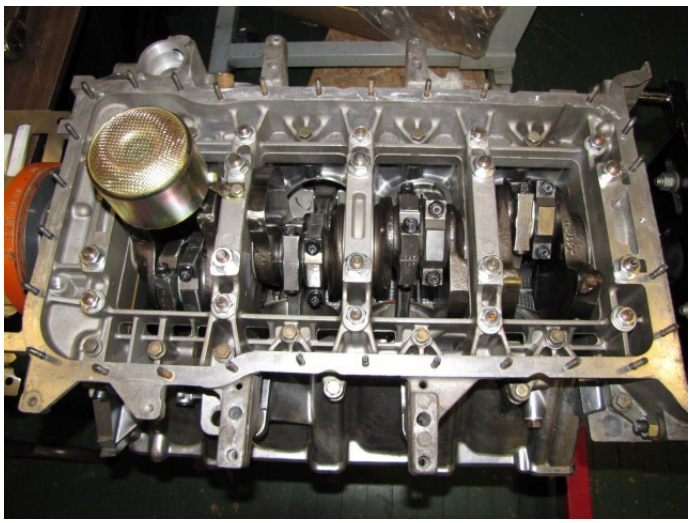
Porsche 928
Crankshaft Scraper and Windage Tray Installation Instructions

Note: This crank scraper and windage tray system is meant to be fitted very closely to the rotating assembly in the engine. It has been manufactured to exceptionally tight tolerances. Even so, small variables in block studs, block stud locations, thrust bearings, and connecting rod side-play make it essential that the fitment be checked as specified herein and adjusted as necessary. It is a virtual certainty that some small adjustments will be necessary during the installation.

Note: These are steel parts and they are not clean and ready for install. It is expected that some filing or grinding will be needed as mentioned in the paragraph above. Because of this, clean the parts thoroughly before each fitment and after each grinding, sanding or filing.

This crank scraper and windage tray system can be installed with the engine in the car as an addition to a running engine, or as the engine is being rebuilt our of the car. For the best clarity, these instructions use photographs of the engine out of the car.

As we begin, you should have already removed your oil pan, and your 928 engine should look like this:

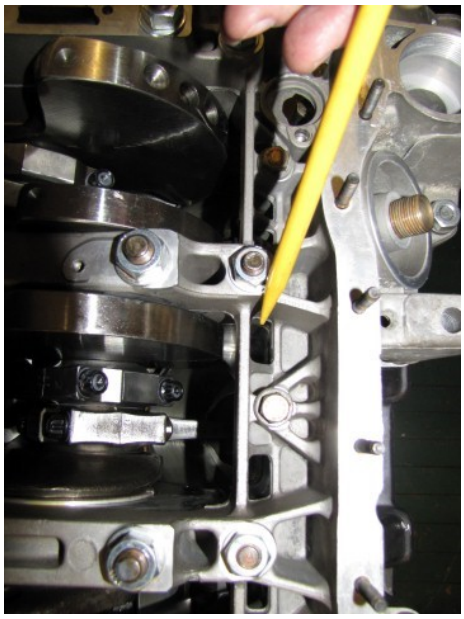


Please remove the oil pickup tube at this time. You will find two 10mm bolts holding the brace to the block, and one fastener by the connection of the pick-up tube to the block.

Remove and set aside—they will all be going back on.

The first thing we are going to do is install the oil diverters. These divert the oil that is returning to the oil pan from the heads so it does not continue to drop onto the spinning crankshaft. This is where it gets air whipped into the oil and forms a large, HP-robbing oil cloud. When oil has entrained air whipped into it, the bearings suffer and the ability of the oil to cool the engine is greatly reduced.

Look at the block and you will see 4 oil return passages cast into the block on each side of the engine.



On the inside, you can see how on one side of the block the oil is protected as it goes by the crankshaft and drop into the oil pan.

But on the other side, it is exposed and allowed to drop almost directly on the crankshaft as it is spinning. This is where our oil diverters will help, and guide the oil past the crank and to the oil pan.

Start by removing all the 17mm (M10) nuts and the heavy washers from the engine as shown. The crankcase will stay clamped because we will not be removing the M12 nuts or the M8 bolts at the same time.

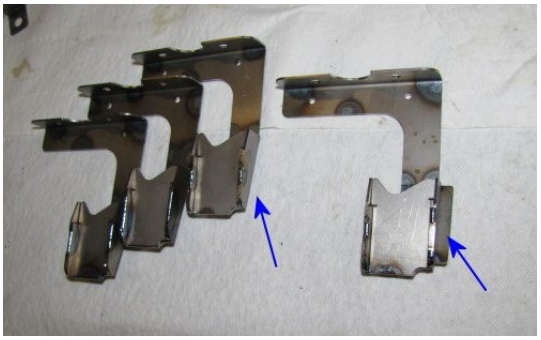
The **Left Side** of the engine is the side with the oil pressure sender and the oil filter.

Locate the **Left Side** oil channel from your kit, as shown here >>

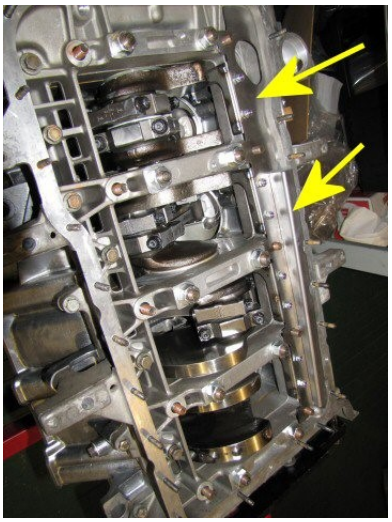
Also locate these 4 diverters, fastening tabs, and nuts from your kit

Note: Three of the diverters are the same and one is different. The arrows in this picture show that one diverter has an extension on the side.

This diverter must be mounted in the first cylinder toward the front of the motor.



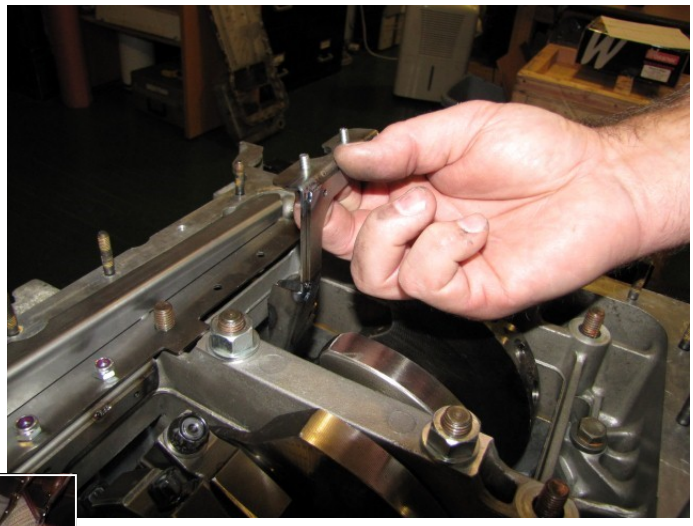
Prepare each of the four diverters for use by pushing a fastening tab through the holes as shown.

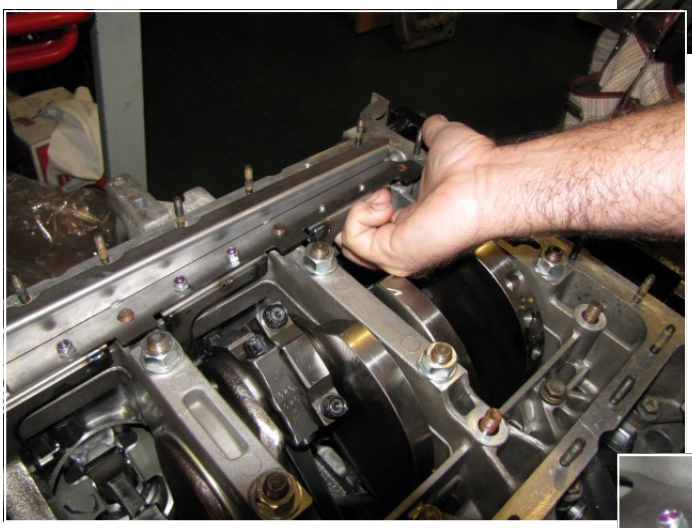


Lay the left side oil channel over the studs and in the motor now. The large end goes toward the sump (front of motor) .

The diverters are installed as shown here. They are bent towards the block, not away from it.

Rotate the crankshaft a little bit to move the counter-weights away so you have room to work.

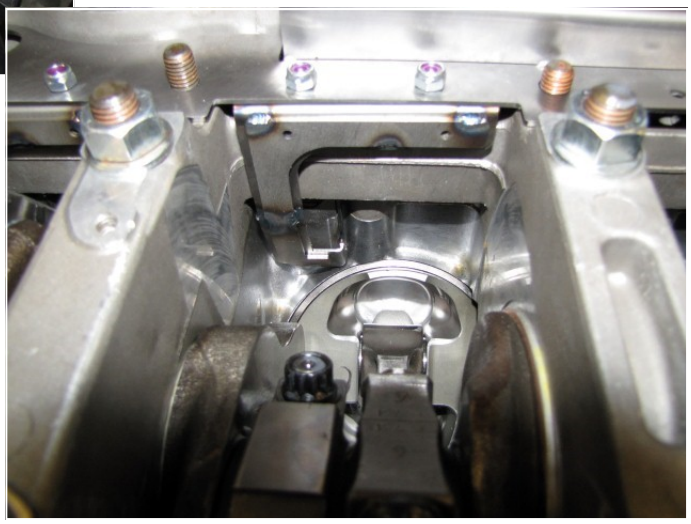




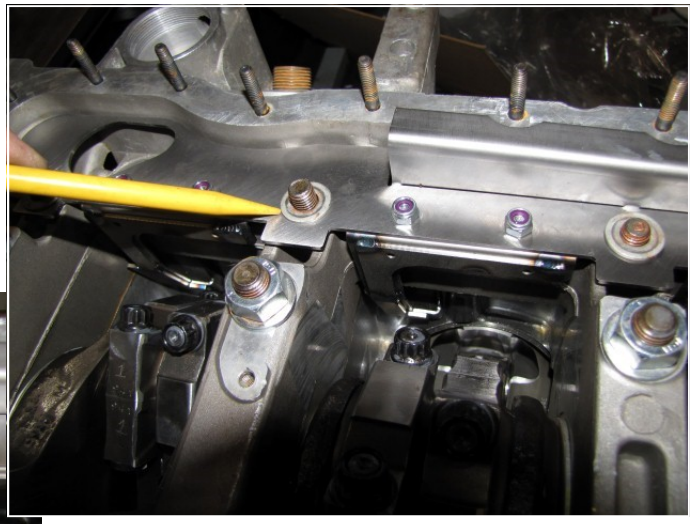
Place the diverter under the oil channel and bring it up from the bottom. Add the Nylock nuts on top to hold it there.

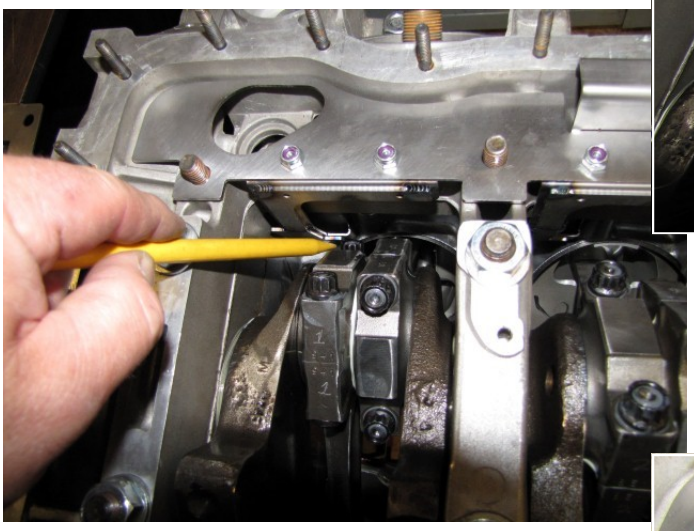
This is a close-up of what the oil diverter looks like when in place.

Install all the diverters, and snug up the small nuts that hold them. Remember that the oil diverter with the side extension only fits in the first cylinder at the front.

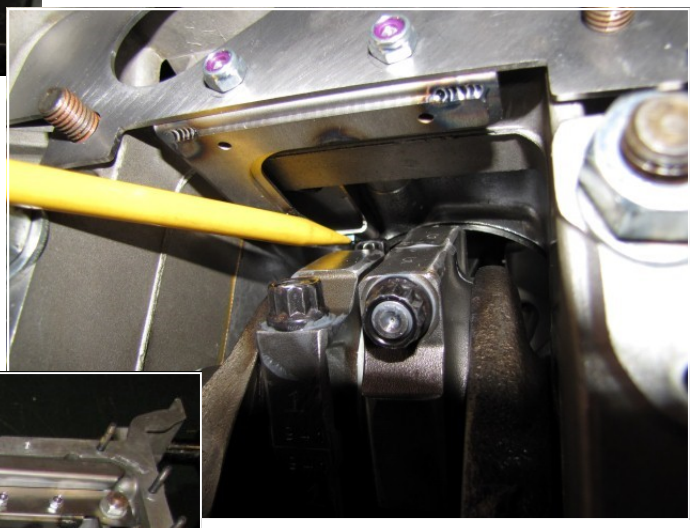


Add the thin washers provided as shown, and the 17mm nuts you previously removed. Just snug them up at this point while we check clearances.





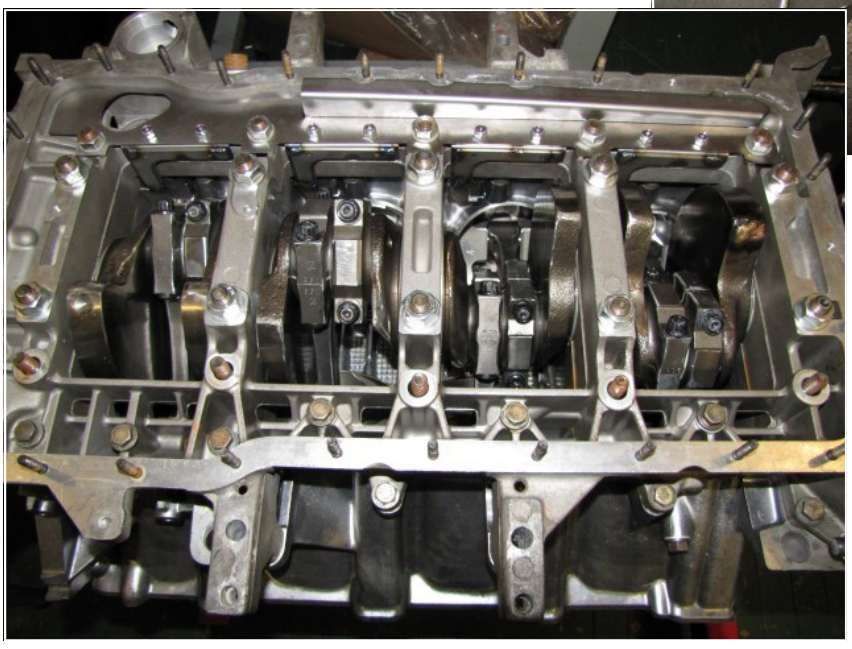
Rotate the crankshaft and check for clearance between the rods and the counterweights and the oil diverters.



Adjust if needed, and re-test.

When all is well, you may re-torque the 17mm nuts down to final spec as published in the 928 WSM.

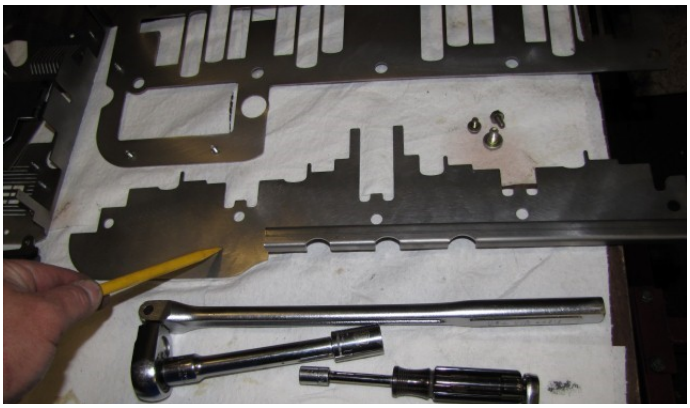
This picture shows all four

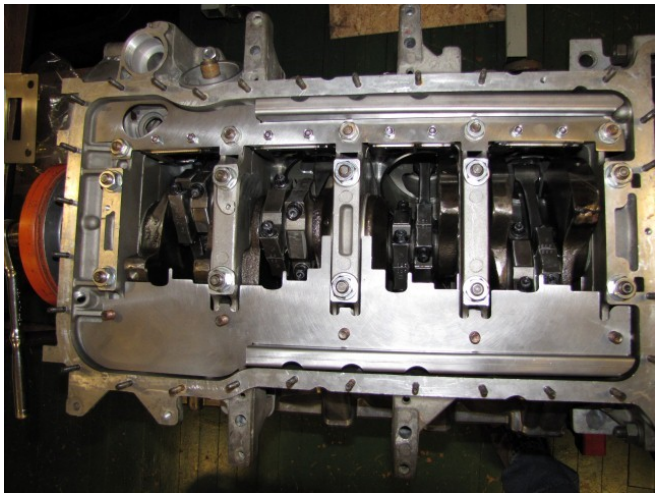


diverters and the Left oil rail finished.

The Left Side of the engine is now done.

Right Side: Select the Right Side oil rail, and lay it in place over the block studs on the Right Side of the motor.





Add the thin washers and the 17mm nuts and snug up the nuts.

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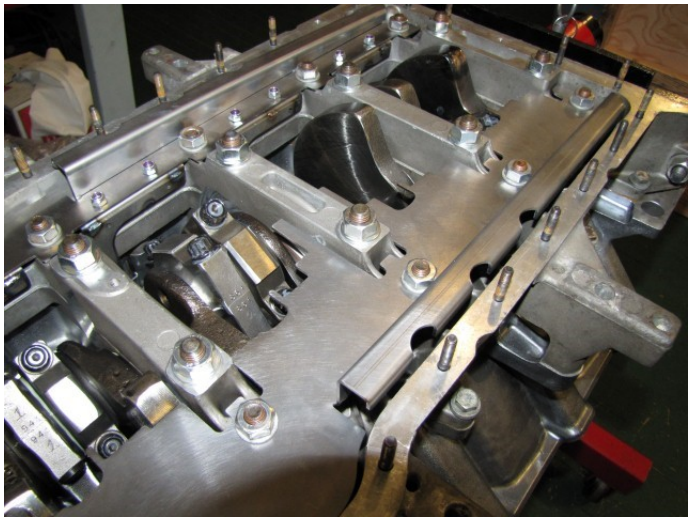
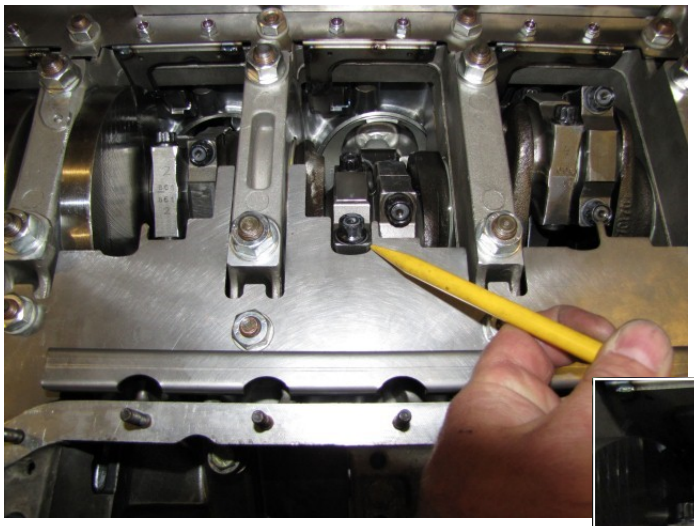
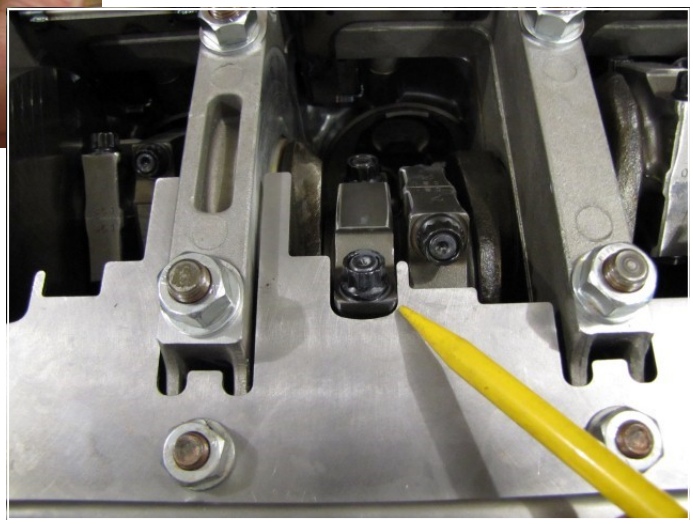




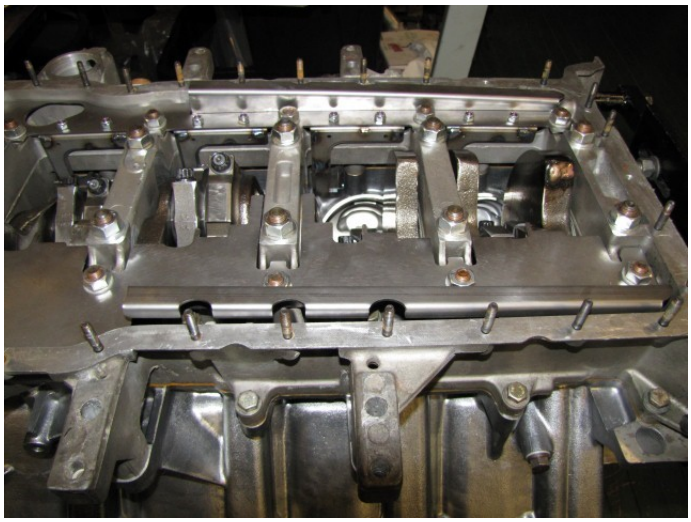
Rotate the engine, and check for clearance to the con rod ends and the crank counter-weights.

CLEARANCE SPECIFICATION
Between .015" and .020"



Note: The crankshaft moves forward and back in the block (Thrust Bearing Play) and the rods move forward and back on their journals (con rod side clearance).

IT IS IMPORTANT that you move the crank forward in the thrust bearing and check all your clearances, then move the crank backwards in the thrust bearing and check them again. This is done by using a lever and prying between a counter-weight and a block webbing.
In addition: move the con rods side-to-side on their journals in each position of the crankshaft as well.



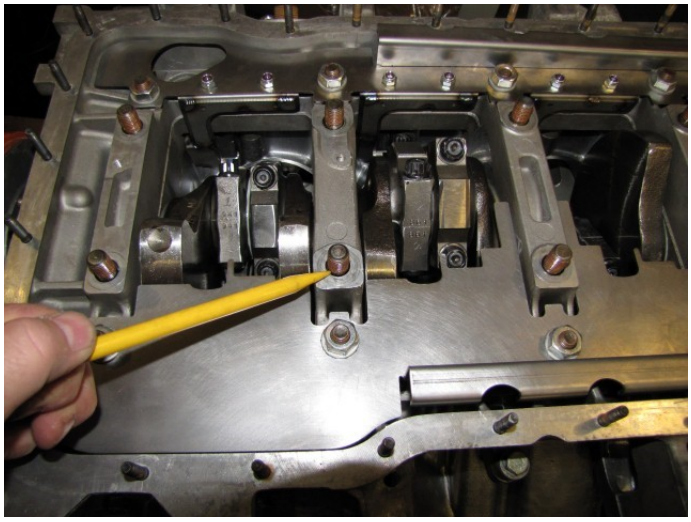
If any adjustment is needed, remove the oil channel, file or grind as needed, then re-install and re-check. Clean the oil channel after each time you grind or file it!.

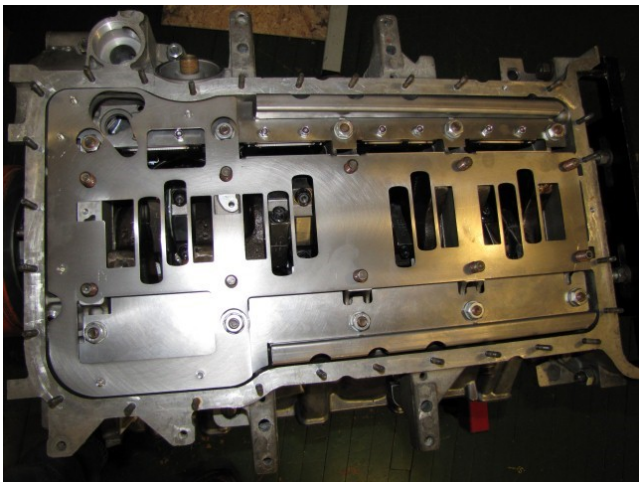
When all clearances are good, you may re-torque the 17mm nuts down to final spec as published in the 928 WSM.

The Left and Right side oil rails are installed.

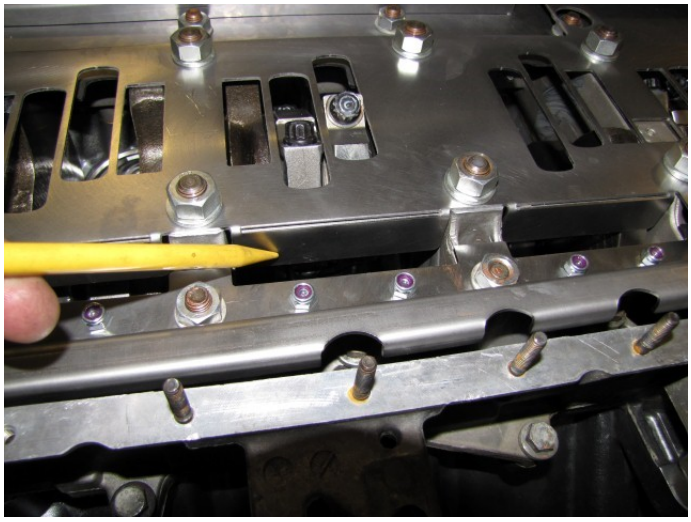
The engine should spin freely without any contact at this point.

Center Section: Remove all the 19mm (M12) nuts and the heavy washers from the engine as shown. The crankcase will stay clamped because we will not be removing the M10 nuts or the M8 bolts at the same time.

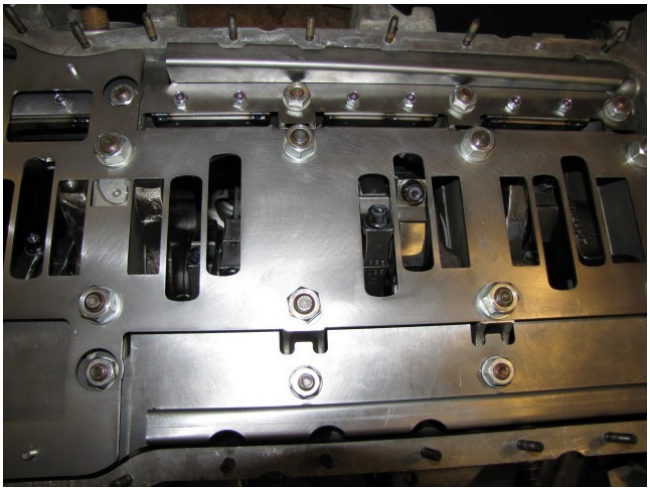




Set the large center section of the scraper in place over the studs.



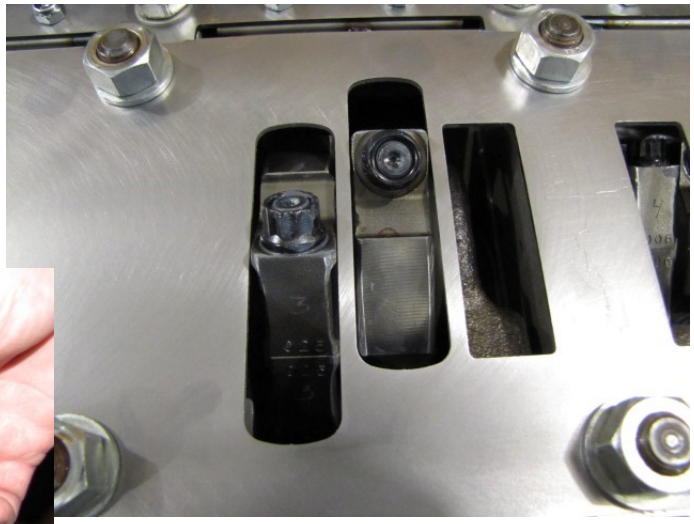
It is installed with the angled scraper pointed toward the crankshaft, as shown here.

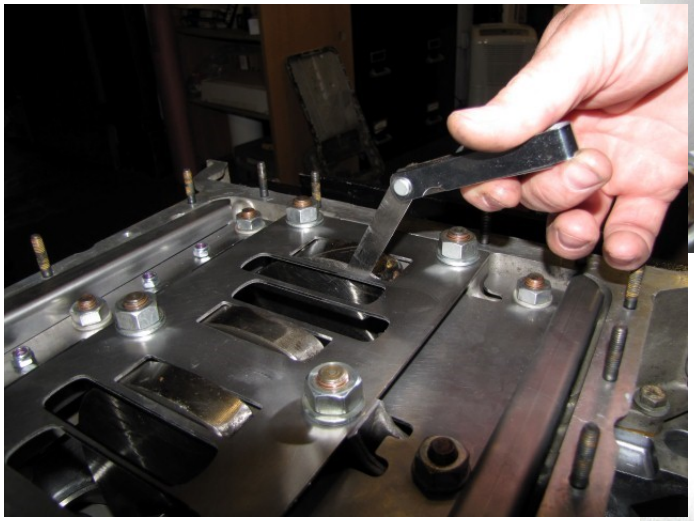


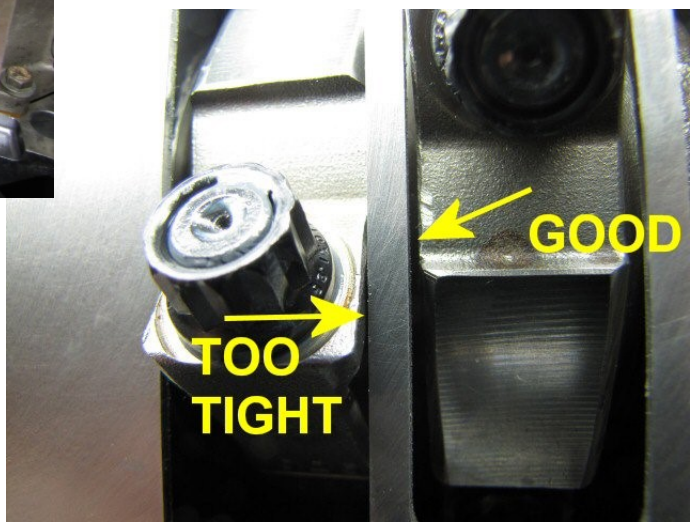
Apply the thin washers provided and replace the M12 nuts. Snug the nuts up but do not torque at this time.

Rotate the engine, and check for clearance to the con rod ends and the crank counterweights.

CLEARANCE SPECIFICATION
Between .015" and .020"







Note: The crankshaft moves forward and back in the block (Thrust Bearing Play) and the rods move forward and back on their journals (con rod side clearance).

IT IS IMPORTANT that you move the crank forward in the thrust bearing and check all your clearances, then move the crank backwards in the thrust bearing and check them again. This is done by using a lever and prying between a counter-weight and a block webbing.

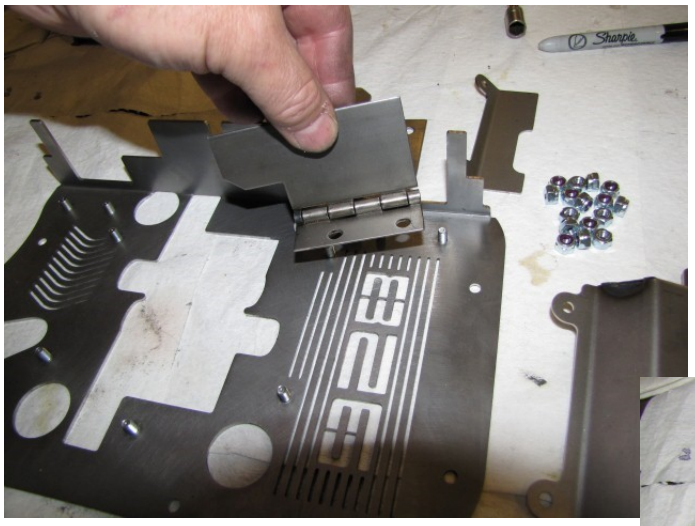
In addition: move the con rods side-to-side on their journals <u>in each position of the crankshaft</u> as well.

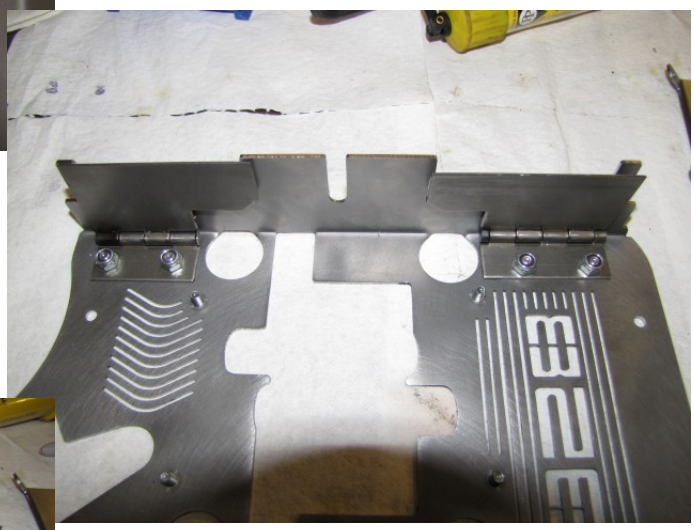
If any adjustment is needed, mark the side of the scraper that needs filing with a Sharpie or similar marker. Then remove the center section, file or grind as needed, then re-install and re-check. Clean the scraper after each time you grind or file it and *before* you put it back on the engine!.

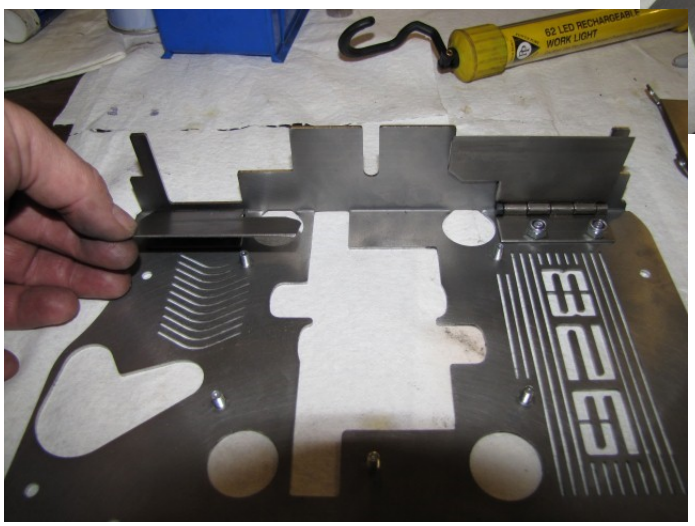
When all clearances are good, you may re-torque the 19mm nuts down to final spec as published in the 928 WSM.

These are the pieces you should have remaining to install at this time. The large piece with the letters “928” in it is the sump windage tray.

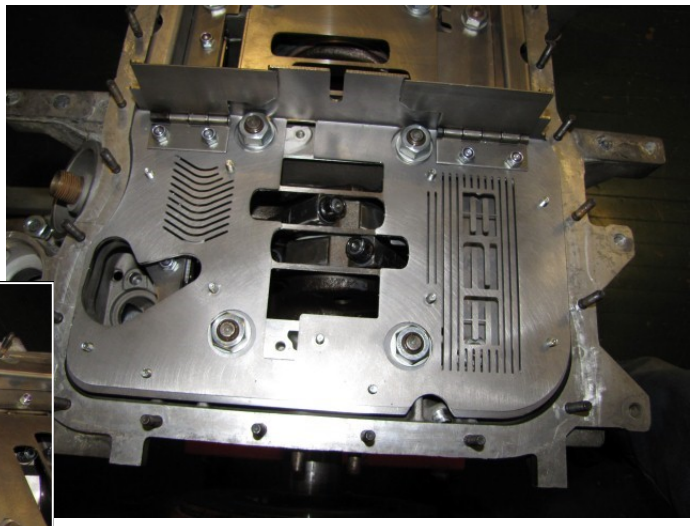
Take the gate hinges from your kit and install them on to the windage tray with the Nylock nuts provided, as shown in the following pictures.



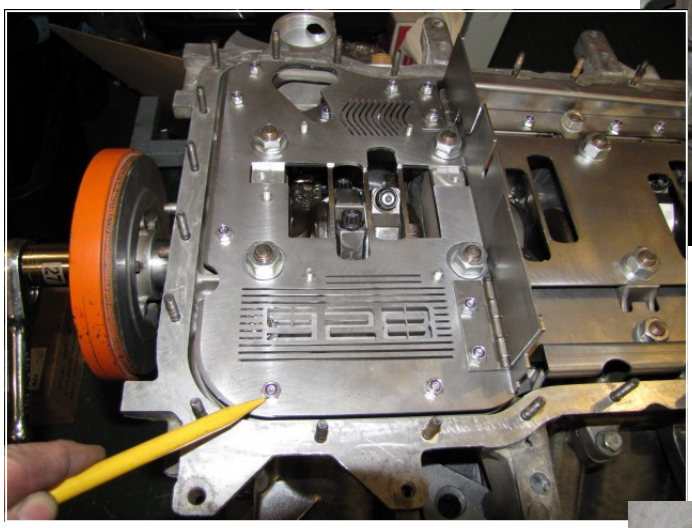




Set the windage tray over the sump and onto the studs provided.

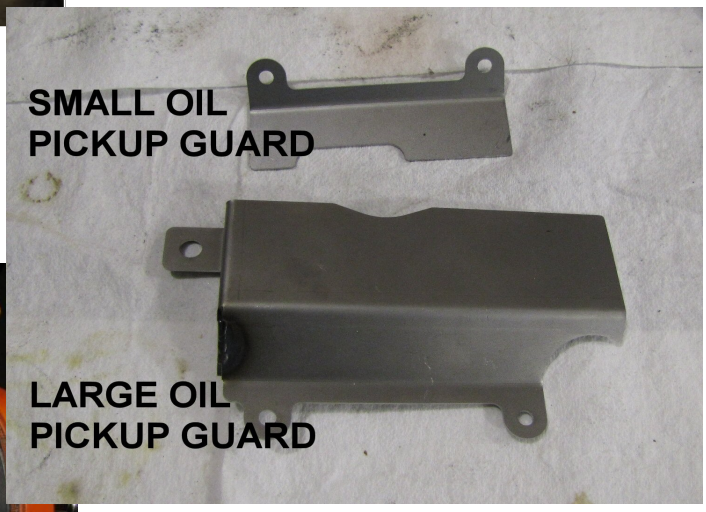


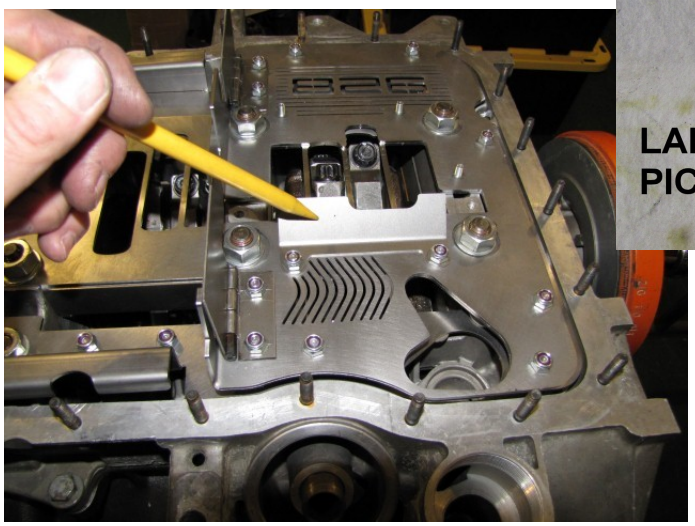
Secure in place with the Nylock nuts provided.

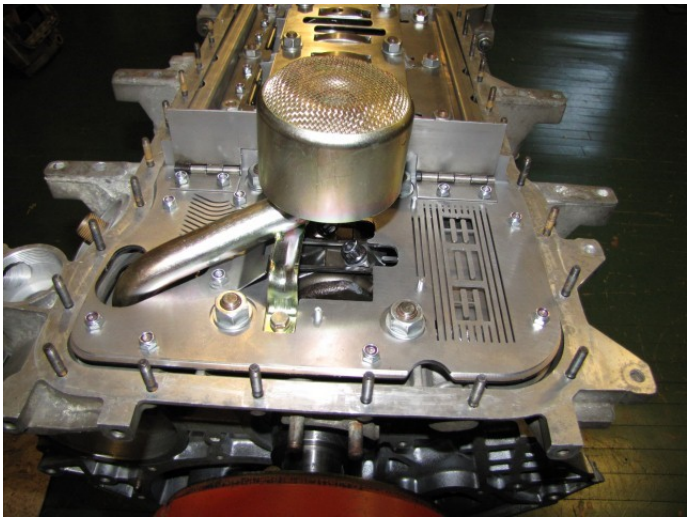


NOTE: the nuts are installed around the perimeter only at this time. Some studs in the center are left without nuts for the next step...

Select the Small Oil Pickup Guard from your kit and set in place upon the windage tray as shown, and secure with two Nylock nuts.

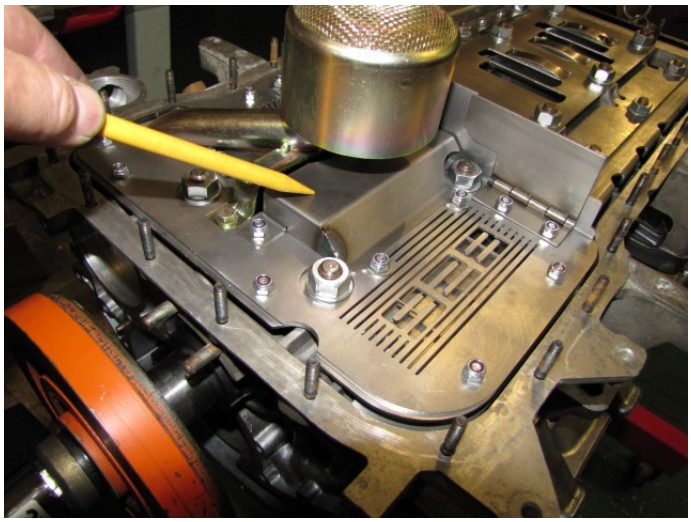






Re-install the oil pickup tube now. Secure with the original fasteners in the original way.

Tip: confirm the thick o-ring seal is on the end of the pickup tube where it meets the block, and that it is in good condition. Replace as needed.



Install the Large Oil Pickup Guard on to the windage tray as shown here, and secure it in place with the Nylock nuts provided.

FINAL STEP: CHECK YOUR WORK!

1) ALL NUTS SHOULD BE TIGHT

2) YOU SHOULD BE ABLE TO SPIN THE MOTOR FREELY WITHOUT ANY CONTACT.

These pictures of a completed installation are for your reference.