Second of a three part series . . .

Making the Vacumotive Clutch Work

by George A. Schmidt

HERE ARE SOME MORE troubleshooting suggestions for Hudson's vacuum clutch system. Like the ones offered in last month's WTN, they are based upon the stepdown models, but should prove adaptable to earlier versions as well. Bear in mind, also, that there is little or no difference in Vacumotive Drive whether it is used alone, or with overdrive, or as part of a Drive-Master assembly, or with all three units in combination . . . except that the latter arrangement (called Super-Matic Drive in the last years) is of course the scariest looking, and therefore specially recommended for showing off to Brand X owners.

Especially when it is all in working order.

8. IF YOU HAVE NO MANUAL, either factory or MOTOR's et al., by all means try to borrow, buy or bum one (at least the appropriate pages, reproduced) while working on your vacuum clutch or Drive-Master. The WTN cannot very well duplicate all appropriate manual information here; and although this article is as detailed as space will permit, it is intended primarily as a supplement.

FOR BACKGROUND OR COMPARISON purposes, incidentally, it is also interesting to read any available material concerning the Packard Electromatic or the Chrysler-product (Imperial to Plymouth) vacuum-clutch systems. These differed in that they were used with an ordinary dry-plate clutch; and though available with overdrive (or freewheeling and sometimes a manual 4th gear instead), neither was offered with an automatic gear-shifter comparable to Drive-Master or even Electric Hand. Ford, of course, copied the Electric Hand setup, and several others (Nash, LaFayette, Studebaker, Chevrolet) offered vacuum-assisted manual gear shifting . . . but the idea of combining this with automatic clutch operation seems to have been Hudson's alone.

Chrysler products offered automatic-clutch options until shortly before the war, when these were displaced by a "Vacamatic" system (not to be confused with Hudson's "Vacumotive"). The Vacamatic featured partial vacuum/electric gearshifting plus fluid drive – and a nonautomatic clutch pedal. Variants of this were sold under several other names as well – Tip-Toe, Gyromatic, M-3, and so on. Vacuum clutch operation, however, was even available on one or two GM lines for a short time; and Packard's "Electromatic Clutch" unit must also be listed here, since despite its name it operated – like Hudson's – upon vacuum and electricity combined.

Another intriguing comparison which is "all in the family" would be with the E-stick (Easy-Stick) clutch available on Ramblers a few years ago. That one, though used with a manual shift, borrowed a notion from the automatic boxes in that hydraulic pressure was used – not to release the clutch, but to hold it tightly in engagement, thus taking the place of the usual clutch springs. Since that time, too, there has been a resurgence of interest in automatic-clutch mechanisms – electric, vacuum, or hydraulic – due to their use on a number of small imported cars: Renault, Citroen, some VW and Mercedes, plus others – usually in combination with a standard (well, almost) gearbox. Mechanically interesting, these systems (including the type with microswitch control hidden in gearshift knob) lack some of the precisely modulated controllability of a well-adjusted Hudson Vacumotive system. Also, there is usually no clutch pedal and hence no way of switching back to nonautomatic driving when preferred – or in case of difficulties.

A closely-related device, of course, is the "power clutch" which is non-automatic but vacuum-ASSISTED very much like a power brake (and

requiring about the same pedal effort). This idea is far from new, bur it has never been pushed very hard (pun intended) in the sports/passenger field. True, at least one nationally-known supplier had a modern, fully-developed optional power clutch system ready for production in the mid-1960's, with several automakers interested; but like most other legitimate automotive improvements since then, it appears to have been effectually buried beneath the antimechanical "smog" and "safety" hysterics which followed. So much for comparisons.

9. IF VACUMOTIVE SYSTEM QUITS SUDDENLY, the cause is nearly always electrical trouble. Not much adjustment is possible here; but look for blown fuse, bad wire, loosened or corroded connector (either at socket plugs or bullet terminals), rubbed insulation, coated governor contacts, etc. Note that the fuse for Vacumotive Clutches (ad some complete Drive-Masters) is 10-amp. full-length type. To avoid wasting fuses while hunting down an elusive short, connect medium-size light bulb and socket temporarily in place of the fuse.

10. IF SYSTEM WORKS ERRATICALLY OR UNPREDICTABLY, trouble could be: a) clutch fluid (again); b) electrical break or short-circuit that only shows up intermittently with vibration, temperature, etc. – which could be in the wiring, or c) often, oily governor contacts. Check and clean these, plus the ones for overdrive and Drive-Master (if any) at the same time. They can be washed with lacquer thinner, choke-cleaner, or similar solvent; then dried by air-blast and/or lintless cloth or tissue. If necessary they can even be taken apart and burned spots removed with metal polish; then rewashed – but DO NOT bend or reverse any parts in a way that might cause pivot function. A crochet hook or darning-needle makes a useful tool for hooking the tiny springs back into place. Now check to be sure contacts are free enough on their pivots to open and close always with a positive little snap – NEVER "hanging up" somewhere in between, or they will soon arc and fail again. To prevent quick recurrence of the oil problem, the inside of governor case and rotor should also be washed with thinner, and dried. If oil still reaccumulates in a short time, governor will have to be replaced with one which is less worn. Also check transmission lube (too thin?) and the little vent atop gearbox (blocked?).

Neither the bronze bushing nor the leather-and-steel oil seal for these governors were listed by Hudson as separate replacement parts, but they were similar to those used on various cars with overdrive through the years; and if available from other sources, they should help considerably in keeping oil off the contact points. Parts are replaceable in both the single (clutch and/or OD only) and double (Drive-Master) type governors. The single type can also be replaced by a complete newer (e.g., Rambler) unit if preferred, retaining only the original cover with contacts, and pinion gear. The early cover (from Hudson and some others, pre-'52) is necessary since it has TWO terminals – overdrive, plus a larger or darker one for vacuum-clutch connection. Packard used the same arrangement.

ANOTHER CAUSE of irregular clutch operation is d) a sticky solenoid valve. Test using jumper wires, with an without engine running. Valve should work even at 4-4½ volts (try with 2 battery cells or 3 dry ones); but it would hardly be reliable at that voltage, so check for excess resistance in circuit – wire terminals, contacts, etc. A meter or light bulb with test prods will help. (Even terminal rivets on valve may be corroded). If valve is electrically OK but still sluggish, take it apart for cleaning (being careful not to lose or bend the small spring at bottom). Remove 2 small flathead screws inside, and work cage & plunger out of valve top. If internal repair parts are needed (they were once available), note that many of them – cage, plunger, spring, rubber valve head, etc. – are identical with certain Drive-Master parts, even though solenoid windings and body of valve are not. Usually, however, it is necessary only to polish all working surfaces with extra-fine

steel wool, clean with lacquer thinner, rub dry, silicone lightly, and then reassemble. Before tightening the 2 external screws, be sure that plunger is well centered and free-moving on its spring. Last, replace check-valve disc and brass plug on top.

With engine not running, the solenoid Valve should respond with an audible little "pop . . . thump" as it is switched on and off.

The next possibility is e) LINKAGE which binds or sticks at some unexpected point. Be sure throttle pedal cannot stick during hard acceleration when engine twists to one side. Be sure, also, that the torsion spring around throttle bellcrank (at rear corner of engine) has not weakened enough to prevent FULL throttle opening at any time, even against the slight added drag of vacuum-clutch linkage. On some cars, a homemade spring tightener (giving perhaps 60-90 deg. of extra windup) may be the only practical remedy at this point.

There is another coil spring – an odd-shaped one – on the clutch release cam (just above threaded-sleeve link). If half of this spring is broken, or unhooked, or binding, the clutch will slip and grab quite erratically. Ditto for small spring on throttle cross shaft atop engine.

Inspect f) the LOCKNUTS on all vacuum-clutch adjustments. If loose, they will allow settings to wander, with untoward results.

Much random sluggishness can be cured by regular oiling of the linkage parts. Ordinary engine oil was recommended, but a heavier mixture containing perhaps 20-40% of STP or a similar thickener is better, especially if parts are worn. Gear oil can also be used. Mixture is easy to apply if thinned slightly with solvent and put into a small dropper or squeeze-type bottle. Pedal linkage (all except rubber parts, but including felt collar on clutch cross shaft) should be similarly lubricated.

A few additional checkpoints are shown in the manuals, along with illustrations identifying the various parts by name.

11. IF ROAD SURFACE IS SLIPPERY, clutch action must often be further smoothed out by "riding" foot lightly on pedal – or in extreme cases turning off vacuum and using pedal alone. Adjustments could of course be altered for better performance on slippery surfaces, but this should be avoided since it will cause trouble (excessive clutch slippage and wear) when roads are dry.

12. IF CLUTCH WILL NOT TAKE HOLD AT ALL in one or more gears, and there is no mechanical breakdown (clutch throwout, disc hub, gears, etc.), look for a) short or ground in Vacumotive wiring, b) sticky solenoid valve, c) part of vacuum linkage disconnected, or d) if it happens only in reverse: overdrive "freewheel" not fully locked out. Give gear lever a second push, or, in extreme cases (cold weather) lock OD out first by hand.

13. IF CLUTCH GRABS INSTANTLY IN ALL GEARS (as it should do only in high), inspect shift-rail switch & wire at side of transmission. Switch terminal should be OFF in high gear; GROUNDED at all other times. If switch must be removed for any reason, DO NOT lose small steel ball from hole in transmission. This switch (single-terminal) was made in several production variants, most OK electrically but given to minor oil leakage. If leak is excessive, check for blocked vent on gearbox and for possible overfilling. Also, while manual cautions, "do not attempt internal repairs" on switches and other small parts, there is often no alternative. This shift-rail switch, for example, can be taken apart if necessary (remove brass eyelets), and a piece of good-quality thin leather cut and fitted to replace the original neoprene oil seal. Use late type (larger-button) switch if possible.

14. IF CLUTCH SYSTEM DOESN'T WORK RELIABLY IN HIGH GEAR – refusing to disengage automatically when car drops below the overdrive speed, for instance – look for: a) governor contacts dirty, or connection poor, b) sticky solenoid valve, c) throttle linkage and accelerator switch not returning all the way to their stops when pedal is released. Look for stiffness or interference, anywhere from carburetor back to rubber pedal boot. If necessary move accelerator switch slightly forward in its slots, and retighten screws. On other hand, if system refused to quit at high speeds, look for d) short circuit. If clutch only slips excessively in high gear, recheck b) and d) above.

15. IF GOVERNOR OPERATES AT WRONG CAR SPEED, the usual correction is to install a different drive pinion. Exact cut-out speed for vacuum clutch alone is not very critical, anything within 18-30 mph. being usable generally. However, the governor contacts are arranged in SPDT (single-pole-double-throw) fashion: when clutch is "on," the overdrive (if any) is "off," so that best overdrive shift speed must also be considered here. The stock setting on most models was c. 19-22 mph. – although with some rear axles, plus overdrive, the engine may buck or even stall if car slows much below 24-27 before clutch disengages. Another problem is that cut-in speed tends to become somewhat LOWER with normal wear. In either case the simplest way to RAISE effective cut-in speed on most cars is to use a pinion with MORE teeth.

Standard governor pinions on these Hudsons had either 15 teeth (with 4.11 rear axle) or 18 teeth (with 4.55 axle – normally the over-drive models). There were 15- and 18-tooth speedometer pinions to match, and all of them fitted the same 10- or 11-tooth driveshaft gears interchangeably. Pinions with 16 and 17 teeth, useful for correction purposes, were also available – from other cars or from Stewart-Warner directly, if not from Hudson.

Double (Drive-Master) governors used the same pinions and had in addition another set of SPDT contact points, designed to operate the second/high gearshift at a speed roughly two-thirds of that for clutch/overdrive. This setting, given as about 10-13 mph. stock, is actually quite critical if the automatic shifting is to be of much real use in heavy traffic. Best procedure with a Drive-Master or Super-Matic car is to drive it several times IN TRAFFIC to make sure of near-optimum setting for the GEARSHIFT speed. Clutch/overdrive speed will then also be OK as a rule, though any change in gearing will of course alter BOTH speeds proportionately.

Several extra gaskets under governor lid will LOWER cut-in speed. A worn-down fibre tip on rotor will also lower it, and about the only fix is to improvise a slightly higher brass button (inside cover) for tip to ride on. Governors can be compared for tip wear, and spring stiffness, by bumping two similar ones together, nose-to-nose (covers removed). Spring tension does vary on these (perhaps intentionally); and the stiffer springs will give a higher cut-in speed. As last resort, take governor rotor carefully apart and beef up one or both of the springs inside (Drive-Master/SMD models have two). Perhaps slightly stiffer ones in the same size can be found; otherwise try to find or alter small washers to serve as spring spacers. To raise ONLY the clutch/OD speed (not gearshift), work only on the heavier spring. Reassemble governor, making sure it will spin true, and retest on road.

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