment. From the 10-gal. tank at the rear fuel is delivered to the carburetor by a Stewart vacuum tank. Differing from the arrangement on the larger car, the exhaust is now carried around the front of the block and is bolted to the intake hot-spot. From the other side of the bulbed section the 1¼-in. exhaust pipe is led direct to the large size muffler. This exhaust arrangement besides keeping the heat away from the front floor boards enables the interior of the cylinder block to be kept clean, as the heat for the hot-spot is brought directly to it.

Auto-Lite System

All three electrical units are of Auto-Lite manufacture. The ignition distributor is of the semi-automatic type while the generator is provided with the third brush system of regulation. The starter which is quickly detachable is engaged with the steel ring on the flywheel by the Bendix drive. The 6-volt, 15 plate, 142 amp. hrs. battery is of large capacity when the size of engine is considered. The oil pump,

distributor and generator are combined in such a manner that each unit is independent of the other and are easily accessible for service, being placed on the forward right hand side of the engine.

Plate Clutch

A Borg & Beck single dry plate clutch and a three speed gearset are mounted as units to complete the powerplant. The clutch mounted in the flywheel has two moulded asbestos facings. Adjustment is provided by a movable disk inside the cover plate. The throwout bearing is of the type embodying a graphite impregnated bearing.

Gears in the selective sliding transmission are of the stub form making for great strength. The six splined main shaft at the front is carried in a straight bushing and at the rear mounted on a ball bearing. Both the anti-friction bearings are of New Departure make. With the countershaft stationary, the cluster gears rotate on plain bushings, positive lubrication of these bearings being insured by a small scoop formed on the shaft between two gears. Gear ratios are:

Reverse ...	4.20 to 1	Second..	1.78 to 1
Low	3.14 to 1	High....	1.00 to 1

Brake on Gearset

Speedometer drive is taken off immediately behind the rear bearing and a transmission lock is built into the case. On an extension of the main shaft a transmission brake drum is located which has a 7 in. dia. by 2¼ in. width while the brake lever is connected with the external contracting band through a simple system of levers. With a brake lining size of 1¼ in. wide by 5/16 in. thick, the total braking area for the emergency brake is 62.1 sq. in.

Powerplant and rear axle are connected by a 1¼ in. propellor shaft and two Mechanics metal universal joints. The rear axle of the semi-floating type employs a pressed steel banjo type housing. Both the ring gear and the pinion integral with the shaft are of chrome nickel steel, the latter being carried at the rear end on a ball bearing and at the front on a double row ball bearing. These three bearings are of New Departure make. The differential assembly is unusually simple in design and consists primarily of a one-piece malleable casting carried on two tapered roller bearings. With a nine tooth pinion and a 46 tooth ring gear a 5.11 to 1 ratio is obtained. Axle shafts are tapered their entire length, the diameter at the wheel end being 1½ in. and 1¼ in. at the splined end. Single row New Departure ball bearings are used to carry the total weight at the wheel ends. Drive is of the Hotchkiss type.

The front axle of I-section made of chrome molybdenum steel employs a total of eight tapered roller bearings. Each steering spindle is carried in two roller bearings while the wheels each have dual bearings of the same type. The cross rod is placed to the rear of the axle beam. Steering gear is of the sector and worm type with the worm carried between radial ball thrust bearings. The bearings on the sector shaft are of hard rolled bronze. It is necessary to make two complete revolutions of the 18 in. dia. aluminum spider steering wheel to bring the front wheels from locked to locked position. Similar to the arrangement on the larger car, the horn button and auxiliary switch for operating the dim and bright lights are mounted on a bracket attached to the right side of the 1½ in. steering post so that these devices can be controlled without removing the right hand from the wheel. Headlights are fitted with the two filament bulbs providing high and low lighting.

Four Wheel Brakes

There is virtually little difference between the braking arrangements on the "70" model and the "66." Brake shoes and equalizers are interchangeable on both cars while the diameters of the drums are the same. The brakes on the front wheels are of the internal expanding type with those at the rear external contracting. Inside the front wheel drums are two cast aluminum shoes anchored at the top. In the wedge shaped spaces formed by the curved ends of the shoes, operating rollers are placed. When the brakes are applied, the rollers are drawn in toward the center of the axle, thus forcing the shoes outward into contact with the drums. An equalizer is also mounted on the pedal so that with this arrangement the sets of brakes on the front and rear axles are equalized as well as the left and right wheel brakes.

Brake Drums 14 Inch Diameter

The dimensions of the brake drums are unusual for a car of this type, the size being 14 in. dia. by 2¾ in. wide. With a brake lining width of 1¾ in., the total braking area of the service brake system is 286.5 sq. in. The drums are the same size on both axles. The hand brakes on the larger car operate on the rear wheel whereas on the model "70" a transmission brake is provided.

Five Frame Cross Members

Five cross members of large dimensions give the straight tapered frame an unusual degree of rigidity. The foremost member is of ¼ in. stock and of the tubular type, being 1½ in. dia. Underneath the radiator is a pressed steel channel member whose

maximum width is 6 5/16 in. Side members of the frame are 4½ in. deep with a 2¼ in. flange and formed of 5 3/2 in. stock. Over the rear axle there is a kick-up of 3¼ in. Semi-elliptic springs of small camber and nearly flat under load are made of chrome vanadium steel. Manufactured by the Mather Co., they are 2 in. wide all round with those on the front axle 34¾ in. long and on the rear 52½ in. long. Under the rear axle there is a road clearance of 8⅞ in. with the standard 5.25 in. tire. Fisk balloon tires on straight side demountable rims are carried on 12 spoke artillery wheels. The minimum turning circle to the right is 35½ ft. and to the left 43½ ft. A gasoline mileage of 15 to 20 miles per gal. is claimed for the model "70" car. Lubrication of the chassis is by the Alemite pressure gun system.

Snubbers Fitted

Both bodies which are of the composite type are reinforced under the rear seat by a steel plate which runs from one body sill or side rail to the other tying the structure together. Conventional steel panels are employed over a wooden frame with the upper rear quarters of the sedan finished in fabric. Weight of the car ready for the road is 3,050 lb. The closed four-door body has a double beading at the belt line and is upholstered in a special grade of "mo-velour." The open car with a single line of beading is upholstered in genuine leather. Exterior finish is in two-tone lacquer. The instrument board is finished in satin walnut with three oval panels containing the instruments. Standard equipment includes: Gabriel snubbers all around dash gasoline gage, sun visor, automatic windshield cleaner and rear view mirror. In addition on the closed car there is a smoking set, heater and dome light.

Duesenberg Adds Purifier and Imco Pump

Adoption of a combined oil filter and rectifier installed on all models has been announced by Duesenberg Motors Co. The Ireland Matthews magnetically operated impulse type pump has also been adopted as the means of supplying fuel to the carburetor.

Star Six Touring to Sell at \$695

A five-passenger touring model listing at \$695 has been added to the Star Six line. Collapsible top, fenders and splash guards are black, the body is French gray and the wheels are natural wood.