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Roundel



YES YOU CAN!

STORY AND PHOTOGRAPHS
BY ERIC EIKENBERRY



UUC Motorwerks' clutch and flywheel upgrade for the E46 M3

Recently, Sander Brouwers—an avid road-racing enthusiast friend—had the opportunity (translation: “necessity”) to change the clutch in his 2001 E46 M3. Several years of track and street abuse had taken their toll, and his original clutch was beginning to slip. After carefully considering all of his options, he decided that a UUC Motorwerks Stage Two lightweight flywheel and organic M5 “sprung center” clutch setup would be an interesting upgrade. This pack-

age was supposed to offer the best of both worlds, providing smooth engagement with a useful increase in acceleration, due to the flywheel’s lightened mass. Would this be advertising hyperbole or empirical fact?

I had the chance to tag along and photograph the process from start to finish for *Roundel*—conclusively proving that despite common opinion, some BMW owners *do* get their hands dirty! If you have at least a little mechanical skill, here’s how

you can get yours similarly soiled; you’ll save a bundle of cash, and feel a genuine sense of accomplishment.

Will the removal of nearly twenty pounds of mass from the back of your engine make a dramatic difference in real-world performance? In a nutshell, yes. While no one’s ever accused the M3 of sluggish acceleration, the new UUC unit adds a new life to Brouwers’ red rocket ship. Engine response is now snappy in any performance mode,



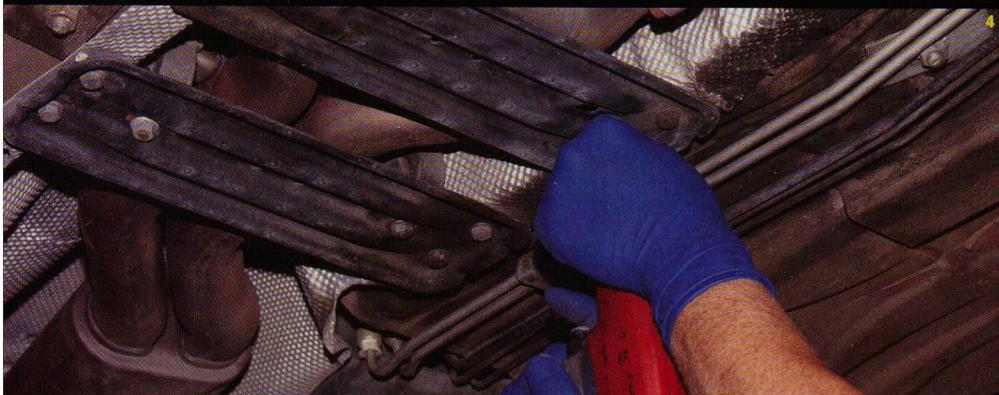
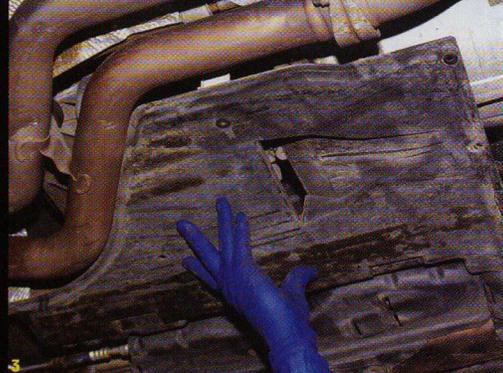
is a job you can tackle yourself—with a little help from friends.

making heel-toe downshifts absurdly easy—and a natural part of everyday driving.

The UUC pressure plate provides 2,400 pounds of static clamping force, and eliminates the LUK-manufactured Self-Adjusting Clutch mechanism (also referred to as the self-machining clutch) and its related host of issues. The original double-mass flywheel, useful for absorbing horsepower and smoothing the engine's power pulses in order to reduce transmission gear

noise at idle, was replaced by UUC's single-mass aluminum unit, requiring the use of a spring-center clutch disc. Rob Levinson, the owner of UUC Motorwerks, has selected a Sachs "organic" OEM M5 clutch disc as the best overall solution for daily performance driving and occasional track use. The new unit features much improved engagement feel while still avoiding the "track-only" heaviness of other performance clutches.

Brouwers is happier now and no longer worried that a ride on a tow truck is in his car's immediate future. He's also thrilled by the M3's new-found squirt. There's no increase in the top-end speed; a lightweight flywheel doesn't add horsepower, it just frees up what's already available. Let's face it; building upon the already-formidable talents of the E46 M3 is no small task. UUC has found a way. It's now up to you, the owner, to install it. Here's the step-by-step procedure:



1: Hoist your M3 in the air on a secure lift. It's also possible to use four sturdy jackstands—but lowering the transmission is extremely difficult that way. Remove the aluminum underbody shield which hides the oil pan and transmission.

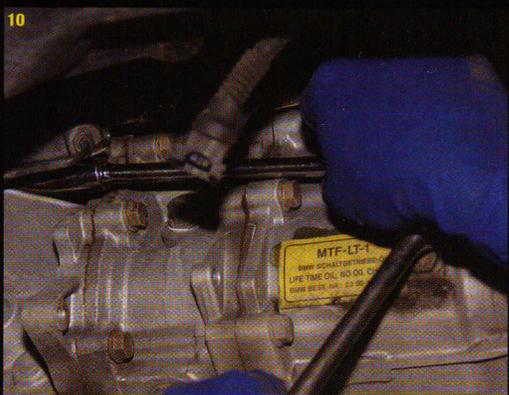
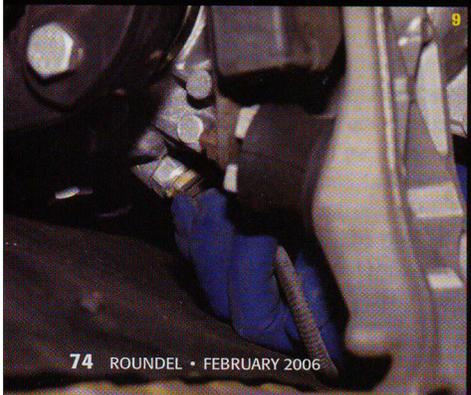
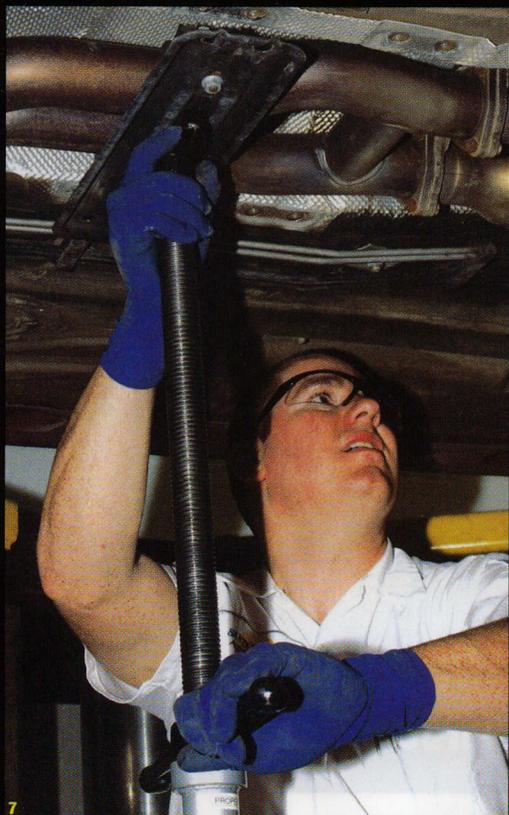
2: Remove the V-brace which runs to the rear differential housing.

3: Remove the black plastic rock shield from under the back of the transmission.

4: Loosen the nuts holding the short braces under the middle of the exhaust system. You can remove the forward brace entirely at this point.

5: Carefully loosen and remove the down-pipe-to-exhaust nuts. Although one side is a reverse Torx-head bolt, you will be able to use a standard socket on it, but you must be cautious.

6: Unbolt the exhaust hanging brackets at the right rear of the car. At the left rear, you'll need a socket extension to reach the mounting bolts under the bumper cover. This becomes a two-man job at this point due to the total weight of the system. You can remove it as a complete unit.



7: Here our installer, Peter Van Wingerden, a technician at the Santa Barbara Auto Group, uses a floor jack to brace the exhaust system before removing the final nuts from the cross-brace. Out of sight, the car's owner, Sander Brouwers, was supporting the back of the system to avoid damaging it.

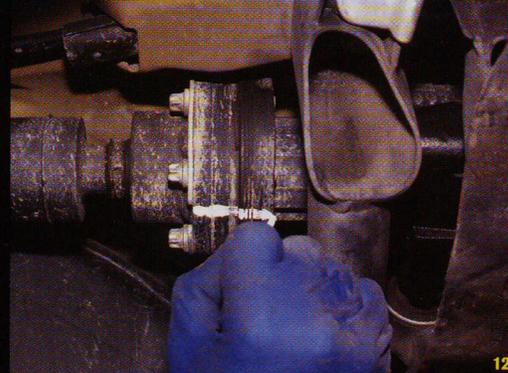
8: Remove the heat shield which hides the drive-shaft.

9: Unplug the speedometer sensor from the driver's side rear of the transmission, just forward of the aluminum transmission mount.

10: Remove the bolts which hold the hydraulic clutch slave cylinder in place. They're located on the driver-side transmission bell housing.



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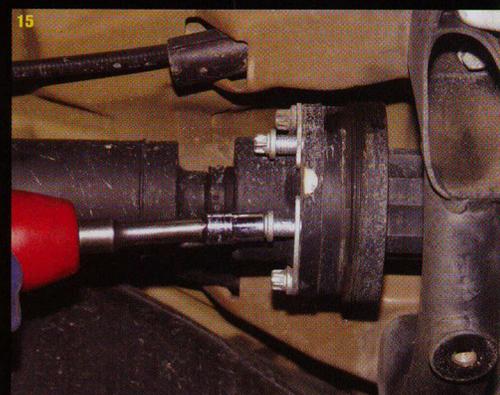
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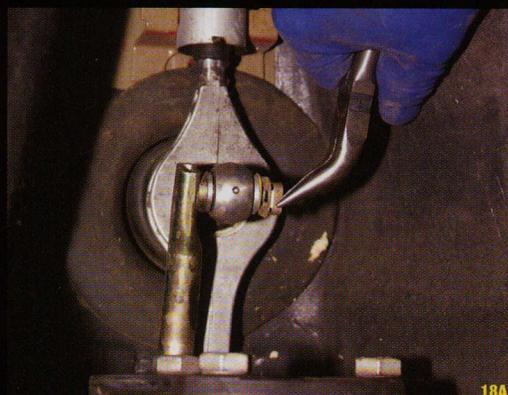
11: On the passenger side, near the front of the transmission, there's a small aluminum bracket you'll need to remove in order to have better access to the bell-housing bolts. It's possible to remove them with the bracket in place, but not much fun that way. **12:** With paint, or some other method which won't simply wipe off accidentally, place a guideline on both mating surfaces of the driveshaft-to-differential flange. **13:** Mark the mating flanges on the other end of the driveshaft, too. **14:** Remove the bolts attaching the driveshaft to the transmission. **15:** Remove the Torx-head bolts which secure the axle to the differential flange. **16:** Use a pry bar or a large, flat-blade screwdriver to separate the drive-shaft from the differential flange.



16



17



18A



18B



19

17: With a helper supporting the transmission end of the driveshaft, remove the nuts which hold the center driveshaft support bearing, then lower the entire driveshaft and place it out of the way. **18:** Use a pair of angled, needle-nose pliers to pull the shift rod retainer clip off the shifter assembly. Stack all of the assorted washers back onto the shift rod after it's been removed from the shifter and replace the clip so you don't lose track of the order in which they're placed. **19:** Lower the car down, if you have it on a lift, so you can access the upper shifter assembly inside the car. The leather shift boot pops out at the edges, while the console cover is held by four screws.



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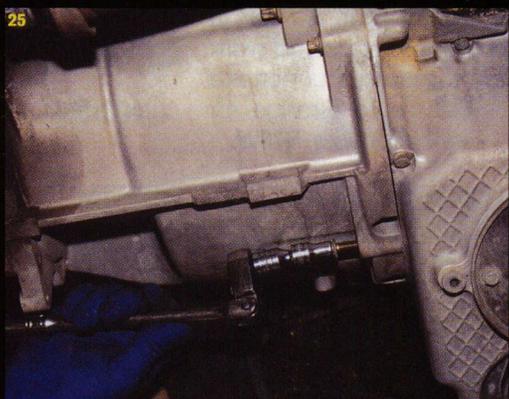


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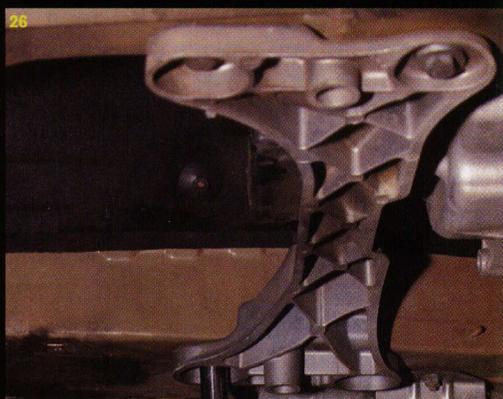
20: Lift the shifter console cover and... 21: ...unclip the power window switches from the underside. 22: Lift out the foam rubber noise isolator... 23: ...and pull the dust/water boot off of the shifter. 24: Stick the open tips of a pair of needle-nose pliers into the slots on the plastic shifter bushing and rotate counter-clockwise to release it and the shifter from the cavity. 25: Raise the car again and begin removing the bell-housing-to-oil-pan bolts. 26: Remove the transmission mount bolts in order to tilt the engine/transmission assembly down at the back edge. This will make it much easier to reach the upper bolts and the shift-rod clip.



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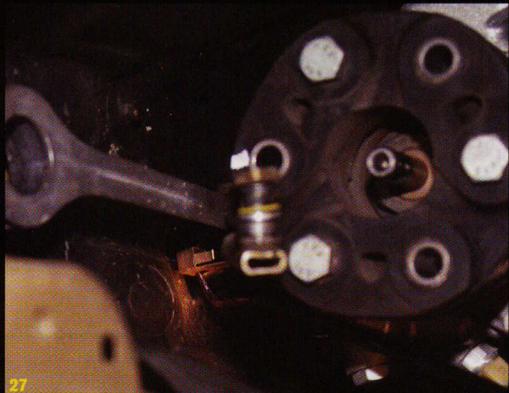
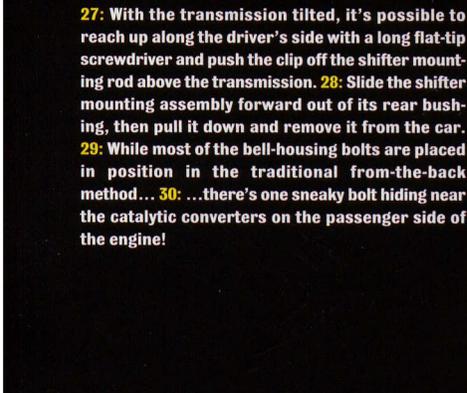


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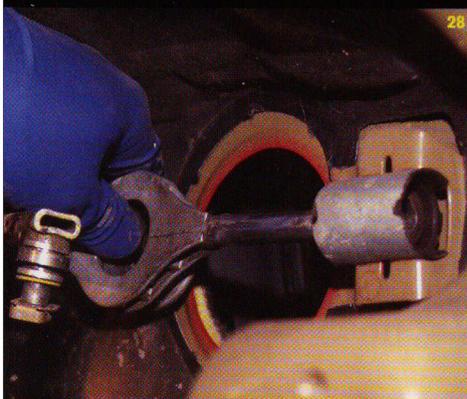
27: With the transmission tilted, it's possible to reach up along the driver's side with a long flat-tip screwdriver and push the clip off the shifter mounting rod above the transmission. 28: Slide the shifter mounting assembly forward out of its rear bushing, then pull it down and remove it from the car. 29: While most of the bell-housing bolts are placed in position in the traditional from-the-back method... 30: ...there's one sneaky bolt hiding near the catalytic converters on the passenger side of the engine!



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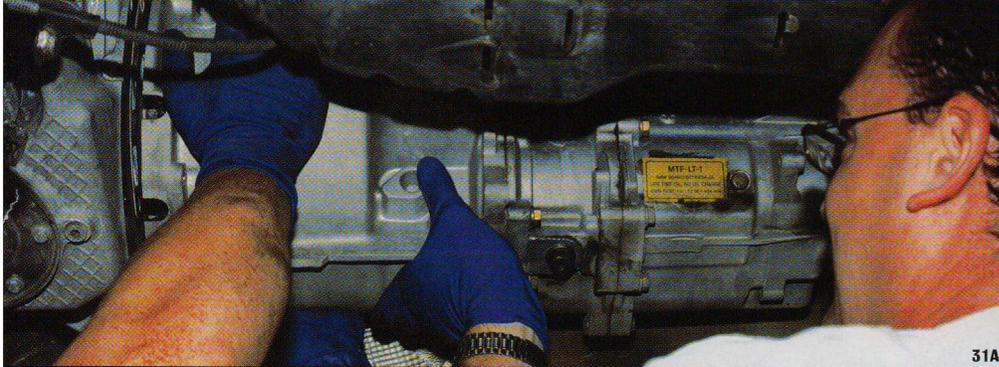
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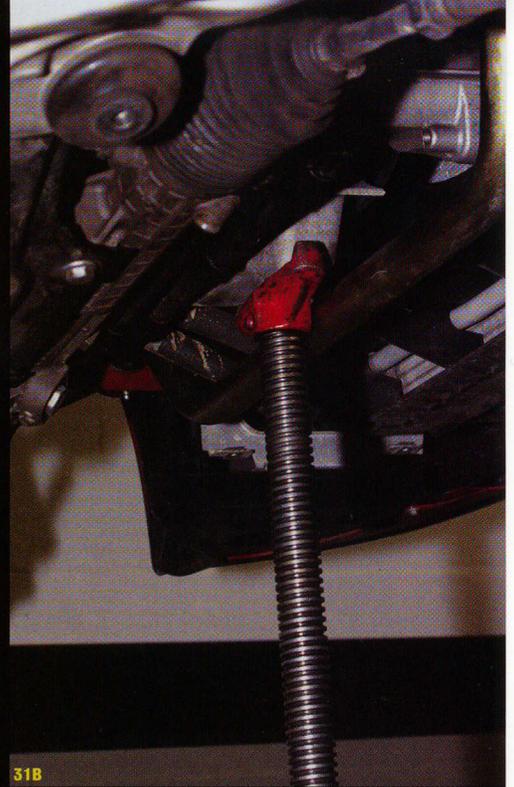


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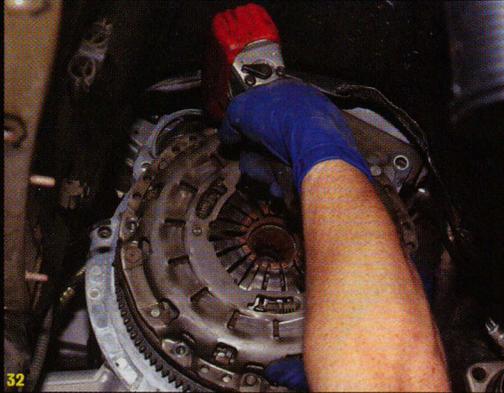


31A

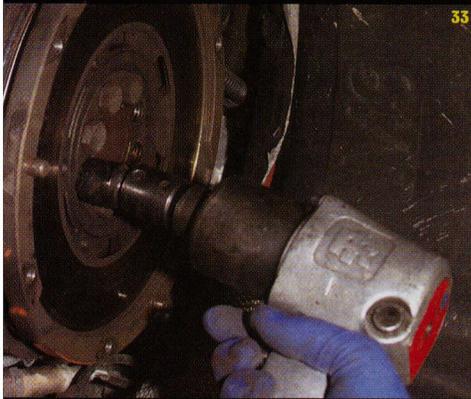
31: Brute force remains the best way to work the transmission backwards off the clutch assembly. You'll need to tilt the engine further upward while rotating the transmission slightly to the passenger's side to clear the transmission tunnel. **32:** Remove the pressure plate by loosening the bolts in a crossover pattern, working back and forth 180 degrees apart to release the clamping force evenly and slowly. **33:** You'll need a hefty impact gun to loosen the bolts on the flywheel. **34:** Note that the new aluminum flywheel has one oversize bolt hole which matches the oversize dowel on the end of the crank.



31B



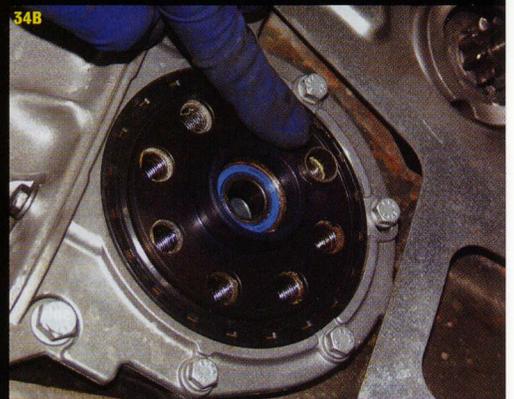
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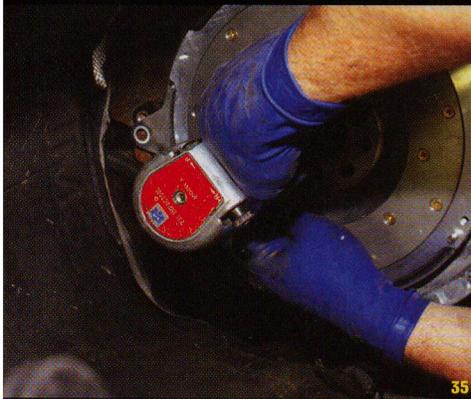
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34A



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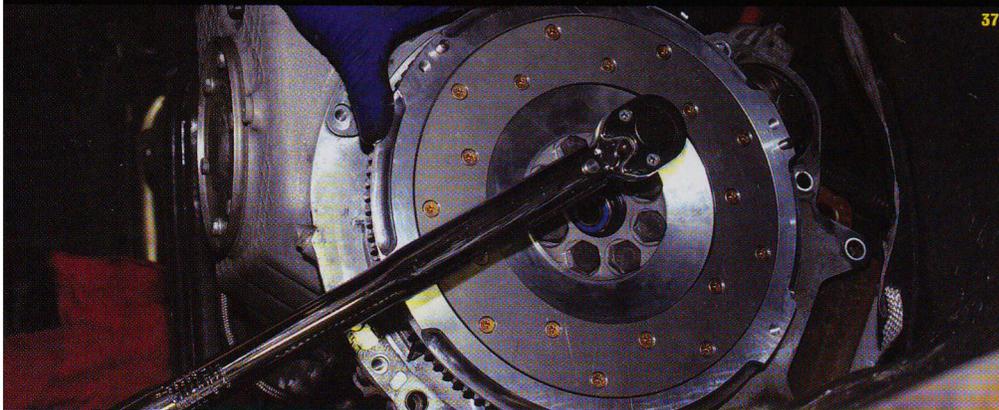


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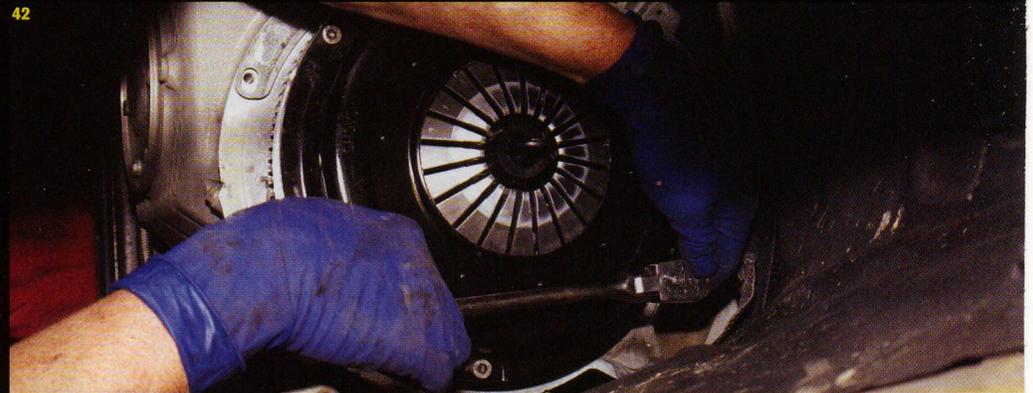
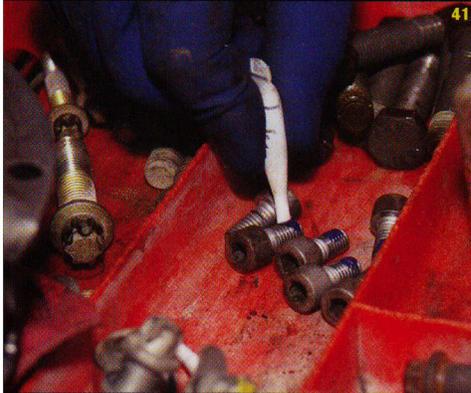
35: Place the new flywheel on the crank and run one bolt in all the way. **36:** Apply Loctite to the other seven flywheel bolts... **37:** ...and install them. Remove and Loctite the first bolt, then reinstall it. Torque all eight bolts to BMW's original specifications. **38:** We had to do a little "custom work" on a dented plastic clutch assembly guide tool before it would slide through the toothed opening in the new clutch disk.



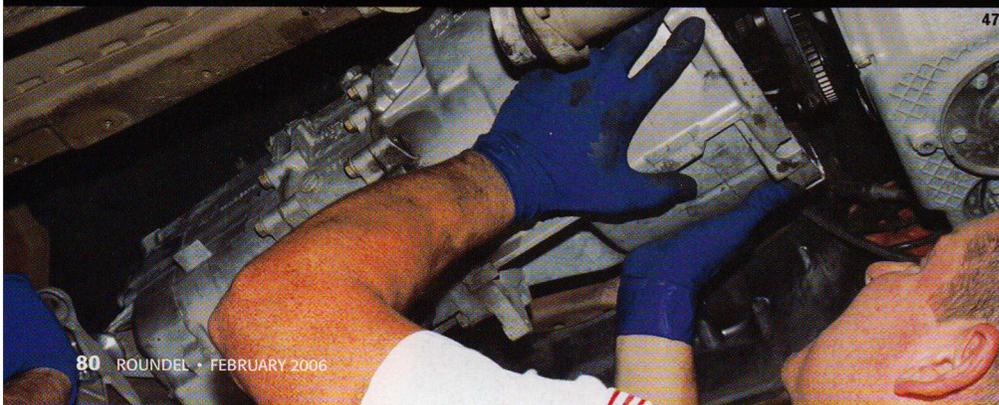
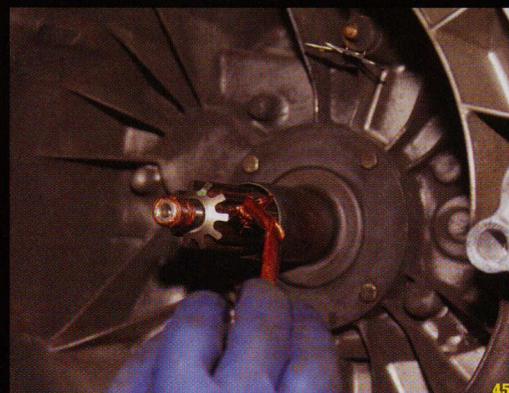
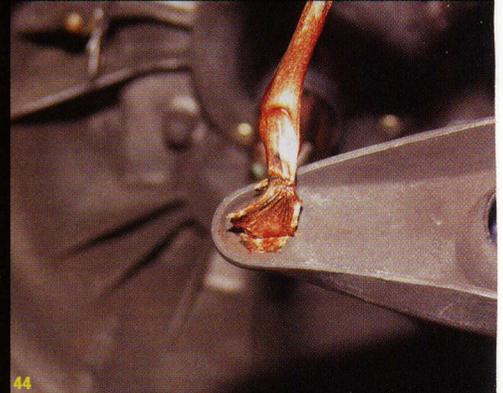
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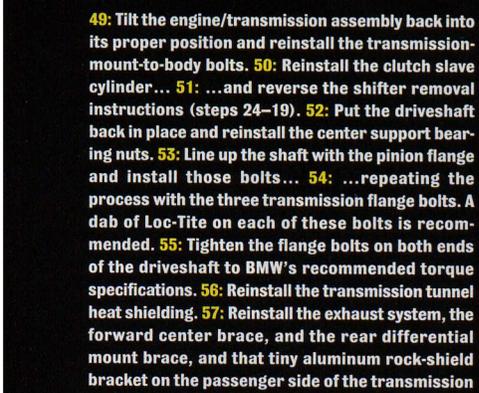
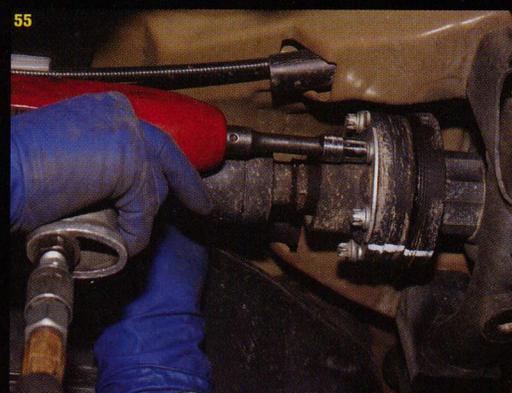
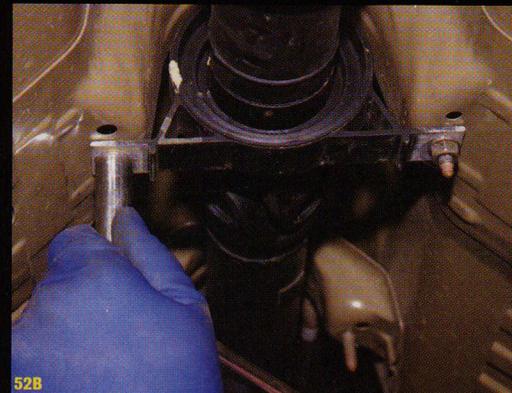
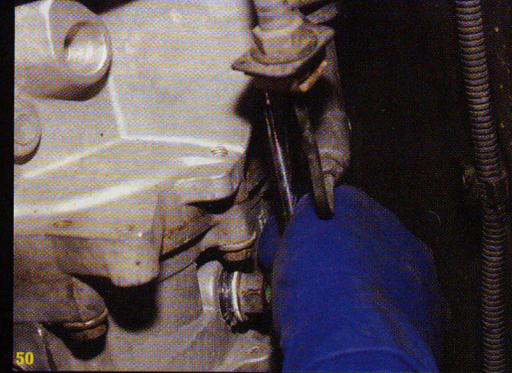


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39: We then used the tool to mount the new clutch disk... 40: ...while Sander cleaned the fingerprints from the new pressure plate's engagement surface... 41: ...and applied Loctite to the pressure plate-to-flywheel Allen-head cap screws. 42: Here Peter makes quick work of the pressure plate installation, again working in a crossover pattern to evenly tighten the assembly. Once more, use BMW's recommended torque specifications from either a Bentley manual, or an official BMW service manual. 43: Press the wire release clip for the throw-out bearing arm off the end of the arm... 44: ...and remove the arm and bearing. Coat the pivot point with high-quality grease. 45: Also grease the splines on the input shaft where the clutch disk will slide. 46: Install the new Sachs throw-out bearing onto the arm and put the arm back into the bell housing, with its retaining clip snapped back in place over the pivot end of the arm. 47: Joyfully reinstall your transmission back into the car—with help. Yes, we had access to a transmission jack—and no, it didn't help, because you have to rotate the transmission in the middle of the process to make it fit the body tunnel! 48: We took the opportunity to install UUC's Double-Sheer Shift Rod while the transmission was on the ground. Once the transmission is in place and the bell housing bolts are cinched tight again, reinstall the shifter mounting rod above the transmission.





49: Tilt the engine/transmission assembly back into its proper position and reinstall the transmission-mount-to-body bolts. **50:** Reinstall the clutch slave cylinder... **51:** ...and reverse the shifter removal instructions (steps 24–19). **52:** Put the driveshaft back in place and reinstall the center support bearing nuts. **53:** Line up the shaft with the pinion flange and install those bolts... **54:** ...repeating the process with the three transmission flange bolts. A dab of Loc-Tite on each of these bolts is recommended. **55:** Tighten the flange bolts on both ends of the driveshaft to BMW's recommended torque specifications. **56:** Reinstall the transmission tunnel heat shielding. **57:** Reinstall the exhaust system, the forward center brace, and the rear differential mount brace, and that tiny aluminum rock-shield bracket on the passenger side of the transmission from step 11. **58:** Reinstall the plastic underbody shield and the front aluminum belly pan/rock shield under the transmission and engine. This concludes the festivities! ♦