SECTION 5F

SPECIFICATIONS AND SPECIAL TOOLS

GENERAL SPECIFICATIONS

BRAKE PEDAL TRAVEL	Millimeters	Inches
A Carline	57.00	2.244
B Carline	57.15	2.250
E Carline	57.00	2.244
C-H Carline	57.00	2.244
G Carline	57.00	2.244
J-N Carline	71.00	2.795

Brake pedal travel maximum with 445 N (100 lbs.) force applied to pedal with ignition "OFF" and vacuum or hydraulic assist depleted.

BRAKE DRUMS	Millimeters	Inches
A-C-H Carline		
Inside Diameter	225.12	8.860
Runout	0.15	0.006
Maximum Rebore Diameter	225.50	8.880
Discard Diameter	226.30	8.909
J-N Carline		
Inside Diameter	200.12	7.879
Runout	0.15	0.006
Maximum Rebore Diameter	200.64	7.899
Discard Diameter	201.40	7.929
G Carline		
Inside Diameter	241.00	9.500
Runout	0.15	0.006
Maximum Rebore Diameter	242.82	9.560
Discard Diameter	243.59	9.590
B Carline		
Inside Diameter	279.00	11.000
Runout	0.15	0.006
Maximum Rebore Diameter	280.92	11.060
Discard Diameter	281.69	11.090

BRAKE ROTORS	Millimeters	Inches
A Carline (JA2-Heavy) and C-H Carline		
Rotor Diameter	260.00	10.240
Lateral Runout	0.10	0.004
Thickness Variation	0.01	0.0005
Rotor Thickness (Max)	26.50	1.043
Minimum Thickness after Refinish	24.68	0.972
Discard Thickness	24.30	0.957
A-J-N Carline		
Rotor Diameter	247.00	9.720
Lateral Runout	0.10	0.004
Thickness Variation	0.01	0.0005
Rotor Thickness (Max)	22.48	0.885
Minimum Thickness after Refinish	21.08	0.830
Discard Thickness	20.70	0.815
E Carline Front		
Rotor Diameter	267.00	10.500
Lateral Runout	0.10	0.004
Thickness Variation	0.01	0.0005
Rotor Thickness (Max)	26.50	1.043
Minimum Thickness after Refinish	24.66	0.971
Discard Thickness	24.30	0.956
E Carline Rear		
Rotor Diameter	254.50	10.020
Lateral Runout	0.07	0.003
Thickness Variation	0.01	0.0005
Rotor Thickness (Max)	12.55	0.494
Minimum Thickness After Refinish	11.28	0.444

Discard Thickness	10.90	0.429
G Carline		
Rotor Diameter	267.00	10.500
Lateral Runout	0.10	0.004
Thickness Variation	0.01	0.0005
Rotor Thickness (Max)	26.50	1.043
Minimum Thickness after Refinish	24.89	0.980
Discard Thickness	24.50	0.965
B Carline Wagon		
Rotor Diameter	305.00	12.000
Lateral Runout	0.10	0.004
Thickness Variation	0.01	0.0005
Rotor Thickness (Max)	26.50	1.043
Minimum Thickness after Refinish	24.89	0.980
Discard Thickness	24.50	0.965

All brake drums and rotors have a discard dimension cast into them. This is a wear dimension and not a refinish dimension. Any drum or rotor which does not meet the specification should be replaced.

MASTER CYLINDER BORE DIAMETER	Millimeters	Inches
A-J-N Carline	22.20	0.875
A Carline (JA2-Heavy)	24.00	0.937
C-H Carline	24.00	0.937
C-H Carline (Anti-lock)	23.80	0.937
B Carline	28.60	1.125
G Carline (Powermaster)	31.75	1.250
G Carline	24.00	0.937
E Carline	28.60	1.125

WHEEL CYLINDER BORE DIAMETER	Millimeters	Inches
A Carline	17.50	0.687
A Carline (JA2-Heavy)	19.00	0.750
A Carline Wagon	20.60	0.812
C-H Carline	22.20	0.937
J-N Carline		
Except J Wagon	16.00	0.625
J Wagon	17.50	0.687
B Carline Wagon	24.50	0.937
G Carline	19.00	0.750

TORQUE SPECIFICATIONS

COMPONENTS	N·m	Lbs. Ft.
Brake Pedal to Bracket – All Carline	34	25
Booster to Pedal Bracket – All Carline	21	15
Master Cylinder to Booster – All Carline	27	22
Parking Brake Control Assembly to Dash		
C-H Carline	20	14
B-G Carline	10	88*
E Carline	17	12
A Carline	15	11
Parking Brake Assembly		
J-N Carline	18	13
Combination Valve Mounting – B-G Carline	20	14
Brake Hose to Caliper – All Carline	45	33
Brake Pipes – All Carline	24	17
Caliper Mounting Bolts – All Carline	51	38
Wheel Cylinder to Backing Plate		
B-G Carline	18	13
C-H Carline	12	106*
Junction Block to Axle Housing – B-G Carline	27	20
Backing Plate to Axle Housing		
B Carline	48	35
G Carline	58	45
Caliper Bleeder Screw – All Carline	13	9
Wheel Cylinder Bleeder Screw – All Carline	6	48*

*LBS. IN.

SPECIAL TOOLS

J 8049 ..... Brake Spring Pliers
J 8057 ..... Brake Spring Pliers
J 21177 ..... Drum and Shoe Gage
J 21472 ..... Bleeder Wrench
J 22647 ..... Push Rod Height Gage
J 23175 ..... Control Valve Installer
J 23456 ..... Tandem Diaphragm Separating Tool
J 23530 ..... Double Lap Flaring Tool
J 23709 ..... Combination Valve Depressor
J 23872 ..... Piston Installer/Compressor
J 26267 ..... Boot Seal Installer
J 28434 ..... Bleeder Wrench
J 28458 ..... Power Piston Seal Protector
J 28662 ..... Brake Pedal Effort Gage
J 28629 ..... ISO Flaring Tool
J 29077-A ..... Boot Seal Installer
J 29532 ..... Bleeder Ball
J 29567 ..... Bleeder Adapter
J 29840 ..... Brake Spring Remover & Installer
J 33588 ..... Piston Locating Installer & Pilot
J 35126 ..... Powermaster Test Gage
J 35587 ..... Boot Seal Installer
J 35588 ..... Caliper Piston Ring Installer
J 35777 ..... Boot Seal Installer
J 35798 ..... Bleeder Adapter
J 35589 ..... Bleeder Adapter (Anti-lock)
J 35592 ..... Break Out Box (Anti-lock)
J 35604 ..... Pressure Gage (Anti-lock)
J 35804 ..... Pressure Switch Socket (Anti-lock)

REPLACING PRIMARY AND SECONDARY PISTON ASSEMBLIES

Follow instructions under **DEPRESSURIZE, REMOVE,** and **DISASSEMBLE POWERMASTER UNIT** first before attempting repair described in the following steps.

REMOVE PISTON ASSEMBLIES

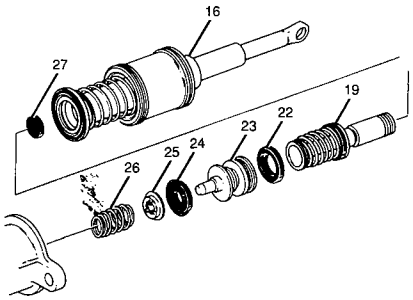
CAUTION: Do not place hand in front of the Powermaster cylinder bore in an attempt to catch pistons when applying compressed air. This could result in serious injury.

Reference figure 5.

1. Remove primary piston assembly (19) and secondary piston assembly (22, 23, 24, and 25) along with spring (26) from Powermaster unit.
   If primary piston assembly did not come out with power piston assembly, remove it along with the secondary piston assembly components from Powermaster unit by applying low pressure compressed air into master cylinder outlet port while covering by-pass holes.
   Cover main bore with a shop cloth to prevent pistons from coming out too fast and possibly causing injury.
   Or, lightly tap Powermaster unit on work bench.

NOTICE: Make note of primary piston identification, stamped on side of piston, and piston length (E-11, 108.08 mm/4.255 in. or E-14, 105.28 mm/4.145 in.). This is to assist in selecting the correct replacement primary piston assembly. Failure to use the correct piston will result in defective brake operation.

2. Remove secondary seal (22), primary seal (24) and spring retainer (25) from secondary piston (23).
3. Remove reaction disc (27) from inside of power piston assembly (16).



16. POWER PISTON ASSEMBLY
19. PRIMARY PISTON ASSEMBLY
22. SECONDARY SEAL
23. SECONDARY PISTON
24. PRIMARY SEAL
25. SPRING RETAINER
26. SPRING
27. REACTION DISC

FIGURE 5

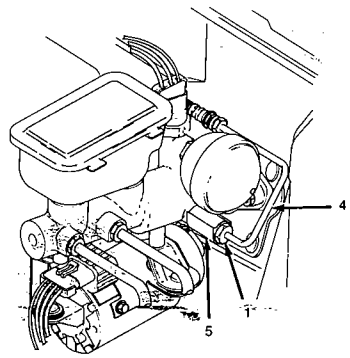
INSTALL PISTON ASSEMBLIES

Reference figure 5.

1. Lubricate replacement parts with new clean brake fluid.
2. Install reaction disc (27) into power piston (16).
3. Install primary seal (24), secondary seal (22) and spring retainer (25) on secondary piston (23).
4. Install spring (26) onto secondary piston assembly.
5. Slide secondary piston assembly (22, 23, 24, and 25) along with spring (26) into Powermaster unit.
   Note: Lubricate cylinder bore with new clean brake fluid to ease assembly.

NOTICE: There are two primary piston assemblies in the repair kit. Use the one having the same identification mark and piston length as that of the original primary piston removed in step 1 of the disassembly procedure (E-11, 108.08 mm/4.255 in. or E-14, 105.28 mm/4.145 in.). Failure to use the correct piston will result in defective brake operation. Dispose of the other replacement primary piston assembly along with the original primary piston assembly.

6. Insert primary piston assembly (19) into power piston assembly (16).
7. Reassemble power piston components along with primary piston assembly (19) as described under **REASSEMBLE POWERMASTER UNIT.**



1. TUBE NUT
4. TUBE AND NUT ASSEMBLY
5. PUMP OUTLET PORT

FIGURE 6

CHECK VALVE ASSEMBLY

IMPORTANT

The check valve assembly can be replaced with Powermaster unit on or off the vehicle. If replacement is to be done off vehicle, follow procedure described under REMOVE POWERMASTER UNIT.

REMOVE CHECK VALVE ASSEMBLY

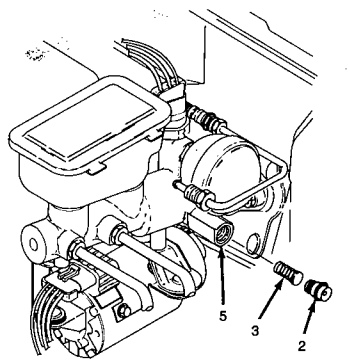
Reference figures 6 and 7.

1. Unscrew tube nut (1) from pump outlet port (5).
2. Rotate tube and nut assembly (4) out of the way.
3. Remove check valve seat assembly (2).
   - Tap "easy out" into check valve seat assembly and pull straight out.
4. Remove poppet and spring assembly (3).

INSTALL CHECK VALVE ASSEMBLY

Reference figures 7 and 6.

1. Install new poppet and spring assembly (3) into pump outlet port (5).
   - Spring end first.
2. Install new check valve seat assembly (2) into pump outlet port (5).
   - To ease assembly, lubricate check valve seat assembly with clean brake fluid.
4. Bottom out check valve seat assembly (2) by threading tube nut (1) into pump outlet port.
5. Torque tube nut (1) to 17 N-m (13 lb-ft).
6. If unit was removed from the vehicle, reinstall following procedure described under **INSTALL POWERMASTER UNIT.**



2. CHECK VALVE SEAT ASSEMBLY
3. POPPET AND SPRING ASSEMBLY
5. PUMP OUTLET PORT

FIGURE 7

NOTICE: Failure to fully depressurize Powermaster unit before performing service operations could result in brake fluid being sprayed on service personnel and vehicle causing damage to painted surfaces.

DEPRESSURIZE POWERMASTER UNIT

1. Depressurize Powermaster before performing any service.
2. With ignition "OFF", apply approximately fifty (50) pounds force to the brake pedal and release pedal a minimum of ten (10) applies.

REMOVE POWERMASTER UNIT

Reference figure 1.
1. Disconnect electrical connectors (6 & 7) from Powermaster unit (10).
2. Disconnect brake pipes (8) from Powermaster unit (10).
3. Remove mounting nuts (9).
4. Remove cotter pin from brake pedal pin and slide pushrod off brake pedal pin.
5. Remove Powermaster unit from vehicle.

DISASSEMBLE POWERMASTER UNIT

Reference figure 1.
1. Remove reservoir cover (20) and dispose of brake fluid. Do not reuse fluid.
2. Remove boot (11).
3. Secure Powermaster unit (10) vertically in a vise.

Reference figure 2.
4. Insert wire through pushrod eyelet (17) and fasten one end to mounting hole (18).
5. Depress pushrod 1/8" - 1/4" and fasten the loose end of wire to opposite mounting hole, securing pushrod in depressed position.
6. Remove retainer (12) as shown in figure 3.
7. Remove wire

Reference figure 4.
8. Slowly pull on pushrod to remove power piston assembly (16) along with piston guide (14).
   NOTE: Primary piston assembly (19) may also come out as part of assembly.
9. Remove piston guide over pushrod eyelet.
10. Remove the small O-Ring (15) from inside piston guide (14).
11. Remove 3 large O-Rings (13) from piston guide (14) and power piston assembly (16).

IMPORTANT

Before reinstalling power piston assembly in Powermaster unit, follow instructions under **REPLACING PRIMARY AND SECONDARY PISTON ASSEMBLIES.**

REASSEMBLE POWERMASTER UNIT

Reference figure 4.(unit in horizontal position)
1. Lubricate replacement O-Rings (13 & 15) with new clean brake fluid.
2. Install new large O-Rings (13), one on power piston guide (14) and two on power piston (16).
3. Install new small O-Ring (15) inside power piston guide (14).
4. Slide piston guide (14) over pushrod eyelet.
5. Insert the primary piston assembly (19), if removed, into end of power piston (16).
6. Push power piston assembly (16) along with primary piston (19) and piston guide (14)into Powermaster cylinder bore.
   Note: Lubricate cylinder bore with new clean brake fluid to ease assembly.

Reference figure 2.(unit in vertical position)
7. Secure pushrod in depressed position using instructions to disassemble Powermaster unit steps 4 and 5.
8. Install new retainer (12).
9. Remove wire.
10. Install boot (11) over pushrod.

INSTALL POWERMASTER UNIT

Reference figure 1.
1. Position Powermaster with pushrod through opening in mounting bracket (21).
2. Slide pushrod on brake pedal pin and push Powermaster unit onto mounting studs.
3. Install cotter pin on brake pedal pin.
4. Install mounting nuts (9).
   Torque to 21 N-m (15 lb-ft).
5. Connect brake pipes (8) to Powermaster (10).
   Torque to 17 N-m (13 lb-ft).
6. Connect electrical connectors (6 & 7) to Powermaster (10).
7. Bleed brake system per procedure in service manual.

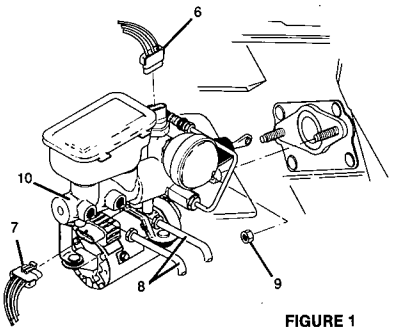


FIGURE 1

6. ELECTRICAL CONNECTOR
7. ELECTRICAL CONNECTOR
8. BRAKE PIPE
9. NUT
10. POWERMASTER UNIT

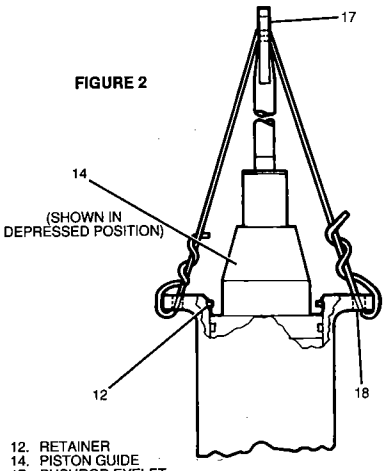
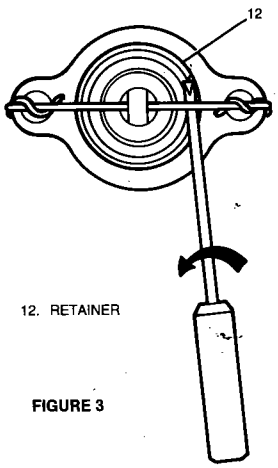


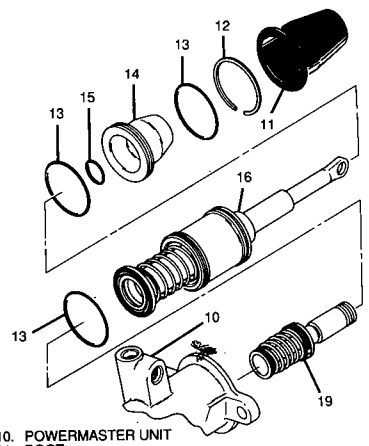
FIGURE 2

12. RETAINER
14. PISTON GUIDE
17. PUSHROD EYELET
18. CYLINDER MOUNTING HOLE



12. RETAINER

FIGURE 3



10. POWERMASTER UNIT
11. BOOT
12. RETAINER
13. LARGE O-RING
14. PISTON GUIDE
15. SMALL O-RING
16. POWER PISTON ASSEMBLY
19. PRIMARY PISTON ASSEMBLY

FIGURE 4