part three of a three part series . . .

Making the Vacumotive Clutch Work

by George A. Schmidt

IT IS HOPED that the suggestions offered so far have been of real help to HET members in restoring at least a few of these vacuum cluthch units to working order—not just barely, but successfully enough to make this longtime Hudson option a pleasant and reliable aid to everyday driving, as it was originally intended to be. In any case, comments, questions, corrections, criticisms, etc. from readers will be most welcome. They can be sent to the Editor or to the undersigned directly (see address at end).

This last installment is devoted to a variety of oddball problems which do crop up occasionally.

16. IF ENGINE WON'T IDLE PROPERLY, look (and listen) for vacuum leaks first of all. Next be sure trouble is not caused by linkage hanging up or sticking in certain positions. If there are no leaks, and yet idle becomes ROUGHER (instead of a bit faster) when vacuum equipment is turned on, the idle-mixture screws must be set slightly richer. There may also be trouble if vacuum for clutch (or wipers) is not being drawn EQUALLY from both barrels in manifold. Check for one partly-blocked hole at vacuum tap.

Vacuum Clutch and Drive-Master cars usually carry double-acting (vacuum-booster) fuel pumps. This prevents wipers from stalling whenever clutch and gearshift are at work, but the pump, too, needs to be checked occasionally for leakage (airdome, diaphragm; lines).

17. IF ENGINE IS HARD TO START—and is usually flooded—check linkage again. Be sure that when accelerator is floored (without quite tripping kickdown switch), both throttle and choke are being held wide open. Note "unloader" linkage on carburetor which pushes choke out of the way. If throttle cannot open wide enough to work this unloader, engine will usually remain flooded.

Vacuum leaks also cause hard starting.

ALL OF THE ABOVE points should be checked before deciding that overhaul of ignition or carburetor or valves is necessary.

The carburetor, of course, must be in good condition—especially its idling and accelerator-pump sections—in order to work smoothly with vacuum clutch; and while most settings should be "by the book," here are a few which may have to be raised slightly: a) idle mixture, b) automatic choke, c) unloader opening, d) cold (fast) idle speed. This is specially important with dubious latter-day fuels or if carb is slightly worn.

18. IF CLUTCH PEDAL SOMETIMES STAYS DOWN WHEN DEPRESSED, the heavy "over-center" spring (outside car frame, underneath) probably was not removed when vacuum system was installed. This spring requires a hefty turnbuckle-type tool to hook off and on. But spring does not actually interfere with vacuum operation; and since it does make for smoother pedal action, you may prefer to leave it in place. No problem.

At the same time, be sure the regular clutch-return spring (on linkage, inside frame), and another small spring (hooked to coupling lever and to bolt on gearbox) are both in place.

19. IF RUBBER PADS at clutch coupling lever SQUEAK at times, they are set much too tight. Rubber may be lubricated with silicone or with Door-Ease wax stick; but first adjust pedal linkage for more free play (1½" is stock). Then recheck clearance at vacuum pull rod clevis as well.

20. IF CAR MUST BE HELD ON UPHILL SLOPE, in traffic (while waiting at stoplight, for example), use brake pedal—or better still, the Hill-Holder which was optionally available on Hudson and other cars. DO NOT make a habit of holding car on hill merely by using accelerator pedal (as is often done with an automatic transmission). This is perfectly possible with the Vacumotive Clutch, true; in fact it should work with complete smoothness in both low and second gears when required . . . but it involves purely mechanical (not hydraulic) slippage, and will cause extremely rapid wear and overheating of clutch parts if continued for any length of time. Use it only for a few seconds when road testing as a check of perfect low-speed coordination between clutch, vacuum system, and engine.

It becomes much simpler to use the BRAKES for hill-holding when one foot does not need to be reserved for clutch pedal. In fact this is one of the few instances in a stickshift car when it is acceptable to cross over using LEFT foot on brake and right on accelerator, automatic-fashion—but do not rev up engine against the brakes before taking off.

21. IF GEARS CLASH WHEN SHIFTED (using vacuum clutch), the effective clutch stroke is generally too short. Be sure first of all that there is not TOO MUCH free play at slot in pull-rod clevis. Most books say 1/8 inch here is enough. Tighten if necessary, and then, if this seems to cause excess slippage, reset either the cushion-point screw or the throttle-adjustment screw (on linkage) as needed to compensate (turn outward, away from strikes). See "fine-adjustment" suggestions given in an earlier issue of WTN.

But do not shorten the threaded-sleeve rod. In fact, if clashing persists, this rod must be LENGTHENED (say 1 or 2 turns at a time), and then the abovementioned adjustments repeated once more to compensate. Test car on road, locking out overdrive but turning on Drive-Master (if so fitted)—this is best way to spot any remaining trouble.

Gear clash caused by clutch drag occurs mainly when clutch is hot, and is specially noticeable in low and reverse gears (which have no synchronizers). If it happens even when clutch pedal is used—and held down within 1" of floor mat—the pedal linkage also needs adjusting. If none of this helps, trouble is probably inside clutch—or gearbox.

Also, some clutch corks have a mild tendency, after standing, to stick upon the first shift or two. The traditional kerosene flush, followed by a change of fluid (perhaps another brand?) may help, provided clutch splines or pressure surfaces are not somewhat damaged as well. Different fluid, however, will usually require some minor adjustment changes to linckage.

Gear clash caused by synchromesh failure is most unlikely on these Hudson gearboxes from mid-'49 through early '52. Some of the earlier ones, however, were not quite as heavily synchronized; and with these an occasional grunt may be heard, especially on the 3-2 downshif, even when clutch and linkage are perfect. The grunt is seldom serious, and of course is less bothersome on overdrive models whenever car is in "freewheel"—that is, overdrive not engaged and not locked out—but the only positive cure is to install a box with the late type synchronizers. (Gears themselves were the same, with choice of wide or standard ratios, and with or without OD.)

To engage LOW without a crunch (while car is moving) normally calls for double-clutching, which must be done using the pedal (though vacuum need not be turned off). There is, however, an easier way on overdrive models: Be sure that car is in "freewheel" and ALSO that clutch is disengaged (using vacuum or foot). This will leave gears practically at rest from both front and rear, and they

can be slipped into low with little or no complaint. If not, recheck for any slight remaining clutch drag, and also be sure that overdrive disengages at proper speed when car slows down.

22. IF CLUTCH DOES NOT ENGAGE CLEANLY ENOUGH, giving instead a sort of uncertain or sloppy "fluid-drive" effect even after adjustments have been made as well as possible, consider the following:

Poor fluid, wornout corks, or weakened springs inside clutch.

Vacuum release valve worn. This little valve is built inside hollow clutch piston rod, and is operated by a long threaded stem attached to outside linkage. There is always more or less air passing through valve while cylinder is in use, and it is normally quite sensitive—only 1/16" or less of valve stem travel will produce a sizable movement of clutch piston. Sometimes, however, with age and wear (an possibly some production differences), the sensitivity is much less, requiring perhaps 1/8" or more of valve stem travel to move piston the same distance as before. There is likely to be increased leakage at both valve and piston edges at the same time. Mild cases may need only lubrication: 1 oz. shock-absorber fluid (regular or HD) through pipe plug at rear. After fluid has worked in well, the usual fine-adjustment of linkage can be repeated on the road.

Internal repair parts for valve and piston were once available, but usually it is easier to find and try another complete cylinder assembly. Compare several if possible, selecting one that requires the least movement of valve rod for the most change of internal airflow and piston response. Test it first by hand, keeping thumb over solenoid-valve hole in front. Lubricate and install on car; then repeat basic adjustment procedure from manual before testing on road. Follow with the usual fine adjustments.

The clutch release CAM (just above threaded-sleeve rod) also has much to do with the positiveness of clutch engagement, since it controls exact action of the vacuum release valve. Although these cams all appear to have about the same shape, some of them (late production?) are found with pivet hole drilled a bit further off center, which causes clutch to take hold somewhat more decisively. If possible, compare cams from several different models and retain the one which works best. Another method is to file a slightly steeper curve onto the part of cam which rides upon cushion point screw--but in this case it is wise to keep one spare similar cam unaltered for comparison. Some early cams (pre-'48) also offered choice of several holes for attaching the threaded-sleeve rod. Outermost hole was standard, for smoothest clutch engagement; but the others could be used if necessary. After making any changes on cam repeat usual adjustment procedure.

23. IF CLUTCH STILL DOES NOT engage positively enough at times, a further correction for it may be available at the ACCELERATOR SWITCH (just below vacuum cylinder on most models). While late-production switches had only two terminals (for a single circuit used in high gear only), the earlier types, through '49, had THREE terminals and two circuits, with the extra one being used to ensure a positive cutoff of vacuum clutch action at about half throttle, in all the lower gears. This is not completely necessary when vacuum release valve and all other parts of system are working perfectly—but it is a good safety feature, reducing any chance of accidental engine runaway upon extra-hard takeoffs, and making the system a bit more reliable in

ordinary driving as well (especially when using low and reverse gears). If the problem occurs with a '50-51 system it may be wise to install the earlier, 3-terminal type switch, adapting the connectors as needed. Note that the two wires which are found leading to one switch terminal must be separated; each will now have a terminal of its own.

The switch can be adjusted somewhat by sliding it in its slotted mounting, or even by placing washers under one mounting leg. For a quicker cutoff (at less throttle opening) move switch slightly REARWARD and/or place several washers under FRONT leg. The slots will often need to be lengthened somewhat. Most of this can be done without unduly disturbing switch's other circuit (for high gear). The high-gear circuit is satisfactory so long as it cuts out somewhere within the first 1-1½" of accelerator travel, and ALWAYS makes contact again promptly when accelerator is released. Make certain, however, that none of these adjustments can interfere with free action of throttle linkage, from slow idle to wide-open. Make doubly certain that, with accelerator floored, the switch link cannot drop "over-center" and thus jam throttle open.

To test switch action (along with rest of clutch circuitry), connect two wires and 6V. test lamp in parallel with (across) clutch solenoid valve in front. DO NOT GROUND either wire, but extend them far enough to put bulb inside car for a test drive. In high gear, bulb should go out at a touch of the pedal; but in the lower gears, bulb should remain lit while clutch begins to take hold smoothly—and then as pedal is suddenly punched further (half throttle or more) it should go out before clutch has chance to slip excessively. Test can be made when clutch is PARTLY warmed up (and thus prone to slip); and again when fully warm—but like other tests it should be done only on clean dry road surface.

As last resort, if switch still does not trip soon enough to be of any real use in the lower gears, take it apart and remove the shaft. Substitute a shaft which has had one "flat spot" altered so that second circuit will trip at only 45 deg. or so after the first one (rather than stock 60 deg.). To avoid necessity for a "building-up" job on the shaft (with solder or brazing), select one from a late-type 2-terminal switch, which has one end of the shaft left blank; and file this to shape. Reassemble, adjust in place on car, and test as above.

24. IF CLUTCH ENGAGES TOO SUDDENLY, giving a sort of slide-BUMP effect even when all the usual linkage adjustments have been optimized, the remedies are largely opposite of those in 22 and 23, above.

First drive car with test lamp connected as already described, in order to find out whether the jerks are being caused by the vacuum release linkage and cam . . . or by premature cutoff at accelerator switch. Obviously this last cannot be the case when late 2-terminal switch is used; but any unscheduled flickering of lamp can still warn of a break elsewhere in circuit. Try using vacuum clutch in low, second and reverse.

If bulb stays bright, but the slide-BUMP occurs anyway, it may be well to find and install a clutch-release cam with pivot hole closer to center. Alternative is to file a more GRADUAL slope on part of cam which touches cushion-point screw. Reset screw a turn or so nearer to allow for this, and then retest car on raod.

But if bulb goes out too soon (in the lower gears), the accelerator switch—especially if modified—needs some counter-adjustment. Move it slightly forward and/or place several washers under rear leg. If switch then interferes with throttle linkage returning all the way to its own stop at idle, the little stop on outside of switch case will have to be filed. Test car on road, preferably with light bulb still connected, and then repeat any minor linkage adjustments as needed.

There should be no perceptible jerks, at least when warmed up . . . except in the case of a "dragster" start (throttle or more—, when system should hesitate just a brief instant to rev up engine; then bite solidly—much as would be done using clutch pedal.

Clutch fluid—too little or too thin—is of course anouther cause of unwanted jerks; and so is a hard carbonized glaze on the corks, if permitted to form. Also, some cheaper brands of fluid tend to cause rather irregular automatic operation even if acceptable for use with pedal. (Permatex brand seems to be an exception, giving good results both ways—if a shade firmer than regular Hudsonite.)

USE CAUTION about trying to smooth out clutch action by altering the release cam. If slope on cam is too mild, clutch under some conditions may not take hold at all in the lower gears—until suddenly tripped by accelerator switch. Result will be rougher instead of smoother operation—or with late-type switch, engine abuse.

25. IF CLUTCH "JUDDERS" OR CHATTERS upon engagement, trouble will be found inside clutch assembly (or even at pedal linkage) rather than in vacuum system. Hudsonite Fluid does seem to mask the problem better than other brands, and sometimes an extra ounce of luid also helps. Be sure chatter is not traceable to loose bellhousing bolts, rubber mounts, etc.—or to worn bronze bushings on clutch throwout shaft.

The Vacumotive system cannot repair a chattering clutch, of course; but it can often be adjusted to give smoother results than ordinary pedal operation.

26. IF TROUBLE COULD BE IN THE DRIVE-MASTER or overdrive on car, these things should be turned off while clutch is being tested. On 1950-51 models which have no separate switch position for vacuum-clutch only, it is necessary to pull the connectors on two Drive-Master units: the throttle-lock solenoid (next to clutch solenoid) and the triple solenoid valve (below). It is better not to pull the 10-prong master switch plug as this contains one circuit for starter button. At same time inspect all Drive-Master wiring for shorts which could be blowing fuses to disable entire system.

If symptoms vanish when vacuum clutch is used alone, the Drive-Master (or Super-Matic) gearshift mechanism will have to be checked out point by point, in much the same manner as outlined here for the clutch section.

AND ON THAT OPTIMISTIC NOTE this discussion of the Hudson Vacumotive can be closed. At present, we are considering whether a similar set of service suggestions for the Drive-Master (gearshift) system—by this writer or perhaps by HET Club members who are better qualified—should be run at some future date. Let us know what you think.

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