Double Clutch

In our never-ending search for an excuse to escape from the office and get our fingers dirty with the greasy fun stuff over at the shop, Karl and I decided to tear our own cars apart for an article on clutch replacements.

The cars in question?

Karl has an '84 Volkswagen GTI. Hale fellow well met if ever there was one (not Karl—the car.) But its clutch is original at 120,000 miles.

The other is my faithful '84 RX-7 which now has 145,000 miles on it. I'm not as coordinated as Karl is, so this will be the Hummer's third clutch.

A Different Approach

The clutch configurations in these two cars are very different. The dissimilarities extend well beyond the obvious differences we see when we compare a longitudinal rear drive setup used by the Mazda, and the transverse front drive configuration used in the GTI. Those differences will be apparent as we go

along. The two cars did have a number of things in common, however.

• **Neither needed to have its flywheel refinished.** This observation may cause the National Flywheel Refinisher's Association to fire off a letter of protest. But both flywheels were in great shape. No heat marks, no checking or gouges. And both new clutches work well, with no signs of grab or chatter.

• **Both cars suffered from "related injuries."** The Rabbit needed new crank and mainshaft seals, and the clutch rod bushing inside the mainshaft was badly worn. The rear transmission mount had turned to mush. And while they weren't included in this repair, all the shift mechanism bushings and the side seals in the transmission were replaced long before the clutch job. Removal of the underbody shielding on the RX disclosed a badly frayed handbrake centering cable. We also found small fluid leaks at the rear of the clutch slave cylinder and an additional leak at the clutch hydraulic hose.

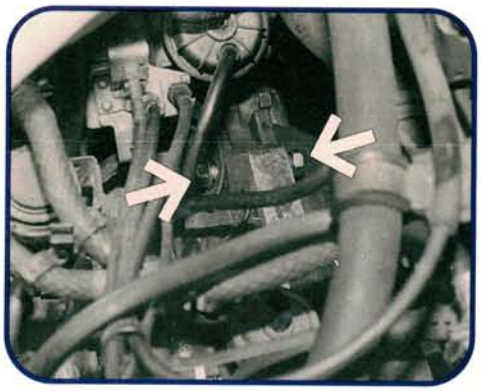
Our Approach

There's no way we can duplicate the shop manuals when it comes to detailed step-by-step procedures for these vehicles. So we've decided to focus on the main things, and add a few tips and hints you won't find in the manual. Before I forget to make some people happy, the clutch assembly for the Rabbit was provided by Sachs Automotive Products **Circle No. 200.** Gary Croyle at Sachs had some great additional tips to offer on the GTI. The Mazda clutch came to us compliments of Daikin Clutch Corporation **Circle No. 201.** Thank you very much.

—By Ralph Birnbaum

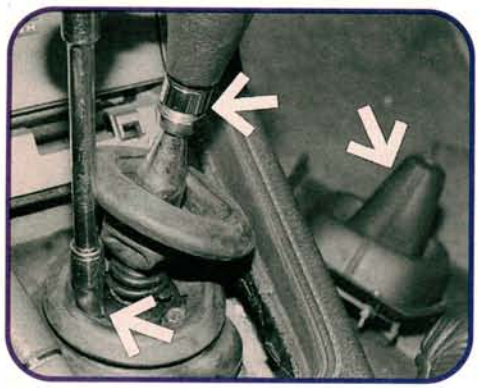
1

We'll start with the Mazda. Disconnect the battery negative cable. Then use a long extension and 12 mm swivel socket to reach down behind the oil filter and remove the two slave cylinder bolts. Check the hydraulic hose for signs of dampness or cracking. Our hose was seeping a bit and we replaced it.



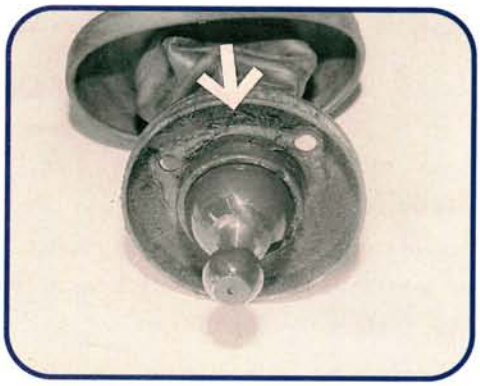
2

The top fastener between the engine and bell housing is this bolt and nut combination (arrows). The nut is on the bell housing side: the bolt screws through a threaded hole in the engine. If you remove the nut, and unscrew the bolt about an inch, the tranny will be a lot easier to reinstall later.



3

Inside the car, back off the lock nut (center arrow) and unscrew the shift knob. Remove the shift boot bezel assembly (right arrow). Pull up the rubber boot at the base of the shifter (left arrow), and push back the lip on the boot below it to remove the three bolts holding the shifter to the trans.



4

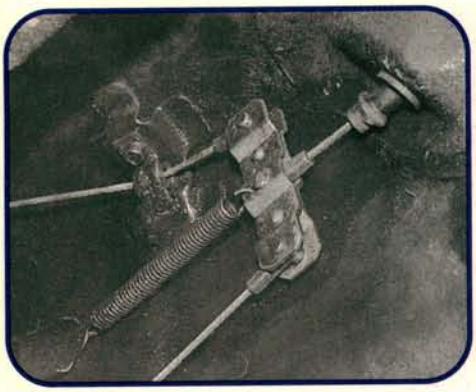
The rubber boot around the shifter collar is a stiff one, and freeing the collar will take some tugging. With the shifter removed, check the condition of the sealing gasket on the collar (arrow). This one had worn away to nothing, and was allowing road salt and dirt into the shift mechanism.

5

Before you raise the car, pull the hand brake to lock the rear wheels. Raise the car and remove the four bolts in the driveshaft flange (we marked the flange for index with white spray paint). You may need to whack the driveshaft with a deadblow hammer to loosen it if it's rusted to the drive flange.

6

We need to get a few more things out of our way before we can drop the trans. I usually remove the front section of the two-piece underbody shield, and the center section of the exhaust between the thermal reactor and muffler. This gives me a lot of room to work. What a boring photo.

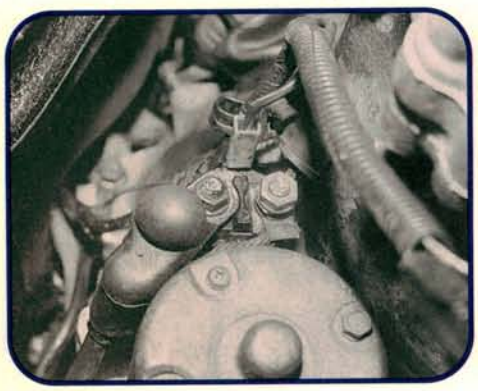


7

With the underbody shield removed, we could see that the cables from the centering mechanism for the handbrake were badly frayed and about to break, so we installed a new one rather than remove the exhaust and shield again at a later date. If the cables aren't worn, give them a good shot of lubricant.

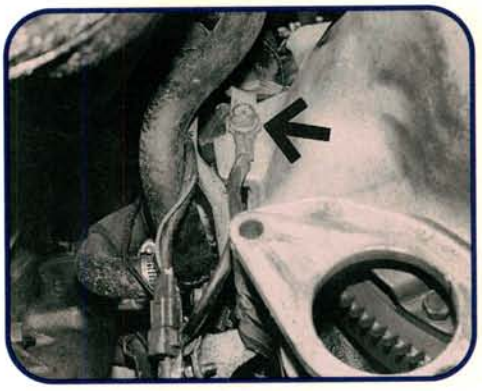
8

You say the car's owner just put fresh gear oil in the trans, and doesn't want it drained? Grab a small plastic cap from a spray can (this one is from a can of CRC Brākleen). Slide it over the end of the transmission output shaft, and the gear oil won't run out when you lower the tail of the trans.



9

Unbolt the rear trans support and drop the tail of the trans downward. This makes access to the bell housing bolts a lot easier. Drop the starter and clean all the electrical contacts. The small solenoid wire spade contact should be double checked for a clean, tight fit, ou'll get a no-crank comeback.



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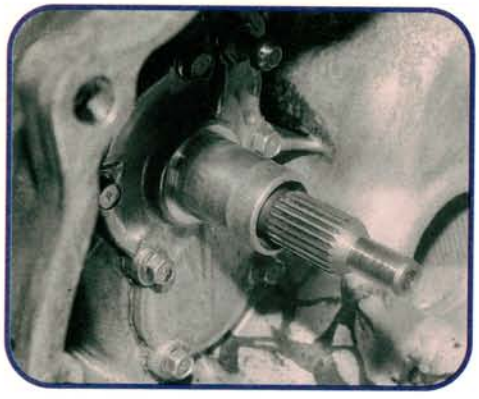
The other big electrical connection is the battery negative cable which bolts to the bell housing (arrow). There are smaller connectors on the left side of the transmission for the back up light and neutral switches. Make sure all of these connections are clean and tight to avoid problems.



11

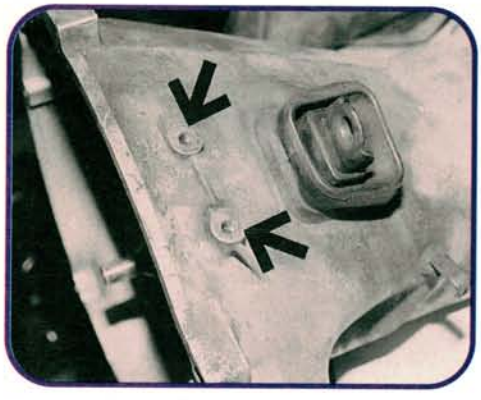
With the tranny out of the car, we flush away all the clutch debris from the inside of the bell housing. Check for signs of a mainshaft seal leak, and inspect the area of the snout where the release bearing rides for wear. Replacement of the mainshaft seal requires removal of the snout cover.

12

I always install the whole release bearing assembly—bearing and release arm, and check it for free movement. A little lithium grease at the pivot ball and shift snout works wonders. Then I *lightly* lube the input shaft splines and test the new clutch disc for free movement. Little things mean a lot.

13

Let's spend a moment with clutch cover bolts. Four of the six bolts are threaded all the way to the bolt head. Two have non-threaded shoulders, and holes to match. Two of the holes in the flywheel are different, with the threads starting about a quarter inch below the contact surface of the cover.



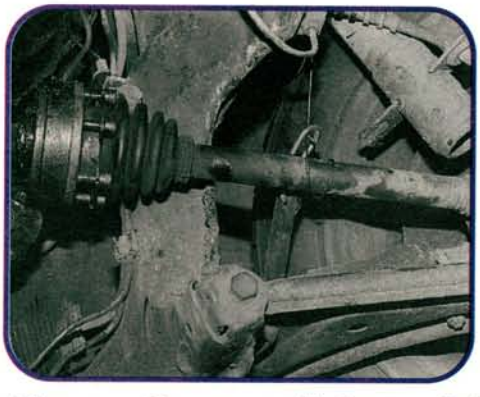
14

This photo shows the location of the tapped holes in the trans case where the slave cylinder mounts. It's a lot easier to install the clutch slave and start the bolts finger-tight before you raise the tranny's tail and bolt up the rear support. Tighten the slave bolts from above later with a swivel socket.

15

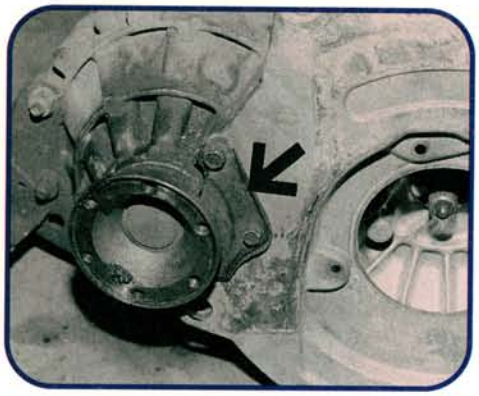
The Rabbit Lived!

VW has a driveline hanger for clutch jobs. We made one from an old bed frame. (The wife never missed it.) Some guys shortcut and hang the whole drivetrain from the right motor mount. But that poor mount likes to sag over time anyhow, and hanging an engine from it seems like cruel and unusual punishment.



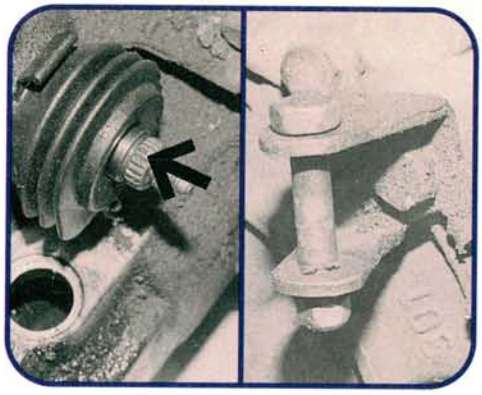
16

After you disconnect all the "stuff" bolted to the transaxle (drive axles, the starter and front engine mount, rear mount, reverse light switch, shifter linkages, main ground cable, and finally, the left motor mount), you can start to lower away. Tie the left axle up out of the way with wire.



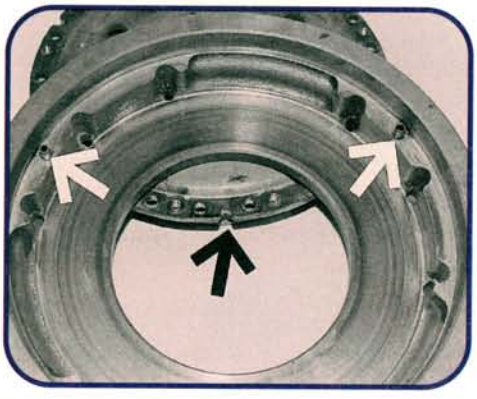
17

This part can drive you nuts if you haven't done this before. The right drive flange won't clear the outer diameter of the bell housing shield. So VW added a small clearance plate (arrow). Remove the plate! If you don't, the flange will catch on it. Two wrenches are needed, one 10 mm and one 11 mm.



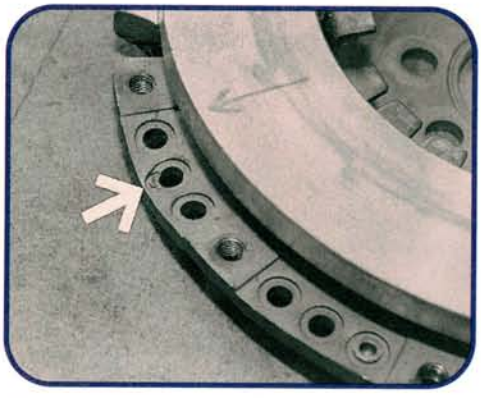
18

Shift linkages. In spite of the bewildering array of linkages, you need to detach only two. One is the main gear selector linkage. The linkage goes on one way because of a double wide tooth in the spline (arrow). The other is a relay rod pivot shoulder bolt (right photo). Lube the bolt and bushing.



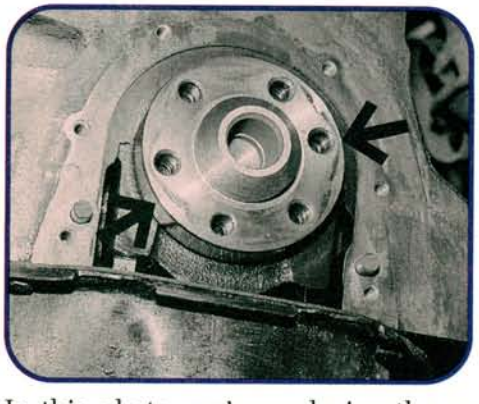
19

On most cars, the flywheel bolts to the crankshaft. VW bolts the clutch cover to the crankshaft. Then they bolt the flywheel over the clutch cover. The flywheel has two dowel pins spaced about 120 degrees apart (white arrows) which fit into two notches on the clutch cover (black arrow).



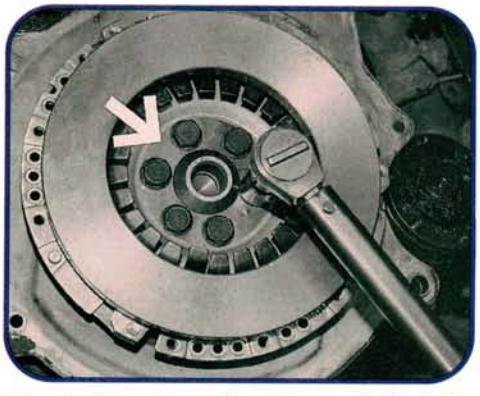
20

This new clutch was returned as defective. Looks like someone didn't get the clutch cover and flywheel indexed properly. Then they tried to draw it into place by tightening the flywheel bolts. The arrow points to the place where the dowel pin tried without success to force its way into place.



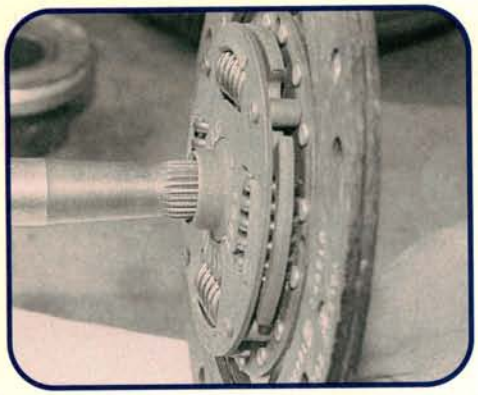
21

In this photo, we're replacing the crankshaft seal. The seal rides in a retainer plate which we've removed. Seal replacement is easier with the retainer removed. This also gives us a chance to clean and inspect the sealing area of the crankshaft (arrows).



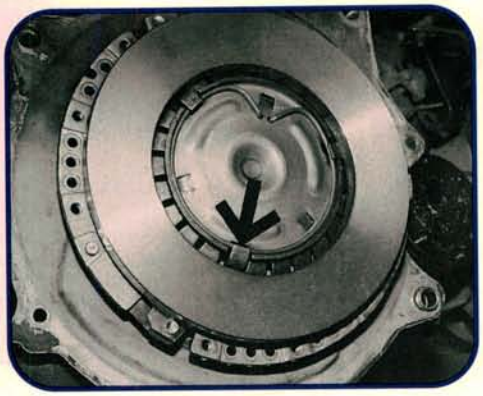
22

The bolt pattern in the crankshaft is asymmetrical. Rotate the cover until the holes align. Don't forget the six-hole spacer ring beneath the bolts (arrow). Apply D6 thread locker or an equivalent to the bolts, and criss-cross tighten them to seat the cover squarely. Final torque is 54 ft-lb.



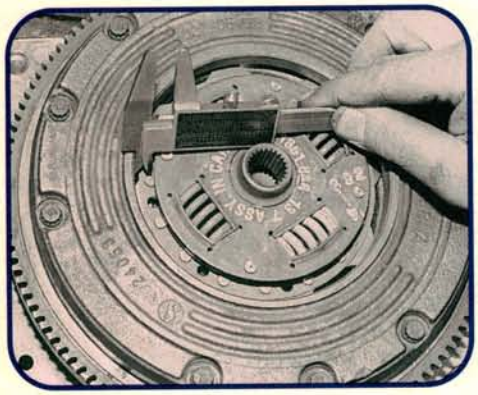
23

You probably tire of our saying "check the disc on the splines." But what if someone hands you a clutch for a 16 valve engine by mistake? The 16 valve clutch has a slightly larger spline diameter than the 8 valve clutch. The tranny will go in REAL easy. This ruined clutch still has paint on the lining.



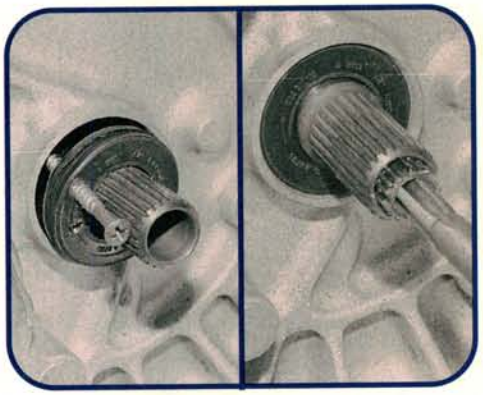
24

The release bearing sits at the far end of the transmission housing. It pushes a long rod which passes through the center of the mainshaft. The rod pushes this center plate to lever the release fingers of the pressure plate. Install the release plate and snap the retainer ring (arrow) into place.



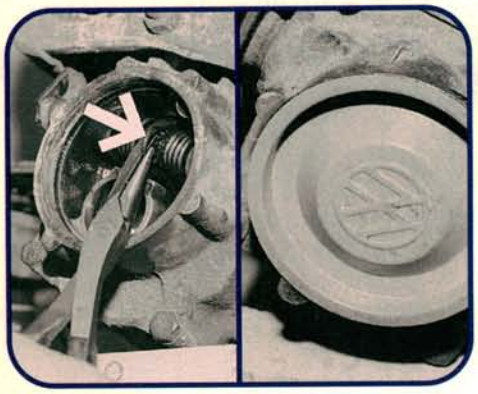
25

If you don't have the VW alignment tool, and aren't sure the disc is centered, try this. Snug the flywheel bolts until the disc will just barely slide. Grab your verniers and measure at four places, 90 degrees apart as shown, until the disc is centered. Final torque the flywheel bolts to 14 ft-lb.



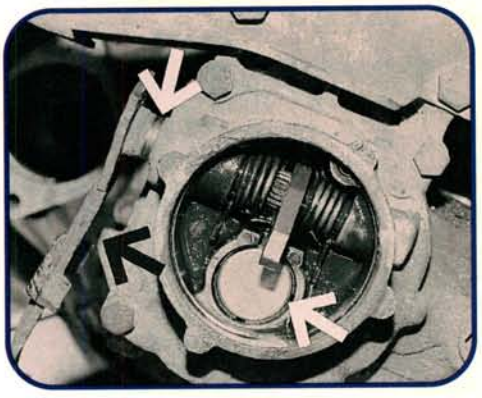
26

A drilled hole and a metal screw make a good mainshaft seal removal tool. Also check the release shaft bushing for wear and the push rod seal for leaks. Run a tap into the old bushing. Use a slide hammer to pull the old bushing. Drive in a new bushing and install a new seal in the mainshaft above it.



27

Release bearings seldom fail. If you are going to replace one, you'll need a new end cover (left photo). Remove the old one by piercing it and prying it out. Then remove the two circlips (arrow) which center the transmission cross shaft in the release arm inside the transmission.



28

Slide the cross shaft out (top arrow) just far enough for the clutch arm to clear its stop on the transmission (arrow, lower left). Rotate the arm past the stop far enough to install a new release bearing (arrow, lower right). Now reverse your steps, and install a new end cap with fresh sealer.