Disc brake Installation
& Service Manual

Closed 2
Mini
M4

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Documentation revision 2.0

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1. Introduction

Thank you for purchasing a Hope Technology disc brake system. Please read the contents of this service manual to fully acquaint yourself with the correct installation and safe operation of your brake.

1.1. Instruction manual coverage

This manual covers the installation and servicing of the Closed 2, Mini and M4 hydraulic disc brakes.

1.2. Safety first

This brake system must be fitted by a competent cycle mechanic using the correct tools. Incorrect installation can result in brake failure that can cause serious personal injuries.

Your braking performance will improve in almost all riding conditions but care must be taken to ride within your own ability. The stopping power of any bicycle is always limited by the traction of the tyre on the ground so take the time to become familiar with your new brake and its braking characteristics.

Before each ride always check the brake for proper function and the brake pads for wear and that there is no system damage resulting in fluid leaks.

If you have any doubts or questions please contact your dealer or the appropriate Hope distributor for your country.

1.3. System identification

There are three current brake designs; the Closed 2 using the Pro lever, the Mini and M4 both using the Mini lever

The Closed 2 is a closed system, while the Mini and M4 are both open systems.

The following table shows examples of each caliper. The caliper profiles can vary depending on the disc rotor size and bolt mounting pattern and the table shows common examples.

Caliper and Lever identification

The Closed 2 caliper A caliper with 2 pistons. The caliper has the word HOPE machined into the side. Closed system. The caliper must be used with a closed system lever. 165mm front caliper shown.	
The Pro lever A two finger lever with a silver pad adjustment screw.	
The Mini caliper A caliper with 2 pistons. The caliper has the word HOPE machined into the side. Open system. The caliper must be used with a Mini lever. 165mm front caliper shown.	
The M4 caliper A caliper with 4 pistons. The caliper has the word HOPE machined onto the side and M4 written next to the caliper number. Open system. This caliper must be used with a Mini lever. 185mm front caliper shown.	
The Mini lever A two finger lever with automatic pad adjustment.	

Under no circumstances should you use a Closed system caliper with an Mini lever (and vice versa). A mismatched system will not work and result in brake failure.

2. Installation

The disc brake system is supplied fully assembled and bled, i.e. containing brake fluid.

The Cycle Dealer is responsible for supplying the caliper with the correct bolt mounting pattern to fit your particular fork or frame. Some installations may require an additional mount bracket as advised by your dealer.

In the first instance it is recommended that you install the brake as supplied without disconnecting and routing the hose through frame guides (if present) or attempting to shorten the hose. Once you have experienced the fully working brake you may decide at a later date to make some hose routing or shortening modifications as described later in this manual.

2.1. The bicycle wheel

The wheel should be built by a skilled wheelbuilder using a 3 cross lacing pattern and correctly tensioned. Your dealer will advise whether the hub in your wheel is compatible with this Hope disc brake. There are two types of compatible hubs; splined Hope hubs that require a 5 bolt disc spider (purchased separately) and International Standard 6 bolt hubs (made by Hope and other hub manufacturers) where the disc rotor bolts directly to the hub.

2.2. Attaching the disc rotor to the hub

For Hope splined hubs fit the spider to the hub splines and ensure it is squarely seated before securing it with the spider lockring. Hubs using a spider require a disc rotor with a 5 bolt pattern. Attach the disc rotor to the hub with the orientation of the rotor arms as shown in Fig 1(6 bolt disc rotor shown).

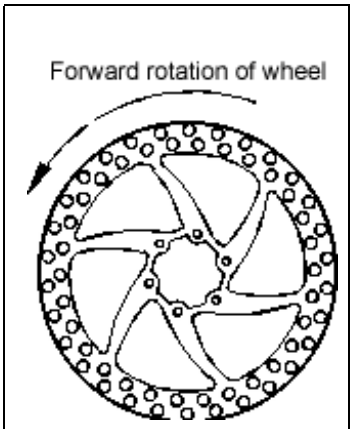


Figure 1

It is recommended that a mild engineering adhesive often referred to as ‘threadlock’ is used on the bolt threads to prevent them unscrewing. Do not use a permanent adhesive or this will prevent removing the disc rotor at a later date.

Replace the wheel with the attached disc rotor in the forks (or frame) making sure the wheel axle is sitting square in the dropouts and that the wheel skewer is correctly tightened.

2.3. Attaching the lever

Attach the lever assembly to the handlebars and route the caliper down to the fork disc mount or along the frame to the rear disc mount. Take care to avoid situations that can damage the brake hose when the bicycle is used such as trapping the hose within suspension fork or rear suspension linkage movements, and also to avoid chaffing on the tire.

The lever will work in any position providing the master cylinder is not totally upside down. The master cylinder need only be horizontal when bleeding the system.

2.4. Attaching the caliper

Before attaching the caliper ensure that the brake pads are fully retracted in the caliper. New brakes will be supplied fully retracted, if you need to perform this operation yourself then on the Closed 2 brakes turn the brake lever master cylinder screw adjuster anti clockwise (see Figure 4). For the Mini and M4 brakes remove the pads to avoid damaging them and gently prise the pistons back with a plastic tire lever (or similar).

The aim is to position the caliper central over the disc rotor using some of the supplied shim washers between the caliper and disc mount to achieve the central positioning. This is trial and error until the correct position is achieved.

When the caliper (and lever) are attached, secure the hose to the frame using ties or hose guides and check for unrestricted handlebar movement and that the hose is not trapped or pinched.

2.5. Personal settings

Finger reach

This refers to the position of the lever blade relative to the bars. There are two procedures for setting the reach depending on whether you have the Pro or Mini lever.

For the Pro lever slacken the grub screw A (see Figure 2) then adjust the position of the lever using the adjuster screw B. When the correct position is achieved gently tighten the grub screw A.



Figure 2

For the Mini lever slacken the grub screw A (see Figure 3) then adjust the position of the lever using the adjuster screw B. When the correct position is achieved gently tighten the grub screw A.



Figure 3

Lever travel (pad position)

This is the amount of lever travel between the brakes off and on position.



Figure 4

For the Closed 2 brakes this can be set using the screw adjuster on top of the lever master cylinder (see Figure 4). Screwing clockwise will move the pads closer to the disc rotor thus reducing lever travel, screwing anti-clockwise moves the pads away from the disc thus increasing lever travel.

For the Mini and M4 brakes there is no manual adjustment and lever travel is determined by the piston seals in the caliper body which retract the pads. When the brake pads have been manually retracted (by pushing the pistons back into their bores) these calipers will require several pulls of the lever to reset themselves, during this period the lever may travel all the way to the bars.

2.6. Break in period

Before riding check the correct action of the brake and that braking effort is applied as the lever is pulled. To achieve the maximum braking effort the new brake pads need bedding in. Bed in the pads by riding a short distance with the brake applied, it also helps to pour clean water over the caliper and pads whilst bedding in. This procedure will achieve good braking performance but will reach its full potential after a few rides.

2.7. On the trail

The Closed 2 brakes

These brakes feature the thumbwheel adjuster (see Figure 4) on the brake lever master cylinder which is used to adjust the position of the brake pads relative to the disc rotor. Turning clockwise will move the pads closer to the disc rotor, screwing anti-clockwise moves the pads away from the disc. There are two situations where adjustment is necessary :

1. Compensating for pad wear. As the pads wear you need to reposition the pads closer to the disc rotor.
2. Compensating for over heating. Extreme heating of the brake due to long descents with heavy braking may cause the brake fluid to expand and push the brake pistons (and pads) closer to the disc in which case you may need to back off the pads using the thumbwheel adjuster, then readjusting as the brake cools down.

The Mini and M4 brakes

These brakes do not provide any means of manual pad adjustment. They do however feature an expansion chamber within the brake lever master cylinder which automatically compensates for pad wear and similarly compensates for fluid expansion as the brake heats up and cools down.

With the caliper correctly centred relative to the disc there should be no disc rub on the Mini and M4 brakes. Even if there is a slight amount of disc rub it will not slow the bike down in any way and will not be audible against the ground noise from the tires.

If you remove your wheels from your bicycle take care not to pull the brake levers otherwise the pistons can pump out. If this happens then simply push the pistons back. If the pistons are so far out that the pads are touching then you will need to remove the pads in order to get at the pistons. If you transport your bicycle with the wheels removed then it is advisable to insert a piece of packing between the pads to keep them in place.

3. Service

3.1. Regular maintenance

Cleaning your brake

The braking performance will be severely reduced if the disc rotor and pads become contaminated with oil, brake fluid or after-market degreasing and cleaning agents. Clean your brake with water.

If the disc rotor becomes contaminated it can be cleaned by wiping with a rag with isopropyl alcohol or disc brake cleaning products designed specifically for bicycle disc brakes. Heavily contaminated brake pads will need replacing.

Checking for system leaks

Check the hose for any damage such as chaffing against the bike, or whenever the bike has been rough handled or dropped. A split hose (however tiny) will cause a system leak which will severely impair braking performance. A damaged hose will need replacing.

Check the caliper and lever assemblies for any signs of fluid loss. See the Troubleshooting section for fixing any problems.

Checking the brake pads

The brake pads will need replacing when the friction material is worn down to 0.5mm. Do not wait until the friction material has worn through to the backing plate because the brake will not function and you will damage the disc rotor.

3.2. Changing the brake pads

Closed 2

1. Remove the wheel.
2. Remove the split pins using pliers and slide out the old pads from the caliper.
3. Retract the pistons turning the brake lever master cylinder screw adjuster anti clockwise.
4. Clean the inside of the caliper with a clean rag and insert the new brake pads, and new split pins. The new pads must be genuine Hope compatible pads for the appropriate caliper.
5. Refit the wheel and adjust the pad position, (see section 2.5).
6. Bed in the new pads (see section 2.6).

Mini and M4

1. Remove the wheel.
2. Remove the ‘R’ clips using pliers, unscrew the retaining pins and slide out the old pads from the caliper.
7. Gently prise the pistons back into the caliper using a plastic tire lever (or similar).
8. Clean the inside of the caliper with a clean rag and insert the new brake pads, and new springs. The new pads must be genuine Hope compatible pads for the appropriate caliper.
9. Refit the wheel and adjust the pad position, (see section 2.5).
10. Bed in the new pads (see section 2.6).

3.3. Bleeding the brake

Bleeding the brake is the procedure whereby new brake fluid is introduced into the system either as a replacement or to flush out any trapped air.

There are several reasons why a bleed operation may be necessary, for example shortening a brake hose, changing the brake fluid, or to remedy a situation described later in the troubleshooting guide (section 4).

There are two distinct procedures for bleeding your disc brake depending on which brake system you have purchased, please make sure you select the correct procedure. But first a few important notes on brake fluid.

Brake fluid

This Hope disc brake contains **DOT 5.1** hydraulic brake fluid which is available from cycle retailers and motor accessory stores. If you cannot obtain DOT 5.1 then DOT 4 is acceptable but you must flush out all the old DOT 5.1 first.

Use of other types of brake fluid, in particular mineral oil, will seriously damage your brake and cause brake failure.

Please read the care instructions that come with the DOT brake fluid, in particular we draw your attention to the following:

- Use only new brake fluid from a closed bottle and replace the bottle's cap afterwards to prevent contamination of the fluid (DOT 5.1 fluid absorbs moisture).
- Brake fluid will strip paint so wipe off any spillage immediately and clean the area with isopropyl alcohol.
- Brake pads contaminated with brake fluid will need replacing because the braking performance of the pad will be greatly diminished.
- Discard old brake fluid in a responsible manner and do not pollute drains or the environment.

Bleeding the Closed 2 disc brake

Item number references refer to the diagram of the Pro lever (download separately).

Wear safety glasses.

1. Remove the wheel and brake pads to prevent contamination.
2. If necessary reposition the brake lever so that the lever and master cylinder is horizontal to the ground.
3. Remove the master cylinder cap (item 23) using a 26mm spanner.
4. Place the closed end of an 8mm spanner over the bleed nipple on the brake caliper. Fit a length of clear plastic hose (approximately 30cm) onto the bleed nipple and place the free end into an empty container. The hose should be a snug fit and not fall off, the free end does not need to be submerged under brake fluid.
5. Fill the master cylinder reservoir with brake fluid.

6. Open the bleed nipple a 1/4 turn. Slowly pull the brake lever to the handle bars and hold. Close the bleed nipple. Release the lever. **Caution**, squeezing the lever too fast will cause brake fluid to squirt out of the master cylinder.
7. Repeat step 6 until no air is seen coming out of the bleed nipple. You will need to keep refilling the reservoir during this operation. **Caution**, if bleeding a rear brake be careful not to spill brake fluid onto the front caliper and disc.
8. Unscrew the reservoir piston from the master cylinder cap. Note that this is a left hand thread, see Figure 5 .
9. Place a rag around the master cylinder to catch any spillage and fill the master cylinder to just below the top surface.
10. Place the reservoir piston into the master cylinder and allow the fluid to overflow. Gently push it down until it rests on the 'O' ring seal and clean away the excess fluid.



Figure 5

11. Screw the silver adjuster into the piston (note, this is a left hand thread and is part of the master cylinder cap) until the cap makes contact with the top of the master cylinder. Press gently down on the cap and thread it clockwise until it is tight then tighten with a 26mm spanner. Screw the thumbwheel of the adjuster (item 25) anti-clockwise to the limit of its travel.
12. Open the bleed nipple a 1/4 turn to allow the pistons to retract into the caliper. The pistons are spring loaded and should return on their own but may require manually pressing back. Close the bleed nipple and remove the plastic hose. **Caution**, do not over tighten the bleed nipple. Wipe away any spilt fluid from the caliper and lever.
13. Replace the pads and insert the wheel.
14. Adjust the silver thumbwheel to obtain the desired lever travel.
15. Check the brake for correct function and that there are no any system leaks.

Bleeding the Mini and M4 disc brake

Item number references refer to the diagram of the Mini lever (download separately).

Wear safety glasses.

1. Remove the wheel and brake pads to prevent contamination.
2. Push the caliper pistons back into their bores and insert a spacer between the pistons to prevent them coming out during the bleed operation.
3. If necessary reposition the brake lever so that the lever and master cylinder is horizontal to the ground.
4. Remove the master cylinder cap (item 4) using a 2mm allen key. Then remove the rubber diaphragm.
5. Place the closed end of an 8mm spanner over the bleed nipple on the brake caliper. Fit a length of clear plastic hose (approximately 30cm) onto the bleed nipple and place the free end into an empty container. The hose should be a snug fit and not fall off, the free end does not need to be submerged under brake fluid.
6. Fill the master cylinder reservoir with brake fluid.
7. Open the bleed nipple a 1/4 turn. Slowly pull the brake lever to the handle bars and hold. Close the bleed nipple. Release the lever. **Caution**, squeezing the lever too fast will cause brake fluid to squirt out of the master cylinder.
8. Repeat step 8 until no air is seen coming out of the bleed nipple. You will need to keep refilling the reservoir during this operation. **Caution**, if bleeding a rear brake be careful not to spill brake fluid onto the front brake caliper and disc.
9. Ensure the pistons are fully retracted in the caliper, the pistons may require manually pressing back.
10. Place a rag around the master cylinder to catch any spillage and fill the master cylinder to just below the top surface.
11. Place the diaphragm into the master cylinder and allow the fluid to overflow. Close the bleed nipple and remove the bleed hose. **Caution**, do not over tighten the bleed nipple. Wipe away any spilt fluid from the caliper and lever.
12. Fit the master cylinder cap and gently tighten with a 2mm allen key. **Caution**, do not over tighten cap as you are only sealing the rubber diaphragm.
13. Replace the pads and insert the wheel. Pull the lever several times to allow the pads to reset themselves to the disc.
14. Check the brake for correct function and that there are no any system leaks.

When to change the brake fluid

For high performance usage, typically downhill racing and applications that use lots of braking effort it is recommended you change the brake fluid once per year. For normal use change the fluid every four years.

To change the brake fluid follow the preceding instructions for bleeding the brake and ensure that the master cylinder is filled (and pumped through) at least four times.

3.4. Shortening or re-routing the hose

Your disc brake is supplied fully assembled and bled by the Hope factory and the hose length will suit the majority of forks and frames. If desired, the following procedure can be used to shorten the hose. The same procedure can be used to detach the hose and route it through existing frame guides.

The item numbers refer to the diagram of the Closed 2 caliper (download separately) but the procedure is identical for all calipers.

1. Remove the wheel and brake pads to prevent contamination.
2. At the caliper end, unscrew the aluminium shroud (item 16) and slide it away from the connector (item 22).
3. Prise open the brass olive (item 15) using a screwdriver and slide the olive away from the connector.
4. Push the end of a small fine bladed screwdriver under the hose end and prise the hose away from the connector. Once it has eased away from the connector it should be possible to detach the hose by gently pulling it. This operation must be done carefully or the inner section of the hose will separate from the outer. **Caution**, hold the separated hose carefully, the hose contains brake fluid and it will leak out if you allow the hose to swing freely.
5. Cut the hose to the desired length using hose cutters or a sharp knife to produce a clean square cut. Do not remove too much, the resulting hose length should still permit the full and unrestricted movement of the handlebars.

   At this stage the hose can be routed through existing fork or frame guides taking care not to kink the hose. Take care to avoid a routing situation that can damage the hose when the bicycle is used such as trapping the hose within suspension fork or rear suspension linkage movements and avoid chaffing on the tire.
6. Push the hose onto the connector.
7. Slide the brass olive and aluminium shroud into position and tighten.
8. Re bleed the system as described in section 3.3.

3.5. Hose change

If the hose becomes damaged such that a system leak (however small) occurs then replace the hose. Try to identify how the original damage occurred to prevent the same thing happening again. A new length of genuine Hope Technology hydraulic hose will need purchasing. Follow the procedure for shortening/re routing the hose in section 3.4. Note, in section 3.4, the hose is disconnected from the lever in the same manner as described for disconnecting from the caliper.

3.6. Caliper half change – piston removal

This operation is required if you change your forks (or frame) to one that incorporates a different disc mount design. In most cases you can utilise your existing Hope disc brake by changing the caliper half to a new one that has the appropriate bolt mounting pattern. Consult your dealer who will advise what caliper half is required.

This procedure can also be used should you need to remove a caliper piston.

1. Remove the wheel and brake pads to prevent contamination.
2. To obtain better leverage leave the caliper on the fork (or frame) and use an Allen key to just release the tightness of the two caliper half retaining screws. Remove the caliper from the fork (or frame), there is no need to disconnect the brake hose.

3. Place the caliper over a clean rag to catch the brake fluid and completely remove the two caliper half retaining screws. The caliper will separate into two halves.

   The piston from the old caliper half needs transferring to the new caliper half. The Closed 2 and XC4 calipers require an additional step prior to removing the piston.

4. **Closed 2 caliper**

   The piston requires unscrewing using a pin spanner. In most situations the piston will easily unscrew, if it is tight then do not force it with the pin spanner or you may damage the piston, in this case use the appropriate Hope tool available from your Hope dealer. Unscrew the piston to the end of its travel, at this point it will rotate freely without unscrewing any further. Now follow step 5 to completely remove the piston from the caliper.

5. To remove the piston (all calipers) a bicycle ‘track pump’ is required. Open the bleed nipple 1/2 turn place the air line over the bleed nipple. Place your thumb over the recessed transfer hole and ask a second person to apply pressure with the pump. The piston will eventually eject with some force so point the caliper towards a clean rag to catch the piston and prevent damaging it. **Caution**, do not look directly at the piston whilst carrying out this operation otherwise it can fly out and strike you in the face.

   For the M4 calipers (2 pistons per caliper half) you should try to eject the pistons simultaneously. If one piston is moving faster than the other then apply finger pressure to one piston to allow the other to catch up.

6. Clean the piston. The new caliper half will include a new piston seal. Wipe the inside of the bore with clean brake fluid and gently push the piston into it. For the Mini and M4 caliper the piston will push all the way to the bottom.

   For the Closed 2 caliper push the piston until it locates on the screw thread and screw the piston into the bore. **Caution**, do not over tighten or you will strip the thread and severely damage the caliper half and piston.

7. Using the new ‘O’ ring transfer port seal provided with the new caliper half place the two halves together and gently tighten. Replace the caliper on the fork/frame and fully tighten the caliper half bolts to the correct torque.

8. Re bleed the system (section 3.3).

3.7. Torque settings

Hose connector	8 Nm
Pistons (Closed 2)	2 Nm
M6 bolts	8 Nm
M5 bolts	4 Nm

4. Troubleshooting

Do not operate the bicycle with defective brakes. Outlined below are some of the common problems and solutions. If the problem persists then contact your dealer or the Hope distributor for your country.

No braking power

Symptoms	Solution
The lever operates as normal but the brake does not deliver a good braking force.	The brake pads are new and not fully bedded in. Follow the instructions in section 2.6. The disc rotor and pads may be contaminated. Clean the disc rotor and pads (see *Cleaning your brake* in section 3.1). If the problem persists then the pads will need replacing.

Lever goes all the way to the bars

Symptoms	Solution
No braking effort and the lever goes all the way to the bars.	For the Closed 2 brakes ensure the pads are correctly adjusted relative to the disc surface. If the Mini and M4 brakes are new or have had some maintenance done then the brake will require some use to reset the pad position. If non of the above work then there may be insufficient fluid in the system from a bad bleed (in which case re bleed) or the system has a leak as described next.

Spongy lever

Symptoms	Solution
Reduced braking power and spongy feel when pulling the lever.	Air in the system. Re bleed the system (see section 3.3). If the problem persists then there may be a system leak described below.

System leak

Symptoms	Solution
Hydraulic oil can be seen on the outside of the system, usually associated with a loss of braking performance. A typical cause is after a crash which has wrenched the hose and damaged other items on the brake. Or the brake is very old and the seals have worn out.	Spare parts are available for your brake. Please consult your dealer who will advise and obtain the required spares.

Lever is stiff and does not return

Symptoms	Solution
The lever does not snap back to its return position when released.	On the both levers the pivot bush (item 12) will need lubricating. If this does not cure the problem then disassemble the lever pivot and clean the bush, ensuring it moves freely within the lever blade. Also make sure the lever pivot screw (item 18) is not over tightened. If the wrong fluid has been used then the piston seals in the lever will be ruined causing them to stick and so preventing the smooth operation of the lever. In this case you need to consult your dealer to obtain new seals.

5. Warranty

Hope Technology disc brakes are warranted for a period of one full year from original purchase against defects in materials and workmanship. The warranty only applies to the original owner and proof of purchase is required.

Hope cannot process any warranty claim until the product has been returned to the factory.

Any Hope product that is returned to the factory and is found by Hope to be defective in materials or workmanship will be repaired or replaced at the option of Hope.

This warranty does not cover damage caused through misuse, incorrect assembly or failure to follow this manual or service instructions.

Hope shall not be held liable for any indirect, special or consequential damages.

This warranty does not affect your statutory rights.