

**1966
COMET,
FALCON,
FAIRLANE
and
MUSTANG

SHOP MANUAL**



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Product**

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1966 Comet Fairlane Falcon and Mustang Shop Manual

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GROUP INDEX

COMET, FALCON, FAIRLANE and MUSTANG

SHOP MANUAL



SERVICE PUBLICATIONS

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**SPECIFICATIONS AND SPECIAL SERVICE TOOLS
AT END OF EACH GROUP**

FOREWORD

This shop manual provides the Service Technician with complete information for the proper servicing of the 1966 Comet, Falcon, Fairlane and Mustang cars.

The information is grouped according to the type of work being performed, such as diagnosis and testing, frequently performed adjustments and repairs, in-vehicle adjustments, overhaul, etc. Specifications and recommended special tools are included.

Refer to the opposite page for important vehicle identification data.

The descriptions and specifications in this manual were in effect at the time this manual was approved for printing. The Ford Motor Company reserves the right to discontinue models at any time, or change specifications or design, without notice and without incurring obligation.



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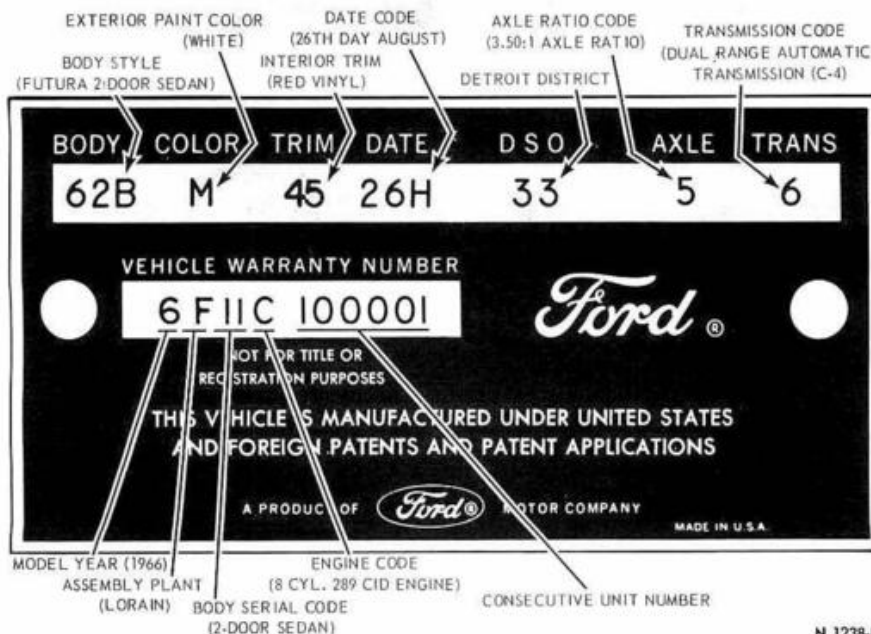
VEHICLE IDENTIFICATION

GROUP 1



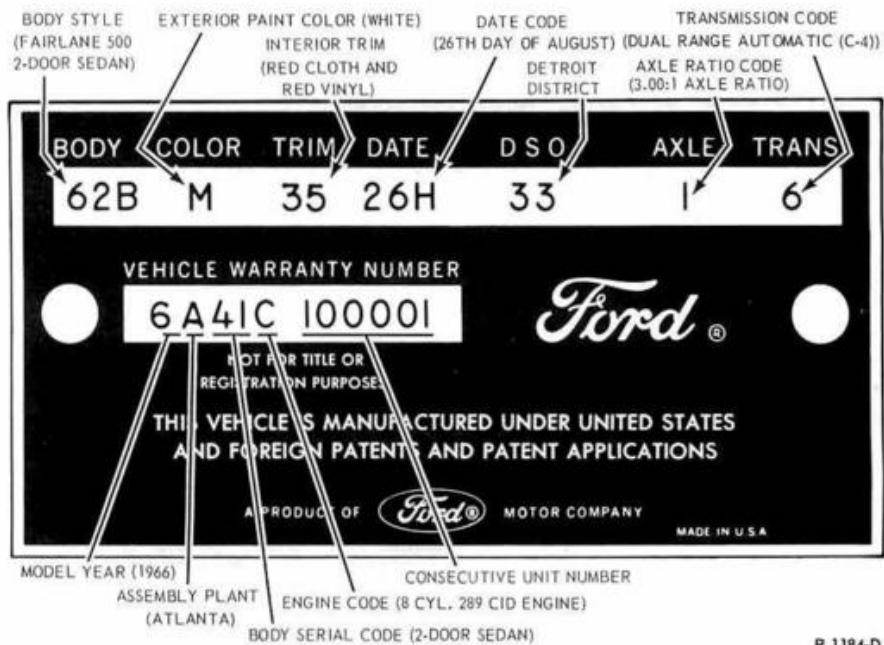
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FIG. 1—Comet Warranty Plate



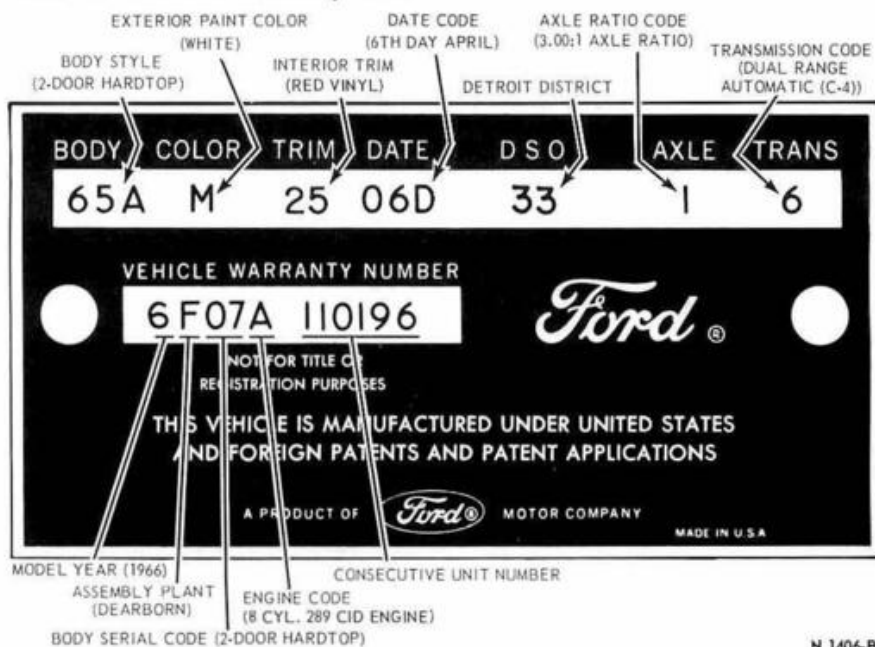
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FIG. 2—Falcon Warranty Plate



R 1184-D

FIG. 3—Fairlane Warranty Plate



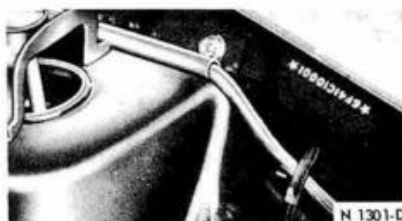
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FIG. 4—Mustang Warranty Plate



N 1219-D

FIG. 5—Vehicle Identification Number Location—Comet, Falcon and Mustang



N 1301-D

FIG. 6—Vehicle Identification Number Location—Fairlane

Figures 1, 2, 3 and 4 illustrate the Comet, Falcon, Fairlane and Mustang Warranty Plates. The warranty plate is located on the rear face (lock face) of the left front door.

The official Vehicle Identification Number, for title and registration purposes, is stamped on the top upper flange of the left front fender apron for Falcon, Comet and Mustang (Fig. 5) and on the vertical face of the left front fender apron near the top for the Fairlane (Fig. 6). Do not use the Vehicle Warranty Number, which appears on the warranty plate, for title or registration purposes.

VEHICLE DATA

The vehicle data appears in a line across the top of the warranty plate (Figs. 1, 2, 3 and 4). The first two letters and a number identify the Body Style. The following one or two letters identify the Exterior Paint Color. The next code consisting of two numbers, or a letter and a number, identifies the Interior Trim. The Date Code showing the date the car was manufactured, follows the Trim Code and consists of two numbers and a letter. The next code gives the district in which the car was ordered and consists of two numbers. The next to the last code is the Axle Ratio Code and is designated by a number for a conventional axle or a letter for an Equa-Lock axle. The last code in the vehicle data is the Transmission Code and consists of one number. The charts that follow, list in detail the various vehicle data codes.

VEHICLE WARRANTY NUMBER

The vehicle warranty number is the second line of numbers and letters appearing on the Warranty Plate (Figs. 1, 2, 3 and 4). The first number indicates the model year. The letter following the model year indicates the assembly plant at which the car was manufactured. The next two numbers designate the Body Serial Code. The letter following the Body Serial Code designates the Engine Code. The remaining numbers indicate the Consecutive Unit Number. The charts that follow, list the various Vehicle Warranty Number codes.

BODY SERIAL AND STYLE CODES

The two-digit numeral which follows the assembly plant code identifies the body series. This two-digit number is used in conjunction with the Body Style Code, in the Vehicle Data, which consists of a two-digit number with a letter Suffix. The following chart lists the Body Series Codes, Body Style Codes and the Model.

COMET

Body Serial Code	Body Style Code	Body Type	Model
02	54A	4-Door Sedan ^①	Comet
01	62A	2-Door Sedan ^①	202
06	71A	4-Door Wagon ^①	
12	54B	4-Door Sedan ^①	Capri
13	63B	2-Door Hardtop ^①	
16	71C	4-Door (Villager) Wagon ^①	
22	54D	4-Door Sedan ^①	
23	63C	2-Door Hardtop ^③	Comet
23	63D	2-Door Hardtop ^①	Caliente
25	76B	2-Door Convertible ^②	
25	76D	2-Door Convertible ^①	
27	63E	2-Door Hardtop ^③	Cyclone
27	63H	2-Door Hardtop ^③ (GT)	
29	76C	2-Door Convertible	
29	76H	2-Door Convertible ^③ (GT)	

①Bench Seat
②Bucket Seats

FALCON

Body Serial Code	Body Style Code	Body Type	Model
02	54A	4-Door Sedan	Standard Sedan
01	62A	2-Door Sedan	
12	54B	4-Door Sedan (Bench)	Futura
11	62B	2-Door Sedan (Bench)	
14	62C	2-Door Sport Coupe (Bucket)	
22	71A	4-Door Wagon	Station Wagon
24	71B	4-Door Wagon Deluxe	
27	66A	2-Door Standard Ranchero	Ranchero
27	66B	2-Door Deluxe Ranchero	
27	66D	2-Door Standard (RPO Bucket W/Console)	

FAIRLANE

Body Serial Code	Body Style Code	Body Type	Model
31	62A	2-Door Coupe	Fairlane
32	54A	4-Door Club Coupe	
41	62B	2-Door Sedan	Fairlane 500
42	54B	4-Door Sedan	
43	63B	2-Door Hardtop	
45	76B	2-Door Convertible	
46	63C	2-Door Hardtop ^③	Fairlane 500 XL
47	76C	2-Door Convertible ^①	
40	63D	2-Door Hardtop ^③	Fairlane 500 GT
44	76D	2-Door Convertible ^②	
38	71D	4-Door Ranch Wagon	Station Wagons
48	71B	4-Door Cust. Ranch Wagon	
49	71E	4-Door Squire	

①Bucket Seats

MUSTANG

Body Serial Code	Body Style Code	Body Type	Model
09	63A	2-Door Fastback ^①	Mustang
07	65A	2-Door Hardtop ^①	
08	76A	2-Door Convertible ^①	
09	63B	2-Door Fastback ^③	
07	65B	2-Door Hardtop ^③	
08	76B	2-Door Convertible ^②	
07	65C	2-Door Hardtop ^③	
08	76C	2-Door Convertible ^③	

①Std. Bucket Seats
②Luxury Bucket Seats
③Std. Bench Seats

EXTERIOR PAINT COLOR CODES

A single letter code designates a solid body color and two letters denote a two-tone—the first letter, the lower color and the second letter, the upper color.

Code	M-30J M-32-J#	Color
A	172A-A	Black
F	1226-A	Lt. Blue
H	1912-A	Lt. Beige
K	1903-A	Dk. Blue Met.
M	1619-A	White
P	1910-A	Med. Palomino Met.
R	1879-A	Dk. Green Met.
T	2008-A	Red
U	1070-A	Med. Turquoise Met.
V	1921-A	Emberglo Met.
X	1632-A	Maroon Met.
Y	1269-A	Lt. Blue Met.
Z	1915-A	Med. Sage Gold Met.
4	1901-A	Med. Silver Met.
5	2025-A	Red
8	1955-A	Yellow

INTERIOR TRIM CODES

Code	Trim Schemes
11	Silver Cloth and Black Vinyl
12	Blue Cloth and Blue Vinyl
15	Red Cloth and Red Vinyl
17	Aqua Cloth and Aqua Vinyl
22	Blue Vinyl
25	Red Vinyl
26	Black Vinyl
27	Aqua Vinyl
32	Blue Cloth and Blue Vinyl
35	Red Cloth and Red Vinyl
36	Black Vinyl
37	Aqua Cloth and Aqua Vinyl
38	Ivy Gold Cloth and Ivy Gold Vinyl
42	Blue Vinyl
44	Emberglo Vinyl
45	Red Vinyl
46	Black Vinyl
47	Aqua Vinyl
48	Ivy Gold Vinyl
52	Blue Cloth and Blue Vinyl
55	Red Cloth and Red Vinyl
57	Aqua Cloth and Aqua Vinyl
62	Blue Vinyl
64	Emberglo Vinyl
65	Red Vinyl
66	Black Vinyl
67	Aqua Vinyl
68	Ivy Gold Vinyl
82	Blue Vinyl
84	Emberglo Vinyl
85	Red Vinyl
86	Black Vinyl
87	Aqua Vinyl
88	Ivy Gold Vinyl
1D	Parchment Cloth and Parchment Vinyl
2D	Parchment Vinyl
3D	Parchment Cloth and Parchment Vinyl
4D	Parchment Vinyl
5D	Parchment Cloth and Parchment Vinyl
OD	Parchment Vinyl
B1	Parchment Vinyl W/Silver
B2	Parchment Vinyl W/Blue
B4	Parchment Vinyl W/Emberglo
B5	Parchment Vinyl W/Red
B6	Parchment Vinyl W/Black
B7	Parchment Vinyl W/Aqua
B8	Parchment Vinyl W/Ivy Gold
B9	Parchment Vinyl W/Palomino
C2	Parchment Vinyl W/Blue
C3	Parchment Vinyl W/Burgundy
C4	Parchment Vinyl W/Emberglo
C6	Parchment Vinyl W/Black
C7	Parchment Vinyl W/Aqua
C8	Parchment Vinyl W/Gold
C9	Parchment Vinyl W/Palomino
D2	Parchment Vinyl W/Blue
D3	Parchment Vinyl W/Burgundy
D4	Parchment Vinyl W/Emberglo
D6	Parchment Vinyl W/Black
D7	Parchment Vinyl W/Aqua
D8	Parchment Vinyl W/Gold
D9	Parchment Vinyl W/Palomino
F2	Parchment Vinyl W/Blue
F3	Parchment Vinyl W/Burgundy
F4	Parchment Vinyl W/Emberglo
F6	Parchment Vinyl W/Black
F7	Parchment Vinyl W/Aqua
F8	Parchment Vinyl W/Ivy Gold
F9	Parchment Vinyl W/Palomino
H1	White Vinyl W/Silver
H2	White Vinyl W/Blue
H4	White Vinyl W/Emberglo

INTERIOR TRIM CODES (Cont'd.)

Code	Trim Schemes
H5	White Vinyl W/Red
H6	White Vinyl W/Black
H7	White Vinyl W/Aqua
H8	White Vinyl W/Palomino

DATE CODES

A number signifying the date precedes the month code letter. A second-year code letter will be used if the model exceeds 12 months.

Month	Code First Year	Code Second Year
January	A	N
February	B	P
March	C	Q
April	D	R
May	E	S
June	F	T
July	G	U
August	H	V
September	J	W
October	K	X
November	L	Y
December	M	Z

DISTRICT CODES (DSO)

Units built on a Domestic Special Order, Foreign Special Order, or other special orders will have the complete order number in this space. Also to appear in this space is the two-digit code number of the District which ordered the unit. If the unit is a regular production unit, only the District code number will appear.

COMET

Code	District	Code	District
11	Boston	34	Detroit
16	Philadelphia	41	Chicago
15	New York	42	St. Louis
17	Washington	46	Twin Cities
21	Atlanta	51	Denver
22	Dallas	52	Los Angeles
23	Jacksonville	53	Oakland
26	Memphis	54	Seattle
31	Buffalo	81	Ford of Canada
32	Cincinnati	84	Home Office Reserve
33	Cleveland	90-99	Export

FALCON, FAIRLANE AND MUSTANG

Code	District	Code	District
11	Boston	45	Davenport
12	Buffalo	51	Denver
13	New York	52	Des Moines
14	Pittsburgh	53	Kansas City
15	Newark	54	Omaha
21	Atlanta	55	St. Louis
22	Charlotte	61	Dallas
23	Philadelphia	62	Houston
24	Jacksonville	63	Memphis
25	Richmond	64	New Orleans
26	Washington	65	Oklahoma City
31	Cincinnati	71	Los Angeles
32	Cleveland	72	San Jose
33	Detroit	73	Salt Lake City
34	Indianapolis	74	Seattle
35	Lansing	81	Ford of Canada
36	Louisville	83	Government
41	Chicago	84	Home Office Reserve
42	Fargo	85	American Red Cross
43	Rockford	89	Transportation Services
44	Twin Cities	90-99	Export

REAR AXLE RATIO CODES

A number designates a conventional axle, while a letter designates a Locking differential.

Code	Ratio	Code	Ratio
1	3.00:1	A	3.00:1
2	2.83:1	L	2.83:1
3	3.20:1	C	3.20:1
4	3.25:1	D	3.25:1
5	3.50:1	E	3.50:1
6	2.80:1	F	2.80:1
8	3.89:1	H	3.89:1

ASSEMBLY PLANT CODES

Code Letter	Assembly Plant	Code Letter	Assembly Plant
A	Atlanta	L	Michigan Truck
B	Oakville (Canada)	N	Norfolk
C	Ontario Truck	P	Twin Cities
D	Dallas	R	San Jose
E	Mahwah	S	Pilot Plant
F	Dearborn	T	Metuchen
G	Chicago	U	Louisville
H	Lorain	W	Wayne
J	Los Angeles	Y	Wixom
K	Kansas City	Z	St. Louis

TRANSMISSION CODES

Code	Type
1	3-Speed Manual
4	Dual Range Automatic (C-6)
5	4-Speed Manual
6	Dual Range Automatic (C-4)

ENGINE CODES

A	8 Cyl. 289 Cu. In. (4V Prem.)
C	8 Cyl. 289 Cu. In. (2V)
K	8 Cyl. 289 Cu. In. (4V Hi-Perf.)
T	6 Cyl. 200 Cu. In. (1V)
Y	8 Cyl. 390 Cu. In. (2V)
Z	8 Cyl. 390 Cu. In. (4V)
2	6 Cyl. ②200 Cu. In. (1V)
3	8 Cyl. ②289 Cu. In. (2V)
①	Low Compression

MODEL YEAR CODE

The number 6 designates 1966

CONSECUTIVE UNIT NUMBER

Each model year, each assembly plant begins production with the number 100001 (Falcon, Fairlane or Mustang) or 500001 (Comet) and continues on for each unit built.

TABLE 1—Disc Brake Trouble Symptoms and Possible Causes

Possible Causes of Trouble Symptoms	TROUBLE SYMPTOMS								
	Excessive Pedal Travel	Brake Roughness or Chatter (Pedal Pumping)	Excessive Pedal Effort	Pull	Rattle	Brakes Heat Up During Driving and Fail to Release	Leaky Wheel Cylinder	Grabbing or Uneven Braking Action	No Braking Effect When Pedal is Depressed
Shoe and Lining Knock-back after violent cornering or rough road travel	X								
Piston and Shoe and Lining Assembly Not Properly Seated or Positioned	X								X
Air Leak or Insufficient Fluid in System or Caliper	X								X
Loose Wheel Bearing Adjustment	X								
Damaged or Worn Caliper Piston Seal	X						X		X
Excessive Lateral Run-out of Rotor		X							
Rotor Excessively Out of Parallel		X							
Frozen or Seized Pistons			X	X		X		X	
Brake Fluid, Oil or Grease on Linings			X	X			X	X	
Shoe and Lining Worn Below Specifications			X						
Proportioning Valve Malfunction			X						
Caliper Out of Alignment with Rotor				X				X	
Loose Caliper Attachment		X		X				X	
Shoe Hold-Down Clips Missing or Improperly Positioned					X				
Operator Riding Brake Pedal						X			
Scores in the Cylinder Bore							X		
Corrosion Build-up in the Cylinder Bore or on the Piston Surface			X				X		
Bleeder Screw Still Open	X							X	X
Lines From Master Cylinder to Proportioning Valve Interchanged						X			

TABLE 2—Drum Brake Trouble Symptoms and Possible Causes

[illegible]

BRAKE BOOSTER TROUBLE DIAGNOSIS GUIDE

BOOSTER INOPERATIVE— HARD PEDAL	If the preliminary tests show that the booster is inoperative or if a hard pedal condition still exists after eliminating the causes of Hard Pedal listed in Table 2, the trouble may be caused by vacuum leakage. Disconnect the vacuum line (two lines if equipped with an automatic transmission) at the booster, remove the vacuum manifold and check valve assembly, and look for a sticking or faulty check valve. Check all vacuum connections for leakage or obstruction. Check all hoses for a	leaking or collapsed condition. Repair or replace parts as necessary. If the foregoing procedure does not eliminate the trouble, remove the booster from the car. Separate the booster body from the end plate, and check the bellows, booster body, and diaphragm assembly for damage that would cause leaks. When assembling, be sure that the diaphragm assembly is properly positioned. Improper location could cause leakage between the vacuum and atmospheric sides of the diaphragm.
BRAKES DRAG OR GRAB	If the brakes still drag or grab after eliminating the causes listed in Table 1, the condition is probably caused by a sticking valve plunger	assembly. Remove and disassemble the booster. Clean, inspect, and replace parts as necessary.
SELF APPLICATION OF BRAKES WHEN ENGINE STARTS	Remove and disassemble the booster. Check the diaphragm for being out of locating radii in the housing. Check for a sticking or un-	seated atmospheric valve. Clean, inspect, and replace parts as necessary. Be sure that the diaphragm is properly located when assembling.

2 COMMON ADJUSTMENTS AND REPAIRS**PARKING BRAKE
LINKAGE ADJUSTMENT****MUSTANG**

Check the parking brake cables when the brakes are fully released. If the cables are loose, adjust them as follows:

1. Fully release the parking brake by turning the handle counterclockwise and pushing it inward.

2. Pull the parking brake handle outward to the third notch from its normal released position.

3. Raise the car.

4. Turn the locking adjustment nut forward against the equalizer (Fig. 1) until a moderate drag is felt when turning the rear wheels in the direction of forward rotation.

5. Release the parking brake, and make sure that the brake shoes return to the fully released position and no drag is felt when turning the rear wheels.

COMET—FALCON—FAIRLANE

Check the parking brake cables when the brakes are fully released. If the cables are loose, adjust them as follows:

1. Fully release the parking brake pedal.

2. Depress the parking brake

pedal one notch from its normal released position.

3. Raise the car.

4. Loosen the equalizer lock nut and turn the adjusting nut forward against the equalizer until a moderate drag is felt when turning the rear wheels (Fig. 2). Tighten the lock nut.

5. Release the parking brake, and make sure that the brake shoes return to the fully released position.

**POWER BRAKE MASTER
CYLINDER PUSH ROD
ADJUSTMENT**

The push rod is provided with an adjustment screw to maintain the correct relationship between the booster control valve plunger and the master cylinder piston. Failure to maintain this relationship will prevent the master cylinder piston from completely releasing hydraulic pressure and can cause the brakes to drag, or cause excessive brake pedal travel.

To check the adjustment of the screw, fabricate a gauge of the dimension shown in Fig. 3. Then place the gauge against the master cylinder mounting surface of the booster body as shown in Fig. 4 or 5. The push rod screw should be adjusted so

that the end of the screw just touches the inner edge of the slot in the gauge. Do not set up side forces on the push rod. Side forces may break the valve plunger.

This is an approximate adjustment only. The push rod should not move more than 0.015 inch as it contacts the master cylinder piston. No movement (exact contact) is ideal.

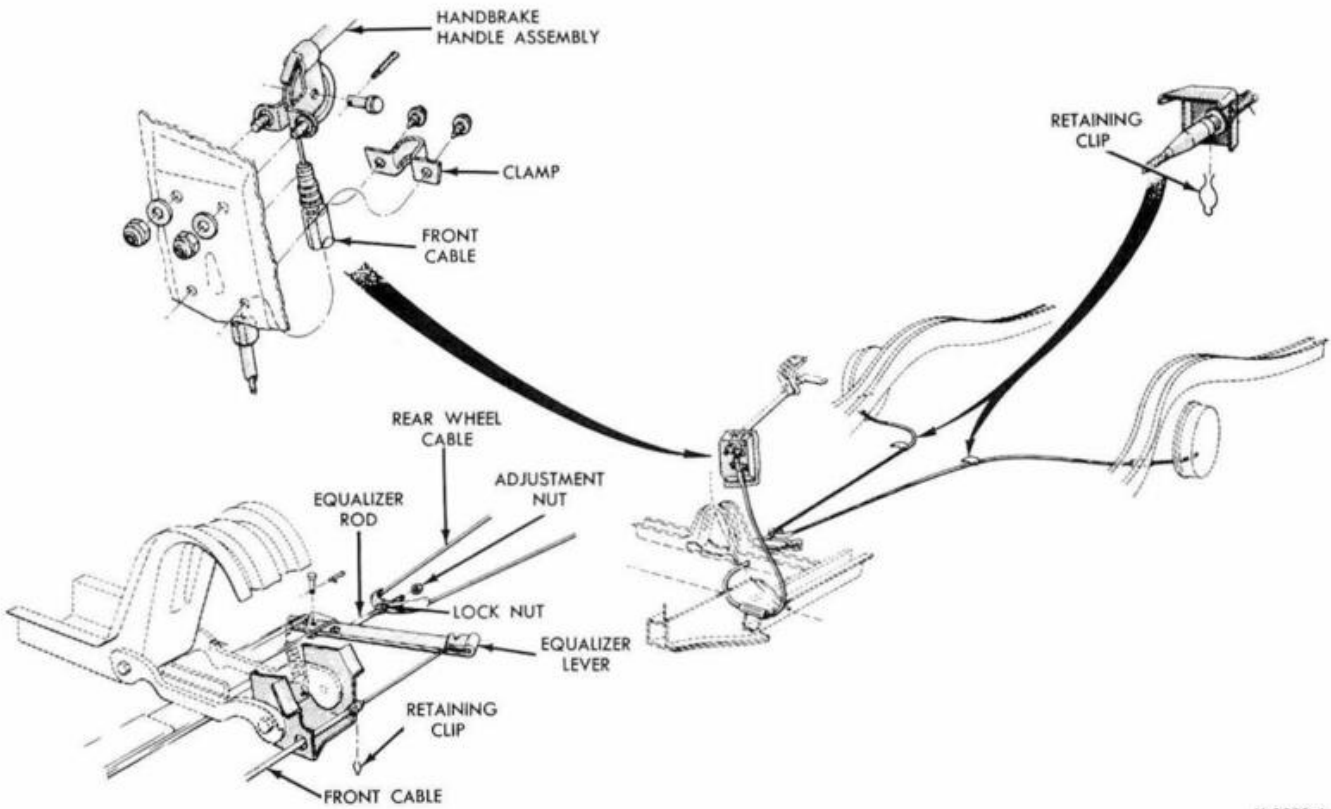
**HYDRAULIC SYSTEM
BLEEDING**

When any part of the hydraulic system has been disconnected for repair or replacement, air may get into the lines and cause spongy pedal action. Bleed the hydraulic system after it has been properly connected to be sure that all air is expelled from the brake cylinders or disc brake calipers, and lines.

The hydraulic system can be bled manually or with pressure bleeding equipment.

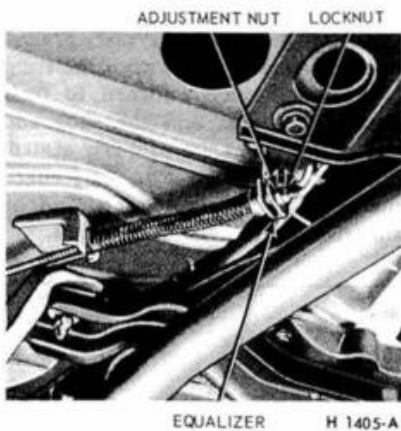
With disc brakes, more pumping of the pedal is required and more frequent checking of the master cylinder may be necessary while bleeding.

On a car with disc brakes, remove the front wheels and tires to gain access to the bleeder fitting on the disc brake calipers.



H-1328-A

FIG. 1—Parking Brake Linkage—Mustang



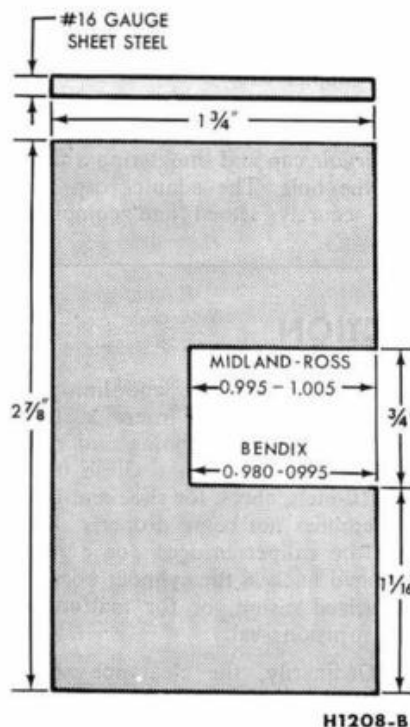
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FIG. 2—Parking Brake Linkage Adjustment Comet—Fairlane—Falcon

MANUAL BLEEDING

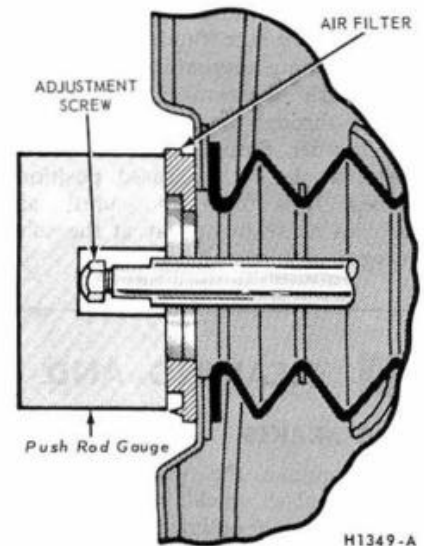
Bleed the longest lines first. Keep the master cylinder reservoir filled with new Rotunda R-103-A (B7AZ-19542-A) brake fluid during the bleeding operation.

Never use brake fluid which has been drained from the hydraulic system.



H1208-B

FIG. 3—Push Rod Gauge Dimensions



H1349-A

FIG. 4—Push Rod Adjustment—Midland-Ross

1. Position a bent 3/8-inch box wrench on the bleeder fitting on the right rear brake wheel cylinder (Fig. 6). Attach a rubber drain tube to the bleeder fitting. The end of the tube should fit snugly around the bleeder fitting.

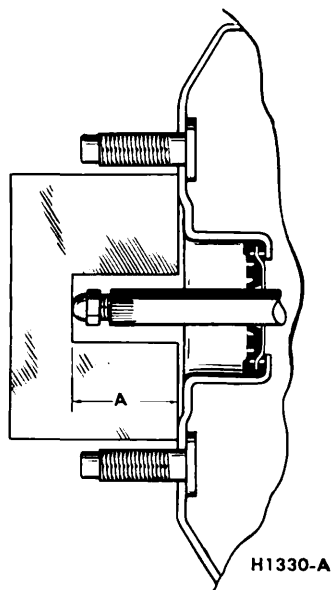


FIG. 5—Push-Rod Adjustment—Bendix

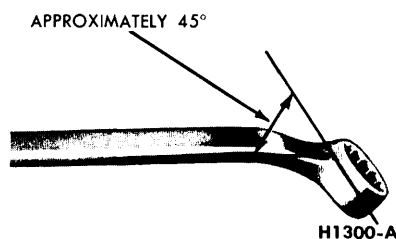


FIG. 6—Brake Bleeder Wrench

2. Submerge the free end of the tube in a container partially filled with clean brake fluid. Loosen the bleeder fitting approximately $\frac{3}{4}$ turn.

3. Push the brake pedal down slowly through its full travel. Close the bleeder fitting, then return the pedal to the fully-released position. Repeat this operation until air bubbles cease to appear at the submerged end of the tube.

4. When the fluid is completely free of air bubbles, close the bleeder fitting and remove the drain tube.

5. Repeat this procedure on the brake cylinders or disc calipers at each wheel in order: left rear, right front, and left front. Refill the master cylinder reservoir after each brake cylinder is bled and when the bleeding operation is completed. The fluid level should be within $\frac{3}{8}$ inch of the top of the reservoir. The diaphragm-type gasket should be properly positioned in the reservoir cap before the cap is installed.

6. On a car with disc brakes, pump the brake pedal until the front brake pistons are returned to their normal positions and that the shoe and lining assemblies are properly seated.

7. Before driving the car, check the operation of the brakes and be sure that a firm pedal is obtained.

PRESSURE BLEEDING

Bleed the longest lines first. **Never use brake fluid which has been drained from the hydraulic system.**

The bleeder tank should contain enough new heavy-duty brake fluid to complete the bleeding operation, and it should be charged with 10-30 pounds of air pressure.

1. Clean all dirt from the master cylinder reservoir cap.

2. Remove the master cylinder reservoir cap, install an adapter cap to the reservoir, and attach the bleeder tank hose to the fitting on the adapter cap.

An adapter cap can be fabricated by cutting a hole in the center of a reservoir cap and smoldering a fitting at the hole. The adapter cap must be securely seated and completely

sealed on the master cylinder or leakage will occur.

3. Position a $\frac{3}{8}$ -inch box wrench on the bleeder fitting on the right rear brake wheel cylinder (Fig. 6). Attach a rubber drain tube to the bleeder fitting. **The end of the tube should fit snugly around the bleeder fitting.**

4. Open the valve on the bleeder tank to admit pressurized brake fluid to the master cylinder reservoir.

5. Submerge the free end of the tube in a container partially filled with clean brake fluid, and loosen the bleeder fitting.

6. When air bubbles cease to appear in the fluid at the submerged end of the drain tube, close the bleeder fitting and remove the tube.

7. Repeat this procedure on the brake cylinder or disc caliper at each wheel in order: left rear, right front, and left front. Refill the master cylinder reservoir after each brake cylinder is bled.

8. When the bleeding operation is completed, close the bleeder tank valve and remove the tank hose from the adapter fitting.

9. Remove the adapter cap, refill the master cylinder reservoir to within $\frac{3}{8}$ -inch from the top of the reservoir. Be sure that the diaphragm-type gasket is properly positioned in the reservoir cap, and then install the cap.

10. On a car with disc brakes, pump the brake pedal until the front brake pistons are returned to their normal positions and the shoe and lining assemblies are properly seated.

11. Before driving the car, check the operation of the brakes and be sure that a firm pedal is obtained.

3 CLEANING AND INSPECTION

DISC BRAKES

1. Remove the wheel and tire, caliper splash shield, and the shoes and linings as outlined in Part 2-2, Section 2.

2. Make three thickness measurements with a micrometer across the middle section of the shoe and lining. Take one reading at each side and one in the center. If the assembly has worn to a thickness of 0.195-inch (shoe and lining together) at any one of the three measuring locations, replace all (4) shoe and lining assemblies on both front wheels.

3. With the shoe and lining assemblies installed, insert a feeler gauge between the lining and rotor. If the clearance is not within 0.002-0.010-inch, check for shoe and lining assemblies not being properly seated on the caliper bridges, for a piston pushed back in the cylinder bore, for a seized piston, or for malfunction of a piston seal.

Ordinarily, the clearance should be 0.002-0.010 inch. However, if the car was stopped by a brake application just prior to checking the clearance, the brakes may drag slightly.

4. To check rotor runout, first eliminate the wheel bearing end play by tightening the adjusting nut. After tightening the nut make certain that the rotor can still be rotated.

5. Clamp a dial indicator to the caliper housing so that the stylus contacts the rotor at a point approximately 1 inch from the outer edge. Rotate the rotor and take an indicator reading. If the reading exceeds 0.0025 inch total indicator runout, replace the rotor. **Do not attempt to refinish a rotor that indicates runout**

in excess of specification. When the runout check is finished be sure to adjust the bearings as outlined in Group 3, in order to prevent bearing failure.

6. Check the rotor for scoring. Minor scores can be removed with a fine emery cloth. If the rotor is excessively scored, replace it.

7. Visually check the caliper. If it is cracked it should be replaced. If leakage or seized pistons is evident, disassemble and repair the caliper as required.

8. If upon disassembly the caliper is found to be distorted or damaged, or if the cylinder bores are scored or excessively worn, replace the assembly.

The two halves of the caliper assembly should never be separated. Damage or failure of one requires replacement of both as a unit.

DRUM BRAKES

1. Remove the wheel from the drum, and remove the drum as outlined in Part 2-2, Section 2. Wash all the parts except the brake shoes in a cleaning fluid and dry with compressed air.

2. Brush all dust from the carrier plate and interior of the brake drum.

3. Inspect the brake shoes for excessive lining wear or shoe damage. If the lining is worn to within $\frac{1}{32}$ inch of the rivet heads or if the shoes are damaged, they must be replaced. Replace any lining that has been oil saturated. Replace the lining in axle sets. Prior to replacement of the lining, the drum diameter should be checked to determine if oversize linings must be installed.

4. Check the condition of the brake shoes, retracting springs, and drum for signs of overheating. If the shoes have a slight blue coloring, or if the springs show a change in free length, indicating overheating, replacement of the retracting and hold down springs is necessary. **Overheated springs lose their force and could cause the new lining to wear prematurely if they are not replaced.**

5. If the car has 30,000 or more miles of operation on the brake linings, or signs of overheating are present when relining brakes, the wheel cylinders should be disassembled and inspected for wear and dirt in the cylinder. The cylinder cups and other parts contained in the overhaul kit should be replaced, thus avoiding future problems.

6. Inspect all other brake parts

and replace any that are worn or damaged.

7. Inspect the brake drums and, if necessary, refinish. Refer to Part 2-2, Section 4 for refinishing.

BOOSTER UNITS

Disassembled views of the brake booster are shown in Figs. 40, 49 and 50, Part 2-2.

After disassembly, immerse all metal parts in a suitable solvent. Use only alcohol on rubber parts or parts containing rubber. After the parts have been thoroughly cleaned and rinsed in cleaning solvent, the metal parts which come in contact with hydraulic brake fluid or rubber parts should be rewashed in clean alcohol before assembly. Use an air hose to blow dirt and cleaning fluid from the recesses and internal passages. When overhauling a power booster, use all parts furnished in the repair kit. **Discard all old rubber parts.**

Inspect all other parts for damage or excessive wear. Replace damaged or excessively worn parts. If the inside of the booster body is rusted or corroded, polish it with steel wool or fine emery cloth.

PART 2-2

BRAKE SYSTEM

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1 DESCRIPTION AND OPERATION

Disc brakes are available as optional equipment for the front wheels on Mustang 8-cylinder cars. The hydraulic brake system employs duo-servo single anchor, internal expanding and self-adjusting drum brake assemblies on the rear wheels of cars with disc brakes, and of front and rear wheels of all others.

A vacuum booster is available as optional equipment on all models except Mustangs equipped with disc brakes.

The master cylinder converts physical force from the brake pedal (and booster if so equipped) into hydraulic pressure against the pistons in the calipers (disc brakes) or in the wheel cylinders (drum brakes). The pistons in turn convert hydraulic pressure back into physical force at the brake shoes.

SELF ADJUSTING DRUM BRAKE ASSEMBLIES

The self-adjusting brake mechanism consists of a cable, cable guide, adjusting lever, and adjuster spring (Fig. 1 and 2). The cable is hooked over the anchor pin at the top and is connected to the lever at the bottom. The cable is connected to the sec-

ondary brake shoe by means of the cable guide. The adjuster spring is hooked to the primary brake shoe and to the lever. The automatic adjuster operates only when the brakes are applied while the car is moving rearward and only when the secondary shoe is free to move toward the drum beyond a predetermined point.

With the car moving rearward and the brakes applied, the wrap-around action of the shoes following the drum forces the upper end of the primary shoe against the anchor pin. The action of the wheel cylinder moves the upper end of the secondary shoe away from the anchor pin. The movement of the secondary shoe causes the cable to pull the adjusting lever upward and against the end of a tooth on the adjusting screw star-wheel. The upward travel of the lever increases as lining wear increases. When the lever can move upward far enough, it passes over the end of the tooth and engages the tooth. When the brakes are released, the adjusting spring pulls the lever downward causing the star-wheel to turn and expand the shoes. The star-wheel is turned one tooth at a time as the linings pro-

gressively wear.

With the car moving forward and the brakes applied, the secondary shoe is against the anchor pin and the primary shoe is moved toward the drum. Therefore, the adjuster does not operate.

The rear brake assembly is basically the same as the front brake. The conventional parking brake lever, link, and spring are used in the rear brake.

The anchor pins on all brakes are fixed and are non-adjustable.

DISC BRAKE ASSEMBLIES

RELATION AND FUNCTION OF COMPONENT PARTS

The disc brake is a fixed caliper, opposed piston, non-energized, ventilated disc type, actuated by a hydraulic system (Fig. 3). There is no lateral movement of either the disc (rotor) or the caliper. The caliper assembly consists of two caliper housings bolted together with each half containing two cylinder bores of $1\frac{5}{16}$ inch diameter. Each cylinder bore contains a piston with an attached molded rubber dust boot to

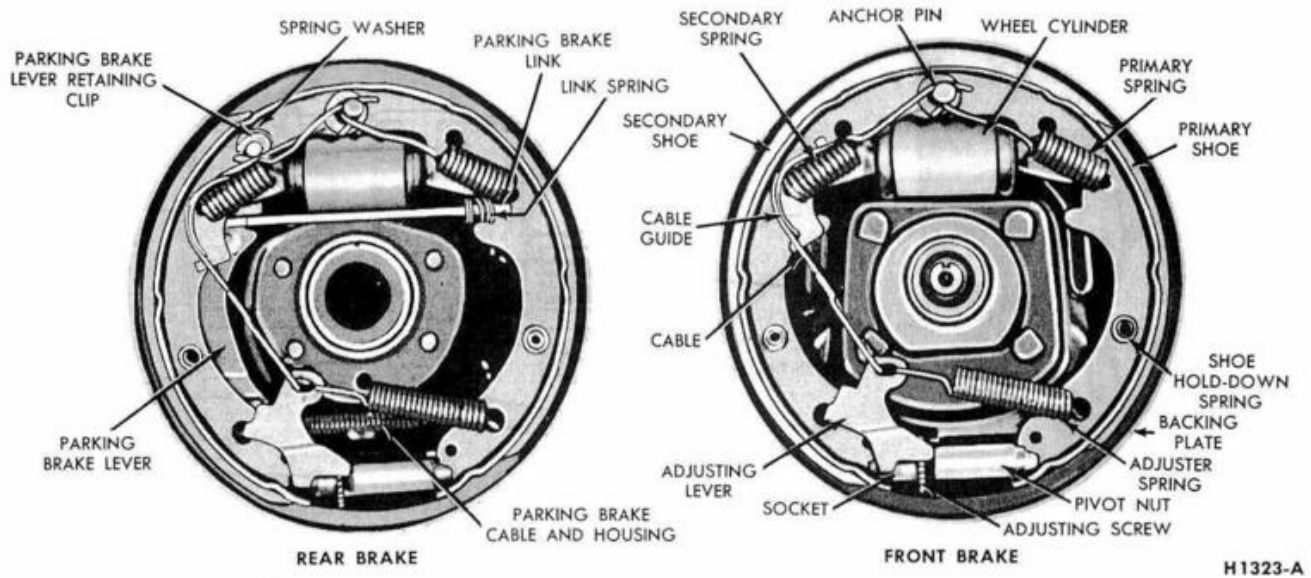


FIG. 1—Self-Adjusting Brake Assemblies—9 Inch Drum

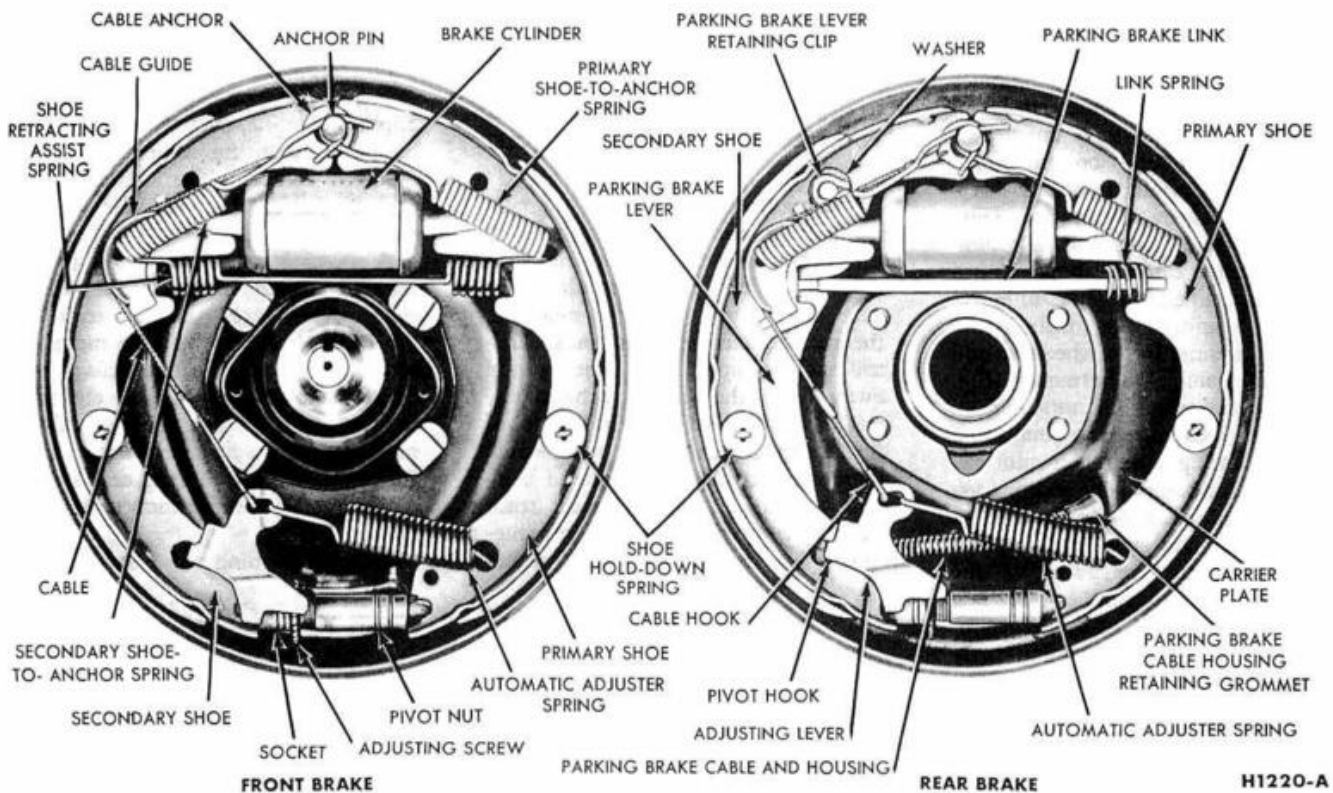


FIG. 2—Self Adjusting Brake Assemblies—10 Inch Drum

seal the cylinder bore from contamination. (Fig. 4). Square-section rubber piston seals are positioned in grooves in the cylinder bores.

The piston seals perform three important tasks:

1. They provide hydraulic sealing between the cylinders and pistons.

2. They return the pistons to released position, when hydraulic pressure is released.

3. They maintain the shoes in correct adjustment at all times (comparable to the automatic adjusters in drum-type brakes).

The cylinders are connected hy-

draulically by means of internal passages in the caliper housing and an external transfer tube between the two halves of the caliper assembly. One bleeder screw and fluid inlet fitting is provided on each caliper assembly.

The shoe and lining assemblies are

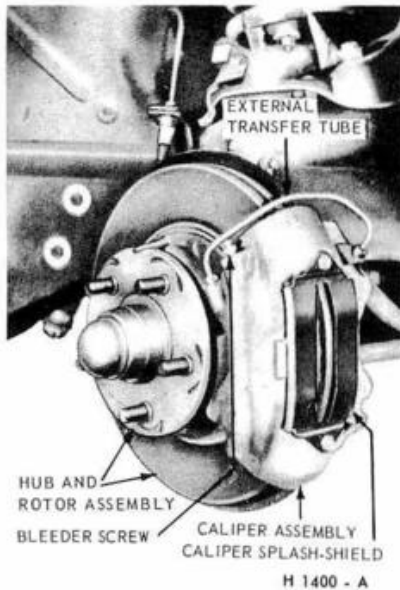


FIG. 3—Typical Disc Brake Assembly

located between parallel machined abutments within the caliper, and are supported radially by tabs on the outer ends of the shoe assemblies (Fig. 35). The shoes slide axially in the caliper abutments by means of the tabs which ride on machined ledges (bridges) when hydraulic pressure is applied to the piston (Fig. 19). A shoe and lining assembly consists of friction material bonded to a metal plate called the shoe. It is replaced as a unit. Brake torque is absorbed by the mating of the shoe end against the caliper abutments (Fig. 35). A splash shield is attached to the top of the caliper to retain the shoe and lining assemblies and reduce contamination. The caliper assembly is mounted to a bracket located between the spindle and rotor splash shield, to the front of the wheel vertical centerline.

The cast iron disc is of the ventilated rotor type incorporating forty fins and is staked to, and rotates with, the wheel hub. The outside diameter of the rotor is 11.375 inches and the inside diameter is 7.375 inches. This type of design increases cooling area and permits circulation of air through the rotor resulting in more rapid cooling of the brake. A splash shield bolted to the spindle is used primarily to prevent road contaminants from contacting the inboard rotor and lining surfaces (Fig. 20). The wheel provides protection for the outboard surface of the rotor.

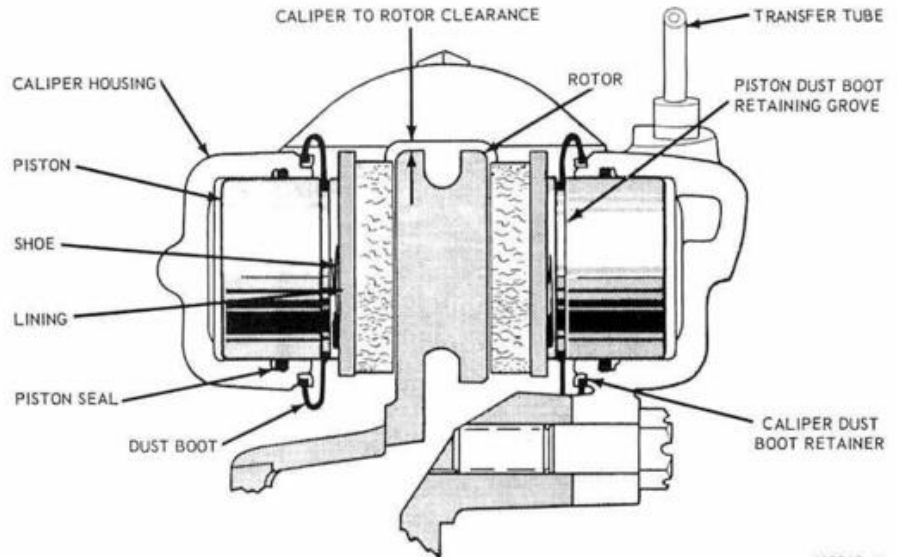


FIG. 4—Typical Caliper Assembly—Sectional View

OPERATION

As the brake pedal is depressed, hydraulic pressure from the master cylinder forces the pistons out of the caliper bores against their respective shoe and lining assemblies. The force of the pistons against the shoes moves the linings against both sides of the revolving rotor to effect braking action.

During brake application, the rubber seal on each piston stretches as the piston moves against the shoe (Fig. 5). When the hydraulic pressure against the piston is released, the seal relaxes or rolls back. This roll-back action pulls the piston away from the shoe approximately 0.005 inch to relieve the force of the lining against the rotor and, thereby, provide the required running clearance. Also, inherent rotor runout contributes to the maintenance of running clearance. Auto-

matic adjustment is achieved by the pistons sliding in the seals outward from the cylinder bores. The piston gradually changes its position relative to the seal as the lining wears and, thus, maintains the correct adjustment location at all times.

When the brakes are in the unapplied position, there is no hydraulic pressure to the calipers because the fluid source at the master cylinder by-passes the residual check valve.

A warning sound feature is incorporated in the design of the brake shoes. Metal tabs on the ends of the shoes create an audible metallic, scraping noise, when the linings become worn enough to allow the tabs to contact the rotor. This metal-to-metal contact warns the driver that the shoes need replacing and is not detrimental to the function of the disc brake.

A proportioning valve located be-

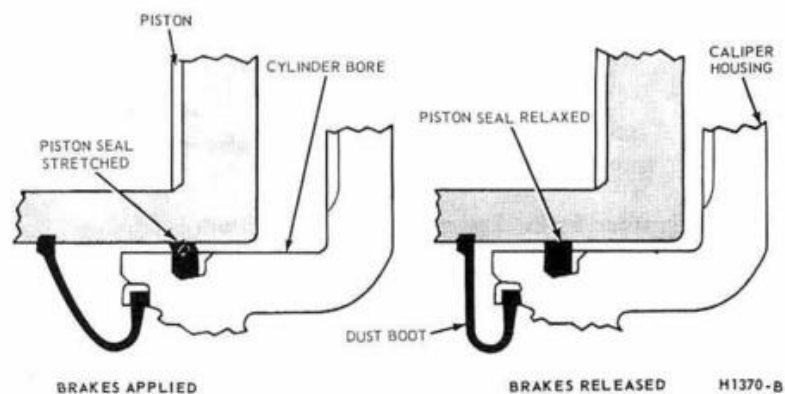


FIG. 5—Function of Piston Seal

tween the master cylinder and the rear brake wheel cylinders provides balanced braking action between the front and the rear brakes under a wide range of braking conditions. (Fig. 21). By regulating the hydraulic pressure applied to the rear wheel cylinders, the valve limits rear braking action when high pressures are required at the front brakes. In this manner, premature rear wheel skid is prevented. The proportioning valve is serviced as an assembly and is never adjusted or overhauled.

BOOSTER SYSTEM—BENDIX TYPE

The diaphragm type brake booster is a self contained vacuum-hydraulic braking unit mounted on the engine side of the dash panel.

The vacuum power chamber consists of a front and rear shell locked together. Within the vacuum chamber are the rubber diaphragm and the integral valve hub and diaphragm plate. The rubber diaphragm fits over the plate, and the outer bead of the diaphragm is locked between the front and rear shells (Fig. 6). The diaphragm return spring is located between the diaphragm plate and the front shell.

The valve hub section of the diaphragm plate protrudes from the

rear shell. A synthetic rubber seal is used between the valve hub and the rear shell. The seal and the valve hub are protected from dirt by a rubber guard connected between the air filter at the end of the hub and a flange on the rear shell. The control valve assembly fits into the hub and is connected to the brake pedal by the valve operating rod. The control valve assembly consists of a plunger, a valve body which supports a single poppet of flexible rubber, and two return springs. When the brake pedal is in the released position the valve return spring holds the valve assembly and operating rod away from the diaphragm plate. In this position, the poppet on the valve body is off the vacuum port seat which is a part of the diaphragm plate. The poppet return spring likewise holds the poppet against the atmospheric port seat which is a part of the plunger.

The hydraulic master cylinder which contains all of the components of the conventional master cylinder is bolted to the booster front shell. The hydraulic push rod forms the link between the master cylinder piston and the vacuum power diaphragm assembly. The end of the push rod, that enters the master cylinder piston, is equipped with a self-locking adjusting screw. The oppo-

site end has a piston head which enters the diaphragm plate. A seal, located in the front shell, seals the opening between the hydraulic push rod and the shell.

Engine manifold vacuum is supplied to the booster through a vacuum check valve located in the front shell. Air is admitted through the air filter located at the end of the valve hub. The hydraulic push rod is actuated by pedal pressure assisted by the diaphragm, which derives power from the pressure differential existing between the vacuum on its front side and atmospheric pressure on its rear side. A passage in the diaphragm plate permits vacuum to pass from the front to the rear side of the diaphragm when the vacuum port opens as the brakes are released.

RELEASED POSITION

With the engine running and the brakes released (Fig. 7), vacuum from the intake manifold is admitted through the check valve to the front (constant vacuum) chamber of the power unit. In the released position (no pressure applied to the brake pedal), the valve operating rod and valve plunger are held to the rear in the valve hub by the valve return spring to CLOSE the atmospheric

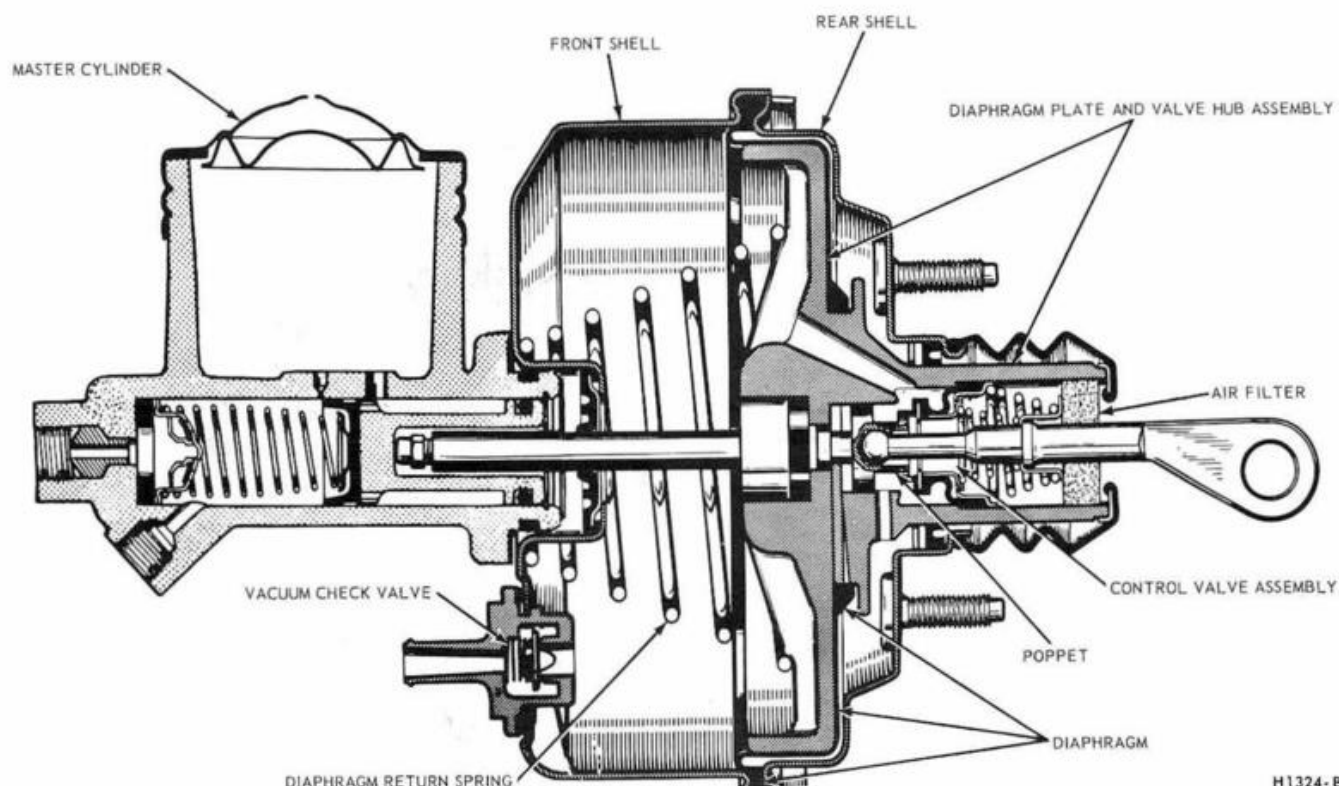


FIG. 6—Cutaway View of Vacuum Booster—Bendix-Type

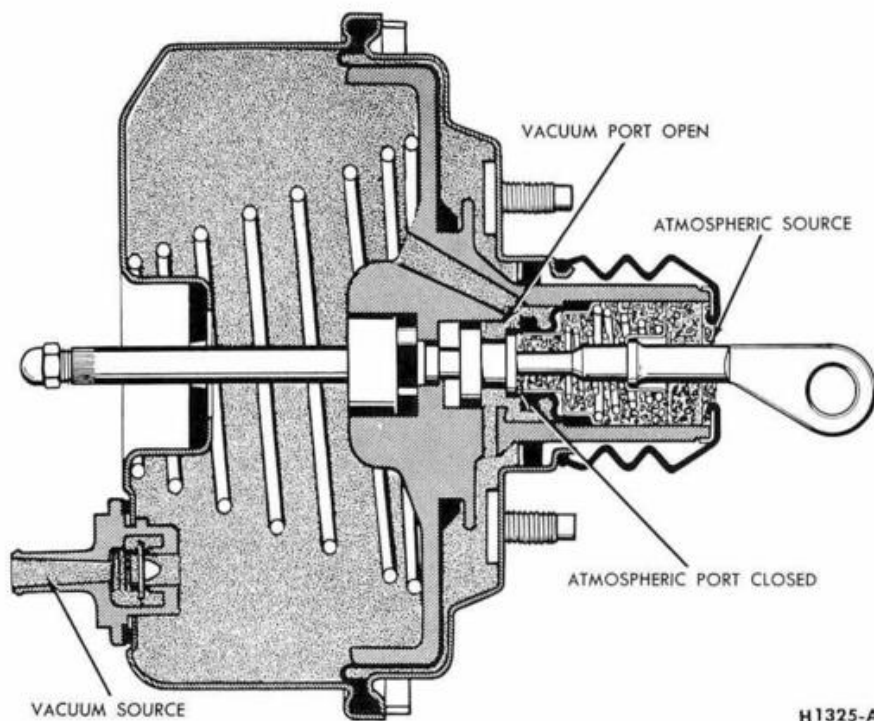


FIG. 7—Booster in Released Position—Bendix-Type

port and OPEN the vacuum port. With the valve in this position, the rear (control vacuum) chamber is also open to vacuum through the porting in the diaphragm and valve hub assembly. The diaphragm is then balanced or suspended in vacuum, since vacuum is present on both sides of the power diaphragm. With the power diaphragm balanced in vacuum, the diaphragm return spring holds the diaphragm and hydraulic push rod in the fully released position. With the hydraulic push rod in this position, the hydraulic compensating port in the hydraulic master cylinder is OPEN. The open port permits brake fluid to either return from the brake system to the fluid reservoir or enter the brake system from the fluid reservoir to compensate for any gain or loss in fluid volume.

APPLIED POSITION

When the brakes are applied (Fig. 8), the valve operating rod and valve plunger move forward in the valve hub section of the diaphragm plate to compress the valve return spring and force the poppet against the vacuum valve seat in the diaphragm plate to CLOSE the vacuum port. Any additional movement of the valve operating rod in the applied direction moves the valve plunger away from the poppet valve to OPEN the atmospheric port and

admit atmosphere through the air cleaner and passages in the diaphragm plate to the rear side of the power chamber. With vacuum present on the front side of the diaphragm and valve housing and atmospheric pressure present on the rear side of the diaphragm, a force is developed to move the vacuum power diaphragm assembly, hydraulic

push rod and master cylinder piston forward to close the compensating port and force hydraulic fluid under pressure through the residual check valve and brake tubes into the brake wheel cylinders. As hydraulic pressure is developed in the brake master cylinder, a counter force (to the rear) acting through the hydraulic push rod, sets up a reaction force against the power diaphragm assembly and valve plunger through the rubber reaction disc (located at the end of the hydraulic push rod). The rubber reaction disc acts similar to a column of fluid to distribute the pressure between the vacuum power diaphragm assembly and the valve plunger in proportion to their respective contact areas. The pressure acting against the valve plunger and valve hub assembly to close off the valve plunger slightly to the rear in relation to the diaphragm and valve hub assembly to close off the atmospheric port. The driver is thus assured a feel of the brake, since part of the counter force reacts through the valve plunger, valve operating rod, and pedal linkage against the driver's foot. This reaction force is in direct proportion to the hydraulic pressure developed within the brake system.

HOLDING POSITION

During brake application, the reaction force which opposes the

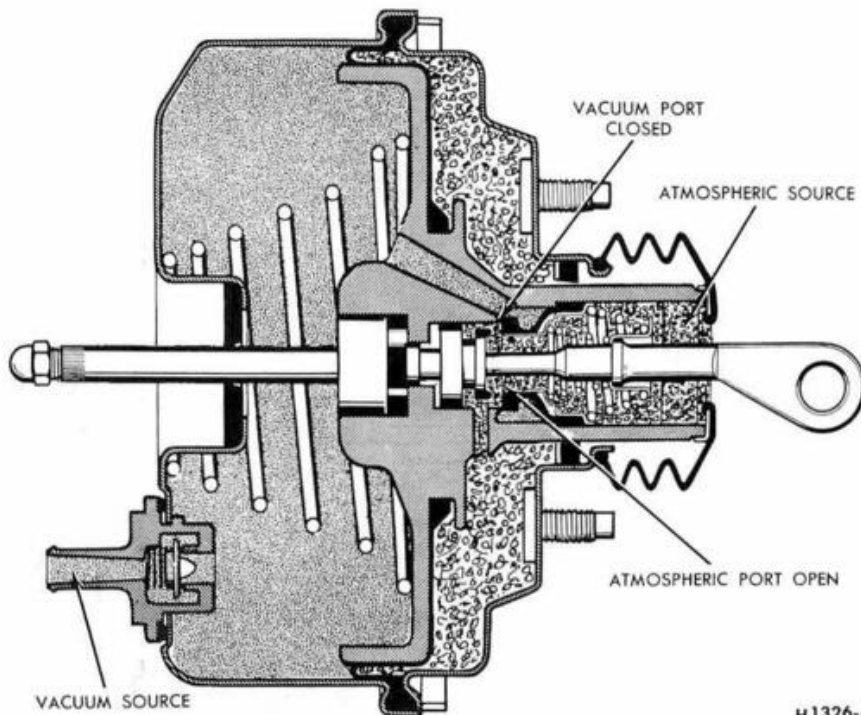


FIG. 8—Booster in Applied Position—Bendix-Type

force applied by the driver, tends to close the atmospheric port. When both atmospheric and vacuum ports are CLOSED, the booster is said to be in the holding position (Fig. 9).

power brake application may be made from the vacuum in the booster. With the engine off and no vacuum in the power system, the brakes can be applied in the conven-

and vacuum chamber, it is possible to obtain several power assisted brake applications with the engine shut off. This arrangement makes a vacuum reservoir unnecessary.

Wither vacuum from the forward side of the diaphragm or air from the bellows (atmospheric chamber) can be connected to the rear side of the diaphragm through porting in the control valve hub and the plunger assembly.

APPLYING POSITION

As the brake pedal is depressed, the valve operating rod and valve plunger assembly move forward compressing the plunger return spring (Fig. 10). The initial movement of the plunger closes the porting from the vacuum chamber preventing further evacuation of the area back of the diaphragm. Further movement of the plunger forces the atmospheric valve off its seat so that atmospheric pressure from the bellows can enter the hub porting that leads to the rear side of the diaphragm.

With vacuum on the front side of the diaphragm and atmospheric pressure on the back side of the diaphragm, a force is developed to move the diaphragm, push rod and master cylinder piston forward to close the compensating port and force hydraulic fluid under pressure through the residual pressure check valve and brake tubes to the wheel brakes. As hydraulic pressure is developed in the hydraulic system, a reaction counter-force acts against the reaction lever and ring assembly. This reaction lever and ring assembly is designed to transmit the reaction forces back through the actuating control valve assembly to the brake pedal and provide the driver with a resistance that is in proportion to the brake hydraulic apply forces. This is the means of providing the proper driver feel to the power brake unit.

HOLDING POSITION

When the forward motion of the brake pedal is stopped and held, the valve operating rod ceases to move the control valve plunger forward. However, the unbalanced forces of atmospheric pressure and vacuum on each side of the diaphragm will continue to move the outer sleeve of the control valve plunger forward keeping the vacuum porting closed. At the same time, the reaction force

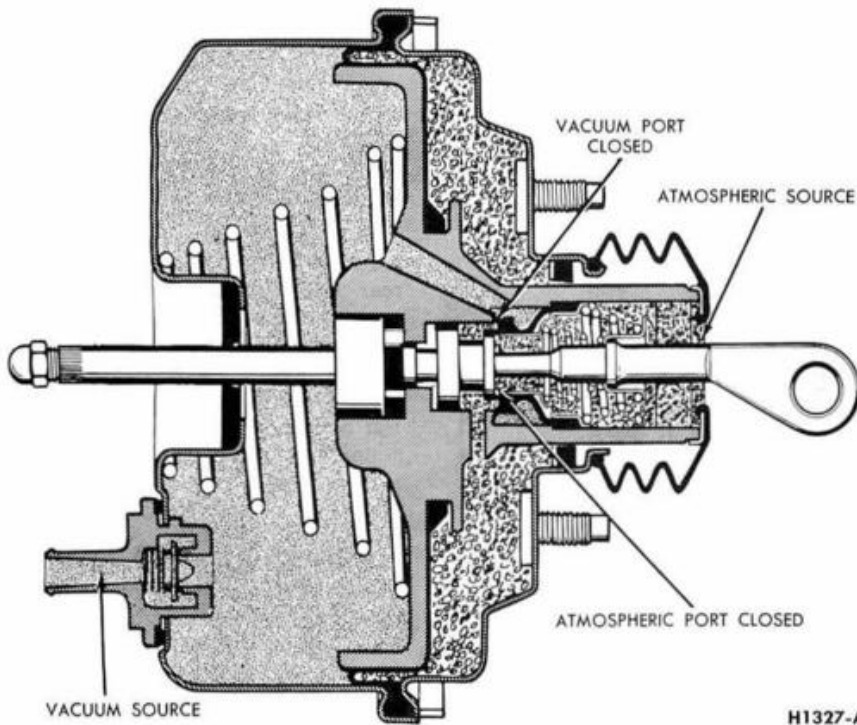


FIG. 9—Booster in Holding Position—Bendix-Type

With both valves closed, any degree of brake application attained will be held until either the atmospheric port is **reopened** by an increase in pedal pressure to further increase the brake application or by a decrease in pedal pressure to **reopen** the vacuum port to decrease the brake application. Whenever the pressure applied to the brake pedal is held constant for a moment, the valve returns to its holding position. However, upon reaching the fully applied position the force applied to the brake pedal overrules the reaction force. In this position the valve plunger and atmospheric valve seat are held away from the valve poppet to admit maximum atmospheric pressure to the rear chamber. With the front chamber open to manifold vacuum, full power application is attained which is referred to as the run-out of the power unit. Any increase in hydraulic pressure beyond this point must be supplied by physical effort of the driver.

NO POWER CONDITION

It should be noted that in case of engine failure and consequent loss of engine vacuum, at least one full

tional manner by applying more physical effort to the brake pedal.

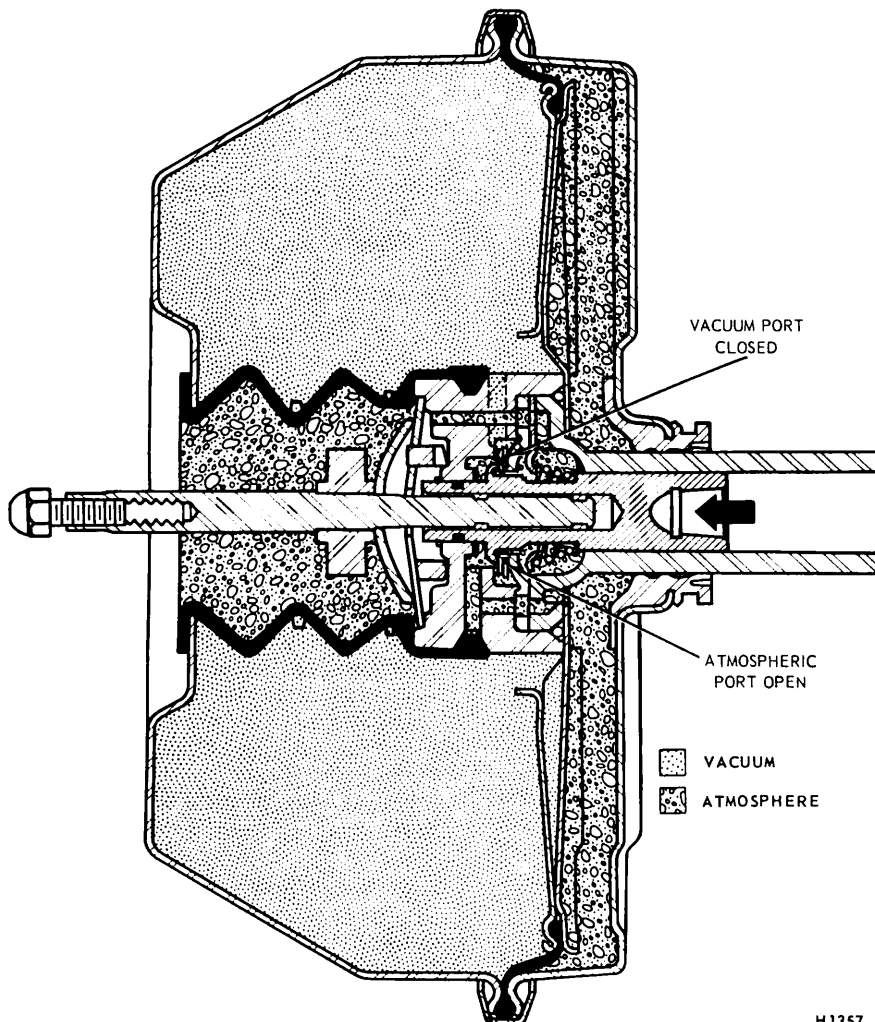
BOOSTER SYSTEM—MIDLAND-ROSS

The optional power brake booster is installed on the engine side of the dash panel and is connected to the brake pedal through a lever assembly and push rod link.

The booster consists of a vacuum chamber, atmospheric valve, control valve plunger assembly, diaphragm, and an atmospheric chamber (Figs. 10, 11 and 12).

Atmospheric pressure is present at all times in the atmospheric chamber at the front side of the atmospheric valve. The air intake to the atmospheric chamber is protected by an air filter. The atmospheric chamber is separated from the vacuum chamber by the bellows assembly within the vacuum chamber.

Vacuum is present at all times in that area of the vacuum chamber forward of the diaphragm. Vacuum is supplied through a hose from the intake manifold to the vacuum manifold and check valve on the booster body. With this integral check valve



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FIG. 10—Booster in Applied Position—Midland-Ross

acting through the reaction ring and lever assembly will tend to move the atmospheric valve to the closed position (Fig. 11). When these combined forces balance, the porting to the vacuum supply will remain closed and the atmospheric valve will cut off any further passage of atmospheric pressure to the area behind the diaphragm. Therefore, the power assist force acting on the master cylinder piston will stabilize and the hydraulic force applying the brakes will be maintained at a constant level.

RELEASED POSITION

When the pedal pressure is released from the valve operating rod and plunger assembly, the plunger return spring moves the plunger away from the atmospheric valve allowing the valve to seat against the hub (Fig. 12). This seating of the

valve closes off the bellows chamber from the hub porting that connects to the rear side of the diaphragm. At the same time, the rearward movement of the plunger opens the porting from the vacuum chamber and draws out the air from the rear side of the power diaphragm. With vacuum on both sides of the diaphragm, the assist force against the master cylinder push rod is eliminated.

Also, a pressure differential is created by the presence of vacuum on the rear (small diameter) side of the valve hub and atmospheric (bellows) pressure on the front (large diameter) side. This pressure differential moves the valve hub and, with it, the valve plunger and diaphragm assembly back to the released position. This releasing action permits the brake shoe retracting springs, acting through the wheel cylinder pistons

and the hydraulic fluid, to return the master cylinder piston and push rod to the released position.

With the piston and push rod in the released position, the hydraulic compensating port in the master cylinder is open. The open port permits fluid to either return from the brake system to the fluid reservoir, or enter the brake system from the reservoir.

PARKING BRAKES—MUSTANG

An independent hand-operated parking brake control actuates the rear wheel brake shoes through a cable linkage. The operating cable is routed from the parking brake control assembly to the equalizer lever which is attached to the equalizer assembly. The rear brake cables connect the equalizer assembly to the parking brake lever at each rear secondary shoe as shown in Figs. 1 and 2.

When the handle is pulled the primary and secondary brake shoes are forced against the rear brake drums. The handle is held in the applied position by the engagement of a spring loaded pawl with a ratchet. Turning the handle counterclockwise disengages the pawl from the ratchet to release the brakes.

PARKING BRAKE COMET, FAIRLANE AND FALCON

An independent foot-operated parking brake control actuates the rear wheel brake shoes through a cable linkage. The operating cable is routed from the parking brake control assembly to the equalizer. The rear brake cables connect the equalizer assembly to the parking brake lever at each rear secondary shoe (Fig. 1).

When the pedal is depressed the secondary brake shoes are forced against the rear brake drums. The pedal is held in the applied position by the engagement of a spring-loaded pawl with a ratchet in the control assembly (Fig. 29).

The parking brake control assembly is mounted to the cowl inner side panel. The pedal pivots on a stationary pedal mount. A spring-loaded pawl and a release lever are assembled to the pedal. A ratchet is assembled to the upper end of the pedal. The pawl contacts the ratchet at such an angle that the ratchet teeth will slide over the pawl as the pedal is depressed; however, when

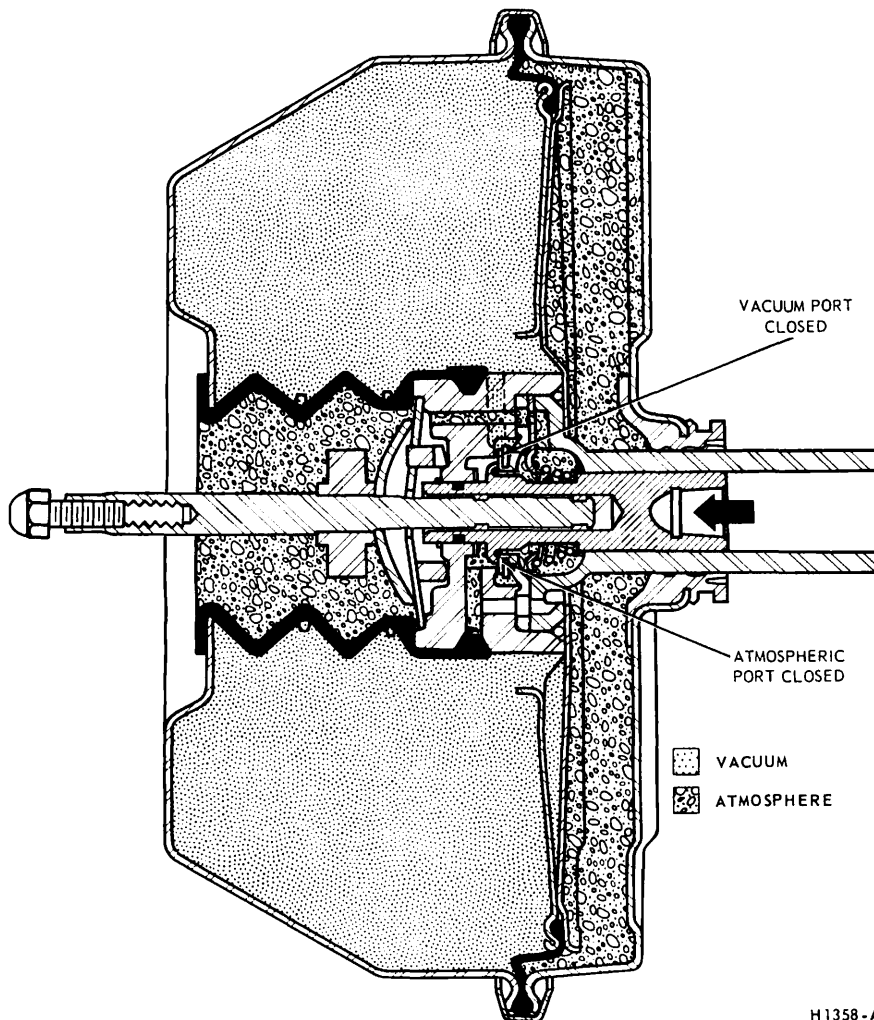


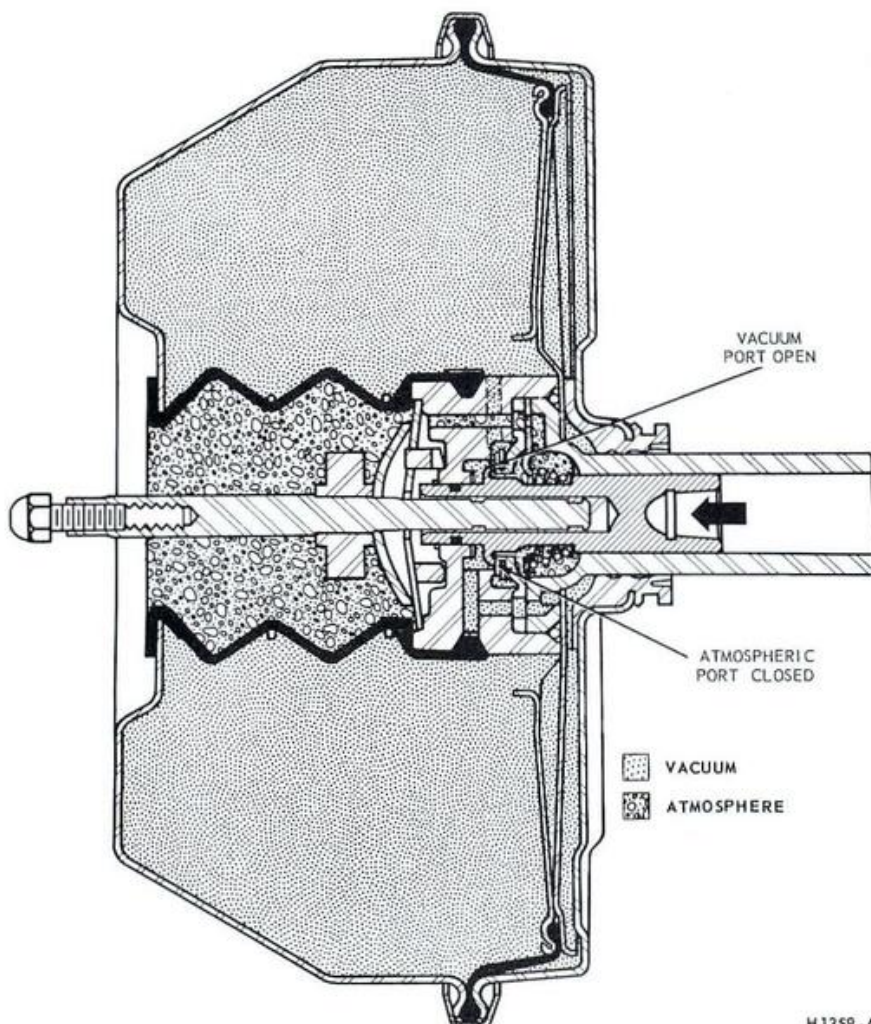
FIG. 11—Booster in Holding Position—Midland-Ross

the applying motion stops and the pedal starts to release, the pawl engages the ratchet and thus locks the

brakes in the applied position.

When the manual release lever is pulled back, (Fig. 29), the cam ac-

tion of the lever on the pawl cam pin will disengage the pawl from the ratchet to release the brakes.



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FIG. 12—Booster in Released Position—Midland-Ross

2 IN-CAR ADJUSTMENTS AND REPAIRS

BRAKE SHOE ADJUSTMENTS

The hydraulic service brakes are self-adjusting and require a manual adjustment only after the brake shoes have been relined, replaced, or when the length of the adjusting screw has been changed while performing some other service operation. The manual adjustment is performed with the drums removed, using the tool and the procedure detailed below.

In case a brake drum cannot be removed in the normal manner, an access knock-out slug is provided in the brake carrier plate. Knock the slug out with a punch and then release the brake shoe as detailed under **Brake Drum-Removal**. Re-

move the drum and knock-out slug. (Install a standard adjusting hole cover in the carrier plate when assembling).

When adjusting the rear brake shoes, check the parking brake cables for proper adjustment. Make sure that the equalizer operates freely.

To adjust the brake shoes:

1. Using Rotunda Tool HRE 8650, (Fig. 13) determine the inside diameter of the drum braking surface.
2. Reverse the tool as shown in Fig. 14 and adjust the brake shoe diameter to fit the gauge. Hold the automatic adjusting lever out of engagement while rotating the adjust-



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FIG. 13—Measuring Drum

ing screw, to prevent burring the screw slots. Make sure the adjusting screw rotates freely. If neces-

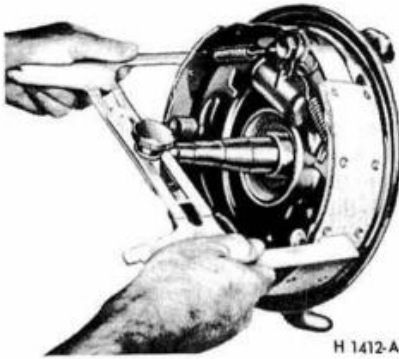


FIG. 14—Measuring Shoes

sary, lubricate the adjusting screw threads with a thin, uniform coating of C1AZ-19590-B Grease.

3. Rotate Tool HRE 8650 around the brake shoes to be sure of the setting.

4. Apply a **small** quantity of high temperature grease to the points where the shoes contact the carrier plate, being careful not to get the lubricant on the linings.

5. Install the wheel on the drum and tighten the mounting nuts to specification.

6. Complete the adjustment by applying the brakes several times while backing the car.

7. After the brake shoes have been properly adjusted, check the operation of the brakes by making several stops while operating in a forward direction.

FRONT BRAKE DRUM

REMOVAL

1. Raise the car until the wheel and tire clear the floor. Remove the wheel cover or hub cap, and remove the wheel and tire from the drum.

2. Remove the drum. If the drum will not come off, knock the access slug out of the brake carrier plate, using a punch. Insert a narrow screwdriver through the slot and disengage the adjusting lever from the adjusting screw. While holding the adjusting lever away from the screw, back off the adjusting screw with the brake adjusting tool (Fig. 15). **Be very careful not to burr, chip, or damage the notches in the adjusting screws; otherwise the self-adjusting mechanism will not function properly.**

3. Remove the grease cap from the hub. Remove the cotter pin, nut lock, adjusting nut, and flat washer from the spindle. Remove the outer bearing cone and roller assembly.

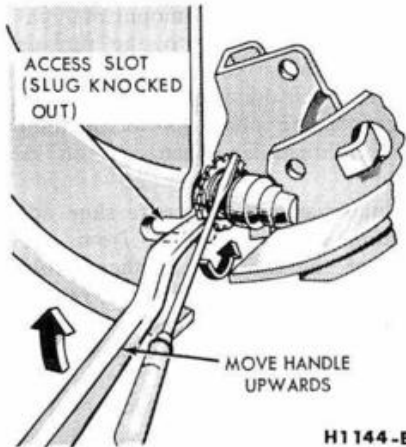


FIG. 15—Backing Off Brake Adjustment

4. Pull the hub and drum assembly off the wheel spindle.

INSTALLATION

1. If the drum is being replaced, remove the protective coating from the new drum with carburetor degreaser. Install new bearings and grease retainer. Soak the new grease retainer in light engine oil at least 30 minutes before installation if retainer is of a leather composition. Rubber seals need not be treated with oil before installation. Pack the wheel bearings, install the inner bearing cone and roller assembly in the inner cup, and install the new grease retainer. See Part 3-5, Section 4 for procedure.

If the original drum is being installed, make sure that the grease in the hub is clean and adequate.

2. Adjust the brakes and install the drum assembly as outlined under "Brake Shoe Adjustments" in this section.

3. Install the outer wheel bearing, washer and adjusting nut.

4. Adjust the wheel bearing as outlined in Part 3-5, Section 2, then install the cotter pin grease cap. Install the wheel and hub cap.

REAR BRAKE DRUM

REMOVAL

1. Raise the car so that the wheel is clear of the floor.

2. Remove the hub cap and wheel. Remove the three Tinnerman nuts and remove the brake drum. If the drum will not come off, knock the excess slug out of the brake carrier plate, using a punch. Insert a narrow screwdriver through the

hole in the carrier plate, and disengage the adjusting lever from the adjusting screw. While holding the adjusting lever away from the adjusting screw, back off the adjusting screw with the brake adjusting tool (Fig. 15). **Be very careful not to burr, chip or damage the notches in the adjusting screw; otherwise, the self-adjusting mechanism will not function properly.**

If the adjustment was backed off, make sure that the adjuster lever is properly seated in the shoe web.

INSTALLATION

1. Remove the protective coating from a new drum with carburetor degreaser.

2. Adjust the brakes as outlined under Brake Shoe Adjustments in this section.

3. Place the drum over the brake assembly and into position. Install the three Tinnerman nuts and tighten them securely. Install the wheel on the axle shaft flange studs against the drum, and tighten the attaching nuts to specifications.

BRAKE SHOES AND ADJUSTING SCREW

REMOVAL

1. With the wheel and drum removed, install a clamp over the ends of the wheel cylinder as shown in Fig. 16.

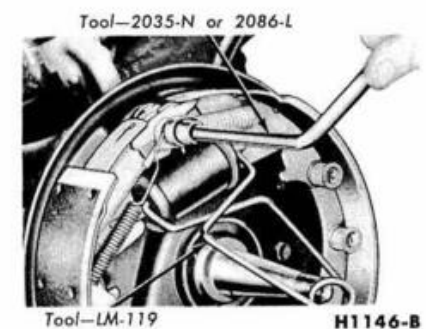


FIG. 16—Retracting Spring Removal—Typical

2. Remove the brake retracting springs using Tool 2035-N or 2086-L (Fig. 16).

3. Disconnect the brake shoe hold-down springs and remove the brake shoe assemblies along with the complete automatic adjustment mechanism.

4. Disassemble the brake shoes.

5. On rear brakes, remove the parking brake link and spring from

the brake assemblies. Disconnect the parking brake cable from the parking brake lever.

6. After removing the rear brake shoes disassemble the parking brake lever from the secondary shoe by removing the retaining clip and spring washer (Fig. 1 and 2).

INSTALLATION

1. Before installing the rear brake shoes, assemble the parking brake lever to the secondary shoe and secure it with the spring washer and retaining clip.

2. Apply a light coating of high-temperature grease at the points where the brake shoes contact the backing plate.

3. Position the brake shoes on the backing plate and secure them with the hold down springs. On the rear brake, install the parking brake link and spring. Connect the parking brake cable to the parking brake lever.

Install the cable guide on the secondary shoe web with the flanged hole properly fitted into the hole in the secondary shoe web. Install the secondary shoe to anchor spring (Figs. 1 and 2).

5. Place the cable eye over the anchor pin with the crimped side toward the backing plate. Install the primary shoe to anchor spring with the tool shown in Fig. 17.

Tool—2035-N or 2086-L



FIG. 17—Retracting Spring Installation—Typical

6. Thread the cable around the cable guide groove.

It is imperative that the cable be positioned in this groove and not between the guide and the shoe web. Be certain that the cable eye is not cocked or binding on the anchor pin when installed. All parts should be flat on the anchor pin. Remove the brake cylinder clamp.

7. Apply a small amount of high-temperature grease to the threads and the socket end of the adjusting screw. Turn the adjusting screw into the adjusting pivot nut to the limit of the threads and then back off $\frac{1}{2}$ turn.

Interchanging the brake shoe adjusting screw assemblies from one side of the car to the other would cause the brake shoes to retract rather than expand each time the automatic adjusting mechanism operated. To prevent accidental installation of the adjusting screw on the wrong side of the car the socket end of the adjusting screw is stamped with an R or L (Fig. 18). The ad-

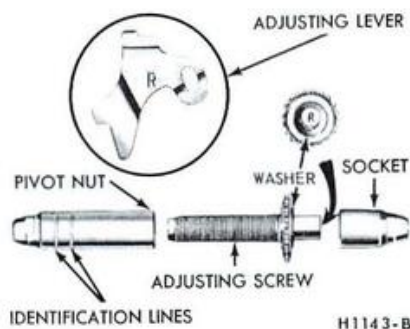


FIG. 18—Adjusting Screw and Lever Identification

justing pivot nuts can be distinguished by the number of grooves machined around the body of the nut. Two grooves indicate a right-hand nut; one groove indicates a left-hand nut.

8. Place the adjusting socket on the screw and install this assembly between the shoe ends with the adjusting screw toothed wheel nearest the secondary shoe.

9. Hook the cable hook into the hole in the adjusting lever. The adjusting levers are stamped with an R or L to indicate their installation on a right or left brake assembly (Fig. 18).

10. Position the hooked end of the adjuster spring completely into the large hole in the primary shoe web. The last coil of the spring should be at the edge of the hole. Connect the loop end of the spring to the adjuster lever hole (Figs. 1 and 2).

11. Pull the adjuster lever, cable and automatic adjuster spring down and toward the rear to engage the pivot hook in the large hole in the secondary shoe web.

12. After installation, check the

action of the adjuster by pulling the section of the cable between the cable guide and the adjusting lever toward the secondary shoe web far enough to lift the lever past a tooth on the adjusting screw wheel. The lever should snap into position behind the next tooth, and release of the cable should cause the adjuster spring to return the lever to its original position. This return action of the lever will turn the adjusting screw one tooth.

If pulling the cable does not produce the action described, or if the lever action is sluggish instead of positive and sharp, check the position of the lever on the adjusting screw toothed wheel. With the brake in a vertical position (anchor at the top), the lever should contact the adjusting wheel $\frac{3}{16}$ inch (plus or minus $\frac{1}{32}$ inch) above the centerline of the screw. If the contact point is below the centerline, the lever will not lock on the teeth in the adjusting screw wheel, and the screw will not be turned as the lever is actuated by the cable.

To determine the cause of this condition:

a. Check the cable end fittings. The cable should completely fill or extend slightly beyond the crimped section of the fittings. If it does not meet this specification, possible damage is indicated and the cable assembly should be replaced.

b. Check the cable length. The cable should measure $8\frac{3}{16}$ inches on 9 inch brakes or $10\frac{1}{8}$ inches on 10 inch brakes from the end of the cable anchor to the end of the cable hook.

c. Check the cable guide for damage. The cable groove should be parallel to the shoe web, and the body of the guide should lie flat against the web. Replace the guide if it shows damage.

d. Check the pivot hook on the lever. The hook surfaces should be square with the body of the lever for proper pivoting. Replace the lever if the hook shows damage.

e. See that the adjusting screw socket is properly seated in the notch in the shoe web.

DISC BRAKE SHOE AND LINING REPLACEMENT

After any brake service work, pump the brake pedal to obtain a firm pedal before moving the car. Riding the brake pedal (common on left foot applications) should be avoided when driving the car.

REMOVAL

1. Remove the wheel and tire from the hub and rotor assembly. **Be careful to avoid damage or interference with the caliper splash shield, bleeder screw fitting or transfer tube.**

2. Remove the two bolts that attach the caliper splash shield, and remove the shield (Fig. 3).

3. To facilitate removal and installation of the shoe and lining assemblies, the pistons must be pushed into their bores. Apply a steady inward pressure against each shoe and lining assembly toward its respective caliper housing on each side of the rotor (Fig. 4). Maintain the pressure for at least a minute. If the pistons will not go in easily, force them in with water pump pliers.

4. Grasp the metal flange on the outer end of the shoe with two pairs of pliers and pull the shoe out of the caliper (Fig. 19).

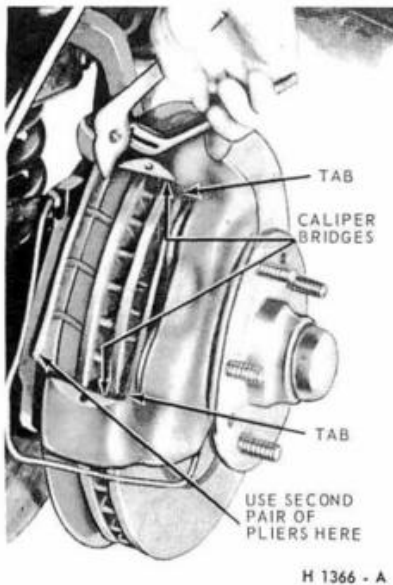


FIG. 19—Removing Disc Brake Shoe and Lining Assembly—Typical

CLEANING AND INSPECTION

When the shoe and lining assemblies are replaced, remove the dust boots from the pistons. Check the condition of the boots, and inspect each piston surface for damage or corrosion. Thoroughly clean each dust boot and surrounding area before installing.

INSTALLATION

1. Position a new shoe and lining

assembly on each side of the rotor so that the lining faces the rotor. Be sure that the tabs on the shoe flanges seat fully against the caliper bridges (Fig. 19).

2. Install the caliper splash shield and secure the shield to the caliper with two retaining bolts (Fig. 3).

3. Pump the brake pedal several times until a firm pedal is obtained and the shoe and lining assemblies are properly seated.

4. Install the wheel and tire on the hub and rotor assembly.

5. Check and refill the master cylinder reservoir with specified brake fluid as required.

6. Road test the car.

It should not be necessary to bleed the system after a shoe and lining replacement.

DISC BRAKE CALIPER ASSEMBLY**REMOVAL**

1. Remove the wheel and tire from the hub and rotor assembly. **Be careful to avoid damage or interference with the caliper splash shield, bleeder screw fitting or transfer tube.**

2. Disconnect the front brake flexible hose from the brake tube at the bracket on the frame (Fig. 24).

3. Remove the two bolts that attach the caliper to the mounting bracket.

Take care to avoid loosening the bridge bolts that hold the two halves of the caliper together.

4. Lift the caliper assembly off the rotor.

INSTALLATION

1. Position the caliper assembly on the rotor, and mate the mounting bolt holes in the caliper with those in the spindle. It may be necessary to push the caliper pistons into the cylinder bores to obtain clearance between the shoe and lining assemblies and the rotor. The shoe and lining assemblies should be seated properly on the bridges.

2. Install the caliper to mounting bracket attaching bolts and torque to specification. Check to insure that the rotor runs squarely and centrally between the two halves of the caliper. There should be approximately 0.090-0.120 inch clearance between the caliper and the rotor outside diameter (Fig. 4).

3. Connect the front wheel brake flexible hose to the brake tube at the bracket on the frame (Fig. 24). The

hose should be checked for correct routing.

4. Bleed the brake system as outlined in Section 2-1. Check the master cylinder fluid level, and the specified brake fluid as required.

5. **Pump the brake pedal several times to actuate the piston seals and to position the shoe and lining assemblies.**

6. Install the wheel and tire.

7. Road test the car.

FRONT WHEEL HUB AND ROTOR ASSEMBLY—DISC BRAKES**REMOVAL**

1. Remove the wheel and tire from the hub and rotor assembly (Fig. 20). **Be careful to avoid damage or interference with the caliper splash shield, bleeder screw fitting or transfer tube.**

2. Remove the caliper assembly from the spindle and the rotor. If the caliper does not require servicing, it is not necessary to disconnect the brake hose or remove the caliper from the car. Position the caliper out of the way, and support it with a wire to avoid damaging the caliper or stretching the hose. Insert a clean cardboard spacer between the linings to prevent the pistons from coming out of the cylinder bores while the caliper is removed.

Handle the rotor and caliper assemblies in such a way as to avoid deformation of the rotor and nicking or scratching of the brake linings.

3. Remove the grease cap from the hub. Remove the cotter pin, nut lock, adjusting nut, and flat washer from the spindle. Remove the outer bearing cone and roller assembly.

4. Remove the hub and rotor assembly from the spindle.

INSTALLATION

1. If the rotor is being replaced, remove the protective coating from the new rotor with carburetor degreaser. Pack a new set of bearings with specified grease, and install the inner bearing cone and roller assembly in the inner cup. Pack grease lightly between the lips of a new grease retainer and install the retainer (Fig. 20).

If the original rotor is being installed, make sure that the grease in the hub is clean and adequate, that the inner bearing and grease retainer are lubricated and in good condition, and that the rotor braking surfaces are clean.

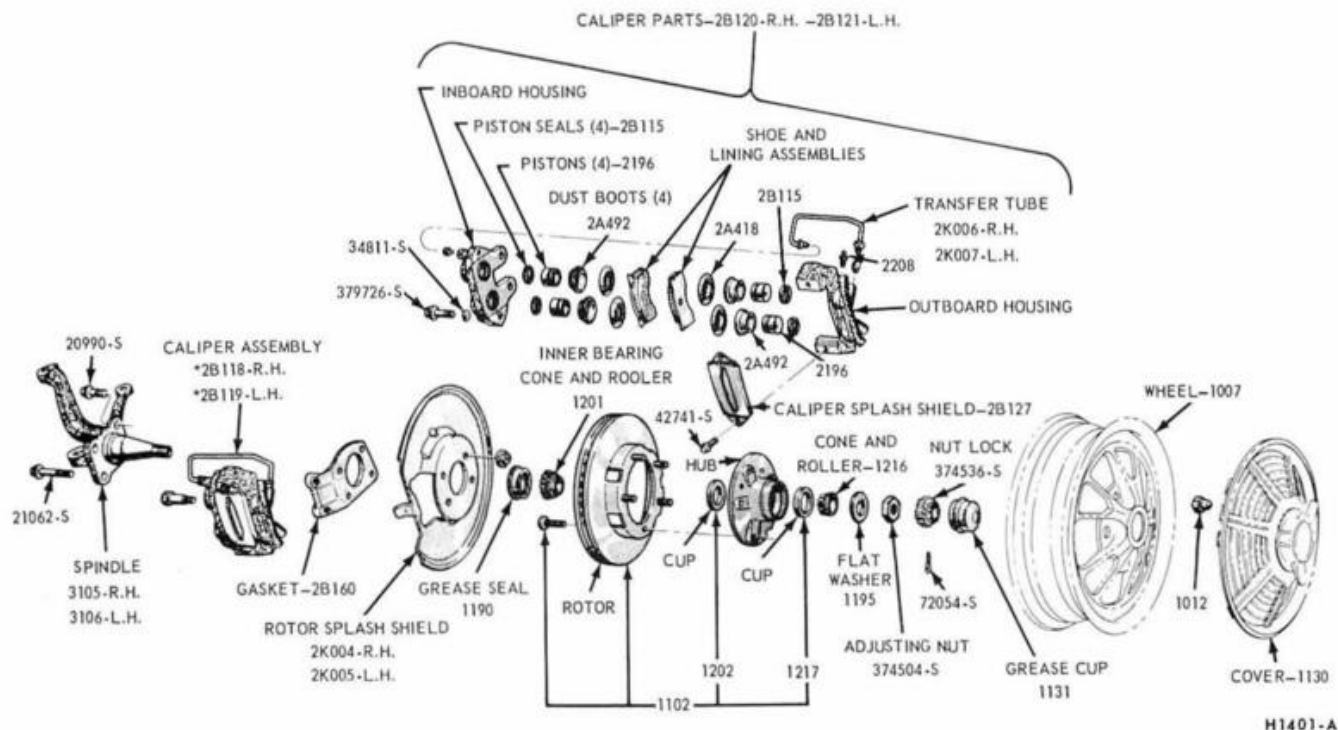


FIG. 20—Disc Brake Disassembled

2. Install the hub and rotor assembly on the spindle.

3. Lubricate and install the outer wheel bearing, washer and adjusting nut.

4. Adjust the wheel bearings to specification, and then install the nut lock, cotter pin, and grease cap. **The wheel bearing adjustment is especially important with disc brakes.**

5. Mount the caliper assembly on the mounting bracket and torque the two mounting bolts to specification. If necessary, push the caliper pistons into the cylinder bores to obtain clearance between the shoe and lining assemblies and the rotor. Be sure that the shoe and lining assemblies are seated on the bridges. Check the flexible hose for correct routing.

6. Install the wheel and tire on the hub and rotor assembly.

DISC BRAKE ROTOR SPLASH SHIELD

REMOVAL

1. Remove the caliper and the hub and rotor assembly as outlined under Removal in the foregoing procedure.

2. Remove the four nuts that attach the splash shield to the mounting bracket and remove the shield (Fig. 20).

3. Remove the gasket.

INSTALLATION

1. Install the gasket.

2. If the shield is bent, straighten it out before installation. Position the shield to the mounting bracket, install the attaching nuts, and torque to specification (Fig. 20).

3. Install the hub and rotor assembly and the caliper as outlined under Installation in the foregoing procedure.

PROPORTIONING VALVE

The proportioning valve is serviced as an assembly and is never adjusted or overhauled.

REMOVAL

1. Disconnect and remove the Master cylinder - to - proportioning valve brake tube (Fig. 23).

2. Disconnect the front-to-rear brake tube from the proportioning valve.

3. Working underneath the left fender, remove the bolt that attaches the proportioning valve to the fender apron and remove the valve through the access hole (Fig. 21).

INSTALLATION

1. From underneath the left fender, install the proportioning valve through the access hole in the fender apron. Position the valve to the

RETAINING BOLT PROPORTIONING VALVE

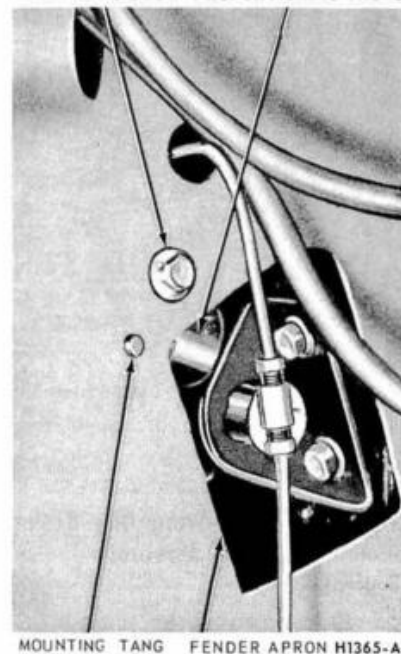


FIG. 21—Removing or Installing Proportioning Valve

apron so that the mounting tang extends through the hole in the fender apron as shown in Fig. 21. Install the attaching bolt.

2. Connect the front-to-rear brake tube to the valve (Fig. 23).

3. Position and connect the master cylinder-to-proportioning valve brake tube.

4. Bleed the brake system.

WHEEL CYLINDER REPAIR

It is not necessary to remove the wheel cylinder from the backing plate to disassemble, inspect, or hone and overhaul it. Removal is necessary only when the cylinder is damaged or scored beyond repair.

DISASSEMBLY

1. With the wheel in a raised position, remove the wheel and the drum.

2. Place a clamp over the ends of the brake cylinder as shown in Fig. 16.

3. Remove the brake shoe assemblies following procedures outlined in this section.

4. The 6-cylinder Falcon and Mustang models are not provided with links. Remove the rubber boots from the ends of the piston.

On 8-cylinder models and on all Comets and Fairlanes, remove the links and rubber boots from the ends of the piston. Remove the pistons, cups, and return spring from the cylinder bore (Fig. 22).

5. Remove the bleeder screw from the cylinder.

INSPECTION

1. Wash all parts in clean denatured alcohol. If alcohol is not available, use specified brake fluid. Dry with compressed air.

2. Check all the internal parts for excessive wear or damage. If any of

the internal parts require replacing, all should be replaced.

3. Inspect the cylinder bore for score marks or rust. If either condition is present, the cylinder bore must be honed. However, the cylinder should not be honed more than 0.003 inch beyond its original diameter. A baffle in the front wheel cylinder of the 6-cylinder Falcon and Mustang models prevents honing; therefore, the cylinder must be replaced.

4. Check the bleeder hole to be sure that it is open.

ASSEMBLY

1. Apply a coating of heavy-duty brake fluid to all internal parts.

2. Thread the bleeder screw into the cylinder and tighten securely.

3. Insert the return spring, cups, and pistons into their respective positions in the cylinder bore (Fig. 22). Place a boot over each end of the cylinder. On 8-cylinder model Mustangs and Falcons and all Comets and Fairlanes, install the links in the ends of the brake cylinders.

4. Install the shoe and adjuster assemblies, then adjust the shoes as outlined in this section.

5. Install the brake drum and wheel, then bleed the brakes as outlined in this section.

WHEEL CYLINDER REPLACEMENT

REMOVAL

1. With the wheel in a raised position, remove the wheel and the drum.

2. Place a clamp over the ends of the wheel cylinder as shown in Fig. 16.

3. Remove the brake shoe assemblies, following procedures outlined in this section.

4. Disconnect the brake line from the brake cylinder. On a car with a vacuum brake booster, be sure the engine is stopped and there is no vacuum in the booster system before disconnecting the hydraulic lines.

To disconnect the hose at a front cylinder, loosen the tube fitting that connects the opposite end of the hose to the brake tube at a bracket on the frame. Remove the horseshoe-type retaining clip from the hose and bracket, disengage the hose from the bracket, then unscrew the entire hose assembly from the front wheel cylinder.

At a rear cylinder, unscrew the tube fitting that connects the tube to the cylinder. Do not pull the metal tube away from the cylinder. Pulling the tube out of the cylinder connection will bend the metal tube and make installation difficult. The tube will separate from the cylinder when the cylinder is removed from the carrier plate.

5. Remove the wheel cylinder attaching bolts and lock washers and remove the cylinder.

INSTALLATION

Wipe the end(s) of the hydraulic line to remove any foreign matter before making connections.

1. To install a front cylinder:

a. Position the cylinder in place against the carrier plate. Install the two lock washers and attaching bolts. Torque them to specifications.

b. Install a new copper gasket over the hose fitting. Thread the hose assembly into the cylinder and tighten it securely.

c. Engage the opposite end of the hose to the bracket on the frame, install the horseshoe-type retaining clip, and connect the brake tube to the hose with the tube fitting nut. Tighten the nut to specifications.

2. To install a rear cylinder:

a. Position the rear wheel cylinder in place against the carrier plate. Enter the tubing into the cylinder, and start the tube fitting nut into the threads of the cylinder.

b. Secure the cylinder to the carrier plate with the attaching bolts and lock washers.

c. Tighten the tube fitting nut to specifications.

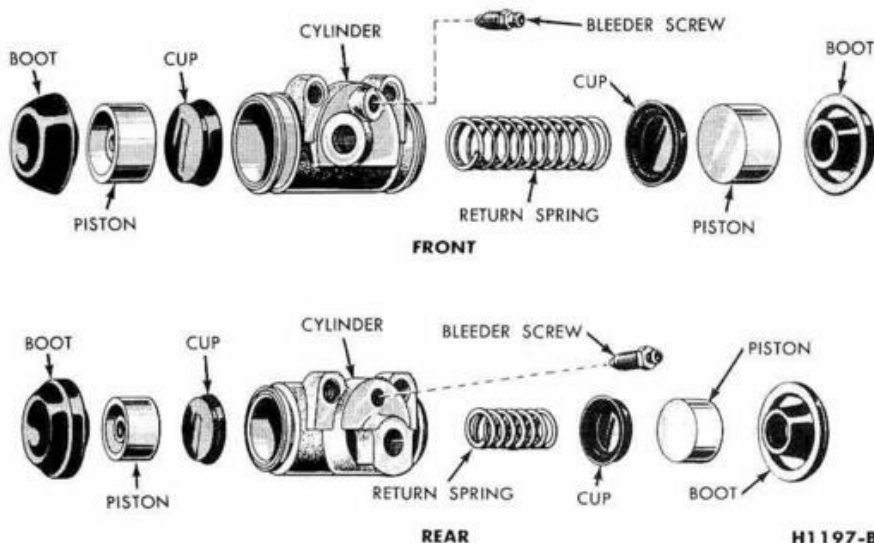


FIG. 22—Front and Rear Wheel Cylinders

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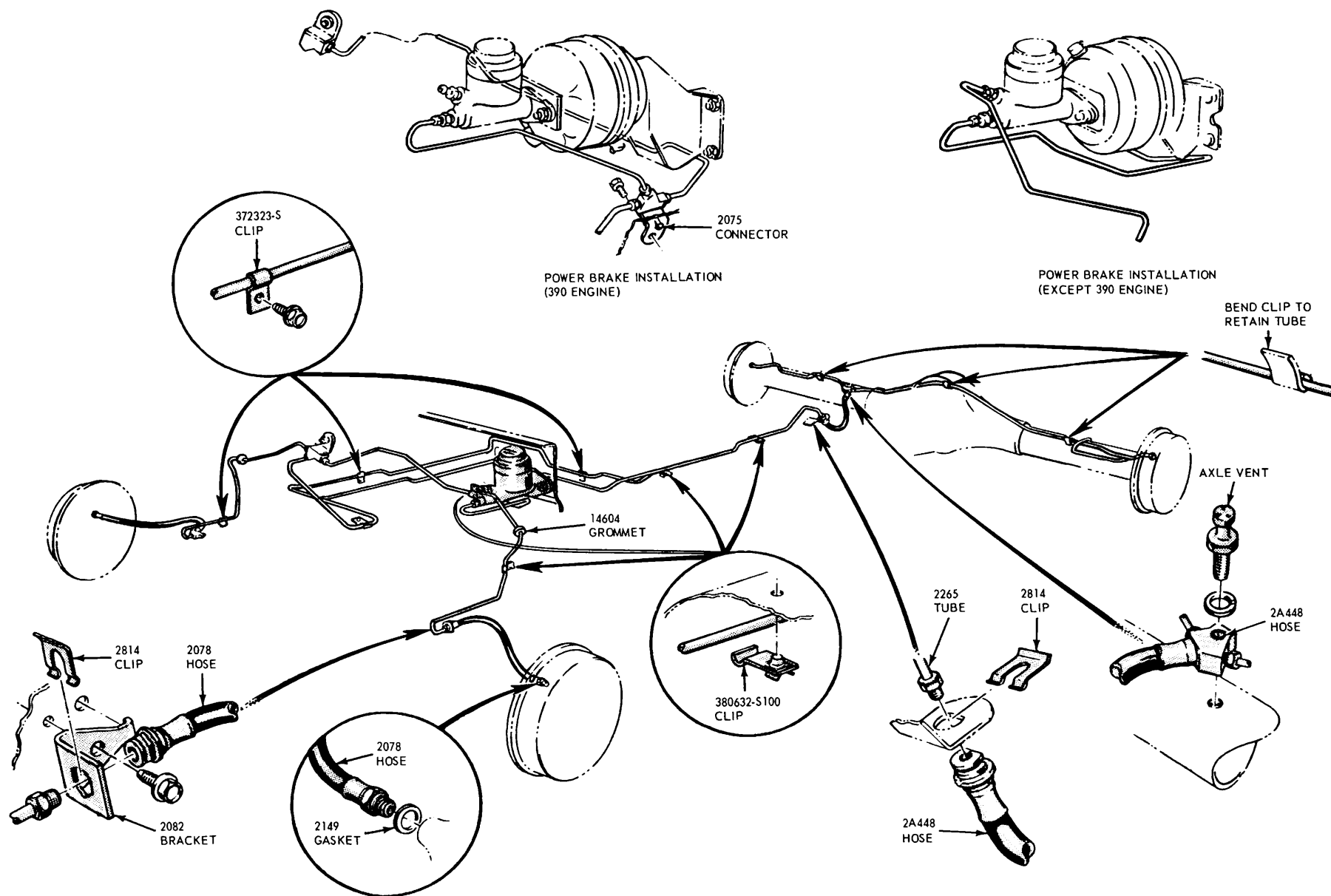


FIG. 23—Hydraulic Brake System—Comet-Fairlane and Falcon

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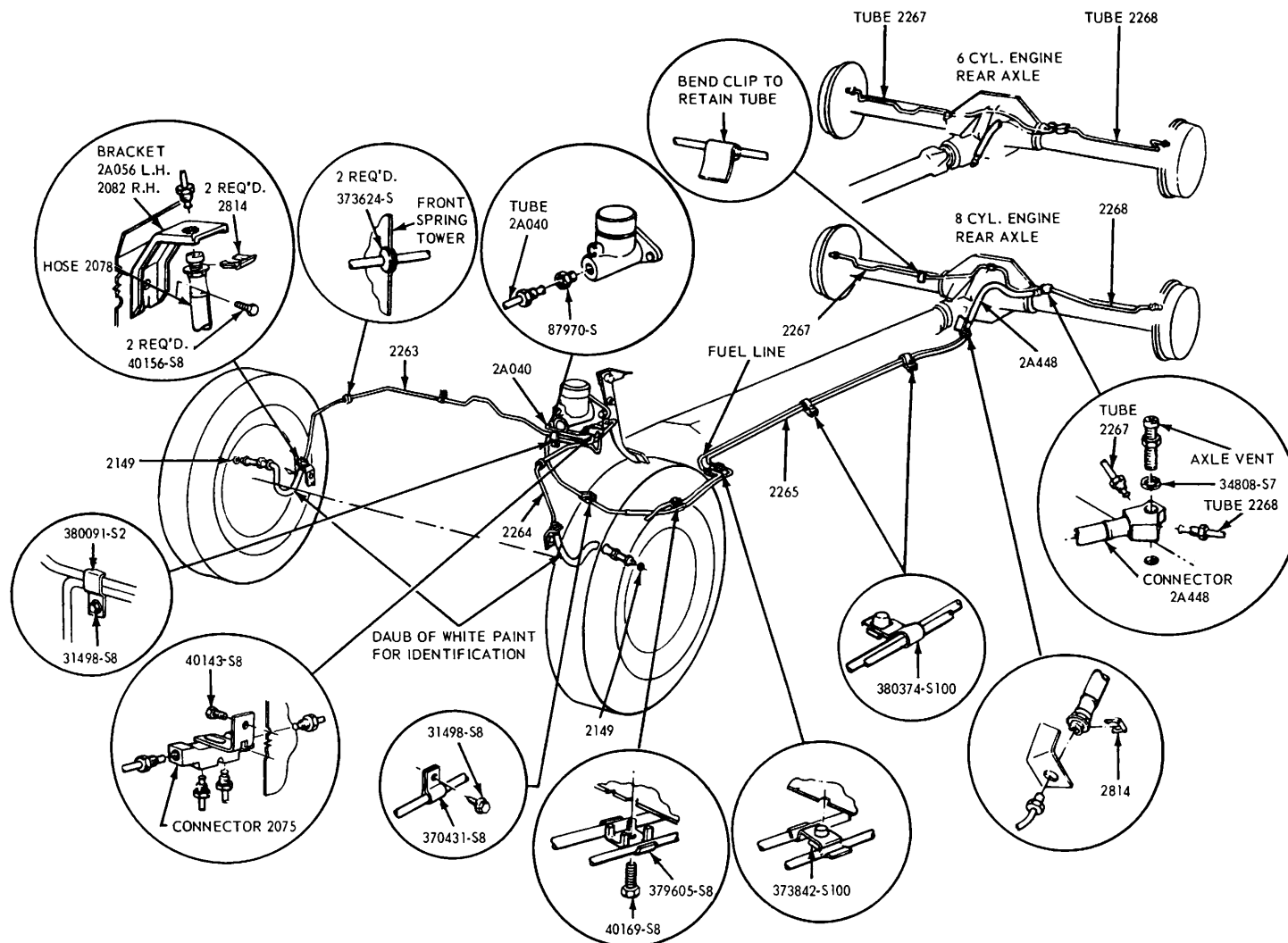


FIG. 24—Hydraulic Brake System—Mustang

3. Install the links in the ends of the wheel cylinder (8-cylinder models only on Falcon and Mustang and all Comet and Fairlane models).

4. Install the brake shoes as detailed in this section.

5. Adjust the brakes as detailed in Part 2-2, Section 2.

6. Install the brake drums and wheels.

7. Bleed the brakes as detailed in Part 2-1, Section 2.

BRAKE CARRIER PLATE REPLACEMENT

REMOVAL

1. Remove the wheel and brake drum. Disconnect the brake line from the brake cylinder.

2. Remove the brake shoe and adjuster assemblies and the wheel cylinder as outlined in this section. On the rear wheels, disconnect the parking brake lever from the cable.

3. If the rear carrier plate is being replaced, rotate the axle shaft so that the hole in the axle shaft flange lines up with the carrier plate retaining nuts and remove the nuts. Pull the axle shaft assembly out of the housing with tool 4235-C and a slide hammer (Part 4-2), then remove the carrier plate.

If the front carrier plate is being replaced, remove the bolts and nuts that secure the plate to the front wheel spindle and remove the plate.

INSTALLATION

1. Position a new rear carrier plate on the attaching bolts in the

axle housing flange. Insert the axle shaft into the housing so that the splines engage the differential side gear with the bearing retainer sliding onto the retaining bolts and against the carrier plate. Install the attaching nuts through the access hole in the axle shaft flange.

Position a new front carrier plate to the wheel spindle and install the attaching bolts and nuts.

2. Install the wheel cylinder and connect the brake line as outlined in this section.

3. Install the brake shoe and adjuster assemblies as outlined in this section. On a rear brake, connect the parking brake cable to the lever.

4. Adjust the brake shoes (Section 2).

5. Install the brake drum and wheel and bleed the brake system as outlined in Part 2-1, Section 2.

HYDRAULIC LINES

Steel tubing is used throughout the brake system with the exception of the flexible hoses at the front wheels and at the rear axle housing brake tube connector (Figs. 23 and 24).

Always bleed the entire hydraulic system after any hose or line replacement.

BRAKE TUBE REPLACEMENT

If a section of the brake tubing becomes damaged, the entire section should be replaced with tubing of the same type, size, shape and length. **Copper tubing should not be used in a hydraulic system.** When bending

brake tubing to fit underbody or rear axle contours, be careful not to kink or crack the tube.

All brake tubing should be flared properly to provide good leak-proof connections. Clean the brake tubing by flushing with clean denatured alcohol, before installation.

When connecting a tube to a hose, tube connector, disc caliper, or brake cylinder, tighten the tube fitting nut to specified torque with Milbar tool 1112-144 or equivalent.

BRAKE HOSE REPLACEMENT

A flexible brake hose should be replaced if it shows signs of softening, cracking, or other damage.

When installing a new front brake hose, position the hose to avoid contact with other chassis parts. Place a new copper gasket over the hose fitting and screw the hose assembly into the front brake cylinder. Engage the opposite end of the hose to the bracket on the frame. Install the horseshoe-type retaining clip, and connect the tube to the hose with the tube fitting nut.

A rear brake hose should be installed so that it does not touch the muffler outlet pipe or shock absorber.

Since the rear brake hose is integral with the rear brake tube connector, the entire hose and connector is replaced as an assembly. Mount the connector to the rear axle housing with the retaining bolt (axle vent) and lock washer. Connect the two rear wheel brake tubes to the connector.

3 REMOVAL AND INSTALLATION

MASTER CYLINDER—STANDARD BRAKES

REMOVAL

1. Disconnect the rubber boot from the rear end of the master cylinder in the passenger compartment.

2. Disconnect the brake line(s) from the master cylinder (Fig. 27)

3. Remove the bolts that secure the master cylinder to the dash panel and lift the cylinder out and away from the push rod. Remove the rubber boot from the push rod.

INSTALLATION

1. With the rubber boot on the push rod, guide the master cylinder over the end of the push rod, and position the cylinder against the dash panel.

2. Install and torque the mounting bolts to specification.

3. Connect the brake line(s) to the master cylinder fitting, but leave the brake line fitting(s) loose.

4. Fill the master cylinder reservoir with heavy-duty Rotunda brake fluid to within $\frac{3}{8}$ inch of the top. Install and tighten the filler cap.

5. Bleed the master cylinder to let air escape from the cylinder at the brake line fitting(s). Then tighten the fitting(s).

6. Remove the filler cap and fill the reservoir to the level specified. Be sure that the diaphragm type gasket is properly seated in the cap. Install the cap and wipe off any fluid from the cylinder.

7. Connect the rubber boot to the master cylinder.

MASTER CYLINDER—POWER BRAKES

REMOVAL

1. Disconnect the hydraulic line(s) from the master cylinder.

2. Remove the two nuts and lock washers that attach the master cylinder to the booster.

3. Remove the master cylinder from the vacuum booster.

INSTALLATION

1. Before installing the master cylinder, check the distance from the outer end of the push rod to the master cylinder mounting surface at the end of the vacuum cylinder (Fig. 4 or 5, Part 2-1). If the push rod dimension is not correct, see Master Cylinder Push Rod Adjust-

ment Part 2-1, Section 2.

2. Position the master cylinder over the push rod onto the two studs that are integral with the booster body.

3. Install, but do not tighten the attaching nuts and lock washers.

4. Connect the hydraulic line(s) to the master cylinder.

5. Tighten the two master cylinder attaching nuts.

6. Tighten all hydraulic line fittings.

7. Bleed the brake system. Fill the master cylinder to $\frac{3}{8}$ inch from the top of the filler opening. Be sure that the diaphragm type gasket is properly seated in the reservoir cap, and install the cap.

BRAKE BOOSTER

REMOVAL

1. Working inside the car below the instrument panel, disconnect the stop light switch wires at the connector.

2. Remove the hairpin type retainer. Slide the stop light switch off the brake pedal pin **just far enough** for the switch outer hole to clear the pin, and then lower the switch away from the pin. Slide the master cylinder push rod link and the nylon washers and bushing off from the brake pedal pin (Fig. 25 or 26).

3. Working in the engine compartment, loosen the hose clamp, and disconnect the vacuum hose from the booster at the check valve.

4. Remove the two master cylinder attaching nuts and pull the master cylinder from the booster, **without disconnecting the hydraulic lines**. Secure the master cylinder out of the way.

5. Remove the four mounting bracket-to-dash panel attaching bolts.

6. Remove the booster and bracket assembly from the dash panel, sliding the push rod link out from the engine side of the dash panel.

INSTALLATION

1. Mount the booster and bracket assembly to the dash panel by sliding the push rod link in through the hole in the dash panel. Install the four attaching bolts.

2. Position the brake master cylinder to the booster assembly and install the attaching nuts.

3. Connect the vacuum hose to the booster at the check valve, and tighten the hose clamp.

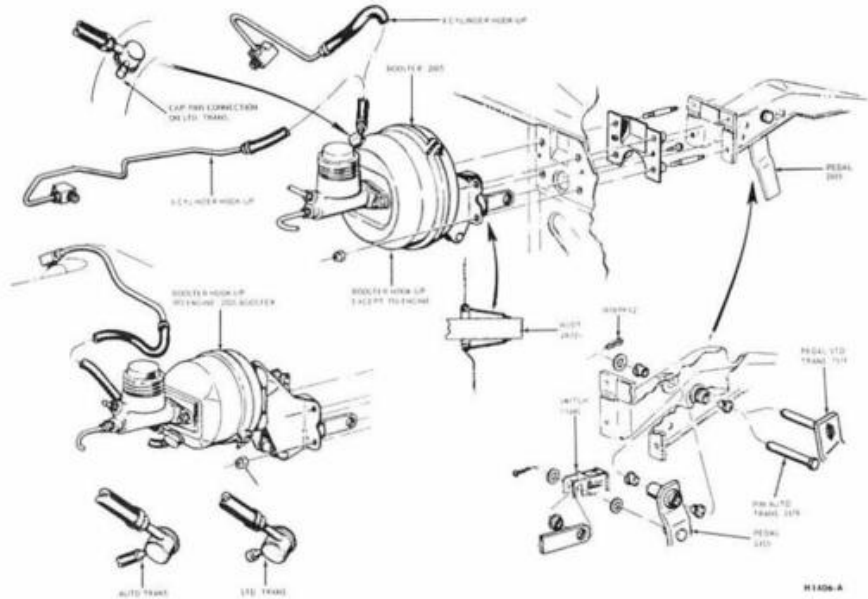


FIG. 25—Vacuum Booster Installation—Comet-Fairlane-Falcon

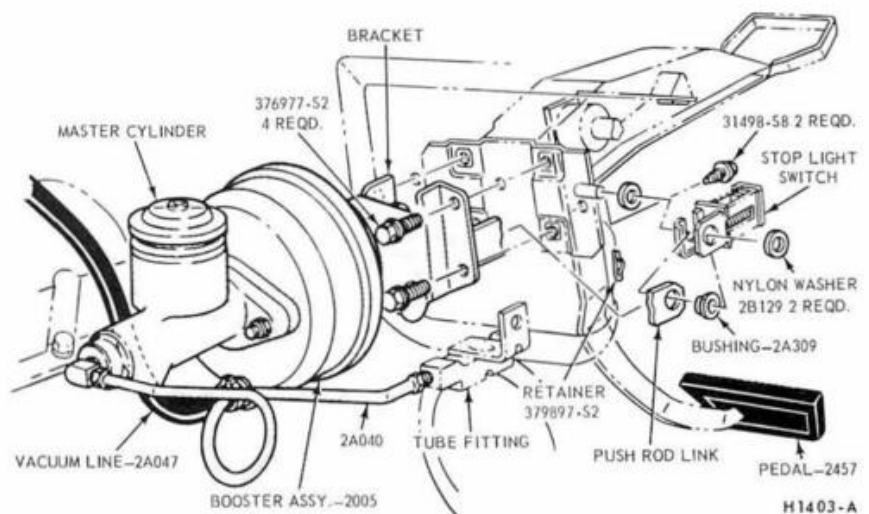


FIG. 26—Booster Installation—Mustang

4. Working from inside the car, install the inner nylon washer, the master cylinder push rod link, and the bushing on the brake pedal pin. Position the switch so that it straddles the push rod with the switch slot on the pedal pin and the switch outer hole just clearing the pin. Slide the switch completely onto the pin, and install the outer nylon washer as shown in Fig. 25 or 26. Secure these

parts to the pin with the hairpin type retainer.

5. Connect the stop light switch wires to the connector, and install the wires in the retaining clip.

BRAKE PEDAL—MANUAL SHIFT TRANSMISSION REMOVAL

1. On a Falcon, Comet or Fairlane, remove the clutch pedal assist spring, (Fig. 27).

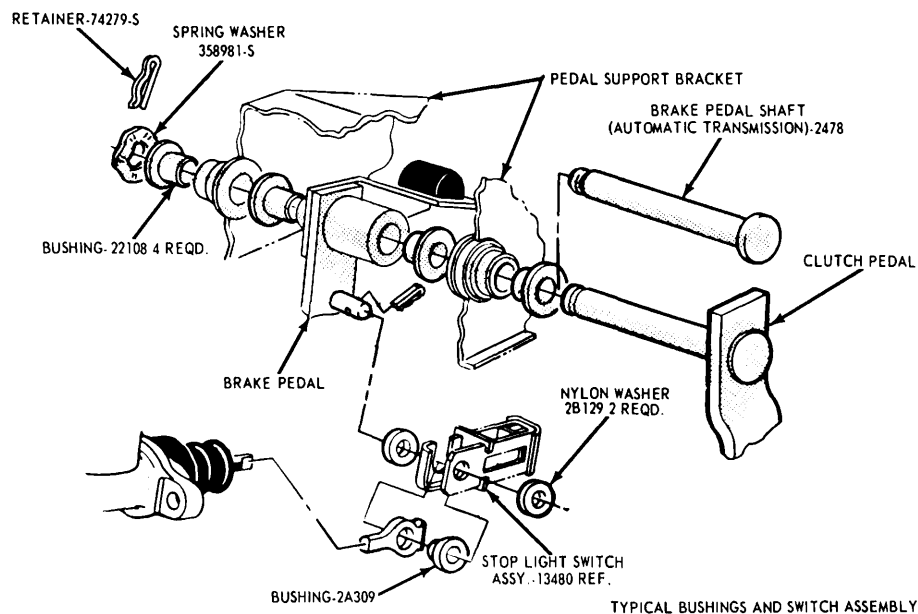
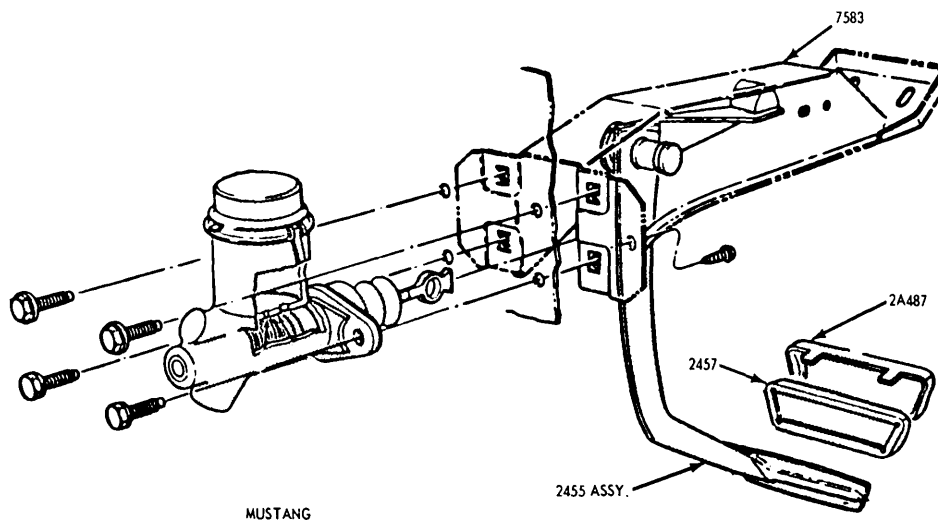
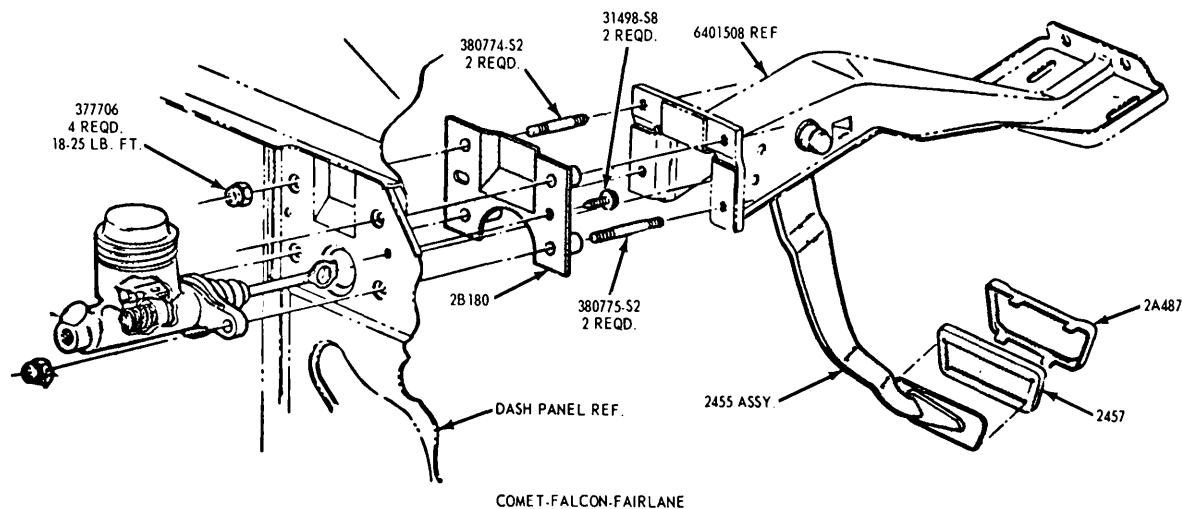


FIG. 27—Master Cylinder, Brake Pedal and Related Parts—Falcon, Fairlane, Comet and Mustang

On a Mustang, remove the pedal bumper and bracket assembly from the pedal support bracket to relieve the tension on the assist spring, and then remove the spring.

2. Disconnect the clutch pedal-to-equalizer rod at the clutch pedal by removing the hairpin type retainer and bushing.

3. Disconnect the stop light switch wires at the connector.

4. Remove the switch retainer, and slide the stop light switch off the brake pedal pin just far enough for the switch outer hole to clear the pin. Then lower the switch away from the pin.

5. Slide the master cylinder push rod and the nylon washers and bushing off from the brake pedal pin (Fig. 27).

6. Remove the self-locking pin and washer from the clutch and brake pedal shaft, then remove the clutch pedal and shaft assembly, the brake pedal assembly, and the bushings from the pedal support bracket (Fig. 27).

INSTALLATION

1. Apply a coating of SAE 10 engine oil to the bushings and locate all bushings in their proper places on the clutch and brake pedal assemblies.

2. Position the brake pedal to the support bracket, then install the clutch pedal and shaft assembly through the support bracket and brake pedal assembly. Install the spring washer and retainer. (Fig. 27).

3. Install the split bushing in the spring groove of the clutch pedal. Hook the clutch assist spring to the groove and to the spring retainer.

4. Connect the clutch pedal to equalizer rod to the clutch pedal assembly with the bushing and the hairpin retainer. Apply SAE 10 engine oil to the bushing.

5. Install the inner nylon washer, the master cylinder push rod, and the bushing on the brake pedal pin. Position the switch so that it straddles the push rod with the switch slot on the pedal pin and the switch outer hole just clearing the pin. Slide the switch completely onto the pin, and install the outer nylon washer as shown in Fig. 27. Secure these parts to the pin with the self-locking pin.

6. Connect the stop light switch wires to the connector, and install the wires to the retaining clip.

BRAKE PEDAL— AUTOMATIC TRANSMISSION

REMOVAL

1. Disconnect the stop light switch wires at the connector.

2. Remove the self-locking pin and slide the stop light switch off the brake pedal pin **just far enough for the switch outer hole to clear the pin**. Then lower the switch away from the pin. Slide the master cylinder push rod and the nylon washers and bushing off from the brake pedal pin (Fig. 27).

3. Remove the self-locking pin and washer from the brake pedal shaft, then remove the shaft, the brake pedal assembly and the bushings from the pedal support bracket.

INSTALLATION

1. Apply a coating of SAE10 engine oil to the bushings and locate all the bushings in their proper places on the pedal assembly and pedal support bracket. (Fig. 27).

2. Position the brake pedal assembly to the support bracket, then install the pedal shaft through the support bracket and brake pedal assembly. Install the washer and self-locking pin.

3. Install the inner nylon washer, the master cylinder push rod, and the bushing on the brake pedal pin. Position the switch so that it straddles the push rod with the switch slot on the pedal pin, and the switch outer hole just clearing the pin. Slide the switch completely onto the pin, and install the outer nylon washer as shown in Fig. 27. Secure these parts to the pin with the self-locking pin.

4. Connect the stop light switch wires to the connector, and install the wires in the retaining clip.

PARKING BRAKE HANDLE— MUSTANG

REMOVAL

1. Remove the two screws that hold the handle bracket on the instrument panel. Remove the attaching screws and the insulator bracket (Fig. 28).

2. Remove the two nuts and lock washers that secure the control to the dash panel.

3. Remove the clevis pin that secures the pulley to the control handle assembly.

4. Disengage the locking rod and remove the ball on the cable from the slot in the control assembly.

INSTALLATION

1. Disengage the locking rod and connect the ball end of the cable to the slot on the control assembly.

2. Assemble the pulley to the control handle and the clevis pin.

3. Position the assembly against the dash panel and instrument panel. Secure the assembly to the instrument panel with the two screws.

4. Install the insulator bracket with the attaching screws (Fig. 28).

5. Working from under the left front fender, install the two lock washers and attaching nuts.

PARKING BRAKE CONTROL ASSEMBLY—FAIRLANE, FALCON, COMET

REMOVAL

1. Make sure the parking brake is completely released. Remove the 3 screws (Fig. 29) that attach the control assembly to the cowl inner side panel.

2. Pull the control away from the cowl panel and remove the hairpin lock retaining the parking brake cable housing to the control assembly.

3. Disconnect the ball-end of the parking brake cable from the control and remove the control assembly.

INSTALLATION

1. Connect the ball-end of the parking brake cable to the control.

2. Install the hair-pin cable housing retainer.

3. Position the control assembly to the cowl side panel and install the attaching screws. Torque to 12-20 ft-lb.

PARKING BRAKE EQUALIZER TO HANDLE CABLE— MUSTANG

REMOVAL

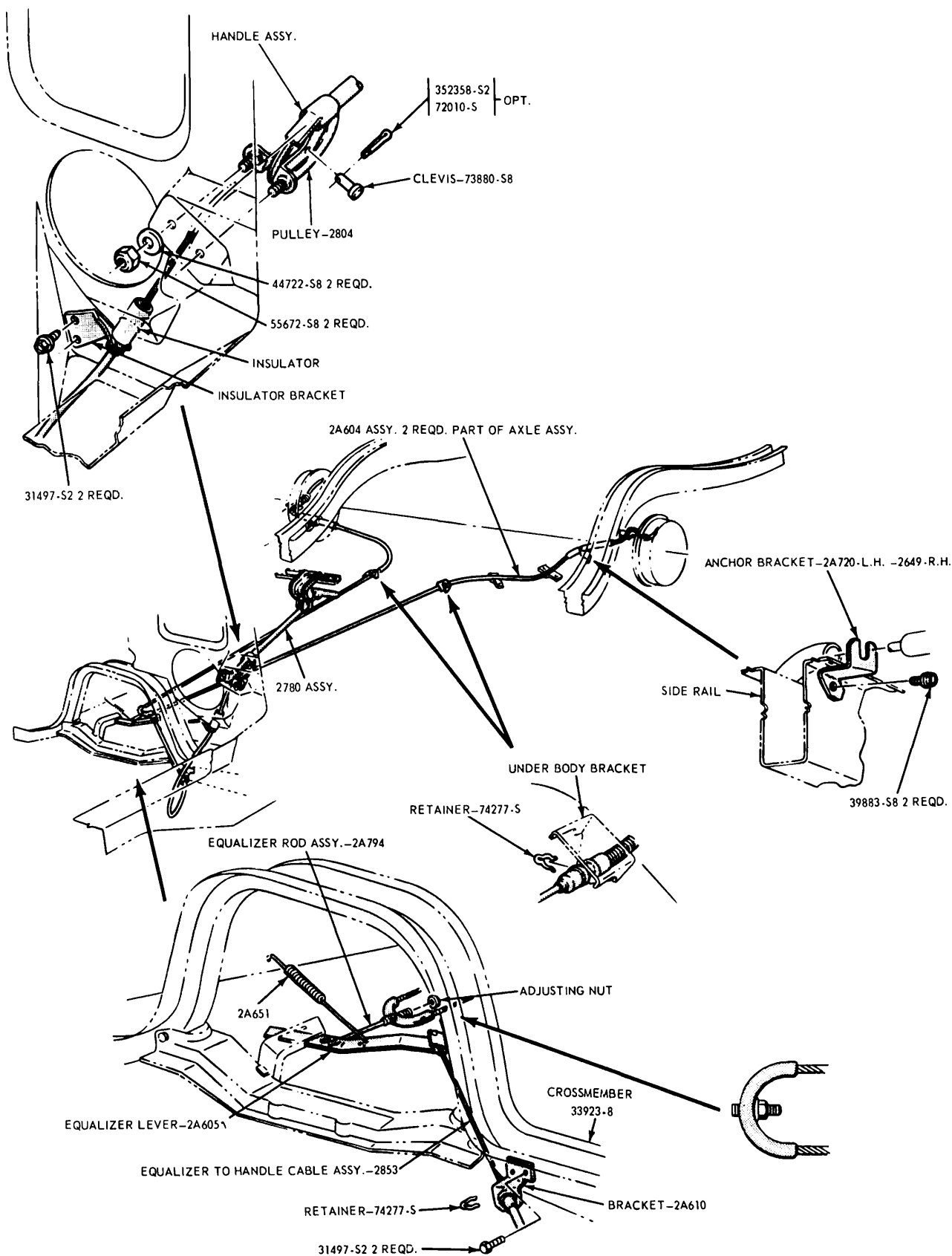
1. Remove the attaching screws and insulator-bracket from the dash panel (Fig. 28).

2. Remove the parking brake handle assembly and disengage the cable from the handle as outlined in this section.

3. Pull the cable down through the hole in the dash panel.

4. Remove the hairpin retainer, and disengage the cable and housing from the bracket on the crossmember.

5. Disconnect the cable ball from the equalizer lever, and remove the cable from the car.



H1404-B

FIG. 28—Parking Brake Linkage—Mustang

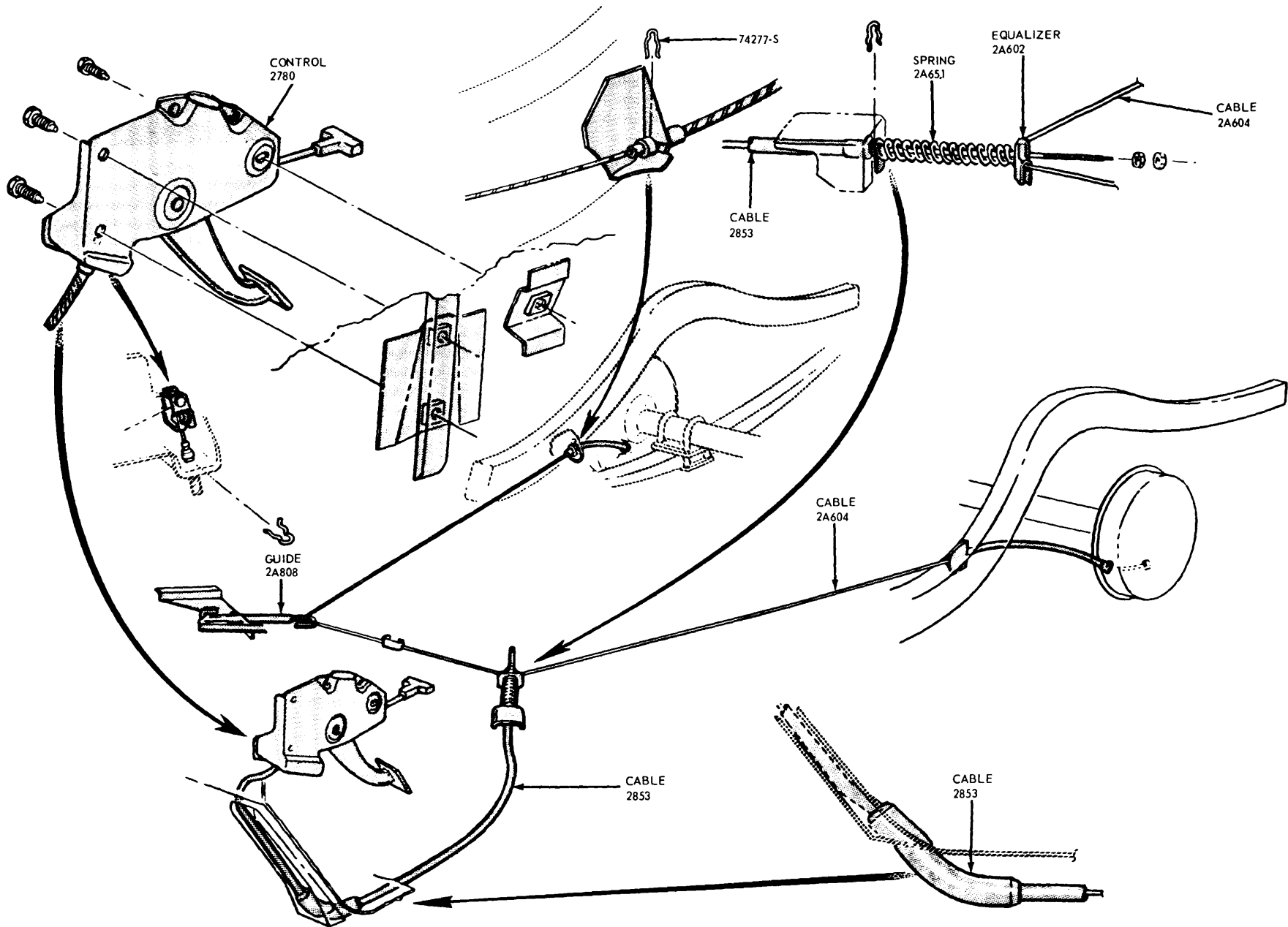


FIG. 29—Parking Brake Linkage—Comet-Fairlane-Falcon

H 1409-A

INSTALLATION

1. Connect the cable lower ball to the equalizer lever (Fig. 28).

2. Engage the cable and housing to the bracket on the crossmember and secure with the hairpin retainer.

3. Push the upper end of the cable up through the hole in the dash panel.

4. Connect the cable upper ball to the parking brake handle, and install the handle assembly as outlined in this section.

5. Install the insulator bracket to the dash panel and secure with the two attaching screws.

PARKING BRAKE EQUALIZER TO PEDAL CABLE—FAIRLANE, COMET, FALCON**REMOVAL**

1. Remove the two nuts that attach the cable to the equalizer and remove the equalizer and spring (Fig. 29).

2. Remove the hair pin retainer holding the cable housing to the frame bracket at the equalizer.

3. Working from inside the car, remove the hair pin retainer holding the cable housing to the parking brake control assembly.

4. Disconnect the ball end of the cable from the parking brake control arm.

5. Remove the left front cowl side trim panel, roll back the floor mat and pull the cable assembly from the floor.

INSTALLATION

1. Position the cable housing through the opening in the floor and pull the grommet into position from under the car.

2. Install the ball-end of the cable in the parking brake control.

3. Install the hair pin retainer to lock the cable housing in position on the parking brake control.

4. Working from under the car, position the cable housing in the frame bracket and install the retainer.

5. Position the spring and equalizer on the cable and install the adjusting nut.

6. Apply the parking brake one notch from the released position.

7. Tighten the adjusting nut until a light to moderate drag is felt when the rear wheels are rotated.

8. Tighten the check nut securely.

9. Fully release the parking brake. No drag should be felt when the wheels are rotated.

10. Position the floor mat and install the cowl side trim panel.

PARKING BRAKE EQUALIZER TO REAR WHEEL CABLE

A single cable passing through the equalizer and cable guides connects both parking brake assemblies on Comet and Fairlane station wagons and on Falcon and Mustang passenger cars. Separate cables for each parking brake are used on Comet and Fairlane passenger cars.

FAIRLANE AND COMET PASSENGER CARS**REMOVAL**

1. Remove the equalizer lock nut and adjusting nut, equalizer and spring.

2. With the cables slack, disconnect the ball-ends from the connector (Fig. 29).

3. Remove the cable from the guide, if required.

4. Remove the hair pin lock retaining the cable housing to the side rail bracket.

5. Remove the wheel and tire and the rear brake drum as outlined in Section 2.

6. Disconnect the rear end of the cable from the parking brake lever on the brake shoe. Disengage the cable housing retaining grommet from the carrier plate and withdraw the cable and housing from the inboard side of the carrier plate.

7. Slide the cable and housing out of the side rail bracket.

INSTALLATION

1. Insert the rear end of the cable through the side rail bracket and pull the cable and housing into position.

2. Insert the rear end of the cable and housing through the hole in the carrier plate from the inboard side.

3. Connect the cable to the parking brake lever on the brake shoe, and install the cable housing retaining the grommet in the carrier plate.

4. Position the cable housing in the side rail bracket and install the hair pin type retainer.

5. Position the cable in the guide and install the connector, thus hooking the two cables together.

6. Insert the cable into the equalizer and install the equalizer, spring, adjusting nut and lock nut to the front, parking brake control, cable.

7. Adjust the parking brake as directed in Part 2-1, Section 2.

FAIRLANE AND COMET STATION WAGONS AND FALCON PASSENGER CAR**REMOVAL AND INSTALLATION**

1. Generally follow the procedure given above, omitting separation of the cables, since the hand brake cable supplied for these models is in one piece. Removal and installation of both rear wheels, tires and drums will also be required.

MUSTANG**REMOVAL**

1. Remove the adjusting lock nut and cable yoke from the equalizer rod (Fig. 28), along with the rear cable assembly.

2. Remove the hairpin retainers and disengage the cable rear housings from the brackets on the underbody.

3. If an 8-cylinder model, remove the single bolt and clamp retaining the cable housing to the underbody immediately behind the cable housing bracket.

4. Remove the two bolts and clamp securing the cable housing to the underbody on all models.

5. Remove the wheels and tires and the rear brake drums as outlined in Section 2.

6. Disconnect the rear ends of the cable from the parking brake levers on the brake shoes. Disengage the cable housing retaining grommets from the carrier plates and withdraw the cable ends and housings from the inboard sides of the carrier plates.

7. Slide the cable housings out of the main side brackets and remove the cable assembly from the car.

INSTALLATION

1. Insert both cable ends and housings through the holes in the carrier plates from the inboard side.

2. Connect the cable ends to the parking brake levers on the brake shoes and engage the cable housing retaining grommets to the carrier plate.

3. Position the cable housings in the main side brackets and install the hairpin retainers.

4. Install the front clamp with one bolt, if an 8-cylinder model.

5. Install the rear clamp with two bolts.

6. Position the cable yoke and cable on the equalizer rod and install the adjusting locknut.

7. Adjust the parking brake as directed in Part 2-1, Section 2.

4 MAJOR REPAIR OPERATIONS

BRAKE DRUM REFINISHING

The 6-cylinder Falcon and Mustang models are equipped with 9-inch brake drums. All other models are equipped with 10-inch drums.

Minor scores on a brake drum can be removed with a fine emery cloth. A drum that is excessively scored or shows a total indicator runout of over 0.007 inch should be turned down. Remove only enough stock to eliminate the scores and true up the drum. The refinished diameter must not exceed 0.060 inch oversize.

If the drum diameter is less than 0.030 inch oversize (9.030 inches 6-cylinder Falcon or Mustang, or 10.030 inches on other models after refinishing, standard lining may be installed. If the drum diameter is more than 9.030 inches or 10.030 inches, oversize linings must be installed.

After a drum is turned down, wipe the refinished surface with a cloth soaked in clean denatured alcohol. If one drum is turned down, the opposite drum on the same axle should also be cut down to the same size.

BRAKE SHOE RELINING

Brake linings that are worn to within $\frac{1}{32}$ inch of any rivet or have been saturated with grease or oil should be replaced. Failure to replace worn linings will result in a scored drum. **When it is necessary to replace linings, they must also be replaced on the wheel on the opposite side of the car.**

Inspect brake shoes for distortion, cracks, or looseness. If this condition exists, the shoe should be discarded. **Do not repair a defective brake shoe.**

1. Wash the brake shoes thoroughly in a clean solvent. Remove all burrs or rough spots from the shoes.

2. Check the inside diameter of the brake drum. If the diameter is less than 9.030 or 10.030 inches, standard lining may be installed. If the diameter is 9.030 to 9.060 or 10.030 to 10.060 inches, oversize lining should be installed.

3. Position the new lining on the shoe. Starting in the center, insert and secure the rivets working alternately towards each end. Install all parts supplied in the kit. **Genuine replacement linings are ground and no further grinding is required.**

4. Check the clearance between the shoe and lining. The lining must seat tightly against the shoe with not more than .005 inch clearance between any two rivets.

MASTER CYLINDER— EXCEPT CARS WITH DISC BRAKES

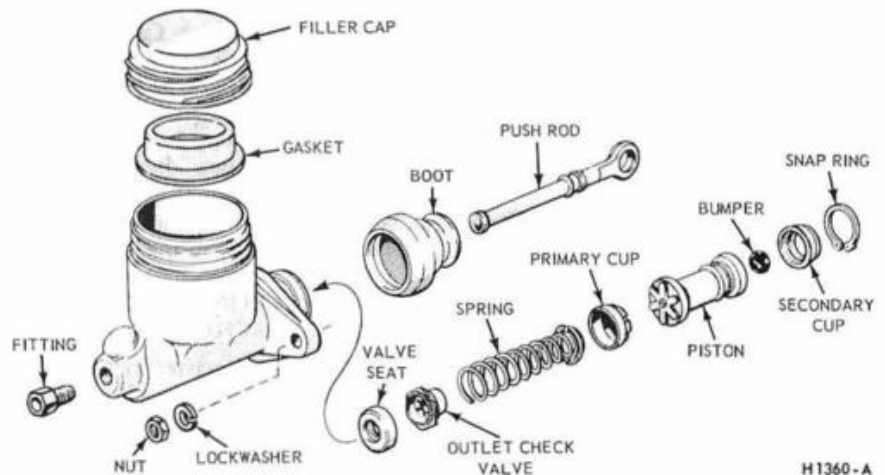
DISASSEMBLY

1. Clean the outside of the cylinder, and remove the filler cap and gasket. Pour out any brake fluid that may remain in the cylinder or reservoir.

2. Remove the snap ring from the bore at the rear of the cylinder with tool 33621 (Fig. 32).

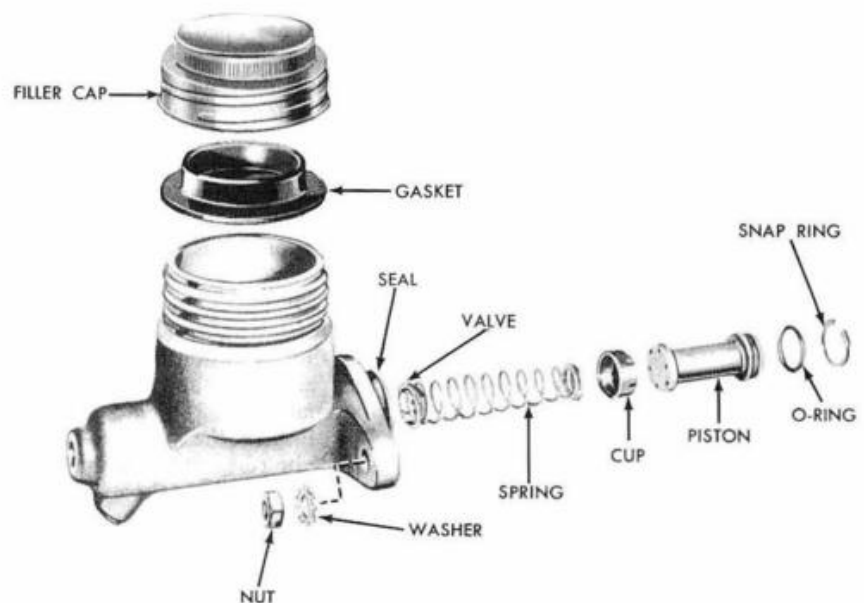
3. When disassembling a master cylinder used with the standard brake system, remove the piston assembly, cup, spring, check valve, and valve seat from the cylinder bore (Fig. 30).

When disassembling a master cylinder used with a booster, remove the piston assembly, cup, and the spring and check valve assembly from the cylinder bore. Remove the O-ring from the piston (Fig. 31).



H1360-A

FIG. 30—Master Cylinder With Standard Brake System



H1279-B

FIG. 31—Master Cylinder With Booster

ASSEMBLY

1. Dip all parts except the master cylinder body in clean Rotunda 103-A heavy-duty brake fluid.

2. Install the brake line fitting(s) on the cylinder and tighten them securely.

3. When assembling a master cylinder used with the standard brake system, install the valve seat, check valve, spring, cup, and piston assembly in the cylinder bore (Fig. 30).

When assembling a master cylinder used with a booster, install the O-ring on the piston. Install the spring and check valve assembly, cup, and piston in the cylinder bore (Fig. 31).

4. Install the snap-ring in the back of the bore (Fig. 32).

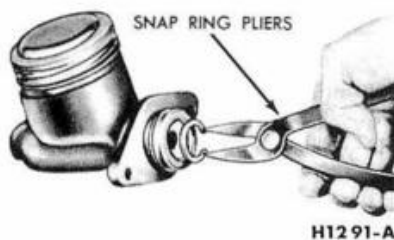


FIG. 32—Removing Snap Ring From Master Cylinder—Typical

MASTER CYLINDER—
WITH DISC BRAKES

DISASSEMBLY

1. Press in against the piston while removing the snap ring retainer, and then remove the piston assembly, cup, spring, residual check valve and seat. (Fig. 33).

2. Remove secondary cup from the piston. Remove the cover by releasing the spring clips on the sides, and remove the diaphragm.

ASSEMBLY

1. Clamp the master cylinder housing in a vise. Dip the hydraulic cylinder parts in brake fluid and assemble the check valve seal, residual check valve, and piston return spring in the bore of the cylinder in the order shown in Fig. 33.

2. If the secondary piston cup was removed from the piston, dip the cup in brake fluid and assemble the cup in the groove of the piston with the lip of the cup as shown.

3. Place the primary cup on the end of the piston assembly, and guide it into the cylinder bore.

4. Press in against the piston to compress the spring while seating

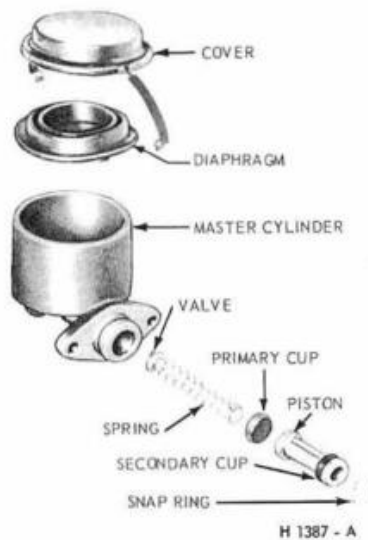


FIG. 33—Master Cylinder Used With Disc Brakes—Disassembled

the snap ring in the groove in the cylinder bore.

5. Install a new diaphragm (only if the old one is defective) in the cover, and attach the cover to the cylinder with the spring clips.

MASTER CYLINDER CLEANING
AND INSPECTION

1. Clean all master cylinder parts in clean denatured alcohol, and inspect the parts for wear or damage, replacing them as required. When using a master cylinder repair kit, install all of the parts supplied.

2. Check the ports and vents in the master cylinder to make sure that all are open and free of foreign matter. Check the condition of the diaphragm type gasket.

3. A leaf-type valve is riveted to the front end of the piston in a master cylinder used with the standard brake system (Fig. 30). If this valve is loose or has moved so that the piston ports are open, replace the piston.

When inspecting a master cylinder used with a booster, check the ports in the piston to make sure that they are open and free of foreign material (Fig. 31).

4. Inspect the cylinder walls for scores or rust, and recondition them if necessary. Hone the cylinder walls no more than necessary (0.003 inch maximum). Oversize pistons and cups are not available for excessively honed cylinders.

5. Remove any burrs or loose metal that may have resulted from the honing operation, and clean the cylinder with denatured alcohol.

DISC BRAKE CALIPER

DISASSEMBLY

Do not remove the bridge bolts that hold the two halves of the caliper together. The two caliper housings are shown separated in Fig. 35 for illustration purposes only.

1. Remove the caliper assembly from the car as outlined in Section 2.

2. Remove the two retaining bolts and the caliper splash shield Fig. 35.

3. Remove the two shoe and lining assemblies.

4. Remove the flexible brake hose from the caliper.

5. Remove the external transfer tube.

6. Remove the four dust boots from the caliper housings and piston grooves.

7. Clamp the caliper in a vise and secure it by the mounting flanges on the inboard housing (Fig. 34).

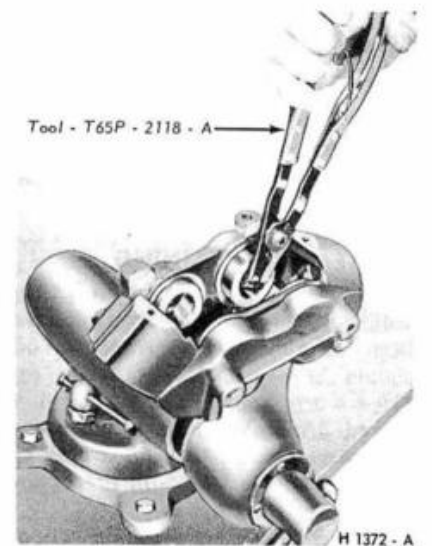


FIG. 34—Removing or Installing Pistons

8. Remove the four pistons from the cylinder bores with the special tool shown in Fig. 34. To prevent cocking with consequent damage to the piston or bore, rotate the piston with the tool while pulling it outward at the same time. Be careful to avoid scratching or damaging the outside diameter surface or dust boot retaining groove of the piston. Such damage causes poor sealing.

If a piston is so completely seized in the cylinder bore that it can not be removed with the special tool, force the cylinder out of the bore by positioning two screwdrivers in the piston dust boot retaining groove and prying outward. To prevent

cocking, tap the end of the piston lightly around the circumference with a hammer, while the prying force is being applied. Be careful to avoid damaging the dust boot retainer in the caliper housing (Fig. 35). If this method of removal is used, the pistons must be replaced.

If the caliper dust boot retainer or retaining groove is damaged or scratched, pry the retainer out of the caliper housing with screwdrivers.

9. Remove the rubber piston seals from the grooves in the cylinder bores by carefully inserting the point of a small knife or other pointed instrument under the seal and raising the seal up far enough to be pulled out with the fingers.

CLEANING AND INSPECTION

Clean all metal parts with alcohol or a suitable solvent (Fig. 35). Use clean, dry compressed air to clean out and dry the grooves and passageways. Be sure that the caliper bore and component parts are completely free of any foreign material.

Check the cylinder bores and pistons for damage or excessive wear. Replace the piston if it is pitted, scored, or the chrome plating is worn

off. Check the caliper dust boot retainer for wear or damage.

ASSEMBLY

1. Clamp the caliper in a vise and secure it by the mounting flange on the inboard housing.

2. If a new caliper dust boot retainer is to be installed, thoroughly clean the contact area on the caliper housing and apply Loctite Sealant, Grade H to the retainer surface that seats in the housing. Install the retainer in the caliper housing.

3. Apply a film of clean brake fluid to new caliper piston seals and install them in the grooves of the cylinder bore. The seal should be positioned at one area in the groove and gently worked around. **Do not use the old seals.**

4. Coat the outside diameter of the pistons with brake fluid and install them in the cylinder bores so that the open end of the piston and the boot retaining groove face out of the bore. To avoid cocking, locate the piston squarely in the bore and apply a slow, steady pressure. If a piston will not easily go all the way into the bore, remove it and thoroughly inspect the cylinder bore, the

piston seal and the installation of the seal. If the piston still will not go in with bore in good condition and the piston seal properly installed, use the tool shown in Fig. 34. Rotate the piston with the tool while pushing it inward at the same time.

5. Carefully install four new dust boots on the caliper housings and pistons. Be sure that each boot is fully seated in the groove of its respective caliper housing and piston (Fig. 35). **Do not use the old dust boots.**

6. Install the external transfer tube.

7. Install the flexible brake hose to the caliper.

8. Install the caliper assembly on the spindle, and install the shoe and lining assemblies and the splash shield as outlined in Section 2.

9. Check the caliper for fluid leaks under maximum pedal pressures. **Do not move the car until a firm brake pedal is obtained.**

DISASSEMBLY OF BOOSTER—BENDIX TYPE

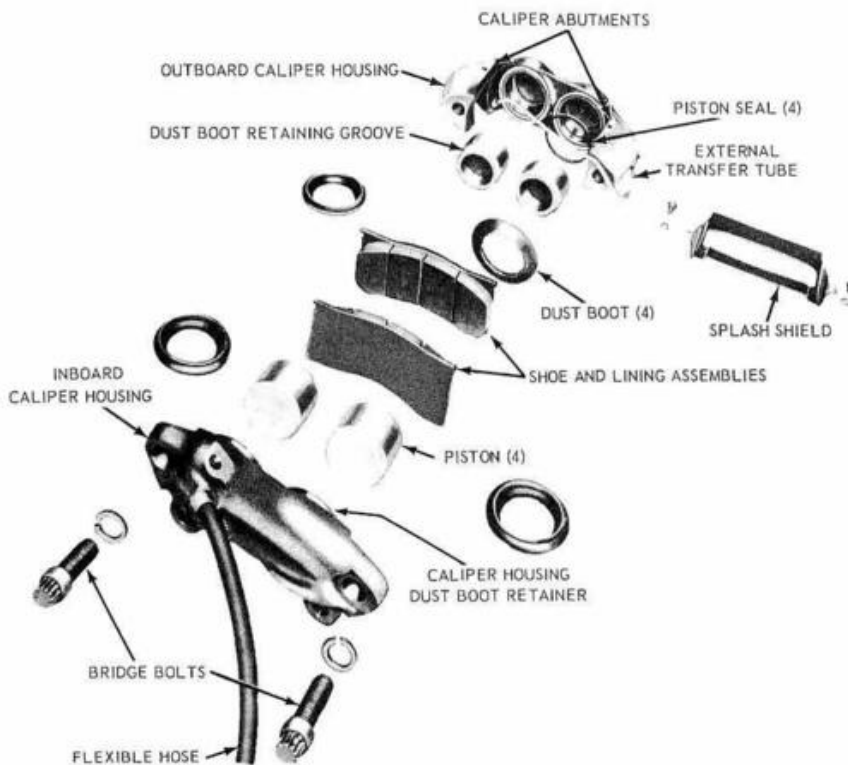
1. Remove the speed nuts that attach the mounting plate to the rear shell and remove the plate.

On a Mustang, remove the retaining nuts and lockwashers and remove the mounting brackets from the rear shell (Fig. 40.)

2. Pull the hydraulic push rod and front seal (Fig. 36) from the front shell.

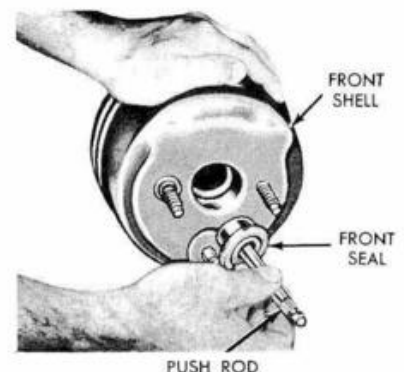
3. Scribe an index mark across the front and rear shells.

4. Place the booster in a vise as shown in Fig. 37. Press downward on the rear shell and at the same time, turn it counterclockwise with a flat bar to release it from the front shell. Release the pressure on the rear shell slowly to prevent the dia-



H1367-A

FIG. 35—Caliper Assembly—Disassembled



H1334-A

FIG. 36—Removing Front Seal and Push Rod—Bendix Booster

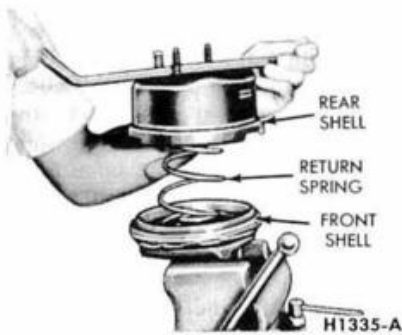


FIG. 37—Separating Booster Shells—Bendix Booster

phragm plate return spring from flying out.

5. Separate the two shells and remove the return spring.

6. Withdraw the diaphragm plate and diaphragm from the rear shell. Remove the dust shield.

7. Remove the diaphragm from the diaphragm plate as shown in Fig. 38.

8. Pry the filter retainer off the diaphragm plate being careful not to chip or damage the plate.

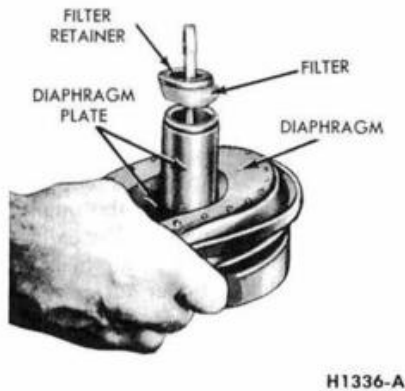


FIG. 38—Removing Diaphragm—Bendix Booster

9. Hold the diaphragm plate so that the valve retainer is facing downward. Press the valve push rod inward to release the tension on the retainer and allow it to drop out of the plate (Fig. 39).

10. Withdraw the valve and rod from the plate.

11. Press the reaction disc out of the diaphragm plate.

12. Drive the seal out of the rear

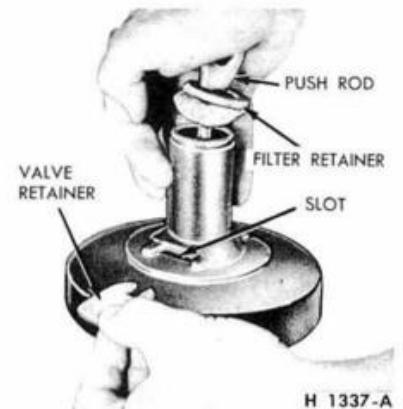


FIG. 39—Removing or Installing Valve Retainer—Bendix Booster

shell with a punch or screwdriver. (Fig. 40). Discard the seal.

13. Working from the inside of the front shell, cut the bead off the check valve grommet. Remove the check valve.

ASSEMBLY OF BOOSTER—BENDIX-TYPE

1. Place the rear shell on two

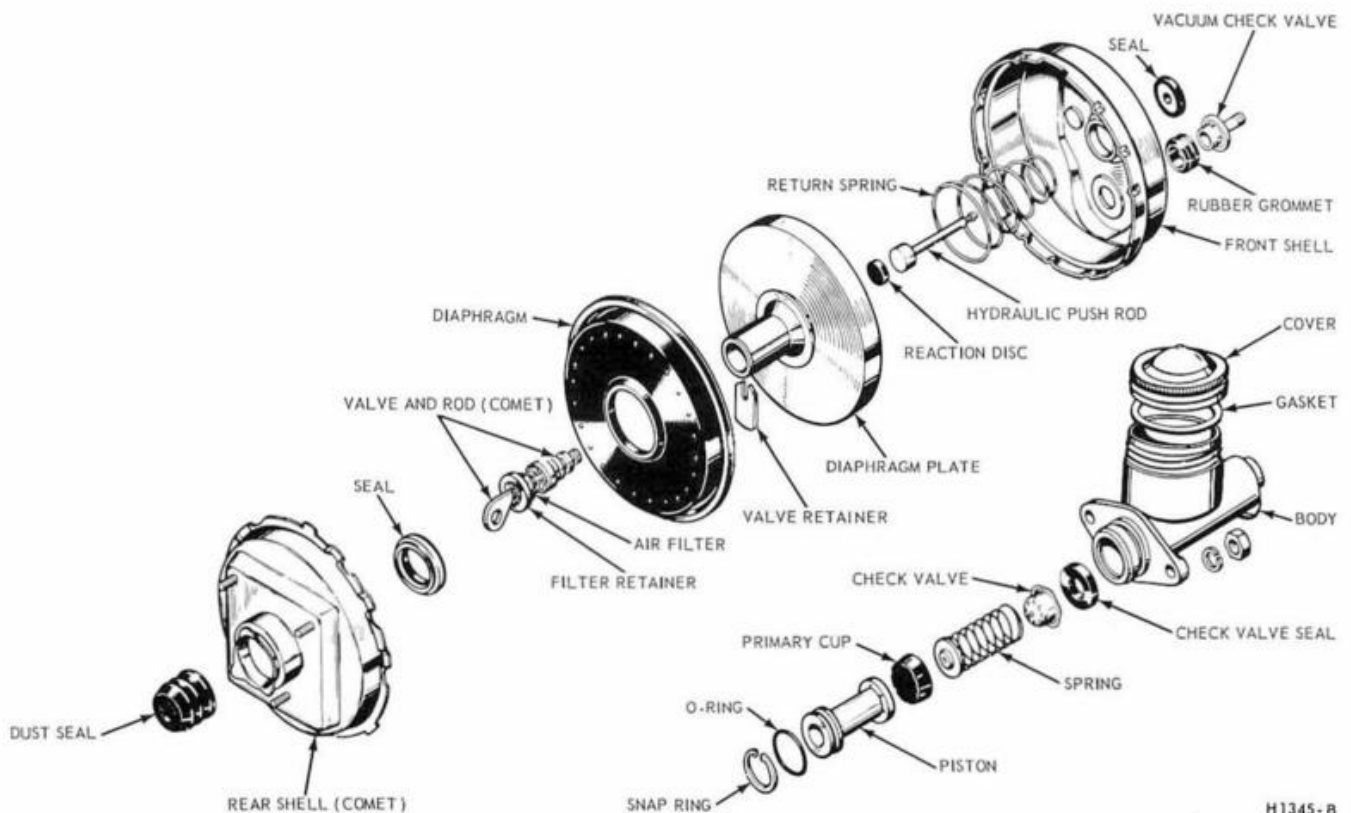


FIG. 40—Vacuum Booster Disassembled—Booster

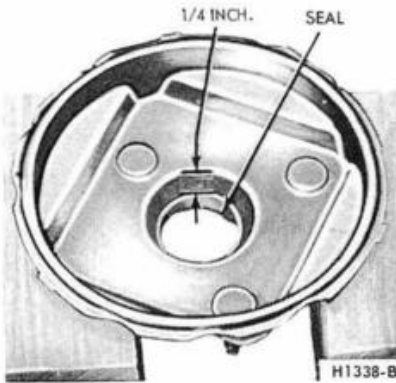


FIG. 41—Installing Rear Shell Seal—Bendix Booster

wood blocks as shown in Fig. 41. Press a new seal, plastic side first, into the recess on the inside of the shell to a depth of 1/4 inch.

2. Dip a new check valve grommet (Fig. 40) in alcohol and install it in the front shell making sure that the beveled edge is toward the inside. Make sure that the grommet is seated. Dip the shoulder of the check valve in alcohol and install it in the grommet. Press the check valve into the grommet until the flange contacts the grommet.

3. Apply silicone grease to the outer surface of the diaphragm plate hub of the diaphragm plate. Push surfaces of the valve.

4. Insert the valve and rod into the hub of the diaphragm plate. Push the rod inward until the retaining groove is aligned with the slot, and then slide the retainer into the groove (Fig. 39).

5. Tuck the filter into place in the plate hub. Press the filter retainer onto the hub being careful not to chip or damage the plastic. (Fig. 38).

6. Install the diaphragm on the diaphragm plate, making sure that the diaphragm lip is tucked in all around the recess between the hub and the plate (Fig. 38).

7. Place the rear shell in a vise. Apply silicone lubricant generously to the top outer flange of the shell. Apply silicone grease to the seal in the rear shell.

8. Carefully guide the valve rod and diaphragm plate hub through the seal in the rear shell.

9. Center the large end of the return spring on the diaphragm plate.

10. Align the index mark on the front shell with the one on the rear shell. Place a flat bar on the front

shell and compress the spring until the tangs on the rear shell contact the notched sections of the front shell, and then rotate it clockwise to lock it in place.

11. Apply lubricant sparingly to the stem of the hydraulic push rod keeping it away from the adjusting screw area. Apply silicone grease liberally to the piston area of the push rod and to the reaction disc.

12. Center the reaction disc on the push rod piston. Guide the disc and push rod into the base of the diaphragm plate, and press the rod inward until the disc is bottomed (Fig. 42).

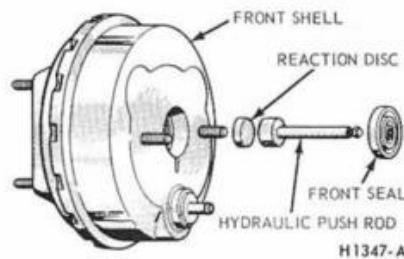


FIG. 42—Installing Reaction Disc, Push Rod and Front Seal—Bendix Booster

13. Press a new front seal into the front shell until it bottoms in the recess (Fig. 42).

14. Install a new dust seal over the push rod and onto the rear shell.

15. On a Comet, position the mounting plate on the rear shell and secure it in place with speed nuts.

On a Mustang, position the two mounting brackets on the rear shell studs, and install the retaining nuts and lock washers (Fig. 40).

DISASSEMBLY OF BOOSTER—MIDLAND-ROSS TYPE

REMOVAL OF EXTERNAL PARTS

1. Remove the two attaching nuts and lockwashers, and separate the master cylinder from the booster body.

2. Remove the air filter assembly from the booster body. Separate the cover and retainer, and remove the air filter (Fig. 49).

3. Remove the vacuum manifold and check valve assembly and the rubber grommet from the booster body (Fig. 49).

4. Disconnect the valve operating rod from the lever assembly by removing the retainer clip and connecting pin (Fig. 49).

5. Disconnect the lever assembly from the end plate brackets by removing the retainer clip and pivot pin.

6. Disconnect the push rod link from the lever assembly by removing the retainer and connecting pin.

7. Remove the attaching nuts, and disassemble the brackets from the end plate.

8. Remove the rubber boot from the valve operating rod.

SEPARATION OF MAJOR COMPONENTS

1. Scribe a line across the booster body, clamp band, and end plate.

2. Remove the clamp band screw and nut, and separate the clamp band, booster body, and end plate (Fig. 49).

3. Push the bellows assembly into the vacuum chamber (Fig. 43), and separate the bellows, control valve, diaphragm assembly, and end plate from the booster body.



FIG. 43—Bellows to Booster Body Engagement—Midland-Ross

4. Push the valve, tail stock, and diaphragm assembly out of the end plate.

5. Remove the rear seal from the end plate (Fig. 44).

DISASSEMBLY OF BELLOW'S, PUSH ROD AND VALVE ASSEMBLY FROM DIAPHRAGM

1. Remove the large bellows clamp and separate the bellows, bellows support rings, and bellows protector from the diaphragm and valve assembly (Fig. 45).

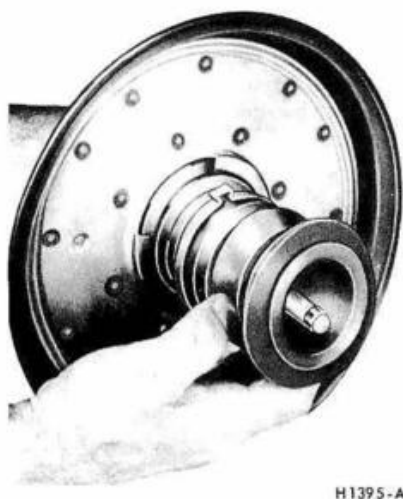
2. Remove the two support rings and the protector from the bellows.

3. Remove the push rod assembly and the reaction lever assembly from the control hub (Fig. 46).



H1363-A

FIG. 44—Removing or Installing Rear Seal to End Plate—Midland-Ross



H1395-A

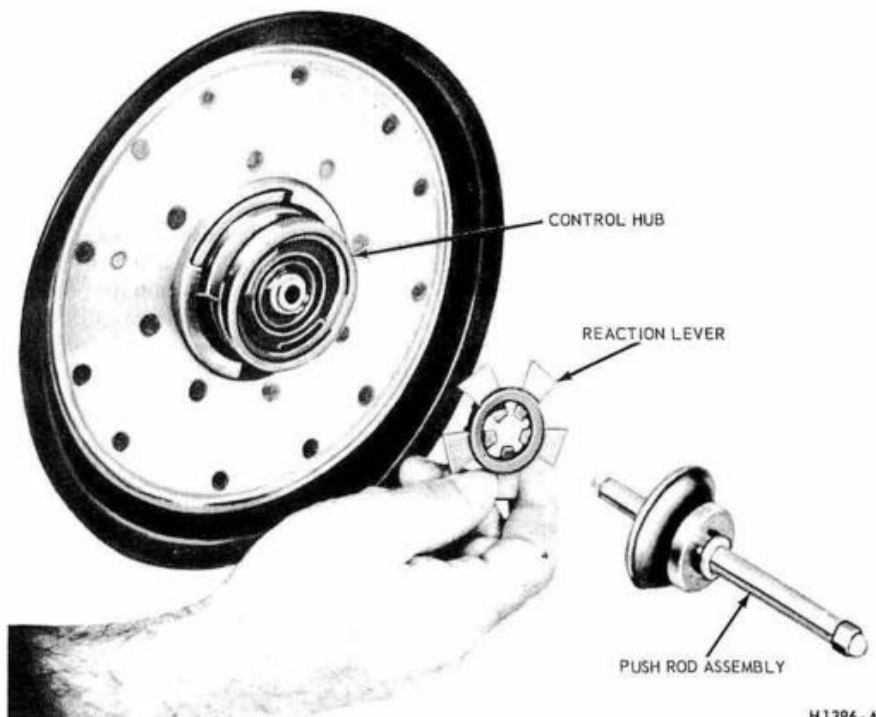
FIG. 45—Removing or Installing the Bellows Assembly—Midland-Ross

4. Remove the two plastic guides from the push rod. Remove the reaction cone retainer and the cone from the push rod (Fig. 46).

5. Remove the valve operating rod from the plunger. To remove, hold the rod firmly and force the plunger off the rod breaking the plastic retainer. If the plunger is to be used again, remove all the broken pieces of the plastic retainer from the groove in the plunger.

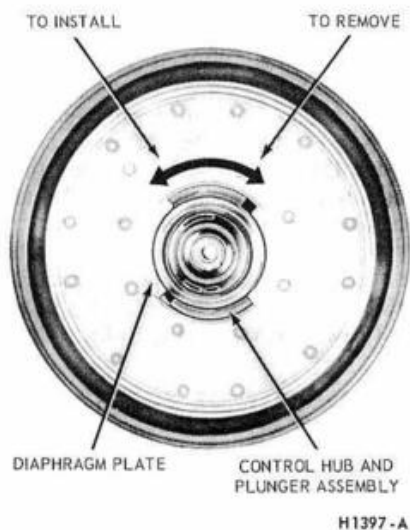
6. Turn the control hub and plunger assembly clockwise to separate it from the diaphragm, and then remove the tail stock and O-ring from the diaphragm (Fig. 47).

7. Remove the retainer that holds the plunger to the control hub (Fig. 48). Separate the control hub and plunger assembly. It may be necessary to file the burr from the pro-



H1396-A

FIG. 46—Push Rod Assembly, Reaction Lever and Control Hub—Midland-Ross



H1397-A

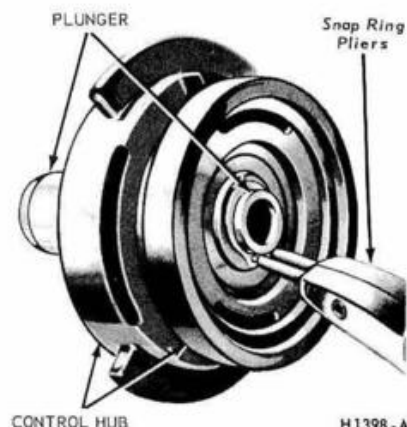
FIG. 47—Removing or Installing Control Hub and Plunger Assembly—Midland-Ross

truding end of the plunger before it can be separated from the control hub.

DISASSEMBLY OF CONTROL VALVE PLUNGER

1. Compress the spring towards the rubber valve and remove the spring retainer.

2. Remove the spring, valve plate,



H1398-A

FIG. 48—Removing or Installing Plunger to Control Hub Retainer—Midland-Ross

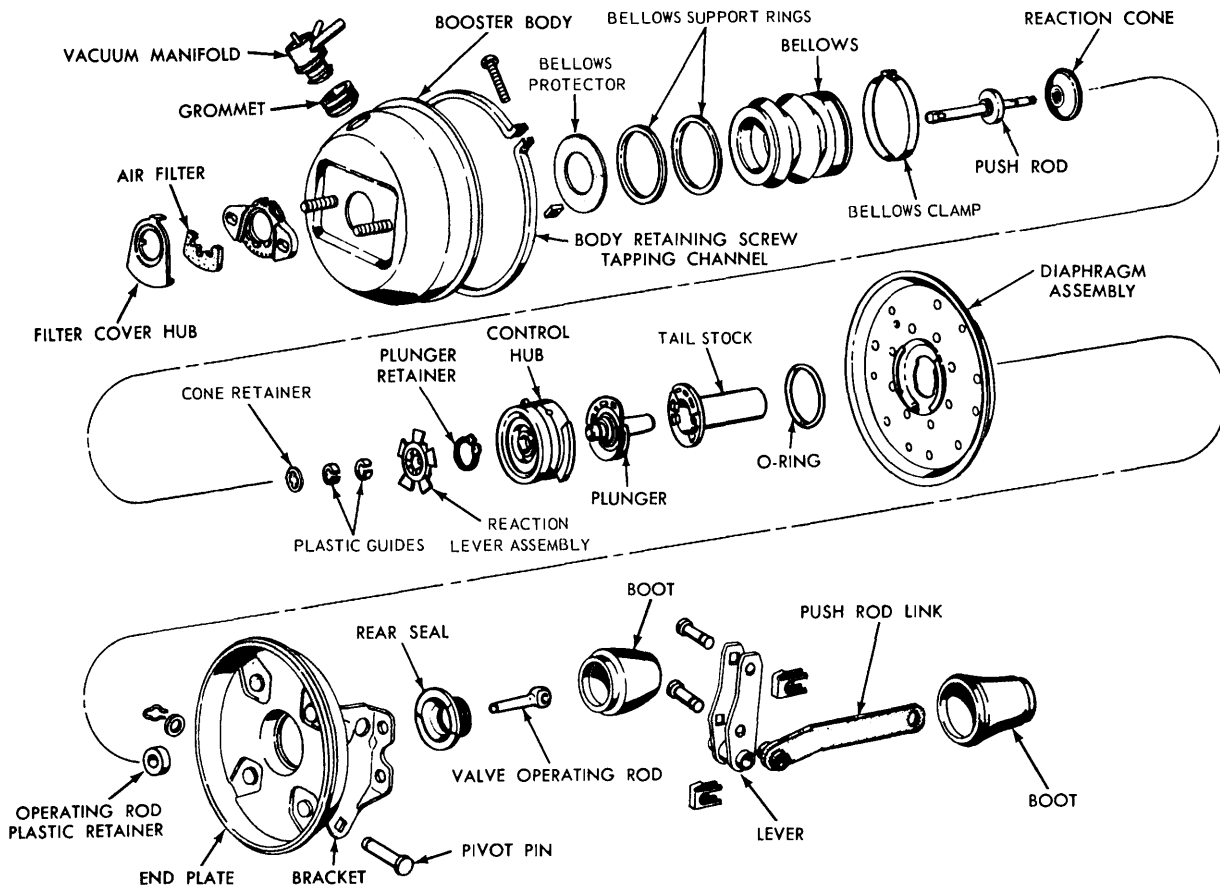
rubber valve, O-ring, and fiber washer from the plunger (Fig. 49).

ASSEMBLY OF BOOSTER—MIDLAND-ROSS TYPE

CONTROL VALVE PLUNGER

1. Assemble the rubber valve, valve plate, spring, O-ring, and fiber washer on the plunger.

2. Compress the spring towards the rubber valve and assemble the spring retainer on the plunger with the flange towards the spring (Fig. 49).



H1362-B

FIG. 49—Booster Unit Disassembled—Midland-Ross

ASSEMBLY OF VALVE ASSEMBLY, PUSH ROD, AND BELLOWS TO DIAPHRAGM

1. Assemble the control valve plunger assembly into the control hub so that the round holes in the rubber valve index with the raised projections on the hub, and the flat on the valve plate indexes with the flat projection on the hub (Fig. 50). Compress the valve spring, and install the retainer in the plunger groove to secure the control valve plunger to the control hub (Fig. 48).

2. Assemble the tail stock over the plunger with the flat on the tail stock indexing with the flat on the hub.

3. Assemble the O-ring over the tail stock and into the "V" groove formed by the tail stock and hub.

4. Assemble the tail stock and the plunger and control hub assembly to the diaphragm, and turn the hub counterclockwise to secure these parts together (Fig. 47).

5. Install the lever assembly in the control hub with the rubber protrusions toward the hub (Fig. 46).

6. Assemble the reaction cone, re-

tainer, and two plastic push rod guides on the push rod. Install the push rod assembly in the valve hub so that the push rod indexes in the valve plunger.

7. Install the two bellows support rings and bellows protector on the bellows. The support rings are positioned in the two larger folds of the bellows and the protector in the smaller fold.

8. Assemble the bellows on the control hub so that the lip of the bellows indexes in the groove on the hub. Secure the bellows to the hub by assembling the large bellows clamp on the diaphragm end of the bellows approximately $\frac{1}{32}$ inch from the end of the bellows (Fig. 45).

ASSEMBLY OF MAJOR COMPONENTS

1. Assemble the rear seal in the end plate (Fig. 44) and position the diaphragm, the control valve components, and the bellows as an assembly into the end plate.

2. Install the rubber grommet in the booster body with the large diameter side to be outside of the booster. Force the vacuum manifold

and check valve assembly through the grommet (Fig. 49).

3. Assemble the booster body to the end plate. Make sure that the lip of the diaphragm is evenly positioned on the retaining radius of the end plate and the booster body. Pull the front lip of the bellows through the booster body and position it evenly around the hole in the booster body (Fig. 46).

4. Install the clamp band over the lips of the booster body and end plate. Align the scribe lines, compress the assembly together, and secure with the clamp and band bolt. Tap the clamp band with a fibre hammer around its circumference as the bolt is being tightened. Tighten to 15 inch-pounds of torque.

INSTALLATION OF EXTERNAL PARTS

1. Install the rubber boot to the valve operating rod and assemble the plastic retainer to the end of the rod. Insert the rod into the plunger so that the retainer engages the groove in the plunger. Install the lip of the boot in the groove of the rear seal (Fig. 49).

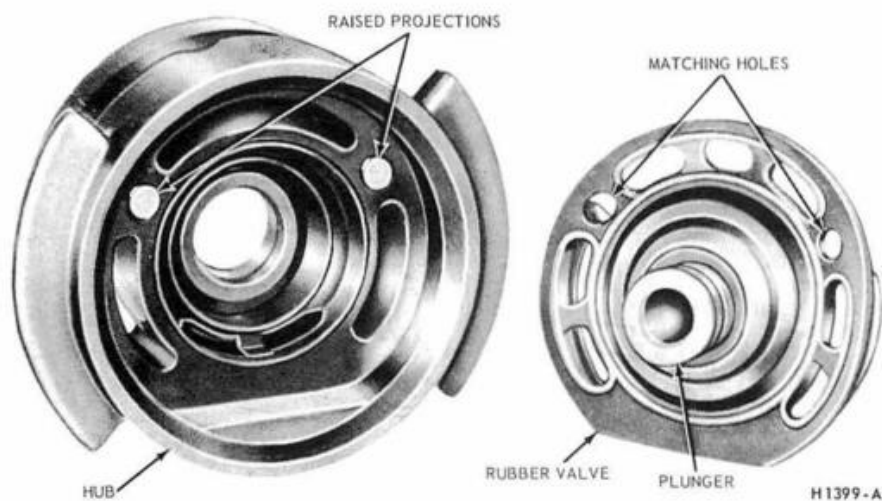


FIG. 50—Assembling Valve Plunger to Hub—Midland-Ross

2. Connect the valve operating rod to the upper end of the lever, and connect the push rod link to the center of the lever with the connecting pins and clips.

3. Position the mounting brackets to the end plate and install the retaining nuts.

4. Connect the lever assembly to the lower end of the mounting brackets with the pivot pin and clip.

5. Position the air filter in the plastic filter cover and then snap the cover and filter on the metal hub with the filter between.

6. Assemble the cover, filter, and hub assembly to the booster body with the metal hub against the booster body.

7. Assemble the master cylinder to the booster body. Torque the master cylinder mounting nuts to specification.

PART

2-3

SPECIFICATIONS

LINING DIMENSIONS—INCHES

FALCON

MODELS	POSITION	FRONT	REAR	COLOR CODE
Falcon Sedan & Hardtop—Six Cylinder	Primary Secondary	2.25 x 7.75 2.25 x 10.0	1.5 x 7.75 1.5 x 10.0	Red-Blue Green
Falcon Station Wagons—Six Cylinder	Primary Secondary	2.25 x 8.35 2.25 x 10.75	2.25 x 8.35 2.25 x 10.75	Silver Yellow-Black
Falcon Sedans—Eight Cylinder	Primary Secondary	2.25 x 8.35 2.25 x 10.75	1.75 x 8.35 1.75 x 10.75	Silver Yellow-White
Station Wagon—Eight Cylinder	Primary Secondary	2.50 x 8.35 2.50 x 10.75	2.00 x 8.35 2.00 x 10.75	Yellow-Black Black-Black

MUSTANG

MODELS	POSITION	FRONT	REAR	COLOR CODE
All Six Cylinder	Primary Secondary	2.25 x 7.75 2.25 x 10.0	1.5 x 7.75 1.5 x 10.0	Red-Blue Green
All Eight Cylinder	Primary Secondary	2.25 x 8.35 2.25 x 10.75	1.75 x 8.35 1.75 x 10.75	Silver Yellow-White
All Eight Cylinder	Disc	4.82 x 1.84	—	White

FAIRLANE AND COMET

MODELS	POSITION	FRONT	REAR	COLOR CODE
Fairlane & Comet 200 & 289 Passenger Cars	Primary Secondary	2.25 x 8.35 2.25 x 10.75	1.75 x 8.35 1.75 x 10.75	Silver Yellow-White
Fairlane & Comet LPO Police & 390 Passenger Cars Maximum Fade Resist.	Primary Secondary	2.50 x 8.35 2.50 x 10.75	2.00 x 8.35 2.00 x 10.75	Yellow-Black Black-Black
Fairlane & Comet LPO Taxi— Max. Wear Resist. (Bonded)	Primary Secondary	2.50 x 9.51 2.50 x 10.75	2.00 x 9.51 2.00 x 10.75	Red White
Station Wagons—Fairlane & Comet 200 & 289	Primary Secondary	2.50 x 8.35 2.50 x 10.75	2.00 x 8.35 2.00 x 10.75	Yellow-Black Black-Black
Station Wagon Fairlane & Comet 390	Primary Secondary	2.50 x 8.35 2.50 x 10.75	2.50 x 8.35 2.50 x 10.75	Yellow-Black Black-Black

CHECKS AND ADJUSTMENTS—INCHES

FALCON

Master Cylinder Bore Diameter Standard	1.000	Lining Maximum Wear Limit (From Top of Rivets)	0.031
Master Cylinder Maximum Allowable Hone	0.003		
Front Wheel Cylinder Bore Diameter 9" Brake 10" Brake	1.062 1.125	Lining Maximum Clearance to Shoe (Midway Between Rivets)	0.008
Rear Wheel Cylinder Bore Diameter 9" Brake 10" Brake	0.844 0.906	Pedal Travel—Standard Pedal Travel—Power Push Rod Adjustment—Power Brakes— Bendix—Midland-Ross	6.50 4.50 0.980-0.995 0.995-1.005
Wheel Cylinder Maximum Allowable Hone [Ⓢ]	0.003	Hydraulic Line Diameter	0.188
Drum Diameter 9" Brake 10" Brake	9.0 10.0	Parking Brake—Type Foot Operated with Pedal Mounted Below Left Side of the Instrument Panel	
Drum Maximum Allowable Run-Out	0.007		
Drum Maximum Boring Diameter 9" Brake 10" Brake	9.060 10.060		

[Ⓢ]Front Wheel Brake Cylinders on Cars with 9" Brakes cannot be Honed

CHECKS AND ADJUSTMENTS—INCHES (Continued)
MUSTANG

Master Cylinder Bore Diameter Standard Power	1.000 0.875	Lining Maximum Wear Limit (From Top of Rivets)	0.031
Master Cylinder Maximum Allowable Hone	0.003	Lining Maximum Clearance to Shoe (Midway Between Rivets)	0.008
Front Wheel Cylinder Bore Diameter 6 Cylinder Engine 8 Cylinder Engine	1.062 1.125	Pedal Ratio Pedal Travel—Standard	6.3:1 6.50
Rear Wheel Cylinder Bore Diameter 6 Cylinder Engine 8 Cylinder Engine	0.844 0.906	Pedal Travel—Power Push Rod Adjustment—Power Brakes Bendix Midland-Ross	3.54 0.980-0.995 0.995-1.005
Wheel Cylinder Maximum Allowable Hone [Ⓢ]	0.003		
Drum Diameter: 6 Cylinder Engine 8 Cylinder Engine	9.0 10.0	Hydraulic Line Diameter	0.188
Drum Maximum Allowable Run-Out	0.007	Parking Brake-Type Hand Operated with Handle Mounted on Lower Left Side of the Instrument Panel	
Drum Maximum Boring Diameter 6 Cylinder Engine 8 Cylinder Engine	9.060 10.060		
FRONT WHEEL DISC BRAKE (RPO—8 CYLINDER ENGINE)			
Master Cylinder Bore Diameter	0.938	Lining Thickness:	0.400 Nominal
Master Cylinder Maximum Allowable Hone	0.003		
Caliper Cylinder Bore Diameter	1.636	Lining Maximum Wear Limit (From Surface of Shoe)	0.030
Rotor Diameter: Outside Inside	11.375 7.375	Lining to Rotor Clearance (Brakes Released)	0.002-0.010
Rotor Thickness	0.810	Pedal Travel (Non Power)	6.50
Rotor Maximum Allowable Runout	0.002	Pedal Ratio	5.57:1
Lining Area	34.00 sq. in.		

[Ⓢ]Front Wheel Brake Cylinders on 6 Cyl. Cars cannot be Honed

FAIRLANE AND COMET

Master Cylinder Bore Diameter	1.000	Lining Maximum Wear Limit (From Top of Rivets or Shoe Rim)	0.031
Master Cylinder Maximum Allowable Hone	0.003		
Front Wheel Cylinder Bore Diameter Passenger—200 & 289 Station Wagon and 390 Car	1.125 1.094	Lining Maximum Clearance to Shoe (Midway Between Rivets)	0.008
Rear Wheel Cylinder Bore Diameter 390 Car Passenger—200 & 289 Station Wagon—d11	0.875 0.906 0.938	Pedal Travel—Standard Pedal Travel—Power	6.5 4.5
LPO Maximum Fade & Maximum Wear Resistant Wheel Cylinders (200 & 289)		Push Rod Adjustment—Power Brakes Bendix Midland-Ross	0.980-0.995 0.995-1.005
Front Wheel Cylinder Bore Diameter	1.094		
Rear Wheel Cylinder Bore Diameter	0.875	Hydraulic Line Diameter	0.188
Drum Diameter	10.0		
Drum Maximum Allowable Run-Out	0.007	Parking Brake—Type Foot Operated With Pedal Mounted Below Left Side of the Instrument Panel	
Drum Maximum Boring Diameter	10.060		
Drum Width—Front Passenger Station Wagon—Maximum Fade and Wear Resistant & 390 car	2.25 2.50		
Drum Width—Rear Passenger Station Wagon Maximum Fade & Maximum Wear Resistant	1.75 2.50 2.00		

TORQUE LIMITS—BRAKES

Description	Falcon ft-lbs	Mustang ft-lbs	Comet and Fairlane ft-lbs
Brake Cylinder to Brake Carrier Plate Bolt	5-7	5-7	10-20
Parking Brake Control Assembly to Instrument Panel Bolt	15-20	8-12	15-20
Master Cylinder to Dash Panel Bolt	20-34	18-25	20-34
Tube Connector to Master Cylinder	6-12	6-12	6-12
Master Cylinder Cover	Finger Tight	Finger Tight	Finger Tight
Parking Brake Control Assembly to Dash Panel Bolt	15-20	8-12	15-20
Brake Hose Bolt	10-15	10-15	10-15
Brake Pedal Support Bracket to Dash Panel Bolt	20-34	20-34	20-34
Brake Pedal Support Bracket to Instrument Panel Nut	9-13	9-13	9-13
FRONT DRUM BRAKES ONLY	5 Lug—75-110	5 Lug—6 Cyl.	75-110
Wheel Assembly to Wheel Hub and Drum Assembly Nut	4 Lug—55-85	4 Lug—8 Cyl.	
Wheel, Hub and Drum Assembly to Wheel Spindle Nut [Ⓢ]	17-25	17-25	17-25
Carrier Plate to Spindle Nut	25-45	25-45	25-45
REAR BRAKES ONLY	8 Cyl.—30-40	8 Cyl.—30-40	
Axle Housing to Carrier Plate Lock Nut	6 Cyl.—25-35	6 Cyl.—25-35	30-40
Drum to Axle Shaft Assembly Speednut	Hand Push Fit	Hand Push Fit	Hand Push Fit
Wheel Assembly to Axle Shaft to Drum Assembly Nut	4 Lug—55-85 5 Lug—75-110	4 Lug—55-85 5 Lug—75-110	75-110
Brake Line Connection to Axle Housing Bolt	12-18	12-18	
Bleeder Screw to Wheel Cylinder	50 in-lbs Max.	50 in-lbs Max.	55 in-lbs Max.
POWER BRAKES			
Vacuum Manifold to Booster Body Mounting Bolt	8-10		
Master Cylinder to Booster Body	10-13		
Brake Booster to Dash Panel	12-15		
Push Rod to Brake Pedal Bolt	10-15		

Ⓢ.0005 to .0065 Bearing end play at assembly.

TORQUE LIMITS—DISC BRAKES

Description	ft-lbs
Caliper Assembly to Mounting Bracket	45-60
Mounting Bracket to Spindle	35-45
Caliper Bleeder Screw	10 (120 in-lbs maximum)— Must be leak proof
Caliper Splash Shield	7-9
Caliper Bridge Bolts	65-75
Rotor Splash Shield to Spindle	10-20
Hub and Rotor Assembly to Front Wheel Spindle	17-25—Rotate rotor while torquing.Ⓢ
Wheel Assembly to Front Wheel Hub and Rotor Assembly	75-110 ft-lbs
Brake Tube Fitting Nuts to Proportioning Valve	70 in-lbs—maximum— Must be leak proof

Ⓢ.0005" to .0065" maximum bearing end play with torque specification of 17-25 ft./lbs.

each wheel stop for more than 3 to 5 seconds.

3. Shut off the engine, and check for leaks.

Fitting and Tube Seat Leak. Since most fluid leaks occur at the fittings and connections in a power steering hydraulic system, these parts should be checked before any other part is replaced.

1. With the engine running at idle speed, raise the car on a hoist.

2. Clean the outside of the control valve and the power cylinder, the bottom surfaces of the pump, and all lines and fittings. Dirt, oil, and grease should be removed from all areas where leaks may exist.

3. Tighten all fittings, using a special 5-flat tube wrench. **Do not tighten the fitting with a standard open end wrench.** If a properly tightened fitting leaks, replace the seat.

Pump, Control Valve, and Power Cylinder Leak. If the fittings and connections do not leak, check the other parts of the system.

Check the hose connection at the pump for leaks, and tighten the hose clamp if necessary.

Pump Leaks. If leakage occurs at the pump reservoir seal, pump outlet valve seals, or the support stud seal, check the torque of the outlet valve nut and the support stud nut. If torque is within specifications, replace the reservoir seal, outlet valve seals, or the support stud seal, whichever is required if leaks are evident other than the lines.

Control Valve Leaks. If the control valve is leaking (somewhere other than the tube seats), replace all the seals, using a control valve seal kit. Use all the parts in the kit, and be sure they are correctly installed. When assembling the new seals in the valve, an application of silicone grease to the internal parts will help to provide a better seal against future leakage. Apply grease to the centering spring area, especially on the cap and spacer mating surfaces. Coat the threads of the cap retaining bolts with grease. The rubber boot seals, the actuator assembly, and the metal cup seals in the control valve should also be coated with silicone grease.

Some oil remaining from the manufacturing processes may be found in the sleeve near the ball stud. Do not confuse this oil with leaking fluid from the hydraulic system.

Power Cylinder Leaks. The power cylinder may leak at the piston rod

seals. A power cylinder seal kit should be used to correct leakage. **Do not replace the power cylinder assembly unless the piston rod is scored or has a dull gray finish instead of a high luster chrome finish.**

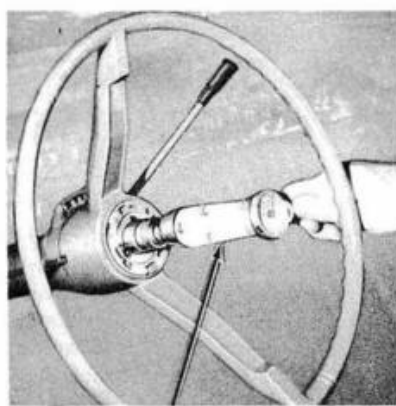
Check Turning Effort

With the front wheels properly aligned and tire pressures correct, check the effort required to turn the steering wheel.

1. With the car on dry concrete, set the parking brakes.

2. With the engine warmed up and running at idle speed, turn the steering wheel to the left and right several times to warm the fluid.

3. Attach a torque wrench to the steering wheel hub. (Fig. 1). Check



Torque Wrench (In. Lb.) G 1270 - B

FIG. 1—Checking Turning Effort—Typical

the effort required to turn the wheel at least one complete revolution in both directions. See Part 3-6 for the specified torque which should be approximately equal in both directions.

Pump-Fluid Pressure Test

A fluid pressure test will show whether the pump or some other unit in the power steering system is causing trouble in the system. Steps outlined below should be followed to determine the cause of the trouble.

1. Measure the pump belt tension.

When adjusting the belt tension on the power steering pump, do not pry against the pump to obtain the proper belt load.

A half-inch cast boss has been incorporated on the front face of the pump cover plate onto which a $\frac{9}{16}$ inch open end wrench can be fitted to pry the pump and obtain the proper belt tension.

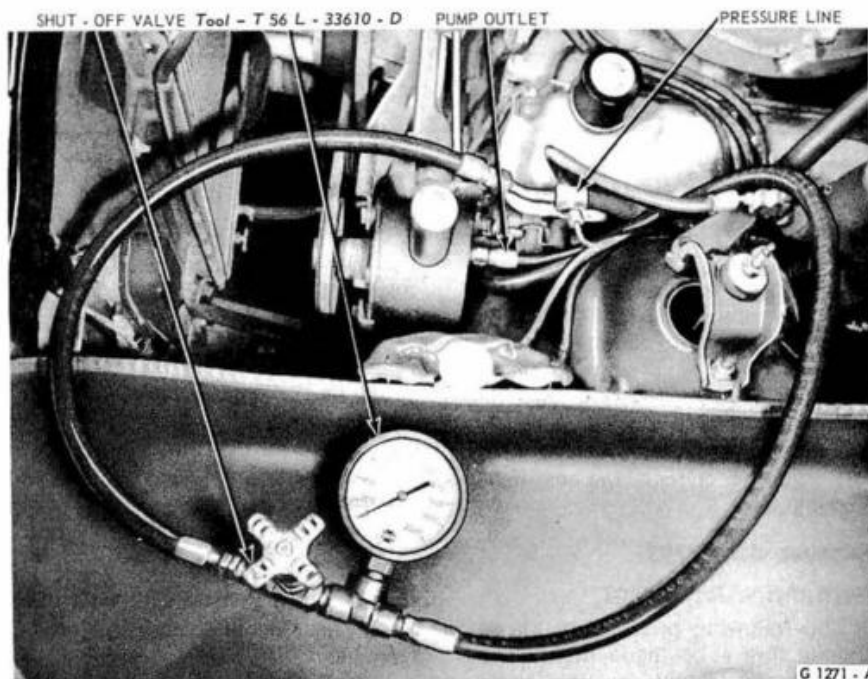
2. Disconnect the pressure line hose from the pump outlet, and install a 0-2000 psi pressure gauge and shut off valve between the end of the hose and the pump outlet (Fig. 2).

Be sure that the pressure gauge is between the pump and the shut off valve, all connections are tight, and the shut off valve is fully open.

3. Connect a tachometer.

4. Start the engine and operate it at idle speed for at least two minutes to warm up the fluid.

5. Cycle the steering wheel from stop-to-stop several times to expel any



G 1271 - A

FIG. 2—Pressure Testing Tool Installed—Typical

air from the system; stop the engine. Remove the reservoir filler cap and check the fluid level in the reservoir. If necessary, add lubricant CIAZ-19582-A to the proper level.

6. With the engine running at approximately 500 rpm and no steering effort applied, and the lubricant at normal operating temperature, the pressure gauge should show a pressure of less than 50 psi. If the pres-

sure is higher, inspect the hoses for kinks and obstructions.

7. Increase the engine speed to 1000 rpm; then, slowly close the gauge shut-off valve. With the valve fully closed, the pump pressure should be 750 to 900 psi.

Do not close the valve for more than a few seconds (maximum 5 seconds), as this would abnormally increase the lubricant (fluid) temper-

ature and cause undue pump and/or steering gear wear. Engine rpm should not exceed fast idle during this test.

If pressure is more or less than specification, replace the pump assembly. If pressure is as specified and steering efforts are heavy, the gear and/or control valve could be at fault.

STEERING TROUBLE DIAGNOSIS GUIDE

BINDING OR POOR RECOVERY	If the steering wheel binds or sticks when turned, or if poor recovery to the straight-ahead position occurs, check the Pitman arm ball stud in the control valve sleeve. If the ball stud is rubbing against the edge of the sleeve slot, the roll pin may be missing. If either of the idler arm bushings are worn or damaged, replace both bushings. Check the steering gear adjustment (Section 2). Check the operation of the control valve spool in the valve housing. If the spool is binding in the housing,	check the spool adjustment. If the adjustment is correct, overhaul or replace the control valve. Check the control valve travel regulator stop adjustment. If the stop is drawn up too tightly, the ball stud will bind in the seats. Adjust the stop as required. Check the control valve sleeve and the socket tube for damage. Replace parts that show signs of damage, and adjust the travel regulator stop. Check for possible interference between the steering wheel and the steering column.
HARD STEERING	If the effort required to turn the steering wheel is greater than normal for the entire travel of the front wheels, check the tire pressure then, test the fluid pressure. Be sure that there are no leaks, that the reservoir is properly filled, and that the belt is properly adjusted. If the pump output pressure is low, the pump may be defective and should be replaced. If the pressure test shows that the trouble is in the control valve or power cylinder, remove and inspect these units. Repair or replace any damaged parts. If the pressure test indicates that the pressures throughout the system are within specifications, check the following items in the order given: Check the control valve spool cen-	tering spring adjustment. Adjust if required (Section 2). Check the control valve spool for movement. If the spool does not move freely, check for, and eliminate, interference between the socket tube and the valve sleeve. If the spool is sticking in the housing, remove the spool and check the spool lands for burrs. Small burrs may be removed with crocus cloth if the edges of the valve lands are not rounded in the process. If the spool cannot be repaired, replace the control valve. Check the control valve ball stud for free movement in the ball stud seats. If the stud is binding in the seats, adjust the travel regulator stop. If the hard steering still persists, check the front end alignment.
EXCESSIVE FREE PLAY	If excessive free play or lost motion is noticed when steering, check the steering gear preload and mesh adjustment. Check for excessive clearance between the steering arm ball stud and the ball stud seats. If the ball stud is loose in the seats, adjust the control	valve travel regulator stop. Check the control valve centering spring adjustment. If the spring adjustment nut is loose, tighten the nut until it is snug, and then back off the nut not more than ¼ turn. Excessive tightening may damage the stop pin.

CONTINUED ON NEXT PAGE

STEERING TROUBLE DIAGNOSIS GUIDE (Continued)

NOISE	Check the pump belt tension. A loose or glazed belt can cause belt squeal. A glazed belt, even when properly adjusted, may slip. Excessive torque at the pressure line joints may distort the tube seats and cause noise.	Noise may result if the specified hose is not used or if it is improperly routed. If noise still exists with the specified hose properly installed and routed, the pump should be replaced.
STEERING CHATTER	A loose pump belt or air in the fluid can cause chatter against the wheel stops during an extremely sharp turn. Check the belt tension, and adjust it to specifications or fill the reservoir if necessary. Check for looseness in the idler arm rod connection. Looseness at this point may be due to worn mounting	bushings or improper mounting nut torque. Replace the bushings if worn. Torque the nut to specification. Check the power cylinder piston rod insulators for looseness. If the insulators are worn, replace them. If the mounting nut is loose, torque it to specification, and torque the lock-nut to specification.
RATTLES	Check the control valve spool centering spring adjustment. If the adjustment is loose, tighten the nut until snug, and then back off the nut not more than ¼ turn. Excessive tighten-	ing may damage the stop pin. Check for looseness between the control valve ball stud and the ball stud seats. If the stud is loose in the seats, adjust the travel regulator stop.
LOSS OF POWER ASSIST	Check the entire system for damage, replacing parts as necessary. Tighten a loose pump belt. Test the fluid pressure to determine whether the trouble is in the pump, the control valve, or the power cylinder. If the pressure test indicates that the pump is at fault, replace the pump. If the pressure test indicates that the control valve or power cylinder is at fault, check as follows: Disconnect the power cylinder piston rod from the idler arm bracket. Operate the piston by hand to check	for resistance to movement. If the piston moves easily with little or no resistance, the internal parts of the power cylinder are broken or damaged. Replace the power cylinder if broken or damaged. Maladjustment of the control valve spool centering spring can cause a loss of either right or left power assist. Check the adjustment, and readjust if necessary. Replace all defective parts. Check the operation of the control valve check valve. If the check valve does not operate freely, replace the check valve assembly.

FRONT WHEEL ALIGNMENT CHECKS

Do not attempt to check and adjust front wheel alignment without first making a preliminary inspection of the front-end parts.

Check all the factors of front wheel alignment except the turning angle before making any adjustments. The turning angle should be checked only after caster, camber, and toe-in have been adjusted to specification.

The front wheel alignment specifications, given in Part 3-6 are correct only when the car is at "Curb Height." Before checking or adjusting the alignment factors, the suspension alignment spacers (Tool T65P-3000-B or C) must be installed to obtain the curb heights.

EQUIPMENT INSTALLATION

Equipment used for front wheel alignment inspection must be accurate. Alignment height spacers (Figs. 3 and 4) are used to check caster, camber. The spacers should be omitted when checking toe-in.

1. Drive the car in a straight line far enough to establish the straight-ahead position of the front wheels, and mark the steering wheel hub and the steering column collar (Fig. 5). **Do not adjust the steering wheel spoke position at this time.** If the front wheels are turned at any time during the inspection, align the marks to bring the wheels back to the straight-ahead position.

2. With the car in position for the front end alignment inspection and

adjustment, install the alignment spacers as follows to establish the curb height.

Insert the pin in the spacer hole marked for the model being checked (Mustang rear does not use the pin).

Raise the front of the car and position the alignment spacers between the suspension upper arm and the spring tower as shown in Fig. 3. The lower end of the spacer should be placed over the head of the ball joint front outside attaching rivet. Position the alignment spacers for the rear of the car between the rear axle and the side rail as shown in (Fig. 4).

3. Install the wheel alignment equipment on the car. Whichever type of equipment is used, follow the installation and inspection instruc-

TABLE 1—Trouble Symptoms and Possible Causes

POSSIBLE CAUSES OF TROUBLE															
SYMPTOMS															
	Jerky Steering	Loose Steering	Hard Steering and/or Loss of Power Assist	Hard Turning When Stationary	Steering and Suspension Noises	Shimmy or Wheel Tramp	Pull to One Side	Side-to-Side Wander	Body Sway or Roll	Tire Squeal on Turns	Binding or Poor Recovery	Abnormal or Irregular Tire Wear	Sag at One Wheel	Hard or Rough Ride	Rear Suspension Misalignment (Dog-Tracking)
1. Incorrect Tire Pressure			X	X		X	X	X	X	X	X	X	X	X	
2. Tire Sizes Not Uniform			X	X			X	X		X		X	X		
3. Overloaded or Unevenly Loaded Vehicle							X	X				X	X	X	
4. Power Steering Fluid Level Low-Leak	X		X	X	X										
5. Sagging or Broken Spring					X		X	X	X			X	X	X	
6. Glazed, Loose or Broken Power Steering Pump Belt	X		X	X	X										
7. Rear Spring Tie Bolt Off Center							X					X			X
8. Broken Rear Spring Tie Bolts					X	X	X	X	X			X			X
9. Rear Spring Front Hanger Mislocated							X					X			X
10. Bent Spindle Arm							X	X		X		X			
11. Bent Spindle							X	X		X		X			
12. Lack of Lubrication			X	X	X						X			X	
13. Air in Power Steering System	X		X		X	X									
14. Obstruction in Power Steering Lines			X	X	X										
15. Loose or Weak Shock Absorber					X	X		X	X			X		X	
16. Loose or Worn Suspension Arm Bushings					X	X						X		X	
17. Binding Front Suspension Ball Joints or Steering Linkage	X		X	X	X						X			X	
18. Loose, Worn, or Damaged Steering Linkage or Connections	X	X			X	X		X		X		X			
19. Loose Steering Gear Mountings	X	X			X	X		X							
20. Insufficient Steering Pump Pressure			X	X							X				
21. Incorrect Steering Gear Adjustment	X	X	X	X	X	X		X	X		X	X			
22. Incorrect Brake Adjustment	X				X		X		X		X	X			
23. Incorrect Front Wheel Bearing Adjustment	X	X			X	X	X	X				X			
24. Wheel Out of Balance	X					X						X		X	
25. Incorrect Front Wheel Alignment			X		X	X	X	X		X	X	X			
26. Out-of-Round Wheel or Brake Drum						X						X		X	
27. Frame or Underbody Out of Alignment							X					X			X
28. Bent Rear Axle Housing					X		X					X			X
29. Excessive Wear of Steering Pump Internal Parts			X		X										
30. Steering Gear Valve Spool Binding or out of Adjustment			X	X			X				X				
31. Obstruction Within Steering Gear	X		X	X							X				

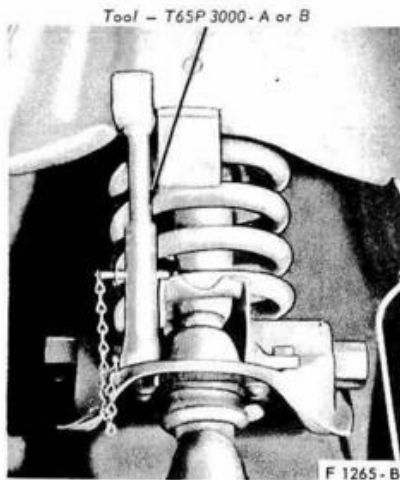


FIG. 3—Typical Front Alignment Spacer Installation

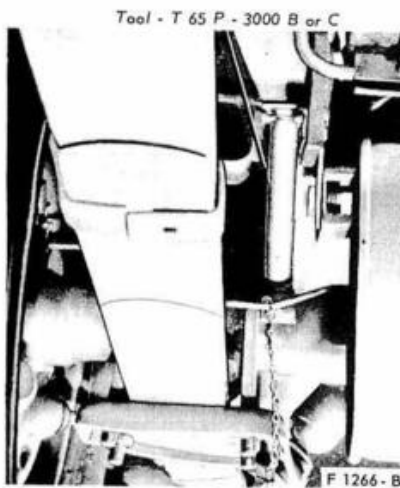


FIG. 4—Typical Rear Alignment Spacer Installation

tions provided by the equipment manufacturer.

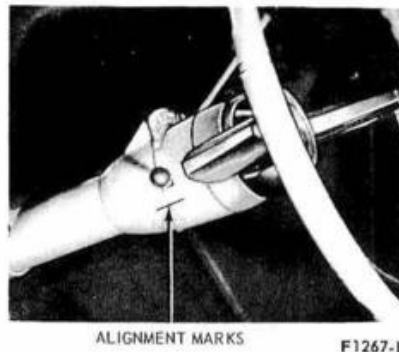


FIG. 5—Straight Ahead Position Marks—Typical

CASTER

Check the caster angle at each front wheel.

Caster is the forward or rearward tilt of the top of the wheel spindle (Fig. 6). If the spindle tilts to the rear, caster is positive. If the spindle tilts to the front, caster is negative. The correct caster angle, or tilt, is specified in Part 3-6. The maximum difference between both front wheel caster angles should not exceed $\frac{1}{2}^\circ$. However, a difference of not more than $\frac{1}{4}^\circ$ is preferred.

CAMBER

Check the camber angle at each front wheel.

Camber is the amount the front wheels are tilted at the top (Fig. 6). If a wheel tilts outward, camber is positive. If a wheel tilts inward, camber is negative. The correct camber angle, or outward (positive) tilt, is specified in Part 3-6. The maximum difference between both front wheel camber angles should not exceed $\frac{1}{2}^\circ$. However, a difference of not more than $\frac{1}{4}^\circ$ is preferred.

TOE-IN

Alignment height spacers are not

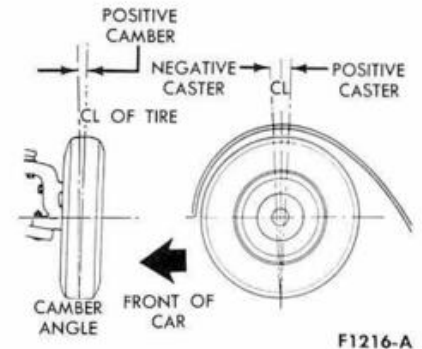


FIG. 6—Caster and Camber Angles

used to check and adjust toe-in. Toe-in should only be checked and adjusted after the caster and camber has been adjusted to specification.

Check the toe-in with the front wheels in the straight-ahead position. **Run the engine so that the power steering control valve will be in the center (neutral) position (if so equipped).** Measure the distance between the extreme front and also between the extreme rear of both front wheels. The difference between these two distances is the toe-in.

Correct toe-in, or inward pointing of both front wheels at the front, is specified in Part 3-6.

FRONT WHEEL TURNING ANGLE

When the inside wheel is turned 20° , the turning angle of the outside wheel should be as specified in Part 3-6. The turning angle cannot be adjusted directly, because it is a result of the combination of caster, camber, and toe-in adjustments and should, therefore, be measured only after these adjustments have been made. If the turning angle does not measure to specifications, check the spindle or other suspension parts for a bent condition.

2 COMMON ADJUSTMENTS AND REPAIRS

After front wheel alignment factors have been checked, make the necessary adjustments. **Do not attempt to adjust the front wheel alignment by bending the suspension or steering parts.**

CASTER AND CAMBER ADJUSTMENTS

MUSTANG

Be sure all the equipment listed in

Equipment Installation is installed before adjusting the caster and camber.

Caster and camber can be adjusted by removing or installing shims between the inner shaft of the front suspension upper arm and the underbody (Fig. 7).

Both caster and camber adjustment can be made at the same time by loosening the nuts on the two bolts that fasten the inner shaft to the underbody. After the required shims

have been removed or installed, torque the nuts to specification. Caster and camber adjusting shims are available in $\frac{1}{32}$ -inch and $\frac{1}{8}$ -inch thickness.

The $\frac{3}{32}$ inch shims should be placed against the fender housing sheet metal or between the $\frac{1}{8}$ inch shims.

CASTER

To adjust caster, remove or install



FIG. 7—Caster and Camber Adjustments—Mustang

shims at either the front bolt or the rear bolt (Fig. 7).

The removal of shims at the front bolt or the installation of shims at the rear bolt will cause the upper ball joint to move forward. The removal of shims at the rear bolt or the installation of shims at the front bolt will cause the ball joint to move rearward. A $\frac{1}{32}$ -inch change of shim thickness at either bolt will change the caster angle approximately $\frac{1}{2}^\circ$. The difference between the shim stack thickness at the two bolts should not exceed $\frac{3}{16}$ inch (Fig. 7).

CAMBER

To adjust camber, remove or install equal shim thickness at both bolts (Fig. 7).

The removal of equal shims at both bolts will move the upper ball joint inward. The installation of equal shims at both bolts will move the ball joint outward. A $\frac{1}{16}$ -inch change of shim thickness at both bolts will change the camber angle $\frac{1}{3}^\circ$. The total shim stack thickness at each bolt should not exceed $\frac{9}{16}$ -inch (Fig. 7).

COMET, FALCON, AND FAIRLANE

Caster is controlled by the front suspension strut (Fig. 8). To obtain positive caster, loosen the strut front nut and tighten the strut rear nut against the bushing. To obtain negative caster, loosen the strut rear nut and tighten the strut front nut against the bushing.

Camber is controlled by the eccentric cam located at the lower arm attachment to the side rail (Fig. 8).

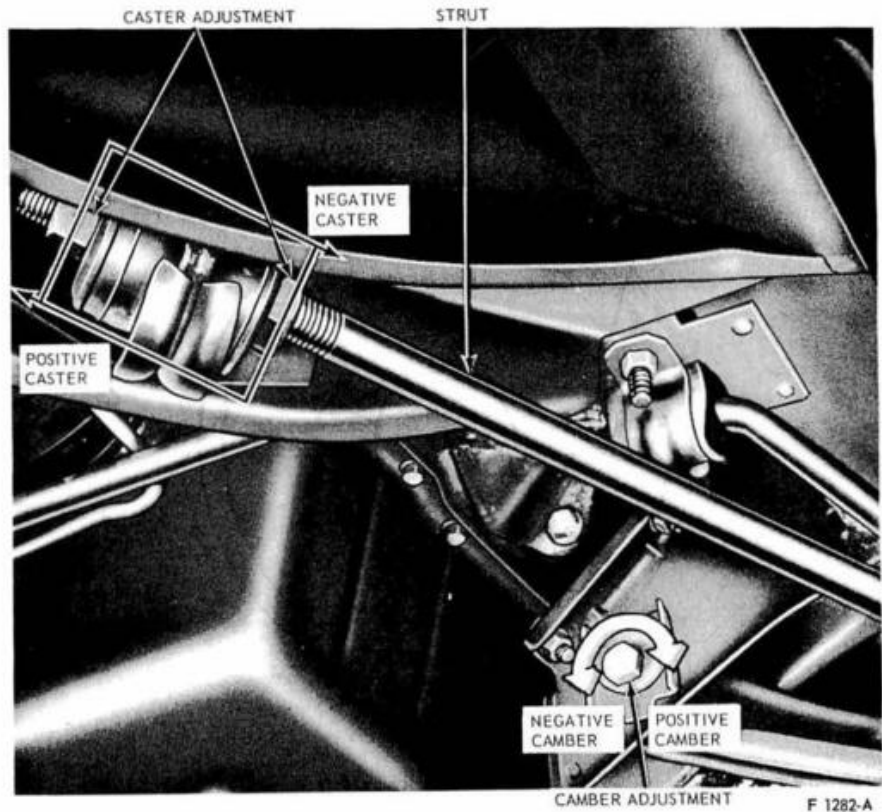


FIG. 8—Caster and Camber Adjustments—Comet, Falcon, and Fairlane

To adjust the camber, loosen the eccentric bolt nut and rotate the bolt and eccentric clockwise from the high position to increase camber or counterclockwise to decrease camber.

After the caster and camber has been adjusted to specification, torque the lower arm eccentric bolt nut and the strut front nut to specification.

TOE-IN AND STEERING WHEEL ALIGNMENT ADJUSTMENTS

Check the steering wheel spoke position when the front wheels are in the straight-ahead position. If the spokes are not in their normal position, they can be properly adjusted while toe-in is being adjusted.

1. Loosen the two clamp bolts on each spindle connecting rod sleeve (Fig. 9).

2. Adjust toe-in. If the steering wheel spokes are in their normal position, lengthen or shorten both rods equally to obtain correct toe-in (Fig. 10). If the steering wheel spokes are not in their normal position, make the necessary rod adjustments to obtain correct toe-in and steering wheel

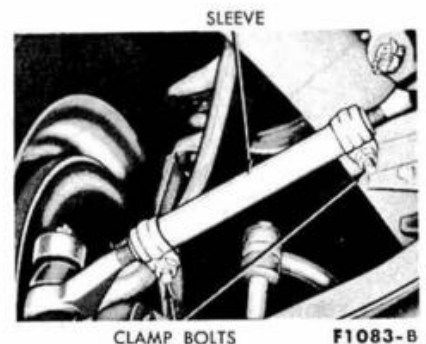


FIG. 9—Spindle Connecting Rod Sleeve—Typical

spoke alignment (Figs. 11 and 12).

3. Recheck toe-in and steering wheel spoke alignment. If toe-in is correct and the steering wheel spokes are still not in their normal position, turn both connecting rod sleeves upward or downward the same number of turns to move the steering wheel spokes (Fig. 11 and 12).

4. When toe-in and steering wheel spoke alignment are both correct, torque the clamp bolts on both connecting rod sleeves to specification.

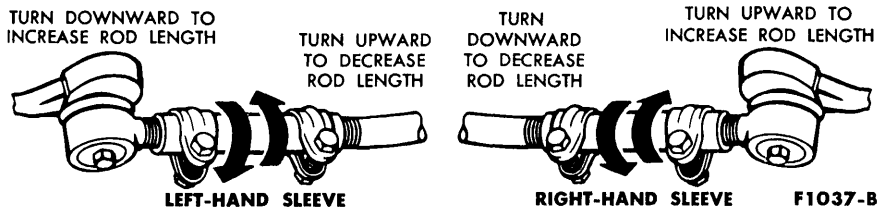


FIG. 10—Spindle Connecting Rod Adjustment

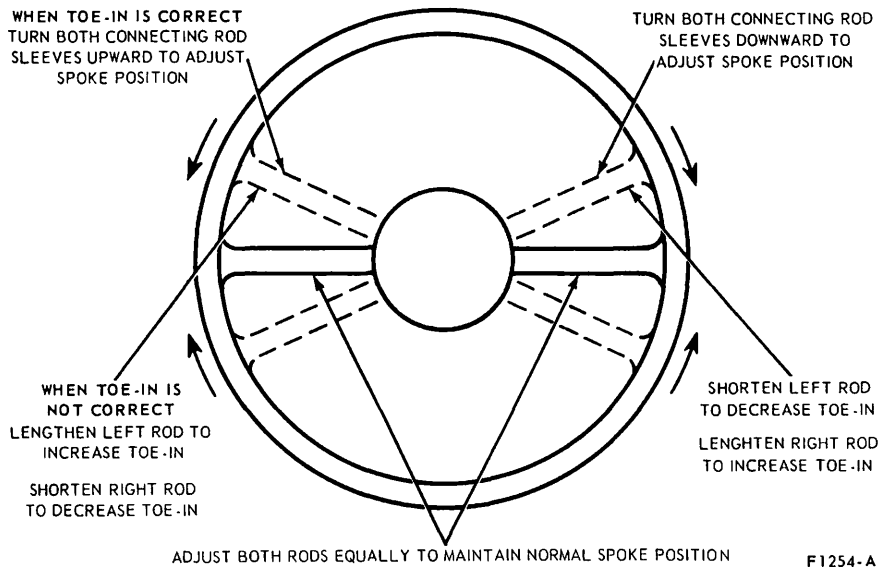


FIG. 11—Toe-In and Steering Wheel Spoke Adjustments—Comet, Falcon, and Fairlane

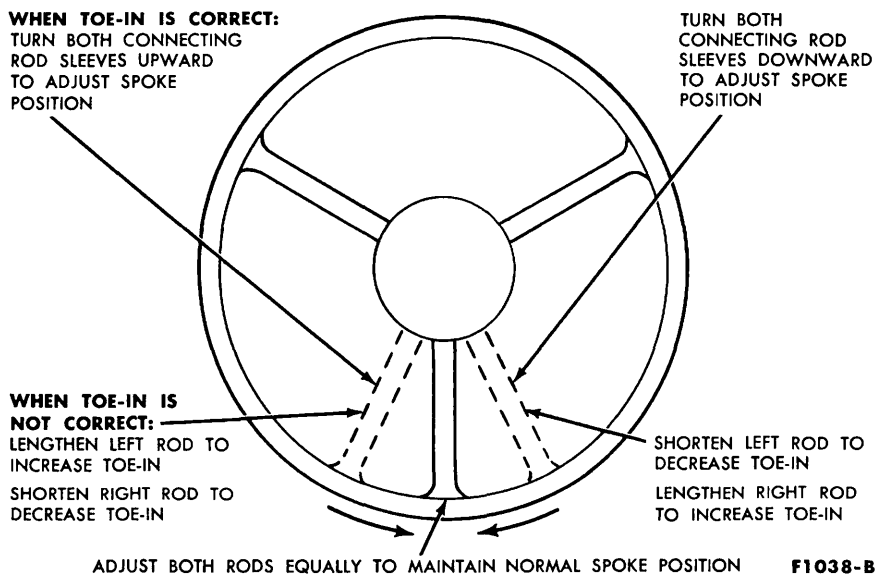


FIG. 12—Toe-In and Steering Wheel Spoke Adjustments—Mustang

The sleeve position should be as shown in Fig. 13 when the clamp bolts are tightened.

STEERING GEAR LUBRICANT CHECKING PROCEDURE

MUSTANG

1. Center the steering wheel.
2. Remove the steering gear housing filler plug.
3. Remove the upper cover-to-housing attaching bolt.
4. With a clean punch or like instrument, clean out or push inward the loose lubricant in the filler plug hole and cover to housing attaching bolt hole.
5. Slowly turn the steering wheel to the **right** stop, lubricant should rise within the **upper** cover bolt hole; then slowly turn the steering wheel to the **left** stop, lubricant should rise within the filler plug hole. If lubricant does not rise in both the cover bolt hole and the filler plug hole, add lubricant until it comes out both holes during this check.
6. Install the upper cover-to-housing attaching bolt.

COMET, FALCON, AND FAIRLANE

1. Center the steering wheel.
2. Remove the steering gear housing filler plug.
3. Remove the lower cover-to-housing attaching bolt.
4. With a clean punch or like instrument, clean out or push inward the loose lubricant in the filler plug hole and cover to housing attaching bolt hole.
5. Slowly turn the steering wheel to the **left** stop, lubricant should rise within the lower cover bolt hole; then slowly turn the steering wheel to the **right** stop, lubricant should rise within the filler plug hole. If lubricant does not rise in both the cover bolt hole and the filler plug hole, add lubricant until it comes out both holes during this check.
6. Install the lower cover-to-housing attaching bolt and the filler plug.

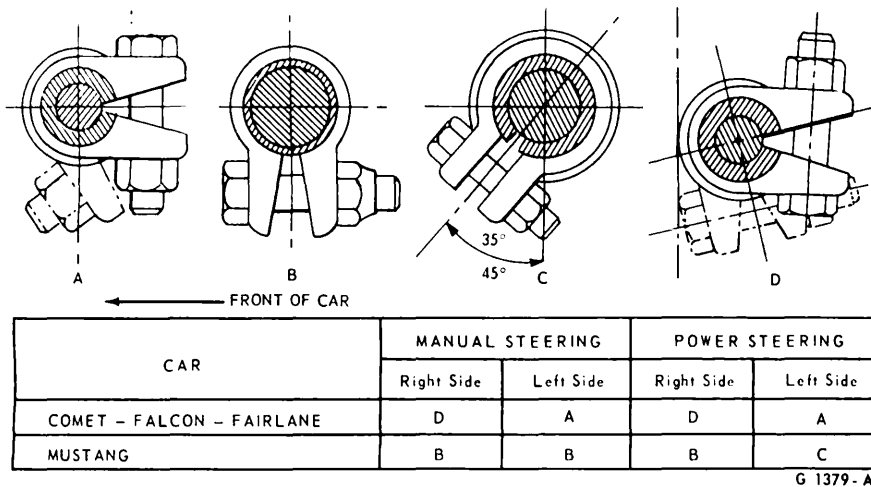


FIG. 13—Spindle Connecting Rod Sleeve Clamp Position

3 CLEANING AND INSPECTION

STEERING GEAR CLEANING AND INSPECTION

Wash all parts in a cleaning solvent and dry with a lint-free cloth. **The bearing should not be spun dry with compressed air.** Inspect the shaft and worm for scoring, cracks or checks, and for straightness of the shaft. Check the splines and the threads on the sector shaft for wear and burrs. Inspect the gear teeth for scoring, pitting and other wear. Inspect the ball bearings for free movement, and the cups for wear or irregular surfaces. Check the housing for cracks and the sector shaft needle bearing for free movement or other wear.

Check the power steering pump pressures. If the pump pressures are not to specification and there are no external fluid leaks, replace the pump. If the pump has a visible leak, replace the reservoir seal, outlet valve seals, or support stud seal, whichever is required.

FLUSHING THE POWER STEERING SYSTEM

Should a power steering pump become inoperative, the shaft and pulley should be checked for freedom of rotation. If the pump shaft does not turn freely (binding), it is an indication that there is wear on the pump internal components and the need for flushing the steering system, when installing a new pump.

1. Remove the power steering pump and pulley as outlined in Part 3-4.

2. Install a new pump and connect only the pressure hose to the pump (Part 3-4).

3. Place the oil return line in a suitable container and plug the reservoir return pipe.

4. Fill the reservoir with lubricant CIAZ-19582-A.

5. Disconnect the coil wire to prevent the engine from starting and raise the front wheels off the ground.

6. While approximately two quarts of steering gear lubricant are being poured into the reservoir, turn the engine over using the ignition key, at the same time cycle the steering wheel from stop to stop.

7. As soon as all of the lubricant has been poured in, turn off the ignition key, and attach the coil wire.

8. Remove the plug from the reservoir return pipe, and attach the return hose to the reservoir.

9. Check the reservoir fluid level; if low add fluid to the proper level. **Do not overfill.**

10. Lower the car.

11. Start the engine and cycle the steering wheel from stop to stop to expel any trapped air from the system.

FRONT END GENERAL INSPECTION

Do not check and adjust front wheel alignment without first making the following inspection for front-end maladjustment, damage, or wear.

1. Check for specified air pressures in all four tires.

2. Raise the front of the car off

the floor. Shake each front wheel grasping the upper and lower surfaces of the tire to check the front suspension ball joints and mountings for looseness, wear, and damage. Check the brake backing plate mountings. Torque all loose nuts and bolts to specifications. Replace all worn parts as outlined in Part 3-2.

3. Check the steering gear mountings and all steering linkage connections for looseness. Torque all mountings to specifications. If any of the linkage is worn or bent, replace the parts as outlined in Part 3-3.

4. Check the front wheel bearings. If any in-and-out free play is noticed, adjust the bearing to specification (Part 3-5). Replace worn or damaged bearings as outlined in Part 3-5.

5. Spin each front wheel with a wheel spinner, and check and balance each wheel as required.

6. Check the action of the shock absorbers. If the shock absorbers are not in good condition, the car may not settle in a normal, level position, and front wheel alignment may be affected.

WHEEL INSPECTION

Wheel lug nuts should be tightened to specification at the predelivery inspection. Loose wheel lug nuts may cause shimmy and vibration. Elongated stud holes in the wheels may also result from loose lug nuts.

Keep the wheels and hubs clean. Stones wedged between the wheel and drum and lumps of mud or grease can unbalance a wheel and tire.

Check for damage that would affect the runout of the wheels. Wobble or shimmy caused by a damaged wheel will cause premature tire wear and eventually damage the wheel bearings. Inspect the wheel rims for dents that could permit air to leak from the tires.

WHEEL BALANCING

See the instructions provided with the Rotunda Wheel Balancer.

UPPER BALL JOINT INSPECTION

1. Raise the car on a frame contact hoist or by floor jacks placed beneath the underbody until the wheel falls to the full down position as shown in Fig. 14. This will unload the upper ball joint.

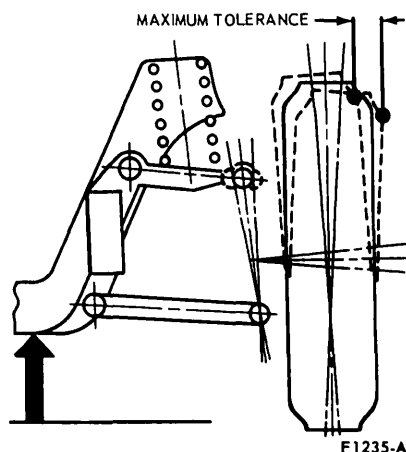


FIG. 14—Measuring Upper Ball Joint Radial Play

2. Adjust the wheel bearings as described in Part 3-5.

3. Attach a dial indicator to the upper arm. Position the indicator so that the plunger rests against the underside of the spindle at the upper ball joint stud.

4. With the dial indicator attached to the upper arm, position the indicator so that the plunger rests against the inner side of the wheel rim adjacent to the upper arm ball joint.

5. Grasp the tire at the top and bottom, and slowly move the tire in and out (Fig. 14). Note the reading (radial play) on the dial indicator. If the reading exceeds specifications (Part 3-6), replace the upper ball joint.

LOWER BALL JOINT INSPECTION

1. Raise the car on a frame contact hoist or by floor jacks placed beneath the underbody until the wheel falls to the full down position.

2. Ask an assistant to grasp the lower edge of the tire and move the wheel in and out.

3. As the wheel is being moved in and out, observe the lower end of the spindle and the lower arm.

4. Any movement between the lower end of the spindle and the lower arm indicates ball joint wear and loss of preload. If any such movement is observed, replace the lower arm.

During the foregoing check, the upper ball joint will be unloaded and may move. Disregard all such movement of the upper ball joint. Also, do not mistake loose wheel bearings for a worn ball joint.

SHOCK ABSORBERS

Passenger cars and station wagons are equipped with hydraulic shock absorbers of the direct-acting type and are nonadjustable and nonrefillable, and cannot be repaired.

Before replacing a shock absorber, check the action of the shock absorbers by grasping the bumper and jouncing the car up and down. If the shock absorbers are in good condition the car will immediately settle to a normal position after the bumper is released.

TESTING

To check a shock absorber removed from a car proceed as follows:

1. Hold the shock absorber in the vertical position with the piston in the same position, push in the piston rod until the shock is extended to its full length.

2. With the shock absorber held in the same position, push in the piston rod until the shock is compressed to its shortest length.

3. Repeat steps 1 and 2 several times until all the air is expelled.

4. Clamp the lower end (small diameter) in a vise in a vertical position.

5. Extend the shock to its full length and then compress it to its shortest length. There should be a constant drag during the complete cycle. Any sudden loss of drag indicates air in the system, loss of fluid, or faulty internal valve operation. Replace defective shock absorbers.

PART

3-2 SUSPENSION

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1 DESCRIPTION AND OPERATION

FRONT SUSPENSION

Each front wheel rotates on a spindle. The upper and lower ends of the spindle are attached to upper and lower ball joints which are mounted to an upper and lower arm respectively. The upper arm pivots on a bushing and shaft assembly which is bolted to the underbody. The lower arm pivots on a bolt that is located in an underbody bracket (Figs. 1 and 14).

A coil spring seats between the upper arm and the top of the spring housing. A double acting shock absorber is bolted to the arm and the top of the spring housing.

The swiveling action of the ball joints allow the wheel and spindle assemblies to move up and down with changes in road surface. The swiveling ball joints also permit the spindles and wheels to be turned to the left or right by the steering gear and linkage.

The pivoting action of the suspension arms provides an **up and down** movement for the spindles and wheels as required by bumps or depressions in the road surface. The coil springs, shock absorbers and stabilizer bar control the front suspension up and down movements. The struts, which are connected between the suspension lower arms and the underbody prevent the suspension arms from moving forward and backward.

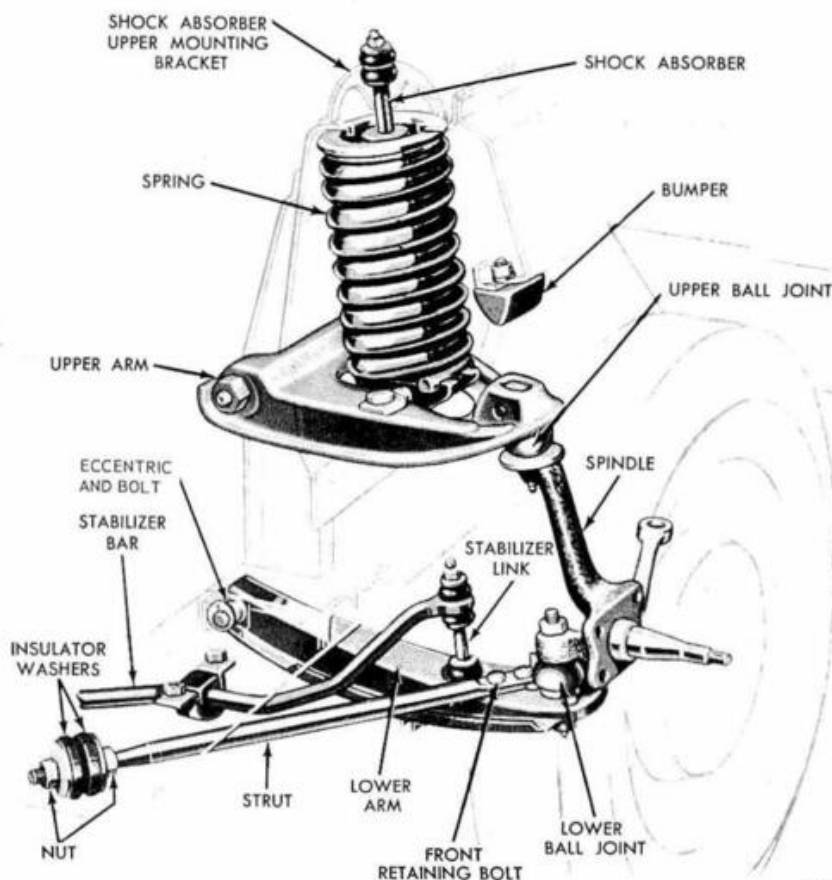


FIG. 1—Front Suspension—Typical

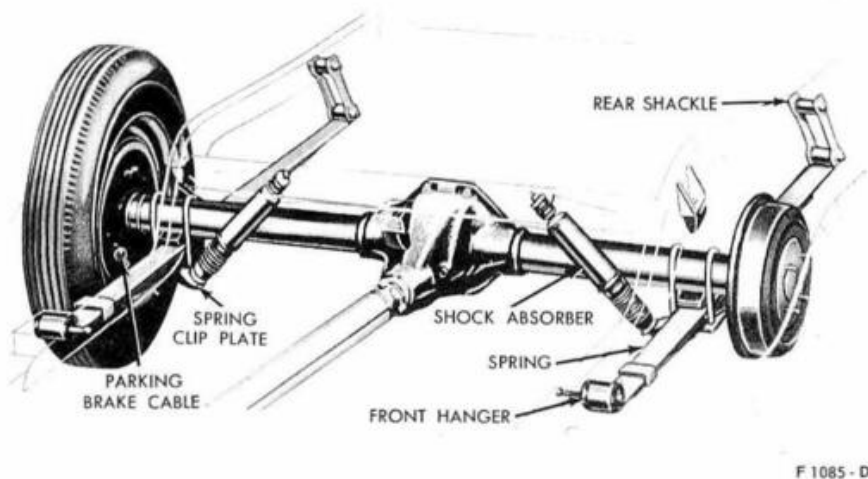


FIG. 2—Rear Suspension—Typical

REAR SUSPENSION

Each rear wheel, hub, and brake drum assembly is bolted to the rear axle shaft flange. The wheel and axle shaft assembly rotates in the rear axle housing. Two spring pads integral with the axle housing, rest on two leaf type springs. The axle housing is fastened to the springs by spring clips (U-bolts), spring clip plates and nuts (Figs. 2 and 18). Each spring is suspended from the underbody side rail by a hanger at the front and a shackle at the rear. The upper end of each shock absorber is mounted to a bracket in the underbody. The lower end is mounted to the spring clip plate.

The springs and shock absorbers provide for up and down movement of the rear axle and wheels as required by changes in the road surface. They also cushion road shocks.

2 IN-CAR ADJUSTMENTS AND REPAIRS

HOISTING INSTRUCTIONS

Damage to suspension and/or steering linkage components may occur if care is not exercised when positioning the hoist adapters of 2 post hoists prior to lifting the car.

If a 2 post hoist is used to lift the car, place the adapters under the front suspension lower arms. **Do not allow the adapters to contact the steering linkage.**

UPPER BALL JOINT REPLACEMENT

1. Position a support between the upper arm and frame side rail as shown in Figs. 3 and 4; then, raise the car and position safety stands.

2. Remove the wheel and tire.

3. Remove the cotter pin and nut from the upper ball joint stud.

4. Position the ball joint remover tool as shown in Fig. 5. The tool should seat firmly against the ends of both studs, and not against the lower stud nut. It may be necessary to remove the lower ball joint cotter pin if it prevents the tool from seating on the lower stud.

5. Turn the tool with a wrench until both studs are under tension, and then, with a hammer, tap the spindle near the upper stud to loosen the stud from the spindle. **Do not loosen the stud with tool pressure alone.** Raise the stud out of the spindle bore.

6. Using a large chisel, cut off the



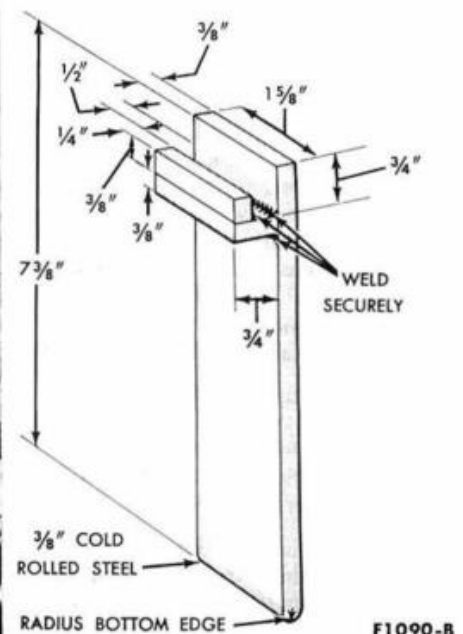
FIG. 3—Upper Arm Support—Mustang

three upper ball joint retaining rivets and remove the ball joint.

7. Clean the end of the arm, and remove all burrs from the hole edges. Check for cracks in the metal at the holes, and replace the arm if it is cracked.

8. Attach the new ball joint to the upper arm. Use only the specified bolts, nuts, and washers. Do not rivet the new ball joint to the arm. Torque the nuts to specification (Part 3-6).

9. Position the ball joint stud in



the spindle bore, and torque the retaining nut to specification. Install a new cotter pin, tighten the nut if necessary to line up the cotter pin hole.

10. Lubricate the ball joint, and install the wheel and tire. Torque the lug nuts to specification (Part 3-6).

11. Remove the safety stands, and lower the car.

12. Remove the support from between the upper arm and frame.

13. Check and, if necessary, adjust caster, camber, and toe-in.

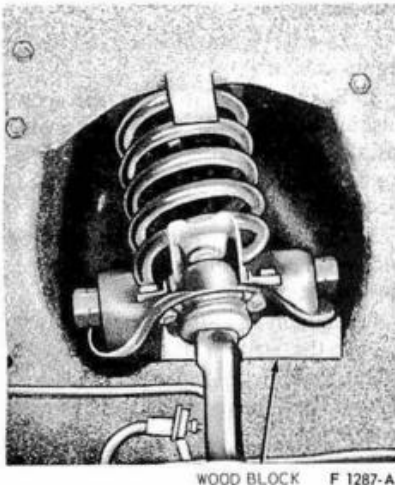


FIG. 4—Upper Arm Support—Comet, Falcon, and Fairlane

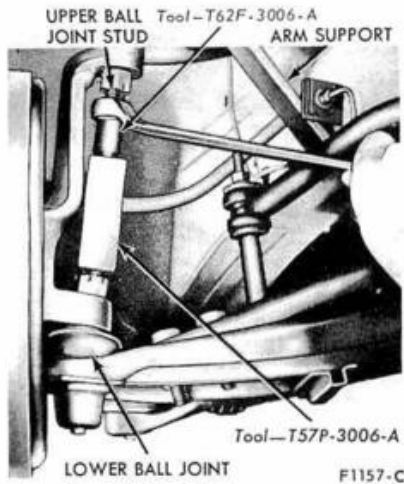


FIG. 5—Loosening Ball Joint Studs in Spindle—Typical

UPPER ARM SHAFT AND/OR BUSHING RELACEMENT

1. Remove the shock absorber and upper mounting bracket as an assembly.
2. Raise the car on a hoist, install safety stands, and remove the wheel cover or hub cap.
3. Remove the grease cap from the hub; then, remove the cotter pin, nut lock, adjusting nut and outer bearing from the hub.
4. Pull the wheel, tire, and the hub and drum off the spindle as an assembly.
5. Install the spring compressor, Tool T63P-5310-A or the Comet Tool 5310-C and compress the spring (Section 3).
6. Remove 2 upper arm to spring tower retaining nuts and swing the

upper arm outboard from the spring tower.

7. Rotate the inner shaft so that the retaining studs can be removed. Remove the retaining studs with a soft mallet (Mustang Only).

8. Unscrew the bushings from the shaft and suspension arm; then, remove the shaft from the arm.

9. Position the shaft in the arm, apply grease to the new bushings and O-rings, and install the bushings loose on the shaft and arm. Turn the bushings so that the shaft is exactly centered in the arm. The shaft will be properly centered when dimensions A and B in Fig. 6 are equal.

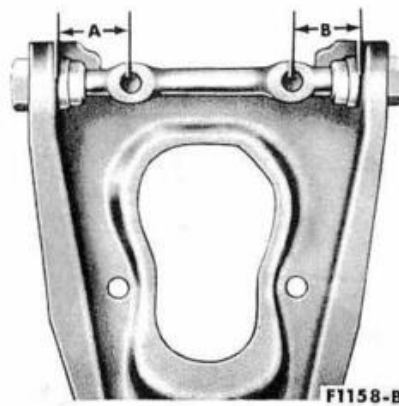


FIG. 6—Shaft Centered in Arm—Typical

10. Fabricate a spacer from a section of $\frac{3}{4}$ -inch diameter pipe or metal of comparable size and strength. On a Mustang the spacer should be $7 \frac{7}{16}$ inches long. On a Comet, Falcon, or Fairlane, the spacer should be $6 \frac{15}{16}$ inches long.

11. Position the spacer parallel with the inner shaft, and force the spacer between the flanges of the upper arm (Fig. 7).

If the spacer can not be forced between the arm flanges due to excessive distortion, replace the upper arm assembly.

12. With the spacer positioned in the arm, torque the bushings to specification. Move the arm on the shaft to be sure that no binding exists, then remove the spacer.

13. Connect the suspension upper arm to the underbody. Install the adjusting shims (Mustang only) and release the front spring.

14. Remove the spring compressor and position the wheel, tire, and hub and drum on the spindle.

15. Install the bearing, washer, adjusting nut and nut lock. Adjust the wheel bearing as outlined in Part 3-5

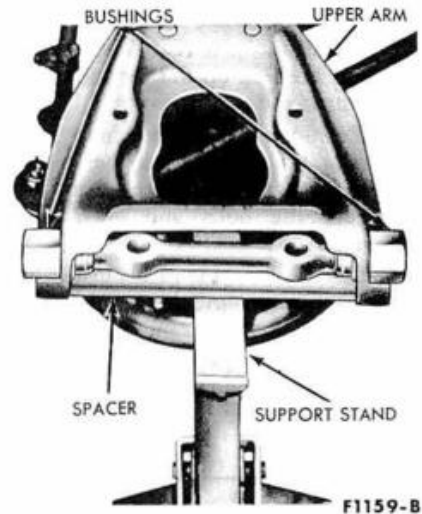


FIG. 7—Torque Upper Arm Inner Shaft Bushings—Typical

and install the cotter pin, grease cap and hub cap or wheel cover.

16. Lower the car and install the shock absorber and upper mounting bracket.

17. Check caster, camber, and toe-in and adjust as necessary (Part 3-1).

STABILIZER REPLACEMENT

1. Raise the car high enough to provide working space, and place supports under both front wheels.

2. Disconnect the stabilizer from each link. Disconnect both stabilizer retaining brackets, and remove the stabilizer.

3. Coat the necessary parts of the stabilizer with RUGLYDE or a comparable lubricant, and slide new insulators onto the stabilizer.

4. Connect the stabilizer retaining brackets, and connect the stabilizer to both links. Torque the bracket retaining screws and the link bolt nut to specification.

5. Remove the supports and lower the car.

LOWER ARM STRUT AND/OR BUSHING REPLACEMENT

MUSTANG

1. Position the block as shown in Fig. 3 under the upper arm for support.

2. Raise the car, position safety stands, and remove the wheel and tire.

3. Remove the strut-to-bracket forward retaining nut, washer and insulator bushings (Fig. 14).

4. Remove the 2 strut-to-lower arm retaining nuts and bolts; then,

lift the strut with rear insulator bushing and washer from the car.

5. Install the new rear washer and insulator bushing on the forward end of the strut rod.

6. Position the strut into the mounting bracket and to the lower suspension arm. Install the strut-to-arm retaining bolts and nuts, and torque to specification.

7. Install the forward insulator bushing, washer, and nut to the forward end of the strut and torque the strut rod nut to specification.

8. Install the wheel and tire, remove the safety stands and lower the

car. Remove the tool supporting the upper arm.

COMET, FALCON, AND FAIRLANE

Removal

1. Raise the car and install safety stands.

2. Remove the lower arm strut front retaining nut, washer and bushing at the frame bracket (14).

3. Remove 2 bolts and nuts attaching the strut to the lower arm and remove the strut.

4. Remove the bushing, washer and nut from the strut.

Installation

1. Install the nut, washer and bushing on the strut.

2. Position the strut to the front bushing bracket and to the lower arm. Install the strut to lower arm attaching bolts and nuts and torque to specification.

3. Position the strut front bushing and washer on the strut and install the adjusting nut.

4. Tighten the strut adjusting nuts against the strut frame bracket.

5. Lower the car and check caster, camber and toe-in and adjust as necessary.

3 REMOVAL AND INSTALLATION

HOISTING INSTRUCTIONS

Damage to suspension and / or steering linkage components may occur if care is not exercised when positioning the hoist adapters of 2 post hoists prior to lifting the car.

If a 2 post hoist is used to lift the car, place the adapters under the front suspension lower arms. **Do not allow the adapters to contact the steering linkage.**

FRONT SPRING

MUSTANG

Removal

1. Raise the front of the car, position safety stands under the frame, and lower the car slightly.

2. Remove the wheel and tire assembly.

3. Remove the shock absorber lower retaining nuts and washers.

4. Remove the shock absorber upper mounting bracket retaining nuts, and remove the shock absorber and bracket as an assembly (Fig. 15).

5. On all 8-cylinder cars, remove the air cleaner to obtain access for tool installation.

6. Position the upper plate (Tool T64K-5310-A) at the spring upper seat; place the bearing of tool T63P-5310-A on the plate and insert the tool shaft (detail A1) through the bearing and upper plate with the tool nut (detail A2) against the bearing as shown in Fig. 8.

7. Install the tool lower plate (detail A3) under the third coil from the bottom (Fig. 9). Secure the plate to the shaft screw (detail A1) with the retainer (detail A4). The retainer en-

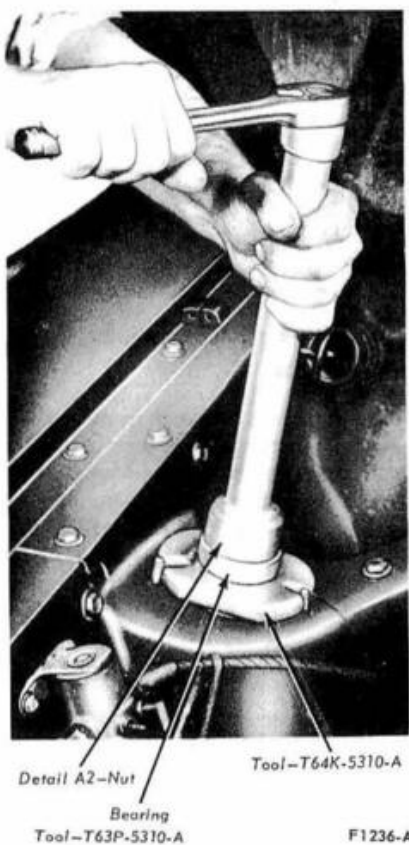


FIG. 8—Compressing or Releasing Spring on Mustang—Upper View

gages the groove in the shaft screw below the plate as shown. The tang of the retainer engages the cut-out in the plate.

8. Insert a 1/2-inch square drive flexhandle wrench in the drive hole in the lower plate to prevent the tool and spring from turning (Fig. 9). While thus holding the tool, compress

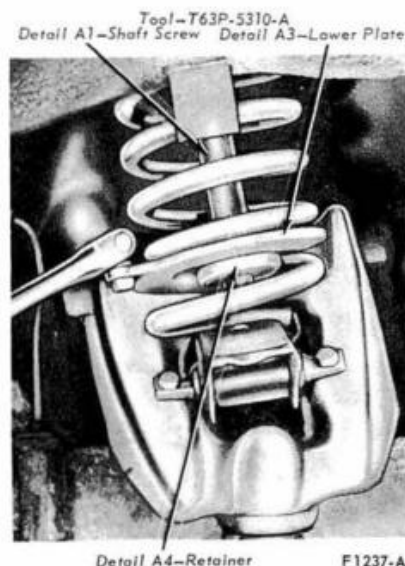


FIG. 9—Compressing or Releasing Spring on Mustang—Lower View

the spring by turning the tool shaft nut clockwise (Fig. 8) until the spring clears the suspension upper arm.

9. Remove the upper suspension arm inner shaft retaining nuts from the engine compartment, and pull the arm, shaft, and retaining bolts away from the underbody. Measure and note the total shim thickness at each inner shaft retaining bolt. Swing the upper arm and shaft assembly 180° out to provide clearance for spring removal (Fig. 10).

10. Turn the tool shaft nut counterclockwise until the spring is released (Fig. 8). **Hold the tool lower plate from turning during spring release. Use a 1/2-inch square drive flexhandle wrench (Fig. 9).**

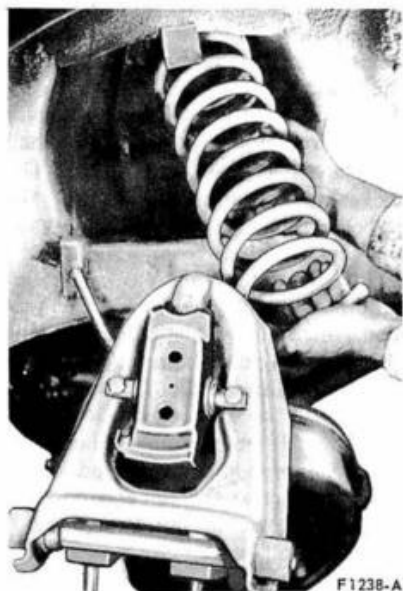


FIG. 10—Removing or Installing Spring—Mustang

11. Remove the components of the spring compressing tool; then, remove the spring as shown in Fig. 10.

Installation

1. With the upper arm turned out of the way for clearance, install the spring in the housing (Fig. 10).

2. Install the spring compressor tool and compress the spring.

3. Swing the suspension upper arm assembly inboard, and insert the arm inner shaft retaining bolts through the mounting holes in the underbody.

4. From inside the engine compartment, install but do not tighten the nuts and lockwashers on the two inner shaft retaining bolts. **The specified keystone type lock washers must be used.**

5. Install the adjusting shims on both bolts between the inner shaft and the underbody. **Install the same shim thicknesses that were removed from each bolt when the arm was disconnected.** Torque the inner shaft retaining nuts to specification.

6. Turn the tool shaft nut counterclockwise to release the spring (Fig. 8). As the spring is being released, guide the spring into its lower seat.

7. Remove the components of the spring tool.

8. Position the shock absorber in the spring housing so that the holes in the upper mounting bracket engage the upper retaining studs in the housing (Fig. 15). The lower retaining bolts go through the mounting holes in the spring lower seat.

9. Install the bracket retaining

nuts, and torque to specification. Install the shock absorber lower retaining nuts on the bolts at the underside of the spring lower seat and torque to specification.

10. Install the wheel and tire assembly, remove the safety stands and lower the car.

11. Check and, if necessary, adjust caster, camber, and toe-in.

COMET, FALCON, AND FAIRLANE

Removal

1. Remove the shock absorber and upper mounting bracket as an assembly.

2. Raise the car on a hoist, install safety stands, and remove the wheel cover or hub cap.

3. Remove the grease cap from the hub; then, remove the cotter pin, nut lock, adjusting nut and outer bearing from the hub.

4. Pull the wheel, tire and the hub and drum off the spindle as an assembly.

5. Install the spring compressor, Tool T63P-5310-A or the Comet Tool 5310-C (Fig. 11), and compress the spring (Figs. 9 and 12). Either tool can be used.

6. Remove 2 upper arm to spring

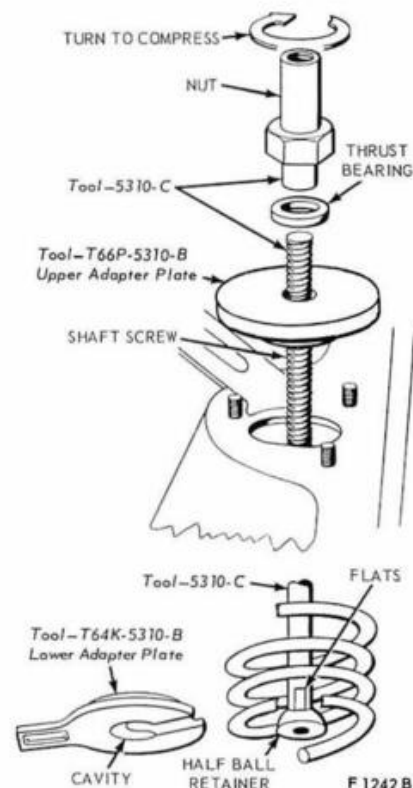


FIG. 11—Comet Spring Tool Installation

tower retaining nuts and swing the upper arm outboard from the spring tower (Fig. 13).

7. Release the spring compressor tool and remove the tool from the spring. Then, remove the spring from the car (Fig. 10).

Installation

1. Place the spring upper insulator on the spring and secure in place with tape.

2. Position the spring in the spring tower. Install the spring compressor, Tool T63P-5310-A and compress the spring.

3. Swing the upper arm inboard and insert the bolts through the holes in the side of the spring tower. Then, install the retaining nuts and torque them to specification.

4. Release the spring pressure and guide the spring into the upper arm spring seat. **The end of the spring must seat against the tab on the spring seat.**

5. Remove the spring compressor and position the wheel, tire, and hub and drum on the spindle.

6. Install the bearing, washer, adjusting nut and nut lock. Adjust the wheel bearing as outlined in Part 3-5 and install the cotter pin, grease cap, and hub cap or wheel cover.

7. Lower the car and install the shock absorber and upper mounting bracket.

8. Check caster, camber, and toe-in and adjust as necessary (Part 3-1).

FRONT SUSPENSION UPPER ARM

MUSTANG

Removal

1. Raise the front of the car, position safety stands under the frame, and lower the car slightly.

2. Remove the wheel and tire assembly.

3. Remove the shock absorber lower retaining nuts and washers.

4. Remove the shock absorber upper mounting bracket retaining nuts, and remove the shock absorber and bracket as an assembly (Fig. 15).

On all 8-cylinder cars, remove the air cleaner to obtain access for tool installation.

5. Install the spring compressor, Tools T63P-5310-A and T64K-5310-A and compress the spring (Figs. 8 and 9).

6. Position a safety stand under the lower arm.

7. Remove the cotter pin from the



FIG. 12—Spring Compressor Installed—Upper View—Comet, Falcon and Fairlane

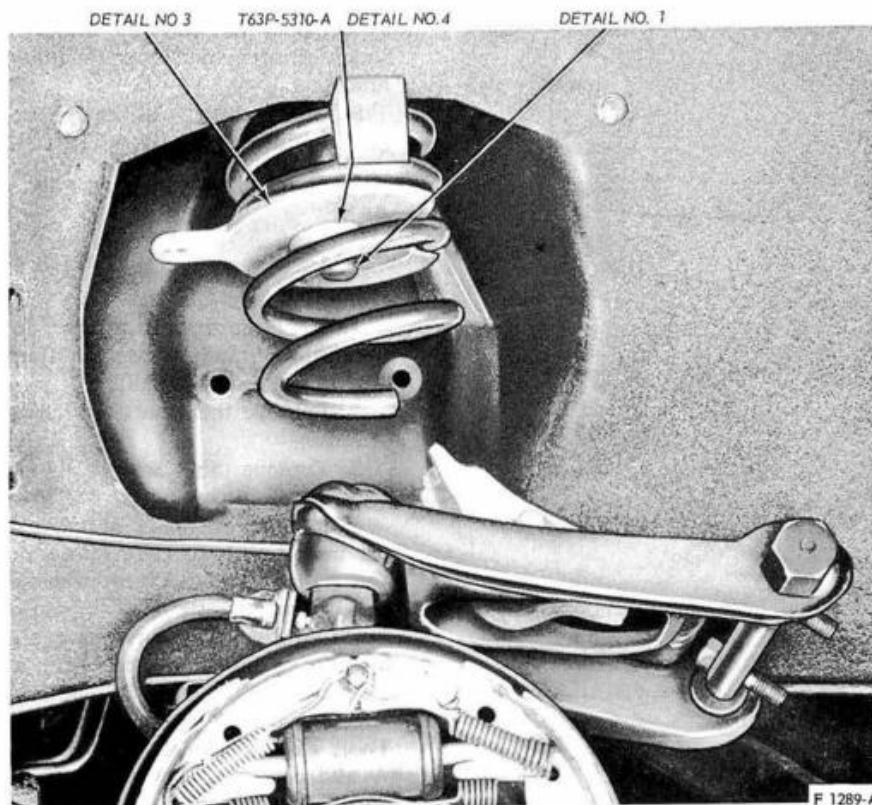


FIG. 13—Compressing Spring—Lower View—Comet, Falcon, and Fairlane

nut on the upper ball joint stud, and loosen the nut one or two turns. **Do not remove the nut from the stud at this time.**

8. Position the ball joint remover tool between the upper and lower ball joint studs as shown in Fig. 5. The tool should seat firmly against the ends of both studs and not against the stud nuts.

9. Turn the tool with a wrench until the tool places the studs under tension; then, tap the spindle near the upper stud with a hammer to loosen the stud in the spindle. **Do not loosen the stud in the spindle with tool pressure only.** If both arms are being removed, loosen the lower stud in the same manner as the upper stud.

10. Remove the nut from the upper stud and lift the stud out of the spindle.

11. Remove the upper arm inner shaft retaining nuts from the engine compartment, and remove the upper arm. Measure and note the total shim thickness at each inner shaft bolt.

12. Wipe off all loose dirt from the upper arm parts. **Do not wash the ball joint with a solvent.**

Installation

1. Position the upper arm on the underbody mounting bracket, and install but do not tighten the nuts and lockwashers on the two inner shaft retaining bolts. **The specified key-stone-type lockwashers must be used.**

2. Install the adjusting shims on both bolts between the inner shaft and the underbody. **Install the same shim thicknesses that were removed from both bolts during disassembly (Fig. 7, Part 3-1).** Torque the nuts to specification.

3. Position the upper ball joint stud in the top of the wheel spindle, and install the stud nut. Torque the nut to specification, and continue to tighten it until the cotter pin hole and slots line up. Install a new cotter pin.

4. Release the coil spring, remove the tool, and install the front shock absorber and the wheel and tire assembly.

COMET, FALCON, AND FAIRLANE

Removal

1. Remove the front shock absorber from the car.

2. Raise the car and install safety stands under the frame side rails.

3. Remove the hub cap or wheel cover and the wheel and tire.

4. Install the spring compressor,

Tools T63P-5310-A (Tool-5310-C-Comet), T64K5310-A or B, and T66P-5310-A or B and compress the spring (Fig. 13).

5. Remove the cotter pin from the upper ball joint stud and loosen the stud nut.

6. Position the ball joint remover tool as shown in Fig. 5. **The tool should seat firmly against the ends of both studs and not against the lower stud nut.** It may be necessary to remove the lower ball joint cotter pin if it prevents the tool from seating on the stud.

7. Turn the tool with a wrench until both studs are under tension; then, tap the spindle near the upper stud with a hammer to loosen the stud from the spindle. **Do not loosen the stud with tool pressure alone.**

8. Remove the ball joint remover tool and remove the ball joint stud nut from the stud.

9. Remove 2 nuts and washers retaining the upper arm to the spring tower. Pull the upper arm away from the spring tower, lift the ball joint stud from the spindle, and remove the upper arm from the car.

10. Remove 2 nuts and bolts and remove the spring pivot from the upper arm.

Installation

1. Position the spring pivot to the upper arm and install the 2 attaching bolts and nuts. Torque the nuts to specification.

2. Position the upper arm to the spring tower and the ball joint stud to the spindle. Install but do not tighten the ball joint stud nut.

3. Position the upper arm to spring tower and install the washers and retaining nuts. Torque the nuts to specification.

4. Release the spring compressor tool while aligning the spring with the upper arm spring pivot. Then, remove the tool.

5. Torque the ball joint stud nut to specification (Part 3-6). Continue to tighten the nut until the slots in the nut are in line with the hole in the ball joint stud. Then, install a new cotter pin.

6. Install the wheel and tire and the hub cap or wheel cover.

7. Remove the safety stands and lower the car.

8. Install the shock absorber.

FRONT SUSPENSION LOWER ARM

MUSTANG

Removal

1. Position a support between the upper arm and side rail as shown in Fig. 3.

2. Raise the car, position safety stands, and remove the wheel and tire.

3. Remove the stabilizer bar and link retaining nut, disconnect the bar from the link, and remove the link bolt.

4. Remove the strut to lower arm retaining nuts and bolts. Remove the steering arm stop from the strut.

5. Remove the cotter pin from the nut on the lower ball joint stud, and loosen the nut one or two turns. **Do not remove the nut from the stud at this time.**

6. Straighten the cotter pin on the upper ball joint stud nut. Position the ball joint remover tool between the upper and lower ball joint studs in the reverse position from that shown in Fig. 5. **The tool should seat firmly against the ends of both studs and not against the stud nuts.**

7. Turn the tool with a wrench until the tool places the studs under tension, and tap the spindle near the lower stud with a hammer to loosen the stud in the spindle. **Do not loosen the stud in the spindle with tool pressure only.** If both arms are being removed, loosen the upper stud in the same manner as the lower stud.

8. Remove the nut from the lower ball joint stud, and lower the arm.

9. Remove the lower arm to underbody pivot bolt, nut and washer. Remove the lower arm.

Installation

1. Position the lower arm to the underbody bracket and install the pivot bolt, washer, and nut loose.

2. Raise the lower arm, guide the lower ball joint stud into the spindle bore, and install the stud retaining nut loose.

3. Install the stabilizer link bolt, washers, bushings and spacer. Connect the stabilizer bar to the link. Install the retaining nut and torque to specifications (Fig. 14).

4. Position the strut and steering arm stop to the lower arm. Install the retaining bolts and nuts, and torque to specification.

5. Torque the lower ball joint stud nut to specification, continue to tighten the nut until the cotter pin hole

and slots are aligned, and install a new cotter pin.

6. Torque the lower arm-to-underbody pivot bolt and nut to specification.

7. Remove the safety stands and lower the car.

8. Remove the support from between the upper arm and frame.

9. **Check and, if necessary, adjust caster, camber, and toe-in.**

COMET, FALCON, AND FAIRLANE

Removal

1. Raise the car and position safety stands under the side rails.

2. Remove the hub cap or wheel cover.

3. Remove the wheel, tire, and hub and drum as an assembly.

4. Remove the stabilizer bar link retaining nut and remove the washers, bushings, spacer, and link bolt (Fig. 14).

5. Remove the 2 strut to lower arm attaching nuts and bolts.

6. Remove the lower ball joint stud nut cotter pin and loosen the nut one or two turns. **Do not remove the nut from the stud at this time.**

7. Position the ball joint remover tool between the upper and lower ball joint studs in the reverse position (upside down) from that shown in Fig. 14. **The tool should seat firmly against the ends of both studs and not against the stud nuts.**

8. Turn the tool with a wrench until the studs are under tension. Tap the spindle near the lower stud with a hammer to loosen the stud in the spindle. **Do not loosen the stud with tool pressure only.**

9. Remove the tool and remove the nut from the lower ball joint stud.

10. Mark the location of the eccentric and eccentric bolt at the lower arm to underbody attachment.

11. Remove the nut, bolt, and eccentrics attaching the lower arm to the underbody and remove the lower arm.

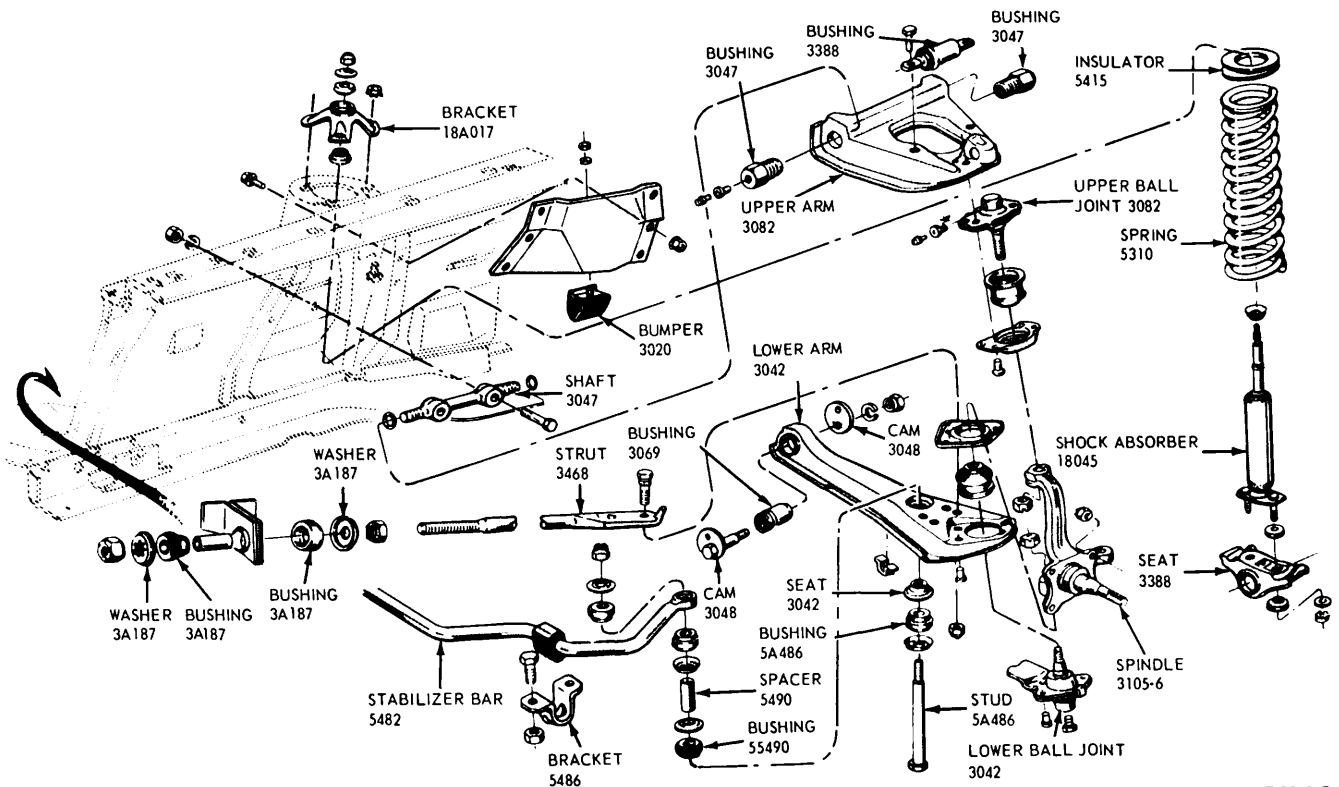
Installation

1. Position the lower arm to the underbody and install the bolt, eccentrics, and nut.

2. Position the ball joint stud in the spindle bore and install the retaining nut.

3. Adjust the eccentrics to the previous marked location and torque the nut to specification (Part 3-6).

4. Position the strut to the lower



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FIG. 14—Front Suspension Assembly—Comet, Falcon, and Fairlane—Typical of Mustang

arm and install the attaching bolts and nuts. Torque the nuts to specification (Part 3-6).

5. Position the stabilizer bar link to the lower arm and install the bolt, washers, bushings, spacer, and retaining nut. Torque the nut to specification (Part 3-6).

6. Torque the lower ball joint stud nut to specification (Part 3-6) and install the cotter pin.

7. Install the wheel, tire, and hub and drum on the spindle and adjust the wheel bearing (Part 3-5).

8. Install the hub cap or wheel cover, remove the safety stands, and lower the car.

9. Check caster, camber, and toe-in and adjust as necessary.

FRONT WHEEL SPINDLE

DRUM BRAKES

Removal

1. Position a support between the upper arm and frame as shown in Figs. 3 and 4; then, raise the car and position safety stands.

2. Remove the hub cap or wheel cover.

3. Remove the grease cap from the hub; then, remove the adjusting nut, washer, and outer bearing cone and roller assembly.

4. Pull the wheel, hub, and drum assembly off the wheel spindle.

5. Remove the brake carrier plate from the spindle. Support the plate to prevent damage to the brake hose.

6. Disconnect the spindle connecting rod end from the spindle arm using Tool 3290-C.

7. Remove the cotter pins from both ball joint stud nuts, and loosen the nuts one or two turns. **Do not remove the nuts from the studs at this time.**

8. Position the ball joint remover tool between the upper and lower ball joint studs (Fig. 5). **The tool should seat firmly against the ends of both studs and not against the stud nuts.**

9. Turn the tool with a wrench until the tool places the studs under tension, and, with a hammer, tap the spindle near the studs to loosen them in the spindle. **Do not loosen the studs in the spindle with tool pressure alone.**

10. Remove the stud nuts and remove the spindle from both studs.

Installation

1. Position the spindle on the lower ball joint stud and install the stud nut (Fig. 14).

2. Raise the lower suspension arm,

and guide the upper ball joint stud into the spindle. Install the stud nut.

3. Torque the upper stud nut and then the lower stud nut to specification. Continue to tighten both nuts until the cotter pin holes and slots line up. Install new cotter pins.

4. Connect the spindle connecting rod end to the spindle arm.

5. Install the brake carrier plate on the spindle, and torque the bolts to specification.

6. Install the wheel and drum and adjust the wheel bearing (Part 3-5).

7. Remove the safety stands, and lower the car.

8. Remove the support from between the upper arm and frame.

9. Check and, if necessary, adjust caster, camber, and toe-in.

DISC BRAKES

Removal

1. Remove the hub cap or wheel cover, and remove the wheel and tire from the hub.

2. Remove two bolts attaching the caliper to the caliper bracket. Remove the caliper from the rotor and wire it to the underbody to prevent damage to the brake hose.

3. Remove the grease cap from the hub, then, remove the adjusting

nut, washer, and outer bearing cone and roller assembly.

4. Pull the hub and rotor assembly off the wheel spindle.

5. Remove four bolts and nuts and remove the splash shield and caliper bracket from the spindle.

6. Disconnect the spindle connecting rod end from the spindle arm using Tool-3290-C.

7. Remove the cotter pins from both ball joint stud nuts, and loosen the nuts one or two turns. **Do not remove the nuts from the studs at this time.**

8. Position the ball joint remover tool between the upper and lower ball joint studs (Fig. 5). **The tool should seat firmly against the ends of both studs and not against the stud nuts.**

9. Turn the tool with a wrench until the tool places the studs under tension, and, with a hammer, tap the spindle near the studs to loosen them in the spindle. **Do not loosen the studs in the spindle with tool pressure alone.**

10. Position a floor jack under the lower suspension arm.

11. Remove the upper and lower ball joint stud nuts; lower the jack and remove the spindle.

Installation

1. Position the spindle on the lower ball joint stud and install the stud nut (Fig. 14). Torque the nut to specification and install the cotter pin.

2. Raise the lower suspension arm, and guide the upper ball joint stud into the spindle. Install the stud nut.

3. Torque the nut to specifications and install the cotter pin. Then, remove the floor jack.

4. Connect the spindle connecting rod end to the spindle arm and install the retaining nut. Torque the nut to specification and install the cotter pin.

5. Position the caliper bracket and splash shield to the spindle and install the attaching bolts and nuts. Torque the nuts and bolts to specification.

6. Install the hub and rotor on the spindle.

7. Position the caliper to the rotor and caliper bracket and install the attaching bolts.

8. Install the wheel and tire on the hub and adjust the wheel bearing (Part 3-5).

9. Install the hub cap or wheel cover.

10. Before driving the car, pump the brake pedal several times to obtain normal brake lining to rotor

clearance and restore normal brake pedal travel.

FRONT SHOCK ABSORBER

REMOVAL

1. Raise the hood and remove 3 shock absorber upper mounting bracket to spring tower retaining nuts.

2. Raise the front of the car and place safety stands under the lower arms.

3. Remove 2 shock absorber lower retaining nuts and washers (Fig. 15).

4. Lift the shock absorber and upper bracket from the spring tower (Fig. 15) and remove the bracket from the shock absorber.



FIG. 15—Removing or Installing Front Shock Absorber—Typical

INSTALLATION

1. Install the upper mounting bracket on the shock absorber and torque to specification.

2. Position the shock absorber and upper mounting bracket in the spring tower, making sure the shock absorber lower studs are in the pivot plate holes.

3. Install the 2 washers and retaining nuts on the shock absorber lower studs and torque to specification.

4. Install the 3 shock absorber upper mounting bracket to spring tower retaining nuts and torque to specification. Then, remove the safety stands and lower the car.

REAR SHOCK ABSORBER—MUSTANG

Removal

1. Disconnect the shock absorber from the spring clip plate (Fig. 18).

2. On the passenger car, remove the shock absorber access cover from the luggage compartment (Fig. 16).



FIG. 16—Rear Shock Absorber Access Cover

On the Ranchero, remove the retaining screws, and lift the forward half of the floor panel from the body; then, remove the access cover from the opening in the floor pan over the shock absorber.

On station wagons, remove the access cover from the opening in the seat riser over the shock absorber.

3. Remove the shock absorber upper retaining nut.

4. Compress the shock absorber and remove it from the car. Remove the bushings and washers from the shock absorber studs.

Installation

1. Place the bushings and washers on the shock absorber studs.

2. Connect the upper stud to the

mounting, and install the bushing, washer, and nut on the stud. Torque the nut to specification, and install the cover (on a station wagon or car).

On the Ranchero, after installing the nut to specification, and install stall the forward half of the floor panel.

3. Connect the lower stud to the spring clip plate, and install the bushing, washer, and nut on the stud. Be sure the spring clip plate is free of burrs. Tighten the nut to specification.

COMET, FALCON, AND FAIRLANE (EXCEPT CONVERTIBLE)

Removal

1. Open the luggage compartment door, and remove the spare wheel and tire. On a station wagon, remove the floor bed panel (14 screws).

2. Fold back the floor mat and

remove the shock absorber access cover from the floor pan. Remove the nut, outer washer, and rubber bushing that retain the shock absorber to the upper mounting in the floor pan (Fig. 17).

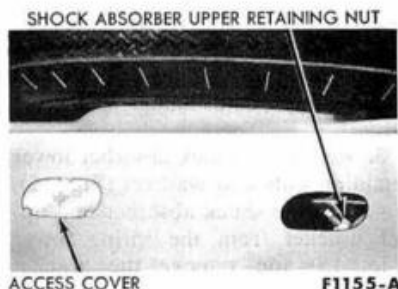


FIG. 17—Rear Shock Absorber Upper Mounting

3. Raise the car and remove the retaining nut, outer washer and bushing from the shock absorber at the

spring clip plate (Fig. 18). Compress the shock absorber and remove it from the car.

4. If the shock absorber is serviceable and requires new bushings remove the inner bushings and washers from the shock absorber studs.

Installation

1. Place the inner washer and bushing on each shock absorber stud.

2. Expand the shock absorber and position it to the spring clip plate and to the mounting in the floor pan.

3. Connect the lower stud to the spring clip plate, and install the bushing, washer, and nut on the stud (Fig. 18). Be sure the spring clip plate is free of burrs. Tighten the nut to specification.

4. From the luggage compartment, install the bushing washer and retaining nut to the upper mounting stud (Fig. 17). Torque to specifica-

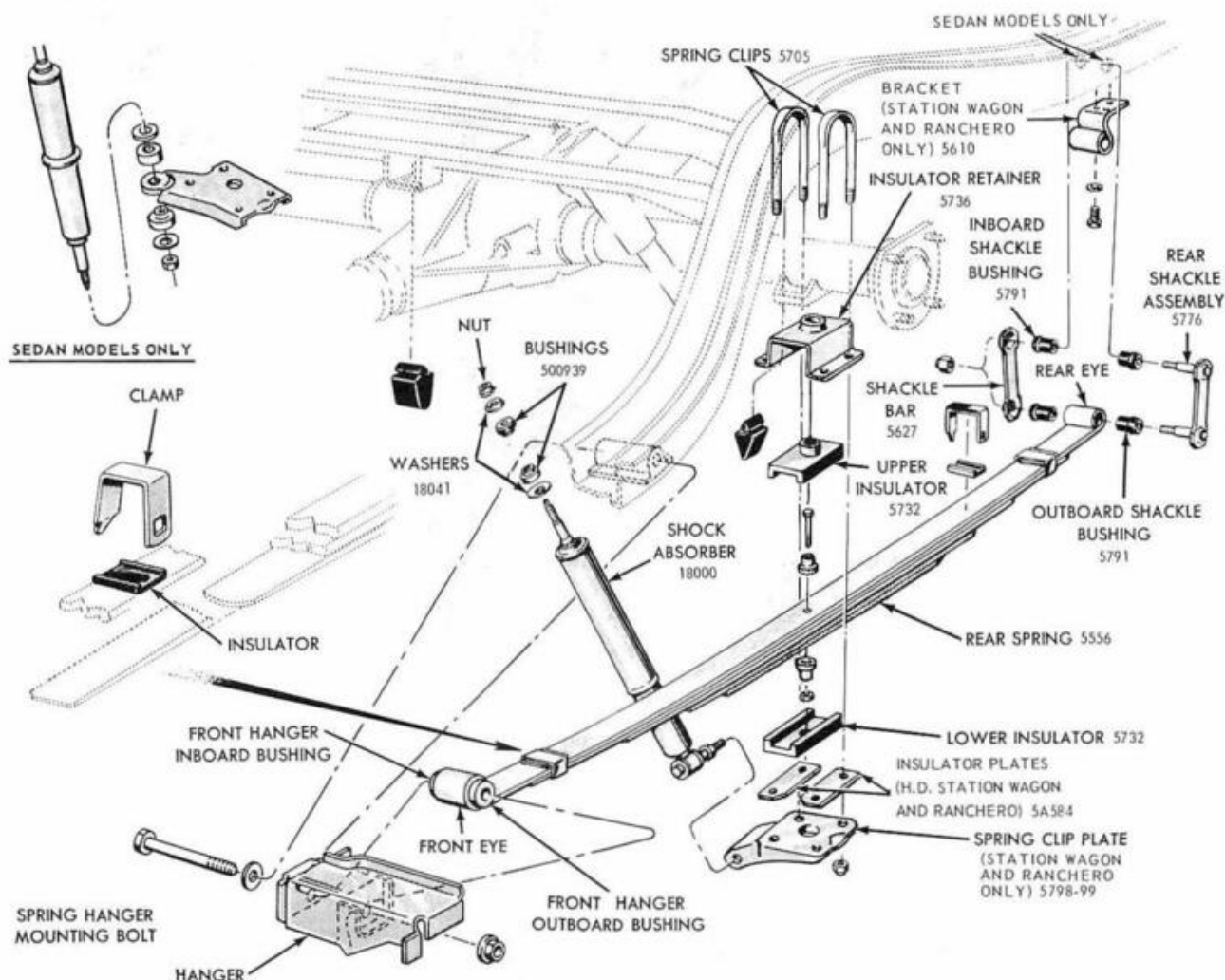


FIG. 18—Rear Spring and Shock Absorber—Typical

tion. On a station wagon, replace the floor bed panel (14 screws).

5. Place the spare wheel and tire in the luggage compartment, and secure it in the storage position.

COMET AND FAIRLANE CONVERTIBLE

1. Remove the rear seat cushion and seat back.

2. Partially raise the car on a hoist. With an assistant under the car holding the shock absorber, remove the nut from the top of the shock absorber.

3. Remove the lower shock absorber attaching nut and remove the shock absorber.

4. Position the washers and bushings on the shock absorber and position the shock absorber to the lower attachment. Install the bushing, washer, and retaining nut and torque the nut to specification (Part 3-6).

5. Lower the car and install the bushing, washer, and retaining nut on the top of the shock absorber. Torque the nut to specification.

6. Install the rear seat back and seat cushion.

REAR SPRING AND/OR BUSHING

REMOVAL

1. Raise the car on a hoist and place supports beneath the underbody and under the axle.

2. Disconnect the lower end of the shock absorber from the spring clip plate, and push the shock out of the way.

3. Remove the spring clip plate nuts from the U-bolts; then, remove the plate (Fig. 18).

4. Remove the two retaining nuts, the rear shackle bar, and the two shackle inner bushings.

5. Remove the rear shackle assembly and the two outer bushings.

6. Remove the front hanger bolt, nut, and washer from the eye at the forward end of the spring. Lift out the spring assembly.

7. If the front bushing is being replaced, assemble the special tool combination to the bushing in the spring front eye as shown in Fig. 19.

8. While holding the tool nut, tighten the tool bolt against the tool thrust washer, the adapter, and detail A1. This operation will force the bushing out of the spring eye into detail A4 of the tool as shown.

INSTALLATION

1. Assemble the bushing and the

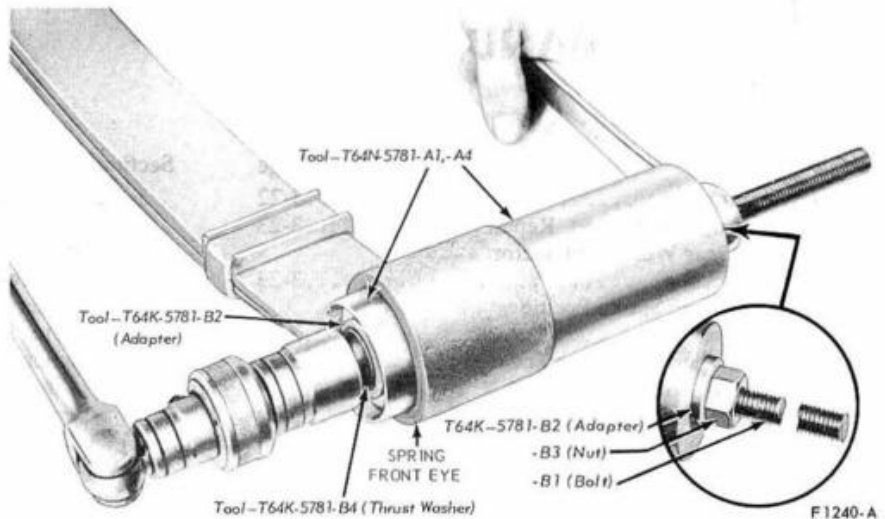


FIG. 19—Rear Spring Front Bushing Removal—Typical

special tool combination to the spring front eye as shown in Fig. 20.

2. While holding the tool nut, tighten the tool bolt against the tool thrust washer, adapter, and detail A4 to force the bushing into the spring eye as shown.

3. Position the spring under the rear axle and insert the shackle assembly into the rear hanger bracket and the rear eye of the spring.

4. Install the shackle inner bushings, the shackle plate, and the locknuts. Tighten the locknuts finger tight.

5. Position the spring front eye in the front hanger, slip the washer on the front hanger bolt, and (from the inboard side) insert the bolt through the hanger and eye. Install the lock

nut on the hanger bolt and tighten finger tight.

6. Torque the rear shackle locknuts to specification.

7. Lower the rear axle until it rests on the spring. Position the spring clip plate on the clips (U-bolts). Install the U-bolt nuts and torque to specification.

8. Connect the lower end of the shock absorber to the spring clip plate.

9. Place safety stands under the rear axle, lower the car until the spring is in the approximate curb load position, and then torque the front hanger stud locknut to specification.

10. Remove the safety stands and lower the car.

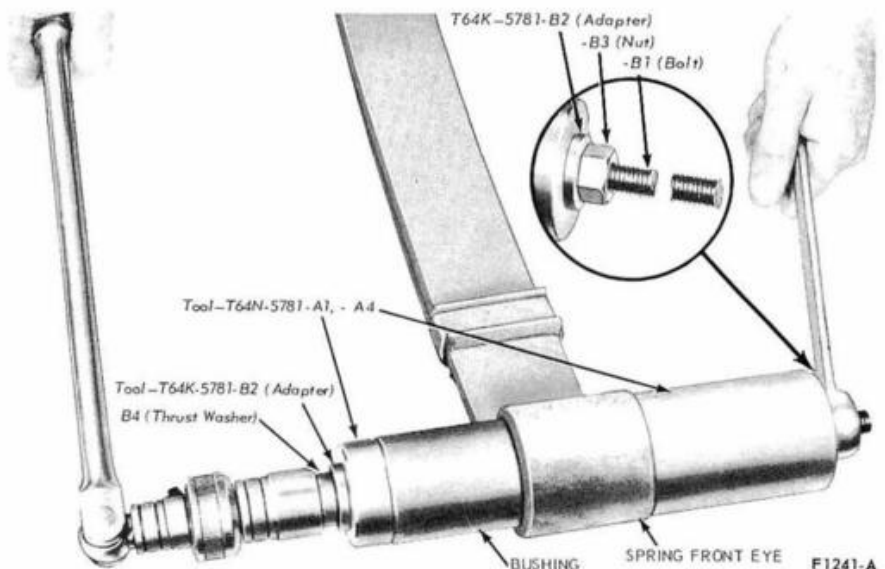


FIG. 20—Rear Spring Front Bushing Installation—Typical

PART

3-3

MANUAL STEERING

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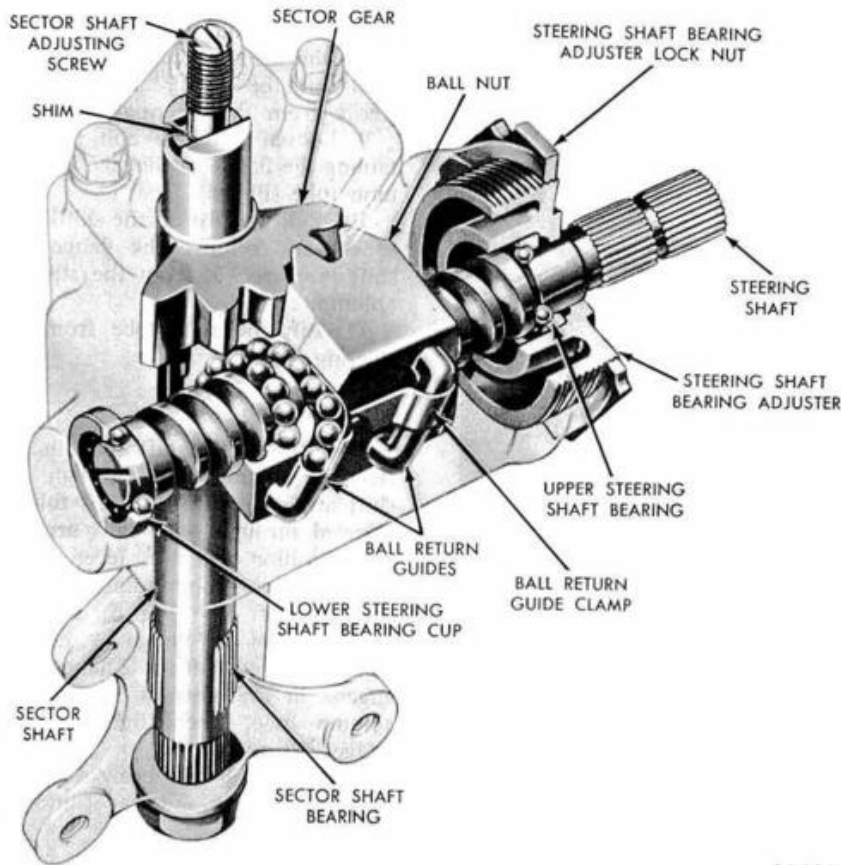
1 DESCRIPTION

The steering gear (Fig. 1) is of the worm and recirculating ball type. The sector shaft rotates in needle bearings that are pressed into the gear housing.

The worm bearing preload is controlled by the large bearing adjuster which is threaded into the housing. The sector shaft mesh load is controlled by an adjusting screw located

in the housing cover.

A steering gear identification tag is provided under one of the cover attaching bolts (Fig. 2).



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FIG. 1—Recirculating Ball Type Steering Gear—Typical

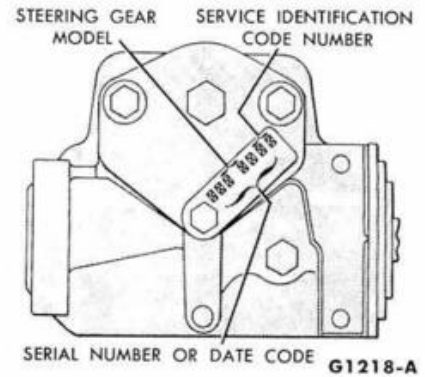


FIG. 2—Steering Gear Identification Tag

2 IN-CAR ADJUSTMENTS AND REPAIRS

HOISTING INSTRUCTIONS

Damage to suspension and/or steering linkage components may occur if care is not exercised when positioning the hoist adapters of 2 post hoists prior to lifting the car.

If a 2 post hoist is used to lift the car, place the adapters under the front suspension lower arms. **Do not** allow the adapters to contact the steering linkage.

STEERING GEAR WORM AND SECTOR ADJUSTMENTS

The ball nut assembly and the sector gear must be adjusted properly to maintain minimum steering shaft end play (a factor of preload adjustment) and minimum backlash between sector gear and ball nut. There are only two possible adjustments within the recirculating balltype steering gear, and these should be made in the following order to avoid damage or gear failure.

1. Disconnect the Pitman arm from the sector shaft.
2. Remove the steering wheel, spring and the centering cone from the shaft and note the relation of the shaft to the bearing.
3. If the shaft is not centered, attach a spring scale to it.
4. Center the shaft by pulling on the scale and note the reading.
5. If more than 20 lbs. pull is required to center the shaft, the steering column should be aligned as detailed in steering gear installation, before adjusting the preload and mesh load.
6. Loosen the nut which locks the sector adjusting screw (Fig. 3), and turn the adjusting screw counterclockwise.
7. Measure the worm bearing preload by attaching an in.-lb. torque wrench to the steering wheel nut (Fig. 4). With the steering wheel off center, read the pull required to rotate the input shaft approximately $1\frac{1}{2}$ turns either side of center. If the torque or preload is not within specification

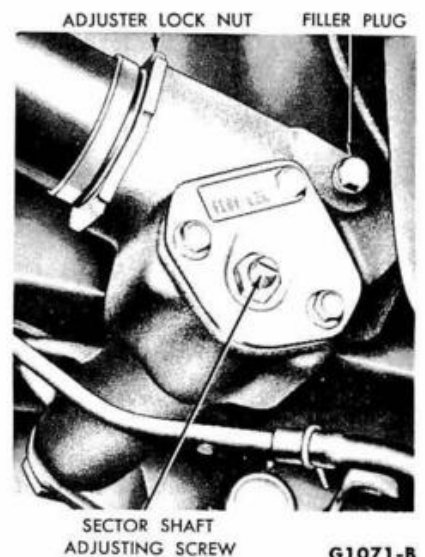
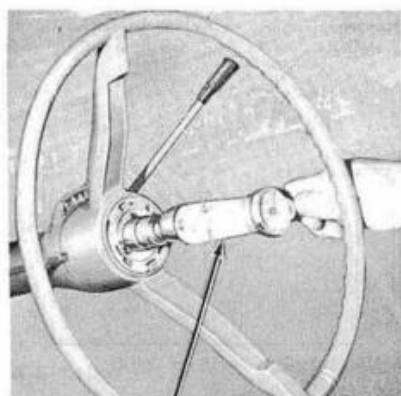


FIG. 3—Steering Gear Adjustments—Typical

(Part 3-6), adjust as explained in the next step.



**FIG. 4—Checking Pre-Load
—Typical**

8. Loosen the steering shaft bearing adjuster lock nut, and tighten or back off the bearing adjuster (Fig. 3) to bring the preload within the specified limits.

9. Tighten the steering shaft bearing adjuster lock nut, and recheck the preload.

10. Turn the steering wheel slowly to either stop. Turn gently against the stop to avoid possible damage to the ball return guides. Then rotate the wheel $2\frac{1}{4}$ turns to center the ball nut.

11. Turn the sector adjusting screw clockwise until the specified pull (Part 3-6) is necessary to rotate the worm past its center high spot (Fig. 4). No perceptible backlash is permissible at 30° on either side of center.

12. While holding the sector adjusting screw, tighten the locknut to specification and recheck the backlash adjustment.

13. Connect the Pitman arm to the sector shaft and torque to specification.

STEERING WHEEL SPOKE POSITION ADJUSTMENT

When the steering gear is on the high point, the front wheels should be in the straight-ahead position and the steering wheel spokes should be in their normal position with the Pitman arm pointing directly forward. If the spokes are not in their normal position, they can be adjusted without disturbing the toe-in adjustment (Refer to Part 3-1).

STEERING WHEEL REPLACEMENT

1. Remove the horn ring (or button) assembly and related parts.
2. Remove the steering wheel at-

taching nut and remove the steering wheel from the shaft, using the tool shown in Fig. 5.



**FIG. 5—Removing Steering
Wheel—Typical**

3. With the front wheels straight forward, position the steering wheel on the steering shaft with the post on the steering wheel hub at the top.

4. Apply Loctite Sealer (C3AZ-19554-A) to the steering shaft threads and install the steering wheel nut on the shaft. Torque the nut to specification.

5. With the front wheels straight forward (post on steering wheel hub at the top), install the horn ring (or button) assembly and the related parts.

STEERING COLUMN SHIFT TUBE REPLACEMENT

FALCON WITH STANDARD TRANSMISSION—COMET AND FAIRLANE WITH STANDARD TRANSMISSION AND STANDARD STEERING

Removal

1. Open the hood and insert a fabricated alignment tool (Group 6) through the column tube and shift arms to retain the shift mechanism in neutral.

2. Disconnect the turn signal and horn wires at the steering column connectors.

3. Remove the horn ring and spring from the steering wheel.

4. Remove the steering wheel retaining nut and remove the steering wheel with Tool 3600-AA (Fig. 5).

5. Remove the trunnion and springs retaining the shift lever in the socket and remove the shift lever.

6. Remove the turn signal switch lever.

7. Remove 3 bearing retainer at-

taching screws and remove the bearing retainer and turn signal switch from the steering column (Fig. 6).

8. Lift the spring and centering sleeve from the steering shaft.

9. Loosen 2 flange bolt nuts retaining the flange to the steering column tube (Fig. 6).

10. Pull upward on the shift lever socket and remove the flange and shift lever socket from the steering column.

11. Lift the shift tube from the steering column.

Installation

1. Position the shift tube in the steering column and through the shift arms. Be sure the shift tube is inserted through both shift arms.

2. Position the shift lever socket on the steering column and engage it with the shift tube (Fig. 6).

3. Position the flange to the hub so that the heads of the 2 flange bolts engage in the slots of the steering column tube. Then, tighten the 2 flange bolt nuts.

4. Position the centering sleeve on the steering shaft and seat it into the flange bearing.

5. Feed the turn signal switch wires through the steering column and position the switch and bearing retainer to the flange.

6. Install the 3 bearing retainer attaching screws.

7. Position the shift lever to the shift lever socket and install the springs and trunnion.

8. Apply 2 drops of Loctite sealer (C3AZ-19554-A) to the threads of the turn signal switch lever and install the lever.

9. Position the spring and steering wheel on the steering shaft and install the retaining nut. Torque the nut to specification and apply 2 drops of Loctite sealer (C3AZ-19554-A) to the junction of the nut and steering shaft threads.

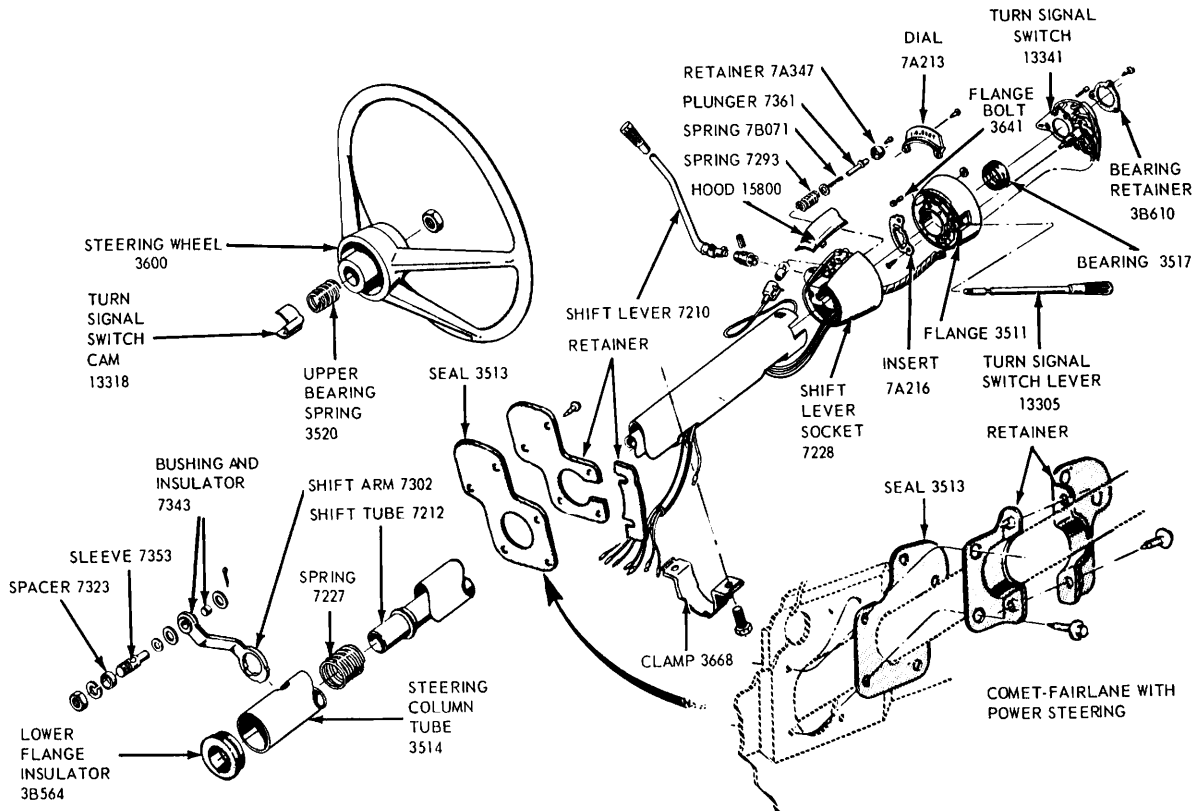
10. Install the spring and horn ring or button on the steering wheel and connect the turn signal and horn wires at the connectors.

11. Adjust the shift linkage, if required, and remove the alignment tool.

COMET AND FAIRLANE WITH STANDARD TRANSMISSION AND POWER STEERING

Removal

1. Open the hood and insert a fabricated alignment tool (Group 6) through the column tube and shift



G 1384-A

FIG. 6—Steering Column Disassembled—Typical

arms to retain the shift mechanism in neutral.

2. Disconnect the turn signal and horn wires at the steering column connectors.

3. Remove the horn ring and spring from the steering wheel.

4. Remove the steering wheel retaining nut and remove the steering wheel with Tool 3600-AA (Fig. 5).

5. Remove the trunnion and springs retaining the shift lever in the socket and remove the lever.

6. Remove the turn signal switch lever.

7. Remove 3 bearing retainer attaching screws and remove the bearing retainer and turn signal switch from the steering column (Fig. 6).

8. Remove the snap ring from the steering shaft.

9. Loosen 2 flange bolt nuts retaining the flange to the steering column tube (Fig. 6).

10. Pull upward on the shift lever socket and tap the end of the steering shaft with a soft hammer. This is to break the bearing loose from the shaft.

11. Remove the bearing, flange, and shift lever socket from the steering column.

12. Lift the shift tube from the steering column.

Installation

1. Position the shift tube in the steering column and through the shift arms and spacer. **Be sure the shift tube is inserted through both shift arms.**

2. Position the shift lever socket on the steering column and engage it with the shift tube (Fig. 6).

3. Position the flange to the hub so that the heads of the 2 flange bolts engage in the slots of the steering column tube. Then, tighten the 2 flange bolt nuts.

4. Position the bearing on the steering shaft and seat in the flange with Tool T62F-3576-A, if necessary.

5. Remove the tool and install the snap ring on the shaft.

6. Feed the turn signal switch wires through the steering column and position the switch and bearing retainer to the flange.

7. Install the 3 bearing retainer attaching screws.

8. Position the shift lever to the shift lever socket and install the roll pin.

9. Apply 2 drops of Loctite sealer (C3AZ-19554-A) to the threads of

the turn signal switch lever and install the lever.

10. Position the spring and steering wheel on the steering shaft and install the retaining nut. Torque the nut to specification and apply 2 drops of Loctite sealer (C3AZ-19554-A) to the junction of the nut and steering shaft threads.

11. Install the spring and horn ring (or button) on the steering wheel.

12. Adjust the shift linkage, if required, and remove the alignment pin from the shift arms and steering column.

13. Connect the turn signal and horn wires at the steering column connectors.

FALCON WITH AUTOMATIC TRANSMISSION COMET AND FAIRLANE WITH AUTOMATIC TRANSMISSION AND STANDARD STEERING

Removal

1. Open the hood and disconnect the shift rod from the steering column shift arm.

2. Loosen the steering gear to side rail retaining bolts.

3. Disconnect the turn signal and

horn wires at the steering column connectors.

4. Remove the horn ring (or button) and spring from the steering wheel.

5. Remove the steering wheel retaining nut and remove the steering wheel with Tool 3600-AA (Fig. 5).

6. Remove the insulation from the dash panel in the area of the steering column.

7. Remove 5 dash panel seal retainer attaching screws (Fig. 6) and remove the seal from the steering column opening. Then, slide the seal up the steering column.

8. Remove 2 bolts attaching the steering column to the instrument panel support.

9. Apply tape to the area around the instrument panel steering column opening to protect the finish on the panel.

10. Place the transmission selector lever in the low gear position.

11. Turn the steering column $\frac{1}{4}$ turn counterclockwise. Pull the steering column upward on the steering shaft until the shift arm contacts the dash panel in the engine compartment.

12. Rotate the steering column clockwise until the shift arm clears the opening in the dash panel. Then, pull upward on the column until the steering column attaching bracket clears the instrument panel. It may be necessary to apply a slight downward pressure on the steering column so the bracket will clear the instrument panel.

13. Rotate the steering column until the shift arm is pointing down and remove the column from the car.

14. Place the steering column on a bench and move the transmission selector lever to the neutral position.

15. Remove the shift tube to steering column hub retaining screw located on the underside of the hub.

16. Pull the shift tube out of the steering column from the lower end.

Installation

1. Position the shift tube in the steering column and install the retaining screw.

2. Place the steering column over the steering shaft with the shift arm pointing down.

3. Slide the steering column down on the steering shaft until the bracket is near the instrument panel opening.

4. Rotate the steering column about $\frac{1}{2}$ turn until the top of the

steering column bracket is straight up and down on the left side of the column.

5. Slide the steering column down on the steering shaft until the shift arm contacts the dash panel. It may be necessary to apply a slight downward pressure to the steering column so the bracket will clear the instrument panel.

6. Rotate the steering column so the shift arm clears the dash panel opening and slide the column down until the shift arm is through the opening. Then, rotate the steering column so that the steering column bracket is in position at the instrument panel support bracket.

7. Loosely install the 2 steering column bracket to support bracket attaching bolts (Fig. 6).

8. Position the seal and retainer to the steering column and dash panel and install the attaching screws (Fig. 6).

9. Position the upper bearing sleeve and spring on the steering shaft.

10. Position the steering wheel on the steering shaft and install the retaining nut. Torque the nut to specification and apply 2 drops of Loctite sealer (C3AZ-19554-A) to the junction of the nut and steering shaft threads.

11. Install the spring and horn ring (or button) on the steering wheel.

12. Connect the horn and turn signal wires at the multiple connector.

13. Connect the shift linkage to the shift arm.

14. Torque the steering gear attaching bolts to specification.

15. Torque the steering column bracket to support brace attaching bolts to specification.

16. Check and adjust the shift linkage as required.

COMET AND FAIRLANE WITH AUTOMATIC TRANSMISSION AND POWER STEERING

Removal

1. Open the hood and disconnect the shift linkage from the steering column shift arm.

2. Remove 2 bolts and nuts retaining the flex coupling to the steering shaft.

3. Disconnect the turn signal and horn wires at the steering column connectors.

4. Remove the horn ring (or button) and spring from the steering wheel.

5. Remove the steering wheel retaining nut and remove the steering wheel with Tool 3600-AA (Fig. 5).

6. Remove the insulation from the dash panel in the area of the steering column.

7. Remove 2 screws clamping the dash panel seal retainer to the steering column. Then, remove 5 screws attaching the retainer to the dash panel and remove the retainer.

8. Remove 2 bolts attaching the steering column to the instrument panel support and remove the steering column from the car.

9. Remove the snap ring from the steering shaft and remove the steering shaft from the steering column.

10. Place the selector lever in the neutral position and remove the shift tube to steering column hub retaining screw located on the underside of the hub.

11. Pull the shift tube out of the lower end of the steering column.

Installation

1. Position the shift tube in the steering column and install the retaining screw.

2. Insert the steering shaft in the steering column and place the upper bearing sleeve on the upper end of the column. Install the spring and nut on the steering shaft to retain the shaft in the column.

3. Position the steering column in the car and loosely install the steering column to instrument panel support bolts.

4. Install the 2 bolts and nuts attaching the flex joint to the steering shaft.

5. Position the dash panel opening seal and retainer to the dash panel and install the 7 attaching screws.

6. Install the insulation to the dash panel in the area of the steering column.

7. Remove the nut from the steering shaft and position the steering wheel on the shaft. Install the retaining nut and torque to specification (Part 3-6).

8. Apply 2 drops of Loctite sealer (C3AZ-19554-A) to the junction of the steering shaft and nut threads.

9. Torque the steering column to instrument panel attaching bolts to specification (Part 3-6).

10. Install the horn ring and spring and connect the turn signal and horn wires at the connector.

11. Connect the shift linkage to

the steering column shift arm and adjust as required.

STEERING COLUMN UPPER BEARING REPLACEMENT

COMET AND FAIRLANE WITH POWER STEERING

1. Disconnect the horn wire and the turn indicator wires at the connectors. Remove the horn ring (or button) and the spring.

2. Remove the steering wheel attaching nut. Remove the steering wheel (Fig. 5) with a puller.

3. Remove the turn indicator lever. Remove the upper bearing retainer screws and move the turn signal switch to one side.

4. Remove 1 bolt clamping the flex coupling on the steering shaft.

5. Remove the snap ring from the steering shaft.

6. Pull up on the steering shaft to remove the bearing from the flange and remove the bearing from the steering shaft.

7. Lubricate the bearing and position it on the steering shaft. Use Tool T62F-3576-A to seat the bearing, if necessary.

8. Install the snap ring on the steering shaft.

9. Install the flex coupling clamp bolt.

10. Position the turn signal switch and bearing retainer to the flange and install the 3 retaining screws.

11. Apply 2 drops of Loctite sealer (C3AZ-19554-A) to the turn signal switch lever and install the lever.

ALL MODELS EXCEPT COMET AND FAIRLANE WITH POWER STEERING

1. Disconnect the horn wire and the turn indicator wires at the connectors. Remove the horn ring (or button) and the spring.

2. Remove the steering wheel attaching nut. Remove the steering wheel (Fig. 5) with a puller, Tool 3600-AA.

3. Remove the 3 bearing retainer screws and remove the bearing retainer.

4. Lift the turn signal switch up and over the steering shaft and position it to one side.

5. Remove the centering sleeve and spring from the steering shaft.

6. Remove 2 flange bolt nuts (Fig. 6) and lift the flange from the steering column.

7. Place a socket of the correct

diameter in the steering shaft opening of the flange and drive the bearing out of the flange from the bottom side.

8. Position the 2 flange bolts in the flange holes. Start the flange bolt nuts on the flange bolts about 1½ turns.

9. Position the flange to the column so that the heads of the 2 flange bolts engage in the slots of the steering column tube. Then, tighten the 2 flange bolt nuts.

10. Lubricate the bearing and install it in the flange.

11. Position the turn signal switch and bearing retainer to the flange and install the 3 retaining screws.

12. Install the centering sleeve and spring on the steering shaft.

13. Position the steering wheel on the steering shaft and install the retaining nut. Torque the nut to specification and apply 2 drops of Loctite sealer (C3AZ-19554-A) to the junction of the nut and steering shaft threads.

14. Install the horn ring (or button) and spring on the steering wheel.

15. Connect the turn signal and horn wires at the connectors and check the operation of both units.

3 REMOVAL AND INSTALLATION

HOISTING INSTRUCTIONS

Damage to suspension and / or steering linkage components may occur if care is not exercised when positioning the hoist adapters of 2 post hoists prior to lifting the car.

If a 2 post hoist is used to lift the car, place the adapters under the front suspension lower arms. **Do not allow the adapters to contact the steering linkage.**

STEERING GEAR MUSTANG

Removal

1. Disconnect the horn and turn indicator wires under the instrument panel. Also on a car with an automatic transmission, disconnect the neutral switch wires.

2. Remove the horn ring (or button). Remove the steering wheel retaining nut and the steering wheel (Fig. 5).

3. Remove the upper bearing centering sleeve and spring.

4. Remove the steering column clamp to instrument panel bolts and

remove the clamp and the insulator.

5. Pull the rubber seal up on the steering column, fold the floor mat aside, and move the dash panel insulation out of the way.

6. Remove the retaining screws from the steering column weather seal on the dash panel. Remove the steering column cover plates and gasket.

7. Slide the steering column tube assembly from the steering gear shaft, guiding the shift lever(s) up through the opening in the dash panel.

8. Raise the car and remove the clutch equalizer and bracket assembly from the frame side rail and engine if so equipped to obtain clearance.

9. On power steering equipped vehicles, remove pit nut attaching nut insulator and washer and remove the power steering cylinder rod from the bracket to obtain clearance for removal of Pitman arm.

10. Remove the inlet pipe from the manifold to obtain clearance.

11. Remove nut and washer. Install Tool T64P-3590-F and remove the Pitman arm from the sector shaft (Fig. 7).



FIG. 7—Removing Pitman Arm—Typical

12. Remove steering gear retaining bolts.

13. Lower the car and disconnect

the wires from the left bank of spark plugs to prevent damaging them.

14. On vehicles equipped with column mounted shift mechanism, disconnect the transmission shift rod(s) at the gear shift lever(s).

15. Remove brake booster if necessary.

16. Remove the support rod from cowl to spring tower (except Comet).

17. Loosen air cleaner to obtain clearance if necessary.

18. Lift the steering gear and shaft assembly from the engine compartment by raising the gear up and forward past the engine and spring tower taking care not to soil or tear the front seat fabric with the end of the steering shaft.

Installation

1. Install the steering gear from engine side and guide the shaft through the dash panel being careful not to soil or tear the front seat fabric. Install the steering gear attaching bolts but do not tighten.

2. Center the steering shaft for straight ahead drive position.

3. Raise car on hoist and install clutch equalizer assembly to engine and underbody if car is so equipped.

4. Install inlet pipe to manifold.

5. Install Pitman arm to the sector shaft and install the lock washer and the torque nut to specification.

6. If equipped with power steering, install power cylinder rod to bracket and install insulator washer and nut to retain.

7. Partially lower car onto safety stands and install the steering column tube assembly over the steering shaft, guiding the shifting arms through the opening in the dash panel.

8. Position the steering column assembly and retaining clamp and insulator, and loosely install the attaching bolts and nuts.

9. Tighten the steering gear to side rail mounting bolts and column to instrument panel retaining bracket.

Check steering shaft to column upper bearing clearance. If the shaft does not touch the bearing, no further readjustment is required. If the shaft is touching the column upper bearing, it will be necessary to check the pull required to center the shaft in the column, using a fish scale. Where pull exceeds 20 lbs. at either plane to center the shaft in the column, the following correction must be made:

Vertical movement of the steering shaft can be accomplished by loosening the steering gear mounting

bolts and pivoting the gear up and down.

Horizontal movement of the steering shaft can be accomplished by loosening the steering column to instrument panel retaining bracket and moving the column to the left or right.

Should additional horizontal movement be required to align the steering shaft, it will be necessary to insert shim(s) of proper thickness between the steering gear assembly and the vehicle side rail. Front end alignment shims can be used for this purpose. After the steering shaft is centered, torque all bolts to specification.

10. Position the upper bearing centering sleeve and spring. After applying Lubriplate to the upper surface of the steering shaft upper bearing and the horn switch brush plate, position the steering wheel on the steering shaft and install the retaining nut. Torque the nut to specification. Then, apply 2 drops of Loctite sealer (C3AZ-19554-A) to the junction of the steering shaft and the retaining nut threads.

Apply Loctite sealer sparingly to the turn indicator lever threads and install the lever.

11. Install the horn ring (or button) and spring, and steering wheel to the center point.

12. Set gap between column tube and steering wheel and tighten column to instrument panel.

13. Lower the car from the safety stands. Connect the horn, turn indicator wires, and (on a car with an automatic transmission) the neutral switch wires.

14. Position the steering column cover plates and gasket on the dash panel and install the retaining screws.

15. Position the dash panel insulation just above the steering column. Position the floor mat and push the rubber seal down to the floor mat.

16. Connect the transmission shift rods and correct adjustment of shift lever(s) and the neutral switch.

17. Connect ignition wires.

18. Connect cowl to spring tower support rod (except Comet).

19. Tighten the air cleaner.

COMET AND FAIRLANE WITH STANDARD STEERING (EXCEPT 390 C.I.D. ENGINE) AND ALL FALCON

Removal

1. Disconnect the turn signal and horn wires at the steering column connectors.

2. Remove the horn ring from the steering wheel.

3. Remove the steering wheel retaining nut and remove the steering wheel with Tool 3600-AA (Fig. 5).

4. Remove 5 steering column retainer attaching screws and remove the retainer from the steering column and dash panel (Fig. 6). Slide the seal up the steering column.

5. Remove the 2 steering column clamp to instrument panel support attaching bolts.

6. Remove the upper bearing centering sleeve and spring from the steering shaft.

7. Disconnect the shift linkage from the steering column shift arms.

8. Raise the car and remove the Pitman arm retaining nut and remove the Pitman arm with Tool T64P-3590-F (Fig. 7).

9. Remove the nut retaining the clutch release arm return spring bracket and remove the bracket and spring (Standard transmission cars only).

10. Remove the 3 steering gear to frame side rail attaching bolts.

11. Lower the car and remove the steering column from the steering shaft.

12. Remove the steering gear from the car.

Installation

1. Position the steering gear in the car and allow it to rest on the frame side rail.

2. Position the steering column over the steering shaft and through the hole in the dash panel.

3. Install the steering gear attaching bolts and the clutch release arm return spring, bracket, and nut.

4. Install the Pitman arm and retaining nut and washer on the sector shaft. Torque the nut to specification.

5. Position the steering column to the instrument panel and install the 2 retaining bolts. Do not tighten the bolts at this time.

6. Position the seal and retainer to the dash panel opening and install the attaching screws.

7. Position the upper bearing sleeve, spring, and steering wheel on the steering shaft and install the retaining nut (Fig. 6). Torque the nut to specification and apply 2 drops of Loctite sealer (C3AZ-19554-A) to the junction of the steering shaft and retaining nut threads.

8. Adjust the steering wheel to flange clearance to $\frac{3}{64}$ inch and tighten the steering column clamp to

instrument panel attaching bolts. Torque the bolts to specification (Part 3-6).

9. Install the spring and horn ring (or button) on the steering wheel.

10. Connect the turn signal and horn wires at the steering column connectors.

11. Connect the shift rods to the steering column shift arms.

12. Torque the steering gear attaching bolts to specification (Part 3-6) and fill the steering gear with the specified lubricant to the correct level (Part 3-1).

COMET AND FAIRLANE WITH POWER STEERING

Removal

1. Open the hood and remove 2 bolts and nuts retaining the flex coupling to the steering shaft.

2. Raise the car and remove 3 bolts and a nut retaining the power cylinder bracket to the frame side rail. Separate the bracket from the side rail and allow the cylinder and bracket to hang.

3. Remove the Pitman arm retaining nut and washer and remove the Pitman arm from the sector shaft with Tool T64P-3590-F (Fig. 7).

4. Remove the nut retaining the clutch release arm return spring bracket and remove the bracket and spring (Standard transmission cars only).

5. Remove 3 steering gear attaching bolts and remove the steering gear.

Installation

1. Position the steering gear to the frame side rail and the flex coupling to the steering shaft and install the 3 steering gear attaching bolts. Torque the bolts to specification (Part 3-6).

2. Install the clutch release arm return spring and bracket (Standard transmission cars only).

3. Position the Pitman arm to the sector shaft and install the washer and retaining nut. Torque the nut to specification (Part 3-6).

4. Position the power cylinder bracket to the side rail and install the 3 retaining bolts and nut. Torque the bolts and nut to specification (Part 3-6).

5. Lower the car and install the 2

flex coupling to steering shaft retaining bolts and nuts.

6. Fill the steering gear with the specified lubricant to the correct level (Part 3-1).

COMET AND FAIRLANE WITH 390 C.I.D. ENGINE AND STANDARD STEERING

Removal

1. Raise the car and remove the Pitman arm retaining nut and washer.

2. Remove the Pitman arm from the sector shaft with the tool shown in Fig. 7.

3. Remove the 3 steering gear to side rail attaching bolts and disconnect the shift rods from the shift levers.

4. Lower the car and disconnect the horn and turn signal wires at the steering column multiple disconnects.

5. Remove the horn button or ring from the steering wheel, and remove the steering wheel retaining nut.

6. Remove the steering wheel from the steering shaft with Tool 3600-AA. Then, remove the tool from the steering wheel.

7. Remove 5 screws attaching the steering column opening seal and retainer to the dash panel. Remove the retainer and slide the seal up the steering column.

8. Remove 2 steering column clamp to instrument panel retaining bolts and lift the steering column from the steering shaft.

9. Open the hood and disconnect the master cylinder brake line from the junction block.

10. Remove the brake master cylinder attaching bolts and remove the master cylinder and brake line from the dash panel.

11. Disconnect the spark plug wires from numbers 5 through 8 spark plugs, and remove the rocker cover from the left cylinder head.

12. Remove 3 steering gear housing cover attaching bolts and remove the housing cover from the steering gear.

13. Remove the steering gear from the car as follows:

a. Place the steering gear output shaft against the fender apron.

b. Pull the steering gear up and over the spring tower and remove the

steering gear from the car.

Installation

1. Remove the steering gear housing cover from the steering gear.

2. Position the steering gear in the car as follows:

a. Insert the steering shaft through the opening in the dash panel.

b. Point the output shaft toward the fender apron. Slide the gear downward and position it to the frame side rail.

3. Install the steering gear housing cover on the gear housing and adjust the steering gear (Section 2).

4. Position the steering column over the steering shaft and loosely install the steering column clamp to instrument panel retaining bolts.

5. Position the steering column opening seal and retainer to the dash panel and install the retaining screws.

6. Center the steering gear midway between a full right and full left turn and position the steering wheel on the steering shaft and install the retaining nut.

7. Torque the nut to specification and apply 2 drops of Loctite sealer (C3AZ-19554-A) to the junction of the nut and steering shaft threads.

8. Install the horn button or ring and the spring to the steering wheel.

9. Install the rocker cover on the left cylinder head and connect the spark plug wires to the spark plugs (Group 8).

10. Position the brake master cylinder to the dash panel and install the attaching bolts.

11. Connect the brake master cylinder line to the junction block.

12. Raise the car and install the steering gear to side rail retaining bolts. Torque the retaining bolts to specification (Part 3-6).

13. Position the Pitman arm to the sector shaft and install the retaining nut. Torque the nut to specification (Part 3-6).

14. Bleed the brake hydraulic system (Part 2-1).

15. Connect the shift rods to the shift levers.

16. Lower the car and torque the steering column clamp to instrument panel retaining bolts.

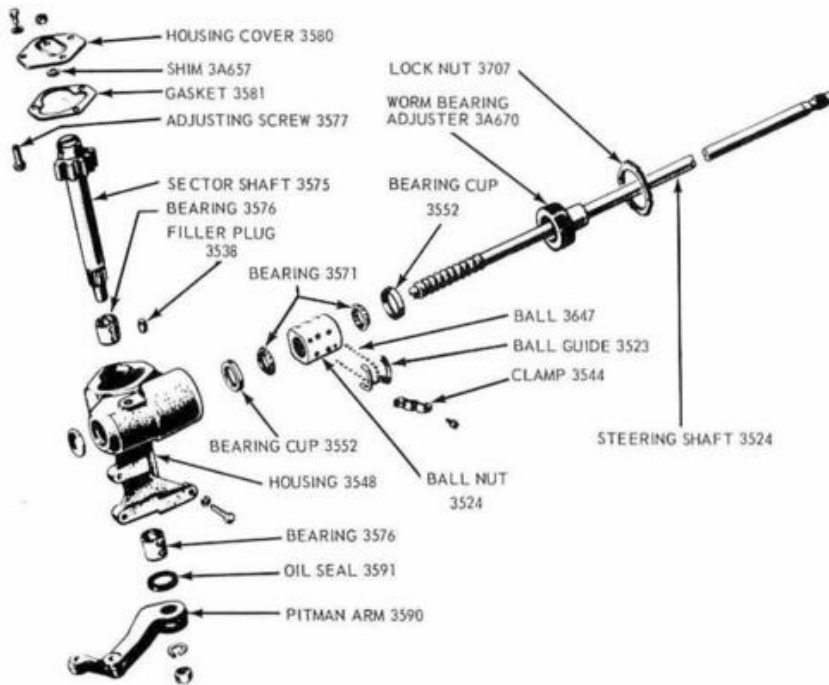
17. Connect the horn and turn signal wires at the steering column multiple connectors.

4 MAJOR REPAIR OPERATIONS

STEERING GEAR

DISASSEMBLY

1. Rotate the steering shaft approximately $2\frac{1}{4}$ turns from either stop.
2. After removing the sector adjusting screw locknut and the housing cover bolts, remove the sector shaft with the cover. Remove the cover from the shaft by turning the screw clockwise. **Keep the shim with the screw (Fig. 8).**



G 1382-A

FIG. 8—Manual Steering Gear Disassembled

3. Loosen the worm bearing adjuster nut, and remove the adjuster assembly and the steering shaft upper bearing and cup.

4. Carefully pull the steering shaft and ball nut from the housing. To avoid possible damage to the ball return guides, keep the ball nut from running down to either end of the worm.

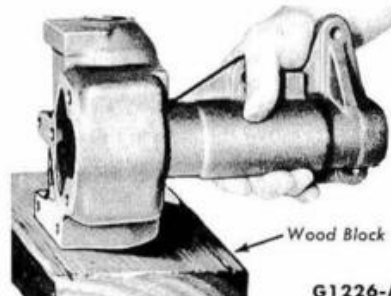
Disassemble the ball nut only if there is indication of binding or tightness.

5. Remove the lower bearing and cup from the housing. It may be necessary to tap the housing on a block

of wood (Fig. 9) to loosen it from the housing.

6. Remove the ball return guide clamp and the ball return guides from the ball nut. **Keep the ball nut clamp-side up until ready to remove the balls.**

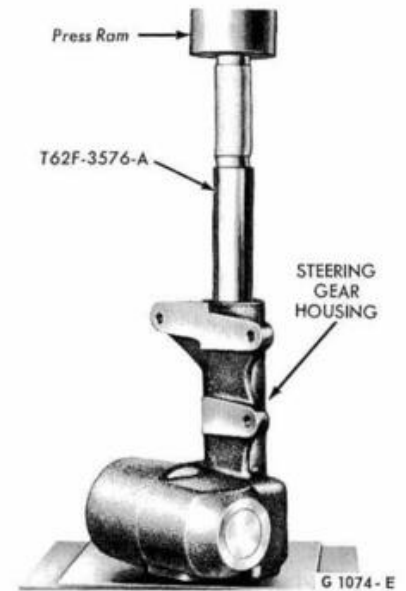
7. Turn the ball nut over, and rotate the worm shaft from side to side until all balls (Mustang—62 balls; Comet, Falcon, and Fairlane—54 balls) have dropped out of the nut into a clean pan. With the balls re-



G1226-A

FIG. 9—Removing Lower Bearing Cup from Housing

moved, the ball nut will slide off the worm.



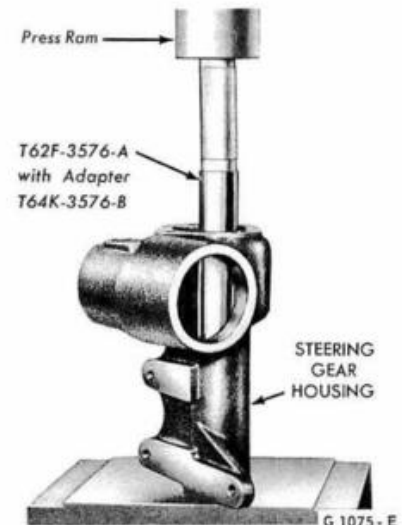
G 1074 - E

FIG. 10—Removing Sector Shaft Bearing

Press both sector shaft bearings out of the housing (Fig. 10). Remove the seal and the bearings only if there is an indication of wear, damage, or bearing mislocation. Do not install a new bearing in a housing in which the bearing has turned or is found to be mislocated. A new housing must be used.

ASSEMBLY

1. If the sector shaft bearings have been removed, press new bearings into the housing (Fig. 11).



G 1075 - E

FIG. 11—Installing Sector Shaft Bearing

2. Position a bearing cup in the adjuster.

3. If the sector shaft oil seal has been removed, install a new oil seal.

4. Swab the inside diameter of the ball nut and the outside diameter of the worm with gear lubricant C3AZ-19578-A prior to assembly. Lay the steering shaft on a bench as shown in Fig. 12. After positioning the shaft, turn the ball nut to place the

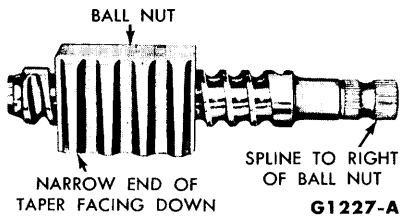


FIG. 12—Positioning Ball Nut—Typical

guide holes in the up position. Align the grooves in the worm and in the ball nut by sighting through the ball guide holes.

5. Insert the ball guides into the holes of the ball nut, tapping them lightly with a wood handle of a screw driver if necessary to seat them.

6. Insert the balls (Mustang—62 balls; Comet, Falcon, and Fairlane—54 balls) into the hole in the top of each ball guide. It may be necessary to rotate the shaft slightly one way,

then in the opposite direction to distribute the balls in the circuit.

7. After the balls (Mustang—31 balls; Comet, Falcon, and Fairlane—27 balls) are installed, install the ball guide clamp. Check the ball nut to see that it rotates freely. Torque the screw to specification.

8. Coat the threads of the steering shaft bearing adjuster, the housing cover bolts, and the sector adjusting screw with a suitable oil-resistant sealing compound. **Do not apply sealer to female threads, and especially avoid getting any sealer on the steering shaft bearings.**

9. Coat the worm bearings, sector shaft bearing and gear teeth with gear lubricant C3AZ-19578-A.

10. Clamp the housing in a vise, with the sector shaft axis horizontal, and position the steering shaft lower bearing cup and the bearing in place.

11. Position the steering shaft and ball nut assembly in the housing.

12. Position the steering shaft upper bearing on the top of the worm, and install the steering shaft bearing adjuster and cup. Install the lock nut with the flat side against the bearing adjuster and the letter outward. Leave the nut loose.

13. After installing the steering wheel nut on the steering shaft, adjust the worm bearing preload, using an inch-pound torque wrench to check for specified preload.

14. Position the sector adjusting screw and the adjuster shim, and check the end clearance which should not exceed 0.002 inch between the screw head and the end of the sector shaft. If clearance is greater than 0.002 inch, replace the shim.

15. Thread the sector shaft adjusting screw into the housing cover.

16. Install a new gasket on the housing cover.

17. Rotate the steering shaft until the ball nut teeth are in position to mesh with the sector gear, tilting the housing so that the ball nut will tip toward the housing cover opening.

18. Apply enough gear lubricant C3AZ-19578-A to fill the pocket in the housing between the sector shaft bearings 30% full.

19. Push the housing cover with the sector shaft into place.

20. Turn the cover to one side and fill the housing with ½ lb. of gear lubricant C3AZ-19578-A.

21. **Install but do not tighten the housing cover attaching bolts. Do not tighten the cover bolts until it is certain that there is some lash between the ball nut and the sector gear teeth.**

22. After loosely installing the sector shaft adjusting screw lock nut, adjust the sector shaft mesh to the specified mesh load, then tighten the adjusting screw lock nut. Remove the steering wheel nut.

5 STEERING LINKAGE REPAIR

The manual steering linkage (Figs. 13, 14, and 15) consists of the Pitman arm, the steering arm-to-idler arm rod, the steering idler arm, and the spindle connecting rods (tie rods). **Do not attempt to straighten bent linkage; use new parts.**

HOISTING INSTRUCTIONS

Damage to suspension and/or steering linkage components may occur if care is not exercised when positioning the hoist adapters of 2 post hoists prior to lifting the car.

If a 2 post hoist is used to lift the car, place the adapters under the front suspension lower arms. **Do not allow the adapters to contact the steering linkage.**

SPINDLE CONNECTING ROD END REPLACEMENT

The spindle connecting rod ends, which are threaded into the outer

ends of the rod sleeves, have non-adjustable, spring-loaded ball studs. A rod end should be replaced when excessive looseness at the ball stud is noticed.

1. Remove the cotter pin and nut from the worn rod end ball stud.

2. Disconnect the end from the spindle, connecting arm, Pitman arm, or idler arm as shown in Fig. 16.

3. Loosen the connecting rod sleeve clamp bolts, and count the number of turns needed to remove the rod end from the sleeve. Discard all rod end parts that were removed from the sleeve. **All new parts should be used when a spindle connecting rod end is replaced.**

4. Thread a new rod end into the sleeve, but do not tighten the sleeve clamp bolts at this time.

5. Insert the stud in the part from which the old one was removed, and install the stud nut. Torque the nut

to specification and install the cotter pin.

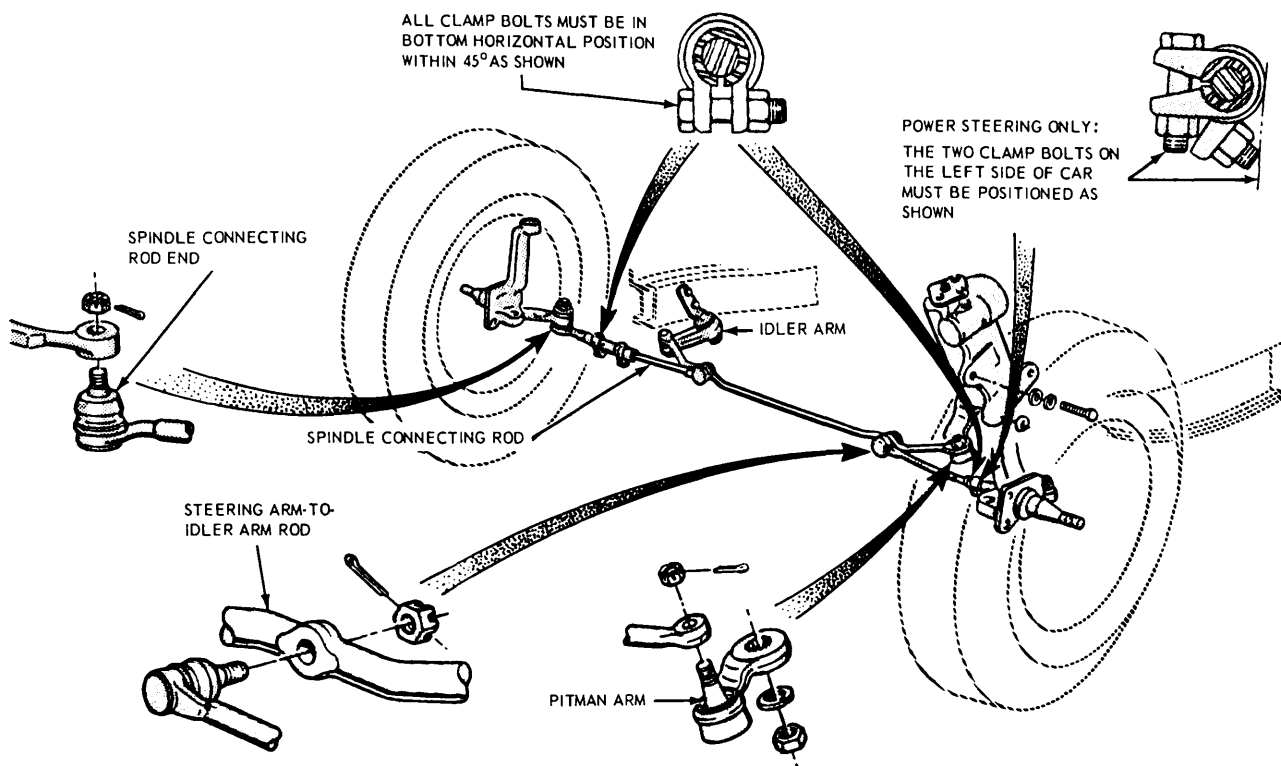
6. Check and, if necessary, adjust toe-in (Part 3-1). **After toe-in is checked and adjusted, torque the old sleeve clamp bolts to specification. Add four pounds torque if new bolts are used.** The tie rod sleeve clamps must be installed as shown in Fig. 13, Part 3-1, to prevent interference with the side rail.

SPINDLE SLEEVE REPLACEMENT

A spindle sleeve should be replaced if it becomes worn or damaged (Figs. 13, 14, and 15). **Do not attempt to straighten the sleeve if threaded portion is damaged.**

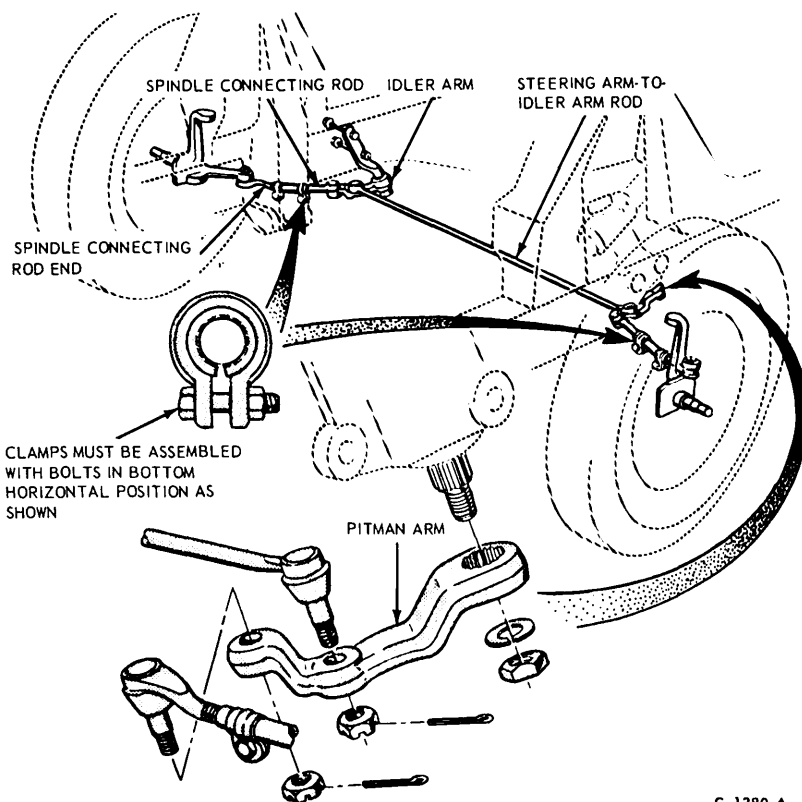
1. Remove the spindle connecting rod ends as described in the previous sub-section.

2. Screw the spindle rod ends into the new sleeve the same number of turns as the ends that were removed.



G 1371-A

FIG. 13—Typical Steering Linkage—Comet, Falcon, and Fairlane



G 1380-A

FIG. 14—6-Cylinder Manual Steering Linkage—Mustang

Do not tighten the clamp bolts at this time.

3. Position the sleeve assembly on the Pitman arm (or the idler arm)

and the spindle arm. Install the attaching nut, torque it to specification, and install the cotter pin.

4. Check and, if necessary, adjust toe-in (Part 3-1). After toe-in is checked and adjusted; torque the sleeve clamp bolts to specification. The sleeve clamp must be installed with the bolt down to prevent interference with the side rail.

STEERING ARM-TO-IDLER ARM ROD REPLACEMENT

The rod connecting the Pitman arm and the idler arm is non-adjustable and is provided with tapered holes to accommodate the ball studs (Figs. 13, 14, and 15). The rod should be replaced when damaged or when worn at the ball studs.

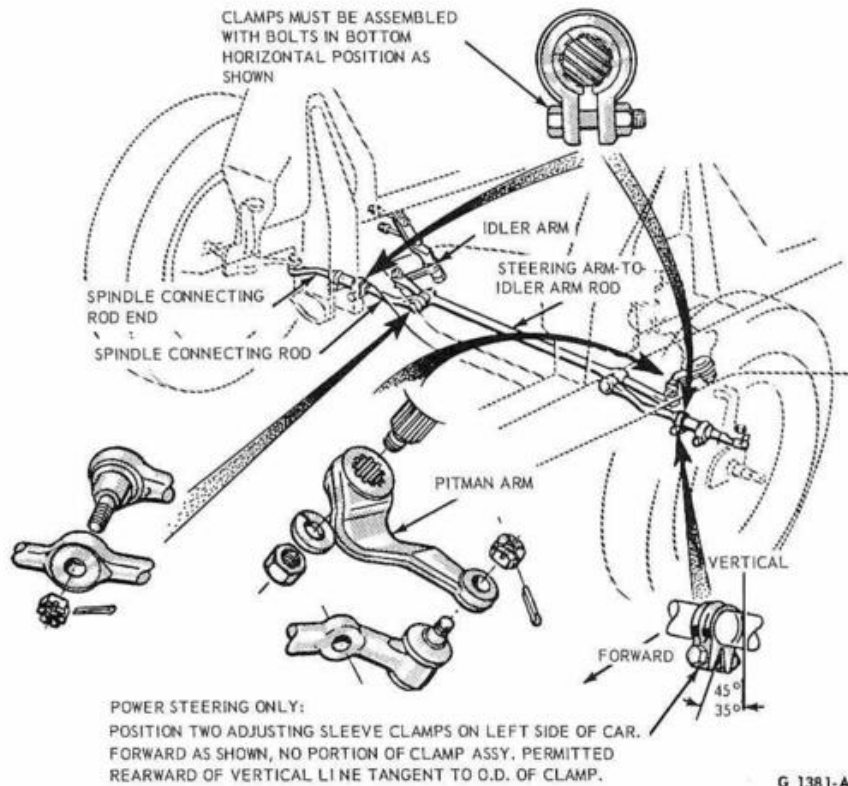
MUSTANG—6-CYLINDER

1. Remove the cotter pins and nuts from the ball studs at the sector shaft arm and the idler arm, and remove the steering arm-to-idler arm rod (Fig. 16).

2. Position the new steering arm-to-idler arm rod on the idler arm and the steering arm.

3. Install the ball stud retaining nuts and torque to specification.

4. Install cotter pins, lubricate the



G 1381-A

FIG. 15—8-Cylinder Manual Steering Linkage—Power Typical—Mustang



FIG. 16—Disconnecting Steering Linkage Ball Stud—Typical

power steering ball stud socket, if necessary.

5. Check and, if necessary, adjust toe-in (Part 3-1).

COMET, FALCON, FAIRLANE, AND 8 CYLINDER MUSTANG

Removal

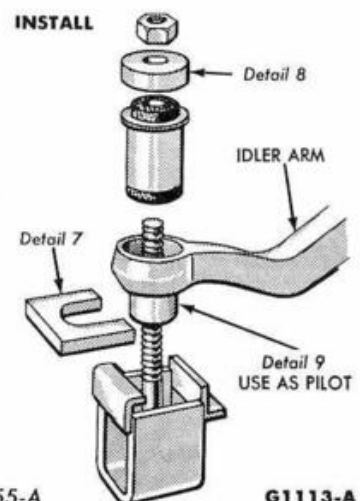
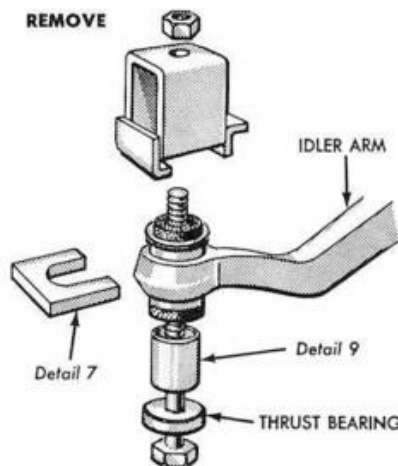
1. Raise the car on a hoist and position safety stands.

2. Remove the 2 cotter pins and nuts retaining both spindle connecting rod ends to the steering arm-to-idler arm rod (Fig. 13).

3. Disconnect the spindle connecting rod ends from the steering arm-to-idler arm rod with Tool-3290-C (Fig. 16).

4. Remove 1 cotter pin and nut retaining the idler arm to the steering arm-to-idler arm rod and disconnect the idler arm from the rod with Tool-3290-C.

5. Remove 1 cotter pin and nut retaining the Pitman arm to the steering arm-to-idler arm rod. Disconnect



Tool—T61P-3355-A

G1113-A

FIG. 17—Replacing Idler Arm Bushings—Typical

the Pitman arm from the rod with Tool-3290-C and remove the rod.

Installation

1. Replace the rubber seals on the spindle connecting rod ends, if required.

2. Position the steering arm-to-idler arm rod to the Pitman arm and idler arm and install the retaining nuts. Torque the nuts to the low end of the specification. Continue to tighten each nut until the slots in the nut align with the hole in the stud. Then install the cotter pin.

3. Position the spindle connecting rod ends to the steering arm-to-idler arm rod and install the retaining nuts. Torque the nuts to the low end of the specification. Continue to tighten each nut until the slots in the nut align with the hole in the stud. Then, install the cotter pin.

4. Remove the safety stands, lower the car, check and adjust toe-in to specification (Part 3-1).

STEERING IDLER ARM AND/OR BUSHING

1. Raise the car and remove the cotter pin and nut retaining the idler arm to the steering arm-to-idler arm rod (Figs. 13, 14, and 15).

2. Remove the cotter pin and nut retaining the idler arm to the bracket and remove the idler arm.

3. Place the idler arm in a vise and replace the bushings as shown in Fig. 17.

4. Position the idler arm to the bracket and steering arm-to-idler arm rod and install the retaining nuts and cotter pins.

5. Lower the car and check caster, camber and toe-in and adjust if required.

PART

3-4 POWER STEERING

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1 DESCRIPTION AND OPERATION

DESCRIPTION

The Power Steering System (Fig. 1) is a hydraulically controlled linkage-type steering system which includes an integral pump and fluid reservoir, a control valve, a power cylinder, the connecting fluid lines, and the steering linkage. The hydraulic pump, belt-driven from the engine

crankshaft, draws fluid from the reservoir and provides fluid pressure for the system. Within the pump itself is a pressure-relief valve which governs the pressures within the steering system according to the varying conditions of operation. After fluid has passed from the pump to the control valve and the power cylinder, it re-

turns to the reservoir.

The power steering pump is a belt driven slipper type pump which is integral with the reservoir. It is constructed so that the reservoir is attached to the rear side of the pump housing front plate and the pump body is incased within the reservoir.

OPERATION

The control valve, operated by steering wheel movement, directs the pressure developed by the pump. When the front wheels are in the straight-ahead position, the control valve spool is held in the center (neutral) position by its centering spring. Fluid then flows around the valve lands and returns to the reservoir (Fig. 2). Within the control valve body there is a reaction limiting valve which reduces parking effort.

When force of about 4 pounds is exerted for a left turn, the valve spool overcomes the pressure of the centering spring and moves toward the right end of the valve. As a result, pressure is exerted on the right side of the power cylinder piston, and fluid in the left end of the cylinder returns to the reservoir (Fig. 2).

If the direction of the force on the steering wheel is reversed, the front wheels will turn to the straight forward position. Or as force on the

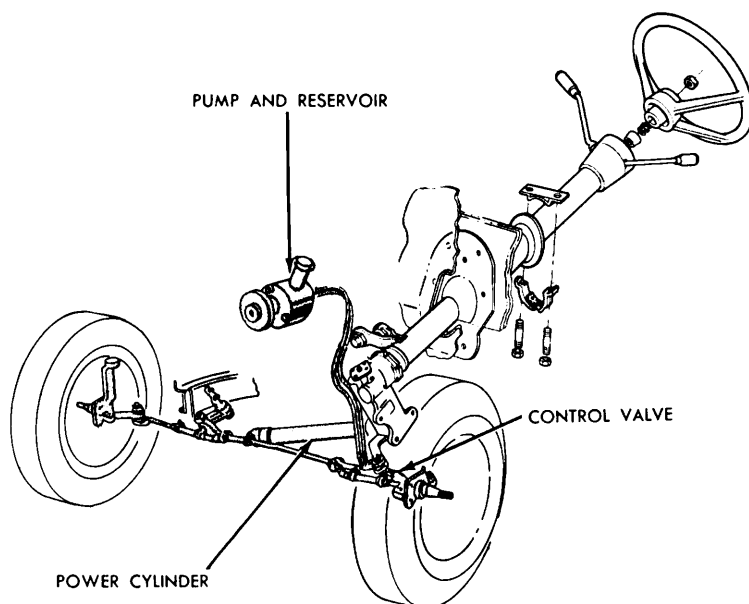


FIG. 1—Power Steering System

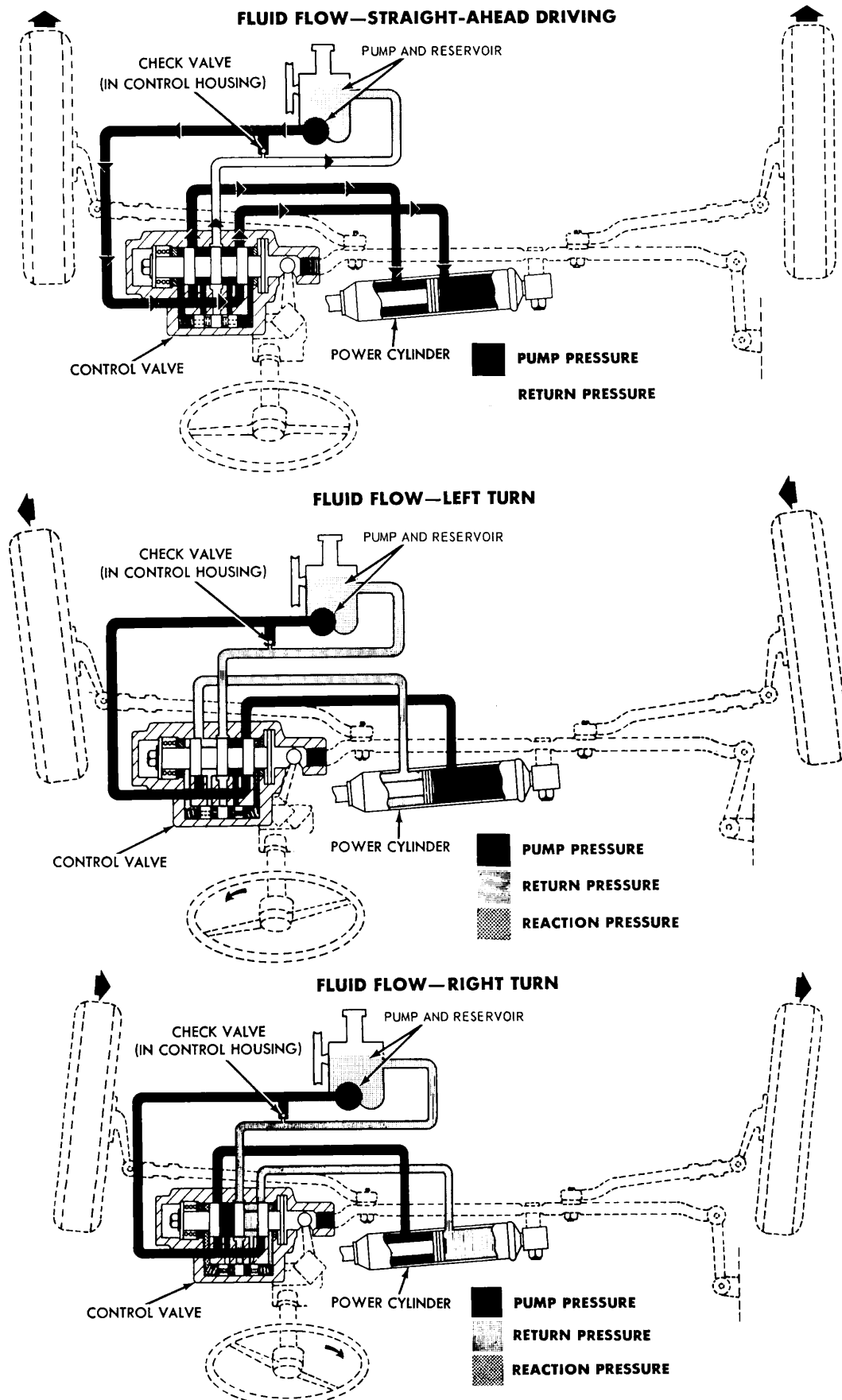


FIG. 2—Fluid Flow Diagram

steering wheel falls below approximately 4 pounds the valve spool centering spring forces the spool back to the center position and there the pressure on both sides of the power cylinder piston is equal. With normal forward driving movement of the car and in the absence of operative pressure within the power cylinder, the front wheels will seek to return to the straight ahead position. This is a normal effect of the front wheel alignment.

For a right turn, the directional forces explained above are reversed (Fig. 2).

If, for any reason, the pump fails to deliver fluid pressure, the car may be steered without pump pressure.

POWER STEERING PUMP

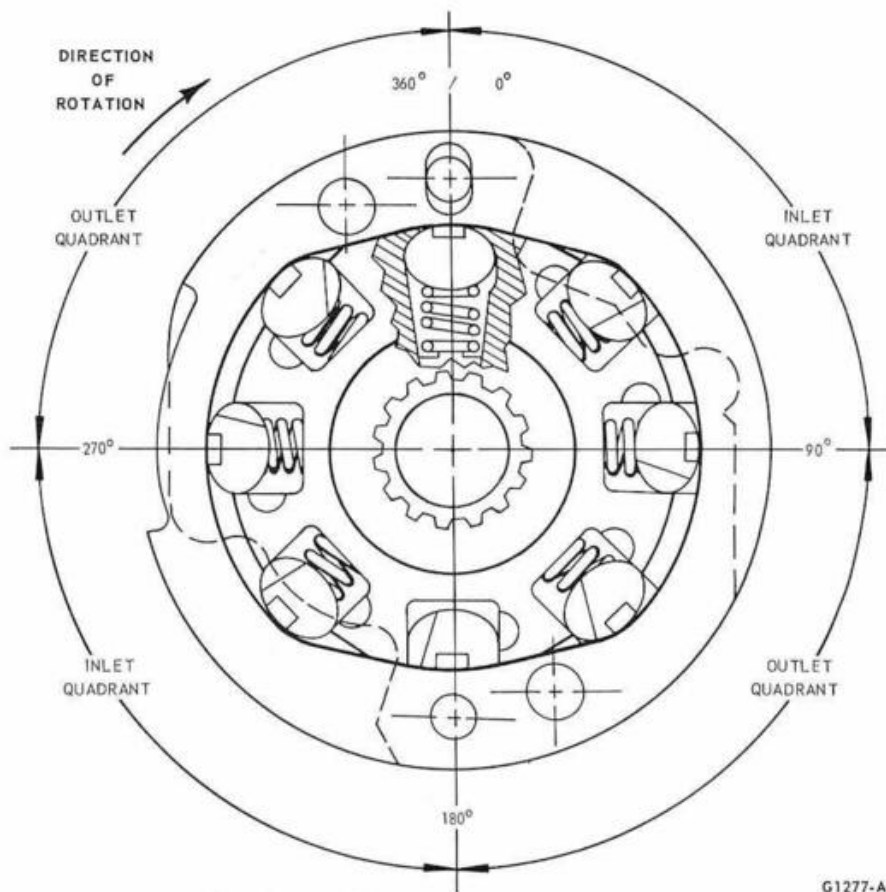
The pump rotor has 8 slippers and springs which rotate inside a cam insert containing two lobes 180° from each other. The cam insert and the pump port plates provide a sealed chamber within which the rotor and slippers rotate between the two lobes for pump operation.

As the rotor turns, the slippers are forced outward against the inner surface of the cam insert by a combination of centrifugal force, slipper spring force and fluid pressure acting on the under side of the slipper. A pair of adjacent slippers, along with the surfaces of the rotor, cam and pressure plates, form a sealed chamber within the crescent-shaped void. As this sealed chamber moves through the crescent shaped void its volume changes, resulting in a pumping action.

As the rotor rotates 90° (Fig. 3), the slipper slides outward in its slot, riding on the cam and the volume of the sealed chamber increases. This creates a vacuum and sets up a suction area. With the inlet port placed in this area, the chamber will fill with fluid. As the rotor rotates from 90° to 180°, the volume of the sealed chamber decreases, thus creating a pressure area. The pressure or outlet port is located in this area. While this pumping action is going on between 0° and 180°, the same condition is occurring between 180° and 360°. This combination creates what is known as a balanced rotor pump. The two pressure and suction quadrants are diametrically opposite each other.

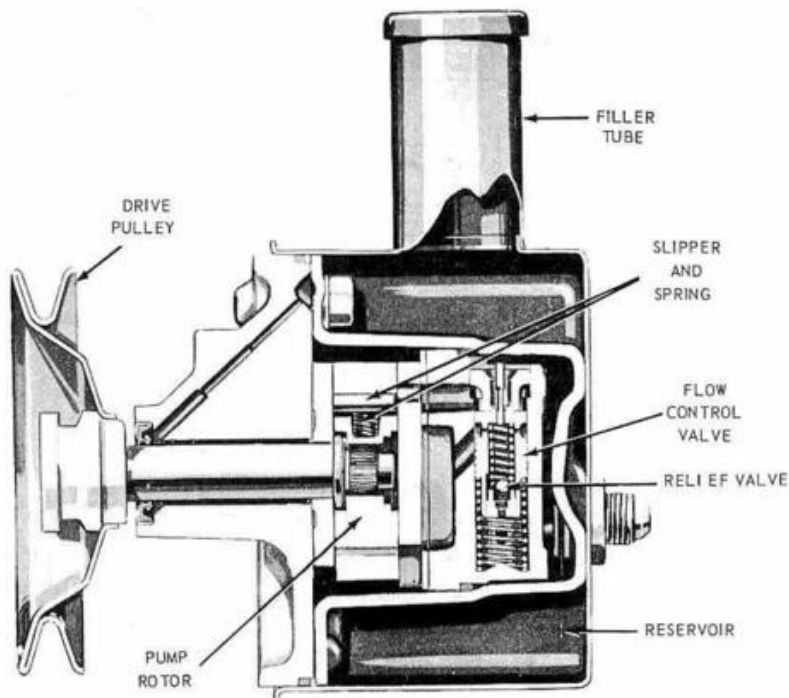
FLOW CONTROL VALVE

Since the pump is a constant displacement pump, the internal flow



G1277-A

FIG. 3—Power Steering Pump Cycle



G1278-A

FIG. 4—Power Steering Pump—Sectional View

will vary directly with the pump speed. However, a power steering

gear requires a relatively high constant rate of flow in the parking zone

and up to approximately 2800 RPM and thereafter a lower rate of flow. This is accomplished by means of a variable orifice mechanism shown in Fig. 4.

All of the internal pump flow is ported from the pumping mechanism (rotor, slippers, and cam insert), through passage A into the flow control zone. All of flow goes through the orifice and out into the line until the bypass port is cracked open. This is the regulation point. The oil drops in pressure in moving through the orifice. The lower pressure is then sensed through a hole drilled in the cover communicating to the rear of

the spool valve. The differential in pressure thus created on the spool valve increases steadily and proportionally with increasing RPM and this moves the valve progressively back into its bore, thus increasing the opening of the bypass port.

The metering pin (Fig. 4) travels with the spool valve decreasing the net area of the orifice at higher speeds. This action reduces flow to the steering gear.

PRESSURE RELIEF VALVE

When the steering wheel is turned completely to the stop position in the right or left turn direction, or in the

case of a road load of sufficient magnitude, the steering gear will not accept any flow from the pump, except for a very limited volume of oil due to leakage past valve seals. Because of this resistance, excessive hydraulic pressure would be developed, if it were not limited by the pressure relief valve.

When relief pressure is reached, the pressure relief ball is forced off its seat, allowing oil to pass through the spool valve and dump into the bypass port (Fig. 4). The relief valve will continue to limit oil pressure to the relief setting for the duration of the overload condition.

2 IN-CAR ADJUSTMENTS AND REPAIRS

HOISTING INSTRUCTIONS

Damage to suspension and/or steering linkage components may occur if care is not exercised when positioning the hoist adapters of 2 post hoists prior to lifting the car.

If a 2 post hoist is used to lift the car, place the adapters under the front suspension lower arms. **Do not allow the adapters to contact the steering linkage.**

PUMP BELT TENSION ADJUSTMENT

Pump drive belt tension cannot be checked accurately using the thumb pressure or belt deflection methods. Correct belt adjustment is assured only with the use of a belt tension gauge.

1. Check the belt tension with a belt tension gauge (T63L-8620-A). With a new belt, or one that has been run for less than 15 minutes, the tension should be within 120-150 lbs. With a belt that has been run for more than 15 minutes, the tension should be within 90-120 lbs.

2. To adjust the belt, loosen the mounting bolts incorporated on the front face of the pump cover plate (hub side) and one nut at the rear. Place a $\frac{9}{16}$ inch open end wrench on the projecting $\frac{1}{2}$ inch boss on the front face of the pump cover plate and pry upward to adjust belt tension. **When adjusting the power steering pump belt tension, do not pry against the pump or reservoir to obtain the proper belt tension. The reservoir will be deformed when pried on or pressed against and a leak will result.**

3. Recheck the belt tension. When the tension has been correctly adjusted, torque the bolts and the nut to specification.

CONTROL VALVE CENTERING SPRING ADJUSTMENT

COMET, FALCON, AND FAIRLANE

1. Raise the car and remove 2 spring cap retaining screws and lock washers and remove the spring cap.

2. Tighten the adjusting nut snug; then, loosen the nut $\frac{1}{4}$ turn. Do not tighten the adjusting nut too tight.

3. Position the spring cap to the valve housing and install the 2 retaining screws and washers.

4. Lower the car.

5. Start the engine and check the turning effort with a spring scale. With the spring scale attached to the rim of the steering wheel, the effort to turn the wheel in both directions should not exceed 12 pounds.

CONTROL VALVE TO POWER STEERING CYLINDER HOSE

COMET, FALCON, AND FAIRLANE

1. Raise the car on a hoist and place a drain pan under the power cylinder.

2. Disconnect the hose from the power cylinder and allow the fluid to drain from the hose. Then, disconnect the hose from the control valve.

3. Connect the hose to the control valve and power cylinder.

4. Remove the drain pan and lower the car.

5. Fill the power steering pump reservoir with fluid to the proper level (Part 3-1).

6. Start the engine and turn the steering wheel to each end of its travel several times to cycle the system. Then, check for leaks.

7. Stop the engine and again check the power steering fluid level. Add fluid as required.

POWER STEERING PUMP TO CONTROL VALVE HOSE

COMET, FALCON, AND FAIRLANE

Removal

1. Remove the fluid from the pump reservoir with a suction gun.

2. Raise the car on a hoist.

3. Remove the clamp retaining the hose tubes to the control valve.

4. Disconnect the fluid return and pressure hoses from the control valve and allow the fluid to drain into a pan.

5. Lower the car and disconnect the fluid return hose from the reservoir.

6. Disconnect the fluid pressure hose from the pump outlet fitting.

7. Remove 1 bolt attaching the hoses, insulator, and the retainer to the frame side rail and remove the hoses, and the insulator and retainer as an assembly from the car.

8. Remove the pressure and return hoses from the retainer and insulator.

Installation

1. Install the pressure and return hoses in the insulator and retainer.

Position the assembly to the frame side rail and install the attaching bolt.

2. Place a hose clamp on the fluid return hose and install the hose on the power steering pump reservoir return fitting.

3. Torque the pump outlet fitting to specification (Part 3-6). Then, connect the pressure hose to the out-

let fitting and torque the fitting to specification.

4. Raise the car and connect the pressure and return lines to the control valve.

5. Install the clamp to retain the hose tubes to the control valve.

6. Lower the car and fill the power steering pump reservoir with

fluid, C1AZ-19582-A, to the proper level (Part 3-1).

7. Start the engine and turn the steering wheel to each end of its travel several times to cycle the system. Then, check for fluid leaks.

8. Stop the engine and again check the power steering fluid level (Part 3-1). Add fluid as required.

3 REMOVAL AND INSTALLATION

HOISTING INSTRUCTIONS

Damage to suspension and/or steering linkage components may occur if care is not exercised when positioning the hoist adapters of 2 post hoists prior to lifting the car.

If a 2 post hoist is used to lift the car, place the adapters under the front suspension lower arms. **Do not allow the adapters to contact the steering linkage.**

STEERING GEAR

Refer to Group 3-3, Section 3 for detailed instructions.

POWER STEERING PUMP

6-CYLINDER

Removal

1. Remove the fill cap from the reservoir and remove the fluid with a suction gun.

2. Disconnect the fluid return hose from the reservoir.

3. Disconnect the oil pressure hose from the pump.

4. Loosen the adjusting bolts and remove the drive belt from the pulley.

5. Drain the coolant from the radiator and remove 3 bolts and spacers attaching the pump bracket to the engine. Remove one bolt attaching the support to the lower edge of the bracket and remove the pump and bracket from the car.

6. Place the bracket in a vise and install a $\frac{3}{8}$ -16 capscrew in the end of the pump shaft.

7. Install tool T63L-10300-B on the pulley and remove the pulley from the pump shaft. Refer to Fig. 5 for tool installation.

8. Remove 3 bolts retaining the pump to the bracket and remove the pump from the bracket.

Installation

1. Position the pump to the bracket and install the 3 retaining bolts.

Torque to specification.

2. Position the pulley to the pump shaft and install tool T65P-3A733A. Press the pulley on the shaft. (Refer to Fig. 4 for tool installation.) Then, remove the tool.

3. Position the pump and bracket to the engine and install the attaching bolts and spacers.

4. Install one bolt to attach the brace to the bottom of the bracket. Torque the bracket attaching bolts to specification (Part 3-6).

5. Position the belt on the pulley and adjust the belt tension to specification with Tool T63L-8620-A (Section 2).

6. Torque the outlet fitting hex nut to specification. Then, connect the pressure hose to the fitting and torque the hose nut to specification.

7. Connect the return hose to the reservoir and tighten the clamp.

8. Fill the radiator with coolant.

9. Fill the pump reservoir to the correct level with transmission fluid (C1AZ-19582-A). Start the engine and turn the steering wheel to each end of its travel several times to cycle the system and check for leaks. Check the fluid level (Section 1, Part 3-1) and fill as required and install the fill cap.

8-CYLINDER

Removal

1. Remove the fill cap from the reservoir and remove the fluid with a suction gun.

2. Disconnect the fluid return hose from the reservoir.

3. Disconnect the oil pressure hose from the pump.

4. Loosen the belt adjusting bolts and nut and remove the drive belt from the pump pulley.

5. Remove 3 bolts and 1 nut retaining the pump to the bracket and remove the pump from the car.

Installation

1. Position the pump to the bracket and loosely install the 2 pivot bolts and 2 adjusting bolts.

2. Position the drive belt on the pulley and adjust the belt tension to specification with tool T63L-8620-A (Section 2). Tighten the adjusting bolts and pivot bolts to specification.

3. Torque the outlet fitting hex nut to specification (Part 3-6). Then, connect the pressure hose to the fitting and torque the hose nut to specification.

4. Connect the return hose to the reservoir and tighten the clamp.

5. Fill the pump reservoir to the correct level with transmission fluid C1AZ-19582-A. Start the engine and turn the steering wheel to each end of its travel several times to cycle the system and check for leaks. Check the fluid level, fill as required, and install the fill cap.

POWER STEERING PUMP PULLEY

REMOVAL

Other than pulley removal and reservoir or seal replacement, the pump should not be disassembled but replaced as a unit.

1. Drain as much of the fluid as possible from the pump through the fill pipe.

2. Install a $\frac{3}{8}$ -16 capscrew in the end of the pump shaft to prevent damage to the shaft end by the tool screw.

3. Install the pulley remover tool, T63L-10300-B on the pulley hub, and place the tool and pump in a vise as shown in Fig. 5.

4. Hold the pump and rotate the tool nut counterclockwise to remove the pulley (Fig. 5).

INSTALLATION

1. Position the pulley to the pump shaft and install Tool T65P-3A733-A as shown in Fig. 6.

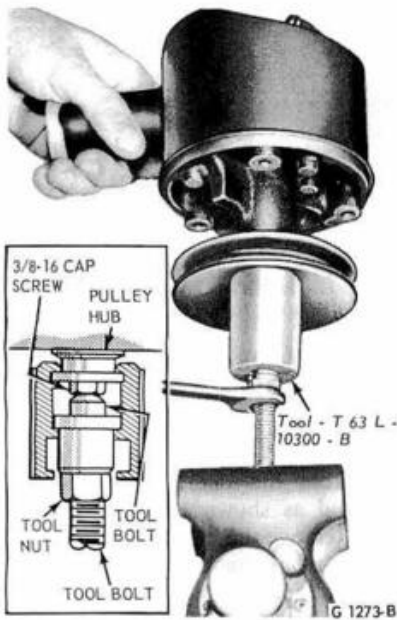


FIG. 5—Removing Pulley From Pump

2. Hold the pump and rotate the tool nut clockwise to install the pulley on the shaft. The pulley face will be flush with the end of the pump shaft. Install the pulley without in and out pressure on the shaft to prevent damage to internal thrust areas.

3. Remove the tool.



FIG. 6—Pulley Installation
POWER STEERING
CONTROL VALVE
MUSTANG—6 CYLINDER

Removal

1. Disconnect the pressure lines leading from the power cylinder to

the control valve, at the valve. Allow the lines to drain into a container.

2. Disconnect the lines leading from the power steering pump to the control valve at the valve. Allow the lines to drain into a container. Remove the clamp that secures the lines to the valve.

3. Remove the two bolts that secure the control valve to the steering arm-to-idler arm rod.

4. Remove the cotter pin and the castellated nut that secures the control valve to the Pitman arm.

5. Disconnect the control valve from the Pitman arm as shown in Fig. 7.

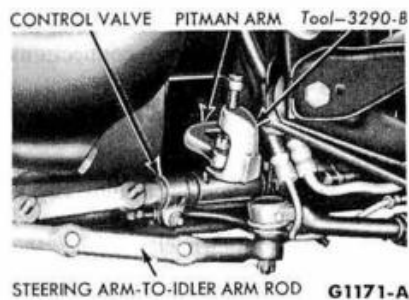


FIG. 7—Disconnecting Control Valve from Pitman Arm—Typical

6. Inspect the tube fittings and the seats in the valve for nicks, burrs or damage. Replace the seats in the valve or the tubes as required.

Installation

1. Place the stud in a straight vertical position. Measure from the center of the stud parallel to the bolt mounting surface (Fig. 8) to the

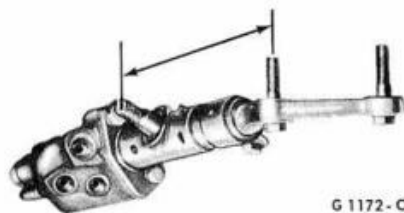


FIG. 8—Control Valve Length Adjustment—Mustang 6-Cylinder

center of the first bolt hole. The distance should be from $4\frac{1}{8}$ – $4\frac{3}{16}$ inches (6 cyl. models only). If not within these limits adjust the length as required.

2. Secure the control valve stud to

the Pitman arm with the castellated nut and a cotter pin.

3. Secure the end of the control valve to the steering arm-to-idler arm rod with two bolts, lock washers and nuts.

4. Connect the pressure line and the oil return line to their respective fittings on the valve. Install the line retaining clamp around the valve.

5. Connect the two lines from the power cylinder to their respective fittings on the valve.

6. Fill the reservoir to the correct level.

7. Start the engine and turn the steering wheel to each end of its travel several times to cycle the system. Stop the engine.

8. Check the fluid level and fill as necessary. Install the fill cap.

9. Start the engine and check for leaks.

COMET, FALCON, AND FAIRLANE

Removal

1. Disconnect the 4 fluid line fittings at the control valve, and drain the fluid from the lines. Turn the front wheels to the left and right several times to force all the fluid from the system.

2. Loosen the clamping nut and bolt at the right-hand end of the sleeve.

3. Remove the roll pin from the steering arm to idler arm rod through the slot in the sleeve.

4. Remove the control valve ball stud nut.

5. Using the tool shown in Fig. 9, remove the ball stud from the sector shaft arm.

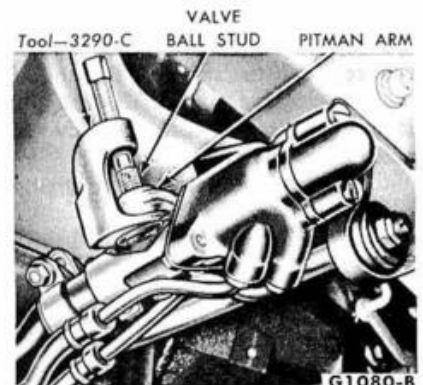


FIG. 9—Control Valve Ball Stud Removal

6. After turning the front wheels fully to the left, unthread the control valve from the steering arm to idler arm rod.

Installation

1. Thread the valve onto the steering arm to idler arm rod until about four threads are still visible on the rod.
2. Position the ball stud in the sector shaft arm.
3. Measure the distance between the center of the grease plug in the sleeve and the center of the stud at the inner end of the left-hand spindle connecting rod (Fig. 10). The distance should be $5\frac{1}{4}$ inches. If the distance is not correct, disconnect the ball stud from the sector shaft arm and turn the valve on the steering arm to idler arm rod to increase or decrease the distance.

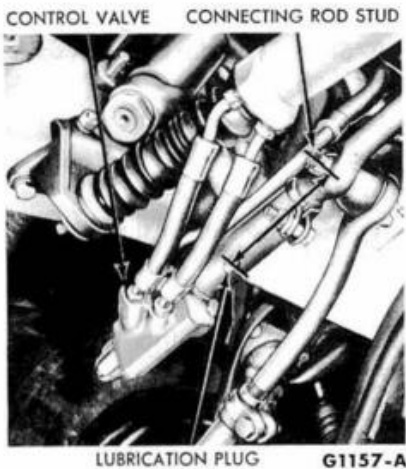


FIG. 10—Control Valve Installation Measurement—Typical—Comet, Falcon, and Fairlane

4. When the correct distance is obtained and the ball stud is positioned in the sector shaft arm, align the hole in the steering arm to idler arm rod with the slot near the end of the valve sleeve. Install the roll pin in the rod hole to lock the valve in position on the rod.
5. Torque the valve sleeve clamp bolt to specification.
6. Install the nut on the ball stud, and torque the nut to specification.

Install a new cotter pin.

7. Connect the fluid lines to the control valve, and tighten all fittings securely. **Do not over-tighten.**
8. Fill the fluid reservoir with the specified fluid to the F mark on the dip stick.
9. Start the engine and run it at idle speed for about two minutes to warm the fluid in the power steering system.
10. Turn the steering wheel all the way to the left and right several times, and check the system for fluid leaks.
11. Increase the engine speed to about 1000 rpm, and turn the steering wheel all the way to the left and right several times.
12. Stop the engine, and check the control valve and hose connections for fluid leaks. Correct the cause of any leaks.
13. Check the fluid level, and refill the reservoir if necessary.
14. With the engine running check the position of the steering wheel when the front wheels are in the straight-ahead position. **Do not make any adjustments until toe-in is checked.**
15. Keep the engine running, and check toe-in. If either toe-in or steering wheel position is not correct make all necessary adjustments (Part 3-1) at the spindle connecting rod sleeves.
16. Check the effort to turn the wheels in both directions. The effort should be about equal in both directions.

POWER CYLINDER**REMOVAL**

1. Disconnect the two fluid lines from the power cylinder and allow them to drain into a container.
2. Remove the pal nut, attaching nut, washer and the insulator from the end of the power cylinder rod.
3. Remove the cotter pin and castellated nut that secures the power cylinder stud to the steering arm-to-idler arm rod.

cap from the valve housing (Fig. 12).

When holding the control valve for disassembly, use a softjawed vise, and clamp the valve only around the sleeve flange to prevent damage to the housing, spool, or sleeve.

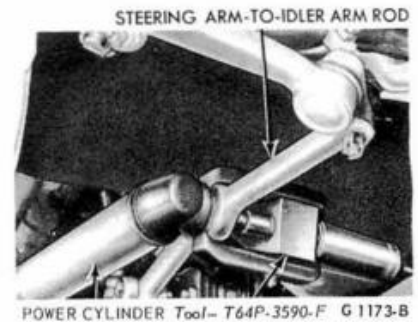


FIG. 11—Disconnecting Power Cylinder Stud

4. Disconnect the power cylinder stud from the steering arm-to-idler arm rod as shown in Fig. 11.
5. Remove the insulator sleeve and washer from the end of the power cylinder rod.
6. Inspect the tube fittings and the seats in the power cylinder for nicks, burrs or damage. Replace the seats in the cylinder or the tubes as required.

INSTALLATION

1. Install the washer, sleeve and the insulator on the end of the power cylinder rod.
2. Extend the rod as far as possible. Insert the rod in the bracket on the frame and compress the rod as necessary to insert the stud in the steering arm-to-idler arm rod. Secure the stud with a castellated nut and a cotter pin.
3. Secure the power cylinder rod with an insulator, washer, nut and a pal nut.
4. Connect each of the two fluid lines to their respective part in the cylinder.
5. Fill the reservoir to the correct level.
6. Start the engine and turn the steering wheel to each end of its travel several times to cycle the system. Stop the engine.
7. Check the fluid level and fill as necessary. Install the fill cap.
8. Start the engine and check for leaks.

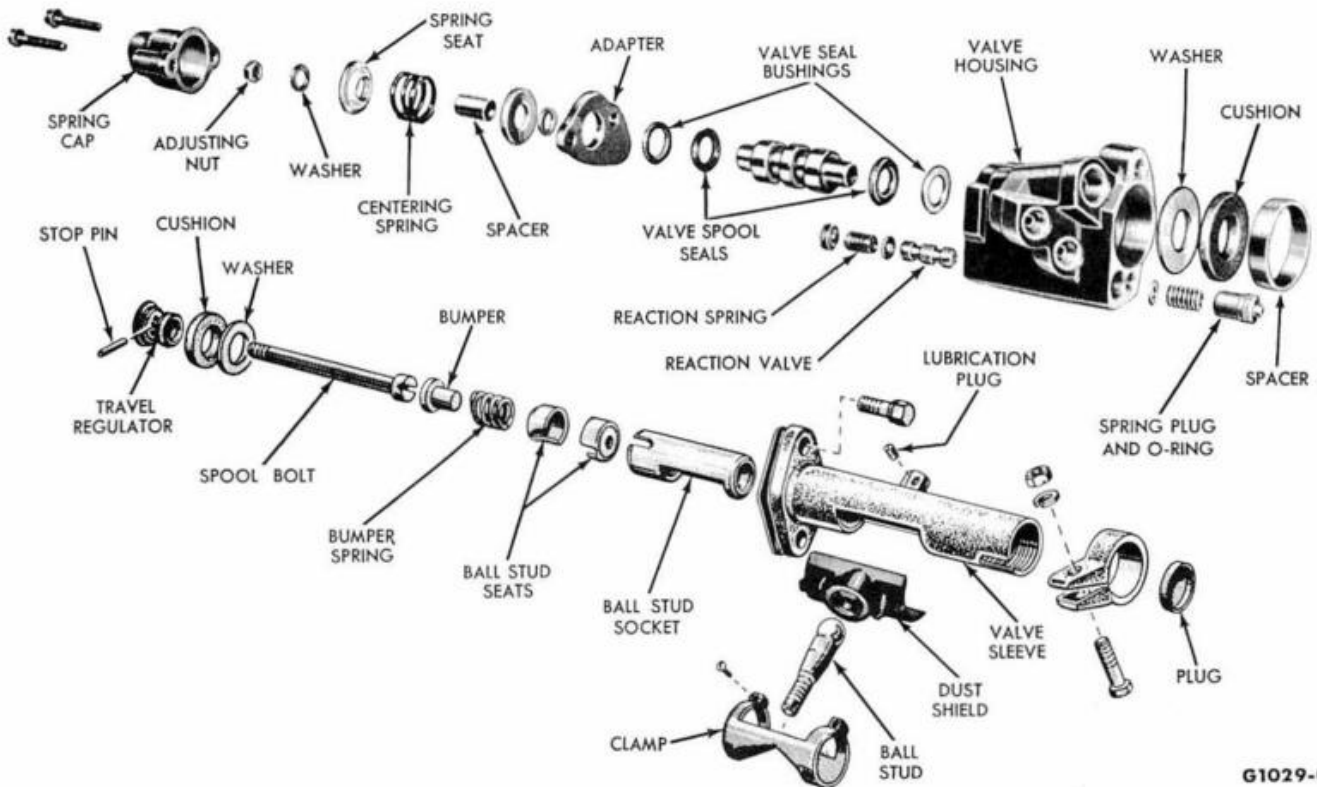
4 MAJOR REPAIR OPERATIONS

CONTROL VALVE**DISASSEMBLY**

1. Wipe all fluid and loose dirt from the outside of the control valve.
2. Remove the centering spring

3. Remove the nut from the end of the valve spool bolt. Remove the washers, spacer, centering spring, adapter, and bushing from the bolt and the valve housing.

4. Remove the two bolts that hold



G1029-C

FIG. 12—Control Valve Disassembled—Typical

the valve housing and the sleeve together, and separate the housing from the sleeve.

5. Remove the plug from the valve sleeve.

6. Push the valve spool out of the centering spring end of the valve housing, and remove the seal from the spool.

7. Remove the spacer, bushing, and seal from the sleeve end of the valve housing.

8. Drive the stop pin out of the travel regulator stop with a punch and hammer (Fig. 13). Pull the head of the valve spool bolt tightly against the travel regulator stop before driving the pin out of the stop.

9. Turn the travel regulator stop counterclockwise in the valve sleeve to remove the stop from the sleeve.

10. Remove the valve spool bolt, spacer, and rubber washer from the travel regulator stop.

11. Remove the rubber boot and clamp from the valve sleeve.

12. Slide the bumper, spring, and ball stud seat out of the valve sleeve, and remove the ball stud socket from the sleeve.

13. After removing the return port hose seat, remove the return port relief valve.

14. After removing the spring plug

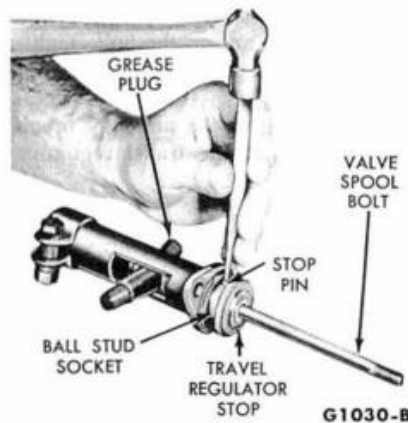


FIG. 13—Removing Stop Pin—Typical

and O-ring, remove the reaction limiting valve (Fig. 14).

TUBE SEAT REPLACEMENT

If a hose seat is worn or damaged it should be replaced. It can be removed with an Easy-Out tool, or by using a bolt of appropriate size as a puller.

1. Tap the existing hole in the hose seat, using a starting tap of suitable size. Be sure to remove all metal chips from the hose seat port after tapping.

2. Place a nut and large flat washer on a bolt of the same size as the



FIG. 14—Removing Reaction Valve Plug

tapped hole. The washer must be large enough to cover the hose seat port.

3. Insert the bolt in the tapped hole, and using the nut as a puller, remove the hose seat.

4. Place a new hose seat in the port, and thread a bolt of suitable size into the port. Tighten the bolt enough to bottom the seat in the port.

ASSEMBLY

Before assembling the control valve, coat all parts except the seals with Automatic Transmission Fluid. Coat the seals with lubricant COAZ-19553-A.

1. Install the reaction limiting valve, the spring, and the plug.

2. Install the return port relief

valve and the hose seat.

3. Insert one of the ball stud seats (flat end first) into the ball stud socket, and insert the threaded end of the ball stud into the socket.

4. Place the socket in the control valve sleeve so that the threaded end of the ball stud can be pulled out through the slot in the sleeve (Fig. 15).

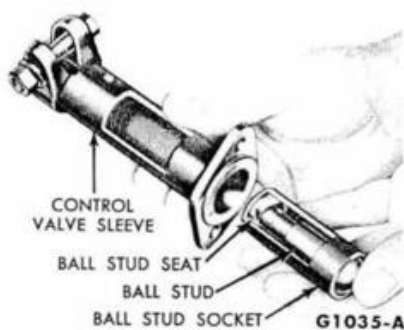


FIG. 15—Installing Ball Socket, Seal and Bracket

5. Place the other ball stud seat, the spring, and the bumper (Fig. 12) in the socket, and install and securely tighten the travel regulator stop.

6. Loosen the stop just enough to align the nearest hole in the stop with slot in the ball stud socket, and install the stop pin in the ball stud socket, travel regulator stop, and valve spool bolt (Fig. 13).

7. Install the rubber boot, clamp, and the plug on the control valve sleeve. Make sure that the lubrication fitting is turned on tightly and does not bind on the ball stud socket.

8. Insert the valve spool in the valve housing. Rotate the spool while inserting it in the housing (Fig. 16).

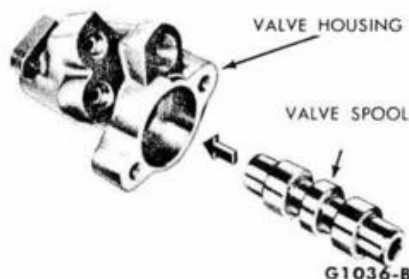


FIG. 16—Inserting Valve Spool

9. Move the spool toward the centering spring end of the housing, and place the small seal bushing, and spacer in the sleeve end of the housing.

10. Press the valve spool against the inner lip of the seal and, at the

same time, guide the lip of the seal over the spool with a small screwdriver. **Do not nick or scratch the seal or the spool during installation.**

11. Place the sleeve end of the housing on a flat surface so that the seal, bushing, and spacer are at the bottom end and push down the valve spool until it stops.

12. Carefully install the spool seal and bushing in the centering spring end of the housing. Press the seal against the end of the spool, guiding the seal over the spool with a small screwdriver. **Do not nick or scratch the seal or the spool during installation.**

13. Pick up the housing, and slide the spool back and forth in the housing to check for free movement.

14. Place the valve sleeve on the housing so that the ball stud is on the same side of the housing as the ports for the two power cylinder lines. Install the two bolts in the sleeve, and torque them to specifications.

15. Place the adapter on the centering spring end of the housing, and install the bushing, washers, spacers, and centering spring on the valve spool bolt.

16. Compress the centering spring, and install the nut on the bolt. Tighten the nut snug, then loosen it not more than $\frac{1}{4}$ turn (Fig. 17). **Excessive tightening of the nut may break the stop pin at the travel regulator stop.**

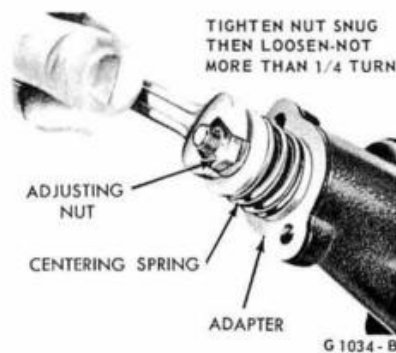


FIG. 17—Adjusting Centering Spring

17. Move the ball stud back and forth in the sleeve slot to check the spool for free movement. See Part 3-6 for the specified travel. Apply COAZ-19553-A (silicone) grease at the sealing areas.

18. Install the centering spring cap on the valve housing, and torque the two cap bolts to specification.

19. Install the nut on the ball stud

so that the valve can be positioned in a vise as shown in Fig 18. Then push forward on the cap end of the valve to check the valve spool for free movement.

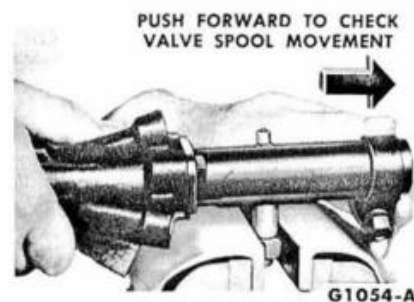


FIG. 18—Inspecting Valve Spool Movement

20. Turn the valve around in the vise, and push forward on the sleeve end to check the spool for free movement.

POWER CYLINDER SEAL

REMOVAL

1. Clamp the power cylinder in a vise, and remove the snap ring from the end of the cylinder. **Be careful not to distort or crack the cylinder in the vise.**

2. Pull the piston rod out all the way to remove the scraper, bushing, and seals. If the seals cannot be removed in this manner, remove them from the cylinder with a sharp pick. Take care, when using a pick, not to damage the shaft or seal seat.

INSTALLATION

When replacing the power cylinder seals, install all of the parts supplied in the repair kit for the cylinder being repaired.

1. Coat the new seals with lubricant COAZ-19553-A and place the parts (Fig. 19) on the piston rod which has been coated with the same grease.

2. Push the rod in all the way, and install the parts in the cylinder with a deep socket slightly smaller than the cylinder opening (Fig. 20).

POWER STEERING PUMP RESERVOIR REPLACEMENT

Reservoir replacement must be done on a clean workbench. Cleanliness of work area and tools is extremely important when repairing any hydraulic unit. Thoroughly clean the exterior of the pump with a suitable cleaning solvent. **Do not immerse the shaft oil seal in solvent.**

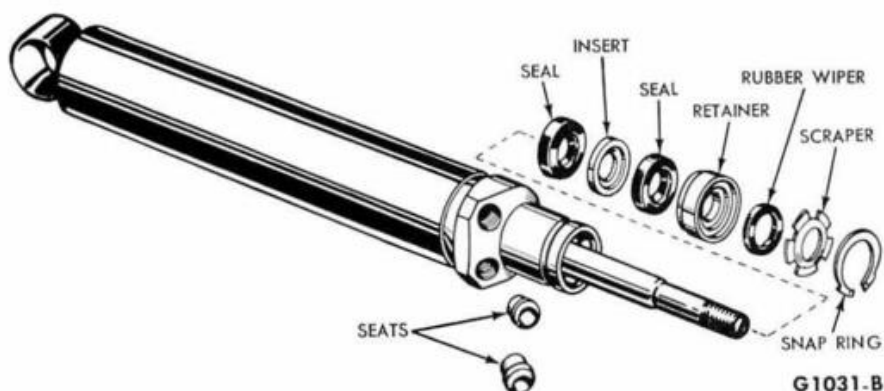


FIG. 19—Power Cylinder

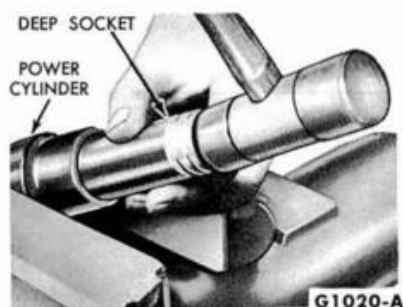


FIG. 20—Installing Power Cylinder Seals

Plug the inlet and outlet openings with plugs or masking tape before cleaning the pump exterior or removing the reservoir.

REMOVAL

1. Position the pump in a bench mounted holding fixture, Tool T57L-500-A.

2. Rotate the pump so the pulley side is facing down and remove the outlet fitting hex nut, stud nuts, and service identification tag.

3. Invert the pump so the pulley side is facing up and remove the reservoir by tapping around the flange with a wood block (Fig. 21).

4. Remove the reservoir O-ring seal, the outlet fitting gasket, and the support stud copper gasket from the pump.

INSTALLATION

1. Install a new gasket on the out-

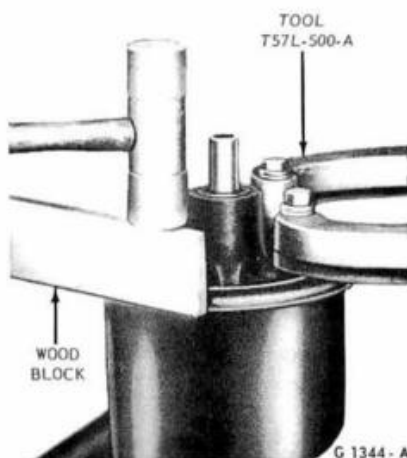


FIG. 21—Removing Pump Reservoir

let fitting, a new copper gasket on the support stud, and a new reservoir O-ring seal on the pump housing plate (Fig 22). **The old gaskets and seal should never be re-used.**

2. Apply vaseline to the reservoir O-ring seal and to the inside edge of the new reservoir flange. **Do not twist the O-ring seal.**

3. Position the reservoir over the pump and align the reservoir with the outlet fitting and the stud hole.

4. Install the reservoir on the pump and O-ring seal with a plastic or rubber hammer and a block of wood as shown in Fig. 23. Tap at

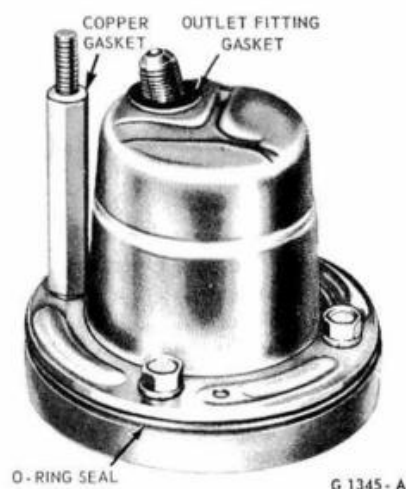


FIG. 22—Gasket Locations

the rear of the reservoir and on the outer edges only.

5. Inspect the assembly to be sure the reservoir is evenly seated on the pump housing plate.

6. Position the service identification tag on the outlet fitting and install the outlet fitting hex nut. Torque the nut to specification (Part 3-6). **Do not exceed specification.**

7. Install the stud nut and torque to specification.

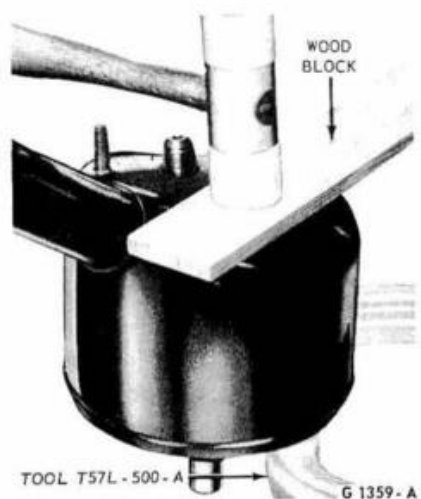


FIG. 23—Installing Reservoir on Pump

PART

3-5 WHEELS AND TIRES

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Front Wheel Bearing Adjustment	3-45	Repacking	3-46
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Wheel and Tire Removal	3-45	Disc Brakes	3-47
Removing Tire From Wheel	3-45	Front Hub and Drum Replacement	3-47
Installing Tire on Wheel	3-45	Front Hub and Rotor Replacement	3-48

1 DESCRIPTION AND OPERATION

FRONT WHEEL

Each front wheel and tire assembly is bolted to its respective front hub and brake drum or rotor on Mustang with disc brakes (optional on Mustang models). Two opposed tapered roller bearings are installed in each hub. A grease retainer is installed at the inner end of the hub to prevent lubricant from leaking in to the drum or on the rotor. The entire assembly is retained to its spindle by the adjusting nut, nut lock and cotter pin (Figs. 1 and 2).

REAR WHEEL

The rear brake drum assembly is retained to studs on the rear axle shaft flange by three speed nuts. The wheel and tire assembly mounts on the same rear axle shaft flange studs and is held against the hub and drum by the wheel nuts. The rear wheel bearing is pressed onto the axle shaft just inside the shaft flange, and the entire assembly is retained to the rear axle housing by the bearing retainer plate which is bolted to the housing flange.

The inner end of each axle shaft is splined to the differential in the rear axle.

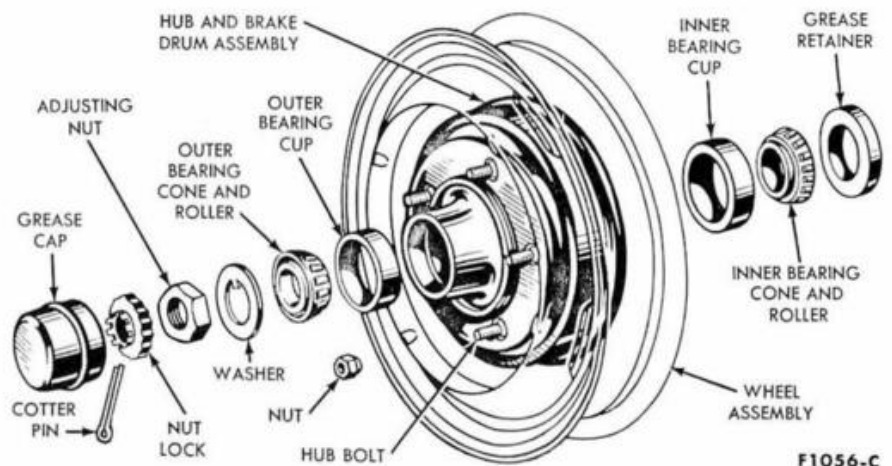


FIG. 1—Front Hub, Bearings and Grease Retainer—Drum Brakes

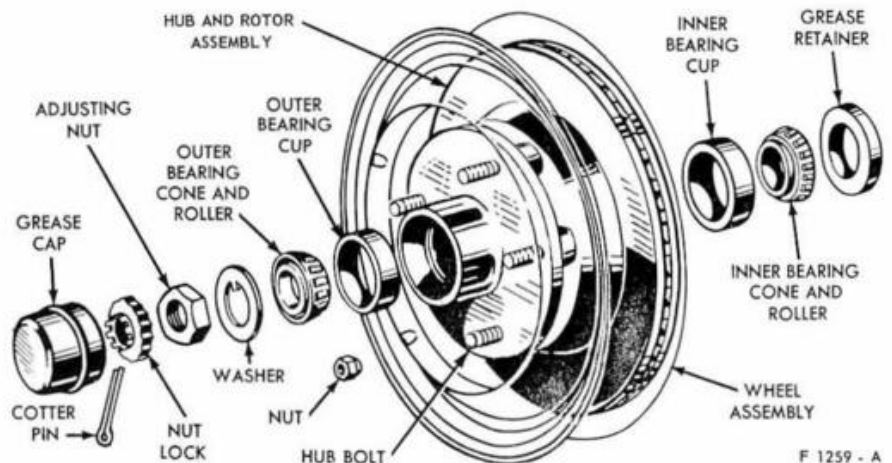


FIG. 2—Front Hub, Bearings and Grease Retainer—Disc Brakes

2 IN-CAR ADJUSTMENTS AND REPAIRS

HOISTING INSTRUCTIONS

Damage to suspension and/or steering linkage components may occur if care is not exercised when positioning the hoist adapters of 2 post hoists prior to lifting the car.

If a 2 post hoist is used to lift the car, place the adapters under the front suspension lower arms. **Do not allow the adapters to contact the steering linkage.**

FRONT WHEEL BEARING ADJUSTMENT

The front wheel bearings should be adjusted if the wheel is too loose on the spindle or if the wheel does not rotate freely. The following procedure will bring the bearing adjustment to specification.

1. Raise the car until the wheel and tire clear the floor.
2. Pry off the hub cap or wheel cover and remove the grease cap from the hub.
3. Wipe the excess grease from the end of the spindle, and remove the cotter pin and nut lock.
4. If equipped with disc brakes, loosen the bearing adjusting nut

three turns. Then, rock the wheel and rotor assembly in and out several times to push the shoe and linings away from the rotor.

5. While rotating the wheel, hub, and drum or rotor assembly, torque the adjusting nut to 17-25 ft-lbs to seat the bearings (Fig 3).

6. Locate the nut lock on the adjusting nut so that the castellations on the lock are aligned with the cotter pin hole in the spindle.

7. Back off both the adjusting nut and the nut lock together until the next castellation on the nut lock aligns with the cotter pin hole in the spindle.

8. Install a new cotter pin, and bend the ends of the cotter pin around the castellated flange of the nut lock.

9. Check the front wheel rotation. If the wheel rotates properly, install the grease cap and the hub cap or wheel cover. If the wheel still rotates roughly or noisily, clean or replace the bearings and cups as required (Section 4).

10. Before driving the car (if equipped with disc brakes), pump the brake pedal several times to obtain normal brake lining to rotor clearance and restore normal brake pedal travel.

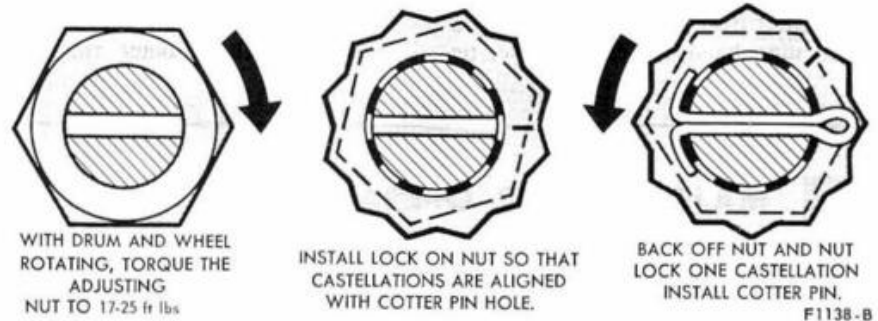


FIG. 3—Front Wheel Bearing Adjustment

3 REMOVAL AND INSTALLATION

HOISTING INSTRUCTIONS

Damage to suspension and/or steering linkage components may occur if care is not exercised when positioning the hoist adapters of 2 post hoists prior to lifting the car.

If a 2 post hoist is used to lift the car, place the adapters under the front suspension lower arms. **Do not allow the adapters to contact the steering linkage.**

WHEEL AND TIRE REMOVAL

1. Pry off the wheel hub cap or cover. Loosen but do not remove the wheel lug nuts.
2. Raise the car until the wheel and tire clear the floor.
3. Remove the wheel lug nuts from the bolts, and pull the wheel and tire assembly from the hub and drum or rotor.

REMOVING TIRE FROM WHEEL

The tire can be demounted on a

mounting machine. **Be sure that the outer side of the wheel is positioned downward.** If tire irons are used follow the procedure given here.

1. Remove the valve cap and core, and deflate the tire completely.
2. With a bead loosening tool, break loose the tire side walls from the wheel (Fig. 4).
3. Position the outer side of the

wheel downward, and insert two tire irons about 8 inches apart between the tire inner bead and the back side of the wheel rim. **Use only tire irons with rounded edges or irons designed for demounting tubeless tires.**

4. Leave one tire iron in position, and pry the rest of the bead over the rim with the other iron. Take small "bites" with the iron around the tire in order to avoid damaging the sealing surface of the tire bead.

5. Stand the wheel and tire upright with the tire outer bead in the drop center well at the bottom of the wheel. Insert the tire iron between the bead and the edge of the wheel rim, and pry the wheel out of the tire.

INSTALLING TIRE ON WHEEL

1. If a used tire is being installed remove all dirt from the tire.

If a tire is being mounted to the original wheel, clean the rim with



FIG. 4—Bead Loosening Tool

emery cloth or fine steel wool. Check the rim for dents.

If a new wheel is being installed, coat a new valve with RUGLYDE or similar rubber lubricant and position the valve to the new wheel. Use a rubber hammer or a valve replacing tool to seat the valve firmly against the inside of the rim.

2. Apply RUGLYDE or a similar rubber lubricant to the sealing surface on both tire beads. With the outer side of the wheel down, pry the beads over the wheel rim with two tire irons. **Do not use a hammer or mallet to force the beads over the rim.**

3. Align the balance mark on the tire with the valve on the wheel.

4. Hold the beads against the rim flanges by positioning a tire mounting band over the tire (Fig 5). If a mounting band is not available, tie



FIG. 5—Tubeless Tire Mounting Band

a tourniquet of heavy cord around the circumference of the tire. Tighten the cord with a tire iron. Center the tire on the wheel with a rubber mallet.

5. Give the tire a few quick bursts of air to seat the beads properly, then inflate the tire to 40 pounds pressure. Check to see that the bead positioning rings (outer rings near

the side walls) are evenly visible just above the rim flanges all the way around the tire. If the rings are not even, deflate the tire completely and inflate it again.

6. When the rings are properly positioned, deflate the tire to the recommended pressure.

WHEEL AND TIRE INSTALLATION

1. Clean all dirt from the hub and drum or rotor.

2. Position the wheel and tire assembly on the hub and drum or rotor. Install the wheel lug nuts and tighten them alternately in order to draw the wheel evenly against the hub and drum or rotor.

3. Lower the car to the floor, and torque the lug nuts to specification (Part 3-6).

4 MAJOR REPAIR OPERATIONS

HOISTING INSTRUCTIONS

Damage to suspension and/or steering linkage components may occur if care is not exercised when positioning the hoist adapters of 2 post hoists prior to lifting the car.

If a 2 post hoist is used to lift the car, place the adapters under the front suspension lower arms. **Do not allow the adapters to contact the steering linkage.**

FRONT WHEEL GREASE SEAL AND BEARING REPLACEMENT AND/OR REPACKING

If bearing adjustment will not eliminate looseness or rough and noisy operation, the hub and bearings should be cleaned, inspected, and repacked. If the bearing cups or the cone and roller assemblies are worn or damaged, they should be replaced.

DRUM BRAKES

1. Raise the car until the wheel and tire clear the floor.

2. Remove the wheel cover or hub cap. Remove the grease cap from the hub. Remove the cotter pin, nut lock, adjusting nut, and flat washer from the spindle. Remove the outer bearing cone and roller assembly (Fig 1).

3. Pull the wheel, hub, and drum assembly off the wheel spindle.

4. Remove the grease retainer and

the inner bearing cone and roller assembly from the hub with a drift.

5. Clean the lubricant off the inner and outer bearing cups with solvent and inspect the cups for scratches, pits, excessive wear, and other damage. If the cups are worn or damaged, remove them with a drift.

6. Soak a new grease retainer in light engine oil at least 30 minutes before installation. Thoroughly clean the inner and outer bearing cones and rollers with solvent, and dry them thoroughly. **Do not spin the bearing with compressed air.**

7. Inspect the cone and roller assemblies for wear or damage, and replace them if necessary. **The cone and roller assemblies and the bearing cups should be replaced as a unit if damage to either is encountered.**

8. Thoroughly clean the spindle and the inside of the hub with solvent to remove all old lubricant.

Cover the spindle with a clean cloth, and brush all loose dust and dirt from the brake assembly. **To prevent getting dirt on the spindle, carefully remove the cloth from the spindle.**

9. If the inner and/or outer bearing cups(s) were removed, install the replacement cup(s) in the hub with the tool shown in Figs. 6 or 7. **Be sure to seat the cups properly in the hub.**

10. Pack the inside of the hub with

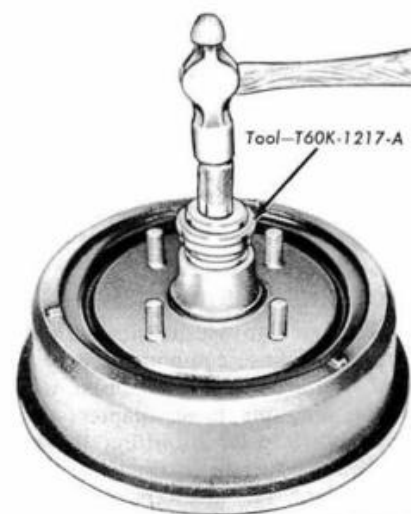


FIG. 6—Installing Front Wheel Bearing Cup—Falcon 6-Cylinder

specified wheel bearing grease. Add lubricant to the hub only until the grease is flush with the inside diameter of both bearing cups (Fig. 8).

11. All old grease should be completely cleaned from the bearings before repacking them with new grease. Pack the bearing cone and roller assemblies with wheel bearing grease. A bearing packer is desirable for this operation. If a packer is not available, work as much lubricant as possible between the rollers

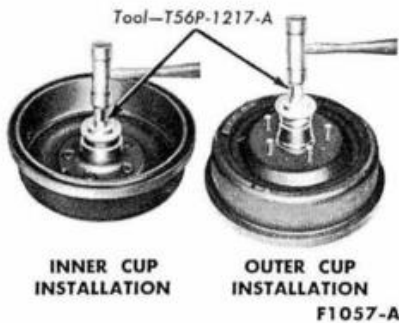


FIG. 7—Installing Front Wheel Bearing Cup—All Fairlane, Comet, and Mustang and 8-Cylinder Falcon

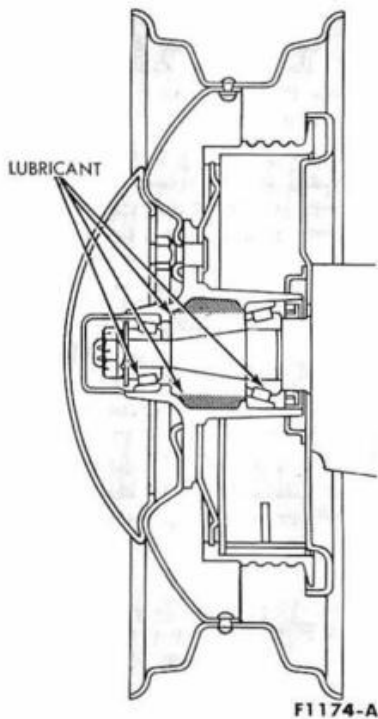


FIG. 8—Front Wheel Hub Lubrication

and cages. Lubricate the cone surfaces with grease.

12. Place the inner bearing cone and roller assembly in the inner cup, and install the new grease retainer with the reverse end of the tool shown in Figs. 6 to 7. **Be sure that the retainer is properly seated.**

13. Install the wheel, hub, and drum assembly on the wheel spindle. **Keep the hub centered on the spindle to prevent damage to the grease retainer or the spindle threads.**

14. Install the outer bearing cone and roller assembly and the flat washer on the spindle; then, install the adjusting nut (Fig. 1).

15. Adjust the wheel bearings as outlined in Section 2, and install a

new cotter pin. Bend the ends of the cotter pin around the castellations of the nut lock to prevent interference with the radio static collector in the grease cap. Install the grease cap.

16. Install the hub cap or wheel cover.

DISC BRAKES

1. Raise the car until the wheel and tire clear the floor.

2. Remove the wheel cover or hub cap.

3. Remove the wheel and tire from the hub.

4. Remove 2 bolts attaching the caliper to the caliper bracket. Remove the caliper from the rotor and wire it to the underbody to prevent damage to the brake hose.

5. Remove the grease cap from the hub. Remove the cotter pin, nut lock, adjusting nut, and flat washer from the spindle. Remove the outer bearing cone and roller assembly (Fig. 2).

6. Pull the hub and rotor off the wheel spindle.

7. Remove the grease retainer and the inner bearing cone and roller assembly from the hub.

8. Clean the lubricant off the inner and outer bearing cups with solvent and inspect the cups for scratches, pits, excessive wear, and other damage. If the cups are worn or damaged, remove them with a drift.

9. Soak a new grease retainer in light engine oil at least 30 minutes before installation. Thoroughly clean the inner and outer bearing cones and rollers with solvent, and dry them thoroughly. **Do not spin the bearings with compressed air.**

Inspect the cone and roller assemblies for wear or damage, and replace them if necessary. **The cone and roller assemblies and the bearing cups should be replaced as a unit if damage to either is encountered.**

10. Thoroughly clean the spindle and the inside of the hub with solvent to remove all old lubricant.

Cover the spindle with a clean cloth, and brush all loose dust and dirt from the brake assembly. **To prevent getting dirt on the spindle carefully remove the cloth from the spindle.**

11. If the inner and / or outer bearing cup(s) were removed, install the replacement cup(s) in the hub with the tool shown in Figs. 6 or 7.

Be sure to seat the cups properly in the hub.

12. Pack the inside of the hub with specified wheel bearing grease. Add lubricant to the hub only until the grease is flush with the inside diameter of both bearing cups.

13. All old grease should be completely cleaned from the bearings before packing them with new grease. Pack the bearing cone and roller assemblies with wheel bearing grease. A bearing packer is desirable for this operation. If a packer is not available, work as much lubricant as possible between the rollers and cages. Lubricate the cone surfaces with grease.

14. Place the inner bearing cone and roller assembly in the inner cup, and install the new grease retainer with the reverse end of the tool shown in Figs. 6 or 7. **Be sure that the retainer is properly seated.**

15. Install the hub and rotor on the wheel spindle. **Keep the hub centered on the spindle to prevent damage to the grease retainer or the spindle threads.**

16. Install the outer bearing cone and roller assembly and the flat washer on the spindle; then, install the adjusting nut.

17. Position the caliper over the rotor and install the 2 attaching bolts.

18. Install the wheel and tire on the hub.

19. Adjust the wheel bearings as outlined in Section 2, and install a new cotter pin. Bend the ends of the cotter pin around the castellations of the nut lock to prevent interference with the radio static collector in the grease cap. Install the grease cap.

20. Install the hub cap or wheel cover and lower the car.

FRONT HUB AND DRUM REPLACEMENT

When the hub and drum assembly is replaced, new bearings, cups, and grease retainer must be installed in the new assembly. The new grease retainer should be soaked in light engine oil at least 30 minutes before installation.

1. Raise the car until the wheel and tire clears the floor. Pry off the hub cap or wheel cover, and remove the wheel and tire assembly from the hub and drum assembly.

2. Remove the grease cap from the hub. Remove the cotter pin, nut

lock, adjusting nut, and flat washer from the spindle. Remove the outer bearing cone and roller assembly (Fig. 1).

3. Pull the wheel, hub, and drum assembly off the wheel spindle.

4. Remove the protective coating from the new hub and drum with carburetor degreaser. Install new inner and outer bearing cups in the new hub with the tool shown in Figs. 6 or 7. **Be sure to seat the cups properly in the hub.**

5. Pack the inside of the hub with specified wheel bearing grease. Add lubricant to the hub only until the grease is flush with the inside diameter of both bearing cups (Fig. 8).

6. All old grease should be completely cleaned from the bearings before repacking them with new grease. Pack the bearing cone and roller assemblies with wheel bearing grease. A bearing packer is desirable for this operation. If a packer is not available, work as much lubricant as possible between the rollers and cages. Lubricate the cone surfaces with grease.

7. Place the inner bearing cone and roller assembly in the inner cup, and install the new grease retainer with the reverse end of the tool shown in Fig. 6 or 7. **Be sure that the retainer is properly seated.**

8. Install the new hub and drum assembly on the wheel spindle. **Keep the hub centered on the spindle to prevent damage to the grease retainer.**

9. Install the outer bearing cone and roller assembly and the flat washer on the spindle; then, install the adjusting nut (Fig 1).

10. Position the wheel and tire assembly on the new hub and drum assembly. Install the wheel lug nuts

and tighten them alternately in order to draw the wheel evenly against the hub and drum. Do not exceed specifications (Part 3-6).

11. Adjust the wheel bearings as outlined in Section 2, and install a new cotter pin. Bend the ends of the cotter pin around the castellations of the nut lock to prevent interference with the radio static collector in the grease cup. Install the grease cup.

12. Install the hub cap or wheel cover.

FRONT HUB AND ROTOR REPLACEMENT

When the hub and rotor assembly is replaced, new bearings, cups, and grease retainer must be installed in the new assembly. The new grease retainer should be soaked in light engine oil at least 30 minutes before installation.

1. Raise the car until the wheel and tire clears the floor. Pry off the hub cap or wheel cover, and remove the wheel and tire assembly from the hub and rotor.

2. Remove 2 bolts attaching the caliper to the caliper bracket. Remove the caliper from the rotor and wire it to the underbody to prevent damage to the brake hose.

3. Remove the grease cap from the hub. Remove the cotter pin, nut lock, adjusting nut, and flat washer from the spindle. Remove the outer bearing cone and roller assembly (Fig 2). Pull the hub and rotor off the wheel spindle.

4. Remove the protective coating from the new hub and rotor with carburetor degreaser. Install new inner and outer bearing cups in the new hub with the tool shown in Figs. 6 or 7. **Be sure to seat the cups properly in the hub.**

5. Pack the inside of the hub with specified wheel bearing grease. Add lubricant to the hub only until the grease is flush with the inside diameter of both bearing cups.

6. All old grease should be completely cleaned from the bearings before repacking them with new grease. Pack the bearing cone and roller assemblies with wheel bearing grease. A bearing packer is desirable for this operation. If a packer is not available, work as much lubricant as possible between the rollers and cages. Lubricate the cone surfaces with grease.

7. Place the inner bearing cone and roller assembly in the inner cup, and install the new grease retainer with the reverse end of the tool shown in Figs. 6 or 7. **Be sure that the retainer is properly seated.**

8. Install the new hub and rotor assembly on the wheel spindle. **Keep the hub centered on the spindle to prevent damage to the grease retainer.**

9. Install the outer bearing cone and roller assembly and the flat washer on the spindle; then, install the adjusting nut (Fig 2).

10. Position the wheel and tire assembly on the new hub and rotor. Install the wheel hub nuts and tighten them alternately in order to draw the wheel evenly against the hub and rotor. Do not exceed specifications (Part 3-6).

11. Adjust the wheel bearings as outlined in Section 2, and install a new cotter pin. Bend the ends of the cotter pin around the castellations of the nut lock to prevent interference with the radio static collector in the grease cap. Install the grease cap.

12. Install the hub cap or wheel cover.

PART

3-6 SPECIFICATIONS

FRONT WHEEL ALIGNMENT

COMET, FALCON AND FAIRLANE	Checking Specifications			Optimum Re-setting Specifications
	Min.	Max.	Maximum Variation Between Wheels	Desired Alignment
Caster	-1°	+1°	½°	0°
Camber	-½°	+1°	½°	+¼°
Toe-in	⅛ in.	⅜ in.	—	¼ in.

MUSTANG				
Caster—6 Cyl.	0°	+2°	½°	+1°
Caster—8 Cyl.	-1°	+1°	½°	0°
Camber—All	-¼°	+1¼°	½°	+½°
Toe-in	⅛ in.	⅜ in.	—	¼ in.

MUSTANG	Optimum Re-Setting Specifications
	Desired Alignment
King Pin Angle	6 Cyl.—7° 8 Cyl.—6⅞°
Turning Angle of Outside Wheel With Inside Wheel Turned 20° 6 Cyl. Std. Steering	18⅞°
6 Cyl. Power Steering	20⅞°
8 Cyl. Std. Steering	19⅞°
8 Cyl. Power Steering	18¾°

COMET, FALCON AND FAIRLANE	Optimum Re-Setting Specifications
	Desired Alignment
King Pin Angle	7½°
Turning Angle of Outside Wheel With Inside Wheel Turned 20°	17¾°

BALL JOINTS

	Radial Play (Inches) Max. Allowable
Upper Ball Joint	0.250
Lower Ball Joint	Replace if Perceptibly Loose

FRONT SUSPENSION TORQUE LIMITS (FIG. 1)

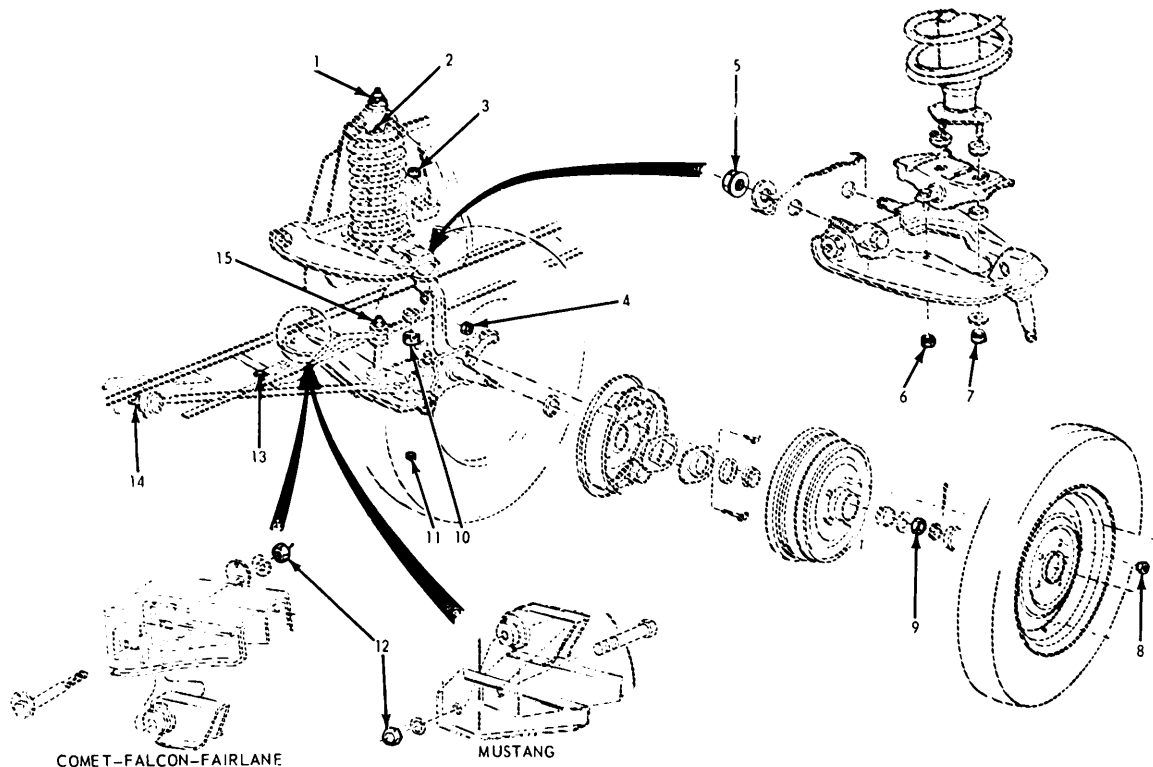
Ref. No.	Description	Torque Ft-Lbs	
		Comet Falcon Fairlane	Mustang
1	Shock Absorber Upper Attachment	20-28	10-15
2	Shock Absorber Upper Bracket to Body	8-13	8-16
3	Front Suspension Compression Bumper to Body	12-17	12-17
4	Brake Backing Plate to Spindle	30-40	25-35
5	Upper Arm and Inner Shaft to Body	75-100	55-75
6	Spring Seat to Upper Arm	17-25	17-25
7	Shock Absorber to Spring Seat	12-17	12-17
8	Wheel Lug Nut 4 Lug Wheel	55-85	—
	5 Lug Wheel	70-115	70-115
9	Wheel Bearing Adjusting Nut	⊙17-25	⊙17-25
10	Ball Joint to Spindle (Upper and Lower)	⊙60-90	⊙60-90
11	Strut to Lower Arm	55-70	55-70
12	Lower Arm to Underbody	75-100	35-50
13	Stabilizer Bar Mounting Bracket to Underbody	11-16	17-25
14	Strut to Underbody	40-60	40-55
15	Stabilizer Bar to Lower Arm	5-10	5-11

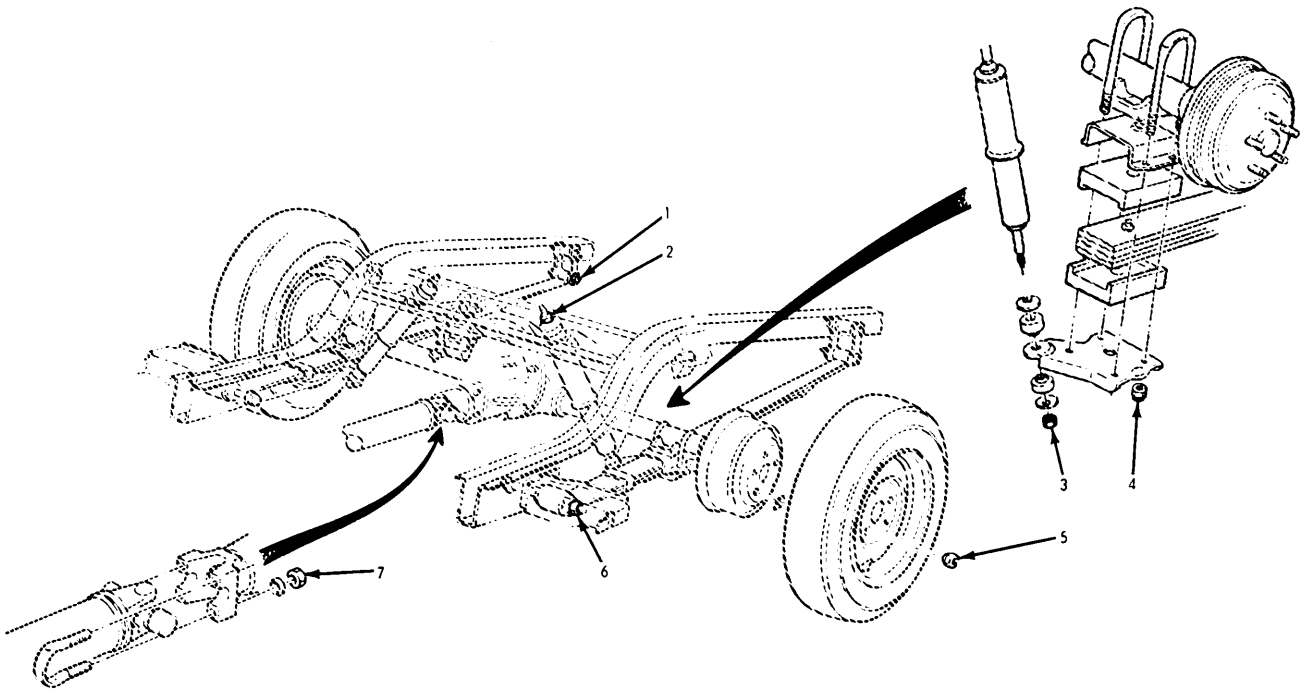
⊙Torque the adjusting nut to 17-25 ft. lb. Locate nut lock on adjusting nut so castellations are aligned with cotter pin hole in spindle. Then, back off adjusting nut and nut lock so the next castellation aligns with the cotter pin hole.

⊙Torque to specification; then, tighten the nut to the nearest cotter pin slot and insert the cotter pin.

REAR SUSPENSION TORQUE LIMITS (FIG. 2)

Ref. No.	Description	Torque Ft-Lbs	
		Comet Falcon Fairlane	Mustang
1	Spring Shackles Bars to Body and Spring	15-22	15-22
2	Rear Shock Absorber to Upper Mounting Bracket	15-25	15-25
3	Rear Shock Absorber to Rear Spring Clip Plate	15-25	15-25
4	Rear Spring to Rear Axle U-bolt Nut	30-45	30-45
5	Wheel Lug Nut 4 Lug Wheel	55-85	—
	5 Lug Wheel	70-115	70-115
6	Rear Spring to Rear Spring Front Hanger	45-55	30-50
7	Universal Joint U-bolt Nut	7-10	12-15

**FIG. 1—Front Suspension Torque Limits**



F 1286-A

FIG. 2—Rear Suspension Torque Limits**STEERING GEAR**

VEHICLE	COMET FAIRLANE		MUSTANG			FALCON	
Model	HCA-CA	HCA-BZ	HCC-AT	HCC-AX	HCC-AW	HCA-CA	HCA-BY
Gear Type	Manual	Power	Manual	Special Manual	Power	Manual	Power
Gear Ratio	22:1	16:1	19.9:1	16:1	16:1	22:1	16:1
Turns of Steering Wheel (Stop to Stop)Ⓢ	5	4	4⅝	3¾	3¾	5	4
Worm Bearing PreloadⓈ in-lbs	4-5	3-4	4-5	4-5	3-4	4-5	3-4
Total Preload (Worm Bearing plus Sector Mesh)Ⓢ in-lbs	9-10	Ⓢ8-9	9-10	9-10	Ⓢ8-9	9-10	Ⓢ8-9
Lube Capacity (oz)	11		8			11	
Lube Type	(C3AZ-19578-A)						
Normal Fluid Pressure Against Either Stop (Engine 1000 rpm)						Power	750-900 psi
Control Valve Spool Travel (from Center)						Power	0.060 in Approx.
Power Steering Belt Tension Using tool BT-33-73F						Power	New: 120-150 lbs.
							Used: 90-120 lbs.

ADJUSTMENTS ALL MODELS:

Adjusting screw clearance at bottom of sector shaft T-slot—.000"-.002".

Sector Shaft end play—steering linkage disconnected—none.

With gear mounted in vehicle or on a suitable fixture and positioned on center, and the sector shaft retained to prevent rotation, apply a 15 lb. in. torque on the steering gear input shaft in both right and left turn directions. The total angular travel of the input shaft cannot exceed 8 $\frac{1}{2}$ degrees, with 8 lb. in. net mesh load.

NOTES:

ⓈGear only—not attached to Pitman arm.

ⓈTotal (mesh load plus worm bearing preload) must be a minimum of 2 lb. in. greater than worm bearing preload.

ⓈRequired to rotate input shaft and worm assembly past the center high point.

ⓈTorque required to rotate input shaft at approximately 1 $\frac{1}{2}$ turns either side of center (gear out of vehicle or Pitman arm disconnected)

**STEERING GEAR TORQUE LIMITS
COMET, FALCON AND FAIRLANE**

Description	Torque	
	Ft-Lbs	In-Lbs
Sector Shaft Cover Bolts	17-25	18-42
Meshload Adjusting Screw Locknut	32-40	
Ball Return Guide Clamp Screw Fairlane (Power)		
Ball Return Guide Clamp Screw (Falcon, Comet, Fairlane—Manual)		42-70
Preload Adjuster Locknut	Ⓢ60-80	

ⓈResidual torque must be 40 ft-lbs minimum

MUSTANG

Description	Torque	
	Ft-Lbs	In-Lbs
Sector Shaft Cover Bolts	15-22	18-42
Meshload Adjusting Screw Locknut	32-40	
Ball Return Guide Clamp Screw		
Preload Adjuster Locknut	Ⓢ45-60	

ⓈResidual torque must be 35 ft-lbs minimum

STEERING LINKAGE TORQUE LIMITS (Fig. 3)

Ref. No.	Description	Torque Ft-Lbs			
		Comet—Falcon Fairlane		Mustang	
		Standard Steering	Power Steering	Standard Steering	Power Steering
1	Cylinder Mounting Bracket to Under body (Side Hole)	—	28-35	—	28-35
2	Steering Spindle Arm Connecting Rod End to Spindle Arm	Ⓢ30-40		Ⓢ30-40	
3	Idler Arm Mounting Bracket to Underbody	28-35		28-35	
4	Pitman Arm to Steering Arm-to-Idler Arm Rod or to Valve and Link Assembly	Ⓢ35-47		Ⓢ35-47	
5	Steering Spindle Arm Connecting Rod to Steering Arm-to-Idle Arm Rod	Ⓢ30-40		Ⓢ25-30	
6	Cylinder Mounting Bracket to Underbody (Bottom Hole)	—	35-43	—	35-43
7	Power Cylinder to Bracket	—	18-24	—	18-24
8	Power Cylinder to Bracket Lock Nut	—	3-5	—	3-5
9	Steering Gear to Side Rail	40-55		40-65	
10	Pitman Arm to Sector Shaft	150-225		85-110	
11	Power Cylinder to Control Rod	—	Ⓢ35-47	—	Ⓢ35-47
12	Idler Arm to Steering Arm-to-Idler Arm Rod.	Ⓢ60-80		Ⓢ35-47	
13	Steering Spindle Arm Connecting Rod and End Clamp to Adjusting Sleeve	8-14		19-26	

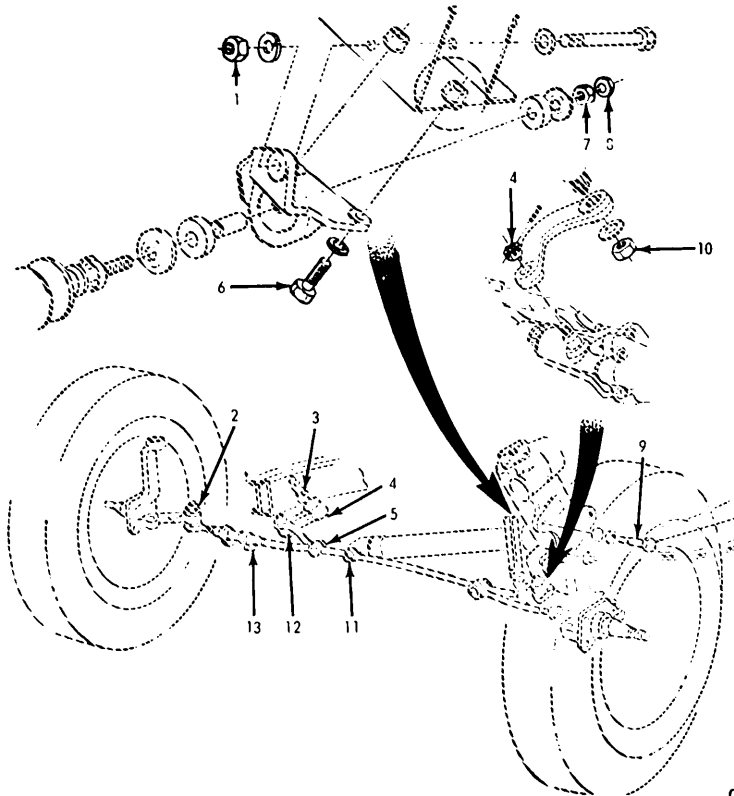
ⓈTorque to low limit of specification; then, tighten the nut to the nearest cotter pin slot and insert the cotter pin.

STEERING COLUMN TORQUE LIMITS

Description	Torque Ft-Lbs	
	Mustang	Comet Falcon Fairlane
Steering Wheel Retaining Nut	25-35	25-30
Steering Column to Support Bracket (Instrument Panel)	9-13	12-16
Steering Column Shift Arm to Shift Linkage	—	20-35
Seal Retainer to Dash Panel	—	16-22

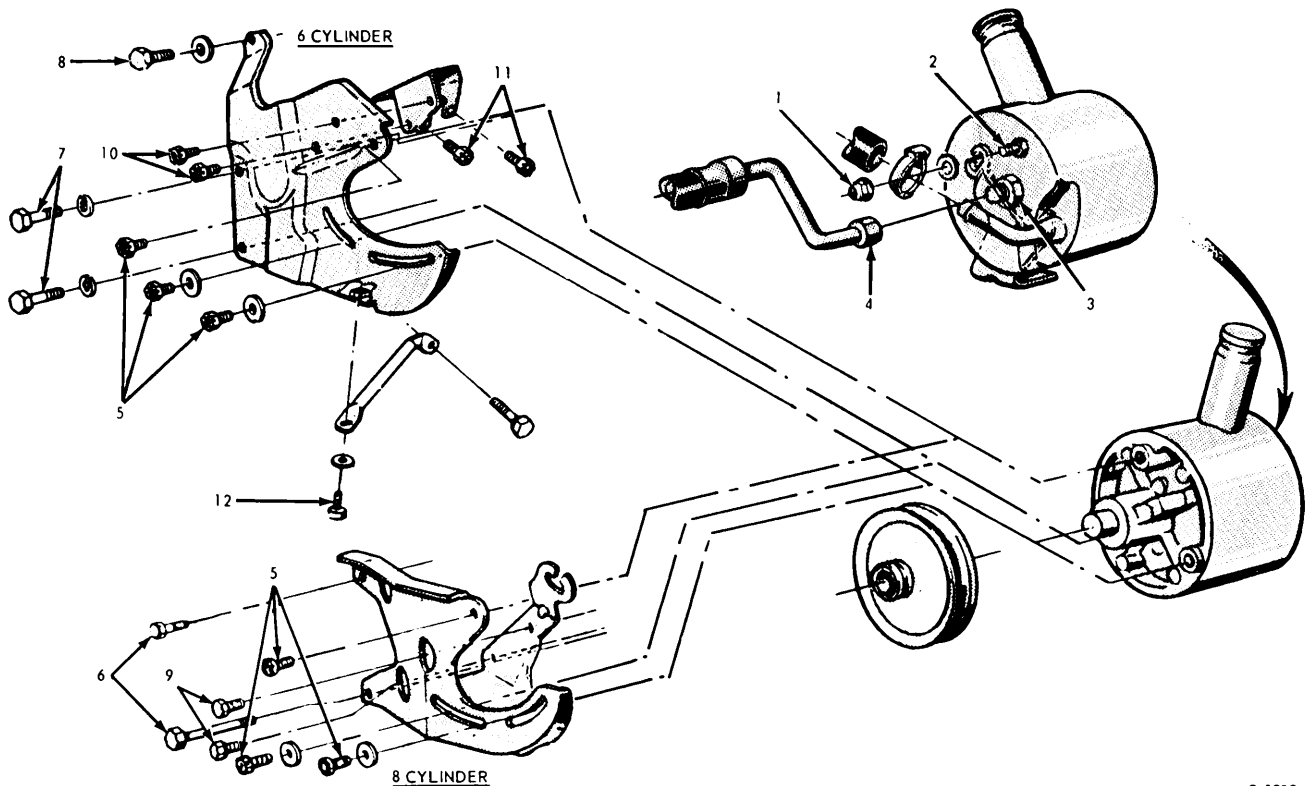
POWER STEERING PUMP TORQUE LIMITS (FIG. 4)

Ref. No.	Description	Torque Ft-Lbs
1	Pump Rear Mounting Nut	11-16
2	Reservoir to Support Stud Retaining Nut	11-16
3	Outlet Fitting Hex Nut	43-47
4	Pressure Hose Nut	18-25
5	Pump Attaching Bolts	30-40
6	Bracket to Engine Attaching Bolts (8-Cylinder)	18-25
7	Bracket to Engine Attaching Bolts (6-Cylinder)	7-10
8	Bracket to Cylinder Head (6-Cylinder only)	13-18
9	Rear Support Bracket Retaining Nuts (8-Cylinder Only)	30-40
10	Bracket to Engine Adaptor	17-25
11	Engine Adaptor to Engine	17-25
12	Support Brace to Bracket	30-40



G 1370 - A

FIG. 3—Steering Linkage Torque Limits



G 1383-A

FIG. 4—Power Steering Pump Torque Limits

TIRES

MODELS	TIRE SIZE		TIRE SIZE		TIRE SIZE	
	6 CYLINDER		8 CYLINDER (289 C.I.D.)		8 CYLINDER (390 C.I.D.)	
	STANDARD	R.P.O.	STANDARD	R.P.O.	STANDARD	R.P.O.
FALCON						
Sedan	6.50 x 13	ⓐ6.95 x 14	6.95 x 14	—	—	—
Wagon	7.35 x 14	—	7.35 x 14	—	—	—
Ranchero	7.35 x 14	7.75 x 14	7.35 x 14	7.75 x 14	—	—
COMET AND FAIRLANE						
Sedan	6.95 x 14	7.35 x 14	6.95 x 14	7.35 x 14	7.35 x 14	7.75 x 14
Convertible	6.95 x 14	7.35 x 14	6.95 x 14	ⓐ7.35 x 14	ⓐ7.35 x 14	ⓐ7.75 x 14
Hardtop	6.95 x 14	7.35 x 14	6.95 x 14	ⓐ7.35 x 14	ⓐ7.35 x 14	ⓐ7.75 x 14
Wagon	7.75 x 14	7.75 x 14—8 Ply	7.75 x 15	7.75 x 14 — 8 Ply	7.75 x 14	7.75 x 14—8 Ply
MUSTANG						
Convertible	6.95 x 14	ⓐ6.95 x 14	6.95 x 14	ⓐ6.95 x 14	—	—
Hardtop	6.95 x 14	ⓐ6.95 x 14	6.95 x 14	ⓐ6.95 x 14	—	—
Imp. Handling	—	—	ⓐ6.95 x 14	—	—	—

ⓐ—Standard on model 62C

ⓑ—110 Level 120 mph dual red band nylon

ⓒ—Standard with air conditioning

ⓐ—110 Level nylon

ⓑ—7.75 x 14 standard on Fairlane GT models

SERVICE TOOLS

Ford Tool No.	Description
T57L-500-A	Bench Mounted Holding Fixture
T56P-1217-A	Front Hub Bearing Cup and Grease Seal Replacer
T60K-1217-A	Front Hub Bearing Cup and Grease Seal Replacer
T65P-3000-B or C	Alignment Spacers
T57P-3006-A	Spindle Ball Joint Assembly Remover Press
T60K-3006-A	Spindle Ball Joint Press Adapter Screw
TOOL-3290-C	Tie Rod Ball Ends and Control Valve Ball Stud Remover
T61P-3355-A	Idler Arm Bushing Remover and Replacer
T62F-3576-A	Sector Shaft Bushing Remover and Replacer
T64K-3576-A	Sector Shaft Needle Bearings and Seal Remover and Replacer
T64K-3576-B	Sector Shaft Needle Bearings and Seal Remover and Replacer Adapter
T64P-3590-F	Steering Arm Remover
TOOL-3600-AA	Steering Wheel Remover
T65P-3A733-A	Power Steering Pump Pulley Replacer
T63P-5310-A (TOOL-5310-C)	Front Coil Spring Remover and Replacer
T64K-5310-A	Front Coil Spring Remover and Replacer Adapter (For T63P-5310-A)
T64K-5310-B	Front Coil Spring Remover and Replacer Adapter (For TOOL-5310-C)
T66P-5310-A	Front Coil Spring Remover and Replacer Adapter (For T63 P-5310-A)
T66P-5310-B	Front Coil Spring Remover and Replacer Adapter (For TOOL-5310-C)
T64N-5781-A	Rear Spring Front Bushing Remover and Replacer
T64K-5781-B	Rear Spring Bushing Adapter
T63L-8620-A	Belt Tension Gauge
T63L-10300-B	Pulley Remover
T56L-33610-D	Power Steering Pump Pressure Gauge

REAR AXLE

GROUP 4

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PART 4-1 GENERAL AXLE SERVICE

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Two types of axles are covered in this group. The **integral carrier** type axle is used only in Mustang and Falcon 6-cylinder models. In this type axle, the differential carrier is inte-

gral with the axle housing. The **removable carrier** type axle is used in Mustang and Falcon 8-cylinder models, and all Comet and Fairlane models. In this type axle, the differ-

ential carrier is bolted to the axle housing and can be removed from the housing for service. A limited-slip differential is available as optional equipment in either type axle.

1 DIAGNOSIS AND TESTING

DIAGNOSIS GUIDE

Certain rear axle and drive line trouble symptoms are also common to the engine, transmission, tires, and other parts of the car. For this reason, be sure that the cause of the trouble is in the rear axle before adjusting, repairing, or replacing any of the axle parts.

REAR AXLE NOISE DIAGNOSIS

Noise characteristics in a rear axle are more difficult to diagnose and repair than mechanical failures. Slight axle noise heard only at a certain speed or under remote conditions must be considered normal. Axle noise tends to peak or be more pronounced at varying speeds and the

noise is in no way a sign of trouble in the axle.

Where noise is present in an objectionable form, loud and/or at all speeds, the first efforts should be made to isolate the noise. Rear axle noise is quite often confused with other noises such as tire noise, transmission noise, driveshaft vibration and universal joint noise. Isolation of the noise in any one unit requires skill and experience. An attempt to eliminate a slight noise may baffle even the best diagnostic experts. Axle noises fall into two basic categories: gear noise and/or bearing noise.

Gear Noise

Abnormal gear noise can be rec-

ognized since it produces a cycling pitch and will be very pronounced in the speed range at which it occurs, usually under drive, float, cruise or coast conditions. Gear noise tends to peak in a narrow speed range or ranges, while bearing noise will tend to remain constant in pitch.

Bearing Noise

Defective bearings will produce a whine that is constant in pitch and varies with vehicle speed. This fact will help distinguish between bearing and/or gear noise.

1. Pinion bearing noise can be identified as a constant grinding noise. Pinion bearings are rotating at a higher speed than differential side

bearings or axle shaft bearings. The noise is most noticeable at a slight pull between 18 to 25 miles per hour.

2. Wheel bearing noise may be confused with rear axle noise. To differentiate between wheel bearings and rear axle, drive the car on a smooth road at medium low speed. With traffic permitting, turn the car sharply right and left. If noise is caused by wheel bearings, the noise will increase on the defective bearing because of side loading.

3. Side bearings will produce a constant grinding noise of a slower nature than pinion bearing, (side bearing noise cannot be determined by the wheel bearing test), but will be in the same frequency as axle shaft bearings.

Also, certain trouble symptoms are common to both the conventional and locking differential axles, while still other symptoms are found only in the locking differential.

To determine whether the car is equipped with a conventional or a locking differential, check the car warranty plate and the axle ratio tag. Refer to CAR IDENTIFICATION at the front of this manual.

LIMITED-SLIP DIFFERENTIAL

The limited-slip differential can be

checked for proper operation without removing the carrier from the axle housing.

Jack up one rear wheel and remove the wheel cover. On a car with a removable carrier type axle, install tool T59L-4204-A on the axle shaft flange studs as shown in Fig. 1. On a car with an integral carrier type axle, use tool T65K-4204-A.

Using a torque wrench of at least 200 ft-lbs capacity, rotate the axle

shaft. **Be sure that the transmission is in neutral gear, one rear wheel is on the floor, and the other rear wheel is raised off the floor.** The torque required to continuously rotate the shaft should be a specified in Part 4-3. The initial breakaway torque may be higher than the continuous turning torque, but this is normal. The axle shaft should turn with even pressure throughout the check without slipping or binding.

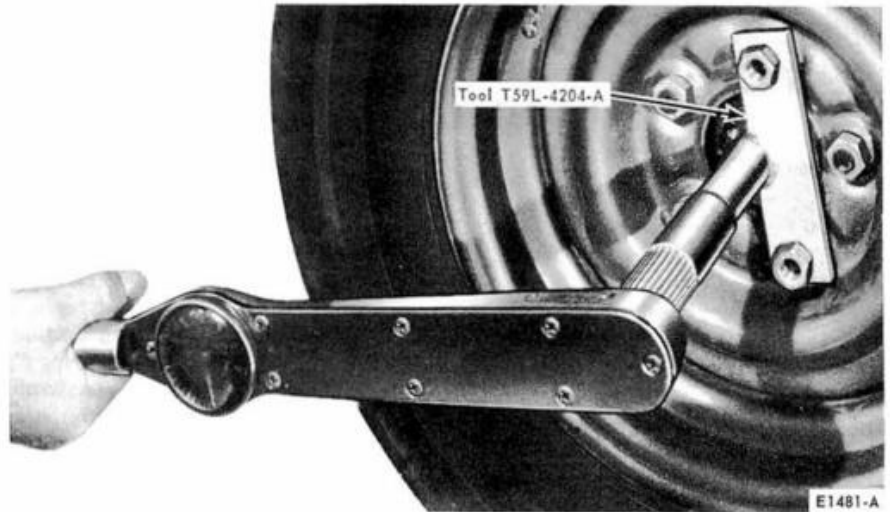


FIG. 1—Checking Limited-Slip Differential

REAR AXLE TROUBLE SYMPTOMS AND POSSIBLE CAUSES

EXCESSIVE REAR AXLE NOISE (ALL REAR AXLES)

Since gears are in mesh, some rear axle noise is normal. However, excessive noise often indicates the beginning of other troubles in the axle.

A road test can help determine whether the noise is being caused by trouble in the rear axle or in other parts of the car. **Before road-testing the car, make sure that the tire pressures and the rear axle lubricant level are normal. Then drive the car far enough to warm the axle lubricant to its normal operating temperature.**

With the car stopped and the transmission in neutral, run the engine at various speeds. If the noise still exists during this test, it probably comes from the engine or the exhaust system.

To determine if the noise is being caused by the rear axle or the tires, drive the car over several different types of road surfaces. Smooth asphalt or black-top roads minimize tire noises. Tire noises may be eliminated by cross-switching the tires. Snow tires often cause noises not heard with conventional tires.

Noise caused by a worn or damaged wheel bearing is often loudest when the car is coasting at low speeds, and it usually stops when the brakes are gently applied. To find the noisy bearing, jack up each wheel and check each bearing for roughness while the wheel is rotating, provided that the car is equipped with a conventional differential.

If all possible external sources of noise have been checked and eliminated, and the noise still exists, road-test the rear axle under all four driving conditions—drive, cruise, float, and coast. Any noise produced by the sidegears and pinions in the differential case will be most pronounced on turns. A continuous whine under a light load between 20 and 35 miles per hour indicates rough or brinnelled pinion bearings. If the tone of drive, coast and float noise differs with speed and if the noise is very rough and irregular; worn, rough or loose differential or pinion shaft bearings are indicated. Remove, disassemble, and inspect the axle.

REAR AXLE TROUBLE SYMPTOMS AND POSSIBLE CAUSES (Continued)

EXCESSIVE REAR AXLE BACKLASH (ALL REAR AXLES)	Excessive backlash in the axle driving parts may be caused by worn axle shaft splines, loose axle shaft flange nuts, loose U-joint flange mountings, excessive backlash between the drive pinion and ring gear, excessive backlash in the differential gears, or bearings which are worn or out of adjustment.
ONE WHEEL SPINS EXCESSIVELY (LIMITED-SLIP DIFFERENTIAL ONLY)	Use the procedure given under limited-slip differential for checking the locking differential while the unit is in the car. If the torque required to rotate one rear wheel is less than the specified minimum, the differential is not functioning properly. To repair the unit, remove it from the axle housing.
AXLE HAS A HIGH-PITCHED, CHATTERING NOISE ON TURNS (LIMITED-SLIP DIFFERENTIAL ONLY)	Drive the car in a fairly tight circle, making five circles clockwise and five counterclockwise. This will permit the lubricant to work in between the clutch plates. If the noise does not disappear during this driving test, it is probable that the axle does not have the approved Ford lubricant. The lubricant may be checked by draining two tablespoonfuls from the axle and mixing it with an equal amount of white alcohol, such as rubbing alcohol. Mix the lubricant and alcohol thoroughly and let it stand for at least two minutes. If the sample now has a blue tint, the lubricant is approved Ford lubricant. If it has a yellow tint, it is not the correct lubricant. Drain and refill the axle with the approved lubricant. It is not necessary to flush the axle housing. After refilling the axle drive the car in fairly tight circles clockwise and counterclockwise. The chattering noise should disappear as soon as the new lubricant works in between the clutch plates.

If the torque reading is less than the specified minimum, check the differential for improper assembly.

A car equipped with a limited-slip differential will always have both wheels driving. If, while the car is being serviced, only one wheel is raised off the floor and the rear axle is driven by the engine, the wheel on the floor will drive the car off the stand or jack.

GEAR TOOTH CONTACT PATTERN CHECK

Paint the gear teeth and roll a pattern as described in Section 3. After diagnosing the tooth pattern as explained here, make the appropriate adjustments as outlined in Section 2.

In making a final gear tooth contact pattern check, it is necessary to recognize the fact that there are three different types of gear set, hunting, non-hunting and partial non-hunting. Each type is determined by the ratio and the number of teeth in the gears. The non-hunting and partial non-hunting types can be identified by the paint timing marks on the pinion and ring gear teeth (Part 4-2, Fig. 30). See Part 4-3 for complete identification specifications.

THE IDEAL TOOTH PATTERN

Figs. 2 and 3 show the ideal tooth pattern. **This pattern is not a rigid standard but merely a general rule.**

In general, desirable tooth patterns should have the following characteristics:

- The drive pattern should be fairly well centered on the tooth.
- The coast pattern should be centered on the tooth but may be slightly toward the toe.
- Some clearance between the pattern and the top of the tooth is desirable.
- There should be no hard lines where the pressure is high.

The individual gear set need not conform exactly to the ideal pattern in order to be acceptable. Characteristic differences between the three

types of gear sets as well as differences between individual gear sets of the same type will result in patterns that are acceptable yet different from those shown in Fig. 3.

HUNTING GEAR SET

In a hunting-type gear set, any one pinion gear tooth comes into contact with all drive gear teeth. In this type, several revolutions of the ring gear are required to make all possible gear combinations.

Acceptable Pattern

The drive pattern shown in Fig. 4 was rolled on a hunting-type gear set. Since each pinion tooth came into contact with each ring gear tooth, the pattern is a result of the com-

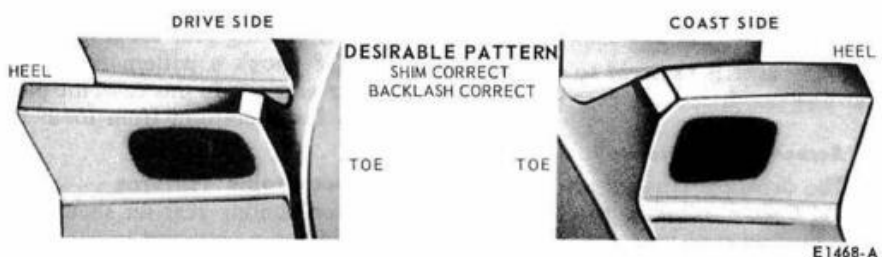


FIG. 2—Ideal Tooth Pattern—Integral Carrier Type Axle

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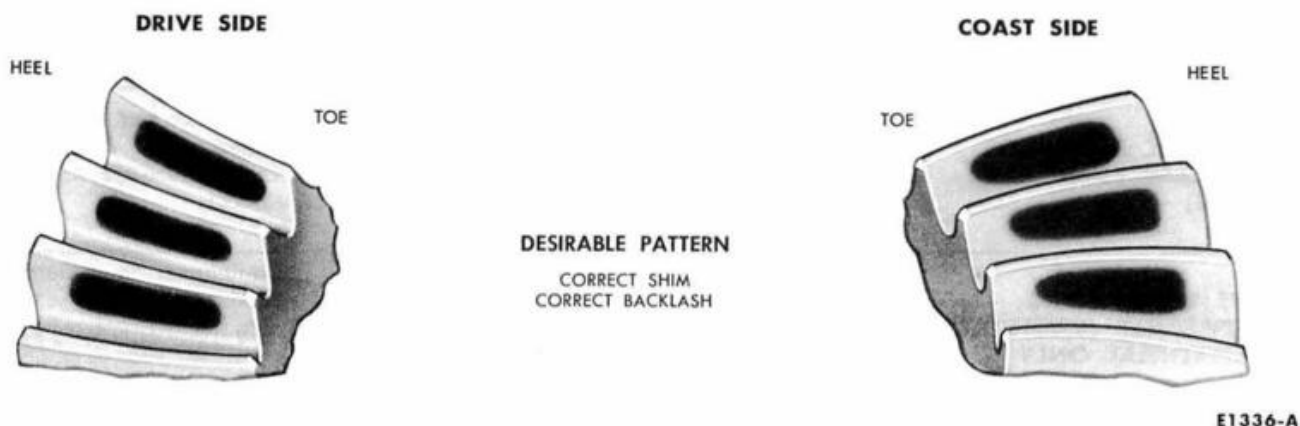


FIG. 3—Ideal Tooth Pattern—Removable Carrier Type Axle

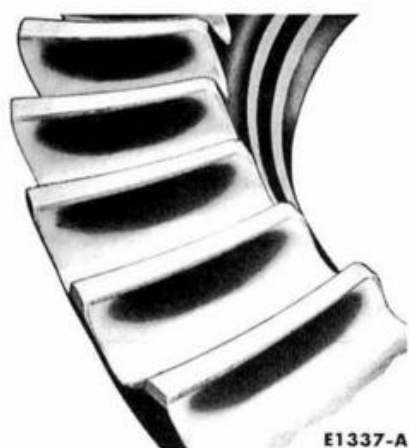


FIG. 4—Acceptable Hunting Gear Pattern

bined tooth contacts. Therefore, the pattern is uniform from tooth to tooth.

Unacceptable Pattern

An erratic tooth pattern on a hunting gear set indicates gear runout and possible need for gear replacement.

A pattern that is uniform, but off center indicates a change in shim or backlash (Figs. 9 or 10).

NON-HUNTING GEAR SET

In a non-hunting type gear set, any one pinion gear tooth comes into contact with only a few ring gear teeth. In this type, only one revolution of the ring gear is required to make all possible tooth contact combinations.

Acceptable Patterns

The drive patterns shown in Figs. 5 and 6 were rolled on two different non-hunting type gear sets. The pattern in Fig. 5 runs from the tooth center toward the toe and then back

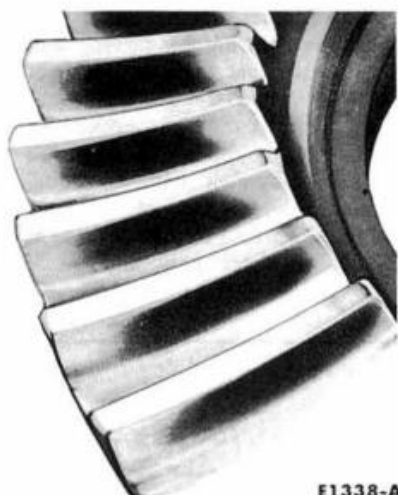


FIG. 5—Unacceptable Non-Hunting Pattern—Center-Toe-Center

to center. The pattern in Fig. 6 runs from the tooth center toward the heel and then back to center. These patterns are not unusual for non-hunting gear sets and are acceptable. The pattern on any one ring gear tooth was formed by only one pinion tooth coming into contact with it. Because of this limited tooth contact, the non-hunting pattern can be more erratic than the hunting pattern and still be acceptable. Likewise, the coast pattern on a non-hunting gear set is usually less uniform tooth to tooth than it would be on a hunting gear set (Fig. 7).

Fig. 8 shows a pattern rolled on another gear set. In this case, the pattern is fairly uniform from tooth to tooth.

Unacceptable Patterns

A non-hunting gear set should be checked for runout and possible replacement if the pattern runs from the tooth center toward the toe and



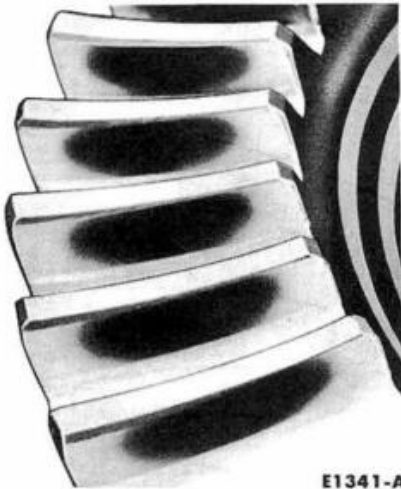
FIG. 6—Unacceptable Non-Hunting Pattern—Center-Heel-Center



FIG. 7—Acceptable Non-Hunting Gear Set—Coast Pattern

back to center on some gear teeth (Fig. 5) while on other teeth of the same gear, the pattern runs from the tooth center toward the heel and back to center (Fig. 6).

A non-hunting gear set requires a



E1341-A

FIG. 8—Acceptable Non-Hunting Pattern—Uniform

change in shimming or backlash when its pattern tends to concentrate toward the heel or toe, top or bottom of most teeth (Figs. 9 and 10).

PARTIAL NON-HUNTING GEAR SET

In a partial non-hunting type gear

set, any one pinion tooth comes into contact with only part of the ring gear teeth, but more than one revolution of the ring gear is required to make all possible gear tooth combinations.

Tooth to tooth pattern uniformity will usually be in between the hunting and the non-hunting patterns. Partial non-hunting gear set patterns will usually be less uniform than hunting gear set patterns, but more uniform than non-hunting gear set patterns.

SHIM AND BACKLASH CHANGES

The patterns shown in Figs. 9 and 10 are typical of gear sets that have either an incorrect backlash or an incorrect shim adjustment. Since each gear set rolls a characteristic pattern, the patterns in Figs. 9 and 10 should be considered as typical only and should be used as a guide rather than a rigid standard. The drive pattern is rolled on the convex side of

the tooth, and the coast pattern is rolled on the concave side.

The movement of tooth contact patterns with changes in backlash and shimming can be summarized as follows:

Integral Carrier Type Axle

1. Thinner shim with the backlash constant moves the pinion farther from the ring gear.

a. Drive pattern moves toward the top of the tooth (face contact) and toward the heel.

b. Coast pattern moves toward the top of the tooth and slightly toward the toe.

2. Thicker shim with the backlash constant moves the pinion closer to the ring gear.

a. Drive pattern moves deeper on the tooth (flank contact) and slightly toward the toe.

b. Coast pattern moves deeper on the tooth and toward the heel.

3. Decreasing backlash moves the drive gear closer to the pinion:

a. Drive pattern (convex side of gear) moves slightly lower and toward the toe.

b. Coast pattern (concave side of gear) moves lower and toward the toe.

4. Increasing backlash moves the ring gear away from the pinion:

a. Drive pattern moves slightly higher and toward the heel.

b. Coast pattern moves higher and toward the heel.

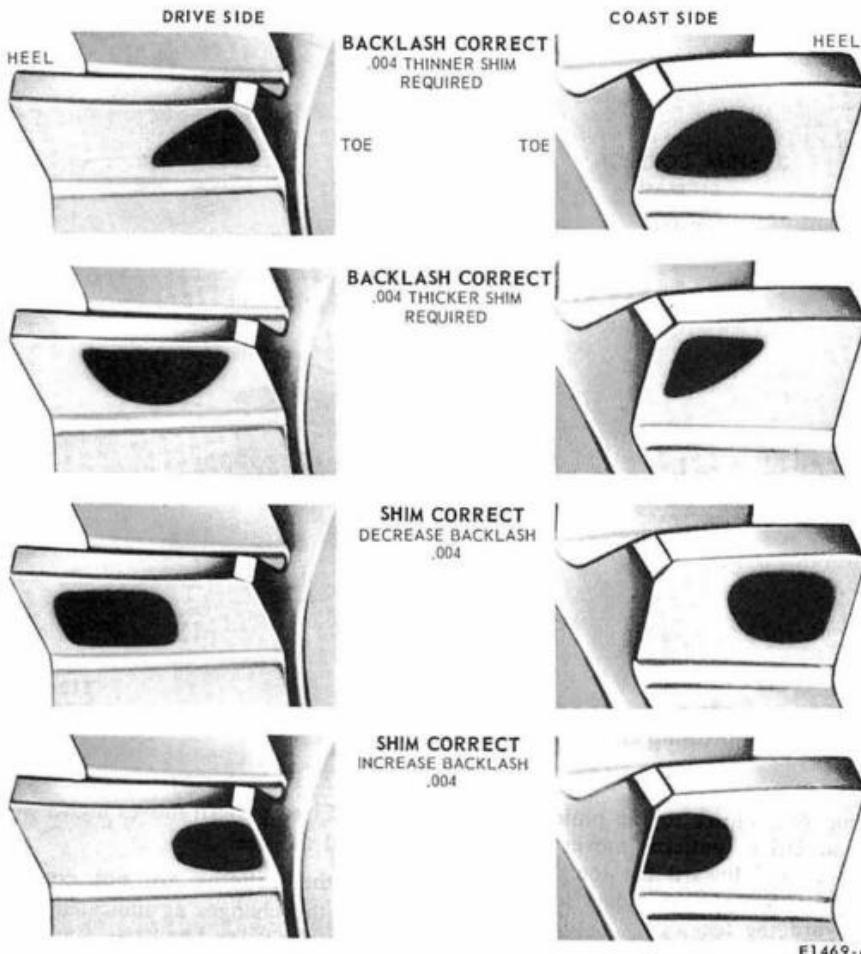
If the patterns are not correct, make the changes as indicated. The differential case and drive pinion will have to be removed from the carrier casting to change a shim. When re-installing the pinion and ring gear of a non-hunting or partial non-hunting gear set, be sure that the marked tooth on the pinion indexes between the marked teeth on the ring gear (Fig. 30, Part 4-2). Refer to Pinion and Ring Gear Tooth Contact Adjustment, Section 2.

Removable Carrier Type Axle

1. Thicker shim with the backlash constant moves the pinion farther from the ring gear:

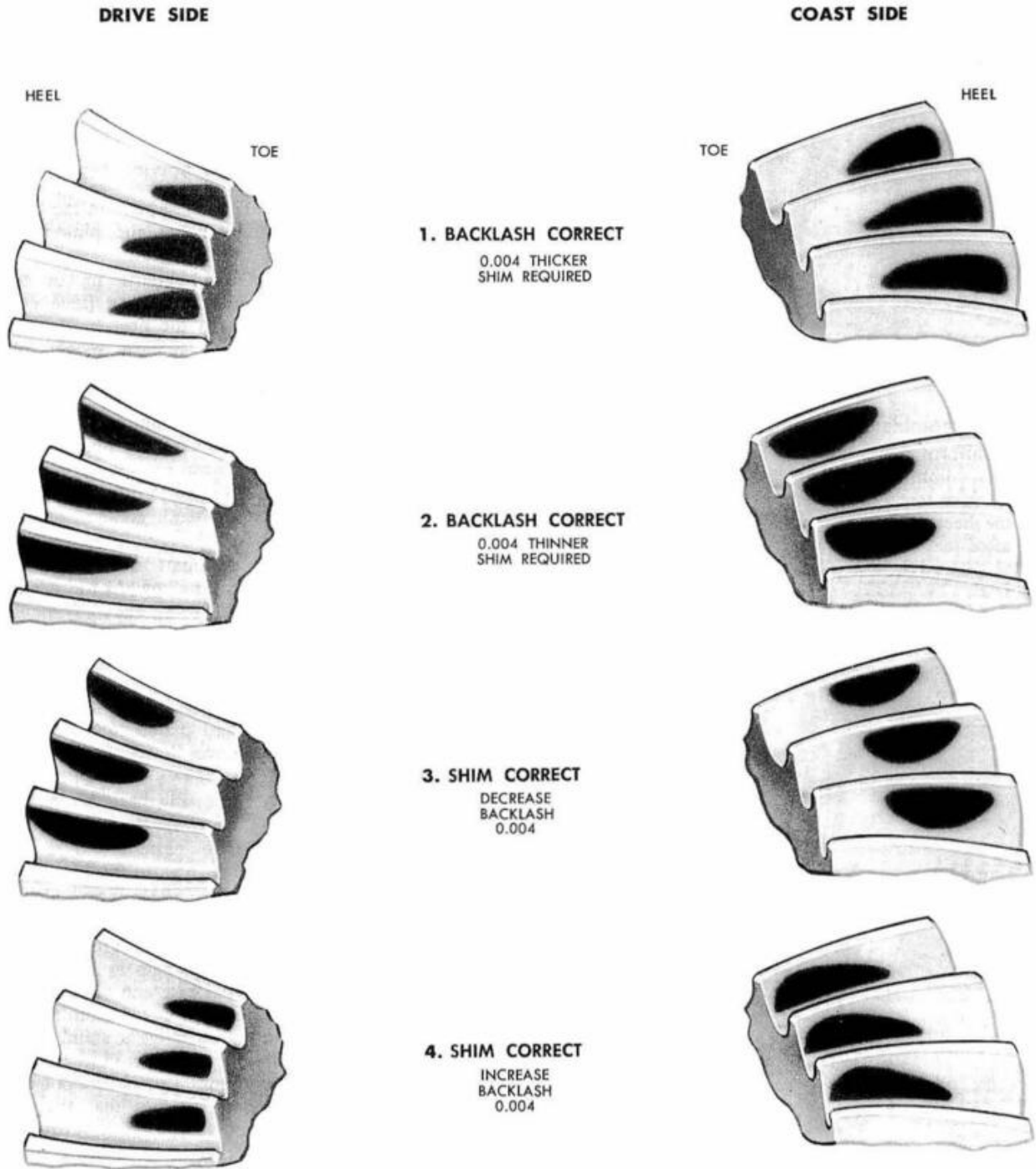
a. Drive pattern moves toward the top of the tooth (face contact) and toward the heel.

b. Coast pattern moves toward the top of the tooth and slightly toward the toe.



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FIG. 9—Typical Gear Tooth Contact Patterns Indicating Shim or Backlash Change—Integral Carrier Type



E1342-A

FIG. 10—Typical Gear Tooth Contact Patterns Indicating Shim or Backlash Change—Removable Carrier Type

2. Thinner shim with the backlash constant moves the pinion closer to the ring gear.

a. Drive pattern moves deeper on the tooth (flank contact) and slightly toward the toe.

b. Coast pattern moves deeper on the tooth and toward the heel.

3. Decreasing backlash moves the

ring gear closer to the pinion:

a. Drive pattern moves slightly lower and toward the toe.

b. Coast pattern moves lower and toward the toe.

4. Increasing backlash moves the ring gear away from the pinion:

a. Drive pattern moves slightly higher and toward the heel.

b. Coast pattern moves higher and toward the heel.

If the patterns are not correct, make the changes as indicated. The pinion need not be disassembled to change a shim. All that is required is to remove the pinion, bearing, and retainer assembly and install a differ-

ent shim. When reinstalling the pinion and retainer assembly of a non-hunting or partial non-hunting gear

set, be sure that the marked tooth on the pinion indexes between the marked teeth on the ring gear (Fig.

30, Part 4-2). Refer to Pinion and Ring Gear Tooth Contact Adjustment, Section 2.

2 COMMON ADJUSTMENTS AND REPAIRS

PINION AND RING GEAR TOOTH CONTACT ADJUSTMENT

Two separate adjustments affect pinion and ring gear tooth contact. They are pinion location and backlash (Figs. 11 and 12).

Individual differences in matching the differential housing and the gear set require the use of shims to locate the pinion for correct contact with the ring gear. On the integral carrier type axle, the pinion locating shim pack is installed between the pinion rear bearing cone and the pinion gear (Fig. 11), whereas, on the removable carrier type axle, the shims are installed between the pinion retainer and the carrier (Fig. 12). Due to this difference in shim position, it should be noted that adding or removing shims in the integral carrier type (Fig. 11) causes the pinion to move in a direction exactly opposite to the pinion movement caused by adding or removing shims in the removable carrier type (Fig. 12).

When adjusting either type axle,

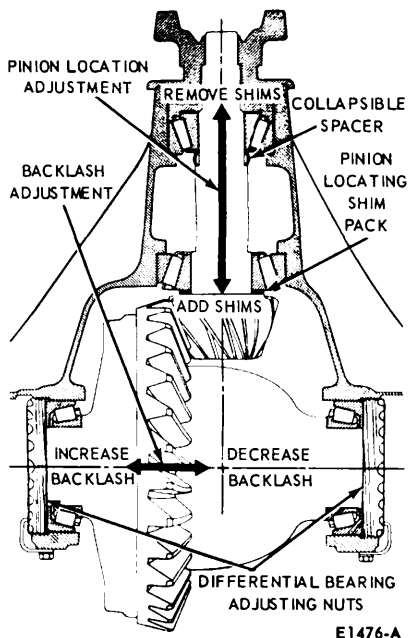


FIG. 11—Pinion and Ring Gear Tooth Contact Adjustment—Integral Carrier Type Axles

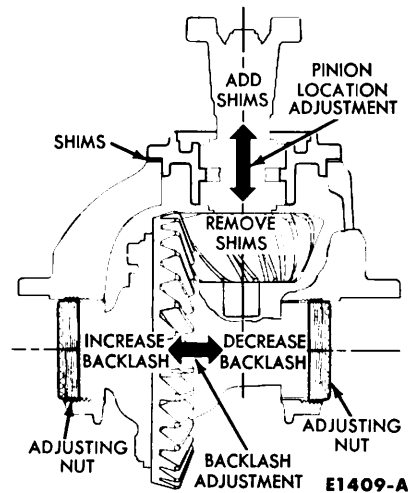


FIG. 12—Pinion and Ring Gear Tooth Contact Adjustment—Removable Carrier Type Axles

shims should be added to or removed from the original shim pack only as indicated by the tooth pattern check described in the foregoing Section 1. When adjusting the integral carrier type axle, **add shims** to move the pinion **toward** the ring gear; **remove shims** to move the pinion **away** from the ring gear (Fig. 11). When adjusting the removable carrier type axle, **remove shims** to move the pinion **toward** the ring gear; **add shims** to move the pinion **away** from the ring gear (Fig. 12).

The tooth pattern check also indicates whether the ring gear should be adjusted away from or toward the pinion to increase or decrease backlash between the gears.

If the tooth pattern check indicates a change in backlash only, follow the procedure under Backlash and Bearing Preload Adjustments. If the tooth pattern indicates a change in shim thickness, follow the procedure under Pinion Location.

BACKLASH AND DIFFERENTIAL BEARING PRELOAD ADJUSTMENTS

To secure a more uniform control of differential side bearing preload in service repairs, a dial indicator set-up such as shown in Fig. 13 is used.

In both types of axle (Fig. 11 and 12), the ring gear is moved away from or toward the pinion as described in the following procedure.

1. Remove the adjusting nut locks, loosen the differential bearing cap bolts, then torque the bolts to (15 ft-lbs on integral carrier type axles; 20 ft-lbs on removable carrier type axles) before making adjustments.

2. The left adjusting nut is on the ring gear side of the carrier. The right nut is on the pinion side. Loosen the right nut until it is away from the cup. Tighten the left nut until the ring gear is just forced into the pinion with no backlash then rotate the pinion several revolutions to be sure no binding is evident. (Recheck the right nut at this time to be sure that it is still loose.) **Tightening the left nut moves the ring gear into the pinion to decrease backlash, and tightening the right nut moves the ring gear away.**

3. Loosen the left adjusting nut 1 to 1½ notches. Tighten the right nut until it first contacts the bearing cup. Rotate the drive gear several revolutions in each direction while the bearings are loaded, to seat the bearings in their cups to be sure no bind is evident. **This step is important.**

4. Install a dial indicator as shown in Fig. 13.

5. Again loosen the right nut to release the pre-load. If there is any backlash between the gears as shown by the dial indicator, tighten the left nut just enough to remove this backlash. At this time, make sure that one of the slots in the left nut is so located that the lock can be installed without turning the nut. Carefully tighten the right nut until it just contacts the cup. On integral carrier type axles, set a preload of 0.008 inch case spread for new bearings and 0.003 to 0.005 for the original bearings. On removable carrier type axles, the preload is 0.012 inch case spread for new bearings and 0.005 to 0.008 for the original bearings. As preload is applied from the right side, the ring gear is forced away from the pinion and usually results in the correct backlash.

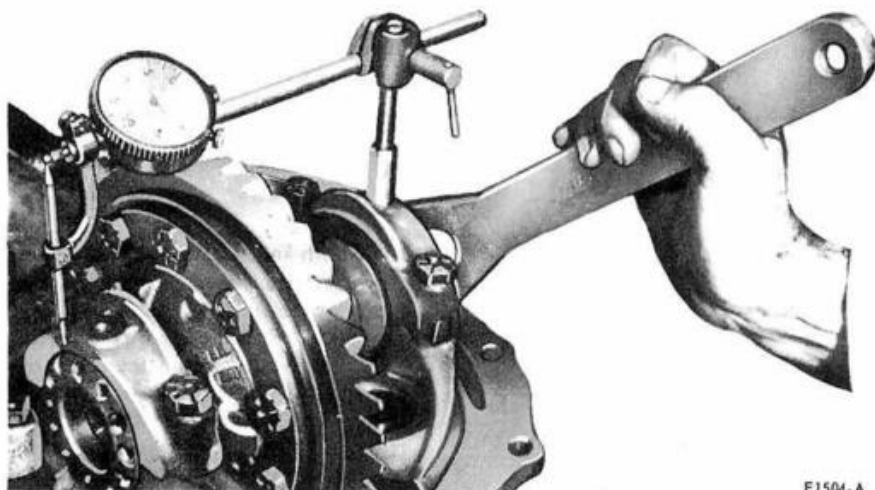


FIG. 13—Adjusting Side Bearing Preload

6. Torque the differential cap bolts to specification (15ft-lbs).

7. Measure the backlash on several teeth around the ring gear. If the measurements vary more than (0.002 inch—integral carrier type; 0.003 inch—removable carrier type) there is excessive runout in the gears or their mountings, which must be corrected to obtain a satisfactory unit. If the backlash is out of specification, loosen one adjusting nut and tighten the opposite nut an equal amount, to move the ring gear away from or toward the pinion. **When moving the adjusting nuts, the final movement should always be made in a tightening direction. For example, if the left nut had to be loosened one notch, loosen the nut two notches, then tighten it one. This insures that the nut is contacting the bearing cup, and that the cup cannot shift after being put in service.** After all such adjustments, check to be sure that the case spread remains as specified for the new or original bearings used.

8. Again check the tooth contact pattern. If the pattern is still incorrect, a change in pinion location (shim thickness) is indicated.

PINION LOCATION

Integral Carrier Type Axle

1. Remove the differential case and the drive pinion from the car-

rier casting, and then remove the pinion bearings as described under Removal of Differential Case and Drive Pinion in Section 4.

2. Measure the original shim thickness with a micrometer. Increase or decrease the shim thickness as indicated by the tooth pattern check described in the foregoing Section 1 and shown in Fig. 9.

3. Install the corrected shim pack and the bearings on the pinion, and then install the pinion and the differential case in the carrier casting as outlined under Installation of Drive Pinion and Differential Case in Section 4 of Part 4-2.

4. Adjust the backlash between the ring gear and pinion as outlined in the foregoing procedure.

5. Make a tooth pattern check. If the pattern is still unsatisfactory, repeat this procedure changing the shim thickness each time until a satisfactory tooth pattern is obtained.

Removable Carrier Type Axle

1. Remove the attaching bolts and the pinion and bearing retainer assembly from the carrier.

2. Measure the original shim thickness with a micrometer. Increase or decrease the shim thickness as indicated by the tooth pattern check described in Section 1.

3. Replace the pinion retainer O-ring (Fig. 47, Part 4-2). Coat the O-ring with axle lubricant before installing. **Do not roll the O-ring into the groove. Snap it into position.**

4. Being careful not to pinch the O-ring, install the pinion and bearing retainer assembly in the carrier with the corrected shim pack.

Before installing the pinion and bearing retainer assembly, determine which type of gear set is being used. The **non-hunting** and **partial non-hunting** types can be identified by the paint timing marks on the gear teeth (Fig. 30, Part 4-2).

If the gear set is of the **non-hunting** or **partial non-hunting** type, clean the teeth on both the pinion and ring gear so that the timing marks are visible. Rotate the differential case and drive gear assembly in the carrier until the marked teeth on the ring gear are opposite the pinion entry hole. Place the pinion retainer assembly in the carrier so that the marked tooth on the pinion indexes between the marked teeth on the ring gear (Fig. 30, Part 4-2).

In almost every case of improper assembly (gear assembled out of time), the noise level and probability of failure will be higher than they would be with properly assembled gears.

When installing the **hunting** type gear set (no timing marks), assemble the pinion and retainer assembly into the carrier without regard to the matching of any particular gear teeth.

5. Install the retainer-to-carrier mounting bolts and torque to specifications.

6. Adjust the backlash between the ring gear and pinion as outlined in the foregoing procedure.

7. Make a tooth pattern check. If the pattern is still unsatisfactory, repeat this procedure changing the shim thickness each time until a satisfactory tooth pattern is obtained.

3 CLEANING AND INSPECTION

INSPECTION BEFORE DISASSEMBLY OF CARRIER

The differential case assembly and the drive pinion should be inspected before they are removed from the housing. These inspections can help to find the cause of the trouble and to determine the correction needed.

On removable carrier type axles, mount the carrier in the holding fixture shown in Fig. 14.

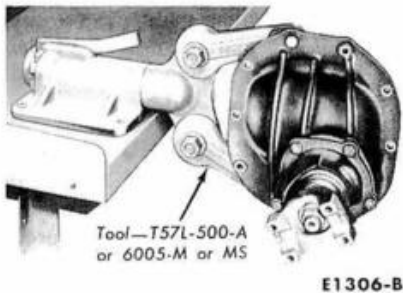


FIG. 14—Bench Fixture for Carrier Overhaul—Removable Carrier Type Axle

Wipe the lubricant from the internal working parts, and visually inspect the parts for wear or damage.

Rotate the gears to see if there is any roughness which would indicate defective bearings or chipped gears. Check the gear teeth for scoring or signs of abnormal wear.

Check the differential case and the drive pinion for end play.

Set up a dial indicator (Fig. 15 or 16) and check the backlash at several points around the ring gear.

Backlash should be within specifications as outlined in the Specifications Section, Part 4-3.

To check the gear tooth contact, paint the gear teeth with the special compound furnished with each service ring gear and pinion. Wrap a cloth around the drive pinion flange to act as a brake. Rotate the ring gear back and forth (use a box wrench on the ring gear attaching bolts for a lever) until a clear tooth contact pattern is obtained.

Certain types of gear tooth contact patterns on the ring gear indicate incorrect adjustment. Noise caused by incorrect adjustment can often be corrected by readjusting the gears. Typical patterns and the necessary corrections are explained under Gear Tooth Contact Pattern Check in Section 1.

Gear tooth runout can sometimes

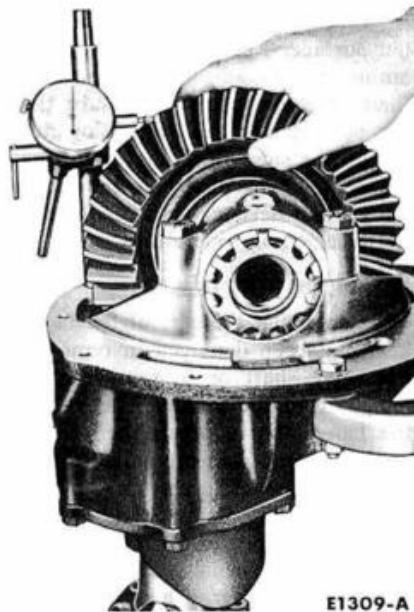


FIG. 15—Checking Backlash—Removable Carrier Type Axle

be detected by an erratic pattern on the teeth. However, a dial indicator should be used to measure the runout of the back face of the ring gear, as shown in Fig. 16 or 17. Refer to Specifications Section for maximum allowable runout.

Loosen the differential bearing cap bolts, and then torque to specification. Remove the adjusting nut locks. Carefully loosen one of the adjusting nuts to determine if any differential bearing preload remains. If at least one notch of preload remains, the differential bearings may be re-used, provided they are not pitted or damaged.

INSPECTION AFTER DISASSEMBLY

Thoroughly clean all parts. Al-

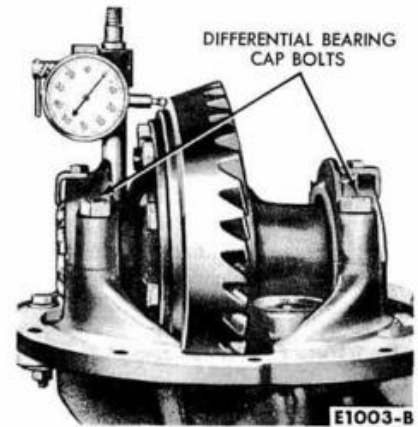


FIG. 17—Checking Drive Gear Runout—Removable Carrier Type Axle

ways use new solvent when cleaning bearings. Do not spin bearings with compressed air. Oil the bearings immediately to prevent rusting. Inspect the parts for any major defects. Clean the inside of the housing before rebuilding and installing the parts.

When a scored gear set is replaced, the axle housing should be washed thoroughly and steam cleaned. This can only be done effectively if the axle shafts and shaft seals are removed from the housing. Inspect individual parts as outlined below.

GEARS

Examine the pinion and ring gear teeth for scoring or excessive wear. **Extreme care must be taken not to damage the pilot bearing surface of the pinion.**

The pattern taken during disassembly should be helpful in judging if gears can be re-used. Worn gears cannot be rebuilt to correct a noisy

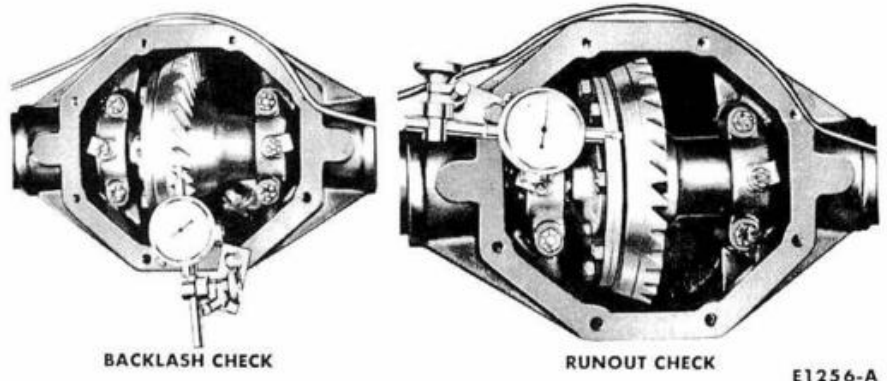


FIG. 16—Checking Backlash and Runout—Integral Carrier Type Axle

condition. Gear scoring is the result of excessive shock loading or the use of an incorrect lubricant. Scored gears cannot be re-used.

Examine the teeth and thrust surfaces of the differential gears. Wear on the hub of the differential side gear can cause a chucking noise known as chuckle when the car is driven at low speeds. Wear on splines, thrust surfaces, or thrust washers can contribute to excessive drive line backlash.

BEARING CUPS

Check bearing cups for rings, scores, galling, or erratic wear patterns. Pinion bearing cups must be solidly seated. Check by attempting to insert a 0.0015-inch feeler between these cups and the bottoms of their bores.

CONE AND ROLLER ASSEMBLIES

When operated in the cups, bearing rollers must turn without roughness. Examine the roller ends for wear. Step-wear on the roller ends indicates that the bearings were not preloaded properly or that the rollers were slightly misaligned.

If inspection reveals either a defective cup or a defective cone and roller assembly, **both parts should be replaced to avoid early failure.**

DIFFERENTIAL BEARING ADJUSTING NUTS

Temporarily install the bearing caps and test the fit of the adjusting nuts in their threads.

The nuts should turn easily when the caps are tightened to 15 ft-lbs (integral carrier type) or 20 ft-lbs

(removable carrier type). The faces of the nuts that contact the bearing cups must be smooth and square. Polish these with a fine abrasive on a flat surface. Replace the nuts or examine the threads in the carrier, if their fit is not proper. Be sure that the bearing caps and adjusting nuts are on the side which they were machined to fit by observing the punch marks and scribe marks made during disassembly operations.

DRIVE PINION FLANGE

Be sure that the ears of the flange have not been damaged in removing the drive shaft or in removing the flange from the pinion. The end of the flange that contacts the bearing cone (integral carrier type) or the oil slinger (removable carrier type) as well as the flat surface of the pinion nut counterbore must be smooth. Polish these surfaces if necessary. Roughness aggravates backlash noises, and causes wear of the flange with a resultant loss in pinion bearing preload.

PINION RETAINER—REMOVABLE CARRIER TYPE AXLE ONLY

Be sure that the pinion bearing cups are seated. Remove any chips or burrs from the mounting flange. Clean the groove for the O-ring seal and all lubricant passages. If the cups were removed, examine the bores carefully. Any nicks or burrs in these bores must be removed to permit proper seating of the cups.

CARRIER HOUSING

Make sure that the differential bearing bores are smooth and the

threads are not damaged.

Remove any nicks or burrs from the mounting surfaces of the carrier housing.

DIFFERENTIAL CASE

Make sure that the hubs where the bearings mount are smooth. Carefully examine the differential case bearing shoulders, which may have been damaged when the bearings were removed. The bearing assemblies will fail if they do not seat firmly against the shoulders. Check the fit (free rotation) of the differential side gears in their counterbores. Be sure that the mating surfaces of the two parts of the case are smooth and free from nicks or burrs.

LIMITED-SLIP DIFFERENTIAL PARTS

Inspect the clutch plates for uneven or extreme wear. The dog-eared clutch plates must be free from burrs, nicks, or scratches which could cause excessive or erratic wear to the bonding material of the internally splined clutch plates. The internally splined clutch plates should be inspected for condition of the bond, bonding material, and wear. Replace the bonded plates if their thickness is less than 0.085 inch or if the bonded material is scored or badly worn. Inspect the bonded plate internal teeth for wear. Replace them, if excessive wear is evident. Bonded plates should be replaced as a set only.

Examine all thrust surfaces and hubs for wear. Abnormal wear on these surfaces can contribute to a noisy axle.

Inspect the Belleville spring for proper free height of 1/4 inch.

PART

4-2 REAR AXLES

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1 DESCRIPTION AND OPERATION

IDENTIFICATION

A metal tag stamped with the model designation and gear ratio is secured to all Ford-produced axles under one of the rear cover-to-housing bolts (integral carrier type) or the carrier-to-housing bolts (removable carrier type). The first five spaces on the top line are reserved for the model designation letters such as WCY-E, WDJ-C, or WEA-B. These letters indicate a specific combination of the following factors: conventional or limited-slip axle; diameter of ring gear; small or large wheel bearings; and the gear ratio. It is important, therefore, to use the model designation for obtaining the correct replacement parts.

CONVENTIONAL AXLES

DESCRIPTION

Integral Carrier Type Axle

The rear axle assembly is an integral-type housing, hypoid design, with the centerline of the pinion set below the centerline of the ring gear (Fig. 1).

The semi-floating axle shafts are retained in the housing by ball bearings and a bearing retainer at the axle housing outer ends.

The differential assembly is mounted on two opposed tapered roller bearings. The bearings are retained in the housing by removable caps. Differential bearing preload and drive gear backlash is adjusted by nuts located behind each differential bearing cup.

The drive pinion assembly is mounted on two opposed tapered roller bearings. Pinion bearing preload is adjusted by a collapsible spacer on the pinion shaft. Pinion and ring gear tooth contact is adjusted by shims between the rear bearing cone and pinion gear.

A cover on the rear of the differential housing provides access for inspection and the removal and installation of the differential assembly and drive pinion.

Removable Carrier Type Axle

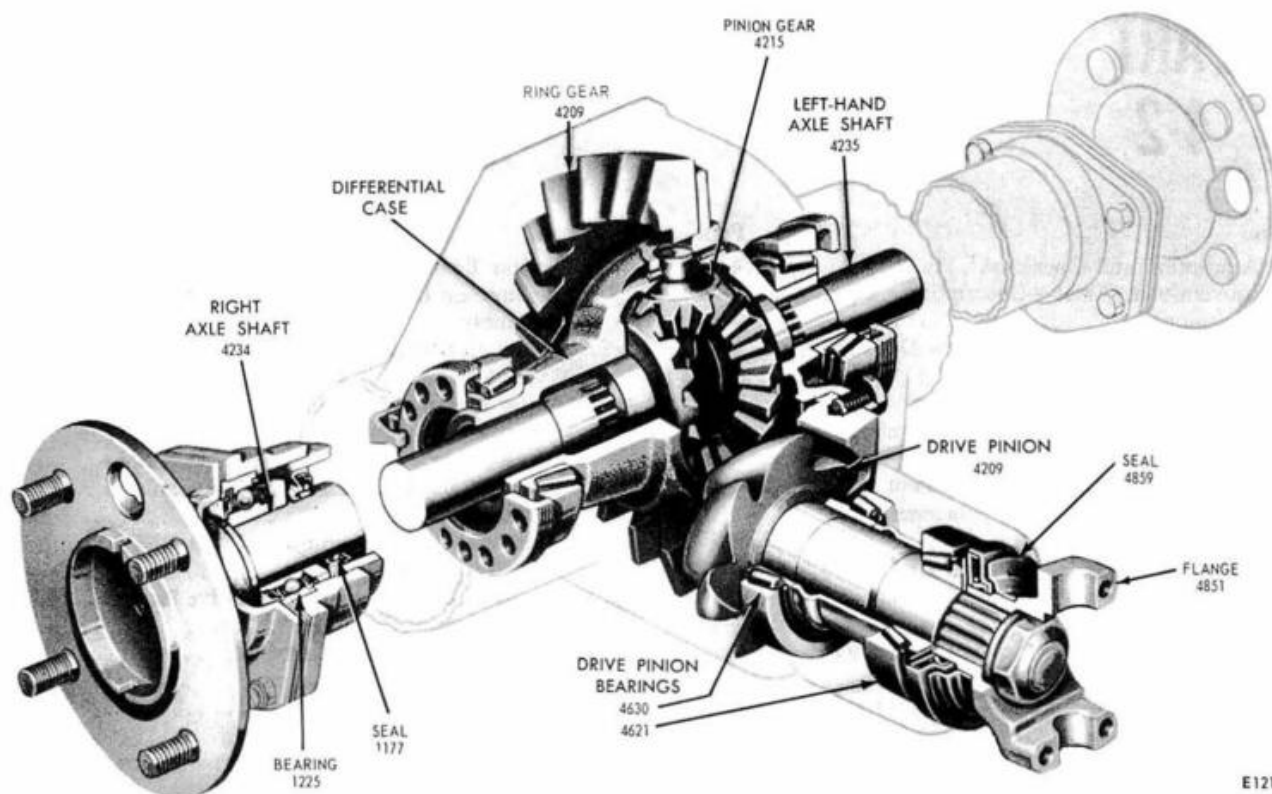
The rear axle is of the banjo-housing, hypoid gear type, in which the centerline of the pinion is mounted

below the centerline of the ring gear (Fig. 2).

The integral pinion gear and shaft and the pinion bearings are assembled in a pinion retainer, which is bolted to the carrier. In this axle, the pinion is straddle mounted; that is, the pinion is supported by bearings both in front of and to the rear of the pinion gear. Two opposed tapered roller bearings support the pinion shaft in front of the pinion gear. A straight roller (pilot) bearing supports the pinion shaft at the rear of the pinion gear. Pinion and ring gear tooth contact is adjusted by shims between the pinion retainer and the carrier housing.

The differential assembly is mounted on two opposed tapered roller bearings, which are retained in the carrier by removable caps. The entire carrier assembly is bolted to the axle housing.

Ball bearing assemblies (rear wheel bearings) are pressed onto the outer ends of the axle shafts and set in the outer ends of the axle housing. These bearings support the semi-float-



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FIG. 1—Typical Rear Axle Assembly—Integral Carrier Type Axle

ing axle shafts at the outer ends. The inner ends of the shafts spline to the differential side gears. Bearing retainer plates hold the shafts in the housing. The left and right axle shafts are not interchangeable, because the left axle shaft is shorter than the right.

OPERATION

The rear axle drive pinion receives its power from the engine through the transmission and drive shaft. The pinion gear rotates the differential case through engagement with the ring gear, which is bolted to the case outer flange. Inside the case, there are two differential pinion gears mounted on the differential pinion shaft which is pinned to the case. These pinion gears are engaged with the side gears, to which the axle shafts are splined. Therefore, as the differential case turns, it rotates the axle shafts and rear wheels. When it is necessary for one wheel and axle shaft to rotate faster than the other, the faster turning side gear causes the pinions to roll on the slower turning

side gear to allow differential action between the two axle shafts.

LIMITED-SLIP DIFFERENTIAL AXLE

The locking differential is provided as optional equipment in both the integral and the removable carrier type axle.

DESCRIPTION

The axle assembly, except for the differential case and its internal components, is identical to the conventional axle.

A constant-friction locking differential, which employs automatic transmission-type clutch plates to control differential action, is available as optional equipment (Fig. 3).

Four steel clutch plates are locked into the differential cover. Three bronze, bonded clutch plates are splined to the left-hand axle shaft. A Belleville spring washer maintains a constant pressure between the steel and bonded clutch plates so that the clutch is always engaged.

OPERATION

The pressure between clutch plates opposes differential action at all times. When the car turns a corner the clutch slips allowing normal dif-

ferential action to take place. Under adverse weather conditions, where one or both wheels may be on a low-traction surface such as snow, ice or mud, the friction between the clutch plates will transfer a portion of the usable torque to the wheel with the most traction. Thus, the wheel that is on ice or snow will not spin, but will have a tendency to operate with the opposite wheel in a combined driving effort.

When performing the following procedures, refer to Part 4-1, Section 3 for cleaning and inspection procedures.

CARE OF AXLE

The lubricant level should be checked every 6000 miles, with vehicle in normal curb attitude. The lubricant level should be at the lower edge of the filler plug hole. It is unnecessary to periodically drain the axle lubricant. The factory fill should remain in the housing for the life of the vehicle, except when repairs are made. The specified lubricant should be installed when the axle is overhauled.

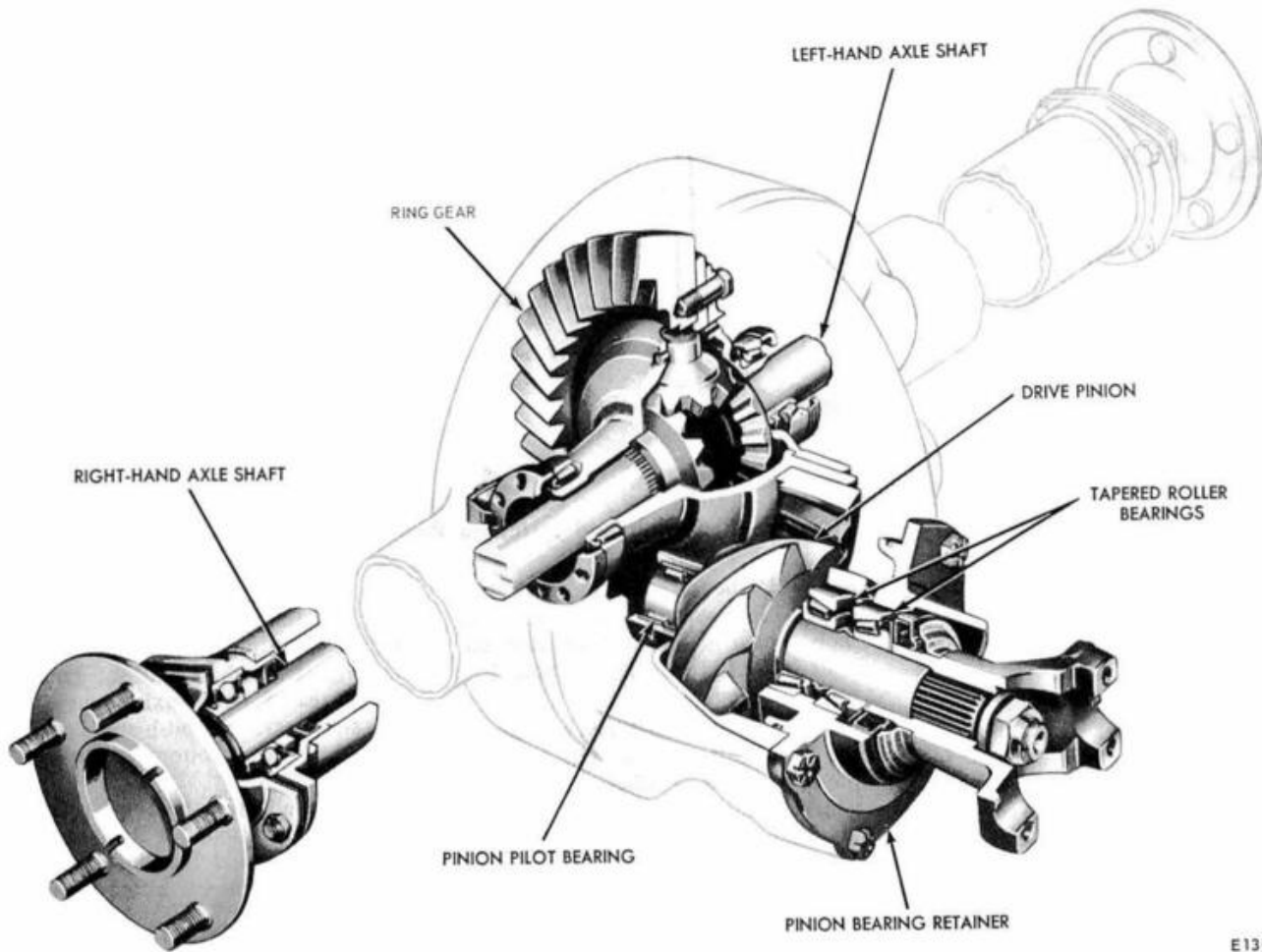


FIG. 2—Rear Axle Assembly—Removable Carrier Type Axle

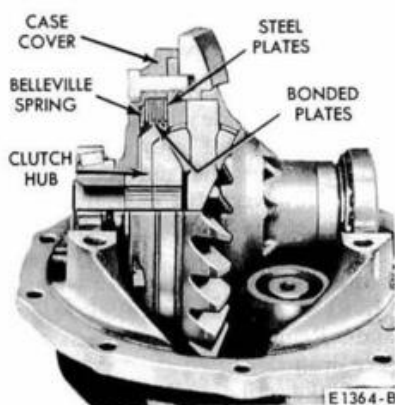


FIG. 3—Typical Limited-Slip Differential

2 IN-CAR ADJUSTMENT AND REPAIR

REAR AXLE SHAFT, WHEEL BEARING AND OIL SEAL REPLACEMENT

The rear axle shafts, wheel bearings, and oil seal can be replaced without removing the differential as-

sembly from the axle housing.

1. Remove the wheel and tire from the brake drum.

2. Remove the Tinnerman nuts that secure the brake drum to the axle housing flange, and then remove

the drum from the flange.

3. Working through the hole provided in each axle shaft flange, remove the nuts that secure the wheel bearing retainer plate. Then pull the axle shaft assembly out of the axle

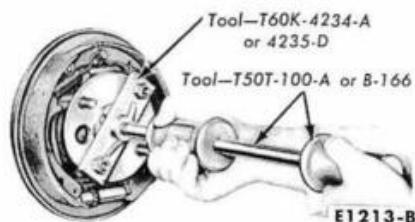


FIG. 4—Removing Axle Shaft—Integral Carrier Type Axle

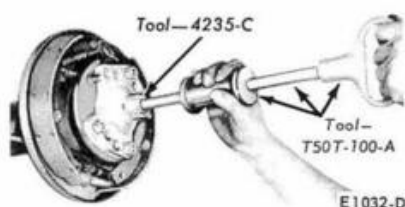


FIG. 5—Removing Axle Shaft—Removable Carrier Type Axle

housing (Fig. 4 or 5). The brake carrier plate must not be dislodged. Install one nut to hold the plate in place after the axle shaft is removed.

4. If the rear wheel bearing is to be replaced, loosen the inner retainer nick by nicking it deeply with a cold chisel in several places (Fig. 6). It will then slide off easily.

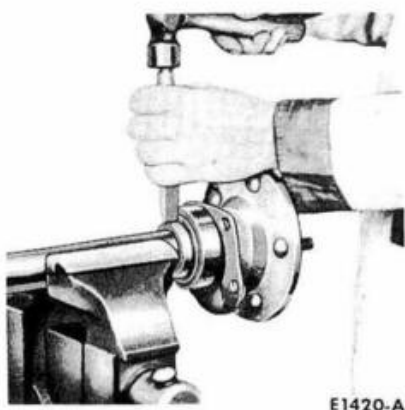


FIG. 6—Removing Rear Wheel Bearing Retainer Ring

5. Remove the bearing from the axle shaft with the tool shown in Fig. 7 or 8. If the push-puller operation shown in Fig. 8 is used, be sure that the puller arms contact the flat surface of the axle shaft flange rather than the bolt heads. Also with this method, be careful not to damage or burr the oil seal journal as the bearing breaks loose.

6. Whenever a rear axle shaft is

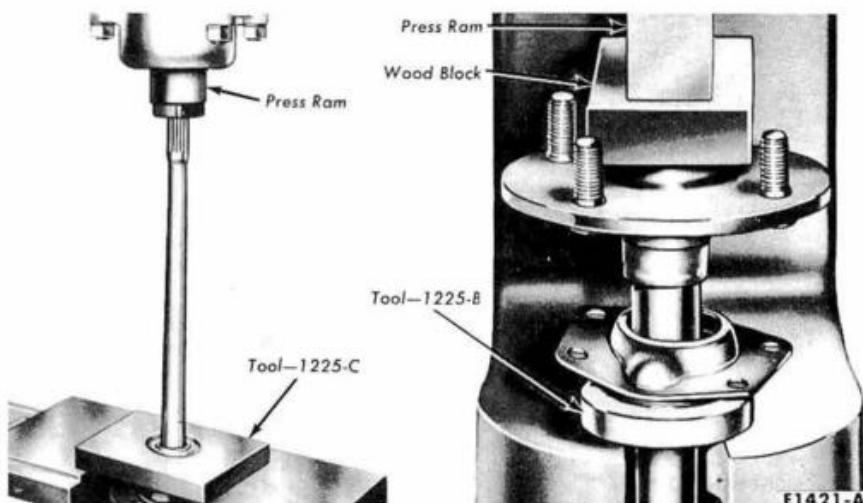


FIG. 7—Removing and Installing Rear Wheel Bearing—Comet

removed, the oil seal must be replaced. Remove the seal with the tools shown in Fig. 9. Soak new oil seals in SAE 10 oil for ½ hour before installing.

7. Inspect the machined surface of the axle shaft and the axle housing for rough spots or other irregularities which would affect the sealing action of the oil seal. Check the axle shaft splines for burrs, wear or damage. Carefully remove any burrs or rough spots. Replace worn or damaged parts.

8. Lightly coat wheel bearing bores with ball joint grease (C3VY-19586-B).

9. Place the retainer plate on the axle shaft, and press the new wheel bearing on the shaft with the tool shown in Fig. 7 or 8. The bearing should seat firmly against the shaft shoulder. Do not attempt to press on both the bearing and the inner retainer ring at the same time.

10. Using the bearing installation tool, press the bearing inner retainer ring on the shaft until the retainer seats firmly against the bearing.

11. Wipe all lubricant from the inside of the axle housing in the area of the oil seal before installing the new seal.

12. Wipe a small amount of oil resistant sealer on the outer edge of the seal before it is installed. Do not put sealer on the sealing lip.

13. Install the new oil seal with the tools shown in Fig. 9. Installation without use of the proper tool will distort the seal and cause leakage. Be sure the new seal has been soaked in SAE 10 oil for ½ hour.

14. Place a new gasket on each

side of the brake carrier plate, and then carefully slide the axle shaft into the housing so that the rough forging of the shaft will not damage the oil seal. Start the axle splines into the side gear, and push the shaft in until the bearing bottoms in the housing.

15. Install the bearing retainer plate on the mounting bolts at the axle housing, and install the attaching nuts. Torque the nuts to specifications.

16. Install the brake drum and the drum attaching nuts.

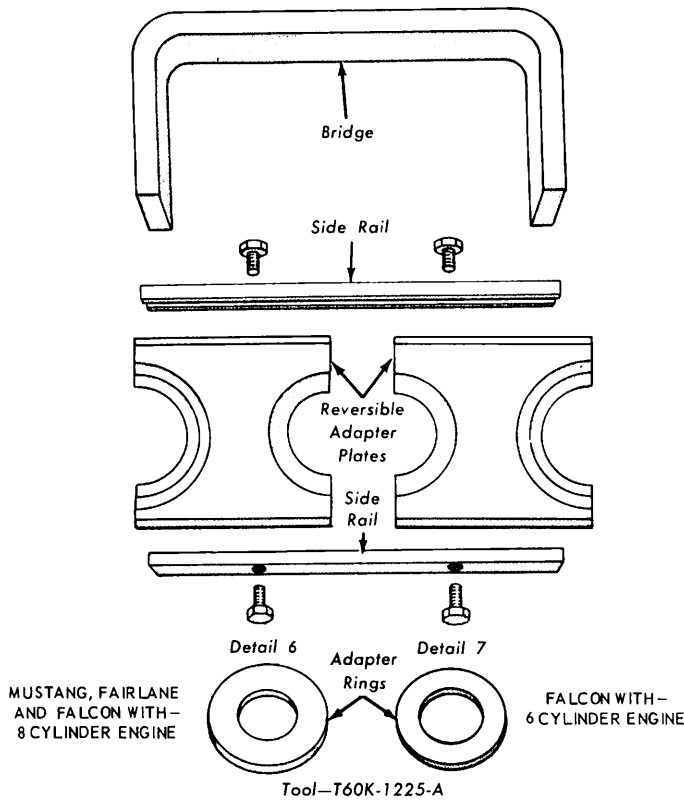
17. Install the wheel and tire on the drum.

REMOVAL AND REPLACEMENT OF DRIVE PINION OIL SEAL

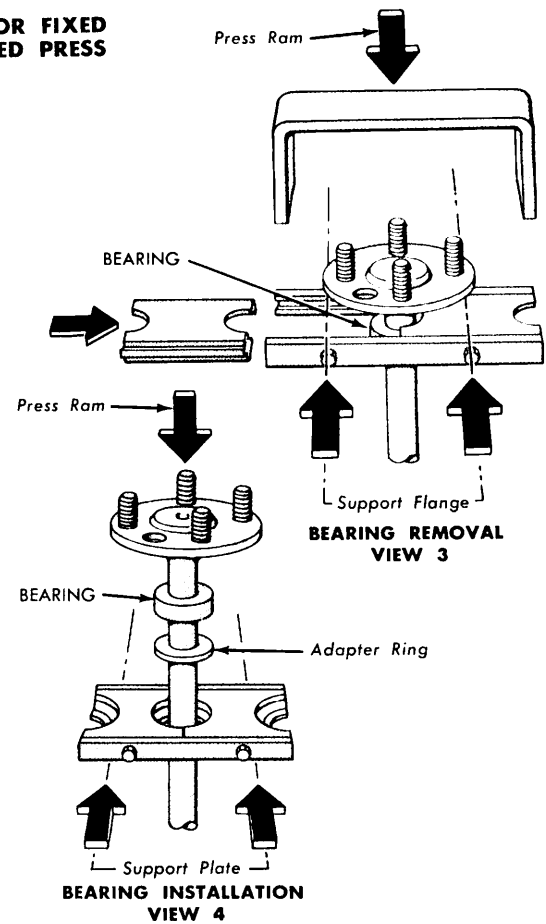
Replacement of the pinion oil seal on either type axle involves removal and installation of only the pinion shaft nut and the universal joint flange. However, this operation disturbs the pinion bearing preload, and this preload must be carefully reset when assembling.

1. Raise the car and install safety stands. Remove the rear wheels and brake drums.

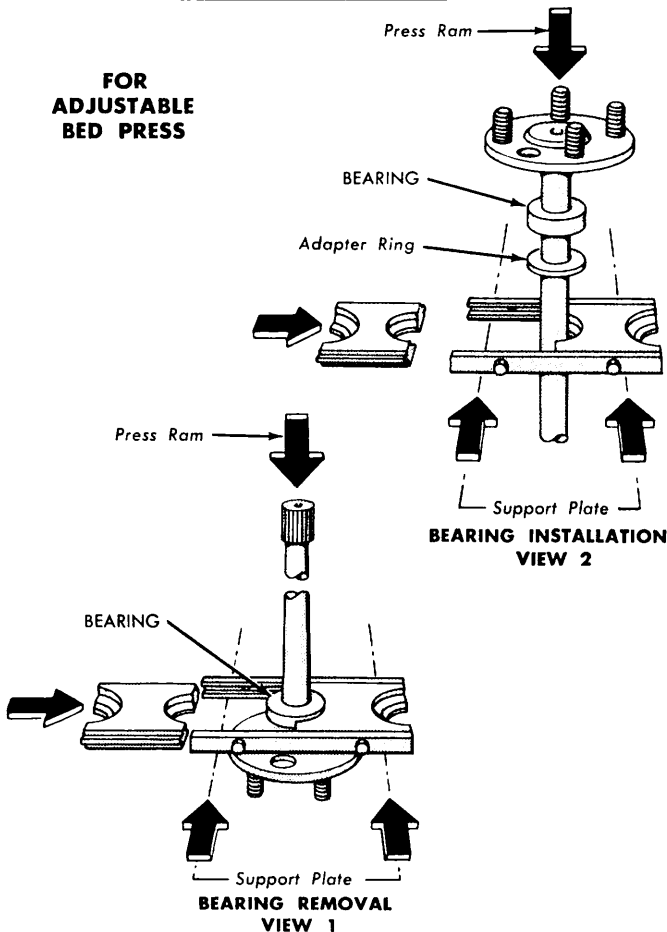
2. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position of the drive shaft at assembly (Fig. 14). Disconnect the drive shaft from the axle U-joint flange. Be careful to avoid dropping the loose universal joint bearing cups. Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal re-



FOR FIXED BED PRESS



FOR ADJUSTABLE BED PRESS



FOR PUSH-PULLER OPERATION

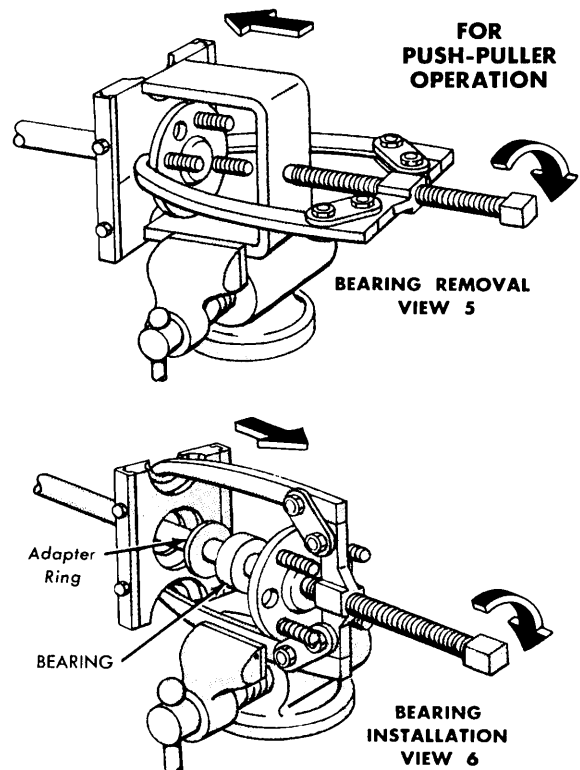


FIG. 8—Removing and Installing Rear Wheel Bearing—Falcon, Mustang and Fairlane

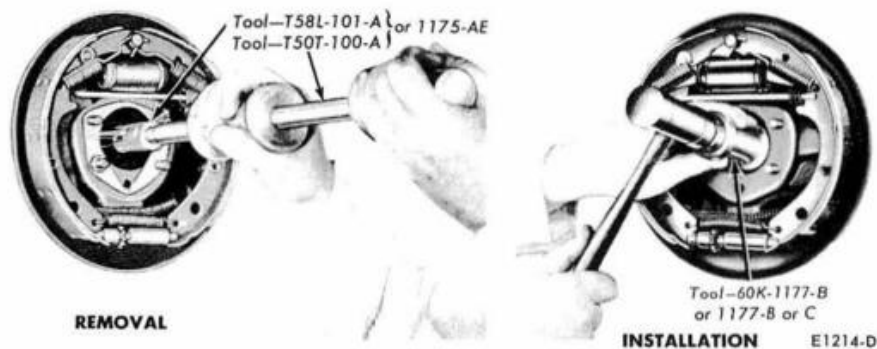


FIG. 9—Removing and Installing Axle Shaft Seal

placer tool in the transmission extension housing to prevent transmission leakage. Refer to the transmission group for the appropriate tool.

3. Install an in-lb torque wrench on the pinion nut. Record the torque required to maintain rotation of the pinion shaft through several revolutions.

4. While holding the flange with the tool shown in Fig. 10, remove the integral pinion nut and washer.



FIG. 10—Typical Drive Pinion Shaft Nut Removal

5. Clean the pinion bearing retainer around the oil seal. Place a drain pan under the seal, or raise the front of the car higher than the rear.

6. Using the tool shown in Fig. 11, remove the pinion U-joint flange.

7. Using the tool shown in Fig. 37, remove the drive pinion oil seal.

8. Clean the oil seal seat.

9. Coat the outer edge of the new seal with a small amount of oil resistant sealer. **Do not put any of the sealer on the sealing lip.** Install the seal in the retainer, using the tool shown in Fig. 12 on integral carrier type axles. With removable carrier type axles, use tool T62F-4676-A or 4676-H on all except cars equipped with high performance engines. On cars equipped with high perform-

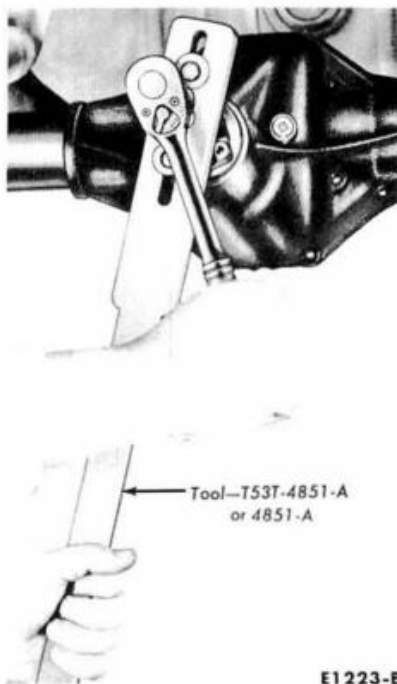


FIG. 11—Typical Drive Pinion Flange Removal



FIG. 12—Typical Drive Pinion Flange Seal Installation

ance engines, use tool 58L-4676-A or 4676-F.

10. Check splines on the pinion

shaft to be sure they are free of burrs. If burrs are evident, remove them by using a fine crocus cloth, working in a rotational motion. Wipe the pinion shaft clean.

11. Apply a small amount of lubricant to the U-joint splines.

12. Align the punch mark on the U-joint flange with the mark on the end of the pinion shaft, and install the flange. With removable carrier type axles, it will be necessary to use the tool shown in Fig. 50 to install the flange.

13. Install a new integral nut and washer on the pinion shaft. (Apply a small amount of lubricant on the washer side of the nut.)

14. Hold the flange with the tool shown in Fig. 36 while tightening the nut.

15. Tighten the pinion shaft nut, rotating the pinion occasionally to insure proper bearing seating, and take frequent preload readings until the preload is at the original recorded reading established in step 3.

16. After original preload has been reached, tighten the pinion nut slowly, until an additional preload has been placed on the bearings, as shown below:

Removable Carrier: 8 to 14 in-lbs.

Integral Carrier: 6 to 12 in-lbs.

The preload should not exceed the amount indicated above, or bearing failure may result. Under no circumstances should the pinion nut be backed-off to lessen preload. If this is done, a new pinion bearing spacer must be installed. In addition, the U-joint flange must never be hammered on, or power tools used.

17. Remove the oil seal replacer tool from the transmission extension housing. Install the front end of the drive shaft on the transmission output shaft.

18. Connect the rear end of the drive shaft to the axle U-joint flange, aligning the punch marks made on the drive shaft end yoke and the axle U-joint flange (Fig. 14).

19. Check the lubricant level. Make sure the axle is in running position. Add whatever amount of specified lubricant is required to reach the lower edge of the filler plug hole.

INSTALLATION OF A NEW UNIVERSAL JOINT FLANGE

1. Raise the car and install safety stands. Remove both rear wheels and brake drums.

2. Disconnect the drive shaft from the axle U-joint flange. **Be careful to avoid dropping the loose**

universal joint bearing cups. Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the transmission extension housing to prevent transmission fluid leakage. Refer to the transmission group for the appropriate tool.

3. Install an in-lb torque wrench on the pinion nut. Record the torque required to maintain rotation of the pinion shaft through several revolutions.

4. While holding the flange with the tool shown in Fig. 36, remove the integral pinion nut and washer.

5. Clean the pinion bearing retainer around the oil seal. Place a drain pan under the seal, or raise the front of the car higher than the rear.

6. Using the tool shown in Fig. 36, remove the U-joint flange.

7. Check splines on the pinion shaft to be sure they are free of burrs. If burrs are evident, remove them by using a fine crocus cloth, working in rotational motion, then wipe clean.

Apply a small amount of lubricant to U-joint splines.

8. Install the U-joint flange using the tool shown in Fig. 50.

9. Install a new integral nut and washer on the pinion shaft. (Apply a small amount of lubricant on the washer side of the nut.)

10. Hold the flange with the tool shown in Fig. 35 while the nut is being tightened.

11. Tighten the pinion shaft nut, rotating the pinion occasionally to insure proper bearing seating, and take frequent preload readings until the preload is at the original recorded reading established in step 3.

12. After original preload has been reached, tighten the pinion nut slowly, until an additional preload of 8 to 14 in-lb over the original reading

is reached. (The preload should not exceed 8 to 14 in-lb over the original reading, or bearing failure may result.)

Under no circumstances should the pinion nut be backed off to lessen preload. If this is done, a new pinion bearing spacer must be installed. (In addition, the U-joint flange must never be hammered on, or pneumatic tools used.)

13. Remove the oil seal replacer tool from the transmission extension housing. Install the front end of the drive shaft on the transmission output shaft.

14. Connect the rear end of the drive shaft to the axle U-joint flange, aligning the scribe marks made on the drive shaft end yoke and the axle U-joint flange (Fig. 14).

14. Check the lubricant level. **Make sure the axle is in running position.** Add whatever amount of specified lubricant is required to reach the lower edge of the filler plug hole.

3 REMOVAL AND INSTALLATION

REAR AXLE HOUSING— INTEGRAL CARRIER TYPE AXLE

REMOVAL

1. Raise the car and support it with safety stands under the rear frame member.

2. Drain the lubricant from the axle.

3. Disconnect the drive shaft at the drive pinion flange.

4. Disconnect the lower end of the shock absorbers.

5. Remove the wheels, brake drums and both axle shafts as outlined in the foregoing Section 2.

6. Remove vent hose front vent tube (Corbin clamp) and remove vent tube from brake tube junction and axle housing.

7. Remove the hydraulic brake T-fitting from the axle housing. **Do not open the hydraulic brake system lines.** Remove the hydraulic brake line from its retaining clip on the axle housing.

8. Remove both axle shaft oil seals with the tools shown in Fig. 9.

9. Remove both brake carrier plates from the axle housing and suspend them above the housing with mechanic's wire. The hydraulic brake lines and the parking brake cables are still attached to the brake carrier plates.

10. Support the rear axle housing on a jack, and then remove the spring clip nuts. Remove the spring clip plates (Fig. 13).

11. Lower the axle housing and remove it from under the car.

12. If the axle housing is being replaced, transfer all the differential and pinion parts to the new housing. See Section 4, Major Repair Operations.

INSTALLATION

1. Raise the axle housing into position so that the spring clip plates

can be installed. On a Comet or Fairlane position the spring upper insulators and retainers between the axle housing and springs and install the lower insulators. Torque the spring clip nuts to specification.

2. Place the brake carrier plates in their normal position on the axle housing. Use new gaskets on each side of the brake carrier plates.

3. Install new axle shaft oil seals with the tool shown in Fig. 9. Soak the new seals in light weight engine oil (SAE 10) for ½ hour before installing them. **Installation without use**

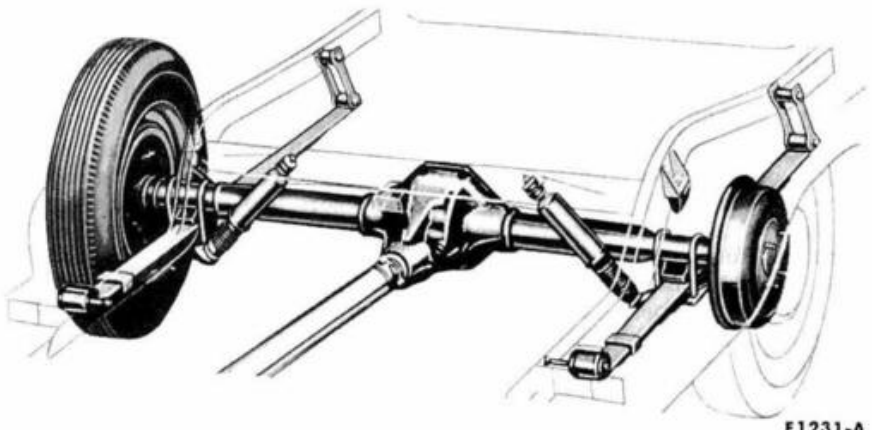


FIG. 13—Rear Axle Installation—Integral Carrier Type

of the proper tool will distort the seal and cause leakage. Coat the outside edges of the new oil seal with a hardening type of sealer such as Permatex No. 2 or its equivalent.

4. Install the axle shafts, brake drums and wheels as outlined in the foregoing Section 2.

5. Attach the hydraulic brake line T fitting to the axle housing, and secure the hydraulic brake line in its retainer on the axle housing.

6. Install vent tube to brake tube junction and install vent hose to vent tube.

7. Raise the axle housing and connect the shock absorbers.

8. Connect the drive shaft at the drive pinion shaft.

9. Fill the axle with the proper grade and amount of lubricant.

10. Road test the car.

DIFFERENTIAL CARRIER—REMOVABLE CARRIER TYPE AXLE

REMOVAL

1. Raise the car on a hoist and remove the two rear wheel and tire assemblies.

2. Remove the two brake drums (3 Tinnerman nuts at each drum) from the axle shaft flange studs. If difficulty is experienced in removing the drums, back off the brake shoes as explained in Part 2-2.

3. Working through the hole provided in each axle shaft flange, remove the nuts that secure the rear wheel bearing retainer plate. Pull each axle shaft assembly out of the axle housing (Fig. 5). Install a nut on one of the brake carrier plate retaining bolts to hold the plate to the axle housing after the shaft has been removed. **Whenever a rear axle shaft is removed, the wheel bearing oil seal must be replaced.** Remove both seals with the tools shown in Fig. 9.

4. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position at assembly. Disconnect the drive shaft at the rear axle U-joint, remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the housing to prevent transmission leakage. Refer to the transmission group for the appropriate tool.

5. Place a drain pan under the carrier and housing, remove the carrier retaining nuts, and drain the

axle. Remove the carrier assembly from the axle housing.

INSTALLATION

1. Clean the axle housing and shafts using kerosene and swabs. To avoid contamination of the grease in the sealed ball bearings, do not allow any quantity of solvent directly on the wheel bearings. Clean the mating surfaces of the axle housing and carrier.

2. Position the differential carrier on the studs in the axle housing using a new gasket between carrier and housing. Install the copper washers and the carrier-to-housing retaining nuts, and torque to specifications.

3. Remove the oil seal replacer tool from the transmission extension housing. Position the drive shaft so that the front U-joint slip yoke splines to the transmission output shaft.

4. Connect the drive shaft to the axle U-joint flange, aligning the scribe marks made on the drive shaft end yoke and the axle U-joint flange during the removal procedure (Fig. 14). Install the U-bolts and nuts and torque to specifications.

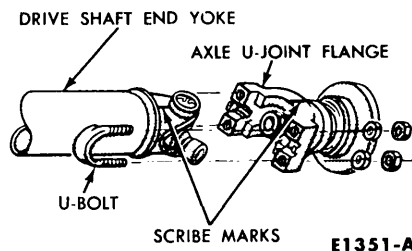


FIG. 14—Drive Shaft-to-Axle U-Joint Connection

5. Soak two new rear wheel bearing oil seals in SAE 10 oil for ½ hour before installation. Wipe a small amount of an oil resistant sealer on the outer edge of each seal before it is installed. **Do not put any of the sealer on the sealing lip.** Install the oil seals in the ends of the rear axle housing with the tool shown in Fig. 9.

6. Install the two axle shaft assemblies in the axle housing. The shorter shaft goes into the left side of the housing.

When installing an axle shaft, place a new gasket on each side of the brake carrier plate and carefully slide the axle shaft into the housing so that the rough forging of the shaft will not damage the oil seal. Start the axle splines into the differential side gear, and push the shaft in until the bearing bottoms in the housing.

7. Install the bearing retainers on the attaching bolts on the axle housing flanges. Install the nuts on the bolts and torque to specifications.

8. Install the two rear brake drums and the drum retaining (Tinnerman) nuts.

9. Install the rear wheel and tire assemblies.

10. If the rear brake shoes were backed off, adjust the brakes as outlined in Part 2-1.

11. Fill the rear axle with specified lubricant.

AXLE HOUSING—REMOVABLE CARRIER TYPE AXLE

REMOVAL

1. Remove the carrier assembly from the axle housing as outlined in the foregoing procedure.

2. Position safety stands under the rear frame members.

3. Disengage the brake line from the clips that retain the line to the axle housing.

4. Disconnect the vent tube from the rear axle housing.

5. Remove the brake carrier plate assemblies from the axle housing, and support them with wire. Do not disconnect the brake line.

6. Disconnect each rear shock absorber from the spring clip plate and position out of the way.

7. Lower the rear axle slightly to reduce some of the spring tension. At each rear spring, remove the spring clip (U-bolt) nuts, spring clips, and spring clip plate. Remove the spring lower insulator and retainer. See Part 3-2.

8. Remove the rear axle housing from under the car.

INSTALLATION

1. Position the rear axle housing on the rear springs. On a Comet or Fairlane, position the spring upper insulators and retainers between the axle housing and springs, and install the lower insulators.

2. Install the spring clips (U-bolts), spring clip plate, and nuts. **Torque the spring clip nuts evenly to specifications.**

3. If a new axle housing is being installed, remove the bolts that retain the carrier plate and bearing retainer from the old housing flanges. Position the bolts in the new housing flanges to hold the brake carrier plates in position. Install the carrier plates with new gaskets to the axle housing flanges.

4. Connect the vent tube to the axle housing.

5. Position the brake line to the axle housing, and secure with the retaining clips.

6. Raise the rear axle housing and springs enough to allow connecting

the rear shock absorbers to the spring clip plates. Connect the lower stud of each shock absorber to its spring clip plate, and install the bushing, washer, and nut on the stud. **Be sure the spring clip plate is free of burrs. Tighten the nut to specified torque.**

7. Install the carrier assembly and the two axle shaft assemblies in the axle housing as outlined in the Installation procedure under Differential Carrier—Removable Carrier Type Axle.

4 MAJOR REPAIR OPERATIONS—INTEGRAL CARRIER TYPE AXLE

DISASSEMBLY

All service operations on the differential case assembly and the drive pinion assembly can be performed with the housing in the car.

REMOVAL OF DIFFERENTIAL CASE AND DRIVE PINION

1. Raise the car and support it on the underbody, so that the rear axle drops down as far as the springs and shock absorbers permit.

2. Remove the cover from the carrier casting rear face, and drain the lubricant. On a Mustang, the muffler assembly must be removed to provide clearance for removing the cover.

3. Perform the Inspection Before Disassembly of Carrier in Part 4-1, Section 3.

4. Remove both rear wheels.

5. Remove the brake drums.

6. Working through the hole provided in the axle shaft flange, remove the nuts that attach the wheel bearing retainers to the axle housing.

7. Pull the axle shafts with the tool shown in Fig. 4. Install a nut on one of the brake carrier plate attaching bolts to hold the plate to the axle housing after the shaft has been removed. **Whenever a rear axle shaft is removed the wheel bearing oil seal must be replaced.** Remove both seals with the tool shown in Fig. 9.

8. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position of the drive shaft at assembly (Fig. 14). Disconnect the drive shaft from the axle U-joint flange. **Be careful to avoid dropping the loose universal joint bearing cups.** Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the transmission extension housing to prevent transmission leakage. Refer to the transmission group for the appropriate tool.

9. Remove the differential bearing

adjusting nut locks (Fig. 15).

10. Mark one differential bearing cap and the case (Fig. 16) to help position the parts properly during assembly.

11. Remove the differential bearing cap bolts and bearing caps. **Hold the differential case assembly in the housing after the caps are removed.**

12. Remove the differential case and bearing cups (Fig. 17).

13. Hold the drive pinion flange and remove the pinion nut (Fig. 10).

14. Remove the pinion flange (Fig. 11).

15. With a soft-faced hammer, drive the pinion out of the front bearing cone and remove it through the rear of the carrier casting.

16. Drive against the pinion front bearing cone, and drive the pinion flange seal and the bearing cone out of the front of the carrier casting.

17. To remove and install the pinion rear bearing cone use the tools in Fig. 18.

18. Measure the shim which is found under the bearing cone with a micrometer. Record the thickness of the shim.

DISASSEMBLY OF CONVENTIONAL DIFFERENTIAL CASE

1. If the differential bearings are to be removed, use the tools shown in Fig. 19.

2. Remove the bolts that attach the ring gear to the differential case. Press the ring gear from the case or tap it off with a soft-faced hammer.

3. With a drift, drive out the differential pinion shaft lock pin (Fig. 20).

4. Drive out the pinion shaft with a brass drift. Remove the gears and thrust washers.

DISASSEMBLY OF LIMITED-SLIP DIFFERENTIAL CASE

1. Place the differential case in a hydraulic press, and apply about one ton pressure across the case bearing hubs while removing the drive gear

attaching bolts. This procedure will contain the spring pressure between the differential case and cover until after the bolts are removed, and thereby prevent stripping of the threads.

2. Release the hydraulic press ram, and remove the differential case cover.

3. Remove the Belleville spring (Fig. 21).

4. Remove the steel and the bonded clutch plates.

5. Remove the differential clutch hub, outer side gear, and thrust washer.

6. Remove the ring gear from the differential case.

7. Drive out the differential pinion shaft lock pin.

8. With a brass drift, drive out the differential pinion shaft. Then remove the pinion gears, inner side gear and thrust washers.

PARTS REPAIR OR REPLACEMENT

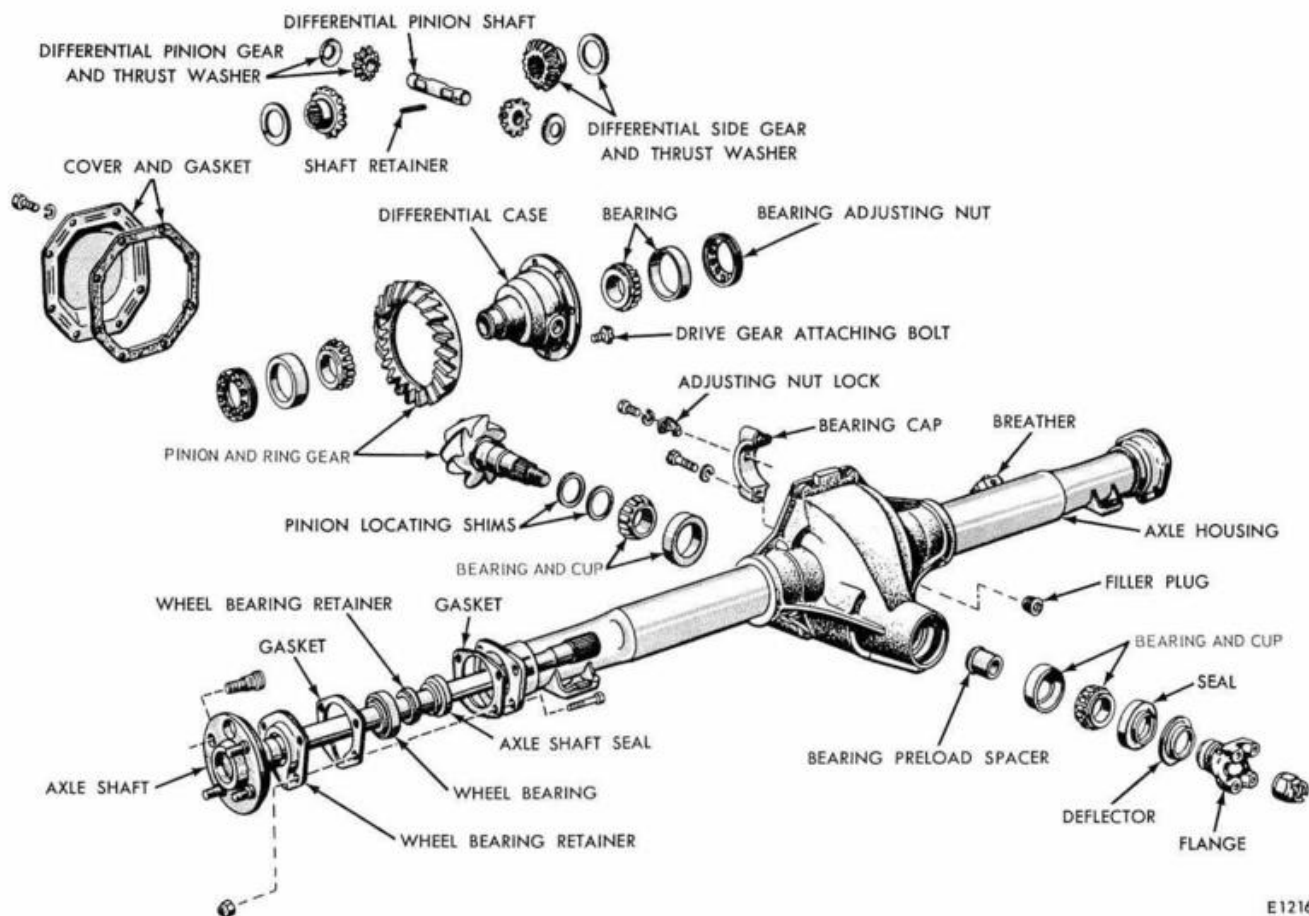
Clean and inspect all the parts as outlined in Part 4-1, Section 3. Before assembling the carrier, repair or replace all parts as indicated by the inspection.

The principal replacement operations are covered in the following procedures. All other repair or replacement operations are performed during Cleaning and Inspection Part 4-1, Section 3, or during the Assembly in this section.

PINION BEARING CUPS

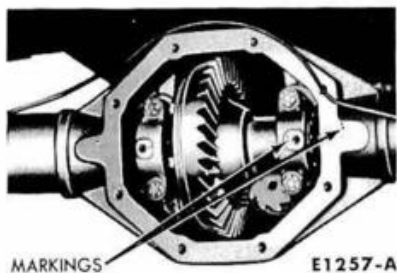
Do not remove the pinion bearing cups from the carrier casting unless the cups are worn or damaged.

If the pinion bearing cups are to be replaced, drive them out of the carrier casting with a drift. Install the new cups with the tool shown in Fig. 22. Make sure the cups are properly seated in their bores. If a 0.0015-inch feeler gauge can be inserted between a cup and the bottom of its bore at any point around the



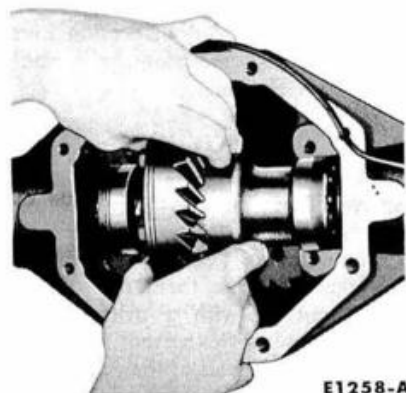
E1216-E

FIG. 15—Disassembled Rear Axle



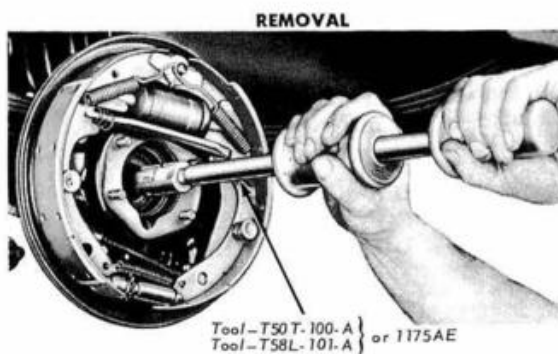
E1257-A

FIG. 16—Typical Differential Bearing Cap Marking



E1258-A

FIG. 17—Differential Case Removal or Installation



E1255-B

FIG. 18—Pinion Rear Bearing Cone Removal and Installation

cup, the cup is not properly seated.

Whenever the cups are replaced, the cone and roller assemblies should also be replaced.

DRIVE PINION AND GEAR SET

Individual differences in machining the carrier casting and the gear set require a shim between the pinion rear bearing cone and the pinion gear to locate the pinion for correct tooth contact with the ring gear. In order to adjust the shim pack to the correct thickness for a given gear

set, each pinion gear is marked with an adjustment number such as the +2 marking in Fig. 23.

When replacing a ring gear and pinion it should be noted that the **original** factory installed shim is of the correct thickness to adjust for individual variations in **both** the carrier casting dimension and in the original gear set dimension; therefore, to select the correct shim thickness for the new gear set to be installed, follow these steps:

1. Measure the thickness of the

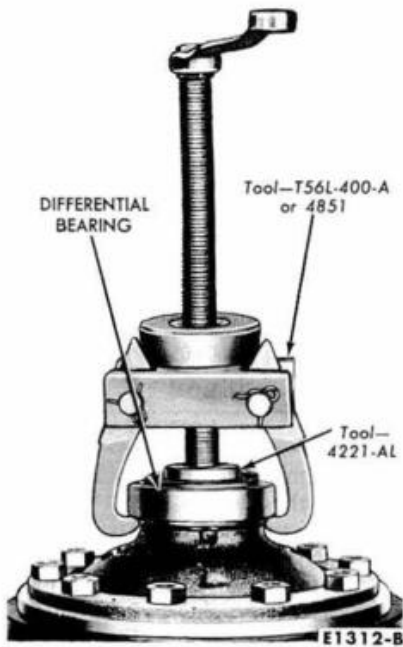


FIG. 19—Differential Bearing Removal

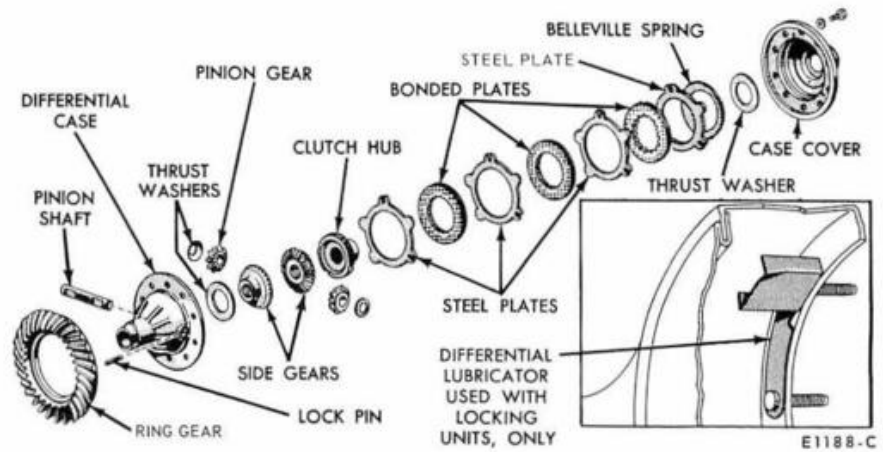


FIG. 21—Locking Differential Assembly

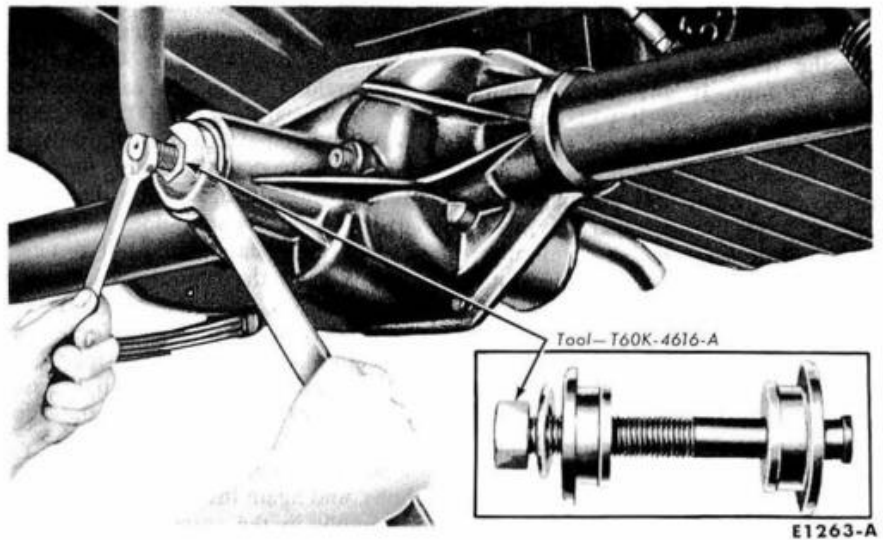


FIG. 22—Pinion Bearing Cup Removal or Installation

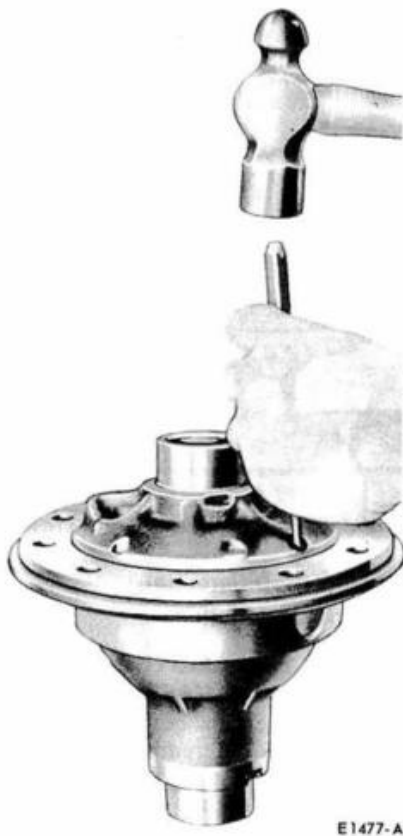


FIG. 20—Differential Pinion Shaft Lock Pin Removal

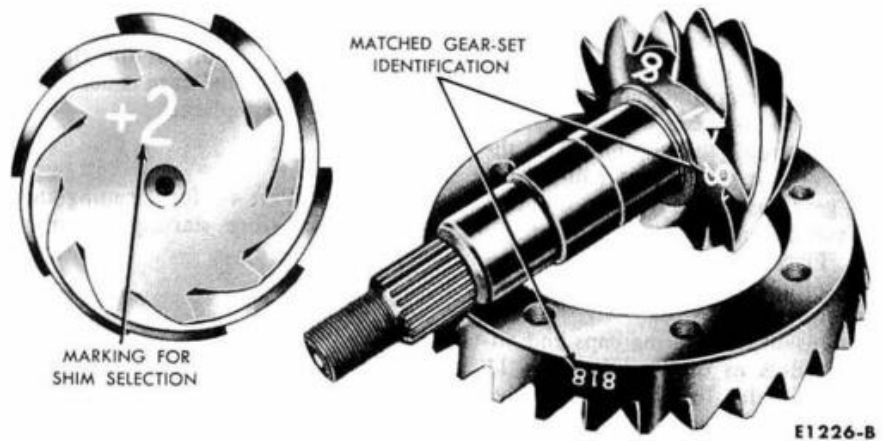


FIG. 23—Gear Set Markings

original shim with a micrometer.

2. Note the shim adjustment number on both the old pinion and the new pinion.

3. Refer to Table 1 to determine

the correct amount of shim thickness change. The amount shown in Table 1 under the old pinion shim adjustment number and in line with the new pinion number is the amount of **change** that should be made to the

original shim thickness.

If the old pinion is marked +4, for example, and the new pinion is marked -2, the table indicates that 0.006 inch of shim stock should be added to the **original shim** pack.

TABLE 1—Drive Pinion Adjusting Shim Thickness Changes (Inch)

Old Pinion Marking	New Pinion Marking								
	-4	-3	-2	-1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003
0	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004
-1	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005
-2	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006
-3	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007
-4	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007	-0.008

If the **original** shim pack was lost or if a new carrier casting is being installed, substitute a **nominal** 0.018 inch shim for the **original**, and follow the foregoing procedure for a trial build-up. If any further shim change is necessary, it will be indicated in the tooth pattern check.

A new ring gear and pinion should always be installed in an axle as a matched set (never separately). **Be sure that the same matching number appears on both the drive pinion and the ring gear.** Note the number 818 in Fig. 23.

4. After determining the correct shim thickness as explained in the foregoing steps, install the new pinion and ring gear as outlined under Assembly.

DIFFERENTIAL CASE, BEARINGS, AND DRIVE GEAR

If the ring gear runout check (before disassembly) exceeded specifications, the condition may be caused by a warped gear, a defective case, or excessively worn differential bearings.

To determine the cause of excessive runout proceed as follows:

1. Assemble the two halves of the differential case together **without** the ring gear, and press the two differential side bearings on the case hubs.

2. Place the cups on the bearings and set the differential case in the carrier.

3. Install the bearing caps and adjusting nuts as outlined in steps 11 thru 14 under Installation of Drive Pinion and Differential Case in this section.

4. Tighten the right nut two notches beyond the position where it first contacts the bearing cup. Rotate the differential case several revolutions in each direction while the bearings are loaded to seat the bearings in their cups. **This step is important.**

5. Again loosen the right nut to release the preload. Check to see that the left nut contacts the bearing cup. Using the dial indicator set-up shown in Fig. 13, Part 4-1, adjust the preload to 0.012 case spread for new bearings or 0.005 to 0.008 for the original bearings, if re-used.

6. Check the runout of the differential case flange with a dial indicator. If the runout does **not now** exceed specifications, install a new ring gear. If the runout still exceeds specifications, the ring gear is true and the trouble is due to either a defective case or worn bearings.

7. Remove the differential case from the carrier and remove the side bearings from the case.

8. Install **new** bearings on the case hubs, and again install the differential assembly in the carrier **without** the ring gear.

9. Check the case runout again with the new bearings. If the runout is **now** within limits, the old bearings were excessively worn. Use the new bearings for assembly. If the runout is still excessive, the case is defective and should be replaced.

ASSEMBLY

Refer to Part 4-1 for Cleaning and Inspection before starting assembly operations.

ASSEMBLY OF CONVENTIONAL DIFFERENTIAL CASE

1. Lubricate all the differential parts with axle lubricant, before they are installed in the case.

2. Place the side gears and thrust washers in the case.

3. Place the two pinion gears and thrust washers exactly opposite each other in the case openings and in mesh with the side gears.

4. Turn the pinions and thrust washers until the holes in the pinion

gears align with the pinion shaft holes in the case.

5. Start the pinion shaft into the differential case. Carefully align the shaft lock pin hole with the pin hole in the case. Drive the shaft into place and install the lock pin (Fig. 20).

6. Place the ring gear on the differential case and install the bolts. Torque the bolts to specification.

7. If the differential bearings have been removed, press them on as shown in Fig. 24.

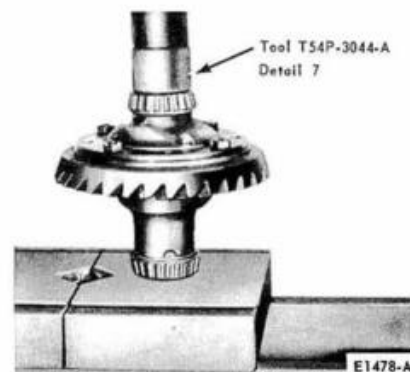


FIG. 24—Differential Bearing Installation

ASSEMBLY OF LIMITED-SLIP DIFFERENTIAL CASE

1. Place the side gear and thrust washer in the differential case (Fig. 24). **Lubricate all parts liberally with axle lubricant during assembly.**

2. With a soft-faced hammer, drive the pinion shaft into the case only far enough to retain a pinion thrust washer and pinion gear.

3. Place the second pinion and thrust washer in position, and drive the pinion shaft into place. **Carefully line up the pinion shaft lock pin holes.**

4. Install the pinion shaft lock

pin. The lock pin must not extend beyond the surface of the case.

5. Insert two 2-inch $\frac{7}{16}$ (N. F.) bolts through the differential case flange, and thread them three or four turns into the ring gear as a guide in aligning the ring gear bolt holes. Press or tap the drive gear into position.

6. Clamp the differential case in a soft-jawed vise. Install the other differential side gear on the differential pinion gears. Place the clutch hub on the side gear. Place the thrust washer on the hub (Fig. 25).

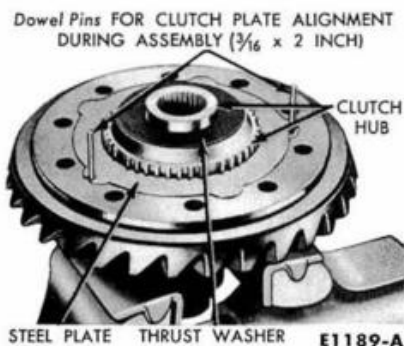


FIG. 25—Clutch Plate Installation

7. To align the clutch plates during assembly, insert two $\frac{3}{16}$ x 2 dowel pins into the differential case. Place a steel plate on the differential case so that the slots in the ears straddle the dowel pin (Fig. 25). Lubricate all the limited-slip differential parts with axle lubricant so that an accurate torque check can be made.

8. Place a bonded plate on the steel plate. Make sure the bonded plate inner spline teeth properly engage the hub spline. Assemble the remaining plates: a steel plate, a bonded plate, a steel plate, a bonded plate, and lastly a steel plate.

9. Place the Belleville spring on the top steel plate. The Belleville spring is assembled with the concave side down (Fig. 26). Carefully center the Belleville spring so that it will fit into the cover.

10. Place the differential case cover on the case (Fig. 27). Start the ring gear bolts.

11. Tighten the bolts evenly and alternately across the diameter of the drive gear. As the bolts are tightened the Belleville spring is compressed and the differential case and cover are pulled together.

12. Remove the dowel pins.

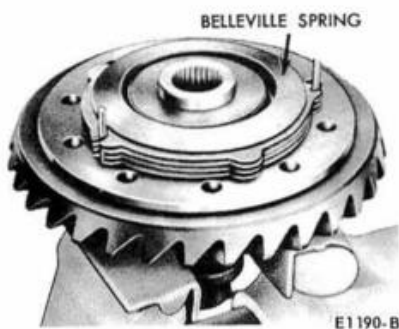


FIG. 26—Belleville Spring Installation

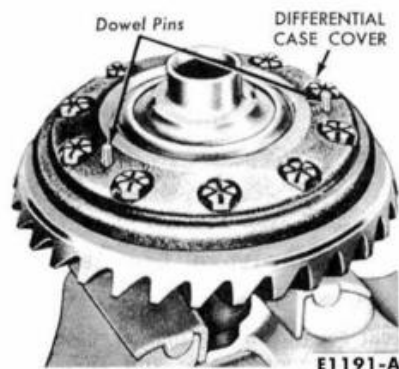


FIG. 27—Differential Cover Installation

13. Torque the case to ring gear bolts to specifications.

14. Check the torque required to rotate one side gear while the other side gear is held (Fig. 28). Ignore the torque required to start the side gear turning. The torque required to keep it moving steadily should be between 100 and 125 ft-lbs, if new clutch plates were installed. The torque should be at least 50 ft-lbs, if the original clutch plates were installed. If the required torque is not within these limits, check for improper assembly.

15. If the differential bearings have been removed press them on as shown in Fig. 24.

INSTALLATION OF DRIVE PINION AND DIFFERENTIAL CASE

1. Place the shim and pinion rear bearing cone on the pinion shaft. Press the bearing and shim firmly against the pinion shaft shoulder (Fig. 18).

2. Place a new pinion bearing preload spacer on the pinion shaft.

3. Lubricate the pinion rear bearing with axle lubricant.

4. Lubricate the pinion front bearing cone and place it in the housing.

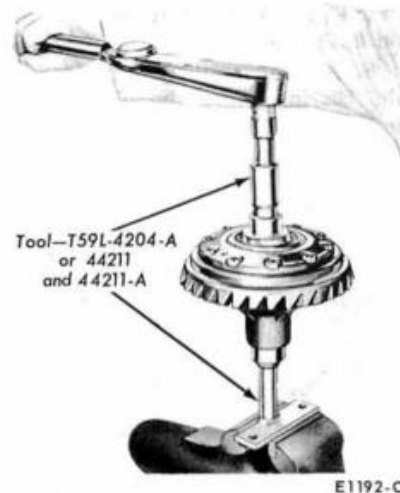


FIG. 28—Differential Torque Check

5. Coat the outside edge of a new oil seal with an oil resistant sealer and install it in the carrier casting (Fig. 12).

6. Insert the drive pinion shaft flange into the seal and hold it firmly against the pinion front bearing cone. From the rear of the carrier casting, insert the pinion shaft into the flange.

7. Place the flat washer on the pinion shaft and start the nut. Use a new nut. Hold the flange with the tool shown in Fig. 10 and tighten the pinion shaft nut. As the pinion shaft nut is tightened, the pinion shaft is pulled into the front bearing cone and into the flange.

As the pinion shaft is pulled into the front bearing cone, pinion shaft end play is reduced. While there is still end play in the pinion shaft, the flange and cone will be felt to bottom. This indicates that the bearing cone and flange have bottomed on the collapsible spacer.

From this point, a much greater torque must be applied to turn the pinion shaft nut, since the spacer must be collapsed. From this point, also, the nut should be tightened very slowly and the pinion shaft end play checked often, so that the pinion bearing preload does not exceed the limits.

If the pinion shaft nut is tightened to the point that pinion bearing preload exceeds the limits, the pinion shaft must be removed and a new collapsible spacer installed. **Do not decrease the preload by loosening the pinion shaft nut.** This will remove the compression between the pinion front and rear bearing cones and the collapsible spacer and may

permit the front bearing cone to turn on the pinion shaft.

8. As soon as there is preload on the bearings, **turn the pinion shaft in both directions several times to set the bearing rollers.**

9. Adjust the bearing preload to specification. Measure the preload with the tool shown in Fig. 29.

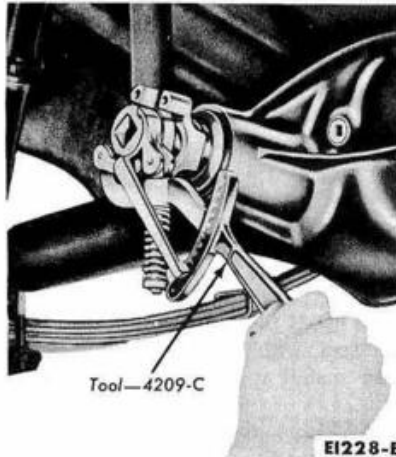


FIG. 29—Checking Pinion Bearing Pre-load

10. Wipe a thin coating of lubricant on the bearing bores so that the differential bearing cups will move easily.

11. Place the cups on the bearings and set the differential case assembly in the carrier casting (Fig. 17).

If the gear set is of the **non-hunting** or **partial non-hunting** type, assemble the differential case and ring gear assembly in the carrier so that the marked tooth on the pinion indexes between the marked teeth on the ring gear as shown in Fig. 30.

In almost every case of **improper assembly** (gears assembled out of time), the noise level and probability of failure will be higher than they would be with properly assembled gears.

When installing the **hunting** type

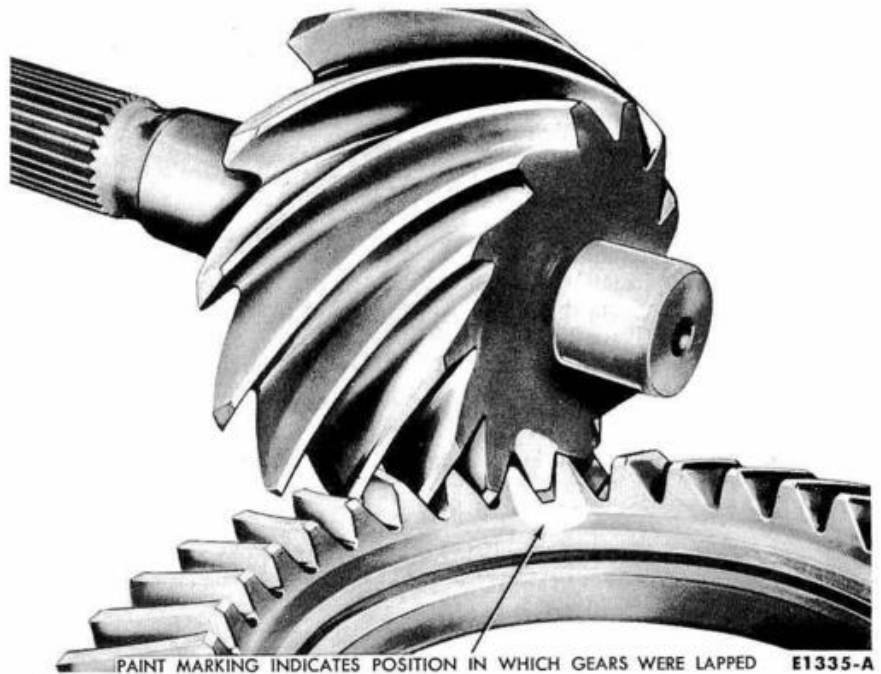


FIG. 30—Typical Gear Set Timing Marks

gear set (no timing marks), assemble the differential case and ring gear assembly in the carrier without regard to the matching of any particular gear teeth.

12. Slide the case assembly along the bores until a slight amount of backlash is felt between the gear teeth. Hold the differential case in place.

13. Set the adjusting nuts in the bores so that they just contact the bearing cups.

14. Carefully position the bearing caps on the carrier casting. Match the marks made when the caps were removed.

15. Install the bearing cap bolts and lockwashers. As the bolts are tightened, turn the adjusting nut with the tool shown in Fig. 31.

16. If the adjusting nuts do not turn freely as the cap bolts are tightened, remove the bearing caps and again inspect for damaged

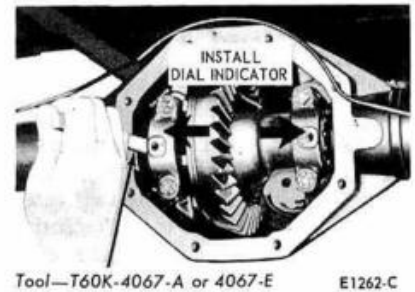


FIG. 31—Backlash and Bearing Pre-load Adjustment

threads or incorrectly positioned caps. Tightening the bolts to the specified torque is done to be sure that the cups and adjusting nuts are seated. Loosen the cap bolts, and torque them to only 5 ft-lbs before making adjustments. Refer to part 4-1 for backlash and bearing pre-load adjustment procedures.

5 MAJOR REPAIR OPERATIONS—REMOVABLE CARRIER TYPE AXLES

DISASSEMBLY

After removing the carrier from the axle housing as described in section 3, mount the carrier in a holding fixture and perform the Inspection Before Disassembly of Carrier as explained in Part 4-1, Section 3. Then disassemble the carrier as outlined in the following procedures.

REMOVAL AND DISASSEMBLY OF CONVENTIONAL DIFFERENTIAL CASE

1. Mark one differential bearing cap and the mating bearing support with punch marks to help position the parts properly during assembly of the carrier. Also, mark one of the bearing adjusting nuts and the carrier with scribe marks for proper

location during assembly (Fig. 45).

2. Remove the adjusting nut locks, bearing caps, and adjusting nuts. Then lift the differential assembly out of the carrier.

3. If the differential bearings are to be removed, use the tool shown in Fig. 19. On cars equipped with high performance engines, use tool T57L-4220-A.

4. Mark the differential case, cover, and ring gear for assembly in the original position.

5. Remove the bolts that attach the ring gear to the differential case. Press the gear from the case or tap it off with a soft-faced hammer.

6. With a drift, drive out the differential pinion shaft lock pin (Fig. 32) and separate the 2-piece differential case.

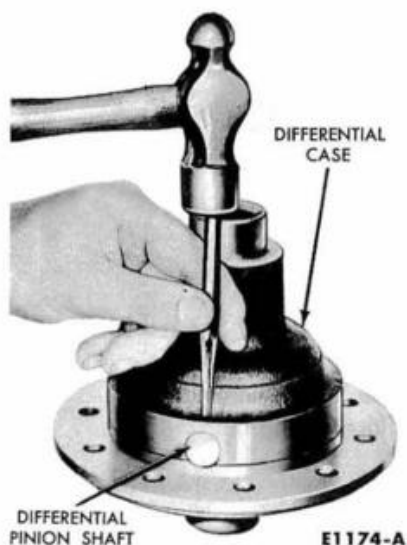


FIG. 32—Removing Differential Pinion Shaft Lock Pin

7. Drive out the pinion shaft with a brass drift (Fig. 33).

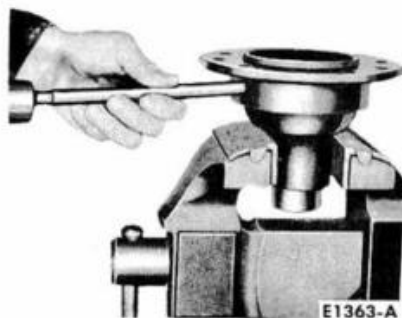


FIG. 33—Driving Out Differential Pinion Shaft

8. Remove the gears and thrust washers. (Fig. 34).

REMOVAL AND DISASSEMBLY OF LIMITED-SLIP DIFFERENTIAL CASE

1. Remove the differential case from the carrier and remove the

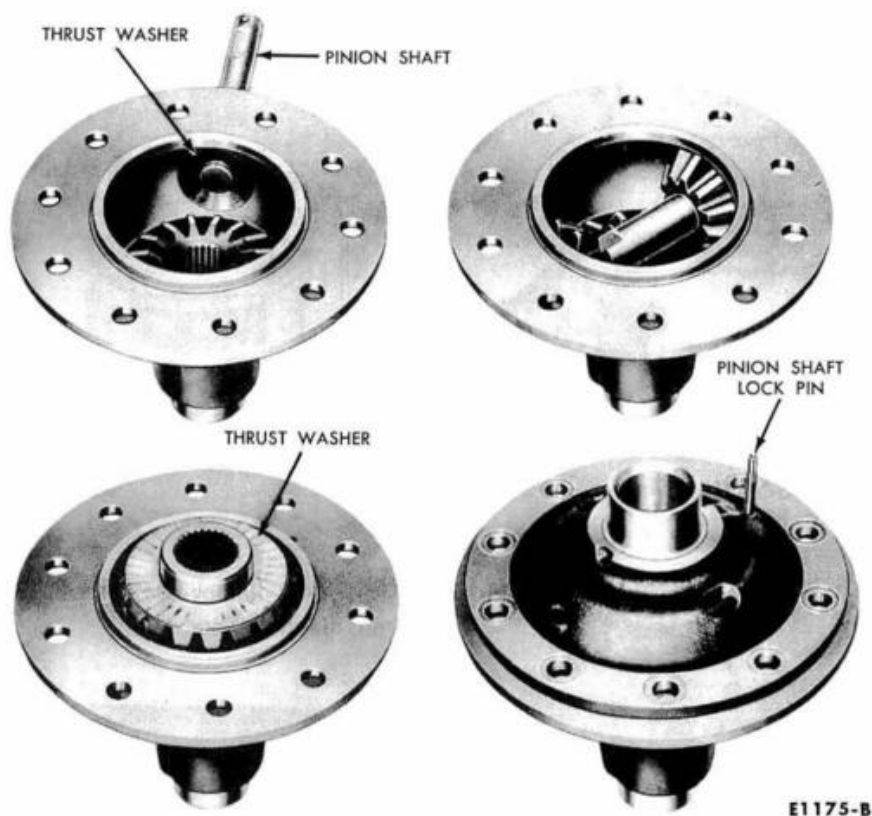


FIG. 34—Assembly of Differential Case

bearings from the differential as outlined in steps 1 through 4 in the foregoing procedure.

2. Place the differential case in a hydraulic press, and apply about one ton pressure across the case bearing hubs while removing the ring gear attaching bolts. This procedure will contain the spring pressure between the differential case and cover until after the bolts are moved, and thereby prevent stripping of the threads. Loosen alternate bolts an equal amount so that the spring pressure will release evenly.

3. Release the hydraulic press ram, and remove the differential case cover.

4. Remove the Belleville spring (Fig. 21).

5. Remove the steel and the bonded clutch plates.

6. Remove the differential clutch hub, outer side gear, and thrust washer.

7. Remove the ring gear from the differential case.

8. Drive out the differential pinion shaft lock pin.

9. With a brass drift, drive out the differential pinion shaft. Then remove the pinion gears, inner side gear, and thrust washers.

REMOVAL AND DISASSEMBLY OF DRIVE PINION AND BEARING RETAINER

1. Turn the carrier case upright, and remove the pinion shaft nut (Fig. 35). Then remove the U-joint flange (Fig. 36).

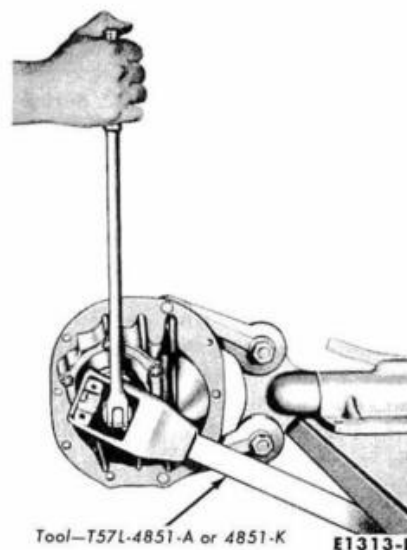


FIG. 35—Removing Pinion Shaft Nut

2. Remove the seal (Fig. 37) and the slinger.

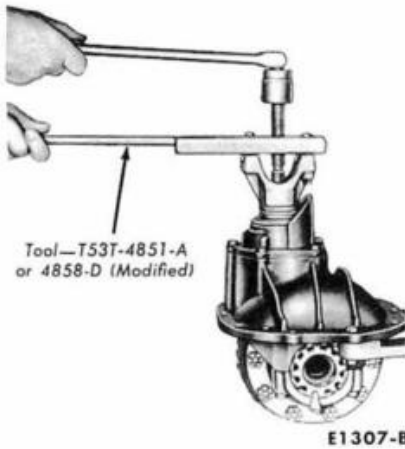


FIG. 36—Removing U-Joint Flange

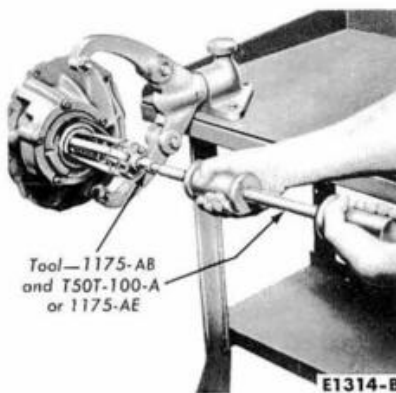


FIG. 37—Removing Pinion Seal

3. Remove the pinion, bearing, and retainer assembly from the carrier housing (Fig. 48). Measure the shim thickness with a micrometer. Record this original shim thickness. If a new gear set is installed during assembly, a new shim will have to be installed. The original shim thickness is one of the factors necessary in calculating the new shim thickness. **Extreme care must be taken not to damage the mounting surfaces of the retainer and carrier.**

4. Place a protective sleeve (hose) on the pinion pilot bearing surface. Press the pinion shaft out of the pinion front bearing cone (Fig. 38).

5. Press the pinion shaft out of the pinion rear bearing cone (Fig. 39).

PARTS REPAIR OR REPLACEMENT

Clean and inspect all the parts as outlined in Part 4-1, Section 3. Before assembling the carrier, repair or replace all parts as indicated by the inspection.

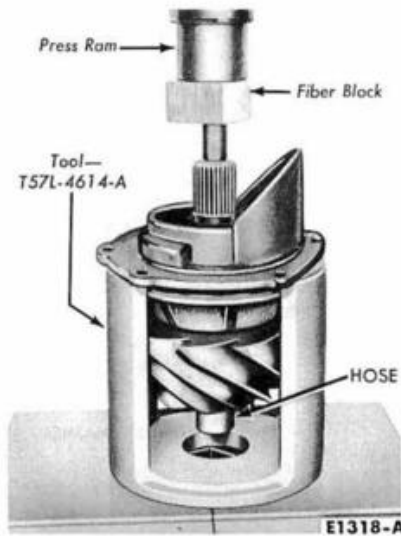


FIG. 38—Removing Pinion Front Bearing Cone

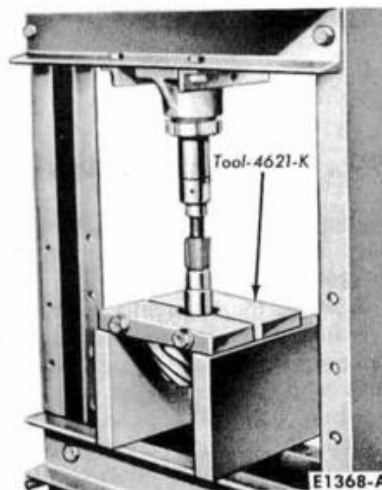


FIG. 39—Removing Pinion Rear Bearing Cone

The principal replacement operations are covered in the following procedures. All other repair or replacement operations are performed during Cleaning and Inspection Part 4-1, Section 3, or during the Assembly in this section.

PILOT BEARING

1. Remove the pilot bearing as shown in Fig. 40. Drive out the pilot bearing and the bearing retainer together. On cars with high performance engines, use handle adapter T53L-200A with tool 757L-4625-A or 4625-K.

2. Drive the new bearing in until it bottoms as shown in Fig. 41. On cars with high performance engines,

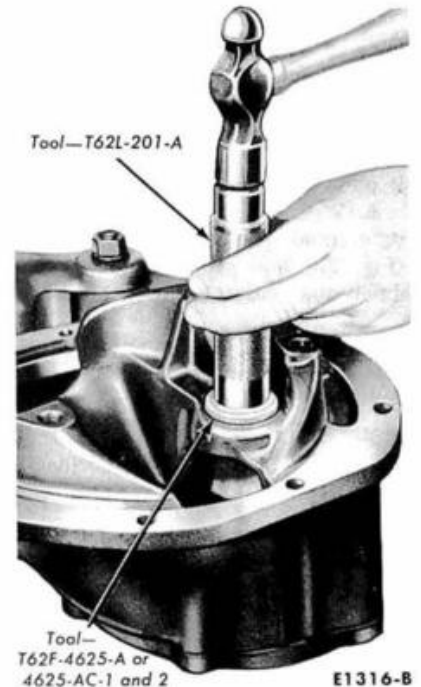


FIG. 40—Removing Pilot Bearing



FIG. 41—Installing Pilot Bearing

use handle adapter 753L-200-A with tool 757L-4625-A, or 4625-K, or 4625-KA.

3. Using the same tool, install a new pilot bearing retainer with the concave side up.

PINION BEARING CUPS

Do not remove the pinion bearing cups from the retainer unless the cups are worn or damaged. The flange and pilot of the retainer are machined during manufacture by locating on these cups after they are installed in their bores. If the cups are worn or damaged, they should be removed and replaced as shown

in Fig. 42. On cars equipped with high performance engines, use the following tools: T57L-4614-A with T57L-4616-A for front cup removal except Comet; tool 4615-D for Comet front cup removal; T57L-4614-A with T57L-4616-A2 for front cup installation and T57L-4614-A with T55P-4616-A2 for rear cup installation.

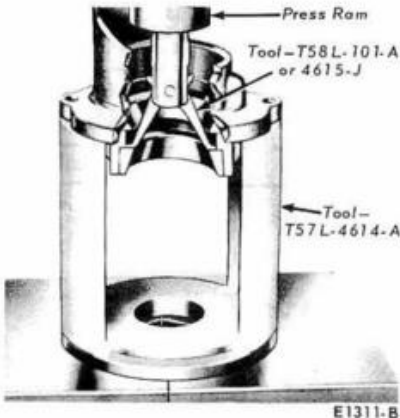


FIG. 42—Removing Pinion Bearing Cup

After the new cups are installed, make sure they are seated in the retainer by trying to insert a 0.0015-inch feeler gauge between the cup and the bottom of the bore.

Whenever the cups are replaced, the cone and roller assemblies should also be replaced.

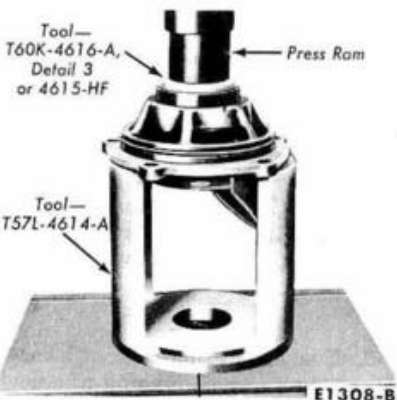


FIG. 43—Installing Pinion Bearing Cup

DRIVE PINION AND GEAR SET

When replacing a ring gear and pinion, note that the original factory installed shim is of the correct thickness to adjust for individual variations in both the carrier housing dimension and in the original gear set dimension. Therefore, to select

the correct shim thickness for the new gear set to be installed, follow these steps:

1. Measure the thickness of the **original shim** with a micrometer.
2. Note the shim adjustment number on both the old pinion and the new pinion. Each pinion gear is marked with an adjustment number such as the +1 marking in Fig. 44.

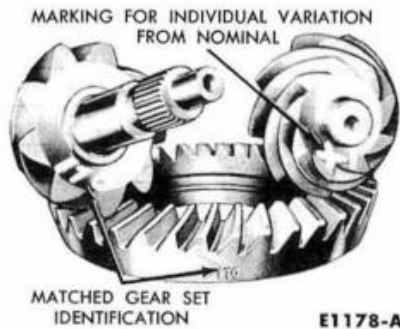


FIG. 44—Pinion and Ring Gear Markings

3. Refer to Table 2 to determine the correct amount of shim thickness change. The amount shown in the table under the old pinion shim adjustment number and in line with the new pinion number is the amount of **change** that should be made to the **original** shim thickness.

If the old pinion is marked +4, for example, and the new pinion is marked -2, the table indicates that 0.006 inch of shim stock should be removed from the **original** shim pack.

If the **original** shim pack was lost or if a new carrier housing is being installed, substitute a **nominal** 0.020-inch shim for the **original**, and follow the foregoing procedure for a trial build-up. If any further shim change is necessary, it will be indicated in the tooth pattern check.

A new ring gear and pinion should always be installed in an axle as a matched set (never separately). **Be sure that the same matching number appears on both the drive pinion and the ring gear.** Note the number 170 in Fig. 44.

4. After determining the correct shim thickness as explained in the foregoing steps, install the new pinion and ring gear as outlined under Assembly.

DIFFERENTIAL CASE, BEARINGS AND RING GEAR

If the ring gear runout check (before disassembly) exceeded specifications, the condition may be caused

by a warped gear, a defective case, or excessively worn differential bearings.

To determine the cause of excessive runout proceed as follows:

1. Assemble the two halves of the differential case together **without** the ring gear, and press the two differential side bearings on the case hubs.

2. Place the cups on the bearings and set the differential case in the carrier.

3. Install the bearing caps and adjusting nuts as outlined in step 11 thru 14 under Assembly and Installation of Conventional Differential Case in this section.

4. Tighten the right nut **two** notches beyond the position where it first contacts the bearing cup. Rotate the differential case several revolutions in each direction while the bearings are loaded to seat the bearings in their cups. **This step is important.**

5. Again loosen the right nut to release the preload. Check to see that the left nut contacts the bearing cup. Using the dial indicator set-up shown in Fig. 13, Part 4-1, adjust the preload to 0.012 case spread for new bearings or 0.005 to 0.008 for the original bearings, if re-used.

6. Check the runout of the differential case flange with a dial indicator. If the runout does **not now** exceed specifications, install a new drive gear. If the runout still exceeds specifications, the ring gear is true and the trouble is due to either a defective case or worn bearings.

7. Remove the differential case from the carrier and remove the side bearings from the case.

8. Install **new** bearings on the case hubs, and again install the differential assembly in the carrier **without** the ring gear.

9. Check the case runout again with the new bearings. If the runout is **now** within limits, the old bearings were excessively worn. Use the new bearings for assembly. If the runout is still excessive, the case is defective and should be replaced.

ASSEMBLY

Refer to Part 4-1 for Cleaning and Inspection before starting assembly operations. Fig. 45 shows the disassembled parts.

ASSEMBLY AND INSTALLATION OF DRIVE PINION AND BEARING RETAINER

1. Install the drive pinion rear

TABLE 2 — DRIVE PINION ADJUSTING SHIM THICKNESS CHANGES (Inches)

New Pinion Marking	Old Pinion Marking								
	-4	-3	-2	-1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003
0	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004
-1	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005
-2	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006
-3	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007
-4	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007	-0.008

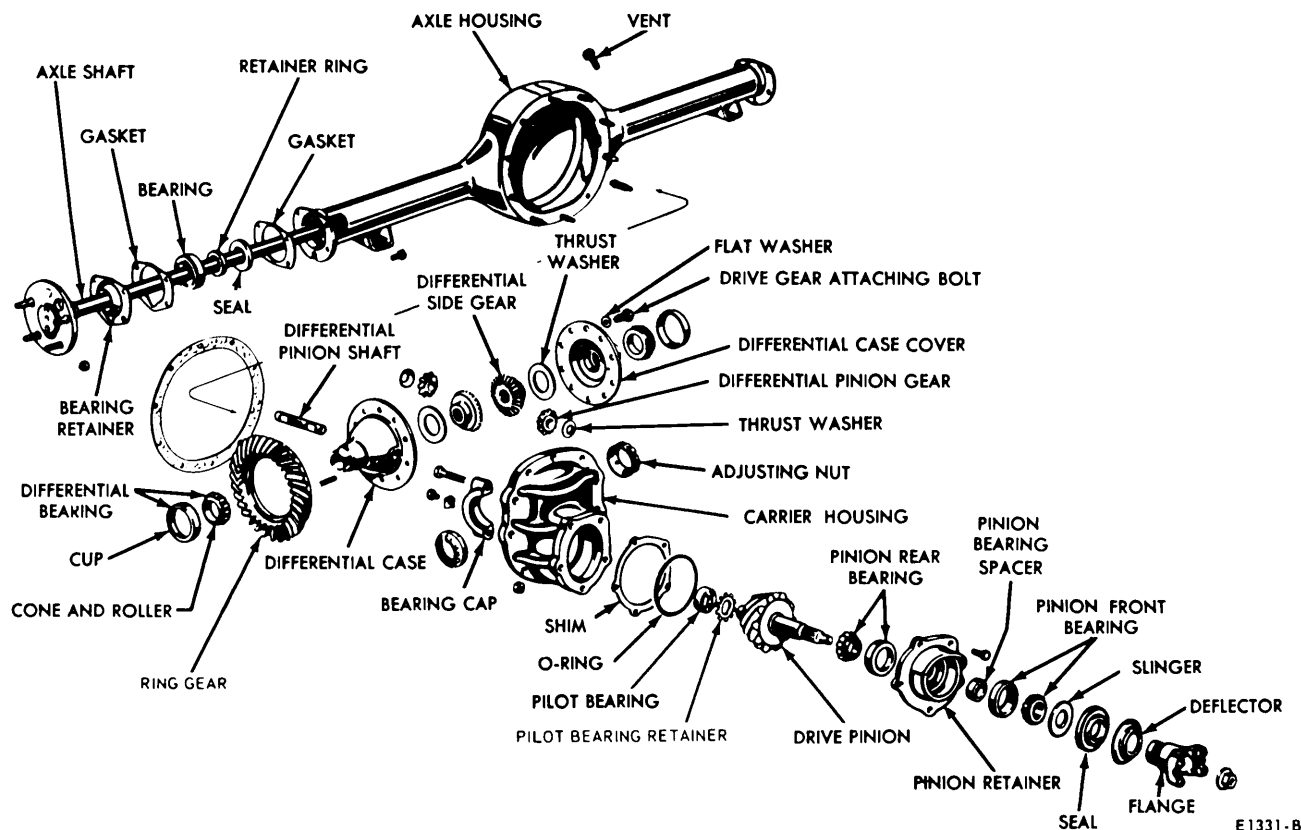


FIG. 45—Rear Axle—Disassembled

bearing cone and roller on the pinion shaft (Fig. 46). On cars equipped with high performance engines use tool T57L-4621-B along with tool 757L-4614-A as shown in Fig. 46. Place a new spacer on the pinion shaft (Fig. 47).

2. Place the bearing retainer on the pinion shaft, and install the front bearing cone and roller in the retainer. Press the front bearing cone and roller into position with the same tools as used in Fig. 46 for front bearing installation. On cars with high performance engines, use

T57L-4621-B along with tool T57L-4614-A.

3. Lubricate the O-ring with axle lubricant and install it in its groove in the pinion retainer. Be careful not to twist it. Snap the O-ring into position.

4. Place the proper shim on the carrier housing and install the pinion and retainer assembly being careful not to pinch the O-ring (Fig. 48).

5. Install the pinion retainer bolts. Torque bolts to specifications.

6. Place the slinger on the pinion shaft.

7. Coat the outside edge of a new oil seal with a small amount of a new oil resistant sealer. **Do not put any of the sealer on the sealing lip.** Install the seal in the bearing retainer (Fig. 49). On cars with high performance engines, use tool T58L-4676-A or tool 4676-F.

New seals should be soaked in SAE 10 oil for ½ hour before use.

8. Install the U-joint flange (Fig. 50).

9. Start a new integral nut and washer on the pinion shaft.

10. Hold the flange (Fig. 35) and

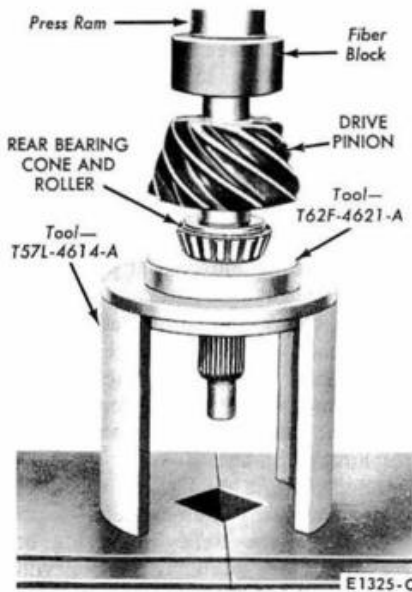


FIG. 46—Installing Pinion Rear Bearing Cone

pound torque wrench is not available tool 4209-C may be used in combination with tool 4209-C12. Correct preload will be obtained when the torque required to rotate the pinion in the retainer is as specified in Part 4-3. If the torque required to rotate the pinion is less than specified, tighten the pinion shaft nut a little at a time until the proper preload is established. **Do not overtighten the nut.** If excessive preload is obtained as a result of overtightening, replace the collapsible bearing spacer.

Do not back off the pinion shaft nut to establish pinion bearing preload. If the torque on the pinion shaft nut is less than 175 ft-lbs. after bearing preload is established, a new collapsible spacer must be used.

ASSEMBLY AND INSTALLATION OF CONVENTIONAL DIFFERENTIAL CASE

1. Place a side gear and thrust

line up the pinion shaft lock pin holes.

4. Place the second side gear and thrust washer in position (Fig. 34), and install the cover on the differential case. Install the pinion shaft lock pin. A pinion or axle shaft spline can be inserted in the side gear spline to check for free rotation of the differential gears.

5. Insert two $\frac{7}{16}$ (N. F.) bolts two inches long through the differential case flange, and thread them three or four turns into the ring gear as a guide in aligning the ring gear bolt holes. Press or tap the ring gear into position.

6. Install and tighten the ring gear bolts and washers evenly, and torque them alternately across the gear to specification.

7. If the differential bearings have been removed, press them on as shown in Fig. 52.

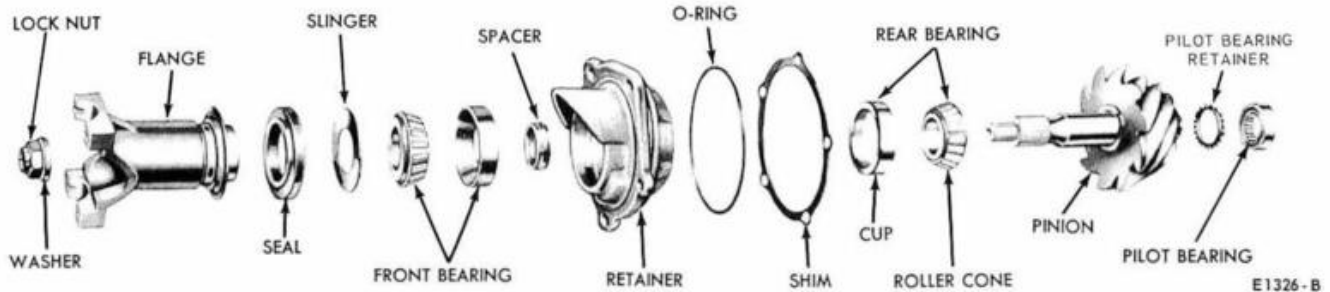


FIG. 47—Pinion and Bearing Retainer

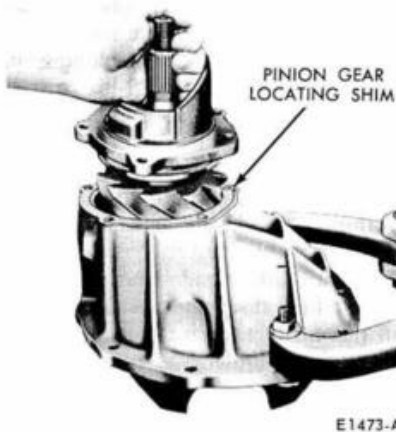


FIG. 48—Installing Pinion and Retainer

tighten the pinion shaft nut to 175 ft-lbs. Do not exceed 175 ft-lbs at this time. As the pinion shaft nut is tightened, rotate the pinion shaft frequently to allow the bearing to seat.

11. Check the pinion bearing preload as shown in Fig. 51. If an inch-

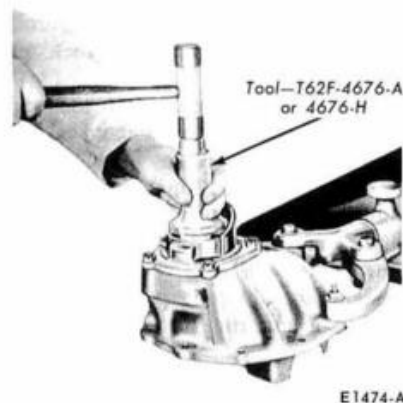


FIG. 49—Installing Oil Seal

washer in the differential case bore (Fig. 34). Lubricate all differential parts liberally with axle lubricant during assembly.

2. With a soft-faced hammer, drive the pinion shaft into the case only far enough to retain a pinion thrust washer and pinion gear.

3. Place the second pinion and thrust washer in position, and drive the pinion shaft into place. **Carefully**

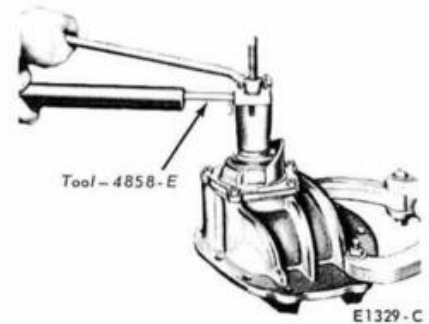


FIG. 50—Installing U-Joint Flange

8. Wipe a thin coating of lubricant on the bearing bores so that the differential bearing cups will move easily.

9. Place the cups on the bearings. If the gear set is of the **non-hunting** or **partial non-hunting** type, assemble the differential case and ring gear assembly in the carrier so that the marked tooth on the pinion indexes between the marked teeth on the ring gear as shown in Fig. 30.

In almost every case of improper

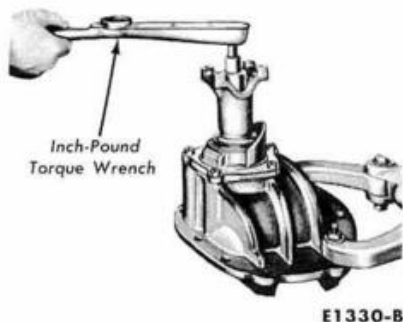


FIG. 51—Checking Pinion Bearing Pre-load

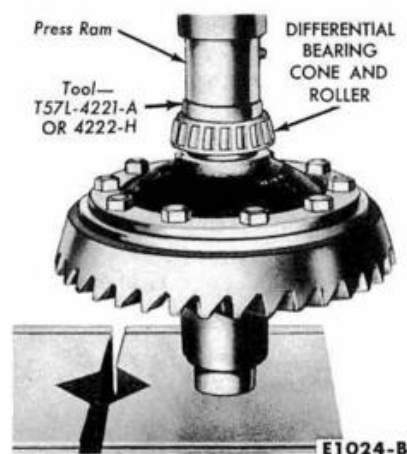


FIG. 52—Installing Differential Bearing

assembly (gears assembled out of time), the noise level and probability of failure will be higher than they would be with properly assembled gears.

When installing the hunting type gear set (no timing marks) assemble the differential case and ring gear assembly in the carrier without regard to the matching of any particular gear teeth.

10. Slide the assembly along the bores until a slight amount of backlash is felt between the gear teeth.

11. Set the adjusting nuts in the bores so that they just contact the bearing cups. The nuts should be

engaged about the same number of threads on each side.

12. Carefully position the bearing caps on the carrier. Match the marks made when the caps were removed.

13. Install the bearing cap bolts and alternately torque them to 70-80 ft-lbs.

14. If the adjusting nuts do not turn freely as the cap bolts are tightened, remove the bearing caps and again inspect for damaged threads or incorrectly positioned caps. Tightening the bolts to the specified torque is done to be sure that the cups and adjusting nuts are seated. Loosen the cap bolts, and torque them to only 25 ft-lbs. before making adjustments.

15. Adjust the backlash between the ring gear and pinion as outlined in Part 4-1, Section 2.

16. Be sure to make a final tooth pattern check before installing the carrier assembly in the axle housing.

ASSEMBLY AND INSTALLATION OF LIMITED-SLIP DIFFERENTIAL CASE

1. Place the side gear and thrust washer in the differential case (Fig. 21). **Lubricate all parts liberally with axle lubricant during assembly.**

2. With a soft-faced hammer, drive the pinion shaft into the case only far enough to retain a pinion thrust washer and pinion gear.

3. Place the second pinion and thrust washer in position, and drive the pinion shaft into place. **Carefully line up the pinion shaft lock pin holes.**

4. Install the pinion shaft lock pin. **The lock pin must not extend beyond the surface of the case.**

5. Insert two 2-inch $\frac{7}{16}$ (N. F.) bolts through the differential case flange, and thread them three or four turns into the ring gear as a guide in aligning the ring gear bolt holes. Press or tap the ring gear into position.

6. Clamp the differential case in a soft-jawed vise. Install the other differential side gear on the differential

pinion gears. Place the clutch hub on the side gear. Place the thrust washer on the hub (Fig. 25).

7. To align the clutch plates during assembly, insert two $\frac{3}{16}$ x 2 dowel pins into the differential case. Place a steel plate on the differential case so that the slots in the ears straddle the dowel pin (Fig. 25). **Lubricate all the locking differential parts with axle lubricant so that an accurate torque check can be made.**

8. Place a bonded plate on the steel plate. Make sure the bonded plate inner spline teeth properly engage the hub spline. Assemble the remaining plates: a steel plate, a bonded plate, a steel plate, a bonded plate, and lastly a steel plate.

9. Place the Belleville spring on the top steel plate. The Belleville spring is assembled with the concave side down (Fig. 26). Carefully center the Belleville spring so that it will fit into the cover.

10. Place the differential case cover on the case (Fig. 27). Start the ring gear bolts.

11. Tighten the bolts evenly and alternately across the diameter of the ring gear. As the bolts are tightened the Belleville spring is compressed and the differential case and cover are pulled together.

12. Remove the dowel pins.

13. Torque the case to ring gear bolts to specifications.

14. Check the torque required to rotate one side gear while the other side gear is held (Fig. 28). Ignore the torque required to start the side gear turning. The torque required to keep it moving steadily should be between 155 and 195 ft-lbs, if new clutch plates were installed. The torque should be at least 75 ft-lbs, if the original clutch plates were installed. If the required torque is not within these limits, check for improper assembly.

15. Install the side bearings on the differential case, and install the case in the carrier as described in steps 7 through 16 under Assembly and Installation of Conventional Differential Case.

PART 4-3

SPECIFICATIONS

REAR AXLE LUBRICATION

Axle Type	Ford Specification	Ford Part No.	Capacity
Integral Carrier	M2C28-B	C2AZ-19590-A	2½ Pints (Approximate)
Removable Carrier (Except with 289-4V Engine)	M-2C50-B	C1AZ-19580-E or F	4½ Pints (Approximate)
Removable Carrier (With 289-4V Engine)	M2C57-A	C2AZ-19580-D	5 Pints (Approximate)
All Axles Equipped With Locking Differential	Use M-2C50-B, plus 4 ounces of M-2C58-A (C1AA-19B546-A) additive per refill of M-2C50-B		

For temperatures above —25°F use SAE 90 Grade lubricant.
For temperatures below —25°F use SAE 80 Grade lubricant.

REAR AXLE—INTEGRAL CARRIER TYPE

DRIVE PINION ADJUSTING SHIM THICKNESS CHANGES—INCH

Old Pinion Marking	New Pinion Marking								
	—4	—3	—2	—1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	—0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	—0.001	—0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	—0.001	—0.002	—0.003
0	+0.004	+0.003	+0.002	+0.001	0	—0.001	—0.002	—0.003	—0.004
—1	+0.003	+0.002	+0.001	0	—0.001	—0.002	—0.003	—0.004	—0.005
—2	+0.002	+0.001	0	—0.001	—0.002	—0.003	—0.004	—0.005	—0.006
—3	+0.001	0	—0.001	—0.002	—0.003	—0.004	—0.005	—0.006	—0.007
—4	0	—0.001	—0.002	—0.003	—0.004	—0.005	—0.006	—0.007	—0.008

REAR AXLE RATIOS, GEAR AND CODE IDENTIFICATION

Identification Tag	Ring Gear Diameter (Inches)	Type of Differential	Axle Ratio
WCY-R	7¼	Conventional	2.88:1
WCY-AA	7¼	Limited-Slip	
WCY-E	7¼	Conventional	3.20:1
WCY-AJ	7¼	Conventional	
WCY-L	7¼	Limited-Slip	

CONTINUED ON NEXT PAGE

REAR AXLE—INTEGRAL CARRIER TYPE (Continued)**ADJUSTMENTS**

	Inch
Backlash Between Ring Gear and Pinion	0.008-0.012
Backlash Variation Between Teeth	Max. 0.003
Runout of Backface of Ring Gear as Assembled	Max. 0.003
Thickness: Differential Side Gear Thrust Washers Differential Pinion Gear Thrust Washers	0.030-0.032 0.030-0.032
Ring Bearing Cone to Pinion Gear Nominal Shim	0.017
Shims Available:	0.008-0.024

TORQUE LIMITS

	Ft-lbs
Rear Cover Bolts	10-17
Differential Bearing Cap Screws	40-55
Differential Bearing Adjusting Nut Lock Bolts	12-25
Rear Shock Absorbers to Rear Spring Clip Plate Assembly Nuts	15-25
Universal Joint Bolt Nuts	7-10
Ring Gear Attaching Bolts	40-55
Rear Axle Shaft Bearing Retaining Nuts	30-40
Spring Clip Nuts (Rear Springs to Axle Housing)	13-20
Minimum Torque Required to Tighten Pinion Flange Lock Nut to Obtain Correct Pinion Bearing Preload	140
Pinion Bearing Preload New Bearings Used Bearings	17-27⊙ 6-12⊙
Differential Bearing Preload (Case Spread-Thousandths) New Bearings Used Bearings	0.008 0.003-0.005

⊙Inch-pounds

REAR AXLE—REMOVABLE CARRIER TYPE**REAR AXLE RATIOS, GEAR AND CODE IDENTIFICATION**

Identification Tag	Ring Gear Diameter (Inches)	Type of Differential	Axle Ratio	Identification Tag	Ring Gear Diameter (Inches)	Type of Differential	Axle Ratio
WCZ-E	7¾	Conventional	2.80:1	WDE-B	9	Conventional	3.00:1
WDJ-B	7¾	Limited-Slip	2.80:1	WEB-C	9	Conventional	3.25:1
WCZ-F	8	Conventional	3.00:1	WED-C	9	Limited-Slip	3.00:1
WDJ-C	8	Limited-Slip	3.00:1	WED-A	9	Limited-Slip	3.25:1
WCZ-S	8¾	Conventional	3.50:1	WDY-B	8	Conventional	3.25:1
WCZ-R	8¾	Conventional	3.89:1	WDY-C	8	Conventional	3.50:1
WDZ-A	7¾	Limited-Slip	2.80:1	WEA-B	8	Limited-Slip	3.50:1
WDW-C	8	Conventional	3.25:1	WDY-A	8	Conventional	3.00:1
WDW-E	7¾	Conventional	2.80:1	WEA-F	8	Limited-Slip	3.25:1
WDW-A	7¾	Conventional	2.80:1	WEA-A	8	Limited-Slip	3.00:1
WDW-D	8	Conventional	3.50:1	WEC-A	9	Conventional	3.00:1
WDZ-C	8	Limited-Slip	3.25:1	WEC-B	9	Conventional	3.25:1
WDW-B	8	Conventional	3.00:1	WEE-A	9	Limited-Slip	3.25:1
WDC-B	8	Limited-Slip	3.00:1	WEE-C	9	Limited-Slip	3.00:1

ADJUSTMENTS

	Inch
Backlash Between Ring Gear and Pinion	0.008-0.012
Maximum Backlash Variation Between Teeth	0.003
Maximum Runout of Backface of Ring Gear as Assembled	0.003

ADJUSTMENTS (Continued)

	Inch
Thickness Differential Side Gear Thrust Washers Differential Pinion Gear Thrust Washers	0.030-0.032 0.030-0.032
Nominal Pinion Locating Shim (By Ring-Gear Size) 7¾" and 8" 8¾" and 9"	0.022 0.015
Available Shims (In steps of 0.001 inch)	0.010-0.029

CONTINUED ON NEXT PAGE

REAR AXLE—REMOVABLE CARRIER TYPE (Continued)

TORQUE LIMITS

Description	7¾"-8" Ring Gear Ft-lbs	8¾"-9" Ring Gear Ft-lbs
Differential Bearing Cap Screws	55-70	70-85
Differential Bearing Adjusting Nut Lock Bolts	12-25	12-25
Carrier to Housing Stud Nuts	30-40	30-40
Pinion Retainer to Carrier Cap Screws	30-45	30-45
Ring Gear Attaching Bolts	65-80	65-80
Rear Axle Shaft Bearing Retainer Bolts	30-40	30-40
Rear Shock Absorber to Rear Spring Clip Plate Assembly Nuts	15-22	15-22
Pinion Flange U-Bolt Nuts	12-15	15-20
Spring Clip Nuts (Rear Spring to Axle Housing)	30-45	30-45
Minimum Torque Required to Tighten Pinion Nut to Obtain Correct Pinion Bearing Preload	175Ⓢ	175Ⓢ
Pinion Bearing Preload	New Bearings and New Seal	17-32 inch-pounds
	Used Bearings and New Seal	8-14 inch-pounds
Differential Bearing Preload (Case Spread-Thousandths)		0.012 0.005-0.008

ⓈIf this torque can not be obtained with a used spacer, install a new spacer.

SPECIAL TOOLS

Ford Tool No.	Former No.	Description
T50T-100-A	B-166	Impact Hammer
T58L-101-A	—	Puller Attachment
T62L-201-A	—	Handle Adapter
T56L-400-A	4851-A	Puller
T57L-500-A	—	Bench Mounted Holding Fixture
T00L-1175-AB	1175-AB	Grease Seal Remover (Head Only)
T50T-100-A and T00L-1175-AB	1175-AE	Seal Remover
T60K-1177-B	1177-B	Rear Wheel Bearing Oil Seal
T60K-1225-A or T00L-1225-C	—	Axle Shaft Bearing Remover and Replacer
T00L-1225-B	—	Axle Shaft Bearing Remover
T60K-4067-A	4067-E	Axle Shaft Bearing Replacer
T00L-4209-C	4209-C	Differential Bearing Adjuster Nut Wrench
T00L-4221-AL	4221-AL	Pinion Tension Scale with T00L-4209-C12 Socket
T57L-4221-A	4222-K	Differential Bearing Cone Remover
T00L-4222-H	4222-H	Pilot (Use with T00L-4221-C or T00L-4851-A)
T60K-4234-A	4235-D	Differential Bearing Cone Replacer
T57L-4614-A	4614	Differential Bearing Cone Replacer
T00L-4615-J	4615-J	Rear Axle Shaft Assembly Remover Adapter
T60K-4616-A	4615-HF 4625-HR 4615-D	Drive Pinion and Drive Pinion Retainer Assembly Support
T57L-4616-A	—	Drive Pinion Front Bearing Cup Remover
T57L-4616-A2	—	Pinion Bearing Cup Replacer
T55P-4616-A2	—	Pinion Front Bearing Cup Remover
T00L-4621-K	4621-K	Pinion Front Bearing Cup Replacer
T62F-4621-A	—	Pinion Rear Bearing Cup Replacer
T62F-4625-A	4625-AC-1 & 2	Drive Pinion Rear Bearing Cone Remover
T55P-4676-A	4676-G	Pinion Bearing Cone Replacer
T62F-4676-A	4676-H	Drive Pinion Pilot Bearing
T53T-4851-A	4851-A	Remove and Replacer
T57L-4851-A	4858-D	Drive Pinion Oil Seal Replacer
T00L-4858-E	4851-K 4858-E	Drive Pinion Oil Seal Replacer
T59L-4204-A	44211 and 44211-A	Flange (Universal Joint) Axle End Remover
T65K-4204-A	—	Universal Joint Flange Holder
—	—	Companion Flange and Pinion Bearing Replacer
—	—	Locking Differential Torque Check
—	—	Locking Differential Torque Check Adapter

REAR AXLES WITH LOCKING DIFFERENTIAL

Torque Check	Integral Carrier Type Axles	Removable Carrier Type Axles
Minimum torque required to turn axle shaft and side gear with one wheel on the ground	50 ft-lbs	75 ft-lbs
Bench Check After Assembly	With New Clutch Plates	100-125 ft-lbs
	With Original Clutch Plates	155-195 ft-lbs
—	50 ft-lbs Minimum	75 ft-lbs Minimum

DRIVE PINION ADJUSTING SHIM THICKNESS CHANGES (Inch)

New Pinion Marking	Old Pinion Marking								
	-4	-3	-2	-1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003
0	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004
-1	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005
-2	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006
-3	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007
-4	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007	-0.008

DRIVE SHAFT AND CLUTCH

GROUP 5

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DRIVE SHAFT **PAGE 5-1**

PART 5-2
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PART 5-1 DRIVE SHAFT

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2 Description and Operation 5-1		Installation 5-2	
3 Replacement 5-2			

1 TROUBLE DIAGNOSIS

DRIVE SHAFT TROUBLE DIAGNOSIS AND POSSIBLE CAUSES

DRIVE SHAFT VIBRATION	Undercoating or other foreign material on shaft. Universal joint U-bolts loose. Universal joints worn, or lack of lubricant. Drive shaft mis-aligned (drive line angle).	Drive shaft and universal joints 180° out of phase. Broken rear spring center bolt. Broken rear spring. Rear springs not matched (Sagged to one side). Drive shaft damaged (bent) or out of balance (missing balance weights).
U-JOINT NOISE	Universal joint U-bolts loose. Lack of lubrication.	Worn U-joints. Worn needle bearings

2 DESCRIPTION AND OPERATION

The drive shaft is the means of transferring power from the engine, through the transmission, to the differential in the rear axle, and then to the rear wheels. The drive shaft incorporates two universal joints and a slip yoke. The universal joints (Fig. 1) are provided with a threaded plug which can be removed for lubrication when necessary. The splines in the yoke and on the transmission output shaft permit the drive shaft to move forward and rearward as the axle moves up and down.

All drive shafts are balanced. If the car is to be undercoated, cover the drive shaft and universal joints to prevent application of the undercoating material.

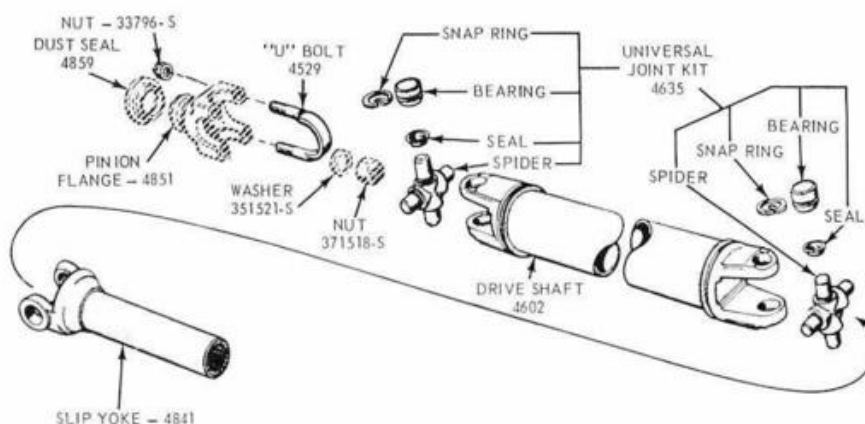


FIG. 1—Drive Shaft and Universal Joints Disassembled

3 REPLACEMENT

REMOVAL

1. To maintain drive shaft balance, mark the relationship of the rear drive shaft yoke and the drive pinion flange of the axle (if the yellow alignment marks are not visible) with the shaft so that they may be installed in their original positions.

2. Disconnect the rear U-joint from the axle drive pinion flange. Wrap tape around the loose bearing caps to prevent them from falling off the spider. Pull the drive shaft toward the rear of the car until the slip yoke clears the transmission expansion housing and the seal. Install the appropriate Extension Housing Seal Installation tool into the extension housing to prevent lubricant leakage.

3. Place the drive shaft in a vise being careful not to damage it.

4. Remove the snap rings that retain the bearings in the slip yoke and in the drive shaft.

5. Position the tool shown in Fig. 2 on the shaft and press the bear-

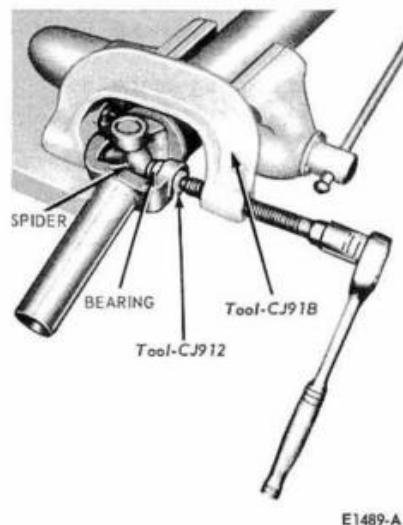


FIG. 2—Removing Universal Joint Bearing

ing out of the slip yoke. If the bearing cannot be pressed all the way out of the yoke, remove it with vise grip or channel lock pliers.

6. Reposition the tool to press on the spider to remove the bearing from the opposite side of the yoke.

7. Remove the yoke from the spider.

8. Remove the bearings and spider

from the drive shaft in the same manner.

9. Clean all foreign matter from the yoke area at each end of the drive shaft.

INSTALLATION

1. Start a new bearing into the yoke at the rear of the drive shaft.

2. Position the spider in the rear yoke and press the bearing $\frac{1}{4}$ inch below the surface (Fig. 3).

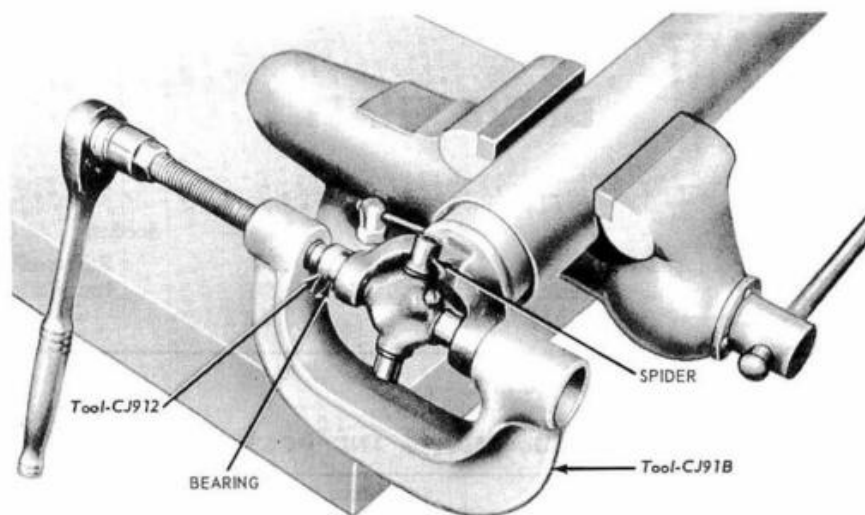


FIG. 3—Installing Universal Joint Bearing

3. Remove the tool and install a new snap ring.

4. Start a new bearing into the opposite side of the yoke.

5. Install the tool and press on the bearing until the opposite bearing contacts the snap ring.

Remove the tool and install a new snap ring. It may be necessary to grind the surface of the snap ring to permit easier entry.

7. Reposition the drive shaft and install the new spider and two new bearings in the same manner as the rear yoke.

8. Position the slip yoke on the spider and install two new bearings and snap rings.

9. Check the joint for freedom of movement. If a bind has resulted from misalignment during the foregoing procedures, a sharp rap on the yokes with a brass hammer will seat the bearing needles and usually provide freedom of movement. Care must be taken to support the shaft end during this operation, as well as

preventing blows to the bearings themselves. Do not install the drive shaft unless the universal joints are free of bind.

10. If either the rubber seal on the output shaft or the seal and integral boot in the end of the transmission extension housing is damaged in any manner, replace the seal or seals as required. Also, if the lugs on the axle pinion flange are shaved or distorted so that the bearings

slide, replace the flange.

11. Lubricate the yoke spline with B8A-19589-A lubricant. This spline is sealed so that the transmission fluid does not "wash" away the spline lubricant (Fig. 4). Remove the tool from the extension housing. Install the yoke on the transmission output shaft.

Install the driveshaft so that the index marks or the yellow mark (if visible) on the yoke is in line with the yellow mark on the axle pinion flange. This prevents vibration which occurs when the balance of the shaft and balance of the axle pinion flange become additive instead of neutralizing. If a vibration exists, the drive shaft should be disconnected from the axle, rotated 180° and reinstalled.

12. Install the U-bolts and nuts that attach the U-joint to the drive pinion flange. Torque the U-bolt nuts to 12-15 ft.-lbs. (7-10 ft.-lbs. on a Falcon and Mustang equipped with a 6-cylinder engine and standard transmission).

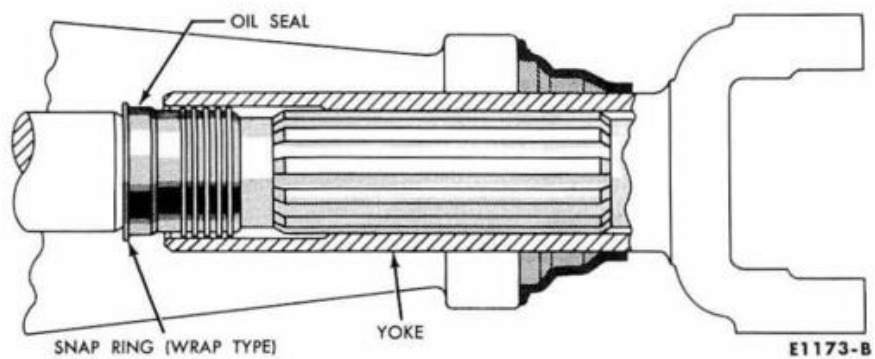


FIG. 4—Output Shaft Spline Seal

PART 5-2

GENERAL CLUTCH SERVICE

Section	Page	Section	Page
1 Diagnosis and Testing	5-4	3 Cleaning and Inspection	5-7
2 Flywheel Housing Alignment	5-5	Release Bearing	5-7
Inspection	5-5	Pressure Plate and Cover	5-8
Correction	5-5	Clutch Disc	5-8
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1 DIAGNOSIS AND TESTING

DIAGNOSIS GUIDE—CLUTCH

TROUBLE SYMPTOMS	POSSIBLE CAUSES	CORRECTION
LOSS OF OR EXCESSIVE CLUTCH PEDAL FREE PLAY AND/OR INADEQUATE RESERVE	1. Clutch linkage out of adjustment. 2. Worn clutch disc. 3. Bent or cracked equalizer bar.	1. Adjust clutch linkage. 2-3. Replace worn or defective parts.
CLUTCH PEDAL HANG UP OR EXCESSIVE CLUTCH PEDAL EFFORT	CLUTCH 1. Assist spring not positioned properly. 2. Binding at pedal support bracket, or equalizer rod at firewall. RELEASE BEARING 1. Lack of lube on transmission input shaft bearing retainer.	1. Install correctly. 2. Lubricate with engine oil or replace support bracket bushing if defective. 1. Clean and lubricate retainer with thin coat of Lithium base grease (no Polyethylene).
CLUTCH NOISY WHEN PEDAL FREE TRAVEL IS TAKEN OUT, ENGINE RUNNING	1. Release bearing failure due to: A. improper travel adjustment. B. bearing cocked on hub. C. release lever out of plane. D. flywheel housing misalignment. E. excessive crankshaft end play.	1. A. Adjust travel to specification. B. Install correctly. C. Check fulcrum plate and return spring. Install correctly. D. Align to specification. E. Repair to specifications.
CLUTCH NOISY WITH ENGINE OFF	1. Insufficient lubricant on assist spring seats. 2. Clutch assist spring clunking. 3. Binding at pedal support bracket or equalizer rod at fire wall.	1. Lubricate linkage and/or spring seats. 2. Lubricate spring ends. 3. Lubricate with engine oil or replace support bracket bushing if defective.
CLUTCH SLIPS OR CHATTERS	1. Incorrect pedal free travel. 2. Worn or contaminated clutch lining. 3. Grease or oil on clutch facings from: A. release bearing B. engine C. release lever D. pilot bearing E. transmission	1. Adjust travel to specification. 2-3. Replace defective parts. (If grease or oil is causing the clutch to slip, replace the disc. Remove the grease or oil from the pressure plate and re-use if it is not burned or scored).

DIAGNOSIS GUIDE—CLUTCH (Continued)

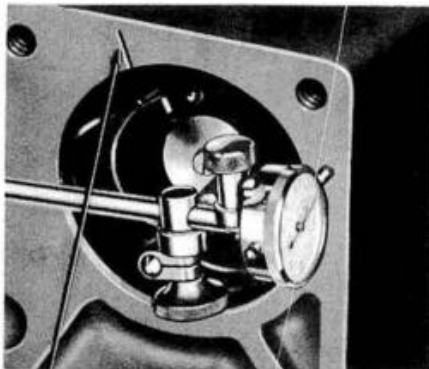
TROUBLE SYMPTOMS	POSSIBLE CAUSES	CORRECTION
THUD	1. Excessive engine crankshaft end play.	1. Repair to specification.
CLUTCH PEDAL SCRUBBING —ENGINE OFF	1. Pedal push rod rubbing on firewall felt and insulator. 2. Pedal shaft binding at support bracket. 3. Lack of lube on transmission input shaft bearing retainer.	1. Lubricate and check clearance. 2. Lubricate with engine oil or replace support bracket bushing if defective. 3. Clean and lubricate retainer with a thin coat of Lithium base grease (no Polyethylene).

2 FLYWHEEL HOUSING ALIGNMENT

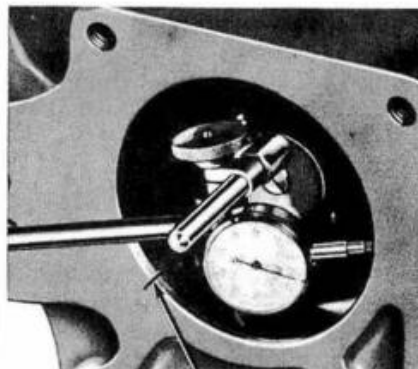
Alignment of the flywheel housing bore and rear face with the engine should be checked as a possible cause of any of the following troubles: excessive transmission gear wear, transmission jumping out of gear, especially third gear, drive line vibration, excessive pilot bushing wear, noisy release bearing, or excessive clutch spin time.

INSPECTION

1. With the clutch release bearing removed, install the indicator pilot tool shown in Fig. 1.



MAXIMUM FACE RUN OUT + 0.009 INCH



MAXIMUM NEGATIVE BORE RUN OUT 0.015 INCH C1017-C

FIG. 1—Flywheel Housing Alignment Check

2. Clean the faces of the flywheel housing bolt bosses, and remove all burrs, nicks, and paint from the mounting face of the housing.

3. Install the dial indicator on the pilot and adjust the holder so the button will contact a circumference just inside of the transmission mounting holes (Fig. 1).

4. Push the flywheel forward to remove crankshaft end play. Set the dial indicator face to read zero.

5. Remove the spark plugs to alleviate compression.

6. While forcing the flywheel forward, rotate the crankshaft through one revolution and note the point of maximum runout. Mark runout on the face of housing as detailed in Steps 1 and 2 of the Dia-L-Igner instructions (Fig. 2).

7. Position the dial indicator to check bore alignment (Fig. 1). The

the crankshaft and the housing.

10. Select the Dia-L-Igner pilot (Fig. 3) which will fit snugly in the bore of the flywheel housing.

11. Press the pilot into place on the locator on the back of the dial.

12. Position the Dia-L-Igner on the face of the housing (Fig. 4) with the pilot in the bore.

13. Rotate the face runout arrow to the positive face runout mark on the housing.

14. Without moving the face runout arrow, route arrow A until it is at the negative bore reading.

15. Slide arrow A to register the amount of bore runout on the—.010—line of the white scale. Use the scale No. to coincide with the pilot being used.

16. Rotate arrow B until it points in the direction of the face runout arrow and its centerline is parallel to the centerline of the face runout arrow.

17. Determine the amount of the face runout on the B arrow scale.

18. The value of the circular line beneath the amount of face runout will be the desired reading. If the reading is in excess of 0.014 inch the housing alignment is unacceptable.

19. Remove the Dia-L-Igner gauge from the flywheel housing.

20. Install the spark plugs and connect the wires.

CORRECTION

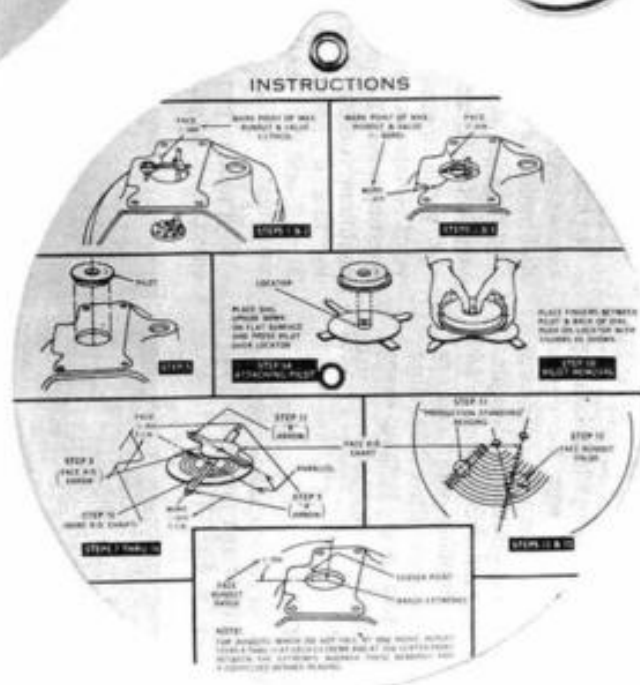
ENGINE IN CAR

Since any change in face alignment will change bore alignment, it

bore must be clean and free of burrs, nicks and paint.

8. Pull the crankshaft through one revolution. Note the indicator reading and mark the maximum point of runout on the face of the housing as detailed in Steps 3 and 4 of the Dia-L-Igner instructions (Fig. 2).

9. Remove the dial indicator from



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FIG. 2—Dia-Igner Gauge

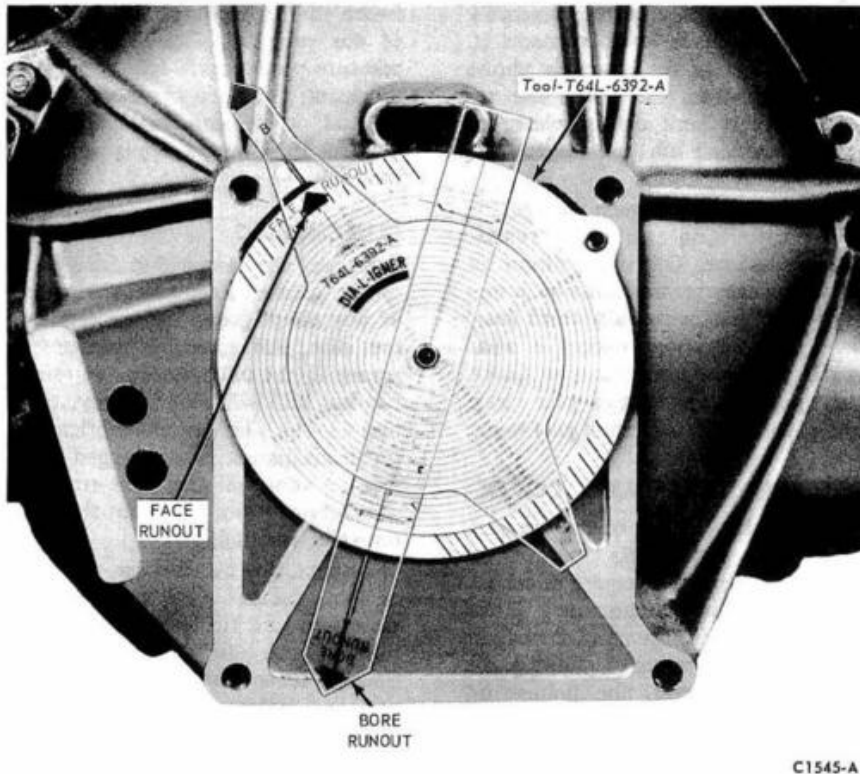


FIG. 3—Dia-L-Igner Gauge Installed

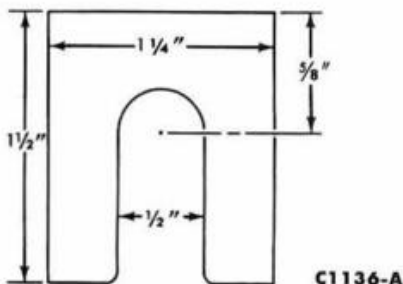


FIG. 4—Fabricated Flywheel Housing Shim

may be possible to correct bore alignment by changing face alignment. Face alignment can be changed by shimming between the flywheel housing and engine. Fig. 4 shows the type of shim which can be fabricated.

Not more than 0.010 inch thickness shims may be used between the

flywheel housing and engine. If a 0.010-inch shim will not bring face and bore alignment within limits, replace the flywheel housing.

The shim required is one half the maximum (—) indicator reading, and should be located at the point of maximum minus (—) indicator reading.

If both the bore and face alignment are out of limits, shim between the flywheel housing and engine to bring face alignment within limits. Check the bore alignment.

If the bore alignment is out of limits and the face alignment is within limits, shim the flywheel housing to the limit of face misalignment and check the bore alignment. If it is not within limits, replace the housing.

ENGINE OUT OF CAR

The same procedure to correct

alignment may be used with the engine out of the car or in the car, up to the point of replacing the flywheel housing. If the bore alignment cannot be brought within limits by shimming, follow this procedure:

1. Remove the flywheel housing from the engine and remove the dowel pins. Install the flywheel housing and tighten the attaching bolts.

2. Install the dial indicator (Fig. 1). Check the face alignment, and shim as required to bring face alignment within limits.

3. Position the indicator to check the bore alignment. If the bore alignment is not within limits, reduce the tension on the flywheel housing attaching bolts so that the housing can be moved by striking it with a lead hammer or a block of wood and a steel hammer.

4. The lateral alignment should be brought within limits so that an indicator reading is within limits between the 9 o'clock and 3 o'clock positions on the bore circle. When the lateral alignment is within limits, the housing usually can be moved straight up or down without disturbing the lateral alignment. When alignment is within limits, torque the housing bolts and recheck bore alignment.

5. If the flywheel housing cannot be moved enough to bring the alignment within limits, mark the holes restricting movement, and then remove the housing and drill the marked bolt holes $\frac{1}{32}$ inch larger.

6. When the flywheel housing bore alignment is within limits and the attaching bolts are at normal torque, hand ream the dowel pin holes $\frac{1}{32}$ inch larger. Use a straight reamer and ream from the flywheel housing side. Oversize dowel pins can be made from drill rod stock.

7. Remove the flywheel housing and then install the oversize dowel pins in the cylinder block. Complete the assembly in the usual way.

8. Recheck the flywheel housing with the Dia-L-Igner gauge to make sure that the housing is within the specified limits.

3 CLEANING AND INSPECTION

RELEASE BEARING

Wipe all oil and dirt off the release bearing. The bearing is pre-lubricated and should not be cleaned with solvent.

Inspect the bearing retainer for

loose spring clips and rivets.

Inspect the release bearing assembly for burrs which may cause the assembly to drag on the transmission bearing retainer. Any such burrs should be cleaned up with fine crocus

cloth. If burrs are found, inspect the transmission input shaft bearing retainer for evidence of scoring. Any scoring should be polished out with crocus cloth. Coat bearing retainer with a thin film of lithium-base grease

C3VY-19586-A. Prior to release bearing installation, apply a light film of Lubriplate on both sides of the release lever fork where it contacts the release bearing hub and retaining springs. Apply a light film of grease (C3VY-19586-A) to the release bearing surface that contacts the pressure plate fingers. Care must be exercised when applying lubricants to the release bearing, release bearing hub and the release lever fork to avoid excessive grease from contaminating the clutch disc.

Hold the bearing inner race and rotate the outer race while applying pressure to it. If the bearing rotation is rough or noisy, replace the bearing.

Most release bearing failures are caused by improper clutch pedal adjustments. If the clutch linkage does not have enough free travel, the release bearing will constantly touch the release fingers and will spin whenever the engine is running.

When installing a release bearing, use the tool shown in Fig. 5.

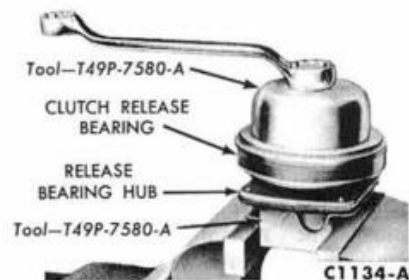


FIG. 5—Installing Clutch Release Bearing on Hub

Release bearing failure can be caused by the release lever contact points being out of plane. Check the

wear on the release bearing assembly where the release lever contacts it.

If one side of the assembly shows more wear than the other, the release lever is bent out of plane, or is not centering on the bracket on the flywheel housing.

Misalignment between the engine and transmission can cause release bearing failure. Other symptoms of misalignment are: transmission jumping out of gear, especially third gear, drive line vibration; excessive wear in the pilot bushing, excessive clutch disc spin time resulting in gear clash, and excessive transmission gear wear.

PRESSURE PLATE AND COVER

Inspect the surface of the pressure plate for burn marks, scores, or ridges. Generally, pressure plate resurfacing is not recommended. However, minor burn marks, scores, or ridges may be removed. During the resurfacing process, the flatness of the pressure plate must be maintained. If the pressure plate is badly heat-checked or deeply scored, replace the pressure plate and cover assembly. Clean the pressure plate and flywheel surfaces with a suitable solvent to be sure the surfaces are free from any oil film. **Do not use cleaners with petroleum base, and do not immerse the pressure plate in the solvent.**

Place the plate on the floor, being careful not to score or scratch the surface. Force each individual finger down, then release it quickly. If the finger does not return quickly, a binding condition is indicated, and the pressure plate should be replaced.

The pressure plate should be lubricated with a lithium-base grease be-

tween the driving lugs and the edges of the pressure plate. Depress the pressure plate fingers fully, apply the lubricant, and then move the fingers up and down until the lubricant is worked in. **Do not apply excessive lubricant.**

CLUTCH DISC

Inspect the clutch disc facings for oil or grease. **Eliminate the source of any oil or grease before replacing the disc.** An excessive amount of grease in the pilot housing or release bearing hub will find its way to the disc facings. Too much lubricant in the transmission or a plugged transmission vent will force the transmission lubricant out the input shaft and onto the disc facings.

Inspect the clutch disc for worn or loose facings. Check the disc for distortion and for loose rivets at the hub. Check for broken springs. **Springs loose enough to rattle will not cause noise when the car is operating.** Replace the disc assembly if any of these defects are present. **Be especially careful when installing a new disc to avoid dropping it or contaminating it with oil or grease.**

PILOT BUSHING

Check the fit of the clutch pilot bushing in the bore of the crankshaft.

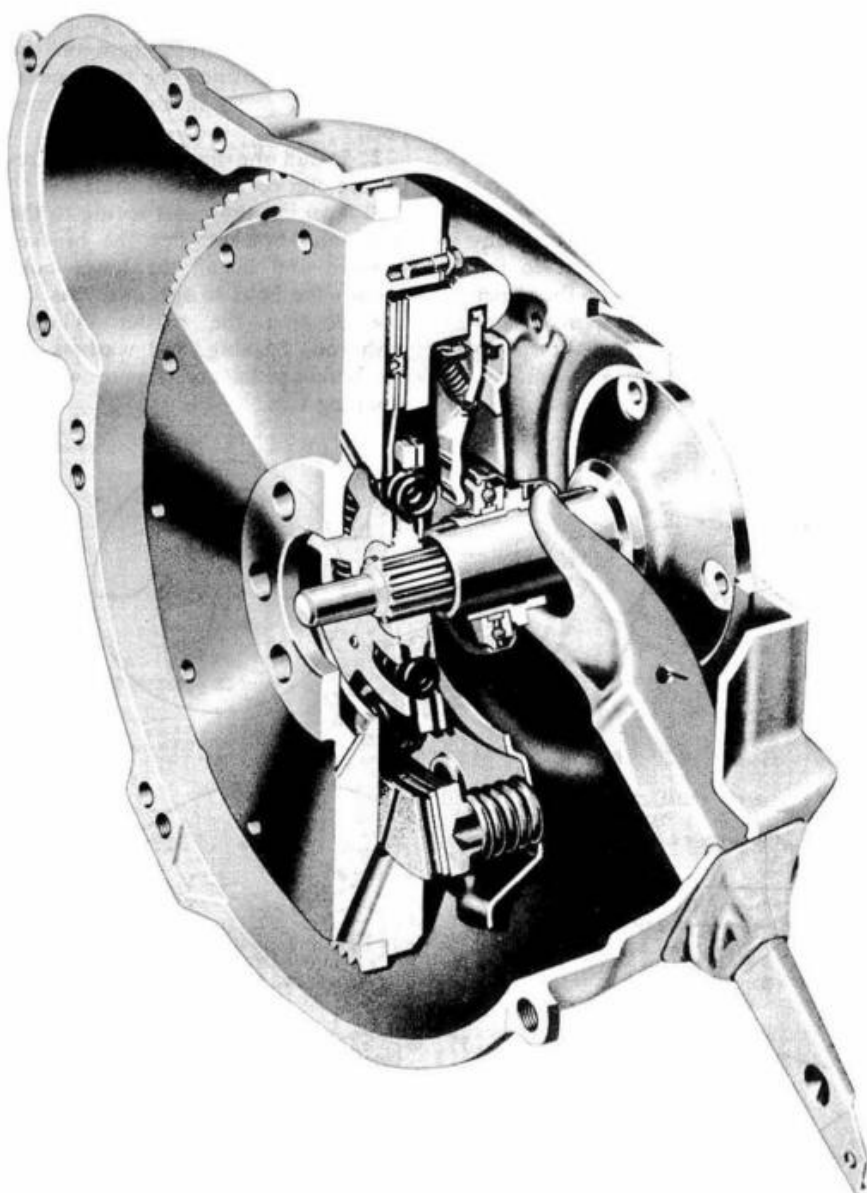
The bushing is pressed into the crankshaft and should not be loose. Inspect the inner surface of the bushing for wear or a bell-mouthed condition. If the bushing is worn or damaged, replace the bushing with a new service bearing. Refer to the applicable engine for the replacement procedure.

PART

5-3 CLUTCH

Section	Page	Section	Page
1 Description and Operation	5-9	Equalizer Bar and/or Bushing	
2 In-Car Adjustments and Repairs	5-10	Replacement	5-11
Clutch Pedal Adjustment	5-10	3 Clutch Removal and Installation	5-12
Clutch Pedal and/or Bushing Replacement ...	5-10		

1 DESCRIPTION AND OPERATION



DESCRIPTION

The clutch is of the centrifugal single dry disc type and consists of the clutch disc, pressure plate and the clutch release bearing (Fig. 1).

OPERATION

The clutch is actuated by a clutch pedal and a series of mechanical linkage.

When the clutch pedal is in the engaged position, the clutch disc facings are clamped between the friction surface of the engine flywheel and the face of the clutch pressure plate, thereby connecting engine power to the transmission. Depressing the clutch pedal actuates the clutch release shaft fork which moves the clutch release bearing against the clutch fingers. This, in turn, moves the pressure plate away from the clutch disc. Since the disc is splined to the transmission input shaft, the clutch disc and transmission input shaft will stop when the clutch is disengaged, thereby disconnecting engine power from the transmission.

C1161-B

FIG. 1 —Clutch Assembly—Typical

2 IN-CAR ADJUSTMENTS AND REPAIRS

CLUTCH PEDAL ADJUSTMENT

Adjust the clutch pedal free travel whenever the clutch does not disengage properly, or when new clutch parts are installed. **Improper adjustment of the clutch pedal free travel is one of the most frequent causes of clutch failure and can be a contributing factor in some transmission failures.**

FREE TRAVEL

1. Disconnect the clutch return spring from the release lever.

2. Loosen the release lever rod lock nut (Figs. 2 and 3).

3. Move the clutch release lever rearward until the release bearing lightly contacts the clutch pressure plate release fingers.

4. Adjust the adapter length until the adapter seats in the release lever pocket.

5. Insert a feeler gauge (0.128 thick for 8 cyl.; 0.178 thick for 6 cyl.) against the back face of the rod adapter. Then, tighten the lock nut (finger tight) against the gauge.

6. Remove the feeler gauge. Hold the lock nut in position and tighten the adapter against the nut. Torque the adapter to 10-15 ft-lbs.

7. Install the clutch return spring.

8. Check the free travel at the pedal for conformance to specification. Readjust if necessary.

9. As a final check, measure the pedal free travel with the transmission in neutral and the engine running at about 3000 rpm. If the free travel at this speed is not a minimum of ½ inch, readjust the clutch pedal free travel. Otherwise, the release fingers may contact the release bearing continuously, resulting in premature bearing and clutch failure. **Free travel must be exactly to specification.**

CLUTCH PEDAL AND/OR BUSHING REPLACEMENT

REMOVAL (COMET, FALCON, FAIRLANE)

1. Remove the retaining clip (Fig. 2) that secures the equalizer rod to the clutch pedal. Disconnect the rod from the pedal.

2. Remove the lower bolt retaining the assist spring bracket to the pedal support. Then, loosen the upper bracket retaining bolt (approximately 4 turns) and disconnect the spring from the clutch pedal and bracket. Do not lose the spring inserts.

3. Disconnect the brake pedal push rod from the brake pedal.

4. Remove the bolt that secures the left air vent control cable bracket to the instrument panel. Position the control cable to one side.

5. Remove the retaining clip and flat washer from the clutch pedal shaft. Then, remove the shaft, bushing, clutch pedal and brake pedal from the support.

6. Remove the bushings from the pedal shaft, and transfer the pedal pad.

INSTALLATION (COMET, FALCON, FAIRLANE)

1. Lubricate the clutch pedal shaft bushings and position them on the shaft. Then, position the brake pedal and clutch pedal in the pedal support.

2. Install the flat washer and retaining clip on the pedal shaft.

3. Position the assist spring to the pedal and bracket. Pry the bracket forward and install the lower bolt. Torque the bolts to specifications.

4. Position the master cylinder push rod, bushing, and washers on the brake pedal and secure with a retaining clip.

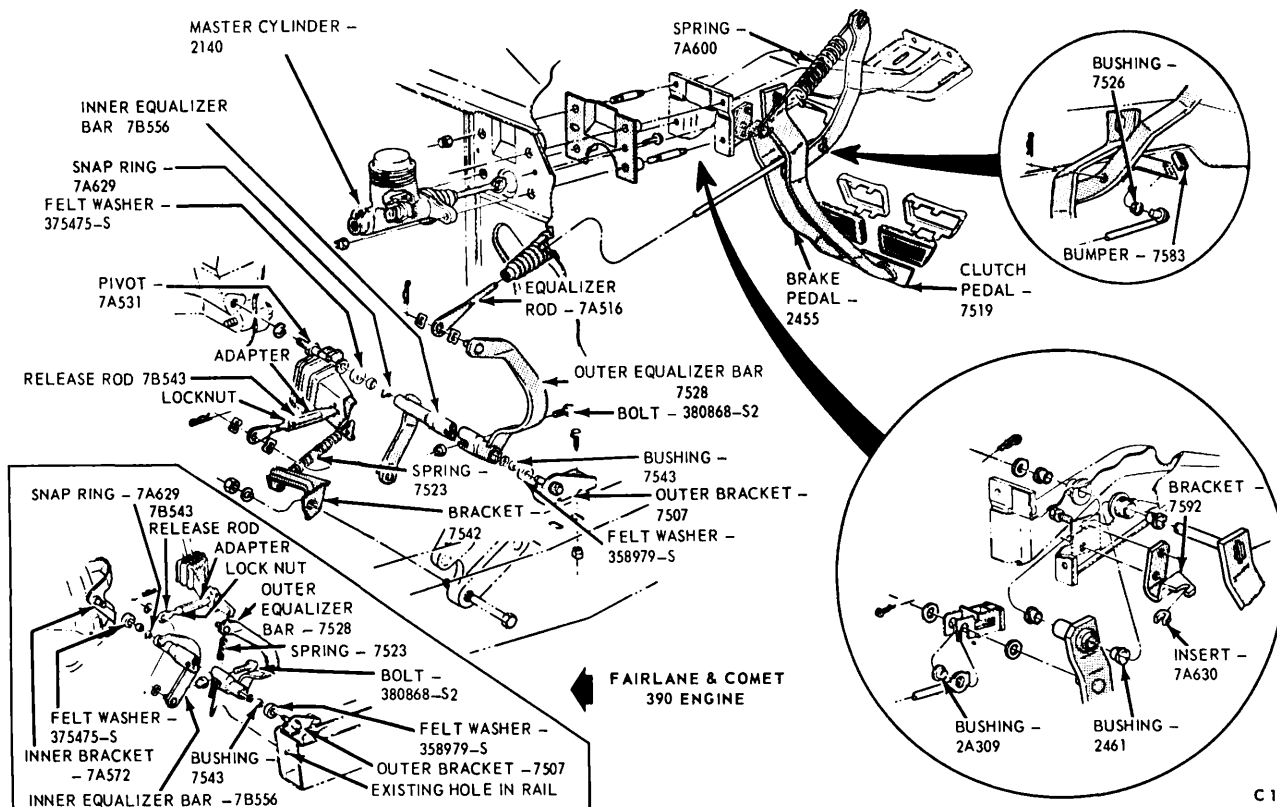
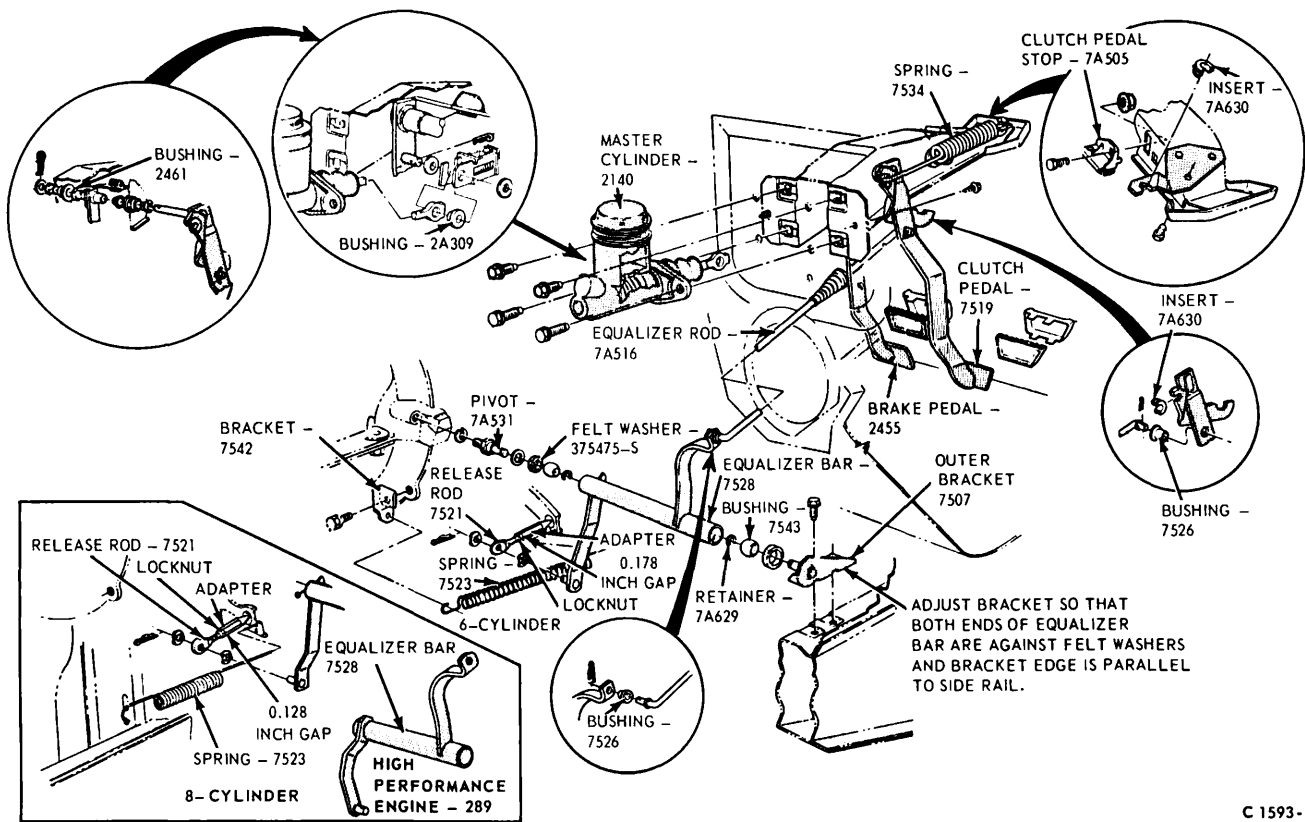


FIG. 2—Clutch and Linkage Disassembled



C 1593 - A

FIG. 3—Mustang Clutch and Linkage Disassembled

5. Connect the equalizer rod to the clutch pedal and secure it in place with a retaining clip.

6. Position the air vent control cable bracket to the instrument panel and secure with the attaching bolt.

7. Adjust the clutch pedal free travel.

REMOVAL (MUSTANG)

1. Remove the retaining clip (Fig. 3) that secures the equalizer rod to the clutch pedal.

2. Remove the attaching nut from the clutch pedal stop, then remove the stop.

3. Pull the clutch pedal upward as far as possible, then disconnect the spring from the pedal and the bracket. Do not lose the two inserts.

4. Remove the retaining clip that secures the master cylinder push rod to the brake pedal. Lift the rod and bushings off the brake pedal.

5. Working from the engine compartment, remove the two nuts and flat washers that secure the parking brake mounting bracket to the cowl panel.

6. Remove the two bolts that secure the handbrake and the air vent control cable bracket to the instrument panel. Position these controls to one side.

7. Remove the three bolts that secure the left air vent to the plenum chamber. Remove the air vent and control cable.

8. Remove the retaining clip and flat washer from the right end of the clutch pedal shaft.

9. While supporting the brake pedal, slide the clutch pedal from the mounting bracket.

10. Remove the delrin bushings from the pedals.

INSTALLATION (MUSTANG)

1. Lubricate the delrin bushings and position them in place.

2. Hold the brake pedal in place, then slide the clutch pedal shaft through the support and the brake pedal. Secure the clutch pedal with a flat washer and the retaining clip.

3. Position the master cylinder push rod and delrin bushings on the brake pedal and secure them with a retaining clip.

4. Pull the clutch pedal all the way up, then install the delrin insulators and the spring.

5. Install the clutch pedal stop.

6. Connect the equalizer rod to the clutch pedal and secure it in place with a retaining clip.

7. Hold the air vent duct in place on the plenum chamber and secure

it with the three attaching bolts.

8. Hold the hand brake control and the air vent control cable bracket in place on the lower end of the instrument panel and secure them with the two attaching bolts.

9. Working from the engine compartment, secure the parking brake mounting bracket to the cowl panel with two flat washers and nuts.

10. Check, and if necessary, position the clutch pedal release rod in the clutch release lever.

11. Adjust the clutch pedal free travel as required.

EQUALIZER BAR AND/OR BUSHING REPLACEMENT

COMET, FALCON, FAIRLANE (EXCEPT COMET AND FAIRLANE WITH 390 V-8)

1. Disconnect the clutch pedal equalizer rod at the equalizer bar (Fig. 2).

2. Raise the car and disconnect the return spring at the release lever. Disconnect the release lever rod from the equalizer lever.

3. Remove the equalizer bar center bolt.

4. Separate the equalizer bar and remove both sections from the car.

5. Remove the equalizer bar outer bracket and bushing assembly.

6. Remove the snap ring, bushing, felt washer, and flat washer from the outer bracket and inner pivot.

7. Position a flat washer, felt washer, and bushing on each pivot and secure with the snap ring.

8. Install the outer bracket and bushing assembly to the frame (Fig. 2). Torque the bracket attaching bolts to specifications.

9. Position the outer section of the equalizer bar on the outer bracket pivot.

10. Connect both sections of the equalizer bar and position it on the inner pivot.

11. Install the equalizer bar center bolt and torque to specifications. Make sure that both ends of the equalizer bar are against the felt washers.

12. Connect the release rod and the release lever return spring.

13. Adjust the clutch pedal free travel.

14. Lower the car. Connect the clutch pedal equalizer rod to the equalizer bar and secure with the retaining clip.

15. Check the free travel at the pedal for conformance to specification. Readjust if necessary.

COMET AND FAIRLANE— 390 V-8

1. Disconnect the clutch pedal equalizer rod at the equalizer bar (Fig. 2).

2. Raise the car and disconnect the

return spring at the release lever. Disconnect the release lever rod from the equalizer lever.

3. Remove the equalizer bar center bolt.

4. Remove the bolts retaining the equalizer bar inner bracket to the flywheel housing and remove the bracket and bushing assembly.

5. Separate the equalizer bar and remove both sections from the car.

6. Remove the equalizer bar outer bracket and bushing assembly.

7. Remove the snap ring, bushing, and felt washer from each bracket assembly.

8. Position a felt washer, and bushing on each bracket assembly and secure with the snap ring.

9. Install the outer bracket and bushing assembly to the frame (Fig. 2.) Torque the bracket attaching bolts to specifications.

10. Position the outer section of the equalizer bar on the outer bracket pivot.

11. Connect the two sections of the equalizer bar. Insert the inner bracket pivot into the equalizer bar and install the assembly to the flywheel housing. Torque the attaching bolts to specifications.

12. Install the equalizer bar center bolt and torque to specifications. Make sure that both ends of the equalizer bar are against the felt washers.

13. Connect the release rod and the release lever return spring.

14. Adjust the clutch pedal free travel.

15. Lower the car. Connect the clutch pedal equalizer rod to the equalizer bar and secure with the retaining clip.

16. Check the free travel at the pedal for conformance to specifications. Readjust if necessary.

MUSTANG

1. Disconnect the clutch pedal equalizer rod at the equalizer bar (Fig. 3).

2. Raise the car and disconnect the release lever return spring at the lever.

3. Remove the equalizer bar outer bracket and bushing assembly.

4. Remove the release rod from the equalizer bar, and then remove the equalizer bar. Remove the bushing and washers from the inner mounting stud.

5. Position the equalizer bar, washers, inner bushing, and retainers on the inner stud.

6. After positioning the outer bushing, install the outer bracket (with the equalizer bar in place).

7. Connect the release rod and the release lever return spring.

8. Lower the car. Connect the clutch pedal equalizer rod to the equalizer bar and secure with the retaining pin.

9. Adjust the clutch pedal free travel as required.

3 CLUTCH REMOVAL AND INSTALLATION

REMOVAL

1. Raise the car on a hoist.

2. Disconnect the drive shaft from the rear U-joint flange. Then slide the drive shaft off the transmission output shaft. Insert appropriate Extension Housing Seal Installation tool over the output shaft and into the extension housing oil seal.

3. Disconnect the speedometer cable from the extension housing.

4. Remove the back-up lamp switch (if so equipped) from the shift linkage control bracket.

5. Disconnect the gear shift rods from the transmission levers. If the car is equipped with a 4-speed transmission, remove the bolts that secure the shift control bracket to the extension housing.

6. Support the engine with a transmission jack and remove the two nuts

securing the transmission rear support to the crossmember.

7. Raise the rear of the engine with the transmission jack. Remove the two nuts, washers, and bolts securing the crossmember to the frame supports. Remove the crossmember.

8. Remove the bolts that attach the transmission to the flywheel housing.

9. Move the transmission rearward until the input shaft clears the flywheel housing, then remove the transmission.

10. Disconnect the clutch release lever return spring from the release lever.

11. Remove the starter cable. Remove the starter motor from the flywheel housing.

12. Remove the bolts that secure the engine rear plate to the front

lower part of the flywheel housing.

13. Remove the bolts that attach the flywheel housing to the cylinder block and remove the housing and the release lever as a unit.

14. Loosen the six pressure plate cover attaching bolts evenly to release the spring tension. **If the same pressure plate and cover is to be installed after the clutch is overhauled, mark the cover and flywheel so that the pressure plate can be installed in the same position, to maintain a balanced assembly.**

15. Remove the six attaching bolts while holding the pressure plate cover then, remove the pressure plate and clutch disc.

INSTALLATION

1. Hold the clutch disc, and pressure plate and cover assembly in po-

sition on the flywheel. Start the cover attaching bolts to hold the pieces in place but do not tighten them. **Avoid dropping the parts or contaminating them with oil or grease.**

2. Align the clutch disc with a clutch arbor as shown in Fig. 4 and

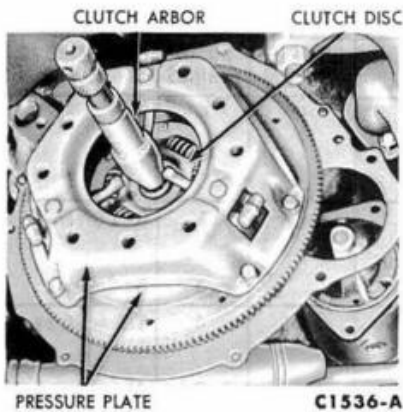


FIG. 4—Installing Clutch Disc

torque the six pressure plate cover attaching bolts evenly to specification. Then remove the tool.

3. Make certain that the release bearing and hub is properly installed on the release lever. Coat the bearing retainer inside diameter with a light film of lithium soap-type grease. **Do not lubricate the bearing hub.**

4. Make certain that the flywheel housing and the cylinder block mounting surfaces are clean. Position the flywheel housing on the cylinder block and install the attaching bolts. Torque the bolts to specifications.

5. Seat the clutch release rod in the release lever socket and install the release lever return spring.

6. Secure the engine rear plate to the front of the flywheel housing with the attaching bolts.

7. Install the starting motor and connect the cable.

8. The mounting surfaces of the transmission and the flywheel housing must be free of dirt, paint, and burrs. Install two guide pins in the flywheel housing lower mounting bolt holes. Move the transmission forward on the guide pins until it is positioned against the flywheel housing.

9. Install the two upper mounting bolts. Then, remove the guide pins and install the two lower mounting

bolts. Torque all bolts to specifications.

10. Raise the rear of the engine high enough to provide clearance for installing the crossmember. Install the two crossmember-to-frame support attaching bolts, washers, and nuts. Do not tighten at this time.

11. Align the bolts in the transmission rear support with the bolt holes in the crossmember, then lower the engine and remove the jack. Install the two transmission rear support-to-crossmember washers and nuts and torque to specifications. Tighten the crossmember-to-frame support nuts.

12. Connect the gear shift rods to the transmission levers. If the car is equipped with a 4-speed transmission, connect the shift control bracket to the extension housing. Adjust the shift linkage.

13. Install the back-up lamp switch (if so equipped) on the shift linkage control bracket.

14. Remove the tool from the transmission output shaft, and install the drive shaft.

15. Adjust the clutch pedal total travel and free play.