This Powermaster unit will give you full braking power as long as you have a live battery, the ignition is on and in the running position but the engine need not be running. This braking system gives you a much lighter brake pedal and is very easy to lock all six wheels if necessary. With existing vacuum booster in good condition approx. 1000 psi with G.M. Powermaster over 1600 psi about 65% more braking power. I would like to suggest all new hydraulic hoses on all wheels. They should be changed anyway. If you buy an old unit that has a black pressure switch (3 Pin Connector) the new type will be the same but gray. That was the recall.

It is easy to install by removing the master cylinder and booster. You will need an adapter between the Powermaster and the fire wall, and the wiring is self explanatory. The adapter or spacer is made of 319 S.R. aluminum, tensile strength 27,000 lbs. per square inch, yield 16,000 lbs. per square inch, elongating 2% over 2 inches. I'm sure this General Motors unit is a must for a safe stop on this six ton motor home.

I am making this adapter and selling at my cost. If someone or some company would like to make this part, please talk to me about the patterns, machining, etc.

The part no. for the GMC Powermaster and parts are as follows

GMC POWERMASTER 18018236 List Price $620.00 Net Price $460.00
ACCUMULATOR 18014978 List Price 50.00 Net Price 37.50
PRESSURE SWITCH 18018141 List Price 12.00 Net Price 8.00 (Gray Only)

You may find this unit in an experienced auto emporium (junk yard) on a 86 Chev. Caprice station wagon, some Delta 88 Olds., Buick La-Sabre all station wagons all the same year.

If you can locate this unit in a junk yard they will run somewhere in the neighborhood of $100 to $200.00 complete. Be sure and try to get the harness that goes with this unit.

Marvin Peck - GMC Classic
5713 Armour Dr.
Houston, Texas 77020

(713) 675-0142
GENERAL DESCRIPTION

This Powermaster unit is a complete, integral power brake apply system. It consists of an electro-hydraulic (E-H) pump, fluid accumulator, pressure switch, fluid reservoir, and a hydraulic booster with an integral dual master cylinder. The nitrogen charged accumulator stores fluid at 510-675 psig for hydraulic booster operation. The E-H pump operates between pressure switch limits with the ignition “ON”. When the pressure switch senses accumulator pressure below 510 psig, the 12-volt E-H pump operates to increase accumulator fluid pressure to 675 psig. When the brake pedal is depressed, fluid from the accumulator acts on the booster power piston to apply the master cylinder which functions in the same manner as a conventional dual master cylinder.

NOTICE: Replace all components included in repair kits used to service this power brake. Lubricate rubber parts with clean, fresh brake fluid to ease assembly. Do not use lubricated shop air on brake parts as damage to rubber components may result. If any hydraulic component is removed or brake line disconnected, it may be necessary to bleed part or all of the brake system. The torque values specified are for dry, unlubricated fasteners. Perform service operations on a clean bench free from all mineral oil materials.

CAUTION: The use of rubber hoses other than those furnished specifically for the Powermaster may lead to functional problems requiring major overhaul.

ON-CAR SERVICE

CAUTION: Failure to fully depressurize Powermaster unit before performing service operations could result in injury to service personnel and damage to painted surfaces.

DEPRESSURIZING POWERMASTER UNIT

| Important |
| Depressurize Powermaster before performing any service. |
| With ignition off, apply and release brake pedal a minimum of 10 times using approximately 50 pounds force on the pedal. |

PRESSURE SWITCH

Figure 2

| Important |
| Depressurize Powermaster unit. See CAUTION on page 5D4-2. |

| Remove or Disconnect |
| Electrical connector (40) from pressure switch (1). |
| Pressure switch (1). |
| O-ring (2). |

| Important |
| See NOTICE on page 5-1. |

ACCUMULATOR

Figure 3

| Important |
| Depressurize Powermaster unit. See CAUTION on page 5D4-2. |

| Remove or Disconnect |
| Accumulator (3). |
| O-ring (4) from accumulator. |

| Important |
| See NOTICE on page 5-1. |

| Install or Connect |
| New O-ring (2) on pressure switch (1). |
| Pressure switch (1) to 20-27 N-m (15-20 lb-ft). |
| Electrical connector (40) to pressure switch (1). |
POWER MASTER BRAKE SYSTEM
STATION WAGON ONLY

INTEGRATED BRAKE WARNING INDICATOR

INSTRUMENT PANEL PRINTED CIRCUIT
('*WITHOUT GAGES; **WITH GAGES)

IGNITION SWITCH

PARK BRAKE SWITCH CLOSED WITH UNEQUAL BRAKE PRESSURE

SWITCH A CLOSED AT 400 PSI AND BELOW

SWITCH B CLOSED AT 510 PSI AND BELOW OPEN AT 625 PSI AND ABOVE

BRAKE ACCUMULATOR PRESSURE SWITCH

BRAKE RESERVOIR PUMP MOTOR

POWER MASTER BRAKE RELAY

BATTERY JUNCTION BLOCK

POWER MASTER BRAKE IN-LINE FUSE (30 AMP)

GAGES

FUSE BLOCK DETAILS

FUSE BLOCK

20 AMP

SEE FUSES BLOCK DETAILS

SEE FUSES BLOCK DETAILS

GAGE FUSE

PUMP MOTOR

ANTI-DIESLING SOLENOID

V8 VIN T ONLY
SYSTEM CHECK

1. Turn the IGNITION SWITCH slowly past the "Run" position.
   • The "BRAKE" WARNING INDICATOR comes on before the IGNITION SWITCH reaches the "Start" position.

2. With the IGNITION SWITCH in "Run," put the Park Brake on.
   • The "BRAKE" WARNING INDICATOR comes on.

3. Release the Park Brake and turn the IGNITION SWITCH "Off." Step on the brake pedal several times until more pedal resistance is felt. Put the IGNITION SWITCH in "Run."
   • The "BRAKE" WARNING INDICATOR comes on, the BRAKE RESERVOIR PUMP MOTOR operates, and then the indicator goes out.

TROUBLESHOOTING HINTS

1. Check the GAGES FUSE by turning the IGNITION SWITCH to "Run" and check to see if the FUEL GAGE is working.

2. Check the POWER MASTER BRAKE IN-LINE FUSE with an ohmmeter.

3. If the "BRAKE" WARNING INDICATOR remains on with the IGNITION SWITCH in "Run" and the Park Brake off, a leak in one of the brake systems is indicated. Verify that that this is true by removing the connector from the BRAKE PRESSURE SWITCH.
   • If the indicator goes out, the BRAKE PRESSURE SWITCH was closed.
   • If the indicator remains on, check for a shorted PARK BRAKE SWITCH, IGNITION SWITCH, or wire.

4. If the "BRAKE" WARNING INDICATOR comes on in "Bulb Test" but not when the Park Brake is on, measure the voltage at the TAN/WHT wire at the PARK BRAKE SWITCH. Put the IGNITION SWITCH in "Run" and apply the Park Brake.
   • If battery voltage is present at the TAN/WHT wire, install a new PARK BRAKE SWITCH.
   • If zero volts is present at the TAN/WHT wire, check the wire for an open between the switch and C100.

5. If the "BRAKE" WARNING INDICATOR comes on with the Park Brake on, but not in "Bulb Test," check for voltage at the IGNITION SWITCH terminal G2. Put the IGNITION SWITCH in "Bulb Test."
   • If battery voltage is present at G2, install a new IGNITION SWITCH.

6. If the "BRAKE" WARNING INDICATOR does not come on with low brake accumulator pressure, check for battery voltage at terminal B of the BRAKE ACCUMULATOR PRESSURE SWITCH. Install a new switch if voltage is present and ground is good at terminal C.

COMPONENT LOCATION

<table>
<thead>
<tr>
<th>Component Location</th>
<th>Page-Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery Junction Block</td>
<td>201-5-E</td>
</tr>
<tr>
<td>Brake Accumulator Pressure Switch</td>
<td>201-4-E</td>
</tr>
<tr>
<td>Brake Pressure Switch</td>
<td>201-12-A</td>
</tr>
<tr>
<td>Brake Reservoir Pump Motor</td>
<td>201-4-E</td>
</tr>
<tr>
<td>Fuse Block</td>
<td>201-8-C</td>
</tr>
<tr>
<td>Park Brake Switch</td>
<td>201-6-A</td>
</tr>
<tr>
<td>Power Master Brake In-Line Fuse</td>
<td>201-6-A</td>
</tr>
<tr>
<td>Power Master Brake Relay</td>
<td>201-4-E</td>
</tr>
<tr>
<td>C100 (46 cavities)</td>
<td>201-4-E</td>
</tr>
<tr>
<td>G112</td>
<td>201-5-B</td>
</tr>
<tr>
<td>S120</td>
<td>201-4-A</td>
</tr>
<tr>
<td>S287</td>
<td>201-6-A</td>
</tr>
<tr>
<td>S801</td>
<td>201-6-A</td>
</tr>
</tbody>
</table>

There is low brake pressure in one system.

- If the indicator remains on, check for a shorted PARK BRAKE SWITCH, IGNITION SWITCH, or wire.

5. If the "BRAKE" WARNING INDICATOR comes on with the Park Brake on, but not in "Bulb Test," check for voltage at the IGNITION SWITCH terminal G2. Put the IGNITION SWITCH in "Bulb Test."
   • If battery voltage is present at G2, install a new IGNITION SWITCH.

6. If the "BRAKE" WARNING INDICATOR does not come on with low brake accumulator pressure, check for battery voltage at terminal B of the BRAKE ACCUMULATOR PRESSURE SWITCH. Install a new switch if voltage is present and ground is good at terminal C.
SYSTEM DIAGNOSIS

1. Remove the connector from the POWER MASTER BRAKE RELAY. Measure the voltage to ground at the following terminals of the connector with the IGNITION SWITCH in “Run.”

VOLTAGE

The BRAKE PRESSURE SWITCH closes when there is an unequal pressure in the two sections of the hydraulic brake system. The switch will remain closed until the problem is fixed.

The IGNITION SWITCH does not have a detent for the “Bulb Test” position, but will close between “Run” and “Start” to test the indicator. The PARK BRAKE SWITCH will be closed any time the Park Brake is set.

When the BRAKE ACCUMULATOR PRESSURE SWITCH (Switch A) senses an accumulator hydraulic pressure of 400 psi and below, it will close.

When the IGNITION SWITCH is in “Run,” “Bulb Test,” or “Start,” Switch B in the BRAKE ACCUMULATOR PRESSURE SWITCH senses an accumulator pressure of 490-530 psi or less, the switch will close. This provides ground to the POWER MASTER BRAKE RELAY coil and the relay will energize to operate the BRAKE RESERVOIR PUMP MOTOR. The pump will run until the accumulator is charged to a pressure above 635-735 psi. When the switch senses a pressure of 635-735 psi, it will open to de-energize the relay, which shuts off the pump. The pump will remain off until the accumulator pressure drops to 490-530 psi and then the cycle starts again. If the pressure drops to 400 psi Switch A in the BRAKE ACCUMULATOR PRESSURE SWITCH will close to light the “BRAKE WARNING INDICATOR.”

RESISTANCE

<table>
<thead>
<tr>
<th>Terminal (Wire Color)</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>D (WHIT)</td>
<td>0</td>
</tr>
<tr>
<td>A (BLK)</td>
<td>0</td>
</tr>
</tbody>
</table>

If terminals A and D are not grounded, check the wiring at those terminals for opens. Also check the BLK wire to ground at the BRAKE ACCUMULATOR PRESSURE SWITCH. If the switch is open, replace it.

If all the voltages and resistances at the POWER MASTER BRAKE RELAY connector are correct and the brake pump does not operate, install a new relay and motor assembly.

CIRCUIT OPERATION

The “BRAKE” WARNING INDICATOR comes on to warn the driver of brake hydraulic pressure loss, or that the parking brake is applied. In cars equipped with the Power Master Brake System, the indicator comes on to warn of low brake accumulator hydraulic pressure.

With the IGNITION SWITCH in “Run,” “Bulb Test,” or “Start,” voltage is applied through the GAGES FUSE and the “BRAKE” WARNING INDICATOR to the BRAKE PRESSURE SWITCH, IGNITION SWITCH, PARK BRAKE SWITCH, and the BRAKE ACCUMULATOR PRESSURE SWITCH (Switch A). When a ground path is provided through any of these four switches, a circuit is completed through the indicator and the closed switch to ground. The indicator lights.

<table>
<thead>
<tr>
<th>Terminal (Wire Color)</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>B (PNK/BLK)</td>
<td>Battery</td>
</tr>
<tr>
<td>C (ORN)</td>
<td>Battery</td>
</tr>
</tbody>
</table>

If the voltage at a terminal is not correct, check the circuit feeding that terminal.

If the voltages are correct, check resistances in the next step.

2. With the connector still removed from the POWER MASTER BRAKE RELAY, measure the resistance to ground at the following terminals. First depress the brake pedal many times to lower the brake reservoir pressure.
TO - GUAGES - FUSE
PINK - W/B BLACK TRACER

30 AMP - FUSE - TO BATTERY

TO - BRAKE - PRESSURE SWITCH
TAN WIRE IN INST. PANEL
SAME - GOES TO BRAKE DIFFERENTIAL VALVE BY COMBINATION VALVE

TO - MASTER BRAKE REAR

LEFT FRONT WHEEL

COMBINATION VALVE

GROUND
GMC Brake System

Modification - Remove Vacuum Boost - Install GMC "Powermaster" Unit

Notes:

Powermaster was used on 1986 GM "full size" station wagons: Chevy Caprice, Olds Cutlass Supreme, Buick Regal, also Turbos (Buick), & some diesels - up into 1987

After '87 this unit was incorporated into the GMC ABS Brake system, by adding wheel sensors, etc.

The following is from 2 PH. conversations to GM on 10-2-90, & later.

1. There is a Powermaster I, II & III (IT WAS NOT IT IS THIS SYSTEM, III IS WITH ABS PUT INTO PRODUCTION)

2. Generally, there are no problems with this system if anything, it is overdesigned - "will run forever"

Some deal is, etc. badmouth the system because vehicles with it were recalled -

The reason for the recall were:

a) Because Powermaster releases quicker than a vac. system, sometimes air is sucked into the brake system via the "combo valve" - a brake proportioning/warning light unit made by Kelso Haynes - The fix is to replace the bad K-11 unit & bleed sys

b) There were some bad pressure switch, which control the unit - this is because a batch was contaminated with incorrect assembly lubricant during manufacture -

The fix is a new (good) switch. The fix is a new accumulator.

c) Once in a while the accumulators will leak down - making the motor run too often/excessively.

The fix is a new accumulator.

Advantages of Powermaster

1. Full brake boost, even if engine stalls

2. More system boost pressure - thus able to get "more" ft. brakes by reducing rear wheel diameters to "5/8" & /1 with "big" rear brakes = more total brakes

Note: Bad pressure switches can stick on - making the motor/pump run continuously, until it "fails"
Marvin Pack (GMC Club Member) made a very nice cast aluminum adaptor - to adapt Powarmaster to a GMC Hi-H. See attached invoice. 713-675-0142.

CAS added a monitor/warning line to the GMC wiring circuit - see attached.

Normally, the monitor line comes on for about 10 sec. while the Powarmaster motor is running/running = approx.

Every other time the brakes are applied.

If the line comes on, it stays on, it means:

1) The motor is not running, because of
   - blown fuse
   - bad motor/or pump
   - bad switch (pressure) which means
     low boost pressure!

(The standard GMC brake/dash warning light functions
as on all GMC vehicles, etc.)

Bought 2 units from Herb's Airdriver @ 125° ea.

Important - must get 2 (both) electrical connectors
   with units - 3 pole = switch; 4-pole = motor

Installed system using DOT 5 silicone fluid

- Using 1/8" ID all wire eyes on rear-rear, 1/16" on rear-front
11-28-90  (GMC Powermaster - Cont.)

After driving this Powermaster system for 1 week, the following was concluded:

1 - The vehicle has "more" brakes, because:
   a) With the smaller rear-rear wheel cylinders (1/16")
      the rear trailing wheel can be locked (as it was with 1/16")
   b) The front-rear wheel can almost (1" cyl)
      be locked (espec. on imperfect road surface)
      (could not lock, previously)
   c) The front wheels brake harder, & the RT. suspension noticeably "dips" (not possible)
      (All or the above occurs during test-severe braking)

2 - Pedal feel is noticeably better than with modification #1 - A little softer, easier, quicker response

3 - DOT 5 Fluid seems OK - No adverse problems
   Brake pedal is normal "height" from floor

4 - The firewall flexed excessively from the brake pedal force, it was felt that this could eventually cause a firewall fatigue crack, & not the best pedal "feel"

5 - A 3-point brace/master cylinder support was devised by making a special bracket under the Powermaster, & securing it with 2 Porsche 944 turnbuckles angled back to the firewall, & 1 turnbuckle vertically up to the area where the O.E. M/cyl support bracket originally attached

6 - The warning light system works A-ok. The amber light comes on for about 10 to 15 sec. on every 2nd or 3rd brake application

Not easy to fabricate, but a very significant improvement
## Parts List for Powermaster

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Item</th>
<th>List $</th>
<th>Net $</th>
</tr>
</thead>
<tbody>
<tr>
<td>1801 8236</td>
<td>Complete Powermaster Assy</td>
<td>640.00</td>
<td>460.00</td>
</tr>
<tr>
<td>1801 1279</td>
<td>Pump &amp; Motor Sub-Assy</td>
<td>291.00</td>
<td>218.00</td>
</tr>
<tr>
<td>1801 4978</td>
<td>Accumulator</td>
<td>50.00</td>
<td>37.50</td>
</tr>
<tr>
<td>1801 8141</td>
<td>Pressure Switch</td>
<td>12.00</td>
<td>8.00</td>
</tr>
<tr>
<td>2550 9419</td>
<td>Combo Valve (May Not Be)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1801 8141</td>
<td>O-Ring (For Switch)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1801 1388</td>
<td>Reservoir Cover</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1801 3293</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>01132</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150 11403</td>
<td>Hi Pressure Hose Kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1201 5797</td>
<td>ELEC. CONNECTOR, MOTOR, 4-PIN</td>
<td>1.38</td>
<td>1.04</td>
</tr>
<tr>
<td>1201 5793</td>
<td>&quot; &quot; &quot; &quot; &quot; &quot; SWITCH, 3-PIN</td>
<td>1.22</td>
<td>0.92</td>
</tr>
<tr>
<td>1201 4836</td>
<td>PIN TERMINALS, PKG. OF 10, FOR ABOVE 554</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SEAL KIT FOR POWERMASTER MAST. CYLINDER</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AVAIL. FROM MBM Q. - 1-800-231-4125</td>
<td>29.00</td>
<td></td>
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<tr>
<td>37048</td>
<td>15/16&quot; WHEEL CYL - REAR, REAR</td>
<td></td>
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<tr>
<td>F 51081</td>
<td>(NAPA PART NO.) 2 Rep'd</td>
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<td></td>
</tr>
<tr>
<td>37048</td>
<td>(WAGNER EQUIV. OF NAPA PART)</td>
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<td></td>
</tr>
<tr>
<td>F 10591</td>
<td>15/16&quot; Same as above, but must be rebored to 1.000 Dia.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(USE ON REAR, FT.) 2 Rep'd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.27-91</td>
<td>WAGNER - LONG BLEEDER SCREW</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Makes it easier to bleed system)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[NAPA # 33512 ? - Not sure of this!]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes:

- GMC Int'l Member: Art Owens 512-758-0246 can supply used Powermasters at 150% CA
- Junkyard Price $125, Herb's Auto Wrecking

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| 76, 4 OF 5 |
POWER MASTER BRAKE SYSTEM
(ONLY FOR STATION WAGON)
POWER MASTER BRAKE SYSTEM
(ONLY FOR STATION WAGON)

---

WARNING:

- The instrument panel circuit includes a brake warning indicator.
- The brake pressure switch is closed with unequal brake pressure.
- The brake power switch is closed with equal brake pressure.
- The park brake switch is closed with parking brake on.
- The amber dash light is used.

---

SWITCH A and SWITCH B are both in one housing, called "THE PRESSURE SWITCH."
Dear Ralph,

After I came home from the convention in Michigan I took some actions and discovered some problems. First, I purchased the Alcoa wheels and new tires. The problem I discovered here was that the wheel bolts were too short for these thicker wheels, they only came a little more than half way through the nut. I was told that this was OK but it didn't look safe to me so I went looking for a longer bolt that would fit the hubs on the GMC coach. I found the right bolt at the NAPA parts store, bolt # 641-1359 is 1/2 inch longer than the original bolt and is the correct size for the ALCOA wheel.

I also purchased the powermaster electric-hydraulic brake system from a junk-yard and received it with one of the electric connectors missing, I checked with the local GMC dealer and found that these connectors are available so I'll list them and the prices. The three pin connector is #12015793 for $1.22 without pins, the four pin connector is #12015797 for $1.30 without pins. The pins come in two sizes, the large size for #12 wire used for pins A & C in the four pin connector is #12051371 for $.97, the small size for all other connections is #12014836 for $.97. The connectors and pins come with seals that make them water tight connections. Any good GM shop should have the crimping tools to assemble these connectors, if the crimper is not available the wires should be soldered into the pin.

I feel this information should be made available to the readers of the newsletter. You might also add, for any one that gets one without the four pin connector that the wire to A & C must be 12 gage wire as these are the leads to the motor and the wiring diagrams do not tell us the size of the wire.

I am looking forward to the next convention.

Sincerely,

Dallas C. Jensen.
Dear Ralph,

After Installing the Powermaster brake system on my coach I would like to point out another problem that your readers should be aware of. I found the clevis pin that connects the control arm to the master cylinder on my coach was 7/16th inch diameter and the hole in the Powermaster brake system was 1/2 inch in diameter. To correct the problem, the control arm should be drilled out to 1/2 inch and a 1/2 inch pin should be used. Or a bushing should be made for the 1/2 inch hole on the Powermaster brake system so that the 7/16 pin can be used. I chose to make the bushing.

I would also point out that I had to adjust the switch for the brake light and the vacuum valve next to it that disengages the cruise control. I chose to connect the wire from pin "B" on the three pin plug to the wire going to the parking brake light switch rather than the wire going to the differential valve as Marvin suggested in his wiring diagram. I believe the parking brake light will get my attention better in the event of a system failure, than the brake light that is located at the bottom of the speedometer.

After road-testing the system I am very happy with it and feel it is a good investment.

I was unable to get to Las Vegas but am planning to make it to Gettysburg in September. See you then.

Sincerely,

Dallas C. Jensen.