1968 FORD and MERCURY

SHOP MANUAL

1968 Ford and Mercury Shop Manual
EAN: 978-1-60371-092-3
ISBN: 1-60371-092-2

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

Note from the Publisher

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.

1968

FORD-MERCURY

SHOP MANUAL

GROUP INDEX

SPECIFICATIONS AND SPECIAL SERVICE TOOLS AT END OF EACH GROUP

MICHIGAN

FOREWORD

This shop manual provides the Service Technician with information for the proper servicing of the 1968 Ford and Mercury Cars.

The maintenance schedule and procedures for maintenance operations are published in the 1968 Passenger Car Maintenance and Lubrication Manual.

The information in this manual 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.

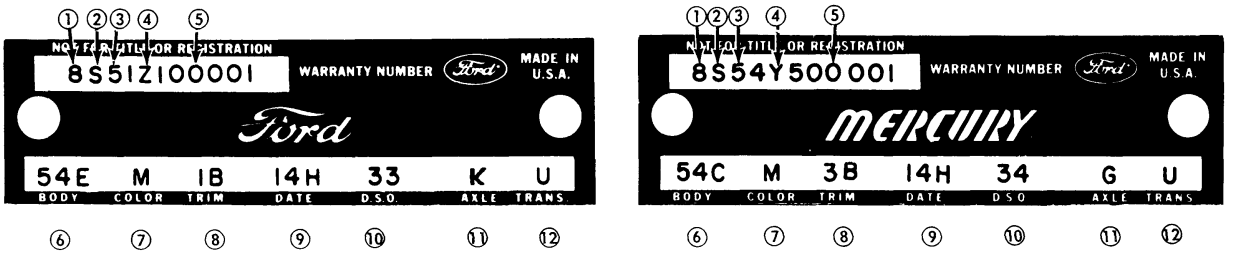
Refer to the opposite page for important vehicle identification data.

The descriptions and specifications in this manual were in effect at the time this manual was approved for printing. 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

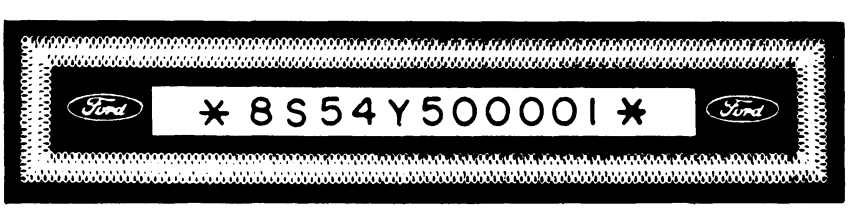


1 MODEL YEAR CODE
2 ASSEMBLY PLANT CODE
3 BODY SERIAL CODE
4 ENGINE CODE
5 CONSECUTIVE UNIT NO.
6 BODY TYPE CODE
7 COLOR CODE
8 TRIM CODE
9 DATE CODE
10 DISTRICT OR DISTRICT AND SPEC. EQUIP. CODE
11 REAR AXLE CODE
12 TRANSMISSION CODE

N 1669-A

FIG. 1—Warranty Plates — Ford and Mercury

FORD



MERCURY

N 1670-A

and Mercury Vehicle
umber (VIN) Tabs

VEHICLE WARRANTY NUMBER

The vehicle warranty number is the first line of numbers and letters appearing on the Warranty Plates (Fig. 1). The Warranty Plate is riveted to the left front door lock face panel. The first number indicates the model year. The letter following the model year number indicates the manufacturing assembly plant. The next two numbers designate the Body Serial Code followed by a letter expressing the Engine Code. The group of six digits remaining on the first line indicate the Consecutive Unit Number.

VEHICLE DATA

The vehicle data appears on the second or lower line on the Warranty Plate. The first two numbers and a letter identify the Body Style. A letter or a number appears next indicating the Exterior Paint Color followed by a number-letter combination designating the Interior Trim. To the right of this code appears the Date Code indicating the date the car was manufactured. A two digit number next designates the district in which the car was ordered and may appear in conjunction with a Domestic Special Order or Foreign Special Order number when applicable. The final two spaces indicate the Rear Axle Ratio (numbers for regular axles, letters for locking-types) and the Transmission type (numbers for manual, letters for automatic).

OFFICIAL VEHICLE IDENTIFICATION NUMBER

The official Vehicle Identification Number (VIN) for title and registration purposes will be stamped on an aluminum tab that will be riveted to the instrument panel close to the windshield on the passenger side of the car and will be visible from outside (Fig. 2).

MODEL YEAR CODE

The number 8 designates 1968.

ASSEMBLY PLANT CODES

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

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.

CONSECUTIVE UNIT NUMBER

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

ENGINE CODES

Code		Type
V	6 Cyl.	240 Cu. In. (1V)
5	6 Cyl.	240 Cu. In. (1V) ①
E	6 Cyl.	240 Cu. In. (1V) Taxi
B	6 Cyl.	240 Cu. In. (1V) Police
F	8 Cyl.	302 Cu. In. (2V)
6	8 Cyl.	302 Cu. In. (2V) ①
	8 Cyl.	390 Cu. In. (2V)
	8 Cyl.	390 Cu. In. (2V) (Prem. Fuel)

① Low Compression

FORD

Body Serial Code	Body Style Code	Body Type	Model
51	54E	4-Door Sedan ①	Custom
50	62E	2-Door Sedan ①	
53	54B	4-Door Sedan ①	Custom 500
52	62B	2-Door Sedan ①	
54	54A	4-Door Sedan ①	Galaxie 500
56	57B	4-Door Hardtop ①	
55	63B	2-Door Hardtop ①	
57	76A	2-Door Convertible ①	
58	65C	2-Door Hardtop ③	
60	63C	2-Door Hardtop ②	Ford XL
61	76B	2-Door Convertible ②	
66	57F	4-Door Hardtop ①	LTD
62	65A	2-Door Hardtop ① ③	
64	54C	4-Door Sedan	
70	71D	4-Door 6 Passenger	Ranch Wagon
71	71H	4-Door 6 Passenger	Custom Ranch Wagon
72	71J	4-Door 10 Passenger	Custom Ranch Wagon
73	71B	4-Door 6 Passenger	Country Sedan
74	71C	4-Door 10 Passenger	
75	71E	4-Door 6 Passenger	Country Squire
76	71A	4-Door 10 Passenger	

① Bench Seat
② Bucket Seat
③ Formal Roof

MERCURY

Body Serial Code	Body Style Code	Body Type	Model
44	54A	4-Door Sedan ① ③	Monterey
44	54B	4-Door Sedan ① ④	
48	57A	4-Door Hardtop ①	
47	63A	2-Door Hardtop ①	
45	76A	2-Door Convertible ①	
54	54C	4-Door Sedan ① ③	Montclair
54	54D	4-Door Sedan ① ④	
58	57B	4-Door Hardtop ①	
57	63B	2-Door Hardtop ①	
64	54E	4-Door Sedan ① ② ④	Parklane
68	57F	4-Door Hardtop ① ②	
67	63F	2-Door Hardtop ① ②	
65	76F	2-Door Convertible ①	
64	54J	4-Door Sedan ② ④	Parklane Brougham
68	57C	4-Door Hardtop ②	
69	63D	2-Door Hardtop ②	Marquis
72	71B	4-Door 6 Passenger ①	Commuter
72	71C	4-Door 10 Passenger ①	
76	71E	4-Door 6 Passenger ①	Colony Park
76	71A	4-Door 10 Passenger ①	

① Bench Seat
② Split Bench
③ Fixed Backlite
④ Drop Backlite

TRANSMISSION CODES

Code	Type
1	3-Speed Manual
5	4-Speed Manual
W	Automatic (XP3)
U	Automatic (XPL)
Y	Automatic (MX)
X	Automatic (FMX)
Z	Automatic (XPL Special)

REAR AXLE RATIO CODES

A number designates a convential axle, while a letter designates a locking differential.

Code	Ratio	Code	Ratio
1	2.75:1	A	2.75:1
3	2.80:1	C	2.80:1
5	3.00:1	E	3.00:1
9	3.10:1	—	—
7	3.25:1	G	3.25:1
8	3.50:1		

EXTERIOR PAINT COLOR CODES

Code	M-30-J M-32-J	Color
A	1724-A	Black
B	3059-A	Maroon
F	3065-A	Dark Aqua Met.
I	2041-A	Lime Green Met.
M	1619-A	White
N	921-A	Diamond Blue
O	2040-A	Light Green
P	2065-A	Pewter Met.
Q	1624-A	Medium Blue Met.
R	3067-A	Dark Green Met.
T	2008-A	Red
U	1070-A	Med. Aqua Met.
W	3120-A	Yellow
X	3061-A	Dark Blue Met.
Y	3073-A	Med. Gold Met.
2	2050-A	Rose Met.
6	1631-A	Light Beige

DISTRICT CODES (DSO)

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

MERCURY

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

FORD

Code	District	Code	District
11	Boston	52	Des Moines
13	New York	53	Kansas City
15	Newark	54	Omaha
16	Philadelphia	55	St. Louis
17	Washington	61	Dallas
21	Atlanta	62	Houston
22	Charlotte	63	Memphis
24	Jacksonville	64	New Orleans
25	Richmond	65	Oklahoma City
27	Cincinnati	71	Los Angeles
28	Louisville	72	San Jose
32	Cleveland	73	Salt Lake City
33	Detroit	74	Seattle
34	Indianapolis	75	Phoenix
35	Lansing	81	Ford of Canada
37	Buffalo	83	Government
38	Pittsburgh	84	Home Office Reserve
41	Chicago	85	American Red Cross
42	Fargo	89	Transportation Services
43	Milwaukee	90-99	Export
44	Twin Cities		
45	Davenport		
51	Denver		

FORD OF CANADA

B1	Central	B4	Midwestern
B2	Eastern	B6	Western
B3	Atlantic	B7	Pacific
I1 thru I7	Export		

Note: Lincoln-Mercury units will use suffix "A" in place of "B".

DATE CODES

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

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

INTERIOR TRIM CODES

Code	Trim Schemes
1A	Black Cloth and Black Vinyl
1B	Med. Blue Cloth and Lt. Blue Vinyl
1D	Dk. Red Cloth and Dk. Red Vinyl
1G	Med. Ivy Gold Cloth and Lt. Ivy Gold Vinyl
1K	Med. Aqua Cloth and Lt. Aqua Vinyl
1U	Lt. Parchment Cloth and Pastel Parchment Vinyl
1Y	Lt. Nugget Gold Cloth and Lt. Nugget Gold Vinyl
2A	Black Vinyl
2B	Dk. Blue Vinyl (Mercury)
2B	Med. Blue Cloth and Lt. Blue Vinyl (Ford)
2D	Dk. Red Vinyl
2G	Med. Ivy Gold Cloth and Lt. Ivy Gold Vinyl
2U	Pastel Parchment Vinyl (Mercury)
2U	Lt. Parchment Cloth and Pastel Parchment Vinyl (Ford)
2Y	Lt. Nugget Gold Vinyl
3A	Black Cloth and Black Vinyl
3B	Med. Blue Cloth and Lt. Blue Vinyl (Mercury)
3B	Dk. Blue Cloth and Dk. Blue Vinyl (Ford)
3D	Dk. Red Cloth and Dk. Red Vinyl
3G	Med. Ivy Gold Cloth and Lt. Ivy Gold Vinyl (Mercury)
3G	Dk. Ivy Gold Cloth and Dk. Ivy Gold Vinyl (Ford)
3K	Med. Aqua Cloth and Lt. Aqua Vinyl (Mercury)
3K	Lt. Aqua Cloth and Lt. Aqua Vinyl (Ford)
3Y	Lt. Nugget Gold Cloth and Lt. Nugget Gold Vinyl
4A	Black Vinyl
4B	Lt. Blue Vinyl
4D	Dark Red Vinyl
4K	Lt. Aqua Vinyl
4K	Lt. Nugget Gold and Black Vinyl
4U	Pastel Parchment Vinyl
4Y	Lt. Nugget Gold Vinyl
5A	Black Cloth and Black Vinyl
5B	Dk. Blue Cloth and Dk. Blue Vinyl (Mercury)
5B	Med. Blue Cloth and Lt. Blue Vinyl (Ford)
5G	Dk. Ivy Gold Cloth and Dk. Ivy Gold Vinyl (Mercury)
5G	Med. Ivy Gold Cloth and Lt. Ivy Gold Vinyl (Ford)
5K	Lt. Aqua Cloth and Lt. Aqua Vinyl (Mercury)
5K	Med. Aqua Cloth and Lt. Aqua Vinyl (Ford)
5Y	Lt. Nugget Gold Cloth and Lt. Nugget Gold Vinyl
6A	Black Vinyl
6B	Dk. Blue Vinyl (Mercury)
6B	Lt. Blue Vinyl (Ford)
6D	Dk. Red Vinyl
6G	Dk. Ivy Gold Vinyl (Mercury)
6G	Lt. Ivy Gold Vinyl (Ford)
6K	Lt. Aqua Vinyl
6U	Pastel Parchment Vinyl
6Y	Lt. Nugget Gold Vinyl
7A	Black Vinyl
7B	Dk. and Lt. Blue Vinyl
7D	Dk. Red Vinyl
7G	Med. and Lt. Ivy Gold Vinyl
7U	Pastel Parchment Vinyl
9A	Black Cloth and Black Vinyl
9B	Dk. Blue Cloth and Dk. Blue Vinyl
9D	Dk. Red Cloth and Dk. Red Vinyl
9G	Dk. Ivy Gold Cloth and Dk. Ivy Gold Vinyl
9K	Lt. Aqua Cloth and Lt. Aqua Vinyl
9Y	Lt. Nugget Gold Cloth and Lt. Nugget Gold Vinyl
BA	Black Cloth and Black Vinyl
BB	Dk. Blue Cloth and Dk. Blue Vinyl
BD	Dk. Red Cloth and Dk. Red Vinyl

INTERIOR CODES—(Continued)

Code	Trim Schemes
BG	Dk. Ivy Gold Cloth and Dk. Ivy Gold Vinyl
BY	Lt. Nugget Gold Cloth and Lt. Nugget Gold Vinyl
CA	Black Vinyl
CB	Dk. Blue Vinyl
CD	Dk. Red Vinyl
CU	Pastel Parchment and Black Vinyl
CY	Lt. Nugget Gold Vinyl
DA	Black Vinyl
DB	Dk. and Lt. Blue Vinyl
DD	Dk. Red Vinyl
DU	Pastel Parchment Vinyl
EA	Black Cloth and Black Vinyl
EB	Dk. Blue Cloth and Dk. Blue Vinyl
ED	Dk. Red Cloth and Dk. Red Vinyl
EG	Dk. Ivy Gold Cloth and Dk. Ivy Gold Vinyl
EK	Lt. Aqua Cloth and Lt. Aqua Vinyl
EY	Lt. Nugget Gold Cloth and Lt. Nugget Gold Vinyl
FA	Black Vinyl
FB	Dk. Blue Vinyl
FD	Dk. Red Vinyl
FG	Lt. Ivy Gold Vinyl (Mercury)
FG	Dk. Ivy Gold Vinyl (Ford)
FY	Lt. Nugget Gold Vinyl
FU	Pastel Parchment Vinyl
HA	Black Vinyl
HB	Dk. and Lt. Blue Vinyl
HD	Dk. Red Vinyl
HG	Med. and Lt. Ivy Gold Vinyl
HU	Pastel Parchment Vinyl
KA	Black Cloth and Black Vinyl
KB	Dk. Blue Cloth and Dk. Blue Vinyl
KD	Dk. Red Cloth and Dk. Red Vinyl
KG	Dk. Ivy Gold Cloth and Dk. Ivy Gold Vinyl
KY	Lt. Nugget Gold Cloth and Lt. Nugget Gold Vinyl
LE	Lt. and Med. Beige Vinyl
NA	Black Vinyl
NB	Dk. and Lt. Blue Vinyl (Mercury)
NB	Lt. Blue Vinyl (Ford)
ND	Dk. Red Vinyl
NU	Pastel Parchment Vinyl
PA	Black Vinyl
PB	Dk. and Lt. Blue Vinyl
PD	Dk. Red Vinyl
PG	Med. and Lt. Ivy Gold Vinyl
PU	Pastel Parchment Vinyl
RA	Black Vinyl
RB	Lt. Blue Vinyl
RD	Dk. Red Vinyl
RG	Lt. Ivy Gold Vinyl
RK	Lt. Aqua Vinyl
RY	Lt. Nugget Gold Vinyl
RU	Pastel Parchment Vinyl
SA	Black Cloth and Black Vinyl
SB	Med. Blue Cloth and Lt. Blue Vinyl
SG	Med. Ivy Gold Cloth and Lt. Ivy Gold Vinyl
SK	Med. Aqua Cloth and Lt. Aqua Vinyl
SY	Lt. Nugget Gold Cloth and Lt. Nugget Gold Vinyl
ZA	Black Cloth and Black Vinyl
ZB	Dk. Blue Cloth and Dk. Blue Vinyl
ZY	Lt. Nugget Gold Cloth and Lt. Nugget Gold Vinyl

BRAKES

GROUP 2

PART 2-1— General Brake Service

1 DIAGNOSIS AND TESTING

REFER TO Figs. 9 and 10 for the brake trouble symptoms and possible causes.

BRAKE SYSTEM TESTS

Always check the fluid level in the master cylinder before performing the test procedures. If the fluid level is not within 1/4 inch of the master cylinder reservoirs, add Rotunda Brake Fluid—Extra Heavy Duty—Part Number C6AZ-19542-A (ESA-M6C25-A) or equivalent for all brake applications.

The disc brake extra heavy duty brake fluid is colored blue for identification purposes. Do not mix low temperature brake fluids with the specified disc brake fluid.

1. Turn the ignition switch to the ACC or ON position. If the light on the brake warning lamp remains on, the condition may be caused by a de-

light remains on, check the switch connector and wire for a grounded condition and repair or replace the wire assembly. If the condition of the wire is good, replace the brake warning lamp switch.

2. Turn the ignition switch to the start position. If the brake warning lamp does not light, check the light and wiring for defects and replace or repair wiring.

3. If the brake warning lamp does not light when a pressure differential condition exists in the brake system, the warning lamp may be burned out, the warning lamp switch is inoperative or the switch to lamp wiring has an open circuit. Check the bulb and replace it, if required. Check the switch to lamp wires for an open circuit and repair or replace them, if required. If the warning lamp still does not light, replace the switch.

BRAKE PEDAL FREE HEIGHT AND TRAVEL MEASUREMENTS

With the engine running for full power brake operation, measure the brake pedal free height, and check the brake pedal travel with the use of the Brake Pedal Pressure Gauge, Tool WRE-500-50 as follows:

Brake Pedal Free Height Measurement

1. Insert a slender, sharp pointed prod through the carpet and sound deadener to the dash panel metal and measure the distance to the brake pedal (Fig. 1).

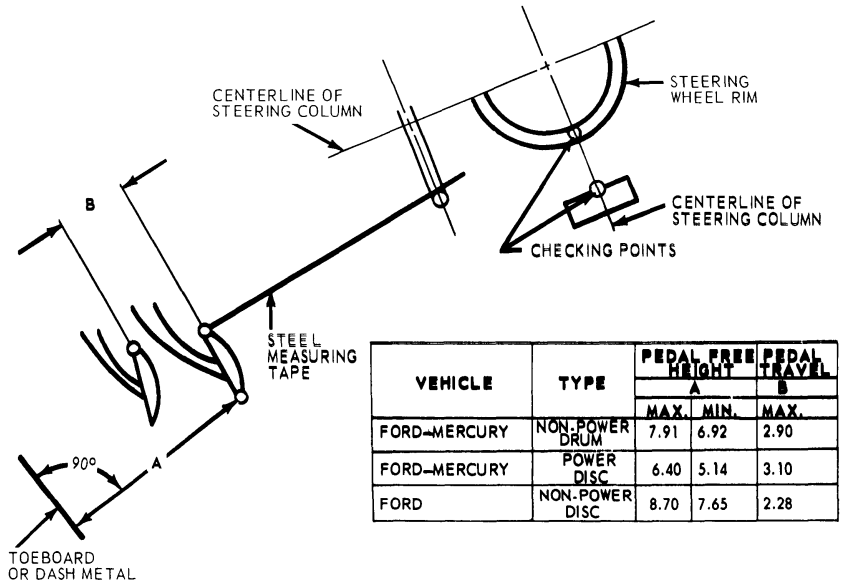
2. If the position of the pedal is not within specification, check the brake pedal linkage for missing, worn, or damaged bushings, or loose attaching bolts and replace them, if required.

3. If the pedal free height is still out of specification, check the brake pedal booster or master cylinder to be sure the correct parts are installed. Replace the defective parts as necessary.

Brake Pedal Travel Measurement

1. Install a Brake Pedal Effort Gauge on the brake pedal pad (Fig. 2).

2. Hook a steel measuring tape to the brake pedal as shown in Fig. 1.



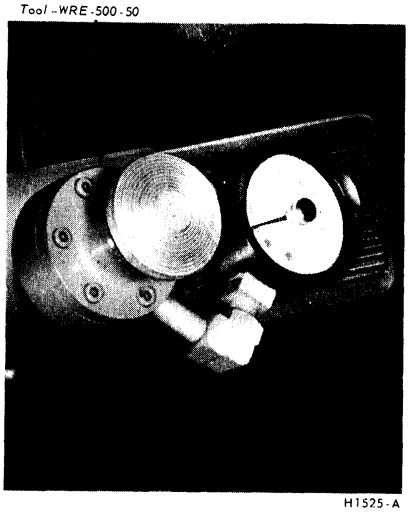
VEHICLE	TYPE	PEDAL FREE HEIGHT A		PEDAL TRAVEL B
		MAX.	MIN.	MAX.
FORD-MERCURY	NON-POWER DRUM	7.91	6.92	2.90
FORD-MERCURY	POWER DISC	6.40	5.14	3.10
FORD	NON-POWER DISC	8.70	7.65	2.28

"A" DIMENSION TO BE MEASURED TO SHEET METAL.

"B" DIMENSION TO BE MEASURED PARALLEL TO THE VERTICAL CENTERLINE OF THE STEERING COLUMN WITH A 50 POUND LOAD APPLIED TO THE CENTERLINE OF THE BRAKE PEDAL PAD. (CHECKS ON POWER BRAKE VEHICLES MADE WITH ENGINE RUNNING)

H 1544-B

FIG. 1—Brake Pedal Height and Travel Measurements



H1525-A

FIG. 2—Brake Pedal Effort Gauge Installed

Measure and record the distance from the brake pedal free height position to the reference point, which is at the six position on the steering wheel by observing the pressure gauge, and measure the distance from the brake pedal to the fixed reference point on the steering wheel rim parallel to the centerline of the steering column.

4. The difference between the brake pedal free height and the depressed pedal measurement under a 50 pound load should be within the specified maximum pedal travel service specification B in Fig. 1.

5. If the pedal travel is more than the specified maximum shown in Fig. 1, dimension B, make several sharp reverse stops (equivalent to 50 pounds pedal pressure) with a forward stop before each. Move the vehicle in reverse and forward for a distance of approximately ten feet; then apply the brakes sharply and hold the brake pedal down until the vehicle is completely stopped. This will actuate the brake self-adjusters. If these stops do not bring the brake pedal travel within specification, make several additional forward and reverse stops as outlined above.

6. If the second series of stops do not bring the brake pedal travel within specification, remove the brake drums and check the brake adjusters to make sure they are functioning. Check the brake linings for wear or damage. Repair or replace all worn or damaged parts and non-functioning adjusters. Adjust the brake lining outside diameter to the approximate inside diameter of the brake drum with Rotunda Tool HRE-8650 (Figs. 12 and 13, Part 2-2).

7. If all the brake adjusters, brake drums and linings are functional and the brake travel is not within specifications, check the pedal linkage for missing or worn bushings, or loose attachments. **Bleed the brakes and centralize the differential valve.**

POWER BRAKE FUNCTIONAL TEST

1. With the transmission in neutral, stop the engine and apply the parking brake. Depress the brake pedal several times to exhaust all vacuum in the system.

2. With the engine shut off, 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, calipers (if so equipped), wheel cylinders and connections for leaks.

3. With the engine shut off and all vacuum in the system exhausted, 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.

If the brake pedal movement feels spongy, bleed the hydraulic system to remove air from the system. Refer to Hydraulic System Bleeding, Part 1, Section 2, Also, check for leaks or insufficient fluid.

LOCKED WHEEL BRAKE

Should one of the wheel brakes be locked and the vehicle 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 will not correct the cause of trouble.**

VACUUM TESTS—VACUUM RELEASE PARKING BRAKES

Visually check the operation of the brake linkage as the brake pedal is depressed. Then, check the operation of the brake linkage when the manual release lever is activated. These checks should indicate whether the manual parking brake control linkage is operating properly or requires re-

pair or adjustment due to inability of the parking brake to hold against moderate vehicle movement. Perform tests of the parking brake system and controls after making certain the linkage and manual controls operate properly.

Diagnosis of vacuum release systems is basically similar to electrical diagnosis. That is, the vacuum system must be complete from the source to the vacuum components. Any leaks, like a bad connection will make the system inoperative. If a leak develops in one of the vacuum systems, one or all of the vacuum components may become inoperative. This would be dependent on the location of the vacuum leak. If the leak is in the vacuum supply, all systems will become inoperative. If the leaks is in the component side of the vacuum control for the specific system, all other systems will operate when the leaking system is off.

When testing a parking brake vacuum release system, a minimum of 10 inches of vacuum (Hg.) should be available at all points where vacuum is applied. This can be checked with a Rotunda Fuel Pump Tester Gauge (ARE345) and two Distributor Tester hose adapters (Marked Q) connected together with a coupling. This allows the Fuel Pump Tester Gauge hose to be adapted to any other vacuum hose or rubber connector in the vacuum systems.

Failure to maintain 10 inches of vacuum (Hg) during vacuum system tests could be caused by a loose hose connection, resulting in a vacuum leak. When checking for vacuum between two points, trace the hose along the entire routing to be sure it is not crossed with another hose and connected to the wrong connection.

All of the vacuum parking brake control checks are to be performed with the engine running at idle speed.

Leaks in the parking brake hoses or a disconnected or improperly connected hose can usually be found by listening for a hissing sound along the hose routings. **Under no circumstances should air pressure be applied to the vacuum system as the actuator diaphragm in the parking brake vacuum motor may be damaged.**

1. Start the engine and run it at idle speed. With the transmission shift control in neutral, depress the parking brake pedal to apply the parking brake. Move the transmission shift control to D range and observe the parking brake pedal to see that the pedal moves upward and the parking brake releases. If the parking brake releases, the parking brake vacuum control is working properly.

2. If the parking brake does not release, test for vacuum at the steering column neutral switch port in the junction block, vacuum lines and the parking brake release vacuum motor. Use the Rotunda Vacuum and Fuel Pump Tester 345. This can be accomplished by removing the hose from each component and attaching it to the vacuum gauge. Connect two distributor tester vacuum hose adapters together with a coupling as a connector to attach the gauge. A minimum of ten inches of vacuum is required to actuate the parking brake vacuum motor. **Do not remove any of the vacuum hoses from the junction block unless the junction block is being replaced, as the plastic nipples are thin and very brittle and damage may result.** If a minimum reading is not present when checking each of the aforementioned components, they must be replaced.

ROAD TEST

A road test should be conducted only when the operator is sure the brakes will stop the vehicle.

During a road test, apply the vehicle brakes at a road speed of 20 mph for all problem conditions listed in Figs. 9 and 10 with the exception of those resolved in the brake system tests and brake chatter. To check for brake chatter or surge, apply the brakes lightly at 50 mph. For each of the symptoms encountered check and eliminate the caused which are listed in Figs. 9 and 10.

If the road test reveals one or more problem conditions listed Figs. 9 and 10, correct all malfunctions of the vacuum system, brake booster and hydraulic system prior to removing brake drums, brake calipers, brake shoes and linings or backing plates.

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 pulling the release lever, or on a vacuum release pedal by pushing down the manual release lever.

2. Depress the parking brake pedal until it is engaged in the first notch of the control.

3. Raise the vehicle. With the

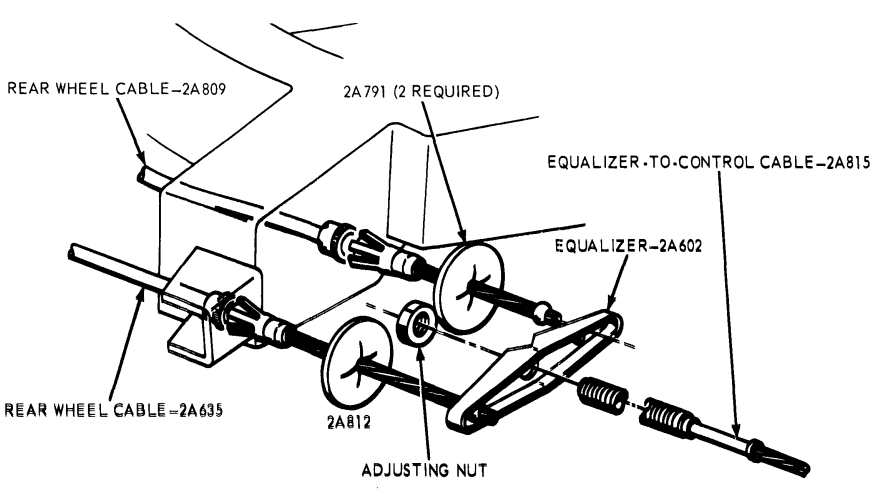


FIG. 3—Parking Brake Adjustment

wheels).

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

5. Depress the parking brake pedal to the third notch. Under normal conditions, this will hold the vehicle satisfactorily.

6. Release the parking brake again, and check as in step 4.

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

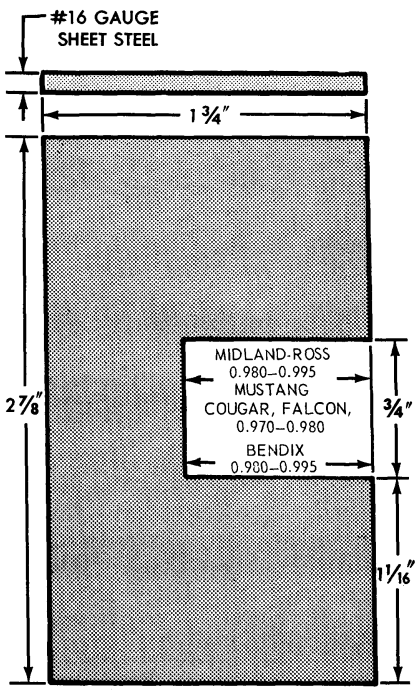


FIG. 4—Push Rod Gauge Dimensions

POWER BRAKE MASTER CYLINDER PUSH ROD ADJUSTMENT

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

diustment screw is set to the screw, fabricate a gauge of the dimensions shown in Fig. 4. 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. 5 or 6. 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.

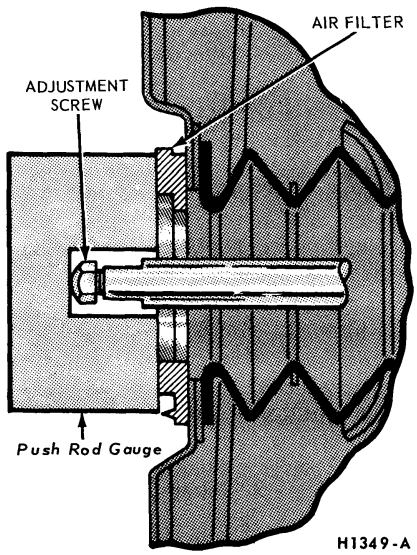


FIG. 5—Push Rod Adjustment—Midland-Ross

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. 6.

This is an approximate adjustment only. To verify the adjustment, look through the make-up (rear) port of the master cylinder when installing the master cylinder to the booster. The master cylinder piston should not move more than 0.015 inch as it contacts the push rod. No movement (exact contact) is ideal.

HYDRAULIC SYSTEM BLEEDING AND CENTRALIZING OF THE DIFFERENTIAL VALVE

When any part of the hydraulic system has been disconnected for repair or replacement, air may enter the system and cause spongy pedal action. Bleed the hydraulic system after it has been properly connected, to be sure that all air is expelled.

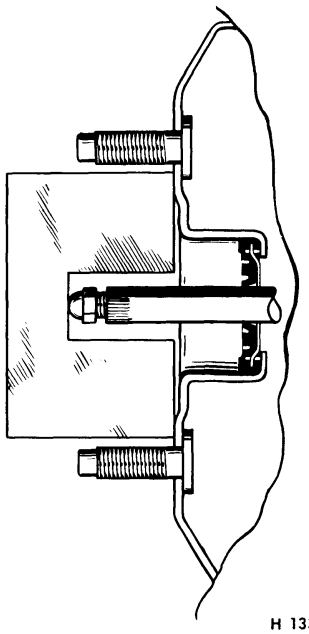


FIG. 6—Push Rod Adjustment—Bendix

MANUAL BLEEDING

The primary and secondary (front and rear) hydraulic brake systems are individual systems and are bled separately. Bleed the longest line first on the individual system being serviced. **During the complete bleeding operation, DO NOT allow the reservior to run dry.** Keep the master cylinder reservoirs filled with Rotunda Fluid—Extra Heavy Duty—Part Number C6AZ-19542-A (ESA-M6C-25-A). **The disc brake extra heavy duty brake fluid is colored blue for identification purposes. Do not mix low temperature brake fluids with the specified fluid during the bleeding operations. Never re-use brake fluid which has been drained from the hydraulic systems.**

1. Loosen the bleed screw located on the side of the master cylinder. **Do not use the secondary piston stop screw, located on the bottom of the master cylinder to bleed the brake system. Loosening or removing this screw could result in damage to the secondary piston or stop screw.**

2. To bleed the secondary (rear) brake system, position a suitable 3/8 inch box wrench (Fig. 7) on the bleeder fitting on the brake wheel

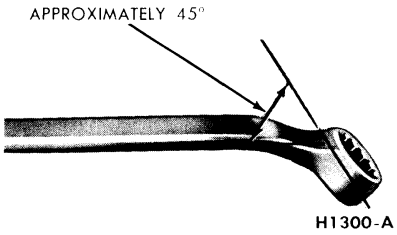


FIG. 7—Wrench for Bleeding Brake Hydraulic System

cylinder. Attach a rubber drain tube to the bleeder fitting. **The end of the tube should fit snugly around the bleeder fitting.**

3. 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.

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

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

6. Repeat this procedure at the brake wheel cylinder on the opposite side. Refill the master cylinder reservoir after each wheel cylinder is bled and install the master cylinder cover and gasket. **Be sure the diaphragm type gasket is properly positioned in the master cylinder cover. When the bleeding operation is completed, the fluid level should be filled to within 1/4 to 1/2 inch from the top of the reservoirs.**

7. If the primary (front brake) system is to be bled. Repeat steps 2 through 6 at the right front brake caliper or cylinder and ending at the left front brake caliper or cylinder.

8. Be sure that the front brake pistons are returned to their normal positions and that the shoe and lining assemblies are properly seated by depressing the brake pedal several times until normal pedal travel is established.

9. Centralize the pressure differential valve. Refer to the Centralizing the Pressure Differential Valve procedures which follow.

Duty—Part Number C6AZ-19542-A (ESA-M6C25-A) or equivalent for all brake applications. **The brake fluid is colored blue for identification purposes. Do not mix low temperature brake fluid with the specified brake fluid during the bleeding operations. Never re-use brake fluid that has been drained from the hydraulic system.** The tank should be charged with approximately 10 to 30 pounds of air pressure. **Never exceed 50 pounds pressure.**

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

2. Remove the master cylinder reservoir cover and rubber gasket, and fill the master cylinder reservoir with the specified brake fluid. Install the pressure bleeder adapter tool to the master cylinder, and attach the bleeder tank hose to the fitting on the adapter.

Master cylinder pressure bleeder adapter tools can be obtained from the various manufacturers of pressure bleeding equipment. Follow the instructions of the manufacturer when installing the adapter.

3. If the master cylinder is equipped with a bleed screw, loosen the bleed screw and bleed the master cylinder until the fluid is free of air bubbles; then, tighten the bleed screw. **Do not use the secondary piston stop screw, located on the bottom of the master cylinder, to bleed the master cylinder.**

Loosen the primary and secondary tube nuts at the master cylinder of those master cylinders without bleed screws and bleed the master cylinder until the fluid flow is free of air bubbles, then tighten the tube nuts to the specified torque. **Do not overtighten.**

4. If the rear wheel cylinders the, secondary brake system, are to be bled, position a 3/8 inch box wrench (Fig.7) on the bleeder fitting on the right rear brake wheel cylinder. Attach a bleeder tube to the bleeder fitting. **The end of the tube should fit snugly around the bleeder fitting.**

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

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

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

8. Repeat steps 3 through 7 at the left rear wheel cylinder.

9. If the vehicle is equipped with disc brakes, repeat steps 4 through 7, starting at the right front disc caliper and ending at the left front disc caliper.

10. If the vehicle contains drum-type front brakes and the primary (front) brake system is to be bled, repeat steps 4 through 7, starting at the right front wheel cylinder ending at the left wheel cylinder.

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

12. On disc brake equipped vehicles, be sure that the front brake pistons are returned to their normal positions and that the shoe and lining assemblies are properly seated by depressing the brake pedal several times until normal pedal travel is established.

13. Remove the Pressure Bleeder Adapter Tool. Fill the master cylinder reservoirs to within 1/4 inch from the top. Install the master cylinder cover and gasket. **Be sure the Diaphragm type gasket is properly positioned in the master cylinder cover.**

14. Centralize the pressure differential valve as follows.

CENTRALIZING THE PRESSURE DIFFERENTIAL VALVE

After a failure of the primary (front brake) or secondary (rear brake) system has been repaired and bled, the dual-brake warning light will usually continue to be illuminated due to the pressure differential valve remaining in the off-center position. **Front wheel balancing operations on disc brake equipped vehicles can also cause a pressure differential in the primary (front) brake system, illuminating the brake warning light.**

To centralize the pressure differential valve and turn off the warning light after a repair operation, a pressure differential or unbalance condition must be created in the **opposite brake system from the one that was repaired or bled last.**

1. Turn the ignition switch to the ACC or ON position. Loosen the differential valve assembly brake tube nut at the outlet port on the opposite side of the brake system that was wheel balanced, repaired and/or bled

last. Depress the brake pedal slowly to build line pressure until the pressure differential valve is moved to a centralized position and the brake warning light goes out; then, immediately tighten the outlet port tube nut.

2. Check the fluid level in the master cylinder reservoirs and fill them to within 1/4 to 1/2 inch of the top with the specified brake fluid, if necessary.

3. Turn the ignition switch to the OFF position.

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

3 CLEANING AND INSPECTION

DISC BRAKES

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

2. Make thickness measurements with a micrometer across the thinnest section of the shoe and lining. If the assembly has worn to a thickness of 0.230-inch (shoe and lining together) or 0.030-inch (lining material only) at any one of three meauring locations or if lining shows evidence of brake fluid contamination, replace all (4) shoe and lining assemblies on both front wheels.

3. Check the caliper to spindle attaching bolts torque. Torque them to specification, if required.

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 contact 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 lateral runout on the indicator, replace or resurface the disc brake rotor. **The following requirement must be met when resurfacing disc brake rotors:**

Rotunda Disc Brake Attachment FRE-2249-2 is the **only approved** tool to be used to refinish the disc brake rotors. The step-by-step resurfacing procedure provided with the tool must be adhered to.

The finished braking surface of the rotor must be flat and parallel within 0.0007 inch; lateral runout must not exceed 0.002 inch total indicator reading, and the surface finish of the braking surface are to be 85/15 micro inches. **The minimum limiting dimension (Fig. 8) from the inboard**

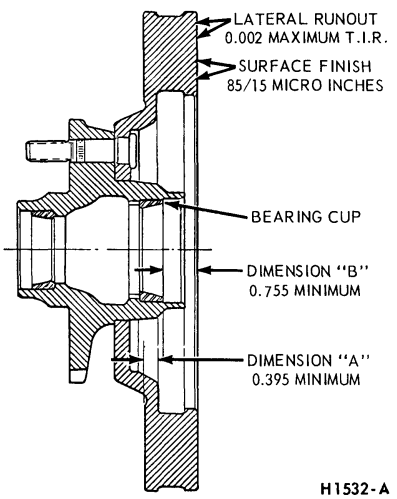


FIG. 8—Disc Brake Rotor Service Limits.

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, refinish it as outlined in step 5 or replace the rotor, if required.

7. Visually check the caliper if excess leakage is evident, it should be replaced. Slight leakage around the piston or a seized piston indicates the need for removal and disassembly.

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

9. Check the brake hoses for signs of cracking, leaks or abrasion. Replace them if necessary.

DRUM BRAKES

1. Remove the wheel from the drum, and remove the drum as outlined in Part 2-2, Section 2.

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

3. Inspect the brake shoes for excessive lining wear or show 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 had been contaminated with oil, grease or brake fluid. 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, retacting 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 vehicle 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 drum and, if necessary, refinish. Refer to Part 2-2, Section 4 for refinishing.

BOOSTER UNIT

Check the booster operation as noted in Part 2-1, Section 1, Power Brake Functional Test. If the brake booster is damaged or defective, replace it with a new booster. **The brake booster is serviced only as an assembly.**

POSSIBLE CAUSES OF TROUBLE	TROUBLE SYMPTOMS												
	Excessive Pedal Travel	Brake Roughness or Chatter (Pedal Pumping)	Excessive Pedal Effort	Pull	Rattle	Brakes Heat Up During Driving and Fail to Release	Leaky Wheel Cylinder	Grabbing or Uneven Braking Action	No Braking Effect When Pedal Is Depressed	Brakes for the Respective System Do Not Apply	Pedal Gradually Moves Toward Floor or Dash Panel	Warning Lamp Stays Lit.	Warning Lamp Does Not Light
Shoe and Lining Knock-back after Violent Cornering or Rough Road Travel	X												
Shoe and Lining Assembly not Properly Seated or Positioned	X					X			X				
Leak or Insufficient Fluid in System or Caliper	X		X						X		X		
Loose Wheel Bearing Adjustment	X			X									
Damaged or Worn Caliper Piston Seal	X						X		X				
Improper Master Cylinder Push Rod Adjustment	X												
Excessive Rotor Runout or Out of Parallel		X											
Incorrect Tire Pressure				X				X					
Frozen or Seized Pistons			X	X		X		X					
Brake Fluid, Oil or Grease on Linings		X	X	X				X					
Shoe and Lining Worn Below Specifications			X										
Proportioning Valve Malfunction			X					X					
Booster Inoperative			X										
Caliper Out of Alignment with Rotor				X				X					
Loose Caliper Attachment	X	X		X	X			X					
Metering Valve Seal Leaks								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	X			X						
Bleeder Screw Still Open									X		X		
Caliper Out of Parallel with Rotor				X									
One Section Dual Brake System Is Inoperative										X		X	
Differential Pressure Valve Is not Centered												X	
Wiring to Warning Lamp Switch Is Grounded												X	
Warning Lamp Switch Is Grounded												X	
Warning Lamp Is Burned Out													X
Warning Lamp Switch Has an Open Circuit													X
Warning Lamp Switch Is Inoperative													X
it													X

mptoms 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 Not Apply	Brakes for the Respective System Do Not Apply	Warning Lamp Stays Lit.	Pedal Gradually Moves Toward Floor or Dash Panel	Warning Lamp Does Not Light
Mechanical Resistance at Pedal or Shoes		X	X														
Brake Line Restricted	X	X	X		X												
Leaks or Insufficient Fluid				X				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										
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			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										
Threads Left by Drum Turning Tool Pulls Shoes Sideways											X						
Cracked Drum								X									
One Section Dual Brake System Is Inoperative														X	X		
Differential Pressure Valve Not Centered															X		
Wiring to Warning Lamp Switch Is Grounded															X		
Warning Lamp Switch Is Grounded															X		
Warning Lamp Is Burned Out																	X
Warning Lamp Switch Has an Open Circuit																	X
Warning Lamp Has Open Circuit																	X

tem) Trouble Symptoms and Possible Causes

PART 2-2— Brake System

1 DESCRIPTION AND OPERATION

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

A vacuum booster is available as optional equipment.

DUAL MASTER CYLINDER BRAKE SYSTEM

The dual-master cylinder brake system has been incorporated in all models to provide increased safety. The system consists of a dual-master cylinder, pressure differential valve assembly and a switch. The switch on the differential valve activates a dual-brake warning light, located on the instrument panel.

The dual-master cylinder brake system is similar to a conventional (single) system, two master cylinders are combined in a singal cast iron casting (Fig. 1). One portion actuates the operation of the other portion

warning light signals a failure of either the front (primary) or rear (secondary) brake system.

On power disc equipped vehicles, the dual-master cylinder has the master cylinder outlet port for the rear (secondary) brake system located on the bottom of the master cylinder body. A master cylinder hydraulic system bleed screw is located in the outboard side of the master cylinder casting. The front (primary) brake system outlet port is located on the outboard side of the master cylinder.

On power drum and standard drum equipped vehicles, the rear (secondary) and front (primary) brake system outlet ports are located on the outboard side of the master cylinder casting. A bleed screw is not used on the master cylinder for power drum and standard drum equipped vehicles.

A code letter is stamped on the end of the master cylinder body casting for easy service identification. Code letter A or P identifies the power disc brake master cylinder, code letter T identifies the standard drum brake master cylinder.

A brake pressure differential valve assembly (Fig. 2) incorporating a hydraulically operated mechanical switch is utilized to operate a dual-brake warning light, located on the instrument panel.

Brake tubes are connected from the dual-master cylinder front (primary) and rear (secondary) brake systems to the pressure differential valve (Fig. 2).

The pressure differential valve is mounted vertically on the frame side rail within the engine compartment. The primary (front) brake system outlet tubes are connected to the ports located in the upper side of the differential vavle assembly and the secondary (rear) brake system outlet tubes are connected to the ports located in the lower side of the differential valve assembly.

Hydraulic pressure for both rear wheel brakes is provided from the single secondary (rear) brake outlet line, located opposite the secondary system inlet port of the differential valve. On disc brake equipped vehicles, a proportioning valve is included in the system and is connected to the differential valve through inlet and outlet tubes. The brake hose bracket serves as a junction point for the individual brake lines that lead to the wheel cylinders of right and left rear brake components.

When the brake pedal is depressed, both the primary (front brake) and secondary (rear brake) master cylinder pistons are moved simultaneously to exert hydraulic fluid pressure on their independent hydraulic system. The fluid displacement of the dual-

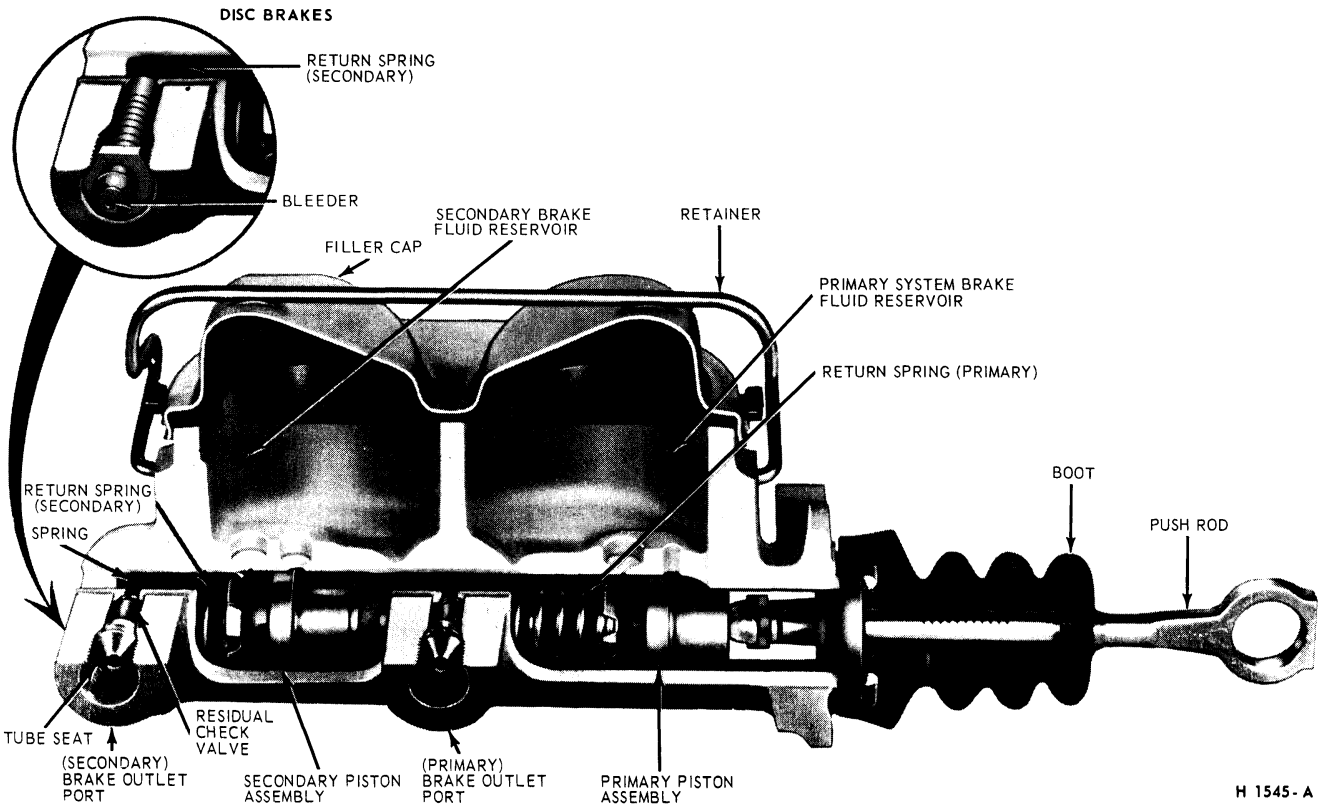


FIG. 1—Dual-Master Cylinder—Typical

master cylinders is porportioned to fulfill the requirements of each of the two independent hydraulic brake systems (Fig. 1).

If a failure of the rear (secondary) brake system should occur, initial brake pedal movement causes the unrestricted secondary piston to bottom in the master cylinder bore. Primary piston movement displaces hydraulic fluid in the primary section of the dual-master cylinder to actuate the front brake system.

Should the front (primary) brake system fail, initial brake pedal movement causes the unrestriced primary piston to bottom out against the secondary piston. Continued downward movement of the brake pedal moves the secondary piston to displace hydraulic fluid in the rear brake system, actuating the rear brakes. On disc brake equipped vehicles, the pressure differential valve will move to the low pressure area of the front system. This movement uncovers the rear brake outlet passage and provides a

compensate for the loss of the failed portion of the brake system provides a warning that a partial brake system failure has occurred. When the ignition switch is turned to the **start** position, a dual-brake warning light provides a visual indication the warning lamp is functional. When the ignition switch is turned to the ON or ACC position, a dual-brake warning light on the instrument panel also provides a visual indication if one portion of the dual-brake system has become inoperative.

Should a failure of either the front or rear brake hydraulic system occur, the hydraulic fluid pressure differential resulting from the pressure loss of the failed brake system forces the valve toward the low pressure area to illuminate the brake warning light (Fig. 2).

A mechanically operated electrical switch is located on the side of the pressure differential valve assembly between the front and rear brake system inlet ports. The inner-end of the spring loaded switch plunger contacts the bottom of a tappered shoulder groove in the center of the valve (Fig. 2). O-ring seals are retained in seal ring lands near each end of the valve.

Should a failure of the rear brake system occur, hydraulic fluid pressure in the rear brake system would drop. During brake pedal operation the fluid pressure build-up of the front brake system forces the valve to move toward the low pressure area, or toward the rear brake system outlet port (Fig. 2). Movement of the differential valve forces the switch plunger upward over the tapered shoulder of the valve to close the switch electrical contacts and light the dual brake warning lamp, signalling a brake system failure.

In the event a front brake system failure should occur, greater pressure from the rear brake system during brake pedal operation forces the valve forward, moving the switch plunger upward onto the valve ramp to light the brake system warning lamp. However, **failure of either the front or rear system does not impair operation of the other brake system.**

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 vehicles with disc brakes, and on front and rear wheels of all others.

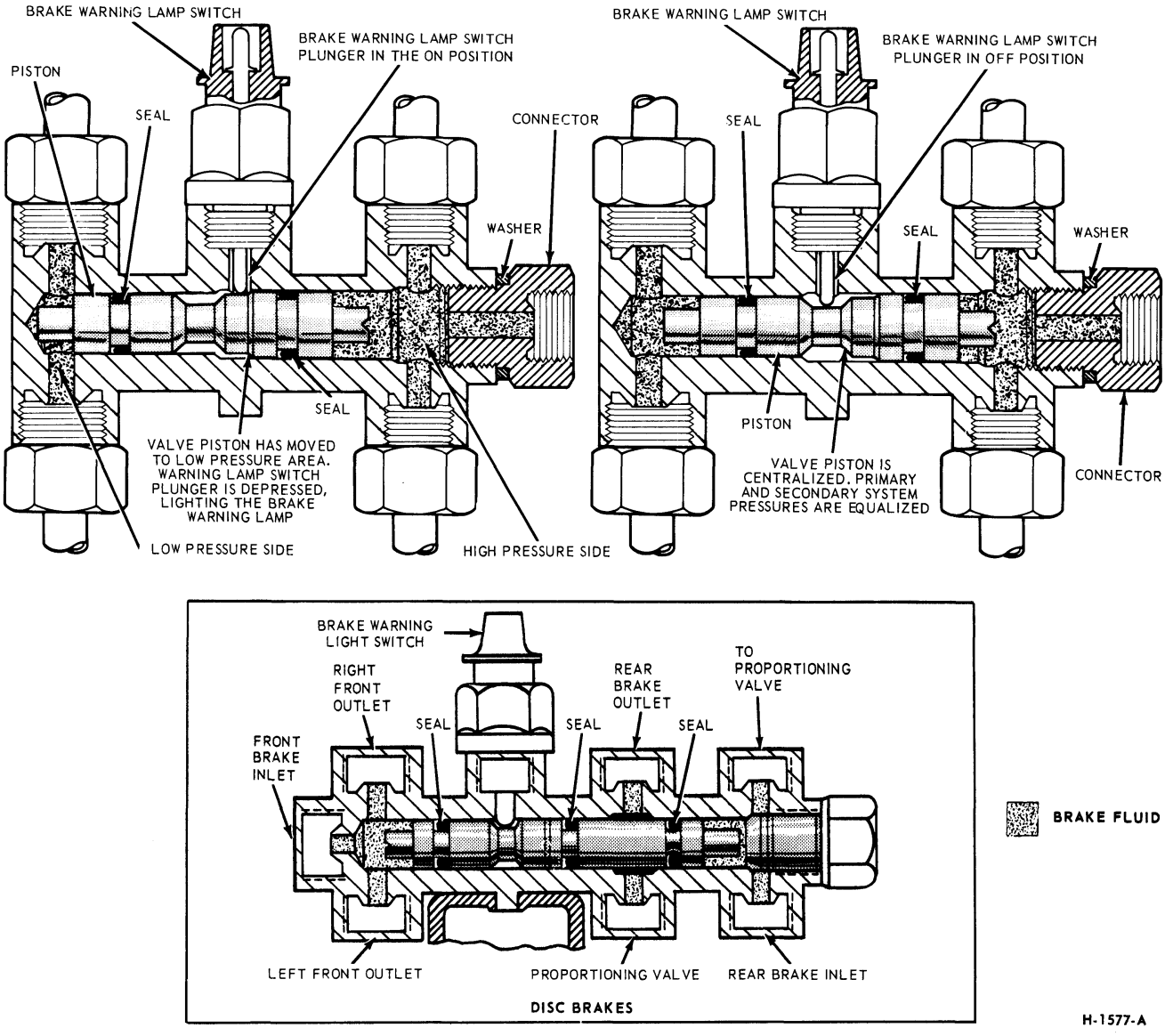


FIG. 2—Pressure Differential Valve and Brake Warning Light Switch Operation

A vacuum booster is available as optional equipment.

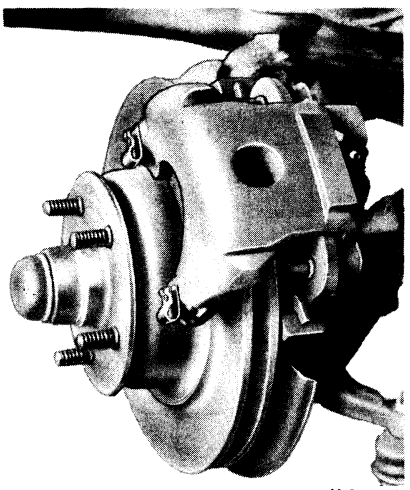
The master cylinder converts physical force from the brake pedal (and booster if so equipped) into hydraulic pressure against the piston in each caliper (disc brakes) or in the wheel cylinders (drum brakes). The pistons in turn convert hydraulic pressure back into physical force at the brake shoes.

RELATION AND FUNCTION

The caliper assembly is made i- c- [illegible] an anchor plate. The anchor plate is bolted to the wheel spindle arm by two bolts. The floating caliper is attached to the anchor plate through two spring steel stabilizers. The floating caliper slides on two guide pins which also attach to the stabilizers. The floating caliper contains the single cylinder and piston assembly. The cylinder bore contains a piston with a molded rubber dust boot to seal the cylinder bore from contamination and also to return the piston to the released position when hydraulic pressure is released. Also a rubber piston seal is used to provide sealing between the cylinder and piston. (Fig. 4).

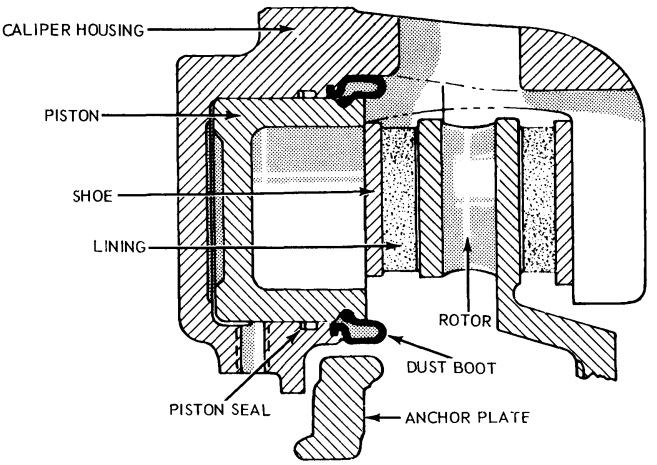
The shoe and lining assemblies are mounted in two different ways. The outboard shoe and lining is fixed to the floating caliper and is retained by two pins and spring clips. The inboard shoe and lining attaches to the end of the cylinder piston and is retained by two spring clips (Fig. 18). The shoe and lining assembly consists of friction material bonded to a metal plate called the shoe. It is replaced as a unit (Fig. 6).

The cast iron disc is of the ventilated rotor type incorporating forty fins and is attached to, and rotates with the wheel hub. The outside diameter of the rotor is 11 7/8 inches and the inside diameter is 7 7/8 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



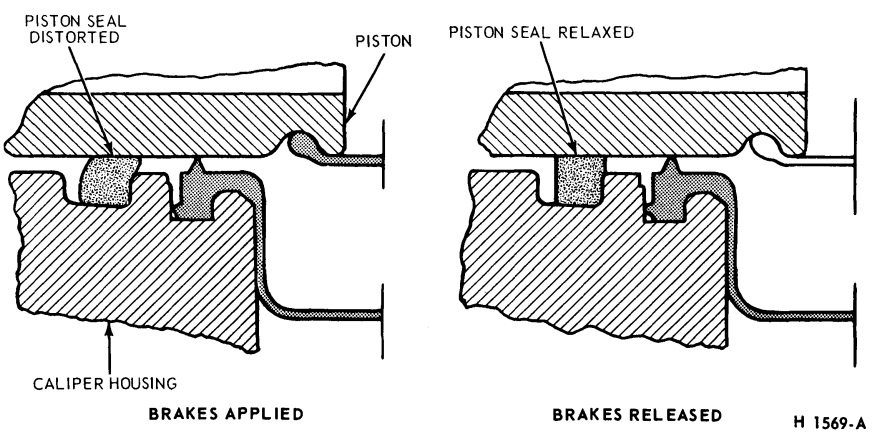
H 1567-A

FIG. 3—Disc Brake Assembly



H 1568-A

FIG. 4—Caliper Assembly—Sectional View



H 1569-A

FIG. 5—Function of Piston Seal

splash shield bolted to the spindle is used primarily to prevent road contaminants from contacting the inboard rotor and lining surfaces. The wheel provides protection for the outboard surface of the rotor.

As the brake pedal is depressed, hydraulic pressure from the master cylinder forces the piston out of the bore. The inboard shoe and lining, being attached to the piston, is forced against the rotor. When the inboard shoe is against the rotor hydraulic pressure equalizes and moves the entire floating caliper assembly inward. The outboard shoe and lining assembly attached to the floating caliper assembly is thereby forced against the rotor. Hydraulic pressure forcing the piston-mounted shoe and lining outward and the caliper-mounted shoe and lining inward creates a squeezing action against the rotor, effecting braking action.

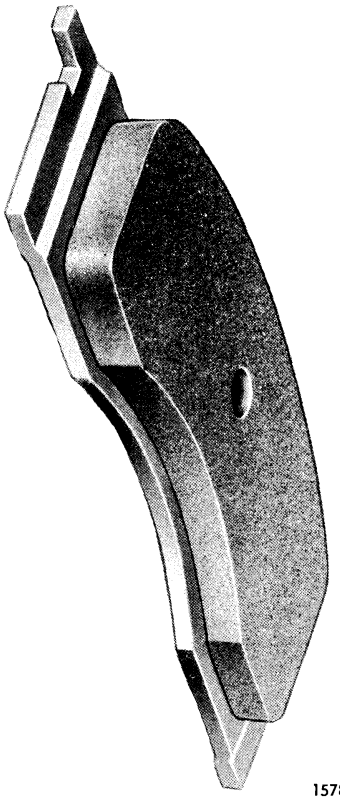
During braking action the rubber boot stretches as the piston moves outward (Fig. 5). When hydraulic pressure is released the boot relaxes and pulls the inboard shoe and lining away from the rotor. When brakes are applied, hydraulic pressure moves the caliper, overcoming the of the stabilizers. When runout will aid in maintaining running clearance between the rotor and the shoe and lining assemblies. Automatic adjustment is accomplished by the piston sliding in the seal 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 pressure differential valve 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. 7). 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.**

HYDRAULIC SELF-ADJUSTING BRAKE SYSTEM

The standard hydraulic brake system employs single anchor, internal



1578-A

FIG. 6— Inner Brake Shoe

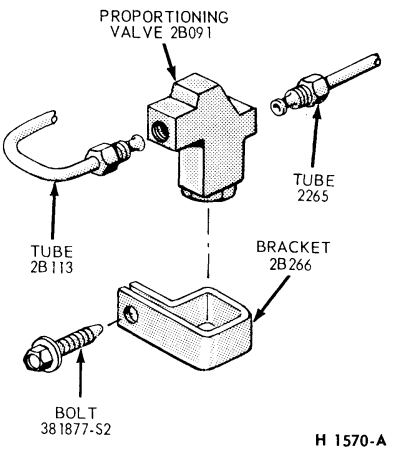
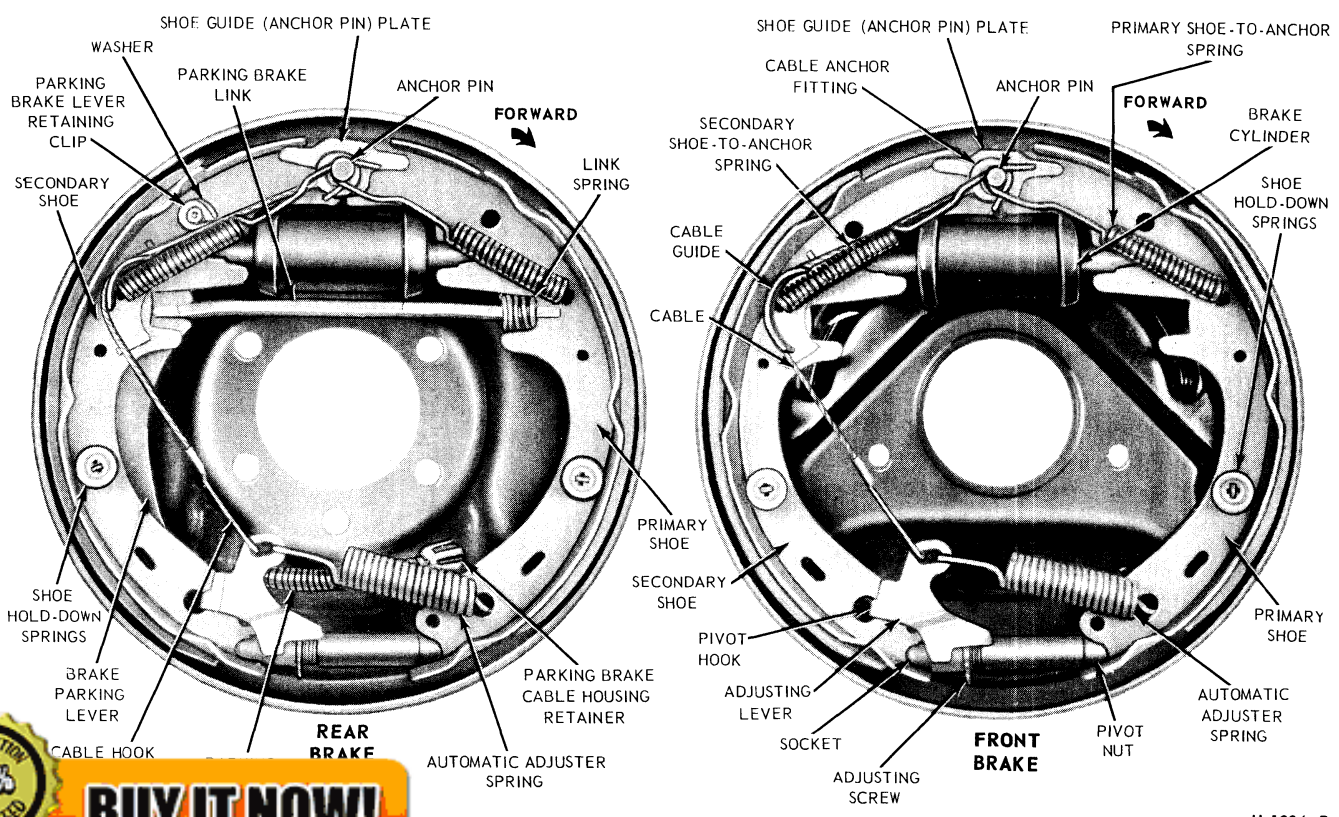


FIG. 7—Proportioning Valve



emblies

The master cylinder converts physical force from the brake pedal and booster into hydraulic pressure against the pistons in the wheel cyl-

inders. 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. 8). The cable is hooked over the anchor pin at the top and is connected to the lever at the bottom. The cable is routed along the webb of 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 the brakes are applied while the vehicle is moving rearward and only when the secondary shoe is free to move toward the drum beyond a predetermined point.

With the vehcile 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 show 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 toothe on the adjusting screw star-wheel. The upward travel of the lever increased 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 vehicle 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.

BRAKE BOOSTER SYSTEM

This diaphragm type brake booster is a self contained vacuum-hydraulic unit mounted on the engine

booster. The booster unit is to be exchanged when it is inspected, checked and found to be defective.

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. 8).

Two types of brake pedal control are used. The automatic (vacuum) release type (Fig. 9) is used on the Mercury Parklane. All other models use the manual release type (Fig. 10).

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. 9 and 10).

Either type of parking brake control assembly is mounted to the dash panel and the instrument 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. 10), 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

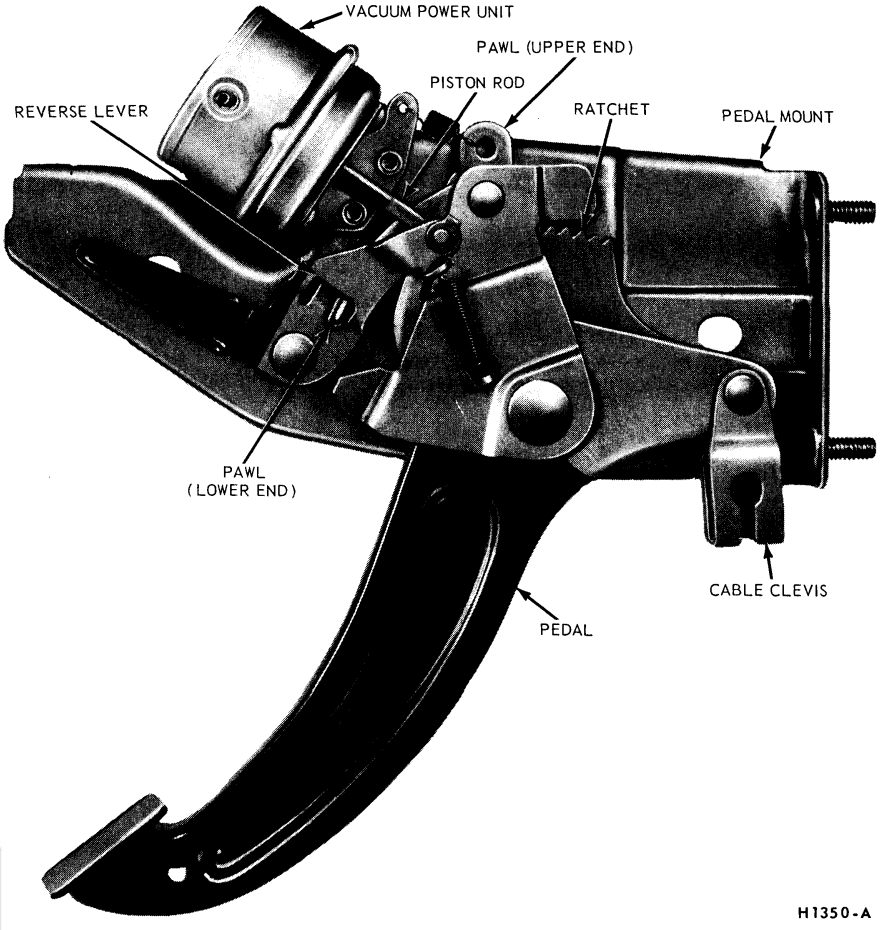


FIG. 9—Parking Brake Control Assembly with Automatic Release

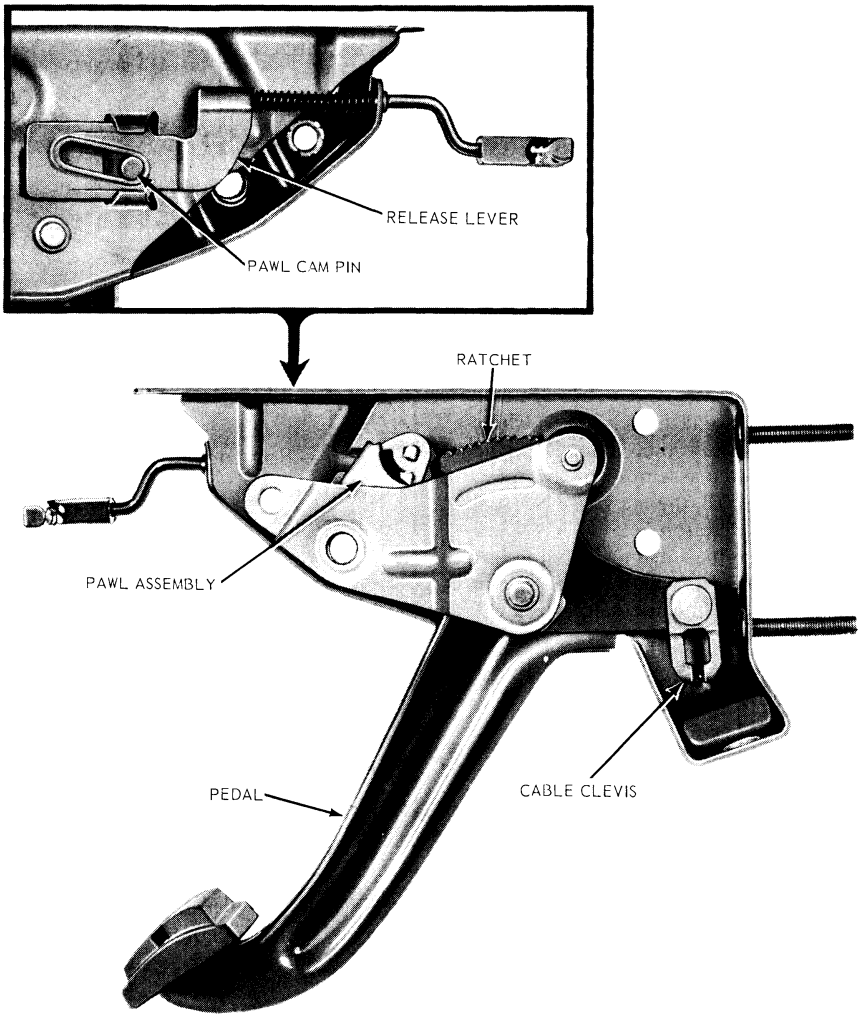


FIG. 10—Parking Brake Control Assembly—Manual Release

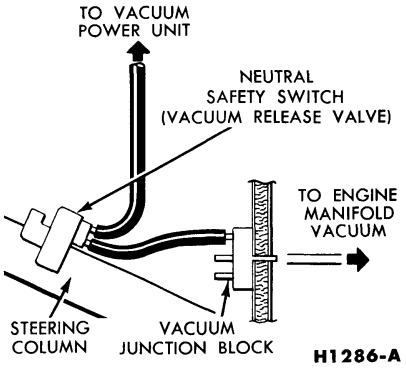


FIG. 11—Connections for Automatic Parking Brake Release

park position with the engine running, 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. 9).

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 9). 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. 9 and 10). 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 on the power unit (Fig. 12). The pressure differential thus created will cause the piston and link to pull the release lever.

2 IN-VEHICLE ADJUSTMENTS AND REPAIRS

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

BRAKE SHOE ADJUSTMENTS

adjustment is performed with the drums removed, using the tool and the procedure detailed below.

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

To adjust the brake shoes:

1. Use Rotunda Tool HRE 8650, (Fig. 12) to determine the inside diameter of the drum braking surface.

2. Reverse the tool as shown in Fig. 13 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 MIC-100-A.

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 backing plate, being careful not to get the lubricant on the linings.

5. Install the drums. Install Tinnerman nuts and tighten securely.

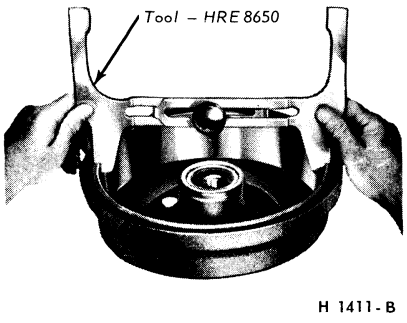


FIG. 12—Measuring Drum

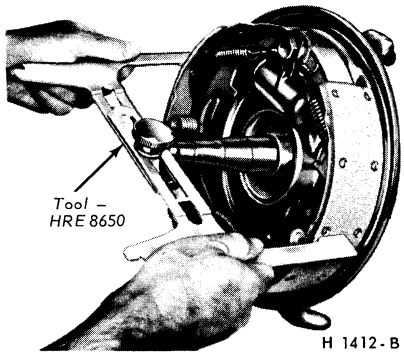


FIG. 13—Measuring Shoes

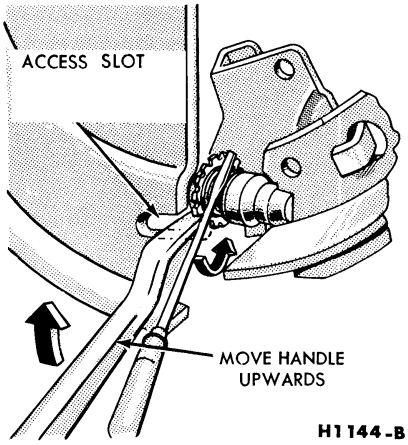


FIG. 14—Backing Off Brake Adjustment

6. Install the wheels on the durms and tighten the nuts to specification.

7. Complete the adjustment by applying the brakes several times with a minimum of 50 lbs pressure on the pedal while backing the vehicle. After each stop the vehicle must be moved forward.

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 vehicle 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 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.

3. Pull the drum off the wheel spindle.

4. If the drum will not come off, pry the rubber cover from the brake backing plate. 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. 14). **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; then sand lightly and wipe with a cloth soaked with denatured alcohol.

2. Adjust the brakes as outlined der 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.

REAR BRAKE DRUM

REMOVAL

1. Raise the vehicle so that the tire 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, pry the rubber cover from the backing plate. Insert a narrow screwdriver through the hole in the backing 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. 14). **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; then sand lightly and wipe with a cloth soaked with denatured alcohol.

2. Adjust the brakes as outlined and grease seal. Pack the wheel bearings, install the inner bearing cone and roller assembly in the inner cup, and install the new grease seal 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 3-7, Section 2, then install the grease cap. Install the wheel and hub cap.

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. 15.

2. Remove the secondary shoe to anchor spring with the tool shown in Fig. 15. With the same tool remove the primary shoe to anchor spring and unhook the cable eye from the anchor pin.

3. Remove the shoe guide (anchor pin) plate (Fig. 8).

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. 8).

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 backing plate.

3. Position the brake shoes on the backing 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.8).

4. Install the shoe guide (anchor pin) plate on the anchor pin.

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

6. Install the primary shoe to anchor spring (Fig. 16).

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. 8).

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. 16.

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 (MIC-100-A) 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 1/2 turn.

Interchanging the brake shoe adjusting screw assemblies from one side of the vehicle 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 vehicle, the socket end of the adjusting screw is stamped with an R or L (Fig. 17). 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.

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

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.

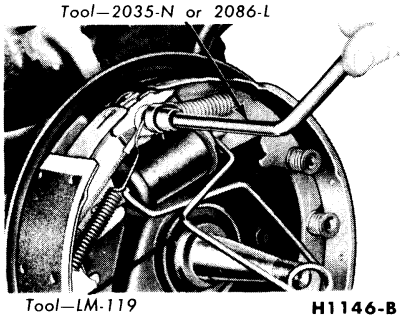


FIG. 15—Retracting Spring Removal

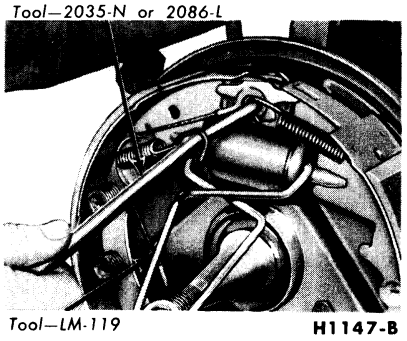


FIG. 16—Retracting Spring Installation

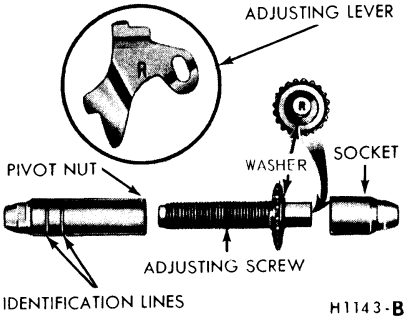


FIG. 17—Adjusting Screw and Lever Identification

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. 8).

14. After installation, check the action of the adjuster by pulling the section of the cable between the cable guide and the anchor pin 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.

DISC BRAKE SHOE AND LINING REPLACEMENT

DISC BRAKE SERVICE PRECAUTIONS

1. 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.

2. If the piston is removed for any reason, the piston seal must be replaced.

3. During removal and installation of a wheel assembly, exercise care not to interfere with and damage the caliper splash shield or the bleeder

screw fitting.

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

5. Be sure the vehicle 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.

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

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

8. 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.

9. The caliper assembly must be removed from the spindle prior to removal of the shoe and lining assemblies.

10. Do not attempt to clean or restore oil or grease soaked brake linings. When contaminated linings are found, brake linings must be replaced in complete axle sets.

REMOVAL

1. Remove the wheel and tire from the hub. **Be careful to avoid damage or interference with the bleeder screw fitting.**

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

3. To facilitate removal and installation of the shoe and lining assemblies, the piston must be pushed into its bore. Apply a steady inward pressure against the inner shoe and lining assembly. Maintain the pressure for at least a minute.

4. Slide the two outer shoe retaining clips off the retaining pins (Fig. 18).

5. Remove the two retaining pins from the outer shoe, then remove the shoe from the stationary caliper.

6. Slide the inner brake shoe outward until it is free of the hold-down springs, then remove the brake shoe.

7. Remove the caliper guide pins and stabilizer attaching bolts, then remove the stabilizers.

8. Remove the guide pin insulators from the anchor plate.

INSTALLATION

When new shoe and lining assemblies are being installed to replace worn linings it will be necessary to push the piston all the way into the caliper bore. This will displace fluid from the caliper into the master cylinder reservoir. Check the primary (front) brake system reservoir level and remove fluid to approximately half full before replacing brake shoes. This will prevent overflow. **Do not reuse the removed fluid.**

1. Install new caliper guide pin insulators in the anchor plate.

2. Position the caliper assembly in the anchor plate.

3. Apply the specified fluid to the caliper guide pins and install them loosely in the anchor plate. **Be sure the guide pins are free of oil, grease or dirt.**

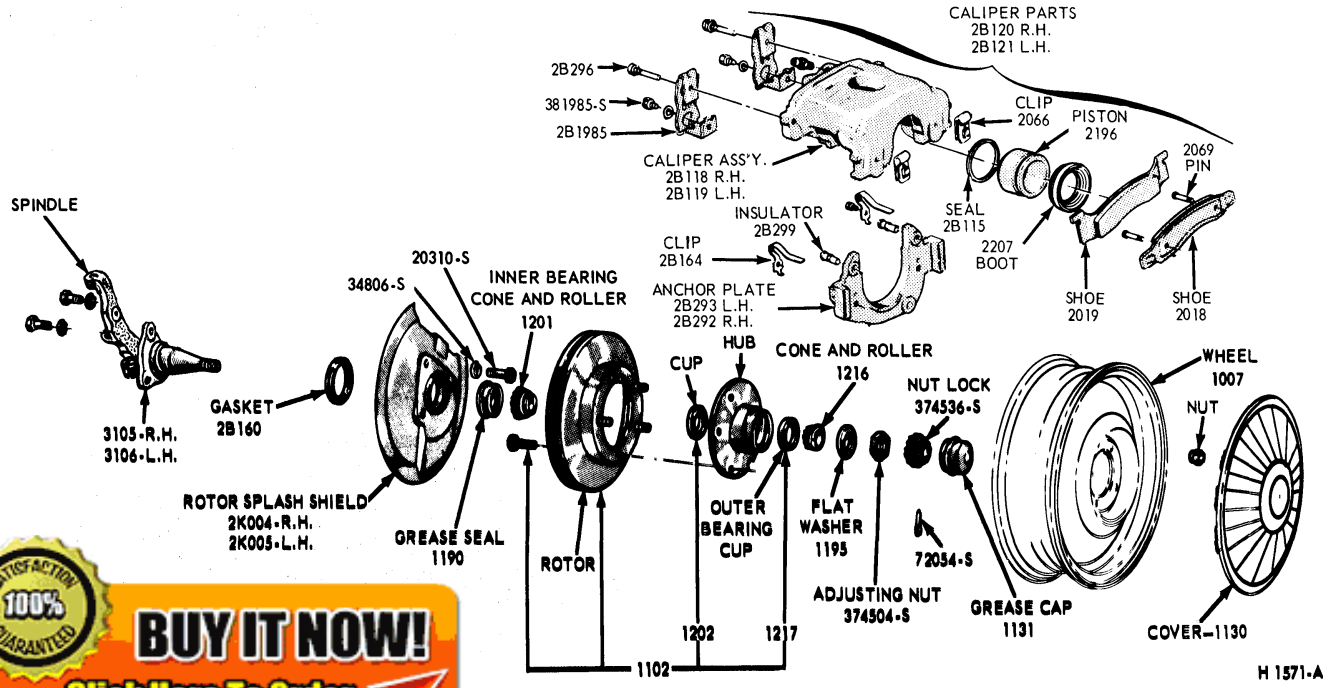
4. Position the outer brake on the caliper and install the two retaining pins and clips.

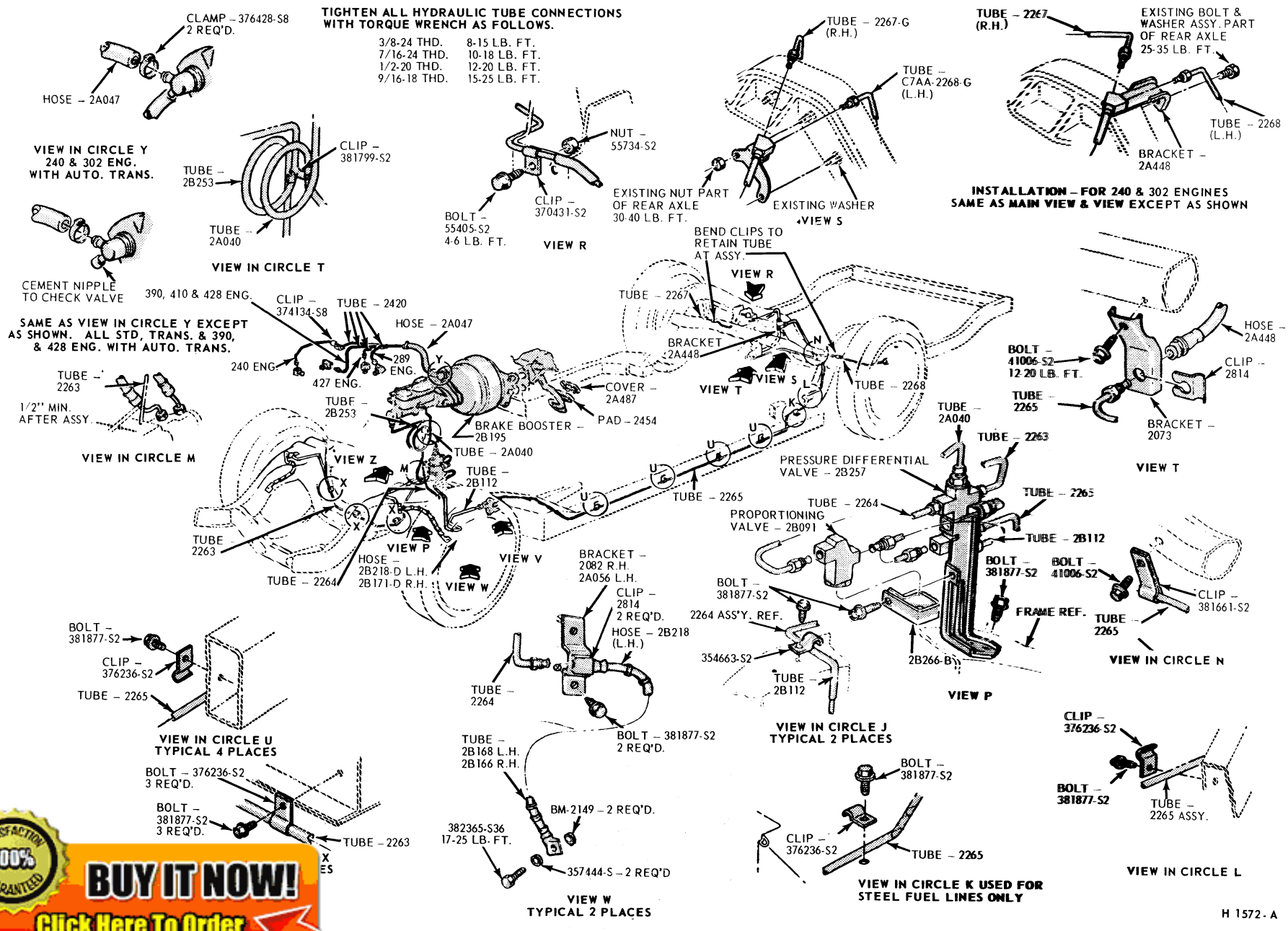
5. Install the inner brake shoe so that the ears of shoe are on top of the anchor plate bosses and under the shoe hold-down springs.

6. Position the shoe and lining assemblies so that the caliper assembly can be placed over the rotor. Rotate a hammer handle between the linings to provide the proper clearance.

7. Install the caliper assembly over the rotor and on the spindle. Install the two caliper attaching bolts, and torque them to specifications. **The upper bolt must be tightened first.** Install the safety wire and twist the ends at least five turns.

8. With moderate pressure applied





to the brake pedal, torque the stabilizer attaching screws and caliper guide pins to specification.

DISC BRAKE CALIPER ASSEMBLY

REMOVAL

1. Remove the front wheel cover. Remove the wheel and tire assembly from the hub and rotor assembly. **Be careful to avoid damage or interference with the caliper splash shield or bleeder screw fitting.**
2. Disconnect the brake line from the caliper.
3. Remove the safety wire and the two bolts that attach the caliper assembly to the spindle.
4. Lift the caliper assembly off the rotor and place it on the bench.

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 piston into the cylinder bore to obtain clearance between the shoe and lining assembly and the rotor.
2. Install the caliper to spindle attaching bolts and torque them to specification. **The upper bolt must be tightened first.** Install the safety wire on the bolts and twist the wire ends at least five turns. Check to insure that the rotor runs squarely and centrally between the two brake shoes.
3. Position the brake hose fitting with a new copper washer on each side of the fitting on the caliper assembly. Install the bolts and torque to specification.
4. Bleed the brake system and centralize the differential valve as outlined in Part 2-1. Check the master cylinder fluid level and add the specified fluid, as required. **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 assembly and the wheel cover.
7. Road test the vehicle.

the hub. (Fig. 18). **Be careful to avoid damage or interference with the bleeder screw fitting.**

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 vehicle. 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 piston from coming out of the cylinder bore while the caliper is removed.

Handle the rotor and caliper assemblies in such a way as to avoid deformation of the rotor and nicking scratching or contamination 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 seal and install the seal (Fig. 18).

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 seal 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 spindle and torque the two attaching bolts to specification. **The upper bolt must be installed first.** If necessary, push the caliper piston into the cylinder bore 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.
7. Pump the brake pedal as required to establish the proper pedal height.
8. Fill the master cylinder to the proper level with the specified fluid.

DISC BRAKE ROTOR SPLASH SHIELD

REMOVAL

1. Remove the caliper and the hub and rotor assembly as outlined under Removal in the foregoing procedure (it is not necessary to disconnect hydraulic connections).
2. Remove the three bolts that attach the splash shield to the spindle (Fig. 18).

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. 18).
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 differential pressure valve to proportioning valve brake tube. (Fig. 19).
2. Disconnect the outlet brake tube at the proportioning valve.
3. Remove the bolt attaching the proportioning valve to the bracket and remove the valve.

INSTALLATION

1. Position the proportioning valve to the bracket and install the attaching bolt.
2. Connect the outlet brake tube to the valve.
3. Position and connect the differential pressure valve to proportioning valve brake tube.
4. Bleed the brake system and centralize the diffential valve. (Refer to Part 2-1, Section 2 for the correct procedure.)

STANDARD OR REAR WHEEL CYLINDER REPAIR

Wheel cylinders should not be disassembled 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 backing 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. 20).
2. Remove the bleeder screw from the cylinder.

INSPECTION

1. Wash all parts in clean 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 diameter.**
4. Check the bleeder hole to be sure that it is open.

ASSEMBLY

1. Apply a light 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. 20). 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 Figs. 19 and 21. On

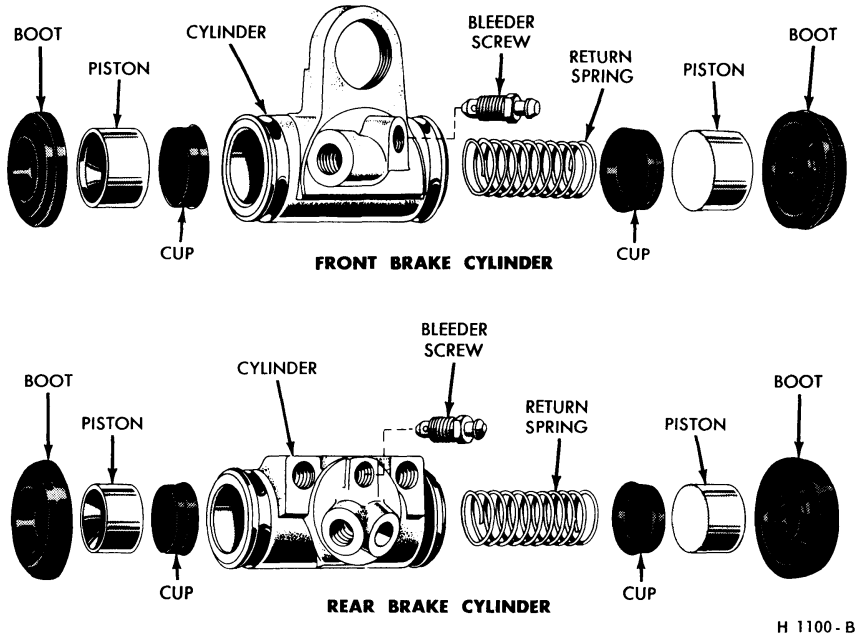


FIG. 20—Front and Rear Wheel Cylinders

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 backing 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

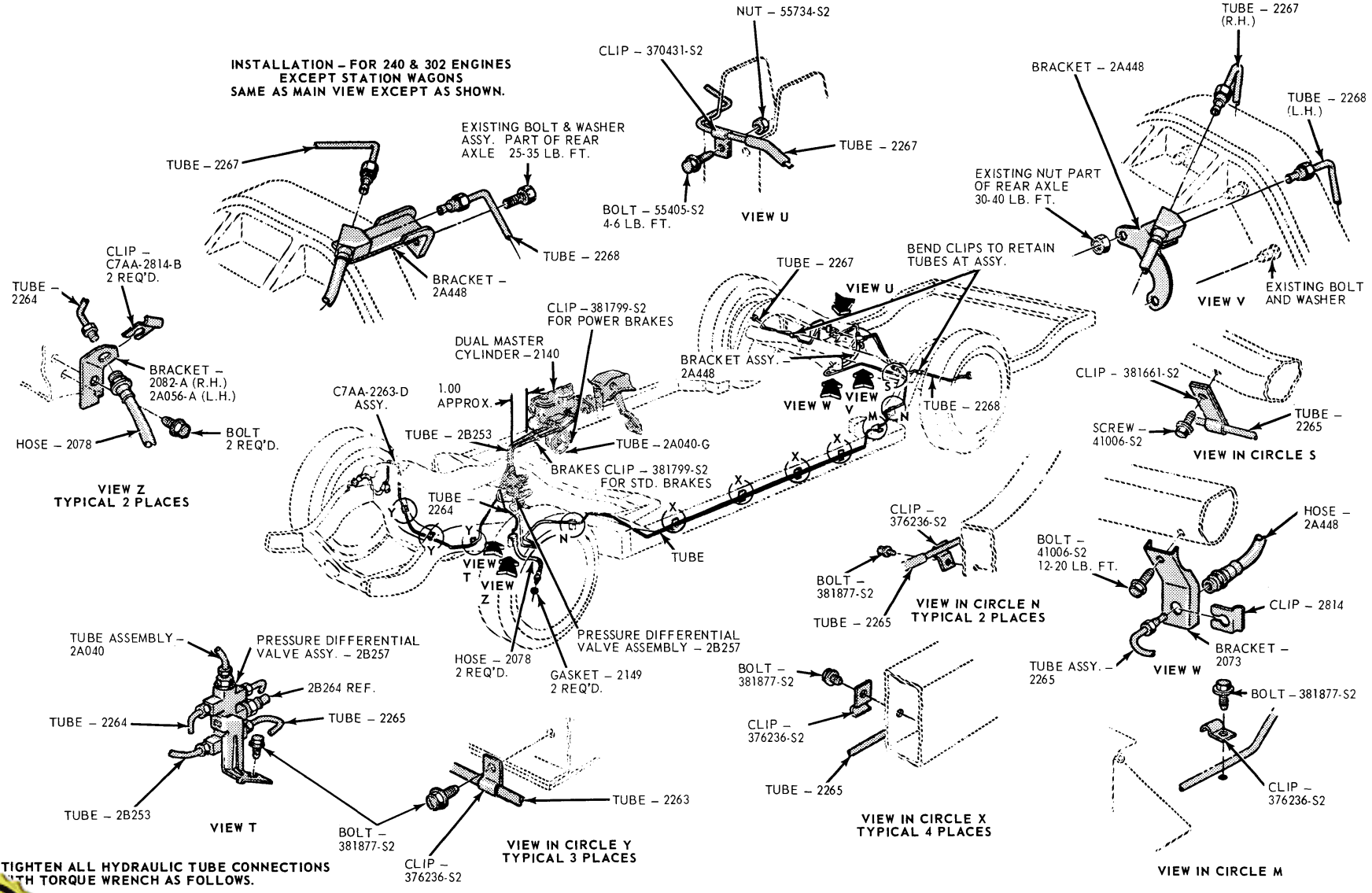
Wipe the end(s) of the hydraulic line to remove any foreign matter before making connections.

1. To install a front wheel cylinder, position the cylinder on the anchor pin against the backing plate. Install the washer and cylinder attaching nut on the anchor pin, and torque it to specification. Lock the washer retainer securely.
2. Install a new copper gasket over the hose fitting. Thread the hose into the cylinder.
3. 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.
4. To install a rear wheel cylinder, 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.
5. Secure the cylinder to the backing plate by installing the attaching bolts and lock washers.
6. Tighten the tube fitting nut to specification with tool 1112-144.
7. Install the links in the ends of the wheel cylinder, install the shoes and adjuster assemblies, and adjust the shoes as oulined in this section.
8. Adjust the brakes (Part 2-2, Section 2). Install the brake drum and wheel. Bleed the brakes and centralize the differential valve as outlined in Part 2-1, Section 2.

BRAKE BACKING 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 backing plate is



being replaced, remove the axle shaft from the applicable rear axle as outlined in Group 4, Part 4-2—Rear Axle, Section 2. Remove the backing plate and gasket.

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

INSTALLATION

If a **rear** backing plate is to be replaced, position a new rear backing plate and gasket on the attaching bolts in the axle housing flange. Install the rear axle shaft for the applicable rear axle. Refer to Group 4, Part 4-2—Rear Axle, Section 2 for the proper installation procedure.

1. If the front brake backing plate is to be replaced, position a new **front** backing 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 drums and wheels. Bleed the brake system and centralize the differential valve 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 connection (Figs. 19 and 21).

Always bleed the applicable primary or secondary brake system after primary or secondary brake system hose or line replacement. Centralize the brake system after bleeding the system.

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 **double flared** properly to provide good leakproof connections. Clean the brake tubing by flushing with clean brake fluid 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.

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 thread the hose assembly into the front wheel cylinder. Engage the opposite end of the hose to the bracket on the frame. Install the horseshoe-type retaining clip, and connect the tube to the hose with the tube fitting nut (Figs. 19 and 21).

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 thread the hose into the rear brake tube connector. Engage the front end of the hose to the bracket on the frame. Install the horseshoe-type retaining clip, and connect the tube to the hose with the tube fitting nut.

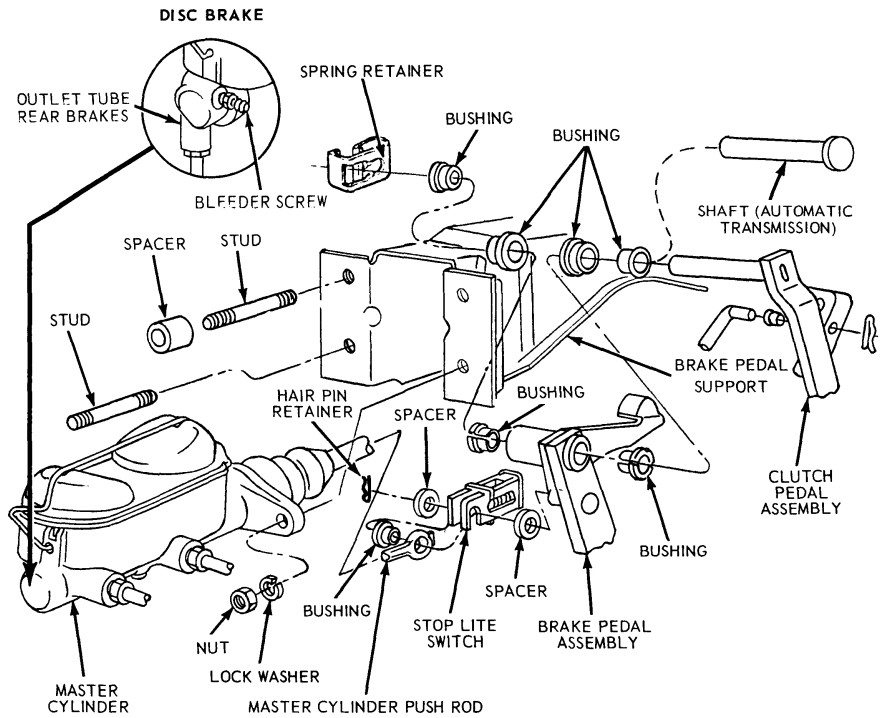


FIG. 22—Master Cylinder Installation— Standard Brakes

STALLATION

below the instrument panel, disconnect the master cylinder push rod from the brake pedal (Fig. 22).

2. Disconnect the stoplight switch wires at the connector. Remove the spring retainer. Slide the stop light switch off the brake pedal pin just far enought to clear the end of the pin, then lift the switch straight upward from the pin. **Use care to avoid switch**

damage during removal.

3. Slide the master cylinder push rod and the nylon washers and bushings off the brake pedal pin.

4. Remove the brake tube from the primary and secondary outlet ports of the master cylinder.

5. Remove the lock nuts that secure the master cylinder to the dash panel and lift the cylinder forward and upward from the vehicle.

INSTALLATION

1. Position the boot on the push rod and secure the boot to the master cylinder. Carefully insert the master cylinder push rod and boot through the dash panel opening and position the master cylinder on the mounting studs on the dash panel (Fig. 22).

2. Install the lock nuts on the studs at the dash panel and torque them to specification.

3. Coat the nylon bushings with SAE 10W oil. Install the nylon washer and bushing on the brake pedal pin.

4. Position the stop light switch on the brake pedal pin, install the nylon bushing and washer and secure them in position with the spring retainer.

5. Connect the wires at the stop light switch connector.

6. Connect the brake lines to the master cylinder leaving the brake line fittings loose.

7. Fill the master cylinder with the specified brake fluid to within 1/4 inch of the top of the dual reservoirs. Use Rotunda Brake Fluid—Extra Heavy Duty—Part Number C6AZ-19542-A (ESA-M6C25-A) for disc brake applications, and Rotunda Brake Fluid—Part Number B7AZ-19542-A, R103-A or equivalent for drum brake applications. **The disc brake system fluid is colored blue for identification. Do not mix low temperature brake fluids with the specified fluid for the power disc brake system.**

8. Bleed the dual-master cylinder and the primary and secondary brake systems. Centralize the pressure differential valve. Refer to Hydraulic System Bleeding and Centralizing of the Differential Valve, Part 2-1, Section 2 for proper procedure.

9. Operate the brakes several times, then check for external hy- leaks.

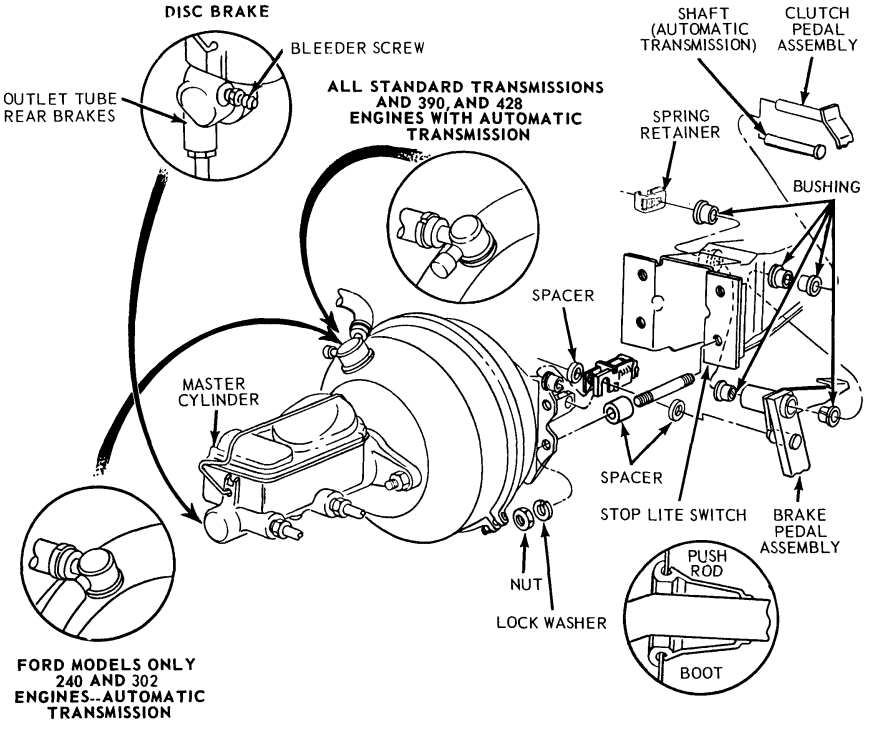


FIG. 23—Master Cylinder Installation— Power Brakes

the primary and secondary outlet ports of the master cylinder (Fig. 23).

2. Remove the two nuts and two lock washers attaching the master cylinder to the brake booster assembly.

3. Slide the master cylinder forward and upward from the vehicle.

INSTALLATION

1. Before installing the master cylinder, check the distance from the outer end of the booster assembly push rod to the master cylinder mounting surface. Turn the push rod adjusting screw in or out as required to obtain the specified length. Refer to Part 2-1, Section 2, Power Brake Master Cylinder Push Rod Adjustment for the proper procedure.

2. Position the master cylinder assembly over the booster push rod and onto the two studs on the booster assembly (Fig. 23).

3. Install the attaching nuts and lock washers and torque them to specifications.

4. Install the front and rear brake tubes to the master cylinder outlet fittings.

5. Fill the master cylinder with the pecified brake fluid to within 1/4 inch of the top of the dual reservoirs. Use Rotunda Brake Fluid — Extra Heavy Duty — Part Number C6AZ-19542-A (ESA-M6C25-A) for all brake applications. **The brake system fluid is colored blue for identification. Do not mix low temperature brake fluids with the specified fluis for the disc brake system.**

6. Bleed the dual-master cylinder and the primary and secondary brake systems. Centralize the pressure differentical valve. Refer to Hydraulic System Bleeding and Centralizing of the Differential Valve, Part 2-1, Section 2 for the proper procedure.

7. Operate the brakes several times, then check for external hydraulic leaks.

PRESSURE DIFFERENTIAL VALVE ASSEMBLY

REMOVAL

1. Disconnect the brake warning light wire from the pressure differential valve assembly switch (Figs. 19 and 21). **To prevent damage to the brake warning switch wire connector, expand the plastic lugs to allow removal of the shellwire connector**

from the switch body.

2. Loosen the tube nut connecting the primary (front brake) system inlet tube at the top of the pressure differential valve assembly and disconnect the tube.

3. Disconnect the primary system left front brake outlet tube from the top side of the pressure differential valve assembly.

4. Disconnect the primary system right front brake outlet tube from the top side of the differential valve assembly.

5. Disconnect the secondary (rear brake) system inlet tube at the lower side of the pressure differential valve assembly.

6. Disconnect the secondary system rear brake outlet tube from the lower side pressure differential valve assembly.

7. Remove the screw retaining the pressure differential valve assembly to the frame side rail and remove the valve assembly.

8. On disc brake equipped vehicles, place the pressure differential valve assembly and mounting bracket in a vise. Loosen the proportioning valve tube nuts at the differential valve and at the proportioning valve. Remove the proportioning valve from the mounting bracket.

9. If the differential valve is to be replaced, remove the brake warning lamp switch and install the switch in the new differential valve. **The pressure differential valve assembly and the brake warning lamp switch are separate units and each is serviced as a separate assembly only.**

INSTALLATION

1. On disc brake equipped vehicles, connect the proportioning valve inlet and outlet tubes to the proportioning valve and differential valve bodies. Tighten the tube nuts to specification.

2. Mount the pressure differential valve assembly on the frame side rail and tighten the attaching screw.

3. Connect the rear brake system inlet tube to the pressure differential valve assembly and tighten the tube nut to the specified torque (Refer to Part 2-3).

4. Connect the rear brake system outlet tube to the pressure differential valve asssmbly. Tighten the tube nut to the specified torque.

7. Connect the left front brake outlet tube to the pressure differential valve assembly. Tighten the tube nut to the specified torque.

8. Connect the shell-wire connector to the brake warning lamp switch. **Make sure the plastic lugs on the connector hold the connector securely to the switch.**

9. Bleed the brakes and centralize the pressure differential valve.

BOOSTER NUT

REMOVAL

1. Working from inside the vehicle below the instrument panel, disconnect the booster 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 pin **just far enough for the switch outer hole to clear the pin,** and then lift the switch straight **upward** from the pin. Be careful not to damage the switch during removal. Slide the boosterpush rod and the nylon washers and bushing off the brake pedal pin (Fig. 23).

2. Open the hood and remove the master cylinder from the booster. Secure it to one side without disturbing the hydraulic lines. **It is not necessary to disconnect the brake lines, but care should be taken that the brake lines are not deformed. Permanent deformation of brake lines can lead to tube failure.**

3. Disconnect the manifold vacuum hose from the booster unit. If the vehicle is equipped with an automatic transmission disconnect the transmission vacuum unit hose.

4. Remove the four bracket-to-dash panel attaching nuts (Fig. 23). Remove the booster and bracket assembly from the dash panel, sliding the push rod link out from the engine side of the dash panel. Remove the four spacers.

5. Remove the push rod link boot from the dash panel.

INSTALLATION

1. Install the push rod link boot in the hole in the dash panel as shown in Fig. 23. Install the four spacers on the mounting studs.

2. Mount the booster and bracket assembly to the dash panel by sliding the bracket onto the mounting studs and the push rod link in through the hole and boot in the dash panel. Install the bracket-to-dash panel attaching locknuts (Fig. 23).

3. Connect the manifold vacuum hose to the booster. If the vehicle is equipped with an automatic transmission connect the transmission vacuum unit hose.

4. Before installing the master cylinder, check the distance from the outer end of the booster assembly push rod to master cylinder surface. Turn the screw in or out to obtain the specified length. Refer to Part 2-1, Section 2, Power Brake Master Cylinder Push Rod Adjustment. Install the master cylinder and torque the attaching nuts to specifications.

5. Working from inside the vehicle 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 booster pushrod, and the bushing on the brake pedal pin. Position the switch so that it straddles the push rod with the switch slot on the pedal pin and the switch outer hole just clearing the pin. Slide the switch completely onto the pin, and install the nylon washer as shown in Fig. 23. **Be careful not to bend or deform the switch.** 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.

BRAKE PEDAL—MANUAL SHIFT TRANSMISSION

REMOVAL

1. Disconnect the clutch pedal-to-equalizer rod at the clutch pedal by removing the hairpin type retainer and bushing (Figs. 22 and 23).

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

3. Remove the spring retainer. Slide the stop light switch off the brake pedal pin **just far enough for the switch outer hole to clear the pin,** and then lift the switch straight **upward** from the pin. **Be careful not to damage the switch during removal.** Slide the master cylinder or booster push rod and the nylon washers and bushing off the brake pedal pin (Figs. 22 and 23).

4. Remove the hairpin type retainer and washer from the clutch and brake pedal shaft. Remove the clutch pedal and shaft, the brake pedal, and

the bushings from the pedal support bracket (Figs. 22 and 23).

INSTALLATION

1. Apply a coating of SAE 10 engine oil to the bushings and locate all bushings in their proper places on the clutch and brake pedal assemblies.
2. Position the brake pedal to the support bracket, then install the clutch pedal and shaft through the support bracket and brake pedal. Install the retainer (Figs.22 and 23).
3. Install the inner nylon washer, the master cylinder or booster push rod, and the bushing on the brake pedal pin. Position the switch so that it straddles the push rod with the switch slot on the pedal pin and the switch outer hole just clearing the pin. Slide the switch completely onto the pin, and install the nylon washer as shown in Figs. 22 and 23. **Be careful not to bend or deform the switch.** 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. Connect the clutch pedal-to-equalizer rod to the clutch pedal assembly with the bushing and hairpin retainer. Apply SAE 10 engine oil to the bushing. Adjust the clutch pedal free play (Group 5) to specification if required. Check the Brake Pedal Free Height and Travel Measurements (Part 2-1, Section 1).

BRAKE PEDAL—AUTOMATIC TRANSMISSION

REMOVAL

1. Disconnect the stop light switch wires at the connector.
2. Remove the hairpin retainer. Slide the stop light switch off the brake pedal pin **just far enough for the switch outer hole to clear the pin,** and then lift the switch straight upward from the pin. **Be careful not to damage the switch during removal.** Slide the master cylinder or booster push rod and the nylon washers and bushing off the brake pedal pin (Figs. 22 and 23).
3. Remove the hairpin type retaining washer from the brake pedal [illegible] remove the shaft the

[illegible] Apply a coating of SAE 10 engine oil to the bushings and locate bushings in their proper places on the pedal assembly and pedal support bracket (Figs. 22 and 23).
2. Position the brake pedal assembly to the support bracket, then install the pedal shaft through the support bracket and brake pedal assembly. Install the retainer.
3. Install the inner nylon washer, the master cylinder or booster push rod, and the bushing on the brake pedal pin. Position the switch so that it straddles the push rod with the switch slot on the pedal pin and the switch outer hole just clearing the pin. Slide the switch completely onto the pin, and install the nylon washer as shown in Figs. 22 and 23. **Be careful not to bend or deform the switch.** 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. Check the Brake Pedal Free Height and Travel Measurements, Part 2, Section 1.

PARKING BRAKE CONTROL ASSEMBLY

REMOVAL

1. Remove the two nuts attaching the control assembly to the dash panel (Fig. 24).
2. Remove the bolt attaching the control assembly to the instrument panel.
3. Disconnect the hose to the parking brake vacuum unit, when so equipped.
4. Remove the cable retainer clip from the cable end and disconnect the cable from the control.
5. Remove the control assembly from the car.

INSTALLATION

1. Position the control in the approximate final position.
2. Fit the cable through its mounting hole and install the retaining clip.
3. Connect the vacuum hose to the parking brake unit, when so equipped.
4. Install the attaching bolt to the instrument panel. Do not tighten.
5. Install the two attaching nuts on the control assembly bracket on the engine side of the dash panel.
6. Torque all nuts and bolts to specifications.
7. Adjust parking brake cable tension, and check operation, as outlined in Part 2-1, Section 2.

PARKING BRAKE TO EQUALIZER CABLE

REMOVAL

1. Raise the vehicle on a hoist.
2. Loosen the parking brake cable adjusting nut at the equalizer (Fig. 24).
3. Remove the cable from the foldover tab on the underbody. Remove spring retainer clip.
4. Remove spring clip that retains the cable to the frame.
5. From inside of passenger compartment, remove spring clip that retains the cable to the parking brake control. Disconnect the cable ball from the control assembly.
6. Remove the cable assembly from the vehicle.

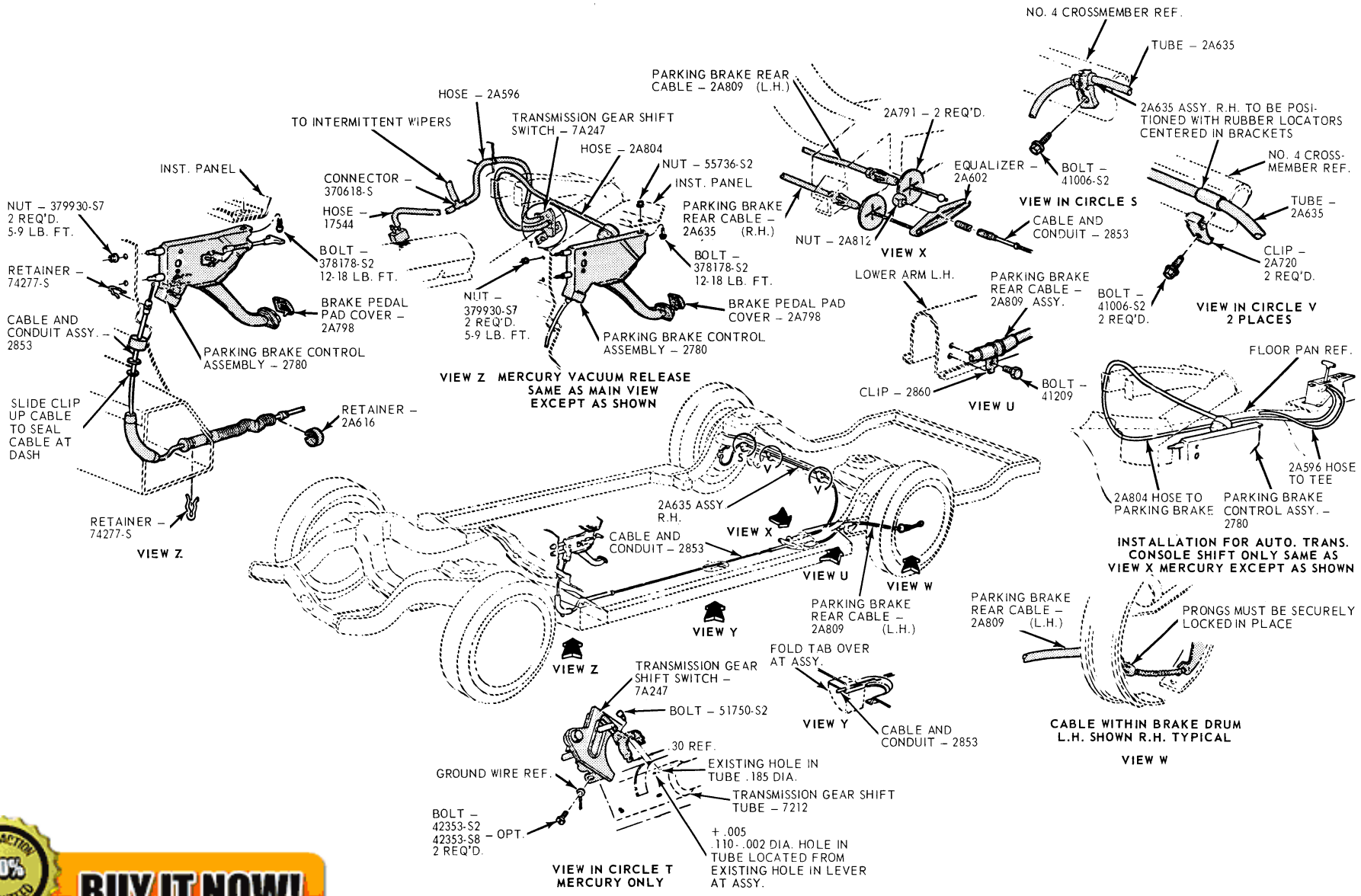
INSTALLATION

1. Position the cable through the provided openings and in the approximate final installation position.
2. Install the hairpin retainer on the cable at the frame crossmember.
3. Connect the ball end of the cable to the parking brake control. Install the cable-to-control hairpin retaining clip.
4. Position the cable seal at the dash panel, and slide the retaining clip upward to seal the cable at the dash opening.
5. Install the spring retainer clip. Position cable in the foldover tab on the underbody.
6. Position the cable thru the equalizer and install the cable adjusting nut.
7. Adjust the parking brake (Part 2-1, Section 2).
8. Lower vehicle on hoist.

PARKING BRAKE EQUALIZER TO REAR WHEEL CABLE

REMOVAL

1. Raise the vehicle and loosen the parking brake equalizer rod adjusting nut. Disconnect the equalizer from the rear cables (Fig. 26).
2. Compress the prongs on the left cable-to-frame side member retainer so the prong can pass through the side-member. Remove the clip that attaches the left cable to the left lower arm. Pull the cable thru the frame left side member.
3. Compress the prongs on the right cable-to-frame side member retainer bracket so the prong can pass



H 1549-B

through the bracket. Remove the clips retaining the right cable to the frame crossmember.

4. Remove the rear wheel cover and wheel. Remove the three Tinnerman nuts that hold the brake drum in place and remove the drum.

5. Working on the wheel side of the rear brake, remove the automatic brake adjuster spring. Compress the prongs on the parking brake cable retainer so that they can pass through the hole in the brake backing plate. Draw the cable retainer through the hole.

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

INSTALLATION

1. Pull enought of the parking brake cable through the housing so that the end of the cable may be inserted over the slot in the parking brake lever on the rear brake shoe.

2. Pull the excess slack from the cable, and insert the cable housing into the brake backing plate access hole so that the retainer prongs expand. **The prongs must be securely locked in place.** Install the automatic brake adjuster spring.

3. Position the right hand cable and the two retaining clips and screws on the rear crossmember. Compress the prongs on the right cable and position the cable in the retaining bracket on the frame side member. Tighten all retaining clip screws.

4. Position the left cable, retaining clip and screw on the left lower suspension arm. Compress the prongs on the left cable and position the cable through the frame side-member. The prongs must be securely locked in place.

5. Insert the ball ends of the cables into the equalizer assembly.

6. Install the rear drum(s) and tighten the three Tinnerman nuts that secure the drum. Install the wheel and tire and the wheel cover.

7. Adjust the parking brake linkage as outlined in Part 2-1, Section 2. Adjust the rear brakes, as required (Part 2-1, Section 2).

4 MAJOR REPAIR OPERATIONS

BRAKE DRUM REFINISHING

Minor scores on a brake drum can be removed with sandpaper. A drum that is excessively scored or shows a total indicator runout of over 0.007 inch should be turned down. Remove only enough stock to eliminate the scores and true up the drum. The refinished diameter must not exceed 0.060 inch oversize (11.090 inches).

If the drum diameter is less than 0.030 inch oversize (11.060 inches) after refinishing, standard lining may be installed. If the drum diameter is 11.060-11.090 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.

ROTOR REFINISHING

Rotunda Disc Brake Attachment, FRE-2249-2, is the **only recommended tool** to refinish the disc brake rotors. The step-by-step resurfacing procedure provided with the tool must be adhered to.

The finished braking surfaces of the rotor must be flat and parallel within .007 inch; lateral runout must not exceed .002 inch total indicator read-

the inboard bearing cup to the inboard rotor face (dimension B) must be observed when removing material from the rotor braking surfaces.

BRAKE SHOE RELINING

Brake linings that are worn to within 1/32 inch of the rivet head or are less than 0.030 inch thick (bonded lining) or have been contaminated with brake fluid, grease or oil must 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 vehicle.**

Inspect brake shoes for distortion, cracks, or looseness. If this condition exists, the shoe must be discarded. **Do not attempt to 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 with a brake drum micrometer (tool FRE-1431). If the diameter is less than 11.030 inches, standard lining may be installed. If the diameter is 11.060-11.090 inches, oversize lining should be installed.

3. Position the new lining on the shoe. Starting in the center, insert and secure the rivets, working alternately towards each end. **Replacement linings are ground and no further grinding is required.**

4. Check the clearance between the shoe and lining. The lining must sit tightly against the shoe with not more than 0.008 inch clearance between any two rivets.

DUAL MASTER CYLINDER

DISASSEMBLY

1. Clean the outside of the master cylinder and remove the filler cover and diaphragm. Pour out any brake fluid that remains in the cylinder.

2. Remove the secondary piston stop bolt from the bottom of the cylinder (Figs. 25 and 26).

3. Remove the bleed screw, if required.

4. Remove the snap ring from the retaining groove at the rear of the master cylinder bore (Fig. 27). Remove the push rod and the primary piston assembly from the master cylinder bore. **Do not remove the screw that retains the primary return spring retainer, return spring, primary cup and protector on the primary piston. This assembly is factory pre-adjusted and should not be disassembled.**

5. Remove the secondary piston assembly. **Do not remove the outlet tube seats, outlet check valves and outlet check valve springs from the master cylinder body.**

INSPECTION AND REPAIR

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

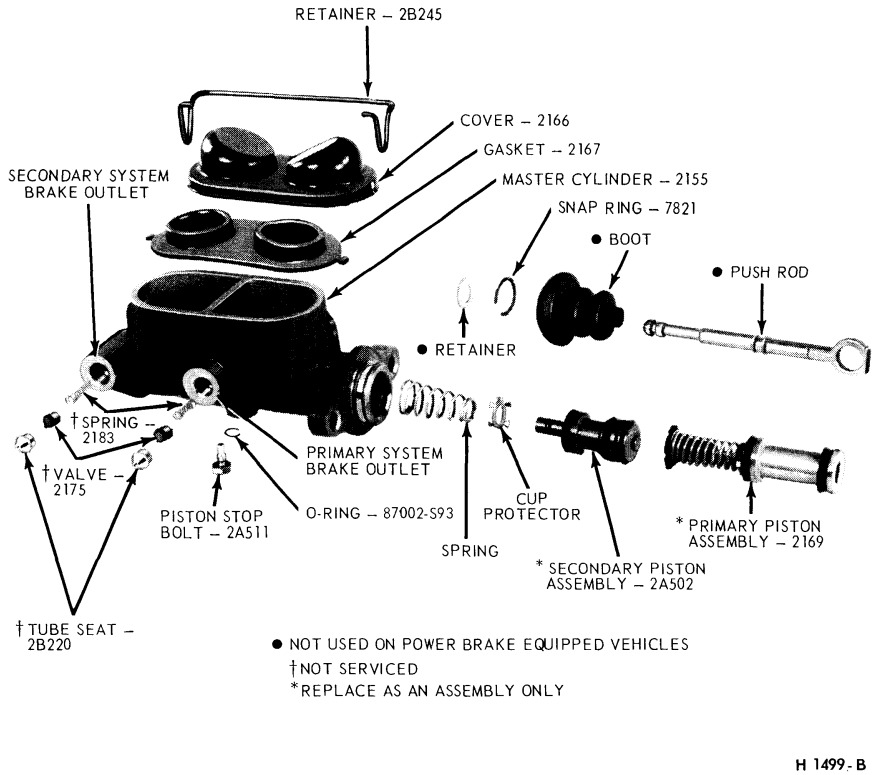
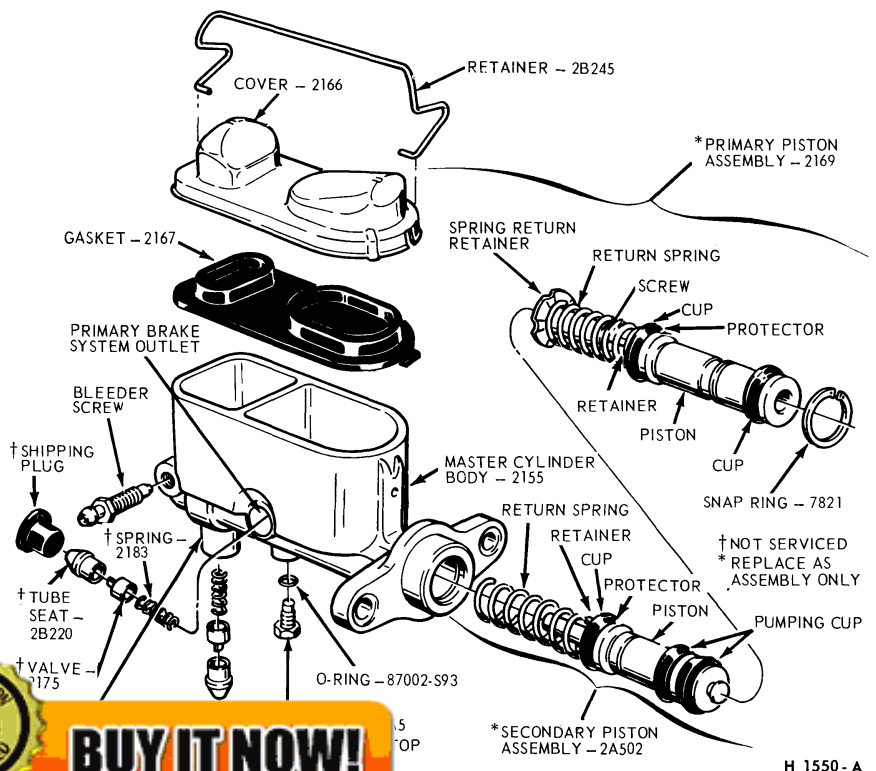


FIG. 25 — Dual Master Cylinder Disassembled— Except Disc Brakes



Disassembled—Disc Brakes

2. Check all recesses, openings and internal passages to be sure they are open and free of foreign matter. Use an air hose to blow out dirt and cleaning solvent. Place all parts on a clean pan or paper.

3. Inspect the master cylinder bore for signs of etching, pitting, scoring or rust. If it is necessary to hone the master cylinder bore to repair damage, do not exceed allowable hone specifications.

ASSEMBLY

1. Dip all parts except the master cylinder body in clean Rotunda Extra Heavy Duty Brake Fluid.

2. Carefully insert the complete secondary piston and return spring assembly in the master cylinder bore.

3. Install the primary piston and return spring assembly in the master cylinder bore.

4. Install the push rod retainer on the push rod, if so equipped. Install the push rod assembly in the cylinder bore. **Make sure the retainer is properly seated and holding the push rod securely.**

5. Depress the primary piston and install the snap ring in the cylinder bore groove.

6. Position the inner end of the push rod boot (if so equipped) in the master cylinder body retaining groove.

7. Install the secondary piston stop bolt and gasket in the bottom of the master cylinder.

8. Install the bleed screw (if so equipped). Install the gasket (diaphragm) in the master cylinder filler cover. Position the gasket as shown in Figs. 27 and 28. **Make sure the gasket is securely seated.**

9. Install the cover and gasket on the master cylinder and secure the cover into position with the retainer.

DISC BRAKE CALIPER

DISASSEMBLY

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

2. Remove the caliper guide pins from the caliper assembly and lift the anchor plate from the caliper.

3. Slide the two outer shoe retaining clips off the retaining pins (Fig. 28).

4. Remove the two retaining pins, then remove the outer brake shoe from the caliper.

5. Slide the inner brake shoe outward until it is free of the hold-down

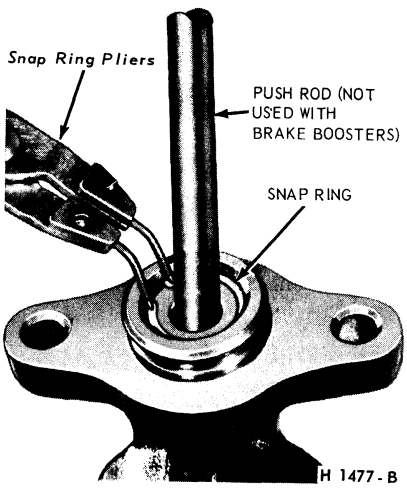


FIG. 27 — Removing Snap Ring—Typical

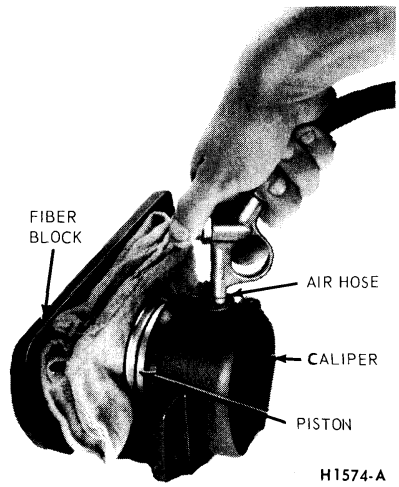


FIG. 29 — Removing Piston From Caliper

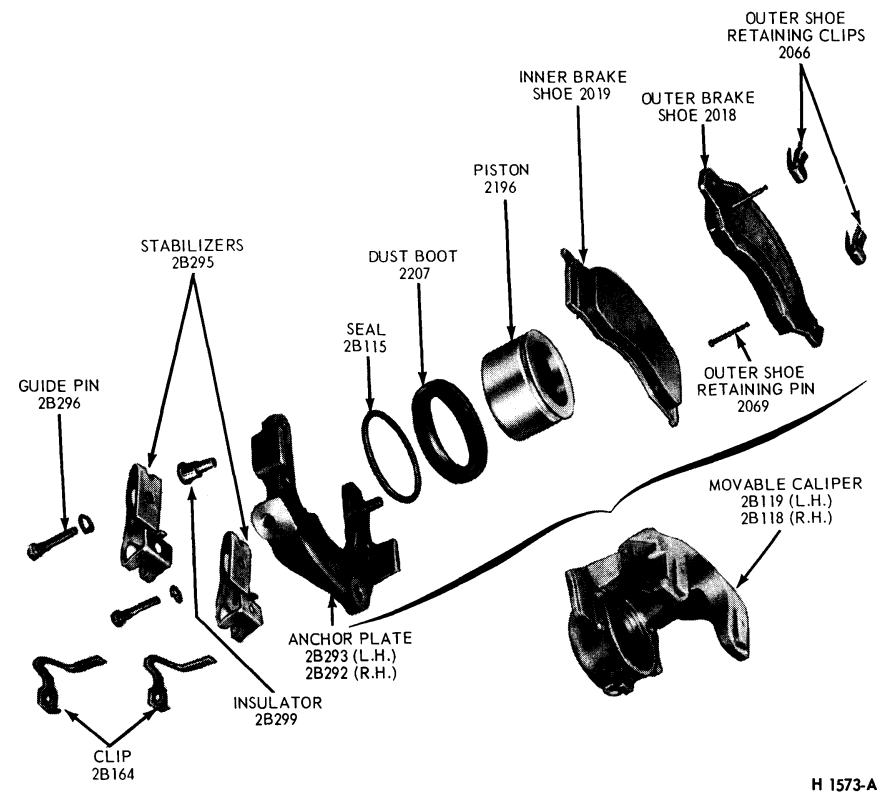


FIG. 28 — Caliper Assembly—Disassembled

springs, then remove the brake shoe.

6. Apply air pressure to the fluid port in the caliper as shown in Fig. 29 to remove the piston. Place a cloth over the piston before applying air pressure to prevent damage to the piston. If the piston is seized and cannot be forced from the caliper, tap lightly around the piston while applying air pressure. **Care should be taken because the piston can develop considerable force due to pressure build-up.**

7. Remove the dust boot from the caliper assembly.

8. Remove the rubber piston seal from the cylinder and discard it.

CLEANING AND INSPECTION

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

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

ASSEMBLY

1. Apply a film of clean brake fluid to the new caliper piston seal and install it in the cylinder bore. Be sure the seal does not become twisted and that it is seated fully in the groove.

2. Install a new dust boot by setting the flange squarely in the outer groove of the caliper bore.

3. Coat the piston with the specified fluid and install the piston in the cylinder bore. Spread the dust boot over the piston as it is installed. Seat the dust boot in the piston groove.

4. Position the inner brake shoe so that the ears of the shoe rests on the top of the anchor plate bosses and beneath the hold-down springs.

5. Install new caliper guide pin insulators in the anchor plate.

6. Position the caliper on the anchor plate.

7. Apply the specified fluid to the caliper guide pins and install them loosely in the anchor plate. **Be sure the guide pins are free of oil, grease or dirt.**

8. Install the caliper on the spindle as outlined under Disc Brake Caliper Assembly.

PART 2-3— *Specifications*

CHECKS AND ADJUSTMENTS—INCHES

Description	Ford, Mercury
Pedal Total Travel–Standard	6.67 ①
Pedal Total Travel–Power	3.70 ②
Power Brake Push Rod Adjustment – Inch Bendix Midland Ross	 0.980–0.995 0.980–0.995
Lining Maximum Wear Limit (From Top of Rivets)	1/32
Lining Maximum Wear Limit (Bonded)	0.030 Total Lining Thickness
Drum Diameter	11.030
Self Adjustment Cable Length– End Cable Anchor to End of Cable Hook	11.140-11.100

① 3 1/4–On Ford and Mercury Vehicles with Front Wheel Disc Brakes
② 2 1/4–On Ford and Mercury Vehicles with Front Wheel Disc Brakes

SHOE AND LINING DIMENSIONS— DISC BRAKES—INCHES

	Ford Mercury
Lining Material	
Lining Size	5.36 x 1.90
Lining Area—Square inches per Segment	10.030
Lining Thickness—Nominal	0.436
Lining Wear Limit (Front Surface of Shoe)—Max	0.030
Lining to Rotor Clearance (Brakes Released)	0.000-0.010

BORE DIAMETERS—BRAKE DRUM, WHEEL CYLINDER AND MASTER CYLINDER

Models		Brake Drum		Wheel Cylinder Bore Dia.		Master Cylinder Bore Dia.	
		Inside Diameter	Boring Limit ① (Max.)	② Front	② Rear	With Power Brake ②	Less Power Brake ②
Ford and Mercury	Taxi	11.030	11.090	1.094	0.938	1.000	1.000
	Other	11.030	11.090	1.094 ④	0.938 ③	1.000	1.000

① Max. Runout 0.007 ② Max. Allowable Hone 0.003
③ 0.969 for 240 & 302 CID Ford Passenger ④ 2.750 for Ford and Mercury with Disc Brakes

LINING DIMENSIONS—DRUM BRAKES—INCHES

Ford and Mercury	Position	Front	Rear	Color Code
Ford Passenger (Riveted Lining)	Primary	2.50 x 9.34	2.25 x 9.34	Yellow-Black
	Secondary	2.50 x 12.12	2.25 x 12.12	Blue-Black
Ford and Mercury—All 427 CID Engine and All Police—Max. Fade Resistance	Primary	3.00 x 9.34	2.25 x 9.34	Yellow-Black
	Secondary	3.00 x 12.12	2.25 x 12.12	Blue-Blue
Ford and Mercury Station Wagons	Primary	3.00 x 9.34	2.25 x 9.34	Yellow-Black
	Secondary	3.00 x 12.12	2.25 x 12.12	Blue-Black
Ford and Mercury Passenger Cars— 10 & 302 CID Engines—Taxi Only— (Bonded Lining)	Primary	3.00 x 9.34	2.50 x 9.34	Pink
	Secondary	3.00 x 12.12	2.50 x 12.12	Red-Red
	Primary	2.50 x 9.34	2.25 x 9.34	Yellow-Black
	Secondary	2.50 x 12.12	2.25 x 12.12	Blue-Black

ROTOR

Car Line	Thickness	Diameter	
		Outside	Inside
Ford, Mercury	1.250	11.96	7.785
Rotor Runout–Maximum Allowable–0.0025 inch.			

TORQUE LIMITS (FT-LBS)

Description	Ford Mercury
Parking Brake Control Assembly Mounting Bolt	15-19
Master Cylinder to Dash Panel Bolts	18-25
Brake Hose Bolt	
Wheel Cylinder Bleeder Screw	Leak Proof
Brake Pedal Support Bracket to Instrument Panel	9-13
Wheel to Hub and Drum Nuts—5-Lug	70-115

TORQUE LIMITS—DISC BRAKES (FT-LBS)

Description	FT-LBS
Caliper Assembly to Spindle	Upper 110-120 Lower 90-120
Caliper Bleeder Screw	6-15 (Must be leakproof)
Caliper Guide Pins	25-35
Rotor Splash Shield to Spindle	9-14
Wheel Assembly to Front Wheel Hub and Rotor Assembly	75-110
Brake Tube Fitting Nuts to Proportioning Valve	70 in-lbs (Max. Must be leakproof)
Stabilizer to Anchor Plate	8-11

Description	FT-LBS
Hub and Rotor Assembly to Front Wheel Spindle	Rotate rotor while torquing to 17-25 ft-lbs. Back off the adjusting nut 1/2 turn and re-tighten to 10-15 inch pounds while rotating wheel. Selectively position nut retainer on adjusting nut so that a set of slots are in line with cotter pin hole. Adjusting nut should not be rotated in this operation. Lock adjusting nut and nut retainer with cotter pin so that the cotter pin end does not interfere with seating of wheel static collector in spindle hole.

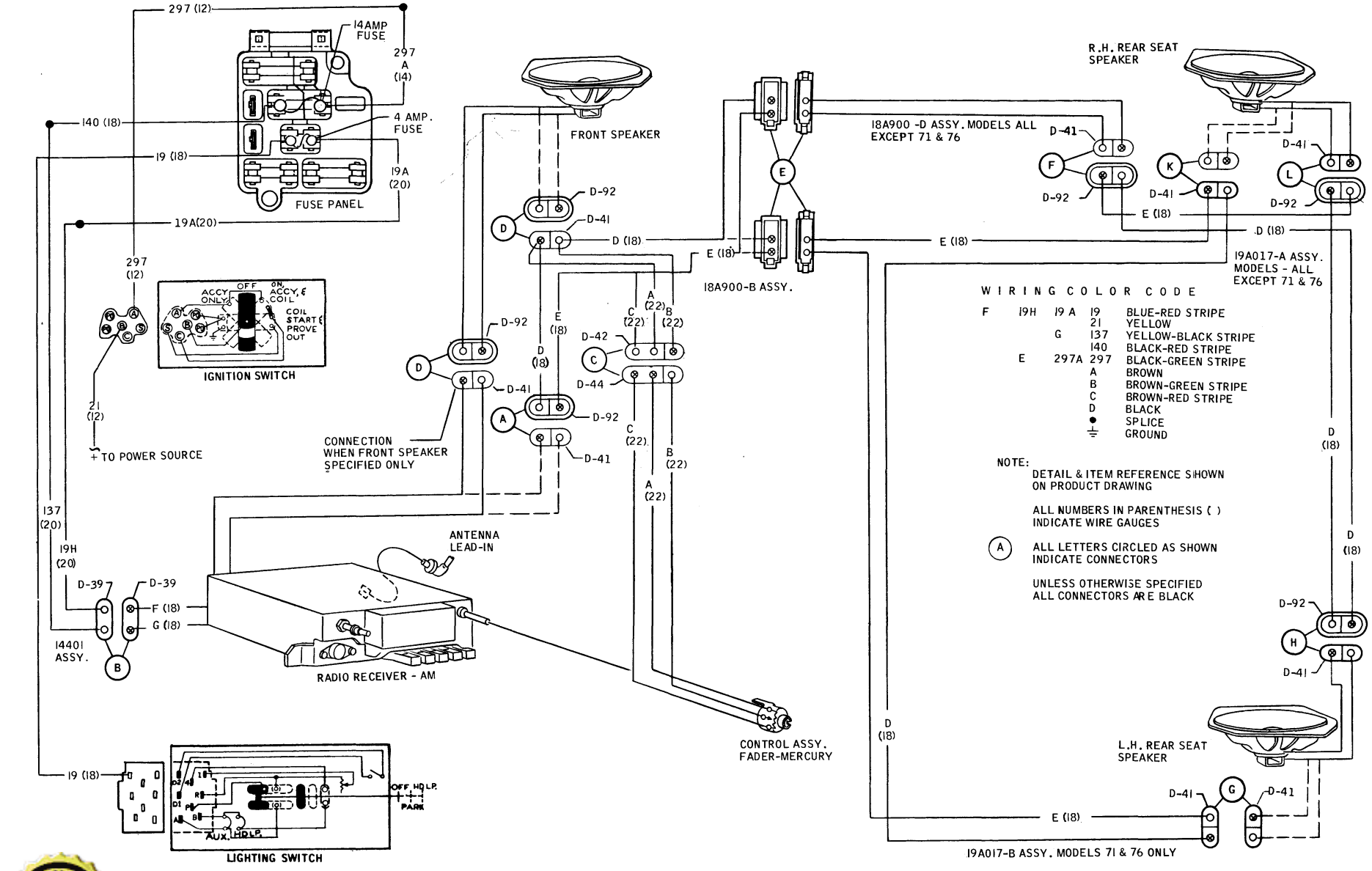
TORQUE LIMITS (FT-LBS) (Continued)

Description	Mercury Ford
FRONT BRAKES—DRUM TYPE Backing Plate to Spindle Nut	25-45
Wheel, Hub and Drum Assembly to Wheel Spindle Nut	Rotate wheel and drum while torquing the wheel bearing adjusting nut to 17-25 ft-lbs torque. Back off the adjusting nut 1/2 turn and re-tighten to 10-15 inch pounds while rotating the drum and wheel Selectively position nut retainer on adjusting nut so that a set of slots are in line with cotter pin hole. Adjusting nut should not be rotated in this operation. Lock the adjusting nut and retainer with cotter pin so that cotter pin end does not interfere with seating of wheel static collector in spindle hole.
REAR BRAKES—DRUM TYPE Drum to Axle Shaft Speed Nut	Hand Push Fit
Brake Cylinder to Brake Backing Plate Bolt	50-20 in-lbs
Brake Backing Plate to Axle Housing: All	50-70
Line Connection to Axle Housing Bolt	12-18
/	18-25
Bracket or Dash	18-25

SERVICE TOOLS

Ford Tool No.	Former No.	Description
Rotunda HRE 8650	—	Brake Adjusting Gauge
—	LM-119	Brake Cylinder Retaining Clamp
—	2018-A	Brake Adjusting Tool
—	2162	Adapter Cap
—	2035-N	Brake Shoe R & R Spring
7000–00	—	Rubber Tipped Air Nozzle

Ford Tool No.	Former No.	Description
TOOL 33621	33621	Internal Snap Ring Pliers
—	Milbar 1112-144	Inch-lb torque wrench
TOOL-4235-C	4235-C	Axle Shaft Remover



Seat Speakers & Fader