Hudsonotes

Column of Mechanical Miscellany
by George Schmidt
Mishicot, Wisc.

Cork Clutch Repair

THE MULTIPLE-DISC version of Hudson's cork clutch had a set of 8 driving discs (or 6 in the final years); and contrary to later practice, it was these driving discs which were cork-surfaced. The driven discs, sandwiched between, were of plain steel. Clutches of this same basic type, but with steel and bronze friction surfaces instead of steel and cork, were used on a number of early Brand X's, in one instance with as many as 34 small-diameter driving discs. Chief advantage of the multiple-disc design was (and still is, in present-day automatic transmissions) smoothness plus firm engagement without the need for extremely high engaging pressures or a large diameter.

Part of the efficiency of the Hudson clutch also derives from the friction characteristics of cork itself, which change markedly (but quite uniformly) as pressure is applied and most of the oil is squeezed from the porous cork surface.

HUDSON'S SIMPLIFIED clutch design, with single cork-insert driven disc, was introduced in 1927, according to information in the H-E-T Club Library. Although this clutch was used for 28 years, through 1954, it underwent numerous small production changes during that time, and usually was also built in different versions for the company's various models. Fortunately most of these variants remain interchangeable as complete clutch assemblies, and in some cases separate component parts are also interchangeable. The variants are shown in Hudson factory literature, and most of them also in *National Automotive Service Data* and other repair manuals. Here are a few examples:

The clutch was made in two sizes, one with a driven disc of nominal 10-inch diameter (108 corks), and a smaller one with minimal 9-inch diameter driven disc (90 corks). The smaller clutch was generally used on cars with the lower-powered 6-cylinder engine (except for overdrive and some business models). However, the larger assembly with 10" disc is often favored as a replacement on any model, especially if with vacuum clutch control.

Normal thickness of the corks (new) was listed as .203 inch for 1936 – 38 and again for all postwar models (another source specifies .213 inch maximum); but approximately .250 inch is given for 1939, and only .077 inch for 1940. This last, of course, represents thickness of only a single cork facing; if doubled and added to the typical .080" thickness of the steel disc, it totals .234 inch.

Standard thickness of the clutch cover gasket (at flywheel) is about 1/32 inch (.03125). If corks are too thick for a given clutch, one possible correction is to use two gaskets; but apart from this, it is important that only a single gasket be used, or spring pressure on disc will be reduced, possibly allowing slippage under load.

Both large (outer) and small (inner)coil springs were used with pressure plate to engage clutch on most models, though a few used 12 outer springs only. Stiffness of these outer springs was increased from 120 pounds each (at 1⅝-inch length, new) for 1936 – 37, to about 135 on some later models (see manual), to 180 – 190 pounds on cars 1946 and up.

The three rectangular blocks bolted inside clutch cover to carry the driving thrust to pressure plate were first used in 1942, on 10"-size clutches, replacing the driving pins in flywheel used on earlier models. The heavier welded-type clutch cover had already been introduced in 1940 along with the 6-spring 10-inch driven disc, for overdrive models.

CLUTCH FINGERS must be properly aligned and free of excessive wear. Check for wear, burrs, etc. at finger tips, and for scoring at front face of throwout bearing, both of which would indicate that bearing probably is defective and has not been turning freely. A warning of this condition is sometimes heard as a scraping or grinding noise from throwout bearing whenever clutch is held down (by pedal or vacuum) while engine is running. In this case bearing must be replaced, and usually the fingers as well. To help avoid bearing problems, a grease fitting is provided (at right side of bellhousing), and this needs to be used with every regular grease job.

A special finger alignment gauge, #J-774, was supplied by factory, but if this is not available, a homemade substitute consisting of a perfectly straight piece of steel, perhaps ½" x ½" x 4", with a threaded hole and thumbscrew placed crosswise through its center, will serve the purpose. With clutch assembled on flywheel (though not necessarily on engine) and driven disc and cover gasket both in place, the three finger heights, measured to edge of clutch cover hub, should be uniform within .005 inch if possible (rather than .010). Adjust higher fingers to match the lowest one, generally by hitting end of finger retainer bolt in cover with a soft hammer. If .030 inch or more of correction is needed, a thin washer (of .005" brass) may be added between retainer and cover, according to the National Service Data manual, which also lists maximum and minimum finger heights (1¼ to 1½ inches on most models), and suggests that cover be checked for possible distortion, especially around finger retainers and at outer edge. To avoid distorting edge, it is probably safest to loosen (and tighten) the 16 cover bolts each only one turn at a time, in rotation, while they are under spring pressure.

For best accuracy it is recommended that clutch and flywheel be pre-assembled at bench to check finger heights and other measurements. Later, when clutch is assembled on car, it is essential that splined hub of driven disc be placed exactly concentric with pilot bearing in flywheel. Since this is not easily managed visually, a spare transmission shaft or an aligning arbor should be used. Many "universal" arbors are supplied with assorted size bushings to fit Hudson and most Brand X's.

The small pilot ball-bearing rarely needs to be replaced, but if it does, be sure new bearing is staked correctly in place. Bearing is lubricated by the flow of clutch fluid.

If bearing noise persists when clutch is engaged (foot off pedal), perhaps louder in neutral or in certain gears, the problem is usually in transmission, most often at main front bearing on gearbox. Clutch pedal free play, however, must also be sufficient (1½ inches).

IF CLUTCH STICKS or will not release completely, and problem is not a need for flushing or for adjustment of linkage, one cause may be a bent disc, or one which is too thick. Another possibility is extreme wear at clutch fingers or at their retainers. Worn retainers can often be salvaged by turning them around so that fingers will bear against unworn portion. Erratic sticking can also be caused by damage to the splines on disc hub or transmission shaft. Check by placing driven disc on splined shaft: it should slide freely at all points. Minor blemishes in spline can sometimes be corrected with a file. Occasionally, due to repeated "popping" of clutch or other oversevere use, a very slight spiral twist may be found in the splines of transmission shaft.

Before a used driven disc is reinstalled, it should also be checked for wear. Manuals do not specify a minimum thickness, but in general, if any of the corks are worn thinner than about .125 inch overall, the disc should be re-corked or replaced.

A FEW HUDSON CLUTCHES, despite careful reassembly and checking of all of the mechanical points already mentioned, may persist with a problem of vibration, shudder, rough engagement, etc. When this happens, the cause is nearly always warpage or distortion of the flywheel or the pressure plate (often both), usually as a result of abuse or overheating in the past. Parts may or may not show visible signs of "blueing' or discoloration from heat.

Al Saffrahn, at the '81 National Meet, pointed out that these parts should be checked when clutch is disassembled for overhaul. Rear surface of flywheel must be flat and free of runout, and this means that it must also be perfectly parallel to the recessed portion of wheel's front surface which bolts to crankshaft. There are several ways of checking flywheel for runout, the best method (on car) probably being with the use of an accurate dial indicator. Crankshaft, however, normally has a small amount of end play which must not be confused with runout.

Some manuals suggest a maximum permissable runout here of about .005 inch (for typical dry-disc clutch), but this is probably excessive for our purpose. For smoothest results, a figure approximately half that, or .002-.0025 inch, might be more useful (this is also the usual tolerance for many modern disc brake rotors). When removing flywheel, note position of the six special nuts (they should not be reinstalled backwards). Before taking wheel to machine shop, check condition of starter teeth, possibly selecting a spare wheel with better teeth if necessary; or if ring gear is to be replaced, preferably doing this before the wheel is machined. The two dowel pins, which are a press fit in wheel, can be driven out with a pin punch, and later reused after wheel has been resurfaced.

IF THE CLUTCH cover/pressure plate assembly is to be reconditioned locally or at home, Al suggests that the recommendations in Hudson's mechanical procedure manual be closely followed. However, some books do suggest that up to .010 inch runout or distortion may be permitted at surface of pressure plate; but experience shows this to be too much, probably by threefold or more, if smooth operation is desired. To check pressure plate, a spare new one in good condition may be laid against it, and any gaps measured with feeler gauge. This can also be done using a good-quality flat surface plate at machine shop. After pressure plate has been resurfaced, it is especially important that the three clutch fingers be checked for uniform alignment, and corrected if necessary. To avoid damage to clutch parts and to the mechanic, a good arbor press or special clutch fixture (such as factory's #J-298-H) should be used when taking pressure plate/cover assembly apart, and again when reassembling.

Even if flywheel and clutch cover are carefully marked and put together in their original positions, there may be a slight problem of vibration due to imbalance if any significant amount of metal has been removed in truing up to surfaces. If cost is not a problem, a professional rebalance job may be considered. Some older manuals suggest patiently trying heavy washers added to a few of the clutch cover bolts to improve balance, but this is necessarily a hit-and-miss effort in most cases. Al reports that ordinarily there is no perceptible balance problem with these clutches after resurfacing, as it is rarely necessary to remove an excess of metal at any one point.

What are the alternatives to machine shop work? A former Hudson service manager once told me that when a late model Hudson (during the stepdown era) was brought in with a complaint of clutch vibration and roughness, the only practical procedure for the shop was to replace the entire clutch assembly with new factory parts. Rebuilt or off-brand parts for these clutches, he said, were usually not favored at the time, due to occasional problems with rough or erratic operation.

This writer has sometimes had good luck in transferring a complete Hudson clutch assembly — flywheel with its own cover, pressure plate, springs, and other parts with or without a replacement cork disc — from a parts car. If the clutch is known to have been operating smoothly in the parts car when last driven, this transfer is nearly always successful, usually needing only a new cover gasket and leather seals.

REAR OF ENGINE must be carefully supported, at oil pan, when transmission is removed for clutch work. To avoid bashing pan, use wood block 4" x 6" or larger on jack or jack stand (block may be wrapped in sacking or other cloth). During the later stepdown years, a special engine holding fixture, #J-4651, was available from factory, and this may be used instead. It was made with a center section to cradle oil pan, and adjustable hooks at either side to engage holes in car frame.

Removal of clutch cross shaft bracket (on frame), and loosening of center bearing on 2-piece driveshaft, are helpful but not always essential when pulling transmission. When the flywheel pan is removed, its two bolt holes are sometimes found not to align perfectly. These can be enlarged slightly with a file (and flat washers added) for easier replacement.

Although one is eager to try out a newly overhauled clutch as quickly as possible, there are several other items which are best checked now before car is reassembled. Transmission and bellhousing are sure to need a thorough cleaning with solvent and a brush before they are put back on car, and the rear rubber engine mount (under the bellhousing) should be cleaned and inspected with special care, and replaced if necessary. Add flat washer to center bolt for strength.

Check gearshift and clutch pedal linkage for bent parts or excessive wear. Inspect cross and caps of front U-joint on driveshaft for wear. This is also a good time to check condition of starter motor (including brushes and bearings), and starter drive. Before removing transmission, the condition of all special linkage, cables, wiring, etc. for Vacuum Clutch, Drive-Master, and Overdrive should be checked, and the positions and routing of these parts carefully noted, so that they can later be put back in place with a minimum of confusion.

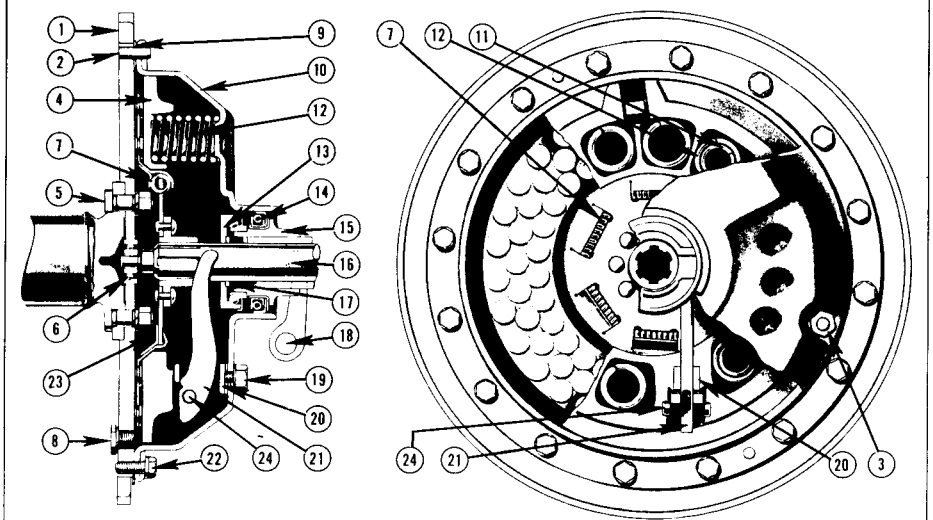
When replacing bellhousing, note that on most models the bolt holes (at engine) are not all the same size. If this type housing is to be used with some later engines (post-'51 or so), one hole at upper right may need to be enlarged to match the others. Be sure that all bellhousing and starter motor bolts have good lockwashers and are properly tightened, since any looseness here will cause rough operation of starter and sometimes of clutch as well.

ALSO ON PROGRAM at the 1981 tech session in Milwaukee was A.J. (Gus) Souza, who discussed the care and adjustment of GM 4-speed Hydra-Matic transmissions as used on Hudson-built vehicles. Details in a future issue of *WTN*.

A CORRECTION for the paragraph at top of center column on page 30 of the January/February issue, which should read:

"Glazing and oxidation of cork surfaces can be caused by excessively hard use and overheating, by poor-quality clutch fluid; or by lack of fluid. Usually the result is a noticeable loss of smoothness in operation. If oxidation is not too severe, a change to a better grade of fluid, preferably one resembling the original Hudsonite as much as possible, may clear up the problem when followed by a few dozen miles of driving in stop-and-go traffic . . ."

1948-1954 CLUTCH — ALL MODELS EXCEPT JET



1. Flywheel
2. Flywheel dowel pin
3. Clutch cover driving lug
4. Pressure plate
5. Flywheel bolt
6. Clutch pilot bearing
7. Clutch driven disc spring
8. Clutch filler plug
9. Clutch cover gasket
10. Clutch cover
11. Clutch engaging spring, inner
12. Clutch engaging spring, outer
13. Clutch throwout bearing
14. Throwout bearing oil seal
15. Clutch collar
16. Main drive shaft
17. Throwout bearing grease retainer
18. Clutch shifter yoke
19. Throwout finger retainer nut
20. Throwout finger retainer
21. Throwout finger
22. Clutch cover bolt
23. Clutch driven disc
24. Throwout finger pin