Technical Information Sheet

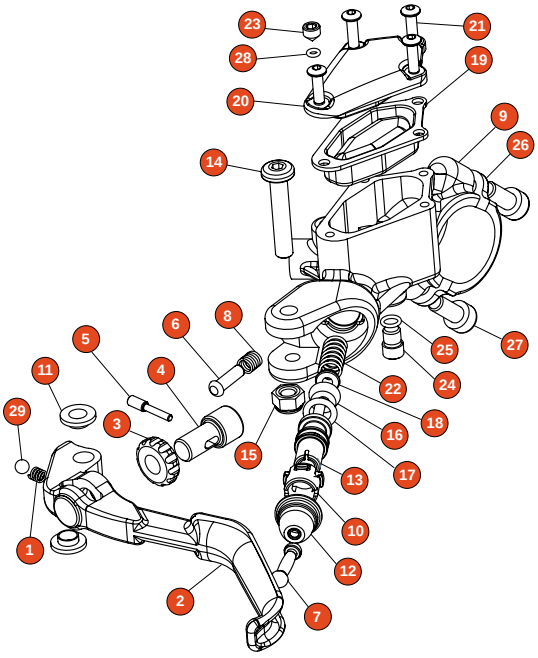
4Racing

XC
FR
DH

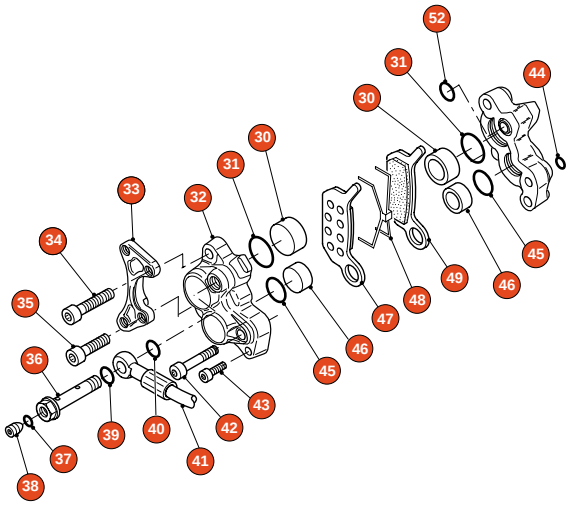
The **4-Racing** brakes are available in the models XC, FR, and DH.
The disks diameter is different, and the XC model uses the B4 pump (consult the specific manual); the manual describes the various interventions according to the models.

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/caliper tube fixing screw/pump tube fixing screw/caliper breather pipe/bleeder 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.***

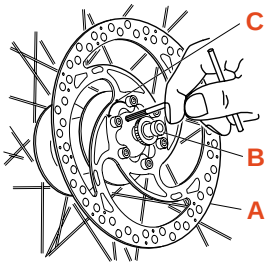
⚠ ***ATTENTION: Carefully read the safety norms so as to guarantee the correct use of the braking system.***

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



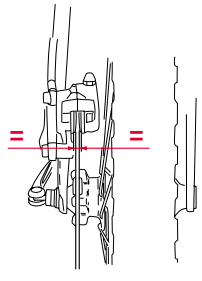
INSTALLATION

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 crosswise 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.

2d



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.

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.

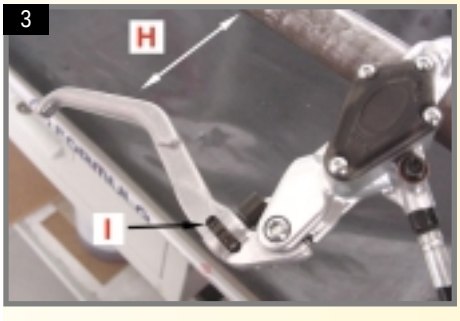
ATTENTION: The braking system needs a certain period of settling down to obtain maximum efficiency. Before making the final approval of the set-up it is necessary to effectuate at least one hundred braking actions and then proceed with a further adjustment to the set-up and a check on the tightness of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

INSTRUCTIONS FOR USE

3: Adjusting the lever position

To adjust the lever position, manually turn the knob **I** and adjust the **H** distance according to the user's requirements.

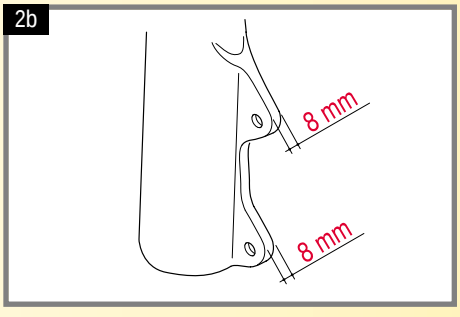
3



2a

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



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.

These adapters change according to the fork and diameter of the disk used; the caliper body instead is always the same.

2a: Installation of the kit

Proceed as follows:

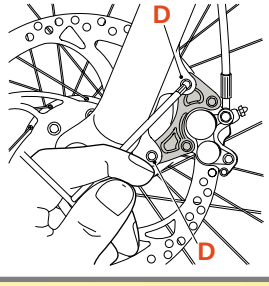
- insert the pump body in the handlebar and fix by turning it to the desired position. Lock with the two screws as shown in the figure, with tightening torque **2.5N·m (22 in.lbs.) ±5%**.
  The two screws must be tightened together and with an equal distance.

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: 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.

2c

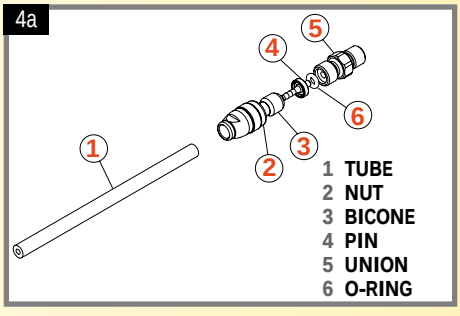


- Assemble the pincer to the fork or frame exclusively utilising the screws **D** supplied with the kit.
- Apply a weak thread-locking liquid and tighten the screws to the torque pressure **9N·m (79.22 lbs. per sq- inch) ± 5%.**

4a, 4b: Adjusting the tube length

Remove the union **5** using an 8mm open spanner.
Measure the portion of tube to be cut and use a cutter to cut it off. Refit the new components.

4a

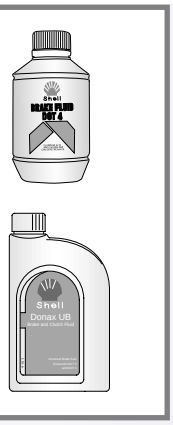


ATTENTION: Be careful when using the cutter because the blade is extremely sharp and could cause serious injury if not used properly.
Do not use blades or saws that could squash or lacerate the tube and therefore could create leakages of brake fluid and therefore an inefficient braking system.
A tube 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.

4b

WARNING: If the bicone is not well tightened, it may become loose while driving the vehicle thus causing the tube detaching with serious risks for 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.

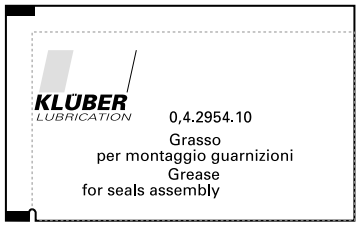
ATTENTION: The fluid used in this braking system, apart from damaging painted parts is also dangerous if it comes into contact with the eyes or skin. Abundantly wash the injured parts with running water in the case of accidental contact with the fluid and contact a doctor if the fluid has come into contact 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 screws (20) with a 2mm setscrew wrench.

7a

7b

7b:

- Remove the cover and the membrane (19).

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

WARNING: when refitting, tighten the 4 fixing screws of the cover at the same torque.

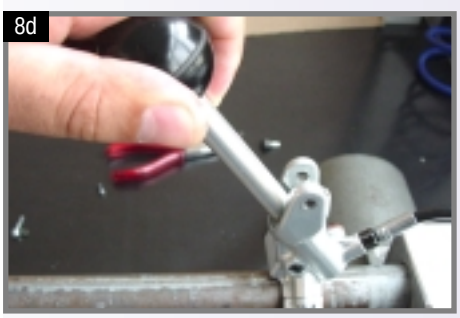
LEVER AND PISTON DISASSEMBLY

8a:

- Use a 3mm setscrew wrench to remove the screw (14) shown in the figure, and an 8mm spanner to remove the relevant check nut (15).
- Remove the brake lever (2).

8a

8d



8d:

- Remove the piston (13) with the specific tool, as shown in the figure.
- Insert the tool, press and turn it simultaneously by 90° in one direction or the other.

8b

8b:

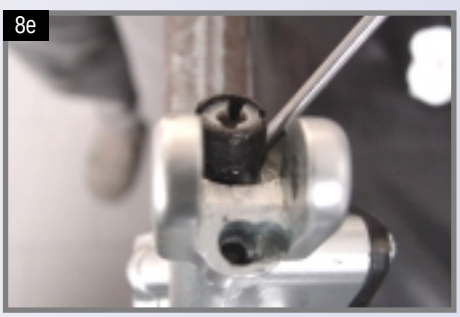
- Remove the pin (6) and the spring (8) shown in the figure using suitable pliers.

8e:

- Remove the specific tool. Withdraw the piston stop (10) with a screwdriver.
- Pull out the piston assembly and replace any damaged parts.

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

8e



8c

8c:

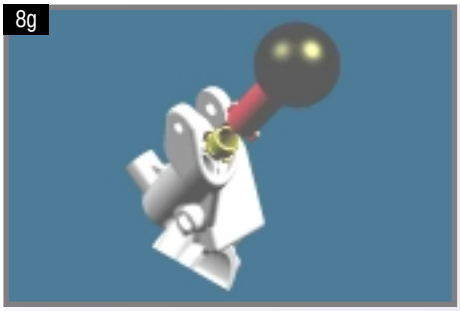
- Remove the pin (7) and relevant dust cover (12) using suitable pliers.

8f

8f, 8g:

- Grease the piston (13) and reinsert it into the pump body.
- Assemble the piston stop (10) onto the special tool and press it onto the pump making the marks coincide with those of the seat. Contemporaneously rotate the tool 90°.

8g



8f, 8g:
- Clean the fixing zone of the lever with a brush dipped in alcohol and lubricate with grease. Reassemble the lever (2) operating in the reverse order of removal.

⚠ ***ATTENTION: When reassembling the lever, pay attention to the dust seal underneath (12) and ensure that it does not enter between the piston (13) and the push-pin (7).***

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

9c

9c:
- Unloose the three screws (34-42-43) fixing the caliper using a 3-4mm setscrew wrench and a TORX T25.

9g

9g:
- Using a small-bladed screwdriver, remove the two O-rings (31 – 45) from the two pincer bodies.
- Before reassembling, clean all components carefully with a brush dipped in alcohol.

9l

PINCER REMOVAL

9a:
- Place the pincer in a vice and unscrew the fixing screw (36) of the tube (41) utilising an 8mm spanner.

⚠ ***ATTENTION: Be careful of the two O-rings (39-40) situated on the tube union.***

9b

9d:
- Open the pincer body.

9d

9e, 9f:
- Fit the first caliper body in the vice with 18mm opening. Eject the two small pistons from the caliper body using a compressed air gun.
- Follow the same procedure for the second caliper body, taking care to close the rear hole with a cloth.

9h

9h:
- Reassemble the O-rings (31-45) after having greased them and also the pistons (30-46) using only finger pressure.
- Check the condition and the position of the coupling O-ring (52) of the two pincer bodies.

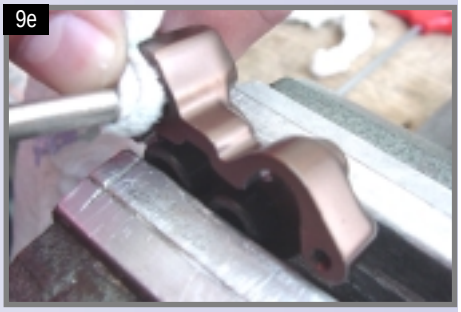
9l:
- Fit the pads (47-49) with the spring (48). Insert the pads fixing screw (42) and fully tighten the 3 screws at torque **5.75N·m (50.61 in.lbs.)±5%** (see Chapter 10: "Brake pads substitution").
- Reinsert the circlip by using a screwdriver (44).

9m:
- Check the position and condition of the O-ring (39-40) on the tube union and then insert the tube into the pincer.

9a

9b:
- Utilising a screwdriver remove the circlip (44) that holds the pad screw in place.

9e



9f

9i:
- Refit the caliper body with the 3 fixing screws (34-42-43) and slightly lock them with the adapter (33).

9i

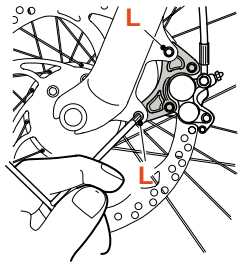
9m

BRAKE PAD SUBSTITUTION

10a, 10b:
To replace the front and rear brake pads (47-49) it is necessary to remove the caliper from its support by unscrewing the fixing screws **L** with a suitable spanner.

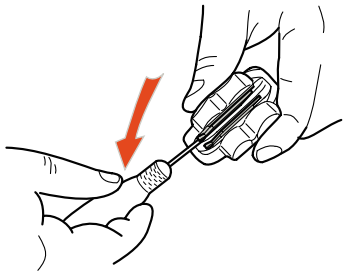
⚠ ***ATTENTION: Considering the reduced dimensions of the components, be careful in the use of the screwdriver because it could cause injury in case of accidental contact with the hands. Use protective gloves.***

10a



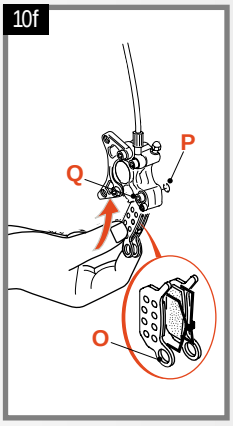
10d:
- Use a small screwdriver, as shown in the figure, and press lightly to lift and remove the worn pads.

10d



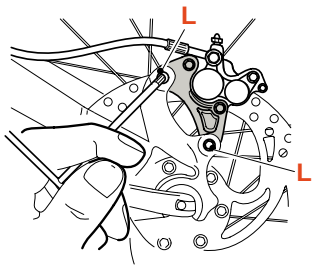
10f, 10g:
- Take the pads and the return spring (48) with two fingers, as shown in the figure, and fit them into their seat.
- Align the hole **O** of the pads and caliper, insert the screw **Q** (43) and tighten at torque **5.75N·m (50.61 in.lbs.) ±5%**.
- Replace the circlip **P** (44).

10f



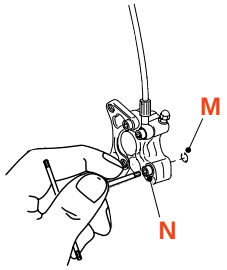
- Refit the caliper assembly on the fork or frame following the indications given in this sheet, and perform the braking operations.

10b



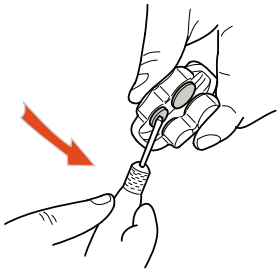
10c:
Proceed as follows:
- Utilising a screwdriver, remove the circlip **M** (44).
- Utilising a 4mm hexagonal spanner, unscrew the screw **N** (42) that fixes the pads.

10c

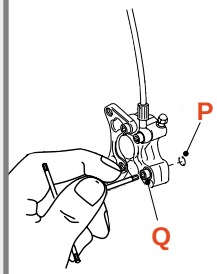


10e:
- Remove any trace of mud, carefully blow with air. Use a large screwdriver to press lightly on the small pistons (30-46) operating the pads to push them back to be able to fit the new pads.

10e



10g

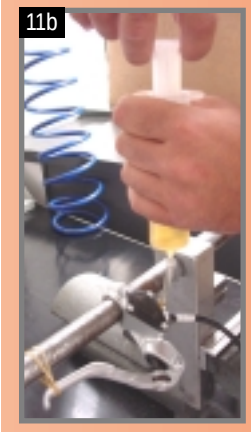


⚠ ***ATTENTION: The braking system needs a period of settling down to obtain the maximum efficiency. Before completing the set-up of the braking system it is necessary to action the brakes at least one hundred times and then proceed with a further adjustment and also a check on the tightness of the screws.***

11a

11a: Eliminating air bubbles
This operation must be carried out after adjusting the connection tube.
- Unscrew the dowel **R** (23) and remove the OR (28) with great care.

11b



11b:
- Fit the syringe and screw it to the pump after checking that the oil amount in the syringe is 10ml.
- 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.
- Remove the syringe from the pump.

⚠ ***WARNING: before removing the syringe it is necessary to free the pump lever that has been previosuly fixed, and then press lightly on the syringe plunger.***

11c

11c:
Refit the dowel R (23) and the OR gasket with great care.
N.B.: To invert the brakes control, follow the steps below.
- disconnect the S union from the relative pump and invert the two pipes. Then refit taking care to bleed any air bubbles

CONTINUED ON PAGE 6

SUBSTITUTION OF BRAKE FLUID

12a:

The 4-RACING brake is available on the market both with or without the breather.
It is important to note that the modification only involves the right hand side, and that the two half-calipers of the two different models are interchangeable, provided that also the pipe fixing screw is changed.
The breather remains unchanged; the breather place is taken by the dowel inside the pipe fixing screw.

12a

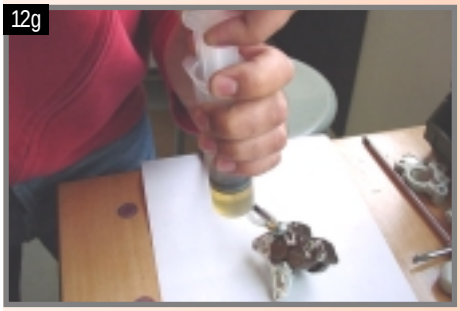
12d:

- Overturn the pump as shown in the figure, and remove the screw (24).

12d

12f

12g



12b

12b:

- Remove the rubber cap and then remove the breather that is present on the pincer by utilising an 8mm spanner. Or the grub screw (38), according to the typology of the pincer.

12e

12f, 12g, 12h:

- 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.

- Remove the syringe and replace the breather or the grub screw (38) 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.

12h

12c:

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

12c

12e:

- 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.
- 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 (24).

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 (24) on the pump, avoiding tightening it excessively.

12i

12i:

- If the presence of air is noticed under the membrane, place the pump in vertical position again and introduce, using the syringe, some drops of oil through the hole after having removed the screw (24), as shown in the figure.
- Replace the screw (24).

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