

MODEL "BTU"

5" x 6½"

Also Model "ATU" 4¾" x 6½"

*Four Cylinder Unit Power Plant
with Removable Cylinder Head*



Buda Model "BTU"

5" x 6½"

We give below a full description of the Buda Four-Cylinder Unit Power Plant, Model "BTU," with removable cylinder head. This engine is the result of several years of experience and careful study of the exacting requirements of heavy duty truck and tractor work, and is not recommended for business and touring cars where a lighter engine will answer satisfactorily. It is primarily designed for heavy duty purpose—to operate on low grades of gasoline for truck service and also arranged with a specially constructed manifold for operating on kerosene for tractor service, and is, therefore, especially adapted for heavy truck and tractor work.

Cylinders arranged with removable head and of special design to insure cooling. Cast en bloc from a special gray cast iron mixture, accurately machined and ground to standard size, and are interchangeable. They are provided with a large water jacket space which is baffled so that the water is discharged directly beneath the valves and arranged to insure a complete circulation of water entirely around each cylinder. Cylinder head provided with a large number of bolts closely and equally spaced to insure drawing down uniformly upon a copper asbestos gasket and prevent any leakage. This makes the cylinder head readily removable for inspections, cleaning out carbon, inspecting or grinding in valves. The removable head of the cylinder is provided with a specially large water space around and above the combustion chamber. Spark plugs located in the cylinder head and entirely surrounded by water. Water circulating passages so arranged as to produce the greatest efficiency with proper cooling around the valves and a uniform temperature of the entire combustion chamber. The top portion of the cylinder head water jacket arranged with a large water space above the combustion chamber so as to produce a minimum resistance to the flow of the water. The water outlet on the cylinder head is fitted with a removable outlet elbow which can be located in *four* different angles. The base flange is extended to carry the valve lifter guides and permits of housing in the guides, valve lifters, and push rods, and provision made for oiling these parts by means of communication with oil from crank case. Exhaust pipe and gas intake pipe located on the *same side* and facilitates hot air connections for burning low grade fuel.

Crank Case is made from gray cast iron, giving great strength and durability. It is divided horizontally into halves, the upper half containing the complete crank shaft bearing and the lower half serving only as an oil pan. Special lugs are provided

H A R V E Y C H I C A G O I L L I N O I S
S U B U R B



on the crank case for the support of the sod pan, thus eliminating the annoyance of a pan supported from the main frame. The crank case forms the upper half of bell housing over the fly wheel and will take any standard make of transmission suitable for No. 1 S. A. E. bell housing, the lower half of bell housing being a separate casting apart from either oil pan or crank case.

The one piece oil pan for truck is divided into an upper and lower compartment, the lower compartment of which is the oil reservoir. The oil reservoir is separated from the upper compartment by an easily removable plate, which feature enables oil reservoir to be thoroughly cleaned from time to time, with minimum effort. *The connecting rods and pistons may be removed without taking the motor out of the frame or disturbing any other parts. This arrangement greatly facilitates repairs or adjustments in the field.*

Fastenings. Engine is of the three-point suspension type. The rear supporting arms are exceptionally strong and cast integral with the upper half of crank case and arranged for main frame support. Forward end of engine is supported at crank center by a suitable trunnion bracket arranged to rest upon drop cross member of the frame. The lower half of crank case can be removed for the purpose of inspection or adjustment without disturbing the adjustment of the crank shaft bearings, or the supporting members.

Valve Mechanism, entirely enclosed and operated by a single cam shaft. Both inlet and exhaust valve are of liberal size, having an effective working diameter of $2\frac{1}{4}$ inches, accurately machined and ground, and are interchangeable. The ends of the stems are hardened to resist wear against the action of the push rods and are fitted with suitable oil tempered springs. Valve stems and push rods work in separate removable bushings. Removable cylinder side plate covers the valves, keeping them free from grit.

Valve Push Rods are of special steel, of mushroom type, hardened, accurately ground and fitted.

Pistons are of cast iron, ground to size, provided with special recesses and drilled with relief holes to prevent the motor smoking. Special care is taken in boring and reaming the piston pin holes to insure perfect alignment, accurate size, and smooth finish and are arranged with a balancing pad to permit each piston to machine to a given weight.

Piston Rings are of one piece good springy cast iron, diagonally split, expansion type, carefully machined on the circumference and sides to standard dimensions and accurately fitted to the pistons.

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T H E B U D A C O M P A N Y
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Piston Pins, extra large, of open hearth steel, case hardened, accurately ground and fitted and machined to a given weight.

Connecting Rods, "I" beam section of Chrome Vanadium steel, drop forged, heat treated, carefully machined and reamed to insure perfect centers and alignment, and are nicely balanced. The upper end of rod is bushed with phosphor bronze; the lower end is fitted with bronze shell, babbitt lined bearings. Four connecting rod bolts are fitted to each rod and are of special steel, heat treated. All connecting rods are machined to a given weight.

Cam Shaft and Cams are forged in one piece from open hearth steel, machined and case hardened. The working surfaces of the cams and the three bearings, which are of liberal dimensions, are accurately ground on a special cam shaft grinding machine. A flange is provided, to which the timing gears is bolted. Cams are exceptionally wide and designed for quietness.

Crank Shaft of special design to admit of accurate running balance, is drop forged from open hearth steel, heat treated, machined, and balanced on a special Norton crank shaft balancing machine and drilled for force feed oiling system. The three extra large main bearings and liberal connecting rod bearings are accurately ground to size, the rear end provided with a flange to which the fly wheel is bolted. Our method raises the tensile strength of our crank shaft upwards to 120,000 lbs. per square inch and the elastic limit to 85,000 lbs. per square inch.

Timing Gears are made with extra wide face (1½ inch) and are cut helical on automatic hobbing machines in order to secure the best results. Particular attention is paid to accurately maintaining gear centers and special equipment has been installed to insure the proper machining of these parts, insuring practically noiseless gears at all times and all speeds. The gear set is composed of one crank, one cam, one idler and one pump shaft gear, *also one generator gear when lighting generator is used*. These gears are easily accessible upon removal of gear case cover.

Bearings. There are three main shaft bearings. All main and connecting rod bearings are bronze shell, babbitt lined. Cam shaft bearings, which are three in number, are of babbitt die cast. All bearings are accurately reamed and scraped to a perfect bearing. All main crank shaft bearings and lower end connecting rod bearings are each fitted with four bolts of liberal size.

Cooling is by means of circulating water pump of centrifugal type with large bronze runner.

Water Pipes are extremely short and of simple construction and are designed to connect to the radiator without bending the hose.



Fan Bracket cast integral with gear case cover for mounting a radiator fan driven by a flat belt 2 inches in width.

Exhaust Manifold is of cast iron, regularly fitted with an expansion joint at the outer end.

Intake Manifold cast integral with exhaust pipe designed for burning low grade fuels. Separate design of combination exhaust and intake pipes used for gasoline and another type for using kerosene as a fuel, and are located on the right hand side of the engine viewing same from operator's seat on truck and so arranged that the cylinders receive an absolutely uniform distribution of mixture and designed for 1½-inch vertical outlet carburetor.

Fly Wheel is attached to the crank shaft flange by six steel bolts and is of ample size. It is regularly furnished to accommodate standard clutches used in connection with No. 1 S. A. E. bell housings.

Balancing. Special attention is given to accurately balancing all revolving parts. The fly wheel and crank shaft are given an accurate running balance on special machines designed for that purpose. The pistons, connecting rods and all reciprocating parts are likewise balanced, reducing vibration to a minimum.

Oiling System. Full force pressure feed to *all* bearings, through drilled crank shaft. This system is of the self-contained positive pressure feed, with pressure regulating valve, the oil being pumped from the oil reservoir which is located beneath the crank case in oil pan by a geared pump and forced through pipe to main bearings, from these through passages in crank shaft to connecting rod bearings. Cam shaft bearings are lubricated by passages connected with the pressure feed system. Pistons and cylinders, also piston pins, are lubricated by oil thrown from the lower ends of the connecting rods. Timing gears are also fed positively from pressure system.

The oil reservoir is so designed that any sediment which may be present in the oil will tend to settle in bottom of reservoir from the oil pump, from whence it may be drawn off from time to time. This feature results in clean oil only being circulated through the engine, which insures a long life for all bearing surfaces and a consequent long lived engine.

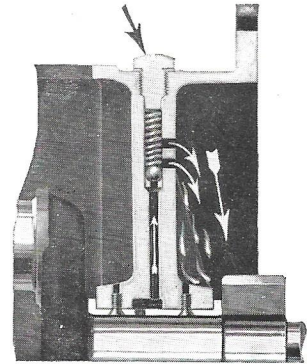
Accessories. Provision is made for attaching most of the Standard Ignition, Starting and Lighting Systems. Crank case arranged for No. 3 S. A. E. starting motor and lighting generator flanges on the right-hand side, and water pump and magneto located on the left-hand side viewing same from operator's seat on truck.

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Lubrication.

This is substantially the same system as used on Buda Engines, Models "HU" and "YU." This is the pressure feed or full forced feed type, designed for heavy duty truck or tractor service. The pump, which is of the geared type, is located in the base of the oil reservoir, entirely submerged in oil. It is driven by a vertical shaft in connection with the camshaft bearing and is hung by a bracket from crankcase extending down into reservoir in oil pan.



Oil pressure is regulated by this check valve. Regulation is simply made by the addition or removal of washers to increase or decrease the pressure of the spring which holds the ball on its seat.

The oil is drawn from the lower oil reservoir through a fine mesh screen and discharged by a steel distributing tube located horizontally the full length of the crank case into connecting passages, which carry the oil directly to each camshaft bearing and main crankshaft bearings.

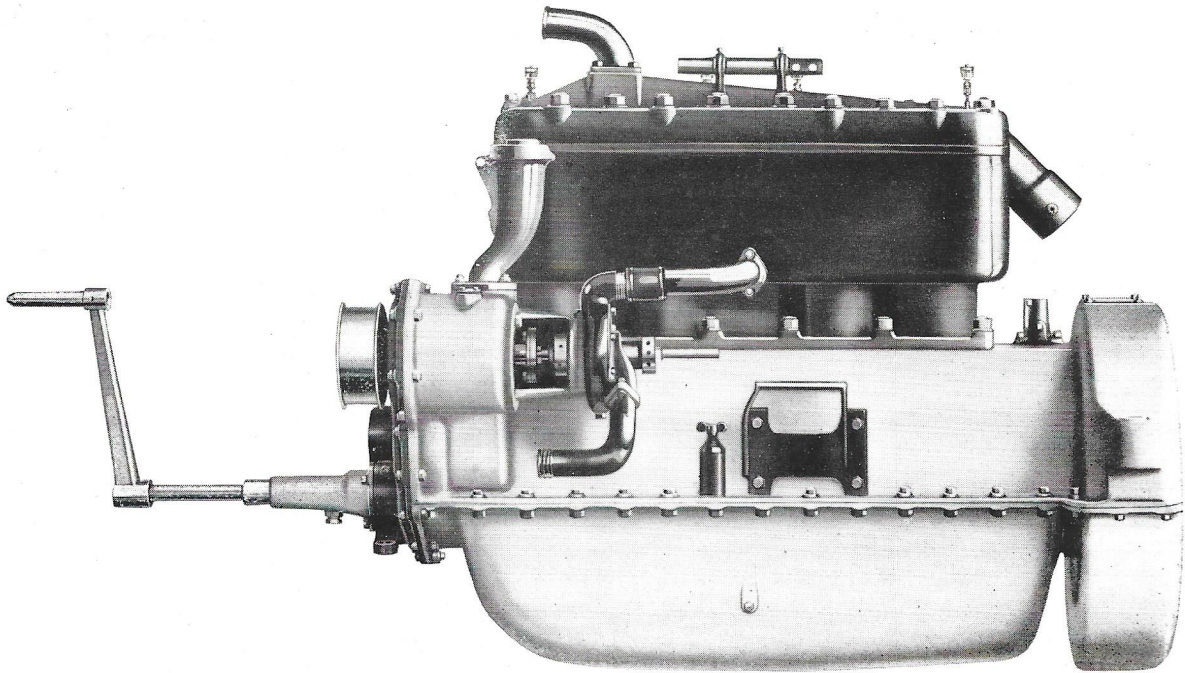
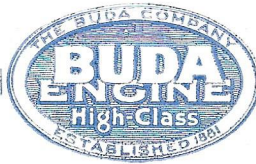
From the crankshaft main bearings the oil is forced through the drilled crankshaft to each connecting rod bearing. Cylinder walls, cams, pistons and piston pins are lubricated by oil thrown from the lower ends of the connecting rods, caught by the piston and carried up into the cylinder. Cams are similarly lubricated.

A pressure of 15 lbs. is maintained at 900 R. P. M. of the crankshaft and is controlled by a regulating valve located in the line. This valve is of the ball and spring type, readily adjusted to the required pressure from the outside of the engine.

Provision is also made for connecting a gauge to the system, which, mounted on the dash, enables the operator to know at all times the condition of his oiling system. Any obstruction or leak in the line may readily be detected by such a gauge.

The timing gears are lubricated from the pressure system, a constant level being maintained in the gear case, the overflow returning to the lower reservoir.

Valve stems and push rods, being enclosed, are lubricated by oil vapor from the crank case through holes drilled in the base of the cylinder.

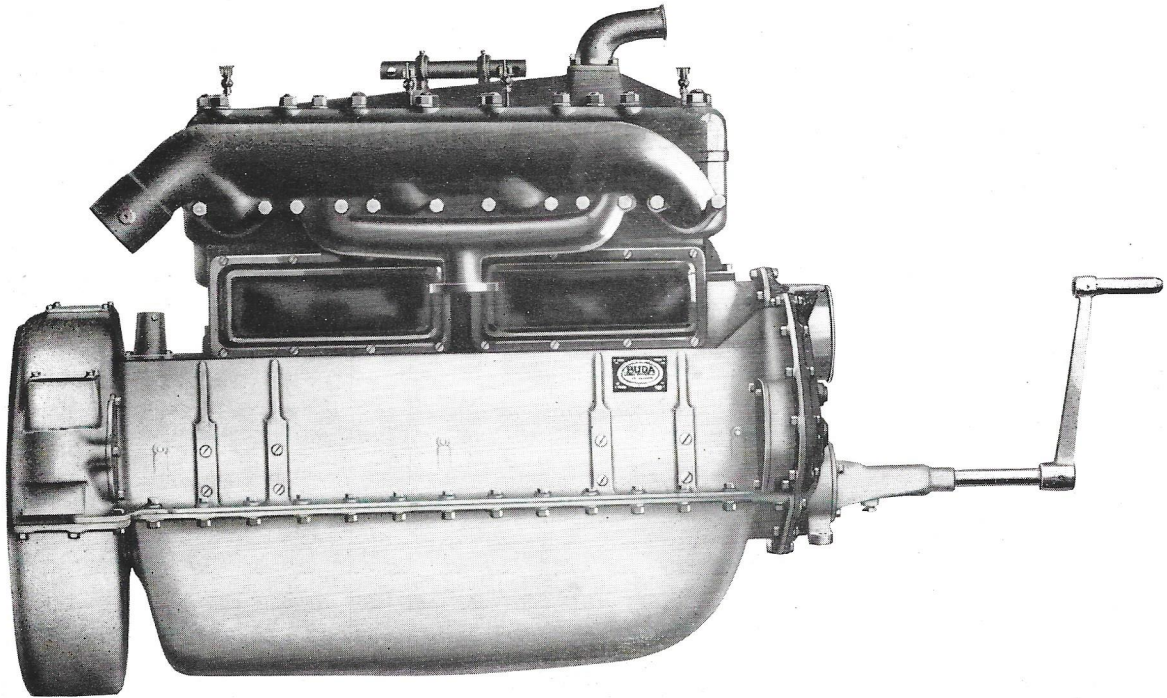


Buda Model "BTU"—Magneto and Water Pump Side
5 in. x 6½ in.—127 x 165 M.M.

SPECIFICATIONS AND DIMENSIONS

Type.....	Four cylinder, vertical, en bloc "L" head type, four cycle		
Bore	5"	127	M.M.
Stroke	6½"	165	M.M.
Weight.....	About 1425 lbs. with regular equipment	674.72	Kgm.
Suspension	3 point		
Ignition.....	Any standard type of magneto or ignition system		
Carburetor.....	1½" vertical outlet	38	M.M.
Lubrication.....	Geared pump force feed system		
Cooling.....	Centrifugal water pump		
Fan	Not furnished		
Extreme length of crank shaft.....	42⅞"	1089	M.M.
"Height from center of crank shaft to top of water outlet pipe.....	28 13⁄16"	732	M.M.
Distance from center of crank shaft to bottom of engine.....	10 13⁄16"	275	M.M.
Distance from center of front supporting bracket to center of rear supporting arm.....	44 13⁄16"	1138	M.M.
Drop of supporting arms from center of crank shaft to top of frame.....	4" to 6"	102	M.M.-152.4 M.M.
Drop of front support bracket.....	2½" or 3½"	63.5	M.M.- 88.9 M.M.
Length of rear supporting arm.....	28¾"	730.5	M.M.
Length of engine over cylinders.....	32⅞"	816	M.M.
Diameter of fly wheel.....	20½"	520.69	M.M.
Weight of fly wheel.....	Truck, 76 lbs. to 115 lbs. for Tractor	34.47	Kgm. to 52.16 Kgm.

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Buda Model "BTU"—Carburetor Side
5 in. x 6½ in.—127 x 165 M.M.

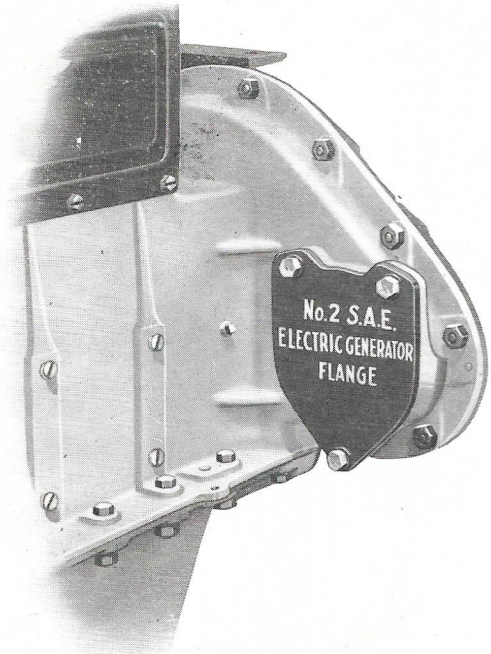
SPECIFICATIONS AND DIMENSIONS—Continued

Face of fly wheel.....	4¼"	107.9	M.M.
Fly wheel regularly furnished for multiple disc clutch.....			
Diameter and length of front bearing.....	2¼ x 4⅞"	57.15 x 104.77	M.M.
Diameter and length of middle bearing.....	2½ x 3⅞"	63.5 x 98.42	M.M.
Diameter and length of rear bearing.....	2⅝ x 4¾"	66.67 x 120.64	M.M.
Diameter and length of connecting rod bearings.....	2½ x 3⅞"	63.5 x 79.37	M.M.
Connecting rod length from center to center.....	14⅜"	374.64	M.M.
Diameter and number of connecting rod bolts.....	⅞" — 4	11.09	M.M.
Diameter and length of piston pin bearing.....	1⅜ x 2¾"	34.92 x 69.84	M.M.
Length of piston.....	6¾"	171.44	M.M.
Effective working diameter of valves.....	2¼"	57.15	M.M.
Use ⅞" 18 standard thread, S. A. E. spark plugs.			
Piston displacement in cubic inches.....	510.5	8361.99	C.C.
Internal diameter of bell housing flange.....	20⅞"	511.16	M.M.
External diameter of bell housing flange.....	21¾"	552.83	M.M.
Diameter of bolt circle.....	20⅞"	530.21	M.M.
Diameter of bolts.....	⅜"	9.525	M.M.

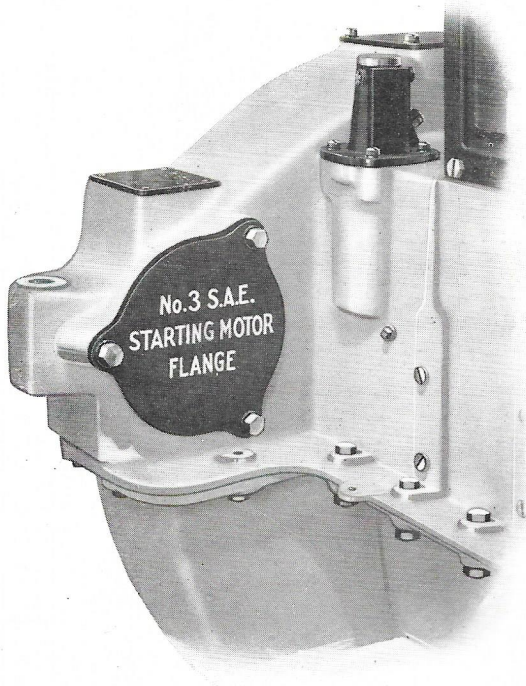
NOTE: This engine furnished in the bell housing (unit feature) only.



All Buda Model "BTU" engines have provision for mounting four electrical units, electric generator, electric starter, distributor drive and magneto. The mounting flanges for the electric generator is No. 2, while the electric starter is of No. 3 Standard S. A. E. flanges and are located on the right hand side of the engine, looking at it from the operator's



Flange for Mounting Electric Generator



Flange for Mounting Starting Motor

seat on truck. The generator is located near the front end of the engine and the starter at the fly-wheel end. Both of these units are gear driven. Provision is made for mounting the magneto on the opposite side of the engine. Any standard make of magneto can be mounted on this engine. The magneto is gear driven.

