

230 Manual Transmission

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GENERAL

This repair group covers external transmission service, including removal and installation of the transmission unit. Internal transmission repair is not covered. Special press tools and procedures are required to disassemble and service the internal geartrain.

Manual transmissions used are based on engine application. Consult **200 Transmission-General** for transmission application information. **Table a** lists gear ratio specifications.

NOTE —

Do not rely on forged casting numbers for transmission code identification.

TRANSMISSION FLUID SERVICE

The manual transmissions installed in the E36 models are normally filled with automatic transmission fluid (ATF), although alternative lubricants may have been used from the factory, depending on transmission type and model year. For example, transmissions fitted to the M3 models are normally filled with a "lifetime" manual transmission fluid (BMW MTF LT-1) and do not require periodic fluid changes.

NOTE —

The transmission lubricant type can be found on a label on the side of the transmission. Consult an authorized BMW dealer for alternate fluid use and the most-up-to-date information regarding transmission operating fluids.

Table a. Manual Transmission Gear Ratios

Transmission	Getrag S5D 200 G	Getrag S5D 250 G	ZF S5D 310 Z	ZF S5D 320 Z
Gear Ratios:				
1st	4.23	4.23	4.20	4.20
2nd	2.52	2.52	2.49	2.49
3rd	1.66	1.66	1.66	1.66
4th	1.22	1.22	1.24	1.24
5th	1.00	1.00	1.00	1.00
reverse	4.04	4.04	3.89	3.89

TRANSMISSION FLUID SERVICE

Transmission fluid level, checking

Checking the transmission oil level involves simply removing the side drain plug and inserting a finger into the hole to check the fluid level. If the fluid level is up to the bottom of the drain hole (finger is wetted by transmission fluid), the level is correct.

Transmission fluid, replacing

NOTE —

Manual transmission fluid type should be printed on a label on the side of the transmission. If in doubt, consult an authorized BMW dealer for the up-to-date information on operating fluids.

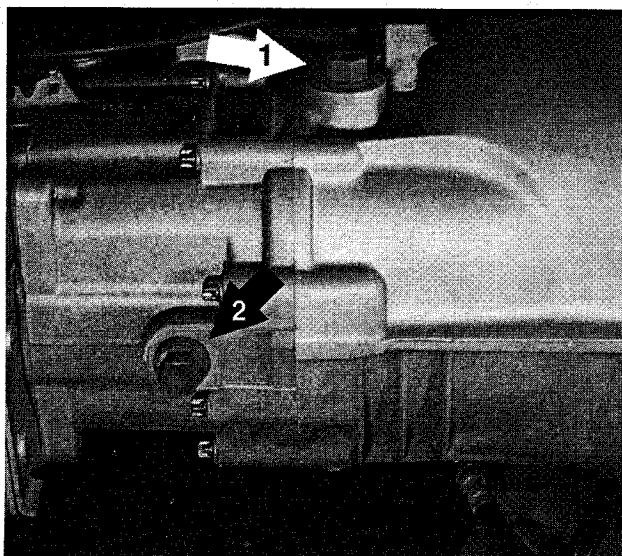
1. Drive vehicle for a few miles to warm transmission.
2. Raise and safely support vehicle to access drain plug.

WARNING —

- When raising the car using a floor jack or a hydraulic lift, carefully position the jack pad to prevent damaging the car body. A suitable liner (wood, rubber, etc.) should be placed between the jack and the car to prevent body damage.

- Watch the jack closely. Make sure it stays stable and does not shift or tilt. As the car is raised, the car may roll slightly and the jack may shift.

3. Place a drain pan under transmission and remove drain plug at bottom of transmission. See Fig. 1.



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Fig. 1. Manual transmission fill (1) and drain plugs (2).

4. Install and torque drain plug.
5. Remove fill plug from side of transmission. Slowly fill transmission with fluid until fluid overflows fill hole.
6. Install and torque fluid fill plug.

Fluid Capacity

- Getrag transmission 1.0 liter (1.1 US qts)
- ZF transmission 1.2 liters (1.3 US qts)

Tightening Torque

- Transmission drain or fill plug 50 Nm (37 ft-lb)

TRANSMISSION SERVICE

Back-up light switch, replacing

1. Raise and safely support vehicle to access back-up light switch.

NOTE —

- The back-up light switch on Getrag transmissions is in the left rear of the transmission.
- The back-up light switch on ZF transmission is in the right front of the transmission.

2. Unscrew switch from transmission.
3. Install new switch.

Tightening Torque

- Back-up light switch to transmission 20 Nm (15 ft-lb)

4. Check transmission fluid level before lowering vehicle.

Selector shaft seal, replacing (transmission installed)

1. Raise and safely support vehicle to access drain plug.
2. Support transmission with transmission jack.
3. Remove driveshaft. See **260 Driveshaft**.
4. Remove transmission crossmember and tilt down rear of transmission.

CAUTION —

Tilting the engine to lower the transmission can lead to damage to various components due to lack of clearance.

-On cars with AST (traction control) remove throttle body before tilting engine.

-Remove brake fluid reservoir if necessary.

5. Working at rear of selector shaft, disconnect shift linkage from selector shaft. See Fig. 2.

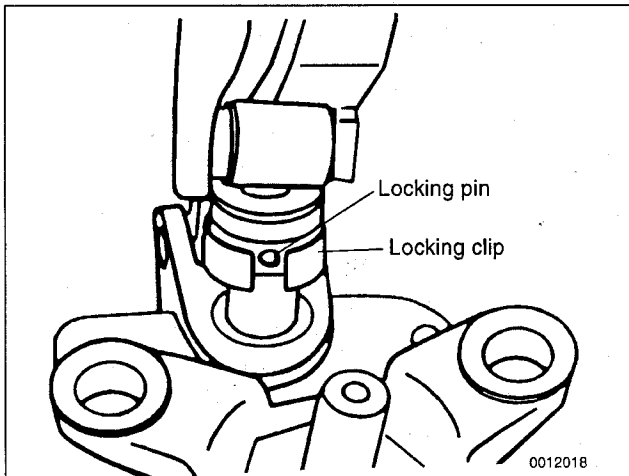


Fig. 2. Disconnect shift linkage from transmission selector shaft by prying back locking clip and pushing locking pin out.

6. Carefully pry seal out with a narrow seal remover or small screwdriver. See Fig. 3.
7. Coat new seal with transmission fluid. Drive new seal in flush with housing. Use BMW special seal installation tool no. 23 2 260 or equivalent and a soft-faced (plastic) hammer. See Fig. 4.
8. Reinstall shift linkage to selector shaft.
9. Raise transmission and reinstall crossmember.

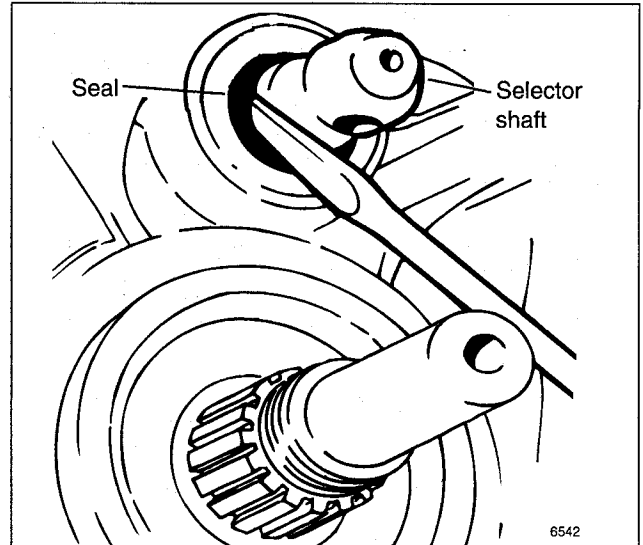


Fig. 3. Selector shaft oil seal being pried out with screwdriver.

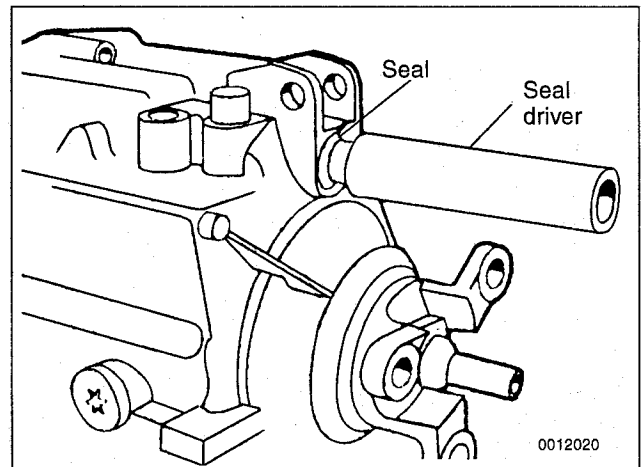


Fig. 4. Selector shaft seal being installed.

10. Install driveshaft using new nuts. See **260 Driveshaft**.
11. Check transmission oil level, topping up as necessary.

Tightening Torques

- Driveshaft to flex disc/
final drive flange See **260 Driveshaft**
- Transmission crossmember to chassis
M8 22-24 Nm (16-17 ft-lb)
M10 42 Nm (31 ft-lb)

Output shaft seal, replacing (transmission installed)

1. Raise and safely support vehicle. Support transmission with transmission jack.

WARNING —

- When raising the car using a floor jack or a hydraulic lift, carefully position the jack pad to prevent damaging the car body. A suitable liner (wood, rubber, etc.) should be placed between the jack and the car to prevent body damage.
- Watch the jack closely. Make sure it stays stable and does not shift or tilt. As the car is raised, the car may roll slightly and the jack may shift.

2. Remove driveshaft. See 260 Driveshaft.
3. Remove transmission crossmember and lower transmission at rear.

CAUTION —

- Tilting the engine to lower the transmission can lead to damage to various components due to lack of clearance.
- On cars with AST (traction control) remove throttle body before tilting engine.
 - Remove brake fluid reservoir if necessary.

4. Bend back and remove collar nut lockplate.
5. Hold flange steady and remove collar lock nut (use 30mm thin-walled deep socket.) See Fig. 5.

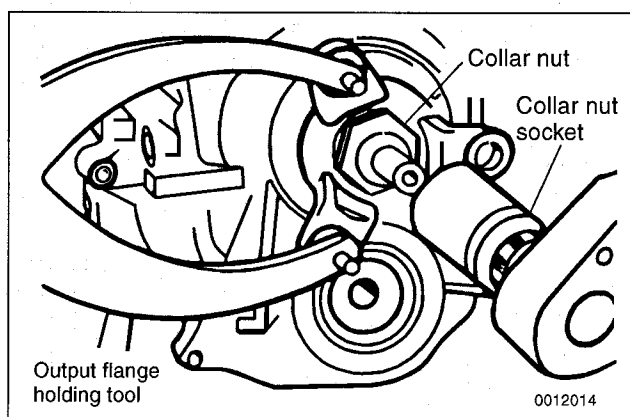


Fig. 5. Use holding tool when loosening output shaft collar nut.

6. Remove flange. If necessary, use a puller.
7. Use a seal puller to remove seal from transmission housing. See Fig. 6.
8. Coat new seal with transmission fluid and drive into position until it is flush with housing. See Fig. 7.

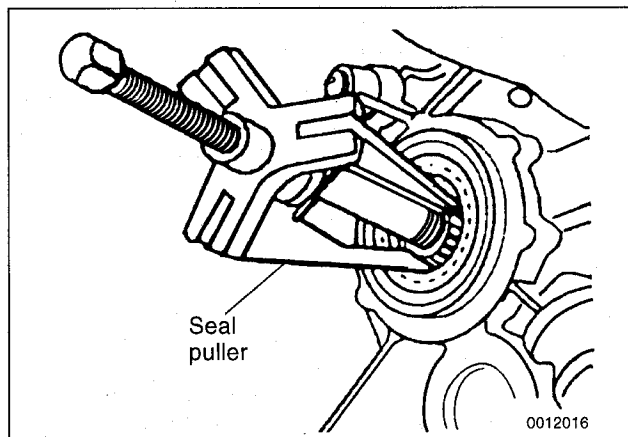


Fig. 6. Puller used to remove transmission seal.

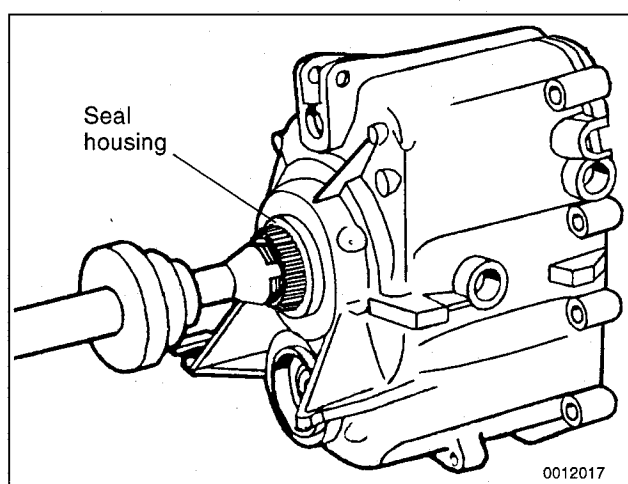


Fig. 7. Output shaft seal being installed using seal driver (BMW special tool no. 23 2 300).

9. Reinstall output flange (and shims, if applicable) to output shaft.

NOTE —

On Getrag S5D 200G and S5D 250G transmissions BMW recommends heating the output flange to about 176°F (80°C) to aid in installation. This can be done by placing the flange in hot water.

10. Coat bearing surface of collar nut with sealer and install nut. Tighten collar nut in two stages. Install new lockplate. Bend tabs into flange grooves.

NOTE —

BMW recommends the use of a sealer such as Loctite® 242 when installing the flange collar nut to prevent oil from leaking past the threads.

TRANSMISSION SERVICE

11. Raise transmission and reinstall transmission cross-member.
12. Install driveshaft using new nuts. See **260 Driveshaft**.
13. Check transmission oil level, topping up as necessary.

Tightening Torques

- Transmission crossmember to chassis

M8	22-24 Nm (16-17 ft-lb)
M10	42 Nm (31 ft-lb)
- Transmission output flange to output shaft

Stage I	190 Nm (140 ft-lb)
Stage II (after loosening)	120 Nm (89 ft-lb)

Input shaft seal, replacing (transmission removed)

Replacement of the input shaft seal requires the removal of the transmission from the vehicle as described later in this repair group.

1. Remove clutch release bearing and release lever from inside bellhousing.
2. Remove bolts for clutch release-bearing guide sleeve, noting bolt lengths. Remove sleeve and any spacers (shims) under it. See Fig. 8.

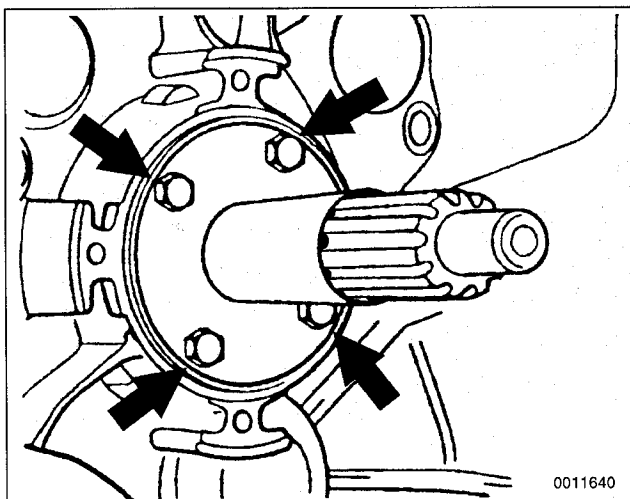


Fig. 8. Clutch release bearing guide sleeve bolts. (Getrag transmission shown).

3. With transmission on a workbench, remove input shaft seal cover from inside bell-housing.
4. Locate two indents in seal housing. Use a punch or scribe to punch holes in housing at indents. Thread two sheet metal screws into holes and pull seal out using screws. See Fig. 9.

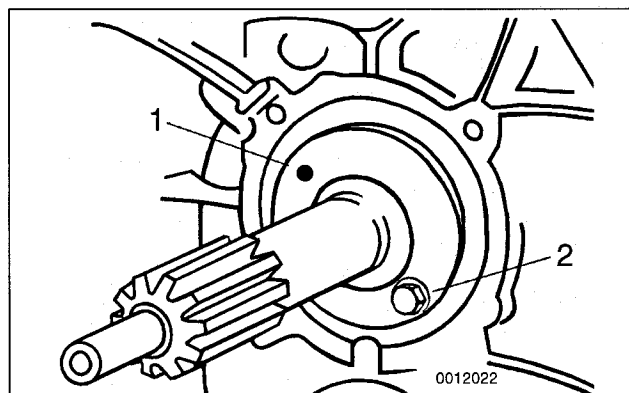


Fig. 9. Indent at oil seal housing (1). Punch holes in seal housing at indents and use sheet metal screw (2) to pull seal from transmission.

NOTE —

Use care not to scratch or damage input shaft. Use a protective sleeve or tape the shaft when removing and installing the seal.

5. Lubricate new seal with transmission oil and drive into place using BMW Special Tool no. 23 2 430 or equivalent.
6. Thoroughly clean guide sleeve mounting bolts, sealing surfaces, and threads in case. Apply sealer (Loctite® 242 or equivalent) to guide sleeve sealing surface and bolts. Reinstall guide sleeve and spacer(s).

Tightening Torque

- Guide sleeve to transmission

M6x12 bolt	10 Nm (89 in-lb)
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TRANSMISSION REMOVAL AND INSTALLATION

Removal and installation of the transmission is best accomplished on a lift using a transmission jack. The engine must be supported from above using appropriate support equipment. This allows the engine to pivot on its mounts to access the upper Torx-head bolts at the bellhousing.

WARNING —

- Make sure the car is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.
- The removal of the transmission may upset the balance of the vehicle on a lift.

Transmission, removing and installing

1. Disconnect negative (-) cable from battery.

CAUTION —

Prior to disconnecting the battery, read the battery disconnection cautions given at the front of this manual on page viii.

2. Install engine support across engine bay. Raise engine so that weight of engine is supported. See Fig. 10.

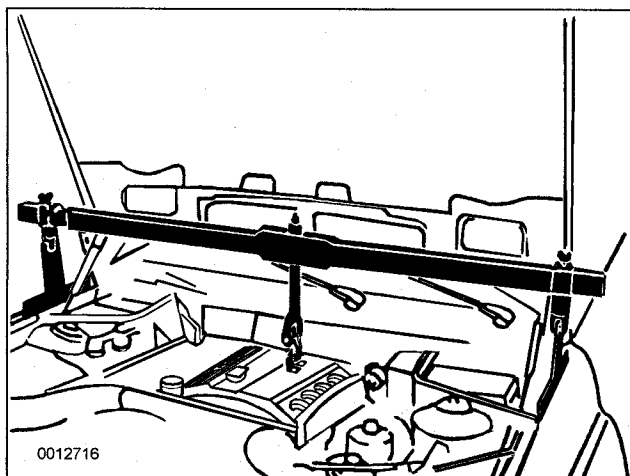


Fig. 10. Engine support equipment used to support engine from above before removing transmission.

3. Raise vehicle to gain access to underside of car.
4. Support transmission with transmission jack. If applicable, remove reinforcing cross brace from below engine/transmission.
5. Disconnect harness connector from reverse light switch on transmission.
6. Remove complete exhaust system and heat shield. See **180 Exhaust System**.

NOTE —

Disconnect oxygen sensor harness connector(s) before lowering exhaust system.

7. Remove driveshaft. See **260 Driveshaft**.
8. Disconnect shift rod from transmission selector shaft. See Fig. 11.
9. Disconnect shift console from top of transmission. See **250 Gearshift Linkage**.

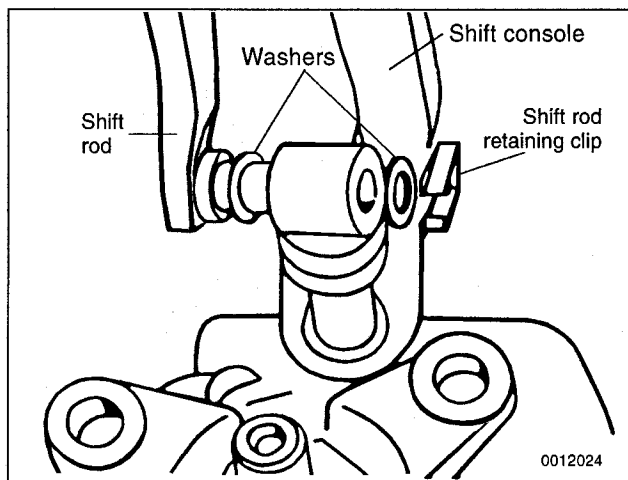


Fig. 11. Shift lever to transmission connection.

10. Unbolt clutch slave cylinder from side of transmission. Do not disconnect fluid hose. Suspend slave cylinder from chassis using stiff wire.

CAUTION —

Do not operate clutch pedal with slave cylinder removed from transmission.

11. Support transmission from below with jack. Remove rear support crossmember from transmission. See Fig. 12.

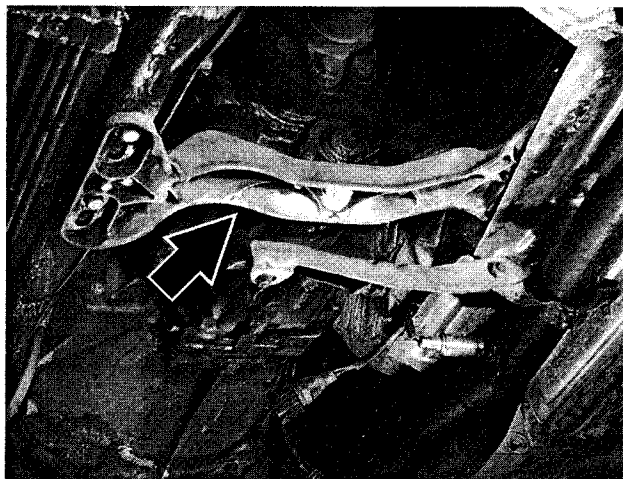


Fig. 12. Rear transmission crossmember (arrow).

12. Lower transmission/engine assembly until it rests on front suspension crossmember.

CAUTION —

Tilting the engine to lower the transmission can lead to damage to various components due to lack of clearance at rear of engine
 -On cars with AST remove throttle body before tilting engine.
 -Remove brake fluid reservoir if necessary.

13. Remove transmission mounting bolts (Torx-head). Note length and location of bolts. See Fig. 13.

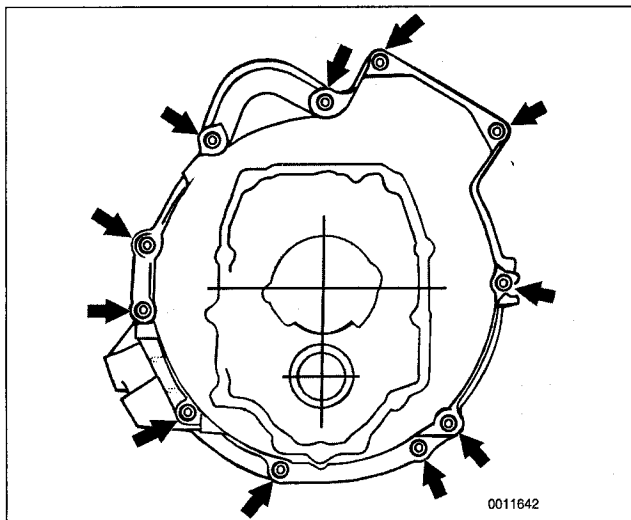


Fig. 13. Transmission mounting bolts.

CAUTION —

At no time should the weight of the transmission be supported by the transmission input shaft.

14. Remove transmission by pulling backward until the transmission input shaft clears the clutch disc splines, then pull downwards. Lower jack and remove transmission.
15. Installation is reverse of removal, keeping in mind the following:
- When installing exchange transmission, transfer parts from old unit to exchange unit
 - Thoroughly clean input shaft and clutch disc splines. Lightly lubricate transmission input shaft before installing.
 - Be sure bellhousing dowels are correctly located. See Fig. 14.
 - Center rear of transmission in driveshaft tunnel before tightening transmission support bracket.

NOTE —

Washers should always be used with Torx-head bolts. Installing bolts without washers will make them difficult to loosen.

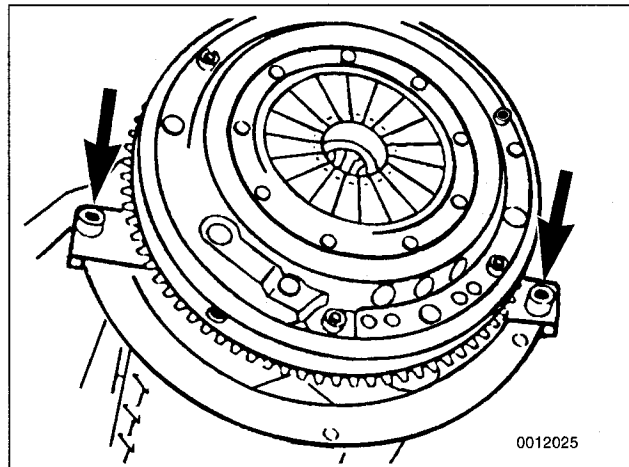


Fig. 14. Bellhousing alignment dowels (arrows).

16. Install driveshaft and preload center bearing bracket. Use new nuts when mounting driveshaft to transmission/flex disc and final drive. See **260 Driveshaft**.
17. Refill transmission with appropriate lubricant before starting or towing the car. See **Transmission Fluid Service** earlier in this repair group.

Tightening Torques

- Reinforcing cross brace to chassis (M10) 42 Nm (31 ft-lb)
- Rubber mount to transmission or bracket nut (M8) 21 Nm (16 ft-lb)
- Slave cylinder to transmission 22 Nm (16 ft-lb)
- Transmission crossmember to chassis
M8 22-24 Nm (16-17 ft-lb)
M10 42 Nm (31 ft-lb)
- Transmission to engine (Torx-head)
M8 22 Nm (16 ft-lb)
M10 43 Nm (32 ft-lb)
M12 72 Nm (53 ft-lb)
- Transmission drain/fill plugs 50 Nm (37 ft-lb)



