1966 FORD and MERCURY

SHOP MANUAL

1966 Ford and Mercury Shop Manual
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1966

FORD-MERCURY

SHOP MANUAL

GROUP INDEX

SPECIFICATIONS AND SPECIAL SERVICE TOOLS AT END OF EACH GROUP

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FOREWORD

This shop manual provides the Service Technician with complete information for the proper servicing of the 1966 Ford and Mercury cars.

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

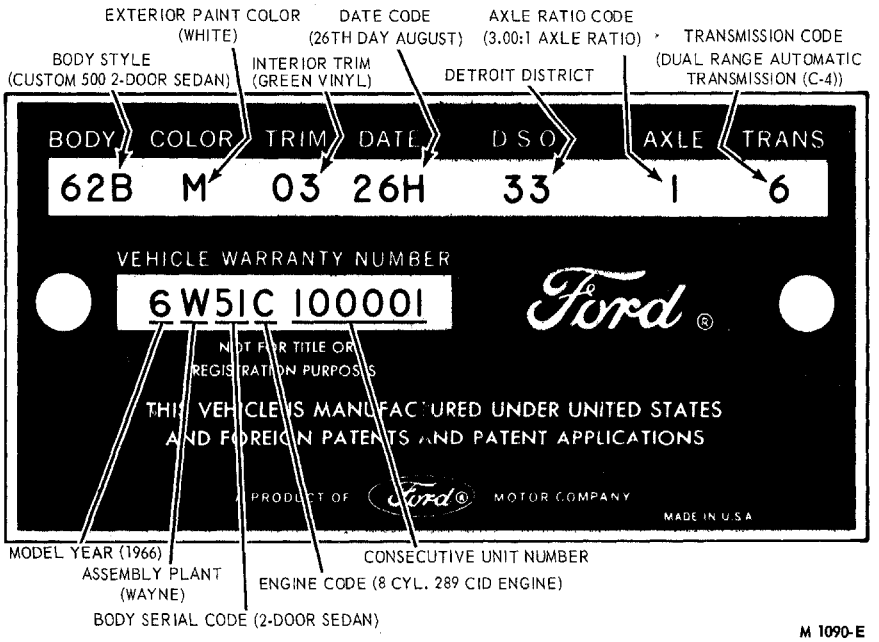
Refer to the opposite page for important vehicle identification data.

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

Ford SERVICE PUBLICATIONS

VEHICLE IDENTIFICATION

GROUP 1



M 1090-E

FIG. 1—Ford Warranty Plate

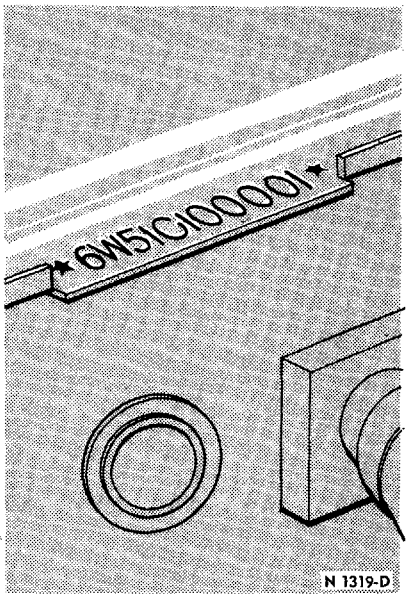


FIG. 3—Ford Vehicle Identification Number Location

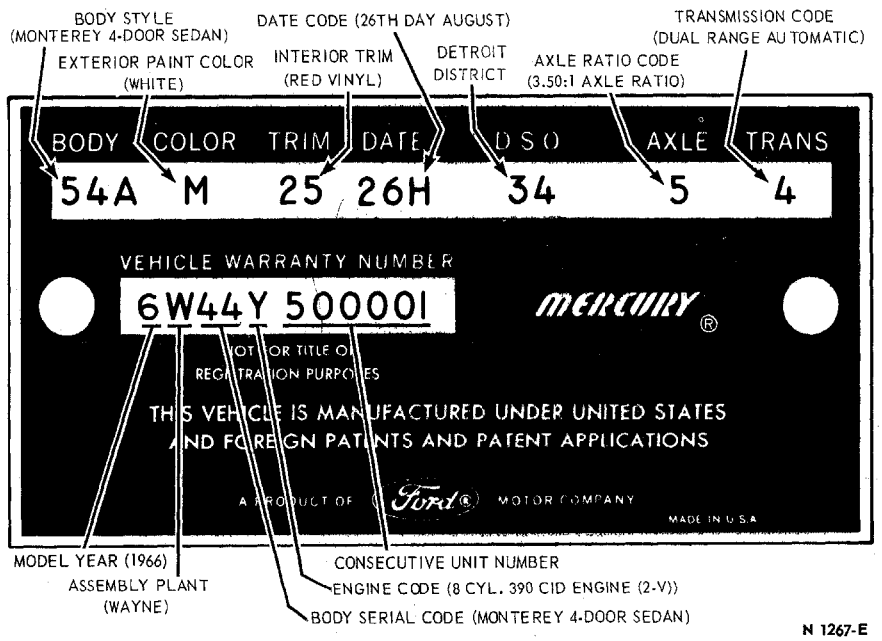


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FIG. 2—Mercury Warranty Plate

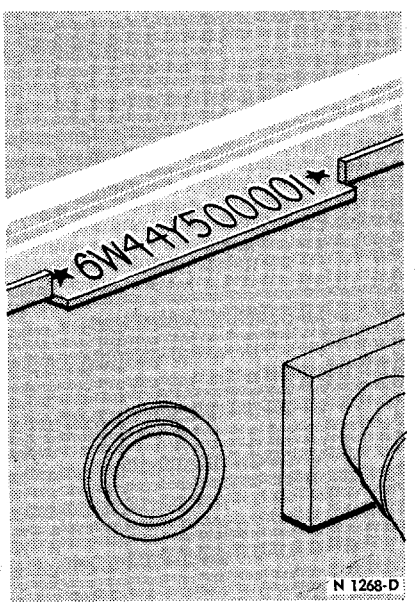


FIG. 4—Mercury Vehicle Identification Number Location

VEHICLE DATA

es 1 and 2 illustrate the Ford and Mercury Warranty Plates. The e left front door.
for title and registration
the top right side (weld
partment (Figs. 3 and 4).
ich appears on the War-
of the warranty plate

(Figs. 1 and 2). The first two letters and a number identify the body Style. The following one or two letters identify the Exterior Paint Color. The next code consisting of two numbers, or a letter and a number, identifies the Interior Trim. The Date Code showing the date the car was manufactured, follows the Trim Code and consists of two numbers and a letter. The next code gives the district in which the car was ordered and consists of two numbers. The next to the last code is the Axle Ratio Code and is designated by a number for a con-

ventional 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.

The vehicle warranty number is the second line of numbers and letters appearing on the Warranty Plate (Figs. 1 and 2). 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 model.

MERCURY

Body Serial Code	Body Style Code	Body Type
Monterey		
42	50A	4-Door Sedan†
43	62A	2-Door Sedan
44	54A	4-Door Sedan
45	76A	2-Door Convertible
47	63A	2-Door H/T Fastback
48	57A	4-Door H/T Fastback
45	76G	2-Door Convertible*
47	63G	2-Door H/T Fastback*
Montclair		
52	50B	4-Door Sedan†
54	54B	4-Door Sedan
57	63B	2-Door H/T Fastback
58	57B	4-Door H/T Fastback
Parklane		
62	50F	4-Door Sedan†
65	76F	2-Door Convertible
65	76C	2-Door Convertible*
67	63F	2-Door H/T Fastback
67	63C	2-Door H/T Fastback*
68	57F	4-Door H/T Fastback
Commuter		
72	71B	4-Door 6 Passenger Station Wagon
72	71C	4-Door 9 Passenger Station Wagon
Colony Park		
76	71A	4-Door 9 Passenger Station Wagon
76	71E	4-Door 6 Passenger Station Wagon

†Reverse Back Window
*Bucket Seats

FORD

Ford Custom		
53	62E	2-Door Sedan
54	54E	4-Door Sedan
Ford Custom 500		
52	54B	4-Door Sedan
[illegible]	62B	2-Door Sedan
[illegible]	[illegible]	[illegible]edan
[illegible]	[illegible]	[illegible]stback
[illegible]	[illegible]	[illegible]stback
[illegible]	[illegible]	[illegible]nvertible
Galaxie 500 XL		
68	63C	2-Door Fastback*
69	76B	2-Door Convertible*
Galaxie 500 7.0 Litre		
61	63D	2-Door Fastback
63	76D	2-Door Convertible
Galaxie 500 Lt'd		
60	57F	4-Door Fastback
67	63F	2-Door Fastback
Ranch Wagon		
71	71D	4-Door 6 Passenger Station Wagon
Country Sedan		
72	71B	4-Door 6 Passenger Station Wagon
74	71C	4-Door 9 Passenger Station Wagon
Country Squire		
76	71E	4-Door 6 Passenger Station Wagon
78	71A	4-Door 9 Passenger Station Wagon

*Bucket Seats

EXTERIOR PAINT COLOR CODES

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

Code	M-30-J/ M-32-J#	Color
A	1724-A	Black
C	1900-A	Dk. Executive Gray Met.
F	1226-A	Lt. Blue
H	1912-A	Lt. Beige
K	1903-A	Dk. Blue Met.
M	1619-A	White
P	1910-A	Med. Palomino Met.
R	1879-A	Dk. Green Met.
T	2008-A	Red
U	1070-A	Med. Turquoise Met.
V	1921-A	Emberglo Met.
X	1632-A	Maroon Met.
Y	1269-A	Lt. Blue Met.
Z	1915-A	Med. Sage Gold Met.
2	1907-A	Dk. Turquoise Met.
4	1901-A	Med. Silver Met.
8	1955-A	Yellow

INTERIOR TRIM CODES

Code	Trim Schemes
12	Blue Cloth and Blue Vinyl
15	Red Cloth and Red Vinyl
16	Black Cloth and Black Vinyl
17	Aqua Cloth and Aqua Vinyl
19	Palomino Cloth and Palomino Vinyl
22	Blue Vinyl
25	Red Vinyl
26	Black Vinyl
31	Silver Cloth and Silver Vinyl
32	Blue Cloth and Blue Vinyl
35	Red Cloth and Red Vinyl
36	Black Cloth and Black Vinyl
37	Aqua Cloth and Aqua Vinyl
38	Ivy Gold Cloth and Ivy Gold Vinyl
39	Palomino Cloth and Palomino Vinyl
42	Blue Vinyl
45	Red Vinyl
46	Black Vinyl
47	Aqua Vinyl
48	Ivy Gold Vinyl
51	Silver Cloth and Silver Vinyl
52	Blue Cloth and Blue Vinyl
53	Burgundy Cloth and Burgundy Vinyl
55	Red Cloth and Red Vinyl
56	Black Cloth and Black Vinyl
57	Aqua Cloth and Aqua Vinyl

INTERIOR TRIM CODES (Continued)

Code	Trim Schemes
58	Ivy Gold Cloth and Ivy Gold Vinyl
62	Blue Vinyl
64	Emberglo Vinyl
65	Red Vinyl
66	Black Vinyl
67	Aqua Vinyl
68	Ivy Gold Vinyl
72	Blue Vinyl
75	Red Vinyl
76	Black Vinyl
77	Aqua Vinyl
82	Blue Vinyl
84	Emberglo Vinyl
85	Red Vinyl
86	Black Vinyl
92	Blue Vinyl
93	Burgundy Cloth and Burgundy Vinyl
94	Emberglo Vinyl
95	Red Vinyl
96	Black Vinyl
A3	Burgundy Leather
B2	Blue with Parchment Vinyl
B3	Burgundy with Parchment Vinyl
B6	Black with Parchment Vinyl
B7	Aqua with Parchment Vinyl
B8	Gold with Parchment Vinyl
B9	Palomino with Parchment Vinyl
D6	White with Black Vinyl
E6	White with Black Vinyl
F2	Blue with White Vinyl
F3	Burgundy with White Vinyl
F4	Emberglo with White Vinyl
F6	Black with White Vinyl
F7	Aqua with White Vinyl
F8	Ivy Gold with White Vinyl
F9	Palomino with White Vinyl
G2	Blue with White Vinyl
G3	Burgundy with White Vinyl
G4	Emberglo with White Vinyl
G6	Black with White Vinyl
G7	Aqua with White Vinyl
G8	Ivy Gold with White Vinyl
G9	Palomino with White Vinyl
K2	Blue Vinyl
K6	Black Vinyl
N2	Blue Vinyl
N5	Red Vinyl
93	Green Vinyl
20	Black Vinyl

DATE CODES

The code letters for the month are preceded by a numeral to show the day of the month when the car was completed. The second year code letters are to be used if the 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)

Domestic Special Orders, Foreign Special Orders, Limited Production Options and Pre-Approved Special Orders have the complete order number recorded in this space. Also to appear in this space is the two-digit code number of the District which ordered the unit. If the unit is regular production, only the District code number will appear.

FORD

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	Export

MERCURY

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

AXLE RATIO CODES

A number designates a conventional axle, while a letter designates an Equa-Lock axle.

Code	Ratio	Code	Ratio
1	3.00:1	A	3.00:1
4	3.25:1	E	3.25:1
5	3.50:1	F	3.50:1
8	3.89:1	H	3.89:1
9	4.11:1		

ENGINE CODES

Code	Engine
B	6 Cyl. 240 Cu. In. (1V)
C	8 Cyl. 289 Cu. In. (2V)
E	6 Cyl. 240 Cu. In. (1V) (Taxi)
H	8 Cyl. 390 Cu. In. (2V, Special)
M	8 Cyl. 410 Cu. In. (4V)
P	8 Cyl. 428 Cu. In. (4V, Police)
Q	8 Cyl. 428 Cu. In. (4V)
R	8 Cyl. 427 Cu. In. (8V, Hi-Perf.)
V	6 Cyl. 240 Cu. In. (1V)
X	8 Cyl. 352 Cu. In. (4V)
Y	8 Cyl. 390 Cu. In. (2V)
Z	8 Cyl. 390 Cu. In. (4V)
3	8 Cyl. 289 Cu. In. (2V)①
5	6 Cyl. 240 Cu. In. (1V)①
8	8 Cyl. 428 Cu. In. (4V)①

①Low Compression

MODEL YEAR CODE

The numeral 6 designates 1966

CONSECUTIVE UNIT NUMBER

Each assembly plant, with each model year, begins with consecutive unit number 100001 (Ford) or 500001 (Mercury) and continues on for each car built.

ASSEMBLY PLANT CODES

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

TRANSMISSION CODES

Code	Type
1	3-Speed Manual Shift
2	Overdrive
4	C-6 Automatic Dual Range
5	4-Speed Manual-Shift
6	C-4 Automatic Dual Range
7	Cruis-o-matic (Ford)
8	Cruis-o-matic (Ford) Multi-Drive (Mercury)

BRAKES

GROUP 2

PART 2-1 GENERAL BRAKE SERVICE

1 DIAGNOSIS AND TESTING

PRELIMINARY TESTS

1. Check the fluid level in the master cylinder, and add Rotunda R-103-A (B7AZ-19542-A) brake fluid if required.

2. With the engine running or enough vacuum in the system for power brakes, push the brake pedal down as far as it will go while the car is standing still. If the pedal travels more than halfway between the released position and the floor, check the brake adjustment and the automatic adjusters.

To check adjuster operation, check the shoes and the adjuster components for binding or improper installation. Follow the procedure de-ed under Brake Shoe Adjust-

al 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. Follow the procedures in the Booster Diagnosis Guide. With the engine shut off, exhaust all vacuum in the system. Depress the brake pedal and hold it in the applied position. If the pedal gradually falls away under this pressure, the hydraulic system is leaking. Check all tubing hoses, and connections for leaks.

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

4. Should one of the brakes be locked and the car must be moved, open the brake cylinder 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 those resolved in the preliminary tests and brake chatter. 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.

For booster removal and installation procedures, refer to Part 2-2, Section 3. For disassembly and assembly procedures, refer to Part 2-2, Section 4. For cleaning and inspection refer to Part 2-1, Section 3.

TABLE 1—Disc Brake Trouble Symptoms and Possible Causes

Possible Causes of Trouble Symptoms	Trouble Symptoms							
	Excessive Pedal Travel	Brake Roughness or Chatter (Pedal Pumping)	Excessive Pedal Effort	Pull—Uneven or Grabbing Brakes	Rattle	Heavy Brake Drag	Caliper Brake Fluid Leak	No Braking Effect When Pedal is Depressed
Shoe and Lining Knock-back after violent cornering or rough road travel	X							
Piston and Shoe and Lining Assembly Not Properly Seated or Positioned	X							X
Air Leak or Insufficient Fluid in System or Caliper	X							X
Loose Wheel Bearing Adjustment	X							
Damaged or Worn Caliper Piston Seal	X						X	X
Excessive Lateral Run-out of Rotor		X						
Rotor Excessively Out of Parallel		X						
Frozen or Seized Pistons			X	X		X		
Brake Fluid, Oil or Grease on Linings			X	X				
Shoe and Lining Worn Below Specifications			X					
Proportioning Valve Malfunction			X					
Caliper Out of Alignment with Rotor				X				
Loose Caliper Attachment				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	
Corrosion Build-up in the Cylinder Bore or on the Piston Surface							X	
Bleeder Screw Still Open								X
Improper Booster Push Rod Adjustment	X							
Shoe Out of Flat More Than 0.005"	X							
Rear Brake Auto. Adjusters Inoperative	X							
Improperly Ground Rear Brake Shoe and Lining Assemblies	X							
Booster Inoperative			X					
Leaking Booster Vacuum Check Valve			X					
Unequalized Front Tire Pressure				X				
Incorrect Front End Alignment				X				
Lining Protruding Beyond End of Shoe				X				
Incomplete Brake Pedal Return Due to Linkage Interference						X		
Booster Check Valve Holding						X		
aulic System						X		
							X	
leeding								X

TABLE 2—Drum Brake Trouble Symptoms and Possible Causes

Possible Causes of Trouble Symptoms	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 Release	Noisy or Grabbing Brakes	Brakes Do Not Apply
Mechanical Resistance at Pedal or Shoes Damaged Linkage		X	X										
Brake Line Restricted	X	X	X		X								
Leaks or Insufficient Fluid				X				X	X				X
Improper Tire Pressure					X					X			
Improperly Adjusted or Worn Wheel Bearing	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						
Linings Glazed or Worn			X		X	X	X	X				X	X
Oil or Grease In Lining			X		X	X	X			X		X	X
Loose Carrier Plate	X					X	X						
Loose Lining					X		X						
Scored Drum										X		X	
Dirt on Drum-Lining Surface												X	
Faulty Wheel 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			X		
Insufficient Shoe-to-Carrier Plate Lubrication	X										X		
Tire Tread Worn						X							
Poor Lining to Drum Contact							X						
Loose Front Suspension							X						
"Threads" Left by Drum Turning Tool Pull Shoes Sideways											X		
Cracked Drum								X					
Sticking Booster Control Valve		X										X	

BOOSTER DIAGNOSIS GUIDE

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

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.
2. Depress the parking brake pedal one notch from its normal released position.
3. Raise the car.
4. Turn the adjusting nut forward against the equalizer until a moderate drag is felt when turning the rear wheels (Fig. 1).
5. Release the parking brake, and make sure that the brake shoes return to the fully released position.

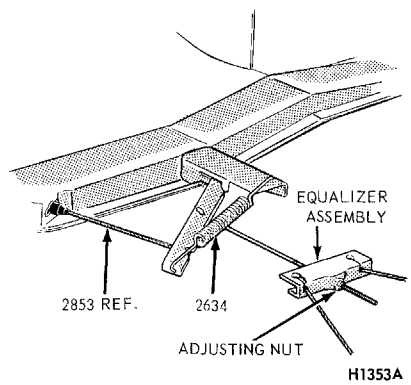


FIG. 1—Parking Brake Linkage Adjustment

POWER BRAKE MASTER CYLINDER PUSH ROD ADJUSTMENT

push rod is provided with an
nt screw to maintain the
pletely releasing hydraulic pressure

To check the adjustment of the screw, fabricate a gauge of the dimensions shown in Fig. 2. On the Midland-Ross booster, remove the master cylinder and air filter assembly and push the bellows back into the booster body. Re-install the air filter directly against the booster body, and then place the gauge against the master cylinder mounting surface of the air filter assembly as shown in Fig. 3 or Fig. 4. The push rod screw should be adjusted so that the end of the screw just touches the inner edge of the slot in the gauge.

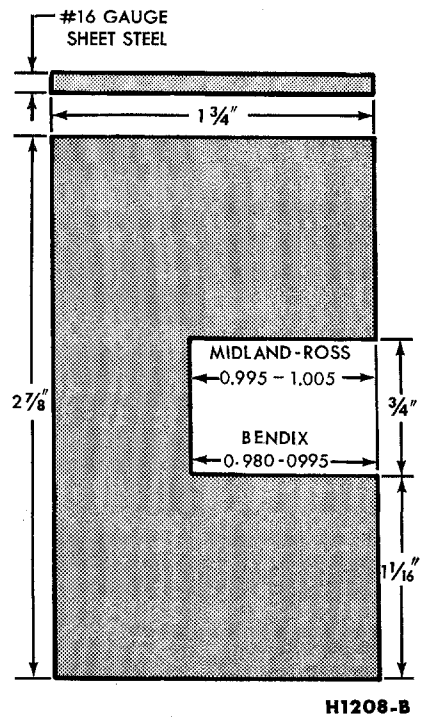


FIG. 2—Push Rod Gauge Dimensions

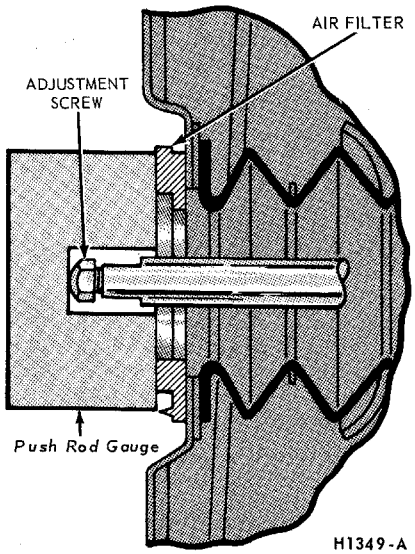


FIG. 3—Push Rod Adjustment —Midland-Ross

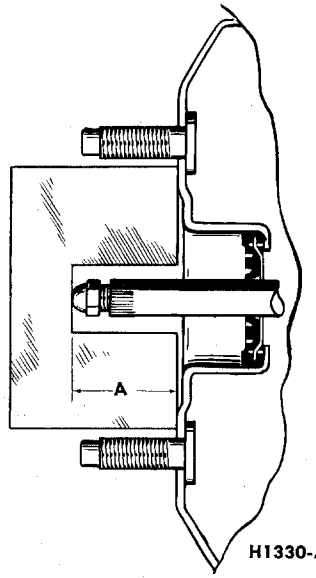


FIG. 4—Push Rod Adjustment—Bendix

Do not set up side forces on the push rod as it may break the valve plunger.

To check the Bendix-type booster, remove the master cylinder and fit the gauge against the master cylinder mounting surface as shown in Fig. 4.

This is an approximate adjustment only. To verify the adjustment, look through the make-up (rear) port of the master cylinder when installing master cylinder to the booster.

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.

MANUAL BLEEDING

Bleed the longest lines first. Keep the master cylinder reservoir filled with new heavy-duty brake fluid during the bleeding operation. If the reservoir is not kept full, the diaphragm gasket may be sucked down to the bottom of the master cylinder.

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

1. Position an offset ⅜-inch box wrench on the bleeder fitting on the right rear brake wheel cylinder (Fig. 5). Attach a rubber drain tube to the bleeder fitting. **The end of the tube should fit snugly around the bleeder fitting.**

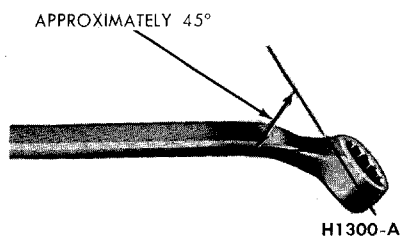


FIG. 5—Wrench for Bleeding Brake

2. Submerge the free end of the tube in a container partially filled with clean brake fluid, and loosen the bleeder fitting approximately ¾ 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, tighten the bleeder fitting and remove the drain tube.

5. Repeat this procedure at each brake wheel cylinder or disc caliper 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 ⅜ 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 (on disc brakes) are returned to their normal positions and that the shoe and lining assemblies are properly seated. **Brake fluid should not be allowed to contaminate the rotors or shoe and lining assemblies.**

7. It is mandatory that the brake pedal be pumped after any disc brake repair or bleeding, in order to establish proper brake running clearance and brake pedal reserve.

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 Rotunda 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 on the reservoir, and attach the bleeder tank hose to the fitting on the adapter cap. Adapter cap 2162 can be used, or an adapter cap can be fabricated by cutting a hole in the center of a filler cap and soldering a fitting at the hole.

3. Position a ⅜-inch box wrench on the bleeder fitting on the right rear brake wheel cylinder (Fig. 5). 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 at each brake wheel cylinder in the following order: left rear, right front, and left front.

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 ⅜ inch from the top of the reservoir, and install the filler cap. The diaphragm-type gasket should be

properly positioned in the cap before it is installed on the master cylinder.

10. Be sure that the front brake pistons (disc brakes) are returned to their normal position and that the shoe and lining assemblies are properly seated. **Brake fluid should not be allowed to contaminate the rotors or shoe and lining assemblies.**

11. It is mandatory that the brake pedal be pumped after any disc brake repair or bleeding, to establish proper brake running clearance and brake pedal reserve.

DISC BRAKES

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

2. Make three thickness measurements with a micrometer across the middle section of the shoe and lining. Take one reading at each side and one in the center. If the assembly has worn to a thickness of 0.195-inch (shoe and lining together) or 0.030-inch (lining material only) at any one of the three measuring locations, replace all (4) shoe and lining assemblies on both front wheels.

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

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

4. To check rotor runout, first eliminate the wheel bearing end play by tightening the adjusting nut. After tightening the nut 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.

DRUM BRAKES

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

2. Brush all dust from the carrier plates and interior of the brake drums.

3. Inspect the brake shoes for excessive lining wear or shoe damage. If the lining is worn 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 lining in axle sets. Prior to replacement of lining, the drum diameter should be checked to determine if oversize linings must be installed.

4. Check the condition of brake shoes, retracting springs, hold-down springs, and drum for signs of overheating. If the shoes have a slight blue coloring, indicating overheating, replacement of the retracting and hold down springs is strongly recommended. **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 entrance of dirt into the cylinder. The cylinder cups should be replaced, thus avoiding future problems.

6. Inspect all other brake parts and replace any that are worn or damaged.

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

BOOSTER UNIT

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

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

PART 2-2 BRAKE SYSTEM

1 DESCRIPTION AND OPERATION

OPTIONAL DISC BRAKES

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

A vacuum booster is available as optional equipment.

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

HYDRAULIC SELF-ADJUSTING

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

The self-adjusting brake mechanism consists of a cable, cable guide, adjusting lever, and adjuster spring (Fig. 1). 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 from the anchor pin. The movement of the secondary shoe causes the cable to pull the adjusting lever upward and against the end of a tooth on the adjusting screw star-wheel. The upward travel of the lever increases as lining wear increases. When the lever can move upward far enough, it passes over the end of the tooth and engages the tooth. When the brakes are released, the adjusting spring pulls the lever downward causing the star-wheel to turn and expand the shoes. The star-wheel is turned one tooth at a time as the linings 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 drum. Therefore, the adjuster does not operate.

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

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

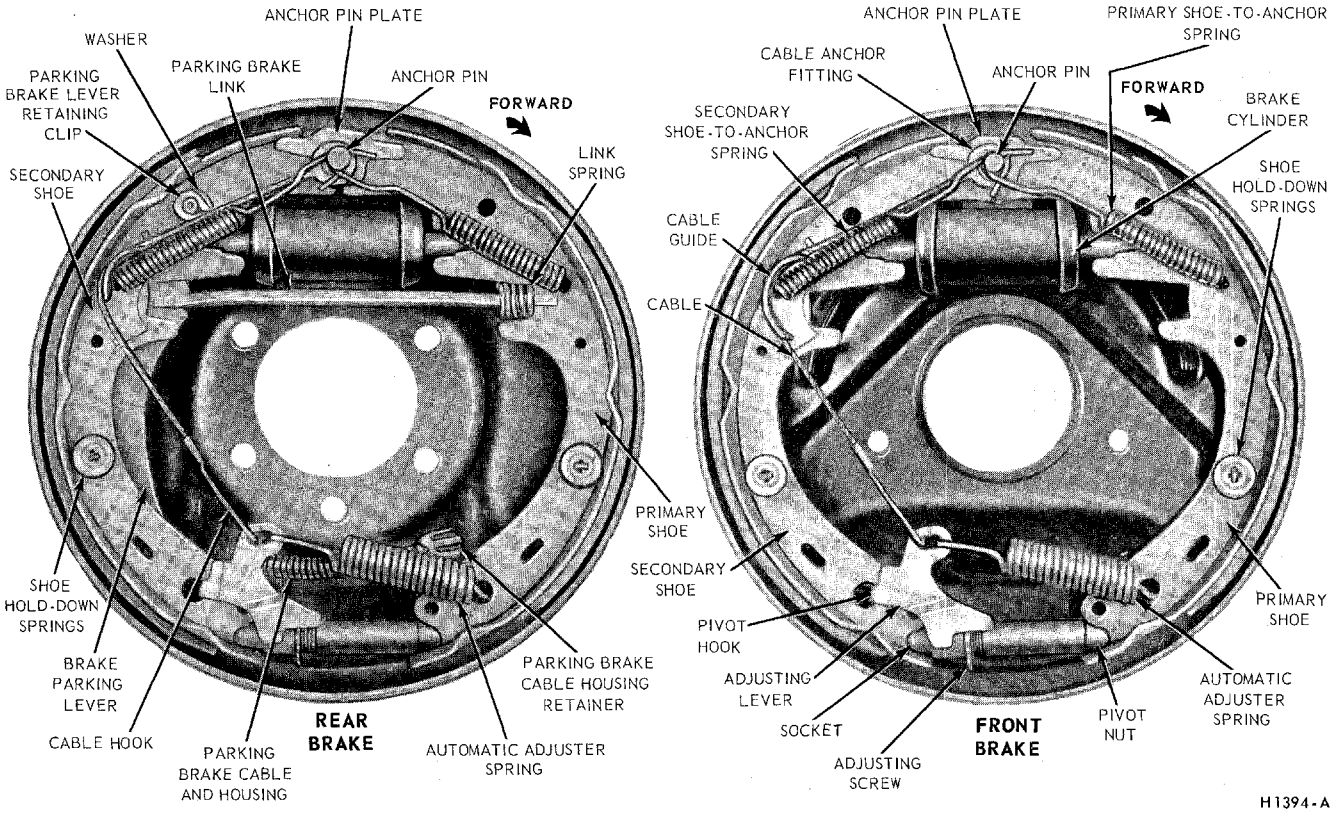


FIG. 1—Self-Adjusting Brake Assemblies

DISC BRAKE ASSEMBLIES

RELATION AND FUNCTION OF COMPONENT PARTS

The disc brake is a fixed caliper, opposed piston, non-energized, ventilated disc type, actuated by a hydraulic system (Fig. 2). There is no lateral movement of either the disc (rotor) or the caliper. The caliper assembly consists of two caliper housings bolted together with each half containing two cylinder bores of 1-15/16 inch diameter. Each cylinder bore contains a piston with an attached molded rubber dust boot to seal the cylinder bore from contamination. (Fig. 3). 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 ween the cylinders and pistons.
2. hey return the pistons to re-

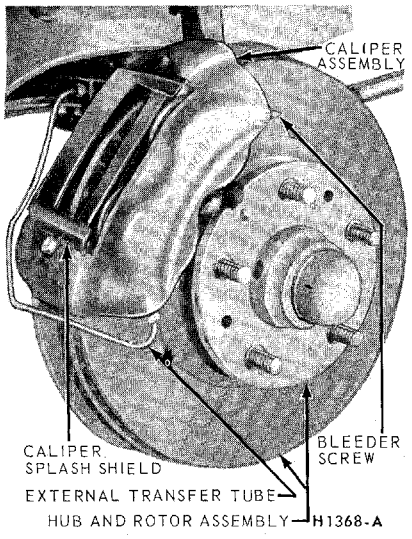


FIG. 2—Disc Brake Assembly

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

The shoe and lining assemblies are located in between parallel machined abutments within the caliper, and are supported radially by tabs on the outer ends of the shoe assemblies (Fig. 2). 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. 3). 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. 2). 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 directly to 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 11.875 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

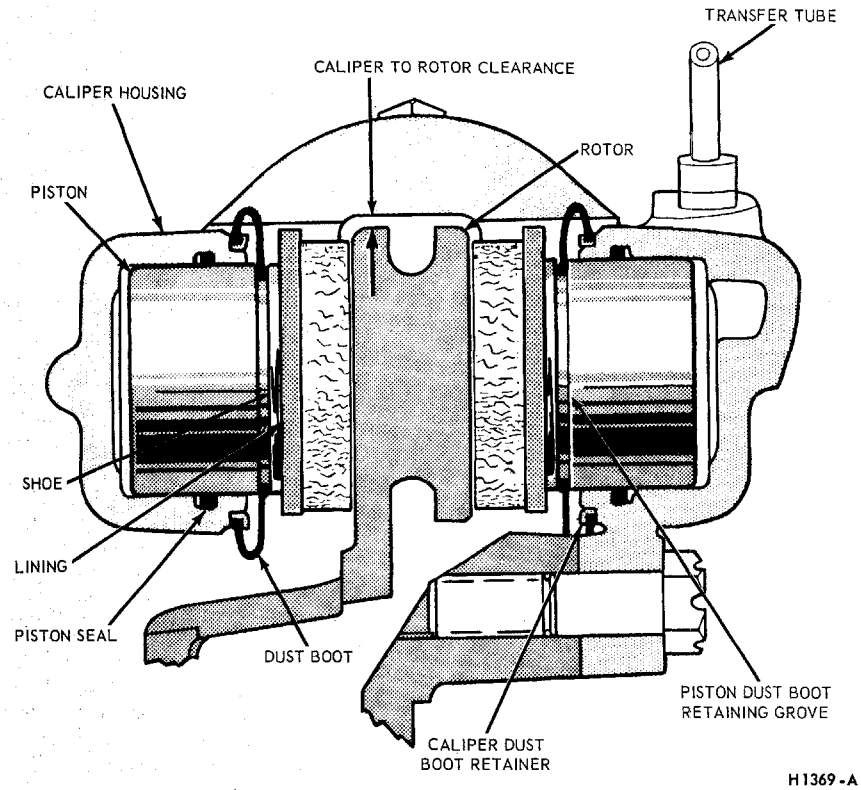


FIG. 3—Caliper Assembly—Sectional View

to prevent road contaminants from contacting the inboard rotor and lining surfaces (Fig. 23 Part 2-2). The wheel provides protection for the outboard surface of the rotor.

OPERATION

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

During brake application, the rubber seal on each piston stretches as the piston moves against the shoe (Fig. 4). 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 [illegible]inst the rotor and, thereby, pro-

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 warning sound feature (Fig. 5) is incorporated in the design of the brake shoes. Metal tabs on the ends of the shoes create an audible metallic, scraping noise, when the linings become worn enough to allow the tabs to contact the rotor. This metal-to-metal contact warns the driver that the shoes need replacing and is not detrimental to the function of the disc brake.

A proportioning valve located between the master cylinder and the rear brake wheel cylinders provides balanced braking action between the front and the rear brakes under a wide range of braking conditions. (Fig. 6). By regulating the hydraulic pressure applied to the rear wheel cylinders, the valve limits rear braking action when high pressures are required at the front brakes. In this manner, premature rear wheel skid is prevented. The proportioning valve is serviced as an assembly and is never adjusted or overhauled.

BOOSTER SYSTEM—BENDIX

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

Two Bendix models are used. The type supplied with disc brakes is exchanged rather than repaired when it is determined to be defective.

The vacuum power chamber consists of a front and rear shell locked together. Within the vacuum chamber are the rubber diaphragm and the integral valve hub and diaphragm plate. The rubber diaphragm fits over the plate, and the outer bead of the diaphragm is locked between the front and rear shells (Fig. 7). The diaphragm return spring is located between the diaphragm plate and the front shell.

The valve hub section of the diaphragm plate protrudes from the rear

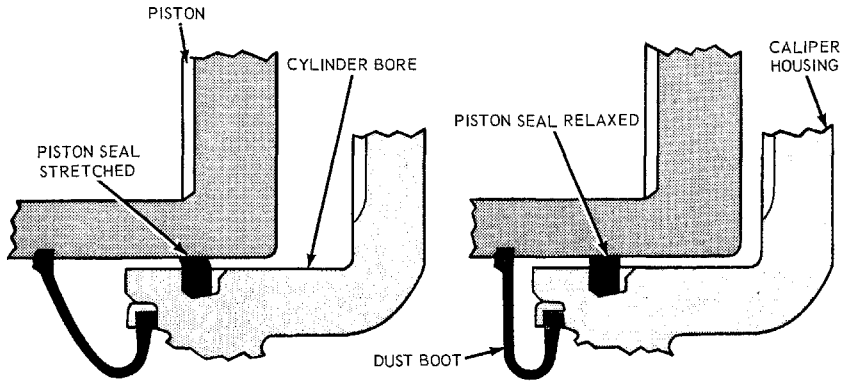


FIG. 4—Function of Piston Seal

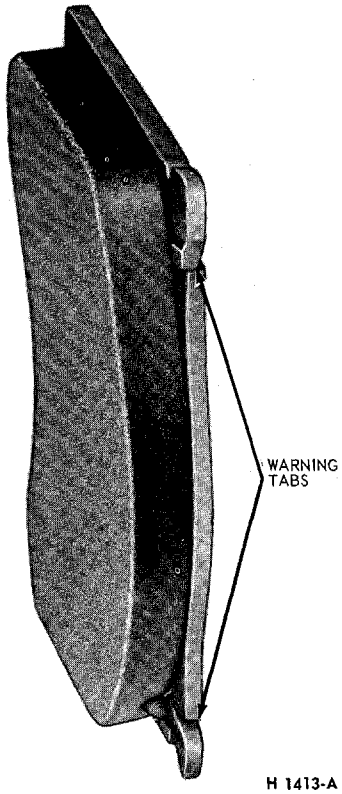


FIG. 5—Worn Lining Warning

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

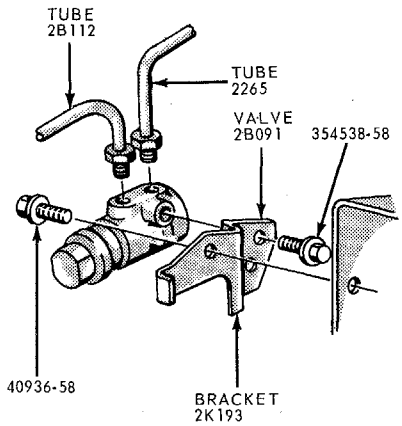
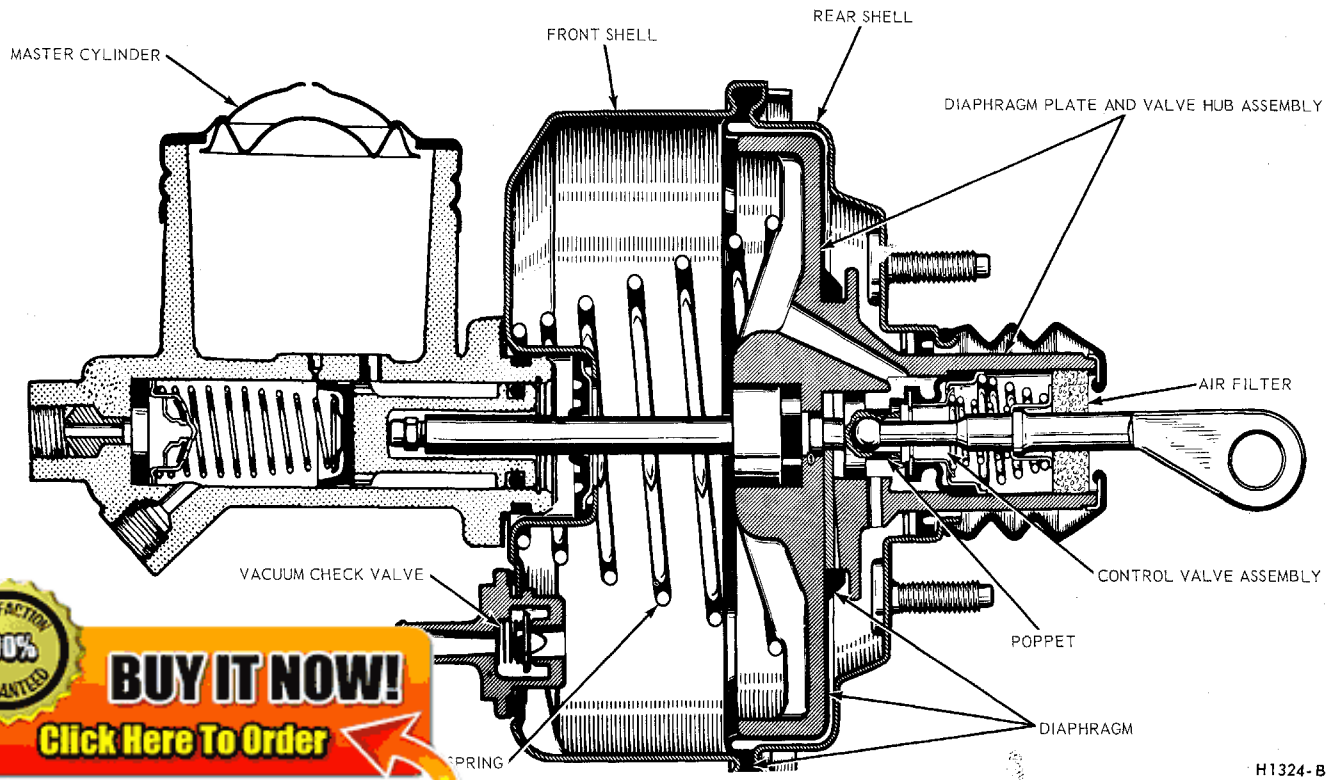


FIG. 6—Proportioning Valve

The hydraulic master cylinder which contains all of the components of the conventional master cylinder is bolted to the booster front shell. The hydraulic push rod forms the link between the master cylinder piston and the vacuum power diaphragm assembly. The end of the push rod, that enters the master cylinder piston, is equipped with a self-locking adjusting screw. The opposite end has a piston head which enters the diaphragm plate. A seal, located in the front shell, seals the opening between the hydraulic push rod and the shell.

Engine manifold vacuum is supplied to the booster through a vacuum check valve located in the front shell. Air is admitted through the air filter located at the end of the valve hub. The hydraulic push rod is actuated by pedal pressure assisted by the diaphragm, which derives power from the pressure differential existing between the vacuum on its front side and atmospheric pressure on its



cuum Booster

rear side. A passage in the diaphragm plate permits vacuum to pass from the front to the rear side of the diaphragm when the vacuum port opens as the brakes are released.

RELEASED POSITION

With the engine running and the brakes released (Fig. 8), vacuum from the intake manifold is admitted through the check valve to the front (constant vacuum) chamber of the power unit. In the released position (no pressure applied to the brake pedal), the valve operating rod and valve plunger are held to the rear in the valve hub by the valve return spring to CLOSE the atmospheric port and OPEN the vacuum port. With the valve in this position, the rear (control vacuum) chamber is also open to vacuum through the porting in the diaphragm and valve hub assembly. The diaphragm is then balanced or suspended in vacuum, since vacuum is present on both sides of the power diaphragm. With the power diaphragm balanced in vacuum, the diaphragm return spring holds the diaphragm and hydraulic push rod in the fully released position. With the hydraulic push rod in this position, the hydraulic compensating port in the hydraulic master cylinder is OPEN. The open port permits brake fluid to either return from the brake system to the fluid reservoir or enter the brake system from the fluid reservoir to compensate for any gain or loss in fluid volume.

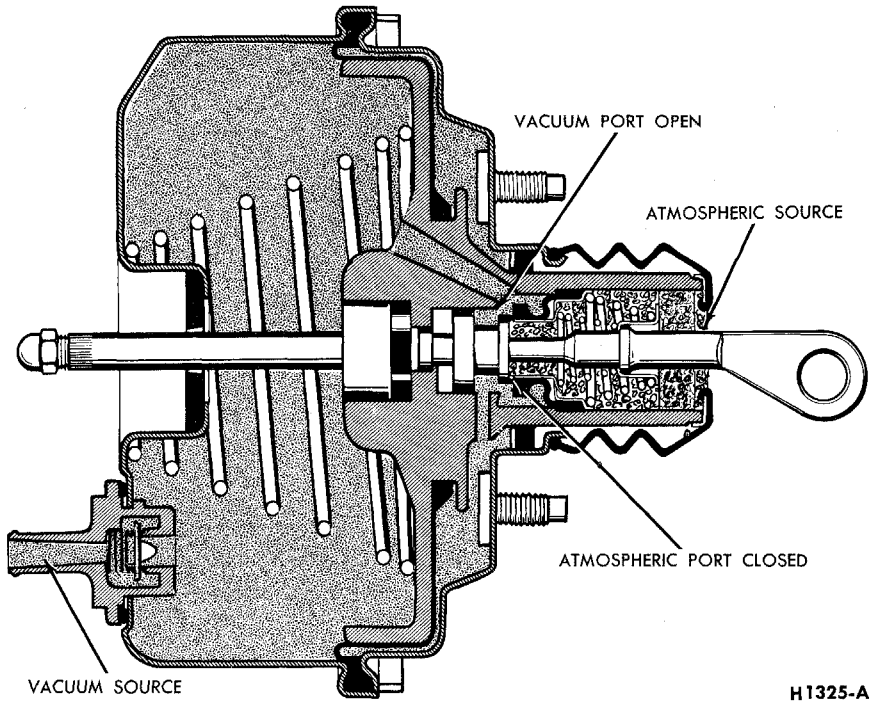


FIG. 8—Bendix Booster in Released Position

APPLIED POSITION

When the brakes are applied (Fig. 9), the valve operating rod and valve plunger move forward in the valve hub section of the diaphragm plate to compress the valve return spring and force the poppet against the vacuum valve seat in the diaphragm plate to CLOSE the vacuum port. Any additional movement of the valve operating rod in the applied direction moves the valve plunger away from the poppet valve to OPEN the atmospheric port and admit atmosphere through the air cleaner and passages in the diaphragm plate to the rear side of the power chamber. With vac-
um present on the front side of the
hragm and valve housing and at-
ward to close the compensating por

sure through the residual check valve and brake tubes into the brake wheel cylinders. As hydraulic pressure is developed in the brake master cylinder, a counter force (to the rear) acting through the hydraulic push rod, sets up a reaction force against the power diaphragm assembly and valve plunger through the rubber reaction disc (located at the end of the hydraulic push rod). The rubber reaction disc acts similar to a column of fluid to distribute the pressure between the vacuum power diaphragm assembly and the valve plunger in proportion to their respective contact areas. The pressure acting against the valve plunger and valve operating rod tends

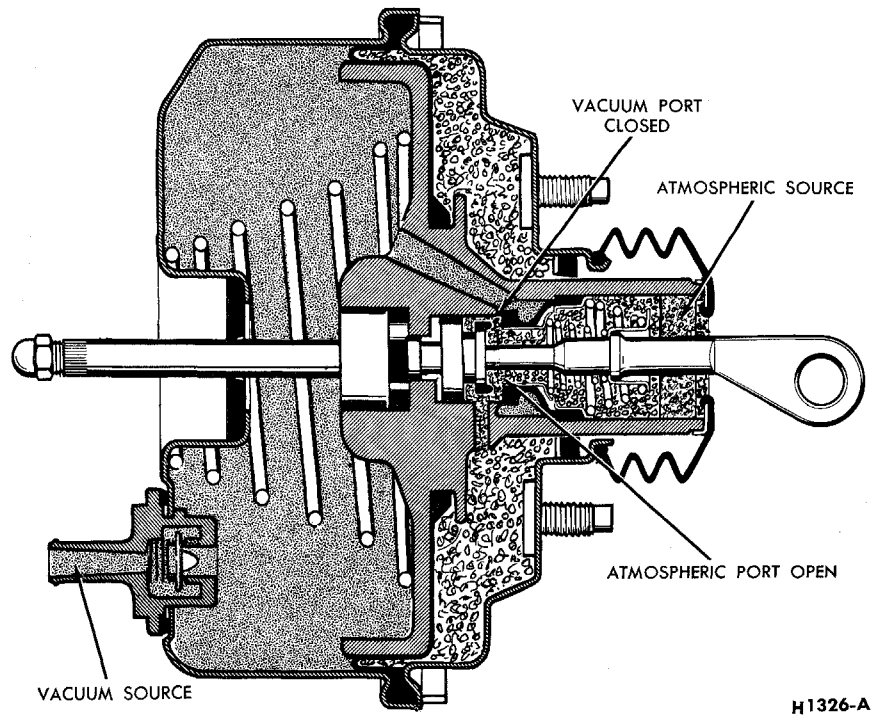


FIG. 9—Bendix Booster in Applied Position

to move the valve plunger slightly to the rear in relation to the diaphragm and valve hub assembly to close off the atmospheric port. The driver is thus assured a "feel" of the brake, since part of the counter force reacts through the valve plunger, valve operating rod, and pedal linkage against the driver's foot. This reaction force is in direct proportion to the hydraulic pressure developed within the brake system.

HOLDING POSITION

During brake application, the reaction force which opposes the force applied by the driver, tends to close the atmospheric port. When both atmospheric and vacuum ports are CLOSED, the booster is said to be in the holding position (Fig. 10). With both valves closed, any degree of brake application attained will be held until either the atmospheric port is **reopened** by an increase in pedal pressure to further increase the brake application or by a decrease in pedal pressure to **reopen** the vacuum port to decrease the brake application. Whenever the pressure applied to the brake pedal is held constant for a moment, the valve returns to its holding position. However, upon reaching the fully applied position the force applied to the brake pedal overrules the reaction force. In this position the valve plunger and atmospheric valve seat are held away from the valve poppet to admit maximum atmospheric pressure to the rear chamber. With the front chamber open to manifold vacuum, full power application is attained which is referred to as the run-out of the power unit. Any increase in hydraulic pressure beyond this point must be supplied by physical effort of the driver.

NO POWER CONDITION

It should be noted that in case of engine failure and consequent loss of engine vacuum, at least one full power brake application may be made from the vacuum in the booster. With the engine off and no vacuum in the power system, the brakes can be applied in the conventional manner by applying more physical effort to the brake pedal.

BOOSTER SYSTEM— MIDLAND-ROSS

The booster consists of a vacuum chamber, atmospheric valve, control valve plunger assembly, diaphragm, and an atmospheric chamber (Figs. 11, 12 and 13).

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

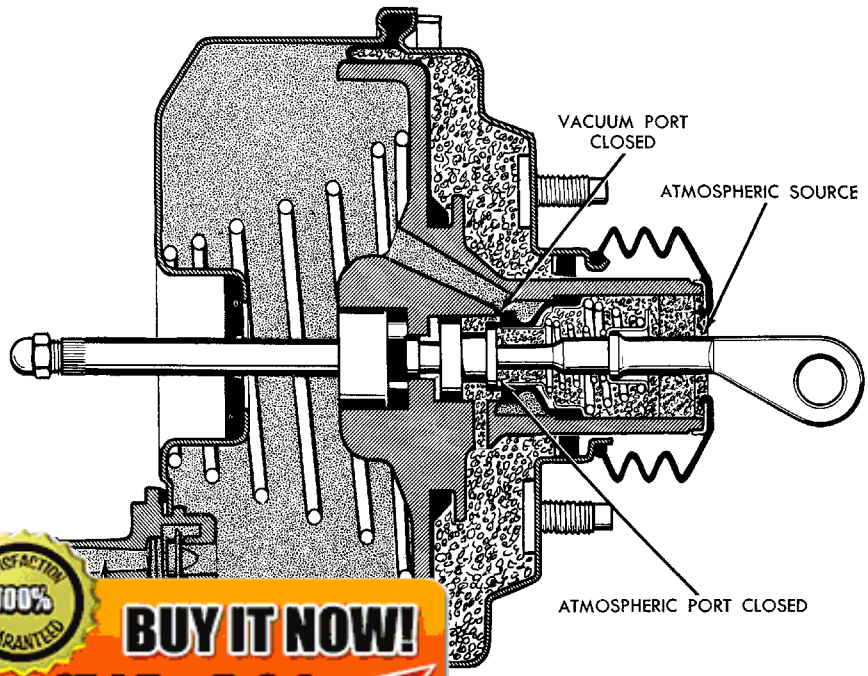


Fig. 10 Booster Air Valve in Holding Position

Vacuum is present at all times in that area of the vacuum chamber forward of the diaphragm. Vacuum is supplied through a hose from the intake manifold to the vacuum manifold and check valve on the booster body. With this integral check valve and vacuum chamber, it is possible to obtain several power assisted brake applications with the engine shut off. This arrangement makes a vacuum reservoir unnecessary.

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

APPLYING POSITION

As the brake pedal is depressed, the valve operating rod and valve plunger assembly move forward compressing the plunger return spring (Fig. 11). The initial movement of the plunger closes the porting from the vacuum chamber preventing further evacuation of the area back of the diaphragm. Further movement of the plunger forces the atmospheric valve off its seat so that atmospheric pressure from the bellows can enter the hub porting that leads to the rear side of the diaphragm.

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

HOLDING POSITION

When the forward motion of the brake pedal is stopped and held, the valve operating rod ceases to move the control valve plunger forward. However, the unbalanced forces of atmospheric pressure and vacuum on

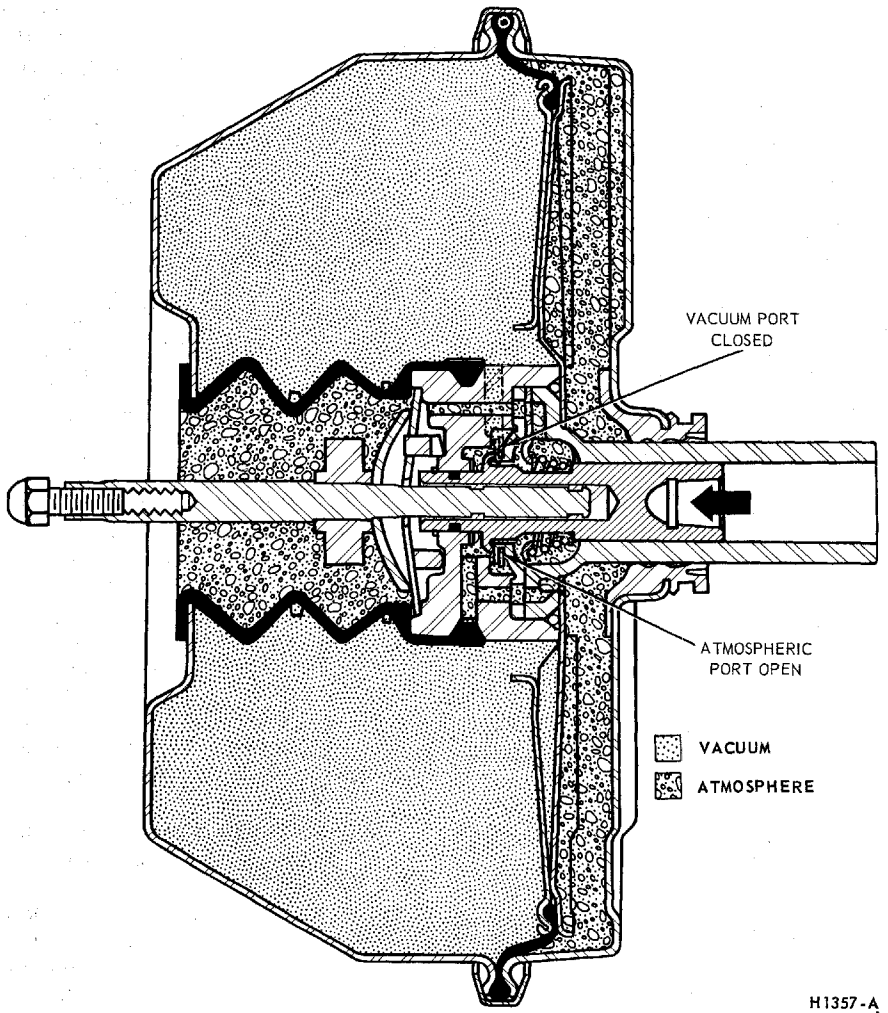


FIG. 11—Midland-Ross Booster in Applying Position

each side of the diaphragm will continue to move the outer sleeve of the control valve plunger forward keeping the vacuum porting closed. At the same time, the reaction force acting through the reaction ring and lever assembly will tend to move the atmospheric valve to the closed position (Fig. 12). When these combined forces balance, the porting to the vacuum supply will remain closed and the atmospheric valve will cut off any further passage of atmospheric pressure to the area behind the diaphragm. Therefore, the power assist force acting on the master cylinder piston will stabilize and the hydraulic force applying the brakes will be re- d and plunger assembly. The plunger from the atmospheric valve allowing the valve to seat against the hub (Fig. 13). This seating of the valve closes off the bellows chamber from the hub porting that connects to the rear side of the diaphragm. At the same time, the rearward movement of the plunger opens the porting from the vacuum chamber and draws out the air from the rear side of the power diaphragm. With vacuum on both sides of the diaphragm, the assist force against the master cylinder push rod is eliminated.

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

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

PARKING BRAKE

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

Two types of brake pedal control are used. The automatic (vacuum) release type (Fig. 14) is used on the Mercury Parklane. All other models use the manual release type (Fig. 29).

When the pedal is depressed (either manual or automatic release type) 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 (Figs. 14 and 29).

Either type of parking brake control assembly is mounted to the dash panel and the cowl upper panel. The pedal, pivots on a stationary pedal mount. A spring-loaded pawl and a release lever are assembled to the pedal. A ratchet is assembled to the upper end of the pedal. The pawl contacts the ratchet at such an angle that the ratchet teeth will slide over the pawl as the pedal is depressed; however, when the applying motion stops and the pedal starts to release, the pawl engages the ratchet and thus locks the brakes in the applied position.

When the lever is pulled back on the manual release type (Fig. 29), the cam action of the lever on the pawl cam pin will disengage the pawl from the ratchet to release the brakes.

On the automatic type, the 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 neutral or park position with the engine run-

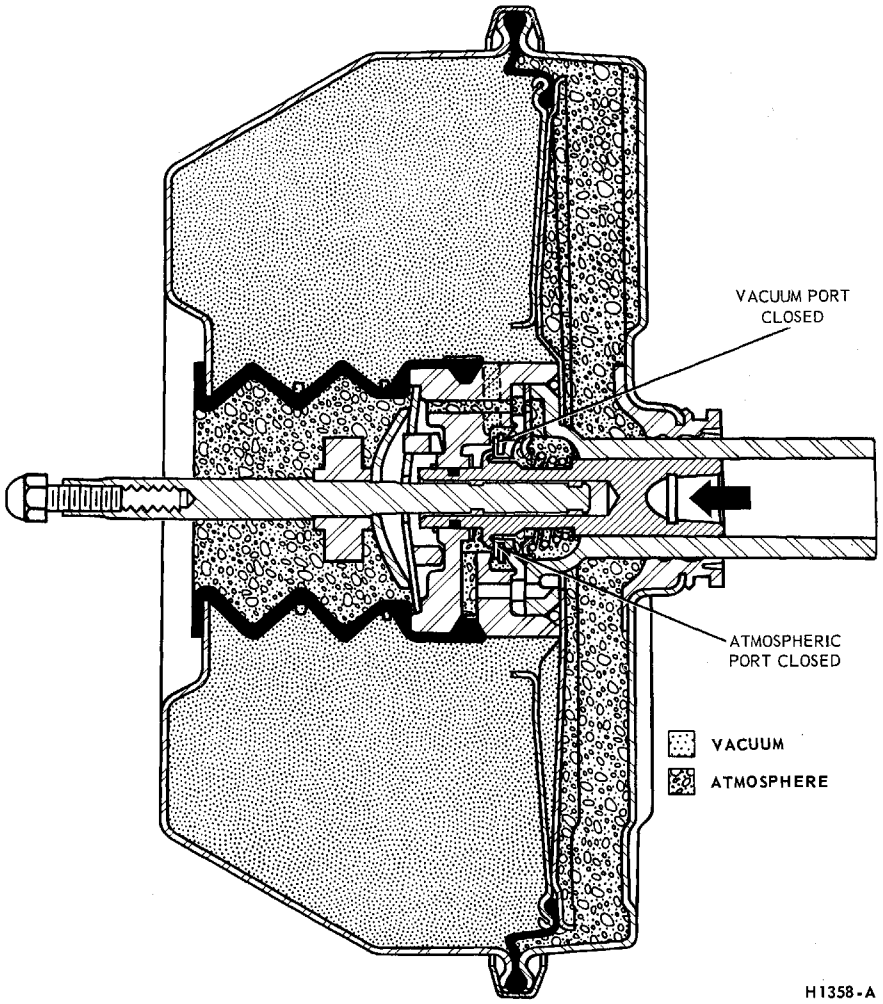


FIG. 12—Midland-Ross Booster in Holding Position

ning, or in any position with the engine off.

The power unit piston rod is attached to the release lever. 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 pivots on a rivet pin in the pedal mount (Fig 14).

The vacuum power unit with mounting bracket is riveted to the control assembly. The vacuum actuated piston within the unit is connected by a rod to the upper end of the release lever to move the pawl out of engagement with the ratchet (Fig. 14). The lower end of the release lever 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 (Fig. 14 and 15). 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 release lever.

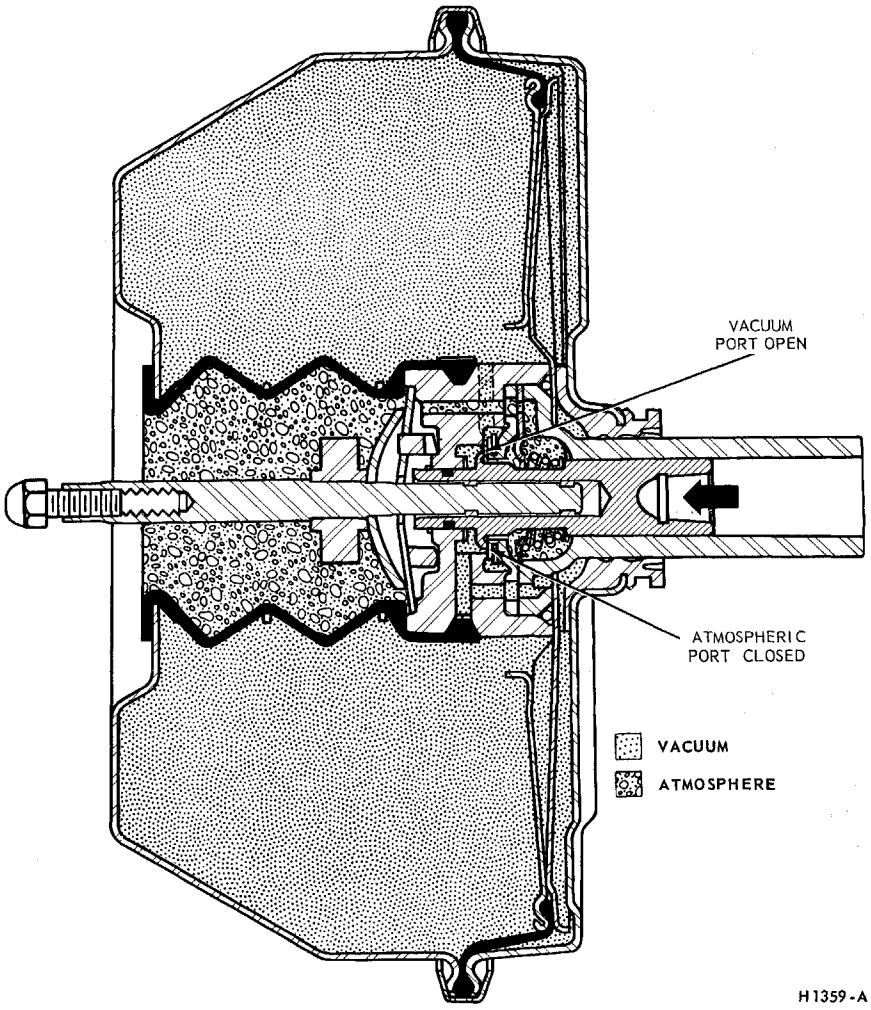


FIG. 13—Midland-Ross Booster in Released Position

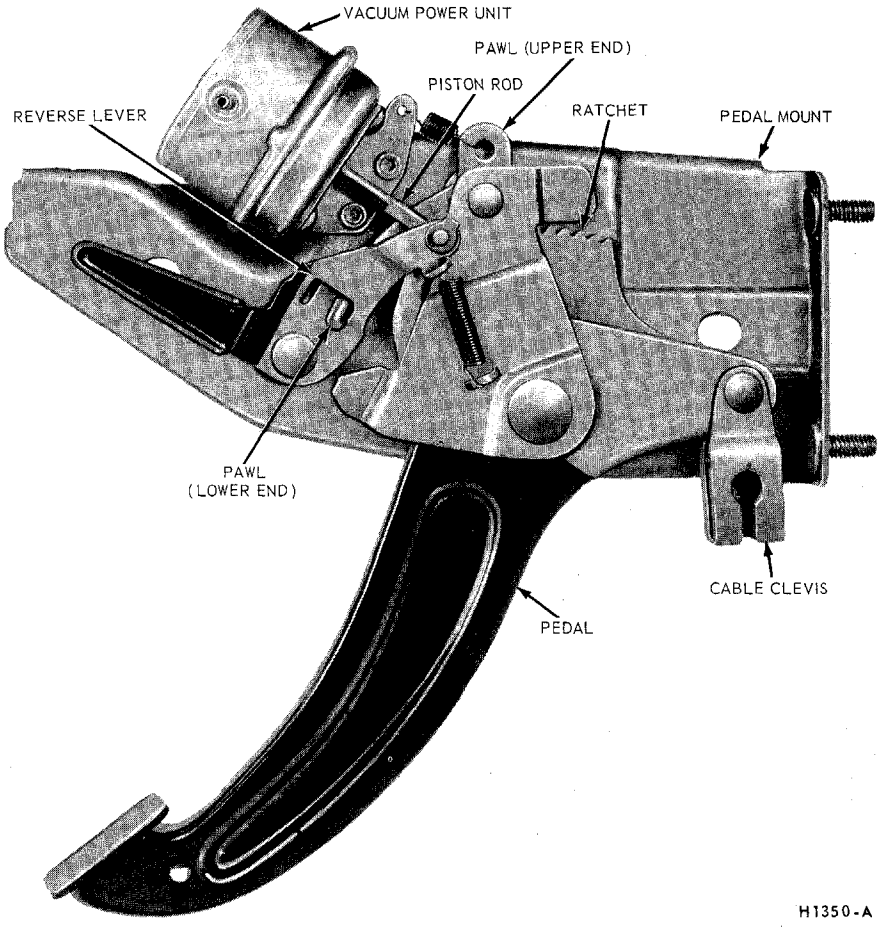


FIG. 14—Parking Brake Control Assembly with Automatic Release

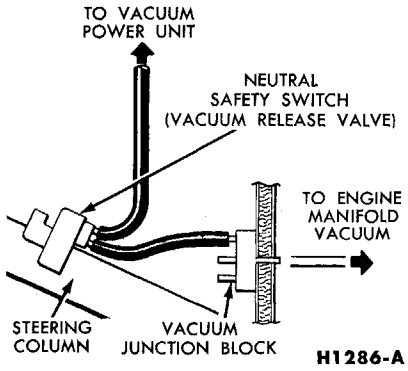


FIG. 15—Connections for Automatic Parking Brake Release

BRAKE SHOE ADJUSTMENTS

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

(In case a brake drum cannot be removed in the normal manner, an access knock-out slug is provided in the brake carrier plate. Knock the slug out with a punch and then re- the brake shoe as detailed un- **ake Drum—Replacement.**

shoes, check the parking brake cables

that the equalizer operates freely.

To adjust the brake shoes:

1. Use Rotunda Tool HRE 8650, (Fig. 16) to determine the inside diameter of the drum braking surface.

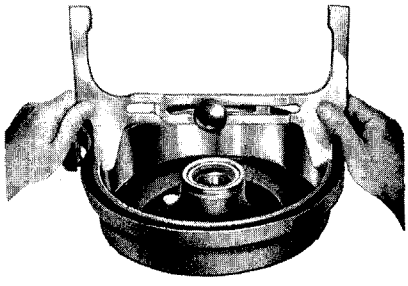


FIG. 16—Measuring Drum

2. Reverse the tool as shown in Fig. 17 and adjust the brake shoe diameter to fit the gauge. Hold the automatic adjusting lever out of engagement while rotating the adjusting 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 C1AZ-19590-B Grease.

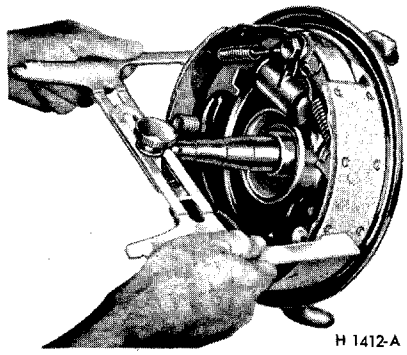


FIG. 17—Measuring Shoes

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

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

5. Install the drums.

6. Install the wheels on the drums and tighten the mounting nuts to specification. Install Tinnerman nuts and tighten securely.

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

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

FRONT BRAKE DRUM

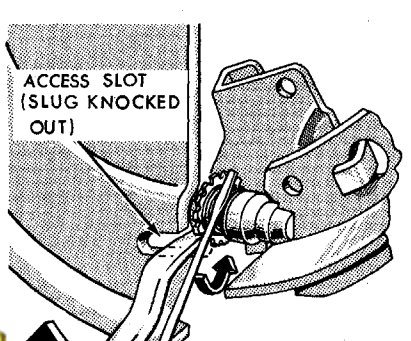
REMOVAL

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

2. Remove the drum. If the drum will not come off, knock the access slug out of the brake carrier plate, using a punch. Insert a narrow screwdriver through the slot and disengage the adjusting lever from the adjusting screw. While holding the adjusting lever away from the screw, back off the adjusting screw with the brake adjusting tool (Fig. 18). **Be very careful not to burr, chip, or damage the notches in the adjusting screw; otherwise the self-adjusting mechanism will not function properly.**

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

4. Pull the drum off the wheel spindle.



INSTALLATION

1. If the drum is being replaced, remove the protective coating from the new drum with carburetor degreaser. Install new bearings and grease retainer. Soak the new grease retainer in light engine oil at least 30 minutes before installation. Pack the wheel bearings, install the inner bearing cone and roller assembly in the inner cup, and install the new grease retainer. See Part 3-5, Section 4.

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

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

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

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

REAR BRAKE DRUM

REMOVAL

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

2. Remove the hub cap and wheel. Remove the three Tinnerman nuts and remove the brake drum. If the drum will not come off, knock the access slot slug out of the brake carrier plate, using a punch. (Clean away all metal from the brake area before installing the drum). Insert a narrow screwdriver through the hole in the carrier plate, and disengage the adjusting lever from the adjusting screw. While holding the adjusting lever away from the adjusting screw, back off the adjusting screw with the brake adjusting tool (Fig. 18). **Be very careful not to burr, chip, or damage the notches in the adjusting screw; otherwise, the self-adjusting mechanism will not function properly.**

INSTALLATION

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

2. Adjust the brakes as outlined under Brake Shoe Adjustments in this section. Place the drum over the brake assembly and into position.

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

BRAKE SHOES AND ADJUSTING SCREW

REMOVAL

1. With the wheel and drum removed, install a clamp over the ends of the brake cylinder as shown in Fig. 19.

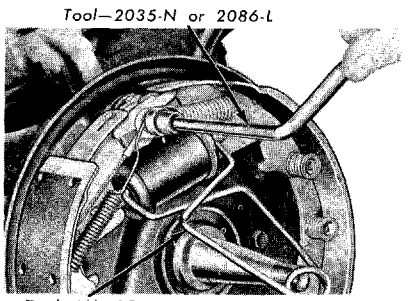


FIG. 19—Retracting Spring Removal

2. Remove the secondary shoe to anchor spring with the tool shown in Fig. 19. With the same tool, remove the primary shoe to anchor spring and unhook the cable eye from the anchor pin.

3. Remove the anchor pin plate.

4. Remove the shoe hold-down springs, shoes, adjusting screw, pivot nut, socket and automatic adjustment parts.

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

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

INSTALLATION

1. Before installing the rear brake shoes, 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. On the rear brake, install the parking brake link and spring. Connect the parking brake cable to the parking brake lever (Fig. 1).

4. Install 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 primary shoe to anchor spring (Fig. 20).

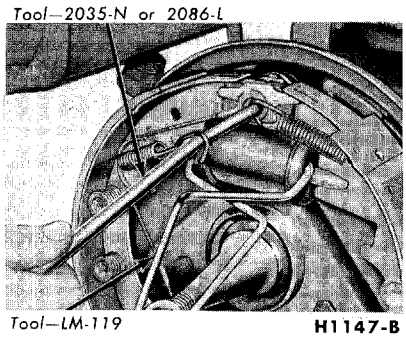


FIG. 20—Retracting Spring Installation

7. Install the cable guide on the secondary shoe web with the flanged hole fitted into the hole in the secondary shoe web. Thread the cable around the cable guide groove (Fig. 1).

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

8. Install the secondary shoe to anchor spring with the tool shown in Fig. 20.

Be certain that the cable eye is not cocked or binding on the anchor pin when installed. All parts should be flat on the anchor pin. Remove the brake cylinder clamp.

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 back off ½ turn.

Interchanging the brake shoe adjusting screw assemblies from one side of the car to the other would cause the brake shoes to retract rather than expand each time the automatic adjusting mechanism operated. To prevent installation on the wrong side of the car, the socket end of the adjusting screw is stamped with an R or L (Fig. 21). 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 ead.

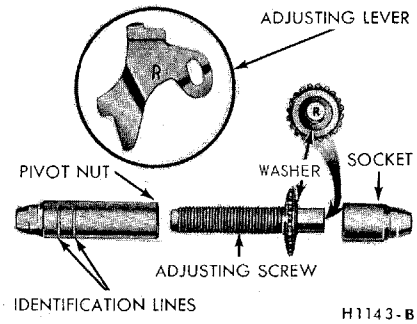


FIG. 21—Adjusting Screw and Lever Identification

justing levers are stamped with an R or L to indicate their installation on a right or left brake assembly (Fig. 21).

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. 1).

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. e 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 11⅛ 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.

DISC BRAKE SERVICE PRECAUTIONS

1. Before the vehicle is moved, after any brake service work, obtain a firm brake pedal by pumping the pedal until it reaches the proper height.

2. Grease or any other foreign material must be kept off the caliper assembly, surfaces of the rotor and external surfaces of the hub during service operations. Handling of the rotor and caliper assemblies should be done in a way to avoid deformation of the brake rotor and nicking or scratching of brake linings.

3. If the square sectioned rubber piston seals are worn or damaged, they should be replaced immediately.

4. During removal and installation of a wheel assembly, exercise care not to interfere with and damage the caliper splash shield, the bleeder screw fitting or the transfer tube.

5. Front wheel bearing end play is critical and must be within specifications.

6. Be sure the car is centered on the hoist before servicing any front end components, to avoid bending or damaging the rotor splash shield on full right or left wheel turns.

7. The bridge bolts joining the two caliper housings should not be disturbed.

8. The proportioning valve should not be disassembled or adjustments attempted on it.

9. Riding of the brake pedal (common on left foot applications) should be avoided during vehicle operation.

10. The wheel and tire must be removed separately from the brake rotor, unlike drum brakes where the wheel, tire and drum are removed as a unit.

DISC BRAKE SHOE AND LINING REPLACEMENT

REMOVAL

1. Remove the wheel and tire from the hub. **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. 23).
3. To facilitate removal and installation of the shoe and lining assemblies, the pistons must be pushed into their bores. Apply a steady inward pressure against each shoe and lining assembly toward its respective caliper housing on each side of the rotor (Fig. 3). Maintain the pressure for at least a minute. If the pistons will not go in easily, force them in with water pump pliers.
4. Grasp the metal flange on the outer end of the shoe with two pairs of pliers and pull the shoe out of the caliper (Fig. 22).

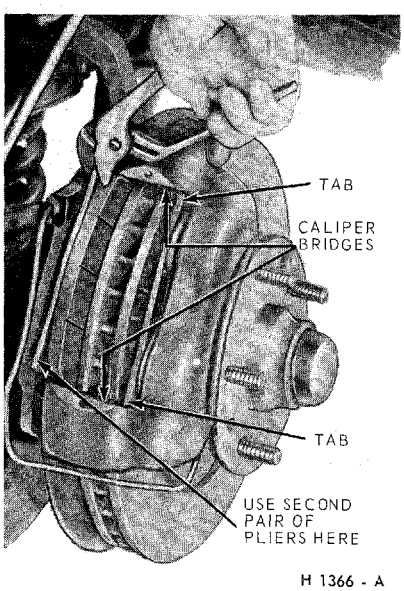


FIG. 22—Removing Disc Brake Shoe and Lining Assembly

CLEANING AND INSPECTION

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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. 22).
2. Install the caliper splash shield and secure the shield to the caliper with two attaching bolts (Fig. 23).
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.
5. Check and refill the master cylinder reservoir with specified brake fluid as required. **It should not be necessary to bleed the system after a shoe and lining replacement providing the hydraulic system has not been opened.**
6. Road test the car.

DISC BRAKE CALIPER ASSEMBLY

REMOVAL

1. Remove the wheel and tire from the hub. **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. 26).
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 attaching bolts and torque them to specification. Make sure 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. 3).
3. Connect the front wheel brake flexible hose to the brake tube at the bracket on the frame (Fig. 26). 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 add the specified brake fluid as required.
5. **Pump the brake pedal several times to actuate the piston seals and to position the shoe and lining assemblies.**
6. Install the wheel and tire.
7. Road test the car.

FRONT WHEEL HUB AND ROTOR ASSEMBLY—DISC BRAKES

REMOVAL

1. Remove the wheel and tire from the hub. (Fig. 23). **Be careful to avoid damage or interference with per 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 (M-1C75A), 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. 23).

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

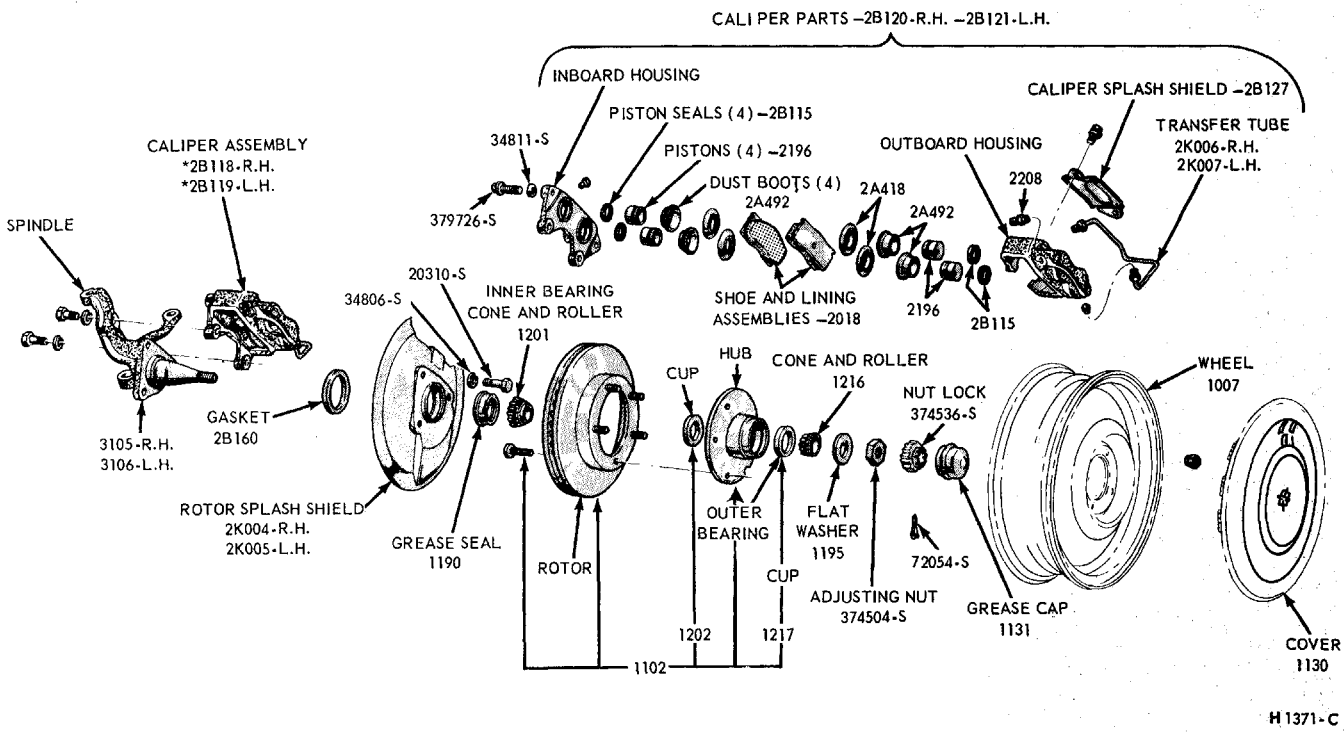


FIG. 23—Disc Brake Disassembled

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.**

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

6. Install the wheel and tire on the hub.

DISC BRAKE ROTOR SPLASH

draulic connections).

2. Remove the three bolts that attach the splash shield to the spindle (Fig. 23).

INSTALLATION

1. If the shield is bent, straighten it out before installation. Position the shield to the mounting bracket, install the attaching bolts nuts, and torque them to specification (Fig. 23).

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

PROPORTIONING VALVE

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

REMOVAL

1. Disconnect and remove the junction block to proportioning valve brake tube. (Fig. 24).

2. Disconnect the front to rear brake tube at the proportioning valve.

3. Remove the bolt attaching the proportioning valve to the frame and remove the valve.

INSTALLATION

1. Position the proportioning valve to the frame and install the attaching bolt.

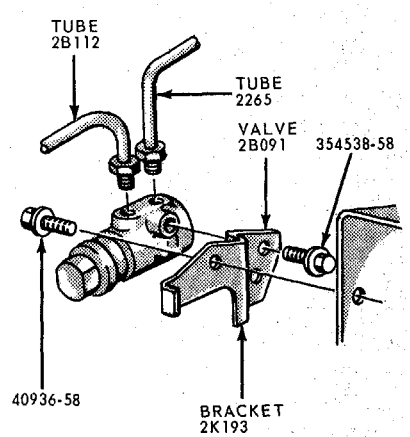


FIG. 24—Proportioning Valve

2. Connect the front to rear brake tube to the valve.

3. Position and connect the junction block to proportioning valve brake tube.

4. Bleed the brake system as directed in **Part 2-1.**

STANDARD OR REAR WHEEL CYLINDER REPAIR

Wheel cylinders should not be dis-

assembled unless they are leaking or unless new cups and boots are to be installed. It is not necessary to remove the brake cylinder from the carrier plate to disassemble, inspect, or hone and overhaul the cylinder. 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. 25).

2. Remove the bleeder screw from the cylinder.

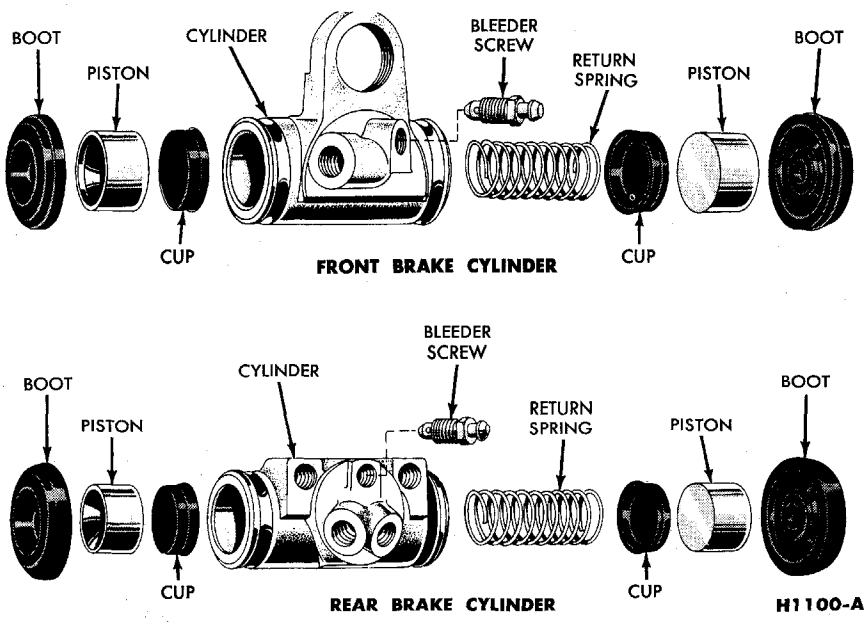


FIG. 25—Front and Rear Wheel Cylinders

INSPECTION

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

2. Replace scored pistons. Always replace the rubber cups and dust boots.

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 diam-**

er.

brake fluid to all internal parts

the cylinder and tighten securely.

3. Insert the return spring, cups, and pistons into their respective positions in the cylinder bore (Fig. 25). Place a boot over each end of the cylinder. Bleed the brake system.

WHEEL CYLINDER REPLACEMENT

REMOVAL

1. 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. **On a car with a vacuum brake booster, be sure the engine is stopped and there is no vacuum in the booster system before disconnecting the hydraulic lines.**

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

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

4. On the rear wheel, remove the wheel cylinder attaching bolts and lock washers and remove the cylinder. On the front wheel, remove the nut and washer that attaches the cylinder to the anchor pin. Remove the cylinder from the anchor pin.

INSTALLATION

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

1. To install a front cylinder:

a. Position the cylinder on the anchor pin against the carrier plate. Install the washer and cylinder attaching nut on the anchor pin, and torque it to specification.

b. Install a new copper gasket over the hose fitting. Thread the hose assembly into the cylinder.

c. Engage the opposite end of the hose to the bracket on the frame. Install the horseshoe-type retaining clip, and connect the brake tube to the hose with the tube fitting nut. Tighten the nut to specification with tool 1112-144.

2. To install a rear cylinder:

a. 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.

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

c. Tighten the tube fitting nut to specification with tool 1112-144.

3. Install the links in the ends of the wheel cylinder, install the shoes and adjuster assemblies, and adjust the shoes as outlined in this section.

4. Adjust the brakes (Part 2-2, Section 2). Install the brake drum and wheel. Bleed the brakes as outlined in Part 2-1, Section 2.

BRAKE CARRIER PLATE REPLACEMENT

REMOVAL

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

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

3. If the rear carrier plate is being replaced, rotate the axle shaft so that the hole in the axle shaft flange lines up with the carrier plate attaching nuts and remove the nuts. Pull the

axle shaft out of the housing with tool-4235C and a slide hammer (Part 4-2), then remove the carrier plate.

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

INSTALLATION

1. Position a new **rear** carrier plate and gaskets 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.

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

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

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

4. Adjust the brake shoes (Section 2), and install the brake drums and wheels. 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. 26).

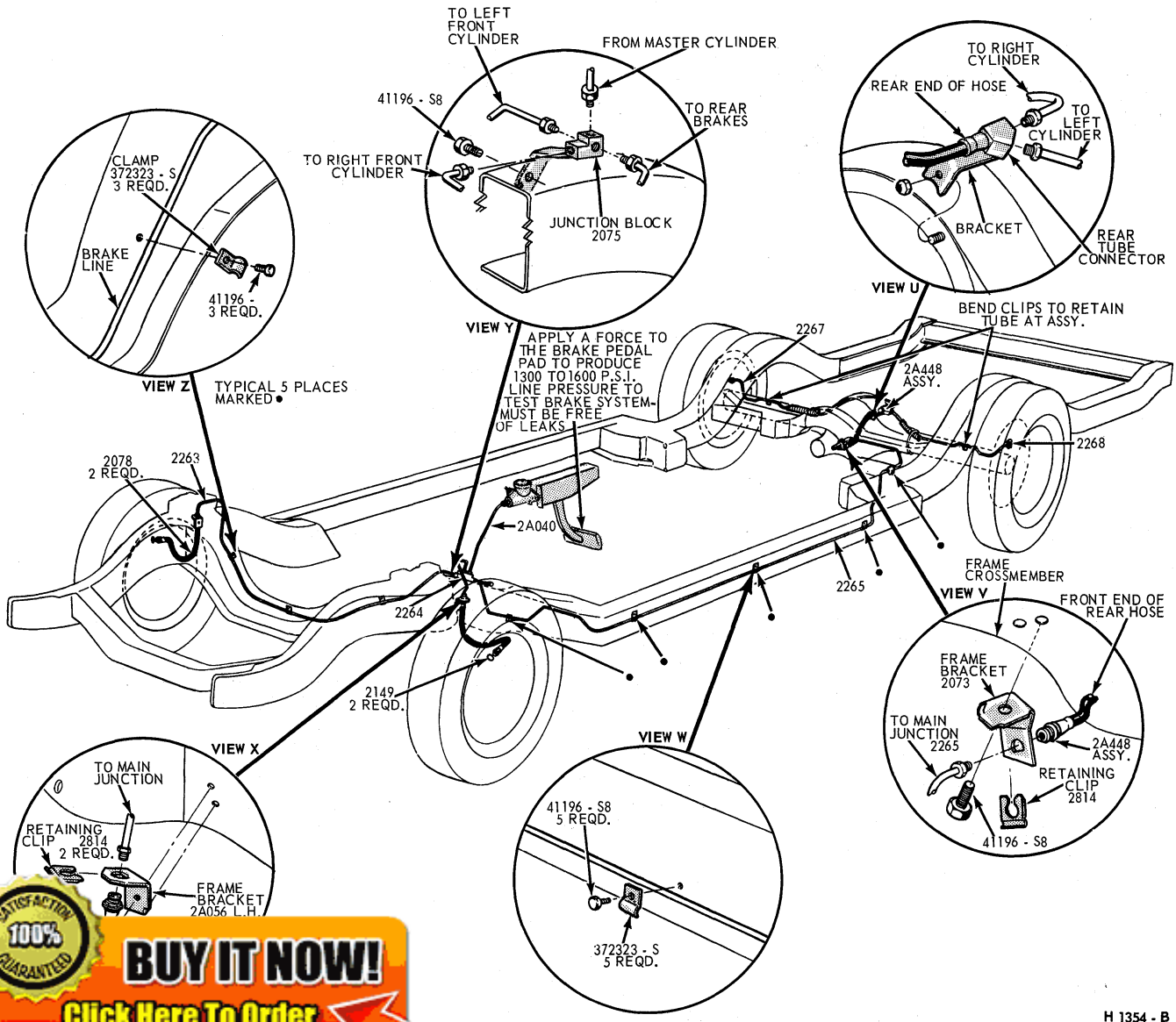
Always bleed the entire system after any hose or line replacement.

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, or brake cylinder, tighten the tube fitting nut to specified torque with Milbar tool 1112-144 or equivalent.



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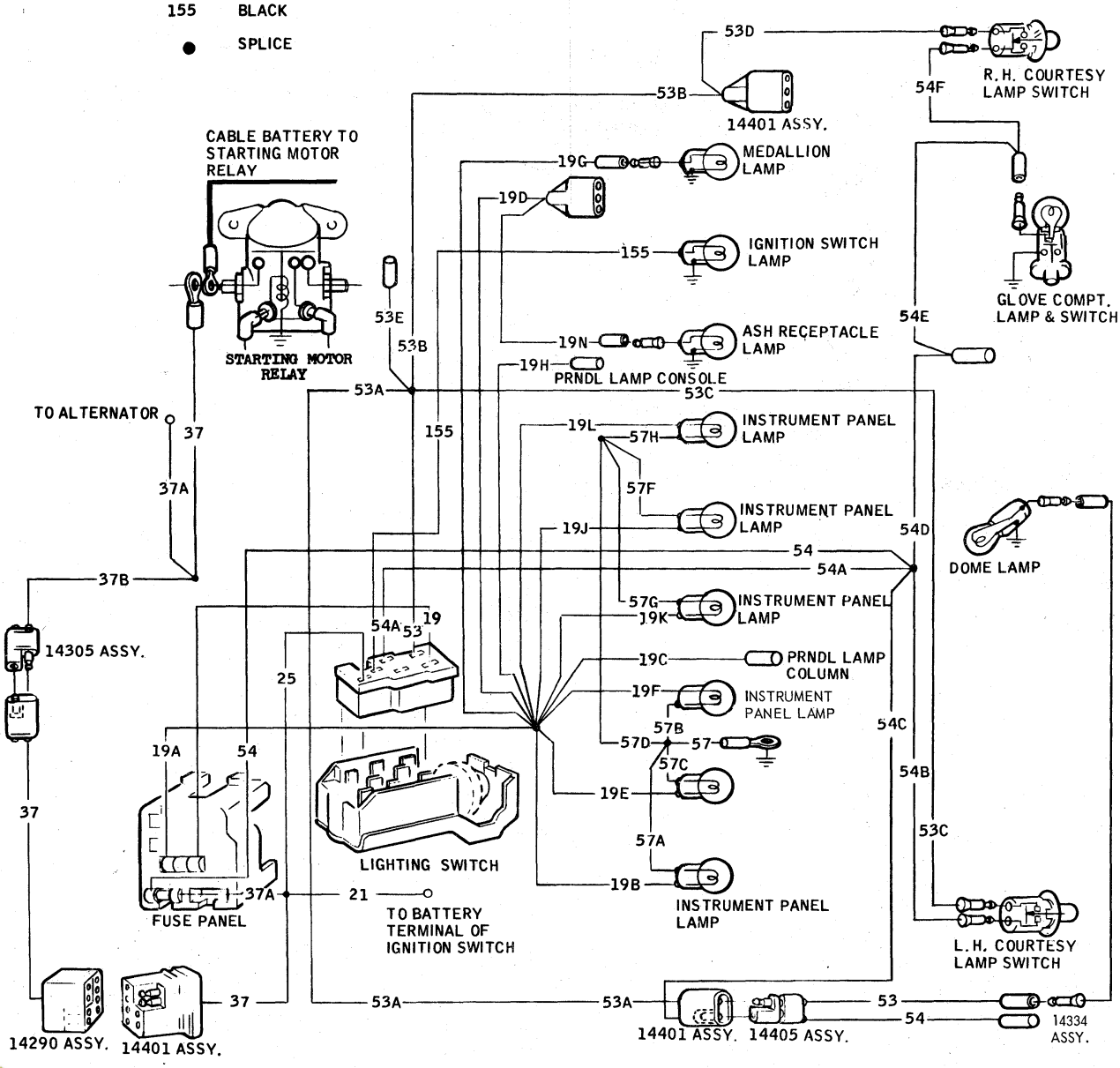
WIRING COLOR CODE

19	THRU	19N	BLUE-RED STRIPE
		25	BLACK-ORANGE STRIPE
37B	37A	37	BLACK-YELLOW STRIPE
53	THRU	53E	BLACK-BLUE STRIPE
54	THRU	54F	GREEN-YELLOW STRIPE
		155	BLACK
		●	SPLICE



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