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Motorcycle Grease, Oil and Filters

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Grease

General Purpose Grease

Grease has several uses on a motorcycle. It's there to protect parts from water, to keep rubber and plastic seals from drying out, and to provide lubrication. Generally speaking, grease is just a reduced fat. In fact, you can find several companies who call their grease bases "soap."

The choice for a general purpose grease to protect from water, keep seals moist, and provide lubrication is easy. If you're going to do your own maintenance, I recommend you get Mobil-1 or Valvoline synthetic grease for general purposes, about \$6 / pound anywhere. This stuff can handle temperatures higher and lower than you'll ever get near. A one pound jar should last you about 15 years.



Shaft Drive Maintenance

There are two types of maintenance you must do on a shaft drive bike. At your rear wheel there are pinion gears where the spinning drive shaft motion is turned 90 degrees into the rear wheel motion. These gears are bathed in oil which much be changed after break in, and about every 10,000 miles thereafter. Honda says this gets done the first time at 12,000 miles. Don't believe it. Do it at about 1,000, and when you see what comes out you'll decide to do it again in about 250 miles to flush the rest of the garbage out.

Also, a shaft drive bike will have splines on each end of the drive shaft, and on a large ring which transmits the power to the rear wheel. These splines must be lubricated. This is a rather tricky subject, as the lubrication requirements of splines are very different from gears or bearings.

Gear Oil

The Recommended Synthetic Gear Oils

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AMSOil Mobil 1 Valvoline
AGL 75w 90 75w 90 75w 90

AMSOil AGL sae 75w-90 synthetic gear oil, about \$8 / quart.

Mobil-1 75w-90 synthetic gear oil, about \$8 / quart at Autozone.

Valvoline 75w-90 synthetic gear oil, about \$8 / quart at Autozone.

How to Change Your Drive Gear Oil



Put the bike on the center stand. Place a large flat metal pan under the rear wheel, like a cookie sheet. This process is a bit messy. Remove the 17mm bolt on the bottom of the rear wheel hub. Next, remove the inspection plug, 17mm large bolt at the rear of the hub. If your drain plug is magnetic, make sure to clean it completely. Replace the drain plug. To fill, get 70 or 80 weight gear oil, and put it into the inspection hole until it comes back out. About 160cc, about 1/6 quart. You may as well buy good synthetic oil, a quart is good for 5 changes.

How to put a bike onto its center stand:



Walk up to the bike, get next to the passenger seat facing the bike. Place your left foot on the center stand, grab something sturdy on the bike with your left hand. With your right hand, grab the passenger hand rail. Gently push the center stand down with your foot until the leg touches the ground. Tip the bike upright until you feel the other center stand leg also touch the ground. Stand with nearly all your weight on your left leg, and pull mostly up and a little back with your hands. Your leg should be doing 85% of the work, there should be very little strain on your back. Once the bike starts moving, it should suddenly feel very light. If the bike stops halfway up, it should take only a gentle pull with your hands to get it the rest of the way up. Normally, once it starts moving you can quit pulling with your hands and your leg pressure will simply glide it up.

Spline Lubricants

You need to grease your drive splines each time you change your rear tire. This is true for all shaft drive bikes, regardless of brand. This is a real issue: ask any BMW rider, or any old-time ST1100 or GL high mileage type, and you'll likely get a whole lecture about spline maintenance. The lecture may or may not be informed, but it will demonstrate real concern.

The drive splines get surprisingly hot. Additionally, there's a lot of pressure on the splines and a lot of back and forth sliding motion. Any liquid type of grease will quickly be squeezed out of

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the splines, and leave you with no protection. The first time you remove your rear tire, you will likely find that the factory grease has dried out completely and solidified into something which does not even remotely resemble a lubricant. Actually, if it's a good Moly grease, it's still doing its job in this form, but it's not a pretty sight.

Honda specifies a spline grease which is 60% molybdenum disulfide ("moly"). Moly is a dry lubricant which bonds to the metal surfaces, offering lubrication properties even when the parts have squeezed everything liquid out. A lot of greases now say "Moly" on the container, but you must be careful about this. Ford and Caterpillar specify moly greases for particular applications, but the requirement is for 3% moly, not even close to the 60% requirement of Honda. It's not enough to buy a moly grease, what you really want is basically dry moly in a grease-like carrier which makes it easier to apply.

These days, most BMW shops seem to be using the Honda moly paste on drive splines. I have no idea what Kawasaki, Yamaha, or Suzuki dealers are doing, but if it's anything like what most Honda dealers are doing, it's simply not acceptable. My informal survey of Honda shops, backed up by observations from several other riders, has convinced me that essentially none of them use Moly-60. They use the cheapest brake and drive shaft grease they can buy.

If you let a dealer or shop change your rear tire, be certain they are using Moly-60 paste or Krytox, or you're going to be needing new drive splines in about 50,000 miles. Guaranteed. I recommend you remove and replace your own wheels, leaving the spline cleaning and lubrication up to you. If you want nothing to do with this, then I recommend you have a talk with your favorite mechanic before tires come up, and buy your own tube of lubricant if necessary.

Moly greases with 60% + molybdenum disulfide content:

- Honda Moly 60 paste, \$9 for 3oz, pn 08734-0001 at your Honda dealer, or \$8 from Kim Leong, STOC 3073, [California Sport Touring](#).
- LocTite Moly paste, 65% molybdenum disulfide. \$20 for an 8oz tube from [Enco](#), part #505-1197, 800-873-3626
- TS-70 Moly Paste, 4 oz. ctg. \$14 from [TSMoly](#). (800) 508-5545

An alternative to moly is the new poly-flourinated lubricants made by DuPont called **Krytox Teflon Bearing Grease**. These chemicals are simply magic. They have almost no known solvents, are chemically inert, and don't burn at any temperature, even in a pure oxygen atmosphere. This is pretty clearly the only grease to use. See [this article](#). Nascar mechanics have found that Krytox grease can reduce the temperature of spline joints on drive shafts by 150°. Also, this stuff lasts forever. It is, unfortunately, quite expensive.



*In oven at 232°C
(448°F) for 40 hr:
Hydrocarbon—40% wt loss*



Hydrocarbon-based lubricants burn; Krytox® does not.

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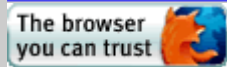
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*In oven at 232°C
(448°F) for 40 hr:
Krytox®—0% wt loss*



*Krytox® grease
in hydrocarbon
solvent is not
dissolved.*

Krytox is compatible with moly - in fact DuPont sells a high pressure Krytox which mixes the two. You may hear some horror story from some mechanic about mixing greases and the result turning radioactive or some such. Don't worry, it won't happen with moly or Krytox.

Krytox greases:

- DuPont XHT-AC extra high temperature anti-corrosive Krytox. \$30 for a 2oz tube, pn 10195K25; \$113 for an 8oz tube, from [McMaster Carr](#).
- DuPont XHT-BDX extra high temperature extra bonding Krytox. \$63 for a 2oz tube pn 10195K22; \$230 for an 8oz tube pn10195K24 from [McMaster Carr](#).
- Loctite Krytox HyperLube, pn 29711. about \$35 for two ounces.

How to lubricate your drive shaft splines



Hint: This is a quite messy job. If you get some spray shaving cream and rub it into your hands and wrists, it will seal your skin and pores with silicon lubricant. Later, when you're all done, this will make cleaning up your hands a lot easier.

With your rear wheel off the bike, the drive splines will be exposed. They're the brass color

bumps in the middle of the drive ring, above right. Clean off any factory stuff with a rag. You will likely need some solvent like Kerosene or Gasoline to get them clean. Now put Moly-60 paste or Krytox on the exposed splines. The idea here is to more or less paint the splines - you're not looking for a large volume of grease, like you would use on a wheel bearing. You want an amount of grease about the size of a pea. It's helpful to use a clean popsicle stick to spread the grease. Try not to get too much on your hands, neither the Krytox nor the Moly greases clean off very easily.

At the first tire change, you should also remove the rear drive system from the swing arm and clean and lubricate the splines on the drive shaft. After the first time, this should be done about every 50,000 miles or so.

Drive Chain Maintenance

Drive chains need a few types of maintenance. It's important to keep the chain and the sprockets clean, as any dirt on your chain will likely work its way into the chain and cause wear. Modern chains are internally lubricated, and have o-rings to keep the lubricants inside. The o-rings need to be kept clean, the rubber kept fresh and moist. The side plates on the chain need some lubrication. Finally, the chain itself stretches over its life, and needs adjustment from time to time.

How to Clean Your Drive Chain



Put your bike on the center stand. If your rear wheel is off the bike, you can pull the sprocket assembly off the wheel. It will just pull off, it's held on by friction with the rubber dampers, there's no bolts. Put the sprocket assembly back on the chain, and put the rear axle through it. Put the motor in neutral, and you can now easily move the chain back and forth. If you don't have a center stand, you can often place a jack under the rear shock linkage and lift the bike onto the jack, side stand, and front wheel enough to spin the rear tire. A half inch of clearance from the rear tire to the ground is plenty.



This is a quite messy job. If you get some spray shaving cream and rub it into your hands and wrists, it will seal your skin and pores with silicon lubricant. Later, when you're all done, this will make cleaning up your hands a lot easier.

Use a rag saturated with WD-40. Don't use gasoline, this will ruin your o-rings. Spin the rear tire slowly while holding the rag against the outer sides of the chain to get the worst of the dirt off. You can also use the same rag to get the grease and dirt off of the rear sprocket and the wheel rim. Now, spin the wheel faster and spray WD-40 directly into the links. This will clean out the side plates and keep the o-rings lubricated and conditioned.

Finally, when the chain is clean and lubricated with light oil, you can seal the chain with a chain wax, such as Maxima or Castrol. Or, you can use Bel-Ray Super Clean chain lube, which has a very good reputation on street bikes. I don't recommend other chain lubes for street use - they seem to pick up more dirt and just make things worse.

Your owners manual will tell you how to adjust your chain. The chain should have roughly 1 1/2" to 1 1/2" (30mm to 35mm) play in it halfway between the sprockets. There will likely be a colored marker on your swing arm that tells you when your chain has stretched to its useful limit.

Chain Oilers

There are electric chain oilers available, but they're \$100 - \$150, and people who have them seem to have mixed feelings about them. Seems like a lot of complexity to me just to drip a bit of oil. The electric products below use piston pumps. This is unfortunate, as any lab rat can tell you this application is crying out for a peristaltic pump. Simpler, less noise and vibration, no moving parts contact the oil. But a bit pricier.



[Scott chain oiler](#) Piston pump, self-priming. About \$100 - \$170.



[Hawke chain oiler](#) Piston pump, self-priming. About \$150.



[Motrax Lubetronic chain oiler](#) Piston pump, self-priming. About \$80. Control unit to adjust oil flow, about \$40.



✓ [Loobman chain oiler](#) Squeeze the bottle a couple times a day, the oiler does the rest. Gravity feed, no electrics, no moving parts. About \$35. I use one of these, I like it.

Chain Breakers



Most modern chains are endless - they have no master link. To change the chain, your owners manual will tell you to remove the swing arm. This is neither necessary nor fun. You can get a chain breaking / forming tool from [J.C.Whitney](#) or <http://www.1888fastlap.com>. Call them for a free catalog. I recommend the Emgo / Motion Pro tool shown above. To replace your chain, first break the old chain, anywhere will do. Tie one end of the new chain to the old chain using string or light wire, and pull the new chain through the countershaft sprocket. Pull the new chain about until the two ends are next to each other at about 2 o'clock on the rear sprocket. You'll have to loosen up your rear axle to accomplish this. Put the master link through the two ends, then use your chain tool to rivet the new chain together.

Make your own Rear Tire Stand.





Get a section of 1½" PVC. Notch the end to fit your swing arm. Don't forget to lock your front brake first. Idea and photo by Paul Fox.

How to align your chain.



Your swing arm almost certain has chain alignment marks on the two sides. However, these are notoriously inaccurate. Much better is to either align your rear wheel using the string method (see Rear Wheel Alignment above) or prop up your rear wheel, and spin it a few times while sighting along the chain and rear sprocket. The rear wheel is aligned when the sprocket teeth stay centered in the middle of the chain.

Engine oil

Executive summary: The commercial grade oils are clearly superior to the mass market oils. For the best protection in your bike or car, use Shell Rotella Synthetic, available at Wal-Mart in blue containers for \$13 / gallon. For the best petroleum oil you can buy, get Shell Rotella T, Mobil Delvac 1300, or Chevron Delo 400, about \$7 / gallon at any auto parts store. On the back of most oil cans is a circular stamp with the certification. Avoid oils that say "energy conserving" in the bottom half of the donut. These oils contain friction modifier additives that could cause clutch slipping over time. All XXw-20 and XXw-30 oils are energy conserving, and should not be used in your motorcycle. 10w-40 oils should not be used in a motorcycle that runs the engine oil through the transmission. Don't buy any oil additives like STP or Slick-50. Here's several pages [All About Oil](#) justifying these conclusions.



I use Rotella-T Synthetic 5w-40 in my ST1300 and DL650.

The Recommended Synthetic Oils



Shell
Rotella
Synthetic
5w-40

Delvac 1
Synthetic
5w-40

Mobil-1
SUV/Truck
Synthetic
5w-40

AMSOil
AMF
Synthetic
10w-40

Golden
Spectro
Synthetic
10w-50

Motul
5100
Synthetic
10w-40

Mobil-1
Synthetic
15w-50

Mobil-1
MX4T
Synthetic
10w-40

The best synthetics are: (in no particular order)

- Shell Rotella-T Synthetic 5w-40 (blue container, not white), \$13 / gallon at Wal-Mart.
- Mobil Delvac-1 5w-40 (grey container, not black), \$27 / gallon at [Petro stations](#), \$20 / gallon at Farm and Fleet.
- Mobil-1 SUV 5w-40, about \$5 / qt anywhere.
- [AMSOil](#) AMF 10w-40 synthetic motorcycle oil, about \$6 / qt.
- Golden Spectro Supreme, (no price).
- Motul 5100 Ester, (no price).

For temperatures below -40, I strongly recommend either Mobil-1 0w-30 or the Canadian Shell 0w-40 Rotella. At these temperatures, your car is your life. Using cheap or incorrect oil is risking your life.

For temperatures below -55c, -65f, stay home. Really.

The Recommended Petroleum Oils



Chevron Delo 400
15w-40

Delvac 1300
15w-40

Shell Rotella
15w-40

The best petroleum oils are: (in no particular order)

- Chevron Delo 400 15w-40 (blue container) \$7 / gallon at any auto parts store, \$34 / 6 gallons at Costco.
- Mobil Delvac 1300 15w-40 (black container) \$6 / gallon at any auto parts store, \$21/ 4 gallons at Sam's Club.
- Shell Rotella-T 15w-40 (white container) \$7 / gallon at Wall-Mart or any auto parts store, \$34 / 6 gallons at Sam's Club.

If you live in another country, you'll have to do a bit of research to decide on an oil. Generally, any oil certified for use in a late model Volkswagen or Mercedes turbo diesel is a good choice. Another good idea is to go to a truck stop and ask the truckers about brands. Rotella is

marketed all over the world, but in other countries it's called Rotella or Rimola or Helix Ultra, and the formulation may be a bit different, depending on local climate and preferences. It will likely also be a lot more expensive than it is here.

How to Change Your Oil



Draining the oil: Put the bike on the center stand and remove the drain plug. It's on the lower left front corner of oil pan. It's good to have the oil a little bit warm. Start with the bike cold, but let the engine idle for about two minutes, until one or two bars show on the temperature gauge.

Filling the oil: Remove the inspection cover from the tupperware, right panel just behind the cylinder heads. To do this take a small object, your key will do, and push the plastic retaining pin center stub in 1/8". Then the whole retaining pin will pop right out. Take the retaining pin apart. To put the retaining pin back in, put the female part into the plastic piece, then the center part last. The tupperware has a tab on the top. You'll figure it out. Now, remove the spark plug cover. It's the plastic piece about 8" long 3" wide on top of the cylinders. Pull up the back edge - it's held on with one rubber plug. Now, push the whole piece forwards 1/4". There are two little fingers on the front of the plastic piece that hook under. The oil fill is the obvious plastic knob right there. You will need a foot long funnel. Pour in 1 gallon and forget about measuring - this is correct.

How to Check Your Oil Level



The ST1300 takes four quarts of oil. To read the oil level correctly, you must start the engine and let it idle until the engine and oil are warm - three bars on the temperature gauge. Then shut off the engine, and wait three minutes for the oil to drain down to the oil pan. Read the oil level while the bike is on its center stand. The site glass for reading the oil level is on the lower right hand side of the engine, visible through a vent in the fairing lower. You'll find four quarts is correct for a simple oil change, or about 4.1 quarts if you also change the filter. If the oil level is above the high mark, remove oil as necessary.

Warning: The experience of existing ST1300 owners is that the dealers almost always overfill the oil on these bikes by anywhere from ½ quart to 1 ½ quarts. Overfilling your engine oil can result in excessive internal air pressures which can cause gaskets and seals to fail. Some ST1300s are developing oil leaks from the top end which are difficult to track down and will keep your bike in the shop for more than a month. We think these two facts may be related. I strongly urge you to check your oil level and adjust it or have it adjusted as necessary.

How to put a bike onto its center stand

- a. Walk up to the bike, get next to the passenger seat facing the bike.
- b. Place your left foot on the center stand, grab something sturdy on the bike with your left hand. With your right hand, grab the passenger hand rail.
- c. Gently push the center stand down with your foot until the leg touches the ground. Tip the bike upright until you feel the other center stand leg also touch the ground.
- d. Stand with nearly all your weight on your left leg, and pull mostly up and a little back with your hands. Your leg should be doing 85% of the work, there should be very little strain on your back. Once the bike starts moving, it should suddenly feel very light. If the bike stops halfway up, it should take only a gentle pull with your hands to get it the

rest of the way up. Normally, once it starts moving you can quit pulling with your hands and your leg pressure will simply glide it up.

Oil Filters

Executive summary: There are highly significant differences between different brands of oil filters. [Most modern Japanese motorcycles](#) use the same oil filter as the Mazda V-6. For the best protection in your bike, use Mobil-1 M1-108 / M1-110 oil filters, \$12 at AutoZone; or Purolator Pure One PL14612 / PL14610 filters, about \$6 at Pep Boys. Next best, use Bosch 3300 / 3323 filters, about \$6 at AutoZone, or SuperTech ST7317, about \$2 at Wal-Mart. Here's several pages [All About Oil Filters](#) justifying these conclusions.

If your bike uses a different filter, the best resources to quickly find a part number are [my x-ref page](#), and the tables at [AMSOil.com](#) and [K&N](#).

I use Purolator Pure One PL14610 filters in my ST1300.

The Recommended Oil Filters



Mobil One M1-110

available at AutoZone, \$12.



PureOne PL14610

available at PepBoys, Fred Meyers, [PartsAmerica.com](#), \$6.

[ST1300 Honda oil filter](#), \$6.99 delivered. \$12 at your local Honda dealer. Normal quality. I recommend this filter only in the sense that it will maintain your warranty in the clearest possible fashion. I understand that some people strongly prefer the manufacturer recommendations and OEM parts. I don't use these filters in my bikes.

Oil Filters that fit most Japanese bikes have 20 x 1.5mm threads, 14 psi by-pass valve, anti-drain back valve, gasket diameter approximately 2.3 inches, O.D. approximately 2.75 inches, length approximately 2.5 to 3.5 inches. If you have room, I recommend the longer filters.

<p>Motorcycle Filters. None are recommended.</p> <ul style="list-style-type: none"> • AC Delco PF2135 • AMSOil SMF103 • Carquest 85358 • FRAM PH6017A • Honda 15410-MCJ-000 • K&N KN-204, about \$13. Metric nut on end for easy removal. • NAPA Gold 1358 • Purolator ML16817. Imported, not made by 	<p>Recommended filters. All have superior filtering.</p> <p>About 2.5 inches long.</p> <ul style="list-style-type: none"> • Purolator Pure One PL14612, about \$6. • Mobil M1-108, about \$12. Made by Champion. • Bosch 3300, about \$6. 	<p>About 3.25 inches long.</p> <ul style="list-style-type: none"> • Purolator Pure One PL14610, about \$6. • Mobil 1 M1-110, about \$10. Made by Champion. • Bosch 3323, about \$6. Made By Champion. • WalMart SuperTech ST7317, about \$2. Made by
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Purolator.

- STP SMO 07
- WIX 51358

Made by Champion.

Champion.

How to Change Your Oil Filter



Get a 65mm oil filter wrench, the type that fits on a ratchet. You can get this at any auto parts store for about \$4. Get a metal one, not the \$)*(&^Q@ plastic type. Place a large flat metal pan under the bike, like a cookie sheet. This process is quite messy. Put the bike on the center stand, with the center stand legs in the middle of the cookie sheet. If your oil filter will drain onto fairing or frame parts, you can use aluminum foil to make protective shields that guide the oil to where it belongs.

Remove your old oil filter. Honda over tightens their oil filters at the factory. This has been a problem for everyone. I had to hammer a screwdriver through the original oil filter and turn it 1/8 turn to get it loose. Put a bit of oil on the O-ring of the new filter, turn it on hand tight, then use your filter wrench to tighten it a bit more, 1/2 turn is fine. You don't need or want to get anywhere near as tight as Honda does. Your Honda manual says the oil filter should be torqued to 24 foot-pounds. I consider this insane, as does every filter manufacturer in the US.

Air Filters

A [dyno review](#) of after market air filters. Stock paper filters cost less, filter better, and make the same power.

I found an [interesting article](#) on the internet claiming K&N and Uni filters let excessive dirt through.

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