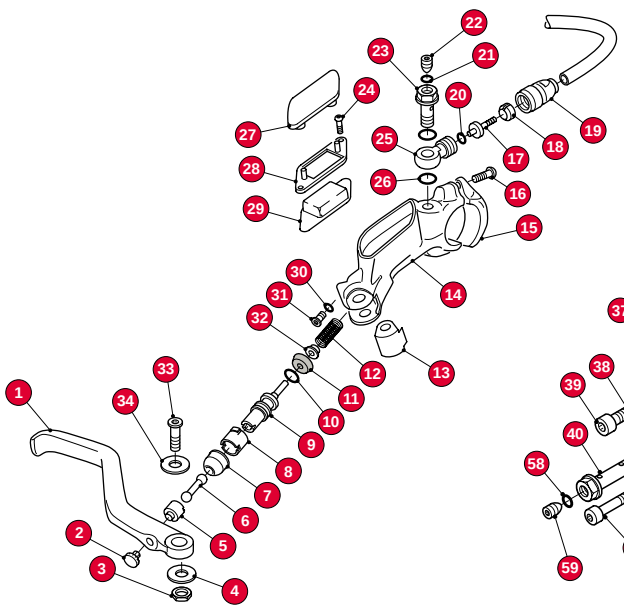
Technical Information Sheet

B4

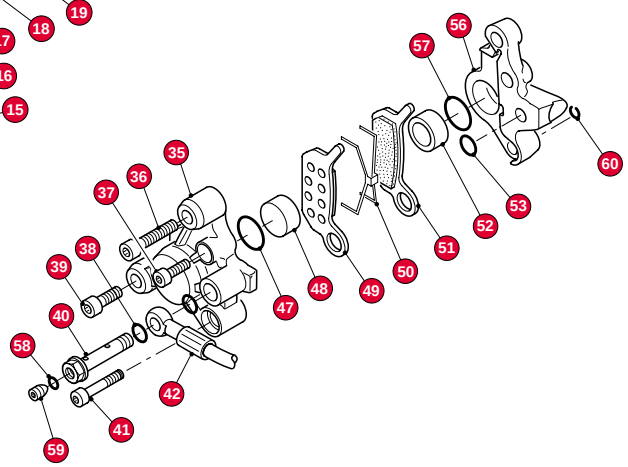
The **B4** family of brakes is composed of Sport, Pro, Team and SL models.
The colours, materials and diameters of the pistons/pincers change but the method of work operations remains the same.
It is possible to utilise larger discs by adopting special adapters (placed between pincer and fork/frame). Different ways of working on the brakes are indicated in this manual.

LIST OF TOOLS:
- TORX T25 spanner (disc screws /pump collar);
- TORX T15 spanner (pump lever adjustment);
- TORX T10 spanner (pump chamber screw);
- 5mm hexagonal spanner (pincer attachment screw);
- Cutter (hydraulic tube cutter);
- 8mm open spanner (replaceable tube tightening nut/pincer tube screw/pump tube screw/ pump breather/bleeding syringe unions);
- Small-bladed screwdriver (for removal of pump chamber cover);
- 4mm hexagonal spanner (pad stud screws/pincer coupling screws);
- 3mm hexagonal spanner (pincer bleeding grub screw/pump bleeding grub screw);
- 2.5mm hexagonal spanner (pump lever screw);
- 2mm hexagonal spanner (pump chamber support screws);
- Pump piston substitution utensil FD40026-20 (pump piston);

PUMP



BRAKE PINCER



INTRODUCTION
Our disc brakes with hydraulic controls have been designed to obtain the maximum in braking performance level, reliability, safety and lightness of components. To maintain these characteristics it is necessary that the correct sized brakes are installed on the bicycle bearing in mind the greater pressure that these brakes transmit. Badly installed or badly maintained brakes can diminish the braking efficiency and can cause dangerous situations for the safety of the cyclist. This manual has been produced to instruct the personnel who are specialised in the assembly, reassembly and maintenance procedures of these brakes and also as information for the user about the general notes and the safety norms to follow in case of interventions by the user.

GENERAL NOTES:
- It must be noted that any maintenance or repair intervention carried out during the guarantee period that do not respect the suggested advice of this instruction manual will cancel the guarantee forthwith. The use of non-original spare parts will also cancel the guarantee.
- Utilise only the special tools; do not substitute with any other equipment that could because it could irreparably ruin the component. All tools must be in good condition.
- Utilise cleaning and lubricating products that are preferable biodegradable and do not dispose of the used fluid in the environment.
- At every substitution, the brake fluid must always come from new containers
- Always operate in a clean place and equipped with adequate work clothing as prescribed by the safety norms.
- Always keep a first aid kit available.

⚠ ***ATTENTION: The fluid used in the braking system, other than damaging painted parts is also dangerous if it comes into contact with the eyes or the skin. In case of accidental contact, wash the affected parts abundantly with running water.***

GENERAL NORMS
This technical information sheet is intended as a guide for the correct and safe use and assembly of the braking system and for its reasonable maintenance.
Constantly observing the norms indicated in this manual guarantee the best performance, use and long life of the braking system and avoids the more common causes of accidents that could occur during use or maintenance.
The following symbols are utilised in every paragraph in this manual:

⚠ ***WARNING: The inobservance of the advice quoted could cause damage to the equipment.***

⚠ ***ATTENTION: The inobservance of the advice quoted could cause damage to either equipment or the user.***

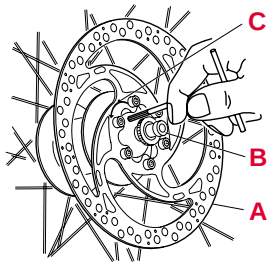
⚠ ***ATTENTION: Carefully read the safety norms so as to guarantee the correct use of the braking system.***

GENERAL SAFETY NORMS
- ***To carry out correctly all the procedures of removal, reassembly and overhaul it is necessary to have an adequate technical specialisation, a perfect knowledge of the braking system and to have completely read this technical information sheet.***
- ***Do not place the hands near or into moving parts. Utilise five-finger robust gloves that do not reduce the sensitivity and the strength of gripsa.***
- ***Instruct the user to not alter the parameters of the braking system to obtain a performance different to the performance foreseen by the design and testing department of Formula.***
- ***Before starting assembly operations examine the work area for possible dangerous conditions. Do not work in the dark – use as much lighting as possible and check that they are efficient.***
- ***Concentrate on making sure that all precautions have been taken before starting any work so that the use of the components will not cause damage.***

SAFETY NORMS OF THE BRAKING SYSTEM
- ***The disc brake must be assembled on wheels that are adapted for this type of use. A wheel with insufficient section radius or with radial engagement of the spokes can collapse under the braking action exercised by the braking system and can cause serious damage or accidents.***
- ***Frequently check the tension and the condition of the spokes. A damaged spoke could break and interfere with the braking system thereby causing serious damage or accidents.***
- ***The frame and the fork of the bicycle must be predisposed to the assembly of the braking system. It is only in this way that the correct dimensions of the supports and the correct positioning of the components can be guaranteed.***
- ***THE BRAKING SYSTEM NEEDS A CERTAIN PERIOD OF SETTLING DOWN TO OBTAIN MAXIMUM EFFICIENCY.***

FORMULA
Power, Technology, Design.

1



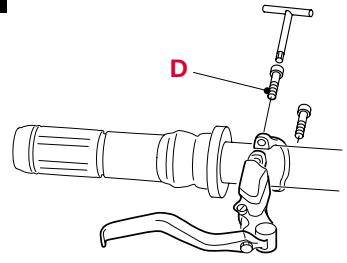
INSTALLATION

1: Brake disc assembly

⚠ ***ATTENTION: Consult the safety norms.***

Place the disc brake **A** onto the hub **B** of an already assembled wheel taking care to respect the direction of rotation expressed by the arrow **C** on the flange of the disc. Fix the disc with the appropriate M5 screws and tighten in a cross-wise direction to **5.75N·m (50.61 lbs. per sq. inch) ± 5%**. Thoroughly clean the disc with ethyl alcohol to remove any traces grease or oil.
N.B. The disc can have four or six fixing holes.

2a



2a: Installation of the kit

Proceed as follows:

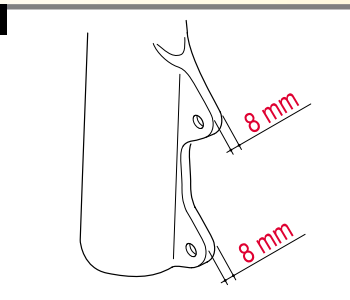
– Insert the pump body onto the handlebar as indicated. Rotate it to the preferred position and fix it with the two screws **D** to the torque pressure of **2.5N·m (22 lbs. per sq. inch) ± 5%**. The two screws must be tightened together and with an equal distance.

If the tube needs to be adjusted see chapter 4a and 4b otherwise proceed with the positioning of the same onto the bicycle by carefully following the following instructions:

– The route of the tube must adhere to the fork or to the frame and must be fixed without excessivel tightening to avoid obstruction of the internal passage of brake fluid;
– The tube must not form a curve of less than 40mm and must not come into contact with moving parts of the bicycle;
– FORMULA supplies a zip tube fastener to facilitate the fixing of the tube.

⚠ ***ATTENTION: A badly-positioned brake tube or a brake tube that comes into contact with moving parts of the bicycle can impede the braking action and thereby cause serious accidents.***

2b



⚠ ***ATTENTION: If the thickness of the relative attachment on the fork or frame is less or more than 8mm it will be necessary to substitute the fixing screws with screws of the correct length.***

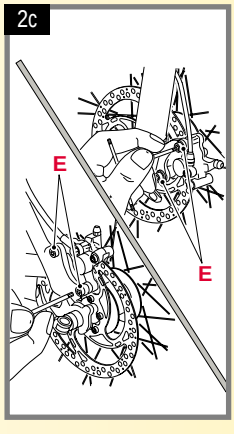
2d: Mount the wheel and fix it with the original fixing nuts, rotate it slowly and check that the disc is centralised between the pads and that no parts come into contact. Effectuate two or three braking actions to bring the pads to the correct distance from the disc.

2e: If the action of the lever is too long, remove the wheel and effectuate two or three braking actions without the disc in position. Remount the wheel and check to see if the lever action is correct. If not, repeat the operation.

If the pads are too close to each other, space them using a cut screwdriver.

⚠ ***ATTENTION: The braking system needs a certain period of settling down to obtain maximum efficiency. Before making the final approval of the set-up it is necessary to effectuate at least one hundred braking actions and then proceed with a further adjustment to the set-up and a check on the tightness of the screws.***

2c



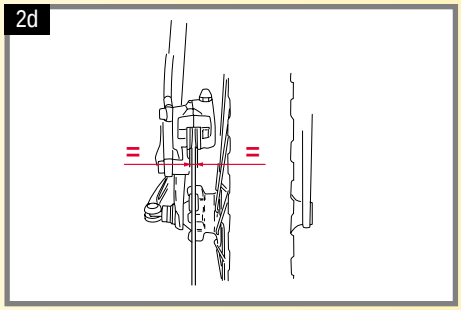
2c: FORMULA supplies appropriate supports to mount between the frame/fork and the brake pincer to adapt the frame/forks to different available brake discs.

⚠ ***WARNING: Only a correct assembly of the braking system and its relative supports guarantees the safety of the cyclist and the exceptional performance of the FORMULA Brakes.***

2c: Assemble the pincer to the fork or frame exclusively utilising the screws E supplied with the kit.

– Apply a weak thread-locking liquid and tighten the screws to the torque pressure **9N·m (79.22 lbs. per sq- inch) ± 5%**.

2d



INSTRUCTIONS FOR USE

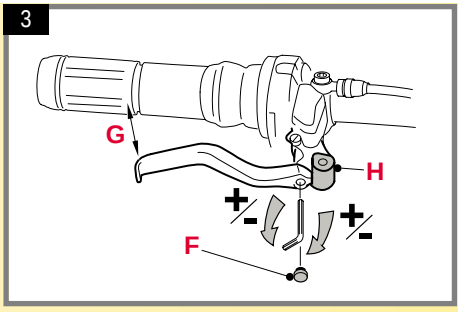
3: Adjusting the lever position

To adjust the lever position, remove the knob **F**. Use a TORX ® - T15 wrench to act on the inner screw of the lever, adjust the distance **G** as desired by the user. Afterwards, refit the knob into its seat.

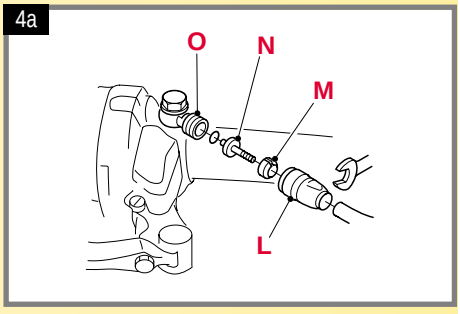
⚠ ***ATTENTION: The levers are only adjusted at the time of the assembling on the handlebar, according to the user's requirements.***

⚠ ***ATTENTION: Replace the lever guard H if it gets damaged for any reason. Failure to do so may cause serious risks to the user.***

3



4a



4a: Tube length adjustment

Remove the female union **L** using an 8mm open spanner. After having determined the part of the tube to eliminate, carry out the cutting operation utilising a cutter.
Making sure to not spill any brake fluid, reinsert the female union **L** onto the remaining tube and successively a new double-bevelled cone **M** and a new pin **N.**
Smear a little grease on the double-bevelled cone **M** and on the threading and re-screw all onto the male union **O** that is situated on the pump.

4b

4b: Sealed tube length adjustment

Cut the union at the extreme end of the tube utilising a cutter.After having determined the part of the tube to eliminate, carry out the cut and reassemble new components (union, double-bevelled cone, pin) that are supplied with the kit.

⚠ ***ATTENTION: Be careful when using the cutter because the blade is extremely sharp and could cause serious injury if not used properly.***
Do not use blades or saws that could squash or lacerate the tube and therefore could create leakages of brake fluid and therefore an inefficient braking system.
A tube that is too short, apart from limiting the ride-ability of the bicycle when making sharp turns could cause tension on the tube that could bring about its separation from the pump or the pincer. IT IS IMPORTANT TO AVOID having pincer/pump tubes that are too short or too long.

⚠ ***ATTENTION: If the double-bevelled cone M is not tightened as prescribed, it could slacken whilst riding and cause the separation of the tube from the pump thereby causing serious damage to the user.***

5

RECOMMENDED LUBRICANTS AND CLEANING PRODUCTS

5: Brake fluid

Utilise exclusively DOT 4 or Shell Donax UB® brake fluids that are in new sealed containers.
Avoid leaving the container open for a long time because this product absorbs humidity that is present in the air and therefore modifying its physical characteristics.
Substitute the brake fluid every two years.

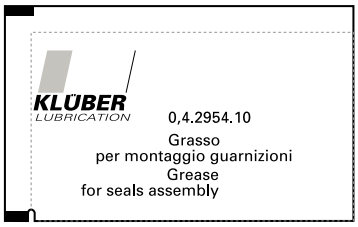
⚠ ***ATTENTION: The fluid used in this braking system, apart from damaging painted parts is also dangerous if it comes into contact with the eyes or skin. Abundantly wash the injured parts with running water in the case of accidental contact with the fluid and contact a doctor if the fluid has come into contact with the eyes. Do not dispose of used fluid in the environment.***

6: Lubricants

Utilise grease (silicone paste) for the O-rings in EPDM.
We recommend UNISILKON TKN 1011 KLUBER.

⚠ ***ATTENTION: The use of non-specified greases can compromise the condition of the O-rings and cause damage to the system. This condition could cause a serious danger for the user.***

6



MAINTENANCE

⚠ ***ATTENTION: Consult the safety norms.***

It is necessary to periodically clean the pincers according to the amount of use and the atmospheric conditions. Utilise an adequate biodegradable degreasing material that does not damage the pincers as described in the introduction to this technical information sheet.
Carefully clean the moving parts of the braking system.

⚠ ***ATTENTION: Utilise only ethyl alcohol to clean the brake discs.***
Utilising products other than those described above could represent a serious danger to the user.

⚠ ***ATTENTION: Never touch the brake disc after the braking system has been used. This could cause injuries.***

BRAKE PUMP REMOVAL

N.B. The numbers in parentheses indicate the references of the parts shown in the exploded view.

7a: Membrane and support substitution

- Remove the cover (27) using two screwdrivers

7a

7b

7b:

- Unscrew the two screws shown in the figure with a 2mm Allen key and remove the support (28) and membrane (29).

N.B.: Before replacing with a new membrane carefully clean the membrane seat.

⚠ ***ATTENTION: When reassembling, always utilise new membranes and supports.***

⚠ ***ATTENTION: When reassembling, equally tighten the two support-fixing screws.***

PISTON AND LEVER REMOVAL

8a:

- Utilising a 2.5mm Allen key, remove the screw (33) as shown in the figure and the relative counter nut (3) utilising an 8mm spanner.

8a

8b

8b:

- Remove the lever cover (13) and remove the brake lever (1).

⚠ ***ATTENTION: Do not drop the washers (34 – 4) of the lever as shown in the figure.***

8c:

- Utilise the specific tool to remove the piston (9) as shown in the figure.
- Insert the tool, press and rotate it 90° contemporaneously in either direction.

8c

8d:

- Remove the special tool and utilising a screwdriver slide out the piston stop (8) of the piston.
- Slide out the piston unit and substitute eventual worn or damaged parts.

⚠ ***ATTENTION: Where necessary, clean with a brush dipped in alcohol.***

8d

8e

8f

8e, 8f:

- Grease the piston (9) and reinsert it into the pump body.
- Assemble the piston stop (8) onto the special tool and press it onto the pump making the marks coincide with those of the seat. Contemporaneously rotate the tool 90°.

CONTINUED ON PAGE 4

8e, 8f:
- Clean the fixing zone of the lever with a brush dipped in alcohol and lubricate with grease.
- Reassemble the lever (1) operating in the reverse order of removal.

⚠ ***ATTENTION: When reassembling the lever, pay attention to the dust seal underneath (7) and ensure that it does not enter between the piston (9) and the push-pin (6).***

⚠ ***ATTENTION: Check for damage of the lever cover (13) and substitute it if damage is found. If this is not done, it could represent a serious danger for the user.***

⚠ ***ATTENTION: After removal/reassembly of the brake pump it is necessary to proceed with the bleeding of the braking system (see "Substitution of fluid").***

PINCER REMOVAL

9a:
- Place the pincer in a vice and unscrew the fixing screw (40) of the tube (42) utilising an 8mm spanner.

⚠ ***ATTENTION: Be careful of the two O-rings (38) situated on the tube union.***

9a

9b

9b:
- Utilising a screwdriver remove the circlip (60) that holds the pad screw in place.

9c

9c:
- Using a 4mm Allen key remove the two fixing screws (37 – 41) as shown in the figure.

9d:
- Open the pincer body.

9d

9e

9f

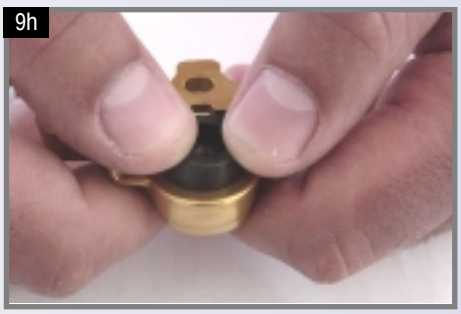
9g

9e, 9f:
- Using compressed air, expel the two small pistons (48 - 52) from the pincer body after having blocked the other exit holes.

⚠ ***ATTENTION: It is advisable to use a cloth to prevent a violent expulsion of fluid and the piston.***

9g:
- Using a small-bladed screwdriver, remove the two O-rings (47 – 57) from the two pincer bodies.
- Before reassembling, clean all components carefully with a brush dipped in alcohol.

9h



9h:
- Reassemble the O-rings (47-57) after having greased them and also the pistons (48-52) using only finger pressure.
- Check the condition and the position of the coupling O-ring (53) of the two pincer bodies (35 - 56).
- Reassemble the pincer body via the non-pad fixing screw (37) and block it slightly.

9i

9i:
- Insert the pads (49 – 51) with the spring (50) and then insert the pad fixing screw (41) and complete the tightening of both screws to a torque pressure of **5.75N·m (50.61 lbs. per sq. inch) ± 5%**. (See chapter 10: "Substitution of the brake pads").
- Reinsert the circlip by using a screwdriver.

9l

9l:
- Check the position and condition of the O-ring (38) on the tube union and then insert the tube into the pincer.

⚠ ***ATTENTION: It is advisable to utilise a cloth to prevent a violent expulsion of fluid and the piston.***

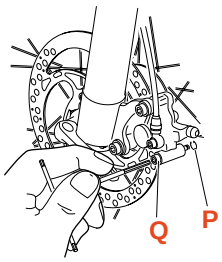
BRAKE PAD SUBSTITUTION

10a: It is not necessary to remove the wheel and the pincer from the bicycle to carry out the substitution of the brake pads.

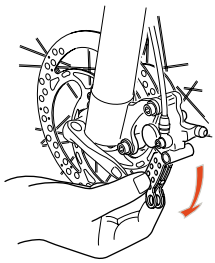
⚠ ***ATTENTION: Considering the reduced dimensions of the components, be careful in the use of the screwdriver because it could cause injury in case of accidental contact with the hands. Use protective gloves.***

Proceed as follows:
- Utilising a screwdriver, remove the circlip **P** (60).
- Utilising a 4mm hexagonal spanner, unscrew the screw **Q** (41) that fixes the pads (49 – 51).

10a

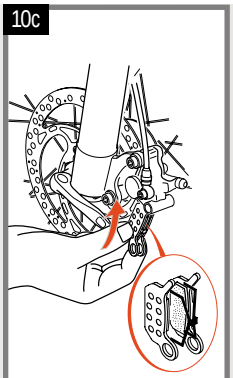


10b



10b:
- Take the pads with two fingers as shown in the figure and slide out the pads by slightly rotating the wheel.

10c

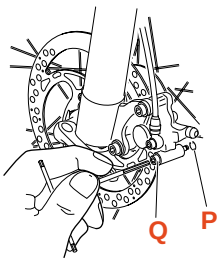


10c:
- Eliminate any traces of mud. Using a brush dipped in alcohol clean the pistons and blow accurately with compressed air. Using a wide-bladed screwdriver exert a light pressure on the pistons that activate the pads to make them open so that the new pads can be inserted.
- Using two fingers, take the new pads and the return spring as shown in the figure and inserting them into their appropriate seat.

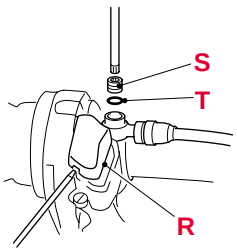
10d:
- Align the holes of the pads and the pincer then insert the screw **Q** (41), tightening it to the correct torque pressure of **5.75 N·m (50.61 lbs. per sq. inch) ± 5%**.
- Replace the circlip **P** (60).

⚠ ***ATTENTION: The braking system needs a period of settling down to obtain the maximum efficiency. Before completing the set-up of the braking system it is necessary to action the brakes at least one hundred times and then proceed with a further adjustment and also a check on the tightness of the screws.***

10d

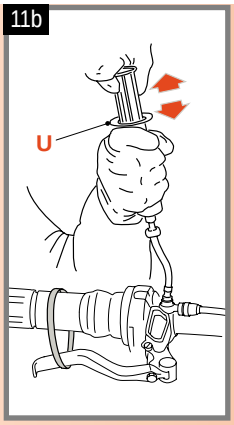


11a



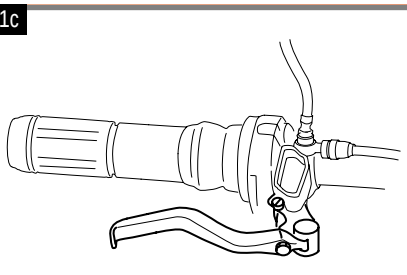
11a: Eliminating air bubbles
This operation must be carried out after adjusting the connection tube.
- Utilising a screwdriver positioned in the appropriate groove, remove the cover **R**.
- Unscrew the grub screw **S** and check the condition of the O-ring **T** underneath. If necessary, substitute it.

11b



11b:
- Install the syringe **U**, screwing it onto the female union and taking care to fill the syringe with 10ml of brake fluid.
- Squeeze the lever and fix it to the handlebar with an elastic band as shown in the figure.
- Keeping the syringe in an upwards position gently suck the air upwards several times that is present in the tube that is visible by the bubbles that float up in the column of fluid that is in the syringe.
- Release the plunger and repeat the operation several times until the air is completely eliminated.

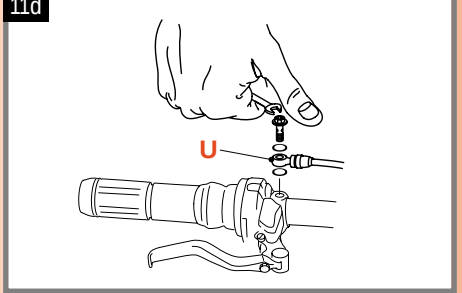
11c



11c:
- Remove the syringe from the female union.

⚠ ***ATTENTION: Before removing the syringe it is necessary to free the brake lever from the handlebar that has been previously fixed.***
Check the quantity of fluid in the membrane inside the pump and if necessary press lightly on the syringe plunger until the membrane is full.
An excessive pressure could damage the membrane.

11d



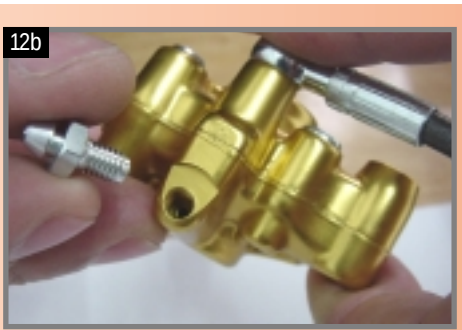
11d: Refit the dowel **S** and the gasket OR **T** (shown in figure 7a), paying special attention to the latter.
N.B.: Follow the steps below to reverse the brakes control:
- Disconnect the **U** fitting from the relative pump, invert the position of the two pipes. Reassemble the fitting and bleed the pipes.

SUBSTITUTION OF BRAKE FLUID

12a:
- Remove the cover (27) of the pump utilising two screwdrivers as shown in the figure.

12a

12b



12b:
The B4 braking system has come onto the market with and without the bleeding breather. It is important to underline that the modification regards only the left-hand side and that the two half-pincers are interchangeable between the two different models and also the tube-tightening screw.
The bleeding does not change; in place of the breather is the grub screw inside the tube-tightening screw.

CONTINUED ON PAGE 6

12c:
- Remove the rubber cap and then remove the breather that is present on the pincer by utilising an 8mm spanner. Or the grub screw (59), according to the typology of the pincer.

12c

12f:
- Utilising the empty syringe, suck out all the old fluid.
- Remove the syringe, empty it and fill it with 20ml of DOT 4 brake fluid or superior.
- Remove the screw (31). Reinsert the syringe in the hole, keeping it in a vertical position and pressing on the syringe plunger. Fill the system with new fluid until it comes out of the screw hole (31).

ATTENTION: The fluid used in this braking system, apart from damaging painted parts is also dangerous if it comes into contact with the eyes or skin. Abundantly wash injured parts with running water in the case of accidental contact with the fluid and contact a doctor if the fluid has come into contact with the eyes. Do not dispose of in the environment.

- Replace the screw (31) on the pump, avoiding tightening it excessively.

12f

12l:
- If air is present under the membrane, it is necessary to place the pump again in a vertical position and insert some drops of fluid via the syringe into the hole after having removed the relative screw (31), as shown in the figure.
- Replace the screw (31).
- Replace the cover (27) clicking it into place on the pump.

ATTENTION: Be careful to avoid any excessive leakage of fluid.

12d

12d:
- Insert the syringe with the appropriate union into the hole of the breather or the grub screw.

12g

12g, 12h, 12i:
- Utilising an elastic band, fix the brake lever to the handlebar.
- Keeping the syringe upright, lightly suck several times to remove any air that may be present in the pincer.

ATTENTION: Before removing the syringe it is necessary to free the brake lever from the handlebar that has been previously fixed.
Check the quantity of fluid in the membrane inside the pump and if necessary press lightly on the syringe plunger until the membrane is full.
An excessive pressure could damage the membrane.

12l

12e:
- Place the pump in a vertical position and remove the screw (31) as shown in the figure.

12e

12h

12i

- Remove the syringe and replace the breather or the grub screw (59) according to the typology of the pincer.
- Insert a spacer between the pads (2.5mm).
- Replace the pump into a horizontal position and pull the brake lever three to four times with certain force to check that the system does not leak and to find any residue air in the chamber.