

**Transmission and Drivetrain: Technical Service Bulletins**Technical Service Bulletin # **B82871201**Date: **871201****Campaign - Weight Certification Label Are Overstated**

TSB # B821287 December, 1987

TO: Selected Ford Dealers

SUBJECT: Owner Notification Program B82 - Installation of a Safety Compliance Certification Label on Certain 1988 F250 4x2 HD and F350 4x4 Vehicles Equipped With Optional Engine

TRUCKS AFFECTED

<u>Vehicles Affected</u>	<u>Assembly Plants</u>	<u>Production From</u>	<u>Dates Through</u>
F250 4x2 HD w/optional engines	Kansas City	8/18/87	8/20/87
	Norfolk	8/17/87	8/20/87
	Twin Cities	8/18/87	8/20/87
	Ontario	8/20/87	8/20/87
F350 4x4 w/optional engines	Kansas City	8/18/87	8/28/87
	Norfolk	8/17/87	8/28/87
	Twin Cities	8/18/87	8/28/87
	Ontario	8/20/87	8/28/87

Approximately 300 trucks involved in Owner Notification Program B82 were produced as follows:

**REASONS FOR THIS PROGRAM**

On some of the subject vehicles, the Accessory Reserve Capacity (ARC) weights specified on the Safety Compliance Certification labels are overstated by as much as 670 pounds.

Overstated ARC weights indicate that greater additional accessory weight can be added to the vehicle than the levels certified for safety compliance of the vehicle. Installation of the maximum indicated accessory weights could result in loading the front axle in excess of this GAWR (Gross Axle Weight Rating).

**PROGRAM PROVISIONS**

Owners of trucks affected by this program will be sent revised Safety Compliance Certification Labels.

**ACTION BY FORD**

Dealers are provided technical and administrative instructions, a listing of involved vehicles and the revised labels to affix to those vehicles identified in their listing as stock.

Letters being sent by the Company to owners will include revised labels and instructions to enable owners to apply the labels to their vehicles. Owners, however, will be advised that if they prefer, they may take their vehicle to their Ford dealer to have this service performed at no cost.

**ADDITIONAL INFORMATION**

Technical Instructions, Labor Operations, and Claims Preparation Instructions are contained on Attachment I, (see page 2). Contact your Service Zone Manager if you have questions regarding this program.

If requested, dealers are to advise and/or assist customers in determining overall truck weight and front axle weight loading if permanent accessories have been installed.

**Owner Notification Program B82 Technical and Administrative Instructions - Attachment I**

Attachment I Page 1 of 1

PLEASE READ THESE INSTRUCTIONS. CIRCULATE THEM TO YOUR PARTS AND SERVICE PERSONNEL. QUESTIONS SHOULD BE DIRECTED TO YOUR SERVICE ZONE MANAGER.

**TECHNICAL INSTRUCTIONS**

1. Locate the existing Safety Compliance Certification Label on the driver's door lock pillar.
2. Verify that the vehicle identification numbers on new and old Safety Compliance Certification Labels are identical.
3. With a clean, dry cloth, wipe off any dirt or film from the old label before installing the new label.
4. Peel the protective backing from the new label and apply the new label directly over the existing label on the vehicle. Rub the label lightly with a soft cloth to remove any wrinkles or bubbles.

## PARTS ORDERING INFORMATION

Revised Safety Compliance Certification Labels are being sent directly to owners of affected trucks. Owners are instructed to bring the labels with their trucks if they prefer dealers to apply the labels.

## LABOR OPERATIONS

	Scheduled Time	Labor Operations
Apply New Label . . . . .	0.2 Hrs.	B82

CLAIMS PREPARATION INSTRUCTIONS (A copy of these instructions should be placed in Subject 5.5 or 9.0 of your Warranty and Policy Manual).

^ Installation of the label for this program will be performed at no charge to owners of eligible trucks.

^ Claim forms 1863 for this program must include standard claim preparation procedures and the information shown below. Program number B82 must be entered in the Program Code box in the upper left of the forms.

Causal Basic Part Number -	1020472
Condition Code	- 79
Labor Operations	- B82
Scheduled Time	- 0.2 Hours
Program Code	- B82

## NOTIFICATION

Owners of affected trucks will be notified with the letter shown on Attachment II. A revised label will be included with the letter.

**Owner Letter Information**

December, 1987

Dear Owner:

Ford Motor Company has found that the truck described below requires the attachment of the enclosed Safety Compliance Certification label.

Vehicle Description:

Serial Number:

Reason For The Program:

The Accessory Reserve Capacity (ARC) weights shown on the Safety Compliance Certification label (located on the driver's door lock pillar) are too heavy. ARC weights indicate the maximum allowable weight of permanent accessories or equipment that can be installed on a vehicle. ARC weights are described in your Owner Guide under "Vehicle Load Capacity".

What Might Happen:

^ ARC weights that are too heavy indicate that too much additional accessory weight can be added to the truck. The additional weight could cause your truck to weigh more than the weight for which it was certified to applicable safety standards.

^ Installation of the allowable accessory weights shown also could result in loading the front axle to more than its GAWR (Gross Axle Weight Rating).

What You Should Do:

Please apply the label to your truck over the existing certification label. This label is located on the door lock pillar on the driver's side of the truck. If you prefer, your Ford dealer will install the label. If permanent accessories have already been installed and you are unsure of the total weight effect, contact your Ford dealer. Your dealer will assist you with overall weight and front axle weight loading determination.

To Install New Label:

^ Check to see that the truck identification number on the new label is the same as that on the original label (located on the door lock pillar on the driver's side). If they are not the same, don't install it. Contact your Ford dealer.

^ Do not try to remove the original label. Clean the surface of the original label by wiping it with a clean, dry cloth to remove any dirt or film that may be there.

^ Peel the backing off the new label and apply the new label directly over the original label on the door lock pillar. Rub the new label lightly with a soft cloth to remove any wrinkles or bubbles.

## CUSTOMER INFORMATION SYSTEM

Under the Ford Customer Information System, you're able to obtain information from Ford regarding Ford-Paid Repair Programs and Technical Service Bulletins for your vehicle or the vehicle of interest to you at no charge.

### • FORD-PAID REPAIR PROGRAMS AFTER THE WARRANTY PERIOD.

Sometimes Ford offers adjustment programs to pay all or part of the cost of certain repairs after the written warranty expires, which can save you money. These programs are not recalls. They aren't required by any governmental agency. They're initiated by us and are intended to help our owners.

### • TECHNICAL SERVICE BULLETINS.

All vehicles need repairs during their lifetime. Sometimes Ford issues Technical Service Bulletins and easy-to-read explanations describing unusual engine or transmission conditions which could lead to costly repairs. We recommend what should be done and offer the latest repair procedures to protect against a more costly repair later.

To get copies of these bulletins or information concerning any adjustment programs relating to your vehicle or to obtain a one-year subscription to the Information System, just ask your Ford or Lincoln-Mercury dealer, call us toll-free 24 hours a day at 1-800-241-3673 (in Alaska or Hawaii, call 1-800-241-3711; in Georgia, call 1-800-282-0959), or write:

Ford Customer Information System,  
P.O. Box 95427  
Atlanta, GA 30347.

We'll need to know your name and address;  
year, make and model of your vehicle; engine size; and whether you have a  
manual or automatic transmission.

Included with this letter you will find the Ford Customer Information announcement. This system provides information on programs such as the program described in this letter and other information that may be of interest to you.

Technical Service Bulletin # **901110**

Date: **900523**

## Steering/Suspension - Shimmy

Article No. 90-11-10

- ^ STEERING-SHIMMY-DIAGNOSTIC PROCEDURE-4X2 UNITS ONLY
- ^ SUSPENSION-SHIMMY-DIAGNOSTIC PROCEDURE- 4X2 UNITS ONLY

LIGHT TRUCK: 1987-89 F-350

**ISSUE:** Front end shimmy may occur at various driving speeds or when hitting bumps in the road. There are several vehicle conditions sometimes described by customers as shimmy which may not actually be "shimmy". Shimmy, as observed by the driver, is defined as large amplitude, rotational oscillations of the steering wheel resulting from large, side to side tire/wheel movements.

**ACTION:** Inspect the truck and perform the following diagnosis to determine the shimmy's causal factors. Be aware of the following points:

- ^ Shimmy is not always confirmed during road testing.
- ^ It is very important to check all systems that can cause shimmy.
- ^ After a general review of the front suspension/steering systems, make the necessary adjustments and replacements as noted.
- ^ Check bolt and nut torques to be sure they are tightened to the specified torque specifications.
- ^ Check the front end alignment. Look for excessively worn tires and out of balance wheel and tire assemblies.

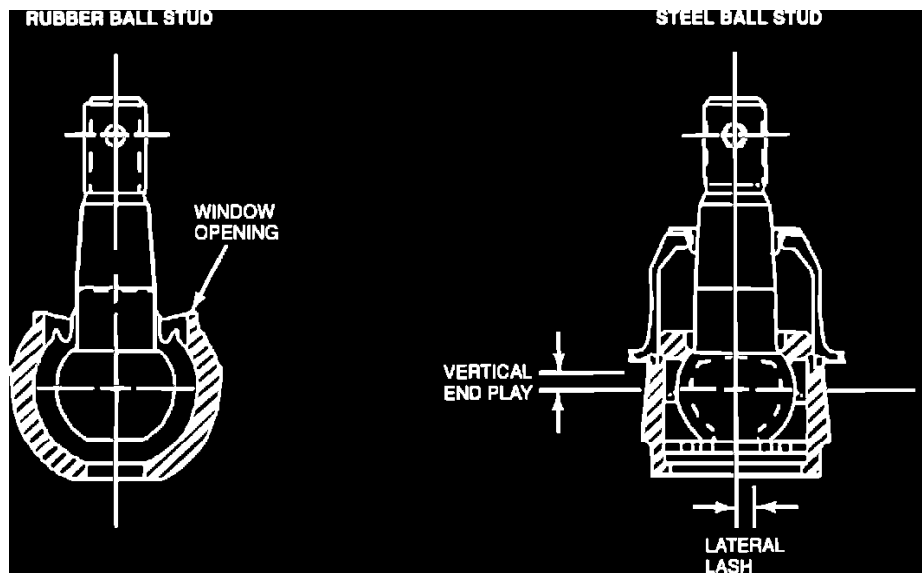
Shimmy should not be confused with steering wheel nibble and vibration concerns.

- ^ Steering wheel nibble is a condition resulting from the tire interaction with various road surfaces. It is observed by the driver as small amplitude, rotational oscillations of the steering wheel.
- ^ Various suspension/steering vibrations are sometimes confused as shimmy. They appear as steering column shake and wheel/tire imbalance. They induce a vertical motion in the steering wheel/column.

Refer to the appropriate model year Light Truck Shop Manual, Sections 18-01, 11-01 and 12-01 for NVH conditions other than shimmy.

## Steering Linkage Inspection:

1. With the weight on the front wheels, check the linkage joints while someone else turns the steering wheel from side to side.



**Figure 1**

- a. For rubber ball socket (RBS) joints, see if the ball stud makes contact with the window opening in the socket bowl while on the truck, Figure 1. If contact is made with the window opening, replace it with a greaseable steel joint.
- b. For steel (greaseable) joints, measure the lateral (side to side) lash in the joint, Figure 1.
  1. If the lash exceeds .060" (1.59 mm), replace the joint.
  2. With the truck on a hoist, check the steel (greaseable) joints for vertical (up and down) end play by pushing and pulling on the joint, Figure 1. If the end play exceeds .090" (2.38 mm), replace the joint.

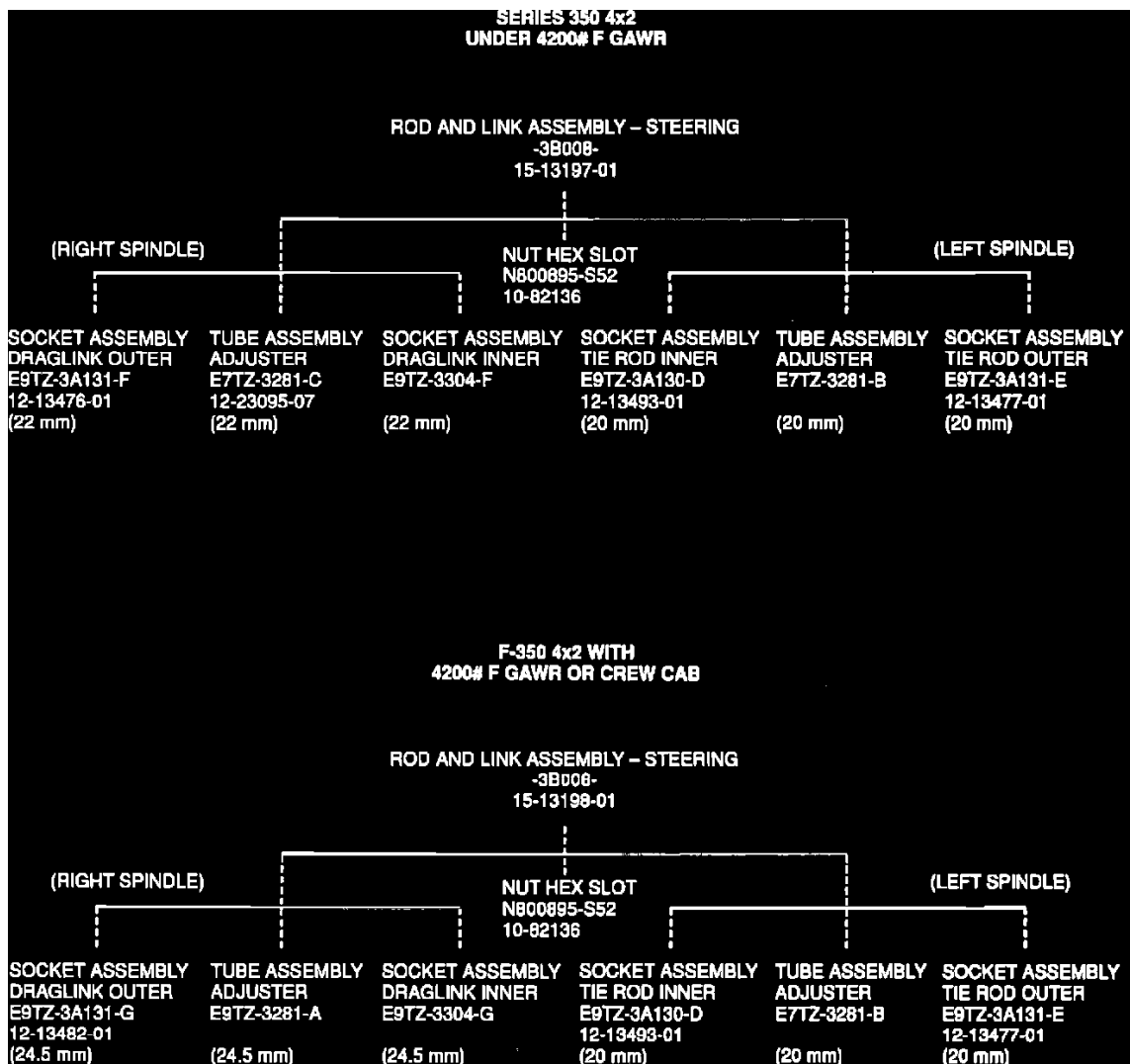


Figure 2

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B483-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

3. Remove the linkage from the truck, Figure 2.
  - a. See if the rubber is torn on the RBS. If the rubber is torn, replace it with a greaseable steel joint.
  - b. See if the steel joint will spin freely. If the joint spins freely with the hand, replace the joint.

Refer to Figure 2 for specific service part applications.

## Steering Gear Inspection:

1. Inspect the mounting surface of the steering gear. Check the frame area for the following:
  - ^ Signs of motion
  - ^ Loose rivets
  - ^ Cracks - Removal of the gear from the frame may be required to check for cracks.

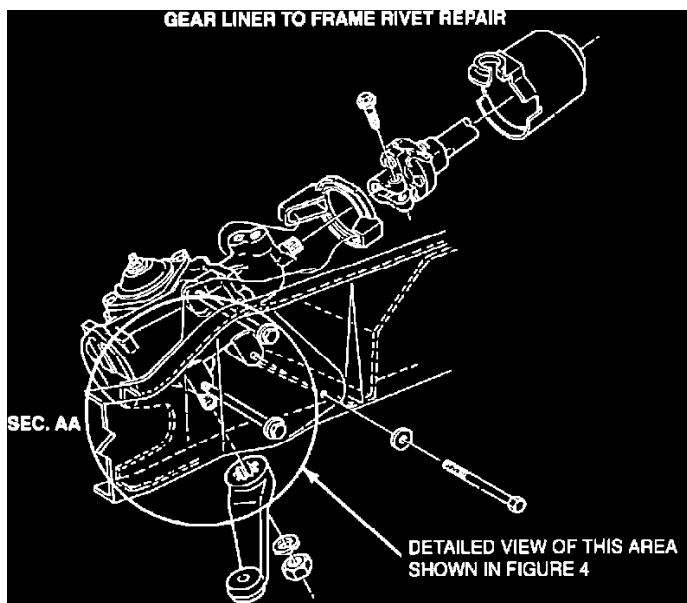


Figure 3

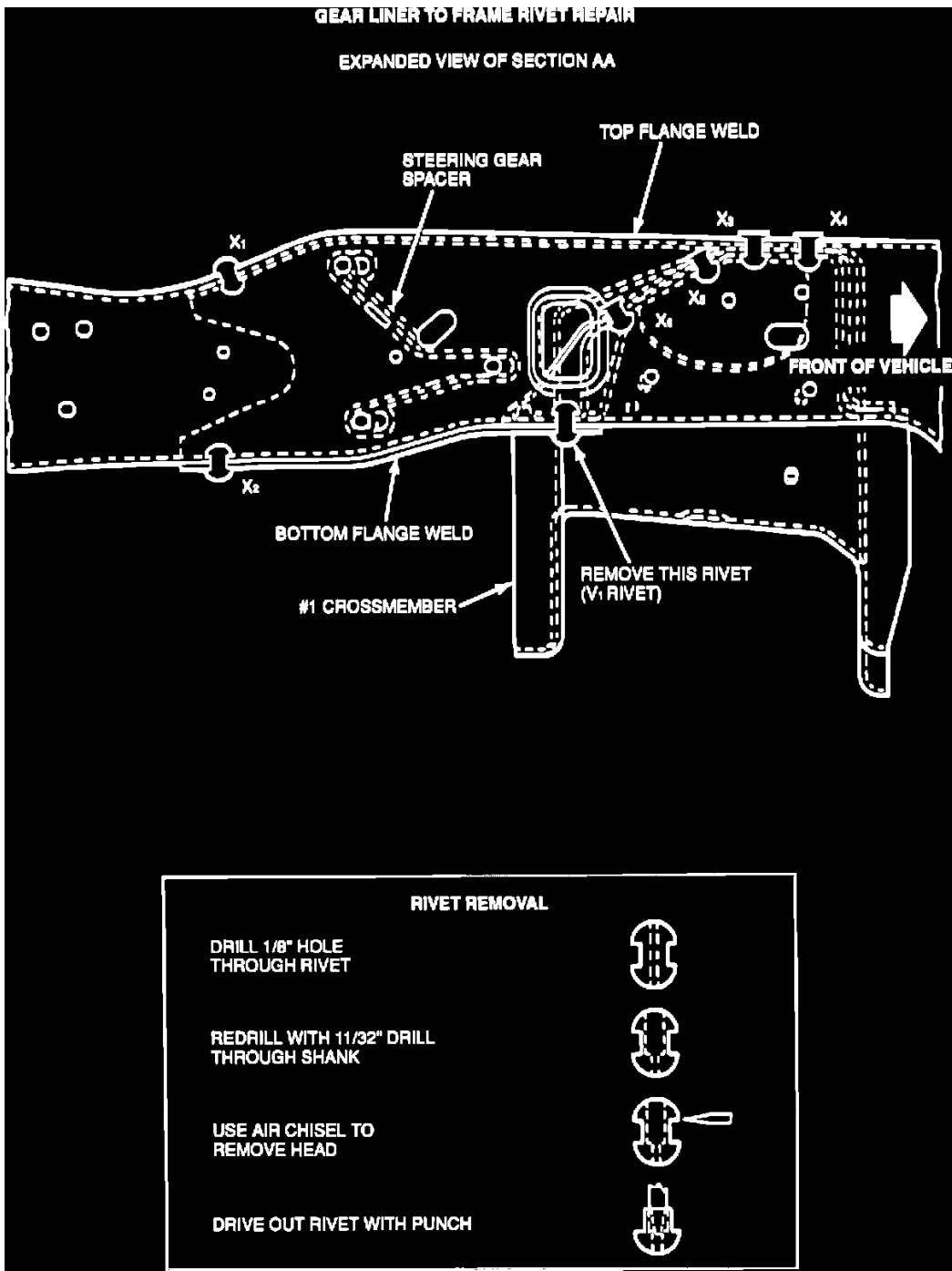
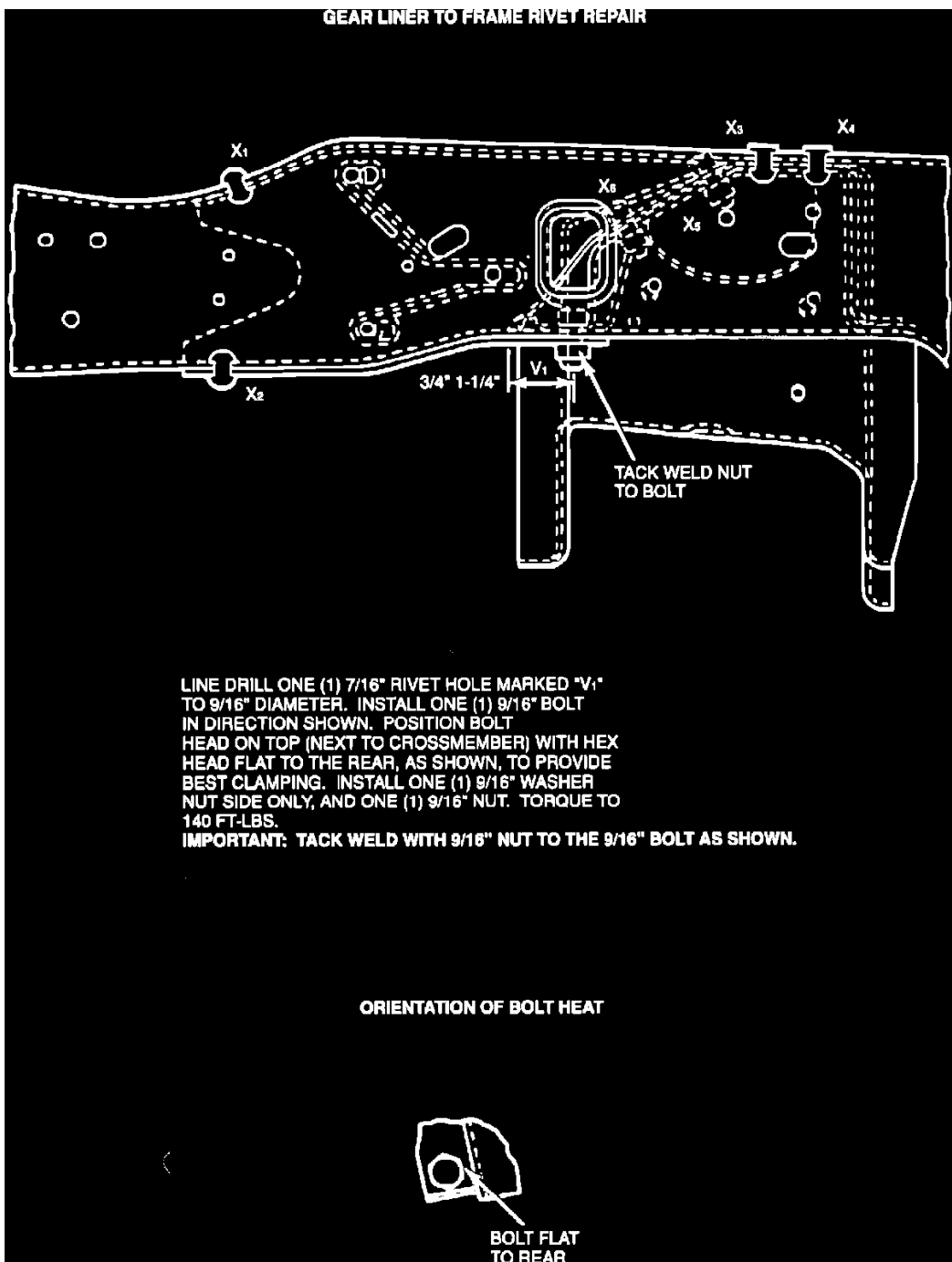


Figure 4



LINE DRILL ONE (1) 7/16" RIVET HOLE MARKED "V1" TO 9/16" DIAMETER. INSTALL ONE (1) 9/16" BOLT IN DIRECTION SHOWN. POSITION BOLT HEAD ON TOP (NEXT TO CROSSMEMBER) WITH HEX HEAD FLAT TO THE REAR, AS SHOWN, TO PROVIDE BEST CLAMPING. INSTALL ONE (1) 9/16" WASHER NUT SIDE ONLY, AND ONE (1) 9/16" NUT. TORQUE TO 140 FT-LBS.  
**IMPORTANT: TACK WELD WITH 9/16" NUT TO THE 9/16" BOLT AS SHOWN.**

Figure 5

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

2. Repair trucks with a cracked frame liner or loose rivets by using Frame Repair Kit (E6TZ-5K130-A). See Figures 3, 4 and 5.
3. Inspect the frame for cracks in the following areas.
  - ^ Frame rail near the steering gear top and bottom flanges
  - ^ Frame rail at the steering gear bolt heads.
  - ^ Frame rail at or near the spring tower bracket
  - ^ Engine crossmember front LH flange.
4. If there are cracks in any of the above locations, replace the frame.
5. If a dealer confirmed shimmy has been experienced, replace the steering gear sector shaft. Use steering gear sector shaft repair kit (EOAZ-3375-A). Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.
6. Check for the presence of mesh load.
  - a. With the front wheels off the ground, hold the tire and turn the tire side to side slowly.
  - b. See if the effort increases when turning the tire straight ahead.
  - c. If no increase is noted, perform the Shop Manual procedure to check and adjust mesh load. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.

### Wheel End Friction and Wheel Bearing End Play Inspection:

1. Inspect the vehicle for worn ball joints. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 14 for service details. Replace as required.
2. Check the wheel bearing end play. Refer to the appropriate model year Light Truck Shop Manual, Vol A, Section 14 for service details. Adjust the end play or replace the wheel bearings as required.

### Vehicle Desensitizing

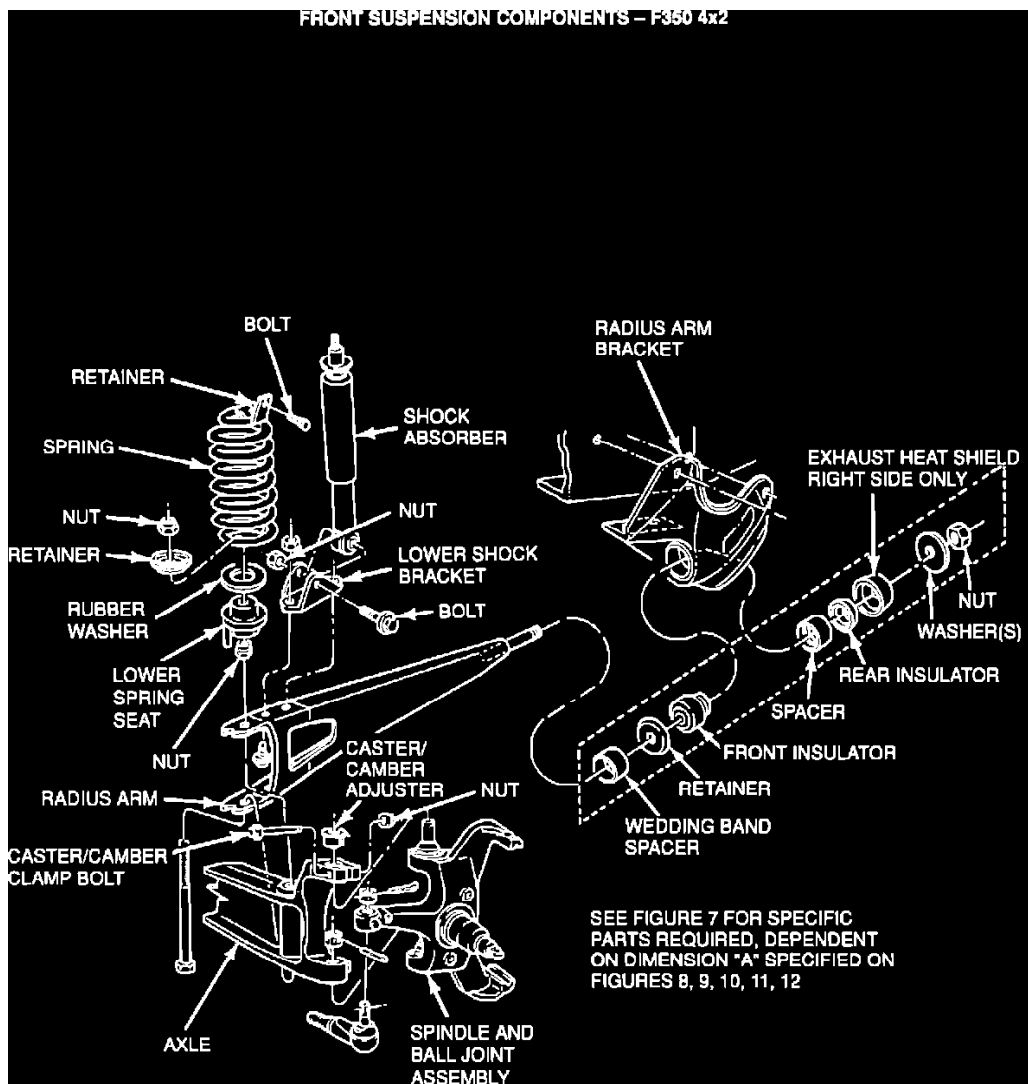


Figure 6

SKETCH NO.	RADIUS ARM STUD LENGTH (DIM. "A") UNTHREADED	WEDDING BAND N804264-S2 8 mm THICK	RETAINER 3B186	INSULATOR FRONT E7TZ-3B203-A	BRACKET E41Z-3B095-B (L.H.) E41Z-3B095-A (R.H.)	SPACER E5TZ-3B244-A	INSULATOR REAR D8TZ-3B203-A	HEAT SHIELD (R.H. ONLY) E4TZ-3B483-A	WASHER 4.5 mm THICK 379572-S2	WASHER 7 mm THICK N805144-S56	NUT 34892-S2	(FRAME MOUNTED) RADIUS ARM		
												Y	Y	Y
2	F350 4x2 DRW	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y		
3	67.7/69.2 mm 74.7/76.2 mm	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y		
3.2	F350 SRW	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y		
3.4	67.7/69.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y		
3.6	74.7/76.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y		

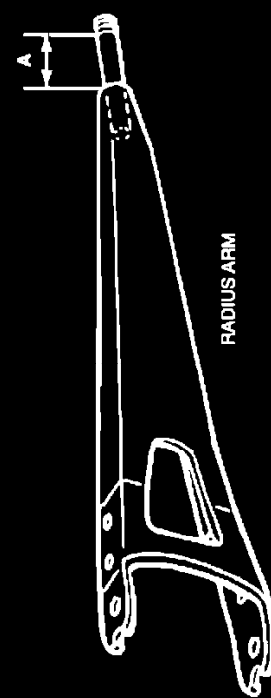


Figure 7

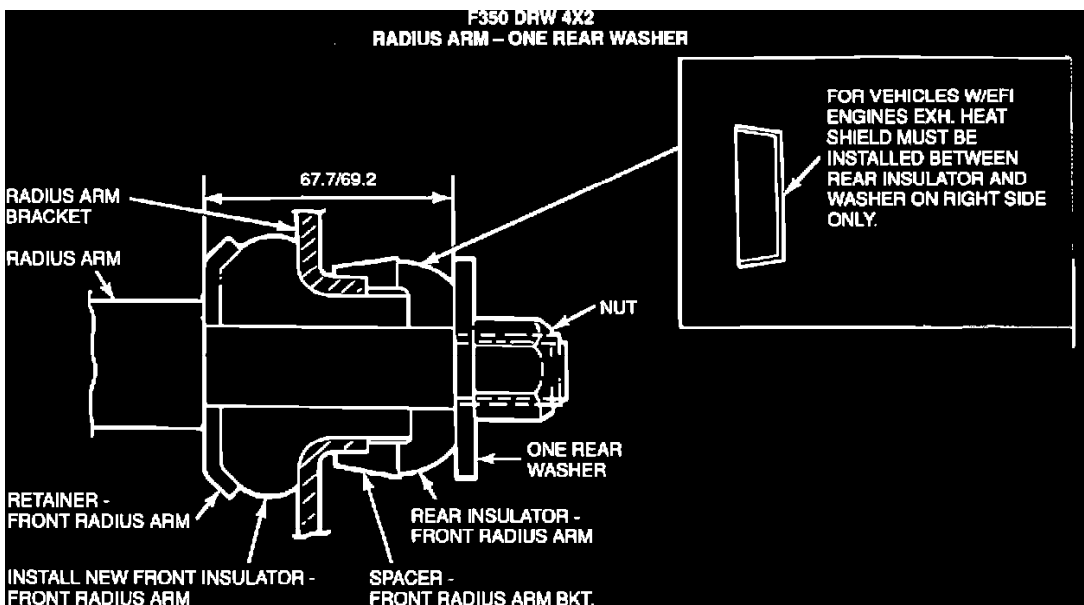


Figure 8

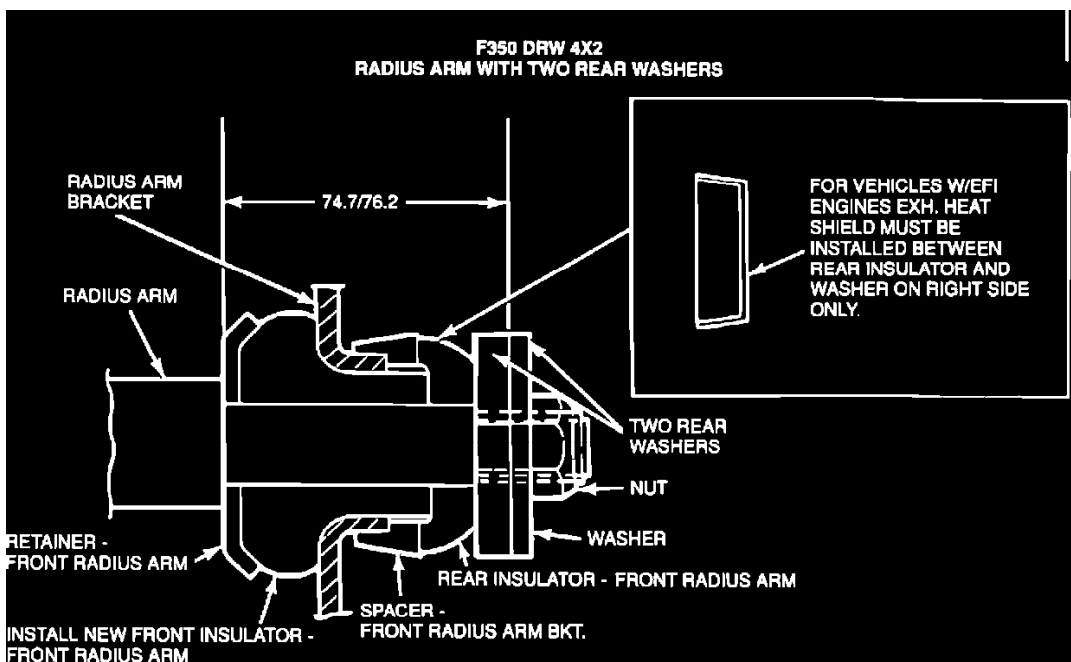


Figure 9

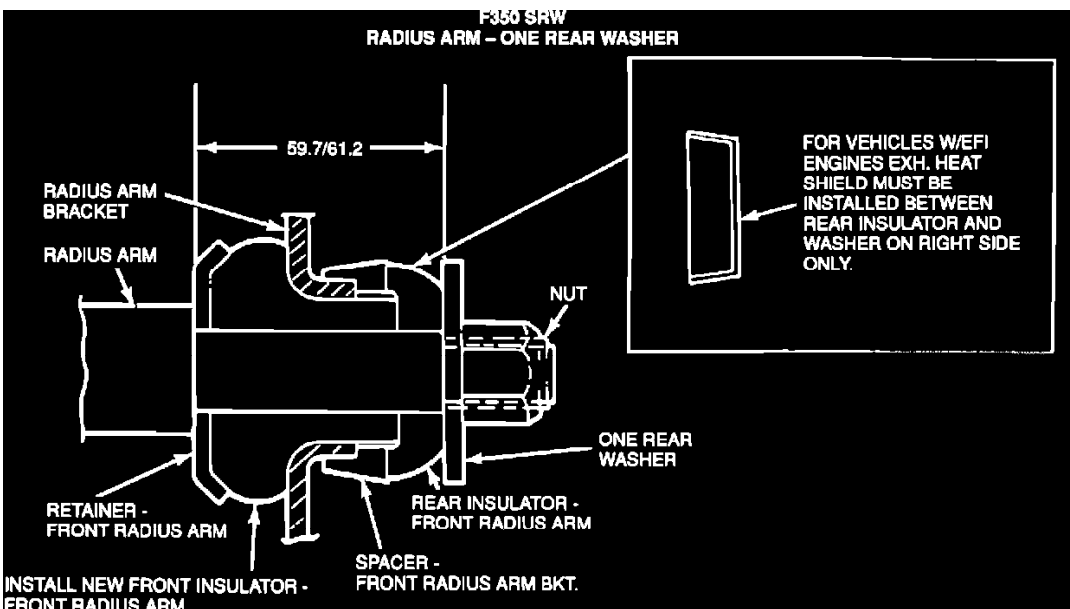


Figure 10

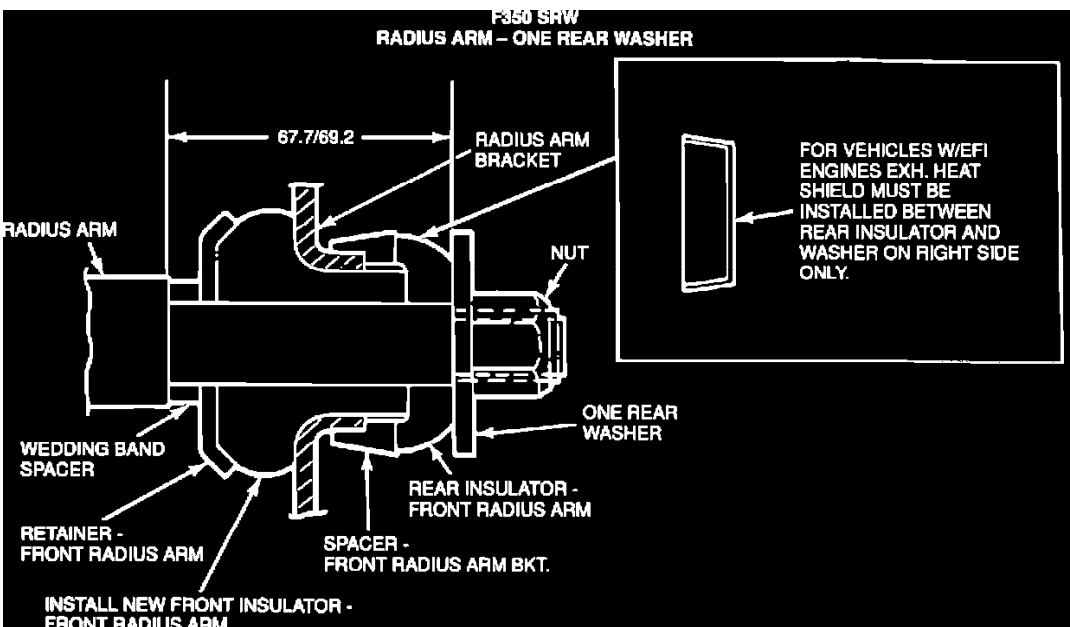
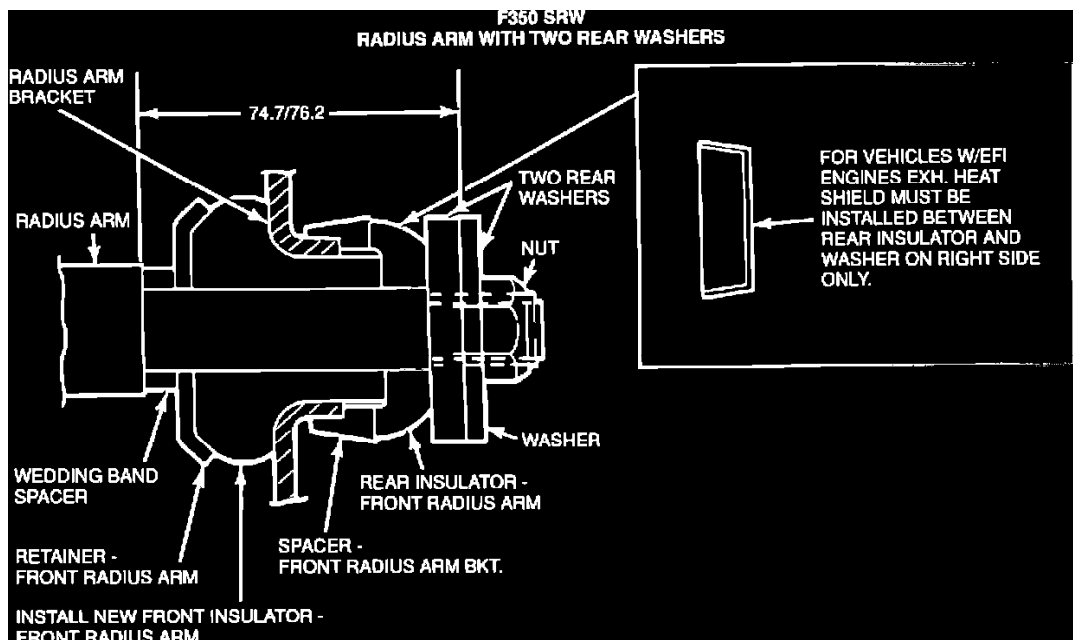


Figure 11



**Figure 12**

1. Inspect the radius arm bushing part stack, Figure 7.
2. Measure the radius arm stud length. See the component matrix, Figure 7, to determine the parts involved and the bushing part stack height for the F-350 DRW 4x2 and the F-350 SRW 4x2. Figures 6 through 12 show the radius arm bushing stack for each truck and follows the matrix.
3. Install rubber bushing (E7TZ-3B203-A) if it is not present on the vehicle.

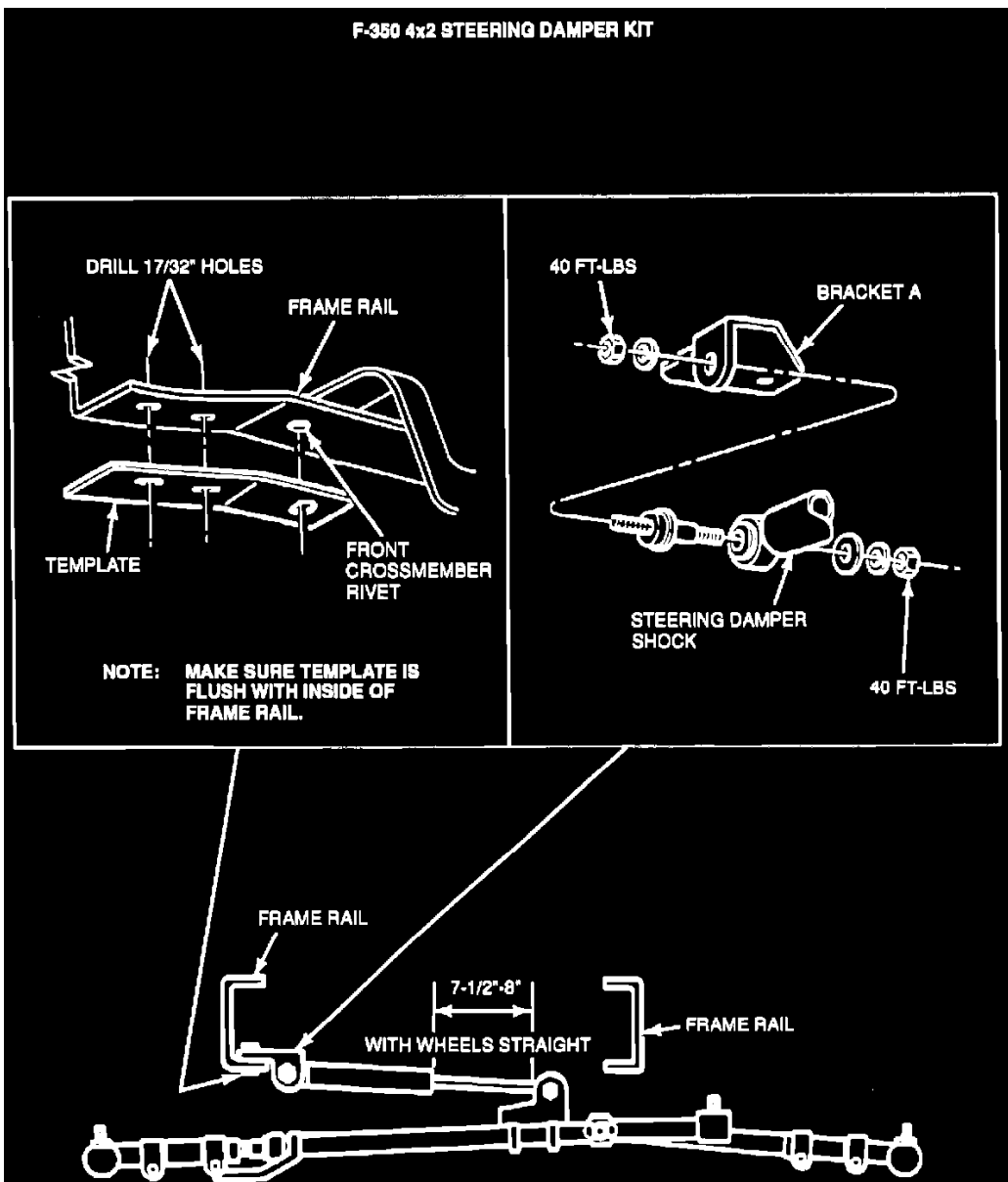


Figure 13

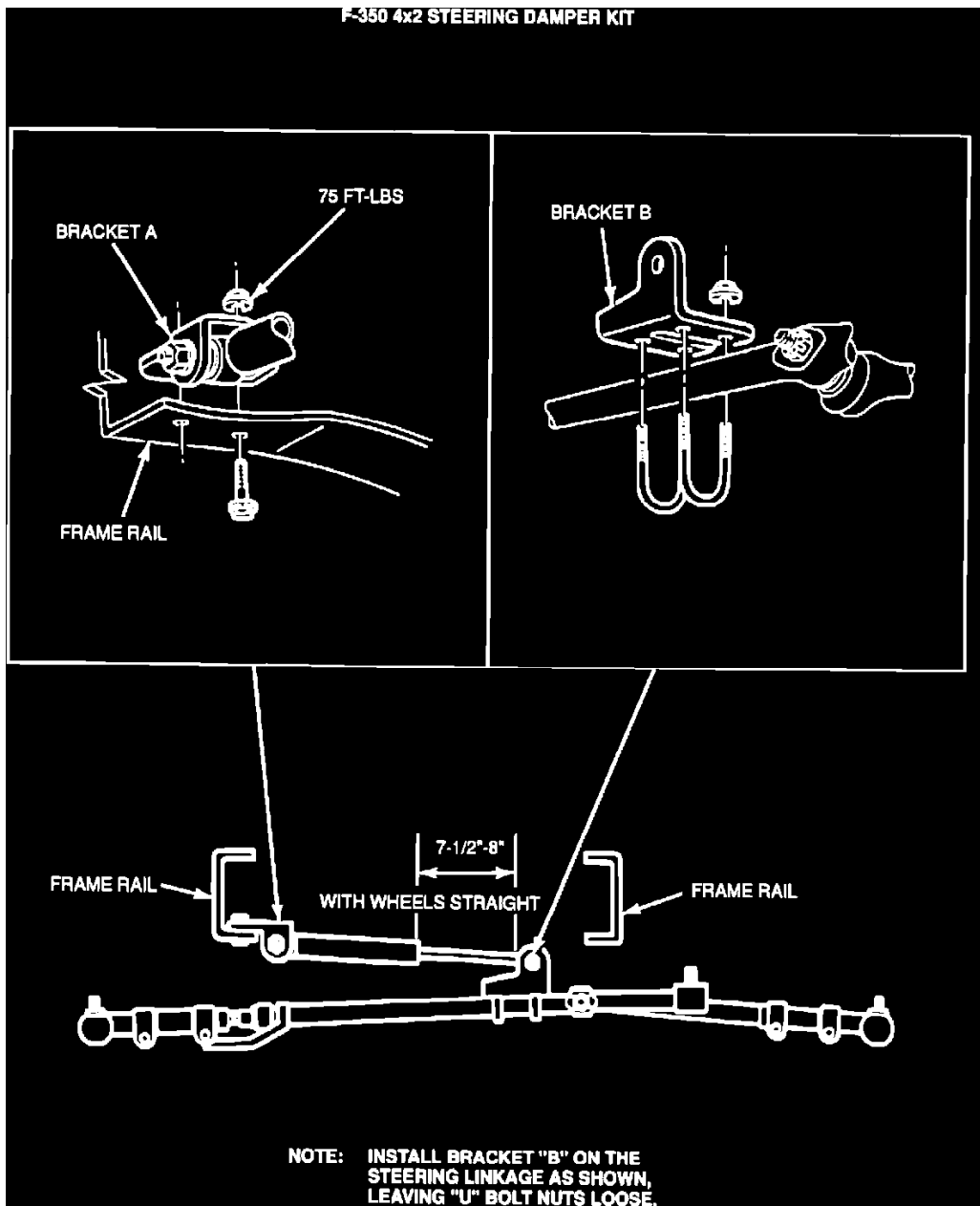


Figure 14

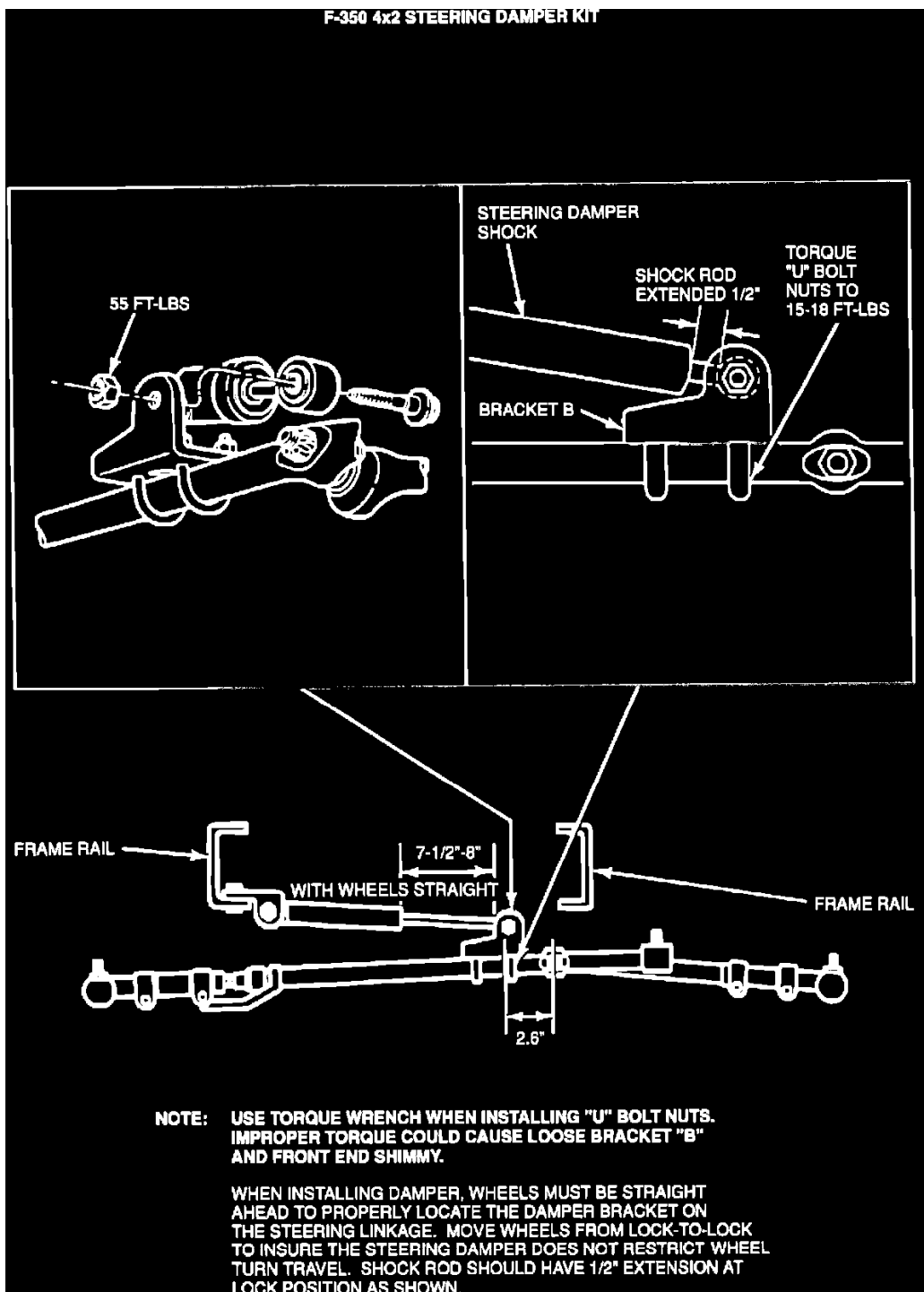


Figure 15

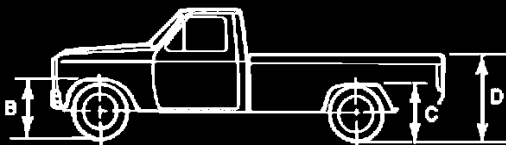
PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
E0AZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

4. Check the truck for the presence of a steering damper on F-350 DRW 4x2 vehicles. See Figure 13, 14 and 15 for a step by step installation procedure.
5. Install a damper (Service Kit E7TZ-3E651-A) on F-350 DRW 4x2 only if it is not present on trucks built before 1/6/88. A damper kit can be installed on trucks built after 1/6/88, if a shimmy is experienced.

## Alignment

TRUCK MODEL	ALIGNMENT FACTORS DEGREES (INCH)	ALIGNMENT SPECIFICATIONS				STANDARD VEHICLE ATTITUDE -REF-			
		AT DESIGN RIDE HEIGHTS (REF)	ASSEMBLY PROCESSING	SHOP MANUAL OR IN-SERVICE CHECKING	MAXIMUM VARIATION BETWEEN WHEELS	LATERAL TILT 2) (SIDE TO SIDE HEIGHT DIFFERENCES)			DOG-TRACK
						"B" FRONTWHEEL HOUSE OPENING	"C" REAR WHEEL HOUSE OPENING	"D" REAR END OF PICKUP BOX	
F-250 4x2 F-350 4x2	CASTER	7.2	●	1) 3)	1.5	15 mm	20 mm	20 mm	30 mm
	CAMBER	-0.5	●	1)	0.7				
	TOE 4)		-0.08 ± 0.25 (-0.03 ± 0.125)	+0.08 ± 0.25 (+0.03 ± 0.125)					
	STEERING AXIS INCLINATION	13.0							
	* INCLUDED ANGLE	12.5							

\* INCLUDED ANGLE DOES NOT CHANGE WITH RIDE HEIGHT  
 ● NOT ASSEMBLY PLANT CONTROLLABLE



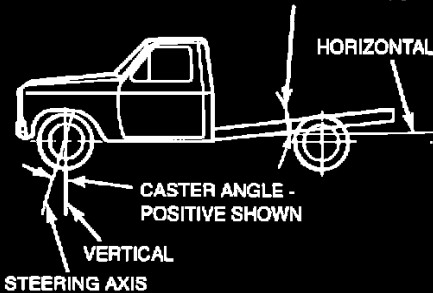
1) SEE CASTER AND CAMBER CURVES ON SHEET 2. CASTER AND CAMBER SETTINGS DEPEND ON RIDE HEIGHT DIM "A"

2) LATERAL VEHICLE TILT SPECIFICATIONS ARE MAX. ALLOWABLE FOR EITHER:  
 - VEHICLE AT CURB WEIGHT WITHOUT OCCUPANTS OR  
 - VEHICLE LOADED (NOT EXCEEDING GVW) WITH EQUALLY DISTRIBUTED WEIGHT OVER THE CARGO AND OCCUPANT AREAS

3) THE CASTER GRAPHS (SEE SHEET 2) AGREE WITH A LEVEL VEHICLE (0° FRAME ANGLE). IF THE VEHICLE IS LOWER IN THE FRONT THEN ADD THE FRAME ANGLE TO THE MEASURED CASTER READING AND COMPARE THIS SUM TO THE GRAPHED SPECIFICATIONS FOR THE GIVEN RIDE HEIGHT. IF THE VEHICLE IS LOWER IN THE REAR THEN SUBTRACT BEFORE COMPARING TO SPECIFICATION

4) TOE IS SET AND TO BE CHECKED AGAINST SPECIFICATION IN-SERVICE AT CURB RIDE HEIGHT ONLY. CURB RIDE HEIGHT IS A VEHICLE AS BUILT FROM THE ASSEMBLY PLANT, FULL FLUIDS, WITH NO ADDITIONAL WEIGHT FROM PASSENGERS, CARGO, AFTER MARKET ITEMS OR BODY MODIFICATIONS. TOE MAY BE RESET TO THE SHOP MANUAL OR OTHER RECOMMENDED SETTING AT ANY RIDE HEIGHT THAT THE VEHICLE WILL OPERATE AT FOR AT LEAST 50 PERCENT OF ITS USE. HOWEVER, TOE SET TO THE SHOP MANUAL SPECIFICATION AT CURB PROVIDES OPTIMUM VEHICLE AND TIRE WEAR PERFORMANCE FOR ALL RIDE HEIGHTS BETWEEN CURB (UNLOADED) AND GVW

FRAME ANGLE - MEASURE IN FLAT AREA AHEAD OF REAR WHEELS



INCLUDED ANGLE

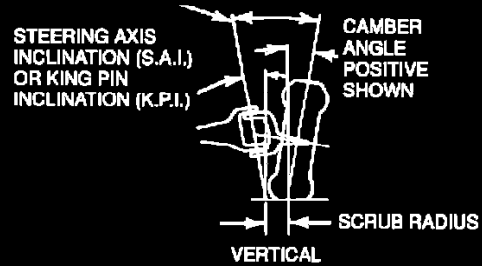


Figure 16

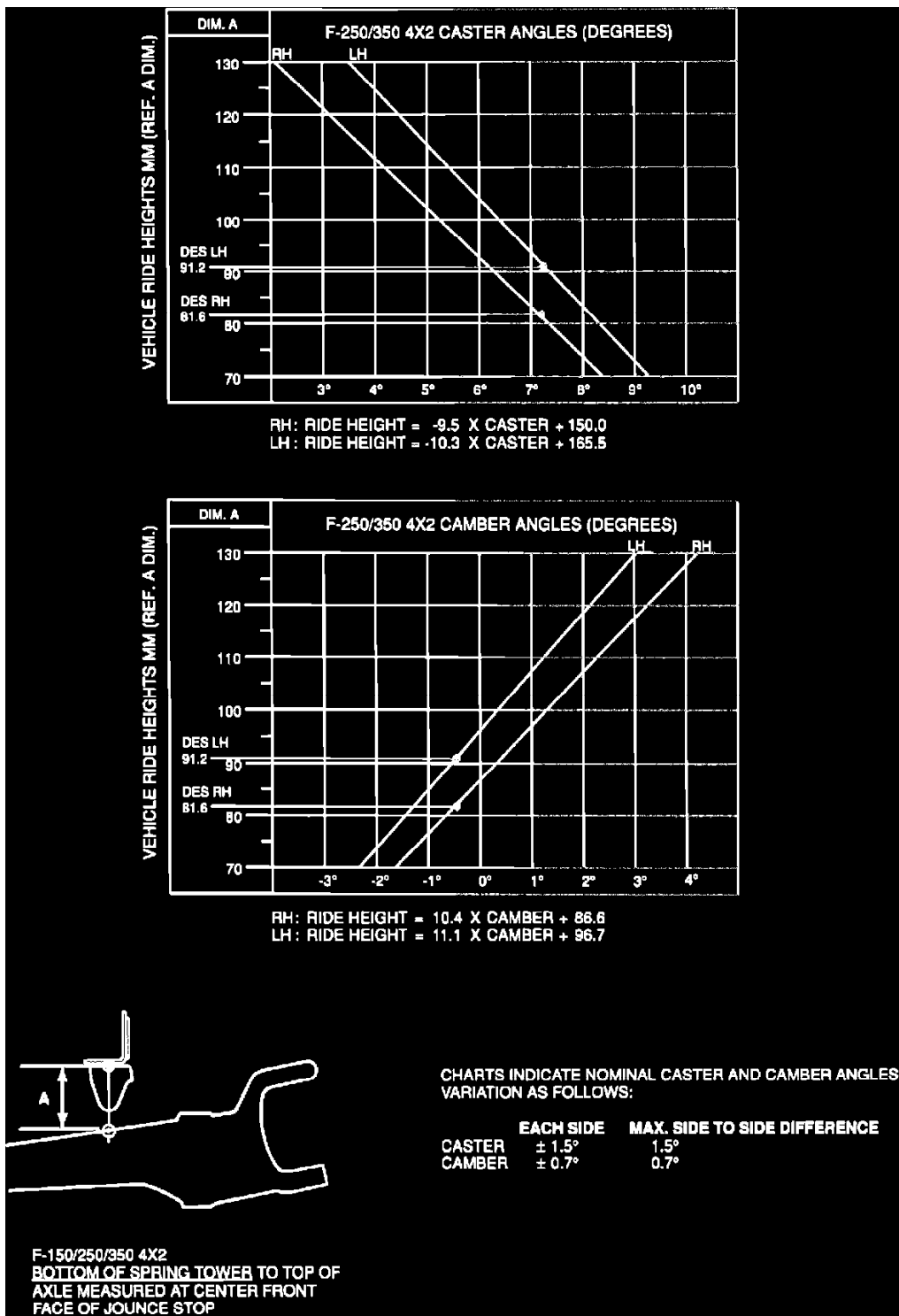


Figure 17

CAMBER OF 0 +/- 1/2~ AS VEHICLE IS OPERATED IS OPTIMUM

1. For vehicles with constant load (utility bodies) - Set camber to 0 +/- 1/2~. Refer to Figures 16 and 17.
2. For vehicles with varying loads (wreckers, dumps, rollback tilts, stake racks, etc.), proceed as follows:
  - a. Have the customer measure fender to ground heights, at wheel centerline with vehicle empty and loaded.
  - b. Measure the front end alignment..
    - ^ Caster
    - ^ Camber

- ^ Toe
- ^ Ride height
- ^ Front fender height to ground
- c. Determine the difference of customer measured loaded and empty fender height to ground when the alignment is measured.
- d. Compute camber at customer measured heights by adding 3/4~ per 1/2" height difference for higher customer heights. Subtract 3/4~ per 1/2" height for lower measured fender heights to measured camber.
- e. Compute the average camber by averaging the high and low numbers.
- f. Reset camber with computed average between 0 + 1/2~.

## TOE

- 3. Set Toe to 0 +/- 1/2~.

## CASTER

- 4. Set caster as shown in the Shop Manual according to ride height.

## Wheels/Tires Size, Pressure, Balance, Wear

1987 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHLS	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/86R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Argent Wheel/Optional Black - Wheel E5TA-UB

1988 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHLS	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	60
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Gray Wheel/Optional - Black Wheel E7UA-JA

1989 F-350 TIRE/WHEEL RELEASES									
F-350 MODEL	WHL	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR	REMARKS
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80	HD FT END OPT
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80	
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Super Cab	D/R	155	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
		161	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	

\* Gray Wheel/Optional Black Wheel E7UA-1A

RECOMMENDED TIRE USAGE - 1989 F-350 TIRE RELEASES							
APPROVED SUPPLIER	LT215/85R16 LRD - A/S	LT215/85R16 LRD - A/T	LT235/85R16 LRE - A/S	LT235/85R16 LRE - A/T	7.50R - 16 LRD - HWY	7.50R - 16 LRD - A/T	7.50R - 16 LRD - M-S
Firestone	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88
Michelin	87/88/89		87/88/89	87/88/89			
Goodyear		87/88/89	87/88/89		87		87/88
General			87/88/89	87/88/89			

#### SIZE AND PRESSURE

- Compare the tire and wheel with the sizes and pressures on the certification label or the following Tire/Wheel Release Charts to make sure the correct tire is used. Inflate the tire to the specified pressure.

#### BALANCE

- Make sure of the correct balance of the front wheels.

#### WEAR

- If heel and toe wear or edge wear are present, rotate the tires.
  - ^ For single rear wheels the same tread styles front and rear, cross rotate all four tires.
  - ^ For single rear wheels with different tread styles, cross switch the front tires.
  - ^ For all dual rear wheels, cross switch the front tires.

Check and reset tire pressure per the certification label or the following Tire/Wheel Release Charts.

NOTE: FOR TIRES WORN TO THE POINT OF REPLACEMENT, USE RELEASED TIRES AS SHOWN IN THE FOLLOWING TIRE/WHEEL RELEASE CHARTS.

## Parts, Time & Etc

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
901110A	Steering Linkage Inspection	0.4 Hr.
901110B	Steering Gear Inspection	0.2 Hr.
901110C	Install Frame Kit	11.7 Hr.
901110D	Install Sector Shaft Repair Kit	0.4 Hr.
901110E	Adjust Steering Gear	0.6 Hr.
901110F	Wheel Bearing End Play Inspection	0.2 Hr.
901110G	Vehicle Desensitizing	1.3 Hr.
901110H	Alignment	1.7 Hr.
901110I	Tire Rotation & Balance	0.9 Hr.

DEALER CODING

BASIC PART NO.      CONDITION CODE

FRONT                      W4

OASIS CODES: 3100, 3200

Technical Service Bulletin # **92186**Date: **920826****Engine - Metal to Metal Noise**

Article No.

92-18-6

08/26/92

- ^ ENGINE - 5.0L - THRUST BEARING OR CRANKSHAFT PREMATURE WEAR - VEHICLES WITH AOD TRANSMISSION
- ^ NOISE - "METAL-TO-METAL" SOUND - 5.0L WITH AOD TRANSMISSION
- ^ TRANSMISSION - AOD - INTERFERENCE BETWEEN THE TORQUE CONVERTER AND THE FLYWHEEL BOLTS

FORD:

1982-88 THUNDERBIRD

1982-90 MUSTANG

1986 LTD

1987-90 CROWN VICTORIA

LINCOLN-MERCURY:

1982-87 CAPRI, CONTINENTAL

1982-88 COUGAR

1982-90 TOWN CAR

1984-90 MARK VII

1987-90 GRAND MARQUIS

LIGHT TRUCK:

1982-90 BRONCO, E-150, E-250, F-150, F-250

This TSB article is being republished in its entirety to include the 1982-1987 Continental and the 1982-1990 Town Car.

ISSUE:

An unusual "metal-to-metal" noise from the engine may be caused by the flexing of the torque converter. The flexing condition causes an interference between the torque converter and flywheel bolts. The interference can cause the thrust bearing and the crankshaft to wear prematurely and eventually fail.

ACTION:

Install six (6) new flywheel bolts with reduced head height to provide additional clearance. Refer to the appropriate Shop Manual, 5.0L Engine Section, for service details.

NOTE:

WHEN A CRANKSHAFT IS REPLACED DUE TO THRUST BEARING FAILURE, INSTALL A NEW CRANKSHAFT THAT HAS A REVISED PILOT HOLE. THIS WILL PROVIDE ADDITIONAL CLEARANCE FOR THE TORQUE CONVERTER. USE NEW FLYWHEEL BOLTS.

PART NUMBER	PART NAME	CLASS
F1AZ-6303-B	Crankshaft	B
F1ZZ-6379-A	Flywheel Bolts (6 Req.)	B

PART NUMBER

OTHER APPLICABLE ARTICLES: NONE		
SUPERSEDES: 92-15-7		
WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Major Component Warranty Coverage, Powertrain Warranty Coverage		
OPERATION	DESCRIPTION	TIME
921806A	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Mustang	7.2 Hr.
921806B	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Thunderbird/Cougar	7.1 Hr.
921806C	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Crown Victoria/Grand Marquis	6.6 Hr.
921806D	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - E 150-250 All Models	10.3 Hr.
921806E	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - F 150-250 All 4X2 Models	8.6 Hr.
921806F	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - F 150-250 All 4X4 And Bronco Models	8.7 Hr.
921806G	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Mark VII	9.0 Hrs.
921806H	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Town Car	8.7 Hr.
921806I	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Continental	8.8 Hr.
DEALER CODING		
	BASIC PART NO.	CONDITION CODE
	6303	56
OASIS CODES: 497000, 499000, 504000, 597997, 702000		

Operation Description

Technical Service Bulletin # **88621**

Date: **880316**

## Driveshaft - Clicking/Popping Noise

^ DRIVELINE - ALUMINUM DRIVESHAFT - "CLICKING" OR "POPPING" NOISE

Article No.  
88-6-21

^ NOISE - "CLICKING" OR "POPPING" - ALUMINUM DRIVESHAFT

LIGHT TRUCK: 1986-88 AEROSTAR  
1987-88 E-SERIES, F-SERIES

ISSUE: A "clicking" or "popping" noise from the driveshaft during transmission engagement or when accelerating from a stop may be caused by inadequate tubeto-yoke bonding on the aluminum driveshaft.

ALUMINUM DRIVESHAFT APPLICATION CHART				
Part Number	Vehicle	Engine	Transmission	Axle
E8TZ-4602-W	1987-88 F-150 (4x2) 133" Wheel Base	4.9L	M50D	2.73/3.08/3.55
		5.0L	AOD	3.55
		5.0L	M50D	3.08
		5.0L	T18	3.55
E8TZ-4602-Y	1987-88 F-250 LD (4x2) 133" Wheel Base	4.9L	M50D	3.55
		4.9L	T18	3.55
		5.0L	M50D	3.55
		5.0L	T18	3.73/4.10
		5.0L	AOD	4.10
E8TZ-4602-Z	1987-88 F-250 LD (4x2) 133" Wheel Base	4.9L	C6	3.55
		5.8L	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-Z	1987-88 F-250 HD (4x2) 133" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-Z	1987-88 F-350 SRW/DRW (4x2) 133" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-AB	1987-88 F-350 DRW (4x2) 136" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8UZ-4602-C	1987-88 E-150 138" Wheel Base	4.9L	AOD	3.55
		5.0L	AOD	3.55
E8UZ-4602-D	1987-88 E-150 138" Wheel Base	4.9L	C6	3.08/3.55
		5.8L	C6	3.55
E8UZ-4602-E	1987-88 E-250 138" Wheel Base Under 8500 GVW	5.0L	AOD	3.73
E8UZ-4602-F	1987-88 E-250 138" Wheel Base Under 8500 GVW	4.9L	C6	3.54/3.73
		5.8L	C6	3.54/3.73
E8UZ-4602-F	1987-88 E-250 138" Wheel Base Club Wagon Over 8500 GVW	4.9L	C6	4.10
		5.8L	C6	4.10
		7.5L	C6	4.10
E8UZ-4602-F	1987-88 E-350 SRW 138" Wheel Base	7.5L	C6	4.10
E8UZ-4602-F	1987-88 E-350 DRW 138" Wheel Base	7.5L	C6	4.10
E8UZ-4602-F	1987-88 Super Wagon 138" Wheel Base Over 8500 GVW	4.9L	C6	4.10
		5.8L	C6	4.10
		7.5L	C6	4.10

ALUMINUM DRIVESHAFT APPLICATION CHART				
Part Number	Vehicle	Engine	Transmission	Axle
E89Z-4602-B	1988 Aerostar	3.0L	M50D	3.45/3.73
E89Z-4602-C	1986-88 Aerostar	3.0L	A4LD	3.45/3.73/4.10
E79Z-4602-A	1986-87 Aerostar	2.3L/3.0L	M50D	3.45/3.73
<b>NOTE: If a new driveshaft is required on the following applications, the original slip yoke from the old driveshaft must be used.</b>				
E8TZ-4602-W	1987 F-150 133" Wheel Base	4.9L/5.0L	NPG 435	3.55
E8TZ-4602-Y	1987 F-250 LD (4x2) 133" Wheel Base	5.0L	NPG 435	3.55/4.10

**ACTION:** To correct this, install a new aluminum driveshaft with an improved tube-to-yoke bond. Refer to the appropriate model year Shop Manual for driveshaft removal and installation procedures. Refer to the driveshaft application charts on pages 38 and 39 of this TSB for the correct part numbers.

PART NUMBER	PART NAME	CLASS
E8TZ-4602-W	Aluminum Driveshaft	C
E8TZ-4602-Y	Aluminum Driveshaft	C
E8TZ-4602-Z	Aluminum Driveshaft	C
E8TZ-4602-AB	Aluminum Driveshaft	C
E8UZ-4602-C	Aluminum Driveshaft	C
E8UZ-4602-D	Aluminum Driveshaft	C
E8UZ-4602-E	Aluminum Driveshaft	C
E8UZ-4602-F	Aluminum Driveshaft	C
E89Z-4602-B	Aluminum Driveshaft	C
E89Z-4602-C	Aluminum Driveshaft	C
E79Z-4602-A	Aluminum Driveshaft	C

**OTHER APPLICABLE ARTICLES:** Supersedes 86-23-20

**WARRANTY STATUS:** Eligible Under Powertrain Warranty Coverage

**OPERATION:** 880621A - One-piece driveshaft

**TIME:** 0.4 Hr. - Aerostar

0.3 Hr. - E-Series, F-Series

**OPERATION:** 880621B - Two-piece driveshaft

**TIME:** 0.5 Hr. - E-Series, F-Series

**DLR. CODING:** Basic Part No. 4602 - Code: 61

**Technical Service Bulletin # 881811**

Date: **880831**

## Dash Panel - Cracks At Clutch Master Cylinder

Article No. 88-18-11

- ^ DASH PANEL CRACKS AT CLUTCH MASTER CYLINDER
- ^ CLUTCH - HIGH EFFORT - DASH PANEL CRACKING
- ^ CLUTCH -SOFT PEDAL AND INCOMPLETE RELEASE

**LIGHT TRUCK:** 1987-88 F-SERIES

**ISSUE:** Incomplete clutch release and/or hydraulic fluid leaking into the cab from the clutch master cylinder may be caused by the reinforcement plate on the clutch master cylinder separating from the dash panel. The separation of the reinforcement plate reduces the clutch master cylinder pushrod travel. Reinforcement plate separation can also cause deflection of the clutch master cylinder that results in a misalignment of the pushrod to the clutch master cylinder. Misalignment causes the O-ring in front of the secondary seal to leak hydraulic fluid.

**ACTION:** To correct this, install a new service released clutch master cylinder mounting bracket. Refer to the following procedure for service details.

1. With an assistant pushing the clutch pedal down several times, check for separation between the dash panel (cowl) and the clutch master cylinder reinforcement dish.

NOTE: THIS MUST BE DONE FROM UNDER THE HOOD IN THE ENGINE COMPARTMENT.

2. If separation is present, install a new clutch master cylinder mounting bracket, (E8TZ-7K509-A for 1988 model year trucks or E3TZ-7K509-A for 1987 model year trucks). Refer to the following service details:
  - a. Remove the two (2) clutch master cylinder retaining nuts.
  - b. Position the clutch master cylinder forward.
  - c. Repair and seal the dash panel, as required.
  - d. Install the clutch master cylinder mounting bracket onto the clutch master cylinder mounting studs.
  - e. Reposition the clutch master cylinder.
  - f. Reinstall the clutch master cylinder retaining nuts. Torque to 7-11 lb.ft. (9-15 N-m).

PART NUMBER	PART NAME	CLASS
E8TZ-7K509-A	Clutch Master Cylinder Mounting Bracket	C
E3TZ-7K509-A	Clutch Master Cylinder Mounting Bracket	CG

OTHER APPLICABLE ARTICLES: 87-16-15, 86-20-10, 85-5-24, 85-5-26, 84-1-14, 83-24-22, 83-23-16

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION: 881811A - Install Mounting Bracket

TIME: 0.5 Use "M" Time To Repair Dash Panel If Required

DLR. CODING: Basic Part No. 7K509  
Condition Code: 14

- ^ CLUTCH (HYDRAULIC) - PEDAL DOES NOT FULLY RETURN - DIAGNOSTIC TIPS
- ^ TRANSMISSION - MANUAL - GEAR CLASH AND HARD SHIFTING
- ^ SPEED CONTROL - INOPERATIVE - LOW CLUTCH PEDAL ALLOWS SWITCH CIRCUIT TO REMAIN OPEN

Article No. 87-16-15

LIGHT TRUCK: 1984-87 F-150/350 BRONCO

Article No. 86-20-10

DASH PANEL CRACKS AT CLUTCH MASTER CYLINDER (6.9L (D)/7.5L)

CLUTCH - HIGH EFFORT -- DASH PANEL CRACKING/MISSHAPED RELEASE LEVER (6.9L (D)/7.5L)

CLUTCH-INCOMPLETE RELEASE  
- DIAGNOSIS (6.9L (D)/7.5L)

LIGHT TRUCK 1983-86 F-250/350

Article No. 85-5-24

CLUTCH - (HYDRAULIC) - SLOW/DELAYED RETURN - COLD WEATHER (TSB 85-1-20 PART CORRECTION)

LIGHT TRUCK 1983-84 F SERIES

Article No. 84-1-14

CLUTCH - SLIPS - (6.9L-7.5L)

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 83-23-16

CLUTCH HYDRAULIC - SLAVE CYLINDER ATTACHMENT - (6.9L DIESEL/7.5L)

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 83-24-22

TRANSMISSION - MANUAL (T-19)  
- HARD SHIFT - UNITS WITH 6.9L DIESEL

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 85-5-26

CLUTCH - HYDRAULIC SYSTEM DIAGNOSIS (F SERIES) & PARTS LISTS (ALL MODELS)

LIGHT TRUCK 1983-85 E, F, B, R, B II

Technical Service Bulletin # **90167**

Date: **900801**

## M/T - Clutch Fluid Leaks/Incomplete Release

Article No. 90-16-7

^ CRACKS - DASH (ENGINE COMPARTMENT BULKHEAD) - CLUTCH MASTER CYLINDER AREA - VEHICLES BUILT BEFORE 6/15/90

^ CLUTCH - HIGH EFFORT - DASH CRACKED IN CLUTCH MASTER CYLINDER AREA - VEHICLES BUILT BEFORE 6/15/90

LIGHT TRUCK: 1984-90 BRONCO, F-150, F-250, F-350 1988-90 F SUPER DUTY

PART NUMBER	PART NAME	CLASS
E3TZ-7K509-A	Small Reinforcement Kit (1983-87)	B
E8TZ-7K509-A	Small Reinforcement Kit (1988-91)	B
E3TZ-7K509-B	Large Reinforcement Kit (1983-1991 Severely Damaged Units)	B

**ISSUE:** Incomplete clutch release and/or hydraulic fluid leaking into the cab from the clutch master cylinder may be caused by the reinforcement plate on the clutch master cylinder separating from the dash panel. The separation of the reinforcement plate reduces the clutch master cylinder pushrod travel. Reinforcement plate separation can also cause deflection of the clutch master cylinder that results in a misalignment of the pushrod to the clutch master cylinder. Misalignment causes the "O" ring in front of the secondary seal to leak hydraulic fluid.

**ACTION:** Inspect the truck and, if necessary, use the following service procedure to install a reinforcement kit.

### Inspection Procedure

- If the truck is a 1988 or later model, confirm that the starter interlock switch operates (the engine can be started) with the clutch pedal at least 0.5" (12.7 mm) from the floor.
- Test drive the truck and check for good clutch release. There should be no grinding of the gears, particularly when shifting from neutral to reverse gear.
- If the truck passes these tests, go to the Small Reinforcement Installation Procedure Section of this article.
- If either of the above conditions are not met, check the hydraulic system for air. Refer to the Suggested Bleeding Procedure at the end of this article.
- Test drive the truck and check for improved clutch release.
- If there is no improvement, proceed as follows:
  - Remove the clutch master cylinder pushrod from the release lever pin on the release lever.

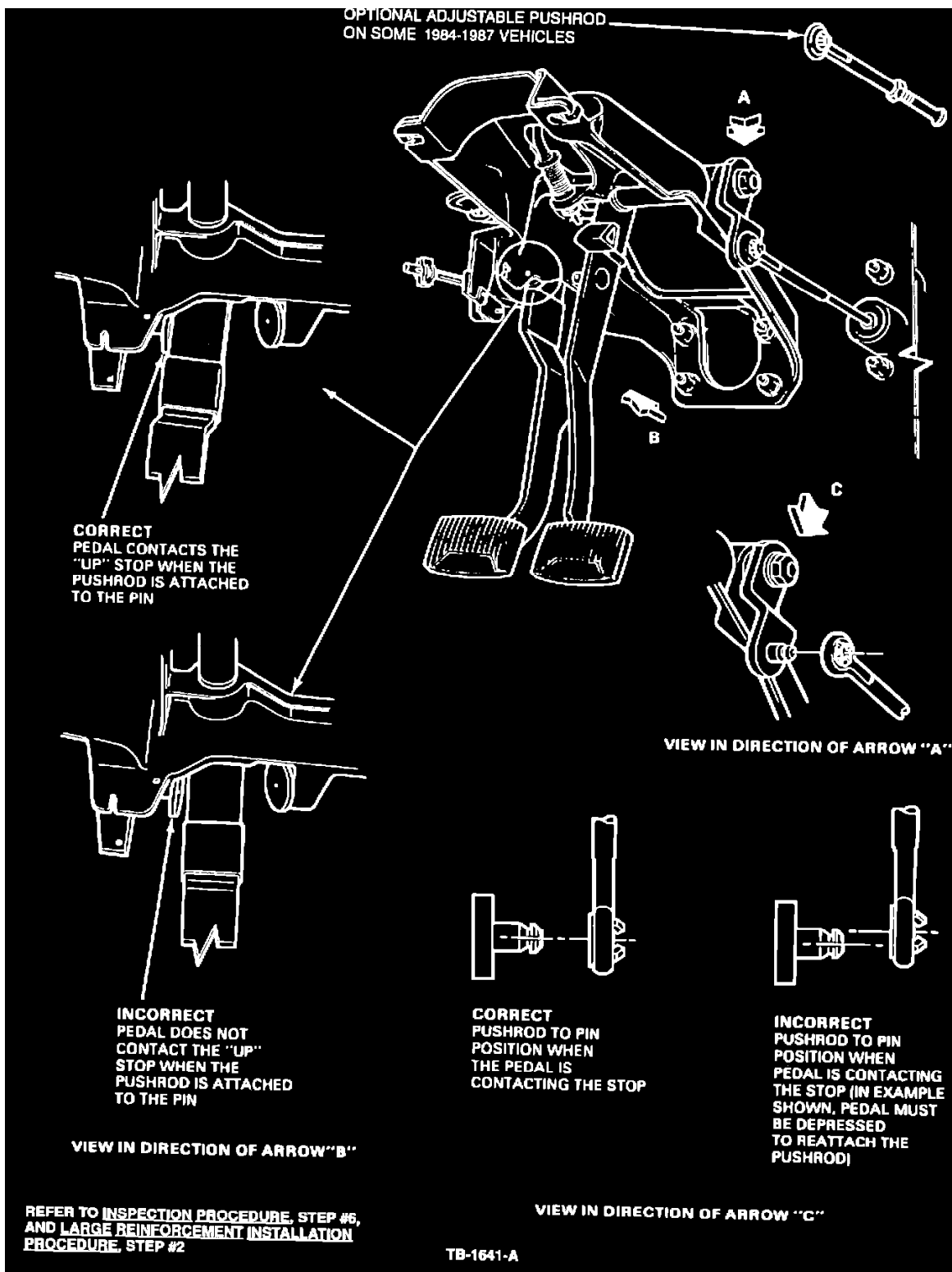


Figure 1

- b. Make sure the hole in the pushrod lines up with the pin, for those units requiring a minimal force for installation, Figure 1.
  - c. If it does not line up correctly, install an adjustable pushrod (except 1988 and later models) or replace the clutch release lever (required on 1988 and later models), cutting a new seat on the cross shaft splines.
7. Test drive the truck again, checking for improved clutch release.

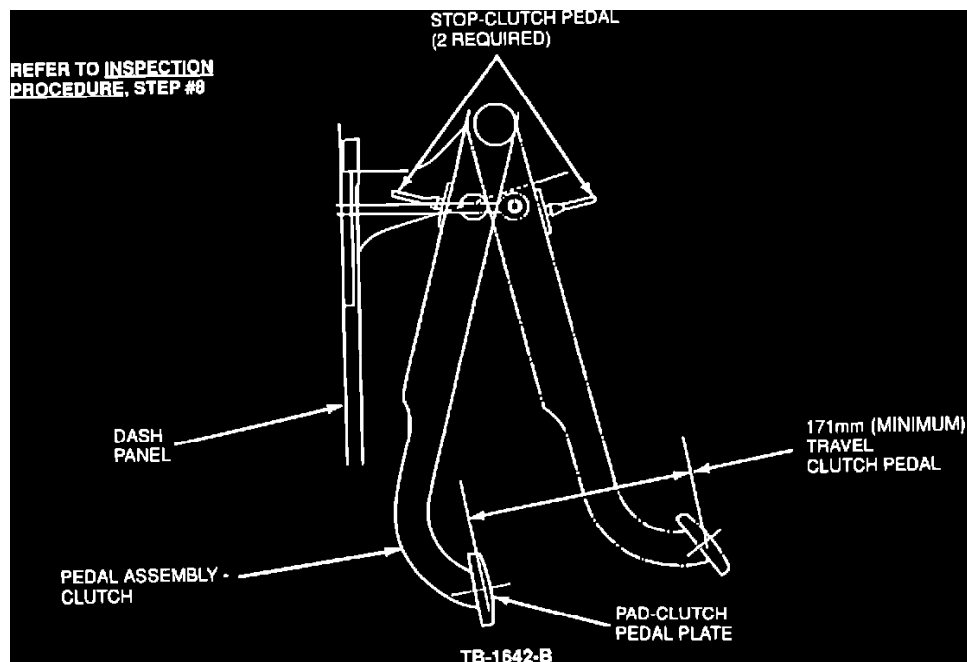


Figure 2

8. If there is no improvement, inspect the truck for adequate release bearing travel.
  - ^ It should be 11 mm or greater for full pedal travel.
  - ^ Pedal travel at the center of the pedal pad should be 6.75" (171 mm minimum) or more, Figure 2.
9. Release bearing travel and gear grinding noise may indicate the following concerns.
  - ^ If the release bearing is 11 mm or greater and there is grinding of one or two gears only, the concern is probably with the transmission.
  - ^ If all gears grind, the concern may be with the clutch and/or pilot bearing which will need replacing.
  - ^ If the release travel is less than 11 mm, check the clutch hydraulic system for air and bleed as necessary.
10. If the release travel is still less than 11 mm, with all of the above items eliminated, proceed as follows:
  - a. Raise the hood, while an assistant operates the clutch pedal.
  - b. Watch the clutch master cylinder for significant deflection.

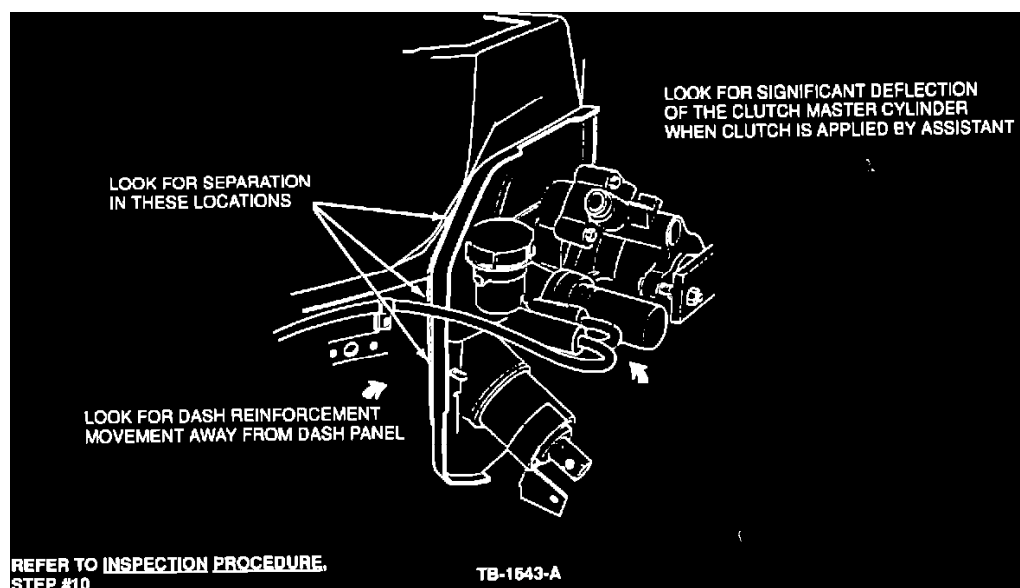
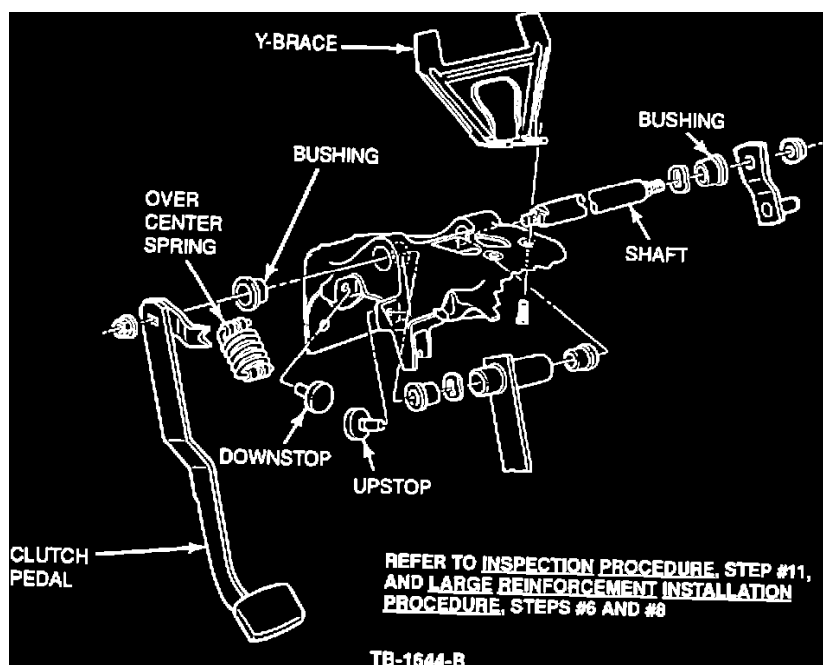


Figure 3

- c. Look for the dash reinforcement moving away from the dash, Figure 3.

- d. On 1987 and earlier models, look down inside the cowl cover at the cowl where it is attached to the dash reinforcement. Check for pulled spot welds.
11. If there is significant movement of the dash or clutch master cylinder, proceed as follows:
- Remove the steering column and its dash toe plate and seal. Refer to the appropriate Light Truck Shop Manual, Section 13-07 for service details.
  - Inspect the dash inside the cab and look for:
    - ^ Pulled spotwelds and cracked or torn sheet metal.
    - ^ Cracks in the brake and clutch pedal support



**Figure 4**

- ^ Missing Y-brace fasteners and a broken or detached Y-brace, Figure 4.

12. Check the cross shaft bushings for wear if the brake pedal moves when the clutch is depressed and vice versa. Replace them as required.

**NOTE:** GENERALLY, TRUCKS WITH SIGNIFICANTLY LESS THAN 11 MM CLUTCH RELEASE BEARING TRAVEL (AFTER COMPLETING THE INSPECTION PROCEDURE AND CORRECTING WHERE NECESSARY) WILL HAVE SIGNIFICANT DASH DAMAGE FROM PULLED SPOTWELDS AND TORN METAL. THESE TRUCKS WILL REQUIRE EXTENSIVE REPAIR. THEREFORE, GO TO THE LARGE REINFORCEMENT INSTALLATION PROCEDURE.

## Small Reinforcement Installation Procedure

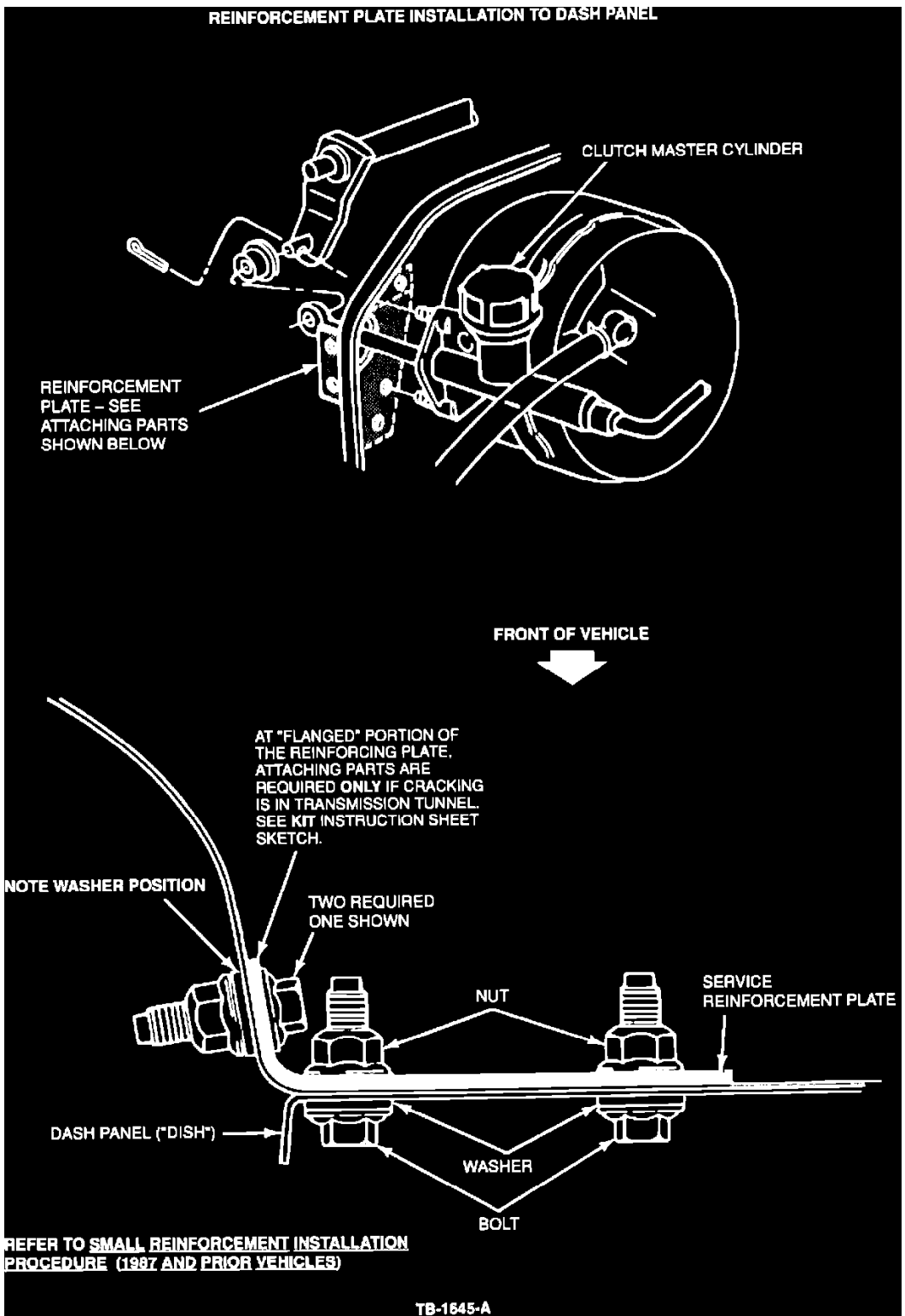
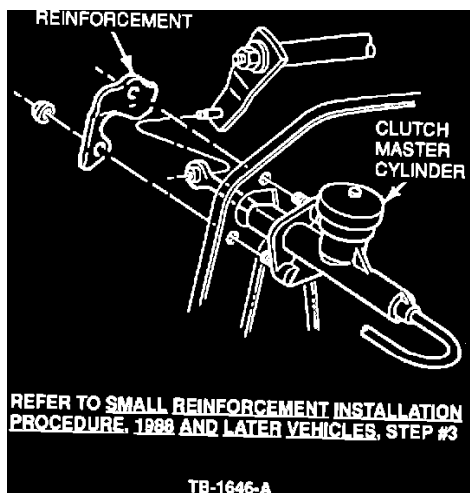


Figure 5



**Figure 6**

There are two small reinforcement kits. One for 1988 and later models and one for 1987 and prior models. This is necessary because a new hydraulic clutch master cylinder mounting pattern was introduced for 1988 models.

#### 1987 And Prior Trucks

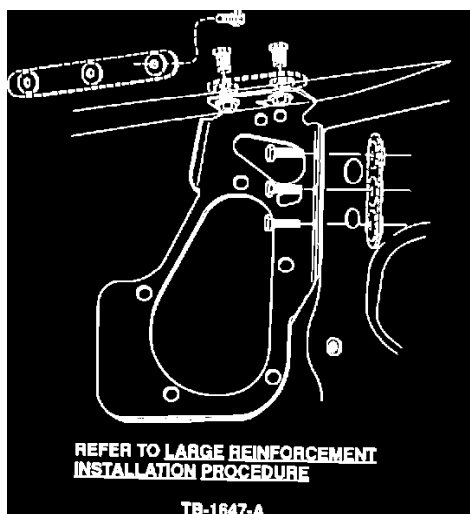
Use reinforcement kit E3TZ-7K509-A on these trucks, Figure 5. Comprehensive installation instructions are included in this kit.

#### 1988 And Later Trucks

Use reinforcement kit E8TZ-7K509-A on these trucks. The only part in this kit is the special reinforcement for these trucks. To install it, proceed as follows:

1. Remove the two clutch master cylinder attaching nuts (13 mm) from inside the truck.
2. Position the reinforcement in place over the clutch master cylinder studs.
3. Re-install the two master cylinder nuts, Figure
6. Tighten to 9.5 - 14.9 N-m.

## Large Reinforcement Installation Procedure



**Figure 7**

Use reinforcement kit E3TZ-7K509-B on all 1983-1991 Bronco/F-Series trucks with hydraulic clutch controls. The kit consists of the following items:

- ^ A main reinforcement or doubler, with a plate having two studs to clamp the doubler through the cowl inner
- ^ Two additional pieces with three threaded holes:

One plate helps attach the main doubler through the dash inner tunnel. The other large piece is placed inside the front of the cowl, with bolts driven through from the engine compartment side of the dash reinforcement, see Figure 7.

## Installation

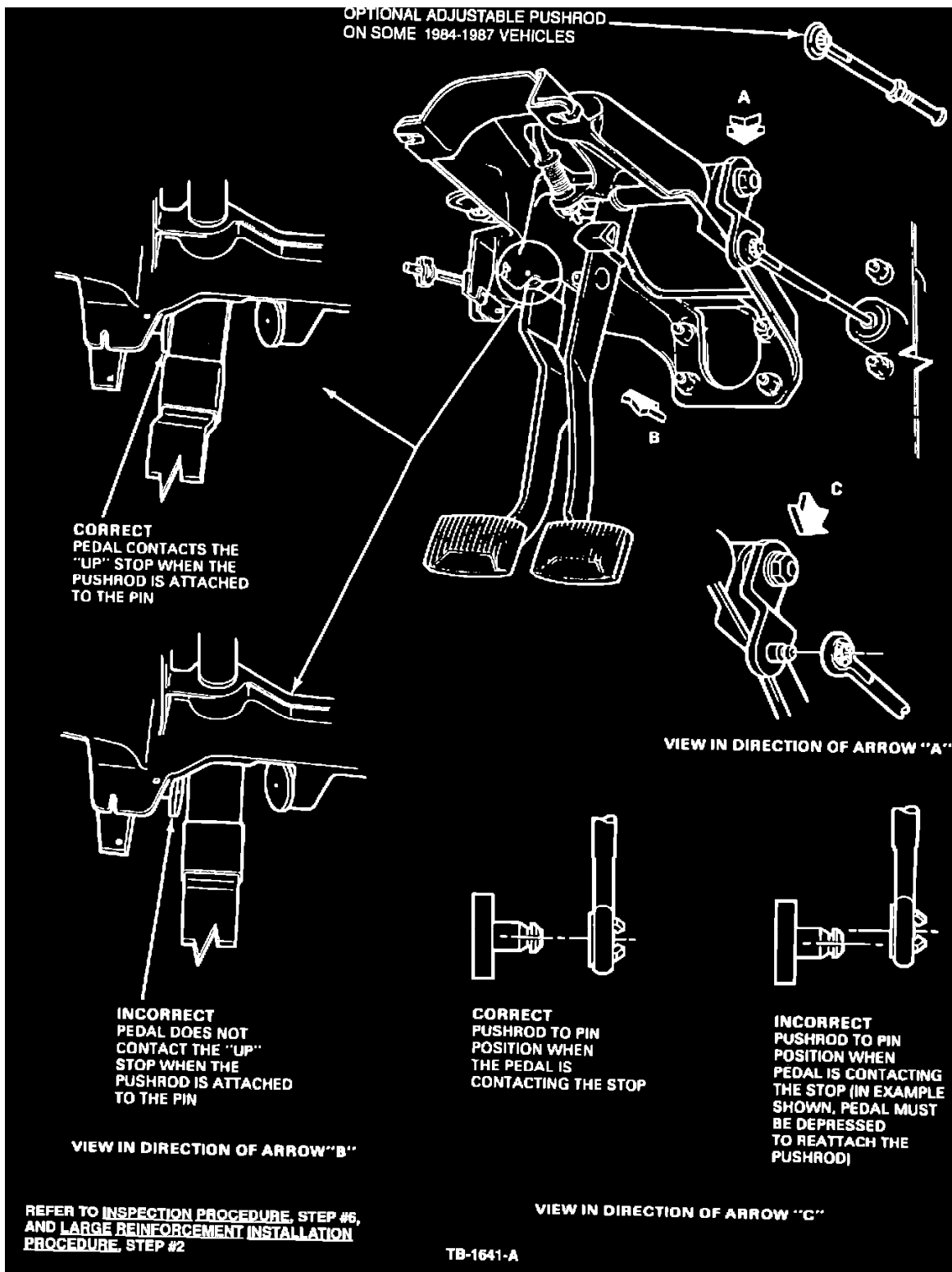


Figure 1

1. Remove the insulating material.
  - a. On earlier models, remove the instrument panel lower sound insulator assembly.
  - b. For later diesel powered trucks, remove the fasteners holding the engine compartment dash insulation in place.

- c. Pull the dash insulation back out of the way.
  - d. Disconnect the battery ground cable.
2. Disconnect the clutch master cylinder pushrod from the lever, removing the pushrod retention clip on older models, Figure 1.
  3. Remove the two nuts attaching the clutch master cylinder to the dash panel.
    - a. Pull the master cylinder into the engine compartment.
    - b. For, 1988 and later trucks, it will be necessary to disconnect the wiring harness connector from the pushrod switch.
    - c. Rotate the master cylinder to get it past the switch through the dash opening.
  4. Remove the steering column and dash toe plate by removing the five (5) fasteners.
  5. Disconnect the brake master cylinder pushrod from the brake pedal.
  6. On F-Super Duty, proceed to Step 7. On all units except F-Super Duty, proceed as follows:
    - a. Remove the four brake booster attaching nuts.
    - b. Move the brake booster to one side.

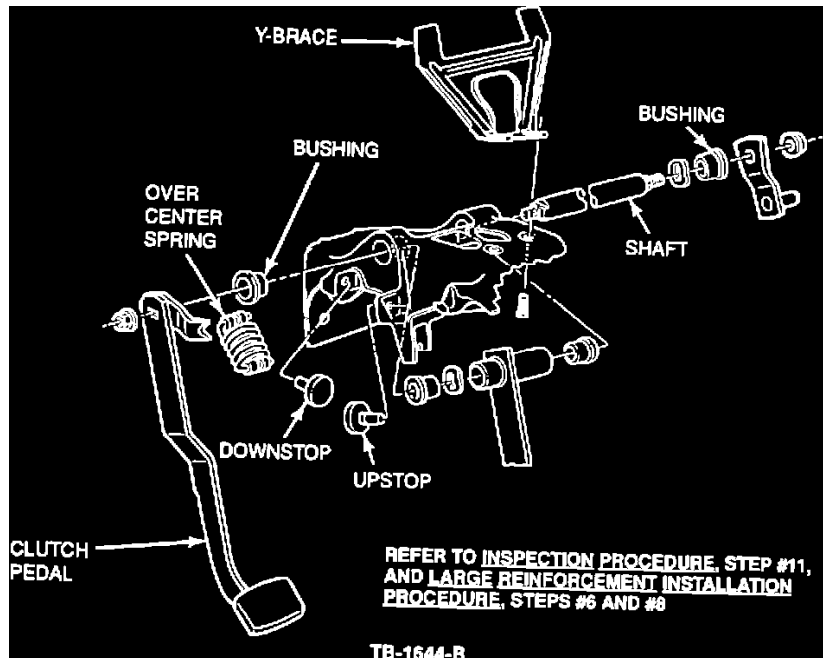


Figure 4

- c. Loosen the two (2) fasteners attaching the brake and clutch pedal support to the Y-brace, Figure 4.
7. Check for cracks.
    - a. Pull back the floor covering and dash sound insulator. (it may be helpful to remove the accelerator pedal.)
    - b. Inspect the area for pulled welds and torn dash sheet metal.

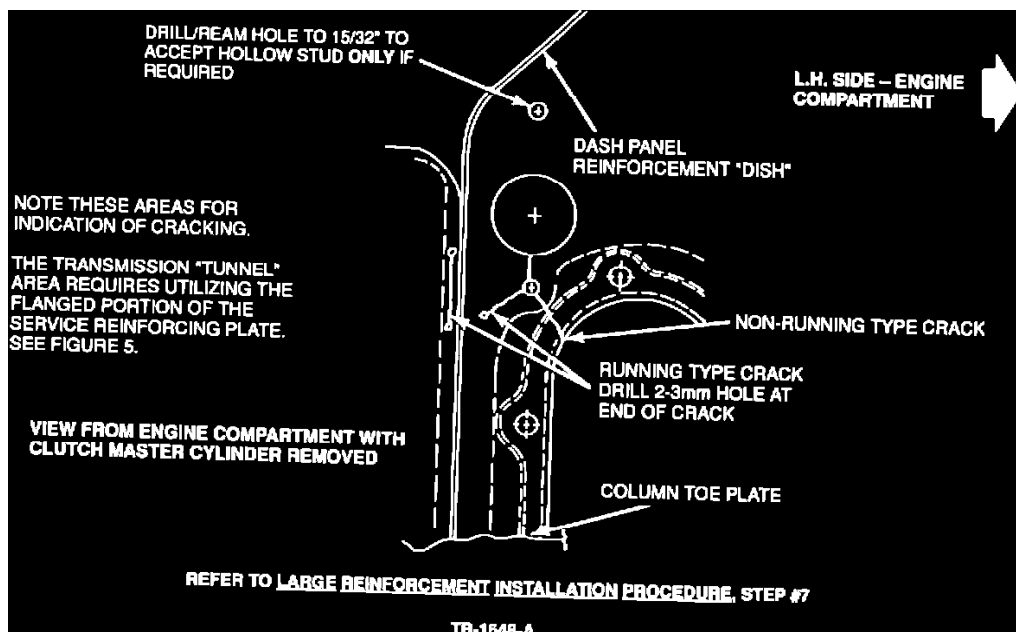


Figure 8

- c. If there are cracks that have not run out, stop them by drilling a 2-3 mm hole at the end, Figure 8.

NOTE: WELDING OR BRAZING IS NOT RECOMMENDED, BECAUSE IT COULD BE A SOURCE OF FUTURE BLIND SIDE CORROSION.

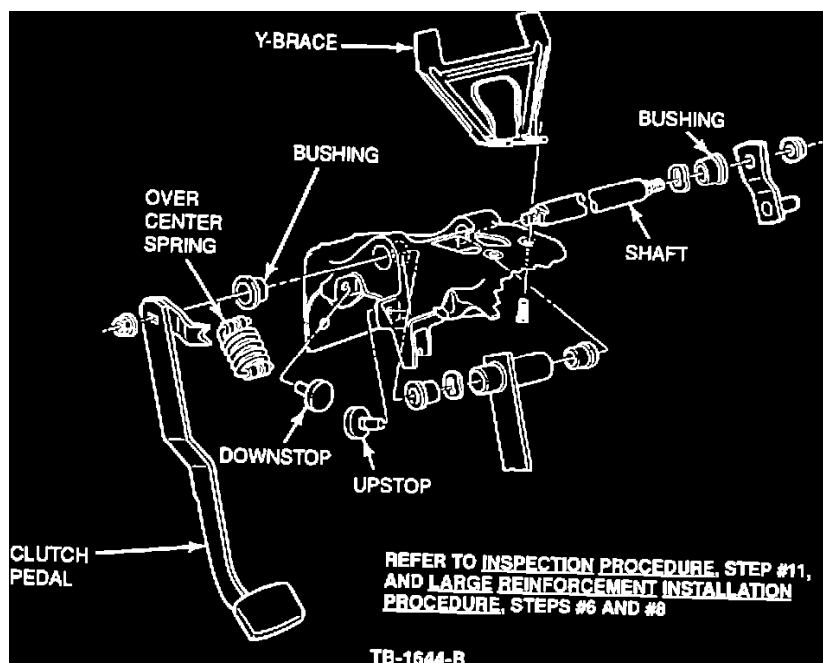


Figure 4

8. Thoroughly inspect the brake and clutch support again for cracks in the casting and worn bushings. Also, inspect the "Y" brace for cracks and missing fasteners. Replace as necessary, Figure 4.
9. Remove excess body sealer in the area of the clutch master cylinder, inside the dash.
10. Carefully remove the cowl top cover 12 fasteners (7 in front, 5 in rear).

NOTE: IT MAY BE NECESSARY TO REMOVE THE RADIO ANTENNA AND REPOSITION THE HOOD TO ACHIEVE THIS. IF THE HOOD IS REMOVED, MARK THE LOCATION OF THE HINGES WITH A WAX PENCIL, PRIOR TO LOOSENING.

11. Place the main reinforcement in position.
  - a. Locate positively, using the lower steering column toe plate fastener and a bolt and nut (8 mm or 5/16") through the upper clutch master

cylinder stud hole.

NOTE: THE SHEET METAL VARIES FROM TRUCK TO TRUCK AND IT MAY BE NECESSARY TO BEND THE REINFORCEMENT TO GET A GOOD FIT.

- b. Tighten the upper nut and bolt securely to compress any distortion in the four sheet metal laminations in this area.
12. Drill the holes for the reinforcement plate.
  - a. Using a 3/8" (9.5 mm) drill bit, with the reinforcement as a template, drill two holes up into the cowl inner and three holes into the inner side of the dash.
  - b. De-burr the outside of the holes as necessary.
  - c. Remove any excess sealant in the area and clean up the drill chips inside the truck and cowl.
13. Attach the smaller plate via the three threaded holes into the engine compartment side of the dash inner panel.
  - a. Use three 8 mm bolts passed through the main reinforcement, from inside the cab.
  - b. Install the rubber cap (N804118) onto the end of the uppermost screw from under the dash.
  - c. Position the plate with the two studs attached inside the cowl, through the two holes drilled from below.
  - d. Attach two 8 mm nuts from the inside of the cab.
14. Using the paper template provided in the kit, proceed as follows:

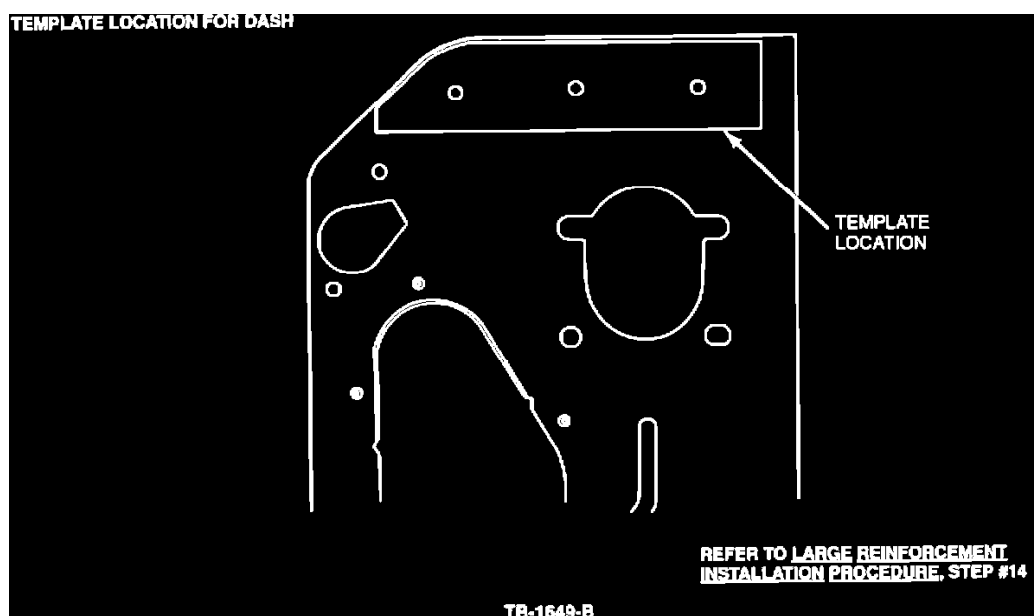


Figure 9

- a. Center punch and drill three 3/8" (9.5 mm) holes into the dash reinforcement and through the cowl, from the engine compartment side, Figure 9.

NOTE: DRILLING WILL BE EASIER IF THERE ARE NO SPOTWELDS VISIBLE THROUGH THE THREE HOLES.

- b. If necessary, move the pattern outboard slightly to avoid any visible spotwelds.
- c. De-burr the holes inside the cowl as necessary and clean up the drill chips inside the cowl.

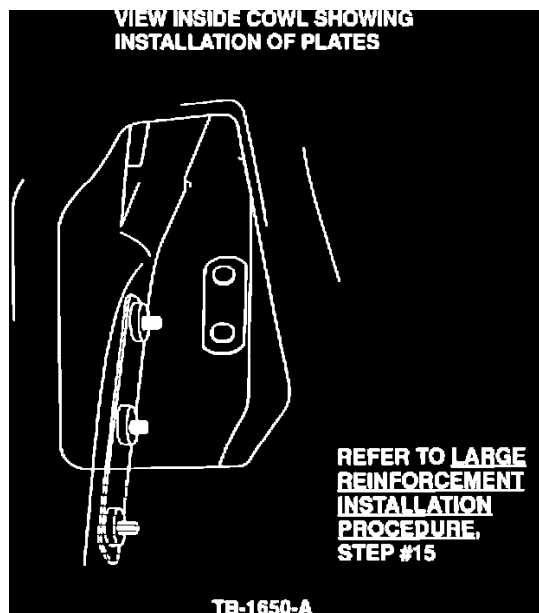


Figure 10

15. Place the larger three holed plate from the kit inside the cowl. Attach it with three 8 mm bolts through the dash reinforcement, from the engine compartment side, Figure 10.
16. Inspect the seam between the cowl inner and outer, inside the cowl, for cracks in the sealant. If necessary, add sealant.
17. Replace the cowl top.
  - a. If the hood was removed, locate the hinges to the wax pencil marks and tighten the fasteners.
  - b. Replace the radio antenna and windshield washer tube.
18. Re-install the brake booster and stoplight switch, if removed. Tighten the brace bolts.
19. Install the clutch master cylinder.
  - a. Inspect the clutch master cylinder for leaks in the area of the pushrod. Replace it if there is evidence of leaking.
  - b. Remove the nut and bolt from the top of the reinforcement.
  - c. Install the clutch master cylinder.
  - d. Inspect the position of the clutch master cylinder pushrod hole. The pushrod hole should go onto the lever pin with no force required while the pedal is against the upstop.

NOTE: ALTHOUGH THIS WAS SPECIFIED IN THE INSPECTION PROCEDURE, REPAIR MAY HAVE CHANGED THE SETTING.

- e. If the pushrod hole is not in position, install and adjust an adjustable clutch master cylinder pushrod (1987 and prior models) or install a new lever (7A554).

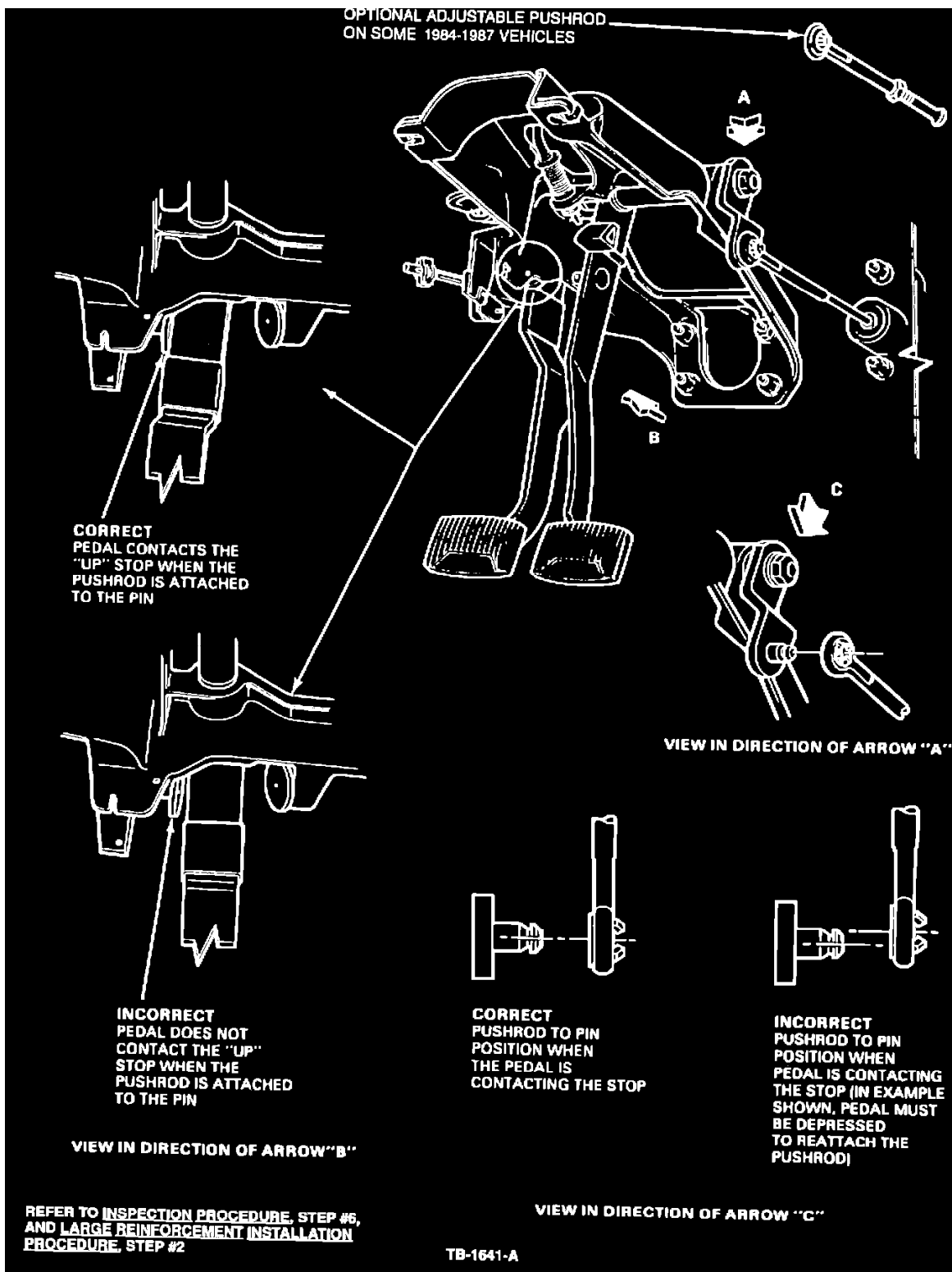


Figure 1

NOTE: THE NEW LEVER IS TIGHTENED INTO PLACE WHILE THE MASTER CYLINDER PUSHROD IS ATTACHED, TO SET THE CORRECT POSITION, FIGURE 1.

20. Remove the toe plate fastener from the bottom of the reinforcement and reinstall the steering column and five (5) fasteners.
21. Complete reassembly.
  - a. Re-install the dash sound deadener material and the instrument panel sound insulator.
  - b. Re-install the engine compartment sound insulator on diesel models.

- c. Connect the battery ground terminal.

## Final Inspection

If the truck has been driven for a long period of time with the broken dash and resulting poor clutch release, the clutch disc could be excessively worn or buckled.

Test drive the truck, evaluating the clutch for clean release. If the release is not satisfactory, measure the release bearing travel.

^ If it has the required 12 mm at full clutch pedal stroke, then the clutch may need to be replaced.

^ If the release bearing has less than the required release travel, then the hydraulic system probably needs to be bled.

## Suggested Bleeding Procedure - External Slave Cylinder

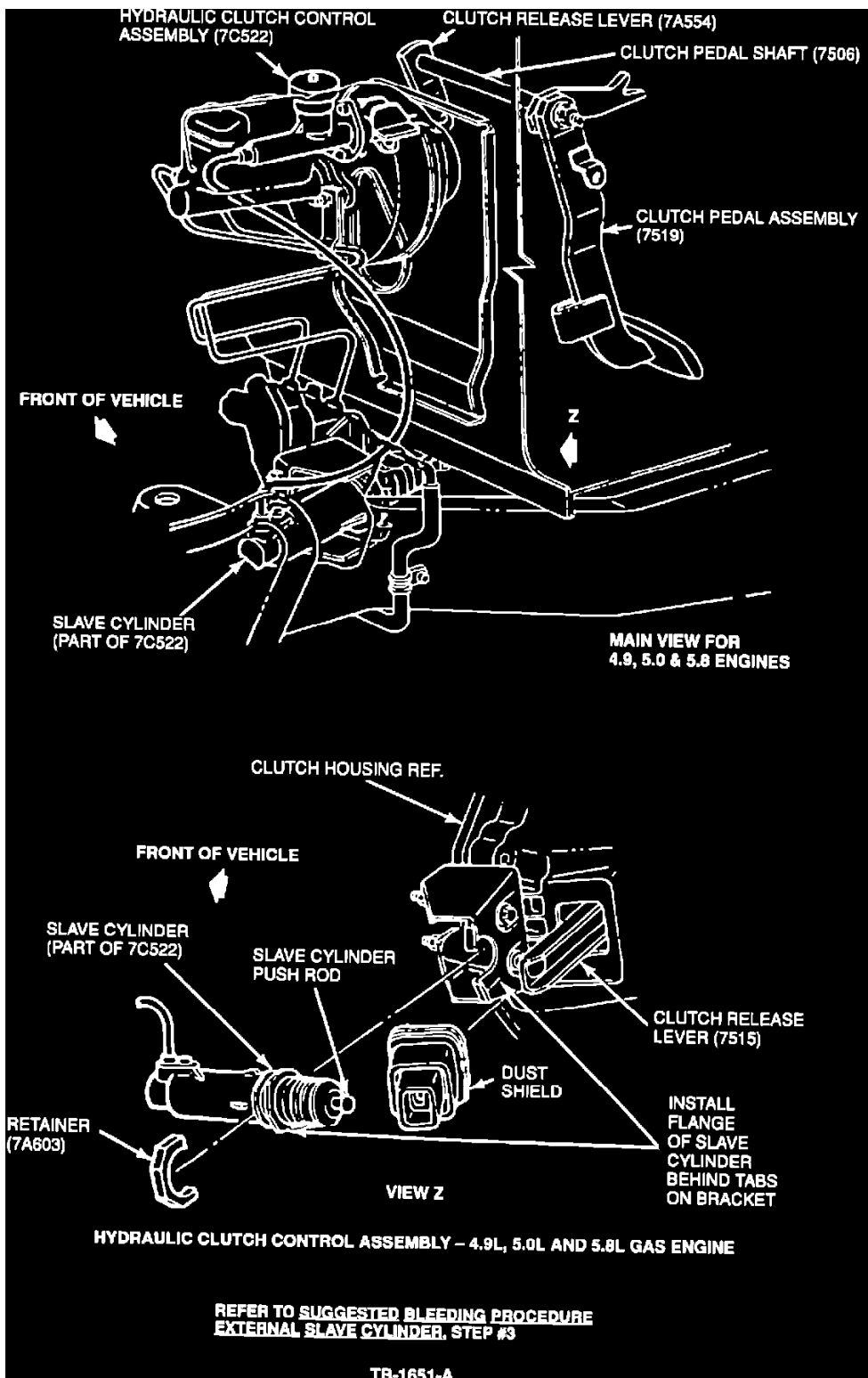


Figure 11

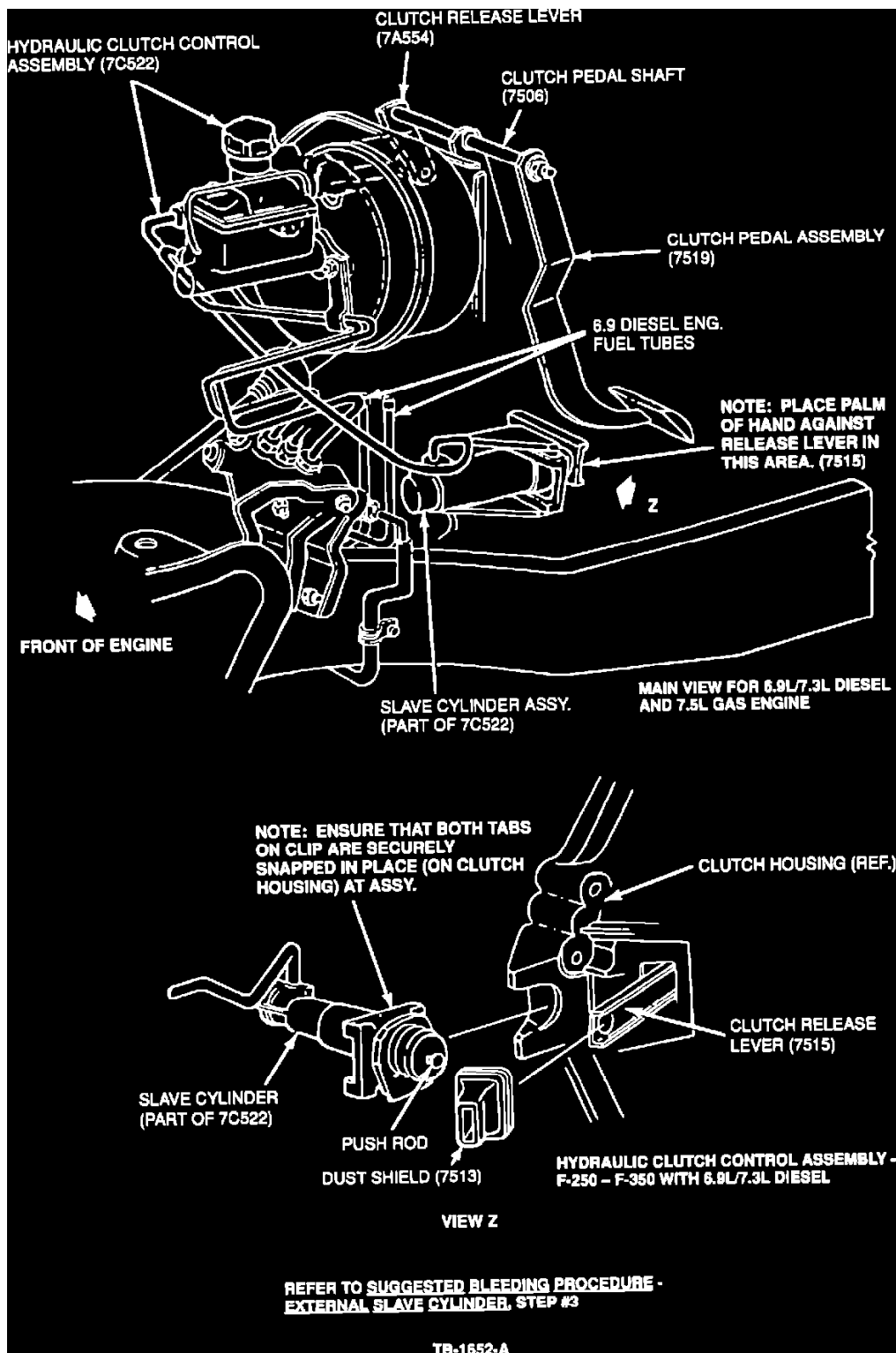


Figure 12

If the truck is a 1987 or prior model, 1988 model with a 7.3L Diesel, 7.5L EFI gas engine or the smaller family of engines with a Warner T-18 four speed transmission, proceed as follows:

1. Remove the master cylinder reservoir cap and diaphragm.
2. Check the fluid level to be sure it is at the step diameter of the reservoir. Do not over fill.
3. From below the truck, push the release lever slowly towards the front of the truck several times. Figures 11 & 12.
4. If it will not move, the master cylinder pushrod is not set correctly. See repair Step # 19.
5. Check the fluid level and replace the diaphragm and cap.

## Suggested Bleeding Proc - Internal Concentric Slave CYL.

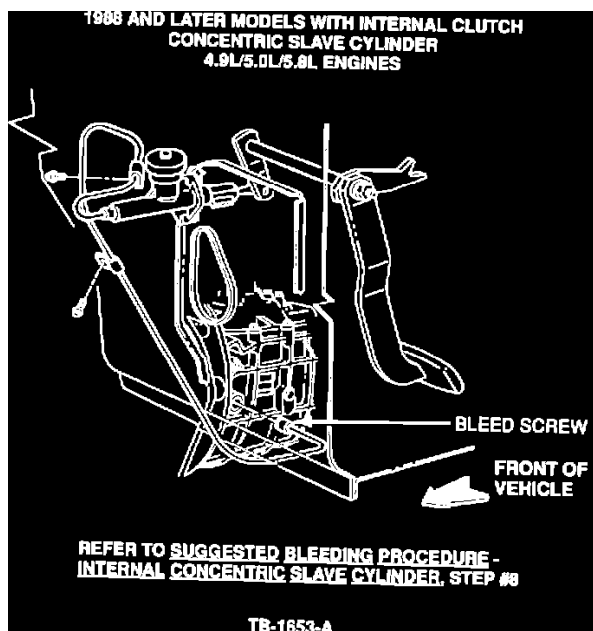


Figure 13

If the truck has a concentric slave cylinder, proceed as follows:

1. Operate the clutch pedal at full stroke, 10-20 times.
2. Check the fluid level at the change in diameter part of the reservoir. Do not over fill.
3. Have an assistant depress the clutch pedal slowly and hold it down.
4. Open the slave cylinder bleed screw and watch for escaping air, Figure 13.
5. Close the bleed screw and have the assistant release pedal.
6. Repeat this cycle several times until there is no sign of air. Be sure to keep the reservoir topped to the correct level.
7. Replace the diaphragm and reservoir cover.
8. Operate the clutch pedal at full stroke 10-20 times.

### Misc. Information

OTHER APPLICABLE ARTICLES: 86-20-10

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
901607A	Inspect & Adjust	0.5 Hr.
901607B	Install Reinforcement	2.9 Hr.

DEALER CODING

BASIC PART NO.    CONDITION CODE  
7050                    50

OASIS CODES:    111000, 505000, 505200, 506000, 590000

Technical Service Bulletin # **911814**

Date: **910905**

### M/T Clutch Housing - Fluid Inside

Article No. 91-18-14

09/05/91

- ^ CLUTCH-SLAVE CYLINDER "LEAKS"- VEHICLES USED IN MUDDY OR DUSTY ENVIRONMENTS

^ LEAKS-CLUTCH SLAVE CYLINDER "LEAKS"- VEHICLES USED IN MUDDY OR DUSTY ENVIRONMENTS

LIGHT TRUCK: 1988-89 ECONOLINE  
1988-91 AEROSTAR, BRONCO, F-150-350 SERIES, RANGER  
1989-90 BRONCO II  
1991 EXPLORER

ISSUE: Fluid detected inside the clutch housing may be caused by a leaking clutch slave cylinder. This may occur when vehicles are driven in severely muddy or dusty environments or when operated with extensive idle time. Vehicles include...

^ 1988-1991 Ranger, 1988-1990 Bronco II,  
1988-1991 Aerostar and 1991 Explorer  
with manual transmissions.

^ 1988-1991 Bronco, F-150-350, and  
1988-1989 Econoline with 5-Speed  
Manual Transmissions, except 7.3L  
Diesel and 7.5L engines.

ACTION: Replace the clutch slave cylinder if inspection confirms the cylinder is leaking. The new clutch slave cylinder contains a guide seal which improves durability and resistance to dirt entry. Refer to the following procedures for service details.

INSPECTION PROCEDURE:

1. If the vehicle is a Bronco or F-150, the repair will only involve 5 speed manual transmissions. Other vehicles described include all manual transmissions.

This slave cylinder is the internal "Concentric" and not the external style. Inspect vehicle to visually verify the style of slave cylinder installed.

2. Determine if the slave cylinder is leaking by checking for a fluid trace inside the bottom of the clutch housing.

REPAIR PROCEDURE

1. Remove the clutch slave cylinder. Refer to the appropriate Light Truck Shop Manual for service details.
2. Replace the clutch slave cylinder with a new slave cylinder (FITZ-7A564-A). Refer to the appropriate Light Truck Shop Manual for service details.

PART NUMBER	PART NAME	CLASS
FITZ-7A564-A	Slave Cylinder	B

NOTE: APPROPRIATE SUPPLEMENT OPERATIONS SHOULD BE USED WITH THE LABOR OPERATIONS LISTED.

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911814A	Inspect For Fluid Leak - All Vehicles	0.3 Hr.
911814B	Replace Clutch Slave Cylinder - Ranger 4X2 With 2.3L	1.8 Hr.
911814C	Replace Clutch Slave Cylinder - Ranger 4X4 With 2.3L And F-Series 4X2 With 5.8L	3.2 Hr.
911814D	Replace Clutch Slave Cylinder - Ranger 4X2 With 2.9L Or 3.0L And Aerostar With 3.0L	2.0 Hr.

911814E	Replace Clutch Slave Cylinder - Bronco II With 2.9L	2.6 Hr.
911814F	Replace Clutch Slave Cylinder - Ranger 4X4 And Bronco II 4X4 With 2.9L And F-Series 4X4 And Bronco With 5.0L	3.5 Hr.
911814G	Replace Clutch Slave Cylinder - Ranger 4X2 And Explorer 4X2 With 4.0L	2.9 Hr.
911814H	Replace Clutch Slave Cylinder - Ranger 4X4 And	3.7 Hr.
911814I	Replace Clutch Slave Cylinder - F-Series 4X2 With 4.9L And Mazda Transmission	2.1 Hr.
911814J	Replace Clutch Slave Cylinder - F-Series 4X2 With 5.0L	2.3 Hr.
911814K	Replace Clutch Slave Cylinder - F-Series 4X4 And Bronco With 4.9L And Mazda Transmission	3.3 Hr.
911814L	Replace Clutch Slave Cylinder - F-Series 4X2 With 4.9L And ZF Transmission	3.1 Hr.
911814M	Replace Clutch Slave Cylinder - F-Series 4X4 With 4.9L And ZF Transmission	4.1 Hr.
911814N	Replace Clutch Slave Cylinder - F-Series 4X4 With 5.8L	4.3 Hr.
911814O	Replace Clutch Slave Cylinder - Econoline	2.8 Hr.

## DEALER CODING

BASIC PART NO.	CONDITION CODE
7A564	77

OASIS CODES: 505000

Technical Service Bulletin # **88817041588**Date: **880401****Front Drive Axle Hublock - Inoperative**

AXLE - FRONT DRIVE - WARN MANUAL HUBLOCKS INOPERATIVE

Article No. 88-8-17

## LIGHT TRUCK:

**ISSUE:** Inoperative front drive axle hublocks on 1987 and 1988 F-150 and Bronco vehicles may be caused by the control dial getting too hot and distorting. The hublock body is made of aluminum which transfers heat rapidly from the brake rotor to the hublock assembly. Under certain braking conditions such as brake dragging or downhill trailer towing control dial distortion may occur. Vehicles operated under these or similar conditions may not experience hublock control dial distortion but may be too hot for customers to engage or disengage the

locking hub feature.

**ACTION:** To correct this, install a new hublock service kit that will not allow heat transfer to the control dial. Refer to the 1987/88 Light Truck Shop Manual, Volume A, Section 11-12-2 for removal of the existing hublocks. Use the 1986 Light Truck Shop Manual to install the new hublock kit, (E7TZ-1L104-A).

PART NUMBER	PART NAME	CLASS
E7TZ-1L104-A	Hublock Kit - One (1) Required	CG

**OTHER APPLICABLE ARTICLES:** None

**WARRANTY STATUS:** Eligible Under Basic Warranty Coverage

**OPERATION:** 880817A - Both hubs

**TIME:** 1.8 Hrs.

**DLR. CODING:** Basic Part No. 1K105

Condition Code: 42

Technical Service Bulletin # **9167**

Date: **910318**

## Rear Axle Hub Seal - Lubricant Leaks

Article No. 91-6-7

03/18/91

^ AXLE - NEW HUB SEAL AND HUB SEAL REPLACER TOOL - VEHICLES WITH 10.25 INCH RING GEAR, FULL - FLOATING REAR AXLES

^ LEAKS - AXLE LUBE - 10.25 INCH RING GEAR, FULL - FLOATING REAR AXLES

**LIGHT TRUCK:** 1985-91 F-250, F-350

**ISSUE:** A new hub seal and a hub seal replacer tool are now available for service. The new hub seal is designed to improve sealing when properly installed using the new hub seal replacer tool.

**ACTION:** Install a new hub seal (FOTZ-1177-A) with the new hub seal replacer tool (T91T-1175-A). Refer to the following inspection list and service procedure for details.

**NOTE:** DO NOT USE THE OLD HUB SEAL REPLACER TOOL (T85T-1175-AH). IT IS NOT DESIGNED TO INSTALL THE NEW SEAL. THE NEW HUB SEAL REPLACER TOOL IS AVAILABLE IN THE 1991 DEALER ESSENTIAL SERVICE TOOL KIT AND IS THE ONLY TOOL APPROVED TO INSTALL THE NEW SEAL.

### INSPECTION PRIOR TO SEAL INSTALLATION

Prior to seal installation, make sure that the following items are checked and servicing action taken where indicated.

^ Inspect the outer diameter of the hub seal to be sure that it is dry and free of oil and grease.

^ Check the hub bore to be sure it is free of grease, dirt and debris.

^ Remove any nicks or burrs from the hub bore.

^ Inspect the inner and outer bearing for damage and replace as required.

^ Pack each hub bearing cone and roller with a bearing packing tool using XG-1-C grease.

^ Make sure that no residual grease from freshly greased bearings gets into the hub bore.

^ Prior to installing the hub assembly, clean the spindle thoroughly and inspect the seal and bearing journals for nicks and/or scratches. Remove nicks or scratches using crocus cloth or similar material.

^ Wipe spindle clean and lightly oil with clean axle lube or engine oil.

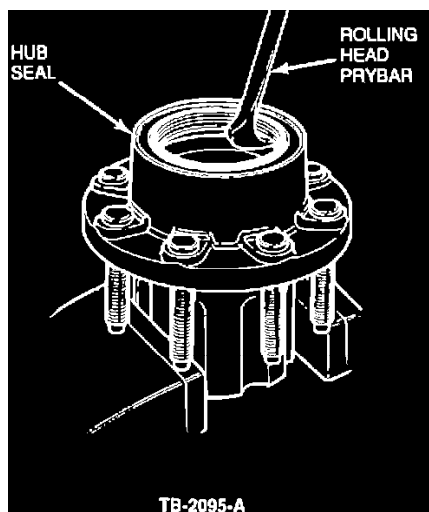


Figure 1

#### REMOVAL & INSTALLATION PROCEDURE

1. Install the hub in a soft jawed vice.
2. Remove the hub seal as shown in Figure 1.

CAUTION: CARE MUST BE TAKEN NOT TO DAMAGE THE HUB SEAL BORE WITH THE SEAL REMOVAL TOOL.

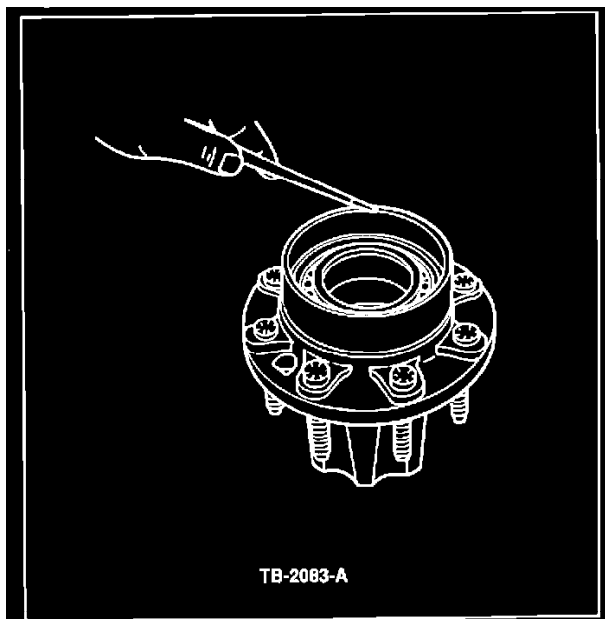


Figure 2

3. Thoroughly clean and inspect the hub bore, Figure 2.

CAUTION: MAKE SURE THE HUB BORE IS FREE OF DIRT, GREASE, BURRS OR NICKS.

NOTE: HUB BEARINGS MUST BE PRELUBED WITH GREASE PRIOR TO INSTALLATION. USE XG-1-C GREASE OR EQUIVALENT.

4. Pack each bearing cone and roller assembly with a bearing packing tool.

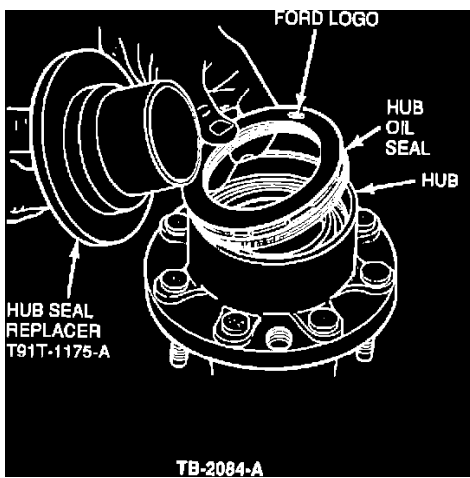


Figure 3

5. Install the seal in the hub with the Ford logo facing up, Figure 3.

CAUTION: HUB SEAL MUST BE FREE OF DIRT OR GREASE.

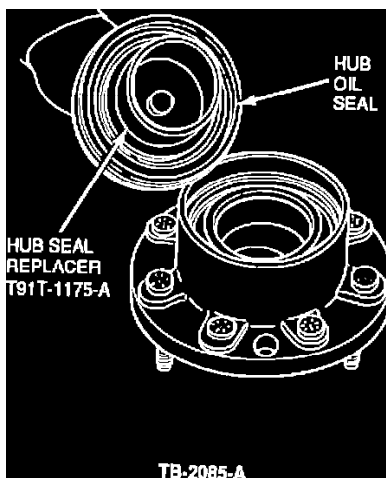


Figure 4

6. Install the hub oil seal on the hub seal installer tool, T91T-1175-A, Figure 4.

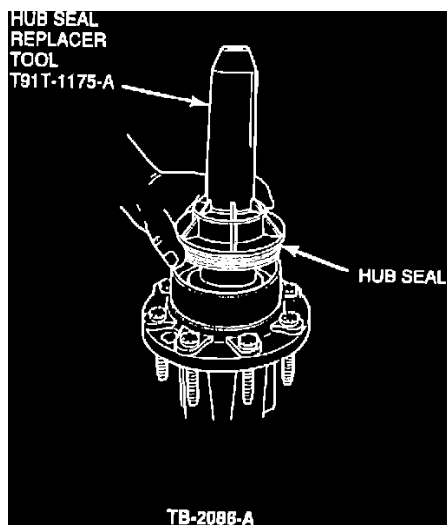
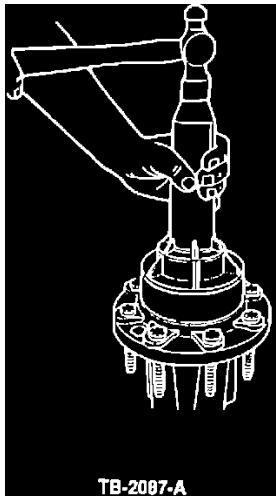


Figure 5

7. Insert the tool with the seal squarely into the hub, Figure 5.



**Figure 6**

8. Hold the tool straight. Strike the handle until the hub seal is fully seated (until tool strikes hub), Figure 6.

**CAUTION:** INSTALL NEW SEAL IF SEAL IS MISALIGNED DURING OR AFTER INSTALLATION.

It is extremely important that the 1991 F-Series Shop Manual procedures be followed when installing the hub assembly.

**CAUTION:** THE SPECIFIED TORQUING AND BACKING OFF OF THE HUB NUT IS CRITICAL IN ORDER TO PERFORM THE REPAIR CORRECTLY.

**NOTE:** ALWAYS TURN THE HUB WHILE TIGHTENING THE HUB NUT. ONCE THE SPECIFIED TORQUE 55-65 LB.FT., (75-88 N-m) IS ACHIEVED, RATCHETING BACK ON THE HUB NUT VARIES DEPENDING ON WHETHER THE HUB BEARINGS ARE NEW OR USED. BACK OFF 5 CLICKS FOR NEW BEARING AND 8 CLICKS FOR USED BEARINGS.

Make sure hub nut wrench tool (T85T-4252-AH) is used as shown in the Shop Manual procedure. Consult The 1991 F-Series Light Truck Shop Manual, Section 05-02B, for service procedures and torque specifications.

PART NUMBER	PART NAME	CLASS
FOTZ-1177-A	Hub Seal	B
XG-1-C	Grease (14 oz. cartridge, Pkg. 60)	V

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 509000

Technical Service Bulletin # **911015**

Date: **910515**

## M/T - M50D Hard Shift Condition

Article No.

91-10-15

5/15/91

TRANSMISSION - M50D - HARD SHIFT TO REVERSE OR FIFTH GEAR

LIGHT TRUCK: 1988-89 ECONOLINE  
1988-90 BRONCO II  
1988-91 AEROSTAR, BRONCO, F-150, F-250, RANGER  
1991 EXPLORER

**ISSUE:** The 5-R synchronizer sliding sleeve clutching teeth may wear on the reverse side. This may cause a hard to engage or partial engagement of fifth or reverse gear and could result in the transmission jumping out of gear. If the wear is allowed to continue, it may become difficult or

impossible to engage 1-2-3 or 4th gear.

**ACTION:** Inspect the 5-R synchronizer sliding sleeve for wear and replace if excessive wear is found. Refer to the following procedure for service details.

#### INSPECTION PROCEDURE:

1. Remove necessary components so that the transmission extension housing can be removed without removing the entire transmission. Refer to the Light Truck Shop Manual Section 07-03A for service details.

**NOTE:** COMPACT VEHICLES MAY REQUIRE REMOVAL OF TRANSMISSION

2. Remove the transmission extension housing.

3. Inspect the 5-R synchronizer sliding sleeve for wear of the reverse clutching teeth.

#### REPAIR PROCEDURE

1. If wear is observed, remove speedometer drive gear (4 x 2 only).

2. Remove the top cover (if repairing on the bench).

3. Carefully remove the main shaft and counter shaft locking nuts.

4. Remove and replace the following transmission parts. Refer to the Light Truck Shop Manual for service procedures.

^ 5th Counter Shaft Gear

^ 5-R Synchronizer, hub and ring assembly

**NOTE:** INSTALL WITH THE DOT ON THE SYNCHRONIZER SLEEVE FACING REVERSE GEAR.

^ Reverse counter shaft gear

^ 5-R Counter Lever

^ 5-R Shift fork and rod

**NOTE:** USE THE SPRING AND BALL FROM THE EXISTING ASSEMBLY.

^ Replace the idler shaft in the reverse idler gear assembly (R1 only).

**NOTE:** THERE ARE EXTRA ADJUSTING SHIMS PROVIDED IN CASE IT IS NECESSARY TO RESET THE 5-R SYNCHRONIZER HUB AND CONTROL REVERSE GEAR END PLAYS TO SPECIFICATION. USE THE NEW MAIN SHAFT AND COUNTER SHAFT LOCKING NUTS UPON ASSEMBLY.

**CAUTION:** USE ALL THE PARTS CONTAINED IN THE SERVICE KIT INCLUDING THE COUNTER REVERSE LEVER. ALTHOUGH THE NEW LEVER LOOKS THE SAME AS THE ONE CONTAINED IN THE TRANSMISSION, CONTACT ANGLES ARE SLIGHTLY DIFFERENT TO INSURE PROPER TIMING AND ENGAGEMENT.

PART NUMBER	PART NAME	CLASS
F0TZ-7C391-E	Synchronizer Service Kit - R2	C
F0TZ-7C391-C	Synchronizer Service Kit - 2.3L, 2.9L, 3.0L, R1	C
F0TZ-7C391-D	Synchronizer Service Kit - 4.0L R1	C

**OTHER APPLICABLE ARTICLES:** NONE

**WARRANTY STATUS:** Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
911015A	Install Synchronizer Service Kit - 4 x 2	2.1 Hr.
911015A	Install Synchronizer Service Kit - 4 x 4	2.9 Hr.

**DEALER CODING**

BASIC PART NO. CONDITION CODE

7124 30

OASIS CODES: 505000

Technical Service Bulletin # **88820041588**Date: **880401****M/T - Hard to Shift Disengages From Third Gear**

TRANSMISSION - ZF MODEL S5-42 - HARD TO SHIFT INTO THIRD GEAR -

TRANSMISSION - ZF MODEL S5-42 - DISENGAGES THIRD GEAR

Article No. 88-8-20

LIGHT TRUCK: 1987-88 F SERIES, BRONCO

ISSUE: A hard shifting transmission during a 2-3 upshift or 4-3 downshift may be caused by a third gear synchronizer that has an improper surface finish. The hard shifting condition may also cause the transmission to disengage from third gear because of incomplete third gear engagement.

ACTION: To correct this, install a new design third gear synchronizer that was manufactured using a new machine lapping process to improve the surface finish. Refer to the 1988 Light Truck Shop Manual, Section 16-34-1 for removal and installation procedures.

PART NUMBER	PART NAME	CLASS
E7TZ-7124-C	Third Gear Synchronizer	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty and Powertrain Coverages

OPERATION: 880820A - Install third gear synchronizer

TIME: 7.6 Hrs. - F Series (4 x 2) 8.6 Hrs. - F Series (4 x 4) 8.3 Hrs. - Bronco

DLR. CODING: Basic Part No. 7124

Condition Code: 85

Technical Service Bulletin # **911811**Date: **910905****M/T - Crunching Shifting From 2nd to 3rd Gear**

Article No. 91-18-11

09/05/91

^ NOISE-INTERMITTENT "CRUNCHING" WHEN SHIFTING FROM 2ND TO 3RD-VEHICLES WITH M50D (MAZDA R1 AND R2) TRANSMISSION

^ TRANSMISSION-M50D (MAZDA R1 AND R2)- INTERMITTENT "CRUNCHING" NOISE WHEN SHIFTING FROM 2ND TO 3RD

LIGHT TRUCK: 1988-89 ECONOLINE  
1988-90 BRONCO II  
1988-91 AEROSTAR, BRONCO, F-150, RANGER  
1991 EXPLORER

ISSUE: A slight intermittent "crunch" or grinding noise may be heard when shifting from 2nd to 3rd. This is caused by improper synchronizer engagement.

ACTION: Install a new synchronizer service kit. Refer to the Parts Block for correct parts usage and the following procedure for service details.

## INSPECTION

1. Drive the vehicle to warm the transmission oil temperature to about 125~F (52~C). This can usually be done after driving about 10 miles at highway speed when the outside temperature is above freezing.
2. On a smooth road surface, accelerate the vehicle from a stop to 3rd gear at normal shift speeds as defined in the owners guide.
3. If a slight "crunch" is heard or grinding sensation is felt in the shift lever when shifting from 2nd to 3rd, proceed with the following synchronizer kit installation procedure.

## SYNCHRONIZER KIT INSTALLATION

1. Remove the transmission from the vehicle. Refer to the appropriate Light Truck Shop Manual, Section 07-03A, for removal procedure.
2. Remove the 1st/2nd and 3rd/4th clutch hub and sleeve assembly along with the corresponding synchronizer ring.
3. Install all parts from the appropriate synchronizer kit. The kits contain new 1, 2, 3, and 4 synchronizer rings, a new 3/4 synchronizer sleeve and an instruction sheet. The original 1/2 clutch hub sleeve assembly and 3/4 clutch hub must be reused.
4. Put a label on the transmission showing it was updated per TSB 91-18-11 and to refer to this TSB before servicing.

NOTE: THE NEW 3RD GEAR SYNCHRONIZER RING AND 3/4 SYNCHRONIZER SLEEVE ARE UNIQUE FROM THE ORIGINAL COMPONENTS. THE NEW COMPONENTS MUST BE INSTALLED AS A SET IN THE PROPER POSITION. FAILURE TO DO SO WILL RESULT IN THE INABILITY TO SHIFT THE TRANSMISSION INTO ONE OF THE GEARS. note>

PART NUMBER	PART NAME	CLASS
FOTZ-7C391-H	Synchronizer Kit - R2 (F-150, Bronco, Econoline)	C
FOTZ-7C391-F	Synchronizer Kit - R1 (Ranger, Bronco II, Explorer)	C
FOTZ-7C391-G	Synchronizer Kit - R1 (Aerostar)	C

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
911811A	Inspect Transmission	0.3 Hr.
911811B	Install Synchronizer Kit Ranger 4X2 With 2.OL, 2.3L, 2.9L, or 3.OL And Aerostar With 3.OL	5.0 Hr.
911811C	Install Synchronizer Kit Ranger 4X4 With 2.3L or 4.OL and Explorer 4X4	6.7 Hr.
911811D	Install Synchronizer Kit - Ranger 4X4 With 2.9L	6.9 Hr.
911811E	Install Synchronizer Kit - Ranger 4X2 And Explorer 4X2 With 4.OL	6.0 Hr.
911811F	Install Synchronizer Kit - Bronco II 4X2 With 2.9L And Bronco With 5.OL	6.5 Hr.
911811G	Install Synchronizer Kit - Bronco II 4X4 With 2.9L	6.9 Hr.
911811H	Install Synchronizer Kit F-150 4X2 With 4.9L	5.1 Hr.
911811I	Install Synchronizer Kit F-150 4X4 With 4.9L or 5.OL And Bronco With 4.9L	6.3 Hr.
911811J	Install Synchronizer Kit - F-150 4X2 With 5.OL	5.3 Hr.
911811K	Install Synchronizer Kit - Econoline With 4.9L	5.2 Hr.

DEALER CODING

BASIC PART NO.            CONDITION CODE  
 7C391                            56

OASIS CODES: 505000, 505200, 506000, 702000

Technical Service Bulletin # **911014**

Date: **910515**

**M/T Transmission Shift Lever - Buzz/Vibration**

Article No.  
 91-10-14

5/15/91

^ NOISE/VIBRATION - SHIFT LEVER - M50D TRANSMISSION

^ TRANSMISSION - M50D - SHIFT LEVER BUZZ/VIBRATION

LIGHT TRUCK: 1988-91 BRONCO, F-150, F-250

ISSUE: Transmission shift lever buzz, may be noticed in overdrive or 4th gear after the vehicle has obtained normal operation temperatures and is driven on a smooth road surface at normal highway speeds of 55 MPH (88Km/h). The tone and intensity of this condition are considerably less when observed in 4th gear than in overdrive.

ACTION: Replace the transmission top cover assembly with the new top cover kit assembly. Refer to the following procedure for diagnosis and service details.

INSPECTION PROCEDURE:

1. Drive the vehicle to warm the transmission oil to approximately 125~F (52~) - about ten miles at highway speeds when the outside temperature is at the freezing point.
2. On a smooth road surface, drive the vehicle at approximately 55 MPH (88 Km/h) in overdrive to verify shift lever buzz.
3. If shift lever buzz is observed, lightly push to the right (passenger side) to determine if the buzz is eliminated.
4. If the buzzing noise is eliminated, refer to the following repair procedures.

NOTE: IF THIS TEST DOES NOT ELIMINATE THE BUZZ, DO NOT REPAIR WITH THIS PROCEDURE, IT WILL NOT CORRECT THE CONCERN, REFER TO THE LIGHT TRUCK SHOP MANUAL FOR FURTHER CONCERN DEFINITION.

REPAIR PROCEDURE

1. Remove the old transmission top cover assembly.
2. Install the new transmission top cover assembly.

NOTE: THE TRANSMISSION DOES NOT HAVE TO BE REMOVED FROM VEHICLE. ACCESS IS GAINED BY REMOVING THE SHIFT LEVER AND SHIFT BOOT AS AN ASSEMBLY. PULL BACK THE FLOOR COVERING AND REMOVE TRANSMISSION OPENING COVER PLATE.

CAUTION: CARE SHOULD BE TAKEN TO INSURE THAT NO DIRT ENTERS THE TRANSMISSION WHILE THE TOP COVER IS OFF.

PART NUMBER	PART NAME	CLASS
F0TZ-7C391-J	Transmission Top Cover Assembly	C

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911014A	Replace Transmission Top Cover Assembly	1.2 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7222	56

OASIS CODES: 505200, 703300

Technical Service Bulletin # 9059

Date: 900228

**M/T - ZF HD M50D Bump/Clunk/Click Noises**

^ NOISE - BUMP/CLUNK/CLICK - ZF HEAVY DUTY M50D TRANSMISSION

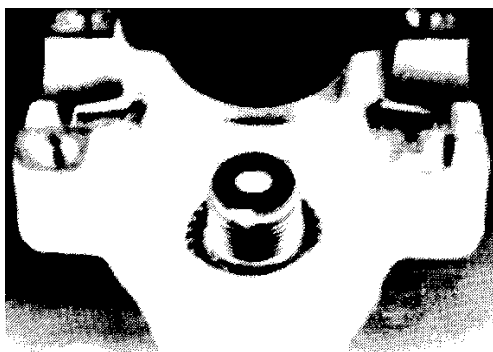
^ TRANSMISSION - ZF HEAVY DUTY M50D-LEAKS LUBRICANT

Article No. 90-5-9

LIGHT TRUCK: 1987-90 F-250, F-350

**ISSUE:** A "bumping/clunking" noise or a "clicking" sound on torque reversal or transmission lubricant leakage may be caused by a loose output flange retaining nut.

**ACTION:** Install a new output flange retaining nut. Refer to the following procedure for service details.

**TB-1555-A****Figure 1**

1. Install a new output flange retaining nut (E7TZ-7045-A) on the output shaft, Figure 1.

**CAUTION:** DO NOT REUSE THE OUTPUT FLANGE RETAINING NUT AFTER ANY SERVICING OF THE TRANSMISSION. ALWAYS REPLACE IT WITH A NEW ONE.

2. Tighten the nut to 184 lb.ft. (250 N-m).

**TB-1556-A****Figure 2**

3. Position a 3/16" (4.76 mm) punch on the locking shoulder of the retaining nut over the groove of the output shaft, Figure 2.

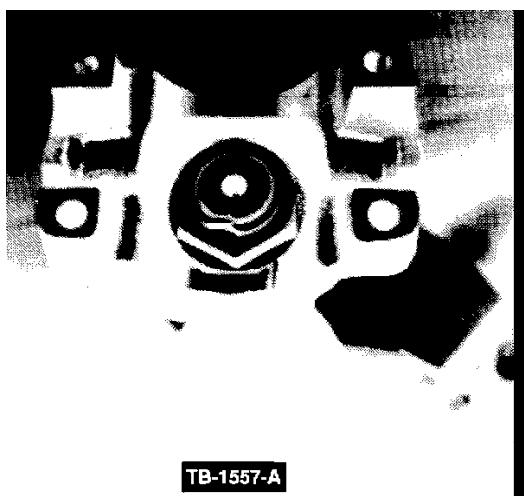


Figure 3

4. Strike the punch with a hammer. Make sure that the shoulder of the retaining nut is contacting the bottom of the groove, Figure 3.

**CAUTION:** WHEN STAKING THE NUT, MAKE SURE THE LOCKING SHOULDER OF THE NUT AND THE GROOVE OF THE OUTPUT SHAFT ARE THE ONLY AREAS USED IN THIS STAKING OPERATION. IF THE NUT IS STRUCK IN ANY OTHER AREA, THE TORQUE WILL BE LOST AND THE NUT MAY COME LOOSE IN SERVICE.

PART NUMBER	PART NAME	CLASS
E7TZ-7045-A	Output Flange Retaining Nut	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
900509A	Install & Stake Retaining Nut	0.4 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7045	33

OASIS CODES: 5500, 5950, 5970, 7100, 7113

Technical Service Bulletin # **911712**

Date: **910821**

## M/T - Gear Noise/Rattle

Article No. 91-17-12

08/21/91

- ^ NOISE - "GEAR RATTLE" - MANUAL TRANSMISSIONS - FROM FLOOR PAN SHIFTER OPENING (4X2 AND 4X4 MODELS)
- ^ TRANSMISSION - MANUAL - "GEAR RATTLE" NOISE FROM FLOOR PAN SHIFTER OPENING (4X2 AND 4X4 MODELS)

LIGHT TRUCK: 1988-91 BRONCO, F SUPER DUTY, F-150, F-250, F-350, F-47

**ISSUE:** Gear noise, commonly referred to as "gear rattle", may enter the cab through the manual transmission shift lever floor pan opening. This noise is normally noticed when the vehicle is at normal operating temperatures and a load is applied to the engine between 500 and 1000 RPM.

**ACTION:** Inspect and evaluate the vehicle for gear rattle. If gear rattle is detected, install a new shift boot over the shift lever to limit gear noise from entering the cab. Refer to the following procedure for service details.

### INSPECTION PROCEDURE:

1. Drive the vehicle till normal operating temperatures are maintained (about 10 miles at highway speeds when the ambient temperatures are above freezing.)

2. On a smooth road surface, place the shift lever in 2nd or 3rd gear and accelerate starting at 500 RPM.
3. If gear rattle is heard and is diagnosed as coming through the shift lever floor pan opening, repair using the following procedure.

## REPAIR PROCEDURE:

1. Remove the shift knob from the shift lever.

NOTE: TO REMOVE THE SHIFT KNOB WITHOUT DAMAGE, PLACE A 16 mm OR AN ADJUSTABLE OPEN END WRENCH UNDER THE SHIFT KNOB END AND STRIKE THE WRENCH UPWARD WITH A HEAVY HAMMER.

2. Remove the (4) screws which secure the boot to the floor. Remove the boot assembly from the the shift lever.
3. Install the new boot assembly over the shift lever and secure to the floor with the the (4) screws provided.

NOTE: USE A SOAP SOLUTION TO ASSIST IN INSTALLING THE SHIFT BOOT OVER THE SHIFT LEVER.

CAUTION: DO NOT USE A HYDROCARBON (OIL) OR GLYCOL BASED LUBRICANT TO AID IN INSTALLING THE SHIFT BOOT. THESE MATERIALS WILL GET INTO THE SHIFT LEVER SPLINES AT THE SHIFT KNOB END OF THE LEVER AND CAUSE THE SHIFT KNOB PLASTIC CORE TO CRACK.

4. Install the shift knob on the shift lever.

PART NUMBER	PART NAME	CLASS
FITZ-7277-A	Boot - Transmission Assembly	B

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911712A	Inspection Only (includes Road Test)	0.3 Hr.
911712B	Inspect And Install Shift Lever Boot	0.7 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7277	53

OASIS CODES: 505000, 505200, 597997, 702300

Technical Service Bulletin # **88912042788**

Date: **880401**

## Full Float Hub Seal - Lubricant Leak

Article No. 88-9-12

AXLE - REAR - FORD 10.25" FULL FLOAT DESIGN - HUB SEAL LEAKS

LEAKS - LUBRICANT FROM HUB SEAL -

FORD 10.25" FULL FLOAT DESIGN REAR AXLE

LIGHT TRUCK: 1985-88 F-250/350

ISSUE: Lubricant leaking from the rear axle on F-250 and F-350 trucks, with Ford 10.25" full float axles may be caused by the hub seal. The leaking condition could affect trucks with single or dual rear wheels.

ACTION: To correct this, install a new design hub seal with improved sealing qualities. The new hub seal is "green" in color to assist in part identification. Refer to the appropriate Light Truck Shop Manual, Volume A, Section 15-09 and the following service procedure for removal and installation instructions.

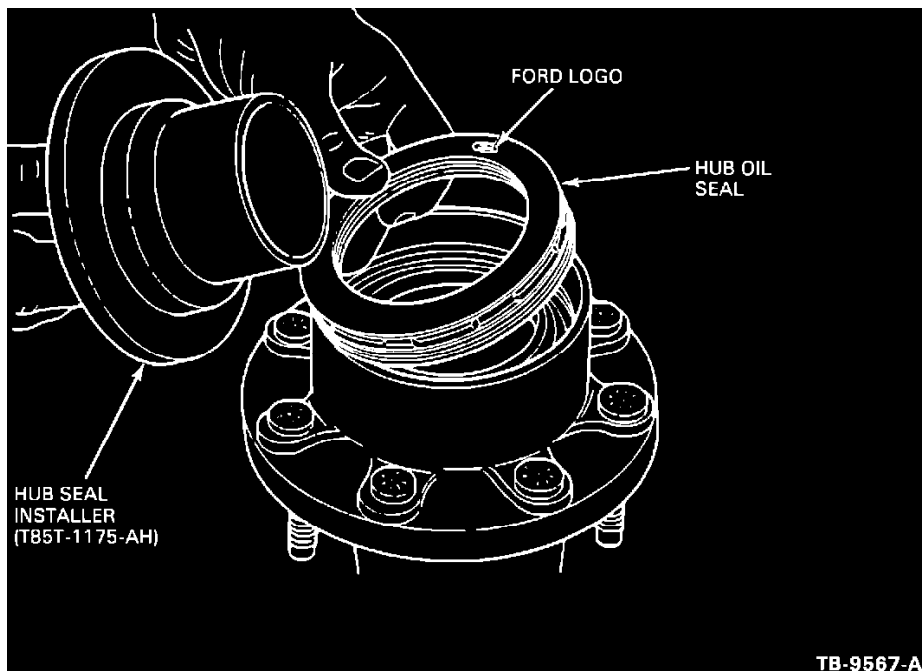


FIGURE 12

1. Position hub seal with the "Ford" logo facing up, Figure 12.

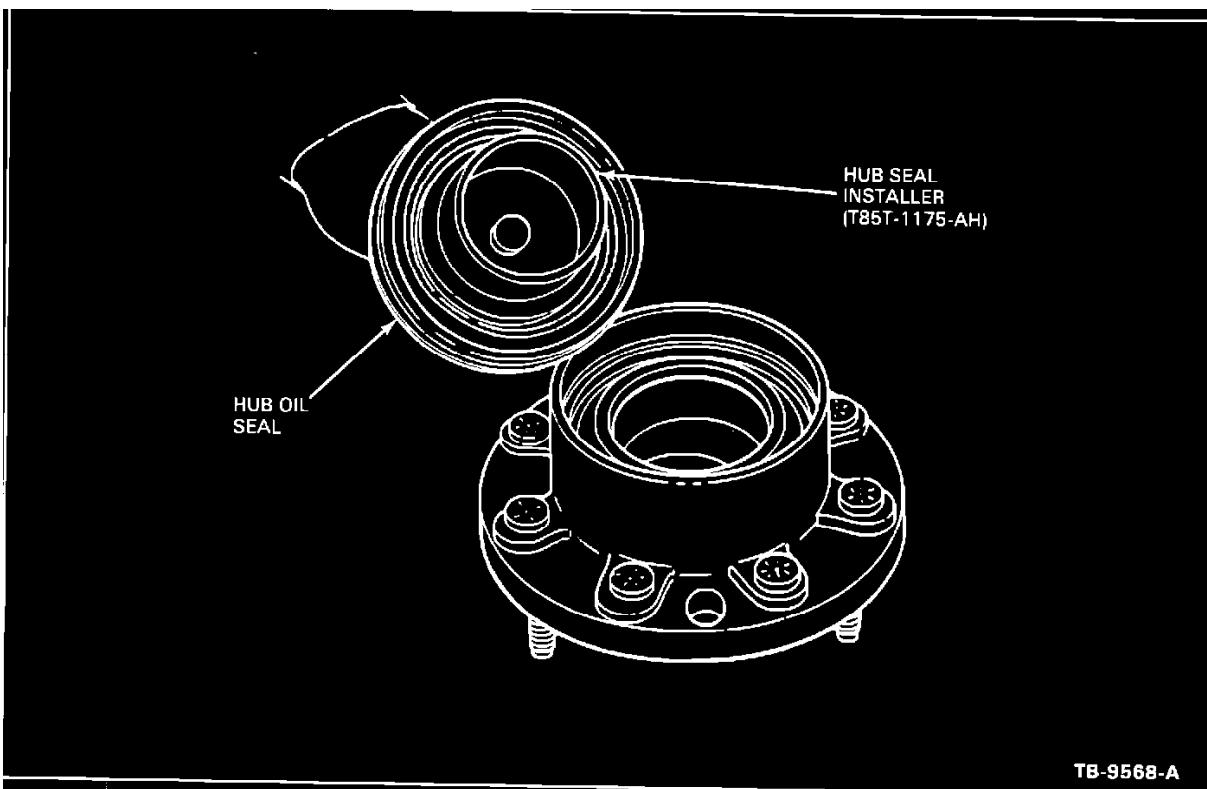


FIGURE 13

2. Install hub seal on hub seal installer tool (T85T-1175-AH), Figure 13.

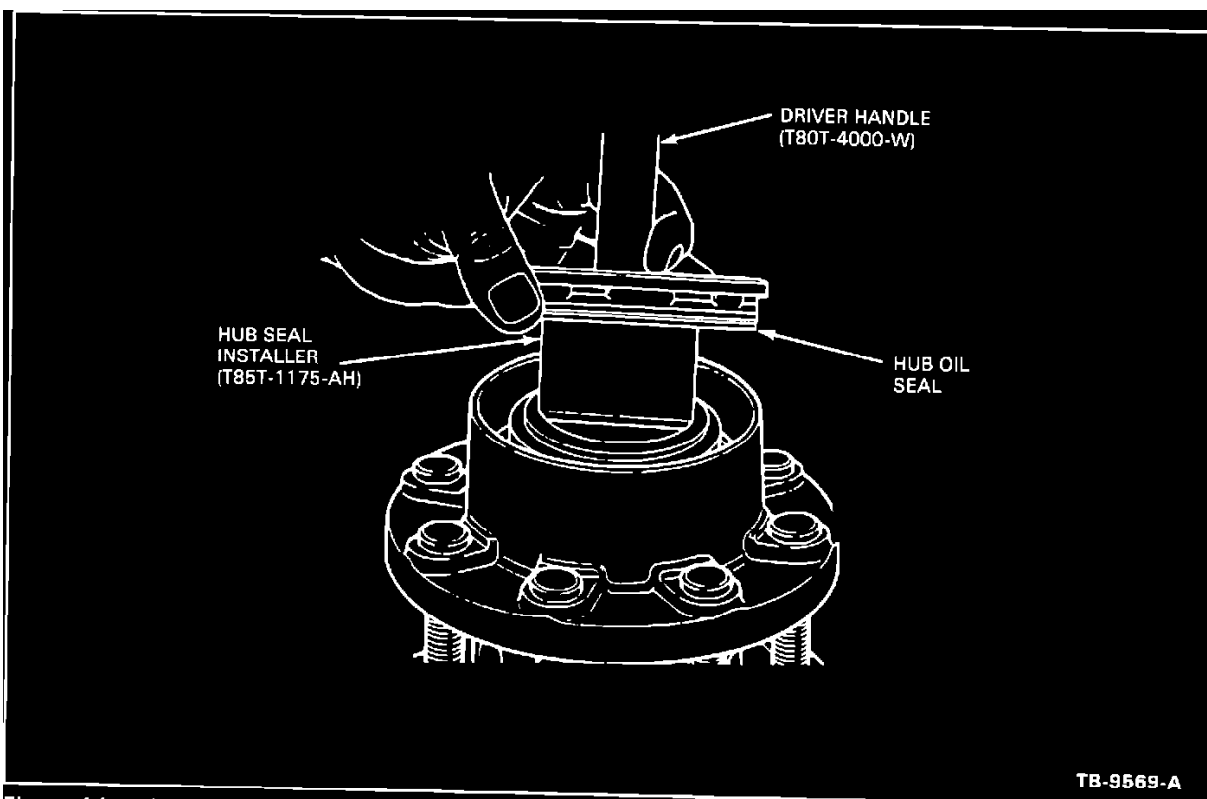


FIGURE 14

3. Insert tool with seal squarely into hub, Figure 14.

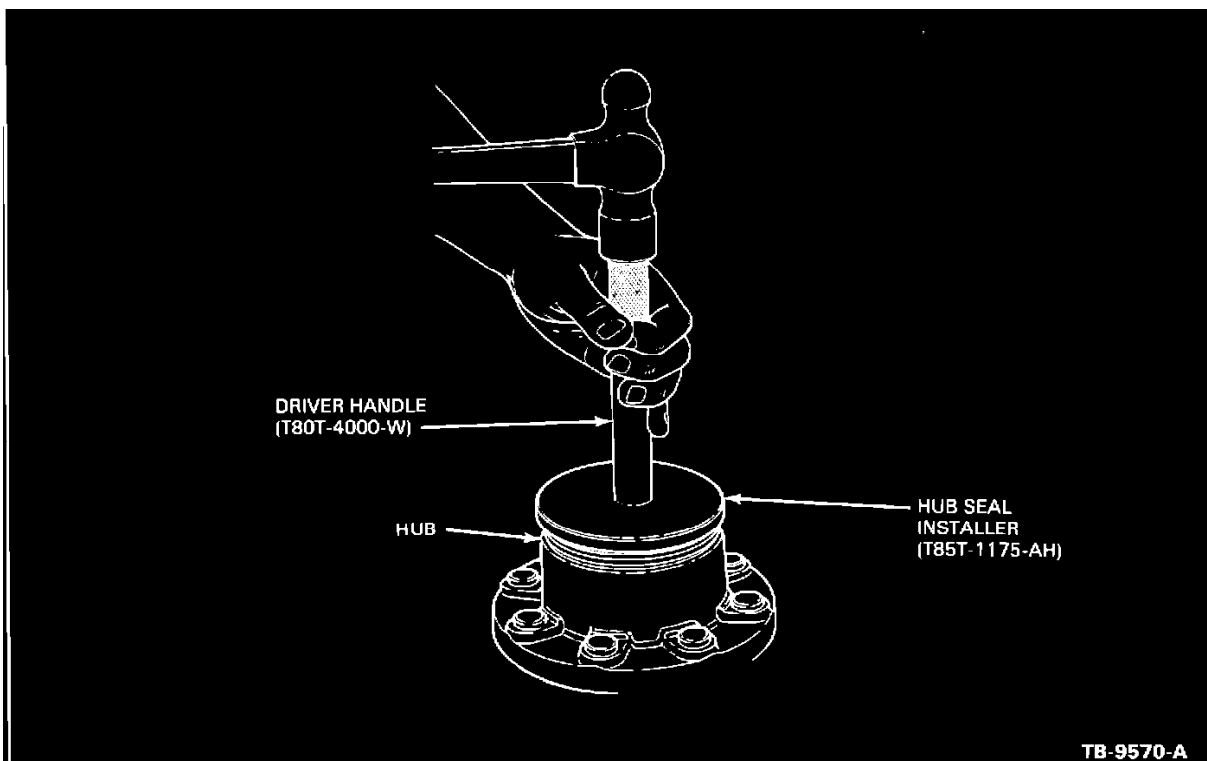


FIGURE 15

4. Hold tool straight and strike handle until hub seal is fully seated, Figure 15.

**CAUTION:** Install new seal if seal is damaged during or after installation.

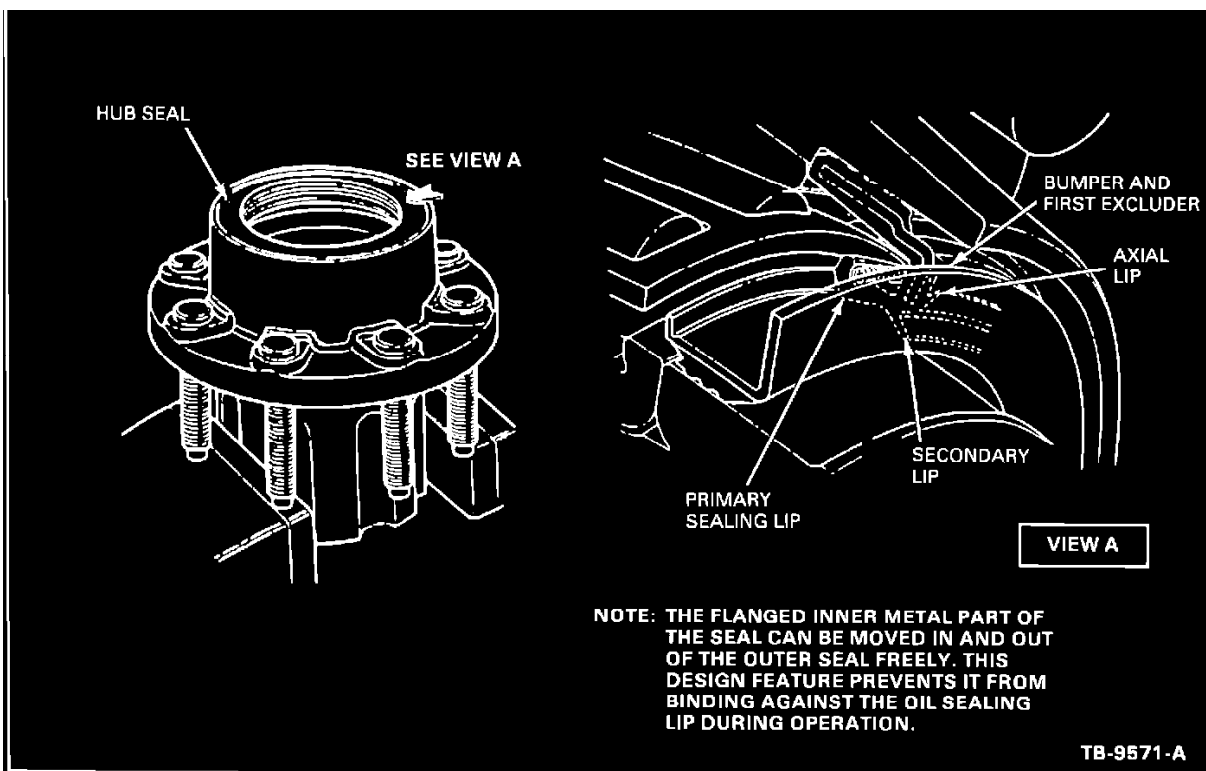


FIGURE 16

**NOTE:** UNITIZED WHEEL SEALS ARE STANDARD ITEMS ON FULL FLOAT REAR AXLES. THE UNITIZED WHEEL SEAL COMBINES THE FUNCTION OF A WEAR SLEEVE AND SEAL IN ONE SELF-CONTAINED UNIT WITH THE SEAL AND SLEEVE SURFACE INSIDE. THE UNITIZED DESIGN PROVIDES MAXIMUM PROTECTION FOR THE SEALING SURFACE DURING INSTALLATION AND OPERATION, FIGURE 16.

PART NUMBER	PART NAME	CLASS
E7HZ-1175-A	Hub Seal	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Powertrain Warranty Coverage

OPERATION: 880912A - Install one hub seal

TIME: 0.7 Hr.

OPERATION: 880912B - Install both hub seals 1.2 Hrs.

DLR. CODING: Basic Part No. 1177

Condition Code: 48

Technical Service Bulletin # **901110**

Date: **900523**

## Steering/Suspension - Shimmy

Article No. 90-11-10

- ^ STEERING-SHIMMY-DIAGNOSTIC PROCEDURE-4X2 UNITS ONLY
- ^ SUSPENSION-SHIMMY-DIAGNOSTIC PROCEDURE- 4X2 UNITS ONLY

LIGHT TRUCK: 1987-89 F-350

**ISSUE:** Front end shimmy may occur at various driving speeds or when hitting bumps in the road. There are several vehicle conditions sometimes described by customers as shimmy which may not actually be "shimmy". Shimmy, as observed by the driver, is defined as large amplitude, rotational oscillations of the steering wheel resulting from large, side to side tire/wheel movements.

**ACTION:** Inspect the truck and perform the following diagnosis to determine the shimmy's causal factors. Be aware of the following points:

- ^ Shimmy is not always confirmed during road testing.
- ^ It is very important to check all systems that can cause shimmy.
- ^ After a general review of the front suspension/steering systems, make the necessary adjustments and replacements as noted.
- ^ Check bolt and nut torques to be sure they are tightened to the specified torque specifications.
- ^ Check the front end alignment. Look for excessively worn tires and out of balance wheel and tire assemblies.

Shimmy should not be confused with steering wheel nibble and vibration concerns.

- ^ Steering wheel nibble is a condition resulting from the tire interaction with various road surfaces. It is observed by the driver as small amplitude, rotational oscillations of the steering wheel.
- ^ Various suspension/steering vibrations are sometimes confused as shimmy. They appear as steering column shake and wheel/tire imbalance. They induce a vertical motion in the steering wheel/column.

Refer to the appropriate model year Light Truck Shop Manual, Sections 18-01, 11-01 and 12-01 for NVH conditions other than shimmy.

## Steering Linkage Inspection:

1. With the weight on the front wheels, check the linkage joints while someone else turns the steering wheel from side to side.

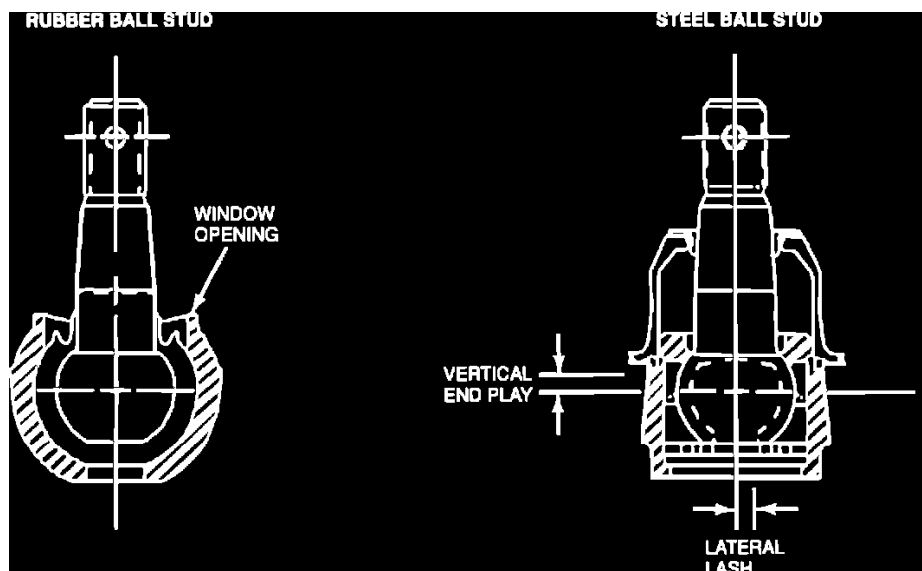


Figure 1

- a. For rubber ball socket (RBS) joints, see if the ball stud makes contact with the window opening in the socket bowl while on the truck, Figure 1. If contact is made with the window opening, replace it with a greaseable steel joint.
- b. For steel (greaseable) joints, measure the lateral (side to side) lash in the joint, Figure 1.
  1. If the lash exceeds .060" (1.59 mm), replace the joint.
  2. With the truck on a hoist, check the steel (greaseable) joints for vertical (up and down) end play by pushing and pulling on the joint, Figure 1. If the end play exceeds .090" (2.38 mm), replace the joint.

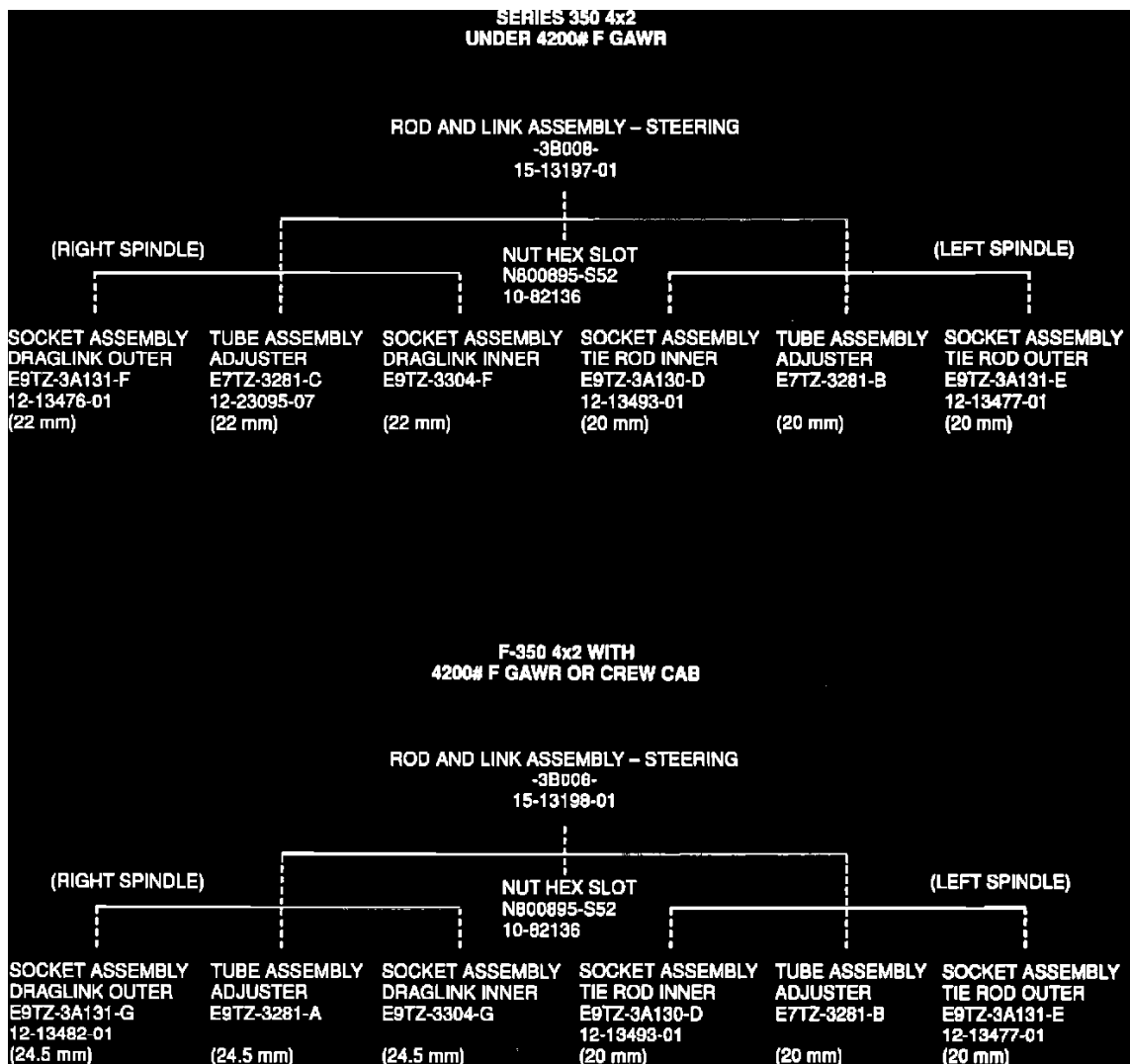


Figure 2

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B483-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

3. Remove the linkage from the truck, Figure 2.
  - a. See if the rubber is torn on the RBS. If the rubber is torn, replace it with a greaseable steel joint.
  - b. See if the steel joint will spin freely. If the joint spins freely with the hand, replace the joint.

Refer to Figure 2 for specific service part applications.

## Steering Gear Inspection:

1. Inspect the mounting surface of the steering gear. Check the frame area for the following:
  - ^ Signs of motion
  - ^ Loose rivets
  - ^ Cracks - Removal of the gear from the frame may be required to check for cracks.

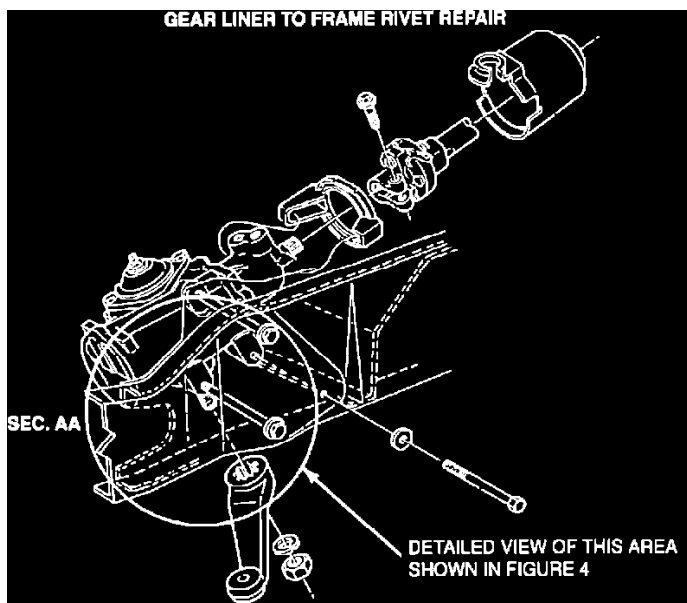


Figure 3

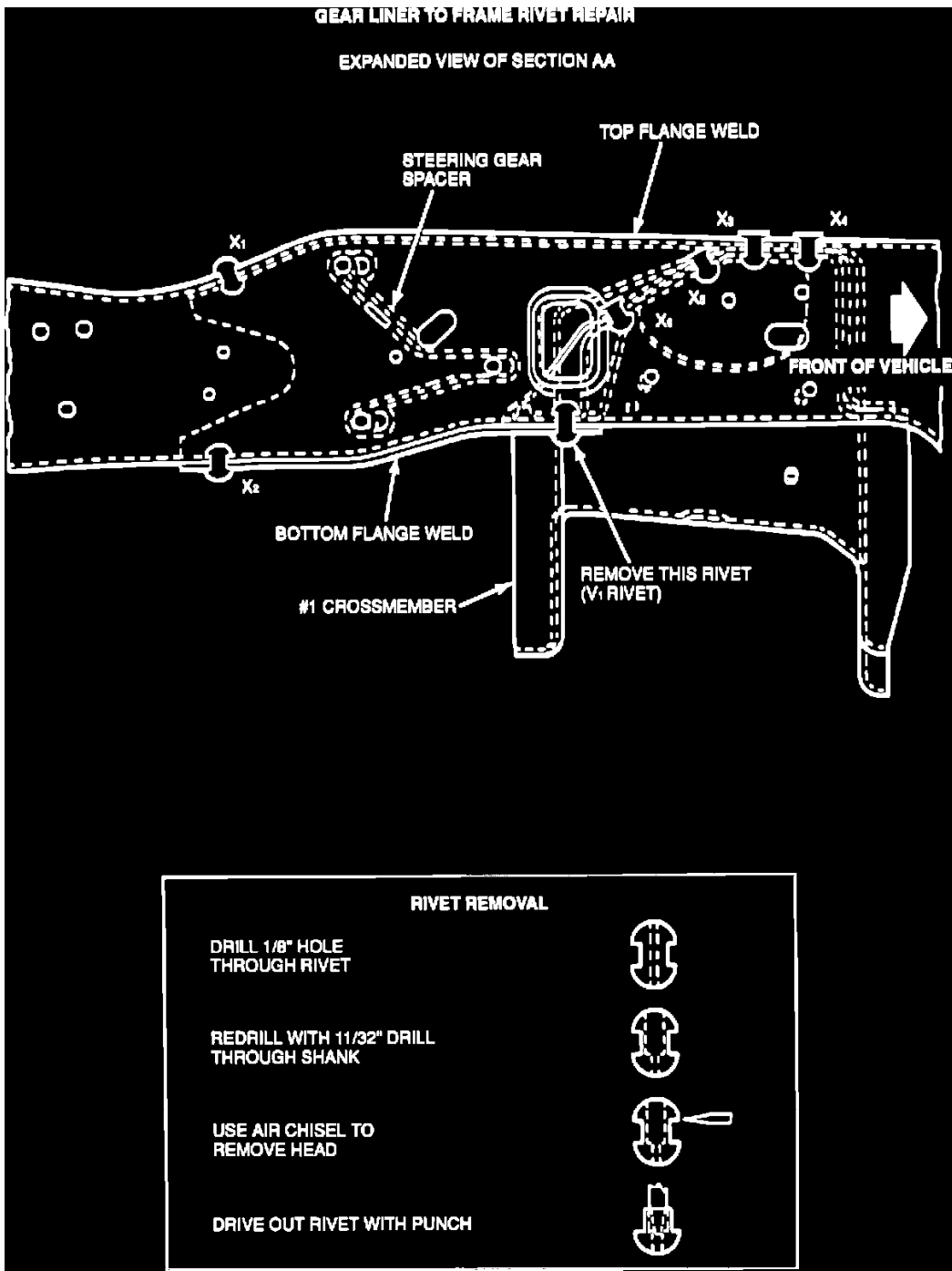


Figure 4

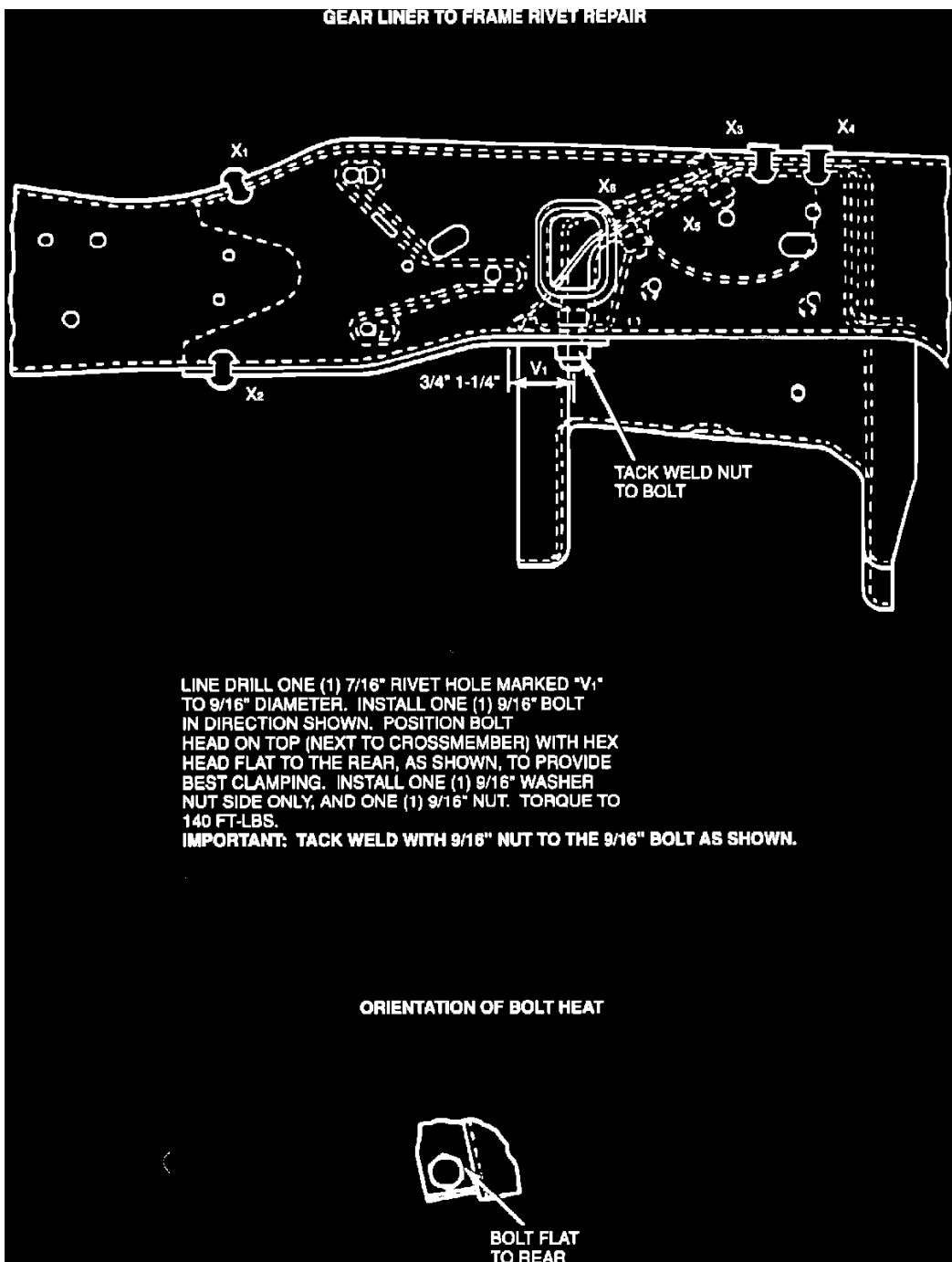


Figure 5

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

2. Repair trucks with a cracked frame liner or loose rivets by using Frame Repair Kit (E6TZ-5K130-A). See Figures 3, 4 and 5.
3. Inspect the frame for cracks in the following areas.
  - ^ Frame rail near the steering gear top and bottom flanges
  - ^ Frame rail at the steering gear bolt heads.
  - ^ Frame rail at or near the spring tower bracket
  - ^ Engine crossmember front LH flange.
4. If there are cracks in any of the above locations, replace the frame.
5. If a dealer confirmed shimmy has been experienced, replace the steering gear sector shaft. Use steering gear sector shaft repair kit (EOAZ-3375-A). Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.
6. Check for the presence of mesh load.
  - a. With the front wheels off the ground, hold the tire and turn the tire side to side slowly.
  - b. See if the effort increases when turning the tire straight ahead.
  - c. If no increase is noted, perform the Shop Manual procedure to check and adjust mesh load. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.

### Wheel End Friction and Wheel Bearing End Play Inspection:

1. Inspect the vehicle for worn ball joints. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 14 for service details. Replace as required.
2. Check the wheel bearing end play. Refer to the appropriate model year Light Truck Shop Manual, Vol A, Section 14 for service details. Adjust the end play or replace the wheel bearings as required.

### Vehicle Desensitizing

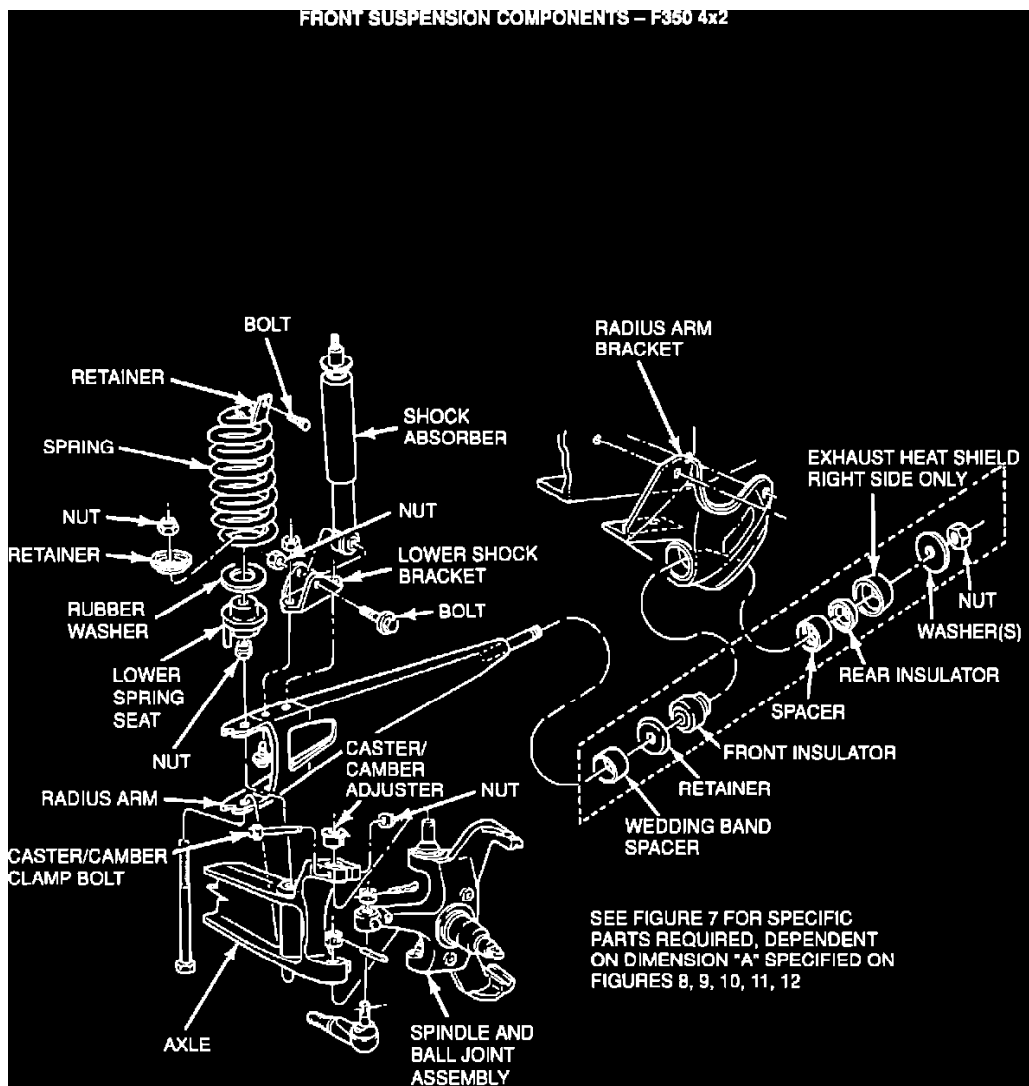


Figure 6

SKETCH NO.	RADIUS ARM STUD LENGTH (DIM. "A") UNTHREADED	WEDDING BAND N804264-S2 8 mm THICK	RETAINER 3B186	INSULATOR FRONT E7TZ-3B203-A	BRACKET E41Z-3B095-B (L.H.) E41Z-3B095-A (R.H.)	SPACER E5TZ-3B244-A	INSULATOR REAR D8TZ-3B203-A	HEAT SHIELD (R.H. ONLY) E4TZ-3B483-A	WASHER 4.5 mm THICK 379572-S2	WASHER 7 mm THICK N805144-S56	NUT 34892-S2	(FRAME MOUNTED) RADIUS ARM		
												Y	Y	Y
2	F350 4x2 DRW	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y		
3	67.7/69.2 mm 74.7/76.2 mm	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y		
3.2	F350 SRW	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y		
3.4	59.7/61.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y		
3.6	67.7/69.2 mm 74.7/76.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y		

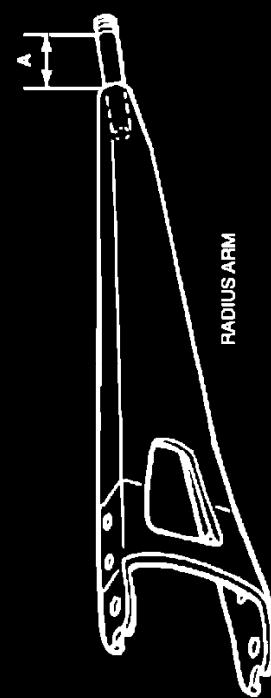


Figure 7

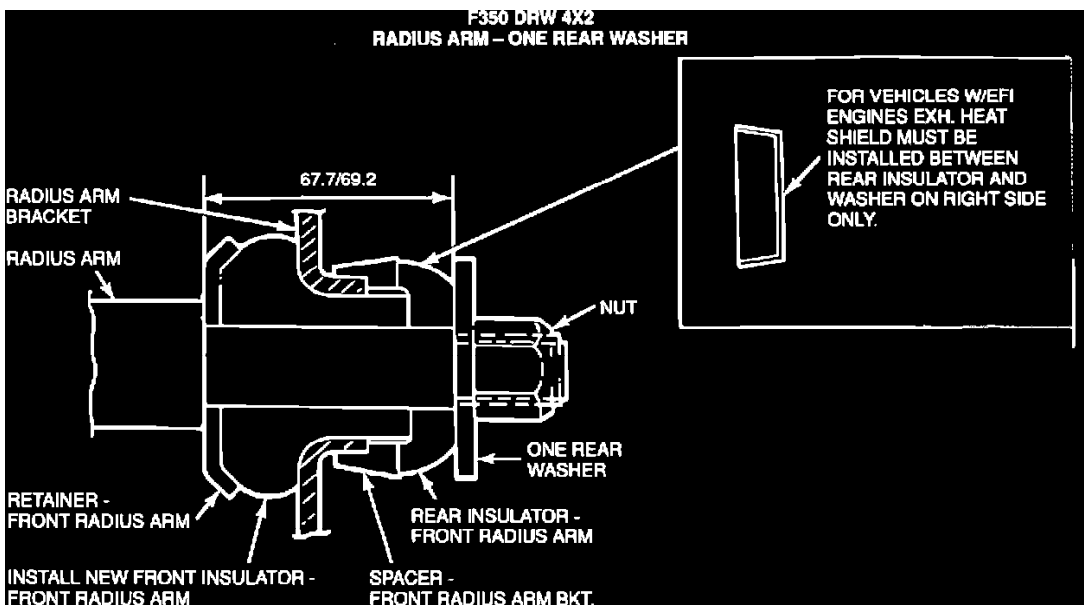


Figure 8

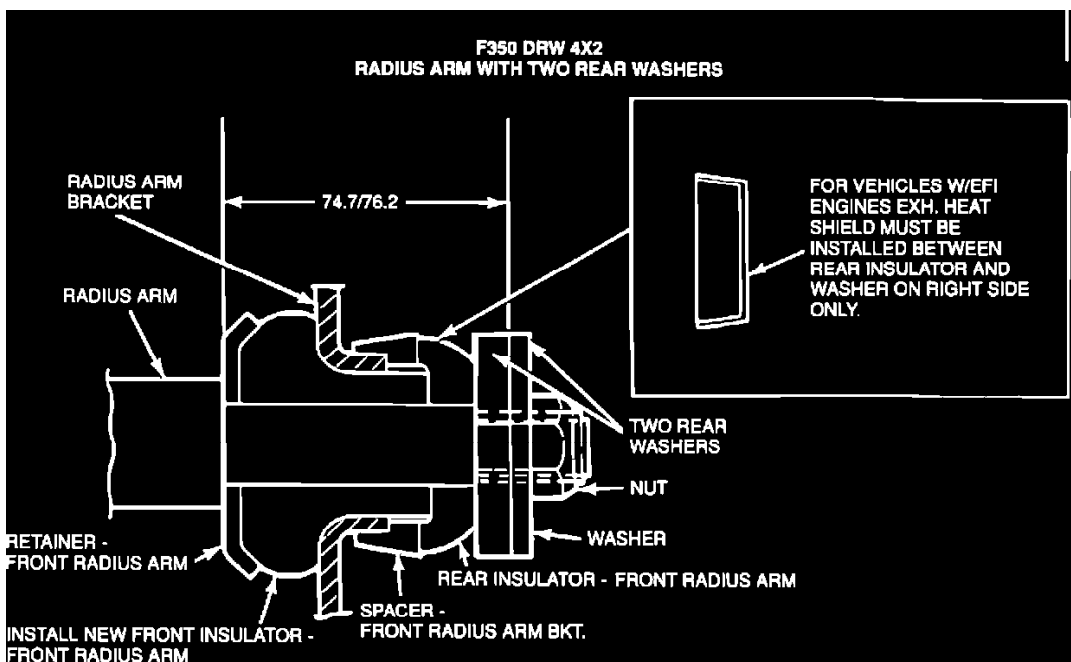


Figure 9

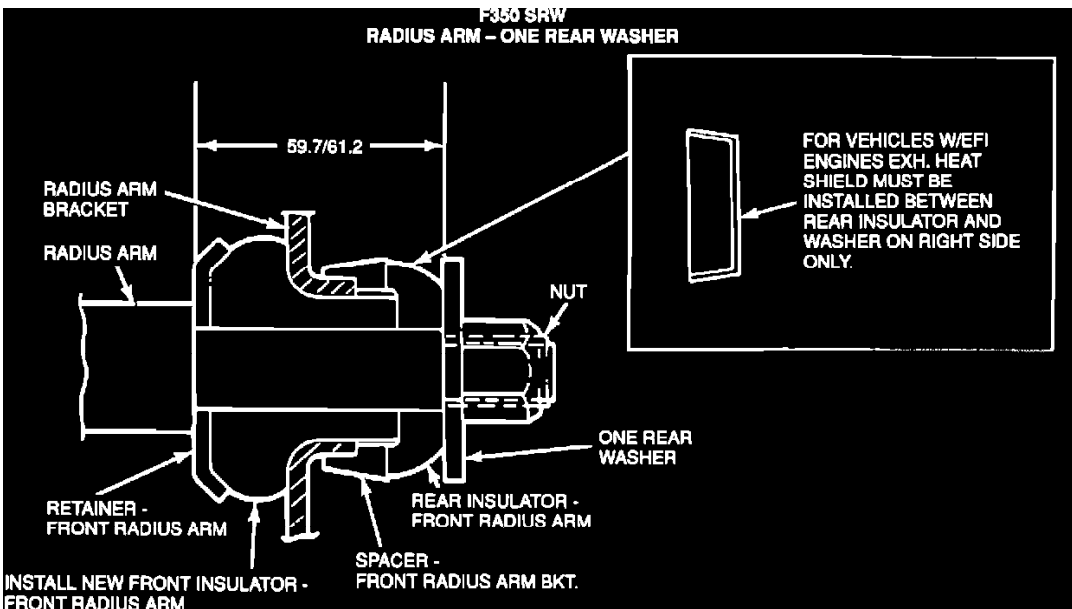


Figure 10

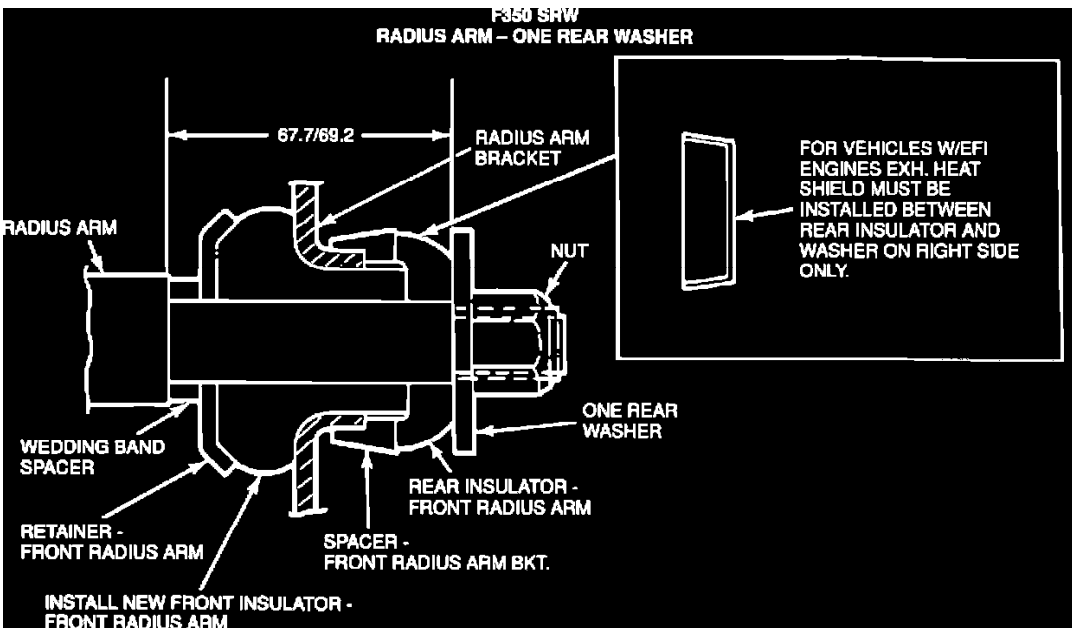
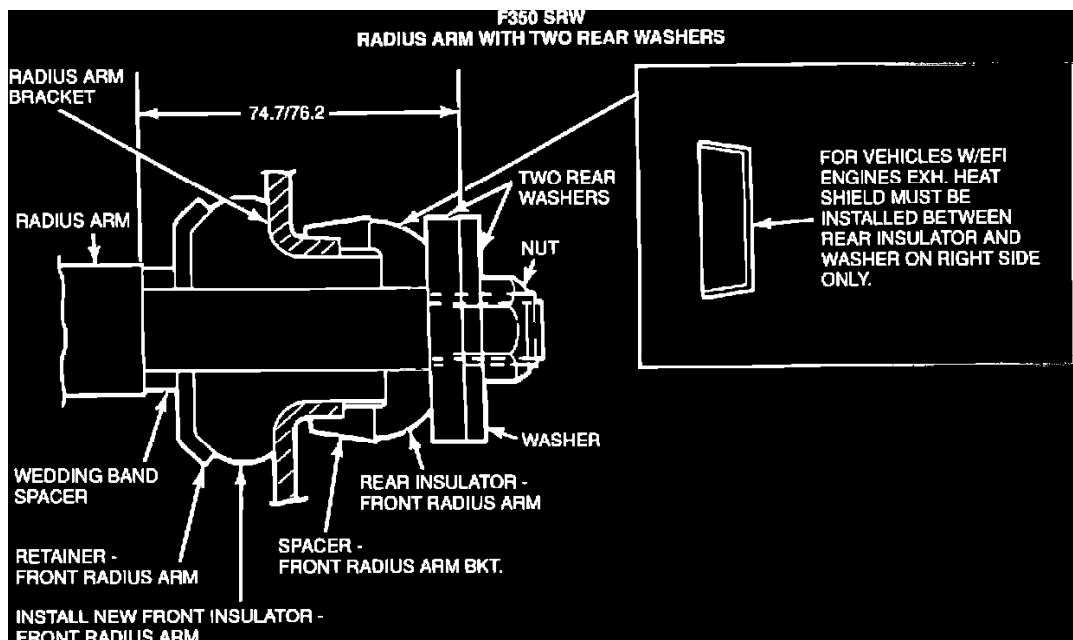


Figure 11



**Figure 12**

1. Inspect the radius arm bushing part stack, Figure 7.
2. Measure the radius arm stud length. See the component matrix, Figure 7, to determine the parts involved and the bushing part stack height for the F-350 DRW 4x2 and the F-350 SRW 4x2. Figures 6 through 12 show the radius arm bushing stack for each truck and follows the matrix.
3. Install rubber bushing (E7TZ-3B203-A) if it is not present on the vehicle.

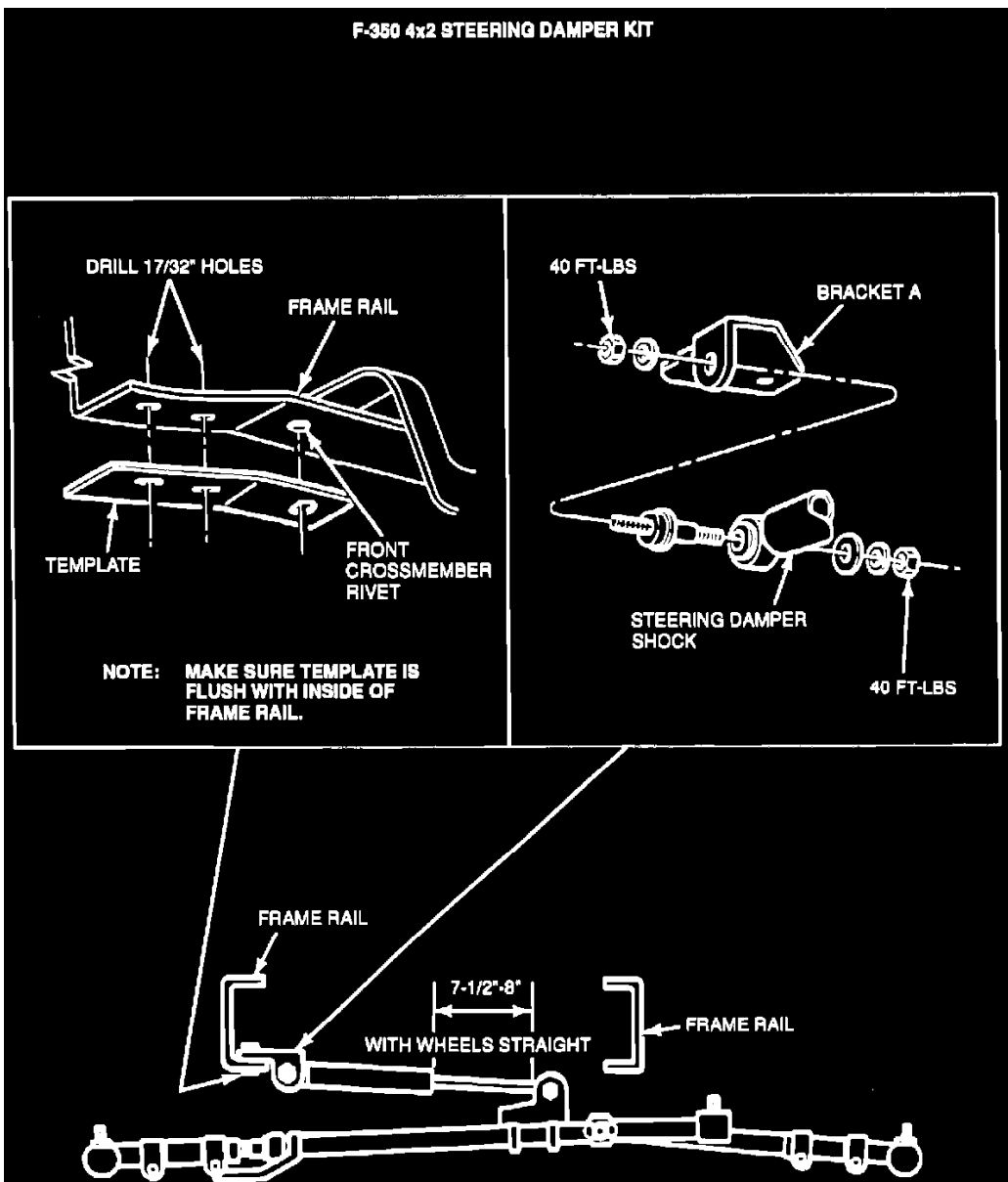


Figure 13

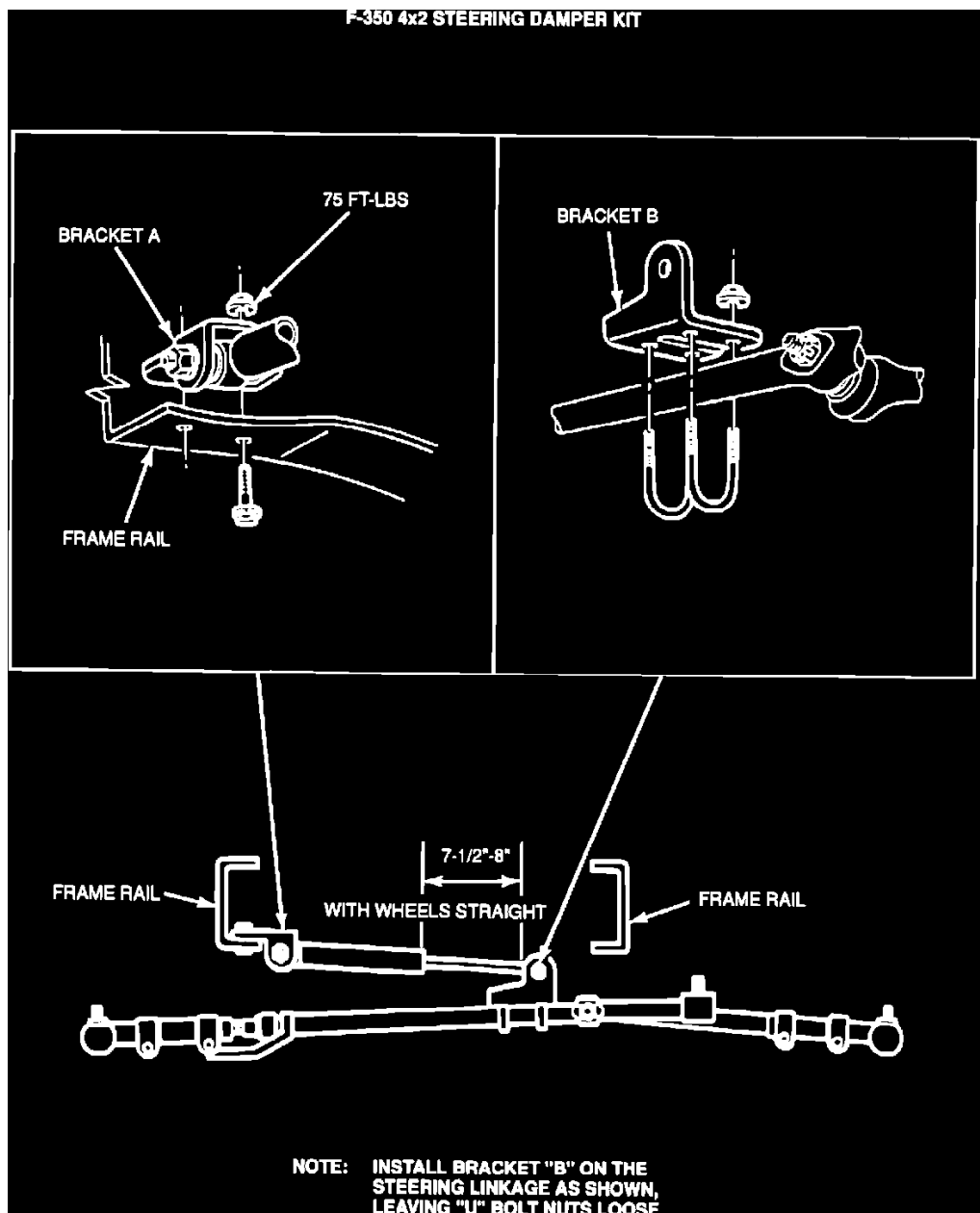


Figure 14

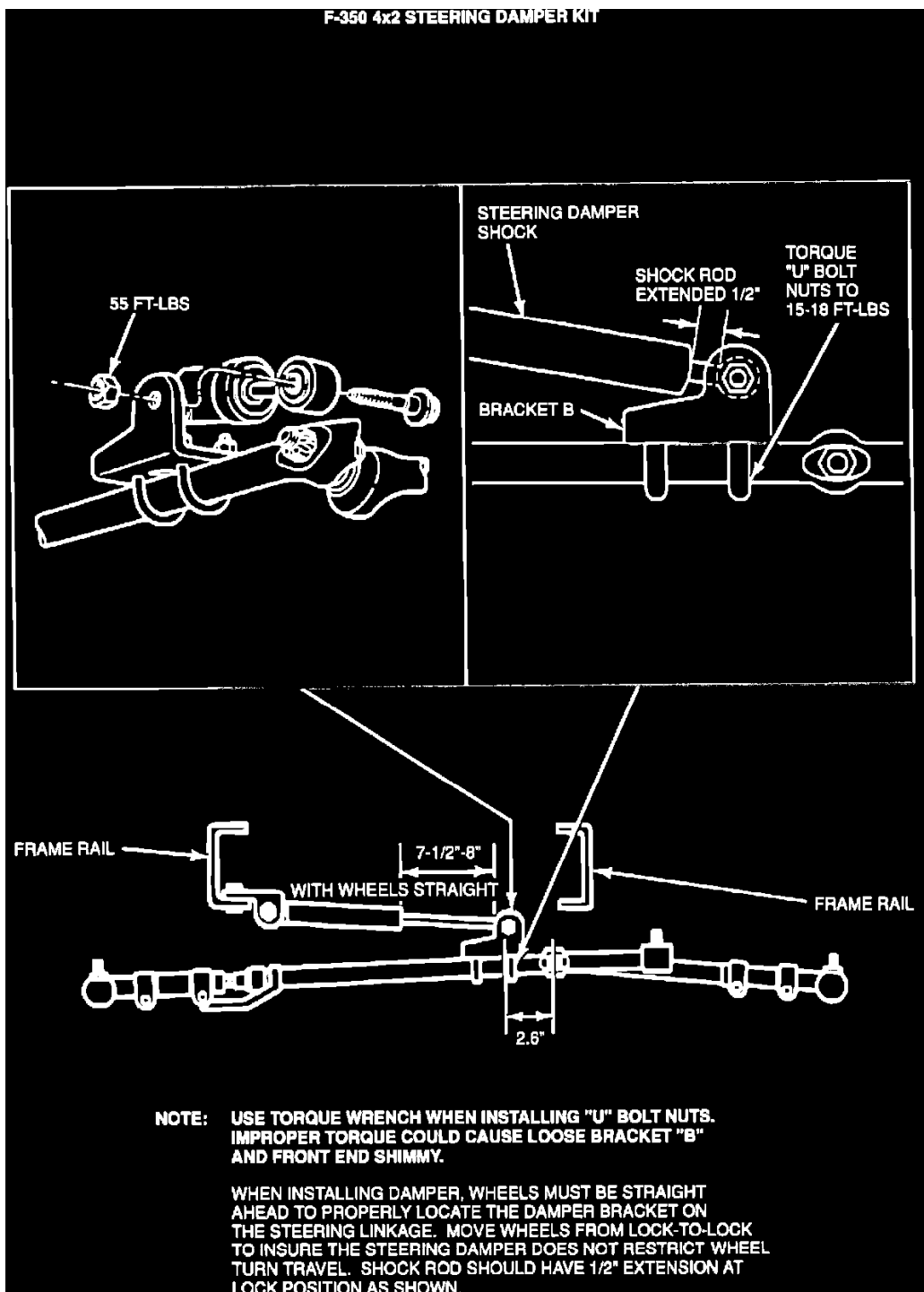


Figure 15

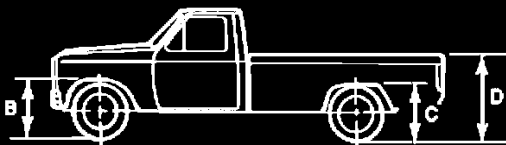
PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
E0AZ-3675-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

4. Check the truck for the presence of a steering damper on F-350 DRW 4x2 vehicles. See Figure 13, 14 and 15 for a step by step installation procedure.
5. Install a damper (Service Kit E7TZ-3E651-A) on F-350 DRW 4x2 only if it is not present on trucks built before 1/6/88. A damper kit can be installed on trucks built after 1/6/88, if a shimmy is experienced.

## Alignment

TRUCK MODEL	ALIGNMENT FACTORS DEGREES (INCH)	ALIGNMENT SPECIFICATIONS				STANDARD VEHICLE ATTITUDE -REF-			
		AT DESIGN RIDE HEIGHTS (REF)	ASSEMBLY PROCESSING	SHOP MANUAL OR IN-SERVICE CHECKING	MAXIMUM VARIATION BETWEEN WHEELS	LATERAL TILT 2) (SIDE TO SIDE HEIGHT DIFFERENCES)			DOG-TRACK
						"B" FRONTWHEEL HOUSE OPENING	"C" REAR WHEEL-HOUSE OPENING	"D" REAR END OF PICKUP BOX	
F-250 4x2 F-350 4x2	CASTER	7.2	●	1) 3)	1.5	15 mm	20 mm	20 mm	30 mm
	CAMBER	-0.5	●	1)	0.7				
	TOE 4)		-0.08 ± 0.25 (-0.03 ± 0.125)	+0.08 ± 0.25 (+0.03 ± 0.125)					
	STEERING AXIS INCLINATION	13.0							
	* INCLUDED ANGLE	12.5							

\* INCLUDED ANGLE DOES NOT CHANGE WITH RIDE HEIGHT  
 ● NOT ASSEMBLY PLANT CONTROLLABLE



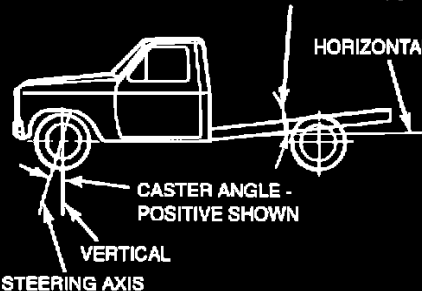
1) SEE CASTER AND CAMBER CURVES ON SHEET 2. CASTER AND CAMBER SETTINGS DEPEND ON RIDE HEIGHT DIM "A"

2) LATERAL VEHICLE TILT SPECIFICATIONS ARE MAX. ALLOWABLE FOR EITHER:  
 - VEHICLE AT CURB WEIGHT WITHOUT OCCUPANTS OR  
 - VEHICLE LOADED (NOT EXCEEDING GVW) WITH EQUALLY DISTRIBUTED WEIGHT OVER THE CARGO AND OCCUPANT AREAS

3) THE CASTER GRAPHS (SEE SHEET 2) AGREE WITH A LEVEL VEHICLE (0° FRAME ANGLE). IF THE VEHICLE IS LOWER IN THE FRONT THEN ADD THE FRAME ANGLE TO THE MEASURED CASTER READING AND COMPARE THIS SUM TO THE GRAPHED SPECIFICATIONS FOR THE GIVEN RIDE HEIGHT. IF THE VEHICLE IS LOWER IN THE REAR THEN SUBTRACT BEFORE COMPARING TO SPECIFICATION

4) TOE IS SET AND TO BE CHECKED AGAINST SPECIFICATION IN-SERVICE AT CURB RIDE HEIGHT ONLY. CURB RIDE HEIGHT IS A VEHICLE AS BUILT FROM THE ASSEMBLY PLANT, FULL FLUIDS, WITH NO ADDITIONAL WEIGHT FROM PASSENGERS, CARGO, AFTER MARKET ITEMS OR BODY MODIFICATIONS. TOE MAY BE RESET TO THE SHOP MANUAL OR OTHER RECOMMENDED SETTING AT ANY RIDE HEIGHT THAT THE VEHICLE WILL OPERATE AT FOR AT LEAST 50 PERCENT OF ITS USE. HOWEVER, TOE SET TO THE SHOP MANUAL SPECIFICATION AT CURB PROVIDES OPTIMUM VEHICLE AND TIRE WEAR PERFORMANCE FOR ALL RIDE HEIGHTS BETWEEN CURB (UNLOADED) AND GVW

FRAME ANGLE - MEASURE IN FLAT AREA AHEAD OF REAR WHEELS



INCLUDED ANGLE

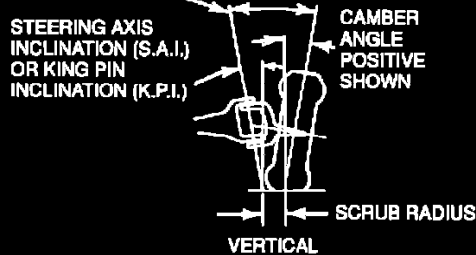


Figure 16

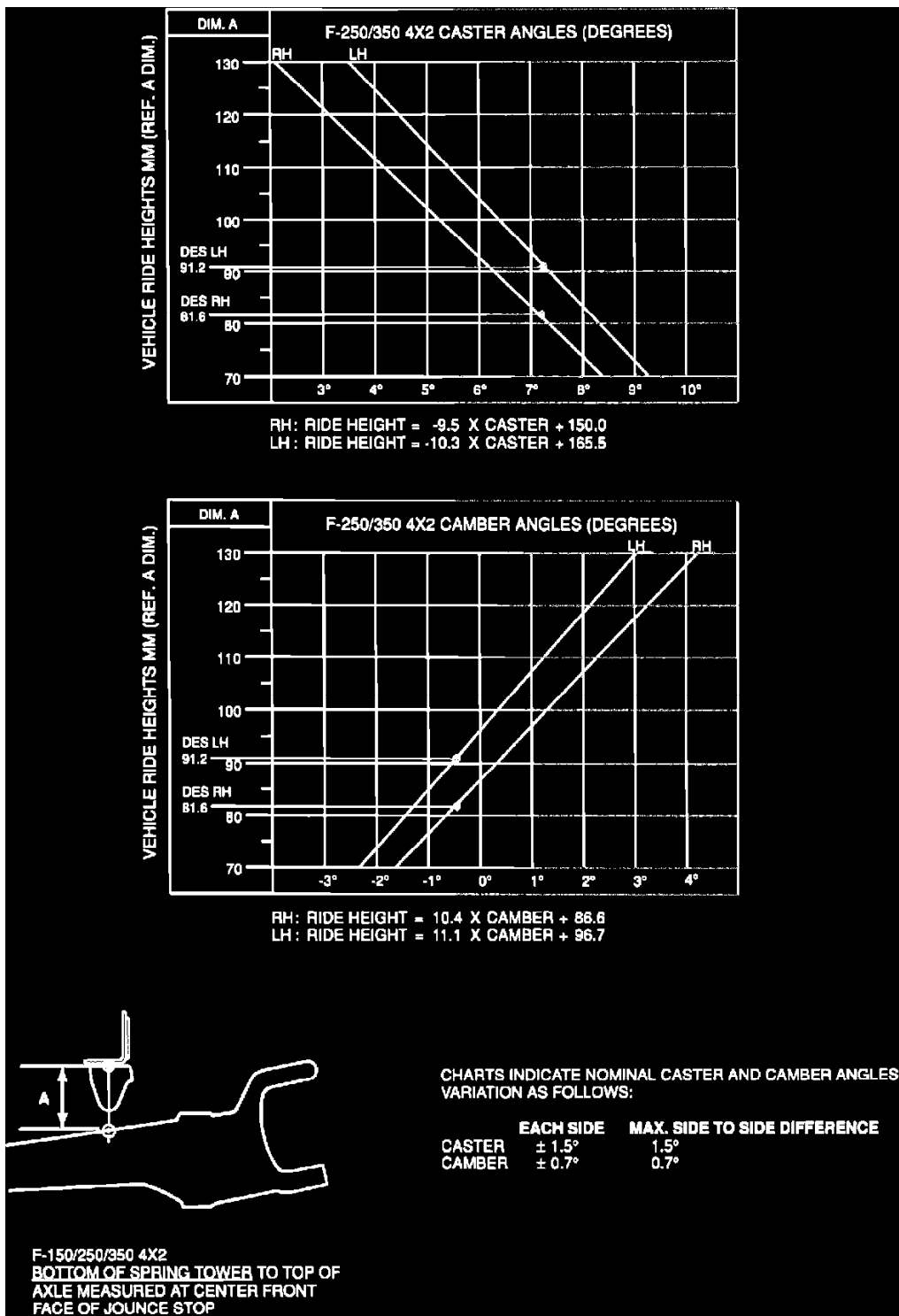


Figure 17

CAMBER OF 0 +/- 1/2~ AS VEHICLE IS OPERATED IS OPTIMUM

1. For vehicles with constant load (utility bodies) - Set camber to 0 +/- 1/2~. Refer to Figures 16 and 17.
2. For vehicles with varying loads (wreckers, dumps, rollback tilts, stake racks, etc.), proceed as follows:
  - a. Have the customer measure fender to ground heights, at wheel centerline with vehicle empty and loaded.
  - b. Measure the front end alignment..
    - ^ Caster
    - ^ Camber

- ^ Toe
- ^ Ride height
- ^ Front fender height to ground
- c. Determine the difference of customer measured loaded and empty fender height to ground when the alignment is measured.
- d. Compute camber at customer measured heights by adding 3/4~ per 1/2" height difference for higher customer heights. Subtract 3/4~ per 1/2" height for lower measured fender heights to measured camber.
- e. Compute the average camber by averaging the high and low numbers.
- f. Reset camber with computed average between 0 + 1/2~.

## TOE

- 3. Set Toe to 0 +/- 1/2~.

## CASTER

- 4. Set caster as shown in the Shop Manual according to ride height.

## Wheels/Tires Size, Pressure, Balance, Wear

1987 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHL	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/86R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Argent Wheel/Optional Black - Wheel E5TA-UB

1988 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHL	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	60
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Gray Wheel/Optional - Black Wheel E7UA-JA

1989 F-350 TIRE/WHEEL RELEASES									
F-350 MODEL	WHL	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR	REMARKS
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80	HD FT END OPT
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80	
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Super Cab	D/R	155	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
		161	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	

\* Gray Wheel/Optional Black Wheel E7UA-1A

RECOMMENDED TIRE USAGE - 1989 F-350 TIRE RELEASES							
APPROVED SUPPLIER	LT215/85R16 LRD - A/S	LT215/85R16 LRD - A/T	LT235/85R16 LRE - A/S	LT235/85R16 LRE - A/T	7.50R - 16 LRD - HWY	7.50R - 16 LRD - A/T	7.50R - 16 LRD - M-S
Firestone	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88
Michelin	87/88/89		87/88/89	87/88/89			
Goodyear		87/88/89	87/88/89		87		87/88
General			87/88/89	87/88/89			

#### SIZE AND PRESSURE

- Compare the tire and wheel with the sizes and pressures on the certification label or the following Tire/Wheel Release Charts to make sure the correct tire is used. Inflate the tire to the specified pressure.

#### BALANCE

- Make sure of the correct balance of the front wheels.

#### WEAR

- If heel and toe wear or edge wear are present, rotate the tires.
  - ^ For single rear wheels the same tread styles front and rear, cross rotate all four tires.
  - ^ For single rear wheels with different tread styles, cross switch the front tires.
  - ^ For all dual rear wheels, cross switch the front tires.

Check and reset tire pressure per the certification label or the following Tire/Wheel Release Charts.

NOTE: FOR TIRES WORN TO THE POINT OF REPLACEMENT, USE RELEASED TIRES AS SHOWN IN THE FOLLOWING TIRE/WHEEL RELEASE CHARTS.

## Parts, Time & Etc

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
901110A	Steering Linkage Inspection	0.4 Hr.
901110B	Steering Gear Inspection	0.2 Hr.
901110C	Install Frame Kit	11.7 Hr.
901110D	Install Sector Shaft Repair Kit	0.4 Hr.
901110E	Adjust Steering Gear	0.6 Hr.
901110F	Wheel Bearing End Play Inspection	0.2 Hr.
901110G	Vehicle Desensitizing	1.3 Hr.
901110H	Alignment	1.7 Hr.
901110I	Tire Rotation & Balance	0.9 Hr.

DEALER CODING

BASIC PART NO.      CONDITION CODE  
FRONT                      W4

OASIS CODES: 3100, 3200

Technical Service Bulletin # **881811**

Date: **880831**

## Dash Panel - Cracks At Clutch Master Cylinder

Article No. 88-18-11

- ^ DASH PANEL CRACKS AT CLUTCH MASTER CYLINDER
- ^ CLUTCH - HIGH EFFORT - DASH PANEL CRACKING
- ^ CLUTCH -SOFT PEDAL AND INCOMPLETE RELEASE

LIGHT TRUCK: 1987-88 F-SERIES

**ISSUE:** Incomplete clutch release and/or hydraulic fluid leaking into the cab from the clutch master cylinder may be caused by the reinforcement plate on the clutch master cylinder separating from the dash panel. The separation of the reinforcement plate reduces the clutch master cylinder pushrod travel. Reinforcement plate separation can also cause deflection of the clutch master cylinder that results in a misalignment of the pushrod to the clutch master cylinder. Misalignment causes the Oring in front of the secondary seal to leak hydraulic fluid.

**ACTION:** To correct this, install a new service released clutch master cylinder mounting bracket. Refer to the following procedure for service details.

1. With an assistant pushing the clutch pedal down several times, check for separation between the dash panel (cowl) and the clutch master cylinder reinforcement dish.

**NOTE:** THIS MUST BE DONE FROM UNDER THE HOOD IN THE ENGINE COMPARTMENT.

2. If separation is present, install a new clutch master cylinder mounting bracket, (E8TZ-7K509-A for 1988 model year trucks or E3TZ-7K509-A for 1987 model year trucks). Refer to the following service details:
  - a. Remove the two (2) clutch master cylinder retaining nuts.
  - b. Position the clutch master cylinder forward.
  - c. Repair and seal the dash panel, as required.
  - d. Install the clutch master cylinder mounting bracket onto the clutch master cylinder mounting studs.
  - e. Reposition the clutch master cylinder.
  - f. Reinstall the clutch master cylinder retaining nuts. Torque to 7-11 lb.ft. (9-15 N-m).

PART NUMBER	PART NAME	CLASS
E8TZ-7K509-A	Clutch Master Cylinder Mounting Bracket	C
E3TZ-7K509-A	Clutch Master Cylinder Mounting Bracket	CG

OTHER APPLICABLE ARTICLES: 87-16-15, 86-20-10, 85-5-24, 85-5-26, 84-1-14, 83-24-22, 83-23-16

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION: 881811A - Install Mounting Bracket

TIME: 0.5 Use "M" Time To Repair Dash Panel If Required

D.L.R. CODING: Basic Part No. 7K509

Condition Code: 14

^ CLUTCH (HYDRAULIC) - PEDAL DOES NOT FULLY RETURN - DIAGNOSTIC TIPS

^ TRANSMISSION - MANUAL - GEAR CLASH AND HARD SHIFTING

^ SPEED CONTROL - INOPERATIVE - LOW CLUTCH PEDAL ALLOWS SWITCH CIRCUIT TO REMAIN OPEN

Article No. 87-16-15

LIGHT TRUCK: 1984-87 F-150/350 BRONCO

Article No. 86-20-10

DASH PANEL CRACKS AT CLUTCH MASTER CYLINDER (6.9L (D)/7.5L)

CLUTCH - HIGH EFFORT -- DASH PANEL CRACKING/MISSHAPED RELEASE LEVER (6.9L (D)/7.5L)

CLUTCH-INCOMPLETE RELEASE

- DIAGNOSIS (6.9L (D)/7.5L)

LIGHT TRUCK 1983-86 F-250/350

Article No. 85-5-24

CLUTCH - (HYDRAULIC) - SLOW/DELAYED RETURN - COLD WEATHER (TSB 85-1-20 PART CORRECTION)

LIGHT TRUCK 1983-84 F SERIES

Article No. 84-1-14

CLUTCH - SLIPS - (6.9L-7.5L)

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 83-23-16

CLUTCH HYDRAULIC - SLAVE CYLINDER ATTACHMENT - (6.9L DIESEL/7.5L)

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 83-24-22

TRANSMISSION - MANUAL (T-19)

- HARD SHIFT - UNITS WITH 6.9L DIESEL

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 85-5-26

CLUTCH - HYDRAULIC SYSTEM DIAGNOSIS (F SERIES) &amp; PARTS LISTS (ALL MODELS)

LIGHT TRUCK 1983-85 E, F, B, R, B II

Technical Service Bulletin # **90167**Date: **900801****M/T - Clutch Fluid Leaks/Incomplete Release**

Article No. 90-16-7

^ CRACKS - DASH (ENGINE COMPARTMENT BULKHEAD) - CLUTCH MASTER CYLINDER AREA - VEHICLES BUILT BEFORE 6/15/90

^ CLUTCH - HIGH EFFORT - DASH CRACKED IN CLUTCH MASTER CYLINDER AREA - VEHICLES BUILT BEFORE 6/15/90

LIGHT TRUCK: 1984-90 BRONCO, F-150, F-250, F-350 1988-90 F SUPER DUTY

PART NUMBER	PART NAME	CLASS
E3TZ-7K509-A	Small Reinforcement Kit (1983-87)	B
E8TZ-7K509-A	Small Reinforcement Kit (1988-91)	B
E3TZ-7K509-B	Large Reinforcement Kit (1983-1991 Severely Damaged Units)	B

**ISSUE:** Incomplete clutch release and/or hydraulic fluid leaking into the cab from the clutch master cylinder may be caused by the reinforcement plate on the clutch master cylinder separating from the dash panel. The separation of the reinforcement plate reduces the clutch master cylinder pushrod travel. Reinforcement plate separation can also cause deflection of the clutch master cylinder that results in a misalignment of the pushrod to the clutch master cylinder. Misalignment causes the "O" ring in front of the secondary seal to leak hydraulic fluid.

**ACTION:** Inspect the truck and, if necessary, use the following service procedure to install a reinforcement kit.

**Inspection Procedure**

1. If the truck is a 1988 or later model, confirm that the starter interlock switch operates (the engine can be started) with the clutch pedal at least 0.5" (12.7 mm) from the floor.
2. Test drive the truck and check for good clutch release. There should be no grinding of the gears, particularly when shifting from neutral to reverse gear.
3. If the truck passes these tests, go to the Small Reinforcement Installation Procedure Section of this article.
4. If either of the above conditions are not met, check the hydraulic system for air. Refer to the Suggested Bleeding Procedure at the end of this article.
5. Test drive the truck and check for improved clutch release.
6. If there is no improvement, proceed as follows:
  - a. Remove the clutch master cylinder pushrod from the release lever pin on the release lever.

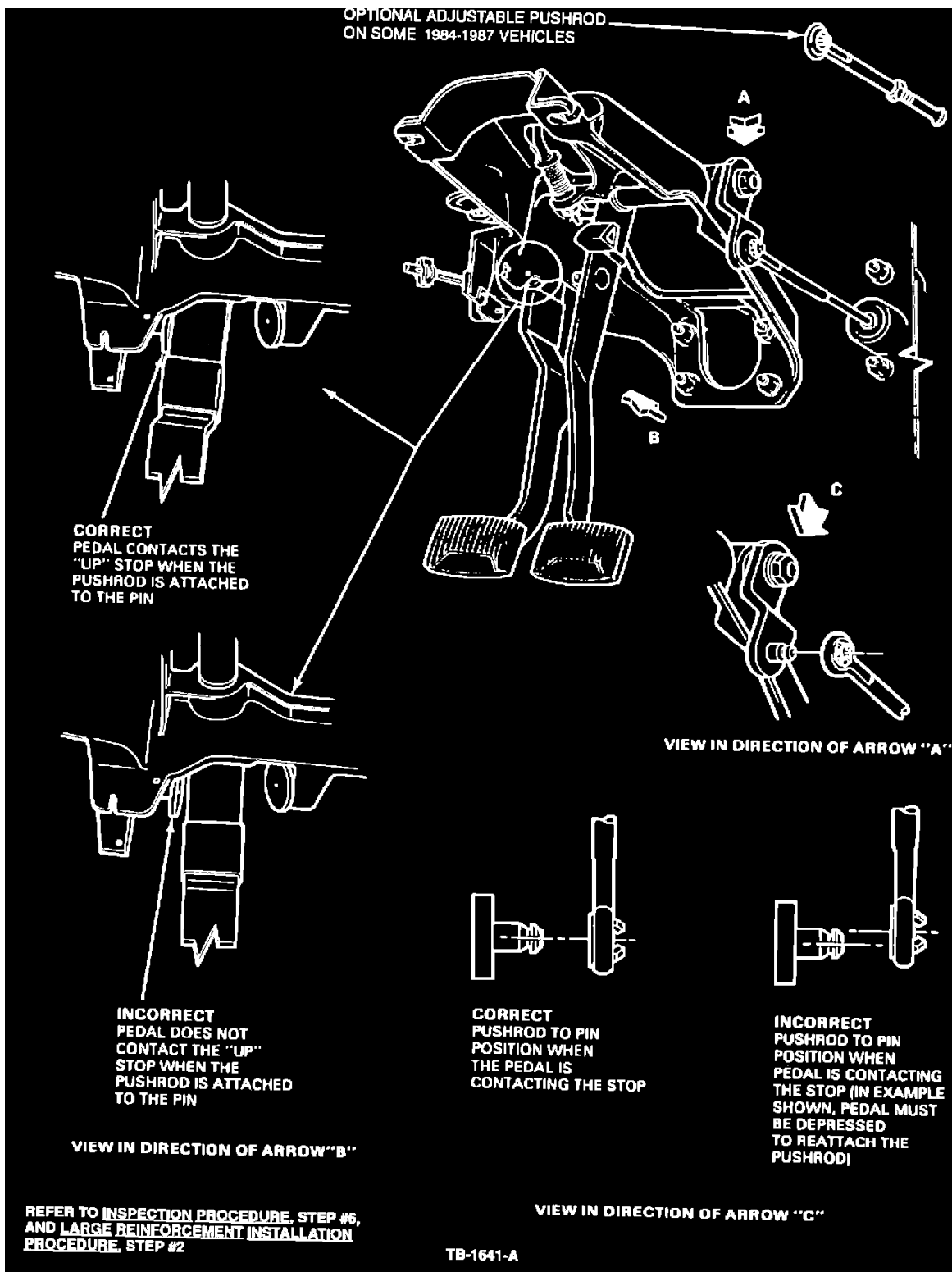


Figure 1

- b. Make sure the hole in the pushrod lines up with the pin, for those units requiring a minimal force for installation, Figure 1.
  - c. If it does not line up correctly, install an adjustable pushrod (except 1988 and later models) or replace the clutch release lever (required on 1988 and later models), cutting a new seat on the cross shaft splines.
7. Test drive the truck again, checking for improved clutch release.

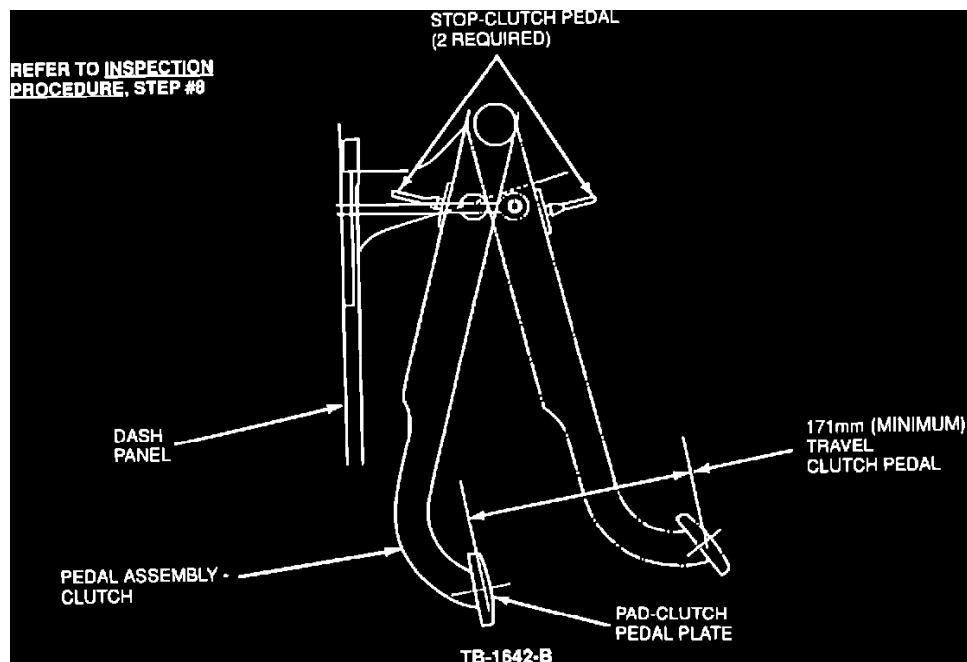


Figure 2

8. If there is no improvement, inspect the truck for adequate release bearing travel.
  - ^ It should be 11 mm or greater for full pedal travel.
  - ^ Pedal travel at the center of the pedal pad should be 6.75" (171 mm minimum) or more, Figure 2.
9. Release bearing travel and gear grinding noise may indicate the following concerns.
  - ^ If the release bearing is 11 mm or greater and there is grinding of one or two gears only, the concern is probably with the transmission.
  - ^ If all gears grind, the concern may be with the clutch and/or pilot bearing which will need replacing.
  - ^ If the release travel is less than 11 mm, check the clutch hydraulic system for air and bleed as necessary.
10. If the release travel is still less than 11 mm, with all of the above items eliminated, proceed as follows:
  - a. Raise the hood, while an assistant operates the clutch pedal.
  - b. Watch the clutch master cylinder for significant deflection.

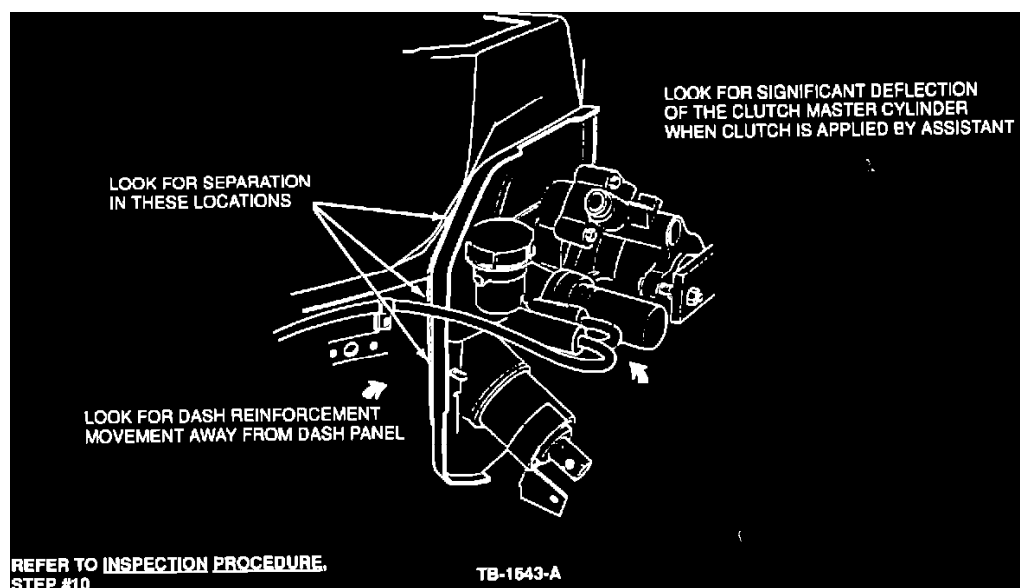


Figure 3

- c. Look for the dash reinforcement moving away from the dash, Figure 3.

d. On 1987 and earlier models, look down inside the cowl cover at the cowl where it is attached to the dash reinforcement. Check for pulled spot welds.

11. If there is significant movement of the dash or clutch master cylinder, proceed as follows:

- a. Remove the steering column and its dash toe plate and seal. Refer to the appropriate Light Truck Shop Manual, Section 13-07 for service details.
- b. Inspect the dash inside the cab and look for:
  - ^ Pulled spotwelds and cracked or torn sheet metal.
  - ^ Cracks in the brake and clutch pedal support

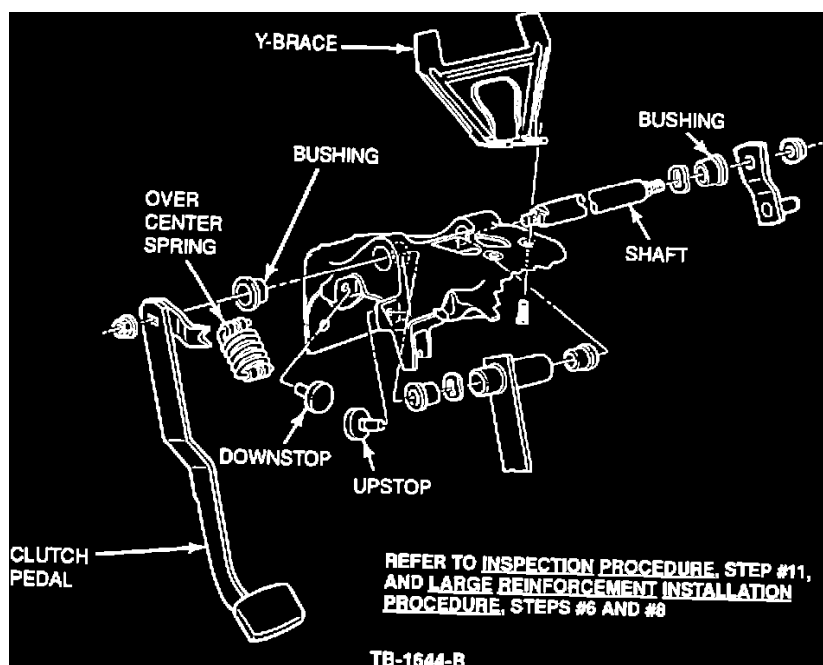


Figure 4

- ^ Missing Y-brace fasteners and a broken or detached Y-brace, Figure 4.

12. Check the cross shaft bushings for wear if the brake pedal moves when the clutch is depressed and vice versa. Replace them as required.

NOTE: GENERALLY, TRUCKS WITH SIGNIFICANTLY LESS THAN 11 MM CLUTCH RELEASE BEARING TRAVEL (AFTER COMPLETING THE INSPECTION PROCEDURE AND CORRECTING WHERE NECESSARY) WILL HAVE SIGNIFICANT DASH DAMAGE FROM PULLED SPOTWELDS AND TORN METAL. THESE TRUCKS WILL REQUIRE EXTENSIVE REPAIR. THEREFORE, GO TO THE LARGE REINFORCEMENT INSTALLATION PROCEDURE.

## Small Reinforcement Installation Procedure

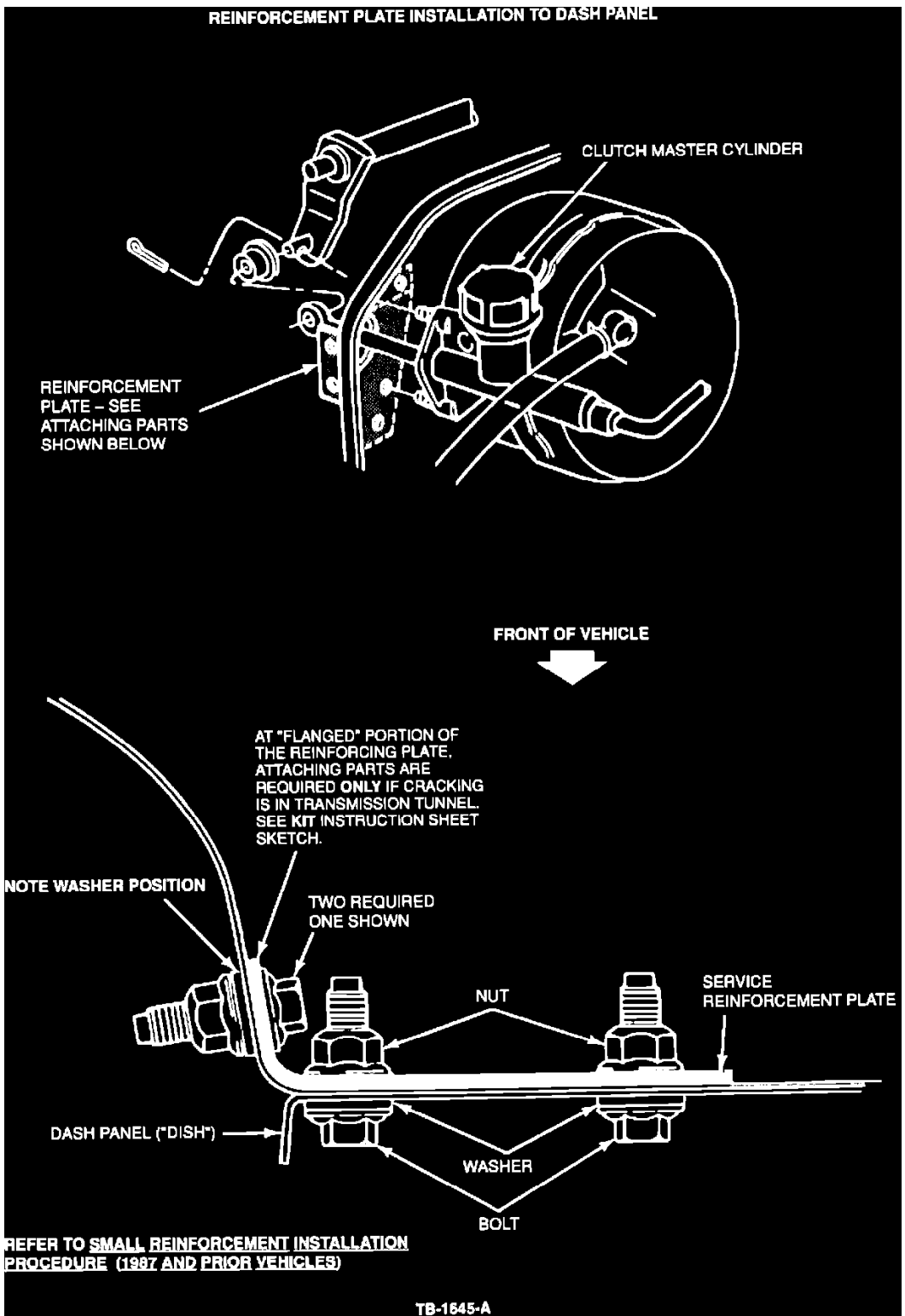
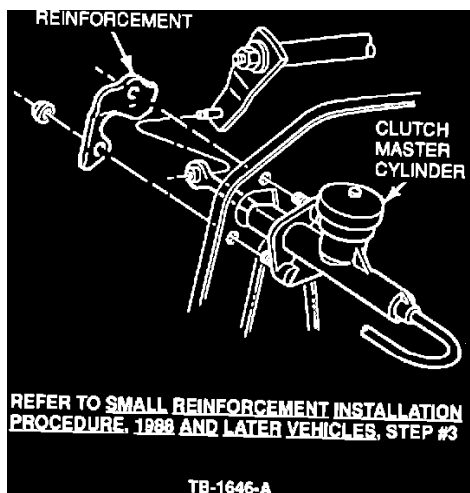


Figure 5



**Figure 6**

There are two small reinforcement kits. One for 1988 and later models and one for 1987 and prior models. This is necessary because a new hydraulic clutch master cylinder mounting pattern was introduced for 1988 models.

#### 1987 And Prior Trucks

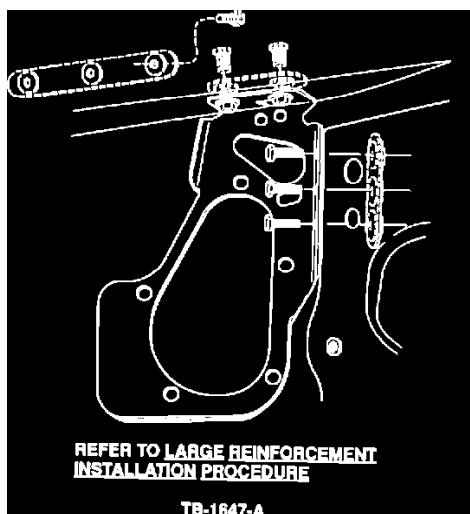
Use reinforcement kit E3TZ-7K509-A on these trucks, Figure 5. Comprehensive installation instructions are included in this kit.

#### 1988 And Later Trucks

Use reinforcement kit E8TZ-7K509-A on these trucks. The only part in this kit is the special reinforcement for these trucks. To install it, proceed as follows:

1. Remove the two clutch master cylinder attaching nuts (13 mm) from inside the truck.
2. Position the reinforcement in place over the clutch master cylinder studs.
3. Re-install the two master cylinder nuts, Figure
6. Tighten to 9.5 - 14.9 N-m.

## Large Reinforcement Installation Procedure



**Figure 7**

Use reinforcement kit E3TZ-7K509-B on all 1983-1991 Bronco/F-Series trucks with hydraulic clutch controls. The kit consists of the following items:

- ^ A main reinforcement or doubler, with a plate having two studs to clamp the doubler through the cowl inner
- ^ Two additional pieces with three threaded holes:

One plate helps attach the main doubler through the dash inner tunnel. The other large piece is placed inside the front of the cowl, with bolts driven through from the engine compartment side of the dash reinforcement, see Figure 7.

## Installation

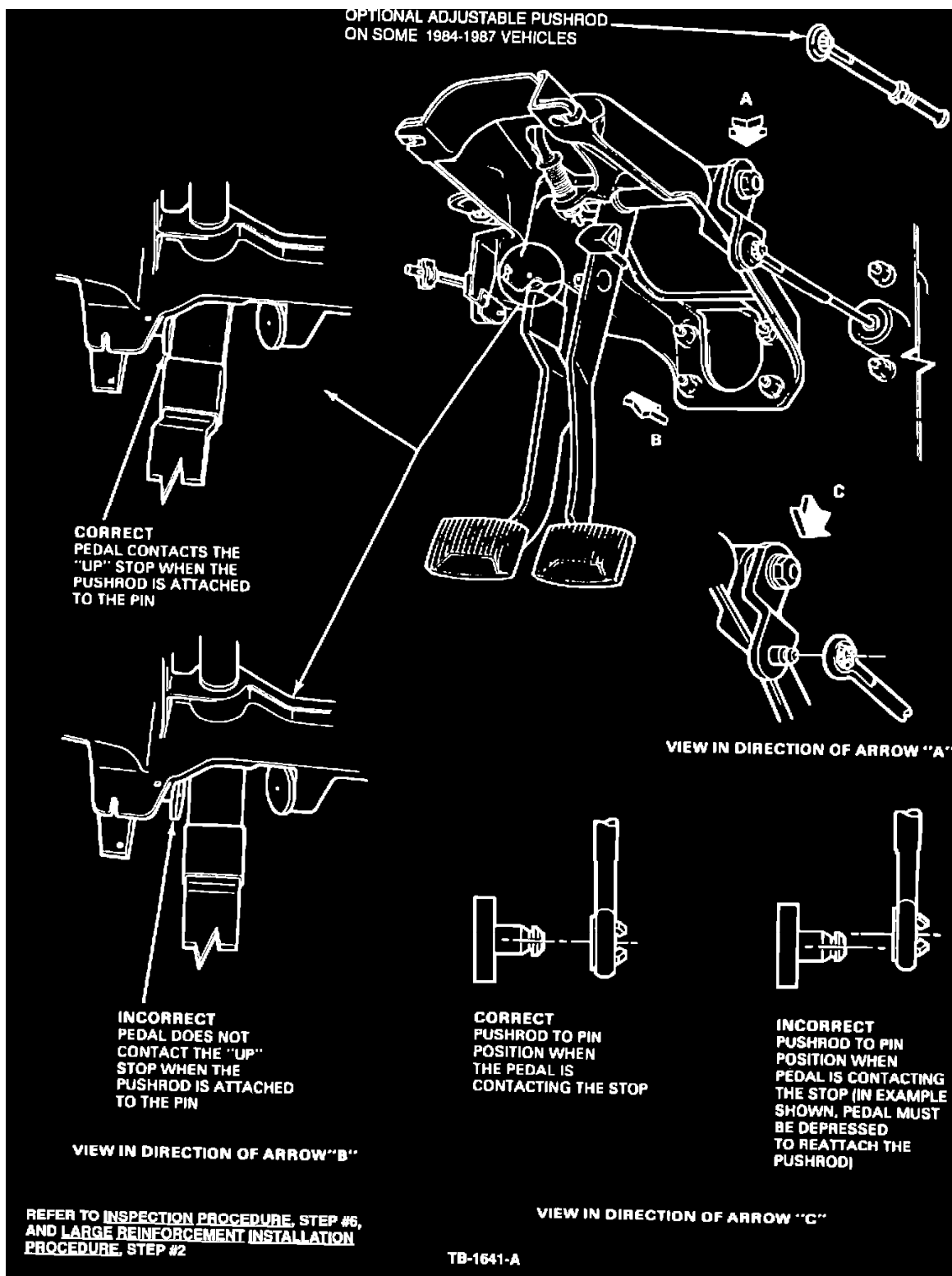


Figure 1

1. Remove the insulating material.
  - a. On earlier models, remove the instrument panel lower sound insulator assembly.
  - b. For later diesel powered trucks, remove the fasteners holding the engine compartment dash insulation in place.

- c. Pull the dash insulation back out of the way.
  - d. Disconnect the battery ground cable.
2. Disconnect the clutch master cylinder pushrod from the lever, removing the pushrod retention clip on older models, Figure 1.
  3. Remove the two nuts attaching the clutch master cylinder to the dash panel.
    - a. Pull the master cylinder into the engine compartment.
    - b. For, 1988 and later trucks, it will be necessary to disconnect the wiring harness connector from the pushrod switch.
    - c. Rotate the master cylinder to get it past the switch through the dash opening.
  4. Remove the steering column and dash toe plate by removing the five (5) fasteners.
  5. Disconnect the brake master cylinder pushrod from the brake pedal.
  6. On F-Super Duty, proceed to Step 7. On all units except F-Super Duty, proceed as follows:
    - a. Remove the four brake booster attaching nuts.
    - b. Move the brake booster to one side.

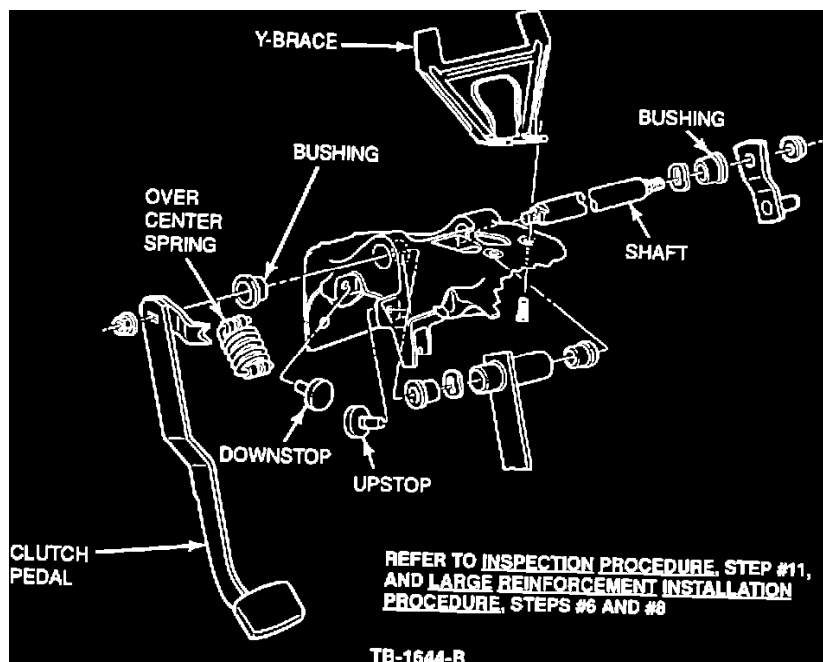


Figure 4

- c. Loosen the two (2) fasteners attaching the brake and clutch pedal support to the Y-brace, Figure 4.
7. Check for cracks.
    - a. Pull back the floor covering and dash sound insulator. (it may be helpful to remove the accelerator pedal.)
    - b. Inspect the area for pulled welds and torn dash sheet metal.

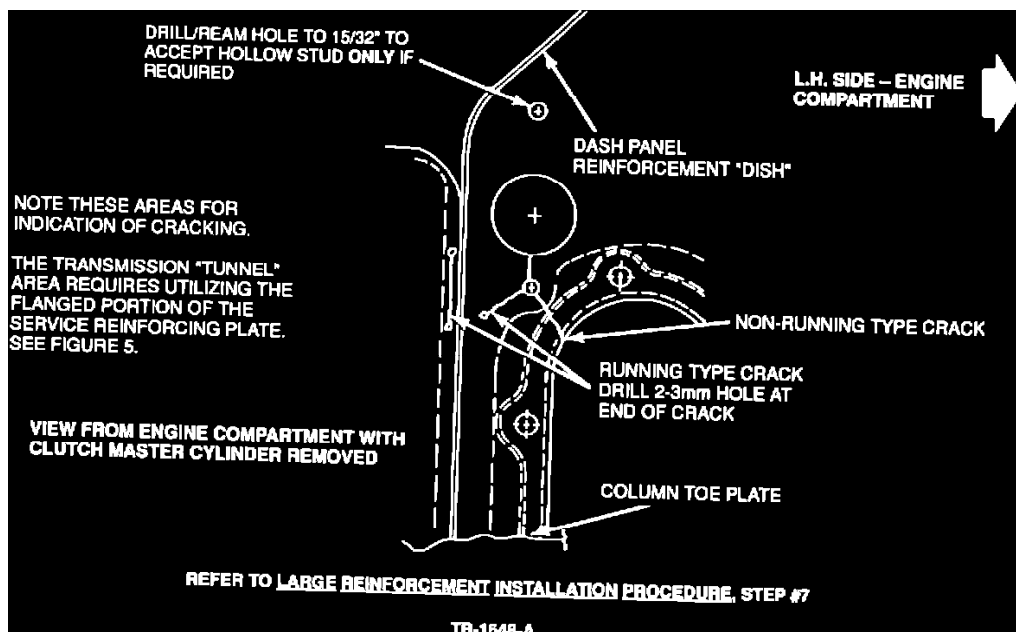


Figure 8

- c. If there are cracks that have not run out, stop them by drilling a 2-3 mm hole at the end, Figure 8.

NOTE: WELDING OR BRAZING IS NOT RECOMMENDED, BECAUSE IT COULD BE A SOURCE OF FUTURE BLIND SIDE CORROSION.

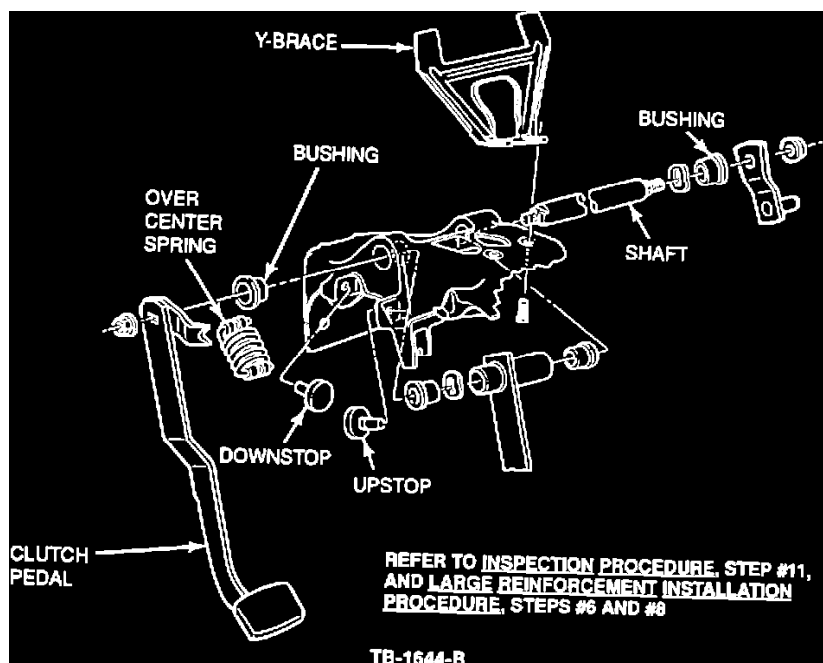


Figure 4

8. Thoroughly inspect the brake and clutch support again for cracks in the casting and worn bushings. Also, inspect the "Y" brace for cracks and missing fasteners. Replace as necessary, Figure 4.
9. Remove excess body sealer in the area of the clutch master cylinder, inside the dash.
10. Carefully remove the cowl top cover 12 fasteners (7 in front, 5 in rear).

NOTE: IT MAY BE NECESSARY TO REMOVE THE RADIO ANTENNA AND REPOSITION THE HOOD TO ACHIEVE THIS. IF THE HOOD IS REMOVED, MARK THE LOCATION OF THE HINGES WITH A WAX PENCIL, PRIOR TO LOOSENING.

11. Place the main reinforcement in position.
  - a. Locate positively, using the lower steering column toe plate fastener and a bolt and nut (8 mm or 5/16") through the upper clutch master

cylinder stud hole.

NOTE: THE SHEET METAL VARIES FROM TRUCK TO TRUCK AND IT MAY BE NECESSARY TO BEND THE REINFORCEMENT TO GET A GOOD FIT.

- b. Tighten the upper nut and bolt securely to compress any distortion in the four sheet metal laminations in this area.
12. Drill the holes for the reinforcement plate.
  - a. Using a 3/8" (9.5 mm) drill bit, with the reinforcement as a template, drill two holes up into the cowl inner and three holes into the inner side of the dash.
  - b. De-burr the outside of the holes as necessary.
  - c. Remove any excess sealant in the area and clean up the drill chips inside the truck and cowl.
13. Attach the smaller plate via the three threaded holes into the engine compartment side of the dash inner panel.
  - a. Use three 8 mm bolts passed through the main reinforcement, from inside the cab.
  - b. Install the rubber cap (N804118) onto the end of the uppermost screw from under the dash.
  - c. Position the plate with the two studs attached inside the cowl, through the two holes drilled from below.
  - d. Attach two 8 mm nuts from the inside of the cab.
14. Using the paper template provided in the kit, proceed as follows:

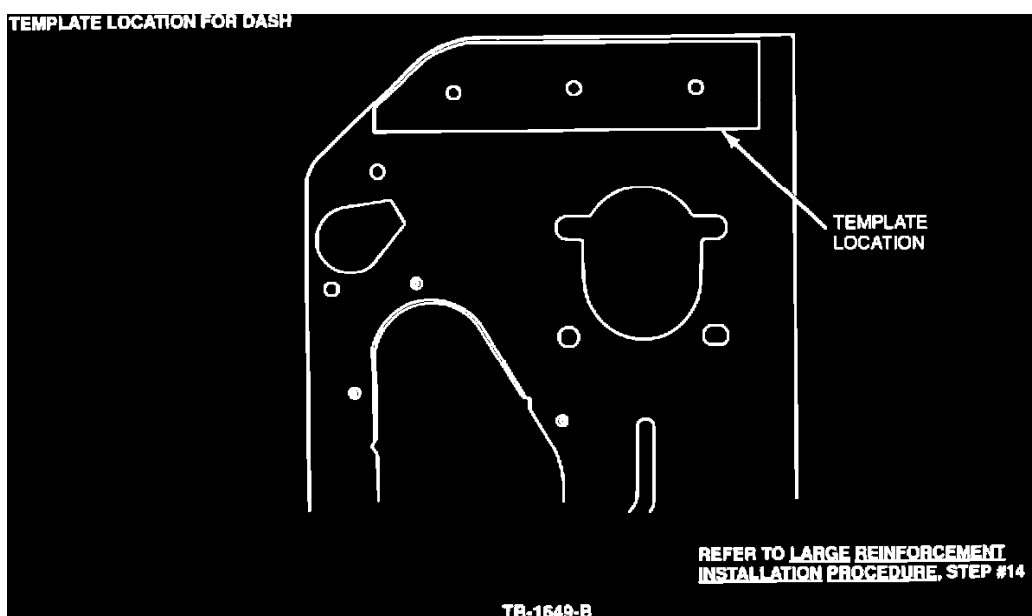


Figure 9

- a. Center punch and drill three 3/8" (9.5 mm) holes into the dash reinforcement and through the cowl, from the engine compartment side, Figure 9.

NOTE: DRILLING WILL BE EASIER IF THERE ARE NO SPOTWELDS VISIBLE THROUGH THE THREE HOLES.

- b. If necessary, move the pattern outboard slightly to avoid any visible spotwelds.
- c. De-burr the holes inside the cowl as necessary and clean up the drill chips inside the cowl.

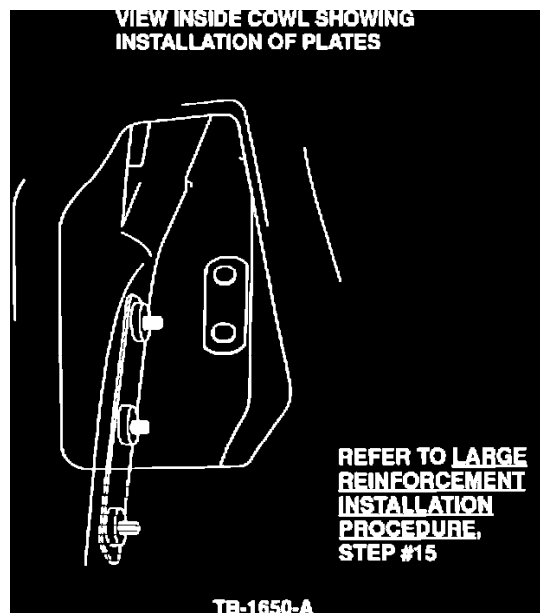


Figure 10

15. Place the larger three holed plate from the kit inside the cowl. Attach it with three 8 mm bolts through the dash reinforcement, from the engine compartment side, Figure 10.
16. Inspect the seam between the cowl inner and outer, inside the cowl, for cracks in the sealant. If necessary, add sealant.
17. Replace the cowl top.
  - a. If the hood was removed, locate the hinges to the wax pencil marks and tighten the fasteners.
  - b. Replace the radio antenna and windshield washer tube.
18. Re-install the brake booster and stoplight switch, if removed. Tighten the brace bolts.
19. Install the clutch master cylinder.
  - a. Inspect the clutch master cylinder for leaks in the area of the pushrod. Replace it if there is evidence of leaking.
  - b. Remove the nut and bolt from the top of the reinforcement.
  - c. Install the clutch master cylinder.
  - d. Inspect the position of the clutch master cylinder pushrod hole. The pushrod hole should go onto the lever pin with no force required while the pedal is against the upstop.

NOTE: ALTHOUGH THIS WAS SPECIFIED IN THE INSPECTION PROCEDURE, REPAIR MAY HAVE CHANGED THE SETTING.

- e. If the pushrod hole is not in position, install and adjust an adjustable clutch master cylinder pushrod (1987 and prior models) or install a new lever (7A554).

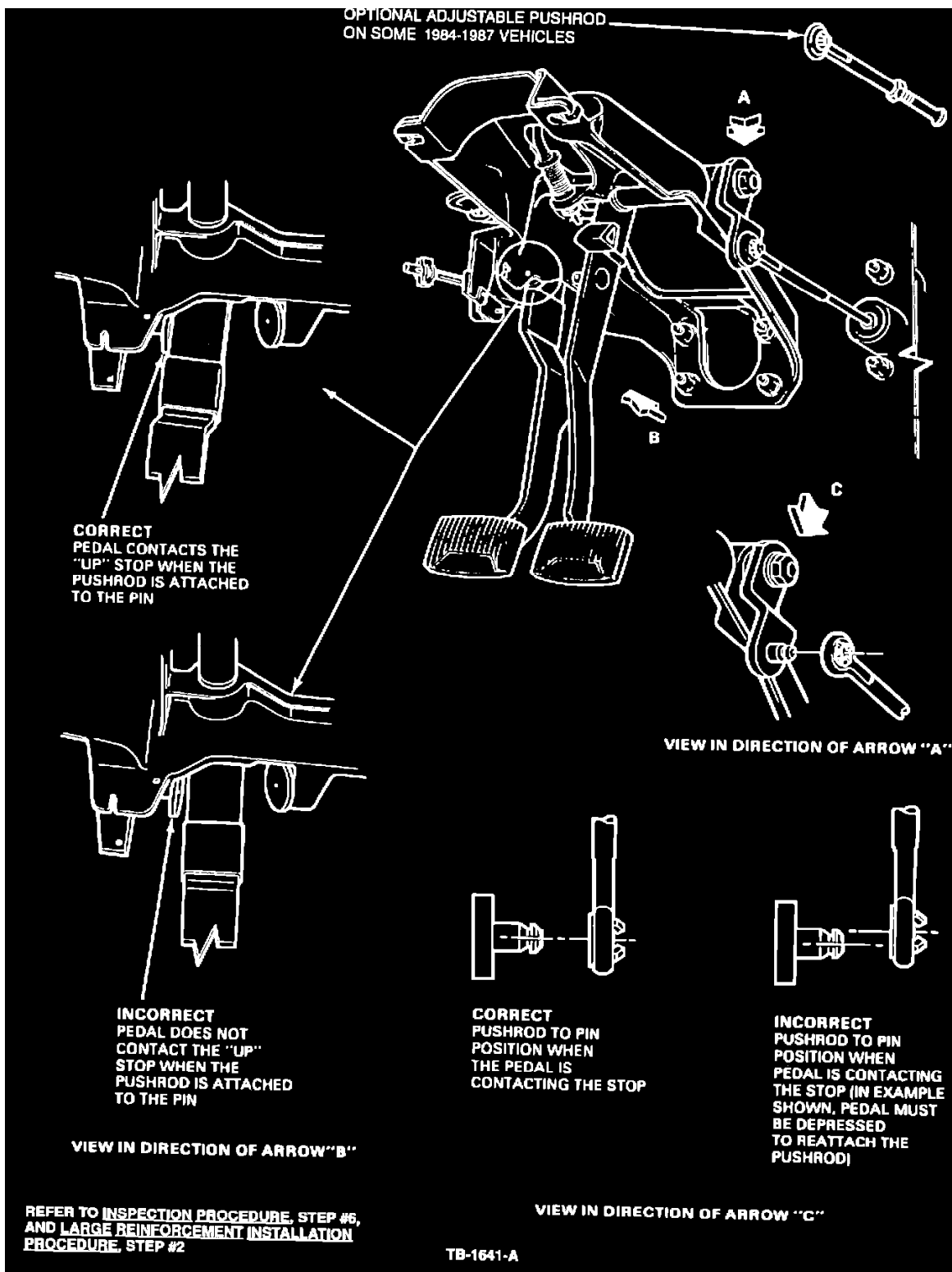


Figure 1

NOTE: THE NEW LEVER IS TIGHTENED INTO PLACE WHILE THE MASTER CYLINDER PUSHROD IS ATTACHED, TO SET THE CORRECT POSITION, FIGURE 1.

20. Remove the toe plate fastener from the bottom of the reinforcement and reinstall the steering column and five (5) fasteners.
21. Complete reassembly.
  - a. Re-install the dash sound deadener material and the instrument panel sound insulator.
  - b. Re-install the engine compartment sound insulator on diesel models.

- c. Connect the battery ground terminal.

## Final Inspection

If the truck has been driven for a long period of time with the broken dash and resulting poor clutch release, the clutch disc could be excessively worn or buckled.

Test drive the truck, evaluating the clutch for clean release. If the release is not satisfactory, measure the release bearing travel.

^ If it has the required 12 mm at full clutch pedal stroke, then the clutch may need to be replaced.

^ If the release bearing has less than the required release travel, then the hydraulic system probably needs to be bled.

## Suggested Bleeding Procedure - External Slave Cylinder

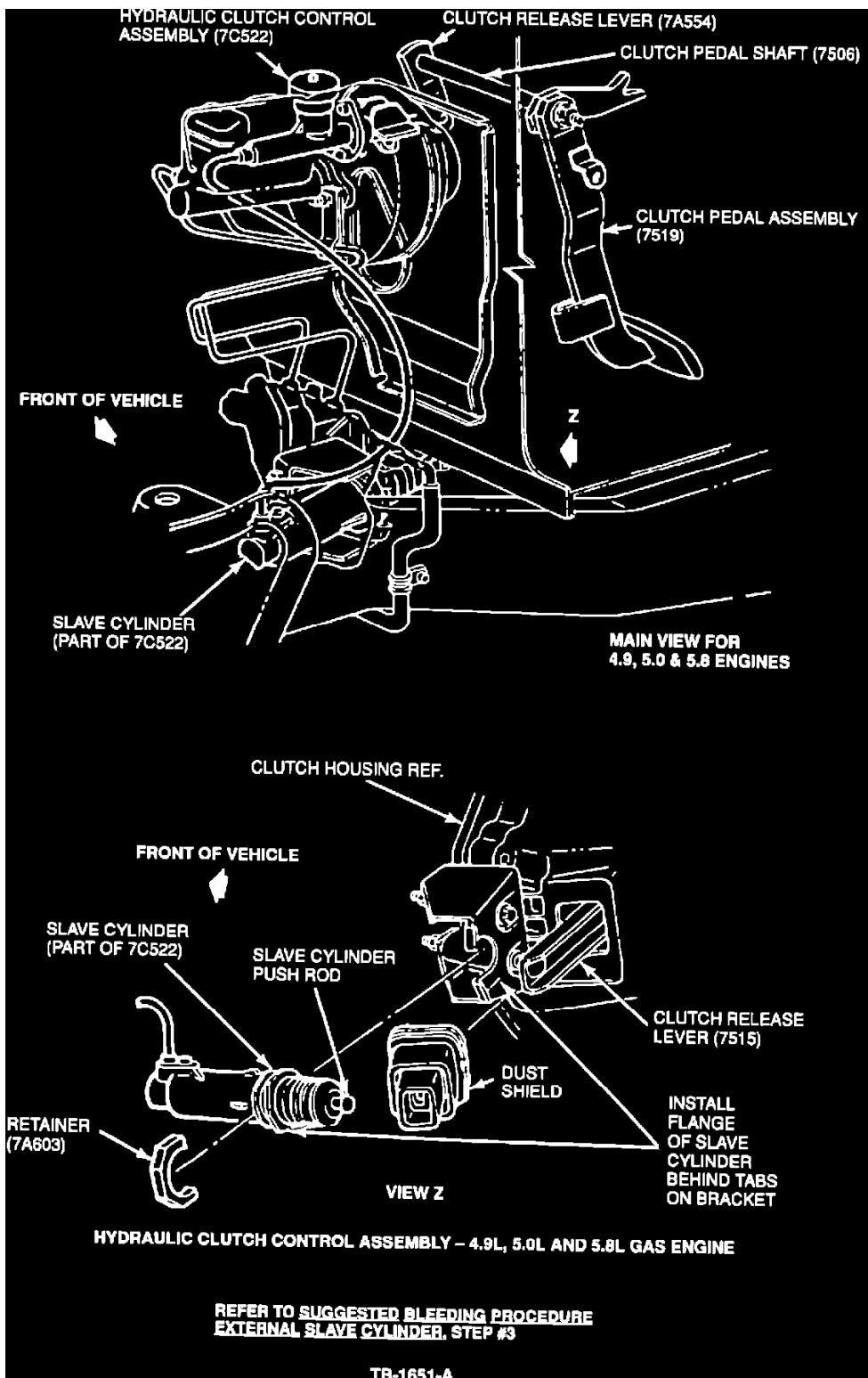


Figure 11

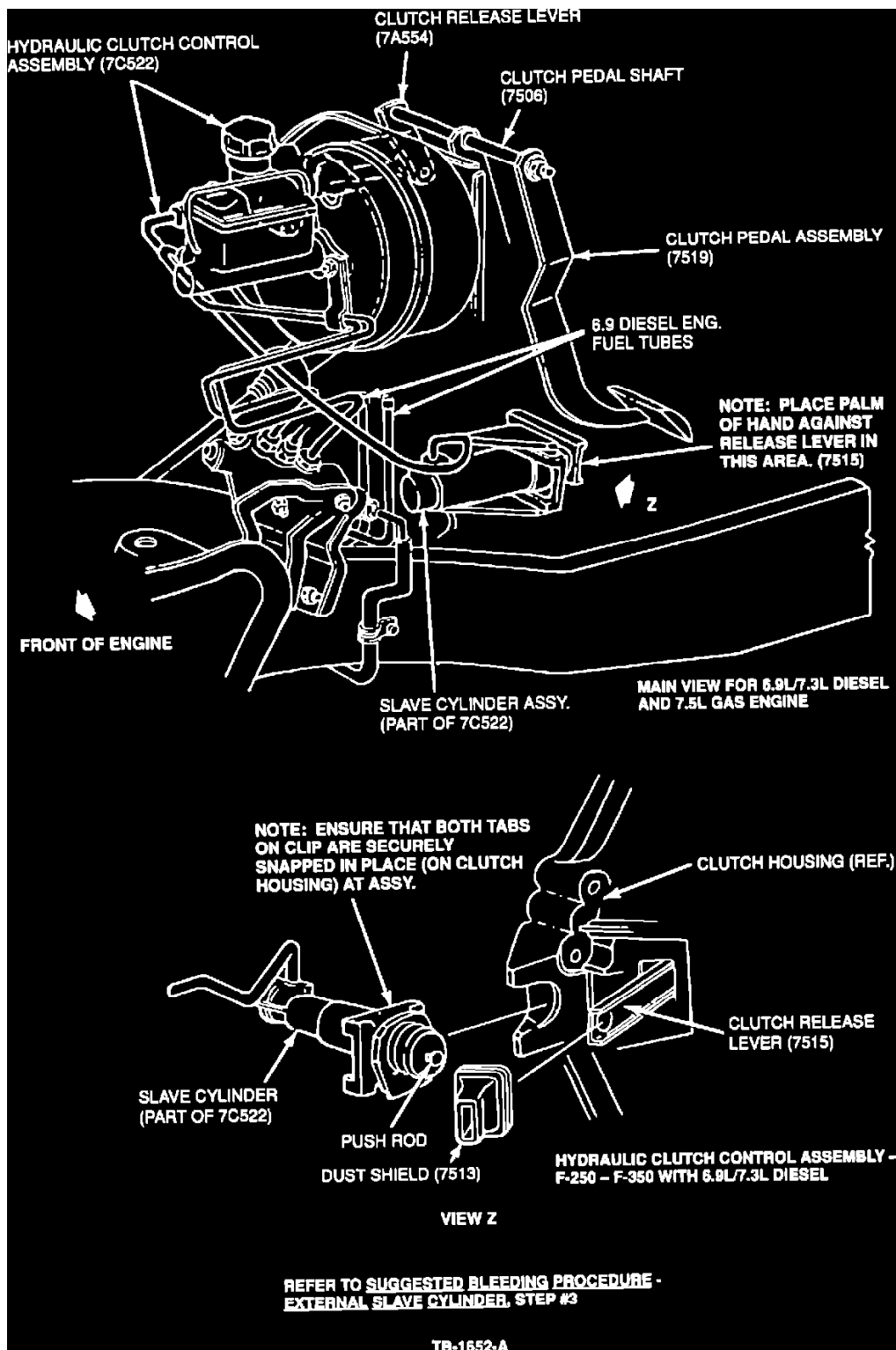


Figure 12

If the truck is a 1987 or prior model, 1988 model with a 7.3L Diesel, 7.5L EFI gas engine or the smaller family of engines with a Warner T-18 four speed transmission, proceed as follows:

1. Remove the master cylinder reservoir cap and diaphragm.
2. Check the fluid level to be sure it is at the step diameter of the reservoir. Do not over fill.
3. From below the truck, push the release lever slowly towards the front of the truck several times. Figures 11 & 12.
4. If it will not move, the master cylinder pushrod is not set correctly. See repair Step # 19.
5. Check the fluid level and replace the diaphragm and cap.

## Suggested Bleeding Proc - Internal Concentric Slave CYL.

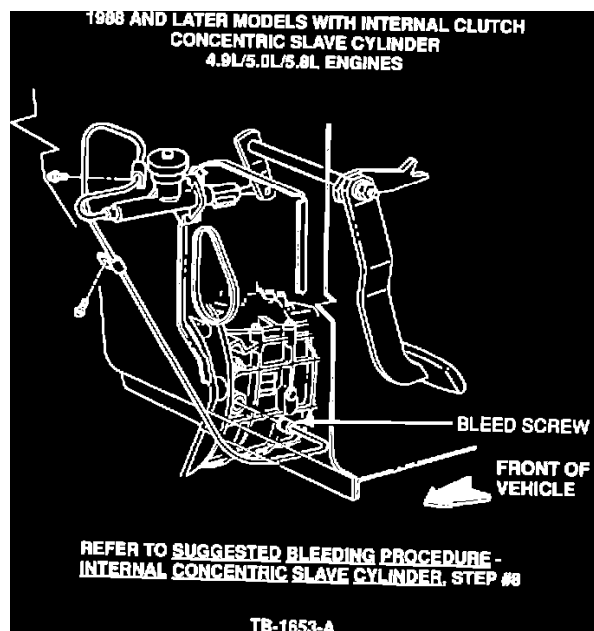


Figure 13

If the truck has a concentric slave cylinder, proceed as follows:

1. Operate the clutch pedal at full stroke, 10-20 times.
2. Check the fluid level at the change in diameter part of the reservoir. Do not over fill.
3. Have an assistant depress the clutch pedal slowly and hold it down.
4. Open the slave cylinder bleed screw and watch for escaping air, Figure 13.
5. Close the bleed screw and have the assistant release pedal.
6. Repeat this cycle several times until there is no sign of air. Be sure to keep the reservoir topped to the correct level.
7. Replace the diaphragm and reservoir cover.
8. Operate the clutch pedal at full stroke 10-20 times.

### Misc. Information

OTHER APPLICABLE ARTICLES: 86-20-10

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
901607A	Inspect & Adjust	0.5 Hr.
901607B	Install Reinforcement	2.9 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7050	50

OASIS CODES: 111000, 505000, 505200, 506000, 590000

Technical Service Bulletin # **ATRATB063**

Date: **910701**

### A/T - AOD Direct Clutch Failure/Excessive Case Bore Wear

TRANSMISSION: A4LD

BULLETIN: # 060B

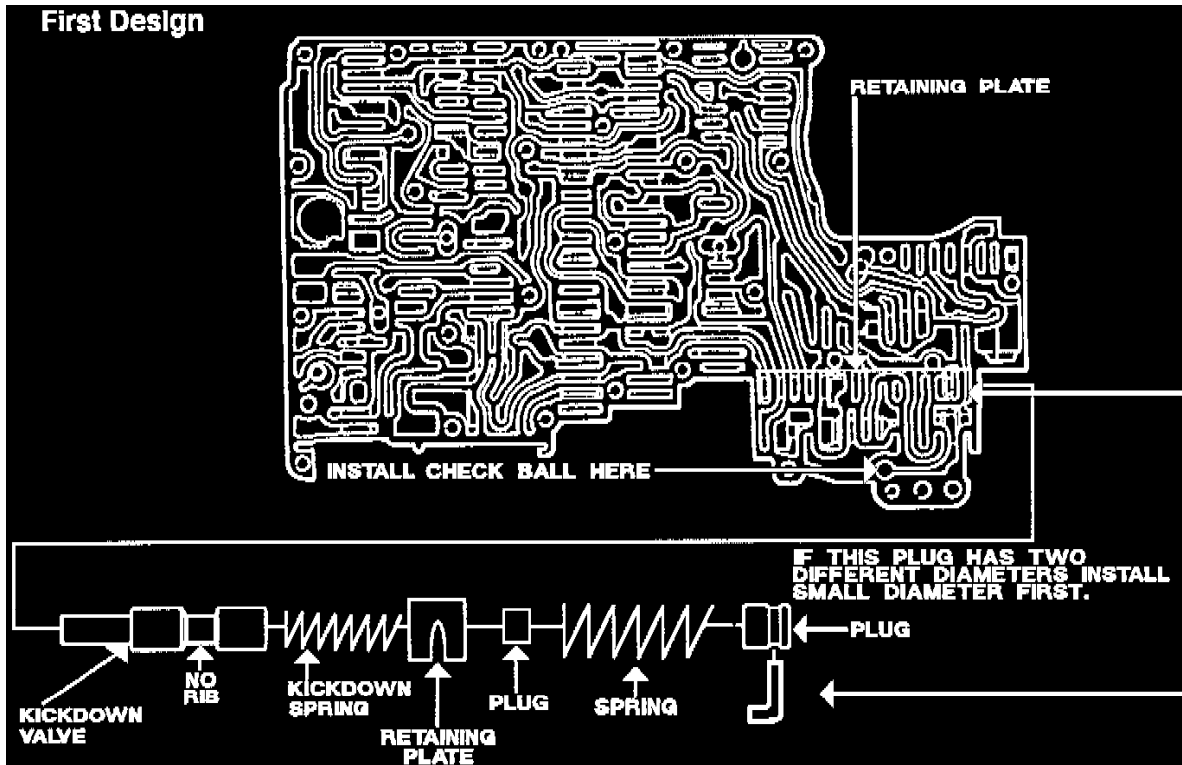
SUBJECT: No Reverse

APPLICATION: Ford

DATE: July 1991

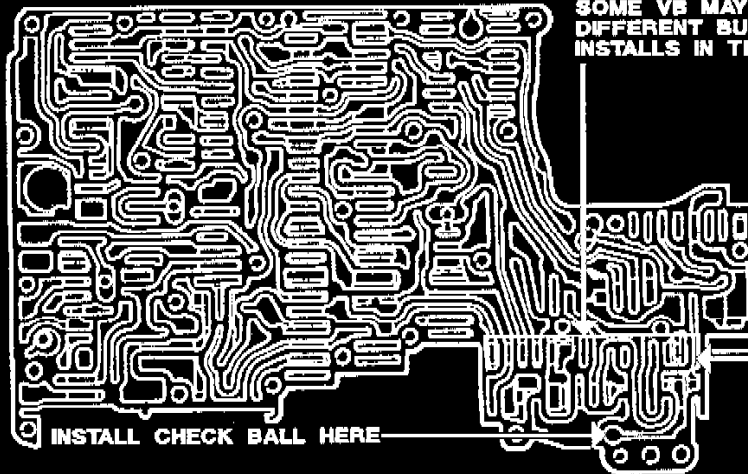
No Reverse

Some A4LD valve body assemblies do not use a check ball to cushion reverse engagement. These valve bodies are equipped with a reverse engagement control valve. Inspect your valve body for the correct assembly using the 3 drawings provided. Do not leave out the check ball on valve bodies that do not have this valve. If the reverse engagement control valve is stuck you may have no reverse.



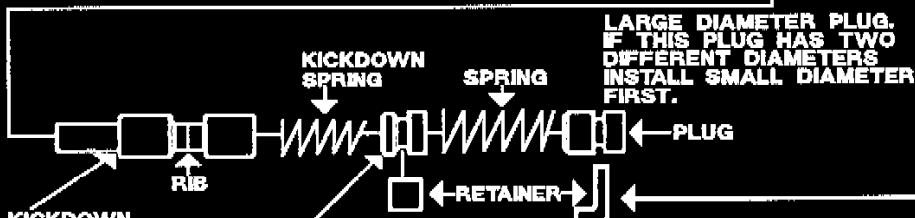
First Design

**Second Design**



**SQUARE RETAINER**  
SOME VB MAY LOOK SLIGHTLY  
DIFFERENT BUT RETAINER STILL  
INSTALLS IN THIS HOLE

INSTALL CHECK BALL HERE



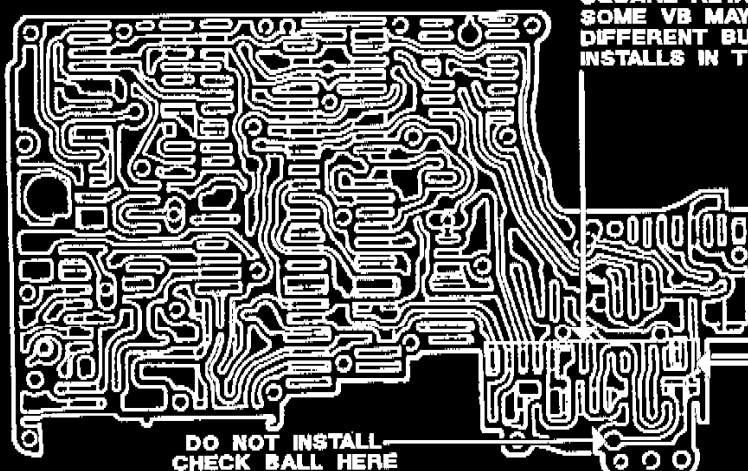
**LARGE DIAMETER PLUG.**  
IF THIS PLUG HAS TWO  
DIFFERENT DIAMETERS  
INSTALL SMALL DIAMETER  
FIRST.

KICKDOWN  
VALVE

**SMALL DIAMETER PLUG.**  
IF THIS PLUG HAS TWO  
DIFFERENT DIAMETERS  
INSTALL SMALL DIAMETER  
FIRST.

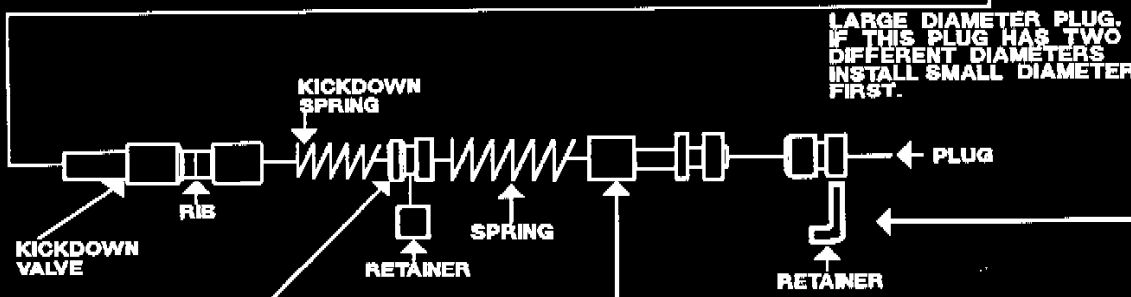
Second Design

**Thrd Design**



**SQUARE RETAINER.**  
SOME VB MAY LOOK SLIGHTLY  
DIFFERENT BUT RETAINER STILL  
INSTALLS IN THIS HOLE

DO NOT INSTALL  
CHECK BALL HERE



**LARGE DIAMETER PLUG.**  
IF THIS PLUG HAS TWO  
DIFFERENT DIAMETERS  
INSTALL SMALL DIAMETER  
FIRST.

**SMALL DIAMETER PLUG.**  
IF THIS PLUG HAS TWO  
DIFFERENT DIAMETERS  
INSTALL SMALL DIAMETER  
FIRST.

**REVERSE ENGAGEMENT  
CONTROL VALVE**

Third Design

## BULLETIN RECAP

- ^ If you have a reverse engagement control valve, leave the check ball out.
- ^ Inspect reverse engagement control valve for sticking.

## FOR ADDITIONAL INFORMATION

TSB 89-14, 88-37, 88-35 & 86-59 and 1990 Seminar Manual

Technical Service Bulletin # **ATRATB875**

Date: **870101**

**A/T - AOD No End Play/Overdrive Band Burned**

TSB 87-5 (Jan)

SUBJECT: FORD AOD

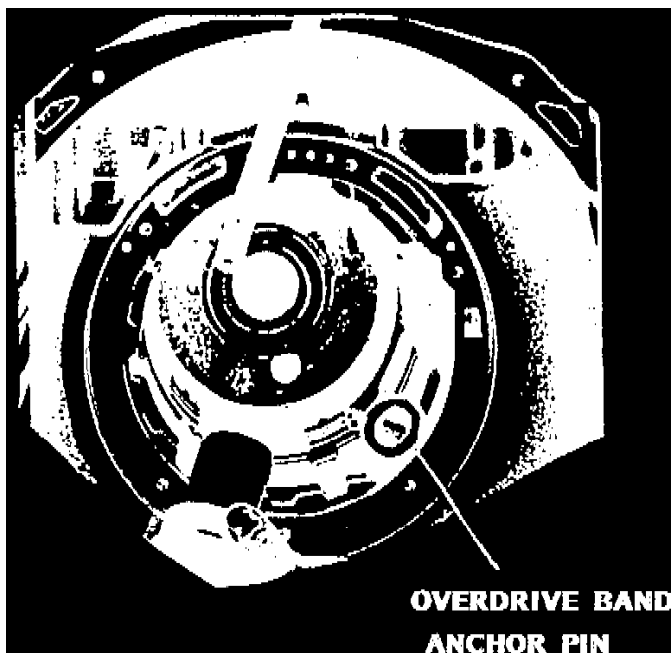
## PROBLEM:

No end-play and/or overdrive band burned.

## CAUSE:

If the problem exists no matter which selective thrust washer is used, it may be the overdrive band anchor pin binding the overdrive band against the reverse clutch drum.

During assembly, it may not appear that the band is binding against the reverse clutch drum. When the pump is installed, it may move the reverse clutch drum to center it, and that's when the reverse clutch drum and the overdrive band will bind.



## SOLUTION:

Knock the overdrive anchor pin outward until it is no longer binding the overdrive band against the reverse clutch drum. Be careful; do not tap the anchor pin out too far! Put sealant on the anchor pin where it extends to the outside of the case.

Technical Service Bulletin # **ATRATB8761**

Date: **871101**

**A/T - C6 No. 9 Thrust Washer Failure**

TSB 87-61(Nov)

DATE: November 01, 1987

SUBJECT: FORD C-6

PROBLEM: No. 9 thrust washer failure

**SOLUTION:**

In 1987 this thrust washer was revised to a thrust bearing that will retro-fit.

The one-way clutch inner race and reverse ring gear hub were also changed, to allow for the thrust bearing, and all three parts must be used as an assembly when converting to the earlier transmissions. The part number is E7TZ-7D164-B, which includes:

1. No. 9 thrust bearing
2. One-way clutch inner race
3. Reverse ring gear hub

Technical Service Bulletin # **911015**

Date: **910515**

**M/T - M50D Hard Shift Condition**

Article No.

91-10-15

5/15/91

**TRANSMISSION - M50D - HARD SHIFT TO REVERSE OR FIFTH GEAR**

**LIGHT TRUCK:** 1988-89 ECONOLINE  
1988-90 BRONCO II  
1988-91 AEROSTAR, BRONCO, F-150, F-250, RANGER  
1991 EXPLORER

**ISSUE:** The 5-R synchronizer sliding sleeve clutching teeth may wear on the reverse side. This may cause a hard to engage or partial engagement of fifth or reverse gear and could result in the transmission jumping out of gear. If the wear is allowed to continue, it may become difficult or impossible to engage 1-2-3 or 4th gear.

**ACTION:** Inspect the 5-R synchronizer sliding sleeve for wear and replace if excessive wear is found. Refer to the following procedure for service details.

**INSPECTION PROCEDURE:**

1. Remove necessary components so that the transmission extension housing can be removed without removing the entire transmission. Refer to the Light Truck Shop Manual Section 07-03A for service details.

**NOTE:** COMPACT VEHICLES MAY REQUIRE REMOVAL OF TRANSMISSION

2. Remove the transmission extension housing.
3. Inspect the 5-R synchronizer sliding sleeve for wear of the reverse clutching teeth.

**REPAIR PROCEDURE**

1. If wear is observed, remove speedometer drive gear (4 x 2 only).
2. Remove the top cover (if repairing on the bench).
3. Carefully remove the main shaft and counter shaft locking nuts.
4. Remove and replace the following transmission parts. Refer to the Light Truck Shop Manual for service procedures.

^ 5th Counter Shaft Gear

^ 5-R Synchronizer, hub and ring assembly

**NOTE:** INSTALL WITH THE DOT ON THE SYNCHRONIZER SLEEVE FACING REVERSE GEAR.

^ Reverse counter shaft gear

^ 5-R Counter Lever

^ 5-R Shift fork and rod

NOTE: USE THE SPRING AND BALL FROM THE EXISTING ASSEMBLY.

^ Replace the idler shaft in the reverse idler gear assembly (R1 only).

NOTE: THERE ARE EXTRA ADJUSTING SHIMS PROVIDED IN CASE IT IS NECESSARY TO RESET THE 5-R SYNCHRONIZER HUB AND CONTROL REVERSE GEAR END PLAYS TO SPECIFICATION. USE THE NEW MAIN SHAFT AND COUNTER SHAFT LOCKING NUTS UPON ASSEMBLY.

CAUTION: USE ALL THE PARTS CONTAINED IN THE SERVICE KIT INCLUDING THE COUNTER REVERSE LEVER. ALTHOUGH THE NEW LEVER LOOKS THE SAME AS THE ONE CONTAINED IN THE TRANSMISSION, CONTACT ANGLES ARE SLIGHTLY DIFFERENT TO INSURE PROPER TIMING AND ENGAGEMENT.

PART NUMBER	PART NAME	CLASS
F0TZ-7C391-E	Synchronizer Service Kit - R2	C
F0TZ-7C391-C	Synchronizer Service Kit - 2.3L, 2.9L, 3.0L, R1	C
F0TZ-7C391-D	Synchronizer Service Kit - 4.0L R1	C

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
911015A	Install Synchronizer Service Kit - 4 x 2	2.1 Hr.
911015A	Install Synchronizer Service Kit - 4 x 4	2.9 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7124	30

OASIS CODES: 505000

Technical Service Bulletin # **901110**

Date: **900523**

## Steering/Suspension - Shimmy

Article No. 90-11-10

- ^ STEERING-SHIMMY-DIAGNOSTIC PROCEDURE-4X2 UNITS ONLY
- ^ SUSPENSION-SHIMMY-DIAGNOSTIC PROCEDURE- 4X2 UNITS ONLY

LIGHT TRUCK: 1987-89 F-350

ISSUE: Front end shimmy may occur at various driving speeds or when hitting bumps in the road. There are several vehicle conditions sometimes described by customers as shimmy which may not actually be "shimmy". Shimmy, as observed by the driver, is defined as large amplitude, rotational oscillations of the steering wheel resulting from large, side to side tire/wheel movements.

ACTION: Inspect the truck and perform the following diagnosis to determine the shimmy's causal factors. Be aware of the following points:

- ^ Shimmy is not always confirmed during road testing.
- ^ It is very important to check all systems that can cause shimmy.
- ^ After a general review of the front suspension/steering systems, make the necessary adjustments and replacements as noted.
- ^ Check bolt and nut torques to be sure they are tightened to the specified torque specifications.
- ^ Check the front end alignment. Look for excessively worn tires and out of balance wheel and tire assemblies.

Shimmy should not be confused with steering wheel nibble and vibration concerns.

Steering wheel nibble is a condition resulting from the tire interaction with various road surfaces. It is observed by the driver as small amplitude, rotational oscillations of the steering wheel.

Various suspension/steering vibrations are sometimes confused as shimmy. They appear as steering column shake and wheel/tire imbalance. They induce a vertical motion in the steering wheel/column.

Refer to the appropriate model year Light Truck Shop Manual, Sections 18-01, 11-01 and 12-01 for NVH conditions other than shimmy.

## Steering Linkage Inspection:

1. With the weight on the front wheels, check the linkage joints while someone else turns the steering wheel from side to side.

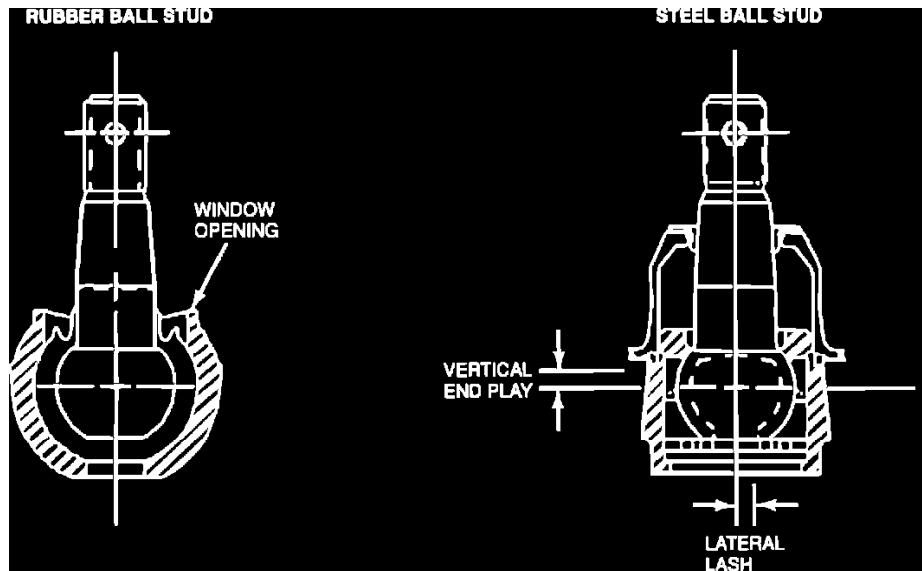


Figure 1

- a. For rubber ball socket (RBS) joints, see if the ball stud makes contact with the window opening in the socket bowl while on the truck, Figure 1. If contact is made with the window opening, replace it with a greaseable steel joint.
- b. For steel (greaseable) joints, measure the lateral (side to side) lash in the joint, Figure 1.
  1. If the lash exceeds .060" (1.59 mm), replace the joint.
  2. With the truck on a hoist, check the steel (greaseable) joints for vertical (up and down) end play by pushing and pulling on the joint, Figure 1. If the end play exceeds .090" (2.38 mm), replace the joint.

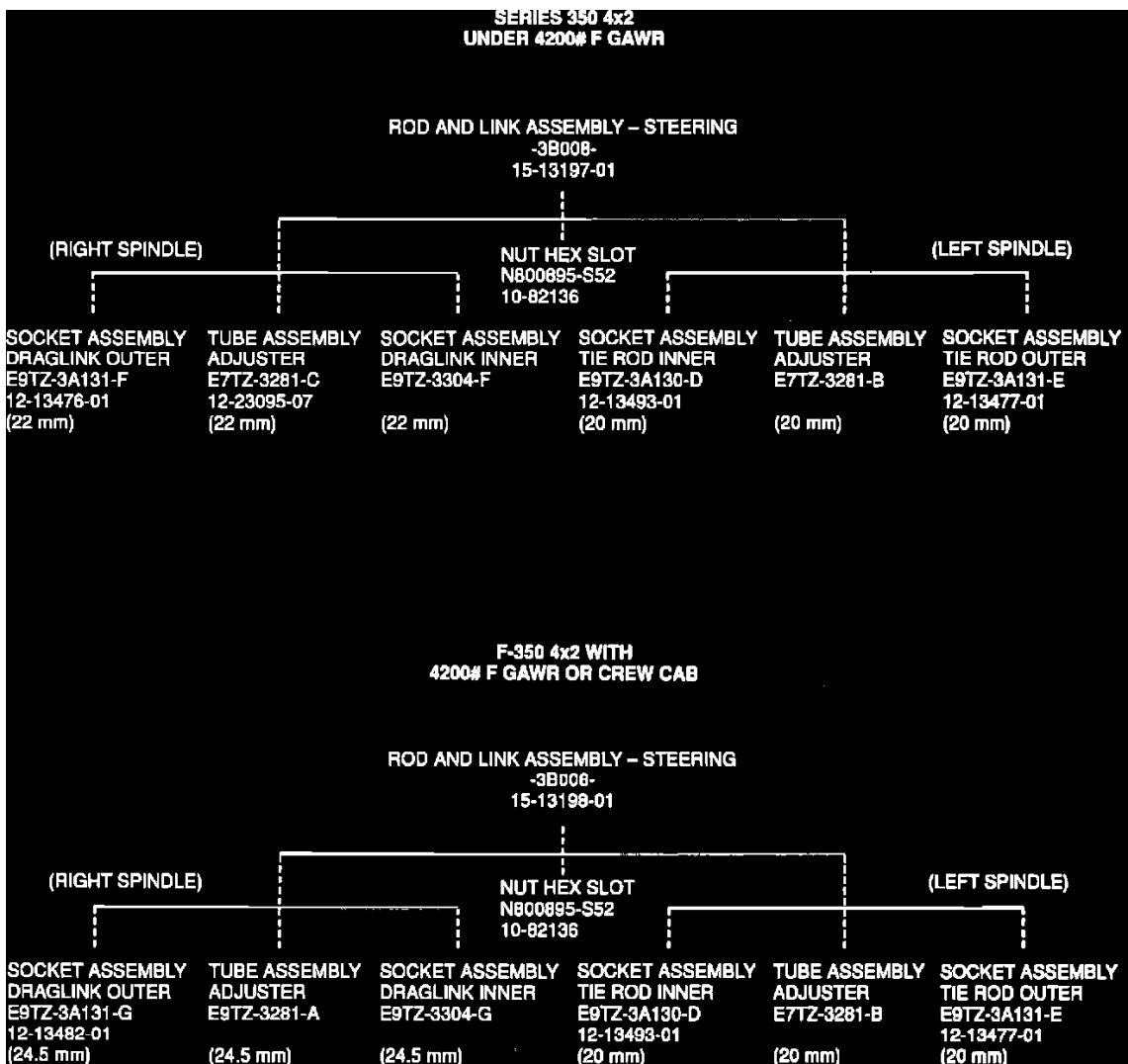


Figure 2

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B483-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

3. Remove the linkage from the truck, Figure 2.
  - a. See if the rubber is torn on the RBS. If the rubber is torn, replace it with a greaseable steel joint.
  - b. See if the steel joint will spin freely. If the joint spins freely with the hand, replace the joint.

Refer to Figure 2 for specific service part applications.

## Steering Gear Inspection:

1. Inspect the mounting surface of the steering gear. Check the frame area for the following:
  - ^ Signs of motion
  - ^ Loose rivets
  - ^ Cracks - Removal of the gear from the frame may be required to check for cracks.

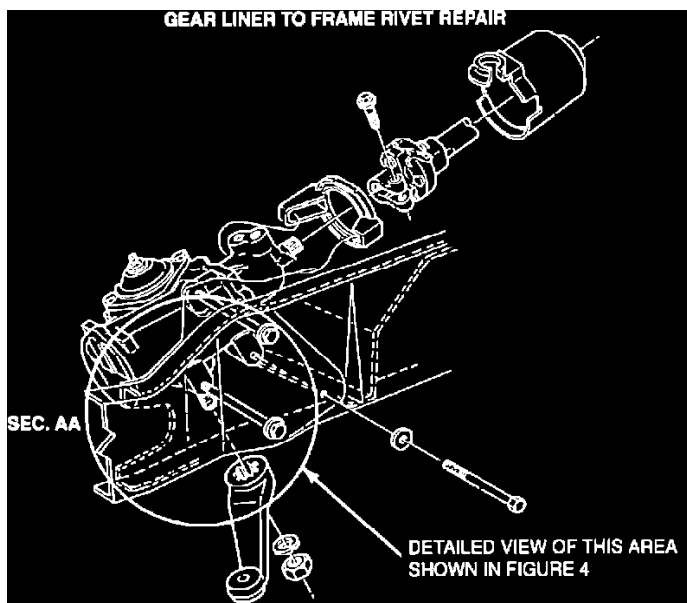


Figure 3

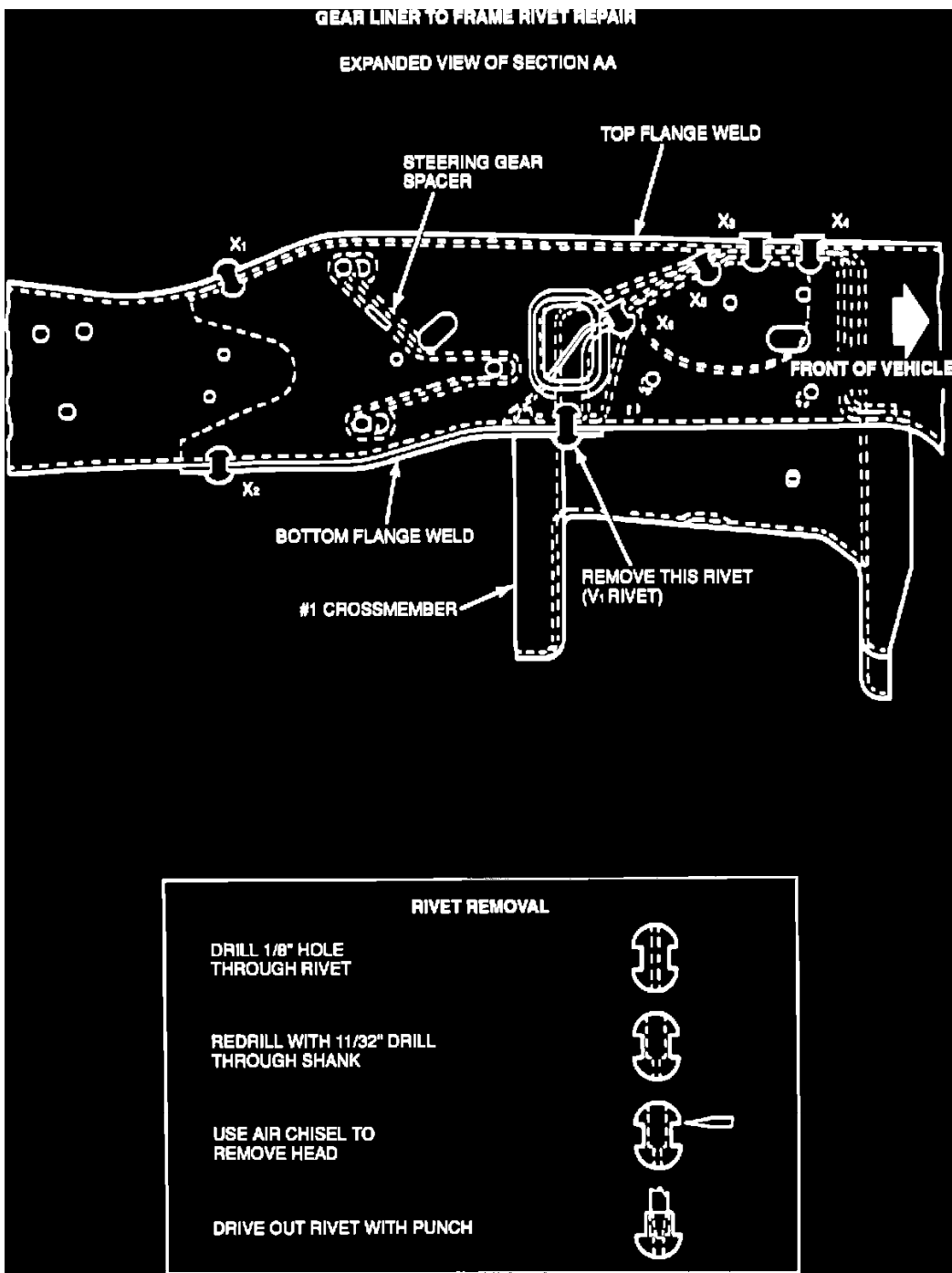


Figure 4

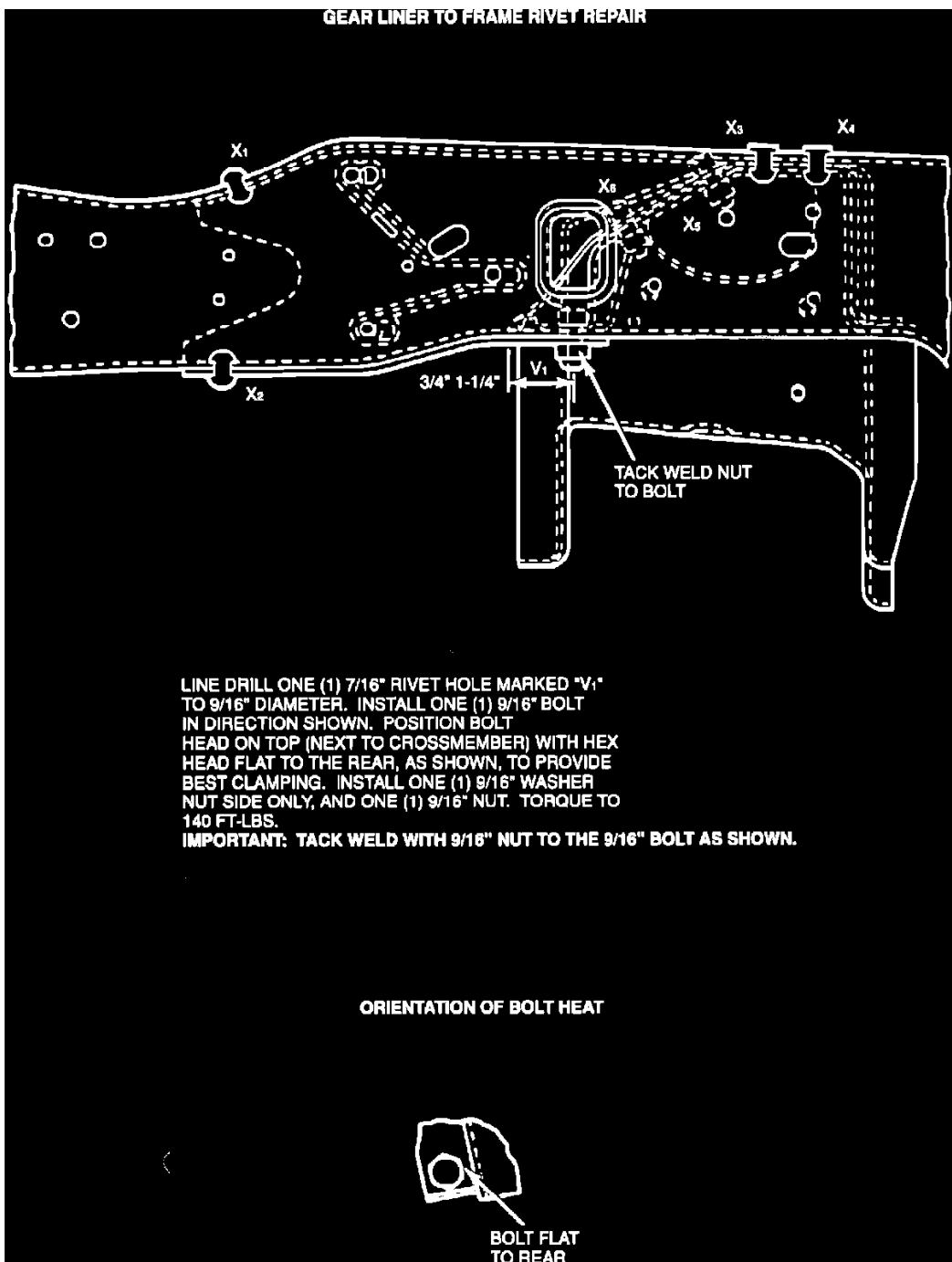


Figure 5

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

2. Repair trucks with a cracked frame liner or loose rivets by using Frame Repair Kit (E6TZ-5K130-A). See Figures 3, 4 and 5.
3. Inspect the frame for cracks in the following areas.
  - ^ Frame rail near the steering gear top and bottom flanges
  - ^ Frame rail at the steering gear bolt heads.
  - ^ Frame rail at or near the spring tower bracket
  - ^ Engine crossmember front LH flange.
4. If there are cracks in any of the above locations, replace the frame.
5. If a dealer confirmed shimmy has been experienced, replace the steering gear sector shaft. Use steering gear sector shaft repair kit (EOAZ-3375-A). Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.
6. Check for the presence of mesh load.
  - a. With the front wheels off the ground, hold the tire and turn the tire side to side slowly.
  - b. See if the effort increases when turning the tire straight ahead.
  - c. If no increase is noted, perform the Shop Manual procedure to check and adjust mesh load. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.

### Wheel End Friction and Wheel Bearing End Play Inspection:

1. Inspect the vehicle for worn ball joints. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 14 for service details. Replace as required.
2. Check the wheel bearing end play. Refer to the appropriate model year Light Truck Shop Manual, Vol A, Section 14 for service details. Adjust the end play or replace the wheel bearings as required.

### Vehicle Desensitizing

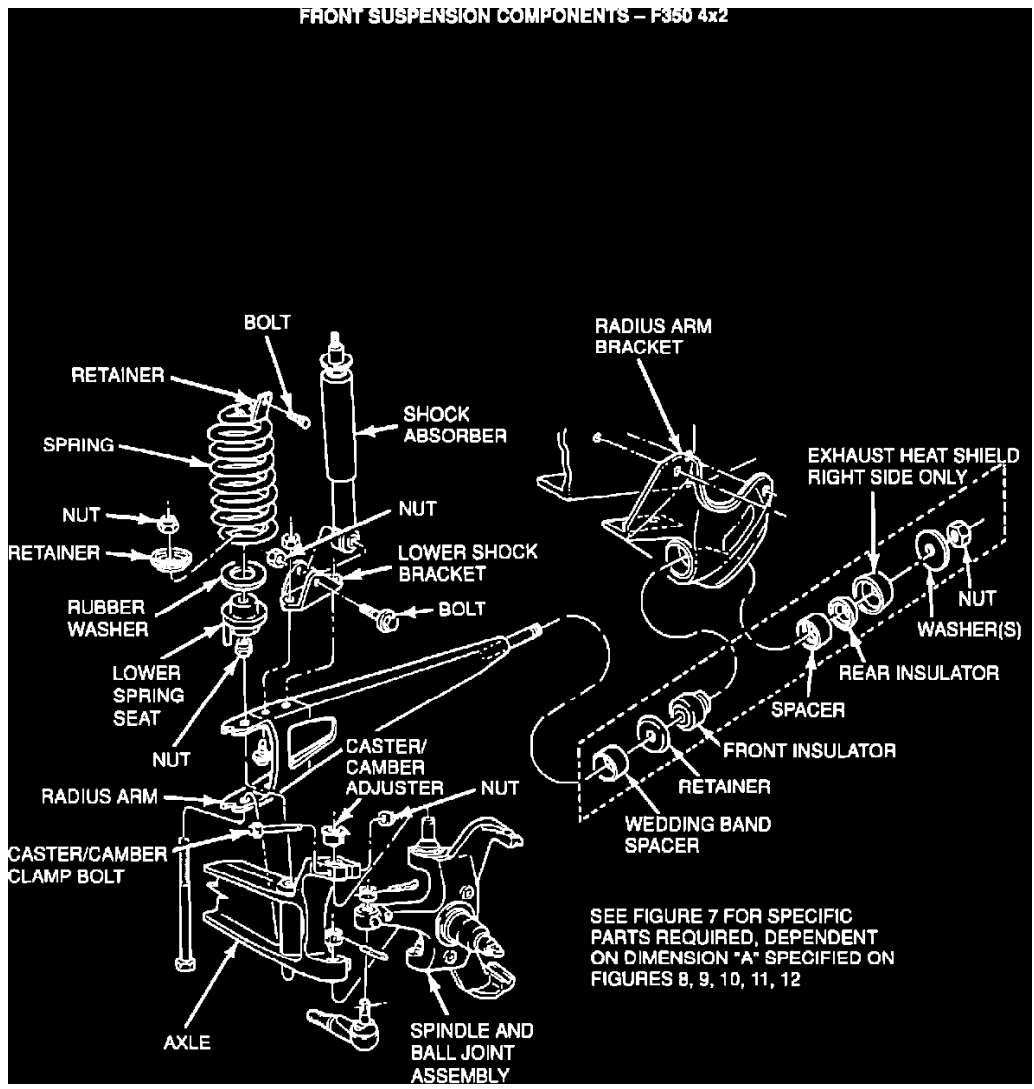


Figure 6

(FRAME MOUNTED) RADIUS ARM											
SKETCH NO.	RADIUS ARM STUD LENGTH (DIM. "A") UNTHREADED	WEDDING BAND N804264-S2 8 mm THICK	RETAINER 3B186	INSULATOR FRONT E7TZ-3B203-A	BRACKET E41Z-3B095-B (L.H.) E41Z-3B095-A (R.H.)	SPACER E5TZ-3B244-A	INSULATOR REAR D8TZ-3B203-A	HEAT SHIELD (R.H. ONLY) E4TZ-3B483-A	WASHER 4.5 mm THICK 379572-S2	WASHER 7 mm THICK N805144-S56	NUT 34892-S2
F350 4x2 DRW											
2	67.7/69.2 mm	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y
3	74.7/76.2 mm	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y
F350 SRW											
3.2	59.7/61.2 mm	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y
3.4	67.7/69.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y
3.6	74.7/76.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y

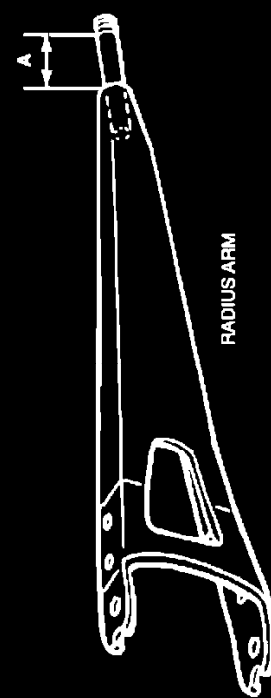


Figure 7

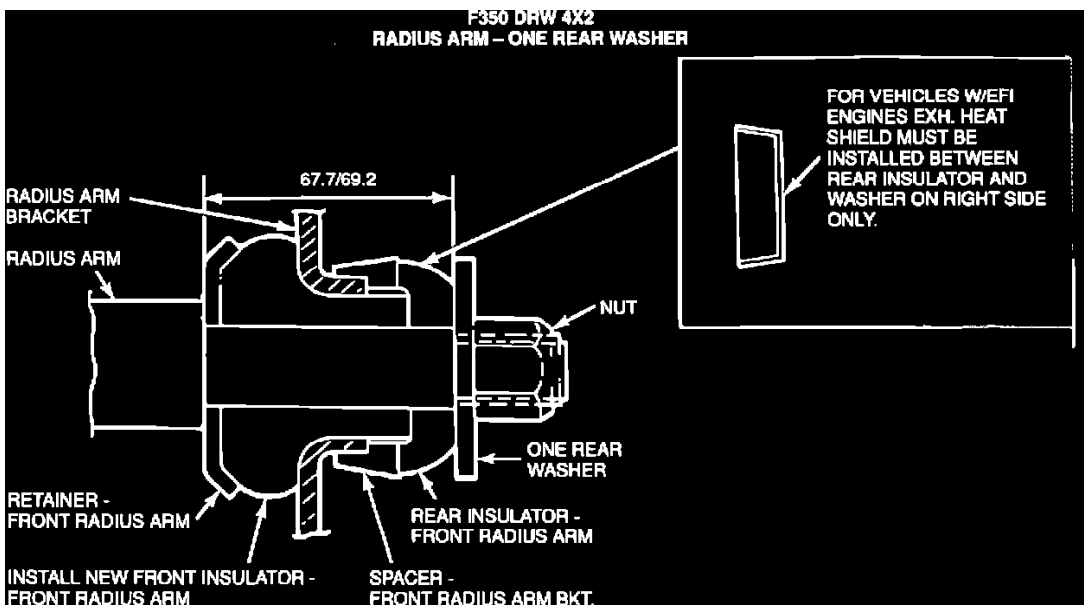


Figure 8

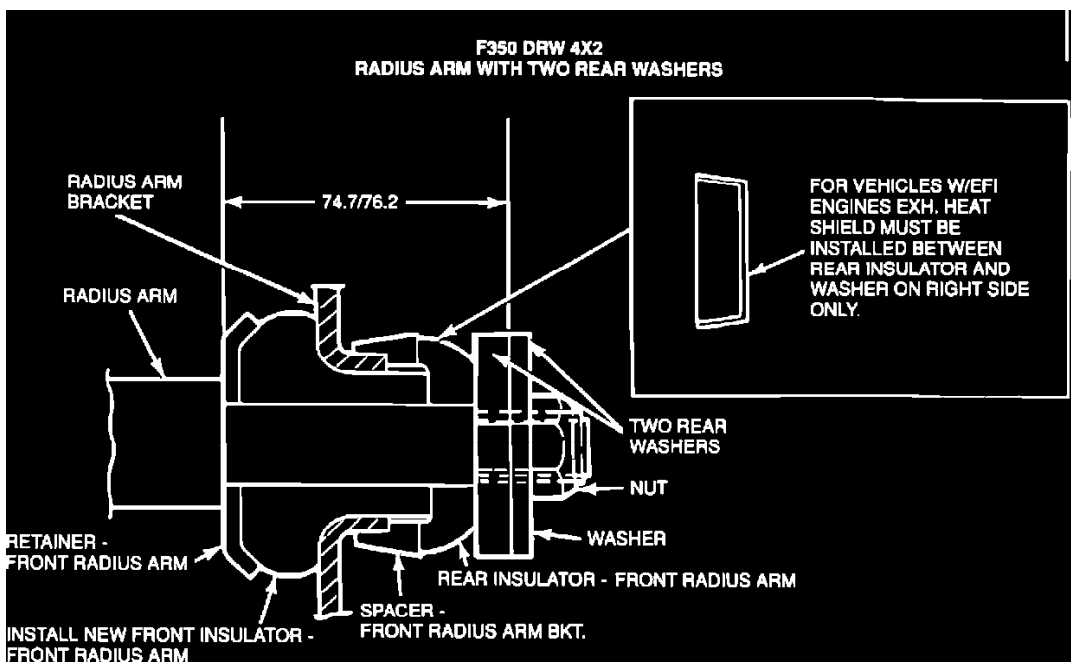


Figure 9

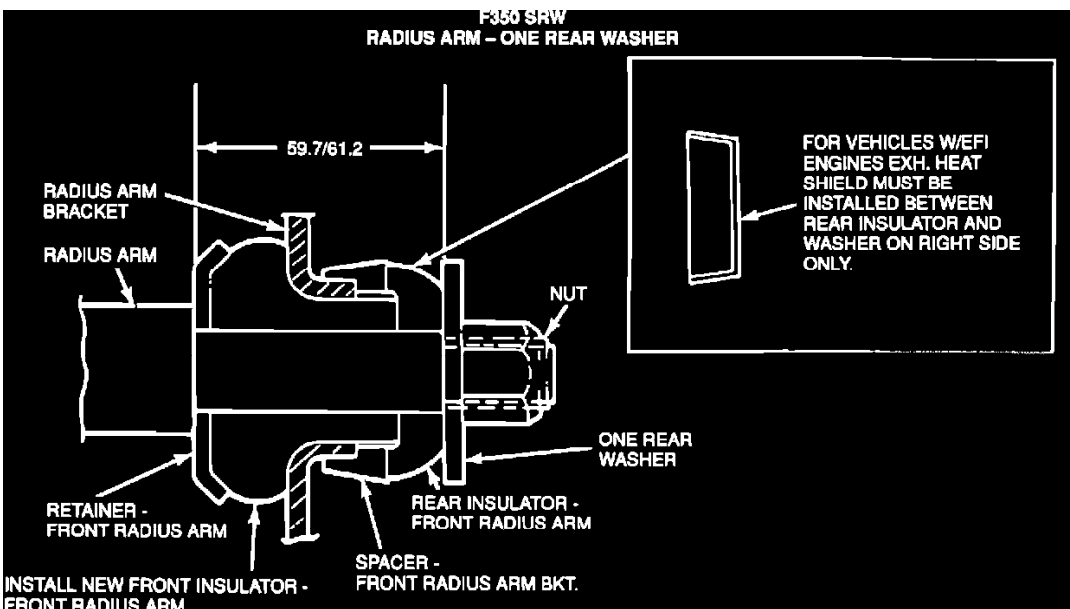


Figure 10

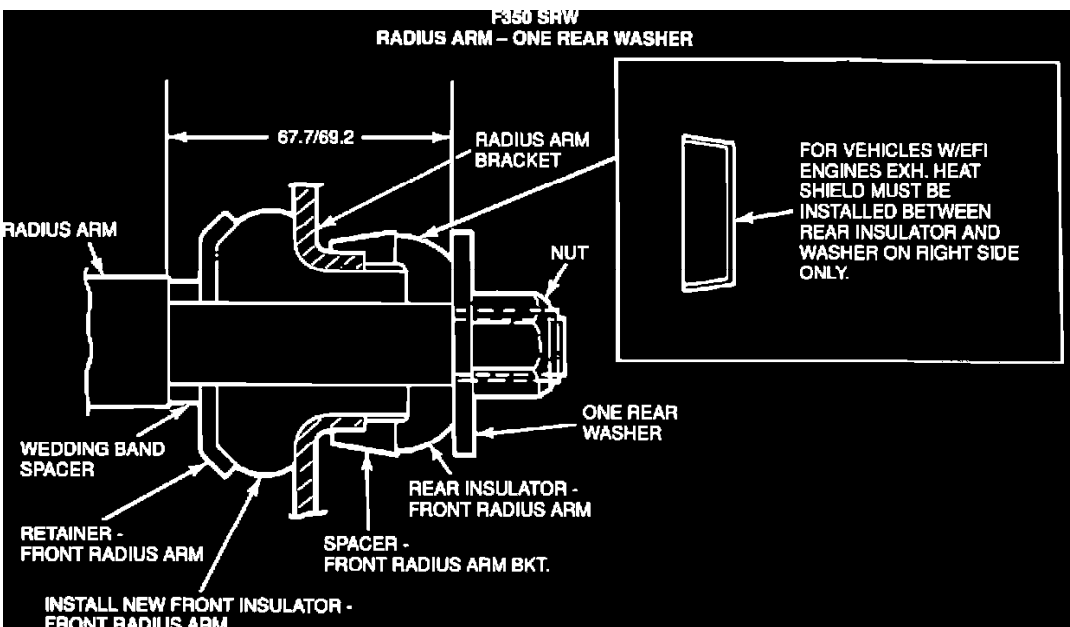
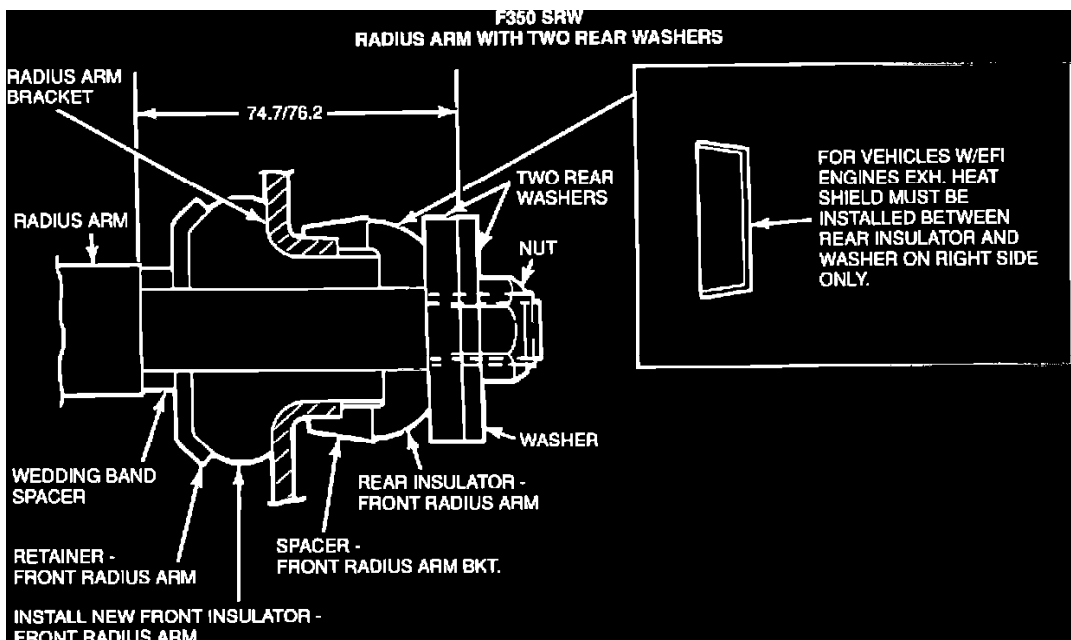


Figure 11



**Figure 12**

1. Inspect the radius arm bushing part stack, Figure 7.
2. Measure the radius arm stud length. See the component matrix, Figure 7, to determine the parts involved and the bushing part stack height for the F-350 DRW 4x2 and the F-350 SRW 4x2. Figures 6 through 12 show the radius arm bushing stack for each truck and follows the matrix.
3. Install rubber bushing (E7TZ-3B203-A) if it is not present on the vehicle.

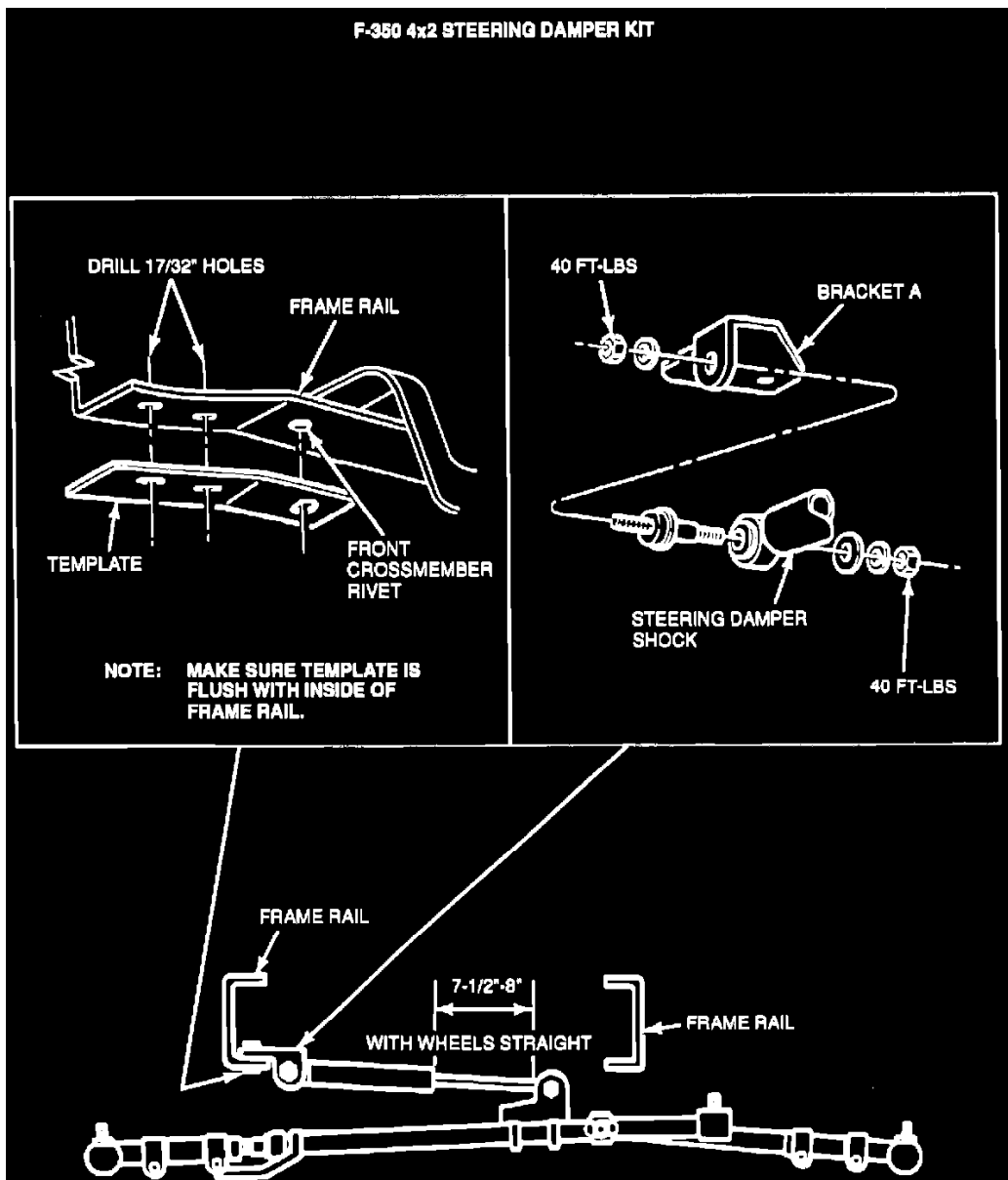


Figure 13

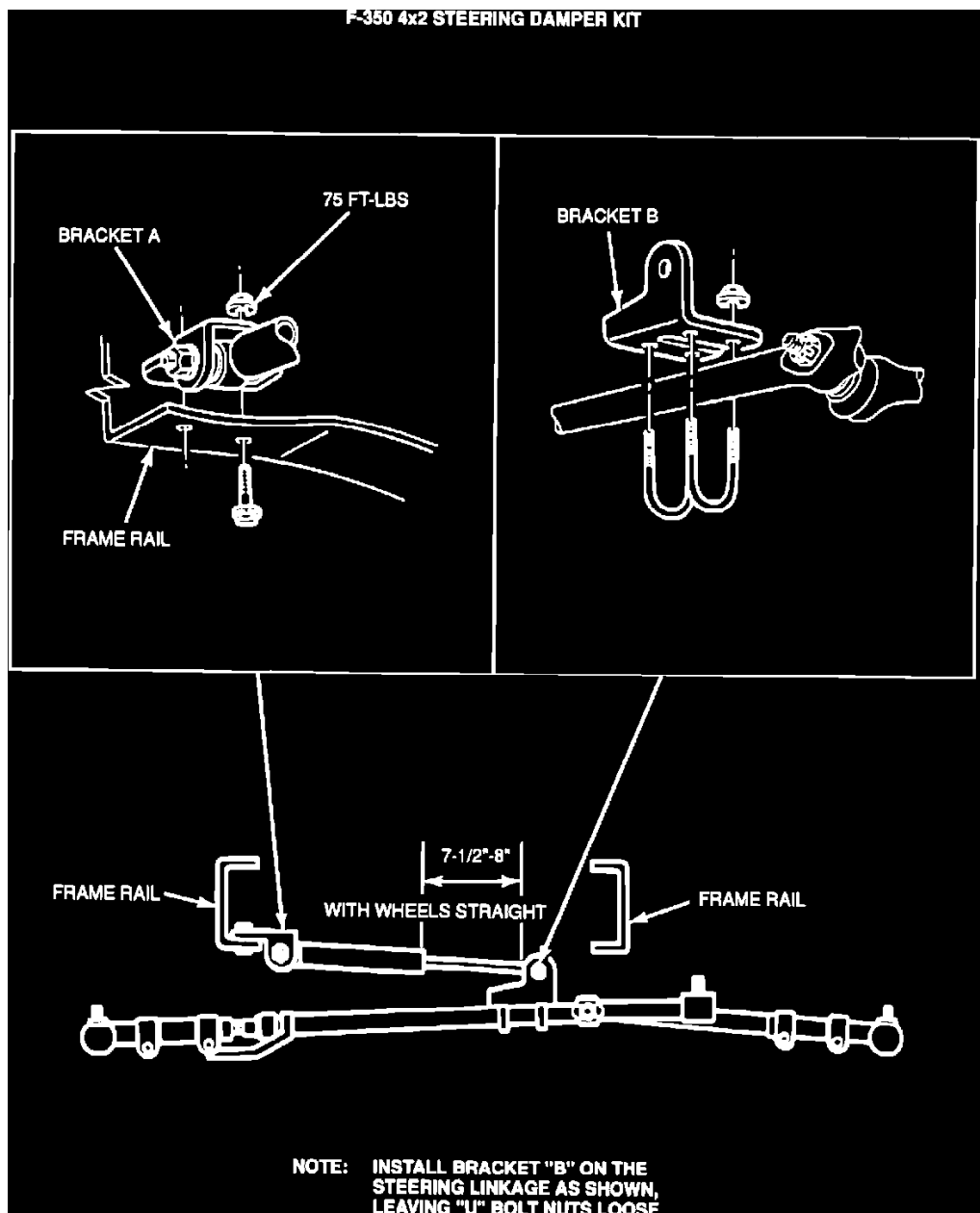


Figure 14

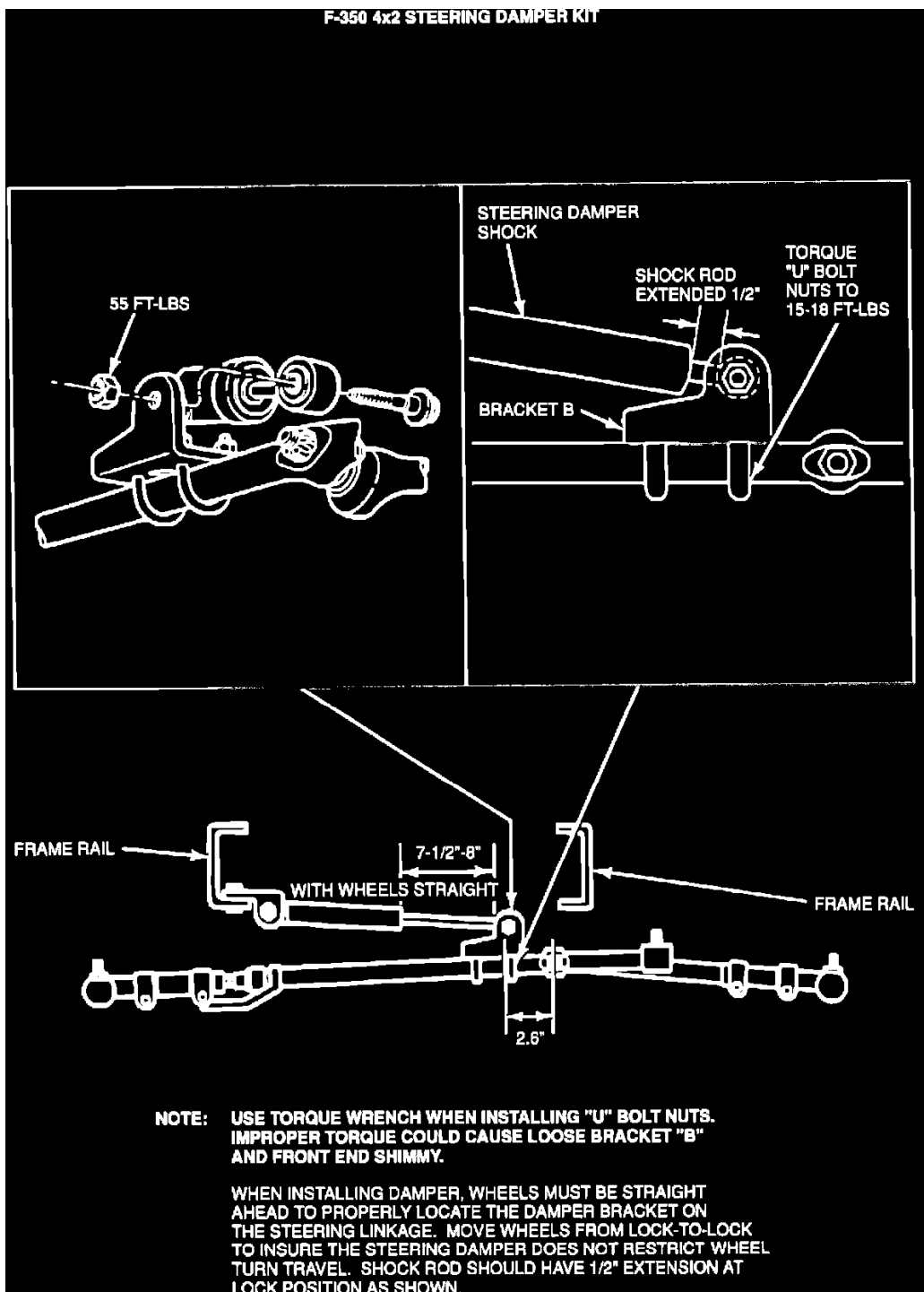


Figure 15

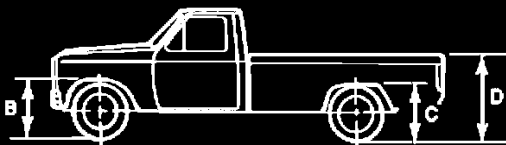
PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
E0AZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

4. Check the truck for the presence of a steering damper on F-350 DRW 4x2 vehicles. See Figure 13, 14 and 15 for a step by step installation procedure.
5. Install a damper (Service Kit E7TZ-3E651-A) on F-350 DRW 4x2 only if it is not present on trucks built before 1/6/88. A damper kit can be installed on trucks built after 1/6/88, if a shimmy is experienced.

## Alignment

TRUCK MODEL	ALIGNMENT FACTORS DEGREES (INCH)	ALIGNMENT SPECIFICATIONS				STANDARD VEHICLE ATTITUDE -REF-			
		AT DESIGN RIDE HEIGHTS (REF)	ASSEMBLY PROCESSING	SHOP MANUAL OR IN-SERVICE CHECKING	MAXIMUM VARIATION BETWEEN WHEELS	LATERAL TILT 2) (SIDE TO SIDE HEIGHT DIFFERENCES)			DOG-TRACK
						"B" FRONTWHEEL HOUSE OPENING	"C" REAR WHEEL HOUSE OPENING	"D" REAR END OF PICKUP BOX	
F-250 4x2 F-350 4x2	CASTER	7.2	●	1) 3)	1.5	15 mm	20 mm	20 mm	30 mm
	CAMBER	-0.5	●	1)	0.7				
	TOE 4)		-0.08 ± 0.25 (-0.03 ± 0.125)	+0.08 ± 0.25 (+0.03 ± 0.125)					
	STEERING AXIS INCLINATION	13.0							
	* INCLUDED ANGLE	12.5							

\* INCLUDED ANGLE DOES NOT CHANGE WITH RIDE HEIGHT  
 ● NOT ASSEMBLY PLANT CONTROLLABLE



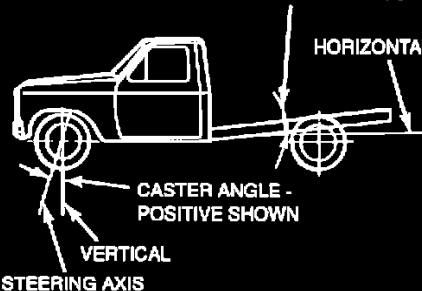
1) SEE CASTER AND CAMBER CURVES ON SHEET 2. CASTER AND CAMBER SETTINGS DEPEND ON RIDE HEIGHT DIM "A"

2) LATERAL VEHICLE TILT SPECIFICATIONS ARE MAX. ALLOWABLE FOR EITHER:  
 - VEHICLE AT CURB WEIGHT WITHOUT OCCUPANTS OR  
 - VEHICLE LOADED (NOT EXCEEDING GVW) WITH EQUALLY DISTRIBUTED WEIGHT OVER THE CARGO AND OCCUPANT AREAS

3) THE CASTER GRAPHS (SEE SHEET 2) AGREE WITH A LEVEL VEHICLE (0° FRAME ANGLE). IF THE VEHICLE IS LOWER IN THE FRONT THEN ADD THE FRAME ANGLE TO THE MEASURED CASTER READING AND COMPARE THIS SUM TO THE GRAPHED SPECIFICATIONS FOR THE GIVEN RIDE HEIGHT. IF THE VEHICLE IS LOWER IN THE REAR THEN SUBTRACT BEFORE COMPARING TO SPECIFICATION

4) TOE IS SET AND TO BE CHECKED AGAINST SPECIFICATION IN-SERVICE AT CURB RIDE HEIGHT ONLY. CURB RIDE HEIGHT IS A VEHICLE AS BUILT FROM THE ASSEMBLY PLANT, FULL FLUIDS, WITH NO ADDITIONAL WEIGHT FROM PASSENGERS, CARGO, AFTER MARKET ITEMS OR BODY MODIFICATIONS. TOE MAY BE RESET TO THE SHOP MANUAL OR OTHER RECOMMENDED SETTING AT ANY RIDE HEIGHT THAT THE VEHICLE WILL OPERATE AT FOR AT LEAST 50 PERCENT OF ITS USE. HOWEVER, TOE SET TO THE SHOP MANUAL SPECIFICATION AT CURB PROVIDES OPTIMUM VEHICLE AND TIRE WEAR PERFORMANCE FOR ALL RIDE HEIGHTS BETWEEN CURB (UNLOADED) AND GVW

FRAME ANGLE - MEASURE IN FLAT AREA AHEAD OF REAR WHEELS



INCLUDED ANGLE

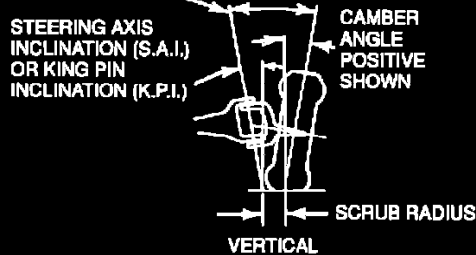


Figure 16

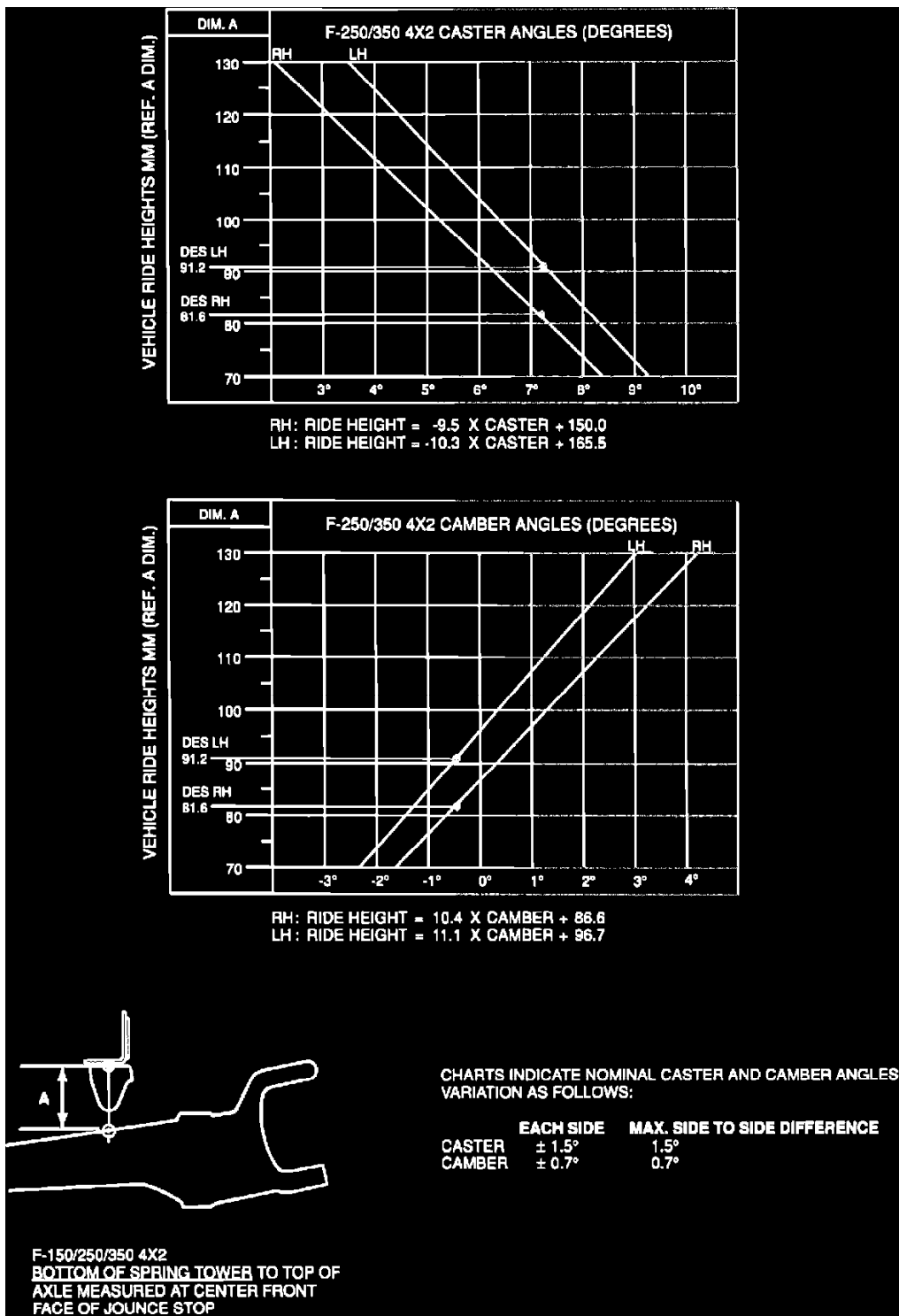


Figure 17

CAMBER OF 0 +/- 1/2~ AS VEHICLE IS OPERATED IS OPTIMUM

1. For vehicles with constant load (utility bodies) - Set camber to 0 +/- 1/2~. Refer to Figures 16 and 17.
2. For vehicles with varying loads (wreckers, dumps, rollback tilts, stake racks, etc.), proceed as follows:
  - a. Have the customer measure fender to ground heights, at wheel centerline with vehicle empty and loaded.
  - b. Measure the front end alignment..
    - ^ Caster
    - ^ Camber

- ^ Toe
- ^ Ride height
- ^ Front fender height to ground
- Determine the difference of customer measured loaded and empty fender height to ground when the alignment is measured.
  - Compute camber at customer measured heights by adding 3/4~ per 1/2" height difference for higher customer heights. Subtract 3/4~ per 1/2" height for lower measured fender heights to measured camber.
  - Compute the average camber by averaging the high and low numbers.
  - Reset camber with computed average between 0 + 1/2~.

## TOE

- Set Toe to 0 +/- 1/2~.

## CASTER

- Set caster as shown in the Shop Manual according to ride height.

## Wheels/Tires Size, Pressure, Balance, Wear

1987 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHL	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/86R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Argent Wheel/Optional Black - Wheel E5TA-UB

1988 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHL	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	60
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Gray Wheel/Optional - Black Wheel E7UA-JA

1989 F-350 TIRE/WHEEL RELEASES									
F-350 MODEL	WHL	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR	REMARKS
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80	HD FT END OPT
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80	
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Super Cab	D/R	155	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
		161	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	

\* Gray Wheel/Optional Black Wheel E7UA-1A

RECOMMENDED TIRE USAGE - 1989 F-350 TIRE RELEASES							
APPROVED SUPPLIER	LT215/85R16 LRD - A/S	LT215/85R16 LRD - A/T	LT235/85R16 LRE - A/S	LT235/85R16 LRE - A/T	7.50R - 16 LRD - HWY	7.50R - 16 LRD - A/T	7.50R - 16 LRD - M-S
Firestone	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88
Michelin	87/88/89		87/88/89	87/88/89			
Goodyear		87/88/89	87/88/89		87		87/88
General			87/88/89	87/88/89			

#### SIZE AND PRESSURE

- Compare the tire and wheel with the sizes and pressures on the certification label or the following Tire/Wheel Release Charts to make sure the correct tire is used. Inflate the tire to the specified pressure.

#### BALANCE

- Make sure of the correct balance of the front wheels.

#### WEAR

- If heel and toe wear or edge wear are present, rotate the tires.
  - ^ For single rear wheels the same tread styles front and rear, cross rotate all four tires.
  - ^ For single rear wheels with different tread styles, cross switch the front tires.
  - ^ For all dual rear wheels, cross switch the front tires.

Check and reset tire pressure per the certification label or the following Tire/Wheel Release Charts.

NOTE: FOR TIRES WORN TO THE POINT OF REPLACEMENT, USE RELEASED TIRES AS SHOWN IN THE FOLLOWING TIRE/WHEEL RELEASE CHARTS.

## Parts, Time & Etc

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3675-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
901110A	Steering Linkage Inspection	0.4 Hr.
901110B	Steering Gear Inspection	0.2 Hr.
901110C	Install Frame Kit	11.7 Hr.
901110D	Install Sector Shaft Repair Kit	0.4 Hr.
901110E	Adjust Steering Gear	0.6 Hr.
901110F	Wheel Bearing End Play Inspection	0.2 Hr.
901110G	Vehicle Desensitizing	1.3 Hr.
901110H	Alignment	1.7 Hr.
901110I	Tire Rotation & Balance	0.9 Hr.

#### DEALER CODING

BASIC PART NO.      CONDITION CODE

FRONT                      W4

OASIS CODES: 3100, 3200

Technical Service Bulletin # **901110**

Date: **900523**

## Steering/Suspension - Shimmy

Article No. 90-11-10

- ^ STEERING-SHIMMY-DIAGNOSTIC PROCEDURE-4X2 UNITS ONLY
- ^ SUSPENSION-SHIMMY-DIAGNOSTIC PROCEDURE- 4X2 UNITS ONLY

LIGHT TRUCK: 1987-89 F-350

**ISSUE:** Front end shimmy may occur at various driving speeds or when hitting bumps in the road. There are several vehicle conditions sometimes described by customers as shimmy which may not actually be "shimmy". Shimmy, as observed by the driver, is defined as large amplitude, rotational oscillations of the steering wheel resulting from large, side to side tire/wheel movements.

**ACTION:** Inspect the truck and perform the following diagnosis to determine the shimmy's causal factors. Be aware of the following points:

- ^ Shimmy is not always confirmed during road testing.
- ^ It is very important to check all systems that can cause shimmy.
- ^ After a general review of the front suspension/steering systems, make the necessary adjustments and replacements as noted.

- ^ Check bolt and nut torques to be sure they are tightened to the specified torque specifications.
- ^ Check the front end alignment. Look for excessively worn tires and out of balance wheel and tire assemblies.

Shimmy should not be confused with steering wheel nibble and vibration concerns.

^ Steering wheel nibble is a condition resulting from the tire interaction with various road surfaces. It is observed by the driver as small amplitude, rotational oscillations of the steering wheel.

^ Various suspension/steering vibrations are sometimes confused as shimmy. They appear as steering column shake and wheel/tire imbalance. They induce a vertical motion in the steering wheel/column.

Refer to the appropriate model year Light Truck Shop Manual, Sections 18-01, 11-01 and 12-01 for NVH conditions other than shimmy.

## Steering Linkage Inspection:

1. With the weight on the front wheels, check the linkage joints while someone else turns the steering wheel from side to side.

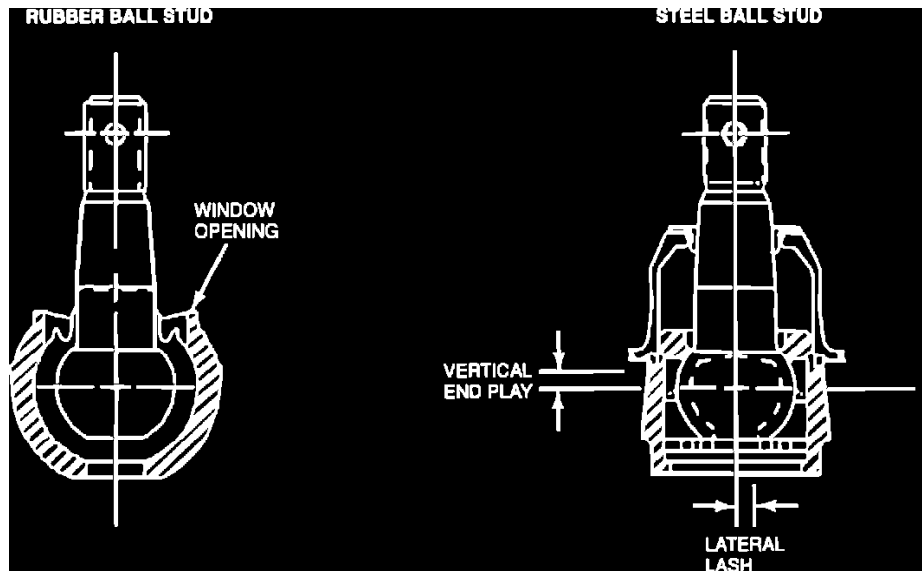


Figure 1

- a. For rubber ball socket (RBS) joints, see if the ball stud makes contact with the window opening in the socket bowl while on the truck, Figure 1. If contact is made with the window opening, replace it with a greaseable steel joint.
- b. For steel (greaseable) joints, measure the lateral (side to side) lash in the joint, Figure 1.
  1. If the lash exceeds .060" (1.59 mm), replace the joint.
  2. With the truck on a hoist, check the steel (greaseable) joints for vertical (up and down) end play by pushing and pulling on the joint, Figure 1. If the end play exceeds .090" (2.38 mm), replace the joint.

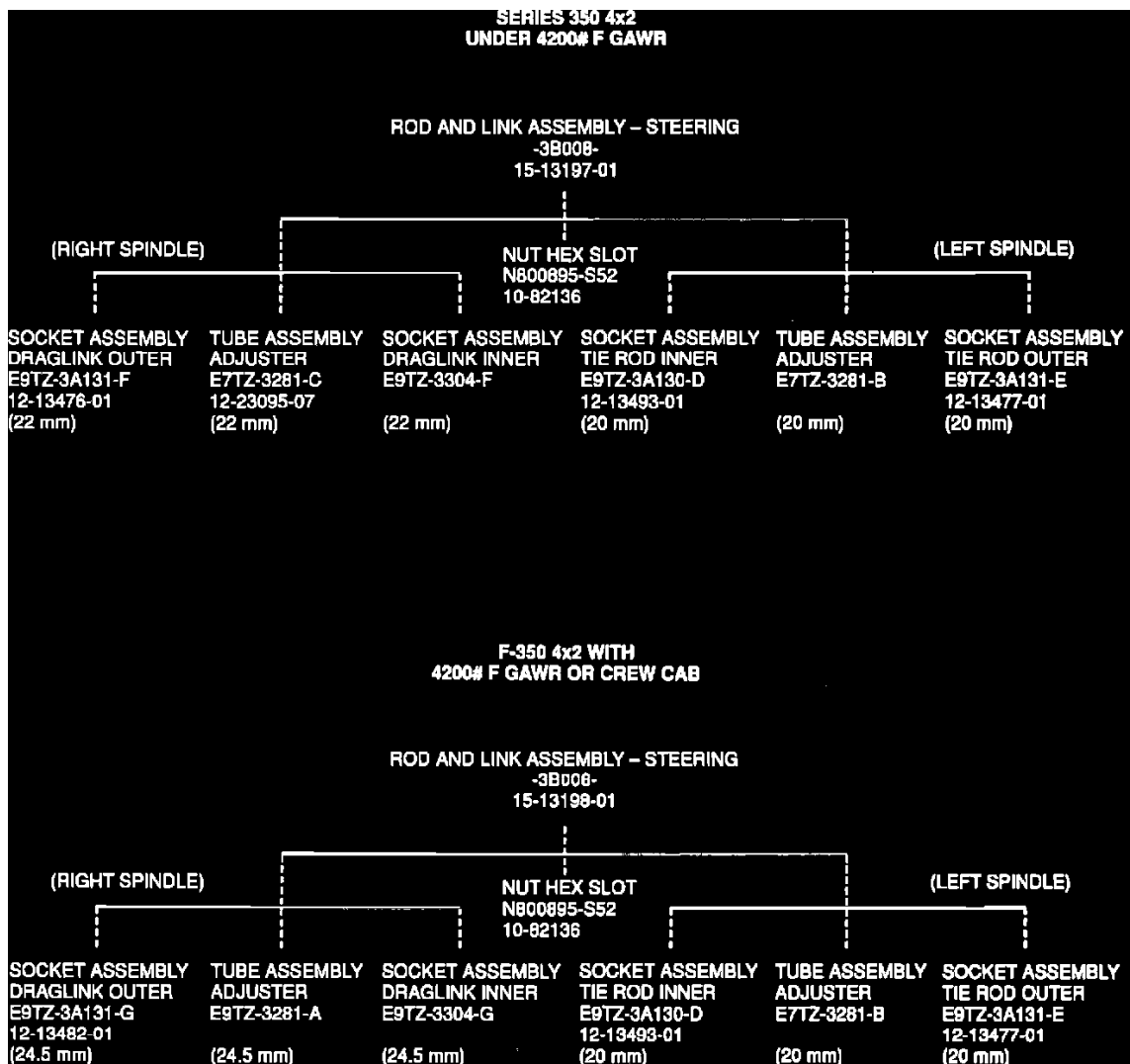


Figure 2

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B483-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

3. Remove the linkage from the truck, Figure 2.
  - a. See if the rubber is torn on the RBS. If the rubber is torn, replace it with a greaseable steel joint.
  - b. See if the steel joint will spin freely. If the joint spins freely with the hand, replace the joint.

Refer to Figure 2 for specific service part applications.

## Steering Gear Inspection:

1. Inspect the mounting surface of the steering gear. Check the frame area for the following:
  - ^ Signs of motion
  - ^ Loose rivets
  - ^ Cracks - Removal of the gear from the frame may be required to check for cracks.

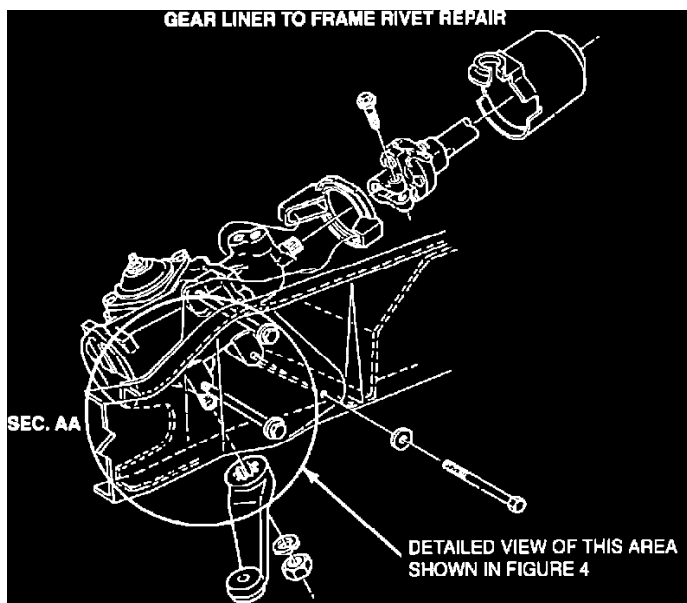


Figure 3

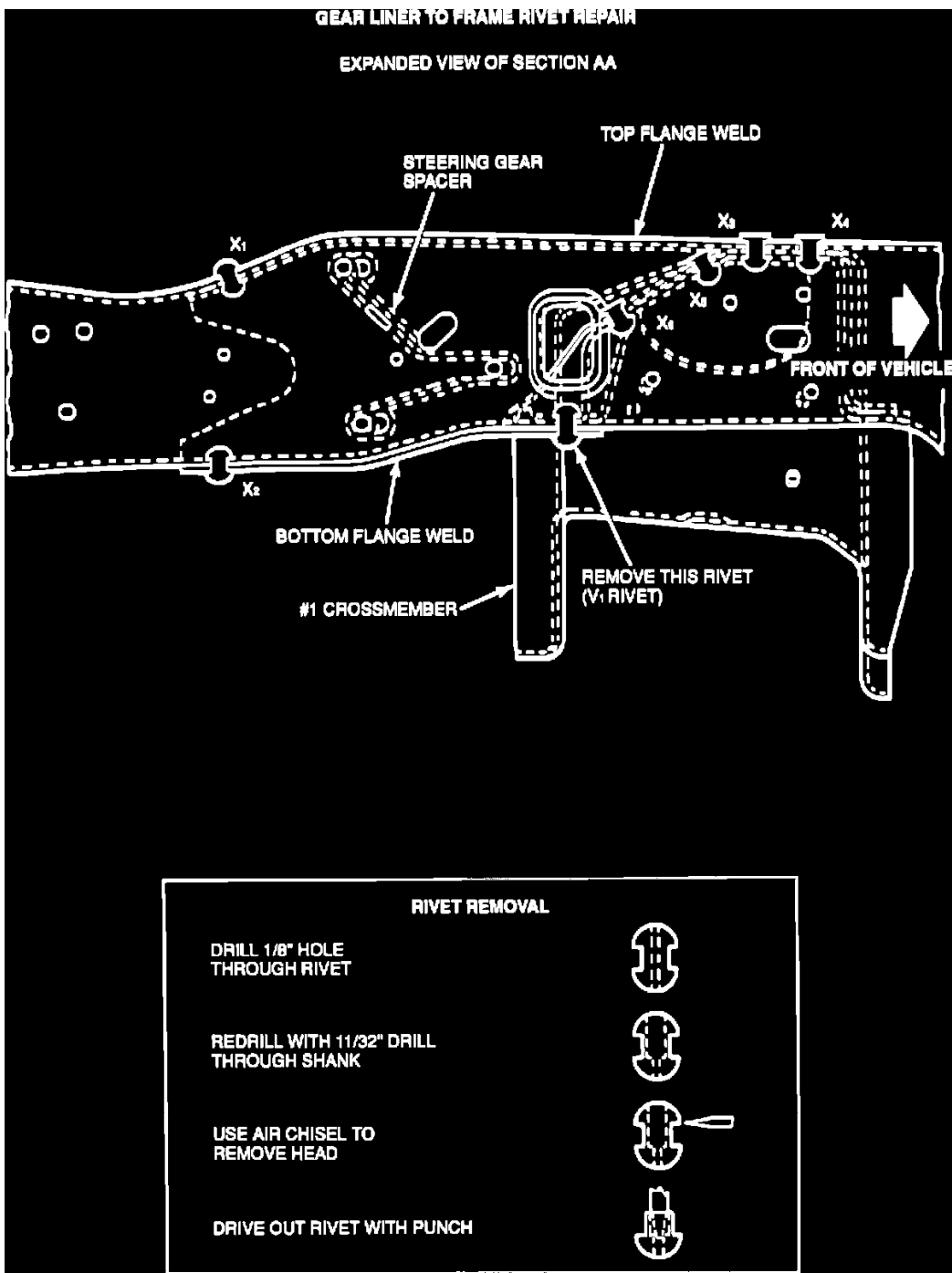


Figure 4

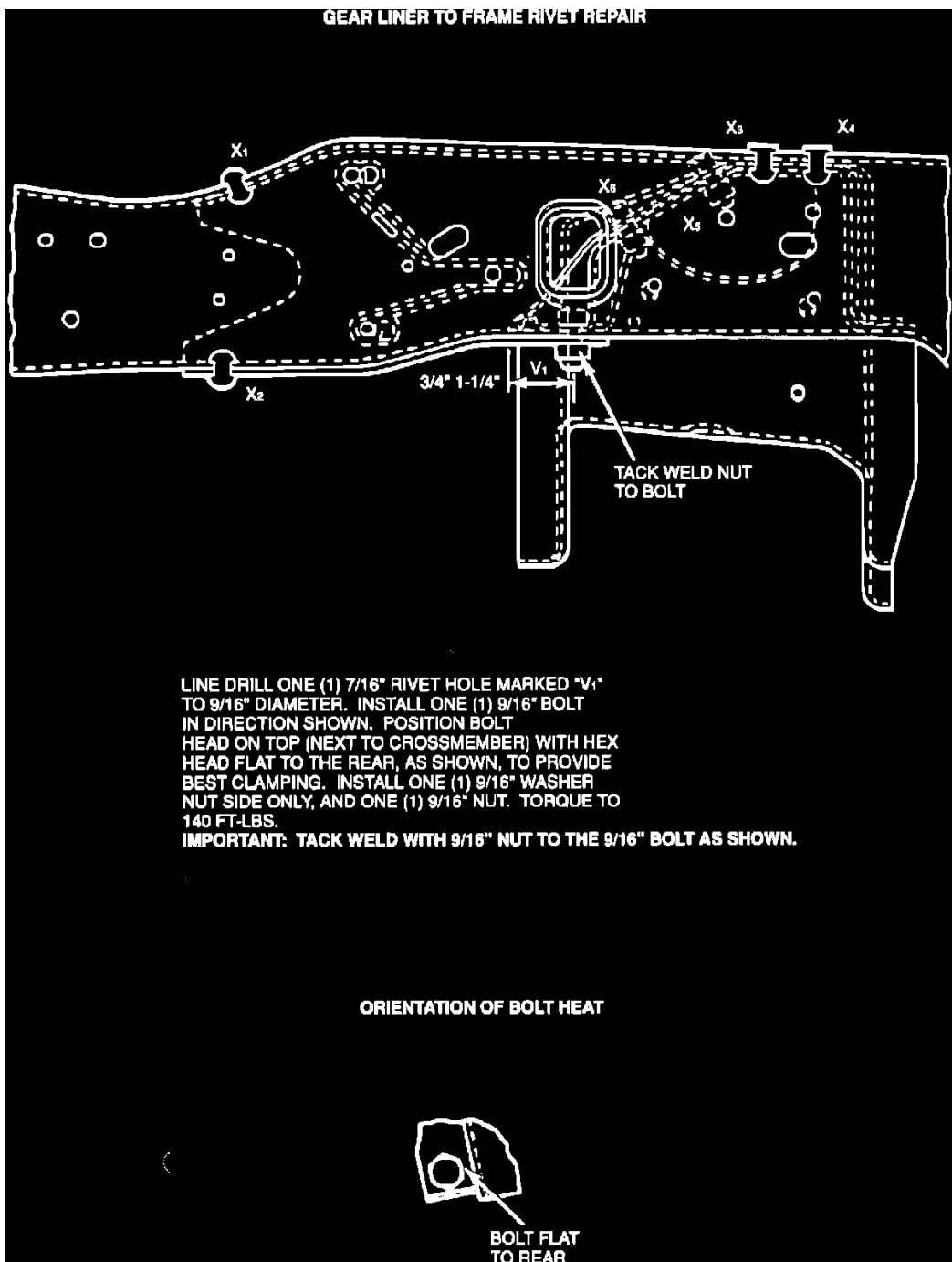


Figure 5

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

2. Repair trucks with a cracked frame liner or loose rivets by using Frame Repair Kit (E6TZ-5K130-A). See Figures 3, 4 and 5.
3. Inspect the frame for cracks in the following areas.
  - ^ Frame rail near the steering gear top and bottom flanges
  - ^ Frame rail at the steering gear bolt heads.
  - ^ Frame rail at or near the spring tower bracket
  - ^ Engine crossmember front LH flange.
4. If there are cracks in any of the above locations, replace the frame.
5. If a dealer confirmed shimmy has been experienced, replace the steering gear sector shaft. Use steering gear sector shaft repair kit (EOAZ-3375-A). Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.
6. Check for the presence of mesh load.
  - a. With the front wheels off the ground, hold the tire and turn the tire side to side slowly.
  - b. See if the effort increases when turning the tire straight ahead.
  - c. If no increase is noted, perform the Shop Manual procedure to check and adjust mesh load. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.

### Wheel End Friction and Wheel Bearing End Play Inspection:

1. Inspect the vehicle for worn ball joints. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 14 for service details. Replace as required.
2. Check the wheel bearing end play. Refer to the appropriate model year Light Truck Shop Manual, Vol A, Section 14 for service details. Adjust the end play or replace the wheel bearings as required.

### Vehicle Desensitizing

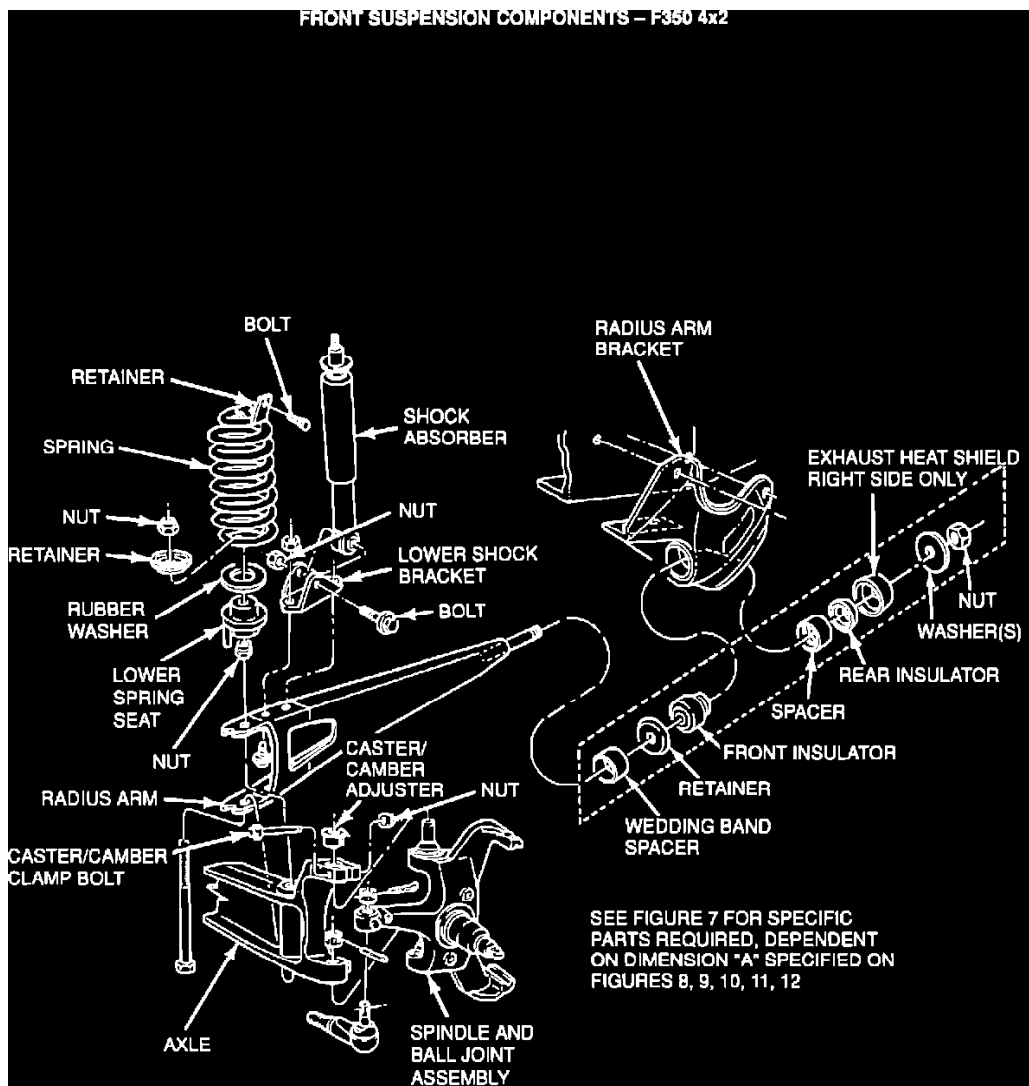


Figure 6

SKETCH NO.	RADIUS ARM STUD LENGTH (DIM. "A") UNTHREADED	WEDDING BAND N804264-S2 8 mm THICK	RETAINER 3B186	INSULATOR FRONT E7TZ-3B203-A	BRACKET E41Z-3B095-B (L.H.) E41Z-3B095-A (R.H.)	SPACER E5TZ-3B244-A	INSULATOR REAR D8TZ-3B203-A	HEAT SHIELD (R.H. ONLY) E4TZ-3B483-A	WASHER 4.5 mm THICK 379572-S2	WASHER 7 mm THICK N805144-S56	NUT 34892-S2	(FRAME MOUNTED) RADIUS ARM		
												Y	Y	Y
2	F350 4x2 DRW	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y	Y	Y
3	67.7/69.2 mm 74.7/76.2 mm	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y	Y	Y
3.2	F350 SRW	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y	Y	Y
3.4	59.7/61.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	N	Y	Y	Y
3.6	67.7/69.2 mm 74.7/76.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y	Y	Y

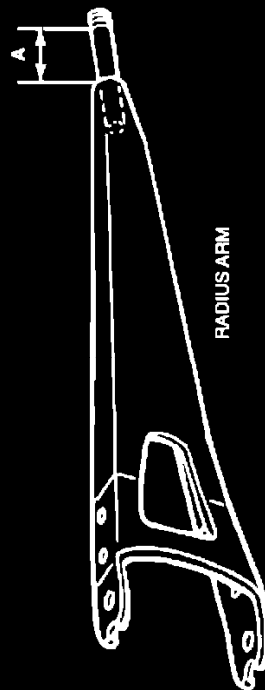


Figure 7

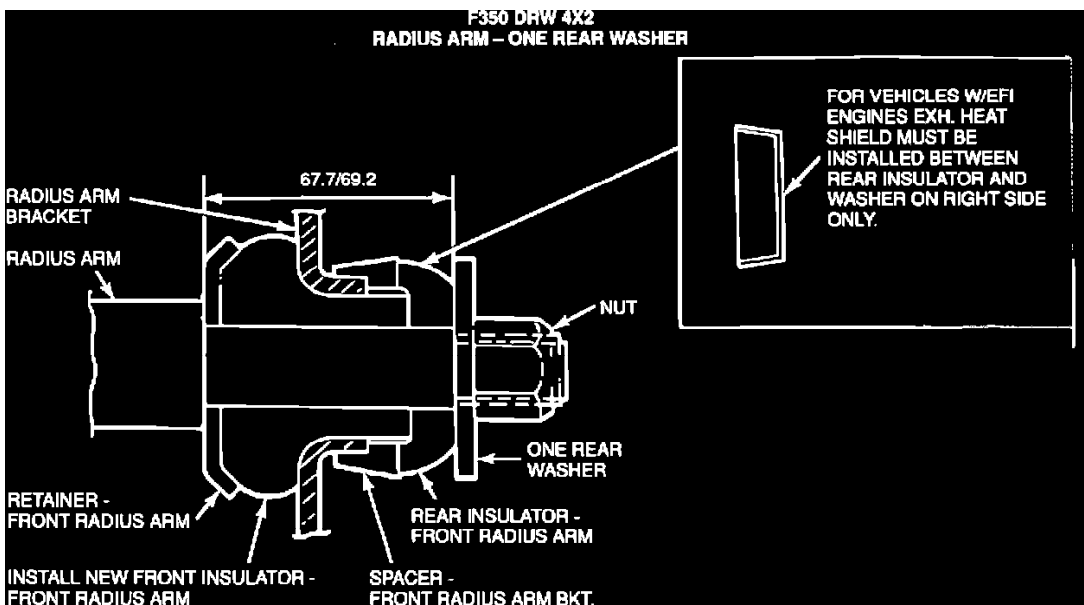


Figure 8

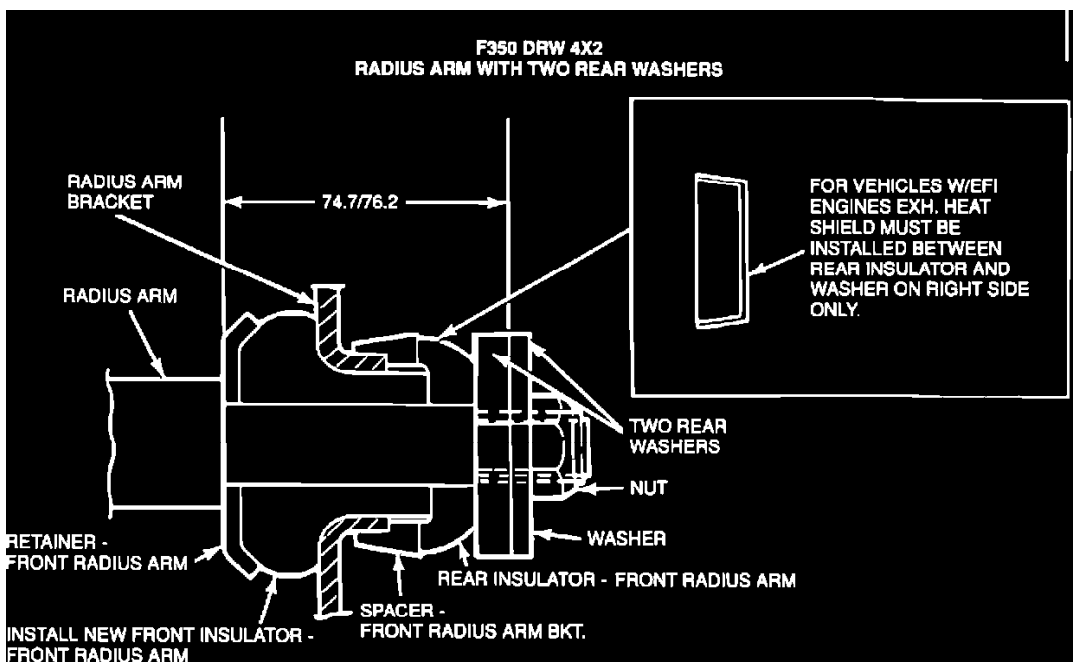


Figure 9

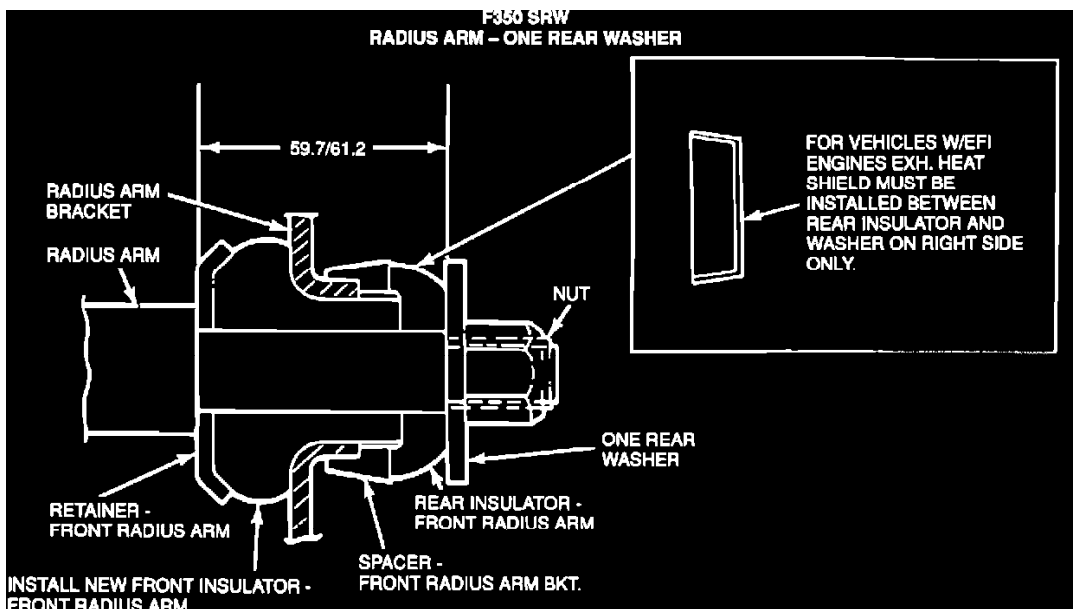


Figure 10

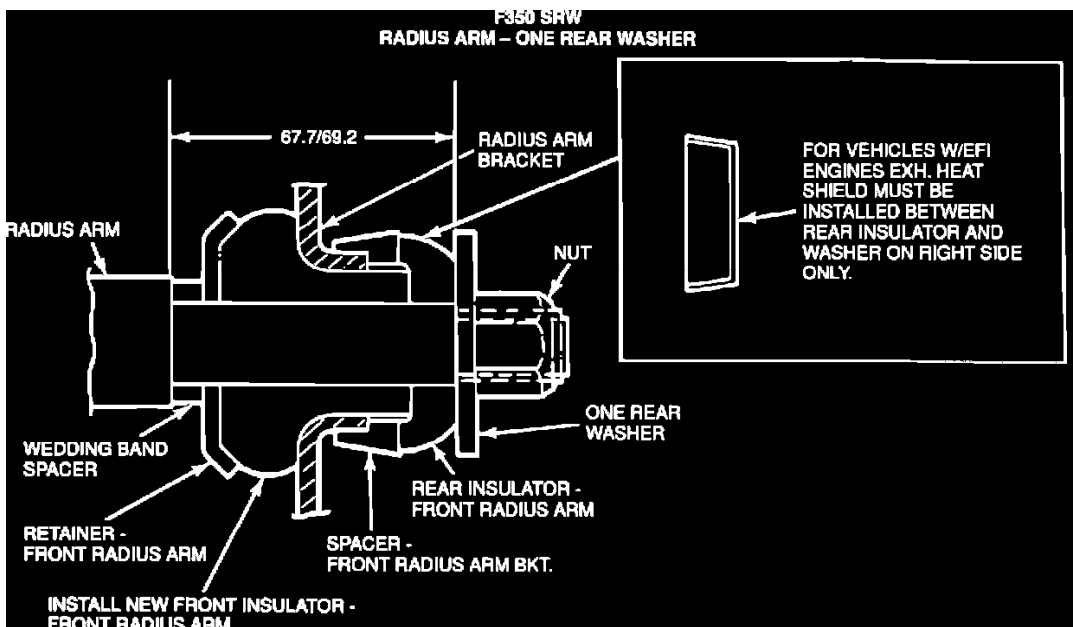
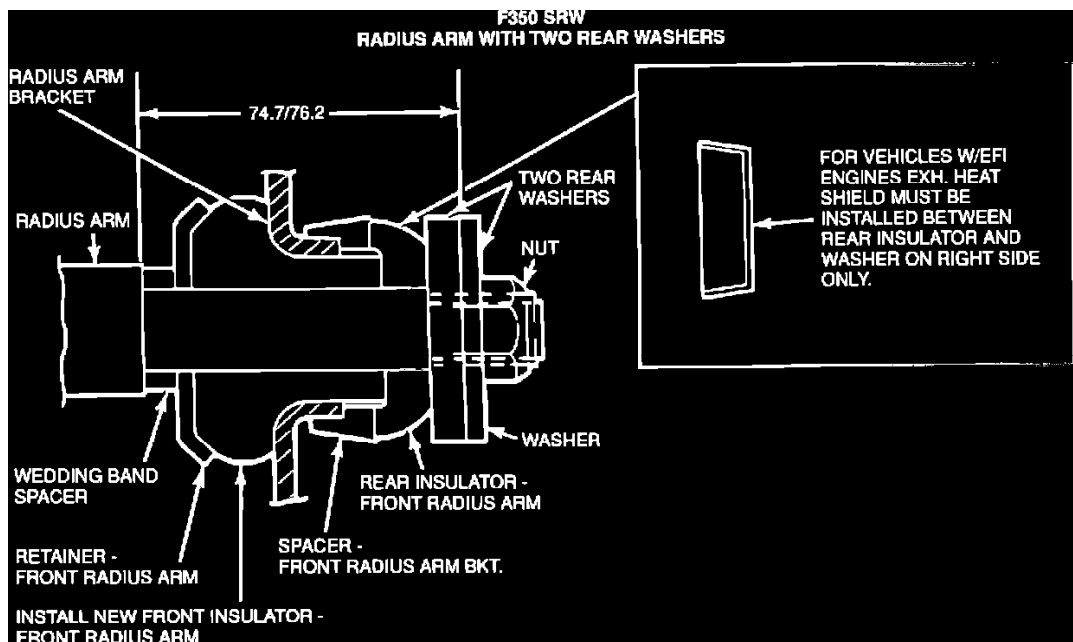


Figure 11



**Figure 12**

1. Inspect the radius arm bushing part stack, Figure 7.
2. Measure the radius arm stud length. See the component matrix, Figure 7, to determine the parts involved and the bushing part stack height for the F-350 DRW 4x2 and the F-350 SRW 4x2. Figures 6 through 12 show the radius arm bushing stack for each truck and follows the matrix.
3. Install rubber bushing (E7TZ-3B203-A) if it is not present on the vehicle.

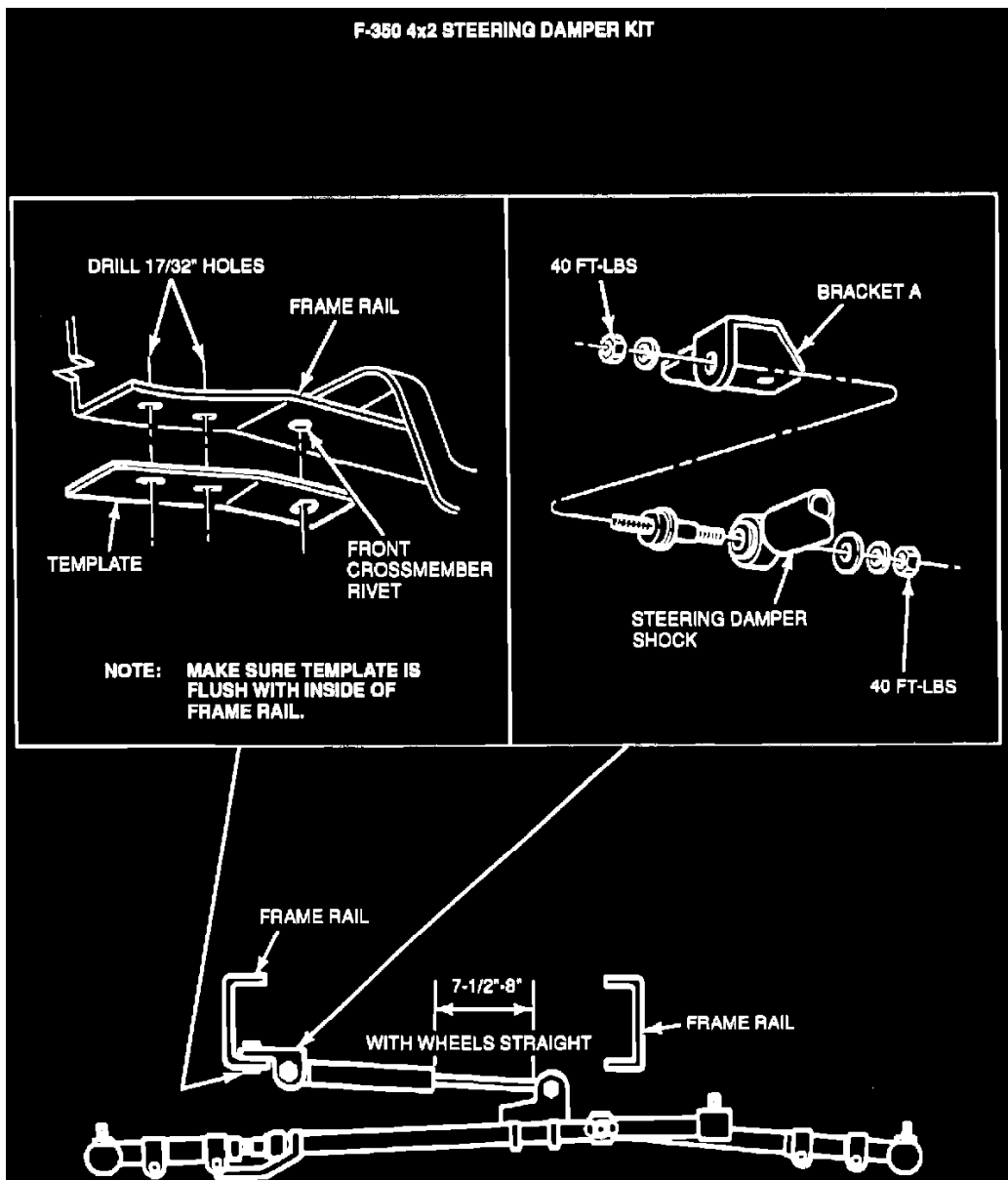


Figure 13

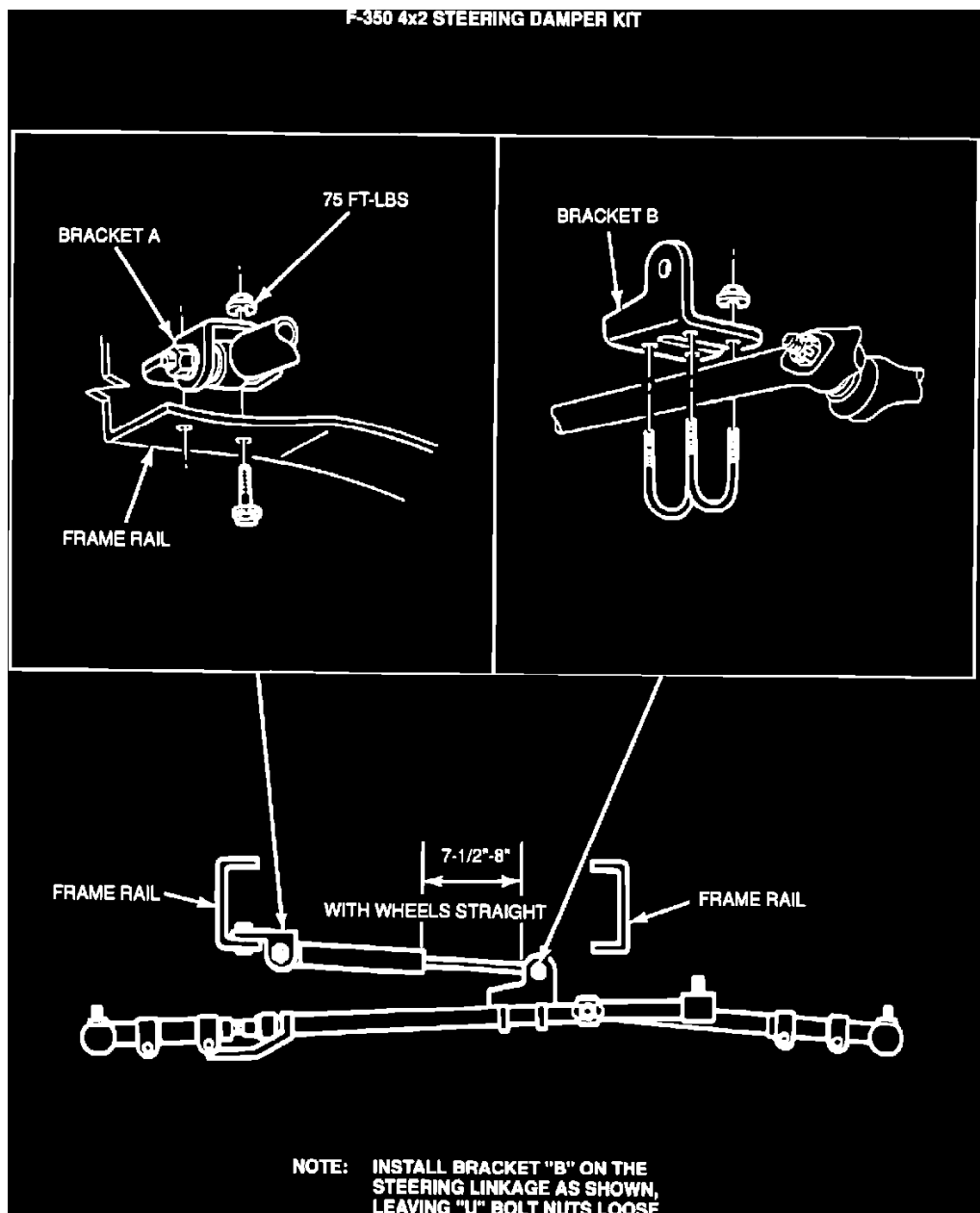


Figure 14

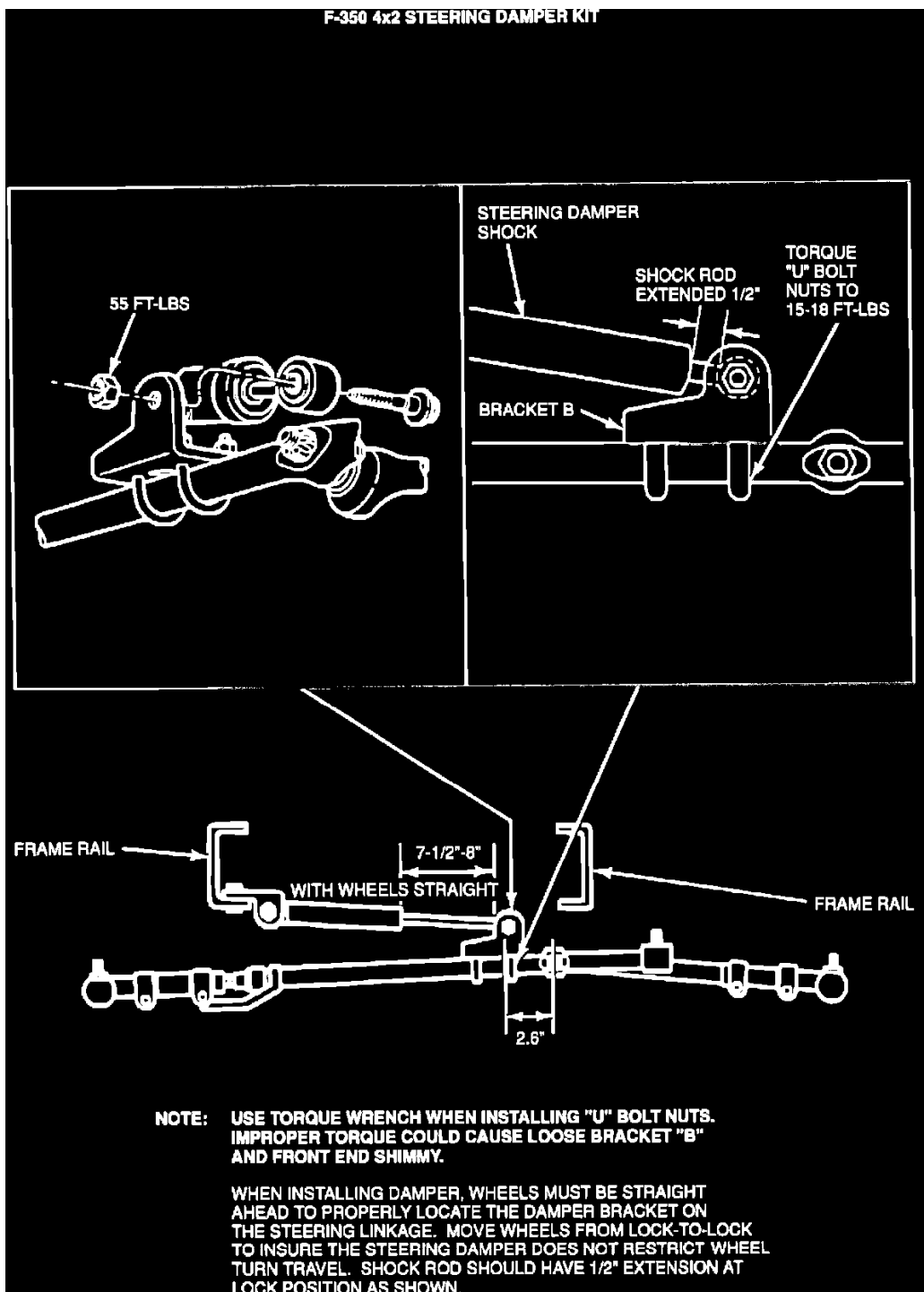


Figure 15

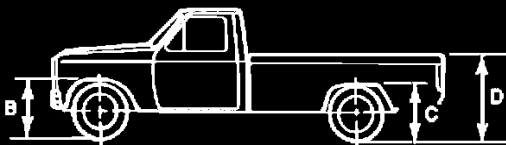
PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
E0AZ-3675-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

4. Check the truck for the presence of a steering damper on F-350 DRW 4x2 vehicles. See Figure 13, 14 and 15 for a step by step installation procedure.
5. Install a damper (Service Kit E7TZ-3E651-A) on F-350 DRW 4x2 only if it is not present on trucks built before 1/6/88. A damper kit can be installed on trucks built after 1/6/88, if a shimmy is experienced.

## Alignment

TRUCK MODEL	ALIGNMENT FACTORS DEGREES (INCH)	ALIGNMENT SPECIFICATIONS				STANDARD VEHICLE ATTITUDE -REF-			
		AT DESIGN RIDE HEIGHTS (REF)	ASSEMBLY PROCESSING	SHOP MANUAL OR IN-SERVICE CHECKING	MAXIMUM VARIATION BETWEEN WHEELS	LATERAL TILT 2) (SIDE TO SIDE HEIGHT DIFFERENCES)			DOG-TRACK
						"B" FRONTWHEEL HOUSE OPENING	"C" REAR WHEEL HOUSE OPENING	"D" REAR END OF PICKUP BOX	
F-250 4x2 F-350 4x2	CASTER	7.2	●	1) 3)	1.5	15 mm	20 mm	20 mm	30 mm
	CAMBER	-0.5	●	1)	0.7				
	TOE 4)		-0.08 ± 0.25 (-0.03 ± 0.125)	+0.08 ± 0.25 (+0.03 ± 0.125)					
	STEERING AXIS INCLINATION	13.0							
	* INCLUDED ANGLE	12.5							

\* INCLUDED ANGLE DOES NOT CHANGE WITH RIDE HEIGHT  
 ● NOT ASSEMBLY PLANT CONTROLLABLE



1) SEE CASTER AND CAMBER CURVES ON SHEET 2. CASTER AND CAMBER SETTINGS DEPEND ON RIDE HEIGHT DIM "A"

2) LATERAL VEHICLE TILT SPECIFICATIONS ARE MAX. ALLOWABLE FOR EITHER:  
 - VEHICLE AT CURB WEIGHT WITHOUT OCCUPANTS OR  
 - VEHICLE LOADED (NOT EXCEEDING GVW) WITH EQUALLY DISTRIBUTED WEIGHT OVER THE CARGO AND OCCUPANT AREAS

3) THE CASTER GRAPHS (SEE SHEET 2) AGREE WITH A LEVEL VEHICLE (0° FRAME ANGLE). IF THE VEHICLE IS LOWER IN THE FRONT THEN ADD THE FRAME ANGLE TO THE MEASURED CASTER READING AND COMPARE THIS SUM TO THE GRAPHED SPECIFICATIONS FOR THE GIVEN RIDE HEIGHT. IF THE VEHICLE IS LOWER IN THE REAR THEN SUBTRACT BEFORE COMPARING TO SPECIFICATION

4) TOE IS SET AND TO BE CHECKED AGAINST SPECIFICATION IN-SERVICE AT CURB RIDE HEIGHT ONLY. CURB RIDE HEIGHT IS A VEHICLE AS BUILT FROM THE ASSEMBLY PLANT, FULL FLUIDS, WITH NO ADDITIONAL WEIGHT FROM PASSENGERS, CARGO, AFTER MARKET ITEMS OR BODY MODIFICATIONS. TOE MAY BE RESET TO THE SHOP MANUAL OR OTHER RECOMMENDED SETTING AT ANY RIDE HEIGHT THAT THE VEHICLE WILL OPERATE AT FOR AT LEAST 50 PERCENT OF ITS USE. HOWEVER, TOE SET TO THE SHOP MANUAL SPECIFICATION AT CURB PROVIDES OPTIMUM VEHICLE AND TIRE WEAR PERFORMANCE FOR ALL RIDE HEIGHTS BETWEEN CURB (UNLOADED) AND GVW

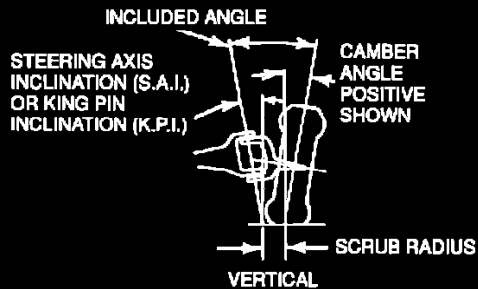
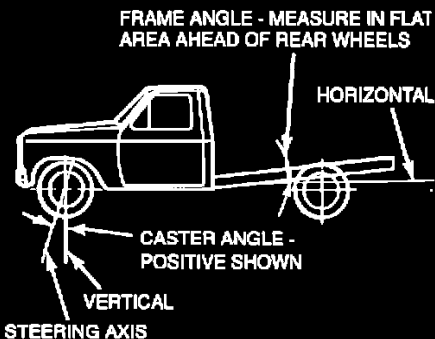


Figure 16

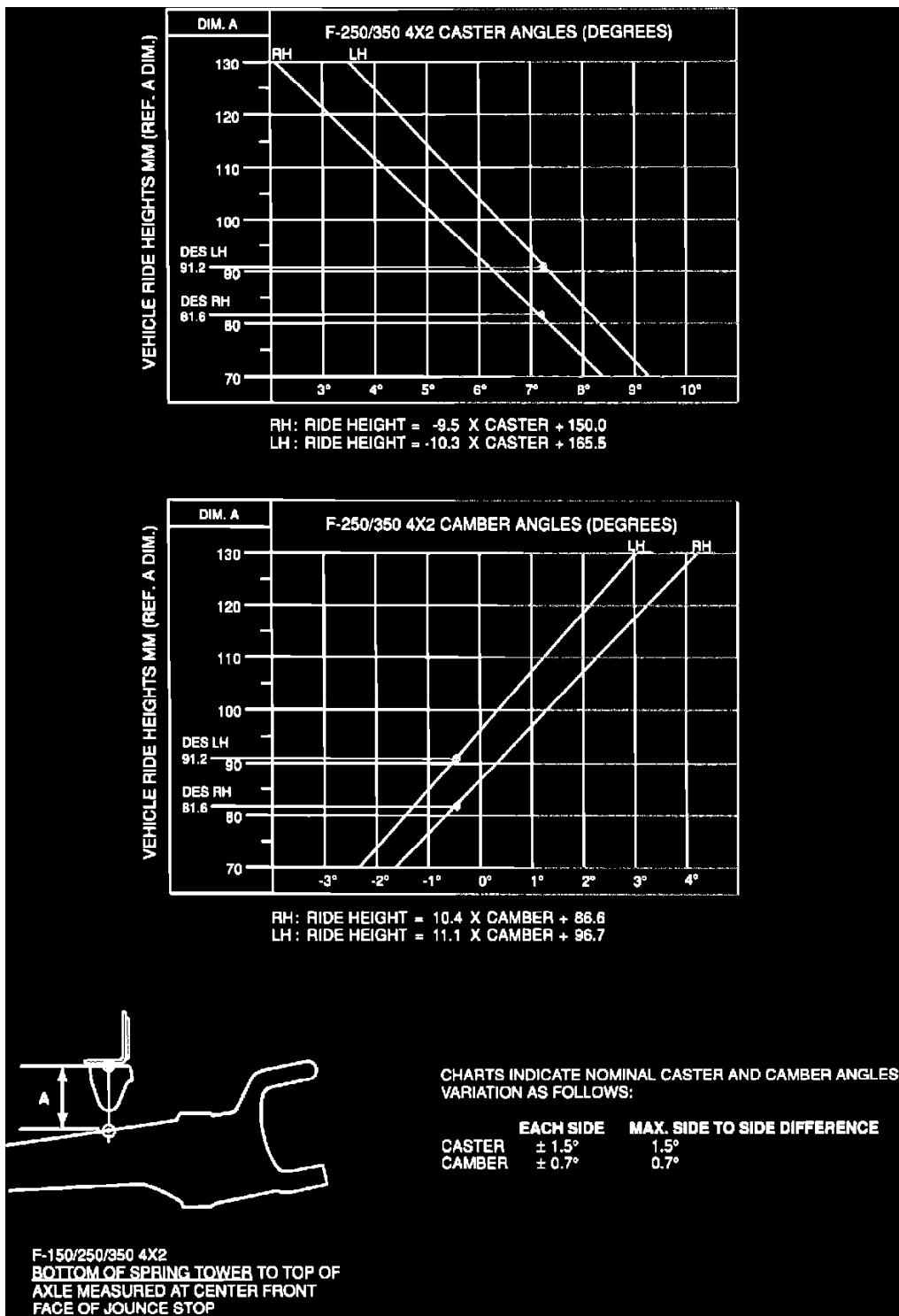


Figure 17

CAMBER OF 0 +/- 1/2~ AS VEHICLE IS OPERATED IS OPTIMUM

1. For vehicles with constant load (utility bodies) - Set camber to 0 +/- 1/2~. Refer to Figures 16 and 17.
2. For vehicles with varying loads (wreckers, dumps, rollback tilts, stake racks, etc.), proceed as follows:
  - a. Have the customer measure fender to ground heights, at wheel centerline with vehicle empty and loaded.
  - b. Measure the front end alignment..
    - ^ Caster
    - ^ Camber

- ^ Toe
- ^ Ride height
- ^ Front fender height to ground
- c. Determine the difference of customer measured loaded and empty fender height to ground when the alignment is measured.
- d. Compute camber at customer measured heights by adding 3/4~ per 1/2" height difference for higher customer heights. Subtract 3/4~ per 1/2" height for lower measured fender heights to measured camber.
- e. Compute the average camber by averaging the high and low numbers.
- f. Reset camber with computed average between 0 + 1/2~.

TOE

3. Set Toe to 0 +/- 1/2~.

CASTER

4. Set caster as shown in the Shop Manual according to ride height.

## Wheels/Tires Size, Pressure, Balance, Wear

1987 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHLS	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/86R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Argent Wheel/Optional Black - Wheel E5TA-UB

1988 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHLS	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	60
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Gray Wheel/Optional - Black Wheel E7UA-JA

1989 F-350 TIRE/WHEEL RELEASES									
F-350 MODEL	WHL.	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR	REMARKS
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80	HD FT END OPT
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80	
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Super Cab	D/R	155	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
		161	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	

\* Gray Wheel/Optional Black Wheel E7UA-1A

RECOMMENDED TIRE USAGE - 1989 F-350 TIRE RELEASES							
APPROVED SUPPLIER	LT215/85R16 LRD - A/S	LT215/85R16 LRD - A/T	LT235/85R16 LRE - A/S	LT235/85R16 LRE - A/T	7.50R - 16 LRD - HWY	7.50R - 16 LRD - A/T	7.50R - 16 LRD - M-S
Firestone	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88
Michelin	87/88/89		87/88/89	87/88/89			
Goodyear		87/88/89	87/88/89		87		87/88
General			87/88/89	87/88/89			

#### SIZE AND PRESSURE

- Compare the tire and wheel with the sizes and pressures on the certification label or the following Tire/Wheel Release Charts to make sure the correct tire is used. Inflate the tire to the specified pressure.

#### BALANCE

- Make sure of the correct balance of the front wheels.

#### WEAR

- If heel and toe wear or edge wear are present, rotate the tires.
  - ^ For single rear wheels the same tread styles front and rear, cross rotate all four tires.
  - ^ For single rear wheels with different tread styles, cross switch the front tires.
  - ^ For all dual rear wheels, cross switch the front tires.

Check and reset tire pressure per the certification label or the following Tire/Wheel Release Charts.

NOTE: FOR TIRES WORN TO THE POINT OF REPLACEMENT, USE RELEASED TIRES AS SHOWN IN THE FOLLOWING TIRE/WHEEL RELEASE CHARTS.

## Parts, Time & Etc

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3675-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
901110A	Steering Linkage Inspection	0.4 Hr.
901110B	Steering Gear Inspection	0.2 Hr.
901110C	Install Frame Kit	11.7 Hr.
901110D	Install Sector Shaft Repair Kit	0.4 Hr.
901110E	Adjust Steering Gear	0.6 Hr.
901110F	Wheel Bearing End Play Inspection	0.2 Hr.
901110G	Vehicle Desensitizing	1.3 Hr.
901110H	Alignment	1.7 Hr.
901110I	Tire Rotation & Balance	0.9 Hr.

DEALER CODING

BASIC PART NO.      CONDITION CODE

FRONT                      W4

OASIS CODES: 3100, 3200

Technical Service Bulletin # **92186**Date: **920826****Engine - Metal to Metal Noise**

Article No.

92-18-6

08/26/92

^ ENGINE - 5.0L - THRUST BEARING OR CRANKSHAFT PREMATURE WEAR - VEHICLES WITH AOD TRANSMISSION

^ NOISE - "METAL-TO-METAL" SOUND - 5.0L WITH AOD TRANSMISSION

^ TRANSMISSION - AOD - INTERFERENCE BETWEEN THE TORQUE CONVERTER AND THE FLYWHEEL BOLTS

FORD:

1982-88 THUNDERBIRD

1982-90 MUSTANG

1986 LTD

1987-90 CROWN VICTORIA

LINCOLN-MERCURY:

1982-87 CAPRI, CONTINENTAL

1982-88 COUGAR

1982-90 TOWN CAR

1984-90 MARK VII

1987-90 GRAND MARQUIS

LIGHT TRUCK:

1982-90 BRONCO, E-150, E-250, F-150, F-250

This TSB article is being republished in its entirety to include the 1982-1987 Continental and the 1982-1990 Town Car.

ISSUE:

An unusual "metal-to-metal" noise from the engine may be caused by the flexing of the torque converter. The flexing condition causes an interference between the torque converter and flywheel bolts. The interference can cause the thrust bearing and the crankshaft to wear prematurely and eventually fail.

ACTION:

Install six (6) new flywheel bolts with reduced head height to provide additional clearance. Refer to the appropriate Shop Manual, 5.0L Engine Section, for service details.

NOTE:

WHEN A CRANKSHAFT IS REPLACED DUE TO THRUST BEARING FAILURE, INSTALL A NEW CRANKSHAFT THAT HAS A REVISED PILOT HOLE. THIS WILL PROVIDE ADDITIONAL CLEARANCE FOR THE TORQUE CONVERTER. USE NEW FLYWHEEL BOLTS.

PART NUMBER	PART NAME	CLASS
F1AZ-6303-B	Crankshaft	B
F1ZZ-6379-A	Flywheel Bolts (6 Req.)	B

PART NUMBER

OTHER APPLICABLE ARTICLES: NONE		
SUPERSEDES: 92-15-7		
WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Major Component Warranty Coverage, Powertrain Warranty Coverage		
OPERATION	DESCRIPTION	TIME
921806A	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Mustang	7.2 Hr.
921806B	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Thunderbird/Cougar	7.1 Hr.
921806C	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Crown Victoria/Grand Marquis	6.6 Hr.
921806D	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - E 150-250 All Models	10.3 Hr.
921806E	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - F 150-250 All 4X2 Models	8.6 Hr.
921806F	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - F 150-250 All 4X4 And Bronco Models	8.7 Hr.
921806G	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Mark VII	9.0 Hrs.
921806H	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Town Car	8.7 Hr.
921806I	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Continental	8.8 Hr.
DEALER CODING		
	BASIC PART NO.	CONDITION CODE
	6303	56
OASIS CODES: 497000, 499000, 504000, 597997, 702000		

Operation Description

Technical Service Bulletin # **88621**

Date: **880316**

## Driveshaft - Clicking/Popping Noise

^ DRIVELINE - ALUMINUM DRIVESHAFT - "CLICKING" OR "POPPING" NOISE

Article No.  
88-6-21

^ NOISE - "CLICKING" OR "POPPING" - ALUMINUM DRIVESHAFT

LIGHT TRUCK: 1986-88 AEROSTAR  
1987-88 E-SERIES, F-SERIES

ISSUE: A "clicking" or "popping" noise from the driveshaft during transmission engagement or when accelerating from a stop may be caused by inadequate tubeto-yoke bonding on the aluminum driveshaft.

ALUMINUM DRIVESHAFT APPLICATION CHART				
Part Number	Vehicle	Engine	Transmission	Axle
E8TZ-4602-W	1987-88 F-150 (4x2) 133" Wheel Base	4.9L	M50D	2.73/3.08/3.55
		5.0L	AOD	3.55
		5.0L	M50D	3.08
		5.0L	T18	3.55
E8TZ-4602-Y	1987-88 F-250 LD (4x2) 133" Wheel Base	4.9L	M50D	3.55
		4.9L	T18	3.55
		5.0L	M50D	3.55
		5.0L	T18	3.73/4.10
		5.0L	AOD	4.10
E8TZ-4602-Z	1987-88 F-250 LD (4x2) 133" Wheel Base	4.9L	C6	3.55
		5.8L	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-Z	1987-88 F-250 HD (4x2) 133" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-Z	1987-88 F-350 SRW/DRW (4x2) 133" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-AB	1987-88 F-350 DRW (4x2) 136" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8UZ-4602-C	1987-88 E-150 138" Wheel Base	4.9L	AOD	3.55
		5.0L	AOD	3.55
E8UZ-4602-D	1987-88 E-150 138" Wheel Base	4.9L	C6	3.08/3.55
		5.8L	C6	3.55
E8UZ-4602-E	1987-88 E-250 138" Wheel Base Under 8500 GVW	5.0L	AOD	3.73
E8UZ-4602-F	1987-88 E-250 138" Wheel Base Under 8500 GVW	4.9L	C6	3.54/3.73
		5.8L	C6	3.54/3.73
E8UZ-4602-F	1987-88 E-250 138" Wheel Base Club Wagon Over 8500 GVW	4.9L	C6	4.10
		5.8L	C6	4.10
		7.5L	C6	4.10
E8UZ-4602-F	1987-88 E-350 SRW 138" Wheel Base	7.5L	C6	4.10
E8UZ-4602-F	1987-88 E-350 DRW 138" Wheel Base	7.5L	C6	4.10
E8UZ-4602-F	1987-88 Super Wagon 138" Wheel Base Over 8500 GVW	4.9L	C6	4.10
		5.8L	C6	4.10
		7.5L	C6	4.10

ALUMINUM DRIVESHAFT APPLICATION CHART				
Part Number	Vehicle	Engine	Transmission	Axle
E89Z-4602-B	1988 Aerostar	3.0L	M50D	3.45/3.73
E89Z-4602-C	1986-88 Aerostar	3.0L	A4LD	3.45/3.73/4.10
E79Z-4602-A	1986-87 Aerostar	2.3L/3.0L	M50D	3.45/3.73
<b>NOTE: If a new driveshaft is required on the following applications, the original slip yoke from the old driveshaft must be used.</b>				
E8TZ-4602-W	1987 F-150 133" Wheel Base	4.9L/5.0L	NPG 435	3.55
E8TZ-4602-Y	1987 F-250 LD (4x2) 133" Wheel Base	5.0L	NPG 435	3.55/4.10

**ACTION:** To correct this, install a new aluminum driveshaft with an improved tube-to-yoke bond. Refer to the appropriate model year Shop Manual for driveshaft removal and installation procedures. Refer to the driveshaft application charts on pages 38 and 39 of this TSB for the correct part numbers.

PART NUMBER	PART NAME	CLASS
E8TZ-4602-W	Aluminum Driveshaft	C
E8TZ-4602-Y	Aluminum Driveshaft	C
E8TZ-4602-Z	Aluminum Driveshaft	C
E8TZ-4602-AB	Aluminum Driveshaft	C
E8UZ-4602-C	Aluminum Driveshaft	C
E8UZ-4602-D	Aluminum Driveshaft	C
E8UZ-4602-E	Aluminum Driveshaft	C
E8UZ-4602-F	Aluminum Driveshaft	C
E89Z-4602-B	Aluminum Driveshaft	C
E89Z-4602-C	Aluminum Driveshaft	C
E79Z-4602-A	Aluminum Driveshaft	C

**OTHER APPLICABLE ARTICLES:** Supersedes 86-23-20

**WARRANTY STATUS:** Eligible Under Powertrain Warranty Coverage

**OPERATION:** 880621A - One-piece driveshaft

**TIME:** 0.4 Hr. - Aerostar

0.3 Hr. - E-Series, F-Series

**OPERATION:** 880621B - Two-piece driveshaft

**TIME:** 0.5 Hr. - E-Series, F-Series

**DLR. CODING:** Basic Part No. 4602 - Code: 61

**Technical Service Bulletin # 881811**

Date: **880831**

## Dash Panel - Cracks At Clutch Master Cylinder

Article No. 88-18-11

- ^ DASH PANEL CRACKS AT CLUTCH MASTER CYLINDER
- ^ CLUTCH - HIGH EFFORT - DASH PANEL CRACKING
- ^ CLUTCH -SOFT PEDAL AND INCOMPLETE RELEASE

**LIGHT TRUCK:** 1987-88 F-SERIES

**ISSUE:** Incomplete clutch release and/or hydraulic fluid leaking into the cab from the clutch master cylinder may be caused by the reinforcement plate on the clutch master cylinder separating from the dash panel. The separation of the reinforcement plate reduces the clutch master cylinder pushrod travel. Reinforcement plate separation can also cause deflection of the clutch master cylinder that results in a misalignment of the pushrod to the clutch master cylinder. Misalignment causes the O-ring in front of the secondary seal to leak hydraulic fluid.

**ACTION:** To correct this, install a new service released clutch master cylinder mounting bracket. Refer to the following procedure for service details.

1. With an assistant pushing the clutch pedal down several times, check for separation between the dash panel (cowl) and the clutch master cylinder reinforcement dish.

NOTE: THIS MUST BE DONE FROM UNDER THE HOOD IN THE ENGINE COMPARTMENT.

2. If separation is present, install a new clutch master cylinder mounting bracket, (E8TZ-7K509-A for 1988 model year trucks or E3TZ-7K509-A for 1987 model year trucks). Refer to the following service details:
  - a. Remove the two (2) clutch master cylinder retaining nuts.
  - b. Position the clutch master cylinder forward.
  - c. Repair and seal the dash panel, as required.
  - d. Install the clutch master cylinder mounting bracket onto the clutch master cylinder mounting studs.
  - e. Reposition the clutch master cylinder.
  - f. Reinstall the clutch master cylinder retaining nuts. Torque to 7-11 lb.ft. (9-15 N-m).

PART NUMBER	PART NAME	CLASS
E8TZ-7K509-A	Clutch Master Cylinder Mounting Bracket	C
E3TZ-7K509-A	Clutch Master Cylinder Mounting Bracket	CG

OTHER APPLICABLE ARTICLES: 87-16-15, 86-20-10, 85-5-24, 85-5-26, 84-1-14, 83-24-22, 83-23-16

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION: 881811A - Install Mounting Bracket

TIME: 0.5 Use "M" Time To Repair Dash Panel If Required

DLR. CODING: Basic Part No. 7K509  
Condition Code: 14

- ^ CLUTCH (HYDRAULIC) - PEDAL DOES NOT FULLY RETURN - DIAGNOSTIC TIPS
- ^ TRANSMISSION - MANUAL - GEAR CLASH AND HARD SHIFTING
- ^ SPEED CONTROL - INOPERATIVE - LOW CLUTCH PEDAL ALLOWS SWITCH CIRCUIT TO REMAIN OPEN

Article No. 87-16-15

LIGHT TRUCK: 1984-87 F-150/350 BRONCO

Article No. 86-20-10

DASH PANEL CRACKS AT CLUTCH MASTER CYLINDER (6.9L (D)/7.5L)

CLUTCH - HIGH EFFORT -- DASH PANEL CRACKING/MISSHAPED RELEASE LEVER (6.9L (D)/7.5L)

CLUTCH-INCOMPLETE RELEASE  
- DIAGNOSIS (6.9L (D)/7.5L)

LIGHT TRUCK 1983-86 F-250/350

Article No. 85-5-24

CLUTCH - (HYDRAULIC) - SLOW/DELAYED RETURN - COLD WEATHER (TSB 85-1-20 PART CORRECTION)

LIGHT TRUCK 1983-84 F SERIES

Article No. 84-1-14

CLUTCH - SLIPS - (6.9L-7.5L)

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 83-23-16

CLUTCH HYDRAULIC - SLAVE CYLINDER ATTACHMENT - (6.9L DIESEL/7.5L)

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 83-24-22

TRANSMISSION - MANUAL (T-19)  
- HARD SHIFT - UNITS WITH 6.9L DIESEL

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 85-5-26

CLUTCH - HYDRAULIC SYSTEM DIAGNOSIS (F SERIES) & PARTS LISTS (ALL MODELS)

LIGHT TRUCK 1983-85 E, F, B, R, B II

Technical Service Bulletin # **90167**

Date: **900801**

## M/T - Clutch Fluid Leaks/Incomplete Release

Article No. 90-16-7

^ CRACKS - DASH (ENGINE COMPARTMENT BULKHEAD) - CLUTCH MASTER CYLINDER AREA - VEHICLES BUILT BEFORE 6/15/90

^ CLUTCH - HIGH EFFORT - DASH CRACKED IN CLUTCH MASTER CYLINDER AREA - VEHICLES BUILT BEFORE 6/15/90

LIGHT TRUCK: 1984-90 BRONCO, F-150, F-250, F-350 1988-90 F SUPER DUTY

PART NUMBER	PART NAME	CLASS
E3TZ-7K509-A	Small Reinforcement Kit (1983-87)	B
E8TZ-7K509-A	Small Reinforcement Kit (1988-91)	B
E3TZ-7K509-B	Large Reinforcement Kit (1983-1991 Severely Damaged Units)	B

**ISSUE:** Incomplete clutch release and/or hydraulic fluid leaking into the cab from the clutch master cylinder may be caused by the reinforcement plate on the clutch master cylinder separating from the dash panel. The separation of the reinforcement plate reduces the clutch master cylinder pushrod travel. Reinforcement plate separation can also cause deflection of the clutch master cylinder that results in a misalignment of the pushrod to the clutch master cylinder. Misalignment causes the "O" ring in front of the secondary seal to leak hydraulic fluid.

**ACTION:** Inspect the truck and, if necessary, use the following service procedure to install a reinforcement kit.

### Inspection Procedure

1. If the truck is a 1988 or later model, confirm that the starter interlock switch operates (the engine can be started) with the clutch pedal at least 0.5" (12.7 mm) from the floor.
2. Test drive the truck and check for good clutch release. There should be no grinding of the gears, particularly when shifting from neutral to reverse gear.
3. If the truck passes these tests, go to the Small Reinforcement Installation Procedure Section of this article.
4. If either of the above conditions are not met, check the hydraulic system for air. Refer to the Suggested Bleeding Procedure at the end of this article.
5. Test drive the truck and check for improved clutch release.
6. If there is no improvement, proceed as follows:
  - a. Remove the clutch master cylinder pushrod from the release lever pin on the release lever.

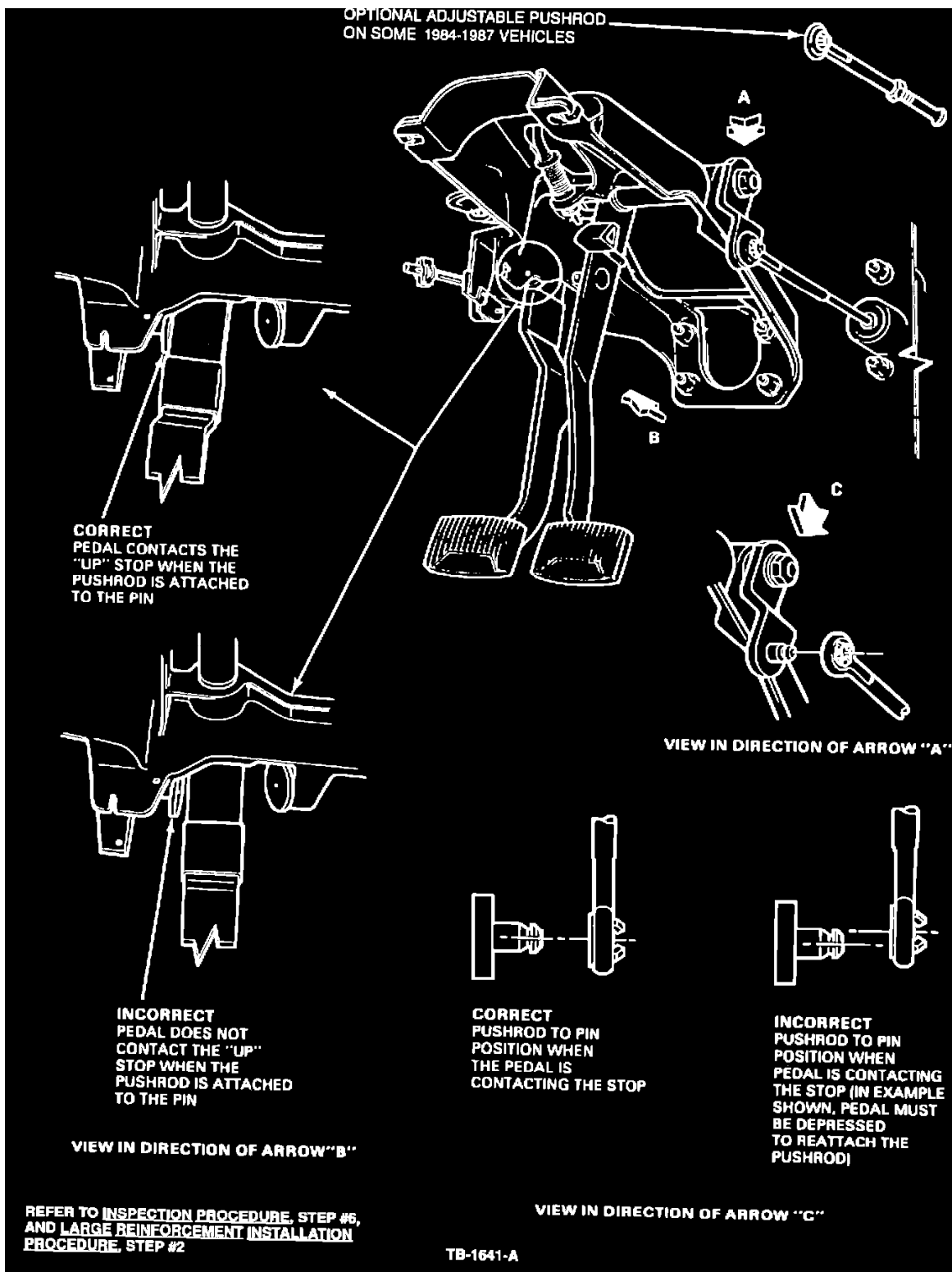


Figure 1

- b. Make sure the hole in the pushrod lines up with the pin, for those units requiring a minimal force for installation, Figure 1.
  - c. If it does not line up correctly, install an adjustable pushrod (except 1988 and later models) or replace the clutch release lever (required on 1988 and later models), cutting a new seat on the cross shaft splines.
7. Test drive the truck again, checking for improved clutch release.

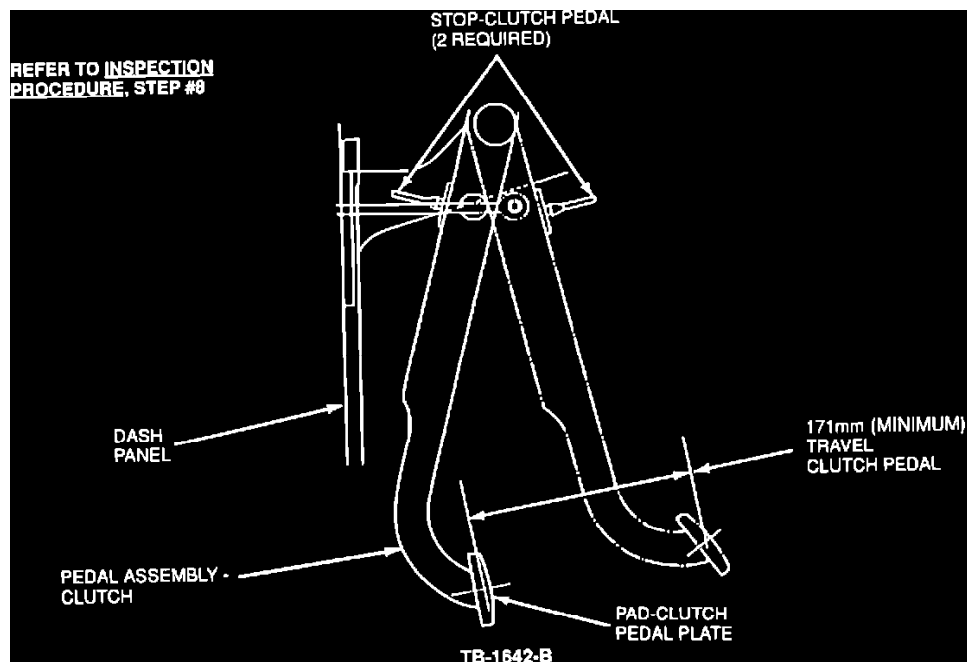


Figure 2

8. If there is no improvement, inspect the truck for adequate release bearing travel.
  - ^ It should be 11 mm or greater for full pedal travel.
  - ^ Pedal travel at the center of the pedal pad should be 6.75" (171 mm minimum) or more, Figure 2.
9. Release bearing travel and gear grinding noise may indicate the following concerns.
  - ^ If the release bearing is 11 mm or greater and there is grinding of one or two gears only, the concern is probably with the transmission.
  - ^ If all gears grind, the concern may be with the clutch and/or pilot bearing which will need replacing.
  - ^ If the release travel is less than 11 mm, check the clutch hydraulic system for air and bleed as necessary.
10. If the release travel is still less than 11 mm, with all of the above items eliminated, proceed as follows:
  - a. Raise the hood, while an assistant operates the clutch pedal.
  - b. Watch the clutch master cylinder for significant deflection.

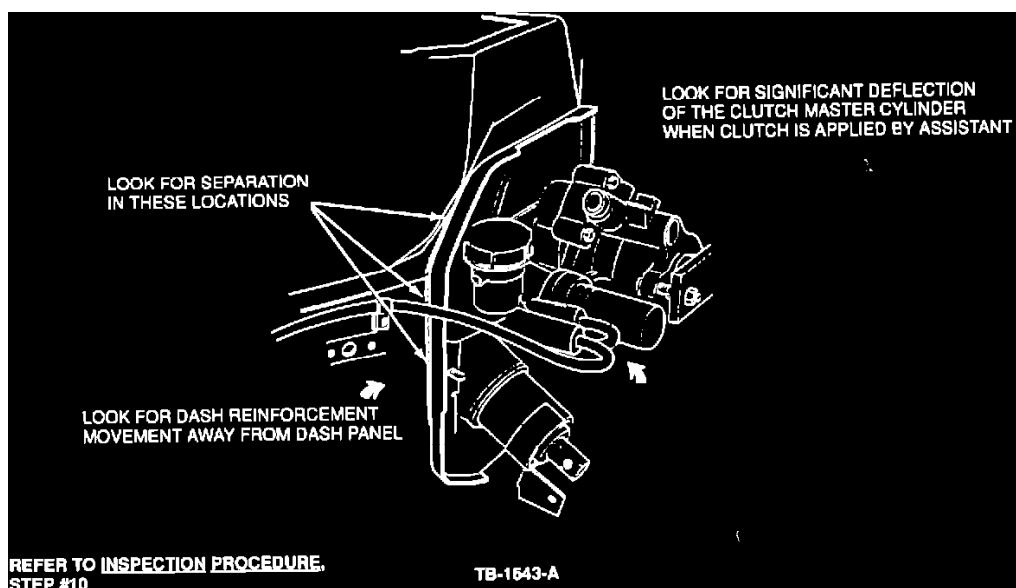


Figure 3

- c. Look for the dash reinforcement moving away from the dash, Figure 3.

d. On 1987 and earlier models, look down inside the cowl cover at the cowl where it is attached to the dash reinforcement. Check for pulled spot welds.

11. If there is significant movement of the dash or clutch master cylinder, proceed as follows:

- a. Remove the steering column and its dash toe plate and seal. Refer to the appropriate Light Truck Shop Manual, Section 13-07 for service details.
- b. Inspect the dash inside the cab and look for:
  - ^ Pulled spotwelds and cracked or torn sheet metal.
  - ^ Cracks in the brake and clutch pedal support

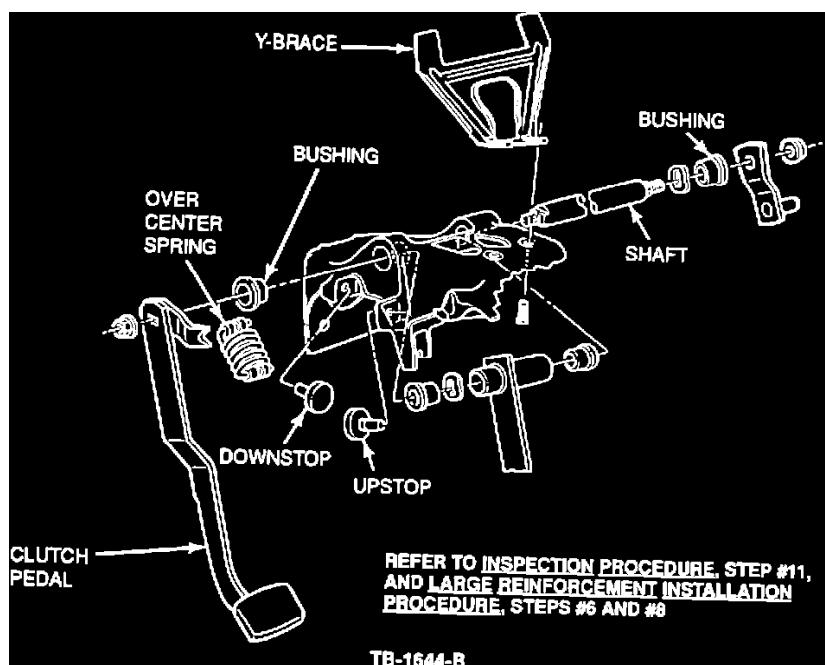


Figure 4

^ Missing Y-brace fasteners and a broken or detached Y-brace, Figure 4.

12. Check the cross shaft bushings for wear if the brake pedal moves when the clutch is depressed and vice versa. Replace them as required.

NOTE: GENERALLY, TRUCKS WITH SIGNIFICANTLY LESS THAN 11 MM CLUTCH RELEASE BEARING TRAVEL (AFTER COMPLETING THE INSPECTION PROCEDURE AND CORRECTING WHERE NECESSARY) WILL HAVE SIGNIFICANT DASH DAMAGE FROM PULLED SPOTWELDS AND TORN METAL. THESE TRUCKS WILL REQUIRE EXTENSIVE REPAIR. THEREFORE, GO TO THE LARGE REINFORCEMENT INSTALLATION PROCEDURE.

## Small Reinforcement Installation Procedure

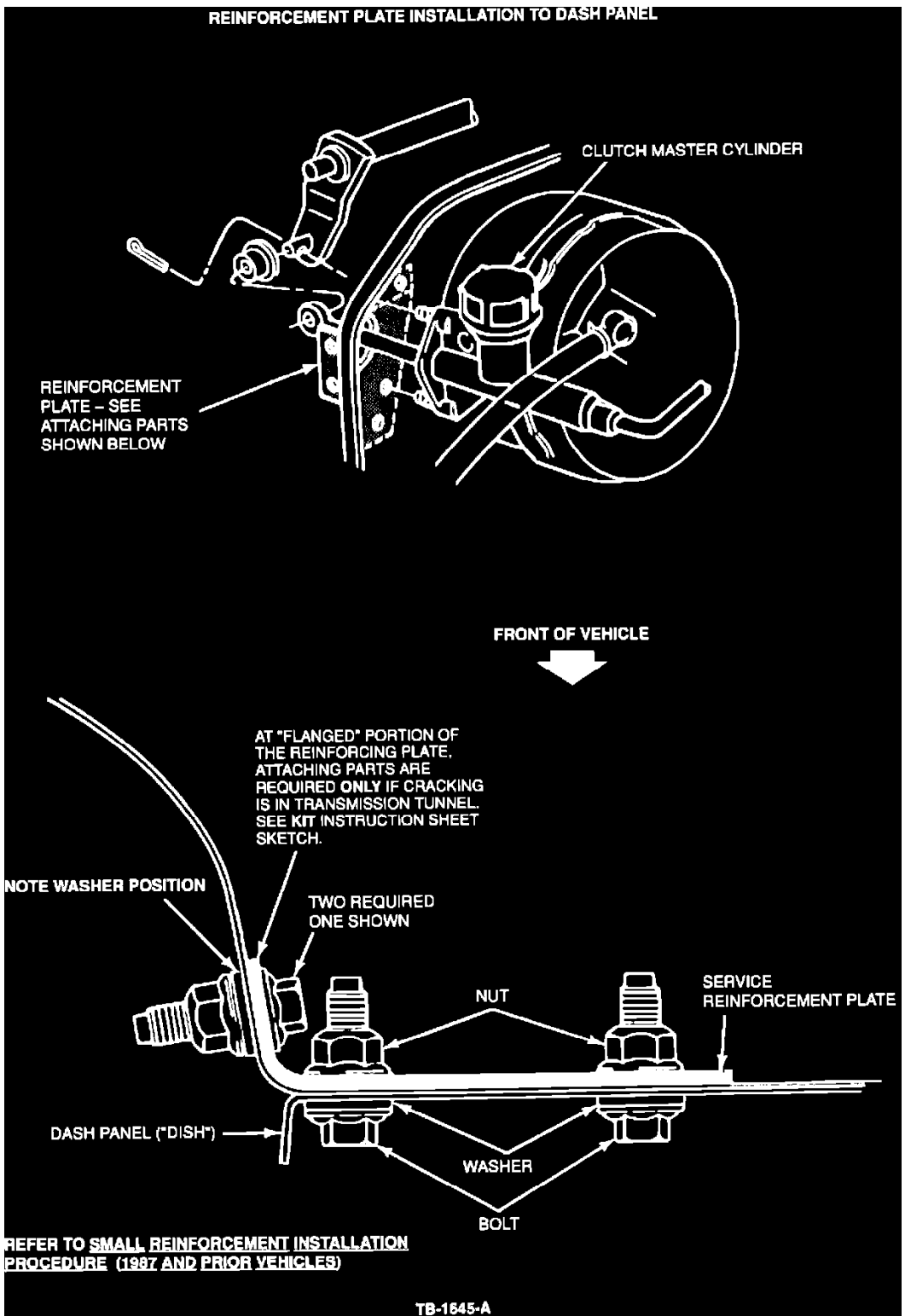
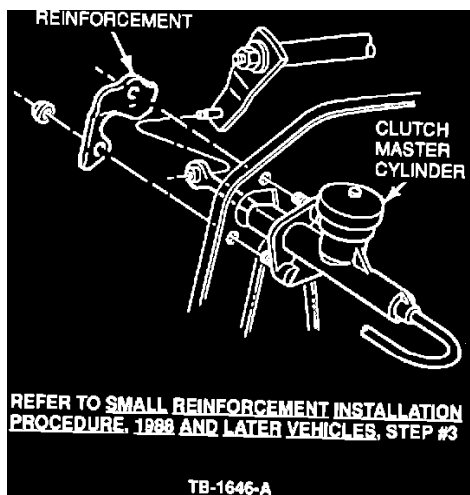


Figure 5



**Figure 6**

There are two small reinforcement kits. One for 1988 and later models and one for 1987 and prior models. This is necessary because a new hydraulic clutch master cylinder mounting pattern was introduced for 1988 models.

#### 1987 And Prior Trucks

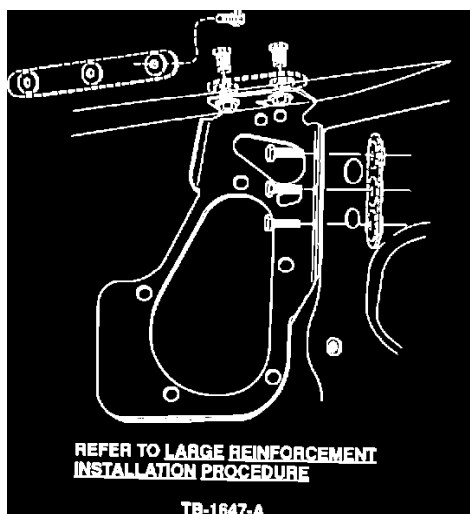
Use reinforcement kit E3TZ-7K509-A on these trucks, Figure 5. Comprehensive installation instructions are included in this kit.

#### 1988 And Later Trucks

Use reinforcement kit E8TZ-7K509-A on these trucks. The only part in this kit is the special reinforcement for these trucks. To install it, proceed as follows:

1. Remove the two clutch master cylinder attaching nuts (13 mm) from inside the truck.
2. Position the reinforcement in place over the clutch master cylinder studs.
3. Re-install the two master cylinder nuts, Figure
6. Tighten to 9.5 - 14.9 N-m.

## Large Reinforcement Installation Procedure



**Figure 7**

Use reinforcement kit E3TZ-7K509-B on all 1983-1991 Bronco/F-Series trucks with hydraulic clutch controls. The kit consists of the following items:

- ^ A main reinforcement or doubler, with a plate having two studs to clamp the doubler through the cowl inner
- ^ Two additional pieces with three threaded holes:

One plate helps attach the main doubler through the dash inner tunnel. The other large piece is placed inside the front of the cowl, with bolts driven through from the engine compartment side of the dash reinforcement, see Figure 7.

## Installation

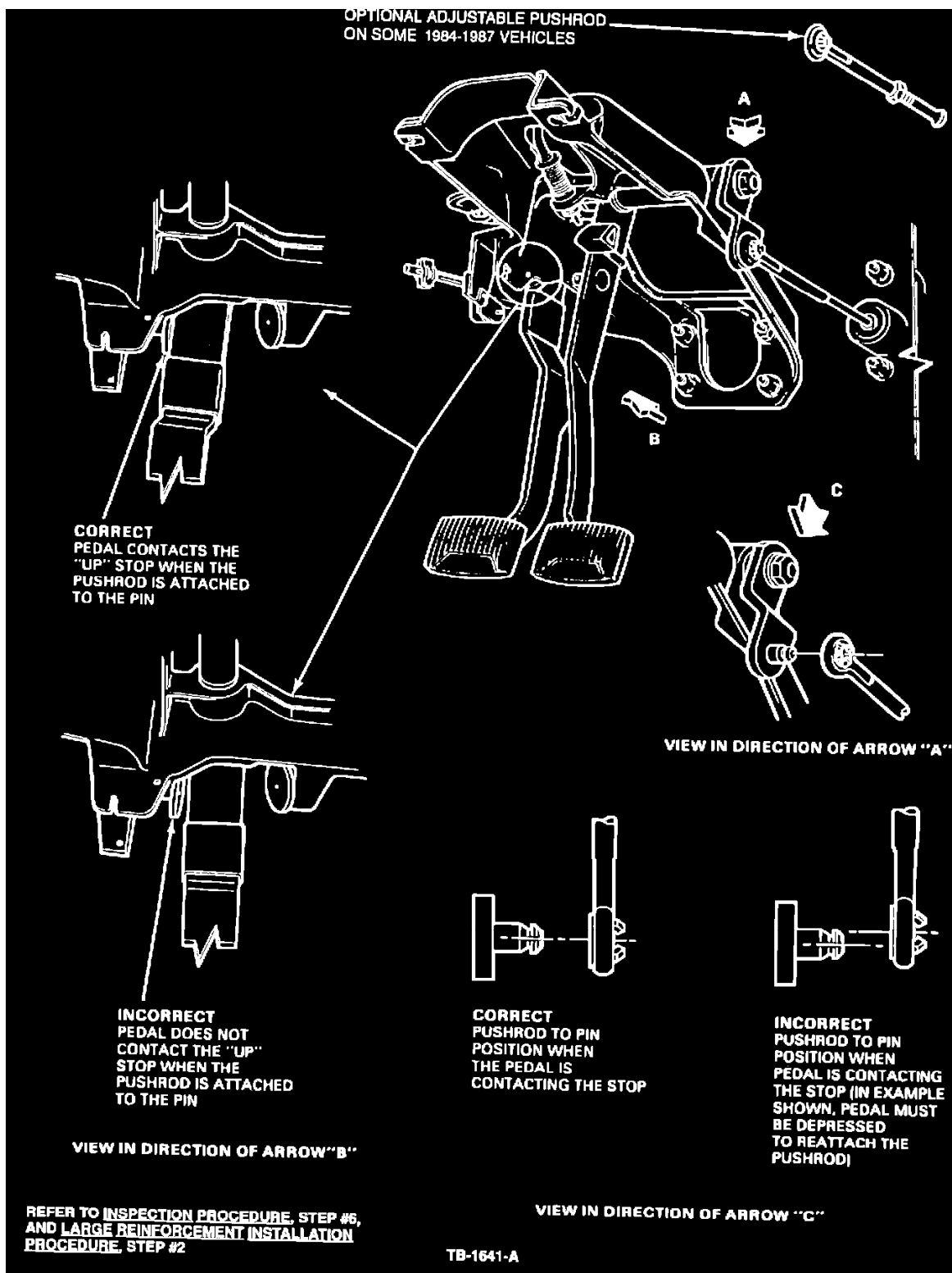


Figure 1

1. Remove the insulating material.
  - a. On earlier models, remove the instrument panel lower sound insulator assembly.
  - b. For later diesel powered trucks, remove the fasteners holding the engine compartment dash insulation in place.

- c. Pull the dash insulation back out of the way.
  - d. Disconnect the battery ground cable.
2. Disconnect the clutch master cylinder pushrod from the lever, removing the pushrod retention clip on older models, Figure 1.
  3. Remove the two nuts attaching the clutch master cylinder to the dash panel.
    - a. Pull the master cylinder into the engine compartment.
    - b. For, 1988 and later trucks, it will be necessary to disconnect the wiring harness connector from the pushrod switch.
    - c. Rotate the master cylinder to get it past the switch through the dash opening.
  4. Remove the steering column and dash toe plate by removing the five (5) fasteners.
  5. Disconnect the brake master cylinder pushrod from the brake pedal.
  6. On F-Super Duty, proceed to Step 7. On all units except F-Super Duty, proceed as follows:
    - a. Remove the four brake booster attaching nuts.
    - b. Move the brake booster to one side.

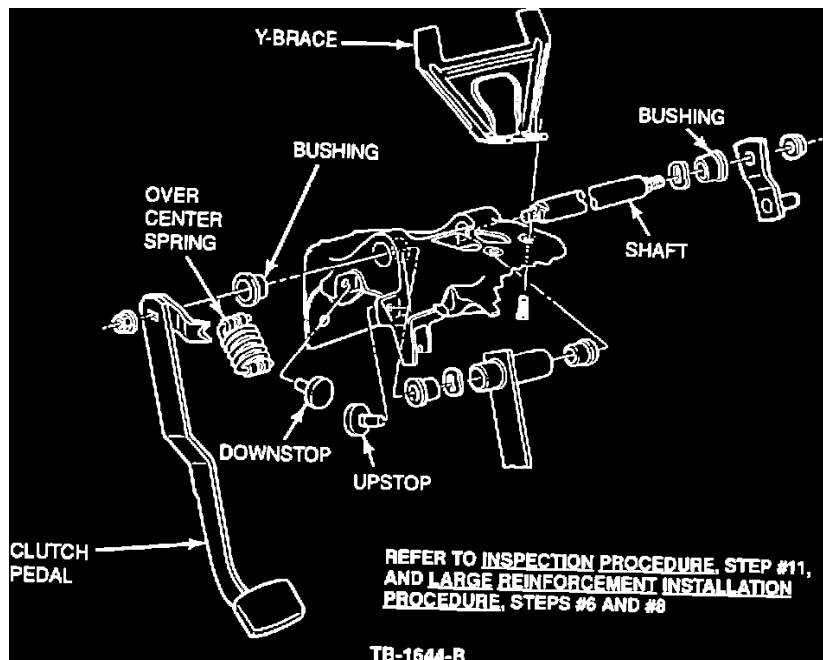


Figure 4

- c. Loosen the two (2) fasteners attaching the brake and clutch pedal support to the Y-brace, Figure 4.
7. Check for cracks.
    - a. Pull back the floor covering and dash sound insulator. (it may be helpful to remove the accelerator pedal.)
    - b. Inspect the area for pulled welds and torn dash sheet metal.

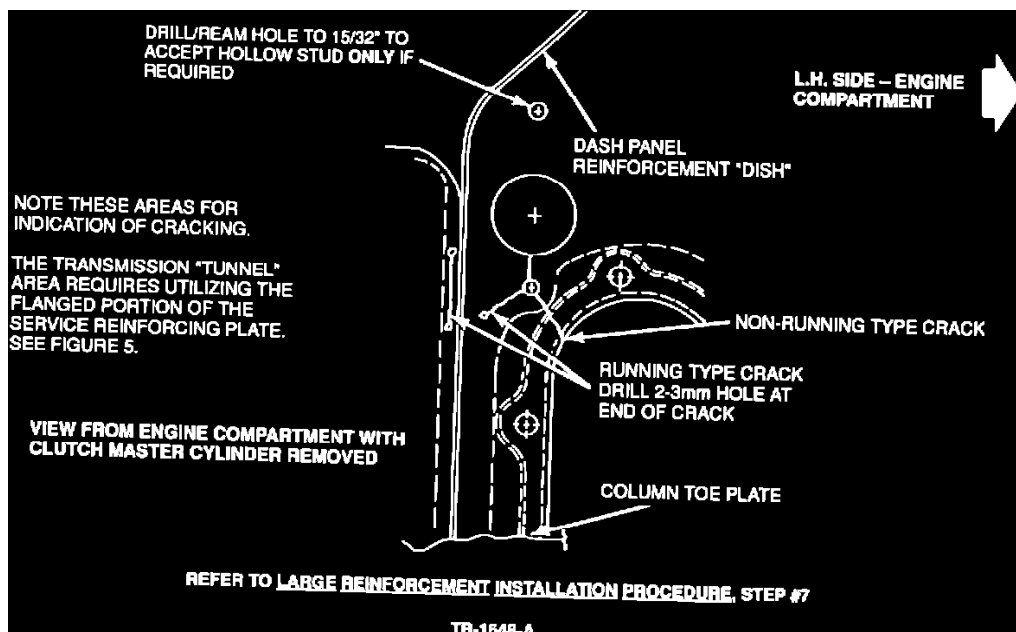


Figure 8

- c. If there are cracks that have not run out, stop them by drilling a 2-3 mm hole at the end, Figure 8.

NOTE: WELDING OR BRAZING IS NOT RECOMMENDED, BECAUSE IT COULD BE A SOURCE OF FUTURE BLIND SIDE CORROSION.

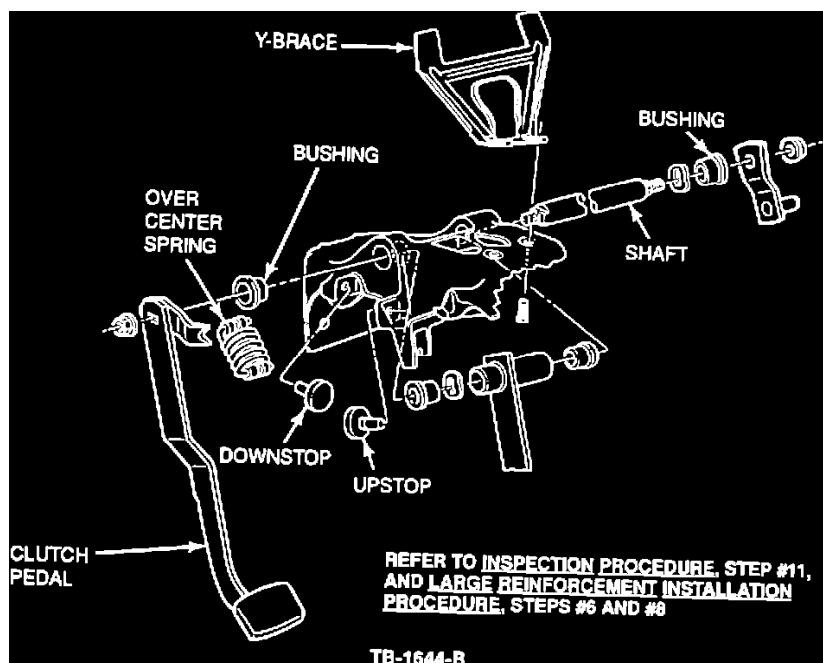


Figure 4

8. Thoroughly inspect the brake and clutch support again for cracks in the casting and worn bushings. Also, inspect the "Y" brace for cracks and missing fasteners. Replace as necessary, Figure 4.
9. Remove excess body sealer in the area of the clutch master cylinder, inside the dash.
10. Carefully remove the cowl top cover 12 fasteners (7 in front, 5 in rear).

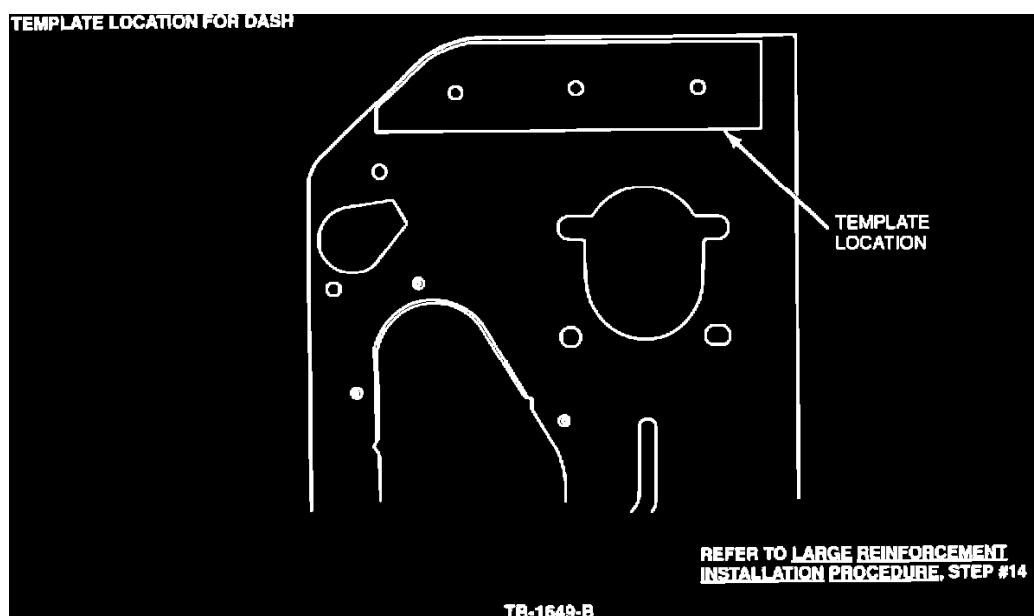
NOTE: IT MAY BE NECESSARY TO REMOVE THE RADIO ANTENNA AND REPOSITION THE HOOD TO ACHIEVE THIS. IF THE HOOD IS REMOVED, MARK THE LOCATION OF THE HINGES WITH A WAX PENCIL, PRIOR TO LOOSENING.

11. Place the main reinforcement in position.
  - a. Locate positively, using the lower steering column toe plate fastener and a bolt and nut (8 mm or 5/16") through the upper clutch master

cylinder stud hole.

**NOTE: THE SHEET METAL VARIES FROM TRUCK TO TRUCK AND IT MAY BE NECESSARY TO BEND THE REINFORCEMENT TO GET A GOOD FIT.**

- b. Tighten the upper nut and bolt securely to compress any distortion in the four sheet metal laminations in this area.
12. Drill the holes for the reinforcement plate.
  - a. Using a 3/8" (9.5 mm) drill bit, with the reinforcement as a template, drill two holes up into the cowl inner and three holes into the inner side of the dash.
  - b. De-burr the outside of the holes as necessary.
  - c. Remove any excess sealant in the area and clean up the drill chips inside the truck and cowl.
13. Attach the smaller plate via the three threaded holes into the engine compartment side of the dash inner panel.
  - a. Use three 8 mm bolts passed through the main reinforcement, from inside the cab.
  - b. Install the rubber cap (N804118) onto the end of the uppermost screw from under the dash.
  - c. Position the plate with the two studs attached inside the cowl, through the two holes drilled from below.
  - d. Attach two 8 mm nuts from the inside of the cab.
14. Using the paper template provided in the kit, proceed as follows:



**Figure 9**

- a. Center punch and drill three 3/8" (9.5 mm) holes into the dash reinforcement and through the cowl, from the engine compartment side, Figure 9.

**NOTE: DRILLING WILL BE EASIER IF THERE ARE NO SPOTWELDS VISIBLE THROUGH THE THREE HOLES.**

- b. If necessary, move the pattern outboard slightly to avoid any visible spotwelds.
- c. De-burr the holes inside the cowl as necessary and clean up the drill chips inside the cowl.

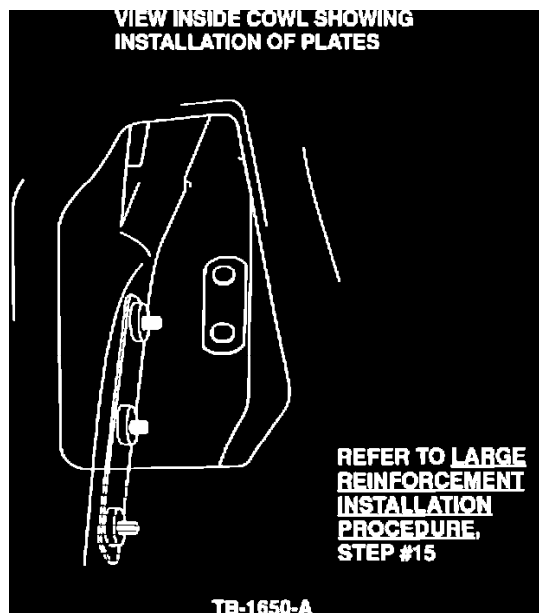


Figure 10

15. Place the larger three holed plate from the kit inside the cowl. Attach it with three 8 mm bolts through the dash reinforcement, from the engine compartment side, Figure 10.
16. Inspect the seam between the cowl inner and outer, inside the cowl, for cracks in the sealant. If necessary, add sealant.
17. Replace the cowl top.
  - a. If the hood was removed, locate the hinges to the wax pencil marks and tighten the fasteners.
  - b. Replace the radio antenna and windshield washer tube.
18. Re-install the brake booster and stoplight switch, if removed. Tighten the brace bolts.
19. Install the clutch master cylinder.
  - a. Inspect the clutch master cylinder for leaks in the area of the pushrod. Replace it if there is evidence of leaking.
  - b. Remove the nut and bolt from the top of the reinforcement.
  - c. Install the clutch master cylinder.
  - d. Inspect the position of the clutch master cylinder pushrod hole. The pushrod hole should go onto the lever pin with no force required while the pedal is against the upstop.

NOTE: ALTHOUGH THIS WAS SPECIFIED IN THE INSPECTION PROCEDURE, REPAIR MAY HAVE CHANGED THE SETTING.

- e. If the pushrod hole is not in position, install and adjust an adjustable clutch master cylinder pushrod (1987 and prior models) or install a new lever (7A554).

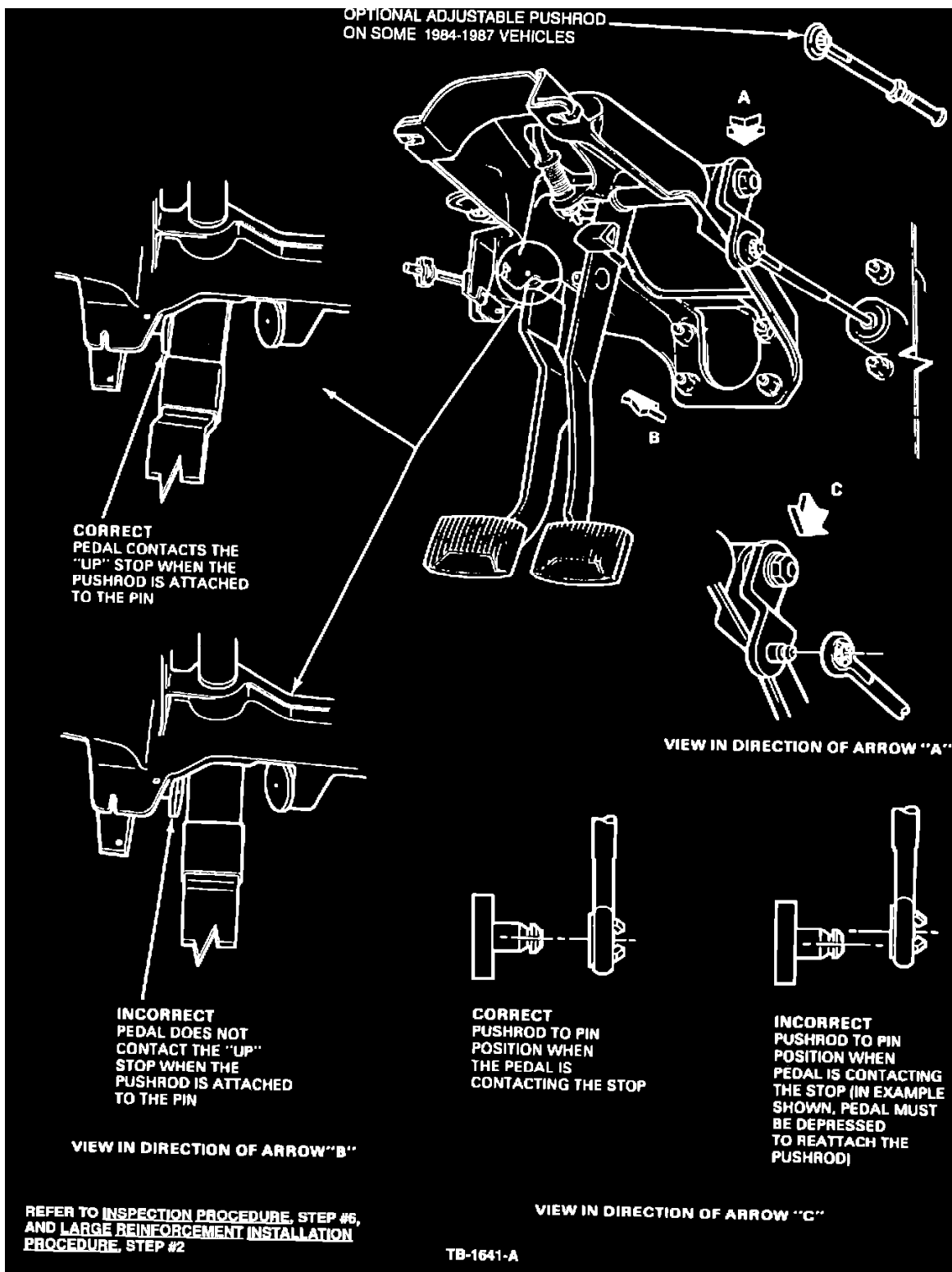


Figure 1

NOTE: THE NEW LEVER IS TIGHTENED INTO PLACE WHILE THE MASTER CYLINDER PUSHROD IS ATTACHED, TO SET THE CORRECT POSITION, FIGURE 1.

20. Remove the toe plate fastener from the bottom of the reinforcement and reinstall the steering column and five (5) fasteners.
21. Complete reassembly.
  - a. Re-install the dash sound deadener material and the instrument panel sound insulator.
  - b. Re-install the engine compartment sound insulator on diesel models.

- c. Connect the battery ground terminal.

## Final Inspection

If the truck has been driven for a long period of time with the broken dash and resulting poor clutch release, the clutch disc could be excessively worn or buckled.

Test drive the truck, evaluating the clutch for clean release. If the release is not satisfactory, measure the release bearing travel.

^ If it has the required 12 mm at full clutch pedal stroke, then the clutch may need to be replaced.

^ If the release bearing has less than the required release travel, then the hydraulic system probably needs to be bled.

## Suggested Bleeding Procedure - External Slave Cylinder

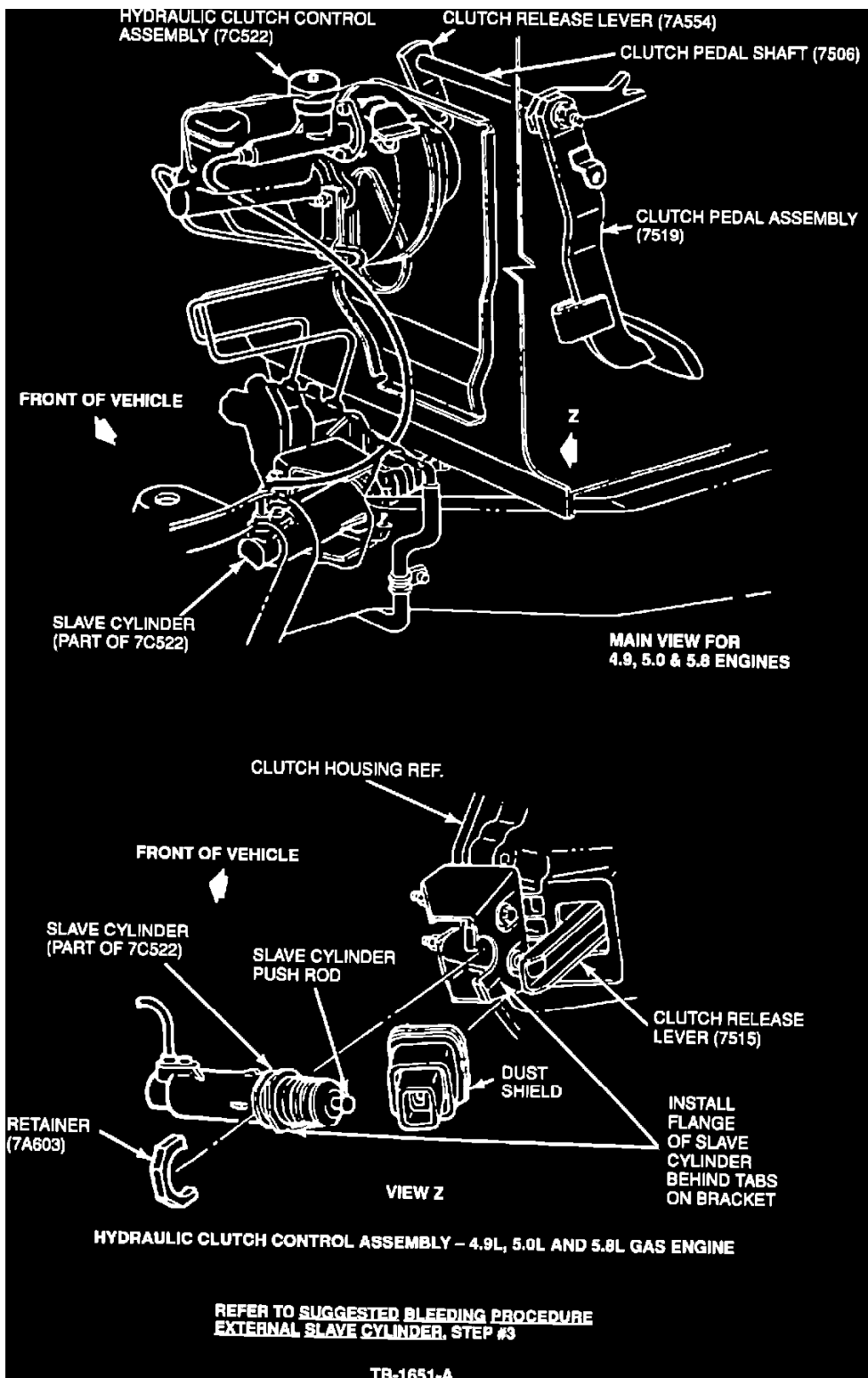


Figure 11

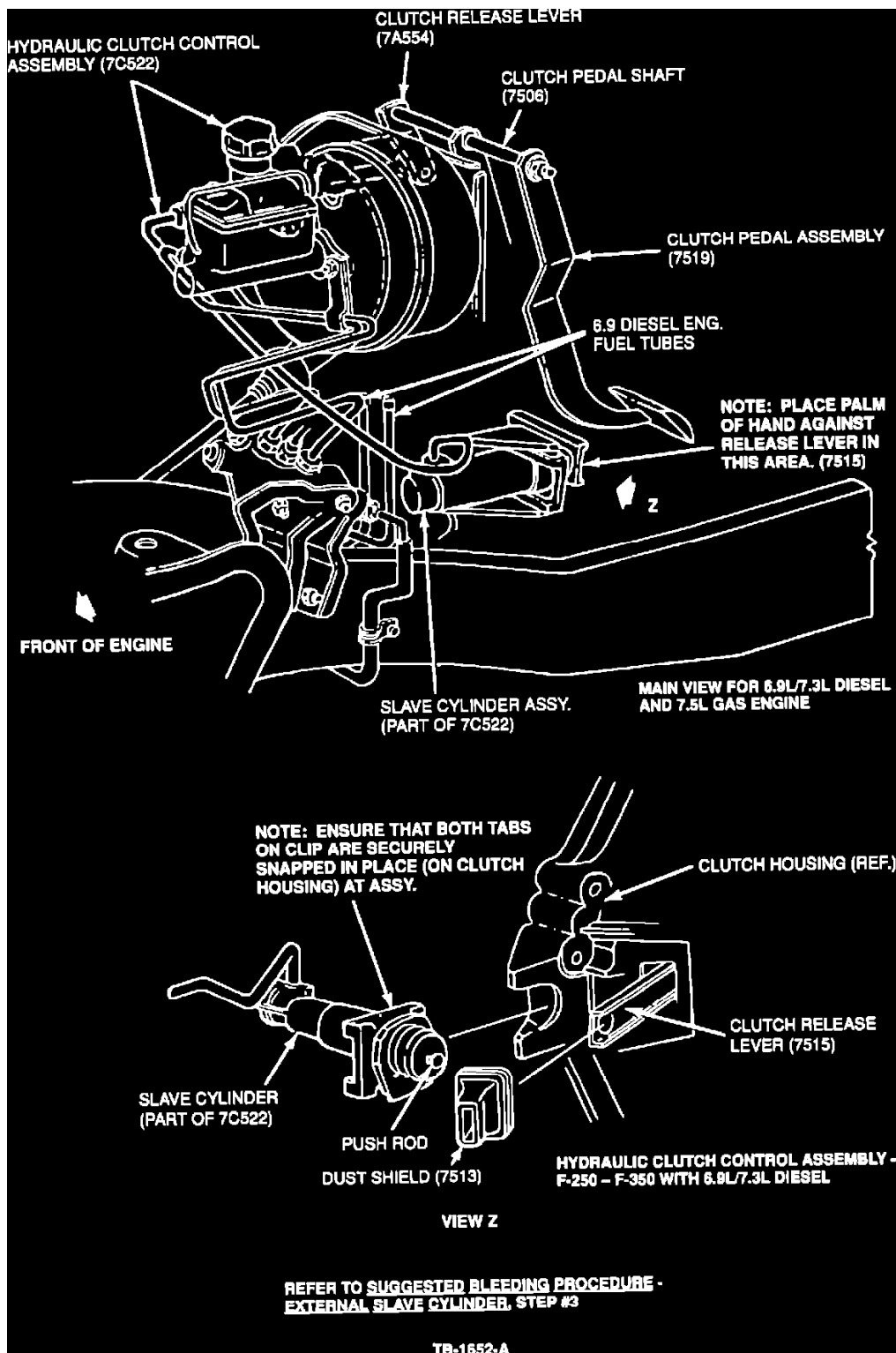


Figure 12

If the truck is a 1987 or prior model, 1988 model with a 7.3L Diesel, 7.5L EFI gas engine or the smaller family of engines with a Warner T-18 four speed transmission, proceed as follows:

1. Remove the master cylinder reservoir cap and diaphragm.
2. Check the fluid level to be sure it is at the step diameter of the reservoir. Do not over fill.
3. From below the truck, push the release lever slowly towards the front of the truck several times. Figures 11 & 12.
4. If it will not move, the master cylinder pushrod is not set correctly. See repair Step # 19.
5. Check the fluid level and replace the diaphragm and cap.

## Suggested Bleeding Proc - Internal Concentric Slave CYL.

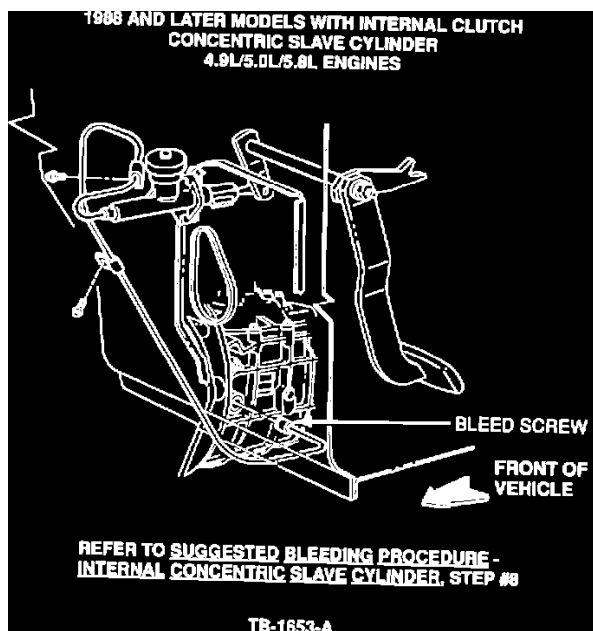


Figure 13

If the truck has a concentric slave cylinder, proceed as follows:

1. Operate the clutch pedal at full stroke, 10-20 times.
2. Check the fluid level at the change in diameter part of the reservoir. Do not over fill.
3. Have an assistant depress the clutch pedal slowly and hold it down.
4. Open the slave cylinder bleed screw and watch for escaping air, Figure 13.
5. Close the bleed screw and have the assistant release pedal.
6. Repeat this cycle several times until there is no sign of air. Be sure to keep the reservoir topped to the correct level.
7. Replace the diaphragm and reservoir cover.
8. Operate the clutch pedal at full stroke 10-20 times.

### Misc. Information

OTHER APPLICABLE ARTICLES: 86-20-10

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
901607A	Inspect & Adjust	0.5 Hr.
901607B	Install Reinforcement	2.9 Hr.

DEALER CODING

BASIC PART NO.    CONDITION CODE  
7050                    50

OASIS CODES: 111000, 505000, 505200, 506000, 590000

Technical Service Bulletin # **911814**

Date: **910905**

### M/T Clutch Housing - Fluid Inside

Article No. 91-18-14

09/05/91

- ^ CLUTCH-SLAVE CYLINDER "LEAKS"- VEHICLES USED IN MUDDY OR DUSTY ENVIRONMENTS

^ LEAKS-CLUTCH SLAVE CYLINDER "LEAKS"- VEHICLES USED IN MUDDY OR DUSTY ENVIRONMENTS

LIGHT TRUCK: 1988-89 ECONOLINE  
1988-91 AEROSTAR, BRONCO, F-150-350 SERIES, RANGER  
1989-90 BRONCO II  
1991 EXPLORER

ISSUE: Fluid detected inside the clutch housing may be caused by a leaking clutch slave cylinder. This may occur when vehicles are driven in severely muddy or dusty environments or when operated with extensive idle time. Vehicles include...

^ 1988-1991 Ranger, 1988-1990 Bronco II,  
1988-1991 Aerostar and 1991 Explorer  
with manual transmissions.

^ 1988-1991 Bronco, F-150-350, and  
1988-1989 Econoline with 5-Speed  
Manual Transmissions, except 7.3L  
Diesel and 7.5L engines.

ACTION: Replace the clutch slave cylinder if inspection confirms the cylinder is leaking. The new clutch slave cylinder contains a guide seal which improves durability and resistance to dirt entry. Refer to the following procedures for service details.

INSPECTION PROCEDURE:

1. If the vehicle is a Bronco or F-150, the repair will only involve 5 speed manual transmissions. Other vehicles described include all manual transmissions.

This slave cylinder is the internal "Concentric" and not the external style. Inspect vehicle to visually verify the style of slave cylinder installed.

2. Determine if the slave cylinder is leaking by checking for a fluid trace inside the bottom of the clutch housing.

REPAIR PROCEDURE

1. Remove the clutch slave cylinder. Refer to the appropriate Light Truck Shop Manual for service details.
2. Replace the clutch slave cylinder with a new slave cylinder (FITZ-7A564-A). Refer to the appropriate Light Truck Shop Manual for service details.

PART NUMBER	PART NAME	CLASS
FITZ-7A564-A	Slave Cylinder	B

NOTE: APPROPRIATE SUPPLEMENT OPERATIONS SHOULD BE USED WITH THE LABOR OPERATIONS LISTED.

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911814A	Inspect For Fluid Leak - All Vehicles	0.3 Hr.
911814B	Replace Clutch Slave Cylinder - Ranger 4X2 With 2.3L	1.8 Hr.
911814C	Replace Clutch Slave Cylinder - Ranger 4X4 With 2.3L And F-Series 4X2 With 5.8L	3.2 Hr.
911814D	Replace Clutch Slave Cylinder - Ranger 4X2 With 2.9L Or 3.0L And Aerostar With 3.0L	2.0 Hr.

911814E	Replace Clutch Slave Cylinder - Bronco II With 2.9L	2.6 Hr.
911814F	Replace Clutch Slave Cylinder - Ranger 4X4 And Bronco II 4X4 With 2.9L And F-Series 4X4 And Bronco With 5.0L	3.5 Hr.
911814G	Replace Clutch Slave Cylinder - Ranger 4X2 And Explorer 4X2 With 4.0L	2.9 Hr.
911814H	Replace Clutch Slave Cylinder - Ranger 4X4 And	3.7 Hr.
911814I	Replace Clutch Slave Cylinder - F-Series 4X2 With 4.9L And Mazda Transmission	2.1 Hr.
911814J	Replace Clutch Slave Cylinder - F-Series 4X2 With 5.0L	2.3 Hr.
911814K	Replace Clutch Slave Cylinder - F-Series 4X4 And Bronco With 4.9L And Mazda Transmission	3.3 Hr.
911814L	Replace Clutch Slave Cylinder - F-Series 4X2 With 4.9L And ZF Transmission	3.1 Hr.
911814M	Replace Clutch Slave Cylinder - F-Series 4X4 With 4.9L And ZF Transmission	4.1 Hr.
911814N	Replace Clutch Slave Cylinder - F-Series 4X4 With 5.8L	4.3 Hr.
911814O	Replace Clutch Slave Cylinder - Econoline	2.8 Hr.

## DEALER CODING

BASIC PART NO.	CONDITION CODE
7A564	77

OASIS CODES: 505000

Technical Service Bulletin # **88817041588**Date: **880401****Front Drive Axle Hublock - Inoperative**

AXLE - FRONT DRIVE - WARN MANUAL HUBLOCKS INOPERATIVE

Article No. 88-8-17

## LIGHT TRUCK:

**ISSUE:** Inoperative front drive axle hublocks on 1987 and 1988 F-150 and Bronco vehicles may be caused by the control dial getting too hot and distorting. The hublock body is made of aluminum which transfers heat rapidly from the brake rotor to the hublock assembly. Under certain braking conditions such as brake dragging or downhill trailer towing control dial distortion may occur. Vehicles operated under these or similar conditions may not experience hublock control dial distortion but may be too hot for customers to engage or disengage the

locking hub feature.

**ACTION:** To correct this, install a new hublock service kit that will not allow heat transfer to the control dial. Refer to the 1987/88 Light Truck Shop Manual, Volume A, Section 11-12-2 for removal of the existing hublocks. Use the 1986 Light Truck Shop Manual to install the new hublock kit, (E7TZ-1L104-A).

PART NUMBER	PART NAME	CLASS
E7TZ-1L104-A	Hublock Kit - One (1) Required	CG

**OTHER APPLICABLE ARTICLES:** None

**WARRANTY STATUS:** Eligible Under Basic Warranty Coverage

**OPERATION:** 880817A - Both hubs

**TIME:** 1.8 Hrs.

**DLR. CODING:** Basic Part No. 1K105

Condition Code: 42

Technical Service Bulletin # **9167**

Date: **910318**

## Rear Axle Hub Seal - Lubricant Leaks

Article No. 91-6-7

03/18/91

^ AXLE - NEW HUB SEAL AND HUB SEAL REPLACER TOOL - VEHICLES WITH 10.25 INCH RING GEAR, FULL - FLOATING REAR AXLES

^ LEAKS - AXLE LUBE - 10.25 INCH RING GEAR, FULL - FLOATING REAR AXLES

**LIGHT TRUCK:** 1985-91 F-250, F-350

**ISSUE:** A new hub seal and a hub seal replacer tool are now available for service. The new hub seal is designed to improve sealing when properly installed using the new hub seal replacer tool.

**ACTION:** Install a new hub seal (FOTZ-1177-A) with the new hub seal replacer tool (T91T-1175-A). Refer to the following inspection list and service procedure for details.

**NOTE:** DO NOT USE THE OLD HUB SEAL REPLACER TOOL (T85T-1175-AH). IT IS NOT DESIGNED TO INSTALL THE NEW SEAL. THE NEW HUB SEAL REPLACER TOOL IS AVAILABLE IN THE 1991 DEALER ESSENTIAL SERVICE TOOL KIT AND IS THE ONLY TOOL APPROVED TO INSTALL THE NEW SEAL.

### INSPECTION PRIOR TO SEAL INSTALLATION

Prior to seal installation, make sure that the following items are checked and servicing action taken where indicated.

^ Inspect the outer diameter of the hub seal to be sure that it is dry and free of oil and grease.

^ Check the hub bore to be sure it is free of grease, dirt and debris.

^ Remove any nicks or burrs from the hub bore.

^ Inspect the inner and outer bearing for damage and replace as required.

^ Pack each hub bearing cone and roller with a bearing packing tool using XG-1-C grease.

^ Make sure that no residual grease from freshly greased bearings gets into the hub bore.

^ Prior to installing the hub assembly, clean the spindle thoroughly and inspect the seal and bearing journals for nicks and/or scratches. Remove nicks or scratches using crocus cloth or similar material.

^ Wipe spindle clean and lightly oil with clean axle lube or engine oil.

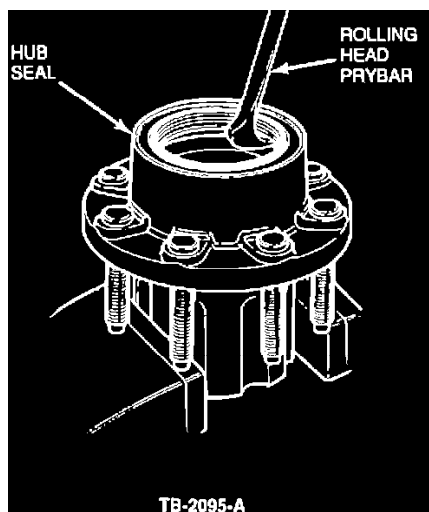


Figure 1

#### REMOVAL & INSTALLATION PROCEDURE

1. Install the hub in a soft jawed vice.
2. Remove the hub seal as shown in Figure 1.

CAUTION: CARE MUST BE TAKEN NOT TO DAMAGE THE HUB SEAL BORE WITH THE SEAL REMOVAL TOOL.

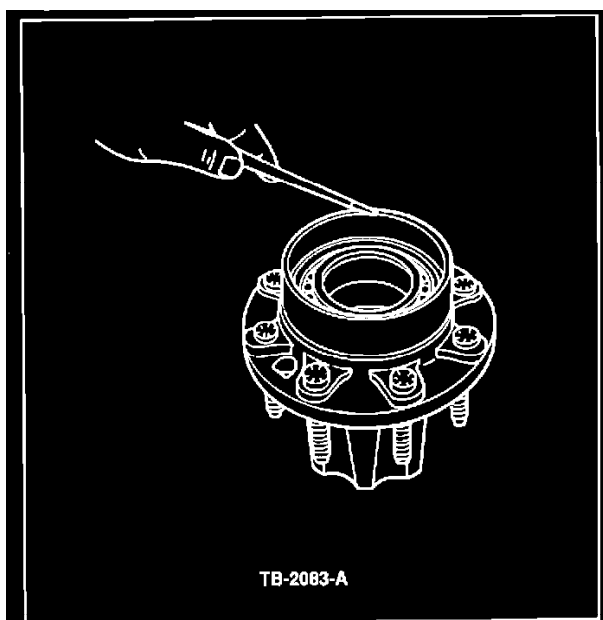


Figure 2

3. Thoroughly clean and inspect the hub bore, Figure 2.

CAUTION: MAKE SURE THE HUB BORE IS FREE OF DIRT, GREASE, BURRS OR NICKS.

NOTE: HUB BEARINGS MUST BE PRELUBED WITH GREASE PRIOR TO INSTALLATION. USE XG-1-C GREASE OR EQUIVALENT.

4. Pack each bearing cone and roller assembly with a bearing packing tool.

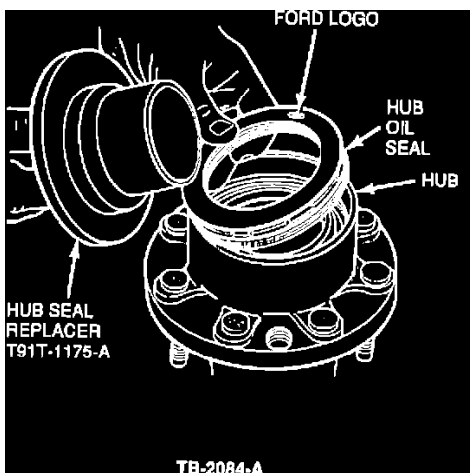


Figure 3

5. Install the seal in the hub with the Ford logo facing up, Figure 3.

CAUTION: HUB SEAL MUST BE FREE OF DIRT OR GREASE.

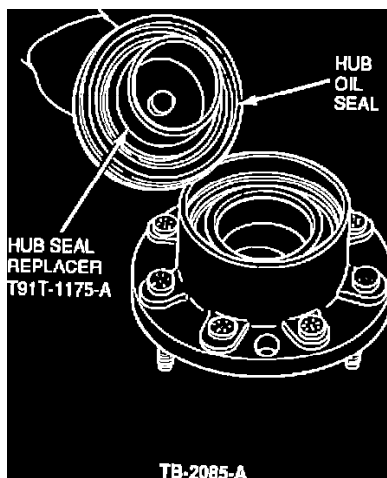


Figure 4

6. Install the hub oil seal on the hub seal installer tool, T91T-1175-A, Figure 4.

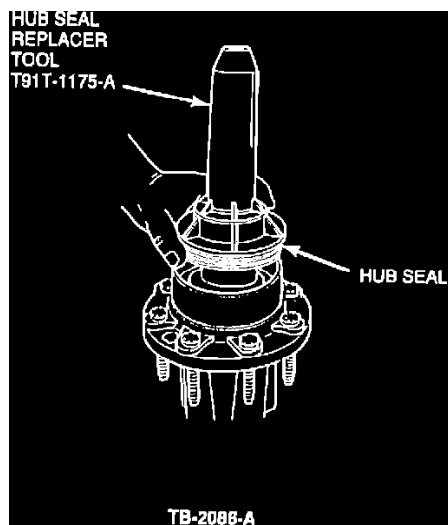
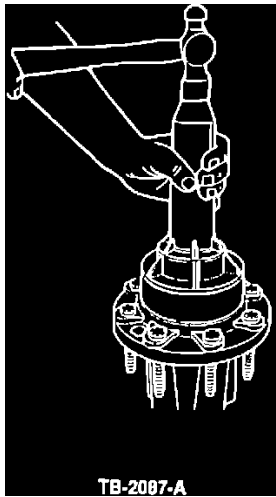


Figure 5

7. Insert the tool with the seal squarely into the hub, Figure 5.



**Figure 6**

8. Hold the tool straight. Strike the handle until the hub seal is fully seated (until tool strikes hub), Figure 6.

**CAUTION:** INSTALL NEW SEAL IF SEAL IS MISALIGNED DURING OR AFTER INSTALLATION.

It is extremely important that the 1991 F-Series Shop Manual procedures be followed when installing the hub assembly.

**CAUTION:** THE SPECIFIED TORQUING AND BACKING OFF OF THE HUB NUT IS CRITICAL IN ORDER TO PERFORM THE REPAIR CORRECTLY.

**NOTE:** ALWAYS TURN THE HUB WHILE TIGHTENING THE HUB NUT. ONCE THE SPECIFIED TORQUE 55-65 LB.FT., (75-88 N-m) IS ACHIEVED, RATCHETING BACK ON THE HUB NUT VARIES DEPENDING ON WHETHER THE HUB BEARINGS ARE NEW OR USED. BACK OFF 5 CLICKS FOR NEW BEARING AND 8 CLICKS FOR USED BEARINGS.

Make sure hub nut wrench tool (T85T-4252-AH) is used as shown in the Shop Manual procedure. Consult The 1991 F-Series Light Truck Shop Manual, Section 05-02B, for service procedures and torque specifications.

PART NUMBER	PART NAME	CLASS
FOTZ-1177-A	Hub Seal	B
XG-1-C	Grease (14 oz. cartridge, Pkg. 60)	V

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 509000

Technical Service Bulletin # **911015**

Date: **910515**

## M/T - M50D Hard Shift Condition

Article No.

91-10-15

5/15/91

TRANSMISSION - M50D - HARD SHIFT TO REVERSE OR FIFTH GEAR

LIGHT TRUCK: 1988-89 ECONOLINE  
1988-90 BRONCO II  
1988-91 AEROSTAR, BRONCO, F-150, F-250, RANGER  
1991 EXPLORER

**ISSUE:** The 5-R synchronizer sliding sleeve clutching teeth may wear on the reverse side. This may cause a hard to engage or partial engagement of fifth or reverse gear and could result in the transmission jumping out of gear. If the wear is allowed to continue, it may become difficult or

impossible to engage 1-2-3 or 4th gear.

**ACTION:** Inspect the 5-R synchronizer sliding sleeve for wear and replace if excessive wear is found. Refer to the following procedure for service details.

**INSPECTION PROCEDURE:**

1. Remove necessary components so that the transmission extension housing can be removed without removing the entire transmission. Refer to the Light Truck Shop Manual Section 07-03A for service details.

**NOTE:** COMPACT VEHICLES MAY REQUIRE REMOVAL OF TRANSMISSION

2. Remove the transmission extension housing.
3. Inspect the 5-R synchronizer sliding sleeve for wear of the reverse clutching teeth.

**REPAIR PROCEDURE**

1. If wear is observed, remove speedometer drive gear (4 x 2 only).
2. Remove the top cover (if repairing on the bench).
3. Carefully remove the main shaft and counter shaft locking nuts.
4. Remove and replace the following transmission parts. Refer to the Light Truck Shop Manual for service procedures.

^ 5th Counter Shaft Gear

^ 5-R Synchronizer, hub and ring assembly

**NOTE:** INSTALL WITH THE DOT ON THE SYNCHRONIZER SLEEVE FACING REVERSE GEAR.

^ Reverse counter shaft gear

^ 5-R Counter Lever

^ 5-R Shift fork and rod

**NOTE:** USE THE SPRING AND BALL FROM THE EXISTING ASSEMBLY.

^ Replace the idler shaft in the reverse idler gear assembly (R1 only).

**NOTE:** THERE ARE EXTRA ADJUSTING SHIMS PROVIDED IN CASE IT IS NECESSARY TO RESET THE 5-R SYNCHRONIZER HUB AND CONTROL REVERSE GEAR END PLAYS TO SPECIFICATION. USE THE NEW MAIN SHAFT AND COUNTER SHAFT LOCKING NUTS UPON ASSEMBLY.

**CAUTION:** USE ALL THE PARTS CONTAINED IN THE SERVICE KIT INCLUDING THE COUNTER REVERSE LEVER. ALTHOUGH THE NEW LEVER LOOKS THE SAME AS THE ONE CONTAINED IN THE TRANSMISSION, CONTACT ANGLES ARE SLIGHTLY DIFFERENT TO INSURE PROPER TIMING AND ENGAGEMENT.

PART NUMBER	PART NAME	CLASS
F0TZ-7C391-E	Synchronizer Service Kit - R2	C
F0TZ-7C391-C	Synchronizer Service Kit - 2.3L, 2.9L, 3.0L, R1	C
F0TZ-7C391-D	Synchronizer Service Kit - 4.0L R1	C

**OTHER APPLICABLE ARTICLES:** NONE

**WARRANTY STATUS:** Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
911015A	Install Synchronizer Service Kit - 4 x 2	2.1 Hr.
911015A	Install Synchronizer Service Kit - 4 x 4	2.9 Hr.

**DEALER CODING**

BASIC PART NO. CONDITION CODE

7124 30

OASIS CODES: 505000

Technical Service Bulletin # **88820041588**Date: **880401****M/T - Hard to Shift Disengages From Third Gear**

TRANSMISSION - ZF MODEL S5-42 - HARD TO SHIFT INTO THIRD GEAR -

TRANSMISSION - ZF MODEL S5-42 - DISENGAGES THIRD GEAR

Article No. 88-8-20

LIGHT TRUCK: 1987-88 F SERIES, BRONCO

ISSUE: A hard shifting transmission during a 2-3 upshift or 4-3 downshift may be caused by a third gear synchronizer that has an improper surface finish. The hard shifting condition may also cause the transmission to disengage from third gear because of incomplete third gear engagement.

ACTION: To correct this, install a new design third gear synchronizer that was manufactured using a new machine lapping process to improve the surface finish. Refer to the 1988 Light Truck Shop Manual, Section 16-34-1 for removal and installation procedures.

PART NUMBER	PART NAME	CLASS
E7TZ-7124-C	Third Gear Synchronizer	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty and Powertrain Coverages

OPERATION: 880820A - Install third gear synchronizer

TIME: 7.6 Hrs. - F Series (4 x 2) 8.6 Hrs. - F Series (4 x 4) 8.3 Hrs. - Bronco

DLR. CODING: Basic Part No. 7124

Condition Code: 85

Technical Service Bulletin # **911811**Date: **910905****M/T - Crunching Shifting From 2nd to 3rd Gear**

Article No. 91-18-11

09/05/91

^ NOISE-INTERMITTENT "CRUNCHING" WHEN SHIFTING FROM 2ND TO 3RD-VEHICLES WITH M50D (MAZDA R1 AND R2) TRANSMISSION

^ TRANSMISSION-M50D (MAZDA R1 AND R2)- INTERMITTENT "CRUNCHING" NOISE WHEN SHIFTING FROM 2ND TO 3RD

LIGHT TRUCK: 1988-89 ECONOLINE  
1988-90 BRONCO II  
1988-91 AEROSTAR, BRONCO, F-150, RANGER  
1991 EXPLORER

ISSUE: A slight intermittent "crunch" or grinding noise may be heard when shifting from 2nd to 3rd. This is caused by improper synchronizer engagement.

ACTION: Install a new synchronizer service kit. Refer to the Parts Block for correct parts usage and the following procedure for service details.

## INSPECTION

1. Drive the vehicle to warm the transmission oil temperature to about 125~F (52~C). This can usually be done after driving about 10 miles at highway speed when the outside temperature is above freezing.
2. On a smooth road surface, accelerate the vehicle from a stop to 3rd gear at normal shift speeds as defined in the owners guide.
3. If a slight "crunch" is heard or grinding sensation is felt in the shift lever when shifting from 2nd to 3rd, proceed with the following synchronizer kit installation procedure.

## SYNCHRONIZER KIT INSTALLATION

1. Remove the transmission from the vehicle. Refer to the appropriate Light Truck Shop Manual, Section 07-03A, for removal procedure.
2. Remove the 1st/2nd and 3rd/4th clutch hub and sleeve assembly along with the corresponding synchronizer ring.
3. Install all parts from the appropriate synchronizer kit. The kits contain new 1, 2, 3, and 4 synchronizer rings, a new 3/4 synchronizer sleeve and an instruction sheet. The original 1/2 clutch hub sleeve assembly and 3/4 clutch hub must be reused.
4. Put a label on the transmission showing it was updated per TSB 91-18-11 and to refer to this TSB before servicing.

NOTE: THE NEW 3RD GEAR SYNCHRONIZER RING AND 3/4 SYNCHRONIZER SLEEVE ARE UNIQUE FROM THE ORIGINAL COMPONENTS. THE NEW COMPONENTS MUST BE INSTALLED AS A SET IN THE PROPER POSITION. FAILURE TO DO SO WILL RESULT IN THE INABILITY TO SHIFT THE TRANSMISSION INTO ONE OF THE GEARS. note>

PART NUMBER	PART NAME	CLASS
FOTZ-7C391-H	Synchronizer Kit - R2 (F-150, Bronco, Econoline)	C
FOTZ-7C391-F	Synchronizer Kit - R1 (Ranger, Bronco II, Explorer)	C
FOTZ-7C391-G	Synchronizer Kit - R1 (Aerostar)	C

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
911811A	Inspect Transmission	0.3 Hr.
911811B	Install Synchronizer Kit Ranger 4X2 With 2.OL, 2.3L, 2.9L, or 3.OL And Aerostar With 3.OL	5.0 Hr.
911811C	Install Synchronizer Kit Ranger 4X4 With 2.3L or 4.OL and Explorer 4X4	6.7 Hr.
911811D	Install Synchronizer Kit - Ranger 4X4 With 2.9L	6.9 Hr.
911811E	Install Synchronizer Kit - Ranger 4X2 And Explorer 4X2 With 4.OL	6.0 Hr.
911811F	Install Synchronizer Kit - Bronco II 4X2 With 2.9L And Bronco With 5.OL	6.5 Hr.
911811G	Install Synchronizer Kit - Bronco II 4X4 With 2.9L	6.9 Hr.
911811H	Install Synchronizer Kit F-150 4X2 With 4.9L	5.1 Hr.
911811I	Install Synchronizer Kit F-150 4X4 With 4.9L or 5.OL And Bronco With 4.9L	6.3 Hr.
911811J	Install Synchronizer Kit - F-150 4X2 With 5.OL	5.3 Hr.
911811K	Install Synchronizer Kit - Econoline With 4.9L	5.2 Hr.

DEALER CODING

BASIC PART NO.            CONDITION CODE  
 7C391                            56

OASIS CODES: 505000, 505200, 506000, 702000

Technical Service Bulletin # **911014**

Date: **910515**

## M/T Transmission Shift Lever - Buzz/Vibration

Article No.  
 91-10-14

5/15/91

^ NOISE/VIBRATION - SHIFT LEVER - M50D TRANSMISSION

^ TRANSMISSION - M50D - SHIFT LEVER BUZZ/VIBRATION

LIGHT TRUCK: 1988-91 BRONCO, F-150, F-250

**ISSUE:** Transmission shift lever buzz, may be noticed in overdrive or 4th gear after the vehicle has obtained normal operation temperatures and is driven on a smooth road surface at normal highway speeds of 55 MPH (88Km/h). The tone and intensity of this condition are considerably less when observed in 4th gear than in overdrive.

**ACTION:** Replace the transmission top cover assembly with the new top cover kit assembly. Refer to the following procedure for diagnosis and service details.

### INSPECTION PROCEDURE:

1. Drive the vehicle to warm the transmission oil to approximately 125~F (52~) - about ten miles at highway speeds when the outside temperature is at the freezing point.
2. On a smooth road surface, drive the vehicle at approximately 55 MPH (88 Km/h) in overdrive to verify shift lever buzz.
3. If shift lever buzz is observed, lightly push to the right (passenger side) to determine if the buzz is eliminated.
4. If the buzzing noise is eliminated, refer to the following repair procedures.

**NOTE:** IF THIS TEST DOES NOT ELIMINATE THE BUZZ, DO NOT REPAIR WITH THIS PROCEDURE, IT WILL NOT CORRECT THE CONCERN, REFER TO THE LIGHT TRUCK SHOP MANUAL FOR FURTHER CONCERN DEFINITION.

### REPAIR PROCEDURE

1. Remove the old transmission top cover assembly.
2. Install the new transmission top cover assembly.

**NOTE:** THE TRANSMISSION DOES NOT HAVE TO BE REMOVED FROM VEHICLE. ACCESS IS GAINED BY REMOVING THE SHIFT LEVER AND SHIFT BOOT AS AN ASSEMBLY. PULL BACK THE FLOOR COVERING AND REMOVE TRANSMISSION OPENING COVER PLATE.

**CAUTION:** CARE SHOULD BE TAKEN TO INSURE THAT NO DIRT ENTERS THE TRANSMISSION WHILE THE TOP COVER IS OFF.

PART NUMBER	PART NAME	CLASS
F0TZ-7C391-J	Transmission Top Cover Assembly	C

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911014A	Replace Transmission Top Cover Assembly	1.2 Hr.

### DEALER CODING

BASIC PART NO.	CONDITION CODE
7222	56

OASIS CODES: 505200, 703300

Technical Service Bulletin # 9059

Date: 900228

**M/T - ZF HD M50D Bump/Clunk/Click Noises**

^ NOISE - BUMP/CLUNK/CLICK - ZF HEAVY DUTY M50D TRANSMISSION

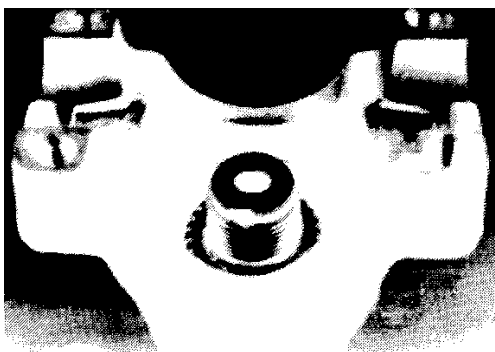
^ TRANSMISSION - ZF HEAVY DUTY M50D-LEAKS LUBRICANT

Article No. 90-5-9

LIGHT TRUCK: 1987-90 F-250, F-350

**ISSUE:** A "bumping/clunking" noise or a "clicking" sound on torque reversal or transmission lubricant leakage may be caused by a loose output flange retaining nut.

**ACTION:** Install a new output flange retaining nut. Refer to the following procedure for service details.

**TB-1555-A****Figure 1**

1. Install a new output flange retaining nut (E7TZ-7045-A) on the output shaft, Figure 1.

**CAUTION:** DO NOT REUSE THE OUTPUT FLANGE RETAINING NUT AFTER ANY SERVICING OF THE TRANSMISSION. ALWAYS REPLACE IT WITH A NEW ONE.

2. Tighten the nut to 184 lb.ft. (250 N-m).

**TB-1556-A****Figure 2**

3. Position a 3/16" (4.76 mm) punch on the locking shoulder of the retaining nut over the groove of the output shaft, Figure 2.

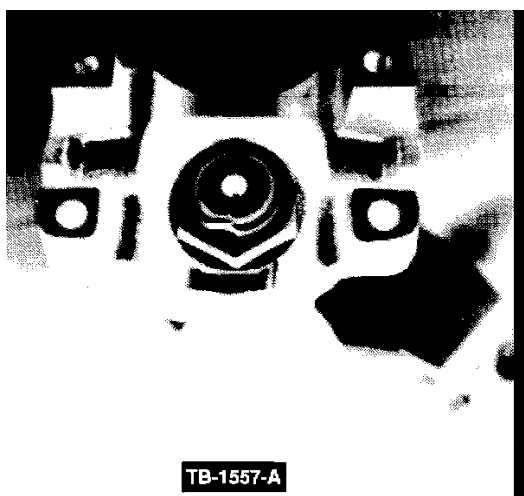


Figure 3

4. Strike the punch with a hammer. Make sure that the shoulder of the retaining nut is contacting the bottom of the groove, Figure 3.

**CAUTION:** WHEN STAKING THE NUT, MAKE SURE THE LOCKING SHOULDER OF THE NUT AND THE GROOVE OF THE OUTPUT SHAFT ARE THE ONLY AREAS USED IN THIS STAKING OPERATION. IF THE NUT IS STRUCK IN ANY OTHER AREA, THE TORQUE WILL BE LOST AND THE NUT MAY COME LOOSE IN SERVICE.

PART NUMBER	PART NAME	CLASS
E7TZ-7045-A	Output Flange Retaining Nut	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
900509A	Install & Stake Retaining Nut	0.4 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7045	33

OASIS CODES: 5500, 5950, 5970, 7100, 7113

Technical Service Bulletin # **911712**

Date: **910821**

## M/T - Gear Noise/Rattle

Article No. 91-17-12

08/21/91

- ^ NOISE - "GEAR RATTLE" - MANUAL TRANSMISSIONS - FROM FLOOR PAN SHIFTER OPENING (4X2 AND 4X4 MODELS)
- ^ TRANSMISSION - MANUAL - "GEAR RATTLE" NOISE FROM FLOOR PAN SHIFTER OPENING (4X2 AND 4X4 MODELS)

LIGHT TRUCK: 1988-91 BRONCO, F SUPER DUTY, F-150, F-250, F-350, F-47

**ISSUE:** Gear noise, commonly referred to as "gear rattle", may enter the cab through the manual transmission shift lever floor pan opening. This noise is normally noticed when the vehicle is at normal operating temperatures and a load is applied to the engine between 500 and 1000 RPM.

**ACTION:** Inspect and evaluate the vehicle for gear rattle. If gear rattle is detected, install a new shift boot over the shift lever to limit gear noise from entering the cab. Refer to the following procedure for service details.

### INSPECTION PROCEDURE:

1. Drive the vehicle till normal operating temperatures are maintained (about 10 miles at highway speeds when the ambient temperatures are above freezing.)

2. On a smooth road surface, place the shift lever in 2nd or 3rd gear and accelerate starting at 500 RPM.
3. If gear rattle is heard and is diagnosed as coming through the shift lever floor pan opening, repair using the following procedure.

## REPAIR PROCEDURE:

1. Remove the shift knob from the shift lever.

NOTE: TO REMOVE THE SHIFT KNOB WITHOUT DAMAGE, PLACE A 16 mm OR AN ADJUSTABLE OPEN END WRENCH UNDER THE SHIFT KNOB END AND STRIKE THE WRENCH UPWARD WITH A HEAVY HAMMER.

2. Remove the (4) screws which secure the boot to the floor. Remove the boot assembly from the the shift lever.
3. Install the new boot assembly over the shift lever and secure to the floor with the the (4) screws provided.

NOTE: USE A SOAP SOLUTION TO ASSIST IN INSTALLING THE SHIFT BOOT OVER THE SHIFT LEVER.

CAUTION: DO NOT USE A HYDROCARBON (OIL) OR GLYCOL BASED LUBRICANT TO AID IN INSTALLING THE SHIFT BOOT. THESE MATERIALS WILL GET INTO THE SHIFT LEVER SPLINES AT THE SHIFT KNOB END OF THE LEVER AND CAUSE THE SHIFT KNOB PLASTIC CORE TO CRACK.

4. Install the shift knob on the shift lever.

PART NUMBER	PART NAME	CLASS
FITZ-7277-A	Boot - Transmission Assembly	B

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911712A	Inspection Only (includes Road Test)	0.3 Hr.
911712B	Inspect And Install Shift Lever Boot	0.7 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7277	53

OASIS CODES: 505000, 505200, 597997, 702300

Technical Service Bulletin # **88912042788**

Date: **880401**

## Full Float Hub Seal - Lubricant Leak

Article No. 88-9-12

AXLE - REAR - FORD 10.25" FULL FLOAT DESIGN - HUB SEAL LEAKS

LEAKS - LUBRICANT FROM HUB SEAL -

FORD 10.25" FULL FLOAT DESIGN REAR AXLE

LIGHT TRUCK: 1985-88 F-250/350

ISSUE: Lubricant leaking from the rear axle on F-250 and F-350 trucks, with Ford 10.25" full float axles may be caused by the hub seal. The leaking condition could affect trucks with single or dual rear wheels.

ACTION: To correct this, install a new design hub seal with improved sealing qualities. The new hub seal is "green" in color to assist in part identification. Refer to the appropriate Light Truck Shop Manual, Volume A, Section 15-09 and the following service procedure for removal and installation instructions.

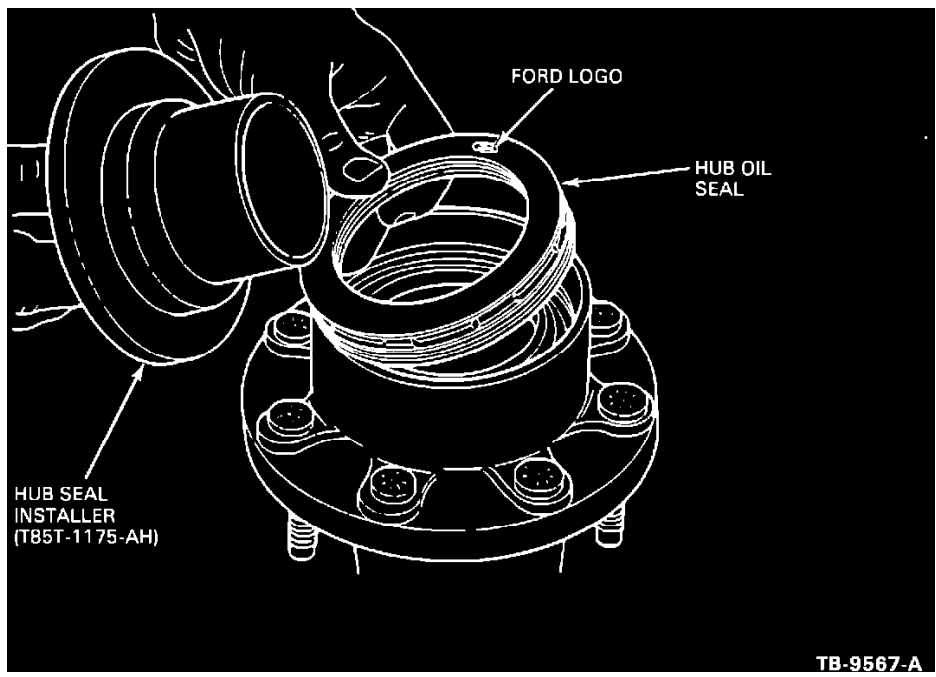


FIGURE 12

1. Position hub seal with the "Ford" logo facing up, Figure 12.

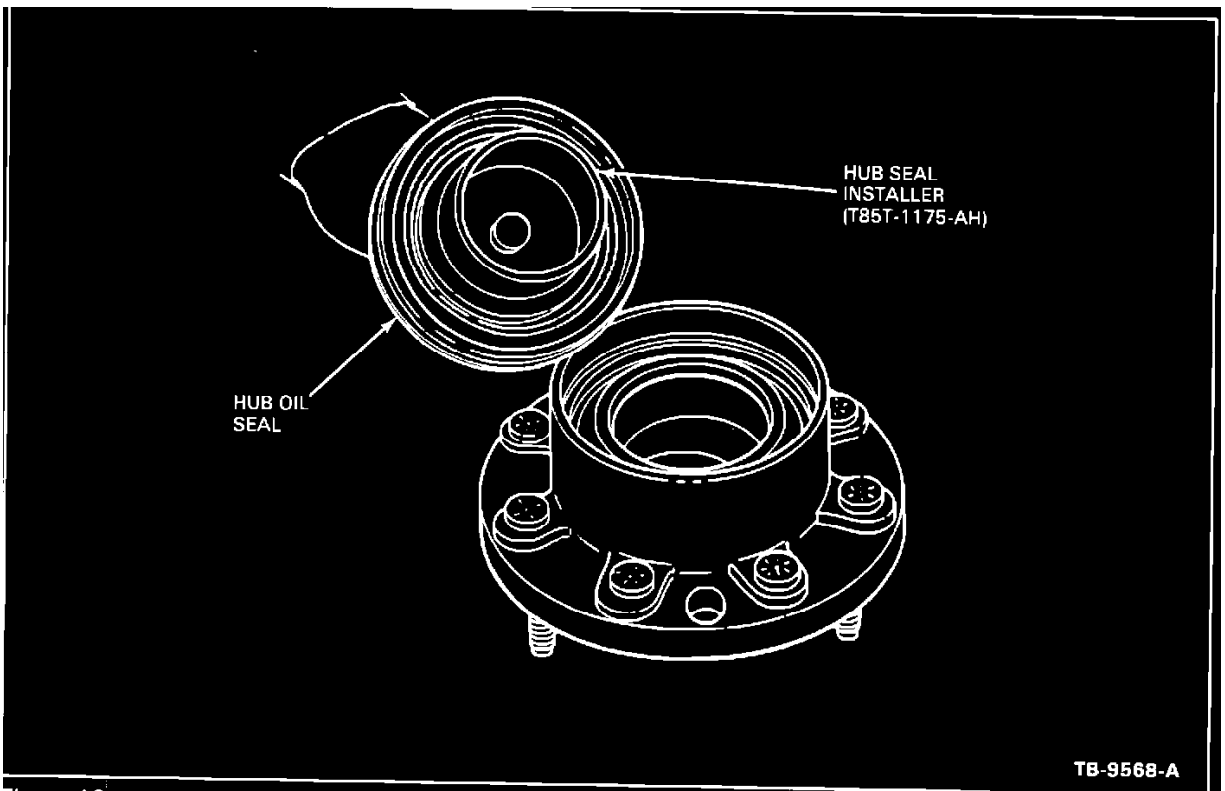


FIGURE 13

2. Install hub seal on hub seal installer tool (T85T-1175-AH), Figure 13.

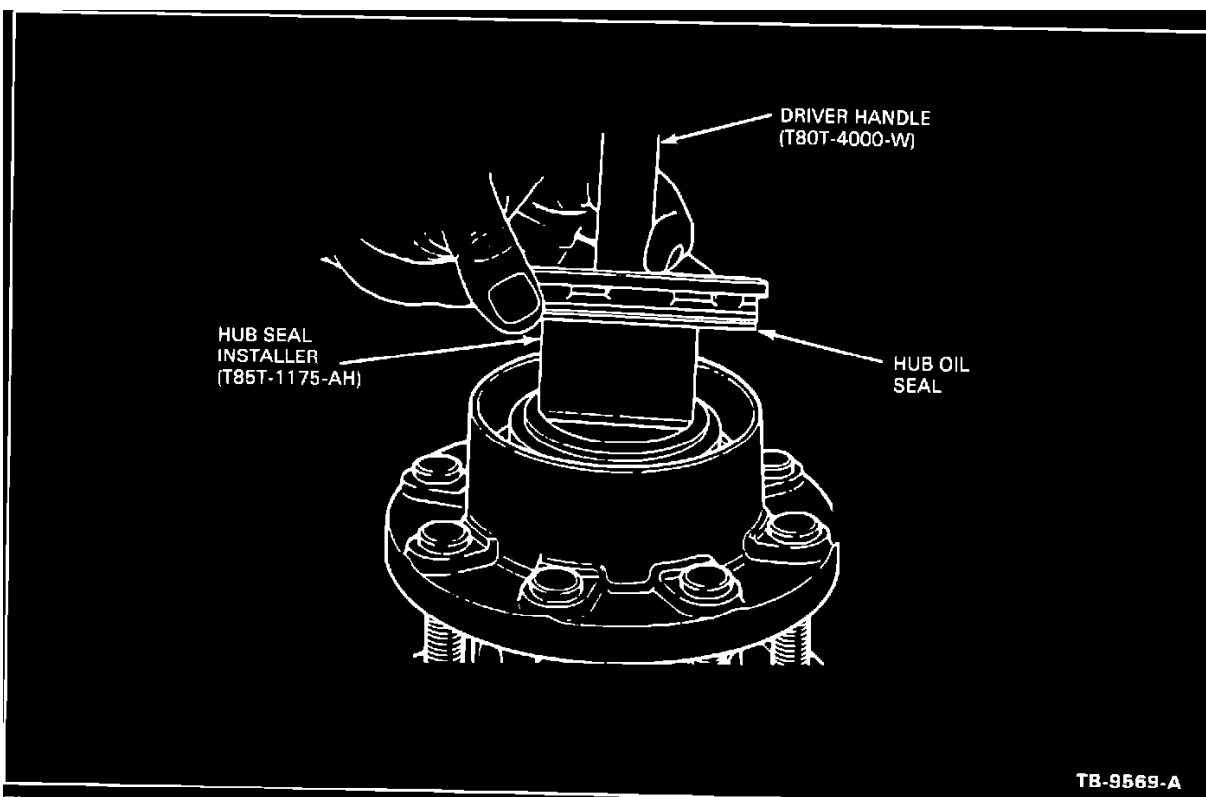


FIGURE 14

3. Insert tool with seal squarely into hub, Figure 14.

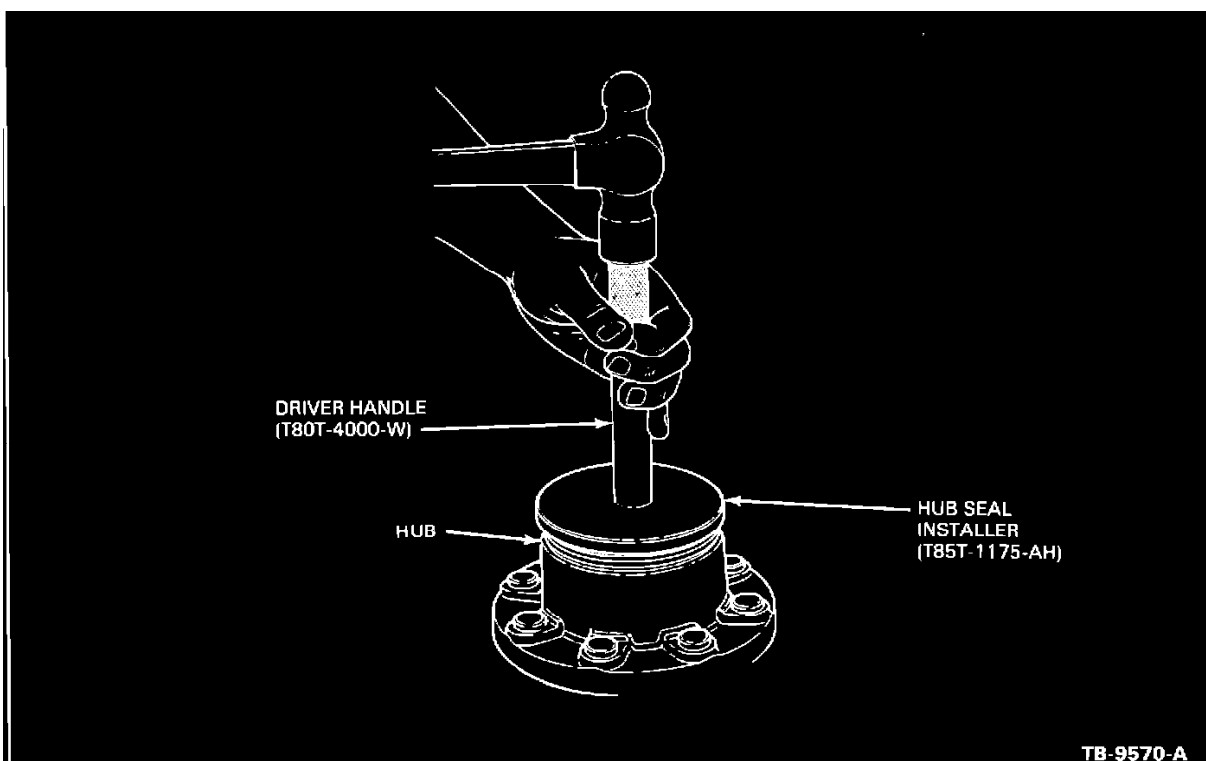


FIGURE 15

4. Hold tool straight and strike handle until hub seal is fully seated, Figure 15.

**CAUTION:** Install new seal if seal is damaged during or after installation.

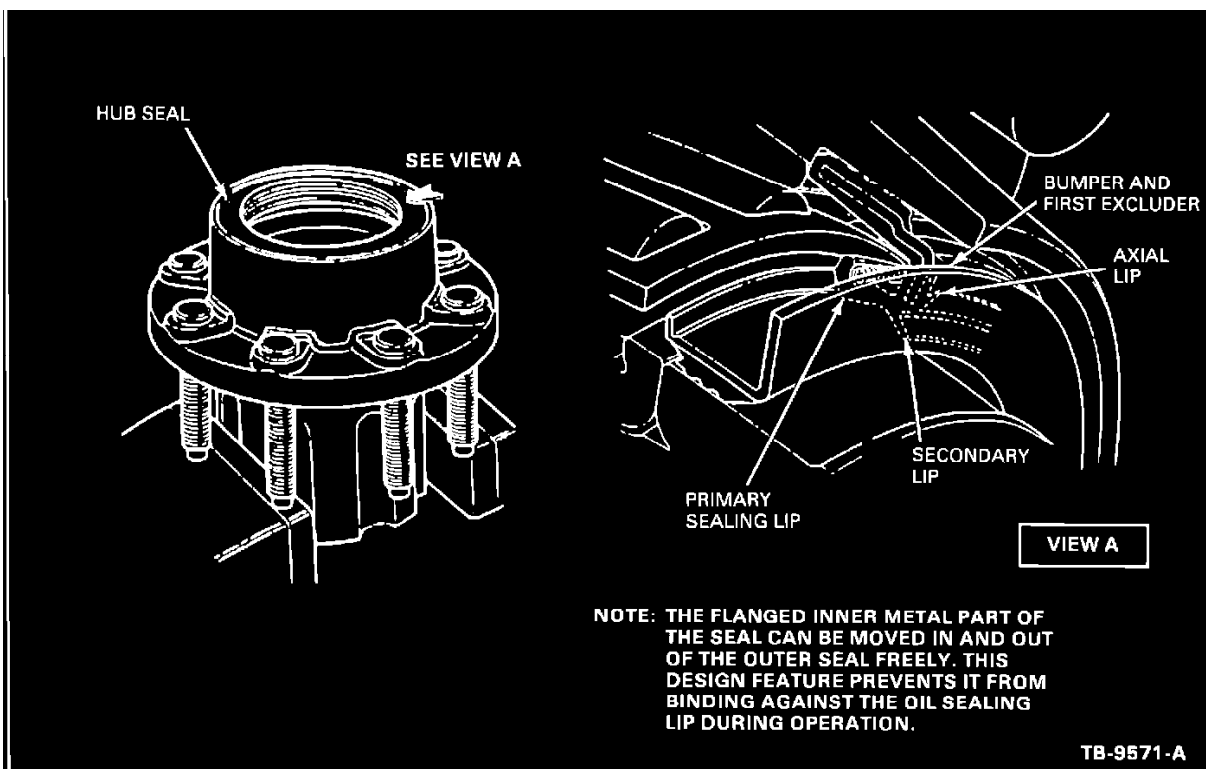


FIGURE 16

**NOTE:** UNITIZED WHEEL SEALS ARE STANDARD ITEMS ON FULL FLOAT REAR AXLES. THE UNITIZED WHEEL SEAL COMBINES THE FUNCTION OF A WEAR SLEEVE AND SEAL IN ONE SELF-CONTAINED UNIT WITH THE SEAL AND SLEEVE SURFACE INSIDE. THE UNITIZED DESIGN PROVIDES MAXIMUM PROTECTION FOR THE SEALING SURFACE DURING INSTALLATION AND OPERATION, FIGURE 16.

PART NUMBER	PART NAME	CLASS
E7HZ-1175-A	Hub Seal	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Powertrain Warranty Coverage

OPERATION: 880912A - Install one hub seal

TIME: 0.7 Hr.

OPERATION: 880912B - Install both hub seals 1.2 Hrs.

DLR. CODING: Basic Part No. 1177

Condition Code: 48

Technical Service Bulletin # **ATRATB063**

Date: **910701**

## A/T - AOD Direct Clutch Failure/Excessive Case Bore Wear

TRANSMISSION: A4LD

BULLETIN: # 060B

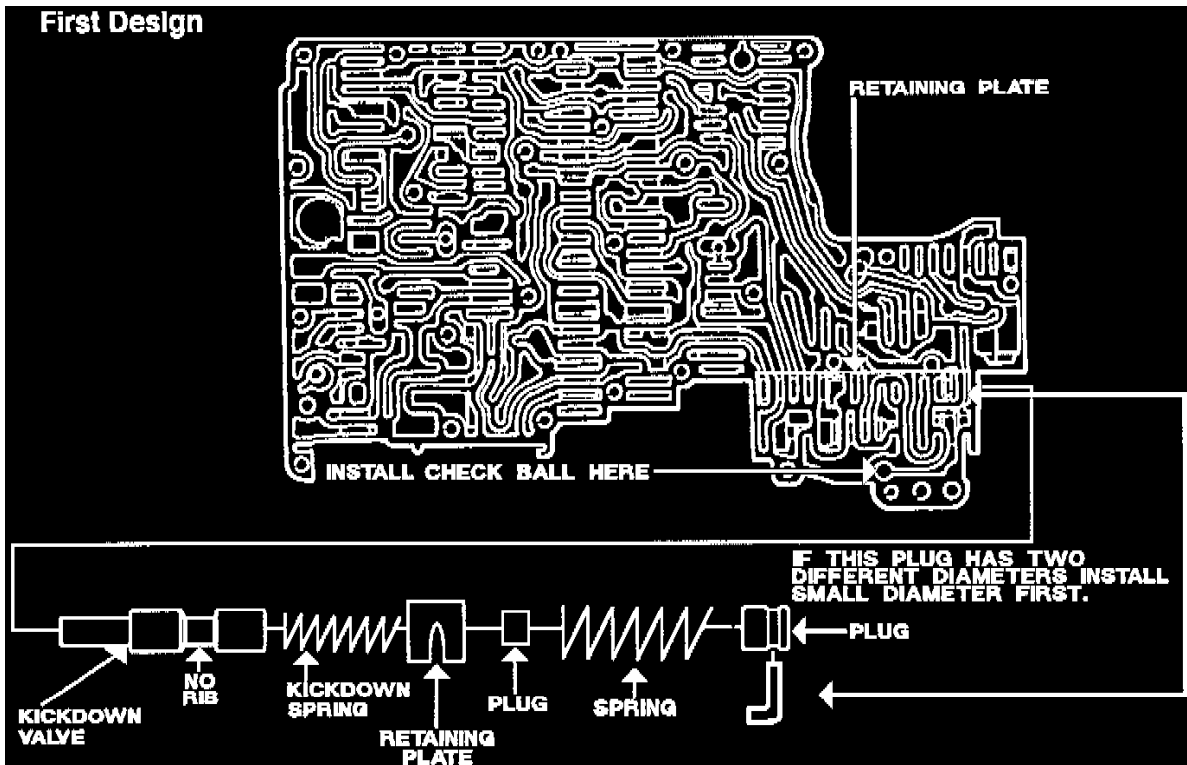
SUBJECT: No Reverse

APPLICATION: Ford

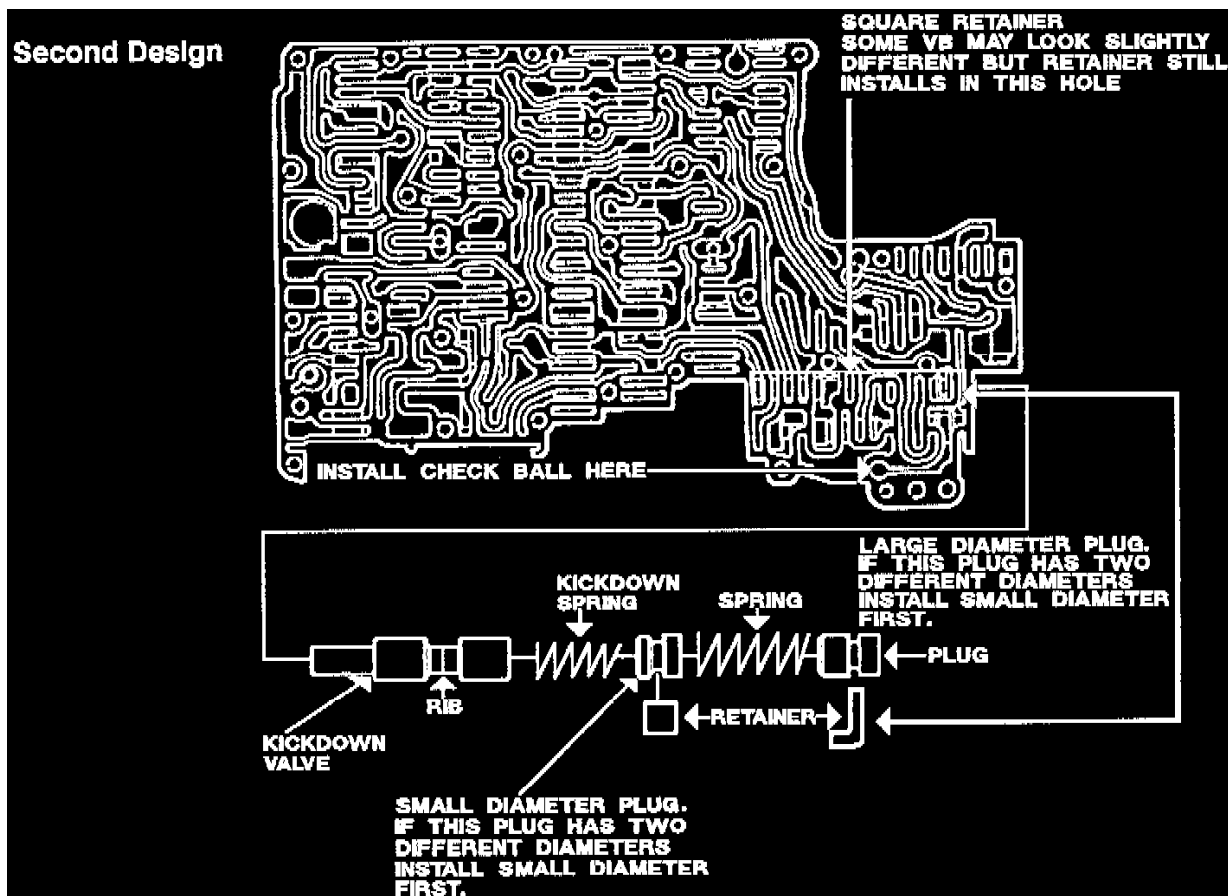
DATE: July 1991

No Reverse

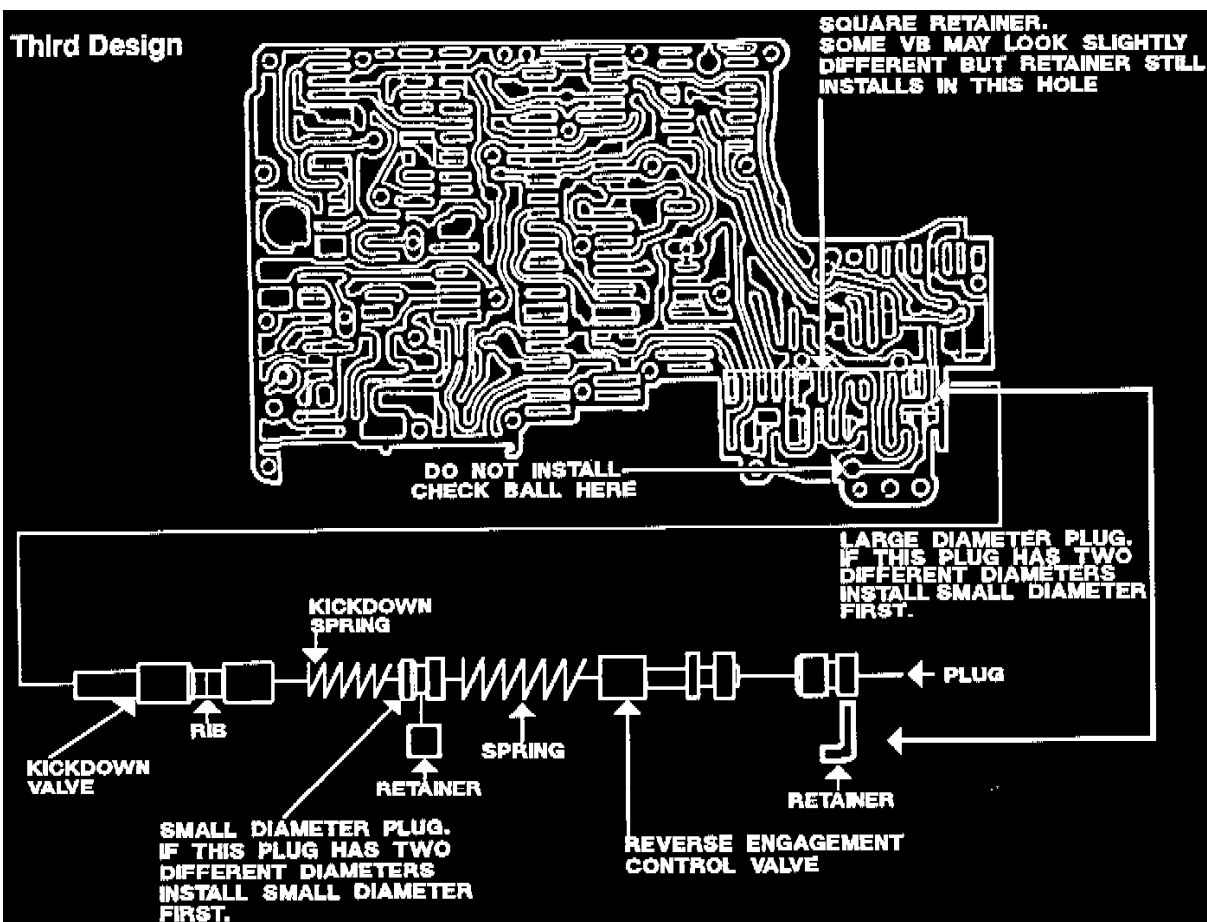
Some A4LD valve body assemblies do not use a check ball to cushion reverse engagement. These valve bodies are equipped with a reverse engagement control valve. Inspect your valve body for the correct assembly using the 3 drawings provided. Do not leave out the check ball on valve bodies that do not have this valve. If the reverse engagement control valve is stuck you may have no reverse.



First Design



Second Design



Third Design

#### BULLETIN RECAP

- ^ If you have a reverse engagement control valve, leave the check ball out.
- ^ Inspect reverse engagement control valve for sticking.

#### FOR ADDITIONAL INFORMATION

TSB 89-14, 88-37, 88-35 & 86-59 and 1990 Seminar Manual

Technical Service Bulletin # **881811**

Date: **880831**

## Dash Panel - Cracks At Clutch Master Cylinder

Article No. 88-18-11

- ^ DASH PANEL CRACKS AT CLUTCH MASTER CYLINDER
- ^ CLUTCH - HIGH EFFORT - DASH PANEL CRACKING
- ^ CLUTCH -SOFT PEDAL AND INCOMPLETE RELEASE

LIGHT TRUCK: 1987-88 F-SERIES

**ISSUE:** Incomplete clutch release and/or hydraulic fluid leaking into the cab from the clutch master cylinder may be caused by the reinforcement plate on the clutch master cylinder separating from the dash panel. The separation of the reinforcement plate reduces the clutch master cylinder pushrod travel. Reinforcement plate separation can also cause deflection of the clutch master cylinder that results in a misalignment of the pushrod to the clutch master cylinder. Misalignment causes the Oring in front of the secondary seal to leak hydraulic fluid.

**ACTION:** To correct this, install a new service released clutch master cylinder mounting bracket. Refer to the following procedure for service details.

1. With an assistant pushing the clutch pedal down several times, check for separation between the dash panel (cowl) and the clutch master cylinder

reinforcement dish.

NOTE: THIS MUST BE DONE FROM UNDER THE HOOD IN THE ENGINE COMPARTMENT.

2. If separation is present, install a new clutch master cylinder mounting bracket, (E8TZ-7K509-A for 1988 model year trucks or E3TZ-7K509-A for 1987 model year trucks). Refer to the following service details:
  - a. Remove the two (2) clutch master cylinder retaining nuts.
  - b. Position the clutch master cylinder forward.
  - c. Repair and seal the dash panel, as required.
  - d. Install the clutch master cylinder mounting bracket onto the clutch master cylinder mounting studs.
  - e. Reposition the clutch master cylinder.
  - f. Reinstall the clutch master cylinder retaining nuts. Torque to 7-11 lb.ft. (9-15 N-m).

PART NUMBER	PART NAME	CLASS
E8TZ-7K509-A	Clutch Master Cylinder Mounting Bracket	C
E3TZ-7K509-A	Clutch Master Cylinder Mounting Bracket	CG

OTHER APPLICABLE ARTICLES: 87-16-15, 86-20-10, 85-5-24, 85-5-26, 84-1-14, 83-24-22, 83-23-16

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION: 881811A - Install Mounting Bracket

TIME: 0.5 Use "M" Time To Repair Dash Panel If Required

DLR. CODING: Basic Part No. 7K509  
Condition Code: 14

- ^ CLUTCH (HYDRAULIC) - PEDAL DOES NOT FULLY RETURN - DIAGNOSTIC TIPS
- ^ TRANSMISSION - MANUAL - GEAR CLASH AND HARD SHIFTING
- ^ SPEED CONTROL - INOPERATIVE - LOW CLUTCH PEDAL ALLOWS SWITCH CIRCUIT TO REMAIN OPEN

Article No. 87-16-15

LIGHT TRUCK: 1984-87 F-150/350 BRONCO

Article No. 86-20-10

DASH PANEL CRACKS AT CLUTCH MASTER CYLINDER (6.9L (D)/7.5L)

CLUTCH - HIGH EFFORT -- DASH PANEL CRACKING/MISSHAPED RELEASE LEVER (6.9L (D)/7.5L)

CLUTCH-INCOMPLETE RELEASE  
- DIAGNOSIS (6.9L (D)/7.5L)

LIGHT TRUCK 1983-86 F-250/350

Article No. 85-5-24

CLUTCH - (HYDRAULIC) - SLOW/DELAYED RETURN - COLD WEATHER (TSB 85-1-20 PART CORRECTION)

LIGHT TRUCK 1983-84 F SERIES

Article No. 84-1-14

CLUTCH - SLIPS - (6.9L-7.5L)

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 83-23-16

CLUTCH HYDRAULIC - SLAVE CYLINDER ATTACHMENT - (6.9L DIESEL/7.5L)

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 83-24-22

TRANSMISSION - MANUAL (T-19)

- HARD SHIFT - UNITS WITH 6.9L DIESEL

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 85-5-26

CLUTCH - HYDRAULIC SYSTEM DIAGNOSIS (F SERIES) &amp; PARTS LISTS (ALL MODELS)

LIGHT TRUCK 1983-85 E, F, B, R, B II

Technical Service Bulletin # 90167

Date: 900801

**M/T - Clutch Fluid Leaks/Incomplete Release**

Article No. 90-16-7

^ CRACKS - DASH (ENGINE COMPARTMENT BULKHEAD) - CLUTCH MASTER CYLINDER AREA - VEHICLES BUILT BEFORE 6/15/90

^ CLUTCH - HIGH EFFORT - DASH CRACKED IN CLUTCH MASTER CYLINDER AREA - VEHICLES BUILT BEFORE 6/15/90

LIGHT TRUCK: 1984-90 BRONCO, F-150, F-250, F-350 1988-90 F SUPER DUTY

PART NUMBER	PART NAME	CLASS
E3TZ-7K509-A	Small Reinforcement Kit (1983-87)	B
E8TZ-7K509-A	Small Reinforcement Kit (1988-91)	B
E3TZ-7K509-B	Large Reinforcement Kit (1983-1991 Severely Damaged Units)	B

**ISSUE:** Incomplete clutch release and/or hydraulic fluid leaking into the cab from the clutch master cylinder may be caused by the reinforcement plate on the clutch master cylinder separating from the dash panel. The separation of the reinforcement plate reduces the clutch master cylinder pushrod travel. Reinforcement plate separation can also cause deflection of the clutch master cylinder that results in a misalignment of the pushrod to the clutch master cylinder. Misalignment causes the "O" ring in front of the secondary seal to leak hydraulic fluid.

**ACTION:** Inspect the truck and, if necessary, use the following service procedure to install a reinforcement kit.

**Inspection Procedure**

1. If the truck is a 1988 or later model, confirm that the starter interlock switch operates (the engine can be started) with the clutch pedal at least 0.5" (12.7 mm) from the floor.
2. Test drive the truck and check for good clutch release. There should be no grinding of the gears, particularly when shifting from neutral to reverse gear.
3. If the truck passes these tests, go to the Small Reinforcement Installation Procedure Section of this article.
4. If either of the above conditions are not met, check the hydraulic system for air. Refer to the Suggested Bleeding Procedure at the end of this article.
5. Test drive the truck and check for improved clutch release.
6. If there is no improvement, proceed as follows:
  - a. Remove the clutch master cylinder pushrod from the release lever pin on the release lever.

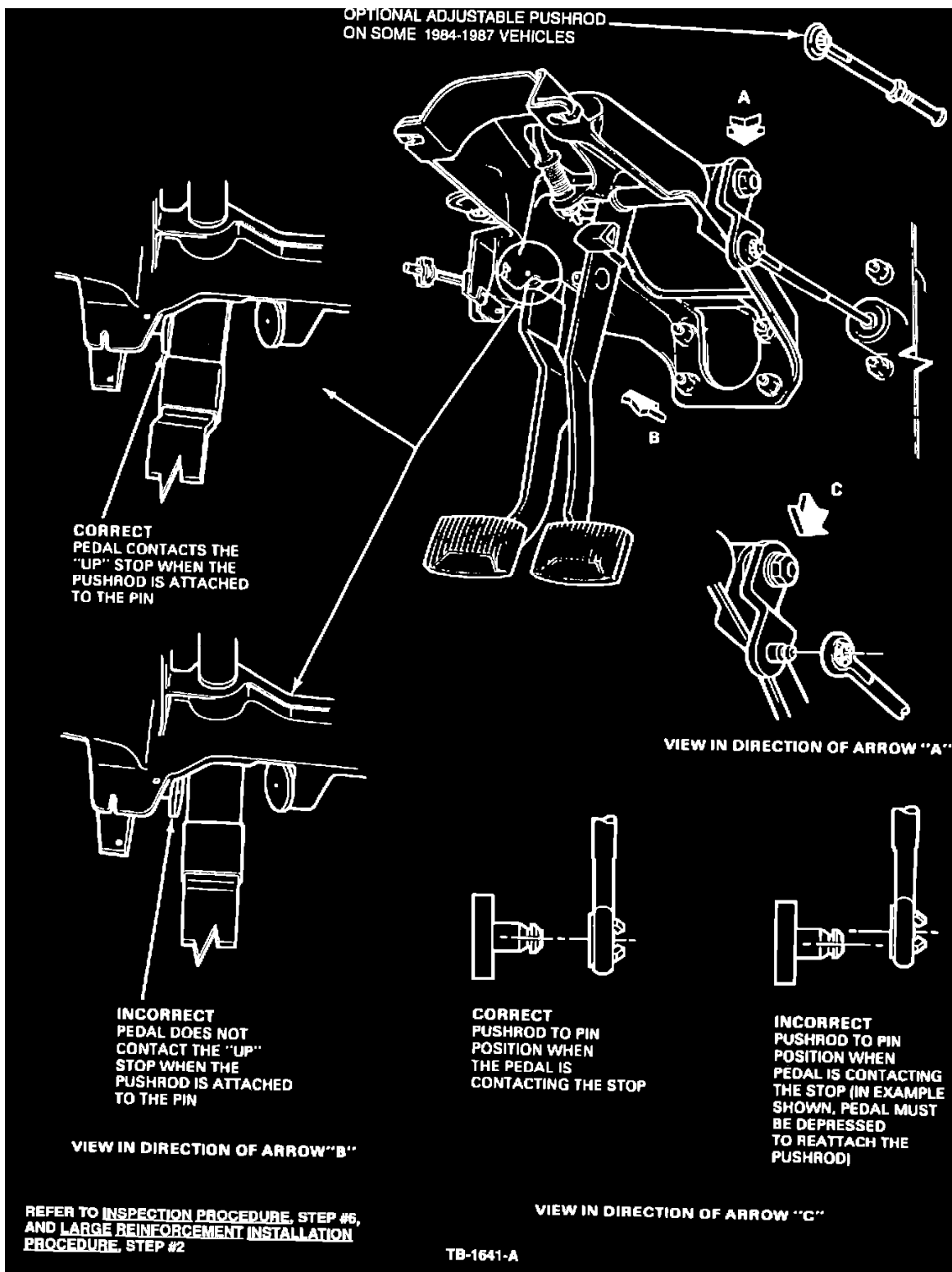


Figure 1

- b. Make sure the hole in the pushrod lines up with the pin, for those units requiring a minimal force for installation, Figure 1.
  - c. If it does not line up correctly, install an adjustable pushrod (except 1988 and later models) or replace the clutch release lever (required on 1988 and later models), cutting a new seat on the cross shaft splines.
7. Test drive the truck again, checking for improved clutch release.

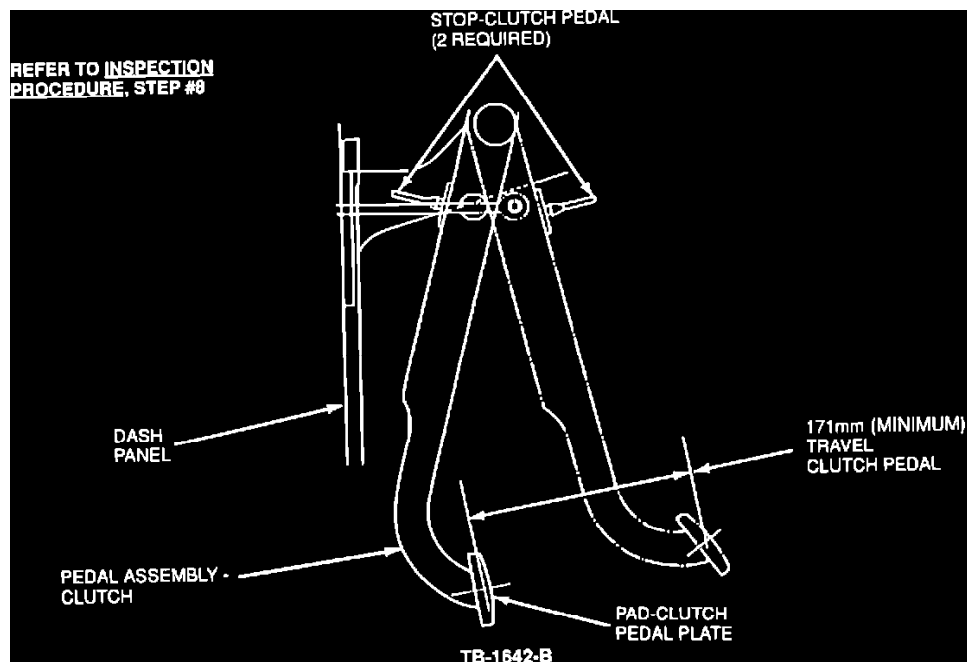


Figure 2

8. If there is no improvement, inspect the truck for adequate release bearing travel.
  - ^ It should be 11 mm or greater for full pedal travel.
  - ^ Pedal travel at the center of the pedal pad should be 6.75" (171 mm minimum) or more, Figure 2.
9. Release bearing travel and gear grinding noise may indicate the following concerns.
  - ^ If the release bearing is 11 mm or greater and there is grinding of one or two gears only, the concern is probably with the transmission.
  - ^ If all gears grind, the concern may be with the clutch and/or pilot bearing which will need replacing.
  - ^ If the release travel is less than 11 mm, check the clutch hydraulic system for air and bleed as necessary.
10. If the release travel is still less than 11 mm, with all of the above items eliminated, proceed as follows:
  - a. Raise the hood, while an assistant operates the clutch pedal.
  - b. Watch the clutch master cylinder for significant deflection.

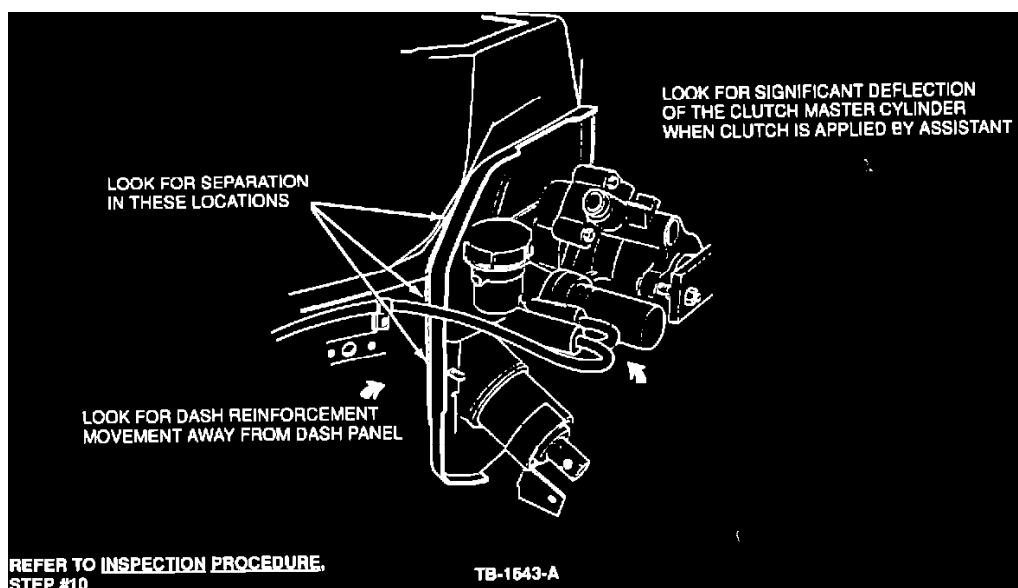


Figure 3

- c. Look for the dash reinforcement moving away from the dash, Figure 3.

d. On 1987 and earlier models, look down inside the cowl cover at the cowl where it is attached to the dash reinforcement. Check for pulled spot welds.

11. If there is significant movement of the dash or clutch master cylinder, proceed as follows:

- a. Remove the steering column and its dash toe plate and seal. Refer to the appropriate Light Truck Shop Manual, Section 13-07 for service details.
- b. Inspect the dash inside the cab and look for:
  - ^ Pulled spotwelds and cracked or torn sheet metal.
  - ^ Cracks in the brake and clutch pedal support

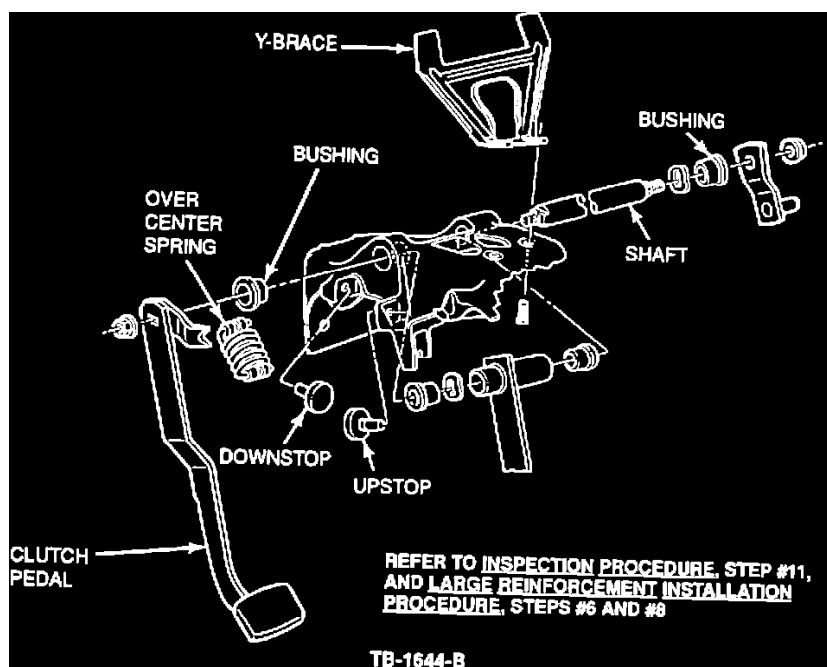


Figure 4

- ^ Missing Y-brace fasteners and a broken or detached Y-brace, Figure 4.

12. Check the cross shaft bushings for wear if the brake pedal moves when the clutch is depressed and vice versa. Replace them as required.

**NOTE:** GENERALLY, TRUCKS WITH SIGNIFICANTLY LESS THAN 11 MM CLUTCH RELEASE BEARING TRAVEL (AFTER COMPLETING THE INSPECTION PROCEDURE AND CORRECTING WHERE NECESSARY) WILL HAVE SIGNIFICANT DASH DAMAGE FROM PULLED SPOTWELDS AND TORN METAL. THESE TRUCKS WILL REQUIRE EXTENSIVE REPAIR. THEREFORE, GO TO THE LARGE REINFORCEMENT INSTALLATION PROCEDURE.

## Small Reinforcement Installation Procedure

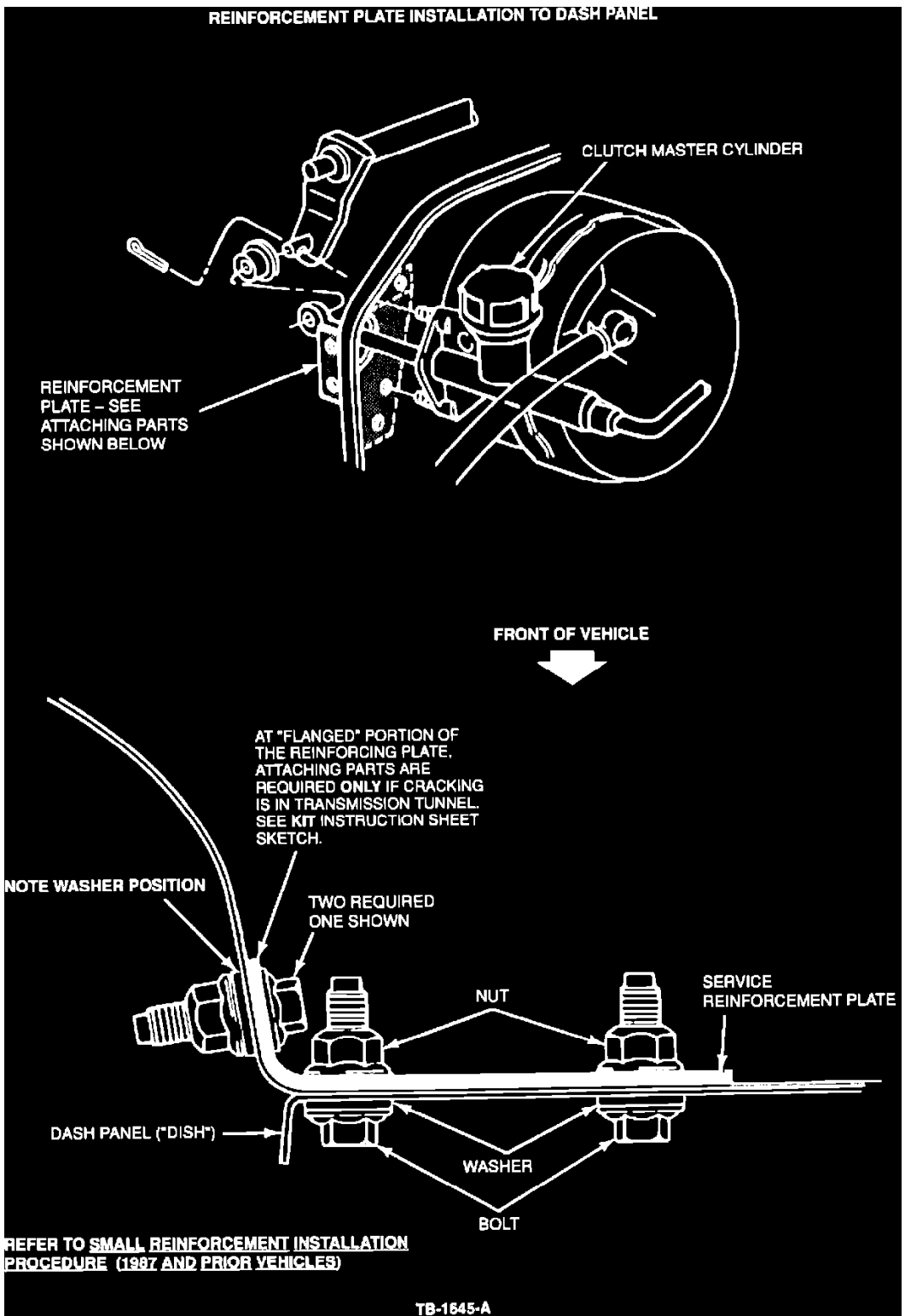
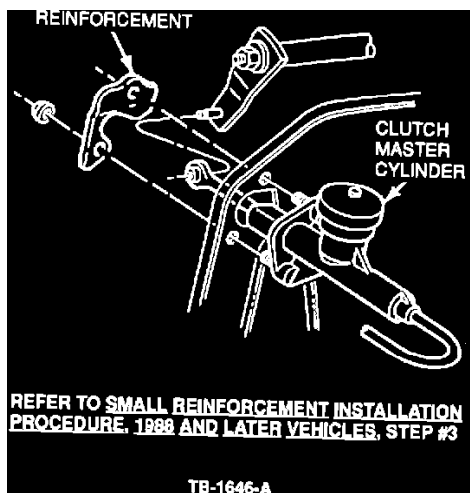


Figure 5



**Figure 6**

There are two small reinforcement kits. One for 1988 and later models and one for 1987 and prior models. This is necessary because a new hydraulic clutch master cylinder mounting pattern was introduced for 1988 models.

#### 1987 And Prior Trucks

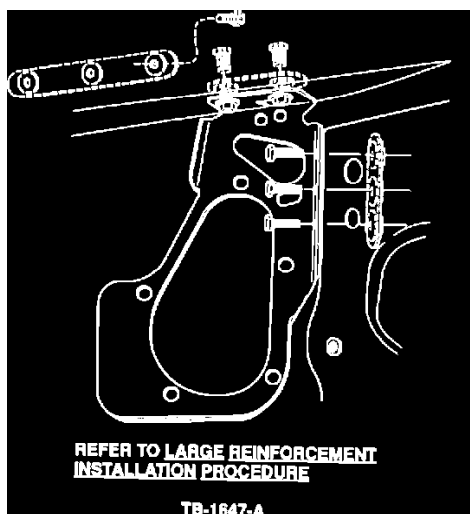
Use reinforcement kit E3TZ-7K509-A on these trucks, Figure 5. Comprehensive installation instructions are included in this kit.

#### 1988 And Later Trucks

Use reinforcement kit E8TZ-7K509-A on these trucks. The only part in this kit is the special reinforcement for these trucks. To install it, proceed as follows:

1. Remove the two clutch master cylinder attaching nuts (13 mm) from inside the truck.
2. Position the reinforcement in place over the clutch master cylinder studs.
3. Re-install the two master cylinder nuts, Figure
6. Tighten to 9.5 - 14.9 N-m.

## Large Reinforcement Installation Procedure



**Figure 7**

Use reinforcement kit E3TZ-7K509-B on all 1983-1991 Bronco/F-Series trucks with hydraulic clutch controls. The kit consists of the following items:

- ^ A main reinforcement or doubler, with a plate having two studs to clamp the doubler through the cowl inner
- ^ Two additional pieces with three threaded holes:

One plate helps attach the main doubler through the dash inner tunnel. The other large piece is placed inside the front of the cowl, with bolts driven through from the engine compartment side of the dash reinforcement, see Figure 7.

## Installation

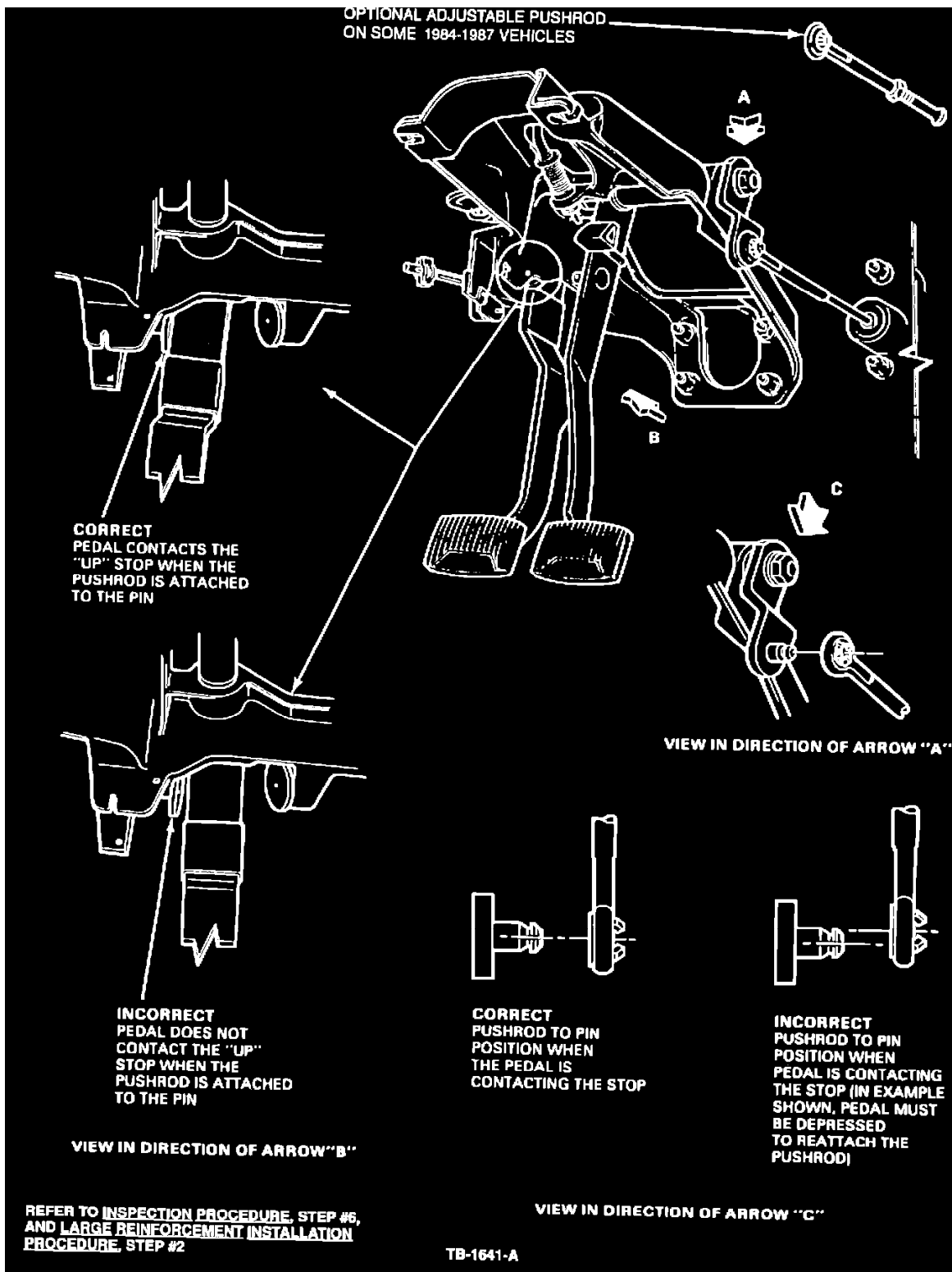


Figure 1

1. Remove the insulating material.
  - a. On earlier models, remove the instrument panel lower sound insulator assembly.
  - b. For later diesel powered trucks, remove the fasteners holding the engine compartment dash insulation in place.

- c. Pull the dash insulation back out of the way.
  - d. Disconnect the battery ground cable.
2. Disconnect the clutch master cylinder pushrod from the lever, removing the pushrod retention clip on older models, Figure 1.
  3. Remove the two nuts attaching the clutch master cylinder to the dash panel.
    - a. Pull the master cylinder into the engine compartment.
    - b. For, 1988 and later trucks, it will be necessary to disconnect the wiring harness connector from the pushrod switch.
    - c. Rotate the master cylinder to get it past the switch through the dash opening.
  4. Remove the steering column and dash toe plate by removing the five (5) fasteners.
  5. Disconnect the brake master cylinder pushrod from the brake pedal.
  6. On F-Super Duty, proceed to Step 7. On all units except F-Super Duty, proceed as follows:
    - a. Remove the four brake booster attaching nuts.
    - b. Move the brake booster to one side.

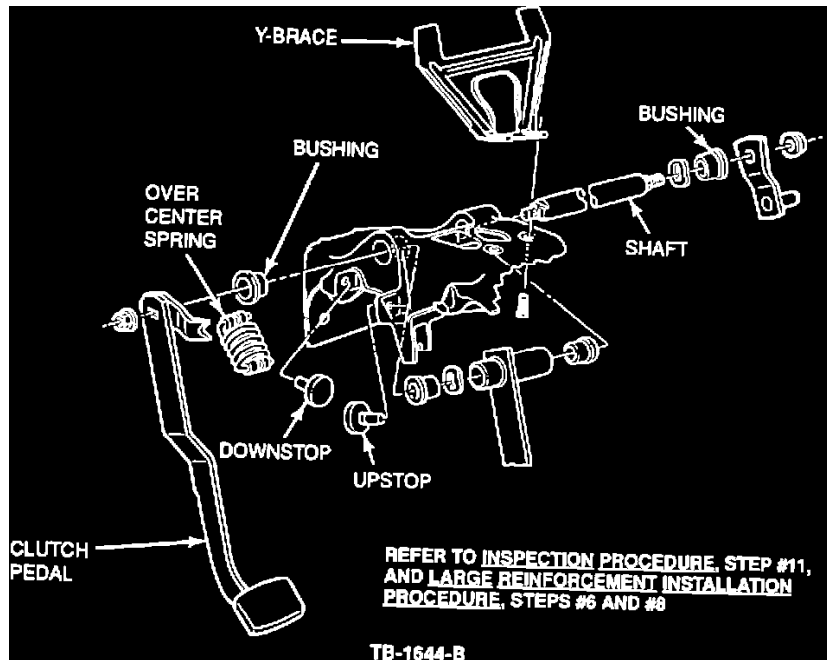


Figure 4

- c. Loosen the two (2) fasteners attaching the brake and clutch pedal support to the Y-brace, Figure 4.
7. Check for cracks.
    - a. Pull back the floor covering and dash sound insulator. (it may be helpful to remove the accelerator pedal.)
    - b. Inspect the area for pulled welds and torn dash sheet metal.

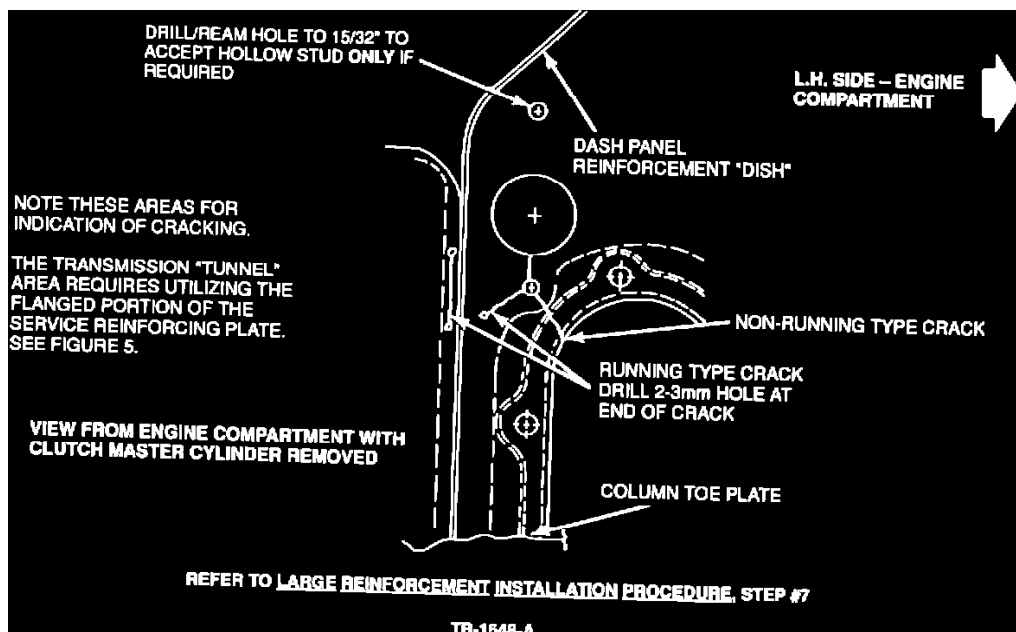


Figure 8

- c. If there are cracks that have not run out, stop them by drilling a 2-3 mm hole at the end, Figure 8.

NOTE: WELDING OR BRAZING IS NOT RECOMMENDED, BECAUSE IT COULD BE A SOURCE OF FUTURE BLIND SIDE CORROSION.

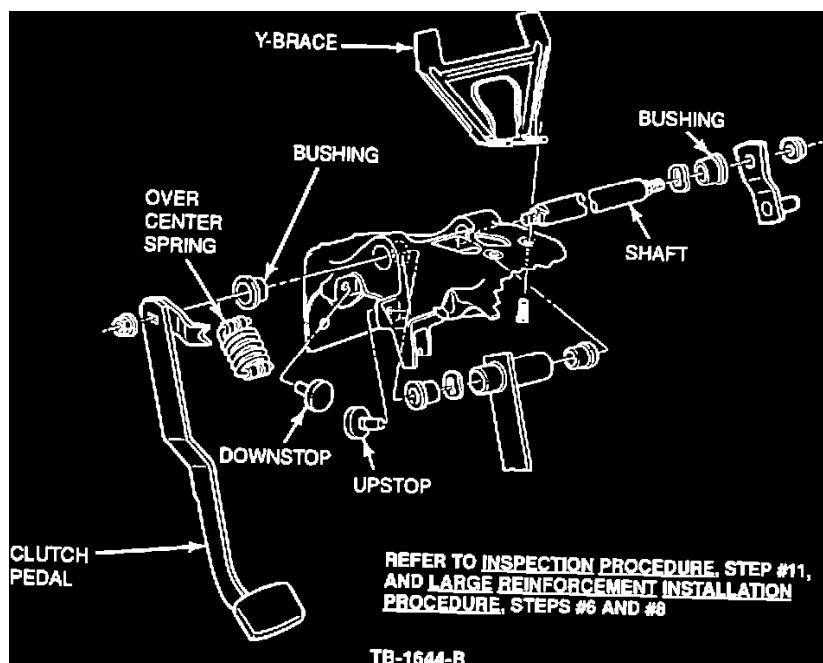


Figure 4

8. Thoroughly inspect the brake and clutch support again for cracks in the casting and worn bushings. Also, inspect the "Y" brace for cracks and missing fasteners. Replace as necessary, Figure 4.
9. Remove excess body sealer in the area of the clutch master cylinder, inside the dash.
10. Carefully remove the cowl top cover 12 fasteners (7 in front, 5 in rear).

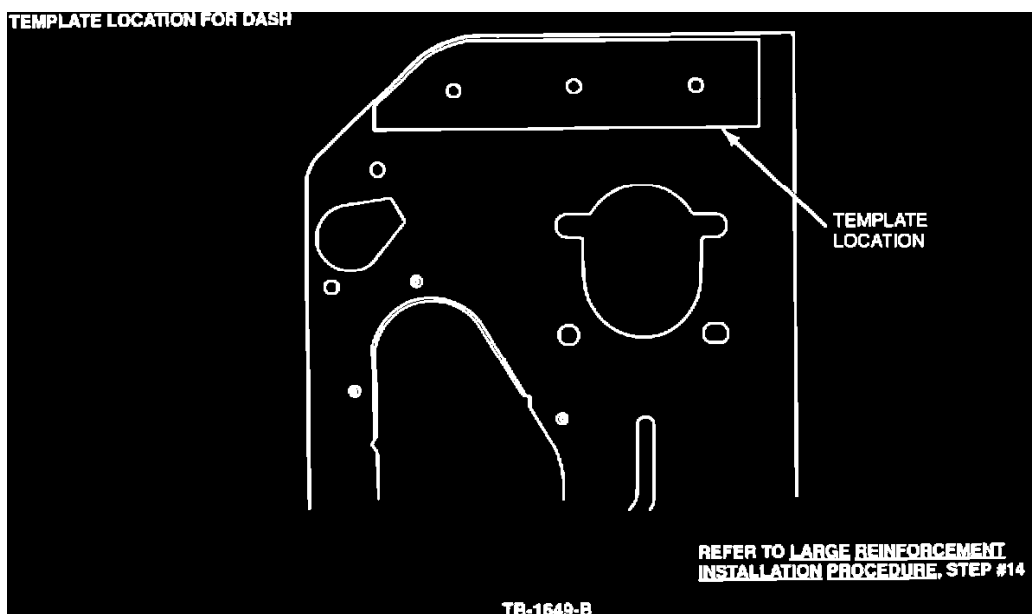
NOTE: IT MAY BE NECESSARY TO REMOVE THE RADIO ANTENNA AND REPOSITION THE HOOD TO ACHIEVE THIS. IF THE HOOD IS REMOVED, MARK THE LOCATION OF THE HINGES WITH A WAX PENCIL, PRIOR TO LOOSENING.

11. Place the main reinforcement in position.
  - a. Locate positively, using the lower steering column toe plate fastener and a bolt and nut (8 mm or 5/16") through the upper clutch master

cylinder stud hole.

**NOTE: THE SHEET METAL VARIES FROM TRUCK TO TRUCK AND IT MAY BE NECESSARY TO BEND THE REINFORCEMENT TO GET A GOOD FIT.**

- b. Tighten the upper nut and bolt securely to compress any distortion in the four sheet metal laminations in this area.
12. Drill the holes for the reinforcement plate.
  - a. Using a 3/8" (9.5 mm) drill bit, with the reinforcement as a template, drill two holes up into the cowl inner and three holes into the inner side of the dash.
  - b. De-burr the outside of the holes as necessary.
  - c. Remove any excess sealant in the area and clean up the drill chips inside the truck and cowl.
13. Attach the smaller plate via the three threaded holes into the engine compartment side of the dash inner panel.
  - a. Use three 8 mm bolts passed through the main reinforcement, from inside the cab.
  - b. Install the rubber cap (N804118) onto the end of the uppermost screw from under the dash.
  - c. Position the plate with the two studs attached inside the cowl, through the two holes drilled from below.
  - d. Attach two 8 mm nuts from the inside of the cab.
14. Using the paper template provided in the kit, proceed as follows:



**Figure 9**

- a. Center punch and drill three 3/8" (9.5 mm) holes into the dash reinforcement and through the cowl, from the engine compartment side, Figure 9.

**NOTE: DRILLING WILL BE EASIER IF THERE ARE NO SPOTWELDS VISIBLE THROUGH THE THREE HOLES.**

- b. If necessary, move the pattern outboard slightly to avoid any visible spotwelds.
- c. De-burr the holes inside the cowl as necessary and clean up the drill chips inside the cowl.

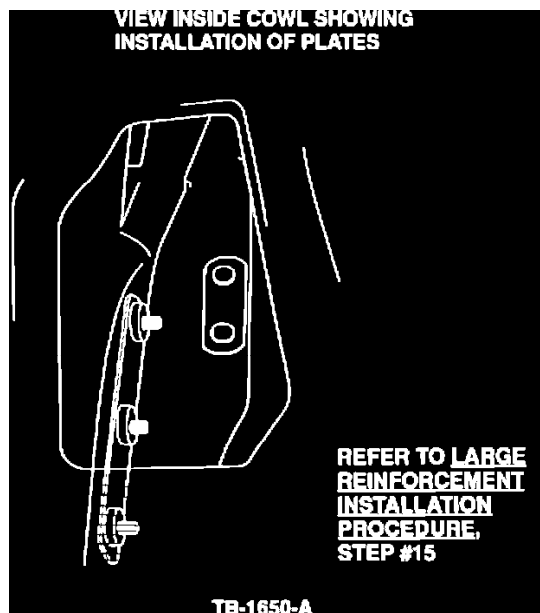


Figure 10

15. Place the larger three holed plate from the kit inside the cowl. Attach it with three 8 mm bolts through the dash reinforcement, from the engine compartment side, Figure 10.
16. Inspect the seam between the cowl inner and outer, inside the cowl, for cracks in the sealant. If necessary, add sealant.
17. Replace the cowl top.
  - a. If the hood was removed, locate the hinges to the wax pencil marks and tighten the fasteners.
  - b. Replace the radio antenna and windshield washer tube.
18. Re-install the brake booster and stoplight switch, if removed. Tighten the brace bolts.
19. Install the clutch master cylinder.
  - a. Inspect the clutch master cylinder for leaks in the area of the pushrod. Replace it if there is evidence of leaking.
  - b. Remove the nut and bolt from the top of the reinforcement.
  - c. Install the clutch master cylinder.
  - d. Inspect the position of the clutch master cylinder pushrod hole. The pushrod hole should go onto the lever pin with no force required while the pedal is against the upstop.

NOTE: ALTHOUGH THIS WAS SPECIFIED IN THE INSPECTION PROCEDURE, REPAIR MAY HAVE CHANGED THE SETTING.

- e. If the pushrod hole is not in position, install and adjust an adjustable clutch master cylinder pushrod (1987 and prior models) or install a new lever (7A554).

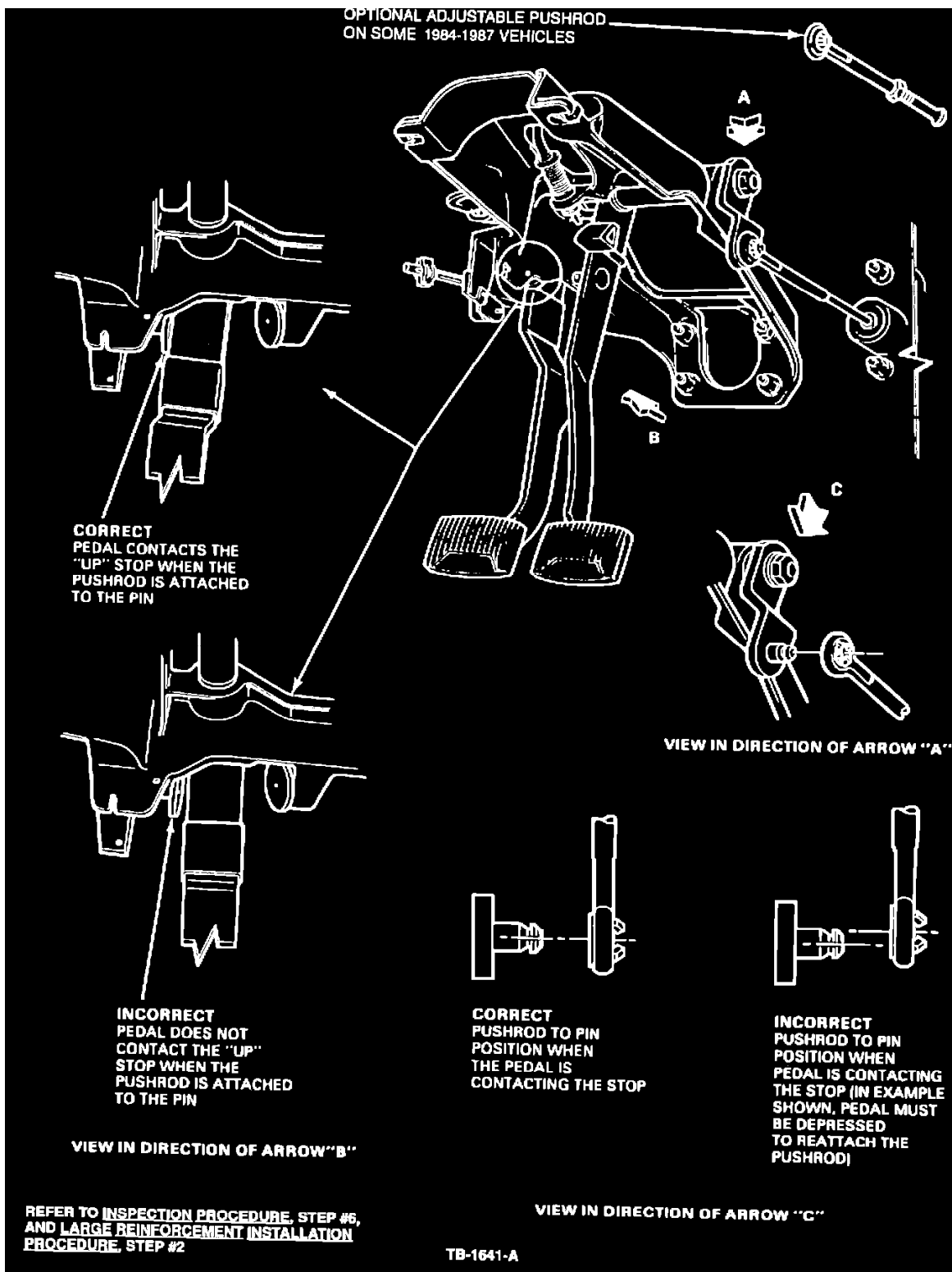


Figure 1

NOTE: THE NEW LEVER IS TIGHTENED INTO PLACE WHILE THE MASTER CYLINDER PUSHROD IS ATTACHED, TO SET THE CORRECT POSITION, FIGURE 1.

20. Remove the toe plate fastener from the bottom of the reinforcement and reinstall the steering column and five (5) fasteners.
21. Complete reassembly.
  - a. Re-install the dash sound deadener material and the instrument panel sound insulator.
  - b. Re-install the engine compartment sound insulator on diesel models.

- c. Connect the battery ground terminal.

## Final Inspection

If the truck has been driven for a long period of time with the broken dash and resulting poor clutch release, the clutch disc could be excessively worn or buckled.

Test drive the truck, evaluating the clutch for clean release. If the release is not satisfactory, measure the release bearing travel.

^ If it has the required 12 mm at full clutch pedal stroke, then the clutch may need to be replaced.

^ If the release bearing has less than the required release travel, then the hydraulic system probably needs to be bled.

## Suggested Bleeding Procedure - External Slave Cylinder

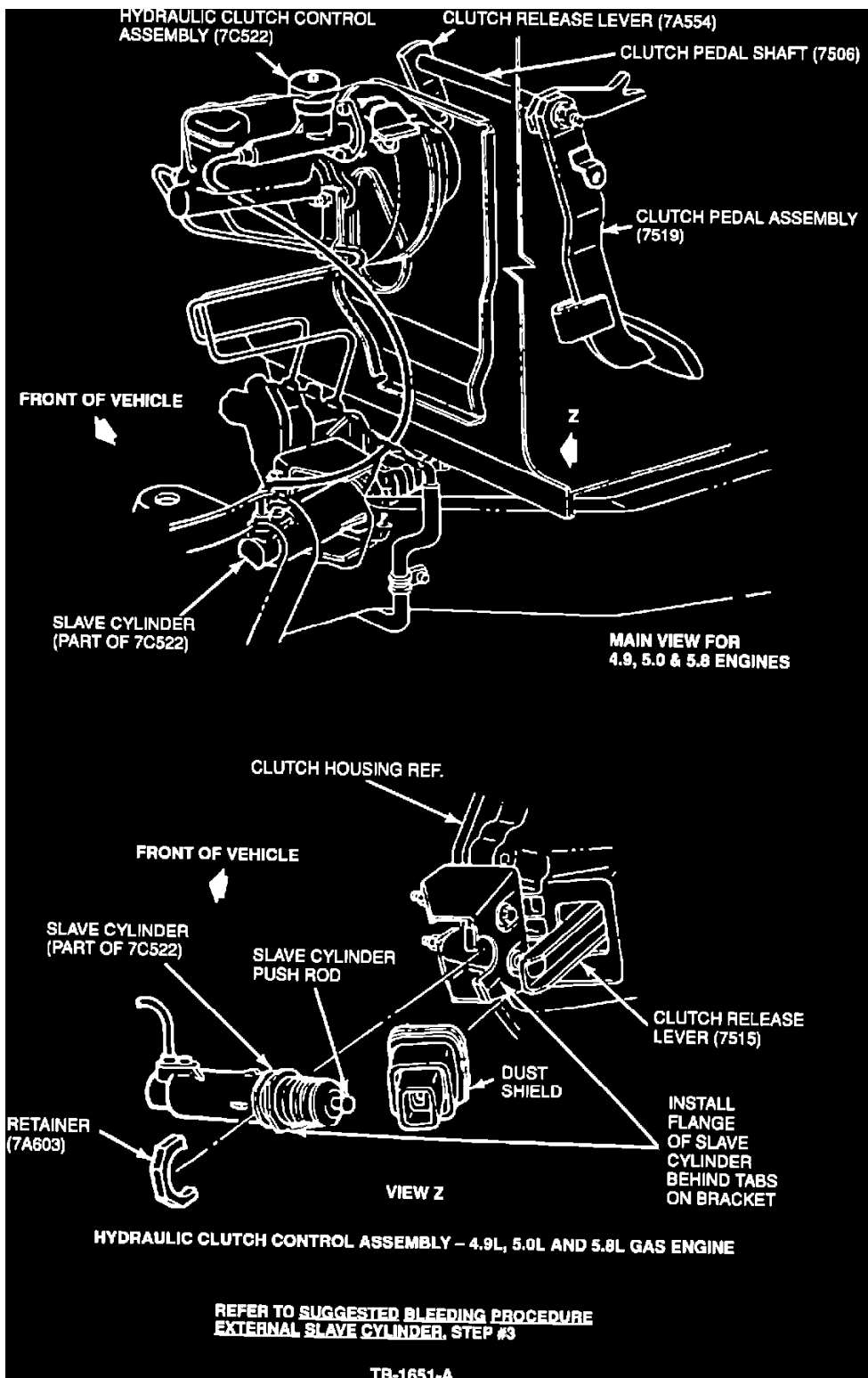


Figure 11

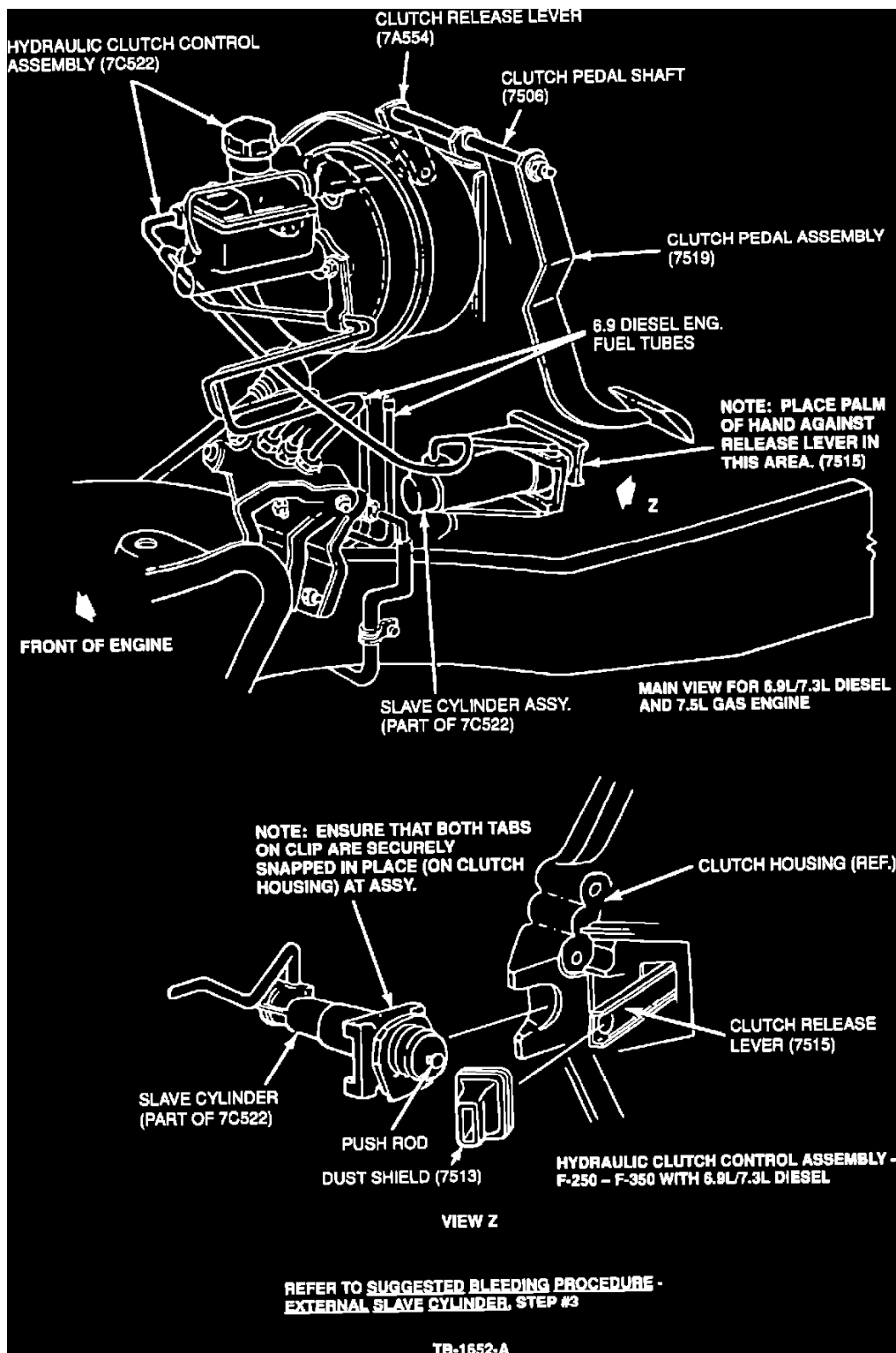


Figure 12

If the truck is a 1987 or prior model, 1988 model with a 7.3L Diesel, 7.5L EFI gas engine or the smaller family of engines with a Warner T-18 four speed transmission, proceed as follows:

1. Remove the master cylinder reservoir cap and diaphragm.
2. Check the fluid level to be sure it is at the step diameter of the reservoir. Do not over fill.
3. From below the truck, push the release lever slowly towards the front of the truck several times. Figures 11 & 12.
4. If it will not move, the master cylinder pushrod is not set correctly. See repair Step # 19.
5. Check the fluid level and replace the diaphragm and cap.

## Suggested Bleeding Proc - Internal Concentric Slave CYL.

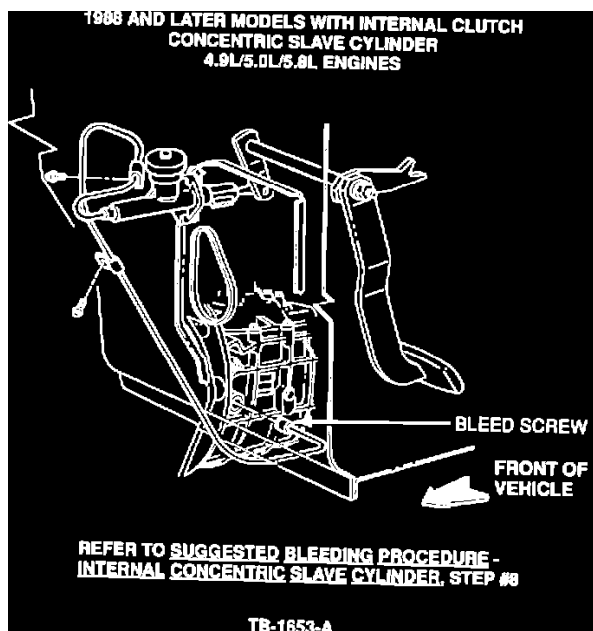


Figure 13

If the truck has a concentric slave cylinder, proceed as follows:

1. Operate the clutch pedal at full stroke, 10-20 times.
2. Check the fluid level at the change in diameter part of the reservoir. Do not over fill.
3. Have an assistant depress the clutch pedal slowly and hold it down.
4. Open the slave cylinder bleed screw and watch for escaping air, Figure 13.
5. Close the bleed screw and have the assistant release pedal.
6. Repeat this cycle several times until there is no sign of air. Be sure to keep the reservoir topped to the correct level.
7. Replace the diaphragm and reservoir cover.
8. Operate the clutch pedal at full stroke 10-20 times.

### Misc. Information

OTHER APPLICABLE ARTICLES: 86-20-10

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
901607A	Inspect & Adjust	0.5 Hr.
901607B	Install Reinforcement	2.9 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7050	50

OASIS CODES: 111000, 505000, 505200, 506000, 590000

Technical Service Bulletin # **911015**

Date: **910515**

### M/T - M50D Hard Shift Condition

Article No.

91-10-15

5/15/91

TRANSMISSION - M50D - HARD SHIFT TO REVERSE OR FIFTH GEAR

LIGHT TRUCK: 1988-89 ECONOLINE  
 1988-90 BRONCO II  
 1988-91 AEROSTAR, BRONCO, F-150, F-250, RANGER  
 1991 EXPLORER

ISSUE: The 5-R synchronizer sliding sleeve clutching teeth may wear on the reverse side. This may cause a hard to engage or partial engagement of fifth or reverse gear and could result in the transmission jumping out of gear. If the wear is allowed to continue, it may become difficult or impossible to engage 1-2-3 or 4th gear.

ACTION: Inspect the 5-R synchronizer sliding sleeve for wear and replace if excessive wear is found. Refer to the following procedure for service details.

INSPECTION PROCEDURE:

1. Remove necessary components so that the transmission extension housing can be removed without removing the entire transmission. Refer to the Light Truck Shop Manual Section 07-03A for service details.

NOTE: COMPACT VEHICLES MAY REQUIRE REMOVAL OF TRANSMISSION

2. Remove the transmission extension housing.
3. Inspect the 5-R synchronizer sliding sleeve for wear of the reverse clutching teeth.

REPAIR PROCEDURE

1. If wear is observed, remove speedometer drive gear (4 x 2 only).
2. Remove the top cover (if repairing on the bench).
3. Carefully remove the main shaft and counter shaft locking nuts.
4. Remove and replace the following transmission parts. Refer to the Light Truck Shop Manual for service procedures.

- ^ 5th Counter Shaft Gear
- ^ 5-R Synchronizer, hub and ring assembly

NOTE: INSTALL WITH THE DOT ON THE SYNCHRONIZER SLEEVE FACING REVERSE GEAR.

- ^ Reverse counter shaft gear
- ^ 5-R Counter Lever
- ^ 5-R Shift fork and rod

NOTE: USE THE SPRING AND BALL FROM THE EXISTING ASSEMBLY.

- ^ Replace the idler shaft in the reverse idler gear assembly (R1 only).

NOTE: THERE ARE EXTRA ADJUSTING SHIMS PROVIDED IN CASE IT IS NECESSARY TO RESET THE 5-R SYNCHRONIZER HUB AND CONTROL REVERSE GEAR END PLAYS TO SPECIFICATION. USE THE NEW MAIN SHAFT AND COUNTER SHAFT LOCKING NUTS UPON ASSEMBLY.

CAUTION: USE ALL THE PARTS CONTAINED IN THE SERVICE KIT INCLUDING THE COUNTER REVERSE LEVER. ALTHOUGH THE NEW LEVER LOOKS THE SAME AS THE ONE CONTAINED IN THE TRANSMISSION, CONTACT ANGLES ARE SLIGHTLY DIFFERENT TO INSURE PROPER TIMING AND ENGAGEMENT.

PART NUMBER	PART NAME	CLASS
F0TZ-7C391-E	Synchronizer Service Kit - R2	C
F0TZ-7C391-C	Synchronizer Service Kit - 2.3L, 2.9L, 3.0L, R1	C

F0TZ-7C391-D Synchronizer Service Kit - 4.0L C  
R1

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
911015A	Install Synchronizer Service Kit - 4 x 2	2.1 Hr.
911015A	Install Synchronizer Service Kit - 4 x 4	2.9 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7124	30

OASIS CODES: 505000

Technical Service Bulletin # **88820041588**

Date: **880401**

## M/T - Hard to Shift Disengages From Third Gear

TRANSMISSION - ZF MODEL S5-42 - HARD TO SHIFT INTO THIRD GEAR -

TRANSMISSION - ZF MODEL S5-42 - DISENGAGES THIRD GEAR

Article No. 88-8-20

LIGHT TRUCK: 1987-88 F SERIES, BRONCO

**ISSUE:** A hard shifting transmission during a 2-3 upshift or 4-3 downshift may be caused by a third gear synchronizer that has an improper surface finish. The hard shifting condition may also cause the transmission to disengage from third gear because of incomplete third gear engagement.

**ACTION:** To correct this, install a new design third gear synchronizer that was manufactured using a new machine lapping process to improve the surface finish. Refer to the 1988 Light Truck Shop Manual, Section 16-34-1 for removal and installation procedures.

PART NUMBER	PART NAME	CLASS
E7TZ-7124-C	Third Gear Synchronizer	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty and Powertrain Coverages

OPERATION: 880820A - Install third gear synchronizer

TIME: 7.6 Hrs. - F Series (4 x 2) 8.6 Hrs. - F Series (4 x 4) 8.3 Hrs. - Bronco

DLR. CODING: Basic Part No. 7124  
Condition Code: 85

Technical Service Bulletin # **901110**

Date: **900523**

## Steering/Suspension - Shimmy

Article No. 90-11-10

- ^ STEERING-SHIMMY-DIAGNOSTIC PROCEDURE-4X2 UNITS ONLY
- ^ SUSPENSION-SHIMMY-DIAGNOSTIC PROCEDURE- 4X2 UNITS ONLY

LIGHT TRUCK: 1987-89 F-350

**ISSUE:** Front end shimmy may occur at various driving speeds or when hitting bumps in the road. There are several vehicle conditions sometimes described by customers as shimmy which may not actually be "shimmy". Shimmy, as observed by the driver, is defined as large amplitude, rotational oscillations of the steering wheel resulting from large, side to side tire/wheel movements.

**ACTION:** Inspect the truck and perform the following diagnosis to determine the shimmy's causal factors. Be aware of the following points:

- ^ Shimmy is not always confirmed during road testing.

- ^ It is very important to check all systems that can cause shimmy.
- ^ After a general review of the front suspension/steering systems, make the necessary adjustments and replacements as noted.
- ^ Check bolt and nut torques to be sure they are tightened to the specified torque specifications.
- ^ Check the front end alignment. Look for excessively worn tires and out of balance wheel and tire assemblies.

Shimmy should not be confused with steering wheel nibble and vibration concerns.

^ Steering wheel nibble is a condition resulting from the tire interaction with various road surfaces. It is observed by the driver as small amplitude, rotational oscillations of the steering wheel.

^ Various suspension/steering vibrations are sometimes confused as shimmy. They appear as steering column shake and wheel/tire imbalance. They induce a vertical motion in the steering wheel/column.

Refer to the appropriate model year Light Truck Shop Manual, Sections 18-01, 11-01 and 12-01 for NVH conditions other than shimmy.

## Steering Linkage Inspection:

1. With the weight on the front wheels, check the linkage joints while someone else turns the steering wheel from side to side.

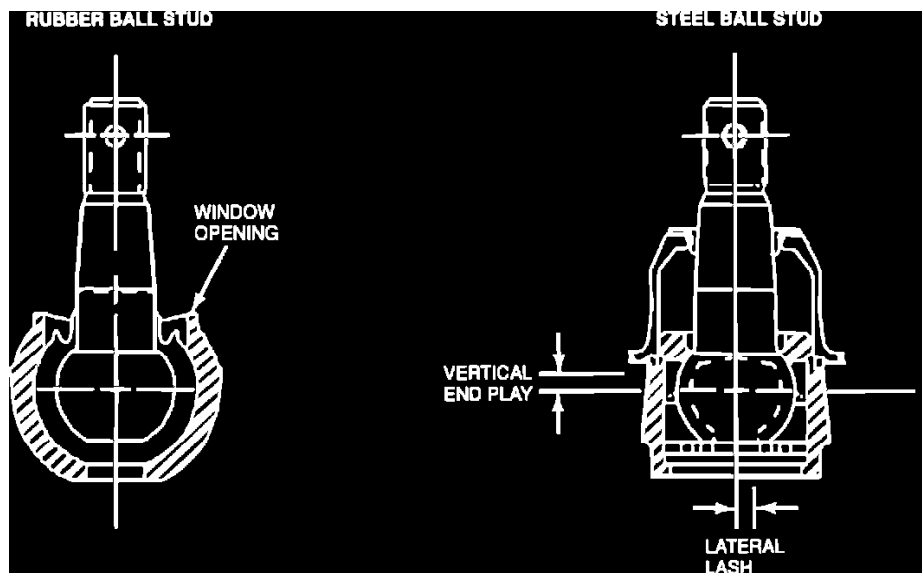


Figure 1

- a. For rubber ball socket (RBS) joints, see if the ball stud makes contact with the window opening in the socket bowl while on the truck, Figure 1. If contact is made with the window opening, replace it with a greaseable steel joint.
- b. For steel (greaseable) joints, measure the lateral (side to side) lash in the joint, Figure 1.
  1. If the lash exceeds .060" (1.59 mm), replace the joint.
  2. With the truck on a hoist, check the steel (greaseable) joints for vertical (up and down) end play by pushing and pulling on the joint, Figure 1. If the end play exceeds .090" (2.38 mm), replace the joint.

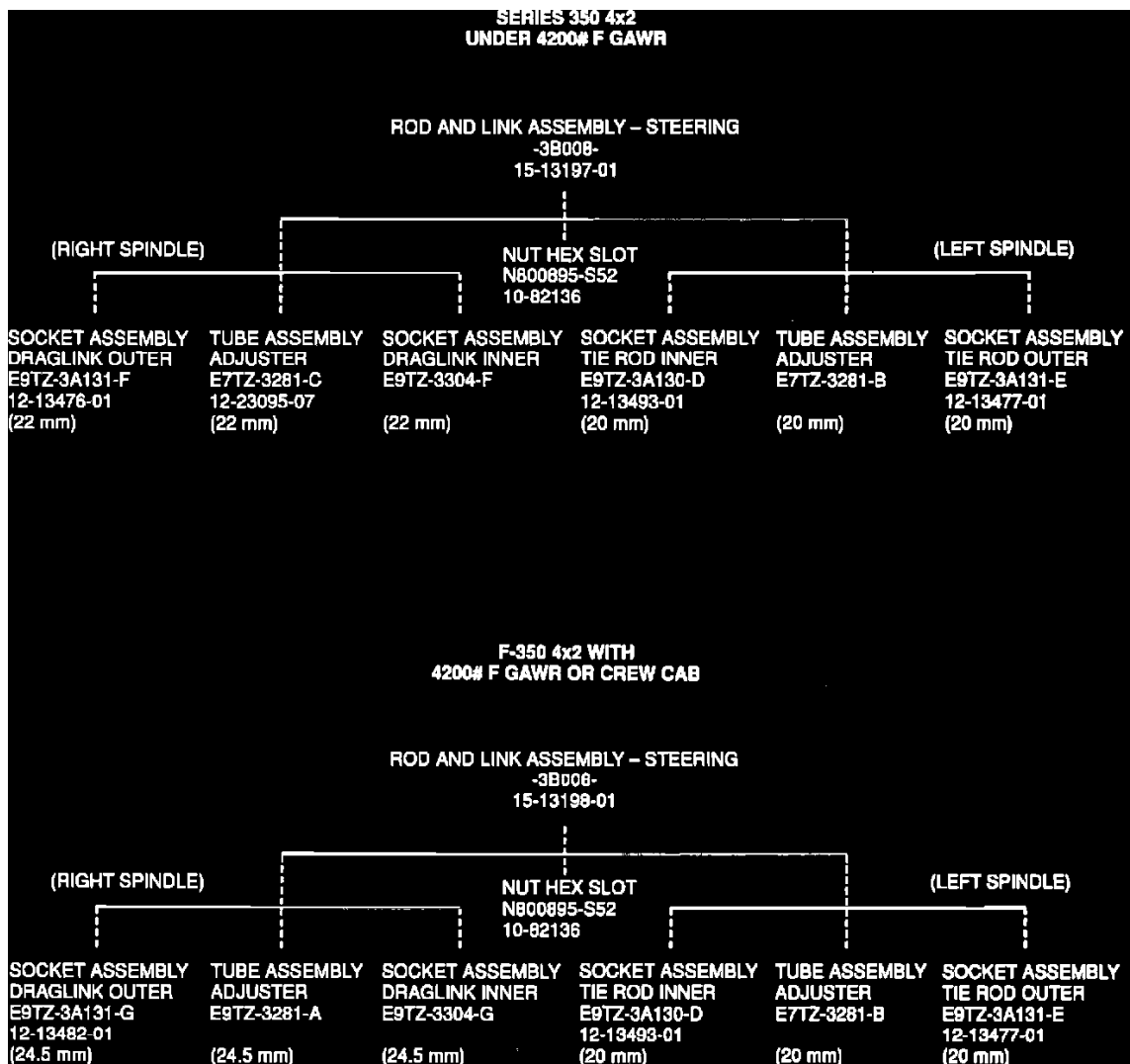


Figure 2

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B483-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

3. Remove the linkage from the truck, Figure 2.
  - a. See if the rubber is torn on the RBS. If the rubber is torn, replace it with a greaseable steel joint.
  - b. See if the steel joint will spin freely. If the joint spins freely with the hand, replace the joint.

Refer to Figure 2 for specific service part applications.

## Steering Gear Inspection:

1. Inspect the mounting surface of the steering gear. Check the frame area for the following:
  - ^ Signs of motion
  - ^ Loose rivets
  - ^ Cracks - Removal of the gear from the frame may be required to check for cracks.

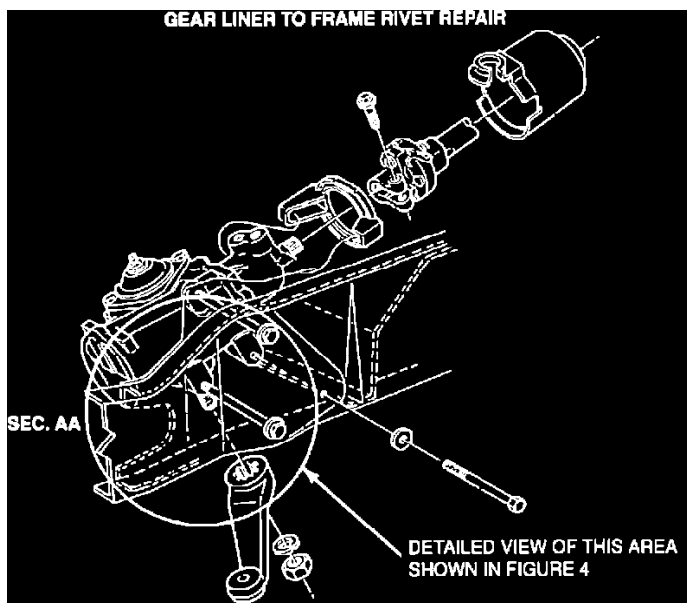


Figure 3

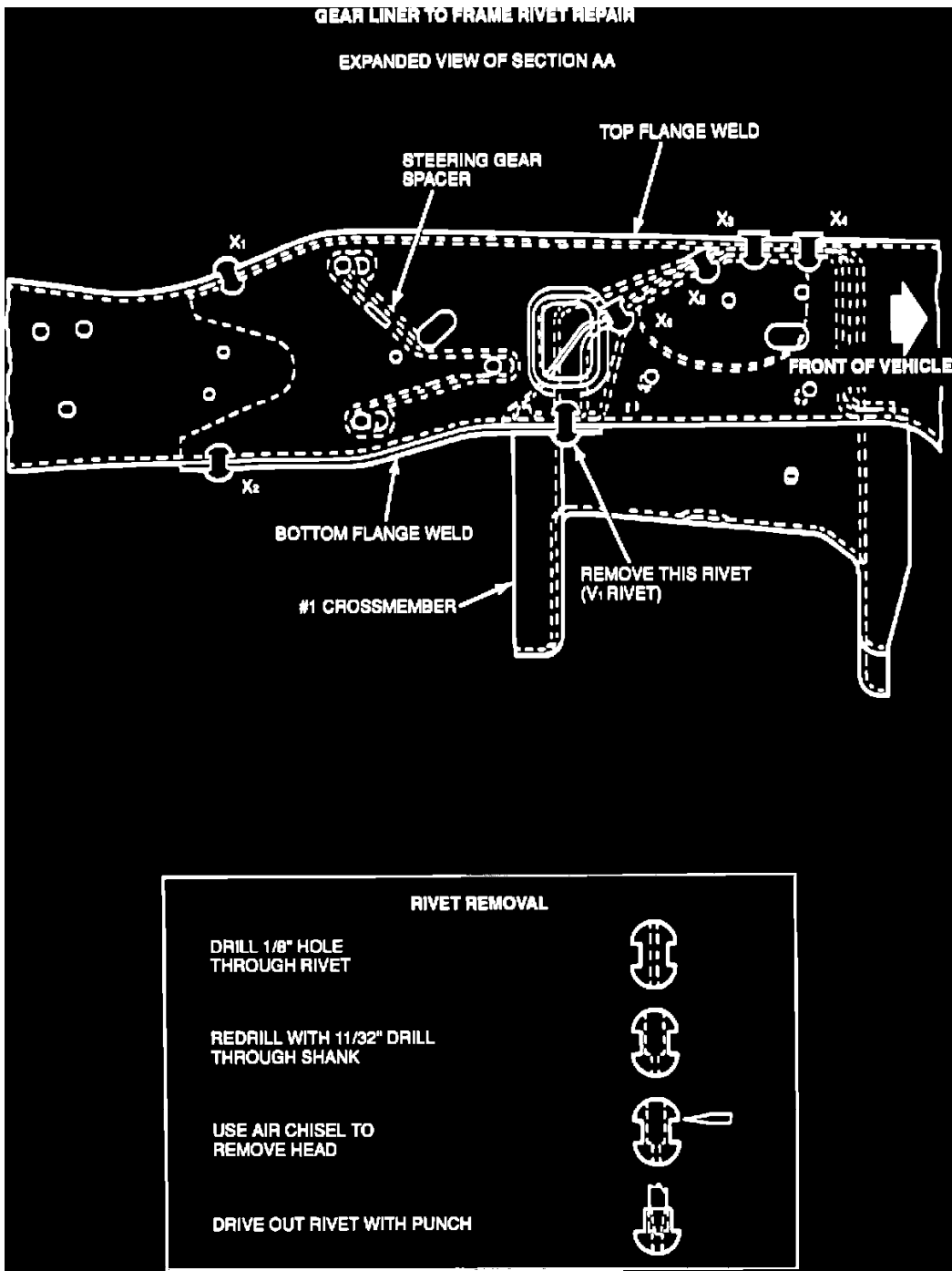


Figure 4

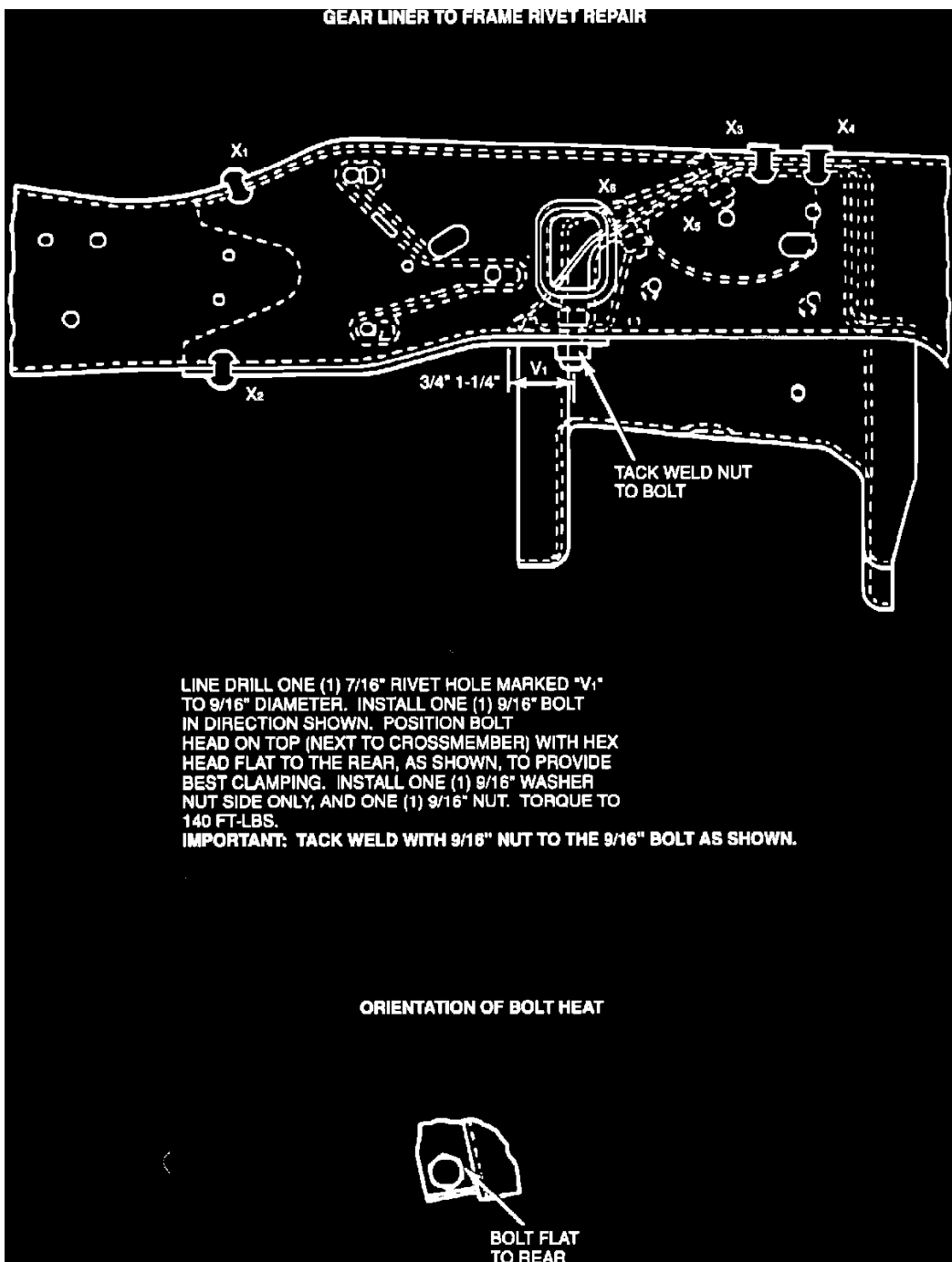


Figure 5

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

2. Repair trucks with a cracked frame liner or loose rivets by using Frame Repair Kit (E6TZ-5K130-A). See Figures 3, 4 and 5.
3. Inspect the frame for cracks in the following areas.
  - ^ Frame rail near the steering gear top and bottom flanges
  - ^ Frame rail at the steering gear bolt heads.
  - ^ Frame rail at or near the spring tower bracket
  - ^ Engine crossmember front LH flange.
4. If there are cracks in any of the above locations, replace the frame.
5. If a dealer confirmed shimmy has been experienced, replace the steering gear sector shaft. Use steering gear sector shaft repair kit (EOAZ-3375-A). Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.
6. Check for the presence of mesh load.
  - a. With the front wheels off the ground, hold the tire and turn the tire side to side slowly.
  - b. See if the effort increases when turning the tire straight ahead.
  - c. If no increase is noted, perform the Shop Manual procedure to check and adjust mesh load. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.

### Wheel End Friction and Wheel Bearing End Play Inspection:

1. Inspect the vehicle for worn ball joints. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 14 for service details. Replace as required.
2. Check the wheel bearing end play. Refer to the appropriate model year Light Truck Shop Manual, Vol A, Section 14 for service details. Adjust the end play or replace the wheel bearings as required.

### Vehicle Desensitizing

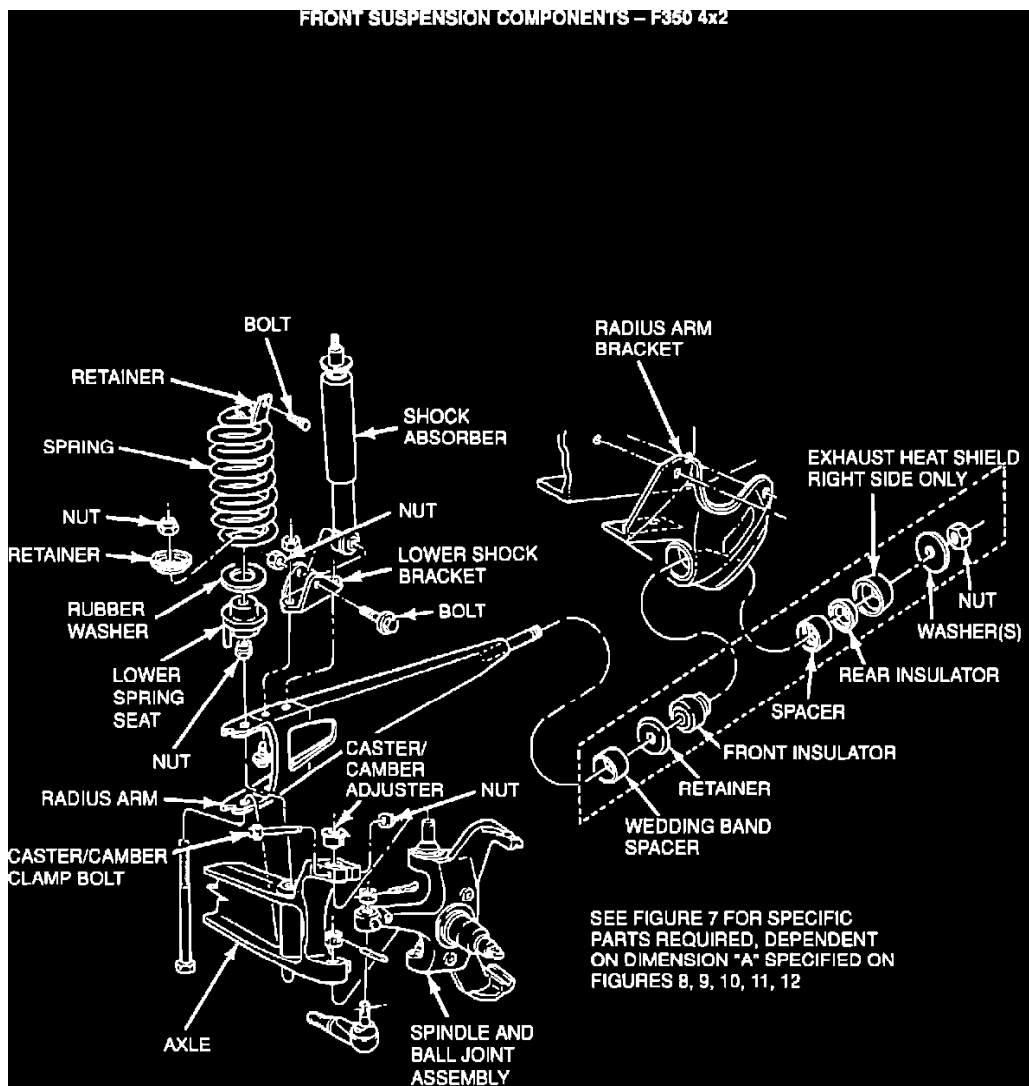


Figure 6

SKETCH NO.	RADIUS ARM STUD LENGTH (DIM. "A") UNTHREADED	WEDDING BAND N804264-S2 8 mm THICK	RETAINER 3B186	INSULATOR FRONT E7TZ-3B203-A	BRACKET E41Z-3B095-B (L.H.) E41Z-3B095-A (R.H.)	SPACER E5TZ-3B244-A	INSULATOR REAR D8TZ-3B203-A	HEAT SHIELD (R.H. ONLY) E1TZ-3B483-A	WASHER 4.5 mm THICK 379572-S2	WASHER 7 mm THICK N805144-S56	NUT 34892-S2	(FRAME MOUNTED) RADIUS ARM					
	F350 4x2 DRW																
2	67.7/69.2 mm	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y					
3	74.7/76.2 mm	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y					
	F350 SRW																
3.2	59.7/61.2 mm	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y					
3.4	67.7/69.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y					
3.6	74.7/76.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y					

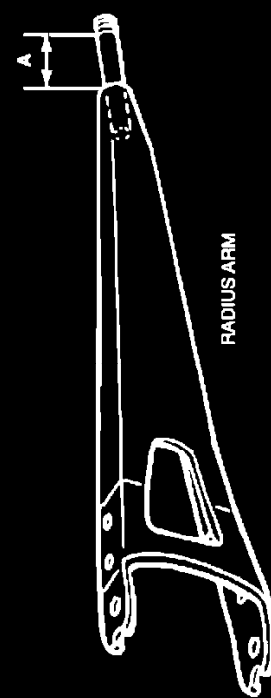


Figure 7

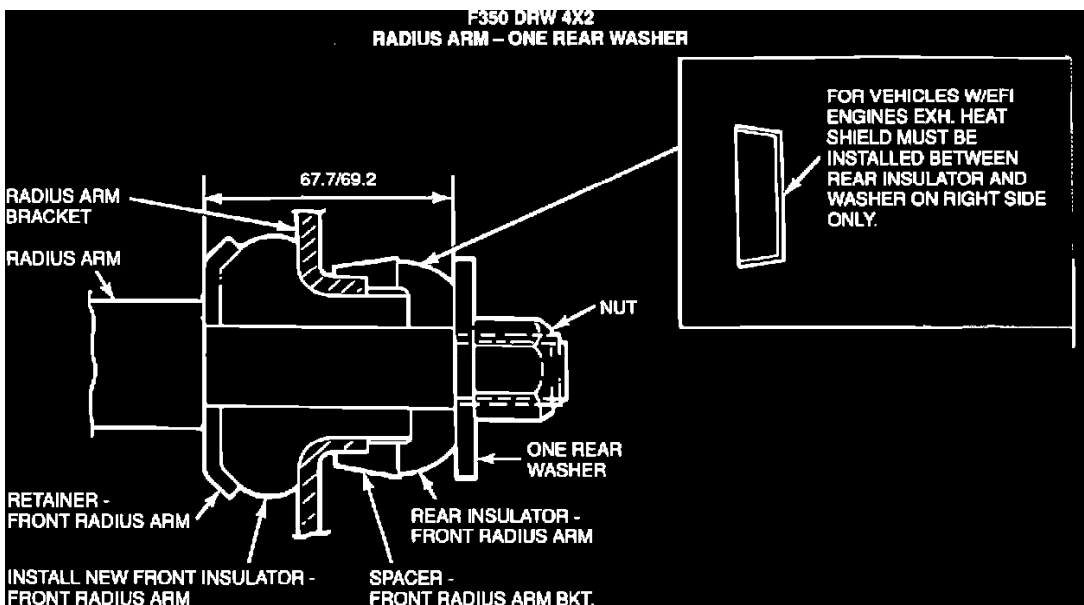


Figure 8

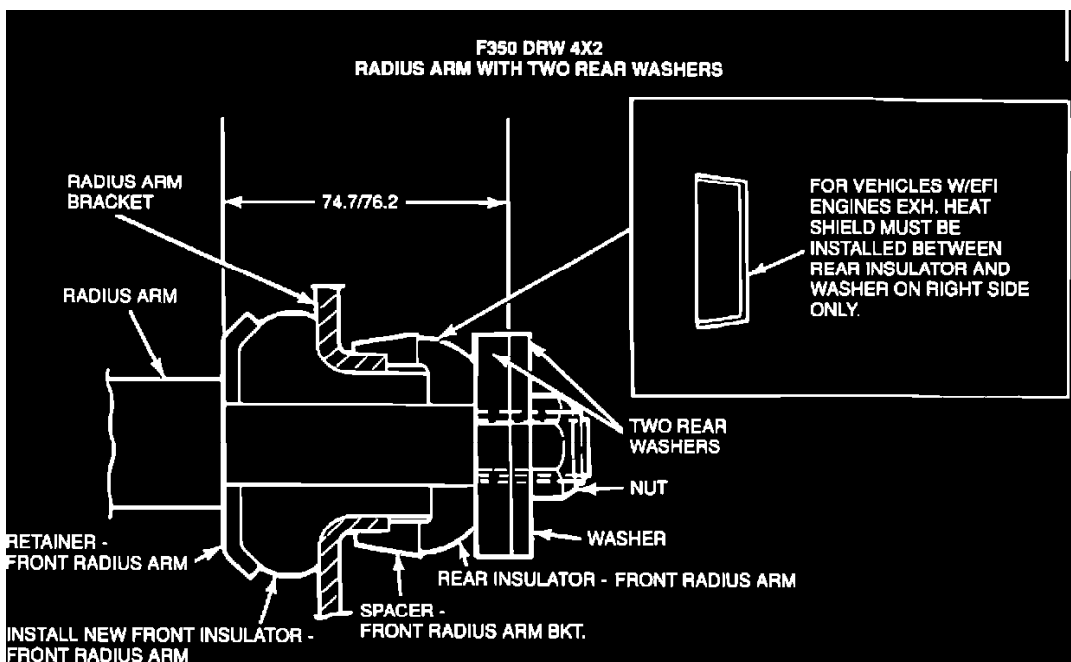


Figure 9

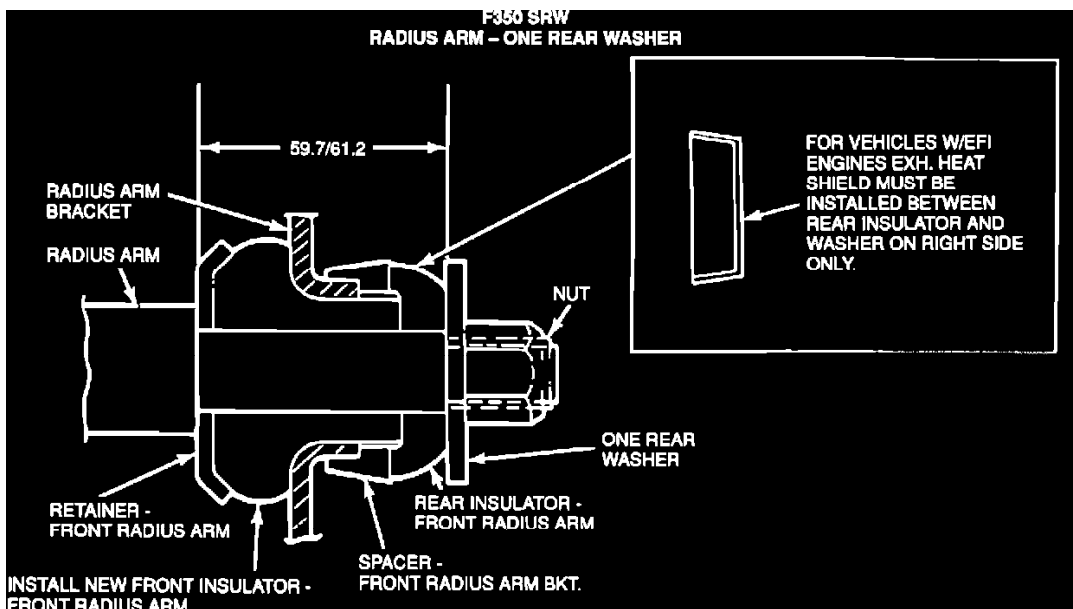


Figure 10

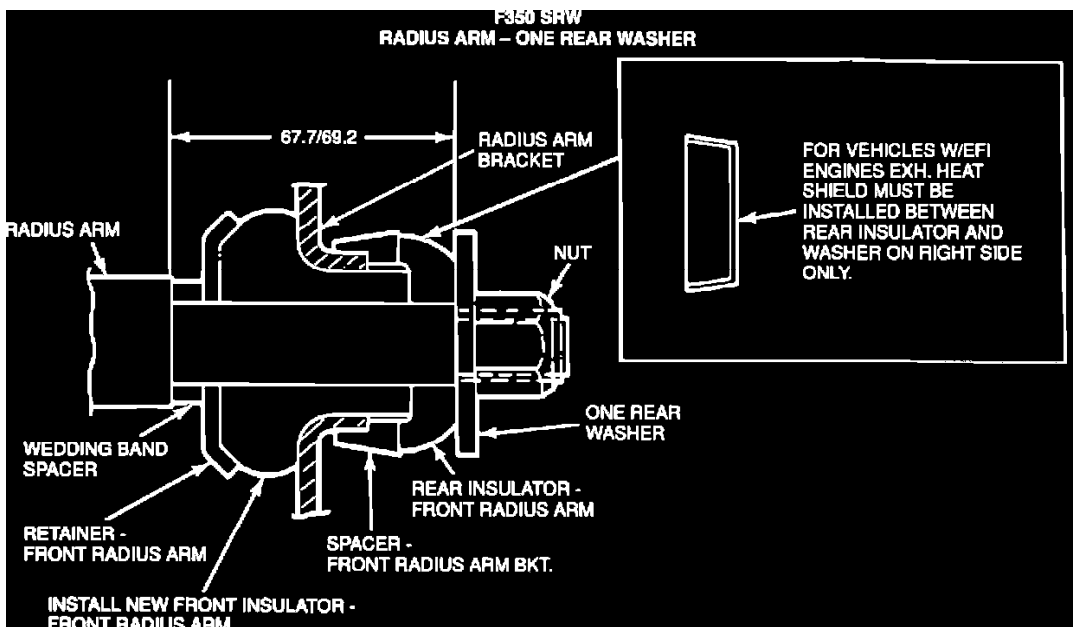
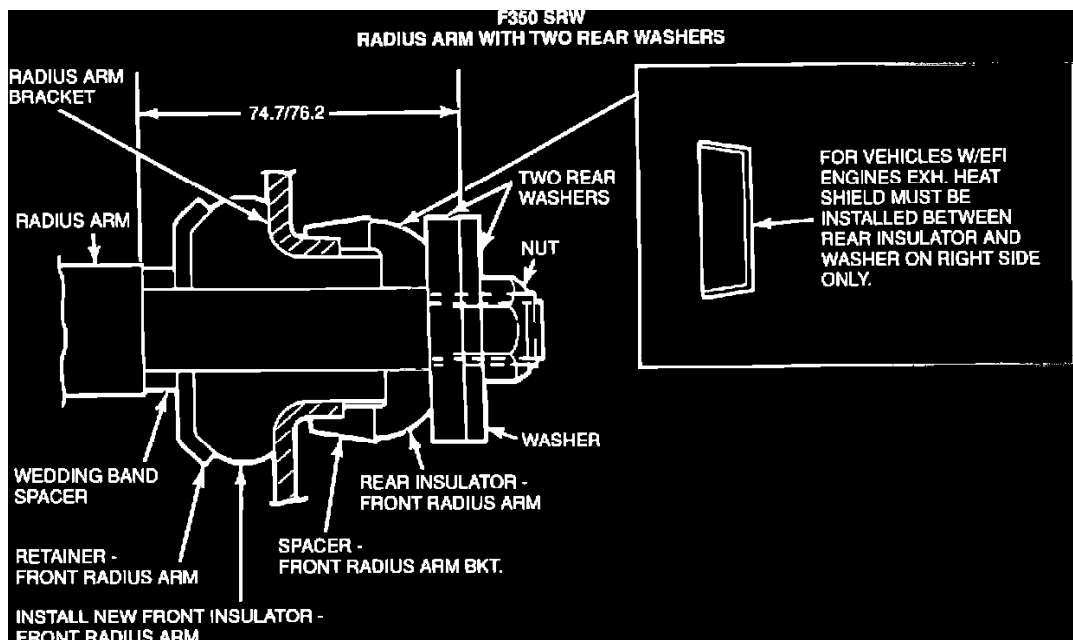


Figure 11



**Figure 12**

1. Inspect the radius arm bushing part stack, Figure 7.
2. Measure the radius arm stud length. See the component matrix, Figure 7, to determine the parts involved and the bushing part stack height for the F-350 DRW 4x2 and the F-350 SRW 4x2. Figures 6 through 12 show the radius arm bushing stack for each truck and follows the matrix.
3. Install rubber bushing (E7TZ-3B203-A) if it is not present on the vehicle.

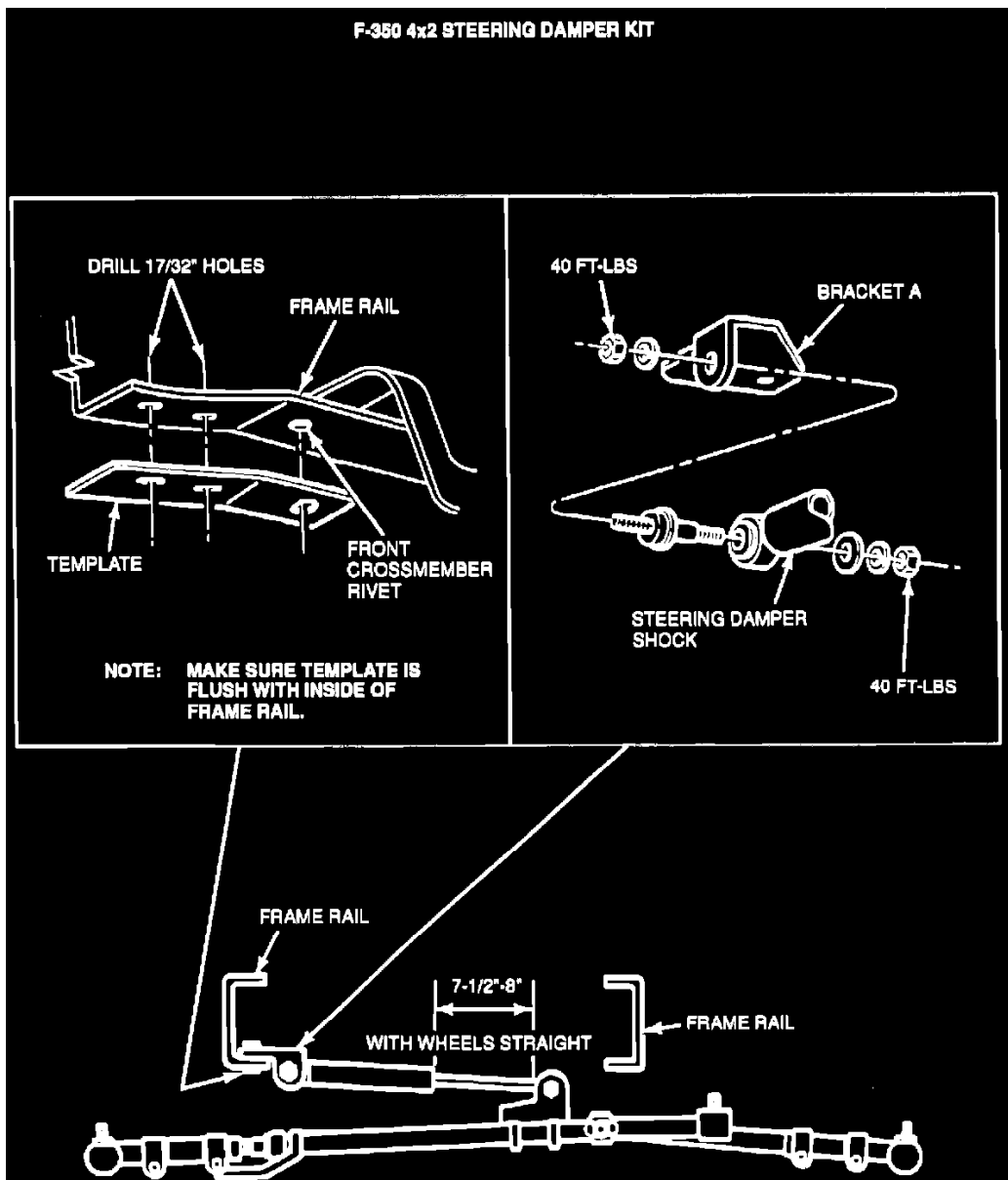


Figure 13

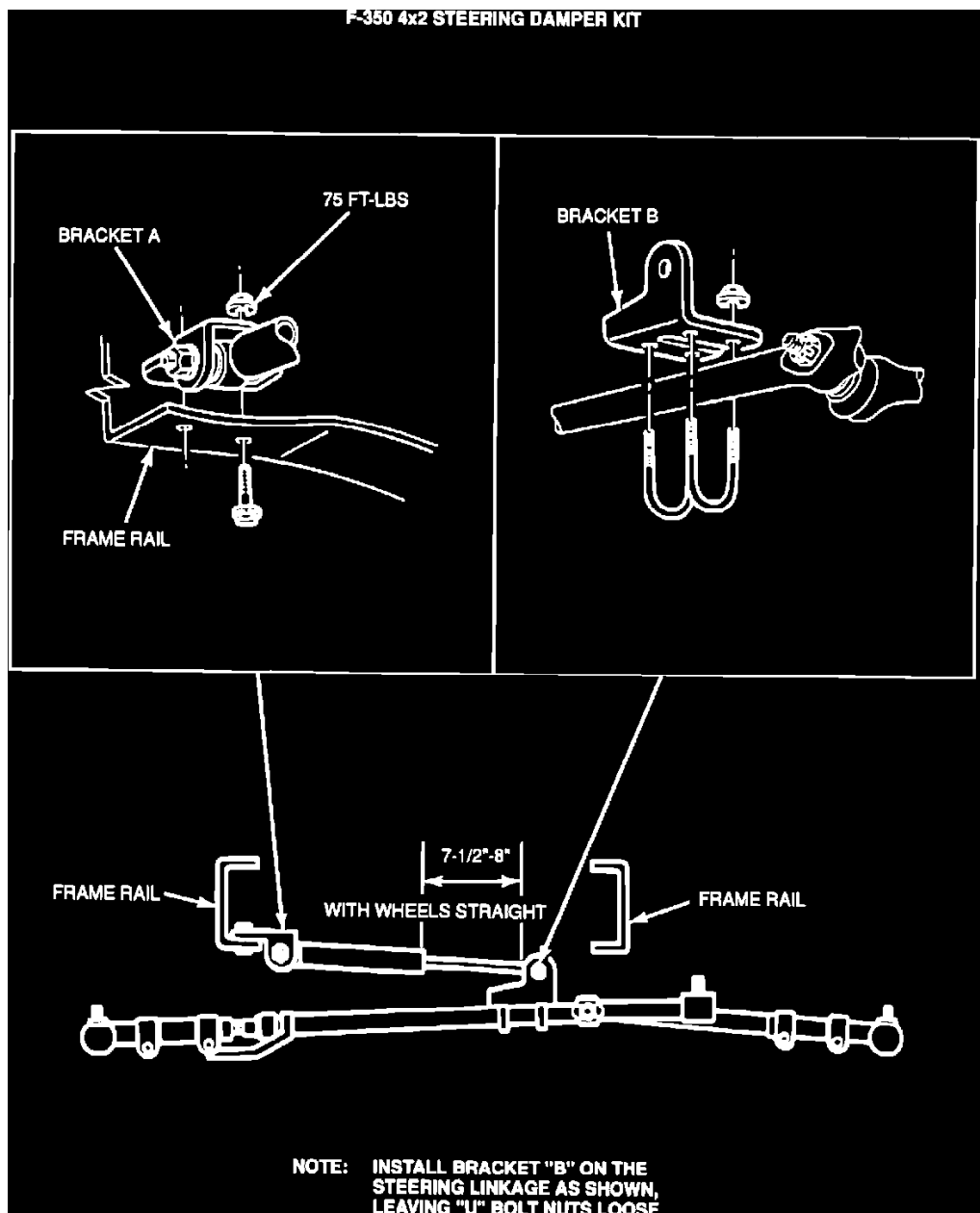


Figure 14

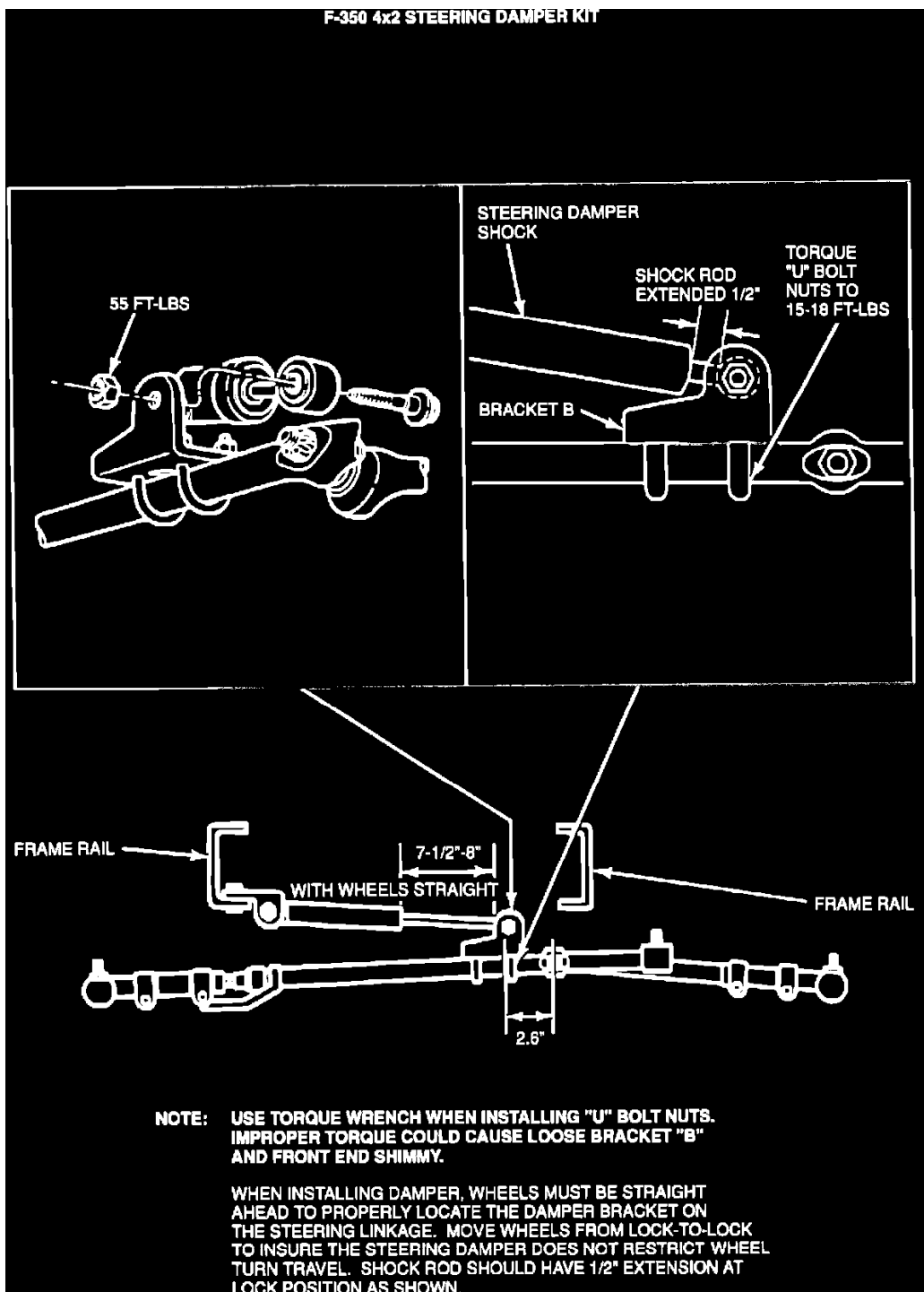


Figure 15

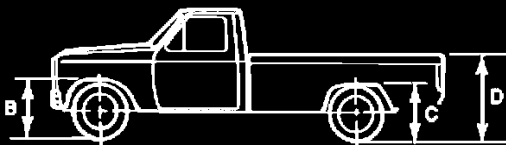
PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
E0AZ-3675-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

4. Check the truck for the presence of a steering damper on F-350 DRW 4x2 vehicles. See Figure 13, 14 and 15 for a step by step installation procedure.
5. Install a damper (Service Kit E7TZ-3E651-A) on F-350 DRW 4x2 only if it is not present on trucks built before 1/6/88. A damper kit can be installed on trucks built after 1/6/88, if a shimmy is experienced.

## Alignment

TRUCK MODEL	ALIGNMENT FACTORS DEGREES (INCH)	ALIGNMENT SPECIFICATIONS				STANDARD VEHICLE ATTITUDE -REF-			
		AT DESIGN RIDE HEIGHTS (REF)	ASSEMBLY PROCESSING	SHOP MANUAL OR IN-SERVICE CHECKING	MAXIMUM VARIATION BETWEEN WHEELS	LATERAL TILT 2) (SIDE TO SIDE HEIGHT DIFFERENCES)			DOG-TRACK
						"B" FRONTWHEEL HOUSE OPENING	"C" REAR WHEEL-HOUSE OPENING	"D" REAR END OF PICKUP BOX	
F-250 4x2 F-350 4x2	CASTER	7.2	●	1) 3)	1.5	15 mm	20 mm	20 mm	30 mm
	CAMBER	-0.5	●	1)	0.7				
	TOE 4)		-0.08 ± 0.25 (-0.03 ± 0.125)	+0.08 ± 0.25 (+0.03 ± 0.125)					
	STEERING AXIS INCLINATION	13.0							
	* INCLUDED ANGLE	12.5							

\* INCLUDED ANGLE DOES NOT CHANGE WITH RIDE HEIGHT  
 ● NOT ASSEMBLY PLANT CONTROLLABLE



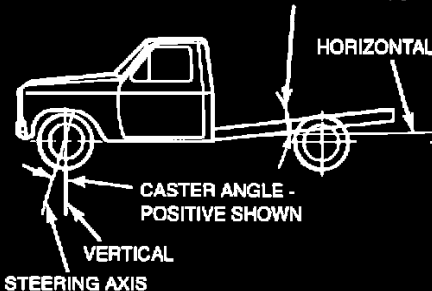
1) SEE CASTER AND CAMBER CURVES ON SHEET 2. CASTER AND CAMBER SETTINGS DEPEND ON RIDE HEIGHT DIM "A"

2) LATERAL VEHICLE TILT SPECIFICATIONS ARE MAX. ALLOWABLE FOR EITHER:  
 - VEHICLE AT CURB WEIGHT WITHOUT OCCUPANTS OR  
 - VEHICLE LOADED (NOT EXCEEDING GVW) WITH EQUALLY DISTRIBUTED WEIGHT OVER THE CARGO AND OCCUPANT AREAS

3) THE CASTER GRAPHS (SEE SHEET 2) AGREE WITH A LEVEL VEHICLE (0° FRAME ANGLE). IF THE VEHICLE IS LOWER IN THE FRONT THEN ADD THE FRAME ANGLE TO THE MEASURED CASTER READING AND COMPARE THIS SUM TO THE GRAPHED SPECIFICATIONS FOR THE GIVEN RIDE HEIGHT. IF THE VEHICLE IS LOWER IN THE REAR THEN SUBTRACT BEFORE COMPARING TO SPECIFICATION

4) TOE IS SET AND TO BE CHECKED AGAINST SPECIFICATION IN-SERVICE AT CURB RIDE HEIGHT ONLY. CURB RIDE HEIGHT IS A VEHICLE AS BUILT FROM THE ASSEMBLY PLANT, FULL FLUIDS, WITH NO ADDITIONAL WEIGHT FROM PASSENGERS, CARGO, AFTER MARKET ITEMS OR BODY MODIFICATIONS. TOE MAY BE RESET TO THE SHOP MANUAL OR OTHER RECOMMENDED SETTING AT ANY RIDE HEIGHT THAT THE VEHICLE WILL OPERATE AT FOR AT LEAST 50 PERCENT OF ITS USE. HOWEVER, TOE SET TO THE SHOP MANUAL SPECIFICATION AT CURB PROVIDES OPTIMUM VEHICLE AND TIRE WEAR PERFORMANCE FOR ALL RIDE HEIGHTS BETWEEN CURB (UNLOADED) AND GVW

FRAME ANGLE - MEASURE IN FLAT AREA AHEAD OF REAR WHEELS



INCLUDED ANGLE

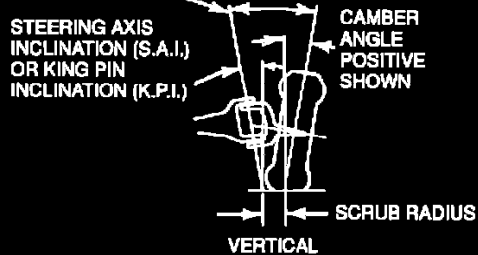


Figure 16

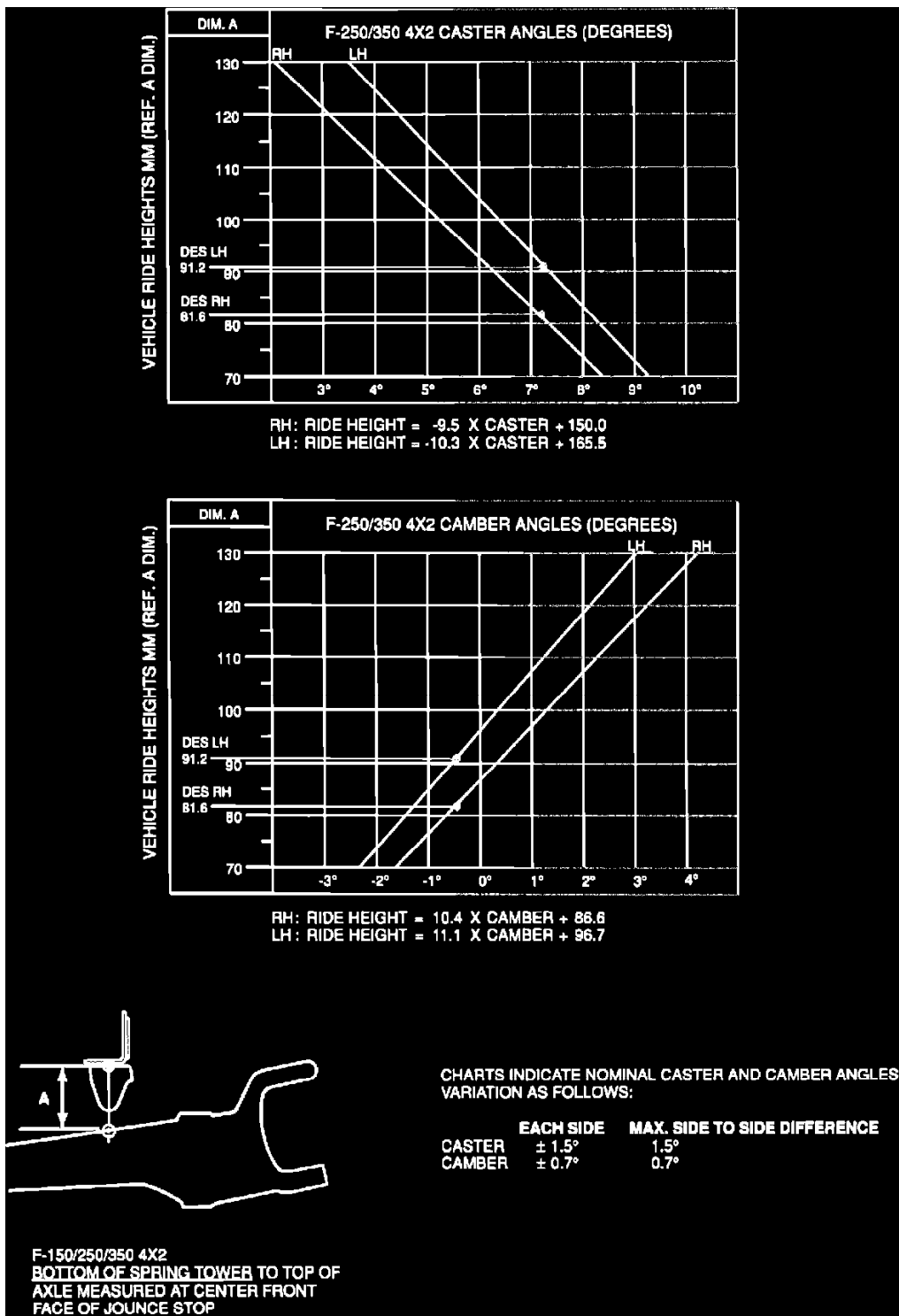


Figure 17

CAMBER OF 0 +/- 1/2~ AS VEHICLE IS OPERATED IS OPTIMUM

1. For vehicles with constant load (utility bodies) - Set camber to 0 +/- 1/2~. Refer to Figures 16 and 17.
2. For vehicles with varying loads (wreckers, dumps, rollback tilts, stake racks, etc.), proceed as follows:
  - a. Have the customer measure fender to ground heights, at wheel centerline with vehicle empty and loaded.
  - b. Measure the front end alignment..
    - ^ Caster
    - ^ Camber

- ^ Toe
- ^ Ride height
- ^ Front fender height to ground
- Determine the difference of customer measured loaded and empty fender height to ground when the alignment is measured.
  - Compute camber at customer measured heights by adding 3/4~ per 1/2" height difference for higher customer heights. Subtract 3/4~ per 1/2" height for lower measured fender heights to measured camber.
  - Compute the average camber by averaging the high and low numbers.
  - Reset camber with computed average between 0 + 1/2~.

## TOE

- Set Toe to 0 +/- 1/2~.

## CASTER

- Set caster as shown in the Shop Manual according to ride height.

## Wheels/Tires Size, Pressure, Balance, Wear

1987 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHL	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/86R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Argent Wheel/Optional Black - Wheel E5TA-UB

1988 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHL	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	60
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Gray Wheel/Optional - Black Wheel E7UA-JA

1989 F-350 TIRE/WHEEL RELEASES									
F-350 MODEL	WHL. BASE	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR	REMARKS
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80	HD FT END OPT
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80	
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Super Cab	D/R	155	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
		161	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	

\* Gray Wheel/Optional Black Wheel E7UA-1A

RECOMMENDED TIRE USAGE - 1989 F-350 TIRE RELEASES							
APPROVED SUPPLIER	LT215/85R16 LRD - A/S	LT215/85R16 LRD - A/T	LT235/85R16 LRE - A/S	LT235/85R16 LRE - A/T	7.50R - 16 LRD - HWY	7.50R - 16 LRD - A/T	7.50R - 16 LRD - M-S
Firestone	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88
Michelin	87/88/89		87/88/89	87/88/89			
Goodyear		87/88/89	87/88/89		87		87/88
General			87/88/89	87/88/89			

#### SIZE AND PRESSURE

- Compare the tire and wheel with the sizes and pressures on the certification label or the following Tire/Wheel Release Charts to make sure the correct tire is used. Inflate the tire to the specified pressure.

#### BALANCE

- Make sure of the correct balance of the front wheels.

#### WEAR

- If heel and toe wear or edge wear are present, rotate the tires.
  - ^ For single rear wheels the same tread styles front and rear, cross rotate all four tires.
  - ^ For single rear wheels with different tread styles, cross switch the front tires.
  - ^ For all dual rear wheels, cross switch the front tires.

Check and reset tire pressure per the certification label or the following Tire/Wheel Release Charts.

NOTE: FOR TIRES WORN TO THE POINT OF REPLACEMENT, USE RELEASED TIRES AS SHOWN IN THE FOLLOWING TIRE/WHEEL RELEASE CHARTS.

## Parts, Time & Etc

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
901110A	Steering Linkage Inspection	0.4 Hr.
901110B	Steering Gear Inspection	0.2 Hr.
901110C	Install Frame Kit	11.7 Hr.
901110D	Install Sector Shaft Repair Kit	0.4 Hr.
901110E	Adjust Steering Gear	0.6 Hr.
901110F	Wheel Bearing End Play Inspection	0.2 Hr.
901110G	Vehicle Desensitizing	1.3 Hr.
901110H	Alignment	1.7 Hr.
901110I	Tire Rotation & Balance	0.9 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
FRONT	W4

OASIS CODES: 3100, 3200

Technical Service Bulletin # 88817041588

Date: 880401

**Front Drive Axle Hublock - Inoperative**

AXLE - FRONT DRIVE - WARN MANUAL HUBLOCKS INOPERATIVE

Article No. 88-8-17

LIGHT TRUCK:

**ISSUE:** Inoperative front drive axle hublocks on 1987 and 1988 F-150 and Bronco vehicles may be caused by the control dial getting too hot and distorting. The hublock body is made of aluminum which transfers heat rapidly from the brake rotor to the hublock assembly. Under certain braking conditions such as brake dragging or downhill trailer towing control dial distortion may occur. Vehicles operated under these or similar conditions may not experience hublock control dial distortion but may be too hot for customers to engage or disengage the locking hub feature.

**ACTION:** To correct this, install a new hublock service kit that will not allow heat transfer to the control dial. Refer to the 1987/88 Light Truck Shop Manual, Volume A, Section 11-12-2 for removal of the existing hublocks. Use the 1986 Light Truck Shop Manual to install the new hublock kit, (E7TZ-1L104-A).

PART NUMBER	PART NAME	CLASS
E7TZ-1L104-A	Hublock Kit - One (1) Required	CG

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION: 880817A - Both hubs

TIME: 1.8 Hrs.

DLR. CODING: Basic Part No. 1K105

Condition Code: 42

Technical Service Bulletin # **90167**

Date: **900801**

## M/T - Clutch Fluid Leaks/Incomplete Release

Article No. 90-16-7

^ CRACKS - DASH (ENGINE COMPARTMENT BULKHEAD) - CLUTCH MASTER CYLINDER AREA - VEHICLES BUILT BEFORE 6/15/90

^ CLUTCH - HIGH EFFORT - DASH CRACKED IN CLUTCH MASTER CYLINDER AREA - VEHICLES BUILT BEFORE 6/15/90  
LIGHT TRUCK: 1984-90 BRONCO, F-150, F-250, F-350 1988-90 F SUPER DUTY

PART NUMBER	PART NAME	CLASS
E3TZ-7K509-A	Small Reinforcement Kit (1983-87)	B
E8TZ-7K509-A	Small Reinforcement Kit (1988-91)	B
E3TZ-7K509-B	Large Reinforcement Kit (1983-1991 Severely Damaged Units)	B

**ISSUE:** Incomplete clutch release and/or hydraulic fluid leaking into the cab from the clutch master cylinder may be caused by the reinforcement plate on the clutch master cylinder separating from the dash panel. The separation of the reinforcement plate reduces the clutch master cylinder pushrod travel. Reinforcement plate separation can also cause deflection of the clutch master cylinder that results in a misalignment of the pushrod to the clutch master cylinder. Misalignment causes the "O" ring in front of the secondary seal to leak hydraulic fluid.

**ACTION:** Inspect the truck and, if necessary, use the following service procedure to install a reinforcement kit.

### Inspection Procedure

1. If the truck is a 1988 or later model, confirm that the starter interlock switch operates (the engine can be started) with the clutch pedal at least 0.5" (12.7 mm) from the floor.
2. Test drive the truck and check for good clutch release. There should be no grinding of the gears, particularly when shifting from neutral to reverse gear.
3. If the truck passes these tests, go to the Small Reinforcement Installation Procedure Section of this article.
4. If either of the above conditions are not met, check the hydraulic system for air. Refer to the Suggested Bleeding Procedure at the end of this article.
5. Test drive the truck and check for improved clutch release.
6. If there is no improvement, proceed as follows:
  - a. Remove the clutch master cylinder pushrod from the release lever pin on the release lever.

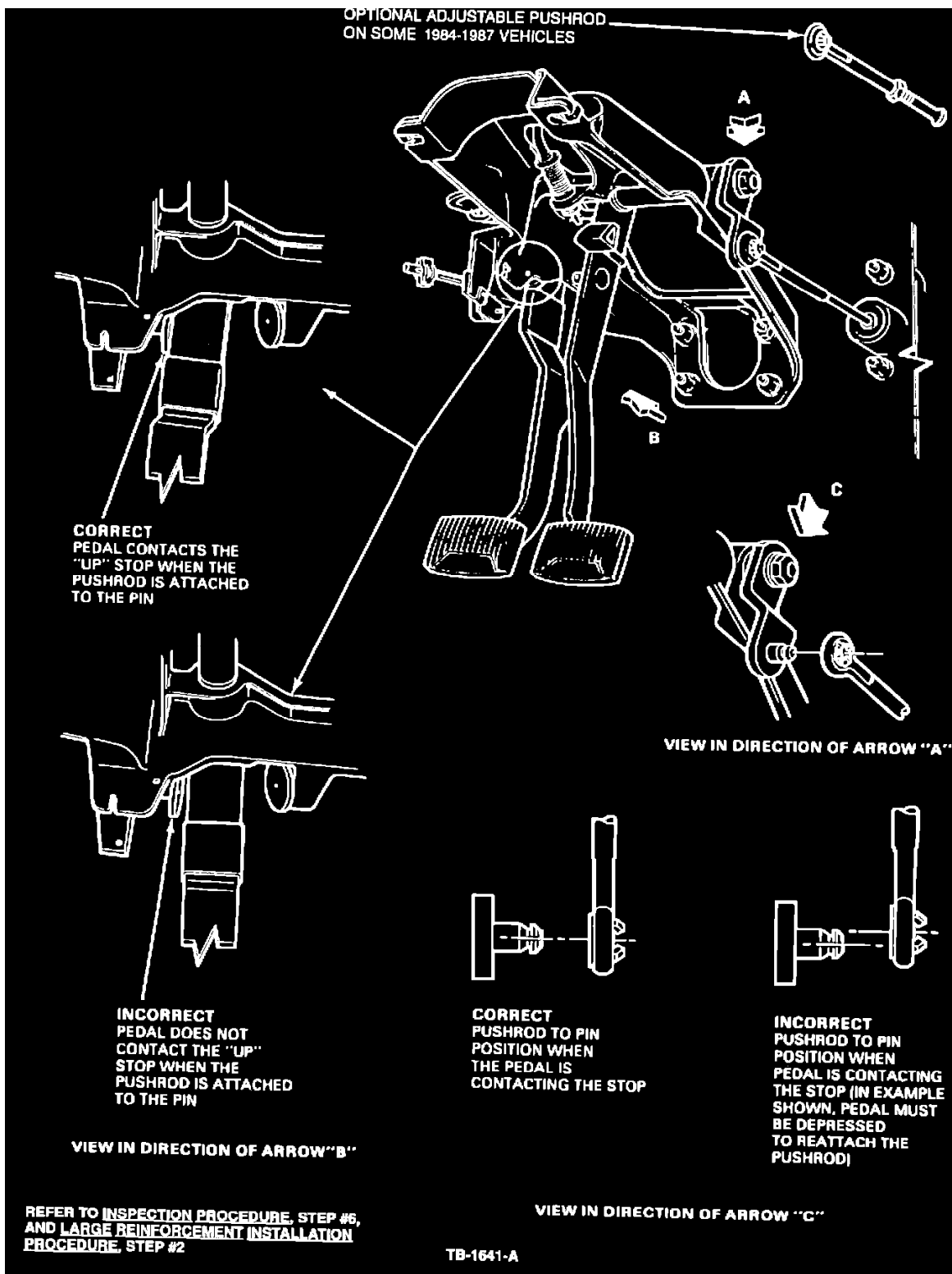


Figure 1

- b. Make sure the hole in the pushrod lines up with the pin, for those units requiring a minimal force for installation, Figure 1.
  - c. If it does not line up correctly, install an adjustable pushrod (except 1988 and later models) or replace the clutch release lever (required on 1988 and later models), cutting a new seat on the cross shaft splines.
7. Test drive the truck again, checking for improved clutch release.

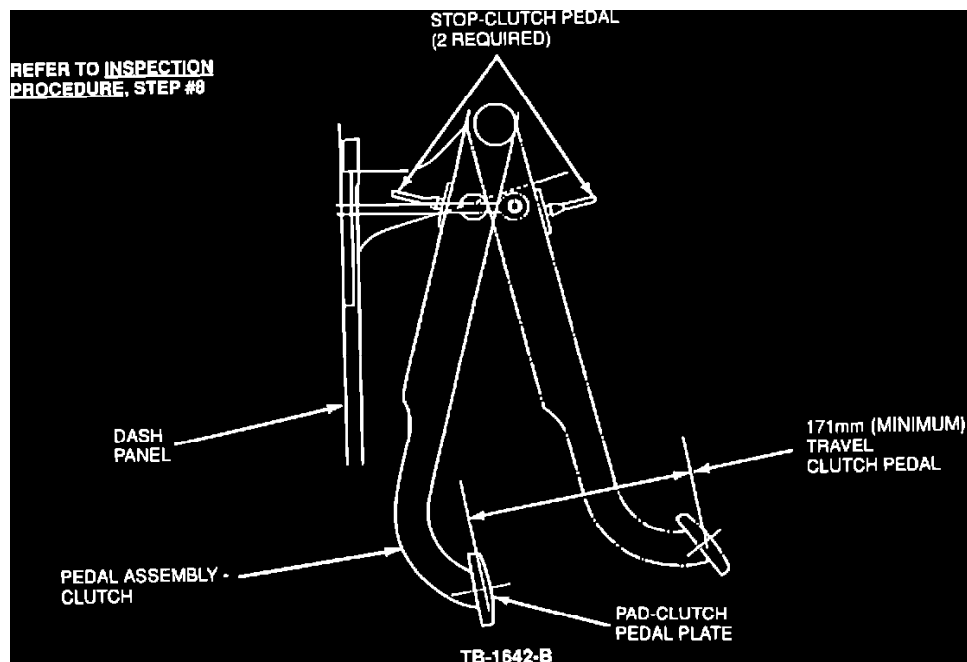


Figure 2

8. If there is no improvement, inspect the truck for adequate release bearing travel.
  - ^ It should be 11 mm or greater for full pedal travel.
  - ^ Pedal travel at the center of the pedal pad should be 6.75" (171 mm minimum) or more, Figure 2.
9. Release bearing travel and gear grinding noise may indicate the following concerns.
  - ^ If the release bearing is 11 mm or greater and there is grinding of one or two gears only, the concern is probably with the transmission.
  - ^ If all gears grind, the concern may be with the clutch and/or pilot bearing which will need replacing.
  - ^ If the release travel is less than 11 mm, check the clutch hydraulic system for air and bleed as necessary.
10. If the release travel is still less than 11 mm, with all of the above items eliminated, proceed as follows:
  - a. Raise the hood, while an assistant operates the clutch pedal.
  - b. Watch the clutch master cylinder for significant deflection.

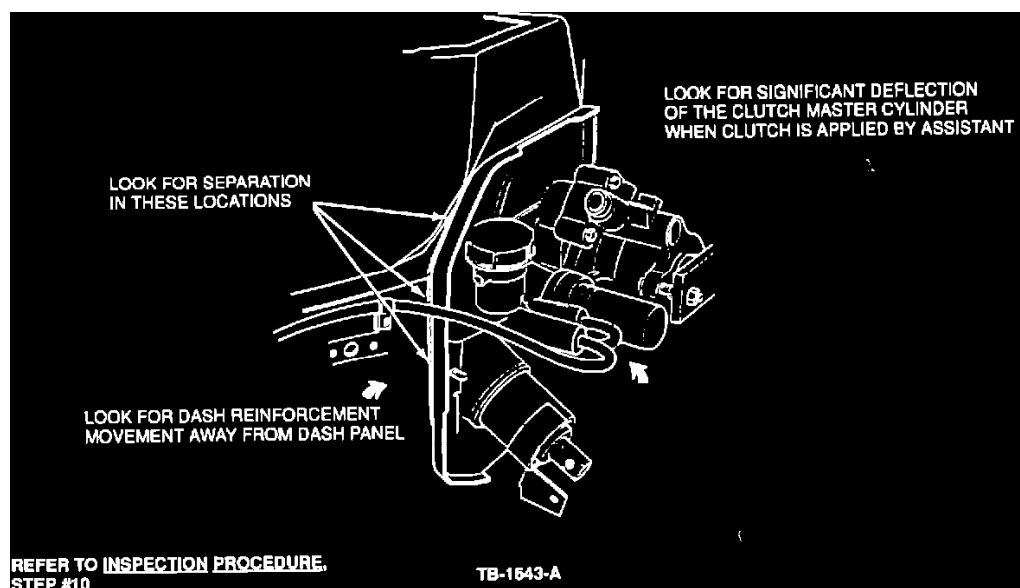


Figure 3

- c. Look for the dash reinforcement moving away from the dash, Figure 3.

- d. On 1987 and earlier models, look down inside the cowl cover at the cowl where it is attached to the dash reinforcement. Check for pulled spot welds.
11. If there is significant movement of the dash or clutch master cylinder, proceed as follows:
- Remove the steering column and its dash toe plate and seal. Refer to the appropriate Light Truck Shop Manual, Section 13-07 for service details.
  - Inspect the dash inside the cab and look for:
    - ^ Pulled spotwelds and cracked or torn sheet metal.
    - ^ Cracks in the brake and clutch pedal support

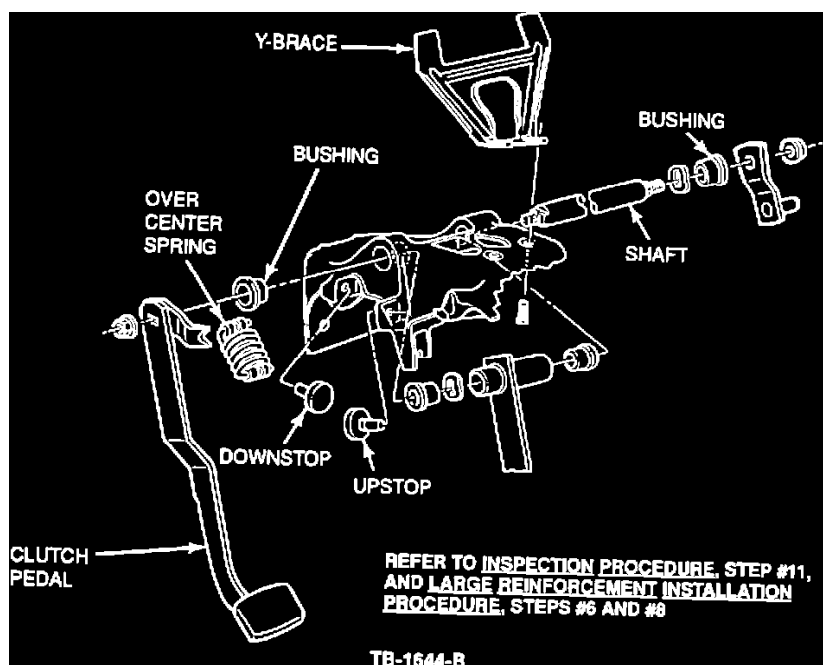


Figure 4

- ^ Missing Y-brace fasteners and a broken or detached Y-brace, Figure 4.

12. Check the cross shaft bushings for wear if the brake pedal moves when the clutch is depressed and vice versa. Replace them as required.

NOTE: GENERALLY, TRUCKS WITH SIGNIFICANTLY LESS THAN 11 MM CLUTCH RELEASE BEARING TRAVEL (AFTER COMPLETING THE INSPECTION PROCEDURE AND CORRECTING WHERE NECESSARY) WILL HAVE SIGNIFICANT DASH DAMAGE FROM PULLED SPOTWELDS AND TORN METAL. THESE TRUCKS WILL REQUIRE EXTENSIVE REPAIR. THEREFORE, GO TO THE LARGE REINFORCEMENT INSTALLATION PROCEDURE.

## Small Reinforcement Installation Procedure

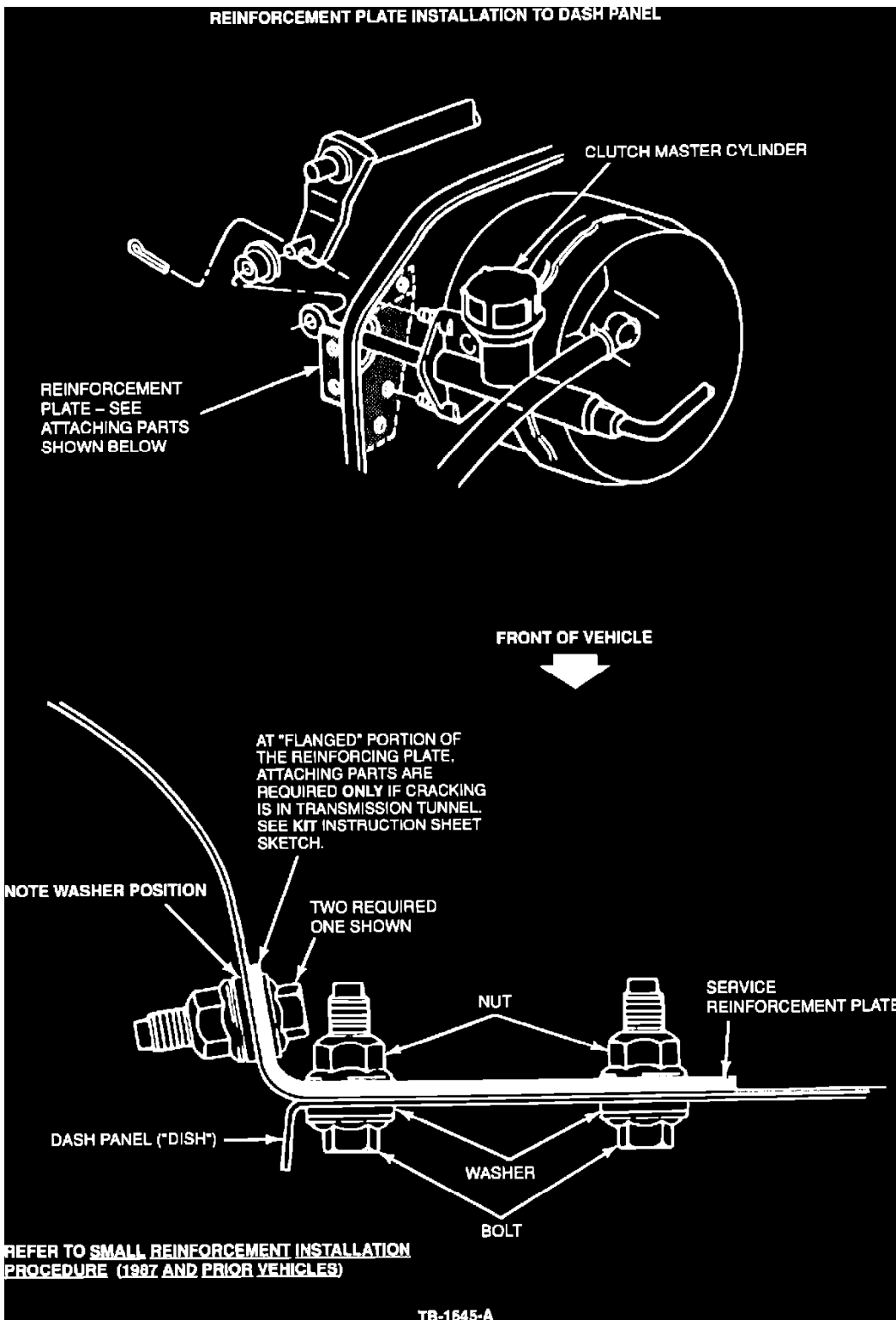
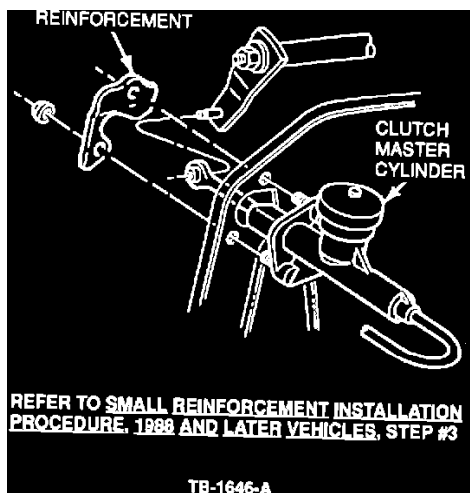


Figure 5



**Figure 6**

There are two small reinforcement kits. One for 1988 and later models and one for 1987 and prior models. This is necessary because a new hydraulic clutch master cylinder mounting pattern was introduced for 1988 models.

#### 1987 And Prior Trucks

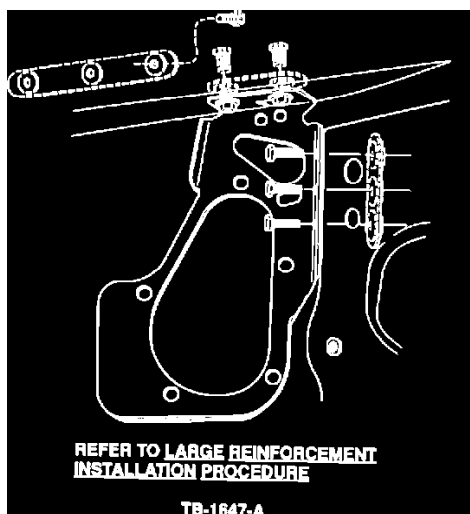
Use reinforcement kit E3TZ-7K509-A on these trucks, Figure 5. Comprehensive installation instructions are included in this kit.

#### 1988 And Later Trucks

Use reinforcement kit E8TZ-7K509-A on these trucks. The only part in this kit is the special reinforcement for these trucks. To install it, proceed as follows:

1. Remove the two clutch master cylinder attaching nuts (13 mm) from inside the truck.
2. Position the reinforcement in place over the clutch master cylinder studs.
3. Re-install the two master cylinder nuts, Figure
6. Tighten to 9.5 - 14.9 N-m.

## Large Reinforcement Installation Procedure



**Figure 7**

Use reinforcement kit E3TZ-7K509-B on all 1983-1991 Bronco/F-Series trucks with hydraulic clutch controls. The kit consists of the following items:

- ^ A main reinforcement or doubler, with a plate having two studs to clamp the doubler through the cowl inner
- ^ Two additional pieces with three threaded holes:

One plate helps attach the main doubler through the dash inner tunnel. The other large piece is placed inside the front of the cowl, with bolts driven through from the engine compartment side of the dash reinforcement, see Figure 7.

## Installation

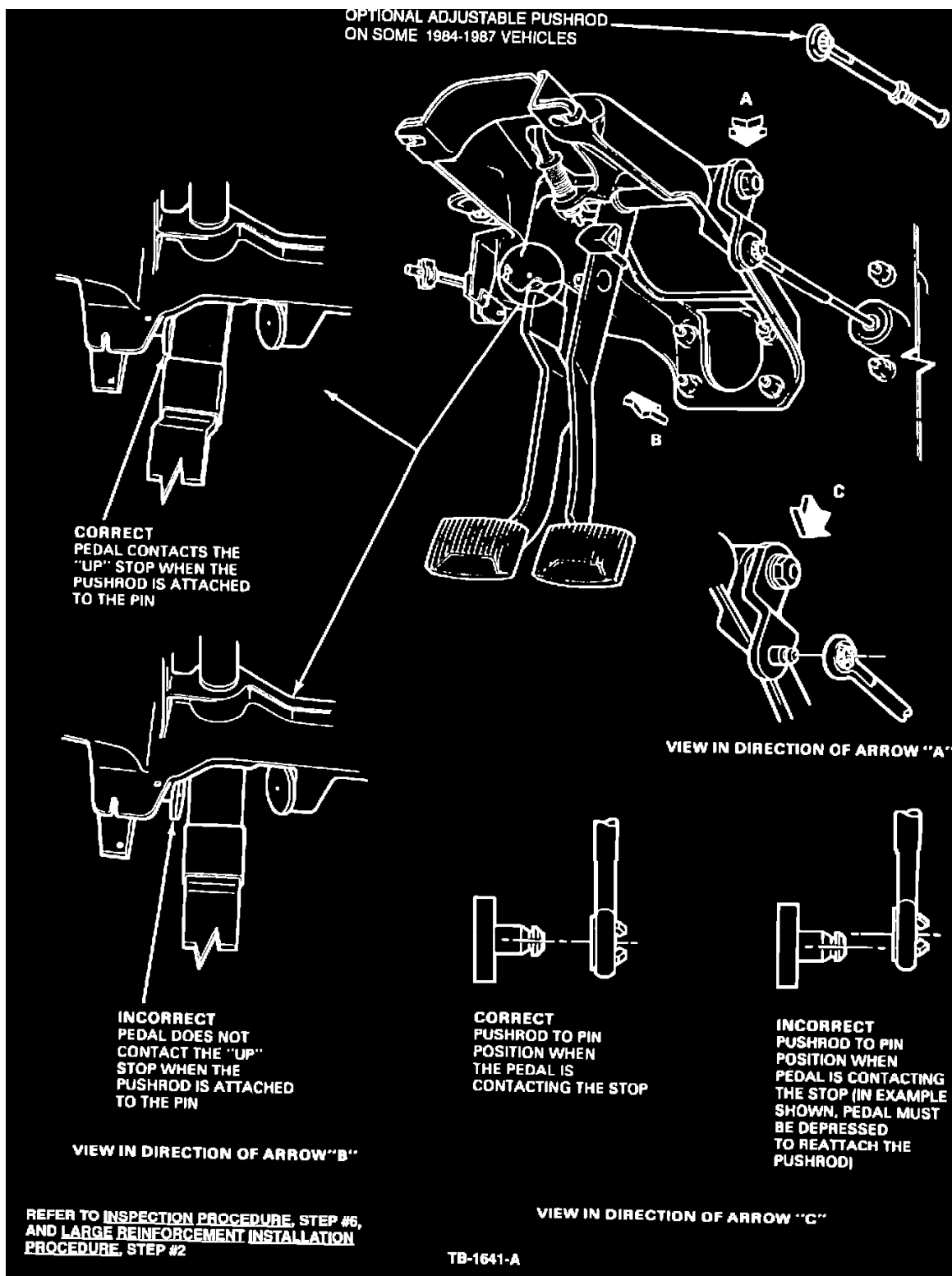


Figure 1

1. Remove the insulating material.
  - a. On earlier models, remove the instrument panel lower sound insulator assembly.
  - b. For later diesel powered trucks, remove the fasteners holding the engine compartment dash insulation in place.

- c. Pull the dash insulation back out of the way.
  - d. Disconnect the battery ground cable.
2. Disconnect the clutch master cylinder pushrod from the lever, removing the pushrod retention clip on older models, Figure 1.
  3. Remove the two nuts attaching the clutch master cylinder to the dash panel.
    - a. Pull the master cylinder into the engine compartment.
    - b. For, 1988 and later trucks, it will be necessary to disconnect the wiring harness connector from the pushrod switch.
    - c. Rotate the master cylinder to get it past the switch through the dash opening.
  4. Remove the steering column and dash toe plate by removing the five (5) fasteners.
  5. Disconnect the brake master cylinder pushrod from the brake pedal.
  6. On F-Super Duty, proceed to Step 7. On all units except F-Super Duty, proceed as follows:
    - a. Remove the four brake booster attaching nuts.
    - b. Move the brake booster to one side.

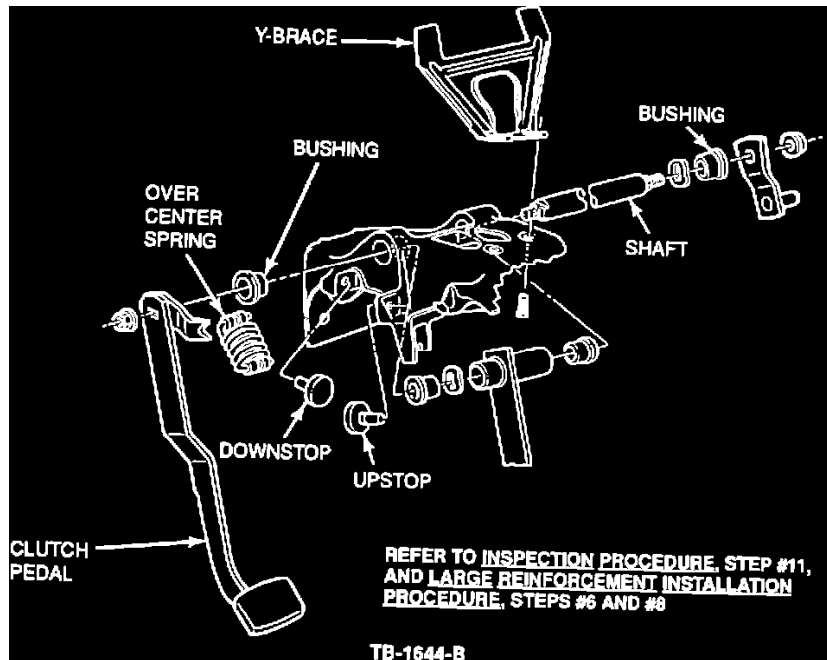


Figure 4

- c. Loosen the two (2) fasteners attaching the brake and clutch pedal support to the Y-brace, Figure 4.
7. Check for cracks.
    - a. Pull back the floor covering and dash sound insulator. (it may be helpful to remove the accelerator pedal.)
    - b. Inspect the area for pulled welds and torn dash sheet metal.

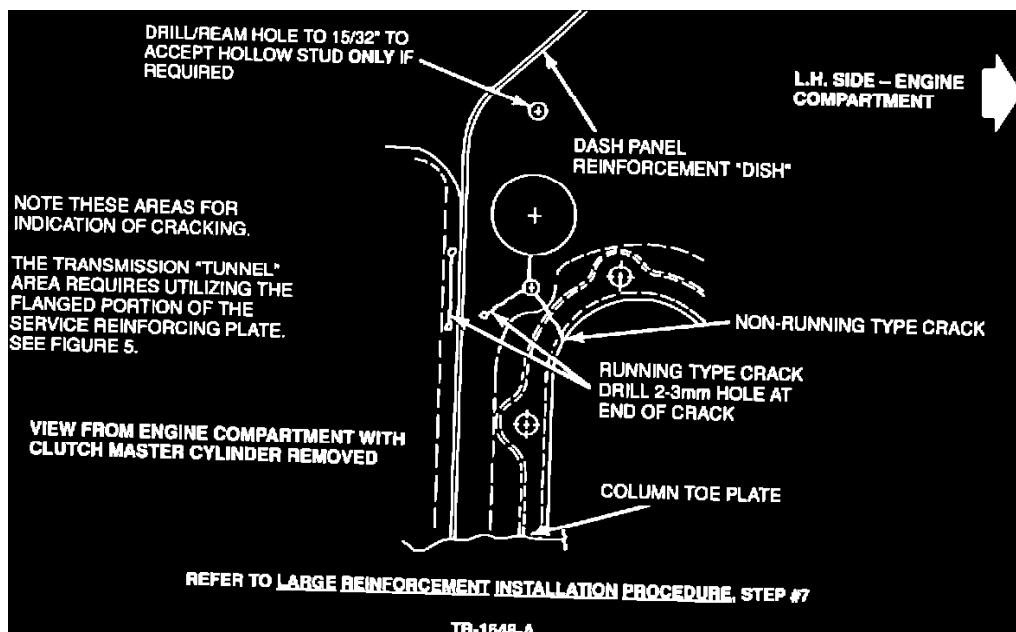


Figure 8

- c. If there are cracks that have not run out, stop them by drilling a 2-3 mm hole at the end, Figure 8.

NOTE: WELDING OR BRAZING IS NOT RECOMMENDED, BECAUSE IT COULD BE A SOURCE OF FUTURE BLIND SIDE CORROSION.

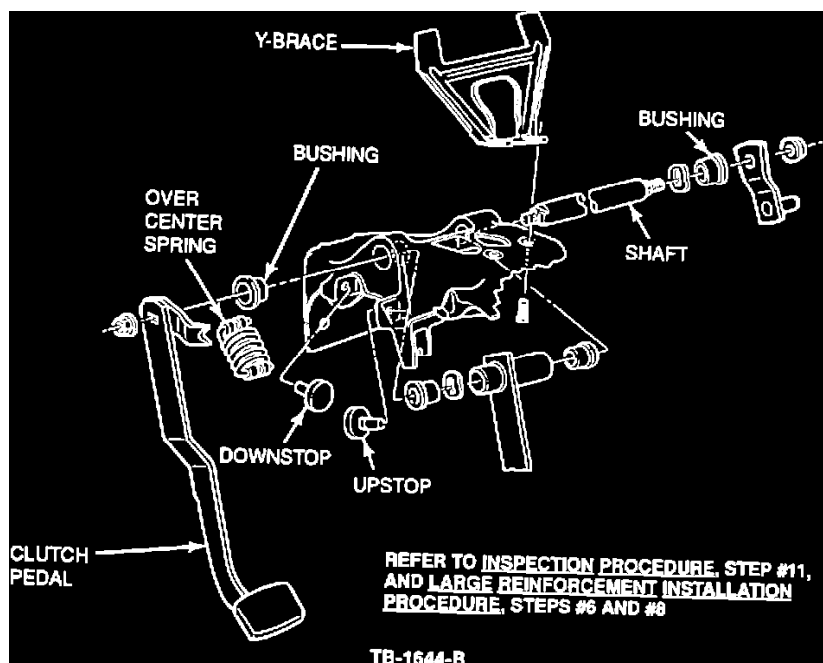


Figure 4

8. Thoroughly inspect the brake and clutch support again for cracks in the casting and worn bushings. Also, inspect the "Y" brace for cracks and missing fasteners. Replace as necessary, Figure 4.
9. Remove excess body sealer in the area of the clutch master cylinder, inside the dash.
10. Carefully remove the cowl top cover 12 fasteners (7 in front, 5 in rear).

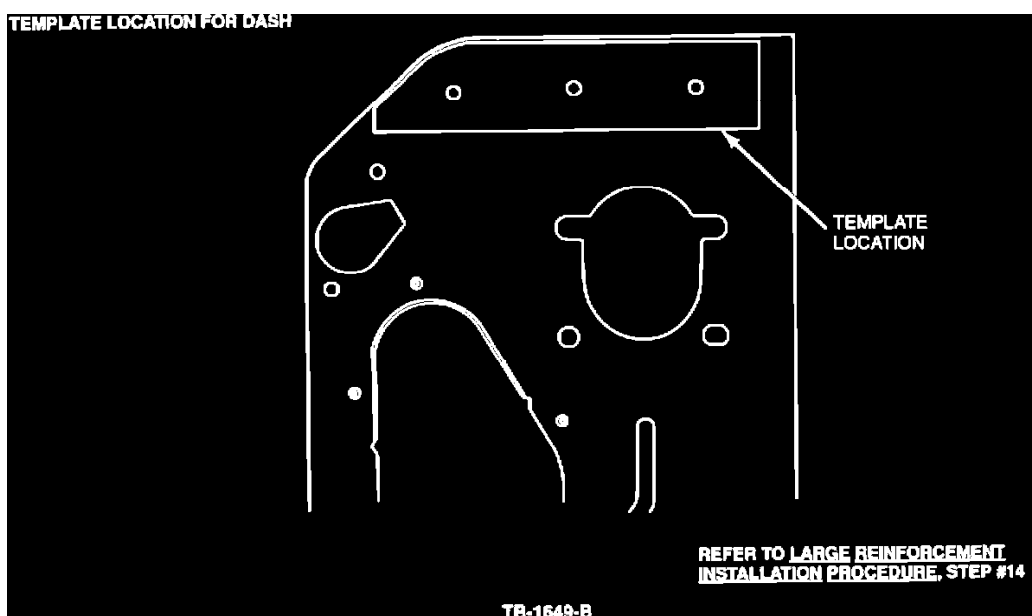
NOTE: IT MAY BE NECESSARY TO REMOVE THE RADIO ANTENNA AND REPOSITION THE HOOD TO ACHIEVE THIS. IF THE HOOD IS REMOVED, MARK THE LOCATION OF THE HINGES WITH A WAX PENCIL, PRIOR TO LOOSENING.

11. Place the main reinforcement in position.
  - a. Locate positively, using the lower steering column toe plate fastener and a bolt and nut (8 mm or 5/16") through the upper clutch master

cylinder stud hole.

**NOTE: THE SHEET METAL VARIES FROM TRUCK TO TRUCK AND IT MAY BE NECESSARY TO BEND THE REINFORCEMENT TO GET A GOOD FIT.**

- b. Tighten the upper nut and bolt securely to compress any distortion in the four sheet metal laminations in this area.
12. Drill the holes for the reinforcement plate.
  - a. Using a 3/8" (9.5 mm) drill bit, with the reinforcement as a template, drill two holes up into the cowl inner and three holes into the inner side of the dash.
  - b. De-burr the outside of the holes as necessary.
  - c. Remove any excess sealant in the area and clean up the drill chips inside the truck and cowl.
13. Attach the smaller plate via the three threaded holes into the engine compartment side of the dash inner panel.
  - a. Use three 8 mm bolts passed through the main reinforcement, from inside the cab.
  - b. Install the rubber cap (N804118) onto the end of the uppermost screw from under the dash.
  - c. Position the plate with the two studs attached inside the cowl, through the two holes drilled from below.
  - d. Attach two 8 mm nuts from the inside of the cab.
14. Using the paper template provided in the kit, proceed as follows:



**Figure 9**

- a. Center punch and drill three 3/8" (9.5 mm) holes into the dash reinforcement and through the cowl, from the engine compartment side, Figure 9.

**NOTE: DRILLING WILL BE EASIER IF THERE ARE NO SPOTWELDS VISIBLE THROUGH THE THREE HOLES.**

- b. If necessary, move the pattern outboard slightly to avoid any visible spotwelds.
- c. De-burr the holes inside the cowl as necessary and clean up the drill chips inside the cowl.

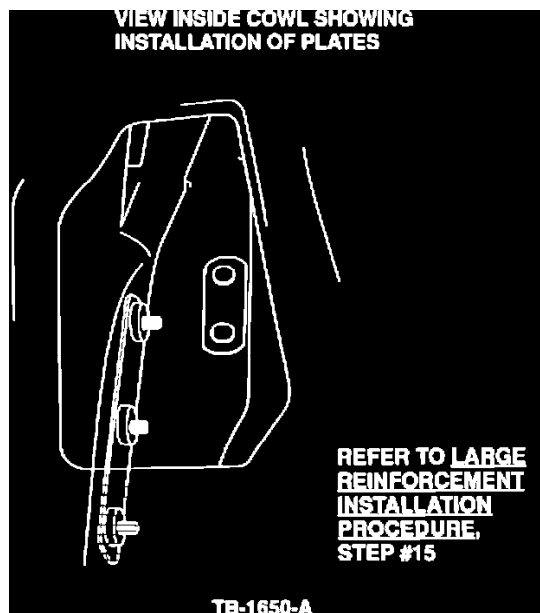


Figure 10

15. Place the larger three holed plate from the kit inside the cowl. Attach it with three 8 mm bolts through the dash reinforcement, from the engine compartment side, Figure 10.
16. Inspect the seam between the cowl inner and outer, inside the cowl, for cracks in the sealant. If necessary, add sealant.
17. Replace the cowl top.
  - a. If the hood was removed, locate the hinges to the wax pencil marks and tighten the fasteners.
  - b. Replace the radio antenna and windshield washer tube.
18. Re-install the brake booster and stoplight switch, if removed. Tighten the brace bolts.
19. Install the clutch master cylinder.
  - a. Inspect the clutch master cylinder for leaks in the area of the pushrod. Replace it if there is evidence of leaking.
  - b. Remove the nut and bolt from the top of the reinforcement.
  - c. Install the clutch master cylinder.
  - d. Inspect the position of the clutch master cylinder pushrod hole. The pushrod hole should go onto the lever pin with no force required while the pedal is against the upstop.

NOTE: ALTHOUGH THIS WAS SPECIFIED IN THE INSPECTION PROCEDURE, REPAIR MAY HAVE CHANGED THE SETTING.

- e. If the pushrod hole is not in position, install and adjust an adjustable clutch master cylinder pushrod (1987 and prior models) or install a new lever (7A554).

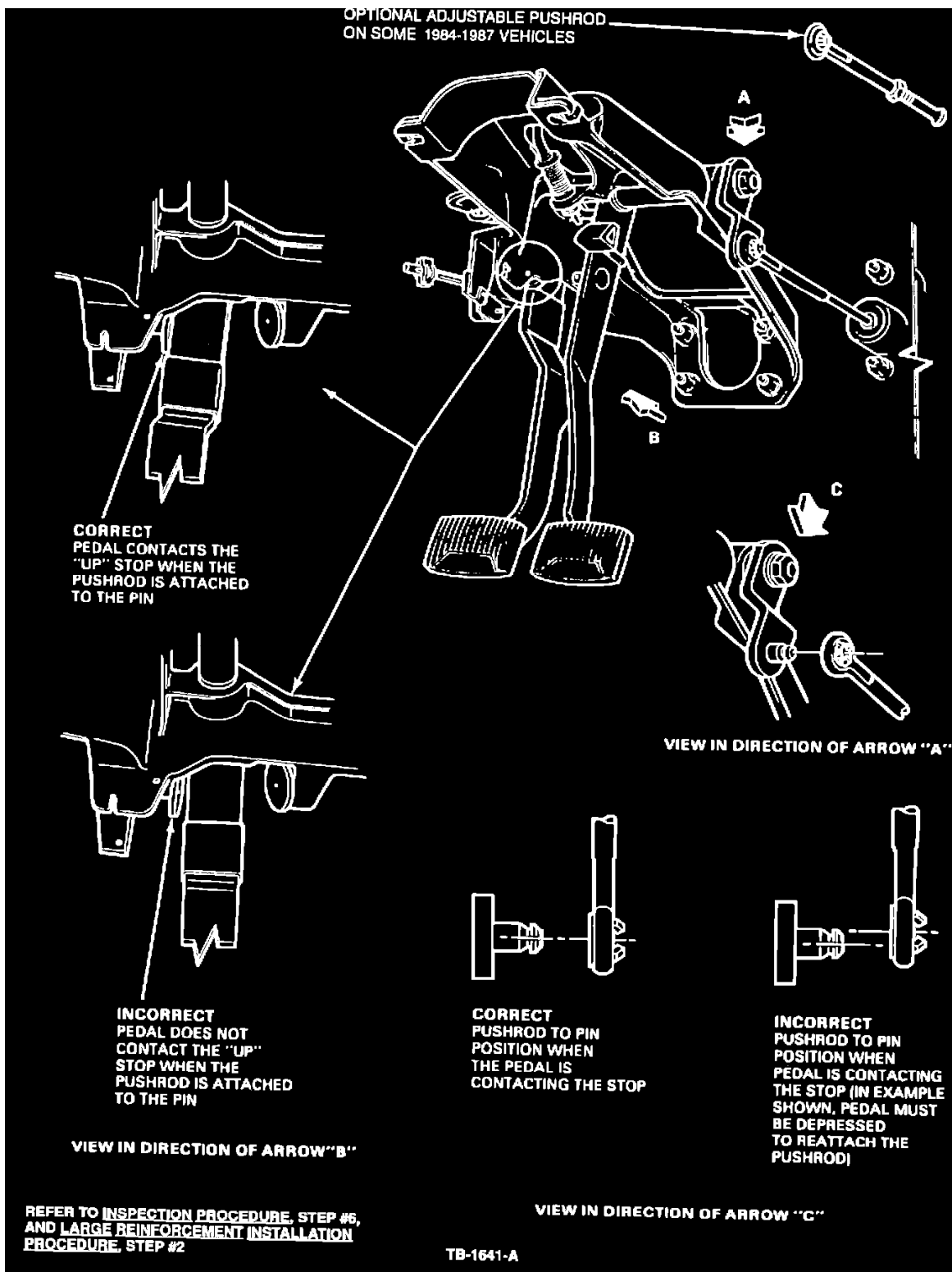


Figure 1

NOTE: THE NEW LEVER IS TIGHTENED INTO PLACE WHILE THE MASTER CYLINDER PUSHROD IS ATTACHED, TO SET THE CORRECT POSITION, FIGURE 1.

20. Remove the toe plate fastener from the bottom of the reinforcement and reinstall the steering column and five (5) fasteners.
21. Complete reassembly.
  - a. Re-install the dash sound deadener material and the instrument panel sound insulator.
  - b. Re-install the engine compartment sound insulator on diesel models.

- c. Connect the battery ground terminal.

## Final Inspection

If the truck has been driven for a long period of time with the broken dash and resulting poor clutch release, the clutch disc could be excessively worn or buckled.

Test drive the truck, evaluating the clutch for clean release. If the release is not satisfactory, measure the release bearing travel.

^ If it has the required 12 mm at full clutch pedal stroke, then the clutch may need to be replaced.

^ If the release bearing has less than the required release travel, then the hydraulic system probably needs to be bled.

## Suggested Bleeding Procedure - External Slave Cylinder

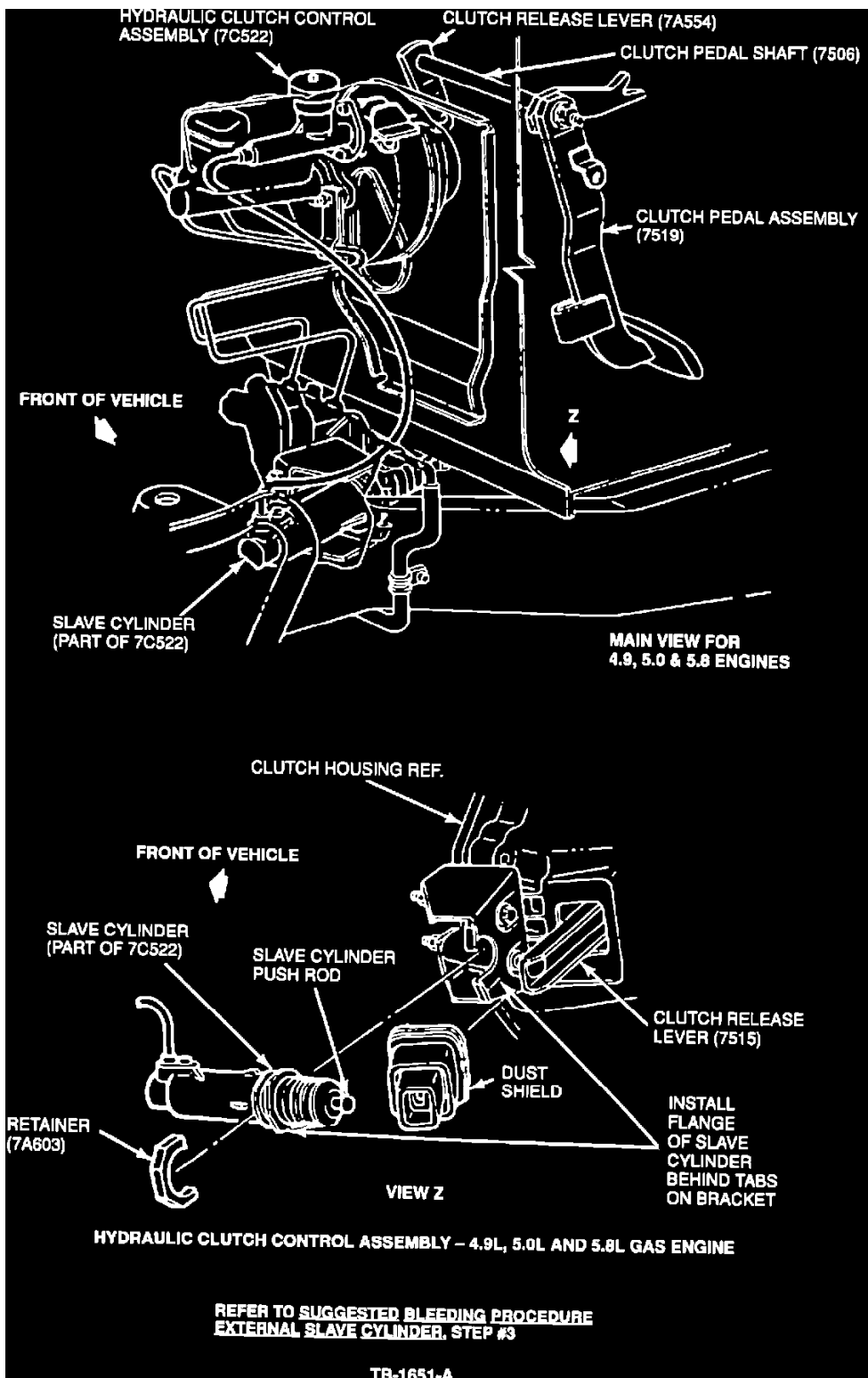


Figure 11

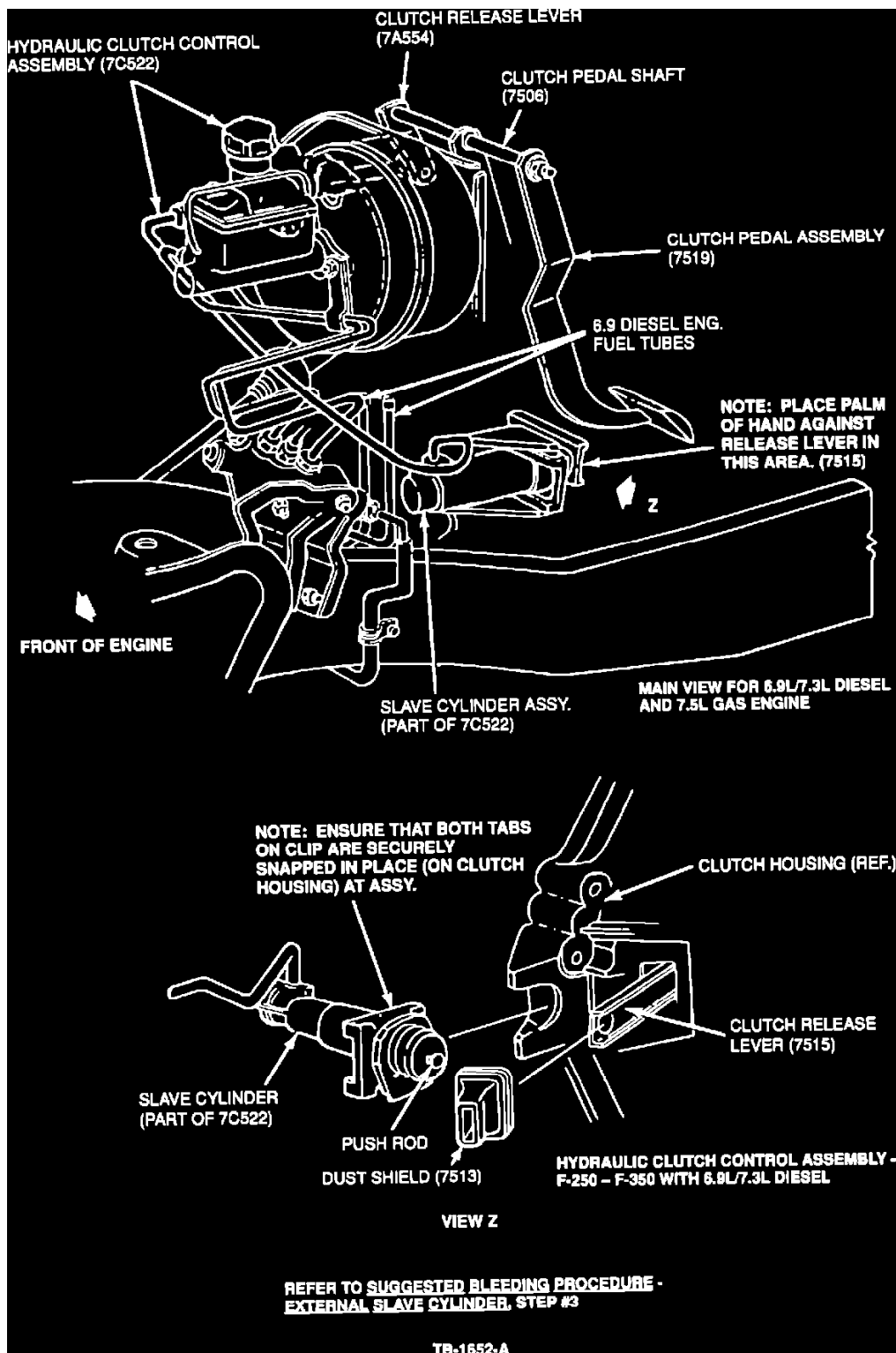


Figure 12

If the truck is a 1987 or prior model, 1988 model with a 7.3L Diesel, 7.5L EFI gas engine or the smaller family of engines with a Warner T-18 four speed transmission, proceed as follows:

1. Remove the master cylinder reservoir cap and diaphragm.
2. Check the fluid level to be sure it is at the step diameter of the reservoir. Do not over fill.
3. From below the truck, push the release lever slowly towards the front of the truck several times. Figures 11 & 12.
4. If it will not move, the master cylinder pushrod is not set correctly. See repair Step # 19.
5. Check the fluid level and replace the diaphragm and cap.

## Suggested Bleeding Proc - Internal Concentric Slave CYL.

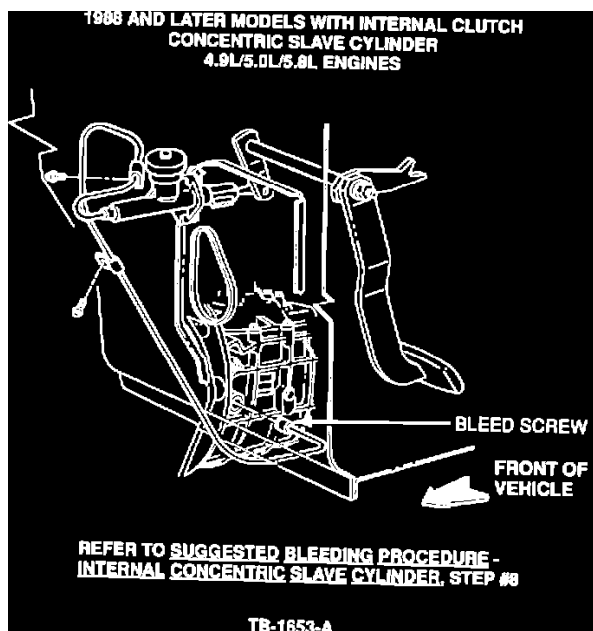


Figure 13

If the truck has a concentric slave cylinder, proceed as follows:

1. Operate the clutch pedal at full stroke, 10-20 times.
2. Check the fluid level at the change in diameter part of the reservoir. Do not over fill.
3. Have an assistant depress the clutch pedal slowly and hold it down.
4. Open the slave cylinder bleed screw and watch for escaping air, Figure 13.
5. Close the bleed screw and have the assistant release pedal.
6. Repeat this cycle several times until there is no sign of air. Be sure to keep the reservoir topped to the correct level.
7. Replace the diaphragm and reservoir cover.
8. Operate the clutch pedal at full stroke 10-20 times.

### Misc. Information

OTHER APPLICABLE ARTICLES: 86-20-10

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
901607A	Inspect & Adjust	0.5 Hr.
901607B	Install Reinforcement	2.9 Hr.

DEALER CODING

BASIC PART NO.    CONDITION CODE  
7050                    50

OASIS CODES: 111000, 505000, 505200, 506000, 590000

Technical Service Bulletin # **911814**

Date: **910905**

### M/T Clutch Housing - Fluid Inside

Article No. 91-18-14

09/05/91

- ^ CLUTCH-SLAVE CYLINDER "LEAKS"- VEHICLES USED IN MUDDY OR DUSTY ENVIRONMENTS

^ LEAKS-CLUTCH SLAVE CYLINDER "LEAKS"- VEHICLES USED IN MUDDY OR DUSTY ENVIRONMENTS

LIGHT TRUCK: 1988-89 ECONOLINE  
1988-91 AEROSTAR, BRONCO, F-150-350 SERIES, RANGER  
1989-90 BRONCO II  
1991 EXPLORER

ISSUE: Fluid detected inside the clutch housing may be caused by a leaking clutch slave cylinder. This may occur when vehicles are driven in severely muddy or dusty environments or when operated with extensive idle time. Vehicles include...

^ 1988-1991 Ranger, 1988-1990 Bronco II,  
1988-1991 Aerostar and 1991 Explorer  
with manual transmissions.

^ 1988-1991 Bronco, F-150-350, and  
1988-1989 Econoline with 5-Speed  
Manual Transmissions, except 7.3L  
Diesel and 7.5L engines.

ACTION: Replace the clutch slave cylinder if inspection confirms the cylinder is leaking. The new clutch slave cylinder contains a guide seal which improves durability and resistance to dirt entry. Refer to the following procedures for service details.

INSPECTION PROCEDURE:

1. If the vehicle is a Bronco or F-150, the repair will only involve 5 speed manual transmissions. Other vehicles described include all manual transmissions.

This slave cylinder is the internal "Concentric" and not the external style. Inspect vehicle to visually verify the style of slave cylinder installed.

2. Determine if the slave cylinder is leaking by checking for a fluid trace inside the bottom of the clutch housing.

REPAIR PROCEDURE

1. Remove the clutch slave cylinder. Refer to the appropriate Light Truck Shop Manual for service details.
2. Replace the clutch slave cylinder with a new slave cylinder (FITZ-7A564-A). Refer to the appropriate Light Truck Shop Manual for service details.

PART NUMBER	PART NAME	CLASS
FITZ-7A564-A	Slave Cylinder	B

NOTE: APPROPRIATE SUPPLEMENT OPERATIONS SHOULD BE USED WITH THE LABOR OPERATIONS LISTED.

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911814A	Inspect For Fluid Leak - All Vehicles	0.3 Hr.
911814B	Replace Clutch Slave Cylinder - Ranger 4X2 With 2.3L	1.8 Hr.
911814C	Replace Clutch Slave Cylinder - Ranger 4X4 With 2.3L And F-Series 4X2 With 5.8L	3.2 Hr.
911814D	Replace Clutch Slave Cylinder - Ranger 4X2 With 2.9L Or 3.0L And Aerostar With 3.0L	2.0 Hr.

911814E	Replace Clutch Slave Cylinder - Bronco II With 2.9L	2.6 Hr.
911814F	Replace Clutch Slave Cylinder - Ranger 4X4 And Bronco II 4X4 With 2.9L And F-Series 4X4 And Bronco With 5.0L	3.5 Hr.
911814G	Replace Clutch Slave Cylinder - Ranger 4X2 And Explorer 4X2 With 4.0L	2.9 Hr.
911814H	Replace Clutch Slave Cylinder - Ranger 4X4 And	3.7 Hr.
911814I	Replace Clutch Slave Cylinder - F-Series 4X2 With 4.9L And Mazda Transmission	2.1 Hr.
911814J	Replace Clutch Slave Cylinder - F-Series 4X2 With 5.0L	2.3 Hr.
911814K	Replace Clutch Slave Cylinder - F-Series 4X4 And Bronco With 4.9L And Mazda Transmission	3.3 Hr.
911814L	Replace Clutch Slave Cylinder - F-Series 4X2 With 4.9L And ZF Transmission	3.1 Hr.
911814M	Replace Clutch Slave Cylinder - F-Series 4X4 With 4.9L And ZF Transmission	4.1 Hr.
911814N	Replace Clutch Slave Cylinder - F-Series 4X4 With 5.8L	4.3 Hr.
911814O	Replace Clutch Slave Cylinder - Econoline	2.8 Hr.

## DEALER CODING

BASIC PART NO.	CONDITION CODE
7A564	77

OASIS CODES: 505000

Technical Service Bulletin # **ATRATB8922**Date: **890701****A/T - AOD Governor Pressure Leaks**

TSB 89-22 (July)

SUBJECT: FORD

SUBJECT: Governor pressure

# 1. There is a lot of information in the field concerning governor pressure leaks on the AOD. Low governor pressure can keep the transmission from making a 3-4 upshift.

The fix has been to tighten the governor counterweight to the output shaft by putting a piece of rubber under the drive ball.

Another fix has been to tighten the aluminum plugs in the valve body which seal governor oil.

These fixes have been working quite well when there is a loss of governor pressure.

- # 2. We have received calls of 4-3 coastdown clunks and shudders when coming to a stop being caused from too much governor pressure. Often these complaints appear after correcting the low governor pressure.

#### CONCLUSION:

If governor pressure is low, we must fix the leaks! If governor pressure is normal, DO NOT TIGHTEN THE COUNTERWEIGHT!

The problem is that the AOD does not have a governor pressure port. If governor pressure is low enough to prevent a 3-4 upshift, it also will not allow a wide open throttle (WOT) 1-2 upshift.

#### SUMMARY:

When diagnosing a problem that you think may be low governor pressure, check for a 1-2 upshift at maximum throttle. If the upshift occurs, governor pressure is fine. Do not tighten the counterweight.

Technical Service Bulletin # 9167

Date: 910318

## Rear Axle Hub Seal - Lubricant Leaks

Article No. 91-6-7

03/18/91

^ AXLE - NEW HUB SEAL AND HUB SEAL REPLACER TOOL - VEHICLES WITH 10.25 INCH RING GEAR, FULL - FLOATING REAR AXLES

^ LEAKS - AXLE LUBE - 10.25 INCH RING GEAR, FULL - FLOATING REAR AXLES

LIGHT TRUCK: 1985-91 F-250, F-350

ISSUE: A new hub seal and a hub seal replacer tool are now available for service. The new hub seal is designed to improve sealing when properly installed using the new hub seal replacer tool.

ACTION: Install a new hub seal (FOTZ-1177-A) with the new hub seal replacer tool (T91T-1175-A). Refer to the following inspection list and service procedure for details.

NOTE: DO NOT USE THE OLD HUB SEAL REPLACER TOOL (T85T-1175-AH). IT IS NOT DESIGNED TO INSTALL THE NEW SEAL. THE NEW HUB SEAL REPLACER TOOL IS AVAILABLE IN THE 1991 DEALER ESSENTIAL SERVICE TOOL KIT AND IS THE ONLY TOOL APPROVED TO INSTALL THE NEW SEAL.

#### INSPECTION PRIOR TO SEAL INSTALLATION

Prior to seal installation, make sure that the following items are checked and servicing action taken where indicated.

^ Inspect the outer diameter of the hub seal to be sure that it is dry and free of oil and grease.

^ Check the hub bore to be sure it is free of grease, dirt and debris.

^ Remove any nicks or burrs from the hub bore.

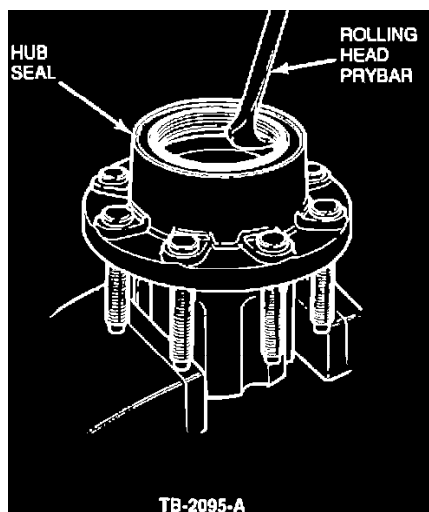
^ Inspect the inner and outer bearing for damage and replace as required.

^ Pack each hub bearing cone and roller with a bearing packing tool using XG-1-C grease.

^ Make sure that no residual grease from freshly greased bearings gets into the hub bore.

^ Prior to installing the hub assembly, clean the spindle thoroughly and inspect the seal and bearing journals for nicks and/or scratches. Remove nicks or scratches using crocus cloth or similar material.

^ Wipe spindle clean and lightly oil with clean axle lube or engine oil.

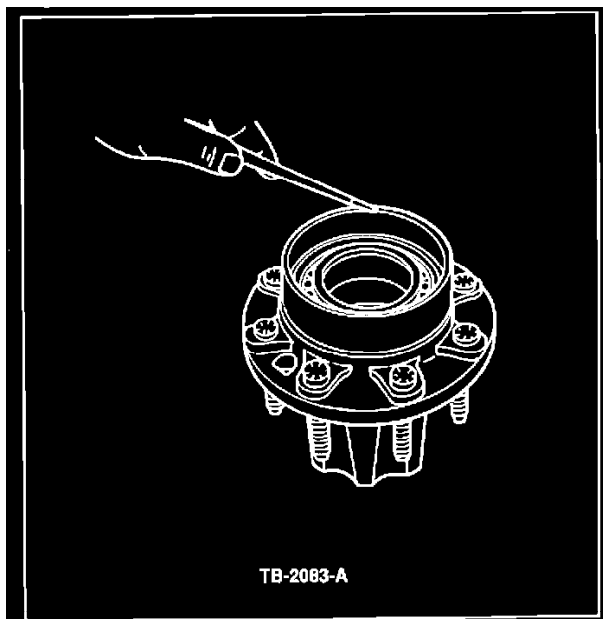


**Figure 1**

#### REMOVAL & INSTALLATION PROCEDURE

1. Install the hub in a soft jawed vice.
2. Remove the hub seal as shown in Figure 1.

**CAUTION:** CARE MUST BE TAKEN NOT TO DAMAGE THE HUB SEAL BORE WITH THE SEAL REMOVAL TOOL.



**Figure 2**

3. Thoroughly clean and inspect the hub bore, Figure 2.

**CAUTION:** MAKE SURE THE HUB BORE IS FREE OF DIRT, GREASE, BURRS OR NICKS.

**NOTE:** HUB BEARINGS MUST BE PRELUBED WITH GREASE PRIOR TO INSTALLATION. USE XG-1-C GREASE OR EQUIVALENT.

4. Pack each bearing cone and roller assembly with a bearing packing tool.

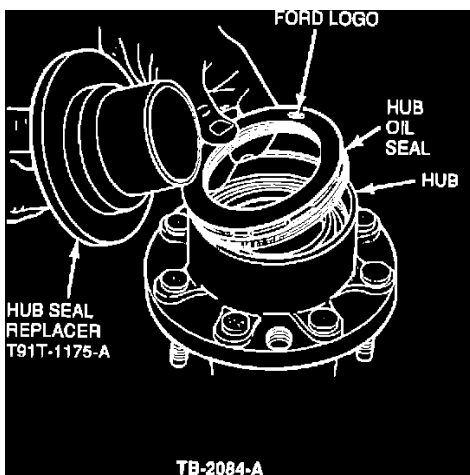


Figure 3

5. Install the seal in the hub with the Ford logo facing up, Figure 3.

CAUTION: HUB SEAL MUST BE FREE OF DIRT OR GREASE.

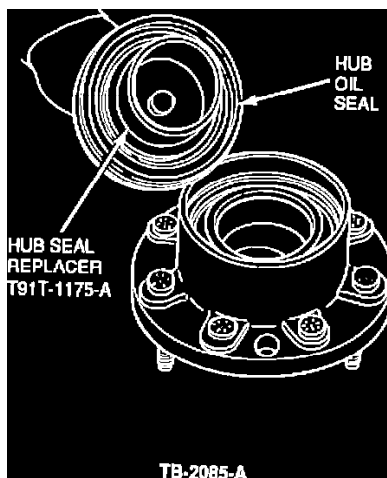


Figure 4

6. Install the hub oil seal on the hub seal installer tool, T91T-1175-A, Figure 4.

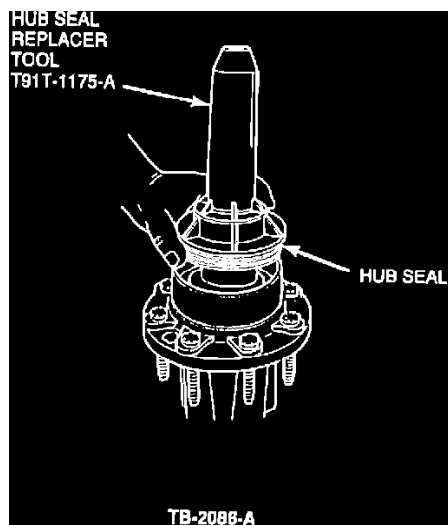
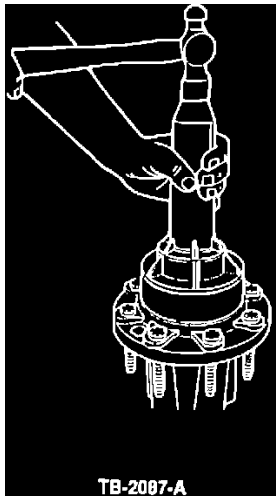


Figure 5

7. Insert the tool with the seal squarely into the hub, Figure 5.



**Figure 6**

8. Hold the tool straight. Strike the handle until the hub seal is fully seated (until tool strikes hub), Figure 6.

**CAUTION:** INSTALL NEW SEAL IF SEAL IS MISALIGNED DURING OR AFTER INSTALLATION.

It is extremely important that the 1991 F-Series Shop Manual procedures be followed when installing the hub assembly.

**CAUTION:** THE SPECIFIED TORQUING AND BACKING OFF OF THE HUB NUT IS CRITICAL IN ORDER TO PERFORM THE REPAIR CORRECTLY.

**NOTE:** ALWAYS TURN THE HUB WHILE TIGHTENING THE HUB NUT. ONCE THE SPECIFIED TORQUE 55-65 LB.FT., (75-88 N-m) IS ACHIEVED, RATCHETING BACK ON THE HUB NUT VARIES DEPENDING ON WHETHER THE HUB BEARINGS ARE NEW OR USED. BACK OFF 5 CLICKS FOR NEW BEARING AND 8 CLICKS FOR USED BEARINGS.

Make sure hub nut wrench tool (T85T-4252-AH) is used as shown in the Shop Manual procedure. Consult The 1991 F-Series Light Truck Shop Manual, Section 05-02B, for service procedures and torque specifications.

PART NUMBER	PART NAME	CLASS
FOTZ-1177-A	Hub Seal	B
XG-1-C	Grease (14 oz. cartridge, Pkg. 60)	V

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 509000

Technical Service Bulletin # **9059**

Date: **900228**

## M/T - ZF HD M50D Bump/Clunk/Click Noises

^ NOISE - BUMP/CLUNK/CLICK - ZF HEAVY DUTY M50D TRANSMISSION

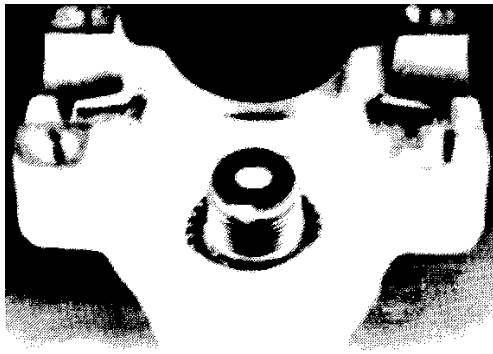
^ TRANSMISSION - ZF HEAVY DUTY M50D-LEAKS LUBRICANT

Article No. 90-5-9

LIGHT TRUCK: 1987-90 F-250, F-350

**ISSUE:** A "bumping/clunking" noise or a "clicking" sound on torque reversal or transmission lubricant leakage may be caused by a loose output flange retaining nut.

**ACTION:** Install a new output flange retaining nut. Refer to the following procedure for service details.

**TB-1555-A****Figure 1**

1. Install a new output flange retaining nut (E7TZ-7045-A) on the output shaft, Figure 1.

**CAUTION:** DO NOT REUSE THE OUTPUT FLANGE RETAINING NUT AFTER ANY SERVICING OF THE TRANSMISSION. ALWAYS REPLACE IT WITH A NEW ONE.

2. Tighten the nut to 184 lb.ft. (250 N-m).

**TB-1556-A****Figure 2**

3. Position a 3/16" (4.76 mm) punch on the locking shoulder of the retaining nut over the groove of the output shaft, Figure 2.

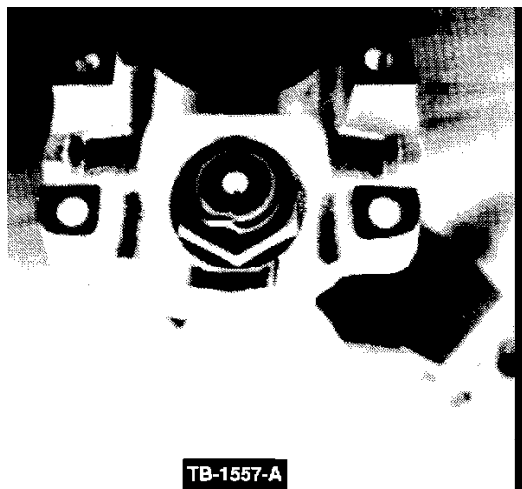
**TB-1557-A**

Figure 3

4. Strike the punch with a hammer. Make sure that the shoulder of the retaining nut is contacting the bottom of the groove, Figure 3.

**CAUTION:** WHEN STAKING THE NUT, MAKE SURE THE LOCKING SHOULDER OF THE NUT AND THE GROOVE OF THE OUTPUT SHAFT ARE THE ONLY AREAS USED IN THIS STAKING OPERATION. IF THE NUT IS STRUCK IN ANY OTHER AREA, THE TORQUE WILL BE LOST AND THE NUT MAY COME LOOSE IN SERVICE.

PART NUMBER	PART NAME	CLASS
E7TZ-7045-A	Output Flange Retaining Nut	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
900509A	Install & Stake Retaining Nut	0.4 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7045	33

OASIS CODES: 5500, 5950, 5970, 7100, 7113

Technical Service Bulletin # **88912042788**

Date: **880401**

## Full Float Hub Seal - Lubricant Leak

Article No. 88-9-12

AXLE - REAR - FORD 10.25" FULL FLOAT DESIGN - HUB SEAL LEAKS

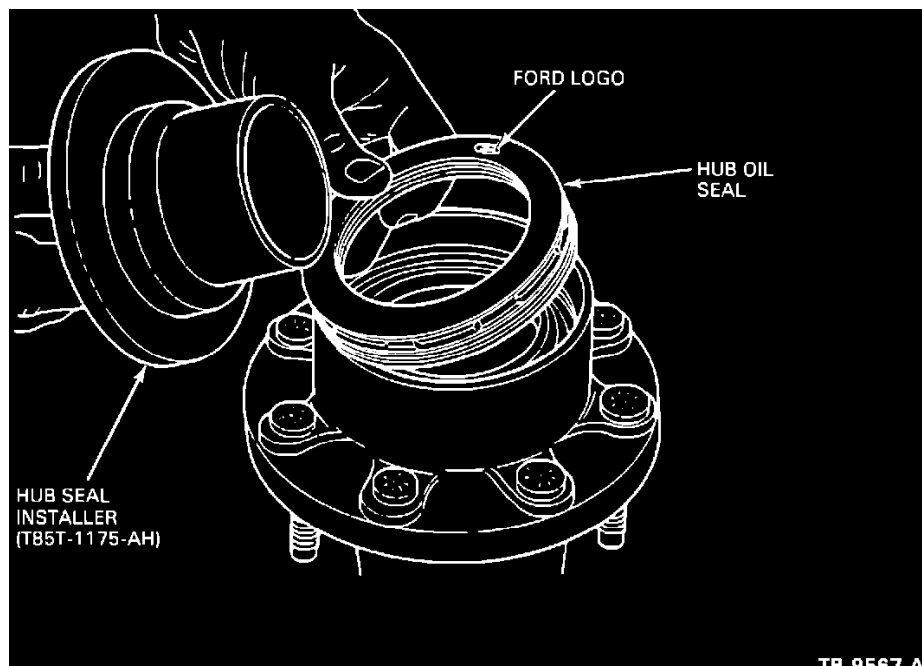
LEAKS - LUBRICANT FROM HUB SEAL -

FORD 10.25" FULL FLOAT DESIGN REAR AXLE

LIGHT TRUCK: 1985-88 F-250/350

**ISSUE:** Lubricant leaking from the rear axle on F-250 and F-350 trucks, with Ford 10.25" full float axles may be caused by the hub seal. The leaking condition could affect trucks with single or dual rear wheels.

**ACTION:** To correct this, install a new design hub seal with improved sealing qualities. The new hub seal is "green" in color to assist in part identification. Refer to the appropriate Light Truck Shop Manual, Volume A, Section 15-09 and the following service procedure for removal and installation instructions.



TB-9567-A

FIGURE 12

1. Position hub seal with the "Ford" logo facing up, Figure 12.

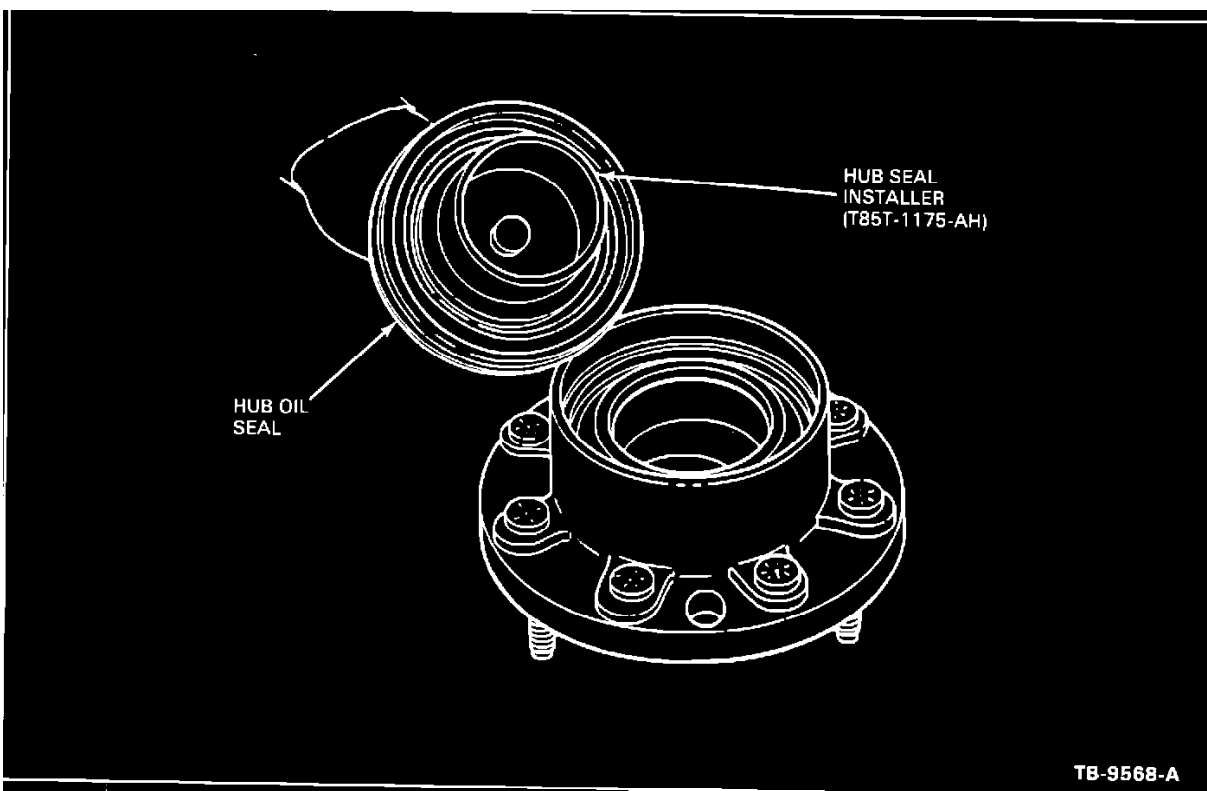


FIGURE 13

2. Install hub seal on hub seal installer tool (T85T-1175-AH), Figure 13.

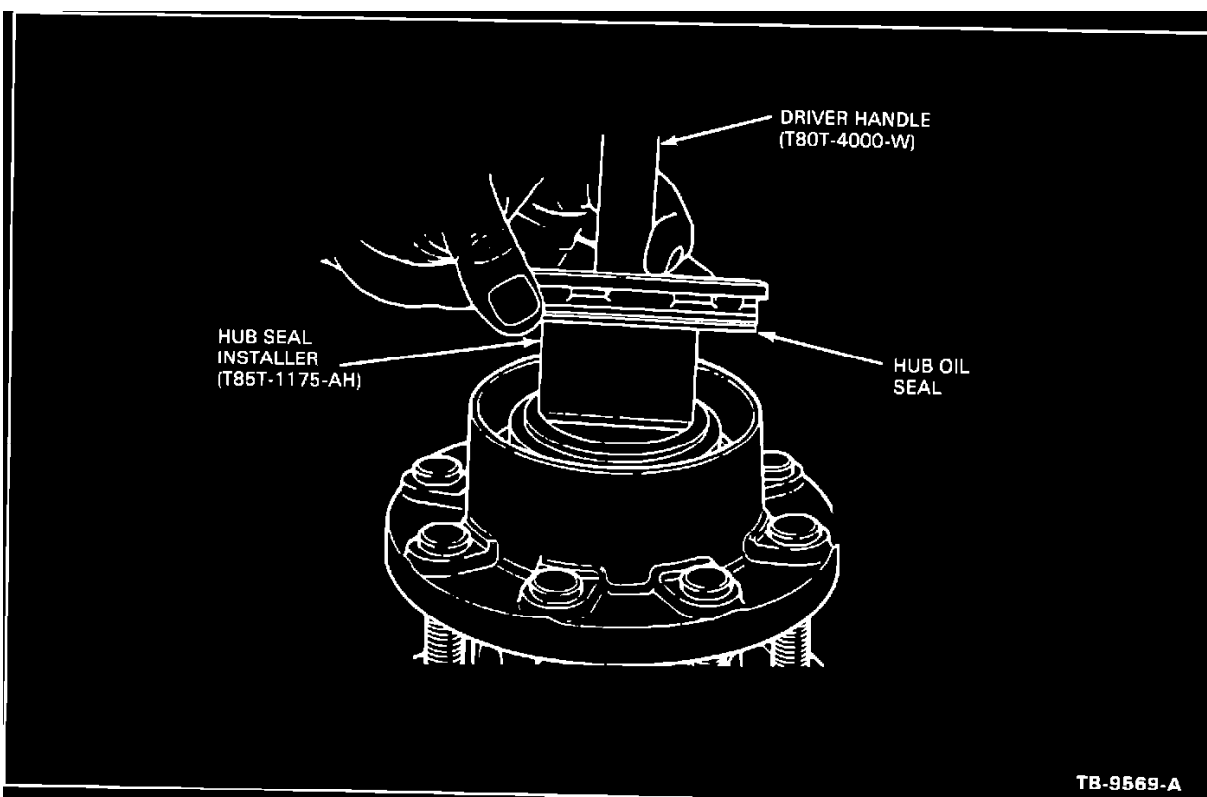


FIGURE 14

3. Insert tool with seal squarely into hub, Figure 14.

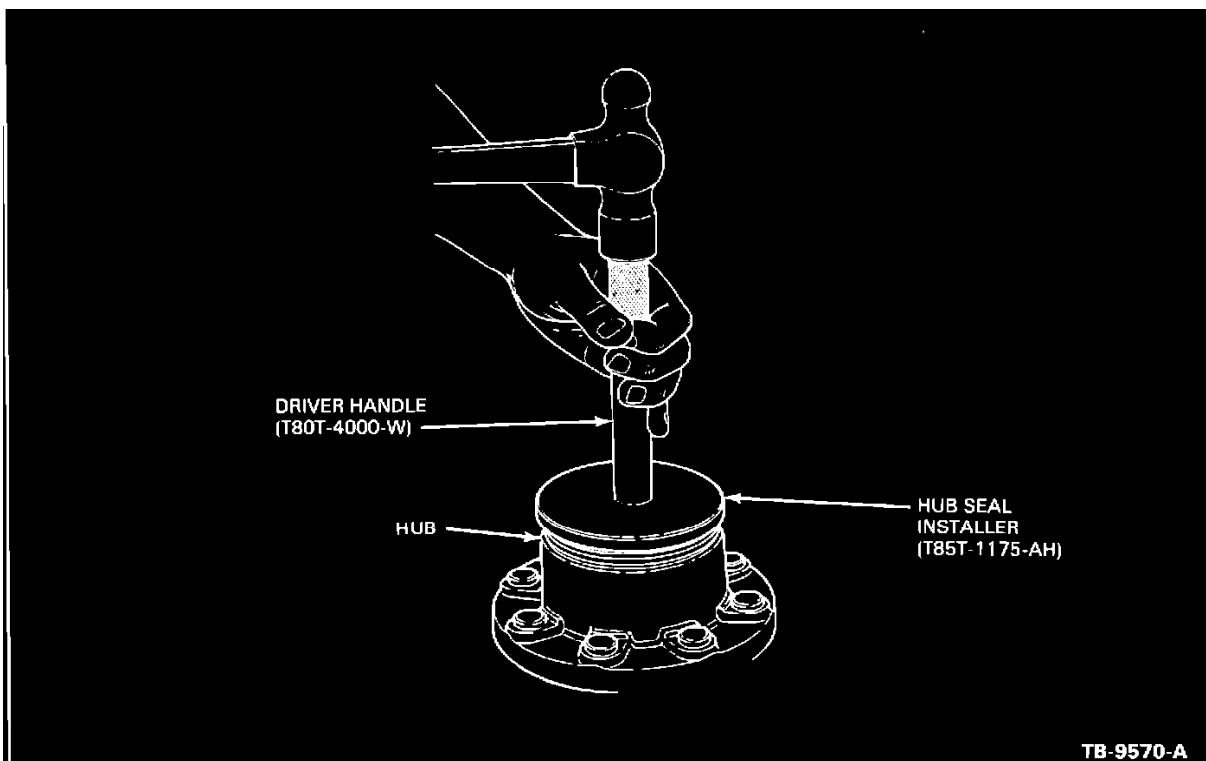


FIGURE 15

4. Hold tool straight and strike handle until hub seal is fully seated, Figure 15.

CAUTION: Install new seal if seal is damaged during or after installation.

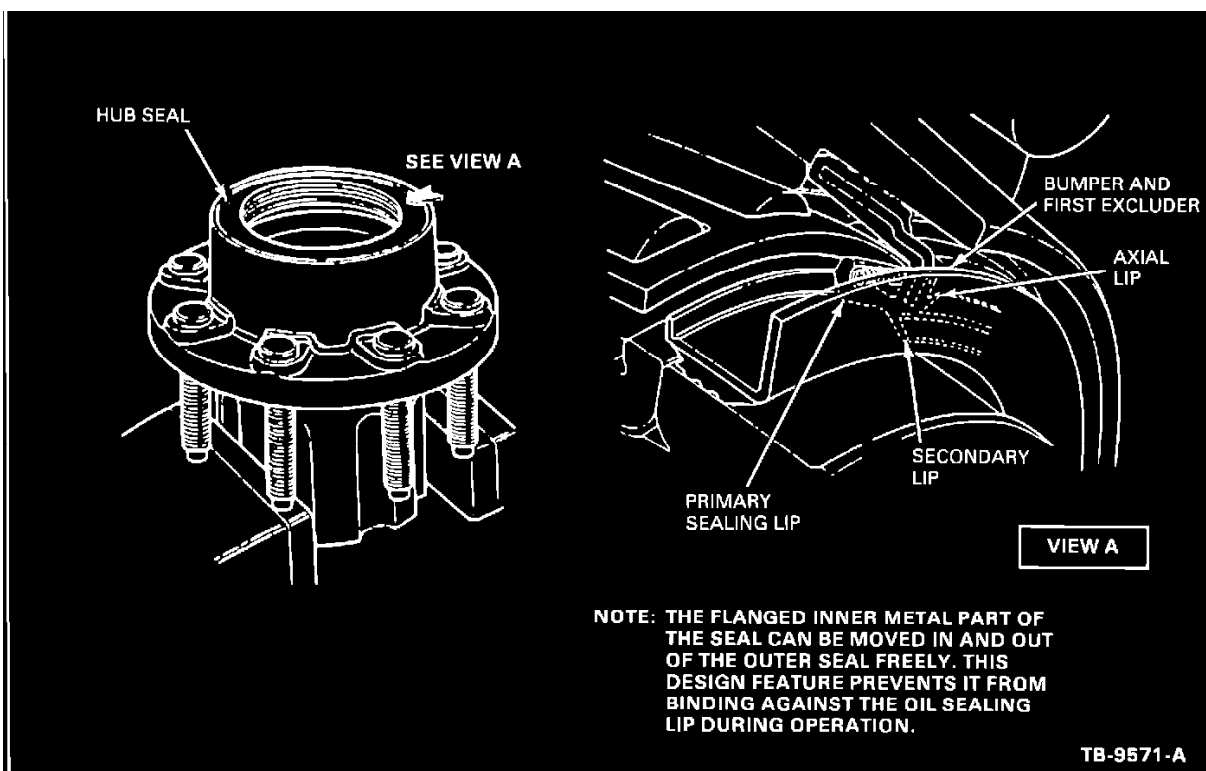


FIGURE 16

NOTE: UNITIZED WHEEL SEALS ARE STANDARD ITEMS ON FULL FLOAT REAR AXLES. THE UNITIZED WHEEL SEAL COMBINES THE FUNCTION OF A WEAR SLEEVE AND SEAL IN ONE SELF-CONTAINED UNIT WITH THE SEAL AND SLEEVE SURFACE INSIDE. THE UNITIZED DESIGN PROVIDES MAXIMUM PROTECTION FOR THE SEALING SURFACE DURING INSTALLATION AND OPERATION, FIGURE 16.

PART NUMBER	PART NAME	CLASS
E7HZ-1175-A	Hub Seal	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Powertrain Warranty Coverage

OPERATION: 880912A - Install one hub seal

TIME: 0.7 Hr.

OPERATION: 880912B - Install both hub seals 1.2 Hrs.

DLR. CODING: Basic Part No. 1177

Condition Code: 48

Technical Service Bulletin # **ATRATB024**Date: **900901****A/T - Harsh Reverse Engagements**

BULLETIN: # 024

DATE: September 1990

TRANSMISSION: All

SUBJECT: Harsh Reverse Engagement

## Harsh Reverse Engagement

This bulletin addresses harsh reverse engagements in many types of transmissions. Reverse usually has two components engaged. These components are an input member and a holding member. The Input member may be a direct, high-reverse or front clutch. The holding member may be a low-reverse band or low-reverse clutch. For this bulletin, we will always call the Input member the reverse input drum and we will call the holding member, the reverse holding member.

Many times the cause of a harsh engagement into reverse is a timing problem. The reverse input drum may be engaging before the reverse holding member. If the reverse input drum applies first, the planetary gear train with all the connected rotating parts begins to spin, building momentum. When the reverse holding member applies it must stop the complete rotating mass of torque converter turbine, shafts, drums and planetary assemblies. If all of these parts come to a sudden stop, it can produce a jolt that is uncomfortable to the driver. Transmissions with heavy or large diameter rotating components could add to the harsh engagement problem. Some examples would be a transmission with a torque converter clutch creating a problem because of the extra weight of damper assembly and the clutch plate. Some transmissions, like the C6 and 3L80/THM400, have comparatively heavier drums and planetaries.

One way to help prevent a harsh engagement is to make sure the reverse holding member applies before the reverse input drum. You can do this by using band adjustments and clutch pack clearances to help regulate which applies first. Before you start any internal work, check some external factors that can influence harsh engagement.

## USE THIS ORDER FOR CORRECTION:

1. Check engine tune. Does the engine idle smooth and have good vacuum? Low vacuum raises line pressure on vacuum modulator equipped transmissions causing harsh engagement.
2. Set engine idle speed to exact manual specification for that particular year and model. The faster a component is rotating, the harder it is to stop. Engine speeds as much as 100 RPM over specifications can cause harsh engagements. RPM's this slight are difficult to detect by just listening to an engine. It is best to check the RPM with a tachometer, but not the one on the dash as it is not accurate for this.
3. Check main line pressure. High pressure can cause aggressive engagement of components.
4. Work with reverse holding member clearances. (Make sure it is not too loose)
5. Work with reverse input drum clearances. (Make sure it is not too tight)
6. Some transmissions may require an additional wave plate in the reverse drum (3L80/THM400, or 4L60/THM700-R4).

## BULLETIN RECAP

^ Check engine tune.

^ Check engine RPM.

- ^ Check pressure.
- ^ Tighten reverse holding member clearance.
- ^ Loosen reverse in put member clearance.
- ^ Install wave plate.

FOR ADDITIONAL INFORMATION:

ATRA: TSB 86-33, TSB 85-54 TSB 85-52, TSB 83-44  
Technical Service Bulletin # **ATRATB871**

Date: **870101**

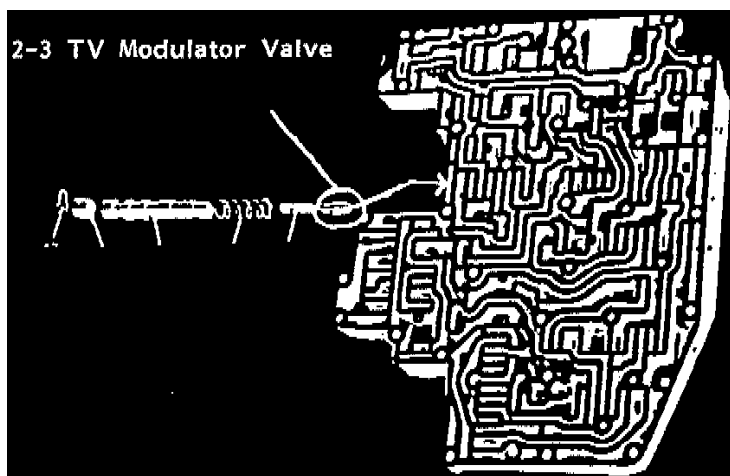
### **A/T - 3-2 Too Sensitive, or No Part Throttle Downshift**

TSB 87-1 (Jan)

SUBJECT: FORD AOD

PROBLEM:

Too sensitive 3-2, or no 3-2 part throttle downshift.



CAUSE:

May be a sticky 2-3 TV modulator valve. If it sticks closed, it can cause a no 3-2 part throttle downshift. If valve sticks open, it can cause a too sensitive 3-2 downshift.

SOLUTION:

Clean the valve, and re-assemble, making sure that a magnet will stroke the valve fully. Torque the valve body in proper sequence.

We recommend approximately .060 inch pounds on a problem unit.

Technical Service Bulletin # **ATRATB8750**

Date: **870801**

### **A/T - AOD No Fourth Gear**

TSB 87-50 (Aug)

SUBJECT: FORD AOD

PROBLEM: No Fourth Gear

When diagnosing a no-3-4 upshift condition, it's important to know what happens in this transmission during the 3-4 upshift.

When the 3-4 shift valve upshifts1 forward clutch oil is exhausted, and the overdrive band is applied.

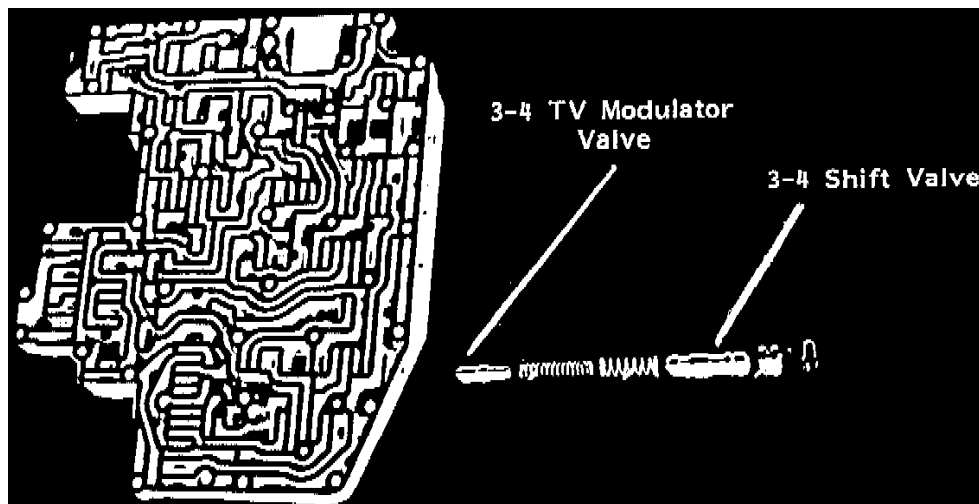
The direct clutches are applied in both 3rd and 4th gears. If the transmission shifts 1-2, 2-3, and never upshifts from 3rd gear, the 3-4 shift valve is not upshifting.

If the transmission makes a shift into neutral instead of 4th gear, it indicates the 3-4 shift valve upshifted, but the overdrive band did not apply properly.

The overdrive band application is controlled by several valves in the valve body, the overdrive servo and the overdrive band.

If the 3-4 shift valve is not upshifting, the possible problems are reduced considerably. These possible problems include: the 3-4 shift valve or the 3-4 modulator valve sticking, or governor oil is not rising high enough to shift the valve.

TO CHECK:



Remove the oil pan, extension housing and the governor. Air check the valve body through the governor feed hole, and try to "feel" the 3-4 shift valve for free movement while looking for excessive leakage. A common source for excessive governor leakage is the round aluminum plugs in the valve body, valve body gaskets, or where the governor support mates to output shaft.

Technical Service Bulletin # **ATRATB8825**

Date: **880601**

### **A/T - Harsh 1-2 Upshift or Slide Bump 1-2 Upshift**

TSB 88-25 (June)

SUBJECT: FORD AOD

PROBLEM: Harsh 1-2 upshift, or slide bump 1-2 upshift

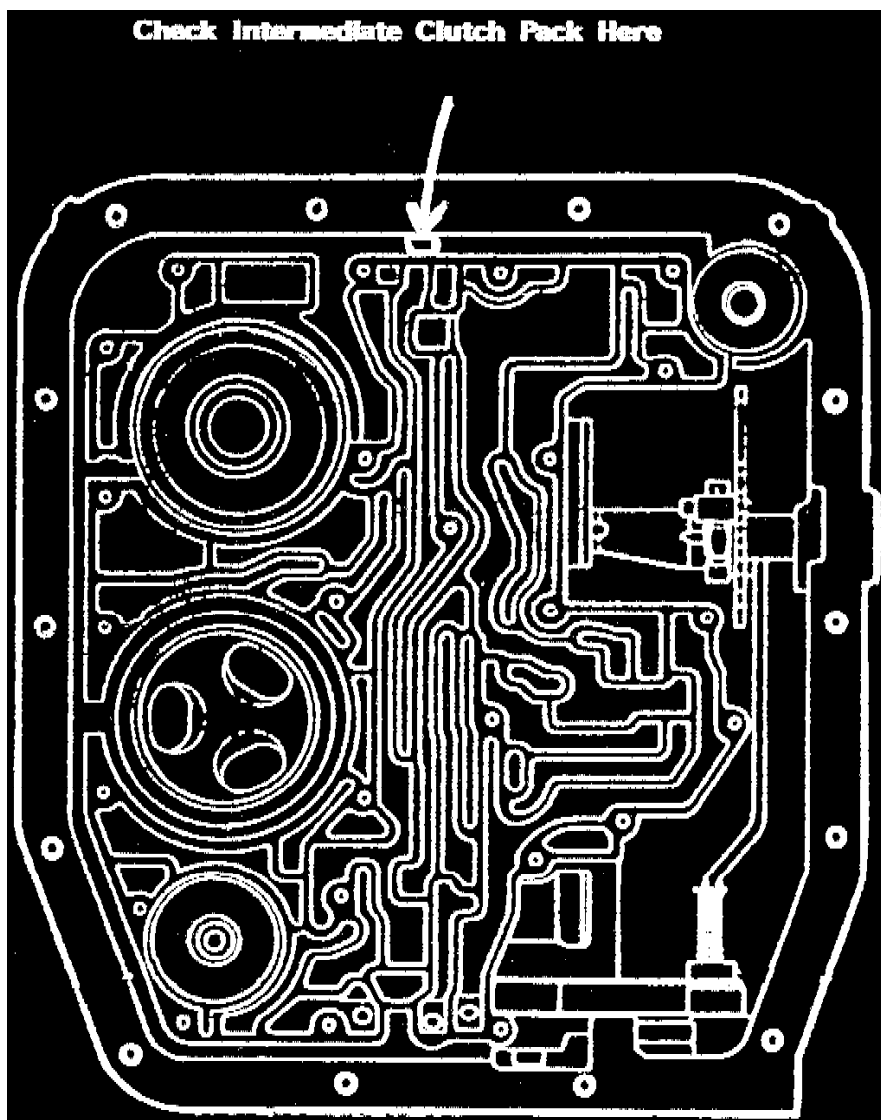
CAUSE:

May be caused by improper intermediate clutch pack clearance

Many technicians have experienced this condition, and blamed it on the friction plate manufacturer. This is not where the fault lies; in fact, the friction plates may be of a better quality than the original friction plates.

If intermediate clutch pack clearance is not checked on AOD transmissions, the intermediate return spring assembly in the pump may drag the clutch pack and glaze the frictions in reverse and low gears.

This can happen before the vehicle is road-tested, and cannot be fixed without removing the glaze from the friction plates.



Intermediate clutch pack clearance can be checked with a tool, or through a small hole in the case after the front pump has been installed. (See Figure)

Proper intermediate clutch pack clearance is:

.030"-.042"

Technical Service Bulletin # **ATRATB8913**

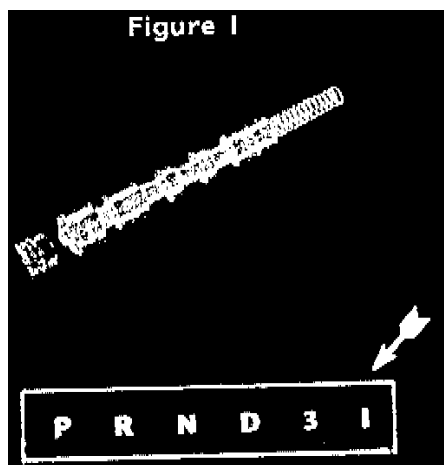
Date: **890401**

**A/T - AOD No Manual Low Gear**

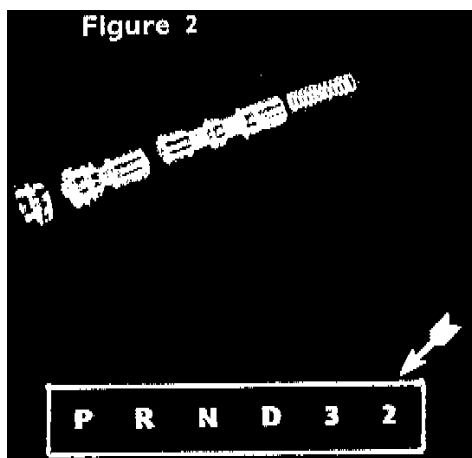
TSB 89-13 (Apr)

SUBJECT: FORD AOD

NO MANUAL LOW



Some AOD's may not have manual low because of the valve body layout. If the shift selector reads P-R-N-OD-3-1, the transmission should have a one-piece 1-2 shift valve in it (See Figure 1). This unit should give you manual low.



If the selector reads P-R-N-OD-3-2, the unit should have a 1-2 shift valve in it (See Figure 2). This transmission will not have manual low. The transmissions with no manual low were usually found in police cars, but may also be found in other vehicles.

If the transmission has ever been worked on, you can't be sure which style you have -- without removing and examining the valve body.

The figures show two different valve trains for the 1-2 shift valve. To get manual low, you must have the one-piece shift valve.

If you run into a valve body that has a two-piece 1-2 shift valve -- this valve body can not provide manual low.

If you want manual low, but you have a two-piece shift valve, you must change the valve body, not just the valve.

Technical Service Bulletin # **92186**

Date: **920826**

## Engine - Metal to Metal Noise

Article No.

92-18-6

08/26/92

^ ENGINE - 5.0L - THRUST BEARING OR CRANKSHAFT PREMATURE WEAR - VEHICLES WITH AOD TRANSMISSION

^ NOISE - "METAL-TO-METAL" SOUND - 5.0L WITH AOD TRANSMISSION

^ TRANSMISSION - AOD - INTERFERENCE BETWEEN THE TORQUE CONVERTER AND THE FLYWHEEL BOLTS

FORD:

1982-88 THUNDERBIRD

1982-90 MUSTANG

1986 LTD

1987-90 CROWN VICTORIA

## LINCOLN-MERCURY:

1982-87 CAPRI, CONTINENTAL

1982-88 COUGAR

1982-90 TOWN CAR

1984-90 MARK VII

1987-90 GRAND MARQUIS

## LIGHT TRUCK:

1982-90 BRONCO, E-150, E-250, F-150, F-250

This TSB article is being republished in its entirety to include the 1982-1987 Continental and the 1982-1990 Town Car.

## ISSUE:

An unusual "metal-to-metal" noise from the engine may be caused by the flexing of the torque converter. The flexing condition causes an interference between the torque converter and flywheel bolts. The interference can cause the thrust bearing and the crankshaft to wear prematurely and eventually fail.

## ACTION:

Install six (6) new flywheel bolts with reduced head height to provide additional clearance. Refer to the appropriate Shop Manual, 5.0L Engine Section, for service details.

## NOTE:

WHEN A CRANKSHAFT IS REPLACED DUE TO THRUST BEARING FAILURE, INSTALL A NEW CRANKSHAFT THAT HAS A REVISED PILOT HOLE. THIS WILL PROVIDE ADDITIONAL CLEARANCE FOR THE TORQUE CONVERTER. USE NEW FLYWHEEL BOLTS.

PART NUMBER	PART NAME	CLASS
F1AZ-6303-B	Crankshaft	B
F1ZZ-6379-A	Flywheel Bolts (6 Req.)	B

PART NUMBER

OTHER APPLICABLE ARTICLES: NONE		
SUPERSEDES: 92-15-7		
WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Major Component Warranty Coverage, Powertrain Warranty Coverage		
OPERATION	DESCRIPTION	TIME
921806A	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Mustang	7.2 Hr.
921806B	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Thunderbird/Cougar	7.1 Hr.
921806C	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Crown Victoria/Grand Marquis	6.6 Hr.
921806D	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - E 150-250 All Models	10.3 Hr.
921806E	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - F 150-250 All 4X2 Models	8.6 Hr.
921806F	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - F 150-250 All 4X4 And Bronco Models	8.7 Hr.
921806G	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Mark VII	9.0 Hrs.
921806H	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Town Car	8.7 Hr.
921806I	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Continental	8.8 Hr.
DEALER CODING		
	BASIC PART NO.	CONDITION CODE
	6303	56
OASIS CODES: 497000, 499000, 504000, 597997, 702000		

Operation Description

Technical Service Bulletin # 88621

Date: 880316

## Driveshaft - Clicking/Popping Noise

^ DRIVELINE - ALUMINUM DRIVESHAFT - "CLICKING" OR "POPPING" NOISE

Article No.  
88-6-21

^ NOISE - "CLICKING" OR "POPPING" - ALUMINUM DRIVESHAFT

LIGHT TRUCK: 1986-88 AEROSTAR  
1987-88 E-SERIES, F-SERIES

ISSUE: A "clicking" or "popping" noise from the driveshaft during transmission engagement or when accelerating from a stop may be caused by inadequate tubeto-yoke bonding on the aluminum driveshaft.

ALUMINUM DRIVESHAFT APPLICATION CHART				
Part Number	Vehicle	Engine	Transmission	Axle
E8TZ-4602-W	1987-88 F-150 (4x2) 133" Wheel Base	4.9L	M50D	2.73/3.08/3.55
		5.0L	AOD	3.55
		5.0L	M50D	3.08
		5.0L	T18	3.55
E8TZ-4602-Y	1987-88 F-250 LD (4x2) 133" Wheel Base	4.9L	M50D	3.55
		4.9L	T18	3.55
		5.0L	M50D	3.55
		5.0L	T18	3.73/4.10
		5.0L	AOD	4.10
E8TZ-4602-Z	1987-88 F-250 LD (4x2) 133" Wheel Base	4.9L	C6	3.55
		5.8L	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-Z	1987-88 F-250 HD (4x2) 133" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-Z	1987-88 F-350 SRW/DRW (4x2) 133" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-AB	1987-88 F-350 DRW (4x2) 136" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8UZ-4602-C	1987-88 E-150 138" Wheel Base	4.9L	AOD	3.55
		5.0L	AOD	3.55
E8UZ-4602-D	1987-88 E-150 138" Wheel Base	4.9L	C6	3.08/3.55
		5.8L	C6	3.55
E8UZ-4602-E	1987-88 E-250 138" Wheel Base Under 8500 GVW	5.0L	AOD	3.73
E8UZ-4602-F	1987-88 E-250 138" Wheel Base Under 8500 GVW	4.9L	C6	3.54/3.73
		5.8L	C6	3.54/3.73
E8UZ-4602-F	1987-88 E-250 138" Wheel Base Club Wagon Over 8500 GVW	4.9L	C6	4.10
		5.8L	C6	4.10
		7.5L	C6	4.10
E8UZ-4602-F	1987-88 E-350 SRW 138" Wheel Base	7.5L	C6	4.10
E8UZ-4602-F	1987-88 E-350 DRW 138" Wheel Base	7.5L	C6	4.10
E8UZ-4602-F	1987-88 Super Wagon 138" Wheel Base Over 8500 GVW	4.9L	C6	4.10
		5.8L	C6	4.10
		7.5L	C6	4.10

ALUMINUM DRIVESHAFT APPLICATION CHART				
Part Number	Vehicle	Engine	Transmission	Axle
E89Z-4602-B	1988 Aerostar	3.0L	M50D	3.45/3.73
E89Z-4602-C	1986-88 Aerostar	3.0L	A4LD	3.45/3.73/4.10
E79Z-4602-A	1986-87 Aerostar	2.3L/3.0L	M50D	3.45/3.73
<b>NOTE: If a new driveshaft is required on the following applications, the original slip yoke from the old driveshaft must be used.</b>				
E8TZ-4602-W	1987 F-150 133" Wheel Base	4.9L/5.0L	NPG 435	3.55
E8TZ-4602-Y	1987 F-250 LD (4x2) 133" Wheel Base	5.0L	NPG 435	3.55/4.10

**ACTION:** To correct this, install a new aluminum driveshaft with an improved tube-to-yoke bond. Refer to the appropriate model year Shop Manual for driveshaft removal and installation procedures. Refer to the driveshaft application charts on pages 38 and 39 of this TSB for the correct part numbers.

PART NUMBER	PART NAME	CLASS
E8TZ-4602-W	Aluminum Driveshaft	C
E8TZ-4602-Y	Aluminum Driveshaft	C
E8TZ-4602-Z	Aluminum Driveshaft	C
E8TZ-4602-AB	Aluminum Driveshaft	C
E8UZ-4602-C	Aluminum Driveshaft	C
E8UZ-4602-D	Aluminum Driveshaft	C
E8UZ-4602-E	Aluminum Driveshaft	C
E8UZ-4602-F	Aluminum Driveshaft	C
E89Z-4602-B	Aluminum Driveshaft	C
E89Z-4602-C	Aluminum Driveshaft	C
E79Z-4602-A	Aluminum Driveshaft	C

**OTHER APPLICABLE ARTICLES:** Supersedes 86-23-20

**WARRANTY STATUS:** Eligible Under Powertrain Warranty Coverage

**OPERATION:** 880621A - One-piece driveshaft

**TIME:** 0.4 Hr. - Aerostar

0.3 Hr. - E-Series, F-Series

**OPERATION:** 880621B - Two-piece driveshaft

**TIME:** 0.5 Hr. - E-Series, F-Series

**DLR. CODING:** Basic Part No. 4602 - Code: 61

Technical Service Bulletin # **ATRASIL8833**

Date: **881001**

## A/T - Driveline Clicking Or Popping Noise

SIL 88-33 (Oct)

**SUBJECT:** FORD

**PROBLEM:** A Driveline "clicking" or "popping" noise

1986-88 Aerostar, 1987-88 E-Series and F Series Truck

The noise may occur during transmission engagement or when accelerating from a stop. The cause may be inadequate tube-to-yoke bonding on the aluminum driveshaft.

ALUMINUM DRIVESHAFT APPLICATION CHART				
Part Number	Vehicle	Engine	Transmission	Axle
E89Z-4602-B	1988 Aerostar	3.0L	M50D	3.45/3.73
E89Z-4602-C	1986-88 Aerostar	3.0L	A4LD	3.45/3.73/4.10
E79Z-4602-A	1986-87 Aerostar	2.3L/3.0L	M50D	3.45/3.73
<b>NOTE: If a new driveshaft is required on the following applications, the original slip yoke from the old driveshaft must be used.</b>				
E8TZ-4602-W	1987 F-150 133" Wheel Base	4.9L/5.0L	NPG 435	3.55
E8TZ-4602-Y	1987 F-250 LD (4x2) 133" Wheel Base	5.0L	NPG 435	3.55/4.10

PART NUMBER	PART NAME	CLASS
E8TZ-4602-W	Aluminum Driveshaft	C
E8TZ-4602-Y	Aluminum Driveshaft	C
E8TZ-4602-Z	Aluminum Driveshaft	C
E8TZ-4602-AB	Aluminum Driveshaft	C
E8UZ-4602-C	Aluminum Driveshaft	C
E8UZ-4602-D	Aluminum Driveshaft	C
E8UZ-4602-E	Aluminum Driveshaft	C
E8UZ-4602-F	Aluminum Driveshaft	C
E89Z-4602-B	Aluminum Driveshaft	C
E89Z-4602-C	Aluminum Driveshaft	C
E79Z-4602-A	Aluminum Driveshaft	C

ALUMINUM DRIVESHAFT APPLICATION CHART				
Part Number	Vehicle	Engine	Transmission	Axle
E8TZ-4602-W	1987-88 F-150 (4x2) 133" Wheel Base	4.9L	M50D	2.73/3.08/3.55
		5.0L	AOD	3.55
		5.0L	M50D	3.08
		5.0L	T18	3.55
E8TZ-4602-Y	1987-88 F-250 LD (4x2) 133" Wheel Base	4.9L	M50D	3.55
		4.9L	T18	3.55
		5.0L	M50D	3.55
		5.0L	T18	3.73/4.10
		5.0L	AOD	4.10
E8TZ-4602-Z	1987-88 F-250 LD (4x2) 133" Wheel Base	4.9L	C6	3.55
		5.8L	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-Z	1987-88 F-250 HD (4x2) 133" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-Z	1987-88 F-350 SRW/DRW (4x2) 133" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-AB	1987-88 F-350 DRW (4x2) 136" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8UZ-4602-C	1987-88 E-150 138" Wheel Base	4.9L	AOD	3.55
		5.0L	AOD	3.55
E8UZ-4602-D	1987-88 E-150 138" Wheel Base	4.9L	C6	3.08/3.55
		5.8L	C6	3.55
E8UZ-4602-E	1987-88 E-250 138" Wheel Base Under 8500 GVW	5.0L	AOD	3.73
E8UZ-4602-F	1987-88 E-250 138" Wheel Base Under 8500 GVW	4.9L	C6	3.54/3.73
		5.8L	C6	3.54/3.73
E8UZ-4602-F	1987-88 E-250 138" Wheel Base Club Wagon Over 8500 GVW	4.9L	C6	4.10
		5.8L	C6	4.10
		7.5L	C6	4.10
E8UZ-4602-F	1987-88 E-350 SRW 138" Wheel Base	7.5L	C6	4.10
E8UZ-4602-F	1987-88 E-350 DRW 138" Wheel Base	7.5L	C6	4.10
E8UZ-4602-F	1987-88 Super Wagon 138" Wheel Base Over 8500 GVW	4.9L	C6	4.10
		5.8L	C6	4.10
		7.5L	C6	4.10

**CORRECTION:**

Install a new aluminum driveshaft with an improved tube-to-yoke bond. Refer to the application charts for the correct part numbers.

Technical Service Bulletin # **911811**

Date: **910905**

**M/T - Crunching Shifting From 2nd to 3rd Gear**

Article No. 91-18-11  
09/05/91

^ NOISE-INTERMITTENT "CRUNCHING" WHEN SHIFTING FROM 2ND TO 3RD-VEHICLES WITH M50D (MAZDA R1 AND R2) TRANSMISSION

^ TRANSMISSION-M50D (MAZDA R1 AND R2)- INTERMITTENT "CRUNCHING" NOISE WHEN SHIFTING FROM 2ND TO 3RD

LIGHT TRUCK: 1988-89 ECONOLINE  
1988-90 BRONCO II  
1988-91 AEROSTAR, BRONCO, F-150, RANGER  
1991 EXPLORER

**ISSUE:** A slight intermittent "crunch" or grinding noise may be heard when shifting from 2nd to 3rd. This is caused by improper synchronizer engagement.

**ACTION:** Install a new synchronizer service kit. Refer to the Parts Block for correct parts usage and the following procedure for service details.

#### INSPECTION

1. Drive the vehicle to warm the transmission oil temperature to about 125~F (52~C). This can usually be done after driving about 10 miles at highway speed when the outside temperature is above freezing.
2. On a smooth road surface, accelerate the vehicle from a stop to 3rd gear at normal shift speeds as defined in the owners guide.
3. If a slight "crunch" is heard or grinding sensation is felt in the shift lever when shifting from 2nd to 3rd, proceed with the following synchronizer kit installation procedure.

#### SYNCHRONIZER KIT INSTALLATION

1. Remove the transmission from the vehicle. Refer to the appropriate Light Truck Shop Manual, Section 07-03A, for removal procedure.
2. Remove the 1st/2nd and 3rd/4th clutch hub and sleeve assembly along with the corresponding synchronizer ring.
3. Install all parts from the appropriate synchronizer kit. The kits contain new 1, 2, 3, and 4 synchronizer rings, a new 3/4 synchronizer sleeve and an instruction sheet. The original 1/2 clutch hub sleeve assembly and 3/4 clutch hub must be reused.
4. Put a label on the transmission showing it was updated per TSB 91-18-11 and to refer to this TSB before servicing.

**NOTE:** THE NEW 3RD GEAR SYNCHRONIZER RING AND 3/4 SYNCHRONIZER SLEEVE ARE UNIQUE FROM THE ORIGINAL COMPONENTS. THE NEW COMPONENTS MUST BE INSTALLED AS A SET IN THE PROPER POSITION. FAILURE TO DO SO WILL RESULT IN THE INABILITY TO SHIFT THE TRANSMISSION INTO ONE OF THE GEARS. note>

PART NUMBER	PART NAME	CLASS
FOTZ-7C391-H	Synchronizer Kit - R2 (F-150, Bronco, Econoline)	C
FOTZ-7C391-F	Synchronizer Kit - R1 (Ranger, Bronco II, Explorer)	C
FOTZ-7C391-G	Synchronizer Kit - R1 (Aerostar)	C

**OTHER APPLICABLE ARTICLES:** NONE

**WARRANTY STATUS:** Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
911811A	Inspect Transmission	0.3 Hr.
911811B	Install Synchronizer Kit Ranger 4X2 With 2.OL, 2.3L, 2.9L, or 3.OL And Aerostar With 3.OL	5.0 Hr.
911811C	Install Synchronizer Kit Ranger 4X4 With 2.3L or 4.OL and Explorer 4X4	6.7 Hr.
911811D	Install Synchronizer Kit - Ranger 4X4 With 2.9L	6.9 Hr.
911811E	Install Synchronizer Kit - Ranger 4X2 And Explorer 4X2 With 4.OL	6.0 Hr.
911811F	Install Synchronizer Kit - Bronco II 4X2 With 2.9L And Bronco With 5.OL	6.5 Hr.

911811G	Install Synchronizer Kit - Bronco II 4X4 With 2.9L	6.9 Hr.
911811H	Install Synchronizer Kit F-150 4X2 With 4.9L	5.1 Hr.
911811I	Install Synchronizer Kit F-150 4X4 With 4.9L or 5.0L And Bronco With 4.9L	6.3 Hr.
911811J	Install Synchronizer Kit - F-150 4X2 With 5.0L	5.3 Hr.
911811K	Install Synchronizer Kit - Econoline With 4.9L	5.2 Hr.

## DEALER CODING

BASIC PART NO.            CONDITION CODE

7C391                            56

OASIS CODES: 505000, 505200, 506000, 702000

Technical Service Bulletin # **911014**Date: **910515****M/T Transmission Shift Lever - Buzz/Vibration**

Article No.

91-10-14

5/15/91

^ NOISE/VIBRATION - SHIFT LEVER - M50D TRANSMISSION

^ TRANSMISSION - M50D - SHIFT LEVER BUZZ/VIBRATION

LIGHT TRUCK: 1988-91 BRONCO, F-150, F-250

**ISSUE:** Transmission shift lever buzz, may be noticed in overdrive or 4th gear after the vehicle has obtained normal operation temperatures and is driven on a smooth road surface at normal highway speeds of 55 MPH (88Km/h). The tone and intensity of this condition are considerably less when observed in 4th gear than in overdrive.

**ACTION:** Replace the transmission top cover assembly with the new top cover kit assembly. Refer to the following procedure for diagnosis and service details.

**INSPECTION PROCEDURE:**

1. Drive the vehicle to warm the transmission oil to approximately 125~F (52~) - about ten miles at highway speeds when the outside temperature is at the freezing point.
2. On a smooth road surface, drive the vehicle at approximately 55 MPH (88 Km/h) in overdrive to verify shift lever buzz.
3. If shift lever buzz is observed, lightly push to the right (passenger side) to determine if the buzz is eliminated.
4. If the buzzing noise is eliminated, refer to the following repair procedures.

**NOTE:** IF THIS TEST DOES NOT ELIMINATE THE BUZZ, DO NOT REPAIR WITH THIS PROCEDURE, IT WILL NOT CORRECT THE CONCERN, REFER TO THE LIGHT TRUCK SHOP MANUAL FOR FURTHER CONCERN DEFINITION.

**REPAIR PROCEDURE**

1. Remove the old transmission top cover assembly.
2. Install the new transmission top cover assembly.

**NOTE:** THE TRANSMISSION DOES NOT HAVE TO BE REMOVED FROM VEHICLE. ACCESS IS GAINED BY REMOVING THE SHIFT LEVER AND SHIFT BOOT AS AN ASSEMBLY. PULL BACK THE FLOOR COVERING AND REMOVE TRANSMISSION OPENING COVER PLATE.

CAUTION: CARE SHOULD BE TAKEN TO INSURE THAT NO DIRT ENTERS THE TRANSMISSION WHILE THE TOP COVER IS OFF.

PART NUMBER	PART NAME	CLASS
F0TZ-7C391-J	Transmission Top Cover Assembly	C

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911014A	Replace Transmission Top Cover Assembly	1.2 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7222	56

OASIS CODES: 505200, 703300

Technical Service Bulletin # **9059**

Date: **900228**

## M/T - ZF HD M50D Bump/Clunk/Click Noises

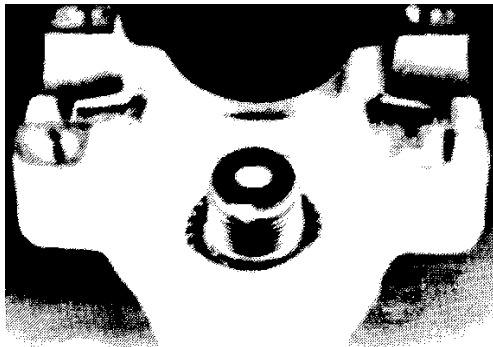
- ^ NOISE - BUMP/CLUNK/CLICK - ZF HEAVY DUTY M50D TRANSMISSION
- ^ TRANSMISSION - ZF HEAVY DUTY M50D-LEAKS LUBRICANT

Article No. 90-5-9

LIGHT TRUCK: 1987-90 F-250, F-350

ISSUE: A "bumping/clunking" noise or a "clicking" sound on torque reversal or transmission lubricant leakage may be caused by a loose output flange retaining nut.

ACTION: Install a new output flange retaining nut. Refer to the following procedure for service details.



**TB-1555-A**

**Figure 1**

1. Install a new output flange retaining nut (E7TZ-7045-A) on the output shaft, Figure 1.

CAUTION: DO NOT REUSE THE OUTPUT FLANGE RETAINING NUT AFTER ANY SERVICING OF THE TRANSMISSION. ALWAYS REPLACE IT WITH A NEW ONE.

2. Tighten the nut to 184 lb.ft. (250 N-m).



Figure 2

3. Position a 3/16" (4.76 mm) punch on the locking shoulder of the retaining nut over the groove of the output shaft, Figure 2.



Figure 3

4. Strike the punch with a hammer. Make sure that the shoulder of the retaining nut is contacting the bottom of the groove, Figure 3.

**CAUTION:** WHEN STAKING THE NUT, MAKE SURE THE LOCKING SHOULDER OF THE NUT AND THE GROOVE OF THE OUTPUT SHAFT ARE THE ONLY AREAS USED IN THIS STAKING OPERATION. IF THE NUT IS STRUCK IN ANY OTHER AREA, THE TORQUE WILL BE LOST AND THE NUT MAY COME LOOSE IN SERVICE.

PART NUMBER	PART NAME	CLASS
E7TZ-7045-A	Output Flange Retaining Nut	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
900509A	Install & Stake Retaining	0.4 Hr.

Nut  
DEALER CODING

BASIC PART NO.	CONDITION CODE
7045	33

OASIS CODES: 5500, 5950, 5970, 7100, 7113

Technical Service Bulletin # **911712**

Date: **910821**

**M/T - Gear Noise/Rattle**

Article No. 91-17-12  
08/21/91

- ^ NOISE - "GEAR RATTLE" - MANUAL TRANSMISSIONS - FROM FLOOR PAN SHIFTER OPENING (4X2 AND 4X4 MODELS)
- ^ TRANSMISSION - MANUAL - "GEAR RATTLE" NOISE FROM FLOOR PAN SHIFTER OPENING (4X2 AND 4X4 MODELS)

LIGHT TRUCK: 1988-91 BRONCO, F SUPER DUTY, F-150, F-250, F-350, F-47

ISSUE: Gear noise, commonly referred to as "gear rattle", may enter the cab through the manual transmission shift lever floor pan opening. This noise is normally noticed when the vehicle is at normal operating temperatures and a load is applied to the engine between 500 and 1000 RPM.

ACTION: Inspect and evaluate the vehicle for gear rattle. If gear rattle is detected, install a new shift boot over the shift lever to limit gear noise from entering the cab. Refer to the following procedure for service details.

INSPECTION PROCEDURE:

1. Drive the vehicle till normal operating temperatures are maintained (about 10 miles at highway speeds when the ambient temperatures are above freezing.)
2. On a smooth road surface, place the shift lever in 2nd or 3rd gear and accelerate starting at 500 RPM.
3. If gear rattle is heard and is diagnosed as coming through the shift lever floor pan opening, repair using the following procedure.

REPAIR PROCEDURE:

1. Remove the shift knob from the shift lever.

NOTE: TO REMOVE THE SHIFT KNOB WITHOUT DAMAGE, PLACE A 16 mm OR AN ADJUSTABLE OPEN END WRENCH UNDER THE SHIFT KNOB END AND STRIKE THE WRENCH UPWARD WITH A HEAVY HAMMER.

2. Remove the (4) screws which secure the boot to the floor. Remove the boot assembly from the the shift lever.
3. Install the new boot assembly over the shift lever and secure to the floor with the the (4) screws provided.

NOTE: USE A SOAP SOLUTION TO ASSIST IN INSTALLING THE SHIFT BOOT OVER THE SHIFT LEVER.

CAUTION: DO NOT USE A HYDROCARBON (OIL) OR GLYCOL BASED LUBRICANT TO AID IN INSTALLING THE SHIFT BOOT. THESE MATERIALS WILL GET INTO THE SHIFT LEVER SPLINES AT THE SHIFT KNOB END OF THE LEVER AND CAUSE THE SHIFT KNOB PLASTIC CORE TO CRACK.

4. Install the shift knob on the shift lever.

PART NUMBER	PART NAME	CLASS
FITZ-7277-A	Boot - Transmission Assembly	B

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911712A	Inspection Only (includes Road Test)	0.3 Hr.
911712B	Inspect And Install Shift Lever Boot	0.7 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7277	53

OASIS CODES: 505000, 505200, 597997, 702300

Technical Service Bulletin # 911015

Date: 910515

**M/T - M50D Hard Shift Condition**

Article No.

91-10-15

5/15/91

TRANSMISSION - M50D - HARD SHIFT TO REVERSE OR  
FIFTH GEAR

LIGHT TRUCK: 1988-89 ECONOLINE  
1988-90 BRONCO II  
1988-91 AEROSTAR, BRONCO, F-150, F-250, RANGER  
1991 EXPLORER

ISSUE: The 5-R synchronizer sliding sleeve clutching teeth may wear on the reverse side. This may cause a hard to engage or partial engagement of fifth or reverse gear and could result in the transmission jumping out of gear. If the wear is allowed to continue, it may become difficult or impossible to engage 1-2-3 or 4th gear.

ACTION: Inspect the 5-R synchronizer sliding sleeve for wear and replace if excessive wear is found. Refer to the following procedure for service details.

INSPECTION PROCEDURE:

1. Remove necessary components so that the transmission extension housing can be removed without removing the entire transmission. Refer to the Light Truck Shop Manual Section 07-03A for service details.

NOTE: COMPACT VEHICLES MAY REQUIRE REMOVAL OF TRANSMISSION

2. Remove the transmission extension housing.

3. Inspect the 5-R synchronizer sliding sleeve for wear of the reverse clutching teeth.

REPAIR PROCEDURE

1. If wear is observed, remove speedometer drive gear (4 x 2 only).

2. Remove the top cover (if repairing on the bench).

3. Carefully remove the main shaft and counter shaft locking nuts.

4. Remove and replace the following transmission parts. Refer to the Light Truck Shop Manual for service procedures.

^ 5th Counter Shaft Gear

^ 5-R Synchronizer, hub and ring assembly

NOTE: INSTALL WITH THE DOT ON THE SYNCHRONIZER SLEEVE FACING REVERSE GEAR.

^ Reverse counter shaft gear

^ 5-R Counter Lever

^ 5-R Shift fork and rod

NOTE: USE THE SPRING AND BALL FROM THE EXISTING ASSEMBLY.

^ Replace the idler shaft in the reverse idler gear assembly (R1 only).

NOTE: THERE ARE EXTRA ADJUSTING SHIMS PROVIDED IN CASE IT IS NECESSARY TO RESET THE 5-R SYNCHRONIZER HUB AND CONTROL REVERSE GEAR END PLAYS TO SPECIFICATION. USE THE NEW MAIN SHAFT AND COUNTER SHAFT LOCKING NUTS UPON ASSEMBLY.

CAUTION: USE ALL THE PARTS CONTAINED IN THE SERVICE KIT INCLUDING THE COUNTER REVERSE LEVER. ALTHOUGH THE NEW LEVER LOOKS THE SAME AS THE ONE CONTAINED IN THE TRANSMISSION, CONTACT ANGLES ARE SLIGHTLY DIFFERENT TO INSURE PROPER TIMING AND ENGAGEMENT.

PART NUMBER	PART NAME	CLASS
F0TZ-7C391-E	Synchronizer Service Kit - R2	C
F0TZ-7C391-C	Synchronizer Service Kit - 2.3L, 2.9L, 3.0L, R1	C
F0TZ-7C391-D	Synchronizer Service Kit - 4.0L R1	C

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
911015A	Install Synchronizer Service Kit - 4 x 2	2.1 Hr.
911015A	Install Synchronizer Service Kit - 4 x 4	2.9 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7124	30

OASIS CODES: 505000

Technical Service Bulletin # **88820041588**

Date: **880401**

## M/T - Hard to Shift Disengages From Third Gear

TRANSMISSION - ZF MODEL S5-42 - HARD TO SHIFT INTO THIRD GEAR -

TRANSMISSION - ZF MODEL S5-42 - DISENGAGES THIRD GEAR

Article No. 88-8-20

LIGHT TRUCK: 1987-88 F SERIES, BRONCO

**ISSUE:** A hard shifting transmission during a 2-3 upshift or 4-3 downshift may be caused by a third gear synchronizer that has an improper surface finish. The hard shifting condition may also cause the transmission to disengage from third gear because of incomplete third gear engagement.

**ACTION:** To correct this, install a new design third gear synchronizer that was manufactured using a new machine lapping process to improve the surface finish. Refer to the 1988 Light Truck Shop Manual, Section 16-34-1 for removal and installation procedures.

PART NUMBER	PART NAME	CLASS
E7TZ-7124-C	Third Gear Synchronizer	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty and Powertrain Coverages

OPERATION: 880820A - Install third gear synchronizer

TIME: 7.6 Hrs. - F Series (4 x 2) 8.6 Hrs. - F Series (4 x 4) 8.3 Hrs. - Bronco

DLR. CODING: Basic Part No. 7124

Condition Code: 85

Technical Service Bulletin # **B82871201**

Date: **871201**

## Campaign - Weight Certification Label Are Overstated

TSB # B821287 December, 1987

TO: Selected Ford Dealers

**SUBJECT:** Owner Notification Program B82 - Installation of a Safety Compliance Certification Label on Certain 1988 F250 4x2 HD and F350 4x4 Vehicles Equipped With Optional Engine

TRUCKS AFFECTED

<u>Vehicles Affected</u>	<u>Assembly Plants</u>	<u>Production From</u>	<u>Dates Through</u>
F250 4x2 HD w/optional engines	Kansas City	8/18/87	8/20/87
	Norfolk	8/17/87	8/20/87
	Twin Cities	8/18/87	8/20/87
	Ontario	8/20/87	8/20/87
F350 4x4 w/optional engines	Kansas City	8/18/87	8/28/87
	Norfolk	8/17/87	8/28/87
	Twin Cities	8/18/87	8/28/87
	Ontario	8/20/87	8/28/87

Approximately 300 trucks involved in Owner Notification Program B82 were produced as follows:

**REASONS FOR THIS PROGRAM**

On some of the subject vehicles, the Accessory Reserve Capacity (ARC) weights specified on the Safety Compliance Certification labels are overstated by as much as 670 pounds.

Overstated ARC weights indicate that greater additional accessory weight can be added to the vehicle than the levels certified for safety compliance of the vehicle. Installation of the maximum indicated accessory weights could result in loading the front axle in excess of this GAWR (Gross Axle Weight Rating).

**PROGRAM PROVISIONS**

Owners of trucks affected by this program will be sent revised Safety Compliance Certification Labels.

**ACTION BY FORD**

Dealers are provided technical and administrative instructions, a listing of involved vehicles and the revised labels to affix to those vehicles identified in their listing as stock.

Letters being sent by the Company to owners will include revised labels and instructions to enable owners to apply the labels to their vehicles. Owners, however, will be advised that if they prefer, they may take their vehicle to their Ford dealer to have this service performed at no cost.

**ADDITIONAL INFORMATION**

Technical Instructions, Labor Operations, and Claims Preparation Instructions are contained on Attachment I, (see page 2). Contact your Service Zone Manager if you have questions regarding this program.

If requested, dealers are to advise and/or assist customers in determining overall truck weight and front axle weight loading if permanent accessories have been installed.

**Owner Notification Program B82 Technical and Administrative Instructions - Attachment I**

Attachment I Page 1 of 1

PLEASE READ THESE INSTRUCTIONS. CIRCULATE THEM TO YOUR PARTS AND SERVICE PERSONNEL. QUESTIONS SHOULD BE DIRECTED TO YOUR SERVICE ZONE MANAGER.

**TECHNICAL INSTRUCTIONS**

1. Locate the existing Safety Compliance Certification Label on the driver's door lock pillar.
2. Verify that the vehicle identification numbers on new and old Safety Compliance Certification Labels are identical.
3. With a clean, dry cloth, wipe off any dirt or film from the old label before installing the new label.
4. Peel the protective backing from the new label and apply the new label directly over the existing label on the vehicle. Rub the label lightly with a soft cloth to remove any wrinkles or bubbles.

**PARTS ORDERING INFORMATION**

Revised Safety Compliance Certification Labels are being sent directly to owners of affected trucks. Owners are instructed to bring the labels with their trucks if they prefer dealers to apply the labels.

**LABOR OPERATIONS**

Scheduled  
Time

Labor  
Operations

Apply New Label . . . . . 0.2 Hrs.

B82

CLAIMS PREPARATION INSTRUCTIONS (A copy of these instructions should be placed in Subject 5.5 or 9.0 of your Warranty and Policy Manual).

^ Installation of the label for this program will be performed at no charge to owners of eligible trucks.

^ Claim forms 1863 for this program must include standard claim preparation procedures and the information shown below. Program number B82 must be entered in the Program Code box in the upper left of the forms.

Causal Basic Part Number	-	1020472
Condition Code	-	79
Labor Operations	-	B82
Scheduled Time	-	0.2 Hours
Program Code	-	B82

#### NOTIFICATION

Owners of affected trucks will be notified with the letter shown on Attachment II. A revised label will be included with the letter.

### Owner Letter Information

December, 1987

Dear Owner:

Ford Motor Company has found that the truck described below requires the attachment of the enclosed Safety Compliance Certification label.

Vehicle Description:

Serial Number:

Reason For The Program:

The Accessory Reserve Capacity (ARC) weights shown on the Safety Compliance Certification label (located on the driver's door lock pillar) are too heavy. ARC weights indicate the maximum allowable weight of permanent accessories or equipment that can be installed on a vehicle. ARC weights are described in your Owner Guide under "Vehicle Load Capacity".

What Might Happen:

^ ARC weights that are too heavy indicate that too much additional accessory weight can be added to the truck. The additional weight could cause your truck to weigh more than the weight for which it was certified to applicable safety standards.

^ Installation of the allowable accessory weights shown also could result in loading the front axle to more than its GAWR (Gross Axle Weight Rating).

What You Should Do:

Please apply the label to your truck over the existing certification label. This label is located on the door lock pillar on the driver's side of the truck. If you prefer, your Ford dealer will install the label. If permanent accessories have already been installed and you are unsure of the total weight effect, contact your Ford dealer. Your dealer will assist you with overall weight and front axle weight loading determination.

To Install New Label:

^ Check to see that the truck identification number on the new label is the same as that on the original label (located on the door lock pillar on the driver's side). If they are not the same, don't install it. Contact your Ford dealer.

^ Do not try to remove the original label. Clean the surface of the original label by wiping it with a clean, dry cloth to remove any dirt or film that may be there.

^ Peel the backing off the new label and apply the new label directly over the original label on the door lock pillar. Rub the new label lightly with a soft cloth to remove any wrinkles or bubbles.

## CUSTOMER INFORMATION SYSTEM

Under the Ford Customer Information System, you're able to obtain information from Ford regarding Ford-Paid Repair Programs and Technical Service Bulletins for your vehicle or the vehicle of interest to you at no charge.

### • FORD-PAID REPAIR PROGRAMS AFTER THE WARRANTY PERIOD.

Sometimes Ford offers adjustment programs to pay all or part of the cost of certain repairs after the written warranty expires, which can save you money. These programs are not recalls. They aren't required by any governmental agency. They're initiated by us and are intended to help our owners.

### • TECHNICAL SERVICE BULLETINS.

All vehicles need repairs during their lifetime. Sometimes Ford issues Technical Service Bulletins and easy-to-read explanations describing unusual engine or transmission conditions which could lead to costly repairs. We recommend what should be done and offer the latest repair procedures to protect against a more costly repair later.

To get copies of these bulletins or information concerning any adjustment programs relating to your vehicle or to obtain a one-year subscription to the Information System, just ask your Ford or Lincoln-Mercury dealer, call us toll-free 24 hours a day at 1-800-241-3673 (in Alaska or Hawaii, call 1-800-241-3711; in Georgia, call 1-800-282-0959), or write:

Ford Customer Information System,  
P.O. Box 95427  
Atlanta, GA 30347.

We'll need to know your name and address;  
year, make and model of your vehicle; engine size; and whether you have a  
manual or automatic transmission.

Included with this letter you will find the Ford Customer Information announcement. This system provides information on programs such as the program described in this letter and other information that may be of interest to you.

Technical Service Bulletin # **ATRATB8748**

Date: **870801**

## **A/T - Slipping or No-Shift/Metal Sealing Rings**

TSB 87-48 (Aug)

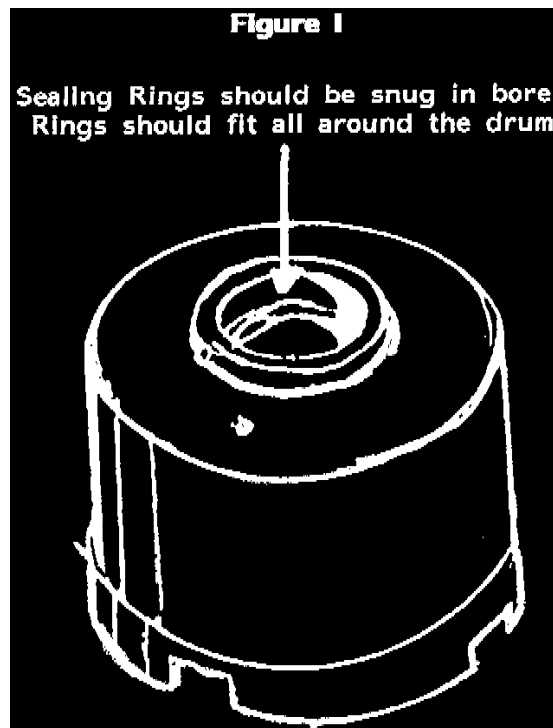
SUBJECT: Metal sealing rings

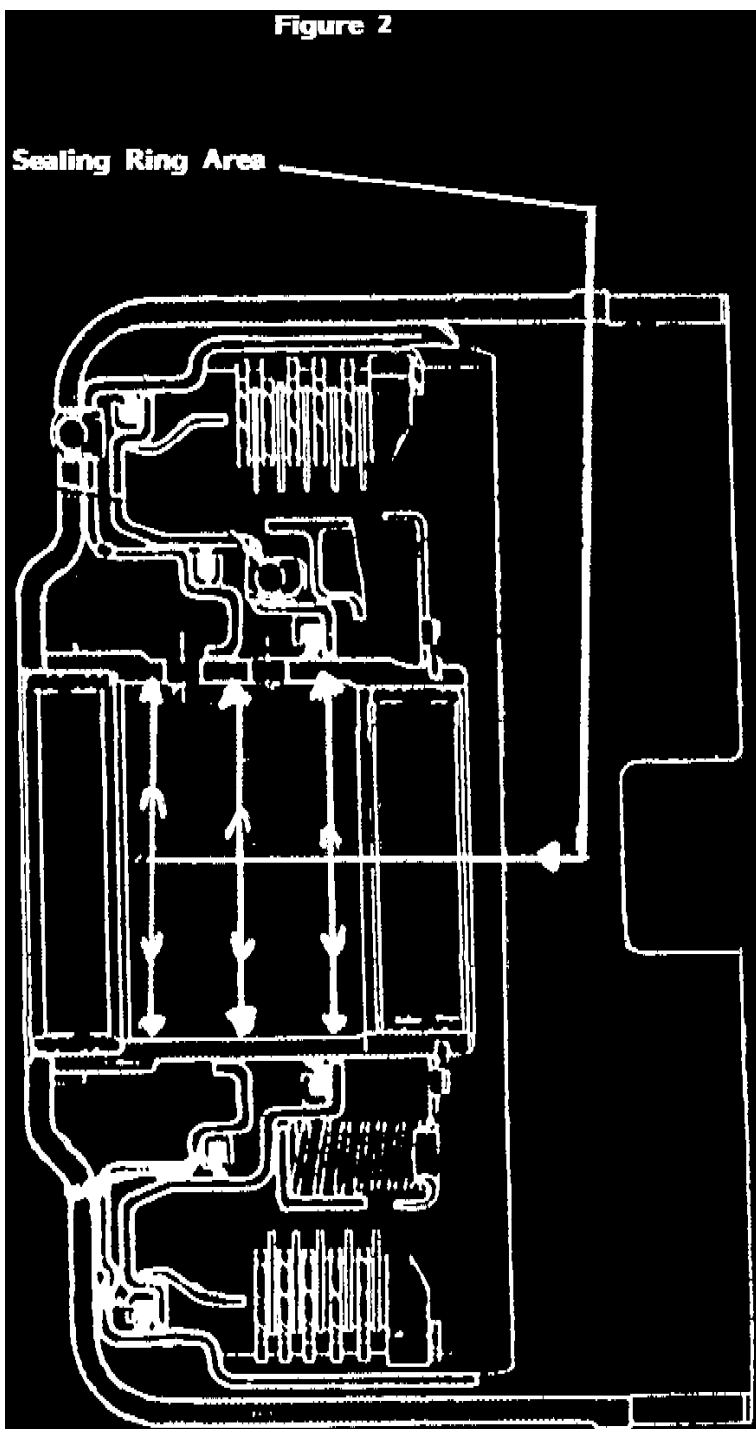
Various Units

PROBLEM: Slipping, or sometimes no-shift

POSSIBLE SOLUTION: Sealing rings could be under-size.

1. Always inspect rings as outlined in SIL 84-29





2. Place ring in bore of drum where they will be running. (See Figures 1 & 2)
3. Sealing rings should be snug in bore; rings should fit all around the drum. (drum could be out-of-round)
4. Air check all drums. (Use 30 PSI air pressure only.) If air escapes you have leaks -- better find now, than later. This represents lost clutch pressure, and could result in soft application and burned friction material.
5. Following these steps will help you save money, plus help you build better units.

Technical Service Bulletin # 901110

Date: 900523

## Steering/Suspension - Shimmy

Article No. 90-11-10

^ STEERING-SHIMMY-DIAGNOSTIC PROCEDURE-4X2 UNITS ONLY

^ SUSPENSION-SHIMMY-DIAGNOSTIC PROCEDURE- 4X2 UNITS ONLY

LIGHT TRUCK: 1987-89 F-350

**ISSUE:** Front end shimmy may occur at various driving speeds or when hitting bumps in the road. There are several vehicle conditions sometimes described by customers as shimmy which may not actually be "shimmy". Shimmy, as observed by the driver, is defined as large amplitude, rotational oscillations of the steering wheel resulting from large, side to side tire/wheel movements.

**ACTION:** Inspect the truck and perform the following diagnosis to determine the shimmy's causal factors. Be aware of the following points:

- ^ Shimmy is not always confirmed during road testing.
- ^ It is very important to check all systems that can cause shimmy.
- ^ After a general review of the front suspension/steering systems, make the necessary adjustments and replacements as noted.
- ^ Check bolt and nut torques to be sure they are tightened to the specified torque specifications.
- ^ Check the front end alignment. Look for excessively worn tires and out of balance wheel and tire assemblies.

Shimmy should not be confused with steering wheel nibble and vibration concerns.

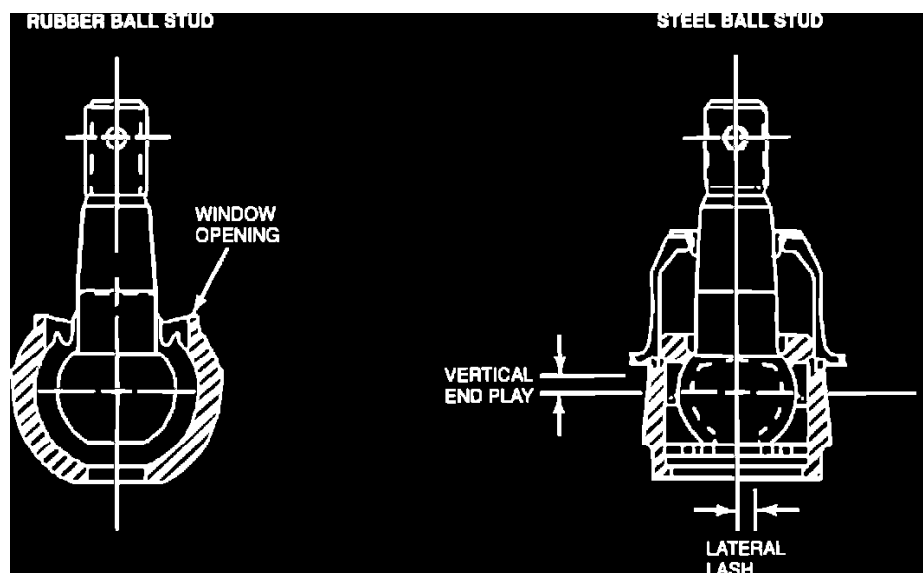
^ Steering wheel nibble is a condition resulting from the tire interaction with various road surfaces. It is observed by the driver as small amplitude, rotational oscillations of the steering wheel.

^ Various suspension/steering vibrations are sometimes confused as shimmy. They appear as steering column shake and wheel/tire imbalance. They induce a vertical motion in the steering wheel/column.

Refer to the appropriate model year Light Truck Shop Manual, Sections 18-01, 11-01 and 12-01 for NVH conditions other than shimmy.

## Steering Linkage Inspection:

1. With the weight on the front wheels, check the linkage joints while someone else turns the steering wheel from side to side.



**Figure 1**

- a. For rubber ball socket (RBS) joints, see if the ball stud makes contact with the window opening in the socket bowl while on the truck, Figure 1. If contact is made with the window opening, replace it with a greaseable steel joint.
- b. For steel (greaseable) joints, measure the lateral (side to side) lash in the joint, Figure 1.
  1. If the lash exceeds .060" (1.59 mm), replace the joint.
  2. With the truck on a hoist, check the steel (greaseable) joints for vertical (up and down) end play by pushing and pulling on the joint, Figure 1. If the end play exceeds .090" (2.38 mm), replace the joint.

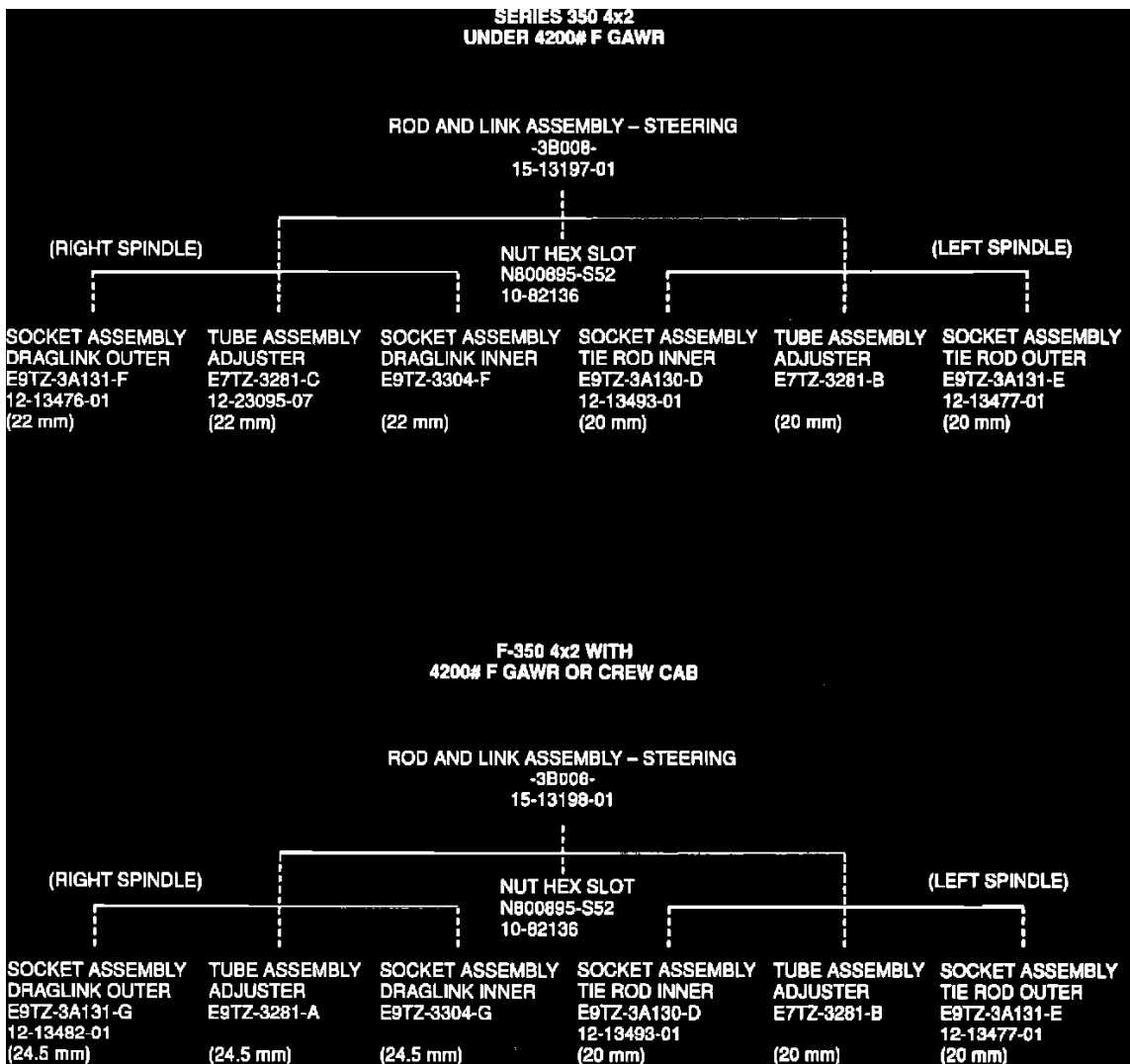


Figure 2

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

3. Remove the linkage from the truck, Figure 2.
  - a. See if the rubber is torn on the RBS. If the rubber is torn, replace it with a greaseable steel joint.

- b. See if the steel joint will spin freely. If the joint spins freely with the hand, replace the joint.

Refer to Figure 2 for specific service part applications.

## Steering Gear Inspection:

1. Inspect the mounting surface of the steering gear. Check the frame area for the following:
  - ^ Signs of motion
  - ^ Loose rivets
  - ^ Cracks - Removal of the gear from the frame may be required to check for cracks.

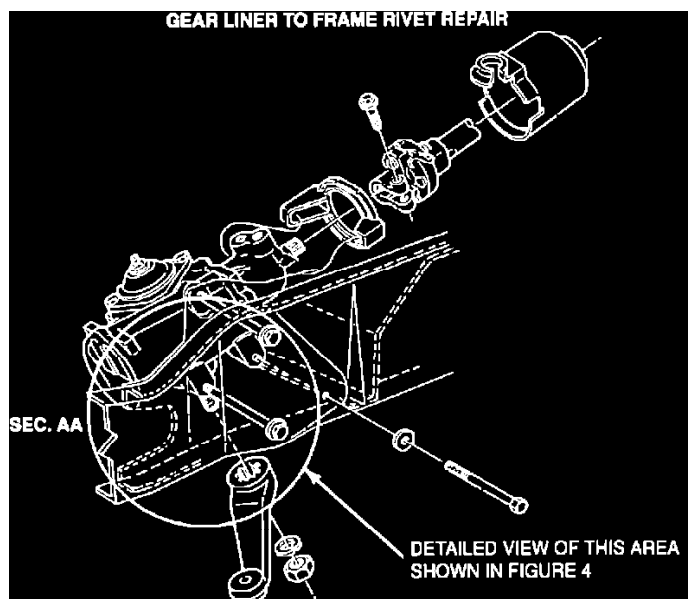


Figure 3

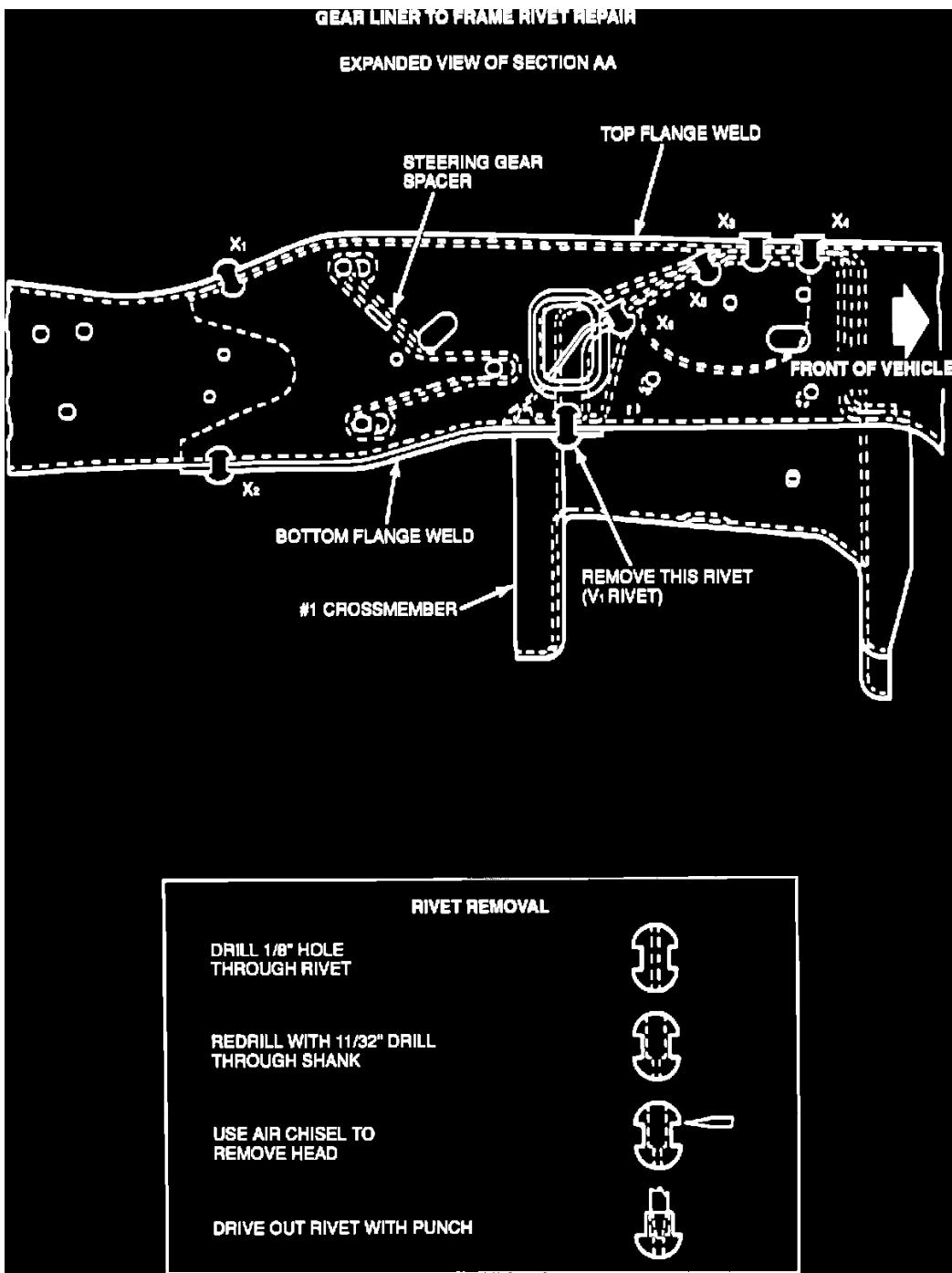


Figure 4

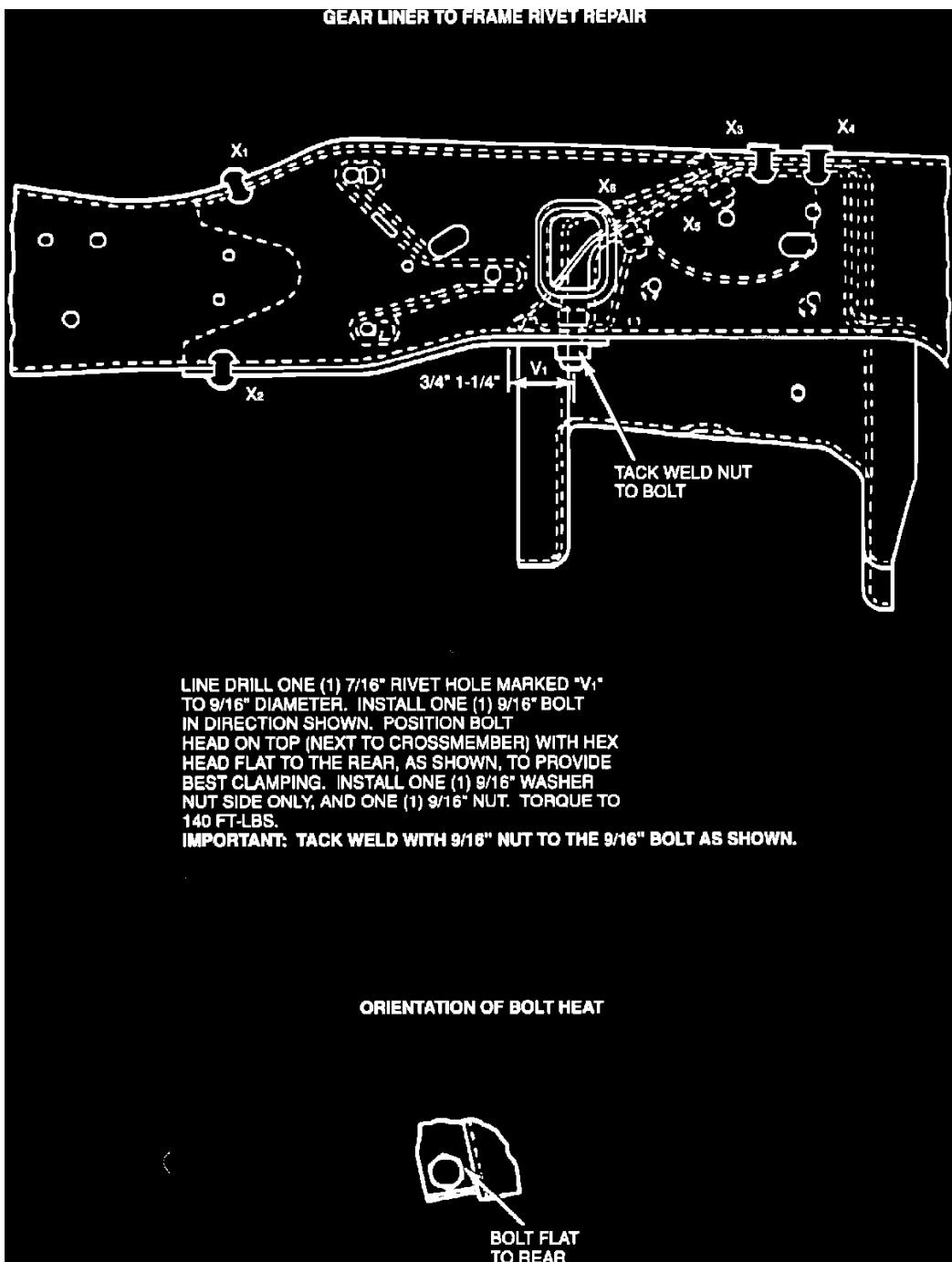


Figure 5

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

2. Repair trucks with a cracked frame liner or loose rivets by using Frame Repair Kit (E6TZ-5K130-A). See Figures 3, 4 and 5.
3. Inspect the frame for cracks in the following areas.
  - ^ Frame rail near the steering gear top and bottom flanges
  - ^ Frame rail at the steering gear bolt heads.
  - ^ Frame rail at or near the spring tower bracket
  - ^ Engine crossmember front LH flange.
4. If there are cracks in any of the above locations, replace the frame.
5. If a dealer confirmed shimmy has been experienced, replace the steering gear sector shaft. Use steering gear sector shaft repair kit (EOAZ-3375-A). Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.
6. Check for the presence of mesh load.
  - a. With the front wheels off the ground, hold the tire and turn the tire side to side slowly.
  - b. See if the effort increases when turning the tire straight ahead.
  - c. If no increase is noted, perform the Shop Manual procedure to check and adjust mesh load. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.

### Wheel End Friction and Wheel Bearing End Play Inspection:

1. Inspect the vehicle for worn ball joints. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 14 for service details. Replace as required.
2. Check the wheel bearing end play. Refer to the appropriate model year Light Truck Shop Manual, Vol A, Section 14 for service details. Adjust the end play or replace the wheel bearings as required.

### Vehicle Desensitizing

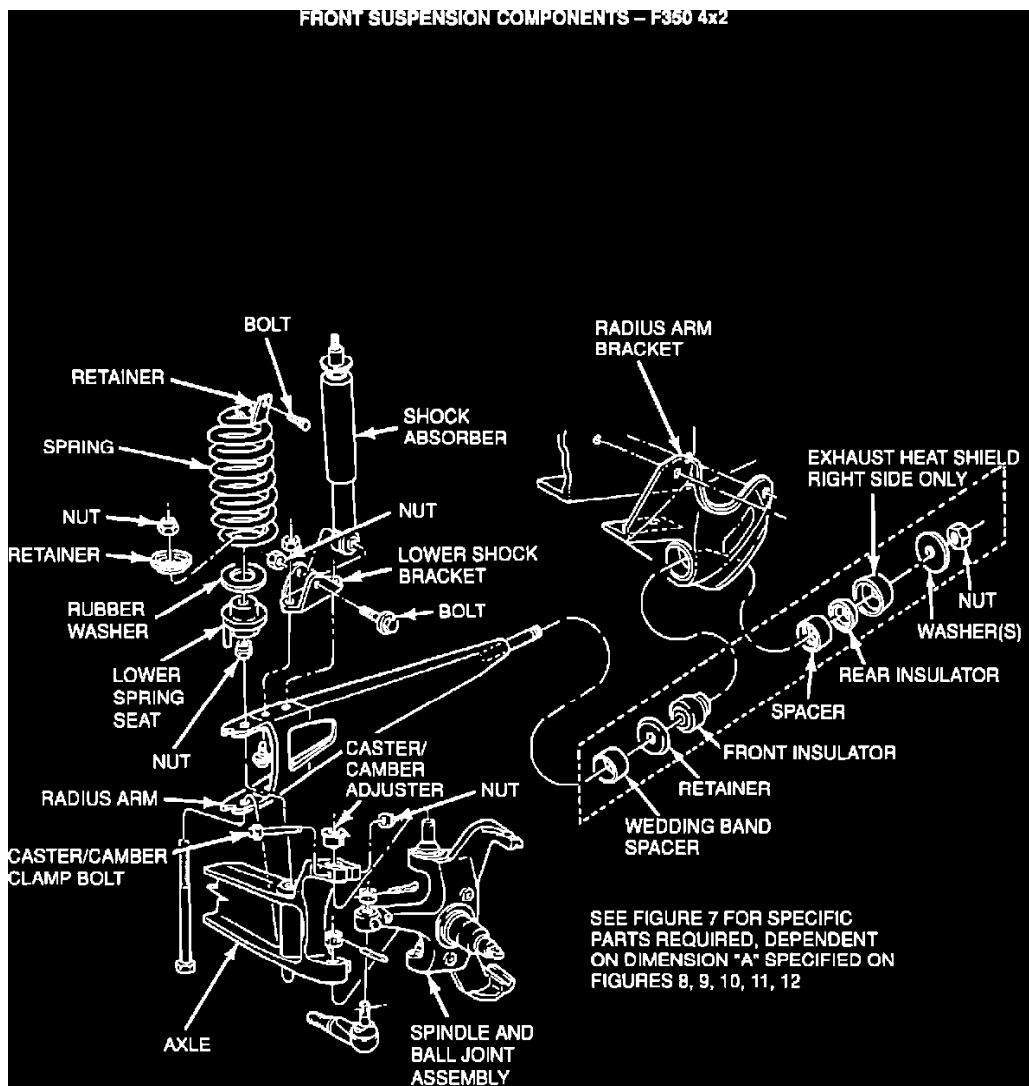


Figure 6

SKETCH NO.	RADIUS ARM STUD LENGTH (DIM. "A") UNTHREADED	WEDDING BAND N804264-S2 8 mm THICK	RETAINER 3B186	INSULATOR FRONT E7TZ-3B203-A	BRACKET E41Z-3B095-B (L.H.) E41Z-3B095-A (R.H.)	SPACER E5TZ-3B244-A	INSULATOR REAR D8TZ-3B203-A	HEAT SHIELD (R.H. ONLY) E4TZ-3B483-A	WASHER 4.5 mm THICK 379572-S2	WASHER 7 mm THICK N805144-S56	NUT 34892-S2	(FRAME MOUNTED) RADIUS ARM		
												Y	Y	Y
2	F350 4x2 DRW	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y		
3	67.7/69.2 mm 74.7/76.2 mm	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y		
3.2	F350 SRW	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y		
3.4	67.7/69.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y		
3.6	74.7/76.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y		

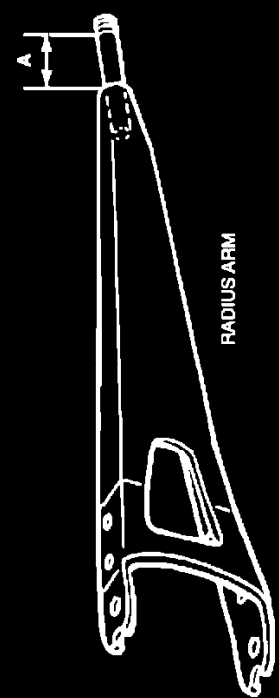


Figure 7

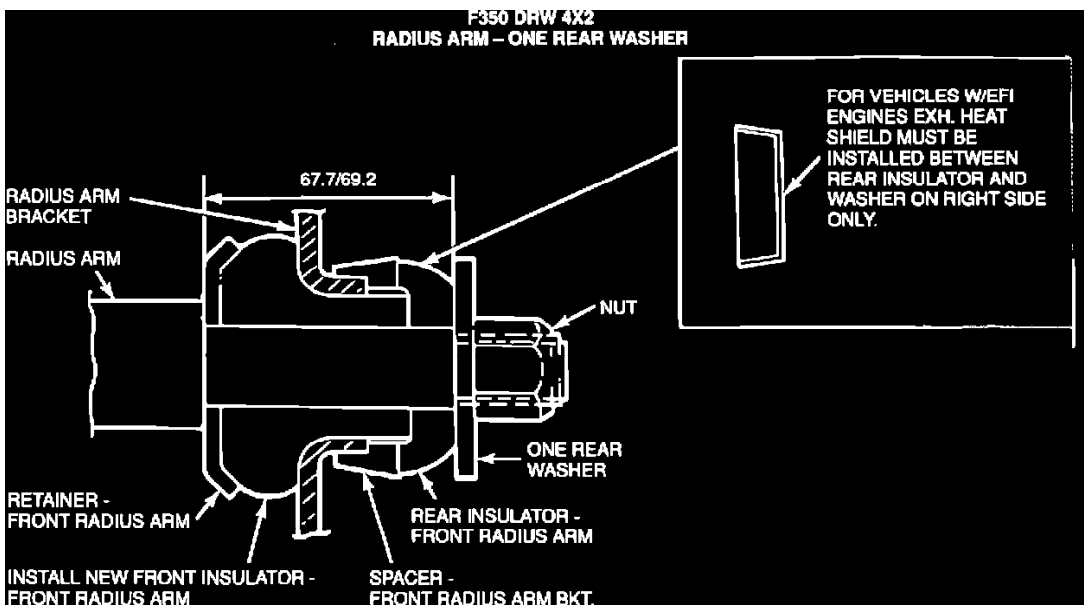


Figure 8

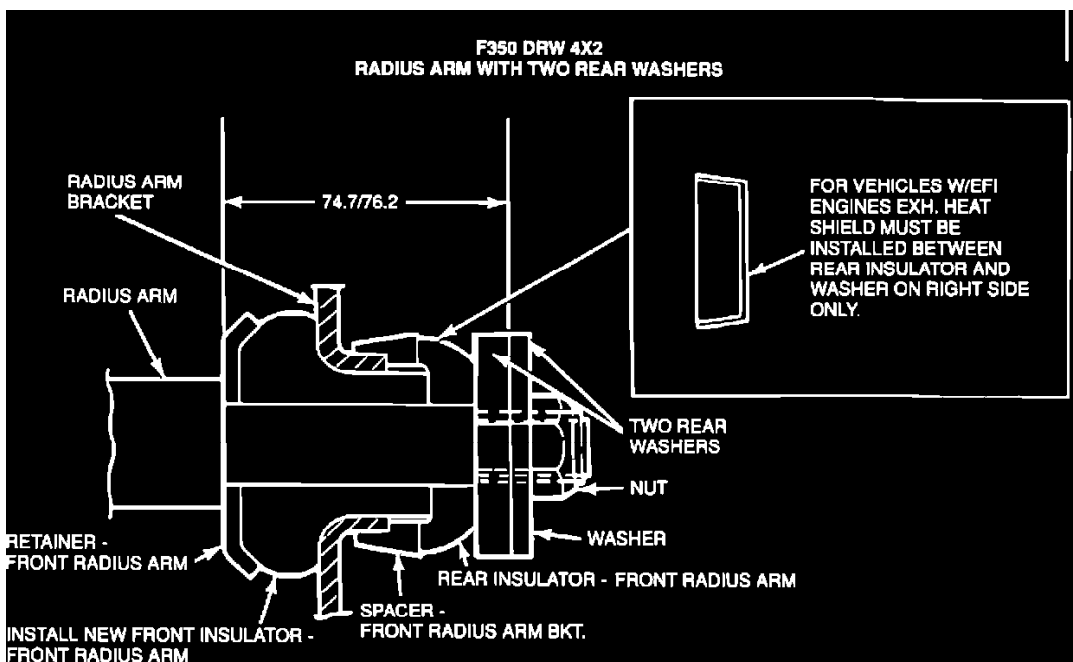


Figure 9

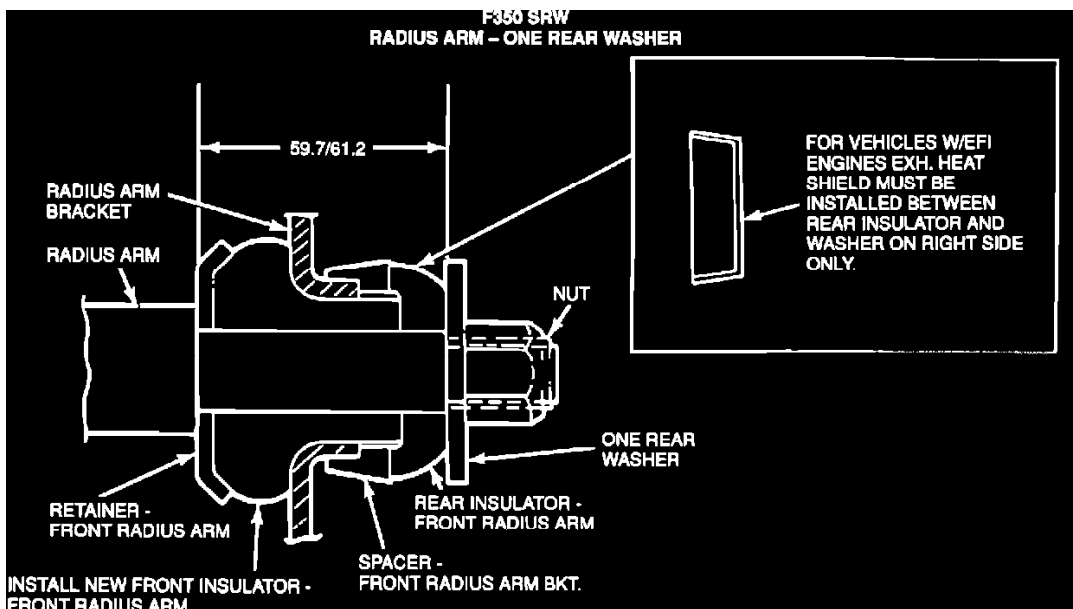


Figure 10

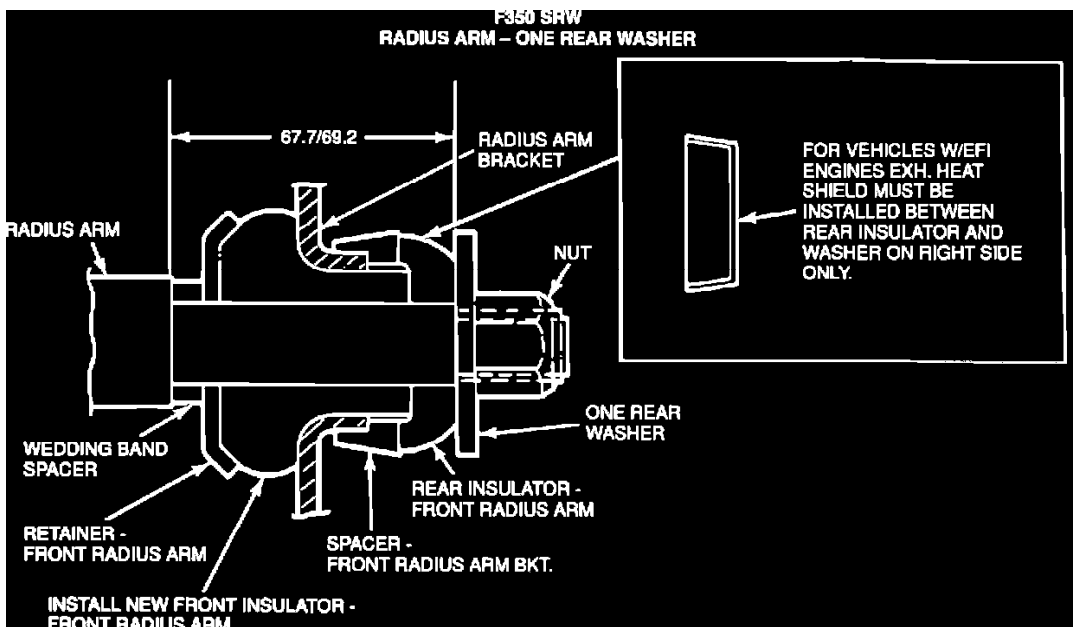
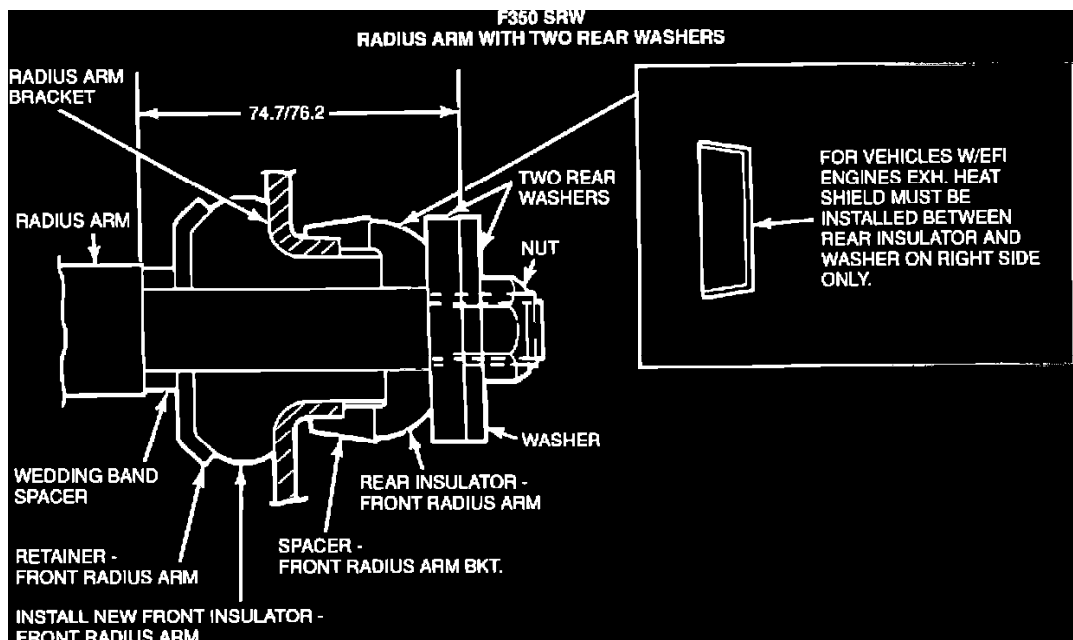


Figure 11



**Figure 12**

1. Inspect the radius arm bushing part stack, Figure 7.
2. Measure the radius arm stud length. See the component matrix, Figure 7, to determine the parts involved and the bushing part stack height for the F-350 DRW 4x2 and the F-350 SRW 4x2. Figures 6 through 12 show the radius arm bushing stack for each truck and follows the matrix.
3. Install rubber bushing (E7TZ-3B203-A) if it is not present on the vehicle.

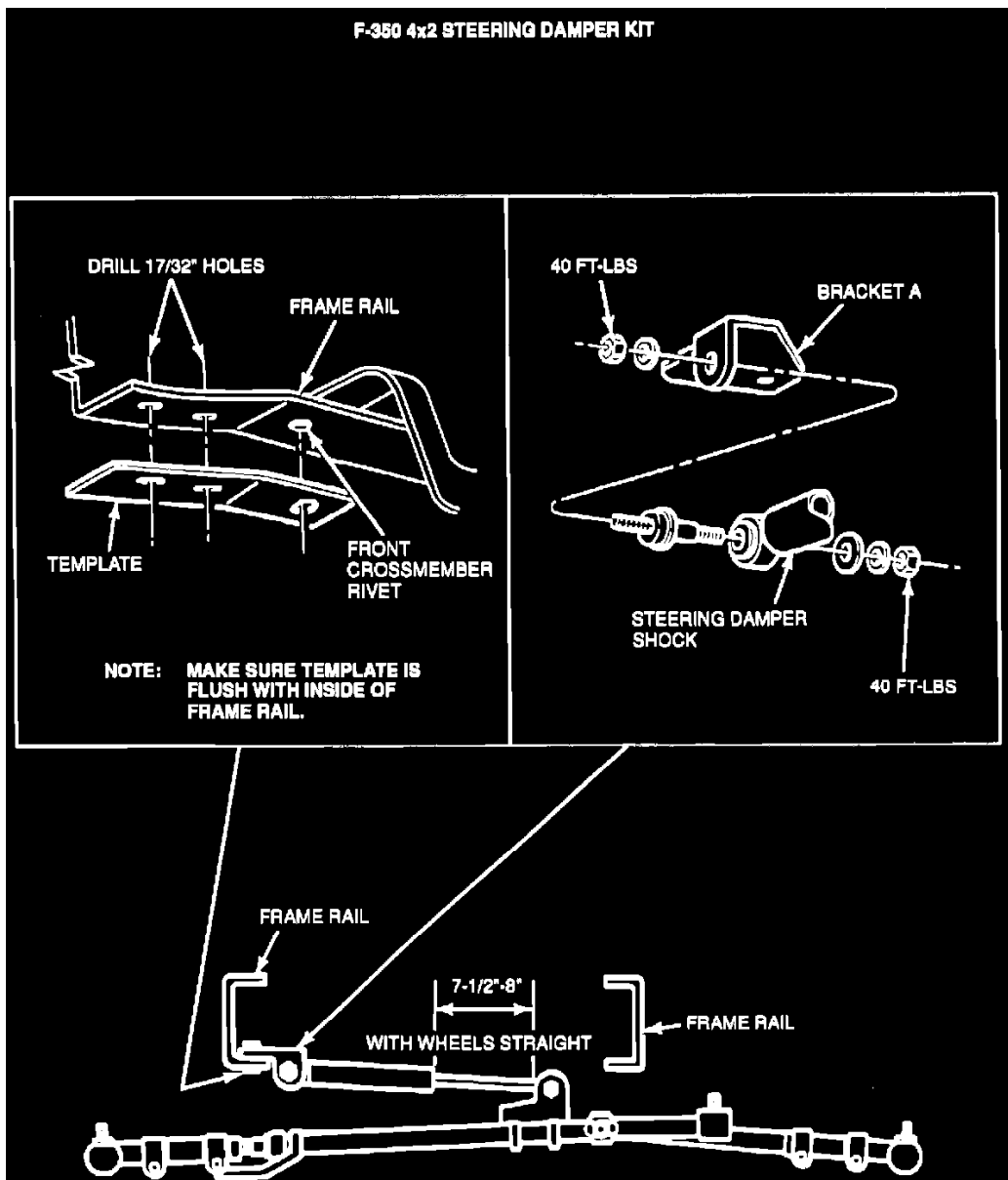


Figure 13

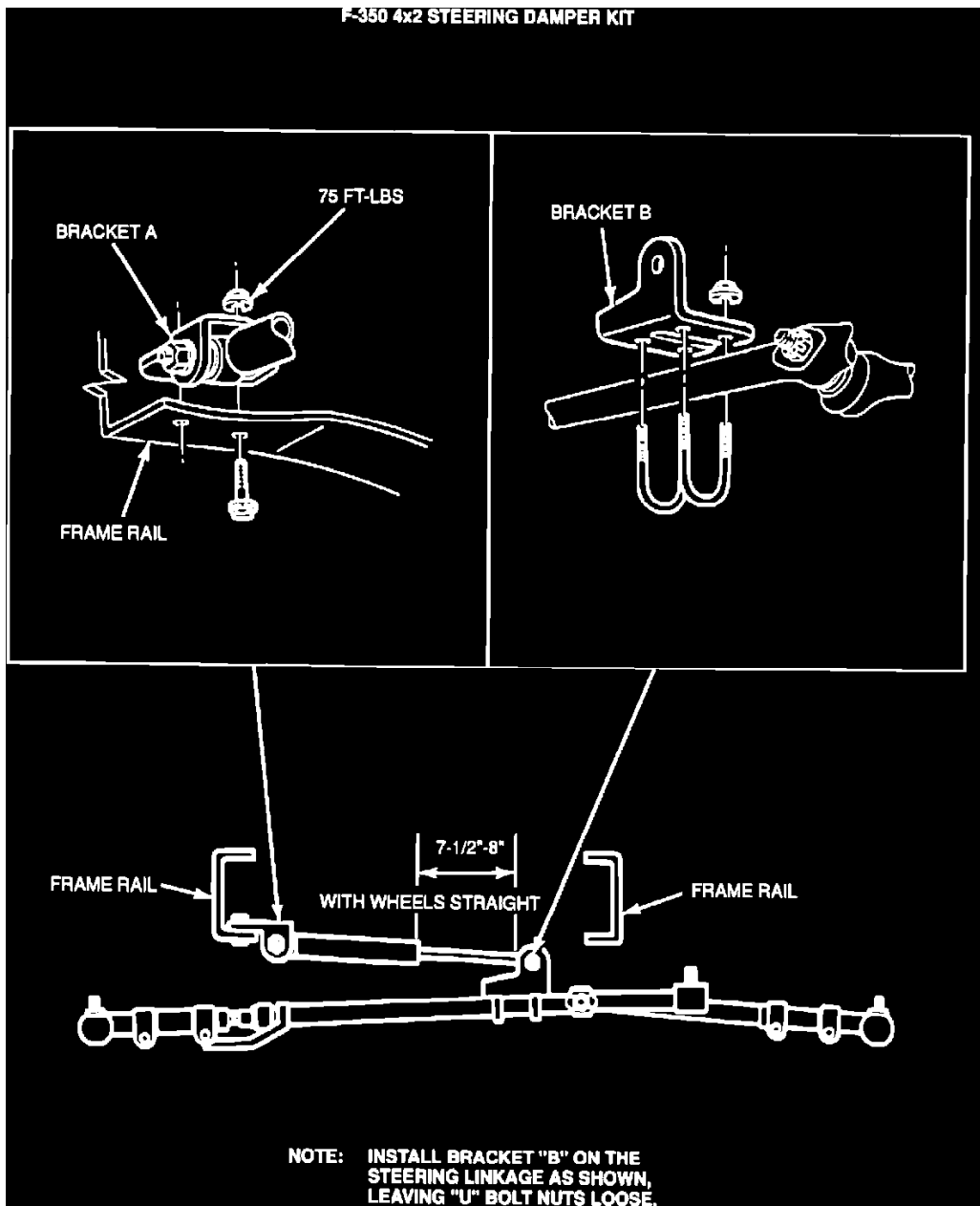


Figure 14

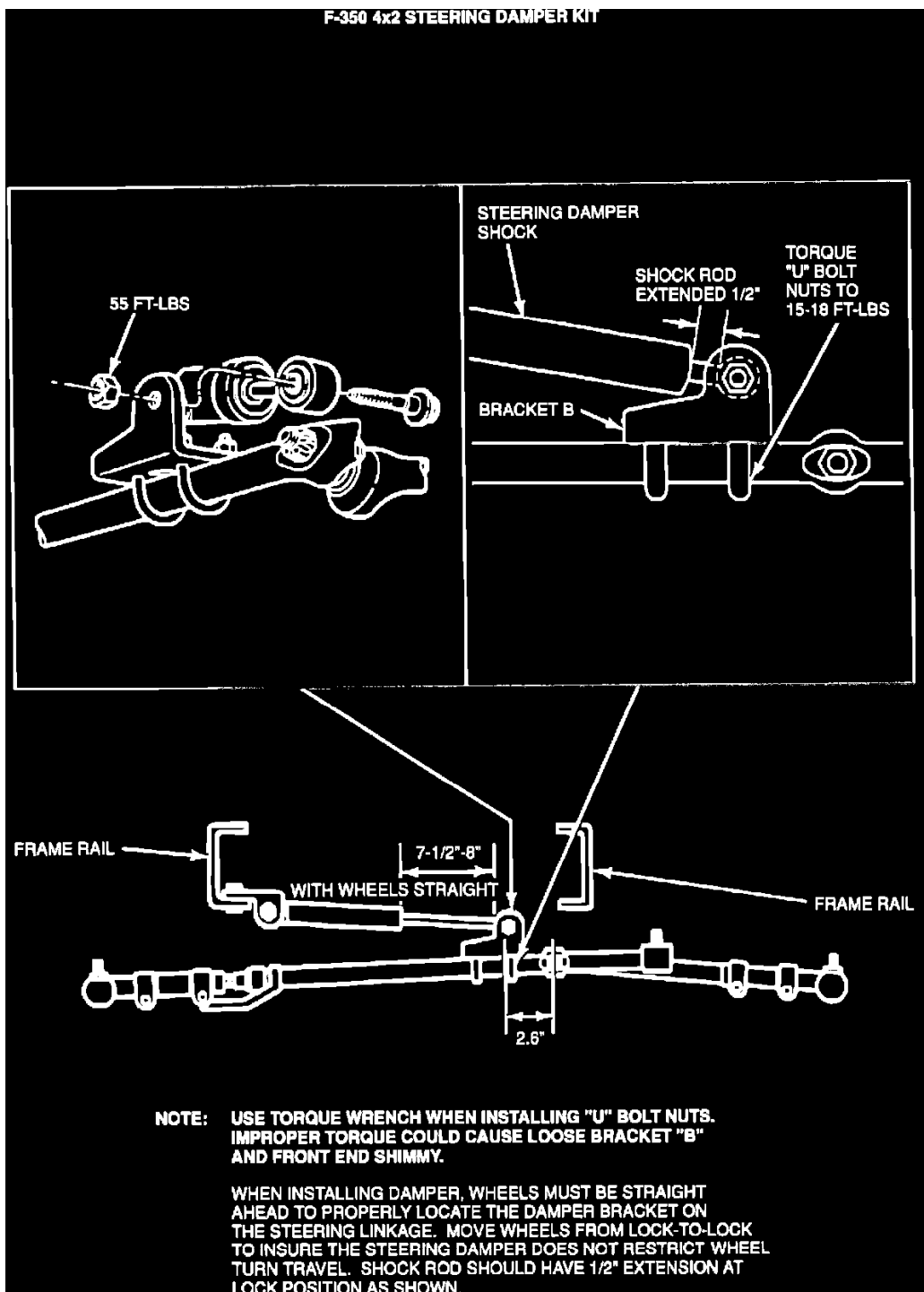


Figure 15

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
E0AZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

4. Check the truck for the presence of a steering damper on F-350 DRW 4x2 vehicles. See Figure 13, 14 and 15 for a step by step installation procedure.
5. Install a damper (Service Kit E7TZ-3E651-A) on F-350 DRW 4x2 only if it is not present on trucks built before 1/6/88. A damper kit can be installed on trucks built after 1/6/88, if a shimmy is experienced.

## Alignment

TRUCK MODEL	ALIGNMENT FACTORS DEGREES (INCH)	ALIGNMENT SPECIFICATIONS				STANDARD VEHICLE ATTITUDE -REF-			
		AT DESIGN RIDE HEIGHTS (REF)	ASSEMBLY PROCESSING	SHOP MANUAL OR IN-SERVICE CHECKING	MAXIMUM VARIATION BETWEEN WHEELS	LATERAL TILT 2) (SIDE TO SIDE HEIGHT DIFFERENCES)			DOG-TRACK
						"B" FRONTWHEEL HOUSE OPENING	"C" REAR WHEEL-HOUSE OPENING	"D" REAR END OF PICKUP BOX	
F-250 4x2 F-350 4x2	CASTER	7.2	●	1) 3)	1.5	15 mm	20 mm	20 mm	30 mm
	CAMBER	-0.5	●	1)	0.7				
	TOE 4)		-0.08 ± 0.25 (-0.03 ± 0.125)	+0.08 ± 0.25 (+0.03 ± 0.125)					
	STEERING AXIS INCLINATION	13.0							
	* INCLUDED ANGLE	12.5							

\* INCLUDED ANGLE DOES NOT CHANGE WITH RIDE HEIGHT

● NOT ASSEMBLY PLANT CONTROLLABLE

1) SEE CASTER AND CAMBER CURVES ON SHEET 2. CASTER AND CAMBER SETTINGS DEPEND ON RIDE HEIGHT DIM "A"

2) LATERAL VEHICLE TILT SPECIFICATIONS ARE MAX. ALLOWABLE FOR EITHER:  
 - VEHICLE AT CURB WEIGHT WITHOUT OCCUPANTS OR  
 - VEHICLE LOADED (NOT EXCEEDING GVW) WITH EQUALLY DISTRIBUTED WEIGHT OVER THE CARGO AND OCCUPANT AREAS

3) THE CASTER GRAPHS (SEE SHEET 2) AGREE WITH A LEVEL VEHICLE (0° FRAME ANGLE). IF THE VEHICLE IS LOWER IN THE FRONT THEN ADD THE FRAME ANGLE TO THE MEASURED CASTER READING AND COMPARE THIS SUM TO THE GRAPHED SPECIFICATIONS FOR THE GIVEN RIDE HEIGHT. IF THE VEHICLE IS LOWER IN THE REAR THEN SUBTRACT BEFORE COMPARING TO SPECIFICATION

4) TOE IS SET AND TO BE CHECKED AGAINST SPECIFICATION IN-SERVICE AT CURB RIDE HEIGHT ONLY. CURB RIDE HEIGHT IS A VEHICLE AS BUILT FROM THE ASSEMBLY PLANT, FULL FLUIDS, WITH NO ADDITIONAL WEIGHT FROM PASSENGERS, CARGO, AFTER MARKET ITEMS OR BODY MODIFICATIONS. TOE MAY BE RESET TO THE SHOP MANUAL OR OTHER RECOMMENDED SETTING AT ANY RIDE HEIGHT THAT THE VEHICLE WILL OPERATE AT FOR AT LEAST 50 PERCENT OF ITS USE. HOWEVER, TOE SET TO THE SHOP MANUAL SPECIFICATION AT CURB PROVIDES OPTIMUM VEHICLE AND TIRE WEAR PERFORMANCE FOR ALL RIDE HEIGHTS BETWEEN CURB (UNLOADED) AND GVW

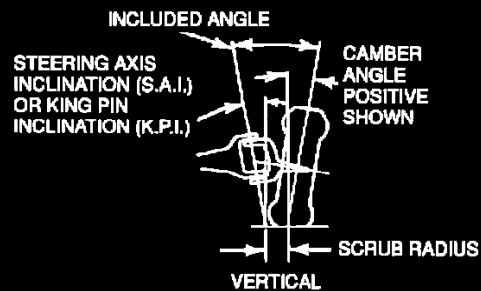
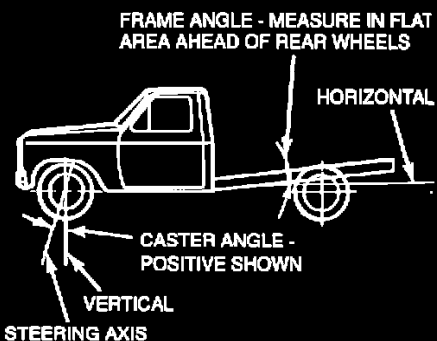
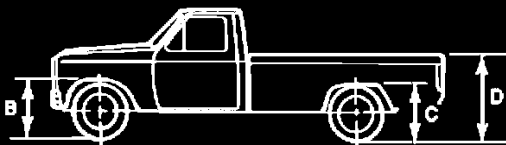


Figure 16

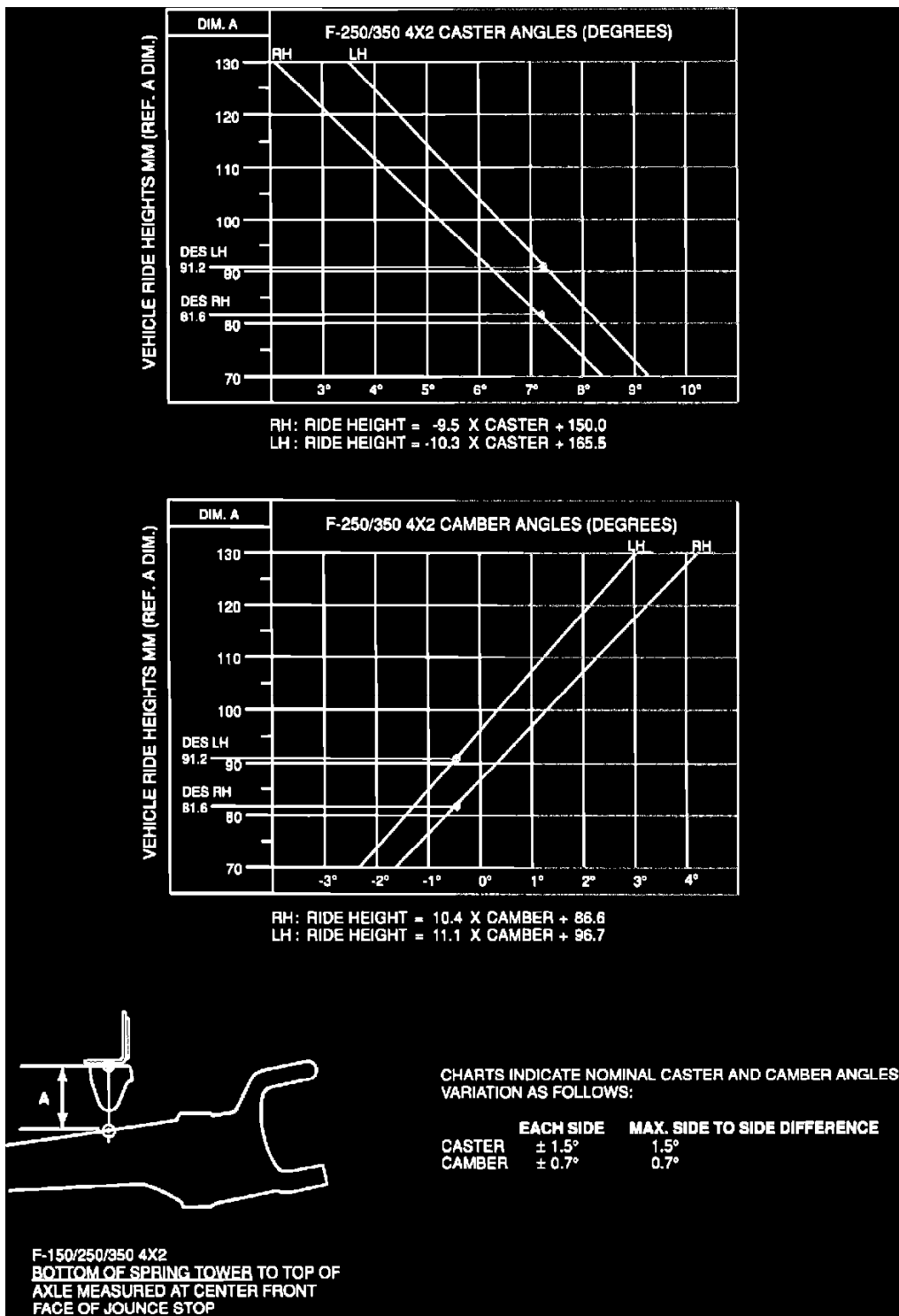


Figure 17

CAMBER OF 0 +/- 1/2~ AS VEHICLE IS OPERATED IS OPTIMUM

1. For vehicles with constant load (utility bodies) - Set camber to 0 +/- 1/2~. Refer to Figures 16 and 17.
2. For vehicles with varying loads (wreckers, dumps, rollback tilts, stake racks, etc.), proceed as follows:
  - a. Have the customer measure fender to ground heights, at wheel centerline with vehicle empty and loaded.
  - b. Measure the front end alignment..
    - ^ Caster
    - ^ Camber

- ^ Toe
- ^ Ride height
- ^ Front fender height to ground
- c. Determine the difference of customer measured loaded and empty fender height to ground when the alignment is measured.
- d. Compute camber at customer measured heights by adding 3/4~ per 1/2" height difference for higher customer heights. Subtract 3/4~ per 1/2" height for lower measured fender heights to measured camber.
- e. Compute the average camber by averaging the high and low numbers.
- f. Reset camber with computed average between 0 + 1/2~.

TOE

- 3. Set Toe to 0 +/- 1/2~.

CASTER

- 4. Set caster as shown in the Shop Manual according to ride height.

## Wheels/Tires Size, Pressure, Balance, Wear

1987 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHLS	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/86R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Argent Wheel/Optional Black - Wheel E5TA-UB

1988 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHLS	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	60
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Gray Wheel/Optional - Black Wheel E7UA-JA

1989 F-350 TIRE/WHEEL RELEASES									
F-350 MODEL	WHL	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR	REMARKS
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80	HD FT END OPT
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80	
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Super Cab	D/R	155	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
		161	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	

\* Gray Wheel/Optional Black Wheel E7UA-1A

RECOMMENDED TIRE USAGE - 1989 F-350 TIRE RELEASES							
APPROVED SUPPLIER	LT215/85R16 LRD - A/S	LT215/85R16 LRD - A/T	LT235/85R16 LRE - A/S	LT235/85R16 LRE - A/T	7.50R - 16 LRD - HWY	7.50R - 16 LRD - A/T	7.50R - 16 LRD - M-S
Firestone	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88
Michelin	87/88/89		87/88/89	87/88/89			
Goodyear		87/88/89	87/88/89		87		87/88
General			87/88/89	87/88/89			

#### SIZE AND PRESSURE

- Compare the tire and wheel with the sizes and pressures on the certification label or the following Tire/Wheel Release Charts to make sure the correct tire is used. Inflate the tire to the specified pressure.

#### BALANCE

- Make sure of the correct balance of the front wheels.

#### WEAR

- If heel and toe wear or edge wear are present, rotate the tires.
  - ^ For single rear wheels the same tread styles front and rear, cross rotate all four tires.
  - ^ For single rear wheels with different tread styles, cross switch the front tires.
  - ^ For all dual rear wheels, cross switch the front tires.

Check and reset tire pressure per the certification label or the following Tire/Wheel Release Charts.

NOTE: FOR TIRES WORN TO THE POINT OF REPLACEMENT, USE RELEASED TIRES AS SHOWN IN THE FOLLOWING TIRE/WHEEL RELEASE CHARTS.

## Parts, Time & Etc

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
901110A	Steering Linkage Inspection	0.4 Hr.
901110B	Steering Gear Inspection	0.2 Hr.
901110C	Install Frame Kit	11.7 Hr.
901110D	Install Sector Shaft Repair Kit	0.4 Hr.
901110E	Adjust Steering Gear	0.6 Hr.
901110F	Wheel Bearing End Play Inspection	0.2 Hr.
901110G	Vehicle Desensitizing	1.3 Hr.
901110H	Alignment	1.7 Hr.
901110I	Tire Rotation & Balance	0.9 Hr.

DEALER CODING

BASIC PART NO.      CONDITION CODE

FRONT                      W4

OASIS CODES: 3100, 3200

Technical Service Bulletin # **911014**

Date: **910515**

## M/T Transmission Shift Lever - Buzz/Vibration

Article No.

91-10-14

5/15/91

^ NOISE/VIBRATION - SHIFT LEVER - M50D TRANSMISSION

^ TRANSMISSION - M50D - SHIFT LEVER BUZZ/VIBRATION

LIGHT TRUCK: 1988-91 BRONCO, F-150, F-250

**ISSUE:** Transmission shift lever buzz, may be noticed in overdrive or 4th gear after the vehicle has obtained normal operation temperatures and is driven on a smooth road surface at normal highway speeds of 55 MPH (88Km/h). The tone and intensity of this condition are considerably less when observed in 4th gear than in overdrive.

**ACTION:** Replace the transmission top cover assembly with the new top cover kit assembly. Refer to the following procedure for diagnosis and service details.

**INSPECTION PROCEDURE:**

1. Drive the vehicle to warm the transmission oil to approximately 125~F (52~) - about ten miles at highway speeds when the outside temperature is at

the freezing point.

2. On a smooth road surface, drive the vehicle at approximately 55 MPH (88 Km/h) in overdrive to verify shift lever buzz.
3. If shift lever buzz is observed, lightly push to the right (passenger side) to determine if the buzz is eliminated.
4. If the buzzing noise is eliminated, refer to the following repair procedures.

NOTE: IF THIS TEST DOES NOT ELIMINATE THE BUZZ, DO NOT REPAIR WITH THIS PROCEDURE, IT WILL NOT CORRECT THE CONCERN, REFER TO THE LIGHT TRUCK SHOP MANUAL FOR FURTHER CONCERN DEFINITION.

#### REPAIR PROCEDURE

1. Remove the old transmission top cover assembly.
2. Install the new transmission top cover assembly.

NOTE: THE TRANSMISSION DOES NOT HAVE TO BE REMOVED FROM VEHICLE. ACCESS IS GAINED BY REMOVING THE SHIFT LEVER AND SHIFT BOOT AS AN ASSEMBLY. PULL BACK THE FLOOR COVERING AND REMOVE TRANSMISSION OPENING COVER PLATE.

CAUTION: CARE SHOULD BE TAKEN TO INSURE THAT NO DIRT ENTERS THE TRANSMISSION WHILE THE TOP COVER IS OFF.

PART NUMBER	PART NAME	CLASS
F0TZ-7C391-J	Transmission Top Cover Assembly	C

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911014A	Replace Transmission Top Cover Assembly	1.2 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7222	56

OASIS CODES: 505200, 703300

Technical Service Bulletin # **B82871201**

Date: **871201**

## Campaign - Weight Certification Label Are Overstated

TSB # B821287December,1987

TO: Selected Ford Dealers

SUBJECT: Owner Notification Program B82 - Installation of a Safety Compliance Certification Label on Certain 1988 F250 4x2 HD and F350 4x4 Vehicles Equipped With Optional Engine

TRUCKS AFFECTED

<u>Vehicles Affected</u>	<u>Assembly Plants</u>	<u>Production From</u>	<u>Dates Through</u>
F250 4x2 HD w/optional engines	Kansas City	8/18/87	8/20/87
	Norfolk	8/17/87	8/20/87
	Twin Cities	8/18/87	8/20/87
	Ontario	8/20/87	8/20/87
F350 4x4 w/optional engines	Kansas City	8/18/87	8/28/87
	Norfolk	8/17/87	8/28/87
	Twin Cities	8/18/87	8/28/87
	Ontario	8/20/87	8/28/87

Approximately 300 trucks involved in Owner Notification Program B82 were produced as follows:

#### REASONS FOR THIS PROGRAM

On some of the subject vehicles, the Accessory Reserve Capacity (ARC) weights specified on the Safety Compliance Certification labels are overstated by as much as 670 pounds.

Overstated ARC weights indicate that greater additional accessory weight can be added to the vehicle than the levels certified for safety compliance of the vehicle. Installation of the maximum indicated accessory weights could result in loading the front axle in excess of this GAWR (Gross Axle Weight Rating).

**PROGRAM PROVISIONS**

Owners of trucks affected by this program will be sent revised Safety Compliance Certification Labels.

**ACTION BY FORD**

Dealers are provided technical and administrative instructions, a listing of involved vehicles and the revised labels to affix to those vehicles identified in their listing as stock.

Letters being sent by the Company to owners will include revised labels and instructions to enable owners to apply the labels to their vehicles. Owners, however, will be advised that if they prefer, they may take their vehicle to their Ford dealer to have this service performed at no cost.

**ADDITIONAL INFORMATION**

Technical Instructions, Labor Operations, and Claims Preparation Instructions are contained on Attachment I, (see page 2). Contact your Service Zone Manager if you have questions regarding this program.

If requested, dealers are to advise and/or assist customers in determining overall truck weight and front axle weight loading if permanent accessories have been installed.

**Owner Notification Program B82 Technical and Administrative Instructions - Attachment I**

Attachment I Page 1 of 1

PLEASE READ THESE INSTRUCTIONS. CIRCULATE THEM TO YOUR PARTS AND SERVICE PERSONNEL. QUESTIONS SHOULD BE DIRECTED TO YOUR SERVICE ZONE MANAGER.

**TECHNICAL INSTRUCTIONS**

1. Locate the existing Safety Compliance Certification Label on the driver's door lock pillar.
2. Verify that the vehicle identification numbers on new and old Safety Compliance Certification Labels are identical.
3. With a clean, dry cloth, wipe off any dirt or film from the old label before installing the new label.
4. Peel the protective backing from the new label and apply the new label directly over the existing label on the vehicle. Rub the label lightly with a soft cloth to remove any wrinkles or bubbles.

**PARTS ORDERING INFORMATION**

Revised Safety Compliance Certification Labels are being sent directly to owners of affected trucks. Owners are instructed to bring the labels with their trucks if they prefer dealers to apply the labels.

**LABOR OPERATIONS**

	Scheduled Time	Labor Operations
Apply New Label . . . . .	0.2 Hrs.	B82

**CLAIMS PREPARATION INSTRUCTIONS (A copy of these instructions should be placed in Subject 5.5 or 9.0 of your Warranty and Policy Manual).**

- ^ Installation of the label for this program will be performed at no charge to owners of eligible trucks.
- ^ Claim forms 1863 for this program must include standard claim preparation procedures and the information shown below. Program number B82 must be entered in the Program Code box in the upper left of the forms.

Causal Basic Part Number -	1020472
Condition Code	- 79
Labor Operations	- B82
Scheduled Time	- 0.2 Hours
Program Code	- B82

**NOTIFICATION**

Owners of affected trucks will be notified with the letter shown on Attachment II. A revised label will be included with the letter.

## Owner Letter Information

December, 1987

Dear Owner:

Ford Motor Company has found that the truck described below requires the attachment of the enclosed Safety Compliance Certification label.

Vehicle Description:

Serial Number:

Reason For The Program:

The Accessory Reserve Capacity (ARC) weights shown on the Safety Compliance Certification label (located on the driver's door lock pillar) are too heavy. ARC weights indicate the maximum allowable weight of permanent accessories or equipment that can be installed on a vehicle. ARC weights are described in your Owner Guide under "Vehicle Load Capacity".

What Might Happen:

^ ARC weights that are too heavy indicate that too much additional accessory weight can be added to the truck. The additional weight could cause your truck to weigh more than the weight for which it was certified to applicable safety standards.

^ Installation of the allowable accessory weights shown also could result in loading the front axle to more than its GAWR (Gross Axle Weight Rating).

What You Should Do:

Please apply the label to your truck over the existing certification label. This label is located on the door lock pillar on the driver's side of the truck. If you prefer, your Ford dealer will install the label. If permanent accessories have already been installed and you are unsure of the total weight effect, contact your Ford dealer. Your dealer will assist you with overall weight and front axle weight loading determination.

To Install New Label:

- ^ Check to see that the truck identification number on the new label is the same as that on the original label (located on the door lock pillar on the driver's side). If they are not the same, don't install it. Contact your Ford dealer.
- ^ Do not try to remove the original label. Clean the surface of the original label by wiping it with a clean, dry cloth to remove any dirt or film that may be there.
- ^ Peel the backing off the new label and apply the new label directly over the original label on the door lock pillar. Rub the new label lightly with a soft cloth to remove any wrinkles or bubbles.

**CUSTOMER INFORMATION SYSTEM**

Under the Ford Customer Information System, you're able to obtain information from Ford regarding Ford-Paid Repair Programs and Technical Service Bulletins for your vehicle or the vehicle of interest to you at no charge.

<p style="text-align: center;">● FORD-PAID REPAIR PROGRAMS AFTER THE WARRANTY PERIOD.</p> <p>Sometimes Ford offers adjustment programs to pay all or part of the cost of certain repairs after the written warranty expires, which can save you money. These programs are not recalls. They aren't required by any governmental agency. They're initiated by us and are intended to help our owners.</p>	<p style="text-align: center;">● TECHNICAL SERVICE BULLETINS.</p> <p>All vehicles need repairs during their lifetime. Sometimes Ford issues Technical Service Bulletins and easy-to-read explanations describing unusual engine or transmission conditions which could lead to costly repairs. We recommend what should be done and offer the latest repair procedures to protect against a more costly repair later.</p>
--	---

To get copies of these bulletins or information concerning any adjustment programs relating to your vehicle or to obtain a one-year subscription to the Information System, just ask your Ford or Lincoln-Mercury dealer, call us toll-free 24 hours a day at 1-800-241-3673 (in Alaska or Hawaii, call 1-800-241-3711; in Georgia, call 1-800-282-0959), or write:

Ford Customer Information System,  
P.O. Box 95427  
Atlanta, GA 30347.

We'll need to know your name and address;  
year, make and model of your vehicle; engine size; and whether you have a  
manual or automatic transmission.

Included with this letter you will find the Ford Customer Information announcement. This system provides information on programs such as the program described in this letter and other information that may be of interest to you.

Technical Service Bulletin # 98-5A-12

Date: 980318

## Vehicle - Towing Behind RVs Guidelines

Article No.

98-5A-12

03/18/98

- ^ BRAKES - WEIGHT LIMITATIONS FOR TOWING
- ^ RECREATIONAL VEHICLES - WEIGHT RATINGS FOR UNBRAKED TOWING LESS THAN GROSS COMBINATION WEIGHT RATING (GCWR)
- ^ TOWING BEHIND RECREATIONAL VEHICLES - RECOMMENDED GUIDELINES
- ^ TRANSAXLE/TRANSMISSION/TRANSFER CASE - VEHICLES TOWED BEHIND RECREATIONAL VEHICLES - RECOMMENDED TOWING GUIDELINES

**FORD:**

1988-93 FESTIVA  
1988-94 TEMPO  
1989-96 PROBE, TAURUS SHO  
1991-97 ESCORT  
1994-96 ASPIRE

**LINCOLN-MERCURY:**

1988-94 TOPAZ  
1991-94 CAPRI  
1991-97 TRACER

**LIGHT TRUCK:**

1988-96 AEROSTAR, BRONCO, E-350, F SUPER DUTY, F-250, F-350, F-53 MOTORHOME, RANGER  
1988-97 F-150  
1991-96 EXPLORER  
1997 MOUNTAINEER

**ISSUE:**

Many motorhome owners tow a vehicle when traveling. Improper techniques can "overload" the brake system of the tow vehicle or damage the drivetrain of the vehicle being towed.

**ACTION:**

Use the information and charts shown in this TSB article to properly match tow vehicle, towed vehicle and towing method.

**TOWING METHODS**

1. TRAILER - The vehicle is loaded onto and secured to a trailer and simply acts as "secured" cargo.
2. DOLLY - The vehicle is "partially" loaded and partially towed. Either front or rear wheels are loaded and secured to a "towing dolly" and the other wheels roll on the road.
3. TOW BAR - All of the vehicle wheels roll on the pavement. The towed vehicle's steering column must be unlocked so that it can track correctly behind the tow vehicle.

**WEIGHT RATINGS AND BRAKES**

- ^ GVWR (Gross Vehicle Weight Rating) - is the MAXIMUM allowable weight of the towing vehicle, passengers and cargo
- ^ GCWR (Gross Combined Weight Rating) - is the MAXIMUM allowable weight of the towing vehicle and the weight of the trailer or vehicle being towed, including all passengers and cargo
- ^ BRAKES - The motorhome brakes are designed and rated for the GVWR of that vehicle and will provide adequate braking for trailers and towing vehicles up to 680 kg (1500 lb)

**CAUTION:**

SEPARATE AUXILIARY BRAKES ARE REQUIRED ON TRAILERS OR TOWED VEHICLES OVER 680 KG (1500 LBS). DO NOT CONNECT A TRAILER'S, DOLLY'S OR OTHER TOWED VEHICLE'S BRAKE SYSTEM TO THE TOWING VEHICLE'S BRAKE SYSTEM.

**TOWED VEHICLES**

1. Trailer-towed - The vehicle should be loaded on the trailer in a manner to:

- a. achieve a trailer tongue load of 10-15% of total trailer weight,
  - b. not exceed the trailer or hitch ratings and
  - c. be securely tied down.
2. Dolly-towed - For front wheel drive vehicles, towing an automatic transaxle (ATX)-equipped vehicle behind another vehicle, such as a Recreational Vehicle (RV), requires that a front wheel dolly or trailer be used.

**NOTE:**

TEMPO ALL-WHEEL DRIVE MODELS MUST BE TRAILER-TOWED. DO NOT TOW THESE VEHICLES USING A TWO-WHEEL TOWING DOLLY.

**CAUTION:**

DO NOT TOW A VEHICLE WITH AN AUTOMATIC (ATX) TRANSAXLE WITH THE DRIVE WHEELS ON THE GROUND. DAMAGE TO THE TRANSAXLE MAY RESULT.

FORD-BUILT VEHICLES APPROVED FOR DINGHY TOWING		
VEHICLE	MANUAL TRANSMISSION	AUTOMATIC TRANSMISSION
<b>FORD CARS</b>		
ASPIRE	YES	NO
FESTIVA	YES	NO
ESCORT	YES	NO
TEMPO	YES	NO
PROBE	YES	NO
TAURUS (SHO ONLY)	YES	NO
<b>LINCOLN-MERCURY CARS</b>		
TRACER	YES	NO
TOPAZ	YES	NO
CAPRI	YES	NO
<b>FORD TRUCKS</b>		
RANGER 4X2	YES	NO
RANGER 4X4	YES	YES**
EXPLORER 4X2	YES	NO
EXPLORER 4X4	YES	YES**
AEROSTAR 2WD	YES	NO
F-SERIES 4X4	YES**	YES**
BRONCO 4X4	YES**	YES**
E-350	YES	NO
MOUNTAINEER 4X2	YES	NO
MOUNTAINEER 4X4	YES	YES**

\*\*Manual transfer case only (not Touch Drive Electric Shift).

3. Tow Bar-towed - Vehicles which can be successfully towed with a tow bar are listed in the following chart. Additional vehicle-specific information follows the chart.

**ALL VEHICLES****NOTE:**

DO NOT TOW ANY VEHICLE AT A SPEED FASTER THAN 88 KM/H (55 MPH). THE MAXIMUM TOWING DISTANCE (WHEN TOWED CORRECTLY) IS UNLIMITED.

**WARNING:**

NEVER USE A TOW BAR THAT ATTACHES ONLY TO THE BUMPER.

**MTX-EQUIPPED VEHICLES**

Towing a manual-transaxle (MTX)-equipped vehicle with the drive wheels on the ground is acceptable only if the vehicle is towed in a forward direction. The parking brake must be released and the gear shift lever must be in Neutral.

^ For Aspire, Festiva, Escort and Tracer, the ignition key must be in the ACO position, the battery must be disconnected to eliminate battery drain, and the steering wheel must be unlocked

^ For Capri, the ignition key must be in the OFF position and the steering wheel unlocked

^ Refer to the specific vehicle Owner Guide for complete details

**CAUTION:**

TOWING MTX-EQUIPPED VEHICLES INCORRECTLY MAY RESULT IN TRANSAXLE DAMAGE.

**TRUCKS**

^ The steering wheel must be unlocked by placing the ignition key in the OFF position

^ Manual transmission shift lever must be in Neutral

^ On 4X4 manual shift transfer cases, the shift lever must be in Neutral

^ 4X4 locking hubs (both manual and automatic) must be unlocked

^ Refer to the specific vehicle Owner Guide for complete details

OTHER APPLICABLE ARTICLES: NONE

SUPERSEDES: 93-24-6

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 504000 Technical Service Bulletin # **8912289614**

Date: **890601**

**Adhesives & Sealants - Availability and Usage**

^ ADHESIVES AND SEALANTS-AVAILABILITY AND USAGE

^ ENGINE-ADHESIVES AND SEALANTS-AVILABILITY AND USAGE

^ STEERING-ADHESIVES AND SEALANTS-AVAILABILITY AND USAGE

^ TRANSMISSION-ADHESIVES AND SEALANTS-AVAILABILITY AND USAGE

Article No. 89-12-2

FORD: 1989 and prior ALL FORD LINES

LINCOLN-MERCURY: 1989 and prior ALL LINCOLN-MERCURY LINES

MERKUR: 1989 and prior ALL MERKUR LINES

LIGHT TRUCK: 1989 and prior ALL LIGHT TRUCK LINES

MEDIUM/HEAVY TRUCK: 1989 and prior ALL MEDIUM/HEAVY TRUCK LINES

ISSUE: Various adhesives and sealants are used to perform many service repairs. A partial list of these Ford products that are available through the Ford Parts System along with their proper use and application is shown below.

ACTION: If adhesives and sealants are required to perform a service repair, refer to the following product information and the appropriate Shop Manual.

Ford Stud And Bearing Mount (EOAZ-19554-BA)/ Ford Threadlocker 262 (E2FZ-19554-B)

These adhesives are high strength threadlockers. They are used for locking all fasteners that must withstand:

^ Heavy shock and vibration.

^ Extreme chemical and environmental conditions, such as solvents, oils, and water immersion.

They prevent fluid/vacuum leaks and seal out rust or corrosion. Their typical applications include securing the following items.

^ Intake manifold bolts

^ Power steering pump adjusting bolts

^ Engine studs

^ Ring gear bolts

^ Seat bolts

^ Cup plugs

To use these adhesives, clean the fastener threads with a wire brush and a non-petroleum based solvent. Apply one or two drops to the threads and torque to the required specifications.

NOTE: THESE ARE HIGH STRENGTH THREADLOCKERS AND THEY REQUIRE SPECIAL EFFORT FOR REMOVAL.

Ford Threadlock And Sealer (EOAZ-19554-AA)

This product is a medium strength threadlocker and sealer which stops air, oil, and fuel leakage. It is a hand tool removable adhesive and is used on aluminum threads. It prevents fluid/vacuum leaks and seals out rust or corrosion. Its typical applications include sealing and securing the following items.

^ Oil pan bolts

^ Valve cover bolts

^ Flywheel attaching bolts

^ Door latch attaching bolts

To use this adhesive, clean the fastener threads with a wire brush and a non-petroleum based solvent. Apply one or two drops to the threads and torque to the required specifications.

Ford Pipe Sealant With Teflon (D8AZ-19554-A)

This product seals and locks air, oil, fuel and hydraulic threaded fasteners. This light paste sealant instantly seals without fouling. It is non-shredding and operates in temperatures up to 400~F. It prevents corrosion of fitting /fastener threads and locks against vibrational loosening. Its typical applications include sealing the following items.

^ Transmission oil coolant lines

^ Fuel inlet fittings

^ Intake manifold vacuum switches

^ Engine oil galley plugs

To use this sealer, clean off residual oil, coolant and other contaminants from the threads. Apply sealer completely around the second and third threads. Install the part and torque to the required specifications.

Ford Gasket Maker (E2AZ-19562-B) And Ford Gasket Eliminator (E1FZ-19562-A)

These products cure in the absence of air. They are used to gasket two machined surfaced flanges. Each product will fill a gap up to .010". The sealants will not cure until the parts are assembled. Once cured, they will remain pliable and flex with movement of the parts. Their typical applications include sealing the following items.

^ Oil dip stick tubes

^ MTX case halves (Gasket Eliminator)

^ Water Pumps

^ Input bearing retainers

^ Rear main bearing parting lines

To use these sealants, make sure all the old gasket material has been removed.

CAUTION: AVOID USING METAL SCRAPERS BECAUSE THEY CAN ETCH THE SURFACES AND PREVENT A GOOD SEAL.

Clean both surfaces with a non-petroleum based solvent to remove all oil, grease and other contaminants. Apply a small bead of sealant continuously

around one surface only and then put the pieces together.

NOTE: REMEMBER, THESE PRODUCTS CURE IN THE ABSENCE OF AIR, SO PLENTY OF TIME IS AVAILABLE TO DO A THOROUGH JOB.

PART NUMBER	PART NAME	CLASS
E0AZ-19554-BA	Stud and Bearings Mount	BM
E2FZ-19554-B	Ford Threadlocker 262	R
E0AZ-19554-AA	Threadlock and Sealer	B
D8AZ-19554-A	Pipe Sealant with Teflon	B
E2AZ-19562-B	Gasket Maker	AM
E1FZ-19562-A	Gasket Eliminator	AM

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: INFORMATION ONLY

Technical Service Bulletin # **901110**

Date: **900523**

## Steering/Suspension - Shimmy

Article No. 90-11-10

- ^ STEERING-SHIMMY-DIAGNOSTIC PROCEDURE-4X2 UNITS ONLY
- ^ SUSPENSION-SHIMMY-DIAGNOSTIC PROCEDURE- 4X2 UNITS ONLY

LIGHT TRUCK: 1987-89 F-350

ISSUE: Front end shimmy may occur at various driving speeds or when hitting bumps in the road. There are several vehicle conditions sometimes described by customers as shimmy which may not actually be "shimmy". Shimmy, as observed by the driver, is defined as large amplitude, rotational oscillations of the steering wheel resulting from large, side to side tire/wheel movements.

ACTION: Inspect the truck and perform the following diagnosis to determine the shimmy's causal factors. Be aware of the following points:

- ^ Shimmy is not always confirmed during road testing.
- ^ It is very important to check all systems that can cause shimmy.
- ^ After a general review of the front suspension/steering systems, make the necessary adjustments and replacements as noted.
- ^ Check bolt and nut torques to be sure they are tightened to the specified torque specifications.
- ^ Check the front end alignment. Look for excessively worn tires and out of balance wheel and tire assemblies.

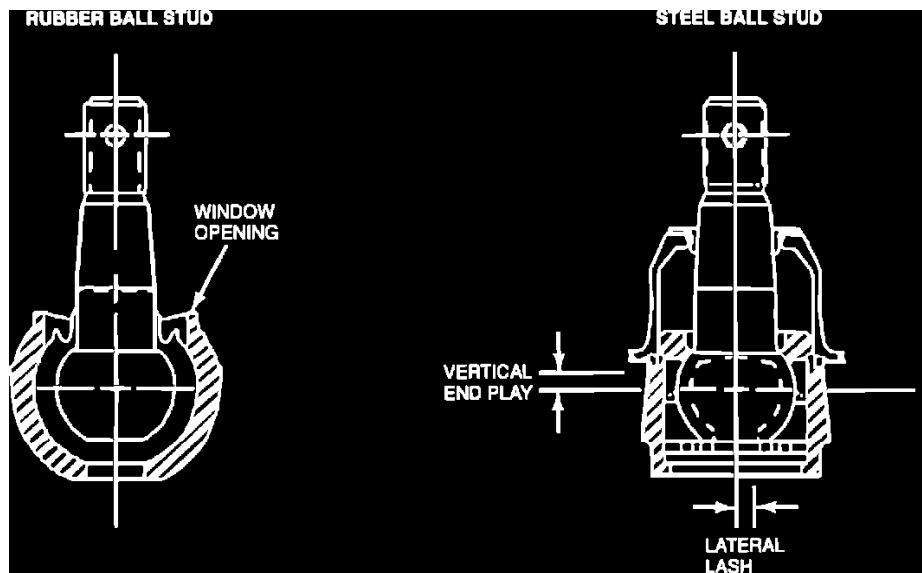
Shimmy should not be confused with steering wheel nibble and vibration concerns.

- ^ Steering wheel nibble is a condition resulting from the tire interaction with various road surfaces. It is observed by the driver as small amplitude, rotational oscillations of the steering wheel.
- ^ Various suspension/steering vibrations are sometimes confused as shimmy. They appear as steering column shake and wheel/tire imbalance. They induce a vertical motion in the steering wheel/column.

Refer to the appropriate model year Light Truck Shop Manual, Sections 18-01, 11-01 and 12-01 for NVH conditions other than shimmy.

## Steering Linkage Inspection:

1. With the weight on the front wheels, check the linkage joints while someone else turns the steering wheel from side to side.



**Figure 1**

- a. For rubber ball socket (RBS) joints, see if the ball stud makes contact with the window opening in the socket bowl while on the truck, Figure 1. If contact is made with the window opening, replace it with a greaseable steel joint.
- b. For steel (greaseable) joints, measure the lateral (side to side) lash in the joint, Figure 1.
  1. If the lash exceeds .060" (1.59 mm), replace the joint.
  2. With the truck on a hoist, check the steel (greaseable) joints for vertical (up and down) end play by pushing and pulling on the joint, Figure 1. If the end play exceeds .090" (2.38 mm), replace the joint.

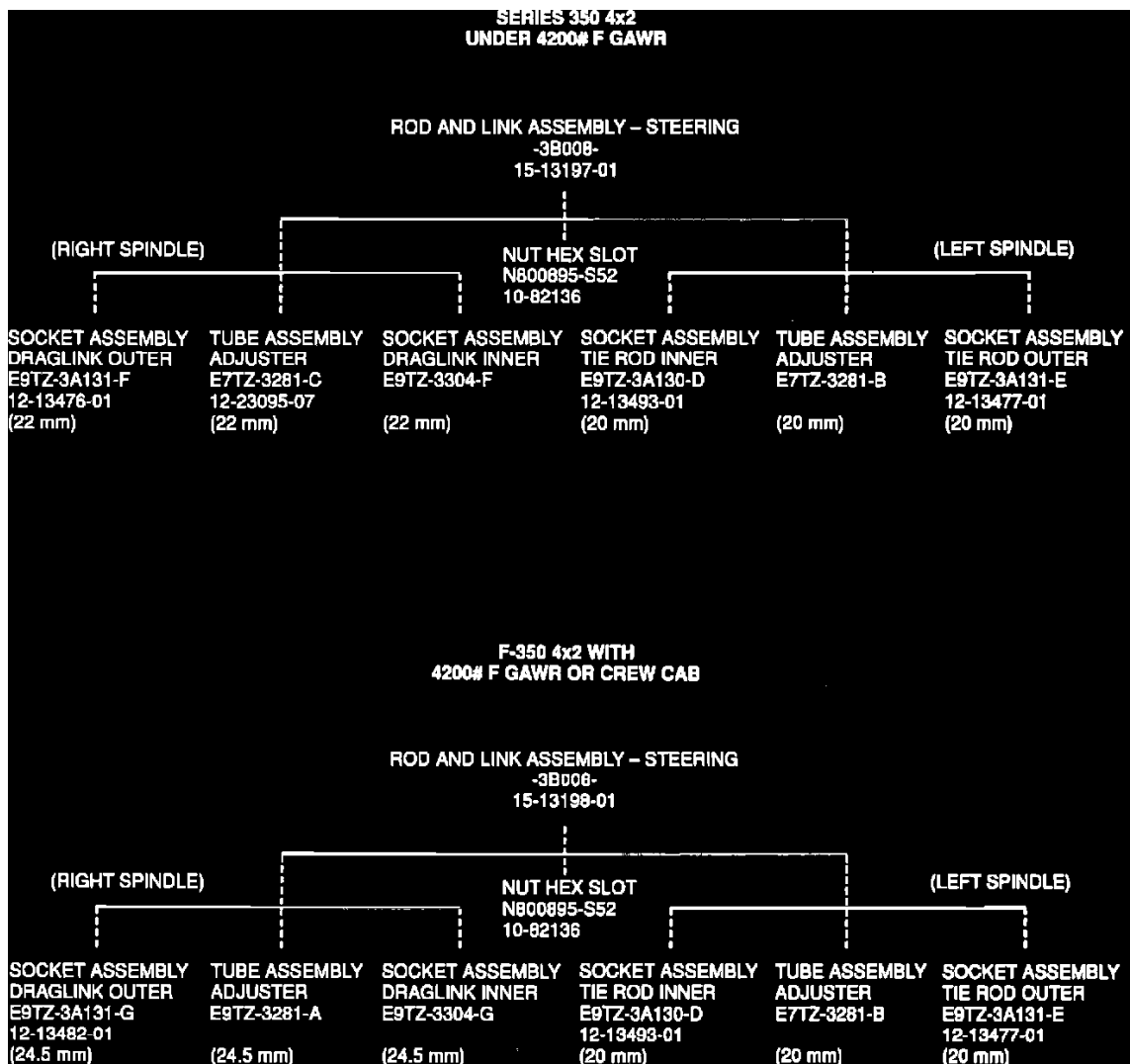


Figure 2

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B483-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

3. Remove the linkage from the truck, Figure 2.
  - a. See if the rubber is torn on the RBS. If the rubber is torn, replace it with a greaseable steel joint.
  - b. See if the steel joint will spin freely. If the joint spins freely with the hand, replace the joint.

Refer to Figure 2 for specific service part applications.

## Steering Gear Inspection:

1. Inspect the mounting surface of the steering gear. Check the frame area for the following:
  - ^ Signs of motion
  - ^ Loose rivets
  - ^ Cracks - Removal of the gear from the frame may be required to check for cracks.

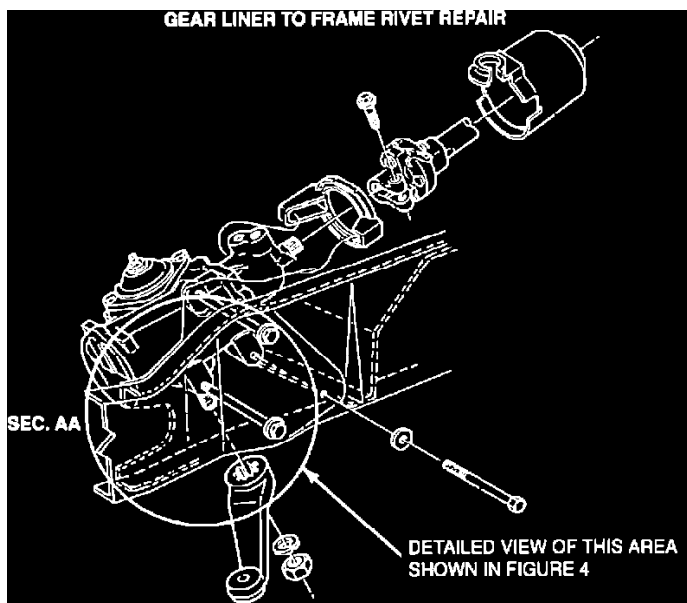


Figure 3

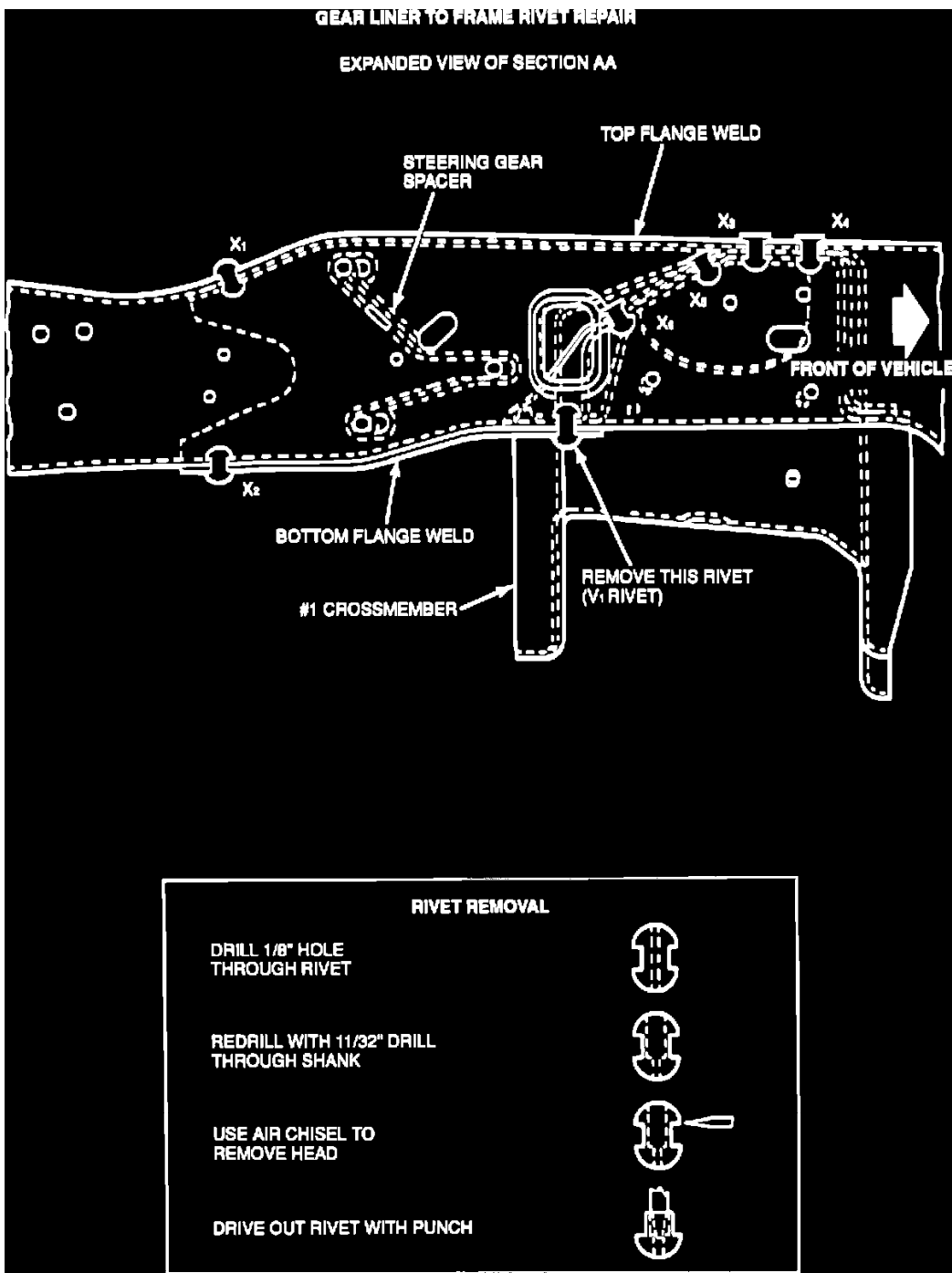


Figure 4

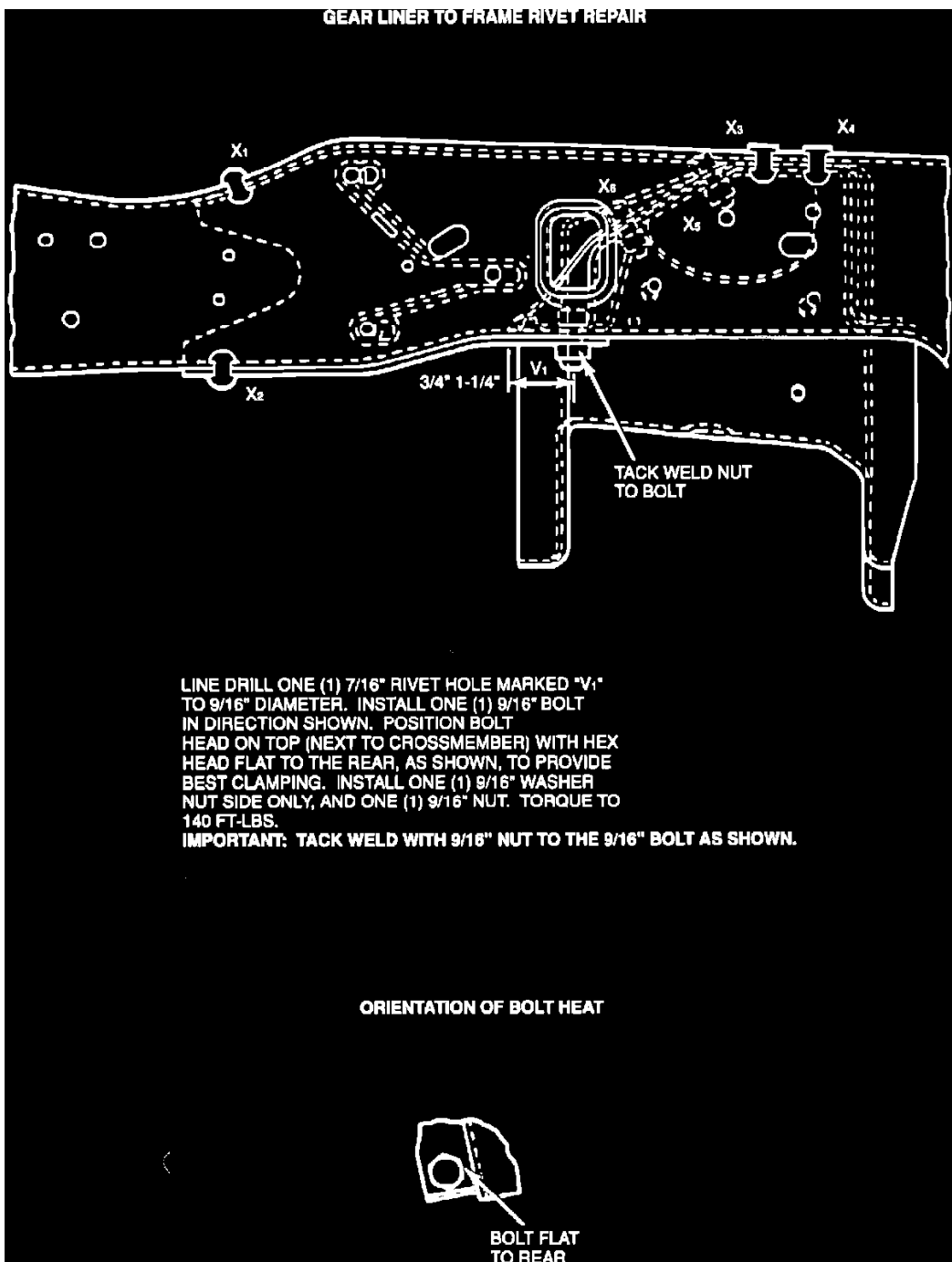


Figure 5

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

2. Repair trucks with a cracked frame liner or loose rivets by using Frame Repair Kit (E6TZ-5K130-A). See Figures 3, 4 and 5.
3. Inspect the frame for cracks in the following areas.
  - ^ Frame rail near the steering gear top and bottom flanges
  - ^ Frame rail at the steering gear bolt heads.
  - ^ Frame rail at or near the spring tower bracket
  - ^ Engine crossmember front LH flange.
4. If there are cracks in any of the above locations, replace the frame.
5. If a dealer confirmed shimmy has been experienced, replace the steering gear sector shaft. Use steering gear sector shaft repair kit (EOAZ-3375-A). Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.
6. Check for the presence of mesh load.
  - a. With the front wheels off the ground, hold the tire and turn the tire side to side slowly.
  - b. See if the effort increases when turning the tire straight ahead.
  - c. If no increase is noted, perform the Shop Manual procedure to check and adjust mesh load. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 13-41 for service details.

### Wheel End Friction and Wheel Bearing End Play Inspection:

1. Inspect the vehicle for worn ball joints. Refer to the appropriate model year Light Truck Shop Manual, Vol. A, Section 14 for service details. Replace as required.
2. Check the wheel bearing end play. Refer to the appropriate model year Light Truck Shop Manual, Vol A, Section 14 for service details. Adjust the end play or replace the wheel bearings as required.

### Vehicle Desensitizing

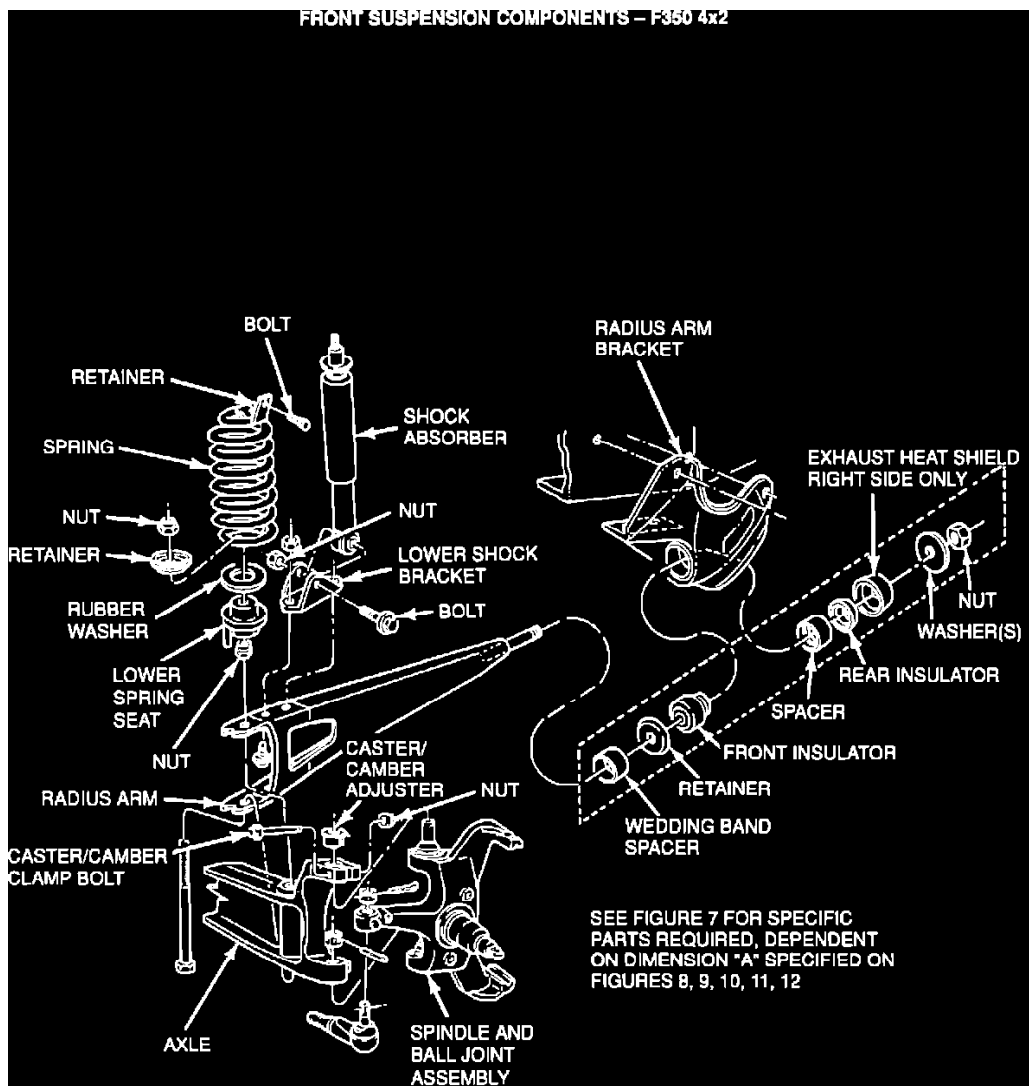


Figure 6

SKETCH NO.	RADIUS ARM STUD LENGTH (DIM. "A") UNTHREADED	WEDDING BAND N804264-S2 8 mm THICK	RETAINER 3B186	INSULATOR FRONT E7TZ-3B203-A	BRACKET E41Z-3B095-B (L.H.) E41Z-3B095-A (R.H.)	SPACER E5TZ-3B244-A	INSULATOR REAR D8TZ-3B203-A	HEAT SHIELD (R.H. ONLY) E4TZ-3B483-A	WASHER 4.5 mm THICK 379572-S2	WASHER 7 mm THICK N805144-S56	NUT 34892-S2	(FRAME MOUNTED) RADIUS ARM		
												Y	Y	Y
2	F350 4x2 DRW	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y		
3	67.7/69.2 mm 74.7/76.2 mm	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y		
3.2	F350 SRW	N	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y		
3.4	67.7/69.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	N	Y	Y		
3.6	74.7/76.2 mm	Y	Y	Y	Y	Y	Y	R.H. Side Only	Y	Y	Y	Y		

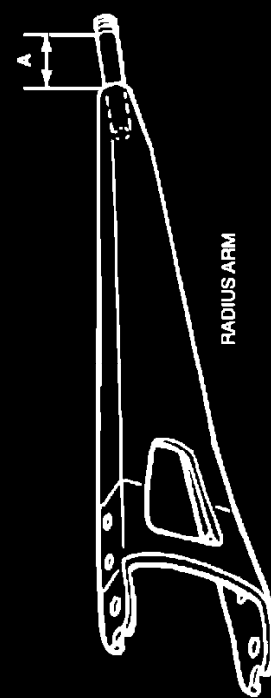


Figure 7

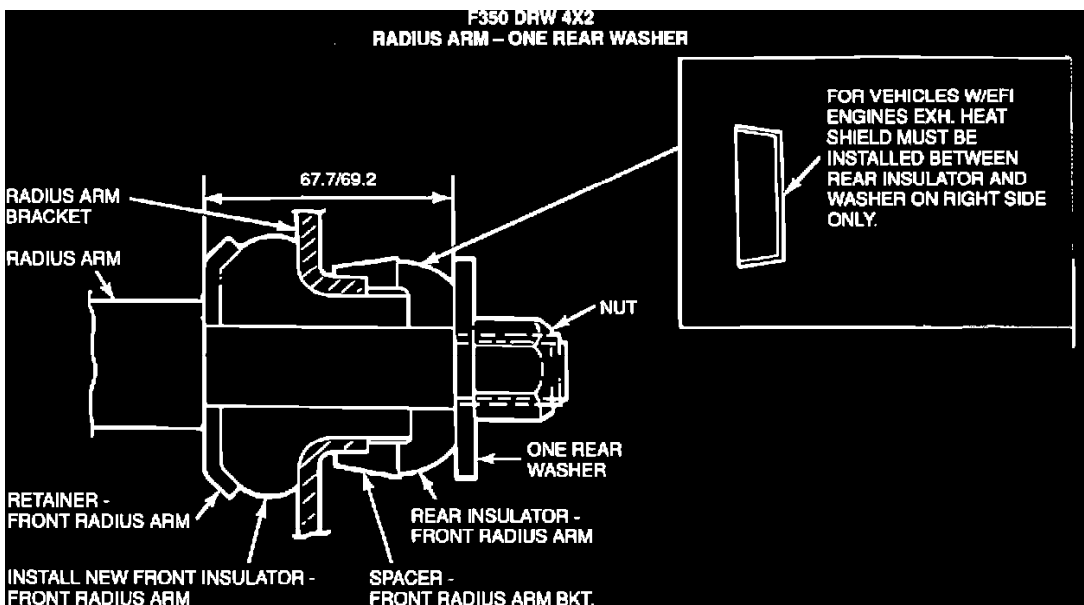


Figure 8

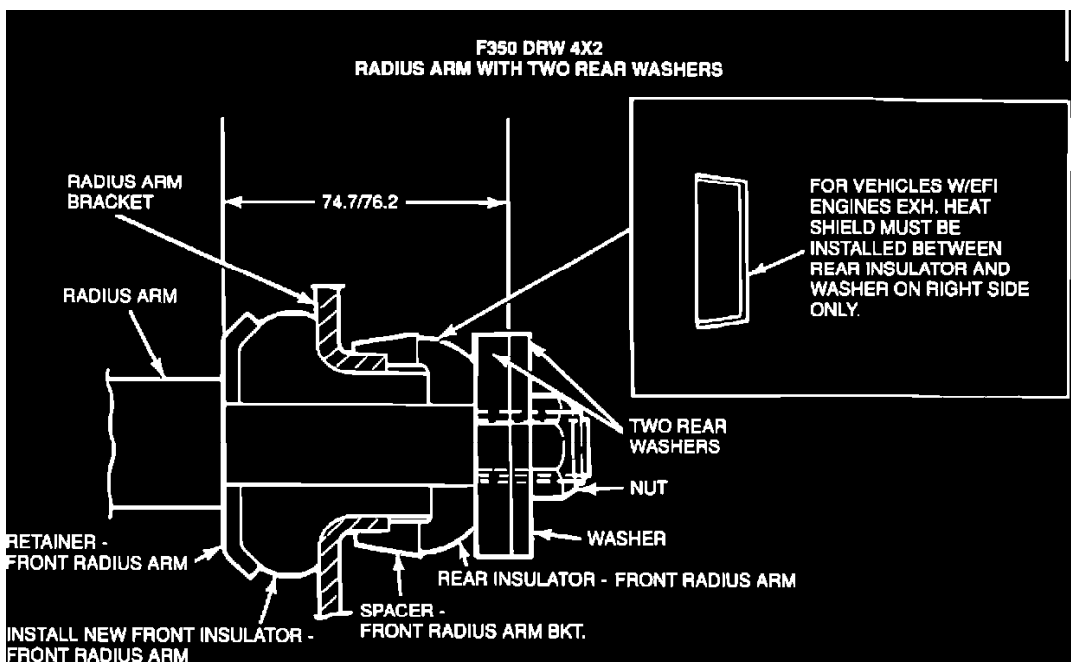


Figure 9

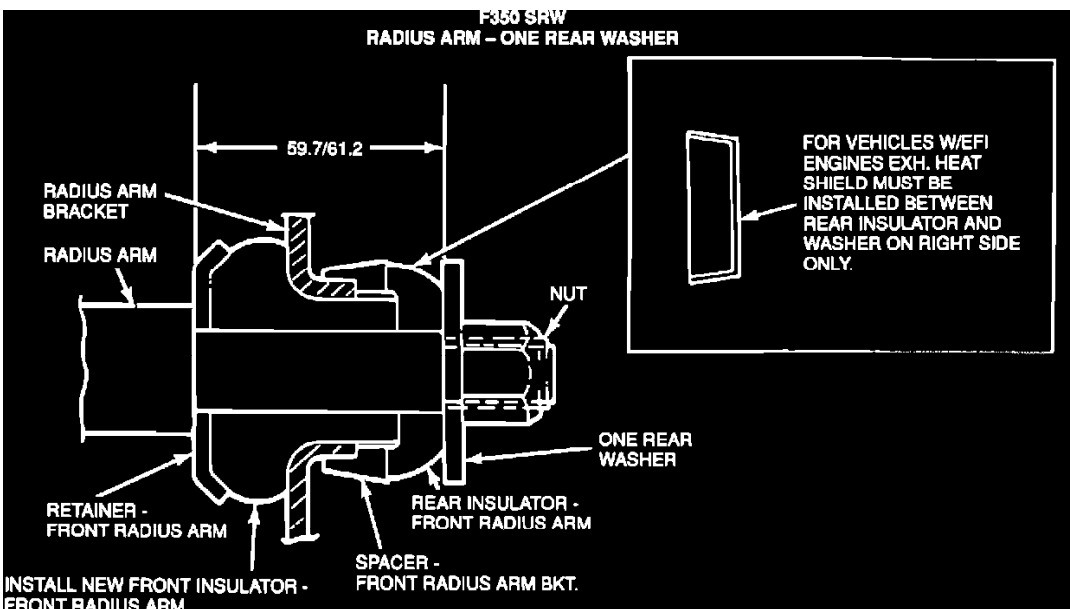


Figure 10

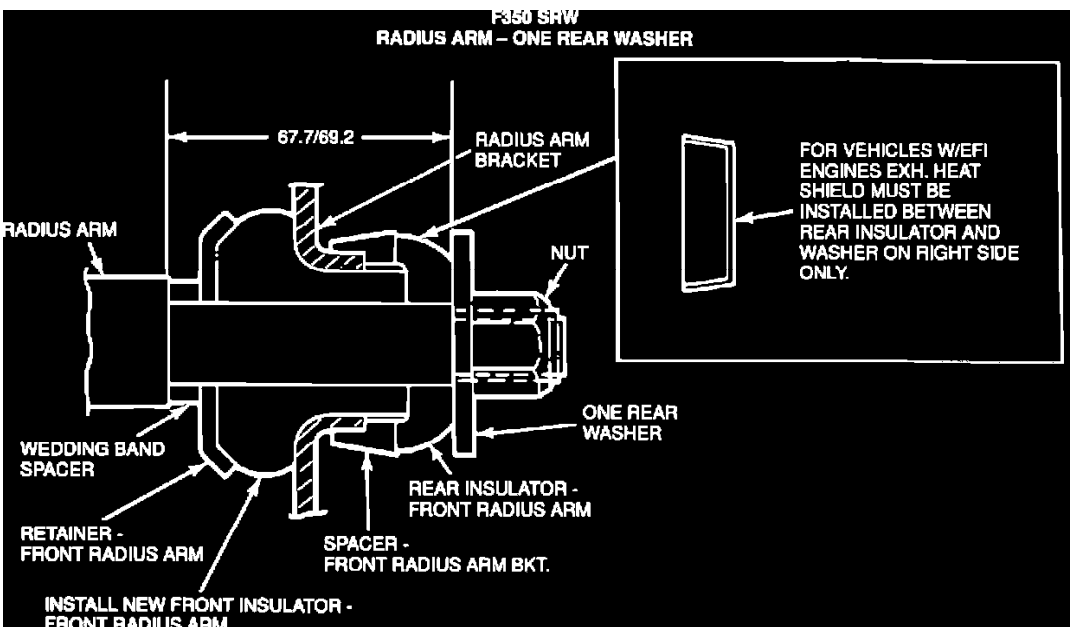
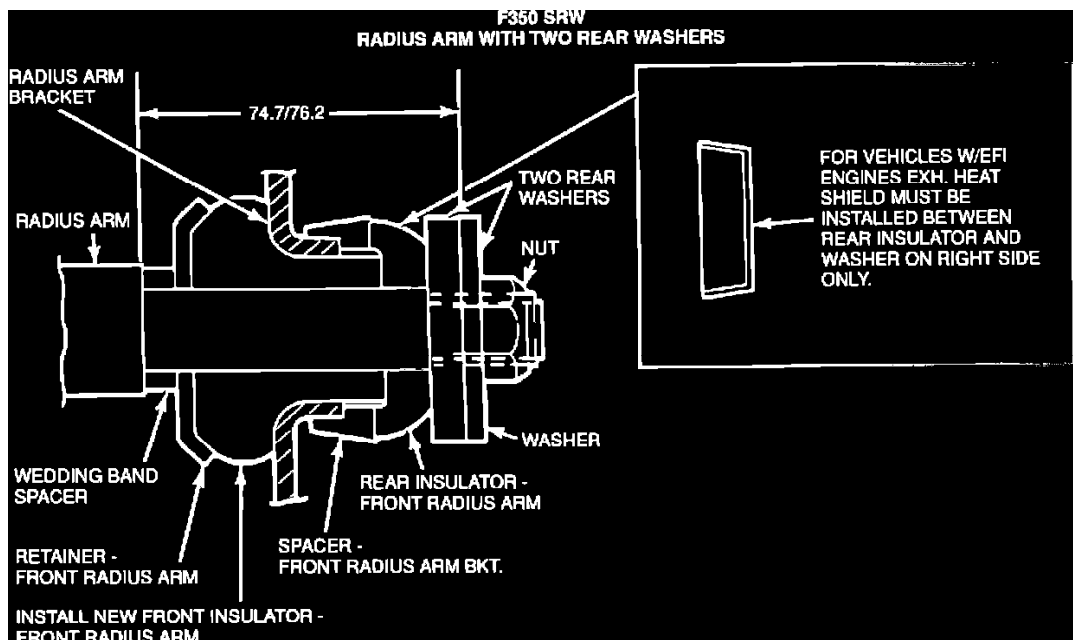


Figure 11



**Figure 12**

1. Inspect the radius arm bushing part stack, Figure 7.
2. Measure the radius arm stud length. See the component matrix, Figure 7, to determine the parts involved and the bushing part stack height for the F-350 DRW 4x2 and the F-350 SRW 4x2. Figures 6 through 12 show the radius arm bushing stack for each truck and follows the matrix.
3. Install rubber bushing (E7TZ-3B203-A) if it is not present on the vehicle.

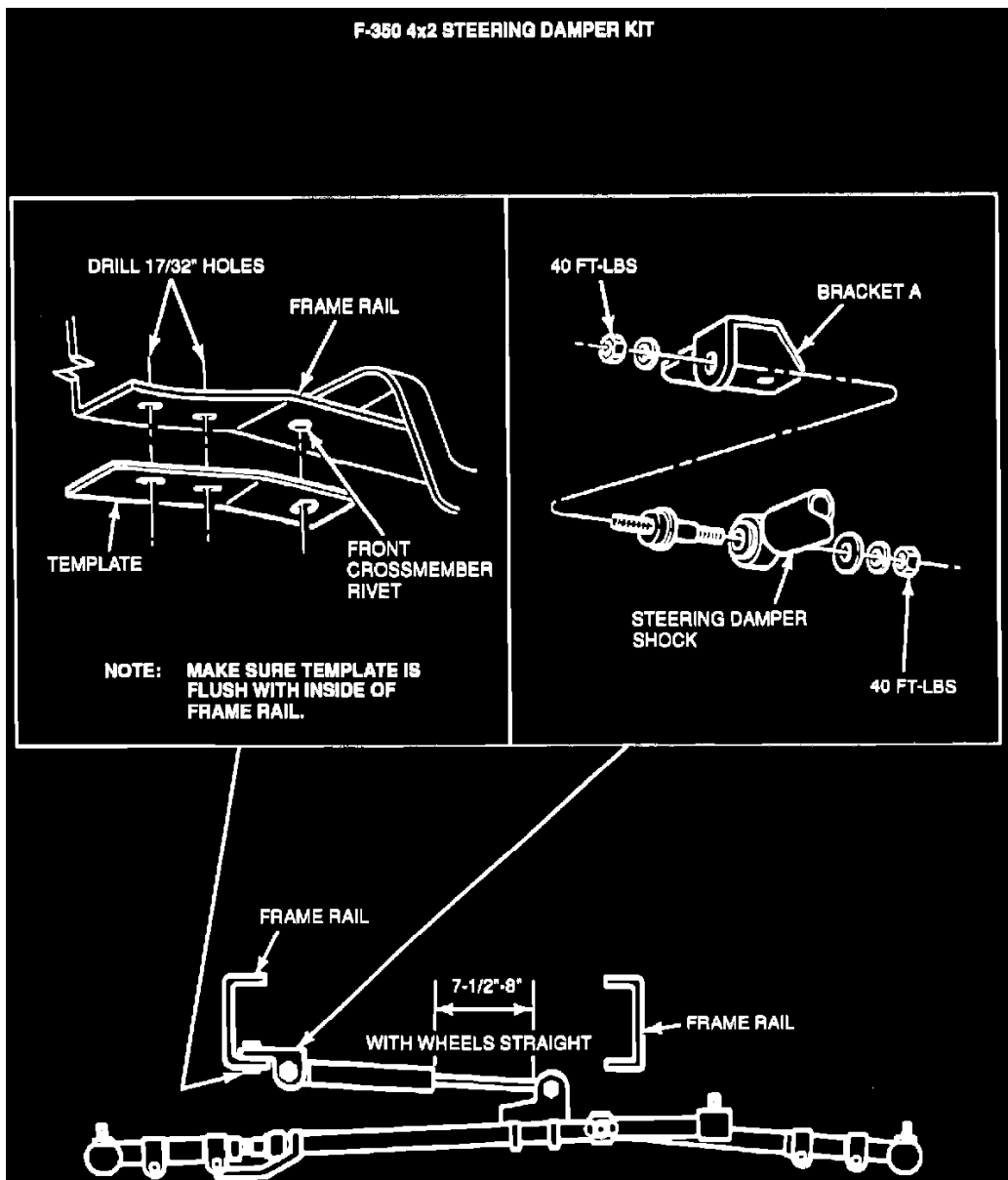


Figure 13

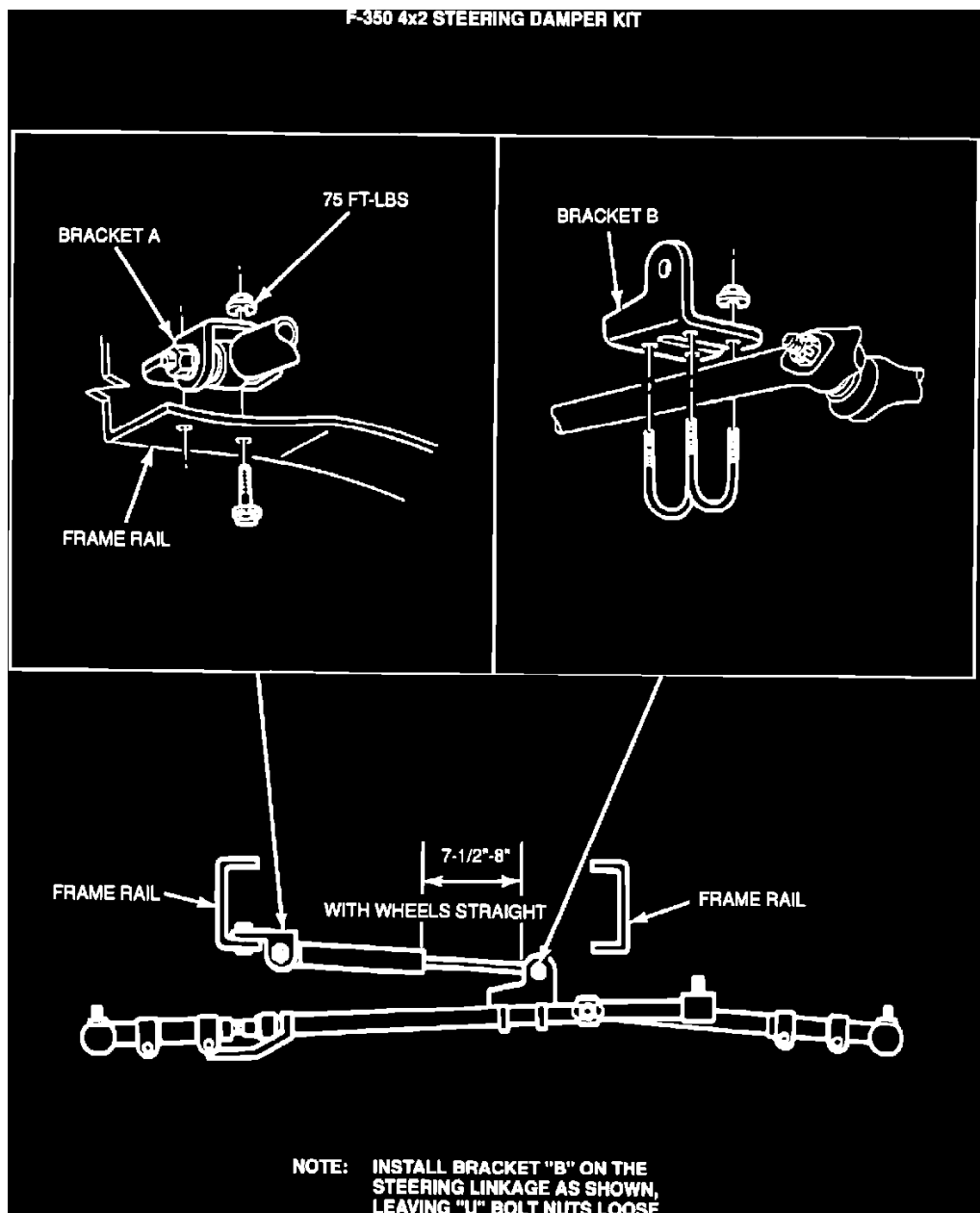


Figure 14

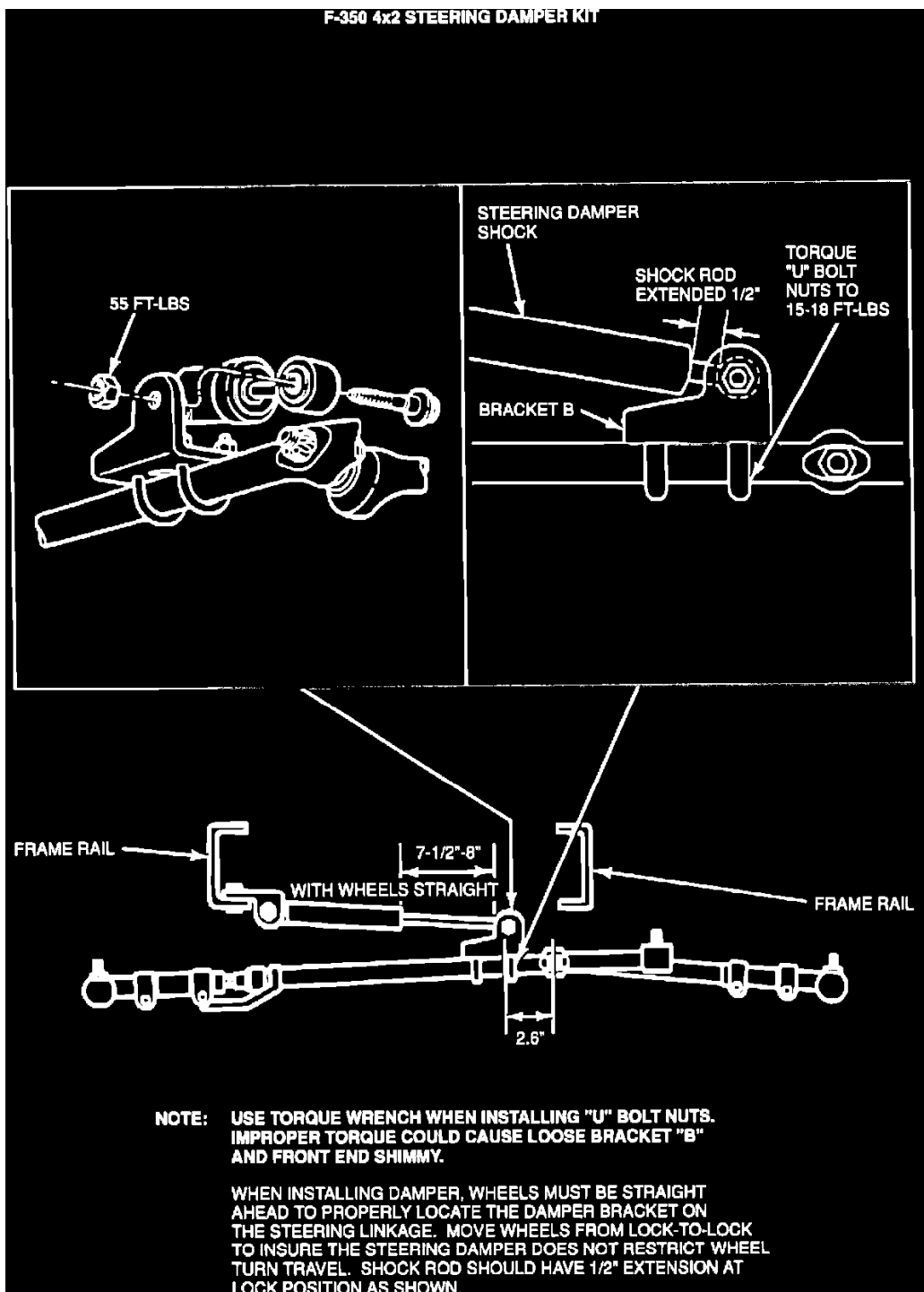


Figure 15

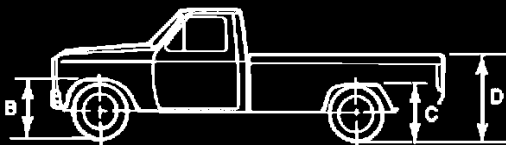
PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
E0AZ-3675-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

4. Check the truck for the presence of a steering damper on F-350 DRW 4x2 vehicles. See Figure 13, 14 and 15 for a step by step installation procedure.
5. Install a damper (Service Kit E7TZ-3E651-A) on F-350 DRW 4x2 only if it is not present on trucks built before 1/6/88. A damper kit can be installed on trucks built after 1/6/88, if a shimmy is experienced.

## Alignment

TRUCK MODEL	ALIGNMENT FACTORS DEGREES (INCH)	ALIGNMENT SPECIFICATIONS				STANDARD VEHICLE ATTITUDE -REF-			
		AT DESIGN RIDE HEIGHTS (REF)	ASSEMBLY PROCESSING	SHOP MANUAL OR IN-SERVICE CHECKING	MAXIMUM VARIATION BETWEEN WHEELS	LATERAL TILT 2) (SIDE TO SIDE HEIGHT DIFFERENCES)			DOG-TRACK
						"B" FRONTWHEEL HOUSE OPENING	"C" REAR WHEEL-HOUSE OPENING	"D" REAR END OF PICKUP BOX	
F-250 4x2 F-350 4x2	CASTER	7.2	●	1) 3)	1.5	15 mm	20 mm	20 mm	30 mm
	CAMBER	-0.5	●	1)	0.7				
	TOE 4)		-0.08 ± 0.25 (-0.03 ± 0.125)	+0.08 ± 0.25 (+0.03 ± 0.125)					
	STEERING AXIS INCLINATION	13.0							
	* INCLUDED ANGLE	12.5							

\* INCLUDED ANGLE DOES NOT CHANGE WITH RIDE HEIGHT  
 ● NOT ASSEMBLY PLANT CONTROLLABLE



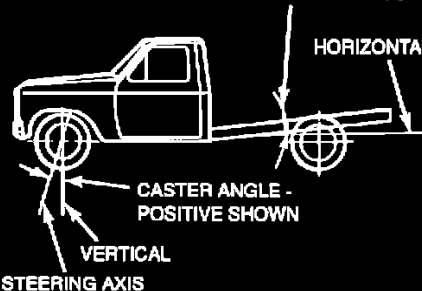
1) SEE CASTER AND CAMBER CURVES ON SHEET 2. CASTER AND CAMBER SETTINGS DEPEND ON RIDE HEIGHT DIM "A"

2) LATERAL VEHICLE TILT SPECIFICATIONS ARE MAX. ALLOWABLE FOR EITHER:  
 - VEHICLE AT CURB WEIGHT WITHOUT OCCUPANTS OR  
 - VEHICLE LOADED (NOT EXCEEDING GVW) WITH EQUALLY DISTRIBUTED WEIGHT OVER THE CARGO AND OCCUPANT AREAS

3) THE CASTER GRAPHS (SEE SHEET 2) AGREE WITH A LEVEL VEHICLE (0° FRAME ANGLE). IF THE VEHICLE IS LOWER IN THE FRONT THEN ADD THE FRAME ANGLE TO THE MEASURED CASTER READING AND COMPARE THIS SUM TO THE GRAPHED SPECIFICATIONS FOR THE GIVEN RIDE HEIGHT. IF THE VEHICLE IS LOWER IN THE REAR THEN SUBTRACT BEFORE COMPARING TO SPECIFICATION

4) TOE IS SET AND TO BE CHECKED AGAINST SPECIFICATION IN-SERVICE AT CURB RIDE HEIGHT ONLY. CURB RIDE HEIGHT IS A VEHICLE AS BUILT FROM THE ASSEMBLY PLANT, FULL FLUIDS, WITH NO ADDITIONAL WEIGHT FROM PASSENGERS, CARGO, AFTER MARKET ITEMS OR BODY MODIFICATIONS. TOE MAY BE RESET TO THE SHOP MANUAL OR OTHER RECOMMENDED SETTING AT ANY RIDE HEIGHT THAT THE VEHICLE WILL OPERATE AT FOR AT LEAST 50 PERCENT OF ITS USE. HOWEVER, TOE SET TO THE SHOP MANUAL SPECIFICATION AT CURB PROVIDES OPTIMUM VEHICLE AND TIRE WEAR PERFORMANCE FOR ALL RIDE HEIGHTS BETWEEN CURB (UNLOADED) AND GVW

FRAME ANGLE - MEASURE IN FLAT AREA AHEAD OF REAR WHEELS



INCLUDED ANGLE

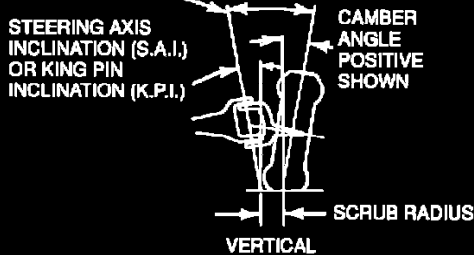


Figure 16

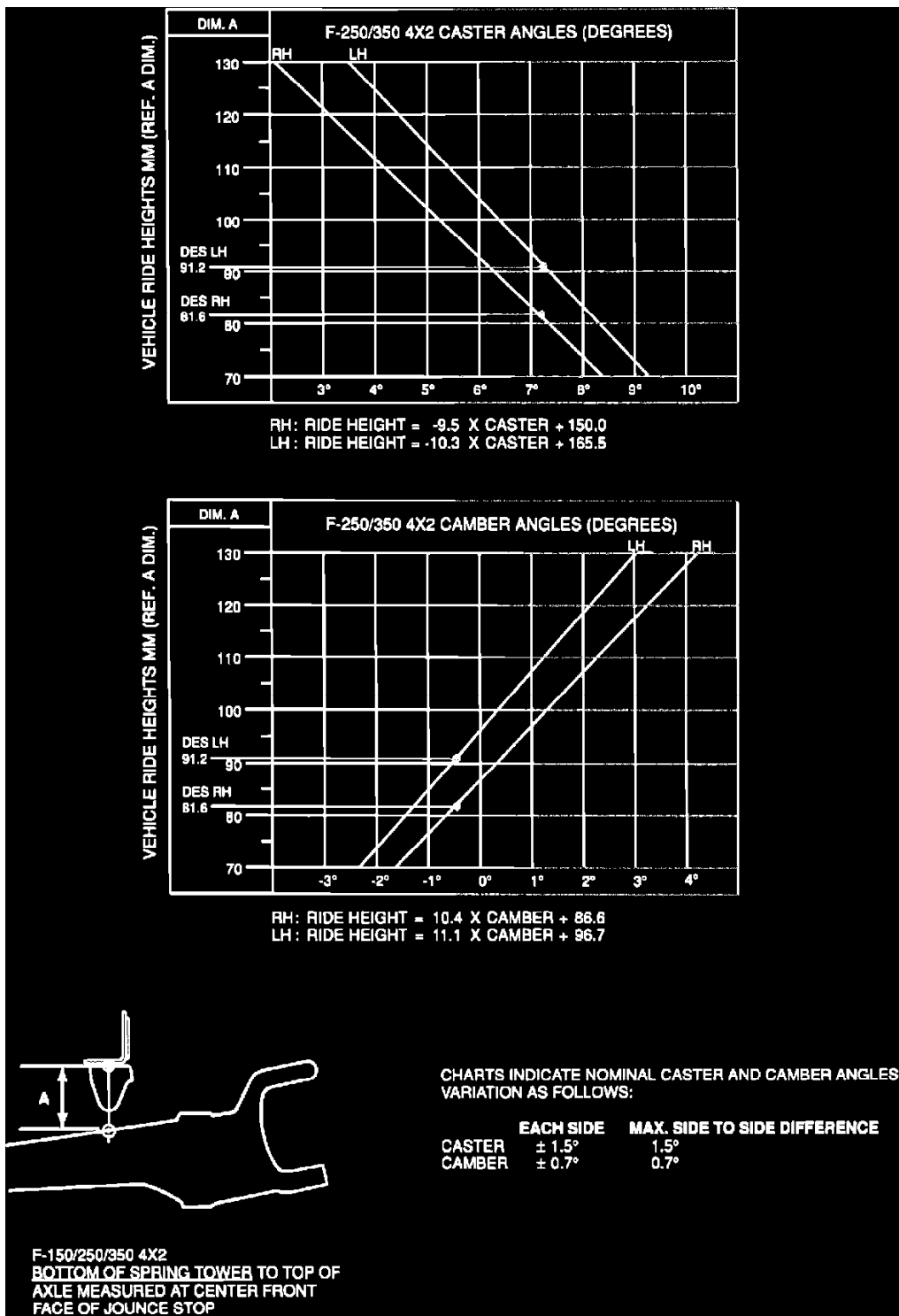


Figure 17

CAMBER OF 0 +/- 1/2~ AS VEHICLE IS OPERATED IS OPTIMUM

1. For vehicles with constant load (utility bodies) - Set camber to 0 +/- 1/2~. Refer to Figures 16 and 17.
2. For vehicles with varying loads (wreckers, dumps, rollback tilts, stake racks, etc.), proceed as follows:
  - a. Have the customer measure fender to ground heights, at wheel centerline with vehicle empty and loaded.
  - b. Measure the front end alignment..
    - ^ Caster
    - ^ Camber

- ^ Toe
- ^ Ride height
- ^ Front fender height to ground
- c. Determine the difference of customer measured loaded and empty fender height to ground when the alignment is measured.
- d. Compute camber at customer measured heights by adding 3/4~ per 1/2" height difference for higher customer heights. Subtract 3/4~ per 1/2" height for lower measured fender heights to measured camber.
- e. Compute the average camber by averaging the high and low numbers.
- f. Reset camber with computed average between 0 + 1/2~.

TOE

3. Set Toe to 0 +/- 1/2~.

CASTER

4. Set caster as shown in the Shop Manual according to ride height.

## Wheels/Tires Size, Pressure, Balance, Wear

1987 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHLS	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/86R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Argent Wheel/Optional Black - Wheel E5TA-UB

1988 F-350 TIRE/WHEEL RELEASES								
F-350 MODEL	WHLS	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	45	60
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
				Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Std	E4TA-AA	LT215/85R16 LRD	58	58
				Opt	E4TA-AA	7.50-16 LRD	45	50
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65
				Opt	E4TA-AA	7.50-16 LRD	50	60
				Opt	E4TA-AA	7.50-16 LRD	50	60

\* Gray Wheel/Optional - Black Wheel E7UA-JA

1989 F-350 TIRE/WHEEL RELEASES									
F-350 MODEL	WHL	WHL. BASE	GVW	AV.	WHEEL (1015)	TIRE	T/P FT.	T/P REAR	REMARKS
4X2 Chassis Cab	S/R	133	8800	Std	E5TA-KA*	LT235/85R16 LRE	51	80	HD FT END OPT
4X2 Crew Cab	S/R	168	9200	Std	E5TA-KA*	LT235/85R16 LRE	51	80	
4X2 Reg. Cab	D/R	133	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Super Cab	D/R	155	10000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Chassis Cab	D/R	137	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
		161	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
			11000	Std	E4TA-AA	LT215/85R16 LRD	58	65	
4X2 Crew Cab	D/R	168	10000	Std	E4TA-AA	LT215/85R16 LRD	58	58	

\* Gray Wheel/Optional Black Wheel E7UA-1A

RECOMMENDED TIRE USAGE - 1989 F-350 TIRE RELEASES							
APPROVED SUPPLIER	LT215/85R16 LRD - A/S	LT215/85R16 LRD - A/T	LT235/85R16 LRE - A/S	LT235/85R16 LRE - A/T	7.50R - 16 LRD - HWY	7.50R - 16 LRD - A/T	7.50R - 16 LRD - M-S
Firestone	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88/89	87/88
Michelin	87/88/89		87/88/89	87/88/89			
Goodyear		87/88/89	87/88/89		87		87/88
General			87/88/89	87/88/89			

#### SIZE AND PRESSURE

- Compare the tire and wheel with the sizes and pressures on the certification label or the following Tire/Wheel Release Charts to make sure the correct tire is used. Inflate the tire to the specified pressure.

#### BALANCE

- Make sure of the correct balance of the front wheels.

#### WEAR

- If heel and toe wear or edge wear are present, rotate the tires.
  - ^ For single rear wheels the same tread styles front and rear, cross rotate all four tires.
  - ^ For single rear wheels with different tread styles, cross switch the front tires.
  - ^ For all dual rear wheels, cross switch the front tires.

Check and reset tire pressure per the certification label or the following Tire/Wheel Release Charts.

NOTE: FOR TIRES WORN TO THE POINT OF REPLACEMENT, USE RELEASED TIRES AS SHOWN IN THE FOLLOWING TIRE/WHEEL RELEASE CHARTS.

## Parts, Time & Etc

PART NUMBER	PART NAME	CLASS
E9TZ-3A131-F	Socket	B
E9TZ-3304-F	Socket	B
E9TZ-3A130-D	Socket	B
E9TZ-3A131-E	Socket	B
E9TZ-3A131-G	Socket	B
E9TZ-3304-G	Socket	B
E7TZ-3281-C	Tube - Adjuster	B
E7TZ-3281-B	Tube - Adjuster	B
E9TZ-3281-A	Tube - Adjuster	B
E6TZ-5K130-A	Frame Repair Kit	CG
EOAZ-3575-A	Steering Gear Shaft	AG
E7TZ-3B203-A	Radius Arm - Insulator	BG
E7TZ-3E651-A	Steering Damper Kit	AG
E4TZ-3B095-B	Bracket - L.H.	R
E4TZ-3B095-A	Bracket - R.H.	RM
E5TZ-3B244-A	Spacer	AM
D9TZ-3B203-A	Insulator - Radius Arm Rear	AM
E4TZ-3B463-A	Heat Shield - R.H.	BM
N804264-S2	Spacer - Pkg. of 6	S
N805144-S56	Washer - Pkg of 3	S
N800895-S56	Nut - Pkg. of 4	BM
379572-S2	Washer	BR
34992-S2	Nut - Pkg. of 5	BS

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
901110A	Steering Linkage Inspection	0.4 Hr.
901110B	Steering Gear Inspection	0.2 Hr.
901110C	Install Frame Kit	11.7 Hr.
901110D	Install Sector Shaft Repair Kit	0.4 Hr.
901110E	Adjust Steering Gear	0.6 Hr.
901110F	Wheel Bearing End Play Inspection	0.2 Hr.
901110G	Vehicle Desensitizing	1.3 Hr.
901110H	Alignment	1.7 Hr.
901110I	Tire Rotation & Balance	0.9 Hr.

DEALER CODING

BASIC PART NO.      CONDITION CODE

FRONT                      W4

OASIS CODES: 3100, 3200

Technical Service Bulletin # **92186**Date: **920826****Engine - Metal to Metal Noise**

Article No.

92-18-6

08/26/92

- ^ ENGINE - 5.0L - THRUST BEARING OR CRANKSHAFT PREMATURE WEAR - VEHICLES WITH AOD TRANSMISSION
- ^ NOISE - "METAL-TO-METAL" SOUND - 5.0L WITH AOD TRANSMISSION
- ^ TRANSMISSION - AOD - INTERFERENCE BETWEEN THE TORQUE CONVERTER AND THE FLYWHEEL BOLTS

FORD:

1982-88 THUNDERBIRD

1982-90 MUSTANG

1986 LTD

1987-90 CROWN VICTORIA

LINCOLN-MERCURY:

1982-87 CAPRI, CONTINENTAL

1982-88 COUGAR

1982-90 TOWN CAR

1984-90 MARK VII

1987-90 GRAND MARQUIS

LIGHT TRUCK:

1982-90 BRONCO, E-150, E-250, F-150, F-250

This TSB article is being republished in its entirety to include the 1982-1987 Continental and the 1982-1990 Town Car.

ISSUE:

An unusual "metal-to-metal" noise from the engine may be caused by the flexing of the torque converter. The flexing condition causes an interference between the torque converter and flywheel bolts. The interference can cause the thrust bearing and the crankshaft to wear prematurely and eventually fail.

ACTION:

Install six (6) new flywheel bolts with reduced head height to provide additional clearance. Refer to the appropriate Shop Manual, 5.0L Engine Section, for service details.

NOTE:

WHEN A CRANKSHAFT IS REPLACED DUE TO THRUST BEARING FAILURE, INSTALL A NEW CRANKSHAFT THAT HAS A REVISED PILOT HOLE. THIS WILL PROVIDE ADDITIONAL CLEARANCE FOR THE TORQUE CONVERTER. USE NEW FLYWHEEL BOLTS.

PART NUMBER	PART NAME	CLASS
F1AZ-6303-B	Crankshaft	B
F1ZZ-6379-A	Flywheel Bolts (6 Req.)	B

PART NUMBER

OTHER APPLICABLE ARTICLES: NONE		
SUPERSEDES: 92-15-7		
WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Major Component Warranty Coverage, Powertrain Warranty Coverage		
OPERATION	DESCRIPTION	TIME
921806A	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Mustang	7.2 Hr.
921806B	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Thunderbird/Cougar	7.1 Hr.
921806C	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Crown Victoria/Grand Marquis	6.6 Hr.
921806D	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - E 150-250 All Models	10.3 Hr.
921806E	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - F 150-250 All 4X2 Models	8.6 Hr.
921806F	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - F 150-250 All 4X4 And Bronco Models	8.7 Hr.
921806G	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Mark VII	9.0 Hrs.
921806H	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Town Car	8.7 Hr.
921806I	Replace Thrust Bearings, Crankshaft And Flywheel Bolts - Continental	8.8 Hr.
DEALER CODING		
	BASIC PART NO.	CONDITION CODE
	6303	56
OASIS CODES: 497000, 499000, 504000, 597997, 702000		

Operation Description

Technical Service Bulletin # 90199

Date: 900913

## Lug Nuts - Proper Torqueing Procedure

- ^ BRAKE SHUDDER - ROTOR DISTORTED - OVERTIGHTENED LUG NUTS
- ^ WHEEL - NUT INSTALLATION - SERVICE TIP

Article No. 90-19-9

FORD: 1986-91 CROWN VICTORIA, ESCORT, MUSTANG, TAURUS, TEMPO, THUNDERBIRD 1988-91 FESTIVA 1989-91 PROBE

LINCOLN-MERCURY: 1986 CAPRI  
1986-87 LYNX 1986-91 CONTINENTAL, COUGAR, GRAND MARQUIS, MARK VII, SABLE, TOPAZ, TOPAZ,  
TOWN CAR 1987-89 TRACER 1991 CAPRI, TRACER

MERKUR: 1985-88 XR4TI 1988-89 SCORPIO

LIGHT TRUCK: 1986-90 BRONCO II 1986-91 AEROSTAR, BRONCO, ECONOLINE, F-150-350 SERIES, RANGER 1988-91 F SUPER DUTY  
1991 EXPLORER

**ISSUE:** The use of a power impact wrench to install wheel nuts provides minimal torque control. Undertightening may allow the lug nuts to loosen, and can result in the wheel separating from the vehicle. Overtightening of wheel nuts may cause brake rotor distortion that could result in a brake shudder. Overtightening may cause distortion of the wheel. This can result in a change in the diameter of the center (axle) hole and make it difficult to remove from the axle it is mounted on or difficult or impossible to install on another axle with a smaller center hole diameter.

**ACTION:** Use a manual torque wrench to tighten wheel nuts. Refer to the appropriate Shop Manual for specific torque values.

**OTHER APPLICABLE ARTICLES:** None

**WARRANTY STATUS:** INFORMATION ONLY

**OASIS CODES:** 306000, 301000

Technical Service Bulletin # **88621**

Date: **880316**

## Driveshaft - Clicking/Popping Noise

^ DRIVELINE - ALUMINUM DRIVESHAFT -  
"CLICKING" OR "POPPING" NOISE

Article No.  
88-6-21

^ NOISE - "CLICKING" OR "POPPING" - ALUMINUM DRIVESHAFT

**LIGHT TRUCK:** 1986-88 AEROSTAR  
1987-88 E-SERIES, F-SERIES

**ISSUE:** A "clicking" or "popping" noise from the driveshaft during transmission engagement or when accelerating from a stop may be caused by inadequate tubeto-yoke bonding on the aluminum driveshaft.

ALUMINUM DRIVESHAFT APPLICATION CHART				
Part Number	Vehicle	Engine	Transmission	Axle
E8TZ-4602-W	1987-88 F-150 (4x2) 133" Wheel Base	4.9L	M50D	2.73/3.08/3.55
		5.0L	AOD	3.55
		5.0L	M50D	3.08
		5.0L	T18	3.55
E8TZ-4602-Y	1987-88 F-250 LD (4x2) 133" Wheel Base	4.9L	M50D	3.55
		4.9L	T18	3.55
		5.0L	M50D	3.55
		5.0L	T18	3.73/4.10
		5.0L	AOD	4.10
E8TZ-4602-Z	1987-88 F-250 LD (4x2) 133" Wheel Base	4.9L	C6	3.55
		5.8L	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-Z	1987-88 F-250 HD (4x2) 133" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-Z	1987-88 F-350 SRW/DRW (4x2) 133" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-AB	1987-88 F-350 DRW (4x2) 136" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8UZ-4602-C	1987-88 E-150 138" Wheel Base	4.9L	AOD	3.55
		5.0L	AOD	3.55
E8UZ-4602-D	1987-88 E-150 138" Wheel Base	4.9L	C6	3.08/3.55
		5.8L	C6	3.55
E8UZ-4602-E	1987-88 E-250 138" Wheel Base Under 8500 GVW	5.0L	AOD	3.73
E8UZ-4602-F	1987-88 E-250 138" Wheel Base Under 8500 GVW	4.9L	C6	3.54/3.73
		5.8L	C6	3.54/3.73
E8UZ-4602-F	1987-88 E-250 138" Wheel Base Club Wagon Over 8500 GVW	4.9L	C6	4.10
		5.8L	C6	4.10
		7.5L	C6	4.10
E8UZ-4602-F	1987-88 E-350 SRW 138" Wheel Base	7.5L	C6	4.10
E8UZ-4602-F	1987-88 E-350 DRW 138" Wheel Base	7.5L	C6	4.10
E8UZ-4602-F	1987-88 Super Wagon 138" Wheel Base Over 8500 GVW	4.9L	C6	4.10
		5.8L	C6	4.10
		7.5L	C6	4.10

ALUMINUM DRIVESHAFT APPLICATION CHART				
Part Number	Vehicle	Engine	Transmission	Axle
E89Z-4602-B	1988 Aerostar	3.0L	M50D	3.45/3.73
E89Z-4602-C	1986-88 Aerostar	3.0L	A4LD	3.45/3.73/4.10
E79Z-4602-A	1986-87 Aerostar	2.3L/3.0L	M50D	3.45/3.73
<b>NOTE: If a new driveshaft is required on the following applications, the original slip yoke from the old driveshaft must be used.</b>				
E8TZ-4602-W	1987 F-150 133" Wheel Base	4.9L/5.0L	NPG 435	3.55
E8TZ-4602-Y	1987 F-250 LD (4x2) 133" Wheel Base	5.0L	NPG 435	3.55/4.10

**ACTION:** To correct this, install a new aluminum driveshaft with an improved tube-to-yoke bond. Refer to the appropriate model year Shop Manual for driveshaft removal and installation procedures. Refer to the driveshaft application charts on pages 38 and 39 of this TSB for the correct part numbers.

PART NUMBER	PART NAME	CLASS
E8TZ-4602-W	Aluminum Driveshaft	C
E8TZ-4602-Y	Aluminum Driveshaft	C
E8TZ-4602-Z	Aluminum Driveshaft	C
E8TZ-4602-AB	Aluminum Driveshaft	C
E8UZ-4602-C	Aluminum Driveshaft	C
E8UZ-4602-D	Aluminum Driveshaft	C
E8UZ-4602-E	Aluminum Driveshaft	C
E8UZ-4602-F	Aluminum Driveshaft	C
E89Z-4602-B	Aluminum Driveshaft	C
E89Z-4602-C	Aluminum Driveshaft	C
E79Z-4602-A	Aluminum Driveshaft	C

**OTHER APPLICABLE ARTICLES:** Supersedes 86-23-20

**WARRANTY STATUS:** Eligible Under Powertrain Warranty Coverage

**OPERATION:** 880621A - One-piece driveshaft

**TIME:** 0.4 Hr. - Aerostar

0.3 Hr. - E-Series, F-Series

**OPERATION:** 880621B - Two-piece driveshaft

**TIME:** 0.5 Hr. - E-Series, F-Series

**DLR. CODING:** Basic Part No. 4602 - Code: 61

**Technical Service Bulletin # 9228**

Date: **920116**

## M/T - M5HD Increased/Uneven Clutch Pedal Efforts

Article No.

92-2-8

01/16/92

**CLUTCH PEDAL - INCREASED OR UNEVEN EFFORTS (VEHICLES EQUIPPED WITH 6.9/7.3/7.5L ENGINES AND M5HD OR ZF TRANSMISSION)**

**LIGHT TRUCK:** 1987-91 F-250, F-350 1988-91 F SUPER DUTY, F-47, F-59

**ISSUE:** Increased or uneven pedal efforts may occur due to galling and contamination build-up on the transmission input shaft retainer.

**ACTION:** Install a new design clutch release bearing when replacing the M5HD or ZF transmission release bearing. This new release bearing has a plastic carrier and wiping seals to control contamination build-up on the transmission input shaft retainer. Refer to the Light Truck Shop Manual for service details.

**NOTE:** RELEASE BEARING REPLACEMENT ALONE WILL NOT SIGNIFICANTLY REDUCE CLUTCH PEDAL EFFORTS. CLUTCH

PEDAL EFFORTS NATURALLY INCREASE WITH CLUTCH DISC WEAR AND A WORN OUT CLUTCH IS THE PRIMARY CAUSE OF EXCESSIVE CLUTCH PEDAL EFFORTS.

PART NUMBER	PART NAME	CLASS
F1TZ-7548-A	Clutch Release Bearing	B

OTHER APPLICABLE ARTICLES: NONE  
 WARRANTY STATUS: INFORMATION ONLY  
 OASIS CODES: 506000

Technical Service Bulletin # **89619**

Date: **890322**

## Transfer Case/PTO - Lubrication Requirements

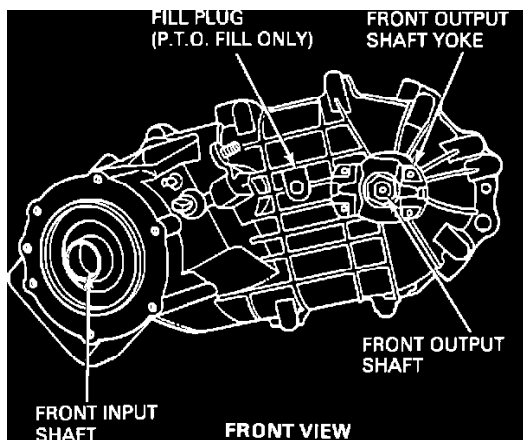
TRANSFER CASE-LUBRICATION REQUIREMENTS FOR VEHICLES EQUIPPED "DANA" POWER TAKE-OFF (PTO) UNITS

Article No. 89-6-19

LIGHT TRUCK: 1987-89 F-350

**ISSUE:** Warner 356 transfer case assemblies with "Dana" P.T.O. units require 4.8 quarts more oil (Dexron II ATF) than transfer cases without P.T.O's. Transfer cases equipped with P.T.O's that are operated under a continuous load in excess of 11 minutes may exhibit failures due to a low fill.

**ACTION:** When servicing transfer cases that have P.T.O's, refill the transfer case as described in the following service procedure.



**FIGURE 1**

**NOTE:** SOME TRANSFER CASES HAVE A FILL PLUG LABELED "FOR P.T.O. FILL ONLY" ON THE FRONT OF THE CASE, FIGURE 1.

**NOTE:** CUSTOMERS SHOULD BE GIVEN A COPY OF THIS INFORMATION FOR FUTURE REFERENCE.

1. Locate the fill plug on the front of the transfer case labeled "FOR P.T.O. FILL ONLY", Figure 1. Fill oil to the level of this fill hole. If this fill hole does not exist, proceed to Step 2.

**NOTE:** THE UPPERMOST CAPSCREW ON THE OUTPUT SHAFT BEARING COVER OF THE P.T.O. SHOULD BE USED TO CHECK THE OIL LEVEL.

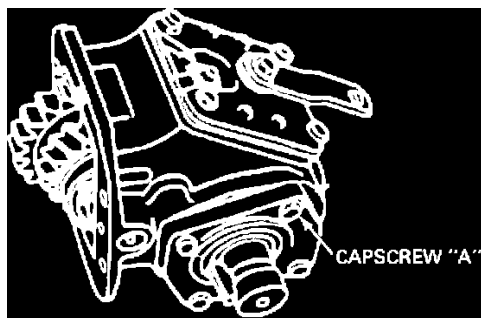


FIGURE 2

2. Remove the uppermost capscrew ("A") on the output shaft bearing cover of the P.T.O., Figure 2.

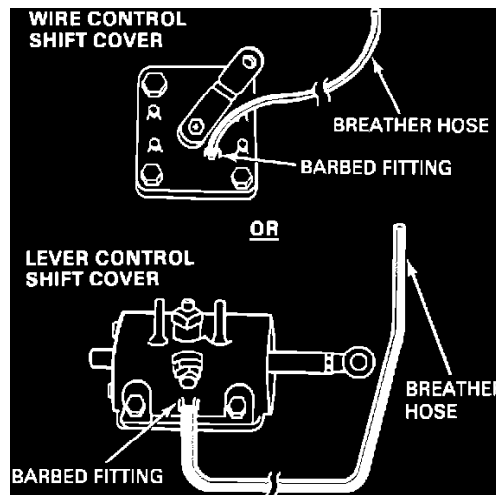


FIGURE 3

3. Remove the barbed fitting and breather hose from the P.T.O. shifter cover, Figure 3.
4. Add oil into the P.T.O. through the breather hole in the shifter cover until the oil begins to run out of the hole for the capscrew ("A").
5. Reinstall the capscrew in the output shaft bearing cover of the P.T.O.
6. Reinstall the barbed fitting and breather hose into the P.T.O. shifter cover.
7. Make sure all the capscrews are properly tightened. Refer to the P.T.O. owner manual for the correct torque specification.

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 5700, 5970

Technical Service Bulletin # 962612

Date: 961216

## Torque Converter - Cleaning and Replacement Guidelines

Article No.

96-26-12

12/16/96

^ TRANSAXLE - TORQUE CONVERTER REPLACEMENT GUIDELINES AND TORQUE CONVERTER/TRANSAXLE COOLING SYSTEM CLEANING PROCEDURES - SERVICE TIP

^ TRANSMISSION - TORQUE CONVERTER REPLACEMENT GUIDELINES AND TORQUE CONVERTER/TRANSMISSION COOLING SYSTEM CLEANING PROCEDURES - SERVICE TIP

FORD:

1985-86 LTD

1985-88 EXP

1985-94 TEMPO

1985-97 CROWN VICTORIA, ESCORT, MUSTANG, THUNDERBIRD

1986-97 TAURUS

1988-93 FESTIVA

1989-97 PROBE

1994-97 ASPIRE

1995-97 CONTOUR

LINCOLN-MERCURY:

1985-86 MARQUIS

1985-87 LN7, LYNX

1985-92 MARK VII

1985-94 TOPAZ

1985-97 CONTINENTAL, COUGAR, GRAND MARQUIS, TOWN CAR

1986-97 SABLE

1987-89 TRACER

1991-94 CAPRI

1991-97 TRACER

1993-97 MARK VIII

1995-97 MYSTIQUE

MERKUR:

1985-89 XR4TI

1988-90 SCORPIO

LIGHT TRUCK:

1985-90 BRONCO II

1985-96 BRONCO

1985-97 ECONOLINE, F-150-350 SERIES, RANGER

1986-97 AEROSTAR

1988-97 F SUPER DUTY

1991-97 EXPLORER

1993-97 VILLAGER

1995-97 WINDSTAR

1997 EXPEDITION, MOUNTAINEER

ISSUE:

Torque converter replacement guidelines and torque converter/transmission (or transaxle) cooling-system cleaning procedures are now available to reduce repeat repairs.

ACTION:

Refer to the following guideline to properly diagnose and service torque converters and to properly clean the torque converter and transmission cooling system using forward flushing/backflushing. For diagnosis, service and cleaning, refer to the appropriate model/year Service Manual, Sections 07-01, 07-02, 03-03, 307-01, 307-02, or 303-03.

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 501000, 502000, 503000, 504000

## Diagnostic Procedure

Prior to torque converter replacement, all diagnostic procedures must be followed. This is to prevent the unnecessary replacement of good torque converters. Only after a complete diagnostic evaluation can the decision be made to replace the torque converter.

The normal diagnostic procedure is as follows:

1. Preliminary inspection.
2. Know and understand the customers concern.
3. Verify the concern:
  - Perform the Torque Converter Clutch Operation Test
4. Perform diagnostic procedures:

a. Run On-Board Diagnostics

- Repair all non-transmission-related Diagnostic

Trouble Codes (DTCs) first.

- Repair all transmission DTCs.

- Rerun On-Board Diagnostic to verify repair.

b. Perform Line Pressure Test

c. Perform Stall Speed Test

d. Diagnosis by Symptom Routines - Use the index to locate the appropriate routine that best describes the symptom(s). The routine will list all possible components that may cause or contribute to the symptom. Check each component listed, diagnose and service as required, before servicing the torque converter.

## Replacement

The torque converter must be replaced if one or more of the following statements are true:

^ A torque converter malfunction has been determined based on completed diagnostic procedures

^ A converter stud(s), impeller hub or bushing is damaged

^ If there is discoloration of the torque converter (due to overheating)

^ The torque converter is found to be out of specification when performing the following checks (as applicable):

1. Torque Converter One-way Clutch Check

2. End Play Check

3. Stator-to-Turbine Interference Check

4. Converter Leakage Check

5. Stator-to-Impeller Interference Check

^ If there is evidence of transmission assembly or fluid contamination due to the following failure modes:

Torque converter Replacement Policy Failure Modes Major metallic failure

Multiple clutches or clutch plate failures

Sufficient component wear which results in metallic contamination

## Torque Converter & Transmission Cooling System Cleaning

When the torque converter is replaced, the following actions must take place:

1. All cooler lines must be thoroughly cleaned by Back and Forward Flushing using Service Manual procedure.

2. All coolers (in-tank and auxiliary) must be thoroughly cleaned by Back and Forward Flushing using Service Manual procedure.

3. All Cooler By-Pass Valves (CBV), if equipped, must be removed and thoroughly cleaned using Service Manual procedures. Replace rubber coated sealing washers prior to reinstalling CBV. Replace CBV if damaged or plugged.

4. Perform Transmission Cooler Flow Test - If the Transmission Cooling System fails the Flow Test, the coolers, CBVs or lines must be replaced. If the coolers are to be replaced, use only factory approved service parts.

If the torque converter is not being replaced, the following actions must take place:

1. The torque convener must be thoroughly cleaned:

a. Torque converters with drain plugs can be cleaned using the Rotunda Torque Converter Cleaner Follow the instructions included with the

equipment.

- b. Torque converters without drain plugs can be cleaned by hand. Partially fill the converter using clean transmission fluid (as recommended for the particular transmission). Hand agitate the converter and then thoroughly drain the fluid. Refill with new fluid, specified for the transmission, and reinstall.
2. All cooler lines must be thoroughly cleaned by Back and Forward Flushing using Service Manual procedure.
  3. All coolers (in-tank and auxiliary) must be thoroughly cleaned by Back and Forward Flushing using Service Manual procedure.
  4. All Cooler By-Pass Valves (CBV), if equipped, must be removed and thoroughly cleaned using Service Manual procedures. Replace rubber coated sealing washers prior to reinstalling CBV. Replace CBV if damaged or plugged.
  5. Perform Transmission Cooler Flow Test - If the Transmission Cooling System fails the Flow Test, the coolers, CBVs or lines must be replaced. If the coolers are to be replaced, use only factory approved service parts.

REQUIRED TOOLS	
Tool Number	Description
014-00028	Rotunda Converter/Oil Cooler Cleaner
014-00752	Rotunda Oil Cooler Flusher Kit
T77L-7902-R	Converter Clutch Holding Tool
T76L-7902-C	Converter Clutch Torquing Tool
T00L-4210-C	Dial Indicator With Bracketry
T80L-7902-A	End Play Checking Tool
014-R1075	Torque Converter Leak Check Tool And Gasket
007-00500	New Generation Star (NGS) Tester
007-00085D	Rotunda Transmission Tester Kit - includes all cables and overlays required for transmission/transaxle diagnosis. Refer to the Service Manual for the correct cable/overlay combination to use. Individual cables/overlays and the tester may be ordered separately from Rotunda.

Required Tools Technical Service Bulletin # 96249

Date: 961118

## A/T Torque Converter - Leak Test Procedure

Article No.

96-24-9

11/18/96

### TORQUE CONVERTER - LEAK TEST PROCEDURE - SERVICE TIP

#### FORD:

1984-94 TEMPO

1984-97 CROWN VICTORIA, ESCORT, MUSTANG, THUNDERBIRD

1986-97 TAURUS

1988-93 FESTIVA

1989-97 PROBE

1994-97 ASPIRE

1995-97 CONTOUR

#### LINCOLN-MERCURY:

1984-92 MARK VII

1984-94 TOPAZ

1984-97 CONTINENTAL, COUGAR, GRAND MARQUIS, TOWN CAR

1986-97 SABLE

1991-94 CAPRI

1991-97 TRACER

1993-97 MARK VIII

1995-97 MYSTIQUE

**LIGHT TRUCK:**

1984-90 BRONCO II

1984-96 BRONCO

1984-97 ECONOLINE, F-150-350 SERIES, RANGER

1986-97 AEROSTAR

1988-97 F SUPER DUTY

1991-97 EXPLORER

1993-97 VILLAGER

1995-97 WINDSTAR

1997 EXPEDITION, MOUNTAINEER

**ISSUE:**

A new torque converter leak test tool has been released. The current leak test tool has been discontinued by the manufacturer. The new tool will be available to all dealers in 1997.

**ACTION:**

When using the new leak test tool, a new procedure must be followed. Refer to the following Service Procedure and/or the 1997 Service/Workshop Manuals when using the new leak test tool.

**NEW TOOL NUMBER**

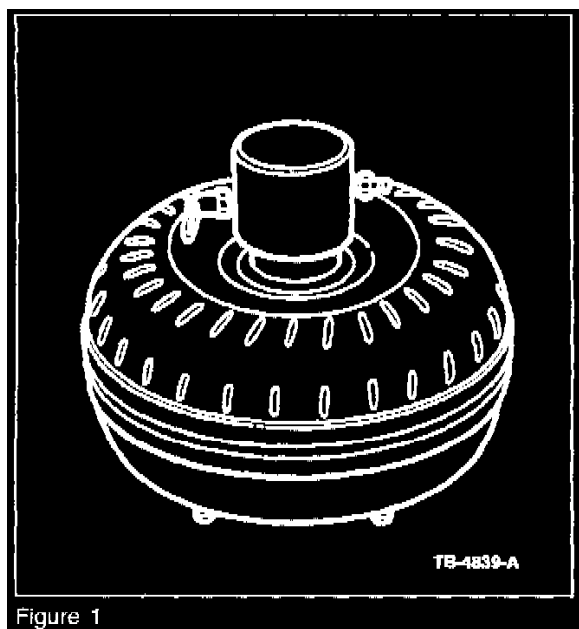
Description	Tool Number
Torque converter Leak Test Tool and Gasket	014-R1075

**SERVICE PROCEDURE**

1. Clean the outside surface of the torque converter.

**CAUTION:**

BE CAREFUL NOT TO DAMAGE THE CONVERTER HUB FINISH WHEN INSTALLING THE TOOL.



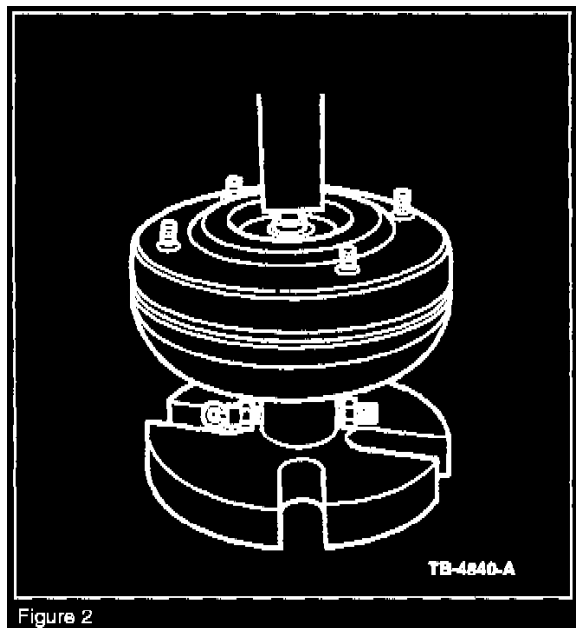
2. Install the Torque Converter Leak Test Tool and Gasket (O14-R1075) into the converter hub. Figure 1.

**WARNING:**

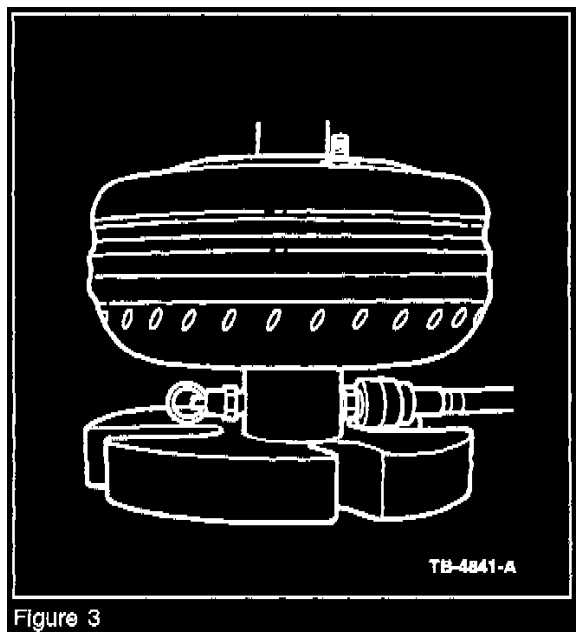
ALWAYS USE PROPER SAFETY PROCEDURES WHILE USING PRESS.

**CAUTION:**

DO NOT DAMAGE THE CONVERTER BY APPLYING EXCESSIVE FORCE FROM THE PRESS. USE ONLY ENOUGH FORCE TO SEAL TOOL INTO THE CONVERTER.



- Place the torque converter with the tool installed into press and apply enough force to seal tool into the converter. Figure 2.



- Using clean, dry shop air only, apply air pressure of 552 kPa (80 psi) maximum to the valve on the tool. Refer to Figure 3.
- With air pressure applied to the valve, inspect for any air leaks at the studs, seams and pilot hub. A soap bubble solution may be applied around those areas to aid in diagnosis. If any leaks are present, replace the converter.

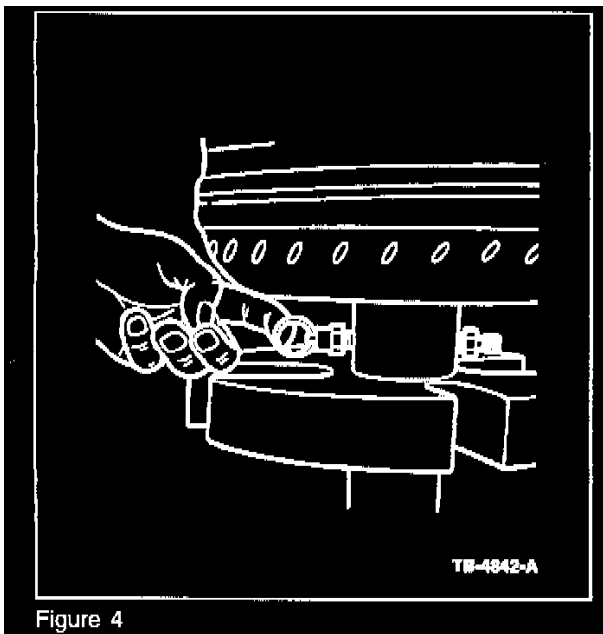


Figure 4

6. Disconnect the air line and release the air pressure from the tool by pulling on the release ring and then slowly releasing the press. Refer to Figure 4.

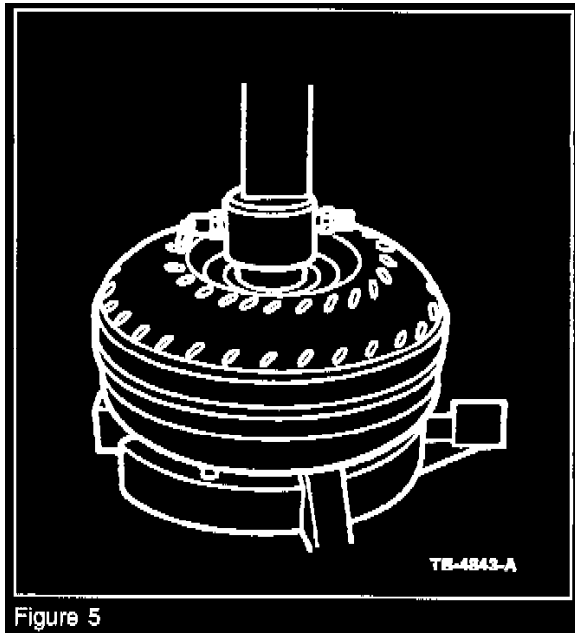


Figure 5

7. Turn the torque converter and tool upside down and reinstall into the press. Repeat Steps 2-6 to check for leaks on the opposite side. Refer to Figure 5.

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 501000, 502000, 504000, 510000

Technical Service Bulletin # **881811**

Date: **880831**

## Dash Panel - Cracks At Clutch Master Cylinder

Article No. 88-18-11

- ^ DASH PANEL CRACKS AT CLUTCH MASTER CYLINDER
- ^ CLUTCH - HIGH EFFORT - DASH PANEL CRACKING

^ CLUTCH -SOFT PEDAL AND INCOMPLETE RELEASE

LIGHT TRUCK: 1987-88 F-SERIES

ISSUE: Incomplete clutch release and/or hydraulic fluid leaking into the cab from the clutch master cylinder may be caused by the reinforcement plate on the clutch master cylinder separating from the dash panel. The separation of the reinforcement plate reduces the clutch master cylinder pushrod travel. Reinforcement plate separation can also cause deflection of the clutch master cylinder that results in a misalignment of the pushrod to the clutch master cylinder. Misalignment causes the Oring in front of the secondary seal to leak hydraulic fluid.

ACTION: To correct this, install a new service released clutch master cylinder mounting bracket. Refer to the following procedure for service details.

1. With an assistant pushing the clutch pedal down several times, check for separation between the dash panel (cowl) and the clutch master cylinder reinforcement dish.

NOTE: THIS MUST BE DONE FROM UNDER THE HOOD IN THE ENGINE COMPARTMENT.

2. If separation is present, install a new clutch master cylinder mounting bracket, (E8TZ-7K509-A for 1988 model year trucks or E3TZ-7K509-A for 1987 model year trucks). Refer to the following service details:

- a. Remove the two (2) clutch master cylinder retaining nuts.
- b. Position the clutch master cylinder forward.
- c. Repair and seal the dash panel, as required.
- d. Install the clutch master cylinder mounting bracket onto the clutch master cylinder mounting studs.
- e. Reposition the clutch master cylinder.
- f. Reinstall the clutch master cylinder retaining nuts. Torque to 7-11 lb.ft. (9-15 N-m).

PART NUMBER	PART NAME	CLASS
E8TZ-7K509-A	Clutch Master Cylinder Mounting Bracket	C
E3TZ-7K509-A	Clutch Master Cylinder Mounting Bracket	CG

OTHER APPLICABLE ARTICLES: 87-16-15, 86-20-10, 85-5-24, 85-5-26, 84-1-14, 83-24-22, 83-23-16

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION: 881811A - Install Mounting Bracket

TIME: 0.5 Use "M" Time To Repair Dash Panel If Required

DLR. CODING: Basic Part No. 7K509  
Condition Code: 14

^ CLUTCH (HYDRAULIC) - PEDAL DOES NOT FULLY RETURN - DIAGNOSTIC TIPS

^ TRANSMISSION - MANUAL - GEAR CLASH AND HARD SHIFTING

^ SPEED CONTROL - INOPERATIVE - LOW CLUTCH PEDAL ALLOWS SWITCH CIRCUIT TO REMAIN OPEN

Article No. 87-16-15

LIGHT TRUCK: 1984-87 F-150/350 BRONCO

Article No. 86-20-10

DASH PANEL CRACKS AT CLUTCH MASTER CYLINDER (6.9L (D)/7.5L)

CLUTCH - HIGH EFFORT -- DASH PANEL CRACKING/MISSHAPED RELEASE LEVER (6.9L (D)/7.5L)

CLUTCH-INCOMPLETE RELEASE  
- DIAGNOSIS (6.9L (D)/7.5L)

LIGHT TRUCK 1983-86 F-250/350

Article No. 85-5-24

CLUTCH - (HYDRAULIC) - SLOW/DELAYED RETURN - COLD WEATHER (TSB 85-1-20 PART CORRECTION)

LIGHT TRUCK 1983-84 F SERIES

Article No. 84-1-14

CLUTCH - SLIPS - (6.9L-7.5L)

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 83-23-16

CLUTCH HYDRAULIC - SLAVE CYLINDER ATTACHMENT - (6.9L DIESEL/7.5L)

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 83-24-22

TRANSMISSION - MANUAL (T-19)

- HARD SHIFT - UNITS WITH 6.9L DIESEL

LIGHT TRUCKS 1983 F-250 HD/F-350

Article No. 85-5-26

CLUTCH - HYDRAULIC SYSTEM DIAGNOSIS (F SERIES) & PARTS LISTS (ALL MODELS)

LIGHT TRUCK 1983-85 E, F, B, R, B II

Technical Service Bulletin # **90167**

Date: **900801**

## M/T - Clutch Fluid Leaks/Incomplete Release

Article No. 90-16-7

^ CRACKS - DASH (ENGINE COMPARTMENT BULKHEAD) - CLUTCH MASTER CYLINDER AREA - VEHICLES BUILT BEFORE 6/15/90

^ CLUTCH - HIGH EFFORT - DASH CRACKED IN CLUTCH MASTER CYLINDER AREA - VEHICLES BUILT BEFORE 6/15/90

LIGHT TRUCK: 1984-90 BRONCO, F-150, F-250, F-350 1988-90 F SUPER DUTY

PART NUMBER	PART NAME	CLASS
E3TZ-7K509-A	Small Reinforcement Kit (1983-87)	B
E8TZ-7K509-A	Small Reinforcement Kit (1988-91)	B
E3TZ-7K509-B	Large Reinforcement Kit (1983-1991 Severely Damaged Units)	B

**ISSUE:** Incomplete clutch release and/or hydraulic fluid leaking into the cab from the clutch master cylinder may be caused by the reinforcement plate on the clutch master cylinder separating from the dash panel. The separation of the reinforcement plate reduces the clutch master cylinder pushrod travel. Reinforcement plate separation can also cause deflection of the clutch master cylinder that results in a misalignment of the pushrod to the clutch master cylinder. Misalignment causes the "O" ring in front of the secondary seal to leak hydraulic fluid.

**ACTION:** Inspect the truck and, if necessary, use the following service procedure to install a reinforcement kit.

### Inspection Procedure

1. If the truck is a 1988 or later model, confirm that the starter interlock switch operates (the engine can be started) with the clutch pedal at least 0.5" (12.7 mm) from the floor.
2. Test drive the truck and check for good clutch release. There should be no grinding of the gears, particularly when shifting from neutral to reverse gear.
3. If the truck passes these tests, go to the Small Reinforcement Installation Procedure Section of this article.

4. If either of the above conditions are not met, check the hydraulic system for air. Refer to the Suggested Bleeding Procedure at the end of this article.
5. Test drive the truck and check for improved clutch release.
6. If there is no improvement, proceed as follows:
  - a. Remove the clutch master cylinder pushrod from the release lever pin on the release lever.

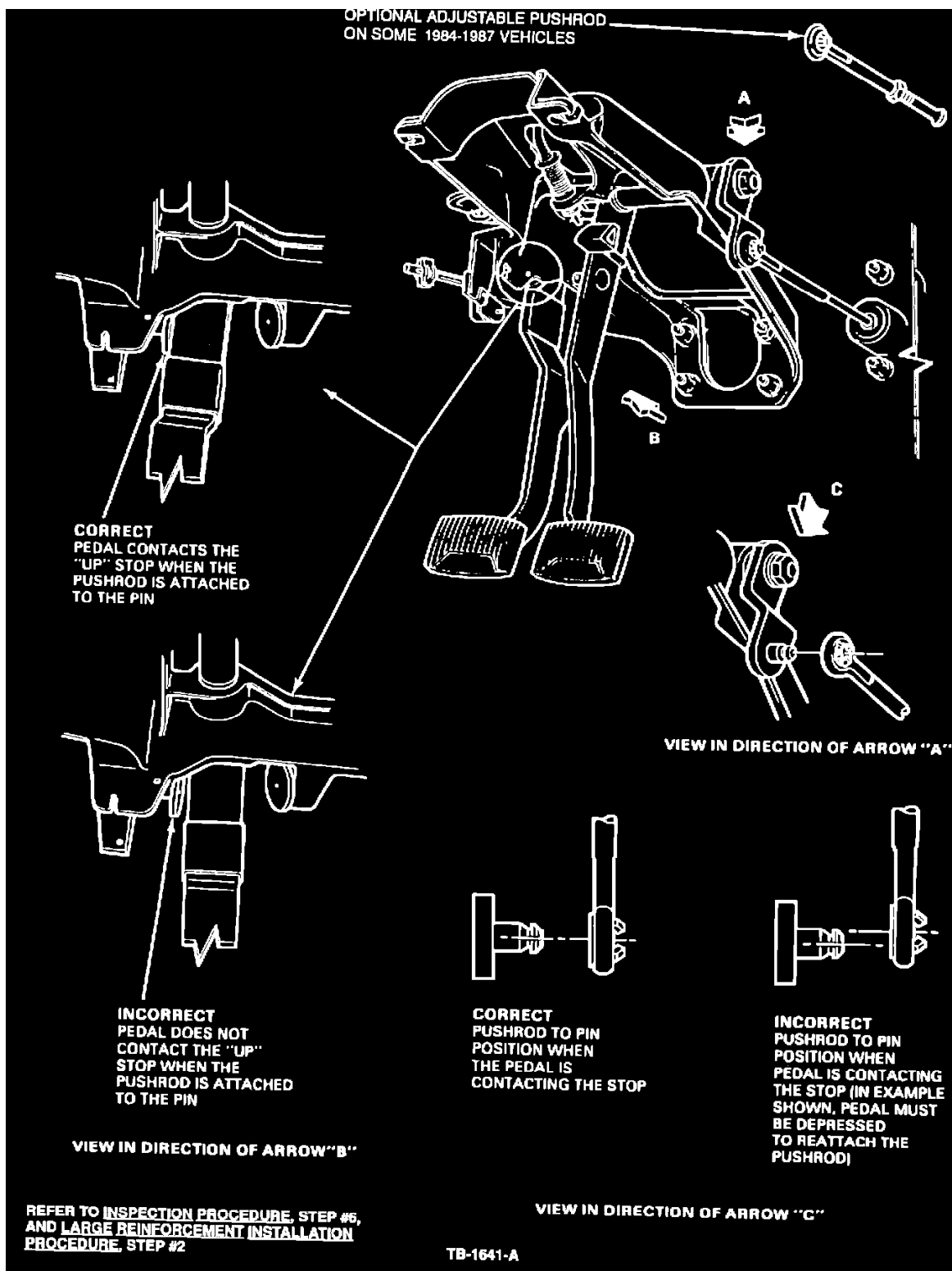


Figure 1

- b. Make sure the hole in the pushrod lines up with the pin, for those units requiring a minimal force for installation, Figure 1.

- c. If it does not line up correctly, install an adjustable pushrod (except 1988 and later models) or replace the clutch release lever (required on 1988 and later models), cutting a new seat on the cross shaft splines.

7. Test drive the truck again, checking for improved clutch release.

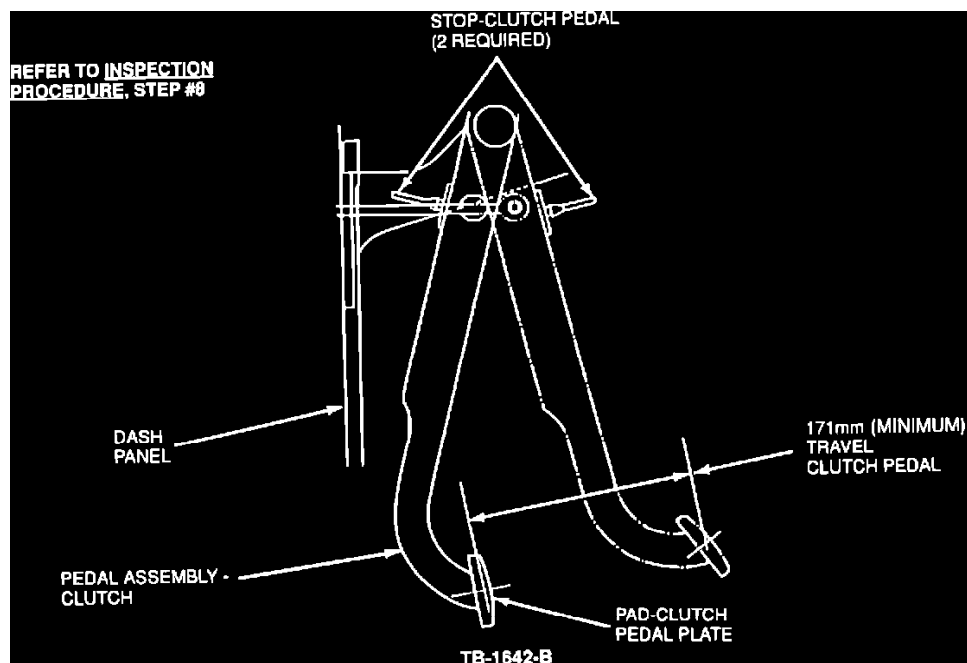


Figure 2

8. If there is no improvement, inspect the truck for adequate release bearing travel.

^ It should be 11 mm or greater for full pedal travel.

^ Pedal travel at the center of the pedal pad should be 6.75" (171 mm minimum) or more, Figure 2.

9. Release bearing travel and gear grinding noise may indicate the following concerns.

^ If the release bearing is 11 mm or greater and there is grinding of one or two gears only, the concern is probably with the transmission.

^ If all gears grind, the concern may be with the clutch and/or pilot bearing which will need replacing.

^ If the release travel is less than 11 mm, check the clutch hydraulic system for air and bleed as necessary.

10. If the release travel is still less than 11 mm, with all of the above items eliminated, proceed as follows:

a. Raise the hood, while an assistant operates the clutch pedal.

b. Watch the clutch master cylinder for significant deflection.

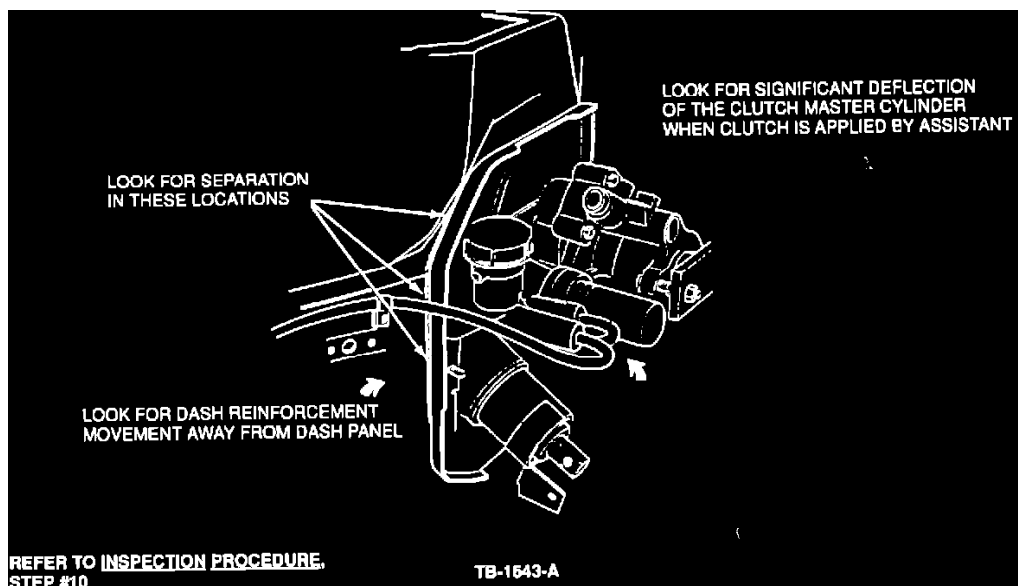


Figure 3

- c. Look for the dash reinforcement moving away from the dash, Figure 3.
  - d. On 1987 and earlier models, look down inside the cowl cover at the cowl where it is attached to the dash reinforcement. Check for pulled spot welds.
11. If there is significant movement of the dash or clutch master cylinder, proceed as follows:
- a. Remove the steering column and its dash toe plate and seal. Refer to the appropriate Light Truck Shop Manual, Section 13-07 for service details.
  - b. Inspect the dash inside the cab and look for:
    - ^ Pulled spotwelds and cracked or torn sheet metal.
    - ^ Cracks in the brake and clutch pedal support

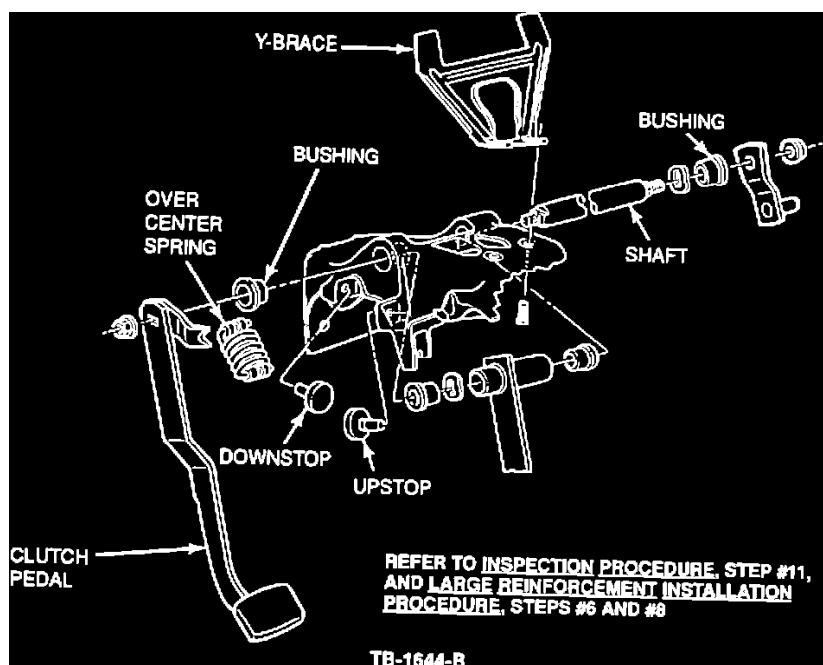


Figure 4

- ^ Missing Y-brace fasteners and a broken or detached Y-brace, Figure 4.

12. Check the cross shaft bushings for wear if the brake pedal moves when the clutch is depressed and vice versa. Replace them as required.

NOTE: GENERALLY, TRUCKS WITH SIGNIFICANTLY LESS THAN 11 MM CLUTCH RELEASE BEARING TRAVEL (AFTER COMPLETING THE INSPECTION PROCEDURE AND CORRECTING WHERE NECESSARY) WILL HAVE SIGNIFICANT DASH DAMAGE FROM PULLED SPOTWELDS AND TORN METAL. THESE TRUCKS WILL REQUIRE EXTENSIVE REPAIR. THEREFORE, GO TO THE LARGE REINFORCEMENT INSTALLATION PROCEDURE.

## Small Reinforcement Installation Procedure

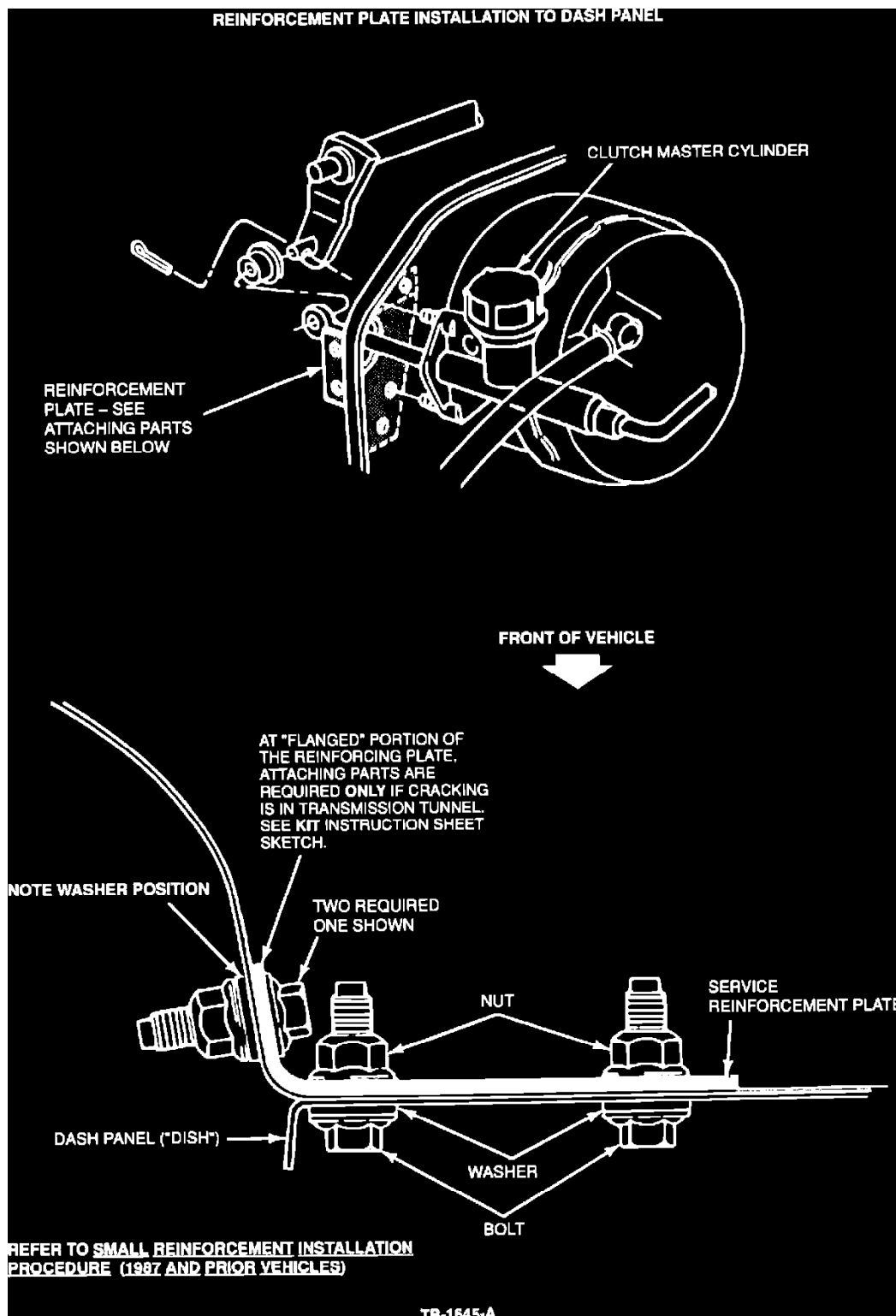
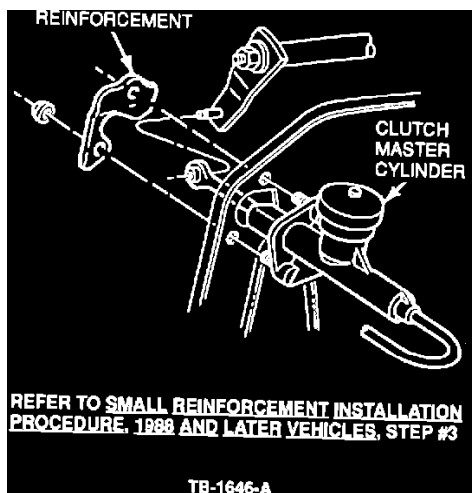


Figure 5



**Figure 6**

There are two small reinforcement kits. One for 1988 and later models and one for 1987 and prior models. This is necessary because a new hydraulic clutch master cylinder mounting pattern was introduced for 1988 models.

#### 1987 And Prior Trucks

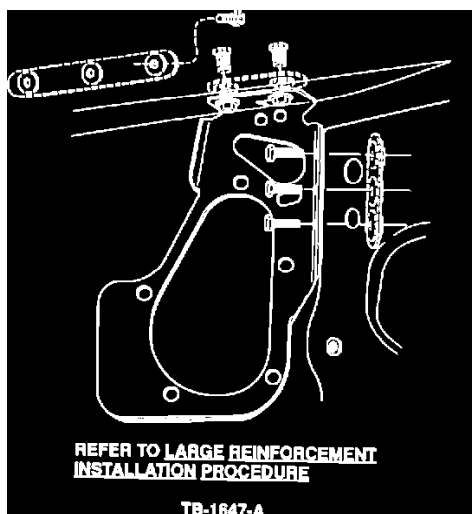
Use reinforcement kit E3TZ-7K509-A on these trucks, Figure 5. Comprehensive installation instructions are included in this kit.

#### 1988 And Later Trucks

Use reinforcement kit E8TZ-7K509-A on these trucks. The only part in this kit is the special reinforcement for these trucks. To install it, proceed as follows:

1. Remove the two clutch master cylinder attaching nuts (13 mm) from inside the truck.
2. Position the reinforcement in place over the clutch master cylinder studs.
3. Re-install the two master cylinder nuts, Figure
6. Tighten to 9.5 - 14.9 N-m.

## Large Reinforcement Installation Procedure



**Figure 7**

Use reinforcement kit E3TZ-7K509-B on all 1983-1991 Bronco/F-Series trucks with hydraulic clutch controls. The kit consists of the following items:

- ^ A main reinforcement or doubler, with a plate having two studs to clamp the doubler through the cowl inner
- ^ Two additional pieces with three threaded holes:

One plate helps attach the main doubler through the dash inner tunnel. The other large piece is placed inside the front of the cowl, with bolts driven through from the engine compartment side of the dash reinforcement, see Figure 7.

## Installation

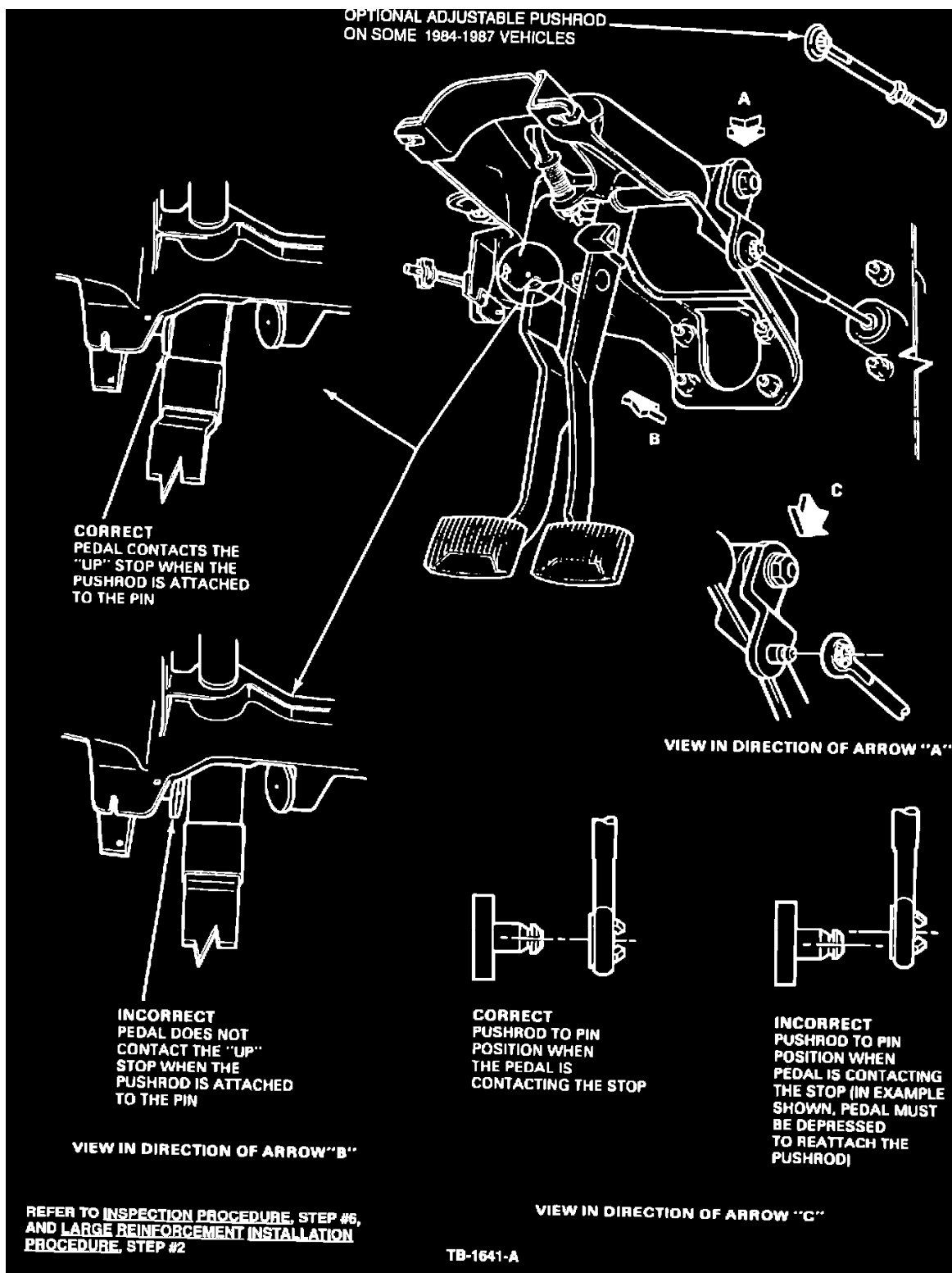


Figure 1

1. Remove the insulating material.
  - a. On earlier models, remove the instrument panel lower sound insulator assembly.
  - b. For later diesel powered trucks, remove the fasteners holding the engine compartment dash insulation in place.

- c. Pull the dash insulation back out of the way.
  - d. Disconnect the battery ground cable.
2. Disconnect the clutch master cylinder pushrod from the lever, removing the pushrod retention clip on older models, Figure 1.
  3. Remove the two nuts attaching the clutch master cylinder to the dash panel.
    - a. Pull the master cylinder into the engine compartment.
    - b. For, 1988 and later trucks, it will be necessary to disconnect the wiring harness connector from the pushrod switch.
    - c. Rotate the master cylinder to get it past the switch through the dash opening.
  4. Remove the steering column and dash toe plate by removing the five (5) fasteners.
  5. Disconnect the brake master cylinder pushrod from the brake pedal.
  6. On F-Super Duty, proceed to Step 7. On all units except F-Super Duty, proceed as follows:
    - a. Remove the four brake booster attaching nuts.
    - b. Move the brake booster to one side.

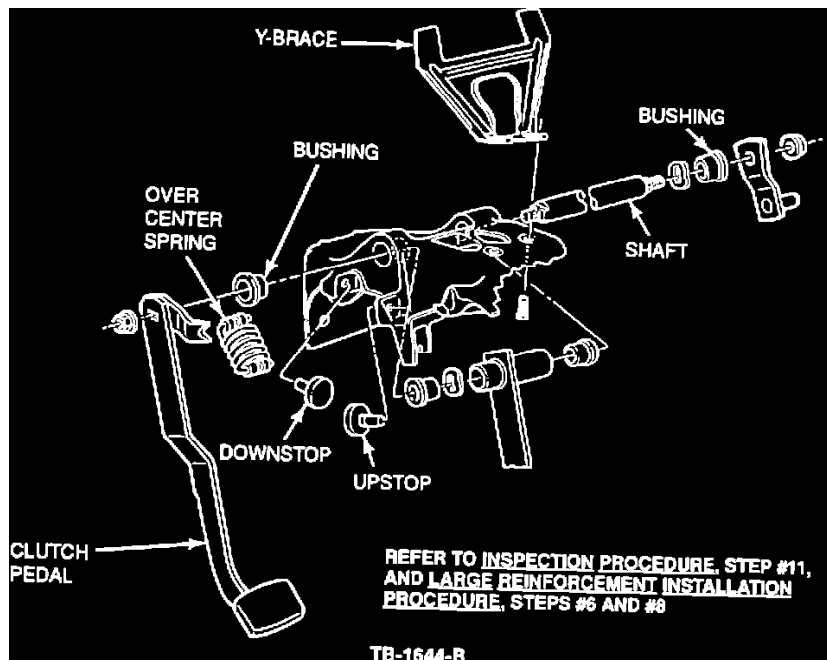


Figure 4

- c. Loosen the two (2) fasteners attaching the brake and clutch pedal support to the Y-brace, Figure 4.
7. Check for cracks.
    - a. Pull back the floor covering and dash sound insulator. (it may be helpful to remove the accelerator pedal.)
    - b. Inspect the area for pulled welds and torn dash sheet metal.

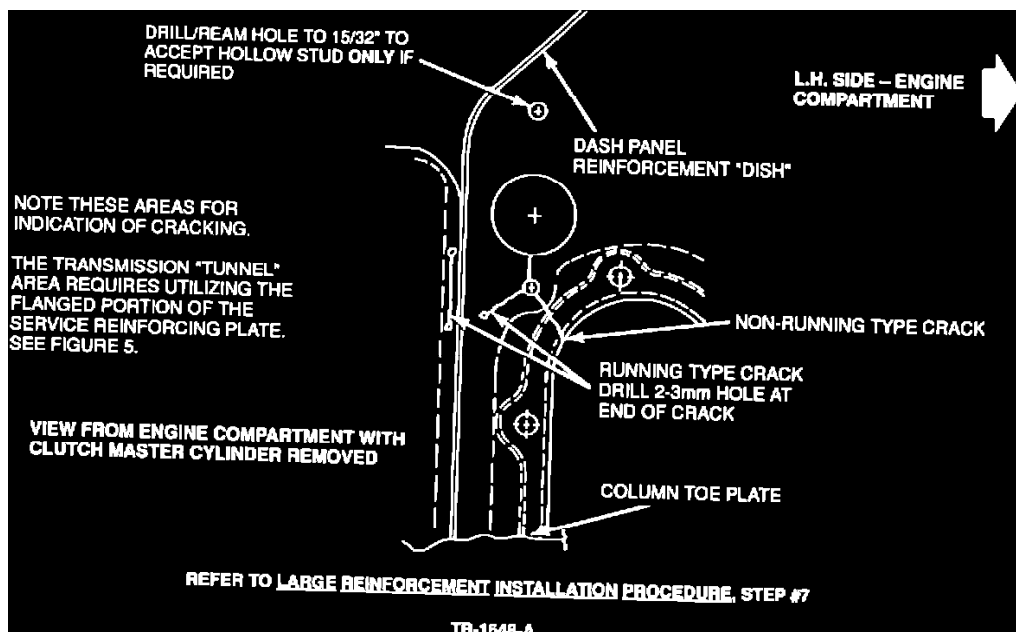


Figure 8

- c. If there are cracks that have not run out, stop them by drilling a 2-3 mm hole at the end, Figure 8.

NOTE: WELDING OR BRAZING IS NOT RECOMMENDED, BECAUSE IT COULD BE A SOURCE OF FUTURE BLIND SIDE CORROSION.

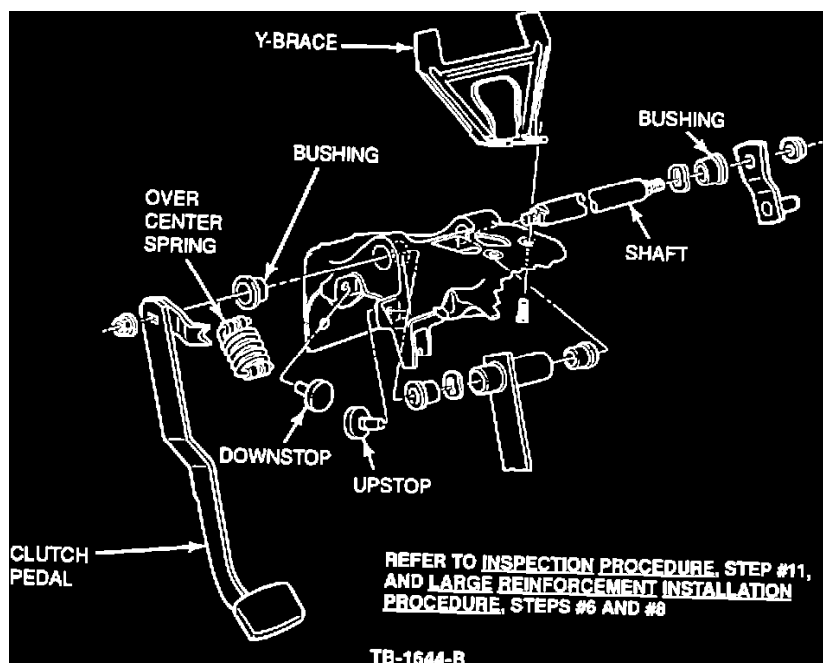


Figure 4

8. Thoroughly inspect the brake and clutch support again for cracks in the casting and worn bushings. Also, inspect the "Y" brace for cracks and missing fasteners. Replace as necessary, Figure 4.
9. Remove excess body sealer in the area of the clutch master cylinder, inside the dash.
10. Carefully remove the cowl top cover 12 fasteners (7 in front, 5 in rear).

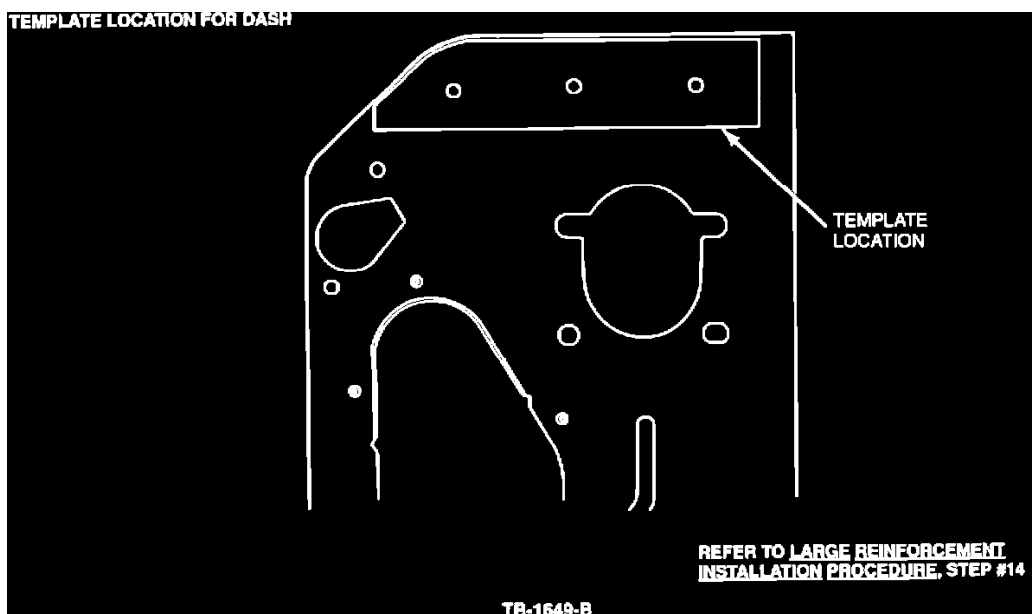
NOTE: IT MAY BE NECESSARY TO REMOVE THE RADIO ANTENNA AND REPOSITION THE HOOD TO ACHIEVE THIS. IF THE HOOD IS REMOVED, MARK THE LOCATION OF THE HINGES WITH A WAX PENCIL, PRIOR TO LOOSENING.

11. Place the main reinforcement in position.
  - a. Locate positively, using the lower steering column toe plate fastener and a bolt and nut (8 mm or 5/16") through the upper clutch master

cylinder stud hole.

**NOTE: THE SHEET METAL VARIES FROM TRUCK TO TRUCK AND IT MAY BE NECESSARY TO BEND THE REINFORCEMENT TO GET A GOOD FIT.**

- b. Tighten the upper nut and bolt securely to compress any distortion in the four sheet metal laminations in this area.
12. Drill the holes for the reinforcement plate.
  - a. Using a 3/8" (9.5 mm) drill bit, with the reinforcement as a template, drill two holes up into the cowl inner and three holes into the inner side of the dash.
  - b. De-burr the outside of the holes as necessary.
  - c. Remove any excess sealant in the area and clean up the drill chips inside the truck and cowl.
13. Attach the smaller plate via the three threaded holes into the engine compartment side of the dash inner panel.
  - a. Use three 8 mm bolts passed through the main reinforcement, from inside the cab.
  - b. Install the rubber cap (N804118) onto the end of the uppermost screw from under the dash.
  - c. Position the plate with the two studs attached inside the cowl, through the two holes drilled from below.
  - d. Attach two 8 mm nuts from the inside of the cab.
14. Using the paper template provided in the kit, proceed as follows:



**Figure 9**

- a. Center punch and drill three 3/8" (9.5 mm) holes into the dash reinforcement and through the cowl, from the engine compartment side, Figure 9.

**NOTE: DRILLING WILL BE EASIER IF THERE ARE NO SPOTWELDS VISIBLE THROUGH THE THREE HOLES.**

- b. If necessary, move the pattern outboard slightly to avoid any visible spotwelds.
- c. De-burr the holes inside the cowl as necessary and clean up the drill chips inside the cowl.

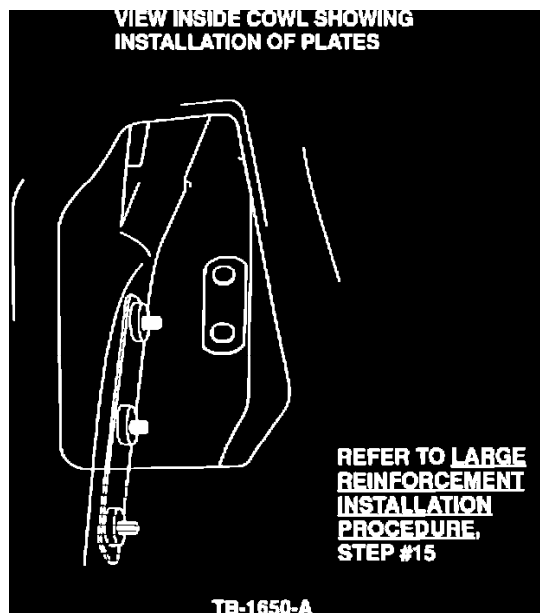


Figure 10

15. Place the larger three holed plate from the kit inside the cowl. Attach it with three 8 mm bolts through the dash reinforcement, from the engine compartment side, Figure 10.
16. Inspect the seam between the cowl inner and outer, inside the cowl, for cracks in the sealant. If necessary, add sealant.
17. Replace the cowl top.
  - a. If the hood was removed, locate the hinges to the wax pencil marks and tighten the fasteners.
  - b. Replace the radio antenna and windshield washer tube.
18. Re-install the brake booster and stoplight switch, if removed. Tighten the brace bolts.
19. Install the clutch master cylinder.
  - a. Inspect the clutch master cylinder for leaks in the area of the pushrod. Replace it if there is evidence of leaking.
  - b. Remove the nut and bolt from the top of the reinforcement.
  - c. Install the clutch master cylinder.
  - d. Inspect the position of the clutch master cylinder pushrod hole. The pushrod hole should go onto the lever pin with no force required while the pedal is against the upstop.

NOTE: ALTHOUGH THIS WAS SPECIFIED IN THE INSPECTION PROCEDURE, REPAIR MAY HAVE CHANGED THE SETTING.

- e. If the pushrod hole is not in position, install and adjust an adjustable clutch master cylinder pushrod (1987 and prior models) or install a new lever (7A554).

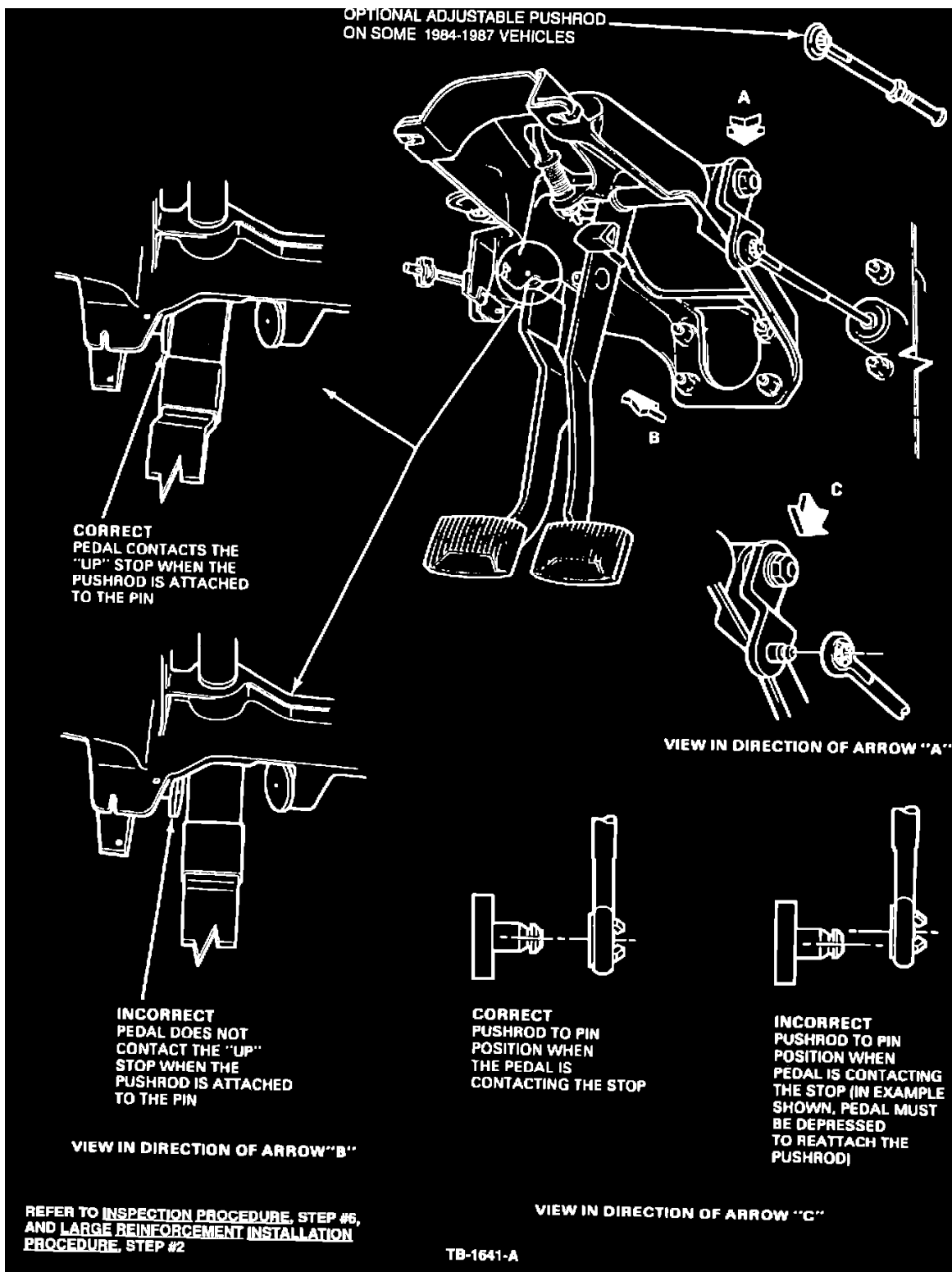


Figure 1

**NOTE:** THE NEW LEVER IS TIGHTENED INTO PLACE WHILE THE MASTER CYLINDER PUSHROD IS ATTACHED, TO SET THE CORRECT POSITION, FIGURE 1.

20. Remove the toe plate fastener from the bottom of the reinforcement and reinstall the steering column and five (5) fasteners.
21. Complete reassembly.
  - a. Re-install the dash sound deadener material and the instrument panel sound insulator.
  - b. Re-install the engine compartment sound insulator on diesel models.

- c. Connect the battery ground terminal.

## Final Inspection

If the truck has been driven for a long period of time with the broken dash and resulting poor clutch release, the clutch disc could be excessively worn or buckled.

Test drive the truck, evaluating the clutch for clean release. If the release is not satisfactory, measure the release bearing travel.

^ If it has the required 12 mm at full clutch pedal stroke, then the clutch may need to be replaced.

^ If the release bearing has less than the required release travel, then the hydraulic system probably needs to be bled.

## Suggested Bleeding Procedure - External Slave Cylinder

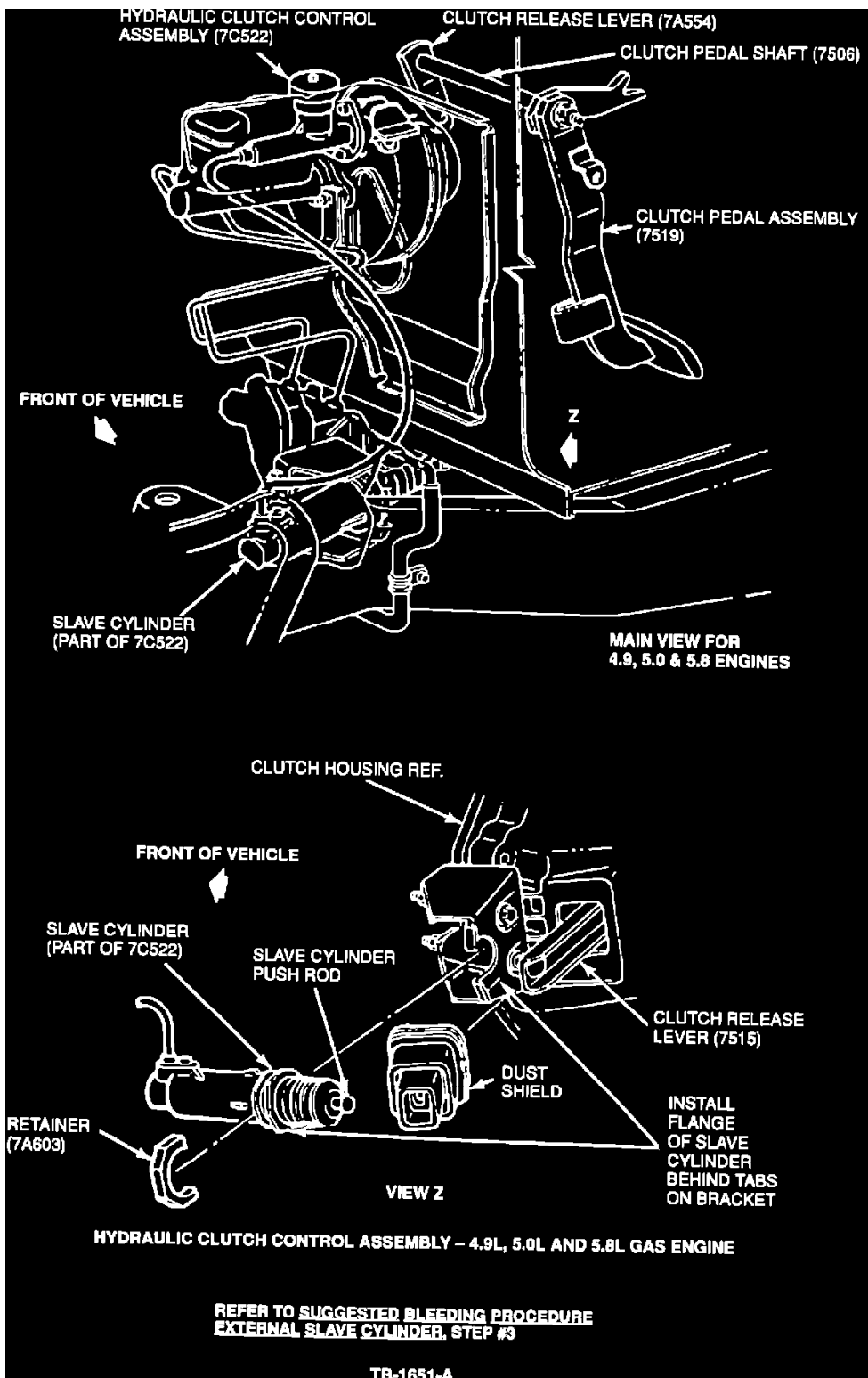


Figure 11

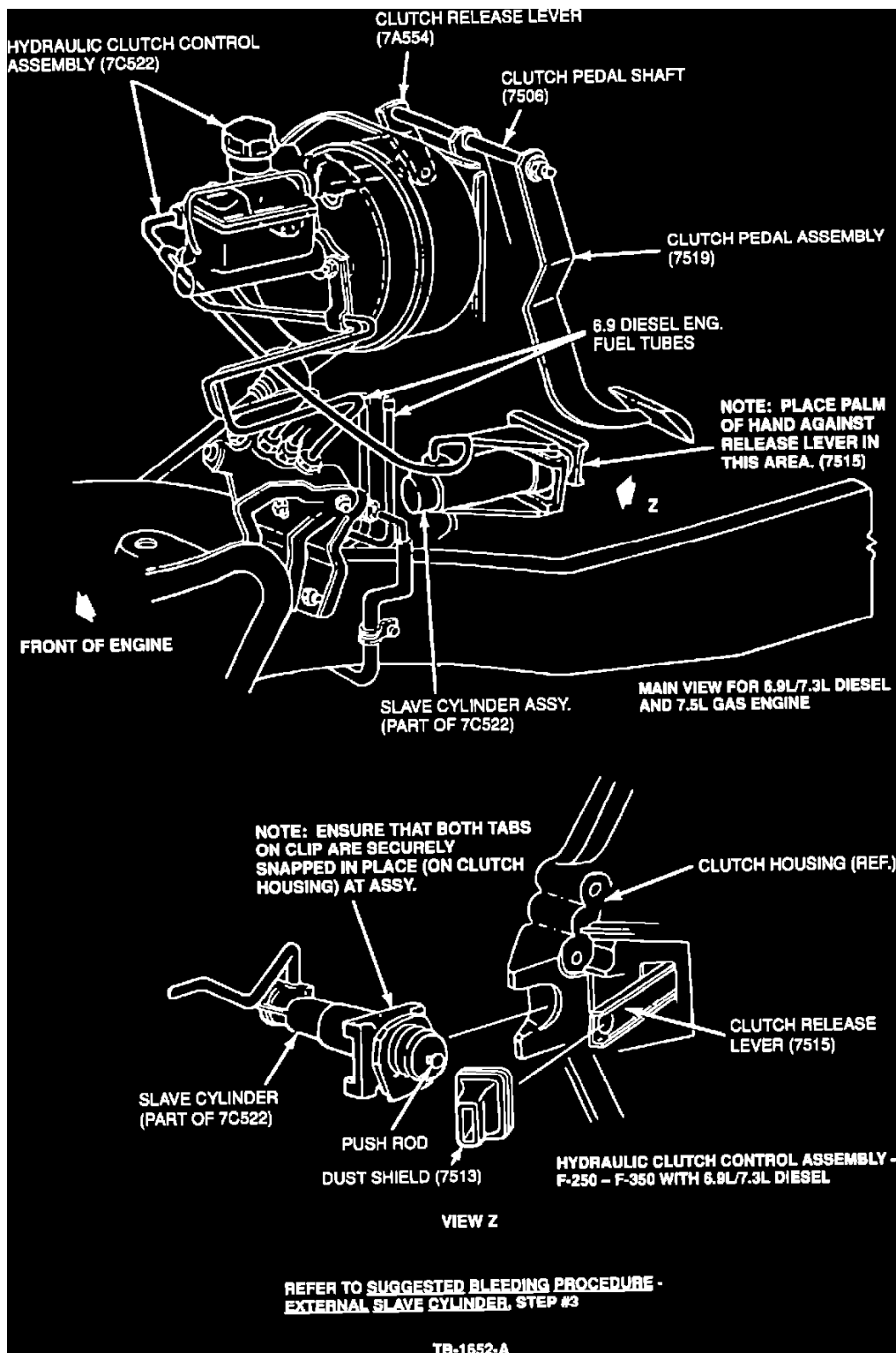


Figure 12

If the truck is a 1987 or prior model, 1988 model with a 7.3L Diesel, 7.5L EFI gas engine or the smaller family of engines with a Warner T-18 four speed transmission, proceed as follows:

1. Remove the master cylinder reservoir cap and diaphragm.
2. Check the fluid level to be sure it is at the step diameter of the reservoir. Do not over fill.
3. From below the truck, push the release lever slowly towards the front of the truck several times. Figures 11 & 12.
4. If it will not move, the master cylinder pushrod is not set correctly. See repair Step # 19.
5. Check the fluid level and replace the diaphragm and cap.

## Suggested Bleeding Proc - Internal Concentric Slave CYL.

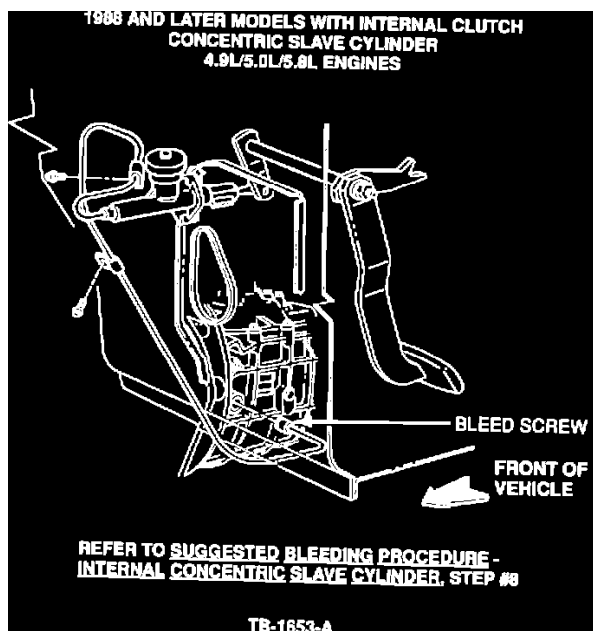


Figure 13

If the truck has a concentric slave cylinder, proceed as follows:

1. Operate the clutch pedal at full stroke, 10-20 times.
2. Check the fluid level at the change in diameter part of the reservoir. Do not over fill.
3. Have an assistant depress the clutch pedal slowly and hold it down.
4. Open the slave cylinder bleed screw and watch for escaping air, Figure 13.
5. Close the bleed screw and have the assistant release pedal.
6. Repeat this cycle several times until there is no sign of air. Be sure to keep the reservoir topped to the correct level.
7. Replace the diaphragm and reservoir cover.
8. Operate the clutch pedal at full stroke 10-20 times.

### Misc. Information

OTHER APPLICABLE ARTICLES: 86-20-10

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
901607A	Inspect & Adjust	0.5 Hr.
901607B	Install Reinforcement	2.9 Hr.

DEALER CODING

BASIC PART NO.    CONDITION CODE  
7050                    50

OASIS CODES: 111000, 505000, 505200, 506000, 590000

Technical Service Bulletin # **911814**

Date: **910905**

### M/T Clutch Housing - Fluid Inside

Article No. 91-18-14

09/05/91

- ^ CLUTCH-SLAVE CYLINDER "LEAKS"- VEHICLES USED IN MUDDY OR DUSTY ENVIRONMENTS

^ LEAKS-CLUTCH SLAVE CYLINDER "LEAKS"- VEHICLES USED IN MUDDY OR DUSTY ENVIRONMENTS

LIGHT TRUCK: 1988-89 ECONOLINE  
1988-91 AEROSTAR, BRONCO, F-150-350 SERIES, RANGER  
1989-90 BRONCO II  
1991 EXPLORER

ISSUE: Fluid detected inside the clutch housing may be caused by a leaking clutch slave cylinder. This may occur when vehicles are driven in severely muddy or dusty environments or when operated with extensive idle time. Vehicles include...

^ 1988-1991 Ranger, 1988-1990 Bronco II,  
1988-1991 Aerostar and 1991 Explorer  
with manual transmissions.

^ 1988-1991 Bronco, F-150-350, and  
1988-1989 Econoline with 5-Speed  
Manual Transmissions, except 7.3L  
Diesel and 7.5L engines.

ACTION: Replace the clutch slave cylinder if inspection confirms the cylinder is leaking. The new clutch slave cylinder contains a guide seal which improves durability and resistance to dirt entry. Refer to the following procedures for service details.

INSPECTION PROCEDURE:

1. If the vehicle is a Bronco or F-150, the repair will only involve 5 speed manual transmissions. Other vehicles described include all manual transmissions.

This slave cylinder is the internal "Concentric" and not the external style. Inspect vehicle to visually verify the style of slave cylinder installed.

2. Determine if the slave cylinder is leaking by checking for a fluid trace inside the bottom of the clutch housing.

REPAIR PROCEDURE

1. Remove the clutch slave cylinder. Refer to the appropriate Light Truck Shop Manual for service details.
2. Replace the clutch slave cylinder with a new slave cylinder (FITZ-7A564-A). Refer to the appropriate Light Truck Shop Manual for service details.

PART NUMBER	PART NAME	CLASS
FITZ-7A564-A	Slave Cylinder	B

NOTE: APPROPRIATE SUPPLEMENT OPERATIONS SHOULD BE USED WITH THE LABOR OPERATIONS LISTED.

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911814A	Inspect For Fluid Leak - All Vehicles	0.3 Hr.
911814B	Replace Clutch Slave Cylinder - Ranger 4X2 With 2.3L	1.8 Hr.
911814C	Replace Clutch Slave Cylinder - Ranger 4X4 With 2.3L And F-Series 4X2 With 5.8L	3.2 Hr.
911814D	Replace Clutch Slave Cylinder - Ranger 4X2 With 2.9L Or 3.0L And Aerostar With 3.0L	2.0 Hr.

911814E	Replace Clutch Slave Cylinder - Bronco II With 2.9L	2.6 Hr.
911814F	Replace Clutch Slave Cylinder - Ranger 4X4 And Bronco II 4X4 With 2.9L And F-Series 4X4 And Bronco With 5.0L	3.5 Hr.
911814G	Replace Clutch Slave Cylinder - Ranger 4X2 And Explorer 4X2 With 4.0L	2.9 Hr.
911814H	Replace Clutch Slave Cylinder - Ranger 4X4 And	3.7 Hr.
911814I	Replace Clutch Slave Cylinder - F-Series 4X2 With 4.9L And Mazda Transmission	2.1 Hr.
911814J	Replace Clutch Slave Cylinder - F-Series 4X2 With 5.0L	2.3 Hr.
911814K	Replace Clutch Slave Cylinder - F-Series 4X4 And Bronco With 4.9L And Mazda Transmission	3.3 Hr.
911814L	Replace Clutch Slave Cylinder - F-Series 4X2 With 4.9L And ZF Transmission	3.1 Hr.
911814M	Replace Clutch Slave Cylinder - F-Series 4X4 With 4.9L And ZF Transmission	4.1 Hr.
911814N	Replace Clutch Slave Cylinder - F-Series 4X4 With 5.8L	4.3 Hr.
911814O	Replace Clutch Slave Cylinder - Econoline	2.8 Hr.

## DEALER CODING

BASIC PART NO.	CONDITION CODE
7A564	77

OASIS CODES: 505000

Technical Service Bulletin # **88816041588**Date: **880401****Full Float Hub - Manual Correction**

AXLE - FORD 10.25" FULL FLOAT DESIGN - HUB REMOVAL AND INSTALLATION PROCEDURE - SHOP MANUAL CORRECTION

Article No. 88-8-16

LIGHT TRUCK: 1988 F-250/350

ISSUE: The hub removal and installation procedure as published in the 1988 Light Truck Shop Manual, Volume A, Section 15-09-16 is incorrect. The notes and specifications in the illustration on top of the page have been changed.

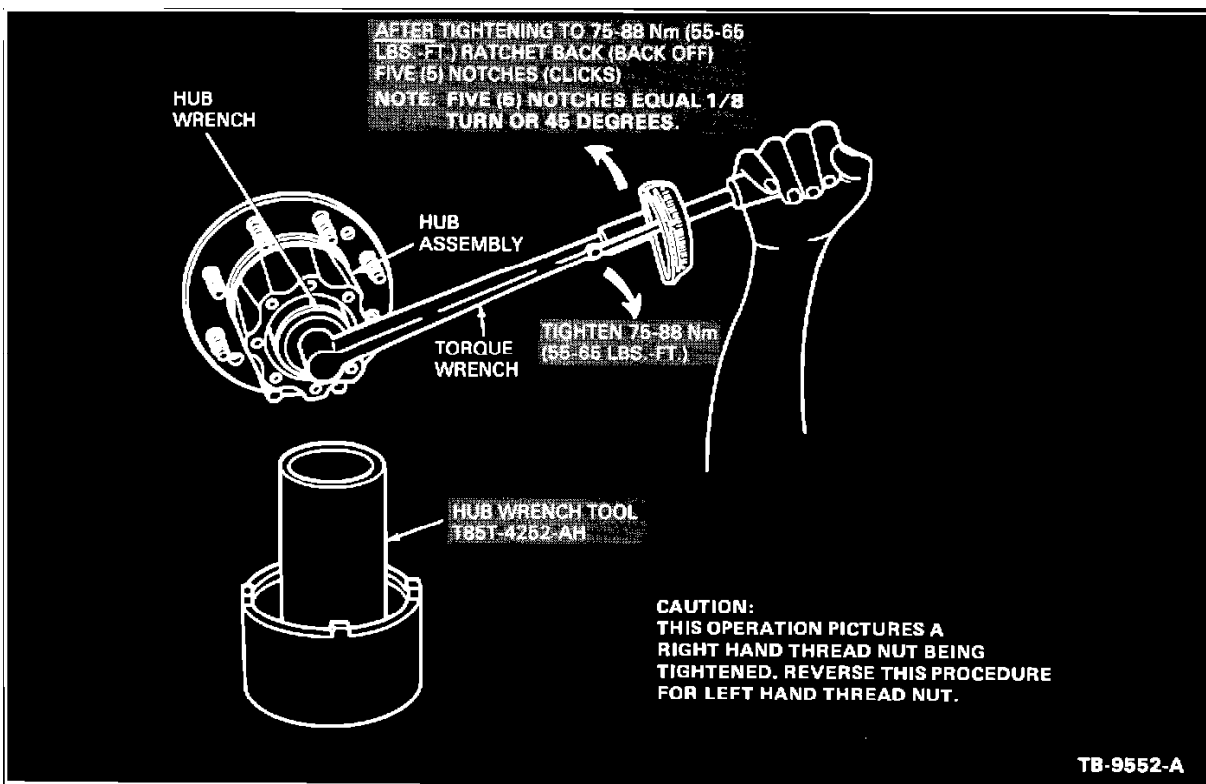


FIGURE 13

**ACTION:** If service is required, refer to the corrected illustration in this TSB article, Figure 13. This information should be inserted in your 1988 Light Truck Shop Manual, Volume A, Section 15-09-16.

**OTHER APPLICABLE ARTICLES:** None

**WARRANTY STATUS:** "INFORMATION ONLY"

**Technical Service Bulletin # 881312**

Date: 880622

## M/T - Pocket Bearing Inspection

**TRANSMISSION - ZF MODEL S5-42 - POCKET BEARING INSPECTION PROCEDURE - SHOP MANUAL REVISION**

Article No. 88-13-12

**LIGHT TRUCK:** 1987 BRONCO 1987-88 F SERIES

**ISSUE:** The pocket bearing (tapered roller bearing between the input shaft and main shaft) may be damaged from insufficient lubrication at initial start-up during engine idle. Inspection of failed components has revealed that in some cases the oil baffle was either missing or improperly positioned.

**ACTION:** If service is required and the transmission is opened up, use the following pocket bearing lubrication inspection procedure.

1. Make sure the oil baffle is installed in the input shaft synchronizer cone recess. Refer to the 1988 Light Truck Shop Manual, Volume A, Section 16-34-8, Item 36.
2. Inspect the oil baffle for tears or damage.

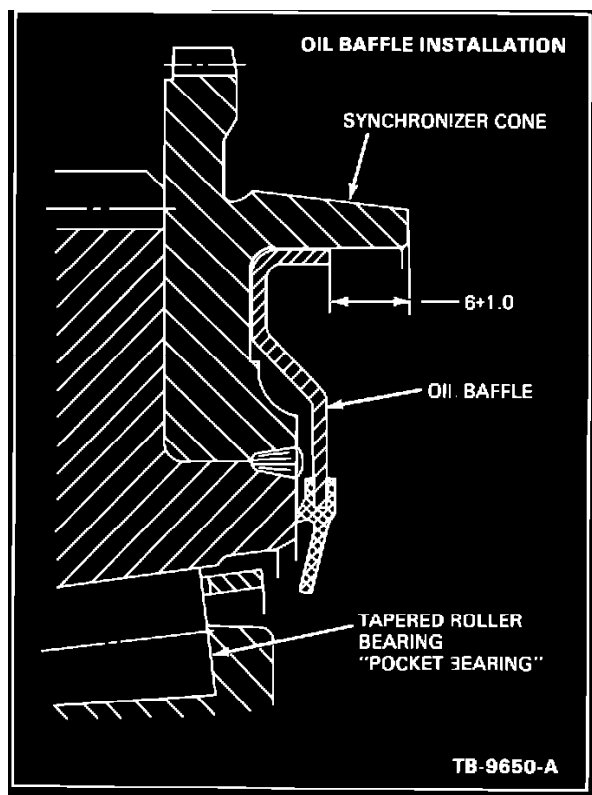


FIGURE 17

3. Be sure the oil baffle lip is recessed 0.24" (6 mm) below the synchronizer cone edge, Figure 17.
4. Make sure the oil baffle fits tightly and cannot be moved by hand.
5. Check to see that the three (3) lubrication holes in the input shaft are free of any obstructions.
6. Make sure the oil channel (in the main case) to the input shaft bearing is free of any obstruction.
7. Make sure the oil retainer ring behind the outer race of the input bearing is free of damage.
8. Check to see that the synchronizer body snap ring forward of the 3/4 synchronizer package on the main shaft is in position.

NOTE: THE INPUT SHAFT AND BAFFLE IS SERVICED AS AN ASSEMBLY.

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: "INFORMATION ONLY"

Technical Service Bulletin # **92514**

Date: **920226**

## Front Drive Axle - Identification Tags

Article No.

92-5-14

February 26, 1992

AXLE - FRONT DRIVE AXLE IDENTIFICATION TAGS - 4X4  
MODELS

LIGHT TRUCK: 1985-90 BRONCO II  
1985-92 BRONCO, F-150-350 SERIES, RANGER  
1991-92 EXPLORER

ISSUE: The 1991 and prior model front drive axles had identification information in the following three (3) places...

- ^ It was on a metal tag attached to a carrier cover mounting bolt.
- ^ It was stamped into the left side axle arm (tube) front face inboard of the U-Joint.

^ It was on a paper tape tag wrapped around the axle arm (tube).

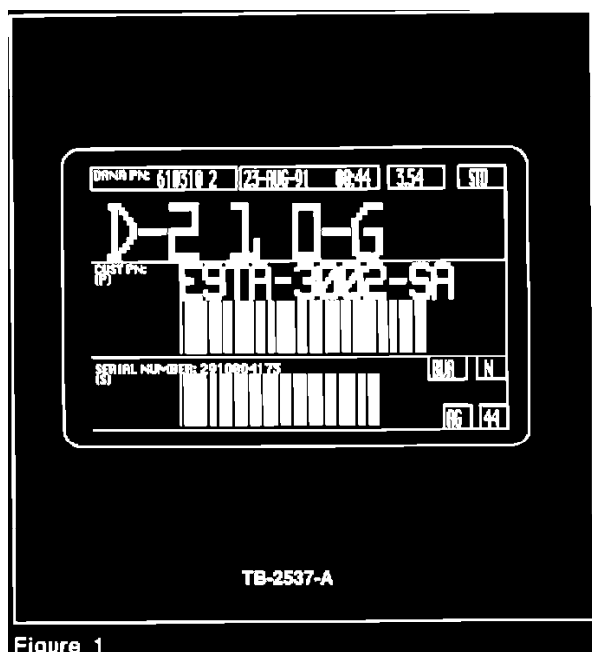


Figure 1

The 1992 model year axles use a glue-on label that replaces all three of the prior identification markings, Figure 1. The new label is on the rear face of the right hand arm (tube).

**ACTION:** Since this glue-on label, Figure 1, is the only identification, be sure that the information on the label is recorded in a retrievable place before any service actions are taken which will damage/destroy or remove the label.

**OTHER APPLICABLE ARTICLES:** NONE

**WARRANTY STATUS:** INFORMATION ONLY

**OASIS CODES:** 509000

Technical Service Bulletin # **88817041588**

Date: **880401**

## Front Drive Axle Hublock - Inoperative

AXLE - FRONT DRIVE - WARN MANUAL HUBLOCKS INOPERATIVE

Article No. 88-8-17

LIGHT TRUCK:

**ISSUE:** Inoperative front drive axle hublocks on 1987 and 1988 F-150 and Bronco vehicles may be caused by the control dial getting too hot and distorting. The hublock body is made of aluminum which transfers heat rapidly from the brake rotor to the hublock assembly. Under certain braking conditions such as brake dragging or downhill trailer towing control dial distortion may occur. Vehicles operated under these or similar conditions may not experience hublock control dial distortion but may be too hot for customers to engage or disengage the locking hub feature.

**ACTION:** To correct this, install a new hublock service kit that will not allow heat transfer to the control dial. Refer to the 1987/88 Light Truck Shop Manual, Volume A, Section 11-12-2 for removal of the existing hublocks. Use the 1986 Light Truck Shop Manual to install the new hublock kit, (E7TZ-1L104-A).

PART NUMBER	PART NAME	CLASS
E7TZ-1L104-A	Hublock Kit - One (1) Required	CG

**OTHER APPLICABLE ARTICLES:** None

**WARRANTY STATUS:** Eligible Under Basic Warranty Coverage

**OPERATION:** 880817A - Both hubs

**TIME:** 1.8 Hrs.

DLR. CODING: Basic Part No. 1K105  
Condition Code: 42

Technical Service Bulletin # **932318**

Date: **931110**

## **A/T - AOD Diagnostic Information**

Article No.  
93-23-18

11/10/93

TRANSMISSION - AOD - NO 3-4 UPSHIFT OR SLIPPING 4TH GEAR - DIAGNOSTIC INFORMATION

FORD:  
1980-86 LTD  
1980-92 CROWN VICTORIA  
1980-93 MUSTANG, THUNDERBIRD

LINCOLN-MERCURY:  
1980-86 MARQUIS  
1980-87 CONTINENTAL  
1980-92 GRAND MARQUIS, TOWN CAR  
1980-93 COUGAR  
1984-92 MARK VII

LIGHT TRUCK:  
1980-93 BRONCO, ECONOLINE, F-150

This TSB article is being republished because of the occasional need for the information it contains. Originally published as TSB 83-13-10 in June of 1983, this article is not easily locatable in many dealerships today; the model application has been updated. Also, The Service Manual contains this information.

ISSUE:  
A no 3-4 upshift condition or a slipping 4th gear may result from

- ^ Direct clutch checkball leaking
- ^ Missing plug in end of output shaft
- ^ Case bore wear
- ^ Leakage at O/D band servo piston and/or case bore
- ^ Seal leakage at 3-4 accumulator piston
- ^ Blocked hydraulic circuit condition
- ^ Improper valve body attaching bolt torque
- ^ Leaking governor circuit
- ^ Torque converter damper/hub malfunction

ACTION:  
Road test, diagnose and repair the transmission as required. Refer to the following diagnostic and repair procedure for service details.

### PRELIMINARY CHECKS/INFORMATION

1. Road test the vehicle to verify the customer complaint. A no 3-4 upshift is characterized by staying in 3rd gear. A slipping 4th gear is characterized by engine cut-loose on 3-4 upshifts and limited or no 4th gear drive capability.
2. Check TV rod/cable to see if bent, kinked or sticking. Repair or replace rod/cable as required.
3. Check TV linkage (could be misadjusted long). On older models, bent, sticking or misadjusted TV Linkage will not properly synchronize with the carburetor/throttle body lever at the time a 3-4 upshift should occur.

GUIDE PRESSURE SPECIFICATIONS *		
GEAR RANGE	IDLE	W.O.T.
P,N,O/D,D,L	55-85 PSI	175-205 PSI
Reverse	75-95 PSI	250-300 PSI

\* Pressures are typical with TV pressure adjusted to specification per Service Manual (approx 32 psi using gauge block). Refer to applicable model-year **AUTOMATIC TRANSMISSION SPECIAL SPECIFICATIONS ISSUE** for exact specifications, if required.

4. Check control pressure and throttle pressure to identify that they are within specifications. Use the guide pressure specifications:

#### DIRECT CLUTCH PRESSURE TEST

Leakage in the direct clutch circuit is usually caused by a leaking checkball in the direct clutch piston. Replacement of the direct clutch piston will alleviate this condition. However, since other factors can be involved, the following additional checks/verifications will aid in making a comprehensive diagnosis of no 3-4 upshift and/or no 4th gear symptoms.

The direct clutch pressure test outlined below will diagnose a low pressure condition or leakage in the direct clutch circuit. A difference of 15 psi or more between direct clutch pressure and line pressure (read at the forward clutch pressure tap) will prevent a 3-4 upshift.

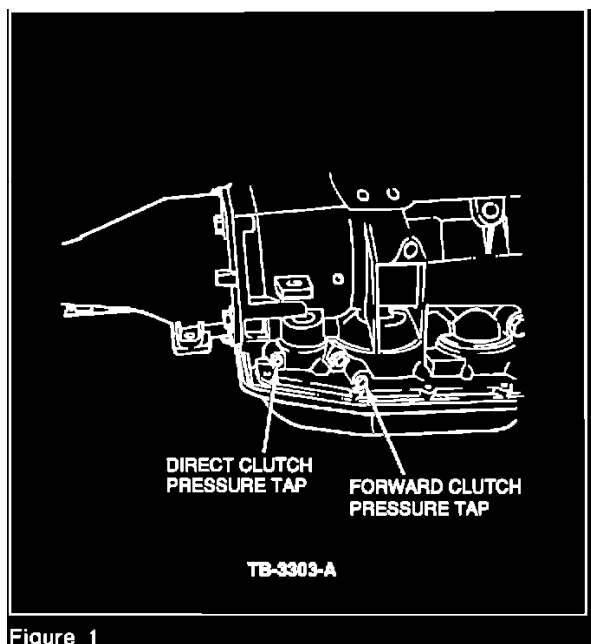


Figure 1

1. Attach 0-300 psi (0-2068 kPa) pressure gauges to the forward clutch and to the direct clutch pressure tap, Figure 1.
  - a. Gauge accuracy must be capable of distinguishing a 15 psi (110 kPa) difference (if this test is done in conjunction with a control pressure test, pressure gauges will be attached to all pressure taps).
  - b. Connect sufficient flexible hose to be able to read the gauges inside the vehicle.

#### CAUTION:

PRESSURE GAUGES AFFECT THE SHIFT QUALITY OF THE TRANSMISSION. DO NOT ACCELERATE OR DECELERATE RAPIDLY WHILE PRESSURE GAUGES ARE ATTACHED. TRANSMISSION FAILURE MAY RESULT.

2. Drive the vehicle. When pressure is applied to the direct clutch, note the difference between line pressure (read at the forward clutch pressure tap) and direct clutch pressure (read at the direct clutch pressure tap).
3. If the difference in pressure is less than 15 psi (110 kPa), the direct clutch circuit is OK.
4. If the difference is greater than 15 psi (110 kPa), there could be a leak in the direct clutch pressure circuit.
  - a. The gauges on the forward and direct clutch pressure taps can be switched to confirm that gauge calibration difference is not the cause.

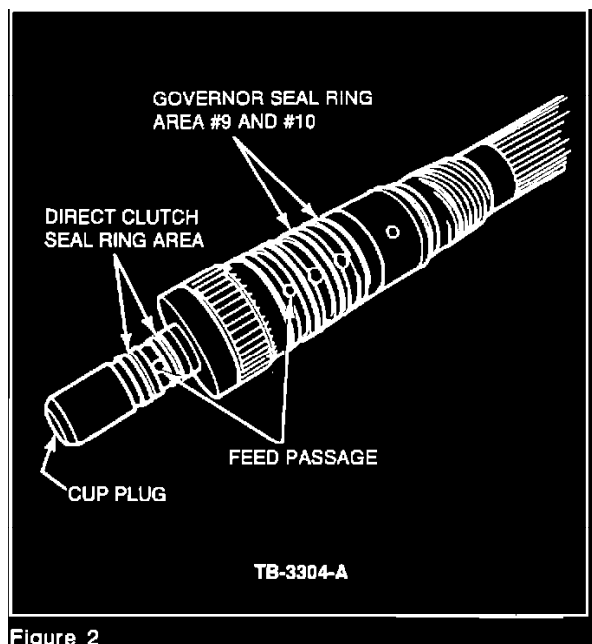
- b. If a 15+ psi (110 kPa) pressure differential can be confirmed, proceed to the "DIAGNOSTIC PROCEDURE NO. 1" (leakage indicated), or to "DIAGNOSTIC PROCEDURE NO. 2" (slips in 4th), if applicable.
- c. If a 15+ psi (110 kPa) pressure differential can not be confirmed, proceed to "DIAGNOSTIC PROCEDURE NO. 3" (no leakage indicated).

DIAGNOSTIC PROCEDURE NO. 1 - NO 3-4 UPSHIFT WITH DIRECT CLUTCH PRESSURE DIFFERENCE GREATER THAN 15 PSI (110 kPa)  
- (indicates leakage in direct clutch circuit)

**NOTE:**

BURNED DIRECT CLUTCH PLATES WILL HELP TO CONFIRM LEAKAGE IN THE DIRECT CLUTCH CIRCUIT. REPLACING ONLY THE PLATES AND NOT FINDING THE CAUSE COULD RESULT IN A REPEAT REPAIR.

1. Check valve body bolt torque. Correct torque is 9-11 N-m (80-97 lb.in.).
2. Remove the valve body and check to see if main control gasket is blocking an orifice.
3. Check valve body-to-case mating surfaces for nicks or porosity.
4. Check the direct clutch piston check ball for leakage (inspect check ball for freedom of movement). Improper seating of check ball will cause leakage:
  - a. Turn piston upside down (flat side of piston facing you) allowing the check ball to seat in the piston.
  - b. Pour a small quantity of solvent over the check ball. If solvent drops past the check ball, replace the piston.
5. Inspect the output shaft feed passages and the cup plug for leakage.



**Figure 2**

- a. Apply 5-10 psi (34-69 kPa) air to the output shaft feed passages, Figure 2.
  - b. If air comes out of the wrong feed passage, replace the output shaft.
6. Check the direct clutch seal rings (inner and outer) for leakage.
  7. Check all direct clutch output shaft seals for freedom of movement and for metal shavings and burrs between the seal and the output shaft, Figure 2

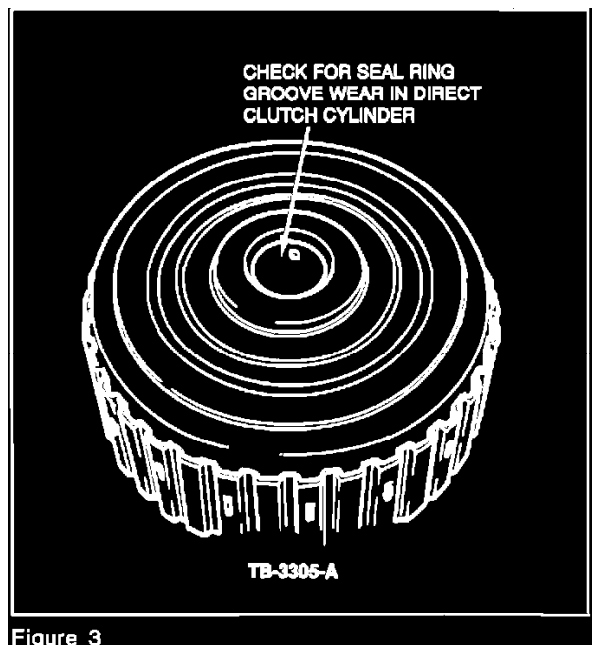


Figure 3

8. Check the direct clutch cylinder for groove marks on the inner ID of the drum, Figure 3.
  - a. Groove marks indicate that the small cast iron rings are turning with the output shaft and grooving the cylinder.
  - b. Groove marks may also be caused by contamination or burrs in the output shaft seal ring grooves, causing the seal rings to turn with the output shaft.
  - c. Check the seal ring grooves carefully. replace the output shaft, seal rings and/or cylinder as required, and/or replace the case if the output shaft seal bore is grooved.

#### DIAGNOSTIC PROCEDURE NO. 2 - SLIPPING IN - 4TH GEAR

##### NOTE:

A burnt overdrive band will help to confirm leakage in the overdrive circuit. Replacing only the overdrive band without finding the cause will result in a repeat repair. If the overdrive band is not burnt, the torque converter damper/hub weld may be suspect.

1. Check the overdrive servo cover O-rings and servo piston seal for possible leakage. Replace the O-rings and seal if leakage is evident.
2. Make sure that the overdrive servo cover is not porous:
  - a. Coat cover with fluid.
  - b. Apply air to overdrive servo apply passage using Servo Piston Remover T80L-77030-B or Transmission Test Plate T82L-7006-A.
  - c. Observe to see if air bubbles are present on overdrive servo cover.
3. Check the overdrive servo case apply passage to see if it is blocked (air pressure test). Replace the case if required.
4. Confirm that the overdrive band is seated correctly to the anchor pin.
5. Check the torque converter for damper/hub weld failure by performing the weld check procedure outlined in the Service Manual:
  - a. Use Torque Converter Checking Tool T83L-7902-A.
  - b. Replace the torque converter if shaft turns more than two (2) degrees, or if there is a grinding noise while applying 68 N-m (50 lb.ft.) of torque.
6. Check splines on both ends of the direct drive shaft and in the direct clutch cylinder for damage/wear.

#### DIAGNOSTIC PROCEDURE NO. 3 - NO 3-4 UPSHIFT WITH DIRECT CLUTCH PRESSURE DIFFERENCE LESS THAN 15 PSI (110 kPa) - (indicates no leakage in direct clutch circuit)

1. Clean the valve body:

- a. Check for a "sticking" condition at the following valves:
    - ^ Overdrive servo regulator valve
    - ^ 3-4 shift valve
    - ^ 3-4 TV modulator valve
    - ^ Orifice control valve
  - b. If any valves are sticking and cannot be free, replace the valve body.
2. Reduce the valve body bolt torque to minimum specification, i.e. 9 N-m (80 lb.in.).
  3. Check the fit of the governor counterweight on the output shaft. If the fit is sloppy, replace the counterweight.
  4. Check the governor-to-output shaft retaining ring to make sure it is properly seated on the output shaft; service as required.
  5. Check the last two large seal rings on the output shaft (# 9, # 10), Figure 2.
    - a. The seal rings should move freely on the output shaft.
    - b. Check for metal or other contamination or burrs between the seal and the output shaft; replace the seals and/or output shaft as required.



Figure 4

6. Check the seal ring bore at the rear of the case for scoring. Light scoring is permissible, but deep grooving indicates case wear. Replace the case if deep grooving is found, Figure 4.

OTHER APPLICABLE ARTICLES: NONE

SUPERSEDES: 83-13-10

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 501000, 503000, 504000, 590000

Technical Service Bulletin # **951610**

Date: **950814**

## **A/T - New Rotunda Fluid Changer Service Tip**

Article No.

95-16-10

08/14/95

FLUID - NEW ROTUNDA FLUID CHANGER - SERVICE TIP

## FORD:

1980 and after CROWN VICTORIA, ESCORT, MUSTANG, THUNDERBIRD  
1982-88 EXP  
1984-94 TEMPO  
1986 and after TAURUS  
1988-93 FESTIVA  
1989 and after PROBE  
1994 and after ASPIRE  
1995 and after CONTOUR

## LINCOLN-MERCURY:

1980 and after CONTINENTAL, COUGAR, GRAND MARQUIS, TOWN CAR  
1981-87 LYNX  
1984-92 MARK VII  
1984-94 TOPAZ  
1986 and after SABLE  
1987-89 TRACER  
1991-94 CAPRI  
1991 and after TRACER  
1993 and after MARK VIII  
1995 and after MYSTIQUE

## MERKUR:

1985-89 XR4TI  
1988-89 SCORPIO

## LIGHT TRUCK:

1980 and after F-150-350 SERIES  
1981 and after ECONOLINE  
1982 and after BRONCO  
1983 and after RANGER  
1984-90 BRONCO II  
1986 and after AEROSTAR  
1988 and after F SUPER DUTY  
1991 and after EXPLORER  
1993 and after VILLAGER  
1995 and after WINDSTAR

## ISSUE:

Rotunda Equipment has available a new piece of equipment for automatic transmission fluid changes. Using the Rotunda ATF 2000 (199-00001) is an efficient way to change automatic transmission fluid.

## ACTION:

When changing automatic transmission fluid using the Rotunda ATF 2000 (199-00001) it is not necessary to remove the transmission pan and/or torque converter drainplug. Contact Rotunda Equipment at 1-800-ROTUNDA for more information regarding the Rotunda ATF 2000.

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 510000

Technical Service Bulletin # **ATRASIL8833**

Date: **881001**

**A/T - Driveline Clicking Or Popping Noise**

SIL 88-33 (Oct)

SUBJECT: FORD

PROBLEM: A Driveline "clicking" or "popping" noise

1986-88 Aerostar, 1987-88 E-Series and F Series Truck

The noise may occur during transmission engagement or when accelerating from a stop. The cause may be inadequate tube-to-yoke bonding on the aluminum driveshaft.

ALUMINUM DRIVESHAFT APPLICATION CHART				
Part Number	Vehicle	Engine	Transmission	Axle
E89Z-4602-B	1988 Aerostar	3.0L	M50D	3.45/3.73
E89Z-4602-C	1986-88 Aerostar	3.0L	A4LD	3.45/3.73/4.10
E79Z-4602-A	1986-87 Aerostar	2.3L/3.0L	M50D	3.45/3.73
<b>NOTE: If a new driveshaft is required on the following applications, the original slip yoke from the old driveshaft must be used.</b>				
E8TZ-4602-W	1987 F-150 133" Wheel Base	4.9L/5.0L	NPG 435	3.55
E8TZ-4602-Y	1987 F-250 LD (4x2) 133" Wheel Base	5.0L	NPG 435	3.55/4.10

PART NUMBER	PART NAME	CLASS
E8TZ-4602-W	Aluminum Driveshaft	C
E8TZ-4602-Y	Aluminum Driveshaft	C
E8TZ-4602-Z	Aluminum Driveshaft	C
E8TZ-4602-AB	Aluminum Driveshaft	C
E8UZ-4602-C	Aluminum Driveshaft	C
E8UZ-4602-D	Aluminum Driveshaft	C
E8UZ-4602-E	Aluminum Driveshaft	C
E8UZ-4602-F	Aluminum Driveshaft	C
E89Z-4602-B	Aluminum Driveshaft	C
E89Z-4602-C	Aluminum Driveshaft	C
E79Z-4602-A	Aluminum Driveshaft	C

ALUMINUM DRIVESHAFT APPLICATION CHART				
Part Number	Vehicle	Engine	Transmission	Axle
E8TZ-4602-W	1987-88 F-150 (4x2) 133" Wheel Base	4.9L	M50D	2.73/3.08/3.55
		5.0L	AOD	3.55
		5.0L	M50D	3.08
		5.0L	T18	3.55
E8TZ-4602-Y	1987-88 F-250 LD (4x2) 133" Wheel Base	4.9L	M50D	3.55
		4.9L	T18	3.55
		5.0L	M50D	3.55
		5.0L	T18	3.73/4.10
		5.0L	AOD	4.10
E8TZ-4602-Z	1987-88 F-250 LD (4x2) 133" Wheel Base	4.9L	C6	3.55
		5.8L	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-Z	1987-88 F-250 HD (4x2) 133" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-Z	1987-88 F-350 SRW/DRW (4x2) 133" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8TZ-4602-AB	1987-88 F-350 DRW (4x2) 136" Wheel Base	4.9L	C6	4.10
		5.8L	C6	3.55/4.10
		7.3L Diesel	C6	3.55/4.10
		7.5L	C6	3.55/4.10
E8UZ-4602-C	1987-88 E-150 138" Wheel Base	4.9L	AOD	3.55
		5.0L	AOD	3.55
E8UZ-4602-D	1987-88 E-150 138" Wheel Base	4.9L	C6	3.08/3.55
		5.8L	C6	3.55
E8UZ-4602-E	1987-88 E-250 138" Wheel Base Under 8500 GVW	5.0L	AOD	3.73
E8UZ-4602-F	1987-88 E-250 138" Wheel Base Under 8500 GVW	4.9L	C6	3.54/3.73
		5.8L	C6	3.54/3.73
E8UZ-4602-F	1987-88 E-250 138" Wheel Base Club Wagon Over 8500 GVW	4.9L	C6	4.10
		5.8L	C6	4.10
		7.5L	C6	4.10
E8UZ-4602-F	1987-88 E-350 SRW 138" Wheel Base	7.5L	C6	4.10
E8UZ-4602-F	1987-88 E-350 DRW 138" Wheel Base	7.5L	C6	4.10
E8UZ-4602-F	1987-88 Super Wagon 138" Wheel Base Over 8500 GVW	4.9L	C6	4.10
		5.8L	C6	4.10
		7.5L	C6	4.10

**CORRECTION:**

Install a new aluminum driveshaft with an improved tube-to-yoke bond. Refer to the application charts for the correct part numbers.

Technical Service Bulletin # **ATRASIL8910**

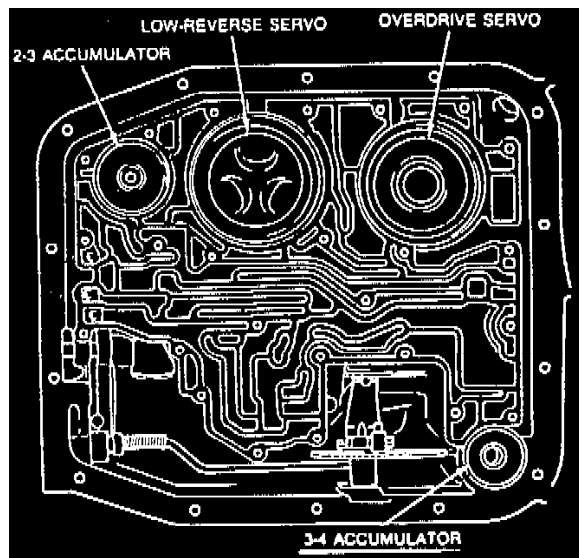
Date: **890301**

**A/T - AOD 3-4 Accumulator Change**

SIL 89-10 (Mar)

FORD AOD

SUBJECT: 3-4 Accumulator



The 3-4 accumulator used in prior model year transmissions is no longer used in 1989 models, except on vehicles equipped with 5.8 liter engines.

The accumulator feed hole in the valve body has been blocked to eliminate the need for a 3-4 accumulator. There is still a bore in the case for the 3-4 accumulator on transmissions that do not have it.

#### Note

Use only a 1989 valve body in a 1989 AOD transmission. 1989 valve bodies can be used to service all prior model year transmissions, even if a 3-4 accumulator is present.

Technical Service Bulletin # **ATRATB024**

Date: **900901**

## A/T - Harsh Reverse Engagements

BULLETIN: # 024

DATE: September 1990

TRANSMISSION: All

SUBJECT: Harsh Reverse Engagement

Harsh Reverse Engagement

This bulletin addresses harsh reverse engagements in many types of transmissions. Reverse usually has two components engaged. These components are an input member and a holding member. The Input member may be a direct, high-reverse or front clutch. The holding member may be a low-reverse band or low-reverse clutch. For this bulletin, we will always call the Input member the reverse input drum and we will call the holding member, the reverse holding member.

Many times the cause of a harsh engagement into reverse is a timing problem. The reverse input drum may be engaging before the reverse holding member. If the reverse input drum applies first, the planetary gear train with all the connected rotating parts begins to spin, building momentum. When the reverse holding member applies it must stop the complete rotating mass of torque converter turbine, shafts, drums and planetary assemblies. If all of these parts come to a sudden stop, it can produce a jolt that is uncomfortable to the driver. Transmissions with heavy or large diameter rotating components could add to the harsh engagement problem. Some examples would be a transmission with a torque converter clutch creating a problem because of the extra weight of damper assembly and the clutch plate. Some transmissions, like the C6 and 3L80/THM400, have comparatively heavier drums and planetaries.

One way to help prevent a harsh engagement is to make sure the reverse holding member applies before the reverse input drum. You can do this by using band adjustments and clutch pack clearances to help regulate which applies first. Before you start any internal work, check some external factors that can influence harsh engagement.

USE THIS ORDER FOR CORRECTION:

1. Check engine tune. Does the engine idle smooth and have good vacuum? Low vacuum raises line pressure on vacuum modulator equipped transmissions causing harsh engagement.
2. Set engine idle speed to exact manual specification for that particular year and model. The faster a component is rotating, the harder it is to stop. Engine speeds as much as 100 RPM over specifications can cause harsh engagements. RPM's this slight are difficult to detect by just listening to

an engine. It is best to check the RPM with a tachometer, but not the one on the dash as it is not accurate for this.

3. Check main line pressure. High pressure can cause aggressive engagement of components.
4. Work with reverse holding member clearances. (Make sure it is not too loose)
5. Work with reverse input drum clearances. (Make sure it is not too tight)
6. Some transmissions may require an additional wave plate in the reverse drum (3L80/THM400, or 4L60/THM700-R4).

#### BULLETIN RECAP

- ^ Check engine tune.
- ^ Check engine RPM.
- ^ Check pressure.
- ^ Tighten reverse holding member clearance.
- ^ Loosen reverse in put member clearance.
- ^ Install wave plate.

#### FOR ADDITIONAL INFORMATION:

ATRA: TSB 86-33, TSB 85-54 TSB 85-52, TSB 83-44  
Technical Service Bulletin # **ATRATB028**

Date: **901001**

### **A/T - Engine Vacuum Testing**

BULLETIN: # 028

DATE: October 1990

SUBJECT: Engine Testing With A Vacuum Gauge

TRANSMISSION: All

Engine Testing With A Vacuum Gauge

#### ENGINE/TRANSMISSION RELATIONS

An important part of transmission diagnosis is to make certain the engine operates properly. If the engine performance is incorrect, the transmission will receive the wrong information.

The engine sends signals to the transmission through a vacuum line, throttle cable or both. These signals basically synchronize torque with transmission line pressure, shift feel and shift timing.

Malfunctions in items like the air filter, spark plugs, EGR valves and other parts of the fuel, electrical and emission systems could result in improper transmission performance.

#### VACUUM GAUGE ENGINE PERFORMANCE TESTING

A vacuum gauge shows the difference between outside atmospheric pressure and the amount of vacuum present in the intake manifold.

The pistons in the engine serve as suction pumps and the amount of vacuum they create is affected by the related actions of:

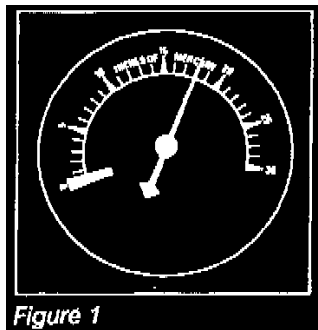
- ^ Piston rings
- ^ Valves
- ^ Ignition system
- ^ Fuel control system

^ Other parts affecting the combustion process (emission devices, etc.).

Each has a characteristic effect on vacuum and you judge their performance by watching variations from normal.

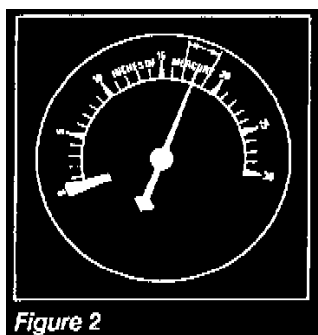
It is important to judge engine performance by the general location and action of the needle on a vacuum gauge, rather than just by a vacuum reading. Gauge readings which may be found are as follows:

#### NORMAL ENGINE OPERATION



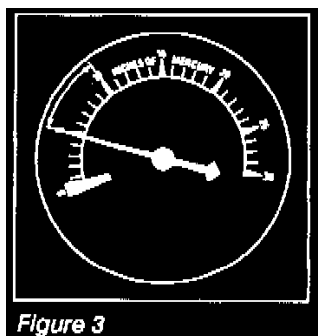
At idling speed, an engine at sea level should show a steady vacuum reading between 14" and 22" HG. A quick opening and closing of the throttle should cause vacuum to drop below 5" then rebound to 23" or more. See figure 1.

#### GENERAL IGNITION TROUBLES OR STICKING VALVES



With the engine idling, continued fluctuation of 1 to 2 inches may indicate an ignition problem. Check the spark plugs, spark plug gap, primary ignition circuit, high tension cables, distributor cap or ignition coil. Fluctuations of 3 to 4 inches may be sticking valves. See figure 2.

#### INTAKE SYSTEM LEAKAGE, VALVE TIMING, OR LOW COMPRESSION



A vacuum reading at idle much lower than normal can indicate leakage through intake manifold gaskets, manifold-to-carburetor gaskets, vacuum brakes or the vacuum modulator. Low readings could also be very late valve timing or worn piston rings. See figure 3.

#### EXHAUST BACK PRESSURE

Starting with the engine at idle, slowly increase engine speed to 3000 RPM, engine vacuum should be equal to or higher than idle vacuum at 3000 RPM.

If vacuum decreases at higher engine RPM's, an excessive exhaust back pressure is probably present.

## CYLINDER HEAD GASKET LEAKAGE

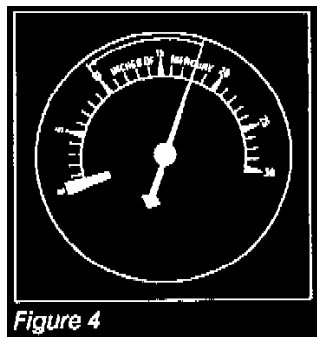


Figure 4

With the engine Idling, the vacuum gauge pointer will drop sharply, every time the leak occurs. The drop will be from the steady reading shown by the pointer to a reading of 10" to 12" Hg or less. If the leak is between two cylinders, the drop will be much greater. You can determine the location of the leak by compression tests. See figure 4.

## FUEL CONTROL SYSTEM TROUBLES

All other systems in an engine must be functioning properly before you check the fuel control system as a cause for poor engine performance. If the pointer has a slow floating motion of 4 to 5 inches - you should check the fuel control.

## BULLETIN RECAP

- ^ Engine problems can affect transmission performance.
- ^ If you suspect an engine problem, connect a vacuum gauge to the intake manifold.
- ^ Note the location and action of the vacuum gauge needle.
- ^ Use the information in the bulletin to determine the engine problem.
- ^ Correct the engine problem before doing extensive calibration work on the transmission.

Technical Service Bulletin # **ATRATB045**

Date: **910301**

**A/T - AOD 4th Gear Complaints**

TRANSMISSION: AOD

BULLETIN: # 045

SUBJECT: 4th Gear Complaints

APPLICATION: Ford RWD

DATE: March 1991

No 4th, Late 4th, Falls Out Of 4th

Step 1.

Check the line pressure at 1200 RPM.

Step 2.

Reset the throttle valve (TV) pressure.

Step 3.

Check for low governor pressure. To do this, perform two checks while on the road test: Check for a wide open throttle 1-2 upshift. Check for a wide open throttle 3-2 downshift from a cruising speed of 35 mph. If there is no W.O.T. 1-2 upshift and there is a 3-1 downshift in place of a 3-2 downshift, suspect low governor pressure see "Checking Governor For Leaks".

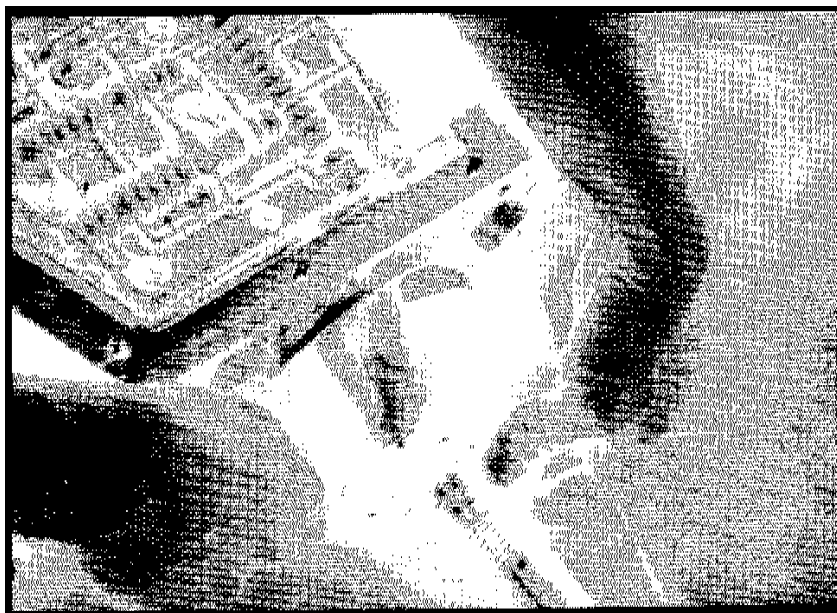
Step 4.



Install a gauge on the forward pressure port and one on the direct pressure port. The pressure port locations are on the passenger side of the vehicle.

Accelerate to 55 mph in the "3" position and check the gauge readings. If the forward pressure is 10 psi or more higher than the direct pressure, there is a leak preventing the 3-4 shift. See "Checking Direct Clutch Leaks".

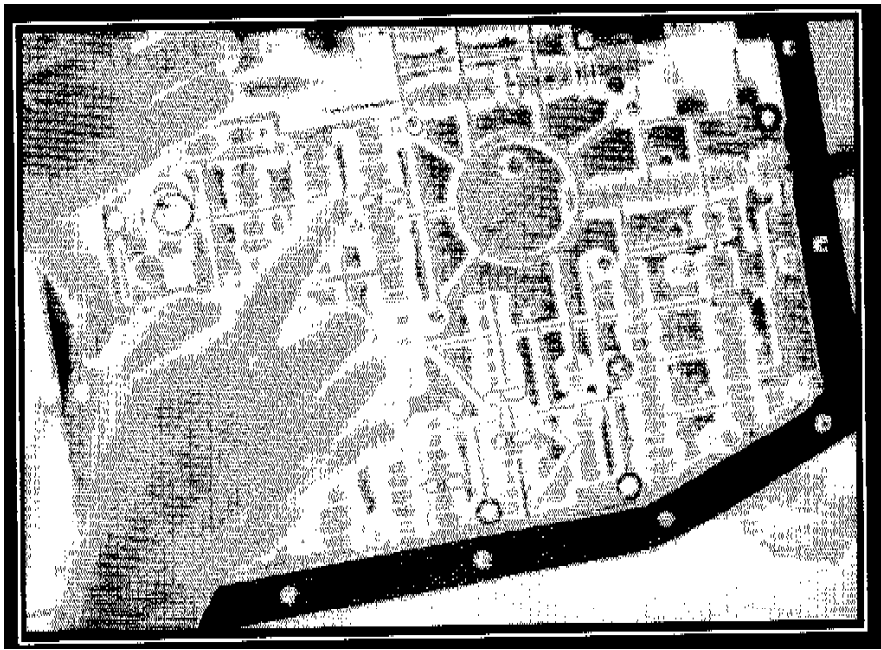
#### CHECKING FOR GOVERNOR LEAKS



If governor pressure is low, check the governor for loose bolts, dirty governor filter, stuck or dragging governor valve, worn governor valve bore, poor mounting surface and broken or incorrect spring (too light). Low governor pressure can be caused by things other than a bad governor. To find possible causes, slowly apply air through the governor to valve body port on the main shaft. With the pan off, look and listen for leaks in the governor circuit. Also check that the 3-4 shift valve moves freely.

Remove the pan. Apply 50 psi air pressure to the direct pressure port on the outside of the case.

#### CHECKING DIRECT CLUTCH LEAKS



Air will come out the exhaust port at the 2-3 shift valve. Seal the exhaust port with your thumb and air check again. Some locations to inspect for leaks are: Valve body gaskets, aluminum orifice control plug, 2-3 accumulator ring, ring bore in the rear of the case, cup plug in the output shaft, direct clutch cylinder ring sealing area, direct clutch seals and check ball in the direct piston.

- ^ To correct a leak at the aluminum orifice control plug; flare the plug using a tubing cutter and replace keeper with flat plate style E5AZ-7E335.
- ^ To correct a leak at the 2-3 accumulator ring: Use a metal or solid Teflon ring from a THM 200 1-2 accumulator piston.
- ^ To correct leaks at the valve body to case surface; flat file the case and use two valve body gaskets between the case and separator plate.
- ^ Do not torque valve body to more than 60 in. lbs..

FOR ADDITIONAL INFORMATION: 1990 Seminar Manual

#### BULLETIN RECAP

- ^ The governor can be checked during the road test.
- ^ A leak in the direct clutch can cause no 4th.
- ^ "Checking Governor For Leaks" will pinpoint governor leaks.
- ^ "Checking Direct Clutch Leaks" will pinpoint direct clutch leaks.

Technical Service Bulletin # **ATRATB063**

Date: **910701**

### **A/T - AOD Direct Clutch Failure/Excessive Case Bore Wear**

TRANSMISSION: A4LD

BULLETIN: # 060B

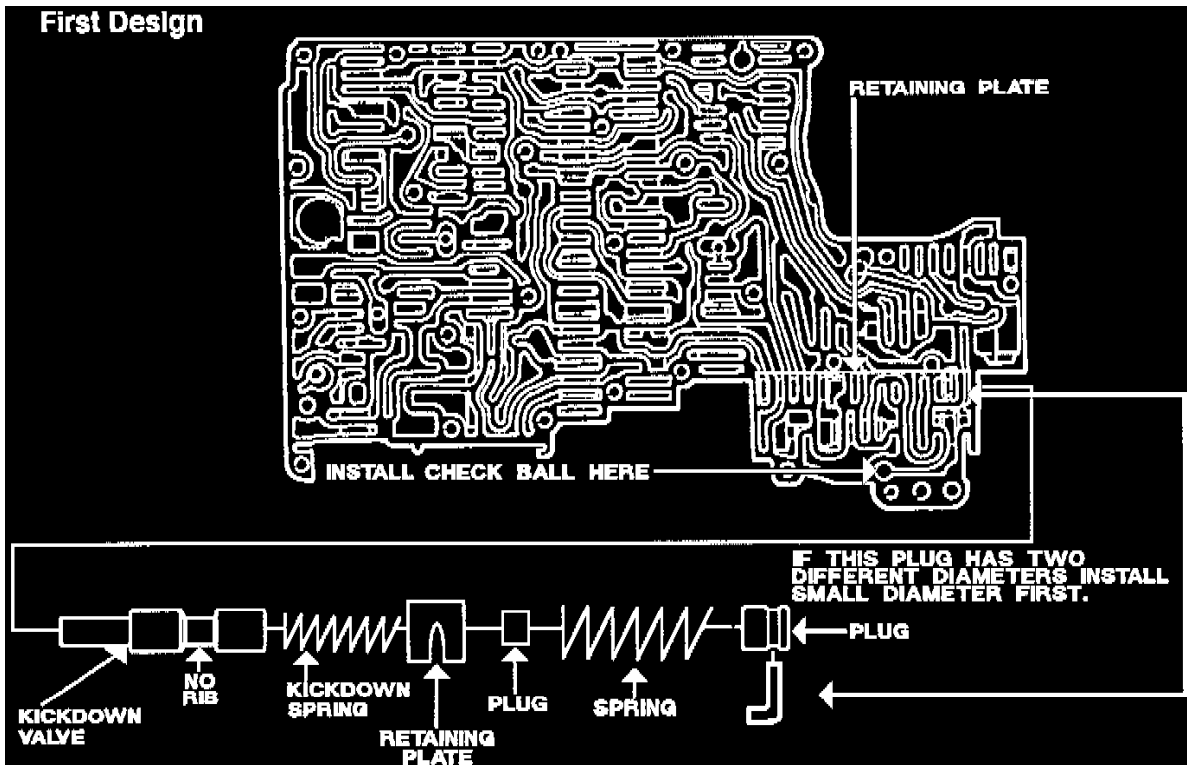
SUBJECT: No Reverse

APPLICATION: Ford

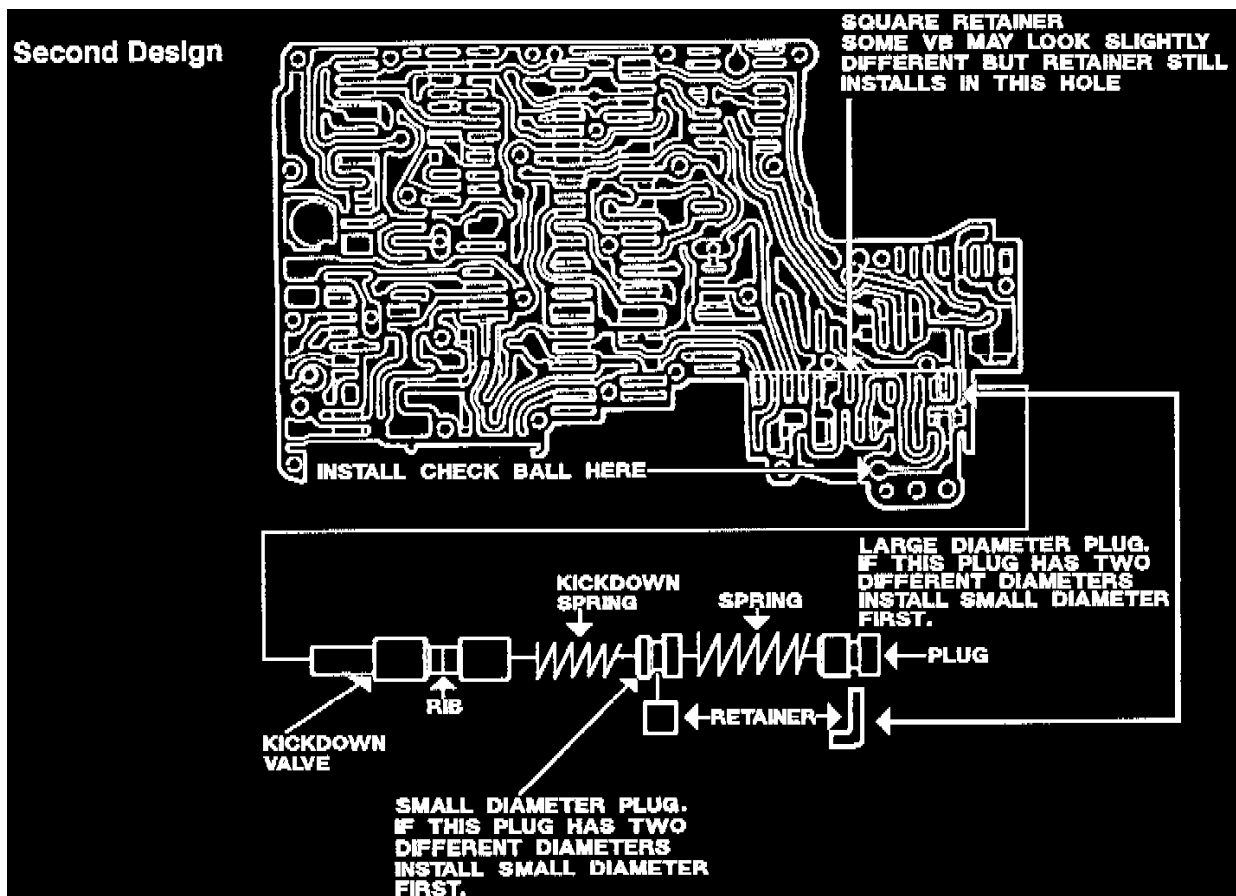
DATE: July 1991

No Reverse

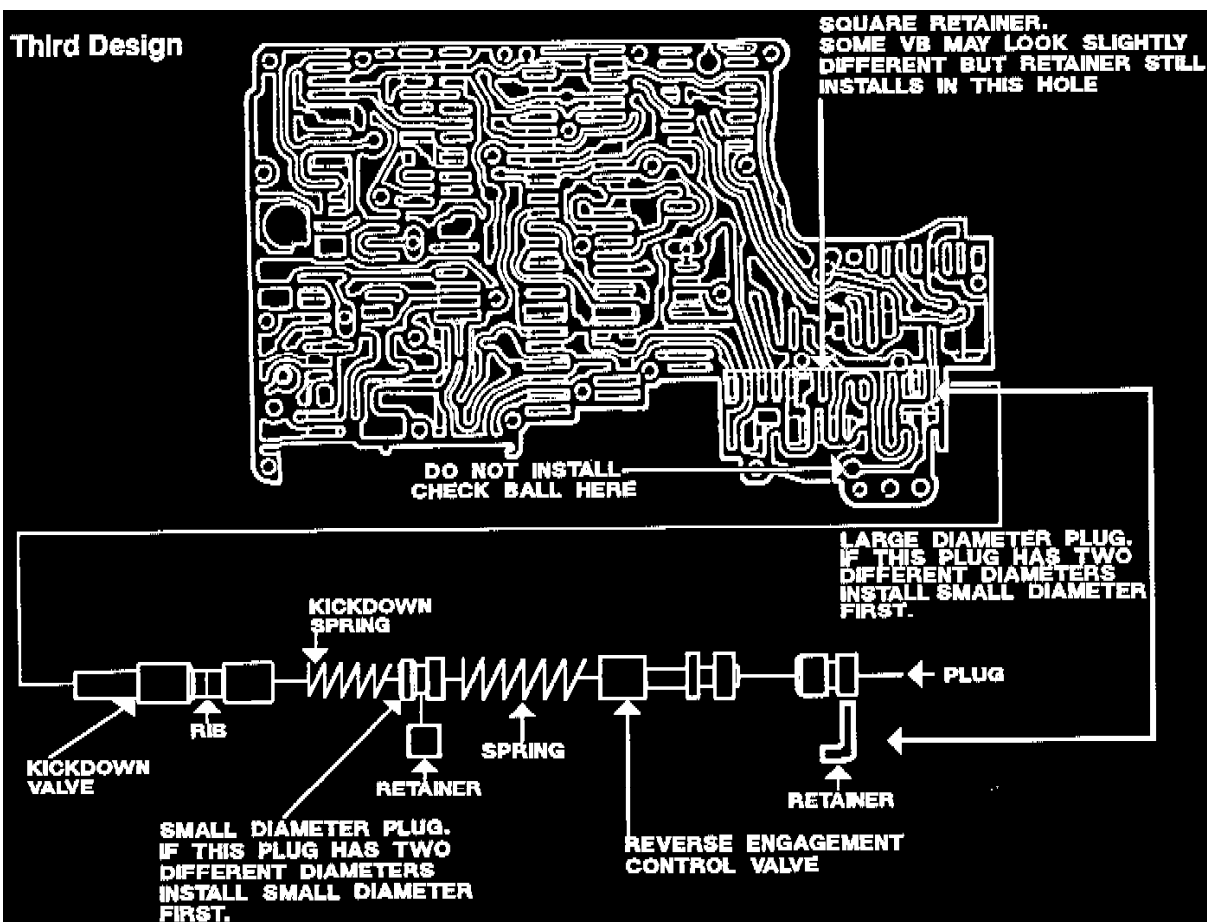
Some A4LD valve body assemblies do not use a check ball to cushion reverse engagement. These valve bodies are equipped with a reverse engagement control valve. Inspect your valve body for the correct assembly using the 3 drawings provided. Do not leave out the check ball on valve bodies that do not have this valve. If the reverse engagement control valve is stuck you may have no reverse.



First Design



Second Design



Third Design

#### BULLETIN RECAP

- ^ If you have a reverse engagement control valve, leave the check ball out.
- ^ Inspect reverse engagement control valve for sticking.

#### FOR ADDITIONAL INFORMATION

TSB 89-14, 88-37, 88-35 & 86-59 and 1990 Seminar Manual

Technical Service Bulletin # **ATRATB078**

Date: **911101**

### **A/T - How To Use A Pressure Gauge**

BULLETIN : # 078

SUBJECT: Pressure Gauge

APPLICATION: Misc.

DATE: November 1991

#### HOW TO USE A PRESSURE GAUGE

A significant number of calls we receive involve improper pressures, so we need to use a pressure gauge when diagnosing problems.

Using a pressure gauge can seem like a formidable task. The reason most people do not use a pressure gauge is because they do not see the value in using one. Technicians do not see the value because the gauge readings do not tell them how to fix the problem. This article will attempt to show the technician how to interpret pressure gauge readings so the technician can find the fix to the problem.

	SLOW IDLE	FAST IDLE	WOT
P			X
R			X
N			
D			
3			
2			
1			

Figure 1

It is best to start pressure tests with mainline pressure. Mainline pressure should be checked in each range: P, R, N, D, 3, 2, 1. Each range, except Park and Neutral, should be checked under three conditions: Slow idle, fast idle, and wide open throttle. A form, as in figure 1 should be made to record the readings.

If all pressures are within specification at slow idle then the pump and pressure regulator are functioning properly.

If all pressures are low at slow idle, it indicates a potential problem in the pump, pressure regulator, filter, low fluid, or internal leakage. To help verify where the problem is, check pressures at fast idle. If all the pressures now read normally, it usually indicates a worn pump but the problem could still be internal leaks.

Internal leaks will usually show up in a particular range. For example a forward clutch leak would have normal pressure in Park, Reverse and Neutral but have low pressure in all forward ranges. A direct clutch leak will show a pressure drop when the transmission shifts to third and low pressure in reverse because in most cases, the direct clutch is on in third and reverse.

A restricted filter will usually show up as a gradual pressure drop at higher engine RPM because the filter cannot pass as much fluid as the pump is trying to draw.

A stuck pressure regulator valve will show up as fixed line pressure which means the same pressure all the time. The pressure may vary with engine RPM which means low pressure at slow RPM and higher pressure at higher RPM. There will be no boost in pressure from the TV or modulator system and no reverse boost.

If pressures are high at slow idle it indicates a pressure regulator or throttle pressure problem. On most cars, the modulator controls throttle pressure. If the transmission has a throttle pressure tap, it will tell you if the throttle pressure circuit is the problem. On GM units without a throttle pressure tap, remove the TV plunger. If line pressure is now normal then it's a TV problem, if not it's a pressure regulator problem.

Pressures also need to be checked at stall or wide open throttle (WOT). When doing a stall test, always observe safety precautions such as checking for broken mounts or bad brakes. Testing should always be done under operating conditions. To do a stall test, put the selector in the range to be tested and with one foot firmly on the brake, press the accelerator to the floor then note your pressure reading. Some technicians will pull the vacuum line off or pull the TV cable with the engine at fast idle. That is not operating conditions and will not detect a problem of trapped vacuum or a cable problem.

If all pressure at stall are low, then you should pull the TV cable to maximum or disconnect the vacuum line. If the pressures are now OK, the problem is in the cable or vacuum system. If the pressures are still low, then the problem is in the pump or control system.

If all pressures at stall are high, then look at the idle pressures. If the idle pressures are also high then this could be a pressure regulator or throttle system problem. If idle pressures are normal then the problem is in just the throttle system.

The reverse stall test is also a maximum pump output test. If you suspect a weak pump then this test will help find it. Often this will show up as low pressure at reverse stall but all other pressures including idle will be normal. If a person wanted to become really proficient with a pressure gauge they should first put a pressure gauge on their own vehicle and leave it there for exactly one week. Every time they drive the car they should watch the gauge. After one week, they should then put the pressure gauge on every single car in the shop that DOES NOT have a problem. Don't use the gauge on cars WITH problems yet. After 30 days of using a gauge on units that work properly, they can then start using the gauge on units with problems. The technician is accustomed to normal readings, abnormal readings will stand out like a sore thumb.

To fix today's transmissions, every professional technician must be proficient in the use of a pressure gauge. The only way to gain this proficiency is to use the pressure gauge daily. Practice makes perfect.

Technical Service Bulletin # **ATRATB088**

Date: **920101**

**A/T - EEC Trouble Codes**

TECHNICAL BULLETIN: # 088

TRANSMISSION: N/A

SUBJECT: Trouble Codes

APPLICATION: Ford

Ford Electronic Engine Control Trouble Codes

IMPORTANT POINTS PARTICULAR TO FORD:

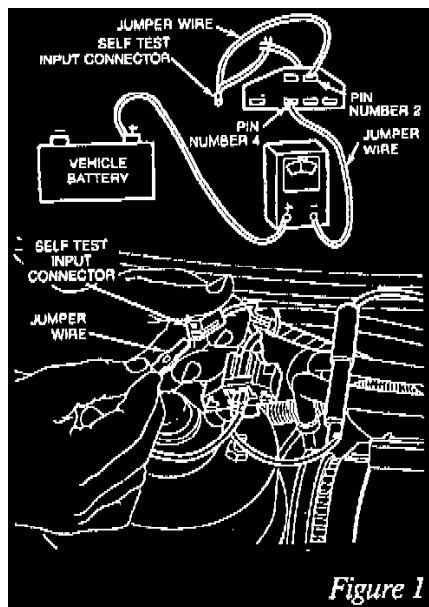
Ford's Electronic Engine Control (EEC) system does not have the ability to be "read" as other systems do. (Example -- watching TPS voltage on a scan tool.) After the codes are retrieved, the system is best diagnosed with a tool called a break-out box. This ties into the computer system and checks the sensors and ground circuits using a DVOM.

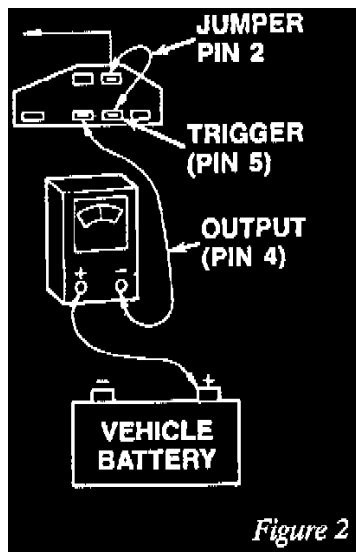
BEFORE TEST PROCEDURES BEGIN:

1. Check all wiring connectors and vacuum hoses.
2. Check for non-OEM splices into wiring, IE: Car phones, CB radios, back up alarms, etc.
3. Engine radiator must be full and able to hold pressure.
4. Engine must be at operating temperature with all electrical accessories turned off.

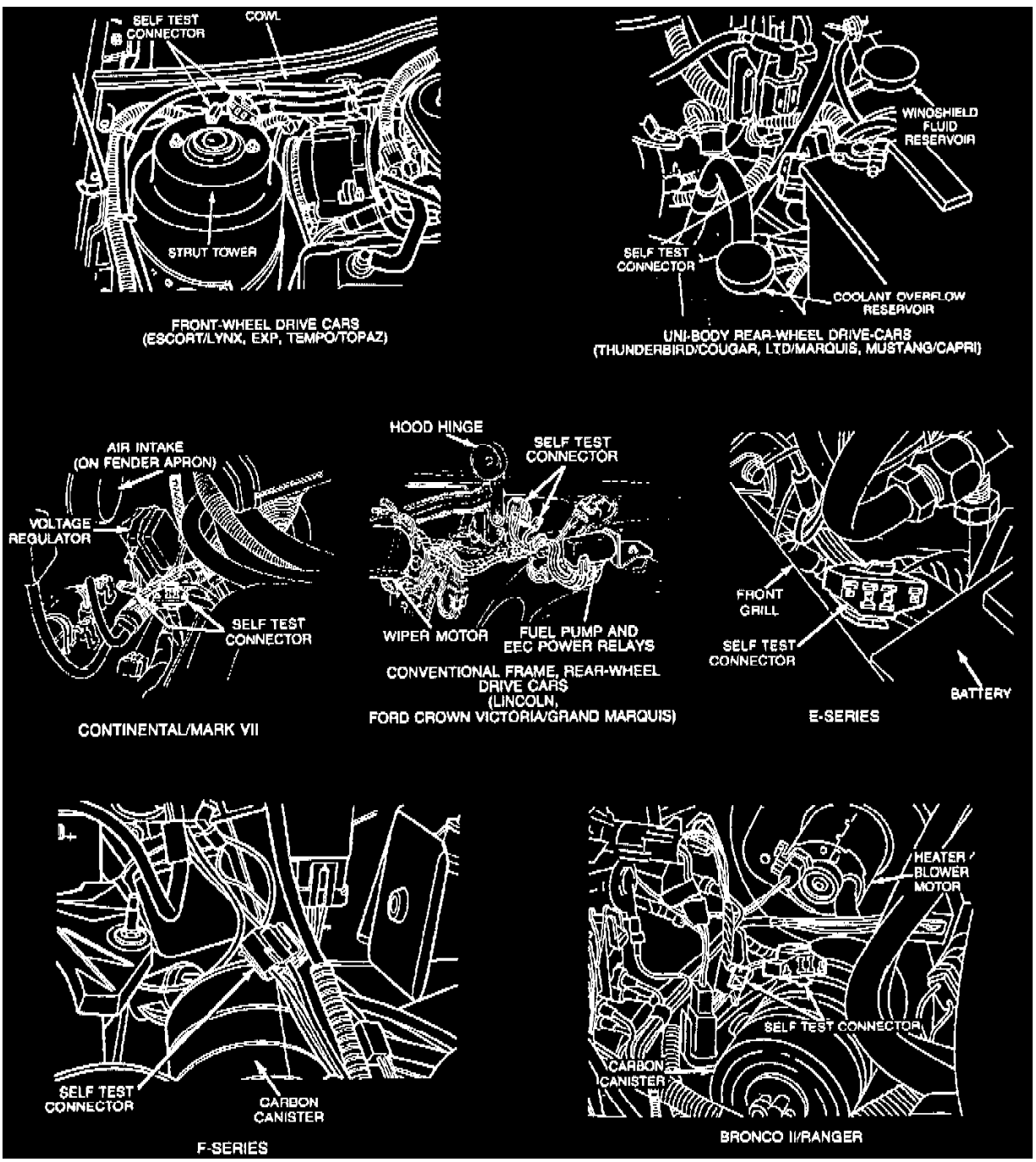
THEN PROCEED:

Voltmeter hook-up





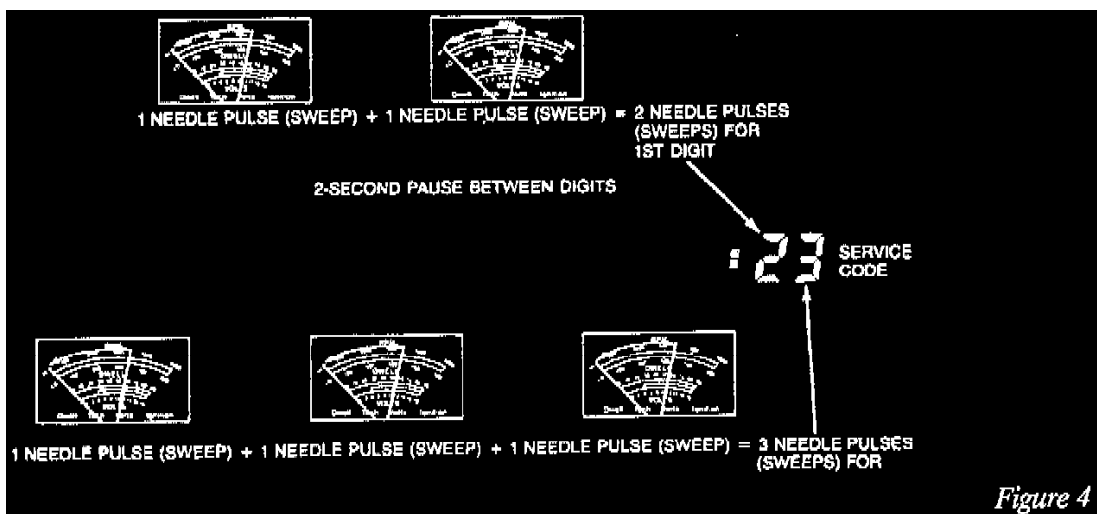
1. Locate the diagnostic connector and the Self Test Input (STI) gray connector.
2. Connect "Analog voltmeter as illustrated Figure 1. If the vehicle is an '83 - 1.6L the schematic in figure 2 must be used.



Typical STI Locations

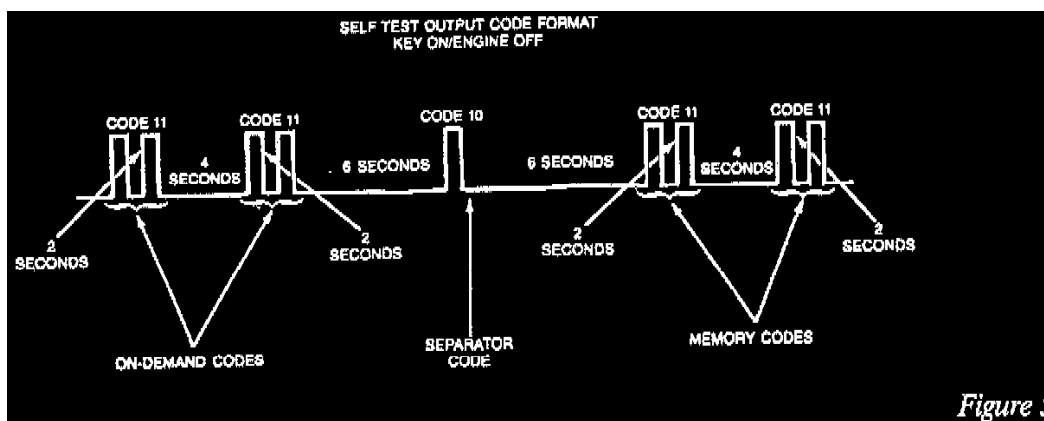
(Always perform this test 1st)

KOEO - Key ON engine OFF test:  
(After hook-up of analog voltmeter)



## (STEP 1)

Turn the key ON... If diesel powered, depress the throttle to the floor for entire test! The processor will run its own self diagnostics and output "hard codes" on your voltmeter. (Figure 4)



## (STEP 2)

Count the needle sweeps and write down the codes in order. Watch for separator code 11 and code 10. These are not faults but indicate "no codes" and divisions between processor memory. Figure 5 is an example of "No Codes". If there were codes present, they would be displayed in the 4 second pause location.

## KOER - KEY ON ENGINE RUNNING TEST

Do this after KOEO tests. Start the engine, the first meter display will be the Engine I.D. code,

- 2 pulses - 4 cylinder
- 3 pulses - 6 cylinder
- 4 pulses - 8 cylinder
- 5 pulses - 7.3 diesel

(Verifies processor installed for proper engine.)

2nd output will be code 10 which is a single pulse on the meter.

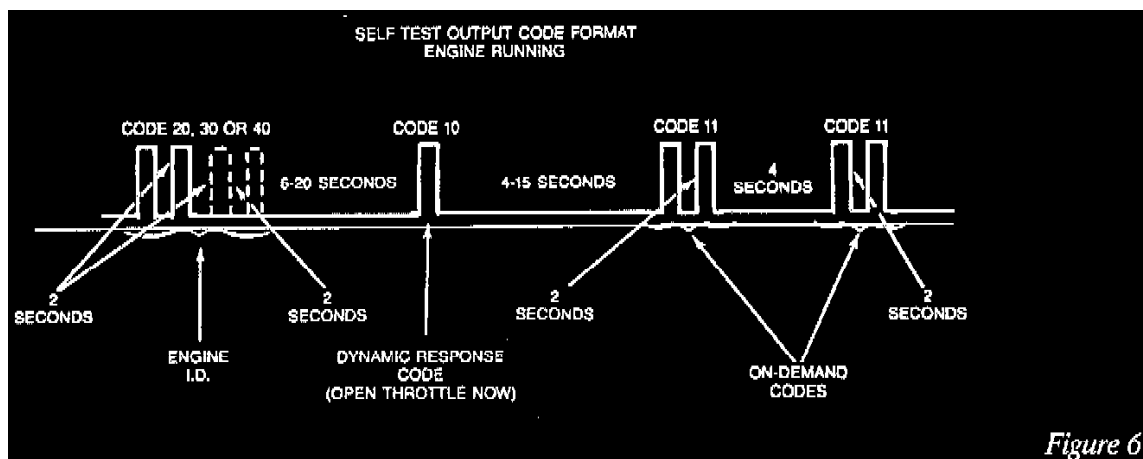
This indicates it is time for the operator to complete the "Dynamic Tests". These tests check items listed as they are actuated.

(1st STEP) Perform WOT (Wide Open Throttle).

(2nd STEP) Turn steering 1/2 turn.

(3rd STEP) Perform BOO (Brake On/Off).

(4th STEP) Cycle O.D. cancel switch if equipped (E4OD).



After completing steps 1 to 4, the analog voltmeter will present codes. (Figure 6)

#### E4OD - DRIVE CYCLE TEST

##### (STEP 1)

Erase all existing codes by disconnecting STI connector while codes are emitted.

##### (STEP 2)

Check transmission fluid level. Engine must be at operating temperature.

##### (STEP 3)

Transmission in "D" range ... Press O.D. cancel switch (light on)... moderately accelerate from 0 to 40 mph and allow 3rd gear shift. Hold speed and throttle steady for 15 seconds.

##### (STEP 4)

Press O.D. switch (light off). Moderately accelerate from 40 to 50 and allow 4th gear upshift. Hold speed and throttle steady for 15 seconds.

##### (STEP 5)

When transmission is in 4th gear... lightly apply and release the brake ... hold speed and throttle steady for 15 seconds.

##### (STEP 6)

Brake to a stop, stand stationary for 20 seconds in "D". Repeat steps 3 to 6 a minimum of 4 times.

##### (STEP 7)

PERFORM KOEO to retrieve any codes.

#### FOR ADDITIONAL INFORMATION:

Locate a Ford - H - Manual or diagnostic manual and Bulletin # 089

Technical Service Bulletin # **ATRATB089**

Date: **920101**

## A/T - Diagnostic Trouble Codes for 1983-1992

TECHNICAL BULLETIN # 089

TRANSMISSION: N/A

SUBJECT: Service Codes

APPLICATION: Ford

DATE: 1992

Ford Service Codes 1983 - 1990

#### CODE LETTERS KEY

RUN -- KOER

MEM -- Continuous codes/KOEO

OFF -- KOEO

ALL -- Displayed in all test sequences

TURBO, -NON-TURBO, -EVP, -PFE, -- Specific to engine

TWO DIGIT CODE	DESCRIPTION
none	ECA can't perform self test. Check power and grounds, if ok change ECA.
11-ALL	System pass no faults present when test was run.
12-RUN	Self test could not reach fast idle RPM spec'. Check idle control and minimum idle setting.
13-RUN	Self test could not reach low idle RPM spec'. Check idle control and minimum idle setting.
14-MEM	Profile ignition pick up problem. Check frequency and % dwell. Check for intermittent wiring problems.
15-OFF	Computer memory failure (ROM). Check for proper seating before replacing ECA.
15-MEM	Power was lost to keep alive memory recently. May have lost other memory codes.
16-RUN	RPM above the self test spec' with ISC motor fully retracted. Check ISC and minimum idle.
16-RUN	RPM too low to perform fuel test. Check for dirty throttle plates and minimum idle.
17-RUN	RPM below self test spec' with ISC retracted. Check ISC motor and minimum idle setting.
18-RUN	SPOUT (spark output from computer) circuit open during self test. Check connector.
18-RUN	Spark angle width circuit problem. Check frequency and % dwell.
18-MEM	Loss of signal from coil negative, ignition diagnostic monitor. Or SPOUT circuit grounded.
19-RUN	RPM dropped too low with ISC retracted during self test. Check ISC and minimum idle speed.
19-OFF	ECA (computer) power failure. Check reference voltage and power connections.
19-MEM	Cylinder identification signal missing or erratic. Check frequency and % dwell.
21-ALL	Engine coolant temperature out of spec' during self test. Check voltage input to ECA.
22(NON -TURBO)	Manifold absolute pressure sensor frequency out of spec'. Check frequency and % dwell.
22-TURBO	Barometric pressure sensor frequency out of spec'. Check frequency and % dwell.
23-ALL	Throttle position sensor out of spec'. Check voltage input to ECA.

CODE	DESCRIPTION
24-NON TURBO	Air charge temperature out of spec'. Check voltage input to ECA.
24-TURBO	Vane air temperature voltage out of spec' during self test. Check voltage input to ECA.
25-RUN	Knock signal was not sent during goose test. Be sure momentary full throttle was reached.
26-RUN	Mass air flow or vane air flow voltage out of spec during self test. Check voltage input to ECA.
26-MEM	Transmission oil temperature sensor voltage is out of spec'. Check voltage input to ECA.
28-TURBO	Vane air temperature voltage out of spec during self test. Check voltage input to ECA.
28-MEM	Loss of ignition diagnostic monitor. Check coil and module operation. (Right coil on 2.3L).
29-MEM	Vehicle speed sensor input signal too low. Check AC voltage and frequency on test drive.
31-EVP	EGR valve position signal is too low. Check voltage input to ECA.
31-PFE	Pressure feedback EGR signal is too low. Check voltage input to ECA.
32-EVP	EGR valve position signal is too low for closed position. Check voltage input to ECA.
32-PFE	EGR valve is not seated properly. Check for carbon blockage.
33-ALL	EGR valve is not opening. Check for sticking valve and manifold vacuum lines.
34-PFE	Exhaust backpressure is too high. Check exhaust system and voltage to ECA.
34-MEM	Pressure feedback EGR signal out of limits. Check voltage to ECA.
34-RUN	EGR flow is too low. Check for carbon or obstruction under EGR valve.
35-RUN	RPM too low to open EGR during self test. Check idle speed and idle control system.
35-PFE	Pressure feedback sensor voltage is too high. Check voltage input to ECA.
35-EVP	EGR valve position voltage is too high. Check voltage input to ECA.
38-MEM	Idle tracking switch open. Check voltage at ECA input.
39-MEM	AXOD transmission converter clutch is not applying properly. Watch for RPM drop at lockup.
41-MEM	(Right) oxygen sensor is not switching. Lean indication. Check voltage at ECA input.
41-RUN	(Right) oxygen sensor signal lean during self test. Check voltage at ECA input.
42-RUN	(Right) oxygen sensor signal rich during self test. Check voltage at ECA input.
42-MEM	(Right) oxygen sensor signal is not switching. Rich indication. Check input to ECA.
44-RUN	Thermactor did not operate during self test. Check diverter and bypass solenoid operation.

CODE	DESCRIPTION
45-RUN	Thermactor air was diverted to exhaust manifold during self test. Check diverter operation.
45-RUN	Distributorless ignition coil pack #1 has a problem. Check coil primary and power for resistance.
45-MEM	Distributorless ignition had primary circuit problem recently. Check all coil packs and DIS module.
45-MEM	Thermactor air did not bypass during self test. Check bypass solenoid operation.
46-RUN	Distributorless ignition coil pack #2 has a problem. Check coil primary and power for resistance.
47-OFF	4X4 switch is closed or grounded on E4OD transmission. Check voltage input to ECA.
47-RUN	Air flow low at base idle. Check for vacuum leaks and o-rings on injectors. Check voltage to ECA.
48-RUN	Air flow too high at base idle. Check ignition for miss and Vane air flow voltage to ECA.
48-MEM	Distributorless ignition coil pack #3 has a problem. Check coil primary and DIS module. (Left coil on 2.3L).
49-MEM	1-2 shift error on E4OD transmission. Road test while watching input voltage to ECA.
49-MEM	Spout signal fixed at 10 degrees BTDC for failure management. Check profile ignition pickup and ignition system.
51-ALL	Engine coolant temperature shows -40 degrees. Check voltage at ECA input.
52-OFF	Power steering pressure switch circuit open. Check voltage at ECA input.
52-RUN	Power steering pressure switch stays open or closed during self test. Check voltage at ECA input.
53-ALL	Throttle position sensor voltage too high. Check adjustment and voltage at ECA input.
54-ALL	Air charge temperature sensor shows -40 degrees. Check voltage at ECA input.
55-RUN	Key power monitor circuit open. Check voltage at input to ECA.
56-MAF	Mass air flow signal too high. Check voltage at input to ECA.
56-VAF	Vane air flow too high. Check voltage at input to ECA.
56-TRUCK	Transmission oil temperature sensor voltage shows -40 degrees. Check input voltage to ECA.
57-MEM	AXOD transmissions has open neutral pressure switch circuit. Check voltage at input to ECA.
58-VAF	Vane air temperature shows -40 degrees. Check voltage at input to ECA.
58-OFF	Idle tracking switch open. Check voltage at input to ECA.
58-RUN	Idle tracking switch closed during self test. Check voltage at input to ECA.
59-OFF	AXOD 4/3 pressure switch failed open. Check voltage at input to ECA.
59-OFF	Idle service jumper between ECA pins 23 & 24 is connected. Remove jumper for self test and normal operation.
59-MEM	2-3 shift error on E4OD transmission. Road test while watching input voltage to ECA.
59-MEM	AXOD 4/3 pressure switch failed open. Check voltage at input to ECA.
59-SHO	Low speed fuel pump circuit problem. Check signal from ECA.
61-ALL	Engine coolant temperature sensor voltage indicated 254 degrees F. Check voltage input to ECA.
62-OFF	AXOD 4/3 or 3/2 pressure switches failed closed. Check voltage input to ECA.
62-MEM	Converter clutch solenoid circuit problem on E4OD transmission. Check amp draw with engine off.

CODE	DESCRIPTION
63-ALL	Throttle position sensor voltage is too low. Check voltage input to ECA.
64-ALL	Air charge temperature indicates 254 degrees F. Check voltage input to ECA.
65-MEM	System did not go into closed loop fuel control. Check fuel control sensor operation.
65-RUN	Overdrive cancel switch did not change during self test. Check voltage input to ECA.
66-TRUCK	Transmission oil temperature sensor voltage shows 290 degrees F. Check voltage input to ECA.
66-MEM	Mass air flow or vane air flow sensor voltage is too low. Check voltage input to ECA.
67-TRUCK	Manual lever position voltage is out of range. Check voltage input to ECA.
67-OFF	Neutral drive switch is open, or AC was on during self test. Check both voltage inputs to ECA.
67-OFF	AXOD neutral pressure switch failed closed. Check voltage input to ECA.
67-MEM	Clutch switch failed. Should give neutral drive gear signal when clutch is depressed.
68-VAF	Vane air temperature indicates 254 degrees F. Check voltage input to ECA.
68-OFF	AXOD 3/2 switch failed closed. Check voltage input to ECA.
68-OFF	Idle tracking switch failed in closed position. Check voltage input to ECA.
68-RUN	Idle tracking switch failed in open position during self test. Check voltage input to ECA.
69-MEM	AXOD 3/4 pressure switch failed in open position. Check voltage input to ECA.
69-MEM	TRUCKS 3-4 shift error on E4OD transmission. Road test while watching solenoid voltage.
69-OFF	AXOD 3/2 pressure failed in closed position. Check voltage input into ECA.
70-MEM	ECA data communications link has a circuit problem. Check for signal from ECA.
71-MEM	ECA reinitialized recently. Check for intermittent power, ignition noise, and ground problems.
71-MEM	Idle tracking switch failed in closed position with ISC motor retracted. Check voltage input to ECA.
71-MEM	Driver cluster control assembly data communications link failed. Check cluster assembly (dealer item)
72-MEM	ECA has had power loss recently. Check power, ground and for wiring problems.
72-MEM	W/DATA LINK Driver message center data communications link failed. Check message center (dealer item).
72-RUN	Manifold absolute pressure sensor voltage change was too small during goose test. Check hose for leaks.
73-RUN	Throttle position sensor voltage change was too small during goose test. Sweep test sensor.
74-RUN	Brake on-off switch did not change during self test. Press brake and check voltage input to ECA.
75-RUN	Brake on-off switch was closed (brake applied) during complete self test. Check voltage input to ECA.
76-MEM	Vane air flow voltage change was too small during goose test. Check voltage input to ECA.
77-ALL	Goose test was not done properly. Repeat self test and briefly go full throttle during goose test.
79-OFF	Air conditioning was on during self test. Check voltage input to ECA.

CODE	DESCRIPTION
81-OFF	Inlet air solenoid circuit has a problem. Check voltage and amp draw at ECA output.
82-OFF	Thermactor air bypass solenoid circuit has a problem. Check voltage and amp draw at ECA output.
82-OFF	Supercharger bypass solenoid circuit has a problem. Check voltage and amp draw at ECA output.
83-OFF	EGR control solenoid circuit has a problem. Check voltage and amp draw at ECA output.
83-OFF	High electric drive fan solenoid circuit has a problem. Check voltage and amp draw at ECA output.
83-SHO	Low speed fuel pump relay circuit has a problem. Check voltage and amp draw at ECA output.
84-OFF	EGR vent solenoid has a problem. Check voltage and amp draw at ECA output.
84-OFF	EGR vacuum regulator solenoid circuit has a problem. Check voltage and amp draw at ECA output.
85-OFF	Canister purge solenoid circuit has a problem. Check voltage and amp draw at ECA output.
85-MEM	Adaptive learn fuel control has reduced fuel to minimum limit. Look for cause of rich condition.
86-MEM	Adaptive learn fuel control has added fuel to maximum limit. Look for cause of lean condition.
86-MEM	Shift solenoid circuit problem. Do amp draw test with engine off.
87-ALL	Fuel pump circuit has a problem. Check voltage and amp draw at ECA output.
88-OFF	Electric drive fan solenoid has a circuit problem. Check voltage and amp draw at ECA output.
89-OFF	AXOD lock up solenoid circuit has a problem. Check voltage and amp draw at ECA output.
89-OFF	Converter clutch override solenoid circuit has a problem. Check voltage and amp draw at ECA output.
91-OFF	Shift solenoid #1 has a circuit problem. Do amp draw test with engine off.
91-RUN	Left oxygen sensor voltage shows lean mixture. Check voltage and find reason for left side problem.
91-MEM	Left oxygen sensor voltage not crossing mid-point. Check voltage and find reason for left side problem.
92-OFF	Shift solenoid #2 has a circuit problem. Do amp draw test with engine off.
92-RUN	Left oxygen sensor voltage shows rich mixture. Check voltage and find reason for left side problem.
93-ALL	Throttle position sensor voltage too low with ISC motor fully extended. Sweep test Throttle sensor.
93-OFF	Coast clutch solenoid has a circuit problem. Do amp draw test with engine off.
94-OFF	Convert clutch control circuit has a problem. Do amp draw test with engine off.
94-RUN	Thermactor air control system inoperative for cylinders 5-6-7-8. Check solenoid voltage and amp draw.
95-ALL	Fuel pump power circuit has a problem. Check power from battery to fuel pump.
96-ALL	Fuel pump power circuit has problem between ECA and Battery. Check for voltage between the two points.
96-SHO	High speed fuel pump relay has a circuit problem. Check voltage and amp draw at ECA output.
98-TRUCK	EPC failed on gas truck
99-TRUCK	EPC failed on diesel truck

111	11	328	32	624	99
112	64	332	33	626	93
113	54	334	34	627	94
114	24	337	35	628	62
116	21	338	51	631	97
117	61	339	61	632	65
118	51	411	13	633	47
121	23	412	12	634	67
122	63	452	29	636	26
123	53	511	15	637	56
126	22	512	15	638	66
128	22	513	19	654	67
129	72	519	52	998	98
144	41	521	52		
167	73	536	74		
172	41	538	77		
173	42	539	67		
179	85	542	95		
181	86	543	96		
182	85	552	82		
183	86	553	81		
211	14	556	87		
212	18	558	EVR Circuit		
213	18	565	85		
225	25	617	49		
311	44	618	59		
312	45	619	69		
313	46	621	91		
327	31	622	92		

## 3 Digit Trouble Code Conversion Chart

**Note**

If you have a '90 or later vehicle the codes may be emitted with 3 digits. These 3 digits can be referenced back to 2 digit diagnosis.

FOR ADDITIONAL INFORMATION: Bulletin # 088

Technical Service Bulletin # **ATRATB092**

Date: **920201**

**A/T - Check ABS Excitor Ring During Differential Rebuild**

TECHNICAL BULLETIN: # 092

TRANSMISSION: Rear Differential

SUBJECT: ABS - Excitor Ring

APPLICATION: Ford Bronco - F-150

DATE: Feb 1992

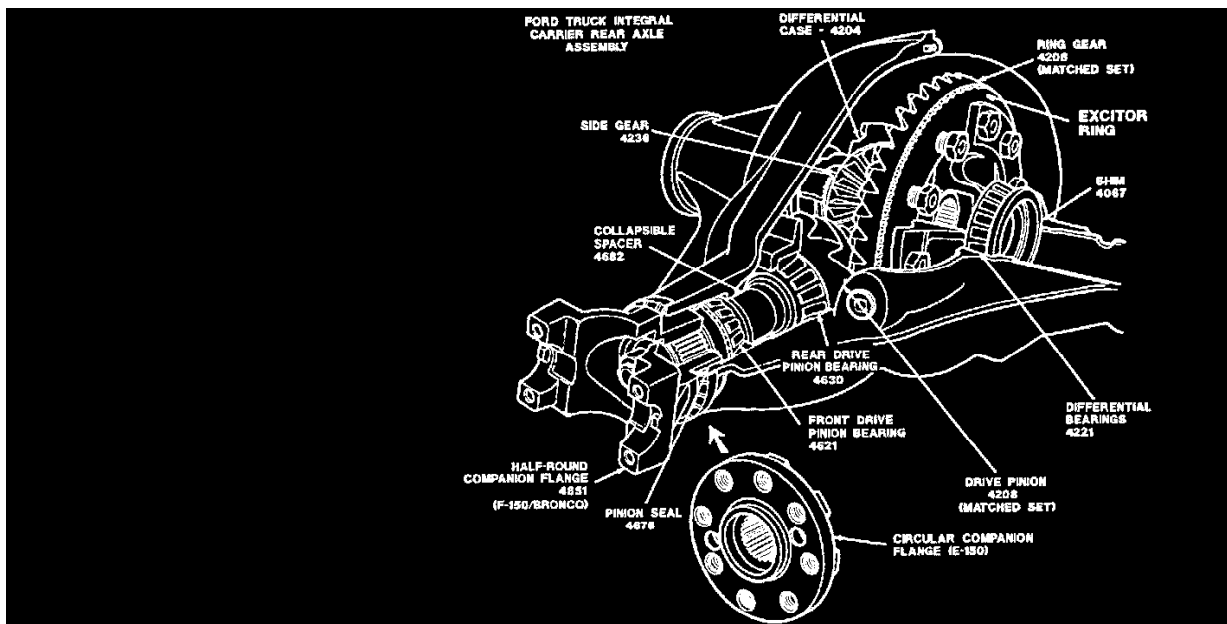


Figure 1

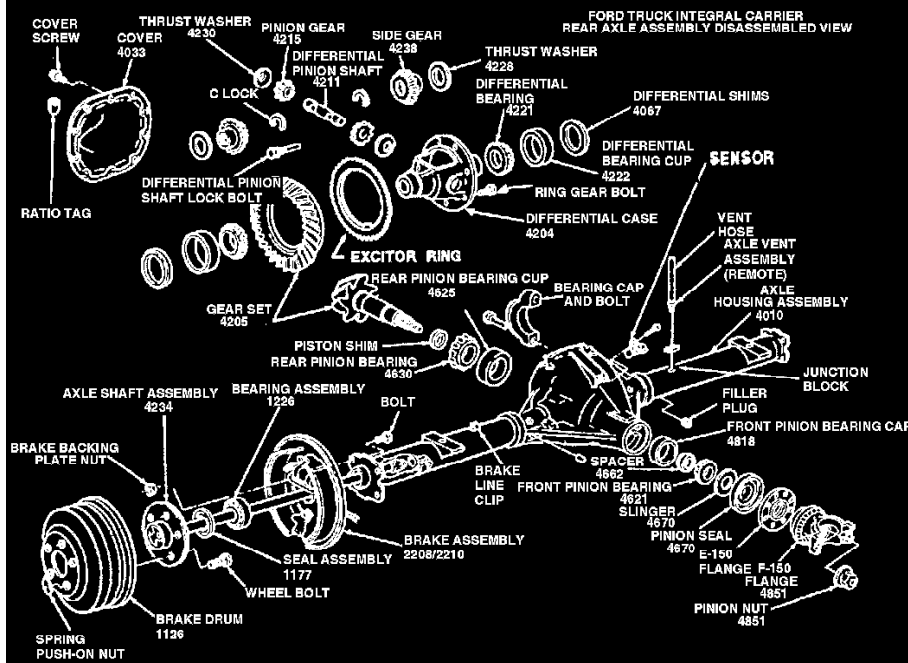


Figure 2

**\*NOTICE\***

If the excitor ring is removed, it must be replaced with a new ring. Failure to do so could make you liable for future brake failure.

When servicing a differential on the Ford Bronco or F-150, "Always" inspect the RABS excitor ring. You should look for a bent ring or missing or chipped teeth that could cause erratic anti-lock brake operation. If damage is found, remove and replace the excitor ring. Always clean the sensor pole piece in the differential housing. (Figure 1)

Technical Service Bulletin # ATRATB254

Date: 940101

**A/T - AODE Cooler Return Line Filter Installation**  
TECHNICAL BULLETIN # 254

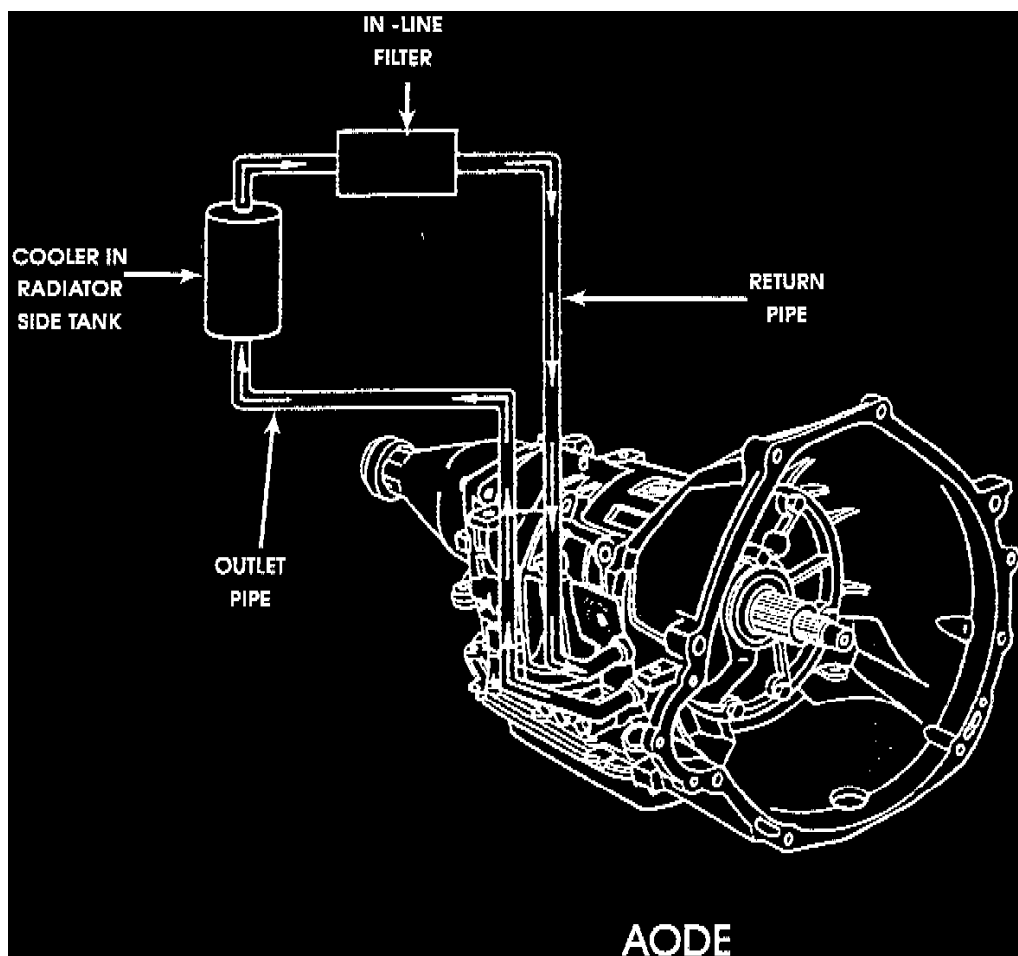
TRANSMISSION: AODE

SUBJECT: Cooler return line

APPLICATION: Ford, Lincoln, Mercury

DATE: 1994

Cooler Return Line



When you install an in-line filter into a transmission's cooler line, you must install the filter into the cooler-to-transmission return line. This is critical, because this is the only way to catch any foreign material leaving the cooler before it reaches the transmission.

It is not unusual to assume that as a unit is improved and the design is modified through the years, that the cooler line orientation on the case remains the same. Unfortunately, this is not so on the Ford AODE.

The Ford AOD (also known as the FIOD or an AOT) cooler return line is the bottom line on the case.

The Ford AODE cooler return line is the one on top. Keep this in mind when installing your in-line filters.

Technical Service Bulletin # **ATRATB871**

Date: **870101**

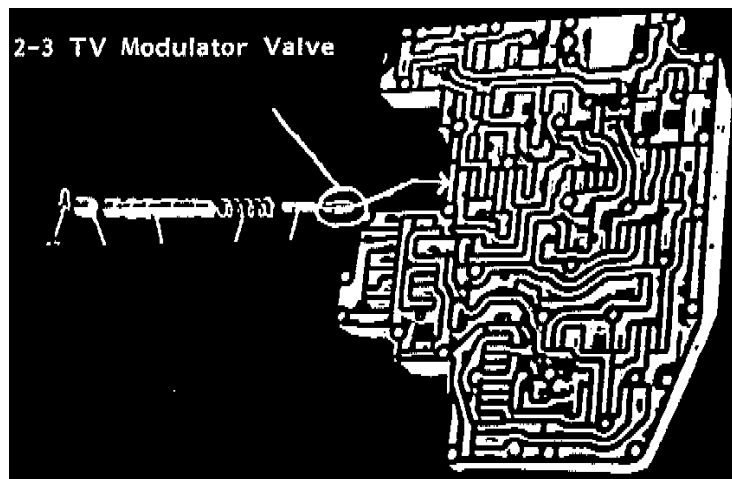
### **A/T - 3-2 Too Sensitive, or No Part Throttle Downshift**

TSB 87-1 (Jan)

SUBJECT: FORD AOD

#### **PROBLEM:**

Too sensitive 3-2, or no 3-2 part throttle downshift.

**CAUSE:**

May be a sticky 2-3 TV modulator valve. If it sticks closed, it can cause a no 3-2 part throttle downshift. If valve sticks open, it can cause a too sensitive 3-2 downshift.

**SOLUTION:**

Clean the valve, and re-assemble, making sure that a magnet will stroke the valve fully. Torque the valve body in proper sequence.

We recommend approximately .060 inch pounds on a problem unit.

Technical Service Bulletin # **ATRATB8729**

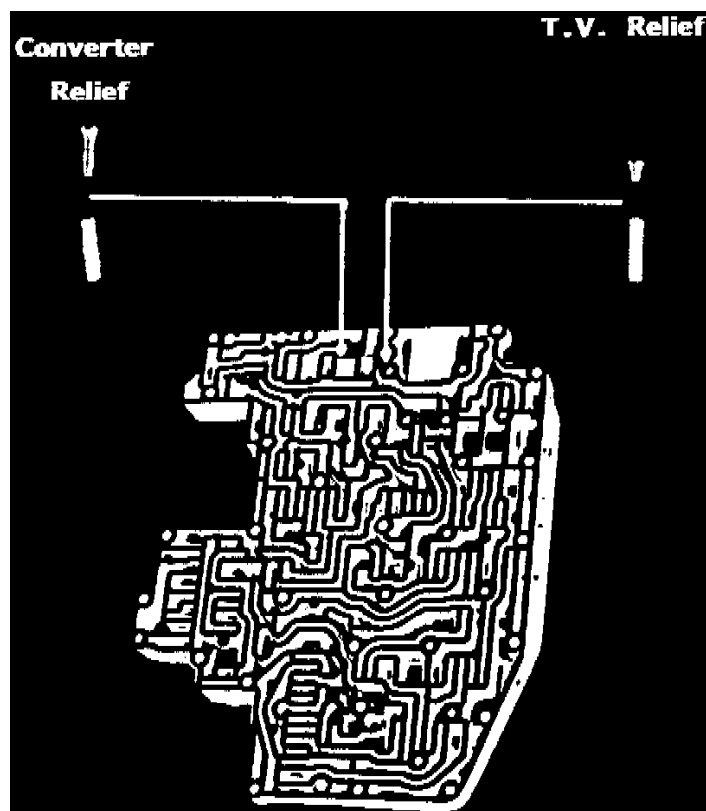
Date: **870401**

**A/T - AOD Relief Valves For Valve Bodies**

TSB 87-29 (May)

FORD AOD

SUBJECT: Relief valves for AOD valve bodies

**Note**

On the earlier valve bodies ('80-'81) both relief valves are the same. On the later ones, the converter relief valve has a longer stem.

Part number E2AZ7E217-A is the converter relief valve with a long stem.

This should be installed on the earlier valve bodies to help prevent it from "buzzing".

Technical Service Bulletin # **ATRATB8738**

Date: **870601**

## **A/T - AOD High Pitched Noise In All Ranges**

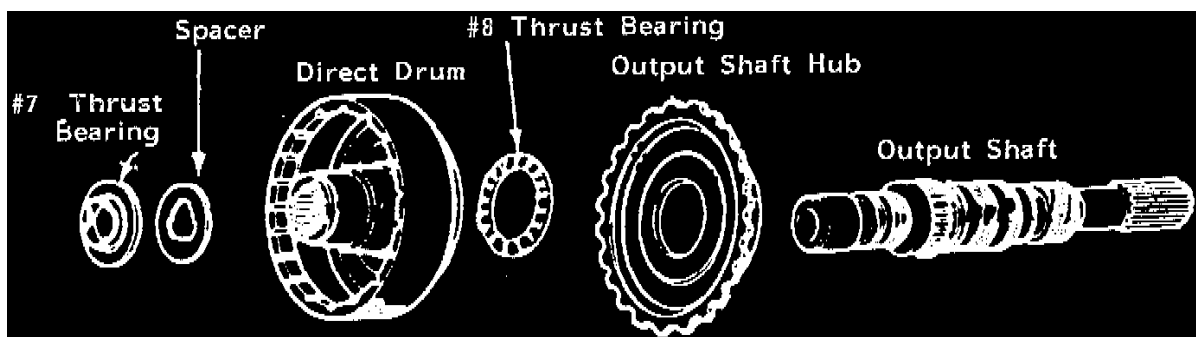
TSB 87-38 (June)

SUBJECT: FORD AOD

### PROBLEM:

High Pitched Noise in all Ranges. The noise becomes louder as the engine RPM increases.

POSSIBLE CAUSE:



Checking for location of noise with stethoscope will help verify if the noise is coming from the front or the rear of the transmission. It may be a bad bearing on either side of the direct drum (# 7 and # 8 Thrust Bearings).

When checking the thrust bearings on the front and rear of the direct drum, be sure the output shaft hub is smooth where the # 8 thrust bearing rides against it.

Always pay close attention to transmission end play on re-assembly. Many thrust bearing failures are due to improper end play.

Technical Service Bulletin # **ATRATB8748**

Date: **870801**

## **A/T - Slipping or No-Shift/Metal Sealing Rings**

TSB 87-48 (Aug)

SUBJECT: Metal sealing rings

Various Units

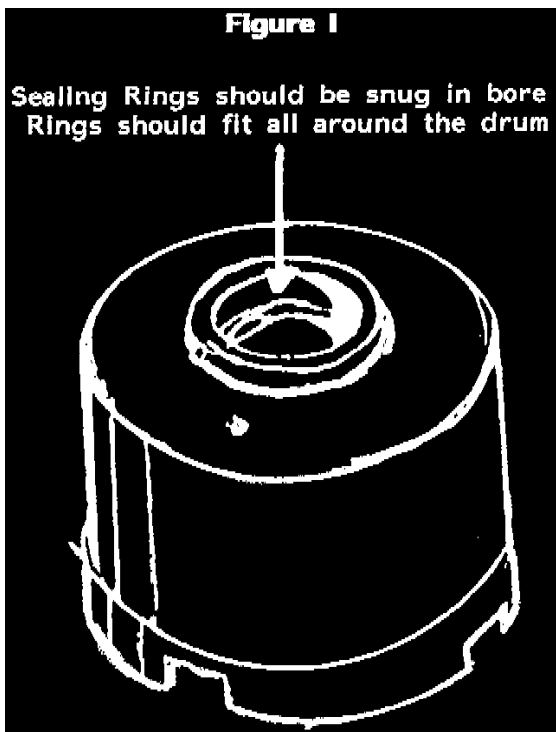
PROBLEM: Slipping, or sometimes no-shift

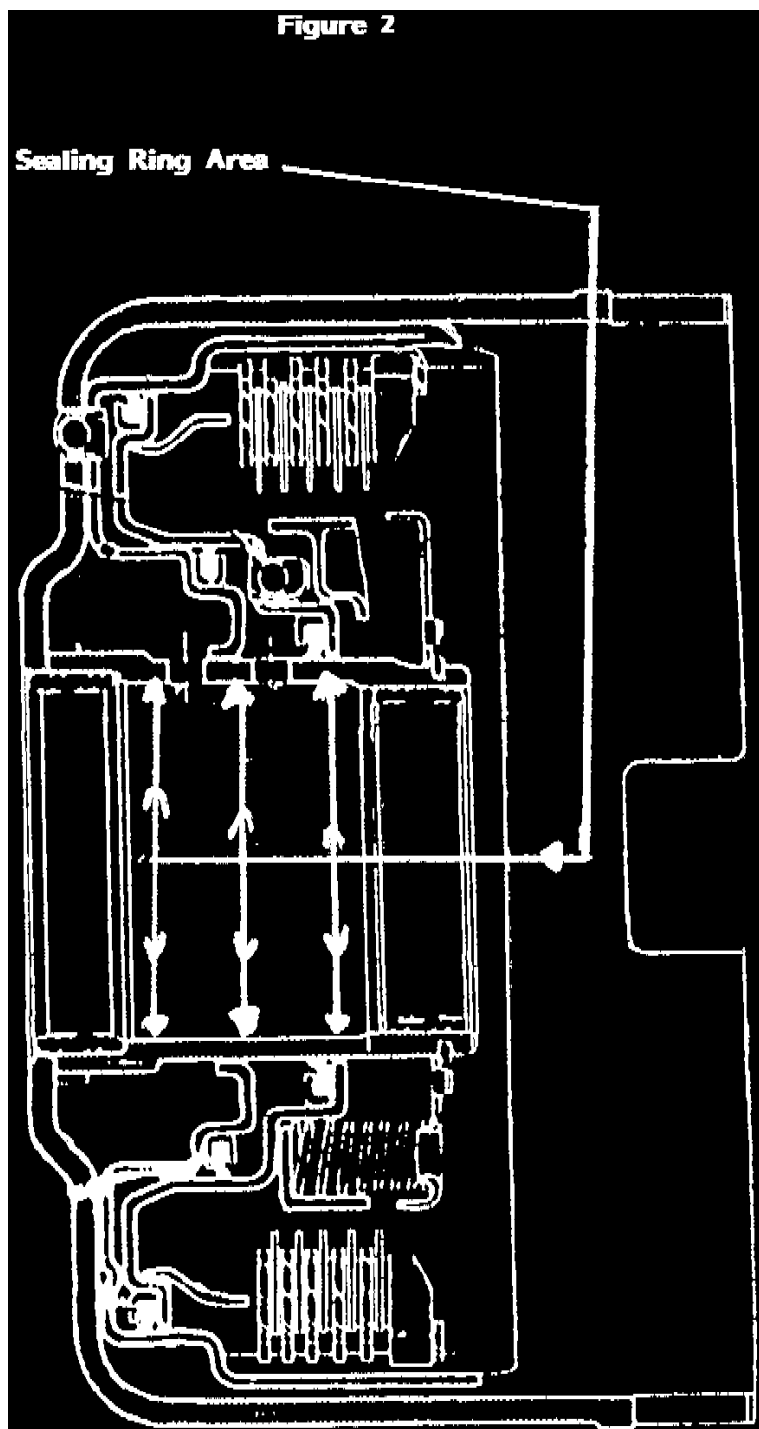
POSSIBLE SOLUTION: Sealing rings could be under-size.

1. Always inspect rings as outlined in SIL 84-29

**Figure 1**

Sealing Rings should be snug in bore  
Rings should fit all around the drum





2. Place ring in bore of drum where they will be running. (See Figures 1 & 2)
3. Sealing rings should be snug in bore; rings should fit all around the drum. (drum could be out-of-round)
4. Air check all drums. (Use 30 PSI air pressure only.) If air escapes you have leaks -- better find now, than later. This represents lost clutch pressure, and could result in soft application and burned friction material.
5. Following these steps will help you save money, plus help you build better units.

Technical Service Bulletin # **ATRATB875**

Date: **870101**

**A/T - AOD No End Play/Overdrive Band Burned**

TSB 87-5 (Jan)

SUBJECT: FORD AOD

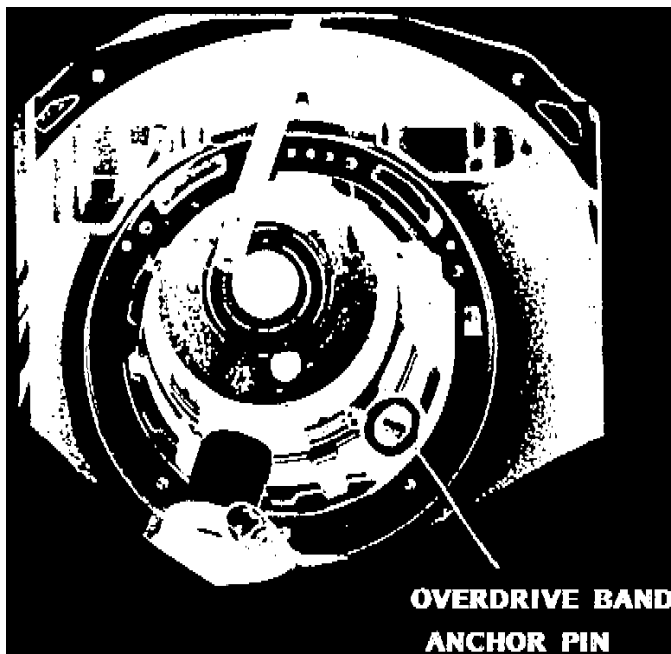
PROBLEM:

No end-play and/or overdrive band burned.

#### CAUSE:

If the problem exists no matter which selective thrust washer is used, it may be the overdrive band anchor pin binding the overdrive band against the reverse clutch drum.

During assembly, it may not appear that the band is binding against the reverse clutch drum. When the pump is installed, it may move the reverse clutch drum to center it, and that's when the reverse clutch drum and the overdrive band will bind.



#### SOLUTION:

Knock the overdrive anchor pin outward until it is no longer binding the overdrive band against the reverse clutch drum. Be careful; do not tap the anchor pin out too far! Put sealant on the anchor pin where it extends to the outside of the case.

Technical Service Bulletin # **ATRATB8750**

Date: **870801**

### **A/T - AOD No Fourth Gear**

TSB 87-50 (Aug)

SUBJECT: FORD AOD

PROBLEM: No Fourth Gear

When diagnosing a no-3-4 upshift condition, it's important to know what happens in this transmission during the 3-4 upshift.

When the 3-4 shift valve upshifts 1 forward clutch oil is exhausted, and the overdrive band is applied.

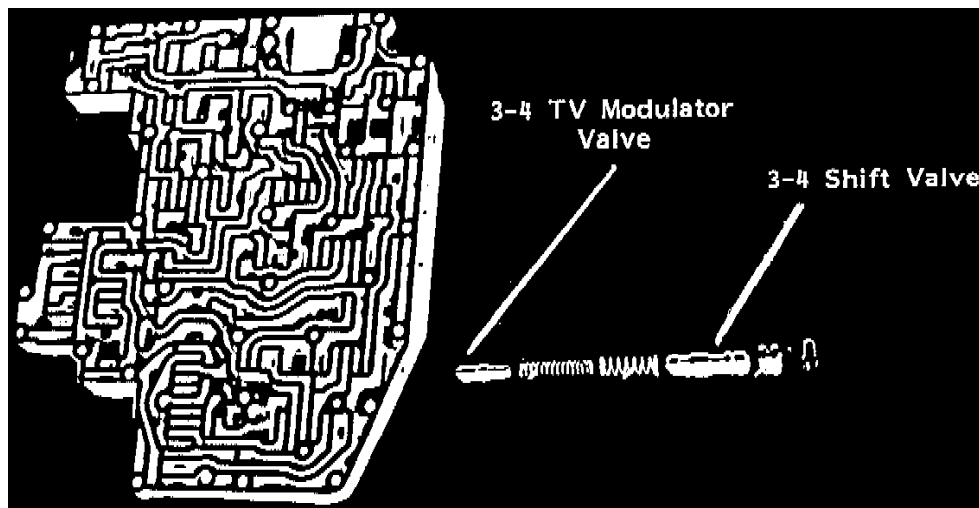
The direct clutches are applied in both 3rd and 4th gears. If the transmission shifts 1-2, 2-3, and never upshifts from 3rd gear, the 3-4 shift valve is not upshifting.

If the transmission makes a shift into neutral instead of 4th gear, it indicates the 3-4 shift valve upshifted, but the overdrive band did not apply properly.

The overdrive band application is controlled by several valves in the valve body, the overdrive servo and the overdrive band.

If the 3-4 shift valve is not upshifting, the possible problems are reduced considerably. These possible problems include: the 3-4 shift valve or the 3-4 modulator valve sticking, or governor oil is not rising high enough to shift the valve.

TO CHECK:



Remove the oil pan, extension housing and the governor. Air check the valve body through the governor feed hole, and try to "feel" the 3-4 shift valve for free movement while looking for excessive leakage. A common source for excessive governor leakage is the round aluminum plugs in the valve body, valve body gaskets, or where the governor support mates to output shaft.

Technical Service Bulletin # ATRATB8754

Date: 870901

## A/T - Front Bushing Wear

TSB 87-54 (Sept)

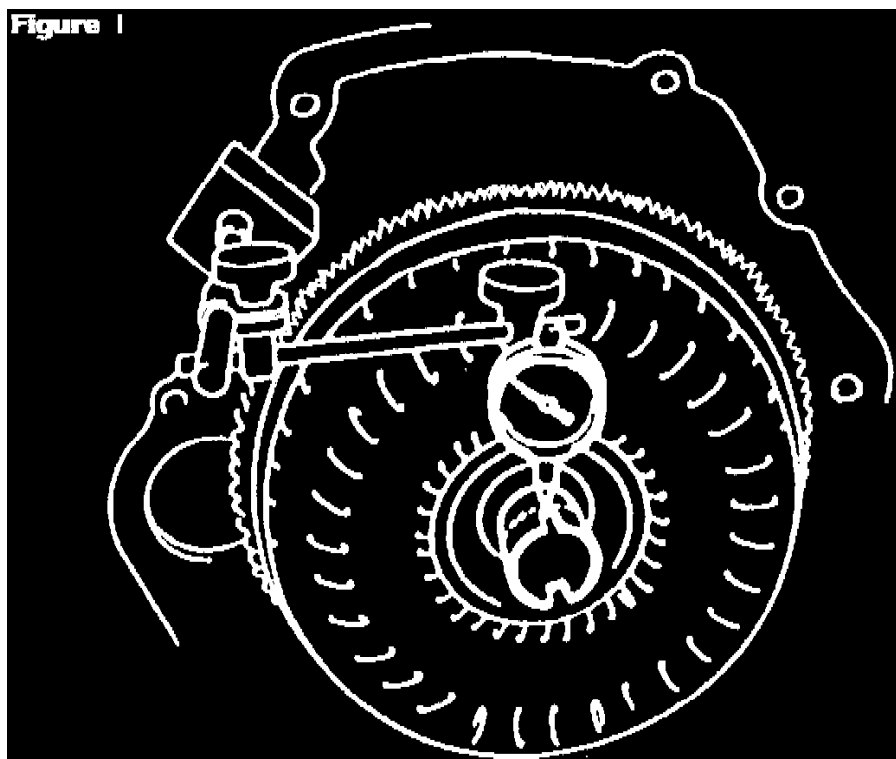
SUBJECT: ALL AUTOMATICS

PROBLEM: Front Bushing Wear

### CAUSE:

When diagnosing front pump bushing wear, the cause may be:

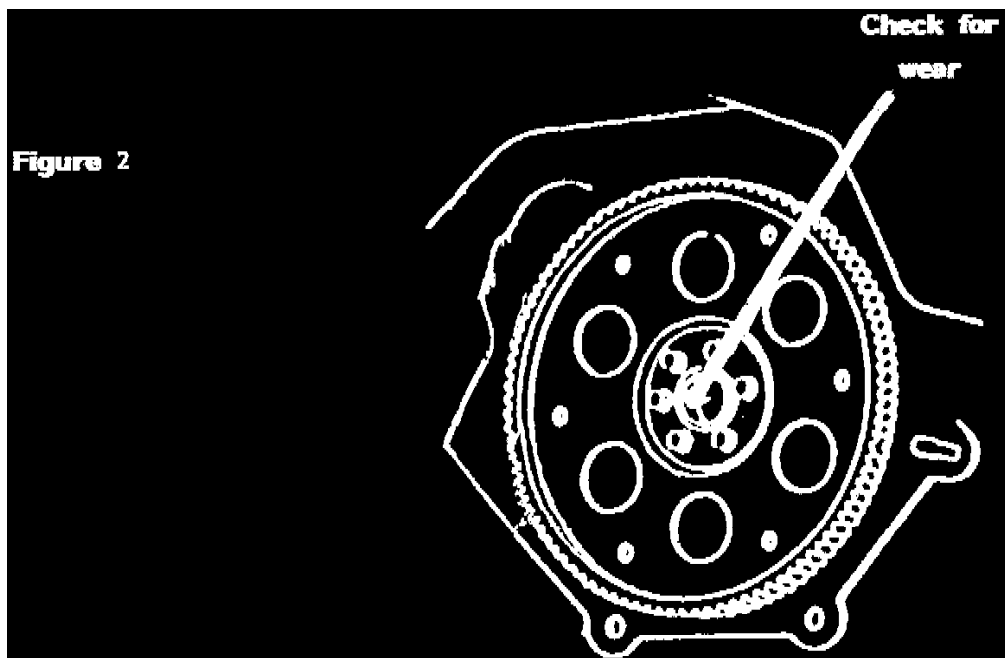
1. Excessive CONVERTER HUB RUN-OUT. This may, or may not be due to a faulty torque converter.



The torque converter can be checked visually, and with a dial indicator. (See Figure 1) Hub run-out should not exceed .010".

2. BROKEN, BENT OR CRACKED FLYWHEELS can also cause run-out. If the torque-converter-to-flywheel bolts have been loose, the flywheel

holes can become egg-shaped, or the torque converter pads may wear into the flywheel, causing run-out.



3. Another possibility is WEAR IN THE CRANKSHAFT, where it supports the torque converter pilot.(See Figure 2)

Often the crankshaft is only worn in a small area where the torque converter pilot has been against it.

If only a portion of the crankshaft is worn, rotate the crankshaft until the worn area is at 12:00 o'clock.

When the torque converter is pushed forward into the crankshaft, the torque converter pilot will bottom on a good portion, and should center properly.

Technical Service Bulletin # **ATRATB8761**

Date: **871101**

### **A/T - C6 No. 9 Thrust Washer Failure**

TSB 87-61(Nov)

DATE: November 01, 1987

SUBJECT: FORD C-6

PROBLEM: No. 9 thrust washer failure

SOLUTION:

In 1987 this thrust washer was revised to a thrust bearing that will retro-fit.

The one-way clutch inner race and reverse ring gear hub were also changed, to allow for the thrust bearing, and all three parts must be used as an assembly when converting to the earlier transmissions. The part number is E7TZ-7D164-B, which includes:

1. No. 9 thrust bearing
2. One-way clutch inner race
3. Reverse ring gear hub

Technical Service Bulletin # **ATRATB8810**

Date: **880201**

### **A/T - AOD Burned Overdrive Band/End Play after Rebuild**

TSB 88-10 (Feb)

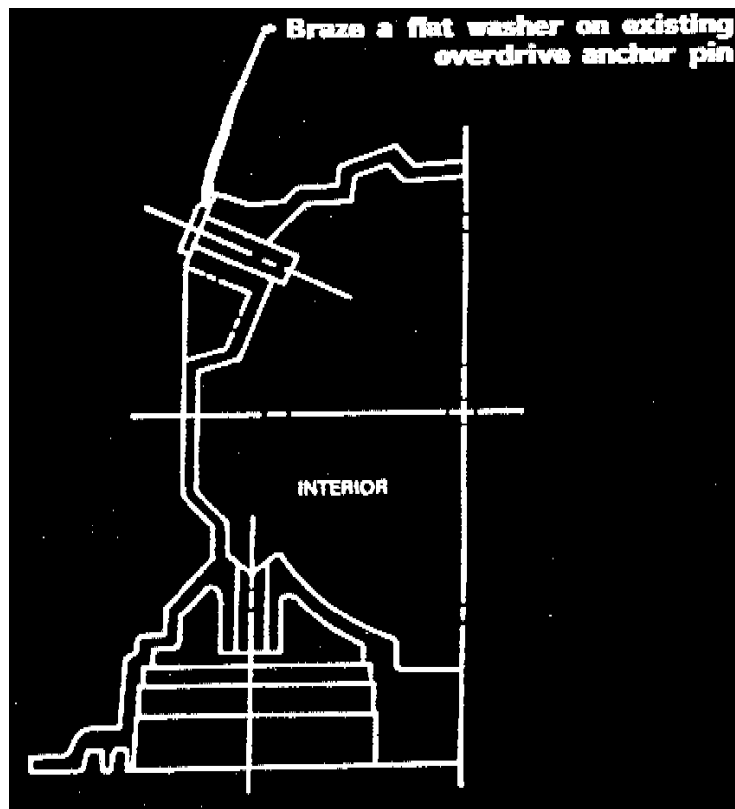
Subject: AOD

PROBLEM:

Burned overdrive band, or no end play after rebuild

CAUSE: May be mis-positioned overdrive anchor pin

SOLUTION:



Instead of purchasing a new style anchor pin, braze a flat washer on the existing pin.

The anchor pin should be positioned so the outside flat surface is flush with the flat case surface.

Always apply sealant to the anchor pin before re-installing it to prevent leakage.

Technical Service Bulletin # **ATRATB8820**

Date: **880501**

## **A/T - AOD Loss of Governor Pressure Through Valve Body**

TSB 88-20 (May)

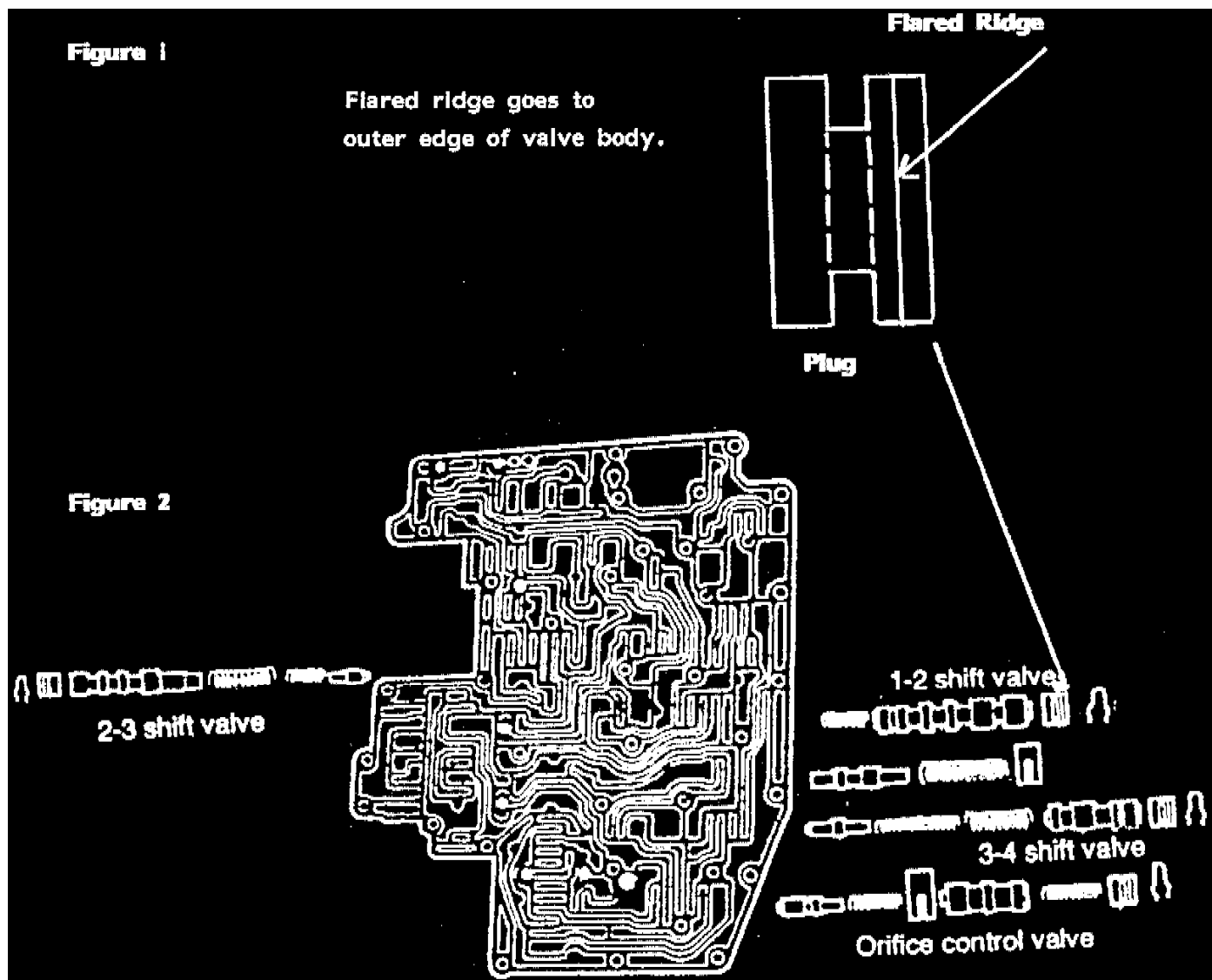
SUBJECT: FORD AOD

PROBLEM: Loss of governor pressure through the valve body.

SOLUTION:

The shift valves in the Ford AOD valve body depend on governor pressure to upshift.

Governor pressure is sealed in the valve body by aluminum plugs held in by a keeper at the edge of the valve body.



An easy way to seal these plugs is with a small tubing cutter. By running a small ridge around the outer diameter of the plug, flare the metal just enough to obtain a snug fit when installed (See Figure 1).

The plugs that should be sealed are for the 1-2, 2-3 and 3-4 shift valve and orifice control valve (Figure 2).

Be sure to check the plug keeper for wear.

A worn keeper will allow the plug to move back and forth, causing plug to lose its snug fit.

Technical Service Bulletin # **ATRATB8825**

Date: **880601**

## **A/T - Harsh 1-2 Upshift or Slide Bump 1-2 Upshift**

TSB 88-25 (June)

SUBJECT: FORD AOD

PROBLEM: Harsh 1-2 upshift, or slide bump 1-2 upshift

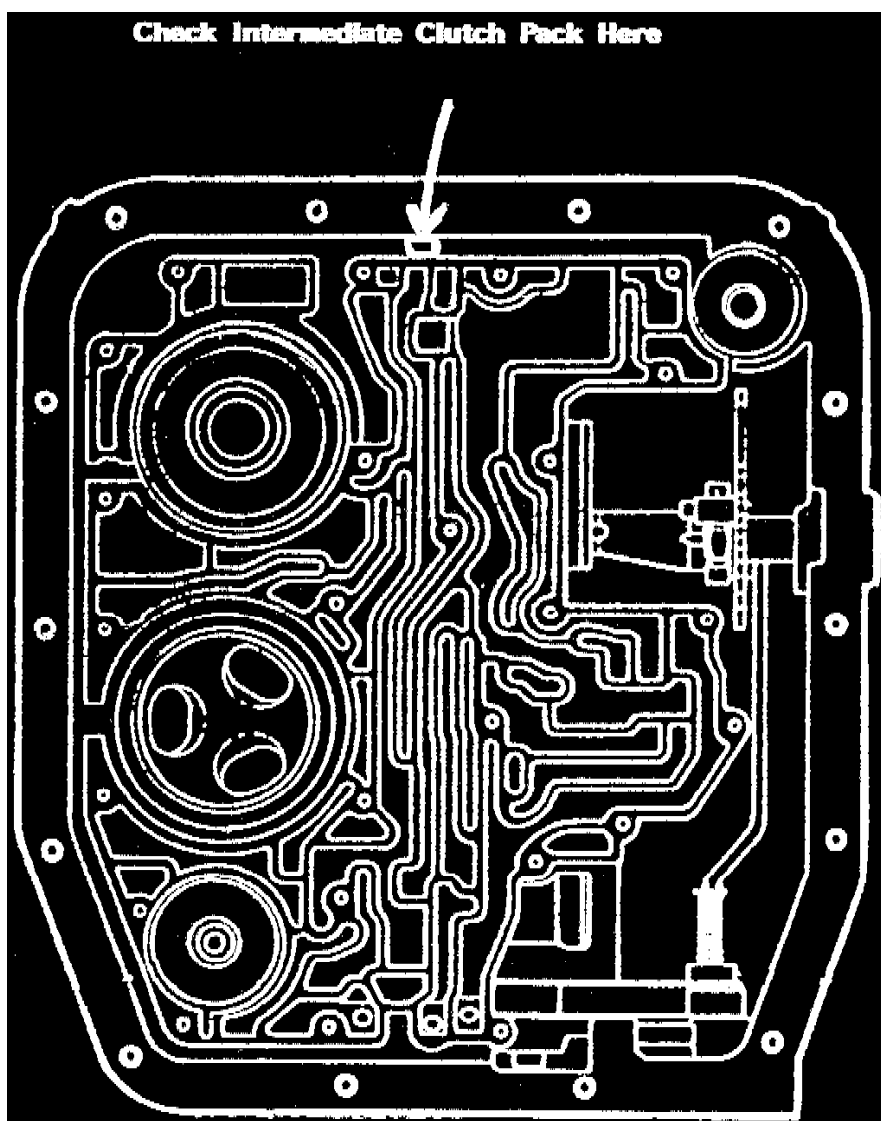
CAUSE:

May be caused by improper intermediate clutch pack clearance

Many technicians have experienced this condition, and blamed it on the friction plate manufacturer. This is not where the fault lies; in fact, the friction plates may be of a better quality than the original friction plates.

If intermediate clutch pack clearance is not checked on AOD transmissions, the intermediate return spring assembly in the pump may drag the clutch pack and glaze the frictions in reverse and low gears.

This can happen before the vehicle is road-tested, and cannot be fixed without removing the glaze from the friction plates.



Intermediate clutch pack clearance can be checked with a tool, or through a small hole in the case after the front pump has been installed. (See Figure)

Proper intermediate clutch pack clearance is:

.030"-.042"

Technical Service Bulletin # **ATRATB8834**

Date: **880701**

## **A/T - Sprag Rotation**

TSB 88-34 (July)

SUBJECT: SPRAG ROTATION

GM, FORD, HONDA, TOYOTA

Many sprags have been installed incorrectly because the manual may be difficult to understand.

The following figures should be easy to understand for a number of reasons:

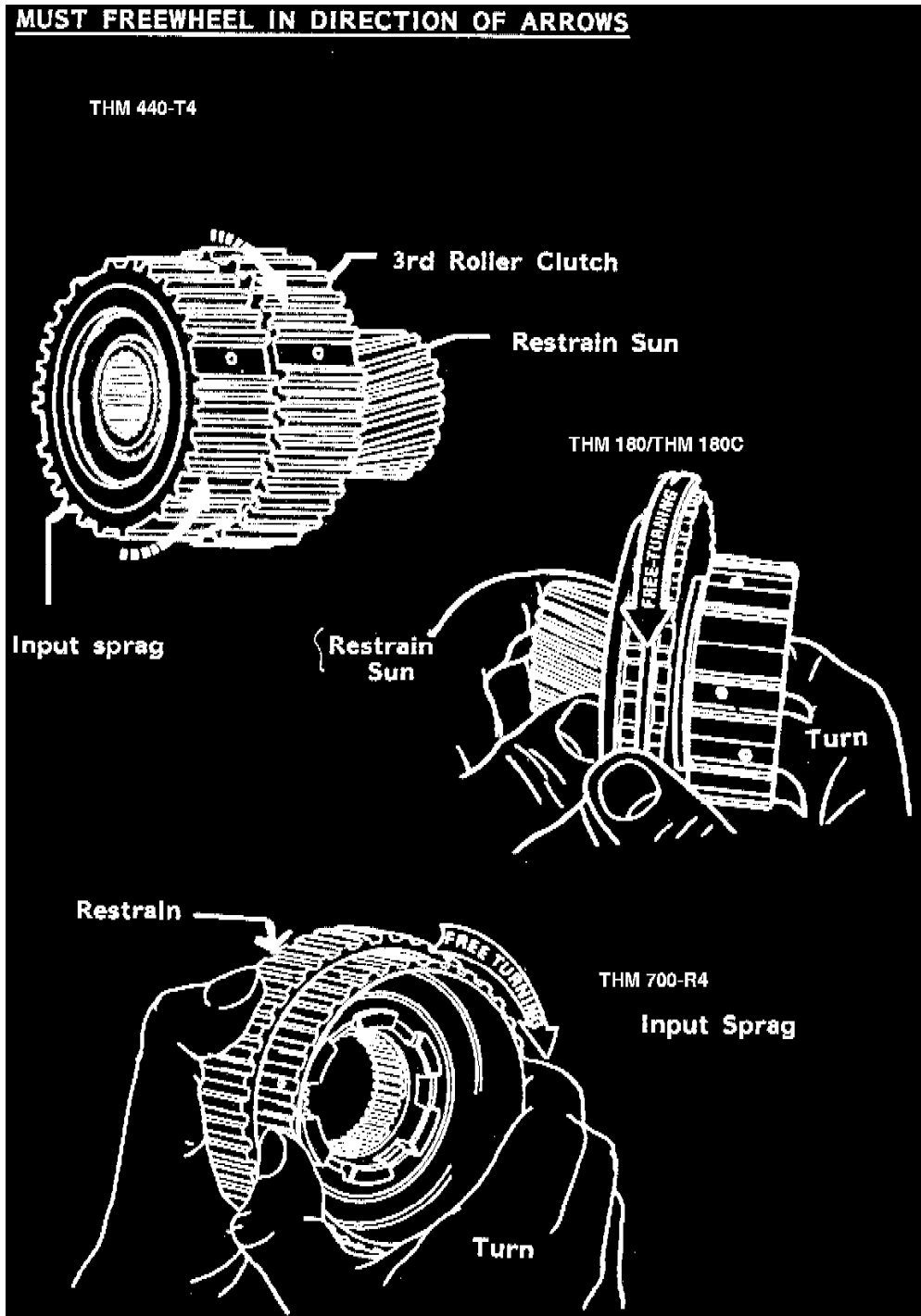
1. An arrow indicates direction of freewheeling
2. "Restrain" indicates component should be held stationary.
3. "Turn" indicates the component should be attempted to turn in both directions. That component will lock one direction and freewheel the other.

Two "RULES OF THUMB" are true when it comes to sprag rotation.

1. Sprags that hold a given planetary gear (Sun, ring, or planetary carrier) stationary to the case will freewheel in third gear.

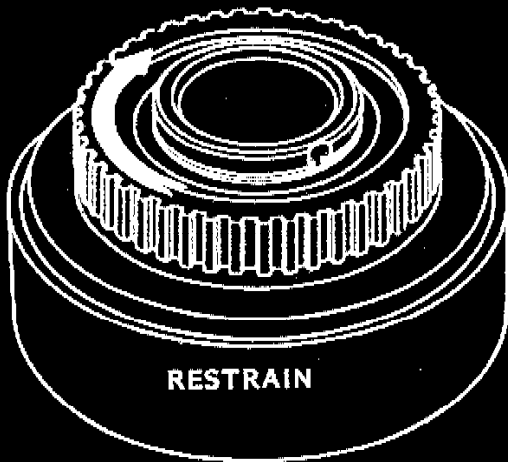
That means the planetary gear must freewheel in engine rotation.

2. A sprag located in an overdrive section must lock when the input shaft is turned in engine rotation, so torque can be transferred to the other section of the transmission.



GENERAL MOTORS  
(THM 440-T4, THM 180/THM 180C, THM 700-R4)

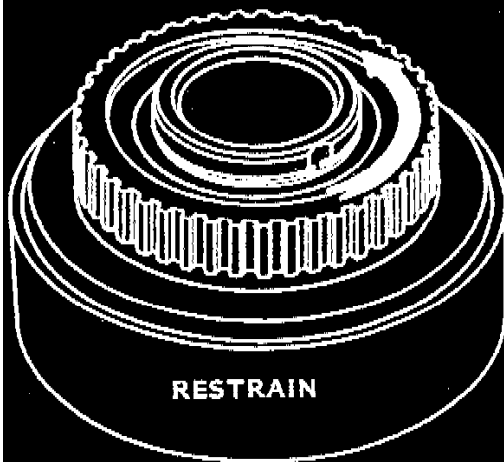
Turn Outer Race  
Must Freewheel in Direction  
of Arrow



RESTRAIN

**375, 400, OR 475 THM**

Turn Outer Race  
Must Freewheel in Direction  
of Arrow

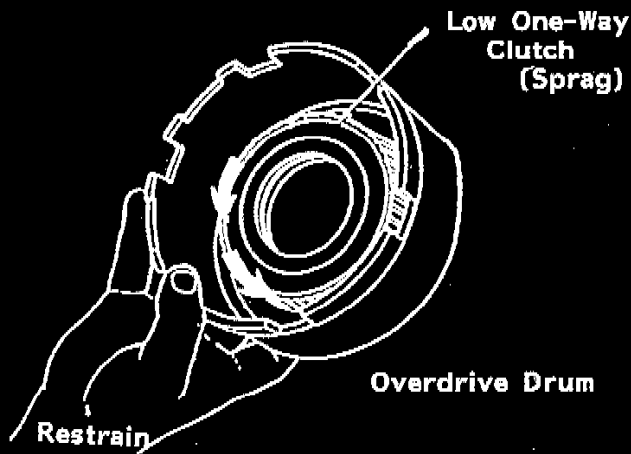


RESTRAIN

**425 THM**

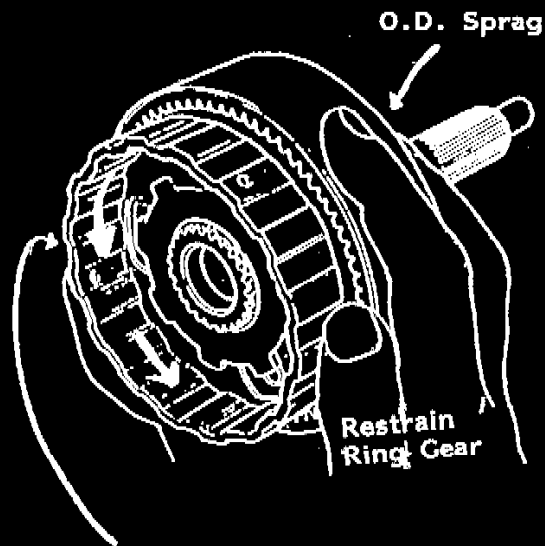
(375, 400, OR 475 THM)

**FORD AXOD**



Outer Race Should Freewheel Counter Clockwise

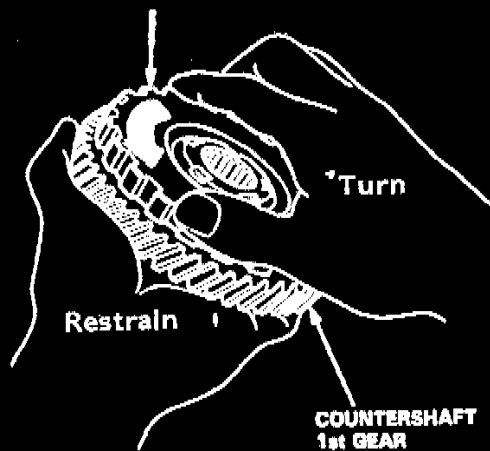
**FORD A4LD**



Planetary Must Freewheel In Direction of Arrows

**HONDA 3 & 4 SPEED**

Parking Gear Should Freewheel in Direction of Arrow

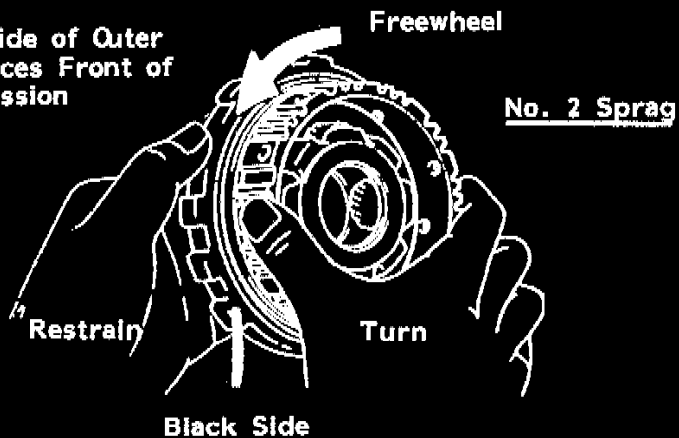


FORD/HONDA  
(AXOD, A4LD, HONDA 3 & 4 SPEED)

A-SERIES

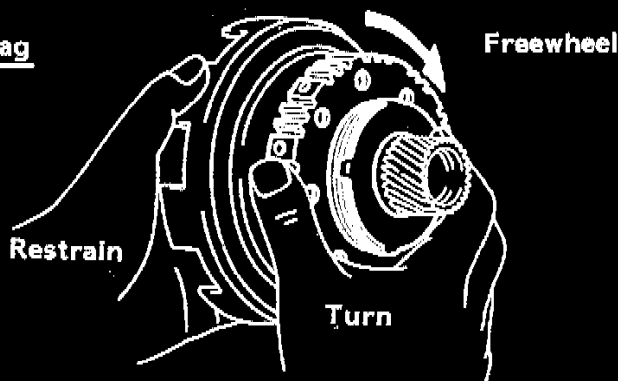
A 130, A 140 SERIES

Shiny side of Outer Race Faces Front of Transmission



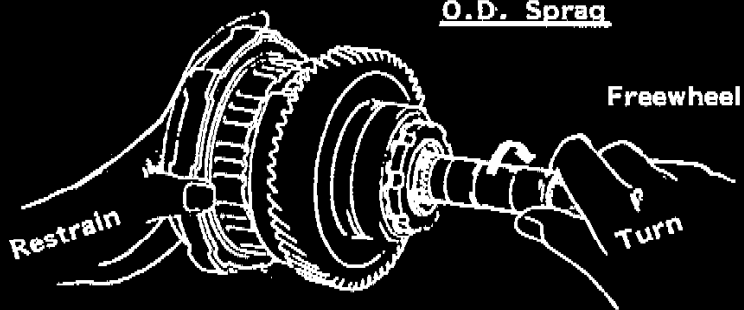
A 130, A140 SERIES

No. 1 Sprag

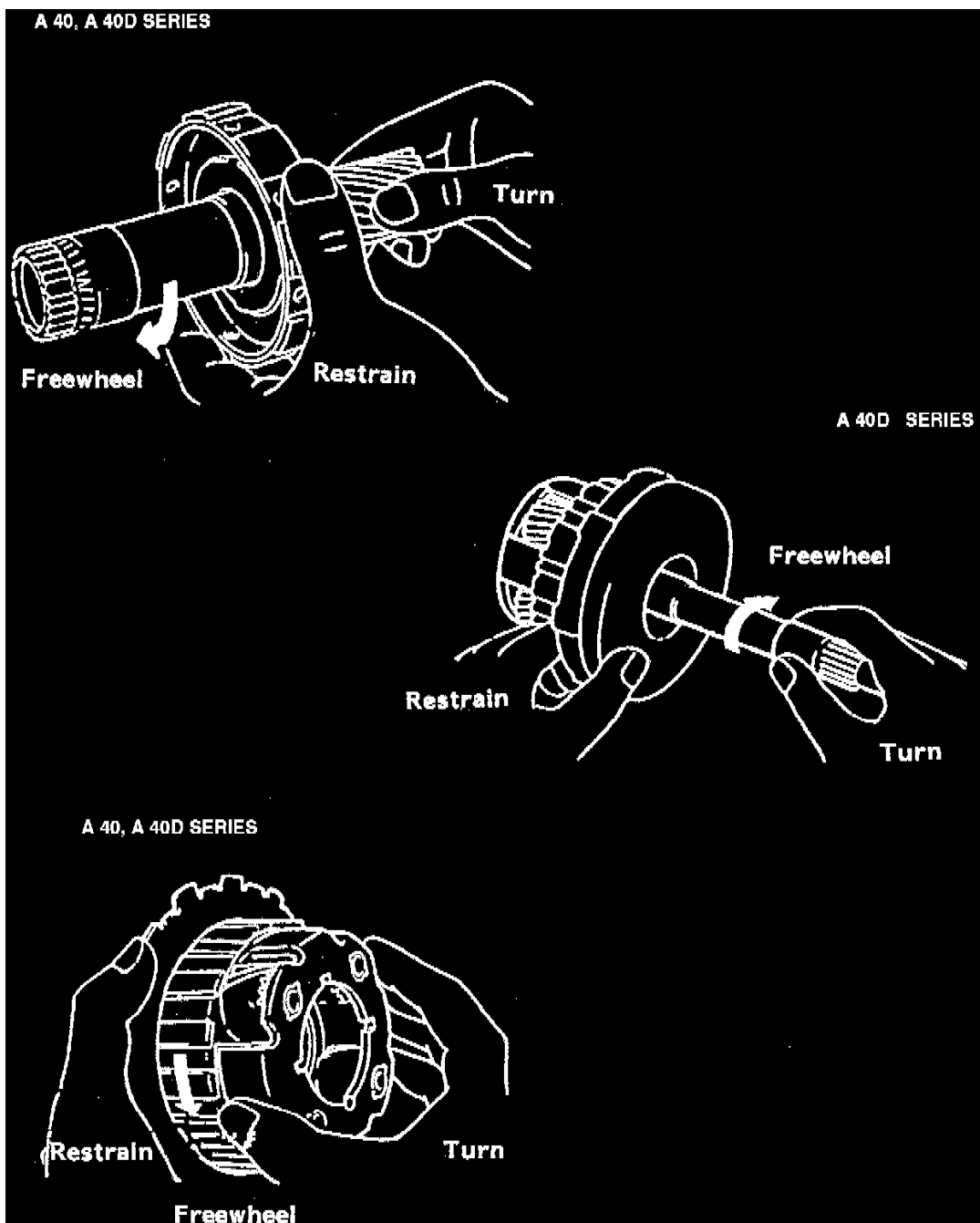


A 140E

O.D. Sprag



(A130, A140, A140E)



(A40, A40D) Technical Service Bulletin # ATRATB8839

Date: 880901

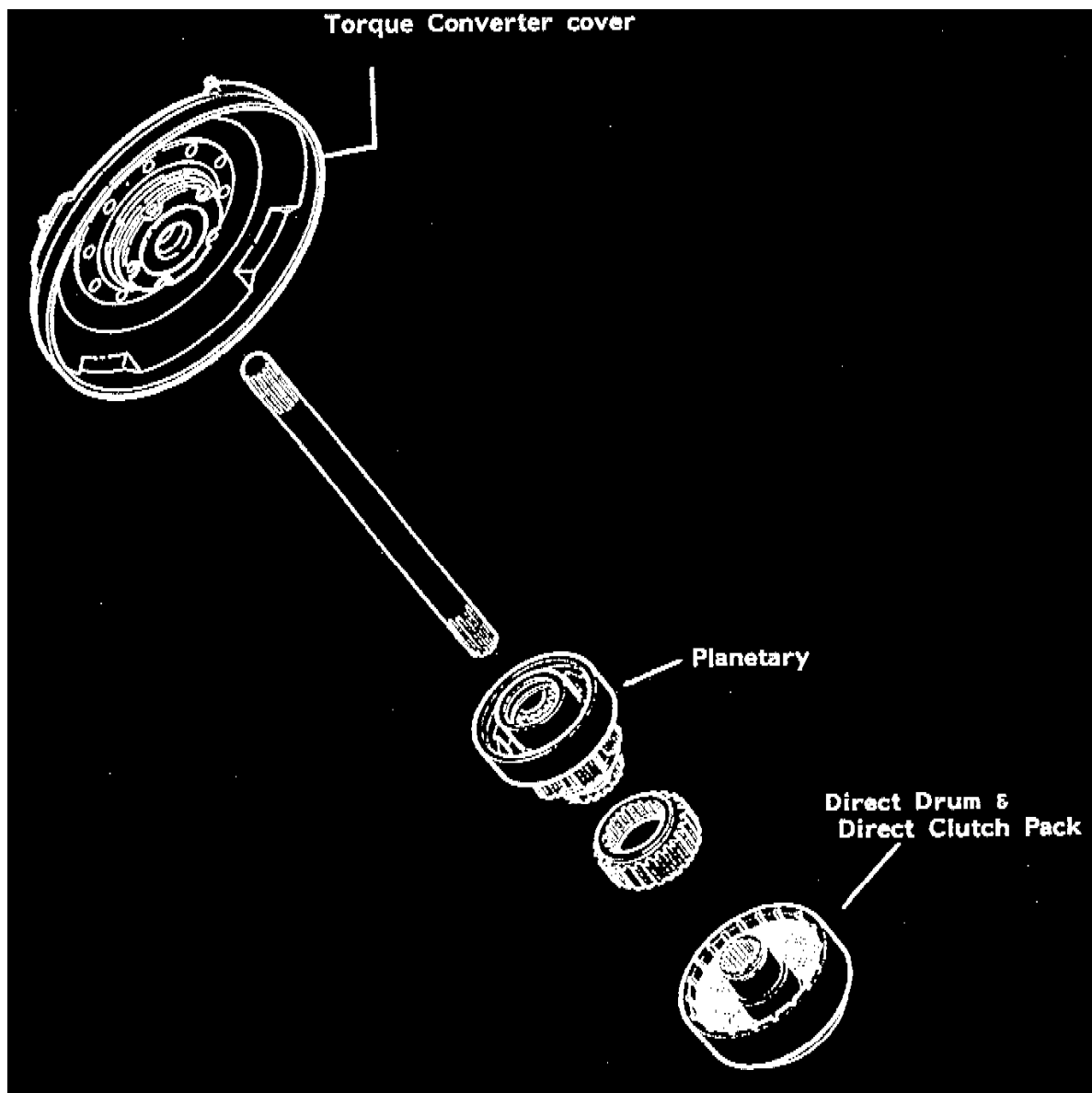
### A/T - AOD Kills Engine In Reverse and/or Forward Gears

TSB 88-39 (Sept)

SUBJECT: FORD AOD

PROBLEM: Kills engine in reverse and/or forward ranges

CAUSE: May be direct clutches applied in gear



When applied, the direct clutch pack connects the torque converter to the planetary. If direct clutches are applied when the transmission is shifted into gear, the torque converter will be mechanically connected to the rear wheels.

Causes of the direct clutches applied in gear are as follows:

1. Direct clutch frictions welded to steels
2. Sticking 2-3 shift valve in valve body
3. Valve body or case cross-leaks

If kills engine only in forward ranges:

1. Sticking governor valve
2. Governor sealing rings worn into case
3. Valve body or case cross-leaks

Technical Service Bulletin # **ATRATB8840**

Date: **880901**

**A/T - AOD Failure In Rear Of Transmission/No Lubrication**

TSB 88-40 (Sept)

SUBJECT: FORD AOD

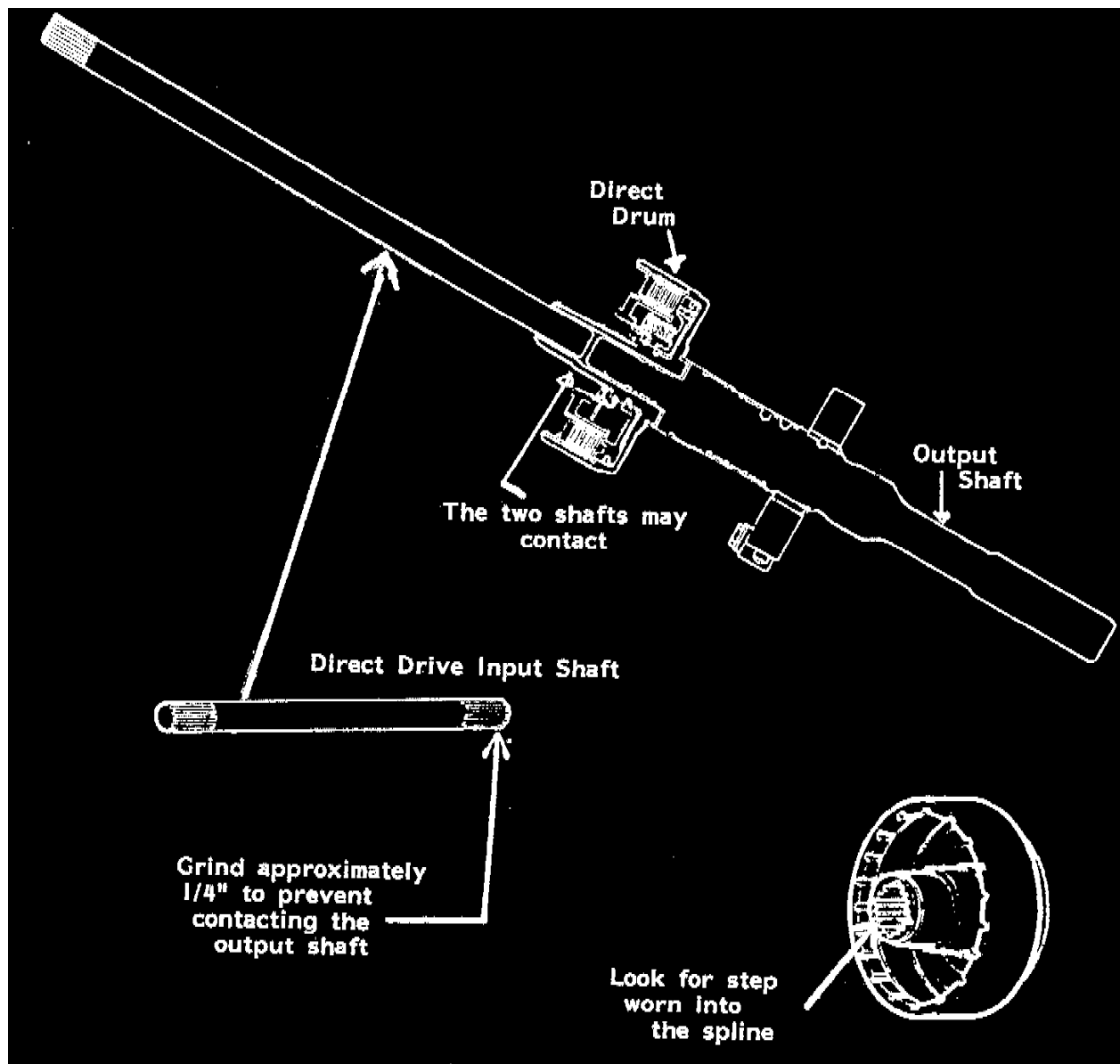
**PROBLEM:**  
Failure in rear of transmission, due to lack of lubrication.

**POSSIBLE CAUSE:**  
Rear of direct drive input shaft contacting the front of the output shaft.

Two holes are drilled into the front of the output shaft. One hole is sealed with a solid cup plug, the other is open to lubricate the rear components.

The direct drive input shaft is splined to the direct drum. If a step wears excessively into the direct drum spline, the direct drive input shaft will contact the output shaft. This may restrict fluid that lubes the rear components.

**CORRECTION:**



If a step is found in the direct drum spline, grind approximately 1/4" off the direct drive input shaft spline.

This will prevent it from contacting the output shaft.

Technical Service Bulletin # **ATRATB8913**

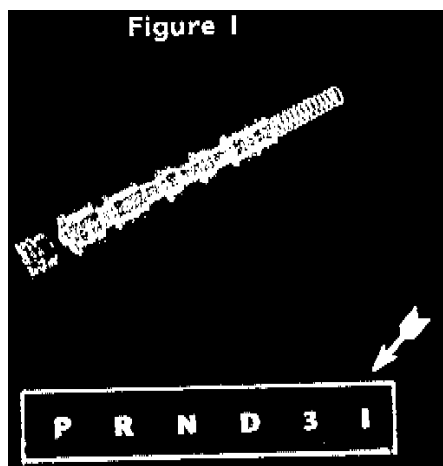
Date: **890401**

**A/T - AOD No Manual Low Gear**

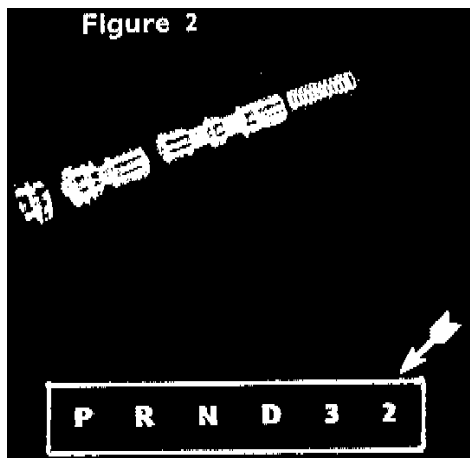
TSB 89-13 (Apr)

SUBJECT: FORD AOD

NO MANUAL LOW



Some AOD's may not have manual low because of the valve body layout. If the shift selector reads P-R-N-OD-3-1, the transmission should have a one-piece 1-2 shift valve in it (See Figure 1). This unit should give you manual low.



If the selector reads P-R-N-OD-3-2, the unit should have a 1-2 shift valve in it (See Figure 2). This transmission will not have manual low. The transmissions with no manual low were usually found in police cars, but may also be found in other vehicles.

If the transmission has ever been worked on, you can't be sure which style you have -- without removing and examining the valve body.

The figures show two different valve trains for the 1-2 shift valve. To get manual low, you must have the one-piece shift valve.

If you run into a valve body that has a two-piece 1-2 shift valve -- this valve body can not provide manual low.

If you want manual low, but you have a two-piece shift valve, you must change the valve body, not just the valve.

Technical Service Bulletin # **ATRATB8916**

Date: **890601**

## **A/T - Rear Planet Failure/Lack Of Lubrication**

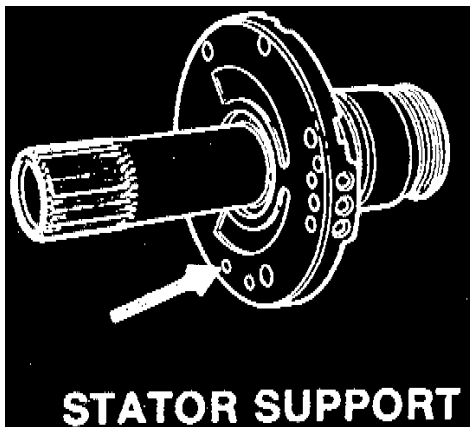
TSB 89-16 (June)

SUBJECT: FORD

PROBLEM: Rear planet failure, due to lack of lubrication

CAUSES: There can be several causes:

1. Cooler restrictions, or crimped auxiliary cooler hoses (SIL 86-8).
2. Direct shaft worn into drum, and rubbing the output shaft (TSB 88-40).



3. Cooler checkball in pump cover is restricted. (See figure) Debris from the converter flows through the passage and can lodge next to the ball, which severely restricts lube flow around the ball. The planets need all of the lube flow available, and the pinion shafts and bearings will "blue" and/or seize if any lube flow is lost.

#### SOLUTIONS:

Always be sure to clean the check ball thoroughly.

Many rebuilders are removing the spring in this passage to improve cooler flow. This seems to be working quite effectively.

Technical Service Bulletin # **ATRATB8922**

Date: **890701**

### A/T - AOD Governor Pressure Leaks

TSB 89-22 (July)

SUBJECT: FORD

SUBJECT: Governor pressure

- # 1. There is a lot of information in the field concerning governor pressure leaks on the AOD. Low governor pressure can keep the transmission from making a 3-4 upshift.

The fix has been to tighten the governor counterweight to the output shaft by putting a piece of rubber under the drive ball.

Another fix has been to tighten the aluminum plugs in the valve body which seal governor oil.

These fixes have been working quite well when there is a loss of governor pressure.

- # 2. We have received calls of 4-3 coastdown clunks and shudders when coming to a stop being caused from too much governor pressure. Often these complaints appear after correcting the low governor pressure.

#### CONCLUSION:

If governor pressure is low, we must fix the leaks! If governor pressure is normal, **DO NOT TIGHTEN THE COUNTERWEIGHT!**

The problem is that the AOD does not have a governor pressure port. If governor pressure is low enough to prevent a 3-4 upshift, it also will not allow a wide open throttle (WOT) 1-2 upshift.

#### SUMMARY:

When diagnosing a problem that you think may be low governor pressure, check for a 1-2 upshift at maximum throttle. If the upshift occurs, governor pressure is fine. Do not tighten the counterweight.

Technical Service Bulletin # **ATRATB8923**

Date: **890801**

### A/T - Math Formulas Part I

TSB: 89-23 (Aug)

SUBJECT:

TRANSMISSION MATH FORMULAS (Your most valuable tool)

Transmission math formulas are not reserved exclusively for engineers. Understanding some basic mathematical formulas can be one of your most valuable tools.

The following information contained in this bulletin will discuss various basic formulas dealing with:

1. Shift Speed
2. Pressure
3. Speedometer ratios

Take the time, now, to understand these relatively simple concepts.

You will be saving yourself many problems, and considerable frustration, and also dollars, in the future.

## Shift Speed and Pressure

### SHIFT SPEED AND PRESSURE

To figure the area of a circle (valve or servo):

Radius (which is 1/2 the diameter) x Radius x 3.14159 = Area

EXAMPLE: A 1" diameter circle has a radius of 0.5"

$$0.5 \times 0.5 \times 3.14159 = 0.785$$

Therefore a 1" diameter circle has an Area of 0.785 sq. inches

Pressure x Area = Force

EXAMPLE: 100 psi line pressure, on a servo with an area of 2 square inches = force

So, 100 psi line pressure x 2 sq in = 200 pounds of force.

Force divided by Area = Pressure

EXAMPLE: 200 lbs divided by 2" = 100 psi

Force divided by Pressure = Area

EXAMPLE: 200 lbs divided by 100 psi = 2 inches

THINGS WE CAN DO WITH THESE FORMULAS:

EXAMPLE: A 700 R4 has 62 psi of line pressure at Idle.

The PR spring weighs 6.5 lbs

The tip (reaction end) of the PR valve has a diameter of 0.365" (0.365 divided by 2 = 0.1825 radius)  $0.1825 \times 0.1825 \times 3.14159 = 0.1046$ " area

We want 75 psi of line pressure at Idle

First, let's see if those numbers add up, using: Pressure x Area = Force

$$62 \text{ psi} \times 0.1046 = 6.48, \text{ or } 6 \frac{1}{2} \text{ lb PR Spring}$$

We want 75 psi:

$$\text{Pressure} \times \text{Area} = \text{Force (Spring)} \quad 75 \text{ psi} \times 0.1046 = 7.85 \text{ lb spring}$$

What if we put in an 8 lb Spring? Force divided by Area = Pressure

$$8 \text{ lbs} \text{ divided by } 0.1046 = 76.48 \text{ or } 76 \frac{1}{2} \text{ line pressure}$$

Now, let's look at RATIO.

Ratio is the relationship in quantity, amount or size, between two or more things.

In our example ratio is: How many psi each pound of spring will add.

Pressure divided by Force = Ratio

EXAMPLE: 62 psi divided by 6.5 lbs = 9.5 ratio Each pound of spring will increase pressure 9.5 psi

Force x Ratio = Pressure

EXAMPLE: 6.5 lbs x 9.5 = 61.75 or 62 psi

(Let's add 1 lb of spring, and see if we get 9.5 more psi.)

Force x Ratio = Pressure

EXAMPLE: 7.5 lbs x 9.5 = 71.25

New pressure Old pressure = Pressure difference

71.25 minus 61.75 = 9.5 psi change (by adding 1 lb of spring)

Once you know the ratio, a lot can be determined. Pressure divided by Ratio = Force

62 psi (actually 61.75) divided by 9.5 = 6.5 lb spring

The ratio never changes. This means that if I know that line pressure is 55 psi at idle, in a 700 R4, the the PR spring must be 5.78 lbs.

Pressure divided by Ratio = Force

So, 55 psi divided by 9.5 = 5.78 lbs.

Now, let's look at a math formula for shift speeds.

Suppose we had shift speeds of 15 mph and 20 mph, for the 1-2 & 2-3 shifts on a transmission. 20 mph may be too early for the 2-3 shift. If we adjust TV modulator, we will move both shifts. We don't want to do that because the 1-2 shift is fine, so let's work with just the 2-3 shift spring.

EXAMPLE: Original spring divided by Original MPH = Ratio

As, 4 lbs divided by 25mph = 0.2

Ratio x Desired MPH = New Spring

0.2 x 25 mph = 5 lb spring

A 5 lb spring will raise the shift on this transmission to 25 mph.

All you need to know is -- Where is it shifting now (at MINIMUM throttle) and what does the spring weigh.

This formula will get you very close, but may be a "tad" off, because we are not accounting for TV pressure helping the spring. This is why you want to check it at minimum throttle, so TV has the least effect.

## Speedometer Ratios

Finally, let's look at speedometer ratios.

Suppose we put an exchange transmission in a car, and now the speedometer is off, because the speedometer drive gear has a different tooth count. What do we have to do to the driven gear to correct it?

Let's say the old drive gear had 7 teeth and the old driven gear had 21 teeth. The exchange unit had 8 teeth on the drive gear.

Old Drive Gear divided by the New Drive Gear = Ratio

7 teeth divided by 8 teeth = 0.875

Old Driven Gear divided by Ratio = New Driven Gear

21 teeth divided by 0.875 = 24 teeth

A 24 tooth driven gear will correct the speedometer error.

Let's do one more speedometer change. This time the old drive is 9, and the new drive is 10. The old driven gear is still 21.

Old Drive Gear divided by New Drive Gear = Ratio

9 tooth divided by 10 tooth = 0.9

Old Driven Gear divided by Ratio = New Driven Gear

21 tooth divided by 0.9 = 23.33 teeth

We can't get a 23.3 tooth count so we round it off to 23 teeth. Now the speedometer will be close, but not exact, because we had to round off the number.

Technical Service Bulletin # **ATRATB8927**

Date: **890901**

## **A/T - Twenty Steps To Successful Repairs**

TSB 89-27 (Sept)

SUBJECT: TWENTY STEPS TO SUCCESSFUL TRANSMISSION REPAIR

1. As you start work on a transmission, read your ATRA bulletins pertaining to that transmission. (If you do this every time, before you know it you'll have the bulletins memorized.)
2. Clean the entire transmission, including the valve body.
3. Check pumps, valve bodies, and cases for warpage.
4. Flat file pumps, valve bodies, and cases. (Just a few strokes with the file to knock off high spots and handle burrs.)
5. Check all pump gear clearances.
6. Check planet pinion endplay and side to side motion.
7. Soak all planet assemblies.
8. Soak all friction material for 15-30 minutes.
9. Sand, tumble, or replace all steel plates.
10. Re-surface all drums on which a band rides.
11. Replace all rotating oil control rings.
12. Check all oil control rings, and rubber products in their bores for proper fit.
13. Replace all major support bushings and bushings that control lube oil.
14. Pre-lubricate all bushings and thrust washers.
15. Pre-lube pumps.
16. Pre-fill torque converters.
17. Use available manuals to find specifications.
18. Set correct clutch and band clearances
19. Take the time to set total unit endplay
20. Use a torque wrench on all pumps and valve bodies.

**A/T - Math Part II**

TSB: 89-30 (Oct)

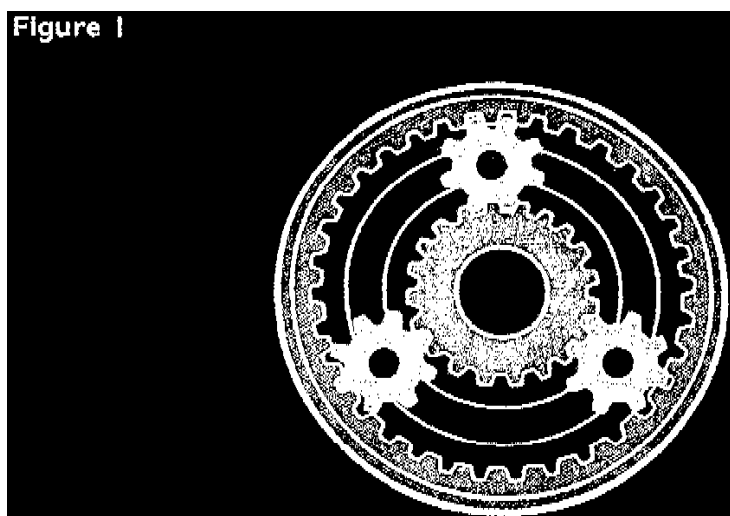
SUBJECT: TRANSMISSION MATH - Part II

Planetary Gear Sets:

Knowing the gear ratios of an automatic transmission can come in handy at times -- especially when you're swapping transmission types or differentials. The problem is in trying to find a manual with the ratios listed. What do you do?

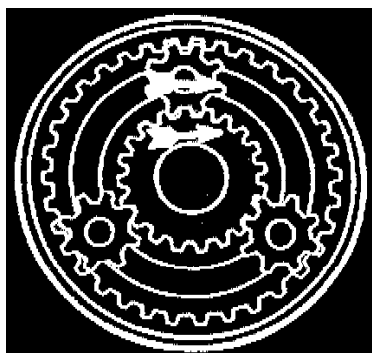
**BREAK OUT THE CALCULATOR, AND FIGURE IT OUT.**

When you figure the gear ratios for planetary gear sets, it is just like any other gear set. You divide the output gear by the input. Also, don't count the idler gear; planetaries are considered idler gears. Set them aside, their tooth count doesn't matter.



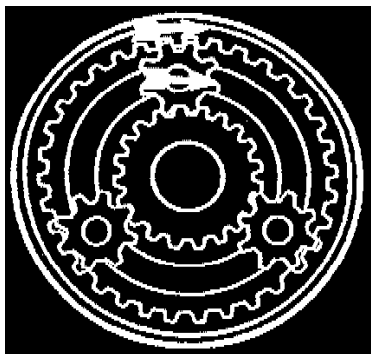
Now for the tricky part -- which gear do you consider the input, and which one the output? Figure 1 shows a planetary gear set with 34 teeth on the ring gear and 20 teeth on the Sun gear.

**FOR GEAR REDUCTION**, one of the gears is held stationary, and the other is used for the INPUT. **THE TOOTH COUNT FOR THE OUTPUT GEAR IS THE SUM OF THE SUN GEAR AND THE RING GEAR**, so if you are using the Sun gear for the input, then the ring gear + the Sun gear divided by the Sun gear = Ratio.



**EXAMPLE:**  $34 + 20$  divided by  $20 = 2.7:1$  This is how 1st gear on a THM 700 R4 is calculated. (See figure)

When the ring gear is used as the input, then the ring gear + the Sun gear divided by the ring gear = Ratio.

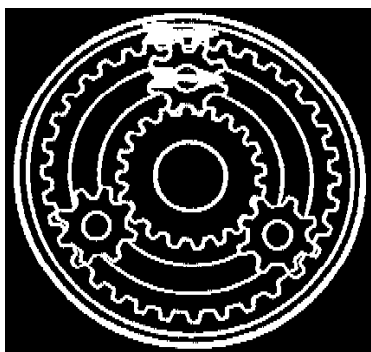


EXAMPLE: 34 + 20 divided by 34 = 1.58 This is now 2nd gear on a THM 350 is calculated. (See figure)

FOR OVERDRIVE, the sum of the ring gear + Sun gear is used for the input tooth count.

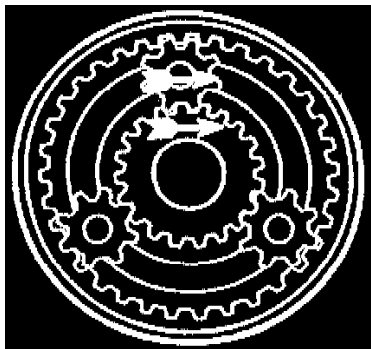
So, IF THE SUN GEAR IS HELD, then the ring gear divided by (ring gear + Sun gear) = Ratio

EXAMPLE: 34 divided by (34 + 20) = .63:1 Look familiar?



The A4LD, the THM 200-4R, the A-140E, the A-40D, the THM 325-4L are some of the units that use this method of getting overdrive. (See figure)

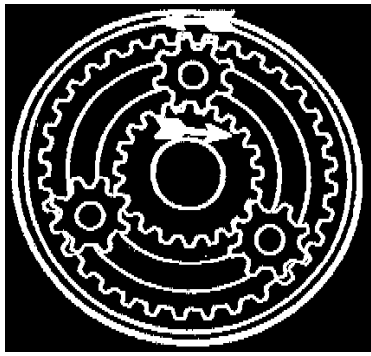
If the ring gear is held, then the Sun gear divided by (ring gear + Sun gear) = Ratio



EXAMPLE: 20 divided by (34 + 20) = .37:1 (See figure)

REVERSE IS THE EASIEST - THE PLANET IS HELD.

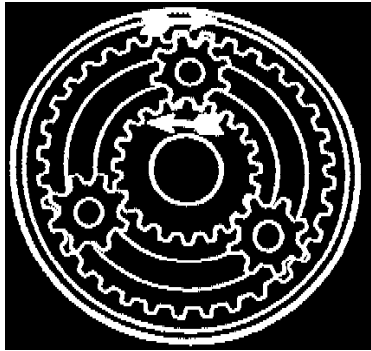
The Sun gear is the input, and the ring gear is the output. The formula for this is: The ring gear divided by the Sun gear = Ratio.



EXAMPLE: 34 divided by 20 = 1.7 (See figure)

Occasionally, the ring gear is used as the input, and the Sun gear as the output.

The formula for this is: The Sun gear divided by the ring gear = Ratio.



EXAMPLE: 20 divided by 34 = .59  
(See figure)

Notice that the output is overdriven.

A transmission using this method must use another planetary gear set to reduce the output. The Mercedes W3A-040 is a good example of this

To get more than one gear forward and a reverse, requires multiple, or compound planetary gear sets.

Two of the most common of these are the SIMPSON GEAR SET, used in transmissions like the THM 350, the Ford C-4, and the TF 6 & 8, and the RAVIGNEAUX GEAR SET, found in transmissions such as the FMX, the AOD, and the T-35.

Figuring out all the ratios for these transmissions is a little tricky, so I'll give you the formulas, and let you figure out how these formulas were derived.

#### THE SIMPSON GEAR SET:

For this example I'll use a THM 200, which has 74 TEETH ON THE FRONT RING GEAR, 42 TEETH ON THE FRONT SUN GEAR, 30 TEETH ON THE REAR SUN GEAR, AND 62 TEETH ON THE REAR RING GEAR.

The formula for 1ST GEAR is: rear ring divided by rear Sun x front Sun plus front Sun + front ring divided by front ring.

EXAMPLE: On the THM 200, it would be:

$$62 \text{ divided by } 30 \times 42 + 42 + 74 \text{ divided by } 74 = 2.74:1$$

SECOND GEAR is easy: Front Sun + front ring divided by front ring.

EXAMPLE:  $42 + 74 \text{ divided by } 74 = 1.57:1$

THIRD GEAR is Direct Drive, or 1:1

REVERSE is rear ring divided by rear Sun

EXAMPLE:  $62 \text{ divided by } 30 = 2.06$

THM 440-T4 (BACKWARDS SIMPSON):

The THM 440 T4 is sort of a backwards version of a Simpson gear set, and although it looks complicated, it really is very simple.

The front Sun gear has 26 teeth, while the rear Sun gear has 42. The front ring gear has 62 teeth, but keep in mind that it is part of the rear carrier, just as the rear ring gear is part of the front carrier, with a tooth count of 74.

As I said earlier, the THM 440 T4 is sort of a backwards version of a Simpson gear set, so in figuring the ratio for 1ST GEAR -- it is identical, except you substitute the words "front" and "rear" in the appropriate places. Front ring divided by front sun x rear Sun + rear Sun + rear ring divided by rear ring = Ratio

EXAMPLE: 62 divided by 26 x 42 + 42 + 74 divided by 74 = 2.92:1

2ND GEAR: Rear Sun + rear ring divided by rear ring

Example: 42 + 74 divided by 74 = 1.57:1

3RD GEAR: Direct Drive, or 1:1

4TH GEAR: Front ring divided by (front Sun + front ring = Ratio

EXAMPLE: 62 divided by (26 + 62) = .74:1

RAVIGNEAUX GEAR SET:

This is considered a compound gear set, and for this example I'll use an AOD, which has:

36 teeth on the front Sun gear

30 teeth on the rear Sun gear, and  
72 teeth on the ring gear

The formula for first gear is: Ring gear divided by rear Sun gear = Ratio

EXAMPLE: 72 divided by 30 = 2.4:1

SECOND GEAR formula is: Rear Sun + front Sun divided by rear Sun x Ring divided by (Ring + front Sun)

EXAMPLE: (30 + 36) divided by 30 x 72 divided by (72 + 36) = Ratio 66 divided by 30 x 72 divided by 108 = 1.47

THIRD GEAR is Direct, or 1:1

FOURTH GEAR is: Ring gear divided by (ring gear + front Sun gear) = Ratio

EXAMPLE: 72 divided by (72 + 36) = .67:1

REVERSE on a Ford AOD is: Ring gear divided by front Sun gear.

EXAMPLE: 72 divided by 36 = 2:1

Technical Service Bulletin # **ATRATB9002006**

Date: **900201**

## **A/T - Choosing the Right ATF**

TRANSMISSION: ALL

BULLETIN: # 9002006

SUBJECT: Automatic Transmission Fluid

DATE: Feb 1990

AUTOMATIC TRANSMISSION FLUID

CHOOSING YOUR ATF

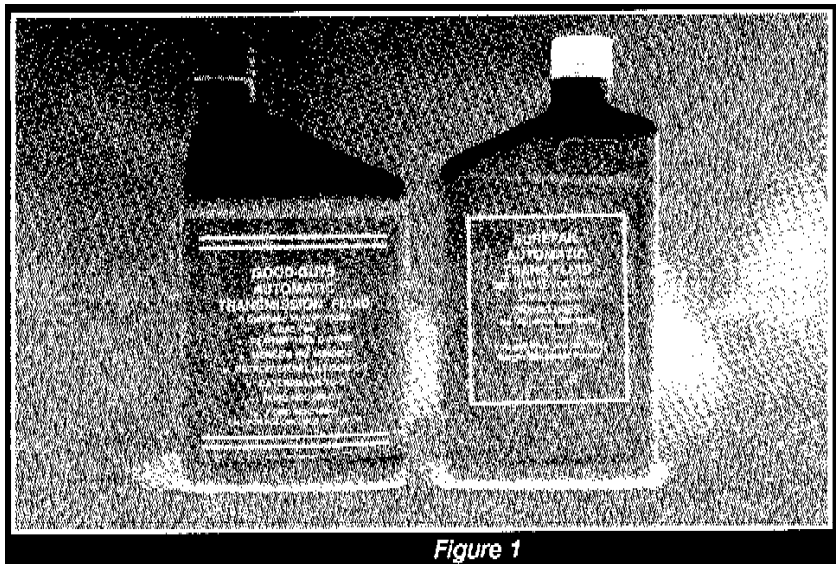


Figure 1

Different ATF's (Automatic Transmission Fluid) can have different frictional properties which can produce different shift characteristics. You may have already experienced problems like lock-up shudder, or squawks on shifts and have corrected them by changing the fluid. This alone tells, you that friction material and fluids are critical in today's cars.

#### MEETING THE O.E.M. SPECIFICATIONS

The first thing to consider when choosing an ATF is "Does it meet the O.E.M. specification?" ATF's wishing to be labeled as DEXRON II and/or MERCON must first meet the respective minimum requirements. It's important to note that even though the specification for DEXRON II and MERCON are currently very similar, **THEY ARE NOT IDENTICAL**. Also note, even fluids which meet the same specification may not be identical. One fluid may just meet a specification and, another may far surpass it. You should know what your fluids properties are! You can get that information from your fluid supplier.

#### EVALUATING YOUR FLUID

Ask your supplier to prove (certify) that the fluid meets O.E.M. specifications (MERCON OR DEXRON II). He will do that by supplying you with the license (certification) number issued to him by the O.E.M.

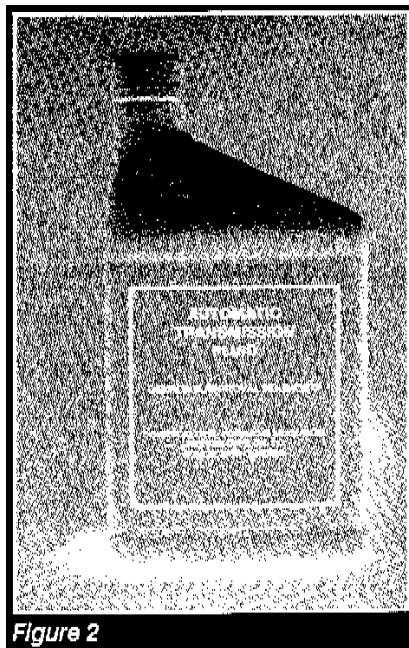
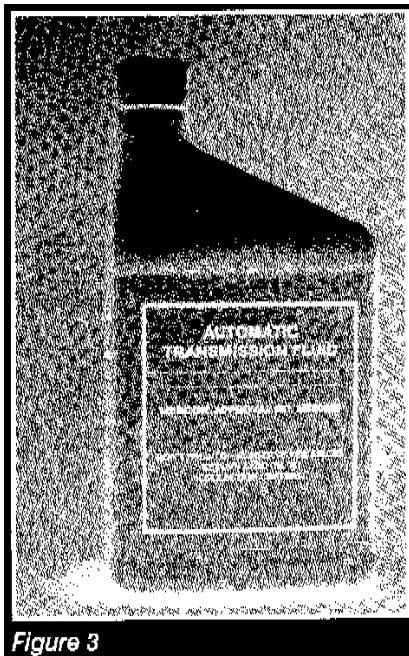


Figure 2

A DEXRON-II license number (sometimes referred to as a "D" number) will always start D-2. A typical DEXRON license number can be seen in Figure 2.



**Figure 3**

MERCON license numbers will be six digits starting with M as shown in Figure 3..

#### TRY TO MEET SEVERAL SPECIFICATIONS!

DEXRON II and MERCON have different minimum specifications, so a product that meets BOTH specifications may be better than those meeting only one spec. Meeting other specs, in addition to the first two can be an added benefit. If a fluid is licensed as DEXRON II AND MERCON as well as others like Allison C-4, or Caterpillar TO-2/TO-4, it means the fluid had to pass more tests and may be a better fluid.

Lastly, demand that the license numbers be placed on all your invoices especially if you buy in bulk. If your supplier is unwilling, it is very likely that they are supplying you an unlicensed fluid. Licensed suppliers are required to supply the license numbers to their customers as part of their agreement with the O.E.M.

#### OTHER THINGS TO CHECK

So now you've narrowed your choices down to a few suppliers that have O.E.M. license numbers. How do you compare two fluids that meet the same O.E.M. Spec.? Ask your supplier to give you the viscometrics on the fluid you buy.

An excellent "bench mark of the overall quality of a fluid is its viscosity at -40 degrees. This is measured in "centipoise" or "cPs". DEXRON II specification says viscosity will be no more than 50,000 cPs @ - 40 degrees. (Some poor fluids have tested at over 1,000,000 cPs) In general, the lower the number, the better the fluid.

Keep in mind that as the number goes down the price of the fluid usually goes up. (You get what you pay for) Most good fluids will average around 35,000 cPs. Hydrotreated (or Hydrocracked) fluids average around 20,000 cPs or less. (Hydrotreating is a refining process done to the base oil to clean out contaminants or impurities) Synthetic ATF's average 10,000 cPs or less, and some are as low as 5000 cPs. Viscosity at -40 degrees is a function of the base stock from which the ATF is made. A low number indicates a premium base oil OR an expensive refining process. (Hydrotreating)

#### FOR ADDITIONAL INFORMATION:

Transmission Digest August '89  
Page 91 December '89 Page 51

#### BULLETIN RECAP

- ^ Only use fluids with O.E.M. approvals.
- ^ Try to get a fluid that meets more than one spec (e.g DEXRON II AND MERCON)
- ^ Check the viscosity at -40 degrees. The lower the number the better.
- ^ Avoid bargain basement fluids with no license numbers.

Technical Service Bulletin # **901511**

Date: **900719**

## TRANSMISSION - ZF S5-42 - (M50D HD) - TROUBLESHOOTING GUIDE-SERVICE TIPS

Article No. 90-15-11

LIGHT TRUCK: 1987-91 BRONCO, E SERIES, F-150-350 SERIES 1988-91 F SUPER DUTY

ISSUE: A troubleshooting guide for the ZF S5-42 manual transmission has been put together to assist service technicians in diagnosing transmission related symptoms.

ACTION: Use the transmission noise evaluation procedure and troubleshooting guide on the following pages of this TSB article. Also refer to the latest Light Truck Shop Manual, Transmission Section for additional service information.

## Evaluation of Noises Under Different Load Conditions

PART NUMBER	PART NAME	CLASS
E9TZ-7210-G	Shift Lever	B
FOTZ-7124-D	Synchronizer 1/2	B
FOTZ-7124-E	Synchronizer 3/4	B
FOTZ-7124-C	Synchronizer 5/Reverse	B
E8TZ-7E218-A	Detent Spring	C
E6AZ-19582-B	MERCON	V
D8AZ-19554-A	Sealant	AG
E2AZ-19562-B	Anaerobic Sealer	AM

It is important to get an accurate description of the complaint from the customer. 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 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 drive axle turns the transmission mainshaft.

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

- ^ Check for any noise change when shifting the transfer case between 4x2, 4 high, 4 low or into neutral.
- ^ With the truck at a complete stop and the transfer case in neutral, shift through all the the gears and evaluate noise at different engine RPM. Check for any noises in neutral at different engine RPM.

Once you have identified the area that the noise is coming from, refer to the troubleshooting guide for concern resolution.

NOTE: THE LATEST LIGHT TRUCK SHOP MANUAL, TRANSMISSION SECTION HAS UPDATED SERVICE INFORMATION AND DIAGNOSTIC PROCEDURES THAT APPLY 1987 AND LATER MODEL YEAR TRUCKS.

<b>TROUBLESHOOTING GUIDE (In Neutral &amp; Parked)</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>ACTION</b>
Noise present with clutch pedal fully depressed.	Engine noise  Clutch release bearing failure.  Pilot bearing failure.  Misaligned transmission.	Refer to shop manual for these areas.
Noise disappears when engine RPM exceeds 1500 without depressing clutch pedal	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.	Check engine idle quality and speed. A rough or low idle will aggravate this concern.
Noise present at engine speeds above idle.	Insufficient lubrication.  Damaged tapered roller or needle bearing.  Scuffed gear tooth contact surfaces.	Drain oil (when required) and fill with the correct oil, conforming to Ford's specification ESP M2C 166H. Type "H" or MERCON (Motorcraft).  Inspect bearings for failure. Pay special attention to the mainshaft front bearing (pocket bearing), located between the input and mainshaft. Turn the gears on the mainshaft to check for needle bearing failure by feeling for roughness.  Disassemble transmission and check gear tooth contact surfaces. Replace gears as required.
Noise on PTO equipped transmissions. Remove the PTO and install a cover plate. Evaluate for noise without PTO.	Incorrect PTO gear mesh due to: Wrong model PTO, incorrect installation, defective PTO.	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.

TROUBLESHOOTING GUIDE (In Gear & 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.	Worn or rough mainshaft rear bearing.	Disassemble transmission and install new rear bearing on mainshaft.
	Needle bearing under mainshaft gears damaged.	Replace bearing, gear and mainshaft as required.
	Wrong preload on main or cluster shaft bearings.	Disassemble transmission and correct preload.
	PTO installed wrong.	Check PTO installation.
"Rattle" noise when taking off from a stop and driving at less than 1000 RPM.	"Lugging Rattle".	Operate truck without "lugging". Condition will not shorten the life of the transmission.
"Clunking" noise when shifting or speeding up or slowing down. Condition is worse on bumpy surfaces.	Freeplay in the system (clutch through axle and fuel injector shutoff timing). Some clunk is normal with the 4.9L & 5.8L engines.	Check for excessive axle backlash. Clunk cannot be corrected by repairing transmission unless a transmission defect is evident.
	Loose yoke nut.	See TSB 90-5-9
Noise while driving in one gear increases with road speed.	Worn, imperfect or chipped gear teeth on the affected gear.	Replace affected mating gears.
"Whining" noise at high engine RPM in 3rd and 5th gear.	Worn input shaft gear and countershaft drive gear.	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.	Upper shift lever damaged or loose.	Change shift lever. If "buzz" is still present, see in which gear the buzz occurs. Disassemble and inspect specific gear. Check guide pieces for clearance.
	Lower shift lever defective.	Replace lower shift lever. Shift lever E9TZ-7210-G is less sensitive to vibration than earlier design.

<b>TROUBLESHOOTING GUIDE (In Gear &amp; Driving)</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>ACTION</b>
Shift lever "rattle" in neutral engine run up, primarily diesel 4x4.	Transfer case shift lever may not have plastic bushing at the pivot.  Transmission lever boot incorrectly installed.	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.
Moan or vibration on F-Super Duty at road speeds greater than 60 MPH.	Aftermarket modifications to frame or driveshaft.	Non-factory driveshafts should be inspected for:  Driveshaft size 0 to 51" long - 3" diameter tube is OK. Up to 55" long - 3 1/2" diameter tube is required. Up to 59" long - 4" 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 center support bearing.
Hard shift (particularly 1st, 2nd & reverse).	Clutch not releasing completely.  Operator not fully depressing clutch.  Dash panel flexing.  Clutch hydraulic line routed too close to exhaust manifold.  Air/water in clutch hydraulic line.  Insufficient synchronizer reserve (a defective clutch system can result in premature loss of synchronizer reserve).	See clutch procedure at the end of this TSB.  Interview operator.  Repair dash panel.  Move line or shield it.  Bleed clutch system.  Replace synchronizer and corresponding gear, if required.

<b>TROUBLESHOOTING GUIDE (Shift Concerns)</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>ACTION</b>
Notchy shifting	Some notchiness is normal (especially in 3rd gear).	Replace with revised synchronizers: 1/2 FOTZ-7124-D 3/4 FOTZ-7124-E 5/R FOTZ-7124-C
"Grinding" noise during shifting	Synchronizer taper too smooth (after a few thousand miles).	Do 3 to 5 hard shifts with high engine RPM. If noise is still present, disassemble and check for damage (burning marks OK). See TSB 90-2-11.
	Synchronizer ring defective.	Change synchronizer assembly.
	Insufficient wear limit of synchronizer ring.	Change synchronizer assembly.

<b>TROUBLESHOOTING GUIDE (Shift Concerns)</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>ACTION</b>
Gear cannot be engaged.	Clutch not releasing (see hard shift)	Check clutch per procedure at the end of this TSB article.
	Interlock shifting plate jammed in transmission.	If bent or damaged, replace the interlocking shifting plate.
	Damage to teeth on sliding collar or improper installation. (dog teeth worn)	Replace or correct synchronizer package. Check for damage on the corresponding mainshaft gear in clutch teeth area. Replace as required.
	Jammed pressure pieces in synchronizer unit.	Remove and disassemble transmission and replace pressure pieces.
	Shift rails out of proper position.	Replace all shift rails, detents and interlock shifting plate.
Sticking in gear	Clutch not releasing (see hard shift above)	Check clutch per procedure at the end of this TSB article
	Interlock shifting plate jammed in transmission.	If bent or damaged, replace the interlocking shifting plate.
	Sliding collar tight on splines. (dog teeth damaged)	Remove and disassemble transmission and replace affected parts.
Stuck in gear.	Shift rails out of proper position.	Replace all shift rails, detents and interlock shifting plate.

TROUBLESHOOTING GUIDE (Shift Concerns)		
CONDITION	POSSIBLE CAUSE	ACTION
Walking or jumping out on rough roads.	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 lever out of its proper location.	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:	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.	Check engine mounts.  Remove and disassemble transmission and replace damaged parts.  Make sure transmission is tightly bolted to the engine.
Walk or jump out on rough roads.	Use of heavy shift lever extensions.  Shift rail detent springs broken or missing.  Detent spring cap not pressed in properly.  No preload in drive gear, mainshaft or countershaft, caused by worn bearings.  Grated selector teeth.	Use original equipment shift lever. Install heavy duty detent springs, (E8TZ-7E218-A).  Remove sealing cap on detent and replace springs.  Replace with new cap and press in 1mm (3/64").  Remove and disassemble transmission and replace defective bearings (necessary to reset bearing preload).  Change synchronizer package and gear.

<b>TROUBLESHOOTING GUIDE (Shift Concerns)</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>ACTION</b>
High shift efforts.	<p>Lack of lubricant or wrong lubricant used, causing build-up of sticky and sludgy deposits on splines of sliding collar.</p> <p>Input shaft pilot bearing rough, or dragging.</p> <p>Damaged mainshaft (pocket) bearing.</p>	<p>Inspect through the PTO openings. If sludge is present, remove and clean the transmission.</p> <p>Place transmission in 4th gear and rotate the output shaft by hand while the clutch is depressed. If a roughness is felt, remove the transmission and replace the input shaft pilot bearing.</p> <p>Install a new input shaft and bearing. (Necessary to reset bearing preload).</p>
High shift effort in one gear only.	<p>Sliding sleeve tight on splines.</p> <p>Synchronizer teeth chipped or badly mutilated.</p> <p>Binding or interference of shift lever with other objects or rods inside the cab.</p> <p>Mainshaft gears, seized or galled on either the thrust face or diameters.</p> <p>Synchronizer failure (wear limit too low, fractures).</p> <p>Synchronizer cone smoothness.</p>	<p>Remove transmission and replace affected synchronizer assembly.</p> <p>Remove and disassemble transmission and replace damaged parts.</p> <p>Check shift operation in cab.</p> <p>Remove and disassemble transmission, replace synchronizer package.</p> <p>Remove and disassemble transmission, replace synchronizer package.</p> <p>Make 3 to 5 hard shifts with high engine RPM.</p>
High shift efforts in cold weather, all gears.	Incorrect, hi-viscosity fluid.	Install Type H or MERCON fluid. Road test the truck to identify possible damage caused by the wrong fluid. Synthetic MERCON E6AZ-19582-B will improve cold weather shiftability.

<b>TROUBLESHOOTING GUIDE (Leak Concerns)</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>ACTION</b>
Leak at shift tower.	Re-used or damaged gasket.	Replace with new gasket. Never Use RTV.
Leak at drain or fill plug.	Taper threaded plugs used in transmissions with an E7TA or E8TA prefix may require thread sealant.  Sealing ring missing from plug. (transmissions with an E9TA prefix or later have a sealing surface machined on the housing).	Use Ford sealant D8AZ-19554-A. Torque plugs to 37 lb.ft (50 N-m).  Install a new sealing ring.
Leak at PTO side plate.	Bolts loose or damaged gasket.	Replace gasket, tighten bolts to 28 lb.ft. (38 N-m).
Leak at shift detent plug.	Re-used or damaged plugs.	Use new plugs when reassembling. Do not deform case around plug to retain.
Leak at large welch plug inside clutch housing. Look for cracks around the hole.	Improper assembly.	Reseal, using anaerobic sealant, (E2AZ-19562-B). If cracked, replace 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).	Improper assembly.	Reseal, using anaerobic sealant, (E2AZ-19562-B). If cracked, replace housing.
Leak at output shaft seal.	Output yoke nut loose or improperly staked (4x2).	Replace seal, using a new nut. Torque to 184 lb.ft. (250 N-m) and stake. See TSB 90-5-9.
Leak at input shaft seal.	Improper assembly. Seal lip may have rolled during assembly.	Replace seal using extreme caution that input shaft does not contact the seal during reassembly. (If the seal lip is rolled, leaking may not occur for several hundred miles.

<b>TROUBLESHOOTING GUIDE (Leak Concerns)</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>ACTION</b>
Leak between quill pipe and clutch housing.	Damaged o-ring during assembly.	Remove quill pipe, inspect sealing surfaces and replace o-ring. Lubricate o-ring prior to assembly to prevent damage.
Leak at case joint.	Damaged case mating surfaces or assembly error.  Use of RTV on a previous repair.	Repair or replace damaged case. Reseal with anaerobic sealant, E2AZ-19562-B. Make sure proper bolt torque. (16 lb.ft. 22 N-m).  Never use RTV on this transmission.

<b>TROUBLESHOOTING GUIDE (Misc. Concerns)</b>		
<b>CONDITION</b>	<b>POSSIBLE CAUSE</b>	<b>ACTION</b>
Cracked clutch housing.	<p>Drivetrain vibration:</p> <p>Caused by assembly error.</p> <p>Vehicle modification. (driveshaft lengthened or shortened).</p>	<p>Check the integrity of driveshaft attachment.</p> <p>Non-factory driveshafts should be inspected for:</p> <p>Driveshaft size</p> <p>0 to 51" long - 3" diameter tube is OK.</p> <p>Up to 55" long - 3 1/2" diameter tube is required.</p> <p>Up to 59" long - 4" diameter tube is required.</p> <p>Working angles greater than 1/2° but less than 3°.</p> <p>System balanced to within 0.4 in/oz at the ends and 0.8 in/oz at the center support.</p>
Cracked rear engine mount transmission attachment ears.	<p>Broken front engine mounts.</p> <p>Vibration caused by a driveline imbalance.</p> <p>Rear mount upper flange not flat.</p>	<p>Replace front engine mounts.</p> <p>See cracked clutch housing.</p> <p>Replace rear mount.</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 VIBRATION OR CONTAMINATION OF THE FLUID. SOME OF THE BIGGEST REASONS FOR BEARING FAILURES ARE:**

<b>TROUBLESHOOTING GUIDE - BEARING FAILURE</b>	
<b>CAUSE</b>	<b>ACTION</b>
Extended start-up idle in extreme cold may lead to mainshaft bearing wear.	Synthetic MERCON (E6AZ-19582-B) provides improved lubrication when transmission temperatures remain below minus 20° F for extended periods.
Operation at or above GCW in high ambient temperatures and steep grades can affect all bearings.	Heat build-up may cause break down of the ATF. Synthetic MERCON can withstand higher operating temperatures. Additional lubricants are under investigation for this operating condition.
Pocket bearing not lubricated due to missing, damaged or misinstalled input shaft oil dam.	Replace damaged components and make sure of proper oil dam installation per the Light Truck Shop Manual. Check for proper installation of the snap ring on the mainshaft next to the oil dam.
Pocket bearing not lubricated due to damaged oil baffle in the input bearing shim pack.	Replace damaged components making sure the tin oil baffle is not damaged during reassembly.
Damage due to towing a vehicle greater than 50 miles or at speeds exceeding 35 MPH with the driveshaft installed. Mainshaft tapered bearing and needle caged bearings are especially susceptible to damage.	Provide correct towing procedures to tow operator.

<b>TROUBLESHOOTING GUIDE - BEARING FAILURE</b>	
<b>CAUSE</b>	<b>ACTION</b>
Vibration break-up of retainer and brinelling of races-fretting corrosion.	Refer to driveshaft restrictions in MISC. CHART of this TSB.
Incorrect preload causes faster wearing of the bearings, due to incomplete contact area.	Be sure to follow pre-load setting procedure in Shop Manual.
Lack of lubricant or wrong type.	Check for leaks and repair as required. Replace with correct fluid.
Acid etch of bearing due to water in lube.	Identify and correct source of water entry.
Worn out due to other part failure.	Remove, disassemble and clean the transmission then replace damaged parts. (necessary to reset bearing pre-load if any tapered bearings are replaced).

### Troubleshooting Guide - Clutch Concerns

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 ENGINE AT 3000 RPM AND

OPERATE 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. IT IS IMPORTANT THAT THE HYDRAULIC RELEASE MECHANISM IS WORKING PROPERLY. CONTINUED OPERATION WITH A DEFECTIVE CLUTCH SYSTEM MAY RESULT IN PREMATURE SYNCHRONIZER WEAR OR DAMAGE.

Hard shifting or difficulty engaging the transmission gears may be the result of improper clutch function. Check the release system travel. Minimum travel for the concentric slave cylinder bearing (4.9L, 5.0L and 5.8L engines) and the external system slave cylinder push rod (7.3L diesel and 7.5L engines) is 11 mm. If system travel is less than 11 mm, refer to TSB 88-18-10 for release system concern diagnosis. Possible concerns include excessive flexing of the dash panel or cracked dash panel reinforcement at the clutch master cylinder mounting and air/water in the hydraulic line.

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

1. Set the parking brake 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 transmission synchronizer.
3. Allow the clutch pedal to fully return and adjust the shift lever position to obtain light contact between the transmission gear teeth. A slight grind will occur.
4. Slowly depress the clutch pedal until gear contact grinding stops. Measure the clutch pedal travel from this pedal position to the full down position.

This clutch reserve dimension should be at least 1 1/2". If the reserve is less than 1-1/2", 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 release bearing contamination and binding on the bearing retainer. Replace the clutch and/or release bearing as required.

OTHER APPLICABLE ARTICLES: 88-18-10, 90-5-9

SUPERSEDES: 88-26-13

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 5100, 5104, 5200, 5300, 5500, 5550, 7100, 7113

Technical Service Bulletin # **872416**

Date: **871204**

## M/T- T18 Used In Limited Production

Article No. 87-24-16

TRANSMISSION - T18 - LIMITED PRODUCTION DURING 1988 AND 1989 MODEL YEARS

LIGHT TRUCK: 1988-89 F-150/250, BRONCO

ISSUE: The Borg-Warner T18 transmission used in prior model years is now used in limited production for selected 1988-89 light trucks. The affected units are F- 150/250 trucks under 8500 GVW with a 4.9L or 5.0L engine and Broncos with a 4.9L or 5.0L engine. The transmission will be offered in the long extension (slip yoke) model ONLY for 4 x 2 applications.

ACTION: If service is required, refer to the 1987 Light Truck Shop Manual, Volume A, Section 16-23-1.

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: "INFORMATION ONLY"

Technical Service Bulletin # **932119**

Date: **931013**

## M/T Gasket Kit - Return of Obsolete Parts

Article No.

93-21-19

10/13/93

^ SERVICE PARTS RETURN OF OBSOLETE GASKET KIT - ZF MODEL S5-42 HD TRANSMISSION - PARTS WITH PACKAGING DATE CODES BEFORE "012593"

^ TRANSMISSION - ZF MODEL S5-42 HD - SERVICE PARTS RETURN OF OBSOLETE GASKET KIT - PARTS WITH PACKAGING DATE CODES BEFORE "012593"

LIGHT TRUCK:

1987-93 F-250, F-350

1988 BRONCO, F-150

1988-93 F SUPER DUTY

ISSUE:

An improved gasket kit replaces the obsolete part.

#### ACTION:

Remove the obsolete parts from your dealership's inventory. The obsolete parts with packaging date codes before "012593" should be returned to your facing PDC within thirty (30) days of this TSB.

- Sort dealership stock of E7TZ-7153-B. Cartons with a packaging date code of 012593 or later will contain OK stock and may be released for normal sale.
- Packaging date codes before 012593 are suspect and should be rejected and returned to your facing PDC using the least expensive transportation.
- If claim is processed electronically using DOES II, use return code "GB"; otherwise, complete a separate paper claim form FPS-340 using return code "J".
- In the "Remarks" section, write "Returned Per TSB 93-21-19".

#### LIMITS

- ^ The returns must be received within 30 days from the date of this TSB.
- ^ Returns are restricted to the subject parts.
- ^ The parts must have been purchased from FCSD in accordance with Policy And Procedure Bulletin 4000.

#### CREDIT

Credit for parts and prepaid freight costs will be issued.

#### NOTE:

THE PART NUMBER HAS NOT BEEN CHANGED. OBSOLETE STOCK CAN ONLY BE DETERMINED VIA PACKAGING DATE CODE. DO NOT RETURN PARTS HAVING PACKAGING DATE CODES OF "012593" OR LATER.

#### NOTE:

REPLACEMENT STOCK IS AVAILABLE FOR ORDERING IMMEDIATELY.

PART NUMBER	PART NAME	CLASS
E7TZ-7153-B	Gasket Kit	B

OTHER APPLICABLE ARTICLES: 93-19-15  
 WARRANTY STATUS: INFORMATION ONLY  
 OASIS CODES: 505000

Technical Service Bulletin # **92310**

Date: **920129**

## Diesel Engine - Redesigned Flywheel Bolts

Article No.

92-3-10

01/29/92

ENGINE - 6.9L/7.3L - NEW FLYWHEEL MOUNTING BOLTS WITH PRE-APPLIED ADHESIVE - VEHICLES WITH ZF MANUAL TRANSMISSION.

LIGHT TRUCK: 1987-92 F-250, F-350  
 1988-92 F SUPER DUTY, F-47, F-59

This article is being republished in its entirety to clarify the issue of a possible oil leak from the flywheel bolt threads.

ISSUE: The threads of flywheel mounting bolts may be a potential leak path for engine oil.

ACTION: When removing or replacing flywheel bolts, install new flywheel bolts with pre-applied adhesive (E7TZ-6379-B) to eliminate any possibility of a potential leak path. The new bolts can be identified by six to eight threads with a silver color. Refer to the following procedure for service details.

1. When installing these bolts for the first time, do not apply additional adhesive to the threads.
2. Each time this new bolt or previous bolt (without pre-applied adhesive) is removed to service the flywheel, proceed as follows:
  - a. Clean the bolt threads.
  - b. Apply Thread Lock 262 (E2FZ-19554-B) to the threads.
  - c. Reinstall the bolt. Tighten to 47 lb.ft. (64 N-m).

PART NUMBER	PART NAME	CLASS
E7TZ-6379-B	Flywheel Bolt (Pkg./5)	B
E2FZ-19554-B	Thread Lock 262	B

OTHER APPLICABLE ARTICLES: 91-14-11

SUPERSEDES: 91-21-11

WARRANTY STATUS: Eligible Under 1992 Bumper To Bumper Warranty Coverage, Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
920310A	Flywheel Bolts - Replace (4x2)	3.5 Hrs.
920310B	Flywheel Bolts - Replace (4x4)	4.5 Hrs.

DEALER CODING

BASIC PART NO.	CONDITION CODE
6379	68

OASIS CODES: 497000, 499000, 505000, 703000, 703100

Technical Service Bulletin # **871814**

Date: **870911**

## A/T, M/T - New `Mercon' Transmission Fluid

TRANSMISSION - AUTOMATIC/MANUAL - NEW FLUID AND USAGE CHART

Article No.  
87-18-14

FORD: 1986 And Prior LTD 1988 And Prior ESCORT, TEMPO, MUSTANG, TAURUS, THUNDERBIRD, FORD

LINCOLN-MERCURY: 1986 And Prior CAPRI, MARQUIS 1987 And Prior LYNX 1988 And Prior TOPAZ, SABLE, COUGAR, MERCURY, MARK VII, CONTINENTAL, LINCOLN TOWN CAR

MERKUR: 1985-88 XR4Ti 1988 SCORPIO

LIGHT TRUCK: 1988 And Prior E SERIES, F SERIES, BRONCO, RANGER, BRONCO II, AEROSTAR

ISSUE: A new Transmission Fluid, MERCON (Ford Specification "MERCON") (XT-2- QDX, Quart), (XT-2-DDX, 55 Gallon Drum) is available for service. Use of the Motorcraft "MERCON" transmission fluid, where specified, will improve cold weather shift effort and synchronized operation.

Trans. Type	Model Year	JATCO for Courier	JATCO for Pass. Car	FMX	C3	C4	C5	C6	AOD	ATX	ZF	AXOD	A4LD	Other Auto. Trans.	MTX-1 (4-Speed) and MTX-111 (5-Speed)	Std. Man. Trans.
	1964															
	1965															
	1966															
	1967															
	1968															
	1969															
	1970															
	1971															
	1972															
	1973															
	1974															
	1975															
	1976															
	1977															
	1978															
	1979															
	1980															
	1981															
	1982															
	1983															
	1984															
	1985															
	1986															
	1987															
	1988															

**M — MERCON®.**  
 \* — Where asterisk is shown, existing DEXRON® -II inventory may be used. New purchases for this application must be MERCON®.  
 Part number XT-2-QDX (Quarts) and XT-2-DDX (55 Gallon Drum) Ford Specification is MERCON®.  
 ‡ — For M50D manual transmission applications in subfreezing temperatures, use Motorcraft MERCON® to improve cold shift effort and synchronizer operation. The Borg-Warner T5 manual transmission can use Motorcraft MERCON®.  
 For Hummer 5-Speed (Merkur XR4Ti), fluid meeting Ford Specification ESD-M2C175-A or E5RY-19C547-A is recommended.

**ACTION:** The chart on page 44 of this TSB gives transmission fluid applications for automatic transmissions and certain manual transmissions for Ford, Lincoln-Mercury, and Merkur vehicles.

**NOTE:** The use of MERCON is NOT RECOMMENDED for power steering systems. The manual transmission lubricant for the 1985 Merkur XR4Ti is a semi-synthetic oil. When adding oil to the transmission, use only E5RY-19C547-A (Ford Specification ESD-M2C175-A) or equivalent.

PART NUMBER	PART NAME	CLASS
XT-2-QDX	MERCON - Quart	V
XT-2-DDX	MERCON - 55 Gallon Drum	V
E5RY-19C547-A	Semi-Synthetic Oil B	

**OTHER APPLICABLE ARTICLES:** 82-9-9 Supersedes 85-1-15, 85-6-7  
**WARRANTY STATUS:** "INFORMATION ONLY"  
**Technical Service Bulletin # 06-14-4**

Date: 060724

**A/T - Mercon V ATF Usage**  
 TSB 06-14-4

07/24/06

MERCON ATF IS BEING REPLACED BY MERCON V ATF AS A SERVICE FLUID.

**FORD:**  
 1980-1997 Crown Victoria

1981-1997 Mustang, Thunderbird  
1981-2003 Escort  
1986-1993 Festiva  
1986-1997 Taurus  
1989-1997 Probe  
1994-1997 Aspire  
1995-2000 Contour  
1980-1996 Bronco  
1981-2003 F-150  
1981-2004 E-Series, F-Super Duty  
1983-1996 Ranger  
1986-1996 Aerostar  
1991-1997 Explorer  
1993-2004 F-53 Motorhome Chassis  
1995-1998 Windstar  
1997-2004 Expedition  
2000-2005 Excursion  
2001-2007 Escape  
1987-2000 F-B-Series  
2000-2007 F-650, F-750

**LINCOLN:**

1980-1997 Town Car  
1981-1997 Continental  
1993-1997 Mark VIII  
1998-2004 Navigator  
2002-2003 Blackwood

**MERCURY:**

1980-1997 Grand Marquis  
1981-1997 Cougar  
1986-1997 Sable  
1987-1999 Tracer  
1995-2000 Mystique  
1999-2002 Cougar  
1993-2002 Villager  
1997 Mountaineer  
2005-2007 Mariner

**MERKUR:**

1985-1989 XR4TI

This article supersedes TSB 01-15-7 to update the vehicle application chart.

**ISSUE**

MERCON(R) Automatic Transmission Fluid is being replaced by MERCON(R) V as a service fluid.

**ACTION**

Beginning immediately all automatic transmission / transaxle applications requiring MERCON(R) can now be serviced using MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V. After July 1, 2007, MERCON(R) Automatic Transmission Fluid will no longer be manufactured, therefore, availability of this fluid will only continue for however long it takes to deplete what remains in inventory.

**SERVICE PROCEDURE**

Service automatic transmissions requiring MERCON(R) with MERCON(R) V or MERCON(R) Automatic Transmission Fluid or dual usage fluids labeled MERCON(R) / MERCON(R) V



USE OF ANY OTHER FLUID MAY CAUSE REDUCED FUNCTIONALITY OR TRANSMISSION DAMAGE.

**CAUTION**

THE FUNCTIONAL CHARACTERISTICS OF FLUIDS FOR CVT TRANSMISSIONS ARE VERY DIFFERENT THAN THOSE OF OTHER AUTOMATIC TRANSMISSION FLUIDS (ATFS).

USE OF A FLUID OTHER THAN MOTORCRAFT CONTINUOUSLY VARIABLE CHAIN TYPE TRANSMISSION FLUID OR ONE LABELED AS MEETING MERCON(R) C WILL CAUSE FUNCTIONALITY CONCERNS AND INTERNAL TRANSMISSION DAMAGE.

**CAUTION**

DO NOT USE AUTOMATIC TRANSMISSION FLUID SUPPLEMENTS, ADDITIVES, TREATMENTS OR CLEANING AGENTS.

PART NUMBER	PART NAME
XT-2-QDX	MERCON® (Quart)
XT-2-DDX	MERCON® (55 Gal. Drum)
XT-5-QM	MERCON® V (Quart)
XT-5-DM	MERCON® V (55 Gal. Drum)

Parts Block

WARRANTY STATUS: Information Only

**NOTE:** The information in Technical Service Bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers". Do not assume that a condition described affects your car or truck. Contact a Ford, Lincoln, or Mercury dealership to determine whether the Bulletin applies to your vehicle.

Disclaimer

Technical Service Bulletin # 9167

Date: 910318

## Rear Axle Hub Seal - Lubricant Leaks

Article No. 91-6-7

03/18/91

^ AXLE - NEW HUB SEAL AND HUB SEAL REPLACER TOOL - VEHICLES WITH 10.25 INCH RING GEAR, FULL - FLOATING REAR AXLES

^ LEAKS - AXLE LUBE - 10.25 INCH RING GEAR, FULL - FLOATING REAR AXLES

LIGHT TRUCK: 1985-91 F-250, F-350

**ISSUE:** A new hub seal and a hub seal replacer tool are now available for service. The new hub seal is designed to improve sealing when properly installed using the new hub seal replacer tool.

**ACTION:** Install a new hub seal (FOTZ-1177-A) with the new hub seal replacer tool (T91T-1175-A). Refer to the following inspection list and service procedure for details.

**NOTE:** DO NOT USE THE OLD HUB SEAL REPLACER TOOL (T85T-1175-AH). IT IS NOT DESIGNED TO INSTALL THE NEW SEAL. THE NEW HUB SEAL REPLACER TOOL IS AVAILABLE IN THE 1991 DEALER ESSENTIAL SERVICE TOOL KIT AND IS THE ONLY TOOL APPROVED TO INSTALL THE NEW SEAL.

### INSPECTION PRIOR TO SEAL INSTALLATION

Prior to seal installation, make sure that the following items are checked and servicing action taken where indicated.

- ^ Inspect the outer diameter of the hub seal to be sure that it is dry and free of oil and grease.
- ^ Check the hub bore to be sure it is free of grease, dirt and debris.
- ^ Remove any nicks or burrs from the hub bore.
- ^ Inspect the inner and outer bearing for damage and replace as required.
- ^ Pack each hub bearing cone and roller with a bearing packing tool using XG-1-C grease.
- ^ Make sure that no residual grease from freshly greased bearings gets into the hub bore.

- ^ Prior to installing the hub assembly, clean the spindle thoroughly and inspect the seal and bearing journals for nicks and/or scratches. Remove nicks or scratches using crocus cloth or similar material.
- ^ Wipe spindle clean and lightly oil with clean axle lube or engine oil.

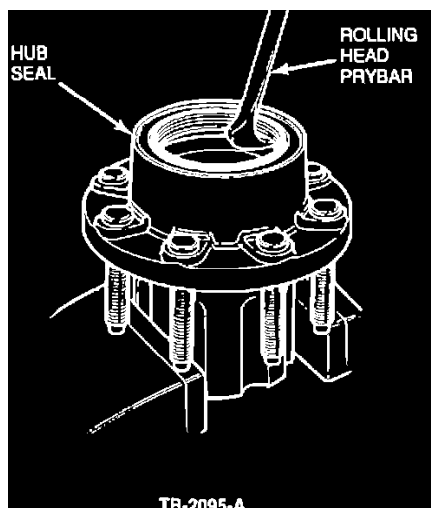


Figure 1

#### REMOVAL & INSTALLATION PROCEDURE

1. Install the hub in a soft jawed vice.
2. Remove the hub seal as shown in Figure 1.

CAUTION: CARE MUST BE TAKEN NOT TO DAMAGE THE HUB SEAL BORE WITH THE SEAL REMOVAL TOOL.

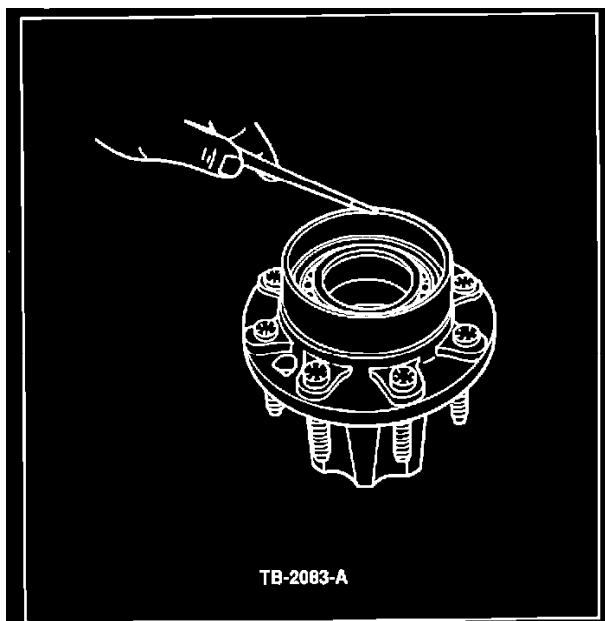


Figure 2

3. Thoroughly clean and inspect the hub bore, Figure 2.

CAUTION: MAKE SURE THE HUB BORE IS FREE OF DIRT, GREASE, BURRS OR NICKS.

NOTE: HUB BEARINGS MUST BE PRELUBED WITH GREASE PRIOR TO INSTALLATION. USE XG-1-C GREASE OR EQUIVALENT.

4. Pack each bearing cone and roller assembly with a bearing packing tool.

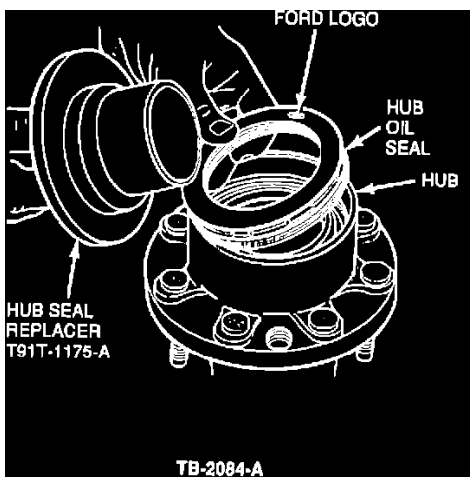


Figure 3

5. Install the seal in the hub with the Ford logo facing up, Figure 3.

CAUTION: HUB SEAL MUST BE FREE OF DIRT OR GREASE.

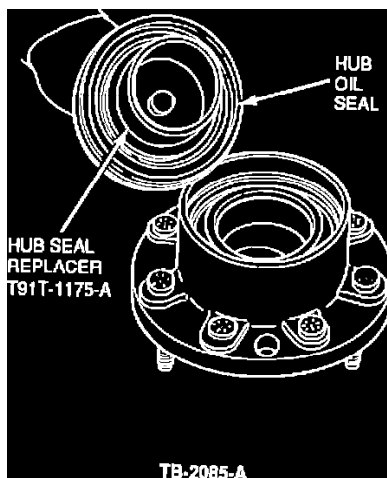


Figure 4

6. Install the hub oil seal on the hub seal installer tool, T91T-1175-A, Figure 4.

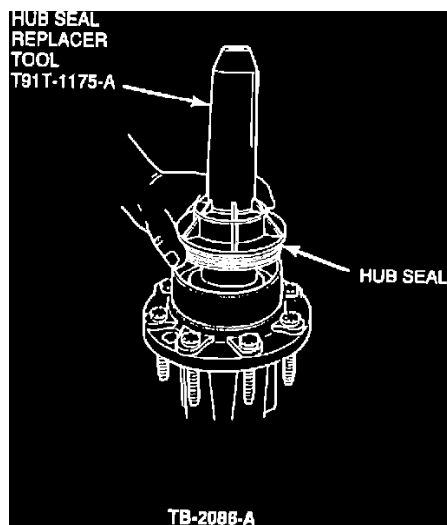
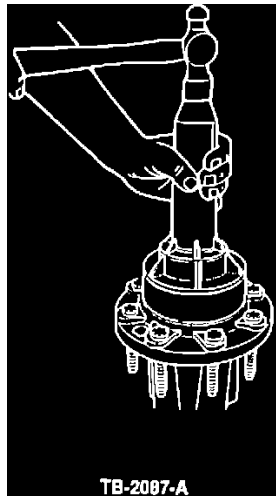


Figure 5

7. Insert the tool with the seal squarely into the hub, Figure 5.



**Figure 6**

8. Hold the tool straight. Strike the handle until the hub seal is fully seated (until tool strikes hub), Figure 6.

**CAUTION:** INSTALL NEW SEAL IF SEAL IS MISALIGNED DURING OR AFTER INSTALLATION.

It is extremely important that the 1991 F-Series Shop Manual procedures be followed when installing the hub assembly.

**CAUTION:** THE SPECIFIED TORQUING AND BACKING OFF OF THE HUB NUT IS CRITICAL IN ORDER TO PERFORM THE REPAIR CORRECTLY.

**NOTE:** ALWAYS TURN THE HUB WHILE TIGHTENING THE HUB NUT. ONCE THE SPECIFIED TORQUE 55-65 LB.FT., (75-88 N-m) IS ACHIEVED, RATCHETING BACK ON THE HUB NUT VARIES DEPENDING ON WHETHER THE HUB BEARINGS ARE NEW OR USED. BACK OFF 5 CLICKS FOR NEW BEARING AND 8 CLICKS FOR USED BEARINGS.

Make sure hub nut wrench tool (T85T-4252-AH) is used as shown in the Shop Manual procedure. Consult The 1991 F-Series Light Truck Shop Manual, Section 05-02B, for service procedures and torque specifications.

PART NUMBER	PART NAME	CLASS
FOTZ-1177-A	Hub Seal	B
XG-1-C	Grease (14 oz. cartridge, Pkg. 60)	V

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 509000

Technical Service Bulletin # **89237**

Date: **891115**

## A/T - AOD Separator Plate Gasket Changes

TRANSMISSION - AOD - MAIN CONTROL GASKET CHANGES AFFECTING USAGE OF SERVICE KITS

Article No. 89-23-7

FORD: 1980-90 CROWN VICTORIA 1980-86 LTD 1980-90 THUNDERBIRD 1985-90 MUSTANG

LINCOLN-MERCURY:

1980-87 CONTINENTAL

1980-90 COUGAR, GRAND MARQUIS 1980-83 MARK VI 1980-90 TOWN CAR 1984-90 MARK VII 1985 CAPRI, MARQUIS

LIGHT TRUCK: 1981-90 BRONCO, ECONOLINE, F-150, F-250

GASKET APPLICATION CHART			
PART NUMBER	PART NAME	MODEL YR. USAGE	REMARKS
E9AZ-7D100-B	Main Control Gasket Kit	1980-1989	Kit contains three throttle valve springs and selection instructions. Only use on 1990 vehicles. Must be ordered individually.
FOAZ-7D100-A	Separator Plate Lower Gasket	1990	
E9SZ-7C155-A	Main Control Upper Separator Gasket	1980-1990	

**ISSUE:** The separator plate lower gasket from the current gasket service kit (7153) and overhaul service kit (7C391) cannot be used on any 1990 model vehicles.

**ACTION:** When servicing 1990 AOD transmissions the separator plate lower gasket found in the current kits must be thrown away and replaced with a new gasket (F0AZ-7D100-A). This new gasket can only be used on 1990 vehicles.

**CAUTION:** USE OF THE SEPARATOR PLATE LOWER GASKET CONTAINED IN THE CURRENT KITS ON 1990 VEHICLES COULD CAUSE A REDUCTION IN THROTTLE VALVE PRESSURE. THIS CAN RESULT IN POSSIBLE TRANSMISSION FAILURES.

In the near future, gasket and overhaul kits will no longer contain any main control gaskets. Two main control lower separator plate gasket items will be available. Refer to the following gasket application chart for correct service part usage.

PART NUMBER	PART NAME	CLASS
E9AZ-7D100-B	Main Control Gasket Kit	B
FOAZ-7D100-A	Separator Plate Lower Gasket	B
E9SZ-7C155-A	Main Control Upper Separator Plate Gasket	B

**OTHER APPLICABLE ARTICLES:** none

**SUPERSEDES:** 88-13-6

**WARRANTY STATUS:** INFORMATION ONLY

**OASIS CODES:** 5100, 5101, 5102, 5200, 5300, 5500, 5800

Technical Service Bulletin # **89816**

Date: **890419**

## Drivetrain - Lubricant Usage

Article No. 89-8-16

^ DRIVETRAIN - LUBRICATION USAGE

^ TRANSMISSION - MANUAL - LUBRICATION USAGE

**LIGHT TRUCK:** 1980-89 BRONCO, ECONOLINE, F-150, F-250, F-350 1983-89 RANGER 1984-89 BRONCO II 1986-89 AEROSTAR

**ISSUE:** A quick reference manual transmission fluid usage chart and a quick reference drivetrain lubrication usage chart for light trucks has been put together to assist technicians in the event service is required.

DRIVETRAIN LUBRICANTS													
	MANUAL TRANSMISSIONS									M/T RELATED			
	4 Spd. T18	4 Spd. NPG 435	M40D TOD	4 Spd. T19	5 Spd. TMA	5 Spd. MMC FM145	5 Spd. MMC FM146	5 Spd. R1 Mazda	5 Spd. R2 Mazda	5 Spd. ZF S5-42	Speedometer Driven Gear	Shift Lever Lower Ball End - MMC	Shift Lever Seat/Cap 435, T18, T19
1980	1	1	1								2		2
1981	1	1	1								2		2
1982	1	1	1								2		2
1983	1	1	1	1	5	1					3	2	2
1984	1	1	1	1	5	1					3	2	2
1985	1	1	1	1	5	1					3	2	2
1986	1	1	1	1	5	1					3	2	2
1987	1	1	1	1	5	1					3	2	2
1988	1						1	4	4	4	3	2	2
1989							1	4	4	4	3	2	2

<b>LEGEND</b>		
<b>Service Part</b>	<b>Description</b>	<b>Specification</b>
1: D8DZ-19C547-A	Standard Transmission Lubricant	ESP M2C83C
2: C1AZ-19590-BA	Long Life Lubricant (Molybdenum Disulfide)	ESA M1CA75B
3: DOAZ-19584-AA	Multi-Purpose Grease	ESR M1C159A
D7AZ-19584-AA		ESB M1C93A
		ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II
		ESP-M2C166-H (Type H)
		ESP-M2C138-CJ (Type A)
<b>Service Part</b>	<b>Description</b>	<b>Specification</b>
5: E5RY-19C547-A	Merkur Synthetic Gear Oil (Dana Axles)	ESD M2C175A
6: C6AZ-19580-E	Additive Friction Modifier	ESW M2C105A
7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A	Grease	ESA M1C172A
9: E8TZ-19590-A	Automatic Hublock Grease	ESA M1C198A
10: E1TZ-19590-A		ESL M1C193 A

FIGURE 1

DRIVETRAIN LUBRICANTS													
	FRONT DRIVE AXLES				TRANSFER CASE					HUBLOCKS			
	Gear Lubricants	Friction Modifier	Upper/Lower Brake Caliper Rails	Wheel and Spindle Bearings, U-Joints and Wheel End Oil Seals	BW 13-45	BW 13-50	BW 13-56	NPG 208	Shift Lever Ball End	R & B II Manual Hublock	R & B II Auto. Hublock	F & B Manual Hublock	F & B Auto. Hublock
1980	6	7	8	9	4	4	4	4	2	2	2	2	11
1981	6	7	8	9	4	4	4	4	2	2	2	2	11
1982	6	7	8	9	4	4	4	4	2	2	2	2	11
1983	6	7	8	9	4	4	4	4	2	2	2	2	11
1984	6	7	8	9	4	4	4	4	2	2	2	2	11
1985	6	7	8	9	4	4	4	4	2	2	2	2	11
1986	6	7	8	9	4	4	4	4	2	2	2	2	11
1987	6	7	8	9	4	4	4	4	2	2	2	2	11
1988	6	7	8	9	4	4	4	4	2	2	2	2	11
1989	6	7	8	9	4	4	4	4	2	2	2	2	11

<b>LEGEND</b>		
<b>Service Part</b>	<b>Description</b>	<b>Specification</b>
1: D8DZ-19C547-A	Standard Transmission Lubricant	ESP M2C83C
2: C1AZ-19590-BA	Long Life Lubricant (Molybdenum Disulfide)	ESA M1CA75B
3: DOAZ-19584-AA	Multi-Purpose Grease	ESR M1C159A
D7AZ-19584-AA		ESB M1C93A
		ESB M1C106B
4: XT-2-QDX	Mercon	Mercon, Dexron II
		ESP-M2C166-H (Type H)
		ESP-M2C138-CJ (Type A)
<b>Service Part</b>	<b>Description</b>	<b>Specification</b>
5: E5RY-19C547-A	Merkur Synthetic Gear Oil (Dana Axles)	ESD M2C175A
6: C6AZ-19580-E	Additive Friction Modifier	ESW M2C105A
7: C8AZ-19B546-A	Disc Brake Caliper Slide Grease	EST M2C118A
8: D7AZ-19590-A	Grease	ESA M1C172A
9: E8TZ-19590-A	Automatic Hublock Grease	ESA M1C198A
10: E1TZ-19590-A		ESL M1C193 A

FIGURE 2

**ACTION:** Refer to the transmission fluid application chart in Figure 1 for the correct fluid usage. Refer to the drivetrain lubrication application chart in Figure 2 for the correct lubricant usage.

PART NUMBER	PART NAME	CLASS
D8DZ-19C547-A	Standard Transmission Lubricant - 5 gallons	BG
C1AZ-19590-BA	Long Life Lubricant (molybdenum disulfide) - 14.5 ounces	B
DOAZ-19584-AA	Multi-Purpose Grease - 4 ounce tube	B
D7AZ-19584-AA	Multi-Purpose Grease - 15 ounce aerosol can	B
XT-2-QDX	Transmission Fluid (Mercon) -	V

	quart can (pkg. of 12)	
C6AZ-19580-E	Gear Oil (Dana axle) - 1 gallon	AG
C8AZ-19B546-A	Additive Friction Modifier - 4 ounce bottle	AM
D7AZ-19590-A	Disc Brake Caliper Slide Grease - 4 ounce tube	AM
E8TZ-19590-A	Grease - 14.5 ounces	B
E1TZ-19590-A	Automatic Hublock Grease - 5 ounce tube	B
E5RY-19C547-A	Merkur Synthetic Manual Transmission Fluid	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 5970

Technical Service Bulletin # **89912**

Date: **890503**

## A/T - AOD Case Thread Update

TRANSMISSION - AOD - CASE BOLT HOLE SIZE CHANGE

Article No. 89-9-12

FORD: 1986-88 CROWN VICTORIA 1986 LTD 1986-88 MUSTANG, THUNDERBIRD

LINCOLN-MERCURY: 1986 CAPRI 1986-87 CONTINENTAL 1986-88 COUGAR, GRAND MARQUIS, MARK VII 1986 MARQUIS 1986-88 TOWN CAR

LIGHT TRUCK: 1986-88 BRONCO, ECONOLINE, F-150, F-250, F-350

ISSUE: The 1989 model year "AOD" transmission case threads are different from prior model year cases. Prior model year transmission cases use a 5/16"-18 thread. 1989 model year transmission cases use a M10-1.5 thread. The larger M10-1.5 bolts will not pass through the prior model year converter plate, transmission brace or engine cover plate.

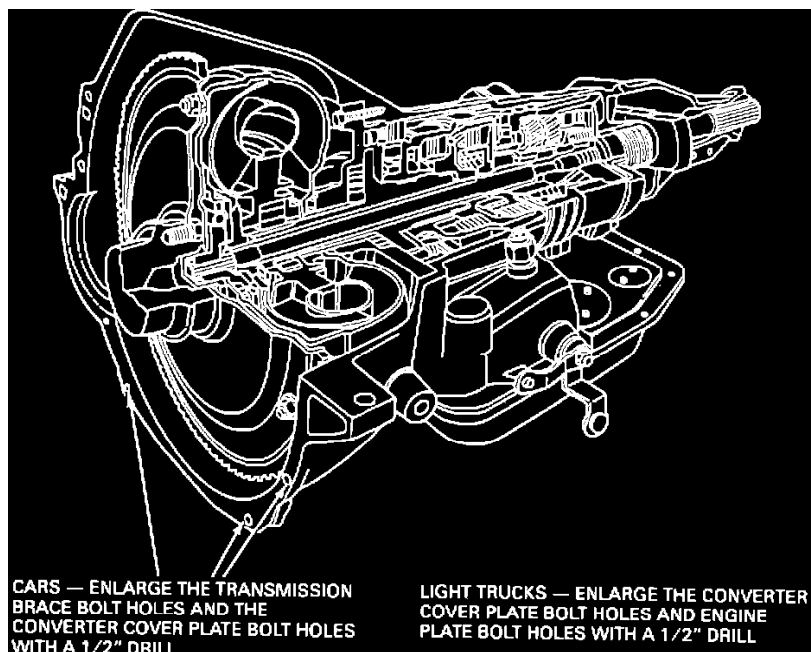


FIGURE 1

ACTION: If a transmission case replacement is required on a past model vehicle, the bolt holes for the car's transmission brace and converter cover plate will need to be enlarged with a 1/2" drill. On light trucks, enlarge the converter cover plate and engine cover plate with a 1/2" drill. Refer to Figure 1 for the bolt hole locations.

OTHER APPLICABLE ARTICLES: None  
 WARRANTY STATUS: INFORMATION ONLY  
 OASIS CODES: 5800

Technical Service Bulletin # **88116**

Date: **880108**

## Axle - Rear Axle Case Porosity/Pinion Seal Leaks

^ AXLE - REAR - CASE POROSITY OR PINION SEAL LEAK - AXLES BUILT AT VAN DYKE PLANT FROM 09/28/87 TO 10/28/87

^ LEAK - REAR AXLE - CASE POROSITY OR PINION SEAL - AXLES BUILT AT VAN DYKE PLANT FROM 09/28/87 TO 10/28/87

Article No. 88-1-16

FORD: 1988 MUSTANG, THUNDERBIRD, CROWN VICTORIA

LINCOLN-MERCURY: 1988 COUGAR, GRAND MARQUIS, MARK VII, LINCOLN TOWN CAR

LIGHT TRUCK: 1988 F SERIES

AXLE PLANT CODES			
Vehicle Application	Affected Axle Codes		
Crown Victoria Grand Marquis Lincoln Town Car	V012B	V013B	V014B
	V015B	V016B	V017B
	V030B	V031B	V033B
	V034B	V037B	V038B
	V039B		
Mustang Thunderbird Cougar	V266D	V281D	V462B
	V479B	V485B	V487B
	V492B		
F-Series	V106C	V107C	V108C
	V110C	V111C	V125C
	V126C	V127C	V128C
	V129C	V130C	V131C
	V132C	V163C	V166C
	V168C	V169C	V170C
	V171C	V183C	V186C
	V189C	V190C	V191C
	V192C		

ISSUE: Rear axle case porosity or leaking pinion seals may be incorrectly diagnosed resulting in repeat repairs. To help find the source of an axle leak, a fluorescent dye has been added to the axle lubricant. Under normal light, the axle lubricant is "GREEN" in color. Under a black light the axle lubricant is "YELLOWORANGE" in color.

ACTION: If service is required, use the axle plant codes on this page and the axle build dated on the service identification tag to determine if the axle had the dye added. Use a black light to locate the source of the leak.

NOTE: The service identification tag is bolted in the two o'clock position on the axle housing cover.

OTHER APPLICABLE ARTICLES: None  
 WARRANTY STATUS: "INFORMATION ONLY"  
 Technical Service Bulletin # **911511**

Date: **910724**

## Rear Axle - Correct Routing

Article No.  
91-15-11

07/24/91

AXLE - VENT HOSE ROUTING - 8.8 INCH AND 10.25 INCH RING GEAR REAR AXLES

LIGHT TRUCK: 1987-91 BRONCO, F-160-350 SERIES

ISSUE: Rerouting of the rear axle vent hose provides better protection against water entering the axle through the vent hose.

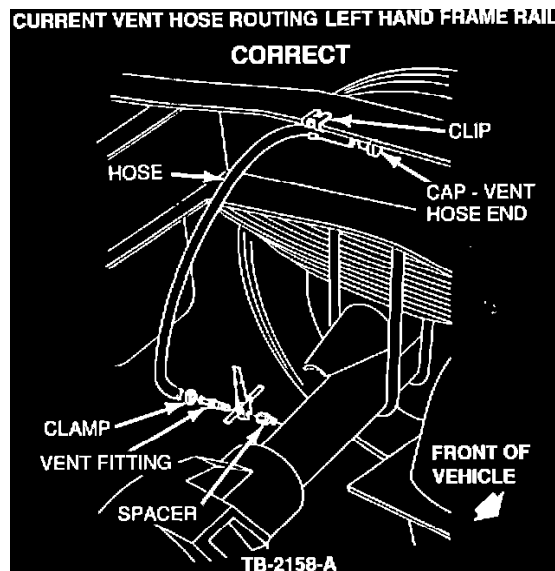


Figure 1

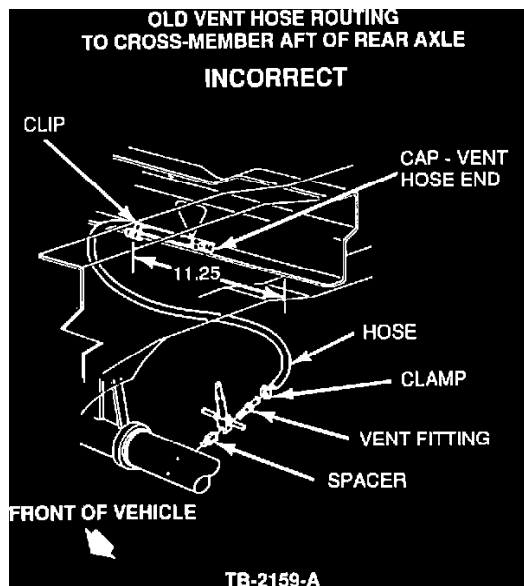


Figure 2

**ACTION:** Check the location of the rear axle vent hose routing which is identical for F-150/250/350 and Bronco Light Trucks. The rear axle vent hoses are mounted on the left hand frame rail (driver's side). This location provides better protection against water entering the axle through the vent hose. Refer to Figure 1; Correct Vent Hose Routing. Previously, vehicles with aft fuel tanks were equipped with the vent hose mounted on the aft axle cross member. This routing has been discontinued. Refer to Figure 2; Incorrect Vent Hose Routing.

**ALWAYS CHECK TO MAKE SURE THE AXLE VENT AND VENT HOSE ARE NOT PLUGGED WHEN SERVICING AXLE.**

The purpose of the vent is to prevent pressure or vacuum buildup in the axle during various driving conditions and temperatures. If the vent is plugged with mud or debris the axle cannot "breathe".

PART NUMBER	PART NAME	CLASS
372047-S100	Clip (Pkg. of 4)	BS
390312-S	Cap Plug (Pkg. of 6)	S
D3PZ-17543-D	Hose (Bulk 50' Roll)	BM
376545-S8	Clamp Hose	S
E8TZ-4022-A	Vent Fitting (Pkg. of 2)	B
E3TZ-2K321-A	Spacer	C

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911511A	Vent Hose Reroute	0.3 Hr.
DEALER CODING		
	BASIC PART NO.	CONDITION CODE
	4022	36
OASIS CODES: 509000, 510000		

Technical Service Bulletin # **911015**

Date: **910515**

## M/T - M50D Hard Shift Condition

Article No.  
91-10-15

5/15/91

TRANSMISSION - M50D - HARD SHIFT TO REVERSE OR  
FIFTH GEAR

LIGHT TRUCK: 1988-89 ECONOLINE  
1988-90 BRONCO II  
1988-91 AEROSTAR, BRONCO, F-150, F-250, RANGER  
1991 EXPLORER

ISSUE: The 5-R synchronizer sliding sleeve clutching teeth may wear on the reverse side. This may cause a hard to engage or partial engagement of fifth or reverse gear and could result in the transmission jumping out of gear. If the wear is allowed to continue, it may become difficult or impossible to engage 1-2-3 or 4th gear.

ACTION: Inspect the 5-R synchronizer sliding sleeve for wear and replace if excessive wear is found. Refer to the following procedure for service details.

### INSPECTION PROCEDURE:

1. Remove necessary components so that the transmission extension housing can be removed without removing the entire transmission. Refer to the Light Truck Shop Manual Section 07-03A for service details.

NOTE: COMPACT VEHICLES MAY REQUIRE REMOVAL OF TRANSMISSION

2. Remove the transmission extension housing.

3. Inspect the 5-R synchronizer sliding sleeve for wear of the reverse clutching teeth.

### REPAIR PROCEDURE

1. If wear is observed, remove speedometer drive gear (4 x 2 only).

2. Remove the top cover (if repairing on the bench).

3. Carefully remove the main shaft and counter shaft locking nuts.

4. Remove and replace the following transmission parts. Refer to the Light Truck Shop Manual for service procedures.

^ 5th Counter Shaft Gear

^ 5-R Synchronizer, hub and ring assembly

NOTE: INSTALL WITH THE DOT ON THE SYNCHRONIZER SLEEVE FACING REVERSE GEAR.

^ Reverse counter shaft gear

^ 5-R Counter Lever

^ 5-R Shift fork and rod

NOTE: USE THE SPRING AND BALL FROM THE EXISTING ASSEMBLY.

^ Replace the idler shaft in the reverse idler gear assembly (R1 only).

NOTE: THERE ARE EXTRA ADJUSTING SHIMS PROVIDED IN CASE IT IS NECESSARY TO RESET THE 5-R SYNCHRONIZER HUB AND CONTROL REVERSE GEAR END PLAYS TO SPECIFICATION. USE THE NEW MAIN SHAFT AND COUNTER SHAFT LOCKING NUTS UPON ASSEMBLY.

CAUTION: USE ALL THE PARTS CONTAINED IN THE SERVICE KIT INCLUDING THE COUNTER REVERSE LEVER. ALTHOUGH THE NEW LEVER LOOKS THE SAME AS THE ONE CONTAINED IN THE TRANSMISSION, CONTACT ANGLES ARE SLIGHTLY DIFFERENT TO INSURE PROPER TIMING AND ENGAGEMENT.

PART NUMBER	PART NAME	CLASS
F0TZ-7C391-E	Synchronizer Service Kit - R2	C
F0TZ-7C391-C	Synchronizer Service Kit - 2.3L, 2.9L, 3.0L, R1	C
F0TZ-7C391-D	Synchronizer Service Kit - 4.0L R1	C

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
911015A	Install Synchronizer Service Kit - 4 x 2	2.1 Hr.
911015A	Install Synchronizer Service Kit - 4 x 4	2.9 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7124	30

OASIS CODES: 505000

Technical Service Bulletin # **932219**

Date: **931027**

## M/T - ZF S5-42 HD Obsolete Parts Return

Article No.

93-22-19

10/27/93

^ SERVICE PARTS RETURN OF OBSOLETE SYNCHRONIZER ASSEMBLY - ZF MODEL S5-42 HD TRANSMISSION - PARTS WITH PACKAGING DATE CODES BEFORE "012593"

^ SYNCHRONIZER - SERVICE PARTS RETURN OF OBSOLETE SYNCHRONIZER ASSEMBLY - ZF MODEL S5-42 HD TRANSMISSION - PARTS WITH PACKAGING DATE CODES BEFORE "012593"

LIGHT TRUCK:

1987-93 F-250, F-350

1988 BRONCO, F-150

1988-93 F SUPER DUTY

This TSB article is being republished in its entirety to change the packaging date code.

ISSUE:

An improved design 3-4 Synchronizer assembly replaces the obsolete part.

ACTION:

Remove the obsolete parts from your dealership's inventory. The obsolete parts with packaging date codes before "012593" should be returned to your facing PDC within thirty (30) days of this TSB.

- Sort dealership stock of FOTZ-7124-E. Receipts with a packaging date code of 012593 or later will contain OK stock and may be released for normal sale.
- Packaging date codes before 012593 are suspect and should be rejected and returned to your facing PDC using the least expensive transportation.
- If claim is processed electronically using DOES II, use return code "GB"; otherwise, complete a separate paper claim form FPS-340 using return

code "J".

4. In the "Remarks" section, write "Returned Per TSB 93-22-19".

#### LIMITS

- ^ The returns must be received within 30 days from the date of this TSB.
- ^ Returns are restricted to the subject part.
- ^ The parts must have been purchased from FCSD in accordance with Policy And Procedure Bulletin 4000.

#### CREDIT

Credit for parts and prepaid freight costs will be issued.

#### NOTE:

THE PART NUMBER HAS NOT BEEN CHANGED. OBSOLETE STOCK CAN ONLY BE DETERMINED VIA PACKAGING DATE CODE. DO NOT RETURN PARTS HAVING PACKAGING DATE CODES OF "012593" OR LATER.

#### NOTE:

REPLACEMENT STOCK IS AVAILABLE FOR ORDERING IMMEDIATELY.

OTHER APPLICABLE ARTICLES: NONE

SUPERSEDES: 93-19-15

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 505000

Technical Service Bulletin # **90211**

Date: **900117**

## M/T - ZF Model S5-42 Inspection Information

TRANSMISSION - "ZF MODEL S5-42" - INSPECTION INFORMATION

Article No. 90-2-11

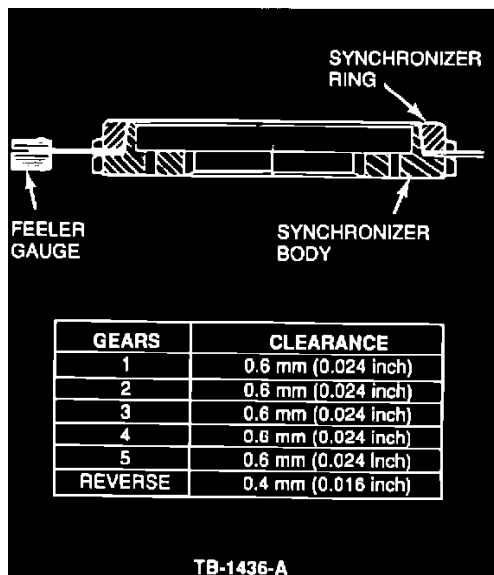
LIGHT TRUCK: 1987-90 F-250, F-350 1988-90 BRONCO, F SUPER DUTY, F-150

**ISSUE:** The synchronizer rings in the ZF transmission have a molybdenum coating on the grooved surface. This coating provides a very hard surface in comparison to brass or bronze style rings. The hard surface causes the surface on the friction taper cone of the gear to show different wear patterns than those shown in transmissions using brass or bronze rings. In some cases synchronizing system parts, rings and gears may be replaced in error.

**ACTION:** Use the following inspection procedure, in addition to Shop Manual and acceptance standards. This information will help you inspect various wear patterns and sporadic burnt patches or marks on the friction cone of the gear to determine if replacement is required.

#### Synchronizer Ring

1. Inspect the internal surface for contact pattern. The contact pattern should be the same on the entire internal circumference of the ring.



**Figure 1**

2. Check the synchronizer ring for proper reserve, Figure 1.
  - a. Position the synchronizer ring on the synchronizer body as shown in Figure 1.
  - b. Insert a feeler gauge and measure the clearance at the two opposite points.
  - c. If the clearance is less than 0.6 mm (0.024") for the 3rd-4th, 1st-2nd and 5th synchronizer assemblies and 0.4 mm (0.016") for the reserve synchronizer assemblies, replace the synchronizer ring, synchronizer body or both if required to bring to within specification.

#### Main Shaft And Input Shaft Gears

1. Inspect the friction taper cone on the gears and check for the following wear patterns.
  - a. Sporadic slightly burnt patches on otherwise evenly smoothed circumference is acceptable. The patches will appear to be blackish in color and will vary in degree and surface area depending on the synchronizer ring contact area.
  - b. Signs of excessive heat will appear to be burnt to a reddish-blue color, mainly on the edges of the cone. This is a result of excessive overloading, operating failure or perhaps a malfunctioning clutch system.
2. Replace gears showing excessively burnt spots (reddish-blue) on the friction taper cone edges. In this case the selector teeth will be damaged as well. Refer to the appropriate Light Truck Shop Manual, Section 16-34 for service details.

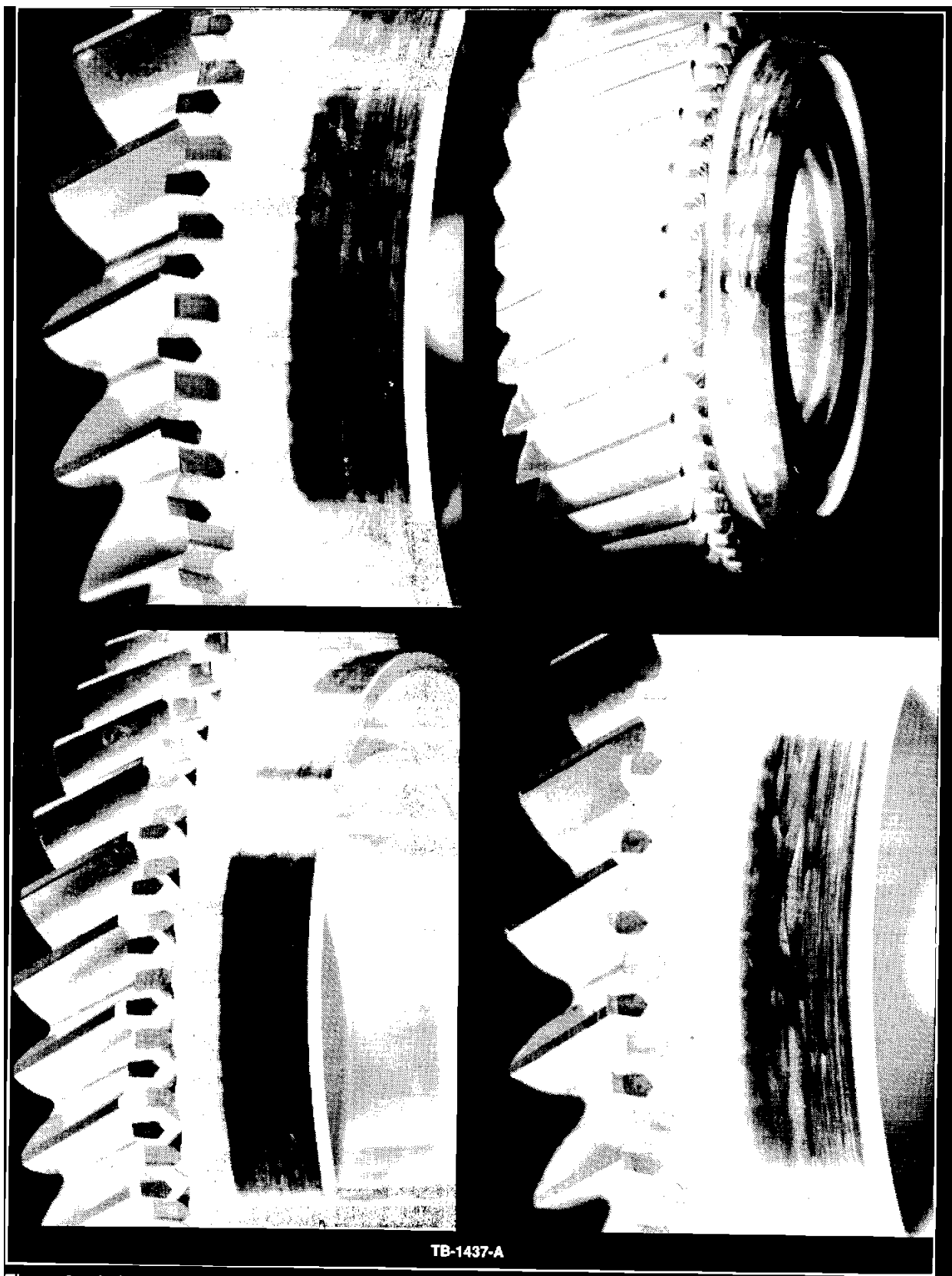


Figure 2

3. Reuse the gears if sufficient synchronizer reserve allowance is available and the teeth (dog teeth) are in good condition. Various acceptable wear patterns on the taper cone are shown in Figure 2.

OTHER APPLICABLE ARTICLES: 88-8-20, 88-26-13

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 5100, 5104, 5200, 5300

Technical Service Bulletin # **88820041588**

Date: **880401**

**M/T - Hard to Shift Disengages From Third Gear**

TRANSMISSION - ZF MODEL S5-42 - HARD TO SHIFT INTO THIRD GEAR -

TRANSMISSION - ZF MODEL S5-42 - DISENGAGES THIRD GEAR

Article No. 88-8-20

LIGHT TRUCK: 1987-88 F SERIES, BRONCO

ISSUE: A hard shifting transmission during a 2-3 upshift or 4-3 downshift may be caused by a third gear synchronizer that has an improper surface finish. The hard shifting condition may also cause the transmission to disengage from third gear because of incomplete third gear engagement.

ACTION: To correct this, install a new design third gear synchronizer that was manufactured using a new machine lapping process to improve the surface finish. Refer to the 1988 Light Truck Shop Manual, Section 16-34-1 for removal and installation procedures.

PART NUMBER	PART NAME	CLASS
E7TZ-7124-C	Third Gear Synchronizer	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty and Powertrain Coverages

OPERATION: 880820A - Install third gear synchronizer

TIME: 7.6 Hrs. - F Series (4 x 2) 8.6 Hrs. - F Series (4 x 4) 8.3 Hrs. - Bronco

DLR. CODING: Basic Part No. 7124

Condition Code: 85

Technical Service Bulletin # **931915**Date: **930915****M/T - ZF S5 42 HD Return of Obsolete Parts**

Article No.

93-19-15

09/15/93

^ SERVICE PARTS RETURN OF OBSOLETE SYNCHRONIZER ASSEMBLY - ZF MODEL S5-42 HD TRANSMISSION - PARTS WITH PACKAGING DATE CODES BEFORE "061793"

^ SYNCHRONIZER - SERVICE PARTS RETURN OF OBSOLETE SYNCHRONIZER ASSEMBLY - ZF MODEL S5-42 HD TRANSMISSION - PARTS WITH PACKAGING DATE CODES BEFORE "061793"

LIGHT TRUCK:

1987-93 F-250, F-350

1988 BRONCO, F-150

1988-93 F SUPER DUTY

ISSUE:

An improved design 3-4 Synchronizer assembly replaces the obsolete part.

ACTION:

Remove the obsolete parts from your dealership's inventory. The obsolete parts with packaging date codes before "061793" should be returned to your facing PDC within thirty (30) days of this TSB.

- Sort dealership stock of FOTZ-7124-E. Receivals with a packaging date code of 061793 or later will contain OK stock and may be released for normal sale.
- Packaging date codes before 061793 are suspect and should be rejected and returned to your facing PDC using the least expensive transportation.
- If claim is processed electronically using DOES II, use return code "GB"; otherwise, complete a separate paper claim form FPS-340 using return code "J".
- In the "Remarks" section, write "Returned Per TSB 93-19-15".

LIMITS

^ The returns must be received within 30 days from the date of this TSB.

^ Returns are restricted to the subject part.

^ The parts must have been purchased from FCSD in accordance with Policy And Procedure Bulletin 4000.

#### CREDIT

Credit for parts and prepaid freight costs will be issued.

#### NOTE:

THE PART NUMBER HAS NOT BEEN CHANGED. OBSOLETE STOCK CAN ONLY BE DETERMINED VIA PACKAGING DATE CODE. DO NOT RETURN PARTS HAVING PACKAGING DATE CODES OF "061793" OR LATER.

#### NOTE:

REPLACEMENT STOCK IS AVAILABLE FOR ORDERING IMMEDIATELY.

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: INFORMATION ONLY

OASIS CODES: 505000

Technical Service Bulletin # **911811**

Date: **910905**

## M/T - Crunching Shifting From 2nd to 3rd Gear

Article No. 91-18-11

09/05/91

^ NOISE-INTERMITTENT "CRUNCHING" WHEN SHIFTING FROM 2ND TO 3RD-VEHICLES WITH M50D (MAZDA R1 AND R2) TRANSMISSION

^ TRANSMISSION-M50D (MAZDA R1 AND R2)- INTERMITTENT "CRUNCHING" NOISE WHEN SHIFTING FROM 2ND TO 3RD

LIGHT TRUCK: 1988-89 ECONOLINE  
1988-90 BRONCO II  
1988-91 AEROSTAR, BRONCO, F-150, RANGER  
1991 EXPLORER

ISSUE: A slight intermittent "crunch" or grinding noise may be heard when shifting from 2nd to 3rd. This is caused by improper synchronizer engagement.

ACTION: Install a new synchronizer service kit. Refer to the Parts Block for correct parts usage and the following procedure for service details.

#### INSPECTION

1. Drive the vehicle to warm the transmission oil temperature to about 125~F (52~C). This can usually be done after driving about 10 miles at highway speed when the outside temperature is above freezing.
2. On a smooth road surface, accelerate the vehicle from a stop to 3rd gear at normal shift speeds as defined in the owners guide.
3. If a slight "crunch" is heard or grinding sensation is felt in the shift lever when shifting from 2nd to 3rd, proceed with the following synchronizer kit installation procedure.

#### SYNCHRONIZER KIT INSTALLATION

1. Remove the transmission from the vehicle. Refer to the appropriate Light Truck Shop Manual, Section 07-03A, for removal procedure.
2. Remove the 1st/2nd and 3rd/4th clutch hub and sleeve assembly along with the corresponding synchronizer ring.
3. Install all parts from the appropriate synchronizer kit. The kits contain new 1, 2, 3, and 4 synchronizer rings, a new 3/4 synchronizer sleeve and an instruction sheet. The original 1/2 clutch hub sleeve assembly and 3/4 clutch hub must be reused.
4. Put a label on the transmission showing it was updated per TSB 91-18-11 and to refer to this TSB before servicing.

NOTE: THE NEW 3RD GEAR SYNCHRONIZER RING AND 3/4 SYNCHRONIZER SLEEVE ARE UNIQUE FROM THE ORIGINAL

COMPONENTS. THE NEW COMPONENTS MUST BE INSTALLED AS A SET IN THE PROPER POSITION. FAILURE TO DO SO WILL RESULT IN THE INABILITY TO SHIFT THE TRANSMISSION INTO ONE OF THE GEARS. note>

PART NUMBER	PART NAME	CLASS
FOTZ-7C391-H	Synchronizer Kit - R2 (F-150, Bronco, Econoline)	C
FOTZ-7C391-F	Synchronizer Kit - R1 (Ranger, Bronco II, Explorer)	C
FOTZ-7C391-G	Synchronizer Kit - R1 (Aerostar)	C

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
911811A	Inspect Transmission	0.3 Hr.
911811B	Install Synchronizer Kit Ranger 4X2 With 2.OL, 2.3L, 2.9L, or 3.OL And Aerostar With 3.OL	5.0 Hr.
911811C	Install Synchronizer Kit Ranger 4X4 With 2.3L or 4.OL and Explorer 4X4	6.7 Hr.
911811D	Install Synchronizer Kit - Ranger 4X4 With 2.9L	6.9 Hr.
911811E	Install Synchronizer Kit - Ranger 4X2 And Explorer 4X2 With 4.OL	6.0 Hr.
911811F	Install Synchronizer Kit - Bronco II 4X2 With 2.9L And Bronco With 5.OL	6.5 Hr.
911811G	Install Synchronizer Kit - Bronco II 4X4 With 2.9L	6.9 Hr.
911811H	Install Synchronizer Kit F-150 4X2 With 4.9L	5.1 Hr.
911811I	Install Synchronizer Kit F-150 4X4 With 4.9L or 5.OL And Bronco With 4.9L	6.3 Hr.
911811J	Install Synchronizer Kit - F-150 4X2 With 5.OL	5.3 Hr.
911811K	Install Synchronizer Kit - Econoline With 4.9L	5.2 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7C391	56

OASIS CODES: 505000, 505200, 506000, 702000

Technical Service Bulletin # **911014**

Date: **910515**

## M/T Transmission Shift Lever - Buzz/Vibration

Article No.

91-10-14

5/15/91

^ NOISE/VIBRATION - SHIFT LEVER - M50D TRANSMISSION

^ TRANSMISSION - M50D - SHIFT LEVER BUZZ/VIBRATION

LIGHT TRUCK: 1988-91 BRONCO, F-150, F-250

**ISSUE:** Transmission shift lever buzz, may be noticed in overdrive or 4th gear after the vehicle has obtained normal operation temperatures and is driven on a smooth road surface at normal highway speeds of 55 MPH (88Km/h). The tone and intensity of this condition are considerably less when observed in 4th gear than in overdrive.

**ACTION:** Replace the transmission top cover assembly with the new top cover kit assembly. Refer to the following procedure for diagnosis and service details.

#### INSPECTION PROCEDURE:

1. Drive the vehicle to warm the transmission oil to approximately 125~F (52~) - about ten miles at highway speeds when the outside temperature is at the freezing point.
2. On a smooth road surface, drive the vehicle at approximately 55 MPH (88 Km/h) in overdrive to verify shift lever buzz.
3. If shift lever buzz is observed, lightly push to the right (passenger side) to determine if the buzz is eliminated.
4. If the buzzing noise is eliminated, refer to the following repair procedures.

**NOTE:** IF THIS TEST DOES NOT ELIMINATE THE BUZZ, DO NOT REPAIR WITH THIS PROCEDURE, IT WILL NOT CORRECT THE CONCERN, REFER TO THE LIGHT TRUCK SHOP MANUAL FOR FURTHER CONCERN DEFINITION.

#### REPAIR PROCEDURE

1. Remove the old transmission top cover assembly.
2. Install the new transmission top cover assembly.

**NOTE:** THE TRANSMISSION DOES NOT HAVE TO BE REMOVED FROM VEHICLE. ACCESS IS GAINED BY REMOVING THE SHIFT LEVER AND SHIFT BOOT AS AN ASSEMBLY. PULL BACK THE FLOOR COVERING AND REMOVE TRANSMISSION OPENING COVER PLATE.

**CAUTION:** CARE SHOULD BE TAKEN TO INSURE THAT NO DIRT ENTERS THE TRANSMISSION WHILE THE TOP COVER IS OFF.

PART NUMBER	PART NAME	CLASS
F0TZ-7C391-J	Transmission Top Cover Assembly	C

OTHER APPLICABLE ARTICLES: NONE

WARRANTY STATUS: Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911014A	Replace Transmission Top Cover Assembly	1.2 Hr.

#### DEALER CODING

BASIC PART NO.	CONDITION CODE
7222	56

OASIS CODES: 505200, 703300

Technical Service Bulletin # **9059**

Date: **900228**

## M/T - ZF HD M50D Bump/Clunk/Click Noises

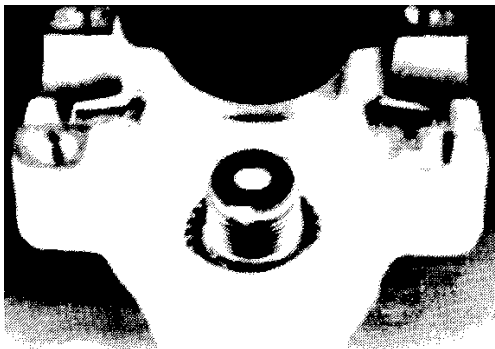
^ NOISE - BUMP/CLUNK/CLICK - ZF HEAVY DUTY M50D TRANSMISSION

^ TRANSMISSION - ZF HEAVY DUTY M50D-LEAKS LUBRICANT

LIGHT TRUCK: 1987-90 F-250, F-350

**ISSUE:** A "bumping/clunking" noise or a "clicking" sound on torque reversal or transmission lubricant leakage may be caused by a loose output flange retaining nut.

**ACTION:** Install a new output flange retaining nut. Refer to the following procedure for service details.



TB-1555-A

**Figure 1**

1. Install a new output flange retaining nut (E7TZ-7045-A) on the output shaft, Figure 1.

**CAUTION:** DO NOT REUSE THE OUTPUT FLANGE RETAINING NUT AFTER ANY SERVICING OF THE TRANSMISSION. ALWAYS REPLACE IT WITH A NEW ONE.

2. Tighten the nut to 184 lb.ft. (250 N-m).



TB-1556-A

**Figure 2**

3. Position a 3/16" (4.76 mm) punch on the locking shoulder of the retaining nut over the groove of the output shaft, Figure 2.

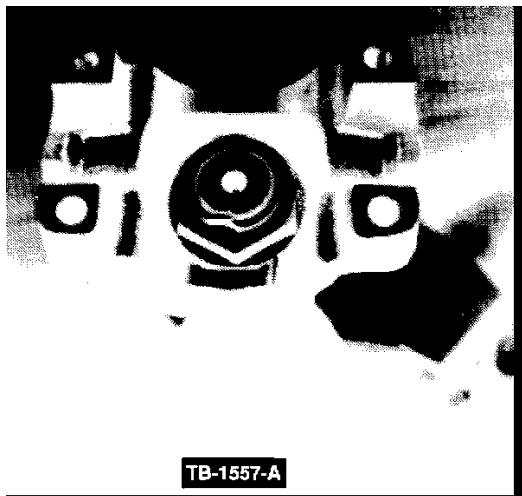


Figure 3

4. Strike the punch with a hammer. Make sure that the shoulder of the retaining nut is contacting the bottom of the groove, Figure 3.

**CAUTION:** WHEN STAKING THE NUT, MAKE SURE THE LOCKING SHOULDER OF THE NUT AND THE GROOVE OF THE OUTPUT SHAFT ARE THE ONLY AREAS USED IN THIS STAKING OPERATION. IF THE NUT IS STRUCK IN ANY OTHER AREA, THE TORQUE WILL BE LOST AND THE NUT MAY COME LOOSE IN SERVICE.

PART NUMBER	PART NAME	CLASS
E7TZ-7045-A	Output Flange Retaining Nut	B

OTHER APPLICABLE ARTICLES: None

WARRANTY STATUS: Eligible Under Basic Warranty Coverage, Powertrain Warranty Coverage

OPERATION	DESCRIPTION	TIME
900509A	Install & Stake Retaining Nut	0.4 Hr.

DEALER CODING

BASIC PART NO.	CONDITION CODE
7045	33

OASIS CODES: 5500, 5950, 5970, 7100, 7113

Technical Service Bulletin # **911712**

Date: **910821**

## M/T - Gear Noise/Rattle

Article No. 91-17-12

08/21/91

- ^ NOISE - "GEAR RATTLE" - MANUAL TRANSMISSIONS - FROM FLOOR PAN SHIFTER OPENING (4X2 AND 4X4 MODELS)
- ^ TRANSMISSION - MANUAL - "GEAR RATTLE" NOISE FROM FLOOR PAN SHIFTER OPENING (4X2 AND 4X4 MODELS)

LIGHT TRUCK: 1988-91 BRONCO, F SUPER DUTY, F-150, F-250, F-350, F-47

**ISSUE:** Gear noise, commonly referred to as "gear rattle", may enter the cab through the manual transmission shift lever floor pan opening. This noise is normally noticed when the vehicle is at normal operating temperatures and a load is applied to the engine between 500 and 1000 RPM.

**ACTION:** Inspect and evaluate the vehicle for gear rattle. If gear rattle is detected, install a new shift boot over the shift lever to limit gear noise from entering the cab. Refer to the following procedure for service details.

### INSPECTION PROCEDURE:

1. Drive the vehicle till normal operating temperatures are maintained (about 10 miles at highway speeds when the ambient temperatures are above freezing.)
2. On a smooth road surface, place the shift lever in 2nd or 3rd gear and accelerate starting at 500 RPM.

3. If gear rattle is heard and is diagnosed as coming through the shift lever floor pan opening, repair using the following procedure.

**REPAIR PROCEDURE:**

1. Remove the shift knob from the shift lever.

**NOTE:** TO REMOVE THE SHIFT KNOB WITHOUT DAMAGE, PLACE A 16 mm OR AN ADJUSTABLE OPEN END WRENCH UNDER THE SHIFT KNOB END AND STRIKE THE WRENCH UPWARD WITH A HEAVY HAMMER.

2. Remove the (4) screws which secure the boot to the floor. Remove the boot assembly from the the shift lever.

3. Install the new boot assembly over the shift lever and secure to the floor with the the (4) screws provided.

**NOTE:** USE A SOAP SOLUTION TO ASSIST IN INSTALLING THE SHIFT BOOT OVER THE SHIFT LEVER.

**CAUTION:** DO NOT USE A HYDROCARBON (OIL) OR GLYCOL BASED LUBRICANT TO AID IN INSTALLING THE SHIFT BOOT. THESE MATERIALS WILL GET INTO THE SHIFT LEVER SPLINES AT THE SHIFT KNOB END OF THE LEVER AND CAUSE THE SHIFT KNOB PLASTIC CORE TO CRACK.

4. Install the shift knob on the shift lever.

PART NUMBER	PART NAME	CLASS
FITZ-7277-A	Boot - Transmission Assembly	B

**OTHER APPLICABLE ARTICLES:** NONE

**WARRANTY STATUS:** Eligible Under Basic Warranty Coverage

OPERATION	DESCRIPTION	TIME
911712A	Inspection Only (includes Road Test)	0.3 Hr.
911712B	Inspect And Install Shift Lever Boot	0.7 Hr.

**DEALER CODING**

BASIC PART NO.	CONDITION CODE
7277	53

**OASIS CODES:** 505000, 505200, 597997, 702300

Technical Service Bulletin # **88912042788**

Date: **880401**

**Full Float Hub Seal - Lubricant Leak**

Article No. 88-9-12

**AXLE - REAR - FORD 10.25" FULL FLOAT DESIGN - HUB SEAL LEAKS**

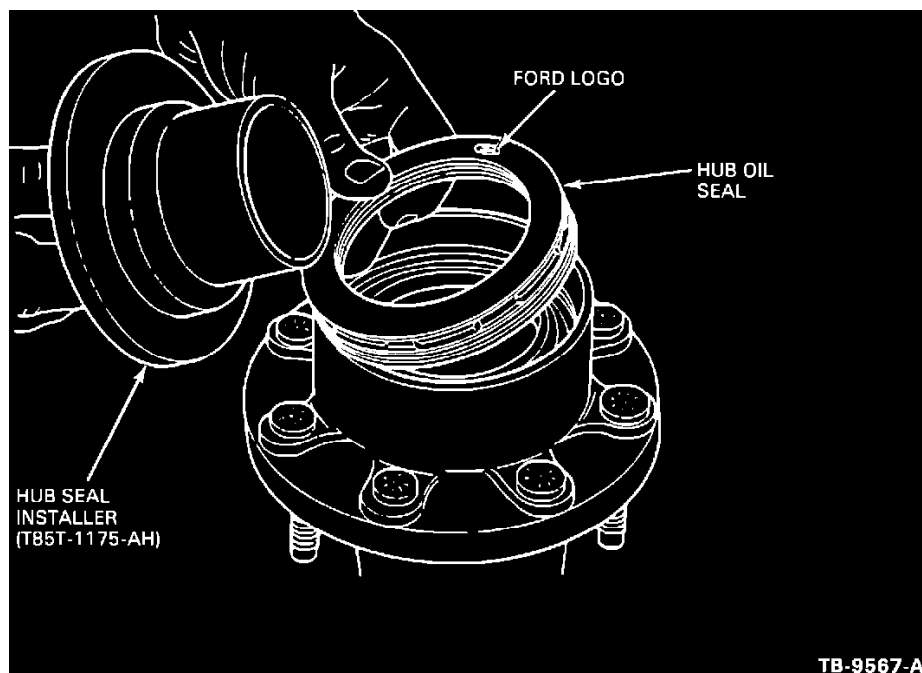
**LEAKS - LUBRICANT FROM HUB SEAL -**

**FORD 10.25" FULL FLOAT DESIGN REAR AXLE**

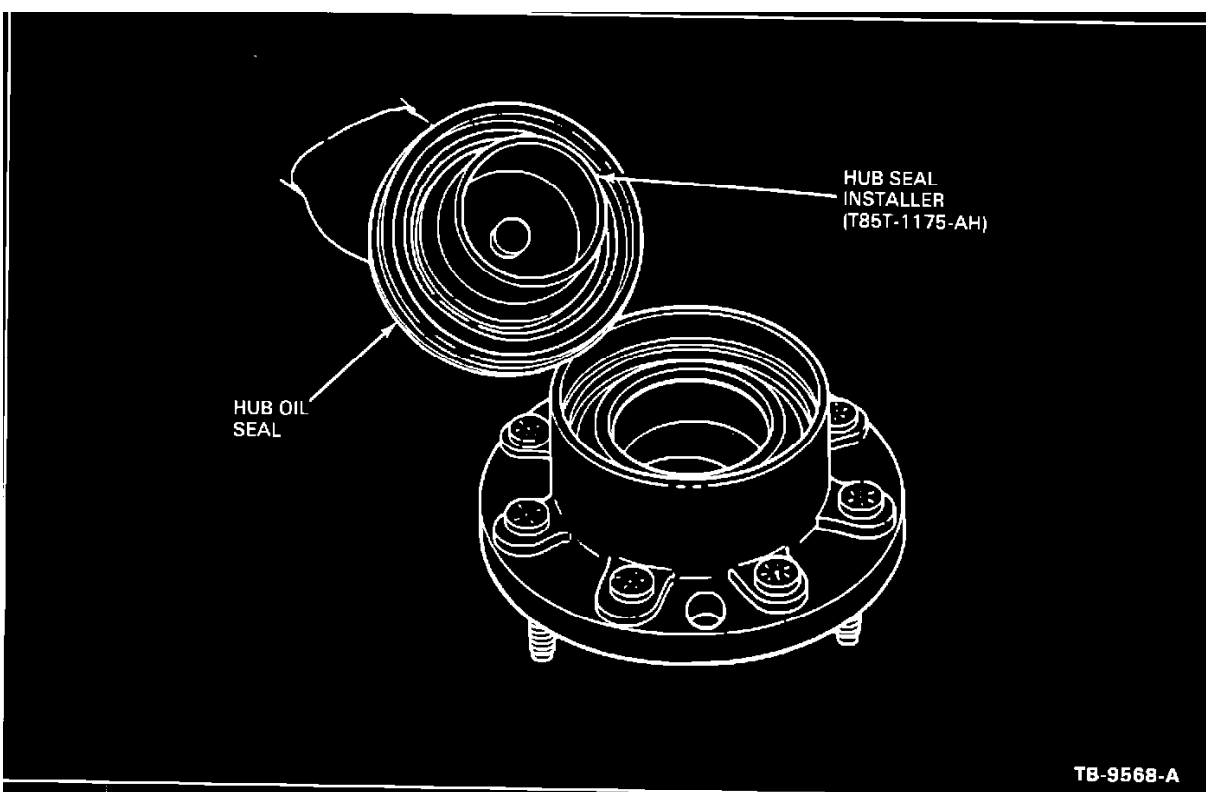
**LIGHT TRUCK:** 1985-88 F-250/350

**ISSUE:** Lubricant leaking from the rear axle on F-250 and F-350 trucks, with Ford 10.25" full float axles may be caused by the hub seal. The leaking condition could affect trucks with single or dual rear wheels.

**ACTION:** To correct this, install a new design hub seal with improved sealing qualities. The new hub seal is "green" in color to assist in part identification. Refer to the appropriate Light Truck Shop Manual, Volume A, Section 15-09 and the following service procedure for removal and installation instructions.

**FIGURE 12**

1. Position hub seal with the "Ford" logo facing up, Figure 12.

**FIGURE 13**

2. Install hub seal on hub seal installer tool (T85T-1175-AH), Figure 13.

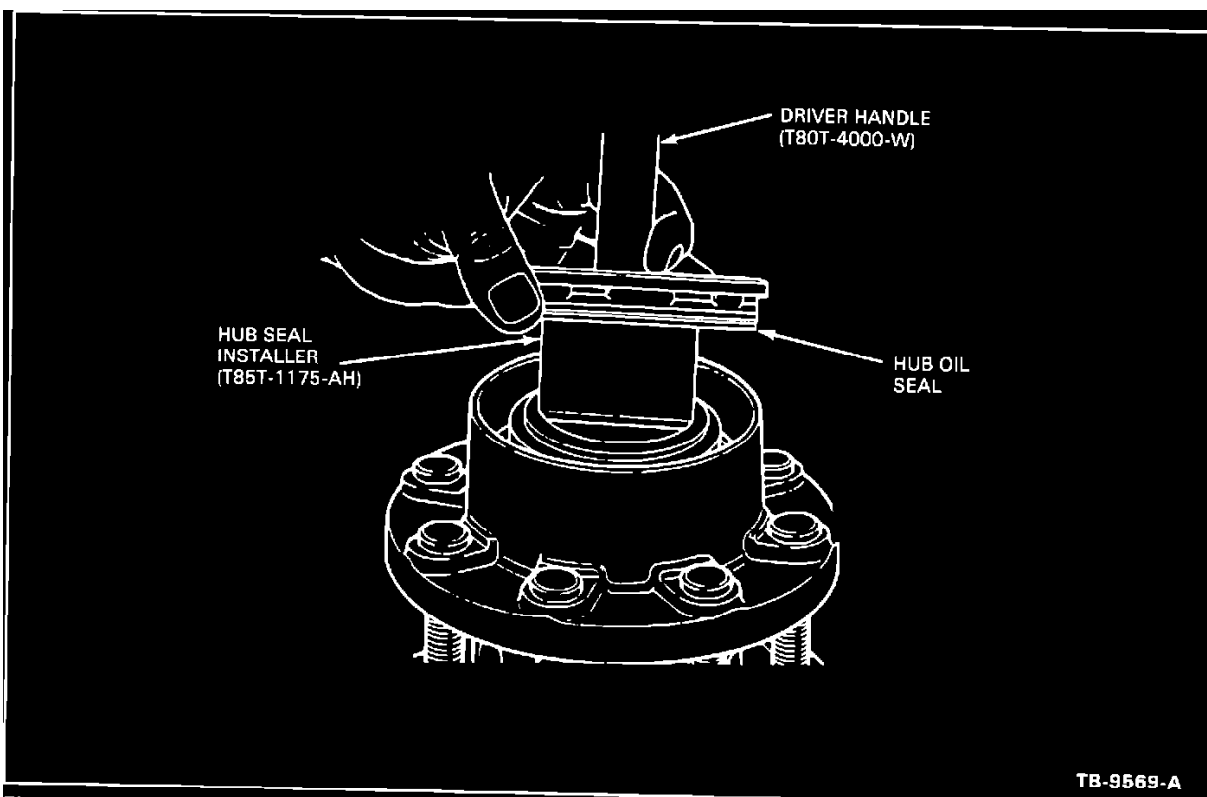


FIGURE 14

3. Insert tool with seal squarely into hub, Figure 14.

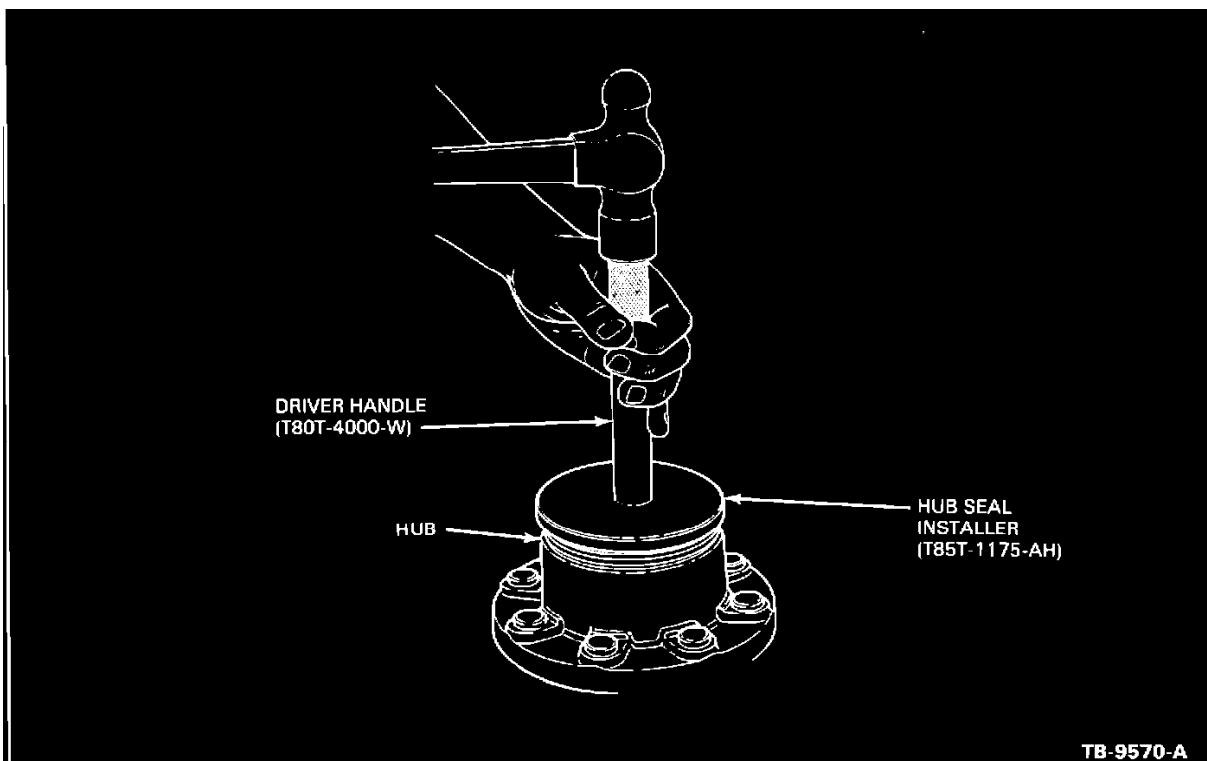


FIGURE 15

4. Hold tool straight and strike handle until hub seal is fully seated, Figure 15.

**CAUTION:** Install new seal if seal is damaged during or after installation.

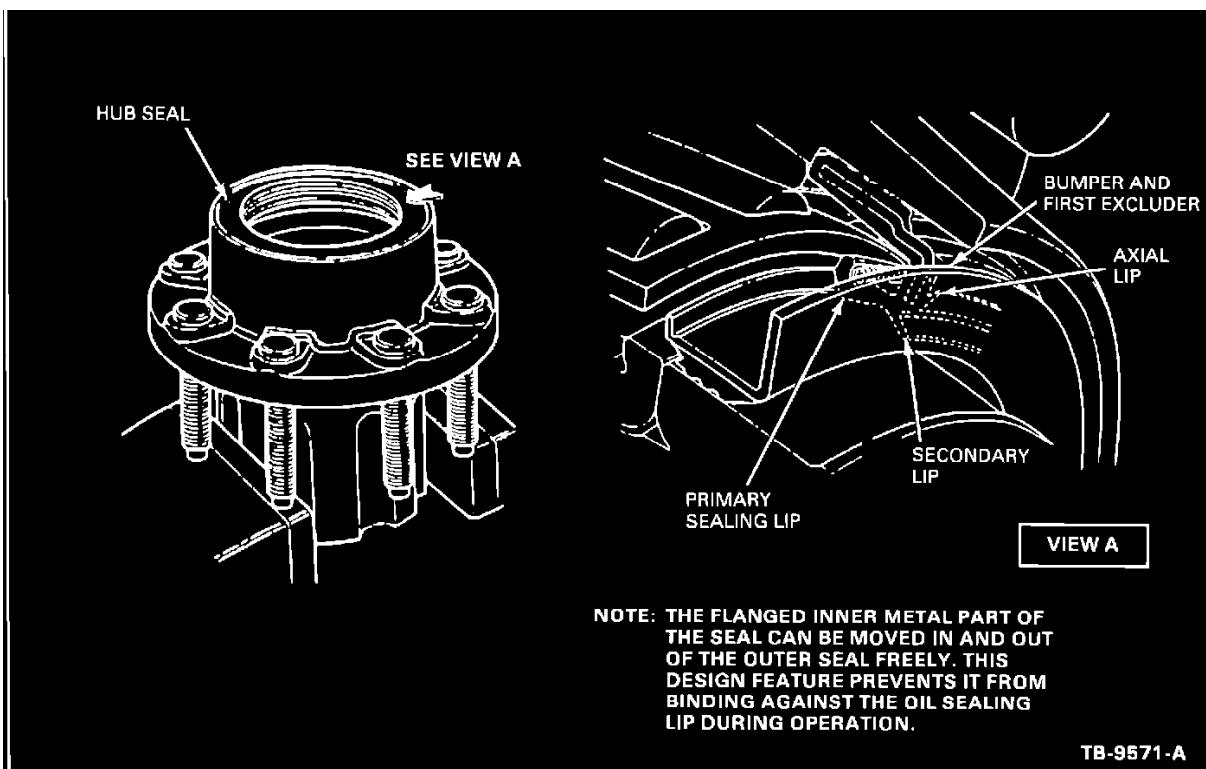


FIGURE 16

**NOTE:** UNITIZED WHEEL SEALS ARE STANDARD ITEMS ON FULL FLOAT REAR AXLES. THE UNITIZED WHEEL SEAL COMBINES THE FUNCTION OF A WEAR SLEEVE AND SEAL IN ONE SELF-CONTAINED UNIT WITH THE SEAL AND SLEEVE SURFACE INSIDE. THE UNITIZED DESIGN PROVIDES MAXIMUM PROTECTION FOR THE SEALING SURFACE DURING INSTALLATION AND OPERATION, FIGURE 16.

PART NUMBER	PART NAME	CLASS
E7HZ-1175-A	Hub Seal	B

**OTHER APPLICABLE ARTICLES:** None

**WARRANTY STATUS:** Eligible Under Powertrain Warranty Coverage

**OPERATION:** 880912A - Install one hub seal

**TIME:** 0.7 Hr.

**OPERATION:** 880912B - Install both hub seals 1.2 Hrs.

**DLR. CODING:** Basic Part No. 1177

Condition Code: 48