



ZF Industries

DESCRIPTION AND OPERATION

Description

The model number for the ZF transmission (7003) is S5-42. This model number can be divided into three parts. First, "S" designates a synchronized transmission. Second, "5" designates the number of forward gears. Finally, "42" is the approximate maximum input torque capacity in tens of ft-lb. In this case 42 equals 420 ft-lb. input torque capacity.

The S5-42 ZF transmission is available in both wide ratio and close ratio versions. The wide ratio version is available for all F-Series vehicles over 8500 lbs GVW, all engines (6007), except F-Super Duty Commercial Stripped Chassis equipped with a diesel engine. The close ratio version is available only in F-Series vehicles with a 7.3L diesel engine and a GVW over 8500 lbs. The ratios are as follow:

	1st	2nd	3rd	4th	5th	Reverse
Close Ratio (Diesel)	4.14	2.37	1.42	1.0	0.77	3.79
Wide Ratio (Gasoline / Diesel)	5.72	2.94	1.61	1.0	0.76	5.24

The transmission features an aluminum case (7005) with an integral clutch housing. Because of the aluminum case, the tapered roller bearings of the transmission shafts must be fitted under preload. This is because heat expansion of the aluminum case is greater than that of the steel alloy mainshaft and countershaft cluster gear (7113). If the bearings were not pre-loaded, this would result in excessive end play when the case is warm, loaded operating conditions. The transmission also features shrink-fit gears on the countershaft cluster gear. Shrink-fit gears are connected to the countershaft cluster gear by friction only, rather than connected through splines. The gear is heated and lightly pressed onto the countershaft cluster gear. The subsequent cooling of the gear provides the shrink fitting. The countershaft cluster gear is serviced as an assembly.



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Inspection and Verification

A troubleshooting guide has been put together to assist diagnosing transmission-related problems. Use the transmission noise evaluation procedure and troubleshooting guides on the following pages, or refer to Section 07-00 in the 1994 Ford Service Manual. Also refer to Section 08-00 in the 1994 Ford Service Manual. Remember, it is important to get an accurate description of the complaint before any diagnosis can be performed. Ask questions as to whether it occurs hot or cold, during shifting, driving at a particular speed or in a particular gear. If possible, have the customer demonstrate the concern.

Cold Transmission

- Drive the truck in all gears (1-5 and reverse gears).
- Evaluate the noise in neutral. Check if there are any noise changes in a particular gear, i.e., 4th gear. In 4th gear the countershaft is not under load.
- Check if the noise increases when the transmission is warming up.
- See if the noise is related to engine speed, road speed or gear selection.

Warm Transmission

- Check all gears plus reverse gear and make note of any noise changes in a particular gear.
- Check noise in neutral while parked. Check if the noise disappears at a certain engine rpm or with the clutch pedal (7519) depressed.
- Drive in the gear in which the noise is most noticeable. Press in the clutch and leave the gear engaged. If the noise changes or disappears, the noise may be amplified by the vibration of the engine.
- Drive under the same condition again. Press the clutch pedal in and shift into neutral. Release the clutch while the truck is coasting down the road. Evaluate the noise, as the rear axle assembly (4006) turns the mainshaft.



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ADDITIONAL TESTING FOR 4X4 TRUCKS (Non-Electronic Shift)

- Check for any noise change when shifting the transfer case (7A195) between 4X2, 4 high, 4 low or into neutral.
- With the vehicle at a complete stop and the transfer case in neutral, shift through all the gears and evaluate noise at different engine rpm. Check for any noises in neutral at different engine rpm.

NOTE:

To isolate clutch concerns from transmission concerns, operate the transmission at no-load. On 4X4 models, place the transfer case in neutral. Remove the driveshaft on 4X2 models. Run the engine at 3000 rpm and operate the transmission throughout ranges with the clutch engaged. If hard shifting concern (power to transmission) disappears, the concern may be in the clutch system. An improperly operating clutch can result in hard shifting that is most noticeable in 1st, 2nd and reverse. The hydraulic release mechanism must work properly. Continued operation with a defective clutch system may result in premature wear or damage of synchronizer (7124).

Hard shifting or difficulty engaging gears may be the result of improper clutch function. Check the release system travel. Minimum travel for the concentric slave cylinder bearing (4.9L and 5.8L engines) and the external system slave cylinder push rod (7.3L and 7.5L engines) is 11 mm (7/16 inch). If system travel is less than 11 mm, this is an indication of problems in the release system such as excessive flexing of the instrumental panel (04320), cracked instrumental panel reinforcement at the clutch master cylinder mounting and air or water in the hydraulic clutch hose (7T504). Refer to Section 08-00 in the 1994 Ford Service Manual.

If release system is greater than 11 mm, and the clutch is suspected, check for clutch reserve as follow:

1. Set the parking brake control (2780) and put the transmission in neutral.
2. With the clutch pedal fully depressed, shift into reverse, then shift half way between reverse and neutral to defeat the synchronizer.
3. Allow the clutch pedal to fully return and adjust the position of shift control selector lever and housing (7210) to obtain light contact between the gear teeth. A slight grind will occur.
4. Slowly depress the clutch pedal until grinding stops. Measure the clutch pedal travel from this position to the full down position (clutch reserve position).

This clutch reserve dimension should be at least 1 1/2 inches. If the reserve is less than 1 1/2 inches, and there are no hydraulic control system concerns, remove the transmission and check for excessive clutch wear. On the 7.3L diesel and 7.5L engines, check for contamination of clutch release hub and bearing (7548) and binding on the bearing retainer. Replace the clutch assembly or clutch release hub and bearing as required.

NOTE:

On the 4.9L and 5.8L vehicles, the case is ribbed in order to reduce gear and gear roll-over noises.



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Symptom Chart

Noise While Stopped — Transmission in Neutral

CONDITION	POSSIBLE CAUSE	ACTION
Noise present with clutch pedal fully depressed.	<ul style="list-style-type: none">• Engine noise.• Clutch release hub and bearing failure.• Pilot bearing failure.• Misaligned transmission.	<ul style="list-style-type: none">• Refer to appropriate Shop Manual for these areas.
Noise disappears when engine RPM exceeds 1500 without depressing clutch pedal.	<ul style="list-style-type: none">• Neutral rollover is caused by the engine firing pulses transmitted through the gear set. Some neutral rollover is normal on the 7.5L application. The dual mass flywheel on the 7.3L Diesel and the two stage clutch on the 4.9L & 5.8L should eliminate this concern on these engines.	<ul style="list-style-type: none">• Check engine idle quality and speed. A rough or low idle will aggravate this concern.
Noise present at engine speeds above idle.	<ul style="list-style-type: none">• Insufficient lubrication.• Damaged tapered roller or needle bearing.• Scuffed gear tooth contact surfaces.	<ul style="list-style-type: none">• Drain oil (when required) and fill with the correct oil, conforming to Ford's specification ESP M2C-166H. Type "H" or MERCON® (Motorcraft).• Inspect for failure. Pay special attention to the mainshaft front bearing (pocket bearing), located between the input shaft and mainshaft. Turn the gears on the mainshaft to check for failure of needle bearing failure by feeling for roughness.• Disassemble transmission and check gear tooth contact surfaces. Replace gears as required.



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Symptom Chart

Noise While Stopped — Transmission in Neutral (Continued)

CONDITION	POSSIBLE CAUSE	ACTION
Noise on PTO equipped transmissions. Remove the PTO and install a cover plate. Evaluate for noise without PTO.	<ul style="list-style-type: none"> Incorrect PTO gear mesh due to: Wrong model PTO, incorrect installation, defective PTO. 	<ul style="list-style-type: none"> Check the mating teeth on transmission countershaft gear and also on the input shaft gear for damage. If any parts are damaged, replace damaged transmission parts. Contact PTO supplier/manufacturer to verify model usage, shimming and PTO quality.

Noise While Driving

CONDITION	POSSIBLE CAUSE	ACTION
Noise is present in all or several gears. Noise occurs at high and low engine speeds and may vary with engine speed.	<ul style="list-style-type: none"> Worn or rough mainshaft rear bearing. Needle bearing under mainshaft gears damaged. Wrong preload on main or cluster shaft bearing. PTO installed incorrectly. 	<ul style="list-style-type: none"> Disassemble transmission and install new output shaft rear bearing on mainshaft. Replace needle bearing and gear. Disassemble transmission and correct preload. Check PTO installation.
'Rattle' noise when taking off from a stop and driving at less than 1000 RPM.	<ul style="list-style-type: none"> 'Lugging Rattle'. 	<ul style="list-style-type: none"> Operate truck without 'lugging'. Condition will shorten the life of the transmission.
'Clunking' noise when shifting or speeding up or slowing down. Condition is worse on bumpy surface.	<ul style="list-style-type: none"> Freeplay in the system (clutch through axle and fuel injector shutoff timing). Some clunk is normal with the 4.9L & 5.8L engines. Loose yoke nut. 	<ul style="list-style-type: none"> Check for excessive axle backlash. Clunk cannot be corrected by repairing transmission unless a transmission defect is evident. Install a new Spiral Locknut. No staking required. Tighten to 270 Nm or 200 ft-lb.
Noise while driving in one gear increases with road speed.	<ul style="list-style-type: none"> Worn, imperfect or chipped gear teeth on the affected gear. 	<ul style="list-style-type: none"> Replace affected mating gears.



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Symptom Chart

Noise While Driving (Continued)

CONDITION	POSSIBLE CAUSE	ACTION
'Whining' noise at high engine RPM in 3rd and 5th gear.	<ul style="list-style-type: none">Worn input shaft gear and countershaft drive gear.	<ul style="list-style-type: none">Check noise level in 4th gear under same engine conditions. If noise level is less, replace the input shaft and countershaft. Inspect and replace other gears as required.
Shift lever 'buzz' present while driving, not present during a neutral engine run up while parked.	<ul style="list-style-type: none">Upper shift lever damaged or loose.Lower shift lever defective.	<ul style="list-style-type: none">Change shift lever. If 'buzz' is still present, see which gear buzz occurs. Disassemble and inspect specific gear. Inspect and replace other gears as required.Replace lower shift lever. Shift lever E9TZ-7210-G is less sensitive to vibration than earlier design.
Shifter lever 'rattle' in neutral engine run up, primarily diesel 4X4.	<ul style="list-style-type: none">Transfer case shift lever may not have plastic bushing at the pivot.Transmission lever boot incorrectly installed.	<ul style="list-style-type: none">Check by temporarily removing the transfer case shift lever. Replace if the noise is gone.Lever boot must make air tight seal to shift lever. Replace boot if stretched or sealing surface is damaged.



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Symptom Chart

Noise While Driving (Continued)

CONDITION	POSSIBLE CAUSE	ACTION
Moan or vibration on F-Super Duty at road speeds greater than 50 MPH.	<ul style="list-style-type: none">• Aftermarket modifications to frame or driveshaft.	<ul style="list-style-type: none">• Non-factory driveshafts should be inspected for:<ul style="list-style-type: none">• Size• 0 to 51 inches long - 3 inch diameter tube is OK.• Up to 55 inches long - 3 1/2 inch diameter tube is required.• Up to 59 inches long - 4 inch diameter tube is required.• Working angles greater than 1/2° but less than 3°.• System balanced to within 0.4 in/oz at the ends and 0.8 in/oz at the driveshaft center bearing bracket.
Hard shift (particularly 1st, 2nd & reverse).	<ul style="list-style-type: none">• Clutch not releasing completely.• Operator not fully depressing clutch pedal.• Flexing of instrumental panel.• Hydraulic clutch hose routed too close to exhaust manifold.• Air/water in hydraulic clutch hose.• Insufficient reserve of synchronizer (a defective clutch system can a result in premature loss of synchronizer reserve).	<ul style="list-style-type: none">• See clutch procedure at the end of this diagnosis guide, or Section 08-00 in the 1994 Ford Service Manual.• Interview operator.• Repair instrumental panel.• Move or shield hydraulic clutch hose.• Bleed clutch system.• Replace complete synchronizer and corresponding gear, if required.



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Symptom Chart

Shift Concerns

CONDITION	POSSIBLE CAUSE	ACTION
Notchy shifting.	<ul style="list-style-type: none"> Some notchiness is normal (especially in 3rd gear). 	<ul style="list-style-type: none"> For excessive notchiness replace with revised synchronizers: 1/2 FOTZ-7124-D 3/4 FOTZ-7124-E 5/R FOTZ-7124-C
'Grinding' noise during shifting.	<ul style="list-style-type: none"> Synchronizer cone too smooth (after a few thousand miles). Synchronizer ring defective. Insufficient wear limit of synchronizer ring. 	<ul style="list-style-type: none"> Do 3 to 5 hard shifts with high engine RPM. If noise is still present, disassemble and check for damage (darkened patches OK). Refer to Synchronizer Ring / Synchronizer Body Wear. Change synchronizer. Change synchronizer.
Walking or jumping out on rough roads.	<ul style="list-style-type: none"> Interference or resistance in the mechanism preventing full engagement of the sliding collar. If sliding collar has been shifted completely into position, some other malfunction could move sliding collar and shift control selector lever out of its proper location. 	<ul style="list-style-type: none"> Remove and disassemble transmission and check profile of internal grooves in the sliding sleeve. Check for shift lever interference. The stub lever, gear shift finger or shift forks could be worn. Remove transmission and replace damaged parts.
Note whether the unit walks out of gear under drive or on a coast load. Also, does the 'walkout' occur on smooth or only on rough roads? A number of items that would prevent full engagement of gears are:	<ul style="list-style-type: none"> Worn or loose engine mounts. Shift fork pads or groove in sliding collar worn excessively. Transmission and engine out of alignment either vertically or horizontally. 	<ul style="list-style-type: none"> Check engine mounts. Remove and disassemble transmission and replace damaged parts. Make sure transmission is tightly bolted to the engine.



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Symptom Chart

Shift Concerns (Continued)

CONDITION	POSSIBLE CAUSE	ACTION
Walk or jump out on rough roads.	<ul style="list-style-type: none">• Use of heavy shift lever extensions.• Shift interlock springs broken or missing.• Detent spring cap not pressed in property.• No preload in drive gear, mainshaft or countershaft, caused by worn bearings.• Grated selector teeth.	<ul style="list-style-type: none">• Use original equipment shift lever and housing. Install heavy duty detent springs (E8TZ-7E218-A).• Remove detent spring plug on detent and replace shifter interlock springs.• Replace with new detent spring plug and press in 1 mm (3/64 inch).• Remove and disassemble transmission and replace defective bearings (necessary to reset bearing preload).• Change synchronizer and gear.
Excessive shift control selector lever movement in 3rd gear.	<ul style="list-style-type: none">• 3-4 synchronizer body snap ring not seated in groove on output and fifth gear driveshaft.	<ul style="list-style-type: none">• Disassemble and replace affected parts, paying special attention to 3-4 synchronizer, input gear, input shaft pocket bearing and shift fork.
Gear cannot be engaged.	<ul style="list-style-type: none">• Clutch not releasing (see hard shift).• Gear selector interlock sleeve jammed in transmission.• Damage to teeth on sliding collar or improper installation (dog teeth worn).• Jammed pressure pieces in synchronizer.• Shift rails out of proper position.	<ul style="list-style-type: none">• Check clutch per procedure at the end of this diagnosis guide, or Section 08-00 in the 1994 Ford Service Manual.• If bent or damaged, replace the gear selector interlock sleeve.• Replace or correct synchronizer. Check for damage on the corresponding mainshaft gear in clutch teeth area. Replace as required.• Remove and disassemble transmission and replace pressure pieces.• Replace all shift rails, detents and gear selector interlock sleeve.



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Symptom Chart

Shift Concerns (Continued)

CONDITION	POSSIBLE CAUSE	ACTION
Sticking in gear.	<ul style="list-style-type: none">• Clutch not releasing (see hard shift above).• Gear selector interlock sleeve jammed in transmission.• Sliding collar tight on splines (dog teeth damaged).	<ul style="list-style-type: none">• Check clutch per procedure at the end of this diagnosis guide, or Section 08-00 in the 1994 Ford Service Manual.• If bent or damaged, replace the gear selector interlock sleeve.• Remove and disassemble transmission.
Stuck in gear.	<ul style="list-style-type: none">• Shift rails out of proper position.	<ul style="list-style-type: none">• Replace all shift rails, detents and gear selector interlock sleeve.
High shift efforts.	<ul style="list-style-type: none">• Lack of lubricant or wrong lubricate used, causing build-up of sticky and sludgy deposits on splines of sliding collar.• Case bushing rough, or dragging.• Clutch not releasing (see hard shift above).• Damaged input shaft pocket bearing.	<ul style="list-style-type: none">• Inspect through the PTO openings. If sludge is present, remove and clean the transmission.• Place transmission in 4th gear and rotate the mainshaft by hand while the clutch is depressed. If a roughness is felt, remove the case bushing, inspect and replace the bearing and input shaft, if required (input bearing preload must be reset if input shaft is replaced).• Install a new input shaft and input shaft pocket bearing (necessary to reset bearing preload).



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Symptom Chart

Shift Concerns (Continued)

CONDITION	POSSIBLE CAUSE	ACTION
High shift effort in one gear only.	<ul style="list-style-type: none">• Sliding sleeve tight on splines.• Synchronizer teeth chipped or badly mutilated.• Binding or interference of shift control selector lever with other objects or rods inside the cab.• Mainshaft gears, seized or galled on either the thrust face or diameters.• Synchronizer (wear limit too low, fractures).• Synchronizer cone smoothness.	<ul style="list-style-type: none">• Remove transmission and replace affected synchronizer.• Remove and disassemble transmission and replace damaged parts.• Check shift operation in cab. • Remove and disassemble transmission, replace synchronizer and other affected parts.• Remove and disassemble transmission, replace synchronizer and other affected parts.• Make 3 and 5 hard shifts with high engine RPM.
High shift efforts in cold weather, all gears.	<ul style="list-style-type: none">• Incorrect hi-viscosity fluid.	<ul style="list-style-type: none">• Install Type H or MERCON® fluid. Road test the vehicle to identify possible damage caused by the wrong fluid. Synthetic MERCON® E6AZ-19582-B will improve cold weather shiftability.



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Symptom Chart

Leak Concerns

CONDITION	POSSIBLE CAUSE	ACTION
Leak at case cover.	<ul style="list-style-type: none"> Re-used or damaged case cover gasket. 	<ul style="list-style-type: none"> Replace with new case cover gasket. Never use RTV.
Leak at transmission case plug.	<ul style="list-style-type: none"> Sealing ring missing from transmission case plugs (transmissions with an E9TA prefix or later have a sealing surface machined on the housing). (Transmissions with an F4TA prefix have a sealing ring on the plug with rubber centering feature for improved sealing). 	<ul style="list-style-type: none"> Install a new sealing ring. Install a new sealing ring.
Leak at transfer case cover.	<ul style="list-style-type: none"> Bolts loose or damaged transmission case deflector gasket. 	<ul style="list-style-type: none"> Replace transmission case deflector gasket, tighten bolts to 38 Nm (28 ft-lb).
Leak at detent spring plug.	<ul style="list-style-type: none"> Re-used or damaged detent spring plugs. 	<ul style="list-style-type: none"> Use new detent spring plugs when reassembling. Do not deform case around detent spring plug to retain.
Leak at large welch plug inside clutch housing. Look for cracks around the hole.	<ul style="list-style-type: none"> Improper assembly. 	<ul style="list-style-type: none"> Reseal, using anaerobic sealant E2AZ-19562-B (WSK-M2G348-A5). If cracked, replace flywheel housing.
Leak at input shaft bearing oil passage plug (inside clutch housing w/7.5L & 7.3L engines and on left side w/4.9L & 5.8L engines).	<ul style="list-style-type: none"> Improper assembly. 	<ul style="list-style-type: none"> Reseal, using anaerobic sealant E2AZ-19562-B (WSK-M2G348-A5). If cracked, replace flywheel housing.
Leak at output shaft oil seal.	<ul style="list-style-type: none"> Output yoke nut loose or improperly staked (4X2, except F-Super Duty). 	<ul style="list-style-type: none"> Replace seal, using a new locknut. Torque to 270 Nm (200 ft-lb). <p>Caution: Do not re-use locknut.</p>
Leak at input oil seal.	<ul style="list-style-type: none"> Improper assembly. Seal lip may have rolled during assembly, garter spring may have become dislodged during a previous repair. 	<ul style="list-style-type: none"> Replace front pump support seal using extreme caution that input shaft does not contact the oil seal during reassembly (if the seal lip is rolled, leaking may not occur for several hundred miles).



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Symptom Chart

Leak Concerns (Continued)

CONDITION	POSSIBLE CAUSE	ACTION
Leak between quill pipe and flywheel housing (7.3L and 7.5L engines only).	<ul style="list-style-type: none"> Damaged O-ring during assembly. 	<ul style="list-style-type: none"> Remove quill pipe, inspect sealing surfaces and replace O-ring. Lubricate O-ring prior to assembly to prevent damage.
Leak at case joint.	<ul style="list-style-type: none"> Damaged mating surfaces or assembly error. 	<ul style="list-style-type: none"> Repair or replace damaged case. Reseal with anaerobic sealant E2AZ-19562-B (WSK-M2G348-A5). Torque bolt to 22 Nm (16 ft-lb).

Miscellaneous Concerns

CONDITION	POSSIBLE CAUSE	ACTION
Cracked flywheel housing.	<ul style="list-style-type: none"> Drivetrain vibration: Caused by assembly error. Vehicle modification (driveshaft lengthened or shortened). 	<ul style="list-style-type: none"> Check the integrity of driveshaft attachment. Non-factory driveshafts should be inspected for: <ul style="list-style-type: none"> Size 0 to 51 inches long - 3 inch diameter tube is OK. Up to 55 inches long - 3 1/2 inch diameter tube is required. Up to 59 inches long - 4 inch diameter tube is required. Working angles greater than 1/2° but less than 3°. System balanced at 3000 RPM to within 0.4 in/oz at the ends and 0.8 in/oz at the center support.
Cracked rear engine mount transmission attachment ears.	<ul style="list-style-type: none"> Broken front engine mounts. Vibration caused by a driveline imbalance. Rear mount upper flange not flat. 	<ul style="list-style-type: none"> Inspect and replace front engine mounts if required. See above. Replace rear mount.



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Symptom Chart

Bearing Failure

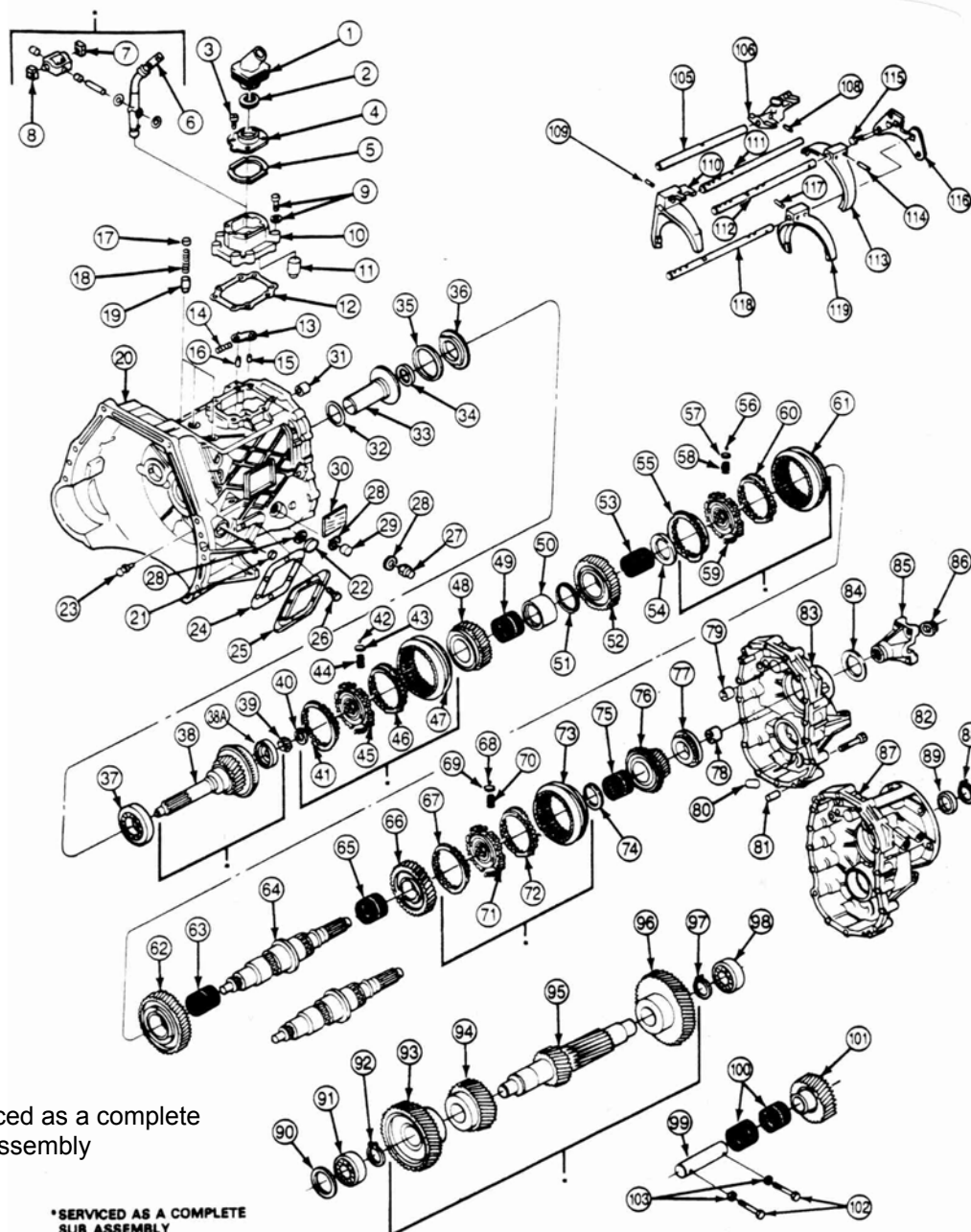
CONDITION	POSSIBLE CAUSE	ACTION
<p>NOTE: The service life of most transmissions is governed by the life of the bearings. The majority of bearing failures can be related to driveline vibration or contamination of the fluid. Additional reasons for bearing failures are:</p> <p>NOTE: This guide does not apply to vehicles equipped with IDI turbo diesel engines.</p>	<ul style="list-style-type: none"> • Extended start-up idle in extreme cold may lead to wear of input shaft pocket bearing. • Any combination of operation at or above GVW in high ambient temperatures, on steep grades, or vehicles with high frontal areas (exceeding 60 square feet) can affect all bearings due to temperature build-up. • Input shaft pocket bearing not lubricated due to missing, damaged or misinstalled front bearing oil scoop ring. • Input shaft pocket bearing not lubricated due to damaged oil baffle. • Damage due to towing a vehicle greater than 50 miles or at speeds exceeding 35 MPH with the driveshaft installed. Third gear bearings are especially susceptible to damage. • Vibration break-up of retainer and brinelling of races-fretting corrosion. • Incorrect preload causes faster wearing of the bearings, due to incomplete contact area. • Lack of lubricant or wrong type. • Acid etch of bearing due to water in lube. • Worn out due to other part failure. 	<ul style="list-style-type: none"> • Synthetic MERCON® E6AZ-19562-B (ESR-M2C 163-AZ) provides improved lubrication when transmission temperatures remain below minus 20° F for extended periods. • Heat build-up may cause break down of the ATF. Synthetic MERCON® can withstand higher operating temperatures. • Replace damaged components and make sure of proper installation of front bearing oil scoop ring. Check for proper installation of the snap ring, which retains the 3-4 synchronizer, on the mainshaft next to the front bearing oil scoop ring. • Replace damaged components making sure the front bearing oil scoop ring is not damaged during reassembly. • Provide correct towing procedures to tow operator. • Refer to restrictions of mainshaft in the Miscellaneous Concern chart of this diagnosis guide. • Be sure to follow preload setting procedure in this section. • Check for leaks and repair as required. Replace with correct fluid. • Identify and correct source of water entry. • Remove, disassemble and clean the transmission then replace damaged parts (necessary to reset bearing preload if any input shaft bushings are replaced).



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Model S5-



* Serviced as a complete sub assembly

*SERVICED AS A COMPLETE SUB ASSEMBLY



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Item	Part Number	Description
1	7277	Gearshift Lever Boot
2	7D152	Snap Ring
3	N603264	Capscrew
4	7262	Gearshift Lever Boot Retainer
5	7207	Gasket
6	7210	Shift Control Selector Lever
7	7C371	Guide Piece
8	—	Guide Piece
9	7A443 & 7C015	Hex Bolts and Washers
10	7203	Shift Control Housing
11	7E218	Shift Detent Plunger Assy
12	7185	Gasket
13	7F194	5th-Reverse Interlock
14	7234	Shifter Interlock Spring
15	7B096	Interlock Roll Pin
16	7B096	Interlock Roll Pin
17	7L013	Detent Spring Plug
18	7N120	Spring
19	7247	Shift Rail Detent Plunger
20	7005	Case
21	7L018	Case Plug
22	7A010	Transmission Case Plug
23	7B602	Clutch Release Lever Stud
24	7166	Transmission Case PTO Gasket
25	7165	PTO Cover
26	304650	Bolt
27	15520	Backup Lamp Switch
28	7L101	Sealing Ring
29	7A010	Transmission Case Plug
30	—	ID Plate (Part of 7003)
31	7D362	Central Shift Rail Bearing
32	7288	Shifter Shaft Seal
33	7080	Release Bearing Guide Tube
34	7052	Input Shaft and Extension Housing Seal
35	7029	Input Bearing Front Shim
36	7040	Oil Baffle

Item	Part Number	Description
37	7025	Case Bearing
38	7017	Input Shaft
38A	7046	Front Bearing Oil Scoop Ring
39	7120	Input Shaft Pocket Ring
40	7B331	Small Parts Repair Kit
41	—	Gear Synchronizer Ring (Part of 7124)
42	—	Ball (Part of 7B331)
43	7124	Synchronizer
44	—	Spring (Part of 7B331)
45	—	3rd Gear Synchronizer Body (Part of 7124)
46	—	3rd Gear Synchronizer Ring (Part of 7124)
47	—	3rd-4th Sliding Sleeve (Part of 7124)
48	7186	3rd Gear
49	7133	Caged Needle Roller Bearing
50	7173	3rd Speed Bearing Spacer
51	7114	Thrust Washer
52	7103	2nd Gear
53	7133	1st Speed Gear Bearing
54	7B331	Small Parts Repair Kit
55	7124	2nd Gear Synchronizer Ring
56	7124	Ball
57	7124	Pressure Piece
58	7124	Spring
59	7124	1st-2nd Synchronizer Body
60	7124	1st Gear Synchronizer Ring
61	7124	1st-2nd Sliding Sleeve
62	7100	1st Gear
63	7127	3rd Gear Bearing
64	7061	Mainshaft
65	7127	Reverse Gear Bearing
66	7142	Output Shaft Reverse Gear
67	7124	Reverse Gear Synchronizer Ring
68	7124	Ball
69	7124	Pressure Piece
70	7124	Spring



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Item	Part Number	Description
71	7124	5th-Reverse Synchronizer Body
72	7124	5th Gear Synchronizer Ring
73	7124	5th-Reverse Sliding Sleeve
74	7B331	Small Parts Repair Kit
75	7121	5th Gear Bearing
76	7158	5th Gear
77	7R205	Output Shaft Rear Bearing
78	7072	Spacer
79	7D362	Central Shift Rail Bearing
80	7E290	Magnet
81	—	Dowel (Part of 7003)
82	7A443	Bolt
83	7A039	Extension Housing (4X2)
84	7052	Input Shaft and extension Housing Seal
85	7089	Output Yoke (4X2)
86	7045	Output Yoke Locknut (4X2)
87	7A039	Extension Housing (4X4)
88	7B331	Small Parts Repair Kit
89	7052	Input Shaft and Extension Housing Seal
90	7119	Thrust Washer
91	7065	Output Shaft Bearing
92	7064	Output Shaft Snap Ring
93	7113	Countershaft Drive Gear
94	7113	Countershaft 3rd Gear
95	7113	Countershaft Cluster Gear
96	7113	Countershaft 5th Gear
97	7064	Output Shaft Snap Ring
98	7065	Output Shaft Bearing
99	7140	Reverse Idler Gear Shaft
100	7E139	Reverse Idler Gear Bearing
101	7141	Reverse Idler Gear
102	7214	Reverse Idler Gear Shaft Bolt
103	7K267	Sealing Ring
105	7240	Main Gear Shift Rail
106	7243	Gear Shift Finger
108	7B096	Roll Pin
109	7B096	Roll Pin

Item	Part Number	Description
110	7230	3/4 Shifter Fork
111	7241	3/4 Reverse Shift Rail
112	7242	5/Rev Shift Rail
113	7231	5/Rev Shift Fork
114	7B096	Roll Pin
115	7A443	Bolt (3)
116	7K201	Gear Selector Interlock Plate
117	7B096	Roll Pin
118	7358	1/2 Shift Rail
119	7239	1/2 Shift Fork