



TECHNICAL DATA SHEET

HB SERIES HANDLEBAR MASTER CYLINDERS

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Handlebar controlled recreational vehicles such as snowmobiles, mini-bikes and motorcycles require an efficient, dependable hand lever operated braking system to ensure optimum performance and safety.

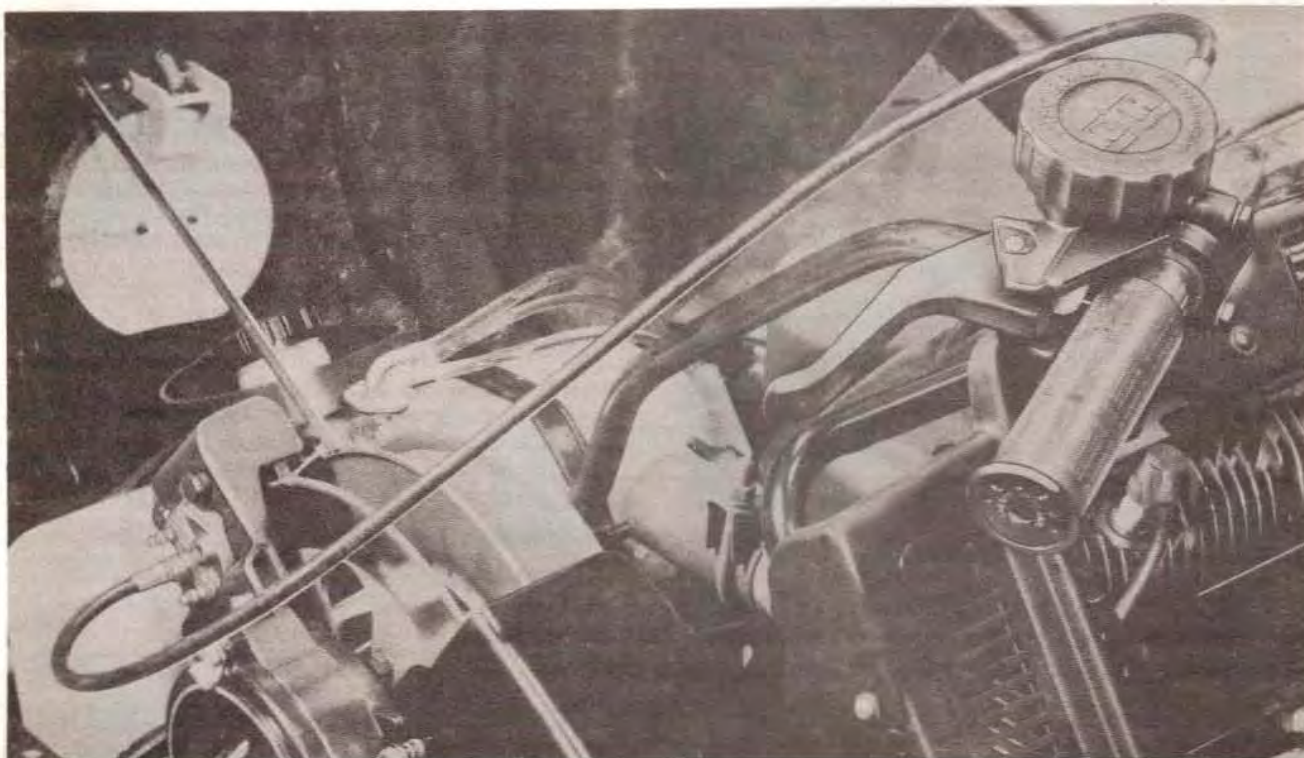
Now, for the first time, the Kelsey-Hayes handlebar mounted master cylinder makes the extra stopping power of hydraulic disc brakes available for these machines. Kelsey-Hayes hydraulic disc brake systems have earned almost instant acceptance for the more powerful and competition type snowmobiles and are already appearing as standard equipment on some motorcycle models. H-H Products Division offers the new model HB master cylinder in two sizes. These compact units are designed specifically for use in conjunction with the Kelsey-Hayes caliper type disc brakes and provide more braking effort and controllability than can reasonably be attained with conventional hand lever and cable systems and mechanical brakes.

The technical data presented in this publication covers both models of the HB master cylinder series,



The HB series master cylinder is a rugged compact unit featuring an integral fluid reservoir protected by a locking cap. Full use is made of space-age, high impact, engineering plastic resulting in a light-weight durable unit.

designated 625HB and 750HB. These units are of 5/8 (0.625) in. and 3/4 (0.750) in. bore respectively. They are available for either left or right hand mounting.



The open engine cowling of this Ski-doo "TNT" reveals the entire hydraulic disc brake system, from the compact Model 220H2 floating mount caliper unit to the handlebar mounted master cylinder.

H-H Products Division/Kelsey-Hayes Company
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INSTALLATION

The availability of this new line of hand operated master cylinders makes it easy to apply highly efficient and powerful hydraulic disc brake systems to many kinds of recreational vehicles that were previously dependent entirely on cable actuated mechanical brake systems with their inherent disadvantage of low torque attainable with a hand lever system. Using a Kelsey-Hayes hydraulic system, the individual components are comparable in size to the corresponding mechanical parts, yet in many instances it is easier to adapt a flexible hydraulic line to the tight space limitation found in snowmobiles, for instance, than the springy cable of a typical mechanical linkage. All the compatible hydraulic caliper units offered by H-H Products Division are available with a choice of fixed or floating mounts to simplify application engineering still further.

The master cylinders are available for either left or right hand mounting and are attached directly to the



The Arctic Cat "EXT" snowmobile is equipped with the new Kelsey-Hayes master cylinder and a Model 400H2 caliper type disc brake for outstanding braking performance. The handlebar clamp is clearly visible in this view.

handlebar with a simple bolted clamp. Bushings are available to suit 3/4 in. or 7/8 in. handlebars. Once the hydraulic line connections are made between the master cylinder and the brake, it is only necessary to fill the reservoir with one of the recommended fluids and purge the system of air as described under the heading "Bleeding Instructions" and then the system is ready for operation.

ROUTINE MAINTENANCE

Adjustment

No adjustment of any kind is required. The simple design offers long life and reliable operation and eliminates any need for adjustment.

Brake Fluid

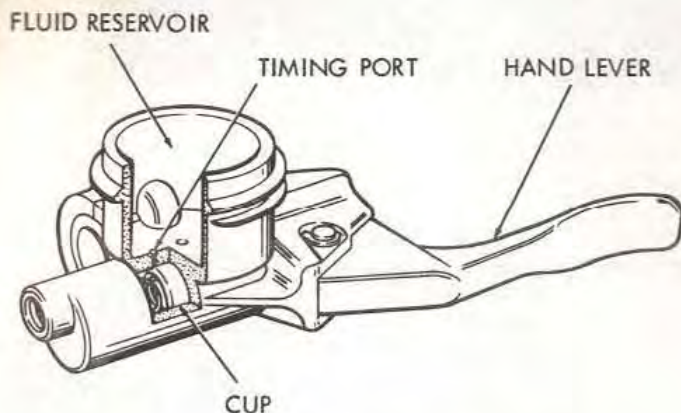
HB series master cylinders are designed for use with SAE type disc brake fluids or high-silicone brake fluids only, such as Kelstar SAE J1073, Wagner-Lockheed FC-59250, Dow 200 Silicone, Union-Carbide Y7085 Silicone, or equal. Do not, under any circumstances, use hydraulic oil, mineral oil, aircraft type or red oil fluids since they will cause cups and seals to expand or deteriorate and the system can no longer operate properly. If at any time hydraulic oil is used, inadvertently, completely drain and flush the master cylinder and brake system.

Replace all cups and seals as soon as possible and refill with fluid of the approved type.

Under normal conditions of service, with the correct type of fluid, there is no need for periodic changes of fluid. Simply keep the reservoir full at all times. Make frequent checks of fluid level (at least every 10 hours of operation) by removing the screw cap from the master cylinder and fill to within 1/32 in. of the top when additional fluid is required.

Timing Port

The unique design of the combined cylinder and reservoir includes a timing port which offers a simple, convenient method of checking brake operation. This port (shown in the cutaway view) is the smaller of the two holes connecting the fluid reservoir with the master cylinder within the one-piece body moulding. When the lever is in the released position the spring in the cylinder pushes the cup back so that this port provides a passage between the reservoir and cylinder. As the cylinder cup moves forward, on brake application, it covers the timing port to seal off the cylinder so that it can apply hydraulic pressure to the caliper. Thus it establishes the effective stroke of the cylinder. This little hole must be kept clear of obstructions or sediment at all times. Visually check for proper operation by first removing the cover.



The timing port in the fluid reservoir offers a simple, convenient method of checking brake operation.

As the hand lever is moved, to apply the brake, a small squirt of fluid from the timing port should be visible.

If this squirt of fluid is not visible, press and release the lever rapidly several times to see if it will clear the port. If the squirt of fluid still does not occur, disassemble the master cylinder by removing one of the rings (4) and pivot pin (3) so that the lever (5), piston (6), O-ring (7), cup (8) and spring (9) may be removed. Examine the cup (8) and O-ring (7) carefully for signs of swelling, due to use of improper oil, or other deterioration. Replace spring, cup and O-ring unless you are sure that all are in good condition.

Then reassemble the parts, in the relationship shown in the exploded view, and check to be sure that the cup uncovers the timing port in the released position. This can be done by inserting a pin (less than 0.020 inch in diameter) into the port. If the port is not completely open, return to place of purchase for correction.

Inspection and Repair

All parts should be inspected periodically for signs of wear or damage and replaced as required. Repair kits are listed below. Disassembly and reassembly is shown in the exploded view. On reassembly, check operation of timing port, as directed in the preceding "Timing Port" paragraph.

BLEEDING INSTRUCTIONS

These procedures apply to hydraulic brake systems with HB series master cylinders.

All brakes are fitted with bleeder valves which seal securely when turned in tight, but will allow air or fluid to pass out through the hole in the nipple end of the valve when loosened. Check all fluid line connections before bleeding and check frequently to see that fluid level in the master cylinder reservoir is well up at all times. Add brake fluid as necessary. Proceed as follows:

1. Remove cap from fluid reservoir of master cylinder.
2. Attach a flexible bleeder tube to the nipple of the bleeder valve on the brake. Use only the top valve if two are fitted. Place the other end of the tube in a jar containing a little clean fluid. The end of the tube must be below the surface of the fluid to prevent ingestion of air. Loosen the valve one turn.
3. Press the master cylinder hand lever slowly. Observe air bubbles rising in the fluid as the air is expelled through the bleeder tube.
4. Repeat step 3, above, until no more air bubbles appear as the lever is moved and only fluid escapes, indicating that no more air is left in the brake system. Check reservoir fluid level to avoid accidentally pumping air into the line at the master cylinder.
5. Tighten the bleeder valve as the lever is being pressed. Check the system carefully for leaks.
6. Finally, top up the fluid level to within 1/32 in. of the top of the reservoir and replace the cap securely.

CAUTION

Do not pour any of the purged fluid back into the reservoir since it is aerated and the air trapped within it will again enter the system.

REPAIR PARTS KITS

Kits of replacement parts are available for repairing both the 625HB and 750HB models. Parts included in kits are shown in the parts list and cover all parts that are likely to wear or deteriorate in normal service.

SERVICE DATA SHEET

DISASSEMBLY

This procedure refers to the exploded view (Figure 2). In general, only disassemble as far as is necessary to effect repairs. Proceed as follows using index numbers as a guide to disassembly.

1. Disconnect the hydraulic lines.
2. Remove screws (2) holding the two castings of the caliper unit together. Separate the two halves.
3. Withdraw the piston assembly (8), then remove the O-ring seal (9).

NOTE

Piston removal is facilitated by the use of an air line applied to the hydraulic inlet port. Exercise extreme caution with this method to avoid injury or damage.

REPAIR OR REPLACEMENT

Examine all components for damage. Replace any defective parts.

Replace the O-ring seal and examine the piston for evidence of scoring. In the case of units fitted with self-retracting pistons, considerable effort is required

to press the self-retracting piston assembly back into the caliper bore. If it slips in easily it should be replaced.

Evidence of severe scoring in the caliper bore will mean replacing the caliper housing assembly since it would be impossible to effect a proper piston seal.

REASSEMBLY

Reassembly is basically the reverse of disassembly procedures. Be sure that all components are clean and serviceable before reassembling the unit. Observe the following points:

1. Dip the piston assembly and the O-ring seal in hydraulic fluid; assemble the seal to the piston. Press the piston into the caliper bore keeping it square to avoid scoring the bore. Push it firmly all the way in.
2. Install the bleeder valve (10).
3. Reassemble the caliper unit castings and spacer to the mounting bracket.
4. Connect the hydraulic lines.
5. Fill the reservoir with fluid; check for leaks.
6. Bleed brakes to purge system of air.



H-H PRODUCTS

DIVISION

KELSEY-HAYES COMPANY

3001 N. 47th STREET MILWAUKEE, WISCONSIN 53209

SERVICE DATA SHEET

400 SERIES - HYDRAULIC
CALIPER TYPE DISK BRAKES 2H2

400 SERIES—HYDRAULIC CALIPER TYPE DISK BRAKE

The following procedures apply specifically to the 400 Series Caliper Type Disk Brake. This series includes the following models: 400H1, 400HR1, 400H2, 400HR2, 400H3, 400HR3. Parts lists for each of these models are included in this bulletin. A complete brake system consists of a disk and its hub or mounting, a caliper unit which is mounted over the outside edge of the disk, the caliper unit mount, the master cylinder and connecting tubing. Two or more caliper type disk brakes may be operated from one master cylinder.

INSTALLATION

Models 400H1 and 400H2 are both single-acting units, 400H2, however, has a floating mount. Model 400H3 is a double acting unit with two opposed pistons.

ATTACHING THE DISK

Bolt the disk securely to the hub but do not overtighten the securing bolts.

CAUTION

The disk must be perpendicular to the shaft. To prevent excessive wear and vibration, it must run true when the hub is rotated.

FLOATING MOUNT (400H2, 400HR2)

With the disk fixed to the axle, the caliper unit must be able to float or slide on its mount so that when the brake is applied the caliper can center itself on the disk to ensure equal pressure application through the friction pads on both sides. A bent or distorted disk will drag on the pads causing excessive wear and will prevent development of full brake torque. If the caliper unit is mounted correctly it will automatically compensate for wear of the pads.

INSTALLING THE CALIPER UNIT AND MASTER CYLINDER

1. Coat the threads of the 1/8 in. line fittings with Loctite or similar jointing compound and attach the fittings to the caliper unit and to the master cylinder.
2. Mount the master cylinder in accurate alignment with the actuating push rod. Check to see that the master cylinder is level.

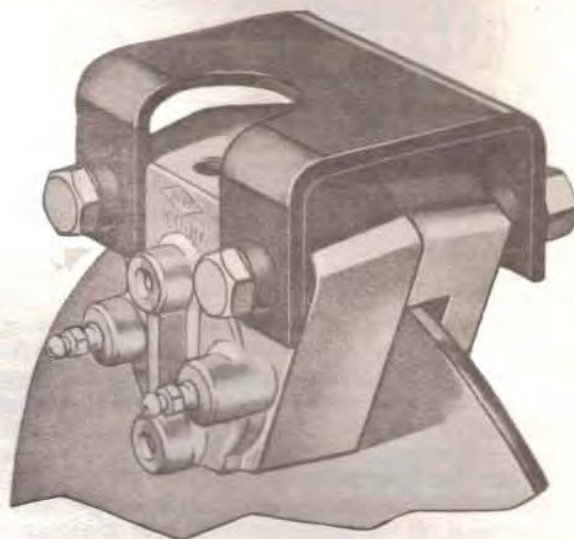


Figure 1. Model 400H2 with Floating Mount

3. Mount the caliper unit with one of the bleeder valves at the top. See that it is parallel to the disk and that it clears the edge of the disk. Use shims under the mounting bracket if necessary. The floating mount bolts must be able to slide in the holes provided in the bracket.

NOTE

Caliper unit must line up exactly with the disk. In the case of floating mount units the caliper must be approximately centered on its mount to provide float in both directions.

4. Tighten the caliper unit mounting bolts securely.
5. Install hydraulic lines from master cylinder. Check all connections and then fill the system with hydraulic fluid; check carefully for leaks.

NOTE

Before putting the brake system into service, bleed all air from the cylinders and lines in accordance with the following instructions.



H-H PRODUCTS

DIVISION

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BLEEDING INSTRUCTIONS

All brakes are fitted with bleeder valves which seal securely when turned in tight, but will allow air or fluid to pass out through the hole in the nipple end of the valve when loosened. Check all fluid line connections before bleeding and check frequently to see that fluid level in the master cylinder reservoir is well up at all times. Add brake fluid as necessary. Proceed as follows:

1. Remove cap from fluid reservoir of master cylinder.
2. Attach a flexible bleeder tube to the nipple of the bleeder valve. Use only the top valve if two are fitted. Place the other end of the tube in a jar containing a little clean fluid. The end of the tube must be below the surface of the fluid to prevent ingestion of air. Loosen the valve one turn.
3. Depress the brake pedal slowly. Observe air bubbles rising in the fluid as the air is expelled.
4. Repeat step 3 above until all air bubbles disappear and only fluid escapes, indicating that no more air is left in the brake system. Check reservoir fluid level to avoid accidentally pumping air into the line at the master cylinder.
5. Tighten the bleeder valve as the pedal is being depressed. Check the system carefully for leaks.

CAUTION

Do not pour any of the purged fluid back into the reservoir since it is aerated and the air trapped within it will again enter the system.

6. Repeat the above procedure at all other caliper units supplied from the same master cylinder.
7. Finally, top up the fluid level to within 1/8 in. of the top of the reservoir and replace the cap securely.

ROUTINE MAINTENANCE

The following checks are suggested to keep the brake system in good operating condition. Frequency will depend largely on the severity of the service encountered.

1. Keep the fluid level in the master cylinder reservoir to within 1/8 in. from the top at all times.
2. Check system for fluid leaks.
3. Check brake for excessive travel or spongy feel.
4. Check the friction pads for wear, damage and looseness.
5. Check caliper unit mount for free floating action.
6. Check security and surface condition of the disks.

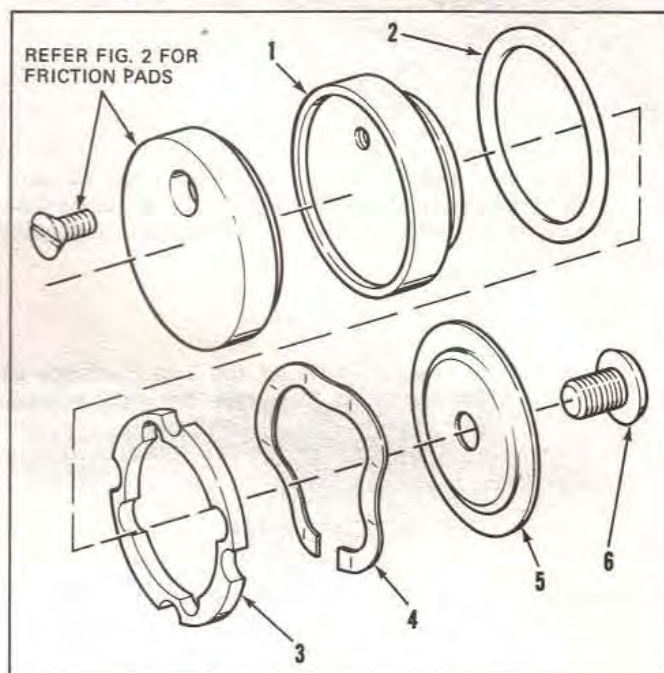


Figure 3. Self-Retracting Piston Assembly (1127-A1 as used on Models 400HR1, 400HR2 and 400HR3)

PARTS LIST

Piston Assembly (1127-A1)

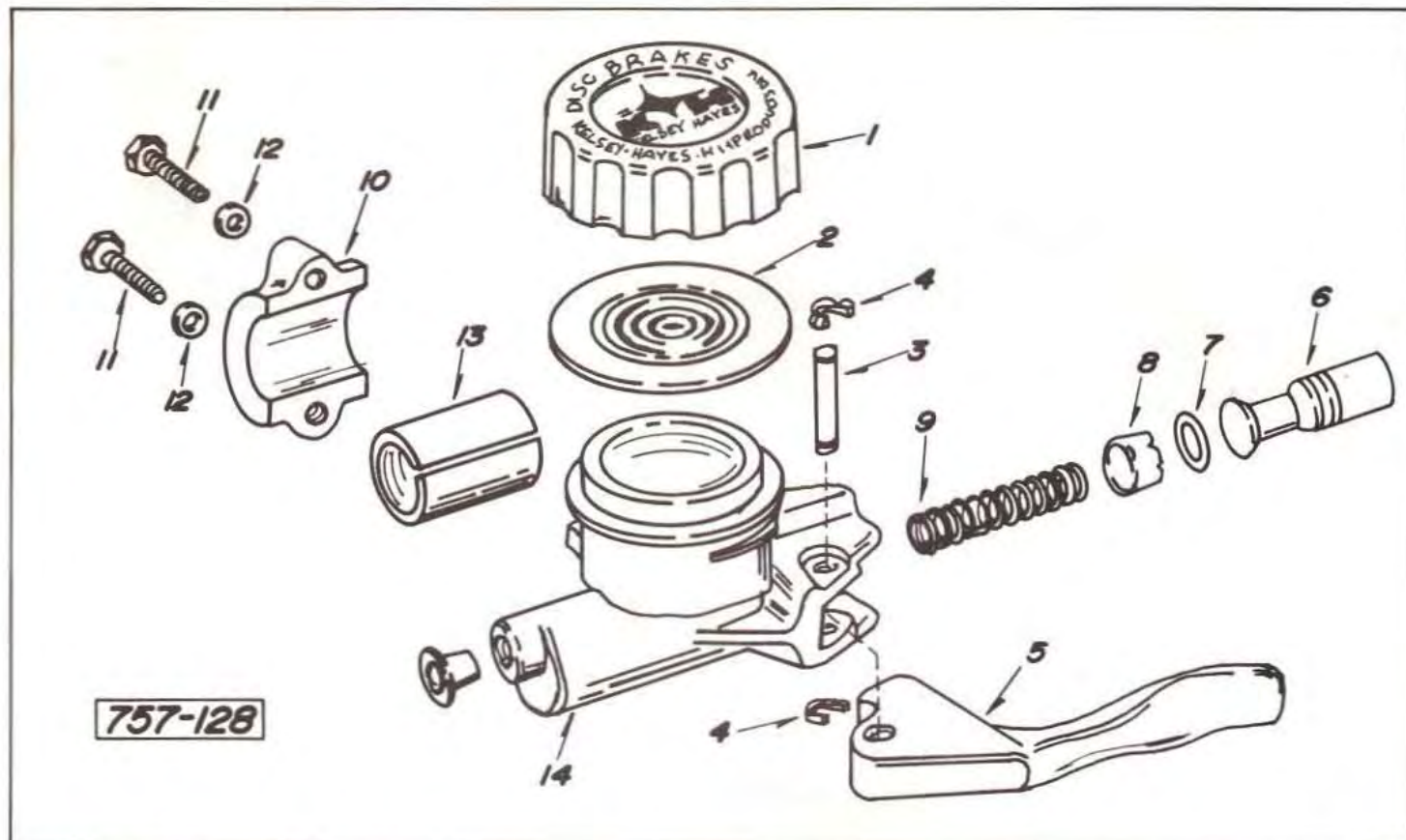
Key	Part No.	Description	Qty.
1	1127	Piston	1
2	8-1046	Seal, O-Ring	1
3	7-1137	Ring, Press fit	1
4	6-1334	Spring, Wave	1
5	1125	Plate, Back-up	1
6	1-1121	Screw, 1/4 - 20 x 3/8 in.	1

REPLACING THE FRICTION PADS

In this procedure refer to the exploded view of the brake in Figure 2. Index numbers refer to basic model 400H1, except where special references are made.

If the installation is an automotive or trailer type application, it is first necessary to remove the road wheel in order to gain access to the caliper unit. Then proceed as follows:

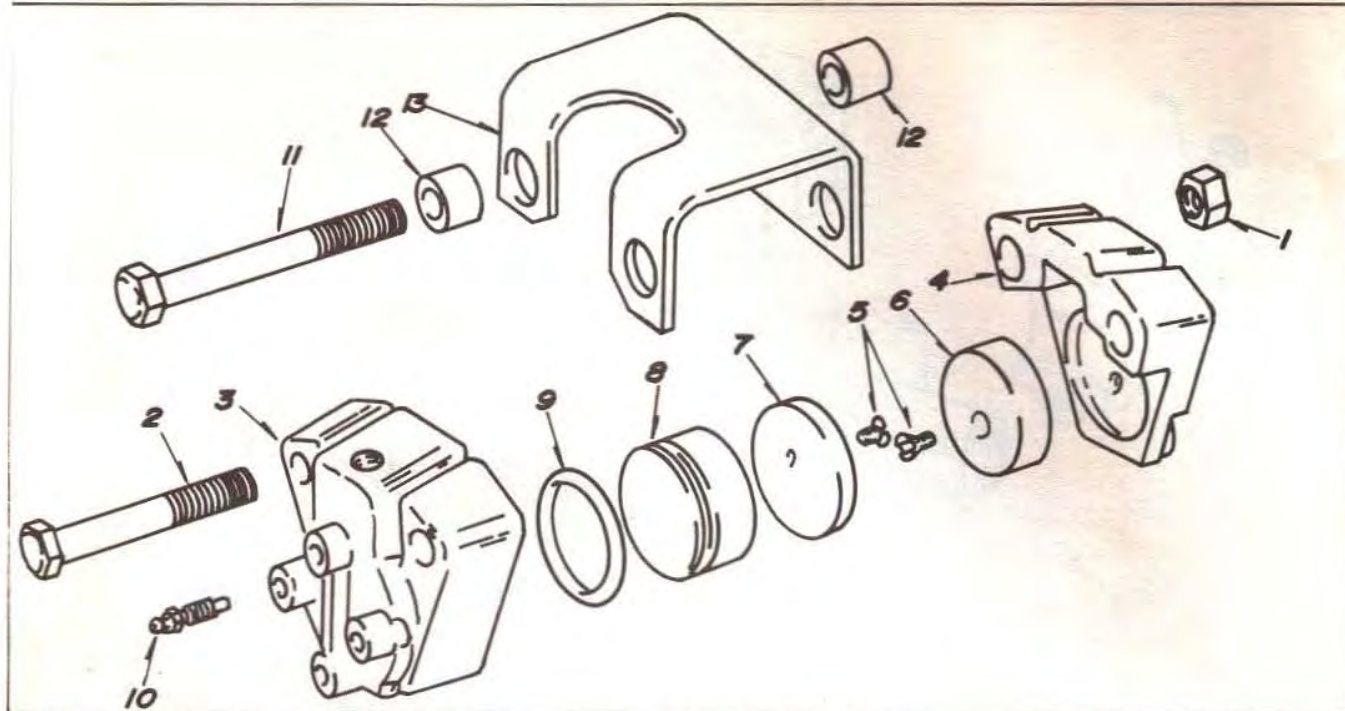
1. Remove mounting screws (2); retaining bushings (12), Models 400H2 and 400HR2 only.
2. Separate caliper castings (3) and (4) from spacer (14) or bracket depending on type of installation.
3. Remove screws (5) then withdraw friction pads (6).
4. Replace new friction pads and reassemble.



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KEY	PART N ^o	DESCRIPTION
1	00-02364	COVER
2	09-02322*	GASKET, BELLOWS
3	05-02365	PIN, PIVOT
4	07-02207*	RING, KLIP
5	18-02660	LEVER, HAND
6	13-02379*	PISTON
7	08-02120*	O-RING
8	13-02116*	CUP, CYLINDER
9	06-02391*	SPRING, RETURN
10	98-02362	CLAMP, HALF
11	01-02370	SCREW, HEX HEAD CAP 1/4-20 X 1"
12	03-02369	WASHER, FLAT 1/4" I.D.
13	11-02368*	BUSHING, RUBBER 7/8" I.D.
14	12-04438	BODY, LEFT HAND
	757-128	HYDRAULIC BRAKE COMPLETE
	745-113	HYDRAULIC BRAKE SERVICE KIT
	757-122	HYDRAULIC BRAKE LINE 96" LONG
	10-03105	FITTING, STRAIGHT
	10-03106	FITTING, 90°

* included in 745-113 service kit



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400H2 HYDRAULIC CALIPER ASSEMBLY

*NOT INCLUDED IN ASSEMBLY

PARTS LIST

KEY	PART N ^o	DESCRIPTION
1	2-1043	NUT, LOCK, 3/8-24
2	1-1349	SCREW, 3/8-24 x 3 in.
3	1044	CASTING, CALIPER, PISTON SIDE
4	1049	CASTING, CALIPER, CARRIER SIDE
5	1-1092	SCREW, 10-24 x 3/8 in.
6	1372-A-613	PAD, FRICTION
7	1375-A-613	PAD, FRICTION
8	1045	PISTON
9	8-1046	SEAL, O-RING
10	10-1131	SCREW, BLEEDER
11	1-1458	SCREW, 3/8-24 x 3-1/2 in.
12	1170-3	BUSHING
13*	1168-B	MOUNT, FLOATING

KELSEY-HAYES BRAKES

Cross Reference Chart Old Part Number Versus New Part Number

<u>OLD PART</u>	<u>NEW PART</u>	<u>DESCRIPTION</u>	<u>LIST PRICE</u>
746-113	757-128	Hyd. Brake Comp.	\$75.20
757-120	12-04438	Body, Left Hand	22.00
757-121	00-02364	Cover	3.60
715-104	05-02365	Pin, Pivot	.60
716-106	07-02207	*Ring, Clip	.15
	09-02322	*Gasket, Bellows	1.00
757-123	18-02660	Lever, Hand	.70
	13-02379	*Piston	2.50
	08-02120	*O-Ring	.50
	13-02116	*Cup, Cylinder	.50
	06-02391	*Spring, Return	1.50
757-119	98-2362	Clamp, Half	1.55
	01-02370	Screw, Hex Hd. 1/4-20 x 1:	.10
736-116	03-02369	Washer, Flat 1/4 I.D.	.15
	11-02368	*Bushing, Rubber 7/8 I.D.	.80
	10-03105	Fitting, Straight	1.10
	10-03106	Fitting, 90°	1.55
712-140	2-1043	Nut, Lock, 3/8-24	.15
	1-1349	Screw, 3/8-24 x 3"	.15
757-126	1044	Casting, Caliper, Piston side	11.80
757-127	1049	Casting, Caliper, Carrier side	3.70
710-192	1-1092	Screw, 10-24 x 3/8"	.15
757-129	1372-A-613	Pad, Friction	3.70
757-125	1375-A-613	Pad, Friction	4.05
	1045	Piston	2.00
	8-1046	Seal, O-Ring	.50
737-103	10-1131	Screw, Bleeder	.30
710-193	1-1458	Screw, 3/8-24 x 3 1/2"	.20
750-139	1170-3	Bushing	.35
757-109	1168	Mount, Floating	1.20
98-04552	757-122	Brake Line	4.80
	745-113	Service Kit (includes items marked with asterisk)	.50
	12-03-052	NLA	
	12-03063	NLA	
15-05202	15-05202	NLA	
	15-05201	NLA	
	10-03134	NLA	
	11-03172	NLA	
	14-03170	NLA	