

K1200RS/GT EVO Brake Bleeding

Gary Hollinger 7/15/04

These directions describe how I did the wheel circuit and control circuit bleed on my '02 K1200RS with EVO brakes. These directions are long because I intended them to be used by someone who has never done any brake work before (like me). Use these directions at your own risk, please follow all safety precautions when they appear. All relevant Attention: Note: and Warnings: from the manual will be included in these instructions. The service schedule states you should bleed the wheel circuits yearly and the control circuit/ABS pump and clutch circuits every 2 years. I used Speedbleeders <http://www.speedbleeder.com/> on my front calipers because they don't allow backflow. This allows you to use the ABS pumps to do the bleeding. Using the pumps is very fast and effective at pushing air bubbles out of the system and allows this to be a one man job.

The Integral ABS brake system has four independent brake fluid circuits. These are drained, and bled separately.

The K1200RS/GT manual calls for using the ABS pump with the following warning: When performing maintenance and repair work on the BMW Integral ABS, avoid rapid and forceful pumping of the brakes.

Special thanks to Mark Bohn for his wheel circuit directions and Paul Francis for deciphering the ABS pump sequence. Without their work I doubt if I would have undertaken this project. These directions are partially written using directions supplied by them and the remaining information from the BMW manual and my own experience.

Warnings

Read these instructions thoroughly before you begin.

Obviously, any work on your motorcycle brakes must be done carefully. Mistakes can be hazardous to your health. Fortunately, the ABS III system has warning lights to help you diagnose many brake system faults before you ride. See your owner's manual on how to interpret these lights if needed.

Brake fluid damages paint very quickly. Pumping the front hand lever with the reservoir cap off usually squirts fluid out toward the windscreen and dashboard. You'll want to go overboard on covering painted surfaces.

It is unlikely that brake fluid is good for your health (absorption through the skin can be damaging to your kidneys). I like to wear surgical-type gloves to avoid contact with brake fluid (or any other bike-related fluids for that matter).

Be sure to read the Check Your Work section after you complete any or all parts of this document.

Tools and Supplies

BMW special tool part # 34 2 532 \$55.00 from your dealer or a suitable home made substitute – ABS pump

T-45 Torx socket – front calipers

5mm Hex bit socket – grub screw
8mm Hex bit socket – rear calipers

7mm open end wrench – ABS pump
8mm open end wrench – BMW front bleeders
10mm open end wrench – battery posts
11mm open end wrench – BMW rear bleeder
12mm open end wrench – to hold grub screw socket (vise grips work too)

5/16 open end wrench – front Speed bleeders
3/8 open end wrench – rear Speed bleeders

Phillips head screw drivers – short and long
Tools to remove fairing pieces

3mm hex socket or allen wrench if luggage rack is installed
17mm socket for rear wheel lug nuts

Small needle nose pliers or forceps – to attach and remove tubing on ABS pump bleeders

3/8 drive ratchet,
1/2 inch breaker bar – to remove the rear wheel
1/4 drive ratchet or a 1/4 drive breaker bar, 1/4 drive x 6 inch extension
Torque wrench

2 cans (8oz) of DOT 4 brake fluid
2 x 60cc syringes, about 12 inches of silicon tubing to attach to syringes
Speed bleeder SB1010S for the clutch and brake control circuit bleed.
Speed bleeder bag and/or an empty container with screw on lid for the used fluid.

9ft x 12ft 0.9mil plastic sheet to cover bike. This can be found at Wal-Mart for a dollar.

Lots of towels, a small can of compressed air - available anywhere computer parts are sold. A couple of 8" zip ties.

Prep Work

Place the motorcycle on its center stand so that it is level. Note: if you leave the side stand deployed you won't activate the fuel pump when switching on the ignition.

Remove the seat.

Remove the luggage carriers if installed and remove the right and left rear fairing panels. Note: if you have a GIVI rack installed you do not have to remove it. Remove the 2 rear screws in the BMW luggage carrier. Then loosen the front GIVI rack bolt that also goes through the front of the BWM luggage carrier. This should allow you room to remove the side fairing pieces.

Remove fasteners securing coolant expansion tank, move it out of your way from the reservoir.

The battery is only removed for the ABS pump control circuit bleeding.

If you wish to install Speed bleeders, install all of them now. You need 1-8mm in each front caliper and 1-10mm in the rear caliper. These will remain installed in the calipers after the job is finished making next year's bleed that much faster.

I installed one in the rear caliper, but later it leaked and I removed it. You can do the rear wheel circuit without a Speed bleeder, but make sure you have one for the clutch/brake filler adapters.

Remember, if you are installing Speed bleeders: since the system is not closed, and the calipers are below the level of the reservoir, when you remove the stock bleed screw, the brake fluid will leak out. Just wrap towels around the calipers, quickly swap the stock screw for the SB--being careful to not cross-thread it in the process--and carefully wipe off the spilled brake fluid. The first few threads on the Speed bleeders do not have any thread sealant on them for this reason. Tighten the SB down carefully, the bleed screws only call for 7Nm of torque to fully seat.

[Integral ABS] Bleeding front wheel circuit
(Inspection IV) annual

Attention: Do not allow brake fluid to come into contact with painted parts of the motorcycle, brake fluid destroys paint. Use only brake fluid from an unopened container.

Attention: Integral brakes, the rear brake must be ready for use. (all the calipers must be either properly installed (with pads!), or removed and securely shimmed! If you switch the bike on and touch either control, the pistons will otherwise be slammed together!)

Attention: fully push the brake pistons back only when the cap has been removed from the wheel-circuit reservoir.



PHOTO 1

1. Remove cap of front wheel circuit reservoir. (see photo 1) Use one of the 60cc syringes with about 6 inches of tubing attached and draw off the old brake fluid from the front wheel-circuit reservoir.
2. Push the front caliper pistons back. If you are going to change front brake pads, do it now. Installing new pads will retract the pistons back almost the entire way. If no new pads are installed, remove both front calipers and push the pistons back fully, both ends of the pad need to be back.
3. Shim the pads/pistons open, I used wood shim stock.



PHOTO 2

4. Draw off the remaining old fluid from the front wheel-circuit reservoir. (Photo 1)
(After pushing the pistons all the way out, the brake fluid in the lines will be forced back into the reservoir. This is why you draw off the fluid first--to prevent an overflow.)

Use the other (clean) 60cc syringe to fill the reservoir with new fluid to the MAX line.

5. Attach your Speed bleeder bag or attach tubing to the left caliper bleeder and put the other end of tubing in a jar. Unscrew left front Speed bleeder about ½ turn. See note below for using BMW bleed screw.

6. Switch on ignition – wait until the test mode is complete. Gently pull the front brake lever until fluid comes out of the front caliper clear and bubble free.

Note: If you are not using Speed bleeders you MUST gently pull the brake lever first, then open the bleeder, you must close the bleeder before you release the brake lever – all while watching to make sure the reservoir does not empty. (A two man job for the front wheel circuits)

Warning: Watch the fluid level in the reservoir. If the brake-fluid level in the reservoir does fall below hose level, the wheel circuit must be refilled at the brake caliper and bled once again.

When the reservoir level reaches the MIN mark, release the brake lever and refill the reservoir to MAX and repeat until fluid is clear and bubble free.

7. Turn off the ignition, close the Speed bleeder and move the hose to the right caliper. Repeat step 6 for the right caliper. Warning: do not let the reservoir level drop below hose level. Turn off the ignition when done, close the right Speed bleeder and remove the

hose.

8. Wrap a towel around the bleeders to prevent fluid blowing onto unwanted items then blow out any remaining fluid from the tip of the bleeders with a can of compressed air. This way you'll know if you have any leaks later.

9. If you shimmed the pads, remove the shims and reinstall the front calipers (Tightening torque: Brake caliper to fork tube 30 Nm). Now turn on the ignition again, let the ABS cycle and then pull the front brake lever. This will seat the pads. Now top off the front wheel reservoir (photo 1) and replace the cap hand tight.

[Integral ABS] Replacing brake fluid in the rear wheel circuit/bleeding (Inspection IV) annual

If you are going to remove the rear caliper to shim the pads/pistons back, you must remove your rear wheel also. First remove the two mounting screws securing the rear caliper – leave the caliper in place. Next remove the 5 lug nuts on the rear wheel and pull the wheel off the hub, let it lean against the exhaust can. Now you have room to remove the rear caliper, then you can roll the rear wheel out of your way.

Attention: During the replacement process, the brake fluid level must not drop below the hose level or else air will be drawn into the brake system.

Warning: If the brake-fluid level in the reservoir does fall below hose level, the wheel circuit must be refilled at the brake caliper and bled once again.

1. Remove the cap from the rear wheel circuit reservoir (see photo 1) and draw off the old brake fluid using the “dirty” 60cc syringe.

2. Push the rear caliper pistons back. If you are going to change rear brake pads, do it now. Installing new pads will retract the pistons back almost the entire way.

3. Shim the pads/pistons open (see photo 2)

4. Draw off the remaining old fluid from the rear reservoir.

Use the other (clean) 60cc syringe to fill the reservoir with new fluid to the MAX line.

5. Attach your Speed bleeder bag or attach tubing to the bleeder put the other end of tubing in a jar. Unscrew the Speed bleeder about ½ turn. See note below for using BMW bleed screw.

6. Switch on ignition – wait until the test mode is complete. Very gently press the footbrake lever until the pump just starts up. Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.

When the reservoir level reaches the MIN mark, release the brake lever and refill the reservoir to MAX and repeat until fluid is clear and bubble free.

Note: If you are NOT using Speed bleeders you MUST gently push the brake pedal first, then open the bleeder. You must close the bleeder before you release the brake pedal – all while watching to make sure the reservoir does not empty. (A one man job for the rear wheel circuit)

Note: The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the reservoir drops all the more rapidly.

Warning: Watch the fluid level in the reservoir. If the brake-fluid level in the reservoir does fall below hose level, the wheel circuit must be refilled at the brake caliper and bled once again.

7. Close the bleeder and remove the hose. Blow out any remaining fluid from the tip of the bleeder with a can of compressed air.

8. If you shimmed the pads, remove the shims and reinstall the rear caliper, don't forget to install the rear wheel now. Roll the rear wheel in place and rest it against the exhaust. Install the caliper, then the rear wheel to the hub. (Tightening torque: rear brake caliper 40 Nm). Turn on the ignition again, let the ABS cycle and then push the rear brake pedal. This will seat the pads. Now top off the rear wheel reservoir and replace the cap hand tight.

This completes the annual wheel circuit bleeding.

The next phase is to bleed the clutch, brake filler adapter and ABS pump control circuits. For this part you will need to remove your battery to access all the bleed screws on the ABS pump. The control circuits are bled more like conventional brakes, i.e. not using the ABS pump, so you DO NOT turn the bike on for this part (or use a Mighty-Vac).

Also for this phase you will need to cover the front of the bike to ensure no brake fluid gets on the windscreen, dash or fairing pieces.

Changing the clutch fluid/bleeding the clutch system
(Inspection IV) every 2 years

READ THROUGH THESE DIRECTIONS BEFORE BEGINNING

1. Turn the handlebars to the right. Cover the entire front of the bike except for the clutch reservoir.



PHOTO 3

2. Wrap the reservoir with a towel, take off reservoir cover with rubber diaphragm, clean and set aside.
3. Pump the clutch lever slowly, but fully to pump any air out of the line (you may see bubbles float to the top). Be careful that brake fluid doesn't squirt out of the snifter hole at the bottom of the reservoir especially later on as the fluid level drops and there is less fluid covering the hole.
4. Using the “dirty” syringe, draw off the old fluid and clean out the reservoir. Top up the reservoir with fresh fluid using the “clean” syringe. There is a stepped, raised indexing mark on the forward inside sidewall of the reservoir. Fill the fluid level to this mark (see photo 4). Attention: When adding brake fluid, do not allow it to enter the holes for the reservoir lid screws.

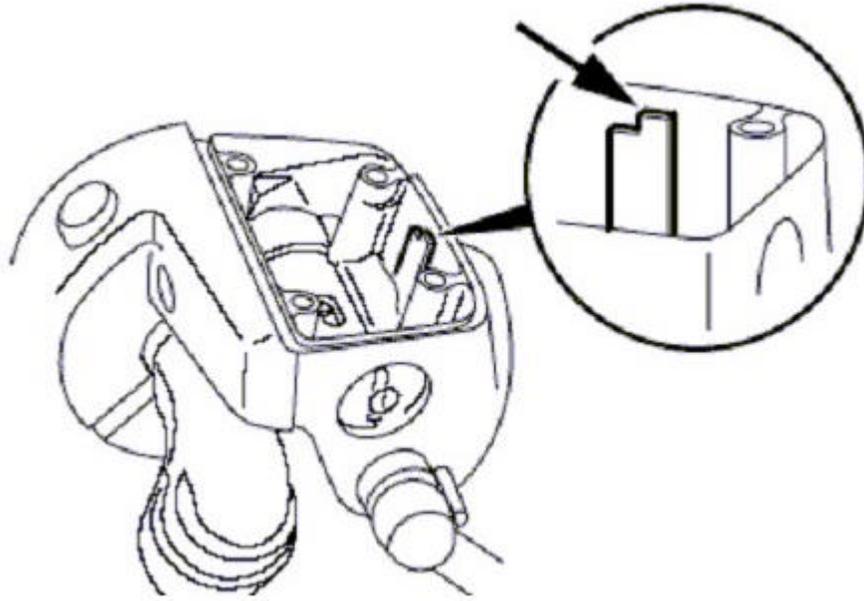
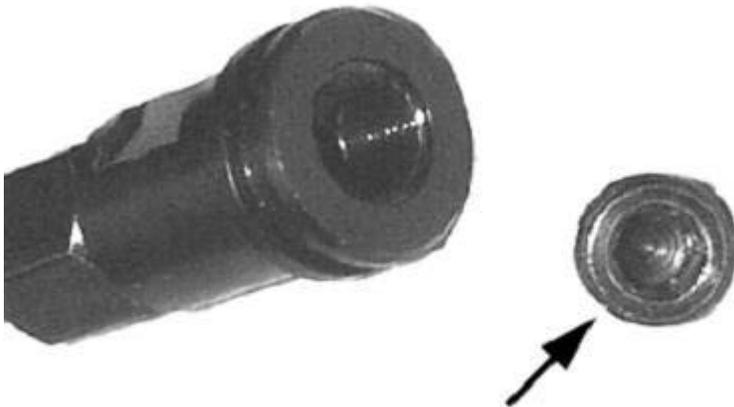


PHOTO 4

5. The clutch is bled through the filler adapter that the factory used to fill the system. You will need to locate the adapter on the right side. Start at the footbrake pedal and looking up just under the main right side fairing you will see a hose that terminates and is attached to the frame with a zip tie. Cut the zip tie and pull the hose down. Slide the outer rubber spacer up the hose to reveal the grub screw/filler adapter.



Grub Screw

Inside the filler adapter behind the grub screw on the end is a check ball valve. The valve

only allows fluid/air to flow into the hose (factory fill). To get fluid out in a clean, tidy manner we need to install a Speed bleeder (SB1010S). The Speed bleeder conical tip has a line scribed on it. File down the point to create a flat tip, but do not file beyond the scribed line. Now remove the grub screw and install the Speed bleeder until seated, have plenty of towels handy just in case. Take your time and DO NOT cross thread or strip the filler adapter.

Note: The clutch and brake control circuits can be done with any 10mm bleeder including the BMW one you may have removed from the rear caliper if you installed a Speed bleeder there. BUT it will make the job much more difficult because you have to open and close the bleeder while under pressure of pulling the corresponding lever. I highly recommend using a Speed bleeder for the clutch and brake filler adapters.

6. Connect the tubing and open the Speed bleeder 1/4 turn.
7. Set the clutch lever to position "4" (furthest out). Slowly squeeze the clutch lever until you see the snifter hole closes (fluid initially squirts back out the hole in the bottom of the reservoir), then squeeze the clutch lever fully to the end of travel.
8. Slowly release the clutch lever and then repeat until the fluid is clear and bubble free. Attention: While bleeding the system, do not allow the brake fluid level to drop below the MIN mark, as otherwise air will be drawn into the clutch system. Bleed the system again if this happens.
9. Fill the clutch reservoir with brake fluid to the upper marking ring. Replace the cover, then use compressed air to make sure no fluid is in the screw holes before replacing the 4 screws.
10. Remove the Speed bleeder and replace the grub screw (Tightening torque: Grub screw at filler adapter 10 Nm). Attach the line back to the frame using a zip tie.

[Integral ABS] Replacing brake fluid in the front filler adapter
(Inspection IV) every 2 years

The ABS pump/control circuit consists of the Filler adapter (1), front dosing cylinders (2), front integral circuits (2) and front control circuits (2). We will bleed the filler adapter first, then the other six bleeders in sequence. Warning: When changing and bleeding the control circuit brake fluid, do not use vacuum extraction.

1. Place the motorcycle on its side stand and turn the handlebars all the way to the left. Repeatedly and slowly pull the front brake lever lightly to expel air from brake master cylinder. Place the motorcycle on its center stand so that it is level. Turn the handle bar to the left. Cover the entire front of the bike except for the brake reservoir.
2. Wrap the reservoir with a towel, take off reservoir cover with rubber diaphragm, clean and set aside. Shift the brake lever to position 4.
3. Pump the brake lever slowly, but fully to pump any air out of the line. Be careful that the brake fluid doesn't squirt out of the snifter hole at the bottom of the reservoir.
4. Using the "dirty" syringe, draw off the old fluid and clean out the reservoir. Top up the

reservoir to the stepped, raised indexing mark with fresh, clean fluid using the “clean” syringe.

Attention: When adding brake fluid, do not allow it to enter the holes for the reservoir lid screws.

5. On the left side of the bike locate the brake system filler adapter next to the ABS pump. (see photo 5)



PHOTO 5

6. Remove the grub screw and install the SB1010S Speed bleeder just like you did in the clutch filler adapter.

7. Attach tubing, then open the Speed bleeder 1/4 turn. Slowly squeeze the brake lever until the brake light switch clicks - snifter hole closed (fluid initially squirts back out the hole in the bottom of the reservoir), then squeeze the brake lever to the end of travel.

8. Slowly release the brake lever and then repeat until the fluid is clear and bubble free.

Attention: While bleeding the system, do not allow the brake fluid level to drop below the MIN mark, as otherwise air will be drawn into the clutch system. Bleed the system again if this happens.

9. Refill the brake reservoir with brake fluid to the stepped, raised indexing mark.

10. Remove the Speed bleeder and replace the grub screw. (Tightening torque: Grub screw at filler adapter10 Nm)

[Integral ABS] Replacing brake fluid in the front control circuit/bleeding

(Inspection IV) every 2 years

Regulations for bleeding the ABS pump front control circuits:

1. Pull the brake lever slowly until the brake light switch clicks (snifter hole closed).
2. Open the bleed screw.
3. Pull the brake lever fully and close the bleed screw.
4. Release the brake lever slowly.
5. Repeat steps 1 to 4 until the brake fluid is clear and bubble free.

In sequence, bleed the:

- front dosing cylinder (F1),
- front integral circuit (F2)
- front control circuit (F3) and,
- again, front dosing cylinder (F1)

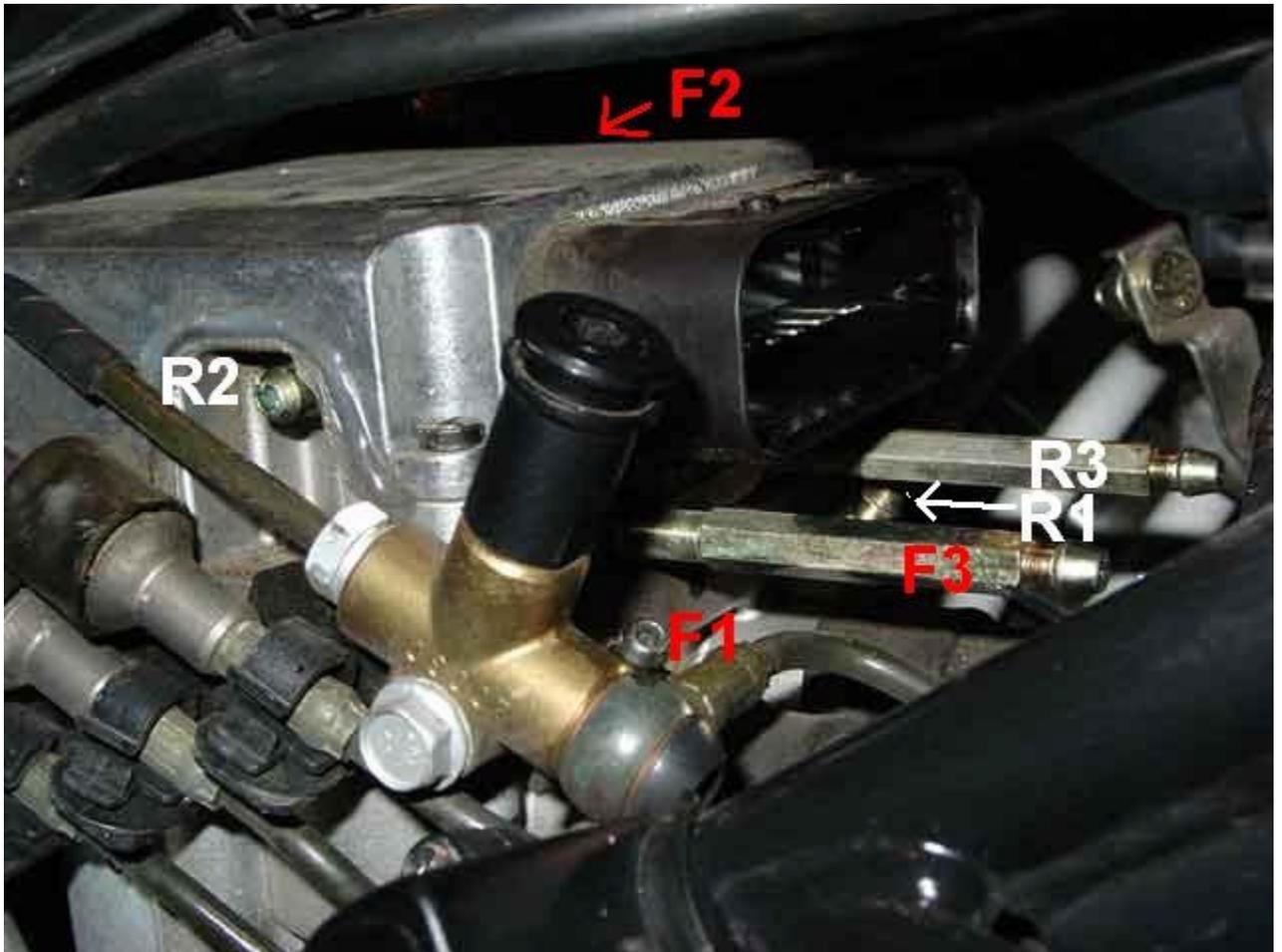


PHOTO 6

You will need BMW tool part # 34 2 532 \$55.00 from your dealer or a suitable home made substitute. Warning: When changing and bleeding the control circuit brake fluid, do

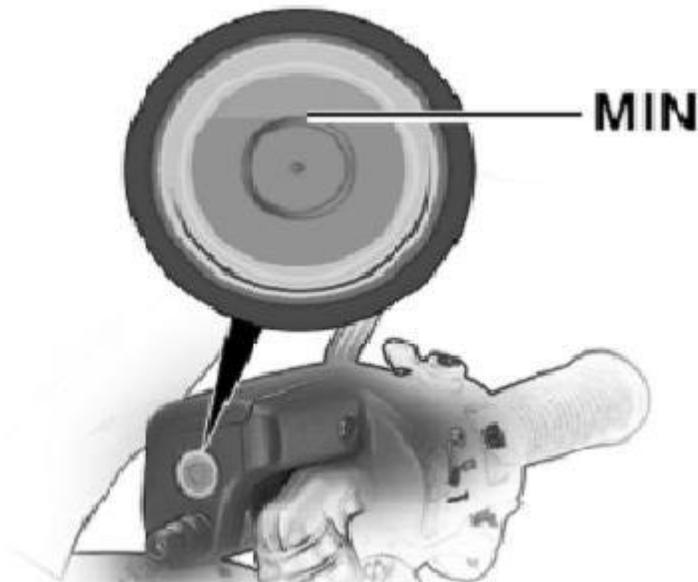
not use vacuum extraction.

1. Remove the dust caps from the 3 front circuit bleeders on the ABS pump (see photo 6). Follow the sequence listed and use the regulations for the procedure to bleed the front control circuits. You will use the special tool on the dosing cylinder bleeder and integral circuit bleeder. Use a 7mm box end wrench on the control circuit bleeder. Attach the tool first, then the tubing. Bleed each one in order until clear and bubble free. Be sure to bleed the dosing cylinder bleeder first and again last.

Attention: While bleeding the system, do not allow the brake fluid level to drop below the MIN mark, as otherwise air will be drawn into the clutch system. Bleed the system again if this happens.

2. When finished, top off the front brake reservoir to the MIN mark. Replace the cover making sure no fluid is in the screw holes before replacing the 4 screws.

Note: The brake-fluid level is independent of brake pad wear.



FLUID LEVEL

[Integral ABS] Specified level at handlebar fitting not belowMIN (top edge of the marking ring)

YOU'RE ALMOST DONE!

[Integral ABS] Replacing brake fluid in the rear control circuit/bleeding (Inspection IV) every 2 years

Remember where your rear brake reservoir is?(see photo 1) Remove the cap, then remove the 3 remaining dust caps from the bleeders on the ABS pump.

Using the following regulation and sequence, bleed the rear control circuits. Watch the level in the reservoir. Warning: When changing and bleeding the control circuit brake fluid, do not use vacuum extraction.

Regulation for bleeding the ABS pump rear control circuits:

1. Push the brake lever slowly until the brake light switch clicks.
2. Open the bleed screw.
3. Push the brake lever fully and close the bleed screw.
4. Release the brake lever slowly.
5. Repeat steps 1 to 4 until the brake fluid is clear and bubble free.

In sequence, bleed the:

- rear dosing cylinder (R1),
- rear integral circuit (R2)
- rear control circuit (R3) and,
- again, rear dosing cylinder (R1) (See photo 6)

Top off the rear reservoir to the MAX mark and replace the cap hand tight.

Now pull the front brake lever fully and depress the rear brake lever fully several times checking for any leaks at the bleeders on the ABS pump.

Replace the battery. Use compressed air to clean and dry out the bleeders (remember to wrap them with a towel to catch the spray).

CHECKING YOUR WORK

Double check that all fittings have been tightened to specified torque and all spilled fluid is cleaned up.

Check all fluid levels at the 4 reservoirs again.

Switch on ignition – wait until the test mode is complete. Pull the front brake lever and push the rear brake pedal together fully for several seconds then release and switch off.

Check all 9 bleeders for leaks (2 front, 1 rear, 6 ABS pump)

Replace all 9 dust covers on the bleeders.

Check that the bike has residual braking function. This is the “barely-there” braking you have with the power off. Do this in your shop pushing the bike around by hand.

Ride the bike very carefully for a short distance on level ground and act as if you have no brakes, because you may not. The warning lights should go out after a short distance. If they do, all is well. If not, check your manual for interpretation of what the blinking lights mean.

Whewwww, I'm done.

Now take the \$350.00 still in your wallet and go buy yourself something nice.

Gary
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MMII IBM K1200RS