1940 PACKARD 2-Door Sedan– Installation & Assembly of the Rear Differential, Axles & Brakes

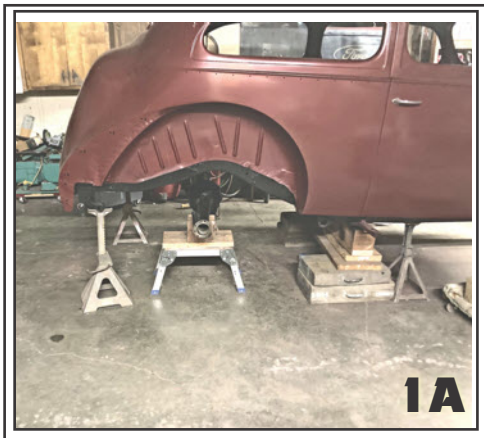
by Ron Carpenter

I will be discussing the installation and assembly of the rear differential, axles and brakes. One thing to say to start with, is that in 1940 Packard did not have the usual 8 1/2" by 11" "Shop Manual" that they had in previous years, so for the larger shop manual you have to get the 1941 book and that is available in reprint from PAC and listed in their Cormorant News Bulletin (CB). What Packard used in 1940 was the "glove box" book and it was called "Owner's Manual" and they actually printed an almost identical "Shop Manual." Over the years I have found a couple things different and I can't remember what they are, but they are basically the same book. These books are great sources of information and in some places have info not found anywhere else. If you want to know the length of the high pressure relief valve spring in the oil pump they have it in the section on "Oil Pump" and that is the only place I have found this information. I should note that the seniors cars have a separate edition for the senior cars.

I have already taken the springs apart and cleaned them by blasting and then sanding the individual leaves. I found a product from Dennis Carpenter that they sell for the leaf springs on the Ford cars and I use them as separators on the leaves and used a high pressure Moly lube with a new spring bolt. I had Jackie at Max Merritt send me some original shackle bushings as I like them better than the reproductions that are available, new stuff just seems too soft so I like the original Harris when I can get them. One more thing on this, I have had to pull springs out of cars and the rear shackles had the plate on the out side. I found that I had to pull the gas tank to get the shackles off the car, so I always remember to put the plate and nuts on the inside towards the tank. On that note, I have already installed the tank but I sent the tank out to Gas Tank Renu and had them seal the tank. This just seems like the best way to repair the tanks short of having a new tank made. One more thing on the gas tank, I installed a new sending unit and I added a wire from the screws holding the unit in that I will put on the the frame as a ground for the sending unit. The reason for this is that the gas tank is insulated on the top and the bottom by a roofing material and that interferes with the ground.

Before I started on installing the differential housing I sent the housing out to the machine shop and had them boil it out to get rid of 80 years of contamination in the housing. The differential that I took out was VERY worn and ground up. It looked to me like the rear axles and seals were improperly installed and that may have contributed to the problems, but nevertheless the housing is clean and ready for installation.

I am starting with the differential housing already under the car with the pumpkin already installed. I figured that blocking it up and putting the springs under it was easier than trying to get it over the springs later.



Picture 1A,1B
I have the front shackle bolt in place with the new bushings installed, but I have not tightened anything and I won't until I have the driving weight on the car. I have a block of wood under the spring to allow the spring to slide up to where I can place the shackle into it. The bushings are installed on the out side.

Picture 2
I have the shackle now in place and like I said I will not be tightening the bolts on it. I have a friction clamp on the shackle to hole the plate in place with the bushings installed. One note on the bushings, I always use Slyglide on the bushings to allow them to move and twist in place before I tighten them. I use this on all my bushings in front end as well.

Picture 3
I now have the rear axle installed, springs with spring bolt and shackles installed. Note I still have the blocks under the car; we are in earth quake country so I'm not taking any chances.

Picture 4
The first thing I will be doing is installing the inner seal. I made a tool to drive the seal in. I made it out of freeze plugs welded to a metal shaft. Works real well for getting the seal in straight and quick.

Picture 5
I have put the drivers side of the car together with a basic adjustment of shims. I put .040-.050 worth of shims on the drivers side of the car and I will be working with the passenger side of the

car. It really does not matter which side you work with but you need one side with the basic start of shims. What is happening is that you are going to center the axles in the center of the differential. The spider gears have a "block" in the middle and it is that item that you're keeping the ends of the axles close but not touching.

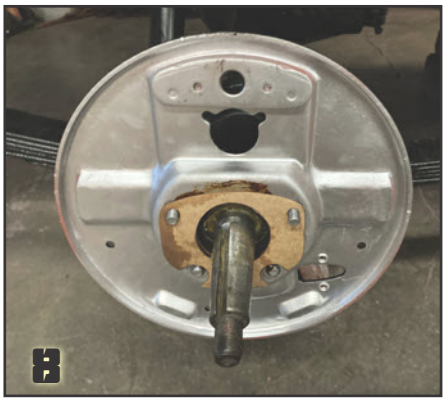
Picture 5 shows that I have put the shims on the bolts that hold the backing plate to the end of the axle housing. This must be the driver's side of the car as I have put axle grease on a bearing. I will be installing just the backing plate on this side bolted tight to the housing. I want to make a note here to be sure that the bolts are tight against the housing and not bottoming out on the threads so put a washer to take up room. The first time I did this I was chasing my "tail" until I realized that I had a loose backing plate, the bolts were not holding the plate to the housing.

Picture 6

I am now on the passenger side of the car and I have the bolts holding about .040 worth of shims on to the housing. I will install for test purposes the axle bearing "DRY" so that I can adjust the axle end play. I do not want the grease to interfere with my adjustment. You can see the shims are laying on the bolts ready for the axle and backing plate. Once I have the proper number of shims figured out, I will take it back out and grease the bearing and put it back together.

Picture 7

What I have set up here is my slide hammer set on the axle nut and my dial indicator on a magnetic base. I have the basic .040-.050 shims as a starting measurement. The backing plate is just installed and there is no requirement for a gasket between the axle housing, the shims and the backing plate, and no sealer such as silicone used. That just interferes with the measurement and I have never seen it leak in the area. Over the years I have acquired a number of shims of the various thicknesses and I can add or subtract as necessary to get the .004-.007 adjustment. I like to shoot for 5-6, I just don't like to make it too tight. I use the slide hammer to move the axle in and out and then I can read on the dial indicator what the measurement is.

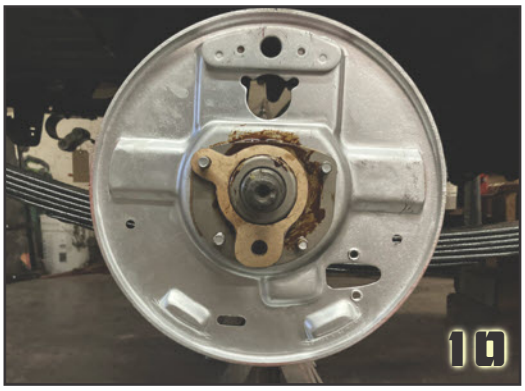


Picture 8

I have now packed the axle bearing and I have the backing plate on the axle and I have installed the first gasket. I don't like the RTV or silicone as it just gets too overused and makes a mess. I mainly use Form-a- Gasket and I have applied some

on the backing plate before I put the gasket on. One note on using original gaskets, if it is old and dry I will soak it in water before I put it on the car.

Picture 9A & 9B
This is the outer seal and what it looks like. We have already as the first step, put the inside seal in the differential. I am using a NOS seal (New Old Stock) and I have soaked the seal in oil for a couple days before I was ready for the seal just to soften it before I needed it. One note here is don't throw away your old seals before you put the car back together. They make new seals for these and I recommend that you order a rear axle seal kit from vendors such as Max Merritt so that you get everything fresh, and you will need to reuse your retainer for this. I have shown how it is installed on the bolts. Also I have cleaned the shaft up so as not to damage the seal as you install the seal on the axle.



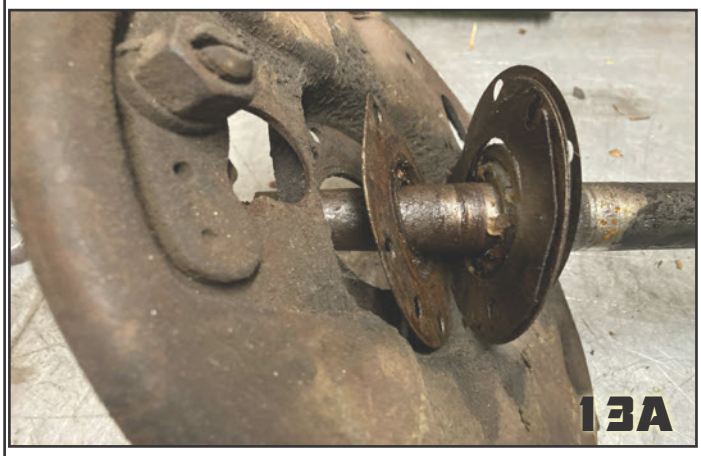
Picture 10,10A
I have the seal plate installed and I am putting on the last gasket. Only one bolt that holds the gasket and it really just has a big hole at the bottom so that any oil that gets past the seal will be directed out of the backing plate at the bottom and not onto the brake shoes. It will direct any oil that gets past the seal, out of the brake shoes area and keep it clean.

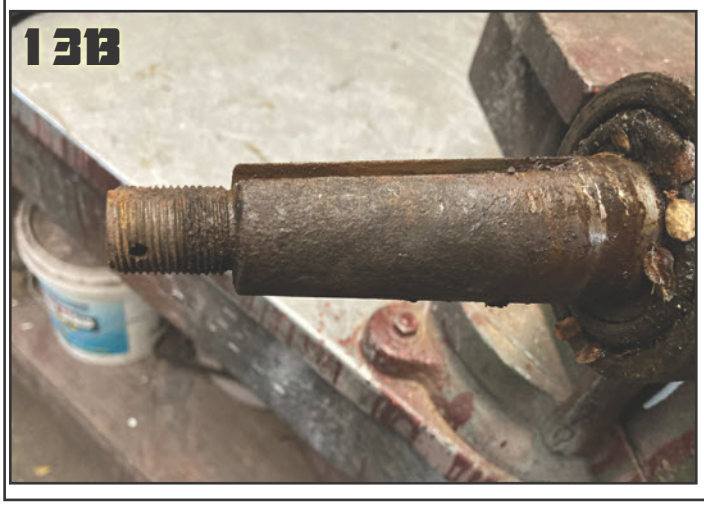
Picture 11
I have installed the final part on the axle seal and this is what I can only call the dust cover. I have installed new lock washers and tightened the bolts. I have installed new shoes and the wheel cylinder and put the return springs back on. One note here is that Packard was very specific about the springs. On the 110 6 cylinder cars the springs were .098 thick and painted blue and they are both the same. This info comes from the owner's manual and it also says that on the 120's the springs are a different color and different thickness on the front primary shoes and the rear secondary shoe. I have installed the rear emergency brake cables also and I am now ready to install the rear drums. One more

thing, when you remove the return springs the ends get bent out so squeeze the ends back where they belong when you finish installing the springs.

Picture 12

One final thing on the rear end work. Packard put a leather axle seal on the threads between the large washer and the drum. These keep the moisture out of the axle and the taper of the drum. I always get an axle seal kit from Max Merritt and I also ask for these leather seals from them also. One more thing, I have bead blasted the drums and had them turned but I do not put a lot of paint on the drums; just a quick coat of high temperature paint. You want the drums to dissipate the heat, so if you put a lot of paint on it you can trap the heat in the drum and when the brakes quit dissipating heat they will fade. One thing that they used to do on the old hot rods was chrome the drums for looks but that was really a BAD idea.





Picture 13A ,13B

I have included the next two pictures to show how NOT to install the rear axle seals and what damage could happen. They have installed the rear seal on the shim side of the backing plate and that is wrong and compounded problems in that they did not get the axle sealed at the drum and it rusted the shaft and the insides of the drum, so I had to throw everything away and get a new axle drum and in addition, the center section of the differential was totally ruined. There was at least a half inch of backlash in the differential and the gears were so worn that you could cut your fingers on the ring and pinion.