1966 FORD

Thunderbird

SHOP MANUAL

1966 Ford Thunderbird Shop Manual
EAN: 978-1-60371-016-9
ISBN: 1-60371-016-7

Forel Publishing Company, LLC
3999 Peregrine Ridge Ct.
Woodbridge, VA 22192
Email address: webmaster@ForelPublishing.com
Website: http://www.ForelPublishing.com

Note from the Editor

This product was created from the original Ford Motor Company's publication. Every effort has been made to use the original scanned images, however, due to the condition of the material; some pages have been modified to remove imperfections.

Disclaimer

Although every effort was made to ensure the accuracy of this book, no representations or warranties of any kind are made concerning the accuracy, completeness or suitability of the information, either expressed or implied. As a result, the information contained within this book should be used as general information only. The author and Forel Publishing Company, LLC shall have neither liability nor responsibility to any person or entity with respect to any loss or damage caused, or alleged to be caused, directly or indirectly by the information contained in this book. Further, the publisher and author are not engaged in rendering legal or other professional services. If legal, mechanical, electrical, or other expert assistance is required, the ...essional should be sought.

1966

THUNDERBIRD

SHOP MANUAL

GROUP INDEX

SPECIFICATIONS AND SPECIAL SERVICE TOOLS AT END OF EACH GROUP

SERVICE PUBLICATIONS

MICHIGAN

any - May 2000

FOREWORD

This shop manual provides the Service Technician with complete information for the proper servicing of the 1966 Thunderbird.

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.

Ford SERVICE PUBLICATIONS

VEHICLE IDENTIFICATION

GROUP 1

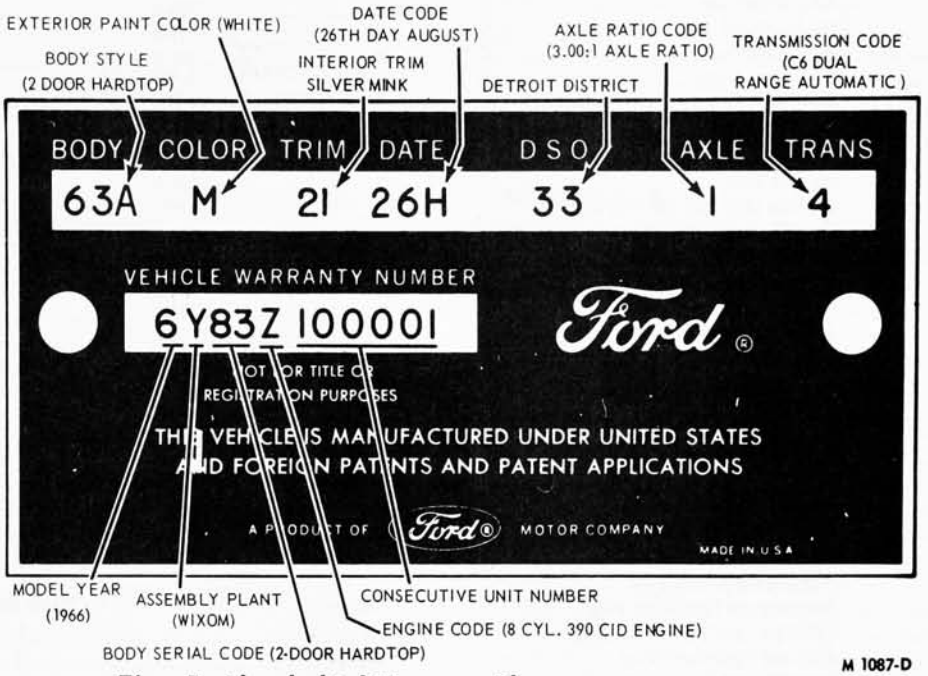
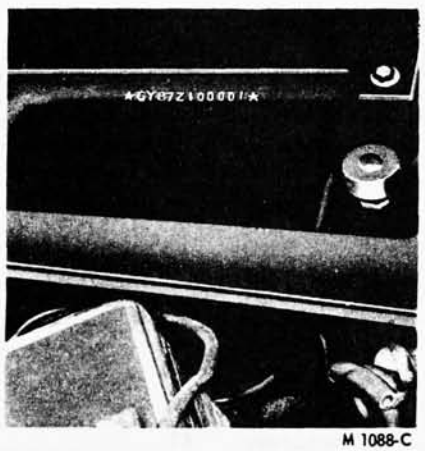


Fig. 1—Thunderbird Warranty Plate

Figure 1 illustrates a Thunderbird Warranty plate. The warranty plate is attached to the rear (lock) face of the left door.

The official Vehicle Identification Number for title and registration purposes is stamped on the hood support top surface to the right of the hood lock plate (Fig. 2). Do not use the Vehicle Warranty Number which appears on the warranty plate for title or registration purposes.



M 1088-C

Fig. 2—Vehicle Identification Number Location

VEHICLE DATA

e vehicle data appears in a line across the top of the warranty plate (Fig. 1). e Body Style. The following one The next code consisting of two he interior Trim. The Date Code 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 (Fig. 1). 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 Serial codes, Body Style codes and the body type.

Body Serial Code	Body Style Code	Body Type
83	63A	2-Door Hardtop (Conventional Roof)
81	63C	2-Door Hardtop (Blind Quarter Roof-Painted)
87	63D	2-Door Landau (Blind Quarter Roof-Vinyl)
85	76A	Convertible

INTERIOR TRIM CODES

Code	Trim Schemes
12	Dk. Blue Cloth and Dk. Blue Vinyl
16	Black Cloth and Black Vinyl
21	Silver Mink Vinyl
22	Dk. Blue Vinyl
23	Burgundy Vinyl
24	Emberglo Vinyl
25	Red Vinyl
26	Black Vinyl
27	Aqua Vinyl
28	Ivy Gold Vinyl
42	Dk. Blue Cloth and Dk. Blue Vinyl
46	Black Cloth and Black Vinyl
51	Silver Mink Vinyl
52	Dk. Blue Vinyl
53	Burgundy Vinyl
54	Emberglo Vinyl
55	Red Vinyl
56	Black Vinyl
57	Aqua Vinyl
58	Ivy Gold Vinyl
62	Dk. Blue Leather
65	Red Leather
66	Black Leather
1D	Parchment Cloth and Parchment Vinyl
4D	Parchment Cloth and Parchment Vinyl
B2	Blue and Parchment Vinyl
B3	Burgundy and Parchment Vinyl
B4	Emberglo and Parchment Vinyl
B6	Black and Parchment Vinyl
B7	Turquoise and Parchment Vinyl
B8	Gold and Parchment Vinyl
B9	Palomino and Parchment Vinyl
G1	Silver Mink and White Pearl Vinyl
G2	Blue and White Pearl Vinyl
G3	Burgundy and White Pearl Vinyl
G4	Emberglo and White Pearl Vinyl
G6	Black and White and White Pearl Vinyl
G7	Turquoise and White Pearl Vinyl
G8	Gold and White Pearl Vinyl
G9	Palomino and White Pearl Vinyl
K2	Blue and Parchment Vinyl
K3	Burgundy and Parchment Vinyl
K4	Emberglo and Parchment Vinyl
K6	Black and Parchment Vinyl
K7	Turquoise and Parchment Vinyl
K8	Gold and Parchment Vinyl
K9	Palomino and Parchment Vinyl
L2	Blue and Parchment Leather
L3	Burgundy and Parchment Leather
L4	Emberglo and Parchment Leather
L6	Black and Parchment Leather
L7	Turquoise and Parchment Leather
L8	Gold and Parchment Leather
L9	Palomino and Parchment Leather
P1	Silver Mink and White Pearl Vinyl
P2	Blue and White Pearl Vinyl
P3	Burgundy and White Pearl Vinyl
P4	Emberglo and White Pearl Vinyl
P6	Black and White and White Pearl Vinyl
P7	Turquoise and White Pearl Vinyl
P8	Gold and White Pearl Vinyl
P9	Palomino and White Pearl Vinyl

T ISSION CODE

pe

al Range Automatic

..... Cruise-O-Matic

EXTERIOR PAINT COLOR CODES

Code	M-32J Number	Color
A	1724-A	Black
B	1911-A	Lt. Beige Met.
E	1446-A	Med. Silver Mink Met.
F	1226-A	Lt. Blue
G	1905-A	Brite Blue Met.
H	1912-A	Lt. Beige
K	1903-A	Dk. Blue Met.
L	1917-A	Ivy Yellow
M	1619-A	White
N	921-A	Platinum
P	1910-A	Med. Palomino Met.
Q	1624-A	Med. Blue 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.
Z	1915-A	Med. Sage Gold Met.
1	1920-A	Rose Met.
2	1907-A	Dk. Turquoise Met.

DATE CODES

The code letters for the month are preceded by a numeral to show the day of the month when the Thunderbird was completed. The second year code letters are to be used if model production exceeds 12 months.

Month	First Model Year	Second Model 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)

Thunderbirds built to a Domestic Special Order, Foreign Special Order, or Pre-Approved Order have the complete order number recorded in this space. Also appearing in this space is the two digit code number of the District which ordered the unit. If the unit is regular production, only the District code number will appear.

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 CODE

Code	Ratio
1	3.00:1
3	3.20:1
6	2.80:1

ENGINE CODES

Code	Type
Z	8 Cylinder 390 Cubic Inch (4 barrel)
Q	8 Cylinder 428 Cubic Inch (4 barrel)

CONSECUTIVE UNIT NUMBER

The assembly plant, with each model year, begins with consecutive unit number 100001 and continues on for each unit built.

ASSEMBLY PLANT CODES

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

MODEL YEAR

The number 6 designates 1966

BRAKES

GROUP 2

PART 2-1 GENERAL BRAKE SERVICE

1 DIAGNOSIS AND TESTING

PRELIMINARY TESTING

1. Check the fluid level in the master cylinder, and add Rotunda R103-A Super Heavy Duty brake fluid (B7AZ-19542-A) if required.

2. Push the brake pedal down as far as it will go while the engine is running or vacuum is in the system and the car is standing still. If the pedal travels to a point less than 1 inch from the floor pan, check the brake adjustment and the automatic adjusters.

To check rear brake adjuster operation, check the shoes and the adjuster components for binding or improper installation and follow the procedure described under Brake Shoe Adjustments in Part 2-2, Section 2.

Make several reverse brake stops to ensure uniform adjustment at the rear wheels.

On front disc brakes, the automatic [illegible] in

[illegible]l,

[illegible]g

brake. Depress the service brake pedal several times to exhaust all vacuum in the system. Then, depress the pedal and hold it in the applied position. Start the engine. If the vacuum system is operating, the pedal will tend to fall away under foot pressure and less pressure will be required to hold the pedal in the applied position. If no action is felt, the vacuum booster system is not functioning.

4. With the engine shut off, exhaust all vacuum in the system. Depress the brake pedal and hold it in the applied position. If the pe[illegible] ually falls away under this the hydraulic system is lea[illegible] all tubing, hoses, calipers, [illegible] cylinders, and connections for leaks.

If the brake pedal movement feels spongy, bleed the hydraulic system to remove air from the lines and cylinder. See Hydraulic System Bleeding, Section 2. Also, check for leaks or insufficient fluid.

5. Should one of the brakes be locked and the car must be moved, open the bleeder screw long enough to let out a few drops of brake fluid. **This bleeding operation will release the brakes, but it will not correct the cause of the trouble.**

ROAD TEST

The car should be road tested only if the brakes will safely stop the car. Apply the brakes at a speed of 25-30 mph to check for the existence of the trouble symptoms listed in Table 1, with the exception of brake chatter and those symptoms resolved in the preliminary tests. For each of the symptoms encountered, check and eliminate the causes which are also listed in Table 1. To check for brake chatter or surge, apply the brakes lightly at approximately 50 mph. Chatter or surge will apply almost entirely to rear brakes only.

For booster removal and installation procedures, refer to Part 2-2, Section 3. No service repairs, other than adjustment of the push rod, are made on this booster. Replace the assembly when the booster is determined to be defective.

TABLE 1—Front (Disc) Brake Trouble Symptoms and Possible Causes

POSSIBLE CAUSES OF TROUBLE	TROUBLE SYMPTOMS	Excessive Pedal Travel	Brake Roughness or Chatter (Pedal Pumping)	Excessive Pedal Effort	Pull	Groan	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
Improper Booster Push Rod Adjustment		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	
Shoe and Lining Worn Below Specifications				X							
Booster Inoperative				X							
Caliper Out of Alignment with Rotor					X					X	
Loose Caliper Attachment					X					X	
Need to Slightly Increase or Decrease Pedal Effort						X					
Excessive Clearance Between Shoe and Caliper or Between Shoe and Splash Shield							X				
Shoe Hold Down Clips Missing or Improperly Positioned							X				
Operator Riding Brake Pedal								X			
Scores in the Cylinder Bore									X		
n Build-Up in the Cylinder Bore or on the Piston Surface									X		
											X
					X						

TABLE 2—Rear (Drum) Brake and General System Trouble Symptoms and Possible Causes

POSSIBLE CAUSES OF TROUBLE	TROUBLE SYMPTOMS	One Brake Drags	All Brakes Drag	Hard Pedal	Spongy Pedal	Car Pulls to One Side	One Wheel Locks	Brakes Chatter	Excessive Pedal Travel	Pedal Gradually Goes to Floor	Brakes Uneven	Shoe Click After Release	Noisy or Grabbing Brakes	Brakes Do No Apply
Mechanical Resistance at Pedal or Shoes			X	X										
Brake Line Restricted		X	X	X		X								
Leaks or Insufficient Fluid					X				X	X				X
Improper Tire Pressure						X					X			
Distorted or Improperly Adjusted Brake Shoe		X	X	X		X	X		X				X	
Faulty Retracting Spring		X				X								
Drum Out of Round		X				X		X						
Lining Glazed or Worn				X		X	X	X	X				X	X
Oil or Grease on Lining						X	X	X			X		X	X
Loose Carrier Plate		X					X	X						
Loose Lining								X						
Scored Drum											X		X	
Dirt on Drum-Lining Surface													X	
Faulty Brake Cylinder		X				X	X						X	
Dirty Brake Fluid		X	X								X			X
Faulty Master Cylinder			X						X	X				X
Air in Hydraulic System		X			X				X					X
Self Adjusters Not Operating						X			X					
Insufficient Shoe-to-Carrier Plate Lubrication		X										X	X	
Tire Tread Worn							X							
Poor Lining to Drum Contact								X						
Loose Front Suspension								X						
...reads" Left by Drum Turning Tool Pulls												X		
									X					

2 COMMON ADJUSTMENTS AND REPAIRS

PARKING BRAKE LINKAGE ADJUSTMENT

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 by pushing down the manual release lever.
2. Raise the car.
3. Adjust the equalizer lever against the cable spring on the pedal cable to the dimension shown in Fig. 1.
4. Loosen the adjusting nut on the equalizer rod, and then turn the lock nut in front of the equalizer several turns forward.
5. Depress the parking brake pedal 1 3/4 inches from its normal released position.
6. While turning the rear wheels in a rearward direction, turn the adjusting nut against the equalizer until a moderate drag is felt (Fig. 1).
7. When the cables are properly adjusted, tighten the lock nut against the equalizer.
8. Release the parking brake, and check to make sure that the brake shoes return to the fully released position.
9. Depress the parking brake pedal two inches. Under normal conditions, this will satisfactorily hold the car.
10. Release the parking brake again, and then depress the pedal 1/2 inch. The brakes should not drag with the pedal depressed 1/2 inch.

If the rear brakes do not fully release, check the cables for kinks or binds. Free the cables as required.

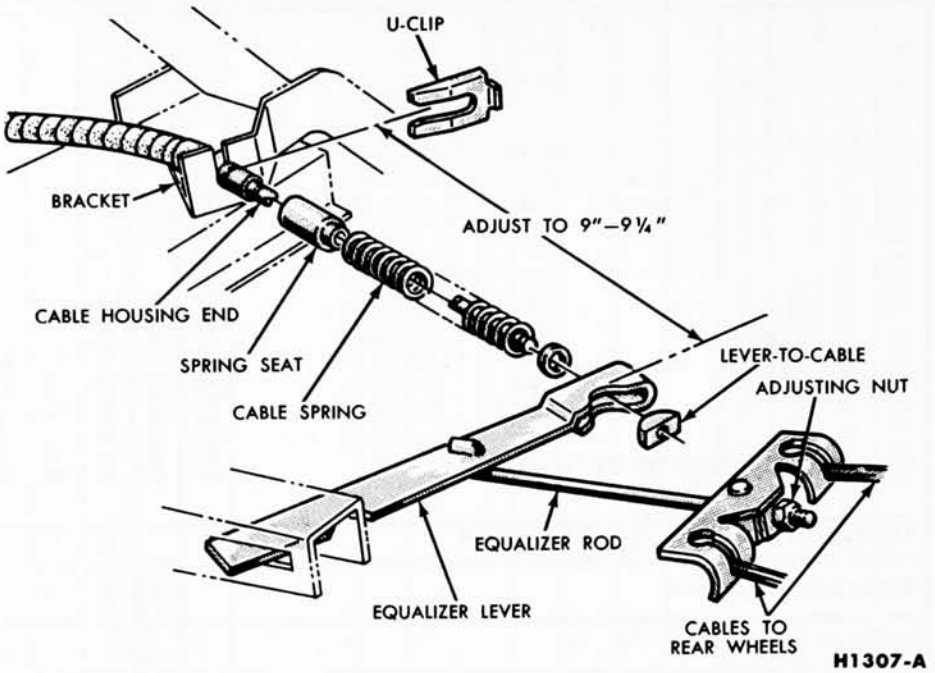


FIG. 1 –Parking Brake Adjustments

MASTER CYLINDER PUSH ROD ADJUSTMENT

The push rod is designed with a self-locking adjustment screw to provide the correct relationship between the booster piston and the ma... ...linder piston. The ad... ...ew is set to the correct ... ser... req... pro...

mains in the original unit. However, when a new push rod is used or the push rod assembly is transferred to another unit, the distance from the end of the adjustment screw to the mounting surface of the booster body should be rechecked either with a micrometer depth gauge to a dimension of 0.980 0.995 inch, or with a height gauge as shown in Fig. 2. The details for making a height gauge are given in Fig. 3.

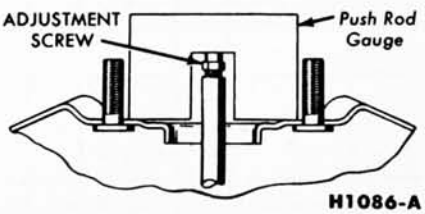


FIG. 2 –Push Rod Adjustment

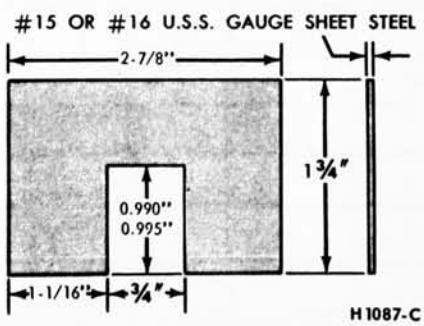


FIG. 3 –Push Rod Gauge Dimensions

To adjust the push rod, hold the serrated end of the rod with cross-milled pliers and turn the adjustment screw **in** to shorten, or **out** to lengthen.

After assembly of the master cylinder to the power section, the piston cup in the hydraulic cylinder should just clear the compensating port hole when the unit is in the fully released position. This can be checked by placing a few drops of brake fluid over the compensating port and applying light air pressure to the output port of the master cylinder. If air bubbles appear, the port is open. If the primary piston cup overlaps the compensating port, there will be no flow of air through the compensating port. If this condition exists, the adjustment screw should be turned into the push rod a slight amount or until the compensating port is open.

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, 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.

Remove the front wheel and tire assemblies in order to gain access to the bleeder fittings on the disc brake calipers.

MANUAL BLEEDING

Bleed the longest lines first. Keep the master cylinder reservoir filled with new Rotunda R103-A Extra Heavy Duty brake fluid during the bleeding operation.

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

1. Position a specially formed 3/8-inch box wrench on the bleeder fitting on the right rear brake wheel cylinder (Fig. 4). Attach a rubber drain tube to the bleeder fitting. **The end of the tube should fit snugly around the bleeder fitting.**

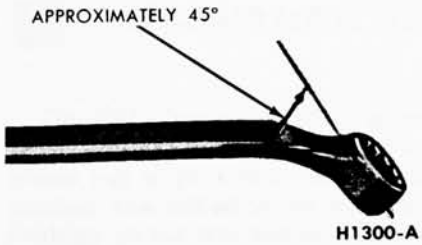


FIG. 4—Brake Bleeder Wrench

2. Submerge the free end of the tube in a container partially filled with clean brake fluid, and loosen the bleeder fitting approximately 3/4 turn.

3. Push the brake pedal down slowly thru 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 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. Be sure that 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 soldering 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 3/8-inch box wrench on the bleeder fitting on the right rear brake wheel cylinder (Fig. 4). 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 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. Be sure that the front brake pistons are returned to their normal positions and that 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

FRONT BRAKES

1. Remove the wheel and tire, caliper splash shield, and the shoe and lining assemblies as outlined in Part 2-2, Section

ing. Take one reading at each side and one in the center. If the assembly has worn to a thickness of 0.231 inch (Shoe and lining together) or 0.066 inch (lining material only) at any one of the three measuring locations, replace all (4) shoe and linings on both front wheels.

3. With the shoe and linings 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 check to see 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 0.002 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 or if excess leakage is evident, it should be replaced. Slight leakage or seized pistons indicate removal and disassembly.

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.

REAR 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 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 pull 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.

PART 2-2 BRAKE SYSTEM

1 DESCRIPTION AND OPERATION

The 1966 Thunderbird brake system employs disc brakes on the front wheels and single anchor, internal expanding and self-adjusting brake assemblies on the rear wheels. The system is powered by a vacuum booster as standard equipment.

The master cylinder converts physical force from the brake pedal and booster into hydraulic pressure against the pistons in the calipers (front wheels) or in the wheel cylinders (rear wheels). The pistons in turn convert hydraulic pressure back into physical force at the discs and brake shoes.

DISC BRAKE ASSEMBLIES —FRONT WHEELS

RELATION AND FUNCTION OF COMPONENT PARTS

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 15/16 inch diameter. Each cylinder bore contains a piston with an attached molded rubber dust boot to seal the cylinder bore from contamination. (Fig. 2). 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 hydraulically by means of internal passages in the caliper housings and an external transfer tube between the two halves of the caliper assembly. One

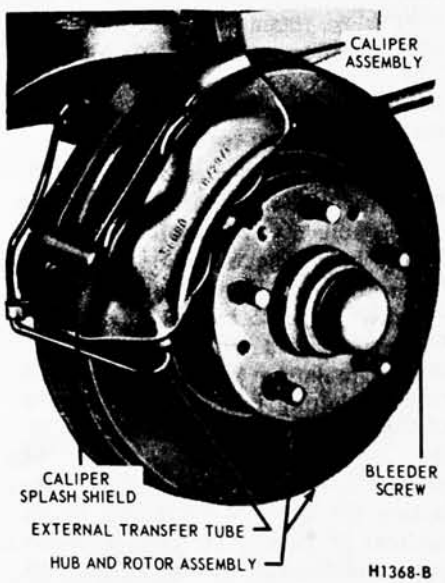


FIG. 1—Disc Brake Assembly

bleeder screw and fluid inlet fitting is provided on each caliper assembly.

The shoe and lining assemblies are located in between parallel machined abutments within the caliper, and are supported radially by tabs on the

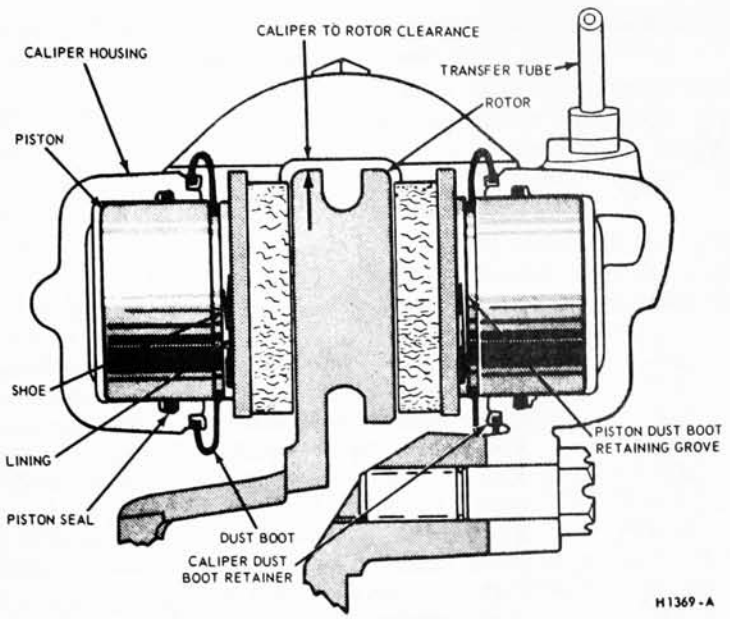


FIG. 2 –Caliper Assembly–Sectional View

outer ends of the shoe assemblies (Fig. 21). 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. 7). 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. 21). 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 on the front wheel spindle to the rear 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 11.87 inches and the inside diameter is 7.875 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. 8). The wheel provides protection for the outboard surface of the rotor.

O[illegible]N

hy[illegible]
cyli[illegible]
cali[illegible]

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 in each piston stretches as the piston moves against the shoe (Fig. 3). 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. Automatic 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 bypasses the residual check valve.

A proportioning valve located between the master cylinder and the rear brake wheel cylinder provides balanced braking action between the front and the rear brakes under a wide range of braking conditions (Fig. 16). 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.

SELF-ADJUSTING BRAKE ASSEMBLIES–REAR WHEELS

The self-adjusting brake mechanism consists of a cable, cable guide, adjusting lever, adjusting screw assembly, and adjuster spring (Fig. 4). 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 secondary 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

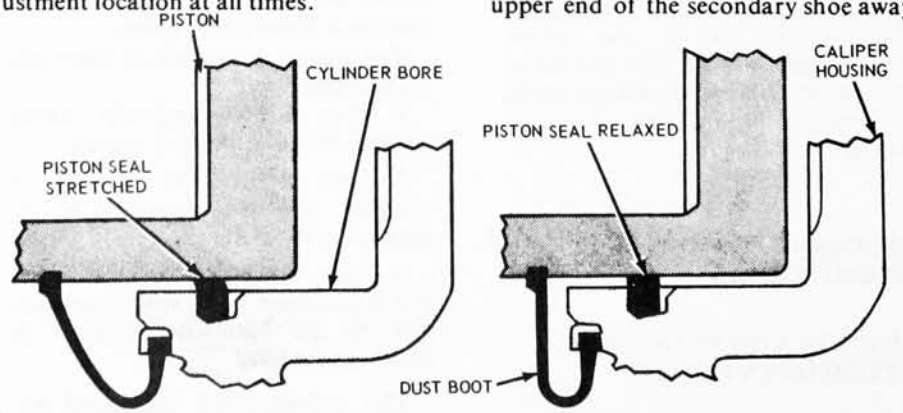


FIG. 3 –Function of Piston Seal

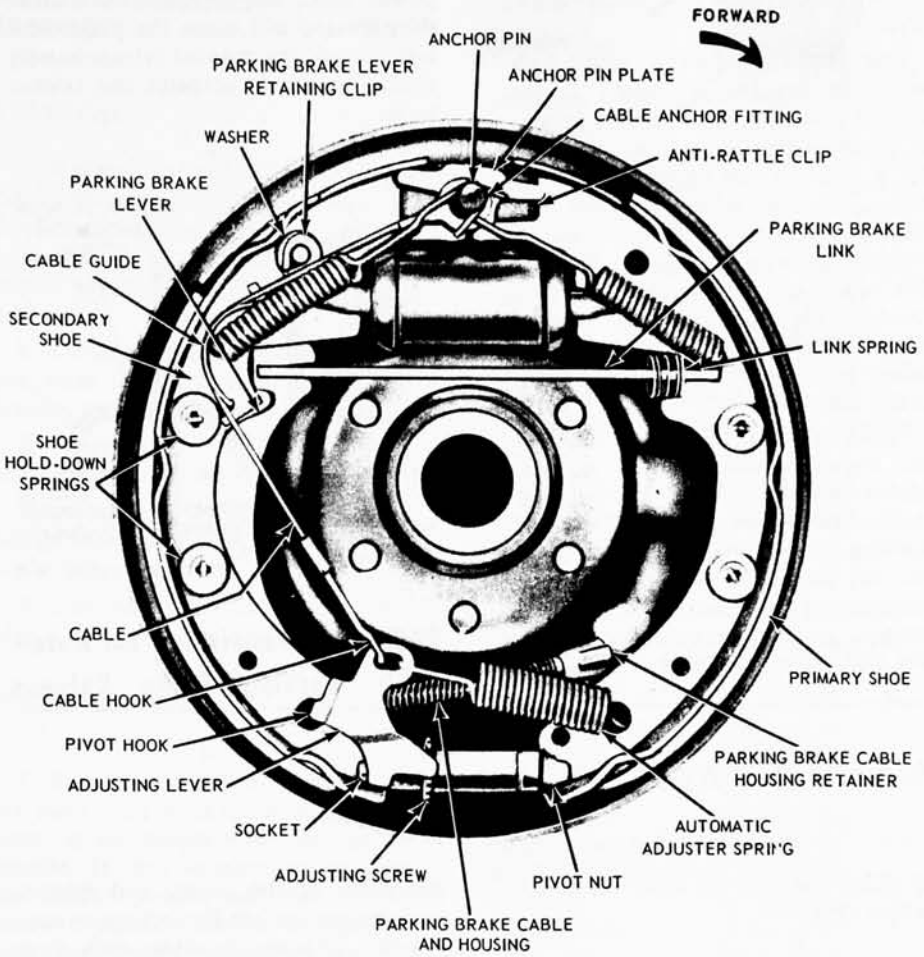


FIG. 4 — Thunderbird Self Adjusting Brake Assembly — Rear Wheel

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 adjuster 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 progressively 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 ...um. Therefore, the adjuster does ...perate.

BOOSTER SYSTEM

DESCRIPTION

The tandem diaphragm type Master Vac is a self-contained vacuum hydraulic power braking unit. It is of the vacuum suspended type which utilizes engine intake manifold vacuum and atmospheric pressure for its power. **Adjustment of the push rod is the only service permitted on this booster. The booster unit is to be exchanged when it is determined to be defective.**

PARKING BRAKES

An independent foot-operated parking brake control (Fig. 5) 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 (Fig. 1, Part 2-1 and Fig. 18).

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.

A vacuum power unit will release the parking brakes automatically when the transmission selector lever is moved into any drive position with the engine running. The brakes will not release automatically, however, when the selector lever is in the

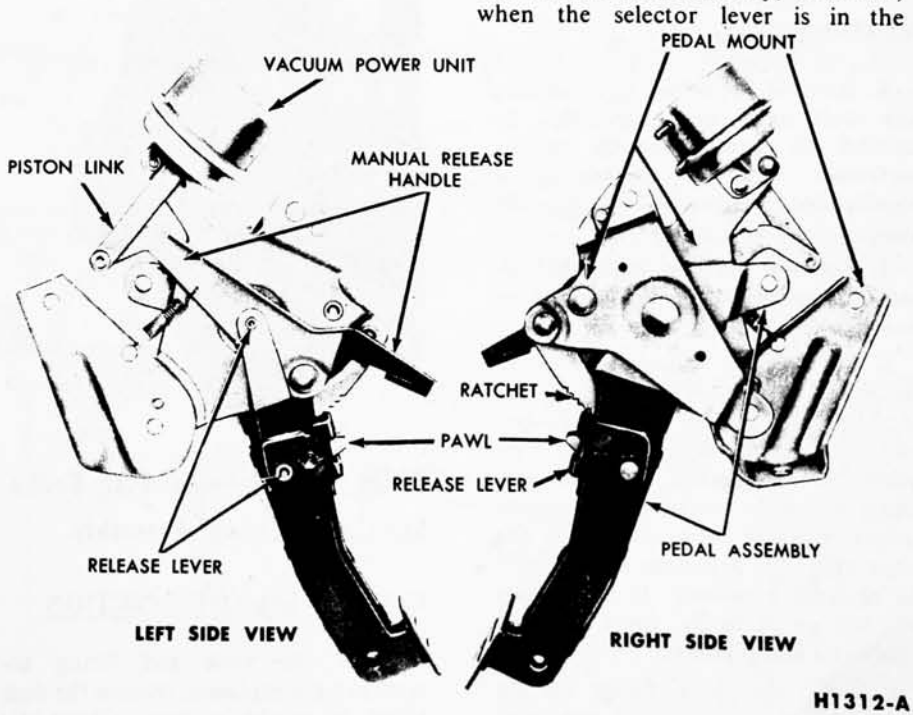


FIG. 5 — Parking Brake Control Assembly

neutral or park position with the engine running, or in any position with the engine off.

The parking brake control assembly is mounted to the left cowl side panel (Fig. 18). The pedal assembly pivots on a stationary pedal mount (Fig. 5). A spring-loaded pawl and a release lever are assembled to the pedal. A ratchet is assembled to the stationary mount. The pawl contacts the ratchet at such an angle that it will slide over the ratchet teeth as the pedal is depressed; however, when the applying motion stops and the pedal starts to release, the pawl engages the ratchet and thus locks the brakes in the applied position. Since the release lever pivots against the pawl, a slight movement of the release lever will disengage the pawl from the ratchet allowing the brakes to release. The release lever is actuated by a manual release handle which is connected to the lever through a slot and rivet pin (Fig. 5).

The vacuum power unit with mounting bracket is riveted to the control assembly. The vacuum actuated piston within the unit is connected by a link to the upper end of the release handle which actuates the release lever to move the pawl out of engagement with the ratchet (Fig. 5). The lower end of the release handle extends out for alternate manual release in the event of vacuum power failure or for optional manual release at any time.

Hoses connect the power unit and the engine manifold to a vacuum release valve in the transmission neutral safety switch (Figs. 5 and 6). Moving the transmission selector lever into any drive position with the engine running will open the release valve to connect engine manifold vacuum to one side of the actuating piston in the power unit. The pressure differential thus created will cause the piston and link to pull the manual release handle which, in turn, actuates the release lever.

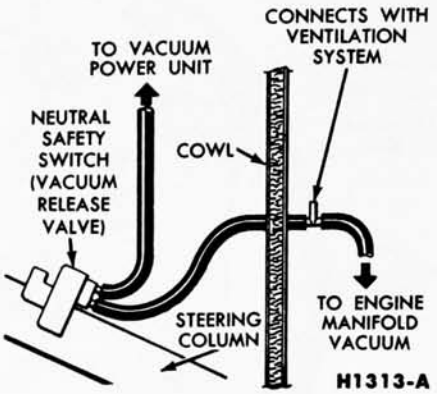


FIG. 6—Connections For Automatic Parking Brake Release

2 IN-CAR ADJUSTMENTS AND REPAIRS

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

FRONT (DISC) BRAKE SHOE AND LINING REPLACEMENT

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. 1).

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 r[illegible]ig. 2). Maintain the pressure [illegible] a minute. If the pistons o[illegible]

of pliers and pull the shoe out of the caliper (Fig. 7).

FIG. 7—Removing Disc Brake Shoe and Lining Assembly

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. 7).

2. Install the caliper splash shield and secure the shield to the caliper with two attaching bolts (Fig. 1).

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. 16).

3. Remove the two bolts that attach the caliper to the spindle.

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 spindle retaining bolts and torque to specification. Note the difference in bolt lengths. 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. 2).

3. Connect the front wheel brake flexible hose to the brake tube at the bracket on the frame (Fig. 16). 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

REMOVAL

1. Remove the wheel and tire from the hub and rotor assembly (Fig. 8). **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.

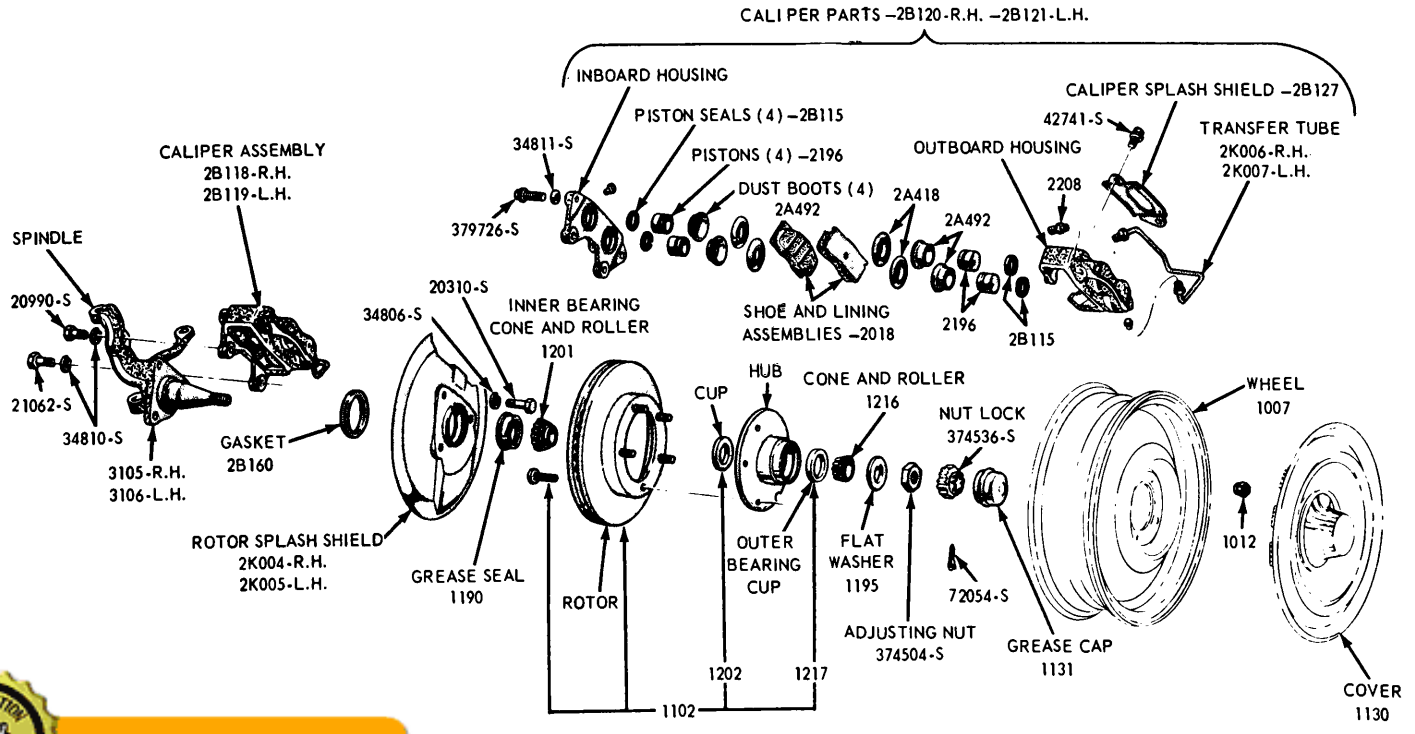
Handle the rotor and caliper assemblies in such a way as to avoid deformation of the rotor and nicking or scratching of the brake linings.

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. 8).

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.

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. Refer to Part 3-4 for specific instructions on adjusting wheel bearings with disc brakes.**

5. Mount the caliper assembly on the spindle 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 three bolts that retain the splash shield to the spindle, and remove the shield (Fig. 8).

3. Remove the gasket.

INSTALLATION

stall the gasket.

shield is bent, straighten it

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

PROPORTIONING VALVE

REMOVAL

1. Disconnect and remove the master cylinder-to-proportioning valve brake tube (Fig. 16).

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. 9).

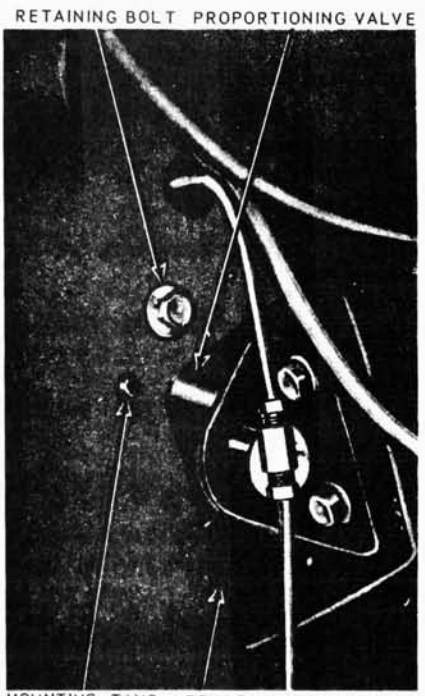


FIG. 9 – Removing or Installing the Proportioning Valve

INSTALLATION

1. From underneath the left fender, install the proportioning valve through the access hole in the fender apron. Position the valve to the apron so that the mounting tang extends through the hole in the fender apron as shown in Fig. 9. Install the retaining bolt.

2. Connect the front-to-rear brake tube to the valve (Fig. 16).

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

4. Bleed the brake system.

BRAKE SHOE ADJUSTMENTS – REAR WHEELS

The car should be raised with the wheels off the floor.

The rear 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.

To adjust the brake shoes:

1. Using Rotunda Tool HRE 8650, (Fig. 10) determine the inside diameter of the drum braking surface.

2. Reverse the tool as shown in Fig. 10 and adjust the brake shoe diameter to fit the gauge. Hold the automatic adjusting lever out of engagement while rotating the adjustment screw, to prevent burring the screw slots. Make sure the adjusting screw rotates freely. If necessary, lubricate the adjusting screw threads with a thin, uniform coating of CIAZ-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 brake shoes contact the carrier plate, being careful not to get the lubricant on the linings.

5. Install the brake drum.

6. Install the three Tinnerman nuts and tighten securely.

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

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

9. Check the adjustment by making several stops while operating in a forward direction.

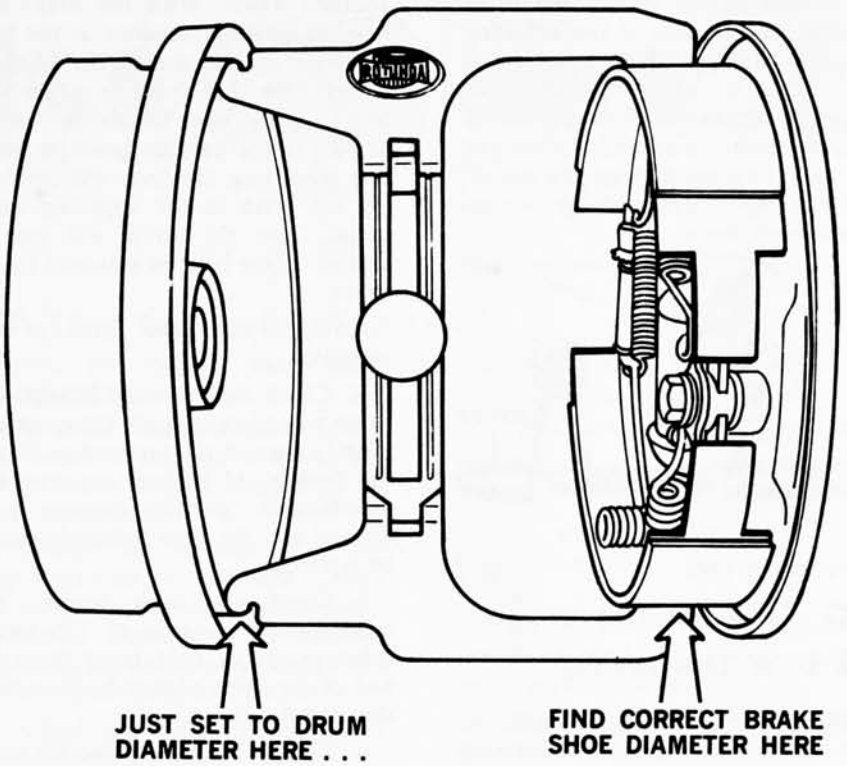


FIG. 10 —Using Tool HRE—8650

REAR BRAKE DRUM

REMOVAL

1. Raise the car until the wheel and tire clear the floor.

2. Remove the wheel cover and wheel. Remove the three Tinnerman nuts and remove the brake drum. If the brake drum will not come off easily, insert a narrow screwdriver through the brake adjusting 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. 11). **Back off the adjustment only if the drum cannot be removed. 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 changed, make certain that the adjuster lever is properly seat- in the shoe web.

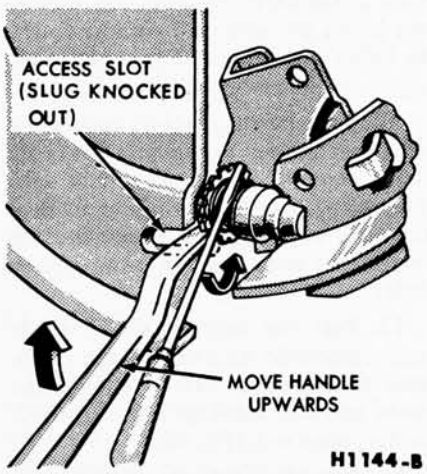


FIG. 11 —Backing Off Brake Adjustment

from a new drum with carburetor degreaser.

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

3. Install the three Tinnerman nuts and tighten securely. Install the wheel on the axle shaft flange studs against the drum, and tighten the retaining nuts to specifications. Install the wheel cover.

4. Complete brake adjustment as directed under Brake Shoe Adjustments.

REAR BRAKE SHOE REPLACEMENT

REMOVAL

1. Remove the wheel and the brake drum and install a clamp over the ends of the brake cylinder as shown in Fig. 12.

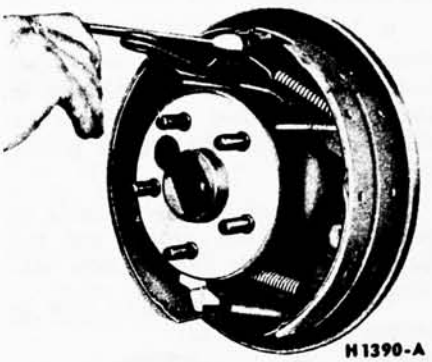


FIG. 12 —Retracting Spring Removal

2. Remove the primary shoe-to-anchor spring with the tool shown in Fig. 13. With the same tool, remove the secondary shoe-to-anchor spring and unhook the cable eye from the anchor pin.

3. Remove the anchor pin plate and the anti-rattle clip.

4. Remove the cable guide from the secondary shoe (Fig. 4).

5. Remove the shoe hold-down springs, shoes, adjusting screw, pivot nut, and socket.

6. Remove the parking brake link and spring. Disconnect the parking brake cable from the parking brake lever.

7. After removing the secondary shoe, disassemble the parking brake lever from the shoe by removing the retaining clip and spring washer (Fig. 4).

INSTALLATION

1. Before installing the brake shoes, back off the parking brake adjustment. Then assemble the parking brake lever to the secondary shoe and

secure 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 carrier plate.

3. Position the brake shoes on the carrier plate and secure the assembly with the hold-down springs. Install the parking brake link and spring. Connect the parking brake cable to the parking brake lever (Fig. 4).

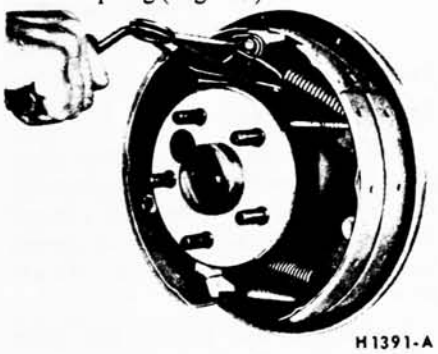
4. Install the anti-rattle clip and the anchor pin plate on the anchor pin.

5. Place the cable eye over the anchor pin with the crimped side toward the carrier plate.

6. Install the cable guide on the secondary shoe web with the flanged hole properly fitted into the hole in the secondary shoe web. Thread the cable around the cable guide groove (Fig. 4).

It is imperative that the cable be positioned in this groove and not between the guide and the shoe web.

7. Install the secondary shoe to anchor spring (Fig. 13)



H1391-A

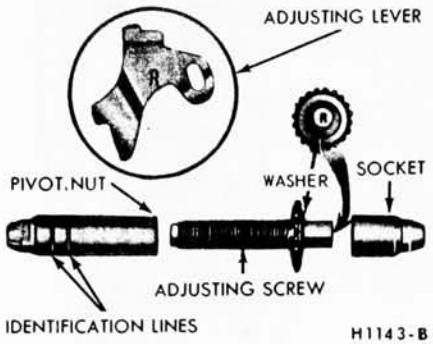
FIG. 13 – Retracting Spring Installation

8. Install the primary shoe to anchor spring with the tool shown in Fig. 4.

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.

9. Apply 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 [illegible]/2 turn.

ing mechanism operated. To prevent installation on the wrong side of the car, the socket end of the adjusting screw is stamped with an R or L (Fig. 14). The adjusting pivot nuts can be distinguished by the number of grooves machined around the body of the nut. Two grooves on the nut indicate a right thread, one groove indicates a left thread.



H1143-B

FIG. 14 – Adjusting Screw and Lever Identification

10. 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.

11. 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. 14).

12. 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.

13. 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 (Fig. 4).

14. 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 3/16 inch (plus or minus 1/32 inch) above the centerline of the screw. If the contact point is below this 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 11 1/8 inches (plus or minus 1/64 inch) 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.

REAR WHEEL CYLINDER REPAIR

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

DISASSEMBLY

1. Remove the links and the rubber boots from the ends of the brake cylinder. Remove the pistons, cups, and return spring from the cylinder bore (Fig. 15).

2. Remove the bleeder screw from the cylinder.

INSPECTION

1. Wash all parts in clean denatured alcohol. If alcohol is not

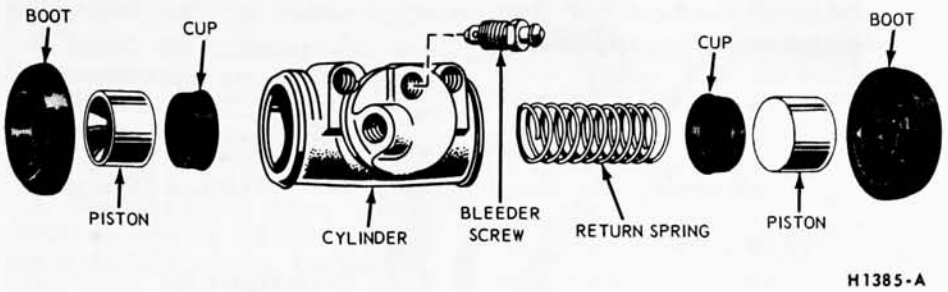


FIG. 15– Rear Brake Wheel Cylinder

available, use specified brake fluid. Dry with compressed air.

2. Check all 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.**

4. Check the bleed 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. 15). Place a boot over each end of the cylinder.

REAR WHEEL CYLINDER REPLACEMENT

REMOVAL

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

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

3. Disconnect the brake line from the brake cylinder. **Be sure the engine is stopped and there is no vacuum in the booster system before disconnecting the hydraulic**

Unscrew the tube fitting that con- the tube to the cylinder. **Do not** cylinder when the cylinder is removed from the carrier plate.

4. Remove the brake 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. Place the rear wheel cylinder into position. Enter the tubing into the cylinder, and start the tube fitting nut into the threads of the cylinder.

2. Secure the cylinder to the carrier plate by installing the attaching bolts and lock washers.

3. Tighten the tube fitting nut to specification with Milbar tool 1112-144 or its equivalent.

4. Bleed the brake hydraulic system as detailed in Section 2.

REAR 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 wheel, disconnect the parking brake lever from the cable.

3. Rotate the axle shaft so that the hole in the axle shaft flange lines up with the carrier plate attaching nuts and remove the nuts. Pull the axle shaft assembly out of the housing with tool 4235C and a slide hammer (Part 4-2), and then remove the carrier 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 attaching bolts and against the carrier plate. Install the attaching nuts through the access hole in the axle shaft flange.

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. Connect the parking brake cable to the lever. Install the brake drum and wheel.

4. Adjust the brake shoes (Section 2), 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 (Fig. 16).

Always bleed the entire 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 the 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 disc brake caliper. Place the opposite end of the hose at the bracket on the frame. Install the

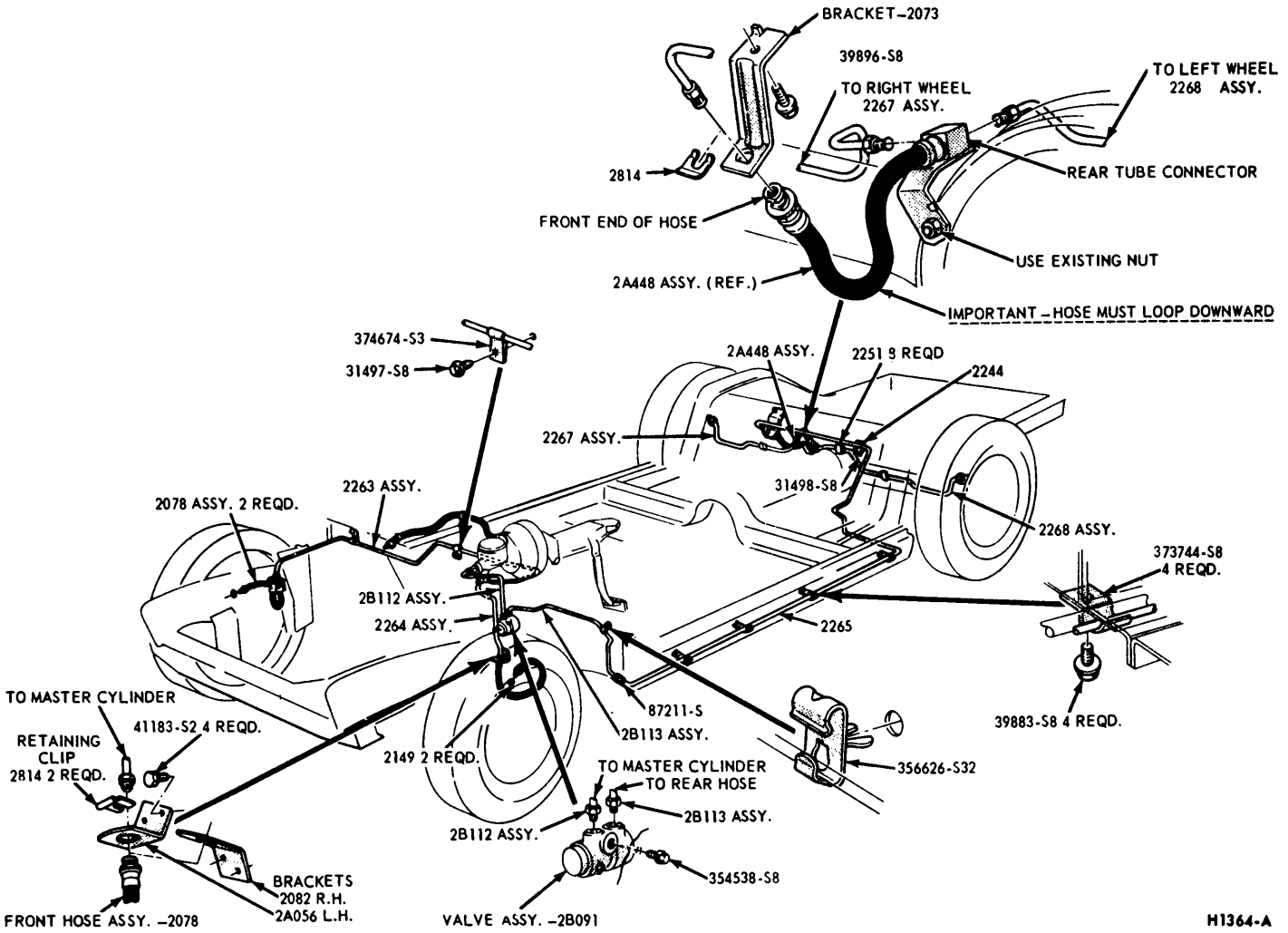


FIG. 16 – Service Brake System

horseshoe-type retaining clip, and connect the tube to the hose with the tube fitting nut (Fig. 16).

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

Place a new gasket over the rear hose fitting and screw the hose assembly into the rear brake tube connector. Place the front end of the hose at the bracket on the frame. Install the horseshoe-type retaining clip, and connect the tube to the hose with the tube fitting nut.

3 REMOVAL AND INSTALLATION

MASTER CYLINDER

REMOVAL

1. Disconnect the brake lines from the outlet fittings (Fig. 16)

2. Remove the two nuts and lock washers that secure the master cylinder to the booster unit. Separate the master cylinder from the booster u… make sure that the master … not rest on the push se… of…

4. Remove the push rod from the power unit. **Do not disturb the adjusting screw.**

INSTALLATION

1. Apply a light coating of lubricant COAZ-19584-A to the piston end of the hydraulic push rod and guide the piston end of the push rod into the center bore of the booster piston.

2. Twist the push rod to make certain the end of the piston is bottomed against the reaction disc and there is no air pocket between the end of the push rod and the reaction disc.

3. Before proceeding with the installation, check the distance from the outer end of the push rod to the master cylinder mounting surface at the end of the vacuum cylinder, (Part 2-1, Fig. 2). This dimension should be from 0.990 to 0.995 inch measured metal to metal. If the push rod dimension is not correct, see Master Cylinder Push Rod Adjustment, Part 2-1, Section 2.

4. When the push rod adjustment is correct, install a new rubber seal in the groove at the end of the master cylinder.

5. Position the master cylinder over the push rod onto the two studs that

are integral with the booster body.

6. Install the attaching nuts and lock washers and torque the nuts to specifications.

7. Connect the brake lines to the outlet fittings (Fig. 16).

8. Bleed the brake system. Fill the master cylinder to 3/8-inch from the top of the filler opening. Use Rotunda Extra Heavy Duty Brake Fluid, R103-A, Ford Part No. C6AZ-19542-A. Be sure that the gasket is properly seated in the filler cap, and install the cap.

BRAKE BOOSTER

REMOVAL

1. Disconnect the vacuum hose from the booster.

2. Remove three bolts and loosen one to allow the brace between the cowl and spring tower to be positioned inboard for obtaining clearance.

3. Remove the attaching nuts and lock washers, and remove the master cylinder from the booster. It is not necessary to disconnect the brake lines.

4. Working inside the car below the instrument panel, disconnect the boost-push rod link from the brake pedal assembly. To do this, proceed as follows:

Disconnect the stop light switch wires at the connector. Remove the hairpin retainer. Slide the stop light switch off from the brake pedal **just far enough for the switch outer hole to clear the pin,** and then lift switch straight **upward** from the pin. Slide the master cylinder push rod and the nylon washer and bushing off from the brake pedal pin (Fig. 17).

5. Remove the four bracket-to-dash panel attaching nuts and washers.

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 (Fig. 17).

7. Remove the dust seal from the booster push rod link and position it in the slot in the dash panel for installation.

INSTALLATION

1. Mount the booster and bracket assembly to the dash panel by sliding the bracket mounting studs and the push rod link in through the holes in the dash panel (Fig. 17).

2. Working inside the car below the instrument panel, install the mounting bracket-to-dash panel retaining nuts and washers. Leave the nuts loose until after the pedal assembly has been connected.

3. Working inside the car below the instrument panel, connect the booster push rod link to the brake pedal assembly. To do this, proceed as follows:

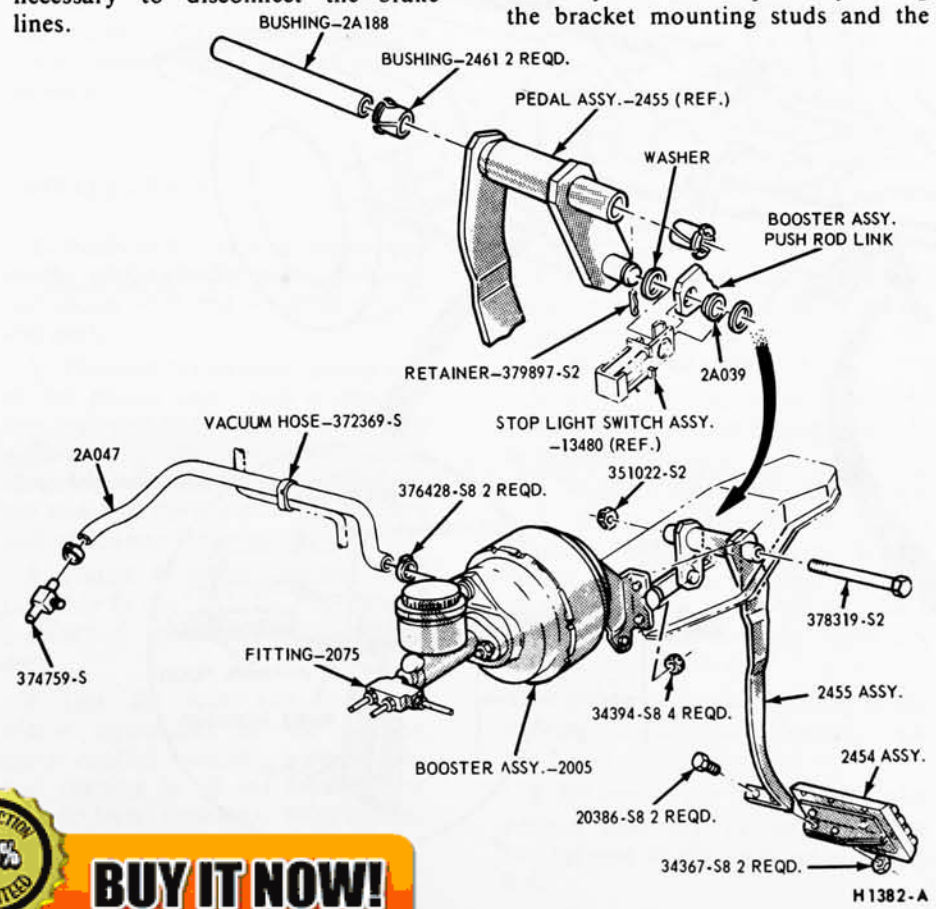
Install the inner nylon washer, the master cylinder push rod, and the bushing on the brake pedal pin. Position the switch so that it straddles the push rod with the switch slot on the pedal pin and the switch outer hole just clearing the pin. Slide the switch completely onto the pin. Install the outer nylon washer as shown in Fig. 17. Secure these parts to the pin with the hairpin retainer. Connect the stop light switch wires to the connector, and install the wires in the retaining clip.

4. Tighten and torque the booster attaching nuts to specification.

5. Position the master cylinder to the booster, install the lock washers and attaching nuts, and torque to specification.

6. Position the cowl to spring tower brace, install the bolts and nuts, and torque to specification.

7. Connect the vacuum hoses to the booster.



Pedal Installation

BRAKE PEDAL

REMOVAL

1. Loosen the booster mounting nuts.

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

3. Remove the hairpin retainer. Slide the stop light switch off from the brake pedal pin **just far enough for the switch outer hole to clear the pin,** and then lift the switch straight **upward** from the pin. Slide the master cylinder push rod and the nylon washers and bushing off from the brake pedal pin (Fig. 17).

4. Remove the pivot bolt and nut that holds the pedal to the pedal support bracket. Remove the brake pedal assembly from the pedal support bracket, and remove the bushings.

INSTALLATION

1. Apply a coating of SAE 10 engine oil to the bushings and locate all the bushings in their proper places on the pedal assembly (Fig. 17).

2. Install the brake pedal assembly and bushings to the support bracket, and then install the pivot bolt through the support bracket and brake pedal assembly. Install the pivot bolt nut and torque to specification.

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, install the outer nylon washer as shown in Fig. 17. Secure these parts to the pin with the hairpin retainer.

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

5. Torque the booster mounting nuts to specification.

PARKING BRAKE CONTROL ASSEMBLY

REMOVAL

1. Raise the car on a hoist and disconnect the pedal cable from the equalizer lever by removing the adjusting nut (Fig. 1, Part 2-1). Remove the U-clip and disengage the cable housing from the bracket.

2. Lower the car. In the passenger compartment, remove the retaining screws and the left kick pad. Remove the four screws that retain the air duct to the inner cowl panel, and then remove the air duct to obtain access to the brake control assembly. Remove the control cable from the air duct.

3. Disconnect the hose from the vacuum power unit.

4. Remove the control assembly-to-mounting bracket bolts.

5. Remove the U-clip that retains the cable housing to the parking brake control housing (Fig. 18).

6. Remove the hairpin retainer and clevis pin from the clevis. Disengage the clevis from the ball end of the cable, then remove the control assembly from the cable and cable housing.

INSTALLATION

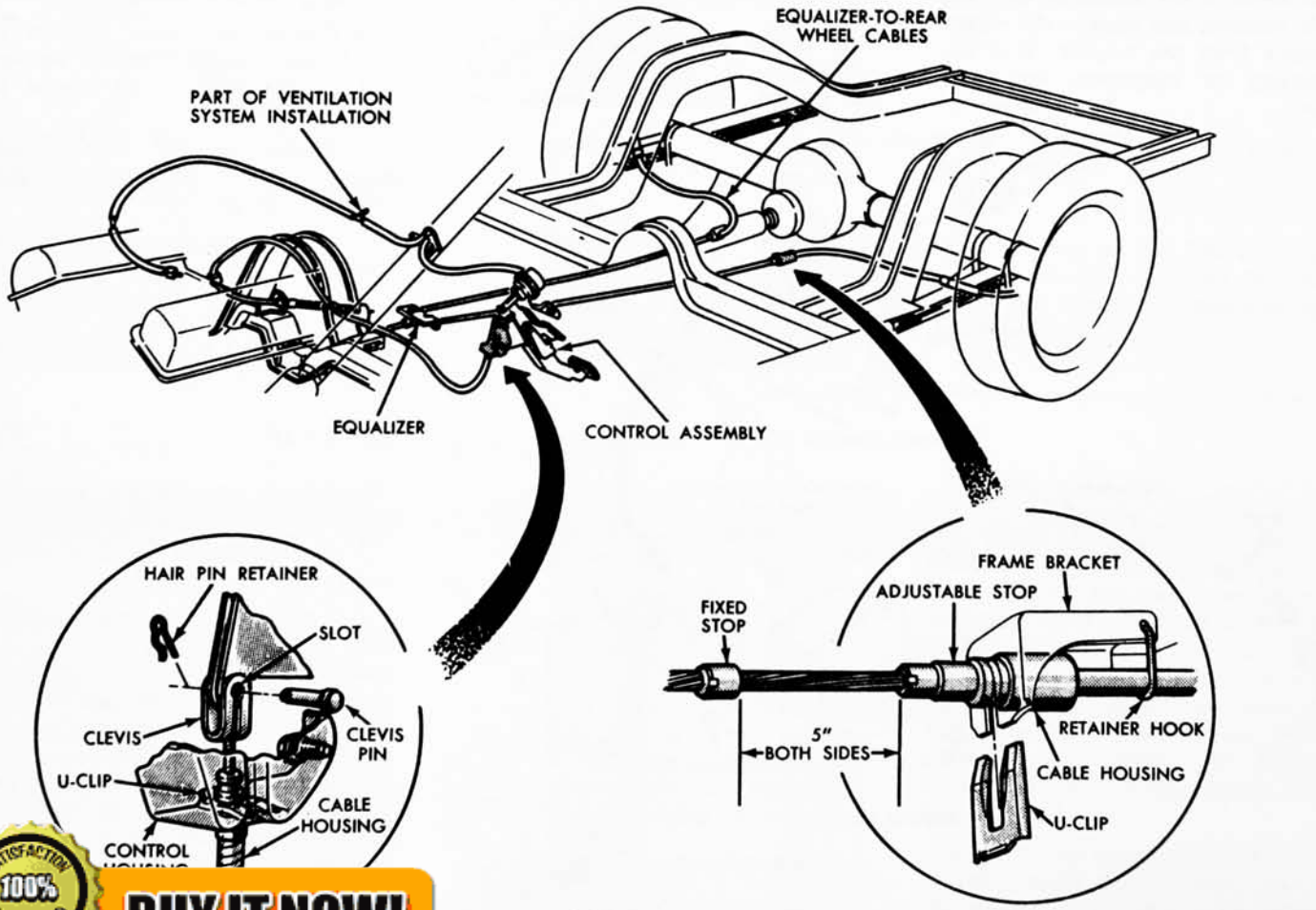
1. Position the cable through the hole in the parking brake control housing. Install the clevis on the ball end of the cable and connect the clevis to the actuating arm with the clevis pin (Fig. 18). Secure the clevis pin with the hairpin retainer.

2. Secure the cable housing to the parking brake control housing with the U-clip.

3. Position the parking brake control assembly to the mounting bracket and install the three attaching bolts.

4. Connect the vacuum hose to the vacuum power unit.

5. Position the air duct to the inner cowl panel, and secure with four retaining screws. Connect the air duct



H1309-A

control cable to the air duct. Position the left kick pad to the side panel and secure with two attaching screws.

6. Raise the car on a hoist. Engage the cable housing to the frame bracket with a U-clip (Fig. 1, Part 2-1). Install the spring seat, cable spring and washer on the rear end of the cable. Assemble the cable to the equalizer lever and install the half-moon type adjusting nut on the end of the cable.

7. Adjust the parking brake linkage as outlined in Part 2-1, Section 2, and then check the operation of the parking brake.

PARKING BRAKE VACUUM POWER UNIT

REMOVAL

1. Remove the parking brake control assembly from the car as described under Removal in the foregoing procedure.

2. Drill out or grind off the two rivets that retain the vacuum power unit to the parking brake control assembly.

3. Drill out or grind off the rivet that connects the vacuum piston link to the release lever, and remove the power unit.

INSTALLATION

1. Position the vacuum power unit on the parking brake control assembly and secure with two round head bolts and nuts.

2. Connect the vacuum piston link to the release lever with a shoulder bolt nut and wave washer. The wave washer is to be positioned on the shoulder bolt between the vacuum piston link and the release lever. The link and release lever must pivot freely.

3. Install the parking brake control assembly in the car as described under Installation in the foregoing procedure.

4. Test the lock and automatic release operations of the parking brake control assembly with the engine running in all the transmission selector lever positions. With the en-

PARKING BRAKE EQUALIZER-TO-CONTROL ASSEMBLY CABLE

REMOVAL

1. Raise the car on a hoist and disconnect the pedal cable from the equalizer lever by removing the adjusting nut (Fig. 1, Part 2-1). Remove the cable washer, spring, and spring seat. Remove the U-clip and disengage the cable housing from the bracket.

2. Lower the car. In the passenger compartment, remove the attaching screws and the left kick pad. Remove the four screws that secure the air duct to the inner cowl panel, and then remove the air duct to obtain access to the brake control assembly. Remove the control cable from the air duct.

3. Disconnect the hose from the vacuum power unit.

4. Remove the control assembly-to-mounting bracket bolts.

5. Remove the U-clip that retains the cable housing to the parking brake control housing (Fig. 18).

6. Remove the hairpin retainer and clevis pin from the clevis. Disengage the clevis from the ball end of the cable. Remove the control assembly from the cable and cable housing.

7. Push the cable and housing down through the hole in the floor pan and remove it from under the car.

INSTALLATION

1. From the underside of the car, guide the upper end of the replacement cable into the hole in the floor pan.

2. From the inside, pull the new cable and housing up through the hole in the floor pan.

3. Position the cable through the hole in the parking brake control housing. Install the clevis on the ball end of the cable and connect the clevis to the actuating arm with the clevis pin (Fig. 18). Secure the clevis pin with the hairpin retainer.

4. Secure the cable housing to the parking brake control housing with the U-clip.

5. Position the parking brake control assembly to the mounting bracket and install the three attaching bolts.

6. Connect the vacuum hose to the vacuum power unit.

7. Position the air duct to the inner cowl panel, and secure with four attaching screws. Connect the air duct control cable to the air duct. Position the left kick pad to the side panel and secure with two attaching screws.

8. Raise the car on a hoist. Engage the cable housing to the frame bracket with a U-clip (Fig. 1, Part 2-1). Install the spring seat, cable spring and washer on the rear end of the cable. Assemble the cable to the equalizer lever and install the half-moon type adjusting nut on the end of the cable.

9. Adjust the parking brake linkage as outlined in Part 2-1, Section 2, and then check the operation of the parking brake.

PARKING BRAKE EQUALIZER TO REAR WHEEL CABLE

REMOVAL

1. Raise the car and remove the wheel cover. Remove the wheel and tire from the drum.

2. Remove the three Tinnerman nuts that secure the brake drum, then remove the brake drum.

3. Loosen the adjusting nut on the equalizer rod and disengage the ball end of the cable from the equalizer (Fig. 1, Part 2-1).

4. Remove the U-clip that retains the cable housing to the frame bracket. Disengage the housing from the bracket and slip off the retainer hook (Fig. 18).

5. Working on the wheel side of the carrier plate (Fig. 4), compress the prongs on the cable retainer so that they can pass through the hole in the carrier plate. Draw the cable retainer out of the hole.

6. With the spring tension off the parking brake lever, lift the cable out of the slot in the lever and remove through the carrier plate hole.

INSTALLATION

1. Pull enough of the cable through the housing so that the end of the cable may be inserted through the carrier plate access hole from the inner side and engaged with the slot in the parking brake lever.

2. Pulling the excess slack from the cable, insert the cable housing into the carrier plate access hole so that the retainer prongs expand.

3. Thread the front end of the cable through the frame bracket, and engage the cable housing to the bracket. Install the U-clip and retainer hook (Fig. 18).

4. Insert the ball end of the cable into the equalizer and tighten the adjusting nut slightly.

5. Install the rear drum. Tighten the three Tinnerman nuts that secure the drum, and install the wheel and wheel cover.

6. Adjust the parking brake linkage as outlined in Part 2-1, Section 2.

4 MAJOR REPAIR OPERATIONS

REAR BRAKE DRUM REFINISHING

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 or 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 (11.150 inches).

If the drum diameter is less than 0.030 inch oversize (11.120 inches) after refinishing, standard lining may be installed. If the drum diameter is 11.120-11.150 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.

REAR BRAKE SHOE RELINING

Brake linings that are worn to within 1/32 inch of the 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 that 11.120 inches, standard linings installed. If the diameter is 150 inches oversize lining

towards each end. Install all parts supplied in the kit. **Ford 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 0.005 inch clearance between any two rivets.

MASTER CYLINDER

DISASSEMBLY

1. Press in against the piston removing the snap ring retainer, and then remove the piston assembly, cup, spring, residual check valve and seat (Fig. 19).

2. Remove secondary cup from the piston. Remove the cover by releasing the spring clips on the sides, and remove the hermetic 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. 19.

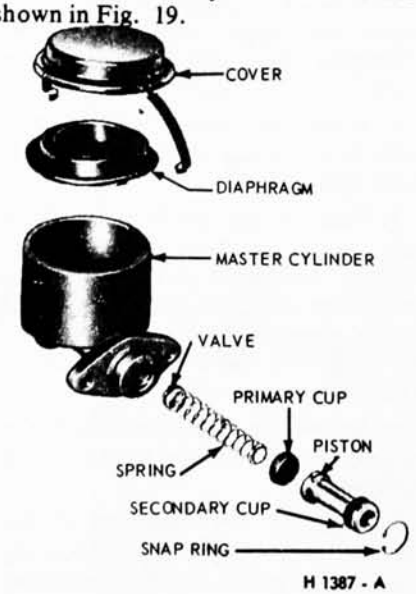


FIG. 19 – Master Cylinder – Disassembled

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 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.

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. 21 for illustration purposes only.

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

2. Remove the two attaching bolts and the caliper splash shield (Fig. 21). (Fig. 21).

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. 20).

8. Remove the four pistons from the cylinder bores with the special tool shown in Fig. 20. 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.

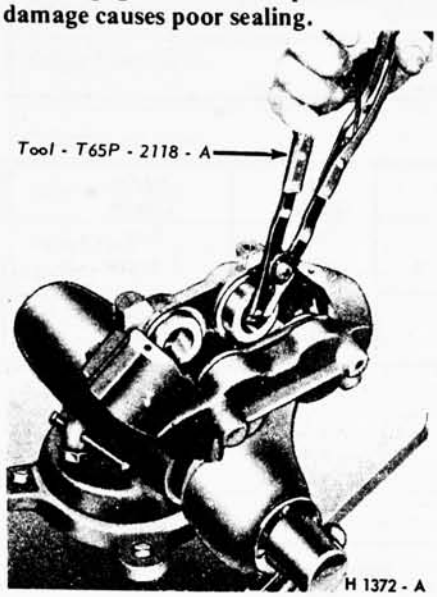


FIG. 20 – Removing or Installing Pistons

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. 21). 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 a suitable solvent (Fig. 21). Use dry, compressed air to clean

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 original 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. 20. 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. 21). **Do not use the original 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.**

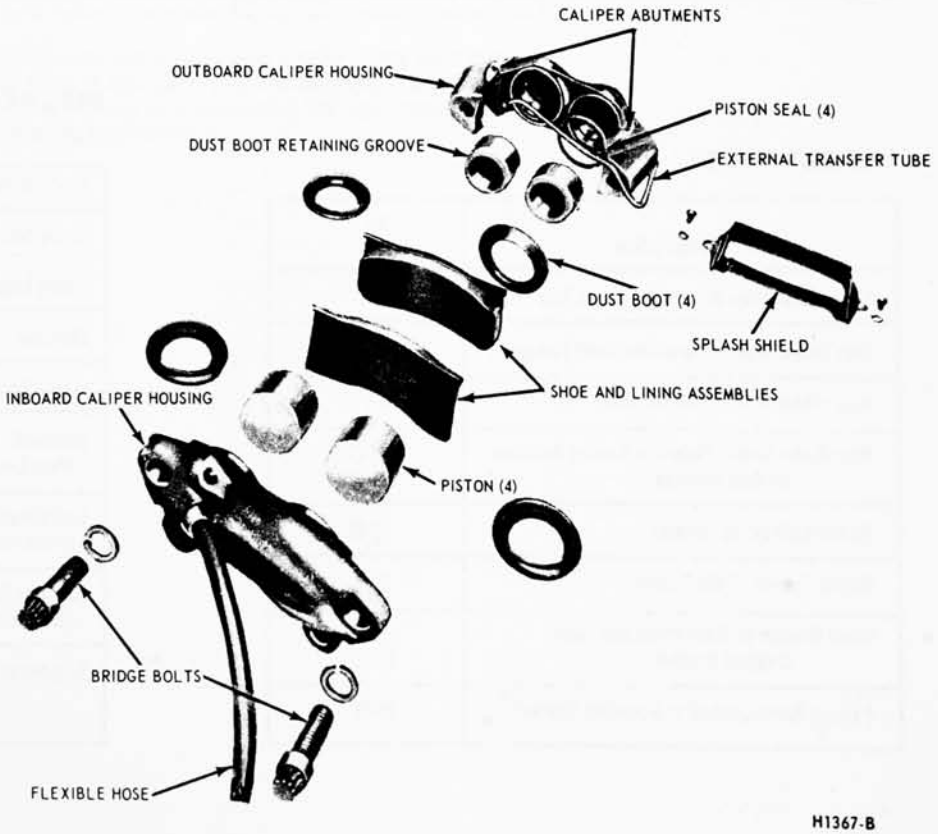


FIG. 21 – Caliper Assembly – Exploded View

PART 2-3 SPECIFICATIONS

DRUM BRAKE DIMENSION—IN INCHES

Drum Inside Diameter	Drum Maximum Boring Limit	Lining Length		Lining Width		Wheel Cylinder Bore Diameter	Master Cylinder Bore Diameter
		Primary	Secondary	Primary	Secondary		
11.030	11.090	9.39	12.21	2.50	2.50	15/16	15/16

BRAKE CHECKS AND ADJUSTMENTS

Type of Check or Adjustment	Specification
Brake Shoe Repair	**Drum Diameter** 11.060—11.090 — **Brake Lining Required** Oversize
	Brake Lining Clearance (Midway between Rivets) Maximum 0.008 inch
	Lining Wear Limit (From Top of Rivets) Maximum 1/32 inch
Master Cylinder	Hydraulic Master Cylinder Bore, Honed Diameter. Maximum 0.9405 inch
Power Unit	Push Rod Adjustment 0.480-0.995 inch
Drum Out-of-Round	Refinish if Total Indicator Runout Exceeds 0.007 inch
Rotor Runout	Replace if Runout Exceeds 0.002 inch

TORQUE LIMITS

Description	Ft-Lbs
Front Brake Hose Bracket to Chasis Bolt	10-15
Rear Brake Drum to Rear Axle Shaft Flange	Hand Push Fit
Rear Wheel to Axle Shaft to Drum	75-110
Rear Brake Carrier Plate and Bearing Retainer to Axle Housing	50-70
Master Cylinder to Booster	12-18
Master Cylinder Tube Fitting	6-12
Brake Booster to Dash Panel and Pedal Support Bracket	15-25
Parking Brake Control to Mounting Bracket	15-19

DISC BRAKE SHOE AND LINING DIMENSIONS—INCHES

Lining Material	
Lining Size	5.36 x 1.90
Lining Area	10.03 Sq. In./segment
Shoe and Lining Thickness	0.600 nominal
Lining Thickness	0.436 nominal
Shoe and Lining Maximum Wear Limit	0.231
Lining Maximum Wear Limit (from surface of shoe)	0.066
Lining to Rotor Clearance (brakes released)	0.002-0.010
Proportioning Valve	450 PSI cut in (43½% reduction in rear line pressure over 450 psi)

DISC BRAKE TORQUE SPECIFICATIONS

Caliper Assembly to Spindle	90-115 Ft-Lbs
Caliper Bleeder Screw	10-Ft-Lbs (120 in-lbs)– Maximum–must be leakproof
Caliper Splash Shield	7-9 Ft-Lbs
Caliper Bridge Bolts	65-75 Ft-Lbs
Rotor Splash Shield to Spindle	10-20 Ft-Lbs
Brake Tube Fitting Nuts to Proportioning Valve	70 In-Lbs–Maximum–must be leakproof
Hub and Rotor Assembly to Front Wheel Spindle	17-25 Ft-Lbs–Rotate rotor while torqueing ①
Wheel Assembly to Front Wheel Hub and Rotor Assembly	70-115 Ft-Lbs
① .0005" to .0065" maximum bearing end play with torque specification of 17-25 Ft-Lbs	

SERVICE TOOLS

Ford Tool No.	Former No.	Description
Rotunda HRE-8650	–	Brake Adjusting Gauge
–	–	Brake Cylinder Retaining Clamp
–	2018-A	Brake Adjusting Tool
–	2162	Adapter Cap
–	2035-N 2086-L	Brake Shoe R & R Spring
TOOL-33621	33621	Internal Snap Ring Pliers
	Milbar 1112-144	In-lb Torque Wrench
	Bendix 73800	Booster Disassembly and Assembly tool A/C Tool
TOOL-4235C	4235C	Axle Shaft Remover

HYDRAULIC FLUID AND LUBRICANT

Description	Hydraulic Fluid and Lubricant
Brake Shoe Adjusting Screw Lubricant	General Chassis Grease C1AZ-19590-B
Brake Fluid	① C6AZ-19542-A

① Disc brakes function best with a fluid having a higher boiling point than previously available fluids. If C6AZ-19542-A fluid is not available, **small** quantities of a reputable brand of heavy duty fluid meeting SAE specification 70R3 may be added to maintain required fluid level.

SUSPENSION, STEERING, WHEELS AND TIRES

GROUP 3

PART 3-1 SUSPENSION, STEERING, WHEELS AND TIRES—GENERAL SERVICE

1 DIAGNOSIS AND TESTING

STEERING

Table 1 lists various suspension, steering, and wheel and tire trouble symptoms and their possible causes. The possible causes are listed in the table in the order in which they should be checked. For example, refer to the fourth trouble symptom in Table 1, Hard Turning When Stationary. When checking the possible causes, check item 1 (tire pressure) and item 2 (tire size) before proceeding with the other items in-
ted.
e 2 lists steering gear trouble

POWER STEERING PRELIMINARY CHECKS

The following preliminary checks should always be made before performing any trouble diagnosis operations. Also, see Tables 1 and 2.

Air Bleeding

Air Bleeding. Air in the power steering system (shown by bubbles in the fluid) should be bled. After making sure that the reservoir is filled to specification (the fluid must be at normal operating temperature when the check is made), turn the steering wheel through its full travel three or four times with the windshield wiper in operation. **Do not hold the wheels against their stops.** Recheck the fluid level.

Fluid Level.

Fluid Level. Run the engine until the fluid is at normal operating temperature. Then turn the steering wheel all the way to the left and right several times, and shut off the engine.

Check the fluid level in the power steering reservoir. The level must be at the full mark on the dipstick. If the level is low, add enough automatic transmission fluid (C1AZ-19582-A) to raise the level to the F mark on the dip stick. **Do not overfill the reservoir.**

PUMP BELT

If the pump belt is broken, glazed, or worn, replace it with a new belt. **Us only the specified type of belt.** Refer to Part 3-3 for belt adjustment.

TABLE 1—Steering System Trouble Symptoms and Possible Causes

POSSIBLE CAUSES OF TROUBLE	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	
4. Power Steering Fluid Level Low-Leak		X		X	X	X										
5. Sagging or Broken Spring						X	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	
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	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			
23. Incorrect Front Wheel Bearing Adjustment		X	X			X	X	X	X				X			
24. Wheel Out of Balance		X				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 of Underbody Out of Alignment								X					X			X
Rear Axle Housing						X		X					X			X
ternal Parts						X										
r Out of				X	X							X				
				X	X							X				

Fluid Leaks.

With the engine idling, turn the steering wheel from stop to stop several times. Check all possible leakage points. Tighten all loose fittings, and replace any damaged lines or defective seats.

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 pull scale to the rim of the steering wheel. Measure the pull required to turn the wheel one complete revolution in each direction. The effort required to rotate the steering wheel should not exceed 3.5 pounds.

TABLE 2—Power Steering Gear Diagnosis Guide

JERKY STEERING	Low fluid level or fluid leakage. Obstruction in power steering lines or within the steering gear.	Loose steering gear mountings. Incorrect steering gear adjustment.
HARD STEERING AND/OR LOSS OF POWER ASSIST	Low fluid level or fluid leakage. Air in power steering system. Obstruction in power steering lines or within the steering gear.	Insufficient power steering pump pressure. Incorrect steering gear adjustment. Steering gear valve spool binding or out of adjustment.
HARD TURNING WHEN STATIONARY	Low fluid level or fluid leakage. Obstruction in power steering lines or within the steering gear.	Insufficient power steering pump pressure.
POWER STEERING GEAR DIAGNOSIS GUIDE	Low fluid level or fluid leakage. Air in power steering system. Obstruction in power steering lines or within the steering gear.	Loose steering gear mountings. Insufficient power steering pump pressure. Incorrect steering gear adjustment.
LOOSE STEERING SHIMMY OR WHEEL TRAMP SIDE-TO-SIDE WANDER	Loose steering gear mountings.	Incorrect steering gear adjustment.
BINDING OR POOR RECOVERY	Insufficient power steering pump pressure. Incorrect steering gear adjustment.	Steering gear valve spool binding or out of adjustment. Obstruction within the steering gear.
BODY SWAY OR ROLL	Incorrect steering gear adjustment.	
POWER STEERING GEAR DIAGNOSIS GUIDE	Steering gear valve spool binding or out of adjustment.	
ABNORMAL OR IRREGULAR TIRE WEAR	Incorrect steering gear adjustment.	

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 9/16" 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 (Tool T56L-33610-D) and shut off valve between the end of the hose and the pump outlet.

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 to the engine.

4. Start the engine and operate it at idle speed for at least two (2) minutes to warm up the fluid.

5. Cycle the steering wheel from stop-to-stop several times to expel any air from the system; stop the engine. Remove the reservoir filler cap and check the fluid level in the reservoir. If necessary, add lubricant (C1AZ-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 pressure 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 1075 to 1150 psi.

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

8. Remove the tachometer.

TABLE 3—Movable Steering Column Trouble Symptoms and Possible Causes

BINDING, ROUGH, OR RASPING COLUMN	Track to column bracket misalignment.	Locking plate out of adjustment rubs pawl. Shroud interference with instrument panel.
HARD COLUMN MOVEMENT	Slide tension out of adjustment. Track to column bracket misalignment.	Locking plate out of adjustment—rubs pawl.
POSSIBLE SHIFT INTO REVERSE WITH COLUMN AT EXTREME RIGHT	Locking plate out of adjustment.	
POOR SHIFTING INTO OR OUT OF PARK	Left stop out of adjustment.	Lock pawl arm binding in pivot bushing.
LATERAL LOOSENESS IN COLUMN WHEN LOCKED	Locking pawl arm loose in pivot bushing.	Pivot bracket loose at steering gear. Left stop out of adjustment.
VERTICAL LOOSENESS IN COLUMN WHEN LOCKED	Loose track or braces. Pivot bracket loose at steering gear.	Slide tension out of adjustment.
RIGHT SHROUD HITS AIR CONDITIONING UNIT	Right stop bolt (on track) out of adjustment.	

FRONT WHEEL ALIGNMENT CHECKS

Do not attempt to check and adjust wheel alignment without first preliminary inspection of

before making any adjustments. The turning angle should be checked only after caster, camber and toe-in have been adjusted to specifications.

The front wheel alignment specifications given in Part 3-5 are correct only when the car is at Curb Height. Before checking or adjusting the alignment factors, the suspension alignment factors, the suspension alignment spacers must be installed to obtain the curb height.

EQUIPMENT INSTALLATION

Equipment used for front wheel alignment inspection must be accurate. Alignment height spacers (Figs. 1 and 2) are used to check caster and camber.

The spacers should be omitted when checking toe-in.

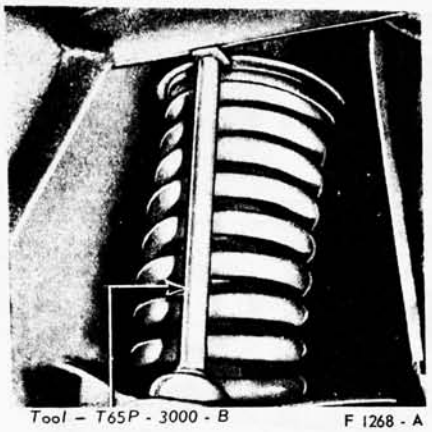


FIG. 1–Alignment Spacer Installation-Front

FIG. 2 Alignment Spacer Installation -Rear

1. Drive the car in a straight line far enough to establish the straight-ahead position of the front wheels, and then mark the steering wheel hub and the steering column collar (Fig. 3). **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 suspension alignment spacers as follows to establish the curb height.

Lift the front of the car and position the suspension alignment spacers between the suspension upper arm

FIG. 3–Typical Straight Ahead Position Marks

and the edge of the frame spring pocket as shown in Fig. 1. The lower end of the alignment spacers should be placed over the head of the ball joint retaining nut. Position the alignment spacers for the rear of the car between the rear axle and the frame side rail as shown in Fig. 2. Lower the rear of the car so that the weight of the body will hold the alignment spacers in place.

3. Install the wheel alignment equipment on the car. Whichever type of equipment is used, follow the installation and inspection instructions provided by the equipment manufacturer.

CASTER

Check the caster angle at each front wheel. Caster is the forward or rearward tilt at the top of the wheel spindle (Fig. 4). 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 3-5.

The maximum difference between both front wheel caster angles should not exceed 1/2° . However, a difference of not more than 1/4° is preferred.

CAMBER

Check the camber angle at each front wheel. The camber angle is the amount the front wheels are tilted at

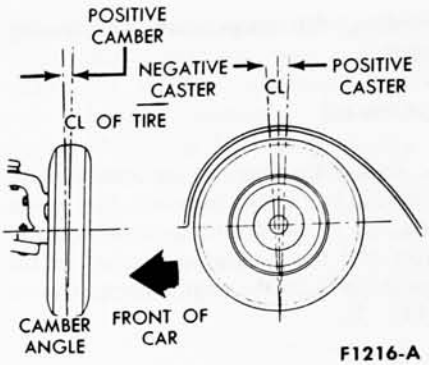


FIG. 4–Caster and Camber Angles

the top (Fig. 4). If a wheel tilts outward, camber is positive. If a wheel tilts inward, camber is negative. The correct camber angle, or outward tilt, is specified in Part 3-5. The maximum difference between both front wheel camber angles should not exceed 1/2°. However, a difference of not more than 1/4° is preferred.

TOE-IN

Alignment height spacers are not used to check and adjust toe-in.

Toe-in should only be checked and adjusted after the caster and camber has been adjusted to specifications.

Check the toe-in with the front wheels in the straight-ahead position. 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 3-5.

FRONT WHEEL TURNING ANGLE

When the inside wheel is turned 20°, the turning angle of the outside wheel should be as specified in Part 3-5. 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.

TMENTS AND REPAIRS

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

bending the suspension or steering parts.

CAMBER

Adjust the camber by removing or installing shims between the pivot bracket of the front suspension lower arm and the mounting bracket on the underbody in the engine compartment (Fig. 5).

The removal of shims between the mounting and pivot brackets will move the lower ball joints inward. The installation of shims between the mounting and pivot brackets will move the lower ball joint outward. Camber adjusting shims are available in several standard shim thicknesses. A 1/16-inch change of shim thickness will change the camber angle 1/3°. The total shim stack thickness should not exceed 11/16-inch.

CASTER

The caster adjustment is made by repositioning the strut on the lower arm as shown in Fig. 5. Adjust the caster by loosening the rearward washers, nuts and bolts. Lift the strut so that the strut serrations will be free from the serrations on the lower arm. Lengthen the distance between the strut forward mount and the side of the lower arm (Fig. 5, dimension A) to decrease the caster angle. Decrease the distance between the strut forward mount and the side of the lower arm (Fig. 5, dimension A) to increase the caster angle. Tighten the rearward nuts that retain the strut to the lower arm. Check the caster, camber, and toe-in alignment for the correct settings listed in the specifications. Remove the suspension alignment spacers.

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. The to[illegible]pecification is specified in Part

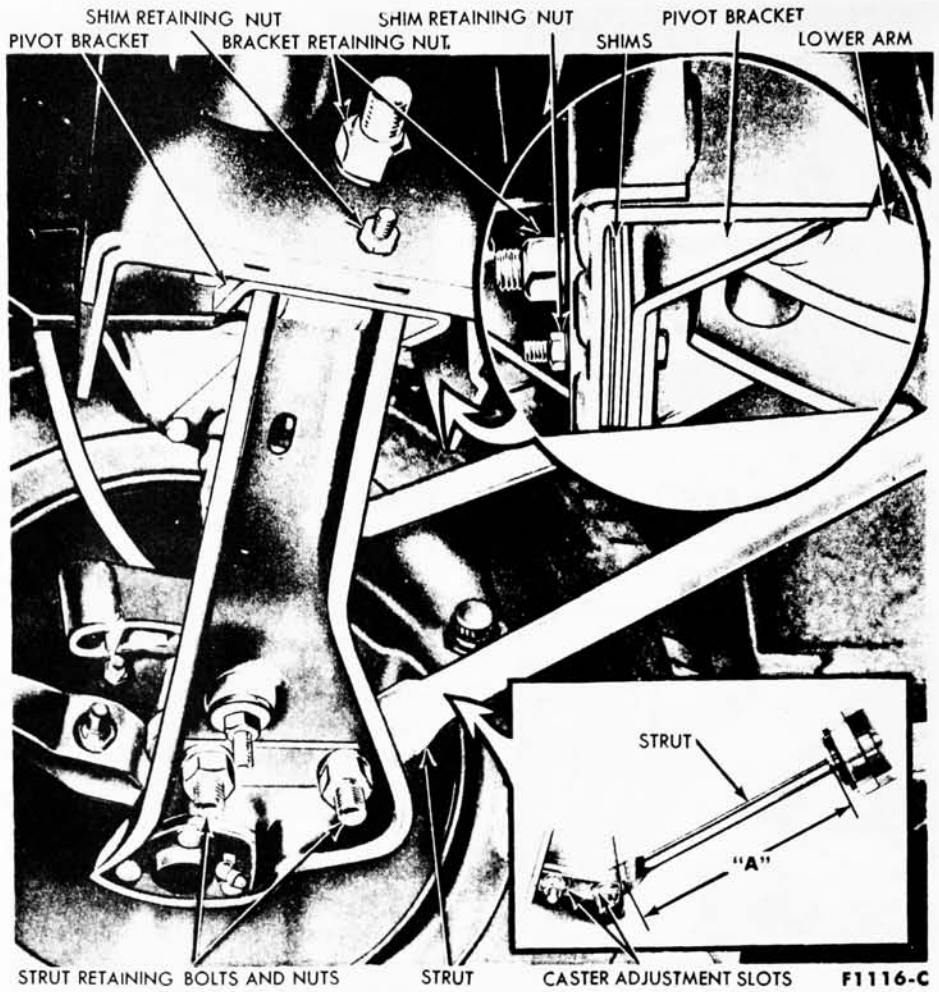


FIG. 5 Caster and Camber Adjustments

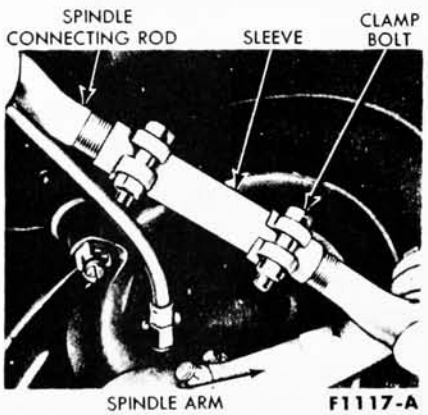


FIG. 6–Spindle Connecting Rod Sleeve

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. 7). If the steering wheel spokes are not in their normal position, make the necessary rod adjustments to obtain correct toe-in and steering wheel spoke alignment (Fig. 8).

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. 8).

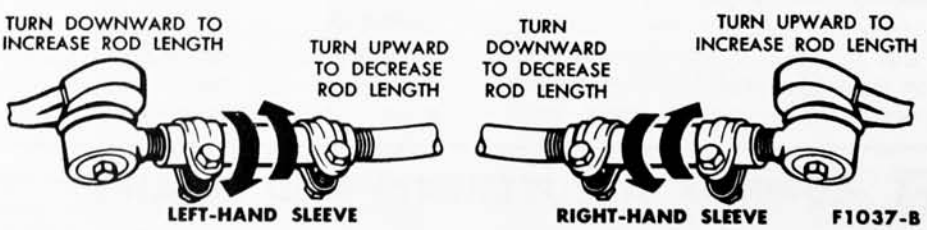


FIG. 7–Spindle Connecting Rod Adjustments

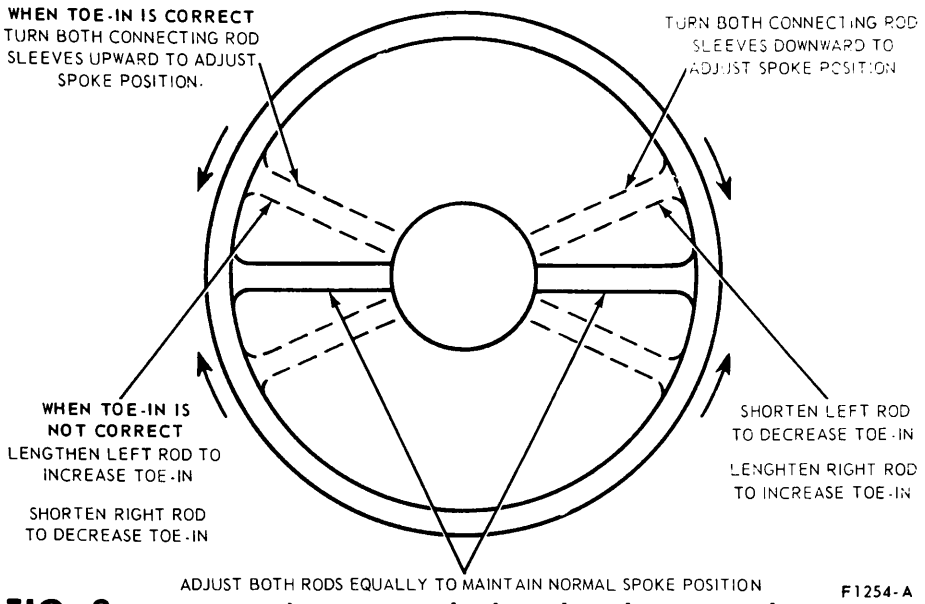


FIG. 8 —Toe-In and Steering Wheel Spoke Alingment Adjustments

4. When toe-in and steering wheel spoke alignment are both correct, make sure the tie rods and tie rod ends are in the neutral position and torque the clamp bolts on both connecting rod sleeves to specifications.

3 CLEANING AND INSPECTION

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. Check the front suspension ball joints and mountings for looseness, wear and damage. Check the brake caliper attaching bolts. 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, it must be replaced.

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

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

Check the action of the shock

WHEEL INSPECTION

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

Keep the wheels and hubs clean. Stones wedged between the wheel and rotor or rear 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 eventually damage the wheel bearings. Inspect the wheel rims for dents that could permit air to leak from the tires.

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. 9. This will unload the upper ball joint.

2. Adjust the wheel bearings as described in Part 3-4.

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.

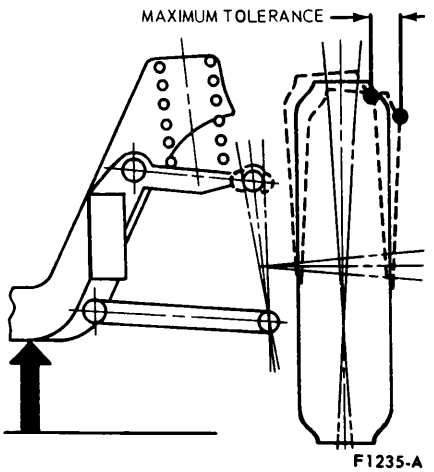


FIG. 9 —Measuring Upper Ball Joint Radial Play

5. Grasp the tire at the top and bottom, and slowly move the tire in and out (Fig. 9). Note the reading (radial play) on the dial indicator. If the reading exceeds specifications (Part 3-5), replace the upper ball joint.

LOWER BALL JOINT INSPECTION

To determine if the lower ball joint is excessively worn or loose, perform the following procedure.

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 are.

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.

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 3-3.

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

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

4. Fill the reservoir with lubricant (C1AZ-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 (C1AZ-19582-A) 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.

PART 3-2 SUSPENSION

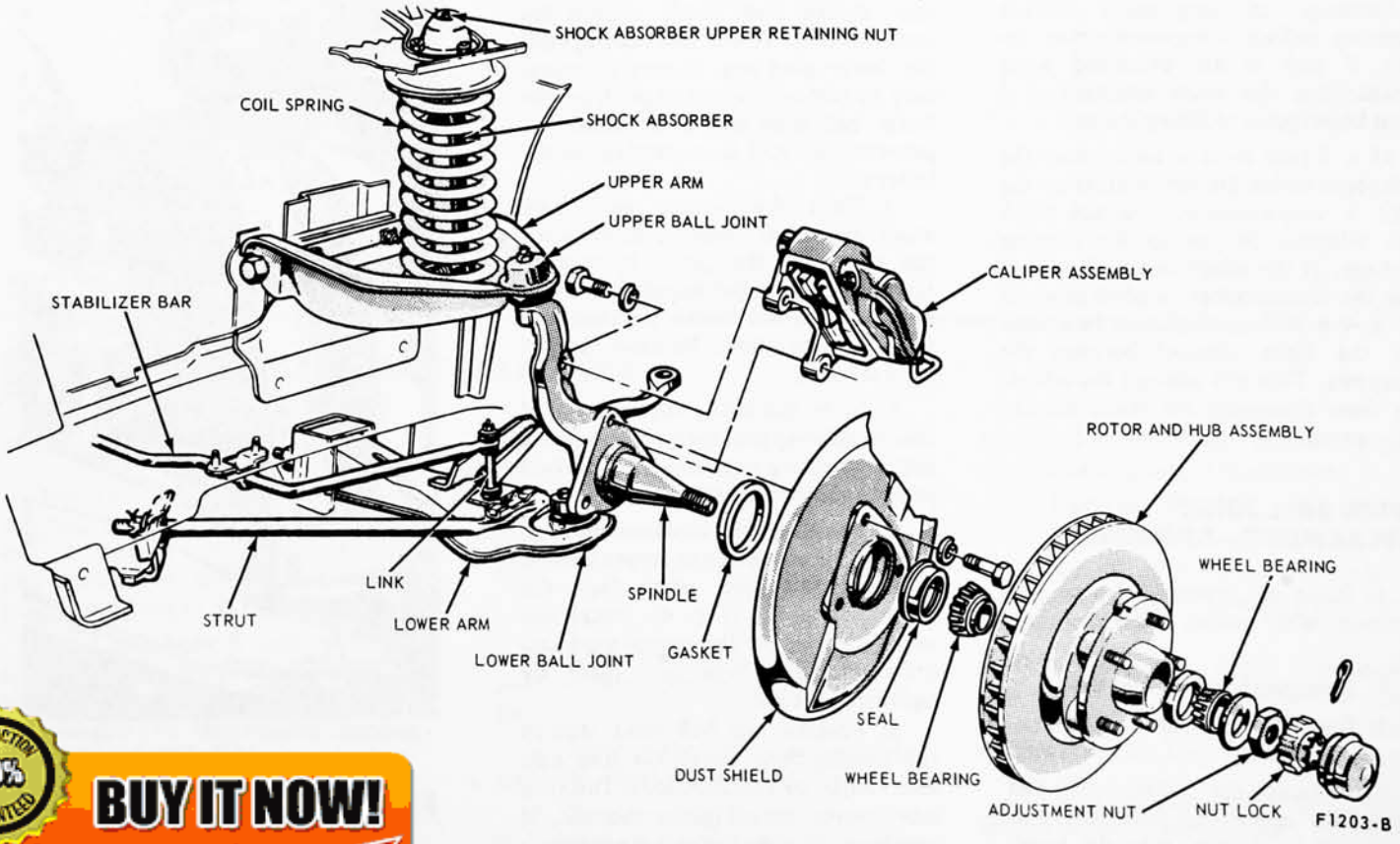
1 DESCRIPTION AND OPERATION

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 mounted in a bracket which is bolted to the underbody (Fig. 1). A coil spring seats between the upper arm and the top of the spring housing. A double-acting shock absorber is bolted to the upper 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 **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.

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 spring assemblies. The axle housing is fastened to the center of the springs by spring clips (U-bolts), spring clip plates, and nuts (Fig. 2). Each spring assembly is suspended from the underbody side rail by hanger and shackle assemblies at the front and rear. The upper end of each shock absorber is mounted to a bracket in the under body; the lower end is mounted to the spring pad at the axle housing.

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.

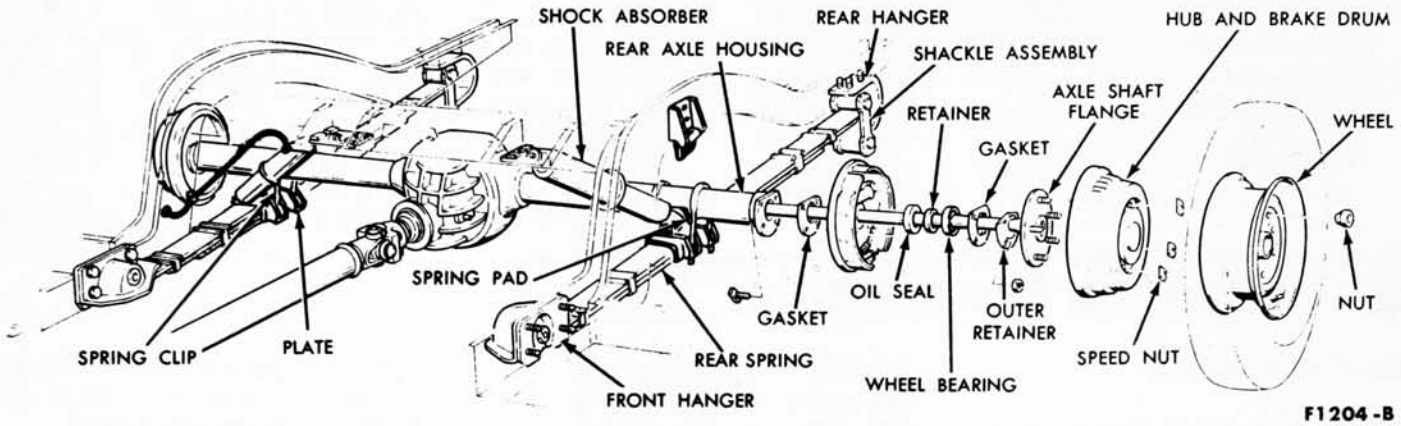


FIG. 2 –Rear Suspension

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, place the adapters under the lower arms or the NO. 1 crossmember. Do not allow the adapters to contact the steering linkage. If the adapters are placed under the crossmember, a piece of wood (2 x 4 x 16 inches) should be placed on the hoist channel between the adapters. This will prevent the adapters from damaging the front suspension struts.

UPPER BALL JOINT REPLACEMENT—ARM IN CAR

1. Raise the front of the car and position safety stands under the chassis.

2. Remove the wheel and tire.

sen the upper stud (ball

end of tool T57P-3006-A, and position the tool as shown in Fig. 3. **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 cotter pin from the lower ball joint stud if the cotter pin prevents the tool from seating on the lower stud.

5. Turn the wrench until both studs are under tension, then loosen the stud from the spindle by tapping the spindle near the upper stud with a hammer. **Do not loosen the stud with tool pressure alone.** Remove the ball joint stud nut.

6. Slide the ball joint stud out of the spindle upper bore. Remove the upper retaining nut, and drive the ball joint out of the suspension arm.

8. Position the replacement ball joint in its recess in the upper arm so that the ball joint notch faces the front of the car (Fig. 4). Install the retaining nut on the upper stud and draw the ball joint into place by tightening the nut.

9. Position the ball joint stud in the spindle bore, install the stud nut, and torque to specifications. Install a new cotter pin. Tighten the nut, if necessary, to align the cotter pin hole.

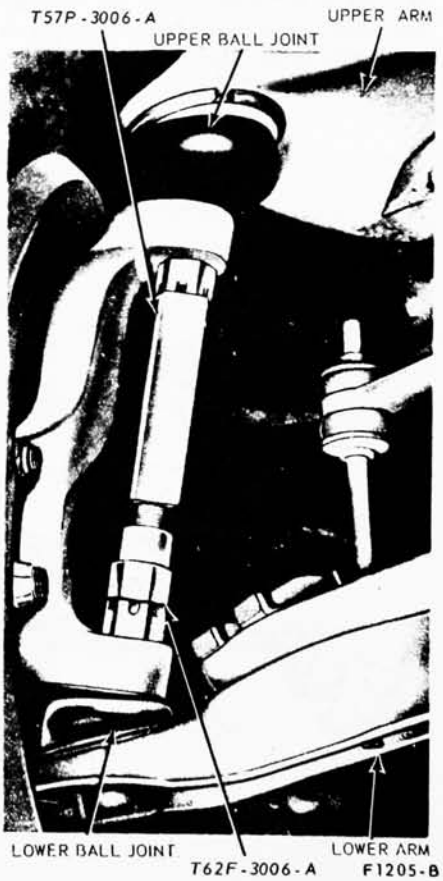


FIG. 3 –Loosening Ball Joint Stud

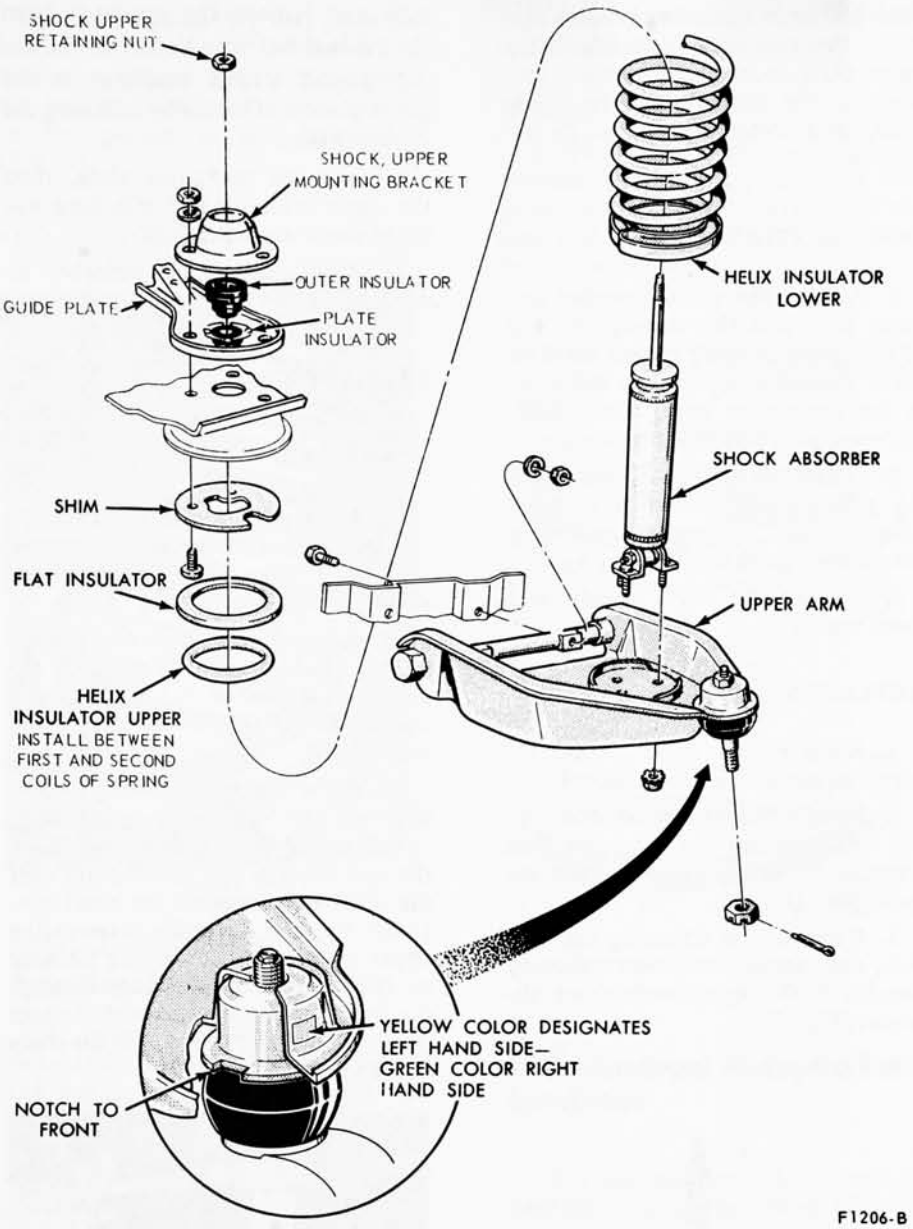


FIG. 4 –Upper Arm, Shock Absorber and Spring Connections

10. Install the wheel and tire assembly.

11. Remove the safety stands, lower the car, and check camber, caster and toe-in.

STABILIZER REPAIR

To replace the end bushings on each stabilizer link, use the following procedure.

1. Raise the car on a hoist.

2. Remove the link-to-stabilizer bar retaining nut, washers, and insulators, and disconnect the link from the bar (Fig. 1).

3. Remove the link-to-lower arm retaining nut, washers, and insulators, and remove the link from the arm.

4. Assemble the link and new washers and insulators to the lower arm, then install the link-to-lower arm attaching nut.

5. Connect the link to the bar with new washers and insulators and secure with the attaching nut.

6. Lower the car.

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, place the adapters under the lower arms or the NO. 1 crossmember. Do not allow adapters to contact the steering [illegible] If the adapters are placed [illegible] ers from damaging the front suspension struts.

FRONT WHEEL SPINDLE

1. Raise the front of the car and position safety stands under the chassis.

2. Remove the wheel cover and remove the wheel and tire from the hub.

3. Remove 2 bolts and washers that attach the caliper to the spindle (Fig. 1). Remove the caliper from the rotor and wire it to the underbody to prevent damage to the brake hose.

4. Remove the hub and rotor from the spindle.

5. Remove 3 bolts and remove the splash shield and gasket from the spindle.

6. Remove the cotter pin and retaining nut, then disconnect the spindle connecting rod end from the spindle arm with Tool 3290-C.

7. Remove the cotter pins and loosen the ball joint stud nuts.

8. Position a box wrench over the

lower end of the Tool T57P-3006-A and position the tool as shown in Fig. 3. **The tool should seat firmly against the ends of both studs, not against the stud nuts.**

9. Turn the wrench until the tool places the studs under tension, then loosen the studs in the spindle by tapping the spindle near the studs with a hammer. **Do not loosen the studs in the spindle with tool pressure alone.**

10. Remove the stud nuts and the spindle from both studs.

INSTALLATION

1. Position the new spindle to the upper and lower ball joint studs, install the stud nuts, and tighten the nuts to specifications. Continue to tighten both nuts until the cotter pin holes line up with slots, then install new cotter pins.

2. Connect the spindle connecting rod end to the spindle arm, and install the retaining nut. Tighten the nut to specifications, align slot and install cotter pin.

3. Install the gasket and splash shield on the spindle. Tighten the retaining bolts to specifications.

4. Install the hub and rotor on the spindle and adjust the wheel bearings.

5. Position the caliper over the rotor and install the attaching bolts. Tighten the bolts to specifications. Check for the correct flexible hose routing (Part 2-2).

6. Install the wheel and tire on the hub.

7. Lubricate the steering stop on the lower arm and the mating flat on the spindle with specified lubricant.

8. Remove the safety stands, lower the car, and check camber, caster, and toe-in.

FRONT SHOCK ABSORBER

REMOVAL

1. Raise the front of the car and position a safety stand under the lower suspension arm; then, lower the car slightly.

2. Disconnect the shock absorber [illegible] bracket from the up-

absorber upper mounting bracket. Remove the two bolts that attach the guide plate to the dash panel brace. Remove the shock absorber, guide plate, and lower bracket as an assembly.

INSTALLATION

1. Position the shock absorber and guide plate assembly through the top of the spring housing so that the three lower mounting studs enter the holes in the suspension upper arm. Install the lower attaching nuts on the studs.

2. Install the two bolts that attach the guide plate to the dash panel brace. Install the upper mounting bracket and the three attaching nuts.

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

REPLACEMENT

1. Remove the front shock absorber as outlined under Removal.

2. Remove the shock absorber upper attaching nut and insulator, then separate the shock absorber from the guide plate (Fig. 4).

3. Remove the attaching nut and bolt, and transfer the lower mounting bracket to the replacement shock absorber (Fig. 5).

4. Pry loose the insulator retaining tabs and remove the insulator from the guide plate (Fig. 4).

5. Install a new insulator in the guide plate and secure by crimping the retaining tabs.

6. Assemble the guide plate, then the outer insulator and attaching nut to the shock absorber shaft.

7. Install the shock absorber as outlined under Installation.

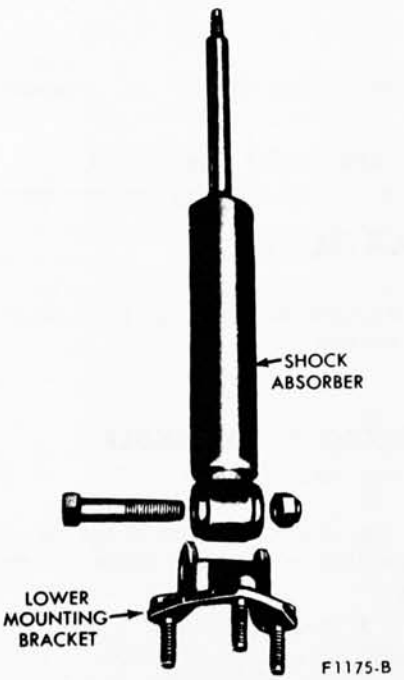


FIG. 5 – Front Shock Absorber and Mounting Bracket

FRONT SPRING

REMOVAL

1. Raise the front of the car, position safety stands under the suspension lower arms; then, lower the car slightly.

2. Remove the wheel and tire assembly. Remove the front shock absorber as described in steps 2 and 3 under Removal in the foregoing procedure.

3. Raise the car slightly in order to lower the suspension upper arm. Install spring tool T63P-5310-A. Slide the tool bearing and upper plate over the shaft screw against the shaft nut. Insert the tool assembly through the upper opening in the spring housing so that the shaft screw goes through the top of the coil spring with the tool upper plate holes going over the studs as shown in Fig. 6.

FIG. 6 – Compressing or Releasing Spring-Upper View

4. From under the car, place the tool lower plate under the fourth coil from the bottom. Secure the plate to the coil by installing the tool retainer in the groove in the shaft screw (Fig. 7).

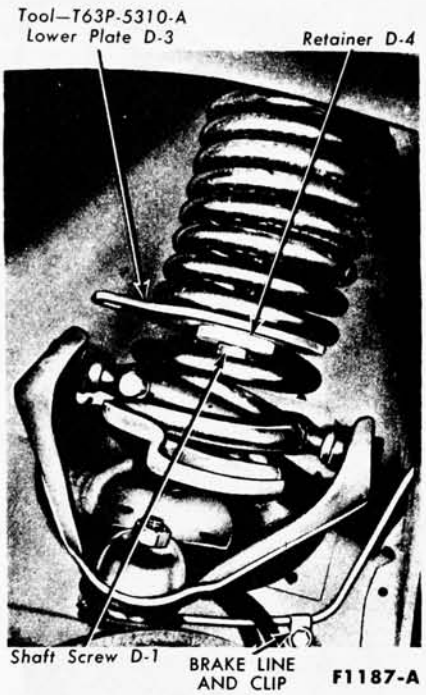


FIG. 7 –Compressing or Releasing Spring-Lower View

5. Insert a 1/2-inch square drive flex-handle wrench in the drive hole in the lower plate to prevent the tool with spring from turning (Fig. 7). While holding the tool, compress the spring by turning the tool shaft nut clockwise (Fig. 6).

6. Remove the two nuts and lock washers that attach the upper arm inner shaft to the chassis, and swing the arm out of the way. The arm pivots on the ball joint.

7. Remove the bolt that retains the clip and brake line to the chassis, then move the brake line out of the way (Fig. 7).

8. Disconnect the stabilizer bar from the link at both left and right hand suspension lower arms by removing the bar-to-link attaching nuts and upper bushings (Fig. 1). Position the bar out of the way.

9. Fully release the spring tension turning the tool shaft nut counterclockwise (Fig. 6). **Be sure to hold**

10. Remove the spring tool, then remove the spring from the car.

INSTALLATION

1. Insert one helix-type insulator between the two top coils of the spring and attach the other to the bottom coil (Fig. 8). Secure both insulators with tape.

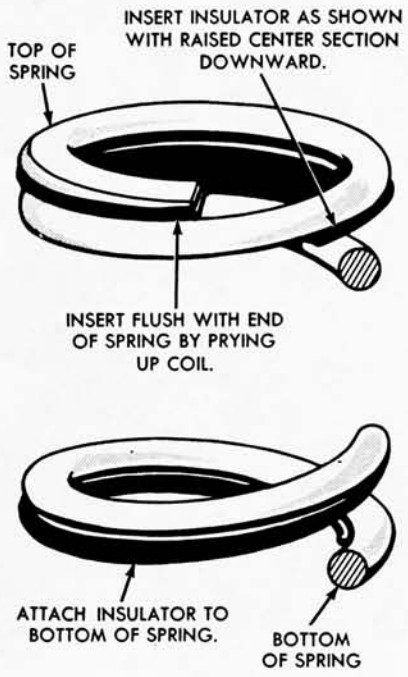


FIG. 8 –Front Spring Insulator Installation

2. Place the flat rubber insulator over the top of the spring (Fig. 4), and secure it with tape in three places.

3. Assemble the upper components of Tool T63P-5310A by sliding the tool bearing and the upper plate over the shaft screw against the shaft nut. Position the spring from under the car so that its upper end is seated in the spring housing. Insert the tool assembly through the upper opening in the spring housing so that the shaft screw goes through the top of the coil spring with the tool upper plate holes going over the studs as shown in Fig. 6.

4. From under the car, place the tool lower plate under the fourth coil from the bottom. Secure the plate to the coil by installing the tool retainer to the groove in the tool shaft screw.

5. Compress the spring by turning the tool shaft nut clockwise (Fig. 6). Hold the tool lower plate from turning during spring compression. Use the 1/2-inch square drive flex-handle wrench.

6. Position the stabilizer bar on the left and right links and install the rubber bushings and nuts (Fig. 1).

7. Position the brake line and clip on the chassis and install the attaching bolt.

8. Swing the upper arm into position and install the arm inner shaft-to-chassis attaching nuts. **Do not tighten.**

9. **Partially** release the spring tension by turning the shaft nut of tool T63P-5310-A counterclockwise (Fig. 6). As the spring is being released, pry the lower coil so that it will seat in the groove of the upper arm. **Hold the tool lower plate with the square drive wrench.**

10. Tighten the upper arm inner shaft-to-chassis attaching nuts to specifications. Release the spring completely, then remove the tool. **Hold the tool lower plate from turning during spring release. Use the 1/2-inch square drive flex-handle wrench.**

11. With the safety stands placed under the suspension lower arms, lower the car enough to compress the spring slightly.

12. Position the shock absorber and upper mounting plate assembly through the top of the spring housing so that the three lower mounting studs enter the holes in the suspension upper arm. Install the lower attaching nuts on the studs.

13. Install the two bolts that attach the mounting plate to the dash panel brace. Install the three mounting plate attaching nuts.

14. Install the wheel and tire assembly. Remove the safety stands. Check caster, camber and toe-in.

UPPER ARM

REMOVAL

1. Remove the shock absorber and coil spring assemblies, and disconnect the arm inner shaft from the chassis as outlined in the Front Spring procedure under Removal.

2. Remove the cotter pin and loosen the upper ball joint stud nut. Place a box wrench over lower end of Tool T57P-3006-A as shown in Fig. 3. **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 cotter pin from the lower ball joint stud if the cotter pin prevents the tool from seating on the lower stud.

3. Turn the wrench until both studs are under tension, then loosen the upper stud from the spindle by tapping the spindle near the upper stud with a hammer. **Do not loosen the stud with tool pressure alone.** Remove the upper stud nut, and disengage the upper ball joint and stud from the spindle. Remove the upper arm from the car.

INSTALLATION

1. Position the arm on the car by inserting the upper ball joint stud in the spindle upper bore. Install the stud nut. Tighten the nut to specifications, then continue to tighten until the cotter pin holes are aligned with the slots. Install a new cotter pin.

2. Install the coil spring, connect the upper arm inner shaft to the chassis, and install the shock absorber. Follow the steps in the Front Spring procedure under Installation.

LOWER ARM

REMOVAL

1. Raise the front of the car, and install safety stands.

2. Remove the wheel and tire from the hub.

3. Remove 2 bolts and washers that attach the caliper to the spindle. Remove the caliper from the rotor and wire it to the underbody to prevent damage to the brake hose.

4. Remove the hub and rotor from the spindle.

5. Remove the splash shield and gasket from the spindle.

6. Remove the link nut underneath the arm (Fig. 9), and disconnect the stablizer link from the arm.

7. Remove the attaching nuts, bolts, washers and plates, and disconnect the strut from the lower arm (Fig. 9).

8. Remove the cotter pin and loosen the lower ball joint stud nut. Place a box wrench over the end of

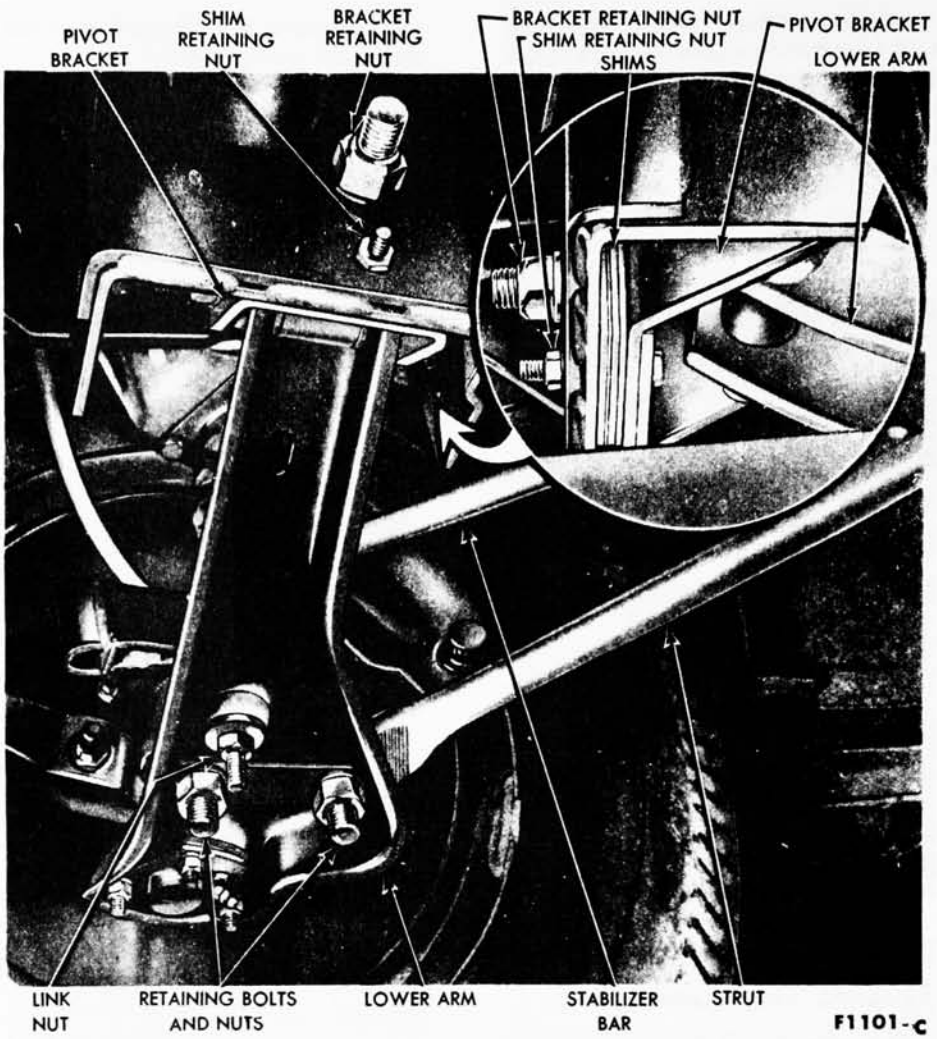


FIG. 9—Suspension Lower Arm Installed

nut. It may be necessary to remove the cotter pin from the upper ball joint stud if the cotter pin prevents the tool from seating on the upper stud.

9. Turn the wrench until both studs are under tension, then loosen the stud from the spindle by tapping the spindle near the lower stud with a hammer. **Do not loosen the stud with tool pressure alone.** Disengage the lower ball joint and stud from the spindle.

10. Remove the pivot bracket retaining nut and the shim retaining nut (Fig. 9), then remove the bracket and lower arm assembly from the car.

11. Place the assembly in a vise and remove the nut from the pivot bolt (Fig. 10). Remove the pivot bolt, and separate the pivot bracket from the lower arm.

INSTALLATION

1. Assemble the pivot bracket to the new lower arm with the pivot bolt,

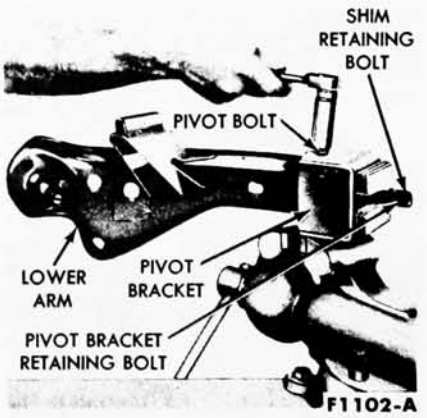


FIG. 10—Lower Suspension Arm Assembly

place the assembly in a vise and install the pivot bolt nut (Fig. 10). Tighten the nut snug. Do not torque it until the lower arm assembly is installed in the car.

2. Slide the shims over the retaining bolts against the pivot bracket (Fig. 10), then mount the lower arm and pivot bracket assembly

to the chassis mounting bracket (Fig. 9). Install the pivot bracket and shim retaining nuts.

3. Insert the lower ball-joint stud in the lower bore of the wheel spindle, and install the stud nut. Tighten the nut to specifications, then continue to tighten until the cotter pin holes are aligned with the slots. Install a new cotter pin.

4. Position and connect the lower arm strut to the lower suspension arm with retaining plates, bolts, washers, and nuts (Fig. 9). Torque the nuts.

5. Connect the stabilizer bar link to the lower suspension arm, and install the washers, bushings and link retaining nut. Tighten the nut to specifications.

6. Tighten the pivot bolt and nut at the lower arm pivot bracket to specifications.

7. Lubricate the steering stop on the lower arm and the mating flat on the spindle. Refer to Group 19 for the specified lubricant.

8. Install the gasket and splash shield on the spindle. Tighten the retaining bolts to specifications.

9. Install the hub and rotor on the spindle and adjust the wheel bearings.

10. Install the caliper to the spindle and tighten the attaching bolts to specifications. Check for the correct flexible hose routing (Part 2-2).

11. Install the wheel and tire on the hub.

12. Remove the safety stands, lower the car, and check the camber, caster, and toe-in.

REAR SHOCK ABSORBER

REMOVAL

1. Raise the rear end of the car. Remove the bolts that retain the shock absorber mounting bracket to the underbody (Fig. 11).

2. Remove the attaching nut and outer washer from the shock absorber lower mounting stud at the spring pad on the axle housing. Disconnect the shock absorber from the stud. Compress the shock absorber and remove it from the car.

3. Remove the nut, outer washer and bushing that secure the shock absorber to the mounting bracket, and remove the bracket.

4. If the shock absorber is serviceable and requires new bushings, remove the inner bushing and washer from the shock absorber upper mounting stud.

INSTALLATION

1. Place the inner washer and bushing on the shock absorber upper mounting stud.

2. Connect the upper stud to the mounting bracket, and install the bushing, washer, and nut on the stud. Torque the nut to specifications.

3. Connect the mounting bracket and shock absorber to the underbody (Fig. 11). Torque the bolts to specifications.

4. Connect the lower eye of the shock absorber to the mounting stud on the spring pad with inner and outer washers and attaching nut. Torque the nut to specifications.

REAR SPRING

REMOVAL

1. Raise the car until the rear wheels clear the floor, and place supports beneath the underbody.

2. Remove the spring clip (U-bolt) nuts (Fig. 11), then lower the jack enough to remove the spring clips.

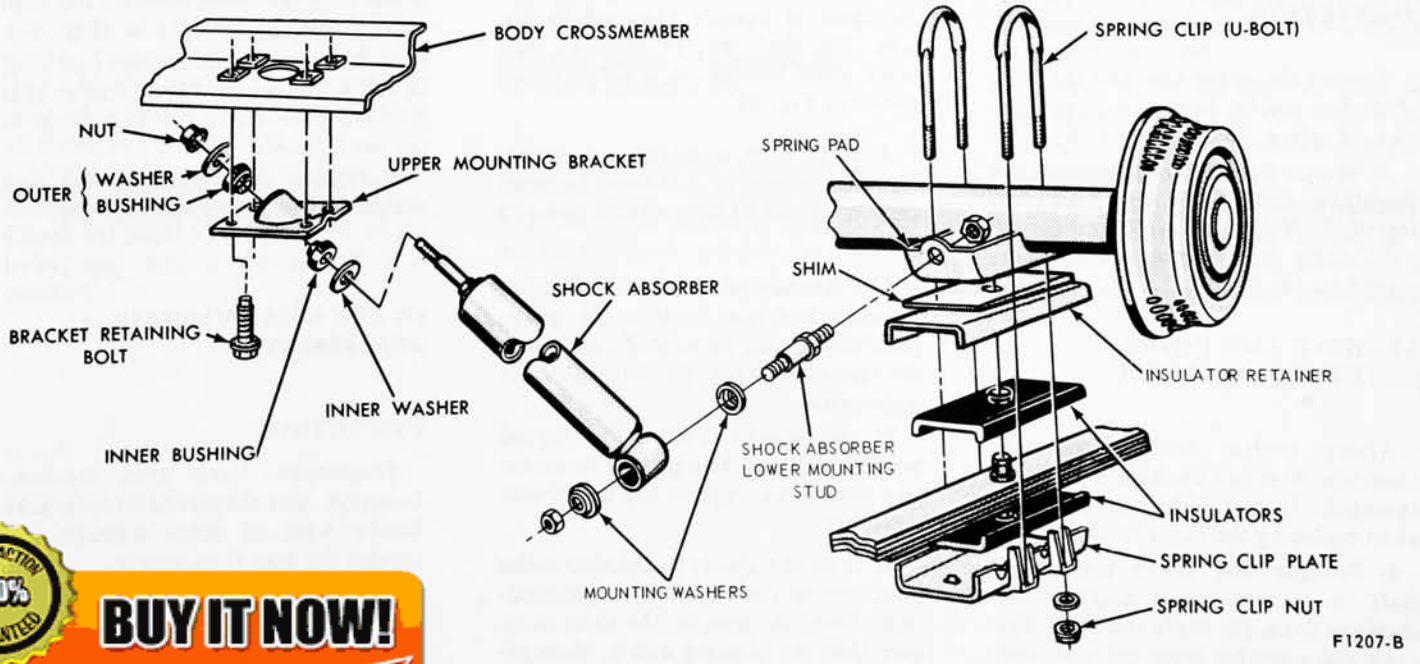
3. Remove the spring front hanger-to-underbody mounting bolts and lock washers (Fig. 12).

4. Remove the rear shackle nuts and shackle bar, then remove the shackle assembly from the rear hanger and spring (Fig. 13).

5. Lower the jack until the spring and front hanger assembly is free of the car.

6. Lift the shim (if used), upper insulator retainer, and insulator from the top of the spring.

7. Remove the spring and front hanger as an assembly from the jack, and separate the spring clip plate and the lower insulator from the spring.



and Spring Center Mounting

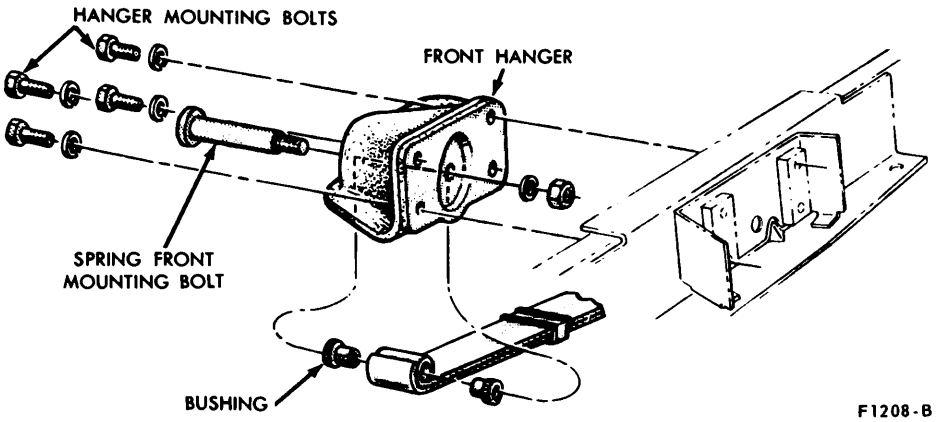


FIG. 12—Rear Spring and Front Hanger Mounting

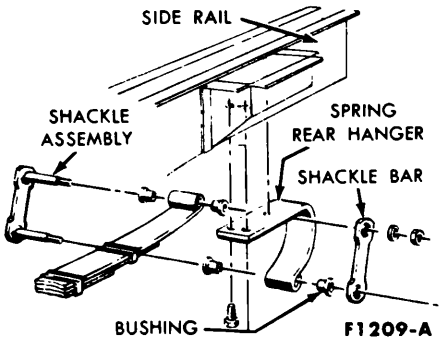


FIG. 13—Rear Spring and Rear Hanger Mounting

INSTALLATION

1. Position the lower insulator and spring clip plate on the center of the spring. Place the entire assembly on a wood block and jack, then raise the jack until the spring is in mounting position.

2. Position the rear eye of the spring on the rear hanger and install the shackle assembly to the spring and hanger (Fig. 13). The rear eye is at the long end of the spring from the center tie bolt. Install the shackle bar and retaining nuts. **Do not tighten the nuts at this time.**

3. Position the spring and front hanger assembly on the underbody, and install the hanger mounting bolts (Fig. 12). Do not tighten the bolts at this time.

4. Install the upper insulator and retainer on the spring (Fig. 11). Install the axle shim if one was used.

5. Raise the jack until the center of the spring, the insulators, the retainer, and the spring clip plate are all properly aligned and positioned against the spring pad on the axle housing (Fig. 11).

6. Install the spring clips over the axle housing and through the holes in the spring clip plate. Install the spring clip nuts, but do not tighten at this time.

7. Raise the rear axle so the weight of the car is on the rear suspension.

8. Torque the rear shackle nuts and the front hanger mounting bolts to specification.

9. Torque the spring clip nuts evenly to specification (Part 3-5). Make sure that the lower insulator retainer contacts the upper retainer. Remove the jack and wood block.

4 MAJOR REPAIR OPERATIONS

UPPER ARM OVERHAUL—ARM REMOVED

INSPECTION

Inspect the upper arm and the inner shaft for cracks, bends or other damage. Replace the parts as required.

Replacement arms come with the bushings, inner shaft, and ball joint installed. If the original arm is to be used, these components should be replaced on the bench.

BUSHING AND INNER SHAFT REPLACEMENT

Always replace both upper arm bushings, if either bushing is worn or damaged. Install only new bushings when replacing the inner shaft.

2. Position the shaft in the arm, apply grease to the new bushings, 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 located at the dimension shown in Fig. 14.

3. Fabricate a 9 1/4-inch spacer from a section of 3/4-inch diameter pipe or metal of comparable size and strength.

4. Position the arm and inner shaft assembly in a vise. Position the spacer parallel with the inner shaft, and force the spacer between the flanges of the upper arm.

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

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

BALL JOINT REPLACEMENT

1. Remove the ball joint-to-arm retaining nut and remove the ball joint from the upper arm (Fig. 14).

2. Install the replacement ball joint in its recess in the upper arm so that the ball joint notch faces the front of the car (Fig. 4).

3. Install the attaching nut and torque to specifications (Fig. 14).

LOWER ARM OVERHAUL—ARM REMOVED

INSPECTION

Inspect the lower arm, the inner bushings, and the pivot bolt for cracks, bends, wear or other damage, and replace the arm if necessary.

Replacement arms come with the ball joint installed. If the original arm is to be used, the ball joint should be replaced on the bench.

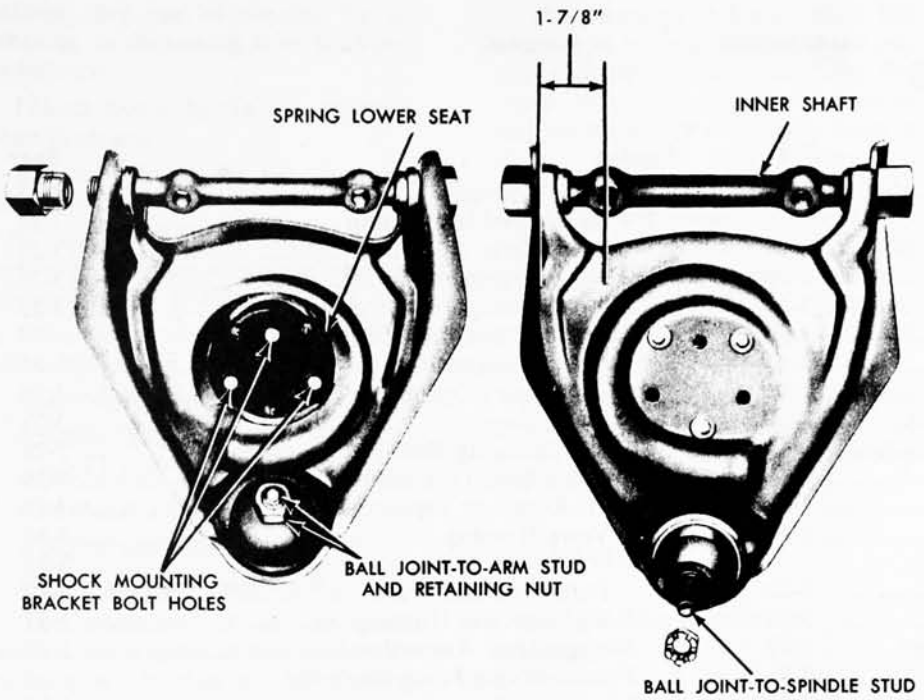


FIG. 14 – Upper Suspension Arm

BALL JOINT REPLACEMENT

The lower ball joint cannot be repaired and must be replaced if it is worn or damaged.

1. Remove the lower arm as outlined in the Lower Arm procedure under Removal.
2. Remove the ball joint from the arm. If the ball joint is riveted to the arm, drill a 1/8-inch pilot hole completely through each rivet, and then drill off the rivet head through the pilot hole with a 3/8-inch drill. Drive all rivets out of the holes.
3. 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.
4. Install a new ball joint on the arm. **Use only the specified bolts, nuts, and washers. Do not attempt to rivet the new ball joint to the arm.**
5. Torque the ball joint attaching nuts and bolts to specifications.
6. Install the lower arm as outlined in the Lower Arm procedure under Installation.

REAR SPRING OVERHAUL—SPRING REMOVED

FRONT HANGER ASSEMBLY

If the front hanger or bushings are to be replaced, proceed as follows:

1. Remove the nut and lock washer from the spring front mounting bolt (Fig. 12).
2. Tap the spring mounting bolt out of the bushings and hanger, then separate the nager from the spring. Remove the bushings.
3. Position the bushings in the front eye of the spring. Assemble the front hanger to the spring eye and install the spring mounting bolt through the hanger, bushings, and spring eye as shown in Fig. 12.
4. Install the lock washer and nut on the mounting bolt and tighten to the specified torque.

REAR SHACKLE AND HANGER ASSEMBLY

Inspect the rear shackle bushings, and studs for wear or damage. Replace parts where necessary (Fig. 13).

If the rear shackle bushings are to be replaced, it will be necessary to remove the rear hanger assembly. Torque the hanger attaching bolts to specification when reinstalled.

SPRINGS LEAVES AND TIE BOLT

Check for broken spring leaves. Inspect the anti-squeak inserts between the leaves, and replace them if they are worn. **The spring leaves must be dry and free of oil and dirt before new inserts are installed.**

Inspect the spring clips for worn or damaged threads (Fig. 11). Check the spring clip plate and insulator retainers for distortion.

If the spring center tie bolt requires replacement, clamp the spring in a vise to keep the spring compressed during bolt removal and installation.

PART 3-3 STEERING

1 DESCRIPTION AND OPERATION

STEERING GEAR

DESCRIPTION

The power steering unit is a torsion-bar type of hydraulic assisted system. This system furnishes power to reduce the amount of turning effort required at the steering wheel. It also reduces road shock and vibrations.

The torsion bar power steering unit includes a worm and one piece rack piston, which is meshed to the gear teeth on the steering sector shaft. The unit also includes a hydraulic valve, valve actuator, and torsion bar assembly which are mounted on the end of the worm shaft and operated by the twisting action of the torsion bar.

The torsion-bar type of power steering gear is designed with the one piece rack-piston, worm and sector shaft in one housing and the valve spool in an attaching housing (Fig. 1). This makes possible internal fluid passages between the valve and cylinder [illegible] eliminating all external lines except the pressure and

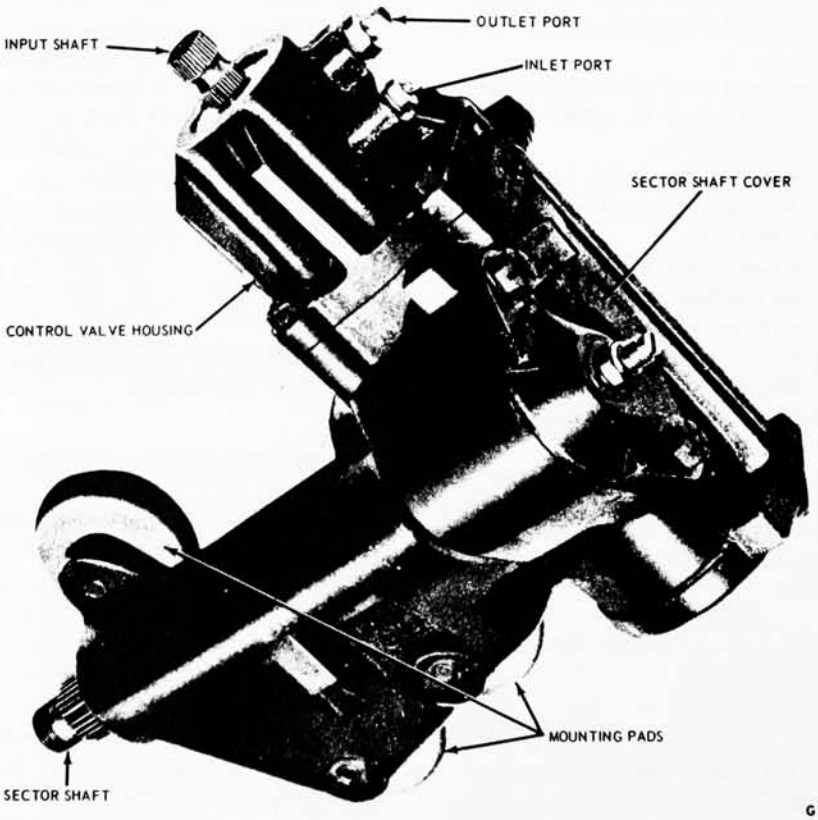


FIG. 1 —Steering Gear

may be applied to either side of the piston.

A selective metal shim, located in the valve housing of the gear is for the purpose of tailoring steering gear efforts. If efforts are not within specifi-