

R1100GS
R1150GS
Maintenance
Manual

Carl Kulow

by Carl Kulow

*Send comments/corrections to
kulowc@indiana.edu*

*ISBN R1100-1150CC
First Edition
1-20-2002*

Copyright: All Oilhead GS Riders

The author has done his best to produce accurate information. However, he assumes no liability for any damage or injury caused by any errors or omissions in this manual. Use at your own risk.

TABLE OF CONTENTS

MAINTENANCE SCHEDULE.....	4
PARTS AND TOOL LIST	5

Cold Engine and Drivetrain Procedures

ALTERNATOR BELT.....	6
VALVE ADJUSTMENT	7
SPARK PLUGS.....	10
AIR FILTER	11
LUBE SIDESTAND AND CENTERSTAND	12
CLUTCH CABLE.....	12
BRAKE AND CLUTCH FLUID	13
BRAKE PADS	14
BATTERY INSPECTION	15
FUEL FILTER.....	16
MISCELLANEOUS.....	17
SUMP GUARD REMOVAL	18
TEST RIDE	18

Hot Engine and Drivetrain Procedures

THROTTLE BODY SYNC	19
ENGINE OIL AND FILTER CHANGE	21
TRANSMISSION GEAR OIL CHANGE	22
REAR WHEEL DRIVE GEAR OIL CHANGE	23
SUMP GUARD INSTALLATION	23

Other procedures

BRAKE PAD REPLACEMENT	24
TIRE CHANGE	26

Service – Every 6K Miles

Engine oil and filter - change
Brake fluid – check
Brake pads – check
Clutch fluid – check
Sidestand – grease
Sidestand switch – check
Spark plugs – check
Valves – adjust
Throttle cables – check
Throttle Bodies - synchronize

Inspection – Every 12K Miles

Transmission gear oil – change
Rear drive gear oil – change (every 24K miles)
Fuel filter – change (every 24K miles)
Battery fluid level – check
Battery – electrolyte level, clean/grease terminals
Air filter – change
Alternator belt – change (every 36K miles, some R1100GS at 24K miles)
Wheel bearing play – check
Swing arm bearing play – check
Spark plugs – change

Annual Service

Brake fluid – change
Clutch fluid – change (every 2 years)

TOOLS

socket set, metric
hex bit socket set (allen), metric (Sears)
ratchet
extensions
wrenches – open end/box, metric
hex wrenches (allen T-handle), metric
torque wrench
pliers
screwdrivers
feeler gauges
oil filter wrench
oil drain pan
motorcycle toolkit (BMW)
rubber gloves (dishwashing)
flashlight, minimag
measuring cylinder (photo store)
Twin Max or carb stix
Mityvac or “one man brake bleeder”
tire change tools (see tire change instructions)

PARTS

Parts

spark plugs
oil filter
air filter
brake pads
oil - 4 qt.
gear oil - 1 1/4 qt.
alternator belt
fuel filter, o-ring, clamps
crush washers for:
- oil drain plug
- transmission fill and drain plugs
- rear drive fill and drain plugs

Misc.

compressed air
anti seize paste
carb or brake cleaner
rags
BMW #10 grease
flexible tubing (tygon)
grease
chain lube
brake fluid (DOT 4)
distilled water

Cold Engine and Drivetrain Procedures

Check Alternator Belt

Tools

T-handle hex – 4mm

Parts

none

1. Remove the four bolts holding the black plastic alternator belt cover at the front of the engine, 4mm T-handle hex.
2. Remove the cover by sliding it straight down.
3. Check the belt for cracks or shredding.
4. Check the belt tension, quite tight, ~1/4" deflection when you press on the center.

Note: Paul Graves suggests that proper belt tension is when you can twist the belt ~90 degrees, midway between the pulleys. If you can twist it more than 90 degrees, it is too loose. If you cannot twist it 90 degrees, then it is too tight.

5. Leave the cover off for the valve adjustment procedure on the next page.

Change Alternator Belt

Tools

T-handle hex – 4mm
socket – 13mm
ratchet
wrench – 13mm
torque wrench

Parts

alternator belt

1. Remove the four bolts holding the black plastic alternator belt cover at the front of the engine, 4mm T-handle hex.
2. Remove the cover by sliding it straight down.
3. Loosen the 2 nuts and 1 bolt, 13mm, that hold the alternator – one is on top and one is on each side, thus allowing the alternator to pivot down.
4. Remove the old belt. (Some bikes have a pipe that traps the belt – loosen it enough to get the old belt out and the new belt in)
5. Install the new belt being sure it is properly seated.
6. BMW calls for a tensioning torque of 5.9 ft.lb. (8 Nm) on the adjuster bolt on the left side of the bike. You have to get at this bolt from the alternator side and you may have to lift the tank. Alternatively, you can pry the alternator up with a large screwdriver to tension the belt.
7. Once the belt is under proper tension, tighten the 2 nuts and 1 bolt, 13mm, to 15 ft.lb. (20 Nm).
8. Check the belt for proper tension (see above) and proper seating alignment.

Valve Adjustment

Tools

T-handle hex – 3mm, 5mm, 6mm
plug wire cap puller
sparkplug socket
short extension
ratchet
rag
hex socket - 6mm
long thin screwdriver
box wrench – 10mm, 16mm (17 will work)
small flashlight
feeler gauges
sharp awl

Parts

none

1. Remember – engine cold!
2. Bike on centerstand.
3. Transmission in neutral.
4. Remove the black plastic valve cover protectors, if installed, using a 5mm T-handle hex wrench.
5. Remove the black valve cover strip by pulling outward on the end where the plug wire goes under it.
6. Pull the plug wire cap off the sparkplug using the special black plastic tool in your BMW tool kit.
7. Before removing the sparkplug, blow compressed air around the plug well – there is often dirt here that can fall into the cylinder when you remove the spark plug!!!

Note: If you do not have an air compressor, you can get a compressed air tank at any Xmart automotive department, or you can get a small can of compressed air at any photo or computer supply store.

8. Repeat again after turning the spark plugs a couple of turns.
9. Remove the spark plugs using the tool kit spark plug socket or 5/8 in. deep well very thin wall socket.

Warning!: It is very easy to get a spark plug socket stuck in the plug well. If your socket does not slide onto the spark plug easily, do not use it!!! Use the spark plug socket in the BMW tool kit instead. I welded a nut onto the end of my BMW socket so I could use a torque wrench on it when installing the spark plugs.

10. Place an oil drain pan under the valve cover.
11. Remove both valve covers using a 6mm hex socket and ratchet.

Note: Loosen the valve cover bolts until you can pull them part way out. They stay in the valve cover – do not try to pull them all the way out.

Note: The valve covers may stick slightly and you will need to tap them firmly with the palm of your hand or a rubber mallet.

Note: Be careful not to dislodge the black rubber vibration damper block in the bottom front of the valve adjustment area (not on some R1100GS).

12. Remove the black rubber timing hole plug, located above and behind the right side throttle body, using a long thin screwdriver to pry it off.
13. Turn the lower alternator pulley clockwise with a 16mm box wrench.
14. Insert a long screwdriver into the right side spark plug hole while turning the engine over.
15. When the screwdriver is almost pushed out the maximum, use a flashlight and start looking for the timing marks S – OT in the small timing window where you removed the rubber plug. (R1100GS = Z – S – OT)
16. Center the OT mark in the window.

Note: Also at OT, the arrow on the cam chain gear will be pointing straight out.

17. Wiggle the valve rockers in and out on both sides - both the intake and exhaust valve rockers for one side should wiggle slightly in and out, the rockers on the other side should be tight.
18. You will be adjusting the valves on the side where they all wiggle slightly as follows:

Valve Clearance

Intake = .006in. (.15mm)

Exhaust = .012in. (.30mm)

Valve Location

Intake Valves are to the rear (take air/gas in from the throttle body).

Exhaust Valves are to the front (exhaust to the exhaust pipes).

19. Adjust the proper valves, located as described above, using a 10mm box, 3mm hex T-handle, and feeler gauge(s) as given in the following steps.

Note: Each intake and exhaust has two valves each that are operated by a forked rocker. Correct procedure calls for you to use two identical feeler gauges simultaneously – one for gauging the valve you are adjusting, and the other as a spacer on the other valve. This is to prevent the rocker from canting while you are adjusting it. Many people get excellent results using only one feeler gauge and skip the spacer feeler gauge.

20. Insert the correct feeler gauge between the valve stem and the adjuster screw. There should be slightly firm drag on the feeler gauge – be sure that you do not have the gauge canted or curved as you are measuring.

Note: One method is to insert the feeler gauge and tighten the adjuster until the feeler gauge will not slide, then back off the adjuster a little until the feeler gauge begins to slide.

Note: You can use the “go, no go” method – a .008in. gauge should not go into the .006 intake; a .014 should not go into a .012 exhaust if adjusted properly. A .007 gauge will go into the .006 intake and a .013 gauge will go into the .012 exhaust, but will give a too tight drag.

21. If any valve needs adjusting, loosen the adjuster lock nut with a 10mm box wrench and turn the adjuster screw with a 3mm hex T-handle to get the correct clearance – slightly firm drag on the feeler gauge.

22. Slide the box wrench over the shaft of the 3mm hex T-handle and hold the adjuster screw with the 3mm hex T-handle while tightening the lock nut with the 10mm box wrench (6 ft.lb or 8 Nm)

Warning! It is very easy for beginning mechanics to strip low torque threads - eg. 6 ft.lb. Use a short grip on 10mm and smaller wrenches. It is also very easy to strip low torque threads with a torque wrench because many torque wrenches are improperly calibrated. Also, with click type torque wrenches it is very easy to not feel the click at low torque settings and then your torque wrench becomes a large breaker bar and you end up stripping the threads.

23. After tightening, double-check the clearance.

24. Rotate the engine 360 degrees to the same OT mark by turning the lower alternator pulley clockwise with a 17mm box wrench as in step 13.

25. Check the rockers on the other side for wiggle – they should all wiggle slightly

26. Now adjust the valves on this other side.

27. Clean the valve covers of any dirt or oil on its sealing edge.

28. Wipe the oil off the valve cover gasket to help ensure no oil leaks. Place it onto the head so that the edge with 3 notches goes to the top. Be sure all the notches are fit into the corresponding studs on the head.

29. Be certain the center donut gasket is in place on the valve cover!!!

30. Carefully replace the valve cover so as not to dislodge the center donut gasket.

31. Evenly tighten the 6mm hex bolts until they bottom out - 6 ft.lb (8 Nm).

32. Replace the small black rubber timing hole plug.

Warning! Be careful!!! It is fairly easy to push it all the way through. I use a sharp awl and stab the plug in the center to hold it. I then place the plug so its right lip is under the timing hole edge and then use a long thin screwdriver to push the left lip into place.

33. Leave the black valve cover strips and the valve cover protectors off until you are done with the spark plugs in the next procedure.

Spark Plugs

Tools

T-handle hex –5mm, 6mm
plug wire cap puller
sparkplug socket
short extension
ratchet
rag
hex socket - 6mm
small flashlight
spark plug gauge
torque wrench
anti-seize paste

Parts

spark plugs

1. The spark plugs were removed in steps 1 – 9 of the preceding valve adjustment procedure. Be sure to read the Warning! following step 9 of the valve adjustment procedure.
2. Replace plugs every 12K miles.
3. Visually inspect the spark plugs and check each for abnormalities – carbon or oil deposits, burned or cracked electrodes, etc.
4. If installing new plugs (every 12K miles), check that they are still set at the factory set gap of .031 in (0.8mm).
5. Very lightly coat the plug threads with anti-seize.
6. Install the plugs by hand using only the spark plug socket to avoid any possibility of crossthreading them.
7. Torque the plugs to 15 ft.lb.(20 Nm).
8. Push the spark plug wire caps firmly onto the spark plugs.
9. Replace the black valve cover strips by putting the two rear tits into place at the spark plug wire and then pushing the front in until it snaps into place.
10. Replace the valve cover protectors using the 5mm hex T-handle – start the bottom center bolt first - short screw goes to the front.
11. Replace the alternator cover – try to get the oil line brackets lined up first and start the top right bolt first since you may need to push the oil line bracket to get the bolt started – same with the bottom right bolt.

Air Filter

Tools

phillips screwdriver
rag
compressed air

Parts

air filter

1. Remove the rear and then the front seats.
2. Unscrew the two phillips screws holding the air filter cover down (some bikes have clips).
3. Pivot the cover up.
4. Remove the old filter and inspect it for damage or replace it with a new one.
5. Place a rag tightly over the air intake where the air filter sat and blow all the dirt and dead bugs out of the filter housing and air horn.
6. Insert the air filter being careful to seat it properly.
7. If the cover hinges came unhooked from their holes, pivot the cover up as high as it will go and hook the hinge tabs into their holes by pivoting the cover down.
8. Fasten the cover by tightening the two phillips screws (or clips).

Warning!: The air filter housing is a prime candidate for a mouse nest and the air filter for use as nesting material. Especially after winter storage be sure to check your air filter. Or screen off the air horn opening during storage so mice can't get in there in the first place.

Lube Side Stand and Center Stand

Tools

wire
grease gun
chain lube

Parts

none

1. Remove the debris from the small grease hole (not found on some R1100GS) at the rear of the pivot point on the side stand using a small wire or carb or brake cleaner if necessary.
2. Use a cone tip adapter on your grease gun to grease the side stand or use chain lube.
3. Spray the center stand pivot bushings with chain lube.

Lube and Adjust Clutch Cable (R1100GS)

Tools

phillips screwdriver

Parts

#10 grease

1. Adjust maximum slack at the clutch lever
2. At the rear of the transmission pry the clutch release arm to release the clutch cable there
3. Lube both ends of the clutch cable with BMW #10 grease
4. Reattach the cable at the transmission
5. Using the knurled adjuster at the hand lever adjust to 12mm between it and the knurled locknut
6. At the clutch release arm loosen the 13mm locknut using a 13mm deepwell socket and swivel
7. Adjust the 10mm bolt to give 7mm freeplay at the hand clutch lever
8. Pull in the hand clutch lever while tightening the locknut at the rear clutch arm

Brake and Clutch Fluid

Tools

phillips screwdriver
towel

Parts

brake fluid

Note: R1100GS does not have a hydraulic clutch. See previous procedure.

Note: Brake fluid can ruin the bike's paint, so cover the tank and any painted or plastic parts with a towel if you are adding or changing fluid!!!

Front Brake Fluid Reservoir

1. Put the bike on the centerstand.
2. Turn the handlebar straight ahead so the reservoir on the right handlebar is level.
3. Check the fluid level in the sight glass of the reservoir.
4. Add only DOT 4 brake fluid if the level is at or below the LOWER level mark.

Rear Brake Fluid Reservoir

1. Put the bike on the centerstand.
2. Check the fluid level in the rear reservoir which is located on the right side just below the seat.
3. Add only DOT 4 brake fluid if the level is at or below the LOWER level mark.

Note: If either the front or rear is low on fluid, be sure to check the brake pads for wear! As the pads wear, more fluid is taken into the system.

Clutch Fluid Reservoir

1. Same as Front Brake Fluid Reservoir above, but on the left handlebar.

Brake and Clutch Fluid Replacement – Bleeding the Brakes

Note: BMW calls for a fluid change annually. Good brakes are too important to skip this relatively straightforward procedure.

Note: There are some devices that aid in bleeding the brakes as you replace the fluid:

1. Mityvac is a small hand held vacuum pump that sucks the brake fluid down and out through the bleeder nipple at each brake caliper. It is available at most auto parts stores.
2. Speed Bleeder is a one way valve bleeder nipple that replaces your stock bleeder nipples. It is available at www.speedbleeder.com

3. One Man Brake Bleeder is a one way valve that attaches to your stock bleeder nipple via a hose. It is available at some auto parts stores.
4. A turkey baster is handy for removing the old fluid from the reservoir before you add the fresh fluid. Once you use it for brake fluid, do not return it to the kitchen.

Note: If bleeding by the standard method of pumping the lever, do not pull the lever all the way to the handlebar or you will force the caliper piston too far out and possibly ruin the seal. This applies to the clutch and rear brake as well.

Note: On the 1150 GS, BMW has a plug or grub screw instead of a bleeder nipple on the right front brake caliper and on the clutch slave cylinder. BMW wants you to replace these with a bleeder nipple to bleed the system and to then reinstall the grub screw when you are finished.

Note: For brake bleeding procedures see *R1100 Tune Up Manual* at <http://www.ibmwr.org/r-tech/oilheads/index.shtml>

Brake Pads

Tools

phillips screwdriver

Parts

brake fluid

Note: Check front and rear pads for wear and replace them if they have less than 1 mm of pad left. Remove the right saddle bag so you can do a good inspection of the rear pads. See the section on brake pad replacement.

Warning: Due to a sticky rear brake retaining pin, the rear pads can wear out in only a few thousand miles. Clean the pin with fine emery paper and lube it with anti-seize. See the section on brake pad replacement.

Note: If either the front or rear brake fluid reservoir is low on fluid, be sure to check the brake pads for wear! As the pads wear, more fluid is taken into the system.

Note: Be sure to check the brake fluid reservoir after replacing the pads as fluid is forced back into the reservoir by the new thicker pads – the reservoir may be too full.

Battery Inspection

Tools

flashlight, minimag
phillips screwdriver
hex socket – 6mm
ratchet

Parts

distilled H₂O

Quick Check Method

1. Place the bike on the centerstand.
2. Remove the front seat.
3. Hold a minimag flashlight right up against the battery, at the expected electrolyte level, and next to the cell you are checking.

Note: I have a 4 cell minimag type flashlight that is brighter and works somewhat better than a minimag.

4. Gently rock the bike so that the battery electrolyte sloshes back and forth. It is this movement of the electrolyte that you are able to see.
5. Repeat for the other cells.
6. If the electrolyte level is low, follow the Standard Method below.
7. Reinstall the front seat.

Standard Method

1. Remove the seats.
2. Remove the right side black plastic panel below the fuel tank.
3. Remove the fuel tank bolt, 6mm hex socket, right side of fuel tank – be careful not to lose the nut on the inside and the bushing in between.
4. Slide the tank straight back as far as it will go.
5. Check the battery electrolyte level from in front of the tank.
6. Fill to the max level with distilled water only – use a squirt bottle with a small hose attached.
7. Clean and grease the battery terminals.
8. Reinstall the fuel tank being sure the black rubber connectors at the front of the tank are in place.
9. Buy a sealed maintenance free battery and skip steps 1 – 8.
10. Leave the tank off if you are doing a fuel filter change.

Fuel Filter

Tools

siphon
empty gas can
rubber gloves
pencil
hex bit socket – 6mm
socket – 8mm
ratchet

Parts

fuel filter
large tank o-ring
2 small hose clamps
2 tiny hose clamps

Note: I have not done this procedure on an R1150GS yet, so the following is based on the procedure for my R1100R which should be similar.

1. Ride the bike until you are almost out of gas or siphon the gas from the tank.
2. Remove the seats.
3. Remove the right side black plastic panel below fuel tank.
4. Remove the fuel tank bolt, 6mm hex bit socket, right side of fuel tank.
5. Set the tank to the side of the bike – lawn chair with an old blanket to prevent scratching the tank.
6. With the tank on its side, remove the fuel pump plate, 8mm socket.
7. Disconnect the fuel overflow and vent hoses – the 2 small hoses inside the tank, noting which hose goes where.

Warning! Do not get any of the hoses mixed up! Label them.

8. Remove the pump unit from the tank.
9. Replace the fuel filter noting the direction of flow.
10. Reconnect the new fuel filter using the 2 small hose clamps.
11. Insert a new o-ring into the tank groove.

Note: The original o-ring swells and will not fit unless you let it “dry” for a few days.

12. Insert the pump unit into the tank.
13. Reconnect the 2 small hoses being sure to connect the striped hose to the striped hose using the 2 tiny hose clamps.
14. Evenly tighten the fuel pump plate, 8mm socket.
15. Install the fuel tank.
16. Check for any leaks

Miscellaneous

Tools

tire gauge
sockets
hex bit sockets
ratchet
torque wrench
powdered graphite
T-40 Torx bit socket

Parts

none

1. Check tires for nails, tread wear, damage, etc.
2. Check tire pressure.
3. Check rear wheel lug bolts, 17mm socket, torque to 105 Nm.
4. Check the front wheel – axle bolt, 30 Nm, - axle clamp bolts, 22 Nm.
5. Check all nuts and bolts.
6. Check all lights.
7. Check horn.
8. Check all air and oil hose clamps.
9. Check the throttle cables.
10. Check for debris in the throttle cable pulleys.
11. Check rotor rivets.
12. Lube locks with powdered graphite.
13. Check the front wheel bearing.
14. Check the rear wheel bearing.
15. Check the swing arm bearings.
16. Check the spokes front and rear – tap them with a box wrench, if they are properly tensioned they will “ping” at various pitches when tapped. If too loose, you will hear more of a thud sound – tighten the spoke until it pings, T-40 Torx. It is generally recommended that you do NOT try to true these wheels yourself, only tighten the occasional loose spoke.
17. Splines – it is generally considered that the splines do not require lube maintenance. If you find it necessary to do a spline lube see *R1100 Tune Up Manual* at <http://www.ibmwr.org/r-tech/oilheads/index.shtml> for a detailed procedure.

Sump Guard Removal

Tools

socket – 10mm
ratchet
channel lock pliers

Parts

loctite(?)

Note: Before you do the test ride, remove the sump guard (skid/bash plate) from the bottom of the engine in preparation for the oil and filter change after your test ride. It is much more pleasant to do before the engine is hot.

1. Remove the four nuts holding the sump guard on, using a 10mm socket and ratchet

Note: If the rear (or front) studs come out with the nuts, loctite the studs into the engine block after you remove the nuts. Once off, the nuts can be removed by holding the rubber spacer with channel lock pliers. The rear nuts are self-locking and will remove more easily after a few removals. (R1100GS may have the self-locking nylock nuts front and rear).

2. Clean the stones, dirt, and dried mud from the sump guard plates.

Note: If you do not ride your GS offroad, you can consider leaving the sump guard plates off permanently for easier oil changes.

Test Ride Bike

1. Take the bike out for a test ride, ~15 min., to get the bike to operating temperature for the throttle body sync and fluid changes in the next several procedures.
2. After the ride, check for oil leaks around the valve covers.

Hot Engine and Drivetrain Procedures

(i.e. normal operating temperature)

Throttle Body Sync

Tools

Twin Max or carb stix
screwdriver, flat blade
needle nose pliers
wrench, 10mm
house fans

Parts

none

Note: If you are doing this procedure for the first time, you should seat the brass bypass screws and record the number of turns for each. Return the screws to where you found them. Also make a note of the number of threads at some reference point on the right throttle body cable adjuster. All this is so you can get back to the same starting point if you mess up.

1. Engine hot at the normal operating temperature of 5 bars on the RID.
2. Bike on the centerstand, transmission in neutral.

Note: If you are experienced with this procedure, it only takes a couple of minutes – including several double checks. If you have never done a throttle body (TB) sync or your TB's are really out of sync, it could take much longer and you should place 1 or 2 house fans blowing on your engine to help keep it from overheating.

Note: You may need to slacken the throttle body cables. See *R1100 Tune Up Manual* at <http://www.ibmwr.org/r-tech/oilheads/index.shtml>

3. Turn on the Twin Max to warm up it up to help prevent drifting from the zero calibration setting.
4. Remove the vacuum hoses from the bottom of each throttle body (TB).
5. Attach the Twin Max hoses to each TB, left hose to the left TB, right hose to the right TB.
6. Calibrate the Twin Max by setting the sensitivity to max and then zero the needle.

Idle Speed Adjustment and Balance

7. Start the engine.
8. Turn the Twin Max sensitivity down if the needle is fluctuating too much, but get it back to or close to maximum sensitivity as you do the final adjustments.

9. Adjust the large brass bypass screw on each TB to get an idle speed of ~1100rpm
 - turn both out, counterclockwise, to increase the idle speed
 - turn both in, clockwise, to decrease the idle speed.
10. Adjust the same large brass bypass screw on each TB to get the Twin Max to zero i.e. to balance the TB's at idle. You can turn just one of the screws for a minor adjustment, or both screws in opposite directions if the balance is off quite a bit. The screws should be within ~1/2 turn of each other when you are finished.
11. Shut the engine off and recheck that the Twin Max is still calibrated to zero.
12. Start the engine and double check the idle speed adjustment and balance.

“High” Speed Balance

Note: It used to be recommended to do this adjustment at ~3000 - 4000 rpm or normal cruising rpm where surging would be most noticeable. However, Paul Graves points out that an adjustment at just off idle will be more accurate because any difference between the throttle plates, left to right, will be a higher percentage difference in the airflow and vacuum.

12. With the grip throttle, raise the rpm's to just off idle, ~1500 rpm.
13. The Twin Max needle should remain at zero, if not you will need to adjust the right side throttle body cable.
14. Loosen the right TB cable locknut, located just to the left of the right TB, using a 10mm wrench.
15. To get zero at off idle, turn the adjuster on the above cable as follows:

clockwise – moves the Twin Max needle left
counterclockwise – moves the Twin Max needle right

Note: Since the adjustment usually changes when you retighten the locknut, it may be easiest to turn the adjuster a little in the correct direction eg. 1/8 turn, and then tighten the locknut with the 10mm wrench while holding the adjuster with needle nose pliers. Now look at the Twin Max to check your adjustment at off idle. Keep repeating small changes of the adjuster and tightening the lock nut until you have zero at off idle.

16. Turn the engine off and recheck that the Twin Max is still at the zero calibration.
17. Start the engine and do a quick double check of the idle speed adjustment and the off idle (high) speed adjustment.
18. Turn the engine off and remove the Twin Max hoses from the TB's.
19. Reconnect the vacuum hoses to the TB's.

Note: For more detailed instructions see *R1100 Tune Up Manual* at <http://www.ibmwr.org/r-tech/oilheads/index.shtml>

Engine Oil and Filter Change

Tools

oil filter tool
hex bit socket – 8mm
ratchet
torque wrench
rubber gloves
funnel
oil drain pan
rag

Parts

oil – 4 qts.
oil filter
crush washer - drain plug

1. Remove the sump plates (skid/bash plates) – see page 18 for instructions.
2. Be sure the engine is hot (go for a short ride).
3. Place the oil drain pan under drain plug (bottom right side of engine).
4. Wear rubber gloves - oil is carcinogenic, plus when you accidentally touch the hot headers!!! or get hot oil!!! on your hands it won't hurt as much.
5. Remove the oil drain plug located to the right of the oil filter, 8mm hex bit socket.
6. Remove the oil filter, oil filter tool and ratchet.
7. Remove the oil filler cap to help draining.
8. Let drain for ~10 min.
9. Use the rag to remove any dirt from around the drain plug area and from the oil filter well.
10. Install the drain plug with a new crush washer and torque to 23 ft.lb. (32 Nm).
11. Fill the new oil filter with fresh oil.
12. Apply a thin coat of oil to the new oil filter rubber gasket.
13. Install the new oil filter and give it $\frac{3}{4}$ - 1 turn after first contact.
14. Add 3.75 – 3.9 qts. of oil total (NOT 4 qts.!!!) using a funnel or oil spout.
15. Install the oil filler cap.
16. Run engine at idle for 2 – 3 min.
17. Wait ~10 min. and check to be sure the oil level is at the dot in the center of the sight glass.
18. Check for any oil leaks at filter and drain plug.

Note: You may get more consistent oil level readings if you put the bike on the sidestand for a few minutes and then put it on the centerstand.

Transmission Gear Oil Change

Tools

hex bit socket – 8mm
socket – 13mm
ratchet
short extension
oil drain pan
carb or brake cleaner
torque wrench
clear tubing (tygon)
funnel
measuring cylinder (photo store)
rag

Parts

gear oil, synthetic (75W/90) 1000cc
crush washers
- drain plug
- fill plug

1. Put the bike on the centerstand.
2. Place the oil drain pan under the drain plug.
3. Remove the drain plug on the right side of the transmission just above the brake pedal, 8mm hex bit socket. (R1100GS transmission drain plug is just below the fill plug, hidden up the “tunnel”, 13mm socket).
4. Remove the fill plug on the right side of the transmission just above the drain plug, 8mm hex bit socket.
5. Clean the metal filings from the magnetic drain plug using a rag and carb or brake cleaner.
6. Install the drain plug using a new crush washer, torque to 22 ft.lb. (30 Nm). (Some R1100GS do not use a crush washer on the transmission drain plug). (Some R1100GS torque the drain plug to 17 ft.lb. (23 Nm)).
7. Fill the transmission with 1000cc (1.06 qt.) of synthetic gear oil using the flexible tubing and a funnel – fill to the bottom edge of the filler hole. (Some R1100GS specify 800cc – check your owners manual)

Note: I use tygon tubing from the hardware store – one end goes into the fill hole and a funnel is inserted into the other end.

8. Install the fill plug using a new crush washer, torque to 22 ft.lb. (30 Nm) (Some R1100GS torque the fill plug to 17 ft.lb. (23 Nm)).

Rear Wheel Drive Gear Oil Change

Tools

socket – 19mm
hex bit socket – 6mm
ratchet
oil drain pan
carb or brake cleaner
torque wrench
funnel
measuring cylinder (photo store)
rag

Parts

gear oil, synthetic (75W/90) 250cc
crush washers
- drain plug
- fill plug

1. Put the bike on the centerstand.
2. Remove the right saddle bag.
3. Place the oil drain pan under the drain plug.
4. Remove the drain plug on the bottom center of the rear wheel hub, 19mm socket.
5. Remove the fill plug at the rear of hub, 6mm hex bit socket.
6. Clean the metal filings from the magnetic drain plug using a rag and carb or brake cleaner.
7. Install the drain plug using a new crush washer, torque to 17 ft.lb. (23 Nm).
8. Fill the rear wheel drive with 250cc (0.26 qt.) of synthetic gear oil using a funnel – fill to the bottom inside edge of the filler hole threads.
9. Install the fill plug using a new crush washer, torque to 17 ft.lb. (23 Nm).

Sump Guard Installation

Tools

socket – 10mm
ratchet

Parts

none

1. Reinstall the sump guard (skid/bash plates), 10mm socket.

Note: The front nuts with their metal sleeve will tighten up normally. However, the rear nylock nuts will not get tight because of the rubber spacers above the plates – so just tighten them until they are snug. (R1100GS may have the self-locking nylock nuts front and rear).

Other Procedures

Brake Pad Replacement

Tools

hex bit socket – 8mm
ratchet
hammer
punch (nail?)
screwdriver, flat blade
torque wrench

Parts

brake pads

Note: I have not done this procedure on an R1150GS yet, so the following is based on the procedure for my R1100R which should be similar.

Note: Many riders are particularly pleased with EBC pads which can be ordered through any motorcycle dealer from Tucker-Rocky.

Front Pads (2 sets) - - - - - all R1100's = EBC # FA246

Rear Pads - - - - - GS, R, RT = EBC # FA245

- - - - -RS = EBC # FA171

The EBC pads may not be a perfect fit. The front pads may need very gentle filing where they touch in the top inside corners (see where the paint is worn off on the OEM pads). The top rear corner of the rear outside pad needs some grinding or filing so that it fits - hold the EBC pad back to back with the opposite OEM pad (inside pad) to see where and how much of the backing plate to remove. This may sound like a hassle but it is quite easy to do.

Note: Anti-rattle springs - Some riders remove the anti-rattle springs from the original OEM pads by drilling them out and then riveting them to the new EBC pads which do not come with springs.

Note: Several riders on the GS list have reported that they are pleased with the Galfer pads and the EBC HH pads.

Note: Be sure that your front brake reservoir is not over full - less than max! You do not want to force brake fluid out the reservoir when installing the new pads! Cover your fuel tank as a safety measure to prevent accidental overflow of brake fluid from eating your paint!!!

Note: Pay special attention to the rear outside pad when inspecting for wear as many riders are wearing this pad out as early as 6K miles!

Front

1. Place the bike on the centerstand.
2. Remove the front caliper bolts that hold it to the fork leg, 8 mm hex bit socket
3. To remove the caliper, gently rock it back and forth on the rotor to spread the brake pads.

Warning! Do NOT compress the front brake lever while the calipers are removed!

4. Remove the keeper from top of the caliper with pliers.
5. Drive out the pin from wheel side with a hammer and punch
6. Remove the old pads.
7. Push the wheel cylinders in all the way with your thumbs.
8. Insert new pads (no anti-rattle spring on EBC pads).
9. Drive in the pin, turning it with a screwdriver so the keeper hole is on top.
10. Insert the keeper
11. Spread the pads again if necessary.
12. Install the caliper onto the rotor.
13. Install the caliper bolts, torque to 30 ft.lb. (40 Nm).
14. Pump the front brake lever until pressure returns!!!!
15. Repeat for the other front caliper.
16. Pump the front brake lever until pressure returns!!!!
17. Check the brake fluid level in the front reservoir.

Rear

Warning: Due to a sticky rear brake retaining pin, the rear pads can wear out in only a few thousand miles.

1. Place the bike on the centerstand.
2. Remove the saddlebags.
3. Remove the keeper from the pin.
4. Drive out the pin from the keeper side (drive toward the wheel).
5. Remove the caliper bolts that hold it to the rear drive, 8 mm hex bit socket.
6. To remove the caliper, gently rock it back and forth on the rotor to spread the brake pads.

Warning! Do NOT compress the rear brake pedal while the calipers are removed!

7. Remove the old pads.
8. Grind or file the EBC pads to fit (see note above).
9. Insert new pads.
10. Clean the pin with fine emery paper and lube it with anti-seize.
11. Drive the pin in.
12. Insert the keeper.
13. Install the caliper onto the rotor.
14. Install the caliper bolts, torque to 30 ft.lb. (40 Nm).
15. Pump the rear brake pedal until pressure returns!!!!
16. Check the brake fluid level in the rear reservoir.

Tire Change

Tools

hex bit socket –6, 8mm
ratchet
socket – 17mm
screwdriver
pencil
wood frame of 2x2” (16” sq. OD)
bead breaker (JC Whitney)
balancing stand (homemade)
tire irons, 3
tire lube
paint brush (for applying lube)
valve core tool
heavy rubber mallet
razor knife
dish soap
compressed air supply
alcohol
rag
torque wrench
short extension
rear wheel axle adapter (BMW)
axle to fit adapter (BMW)
tape
grease

Parts

tires
wheel weights

Front Wheel Removal

1. Place the bike on the centerstand.
2. Weight the rear of the bike so it will not rock forward.
3. Remove both sets of calipers, 8mm hex bit socket to remove the 2 bolts holding each caliper to the bottom of the fork leg
4. To remove the caliper, gently rock it back and forth on the rotor to spread the brake pads.

Warning! Do NOT compress the front brake lever while the calipers are removed!

5. Remove the axle “nut” (bolt) from the left end of the axle, 17mm socket
6. Loosen the axle clamp bolts several turns, 6mm hex bit socket.
7. Note carefully the orientation of the speedometer drive unit so you get it installed correctly later on!!!
8. Insert a screwdriver into the end of the axle and pull and twist to remove the axle while supporting the tire (watch for the spacer on the right side).
9. Roll the wheel out.
10. Now is a good time to take a good look at the brake pads.
11. Check the front wheel bearing.

Front Tire Change

Hints: Warm the tires in the sun! A warm tire goes on much more easily. When levering the last of the tire bead onto the wheel, be absolutely certain the opposite bead is not seated but rather squeezed into the middle of the wheel. Put just the wheel, no tire on it, on the balancing stand and check for the heavy spot and use that rather than the tire stem for the heaviest spot.

Tire Removal

1. Place the wheel on the wooden support frame to prevent rotor damage (or remove the rotors, 5mm hex bit socket).
2. Mark the direction of rotation on the wheel so you don't put the new tire on backwards!
3. Remove the valve core with the valve core tool being careful not to let it get launched.
4. With the wheel in the wooden frame, break the bead all around on both sides with the bead breaker being careful that it does not slide into the wheel and scratch it
5. Lube the bead on one side with tire lube.
6. Pry off the first side with 2 or 3 tire irons (tape them with electrical tape or duct tape to avoid scratching the wheel).

Note: The GS has very thick rim edges and regular rim protectors do not fit. Also because of the thick rim edges, tire irons tend to slip off unless you insert them a little farther than usual.

Note: There is a bit of a trick to getting the second side off. Proceed as follows:

7. Lube both sides of the second bead extra well – this is the hard one to remove.
7. Stand the tire and wheel vertical
8. With 1 or 2 tire irons reach into the wheel and pry the second side over the edge of the wheel (pry it part way off) and hold it there under tension.
9. Take the heavy rubber mallet and pound the tire off the rest of the way.
10. Clean the wheel of any dirt. Clean off any old rubber from the wheel where the tire seals.
11. Remove the old wheel weights with a razor knife and alcohol.
12. Balance just the wheel to confirm (or not) that the valve stem is the heaviest spot. Mark the heavy spot if different than the valve stem.

Tire Installation

13. Align the painted tire balance dot with the tire stem or heavy spot on the wheel!!! and the correct direction of rotation!!!
14. Lube the first bead of the new tire and push it on with hands, knees, feet and tire iron.

15. Lube the second bead and push it down with hands, knees, feet ~ $\frac{3}{4}$ the way on.
16. Using three tire irons pry the tire on the rest of the way - the real secret is to be sure the opposite side of the tire is squeezed into the center of the wheel (use bead breaker if necessary).
17. Double check alignment of tire balance dots with the valve stem!!!
18. Double check the direction of rotation.
19. Insert the valve core, inflate to seat tire, inflate to 40 psi – you should hear a loud pop as each side seats.
20. Mix up some soap bubbles and check the bead/wheel seal on both sides and check the valve core for leaks.
21. Check that the thin tire ridge is evenly spaced all the way around the wheel.

Front Tire Balance

1. Insert the axle into the wheel and place on the balancing stand.
2. Determine balance by taping assorted weights to the wheel.
3. Precurve the whole weight ribbon to same curvature as the wheel.
4. Clean the wheel with alcohol before sticking the weight on.

Front Wheel Installation

1. (Reinstall the rotors if you removed them, 24 Nm plus Loctite 243).
2. Grease the axle lightly.
3. Roll the wheel in – geared ABS teeth to the left side of the bike.
4. Lift the wheel slightly and start the axle from the right side of the bike and insert the right side spacer and the left side speedo drive - the tab on top of the speedo drive goes in front of the tab on the inside of the left fork leg.
5. Tighten the axle nut (bolt), 17mm socket, torque to 22 ft.lb.(30 Nm).
6. Gently pry the brake pads apart with a tire iron.
7. Install the calipers, 8mm hex bit socket, torque to 30 ft.lb (40 Nm).
8. Pump the front brake lever until pressure returns!!!!
9. With the bike off the centerstand compress the front forks several times with the rear brake applied.
10. With the bike on the sidestand tighten the axle clamp bolts, 6mm hex bit socket, torque to 16 ft.lb (22 Nm).
11. Pump the front brakes!!!

Rear Wheel Removal

1. Place the bike on the centerstand.
2. Block up the bike under the catalytic converter so the rear tire is up off the floor
3. Put the bike into first gear.
4. Remove both saddlebags.
5. Remove the rear brake caliper by removing the caliper bolts that hold it to the rear drive, 8 mm hex bit socket.
6. To remove the caliper, gently rock it back and forth on the rotor to spread the brake pads.

Warning! Do NOT compress the rear brake pedal while the calipers are removed!

7. Remove the 4 wheel lug bolts and cone spacers, 17mm socket.
8. Roll the wheel out.
9. Check the rear brake pads.

Rear Tire Change

1. Same as the front.

Note: The rotor is recessed from the outside of the rim and should be OK without using the wooden frame, but be careful.

Rear Tire Balance

1. Same as the front EXCEPT:
 - a. Pry or push out the plastic hub cap in the center of the wheel.
 - b. The rear tire can be a real bear to get on – helps to have a long 18” tire iron.
 - c. To balance, attach the four hole axle adapter to the rear wheel using the lug bolts and spacer cones.
 - d. Reinstall the little plastic hubcap.

Rear Wheel Installation

1. Gently pry the brake pads apart with a tire iron.
2. Roll the wheel into place.
3. Install the 4 lug bolts and cone spacers, 17mm socket, FIRST torque to 37 ft.lb. (50 Nm) THEN final torque to 77 ft.lb. (105 Nm).
4. Install the caliper, 8mm hex bit socket, bolt + lockwasher goes to the rear, bolt only goes through the ABS wire bracket, torque to 30 ft.lb (40 Nm).
5. Pump the rear brake pedal until pressure returns!!!!