

Identify that Ford Flathead V8 Engine

Over a decade ago we did a big thread on 221-239-255 flathead V8 engine identification, link [here](#). Many people contributed knowledge and pictures to that thread, and it was referenced frequently. Since then, Photobucket has changed how they do business resulting in the pictures being a mess. The old posts are no longer editable after such a long time, for understandable reasons. This thread is a re-start with new picture posting method relying only on the Ford Barn. The information here is consolidated from both that first thread and many other discussions here on the Ford Barn, with many thanks to everyone who participated in adding information both to that thread and in other threads since then.

This thread is intended to provide the information for identifying the core engine. It is not intended to provide every detail of each year engine. For that level of information please see the applicable Early Ford V8 Club book covering the specific year you are interested in. Rather, for this discussion the focus will be on the engine block as the identifying part of the engine. Anything bolted onto the engine block should not be used to identify the engine. All other parts of the engine can, and in many cases, have been swapped between years & types. Ford Motor Company was one of the first to swap parts between years, with one example being fuel pumps being swapped onto one year old cars in 1933. Ford had a service program to keep customer vehicles running, and had no care in the world for detailed correctness on how the vehicle was originally built on the assembly line. As an example, later in this thread will be a picture of Ford service literature that has obvious mix-up of engine blocks, but worked if all you cared about was keeping your vehicle running well.

There will be a lot of pictures. The 1932 V8 engines are the starting point and changes from there will be pointed out in chronological order for each successive USA type. Each engine type discussed afterwards will detail the changes from the previous type(s) of engine. When viewed in chronological order the details of the engines make more sense as the evolution of design. The following table includes enough detail to identify each engine type produced in the USA. Each engine type identified in the table below will have a post with the information and pictures clarifying the features. You may have to scroll through multiple sections to find a picture of a specific identification feature from the table, one example is the picture showing the “pencil test” is in the 1938 24 stud section.

One last thing about this table: a model year that spans two different features does **not** indicate that early vehicles in the year used one feature and late vehicles used a different feature. This **does** indicate Ford produced two design engines with either features side-by-side during the model year (this was a Ford practice apparently to ease into a new design).

USA Blocks	Year(s)																		
Features	1932	1933-1934	1935-1936		1937	1938		1939-1940		1941-1942		1943	1944	1945	1946-1948		1949-1953		
Common nomenclature	1932	33-34	35-36	LB	late 21 stud		81A		81A	99	81A	99	?		41A*	59	8BA		
Factory cubic inches	221								239	221	239	221 or 239			221	239	239 or 255		
Factory bore	3 1/16 (3.0625) inches								3 3/16"	3 1/16"	3 3/16"	3 1/16" or 3 3/16"			3 1/16"	3 3/16 (3.1875) inches			
Water drain	straight down								angled							none			
Head fasteners	21 stud					24 stud												24 bolt	
Main Bolts into Valve Chamber?	yes		no																
Cam Bearings ?	no	yes																	
Crankcase vent ?	no		yes															yes, updated	
Water pump location	head mounted pumps				block mounted pumps														
Main bearing type	poured Babbitt			replaceable insert															
Main bearing diameter	1.999 inches			2.399 inches					2.499 inches										
Crankshaft snout	Short (24.47 crankshaft overall length)								Long (26.03 crankshaft overall length)										
"Raised" intake ?	no								yes		?		no						
Curved between exhaust ports ?	no								yes										
Core plugs in oil pan rails ?	yes								no										
Passes "pencil test" ?	yes												?		yes	no			
Cast on bell housing ?													yes		no				
Center water hole	keystone								round	keystone	round	?			round				
Bottom center water hole	keystone									?			round						

*41A blocks were not factory installed in production vehicles. These are service replacement blocks only sold after WW2 for use in repairing pre-war vehicles.

Most of the information I will post initially is on USA domestic production engines cast in the Rouge plant in Dearborn Michigan. After going through the USA production there will be a bit of information on engines produced outside the USA: at the Windsor plant in Canada, at the Dagenham plant in England, at the plant in Cologne plant in Germany, and at the Strasbourg, then Poissy plant in France. I still have a lot to learn about the production changes from these plants and hope more is shared by the knowledgeable folks here on the Ford Barn.

1932

Identification of Ford Flathead V8 engines has to start at the beginning, with 1932 motors. Almost everything in the 1932 engines is at best one year only parts. Most of the parts were revised several times during the 1932 model year production. Henry decided to introduce the V8 before it was really developed so the public became the testing crew. This wasn't a great idea as there were numerous problems with the early cars, mostly related to the engine. Rather than provide an incomplete version of the story I'll direct you to other very good sources: The [1932 Ford Book \(2 volumes\) by David Rehor](#), [articles on the subject by Dave Cole in the V8 Times](#), and [The Early Ford V8 as Henry Built It by Edward P. Francis and George DeAngelis](#).

Features of the 1932 Ford V8 engine blocks common to all the 221-239-255 Ford flathead V8s are:

- Flathead design
- 90 degree motor (90 degree angle between the cylinder banks)
- The cylinder bores do not line up with the main bearing center-line, which occasionally causes confusion (Desaxe principle)
- There are eight intake ports, one per cylinder exiting in the top center of the engine
- There are six exhaust ports exiting on the outside of the engine, with the center cylinders on each bank sharing a port
- The crankshaft runs in three main bearings
- The camshaft has three bearing journals located above the crankshaft main bearings
- Valves are 1.5 inches head diameter

This list of features is more extensive than for the later engines since many of the features continued to multiple years of Ford flathead V8 221-239-255 production:

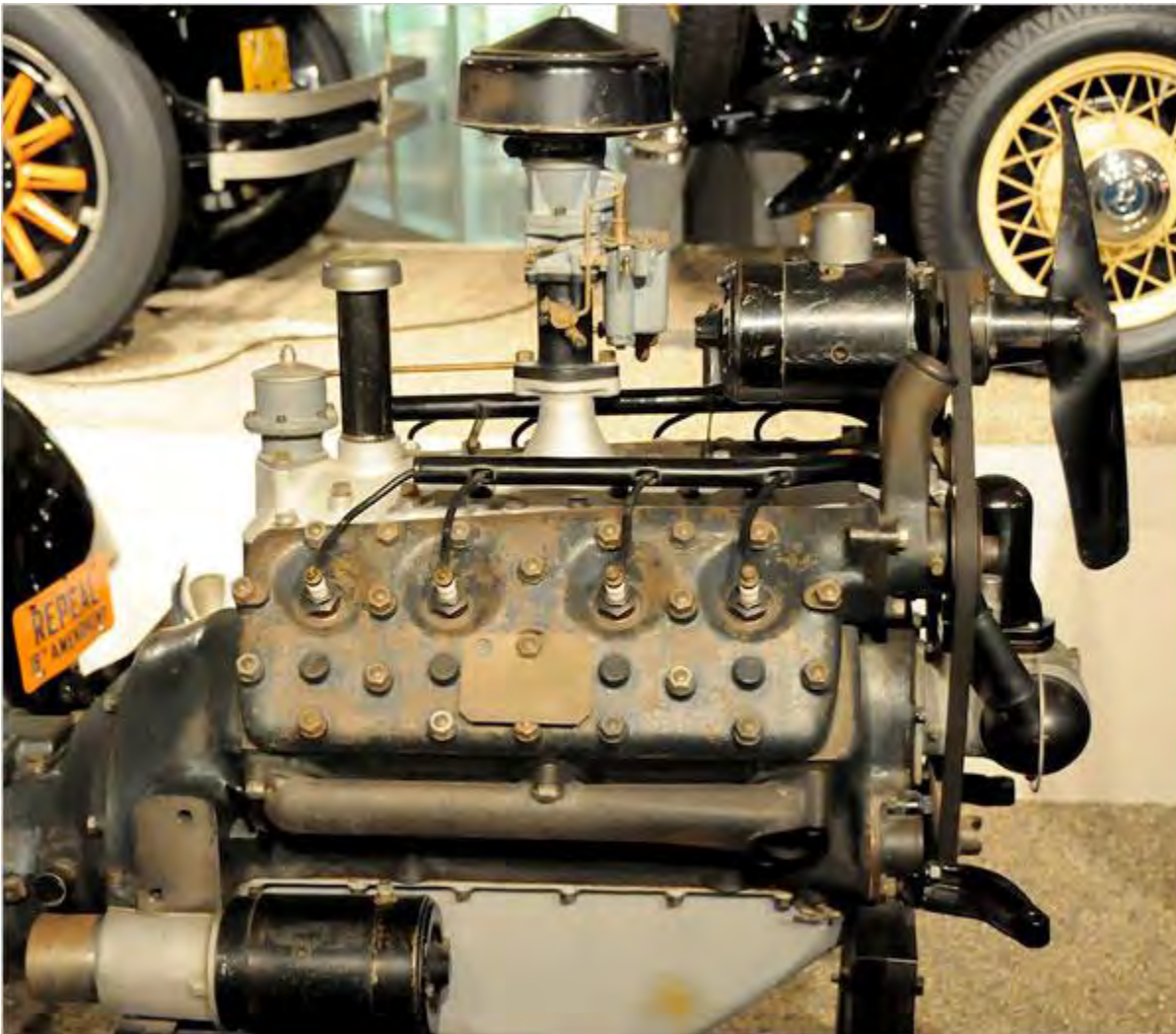
- The water drain ports are vertical
- 21 studs retain each cylinder head
- Water pumps are in the front of the cylinder heads
- There is no crankcase ventilation
- The front face of the block is smooth
- Approximately 221 cubic inches
 - o 3 1/16 inch bore
 - o 3 3/4 inch stroke
- 1932 blocks do *not* have cam bearing inserts, the cams run directly in the machined cast iron of the block
- The main bearing caps are retained by main *bolts*, with the bolt heads accessible inside the valve chamber (main bolts being similar to Model T and Model A design)
- 1932 camshafts are made from forgings
- 1932 crankshafts are made from forgings
- The crankshaft has a very short "snout" sticking out in front of the timing cover, just long enough to install a fan belt drive pulley
- The crankshaft is 24.47 inches overall length
- The rod bearings are floating inserts (one insert per throw serving two rods) with a journal diameter 1.998-1.999 inches
- There is no rear seal surface on the crankshaft, a "slinger" is used for rear main bearing oil control
- Hard valve seats are installed for both intake and exhaust valves
- The top of the block between the intake ports and the cylinder banks is machined flat
- 1932 main bearings are poured Babbitt with a journal diameter 1.998-1.999 inches
- The exhaust ports are raised compared to the outer wall of the water jacket
- Oil pressure is controlled by a relief valve in the front of the valve chamber, with the bypass oil aiding in lubricate the timing gears (no pressure relief valve in the oil pump)

- The bell housing is cast onto the cylinder block
- The block above the timing gear opening is straight so that a pencil will rest there
- There are core plugs in the oil pan rail (used to remove casting sand in the water passages from the manufacturing process)
- The center water hole in each deck is an upside-down keystone shape
- The bottom center water hole in each deck is an upside-down keystone shape

From that list, the two features of the 1932 blocks that can quickly be used for identification are:

- The water drains are straight down
- The front of the block is flat with no has recessed areas between the water inlets and the timing gear

Here is production V8 engine #1 (prototype engine 243 that was run down the assembly line so Ford could officially start production of V8 cars), as displayed in the Henry Ford Museum.



This picture shows many of the features of a 1932 V8 block. Note the three main bearings, cast in bell housing, core plugs in the oil pan rails, “raised” exhaust ports, straight water drain ports, flat front of the block from water inlet to timing gear opening, and no place to install water pumps. This picture shows many of the features of a 1932 V8 block. Note the three main bearings, cast in bell housing, core plugs in the oil pan rails, “raised” exhaust ports, straight water drain ports, flat front of the block from water inlet to timing gear opening, and no place to install water pumps.



This picture shows the crankcase area and main bearing caps on a 1932 block. Note the lack of any crankcase ventilation. The main bearing bolts can be seen to the left of the block.



Here is a different view of the crankcase area and main bearing caps for a 1932 block. The tube coming off the rear main bearing cap is the oil return from the crankshaft slinger.



This picture shows the cylinder deck and intake surface of a 1932 block, which looks similar to the other 221-239-255 blocks. Note the 21 studs, easily differentiated from later blocks since there is a stud directly below each cylinder. Also note the upside-down keystone water passages in the center and bottom of the middle of the deck.



This picture shows the front of a 1932 engine. The short crankshaft is apparent with the crank pulley retaining bolt flush with the crank pulley. Note the motor mounts and water inlets. These bolt hole positions stayed for the duration of 221-239-255 engine production. The water inlet bolt positions created an interesting, and unfortunate, situation later when water pumps were added to the front of the blocks starting in 1937.



1933-34

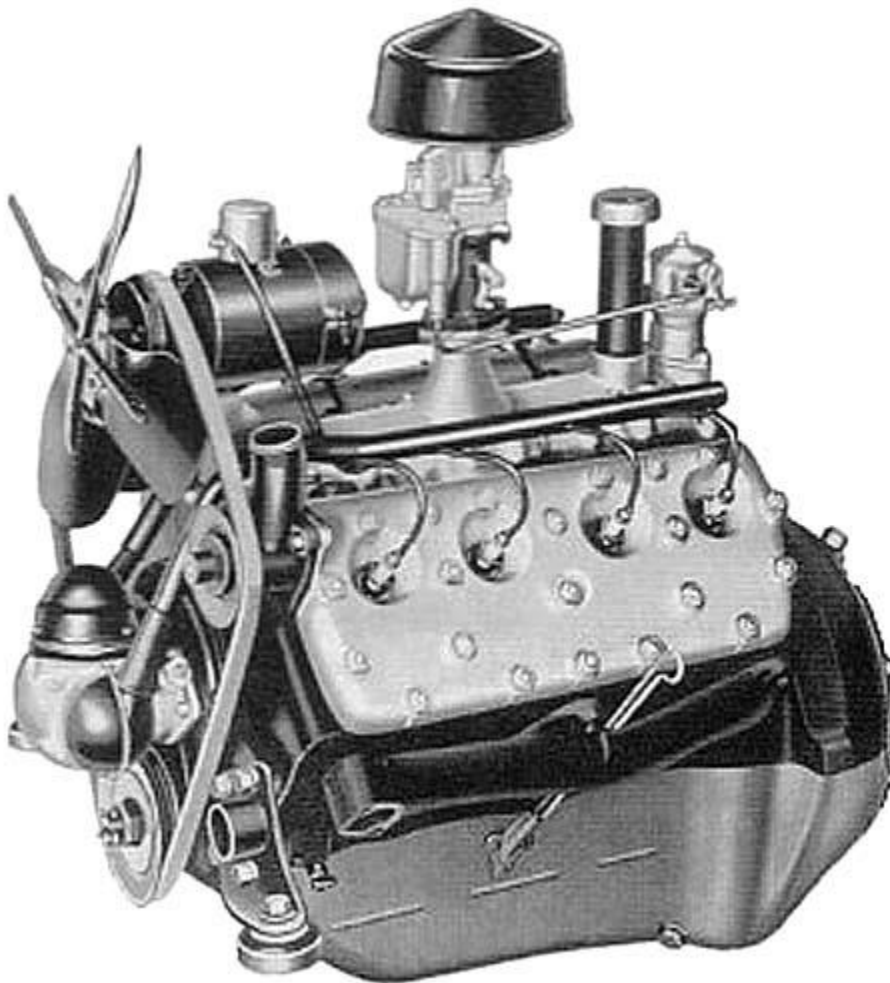
Ford went through rapid development of the V8 engine through 1934, resulting in a better than 15% increase in horsepower for 1933 (75 hp) and another increase, this time better than 13% for 1934 (85 hp). The changes to increase power were primarily intake and compression related, not related to the block.

1933 V8 blocks updated several features from the previous year. These features were kept in production through 1934.

Features of the 33-34 blocks that can be used for identification are:

- The water drains are angled
- The front of the block has recessed areas between the water inlets and the timing gear (almost certainly to save cast iron and weight)
- Babbitt main bearings 1.999" diameter with caps retained by bolts
- No crankcase ventilation
- 21 studs retaining the cylinder heads
- Water pumps in the cylinder heads
- Passes the pencil test
- Core plugs in the oil pan rails

Here is an assembled 1933 engine with aluminum cylinder heads, stamped steel pan, etc.



This picture shows the front of a 33-34 engine. You can see the recesses added between the timing cover and the water inlets.



This picture shows the crankcase area of a 33-34 engine. Note the angled water drain. This picture is also shows the early oil pump, short crank, safety wire through the main cap retaining nuts, and the general look of an early flathead V8 crankcase.



This picture shows the 3" main bearing cap bolt spacing (same spacing on all 32-36 Babbitt motors).



These three pictures show clearly the valley areas where the main bearing bolts go. The first image is the front of the block for the front main bearing bolt locations, the second image is the center main bearing bolt locations, and the third image is the rear main bearing bolt locations.







1935-36

In 1935 Ford updated the V8s with a feature that helped both engine life and passenger comfort, crankcase ventilation. At the back of the valley a raised area was added that connected with the oil fill. At the front of the block a passage was added at the front of the block so the valve chamber could vent to the road down through an opening in the oil pan. Air entering the breather at the back of the intake manifold first went down to the crankcase before traveling up through the valley, down the passage at the front of the block, and out to atmosphere through a slit in the back of a protrusion on the front of the oil pan. The top of the passage at the front of the block interfered with the front main bolt hole, so the main caps were switched to being retained with studs. The main bearings were still poured Babbitt. This was the only V8 engine in production at the start of the 1935 model year, and was continued through the end of 1936 production.

Features of the 35-36 block that can be used for identification are:

- 21 studs retaining the cylinder heads
- Water pumps in the cylinder heads
- The water drains are angled
- Passes the pencil test
- Core plugs in the oil pan rails
- Crankcase ventilation
- Babbitt main bearings 1.999" diameter retained by studs (stud spacing approximately 3")

This picture shows the crankcase area of a 35-36 block. Note the triangle shaped passage to the left of the front main bearing, that is the crankcase ventilation passage that goes up to the valley.



This picture shows the front of a 35-36 block. Note the tube sticking up at the front inside the valley area, that is installed at the top of the crankcase ventilation passage in the block.



This picture shows the fuel pump push rod area, now featuring a raised area.



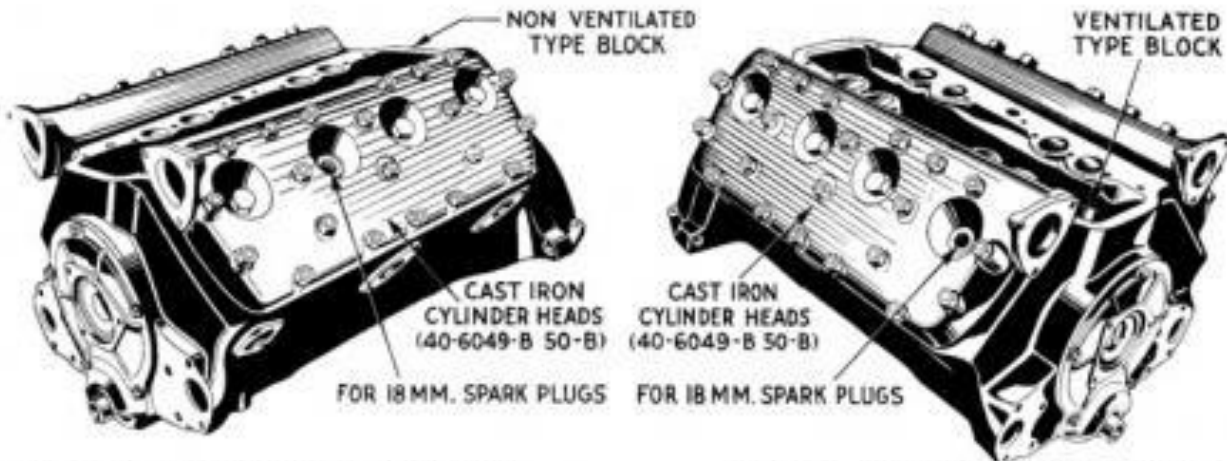
This picture of the right side of a 35-36 block shows that there has not yet been any change to the cylinder head mating surface since V8s were introduced.



This is as good a time as any in this effort to show both how little Ford cared about retaining production line “correctness” and how easy it is to mix-and-match parts between years. This picture is from Ford from the mid 1930, for engine identification to be used in the engine exchange program. Keen eyed viewers will notice that:

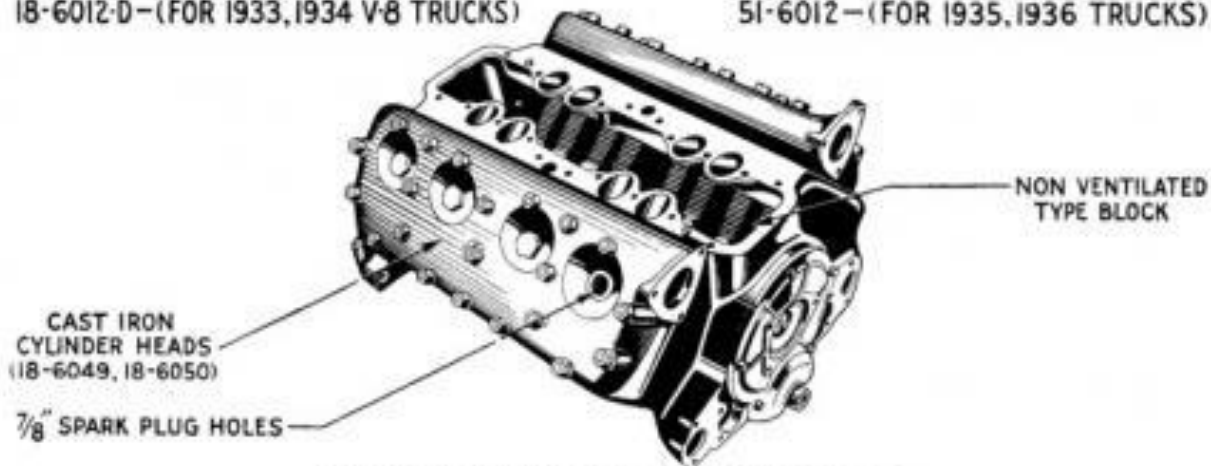
1. The long blocks for both the 1933-1934 V8 Trucks and the 1933-34 Passenger & Commercial Cars are actually 1932 production blocks with the flat front face.
2. The long block for 1932 V8 Passenger Cars is actually a 1933-34 block with the recesses between the timing gear area and the water inlets.

V8 Block Chart 1932 to 36

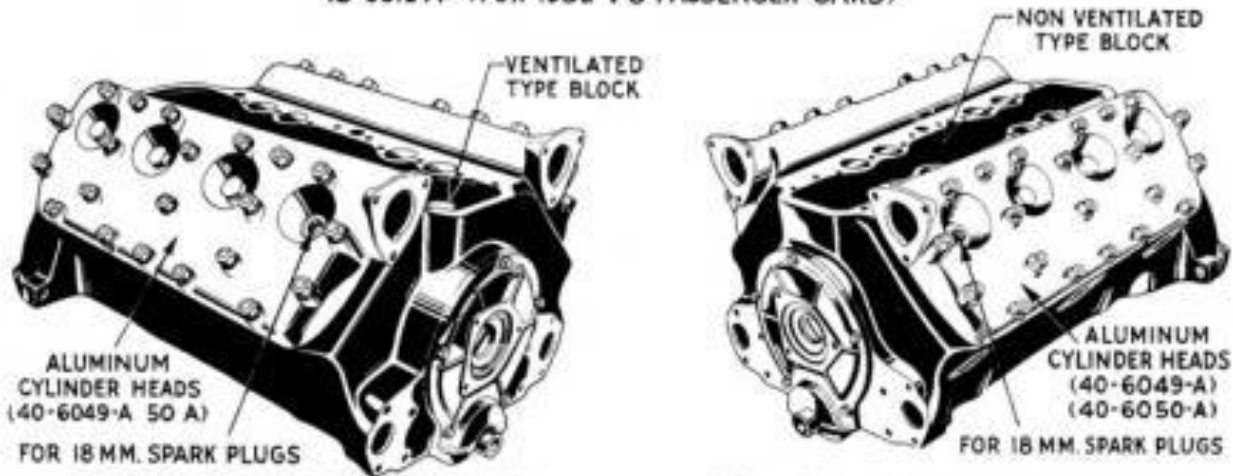


18-6012-D—(FOR 1933, 1934 V-8 TRUCKS)

51-6012—(FOR 1935, 1936 TRUCKS)



18-6012-A—(FOR 1932 V-8 PASSENGER CARS)



48-6012—(FOR 1935-36 PASSENGER AND COMMERCIAL CARS)

18-6012-B—(FOR 1933-34 PASSENGER AND COMMERCIAL CARS)

Reconditioned V-8 Cylinder Assembly Identification Chart

LB

Things got a bit interesting in late 1935 since Ford produced two similar V8 engines with different main bearings at the same time. In 1935 Ford started insert main bearings with what are now known as “LB” engines. The LB motors feature replaceable main bearing inserts. LB production started during the 1935 model year and continued in increasing numbers through the end of 1936 model production along side Babbitt main bearing engine production (both occurred at the same time). The main bearing diameter was increased to 2.399” on the crankshafts used in LB motors. LB blocks are visually identical to 35-36 blocks except for wider spacing between main bearing retaining studs, measuring approximately 3 1/4” instead of the previous 3”. Some, but not all, LB motors have “LB” stamped on the top surface of the block near where the intake bolts on. I would not use that stamping as positive identification as an unscrupulous person could have added it to a more common Babbitt motor at some time in the last 80+ years.

Features of the LB block that can be used for identification are:

- 21 studs retaining the cylinder heads
- Water pumps in the cylinder heads
- The water drains are angled
- Passes the pencil test
- Core plugs in the oil pan rails
- Crankcase ventilation
- Insert main bearings 2.399” diameter retained by studs (stud spacing approximately 3 1/4”)

For USA production the outside of the LB motors look identical to the 35-36 engines. This picture shows the front of an LB block.



Here is a picture of the valley of an LB with a better view of the crankcase ventilation tube introduced with 1935 production



Assembled motors may be ruled out as being LB motors by very close examination of the distance between draft on oil pan and front main bearing area of oil pan. The front of the oil pan is a bit wider to clear the larger main bearing caps. The space between the crankcase vent on the oil pan is much smaller on the LB motors, see picture for comparison with the insert motor pan on the left and the Babbitt motor pan on the right. I do not know if an insert bearing oil pan will fit and work on a poured bearing block, so I cannot recommend using a later oil pan as a positive identification of an insert motor on an assembled engine.



1937-38 Late 21 stud

The late 21 stud engines were used for all of 1937 production, and continued in decreasing numbers through the end of 1938 model year production.

Ford made a significant change to the V8 engines for the 1937 model year, putting water pumps at the front of the engine block to push cooled water into the engines. Ford USA would make no more poured Babbitt V8 motors, production was standardized to insert main bearings using the crankshaft and associated parts first used in the LB motors. Other than the modification to the front of the block to add water pumps, the late 21 stud blocks are virtually identical to the LB blocks. This allowed Ford to use the late 21 stud motors in the earlier cars by using block off plates for the added upper water pump openings. To this day an owner of a 1932 through 1936 car can use a 1937 block, crank, and oil pan, block off plates, and all other original to the car parts to swap the late 21 stud motor into an earlier car (care must be used to make sure the pistons match the heads, either flat or dome type).

Features of the late 21 stud

- 21 studs retaining the cylinder heads
- Water pumps in the block
- The water drains are angled
- Passes the pencil test
- Core plugs in the oil pan rails
- Crankcase ventilation
- Insert main bearings 2.399" diameter retained by studs

This picture shows the front of a late 21 stud block. The large upper holes are where water pump impellers go. The two bolt holes diagonally across each large hole are the upper two water pump bolts. The lower water inlet hole and two bolt holes above and below the water inlet are the same as the earlier 21 stud motors. This leads to an interesting condition that kinda sucks, the bottom water pump bolt, the one below the water inlet hole, is inside the water pump inlet. The bolt in the water pump inlet was maintained until the end of 221-239-255 engine production. Everything else on the late 21 stud motors looks the same as the LB motors, and very similar to the 35-36 motors.



The crankcase area is unchanged from the LB engines



The cylinder head deck, intake area, valley, etc. are unchanged from the LB engines



1938 Only 24 stud

Things get interesting again in 1938 since Ford returns to producing different engine types side-by-side in the same model year. As mentioned in the previous section, Ford continued 21 stud motor production through the 1938 model year, but Ford also started production of 24 stud motors for use in the 1938 model year. These one year only partial production motors are unusual. They are identical to the late 21 stud motors except that the stud at the bottom of the cylinder bore has been replaced with two studs on either side of the cylinder bore. The crankshafts, rods, bearings, cooling passages in the decks, and everything except the number of fasteners holding the heads down is the same as the late 21 stud motors. These 24 stud motor occasionally confuse people who incorrectly expect the crankshaft and bearings to be like all other 24 stud motors starting the next year. The reason for the change in stud count becomes apparent in 1939. If you happen across one of these motors don't expect to build a performance engine with it, the cylinders don't take large over-bores and the later crankshafts take a whole lot of work to drop in. If you happen to have read the article of the work taken to make a 255 cubic inch late 21 stud motor for the Great American Race in the 1990s, just apply all that same effort to the first 24 stud motors.

This series of engines got the 81 identification since they started in 193**8** and displaced 22**1** cubic inches.

Features of the 1938 only 24 stud

- 24 studs retaining the cylinder heads
- Water pumps in the block
- The water drains are angled
- Passes the pencil test
- Core plugs in the oil pan rails
- Crankcase ventilation
- Insert main bearings 2.399" diameter retained by studs

Here is a picture of a 1938 24 stud motor. The cylinder heads are one year only, featuring a cast in part number on the face of the heads. The battery cable is not supposed to attach to the middle head stud.



Here is a picture of the “pencil test” being performed on a 1938 24 stud. The pencil is resting on the front of the block just behind the timing cover. If you can do that your engine passes the “pencil test”; make sure you are not resting the pencil on the timing cover itself. You can also see the short crankshaft common to small insert main bearing crankshafts and blocks.



1939-40 Mercury

1939 saw several changes to V8 engines. The biggest changes were due to the introduction of the Mercury. The Mercury had an engine based on the Ford V8, but with a noticeable increase in torque and a nice bump in horsepower. The additional power came as the result of additional displacement, 239 cubic inches instead of Ford's 221 cubic inches. The additional cubic inches came from a 1/8 inch larger bore, to 3 3/16 inches. Now we have the reason for 24 studs per head. The lower line of studs on the 21 stud motors is too close to the bore for safe production of 239 cubic inch motors. With the addition of more power came larger main and rod bearings, this time 2.500 inch diameter mains and 2.140 inch diameter rods. Another difference started with 1939 motors is a longer crankshaft. Ford and Mercury mounted the engine fan on the end of the crankshaft in 1939, 1940, and 1941. To allow the fan to be held onto the snout of the crankshaft, the snout was made longer. Starting in 1939 some V8 blocks were relieved between the valves and the bore at the factory. This was done to reduce compression and detonation problems on large trucks. Both 3 1/16 bore and 3 3/16 bore blocks may be factory relieved. All blocks still have four freeze plugs in the oil pan rails. Mercury blocks have round center water holes in the decks that can be used to identify a 239 motor from the smaller Ford motors of the same years.

The 239 cubic inch Mercury engine was also optional in trucks. The water holes in the deck feature a circular center instead of the upside-down keystone. Some 239 blocks had 99 stamped into the passenger side intake rail near the front, but not all. As with the LB, an unscrupulous person could have added this marking to a less desirable engine also. The determination on one of these blocks should be made using the center water holes in the deck. Mercury motors will have an upside-down keystone at the bottom and a circular hole in the middle. These can be seen in the The 239 cubic inch Mercury engine was also optional in trucks. The water holes in the deck feature a circular center instead of the upside-down keystone. Some 239 blocks had 99 stamped into the passenger side intake rail near the front, but not all. As with the LB, an unscrupulous person could have added this marking to a less desirable engine also. The determination on one of these blocks should be made using the center water holes in the deck. Mercury motors will have an upside-down keystone at the bottom and a circular hole in the middle.

The series engines got the 99 identification since they started in 1939 and displaced 239 cubic inches.

Features of the 1939-40 Mercury

- 24 studs retaining the cylinder heads
- Water pumps in the block
- The water drains are angled
- Passes the pencil test
- Core plugs in the oil pan rails
- Crankcase ventilation
- Insert main bearings 2.499" diameter retained by studs
- Round center water hole in the deck
- Upside down keystone water hole in the lower center of the deck

The circular center water hole and upside-down keystone can be seen in this picture.



The crankcase area with the core plugs in the oil pan rail can be seen in this picture.



1939-40 Ford

The Ford blocks got the bigger mains just like the Mercury, but continued with the smaller 2.000 inch rod bearings. As mentioned in the previous Mercury section the Ford motors also got a longer crankshaft. All blocks still have four freeze plugs in the oil pan rails. Ford blocks continued with upside down keystone center water holes in the decks. These blocks can be bored 1/8 over to 239 cubic inch size so a 3.1875 bore should not be used to determine block identity.

Features of the 1939-40 Ford

- 24 studs retaining the cylinder heads
- Water pumps in the block
- The water drains are angled
- Passes the pencil test
- Core plugs in the oil pan rails
- Crankcase ventilation
- Insert main bearings 2.499" diameter retained by studs
- Upside down keystone center water hole in the deck
- Upside down keystone water hole in the lower center of the deck

The deck and front of the block on the 221 cubic inch Ford motor is almost identical to the Mercury motor, with the exception of center water outlet. The water holes in the deck and other similarities can be seen the following picture.



This is as good a time as any to bring up a cautionary message. Be careful, or simply don't, hang a flathead Ford V8 with a cast on bell housing from a common engine stand. The bell housing area isn't designed for the load. Some people do that with no problem, some stick a board under the nose of the crank, and a few break their engines. Dad was given this 1940 Ford motor because it was broken during assembly after all the machine work had been done.



1941-42 Mercury

Functionally the 1941 and 1942 engines are identical to the 39-40 units, but visually there are significant changes. The most unique, and easy to see, is the intake area. The intake deck is no longer flat. This is frequently referred to as a “raised” intake, but it isn’t. The intake surface is the same height, and the surrounding area is lowered. Also changed is the side of the block around the exhaust ports, the block side now curve up to meet the ports. Another change is the elimination of the core plugs in the oil pan rails. All these features are common to both Ford and Mercury engines so final identification is made by the center water hole in the cylinder deck.

Features of the 1941-42 Mercury

- 24 studs retaining the cylinder heads
- Water pumps in the block
- The water drains are angled
- Passes the pencil test
- No core plugs in the oil pan rails
- Smoother block sides without raised looking exhaust ports
- Crankcase ventilation
- Insert main bearings 2.499” diameter retained by studs
- Round center water hole in the deck
- Upside down keystone water hole in the lower center of the deck

The “raised” intake surface can be seen in this picture, along with the round center water hole.



The revised block sides and oil pan rail without core plugs can be seen in this picture. This block is also factory relieved, a practice used on truck motors to control detonation by lowering compression.



1941-42 Ford

The 1941 and 1942 Ford motors are very similar to the same year Mercury engines with the same changes compared to earlier motors: the “raised intake”, the curved outside walls of the block meeting the exhaust port flanges, and the elimination of the core plugs in the oil pan rails. These blocks can be bored 1/8 over to 239 cubic inch size so a 3.1875 bore should not be used to determine block identity.

Features of the 1941-42 Ford

- 24 studs retaining the cylinder heads
- Water pumps in the block
- The water drains are angled
- Passes the pencil test
- No core plugs in the oil pan rails
- Smoother block sides without raised looking exhaust ports
- Crankcase ventilation
- Insert main bearings 2.499” diameter retained by studs
- Upside down keystone center water hole in the deck for Ford, and round hole for the Mercury
- Upside down keystone water hole in the lower center of the deck

You can see the "raised intake" and upside down keystone center water hole in this picture.



World War 2

Lots of interesting changes happen to flathead V8s around the world during WW2. Ford Dearborn lost contact with some facilities, there were local rush demands in other plants, and in general the engine features got less consistent around the world. From what I have been able to learn USA production seems to largely have kept going with 1941-42 type engines. The story gets particularly interesting over in Europe, stick around to the non-USA sections to read about that.

Please be careful with pictures taken during World War 2, just because a truck is in a specific nation's use does not indicate it was produced by that nation or it's vehicle supplier(s). All sides were quite happy to incorporate any captured operational Ford vehicle into their fleet, and did so regularly. A quick insignia paint job and the vehicle switched sides, regardless of where the vehicle or engine was produced.

1945-48 59 series

Ford was early out of the gate officially getting back in production in July of 1945, but it was more of a stunt than real volume production. Along with the rest of the USA auto manufacturers Ford slowly worked through the supply and manufacturing problems of converting back from war production and increased civilian vehicle volumes to meet the post war demand for automobiles. The new Fords and Mercuries looked an awful lot like the 1942 models, but at least they were new cars. The engines were updated a bit too, with the change exciting for Ford and disappointing for Mercury. Both the Fords and Mercuries now used the same 239 cubic inch 100 horsepower engines. This gave the Ford V8s a solid horsepower lead over the Ford 6s, but also resulted in the Mercury having no performance advantage and basically being a longer wheelbase Ford with an upgraded interior and different trim. Before WW2 the Mercuries had enjoyed a power advantage over the Fords, but that was gone until 1949.

The 59 engine changes from the pre-war units include a return to the flat intake deck, round water holes in both the center and lower center of the cylinder deck, a sloped front of the engine between the intake surface and the timing cover area so the blocks will no longer pass the “pencil test”, and unless someone has ground it off a large 59 cast on top of the bell housing. The valve angle was also changed for post-war blocks, with the valves moved approximately 0.090” further from the bore to allow more cooling water around the valve seats.

The 59 series engines got that identification since they started in 194~~5~~ and displaced 23~~9~~ cubic inches.

Features of the 59 engines

- 24 studs retaining the cylinder heads
- Water pumps in the block
- The water drains are angled
- Fails the pencil test
- No core plugs in the oil pan rails
- Smoother block sides without raised looking exhaust ports
- Crankcase ventilation
- Insert main bearings 2.499” diameter retained by studs
- Round center water hole in the deck
- Round water hole in the lower center of the deck
- 59 cast on the bell housing

You can see the return to the flat intake surface and the round water holes in the center of the cylinder deck in this picture.



The sloped front of the block between the intake surface and the timing cover are shown here.



Here is the 59 mark. This isn't a guarantee of a 59 series motor, more on that in the next section.



41A block

The 41A engines were never installed in new vehicles by Ford, they were always service replacement parts. Mentioned earlier was Ford's engine exchange program that was a selling point for new car owners starting in 1932. Cars typically lasted much longer than the first engine and engines went in for overhaul. Ford started offering factory reconditioned engines on an exchange basis for Ford owners. You drove your car with a worn-out engine to the local Ford dealer in the morning, walked to the office, walked back after work, and drove home with a fresh engine under the hood. Your old long block was sent off to the factory to be reconditioned and cycled back into someone else's Ford. After WW2 apparently some of the old engines were just too worn out to get reconditioned so Ford made new service replacement engines specifically to replace the old 221 cubic inch motors in prewar Fords. Ford had all the tooling set up and going for the new 59 series engines so most of that got used on the service replacement engines. This resulted in a confusing combination of features in one engine block. Almost everything looks just like the 59 series engine except the bore is small, 3 1/16, and the front of the block passes the "pencil test". Apparently, these blocks do not have the cylinder wall thickness to be bored out and used as performance engines.

The 41A designation from the Ford parts catalog indicates these motors were released for 1944 production and are 221 cubic inches.

Features of the 41A engines

- 24 studs retaining the cylinder heads
- Water pumps in the block
- The water drains are angled
- Passes the pencil test
- No core plugs in the oil pan rails
- Smoother block sides without raised looking exhaust ports
- Crankcase ventilation
- Insert main bearings 2.499" diameter retained by studs
- Round center water hole in the deck
- Round water hole in the lower center of the deck
- 59 cast on the bell housing

The front of this block passes the “pencil test”.



While the back of the same block has 59 cast in the bell housing.



1949-53 8BA

Ford's last big revision to the domestic flathead V8 was a good one. The cooling system was revised in a major improvement, the cast on bell housing was gone so the back of the block looks a lot like most other engines, the valve train was updated with one piece valve guides and matching straight stem valves, rod bearings were changed to lock in type with one bearing set per rod, an improved oil pump with helical gears was introduced in 1950, improved crankcase ventilation with a real road draft tube pulled the fumes away, and the distributor was finally moved so that you can both see it and work on it *at the same time*! In my opinion these are by far the best of the flathead V8s.

The 8BA engines first landed in production vehicles with the new F series of Ford trucks in 1948. Use in passenger cars started with the 1949 model year Fords and Mercurys in the summer of 1948. The same basic engine design continued through the end of the 1953 model year for both Ford and Mercury. Ford continued with the 239 cubic inch displacement while Mercury returned to having a more powerful motor with a larger 255 cubic inch displacement thanks to a stroked crankshaft.

I have seen a guide to date codes on 8BA engines published and re-published by many different sources. I have not personally seen an 8BA block with those codes on it, and have concluded the codes were not widely used. All 8BA era blocks are equivalent with the only notable running change being the elimination of the hardened valve seats, first gone from the intakes in 1951 and then also gone from the exhaust by 1953. Seats can still be installed during a rebuild if needed. What determines a 48 truck motor from a 52 car motor from a 51 Mercury motor from a 53 Mercury motor are all bolt on items such as intake, heads, water pumps, exhaust manifolds, bell housings & matching starter plates, etc.

Features of the 8BA blocks

- 24 bolts retaining the cylinder heads
- Water pumps in the block with extra passage above the impeller opening
- Revised crankcase ventilation
- Insert main bearings 2.499" diameter retained by bolts
- Long water passage openings at the back of the cylinder decks
- No cast on the bell housing

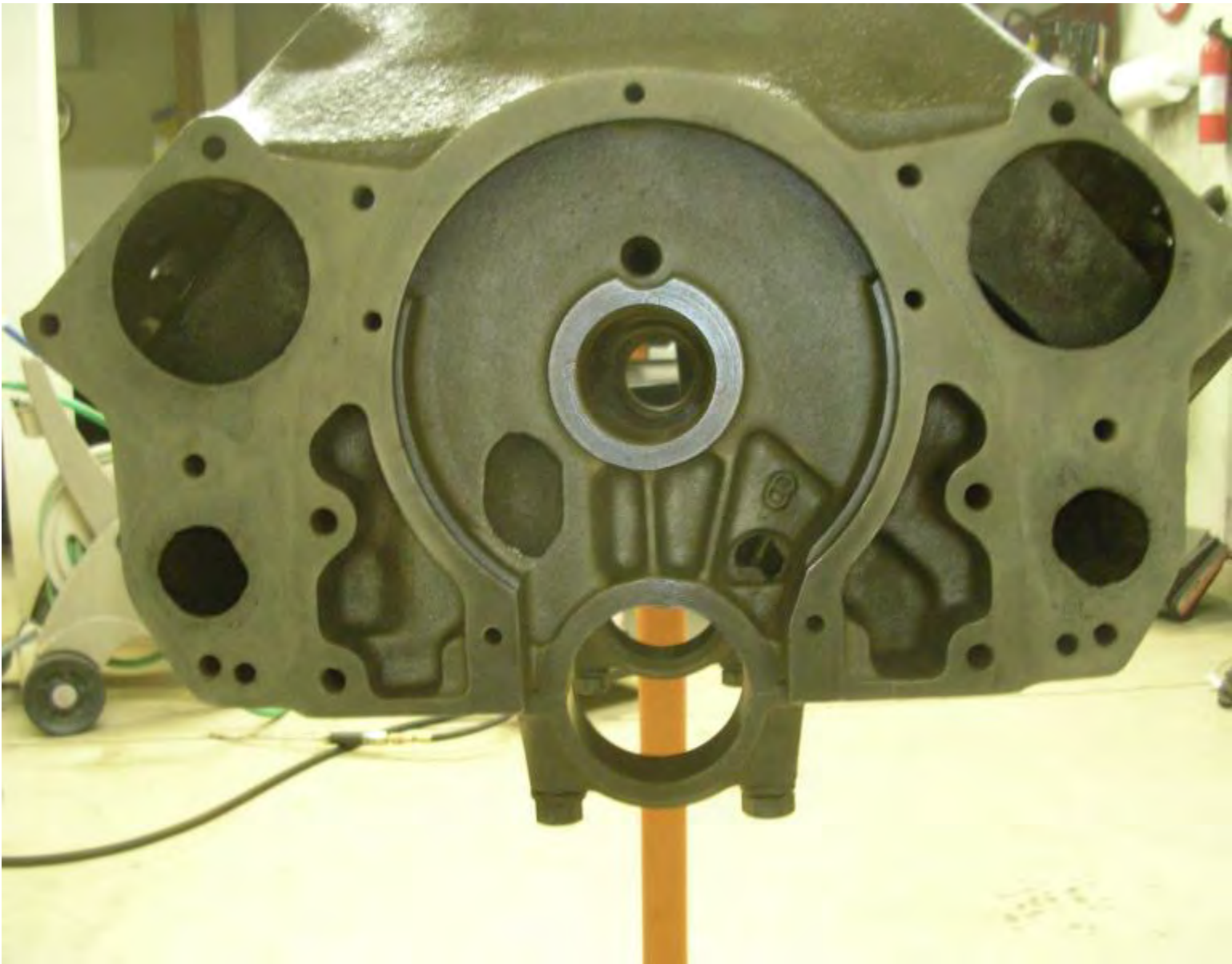
The back of the block without a bell housing and long water passages at the back of the cylinder deck are evident in this picture.



The revised breather passage is apparent in this picture where the owner has started painting the crankcase area with Glyptol.



The front of the block with the added water pump passage above the impeller hole is apparent in this picture.



Interchange Information

Another warning about IDing engines from external parts. Just about everything can be swapped into or onto a Ford flathead V8 221-239-255 engine. This is a list that is far from complete of the parts that are swappable backwards and forwards on these engines. You can be confident that at some time any possible swap that could result in a running engine was done.

- Crankshafts:

- o 1.999" main Babbitt crankshafts can be installed in engine up through the 59 series. Ford made special thick insert main bearings to allow this. If you have a good Ford parts catalog, some patience, and search you can still find these. Frequently there are some on that auction site. Any flathead insert main bearing with an "18" prefix is one of these special swap bearings.
- o 2.399" insert main crankshafts can be installed in engine up through the 59 series. Ford made special thick insert main bearings to allow this. If you have a good Ford parts catalog, some patience, and search you can still find these. Frequently there are some on that auction site. Flathead insert main bearing with an "68" prefix and suffixes G, H, J, K, L, N, P, X, and Y are special swap bearings.
- o 2.499" insert main crankshafts can be installed in any block made for 2.500" bearings. You must use the rear main bearings that match the block type. If the crankshaft was originally made for floating rod bearings and has only one oil hole per rod throw you must use floating rod bearings and matching rods. If you want you can use floating rod bearings and matching rods on 8BA era cranks, but the only reason to do that today is if you are running a 1/8th stroked crankshaft and need the prewar Ford rod bearing size.

- Camshafts

- o All camshafts can be swapped between engines with enough work.
- o 8BA era camshafts need the front distributor drive gear section machined off and a distributor drive slot added for use with earlier timing covers.
 - Mart has a nice video on YouTube showing how he did this: <https://www.youtube.com/watch?v=Ydy38R7EPL8>
- o 1942-48 "short" cams can be used in earlier engines by adding a "button" that fills the space between the cam and the earlier distributor.
- o 1932-1941 "long" cams can be used in later engines if the earlier timing cover and distributor is used
 - All 1932-38 cams use pressed on timing gears
 - Bolt on timing gears were first used in 1939
- o 1939-48 cams with bolt on timing gears can be used with 8BA era distributor setups by using an add-on drive gear that bolts on with the timing gear, but the quality of the add-ons are suspect so this is not recommended.

- Cylinder heads

- o All 21 stud heads can be bolted on all 21 stud blocks, but there are many combinations that should be avoided
 - 37 center water outlet heads on a 36 and earlier block would result in no water pumps. I have never seen or heard of this, so this is mentioned for completeness only.
 - 32-26 heads were first bolted onto on a 37 block by Ford, with block off plates used to close off the later water pump impeller holes.
 - Make sure the heads and pistons match, flattop heads cannot be used with domed pistons since the dome tops hit the head. Dome top heads on flattop pistons will have crap compression, poor combustion, and no performance.
- o All 24 stud and 24 bolt heads will swap, but again there are combinations that don't make sense

- 8BA type heads are a mis-match on earlier blocks since the water passages at the back of the block are not the same.
- Earlier heads are sometimes installed on 8BA blocks, mostly for looks, and require blocking off a water hole in the right side deck.
- 1938-1948 heads will interchange, with some rework required in specific cases.
 - All 38-48 heads will bolt on 38-42 blocks
 - Prewar heads need the valve area machined back for use on postwar blocks due to the valve angle change. KR Wilson sold a fixture to do this and odds are not bad that someone in your area has one.
 - For the record, the highest compression commonly available Ford cast iron 38-48 head is not the 81A, it is the last of the 59 series, the 59A-B.

- Water pumps

- o All 32-36 head mounted water pumps interchange.
- o All 37-48 block mounted water pumps interchange.
 - 37-48 water pumps can be installed on 8BA era engines, but the top water hole above the impeller hole must be plugged. Also, the 8BA type ignitions cannot be used.
- o All 8BA era water pumps interchange.
 - 8BA era water pumps can be installed on 37-48 blocks, but the top hole in the water pump needs to be plugged. 8BA crank pulley and generator placement must also be used since the fan belt moves forward with the 8BA setup.

- Intakes

- o All intakes can be bolted onto all blocks.
- o Intake type is tied to fuel pump type. There are multiple different length fuel pump push rods that must match both the pump type and intake.
- o 8BA era blocks have some of the intake bolts holes blanked off (not drilled and tapped)
- o Crankcase ventilation is tied to the intake and block design, try to keep a functional breathing setup. Do not install a PCV setup that results in pulling dusty air into the crankcase from under the engine.

- Flywheels

- o All flywheels will bolt onto all crankshafts, but the starter setup requires a matching flywheel.
- o All 32-48 flywheels interchange.
- o All 49-53 flywheels interchange

- Exhaust manifolds

- o All exhaust manifolds will bolt onto all engines.

Outside of USA

I have a lot less information about the engines produced outside of the USA. I do not have a chart showing engine features for manufacturing outside of the USA, maybe I could put one together with enough information. I am not trying to duplicate any information already included in sections above. I will include deviations from the USA type motors. May thanks to multiple members of the Ford Barn for providing the pictures and information on these engines. I will have a single section on each country that I am aware of outside the USA that made flathead Ford (type) engines: Canada, England, France, and Germany. If you have new information please post a reply and let us know so this gets clearer.

Canada

Starting off the places outside the USA that flathead V8s were manufactured is the Windsor plant in Ontario Canada. Canada supplied the Commonwealth outside of Europe with engines and vehicles in some form for most of the flathead era. Our Canadian, Aussie, and Kiwi members have helped with some information about Canadian specific engine features. Undoubtedly I have missed several things and hope more information is shared.

Canada started V8 production with the same type of engine as the USA, the 1932 units. Pre-war the Canadian engines largely followed USA types, with a few deviations.

First is a 32-33 transition motor. Outside of the USA the transition to 1933 production V8s was not a hard line. 1932 style vehicles stayed in production for years in some locations. There are some engine blocks that share features of the typical 1932 and 1933-34 units. The following pictures show a block with some 1932 features and some 1933-34 features. Also shown are a forged 1932 crankshaft and a cast 1933-36 crankshaft.

This picture shows a block with the casting for straight down 1932 location water drains and angled 1933-later water drains.



The block pictured above and below was damaged in the bell housing area. This damage can occur by hanging the engine from the bell housing using a modern engine stand. Some people have gotten away with using a modern engine stand in that way while others have experienced catastrophic block failure like this. The accepted way to mount a flathead V8 with integral bell housing to an engine stand is using an adapter that bolts onto the exhaust ports. You can make your own adapter or purchase one from some vendors.



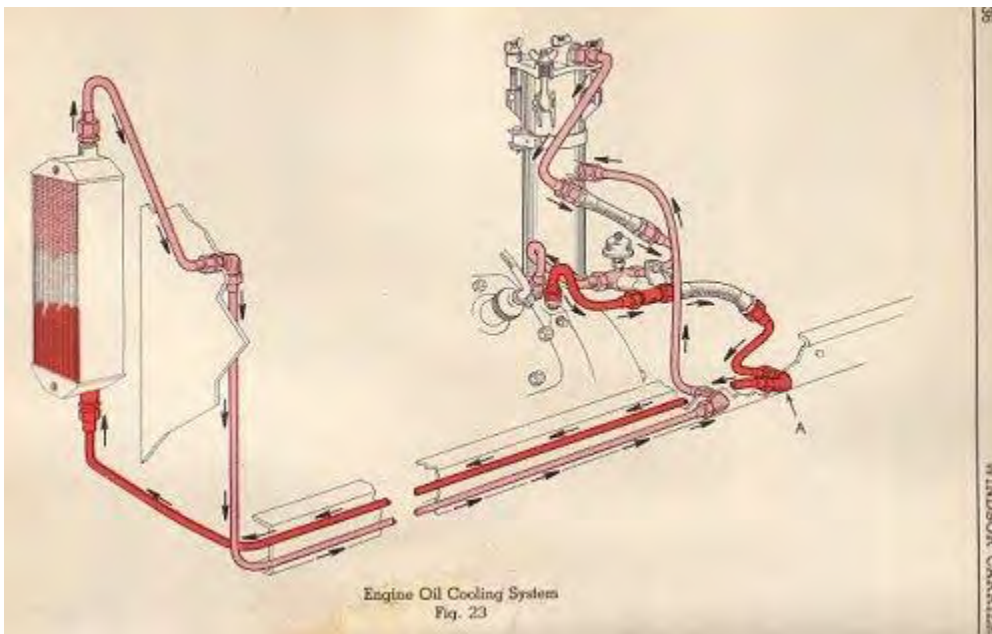
This picture shows a forged 1932 crankshaft on the left next to a cast 1933-36 crankshaft on the right. Also note the double disk feature at the back of the crankshaft that make up the rear main thrust surface and the crankshaft oil slinger.

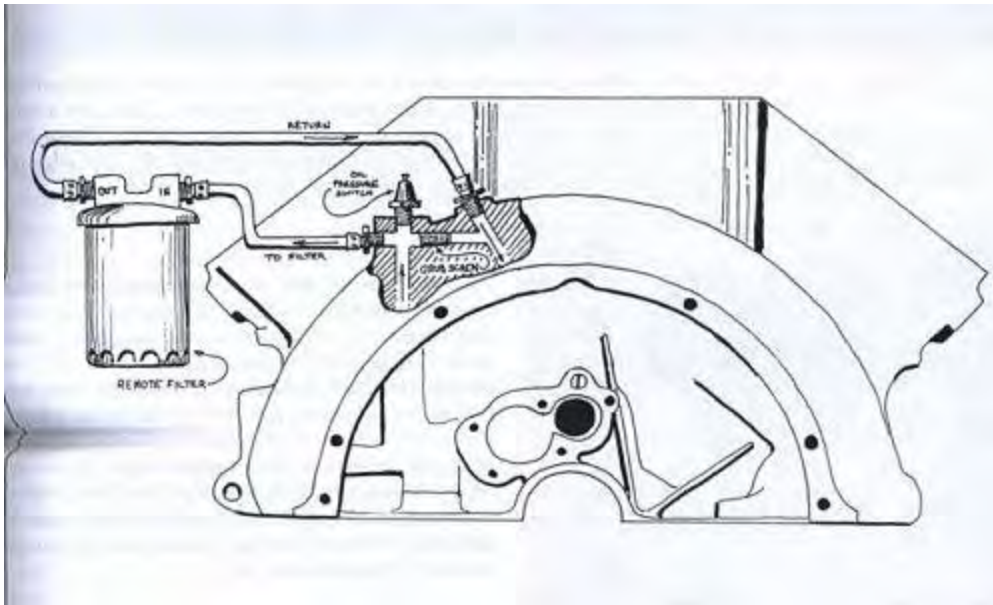


When Canada started producing insert bearing blocks two extra holes were added, possibly for fixturing. This is the extra hole in the front of a Canadian LB block



Canadian deviations from USA practice took off in WW2. Canada produced a lot of small military vehicles powered by flathead V8s, and these needed either extra cooling or extra filtering due to the extreme conditions. A full flow oiling system modification was designed in, with a boss added for an extra oil passage opening in the bell housing area. This required blocking the passage between the camshaft and the oil pressure sending unit so oil was sent out of the block at the oil pressure boss and back into the block at the added opening. Similar methods have been mentioned for “full flow” oiling modifications to flatheads ever since.



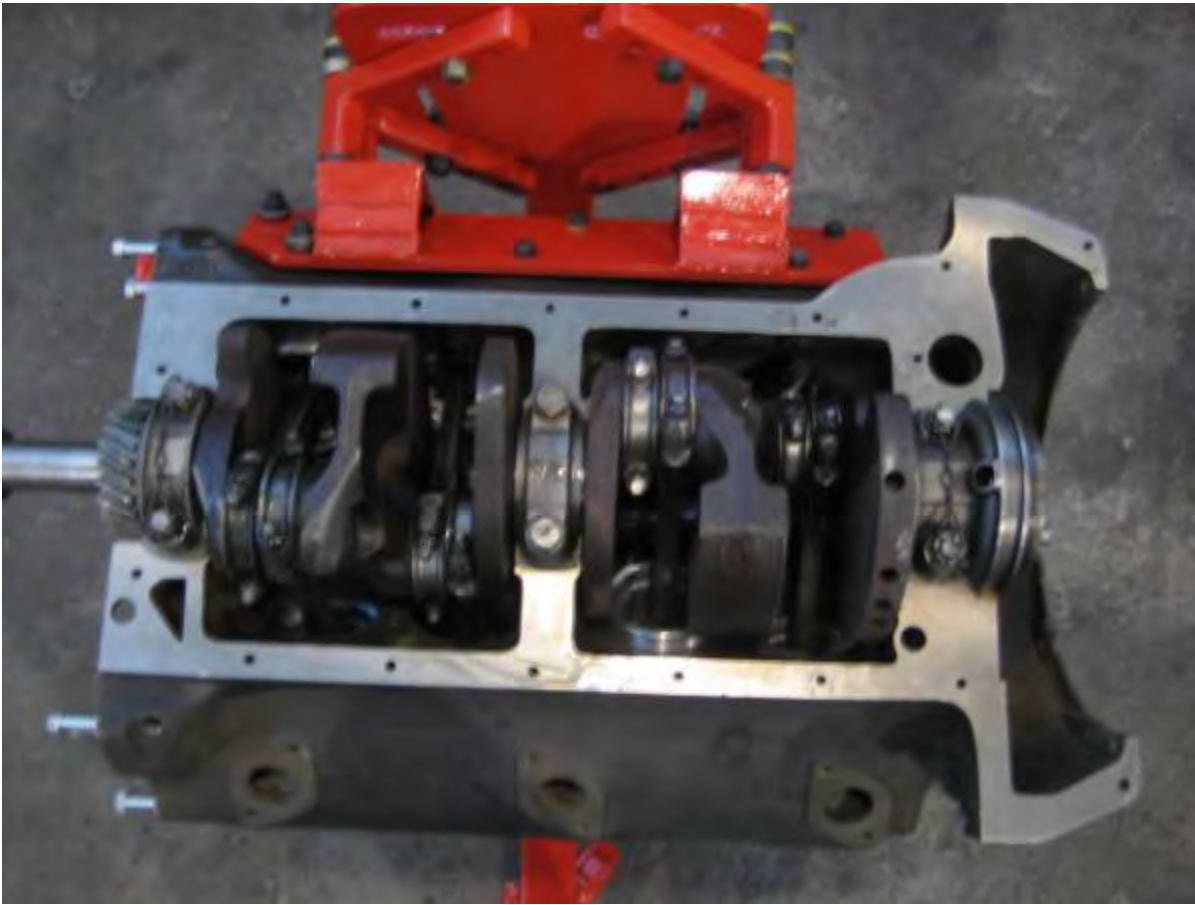


After WW2 Canada produced their own variation of the 59 series motors, the C69A. These had special insert rod bearings that ran in crankshafts with two oil holes per rod throw (like the later 8BA cranks) and used modified floating type rods with tangs added to locate the thick bearings. Functionally the C69A blocks are equivalent to USA 59 blocks, unless you happen to get a full flow modified block.

The C69A casting on the top of the bell housing and extra oil port are shown in this picture.



Both extra holes used by Canada in insert bearing blocks can be seen in this crankcase view of the C69A motor also pictured above. The front hole is in front of the breather passage and the back hole is next to the rear crank counterweight.



Canada continued production of flathead engines through the 1954 model year. I am not aware of anything special about Canadian 8BA era engine blocks.

England

Ford's flathead V8 production in England happened at the Dagenham plant starting in 1935 or 1936. Production started with the 1935-36 type engines, but I am not aware if these were Babbitt motors or if production started with insert main motors. Production of flathead V8s continued into the 1950s. Interestingly all flathead V8s produced at Dagenham are 21 stud units. The engines that deviate from USA type are the "Pilot" type motors. These have a large core plug at the back of each cylinder bank.



France

I have very little information about engine blocks manufactured by Ford at either the Matford plant at Strasbourg or at the Ford SAF plant at Poissy. Ford sold the whole works to Simca in 1954 including the tooling to make flathead V8s in use on trucks. These kept being produced in at least small numbers to support a French military vehicle. These are the French blocks that came onto the USA market about 20 years ago. If anyone knows the flathead V8 manufacturing history prior to the military engines please post a reply and share it with us. Many of the features of the late French engines look an awful lot like the late German engines.

The military engines have a combination of 59A era and 8BA era features. It appears to me that the changes with significant improvement to operation were adopted, while features that didn't help with truck use were not adopted. Primarily the cooling system improvements from the 8BA type was incorporated.





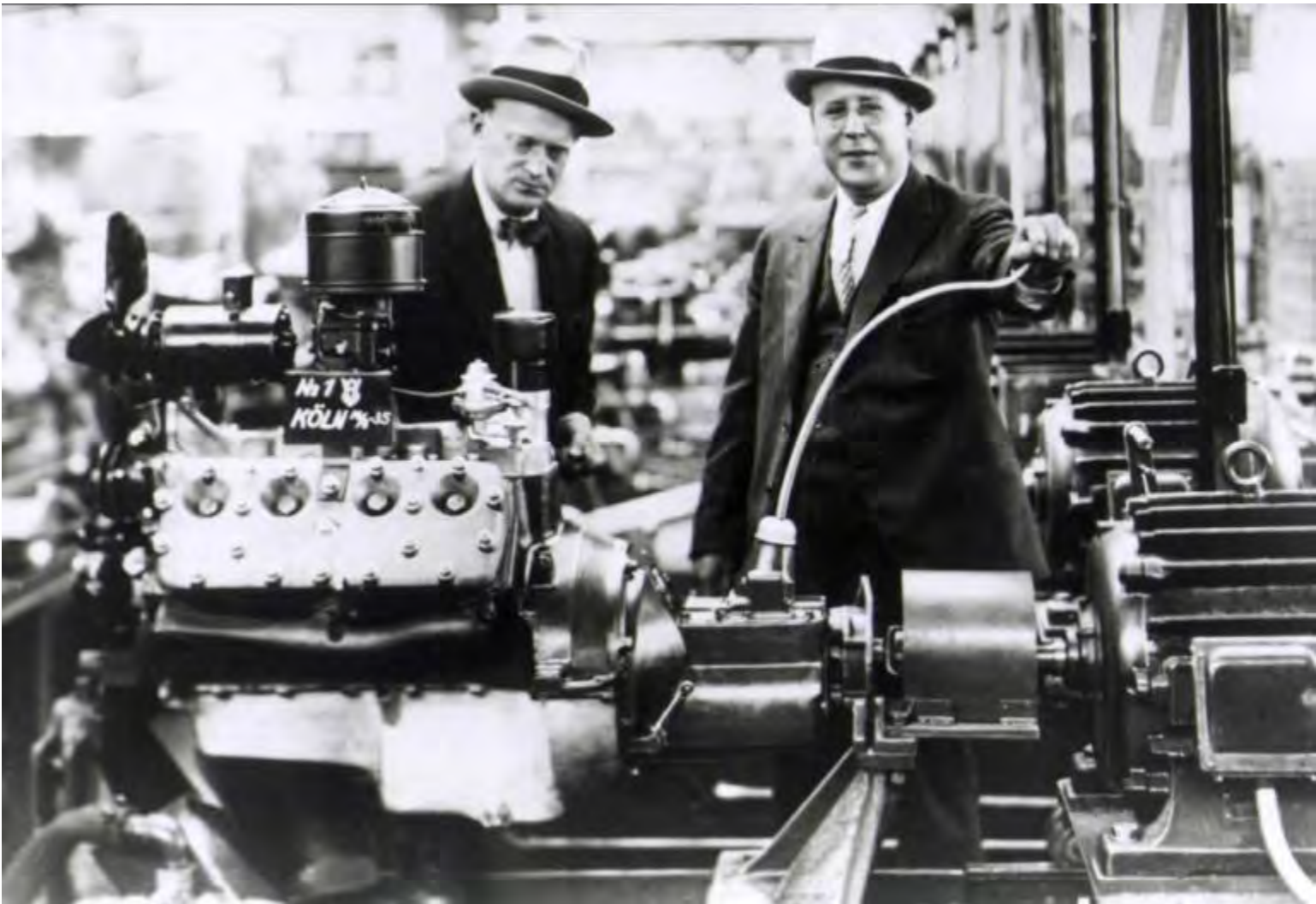


Germany

Flathead V8 production at the Koln plant in Cologne Germany deviated from USA practices due to politics and a war. Before WW2 the German production primarily followed USA practices, with some lag in adopting changes. One notable difference is all German V8s used a cast aluminum oil pan, probably because the stamping dies and machine were too expensive to justify for the small volume production of these engine.

Please be careful with pictures taken during World War 2, just because a truck is in German use does not indicate it was produced in Germany. All sides were quite happy to incorporate any captured usable Ford vehicle into their fleet, and did so regularly. A quick insignia paint job and the vehicle switched sides, regardless of where the vehicle or engine was produced.

Production started with the 1935-36 type engines as shown in this celebratory picture of the first engine.



At some point the Germans got fed up with the distributor low on the front of the motor and decided to do something about it. The block casting was modified so that a distributor drive could be attached at the top of the oil pump.



Here is a picture of a German engine in a military vehicle, check out that distributor access.



After the war the plant was returned to Ford. The German engines were updated with some of the 8BA features, but not all. It appears to me that the cooling improvements were adopted, but no other changes since the German motors already had a top mounted distributor. Continued use in already designed vehicles probably had something to do with this, more information would be nice.

These engine pictures show the updated cooling system evident by the 8BA style heads, but retaining the cast on bell housing and not adopting the 8BA style crankcase ventilation.







