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Servicing Values

THE importance of properly operating valves, especially at this time of the year when motor performance should be at its best, prompts us to repeat this information—

We grind valves in an attempt, in too many cases a futile one, to restore the alignment that the valves had when first assembled. The attempt fails because the valve seat is no longer concentric or at right angles to the guide and the valve cannot find a perfect seat.

Both the cylinder block and valve stem guide are cast-iron which is subject to seasoning when heated. During the seasoning process, the texture of the metal changes and becomes more dense.

This sometimes causes the valve stem guide to warp or shift position slightly so that it is no longer in proper alignment with the valve seat. (Fig. 1.)

The blame is not confined alone to the guide, although with its long area exposed to the great heat of the exhaust it is more subject to warpage than the valve seat which is cooled by the water in the water jacket.

After the first 1000 or 1500 miles this seasoning process is completed and if the seat is then recut so that it is again concentric and at right angles to the guide regardless of the top face of the block, it will remain so during the life of the car and will require very little attention.

If left, however, the raised edge of the valve (Fig. 1) is exposed to the direct heat of

the explosion which will burn both the seat and the valve—the hot flames beating directly on the exposed valve stem will warp it causing worn guides and stuck valves. (Fig. 2.)

A badly burned valve seat cannot always be repaired without bringing the seat too low in the block for efficient operation. Blocks with the seats in this condition will be refused for credit by the factory when returned for credit on the reground basis.

Valve seats not concentric with the guides are also responsible for noisy tappets. In those cases where the tappets are noisy and adjusting them even closer than the prescribed .004" does not correct the fault can almost invariably be traced to this cause. When operating at low speeds, the spring brings the valve to its seat where one side strikes first, (Fig. 1.) During the moment that the valve is on its seat, the tension of the spring causes the valve to make a second movement on the seat which closes the valve, slapping the face against the seat and the stem against the sides of the guide. (Fig. 2.)

It is this second movement that causes the noise which defies adjustment.

In addition to the tappet noise, so-called, it also has a tendency to pound out the seat, wear the valve stem on alternate sides at the top and bottom part of the travel and wear the valve guide egg-shaped.

At high speeds, the moment of pause is so slight

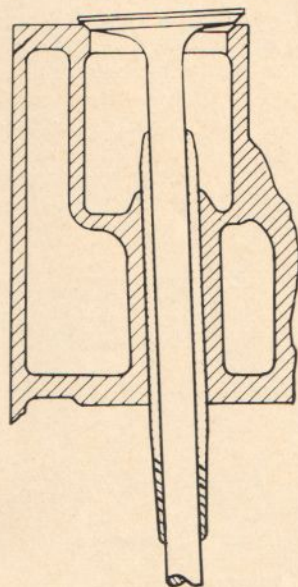


Figure One

Showing, in an exaggerated condition, the valve resting on the edges of the seat, due to warpage of the valve guide and block by the seasoning process.

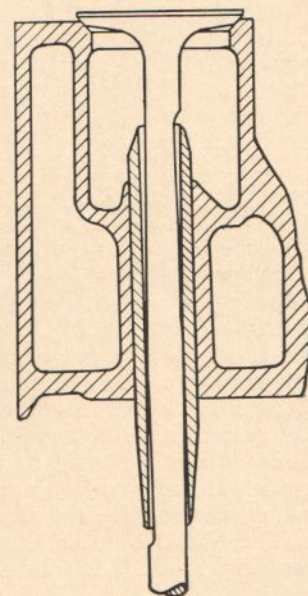


Figure Two

Showing an exaggerated condition of valve stem and guide wear, the result of the valve spring cocking the valve stem with a second motion after it has found its seat.

"Courtesy Always Pays — And You Are Paid To Be Courteous"

that there is not time for the valve to take the second movement and it remains open on one side burning the valve and valve seat.

To correct these evils, the valves should be resealed and refaced. By reseating with the proper method, the seats are made concentric and at right angles to the new position of the guide and the valve is trued up so that it will find a full seat at all motor speeds without having to take the second movement just described, with the resultant noise.

After 1000 to 1500 miles of operation, the seasoning process is completed and the valves may now be resealed with the assurance that they will remain in line. After having once been resealed the valves need not be disturbed again for many miles more than was previously thought necessary. It may be necessary to clean the carbon more often, but the valves should not be disturbed as long as compression is maintained.

In cases where the valve seat has been pounded or burned past any chance of reseating, it was previously necessary to scrap the block. It is possible, however, to counterbore around the valve and fit in a cast iron ring in which a new seat may be cut and the block put back in service again.

To do both of these operations, the Service Department has developed Valve Reseating Equipment S. T. 669 which when used in conjunction with a Black and Decker Valve Refacer S. T. 412, makes possible doing these operations in the field just as accurately as at the factory.

The principle is to locate a pilot in the valve guide so that its center coincides with the new center of the guide. The cutter should be turned on this pilot thus recutting the seat concentric with and at right angles to the new center line of the guide.

The valve guide being of small bore, the pilot must necessarily be small. Trouble is sometimes experienced due to the pilot being sprung by the operator pushing or pulling on the cutter as he turns it. To eliminate any tendency of this kind a bearing should be fitted above the cutter to take all side thrust so that the action of the driving wrench on the cutter is only rotative with just enough downward pressure to feed the cut.

S. T. 669 illustrated in Fig. 3 was designed with these principles in mind.

The pilot "A" fits in the valve stem on a taper and has a thread milled on the lower end for the attachment of the cone and nut shown. This arrangement fixes the pilot in the guide locating it both top and bottom true with the center line of the guide. Fixing the pilot in the guide has the advantage that once fixed on center it does not get out of line through turning in an eccentric bore. Being fixed at the extreme ends of the bore rather than at the center it has no tendency to wobble as to oversize pilots which are fitted to the smallest diameter of the guide. A small portion not over $1\frac{1}{2}$ " in length near the middle where it has the very minimum of piloting effect.

The pilot should be fitted snug, but not tighter than necessary to make it solid and to prevent turning in the guide.

The support arm "B" is then fastened to the top face of the cylinder being held in place by the wrench "D" which screws down on the cylinder head studs.

Before the support arm is fastened tightly, the driving wrench "C" which is reamed on the inside to fit the straight shank of the pilot should be put through the bearing and slipped down over the pilot.

This locates the support arm over the pilot although no attempt has been made to align it perfectly. Any error

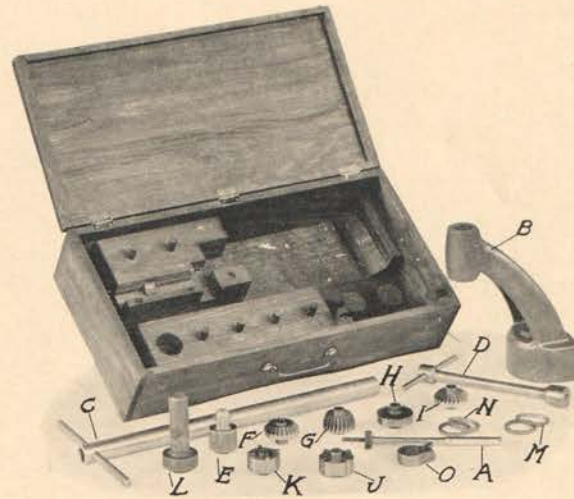


Figure Three
Packard Valve Reseating Equipment S. T. 669.

in alignment is taken care of by the universal joint action between the driving adapter "E" and the driving wrench. After aligning the support arm in the manner just described, it is locked tight with the wrench "D" after which the driving wrench is removed.

The cutters are fitted with split tapered bushing which serve the double purpose of compensating for wear and act as a brake on the cutter, eliminating any tendency to chatter. The friction of the cutter on the pilot should be adjusted so that there is an appreciable drag when the cutter is turned with the fingers.

The cutter is slipped on the pilot and down against the valve seat. The drive adapter "E" is next applied to the cutter, the driving wrench is fitted to the drive adapter thru the bayonet slots. A counterbore in the end of the driving wrench rests on the spherical head of the drive adapter, all downward force being applied thru this ball joint which prevents any angularity between the driving wrench and the cutter effecting the accuracy of the cut. The pin in the bayonet slots serves to drive the cutter only, it being possible to turn the driving wrench thru a considerable angle without exerting other than a turning motion on the cutter.

Care should be exercised in using the cutter to prevent taking out an excess of stock and thus lowering the valve seat too much for efficient operation.

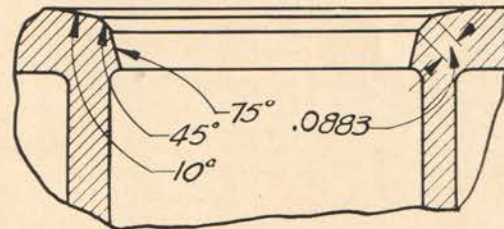


Figure Four
Typical valve seat showing two narrowing cuts
and the proper width of valve seat .0883 in.

The best procedure is to first use the 45 degree notched tooth cutter "F" taking one very light cut to break the scale. Follow up with the 75 degree throat cutter "G" cutting just enough to show a thin mark around the entire line of the seat. The seat should next be narrowed to .0883" using the 10 degree top face cutter "H". Finish up with one very light cut with the 45 degree smooth cutter "I" to put a finished surface on the valve seat.

The valves should now be refaced and reinstalled without grinding. To grind the valve now would be to undo all the good that has been done. Grinding a valve even with a screw driver and using a light pressure will shift the valve in the seat and put it out of line.

Without grinding, the motor may not show full compression cold, but running it a few minutes giving the valves and seats a chance to pound in will bring it back to standard.

When the seats are burned or pounded out past any possibility of repair by reseating, a replacement seat should be fitted. The procedure in this case is to set up as for reseating except that the replacement seat cutter "J" or "K," depending on whether it is an exhaust or intake valve, is used rather than a valve seat cutter. Take one very light cut, just enough to show a mark all the way around. Remove the driving wrench and fit the stop collar "O" on above the support arm bearing. Select a replacement seat "M" or "N" depending on whether it is an exhaust or intake valve and with the driving wrench in place hold the replacement seat against the top of the support arm bearing—bring the stop collar down tight against it and lock tight by turning up on the thumb nut. Remove the replacement seat and cut in with the cutter until the stop comes flush against the top face of the support arm. Remove the driving wrench, support arm and cutter and with the replacement seat drift "L" drive the replacement seat in place. Set up again as before and cut a new seat using the same process.

Boston Handles Accessories

After setting up an enviable sales record under strained working conditions caused by building alterations, the Packard-Boston Accessory Store has finally emerged to its rightful place in the palatial new salesrooms of the Boston Store.

Manager C. E. Wyman, Jr., who after more than a year of gypsy like encampments in various corners of the Plant feels qualified for a tent bosses job in a traveling circus—sends these photographs of his new Store as mute evidence of the reward which spurred him on to such a meritorious performance despite the handicaps of the past year.

The new Boston Accessory Store is strategically located between the New Car Sales and Service Departments, with entrances and identifying signs in both. In addition to this, an accessory display case has been built into the



Exterior of Store

wall dividing the New and Used Car Departments where an attractive exhibit of up-to-the-minute accessories may be seen.

Salesroom floor space adjacent to the Store is provided for the permanent exhibit of a completely equipped accessory show car. The foresight of the Management in selecting the location of this New Store makes it possible for the car to be viewed by pedestrians outside the building as well as those who come into the salesroom.

The Accessory Store itself occupies an area of approximately 90 square feet and is flanked on three sides (two on New Car side and one on Service Side) with spacious built in display cases which can be looked into from the inside or the outside of the Store. An abundance of shelf and counter space is provided for an orderly and practical display of Packard Approved Accessories.

Outside and above the entrance from the New Car Salesroom a Neon-like sign reading "Packard Approved Accessories" identifies the Store. Here again the careful consideration shown throughout in construction and location of the Store is manifest as the sign can be seen by motorists and passersby for several hundred feet along the main artery which the Store faces.

The fact that the Boston Accessory Division's net profits for 1929 exceeded by eight times the net profit made in 1924 is largely the reason for the prominence and modern equipment given to the new Accessory Headquarters.

Mr. C. E. Wyman, Jr., who started with Packard as a car shifter and who has managed the Store since April, 1925, feels that with these new facilities this year's business will greatly exceed his best previous performance.



Interior of Store

Inspection

We all know the meaning of this word, but in our hurry I think we sometimes give the customer the idea that our interpretation of it isn't the same as his. Let's keep in mind that the real meaning of inspection is to look into, and that is what the customer wants.

The customer drives into your station and says "There's something wrong with my motor," you lift the hood—listen a moment and say "Piston slap, you need a new set of pistons and the bearings should be taken up, that will run about \$150.00." That, on your part, is poor inspection and poor salesmanship. Do you suppose you have created any confidence in the owner's mind? He didn't drive in expecting to find Col. Vincent, Thomas Edison and a couple of mechanical wizards all wrapped

up in one Service Salesman's coat, all he was looking for was a courteous chap who wanted to help him with his trouble—he didn't expect you to know by the license number, or by the amount of grease and dirt on his motor just exactly what part was causing the noise—he did want to know what the trouble was and what it would take to fix it.

What you should have done was to ask him a few questions as to when the noise seemed most pronounced or what difference he noticed in the operation of the car at that time, or how long the noise had been noticeable. It probably would have been wise to have taken a short ride with him, you could then have told him the indications were that the pistons were worn—that the right thing to do was to have the head removed and have each one measured up, that you would do this for him and if he preferred, you would call him and let him know exactly what you found, or that if he wished you would go ahead and take care of the whole thing, the price would be \$150.00 if all of the pistons required changing. The job would be just the same as a factory fitted motor and the results would be very satisfactory. Stress the point that it would eliminate the noise and that he would have the result of practically a new motor.

Now you have his confidence—he knows that you are trying to help him and are interested in satisfying him—before he only knew that you were in a big hurry, that you might be guessing and maybe his motor didn't require any such amount of work and anyway \$150.00 was a lot of money for taking out one little noise.

Think it over fellows—are you really inspecting each car with the customer? Inspection is simply one method of selling service. Do your inspections sell?

Technical Letter Review

Recent issues of Technical Letters contained information of value to the shop, the service salesman and the stock room. These letters should be reviewed from time to time so that everybody will be familiar with the technical information issued by the factory.

TL-1879 cautions about checking the oil level in the differential on delivering the car, notifies you of the new springs under piece 177669, which is a softer acting radiator shutter spring, it also gives you a softer accelerator pedal spring under part 177677.

TL-1880 explains the use of the shock absorber vented filler plug under part 178768.

TL-1881 describes the transmission change speed lever spring under part 178728.

TL-1882 contains a list of part numbers on the change in the brake front camshaft from the inch and one-half to the inch and three-quarter size.

TL-1883 outlines the routine for handling radiator cores to be returned to the factory for cleaning or re-coring. The prices for this service are given.

TL-1884 gives the prices on standard and oversize cylinder and piston exchanges.

TL-1887 lists the prices of the bonnet side and door assemblies for use on 626 and 726 cars.

TL-1889 explains the installation of the seventh series radiator shutter return spring on the sixth series assembly.

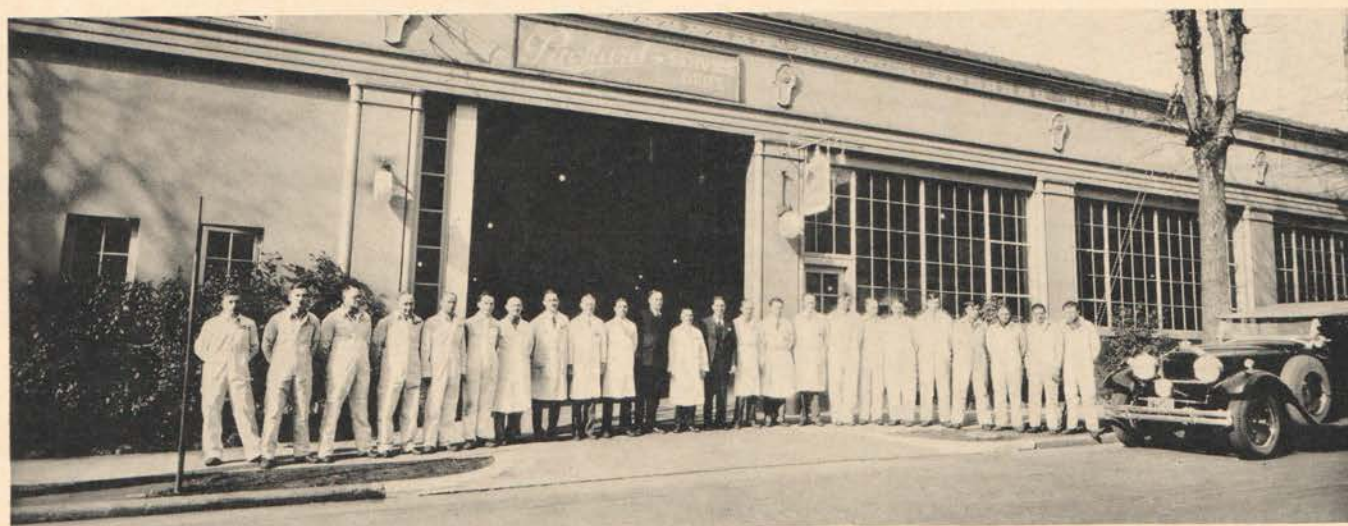
TL-1890 solves the problem of the oil knock noticeable in some instances at a speed of about 15 to 20 miles an hour. The oil pump air bleed is carried under part 179951.

TL-1891 included a pamphlet on the adjustment of the new type brake linkage used in production after frame 289246 on the 626, frame 182450 on the 740 and frame 181497 on the 745.

TL-1892 gives some additional information about the new type brake linkage and explains the installation on the seventh series cars previous to this change.

TL-1894 explains the proper adjustment of the fan belt on the 626 cars, it also gives information concerning reducing the size of the fan blade.

TL-1896 describes the change in the ventilator cover lever, a sketch shows how the change may be made in service. The new design has proven very successful in correcting ventilator leaks.



Lee Merrill and the boys from Portland, Ore., are hereby added to the Honor Roll

*We Welcome Suggestions and Inquiries from Packard Service Men. Address All Communications Care
Editor, Packard Service Letter.*