

## FIXING EXHAUST MANIFOLD LEAKS

By Alex Janke

Exhaust leaks at the manifold are a fairly common problem. These leaks can be prevented with some advance preparation, careful installation, and the use of exhaust manifold glands.

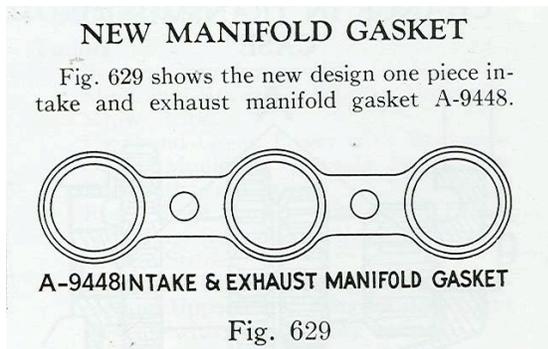
The exhaust manifold glands, Ford part number A-9440, were a carryover from the Model T Ford. The gland is a small metal ring that fits between the exhaust manifold and the engine block. Both the exhaust manifold and engine block are counter bored to fit the glands. The glands help seal the manifold and keep it from “sagging” under heat and the weight of the muffler. The Model A uses four glands, one for each exhaust port.

At the rear exhaust ports temperatures can reach 900 to 1200 degrees F. At those temperatures the weight of the muffler can cause the rear port to sag as much as 1/2 inch, causing a misalignment between the port and the gasket, creating an exhaust leak.

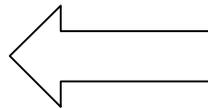


**Counter Bore in Exhaust Manifold**

In the January 1929 Service Bulletin, a new manifold gasket was introduced that would, “...eliminate the counterbore for the glands in both the manifolds and cylinder block...” This new design was to be installed without glands.



### **Service Bulletin January 1928**



From January 1929 through March 1929, engine blocks were produced without counter bores for the glands. Beginning in April 1929 the production of engine blocks with counter bores resumed and continued through the end of production. Since putting a counter bore in the block or manifold is a machining process requiring additional time and cost, resuming counter boring was done for a reason. The support provided by the glands was necessary.

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The glands never went out of production and their use was resumed with the April 1929 counter bored blocks.

When an exhaust manifold is removed a straight edge can be laid across the edge of the openings and the amount of "sag" can be measured.

**Below is a new manifold that has been mated with intake manifold and machined flat, note the exhaust openings are in alignment intakes are slightly smaller than exhaust so they do not match but are centered correctly.**



Counter Bore in Block



The standard exhaust manifold carries all the weight of the muffler and tail pipe. Over time this weight and the heat generated in the exhaust manifold causes the cast iron in the manifold to sag unless gland rings are installed.

**Used original manifold showing sag of about 1/2"**

The glands ride in the engine block, through the gasket, and into the manifold. Often when a manifold is changed the glands are thrown out with the old gasket and never reinstalled.



Eventually the manifold leaks and it is too late to reuse it because of sag. New glands will not fit and the ports will not align. Good gaskets can obtain a seal if the ports do not line up, but over the course of time the gasket will leak around the weak point of the seal.

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Some years ago, there were a number of articles written about heating exhaust manifolds and returning them to their original configuration. Unfortunately, most of these efforts resulted in cracked manifolds and used a lot of oxygen and acetylene. The new manifolds sold by the Model A parts suppliers are counterbored for glands and are properly aligned.

Exhaust manifolds with heaters generally did not experience excessive sag because of the additional material helped carry the weight.



**Well-used exhaust manifold heater that shows no sag**

Using glands prevents both leaks and sags. Here is a photograph of an exhaust manifold that had been installed using glands for 7 years and driven over 50,000 miles yet has very minimal sag.



Glands are sold by all the part suppliers and are of the split ring type. These can be pressed into the counter bore by hand. Glands can be fabricated using a piece of 1 1/4" EMT conduit. The EMT is just slightly too large and can be machined or sanded down to fit and cut with a hack saw or band saw.



**Glands sold by suppliers on left and homemade glands made from conduit on the right**

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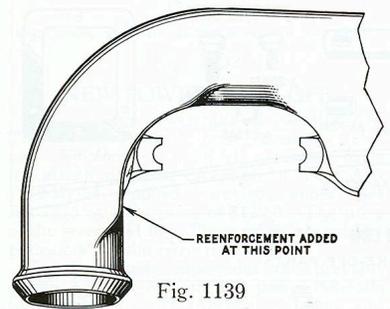
In May of 1931, another new gasket type was introduced. The Ford Service Bulletin announcing this gasket included the advice, “If an owner has experienced any trouble with manifold gaskets blowing out, always remove the exhaust manifold and carefully check it to determine if it is warped or cracked.”

The fit of the exhaust and intake manifolds is essential. They must be bolted together tightly and then machined so that the top of the ears on each are even and so the surface mating to the cylinder block is flat. (.001” to .004”) The mounting ears on both the exhaust and intake manifolds must be within .010” thickness or height of each other. The attaching cupped washer sits on both the exhaust manifold ear and the intake manifold ear. If the two ears are not close in thickness, the high (thicker) ear will possibly crack when tightening down the manifold stud nuts, preventing a tight gasket seal.

When using a new exhaust manifold and an old intake manifold it may be necessary to machine off a lot of material to get a flat surface across exhaust and intake ports. Since most of this grinding takes place on the exhaust manifold the depth of the counter bore is affected. When everything is new the glands are approximately ¼” thick and fit nicely, but if the counterbore has been reduced the glands may be too thick and if installed will result in a leak.

To avoid this problem install the manifolds with glands and fit to the block without a gasket. They should fit flush, if there is a gap the glands need to be filed / sanded down until the fit is flat. Then the gasket is installed and the manifold tightened. It is critical this be done slowly and incrementally so as not to stress and crack one of the manifold ears.

In March of 1931, a strengthened exhaust manifold was introduced to help prevent some of the “sagging”. This new design kept the counter bore and the additional reinforcement acted much like the extra material on a heater manifold.



The best results are obtained with both a new intake and exhaust manifold from the parts suppliers. They should be mated and port surfaces machined flat. The amount of machining is minimal, but essential. With glands, a good gasket, and careful torque application this arrangement should provide an engine free from manifold leaks for years of touring.

*Special thanks to Mr. Les Andrews for his assistance in completing this article.*

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