



Transmission

Cleaning

CAUTION:

Do not clean, wash or soak transmission seals in cleaning solvents. Dry all parts with compressed air.

1. Wash all parts, except ball bearings and seals, in a suitable cleaning solvent. Brush or scrape all foreign matter from the parts. Be careful not to damage any parts with the scraper.
2. Rotate the bearings in a cleaning solvent until all lubricant is removed. Hold the bearing assembly to prevent it from rotating while drying it with compressed air.
3. Lubricate the bearings with Synthetic MERCON® Multi-Purpose Automatic Transmission Fluid E6AZ-19582-B (ESR-M2C163-A2) or equivalent. Wrap them in a clean, lint-free cloth or paper, until ready for use.

Inspection

1. Inspect transmission case and housing for cracks, worn or damaged bores, damaged threads, or any other damage that could affect operation of the transmission. Inspect the machined mating surfaces for burrs, nicks or damage.
2. Inspect the front face of case for small nicks or burrs that could cause misalignment of transmission with flywheel housing. Remove all small nicks or burrs with a fine stone.
3. Inspect flywheel housing for cracks. Make sure the machined mating surfaces are free from burrs, nicks, or any other damage.
4. Check the condition of the shift levers, forks, shift rails and shafts.
5. Inspect ball bearings. Refer to Ball Bearing Inspection.

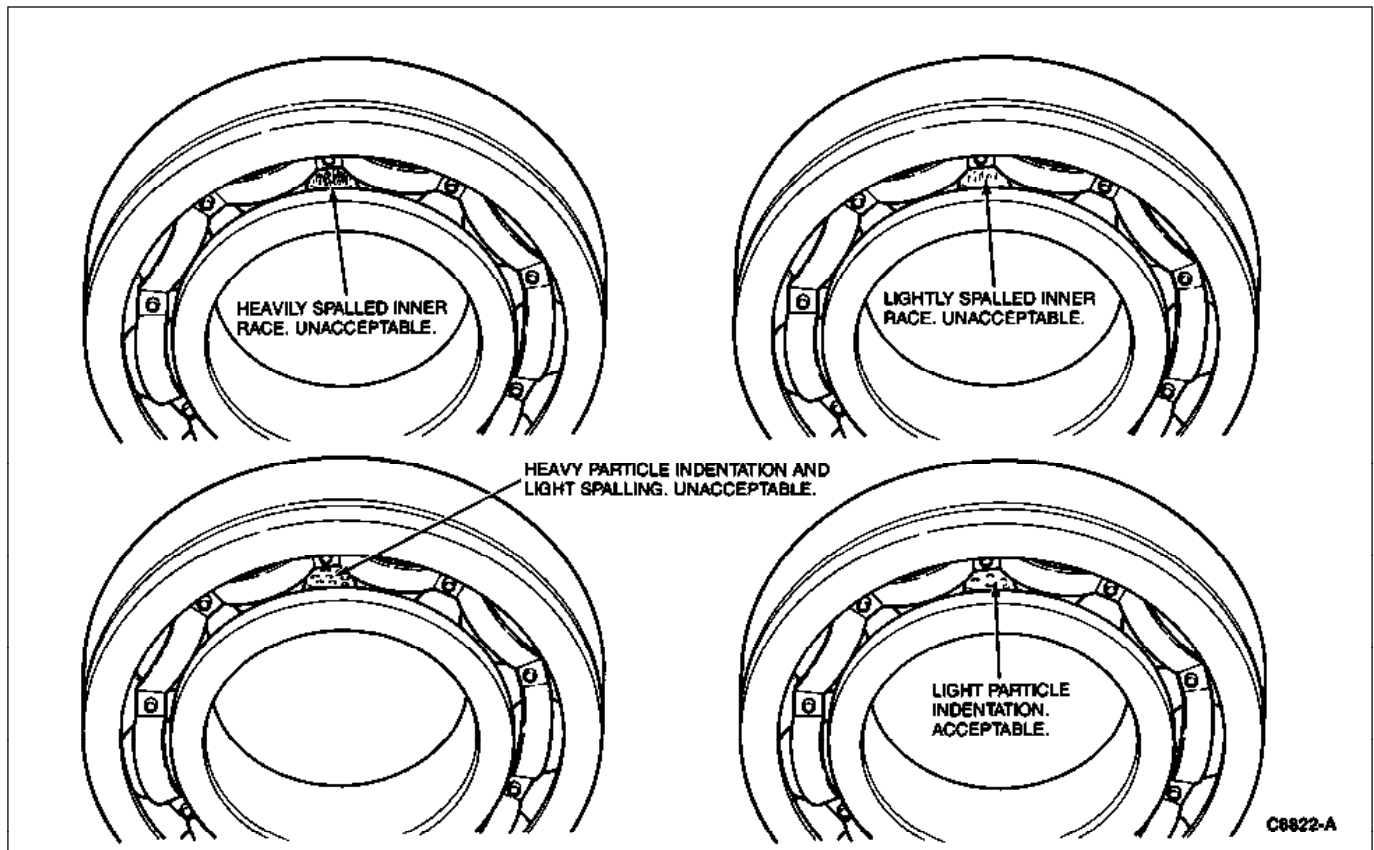
Cleaning

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Ball Bearing Inspection

Bearing Raceways

1. Inner Ring Raceway--While holding outer ring stationary, rotate inner ring at least three revolutions. Examine raceway of inner ring for pits or spalling. If pits or spalling are unacceptable, replace the bearing assembly. Light particle indentation is acceptable.
2. Outer Ring Raceway--While holding inner ring stationary, rotate outer ring at least three revolutions. Examine raceway of the outer ring from the same side as the raceway of the inner ring. If raceway is spalled or pitted, similar to that shown, replace the bearing assembly. Light particle indentation is acceptable.



Bearing External Surfaces

The bearing must be replaced if damage is found in any of the following areas:

1. Radial cracks on front and rear faces of outer or inner rings
2. Cracks on outside diameter or outer ring (particularly around snap ring groove)
3. Deformation or cracks in ball cage (particularly around rivets)

Spin Test

1. Lubricate bearing raceways with a slight amount of Synthetic MERCON® Multi-Purpose Automatic Transmission Fluid E6AZ-19582-B (ESR-M2C163-A2) or equivalent. Turn the bearing back and forth slowly until raceways and balls are coated with fluid.



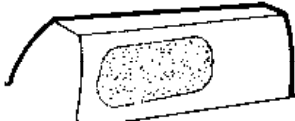
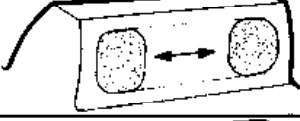
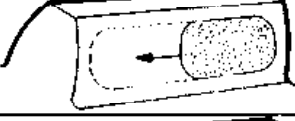

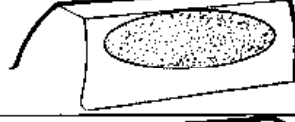

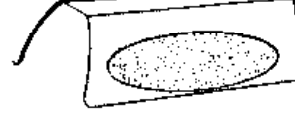
2. Hold bearing by inner ring in a vertical position. Vertical movement between the inner and outer rings is acceptable. Spin outer ring several times by hand (do not use an air hose). If roughness or vibration is noticeable or the outer ring stops abruptly, the bearing should be cleaned again and lubricated. Roughness in a bearing is usually caused by foreign particles inside the transmission case. If bearing is still rough after cleaning and relubricating three times, it must be replaced.
3. Hold bearing by the inner ring in a horizontal position with the snap ring groove up. Spin outer ring several times by hand (do not use an air hose). If bearing is still rough after cleaning and relubricating three times (if not done in Step 2), it must be replaced. If bearing passes the visual inspection and spin test, it can be re-installed in transmission.

Gear Inspection

Inspect the teeth of each gear. If excessively worn, broken or chipped, replace the gear. Excessive wear increases backlash, which results in noise and unacceptable operating characteristics.

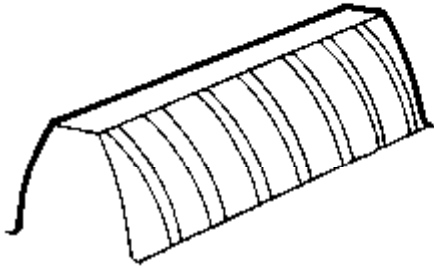
Some forms of grind marks and tooth wear contact patterns are acceptable and should not be considered as a source of gear noise. Grind marks are distinctive from wear or damage which are local swells (polished raised projections), nicks and chips. All gears have possible factory repair grind marks. Phosphate coated gears are especially easy to recognize since the grind operation removes a patch of phosphate and base metal exposing the lighter metallic color. The illustrations show normal and abnormal gear tooth contact patterns, normal tooling marks, and approved and unapproved chip/nick removal procedures.

Typical Transmission Gear Tooth Contact Patterns

CONTACT PATTERN	UNACCEPTABLE	ACCEPTABLE
① DESIRED PATTERN (CONTACT)		
② END CONTACT PATTERN		
③ TRAVELING CONTACT (PATTERN MOVES FROM SIDE TO SIDE ON FACE OF GEAR)		
④ HIGH CONTACT PATTERN		
⑤ LOW CONTACT PATTERN		

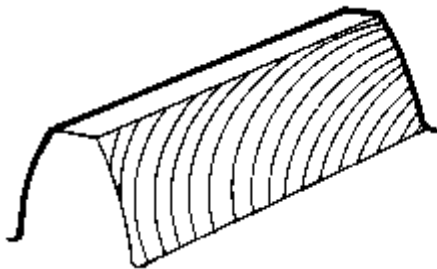
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Normal Tool Marks--Typical



NOTE: NO ROUGHNESS OR RIDGES EVIDENCED ON GEAR TOOTH FACE.

**NORMAL GEAR "SHAVING"
TOOL MARKS**

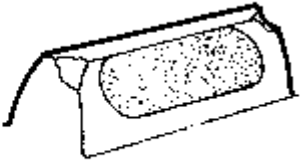
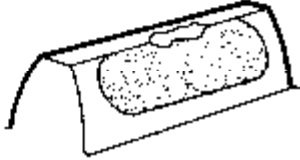
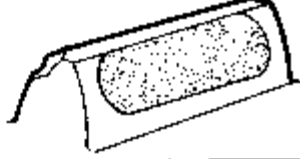
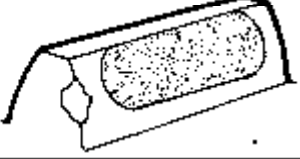



NOTE: NO ROUGHNESS OR RIDGES EVIDENCED ON GEAR TOOTH FACE.

**NORMAL GEAR "SHAVING"
TOOL MARKS. MARKS HAVE
A "WIRE BRUSHED"
APPEARANCE.**

C6698-A

Approved Transmission Gear Tooth Chip/Nick Removal Procedure

<p>① GRIND CHIP/NICK FROM CORNER FACE OF GEAR-DRIVE SIDE. (APPROVED)</p>	
<p>② GRIND CHIP/NICK FROM EDGE OF GEAR O.D. MAY EXTEND SLIGHTLY INTO GEAR PATTERN ON TOOTH FACE. (APPROVED)</p>	
<p>③ GRIND CHIP/NICK FROM CORNER FACE OF GEAR-COAST SIDE. (APPROVED)</p>	
<p>④ GRIND CHIP/NICK FROM GEAR EDGE MAY EXTEND SLIGHTLY INTO GEAR GACE. (APPROVED)</p>	
<p>⑤ GRIND CHIP/NICK FROM GEAR FACE-IN GEAR PATTERN AREA. (NOT APPROVED)</p>	

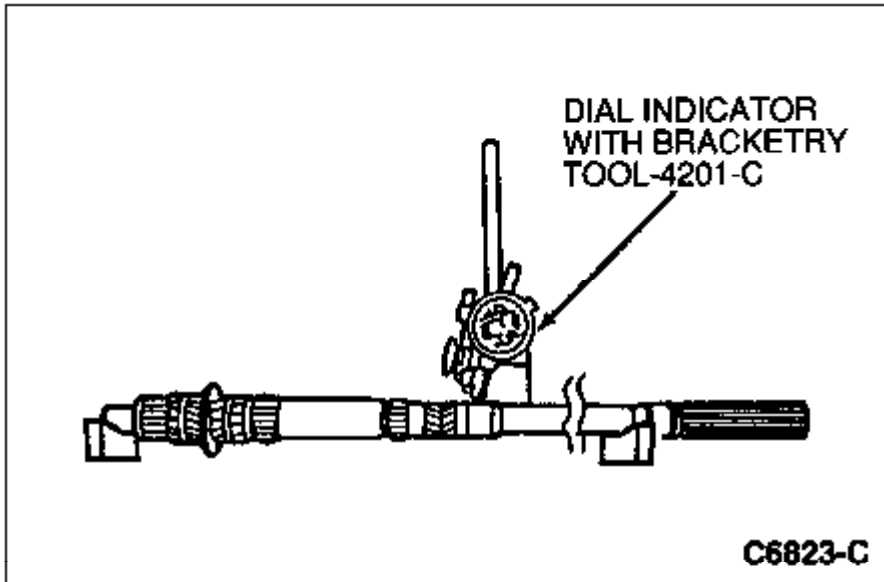
Output Shaft Inspection

Tools Required:

- Dial Indicator with Bracketry TOOL-4201-C
1. Check output shaft for runout by mounting the shaft between V-blocks and applying Dial Indicator with Bracketry TOOL-4201-C or equivalent to several places along shaft. The standard reading of the indicator for runout should be less than 0.05mm (0.002 inch). If runout exceeds 0.05mm (0.002 inch), replace shaft.
 2. Replace output shaft if splines are damaged. If needle bearing surface on the bearing journal is damaged, replace the output shaft.

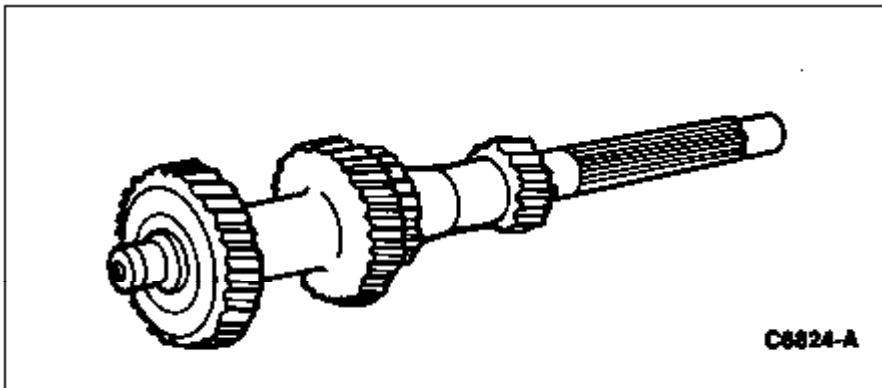
Input Shaft Inspection

1. If needle bearing surface in bearing bore is damaged or if cone surface is damaged, replace shaft.
2. Check input shaft gear teeth and splines for wear or damage. Replace input shaft if gear teeth or splines are bent, scored, or worn.



Countershaft Inspection

Check countershaft gear teeth and countershaft splines for wear or damage. Replace countershaft if bent, scored, or worn.



Synchronizer Mechanism Inspection

1. Inspect gear teeth on synchronizer blocker ring. If there is evidence of chipping or excessively worn teeth, replace with new parts.
2. Inspect synchronizer blocker ring for wear. To check the wear of synchronizer blocker ring, fit synchronizer blocker ring evenly to gear cone. Measure clearance between side faces of synchronizer blocker ring and gear with a feeler gauge. If clearance is less than 0.8mm (0.031 inch), replace synchronizer blocker ring or gear.

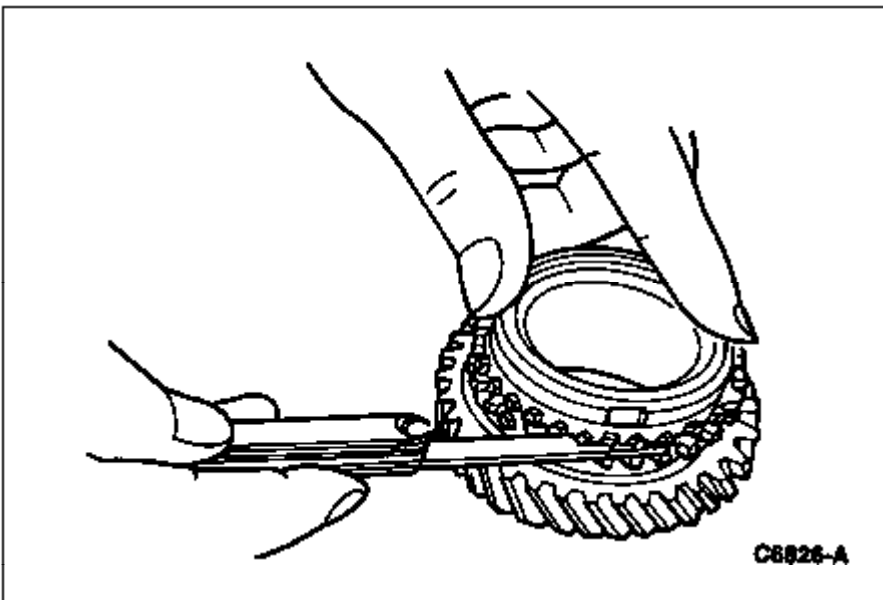
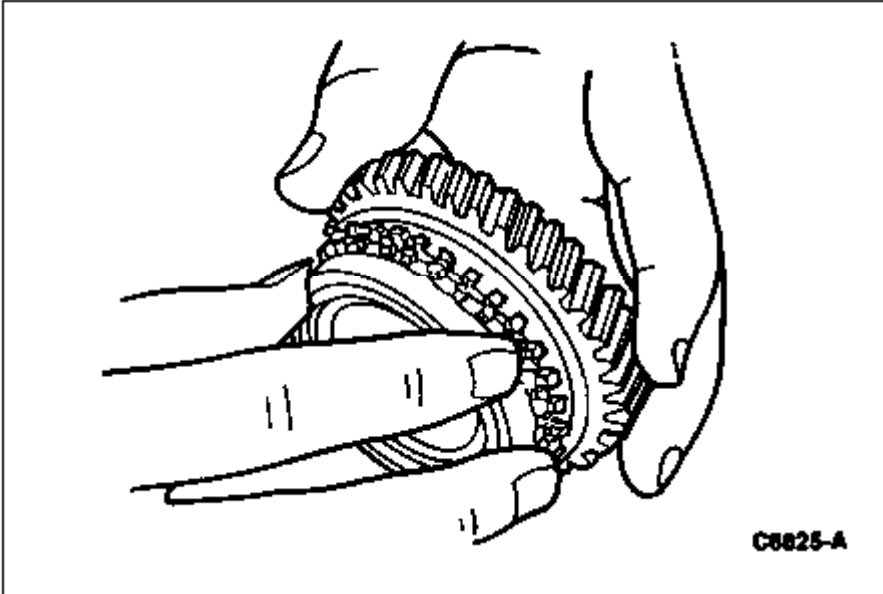
NOTE:

First/second, third/fourth and fifth/reverse synchronizer-to-gear clearance specifications are the same.

3. Inspect contact between inner surface of reverse (brass) synchronizer blocker ring and cone surface of reverse gear. To inspect, apply a thin coat of Prussian Blue or equivalent on cone surface of gear and fit it into the ring. If the contact pattern is poor, correct this by applying compound and lapping surfaces together.
4. Inspect fiber-lined synchronizer blocker ring for evidence of wear, flaking, glazing and burned or

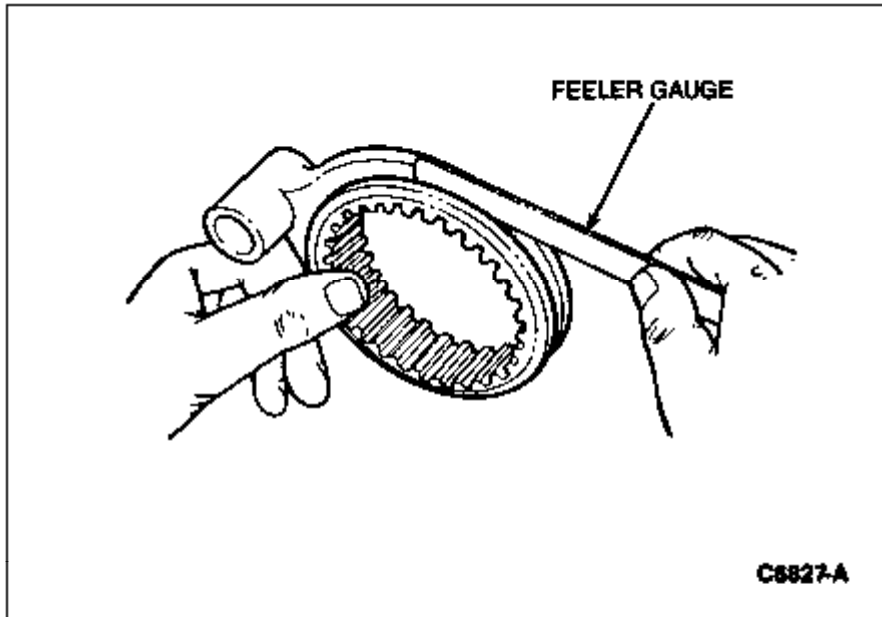
missing lining material.

5. Ensure clutch sleeve slides easily onto clutch hub.
6. Check synchronizer inserts (keys), inner surface of clutch sleeve, and insert groove on clutch hub for wear.
7. Check synchronizer insert spring for tension.



Shift Fork/Clutch Hub Sleeve Inspection

Check the contact surfaces of the shift fork and clutch hub sleeve for evidence of wear or damage. Verify that clearance exists between shift fork and slot in hub sleeve. Measure from shift fork to the clutch hub sleeve. Clearance should not exceed 0.8mm (0.031 inch).

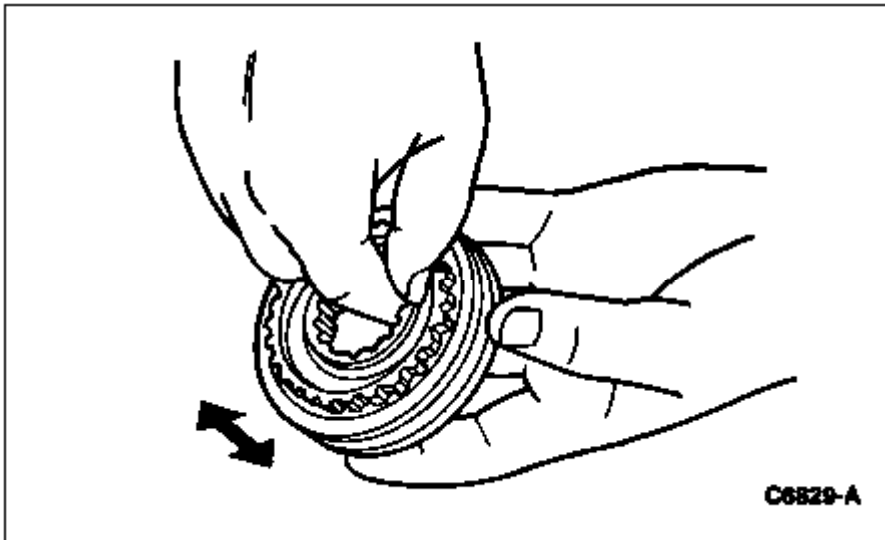


CLUTCH HUB SLEEVE-TO-SHIFT FORK CLEARANCE (R2)

Standard	Maximum
1st/2nd 0.1-0.358mm (0.003-0.014 inch)	0.8mm (0.314 inch)
3rd/4th 0.1-0.358mm (0.003-0.014 inch)	0.8mm (0.314 inch)
5th/Rev 0.1-0.358mm (0.003-0.014 inch)	0.8mm (0.314 inch)

Clutch Hub Inspection

1. Check operation of clutch hub sleeve installed onto hub.
2. Position clutch hub and sleeve horizontally. Lift the hub approximately three-quarters of the way off the sleeve. Release the hub, and observe downward motion. Hub should slide downward into sleeve on its own. It should not be necessary to push hub into sleeve. Service as necessary.



Extension Housing Inspection

NOTE:

The extension housing rear bushing cannot be serviced. If it requires service, the extension housing must be replaced as a unit.

Inspect the extension housing for cracks. Ensure that the machined mating surfaces are free from burrs, nicks, or any other damage. If necessary, replace the oil seal after the extension housing has been installed onto the transmission.

Speedometer Gears Inspection

Check the drive gear and driven gear, and the driven gear shaft for wear or damage. Check the O-ring and oil seal for weakness or damage.
