

About the Freewheeling Overdrive Transmission

by Frank Daly

As you may have read in the Newsletter, shortly after returning from the Durango Meet, I started to hear a clicking noise while in second gear in my C2. It was pretty obvious from the start that I had lost a tooth (or more) from the second speed gear. Upon removal and disassembly of the transmission, that suspicion was confirmed – two teeth were each partially broken. Interestingly, John Spinks examined some close-up photos which I sent to him and postulated, based on the color of the metal, that one tooth had partially broken quite some time ago, and that the “fresh” broken tooth was likely caused by further separation of the old break and the fragment doing its damage. Examination by a metallurgist friend supported John’s suspicions.

Fortunately, Phil Putnam had a spare transmission which had good gears in it. But while the transmission and overdrive assembly was out of the car, I decided to tackle an issue which plagues many of our Airflows – the issue of difficulty **going** into and **staying** in reverse while overdrive is enabled. Sharing what I learned in this regard is the purpose of this article.

First of all, some standard terminology. When the knob on the dashboard is pushed in, the overdrive is **enabled**. When the knob is pulled **out**, the overdrive is **locked out** (Chrysler’s terminology).

And just for fun, I’ll remind the reader of something which he likely knows, although some have expressed confusion in this area. We say that the transmission freewheels, and indeed it does – but only when the overdrive is NOT engaged. Some Airflow owners have expressed concerns due to the deservedly poor reputation of what I’ll call full time freewheeling offered on cars in this era. With no engine compression to slow vehicles down when descending hills, and taking in mind the somewhat marginal brakes of the day (non Airflow cars!), horror stories of freewheeling cars running away are numerous.

However, in overdrive equipped Airflows, freewheeling **only** takes place when overdrive is not engaged. Once overdrive kicks in (after lifting your foot off the accelerator above overdrive engagement speed – approximately 37 mph), engine compression will assist in braking when appropriate. If you are driving in hilly terrain but expect to remain above the OD engagement speed, it’s safe to leave the

knob in. If you are driving in hilly terrain and you will likely be descending at speeds below the engagement speed, you can disable both the overdrive and freewheeling function by pulling the knob out. Now you have only three forward speeds and no freewheeling, like many of the cars of the era. As John Spinks says: HOW BORING!

Is the transmission designed such that it is difficult (or impossible!) to engage reverse while overdrive is enabled? Absolutely not true, although this rumor or legend abounds. I have been told by numerous people that Chrysler designed the transmission/overdrive so that reverse could not be engaged while overdrive was enabled in order to prevent damage to the freewheeling mechanism. But the mechanics of the design prevent this - as you will see in this article, engaging reverse while overdrive is enabled takes the car out of overdrive (and freewheeling) temporarily, and returns it to ‘overdrive enabled’ mode when you take the car out of reverse.

Chrysler was justifiably proud of this innovative “automatic” overdrive. It is clear that they intended for the average driver to drive around with the overdrive enabled. Unlike overdrives in Mopars of later years, one drives with the knob **in** if all is functioning properly. I don’t think that owners would be very happy “in the day” if they were expected to yank the knob out and have it stick nearly five inches out of the dashboard during everyday driving (although this is what we do under certain conditions today). Remember the literature – “At 45 miles per hour, *a miracle happens!*” Chrysler intended for the Airflows to automatically engage overdrive when appropriate. See the attached clip from a Ross Roy Salesman’s Service Bulletin (dedicated to the Airflow) which drives this point home.

There are **two** primary undesired conditions which occur due to the design of the transmission/OD. The first has been much discussed in the Newsletter. The first mention which I can find goes back to May of 1985, in an article written by Bill Young. And as recently as November of 2008, Jon Clulow provides an excellent summary along with some great photographs. This is the issue of what has been termed sludge buildup. I’ll discuss it a little more here.

When you pull the OD knob out to lock out overdrive, or push it in to enable overdrive, you are moving a counter-

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shaft forward and backward. The countershaft is moving in and out of closed cavities at either end; these cavities are filled with oil. Because of the presence of this oil, there are relief holes in the countershaft which permit the oil to be displaced through the holes when you push the shaft into the blind cavities. If these holes are plugged due to sludge buildup, then when you are pulling your knob out or pushing it in, you are essentially trying to compress the oil. Eventually it will find its way past the countershaft, but it is quite a struggle. One Club Member described his experience in moving the OD knob in and out by saying that he nearly had to brace his feet on the dashboard to pull the knob out!

Now if **OD is enabled** (knob in), and you wish to engage reverse, for reasons mentioned above you have to move the OD clutch shaft rearward (into direct drive, or OD locked out). A lockout pin in the transmission/OD pushes the clutch shaft rearward when you push the shift lever into reverse, **just as if you had pulled the knob out**. As you push the shift lever into reverse, you are compressing a spring in the OD mechanism which has the purpose of returning the clutch shaft forward to the OD enabled position as soon you take the car out of reverse. If the oil relief holes are plugged, it will be very difficult to put the car in reverse, as you are once again compressing oil. Many owners deal with this problem by pulling the knob out when they wish to go into reverse, although it might be quite difficult to do so. But once you get overdrive locked out, going into and staying in reverse is no longer a problem.

So if you have great difficulty **going into reverse** while OD is enabled (knob in), or if you have great difficulty **pulling the knob out or pushing it in**, then it is likely that deposits are blocking the relief ports and you need to disassemble and thoroughly clean your OD assembly as described in Bill Young's letter and Jon Clulow's article.

On my car, I had had the transmission/OD thoroughly

A Real Selling Point

What a demonstration the salesman can build around *this* feature! Many features may be almost worth their weight in gold, but they may not impress the prospect because their results may not be particularly noticeable when the car is new. Here is a



feature that the prospect will notice for himself— instantly. The smooth, effortless glide of the Chrysler in overdrive can not help but impress every prospect who drives it. And he has secured this important improvement in car performance without knowing that the device is on the car. There is nothing new for him to learn. He operates the car as usual.

cleaned and rebuilt. It was easy to pull the knob in and out, and it was easy to get into reverse when the OD was enabled or locked out. However, my transmission simply would not **stay** in reverse if the OD knob was in (OD enabled). I had to hold it in with one hand while backing up, or stop and pull the OD knob out, which was easy but inconvenient and clearly not the intention of the design.

What I learned (with the help of John Spinks and John Heimerl) is that when you engage reverse while OD is enabled, you are dealing with a delicate balance between the above-mentioned spring which wants to push the overdrive clutch shaft forward into the “overdrive

ready” position as soon as you disengage reverse and a ‘spring + ball + detent’ setup in the first/reverse shift rail assembly which wants to **hold** the transmission in reverse position until you move the shift lever to go out of reverse. Apologies for the repetition, but many people have asked for clarity in this regard. When you go into reverse (no sludge, knob in, overdrive enabled) here's what happens: (1) the first/reverse shift rail moves toward the rear of the car. (2) A lockout pin on the shift rail pushes the clutch shaft rearward into the direct drive position. (3) A spring is compressed and this spring tries to push the shift rail forward, out of reverse. (4) When the shift rail is all the way back (transmission in reverse) a small metal ball with a spring behind it, pops into a detent in the shift rail. **This ball in the detent is what holds the shift rail in the reverse position against the pressure exerted by the spring.**

In my case, the spring which pushes the ball into the detent into the shift rail in order to hold the transmission in reverse had “fatigued”, thus not pushing the ball firmly into the detent. In addition, years of use had rounded off the edge of the detent. The rounded detent could not hold the ball in place against the pressure of the spring. After many, many hours of tinkering, finding a strong donor spring and carefully grinding the detent with a dremel stone resulted

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in sufficient strength to hold the shift lever in reverse until I moved the gearshift out of reverse.

So if you can get your transmission into reverse with the knob in (and even on well functioning units you often have to “fiddle” with it, due to internal gear design) but it won’t stay in reverse, take a look at the detent in the shift rail. Also make sure that the ball in the case exerts a great deal of pressure on your finger if you push it in, compressing the spring behind it. John Heimerl once mentioned to me that in reassembling a transmission, he had to go through quite a few donor transmissions to find a ball and detent combination which holds the shift rail into reverse. I did not have spare parts, and rectified the problem by cleaning up the detent and putting a stronger spring behind the ball.

Although I did my detent modification work while the transmission was out of the car, it seemed to me that this work could be accomplished with the transmission in place. I asked John Spinks to confirm my belief, and this is what he tells us:

“The detent modification work can be accomplished whilst the transmission is in the car. You will however find that the ’34 transmission has a cast iron top plate which houses the shift rails so when this cover is removed, the shift rails, detent springs and balls etc. all come out of the transmission case as one piece. In the case of the ’35, ’36 and ’37 transmissions, they all have a pressed steel top cover plate which when removed allows ready access to the shift rails

and problem detents which are left mounted in the top of the transmission case. A word of CAUTION though is to make sure that nothing like a ball bearing or a spring or washer or whatever falls into the oil in the transmission as the results will be disastrous. Finally, to remove the top plate in the ’34 transmission, the transmission must first be drained of all oil and the overdrive to 3 speed retaining bolts must be loosened a few turns and the overdrive slid back a little so as to release the top cover selector cover.”

I believe that automatic overdrive was an admirable objective, but in practice the whole setup turned out to be somewhat temperamental at best. While I had thought that the problem of jumping out of reverse was the result of the wear described above, recently Kevin Clause posted a copy of a letter on the Yahoo Airflow Group. The letter is from the owner of a three month old DeSoto Airflow, written to Chrysler Corporation; this owner states that “...unless it is in conventional gear, the shifting lever occasionally slips out of reverse when you are backing unless you keep your hand on the lever while you are backing.” This problem on new cars speaks to the marginality of the design. It is my personal opinion that this fragility led Chrysler to embrace a more typical approach to overdrive engagement in later Mopar cars. The overdrive is not automatic – it is manually engaged by pulling out the “Overdrive” knob when overdrive is desired.

With so many innovations in the Airflow and such relatively low production numbers, perhaps it is not surprising that not everything worked as planned. The above problems are not show stoppers, but I can say that my Airflow is now much more pleasant to drive when I don’t have to worry about the position of the knob when I go into reverse!

2012 Membership Roster

We are pleased to include with this Newsletter the 2012 Membership Roster. We have attempted to include all of the updated information you submitted on your 2012 Renewal Form. We know there are some errors (hopefully few) in the new booklet. Please take the time to check your information now and send any corrections to Jim Lightfoot (Email: airflow3@yahoo.com, phone: 805-522-4040, snailmail 743 Harper Street, Simi Valley, CA 93065). This way we can make corrections in our database and include correction notices in future Newsletters.

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