

for Economical Transportation



**Chevrolet Four Cylinder
Engine Rebuild Discussion**

From the chat site of:
The Vintage Chevrolet Club
Of America

Teacher: Raymond Holland

This is topic **School is in session** in forum **Tech Talk** at **Vintage Chevrolet Club of America (VCCA)**.

To visit this topic, use this URL:

http://vccachat.org/cgi-bin/ultimatebb.cgi?ubb=get_topic;f=38;t=000003

Posted by **AntiqueMechanic** (Forum Member # 13) on August 28, 2002 22:07 :

Everybody please take your seats. Get out your repair manuals, owner's manuals, an early copy of the Dyke's Encyclopedia, the Motor's Factory Shop Manual (That's the green covered one), the Motor's Auto Repair Manual (That's the blue one), all the copies of the Chevrolet books titled "What Every Chevrolet Mechanic Should Know" (That's the green one) and any answer sheets that go with that type book. Although not required, any parts books can be of value. Best you bring a 'sack lunch' as the sessions may go longer than expected. (Would someone ask the student in the right rear of the classroom to please refrain from throwing 'spit balls').

I had planned to watch TV tonight but nothing interesting was on. Decided to go to the shop and work. The project is a 1928 with an unknown history other than numerous pieces of paper that verify several parts were purchased. The engine ran well but had a peculiar noise best described as a 'scraping' noise. Several days ago the the pan was dropped and some shims taken out here and there. It was noted that the back wall of number 3 cylinder had scrape(?) marks on it. Assumption was made that a ring had broken and was scratching the wall. Buttoned it up at that time for later investigation.





Tonight I dropped the pan again after draining the oil, drained the water, and proceeded to remove the head. Removed the cap from number 3 rod (making notes as to the location and number of shims) in preparation to remove it. After the head was removed the piston was lowered, rag stuffed in the cylinder, and the tough job of removing the carbon was started. Had to use transmission oil, steel wool and about a quart of 'elbo grease'. Finally was ready to push the piston up very slowly so I could catch each ring and prevent it from 'snapping" and possibly breaking it. Removed the piston and made the following observations: Approximately 1/3 of the rear side of the piston was 'scarred' from the top to the bottom. All rings were intact. Piston pin was not protruding on either side. The piston was marked .020 and FRONT. When the rod was held in my hand and with the piston pin parallel to the floor, as was the rod, the piston DID NOT MOVE.

Class dismissed. Your assignment is to evaluate the above information, and present your theory as to the nature of the problem.

We will continue this as it develops in the shop.



Posted by **Chev Nut** (Forum Member # 252) on August 29, 2002 06:06 :

Chev Nut is raising hand to speak  From observation of A.T. fluid and steelwool used I would say there was some corrosion between the cyl. wall and piston. Engine may have been "stuck" at one time or had a coolant leak on that cylinder also causing wrist pin to also corrode to the piston. Corrosion broke loose or was broken loose allowing it to run, scarring piston (and cyl. wall???) with rings making noise scraping over rough cylinder wall.   

Posted by **Chev Nut** (Forum Member # 252) on August 29, 2002 06:49 :

ChevNut has hand up again. The fact that you were able to push the piston out without cutting the top of cyl. ring ridge indicates the engine has very few miles on rebuild.

Posted by **MrMack** (Forum Member # 21) on August 29, 2002 07:26 :

Hey Teach, I say Hey Teach! That could be so Chevy nut, Or, maybe someone re-placed the rings, without replacing the almost new piston, after the cylinder was scarred from a previous botched repair job? sounds like the piston pin would have been a tad looser if the engine was broken in. That is how tight a new piston pin should be.

Posted by **ChevyChip** (Forum Member # 2) on August 29, 2002 07:59 :

Herr Professor,
I have a few questions. Which is the back side of the piston? Is it the camside or the side opposite the "front"?

You wrote "The piston was marked .020 and FRONT." Is it aluminum or cast iron?

"When the rod was held in my hand and with the piston pin parallel to the floor, as was the rod, the piston DID NOT MOVE." The piston did not move on its own (by gravity)? or by hand pressure? What happens when the piston rod assembly is rotated 180 deg. longitudinally? Does the piston move along the pin with thumb pressure?

Posted by **RustyFender** (Forum Member # 23) on August 29, 2002 08:48 :

RustyFender raising his hand. Check the dippers on the rod caps to make sure the splash depth is correct. Possibly the recent rebuild employed a new cork pan gasket which could lower the pan enough to reduce splash and cause the wrist pin to almost seize from lack of proper lubrication. This in turn would cause the piston skirt to dig into the cylinder wall. I would also check for proper oiling provisions on the piston wrist pin and that the






piston was installed in the correct direction.



-R

Posted by **CHEVY** (Forum Member # 131) on August 29, 2002 09:01 :

SORRY TEACHER, IM THE KID IN THE BACK OF THE ROOM THROWING SPIT BALLS. I

HAVE A QUESTION ???  BETWEEN USING CAST IRON PISTONS OR ALUMINUM PISTONS, WHAT AMOUNT OF PISTON TO CYLINDER WALL CLEARANCE SHOULD THERE BE FOR THE TWO TYPES OF PISTONS????    

Posted by **d2d2** (Forum Member # 237) on August 29, 2002 09:18 :

If the piston pin was too tight wouldn't it scratch the piston and cylinder wall on the sides instead of front and rear? If you have a bent connecting rod wouldn't it cause the piston to scratch the wall the same amount front and rear?

Posted by **AntiqueMechanic** (Forum Member # 13) on August 29, 2002 09:19 :

Congratulations students. It is obvious you have been attentive. At this point no additional work has been accomplished so these answers are based on the initial inspection as presented.

Chev Nut : I can't discount your corrosion theory at this point, although it doesn't appear to apply. Your second post about the 'ridge' is true. Very little ridge, and as indicated, engine doesn't appear to have many hours on it. I should have pointed out also that the buildup of carbon at the top of the piston travel is 'normal'. If you plan to reassemble with the same parts it is important to remove this carbon before removing the piston through it. In severe cases of wear it will also be necessary to use the ridge reamer.

MrMack : From the evidence so far it appears that all the components are compatible; ie, piston and rings were replaced at the same time. Other indicators as I disassembled the engine indicate that it was done by 'professionals(?)' and something went sour.

ChevyChip : Good questions. My reference to the 'back side' of the piston was that opposite the side marked 'front' or firewall side. You may be on to something when you mention 'camside'. I should have mentioned that the pistons are 'aftermarket', are aluminum and appear to be very 'crude'. At this point I don't know if they are 'round' or 'camground'. Something to check out. When holding the rod in my hand I would have expected the piston to 'tip' as I held it horizontal. It didn't. This is obviously not a scientific test, but a quick check to see if the piston pin was seized or too tight.

At this point in the investigation my attention will be upon the possibility of piston pin

problems, bent rod, or defective piston. Will also try to identify the manufacturer of the pistons, although I already have my suspicions based upon the similarity to known pistons.

Okay class. Recess, while the instructor works on the next lesson plan.



Posted by **AntiqueMechanic** (Forum Member # 13) on August 29, 2002 14:44 :

Everyone please take your seats and knock OFF THE NOISE. Class is again in session.

First: Q&A

Rusty Fender : Clarification on the dippers. 1928 does not have 'dippers' but instead has 'protrusions' on the rod cap that hit in the oil and SPLASH it all over the area. (At least I know you were paying attention and not looking out the window and dreaming of driving your old Chevy). I have not checked the depth yet but will during reassembly. Pan gasket was normal thickness. Piston was installed correctly and from all appearances oil was making the trip up inside the piston to the piston pin.

CHEVY : I WILL ANSWER YOUR QUESTION IN AN EVASIVE MANNER. PISTON INSTALLATION CLEARANCE IS DICTATED BY THE PISTON MANUFACTURER. IT DEPENDS ON TYPE OF GRIND, COMPOSITION, AND OTHER VARIABLES. AS A RULE I FOLLOW THE MANUFACTURERS RECOMMENDATION WITH THE EXCEPTION OF THE 53/54 PG ENGINES. DUE TO THE HARD STARTING CHARACTERISTICS OF THESE ENGINES I ALLOW MORE CLEARANCE. EVEN THEN OCCASIONALLY I HAVE TO LOAN THE CUSTOMER A 4-FIELD STARTER UNTIL THE ENGINE HAS WORN IN AND WILL CONSISTENTLY START WHILE HOT. I THEN REPLACE THE STARTER WITH EITHER A HD OR STANDARD STARTER. PLEASE NOTE THAT FIGURES PRESENTED IN PRIOR POSTS WERE FROM OLD REPAIR MANUALS AND APPLY TO OEM PISTONS AND NOT NORS PISTONS. (WOULD YOU PLEASE REMAIN AFTER CLASS AND WE WILL DISCUSS HOW TO TYPE WITHOUT USING THE 'CAPS LOCK' BUTTON)

d2d2 : Your question is very logical. Follow the discussion and you will be surprised at the apparent conclusion.

Okay class, here is the latest information.

Took the piston and rod out to one of my trusted machine shops for their inspection and opinion. Upon close inspection in good light it was evident that the piston pin/piston was to blame for the problem. The pin was very tight in the piston and could not be slid from side to side. Brought the unit back to the shop and started to remove the piston pin. It moved some but refused to be extracted. Was able to get a look inside the damaged side and it was evident that the boss on the damaged side had completely disintegrated and particles of the piston were impregnated into the pin and would not let it be removed.

(Students I hate to admit this, but in attempting to remove the pin, in my frustration, I managed to break the oil ring). Now I am faced with an addition problem. Because only one side, the backside, of the piston failed, it caused the most damage to the rear of the piston. There were wear marks on the front side that indicated the piston was in a bind, but not near the damage as to the rear.

In view of my next actions it appears we will have to suspend class for a while. I called the apparent manufacturer, discussed the problem, and then shipped it out to them for their examination. Now we wait.

Please keep your books handy as we will continue the class when we get an update.



Posted by **MrMack** (Forum Member # 21) on August 29, 2002 19:07 :

Say Teach, I was wondering... Why don't we have recess so that me and Chipper can go out to the school parking lot and play with our cars? Yeah!

Posted by **CHEVY** (Forum Member # 131) on August 29, 2002 19:13 :

say ray, who made the piston that you sent yours too, to be checked out??, thanks don



Posted by **MrMack** (Forum Member # 21) on August 29, 2002 19:16 :

Well Ray, so you found the name of the manf. on the piston? Have you ever bought pistons and overhaul parts from J. C. Whitney Co.? I have heard they are from the same plant that makes stuff for some well known West Coast Shops.

Posted by **Chev Nut** (Forum Member # 252) on August 29, 2002 20:13 :

I have purchased some engine parts from JCW over the years and been very satisfied with them. The piston rings were MUSKEGON RINGS at that time now they carry another brand. the bearings were a national brand and gaskets were Felpro. The parts came in a plain white box but the instructions inside etc. had the manufacturers name on them.

Posted by **chevguroo** (Forum Member # 281) on August 29, 2002 20:19 :

Hi, this is Chevguroo, away at boarding school, receiving snail mail after class is out. In my 28 years of mucking around with Chev 4's I have seen many symptoms of engine

problems. 2 of the most common are bent crankshaft and bent push rod. The bent crankshafts I have measured have been up to 9 thou, and I have heard of a lot worse in 29's.

The bent crank usually results in excessive centre main wear, and possibly would have little affect on the piston.

Bent rods are hard to measure and special equipment is needed. I have a device that is used for straightening bent Chev 4 rods, that was used with a jig back in the good old days.

However if your rod had a bend towards the back, this would force the piston towards the back of the cylinder, and hence the wear/scraping as described.

My bet will be on a bent rod.

Do I get an early mark?, as it is Friday arvo down hear and I'm taking the 28 2 door out for a run tomorrow

Chris

PS the original radiator has sprung a leak, does anyone one know whether the warranty was for 70 years or 80 years?

Posted by **AntiqueMechanic** (Forum Member # 13) on August 29, 2002 21:38 :

Okay class, heads up.

Q&A

MrMack : You and Chipper can go outside, however return to your seats promptly when the bell rings.

CHEVY : At this time I don't want to name the manufacturer of the pistons as I am only 99.99% certain who did it. Besides, it would serve no purpose. Congratulations, I see you discovered how to release the 'Caps Lock' button.

MrMack : No, the name of the manufacturer is not on the pistons, however by a process of reasoning I am 99.99% sure who did them. Location where the engine was initially rebuilt, familiarity with the product, and other key indicators. No, I have not purchased parts from J C Whitney for years. Around 1972 when I did my '41 numerous parts were purchased from them. Shipping costs are a big deterrent now.

Chev Nut : See above. I do not question their parts, it's just that I am too far away and shipping adds too much to the cost.

chevguroo : You are correct in your findings with the Chevrolet 4-cylinder engine. The straightness of the components is very important and are measured very carefully. At this point I don't suspect a bent rod but rather a defective piston/piston pin. My new purchase, the '28 Roadster, still sports it's original radiator core and performed flawlessly on the last two tours at Crater Lake, OR and Lassen Park, CA. I assume my warranty is

still good.



Posted by **Chev Nut** (Forum Member # 252) on August 30, 2002 11:39 :

While we are out on the play grounds for recess I would like to relate why I came up with the coolant leak idea. It's a problem that I experienced with my '39. When the new block was installed in 1983 I had the head resurfaced and magnafloxed. Over the years had noticed a slight amount of rust on #4 spark plug but coolant always stayed full. When I began using the car again for long trips it became evident a cyl. was getting low in compression.

Two years ago the head was removed and found very rusty combustion chamber and ex. valve. This didn't bother me too much as I had a new head on hand but what did bother was the cyl. wall was pitted, but not real bad and the top of the aluminum piston looked corroded. I used a fine hone and cleaned up the cyl. wall with piston in place and put it back together. It runs fine and have taken three long trips with it including New York and Arkansa and uses less than a quart of oil in 2000 miles. Could, if it sat for a long time, have caused a major problem. Cause was a crack in the valve seat, not uncommon on these years. (no, I never added cold water to a hot engine)

Posted by **AntiqueMechanic** (Forum Member # 13) on August 31, 2002 19:27 :

We'll take a vacation until the piston, rod, and pin are investigated by the manufacturer. What, with holiday, slow shipping, reluctance to make a decision, ect, it may be several days till we start school again. Don't worry, we will continue until the case is solved. Now go out and play in the schoolyard, but be CAREFUL. (AND CONTINUE TO WORK WITHOUT THE CAPS). 😈



Posted by **AntiqueMechanic** (Forum Member # 13) on September 11, 2002 22:07 :

ATTENTION everyone. School is back in session. Gather up all those kids out in the school yard and take your seats.

When we last dismissed the class we had shipped the piston, rod and pin off for identification and evaluation. That mission has been accomplished. Go to this location for the identification of the manufacturer and return to your seat.

<http://www.vccacolumbiariverregion.org/chatimages/chatray4.jpg>



I think that is a firm indicator of the manufacturer.

This next picture is a view of the piston pin boss nearest the firewall. Note that the casting appears to have 'sponged' in this boss. The other side of the piston reveals normal wear and no damage. Material in the damaged boss has transferred to the piston pin and attempted to 'freeze' the pin, however that never did happen. Go take a look and return.

<http://www.vccacolumbiariverregion.org/chatimages/chatray1.jpg>



This next picture is of the end of the pin that received the damage. Note the buildup of material on the pin. Go look and return.

<http://www.vccacolumbiariverregion.org/chatimages/chatray6.jpg>



This last picture is the side of the piston facing the firewall and the side of the piston that had the damaged boss. Go look and return.

<http://www.vccacolumbiariverregion.org/chatimages/chatray2.jpg>



The rear (firewall side) of the cylinder was scratched. This area was honed out and would be considered servicable.

As noted in another post I contacted the piston manufacturer to obtain a single piston and set of rings. Short version: They won't make a single piston. They will do a set: \$600.00, rings are ONLY \$80.00, time frame, about the same as the construction period

for the Golden Gate Bridge.

At this stage of the game the engine is coming out of the car. It will be totally disassembled, hot tanked, and thoroughly inspected. While the engine is out the engine compartment will be detailed, a new wiring harness installed, and adjustments made as to body and radiator shell fit.



Depending upon the results of the detailed inspection of the engine it will receive new pistons, with cylinders bored out and fitted to each new piston. Rods most likely will be inserted. Other work will be done as necessary.

This will conclude the 'school'. Progress on the rebuilding will be posted only if there is an interest in it.

Final grades will be posted in the hallway within one week. Suggest you retain your notes for future reference. Have a great vacation.



Posted by **AntiqueMechanic** (Forum Member # 13) on September 11, 2002 23:43 :

A great big **THANKS** to 32 confederate for staying up late and assisting in the posting of the pictures in my last post. Couldn't have done it without him.  







Posted by **ChevyChip** (Forum Member # 2) on September 12, 2002 09:37 :

Hey Teach,
Thanks for the lesson. Notes put into hermetically sealed container with inert gas pad.
Sure says a lot about standing behind your products. Way way behind.

Posted by **CHEVY** (Forum Member # 131) on September 12, 2002 12:54 :


hey teacher, Im the kid in the back of the room that was shooting spit wads at chipper, the bugle player, please dont end the school session so soon, as I played hookey the last two weeks. teacher, what I want to know is, will you resleeve the the engine or will you

bore it. where will you get the pistons and will they be cast iron or aluminum.   


Posted by **AntiqueMechanic** (Forum Member # 13) on September 12, 2002 14:11 :









CHEVY

"Depending upon the results of the detailed inspection of the engine it will receive new pistons, with cylinders bored out and fitted to each new piston. Rods most likely will be inserted. Other work will be done as necessary."

Pistons will be aluminum and will be purchased from my local parts house. Clearance will be as specified by the manufacturer. 



Posted by **CHEVY** (Forum Member # 131) on September 13, 2002 18:56 :

HEY TEACHER, HAVE YOU PURCHASED ALUMINUM PISTONS BEFORE?? IT SOUNDS LIKE THERE IS NOT SO GOOD OF ONES BEING SOLD ON THE MARKET TODAY. WHEN YOU REBUILD THE ENGINE, ARE YOU DOING IT ONE HUNDRED PERCENT OR ARE YOU JUST DOING ENOUGH TO GET IT BACK ON THE ROAD.??        

Posted by **AntiqueMechanic** (Forum Member # 13) on September 13, 2002 19:25 :

I always use aluminum pistons in all rebuilds. Modern pistons as a rule do not cause any undue problems.

The engine will be totally rebuilt with replacement parts as necessary and will employ several upgrading methods.



Posted by **coope** (Forum Member # 1286) on September 14, 2002 10:09 :

Will you chamf/ radius lower skirt edge of new pistons?
Sharp edge can cause load on cast iron causing failure.
chev v-6 problem was solve in1995. All new piston incorp. this .. Engine running past 60,000 were ok others failed. A friend of mine solved this problem. got paid good.
REX

Posted by **Chev Nut** (Forum Member # 252) on September 14, 2002 11:22 :

I think posting the step by step process of the rebuild as it takes place will be both

interesting and educational. KEEP IT GOING



Posted by **AntiqueMechanic** (Forum Member # 13) on September 14, 2002 12:18 :

Hi coope,

No, I will not modify the pistons in any way. I am using MODERN pistons and don't want to void the warranty. The pistons are aluminum/modern alloys.



Posted by **Babbit Head** (Forum Member # 1194) on September 14, 2002 18:12 :

Hand raised. Mr. Professor, Mr. Professor! 🤔 You can tell I'm new to this school because my service manual is not very greasy yet. Is it still your professional opinion that the cause of failure was "crude" low quality components used in the last rebuild? Do you believe lubrication has been adequate? 😞

Posted by **Chev Nut** (Forum Member # 252) on September 14, 2002 20:21 :

My humble opinion would also lean toward a lubrication problem. The unknown is how tight the pin was, was engine driven too fast while fresh, run low on oil or overheated. The material transferred from the piston to the pin and ripped off the piston indicates extreme heat due to lack of lubrication. Was piston fit too tight in cyl.????? If it is, skirt scuffing usually results. We will never know for sure as to what caused the problem but its fun to speculate.

Posted by **CHEVY** (Forum Member # 131) on September 14, 2002 22:46 :

HI CHEVGENE, IF THE LUBRICATION WAS OK, THEN WHAT DAMAGE WOULD BE DONE BY OVERHEATING. ANOTHER THING I HEAR IS PISTON COLLAPSE, WHAT EXACTLY HAPPENS WHEN YOU HAVE PISTON COLLAPSE. THANKS 😞 😞 🚗 🚗 😞 😞

Posted by **Chev Nut** (Forum Member # 252) on September 15, 2002 06:13 :

Now I'm glad you asked that question. (that is what speakers always say when asked a question that they don't have an answer for) I have heard the term used many times and can't say that I have actually seen a collapsed piston in my 50plus years of looking under

hoods. I would assume (and we know what that can stand for) that a piston subjected to extreme heat will have the skirts deform causing it to be a loose fit in the in the cylinder. That is the best that I can come up with.....What the great pictures of Ray's piston shows me is that extreme heat was present causing aluminum to heat up and melt. This could have been caused by something that I mentioned in my previous post and the alloys (or lack of) in the piston could not tolerate. The picture of the wrist pin indicates that it was so hot that it turned blue. That also goes back to the clearance mentioned so often, whether its piston or bearing clearance it should be referred to as OIL clearance because this will be the amount of room for the oil film so if things get so heated and there is no room left for oil lubrication fails, there is metal to metal contact, and the friction causes heat and things melt. That is what causes a bearing to "burn out" pistons to "score" and all kinds of nasty things.....I still respect Ray's opinions as he is familiar with the four cyl. engines and can see his first hand although the pictures are great. Amen

Posted by **CHEVY** (Forum Member # 131) on September 15, 2002 09:47 :

THANKS CHEVGENE, FOR YOUR COMMENTS, YOUR EXPERTISE ON ENGINES ARE A GREAT ASSET TO THIS VCCA CHAT SITE. THANKS FOR ALL YOUR INFORMATION. I JUST WISH I COULD HAVE MY ENGINE SITTING ON YOUR WORK BENCH. I WOULD THINK THAT A LOT OF GUYS WHO USE THE TERM PISTON COLLAPSE, REALLY DON'T KNOW EXACTLY WHAT THAT TERM MEANS. CHEVGENE, WOULD YOU THINK THAT WITH EXTREME HEAT AT THE WRIST PIN, THAT THE CLEARANCE TOLERANCE WOULD CHANGE CAUSING IT TO LOOSEN AND CAUSE PISTON SLAP. ALSO WHEN YOU TALK ABOUT PISTON SLAP ARE YOU SAYING IT IS AT THE SKIRT OF THE PISTON WHERE THE KNOCK HAPPENS. THANKS FOR YOUR COMMENTS 😊😊👍👍👍👍😊😊

Posted by **ChevyChip** (Forum Member # 2) on September 15, 2002 12:22 :

Piston slap is the result of the piston rocking back and forth in the cylinder. If the fit is too loose the skirt will hit the cylinder wall one or more times on its trip up and down. It is like tapping on the inside of the cylinder with a hammer. The amount of force from the exploding gas/air mixture and resistance of the piston pin/piston also affect the force of the slap. There also will be some engine speeds that are worse than others. To go into all the dynamics gets a bit complicated.

Though not good and eventually damaging. Piston slap will not typically cause too much damage in a short time.

Posted by **Chev Nut** (Forum Member # 252) on September 15, 2002 15:45 :

Chip answered the piston slap question well but with Ray's piston and wrist pin problem it is hard to say as to which thing failed first or what caused either to fail. I would say that NEITHER was caused by piston slap. The other thing is that he has found no damage on

the other pistons. When overheating is a cause there will usually be problems with more than one piston. No, you wouldn't run your engine on my bench. It would never get done. While listening to all of this I have my own problem waiting for me in my garage. Two years ago my '34 developed an engine noise. It was very slight at the beginning, could short it out on #1 cyl. so I dropped the pan and checked rod clearance. Everything was OK. What I could see of piston & cyl. wall looked OK but noise was still there. Although I have driven it very little since the noise has become louder so the next thing is to pull the aluminum piston, and although anxious to do so just haven't found the time. The pistons are NORS replacements of an old name brand. The engine is bored .040" over and I do have another set to work with. The way things look it may be next year's project. (that's what I said last year)

Posted by **Pre25Chev4** (Forum Member # 10) on September 15, 2002 22:47 :

So when is somebody going to ask Ray - just what "MODERN" aluminum piston manufacture and engine model does he buy [that will fit in the Chev 4] down at his local parts store?

Posted by **AntiqueMechanic** (Forum Member # 13) on September 16, 2002 20:44 :

I will use a set of Badger pistons that are aluminum as 1928 originally used aluminum. Even if they did not, I would elect to use the aluminum piston as I don't want to be slinging around any more weight than is absolutely necessary. Anticipating your next question, the clearance at the skirt will be .0015. Each piston will be hand fitted to its assigned hole.



Posted by **TimBailye** (Forum Member # 366) on September 17, 2002 18:21 :

Toyota experimented with Ceramic pistons (from memory, in the late seventies). These were fitted to some import Corolla's found in Australia. A company here called Coroma

makes Ceramic toilet bowls. Guess what those cars got renamed 🤔.

BTW, I also fly model aircraft for a hobby. One brand of motor I have uses Ceramic coated piston/bore technology. These motors don't seem to have much compression, but produce HEAPS of power from 0.060 cubes/18,000rpm and show no sign of ever wearing out 😊.

Tim.

Posted by **CHEVY** (Forum Member # 131) on September 17, 2002 18:44 :

HELLO TEACHER, I THINK ITS TIME TO GET THE CLASS BACK IN THE ROOM. MAYBE SOME DISCUSSION SHOULD BE ABOUT OTHER OPTIONS OF PISTONS BESIDES ALUMINUM AND CAST IRON. A 28 CHEVY WITH CERAMIC PISTONS, NOW THAT WOULD REALLY BE A CLASSIC, AND I WOULD THINK THE ENGINE WOULD BE VERY QUIET, OR SOUND LIKE A B29 FLYING OVERHEAD?????



Posted by **ChevyChip** (Forum Member # 2) on September 17, 2002 19:30 :

I was in the playground playing tag, pot and chase'em. Some like the cats eyes, others steelies but me I like my ceramic boulder. It will knock the s^*\$@ out of the others. Doesn't hurt the thumb nail like a steelie.

Is it time to come in Teach?


Hay Ray, what you really need is magnesium pistons. Much lighter than aluminum. Ceramics were researched very heavily about 20 years ago. Work well but still too costly to produce. I have an ad somewhere for Dow Metal pistons for Chevrolets from 20s or 30s. They were a magnesium alloy. Guess too costly for that time. Most of you older mechanics will remember that the Volks had magnesium cylinder block and transmission case. Some other parts too.

Posted by **AntiqueMechanic** (Forum Member # 13) on September 18, 2002 10:18 :

Do I need to explain why I have abandoned this thread that I started?



Posted by **Chev Nut** (Forum Member # 252) on September 18, 2002 13:53 :

I can see where Ray is coming from. Although humor is great it has completely derailed his attempt to have this thread be an educational experiance.....OH- OH ,hope I didn't make any new enemies ...I have enough already 

Posted by **Chev Nut** (Forum Member # 252) on September 20, 2002 20:20 :

I have a Question for AntiqueMechanic.....Are Badger pistons still being made?I had never heard of that brand until you mentioned it,then saw a set for sale on Ebay (for 235)

Posted by **AntiqueMechanic** (Forum Member # 13) on September 21, 2002 05:37 :

Hi Chev Nut,

Sorry for the inconvenience, but your answer is in "Radios, Tools, and Accessories".



Posted by **chevguroo** (Forum Member # 281) on September 22, 2002 20:11 :

Hey teacher, your class has drifted off in the wrong direction and the parents are complaining that their kids might give up Chev 4's and start collecting planes.

Many years ago an old time mechanic I knew used F#@*d pistons in his 28 truck, I think they were 302 small block types. Has anyone done any research into what modern equivalents will do the job rather than relying on aftermarket pistons that are often manufactured to a price and not a quality?

Another old timer I knew reckoned you got more power out of cast iron pistons than aluminium, this was after trying both.

Chris, with the 28 finally ready for the 35th Anniversary Rally down under

Posted by **AntiqueMechanic** (Forum Member # 13) on May 26, 2003 09:42 :

In order to provide a more coherent thread it has been edited: 26 May 2003

This thread is now locked.

Posted by **tonyw** (Forum Member # 868) on May 28, 2003 05:28 :

I would like to know the most likely cause of the piston pin grabbing hold of the piston as you indicated there was evidence of sufficient oil in the area. Was it a lack of coolant flow between cylinders 3 & 4 or something else.

Moved to current active thread.

[May 28, 2003, 09:07: Message edited by: AntiqueMechanic]

Posted by **AntiqueMechanic** (Forum Member # 13) on November 13, 2003 12:15 :

Hi,

To assist in following this topic in sequence just click on [GO](#).

Notice: All comments posted herein do not necessarily reflect the official position of the VCCA.

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This is topic **School is in session (Contd)** in forum **Tech Talk** at **Vintage Chevrolet Club of America (VCCA)**.

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Posted by **AntiqueMechanic** (Forum Member # 13) on September 21, 2002 05:33 :

Hi Chev Nut,

Sorry for the inconvenience of sending you down here for an answer.

Can't really say for sure that they are still manufacturing them, but I got the call yesterday that my pistons and rings had arrived at the parts house for me to pick up.

NOTE: The "Moderator" of this department has advised me that any post not contributing directly to the thread will either be deleted or moved into "General Discussions" if it has any other redeeming value.



Posted by **Chev Nut** (Forum Member # 252) on September 21, 2002 20:55 :

The Ebay picture of the 235 pistons looked like OEM pistons. Perhaps with some luck your '28 pistons will be close to the originals (for '28) which were very similar to the 235 pistons in appearance.

Posted by **Pre25Chev4** (Forum Member # 10) on September 22, 2002 20:53 :

Badger is a very well known piston company for replacement pistons. I tried to check for a 28 Chev 4 part # on the Internet but it appears only authorized distributors can get into its reference catalogs - for part # and cost info.

Do you have all the catalog data on these 28 replacement pistons and what oversizes & CR [ring type] are available?

These Badger pistons for the Chev 4 are certainly a nice surprised to me since I thought only Egge and JAHNS were still made.

Thank, KenK

Posted by **AntiqueMechanic** (Forum Member # 13) on September 22, 2002 21:19 :

Hi ken,

Unfortunately some information must remain as "Trade Secrets". Appears to work for Bill Gates and he has almost as much money as I do. (Or is it the other way around?)

Accept the fact that Badger has pistons for the Chevrolet 4-cylinder cars.



Posted by **CHEVY** (Forum Member # 131) on September 24, 2002 13:53 :

RAY, DOES BADGER MAKE THE PISTONS, OR DO THEY JUST SELL THEM AND IS THERE A CATALOG YOU CAN GET?? 😊 🚗 🚗 😊

Posted by **AntiqueMechanic** (Forum Member # 13) on September 24, 2002 14:25 :

Badger has been in business for years and are the manufacturer of the pistons. They are distributed by Dynagear(R), Downers Grove, IL. Your local parts house should have their catalog and can assist in ordering.

Unless you are an authorized distributor I would doubt that you could get a catalog other than an outdated one from your parts supplier.



Posted by **CHEVY** (Forum Member # 131) on September 24, 2002 20:11 :

HI CHEVGENE, THAT WOULD BE GREAT IF RAY GIVES US THE NUMBER OF THE PISTONS HES PUTTING IN HIS ENGINE. IM SURE THEIR ARE OTHERS WHO MAY NEED THE SAME ONES. AND ALSO YOU COULD BUILD A LIST OF THE DIFFERENT NUMBERED PISTONS AS

TO SIZE. GOOD IDEA CHEVGENE. THANKS 😊 😊 🗨️ Yippie! 🗨️ Yippie! 🗨️ Cool! 🗨️ Cool!



Posted by **ChevyChip** (Forum Member # 2) on September 24, 2002 21:49 :

Now I don't want to steal any thunder from Antique Mechanic but you guys only need the bore, skirt length, piston pin location from top of piston and size to get replacement pistons. There are several pistons for non-Chevys that can be used in the six cylinders. Depending on application the pistons may be domed or flat top. I imagine 4 banger pistons are also available. Right Ray?

Posted by **AntiqueMechanic** (Forum Member # 13) on September 24, 2002 21:54 :

That's what I have been trying to tell them. Most shops charge even more for the research than machining rates. If you have a serious need for the information, you can get it.

It doesn't have to be by brand name 'Badger'. Any brand will do.



Posted by **CHEVY** (Forum Member # 131) on September 25, 2002 08:23 :

HI RAY, IN YOUR YEARS IN ENGINE REBUILDING AND FOOLING AROUND WITH ANTIQUE CARS, HAVE YOU USED DIFFERENT MANUFACTURERS OF PISTONS OR DO HAVE YOU STUCK WITH ONE KIND? ARE BADGER PISTONS, FROM WHAT YOU HAVE READ AND HEARD, SUPPOSED TO BE BETTER THAN SOME OTHER BRANDS OF PISTONS. THANKS 😊



Posted by **John 348/340HP** (Forum Member # 32) on September 25, 2002 20:48 :

Don, I have used Badger pistons in at last 10 small blocks that I built over the past few years. They are a good cast normal service piston, and they all seem to be balanced with each other real close. I don't think I would feel to comfortable reving them up to 8 grand, but then I there are'nt any cast pistons that I would feel good with at 8 grand. For what you guys are using them for they should be fine. Low compression and low rev's, what could go wrong?

John 348/340HP

Posted by **CHEVY** (Forum Member # 131) on September 26, 2002 13:31 :

THANKS FOR THE REPLY JOHN. IM HOPEING MY EGGE PISTONS HOLD UP FOR AWHILE???? 😊 😊 🙌 🙌 🙌 🙌 😊 😊

Posted by **John 348/340HP** (Forum Member # 32) on September 26, 2002 17:21 :

Low rev's and low compression, not much to hold up to. I never heard anything bad about EGGE, good luck with the project.

John

Posted by **CHEVY** (Forum Member # 131) on September 26, 2002 19:32 :

I WOULD LIKE TO KNOW, IF THE MAINS ARE A LITTLE LOOSE FITTING, WILL YOU GET

ENGINE KNOCK FROM THEM OR DO YOU ONLY GET ENGINE KNOCK FROM THE RODS
BEING TOO LOOSE????? OR THE PISTONS FITTING TOO LOOSE?????      

Posted by **ChevyChip** (Forum Member # 2) on September 26, 2002 22:23 :

Don,
Any part of the engine will make a noise if tolerances are greater than recommended. Rods and mains can make a similar noise. Shorting the plug on a cylinder, listening with a stethoscope (screwdriver), noting if worse on acceleration, under load or at low speed vs higher speed, etc. is the method to tell what the problem is before disassembly. The more experience the better a person can separate the causes of the noises.

Posted by **AntiqueMechanic** (Forum Member # 13) on October 10, 2002 00:49 :

School is about to convene for another session. The engine has been extracted from the car and completely disassembled.

A question was asked earlier in a private message as to how to remove the engine from the car. My solution was to remove the hood, radiator as a unit and the cross bar (headlight bar). Inside I removed the floorboards. Driveline was broken at the u-joint. Transmission cover was removed and the parking brake handle. Before the operation was started I had already removed the head and the pan. To prevent damage to the oil pump it was removed. It would not have been necessary, but I removed all the 'black items' (generator, starter, ect). At this point it was very easy to remove the engine, bell housing, and transmission as a unit.

With the assembled unit removed from the car it was then very easy to break it up into the major components. Everything was set aside except for the engine. It was to be disassembled next.

During this operation of removing the engine, and the subsequent disassembly, it was very apparent that the shop/individual that built the engine and did the original assembly were very competent. If it were not for the failure of the #3 piston the engine would have performed for many more years. However, it is evident it was eventually doomed to failure. Although the mains are still serviceable, problems were present. When we rebuilt Chevrolet engines in the late 40's and early 50's it was possible to identify the brand of engine oil used by the owner based on the residue in the engine. If the owner had used PxxxxiL the pan would be an inch deep in sludge. That describes this engine. When the main bearing shells were carefully taken from the engine the oil feed holes were already blocked by massive amounts of sludge. It is obvious that the previous owner did not perform any maintenance on this engine. Other signs of good work by the engine builder were the attention to detail such as aircraft wiring the screws on the oil pump. When removing the engine from the car it was noted that the engine mounting bolts were assembled with the proper bolts, nuts, and cotter keys, but the nuts were still loose (?).

The engine has been completely stripped and is ready for the 'hot tank'. Was discouraged that no shims are left in any of the rods. This will take more examination and measurements before a decision can be made as to what action to take. On the other hand, all mains had shims. The crank does not appear to have any major damage, although it has not been 'tanked' and examined.

The next step is to clean everything and examine it very closely. I already know that the cylinders will be punched out approximately .060. As they are now at .020 and whatever wear and taper that exists, the boring will not be extensive. As noted before, each piston will be fitted to it's own hole with the clearance as prescribed by the piston manufacturer.

Your questions and comments are welcomed. Just for the fun of it, and to keep interest by more members, it would be appreciated if they were pertinent.



Posted by **Chev Nut** (Forum Member # 252) on October 10, 2002 06:29 :

So far you have not mentioned the head. Are you planning to have the head magnfluxed for cracks or didn't the 4's have the cracking problem so common in the 6's???? I used to feel the same about P-oil but have converted to it in the last 15 years and always found engines to be clean. This could have been caused by a coolant leak into the crankcase. (the sludge). Glad to be back in school.

Posted by **MrMack** (Forum Member # 21) on October 10, 2002 08:00 :

I am in agreement with Chev nut on the engine oil, I don't think it is so much a matter of oil brand as much of grade of oil and how often it is changed to eliminate contamination that occurs, sometimes without the owners knowledge, such as a coolant leak, poor air cleaning, dusty conditions or a fuel contamination from a faulty carb needle valve or extra rich mixture from a bad choke or bad use of a good choke , also from a poorly operating heat rizer.

Posted by **ChevyChip** (Forum Member # 2) on October 10, 2002 15:02 :

I think in the past 15 years P.n....I has changed their base. I personally had sludge problems with three engines 20-30 years ago when that was the only oil used. There was no evidence of another contributing factor. I switched to another brand of oil and have not seen the sludging problems again. Part of that is the change in additive packages that occurred about that time to SF specs.

I am glad that school will soon be back in session. I am ready to take my seat as soon as the bell rings. Reminds me of Pavloff's dogs.

I am presently repairing (vs a rebuild) a '31 six cylinder to be used as a carburetor test engine. It was one that I had against the wall. It has 0.020 oversize aluminum pistons of unknown manufacture. I have not checked the bottom end yet only removed the head (1930 casting date) (several valves stuck). It had a bocue of carbon on the intake valve stems and about 1/16" on the tops of the pistons, head, valves, etc. Being a low temp engine it is easy to remove.

I should know today or tomorrow about cracks in the head as it is in the shop to get tanked and magnifluxed. If ok then likely we will have to replace several exhaust seats as they are badly rust pitted. Intakes look relatively good. Since I don't know the history can only suspect long term storage in high humidity area like Texas Gulf Coast.

If interested I will keep updated in separate topic.

Posted by **MrMack** (Forum Member # 21) on October 10, 2002 20:09 :

I started to using a good high detergent oil back when we had hydraulic lifters in the PG engines 52 in particular, and my dad had one of one of those new fangled Chrysler V/8s with the hydraulic lifters and the engine oiled torque converters. their lifters were bad to clatter and when one of them was torn down and had sludge everywhere, we started useing Phillips HDS 20 wt. like we used in the screaming jimmy diesels on the road trucks and loaders and everything else with a diesel engine. It worked then. we always used some Pennsylvania crude based oil and a high detergent one, (Amalie, Penns oil, Quaker State), that stopped the lifter and sludge problems that we had experianced with Gulfpride and Havoline. and Unique. now whether it was the best I have no idea, but after all Arnold Palmer used it in his old tractor!

OOPs! Ray , you may need to have the moderator to delete this if it is out of line or offensive to anyone.....

Posted by **AntiqueMechanic** (Forum Member # 13) on October 11, 2002 01:04 :

CHEV NUT:

I am saving the head for later. There are some problems and I have a unique solution to share with you. There is also some exciting information about the head.

MR MACK:

Everything that you said has merit. It's just that years ago it was a standing discussion among the mechanics that the extremely contaminated engines on disassembly had been using P####O##. This was confirmed several times by asking the owner what brand oil he had been using.

CHEVY CHIP:

It was not too far from your location that I was doing the 'wrench' work on the old Chevy's. Must have just been the local oil that caused the problem. Good to see you back in school. School will remain in session as long as the students are attentive or the subject

matter doesn't become boring. (Boring, that sounds like a machine shop operation).

Would be more than welcome to be kept posted on your project.

MR MACK:

You're right; perhaps we have lubed this one sufficiently, and can take it down off the lift.

After a good nights rest, the block was examined again this morning in natural light. In viewing the exhaust side of the block the discoloration of the area surrounding the #3 and #4 piston was very obvious. Oil under the pushrod cover was 'burned'. The engine paint on the backside of #4 was also burned. This engine had obviously been very hot in that area either as a result of the bad piston or just the reverse, the piston had been damaged by the hot spot. The block is in the hot tank as we speak and will be closely examined and magnafluxed when it comes out. To insure the maximum cleaning action all 'freeze' plugs were removed. Particular attention will be placed on flushing and probing the water passages.

For future reference here are the markings on the block:

348532-4, directly underneath this number is a Bow tie, and under that is K 16 7 (Nov 16 1927) This date is consistent with the assembly date of the car. The engine number stamped on the boss is: 38 64000. Keep this number in mind when we get to the head. Inside the engine and under #1 and #2 cylinders is stamped "B7" and under #3 and #4 is stamped "A11".

(KenK, please jump in here and comment as you see fit on all these numbers and markings).

Also today, time was spent on the fitting of pistons to the rods. What appeared as a simple machining process sent me to 5 machine shops before I could get one to tackle the project. The work is to be completed on Friday. When I pick them up that will be the main emphasis of our next class. Till then----recess.



Posted by **ChevyChip** (Forum Member # 2) on October 11, 2002 09:42 :

Ray,

The oil sludging problems with P.....I was first noticed when I was still in the frozen north and continued when I got to Gods Country. Just happens that more of the engines were made by a company with four letter name beginning with an F. Don't believe that it had anything to do with it. Also had a couple of Chevys with sludging.

It still happens. My son is in service department of local Lexus dealer. The have rebuilt or replaced engines with less than 20k miles. Owner did not change oil as recommended (probably only the initial change that is part of warranty). There were grooves in the sludge in the pan where the rods and counter weights rotated.

Reason to bring this up is that all mineral oil (refined from crude) will form sludge. It is a

function of temperature, water, air. Essentially the oil breaks down and recombines into larger molecules, more like polymers (plastic to non-chemists). Additives are added to modern oils to retard sludge formation but only so much can be added. When it is gone then the sludge forming process begins in earnest. With modern oil sump (pan) temperatures it doesn't take too long before you have something resembling grease instead of oil.

Yes we all know people who never changed oil only added. I have a good friend that put 200k+ miles on a Chevy 305 and could not remember the last time he changed the oil (claims over 200k). The engine was rebuilt with the original crank and was not bored (they said it didn't need it). Only put rings, bearings, chain, gears in it. Find it hard to believe but it still runs around here. My only explanation is that it is a cool crankcase engine.

Don't ever think about doing that with one of the modern high hp small displacement engines. They run much too hot for that.

Posted by **29chevy** (Forum Member # 114) on October 14, 2002 11:57 :

Ray, glad to see school back in session again, I brung my crayons and everything this time. In the process of putting to gather a 231 V6 motor myself and need a break now and then. Have used Castor oil products in most every car that I have ever owned and have had next to no problems with it's performance to date. I have to admit that I most likely change oil more often than is really necessary but it works for me and keeps the oil companys in business. Will look fwd to more up dates in future classes.

Kirk 

Posted by **AntiqueMechanic** (Forum Member # 13) on October 16, 2002 23:56 :

Perhaps just a bit of refresher information is in order. Last session we talked about the engine number, date and casting number. This information is located on the passenger's side and near the rear of the block. The stamped number is the engine number.



To tie this all together the car number on the small plate located on the right end of the seat riser is: 6 AB 2324 This number tells us that the car was assembled in Oakland, CA, the AB indicates a 1928 National and the last number is the sequential assembly number at Oakland. This very low number corresponds with the low number on the engine and the casting date of 1927. I'm still waiting for one of our absent students (KenK) to raise his hand and tell us all about these numbers and dates.

Hot tanking the block turned out to be difficult too. That is to get it thoroughly clean. When the rear soft plug was removed it took a drill bit to remove the 'crud' packed around #4 in the water passages. It was obvious that no water had circled #4 in many years. The reservoirs above the front and rear mains were packed with black gook. It is even more obvious that this car was not well maintained and now I even question the engine builder.

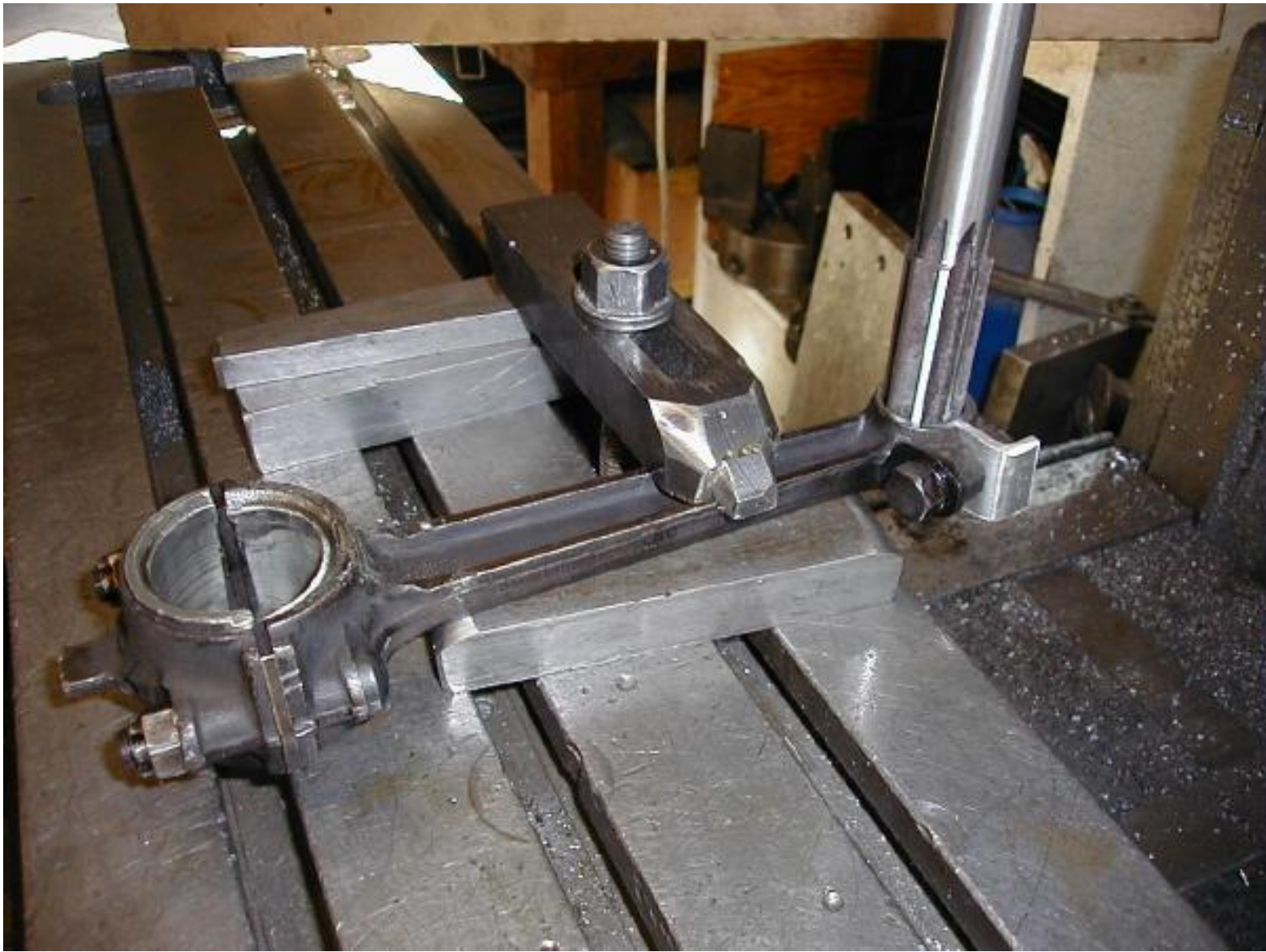


From the picture, which is the right side (passenger), you can easily see the discoloration around #3 and #4 as was mentioned in an earlier post. What, with the plugged water passages, poor oil changing practices, and perhaps the bad piston, it is no wonder that I decided to tear this engine down for inspection.

Here is a view of the 'crud' on the center main bearing support. This same material was all over the inside of the engine and in all the reservoirs.



At this point the rods have been modified at the small end to accept the pistons I have selected. This is a view of our setup on a milling machine to ream the small ends. This provided a rough cut and they were finished up with the hone on the rod-resizing machine. Notice in the picture that a piece of metal has been clamped in the open space on the rod. This is necessary to prevent the reamer from catching the edge of the gap. This also insures that we have the exact size necessary when the bolt is released.



Next will be fitting the big ends of the rods to the crank.



Posted by **AntiqueMechanic** (Forum Member # 13) on October 21, 2002 22:27 :

All the cars are back in the barn after a madhouse weekend. Had one of my cars in the Big NW Car Collectors Show and Swap Meet. Our local VCCA Columbia River Region had a club display that featured my '41 and another '41 that I maintain for a customer. One of my '28s was in the Ghost Stories presentation. This is a major production on Officers Row in the historic Vancouver Barracks in Vancouver Washington. So now we can start school again.

The best time to fit the big ends of the rods to the crank is while it is out of the block. This is kinda practice on this job as we have already fit the rods before we tore the engine down. However, as a check we will do it under these ideal conditions. By fitting the rods

with the crank out of the block we can swing the rod completely around the throw and find out if there is any unusual wear in the throw. As we have mentioned earlier, it is typical for the throw to wear into an oval shape. This is because the force is at the top of the travel on the throw and then again at the bottom as it changes direction. There is very little force and therefore very little wear when the throw is at a 90 degree angle. Granted, we could make the same determination by use of a micrometer. You will note that I have not mentioned using plastigage for this fitting. If this was the first time around it could have been used, however a practiced feel is more accurate.



Each rod is fitted to its specific location on the crank. That is #1 rod is fit to the #1 throw and so forth. As each rod is fitted it is advisable to make written notes as to how many shims are used and their location. As the rod is removed small plastic ties can be used to keep the components in their required location until the final assembly is started.

Even from the factory assembly, components are liberally marked as to their location. Pistons are marked as to 'front' and to which hole. Rods are generally marked by numbers at the factory. It has become custom in engine rebuilding to remark the rods. This is usually done by hash marks. These marks designate in which hole the rod will be placed

and which rod cap goes to that rod.



Note in the picture that this rod is marked by #4 on both the rod and cap and subsequently remarked #4 with hash marks. Unseen in the photo, but the bottom, or cap, is also marked with 4 hash marks. It is safe to say that when we do the final assembly this one will go in #4 hole.

Okay, we will have recess while I go put out some fires in other locations. Wouldn't it be nice if this were all I had to do?



Posted by **Pre25Chev4** (Forum Member # 10) on October 22, 2002 00:14 :

Ray, this '28 block you have is the earliest '28 block I have run across. As you know the date code of K 16 7 indicates this block was cast on November 17, 1927.

The Bowtie casting mark shows it was cast at the Saginaw Foundry that GM had turned over to the Chevrolet Division several months before. The cast in number 348532 is the part # of the 1928 bare Cyl Block. The bare block was not serviced, since you had to buy a #361157 Cyl Block with Caps and Screws for \$24 in 1928.

Most records show the first 1928 production Engine started at Serial #3863596 which would make your #3864000 the 405th 1928 engine built at the Flint plant [I would estimate] around Dec 1st 1927. Is the Cyl head the original head for this engine? If it is, you should find the same engine serial # stamped on one of its exhaust port flanges?

The Car No. 6AB2324 was the 1324th 1928 Model passenger or commercial car to come off the Oakland assembly line, since Job #1 was Car No. 6AB0001. I believed 1928 model production started in December 1927 and Oakland built 1741 total units to include pass, comm. and One Ton Trucks. I seem to recall the show room announcement of the 1928 Models was about Dec 30-31, 1927, so I bet most of the December production was built before Christmas to allow the Western Dealers time to receive express shipment of these first of the new 1928 Chevrolet models, so they would have at least one showroom model to display on the 1928 model announcement day.

So Ray, it is a good chance that your '28 Roadster was a showroom announcement day model. KenK

Posted by **MrMack** (Forum Member # 21) on October 22, 2002 07:25 :

Ray, Thanks for the nice textbook with pictures. I have seen the kind of build up you show on your engine from engines have had two over the counter remedies, in-expensive oil additives that are advertised as "an overhaul in a can" and usually in an engine that had a heat related failure. the other additive was used to stop a radiator leak, that had leaked into the crankcase. Of course the build up may have occurred before the additives were added, but the most common factor seems to have been POOR or NO normal engine maintenance.

I used to do work on Chevrolet and IH truck engines in the late 50s and early 60s (I was a mechanic's helper) for a certain dump trucking contractor that used Gulfpride oil. You would not believe the sludge build up on his engines. His drivers never changed oil or serviced the air cleaner. After the mechanic, he used for years, left, he hired a guy out of the Army that was a M.T. mechanic at Fort Sill, Ok. He instituted a PM program and put premium heavy duty air cleaners on the trucks. The results were amazing, even though the drivers continued to abuse the engines and failures occurred the engines were noticeably cleaner, and they continued using Gulfpride with out the sludge buildup. This makes me believe it isn't the brand of oil so much as it is the way the engine is maintained and operated. Many times we over look poor operating practices as well as poor maintenance programs.

Posted by **AntiqueMechanic** (Forum Member # 13) on October 23, 2002 00:31 :

Okay, students what grade would you expect me to give to KenK when the report cards

are distributed at the end of this course? Thanks Ken for your contribution.

It appears that some of the students are looking ahead (pun intended) at the class schedule and see that we will spend some time on the head. Don't want to give away the major points yet, as I think that discussion will be very interesting. For now, lets just say that the head is the original one.



Posted by **ChevyChip** (Forum Member # 2) on October 23, 2002 09:20 :

Student in the back raising his hand. When recognized he speaks "He is not sticking to the current subject." "I think that he is trying to butter up the teacher." A spit wad sails across the room. Is the class becoming unruly? "Shouldn't we wait and see how much he contributes and what he scores on the final exam?"

Posted by **AntiqueMechanic** (Forum Member # 13) on October 28, 2002 00:39 :

Time to call the students back in from the schoolyard. Class is gonna start in just a minute.

The block has been thoroughly cleaned and is now ready to be bored for the new pistons. Both the top of the block and the bottom are sanded to insure there are no burrs or imperfections that will interfere with the placement in the boring machine. It is absolutely necessary that the block be in 'registration' with the boring machine. Note the two clamps on each end that will hold the block firmly.



For this machine the cutter is set very carefully based upon the current size of the bore and the size necessary for the new pistons. It is then installed in the boring bar.



To insure that the cutter is directly in the center of the cylinder that will be bored, the bar is lowered into the cylinder and 4 locating fingers are extended to touch the cylinder walls. At this time the cutting bar and head are floating on air pressure. When center is located the air is removed and the cutting head secured for the cut.



The boring bar has been started in number 1 cylinder and continues the boring automatically. When each cylinder is completed the head and bar must be centered as above for the next cylinder.

When all the cylinders have been bored the machine is reset with a different cutting tool and a slight 'chamfer' cut is made to assist in the installation of the piston when the rings are installed.



This procedure has now completed a rough cut of the approximate size for each cylinder. Now the block is removed and placed in a special machine that will hone the cylinders to the specified size based on each individual piston.



Note in the upper left corner you can see the honing head and behind it a digital readout of the progress of the honing.



This is the first rough hone. Course stones are used for a fast cut and to smooth the imperfections left by the boring tool. When the machine nears the specified size for the cylinder the stones are changed to fine and a final honing is accomplished.



Although the digital readout is monitored, the final measurement is made by the bore gage that is set based on each individual piston. (No, all pistons are NOT made equal). As each piston is fitted to a special cylinder it is permanently marked on the face for reference when assembly is begun.



OK, recess. Study for the next phase which will be "laying the crank".

Posted by **lil' johnny** (Forum Member # 606) on October 28, 2002 09:18 :

Excellent pictures and explanations!

>>I'm curious to know why you went .060 on the bore?

>>How did you know the specs on the 'deck height' of such an old block?

>>Finally, what is the thick shim-like piece between the upper and lower rod caps that's shown in the photos?

Posted by **AntiqueMechanic** (Forum Member # 13) on October 28, 2002 10:22 :

Hi lil' johnny,

Thanks for your comments on the pictures and explanation.

>>I'm curious to know why you went .060 on the bore? Answer: The block had already been bored to .020 on a previous rebuild. The pistons I selected for this rebuild are 'standard' at .060 (approx) over the 'standard' Chevrolet block. This required a rebore of approximately .040 over the previous work.

>>How did you know the specs on the 'deck height' of such an old block? Answer: To be honest with you I don't understand the question. If you mean was the block milled or shaved the answer is NO.

>>Finally, what is the thick shim-like piece between the upper and lower rod caps that's shown in the photos? Answer: I assume you are in reference to the picture earlier in the thread showing how rods are marked. When the rod is 'pored' it starts out with a thick spacer on each side in addition to at least 5 .001 shims on each side. This is to permit further 'tuning' of the big end fit as the engine is 'broken' in by removing shims of .001 thickness one at a time.

Thanks for the questions.



Posted by **lil' johnny** (Forum Member # 606) on October 28, 2002 12:58 :

Ray,

Thanks for the reply.

>>The .060 bore in a 216 or a 235 is pretty much the practical limit of engine life. Will you do anything "special" to cool your 4cylinder after such a thin bore lining, or is your 28' thick walled and better water cooled on the block?

>>The "decking" is just a general old term for milling the block top. Old engines blocks may have been milled/sanded/machined flat in the past if they have seriously overheated or otherwise warped. I should have refered to it as overall "block height".

>>Keep up the fine work and especially those great pictures!

Posted by **MrMack** (Forum Member # 21) on October 28, 2002 15:57 :

What kind of variation did you find in this new set of pistons, Weight, Outside diameter of the heads and skirts ? Since you decided to bore and hone the cylinders to each piston, there must have been over .001 or .002 difference? Why not turn, or grind all pistons to the same value Are they coated or surface hardened? and bore and hone all 4 cylinders the same?.....Will these new pistons raise the compression ratio much with the .060 overbore and the new style piston ? What will be the distance from the face of the block to the topsurface of the pistons at TDC? Did you have any deep pitting on the journals of the crankshaft? are you using inserted rods?Didn't look like inserts from what I could see.

Posted by **AntiqueMechanic** (Forum Member # 13) on October 29, 2002 00:11 :

lil' johnny,

It is agreed that .060 is a big jump from a standard bore. However, it must be noted that we are neither hoeing new ground nor plowing a new field. Boring a 4 cylinder out to this size has not proven to be a problem. I have consulted the Speed Guru in Sacramento and he has constructed many engines with this bore. And he **races** his engines. As to expected heating problems, I do not expect any more problem than with a standard bore. Perhaps **Herb** can jump in here and comment on the .060.


Mr Mack,

It is necessary to use the boring machine to enlarge the cylinders for the new pistons. Let's let this machine do as much work as possible rather than going over and setting up the lathe to turn pistons. It is very common in engine building to fit pistons to individual holes. It was even done that way at the factory. As to the new compression ratio, it will be increased some but not enough to make a big difference. Piston pin centers are very compatible, so only the diameter of the piston will change. Crank was in excellent shape and was only polished. Inserts will not be used on this engine, as the rods are useable as removed. My next project, also a '28 engine, will be inserted along with several other modifications to improve reliability.

Thanks for your interest.



Posted by **Gator** (Forum Member # 717) on October 29, 2002 05:00 :

P.S. Ditto, great information and I liked the Harley too. 

[May 26, 2003, 11:33: Message edited by: AntiqueMechanic]

Posted by **Master Six** (Forum Member # 50) on October 29, 2002 06:23 :

I remember when I worked in an automotive machine shop in the late '70's, engines would come in for first time rebuild with individual cylinders .010 or .020 oversize. There was not always consistency-if there was flaw in manufacturing, only one or two cylinders were bored out! I believe U.S. manufacturers had to get their act together because of the import quality of car was cutting into sales. The type of boring bar being used is the way to do the job-not the type that bolts to the top surface, which as I recall uses another bore and a possible cylinder head bolt hole for clamping purposes.

Posted by **AntiqueMechanic** (Forum Member # 13) on October 29, 2002 10:28 :

Hi gator,

Took a lot of looking to discover there was a "harley" in one of the pictures. Looks like I blew that one.



Posted by **K1dan** (Forum Member # 695) on October 29, 2002 15:42 :

That isn't just any Harley in the picture.....that, my friends, is Springer Soft tail. Nice class Teacher. Nice toys too!!!!!!!
Dan.

Posted by **AntiqueMechanic** (Forum Member # 13) on October 30, 2002 00:24 :

Looks like the teacher is going to have to spend more time with the pictures. Didn't realize that I had posted a distraction of a Harley in the background. Will be more careful with additional pictures.

Master Six

I have run into numerous engines that had various size pistons on an initial teardown. The best example was my '25 Roadster engine. All 4 pistons were different. On the face of the block and near each cylinder were markings indicating the characteristics of each piston and cylinder.

The boring machine used for this job is a far cry from units of years ago. As you indicated the type that bolts on was the standard then. I have assisted in boring blocks in the car on many occasions with the bolt on boring machines. Not only that, we even turned the throws with the crank in the block and in the car.

Gator & K1dan,

Sorry about the distraction of the Harley. Will try to screen the future pictures better. However, you should not have been looking out the schoolroom window in the first place. For that, you must both remain after class and dust the erasers and wash the chalkboard.

Class dismissed.



Posted by **DdeuceMan**. (Forum Member # 69) on October 30, 2002 15:10 :

  Now how did he know that I wanted to do that!   LOL

Posted by **old216** (Forum Member # 1300) on October 31, 2002 09:02 :

I have been skipping class but I noticed that you have left all your notes on the board!

My question is whether the crankshaft has counterweights or not ? It appears that it does not. I observed a 1928 Chev 4 cylinder truck at a cruise night this summer and it ran very smoothly.

Posted by **K1dan** (Forum Member # 695) on October 31, 2002 16:53 :

I'm sorry teacher, I was just trying to be observant. Do I get to clean the Harley too?!

Gator, do you want the board or the erasers?

Posted by **AntiqueMechanic** (Forum Member # 13) on November 01, 2002 00:35 :

As they say on **SURVIVOR; THAILAND**, first things first! I would like to thank **Gator** and **K1dan** for their excellent job of cleaning the erasers and blackboard. Not only did they accomplish that chore, but also aliened the desks, pushed in the chairs and emptied the wastebaskets. Nice job guys.

Old216

Glad you kept up with the class by reading the notes. No, the crankshaft does not have counter weights. Have talked to several of the old mechanics and the jury is still out on that subject for the Chevrolet 4-cylinder. They have basically the same opinion on shaving weight off the flywheel. Only benefit is a slight increase of 'off the line' speed. A well-built and balanced 4-cylinder engine is a pleasure to listen to. After the change from generator driven distributor to cam driven, and therefore the belt driven generator, and with the use of a fiber cam gear, the 4-cylinder engine just purrs.

Okay students, heads up. We are going to change the lesson plan a bit and head in a slightly different direction. Needless to say, as the engine is being assembled, things are also happening to other components of the engine. Lots of bolt on items need to be cleaned and painted. To paint we need to know what color and that is where we are headed now.

The picture is of a '28 Touring purported to be bone stock and original. A very reputable VCCA member who I have not contacted for permission to name owns it. The picture is very interesting and tends to bare out some of the comments in a companion thread about engine component colors. I would like to have your comments about the picture as far as

colors go. I am sorry I did not take a picture of the driver's side of the engine. In looking at the engine it is obvious that some modifications have been made. Note the "T" on top of the vacuum tank. One line to the intake manifold (correct) and another line through the firewall to a windshield wiper. This has been added, as the Touring did not have a vacuum wiper. Your comments please on the firewall color. Noting for example that the valve cover is engine color, does this throw out the understanding that only items attached to the engine prior to painting are engine color, or have we now proved that some items were painted engine color and then attached? Several have said for example the air cleaner was engine color and I can't imagine that it was attached when painted. Same goes for the plug wire metal cover, and I just glass beaded one I swear was black on the inside and had always been black?



Let's have your comments (and keep it clean).


Edited: It has been pointed out to me that a *faux pas* was made on the picture. That **is** the driver's side. What I meant was, I wish I had also taken a picture of the *passenger* side.






Posted by **Walt D** (Forum Member # 58) on November 01, 2002 05:50 :

Air cleaner brackets are black and encircle the air cleaner and attach to the side push rod cover bolt. according to engineering specs the air cleaner is A.C. make.
All valve covers for '28 that I have seen and examined for original paint were black. Usually the inside has some of the original paint which to me is obvious.
Further going back to how much oil in the oil pan - Dry motor 4 1/2 Qts Re-fill 4 Qts. Oil pressure gauge 12 - 15 lbs. This according to engineering specs.

Posted by **Gator** (Forum Member # 717) on November 01, 2002 06:18 :

psssssssss.....K1dan, psssssssss, meet you at the cycle parking lot after school, pass it on. 

Don't want to offend the '28 owners but I'm glad the '32 motor color is not this. Looks more like a Fo*d color for '28 Fo*ds, which was on my brother's '28 Fo*d roadster. 
 wazzzup? 

Posted by **MrMack** (Forum Member # 21) on November 01, 2002 07:14 :

Thanks for the info Walt, that sounds right about the oil capacity and paint scheme...

Gator, don't get too excited about the Engine color, Ray calls it "Correct Engine color" but the verdict is still out, half of the jury is not convinced that the O.D. color is correct!

Posted by **Oldie** (Forum Member # 33) on November 01, 2002 07:49 :

At the risk of getting my toes stepped on, I'm going to wade into this discussion on engine component colors.

Rocker Cover Color: I'm really confused on this issue. Originally, during restoration of my '28 Roadster, I painted the rocker cover the same as the engine. The judges didn't like that so I painted a second unit black which hasn't drawn a point deduction since. My feeling is that it should be engine color. I say this because in my parts stash I have two extra covers that appear to be original with engine color green paint still remaining over what appears to be a black base under coat.

Spark Plug Wire Carrier: My belief it that these "L" shaped box style wire carriers were painted Black. I have three spares on the shelf that are all black and appear to be original.

Intake Manifold: I believe the one pictured is incorrect in color and should be Black. Here I have six spares and each one is Black and appear to be original.

Air Cleaner Color (part of earilier discussion and not shown here): I have two spares, both painted engine green, one with partial remains of the original decal. Here again, I painted my air cleaner black during restoration and the judges didn't like it, so I repainted it engine color without point deduction since.

Other 1928 Engine Dress items that I believe were originally painted black: Starter, Generator and its pivot and adjustment brackets. Oil filler tube and cap. Crankcase breather tube. Engine fan blade.

Body Firewall color: After looking at many 1927 and 1928 vehicles over the years, my belief is that all Closed cars had the "Front of Dash" or "Firewall" painted black while all oven cars were body color. I think the closed vehicle issue is easy to decide because there are still a large number of unchanged vehicles out there to view. In the case of the open cars, the arguement will continue. I've had repeated discussions with Bob Hensel on this issue since the Judging Books that he made up, with the help of many others, to point out "vehicle correctness items for judging purposes", states that all '27 and '28 vehicles had the Firewall painted black.

Vacuum Tank Tee: The vacuum tank tee arrangement shown in the picture isn't only incorrect for the Touring, it's incorrect for the '28 closed car as well. Not trying to pick it apart, but just pointing out the fact so others won't follow suit and alter their vehicles in a similar fashion. The fuel feed line to the vacuum pump appears to be a copper replacement and it is missing the anchor strap to the firewall (note the hole at outer end and slightly above the firewall lower reinforcement rib). My '27 coupe and my current '28 Cabriolet have steel lines, while my '28 Roadster has a brass seamed tube.

There, that should be enough controversy for one day. I don't consider myself an authority on any of these items listed above and I have no axe to grind one way or the other. My reasoning is to generate discussion based upon what I've observed or learned over the years so we might come to some agreement on how Chevrolet delivered one small segment of their product line. We will probably never get it totally correct because I believe in the early years Chevrolet Assembly Plant managers were given a lot of latitude on how they did things and what materials they used for assembly at different plant locations.

Posted by **Pre25Chev4** (Forum Member # 10) on November 01, 2002 08:05 :

Yes - I suspect the AC Flint Plant painted all its '27-'28 Air Cleaners for Chevrolet this Olive Drab color -at least every original air cleaner I have seen!

The question is - did the Flint Engine Plant #4 paint its engines the same O.D. color that AC used?

I have seen a photo of a 1917 490 engine that Dan Johnson in Washington owns that still shows how the ehgine serial # was painted in yellow on the front left of the crankcase -

with the original O.D. paint still on this engine.
KenK

Posted by **MrMack** (Forum Member # 21) on November 01, 2002 08:06 :

Oldie, thanks very much for your input on this,

Seems to me that some members of VCCA believe one way and others believe another way.

It is not the loudest and most persist group that is "correct" in all instances, and just because one vendor sells the "correct" color doesn't mean their version is "correct" in all respects.

Untill a time machine is invented, or a truly "Certified and documented un-disturbed original car is unearthed somewhere this controversity on engine colors and other really insignificant items will not be resolved to everyones satisfaction.

Posted by **AntiqueMechanic** (Forum Member # 13) on November 03, 2002 16:06 :

I would like to thank all you guys for the comments, but it appears my assistant has already done that, so we will just forge on.

Class, I think we will wind up this colorful discussion (again, pun intended) with a single post that will attempt to record in one spot all of the engine compartment color information for the 1928 passenger car (National). Just to set the record straight, the Roadster body and the Touring body were produced by Chevrolet. Fisher produced all closed bodies. This fact may explain some differences in how items were painted.

In the way of discussion it appears that a major deviation in paint color schemes has occurred with the air cleaner. It appears that the air cleaner was ORDERED from AC pre-painted engine color. Then, does it also appear that they ordered the oil filter painted black and both units sporting the AC decals?

Gas line, I have two Oakland cars and both have copper gas lines. Is this subject still open or does it depend upon assembly plant and body manufacturers?

Although not discussed yet, what color do we want to paint the transmission and bell housing (clutch housing)?

So I am going to close this post and open another and attempt to list the items and proper colors.

Short recess students and back into your seats.



Posted by **AntiqueMechanic** (Forum Member # 13) on November 03, 2002 16:43 :

The following is intended to be a list of the engine compartment items and the colors they should be painted. In the case of engine color this is defined as a Gray/Green color. All other colors are defined as black. I can edit this post at any time, so, if you have information on a specific item, post it and this MASTER post will be updated.

Engine block: Engine color

Head, less rocker shaft, rockers and push rods: Engine color

Pan/Sump: Engine color

Timing gear cover: Engine color

Crank pulley: Engine color

Water pump: Engine color

Water outlet: Engine color

Front cover to flywheel: Engine color

Valve cover: Black (Edited 4Nov02 This item begs for additional input to include assembly plant or other documentation)(Edited 5Nov02 '28 TA says Black)

Spark plug "L" cover: Black

Spark plug wires: Black

Fan: Black (Edited 3Nov02)

Hoses: Black (Edited 5Nov02)

Fan Belt: (Looking for more input)

Driver's side:

Generator and all braces and brackets: Black

Cutout: Black

Oil filler tube and cap: Black

Draft tube (from block to back side of carburetor): Black

Carburetor: Black except for the bowl and nut

Intake manifold: Black

Choke support: Black

All linkage such as throttle and spark: Black

Oil lines to filter and oil gage: Copper?

Vacuum tank: Black

Steering column and box: Black

Pre-heat tube: Natural (cad/tin ?)

Dipstick: Black

Splash pans: Black

Horn: Black

Fan shroud: Black

Passenger's side

Exhaust manifold: Black (Edited 3Nov02 Questioned if it were in fact painted)

Distributor: Black

Coil and stand: Black
Oil filter, holder and band: Black (Edited 4Nov02 to specify oil filter)
Preheat stove: Black (Edited 3Nov02 Questioned if it were painted)
Engine side covers (Pushrods): Engine color
Splash pans: Black
Elbow in the lower radiator hose: Black
Rod from firewall to top of radiator: Black

Now the big one: Firewall and specify closed or open
(Edited 5Nov02 Based on the answer from the '28 TA the firewall is body color on the open cars.)

Input please and let's see if we can clean this list up and perhaps make agreement.



Posted by **MrMack** (Forum Member # 21) on November 03, 2002 19:09 :

Oldie and Ray,.....

I have no trouble with either Oldie or Ray's schemes, just a couple or so things:

Fan black?

Sparkplug wires should be black rather than the Manila color with tracer threads (which I paid a premium price for, to get rid of the too new black wires like on the 53)?

And why paint the exhaust manifold or heat box attached to the exhaust pipe near the manifold? This is a practical question since the car will be driven several times and miles to the show, or should one paint the exhaust items after arriving on the judging field?

also is the carb CI body to be painted black or natural CI gray I assume we are not allowing for any repairs to be made, since this is as off the showroom floor state of condition?

Posted by **Oldie** (Forum Member # 33) on November 03, 2002 19:33 :

Ray,

I'm assuming that your last posting is a summary of all the various engine paint combinations based upon the input to this thread.

I'm still unsure as to what color the rocker cover should be, engine color or black? It would be nice if Walt D would enter into this discussion.

Like MrMack, I'm doubtful that Chevrolet would have painted the exhaust manifold or pre-heater portion of the exhaust take-down pipe, knowing that paint on those areas would last only a short time.

The remainder of the areas listed seem appropriate to me. We all paint the casting portion of our 4 cylinder carburetors these days using a hi-gloss black. I suspect that Chevrolet left them unpainted or used a lesser quality paint originally.

Posted by **mromano** (Forum Member # 43) on November 03, 2002 19:59 :

Hi All

I need to provide my input to this chat. I have a 28 four door. In the last 27 years I have acquired three motors. The original one in the car and two spares. In all three cases, the rocker cover was painted ENGINE color (grey/green). It was very noticeable on the underside where it was NOT subjected to the elements and was probably coated with oil to which we realize now was a protection over the years.

I also question the intake manifold color. Put yourself in the position of the assembly line workers. It was probably easier to bolt up the intake and then give the motor a shot of paint. Unless someone has documentation as to the specific assembly line procedure/sequence. And the discussion continues!!!

mromano

Posted by **MrMack** (Forum Member # 21) on November 03, 2002 20:38 :

mromano, I believe, what this all boils down to is the fact that undisputed documentation does not exist for the current subject, 1928 engine and engine compartment paint colors and schemes. Your statement about having bought 3 engines during the last 27 years adds to the current knowledge, however it does leave 47 years to be documented for what happened to those engines . I would hope a more definitive documentation will be uncovered by those doing the research.

Posted by **Walt D** (Forum Member # 58) on November 05, 2002 06:56 :

Just to throw in a little more trivia. How many know that the original radiator hoses (all three) were black with the trademark logo stamped into the rubber. (CHERVOLET in block letters surrounded by the the BOWTIE) I have two originals from a 15 mile documented 2 door (coach) I have also observed these same type hoses on a documented 9000 mile utility chassis. Great ain't it!!

Further the fan belt was reddish orange in color and the plug wires were black rubber with hard wire. The fuel line to vacuum tank was brass with a seam and tin coated, bolted to the firewall (dash). I have several of these brass fuel lines, however, they had a tendency to crack, so obviously they were replaced.

Posted by **Junkyard Dog** (Forum Member # 4) on November 05, 2002 07:36 :

Walt: That was interesting about the radiator hose with the Chevrolet logo being used in 1928, because 1929 thru 1932 also used a black radiator hose with the Chevrolet logo on it as well. The logo was yellow and I have an original hose in my collection with the Chevy logo. 🇺🇸 🇺🇸 🇺🇸 🇺🇸 🇺🇸

Posted by **ChevyGuru** (Forum Member # 342) on November 05, 2002 07:44 :

Question about these original black hoses: often, you see early cars with the red hoses, and sometimes the belt(s).

For what early Chevrolets are the red hoses correct?

I have never run into a vendor that has these.



Posted by **MrMack** (Forum Member # 21) on November 05, 2002 08:19 :

Walt, thanks for this information, I saw some rubber hoses on Ebay porported to be for GM vehicles 192x thru 193x "the same as original" that were hand wrapped RED rubber! Is there someone that has a rubber stamp that can be used to mark the logo , seems that someone remarked about "Useing or borrowing JYD's stamp"?

A late question:

Teacher, we are waiting for a report on the progress of the overhaul or rebuilding of the engine. Maybe you have been sidelined with another project?

And another, Would you clue us in as to the camera and techniques you have used to get these very good photos?

Posted by **mromano** (Forum Member # 43) on November 05, 2002 19:46 :

Hi Guys

I would love to see some pics of these hoses and belts. Any possibilities of this happening??

the discussion continues, ain't it great!

mromano

Posted by **AntiqueMechanic** (Forum Member # 13) on November 05, 2002 23:46 :

Some more input to the 'chart' of paint colors for the engine compartment. I posed the

question of valve cover color to the Technical Advisor for '28. His answer was BLACK. I think I will go with the TA, after all, we should accept their answers after the big bucks we pay them.

Also ask about the firewall and the answer for OPEN cars was BODY COLOR.

Although we have not covered the radiator hoses, here is the skinny on that item. The picture below is a hose from my recently purchased '28 Roadster. Notice it is a nice shade of BLACK, which was surprising to me. Almost everything I had looked at in the past was RED, however they did not have the markings on them. I think the picture answers the question on at least the '28s as to the black color. Notice also the hose clamp. I expected the two-wire clamp. No question now. As to the fan belt, I don't have an answer for that one.



Behind schedule on the engine assembly. Will be back to it shortly. Don't touch that dial.

As to the pictures posted. I suggest you contact your grandchildren for assistance in that department. In my case, I have the able assistance of 32confederate, better known as

Bruce S. Deford. Thanks, Bruce.

Posted by **AntiqueMechanic** (Forum Member # 13) on November 05, 2002 23:56 :

Don't forget to go back and review the post: November 03, 2002 16:43 in this thread. It is edited as required.



Posted by **mromano** (Forum Member # 43) on November 06, 2002 06:34 :

Ray

Thanks so much for the continued info. I would like to raise another issue for discussion. I am concerned about the interior material. I mentioned it elsewhere on this board. The material covering the seats in my 28 is a codoroy which has a one wide and two narrow configuration. Hampton sells a material where the codoroy is all the same width and the color is dark green. I believe it should be an OLIVE color. Any discussion on this issue would be greatly appreciated.

Also, what is the color/kind of paint used on the dash insert which holds the gauges/spedo/light switch. Is it some kind of crazy white/cream metal flake????

thanks much
mromano

Posted by **AntiqueMechanic** (Forum Member # 13) on November 06, 2002 09:37 :

Hi mromano,

Good questions, however they are beyond the scope of this thread. I suggest you pose these questions in the '12-'28 section and/or contact the '28 TA if you are a member of VCCA.



Posted by **MrMack** (Forum Member # 21) on November 06, 2002 10:35 :

(1) Ok Teacher, as to asking my grandchildren about the photos.Should I ask the ones born in 1978 or the last one born in 1999? I have a Canon A1 from about 1977 , However I am now using a Sony Mavica FD83 that I have had several years, Your photos seem to have the same high quality as is seen with these digital rigs.

(2) On the photo of the engine casting number the Casting number 348532 is followed with a dash and then a 4 is this common on your other 1928 engines and others you have observed? The reason for the question is that my 28, the only one I have observed, does not have the dash and single digit after the 348532, and it has a casting date of B 25 8. Ken K said your engine was the very earliest one he had seen and it came from the Flint plant soon after it was turned into a Chevrolet Plant? Were all of the 28 engines cast in the Flint plant?

Posted by **mromano** (Forum Member # 43) on November 07, 2002 08:03 :

Ray et al.

I have more on the discussion of the rocker cover paint color. I was to the library at the AACA headquarters in Hershey and if you look at pg.38 of the Jan 5, 1928 issue of MOTOR AGE there is a picture of the engine/trans. The rocker cover is definitely darker than the block, indicating the black rocker cover.

Another article I found which was not identified described and pictured a 28 four cyl. Again, the rocker cover is definitely much darker than the rest of the engine.

If you look at the Chevrolet service news bulletin Vol. 2 No.1 Jan 1928 there are three pictures of the motor/trans. One on page 8 on page 9 and page 12. On page 8 the cover looks like the same color as the engine. On page 9 it looks like it is darker. On page 12 it shows the car heater and you can see the cover which looks darker than the block.

Chevrolet service news Vol 2 No 9, Aug 1928, page 43 shows another picture of the "new" heater and the rocker cover looks like the same color as the block.

Chevrolet Service News Vol. 2 No10 Sept 1928, page 1 again shows the exhaust side of the motor and rocker cover looks like the same color as the block.

I am a VCCA member, in fact my VCCA number is 8927. I have been a member since the early 70's. I have observed and talked to many chev owners (many of them who grew up with these cars) and It is amazing to talk about many of the same parts having slight changes in configuration (Like PAINT). So maybe the color of the rocker cover was changed during the build run??? I don't know but I am open to discussion.

mromano

Posted by **ChevyChip** (Forum Member # 2) on November 07, 2002 09:29 :

mromano,

Your post is an example of exactly what we need more of on these questions. It presents facts with citation of the documentation. That way others can check the references for themselves. Inspection of "original" vehicles is also valuable and in some cases is accurate. But, in the intervening years changes by owners, dealers, repair shops can be

done without us modern investigators knowing.

If more of us would do the research and share it with others then we could be more confident when we restore these old Chevys. An peer reviewed article in the G&D will assist VCCA members and can be a start to developing restoration manuals for these old Chevys.

Posted by **AntiqueMechanic** (Forum Member # 13) on November 07, 2002 12:43 :

MrMack,

Interesting observation on the casting number. I have checked all my other '28 engines and the one I am working on is the only block with the supplemental number.



Posted by **ChevyGuru** (Forum Member # 342) on November 07, 2002 17:11 :

I have been following this string with great interest. With respect to mromano's thoughts about possible changes during the model run on rocker cover color, perhaps I could contribute a thought.

Obviously, nothing better resolves such a question than the original documentation mromano references. Then again, as he points out, these very same information sources present conflicting information, thus his question about possible changes during the model run.

I am also a 30 year VCCA member. I am definitely no expert on '28s, never owned one (yet). Most of my cars have been 6 cylinder era cars. But I do pay pretty good attention.

But now I am nearing the end of a restoration on my '25 Roadster, and have learned a whole lot about 4 cylinders – and I love them!. The 1925 was the first year that rocker covers were standard equipment from the factory. Actually, on '25s there were 2 rocker covers: one for the front two cylinders, a small gap in the middle, and then a second identical cover for the rear two cylinders. This was the only year that used the two covers – obviously, they soon figured out that it was cheaper to do it with a single cover.

It is undisputed that the two covers in 1925 are BLACK. This is logical, since in this first year of being used, they would pretty likely have been added after the engine was assembled and painted. Therefore, this custom may have endured at SOME OF THE ASSEMBLY PLANTS for the following few years.

I think it is probably more likely that there is variation on this detail between assembly plants, than the idea of a mid-year change in practices at ALL assembly plants (although that is certainly a possibility). I know that in the 1925 model year, we find small variations between cars built at different plants. Let's face it, in the America of the 1920's, it was a

long way from Janesville, WI to Oakland, CA to Cincinnati, OH! A hypothetical example: a plant manager in Oakland might run out of, say, aluminum running board trim. He couldn't get any from another plant for 2 weeks by train, and he didn't want to have his production line down, or be stacking up inventory that would have to be refitted. So, he found a local supplier to run off a two week supply of trim. It was "close enough" to use, but not quite exactly what was specified. So he used it.

Maybe he bought rocker cover stampings from a supplier that his plant had used for years, who learned to paint rocker covers black, in 1925. Maybe nobody ever told this supplier – "hey, we're switching to engine color paint this model year" – so they kept coming in black. (What color were '26 & '27 covers?)

I realize this is just speculation, but we do know that differences between plants exist, on detail items like this that don't really affect the car's marketability. It comes up all the time, especially in early production.

I agree completely with ChevyChip's post above, stating that what we need is "facts, with citation of the documentation". And this post certainly does not fill that bill. But I think it is definitely possible that this uncertainty about rocker cover color may be a function of variation in practices at DIFFERENT PLANTS, or possibly a policy change during the year, as mromano originally suggested.



Posted by **ChevyChip** (Forum Member # 2) on November 07, 2002 18:49 :

Hey Guru and others,
I might believe the black vs. engine color reasoning if the valve covers were supplied and installed at each assembly plant. However I have a major problem with that. I don't understand why the valve covers would not have been installed at the engine plant. Now I know that Flint built engines in that era and later and some were at least assembled in Canada. The question is "Were engines also assembled in other plants?"

Posted by **ChevyGuru** (Forum Member # 342) on November 07, 2002 18:55 :

Excellent point! I worried about that, too, as I was typing my novel there.

How complete were the engines when they left the engine plant? How many engine plants were in operation in 1928? Which parts got added at the ASSEMBLY plants?



Posted by **AntiqueMechanic** (Forum Member # 13) on November 07, 2002 19:25 :

TIME OUT Go back to the picture on post Nov 01, 2002, 00:35.

From that picture alone we can determine that the cover was NOT painted on the engine, for if it was, the "L" shaped wire loom, the plug wires and probably the spark plugs would be covered with engine color paint. Also the retaining nut and washer would be engine color.

If it were not painted on the engine does it assume the character of the air cleaner where a jobber in accordance with Chevrolet specifications paints it? I think not. Therefore, it is most likely to have been painted OFF the engine and with a more easily obtainable color: BLACK.

Back to the '28 TA who says black and we give him the big bucks to make that determination.



Posted by **mromano** (Forum Member # 43) on November 07, 2002 21:30 :

Hey Ray

I respect your opinion and the one of the 28TA but I'll bring my documentation with me when I get it judged. Living in Eastern PA I get to Hershey a few times a year. I will return to the library and try to get more info. They have some great info like original sales literature and articles from many magazines for almost any car and year. I noticed that even the CHEVROLET sales literature differs in description of exterior colors for the 28. For the 4 door sedan one ad says the exterior color is Faunce Green Duco with Dunsmuir Gray trim and the other says Paul Revere Green. Same car, same year, same model, Same manufacturer!!!! GO figure! And then I go to another source and it says the Faunce was an early color and the Paul Revere was a later color.

Until I have further research, let's get back to the rebuild and get this school back in session. I really enjoy learning about the rebuild and everything else involved. It would be great to meet you all at a tour or event. You certainly have much to share. Until then, I am going outside for recess!!!

mromano

Posted by **MrMack** (Forum Member # 21) on November 07, 2002 21:30 :

mromano, read a little further down or maybe up, it also says they was a change, early 28 sedans were Faunce Green and later 28 sedans were Revere Green

and.....

Mromano, please be patient, our teacher likes to keep us in suspension or suspense whichever, then dump a ton of stuff on us!

Are you all sure that the sparkplug wires are black on a 28?

I bought a new set to get away from black and they were manila colored cloth covered and has a red tracer thread in them. I want to be sure, before I paint them. Maybe I should get some off a VW bug, the red transparent plastic ones that you can see the sparks going down the wires!

Posted by **Pre25Chev4** (Forum Member # 10) on November 08, 2002 00:56 :

Yes, it is odd for the 1928 block casting part # to have a "- 4" following it? I have seen this "Change Order" or "Drawing Level" number on pre 1928 blocks. I have a bare 28 block sitting by my driveway [a garden decoration?] that I just went out in the rain to check – it's is serial #4098681 with a casting date of B 21 8 [February 21, 1928] –and it has what I take to be the Change Order #16 cast-in to the right of the cast-in Bowtie.

It is possible that Chevrolet did source FERRO Blocks [1928 castings] in addition to its own in-house Gray Iron Foundry in Saginaw? The Sept 30, 1927 FERRO cast 1927 Coupe block [serial # 3802580] I sold to Michael a few years ago was the latest FERRO block I have taken note off – it didn't have the Bowtie cast-in.

I think I can shed some insight as to why the 1928 engine valve cover was not installed at the Flint Motor Plant #4, the world's sole source of the 1928 Chev 4. I seen a 1926 GM document that outlines the late Series V passenger car Assembly "Sequence of Operation." The following in part is the engine sequence:

1. Assemble transmission support to transmission
 2. Check timing on engine
 3. Assemble transmission to engine
 4. Remove cover plate on trans., fill with oil & mount shift & brake levers
 5. Assemble universal joint & bolt to transmission
 6. Tighten cylinder head bolts on engine
 7. Mount ignition coil and wire
 8. Fill engine with oil
 9. Mount engine in frame
 10. Assemble spark plugs in engine
- [Then after the body is dropped and mounted on the chassis]
11. Connect gas line to vacuum tank & gas line to carburetor to tank
 12. Assemble suction pipe – manifold to tank
 13. Prime vacuum tank & attach vent pipe
 14. Fill with gas and water
 15. Start up engine and adjust valves
 16. Mount valve rocker cover
 17. Shut down engine

So the reason the valve cover were not installed at the Flint Motor Plant #4 but at the various assembly plants was the need to both tighten the head bolts before the engine was mounted in the frame and adjust tthe valves hot after the engine was started at the end of the line.

KenK

Posted by **AntiqueMechanic** (Forum Member # 13) on November 08, 2002 21:51 :

Good evening class. We have a lot to cover this evening so clear your desk and get out your notebook and let's get right to it.

Perhaps now is the best time to discuss how the engine is oiled while it is disassembled. Of course the center of attention for the oiling system is the oil pump. A pointed discussion of the pump will be the subject of another session. For now, lets assume we have a good flow of oil under "X" pounds pressure.



You are looking at the oil distributor with pipes part number 348460. It is important that we understand just how this device functions and where the oil is sent and under what conditions. Notice the fitting in the upper right center. This fitting is connected to the oil pump by a copper line. Oil enters the distributor at this fitting. Notice the chalk line I have drawn. The spring-loaded device in the picture is the oil distributor valve assembly. When this device is installed in the distributor it is secured by the oil distributor fitting directly

below. Now let's continue the path of the oil. It enters the distributor ABOVE the valve. The valve directs the oil through the oil distributor fitting where it takes two paths. Note the provisions for two fittings. One path leads the oil directly to the oil pressure gage. The second path leads the oil to the opposite side of the block and through the oil filter. When it leaves the oil filter it is returned to the fitting on the lower right of the picture. The path now is unobstructed through the oil distributor and into the four pipes. From the four pipes the oil is directed into the 4 troughs, one under each rod. Notice that the oil distributor valve assembly was not involved in this operation so far other than preventing the oil from making a direct path to the oil pipes. So when does the valve assembly come into play? Assume the oil filter is plugged with debris. The oil is blocked in one path to the oil gage and on the other path to the oil filter. With both paths blocked the oil pressure overrides the spring pressure and oil is allowed to flow into the 4 pipes. (In some other threads on the Chevy Chat a question was ask about what happens if you shut off (bypass) the oil filter. As you can see this would force the valve to function continuously. Therefore it would be best to remove the valve if you removed the oil filter).

So, we have lots of oil in each trough now, but how do the bearings get lubricated? Unlike, for example, the 1925 engine, there is absolutely nothing in the '28 engine that is pressure lubricated. (In the '25 engine the center main is pressure lubricated).

Now let's examine how the three main bearings are lubricated. Above each of the three bearings, and permanently cast in the block, are reservoirs.



Look closely and you can see that I have laid a small mirror in the block so you can see the reservoir. This reservoir is filled by 'splash' oil. As indicated previously, all four troughs under each rod have been filled by the individual pipes. As the rod 'tang' hit's the oil it is splashed throughout the interior of the block. Over a period of time all three reservoirs are filled.



This is the rear main block 1/2 bearing. Note the nice Chevrolet Bowtie. At the top of the picture is the 'locator'. This protrusion fits in a depression in the block to prevent movement of the bearing shell. The hole at the bottom of the bearing matches a hole in the block that leads to the oil reservoir.



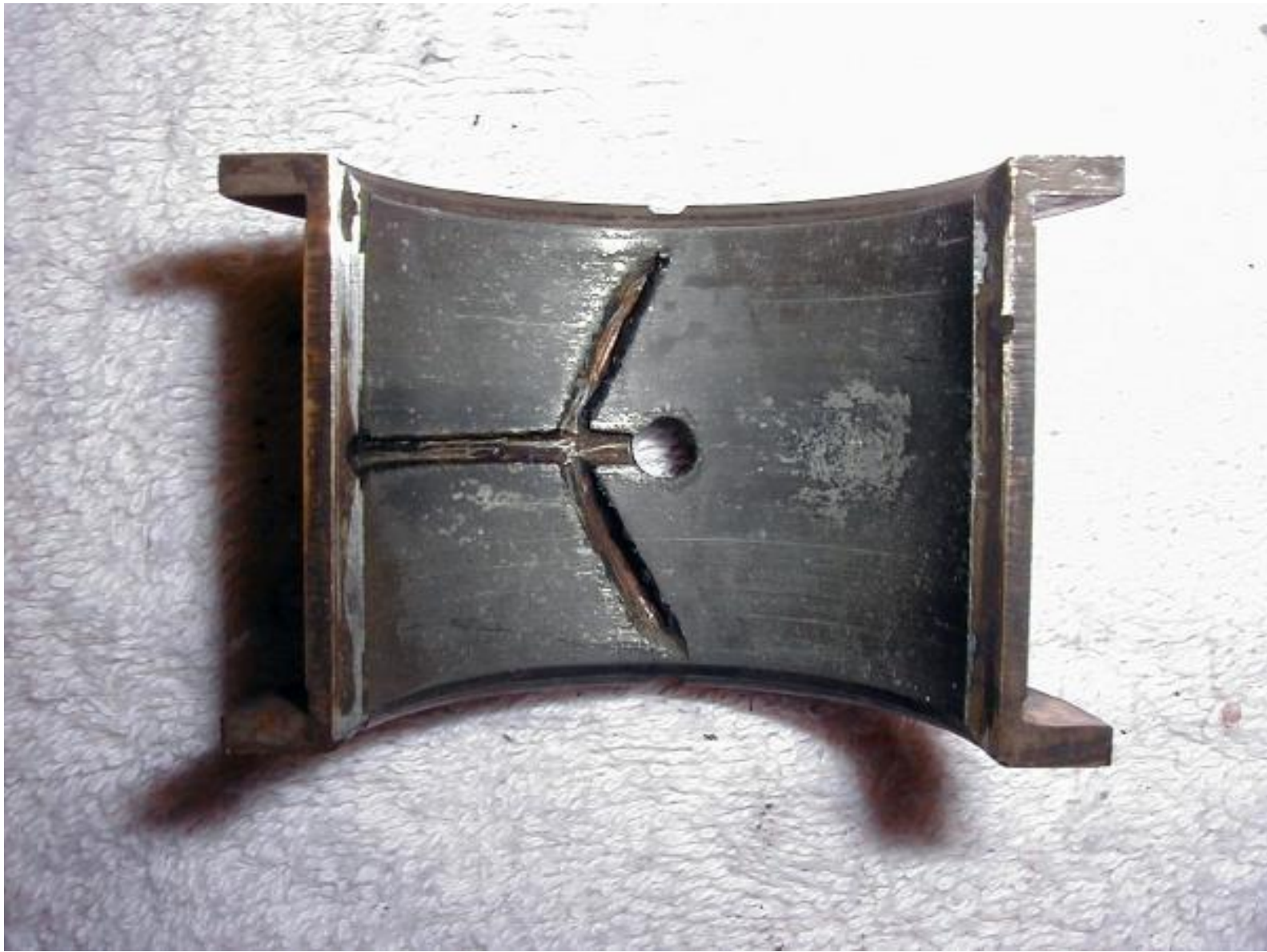
This is the other side of the bearing as it is mounted in the block. Note the entry hole for the oil to lubricate the rear main. Put your finger on the page right there. Where is the rear main seal? No seal? Then what keeps the oil from running out the rear of the engine?



This is the other ½ of the rear main. Note the three concentric grooves that are near the rear (top) of the bearing. Any oil that has worked its way past the main bearing surface migrates into these grooves. Note the hole in the grooves. Any excess oil goes through the holes rather than out the back of the engine. But where does the oil go?



At the very bottom of this picture you can see a hole that connects to the hole in the rings. This interconnecting tunnel dumps the excess oil back into the pan/sump.



This is the center main bearing. Note the hole in the center of the bearing that connects to the reservoir above it. Oil enters here and is directed down the 'crow's foot' to the other $\frac{1}{2}$ of the bearing and out each side of the bearing to lubricate the edge of the center main. The thick sides of this center main serve as the thrust bearing.

The front main is lubricated the same as the other bearings, however the front bearing allows oil to go both ways as we have to lubricate the cam and crank gear. More on that later.

Okay students, we are out of time, and Bill only lets me post so many pictures. Next session we will cover how the remainder of the engine is lubricated. Honest, eventually we will get around to "laying the crank".



Posted by **K1dan** (Forum Member # 695) on November 09, 2002 02:43 :

Looking at the second photo, the underside of the rear main 1/2. I see some discoloring from heat. Was that gaulling I could see on the actual bearing surface? I didn't see as much or any on the center main cap. This leads me to believe that damage to that bearing was caused by either over heating from the plugged water jackets, poor oil supply or both.

Was it just the "close tolerance" of the bearing that kept the oil in the reservoir from just running out? I suppose that if the oil sat in the reservoir long enough it would suffer thermal break down and just run away causeing oil starvation for that bearing.

Dan.

Posted by **mromano** (Forum Member # 43) on November 11, 2002 10:25 :

Hey Teacher

I have a question about the oil system. The oil is sent out the opening through a "t". one line goes to the gauge, the other goes through the middle of the block to the oil filter. There is an adapter between the compression fitting and the nipple of the oil filter. If you look inside this adapter, there is a restriction hole in this adapter/fitting. In other words, the hole through this fitting is NOT as large as the copper tube leading to it. In fact, it is very small. I believe it's purpose is to restrict flow to the filter. Two questions....

1. Why the restriction, it seems it would clog easier??
2. I havd two motors, one with this adapter on BOTH ends of the filter and the other only at the supply end of the filter and NOT the return end of the filter. Which is correct.

Also, do you allow show and tell in your class? I just completed a rebuild of my spare motor dated C 1 8 with a head date of B 29 8 and the stamped number on the exhaust port matches the block. I have pics which I would be willing to share.

thanks
a student sitting in the back row near the window!

Posted by **28chevrolet** (Forum Member # 1414) on November 11, 2002 16:25 :

here's my reasoning for the restriction,or like some would call it (an orifice) .I beleive that it is used to force the oil flow/pressure to the guage.Any fluid would always take the easiest flow path so the restriction would allow the primary flow to the oil pressure guage.I beleive that chevy wanted to make sure that the owner knew the correct pressure in case of a oil pump issue.

You should only need one restriction at the oil filter.Once you restrict a flow once in a piticular direction then the flow is always slowed down no matter how many restrictions are in the oil path.

Does any one disagree or agree with my senarial ? 😊 😐 😞

Posted by **28chevrolet** (Forum Member # 1414) on November 11, 2002 16:28 :

Hey guys, what is the size of the restriction on the fitting ? can any one help 😞

Posted by **RustyFender** (Forum Member # 23) on November 11, 2002 22:14 :

Hello Ray,

I am excited to see so many familiar pictures that I can compare with my own notes. My question is this. Had your bearings been damaged, what would have been your course of action? Would you have gone with modern inserts on either rods or mains? Are new rough babbitt main inserts available for the 28 Chevy that you can line bore locally?

Thanks,
-R

Posted by **AntiqueMechanic** (Forum Member # 13) on November 12, 2002 20:54 :

Quickly, students, take your seats and quiten down, we have a lot to cover in tonight's class.

First: Q&A

K1dan

Very astute observation. It is really obvious that all the main bearings have been overheated, however they are still serviceable and I will use them. Yes, the bearing clearance (.0015-.002) is what retains the oil in the reservoirs. Ever wonder why you could park a 4-cylinder Chevrolet, have no oil drops on the floor, come back much later and there they are. Also consider that if the vehicle is parked for a long time, engine not operating, that all the reservoirs will drain, so when we restart the engine we have to replenish those reservoirs.

mromano

Why the restriction in the fitting to the oil filter? The restriction is to slow the oil passage through the filter and to provide resistance to the pump in order for the dash gage to read pressure. The restriction goes on the INPUT side of the oil filter.

As to your last question. I think that Show & Tell would be great. You make the decision as to any confusion to the students as to which engine is yours and which is the teaching vehicle. Otherwise, go for it.

28chevrolet

I concur with your explanation of the restriction in the oil filter line. And yes, only one

restriction.

As to size, my best measurement was 1/16.

Rusty Fender

You ask what action could be taken if the rod or main bearings were so badly damaged they would have to be replaced. Lets take the mains first. If they were damaged the mains would have to be repped into the shells. Several places do this type work. They can be semi-finished to your specifications and then line bored when reinstalled. The crank can also be welded up and reground back to standard. As to the rod bearings. I have at least two sources that can insert the 4-cylinder rods with modern inserts. In talking to one of them I was surprised to find that he does the rods first and then fits the crank throws by grinding. Always been my experience to grind the crank and fit the bearings. Ah, these new modern methods. As to the last question, I always hate to make a solid statement, but the last time I checked, you could still get re-Babbitted mains.

Now for the scary part. I have built both 4-cylinder and 6-cylinder engines by taking the main bearing shells out and poring the Babbitt directly into the block after boring additional holes in the block to attach the Babbitt. The block is then line bored with registration on the camshaft. Every one of them is still on the road and running.

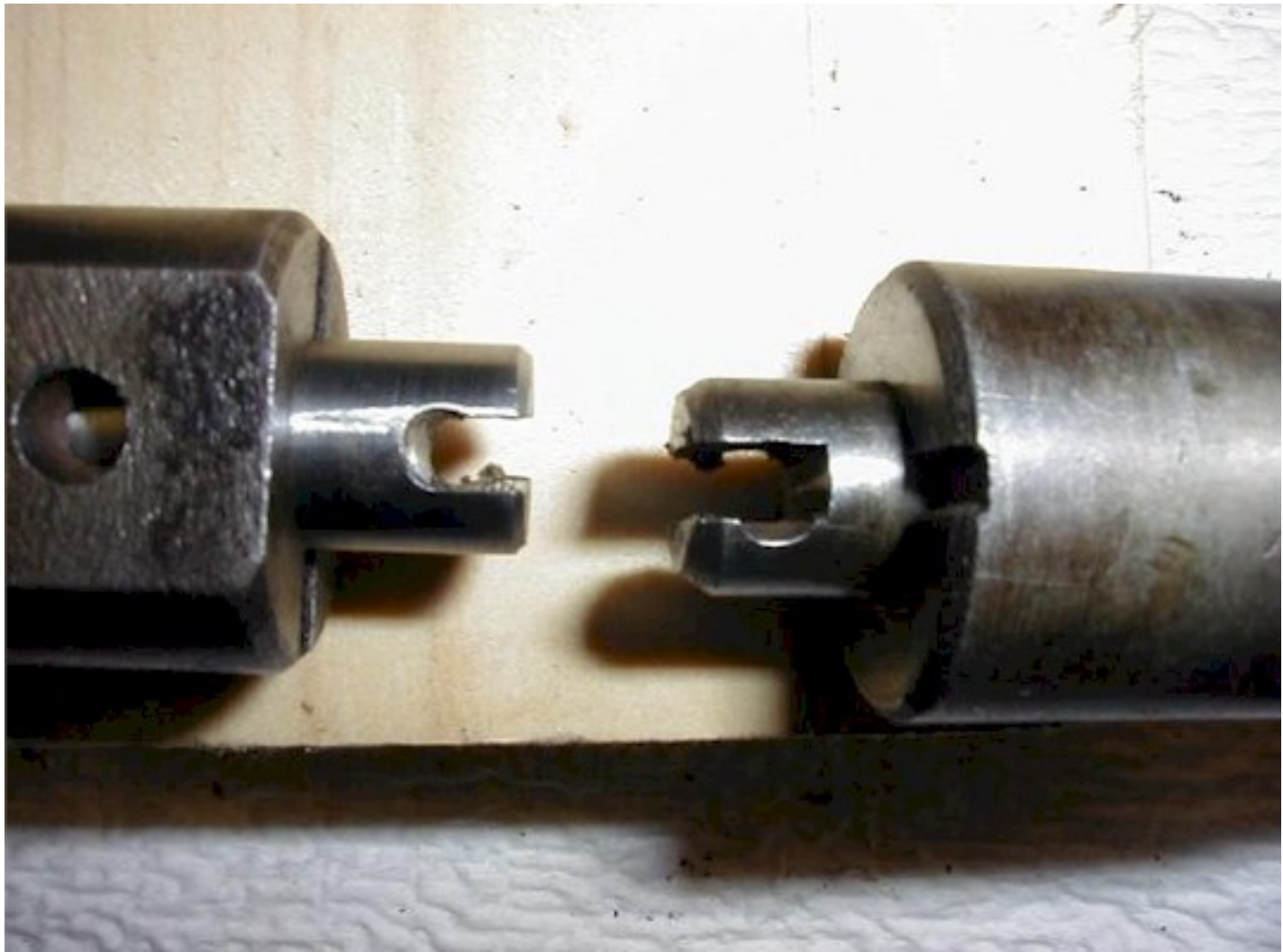
Now that the Q&A's are taken care of lets get to the new material.

We are gonna backtrack a bit and go back to the oil pump. Initially, we just stipulated that we had a pump and we had some pressure. In reality we don't really care what our pressure is as long as we have some to move the needle on the dash and sooth our concerns. As mentioned earlier, nothing in a '28 engine is pressure lubricated. What we really need is VOLUME. We want to fill the troughs as fast as possible so splash lubrication can fill all the reservoirs quickly. The OE oil pump on the '28 is a vane type pump. Vane pumps are noted for volume and not pressure. Although the '28 OE pump is normally satisfactory it was my desire to see if improvements could be made.

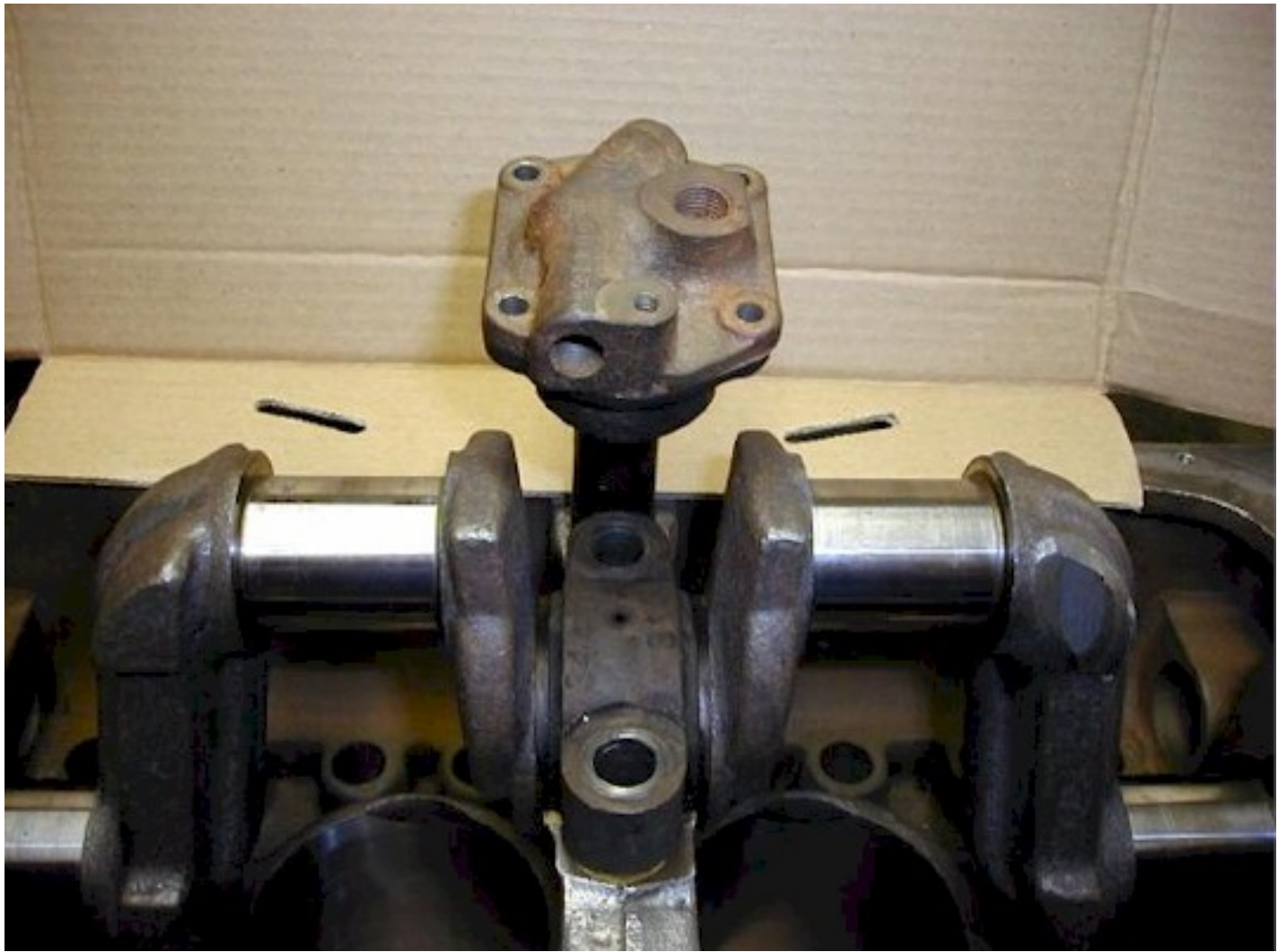
My objective was to go to a gear pump and overcome the sometimes failure of the vane pump to stay primed and provide more pressure and volume.



Above left is a gear pump and on the right is the vane OE pump. The pump shaft on the gear pump has been modified by threading the end and mounting a permanent extension to mate the distributor.



Ever inspect your OE pump and discover what appears to be abnormal wear on the drive end? Well, that is not wear. That groove is put there to 'hook' the distributor and make the two shafts operate as one. Otherwise the distributor would jump up and down as it rotated. The OE pump is on the right and the NEW pump is on the left.



This is a test fitting to insure that the crank throws will not hit the new pump. Notice even the cap bolts are not installed. Everything looks good at this point. Notice that the pump extends much lower into the pan. This is a major advantage, as a portion will actually be submerged in the sump oil.



I have disassembled the pressure regulator valve to insure thorough cleaning. Never did find out what the exact release pressure was on this pump, but it really doesn't matter. Pressure could be adjusted by cutting some of the spring off (less pressure) or stretching it (more pressure) or by replacing the spring.



More test runs to insure I could run the pressure line and not have it interfere with the crank throws. Fittings have to be matched to make the pipe fit. First fitting of the pickup shroud to insure clearance with the oil pan.



All the test runs have now been made. All components will fit and operate. Now they must all be removed so we can take up the "Laying of the Crank". Sorry to disappoint you, but the next class will cover the remainder of the moving engine parts and how they are lubricated.



Posted by **MrMack** (Forum Member # 21) on November 12, 2002 21:03 :

OK Teach,..... but first to the question about the orifice in the gauge line, it may be to resist any surge upon start-up. The manual states that the upper part of the line should contain air that acts as a cushion and prevents oil from getting into the gauge. OK.....let her RIP!

Posted by **ChevyChip** (Forum Member # 2) on November 13, 2002 07:46 :

Thanks Mack,
Your comment reminded me of something that people often do thinking they are really

doing good. They bleed the oil line at the gage to make sure the line is clear. Don't do it!!! Two things happen the acids that are in the oil can destroy the gage tube and the oil will act as a buffer in pressure measurement.

Air can move through the tube much faster than oil. As the pressure changes in the engine the air in the gage line can therefore react much faster.

Ever wonder why Chevrolet used such a small line to the oil gage? Now you know. Or you still don't know? To help keep oil from the gage.

Posted by **ChevyGuru** (Forum Member # 342) on November 13, 2002 10:25 :

Hey, Teach!! <hand waving frantically>

A "Devil's Advocate" question (hope I don't get in trouble for this!).

Is the OE pump really so inferior that it is worthwhile to change/update? If we are worried about volume more than pressure? Was this a weak link in the original design, or something that advancing technology just dramatically improved?

I'm sure the change is being made to improve the engine's durability, as the car will see more touring than showing - and, I realize that when completed this modification will be invisible, but I was thinking of the "Preserve and Restore" - "as delivered to the original retail owner" - those type of philosophical concerns....

Thirty years from now, when some future owner opens the engine, what will he make of all this?



Posted by **MrMack** (Forum Member # 21) on November 13, 2002 18:38 :

My questions are:

(1) When did the gear pump first become available for the 1928 engine?

(2) Is the pump shown the present standard replacement, or is it manufactured for another engine and is being adapted to the 1928 engine?

(3) Is the vane type original pump readily available from the vendors that cater to the early Chevrolet 4 cylinder engine or is the gear type pump your choice because you expect more reliability from this pump?

(4) Is the gear pump ordinally mounted lower in the pan, as you are doing, and an distributor drive extension required for the 1928, or is there another way it is sometimes mounted where the extension shaft isn't required for the Chevrolet engine?

Posted by **mromano** (Forum Member # 43) on November 14, 2002 09:46 :

I am in agreement with ChevyGuru. The lucky person who has this car in the future will want to argue that this oil pump must be some kind of option available in '28, not knowing what went on in the fall of 2002. Just my \$0.02.

Posted by **d2d2** (Forum Member # 237) on November 14, 2002 11:42 :

Why would Chevrolet use a gear pump for part of 1928 and then go back to a vane type pump for the sixes? For the same reason they went back to cast iron pistons? Why would you need to increase oil pressure if the bearings are oiled by gravity? Some aftermarket rebuilt pumps I have seen had only the casting number, all other marks were ground off and the Chevrolet casting number became their part number.

Posted by **AntiqueMechanic** (Forum Member # 13) on November 15, 2002 00:57 :

Q&A

MrMac, ChevyChip,

I don't see anything in the repair manual or the owner's manual about not bleeding the oil line to the gage. All I find is a picture of the lubrication system and in that picture it points out the air cushion. As to the purpose of the restriction in the line to the filter. If it was not there, and we had a new filter, which would provide little restriction to the oil, I suspect the oil pressure reading would be very low. Perhaps the most interesting thing about the oil pressure gage is the comment in the repair manual: "It should be noted that the oil gage is an indicator only and merely shows whether or not the oil pump is working". Do I see a futuristic engineer who wrote that, as envisioning the 'idiot lights', which were so popular in the '60s?

ChevyGuru, mromano,

I have been cogitating on your query for many hours now and have concluded that it is a possible set up/bait that could lead into a jumbled thread, as did the famous 'battery' discussion. This begs the question of what you would say if a crumbled distributor on a '25 were replaced with a new body made of much better material? And that item is visible. Quoting from my post of Nov 12 2002 20:54: "Although the '28 OE pump is normally satisfactory it was my desire to see if improvements could be made. My objective was to go to a gear pump and overcome the sometimes failure of the vane pump to stay primed and provide more pressure and volume."

MrMack, d2d2,

The OE oil pump for the AA and AB (Capital '27 and National '28) is a vane type pump part number 360954. That is the only pump provided for those engines. Assuming your pump was defective I do not know any supplier that can provide that pump. However, a

replacement gear pump is available for just less than \$200.00 from several vendors. Although I have not personally inspected one of these pumps I suspect it would be very similar to my solution to the replacement problem. My solution is considerably cheaper and gives me the flexibility of selecting the method of mounting. Some inherent problems can be eliminated by my decision to mount the pump as low in the sump as possible.

Now students, our subject tonight is the continued discussion of the internal lubrication of the engine. We have already discussed how the mains are oiled, that is by means of the three reservoirs. The three cam bearings (not actual bearings but machined surfaces within the block) are also lubricated by their own reservoirs. So at engine start up after considerable time has expired a total of 6 reservoirs must be filled. This is accomplished by the 4 rods/throws contacting the oil in the four troughs. Earlier, we discovered how these troughs were filled by the 4 pipes from the oil distributor. On the bottom of each rod is a tang that hit's the oil on each revolution and splashes it all over the interior of the block. This oil mist is what lubricates the cylinder walls and piston pins. Excess oil is wiped down the cylinder walls by the bottom, or oil control, ring. The oil being forced through a hole located near the tang lubricates the big end bearings of the rods. This oil is circulated through the bearing surface and exits on top through two holes provided for that purpose.



Notice on the picture the hole in the rod-bearing cap. This is the entrance hole for the oil. The tang is located in the picture just below the hole. The hole has been chamfered

slightly to funnel more oil into the bearing.

We now have covered the interior lubrication. This still leaves the lubrication of the timing gears and front of the engine and the valve train. This will be done at a later date. Enough for now-----Class dismissed.



Posted by **Chev Nut** (Forum Member # 252) on November 15, 2002 06:28 :

Two comments from some one who knows very little about 4 cylinders.....This confirms my earlier suspicion about AntiqueMechanics intrest in 1936 oil pumps.I just knew one was going to enter the rebuild.The original '36 oil pump was a vane pump as a 4 cyl. was .The gear pump was first used in 1937.In the later years Chevrolet made a replacement gear pump for 1929-1936 models.It came in kit form and contained The screen.line, and fittings required for the change.A great up-date for those years too.....The first 5 years of the F--d V-8 the main bearings were poured directly into the block and caps as per Rays method.

Posted by **ChevyGuru** (Forum Member # 342) on November 15, 2002 07:21 :

Hey, Teach-

No intent to bait, set-up, nor defraud here! It was a sincere question.

I think you have answered it. Actually, your answer to d2d2 & MrMack possibly answered it better- you said "The OE oil pump for the... '27 and '28... is a vane type pump part number 360954..... Assuming your pump was defective I do not know any supplier that can provide that pump. However, a replacement gear pump is available for just less than \$200.00 from several vendors. Although I have not personally inspected one of these pumps I suspect it would be very similar to my solution to the replacement problem."

That statement, together with the added information in Chev Nut's post immediately above, answers me.

I guess, therefore, if a guy wanted to rebuild the 4 cylinder WITHOUT this type of update, he would either have to get lucky and find an NOS oil pump somewhere, or just clean up and re-use his old one (possibly not a real great solution for a car to be used in touring).

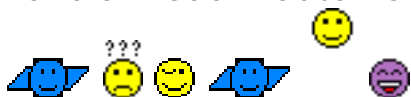
Now I understand where you're coming from...



Posted by **MrMack** (Forum Member # 21) on November 15, 2002 07:47 :

This pump installiation opens up a lot of possibilities for those of us that intend to do a lot

of touring of our 4 cylinder Chevrolets. It is apparent that these types of modifications have been around for some time. Access to a few basic machine tools will allow many modifications that should improve the performance and reliability of the engines, I can see why the old four cylinder racing engines did so well, All you need do is get the idea of maintaining originality out of your mind, get to work, and the next thing you know we will have a modern automobile that "looks" just like a 1928 Chevrolet.



Posted by **DdeuceMan**. (Forum Member # 69) on November 15, 2002 15:53 :



Posted by **Chev Nut** (Forum Member # 252) on November 18, 2002 19:16 :

The 1936 replacment gear pump must be a modified 1937-39 oil pump because it uses a ball for the oil pump relief valve.From 1940 and up a valve was used.The spring is the same for the original 1937 relief valve thru 1953 (low pressure engine) so the max. pressure relief is the same for all these engines.The oil pump screen and cover is also the 37-39 style so that would make sense..also in those years the support and pipe are not bolted to the main bearing cap as they are in'40 & up....I have the 1934 gear pump unit in my '34 and it produces higher oil pressure than my 39.Often thought it may have been the '40 and up style pump which had larger gears and gave better presure. Its still an improvement over the orig. '34 vane pump.Was a '36 pump chosen because that is the only year the 6 cyl. pump had the female slot on the end of the pump as a 4 cyl. has or wasn't that criticle ?????

Posted by **MrMack** (Forum Member # 21) on November 18, 2002 19:51 :

Gene, I have a pump in my shop that I took out of a 216 engine that outwardly looks idenitical to the replacement Ray is using including the pickup screen. This pump was a low pressure pump out of the old babbit pounder. The engine number indicated it was a 1951 engine. The ease of fitting the pump to the 4 cylinder is a real eye opener for me, I never considered this method of a modification. I am anxious to see what he does with the head and valve train and rocker arms.

Posted by **Chev Nut** (Forum Member # 252) on November 18, 2002 19:59 :

MrMack,Ona picture it may look the same but the screen is of a different size and the mounting of the screen is different.Check my last post""I did an edit.On the 37-39 the pick-up is direct and not bolted to main brg.cap.

Posted by **MrMack** (Forum Member # 21) on November 18, 2002 21:09 :

Gene, aren't all of the Chevrolet oil pumps from 28 to 62 pulled by the distributor with a male distributor and a female pump shaft? The gear pump shaft was threaded and an extension shaft screwed on, and probably locked. can't see why or how the pump can capture the distributor shaft, don't it just mate tang to slot? Why would the distributor shaft jump up and down?

...and it looks like the screen housing was ground down to fit the 28 pan.

Posted by **Chev Nut** (Forum Member # 252) on November 19, 2002 16:25 :

In the 1929-36 oil pumps the 1936 is the only one that the tang that connects the dist. shaft to the oil pump (male end) is located on the end of the distributor. Also the oil pump shaft is larger, 9/16" instead of 1/2 & set screw is 3/32" larger. The 1936 distributor and oil pump fit only a 1936 due to these changes. When Chevrolet made the gear type oil pumps to update the 29-36 vane pumps there were five variations, 604506 fit 29, 604507 fit 30-32 & 33 & 34

Std., 604508 fit 33-34 except Std., 604509 fit 35 and 604510 fit 36. These were complete change over kits with all parts included to install..... The end of the dist. slips into the oil pump---no connectors-----on the 216 set up the slot in the oil pump engages with the the pin thru the dist. gear.

Posted by **AntiqueMechanic** (Forum Member # 13) on November 19, 2002 17:47 :

Q&A

Chev Nut,

Your comments of Nov 15, 2002 06:28 are 100% correct and on target. More response later.

ChevyGuru,

Didn't mean to get so uptight, but wanted the thread to stay as reasonably close to the original subject as possible.

MrMack,

My idea of replacing the oil pump with a gear pump is not at all original even if a vane pump were available. This has been done for years. However, I think your comment is a bit strong about the idea of maintaining originality. Unfortunately our history file on this site doesn't go back far enough to include the farce I wrote on replacing components on a '28 with S-10 items. Short story was that EVERY item was replaced except the Griffin Radiator Cap because I wanted to at least keep it ORIGINAL.

Chev Nut,

Your posts of Nov 18, 2002, 19:16 and Nov 19, 2002, 16:25. All of the data you have posted is extremely informative. That is an excellent summary of the original oil pumps and the updating of all the early vane pumps by a gear pump. Obviously Chevrolet felt the gear type pump was superior to the original vane type. The 64-dollar question: Why did I choose a '36 pump? Because that one was in stock. Any gear pump of the period would have been acceptable. In my application, either the entire shaft could have been replaced or since I did not have a piece of round stock of the proper size on hand it was easier to cut, thread and extend.

MrMack,

Your posts of Nov 18, 2002, 19:51 and Nov 18, 2002, 21:09. All of these oil pumps can be easily identified by the part number, which is on the shaft and repeated on the pump cover. If you go back to the second picture in the post on the oil pump you will notice that there is an indentation on the slot to 'capture' the distributor. The only thing that holds the distributor in the engine is a single screw which is spring loaded. With a slot and a tang mating the distributor will be mobile as the cam gear is forcing the distributor in two directions simultaneously. Therefore the slit is modified to 'hold' the distributor shaft. Other modifications were made to the installation to provide for 'fit'. And finally, the model number that I used was 604510.

Okay students, I promise that the next class will be on the installation of the crank. Class dismissed.



Posted by **MrMack** (Forum Member # 21) on November 19, 2002 18:30 :

Ok, that splains my question satisfactorially, and I did remember your comment about the S-10, I have no problem using a modifed pump in order to complete an engine and get the car onto the road, I just wouldn't see why it would be done to increase the oil pressure. but to do it because an original pump is not available at a reasonable price sounds like a good idea, otherwise someone that hordes a few original items can hold you up ,pricewise, and it happens too often, IMHO

Posted by **AntiqueMechanic** (Forum Member # 13) on November 21, 2002 01:09 :

Class is in session. Please take your seats.

We have just a few more loose ends to tie up before we "lay that crank". While the crank is out of the block is a good time to make the final installation of the oil distributor assembly with pipes.



This is one of the attachment points in the block to secure two of the pipes. Notice that this is a through hole in the block. Any time you have a hole that goes through the block you have an excellent chance for an oil leak.



[IMG]

On the left are the two brackets that secure the pipes on each end. Notice there is a bolt, a lock washer, and a copper sealing washer. In the center of the picture is the bracket that holds the spark rod as it goes through the engine block between #2 and #3 cylinders. To the right is another copper sealing washer and finally the fittings that go through the block to attach the distributor.



[IMG]

One of the items we all have sitting on the shelf in the shop is a can of gas tank sealer. This is the old formula that was yellow and was named "yellow snot". It is no longer used to seal the tanks as it was not resistant to alcohol and has been replaced by the 'white snot'. The company that never did get their engine colors correct, but that's another story made this stuff. The reason we didn't throw away the yellow stuff is that it makes an excellent sealer. By using this stuff it is safe to reuse the copper seal. The seal has been dipped into the sealer and is now ready to be assembled.



This is the return fitting from the oil filter and also has a copper washer for sealing purposes. It has also been dipped in the gas tank sealer and is ready for assembly.

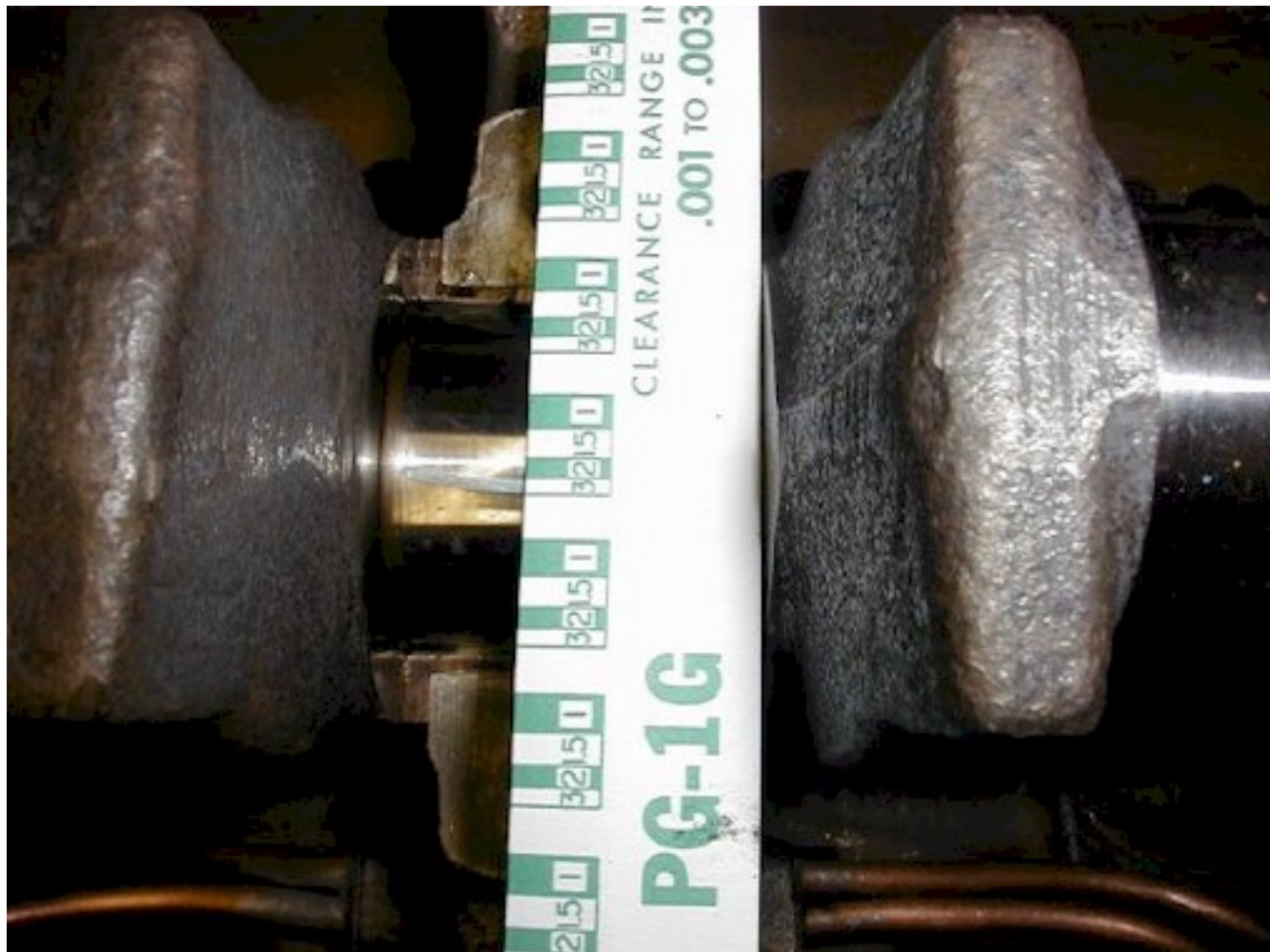


This is one side of the oil distributor and shows two of the pipes. Notice the special bracket with the through bolt and the square nut. This bolt, copper washer and nut were also dipped in the sealer before assembly. The other two pipes are held on the other side of the engine by the same type bracket, bolt, washer, and nut. The fitting you see in the picture is for the connection to the oil pump and is the feed line.

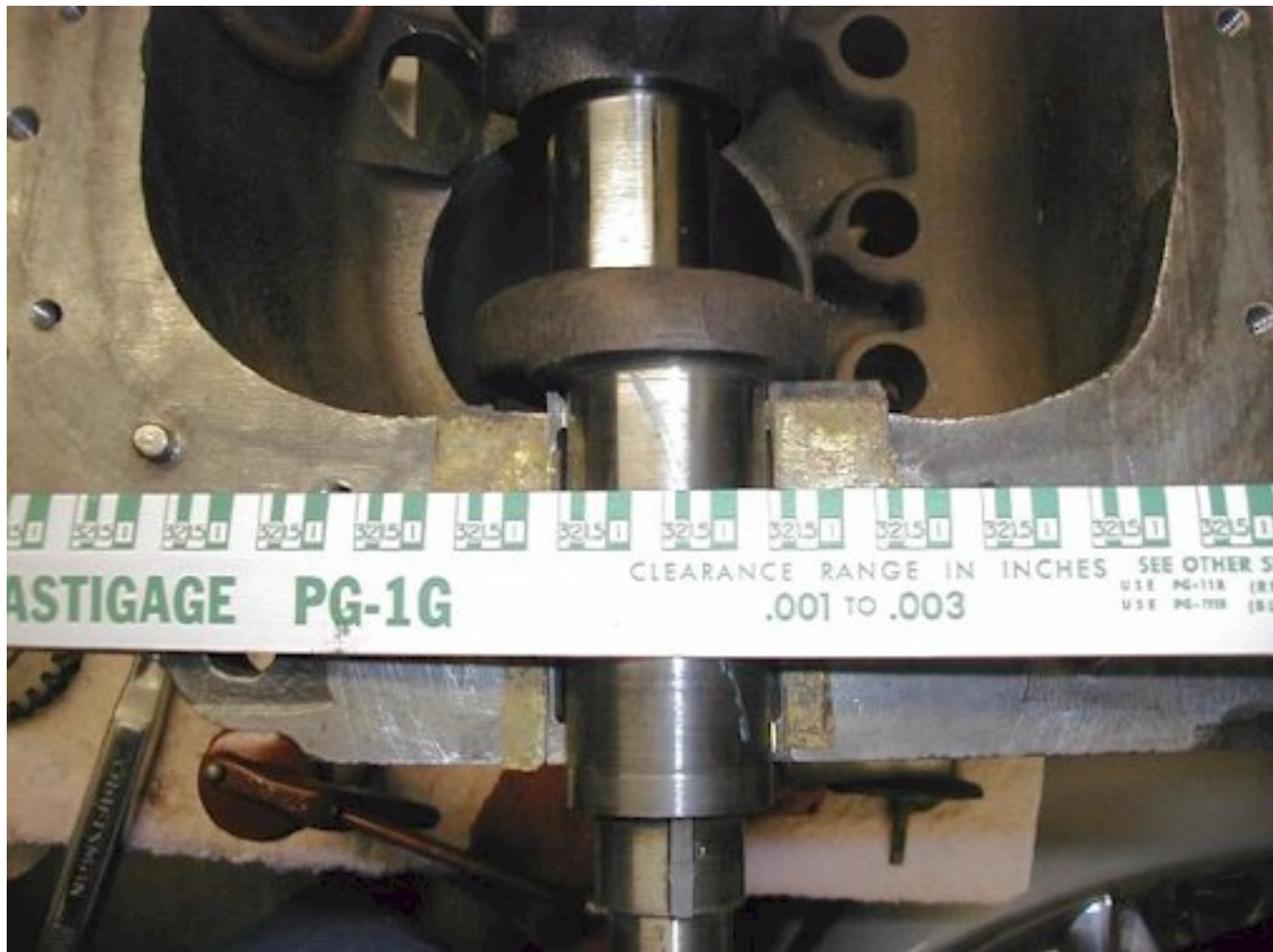
In preparation to lay the crank it is still squeaky clean from the hot tank and the polishing procedure. The $\frac{1}{2}$ shells have been laid in the block in their assigned spots and are also clean and dry. Very carefully the crank is laid into position. When the engine was disassembled note was made of any and all shims used in each main bearing and their location. As the engine obviously has seen many hours of operation, shims are removed arbitrarily for the first test fitting. One method of checking the oil clearance in a bearing is the use of PLASTIGAGE. This is a wax like material that is shaped in a string and has an exact size. This string is placed between the bearing and the crank, the other $\frac{1}{2}$ of the bearing is installed, the bolts are torqued to specifications and then the caps are removed and the displacement of the plastigage is measured with a scale provided. This tells how much clearance exists. Plastigage is available in three sizes. The green package is for measuring clearances from .001 to .003, the red is used for .002 to .006 and the blue is used for .004 to .009.



This is the rear main. I have laid the plastigage diagonally across the crank in order to measure some width along with the length. Actually, the crank should be measured at two different locations. With the crank at top dead center and at a 90 degree location. This is to check for egg shaped crank. Most wear on the crank would be at the top or bottom of the piston travel. All shims were removed from the rear main. It appears that my oil clearance is about .002. The repair manual does not specify a clearance for oil, however it does caution against having them too tight. This would cause heat that could easily melt the thin coat of babbitt. I am satisfied with the .002, but realize the next time the engine is repaired it will be necessary for new mains as there are no more shims to remove.



This is the center main. The reading here is also about .002+ and all shims have been removed here also. The center main serves as the thrust bearing in the 4-cylinder motor. When you push in on the clutch you are shoving the crank up against one side of the center main. The clearance for the center main thrust is .004 to .006. This clearance can be measured with a dial gage or by use of feeler gages.



This is the front main. The reading here is also about .002+. This bearing still has a number of shims left on each side. However, because the center and rear are out of shims the next disassembly will call for a complete rebuild.

Now that all the bearings have been measured we can get ready to 'button up' the crank. All traces of the plastigage must be removed from the crank and bearing shells. The crank should be removed for the final time. Each bearing $\frac{1}{2}$ must be liberally oiled with assembly lubrication. The crank should also get a good coat at all the bearing surfaces. Starting with the center main each bearing cap should be torqued to specifications. After tightening each bearing the crank should be turned to insure it still turns easily. The assembly lubrication makes the crank harder to turn than when it was dry. When all bolts are tight the locking tabs should be engaged on each cap bolt.

Now that we have 'laid the crank' we will work on the front of the engine next session. Class dismissed.

Posted by **ChevyChip** (Forum Member # 2) on November 21, 2002 10:22 :

Student with hand waving in back of the room.
Hey Teach, I have a few questions.

Do you recommend rotating the shaft on dry bearings? Is it only for shafts that have been

polished and checked for straightness? How is straightness checked?

Was the thrust 0.004-0.006" as measured in places around the shaft and bearing? Of were you just giving us the specification range?

Student now standing on desk to get better view of engine and as a result of excitement.

If the thrust is in specifications aren't you really lucky as most of the engines that I have measured have over specification thrust when there are still shims in the main bearings. I think it may be from people riding the clutch or holding the clutch pedal in while stopped for long periods.

Did you do any checks for the integrity of the babbitt? If so what were they? If not how do you tell if the babbitt is not getting oxidized and brittle? If brittle then it will come loose from the shell and all hell will break loose (pun intended).

Ok, I will let other students have a chance. Sorry but I get excited when we get to the putting back together stage.

Posted by **MrMack** (Forum Member # 21) on November 21, 2002 14:36 :

So, you were able to tell that the thrust wear was at the forward side of the bearing flange? is there a thrust wear shim for the bearing flange, or must it be replaced when the thrust wear exceeds specs? I suppose there is also other damage internally to an engine from riding the clutch, and not just to the clutch itself, very interesting! Charlie Chip Chan.....

Posted by **Chev Nut** (Forum Member # 252) on November 21, 2002 15:13 :

The Chevy 4 was a common engine to modify for racing. What did they do for lubrication??? With the mains depending on oil thrown up by the rods it must have taken forever for the mains to receive oil ...especially in cold weather. It would take a bit of plumbing but piping oil up to the mains as in '29-'31 would sure help. At 50 MPH 3.82 gears and tall tires the engine must be turning over at about 2100 RPM which must be the limit for a stock engine.

Posted by **AntiqueMechanic** (Forum Member # 13) on November 22, 2002 00:48 :

ChevyChip,

Q:

Student with hand waving in back of the room.
Hey Teach, I have a few questions.

Do you recommend rotating the shaft on dry bearings? Is it only for shafts that have been

polished and checked for straightness? How is straightness checked?

A: The reason I wanted the crank and bearings dry is to get a more accurate measurement. With a polished crank and seated bearings the chance for damage is small. When the crank was in the lathe for polishing the straightness was checked and found to be satisfactory. The limit is within .002 of perfect.

Q:

Was the thrust 0.004-0.006" as measured in places around the shaft and bearing? Of were you just giving us the specification range?

A: The figures given were the specifications. Actual measurements were pass on a .006 feeler gage and lock on a .007. On the outside of specifications but still acceptable. If the engine has a detectable knock this figure could enter into the diagnosis.

Comment:

Student now standing on desk to get better view of engine and as a result of excitement.

Response: Please get off the top of the desk. If you were to fall your parents would hold me responsible.

Q:

If the thrust is in specifications aren't you really lucky as most of the engines that I have measured have over specification thrust when there are still shims in the main bearings. I think it may be from people riding the clutch or holding the clutch pedal in while stopped for long periods.

A: As I constantly recommend against prolonged idle, this is another no no. If it is apparent that the clutch must be depressed for a sustained period the transmission should be shifted into neutral and the clutch released. The center thrust bearing is a more durable material than the bearing, however it is commonly worn badly on most disassemblies.

Q:

Did you do any checks for the integrity of the babbitt? If so what were they? If not how do you tell if the babbitt is not getting oxidized and brittle? If brittle then it will come loose from the shell and all hell will break loose (pun intended).

A; Each of the 6 ½ bearings were removed from their seats and shells and inspected. The mating edges were filed where the babbitt had drifted to the mating edges. None of the bearings showed any signs of cracking or gouges. Some discoloring was observed, but in the end all bearings were found to be serviceable.

Comment:

Ok, I will let other students have a chance. Sorry but I get excited when we get to the putting back together stage.

Response: The most exciting part is the first firing of the engine after installation.

MrMack,

The wear on the thrust bearing is on the back side of the bearing. The crank is thrust forward against the back side of the bearing. There are no shims associated with the thrust bearing and if out of specifications must be replaced.

Chev Nut,

I do not agree that it takes a long time to splash oil on the main bearings. Unless the engine has been idle for a considerable time period there would still be residual oil in each of the reservoirs. As soon as the engine was started the bearings would receive some direct splash and the reservoirs would fill quickly. In modifying the 4-cylinder engine for race use the most critical lubrication issue would be an oil pump that had sufficient capacity to keep the 4 troughs full at all times. While on the National Pre-29 Meet it is not unusual to find most cars capable of sustained speeds at or in excess of 40 MPH. I estimate that I was doing in excess of 50 MPH in my '25 when I blew the timing gear in Durango, CO.



Posted by **MrMack** (Forum Member # 21) on November 22, 2002 06:08 :

OK, I see what you mean by the wear on the rear flange by the crank being thrust FORWARD, I was 180* off I reckon, that was what I was wanting to know, And I agree with Chip that the splash and dip system should provide instant lubrication to the lower engine parts, except maybe the timing gears. I believe the main addition to a higher volume and pressure gear pump , for racing engines, the main modification was a large volume pan to give a large volume of engine oil for additional cooling and as a hedge against oil consumption

Posted by **Chev Nut** (Forum Member # 252) on November 22, 2002 07:24 :

The main bearing thrust problem is not only on stick shift cars. With an automatic trans. this can be a problem too. Under constant heavy loads, most common in trucks, the torque converter can exert pressure on the thrust bearing also..... Also have seen it mentioned in older manuals that if there is still too much end play in the crankshaft due to wear the new bearing can be built-up with solder to take up clearance..... Also glad to hear MrMack admit he is a little off ^{???} 😞 like the rest of us old car nuts.

Posted by **AntiqueMechanic** (Forum Member # 13) on November 22, 2002 17:10 :

Gotta quit making my posts after midnight.

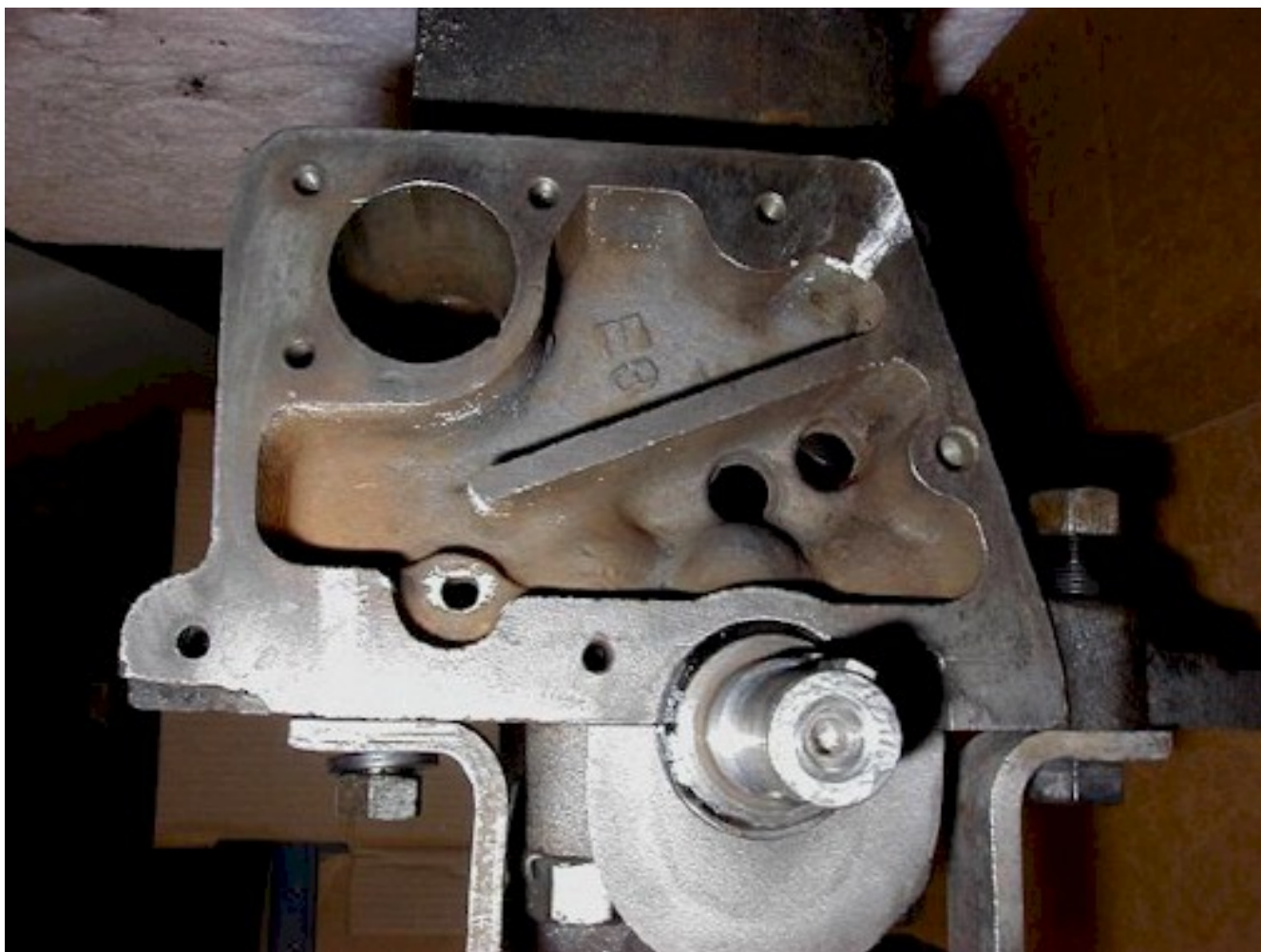
In addition to replacing the center main/thrust bearing, the crank can be welded and turned to fit the current bearing. That would have been an option in my case. This solution can generate more work however. After the welding and turning the crank, it will be necessary to check the straightness again as the heat from the welding could affect it.



Posted by **AntiqueMechanic** (Forum Member # 13) on November 25, 2002 00:21 :

Attention students, class is in session again.

This session continues the study of the oil flow. The picture is of the front of the engine. This is before the gear cover plate is installed. You can see the front end of the crank in the lower right side of the picture. The large hole in the upper left is the front cam bearing.



If you look directly above the crank you will observe two holes close together. These holes go through to the inside of the block. These two holes are the main entry for oil into this cavity. The single hole marked with chalk in the lower left is the return hole back to the pan/sump. In the extreme upper right of the picture is an entrance hole from the outside of the block. This hole is where the end of the draft tube from the carburetor is attached.

More on this tube later, but this is where the burned gasses are scavenged and directed back into the intake through the carburetor. In the lower left corner marked by chalk is the location of one motor mount bolt. This is a **through** bolt. That is, it is threaded into this cavity. If you have an oil leak at the front of the engine that is driving you crazy, remove this bolt, coat with the gas tank sealer (yellow snot) and replace. Notice that at about 4:30 on the cam bearing is an oil groove. Splash oil from inside the engine and from the reservoir above the cam bearing can traverse this groove and will end up past the gear cover plate to lubricate the cam gears. Other than the small amount of oil that gets by the front main bearing this is the only means of lubrication for the cam gears.

Class dismissed. More study on the system to lubricate the cam bearings and other locations to leak oil in the next session.



Posted by **AntiqueMechanic** (Forum Member # 13) on November 27, 2002 22:04 :

Since tomorrow is Turkey Day the class will be short so you can get ready.

This picture shows the block upside down and is the passenger's side.



The locations marked 1, 2, & 3 in chalk are soft plug locations. However, water is not behind them. These are the access holes that are drilled from the outside through the cam bearings and all the way into the reservoirs for each cam bearing. It is necessary to

remove these soft plugs before the block is hot tanked. In the cleaning process a wire brush can be inserted all the way into the reservoirs for a good thorough cleaning.

When we have finished assembling the block the new soft plugs will be installed and as usual sealed with a liberal application of "yellow snot".

Note the two holes between #1 and #2 on the photo. They are indicated by the two arrows in chalk. These are through holes used to mount the oil filter and coil mounting bracket. So, since they are through holes, what do we do with them students? Correct, a liberal coating of the "yellow snot" on the threads of the two mounting screws.

Directly to the left of the #2 is the setscrew and locking nut for mounting the oil pump.

Class dismissed. Don't overeat on the turkey and be back in class for the next project, the timing gears and cam installation.



Posted by **AntiqueMechanic** (Forum Member # 13) on November 30, 2002 00:46 :

Students if you are not too full of turkey and vittles we will continue with the study of the 1928 4-cylinder engine.

The next step in the assembly is the camshaft.

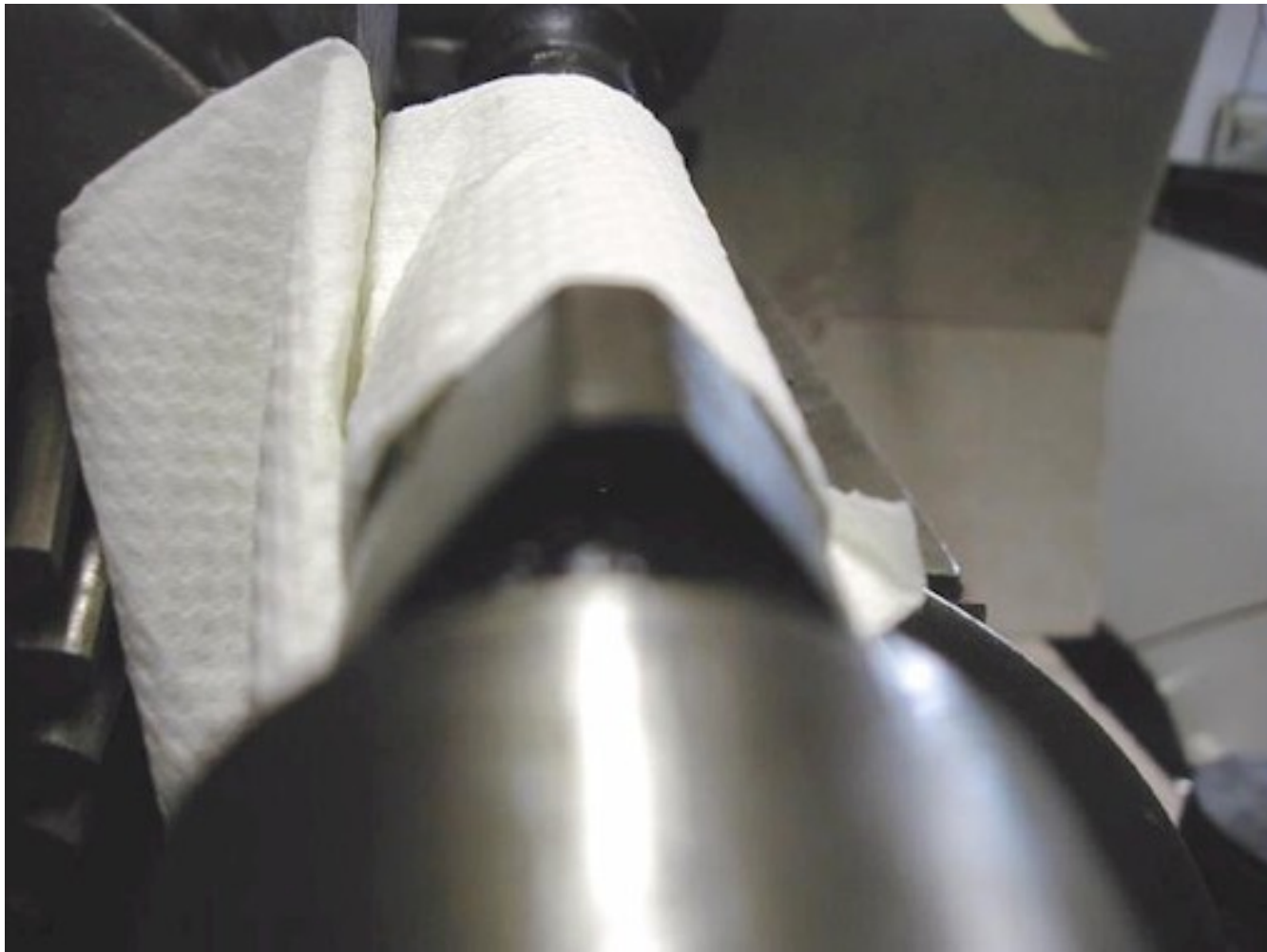


Notice the plate behind the cam gear with two holes in it. That is the camshaft thrust plate. This plate is installed on the cam first followed by the cam gear. The cam gear is pressed on to a clearance of free to .001.

Initially when the cam was removed and before cleanup it was decided to reuse the cam as removed. After cleaning it up it was decided that although not absolutely necessary it would be best to have it reground.



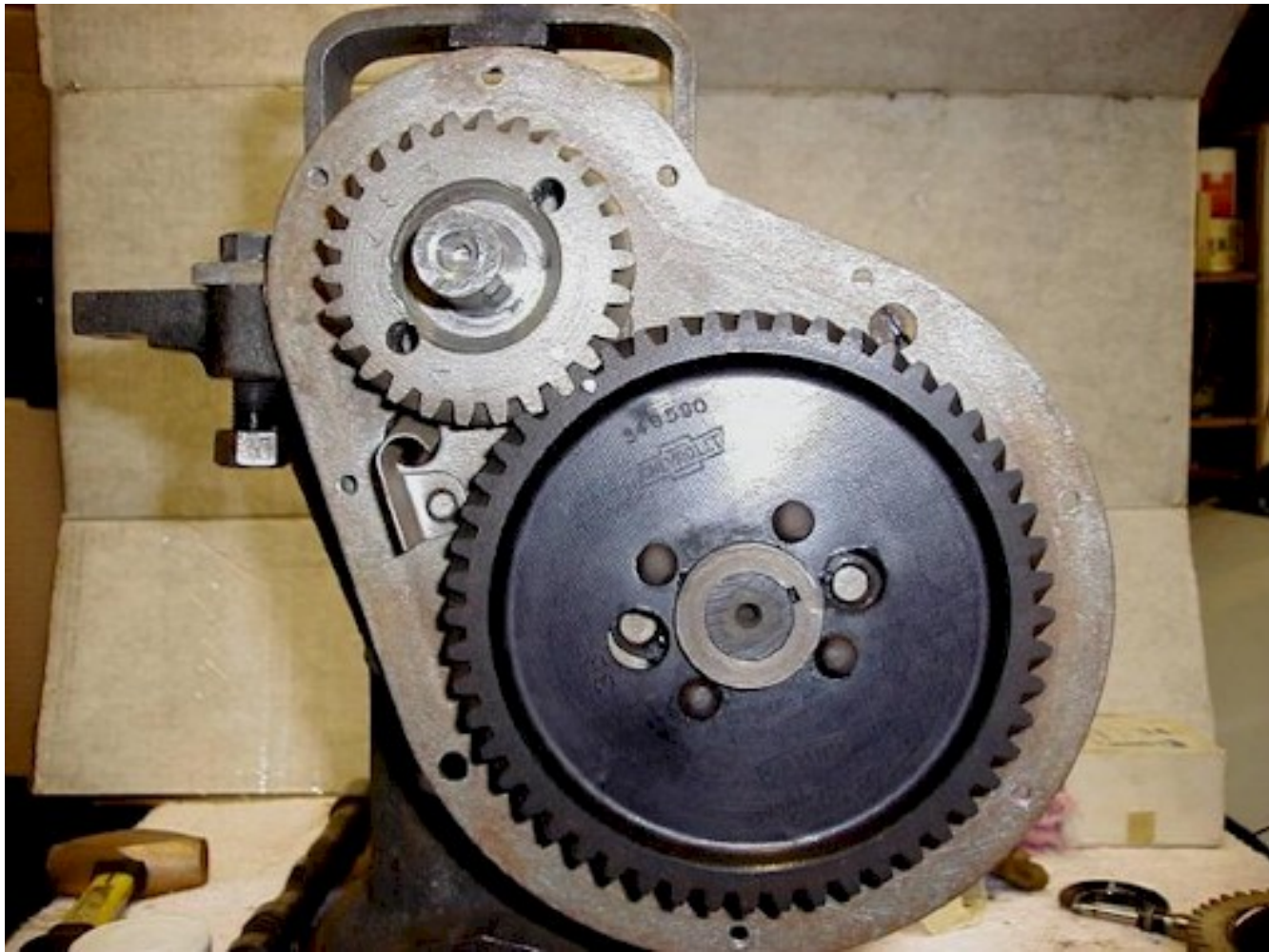
This is what you expect to see a cam lobe look like. A nice clearly defined point. In most 4-cylinder engines all the lobes look like this one. However, in the 1928 engine this lobe is only used for the exhaust valves.



This is the shape of the intake valve lobes. Notice that this lobe is almost completely flat on the top. This configuration holds the intake valve open longer allowing a greater charge of the air fuel mixture.



The lifters were changed on the 1928 engine to the flat bottom type, which are the preferred type, and are used in later Chevrolet engines. The lifter on the right is the '28 lifter and the one on the left was used on most of the early engines. The early lifter had a slightly rounded end, and as a result wore a saddle in the lobes of the early camshafts, because of this configuration. Much less wear, and therefore extended life, is experienced on the '28 camshaft.



After a good coating of both the camshaft and the bearing surfaces in the block with assembly lubrication, the cam is inserted into the block. This application uses a metal crank gear and a fiber cam gear.

In 1927 Chevrolet reversed the normal composition of the crank and cam gears in the engines. For '27 the cam gear was metal and the crank gear was fiber. Another confusing issue was the use of a different number of teeth in each gear. For 1927 ONLY, the tooth count was 46 cam and 23 crank. All other gear sets were 52 cam and 26 crank. The '27 gear sets may be used in the '26 and '28 engines IF USED AS A SET ONLY.

Here is where we start getting in trouble. The mating mark on the cam gear is on a TOOTH. The mating mark on the crank gear of course is on the valley or between two teeth. IF YOU HAVE THE AA-AB CHEVROLET REPAIR MANUAL EFFECTIVE FEBRUARY 1ST, 1928, GO IMMEDIATELY TO PAGE 42 AND CORRECT FIGURE 42 FOR THE SERIES AB. The assembly marks are backward.

To make matters worse, and has been pointed out in this Chevy Chatter before, many aftermarket fiber cam gears are mismarked. If you have an OEM gear to copy the mark from, use it.



If you don't have an OEM gear you can construct a line through the center of the cam gear and in line with the keyway. Then count 15 teeth counterclockwise to locate the mating mark on the cam gear.

Enough for this lesson as I can see several of you nodding off as a result of overeating. Next class will cover the widely held misconception of the relationship between the assembly marks on the cam and crank gear and TDC (top dead center).



Posted by **AntiqueMechanic** (Forum Member # 13) on December 04, 2002 01:17 :

(Loud banging on the desk in an attempt to get the attention of the students).

In our dialog on cam gears we failed to mention the difference in width of the gears. The F, G, 490, Superior and U all used a cam gear that was 5/8 inches thick. The C ('27) and N ('28) used a 13/16-inch thick gear. Although the later (13/16) gear could be used on the earlier models in most cases there was not enough room under the cam gear cover for clearance. Extra gaskets and physically deforming the cam cover has been attempted in order to make it work. Some have attempted to shave off a portion of the gear. I can attest to the results of this scheme. I had shaved a gear that I used in my '25 and

experienced a complete destruction of the gear in Durango, CO. I believe that the removal of the hardened surface of the gear weakened it sufficiently that it failed.

For your viewing pleasure.



1927 Capital 13/16 steel cam gear part number 346875. This gear is for use with the fiber crank gear part number 346874.



This is a 13/16 fiber gear part number 348590 and is used with the steel crank gear part number 348591.



This is an after market fiber 13/16 gear for use with the steel crank gear in either the '27 or '28 if used with the steel gear. This gear was NOT mismarked. It wasn't marked at all. The mark you see added was based on a transfer from an OEM gear.



Study this picture closely. You will see that the marks on the cam and crank gear are 'mated'. Now look at the location of the crankshaft. Notice that the lobes are not vertical. The point I am making is that this is not the TDC (top dead center) that would be used for the installation and registration of the distributor. For years it has been difficult to convince people that the mating marks are FOR ASSEMBLY ONLY and have absolutely no relation to the TIMING of the engine. It is easy to see from the picture that if you looked through the hole in the flywheel cover you would NOT see the timing mark. After the timing gear cover is installed, so you can't see the marks, is the time to place #1 cylinder at TDC, with both valves closed, and then install and time the distributor.

Class dismissed. Please place your chairs under the table, and don't forget to take your books with you. And would someone please erase the blackboard and dust the erasers? Thanks.



Posted by **K1dan** (Forum Member # 695) on December 04, 2002 04:37 :

Thank you so much for the very informative lesson, Sir, however I would ask that you not bang on the desk quite so loud next class. You caused me to awaken so suddenly, I fell out of my chair and struck my head on JYD's steel toed boot. This in turn startled him causing him to bite my right forearm. After class I had to go the hospital for rabies testing and because we were not able to catch the mangy curr, (he was chasing Elvira and hasn't been seen since). I forced to spend about eight hours in the hospital to clean the wounds he inflicted and to get about 156 stitches. I have also had to endure a series of immunizations. (ya just never know where those Junkyard Dogs have been.)

Now, does the assembly procedure you just described apply to the Six as well?

Dan.

Posted by **ChevyChip** (Forum Member # 2) on December 04, 2002 08:24 :

Dan,
In a few words, basically yes!

Posted by **Chev Nut** (Forum Member # 252) on December 05, 2002 06:43 :

Although I didn't see you mention that you installed a new timing gear I assume that you did (at least the fiber) as I feel that this is weak link in the chain. 🤔

Posted by **old216** (Forum Member # 1300) on December 05, 2002 18:14 :

Very fascinating, this fiber gear on crank, steel on cam or steel on crank and fiber on cam. I wonder why they insisted on using fiber at all ? What would be wrong with steel to steel ? I have noticed that the later truck sixes used steel and aluminum, again why no steel to steel ?

I agree with Chev Nut, fiber is the weak link. I had one go on a 235 one time and never forgot that happening!

Posted by **Junkyard Dog** (Forum Member # 4) on December 05, 2002 18:29 :

It's a noise factor. 🤔🤔🤔🤔

Posted by **MrMack** (Forum Member # 21) on December 05, 2002 19:13 :

I replaced the first one I ever saw when I tore down a 52 PG engine back in the 50's and said "What is this Mickey Mouse thang?" even tho it was in fine shape, I replaced it with a aftermarket aluminum one from a local Speed shop. It was a little noisy, but I was a teenager with a lead foot and didn't mind a little noise (split manifold and glasspacs). Now I just go with the flow and replace them with new fibre ones. I suppose metal replacements are available somewhere on the swap meet circuit.

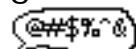
Posted by **Chev Nut** (Forum Member # 252) on December 05, 2002 19:40 :

The fiber gears were not all that bad. The important thing is their lubrication. Chevrolet constantly tweaked the oil flow to the gears but the passage tended to sludge up-causing the timing gear To wear. The problem was less when they went to full pressure oiling because the oil flow was better. Fiber gears were used on the 194--230--250 engines right up to the last years that they were produced and they were much more dependable than the chain drives on the V8s in those years. When ever a timing gear goes (you can usually hear it rattle) the oil pasage behind the front mounting plate should always be cleaned out.

Posted by **MrMack** (Forum Member # 21) on December 05, 2002 19:54 :

Chev Nut good advise, I have a extra block here from a 56 truck that was overhauled in 1988 and threw a rod because the shade-tree didn't line up a rod insert, or got it stopped up and the fiber gear is new, so I guess they are ok,

I have had a 400, a 305 and a 350 long milage engines that had to have the chain and gears replaced on. They are a bear to troubleshoot when they just jump one notch.



A fibre gear usually shucks a few teeth and..... that is all she wrote!!!..... An interesting thing, to me anyway, is that a chain driven cam turns in the opposite direction from a direct gear..... Have you ever thought about that?



Posted by **Chev Nut** (Forum Member # 252) on December 05, 2002 20:14 :

Yes its strange. On the Pontiac Iron Duke engine they changed from a timing gear to a chain in the last years of production. The fiber gears were always extreemly noisy in them but seldom went out. When they went to the chain they were not as noisy but had more failures..... If you read the introduction info. in 1954 they described a new stronger and quieter timing gear for just the Power Glide engine. the gear has a cast iron inner hub and

an aluminum outer gear separated by a synthetic rubber insulator .It was supposed to be stronger & quieter.It never was used in production-sounded like a good idea but???

Posted by **MrMack** (Forum Member # 21) on December 05, 2002 20:53 :

Cost was prohibitive?? and not more durable? That was about the time Chevrolet radios were really becomeing common so you needed a quiet engine???

Posted by **AntiqueMechanic** (Forum Member # 13) on December 09, 2002 01:06 :

Chev Nut,

As a matter of fact, I did not replace the timing gear. Admittedly, it has more backlash than recommended, prior experience tells me it will be okay. When you install a new fiber gear and run it for several hours/miles and inspect it you will find that the "hair" has been worn off and the gear will have approximately as much backlash as I have from using the old gear.

Barring additional questions, we will lay the timing gears to rest.

Time now to assemble the pistons, rods, and rings.

First step is to measure the ring gap. The ideal situation is for the ring to make a perfect continuous circle in the bore to prevent compression from escaping. This is not possible, as the ring will expand when heated. Therefore the ring gap must be established to account for this expansion and not seize when heated. To determine this spacing follow the instructions packaged with the rings. In this case the manufacturer specified a factor of .004" per 1" of bore. Or in our case $.004 \times 3 \frac{11}{16} (3.6875) = .01475$ or .015. To measure this ring gap, place the piston, without any rings installed, in the bore. Place a ring on top of the piston and square it away with the bore. Measure the ring gap and assure that it exceeds the .015.

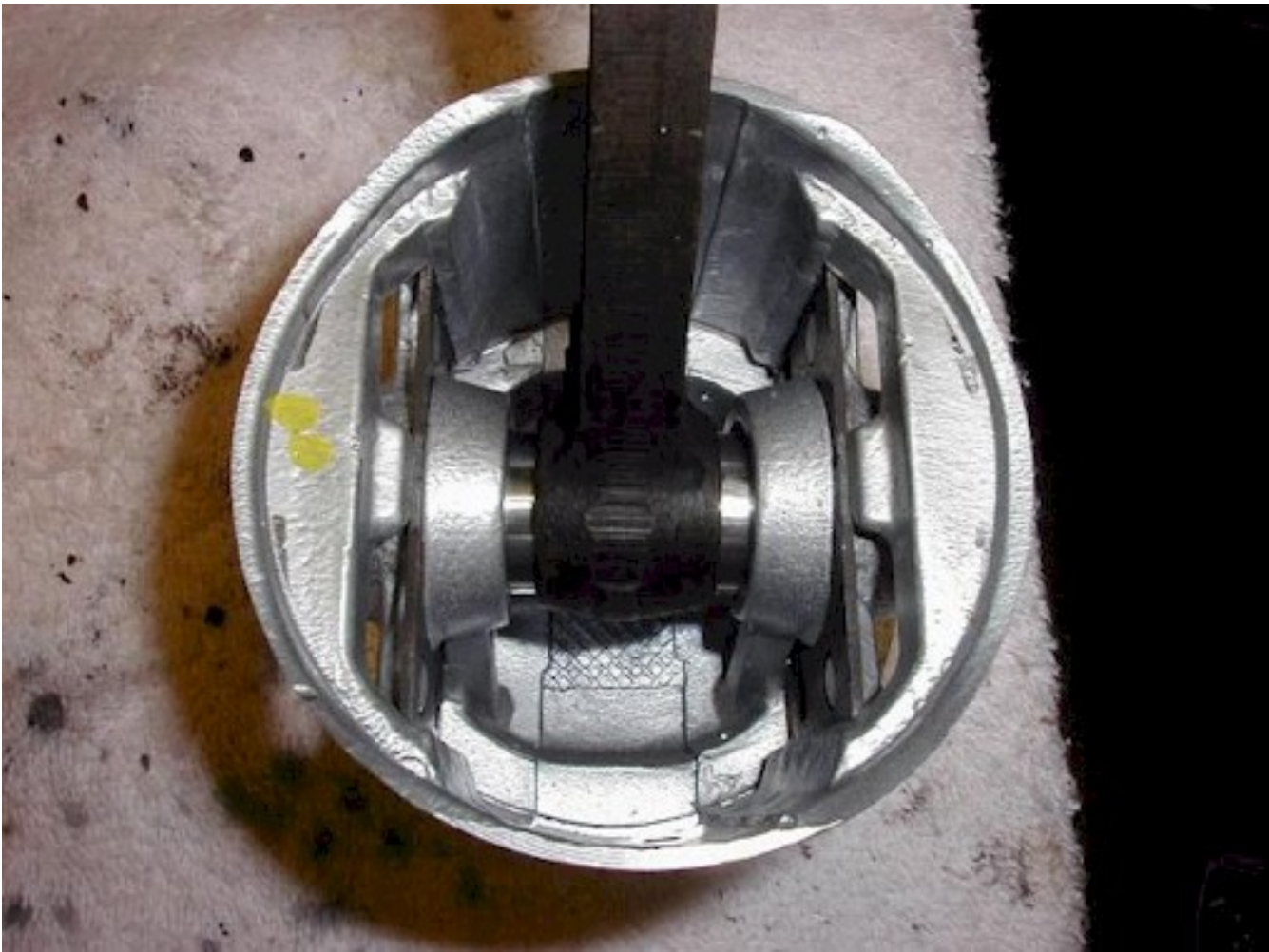


EVERY ring must be measured except the oil control rings.

Next is to hang the piston.



Insure you have identified the front of the piston. This one is clearly marked near the piston pin boss. Inspect the rod and insure that the installed rod will have the piston pin bolt and the open oil hole on the big end facing the cam. Insert the rod into the piston, place the piston pin in place and center the pin and rod.



The last action to the block was the honing of the cylinders. Therefore each bore must be completely cleaned to insure none of the grit is embedded in the cylinder walls. Follow the piston ring manufacturers instruction as to lubrication of the cylinder walls. Perfect Circle recommends the walls be lubricated with light oil before the piston is installed.


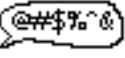
Note the instructions as to which side is UP on each ring and install in the appropriate groove on the piston. A ring installation tool is recommended.

Using a ring compressor, install each assembled unit into the holes as marked when the engine block was bored and with the correct pre-fitted rod. It is advisable to rotate the crank at least one revolution as each piston is installed to insure there are no binds. When all units have been installed and the crank turns without binding, install the cotter pins to insure the cap bolts will not loosen.



Posted by **Bowtie Bob** (Forum Member # 1442) on December 09, 2002 08:22 :

Ray, I've been following your instructions with interest and agree with all you've taught. Just thought I'd add one small item which was overlooked (unless I missed it): When installing the rings, make sure to stagger the ring gaps from each other. I remember one

neophyte dummy mechanic   many years ago that lined the gaps up in a nice row. I won't mention any names, but he never did it again!!

Bowtie Bob 

Posted by **old216** (Forum Member # 1300) on December 09, 2002 09:32 :

I am at the back of the class so you probably didn't notice my hand up. Anyhow, recently, on the disassembly of my 216, I noticed that the oil ring gaps were almost together, not staggered. Is this not unusual, even for oil rings ?

Posted by **Chev Nut** (Forum Member # 252) on December 09, 2002 10:00 :

Your aluminum pistons look great. I see they even have off-set piston pins (the "big" improvement Chevrolet introduced in 1954 to eliminate piston slap)





Posted by **lil' johnny** (Forum Member # 606) on December 09, 2002 10:31 :

Shouldn't the ring gaps be staggered 120°. (12 o'clock, 4 o'clock, 8 o'clock).

To check ring gap: On latter Chevy Six cylinders I usually just take both Compression rings for a given cylinder, stack them together with the gap lined up, and shove them ¼ of the way into the cylinder bore using the piston as a plunger. It works real fast cause you are just looking for a ring with the least clearance. (takes 6 "feeler" readings instead of 12 on a Chevy Six).

Ps. Did you micrometer your piston skirts; or do a skirt-to-sidewall clearance with the long feeler gauge?

Posted by **DdeuceMan**. (Forum Member # 69) on December 09, 2002 15:22 :

  "Stepping into class here, a walk in..... if you will". An apple to the teacher if I may,.....but wait a minute. Reefer Service charges being what they are. The paperwork for it..... being silly. But on the other hand....he would get it in 2 days..... Naaaaa.....it will be the thought that counts and I'll have to leave it at that. I'll repeat myself here, don't understand a single syllable with regard to what has been said thusfare. Sure is interesting though !  

Posted by **old216** (Forum Member # 1300) on December 09, 2002 18:59 :

Now I need to know what the offset is. Darn, I thought I knew it all! Is the pin actually offset to favour one side ?

Posted by **Chev Nut** (Forum Member # 252) on December 09, 2002 20:18 :

Just look close at the front view of the piston. Notice that the pin is left to center. This reduces the force with which the skirt hits the cylinder wall. This is a rather simple answer but the full description with illustrations is in the 1954 Chevrolet Engineering manual. The 1953 Power Glide piston looked exactly like that only the pin was centered. There were a lot of complaints of cold piston slap. Chevrolet insisted that this wouldn't happen when the '53s were new due to the steel struts (which were also used back in the original 28 pistons). Well in the quieter hydraulic lifter engine the piston noise could be heard and the "big improvement" in 1954 was the off set pins. That is still used to day on GM engines but piston noise is worse than ever due to the short skirt pistons in use today. Back in 54 we replaced many of the 53 pistons with the 54's and also used the standard high limit which were a .001" or so larger.

Posted by **ChevyChip** (Forum Member # 2) on December 09, 2002 20:33 :

Hey teach,

Is the offset piston pin the reason that the locating the "front" of the piston is so critical? Thought so! (thumbing nose at Wacky, Macky).

Posted by **AntiqueMechanic** (Forum Member # 13) on December 10, 2002 00:10 :

Q&A

Bowtie Bob,

Excellent observation Bob. I did in fact forget to point out the procedure for aligning the gaps in the compression rings. The procedure is to stagger them in any pattern that does not have them all located at the same point on the clock.

Old216,

Yes, it is even more important that the three components of the oil rings are staggered. The two outside rings hold the interior spacer together.

Chev Nut,

I am really pleased with the selection of these pistons for my project for several reasons.

Lil' johnny,

I have no problem with your system of aligning the gaps as you suggested. Good plan. Excellent suggestion of gapping all the rings in one bore in one step for that specific bore. Saves time.

When we bored the block we made very precise measurements of EACH piston and insured that each piston was assigned a bore and the bore honed to the specified clearance for that piston.

DduceMan,

It is very obvious that I should have paid more attention to your comfort in the back of my '28 touring during the week we spent together on the National 4-cylinder tour in Canada. I think you must have gotten too cold. This is the engine from that touring that we are working on.

Old216,

Chev Nut answers your question very ably in the post immediately following your question. An excellent explanation.

Chevy Chip,

Right on. A lot of good it does to have state of the art hardware in your hands if you don't employ it to the maximum advantage.

Somehow we overlooked the picture of securing the bolts on the big ends of the rods. So here it is.



Thanks for your interest, comments and questions.



Posted by **lil' johnny** (Forum Member # 606) on December 10, 2002 10:38 :

Ray,

One of the most common areas of general confusion when rebuilding an engine is the difference in numbers that a mechanic uses, and the numbers that a machinist uses. Your example of the ring makers .004" per 1 inch of bore is a good example of a confusing specification. A mechanic uses the nominal 3-11/16" for the bore. A machinist uses an actual measurement to the degree of his measuring tools (ten thousandths). Both numbers will give a "ballpark" number for the ring gap due to the "wiggely" spec given by the ring maker.

>>> There sometimes arise problems with precision, significant digits, and especially accuracy when so many numbers get specified and converted that actual "clearances" may drift from factory specs.



>>> You're doing a great job on this project and you really know what you're doing!

>>> I just have a tip for the more "novice" engine builders. So many guys have complained of problems like piston slap, piston collapse, oil clearances, etc. that the beginner should use extra caution. For instance measure twice; double check a micrometer reading with a dial caliper to see if your reading the mic' OK; and use stuff like plastigage and feeler gauges on the "finished" engine part to ensure "accuracy". It will keep the quality up, and the blame down.

>>> New parts, old numbers, and a smaller pool of experienced craftsmen make Ray's posting very important for future reference.

>>> Nuff said...keep up the great work, and thanks for the pictures!!!!

Posted by **DdeuceMan**. (Forum Member # 69) on December 10, 2002 15:32 :

 Ray....."NO".....did not at all feel neglected, (am a rather somber chap anyway), and did not by any stretch of the imagination get cold back there. It was really neat. Got to "WAVE" at a bunch of strangers all day / week. I did however get a real "wrist workout" on the Banff Downtown Day.  LOL.....Felt like Prince Phillip or somethi'n. (honest).

Posted by **AntiqueMechanic** (Forum Member # 13) on December 14, 2002 00:39 :

lil' johnny,

Head lowered and blushing. Thanks for your comments.

Before we progress further I think it would be wise to re-emphasize some points that were

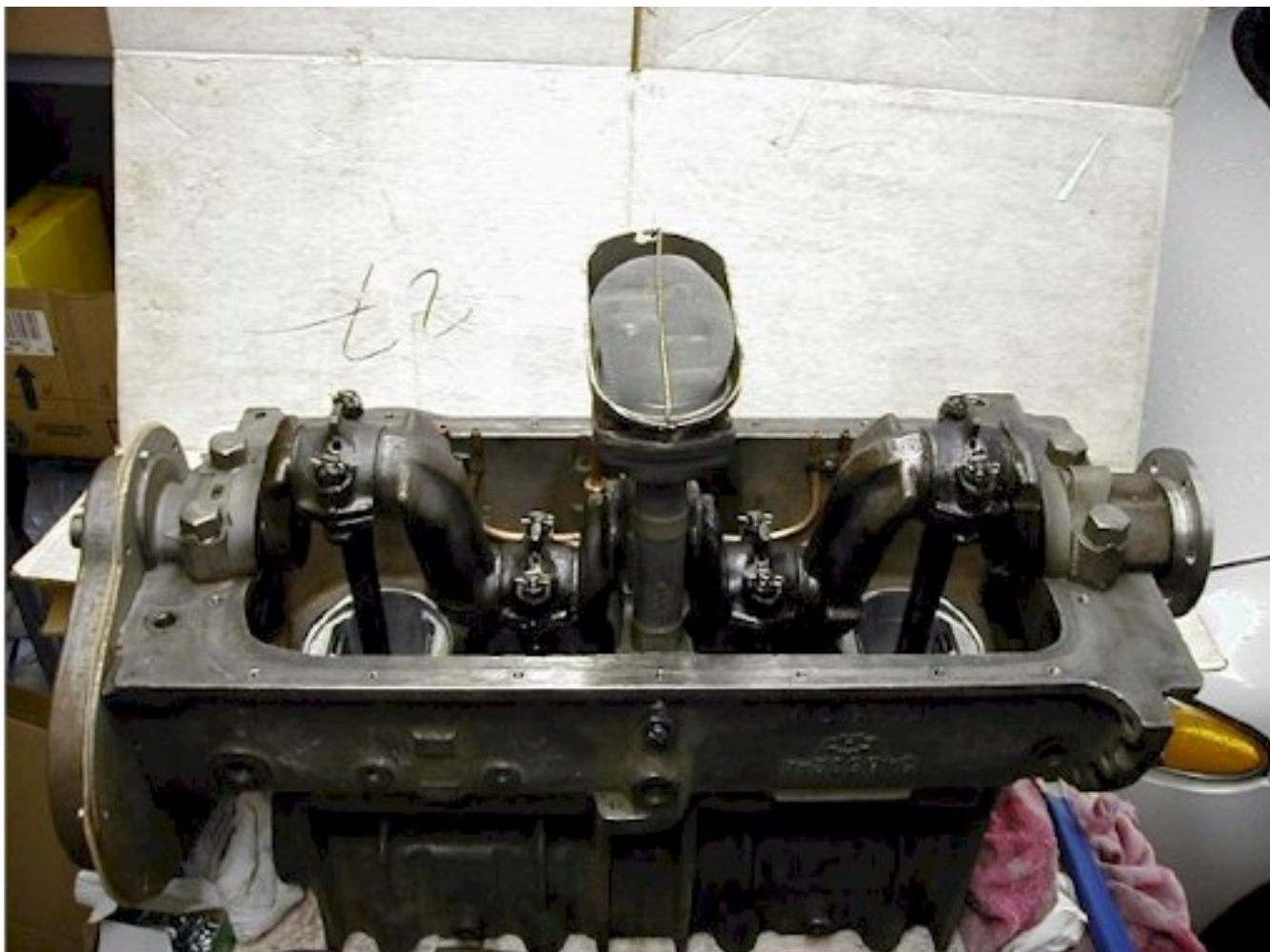
made earlier in some of the postings.

In the posting Nov 30, 2002, 00:46 considerable discussion was devoted to the checking, and in some cases remarking, timing gears. It was pointed out that an error existed in the Chevrolet Repair Manual in reference to a figure in the manual. The wrong tooth is marked on the Series-AB figure 42 on page 42. That post also describes how to mark or check a new cam gear if you do not have an OEM gear as a reference to transfer the mark.

Both of these subjects are addressed in the May 28 Chevrolet Service News on page 30. By the use of drawings and text, specific instructions are given on both of these operations.

The same page also describes how to mate the flywheel to the crank. There are 6 holes in the crank and flywheel, which give us too many combinations. This tells how to make the selection. Additionally, this subject will be covered in the next class session.

In a posting elsewhere, in Chevy Chat, some snide remarks were made about a 1928 Chevrolet on ebay that had a side mount. Eat your words as you go to page 42, August 1928 Chevrolet Service News. Question: Does anyone have this complete set-up for sale?



This is the last time we will see the innards, as the next step is to button up. Best we blow out the cavity real well with compressed air and most of all check to see that we have not left any tools inside. (Don't laugh. I took a door apart on a new car to locate a rattle and

found a tool inside from the assembly plant).

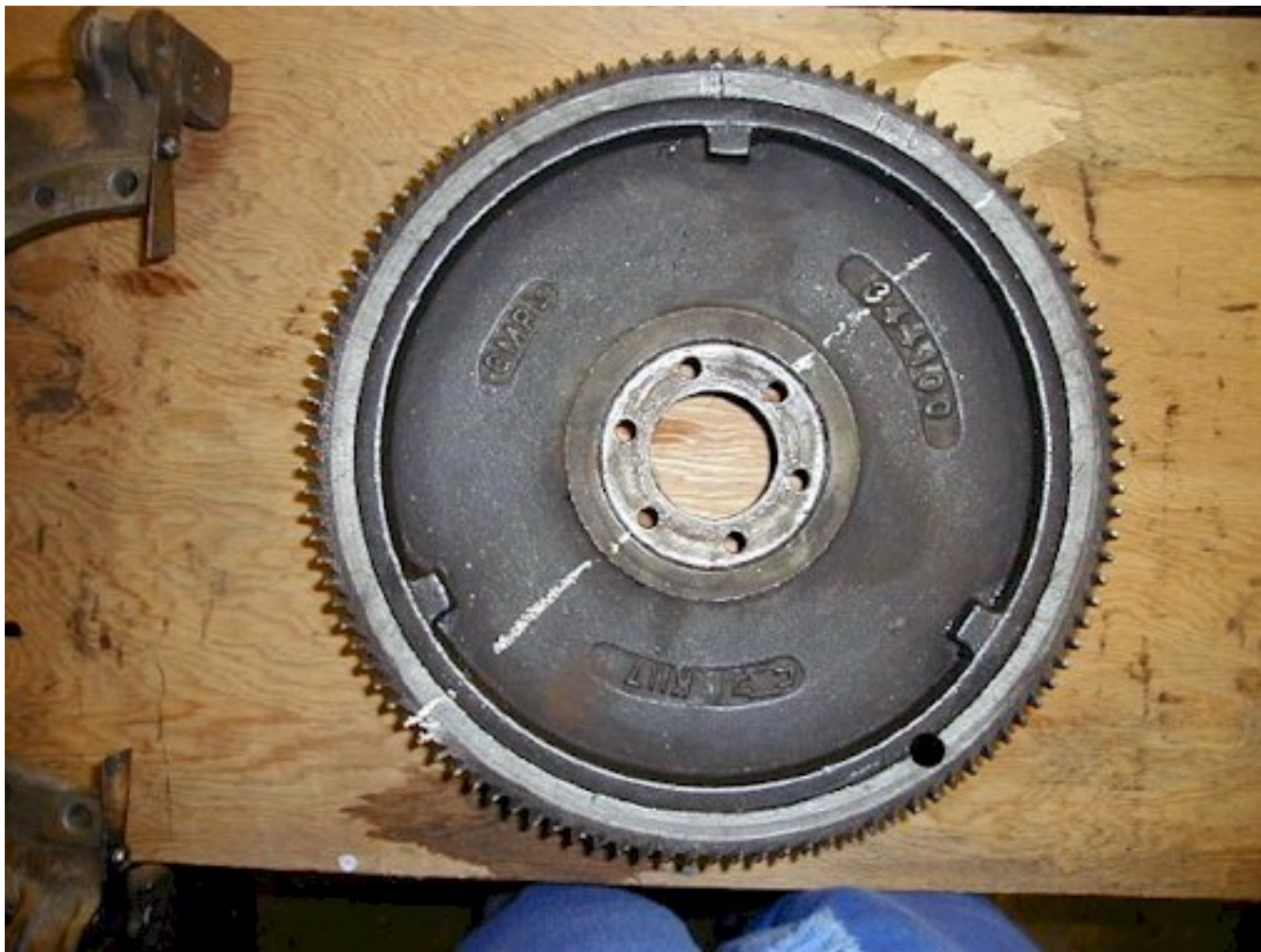
Class dismissed.



Posted by **AntiqueMechanic** (Forum Member # 13) on December 15, 2002 16:26 :

Take you seats and get out your notebook.

We need to install the flywheel now because it is the right time in the sequence of assembly, and because we can use it to turn the crankshaft much easier. After a good cleaning and inspection it was determined that there were two locations around the ring-gear teeth that were damaged. When a 4-cylinder engine is switched off it comes to rest in either of two locations. It can stop with #1 & #4 pistons up or with #2 & #3 pistons up. When the starter is engaged then one or the other of these locations on the ring-gear meet with the starter Bendix drive gear. That is why we have two specific locations for wear and not uniform wear around the circumference. Ideally, we would replace the ring-gear as this is an easy fix, but they are relatively hard to come by. Therefore, we will try to improve the worn locations. Either a hand file, or if you are proficient with an angle grinder and thin stone, can be used to smooth down the damaged teeth. The idea is to remove any sharp projections and blunt spots that prohibit the gears from meshing smoothly. Caution must be exercised to prevent too much material from being removed.



While the flywheel is off and cleaned up is also a good time to examine some other characteristics. Looking at the markings we note that the casting number is 344100. The casting date is K117, or November 11, 1927, and there is the official logo of the Chevrolet Bow Tie. This is consistent with the dates on the block, head, and seat-side data plate. The company that did the casting was GMRL (Yield to KK to enlighten us on that one).

As mentioned in a previous post the flywheel can be mounted in any of 6 different positions. Any of which would not affect the running of the engine, however, there is a correct position out of the 6. To find this location the support must be assembled to the back of the block. In this support is a window, visible from the front of the engine, equipped with a pointer.



The large hole on the right is the opening for the starter. Across from that hole is the window with the pointer. Insure that the crankshaft is located with the #1 piston at TDC and by looking inside at the cam lobes for number 1 piston, insure that both valves would be closed (compression stroke). Now very carefully place the flywheel on the end of the crankshaft. While looking in the viewing window on the support, turn the flywheel until the pointer is aligned on the U I C mark (Upper/Center) on the flywheel. You may install the flywheel at this position, or if not ready, mark the location with chalk so you know where it goes when you do install it. The chalk line on my flywheel indicates this location. Notice that the line does NOT go through the position marked U I C on the flywheel and that is the point to be made.



Now you can see where the U I C line is located. To the right of this line is the 25-degree mark. Now that the location of the flywheel has been established and installed these two marks are of no further concern at this stage of assembly, but will be of major importance later as we install the distributor and perform final timing.

When final installation of the flywheel is made, insure that each bolt has the special flywheel bolt gasket, part #346800, installed on the BOLT end. This is a special copper washer.

The flywheel under pan is the next item to be assembled. It is held with a single bolt screwed into the support on each side. Insure that the under pan still has the large cotter pin installed in the drain hole.



It has been brought to my attention that the students are getting by with very little study and NO homework. Therefore, here is your homework assignment for the next class. In the above picture is a cotter key installed in the drain hole. As long as I can remember sliding under a Chevrolet I have observed that cotter key. It is even pictured in the parts book preinstalled in the under pan. Your assignment:

What is the purpose of this cotter key and state your reference?

Class dismissed.




Posted by **d2d2** (Forum Member # 237) on December 15, 2002 17:46 :

It looks like an oil dripper.

Posted by **Bowtie Bob** (Forum Member # 1442) on December 15, 2002 17:58 :

Oh! Oh! Teacher!!! (hand waving furiously) - The cotter key, I believe, is to ensure that the hole doesn't get plugged up and allow oil to build up in the housing, which would

contaminate the clutch plate. At least, that's what I was told a long time ago by an old mechanic. 

Posted by **MrMack** (Forum Member # 21) on December 15, 2002 18:27 :

Ok, If you think I am not paying attention, You were wrong. It does not make any difference where the camshaft is oriented in order that the flywheel is installed correctly, in fact the camshaft does not even need to be in the engine in order to aline the flywheel with the crank, UC is Uc whether the engine is on intake , or what, number one piston must be at the uppermost position in the cylinder. The timeing mark is in the window any time the # 1 piston is at upper center.

I do,however, agree with Rays instructions for this reason, you need to get in the habit of having all your ducks in a row!

Posted by **ChevyGuru** (Forum Member # 342) on December 15, 2002 20:18 :

Oops....

I took that cotter key out, and tossed it!

I'm gonna flunk for sure.....



Posted by **AntiqueMechanic** (Forum Member # 13) on December 15, 2002 20:22 :

MrMack,

Just wanted to give you some time to think about your post before I comment.

Hint: You must follow the discussion in sequence.



Posted by **Chev Nut** (Forum Member # 252) on December 15, 2002 20:30 :

AntiqueMechanic...Would it be possible to bolt the fly wheel in a different location on the crank and restamp the timing marks?This would rotate the worn teeth to an unused location.

Posted by **RustyFender** (Forum Member # 23) on December 15, 2002 20:45 :

I need a pass to the principal's office, I left out the special flywheel bolt gaskets, part #346800 on my last rebuild. The ones I removed were not worth saving and no replacements were readily available.

If it's of any redeeming value, I did have the entire flywheel and pressure plate assy. precision balanced along with the crank, rods and pistons.




-R 

Posted by **MrMack** (Forum Member # 21) on December 16, 2002 07:11 :

Yeah, Ray That is what I meant by having your ducks in a row! that is surely the way to go on a complete rebuild. But the uc should be in the window anytime that the #1 piston is up, not just when #1 is on the compression stroke, (that is the point I was making) when you time the camshaft the previous procedure you showed better be followed to the letter. That is the place that an error is likely to occur. Also when the distributor is inserted.

Posted by **32confederate** (Forum Member # 12) on December 16, 2002 12:46 :

Mr Mack!

You must be talking about a 2 cycle engine!  Not a Chevy 4!   You sure you don't want to think that one over again? Think really hard this time, because I agree with Ray.

Posted by **MrMack** (Forum Member # 21) on December 16, 2002 14:39 :

Ok, You think about it We are talking about the flywheel in relation to the crankshaft, doesn't have anything to do with 4 cycle or 2 cycle there is one position where the flywheel will fit on the crank when # 1 piston is at UC, and that is it. the flywheel is fastened to the crank , and therefore when #1 piston is up it is in the correct position.

Now the camshaft and distributor is another story, the flywheel and the crankshaft make TWO revs per one rev of the camshaft and the distributor rotor makes one rev..... That is why you have to have the #1 piston up on compression to set the rotor to fire.

Posted by **old216** (Forum Member # 1300) on December 16, 2002 18:59 :

I must ask the unasked question: Why does the engine come to rest in only two positions? Now I was in class the whole time and I didn't here this explained!

Posted by **lil' johnny** (Forum Member # 606) on December 16, 2002 21:22 :

"Why does the engine come to rest in only two positions?"

Maybe the reason is that a typical 4 cylinder employs a 180° crankshaft? The "throws" are 180° apart (1 & 4 pistons move up-down together, 2 & 3 pistons move up-down together) therefore when the engine comes to rest the weight of the crankshaft has either 1&4 on the bottom, or 2&3... its gravity.

The Chevy Six has a 120° crankshaft and will have 3 places of normal wear on the flywheel corresponding to pairs of pistons that will come to rest in one of 3 positions.

I guess???

Posted by **MrMack** (Forum Member # 21) on December 16, 2002 22:18 :

Johnny, do you think it is as much coming up against compression as well as gravity?...I haven't noticed that kind of wear, I have 3 or 4 used flywheels I need to check them.

Posted by **lil' johnny** (Forum Member # 606) on December 16, 2002 22:36 :



Mr. Mack,

I would think that sooner or latter the compression/vacuum won't matter as it will leak out to stabilize to the atmospheric pressure. Gravity seems a bit more constant, but to tell the truth , I really don't know.

Anyway, I have heard the end result will show up in the flywheel teeth and some old-timers used to "turn" the ring gear around the flywheel to even out the wear.

PS...I think I'll spin my old Chevy Six around and mark the flywheel with chalk where it stops. Kinda like one of them crooked roulette wheels at the casino.....

Posted by **Bowtie Bob** (Forum Member # 1442) on December 17, 2002 06:06 :





My curiosity is up  - What IS the cotter pin in the drain hole of the flywheel underpan really for ????? 

Posted by **MrMack** (Forum Member # 21) on December 17, 2002 07:30 :

The cotter key serves the purpose of assuring that any oil, clutch powder dirt will drain out of the drain hole, it keeps it from being stopped up like Chevy nut said . It is loose enough a fit so that it jiggles around from the motion of the car but is bent over so that it

doesn't bounce out.

Posted by **DdeuceMan**. (Forum Member # 69) on December 17, 2002 16:23 :

  Ah ha.....  

Posted by **Chev Nut** (Forum Member # 252) on December 17, 2002 20:09 :

The stopping position of the engine must be determined by compression-depending on which cylinders "stop" the engine as it quits revolving. If you were to remove the spark plugs (no compression) it would slowly come to a halt at any position.....Very intresting. The 4 cyl. cars used six flywheel bolts and and in 1929-up the 6 cyl. engines used only four up thru 1941. [plus a locating dowel]

Posted by **MrMack** (Forum Member # 21) on December 17, 2002 20:43 :

Gene, does that mean that a six is smoother running than a four? and a V/8 is just really a twin four?

Four is good, six is best, eight is way too many?

Posted by **d2d2** (Forum Member # 237) on December 17, 2002 22:32 :

In any V type engine there are pistons and rods going up and down in two different directions or planes. Check out the Oakland - Pontiac - Viking series of V8 engines that GM made around 1930-32. Some had a single plane crankshaft and were not as smooth as the ones with a two plane crankshaft. Cadillac V8s had a two plane crank from about 1924 on. It changed the intake manifold design, the firing order and the sound of the exhaust.

Posted by **AntiqueMechanic** (Forum Member # 13) on December 18, 2002 00:04 :

Q&A

d2d2

Sorry, can't give you any credit for your answer, as it is too vague.

Bowtie Bob

A perfect answer. Main purpose is to keep the hole open for drainage.

MrMack

I have reviewed the transcript from the lesson and see no reason for further elaboration. From your later posts it appears you really do understand how it goes together and why.

ChevyGuru

Best you go put the cotter key back in the flywheel cover. After all, there really was a purpose for it being there.

Chev Nut

Excellent solution and frequently used. As long as new registration marks are established it is a very logical fix. The old marks should be painted over or concealed in some manner to prevent confusion by subsequent mechanics/owners.

Rusty Fender

Shame on you. Reminds me of my conversation with a technician at the parts house where I get my bearings. When I specified I wanted sealed bearings he asked what I intended to use them for. I told him axle bearings on a 1925. He advised that the sealed bearing was an inferior bearing to the normal bearing and further advised I could only expect about 50,000 miles under that usage. (If I could only be so lucky).

Anyway, the purpose of the seals was twofold. First, they acted as a lock washer and second they made a seal around the head of the flywheel bolts to prevent oil leaking from the engine penetrating into the clutch housing.

Old216

Why does the 4-cylinder engine come to rest at only two places? Take a look at lil' Johnny's comments. I think he covers it quite well.

lil' johnny

For lack of a more technical answer we will go with your explanation.

Bowtie Bob

You have already answered your own question and a good answer at that.

Chev Nut

Combine your answer with that of lil' johnny and I think the subject has been well covered.



More homework. Now, here is the number that is on the flywheel 344100. When I go to the parts book and find a flywheel for a 1928 (same from 1925-28) I come up with part number 344099. (Look closely at the picture and you can identify the copper washers/seals under each flywheel bolt head.)

Assignment: Do I have the wrong flywheel or is there an explanation?



Posted by **Bowtie Bob** (Forum Member # 1442) on December 18, 2002 06:00 :


Nope! - You have the correcto-mundo flywheel !! 🤖

As I understand Chevy's numbering system, the number on the flywheel (344100) is a casting / forging number. The part number in the Parts manual (344099) is an "odd" number, one digit below the casting number. I believe that using an "even" number for a casting number and a number one digit less for the part number, was used throughout Chevy's numbering system. 🤖 [gifts]





Posted by **ChevyChip** (Forum Member # 2) on December 18, 2002 12:23 :

Bowtie,
You got it almost right. Some casting numbers end in an even number and then the part number is the same. Though not as prevalent others end in either an even or odd number and the casting number has no relation to the part number.
I have not researched to find if any odd numbers are both part and casting numbers but I would not put it past Chevrolet trying to confuse us.

Posted by **32confederate** (Forum Member # 12) on December 18, 2002 12:24 :

I agree that it is the casting number and you do have the right flywheel. But I don't know about the part number always being one number below. I had a 33 Canadian engine and the casting number on it was one number below a 32 manifold. 

Posted by **Bowtie Bob** (Forum Member # 1442) on December 18, 2002 12:46 :

Food for thought - Chevy's numbering system ("systems", apparently) may have changed depending on who was in charge of Engineering at any particular time. I saw a lot of changes like that happen in the place I worked for 38 years, when management changed. I guess when someone moves into a highly visible position, they have to make SOME kind of change to justify their appointment. "Smoke & mirrors", we used to call it!!    



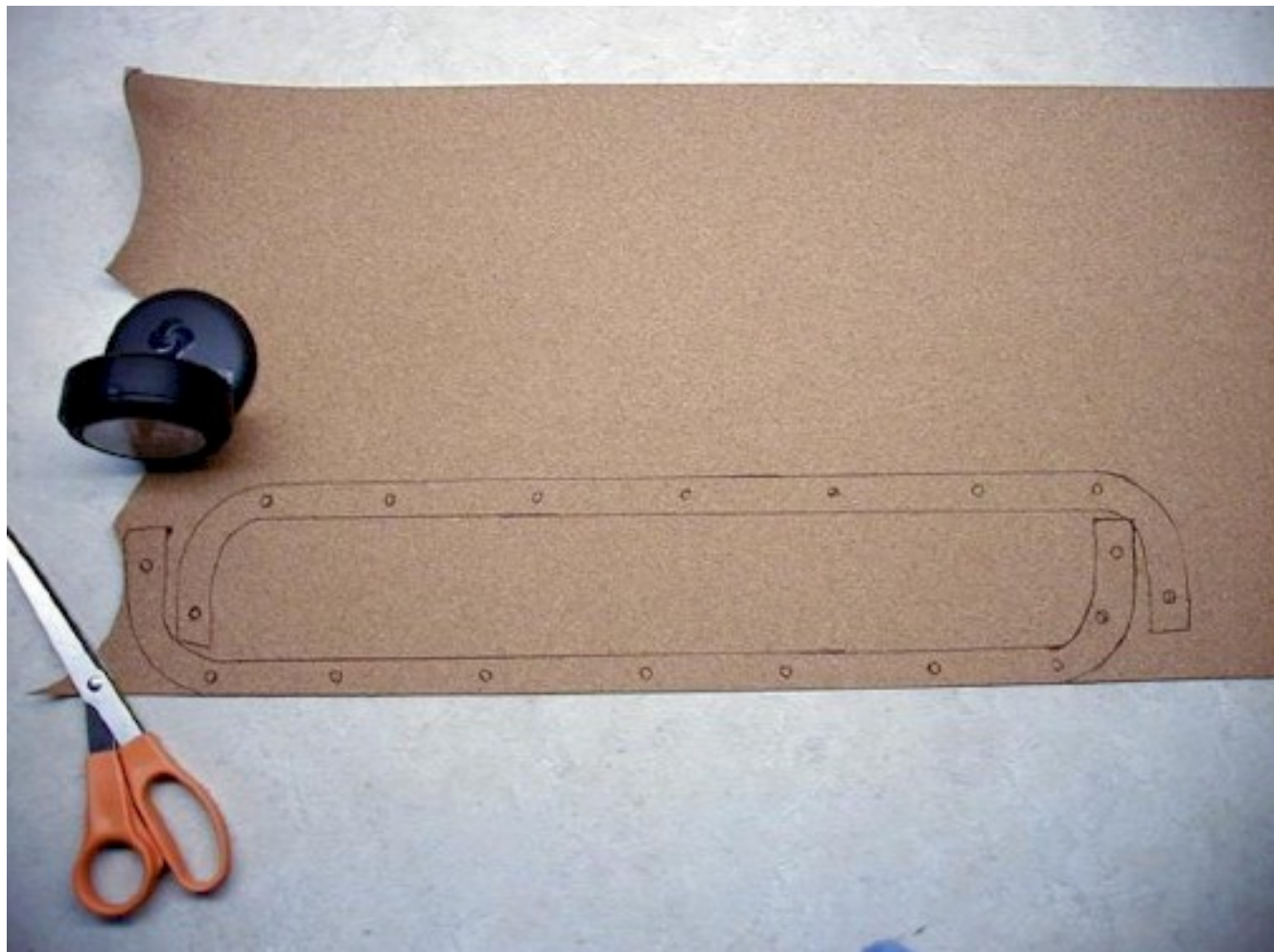
Posted by **AntiqueMechanic** (Forum Member # 13) on December 22, 2002 16:44 :

Would like to congratulate all the students as a group for your fine homework project. The confusion exists because a number marked on an item does not provide positive identification. I have always explained the difference as only replacement PARTS have part numbers.

In our last session we took a final look inside the engine, removed all the tools, and blew it out good with an air hose. About time to 'button' it up.



The pan should be inspected for any deformities and most important the inspection of the oil troughs. If this were a major rebuild, where parts from many sources were combined to assemble the engine, we would make some major tests for rod and trough clearance. This could be accomplished by construction of a "JIG" or by filling the troughs with axle grease, installing the pan with correct gaskets, and turning the crank to send each rod through the troughs. The repair manual refers to these troughs as "small oil pans". Ideally, the rod will dip into the troughs 1/16 inch to 3/32 inch. As we are reassembling an engine with basically all the original parts we will not make any tests for the "dip". On the teardown there was no evidence of a problem in this area. We will however, inspect each of the troughs to assure they are firmly affixed at each end and have no visible damage.



I have nothing against gasket sets, but have always preferred to cut all my own gaskets. I usually keep several different gasket sets in stock and use them as patterns if it is not easier to just trace the part from where you intend to use the gasket. If you are not experienced in the proper thickness of various gaskets, then it is better to use the sets.



It is always a challenge to get the pan end gaskets to a) stay in place, or b) fit the pan. The gasket furnished in the kit is too thick to work with. Take a piece of gasket stock approximately $\frac{1}{2}$ the thickness of the piece in the kit. Slice two strips $\frac{1}{2}$ inch by approximately 12 inches. Bend together in the middle, use a very good quick dry glue, glue the two pieces together, place around a coke/beer can and secure with a rubber band. Leave assembled till the glue has set up. Use the same glue to affix the two strips to each end on the bearing caps. Set the pan down on the gaskets and leave till fully set up. In most instances I only glue one side of a gasket. After all we do occasionally make a mistake and have to go back in. I use gasket shellac compound by Indian Head, but any brand will do. Remove the pan, lay each side gasket in place and take a good look at what area it covers, remove the gasket, apply the shellac, then replace the side gasket in place making sure all the holes line up. When the gasket is firmly held in place I use black RTV and place a dollop in each corner where the side gasket meets the bearing shell gasket (ChevyGuru whispering to ChevyChip, "What to hell is a dollop?" ChevyChip whispering to ChevyGuru, "Two or more dabs". Chevy Guru, "OH!".) Set the pan back on and start a screw in each corner. The Chevrolet Parts Price List is an invaluable tool. I have the 3 $\frac{1}{4}$ X 6 inch version dated Apr 1, 1928. Under Oil Pan is listed Round Head Machine Screw $\frac{1}{4}$ "-20X $\frac{1}{2}$ ". So that is what we will use to secure the pan.



Laying on the side of the engine is the "Special" tool used to install/remove these screws. Note that it has a shield over the bit and is spring loaded. By placing the shield over the screw, pressing down to engage the bit in the screw and then operating like a brace and bit.

After the pan is installed the Gear Cover is installed. Again by looking in the Parts Price List we find that it is secured with Round Head Machine Screw $\frac{1}{4}$ "20X3/8", $\frac{1}{4}$ "20X7/8" and $\frac{1}{4}$ "20X5/16". I make the gasket for this application also and glue it to the Gear Cover Plate. As oil sits at the joint at the bottom of the cover you may choose to glue the other side of the gasket also.



Time for more home work.

What is this cover covering and why? Extra bonus points. Find the part number for the cover.



Posted by **ChevyGuru** (Forum Member # 342) on December 22, 2002 18:08 :

Don't know about that cover. Must be something that appears on these new-fangled '28s that I don't have on my '25. Or else I left it off of my '25, which is definitely possible. I notice lots of other improvements and updates on this '28 job, versus my slightly more primitive '25.

I was pleased to learn that the Teacher uses Indian Head gasket gloop. That's what I've used for years, too.

However, last month when I installed my oil pan, I used BLUE RTV (not the black) at those corners where the crank "humps" meet the flat surface of the pan. And, I'm sorry to say, I inadvertently used 3 dabs, which apparently would equate to 1.5 dollops, of the blue stuff, but it's all on the inside....

Also, I was not able to find a Coors can handy when making the crank hump gaskets as above, but I am happy to report that a Mountain Dew can will work just as well.



Posted by **d2d2** (Forum Member # 237) on December 22, 2002 18:22 :

That cotter pin device that is not an oil dripper, does it have an official name and part number?

Posted by **AntiqueMechanic** (Forum Member # 13) on December 22, 2002 18:49 :

Hi d2d2,

quote:

It looks like an oil dripper.

The reason I did not give you full credit on your report card is that you did not also specify that it was for the purpose of keeping the hole open so the oil could "drip".

I don't know the official name for the device. It is already installed in the flywheel under pan both from the factory and if you purchase the pan from the parts department.

Don't worry, you will get additional chances to bring up your grade.



Posted by **AntiqueMechanic** (Forum Member # 13) on December 24, 2002 11:28 :

Hi ChevyGuru,

quote:

And, I'm sorry to say, I inadvertently used 3 dabs, which apparently would equate to 1.5 dollops, of the blue stuff, but it's all on the inside....

Your quote gives me great concern. I am not a real fan of RTV. I have had some very serious problems using it. Do not **EVER** use it around any place where it can come in contact with gasoline. Be especially careful with overusing it. As I read your post you

allowed a quantity of the RTV to be on the **INSIDE**. And that of course is where we do **NOT** want it to be. If a glob of the RTV is allowed to be free in the pan/sump only bad things can happen. The pickup pipe on the '25 engine lies on the bottom of the pan/sump and is **UNPROTECTED** . Eventually this glob will find the pickup tube and block the entrance. Even if it does not attack the pickup tube, if it is splashed up into any of the 6 reservoirs, it will sink in the oil, and block the drip hole to the bearing.

I will not bore you with details, but I spent several days on the road years ago, with a newly installed oversize gas tank, that RTV had gotten inside of. Blocked the gas pickup and when I switched lines and used the return line as the pickup, eventually it blocked that line. Nothing like removing a full gas tank from a motor home, disassembly and total cleaning. Bad enough in your own garage or shop.

On a National Pre-29 tour at Moab, UT, I experienced low oil pressure and finally no oil pressure in my '25. On teardown it was discovered that a glob of RTV was stuck in the end of the oil pickup tube.

Please do not read anything into this warning on RTV. It has its uses and serves them well if used sparingly and carefully.

It is suggested you place a large fuel strainer "sock" over the intake tube of any 4-cylinder you are rebuilding prior to 1926. Starting with the "in block" oil pump in 1926 a strainer is standard equipment.

Oh, and **MERRY CHRISTMAS** to all.



Posted by **ChevyGuru** (Forum Member # 342) on December 24, 2002 15:36 :

Now you have scared me!

I gotta say, though - the dollop was firmly smeared into place at that junction of the crank "hump" gasket, where it meets the flat gasket (all 4 corners). There should not have been any left loose, I smeared it as sort of a back-up film layer over that leak-prone area, no lumps.

But I will consider myself warned and advised, for future applications.



Posted by **AntiqueMechanic** (Forum Member # 13) on December 29, 2002 18:27 :

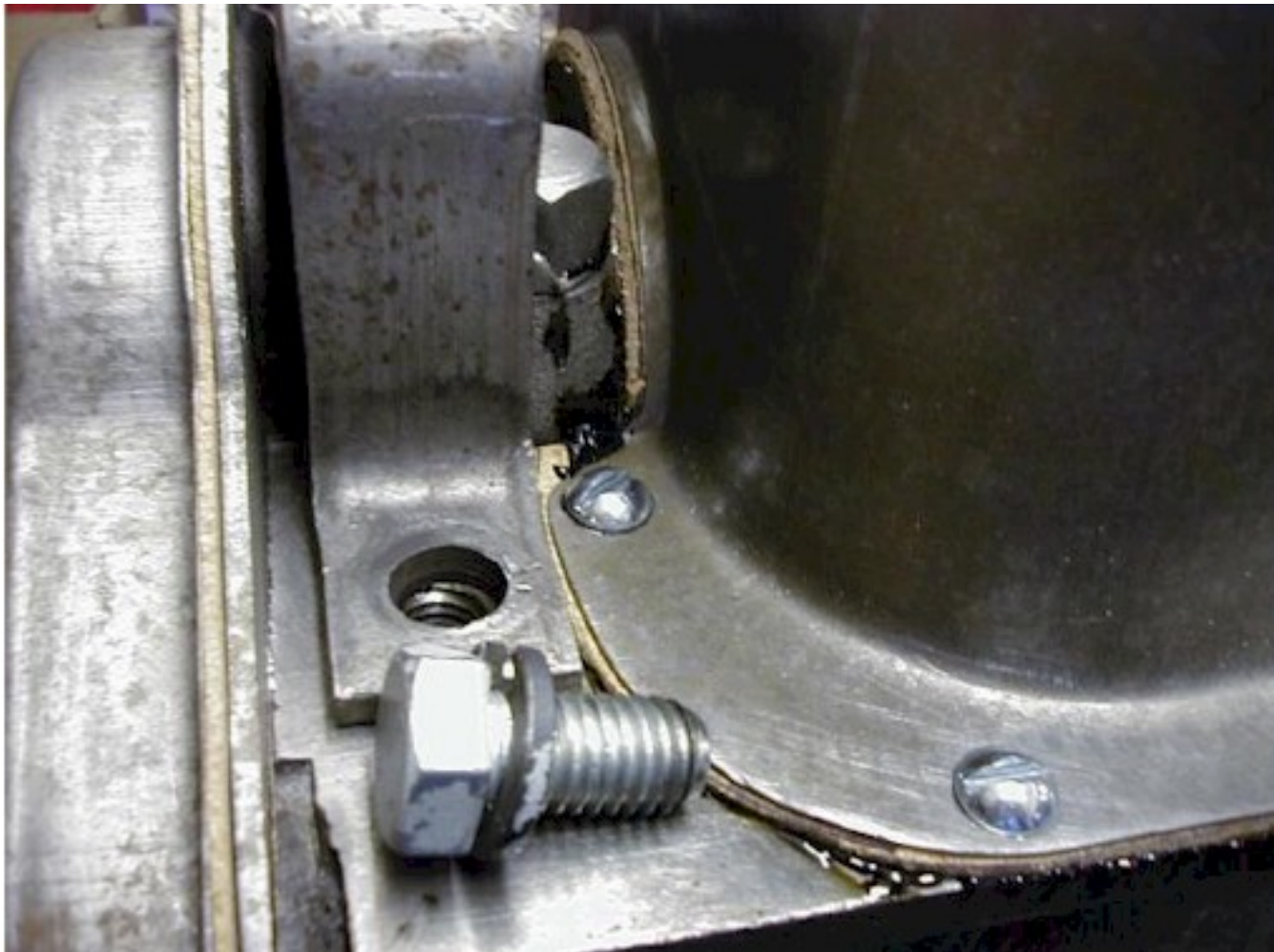
Well, it is obvious that the students drank way too much eggnog over the Christmas Holidays. Not only did no one identify the cover, we didn't even have any guessers. So here is the picture again.



As you can see this is near the rear main bearing and up against the lower flywheel cover.



More hints. Now the area is exposed that was covered. There is of course one on each side of the engine. Suggest you go back and review some of the previous pictures and the text that goes with them and see if you can now identify what is going on. Remember the bonus points if you provide the part number(s).



This is the front of the engine and is the motor mount. You can also see the area where the pan connects across the main bearing cap and at the junction you can observe just a small "dollop" of the black RTV. On the opposite side is a through bolt with a lock washer and nut. This side has a through bolt that goes into the front timing gear cavity.

Home Work: What must we do specifically to the bolt and why?



Posted by **Bowtie Bob** (Forum Member # 1442) on December 30, 2002 06:29 :





quote:

Home Work: What must we do specifically to the bolt and why?

Apply sealant to the threads to prevent leakage due to a "thru" hole 🙄

 -Bob


Posted by **DdeuceMan**. (Forum Member # 69) on December 30, 2002 15:01 :

  Gosh.....golly..... on Ray's idea of using a Coors can and the subsequent suggestion of the soft drink can!The only way I'd be able to help somebody do that is to drink the beer (or whatever) first. ROTFLOL....   Or.....wait a sec, those elastic bands would crunch an empty can come to think of wouldn,t they? Oh well.....I'd still think I'd be able to help out somehow. LOL. Hey.....I,m still friendly.

Posted by **ChevyChip** (Forum Member # 2) on December 31, 2002 11:10 :

Little kid in the back with black felt cowboy hat (it's winter y'all) raises his hand. "Hey Teach, Hey Teach, I know!
The cover fits over the gap between the block and the flywheel housing. The part number is ??? can't find a number yet. Maybe when mind clears near midnite.

Posted by **29chevy** (Forum Member # 114) on January 02, 2003 11:53 :

From the short kid in the back of the room, has been out sick alot. I think the part # is 345511 and the gasket is 345510. Not being a 4cyl kid and having just this old 6cyl to work with not sure of it's purpose. 

Posted by **AntiqueMechanic** (Forum Member # 13) on January 05, 2003 15:48 :

Q&A

Bowtie Bob,

100% credit for that answer Bob. That bolt does in fact penetrate into the cavity that contains the cam and crank gear. If we did not seal the threads on the bolt, oil would eventually escape. This would appear as if the front main were leaking. If this problem exists on your car I suggest you remove the bolt, clean it, and coat liberally with the "yellow snot" and replace.

DdeuceMan,

Too bad. If you empty the can first it is subject to collapse from the rubber bands. After the job is finished then you could reward yourself with the contents.

ChevyChip,

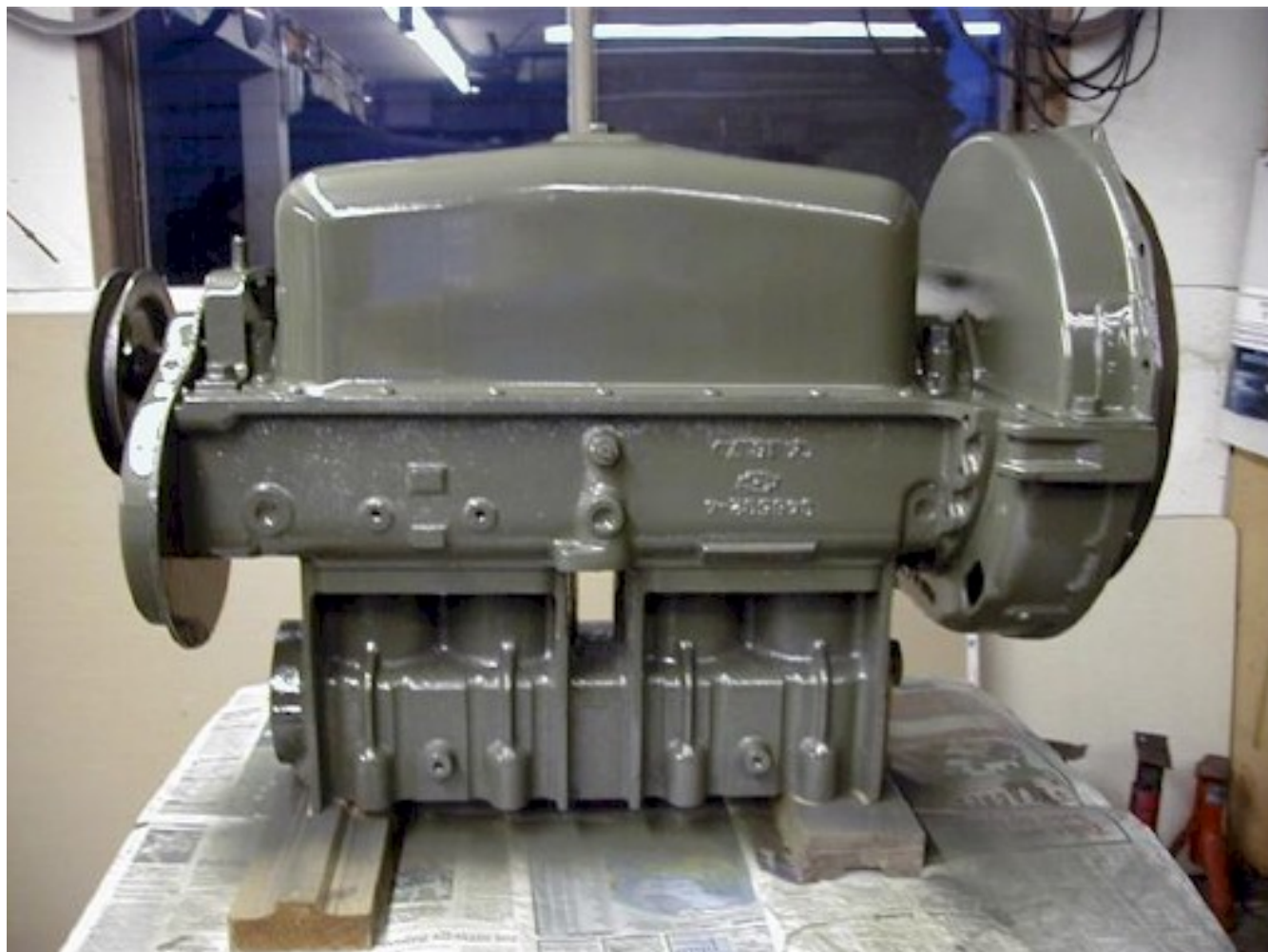
Can only give you ½ credit. The two covers, one on each side, are to keep any liquid (oil,

water, fuel) or dust/debris from entering the clutch housing and contaminating the clutch disc or causing premature wear to the graphite throw out bearing. It is obvious to me that this was a factory installation. The threaded holes are too perfect for in the field application and the uniform cut of the two covers tells the same story. However, if true, they should be in the parts book or in some special publication from Chevrolet. I have looked in every parts book I have and any other publication from Chevrolet for the period and find no mention of these parts. If someone runs into the answer please post it for us.

29chevy,

Great answer, but we do not have a question to credit it to. The two part numbers you list are the Gear Cover and Gear Cover Gasket. Those parts are on the front end of the engine. But, hang in there; and at least you were trying.

Now that the bottom part of the engine is finished it is time to set it aside and start work on the head. This is not the configuration the engine should be when it is painted, however due to space and time requirements I have elected to paint the engine as it sits and let it dry before tipping upright for the final assembly.






Now get ready for the real fun part. Information about the head, steps to be taken and the final assembly.



Posted by **RustyFender** (Forum Member # 23) on January 05, 2003 16:27 :



Here we have a picture of our illustrious teacher photographing today's session for the students. (Sorry, I couldn't resist! )

-R 


Posted by **CHEVY** (Forum Member # 131) on January 05, 2003 16:41 :

Hello Ray, Sorry Im late to class, But just have not had time to follow the four cylinder engine rebuild. The junkyard dog keeps me to busy with the six cylinder engines. Ray did you use washers and lock washers on the pan bolts like the six cylinder engines? thanks



Posted by **CHEVY** (Forum Member # 131) on January 05, 2003 19:33 :

Hi Mackie Wacky and Ray, Happy New Year TO You and Everyone. Ray I now have got very Interested In your thread on the rebuilding of your engine. You have without a doubt, Put on a great classroom session for everyone and have been very helpful about the rebuilding process of your engine. Now If I could get you to sell me one of those four

cylinder buggies you have, Then I could go on the 4 cylinder tours???? 



Posted by **Chev Nut** (Forum Member # 252) on January 05, 2003 19:47 :


The engine looks grey on my screen.Is that due to the glare of the lights???

Posted by **MrMack** (Forum Member # 21) on January 05, 2003 19:56 :

Gene, it looks gray to me too, but I wasn't about to say anything ,..... We both might end up in D- hall!



Posted by **CHEVY** (Forum Member # 131) on January 05, 2003 20:01 :

Hey Teacher, I was wondering, Was those engine pan bolts supposed to be painted engine color? 

Posted by **ChevyChip** (Forum Member # 2) on January 05, 2003 22:02 :

My wife tells me that I am color blind particularly for grey, green colors. It must be my problem that it looks gray, or grey and not green. Ray, I also checked all the parts books that I have and could not come up with any part

number. But the '28 engines I checked all have the parts. I have two more that I can check. I agree that it is a factory installation. Why no number? I even checked some of my later (up to '32 effective date) and part is not in them either (or I can't find where the little sucker is hiding).

Posted by **AntiqueMechanic** (Forum Member # 13) on January 06, 2003 15:40 :





CHEVY

It is very important that you keep up with your lessons and continue to read the text. Go check this out [here](#).

As to the paint color; permit me to delay the answer to this question until I post more pictures. However, consider this; the pictures were made with very bright florescent lights, with a flash used on the camera, the paint is extremely shiny and reflects my blue coveralls, and perhaps most important, the proficiency of the photographer is highly suspect, he even tried to slip in a "self-portrait".



Posted by **DdeuceMan**. (Forum Member # 69) on January 06, 2003 15:59 :

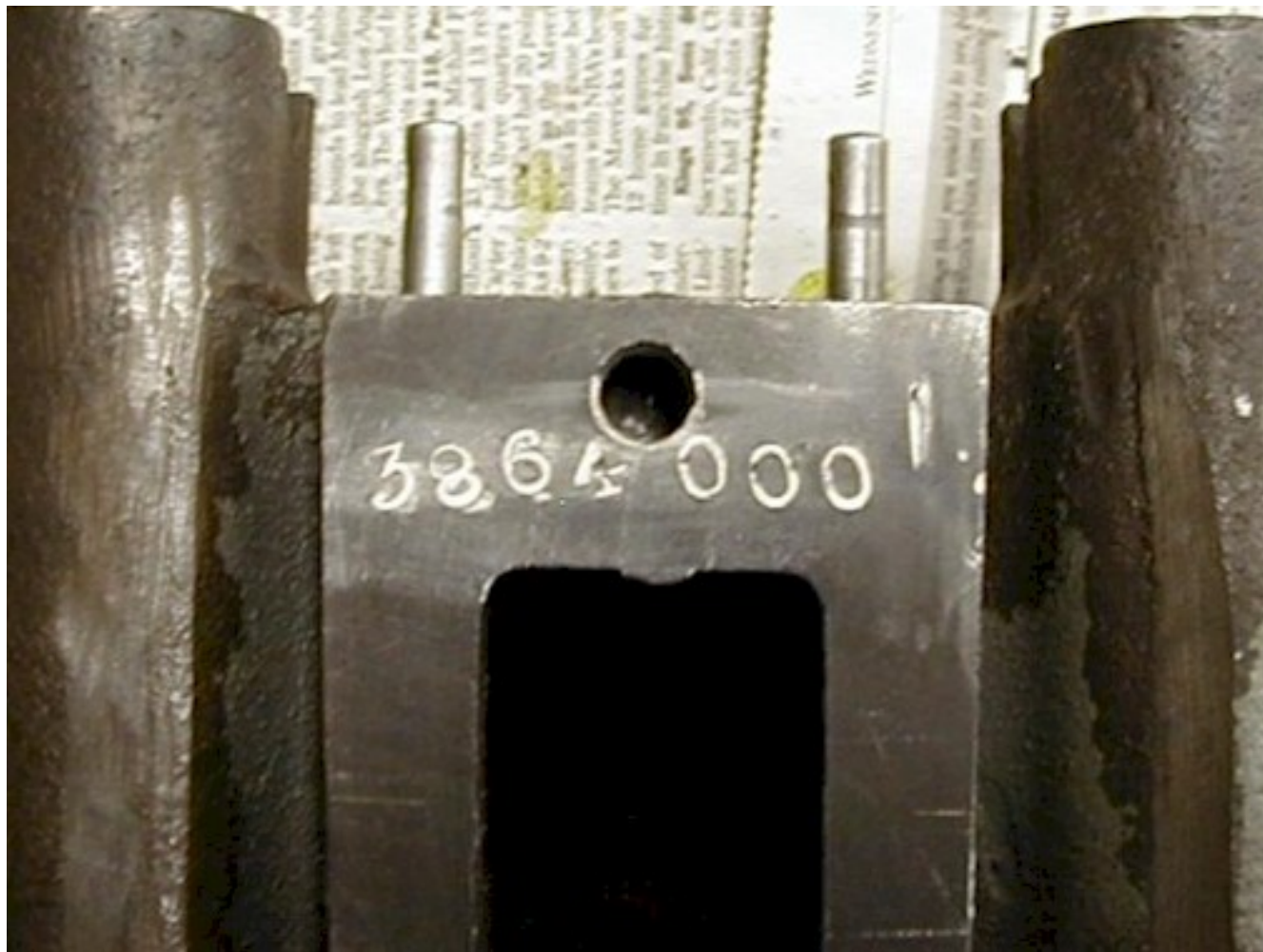
  Dear Mr. "self-portrait".....Neat anyway   LOL

Posted by **AntiqueMechanic** (Forum Member # 13) on January 11, 2003 00:30 :

Time to clear the desks and get out your books and turn to Chapter 9, Heads. Now that the bottom part is finished and painted lets work on the head. One of the most exciting things about this head is the matching numbers. To refresh your memory lets go back and take a look at the serial number that is stamped on the block.



This is the serial number of the block from the engine we are working on. It is located on the right (passenger) side of the engine near the rear on a boss provided for this purpose.



This is the serial number of the head. This number is stamped on the head under the rear exhaust manifold. When the manifold is installed this number is not visible. As you can see this number is the same as the number on the block. This proves we have a matched set (head/block) as installed at the factory. I do not know how extensive this method of numbering block/head is, however every engine I have disassembled that were obviously the original have had these matching numbers. I must admit that most of these engines were from #6 plant (Oakland). Would be interesting to hear from students on the other side of the states to see if this system was used at other eastern plants. Was the purpose to provide a means of identifying stolen heads? What was the purpose?

Now to show how important it is to me to keep these matched serial numbers together take a look at the front of the head where the water outlet bolts on.



If you look closely you will see that both bosses that are threaded and are used to mount the water outlet are destroyed. One is gone and the other is obviously split and not useable. Obviously if you have another head that was good you would use it. (And I do have several more '28 heads). But, because of the numbers we must find a solution to fasten the water outlet and keep the set intact.


Those of you who have worked on the '28 heads have seen this problem frequently along with broken bolts as a result of rust. The '28 head is the only head that exposes the center part of the bolt. Because it is exposed to the water, which in many cases is not protected by antifreeze, these bolts will rust completely through. When you go to remove the water outlet the bolt breaks off flush with the front of the head. Removing and repairing this problem is difficult and time consuming. If the bolts used for this purpose were either brass or stainless steel it would reduce the cause of the problem.

HOMEWORK: Suggest how we can salvage this head and make it serviceable.



Posted by **Chev Nut** (Forum Member # 252) on January 11, 2003 08:41 :

One suggestion would be to braze two studs into the head and tighten housing with nuts-

won't look original but could save head. 

Posted by **MrMack** (Forum Member # 21) on January 11, 2003 10:20 :

That could work Gene or mill out a larger round hole and machine a couple of threaded bushings and either press them into the head and lock them with pins or braze them in. The trick will be to keep them in the correct alignment, a templet could be made from a really good housing.

Posted by **Oldie** (Forum Member # 33) on January 11, 2003 14:57 :

It would appear that the head has been repaired earilier. The only reason I can give for the 6 extra 1/4" or 5/16" holes (can't really tell size from the photograph) would be for the installation of plate that the water outlet housing could then be attached to. The plate would have to be thick enough to accept counter bored hole(s) in order to recess the bolt heads or flat head machine screws. This repair also requires that the plate be thick enough to withstand the water housing attaching bolt stress. That's one method of repair.

The picture gives the impression that the water outlet housing right (as viewed) attaching bolt embossment is missing. Originally that portion of the casting was attached to the wall that forms the inlet valve chamber. Not sure how critical that might be.

If I were trying to not draw attention to the repair I might try something similar but different. I would square up the cylinder head opening removing the damaged bolt embossment areas. Then I would fabricate a plate with the similar inner opening shape as the original opening. I would add a second thickness of material on the back side where the water outlet housing bolts holes are required. The plate would be approximately 3/16" thick and 1/8 inch larger on all sides than the original shape of the cylinder head. Next I would chamfer a 45 degree edge at the outer egdes of the original sealing surface approximately 1/8 inch deep. The next step is the most difficult and risky. Weld the plate on the back side to the cylinder head at the chamfer area. (could be the total downfall of this process from heat warpage or poor welding or both). If successfull, I would then grind the outer edges of the plate down to something resembling the original contour. Install the water outlet housing and paint the unit. Hopefully, only the most knowledgable would even question the repair.

Posted by **ChevyChip** (Forum Member # 2) on January 11, 2003 17:41 :

Teach,
Since the damages holes are on the edge of the casting there are several options. The easiest is to clean the area then weld or braze enough to drill and thread the holes. Tig or even wire welding can be used. If the area to be welded is heated then the stress cracking will be reduced. But cracking caused by the shrinkage of the filler versus the cast iron is much less because the weld can shrink in two dimensions and the third for most of its

area. It is much different than welding a crack which can not relieve the stress in two dimensions. It is recommended to heat the area to 400-600 deg. if brazing and higher for welding and allow to cool gradually.

If you don't believe it can be welded with steel wire then try it on the edge of a piece of cast iron. You will be surprized.

Posted by **n j horst** (Forum Member # 570) on January 12, 2003 10:14 :

mr ray, i have read and followed the sessions as they started from page one on! and have found your information greater, than one could ever compile from book's ? a question that i have for you sir: is the engine and head have matching ### that you have shown ! but the engine's that are coded with a truck ## , or (t) in the front of code, i wonder what difference does that really mean? when in fact i believed the car and truck were the same for 1/2 ton in 1927 / 1928 then? meaning the chassis and engine's are the same? or are they mr ray.

Posted by **AntiqueMechanic** (Forum Member # 13) on January 13, 2003 15:45 :

WOW, suggestions don't get any better than this. All the work in putting this "Class is in Session" together is paid for in full with responses like those above.

Chev Nut,

Your suggestion is perhaps the best of all if you are working on a driver. Not only that, but your method is perhaps the least invasive.

MrMack,

Your suggestion is similar to **Chev Nut** with the added benefit of the ability to use the bolts and the end result would not reveal any work done. After bolting up the water outlet and a paint job this "fix" would not be noted. Keep in mind that in order to do the brazing some of the procedures presented by **Oldie** and **ChevyChip** must be followed.

Oldie

Good eye. You have noted another solution to the problem. At this point I will reserve comment on that procedure till later.

Your suggested solution would undoubtedly work. And work is the key word. Only a qualified machinist/welder would be capable of executing your plan, however it would accomplish both missions, that is to repair the head and attempt to conceal the original problem.

ChevyChip,

Your suggestion is also viable. You have also touched on a very critical step if any type

welding/brazing is attempted on the head. The head must be stripped (all valves, rocker shafts, fittings, and rockers removed). The head must then be heated slowly to achieve sufficient heat and expansion to accommodate the invasive welding/brazing procedure. After the work is done then the head must be cooled very slowly to prevent stress.

I hope it is understood that the suggestions offered above are not intended to be accomplished by the owner. These suggestions are presented in order to give the owner an option in selecting the method of repair and then being able to describe his desires to the appropriate machine/welding shop. Of course the easy way to solve the problem is to take the head to a specialist that concentrates on solutions to problems associated with cracked heads/blocks and other cast iron devices.

n j horst,

Let me try to answer your question/concern and if someone wishes to jump in and assist, be my guest. As I noted in my discussion of the matching numbers I am not an expert in this area. I have solicited response from members as to their experience as to how widespread this procedure was. Perhaps it was only done at the Oakland assembly plant or could have been implemented at every assembly plant. I do not think there would be any difference in the procedures in the passenger car and truck engines. I still welcome member's comments on this subject.

Your last comment needs some explanation. The easy part is that the truck frame (chassis) and the car frame was **NOT** the same. Now for the engine. Let's start with a known quantity and work our way up to the end of the 4-cylinder area. The '26 engine had the distributor in the block, a single exhaust and both intake and exhaust valves were the same size 1/2 inch. This configuration was correct for the start of '27. The next step was single exhaust, distributor in the block and now the valves are 1 21/32 inch. And in 1928 the combination was 1 21/32 inch valve, distributor in the block and a dual exhaust. (Dual exhaust means the exhaust left the head at two places as opposed to a single port). So, although the truck and car engine were interchangeable, they were not the same. The parts book lists a separate number for the '27 complete engines (car & truck) and the '28 complete engines. The major difference is the valves.

Due to a glitch in the picture department you will not get to see the instructors solution to the problem till the next class. And best of all, no **HOMEWORK** .



Posted by **RustyFender** (Forum Member # 23) on January 13, 2003 20:16 :

Pragmatic Approach: Obtain another 28 Chevy cylinder head. Face down the exhaust port to remove the numbers. Stamp new numbers in the exhaust port. Problem solved. 😊

-R 

Posted by **ChevyChip** (Forum Member # 2) on January 13, 2003 21:39 :

Rusty,

Three times I considered writing this response and twice I decided not to do it. Guess that makes this the third time. I was not sure that I could write it so it would not be taken as a personal attack. I don't know you except for this forum and don't know if your suggestions is your personal feeling or just a possible option or a tongue in cheek situation.

I hope you don't take this response as directed to you personally. It is intended only to point out what has almost become an acceptable practice.

I personally have a problem with your suggested approach. First since the numbers do not show when the manifold is attached why change the numbers? Just to fool someone into thinking that it was the numbers matching head? If the numbers are changed what has been accomplished? Is there a sense of accomplishment equal to that when you have saved the genuine part? Which is perservation or restoration of an old Chevrolet? Or both?

Unfortunately my opinion is that the changing of numbers has become more acceptable. I hope that the trend does not continue or I am wrong and it is not becoming more acceptable. I also hope that I have not insulted anyone but in a little way pointed out the possible sense of accomplishment in saving Chevrolet history.

Posted by **RustyFender** (Forum Member # 23) on January 14, 2003 15:26 :

quote:

I was not sure that I could write it so it would not be taken as a personal attack. I don't know you except for this forum and don't know if your suggestions is your personal feeling or just a possible option or a tongue in cheek situation.

Hi Chip, my post was written with tongue in cheek but I'm sure there are those who seriously considered this solution. (maybe wont admit it). In my opinion, I don't care if the numbers don't match but it would be wrong to change them.

I don't want this thread to degenerate into a holy war about right/wrong practices, we can start a new thread about that one. I look forward to the teacher's next session.

Thanks,

-R 

Posted by **MrMack** (Forum Member # 21) on January 14, 2003 16:51 :

If you want to use another head why do anything to it, who besides your self will know, so if it don't bother you and your vanity, just find another head put it on and when you sell the car (unlikely?) tell the new owner you put on a new head and charge extra for the new head!

Then I would try to fix the old head, anyway just so My vanity could say "Yeah I fixed it!"

Posted by **mromano** (Forum Member # 43) on January 15, 2003 09:17 :

Hi All

I would fix the head and NOT change the numbers. I am also a member of the National Corvette Restorers Society (a Chev Club!!) and this is the topic of many a discussion. Guys are restamping engine pads and then presenting the car as an all Original car. WRONG!! I am against restamping of ANY kind. Big problems will result. Just my \$.02.
great class....keep it up teach!

mromano

Posted by **n j horst** (Forum Member # 570) on January 15, 2003 10:38 :

mr Ray. a note for you to think about? i looked at my serial number and they did in fact stamp matching ### on head and block on truck engine's as noted on car's! not sure of assembly plant? but the engine is a 1928 coded (t) at least our two engine's, one being a car the other a truck are. thank you for teaching us new thing's and thought's.

Posted by **AntiqueMechanic** (Forum Member # 13) on January 17, 2003 18:02 :

Did not expect this project to get into a discussion on ethics. However, now that the subject has been thrust out into the open I'll give you my take on it. As I mentioned in an earlier post it was important to me to keep this head married to the block in the car as they had matching numbers. To do that it became a challenge to find a way to repair the head and salvage it. As mentioned, I have other heads available, which could have been used either without changing the numbers or by replacing the numbers. Honestly, those options did not even occur to me, as there was a viable method of repairing the head.

I guess I have a 'thing' about restoring these old fellows. My '25 Roadster had a section approximately 3 X 3 inches in the center of the block that was cracked all around as a result of freezing many years ago. It would have been much cheaper to replace the complete engine, but the head and block had matching numbers, WHICH APPEARED ON THE ORIGINAL TITLE THAT CAME WITH THE CAR. Without hesitation I stripped the block, loaded it up and drove the 2700 miles to Oklahoma to the fellow who was the master of block/head repair. I defy you to examine my Roadster now and discover that the block has even been worked on. It is a perfect job and now the car is restored with the ORIGINAL engine whose numbers match the ORIGINAL title.

Every job I tackle is done with the thought that someday, someone, will disassemble this project and critique my workmanship.

Running behind a bit on keeping the pictures up with the actual project. So, a complete change of pace.



This is how the head looked when it was removed. You can see considerable carbon build up. Too much build up can cause problems, such as pre-ignition, caused by the carbon getting hot enough to ignite the fuel mixture before the plug fires. Pieces of the carbon can break loose and get under the exhaust valve. This can cause the valve to burn or be damaged. Too much carbon build up can also cause 'pounding' on acceleration, and can lead to overheating.

HOMEWORK: How do we remove this carbon build up?



Posted by **MrMack** (Forum Member # 21) on January 17, 2003 18:43 :


Well, I think we should remove the carbon like the repair manual says to do, whenever the

valves are ground. unless someone wants to do it the modern way.

Posted by **Bowtie Bob** (Forum Member # 1442) on January 18, 2003 07:29 :

I've used a small, stiff rotary brush with a ¼" electric variable speed drill motor to remove the carbon and it seemed to work well. The heavier pieces can be carefully "chipped" out with small dental picks, that I con my dentist out of. The operative word in removing the carbon deposits is "CAREFULLY", so as not to damage the combustion chamber surfaces in the process.

I'm not aware of any chemical means of removal, but would be very interested in trying

one (or several), if anyone would like to share their ideas here. 

 -Bob

Posted by **MrMack** (Forum Member # 21) on January 18, 2003 07:57 :

That is one of the ways I have done the carbon removal, except I don't use dental burrs, I usually do a good cleaning job with my hot water pressure washer and dry with compressed air, then immediately spray everything down with a mixture of 1 part WD 40, 1 part 20 wt motor oil and 1 part MMO (Chip can subsitute ATF if he wants) and work the valves up and down then let it set for a couple of days, then wash in solvent and most of the carbon is gone. Then a round of the metal brushes on a drill or die grinder produces results I like. I don't normally send the head off for new seats and guides unless it is one that I haven't seen run, or after inspection I decide the expense is justified, I will usually do a valve grinding operation by hand, the old fashioned way). That is a perk of being retired, I have a lot of time to do things without being in a real rush.

Posted by **AntiqueMechanic** (Forum Member # 13) on January 18, 2003 10:04 :

Teacher was not clear on this homework assignment. Let's assume the head is still on the engine. How can we prevent or remove some of this carbon without removing the head. Or can it be done?



Posted by **Chev Nut** (Forum Member # 252) on January 18, 2003 10:13 :

That sounds better. Carbon accumulaton can be "controlled" by having correct air/fuel mixture and spark setting. May be removed by running a carbon solvent thru the carburetor with engine running. (notice I said MAY). I won't even suggest the pouring water thru carb. with engine running as a more serious problem than carbon can result.

Posted by **MrMack** (Forum Member # 21) on January 18, 2003 10:24 :

Carbon is a fact of life with the low compression Chevrolet four with the fixed jet carb. and the choke. also any stop and go driveing, however it can be minimized by proper service , tuneups, correct sparkplugs and sparing use of the choke and proper driveing techniques. (i think that a correctly operating thermostat that maintains a coolant temp above 160* F helps.

Posted by **Bowtie Bob** (Forum Member # 1442) on January 18, 2003 13:35 :

Carbon build up can be controlled to a certain degree, but eventually will become an issue to deal with. My experience has been that if there's enough build up to initiate pre-ignition, the head should be removed and the job done right to prevent any little pieces from interffering with the valves or scoring the cylinder walls. Every time (or so it seems) I try to take a short cut, I seem to wind up with more work and greater expense than I would have had by doing the job the right way in the first place. There must be a Murphy's law on that issue, isn't there??
Anyway, just my 2¢ worth.

 -Bob

Posted by **29chevy** (Forum Member # 114) on January 18, 2003 14:46 :

Teacher, short 6cyl kid from the back of the room. There use to be a product called Carbosolve it was a chemical fluid that dissolved the tarry binder which held the carbon particles together. When this tarry binder is dried out by running the motor, the loose carbon particles are blown out thorough the exaust. They use to sell an injector kit which mounted to the dash and a small copper tube attached to the center of the intake manifold. you attached a can of the Carbosolve to the injector under the dash and pulled the handle once to inject just the right amount of cleaning fluid into the cylinders with the engine running and then turned off the engine for the night and in the morning the dried carbon was blown out through the exaust.

This type of solvent was offered by numerous automotive suppliers such as Faeth Company of Kansas City (1930's) and also Chanslor & Lyon Co. of Los Angeles in their 1917 Catalog.

A water mist injection system was also used in the late 40's and 50's to accomplish this task.



Posted by **ChevyChip** (Forum Member # 2) on January 18, 2003 19:38 :

Your local Chevrolet dealer sold a carbon remover chemical as late as the 80s maybe later. It was a solvent that was poured down the carburetor with the engine running at moderate speed. The idea was to get about 1/2 the quart can into the engine slowly enough so it did not die. Then the last half was poured quickly so the engine died. You waited several hours for the solvent to penetrate the carbon deposits. Then started the engine. The process produced lots of white smoke. Since the solvent also washed the oil from the cylinder walls and penetrated into the rings and probably the pan draining the oil soon after the treatment was recommended. It was also not recommended to use the stuff more than once.

The effectiveness of the above treatment is unknown to the author (this student). The only truly effective way to remove carbon is mechanically!

Posted by **Chev Nut** (Forum Member # 252) on January 19, 2003 07:05 :

The carbon cleaner sold by GM originally was called Cleens and was great. In the 70s the name was changed to "Top Engine Cleaner" and is still available but seldom used as it's impossible to pour in to a fuel injected car. It does come in an aerosol can also. The modern method for cleaning carbon is a device that blasts the combustion chambers and valves with walnut shells (rice was also used at one time - un-cooked), it is sucked back out and any remaining is harmlessly blown out or burned. On some older Toyotas the engines got to the point where they refused to run due to intake valve deposits and this process would work without removing the head.

Posted by **MrMack** (Forum Member # 21) on January 19, 2003 07:06 :

Hey Chipper! that is exactly the process of "Fogging" with Marvel Mystery Oil! Except it was oily enough that it didn't wash the oil out of the cylinders, in fact it worked as a Mystery lube, and the big cloud of white smoke smells heavenly! Yeah! (TIC)



Posted by **ChevyChip** (Forum Member # 2) on January 19, 2003 08:14 :

Hey Gene,
Is that how the Japanese cars got the name 'rice burner'.

Posted by **AntiqueMechanic** (Forum Member # 13) on January 19, 2003 16:13 :

Thanks to all the students who took time to address the homework assignment.

After an engine has ran for several miles/years it is not a bad idea to remove the head for

cleaning and inspection. This is the best time to make an effort to remove any carbon buildup.

Any attempt to remove the carbon without disassembly is a hit and miss proposition. A few years ago (Late '40s early '50s) when I worked at a service station, it was common to use SHALOR RISLONE. Approximately ½ of the contents were run through the engine by way of the carburetor. Then the oil was drained and the other ½ of the container added to the new oil. Automatic transmission fluid works just as well and is cheaper. As suggested brake fluid and water were sometimes used for a quick tune-up and cleansing of the engine.

As a sidelight, the station where I worked sold GULF gasoline in three mixtures, regular, Ethyl, and white gas. The white gas was used in gasoline lanterns, gasoline irons, and any appliance that required a fuel that had a minimum of residue. The pumps were the 10-gallon visible with the pump handle. And yes, we sold "White Lightning" in the back room and NO; I do not know where the pumps went. The "White Lightning" would have been an excellent carbon remover, however the cost was prohibitive.

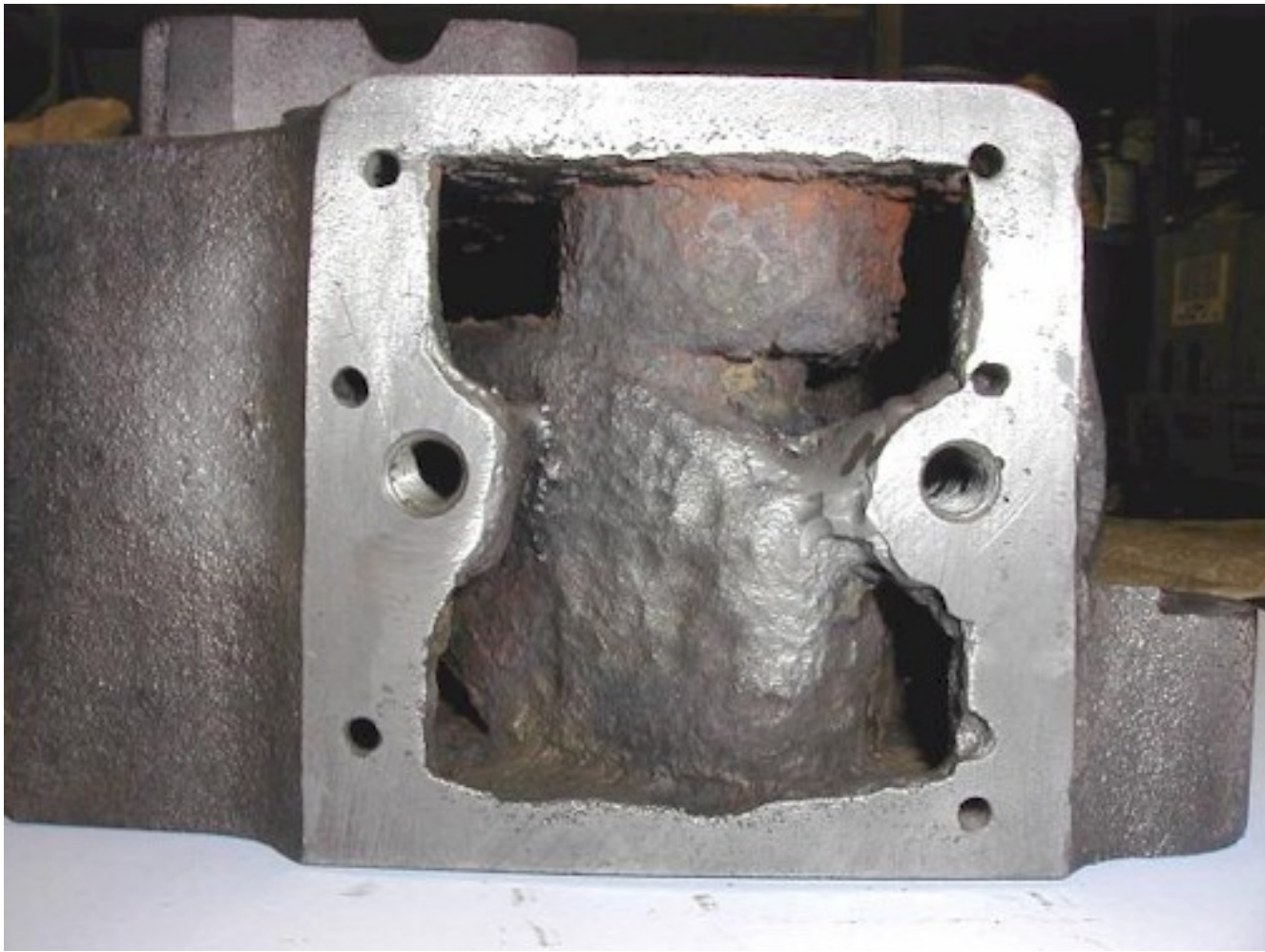
We left unanswered the selected method to attack the broken bosses on the front of the head. Someone was astute enough to observe the 6 small holes drilled in the outer edge of the opening. This was the solution of the prior engine rebuild. These holes were tapped to accept screws to attach a fabricated plate.



This plate was $\frac{1}{4}$ inches thick and was counter sunk at the locations for the 6 mounting screws. Eight large holes were drilled to allow water passage. A gasket was used to mount this plate to the front of the head.



Two holes were drilled and tapped to receive the two mounting bolts. A smart decision was made to select brass bolts to mount the water outlet. As mentioned earlier, this was a weak point in the design of the engine in that the shafts of the original bolts were exposed to the water and quickly rusted away. Another gasket was required to mount the water outlet. Crushable gaskets were used on the shoulder of the bolts to seal that area.



My solution to the problem was to take the head to an expert cast iron worker. The old cracked and broken remains of the bosses were ground away to expose good solid metal. The head then was heated to a very high temperature; new metal was built up similar to the original bosses. The head was then allowed to cool over a long period of time. The front mounting area was machined flat and holes bored and tapped to accept the mounting bolts. Either brass or stainless steel bolts are recommended to attach the water outlet. Crushable brass washers are used to seal the shoulders.



Exploded view of the water outlet. Nineteen-twenty-eight was the first year that Chevrolet provided for a thermostat. A quick look at a '28 engine and you immediately see the bulged water inlet. Inside is the thermostat held in place by a "C" shaped device held in position by two BRASS bolts.



Thermostat held in position and water outlet ready to install. Seventy-five years later and a current day thermostat fits very nicely.



Casting date of November 10, 1927 for the head. November 16, 1927 was the date on the block. Both the head and the block have matching serial numbers and the casting dates fall into place for this to all be a successful marriage.

You did so well on the last homework assignment you get a break till next class.



Posted by **mromano** (Forum Member # 43) on January 19, 2003 17:07 :

Hi Teach

Sorry for taking so long to do the homework.... How about crushed walnut shells?? An old timer told me they would raise the rpm and introduce some crushed walnut shells via the air opening of the carb. Any shells that might get caught will eventually burn. What do you think??

My compliments to you for maintaining the use of original parts in your restoration projects.

I completed a spare 28 engine restoration just before christmas and I cut the valves and

head at the local shop owned by a friend that had the right equipment. Put a 45 degree on the valves and a 45 and 60 on the head for secure seating and then used the seat dressing making sure not to go in a complete circle and used the "slot" in the valve for a large screwdriver. You can actually "FEEL" when it eventually seats. What a fun project it was!!! There is minimal "blow-by" via the valve stems but then we must remember the technology back in 1928!!!

OK I am done talking I'll sit down and pay attention!!!

mromano

Posted by **old216** (Forum Member # 1300) on January 19, 2003 17:50 :

Teacher,
could you tell us how the metal was built up in the head repair. Would this be gas welding or MIG welding ?

Student in the back row.

Posted by **RustyFender** (Forum Member # 23) on January 20, 2003 09:19 :

Question for the teacher. How does one go about looking for an 'expert' cast iron worker qualified for such a job. Likewise, how does one find a qualified shop for any type of machine work? I have been burned twice in the past by shops that were recommended as reputable and either did lousy work (caused more damage) or else sat on the project so long they lost the parts.

Thanks,

-R 

Posted by **AntiqueMechanic** (Forum Member # 13) on January 24, 2003 12:24 :

mromano ,

Interesting recommendation on the crushed walnut shells. As they are also used to do blasting, such as paint removal, who knows, it may work.

Not sure what you meant by "blow-by" in reference to the valve stems. Valves will be a subject for discussion and probably homework later.

Old216 ,

Sure, here is some more input on the head repair. The shop that did the work has a very elderly gentleman who still practices procedures that have been used for years and have survived the passing of time. First the head is brought up to around 800 degrees by use of a rosebud(s). When it has achieved an even temperature it is placed in an electric blanket

to maintain the heat. With the use of a special cast iron gas welding rod and a borax based flux, the area is built up to the desired level. With the use of the electric blanket the head is slowly brought back to room temperature. The next step is the milling machine where it is decked, drilled and tapped. As you can see this procedure is not inexpensive.

RustyFender ,

Very good question and something I pride myself at. In addition to knowing your own limits it is important to know sources of parts, services, and other means of doing outsourcing. Each Friday some 15 to 20 fellows gather at a local cafeteria for lunch. The group includes three owners of restoration shops, a master machinist, a parts man, a painter, and several fellows who own one or more antique cars/equipment/trucks. Antique cars are usually driven to the cafeteria and a special area is provided for us to park. If the city and parking lot owner would allow it one of the members would fly in in his helicopter. (Most of the owners have way too much money). In addition to feeding our face a wealth of information is exchanged.

I do not consider myself bashful. If I need something done it does not bother me to enter a shop, ask for the manager, state my need, and then ask to see a sample of the work so I can judge for myself. My experience is that almost every shop knows the capabilities of the other shops in town and are not hesitant to recommend someone if you have a special problem.

If nothing else, I would think that if you have been following my "School is in Session", you have at least been exposed to some of the methods employed in engine rebuilding and can arm yourself with much more intelligent questions in solving your projects.



This subject should have been covered when we were hot-tanking and cleaning the block. There are eight bolt holes used to attach the head. For years the 4-cylinder people have been hindered by the lack of NEW head bolts for reassembly. The old head bolts have been stretched or will stretch more when we reuse them. Due to the non-standard size of the bolts we can't buy new ones. You can have new ones "made" at a machine shop, however that is expensive. Inspect the threads in the 8 holes in the head for condition. If they are already showing signs of wear and damage one solution is to replace the threads. For about \$50.00 you can purchase a Helicoil kit to replace all 8 holes. The kit will include a special size drill to clean the holes, a tool to retap the threads, enough inserts to do the 8 holes, and a special tool to install the inserts. This will change the number of threads per inch and allow you to purchase new head bolts.

When you have finished inspecting the holes or making the repairs it is **EXTREMELY** important that each hole be cleaned out thoroughly. This is to prevent false torque readings and possibly breaking the boss that contains the hole.

It is time to install the head. If the head gasket removed from the engine is inspected and found to be in good shape it may be reused. I have used the same head gasket as many as 4 times with good success. If you have a new copper or metal head gasket, by all means use it. The repair manuals suggest the gasket be coated with grease on both sides. I prefer to use the Permatex copper spray-a-gasket. Place a good coating at each of the water passages. While you are looking in the repair manual notice the pattern recommended for the sequence of tightening the bolts. Recommendation is that you start at the **ENDS** . How much torque for the bolts? This subject has been broached several times in this forum. Can you remember the steps and pounds of torque?

Homework :

Describe the steps used to torque the head bolts on this engine. Give the torque for new bolts and used bolts.



Posted by **old216** (Forum Member # 1300) on January 24, 2003 19:29 :

This is the first time I have heard of reusing a head gasket. Is this head gasket a composite one or a pure metal one ? I am asking because I want to know if your advice is only for one type of gasket.

Posted by **ozjim** (Forum Member # 283) on January 25, 2003 03:22 :

Teacher, from the kid down under, i was taught by a previous teacher from another school to never reuse the Old head bolts, if new ones are easily obtainable.(like you have done on your motor)

Step (1) starting in a clockwise direction from the from the front of the cylinder head,

lightly nip the bolts and work in an ever deminishing circle. (ie) from the outside edge to the inside bolts.

Step (2) set the tension wrench for 30ft pounds, and repeat step1.

Step (3) seset tension wrench to 40ft pounds.

and repeat step1.

Step (4) reset t/w to 45ft pounds, and repeat step1

Step (5) reset t/w to 50ft pounds, and repeat step1

Step (6) reset t/w to 55ft pounds, and repeat step1


Step (7) reset t/w to 60ft pounds and repeat step1.

Step (8) check work again, leave wrench at 60ft pounds and repeat step1 and recheck all bolts.

Step (9) Recheck again after finishing assembling motor and before you are ready to fire up the engine.

Step (10) Start the engine and let warm up to running temperature, stop the engine and retension at 60ft pounds again repeating step 1.

The workshop manual however prefers the head bolts tensioning pattern, front to rear in diagonal opposites, and reverse the process on the inner 4 bolts, see pg 14 of the manual.

As a note, i manufacture head studs with 1/2" x 20 tpi unf thread on the top of the stud and 1/2" x 12 on the base of the stud on all of my engines this gives a much more even tension when pulling the head down. 

Posted by **ChevyChip** (Forum Member # 2) on January 25, 2003 08:08 :

I basically agree with ozjim but would add a bit. When installing head bolts first lubricate the threads with a bit of oil. If the bolts penetrate into the water jacket then add a sealer like Permatex 33 designed for the job. Also check for straight threads without nicks, burrs or other deformations. If the threads are not regular and even don't use the bolt. Check the length of the threads with a gage if there is any doubt. When tightening the bolts always back off about a 1/4 turn then tighten to torque desired. Then back off 1/4 turn and re torque. Note the position of the wrench when torqued the first time and second. If they differ by more than a few degrees then repeat the loosening and tightening. What you are doing is mating the threads on the bolt and block giving more of a complete contact. It eliminates loosening of the bolts during operation and most retorquing.

Also make sure that both the top of the block, gasket and the head are flat and clean. It is suprising how small a piece of dirt can cause a leak or cracked head if in a critical place.

Posted by **ChevyGuru** (Forum Member # 342) on January 25, 2003 21:11 :

I believe it makes more sense to ignore the Repair Manual in this one specific situation, and tighten in an alternating "X" pattern starting with the INNER bolts, then the outer bolts. It defies everything I have ever learned or believed to tighten starting with the outer bolts, and work inward.

When reusing the old bolts, a wise man told me not to exceed 50 Ft Lbs normally, maybe up to 55 if absolutely needed to seal. I would also take the extra time to torque down in 5 ft. lb. increments, not 10.

I also like the copper spray gasket sealer, given the low compression, and the likelihood of leaks.



Posted by **AntiqueMechanic** (Forum Member # 13) on January 27, 2003 20:25 :

Old216 ,

The only head gasket that can be reused are the metal clad type which may be steel or copper. The reproduction composite gaskets are not worth the shipping charge. I would much rather reuse a good gasket than risk a re-do on a job by using the composite.

Page 13, in the Series AA-AB Repair Manual effective Feb 1st, 1928, gives instructions for reusing the head gasket and also describes the use of grease as a sealer. Other repair manuals in my library contain similar instructions on the subject.

Ozjim ,

I do not have a problem with your solution to the torque settings nor the method employed. I just find it interesting that Chevrolet started on the outside (ends) and worked into the middle bolts. I have never seen the torque specifications printed in any of the old service manuals. If it is there I would appreciate someone directing me to it.

I know several members who work on the 4-cylinder engines and use the studs as you mention. As they are building race engines I can see the need for the studs. In doing a restoration with the studs it leaves the stud sticking up with a nut, which is easily seen on the driver's side. If you were producing the studs it would be just as easy to make replacement HEAD BOLTS. The markings on the head bolt would give away the fact that it was a replacement head bolt, but would not be as obvious as the stud.

ChevyChip ,

Very good input on the technique of how to torque the bolts. Also your comments on cleanliness are very timely. Assembly time is when we wipe, blow, inspect, and clean again. Good points.

ChevyGuru ,

Your point on the procedure is well taken. After the job is completed it would be very difficult if not impossible to find which method a mechanic used. Again, if you had a failure I don't know how you would make the determination that it was caused by the procedure.

Although not desirable, reusing the head bolts is a common practice. I have done it for years and never experienced a problem. As you indicated, I drop the final torque figures down some and am very conscious of the feel when tightening the bolts. You can easily feel a bolt stretch and know to stop.

If we could get **ozjim** to make head bolts for us we would use them.

I have had extremely good luck with the copper spray sealant on head gaskets and any other place I need to make a good seal.



To compensate for worn valve stems and guides, Chevrolet provided valves with oversize stems. The heads did not originally have guides installed. The hole bored through the head was the guide. Years ago when these special valves were available that was an acceptable solution. The accepted solution now is to install valve guides and use standard valves. Guides can be knurled once and if worn out can easily be replaced again. From the picture it is obvious that this head has had guides installed. Notice also that the boss is split on one of these installations. This should not pose a problem and will be used as you see it.

HOMEWORK :

At what point is a valve stem or guide worn out?

Posted by **Bowtie Bob** (Forum Member # 1442) on January 28, 2003 12:59 :

I've always used the rule that if there's any perceptable side play, they should be replaced. Probably OK to use them with .002" - .003" side play (wear).

 -Bob

Posted by **Chev Nut** (Forum Member # 252) on January 28, 2003 17:52 :

The 1928 engine was way ahead of its time. The cast -in- heads guides reappeared in 1955 on the V-8s. Oversized valves were also the repair option.

Posted by **AntiqueMechanic** (Forum Member # 13) on February 01, 2003 00:46 :

This is a tough one as there is nothing definitive written on the subject as far as I know. Therefore, let's run this thing through the computer and see what comes up.

We start with the exhaust valve. On the POWER stroke the valve is closed so no problem. On the EXHAUST stroke the valve is open. If there is extreme wear in either the guide or stem or both some exhaust gas will be discharged along side the valve stem. Not a big problem, perhaps some unwanted noise. On the SUCTION stroke the valve is closed and again no problem. On the COMPRESSION stroke the valve is still closed and again no problem.

Now for the intake valve. On the POWER stroke the valve is closed and no problem. On the EXHAUST stroke valve is still closed and no problem. On the SUCTION stroke the valve is open. Again assuming considerable wear air could be drawn down the valve guide to mix with the incoming charge from the intake manifold. This would dilute the charge and reduce power, and the lean mixture could cause overheating. On the COMPRESSION stroke the valve is closed and again no problems.

So it would appear that the only time we could have a problem with worn guides/stems would be with the intake valves. In my opinion this would require considerable wear to pose a problem. As to an exact measurement, I don't have one. It just doesn't appear to be a big problem. However, if the valves are to be ground as I have done on this job, the 4 best fitting valves were designated as intake valves and fitted to that position. The worst 4 were designated as exhaust and placed there. Then, all valves were ground to fit the assigned hole.



On the left is the face of one rocker that is as removed from the engine. The mark you see is the wear pattern. Let's assume for the sake of discussion that the wear mark is in fact .010 inches deep. This valve would be noisy and we may decide to gage it and readjust. Assuming that we wanted to set this valve to a value of .010 inches and place the flat feeler gage between the top of the valve and the end of the valve stem. We make this adjustment and to our amazement the valve is now much more noisier. Why, because the combined value of the assumed correct setting and the addition gouge in the lifter has in fact become an actual .020 setting. The point of this discussion is to point out the necessity of grinding the rocker arm faces when a head is rebuilt. The rocker arm face on the right has been ground so that now a feeler gage placed under the arm and on top of the stem would result in an actual setting of .010.



Posted by **ChevyChip** (Forum Member # 2) on February 01, 2003 09:56 :

Hey teach, hey teach?
Kid in back takes finger from nose to raise hand up.

Teach, My grandpop taught me different. He said that if a valve guide gets too worn then

it is more likely to have carbon build up on the valve stem. And the guide tends to wear unevenly which makes an oblong hole. When the valve stem with carbon on it moves up and down and rotates a teeny bit or cocks a little in the guide it will stick. Then something bends or breaks. When that happens it ruins your day.

Posted by **Chev Nut** (Forum Member # 252) on February 01, 2003 10:08 :

Chip, I will have to agree with your grand pa a little. I believe that a loose intake guide will lead to carbon formation on the valve stem. This would be caused by excessive oil running down the stem, causing valve sticking. The only thing is this can't or won't happen until 1929. In the later years (Modern) its found best to have guides dry of oil. Guess it all 4s would naturally run dry.

Posted by **ChevyChip** (Forum Member # 2) on February 01, 2003 17:09 :

Gene,

I have found carbon build up on the valve stems for both intake and exhaust valves. Most of the time it is the exhaust valves that has the hard tan deposits and they are limited to the head area. But I have seen it creep up the stem if the guides are worn. I recently took a two '31 heads apart and both intake and exhaust valves were stuck. There was carbon build up on stems of both. Now I realize the sixes had oil fed to the valve train and likely more chance of carbonization of oil on the stems. But oiling of the four bangers will put some oil on the valve stems. That said I personally feel that the majority of the carbon comes from the combustion chamber and not the oil on the head.

Posted by **AntiqueMechanic** (Forum Member # 13) on February 08, 2003 15:38 :

Comments by **ChevyChip** and **Chev Nut** are so noted. However, the teacher will stick by the comments in my previous post. Although possible, I have never heard of a 4-cylinder valve sticking which resulted in a bent pushrod or broken rocker arm. The worst case scenario is for a piece of carbon to lodge between the lip of the valve and the valve seat. This would hold the valve open and cause the valve to be 'burned'.

In defense of **ChevyChip** and **Chev Nut** , there comments are pertinent to the 6-cylinder and later engines. The major difference is the later engines are submitted to an oil environment. In fact we must use valve stem seals to prevent the oil from entering the engine by way of the valve guides.

Back to the assembly of the head. In the following picture note the felt rings on the top of the pushrods and under the rocker arms.



If there is a question about these felt rings, rest at ease. They are part number 327647 and are in fact OE. With the valve cover off, each of these rings are oiled with engine oil. Each rocker arm has an oil hole located over the shaft and this position must be oiled also. Before replacing the valve cover a felt pad is saturated in engine oil and placed over the length of the rocker arm shafts. The part number of the pad is 345468. And yes, there are valve cover gaskets, two of them, part number 348561. They are "L" shaped and placed at each end. While on the valve cover, note that it has 4 small holes, two at each end. These holes match up with channels on the underside of the valve cover. The purpose of the holes is to allow oiling of the felt pad without removing the valve cover.

I cringe at posting the above picture as it is intended to show the engine color. Depending upon many variables each of you will probably see a different color, but the correct engine color is "olive-green".



In preparation to adjusting the valves we must move the flywheel into position. This is the view we see looking through the cutout provided and the marking arrow. Next class will cover the procedure for initial valve adjustment.



Note the two major depressions in the head. One on each end with 4 valves and associated valve springs and rocker arms. These depressions are the subject of your home work.

HOMEWORK: How much and what type lubrication is placed in these two depressions .



Posted by **Chev Nut** (Forum Member # 252) on February 08, 2003 16:48 :

The side cover view shows a very nice green color on my screen but the next two, because of being shot close up?? are 6 cyl. gray.

Posted by **ChevyGuru** (Forum Member # 342) on February 08, 2003 18:02 :

I'll be bold, and answer the Homework Question-

NONE!


You have already outlined all the top-end oiling points in the text above.



Posted by **Pre25Chev4** (Forum Member # 10) on February 09, 2003 00:58 :

According to the August 1927 CSN "these pockets are filled on every new car before delivery" with engine oil.

Posted by **Chev Nut** (Forum Member # 252) on February 09, 2003 06:33 :

What is the reason for them to be filled with oil?...looks as if it would serve no purpose 



Posted by **Chevrolet** (Forum Member # 1723) on February 09, 2003 11:05 :

my guess is that, upon initial start up after it left the factory, the pockets full of oil would provide a splash of oil to all of the rocker contact points and refresh the felt pads, until the regular oil came up to pressure?..




epi

Posted by **Chev Nut** (Forum Member # 252) on February 09, 2003 13:07 :

Bt the "regular" oil dosen't get up there-the rocker arms are oiled with an oil can by the the owner-

Posted by **Chevrolet** (Forum Member # 1723) on February 09, 2003 18:38 :

chevgene,

uh, that's probably why your forum number is 252 and mine is 1723... 

my next guess is that "I guess I don't know"...



epi

Posted by **Chev Nut** (Forum Member # 252) on February 09, 2003 20:22 :

Chevrolet- Don't feel bad. When I made an earlier post in this thread about oil causing carbon on the valve stems on a 4 cyl. it was necessary for me to erase what I wrote and reword it. We just have 6 cylinder minds.

Posted by **mromano** (Forum Member # 43) on February 10, 2003 11:56 :

There is no forced oil to the head of the 28 engine.

As far as the "wells" around the valve guides, maybe there to catch oil run off from the felt pad. I still cannot get use to the head bolts. Original bolt have a higher head and no top markings. Did we ever find out what the one contraption is in place of the headbolt?

About the two holes to oil the felt pad without taking off the valve cover!!!! I have a hard time believing that one. First those holes are very small. It would take days. Also, the oil would not be distributed evenly over the surface of the felt pad that is on top of the rocker arms. I am open to dialogue.

later
mromano

Posted by **AntiqueMechanic** (Forum Member # 13) on February 10, 2003 20:08 :

Perhaps the way to attack this series of Q&A is to start at the end and work backward.

mromano

First, you are still concerned about the head bolts. The head bolts that I used came with the engine. They are a very good quality bolt obviously made by either the prior engine rebuilder or by a machinist for his use. That is why you see the shallow head and with visible markings. The threads were cut to match the original TPI. Perhaps I confused the students by putting the information on the odd head bolt in a different thread [Head Bolt](#)

Lastly, you have doubts about the oiling of the felt pad over the rocker arms.



There are a total of 4 holes provided to replenish the oil in the felt pad. Remember, that on assembly, the pad is saturated with engine oil before being placed under the valve cover. The holes are provided so additional oil can be placed on the pad without removing the cover.

If oil is placed in the 4 holes on the top it will be discharged below at each point I have marked with the chalk arrow. This would provide very good coverage of the felt pad.

Now for the homework assignment. What type of lubricant if any is to be placed in the two depressions?

SHOP HINTS

Adjusting Breaker Points on Semi-Automatic Distributor

Contact points on the new Delco-Remy semi-automatic distributor are adjusted in an entirely different manner than heretofore. These points are fixed in their mountings—and are controlled by an eccentric screw moving the mounting plate. See Figure 4.



Oil In Valve Pockets

Cars are now shipped without oil in valve pockets. This was discontinued to avoid oil dripping in double decked cars during shipment.



Figure 6

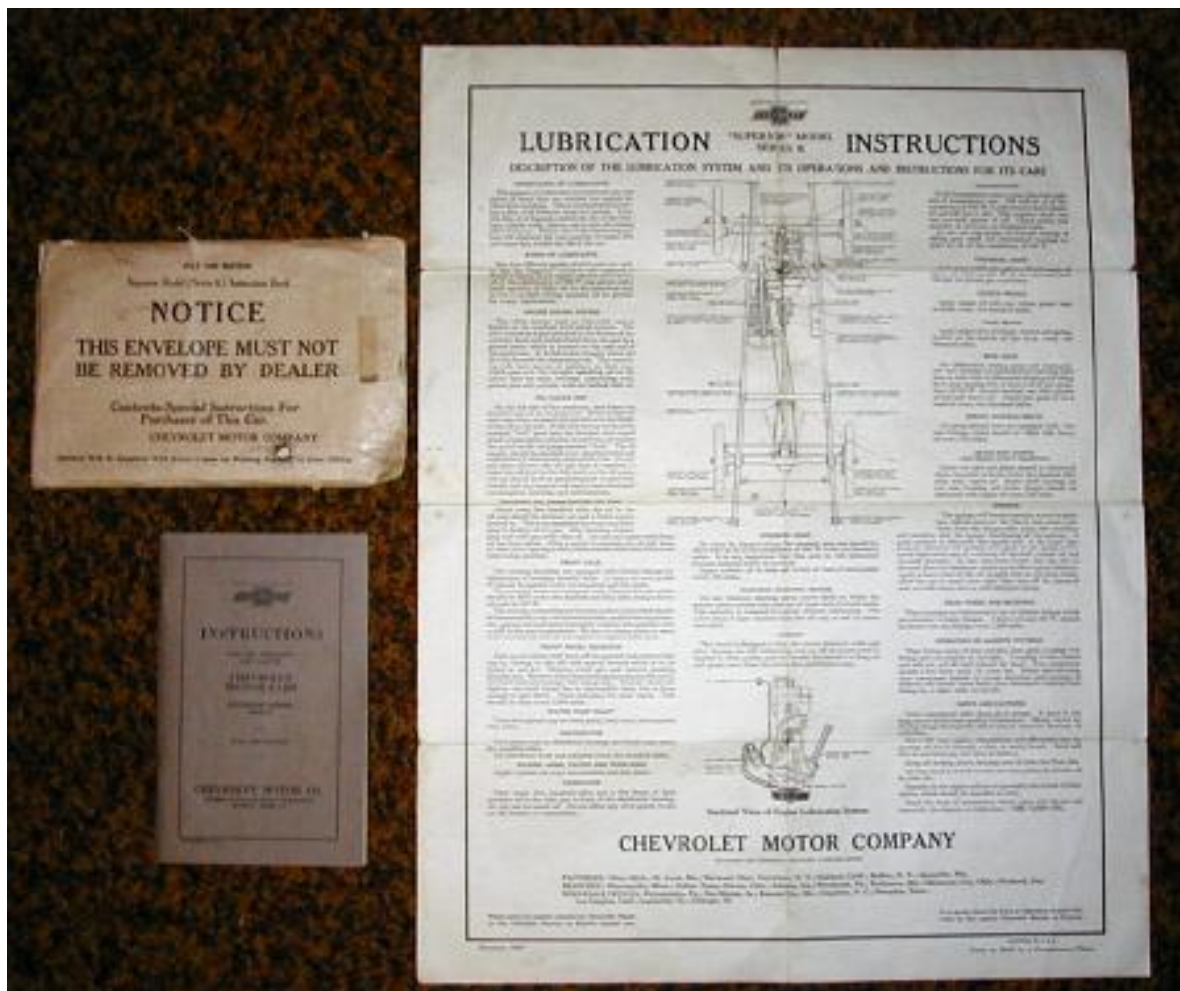
Refer to Figure 6 and see that these pockets are filled on every new car before delivery. If neglected, valve squawks are very liable to develop.

This is a very interesting instruction located in the August 1927 CSN on page 31. This instruction says 'filled' not just replenish the oil.



The bosses that the valves operate in are equal to if not higher than the surrounding area.

For any oil to get to the valve stems it would have to be splashed(?) by the valve springs. I would think that if the valves were squeaking a shot from the on board oil can would be sufficient.



Every vehicle delivered by the dealer to the original owner came with an envelope that contained the owner's manual and a lubrication chart. This chart was the same as contained in the center of the owner's manual except it was 18 ½ X 24 inches. This chart was to be placed on the garage wall as a reference for the owner. I have several of these charts, many different owners manuals, and repair manuals for many different years. I have combed every reference I own looking for instructions about servicing the oil in these two depressions. Results: **NONE** , other than the small notice in the Aug '27 CSN.

This forum is still open for your comments, with references, on this puzzle.





Posted by **MrMack** (Forum Member # 21) on February 10, 2003 21:48 :

Just one comment for Mromano, there is a oil can and holder that goes on the firewall so that motor oil can be squirted into the four holes in the valve cover, every few hundred miles.

Posted by **L6farmer@aol.com** (Forum Member # 1533) on February 23, 2003 20:11 :

Chevygene: I liked your class on the flywheel last December. But, what is the answer on the cotter key. Is it so that the oil doesn't build up, and it keeps it cleaned out?

Also, I didn't see the answer to the repositioning of the flywheel to avoid the bad areas. Can this be done? I have a flywheel on a 6-cylinder engine, and it has three worn areas.

Please help me. Thanks,  

Posted by **Pre25Chev4** (Forum Member # 10) on February 25, 2003 12:27 :

Concerning - Oil in the valve pockets

I was reading Jim Farris copy of Chevrolet Sales Speeder for October 1922 at the San Diego Swapmeet this pass weekend, when I spotted the notice that the factory was now adding oil in the valve pockets. The reason mentioned was to prevent loss of power caused by sticky valves. It claimed that with the tight clearance between the stem and the valve bore in head on a new 'motor' that the valves could stick during the break-in period if the engine got hot. Therefore the factory would add the oil in the valve pockets so some splash oil would lube the valve stems. This fact was not mentioned in the Owners Instruction Book or the Lube Charts because after break end period it would not be required to maintain oil in these pockets.

KenK

Posted by **Bowtie Bob** (Forum Member # 1442) on February 25, 2003 14:37 :

L6farmer@aol.com : The answer to the cotter key question was answered by MrMack on 12/17 @ 07:30am. His answer is printed below:

quote:

The cotter key serves the purpose of assuring that any oil, clutch powder dirt will drain out of the drain hole, it keeps it from being stopped up like Chevy nut said . It is loose enough a fit so that it jiggles around from the motion of the car but is bent over so that it doesn't bounce out.

 - Bob

Posted by **DdeuceMan**. (Forum Member # 69) on February 25, 2003 15:52 :

  Hey.....I remember that.  

Posted by **AntiqueMechanic** (Forum Member # 13) on February 26, 2003 13:30 :

Ring the bell and get the kids in, it's time for class.

First we need to tie up some loose ends. As to the oil in the two depressions in the head; thanks to Ken for his insight into that question. It now appears that this was in response to a problem noted in the field. Apparently, prior to October 1922 no lubrication was placed in these depressions. As a result of the problems noted by Ken the addition of the oil was the 'fix'. This is consistent with the note in the August '27 CSN. I think we can close this perplexing subject out with the conclusion that oil is NOT to be placed in the depressions unless you have a freshly rebuilt engine, with guides installed and closely fitted to new valves, or you can hear 'squeaking' noises coming from the valve train. Probably not a bad idea to squirt a bit of oil on the stems as you do your frequent oil can job on the rockers and the joint at the rocker adjusting bolt and the top of the pushrods.

EDITORIAL

{As this site has been in operation for well over a year, an abundance of information is contained in portions of the threads not revealed, when you go to a particular heading. For the new member it may not even be apparent that additional information has already been posted and available by a bit of additional work. I must admit that I am not completely versed in the operation of the 'search' mechanism available on this site. My point is that if you have a perplexing problem, that you need an answer for, you may find it is already posted, if you know the procedure to 'find' it. This is not to say that a revisit of a subject is bad, as it is not. With the addition of new members daily a new and different viewpoint may in fact be a plus.} (He now steps down from his box and returns back behind the teacher's desk.)

With the rocker shafts and rockers installed on the engine it is time for the initial valve adjustment. (Credit to MrMack as he has already eluded to this next problem.) If the rockers arm faces are worn to the point of needing to be refaced the rocker arm bushings would be suspect also. That was true in this case. More movement was evident than considered serviceable. A new set of bushings and two new shafts were ordered.

To install new bushings the old ones must be removed. This is best done with a die grinder. With the grinder cut a path across the bushing from side to side. Make this grind in line with the shaft and not vertical so as to weaken the bushing if you over cut. After the cut is made it will be easy to extract the remainder of the bushing. To install the new bushings they must be pressed and not driven. A hydraulic press or even a vice may be used to gently press the bushings into place. If you try to drive them in you run the risk of distorting the very soft and fragile bushing. After they are all installed it will be necessary to resize them to the new shaft. If you are doing your own work a reamer can be purchased for a nominal fee. With a normal drill press or milling machine you can easily ream the bushings to the proper size.

What are we trying to accomplish when we adjust the valves? Ideally, we would like the valve to open to it's maximum limit to either exhaust burned gasses or to receive the maximum charge from the carburetor. While at the same time when the valve is closed we want it closed securely so there is no leakage. To accomplish this objective we need the rocker arm to stay in contact with the end of the valve stem while the other end is following the movements from the cam lobes. However, when the valve is in the closed position the arm must NOT remain in contact with the stem. This would prevent the valve from seating properly. Therefore, we establish a "valve clearance" which we set between the end of the rocker arm and the top or end of the valve stem. For the engine we are working on the clearances are established as .006 for the intake valves and .008 for the exhaust.

To understand the adjustment procedure we need some given information. The firing order for this engine is: 1, 2, 4, 3. The arrangement of the valves from the front of the engine to the rear are: EIIEIIE where E=exhaust and I=intake. (Don't worry if you start at the wrong end. The results are the same.)

You must keep in mind as you follow the procedure that this is the procedure for STATIC adjustment. Static means the motor is not running and in this case is an initial adjustment after a rebuild. To make these adjustments you do not need to install the distributor (you will understand why in later classes) and the two side covers should not be installed yet.



With the side cover still off we have a good look at the lifters and their guides. It is easy to determine which lifter is on a portion of the lobe on the camshaft and which lifter is at the bottom of it's travel. The lifter lowest in it's hole is at the bottom of it's travel and the one to be adjusted. With your multiple feeler gage assortment select the .007 gage. Why the .007, because all we wish to accomplish in this adjustment procedure is to insure the engine will operate. FINAL VALVE ADJUSTMENT CAN ONLY BE ACCOMPLISHED WHEN THE MOTOR HAS BEEN RUN AND HAS ACHIEVED OPERATING TEMPERATURE. The other reason for selecting the .007 gage is that it is easy to find, is in better shape, because it is between the .006 and .008 on your gage assortment which are gnarled and beat up.

The procedure now is to slowly rotate the flywheel and identify the valves which are at the extreme bottom of their travel, and adjust the ***** to the .007 setting. Tighten the lock nut on the adjusting ***** . To make things simple use a piece of chalk or other marking device and mark the valve you just adjusted. Continue to rotate the flywheel until you have identified all 8 valves and adjusted them to .007. After the last one you should turn the flywheel through two complete turns and make sure each rocker arm is loose at some point in the two revolutions.

Put the two side covers on after gluing the gaskets to the covers and not to the block.

Place your chairs under the desk and recess.



Posted by **AntiqueMechanic** (Forum Member # 13) on March 03, 2003 00:01 :

ATTENTION STUDENTS!

This thread is getting too close for comfort to being 13 pages long. For many reasons we just don't want to go there. Soooooooooooooo, with this post we will close out the many pages of the "School is in session" and reopen it with the next school session which should be this week. Don't go away, we'll be right back.



Posted by **Bill Barker** (Forum Member # 1) on March 04, 2003 17:58 :

The next class in this course can be found at
[<this location>](#) 😊

Please bring two sharpened No. 2 pencils with erasers.



Posted by **AntiqueMechanic** (Forum Member # 13) on May 26, 2003 22:12 :

This complete thread has been edited to comply with the intent of this forum.

This thread will be locked and continued under a new thread.

To assist in finding the head of the new thread you can click [HERE](#).

Notice: All comments posted herein do not necessarily reflect the official position of the VCCA.

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This is topic **1928 School is again in session!** in forum **Tech Talk** at **Vintage Chevrolet Club of America (VCCA)**.

To visit this topic, use this URL:

http://vccachat.org/cgi-bin/ultimatebb.cgi?ubb=get_topic;f=38;t=000002

Posted by **AntiqueMechanic** (Forum Member # 13) on March 03, 2003 00:07 :




Hi Students,

Welcome to the first entry to a new string on the rebuild of the 1928 engine. Our old string was getting too long and approaching the dreaded 13 pages.

Keep your notes and books ready as we will discuss spark plugs in the next class.



Posted by **DdeuceMan**. (Forum Member # 69) on March 03, 2003 15:25 :

  Ok Ray.....I enjoy tagging along.   Don

Posted by **AntiqueMechanic** (Forum Member # 13) on March 03, 2003 21:15 :

Welcome to the new School thread. Still business as usual, so get to your seats and let's get started.

Although we have not stuffed the engine back in the engine compartment we need to think about putting some spark plugs in it.

The general characteristics of the 4-cylinder spark plugs include a thread size of 7/8 inches and a 1 1/8th Hex drive. Projection is 3/4 inch.

New spark plugs were probably sold as a set in an AC Spark Plug box.



The July 28 CSN tells us that prior to the Model AB (1928) that all prior models used the AC "B" spark plug.



Here is a box of 4 of the type "B" spark plug. Notice that the box end specifies Chevrolet.



This is a box of NOS AC 78S plugs for the 1928 Chevrolet. The 78 S plug is still manufactured, however it is not the same as the original 78 S in that the projection is only $\frac{1}{2}$ inch.

Both the AC "B" and 78 S plugs in NOS condition are becoming very difficult to obtain and also expensive when located. In an attempt to seek a solution and an acceptable substitute I have obtained an Adaptor.




This adaptor allows the use of a modern spark plug in the 4-cylinder engine. The major disadvantage of this arrangement is that no non-resistor plugs are available with a $\frac{3}{4}$ reach. This means that a resistor plug must be used, however if the ignition system is in a good state of

repair the results are completely satisfactory. I recommend that the AC R44LTSM6 plug be used in this adaptor. R=Resistor, 4=14MM thread size, 4=heat range, L=long reach, TS=Tapered seat with extended tip, M=special design electrode, and 6=point gap. When the plug is installed the plug gap is set to .025. Using the codes as listed you can select the makeup of the plug of your choice.



Posted by **RustyFender** (Forum Member # 23) on March 04, 2003 19:29 :

Hi Teacher,
Someone once told me they obtained a worn-out set of spark plugs of the two-piece variety and used the lower halves as adaptors for modern plugs. However, I was not aware that the adaptors were "obtainable" for this purpose. Very interesting. 

-R 

Posted by **MrMack** (Forum Member # 21) on March 04, 2003 22:27 :

Raymundo, are these adapters only available with the internal machineing for the gasketless tapered plugs? Next question from whom are they available? I haven't seen a lot of publicity in print for them. Did you think we were never going to ask?.....

Posted by **AntiqueMechanic** (Forum Member # 13) on March 04, 2003 23:51 :

The adaptors are available from me and are only for the tapered seat. If you can find a plug that is non resistor, and has sufficient reach, I could provide a flat seat adaptor. Didn't make them as I did not see a need.



Posted by **MrMack** (Forum Member # 21) on March 05, 2003 10:33 :

I have used the resistor plugs in both the six and the four cylinders and haven't had any problems with their performance at all, some may shy away from them but I don't have any problems with them as long as the coil and the plug wires are in good shape and the rest of the ignition circuit is in good condition.

Posted by **AntiqueMechanic** (Forum Member # 13) on March 09, 2003 17:56 :

The engine in now assembled to the point that it really needs to be installed in the car prior to further work. As with any project, the best of plans are laid aside and modified as you go along. This project was no exception. With the engine removed from the car it provided an excellent opportunity to clean and paint the engine compartment. And if you are gonna go that far you are

not going to miss the chance to rebuild the steering sector as it is now so accessible. The firewall was painted black with a paintbrush sometime in the past so since it is devoid of any attachments it must be repainted the proper color. And did I mention that if you are going to make all these improvements you may as well install a new wiring harness?



So here are the results of those sideline projects.

Of course while the transmission was out of the car it must be addressed also. Although, I had just refreshed the transmission when I first purchased the car I decided to build yet another transmission to reinstall. And.....that means full inspection of the clutch plate and the throw-out bearing. The bearing had been replaced when I did the prior transmission work so it was cleaned and reinstalled. I decided to try another clutch plate for this assembly. After all this work it was time to reassemble the engine and transmission/clutch assembly.



This is the configuration I chose to reinstall the engine/transmission assembly. I also elected to try another U-joint and speedometer drive assembly.



One final look at the engine compartment. Firewall has been painted, engine compartment painted, steering sector rebuilt, horn rebuilt and painted, and that portion of the wiring harness in the engine compartment installed. Note the armored wire across the front of the compartment for the headlights.



Two VCCA members appeared at the shop at the wrong time. (Actually I knew they were coming so I lay in wait). With two more sets of eyes watching the operation it was very painless to drop the engine back into the frame. However, even with the additional help it is just about impossible to carry out this operation without scraping at least a small portion of the fresh paint. A tiny paintbrush took care of that.

With the engine combination setting back in the compartment the next operation is to install the dash instruments (which also received a complete restoration and plating as necessary). When we return to the engine it will be time to prime the oil system and install the distributor.



Posted by **MrMack** (Forum Member # 21) on March 09, 2003 19:32 :

Well, Raymundo, sounds like you will have a "almost new " 75 year old car!



Posted by **Bowtie Bob** (Forum Member # 1442) on March 10, 2003 07:06 :

Ray, I'm reminded of a '29 F*rd roadster I had several years ago. I removed the steering column to install a new bushing and decided to repaint the column, as long as it was out of the car. Then the steering column looked better than the rest of the car. The simple \$15.00 repair wound up costing about \$14k and took 2-years!! I now try to keep from fixin' what ain't broke!!



 -Bob

Posted by **28chevrolet** (Forum Member # 1414) on March 11, 2003 17:24 :

the 28 is looking good!! I dont want to get off the subject of your repair Antique, but i happened to notice your 4 hood latches. My 28 AB has 3 similar latches but they dont fall back as far. Actually i have to hold them out of the way or the hood scrapes on them. NOW for the 4th latch that was on my car it always fell against the fender and it was rather difficult to not chip it, also it didnt have the lower wedged bracket that is suppose to match the wedge on the hood . I took the darn thing off until i find an actual replacement. I think it must have been a FORD  product??? Any comments on the latches ? 

Posted by **AntiqueMechanic** (Forum Member # 13) on March 11, 2003 17:39 :

Hi 28chevrolet,

Relax, there are 4 (count them) different hood catches for the '28 Chevrolet. All of which are correct. It is desirable of course for them to all match. The proper catch is determined by the hood catch bracket. If necessary I could expand on this and describe each one, but it is probably

not necessary.



Posted by **AntiqueMechanic** (Forum Member # 13) on March 12, 2003 13:56 :

The engine has been set in place in the engine compartment. The engine is secured there in three places. The front of the engine has a single stud that goes through the front cross member.



The rear sits on the second cross member and is secured on each side by a through bolt.



It is important to note that the two bolts are inserted through the bottom with the threads at the top. The second thing to observe is that all three items, the stud and two bolts, use a castle nut and cotter key. This is extremely important. A loose engine can cause serious problems and does major wear to the mounting bosses on the engine and the cross members. The two bolts are installed from the bottom in order to make the nuts visible each time the hood is raised to service the engine.

The oil filter and coil bracket has now been installed on the right front of the engine.



Students, you have had it too easy recently, because of the lack of homework.

HOMEWORK:

Who can remember what precautions must be observed in the installation of the oil filter/coil bracket?



Posted by **RustyFender** (Forum Member # 23) on March 12, 2003 15:15 :

quote:

HOMEWORK:

Who can remember what precautions must be observed in the installation of the oil filter/coil bracket?

For one thing, the bracket needs good electrical conductivity to the engine block which hopefully has good conductivity to the frame. (been there!)

-R 

Posted by **n j horst** (Forum Member # 570) on March 12, 2003 17:51 :

I agree with Mr Rustyfender, also make sure the bracket is not reversed or upside down ! the coil need's to screw to the top of bracket.

Posted by **Gator** (Forum Member # 717) on March 13, 2003 11:32 :

anti-seize needed?

Posted by **ChevyChip** (Forum Member # 2) on March 13, 2003 21:40 :

Hey teach, Hey teach,
What about the AC Z plugs? Weren't they originally used in the '28s?

Posted by **AntiqueMechanic** (Forum Member # 13) on March 16, 2003 18:28 :

RustyFender

Your presumption is correct if we are using the original Remy 284W coil. In this era (20's) the method of winding a coil did not tie the primary and secondary windings together at the ground end. Each winding, primary and secondary, were wound individually on an iron core. The internal

condenser, connected to one end of the primary winding, was grounded to the center rod which ran through the iron core. To complete the condenser circuit the coil base had to be grounded, and this was accomplished through the coil/oil filter mount to the engine block and then back to the negative side of the battery, to complete the circuit.

If you are running a modern coil, grounding is not necessary, unless you have mounted the external condenser to the coil mount. (Just for fun, remove your condenser from the mount on your modern coil, remove the coil from it's mount and lay it on some insulated material {rubber, cloth, ect}, with a jumper, connect the base of the CONDENSER to a good ground). Your engine will run exactly as it did previously.

n j horst

Although difficult, I'm sure some enterprising mechanic could make things operate if the oil filter/coil mount was upside down.

Gator

There are many places where anti-seize is used correctly, however this is not one of them.

I am puzzled why every student missed this simple question. It has been several weeks ago that this point was emphatically presented, however it was covered in more than one class.

As these two mounting bolts are placed in through holes in the block, the bolts are to be dipped in the "yellow snot" in order to seal them. Just another place for your engine to leak oil and very difficult to identify or find. To refresh your memory go back in the lesson plans and read this information again. ([Through holes in the block.](#))

ChevyChip

Let's hear from one of the students about the AC Z spark plugs.

With the engine installed and bolted down, one of the steps remaining is to connect the U-joint. This has always been a difficult task. Although there is a special tool available that holds the forward ½ of the U-joint in place as you attempt to mate the two pieces and start the nuts on the bolts, or install the bolts depending upon the model, a make shift tool is just as efficient.



This simple tool is nothing more than a length of bailing wire. (Ask someone from the Midwest or South what bailing wire is. I have spent many hours sitting on the special seat attached to the side of a horse/donkey powered stationary hay bailer and poked the bailing wire through the blocks for hours at a time). If you look near the hole in the upper left you can see the end of the wire. Make a "U" shape out of a length of wire and feed it down and behind the front 1/2 of the joint. Pull up tight and bend each end over to hold as you connect the 1/2's together.



This is from below the car and you can see the other end of the bailing wire. It is near the speedometer cable connection on the right side of the picture.



In almost every case the torque tube will not line up perfectly with the rear of the transmission. A jack placed under the tube can assist in the vertical movement. For the lateral movement, a small ratchet strap will handle that chore handily. After the U-joint has been joined and tightened, don't forget to remove the bailing wire.

If the torque tube does not line up close to the transmission when free, the reason should be investigated. This may indicate that some component in the rear drive line is bent or damaged. In any case it is considered good procedure to loosen all the nuts on the U-bolts that attach the springs to the rear axle housing. Make the U-joint connection and then don't forget to return the nuts back to the tight position.

No homework this time, however it appears all students need to review the previous classes.



Posted by **mromano** (Forum Member # 43) on March 16, 2003 19:10 :

Ray (teach)

I have a B.S. and two Master degrees along with other post graduate work. Your class is the most interesting and informative class of all. Thanks you for all your efforts and knowledge.

looking forward to continued class attendance.
mromano

Posted by **RustyFender** (Forum Member # 23) on March 16, 2003 19:35 :

Hi Teacher,

Very interesting U-joint assembly. I have two 1928 Chevrolet driveline assemblies and they differ from the one pictured. In both cases, the front and rear halves are stamped steel. The front half has four studs incorporated into it that extend into the rear half and the whole assembly is joined with four nuts on the rear side. When assembled, the U-joint holds four spherical bushings in which the front and rear Ts move. I have never experienced any trouble assembling the U-joint where I have needed any special high-tech tools such as bailing wire. I can generally get at least one nut started with my fingers and the rest are accessible by rotating the drive shaft. The situation does become a little more complex with a Johnson Overdrive.

As they say, a picture is worth a thousand words. I find yours greatly enhance the discussion. By the way, I do use a 284W coil.

-R 

Posted by **Oldie** (Forum Member # 33) on March 17, 2003 08:34 :

Ray,

The jack supporting the '28 torque tube wouldn't happen to be a "Eureka #2 by Ashland" would it, and it so, is it for sale?

Posted by **mromano** (Forum Member # 43) on March 17, 2003 11:40 :

Hey Rusty Fender

I have two drive lines (in car and spare) and both have the stamped steel components in the u joint assembly. Interesting!

mromano

Posted by **MrMack** (Forum Member # 21) on March 17, 2003 15:42 :

Ray, did you check the clearance between the rear ball half and the front half before putting the gasket and cork seal on the shaft ,or did you go with the same thickness gasket and seal as was used before the overhaul? I always used the standard seals and gaskets on the later models without doing any checking, but it seems that I saw somewhere that this clearance should be checked on the 28, am I just dreaming?

I can certainly relate to the hay-baling operations, boys were hired around our home place to tie and to punch wires, you had to be on the ball so to get the wires around the bale there were wooden blocks that were dumped in the press to separate the bales the wires went into a groove in the blocks the tieboy inserted the wire into the block, the wire-puncher caught the end of the wire and punched it back thru the bale on the other end and the wire-tyer ran it thru the loop in the end of the wire and made several wraps to secure it they had to do two wires on each bale and the bale was inching thru the press all the time. and then someone had to catch the blocks as they came out the rear of the press and tote them back up to the guy feeding the press the puncher had to watch a mark on the press and dump a block at a certain time to make uniform

length bales, I bet you also remember how much chafe and dirt was breathed in a day of baling hay!

Posted by **tonyw** (Forum Member # 868) on March 29, 2003 04:01 :

I dont know where the haybaling fits into this thread but I remember at least 6 years of the fork it in balers. Harvest was much easier after the automatic feed and tie units.

This has been a very informative line even though I am working on a 38 6cyl vehicle. I am still interested in the early technology and the various updates right through to current production.

I have not found (although not looked hard yet) someone down under the does the whitemetal bearings.

Tony

Posted by **AntiqueMechanic** (Forum Member # 13) on March 30, 2003 15:51 :

Mromano ,

Thanks for the apple. Check the next entry for a discussion of the types of U-joints.

RustyFender ,

Very astute observation on the type U-joint that I used. I also have several of the multi-part units of the stamped steel variety. When inspecting my supply to complete this job, the after-market unit I used appeared to be the best of the bunch. For some reason the gear that drives the speedometer gear is stripped on several of my U-joints. Not sure what this indicates. Could be a lack of lubrication of the cable drive, speedometer, or the U-joint cavity did not have any/or improper lubrication.

For a picture of the use of the special tool to mate the two U-joint 1/2s, see page 74 of the Series AA-AB Repair Manual. The bailing wire works just as well if not better.

Oldie ,

Alas, the jack you see me using is of the era, however, a close inspection of the handle reveals a 4-letter word that starts with F. Can't put my finger at the moment on a picture in a Chevrolet publication that shows a similar jack in use.

MrMack ,

I am not aware of any specific instructions about clearance in the assembly of the ball 1/2s other than rules that apply to any U-joints. As a rule, I start with several gaskets for a trial fit, if too loose, it is easier to cut a gasket for removal than to take apart and install gaskets if too tight. If I have missed a point on this assembly, please enlighten us.

MrMack ,

As a general rule, the procedures I have outlined in this series are the same for any engine assembly. Even if you don't indulge in the operation of your Chevrolet this specific, at least you

can appreciate the work done for you that has been farmed out.

Don't have any recommendations as to who to contact in your land that pour the bearings and does the line bore. Perhaps someone from this forum will contact you with information.

Although I am making good progress and am on schedule, this project just seems to get bogged down with the minor problems. As mentioned earlier, when you have an engine out of the chassis, it is a good chance to clean up, repair, paint, and adjust any component that has been exposed or removed. The engine compartment was toughly cleaned and repainted. Excellent opportunity to replace the wiring harness, which I did. The steering box was rebuilt (more on that later). In the process of rebuilding that unit the steering lock and key mechanism was rebuilt. ([Key& Lock](#)).

As with most cars of this vintage the choke pull was inoperative and some innovative prior owner had punched an extra hole in the dash to install an aftermarket choke pull. (Don't you just hate it when you find extra holes in places where they were not intended?)

Fortunately the original choke handle and holder were still present. They were removed, disassembled, and sent out for plating.



Next is to purchase a universal choke/throttle cable. Be sure and select one that the sheath is the same size as the original. Cut the sheath and cable at the end of the holder.



You will discover that the original holder was actually threaded on the sheath end. Simply ***** the sheath into the original holder.



The choke pull has a hole near the end and grooves on each side. Bend the inner wire into a 1/2 "H" as shown in the picture. Make sharp bens so it will fit in the holder.



This is the completed unit and ready to install.



When installing the cable be sure to thread it through the holder prior to connecting to the carburetor. (All you students with 1928 vehicles stop now and inspect your vehicle for this

holder).



Finished product. Needless to say, all the instruments, lighting switch and all labels were restored while the instrument cluster was out. Even the speedometer was rebuilt and reset to "0" miles. I do not consider this a speedometer resetting in the current context. The cable was broken when I received the car and actual mileage is only a conjuncture.

Homework: After the U-joint was buttoned up, what type and how much lubrication if any, was placed in the 'ball'?

(My apologies. Looks like the kids were playing while I was getting the lesson together)



Posted by **RustyFender** (Forum Member # 23) on March 30, 2003 17:07 :

That engine looks clean enough to eat off of. Show it to me in 1000 miles 😊 Also, good homework question. I did some research and found a couple articles regarding lubrication of the universal. The following is from June 1927 Service News page 23.

Universal Joint Alemite Fitting Removed

The Alemite fitting located on the universal joint housing has been removed in production and is replaced by a pipe plug. This change was found necessary due to the use of extremely high pressure lubricating guns at this point, forcing the grease into the speedometer cable, which is objectionable.

There is a certain amount of leakage from the transmission, but not sufficient to permanently care for the universal joint, and the proper method of lubrication is to remove the pipe plug and fill the housing by means of a low pressure gun. Do not replace this pipe plug with an Alemite fitting as the difficulty which we have previously found is bound to reoccur.

The manual states the universal joint should be lubricated with 600W every 1000 miles however, it does not state capacity of the universal ball. In my own case, I generally add enough oil to fill the bottom of the ball as any more would simply drain past the front driveline bushing, down the housing and into the differential. I occasionally pull the fill plug on the differential and allow any overflow to drain out.

Also, here is a picture of the proper tool for universal joint assembly from the repair manual. Another picture appears in the 1927 Chevrolet Service News.

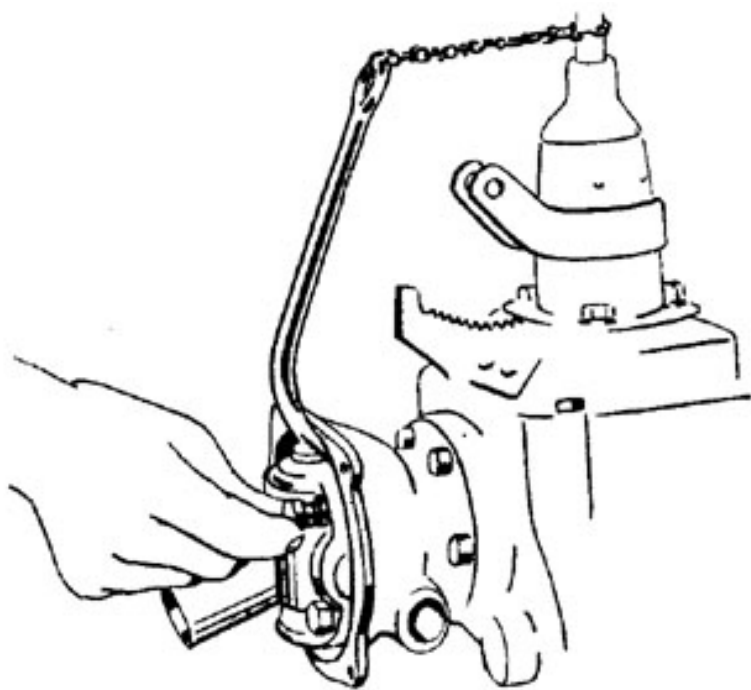


Figure 66—Assembling Universal Joint

Regards,
-R 

Posted by **MrMack** (Forum Member # 21) on March 31, 2003 10:28 :

I noticed (as pointed out in the picture)and is also noted in the repair manual that the Alimite connection was removed and replaced with a pipe plug in the rear housing thru which the universal joint is lubricated to prevent service people from using a "high Pressure" gun to lube the U-joint as high pressure would force the heavy lube oil up into the speedometer cable,it also noted the Alimite connection should not be reinstalled, It went on to say that the housing should be "filled" with a low pressure gun or pump. I didn't see how much heavy oil should be put in when the U-joint was installed, but I remember it takes about one pint to fill it initially and then it should be topped off every 1000 mile interval.

And yes "Teach" when you leave the room and don't return for a few days the students get to discussing other things, I ,myself ONLY reply to their rambleings because I am weak and gullible, and often get sucked into their stories! LOL!

Posted by **AntiqueMechanic** (Forum Member # 13) on April 07, 2003 20:46 :

Looks like I will have to give **RustyFender** full credit for his homework answer. Nice job.

Yes, we know what the correct procedure is; however I have disassembled more U-joints packed with grease than the 600W oil as specified.

The Service News page acknowledges some leakage from the rear of the transmission into the U-joint ball area. Over a period of time this excess lubrication drifts by the seal on the driveline and ends up as an overfill in the rear end. It has been the custom over the years to drain some from the rear end and add about the same amount to the U-joint ball area.

Thanks for the picture of the special tool for assembling the U-joint. It works almost as well as the bailing wire.

Final comment on the transmission. As usual, I rebuilt the one in the demonstration car. In addition to using the "yellow snot" on the gear shafts I use SOS (sealed one side) bearings for both the input shaft and the output shaft. With all the attention to the through bolts, yellow snot, sealing of the shafts, and the SOS bearings the leakage can be reduced drastically.

MrMack ,

I personally question the intent of the comment in the instructions that says, "fill the housing". Since it does not include the word "full", I read this as a quantity. In my opinion the word "some" is much more accurate.

There is no good place to stop when you start a project such as the one we have been following for months. So, out came the steering mechanism for a complete disassembly, refurbishing, and reinstallation.



This is an exploded view of the 1928 steering sector. This was the first year that ball bearings were used. Prior to this they used a series of washer type discs to adjust the free play. At the top of the picture is the side cover. Directly under it is a spacer that is placed on the end of the gear and shaft. The number of gaskets used on the side cover plate adjusts the side play. The next 6 items are the ball bearings and the races. A set of three are placed on the shaft, one set above the worm gear and one below. In the next row are the end plug, packing and the adjustable rod end support. The end support has a bushing, as does the main housing that supports the steering shaft. These two bushings were removed and new ones made on the lathe. The gear and shaft is also supported by two bushings, one on each end. They were also removed and new ones made to replace them. In the final assembly, the set of races on the right and ball bearings must be placed on the shaft before it is threaded through the housing. The left set is then placed on the end of the shaft prior to the installation of the end support, packing and finally the plug. Inspection of the gear will reveal that only a small portion of the gear is actually used in steering the car. As the end of the gear shaft is splined and not keyed, we can select a completely new and unused portion for the reassembly. Adjustment of the end support is to remove the shaft endplay.



What is not shown in the picture, and is a major component of the steering mechanism, are the three concentric tubes that make up the center of the steering shaft. (The steering shaft is in fact a hollow tube). These tubes are the spark adjust, throttle, and the horn wire sheath. After the steering wheel is installed the assembled tubing is inserted into the hollow steering shaft. The plug, as shown in the above picture, is then tightened to retain the lubrication. Several levers and clamps are installed on the ends of the tubes to complete the installation.

More homework:

What type and how much lubrication is placed in the steering housing when completed?



Posted by **32confederate** (Forum Member # 12) on April 07, 2003 21:11 :






Heavy Oil!  

Posted by **AntiqueMechanic** (Forum Member # 13) on April 08, 2003 13:37 :

Need a reference. That could be your best guess.



Posted by **32confederate** (Forum Member # 12) on April 08, 2003 14:11 :

My reference was: Page 52, Owner's Manual, April 1, 1928 and the lubrication chart in the middle of the book.     

Posted by **RustyFender** (Forum Member # 23) on April 08, 2003 15:12 :


Hey Teacher,

Very good timing on this subject as I just returned from a 200 mile trip in my 28 in gusting winds where I had to fight the car to keep it on the road. How do I remove play in the steering box other than selecting a different set of teeth on the steering sector? I have already tried that. I recently helped a friend adjust the steering box on a 31 model and the procedure involved loosening the cover and turning an eccentric bolt to change the gear lash. Unfortunately the 28 does not have that ability. Some have told me the only way is to fabricate an eccentric bushing for the sector shaft and press it into the proper position.

Thanks,

-R 

Posted by **DdeuceMan**. (Forum Member # 69) on April 08, 2003 15:22 :

  Another great thread.....SUPER !   Don

Posted by **AntiqueMechanic** (Forum Member # 13) on April 08, 2003 20:54 :

Four cylinder steering, I did not intend to go there, but since **RustyFender** broached the subject, we will go. These instructions are specifically for the 1928 National AB, but most procedures also apply to other vehicles as appropriate.

This subject is best covered in an elimination pattern. Look for the easy answers and work from there.

1. Jack up one front wheel. Place one hand at 12 o'clock and one at 6 o'clock. Push the top in and out. If there is movement, use the special wrench and remove the hubcap. Remove the cotter key and tighten the nut tight. Push the top in and out. If there is still movement consider replacing the kingpins. If no movement make the proper wheel bearing adjustment, replace the cotter key, and replace the cap.
2. Place one hand at 3 o'clock and one at 9 o'clock. Shake the tire again. If movement, observe the tie rod end(s) and see if the movement is there. Watch the steering wheel and see if it moves in concert with the wheel movements. Make notes as to the location of the movement.
3. Lower that front wheel, jack up the other one, and repeat the process.
4. On a flat surface, push the car for a few feet. Let it roll to a stop without using the foot brake. Ask for some help from your supervisor and measure the width of the two front tires on the backside as high up as you can get your measuring device. Make a note of this measurement. Now go to the front and at the same level measure the width there. The front measurement should be 0 to 1/8 inch LESS than the rear measurement. If not correct, loosen the tie-rod ends and rotate the tie-rod to achieve this condition.
5. With the front wheels back on the ground move the steering wheel from side to side. If slack movement is felt, adjustments to the steering box are necessary. Loosen the clamp bolt on the end of the steering column. With the proper spanner tool (or in a pinch a set of large water pump pliers) tighten the worm-adjusting plug. Check the steering wheel movement again. If it still has movement, remove the housing cover. (Place a container under it to catch the heavy oil that is used to lubricate the steering box). Remove one or more of the paper gaskets and replace the cover. Check the wheel again. Either replace the heavy oil or remove additional gaskets. You have now completed almost all the adjustments you can perform on the vehicle.
6. Test drive the vehicle. If the vehicle tends to wander on the road, consideration must be given to removal of the gear box and replace the 4 bushings. In my opinion it is not necessary to try to install the bushings off-center. The movement of the pitman arm shaft to a new and unused set of teeth in effect returns the box back to the factory specifications.
7. If the test drive shows the steering linkage to be tight, and you still have problems with wander, it may be time to find a friend in an alignment shop. No provisions are provided for adjustment of caster and camber on the 4-cylinder vehicles, however by tilting the axle and shimming between the axle and spring perch some adjustment can be accomplished.

8. If none of the procedures outlined above improve the steering and handling, consider checking the **NUT** behind the steering wheel.



Posted by **MrMack** (Forum Member # 21) on April 08, 2003 22:01 :

One thing that I have noticed on my 1928 Sedan is that the tires need to be kept fully inflated, to make it steer well. I keep at least 45 psi in them and check the lugs and rimbolts for rusty spots after driving several miles, a rust spot means a lug is loose and the rim is moving against the wheel, new Jaxon clamps are available from several vendors. When you have the wheel jacked up set a reference (hammer handle next to the side of the tire) and rotate it, make sure there is no wobble from a badly aligned or bent wheel or rim.

Posted by **RustyFender** (Forum Member # 23) on April 09, 2003 08:54 :

Thanks for the information. I was referring specifically to problems relating to the steering box itself. In my case, I disconnected the drag link and got a good hand hold on the pitman arm. I can rock it slightly but there is no endplay in either the pitman arm shaft or the steering shaft. This to me means gear lash. With the **NUT** sitting behind the steering wheel, I have about two inches play in either direction before pitman arm starts to move.

Thanks!

-R

Posted by **n j horst** (Forum Member # 570) on April 09, 2003 15:11 :

I know that 600w oil is used in the steering box ! but what is the correct amount ? i did not see the answer teacher, to the last part of your question, trying to get some extra point's here!

Posted by **chevguroo** (Forum Member # 281) on April 09, 2003 20:06 :

I have been following this school for over 6 months with great interest. In fact I have printed out all pages to make a fine reference book for future work.

Just going back to the uni joint again, quickly.

I have used successfully for over 25 years, Castrol LMM (Australian terminology, US may be different) graphite grease in my uni with great success. I pack it full.

Another useful hint. A replaced the felt seal in the back of the bell (where it slides up and down the torque tube) with 2 "O" rings side by side. You have to 'lever' out the steel that is used to hold the felt. I also used a large "O" ring on the bell clamp as well. It works well, but is very difficult to keep in place when bolting up.

I had the speedo drive gears made as replacements many years ago. There are some still available through Australian part time Chev 4 parts manufacturer Derek Page, who some of you know. For those who don't and are interested in one. I can get and psot his email address

keep up the good work
Chris

Posted by **K1dan** (Forum Member # 695) on April 10, 2003 15:25 :

Ray,
What happens if my supervisor refuses to help with the alignment procedure? She doesn't come near the garage when I'm working on the car, (She says I "speak in tongues").
Dan.

Posted by **MrMack** (Forum Member # 21) on April 10, 2003 21:31 :

I have one of those kinds of "Supervisors" too she thinks I am "talkin'" to her! Here is what I do, I use a couple of the large coffee cans and a length of angle iron, set the coffee cans outside of the wheels and position them where the angle iron will lay on the can like a upside down V really close to the tire and use a strait edge across the side of the tire to mark the angle iron at the rear of both tires, also mark the tire next to the angle iron. Pull the angle iron out and measure the distance between the outside of the tires at the rear, move the cans and angle iron forward and rotate the tire to where the mark on the tires are even with the angle iron measure and compare the front to the rear, and go from there. (if the supervisor comes around she will probably ask if you are crazy, or if you are ever coming in for lunch.)

PS: If you are rich like Raymondo, Chipper, Boltz and JYD you may want to use 4 coffee cans and two pieces of angle iron, to speed up the process and maybe you won't be late for lunch....!

Posted by **AntiqueMechanic** (Forum Member # 13) on April 11, 2003 14:51 :

You are invited to take a look [HERE](#).

Please read the note. Thanks, and your cooperation would be appreciated.



Posted by **ChevyChip** (Forum Member # 2) on April 11, 2003 20:21 :

Geeze, I don't drink coffee either and can't afford the angle iron so use a tape and chalk. First raise front tires off ground and put supports under axle so load is as close as possible to when vehicle is resting on its wheels. Make a mark on each tire with chalk on a groove on the tread. Measure with tape. Rotate both tires to as close to 1/2 turn as possible and remeasure with tape. The difference is the toe in or out.

Posted by **AntiqueMechanic** (Forum Member # 13) on April 14, 2003 20:44 :

MrMack ,

Your comments are examples of good maintenance on the older vehicles.

RustyFender ,

I understand what you are saying; however if you go to a new set of teeth on the pitman arm shaft, theoretically that is back to factory specifications less the minor wear on the worm gear. As we have discovered there is no adjustment for mesh on these two gears.

N j horst ,

The steering box is to be filled with the 600-weight oil. Then the instructions say to replenish it ever 1000 miles. As the gearbox is notorious for leaks, I use both the oil and a combination of grease. They will mix to a certain extent and some of the resultant mix will remain in the gearbox.

Chevguroo ,

You are not the only one to use grease in the U-joint ball. Just as I use it in the steering box I also use the same combination in the U-joint. I have disassembled several gearboxes and U-joint balls to find a preponderance of grease as the major lubricant. I like your idea of the use of the "O" rings to help seal up the U-joint ball.

MrMack ,

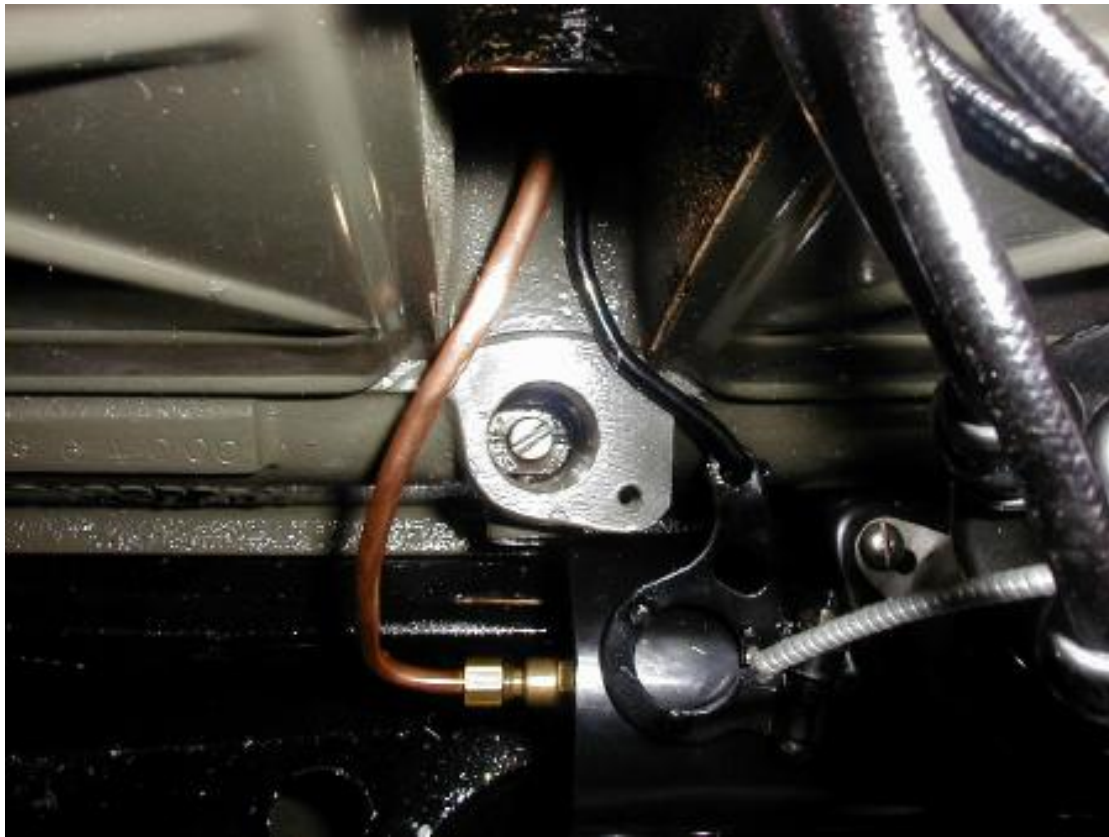
Your method of checking the toe in has some merit. I should caution that you should repeat the process more than once to remove any error introduced by a bent or crooked wheel.

ChevyChip ,

Again this is a method of arriving at a solution to the toe in. I personally, would want the full weight of the car on the tires when the measurements are made, however your method is better than doing nothing.

If you wish to really spend some time at this project and achieve more accuracy, jack up one wheel, provide a steady rest and with a lead pencil, mark the tread as you slowly rotate the tire. Do the same procedure on the other side. With the weight of the car on the tires, make the measurements. After all, with a standard of 0 to 1/8 inch in toe in, how wide is a chalk mark?

Before we got sidetracked, we had almost finished the assembly stage on the engine. The distributor was installed temporarily, only as a reference to run the spark plug wires and to complete the installation and adjustment of the spark adjustment all the way from the steering column to the distributor. In preparation for starting the engine we must prime the oil system. Now remove the distributor.



This is the view of the top of the drive to the oil pump. We need to fabricate a device to fit in the slot on the oil pump so we can artificially pump oil.



One solution is to take a short piece of steel gas line. Flatten the end with a hammer so it will fit in the slot on the oil pump. With a regular drill, and in a clockwise direction, we can operate the

oil pump. With my assistant watching the dash oil pressure gage, and operating the hand drill at full speed, I could generate 27 pounds of indicated pressure. Knowing that all 4 oil troughs are empty and that although I am reusing the original oil filter, it had been drained, the pumping was to continue until these items were full. I ran the pump for several minutes to accomplish this mission. Key locations now had oil for operation, however this procedure does NOT provide for any oil in either the main bearing reservoirs or the cam bearing reservoirs. Neither does it place any oil up front on the timing gears.

Install the bearing washer on the oil pump shaft.



Install the distributor for preliminary attempts to start the engine. (We will skip this procedure for the time being as it will be a class by itself).



You are looking at the flexible heat pipe from the stove to the carburetor. If you look just below the cotter key you can see the opening in the flywheel housing used to view the mark on the flywheel.



With the air cleaner installed (yes, I know it is missing the decal which will be applied later) it is virtually impossible to see into the hole and view the timing mark.

EDITORIAL : As far as I can tell, there is only one vendor of exhaust systems for the Chevrolet 4-cylinders. NONE of them fit as was designed. Not only do they not fit, the workmanship is totally unacceptable. This subject has been broached with the vendor with no noticeable improvement in either quality or fit. When I restored my 1925 Roadster I was so frustrated I decided to build the entire system myself. See G&D for October 1983 for my article on the construction of this system.



This is the driver's side of the engine and shows the connection of the other end of the heat tube attached to the intake of the carburetor. Don't think this heat tube is not important. Remove, or let the tube become dislodged, and try to operate your car. Yes, it can be done, but not as smoothly as when the carburetor is getting a good shot of preheated air.

Next class will be the positioning of the distributor, timing and initial attempt to start the engine.



Posted by **n j horst** (Forum Member # 570) on April 15, 2003 12:51 :

Mr Ray: I noticed that on the bottom of the vaccum tank you installed a petcock, inline to carb ? Was that for safety reason's ?

Posted by **AntiqueMechanic** (Forum Member # 13) on April 15, 2003 13:13 :

Hi n j,

The shut-off Cock is part number 114644. It is necessary to shut off the flow of fuel from the vacuum tank to the carburetor if this line must be disconnected in order to work on the carburetor. Without the shut-off, each time the line is disconnected you would drain all the fuel in both tanks inside the vacuum tank. If the carburetor were subsequently removed you would lose that fuel also. On a restart it would place a huge drain on the battery to turn the engine over enough to obtain sufficient fuel for starting.



Posted by **chevguroo** (Forum Member # 281) on April 16, 2003 20:28 :

Ray

2 points

1. I used to manufacture exhaust systems for all model 4 cyl. Chevs, they were a bit rough and ready but did the job. I sold about 400 over 10 years. These are now being manufactured by another bloke in the VVCAA (aust. vintage chev club) and his are A1, even better than they were new. (I have n.o.s systems for 27 and 28 models for comparison) However the exhausts in Australia are somewhat different, because of the right hand drive interference. My 28 2 door sedan that I imported from St. Paul Minneapolis has an exact (as close as I can get it) copy of the US 28 system. If there was enough interest I'm sure he'd be willing to make them for export to the US. The purchase price would be probably be a fraction over \$100 US, however you would need to add shipping to the price.

For models other than 28 he would need US patterns.

Let me know if you want me to ask him. I had one enquiry before, but tooling for one system wasn't economical

I could email photos of a new system off the car, if that would help.

Point 2. I noticed in one of your photos that the fuel line from the vacuum tank sagged below the point where it inlets into the carburettor, it should gradually run downhill all the way, and (possibly) have a vibration loop in it. All the Chev 4's out here run the vibration loop in both the vacuum inlet and the fuel outlet.

Chris

Posted by **MrMack** (Forum Member # 21) on April 16, 2003 21:18 :

Ray, I noticed the cotter pin securing the flex intake tube in the air cleaner, is that a mod you put on, or what was original? My 28 has a set screw that threads in the carb inlet and interferes with the flex tube which also appears in your photo, I haven't noticed the air cleaner end, it was already there when I purchased the car, is this a mod, or original? Do you have an early photo of the configuration of the fuel lines (tank to carb) and (supply line to vacuum input)?

Posted by **ChevyChip** (Forum Member # 2) on April 16, 2003 21:52 :

Mack,

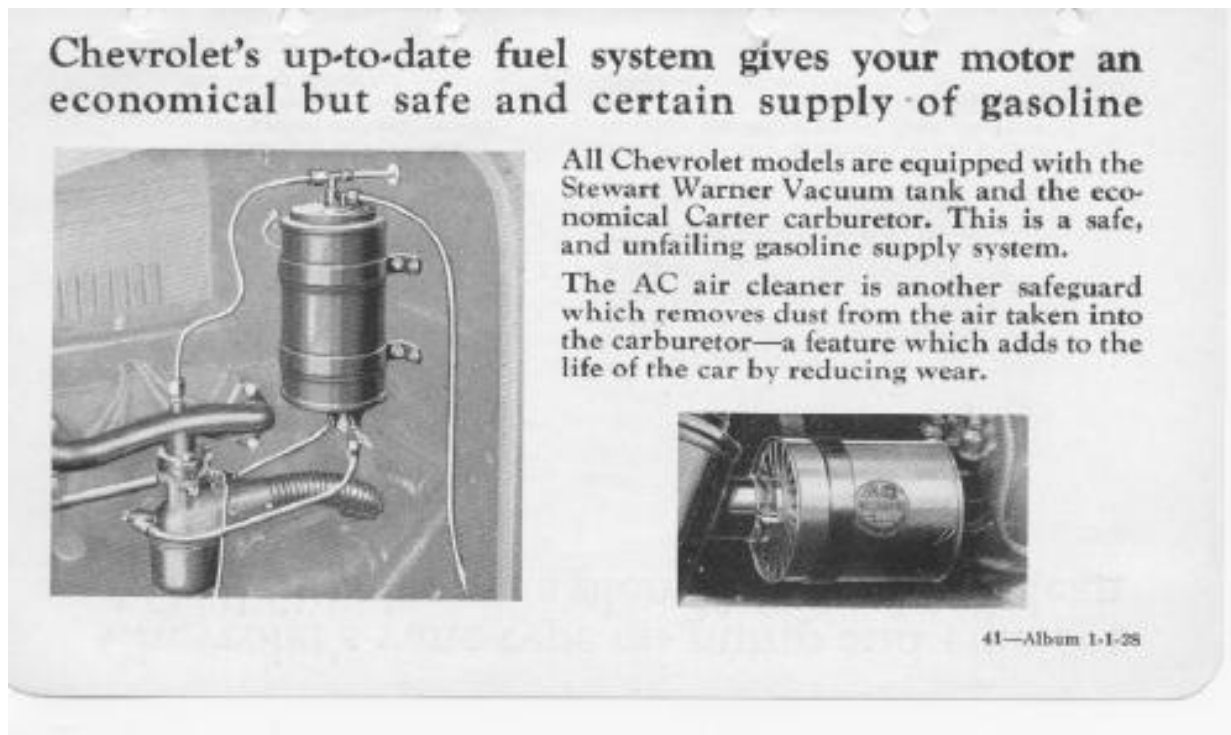
The cotter pin is original on the stove end for the later 4 bangers as is the set screw in the inlet of the carb. Earlier carbs used the long cotter pin. Both my '19 and '20 use the cotter pin on the carburetor end.

Posted by **AntiqueMechanic** (Forum Member # 13) on April 17, 2003 00:28 :

Chevguroo ,

Too bad you are not still making exhaust systems and exporting them to the US. In my opinion all the systems from 1925-28 are incorrect on numerous points and craftsmanship is nonexistent. If you have a picture of a correct 1928 system, and can send it to me, I will post it for and example.

Your second point about the fuel lines.



This picture was posted to the forum in a different thread. With the picture, which is taken from my Dealer's Album , (and is of a closed car), and data from the Parts Price List, April 1, 1928, for the Series AB-1928, this discussion can be concluded. Part number 328980, Gas Line passenger cars (125 1/2"), part number 352020 Vacuum tank suction line (from top of tank to intake manifold 13 3/4"), and finally, Part number 345157 Vacuum tank to carburetor tube 15 11/16"). These measurements allow the configuration in the picture and no other routing is available. Also, in answer to a previous question. In addition to a Shut-Off Cock at the bottom of the vacuum tank there is an additional Shut-Off Cock Part number 120900 located at the gas tank.

MrMack ,

The connections at each end of the heat tube are the approved methods. As to the picture, see above. If you are in reference to how my car was when received, you don't want to know. When the class is over I will have a few comments about the overall vehicle.

ChevyChip ,

You are correct on all points.



Posted by **MrMack** (Forum Member # 21) on April 17, 2003 21:06 :

No Ray, I wasn't reference your car when you received it, just that I purchased mine , and it was the first 4 cylinder I ever paid much attention to. Thanks for the pictures and info on the fuel lines, I didn't remember seeing it before. My car does have a glass settling bowl AC fuel filter on the supply line before the vacuum tank and a small 5/16" needle type shutoff valve just below the vacuum tank on the line to the carb, I will re-arrange the lines for a more suitable configuration, and also leave the filter in place. The line from the tank has been spliced with a compression union and it is 5/16 copper tubing, is that the original size?



Posted by **AntiqueMechanic** (Forum Member # 13) on April 22, 2003 22:30 :

MrMack ,

You are correct in that the fuel line from the tank to the top of the vacuum tank is 5/16. As to the material? Won't go there.

How come no one ask me what oil I used in the engine or how much? So before you do, here is the answer. I use multi-viscosity 10W-30 oil, and the basic fill for the 4-cylinder engine is 4 quarts. The oil filter was new, but has been on the engine while operating. Most of the oil was drained out during the disassembly, so ½ additional quarts were added for a total of 4 ½ quarts.

Attention! All students gather around as we have a mystery to solve. The engine has already been operated; in fact the car has been driven on short test drives. However, in our sequence of operations in this class the installation of the distributor and timing the engine would have been the next step. When I went to take the pictures of the distributor I realized that the distributor had been installed incorrectly.



This is a picture as installed. Note that the clips for the distributor cap are 90 degrees from the line of the engine. This puts the back clip between number 2 and 3 cylinder and as a result it is extremely difficult to get to. Obviously this is not the correct way to install the distributor. I decided it would only take a few minutes to correct this error and I could then take my pictures. To make a long story short there was no way I could install the distributor correctly. I checked the model number 635B and that is correct. I dug out some more distributors and found another identical, however another one was completely different, and all had the same model number 635B.

(NOTE: The decal on the air cleaner is incorrect. I will discuss the decal for the air cleaner and oil filter in a later class).



Observe these three distributors closely. Look where the data plate is located, check the grease fitting versus the ridge on the base, and check the location of the stud where the wire from the coil attaches. The two on the left are the same, however the one on the right is different. After much research it was discovered the one on the right is the only distributor that could be mounted as required. So, stop everything and let's rebuild a correct distributor.



On all motors after number 3409976, except motors 3410801 to 3415520, and on approximately June 1927, a new semi-automatic distributor was introduced. This distributor was the Model 635B. With the point plate removed from the distributor you can observe the two spring loaded counterweights. When the speed of the engine exceeds 1000 RPM, or approximately 22 MPH, these counter weights move and can advance the timing as much as 20 additional degrees at 2400 RPM. This gives us a total of 45 degrees before top dead center.



When working on a distributor, or changing the points, inspect this special piece of insulation that is located on the contact post. It is a critical part of the operation of the distributor.



Here you see the points installed along with the rotor. At the lower right you can see how the special piece of insulation protects the spring on the points and prevents it from touching the distributor body, thereby, shorting out the points.



Distributor installed and timed. Now the clips for the cap are parallel to the engine and can easily be accessed for checking the points or making adjustments.

Stay with us class. Eventually we will cover the installation of the distributor, adjustment of the spark control, and timing.

HOMEWORK: *What is the point setting (contact opening) on the AA & AB?*



Posted by **RustyFender** (Forum Member # 23) on April 23, 2003 13:55 :

Page 185 of the repair manual states 0.020" to 0.025". It does not indicate a different value for AA series but I don't have the repair manual for 1927 to cross-check.

Anybody care to guess what happens if you install the spring-loaded counter weights incorrectly? I'm not afraid to admit I did this once. 😊

-R 

Posted by **WIZARDSMITH278** (Forum Member # 838) on April 24, 2003 14:39 :

Hello,

I agree with chevguru(Hi Chris !)about the exhaust systems being made by his friend.I asked him to make one for my '28 Truck,and even though he said he'd never had a request for a truck system,he said he would have a go at it.

From the 4 Cyl Master Parts Book,we deduced that the "AB","LO" and "LP" were all the same.I picked up the exhaust system as I needed it desperately to go on our clubs May Tour to Albury, in May 2002,and it fitted up perfectly.It even sounds better,just like a Chev 4 should.

So I can highly recommend the quality of these exhaust systems.As chevguru says,the maker would need sample systems for your left hand drive cars,as ours are different down under.

Posted by **chevguroo** (Forum Member # 281) on April 27, 2003 20:06 :

Ray

I have just had 10 days off and as for some reason I can't access this column from my home computer, I had to wait till I got back to work.

Had the 28 out on 3 occassions while I was off, good stuff, should do it more often.

Re the fuel line vibraration loops, I was informed by an old codger that they were put in as our real crappy roads, which most were not sealed in those days, caused these lines to vibrate so much that they broke. So it could be an Aussie thing. I'll stick to them as we use our Chevs still on these off the beaten track dirt roads quite often, and I had a vacuum wiper line break off my 34 at the manifold and burnt out 3 exhaust valves. I now also have a tap in the manifold to turn it off in case it happens again.

Re the exhaust systems, I can give you a photo of my home made 28 system, and will ask the bloke who is manufacturing them to see if he can give me some photos of his reproduction systems. I believe that the 28 system would be the only one different for the left hand drive configuration. I'll have to email the pictures to you for you to post

Chris

Posted by **chevguroo** (Forum Member # 281) on April 28, 2003 20:23 :

Ray

I spoke to Gary Graham, the bloke making the Chev 4 exhaust systems. He will gladly ship to US, is going to give me a number of photos of a 27 system, which we believe is the same as US 27's, and is endeavouring to obtain shipping prices to US.

I tried to email you offline via the mail option at the bottom of the post, and it wouldn't let me. I will need to able to do this to send you the photos for posting.

Also I will need the actual lenght of a 28 hot box, as I made my LHD 28 system from the diagram in the Service News. I know everything is perfect, because it fits nicely, but had to guess the lenght of the hot box.

I will give Gary a LHD manifold and he will set it up on a 28 engine in a rolling chasis to make sure it fits perfectly before reproducing a LHD version They can be supplied with or without the optional tailpipe

He makes all Chev systems from 1916 to 1928

Hope all this helps
Chris

Posted by **AntiqueMechanic** (Forum Member # 13) on April 28, 2003 22:52 :

Hello students! Your last homework was to give the point setting and a reference. RustyFender gave a value of .020 to .025 inches. His reference is above. This homework was assigned for a purpose. The Repair Manual on page 185 gives the above value; page 227 gives .018 to .024, and the OM gives the value as .018 to .025. You would think they would have a 'company' value and be consistent.

EXHAUST SYSTEM:

You can follow the discussion by **WIZARDSMITH278** and **chevyguroo** above. I hope one of them sends me a picture of a correct 1928 system and if so I will post it. I measure the hot box at 6 ¼ X 3 in diameter. This is from a repo system and is subjective. If the price is complete I feel there is a market for correct exhaust systems for at least the 1925-28 models.

RIMS:

While the engine work has been progressing, other adventures are also taking place. All 5 rims on the car were the wrong size. (They were 2 ½ inches as measured across the inside of the rim. This made them Capital AA 1927 rims). A set of 5 correct rims of the proper size has been obtained, sand blasted and just returned from the cadmium plating shop.



This measurement is to be 3 inches for the 1928. The diameter is 22 ¼ from the extreme outer edges. The tire size is 30 X 4.50 straight side balloon. Modern size for the 1928 is 4.40/4.50X21.



Isn't it neat to have something just like brand new? You can even read the **JAXON** imprinting on the rim.



And my heart really beats fast when I can find the almighty **BOWTIE** imprinted on the part. It just doesn't get any better.

TIMING:

Let's get started on the timing of this fully assembled engine. The basic instructions for the installation of the distributor and timing are contained in Chevrolet Service News July 1927 on page 27. However, you need a good understanding of the operation of the engine to follow those instructions.

If you remember when we were assembling the engine we left the crank at the position where the 25-degree mark was showing in the timing window. The CSN does not point this out, but the 25-degree mark can appear twice in a single rotation of the cam. And, we **MUST** have the correct one. The side covers are on the engine so we can't observe the lifters, but we can remove the valve cover and observe the rocker arms. To check for the correct rotation of the 25 degree mark observe the location of the rocker arms for number 4 cylinder. Why number 4, because the grind on the 1928 cam is such that it is very difficult to determine if both valves are closed on number 1. If we look at number 4 one rocker arm is in a pronounced different position than the other rocker arm. This indicates that number 4 is **NOT** on the firing position, but number 1 then is. Check the arms on number 1 and they should be at the same elevation. We have now insured that the 25-degree mark and the firing of number 1 are coordinated.



Install the distributor with the rotor exactly 90 degrees from the line of the engine. It will be necessary to use a screwdriver or similar tool to move the oil pump drive shaft to align with the

pin in the drive gear of the distributor. You will also discover that as you start to drop the distributor down it will rotate. You must move the rotor in the correct direction that insures the rotor be at the correct place when seated. Insure the clamp ring is loose on the distributor. With the retaining washer, spring and bolt in position tighten the bolt. Inside the car move the timing lever to the maximum **ADVANCED** position. Rotate the distributor counter clockwise until the points are just ready to open. Tighten the clamp bolt. Install the distributor cap and insert the plug wires in the correct holes. The number one plug wire will go in the nearest hole to you and on the right side. Number 2 is in the left hole, number 4 is in the upper left hole and number 3 is in the upper right hole. The rotation of the rotor is clockwise and the firing order is: 1-2-4-3.

You are now ready to start the car. First move the spark control to the RETARD position on the steering wheel. Turn on the ignition and start the engine. **CAUTION** , do not race the engine nor allow it to idle for the first few minutes of operation. Remember when we primed the oil system we were only able to fill the 4 troughs. There is NO oil in any of the reservoirs. Therefore, we must run the engine at a fairly fast pace to SPLASH oil up into the cam and main bearing reservoirs. Observe the oil gage to insure we have oil pressure. If there is no indicated pressure, shut off the engine and find the cause.

After the engine has achieved operating temperature it is time to complete the timing procedure. Use a strobe type timing light and if it is 12-volt operation only it will be necessary to use an auxiliary 12-volt battery to power the light. Attach the pickup unit to number 1 plug, and move the spark control to ADVANCED position on the steering wheel. With the engine operating at idle, direct the light through the observation hole in the flywheel housing and by moving the distributor align the pointer on the 25-degree mark on the flywheel. When this is achieved tighten the clamp bolt on the distributor.

You are now ready for a test drive.

If you remember, when we adjusted the valves we set all of them at .007. Leave that adjustment until we have a few hours on the engine and then we will complete the required procedures prior to buttoning up the engine.

Class dismissed to go for a test drive



Posted by **MrMack** (Forum Member # 21) on April 28, 2003 23:12 :

Ray, how do you determine which side of the rim goes to the outside of the car? By the valve stem hole or the small welded knob on the rim edge? Or.....?

Posted by **AntiqueMechanic** (Forum Member # 13) on April 29, 2003 08:58 :

Hi MrMack,

The rim can be mounted in one position only.



The split in the rim is at 3:00 o'clock and must be located at a rim bolt. With the tube stem through the hole there is no other way.



Posted by **MrMack** (Forum Member # 21) on April 29, 2003 09:52 :

That is the way it looks to me, but I have seen a fellow (on a tour) that tried to mount the rim on the disk wheel back side out and it was a bugger to get back off and get turned around.

I was mainly asking about mounting the tire on the rim correctly (for those with white walls with a preferred side out) My tires are solid black so it don't make that much difference, I try to put the red dot opposite the valve stem on the outside of the wheel.

Posted by **Bowtie Bob** (Forum Member # 1442) on April 29, 2003 16:32 :

Mention wasn't made about breaking in the cam unless I missed it. On much newer cars, I've always followed the practice to run an engine at 2000 RPM's for 20 minutes to break in the cam properly. Doesn't the same practice apply to older motors??

 -Bob

Posted by **chevguroo** (Forum Member # 281) on May 01, 2003 19:54 :

Ray

Going back to the photo of your rim, the one with the bow tie that gets your heart going. Below and slightly to the right is a prominent indentation (from the inside to the outside), there are four of these and are basically there to hold the steel fellow of the wheel in place. They tend to wobble a bit without this.

Most of the rims in Australia don't have this indentation (probably aftermarket, as our rims suffered in their heyday on our rough roads)

My heart stops when I see one with the indents in it and as our rims appear to be locally made, my heart would miss more than one beat if I came accross one with a bow tie in it

I was presently surprised to see the Jaxon mark on my US import 28, as we didn't even get that.

Also I often wonder when following a Chev 4 (or 29) when I see a rim that appears buckled (and we have heaps of them on cars here) is one without the indent, and just wobbles a bit.

Chris

Posted by **ChevyChip** (Forum Member # 2) on May 05, 2003 11:35 :

Ray,

I bought new tires for a recently purchased '28 with a 30 year old amateur restoration. Did not understand the meaning of amateur until I got this car. It has three '28 wheels and one '27 or earlier steel disc wheel. Will not go into the long sad story but, had to re-mount the tires onto the rims on the car during the recent SST. Made a good tire changing seminar for several 4 banger owners.

Also discovered a while back that the rims for '28 were not cadmium plated but painted black. Same for '29-31 disc wheels. Was suprised to find this as I have always thought they were plated. Even the '31 Fire Truck rims are wrong. Looks like '27 was the end of the cad. plated rims, clamps, nuts.

Posted by **Oldie** (Forum Member # 33) on May 05, 2003 11:56 :

ChevyChip-

Please elaborate on the "black painted vs cadmium plated split rims" statement for 1928. Are you talking passenger car, truck, or both?

[December 16, 2003, 17:16: Message edited by: AntiqueMechanic]

Posted by **AntiqueMechanic** (Forum Member # 13) on May 15, 2003 22:46 :

In an earlier class I promised we would cover the two decals used on the 1928 engine. There is a decal on the oil filter and also on the air cleaner.



This is the Oil Filter decal. The Air Cleaner is exactly the same except it says: Air Cleaner. As noted both decals are round and several pictures appear in the CSNs for 1927-28.

Bowtie Bob ,

Your comment about breaking in cams is new to me. Can't see that the cam needs any special 'wear-in' that would not apply to all the other components in the engine.

Chevguroo ,

You are absolutely correct about the 4 indentions on the 1928 rims. They are absolutely critical for a proper fit on the correct 1928 wheels.

ChevyChip ,

You would do all of us a service if you would post your reference for the painted rims. Everything I come up with indicates the cad finish.

Oldie ,

I'm also waiting for the reference.

Along the lines of **Bowtie Bob's** comments, I now have a few hours and miles on the engine. Time to initiate the next step.

The first order of business is to re-torque the head. We will use the same values as when initially assembled, i.e., 55-60 pounds. (We have new head bolts). The pattern has already been explained and is available in the Repair Manual.

Check the point setting and then start the engine. The engine must be operated for several

minutes in order to bring it up to operating temperature. If you remember on the initial assembly the valves were all set at .007. Now we must set them to the proper specifications, which is: Intake .006 and Exhaust .008. I recommend that a vacuum gage be attached to the engine as a visual reference when setting the valve clearance.



This is a very valuable tool to use when adjusting valves. The wrench part is placed over the stop nut on the rocker arm, loosen the lock nut and then use the built-in screwdriver to make the adjustment. Check progress with a feeler gage. If you make a mistake it should be in the excess. That is, make the adjustment too loose rather than too tight. If the valves are adjusted too tight there is the possibility of burned valves.

Replace the felt oiling blanket back over the top of the valves and lubricate with engine oil. Also re-oil the "O" rings around the top of each pushrod. Replace the valve cover.

It is considered good practice to change the oil in the engine even though it only has a few minutes and miles. This will flush out any debris that may have been in the pan or lodged somewhere else in the engine. As always, I recommend multigrade oil.



The final product.



In the next few days I intend to remove the bulk of the graffiti that has been placed on the blackboard by some of the students. Several members have indicated a desire to either make a CD of this complete thread or in some cases print it. If you want the graffiti included, and wish to copy all of it, I suggest you accomplish this soon. As a reminder, there are two threads under this heading and one thread under the 12-28 section at the top of the page. I will ask a moderator to clean up that thread also.



Posted by **tonyw** (Forum Member # 868) on May 16, 2003 03:49 :

I have been following this thread with much interest and on reviewing page three I noticed that the top photo is not of a distributor incorrectly positioned. I am now curious as to make and model of the tip truck just inside the door of the workshop.
Is it your workshop or a friends.
Keep up the good work.

Posted by **AntiqueMechanic** (Forum Member # 13) on May 16, 2003 09:43 :

Hi tonyw,

Sorry about the confusion. The grimlyns snuk into my machine while I was away.

I think it is fixed now.

That picture, and one more, actually went with the entry about the ALL-CAL meet. The shop is part of the Don Dougherty ([STL TIKN Machinery](#)) collection in Colfax, CA. I am not positive as to the make of the dump truck, but I think it is a 1924 Autocar Rotary Dump.



Posted by **Bowtie Bob** (Forum Member # 1442) on May 17, 2003 08:59 :

Antique Mechanic: Not to beat a dead horse, but cam break-in is critical. Any high performance cam comes with instructions to immediately, upon start-up of a newly rebuilt engine, run the engine at 2000-RPM for 20-30 minutes. I just spoke to my son-in-law, who is a drag racer by hobby and an Engineer for Delphi, specializing in cam design, who confirmed the necessity for proper cam break-in. According to him, 2000-RPM is the lightest load on the cam lobes....under 2000 RPM there's a lot of spring pressure and over 2000-RPM's there's a lot of load due to inertia. The 2000-RPM figure is, for most motors, the best (i.e. lightest - inertia tends to balance out spring pressure at 2000-RPM) load on the cam lobes and thus, the best speed to wear in the cam lobes. If the procedure isn't followed, there's a greater chance of 'scuffing' or 'galling' of the cam lobes. Perhaps on the relatively small power outputs of these early engines, there isn't the load exerted upon the cams, as there is in the higher horsepower engines which have higher spring pressures and RPM's. The oldest engines I've ever rebuilt were 216" Chevy's and I followed the above practice with them.

In any event, it's food for thought and I just thought I'd raise the question.

OK, I'm sitting back down and zippin' the lip (for now). 

 -Bob

Posted by **lil' johnny** (Forum Member # 606) on May 17, 2003 10:32 :

From what little I know of antique 4cylinder engines (lower rpms, low compression, low hp) the most critical "break-in" was for the piston rings; as they related to both the cylinder side walls & the ring land grooves...
then the re-adjusting of the valve lash?

Cam problems were seen once the motor got to operating temp if the block alignment wasn't perfect , or torque specs were improperly done.

Posted by **Gator** (Forum Member # 717) on May 19, 2003 08:56 :

Why take a chance? A break in can't hurt anything. I have always been told that a break in was highly important on a new or newly rebuilt engine.

Posted by **AntiqueMechanic** (Forum Member # 13) on May 20, 2003 16:55 :

I have not been able to find any explicit pictures of the internal workings of the 1928 parking brake. Based on a request by n j horst, and perhaps needed by others, here is a picture and explanation. (Unfortunately I don't have any units at this stage of completion, so my apologies for using a picture of a spare rear-end. Just ignore the grease).



This is the brake housing with the axle and brake-drum removed. Identification of the parts:

6. This is the area where the brake drum would be if installed.
5. This is the service brake band and is completely independent of the parking brake system.
4. This is the parking brake band. Where the service brake would be engaged by compression of the band, the parking brake is engaged by expansion.
3. These are the links from the parking brake band to a central control link.
2. This link picks up the two links from the parking brake band and connects them to the actuator arm.
1. This is the actuator arm. The arm pivots on the left end where it is attached to a rod that goes

to the parking brake handle. When this arm is pivoted in the direction of the arrow it pulls down the link above which in turn pulls down the two links simultaneously. This action spreads the parking brake band and presses them against the inside of the brake drum.

NOTE: There are actually 4 links at location 3. Two are visible and two are concealed on the backside.



Posted by **RustyFender** (Forum Member # 23) on May 20, 2003 17:59 :

Yet another picture 

Regards,
-R 



Posted by **n j horst** (Forum Member # 570) on May 20, 2003 19:32 :

Mr.Antiquemachanic and Mr.Rustyfender, thank you very much for the time and effort you both

took to help out! I could not find the information anywere ? It is Gentalman like you guy's that truly make this site and hobby a delight to enjoy. NJ Horst.

Posted by **chevguroo** (Forum Member # 281) on May 20, 2003 20:27 :

Whilst on the subject of parking brakes, the actual unit that that the lining attaches (shoe/band) to can cause a lot off problems if you do not use the one that came off the diff housing you're putting back in.

I had a problem with one of my Chev 4's (restored by someone else) brakes locking on whilst reversing. It took me a long while to find out why.

The reason was that there are 3 different types of brake bands and diffs. The difference being in the 3 'tags/locaters that stop the shoe/band slipping sideways within the drum.

You can see clearly, in Rustyfenders photo, the bracket on the backing plate where this tag sits in. There are 2 tags, one at either side of the opening (or each end) of the band and 1 tag opposite or at the centre of the band/shoe. This is where the difference lies. This back tag has 3 different locations and fit 3 differently placed brackets on the backing plates.

The 1st type is directly opposite the opening in the band. The second type is offset about 1.5" to the left of centre. The 3rd type is offset 1.5" to the right of centre. The diff housings came out with 3 dirrent positions on the backing plate to accomodate the 3 different tags.

What my Chev has was and offset tag on the band placed on a diff with the centre bracket, so that when you reversed the car, the tag tried to ride off the end of the bracket, rather than slide back and forth as it would in it's correct bracket.

I have kept an example of each of the 3 shoes for demonstration purposes

It all sounds a bit long winded and is not easy to explain, however if you reline an offset shoe and wonder why it doesn't fit properly you'll now know why.

I could probably get some photos and send them over if would explain the differences better

Chris

Posted by **Gator** (Forum Member # 717) on May 21, 2003 08:08 :

Your "finished project" is one very beautiful car, you can and should feel a lot of pride in your achievement.

Hope to see the car one day in person. As Roy would say "Happy trails to you...".

Posted by **AntiqueMechanic** (Forum Member # 13) on May 23, 2003 15:42 :

A few days ago I was doing the research on the proper label on the 4-cylinder (1927-28) oil filter. I remembered I had a NOS one on display. Today I took it down to verify the label and discovered to my surprise that the box has never been opened. As a result we can't use it as

proof. We'll just assume there is one in there and it has the round label.



Posted by **AntiqueMechanic** (Forum Member # 13) on May 24, 2003 19:56 :

I think I have the picture situation under control, and although this string is not about pictures, here is a tip. The location where you store pictures on YOUR computer must not assign the same identification to more than one picture. If you anticipate uploading a picture and placing it on the Internet it is best to rename the picture a unique and non-duplicate name.

About the comments on engine "break-in". This is not to devalue the need to conduct some sort of break-in, but to treat a 4-cylinder engine of the vintage we are working with, as a 'race' engine is perhaps overkill. Not at all sure I wish to subject a fresh 4-cylinder engine to 2000 RPM for 20 or so minutes. Of more value in breaking in the engine is to run it at various speeds, listening for any unusual noises and carefully monitoring the engine temperature.

Actually, the proper way to 'break-in' the 4-cylinder engine is as prescribed in the Repair Manual. This method requires the facilities to turn the engine and 'burnish' it. The procedure used a running motor connected to the 'unbuttoned' subject engine. After it had been 'run' for a while or 'burnished' the engine was checked for compliance with specifications and then buttoned up and the engine placed in the final chassis. Very few shops, if any, have the capability to perform this procedure today.

As our 'school' engine has accumulated more miles and hours it has developed an unwanted sound. To the seasoned mechanic this noise would be quickly identified. To the uninitiated, here is a procedure to help locate the noise.

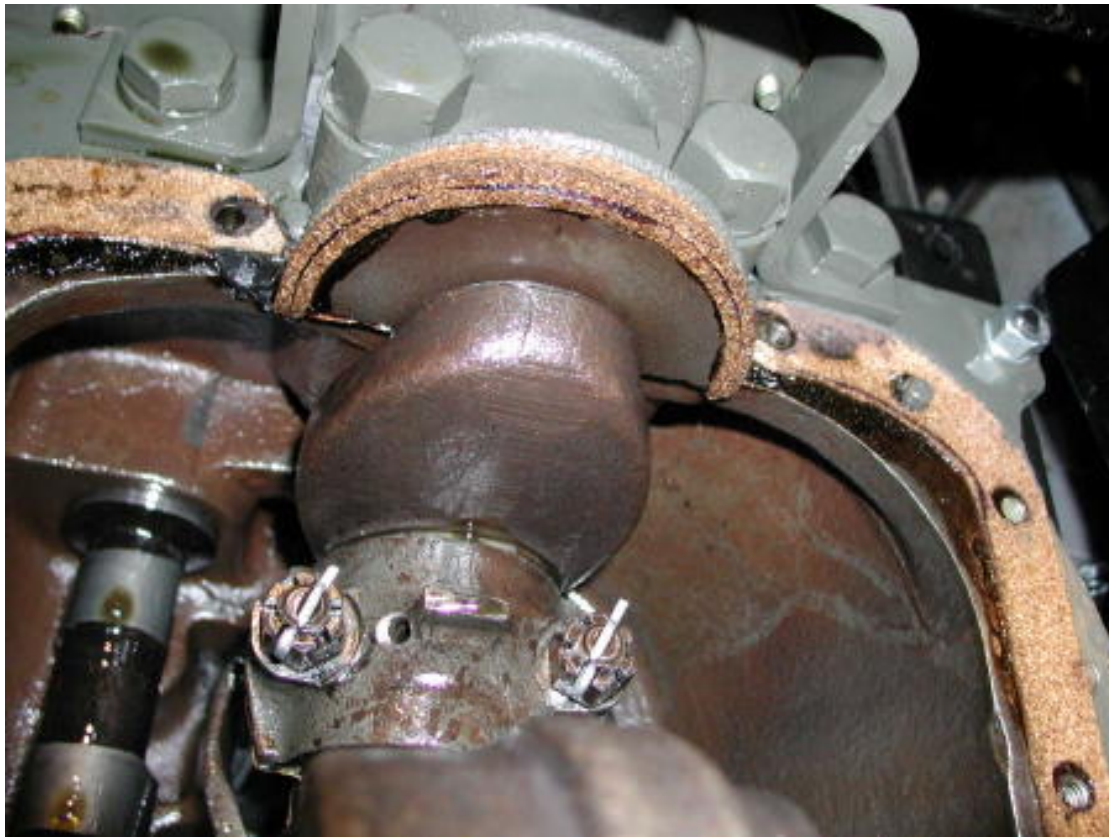
Listen carefully to see if the source can be identified. Noises made by the valve train are included in this category. To narrow the search, use a feeler gage on each rocker arm to see if the noise changes. If it does, readjust the offending valve to the correct specifications.

Internal noises are a bit more difficult to locate. Use a screwdriver to short out each sparkplug in order. Listen for an INCREASE in the noise. If found, this would most likely be rod noises, either at the wrist pin or at the 'big' end.

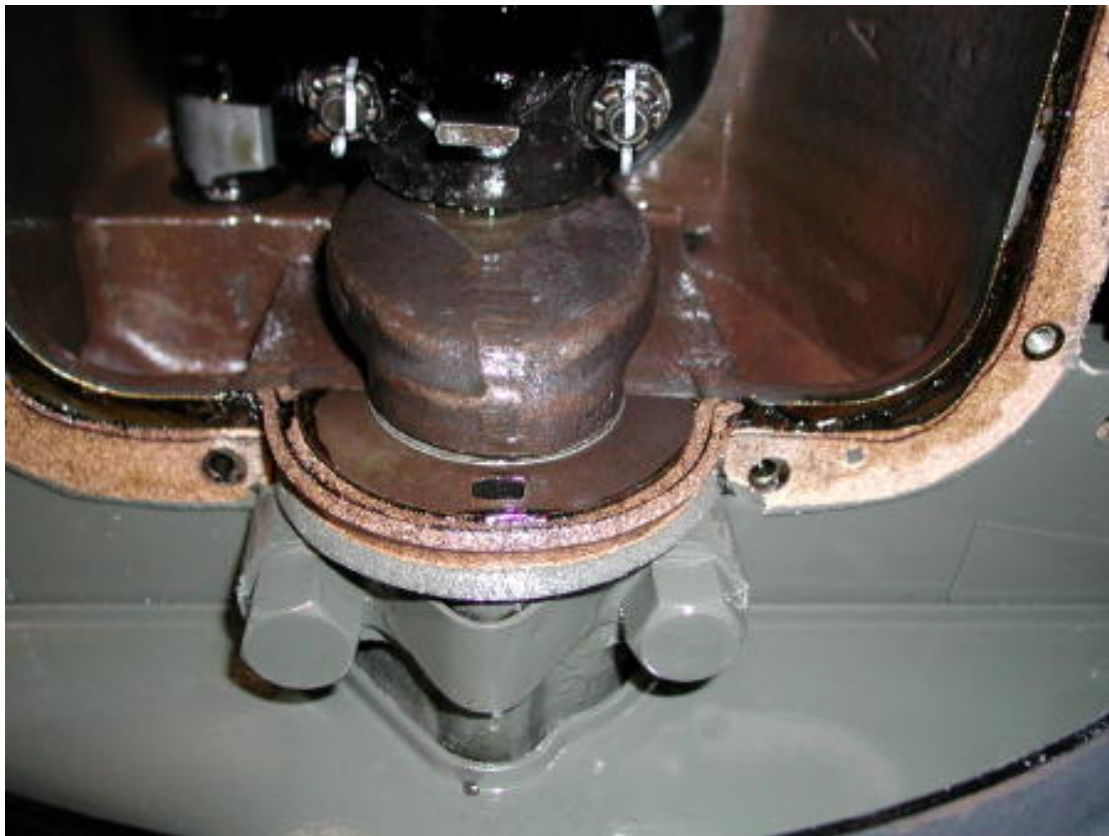
To identify main bearing noises is the most difficult. If you have eliminated the valve adjustment, passed the rod noise test, then it may be the main bearings. By 'racing' the engine a seasoned mechanic can identify main bearing noises and by use of a broomstick with one end placed behind your ear and the other near the base of the engine against the area of each bearing, listen for a pronounced 'thump'. Main bearings do not typically produce a 'knock' but rather the 'thump'.

In our case it was quickly determined that number 2 rod was the guilty party. The oil was drained from the pan and then the pan removed. The bearing cap was removed from #2 rod, the crank and rod surface cleaned and dried, and a fresh piece of green PLASTIGAGE placed on the cap. Rod was retorqued, cap removed, and the PLASTIGAGE 'read'. The reading was slightly in excess of .003. Shims of the same value were removed from each side of the cap to reduce this reading down to .001-.0015.

In earlier classes the procedure for installing gaskets on the oil pan were discussed with pictures to support the text. This job verified the value of the procedure.



This is the front main bearing cap.



This is the rear main bearing cap. Notice in both cases how the pan gasket is still undisturbed and intact. Close inspection also failed to find any evidence of oil leaks. These results were achieved by gluing only one side of the gasket and by forming special shaped gaskets for each

main bearing cap.

A question was asked on the forum recently about the proper installation of cotter pins. I am not saying that the ones in the picture are 'the' solution, but rather the way I have done them for years.

The pan was reinstalled, no washers under the ¼ 20X1/2 round head machine screws, and without any additional sealant. Oil was replenished in the pan, engine started, test run, and then test-driven. Results: **PROBLEM SOLVED** .

The 1928 Touring will be field tested early next month on the 4-cylinder tour at Lakeport, CA, hosted by Bob Cramer, and then reloaded for the trip to the National tour in New Mexico in late June. Hope to see some of the students on either or both tours.



Posted by **RustyFender** (Forum Member # 23) on May 25, 2003 07:59 :

Hi Ray,
It's interesting how these old engines speak volumes about their condition to the trained ear. No fancy computers, 'check engine' lights, or any of that stuff is necessary if you just pay attention to what the engine is telling you. I wanted to add that if the noise you hear occurs once for every 2 revolutions of the crankshaft, you're probably dealing with a camshaft or timing gear problem.

Regards,

-R 

Posted by **AntiqueMechanic** (Forum Member # 13) on May 26, 2003 11:23 :

This thread has been edited to narrow the content to the 1928 Chevrolet.

Posted by **AntiqueMechanic** (Forum Member # 13) on May 28, 2003 09:04 :

tonyw
Shade Tree Mechanic
Forum Member # 868

posted May 28, 2003 05:28

I would like to know the most likely cause of the piston pin grabbing hold of the piston as you indicated there was evidence of sufficient oil in the area. Was it a lack of coolant flow between cylinders 3 & 4 or something else.

1938 1/2 ton
Hope to drive it before I retire

From: Goulburn Australia | IP: Logged |

Edited/moved to active thread.

Posted by **AntiqueMechanic** (Forum Member # 13) on May 28, 2003 09:14 :

Hi tonyw,

In my opinion the cause was a badly cast piston combined with a failure of the previous rebuilder to thoroughly clean the water passages in the block. The soft plug in the back of the block should be removed in every case and the inside of the water passages in the block rodded out. Long periods of operating the engine at idle speed could also contribute to the problem.

Notice: All comments posted herein do not necessarily reflect the official position of the VCCA.

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CAST OF CHARACTERS

Antique Mechanic:	Raymond Holland
Chev Nut:	Gene R. Schneider
Chevy Chip:	Forest Sweet
MrMack:	Mack Courtney
CHEVY:	Don Boltz
Chevguroo:	Chris Osborne
Pre25Chev4:	Ken Kauffman
John348/340HP:	John Mahoney
K1dan:	Dan Martin

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