Lycoming O-290 GPU Conversion

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ORIGINAL TEX

O-290 GPU CONVERSION

In converting the O-290-G engines, the first step is to completely disassemble the engine and check it thoroughly.

It is desirable to remove the flange and excess material from the front of the engine. This can be done with such simple hand tools as a drill, hacksaw and file. The flange can be drilled as outlined in photo #1. With the holes drilled close together in this fashion, the majority of the flange can easily be removed as in photo #2. As much material can be removed as shown in photo #7.

The next step is to locate the boss on the inside of the left hand side of the case as shown in the photo #3. The circle on the case shows the location from the outside. Note also in photo #3 that the excess material on the case just below the circle has not yet been removed. This is where the crankcase breather is located. This boss is drilled through the center, first with a small size drill to be sure that the hole is centered in the boss, and drilled at the correct angle. Then drill with a 29/32 inch drill for a 3/4 inch pipe tap. Then tap this hole for a 3/4 inch pipe fitting to be used for the breather.

The engine mount ears are then chamfered to a 70 degree chamfer to accept rubber bushings #60883 for the engine mount. These are chamfered just deep enough to accept the cone end of the rubber bushing. When chamfered out from both sides, the hole in the center will be opened up to approximately 3/4 inch. These engine mount bushings will accept a 1/2 inch bolt. A pipe reamer of approximately 70 degrees can be purchased from Sear's Roebuck and can be used on a 1/2 inch drill motor. If the pipe reamer is held with enough pressure, it will not chatter and will make a smooth cut. Photo #4 shows engine mount ear before being chamfered and photo #5 shows the engine mount ears after being chamfered. Also note in photo #5 the aluminum plate welded to the back end of the oil pan to close it up.

If a standard oil pan is to be used two studs should be installed in the crankcase on the oil pan flange as shown in photo #6.

Photo #7 shows the front of the crankcase with the excess material removed and also showing the prop bushings installed in the prop flange. It also shows the crankcase breather fitting installed.

The oil pressure relief valve spring as shown in photo #8 that comes with the engine will only give you approximately 25 pounds of oil pressure. This spring is to be discarded and spring part #61084 is to be used instead. If the ball check is not rusted or marred it can be reused. If it is damaged, replace it with part #1028-B.

Photo # 9 shows the section of the oil pan to be cut off as indicated by the white mark on the pan. This section can be cut off and a plate welded on the back as in photo #5. If this modified oil pan is th be used, an oil cooler adapter is not necessary, as the oil cooler bypass valve is originally installed in the pan and the fittings for the oil cooler lines are also installed in the pan. A standard O-290 oil pan can be used on this engine. It will fit directly to the parting surface on the bottom side of the crankcase. If a standard O-290 oil pan is used, it is important that the oil pan be from a 125 horsepower, because the hole for the carbuerator must be the correct size. An oil pan from a 115 HP to a 160 HP will fit, but the hole for the manifold will not be the right size except in the 125 HP pan.

If the standard oil pan is used, the front intake pipes will fit as they are, but the rear intake pipes have to be shortened. The section to be removed is shown in photo #10. This section is cut out and the pipe is welded together to fit the intake adapter on the oil pan.

If the modified oil pan is used, the intake pipes will be cut as needed to make the intake manifold as illustrated in the drawing.

On the cylinders, the lower plug is removed. The threads are already installed for the lower spark plug. The little allen plug on the intake side can be removed and the primer fittings installed. See photo #11.

The breather elbow that is originally installed on the rear case vacuum pump drive pad can be removed and discarded if the case is drilled and tapped for the breather line as described earlier. If you do not drill and tap the case, this breather can remain in place, although it is big and bulky. When the breather elbow is removed, a standard assessory cover plate can be used or a plate made from 1/8 inch sheet aluminum. See photo #12.

Photo #13 shows the rear case with the original parts removed. From left to right they are: Magneto and spacer, oil cooler screen and housing, oil breather elbow and speed governor. The magneto is reinstalled. The oil breather screen and housing is reinstalled with the oil cooler adapter between the screen housing and the rear case, if a standard oil pan is used,. The oil breather elbow is discarded as previously mentioned, and in place of the speed governor, install a second magneto, Bendix type S4ln-20 or S4in-21(impulse type) can be installed with a spacer as on the left side. If this is done, longer magneto mounting studs need to be used. (Part #61668). Also note fuel pump mounting pad

Photo #14 shows the oil cooler adapter installed. Note the plate on the vacuum pump drive.

It is advisable to remove the front oil plug on the crankshaft

to remove the sludge. This plug is a standard 2 inch freeze plug that can be purchased at any automotive supply store or replace with part STD 1211. Notice the plug and sludge removed in photo # 15.

At this point, I want to relay the importance of removing and replacing all the sludge tubes in the crankshaft, regardless of how clean the engine looks. Photo # 16 shows one of the sludge tubes removed. The sludge that forms around these tubes gets hard and dry and will restrict oil flow if it is not removed. Replace the sludge tubes with part #71577.

Photo # 17 shows the prop flange with just 2 of the bolts removed. The 4 bolts must be removed very carefully as there is a chance of bending the flange if they are just hammered out. They should be very carefully pressed out. After the bolts are removed, install prop flange bushings #60814 or 60814-S if the first one is not available. The only difference found in these two is that the latter costs more. In most of the crankshafts that I have found, the two remaining holes are slightly larger. In these, bushings #68866 are used. To install these bushings, I found it can easily be done by putting the flange of the crankshaft in the oven and putting the bushings in the freezer for a short time. The bushings can then be installed in the flange by inserting the bushing in the hole from behind, and placing a 1 inch socket over the hole in front, then by using a "C" clamp, the bushings can be "squeezed" into the flange. On the two larger bushings, it is sometimes necessary to slightly ream out the holes in the flange. Use caution here, as the metal to be removed is very slight. The prop flange with all the bushings installed can be seen in photo # 7. Note the top and bottom bushings as they are the larger ones.

Photo # 18 shows the engine with the standard oil pan and the MA3SPA Marvel Schobler carbuerator installed. Also note the exhaust stacks made from Ford and Edsel tail pipe extensions. These extensions can be purchased at any automotive supply store. The baffles that come with the engine can be modified and tightened up some and be used on the converted engine. This engine also requires an oil cooler in aircraft use. Some of the engines have the small oil coolers with them. These can readily be adapted.

These engines have a starter pad on the front of the engine, left lower side, as on a standard engine. A standard Lycoming starter ring can be installed if the excess material around the nose of the case is removed as previously suggested.

The prop flange plate that goes between the prop mounting bolt heads and the prop can be made up of 1/8 inch aluminum. This is just a plate that goes on in front of the propellor. Or you can use part #45688 instead. Standard prop bolts can be used.

The replacement parts for the engine such as bearings, rings, and gaskets are standard O-290-D engine parts and can be purchased through a Lycoming dealer.

The oil ring on some pistons is part #67540, this one ring can be used on all of the pistons. Third ring groove will have to be measured to determine if a #68338 oil ring can be used if the #67540 is not available.

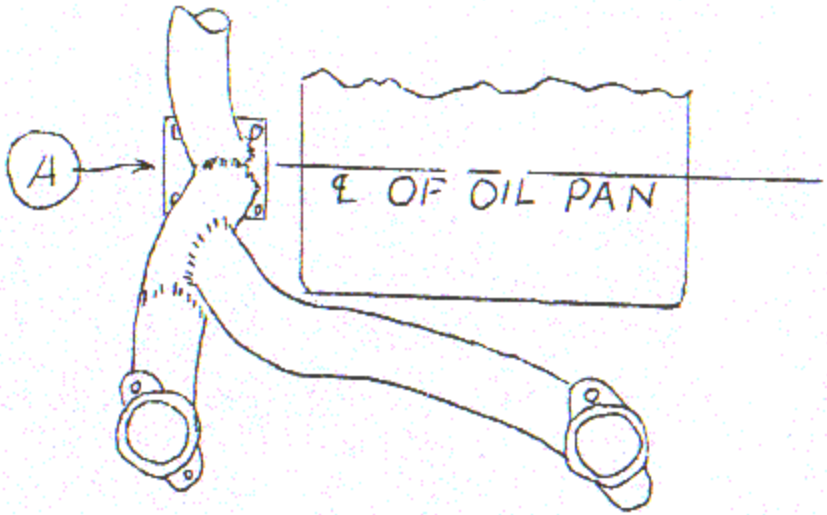
The best source of supply for the rings and other miscellaneous O-290-G parts that I know of is El Reno Aviation, El Reno, Okla.

Also I would recommend that the Lycoming Parts Catalog and the Lycoming Overhaul Manual, price $6.00, be used, as the information in them is invaluable. These can be purchased from El Reno or your Lycoming dealer.

For additional information, the Flight Standards Service, release #462 lists all the parts interchangable with the standard O-290 engine, which are too numerous to be listed here. This release can be obtained free of charge from the Federal Aviation Agency, Washington 25, D. C. or your local FAA Flight Safety Office.

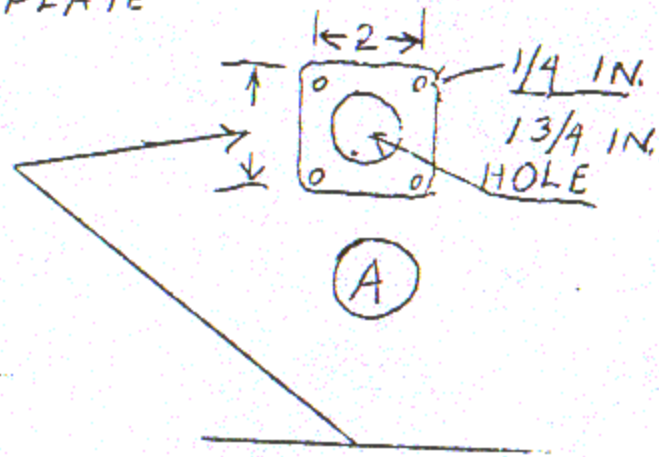
If you have any questions, please feel free to write at any time.

Good luck in your project. Let's all build and Fly Safely.

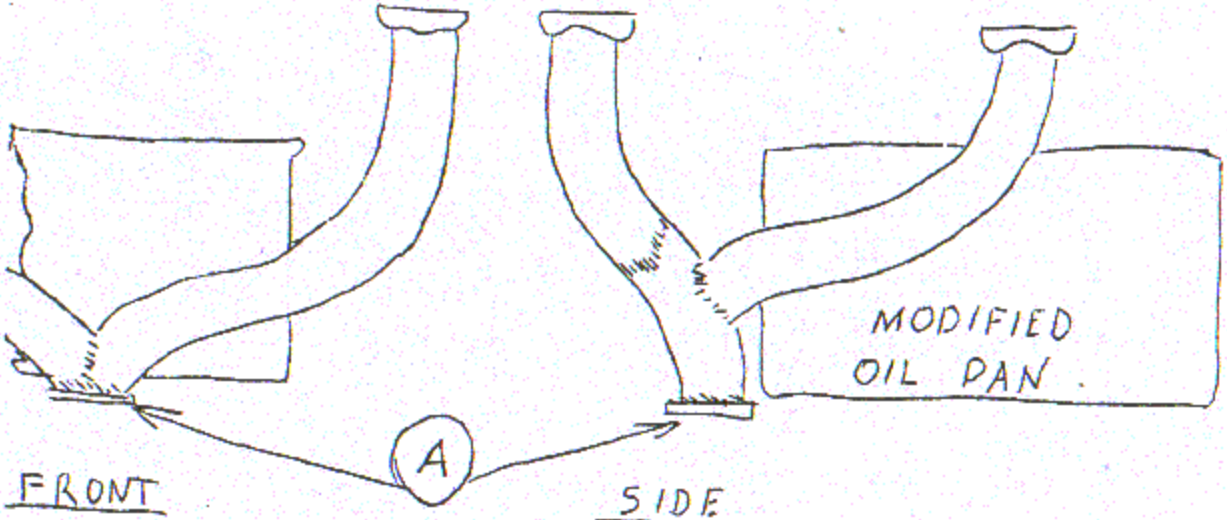


TOP

CARB. FLANGE .090 STEEL PLATE



SIZE TO FIT CARB. USED



FRONT

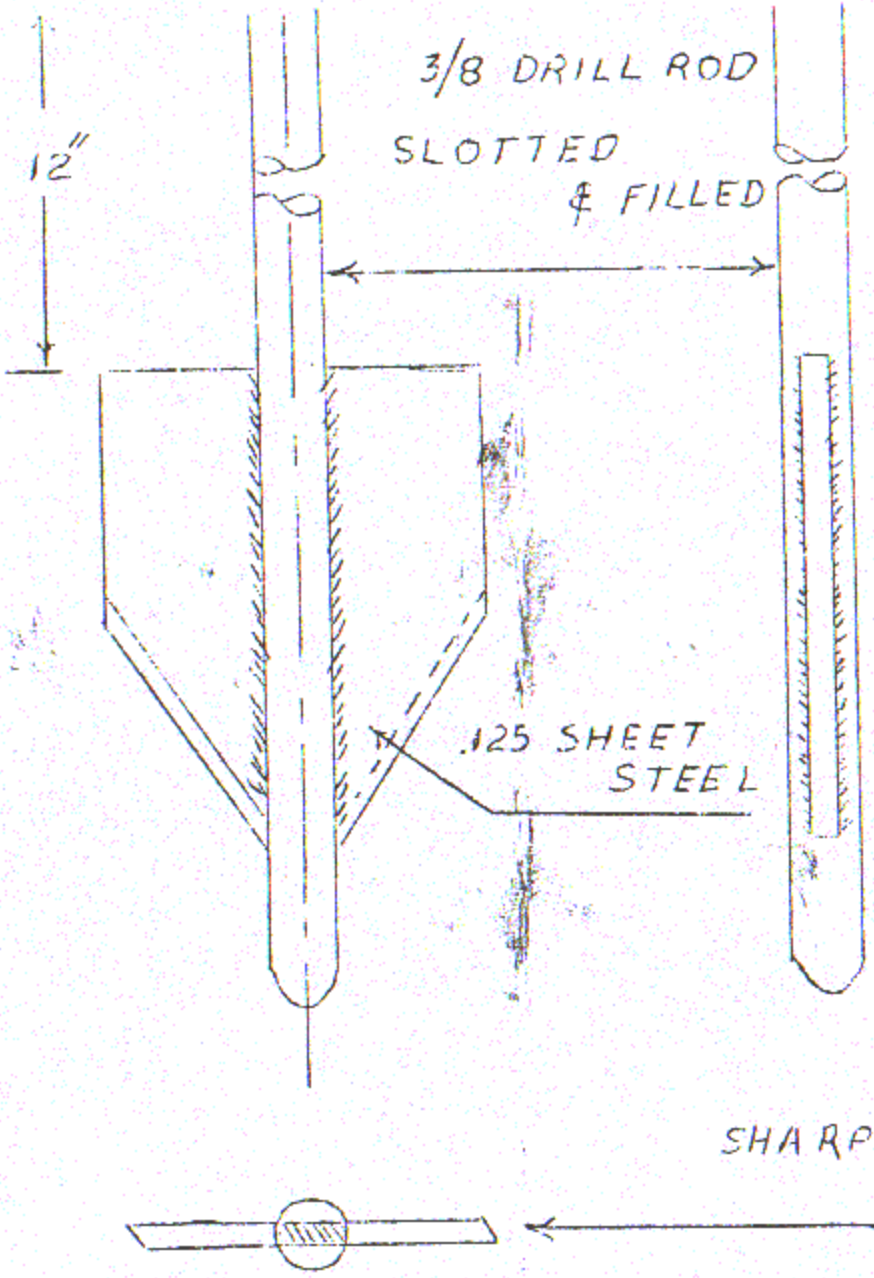
SIDE

PIPES CAN BE MADE IN SECTIONS AND PUT TOGETHER WITH INTAKE PIPE RUBBER HOSE 1 1/2 IN. I.D. LYC. P/N STD 1196 & CLAMPS

PIPE CAN BE MADE TO FIT TO THE FRONT OR REAR OF OIL PAN AS DESIRED

BENDS FROM 1 1/2 IN. AUTOMOBILE TAIL PIPE CAN BE USED TO EXTEND ORIGINAL INTAKE PIPES AS NEEDED.

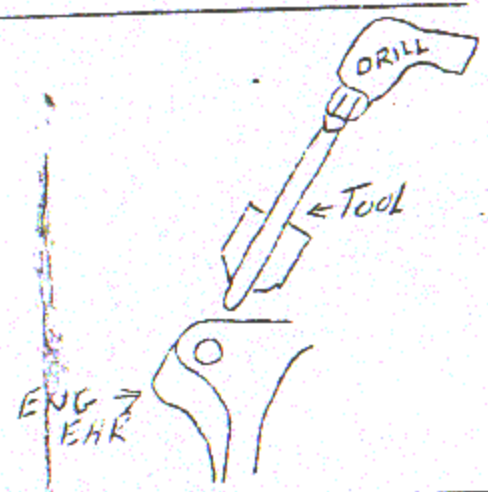
INTAKE PIPE SYSTEM FOR O290-G



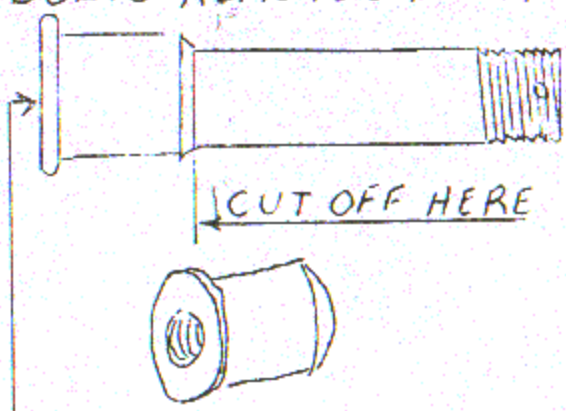
ENGINE MOUNT CHAMFERING TOOL

CAN BE USED INSTEAD OF PIPE REAMER

FULL SIZE

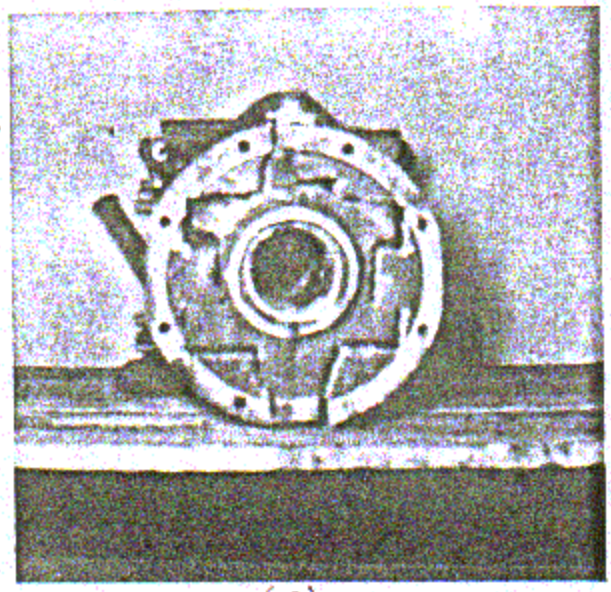


BOLTS REMOVED FROM CRANKSHA



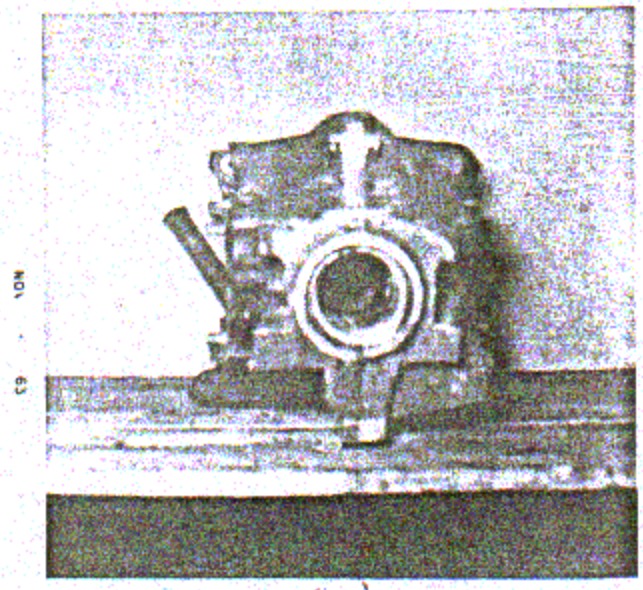
DRILL THROUGH & TAP 3/8 X24

PROP FLANGE BUSHINGS TO USE IN PLACE OF 608145 BUSHINGS CAN BE MADE BY CUTTING & TAPPING AS SHOWN.



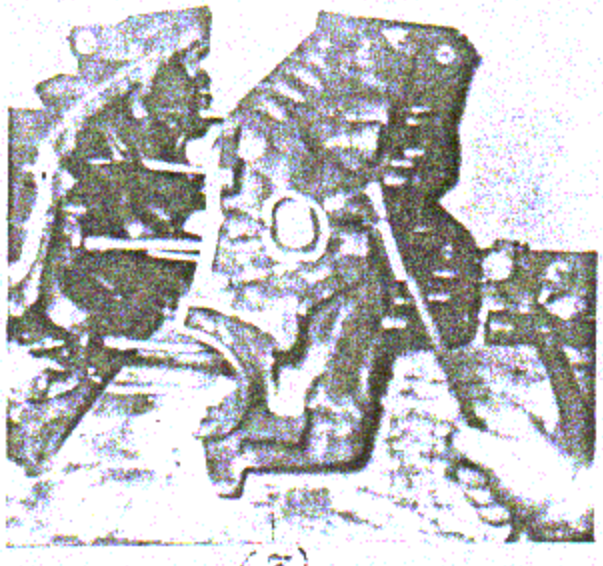
(1)

The flange can be drilled as outlined in Photo # 1



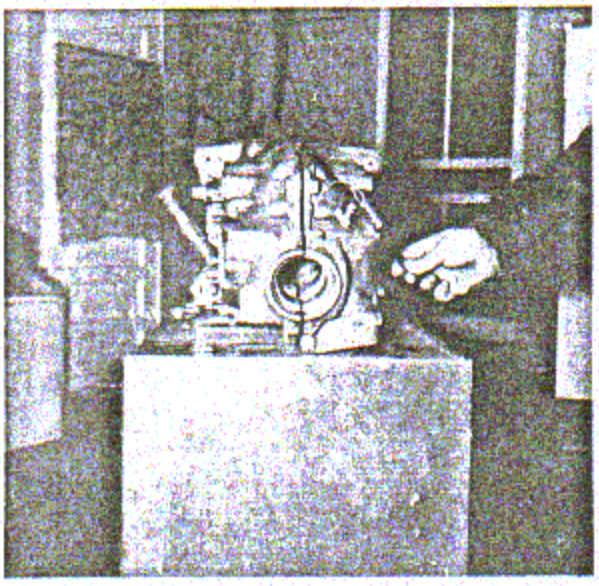
(2)

With the holes drilled close together in this fashion, the majority of the flange can easily be removed as in photo # 2.

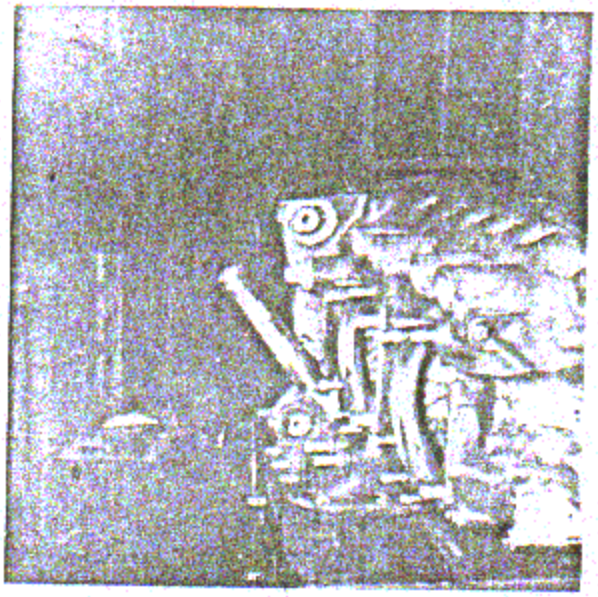


(3)

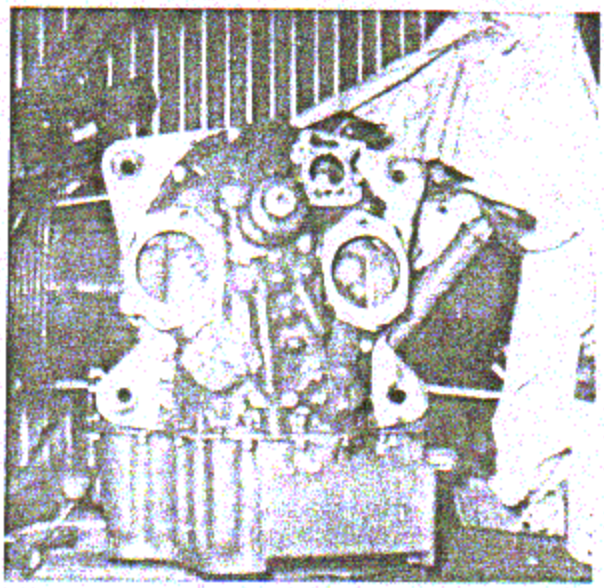
The next step is to locate the boss on the inside of the left hand side of the case as shown in photo # 3.



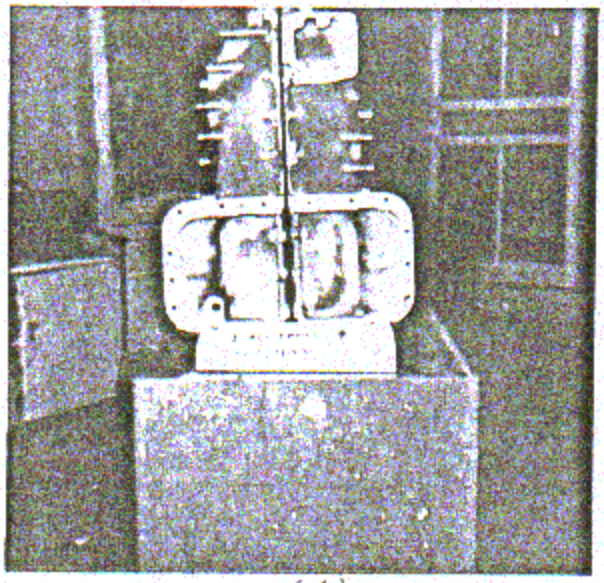
(3A)



Engine mount ear before being chamfered

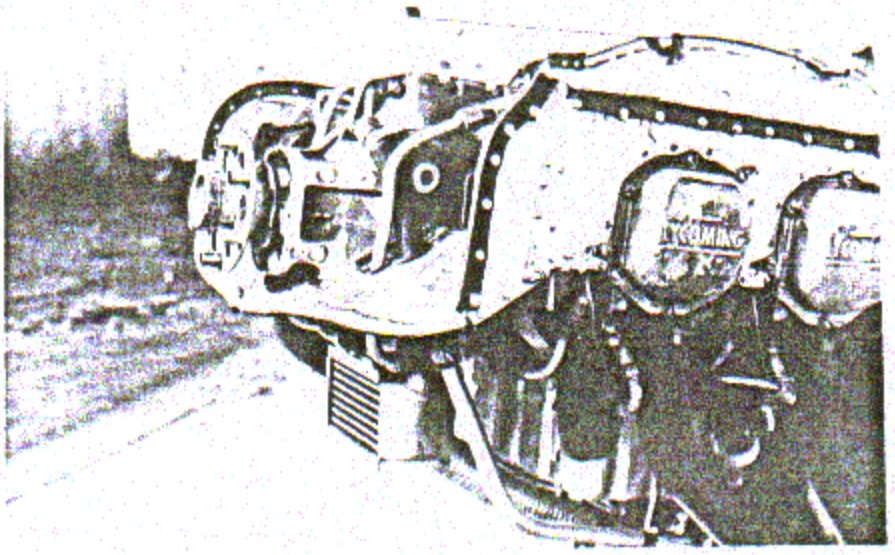


Engine mount ears after being chamfered. Note: aluminum plate welded to the back end of the oil pan to close it up.



(6)

If a standard oil pan is to be used two studs should be installed in the crankcase on the oil pan flange as shown.



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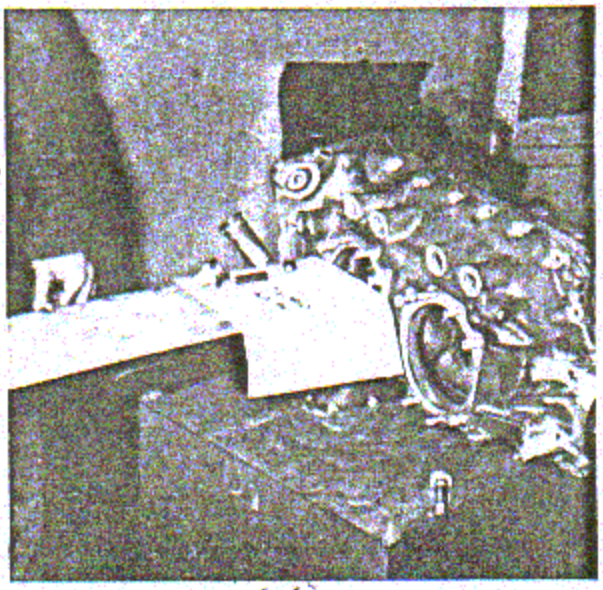
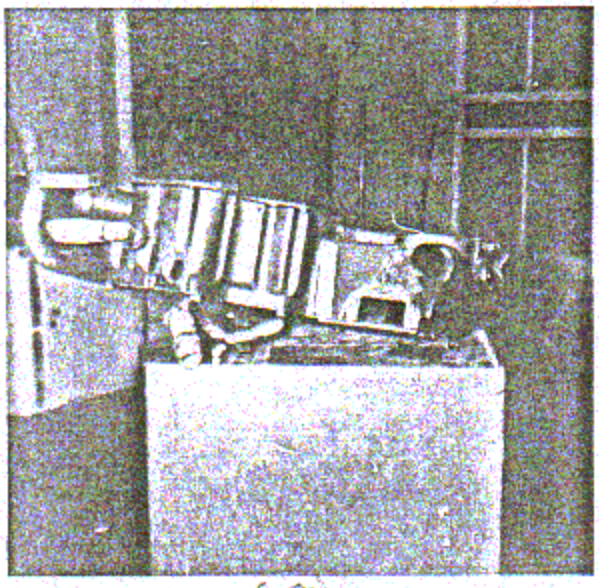
(7)

Note front of crankcase with the excess material removed and also showing the prop bushings installed in the prop flange. Note: breather fitting installed.



(8)

Oil pressure relief valve spring shown

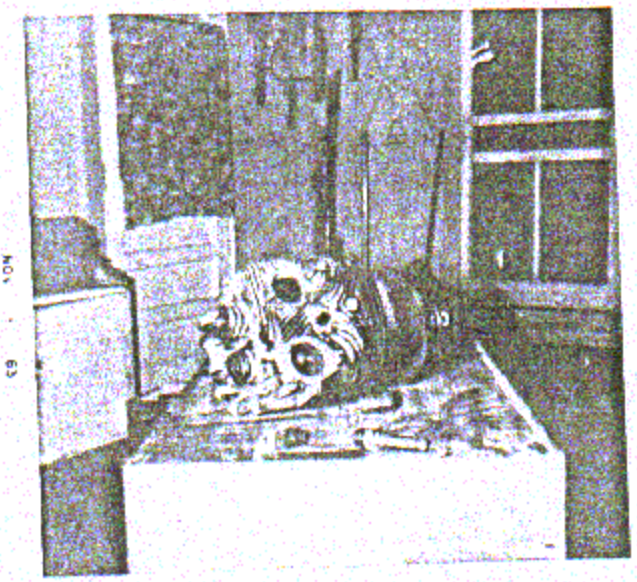


(9)

note section of the oil pan to be cut off as indicated by white mark on the pan.

(10)

Rear intake pipes shortened for standard oil pan, section to be removed shown.



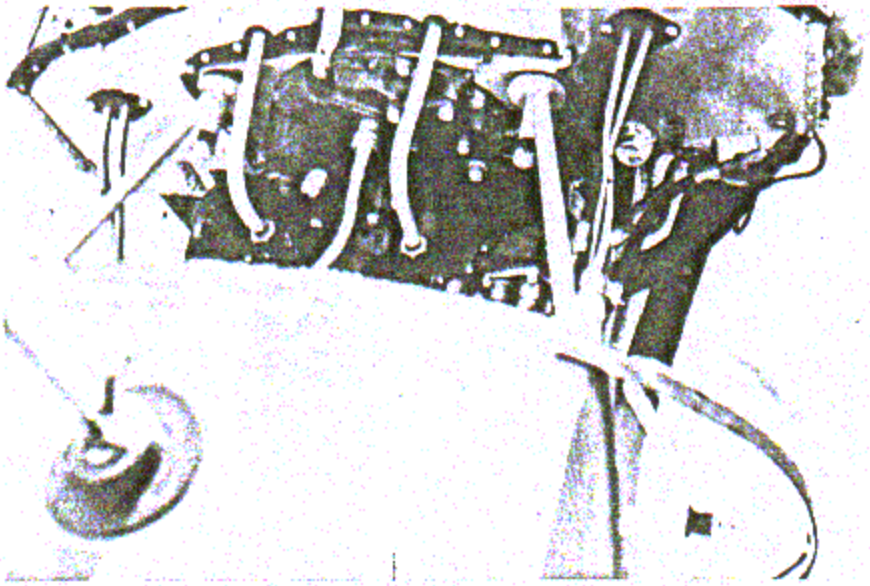
(11)

on cylinders, lower plug is removed. The little allen plug on the intake side can be removed and the primer fittings installed.

(12)

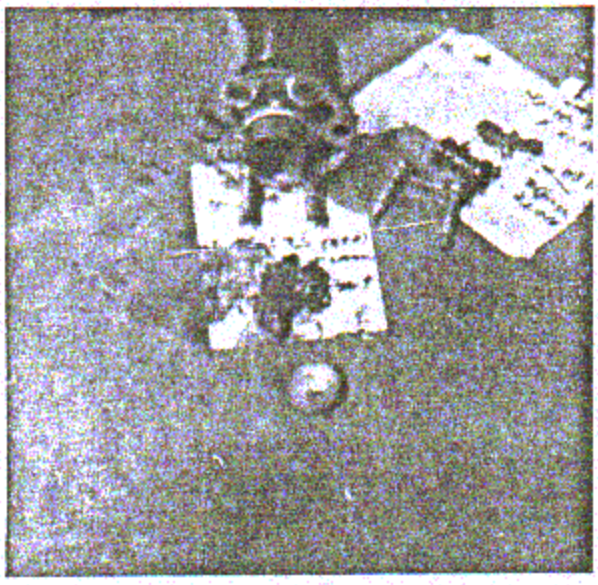
When the breather elbow is removed a standard assessory cover plate can be used or a plate made from 1/8 inch aluminum.

Note rear case with the original parts removed.



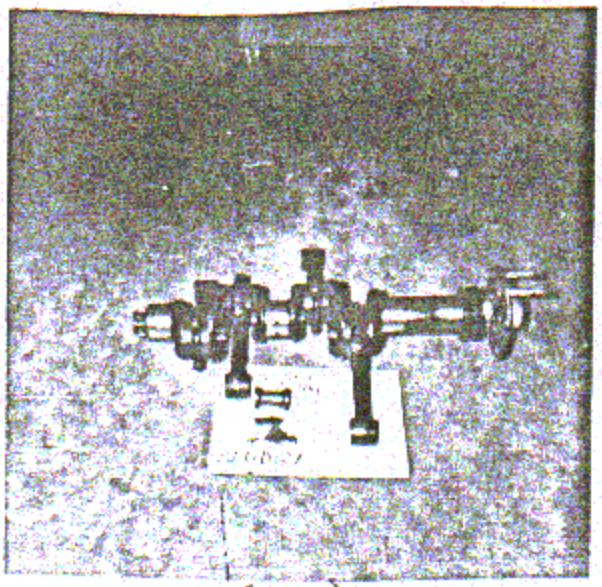
14

note oil cooler adapter installed. Note also the plate on the vacuum pump drive.



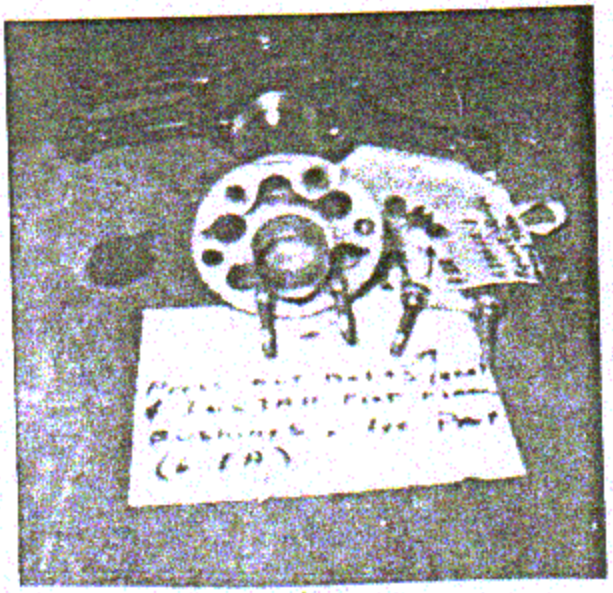
-15-

Note plug and sludge removed.



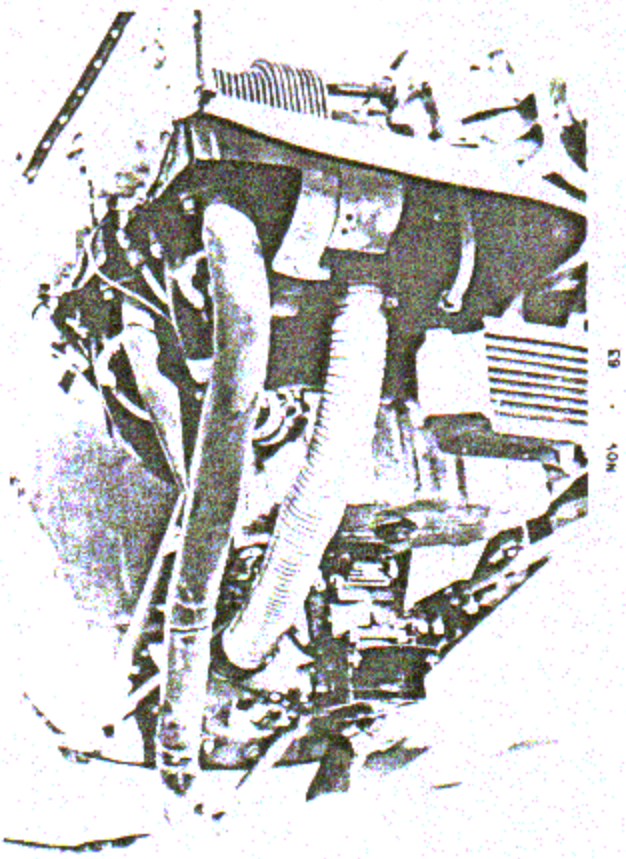
(16)

Note one of the sludge tubes removed.



(17)

Note the prop flange with just 2 of the bolts removed.



(12)

Note engine with the standard oil pan and the MA3SPA Marvel Schebler carburetor installed.