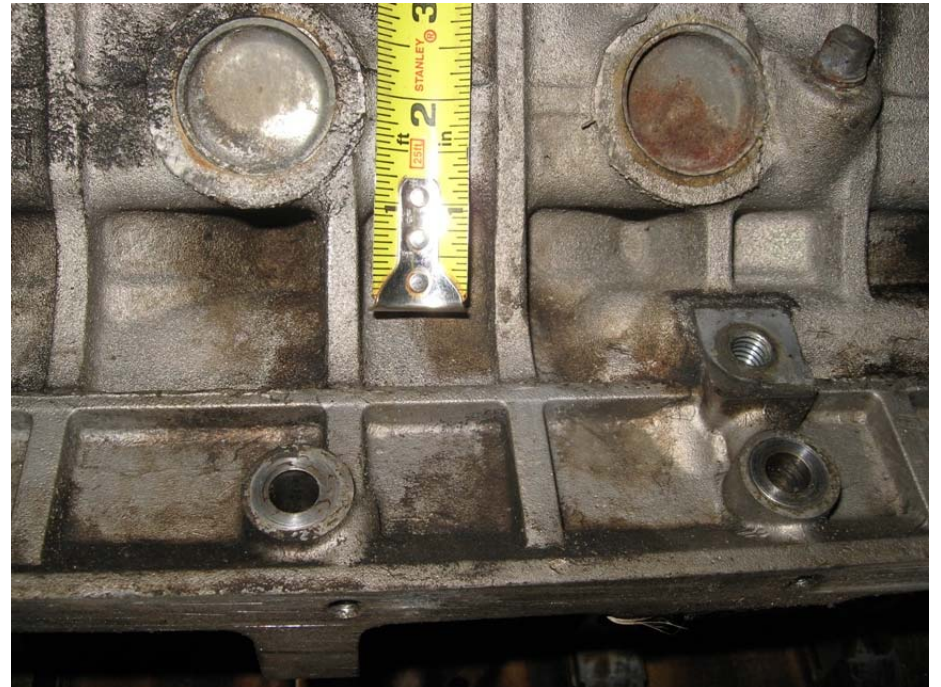


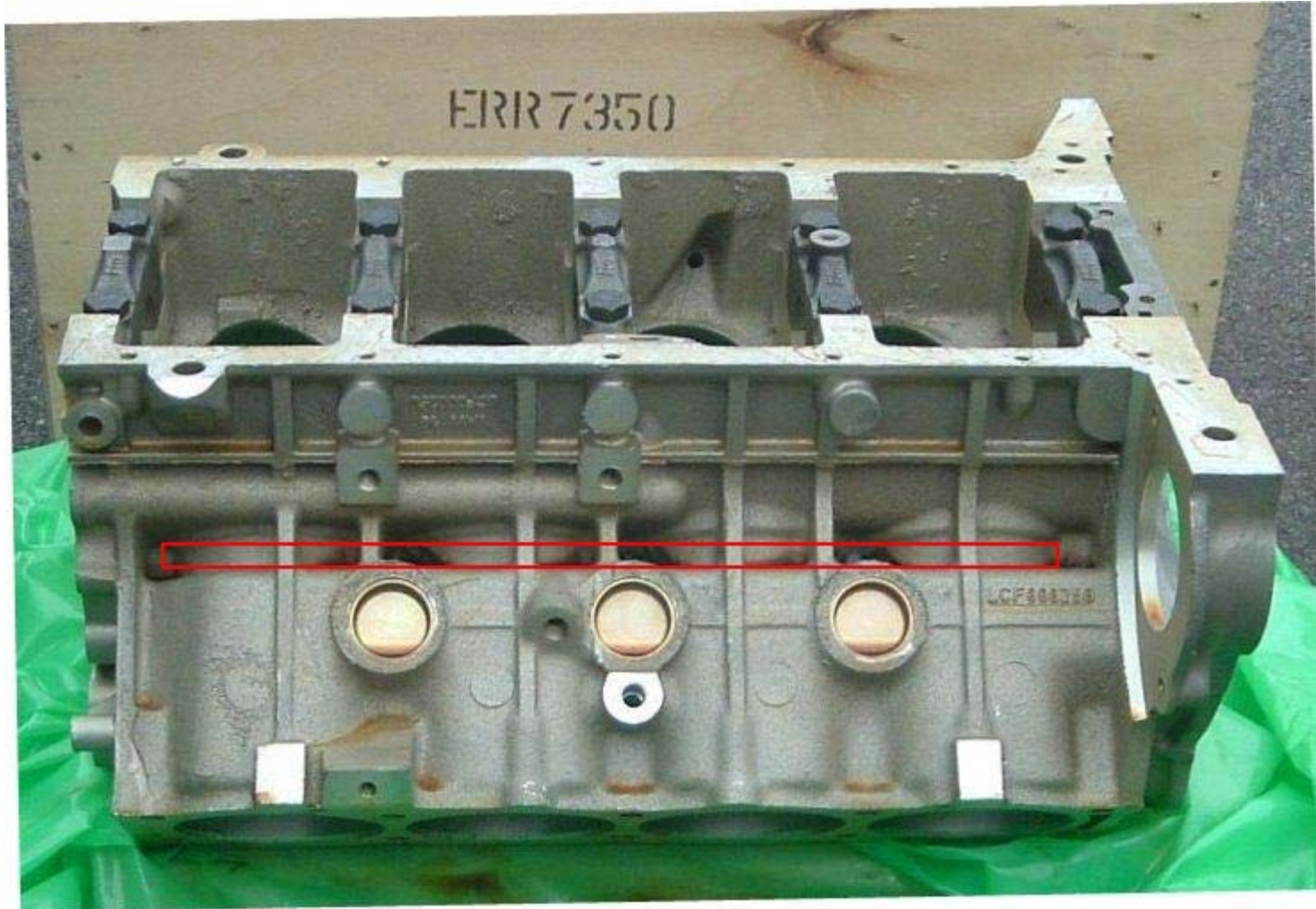
Here is the distance to the bottom of the liner from the deck. This measures 5 3/8"



The bottom of the measure shows the bottom of the liner on the outside of block



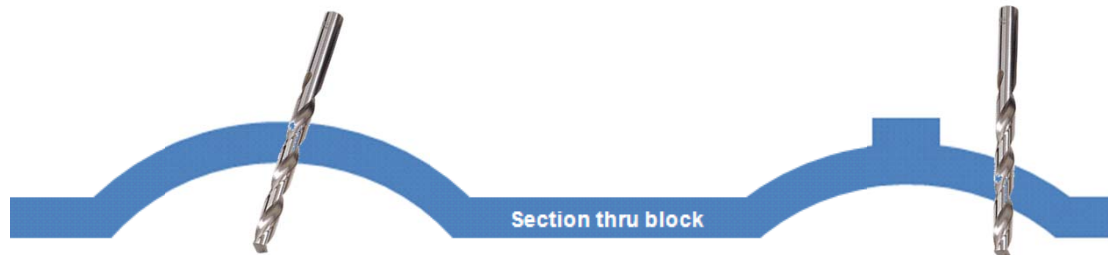
The area shown inside the red in this image shows the ideal location to drill holes for the pinning operation. This area ends up approx $\frac{3}{4}$ " below the lower oil control ring so there is no concern with any interfering with the rings.



Take your drill with the appropriate tapping drill size. Choose a location that will allow you to drive the screw so it is pointing towards the centre of the cylinder. If you are doing this to a built engine, make sure you rotate the piston to TDC for each cylinder in turn – drilling a ventilation hole through your piston skirt is not what you want to do!



OK

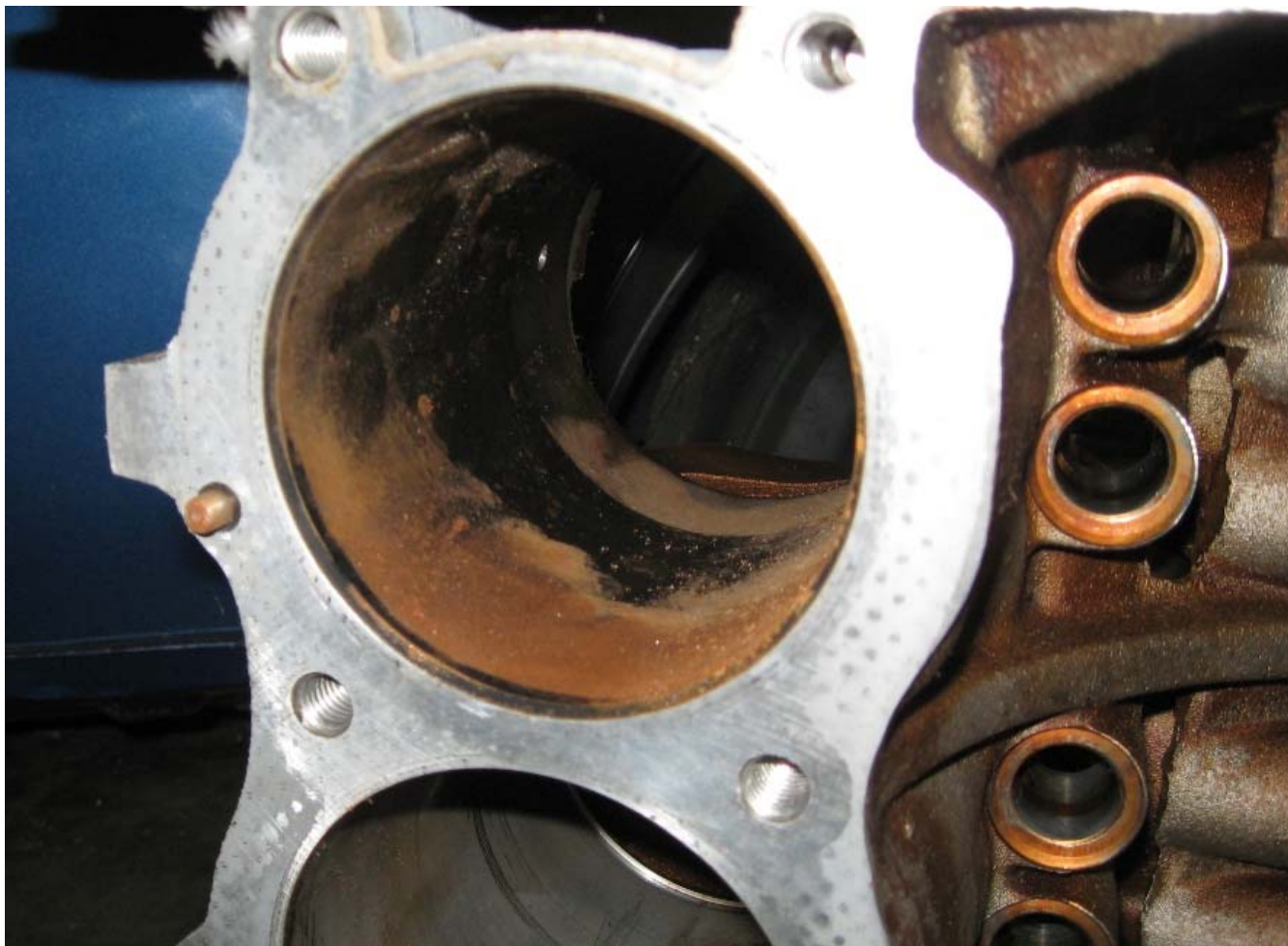


NOT OK

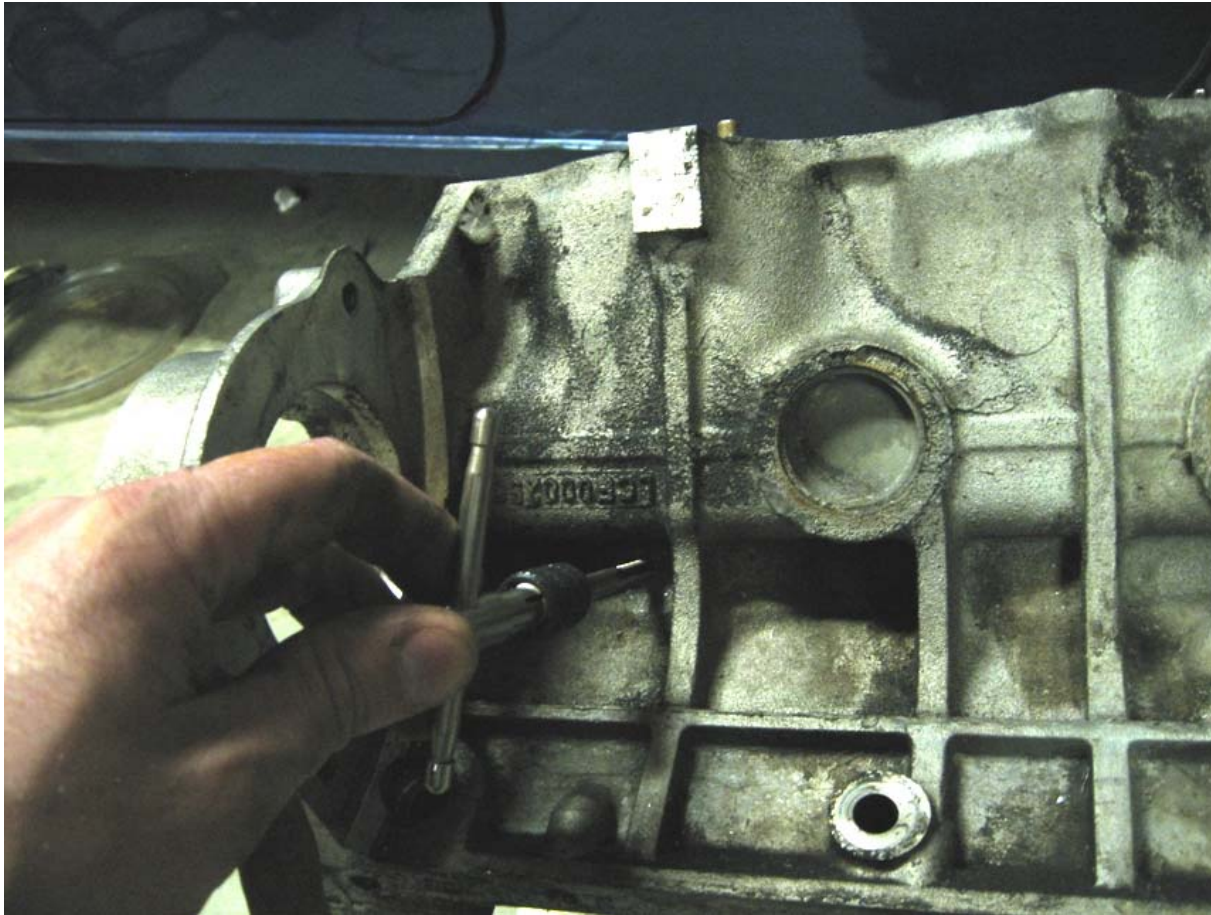
Here you can see the hole viewed from inside the liner. Note that is below the witness line from the piston rings.

Incidentally, note the ridge in the bottom of the adjacent cylinder. This is what prevents the liners from falling into the sump – but there is nothing aside from a poor mechanical fit that prevents the liners from moving upwards, and making this lovely tapping sound as they punch the firing ring in the head gasket(s). Take a look on Youtube to see this:

<http://youtu.be/d6G1Ojv3I20>

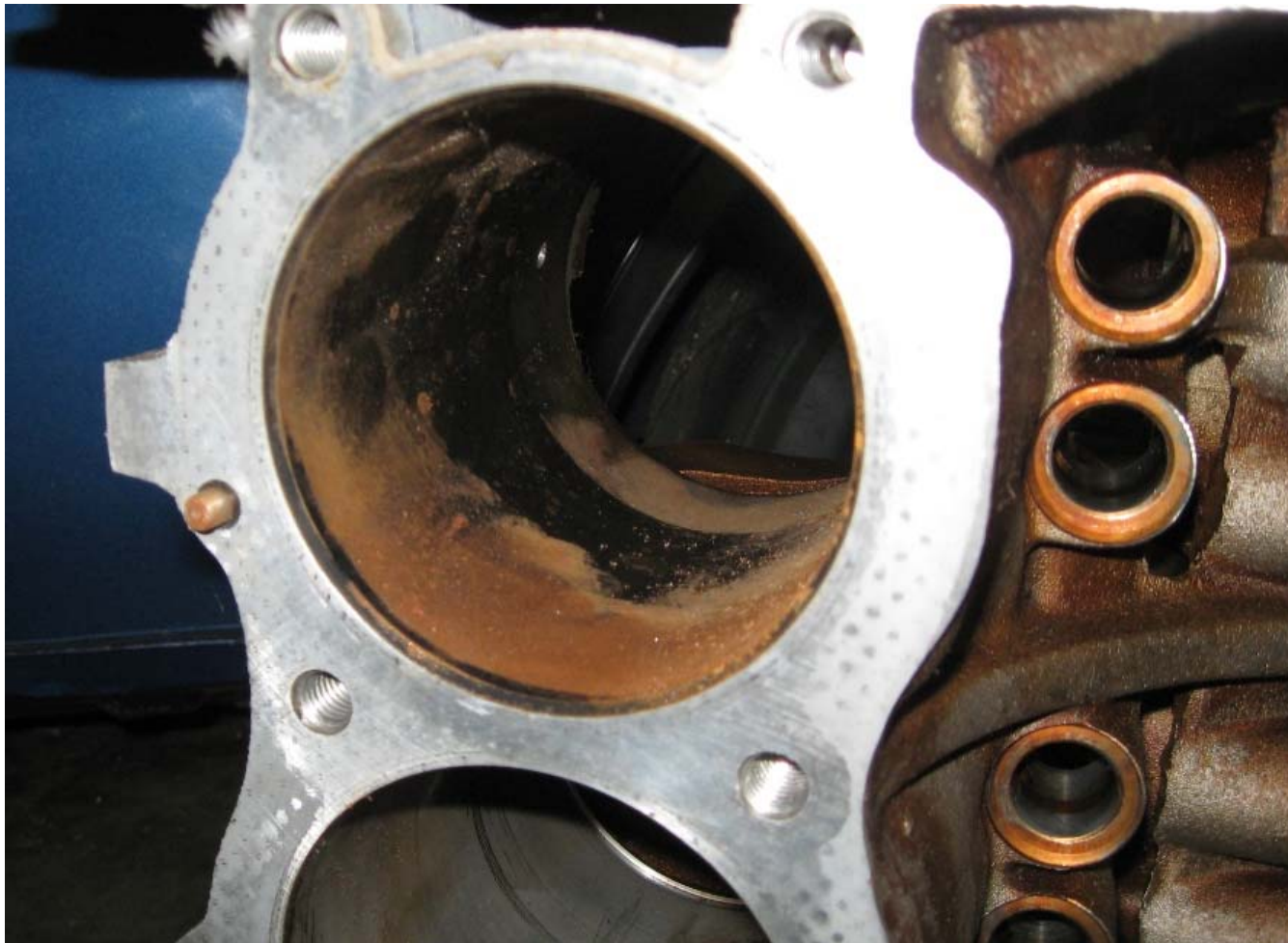


Now, take the taper-tap and insert into the tee-handle tap wrench. The best one is a sliding tee-handle. Don't be tempted to use a regular open-ended wrench, spend a few bucks and do it right! Start with the taper tap first. Spray the tap with tapping fluid, or WD40 if you don't have tapping fluid on-hand. If you have never done any tapping, look on YouTube for the correct way to tap a hole to give you some pointers. Once you have done the taper tap, finish with the bottom tap. Don't bottom the taps out – that is not needed!!!



Now that the drilling and tapping is complete, reach inside the liner, and with a small piece of emery cloth, or wet/dry paper, gently rub around the hole. This will remove any small burrs left that could scuff the piston.

At this point, spray the area around the threaded hole down with brake cleaner. This will remove any traces of dirt, chips and grime.



I measured the thickness of the block and liner - basically the length of the drilled hole. It came to 0.185". They could all vary by quite a lot, so just use this value as a starting point.



Proceed to cut the first socket cap screw down to a few thou less than the value on the previous page using a hacksaw or one of those thin disc-cutters in you angle grinder



To allow the screw to start correctly, you will need to add a little chamfer to the top of the screw – take your file and take just enough off using the file at an angle. A wire-brush will also help clean the start thread.



Wind the screw into the hole, being careful not to cross-thread it. If it doesn't start easily, then put it back on the vise and file a little more around the lead of the thread. Torque it up snug. In the image below, you can see I am checking if the screw is proud using my fingers. It is easy to feel for this. In this case, the front face of the screw is proud of the liner. This will foul the piston skirt, so it needs more taking off.



The screw has now been filed down some more to make it shorter and the lead-thread chamfered slightly to make it start easily in the threaded hole.



The tip of the screw is now sitting just inside of the liner – the feel test with your finger is enough to verify this. Now, it is time to remove the screw, and clean down the thread and area with brake cleaner one last time. After this is done, put some loctite on the screw thread, and wind it back in. It doesn't need to be really tight, just snug. The last thing you want to do is strip the thread.



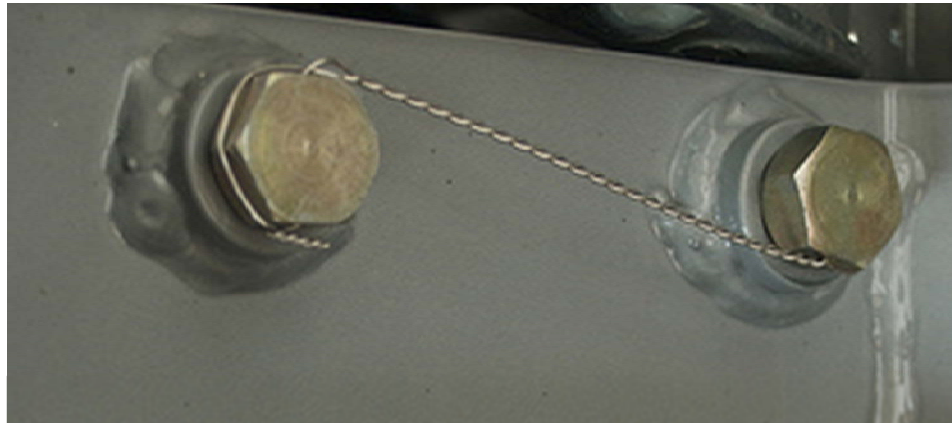
Proceed to pin all the other liners. You may as well do all of them rather than guessing which one is the problem.

When this is completed, you need to lockwire them to make sure they never come out.

There is a good video on youtube for this process: <http://youtu.be/OwFjUX6SaY8>

In reality, you can do a reasonable job without the proper lockwire pliers. Just by twisting the wires together by hand. As we are not dealing with aviation here, this is more than acceptable for what we are doing.

As I haven't gone through and done this to my old scrap block, just take a look at the video, and the image below to see what you want to achieve.



Other notes:

- The liners are non-ductile cast iron, so they don't generate much, if any of a burr on the reverse side when drilling into the liner.
- The locations I suggested to drill and tap are solid, there are no water jackets or oil lines in this location of the block
- I recommend 1/4-28 size thread and a 7/32 tapping drill.
- If doing this to an engine in the vehicle, you will need a compact drill, or right angle air drill as you may be limited on space between the chassis rails. **Also make SURE that you have moved the piston to TDC on the cylinder you are working on before drilling the hole!!!**
- Remember to order a new sump gasket before starting the job
- The inside of your engine needs to be kept clean. Don't leave burrs and swarf in there. Perhaps consider changing your oil a few hundred miles after doing this liner pinning.

- Before jumping in and doing this fix, check your oil pressure is ok. Also, do what you can to check your valvetrain – it could be your lifters, rockers, or cam making a noise. The flex-plate has also been known to have a ticking/rattling sound
- However, If your engine has this loud rhythmic, perhaps erratic ticking that only starts after a few minutes (as the engine warms up), goes quiet over 2000-ish rpm, and is quiet again the next time you start it from cold., it is probably the liners...

Hope to not hear you soon! Dave

Parts order list:

<http://www.mcmaster.com>

The screenshot shows a Windows Internet Explorer browser window displaying the McMaster-Carr website. The address bar shows the URL <http://www.mcmaster.com/#orders/=grtouv>. The page title is "McMaster-Carr - Current Order". The website header includes the McMaster-Carr logo, the text "OVER 490,000 PRODUCTS", and a "Log in" link. A navigation bar contains buttons for "FIND", "CONTACT US", "BOOKMARKS", "ORDER HISTORY", and "CURRENT ORDER".

The main content area is titled "Current Order" and includes a "Purchase order (optional)" field. Below this is a table listing the items in the order:

Line	Quantity	Product	Ships	Unit price	Total	Delete
1	1 pack	90117A200 Wire-Lockable Alloy Socket Head Cap Screw 1/4"-28 Thread, 3/4" Length, 0.0625" Hole Size, packs of 10	today	\$7.23 pack	7.23	⊗
2	1 each	26035A211 Carbon Steel Hand Tap 1/4"-28, 4 Flute, Taper	today	2.32 each	2.32	⊗
3	1 each	26035A231 Carbon Steel Hand Tap 1/4"-28, 4 Flute, Plug	today	2.32 each	2.32	⊗
4	1 each	25605A63 Economy Tap Wrench T-Handle Style, 0 - 1/4" (1.6-6.3mm) Tap Size	today	5.00 each	5.00	⊗
5	1 each	2901A122 Gen Purp Black-Oxide HSS Jobbers' Drill Bit 7/32", 3-3/4" Oal, 2.2" Drill Depth, 135 Deg Point	today	2.24 each	2.24	⊗
6	1 each	8860K14 Stainless Steel Wire (Type 304) Soft Temper, .032" Dia, 1/4-lb Spool, 91' Spool	today	6.10 each	6.10	⊗
7						

Below the table, there is an "ADD" button and a text input field for "Paste products and quantities". To the right of the table, the "Merchandise total" is listed as \$25.21. At the bottom right, there is a "PLACE ORDER" button. The footer of the page includes links for "Home", "Help", "Returns", "Careers", "Settings", and "Terms and Conditions".