Honda CBR models covered by this manual:

- CBR600F-H 596cc 1987
- CBR600F-J 598cc 1988
- CBR600F-K 598cc 1989
- CBR600F-L 598cc 1990
- CBR1000F-H 998cc 1987
- CBR1000F-J 998cc 1988
- CBR1000F-K 998cc 1989
- CBR1000F-L 998cc 1990
- CBR1000F-M 998cc 1991
- CBR1000F-N 998cc 1992
- CBR1000F-P 998cc 1993
- CBR1000F-R 998cc 1994
- CBR1000F-S 998cc 1995
- CBR1000F-T 998cc 1996

Refer to Manual No. 2870 for the 599cc CBR600F2 and F3 models.

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- Engine and transmission – servicing and overhaul.
- Fuel and ignition systems explained.
- Cooling system – checks and remedies.
- Suspension and steering – adjustment and overhaul.
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Honda
CBR600F1 & 1000F Fours
Service and Repair Manual

by Mark Coombs and Penny Cox

Models covered
CBR600F1, 598 cc. UK January 1987 to December 1991
CBR600F1 (Hurricane), 598 cc. US February 1987 through 1990
CBR1000F, 998 cc. UK January 1987 onwards
CBR1000F (Hurricane), 998 cc. US March 1987 onwards

Refer to manual No. 2070 for the 599cc CBR600F2 model.
LIVING WITH YOUR HONDA CBR

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The Birth of a Dream

by Julian Ryder

There is no better example of the Japanese post-War industrial miracle than Honda. Like other companies which have become household names, it started with one man’s vision. In this case the man was the 40-year-old Soichiro Honda who had sold his pistón-firing manufacturing business to Toyota in 1954 and was happily spending the proceeds on prolonged parties for his friends. However, the difficulties of getting around in the chaos post-War Japan invited Honda, so when he came across a job lot of generator engines he realized that here was a way of getting people mobile again at low cost.

A 12 by 18-foot shop in Hamamatsu became his first bike factory, fitting the Honda C70 and C90 OHV-engined models with generator motors into pushbikes. Before long he’d used up all 500 generator motors and started manufacturing his own engine, known as the ‘shiny’, either because of the elongated cylinder head or the spotty exhaust pipe or perhaps both. The engine made so little of a sound a horsepower from its 50 cc engine but it was a major success and became the Honda A-Type. Less than two years after he’d set up in Hamamatsu, Soichiro Honda founded the Honda Motor Company in September 1946.

By then, the A-type had been developed into the 60 cc B-type engine, which Mr Honda decided deserved its own chassis; not a bicycle frame. Honda was about to become Japan’s first post-War manufacturer of complete motorcycles. In August 1949 the first prototype was ready. With an output of three horsepower, the 98 cc D-type was still a simple two-stroke but it had a two-speed transmission and most importantly a pressed steel frame with telescopic forks and lord it rear end. The frame was almost triangular in profile with the top rail going in a straight line from the massively braced steering head to the rear axle. Legend has it that after the D-type’s first trials the entire workforce went for a drink to celebrate and by and think of a name for the bike. One man broke one of those silencers you get when people are thinking, exclaiming: ‘This is like a dream!’ ‘That’s it!’ shouted Honda, and so the Honda Dream was christened.

‘This is like a dream!’
‘That’s it!’ shouted Honda

Honda was a brilliant, intuitive engineer and designer and he did not bother himself with the marketing side of his business. With hindsight, it is possible to see that employing Takeo Hukusima who would soon sort out the home market and plan the eventual expansion into overseas markets was a masterstroke. He arrived in October 1949 and in 1950 he was Sales Director. Another vital new name was Kiyoshi Kawashima, who along with Honda himself, designed the company’s first four-stroke after Kawashima had told them that the four-stroke opposition to Honda’s two-stroke sounded nicer and therefore would sell better. The result of that statement was the overhead valve 148 cc E-type which first ran in July 1951 just two months after the first drawings were made. Kawashima was made a director of the Honda Company at 34 years old.

The E-type was a massive success, over 32,000 were made in 1953 alone, but Honda’s lifelong pursuit of technical innovation sometimes distracted him from commercial reality. Frustration pointed out that they were in danger of losing their core business, the motorised bicycles that still formed Japan’s main means of transport. In May 1952 the F-type Cub appeared, another two-stroke despite the top men’s reservations. You could buy a complete machine or just the motor to attach to your own bicycle. The result was certain direction, a white fuel tank with a circular profile went just below and behind the saddle, a white wheel of the bike, and the motor with its horizontal cylinder and bright red cover just below the rear one on the same side of the bike. This was the machine that turned Honda into the biggest bike maker in Japan.

with 70% of the market for both two-stroke bicycle motors, the F-type was also the first Honda to be exported. Next came the machine that would turn Honda into the biggest motorcycle manufacturer in the world.

The C100 Super Cub was a typically audacious piece of engineering and marketing. For the first time, but not the last, Honda invented a completely new type of motorcycle, although the term ‘scooter’ was coined to describe the new bike which had many of the characteristics of a scooter but the large wheels, and therefore stability of a motorcycle. The first one was sold in August 1964. Eleven years later over three million of them were on the roads of the world. Its success can be attributed to the Super Cub being an efficient, practical machine that was easy to respond to the mass market.

The GL1000 introduced in 1975, was the first in Honda’s line of Goldwings

Honda’s export drive started in earnest in 1957 when Britain and Holland got their first bikes. America got just two bikes the next year. By 1960 Honda had half the American market with 65,000 sales. But Soichiro Honda had already travelled abroad to Europe and the USA, making a special point of going to the Isle of Man TT, then the most important race in the GP calendar. He realized that no matter how

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The CB500 Super Dream became a favorite with UK learner riders of the late seventies and early eighties

ready for the TT. In 1959 the factory entered five riders in the 125cc. They didn’t have a massive impact on the event, being rudely neglected as a curiosity, but sixth, seventh and eighth were enough for the team prize. The bikes were off the pace but they were well engineered and very reliable.

The TT was the only time the West saw the Honda in ‘56, but they came back for more the following year with the first of a generation of bikes which shaped the future of motocycling - the double-overhead cam four-cylinder 250. It was only one model, but two revved at 14,000 rpm - but didn’t handle anywhere near its revs potential. However, Honda had now signed up non-Japanese riders to keep their challenge. The first win didn’t come until 1962 (Audi Tom Phillis in the Spanish 125 GP) and was followed up with
Introduction

a world-striking performance at the TT. Twenty-one year old Mike Hailwood won both 125 and 250 cc TTs and Honda filled the top five positions in both races. Such was Honda’s master plan was starting to come to fruition. Hailwood and Honda won the 1961 250 cc World Championships. Next year Honda won three titles. The other Japanese factories fell back and two independent Honda to produce some of the most fascinating races ever been the awesome six-cylinder 250, the five-cylinder 125, and the 500 four, with which the late Burt Holland, John Angell and the MV Agusta.

When Honda pulled out of racing in ’67 they won won salon cars, sports cars, lightweight manufacturer’s titles, and 137 GP’s, including 18 TTs, and introduced the concept of the modern works team to motorcycle racing. Sales success followed racing victories as Suzuki Honda had predicted, but race success was far more advanced as rapidly as the racing machinery. The Honda that came to Britain in the early 50s were immediately sophisticated. They had overhead cam where the British bikes had pushrods. They had electric starters when the 650 failed on the kickstart. They had 12v electrics when even the biggest British bike used a 6V system. There was no end to the technological wizardry and when in 1968 the first four-cylinder CB750 road bike arrived the world changed for ever. They even had in store a new wind for 200cc. Honda raced again with the CB750 at Daytona and won the World Endurance title with a prototype DOHC version that became the CB900 roadster (The). There was the four-cylinder CBLX; the first turbocharged production bike, they invented the full dress touring with the Goldwing and came back to GP’s with the revolutionary four-cylinder NSR500 four-stroke, a much more powerful bike that was more of the era than than racing experiment than racer. It was thin, though, that Mr Honda was not keen on two-stroke early motorcyclic engines had to be eradicated away to him as two-stroke power. However, in 1962 Kusak design the CB750, an eight-cylinder lightweight against the big four-cylinder opposition in 1969/1970. The bike won the first annual in 1983 took the world title for Freddie Spencer. In four-stroke racing the V4 layout took over from the straight four, dominating TT, F1 and Endurance championship races. When Superbike arrived Honda was ready with the KC200. It was new to the world in 1982. The VRV 4-stroke became an instant classic while the CB900R introduced another new class of bikes in the way of becoming a best-seller. And then there was the XR250. This introduction of technical two-deck force unlocked many of Soichiro Honda’s ideas. It used the latest techniques and materials. In every component, from the air-piston, 30-valve V4 motor to the titanium coating on the discbrakes, it was - as Mr Honda would have said - his masterpiece. And best it could possibly be. A fitting memorial to the man who shaped the motorcycle industry and motorcycles as we know them today.

The Honda CB750

The CB750 continued the Honda tradition of four-valve-per-cylinder across-the-frame fours, but swapped water cooling for the CB500R it was in line with industry trends, but surpassing expensive aluminium frames in favour of good old steel wasn’t. Neither was the all-enclosing bodywork and big, flared front mudguard which some observers found a little bulbous for their tastes. Three air intake scoops either side of the headlight showed that the designers had spent a lot of time on the problem of feeding the motor with a supply of slightly pressurised, still air - internal aerodynamics they called it. Aesthetically, there was no doubt that Honda had achieved their design aims of over 100bhp per litre from both the 600 and 1000 yet still managed to show the dimension of the motor compared to the air-cooled fours in all directions. Values were modest, some having hollow piston rings thinned down, a typical inventory of Honda attention to detail. The valve gear consisted of rocker arms pivoting on ball and plain pins in the head thus eliminating the need for a straight line to steer with a good degree of downright. The layout bore a very close resemblance to the arrangement on the VF1000 which was launched a year below the CB750.

The only internal differences between the 600 and 1000 were the cylinder and the inlet manifold for the 1000 which was a balance shaft gear-driven directly off the crankshaft and the 1000 had its alternator mounted piggy-back behind the cylinders to keep the engine width to a minimum. The 600 was said to have a idle speed of 16-inch front wheels and used 17-inch rear wheels that gave quick steering without compromising stability.

The CB900

The CB900 roadster arrived the world changed for ever. They even had in store a new wind for 200cc. Honda raced again with the CB750 at Daytona and won the World Endurance title with a prototype DOHC version that became the CB900 roadster (The). There were no end to the technological wizardry and when in 1968 the first four-cylinder CB750 road bike arrived the world changed for ever. They even had in store a new wind for 200cc. Honda raced again with the CB750 at Daytona and won the World Endurance title with a prototype DOHC version that became the CB900 roadster (The). There were no end to the technological wizardry and when in 1968 the first four-cylinder CB750 road bike arrived the world changed for ever. They even had in store a new wind for 200cc. Honda raced again with the CB750 at Daytona and won the World Endurance title with a prototype DOHC version that became the CB900 roadster (The). 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Safety First!

Professional mechanics are trained in safe working practices. Never perform engine diagnostics or repairs yourself. You may be tempting fate by getting involved in a job that should be done by a professional. Take the time to ensure that your vehicle is not at risk. A mechanic's lack of attention can result in an accident, as can failure to observe simple precautions. Be sure to consult a comprehensive list of all dangers, it is important to make an informed decision to avoid injury and to encourage a safe approach to all work you carry out on your own.

Asbestos
- Contains asbestos, insoluble, smoldering and other products—such as brake pads, clutch linings, gaskets, etc.—must be handled carefully. Extreme care must be taken to avoid inhaling dust from such products since it is highly toxic, and can cause lung cancer. It is also illegal to ship or dispose of these materials.

Fumes
- Certain fumes are highly toxic and can cause severe symptoms even in small quantities. Avoiding fumes that can be inhaled is the best way to prevent them. Always work in a well-ventilated area.

Fumes
- Never run the engine of a motor vehicle in an enclosed space such as a garage. Exhaust fumes contain carbon monoxide which is extremely poisonous. If you need to run the engine, always do it outside so that the fumes can escape.

Fumes
- Never use gasoline or other flammable liquids as cleaning agents. These substances can explode and cause serious injury.

The battery
- Always disconnect the battery ground terminal before working on the fuel or electrical systems.

The battery
- Never spill fuel or battery acid on your skin, feet, or clothing.

The battery
- Never try to extend the battery life by adding water to it. Water will damage the battery plates and reduce its capacity.

The battery
- Always disconnect the battery ground terminal before working on the fuel or electrical systems.

Electricity
- When using an electric power tool, protect your hands. Always ensure that the appliance is correctly connected to the plug and that the plug is correctly connected to the outlet. If you have any doubt, call a professional.

Electricity
- When using electrical appliances in damp conditions, always ensure that they are properly grounded. Do not use electrical appliances in damp conditions, even if they appear to be working correctly.

Electricity
- Never attempt to repair an electrical device yourself. Always contact a qualified electrician.

Buying spare parts
- Once you have located all the VIN numbers, record them for future reference. It is not always necessary to obtain the original manufacturer's components for your vehicle. It is important to have the VIN number in order to obtain the correct parts.

VIN (Vehicle Identification Number)
- The frame vehicle identification number (VIN) is stamped into the frame on the right side of the front wheel or on the left side of the frame. It is also stamped on the metal plate, riveted to the frame just behind the front fender lip.

VIN (Vehicle Identification Number)
- If you intend to reuse the frame, it is important to check the VIN number before purchasing a new frame. It is important to check the VIN number before purchasing a new frame. It is important to check the VIN number before purchasing a new frame.

VIN (Vehicle Identification Number)
- Always check the VIN number before purchasing a new frame. It is important to check the VIN number before purchasing a new frame. It is important to check the VIN number before purchasing a new frame.
1 Engine/transmission oil level

Before you start:
✓ Start the engine and let it idle for a few minutes, allowing it to reach normal operating temperature. Do not race the engine in an enclosed space such as a garage or workshop.
✓ Stop the engine and place the motorcycle on its centrestand. Allow it to stand undisturbed for about five minutes to allow the oil to settle to stabilize. Make sure the motorcycle is on level ground.

Bike care:
- If you have to add oil frequently, you should check whether you have any oil leaks. If there is no sign of oil leakage from the pipes and gaskets the engine could be burning oil (see Fault Finding).

The correct oil:
- Modern, high-revving engines place great demands on their oil. It is very important that the correct oil for your bike is used.
- Always top up with a good quality motor oil of the specified type and viscosity and do not overtight the engine. If the engine is inadvertently overfilled, excess oil can be removed using an empty plastic squeeze pack such as that used for gear oils.

<table>
<thead>
<tr>
<th>Oil type</th>
<th>SAE 30W-40</th>
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3 The oil level should lie between the marks on the end of the dipstick.
4 Add the specified oil to restore the oil level.

2 Coolant level

Before you start:
✓ Make sure you have a supply of coolant available in mixture of 50% distilled water and 50% corrosion inhibited ethylene glycol antifreeze is on hand.
✓ Place the motorcycle on its centrestand whilst checking the level. Make sure the motorcycle is on level ground.
✓ Remove the right sidestand and on 1000 models also remove the seat. Start the engine - the coolant level check is made with the engine running.

Bike care:
- Use only the specified coolant mixture. It is important that antifreeze is used in the cooling system all year round, not just during the winter months. Don't top-up with water alone, as the antifreeze will become too diluted.
- Do not Ever use the reservoir tank. If the coolant significantly above the upper line at any time, the surplus coolant should be drained off to prevent it from being expelled out of the front fork when the engine is running.
- If the coolant level falls steadily, check the system for leaks as described in Chapter 1. If the level falls continuously to feel, it is recommended that the machine be taken to a Honda dealer who will pressure test the system.

1 Coolant level must lie between upper and lower marks on reservoir with engine running - 1000 model shown.
2 Stop the engine. If the level is low, remove the filler cap and top up the upper level mark using only the specified coolant.

3 Top up with new clean hydraulic fluid of the recommended type to the upper mark on the front side of the reservoir. Take care to avoid spills (see Warning above).

4 Ensure that the diaphragm is correctly folded before installing the float (where fitted) diaphragm, plate and cover.

6 On 600 models, the brake fluid level can be seen through slot in right sidepanel. Fluid must lie between upper and lower lines.
7 On 1000 models, remove the right sidepanel to view the rear brake fluid level. Fluid must lie between upper and lower lines.

Daily (pre-ride) checks

3 Brake fluid levels

- Warning: Hydraulic fluid can harm your eyes and damage painted surfaces, so use extreme caution when handling and pouring it. Do not use fluid that has been standing open for a long time, as it absorbs moisture from the air which can cause a dangerous loss of braking effectiveness.
- Bike care:
  - The fluid in the master cylinder reservoir will drip slightly as the brake pads wear down.
  - If the fluid reservoir requires repeated topping-up this is an indication of an hydraulic leak somewhere in the system, which should be investigated immediately.

Before you start:
- Position the motorcycle on its centrestand and turn the handlebars until the top of the master cylinder is as level as possible.
- On 1000 models, remove the right sidepanel to access the rear brake fluid reservoir. This isn't necessary on 600 models due to the inspection slot in the panel.
- Make sure you have the correct hydraulic fluid DOT 4 is recommended.

1 Front brake fluid level is checked via sightglass - it must be above lower level line (arrow).
2 Remove the two screws (arrow) to free the front brake reservoir cap.
3 Top up with new clean hydraulic fluid of the recommended type to the upper mark on the front side of the reservoir. Take care to avoid spills (see Warning above).
4 Ensure that the diaphragm is correctly folded before installing the float (where fitted) diaphragm, plate and cover.
5 Some models have a span adjuster on the brake lever - check that the adjuster wheel notch aligns with the arrow on the lever (arrow).
6 On 600 models, the brake fluid level can be seen through slot in right sidepanel. Fluid must lie between upper and lower lines.
7 On 1000 models, remove the right sidepanel to view the rear brake fluid level. Fluid must lie between upper and lower lines.
8 Unscrew the cap and lift out the plate and diaphragm to add fluid on 1000 models.
4 Clutch fluid level (1000 models)

![Image of clutch fluid level](image)

**Warning:** Hydraulic fluid can harm your eyes and damage painted surfaces, so use extreme caution when handling and pouring it. Do not use fluid that has been standing open for some time, as it absorbs moisture from the air which can cause a loss of clutch effectiveness.

**Before you start:**
- Position the motorcycle on its centrestand and turn the handlebars until the top of the master cylinder is as level as possible.
- Make sure you have the correct hydraulic fluid, DOT 4 is recommended.

**Bike care:**
- If the fluid reservoir requires repeated topping-up this is an indication of an internal leak somewhere in the system, which should be investigated immediately.
- Check for signs of fluid leakage from the hydraulic hoses and components - if found, rectify immediately.
- Check the operation of the clutch; if there is evidence of air in the system (poppies fail to lever), it must be bled as described in Chapter 7.

1. Clutch fluid level is checked via sightglass - it must be above lower level.
2. Remove the two screws (arrow) to free the reservoir cap.
3. Top up with new clean hydraulic fluid of the recommended type to the upper mark on the front inside face of the reservoir.
4. Ensure that the diaphragm is correctly folded before installing the plate and cover.

5 Suspension, steering and final drive

**Suspension and Steering:**
- Check that the front and rear suspension operates smoothly without binding.
- Check that the suspension adjustment settings are as required.
- Check that the steering moves smoothly from lock-to-lock.

**Drive chain:**
- Check that drive chain slack isn't excessive.
- If the chain looks dry, lubricate it - See Chapter 1.
- Check the drive chain for correct tension.

6 Legal and safety checks

**Lighting and signalling:**
- Take a minute to check that the headlamp, tail lamp, brake stop lamp and turn signals all work correctly.
- Check that the horn sounds when the switch is operated.
- A working speedometer is a statutory requirement in the UK.

**Safety:**
- Check that the throttle grip rotates smoothly and clicks shut when released.
- Check that the engine shuts off when the kill switch is operated.
- Check that sidestand return spring holds the stand securely up when retracted. The same applies to the centrestand.

**Fuel:**
- This may seem obvious, but check that you have enough fuel to complete your journey. If you notice signs of fuel leakage - rectify the cause immediately.
- Ensure you use the correct grade unleaded fuel - see Chapter 1 Specifications.

7 Tyres

**The correct pressures:**
- Check the pressures carefully for cuts, tears, embedded nails or other sharp objects and excessive wear. Operation of the motorcycle with excessively worn tyres is extremely hazardous, as traction and handling are directly affected.
- Check the condition of the tyre valve and ensure the dust cap is in place.
- Pick out any stones or nails which may have become embedded in the tyre tread. If left, they will eventually penetrate through the casing and cause a puncture.
- If tyre damage is apparent, or unexplained loss of pressure is experienced, seek the advice of a tyre fitting specialist without delay.

**Tyre care:**
- At the time of writing, UK law requires that tread depth must be at least 1 mm over 3/4 of the tread breadth at the sides of the tyre, with no bald patches. Many riders, however, consider 2 mm tread depth minimum to be a safer limit. Honda recommends a minimum tread depth of 1.5 mm (0.06 in) for the front tyre, and 2.0 mm (0.08 in) for the rear.
- Many tyres now incorporate wear indicators in the tread. Identify the triangular point or TVI mark on the tyre sidewall to locate the indicator bars and replace the tyre if the tread has worn down to the bar.

**Tyre tread depth:**
- Check the tyre pressures when the tyres are cold and keep them properly inflated.
- Measure tread depth at the centre of the tyre using a tread depth gauge.
- Tyre tread wear indicator bars (A) and location marking on sidewall (B).

<table>
<thead>
<tr>
<th>Loading/speed</th>
<th>Front</th>
<th>Rear</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 600 models and 1000 K models onward</td>
<td>36 psi (2.5 Bar)</td>
<td>42 psi (2.9 Bar)</td>
</tr>
<tr>
<td>1000 H, J models:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 50 kg (110 lb) load - solo</td>
<td>36 psi (2.5 Bar)</td>
<td>42 psi (2.9 Bar)</td>
</tr>
<tr>
<td>90 kg (198 lb) to max load* - pillion</td>
<td>42 psi (2.9 Bar)</td>
<td>42 psi (2.9 Bar)</td>
</tr>
</tbody>
</table>

*Refer to Dimensions and Weights in Reference section for details of maximum loading.
Chapter 1
Routine maintenance and Servicing

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Degrees of difficulty

Easy, suitable for novice with little experience
Fairly easy, suitable for beginner with some experience
Fairly difficult, suitable for competent DIY mechanic
Difficult, suitable for experienced DIY mechanic
Very difficult, suitable for expert DIY or professional

Specifications

Engine

Oil capacity at oil change:
600 models ......................................................... 3.0 lit (3.2 US qt, 5.3 imp pt)
1000 models ....................................................... Not available

Oil capacity at oil and filter change:
600 models ......................................................... 3.4 lit (3.6 US qt, 6.0 imp pt)
1000 models ....................................................... 3.8 lit (4.0 US qt, 6.7 imp pt)

Oil capacity after disassembly:
600 models ......................................................... 4.0 lit (4.2 US qt, 7.0 imp pt)
1000 models ....................................................... 4.5 lit (4.8 US qt, 8.0 imp pt)

Coolant capacity:
600 models ......................................................... 2.0 lit (2.1 US qt, 3.5 imp pt)
1000 models ......................................................... 3.0 lit (3.2 US qt, 5.3 imp pt)

Spark plug type:
All 600 models and 1000 T model onward
NGK DPR8EA-9 or NGK PR8EPR-U9
1000 H, J, K, L, M, N, P, R, S models
NGK DPR8EA-9 or NGK PR8EPR-U9

Spark plug gap
0.8 - 0.9 mm (0.032 - 0.035 in)

Inlet valve clearance (cold):
600 models ......................................................... 0.14 - 0.18 mm (0.0055 - 0.007 in)
1000 models ....................................................... 0.10 - 0.12 mm (0.0039 - 0.0047 in)

Exhaust valve clearance (cold):
600 models ......................................................... 0.18 - 0.22 mm (0.007 - 0.009 in)
1000 H, J, K, L, M, N models ................................ 0.18 - 0.22 mm (0.007 - 0.009 in)
1000 P models onward ........................................... 0.18 - 0.22 mm (0.007 - 0.009 in)

Idle speed:
600 California models ............................................ 1300 ± 100 rpm
1000 California models .......................................... 1200 ± 100 rpm
1000 L California models ........................................ 1050 ± 100 rpm
1000 P and California models ......................... 1100 ± 100 rpm

All other 1000 models ............................................ 1000 ± 100 rpm
Maintenance Schedule

Miscellaneous

Freeplay adjustments:
- Throttle cable freeplay - at idle/any speed: 2 - 6 mm (0.08 - 0.24 in)
- Clutch cable freeplay: 600 models - at idle: 10 - 20 mm (0.4 - 0.8 in)
- Final drive chain: 15 - 25 mm (0.6 - 1.0 in)

Front fork: Standard air pressure - all 600 models and '1000 H, J models: 0 - 6 psi (0 - 0.4 Bar)

Tyre pressures - cold:
- 1000 H and J models:
  - Up to 190 kg (420 lb) - max load: 36 psi (2.5 Bar)
  - 190 kg (420 lb) to max load + 75 kg (165 lb): 42 psi (2.9 Bar)
  - All 600 models and '1000 K onwards: 42 psi (2.9 Bar)

Refer to Dimensions and Weights in the Reference part of this Manual for details of maximum vehicle loading.

Tyre tread depth - minimum limit:
- 1.5 mm (0.06 in) (1.0 mm (0.04 in) at the time of writing. UK law requires that tread depth must be at least 1 mm over 3/4 of the tread breadth all the way around the tyre.

Torque settings

| Nut type | Rear axle nut | Rear | Spark plugs | Front brake caliper mountings - 600 models and all 1000 H, J, K, L, M, N models | Front brake pad retaining pin | Front brake pad retaining pin plug (if fitted) | Rear brake caliper mountings - 600 models and all 1000 H, J, K, L, M, N models | Brake shoe pad retaining plate bolt | Engine oil drain plug | Rear axle nut
<table>
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</tr>
</thead>
<tbody>
<tr>
<td>kgf cm</td>
<td>9.0</td>
<td>5.5</td>
<td>9.3</td>
<td>2.7</td>
<td>1.8</td>
<td>0.25</td>
<td>2.3</td>
<td>1.1</td>
<td>2.3</td>
<td>2.0</td>
</tr>
<tr>
<td>ft lb</td>
<td>66.0</td>
<td>59.9</td>
<td>67.0</td>
<td>20.0</td>
<td>13.0</td>
<td>1.8</td>
<td>11.0</td>
<td>8.0</td>
<td>11.0</td>
<td>8.0</td>
</tr>
</tbody>
</table>

Recommended fluids and lubricants

<table>
<thead>
<tr>
<th>Engine</th>
<th>Fuel grade</th>
<th>Coolant</th>
<th>Brake and clutch fluid</th>
<th>Final drive chain</th>
<th>Wheel bearings and speedometer drive</th>
<th>Steering head bearings</th>
<th>Steering gear and suspension linkage pivots</th>
<th>All control pivots, links and pivots and throttle twistgrip</th>
<th>Control cables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine</td>
<td>91 octane</td>
<td>50% methanol: 50% distilled water</td>
<td>DEXRON III</td>
<td>SAE 90 gear oil or aerosol lubricant</td>
<td>High melting point grease</td>
<td>General purpose grease</td>
<td>Molybdenum disulphide grease</td>
<td>Chain and cable lubricant, molybdenum greases</td>
<td>Light machine oil or cable grease</td>
</tr>
</tbody>
</table>

Honda 4-stroke oil or equivalent good quality SAE 10W40 SF or SG motor oil.
Unleaded, minimum octane rating 91 (RON/RIN).
50% distilled water: 50% conventional inhibited ethylene glycol antifreeze.
Dexron III: SAE 90 gear oil or aerosol lubricant suitable for O-ring chains.
High melting point grease.
General purpose grease.
Molybdenum disulphide grease.
Chain and cable lubricant, molybdenum greases.
Light machine oil or cable grease.

Daily (pre-ride)
- Check the spark plugs - US 600 and 1000 H and J models (Section 2).
- Check the clutch operation - US 1000 L and all UK models (Section 2).
- Check the oil level and adjust if necessary (Section 3).
- Check the battery (Section 6).
- Check the brake pads for wear (Section 7).
- Check the clutch operation - 600 models.
- Lubricate all control cables and pivot points (Section 9).

Synchronise the carburetters (Section 14).
Check the air cleaner element (Section 3).
Check the oil level and adjust if necessary (Section 3).
Check the battery (Section 6).
Check the brake pads for wear (Section 7).
Check the clutch operation - 600 models.
Lubricate all control cables and pivot points (Section 9).

Synchronise the carburetters (Section 14).
Check the air cleaner element (Section 3).
Check the oil level and adjust if necessary (Section 3).
Check the battery (Section 6).
Check the brake pads for wear (Section 7).
Check the clutch operation - 600 models.
Lubricate all control cables and pivot points (Section 9).

Every 600 miles (1000 km)
- Adjust and lubricate the final drive chain (Section 1).

Every 6000 miles (6000 km)
Perform all of the daily (pre-ride) checks plus:
- Renew the spark plugs - US 600 and 1000 H and J models (Section 2).
- Clean the air cleaner element (Section 3).
- Check the oil level and adjust if necessary (Section 3).
- Check the battery (Section 6).
- Check the brake pads for wear (Section 7).
- Check the clutch operation - 600 models.
- Lubricate all control cables and pivot points (Section 9).

Every 12000 miles (12,000 km)
- Check the air cleaner element (Section 26).
- Check the evaporative emission control system hoses for signs of damage and renew if necessary - US California models (Section 27).

Every 18 months, or every 12,000 miles (18,000 km)
- Renew the air cleaner element (Section 26).
- Check the evaporative emission control system hoses for signs of damage and renew if necessary - US California models (Section 27).

Anually, or every 8000 miles (12,000 km)
Perform all of the above plus:
- Renew the brake fluid (Section 28).
- Renew the clutch fluid - 1000 models (Section 28).

Two yearly, or every 24,000 miles (36,000 km)
Perform all of the above plus:
- Renew the coolant (Section 29).
Every 600 miles (1000 km)

1. Measure the final drive chain freewheel.
2. Rotate chain adjuster nuts with an equal amount of force.
3. Lubricating the final drive chain.

Every 4000 miles (6000 km)

1. Drive chain - adjustment and lubrication
2. Spark plugs - check
3. Air cleaner element - cleaning

Adjustment

1. To check the drive chain freewheel, place the machine on its stand and set the rear wheel clear of the ground. Find the chain's tightest spot by rotating the rear wheel and feel the amount of play present on the bottom run of the chain, testing along the complete length of the chain. When the tightest spot has been found, push the machine off its centre stand and support it on the side stand. Measure the total up and down movement available on the bottom run of the chain midway between the sprockets (see illustration). This measurement should be within the limits given in the Specifications. It is not the chain must be adjusted as follows:

3. Tighten both adjuster nuts by an equal amount to draw the axle back until the drive chain freewheel is correct (see illustration).
4. To preserve accurate wheel alignment, ensure that the same amount of movement is present on the surface of each adjuster arm as visible in the cutout of each swingarm fork end on both sides of the machine. A more accurate check of wheel alignment can be made by facing a light source of light against the shadow of the front wheel, which is perfect when the shadow is not visible (see illustration).
5. Once wheel alignment is known to be correct, tighten the axle nut to the specified torque setting followed by the adjuster lockscrew. Place the machine on its centre stand and check that the wheels spin freely.
6. Take note of the chain wear indicator before the swingarm ends and renew the chain if necessary. The arrowed alignment mark comes into the red 'replace chain' zone.

Lubrication

Although the chain fitted as standard equipment is of the D-ring type, greasing being sealed into the internal bearing surfaces by O-rings at each end of the rollers, lubrication is still required to prevent the rollers from wearing on the sprocket teeth and to prevent the O-rings from wearing out. A heavy (SAE 90) gear oil is best for this task; it will stay on the rollers longer than a lighter engine oil.

When reassembling the wheel, allow oil to drip onto the rollers until all are oily, then apply a small amount to the O-rings on each side (see illustration). An alternative is to use one of the proprietary aerosol-applied chain lubricants.

Caution: Some propellants used in aerosols cause the O-rings to deteriorate very rapidly, so make certain that the product is marked as being suitable for use with O-ring type sealing (see illustration).

Apply oil to the top of the lower chain run - centrifugal force will work it into the chain when the bike is moving.

Six monthly, or every 4000 miles (6000 km)

2. Spark plugs - check

1. On 1980 and later models both the upper fairing inner covers and left and right substructures. On 1980 K-models onward remove the seat. On all 1980 models remove the fuel tank front mounting bolts then raise the tank up and support on its prop stay. On 600 models remove both the left and right sides covers from the fairing.
2. Carefully pull out the spark plug caps and remove any dirt or other foreign matter from the spark plug centres. Using a suitable plug spanner, unscrew and remove the spark plugs whilst keeping them clearly defined by their cylinder number.
3. Using feeler gauges, preferably of the wire type for greater accuracy, measure the gap between the electrodes and compare it with the figure given in the Specifications. If adjustment is required this can be carried out as described below, assuming that the plug is otherwise undamaged. In the event that any plug is heavily fouled or damaged in any way renewal is required; renew the plugs as a set. Note: If a plug exhibits signs of over overheating (indicated by the letter H) to ensure compliance with the ignition system. The same applies to the suppressor caps if these are ever renewed.
4. If the spark plugs are still serviceable, carefully compare the appearance of their electrodes with the colour photographs at the end of this manual and note any information obtained from this. If any plug appears to show a fault, seek expert advice as soon as possible. The standard grade of spark plug should prove adequate in normal use and a change of specification would only occur when the hotter (or colder grade of plug) should not be made without expert advice from a Honda dealer.
5. Clean the plug electrodes by carefully scraping away any accumulated carbon deposits using a small knife blade or small files and abrasive paper; take care not to bend the centre electrode or to chip or damage the ceramic insulator.

Caution: The cleaning of spark plugs on commercial sand-blasting equipment is not recommended due to the risk of abrasive particles being jammed in the gap between the insulator and plug metal body, only to fall clear later and drip into the engine; any plug that is too heavily fouled should be renewed.
6. Once clean, file the opposing faces of the electrodes flat using a small file. A magnet or even a nail file is ideal for this purpose. Whichever method is chosen, make sure that every trace of abrasive and loose carbon is removed before the plug is installed. If this is not done, the debris will enter the engine and cause damage or rapid wear.
7. Whether a cleaned or new plug is fitted, always check the electrode gap before installing it. Use a spark plug adjusting tool or feeler gauges to measure the gap, and if adjustment is required, bend the outer (earthy) electrode only. Note: Never bend the centre electrode or the ceramic insulator nose will be damaged.
8. Before the plugs are fitted, apply a fine coat of P50 or molybdenum dihydrogen grease to the threads. This will help prevent thread wear and damage on installation, and make their subsequent removal easier. Fit each plug finger-tight, lightly tighten it further by 1/4 turn only, to ensure a gas-tight seal. Beware of overtightening, and always use a plug spanner or socket of the correct size; tighten all spark plugs to the specified torque setting, where possible.
9. Never overtighten a spark plug otherwise there is a risk of slipping the thread from the cylinder head, especially as it is cast in light alloy. A stripped thread can be repaired without having to scrap the cylinder head by using a Hotchkis thread insert. This is a low-cost service, operated by a number of dealers.
10. When refitting the suppressor caps, ensure that the HT leads are correctly routed; note that the leads are numbered as an aid to identification.

3. Air cleaner element - cleaning

1. On 600 models remove the fuel tank as described in Chapter 4, slacken the screws which retain the top of the air cleaner housing, HT leads (see illustrations). On 1000 models remove the right sidepanel then slacken the three screws which retain the air cleaner housing side cover, removing it from the machine (see illustration). Pull out the retaining clip from the bottom of the element and withdraw the element from the housing (see illustrations).
3.1 On 600 models remove air cleaner housing top screws, remove cover...
Every 4000 miles (6000 km)

3.3 On 600 models ensure arrow on element facing forward

2 The element is of the dry paper type and can be cleaned by gently tapping the element on a solid surface to dislodge the dust and debris from the paper. If compressed air is available, use it to clean the element by blowing from the inside out. If the paper is extremely dirty or torn, the element must be renewed.

Note: On 1000 models drain the crankcase breather tube, as described in the following Section, before refitting the element.

3 The element is installed by a reverse of the removal process. On 600 models note that the element must be installed so that the arrow on its flange is in the top surface, facing forwards (see Illustration). Ensure the element is correctly seated then refit the top of the air cleaner housing, tightening its retaining screws securely. Refit the fuel tank as described in Chapter 4. On 1000 models ensure the element is correctly positioned in the housing and secure it in place with its retaining clip. Refit the side cover to the air filter housing, ensuring it is correctly seated, and tighten its retaining screws securely. Refit the airbox.

4 It is essential that the element and housing sections or covers are correctly positioned and seat well to prevent unfiltered air entering and damaging the engine. The carburettors are also jetted to compensate for the presence of the element. If it is damaged, renewed. A leaky element in any way or manner, serious engine damage could result. Owners of US models should also note that the air cleaner is subject to the anti-tampering legislation currently in force (see Chapter 1). For this reason the engine should never be run with the air cleaner element removed or disconnected.

4 Crankcase breather - draining (1000 models)

Warning: In addition to the service interval, the crankcase breather should be cleaned whenever the machine is ridden hard in wet conditions or washed. It must also be drained whenever deposits can be seen in the transparent section of the breather tube.

1 The crankcase breather tube can be found under the seat of the machine, just behind the centre stand. The tube is connected to the air cleaner housing and is used to drain any water or oil present in the housing.

2 To drain the tube simply remove the plug from it and allow the contents to drain out into a suitable container (see Illustration). When draining is complete refit the plug.

600 models

1 This model has a sealed battery, and thus requires no maintenance with regard to topping-up its electrolyte. All that should be done is to check that its terminals are clean and tight and that the case is not damaged or electrolyte leaking. If the battery does not need to be removed for any reason, refer to Chapter 8, Section 3 for details.

1000 models

2 Remove the seat then unhook the rubber strap and remove the battery cover and the tool kit. Remove the battery by disconnecting the leads and lifting it out of the machine.

Note: Always disconnect the negative (-) terminal first when disconnecting the battery terminals to prevent the risk of short circuits.

3 The electrolyte level, visible through the translucent casing, should be between the marked minimum and maximum levels. If the battery casing is dry, remove the cell caps and top up to the upper level with distilled water (see illustration).

4 Check the battery for any signs of pale grey or blue at the bottom of the casing. This is caused by submersion of the plates due to recharging at too high a rate or as a result of the battery being left discharging for long periods. A good battery should have little or no sediment visible and its plate should be straight and pale grey or brown in colour. If sediment deposits are deep enough to reach the bottom of the plates, or if the plates are buckled and have whitish deposits on them, the battery is faulty and must be renewed. Flammability of a poor battery will give rise to a large number of minor electrical faults.

3.4 On 1000 models remove the crankcase breather drain plug and allow its contents to drain on the underside of the machine, just behind the centre stand. The tube is connected to the air cleaner housing and is used to drain any water or oil present in the housing.

2 To drain the tube simply remove the plug from it and allow the contents to drain out into a suitable container (see Illustration). When draining is complete refit the plug.

4.2 On 1000 models to remove the crankcase breather drain plug and allow its contents to drain

5 Engine idle speed check

1 The idle speed should be checked and adjusted before and after the carburettors are synchronised and when it is obviously too high or too low. Before adjusting the idle speed, make sure the valve clearances and spark plug gaps are correct. Also, turn the handlebars back-and-forth and see if the idle speed changes as this is done. If it does, the throttle cable may not be adjusted correctly, or it may be worn out. This is a dangerous condition that can cause loss of control of the bike. Be sure to correct this problem before proceeding.

6 Brake pads - wear check

Warning: Brake pads contain asbestos. Take great care not to inhale any brake dust during the operation, and read the notes given in Safety first concerning asbestos.

1 The brake pads can be checked for wear without removing them from the caliper. On 600 models they can be checked through the gap between the caliper and the disc, as indicated by the cast arrow on the caliper surface. On 1000 models the front pads can be checked from the underside of the caliper, and the rear pads from the rear of the caliper.

2 On all models, the need for brake pad renewal can be determined by referring to the pad wear indicator on the friction material. Depending on the pad's manufacture, the wear limit indicator will be shown either as a series of grooves cut into the friction material, which will be visible until the pads have worn down to the bottom of the grooves, or as a wear groove or chamfer on the backing metal side of the pad, the wear limit being when the friction material wears to the point where the groove or chamfer is exposed.

3 Due to the different types of pad fitted, it is recommended that the pad type be determined as soon as possible, before renewal becomes necessary. If there is any doubt about the pads' condition or identification of pad type is difficult with the pads installed in the calipers, remove them as described below. Removal is necessary, always renew both pads as a set, and at a time in the case of the front brake, renew both sets at the same time.

Front brake - 1000 H J and all 600 models

4 Remove both pads from the caliper to reveal the pad pin retaining bolt heads, slacken both pad pins. Slacken and remove the caliper bracket mounting bolts and slide the caliper off the disc, taking care not to relieve any undue strain on the hydraulic hose. Remove both pad pins from the caliper and withdraw the brake pads, noting the correct position of the pad spring fitted to the caliper pads.

5 Inspect the surface of each pad for contamination and check that the friction material has not worn beyond its service limit groove. If either pad is worn out or beyond the service limit, fit a new pad at any point, fouled with oil or grease, or heavily scored or damaged by dirt and debris, both pads must be renewed as a set.

Warning: Brake pads contain asbestos. Take great care not to inhale any brake dust during the operation, and read the notes given in Safety first concerning asbestos.

3.4 On 1000 models check the electrolyte level must be between marks on casing

3.5 Idi speed adjustment on 1000 models

3 On 1000 models electrolyte level must be between marks on casing

4 Snap the throttle open and shut a few times, then recheck the idle speed. If necessary, repeat the adjustment procedure several times, slightly idle can be increased, the fuel-air mixture may be incorrect. Refer to Chapter 4 for additional carburettor information.

8 Battery - checks

7.7b ... and refit pad retaining pins

7.7a ... install caliper and tighten caliper mounting bolts...

2 On installation, check that the battery breather hole is not blocked and is correctly routed. Connect up the battery terminals, remembering to connect the negative (-) terminal last. Ensure that the terminals are tight and that the rubber cover is correctly fitted to the positive (+) terminal. Put the tool kit and cover back in place and secure the cover in position with the rubber strap.

All models

6 If the machine is not in regular use, disconnect the battery and give it a recharger charge every month to six weeks, as described in Chapter 8.
Every 4000 miles (6000 km)

Rear brake - 1000 H, J and all 600 models:

8. Stabilize the pad pin retaining plate bolt and remove the plate from the caliper. Remove the caliper mounting bolt and rotate the caliper in a clockwise direction until it is clear of the disc. The caliper can then be removed from the machine by pulling it away from the wheel to free it from its mounting bracket, taking care not to place any undue strain on the brake hose. The pad pins can then be pulled out of the caliper using a pair of pointed-nose pliers, and the pads withdrawn, noting the correct position of the pad retaining spring in the caliper.

9. Inspect the pads as described above in paragraphs 5 and 6. Install the pads in the caliper as described in paragraph 7 before fitting the caliper as follows:

10. Remove all traces of corrosion from the caliper mount pin and then smear a small amount of silicone grease along its length. Refit the caliper to the mounting bracket, then swing the caliper down into position ensuring that the pads are positioned correctly on each side of the disc. Install the caliper mounting bolt, having first smeared silicone grease along its shank, and tighten it to the specified torque setting. Fit the pad pin retaining plate ensuring that it engages correctly with the slots in the pad pins and tighten its bolt to the specified torque setting.

Front and rear brake - 1000 K, L, M and N models:

11. The brake pads on these models can be removed and installed whilst the caliper is fitted to the machine. Remove the pad pin plug from the caliper and extract the pad retaining pin. Withdraw the pad retaining pin and slide the brake pads out of the caliper.

12. Inspect the pads as described above in paragraphs 5 and 6. Check that the pad spring is in place in the caliper. Slide the pads into position ensuring that they locate correctly with the caliper mounting bracket, and refit the pad retaining pin (see illustrations). If new pads are installed, it will be necessary to push the pistons back into the caliper to gain the necessary clearance for the increased friction material thickness. Tighten the pad retaining pin to the specified torque setting and refit the pad pin plug, tightening it securely.

Front and rear brake - 1000 P models onward:

13. The brake pads can be removed and installed with the caliper fitted to the machine. Unscrew the pad retaining pin and press the spring plate on the other side of the caliper to allow the retaining pin to be withdrawn (see illustration). Slide the brake pads out of the caliper.

Clutch check - 600 models:

1. Check that the clutch cable operates smoothly and easily. If the clutch lever operation is heavy or stiff, lubricate the cable as described in the following section. When the cable is operating smoothly it is necessary to check that the clutch lever is correctly adjusted. The clutch is correctly adjusted when there is 10 - 20 mm (0.4 - 0.8 in) freeplay, measured at the ball end of the lever (see illustration). If adjustment is required, use the handlebar and adjuster on the lever mounting bracket (arrowed).

2. If there is insufficient range in the upper adjuster it will be necessary to remove the right side cover from the fairing and adjust the freeplay at the lower adjuster on the casing (see illustration). Screw the upper adjuster fully inwards and slacken the locknut on the lower adjuster. Rotate the adjuster nut until the required freeplay is obtained at the handlebar lever, then securely tighten the lower adjuster locknut and refit the side cover to the fairing. If necessary, fine adjustments can then be made using the handlebar adjuster.

Control cables:

3. Check the outer cables for signs of damage, then inspect the exposed portions of the inner cables. Any signs of kinking or fraying will indicate that renewal is required. To obtain maximum life and reliability from the cables they should be thoroughly lubricated.

6. To lubricate the throttle, choke and clutch (600 models) cables, disconnect each cable at its lower end, then lubricate the cable with a pressure lube adapter (see illustration). An alternative is to remove the cable from the

9.2a Lubricating a cable with a pressure lube adapter (make sure the tool seats around the inner cable)
machine, hang the cable upright, and make a small funnel arrangement using plasticine or by tapping a plastic bag around the upper and of the cable (see illustration). Fill the funnel with oil and leave it overnight to drain through 3 The speedometer cable should be removed for for examination and lubrication as described in Chapter 6.

**Pivot points**

4 The footpegs, clutch and brake levers, brake pedal, gearshift lever and side and centrestand pivots should be lubricated frequently. If the pivot is particularly dry, the component should be disassembled for thorough lubrication. However, if chain and cable lubricant is being used, it can be applied to the pivot joint gaps and will usually work its way into the areas where friction occurs. If motor oil or light grease is being used, apply it sparingly as it may attract dirt which could cause the controls to bind or wear at an accelerated rate. Note: One of the best lubricants for the control lever pivots is a dry-lubricant (available from many sources by different names).

5 Check that the stands are held securely in their raised positions by the return springs.

---

**Annually, or every 8000 miles (12,000 km)**

10 Engine/transmission oil and filter - change

**Note:** The oil should be drained from the engine while it is at its normal operating temperature. This ensures that the oil is relatively clean and will therefore drain quicker and more completely, also any impurities will be held in suspension.

1 Remove the tainting side panels, noting that on 1000 H and J models it is only necessary to remove the lower section (see Chapter 6).

2 On all models, start the engine and warm it up to normal operating temperature. Place the machine on its centrestand on level ground and position a suitable-sized container, of at least 4.5 litres (4.8 US qt, 0.4 imp gal) capacity, beneath the engine unit and remove the drain plug from the sump (see illustration). Remove the oil filter cap to assist draining.

**Warning:** Take great care to scalloping your hands on the escaping oil or on the exhaust system.

3 Oil filter removal is easy if access to the Honda service tool. Part Number 07MA-A7101001, can be obtained. This tool is a

---

**3b. Lubricating a control cable using a funnel type arrangement**

**Note:** It is antiseptic and illegal to dump oil down the road to the flow.

To find the location of your local recycling bank, call this number.

In the USA, note that any oil supplier must accepted used oil for recycling.

---

**11 Valve clearances check**

**Note:** The valve clearances must be checked and adjusted with the engine cold, preferably after the machine has been left overnight.

1 Remove the cylinder head cover as described in Chapter 2, Section 7. On 600 models remove the crankcase and timing hole caps from the right crankcase cover. On 1000 models remove the cap from the left crankshaft end cover, noting that on 1000 K models onward it will first be necessary to remove the engine protector (see illustration).

2 Using a suitable socket on the large hexagon nut on the end of the crank, turn the crankshaft in a clockwise direction on 600 models and an anticlockwise direction on 1000 models, until the T mark on the flywheel or crankcase aligns with the index mark visible on the crankcase cover or rotor (as applicable) and number 4 cylinder is at TDC on its compression stroke. (ie intake valve has just closed (see illustration)).

3 With the engine in this position check the intake valve clearances of numbers 2 and 4 and the exhaust valve clearances of cylinder 3 and 4. Using feeler gauges, measure the clearance between the follower and cam lobe. Turn the crankshaft through the complete turn (360°) so that number 1 cylinder is at TDC on its compression stroke, and check the intake clearances of numbers 1 and 3 cylinders and the exhaust valve clearances on cylinders 1 and 2. All clearances must be within the specified limits given in the Specifications. If any are less than specified, action must be taken immediately to prevent damage to the valve and valve seat. If any are larger than specified the error must still be corrected but the procedure is not quite as serious. If necessary, the clearances can be adjusted as described below using the screw and locknuts fitted to the cam followers.

4 On 1000 H, J and all 600 models the task of adjusting the valve clearances will be made considerably easier using the Honda locknut and adjusting screw wrenches. Part Numbers 07MA-MW71020 and 07MA-MW71010 respectively. On 1000 K models onward the clearances are adjusted using the aforemen-

---

**13 Throttle and choke cable - freeplay check**

**Throttle cable adjustment**

1 There should be 2 - 6 mm (0.08 - 0.24 in) of freeplay in the throttle cables, measured in terms of twistgrip travel (see illustration). If this is not the case, slacken the locknut on the cable upper adjuster and rotate the adjuster until the required amount of freeplay is obtained then tighten the locknut. If it is not possible to obtain the correct freeplay with the upper adjuster, it will also be necessary to make adjustment at the lower adjuster, situated on the carburettor (see illustration).

2 To gain access to the lower adjuster on 600 models it is necessary to remove the fuel tank as described in Chapter 4, and the air cleaner housing. On 1000 H and J models remove both the upper fairing inner covers and side panels, and on K models onward remove the seat. On 1000 K models, remove the fuel tank mounting bolts, lift the tank up and support it on its prop stay. Screw the upper adjuster cable to obtain the maximum possible freeplay, then slacken the lower adjuster locknut and fit the cable freeplay using first the lower adjuster and then, if necessary, the upper adjuster. Once the
14 Carburettor - synchronisation

14.5 Loosen cable retaining clamp to set choke cable freeplay.

- 14.3a. Vacuum take off point - 1000 H, J, K, L, M, N models
- 14.3b. Vacuum take off point with gauge adapter in position - 1000 P models onward

Every 8000 miles (12 000 km)

1.42 ... and, if necessary, lower cable adjusters - 600 shown

14 Carburettors - synchronisation

Note: A set of accurate vacuum gauges is essential for synchronising the carburettors; if not available, the job should be entrusted to a Honda dealer. On no account attempt to adjust synchronisation by feel - it will almost certainly make things worse.

Note: The carburettors must be synchronised with the engine at its normal operating temperature and the machine on its centrestand.

1. Before the carburettors can be synchronised, ensure that the throttle and choke mechanisms are operating correctly (see Section 13).

2. On 600 models, remove the fuel tank, as described in Chapter 4, and the left and right side fairings. Slacken and remove the four screws, one in each intake tract, from the cylinder head and screw in the adapters. Connect the vacuum gauge hoses to the relevant adapters and arrange a temporary fuel supply, other than by using a small temporary tank or by using extra long fuel pipes to the new remote fuel tank on a nearby bench.

3. On all 1000 models raise the fuel tank up and support it on its prop stay. On 1000 H, J, K, L, M, N models, remove the rubber plug of vacuum tube; (as applicable) from the vacuum take-off port on the top of each carburettor and connect the vacuum gauge hose to the take-off ports (see illustration). On 1000 P models onward, release the fuel tap vacuum hose from No. 1 cylinder take-off point, the rubber plugs from Nos. 2 and 3 cylinder take-off points, and the screw and washer from No. 4 cylinder take-off point. Screw an adapter into No. 4 take-off point and connect the vacuum gauge hoses (see illustration).

4. On all models, start the engine and allow it to warm up to normal operating temperature. If the gauges are fitted with damping adjustment, set this so that the needle fluctuates just eliminated but so that they can still respond to small changes in pressure. Set the engine to the specified idel speed.

5. With the engine idling, check that all needles produce the same reading. A tolerance of 2 cm Hg on 1000 models and 4 cm Hg on 600 models is permissible but it is better to have all cylinders adjusted to the same reading, this is by no means as difficult as it would appear, requiring only a little care and patience. Note that it does not matter what the reading is, only that it is the same for all four cylinders. Stop the engine and allow it to cool down if it overheats.

6. The carburettors are adjusted by the three screws situated between each carburettor, in the throttle linkage (see illustrations). Number two cylinder (all 600 models and 1000 H, J, K, L, M, N models) or number three cylinder (1000 P models onward) carburettor should be used as the base setting and the other three carburettors should be adjusted to the same.

Note: Do not press down on the screws whilst adjusting them, otherwise a plate reading will be obtained. When all the carburettors are synchronised, open and close the throttle quickly to settle the linkage, and recheck the gauge readings, readjusting if necessary.

15 Clutch - check (1000 models)

1. Check the fluid level as described in Daily ride check.
2. Inspect the clutch hose for signs of leakage or deterioration, especially at the unions on the master cylinder and slave cylinder.
3. If there are traces of air in the system, the clutch should be bled as described in Chapter 7 using the procedure given for bleeding air from the hydraulic brake system.

16 Fuel pipe and filter inspection

- 16.2 Remove the fuel tap and clean its filter
- 16.3 Ensure fuel pump filter is installed so that arrow faces pump

17 Cooling system checks

1. With reference to Chapter 3, check the cooling system for leakage and damaged components. Pay particular attention to the hoses and check that all hose clips are correctly positioned and securely fastened.
2. Check the drainage hole on the underside of the water pump body for signs of leakage. Leakage from this hole indicates failure of the pump's mechanical seal.

18 Secondary air supply system check (California models)

Note: The air supply system is subject to anti-lag legislation in force which means that the machine must never be used with any part of the system disconnected, missing, rendered inoperative or modified in any way.

19 Steering and suspension checks and adjustment

Checks

1. Place the machine on its centre stand and raise the front wheel clear of the ground using a suitable stand. Check the steering head bearings by grasping the bottom of both fork tubes, then pulling upward in a vertical direction and then sideways; any freeplay should be felt between the fork bottom triple clamp (grips) and the frame head lug. Check for overtightened bearings by placing the forks in a straight-ahead position and tapping lightly on
19.8 Adjusting rear suspension spring preload

9. The shock absorber also features damping adjustment. The 1300 and J models have 3-position damping adjuster situated behind the left sidepod. Position 1 is the softest setting and position 3 the hardest. Set the adjuster to the required position using a suitable screwdriver. Ensuring that it clicks into position. On 1000 K models onward the damping adjuster is situated on the lower and of the shock absorber and can be accessed just below the right footpeg (see illustration). Turn the adjuster clockwise to increase the damping and harden the ride, and anticlockwise to reduce the damping and soften the ride.

20. Wheels - inspection

10. Check the complete wheel for cracks and chips, particularly at the spoke roots and the edge of the rim. As a general rule a damaged wheel must be renewed as cracks will cause stress to the wheel which may lead to sudden failure under heavy load. Small nicks may be carefully radiused with a fine grade of abrasive paper (No 6000 - 10000) to relieve the stress. Note this destroy the painted finish of the wheel and the wheel will then require repainting in a suitable paint. If there is any doubt as to the condition of a wheel, advice should be sought from a Honda dealer or specialist wheel repair.

1000 models

8. The rear shock absorber has a 22-position damping adjuster. The adjuster is located behind the right sidepod and can be turned using a suitable socket (see illustration). Turning the adjuster clockwise increases the preload and hardens the ride, and turning it anticlockwise decreases the preload and softens the ride.

21.3 Adjust rear stop lamp switch as described in text - 600 shown

21.5 Checking the operation of the DCBS - 1000 P models onward

9. The shock absorber also features damping adjustment. The 1300 K and J models have 3-position damping adjuster situated behind the left sidepod. Position 1 is the softest setting and position 3 the hardest. Set the adjuster to the required position using a suitable screwdriver, ensuring that it clicks into position. On 1000 K models onward the damping adjuster is situated on the lower and of the shock absorber and can be accessed just below the right footpeg (see illustration). Turn the adjuster clockwise to increase the damping and harden the ride, and anticlockwise to reduce the damping and soften the ride.

23. Side stand - check

21. Side stand check - K models onward

3. Sit on the machine, ensure the side stand is in the raised position. Start the engine, pull the clutch lever in, shift the transmission into first gear and press down the side stand. As the stand is lowered the engine should cutout. If this is not the case the side stand switch operation is faulty and it should be checked as described in Chapter 5.

4. Lubricate the switch with a water dispersive fluid such as WD40.

10. Check that the fluid level in the master cylinder is correct (see (Daily pre-ride checks)). Look for leaks at the hydraulic connections for cracks in the hoses. If the lever or pedal is spongy, bleed the brakes as described in Chapter 7.
24 Headlight - check

1. Improperly adjusted headlight may cause problems for incoming traffic or provide poor, unsafe illumination of the road ahead. Before adjusting the headlight, be sure to consult with local traffic laws and regulations.

2. The headlight beam aim is set using the adjustment screws on the back of the headlight unit. To gain access to these adjustment screws on 1000 H and J models it is first necessary to remove the upper fairing inner sections, and on 1000 K models it is necessary to remove the upper fairing cover from the underside of the upper fairing section (see illustration).

3. On 600 models the knob on the top right of the unit adjusts the horizontal aim of the beam, and the knob on the bottom left alters the vertical aim of the beam. On 1000 H and J models the knobs on the top right of the unit adjust the vertical aim and the horizontal aim is altered by rotating the bottom left adjuster with a suitable crosshead screwdriver. On 1000 K models onward, each bulb must be adjusted individually. The crosshead screwdriver fitted on each side of the unit allows the horizontal adjusters to be positioned in the centre of the unit and are adjusted using a crosshead screwdriver.

25 Fasteners - tightness check

1. Work around the machine checking all nuts and bolts for tightness. Pay particular attention to the engine mountings, exhaust mountings, rear suspension and swingarm bolts, top and bottom triple clamp pinch bolts, wheel axis and all brake caliper bolts. Where possible use a torque wrench to check that all fasteners are tightened to their specified torque settings.

26 Air cleaner element renewal

1. Refer to Section 3 for the air cleaner removal and installation procedure.

27 Evaporative emission control system hoses - check (California models)

Note: The evaporative emission control system is subject to anti-tampering legislation currently in force which means the machine must never be used with any part of the system disconnected, missing, rendered ineffective or modified in any way.

1. Remove the fuel tank as described in Chapter 4 and inspect all emission control system hoses for signs of chafe, punctures or deterioration, paying particular attention to the areas around the hose clips. Ensure that none of the hoses are kinked, pinched or split. If the renewal of any component is required use only genuine Honda parts.

2. Refer to the vacuum hose routing label on the air cleaner cover.

Chapter 2
Engine, clutch and transmission

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28 Brake and clutch fluid - renewal

Note: Brake fluid is an excellent paint stripper and will attack painted and plastic components. Wash any spill fluid immediately with copious quantities of water.

1. The hydraulic fluid must be renewed at the specified interval to preserve maximum brake/clutch efficiency by ensuring the fluid has not deteriorated to an unsafe level.

2. Before starting work obtain a new, sealed can of the recommended hydraulic fluid (you may need more for the DCBS of the 1000 P models onward) and carefully read the Station on brake bleeding in Chapter 7. Prepare the plastic tube and jar the same way as for bleeding, then open the bleed nipple and apply the lever or pedal (as appropriate) repeatedly.

Note: Keep the master cylinder reservoir topped up at all times, otherwise air will enter the system and greatly affect the operation.

3. Follow the procedure in Chapter 7 to bleed all fluid from the hydraulic components - this is particularly important in the case of the DCBS fitted to 1000 P models onward.

29 Coolant - renewal

1. To minimise the build-up of deposits in the cooling system and ensure maximum protection against freezing the coolant must be renewed at the specified interval. The system should be drained, flushed out and filled with fresh coolant as described in Chapter 3.

2. On 1000 K models onward, remove the maintenance cover to gain access to the headlight adjusters.
### Camshafts

**Cam lobe height:**
- **Inlet:** 30.949 - 31.249 mm (.12185 - .12302 in)
- **Service limit:** 30.949 mm (.12187 in)
- **All other 600 models:** 31.582 - 31.882 mm (.12434 - .12562 in)
- **Service limit:** 31.52 mm (.1240 in)

**Service limit:**
- **1000 H, J, K, L, M models:** 35.658 mm (.13991 in)
- **1000 N models:** 35.55 mm (.1400 in)
- **US 1000 P models onward:** 35.650 mm (.13996 in)
- **UK 1000 P models onward:** 35.658 mm (.13991 in)

**Service limit:** 35.650 mm (.13996 in)

**Exhaust:**
- **600 California models:** 30.540 - 30.820 mm (.12.019 - 1.17710 in)
- **Service limit:** 30.540 mm (.12.019 in)

**Service limit:** 30.540 mm (.12.019 in)

**All other 600 models:** 31.500 - 31.800 mm (.12.40 - 1.220 in)

**Service limit:** 31.500 mm (.12.40 in)

**1000 H, J, K, L, M models:**
- **Service limit:** 35.650 mm (.13996 in)
- **1000 N models:** 35.500 - 35.650 mm (.13976 - 1.4039 in)
- **UK 1000 P models onward:**
  - **Service limit:** 35.650 mm (.13996 in)

**Service limit:** 35.500 - 35.650 mm (.13976 - 1.4039 in)

**Camshaft journal OD:**
- **600 models:** 22.939 - 22.980 mm (.90311 - 0.90471 in)
- **1000 H, J, K, L, M models:** Not available
- **1000 P models onward:**
  - **Number 1 and 4 journals:** 27.959 - 27.980 mm (1.10071 - 1.10156 in)
  - **Number 2 and 3 journals:** 27.929 - 27.950 mm (.10966 - 1.10034 in)

**Camshaft journal/cylinder head bearing oil clearance:**
- **600 models:**
  - **Number 1 and 4 journals:** 0.023 mm (.00091 in)
  - **Number 2 and 3 journals:** 0.023 mm (.00091 in)

**Service limit:** 0.023 mm (.00091 in)

**1000 H, J, K, L, M, N models:**
- **Service limit:** 0.10 mm (.00394 in)

**1000 P models onward:**
- **Number 1 and 4 journals:** 0.10 mm (.00394 in)
- **Number 2 and 3 journals:** 0.10 mm (.00394 in)

**Service limit:** 0.10 mm (.00394 in)

**1000 N models:**
- **Service limit:** 0.12 mm (.00472 in)

**Piston rings

**Ring to groove clearance - 600 models:**
- **Top ring:** 0.025 - 0.050 mm (.00100 - .00200 in)
- **Second ring:** 0.015 - 0.035 mm (.00060 - .00138 in)

**Ring to groove clearance - 1000 H, J, K, L, M, N models:**
- **Top ring:** 0.025 - 0.050 mm (.00010 - .00020 in)
- **Second ring:** 0.015 - 0.040 mm (.00006 - .00158 in)

**Ring to groove clearance - 1000 P models onward:**
- **Top ring:** 0.010 mm (.00004 in)
- **Second ring:** 0.000 mm (.00000 in)

**Ring and end gap:**
- **600 models:**
  - **Top ring:** 0.040 mm (.0016 in)
  - **Second ring:** 0.060 mm (.0024 in)

**1000 H, J, K, L, M, N models:**
- **Top ring:** 0.000 mm (.0000 in)

**Connecting rods and bearings:**
- **Small-end bearing ID:**
  - **600 models:**
    - **Service limit:** 16.016 - 16.044 mm (.63050 - .63138 in)
  - **1000 models:**
    - **Service limit:** 20.016 - 20.044 mm (.78600 - .78780 in)
  - **Service limit:**
    - **1000 P models onward:**
      - **Number 1 and 4 journals:**
        - **Connecting rod marked 1:** 36.000 - 36.066 mm (.14173 - .14176 mm)
        - **Connecting rod marked 2:** 36.028 - 36.064 mm (.14176 - .14179 mm)
      - **1000 models:**
        - **Connecting rod marked 1:** 43.059 - 43.006 mm (.16929 - .16931 mm)
        - **Connecting rod marked 2:** 43.006 - 43.064 mm (.16932 - .16935 mm)

**Connecting rod standard O.D.:**
- **600 models:** 32.984 - 33.000 mm (.12988 - .12992 mm)
- **1000 models:** 39.967 - 40.000 mm (.15742 - .15749 mm)

**Crankpin size:**
- **600 models:**
  - **Crankshaft marked A:** 32.982 - 33.000 mm (.12988 - .12992 mm)
  - **Crankshaft marked B:** 39.984 - 39.992 mm (.15746 - .15749 mm)

**Crankpin size O.D.:**
- **1000 models:**
  - **Crankshaft marked A:** 39.965 - 40.006 mm (.15742 - .15749 mm)
  - **Crankshaft marked B:** 39.967 - 39.994 mm (.15742 - .15749 mm)

**Connecting rod thrust thickness (colour code):**
- **600 models:**
  - **Gold (yellow):** 1.496 - 1.499 mm (.05880 - .05920 in)
  - **Green (green):** 1.494 - 1.494 mm (.05880 - .05890 in)
  - **Red (red):** 1.493 - 1.493 mm (.05873 - .05874 in)

**Crankpin clearance - all models:**
- **Service limit:** 0.006 mm (.00024 in)

**Pistons

**Piston OD:**
- **600 models:**
  - **Service limit:** 62.960 - 62.990 mm (2.4767 - .24799 in)
  - **1000 models:**
    - **Service limit:** 78.86 mm (3.102 in)
    - **Return pin bore ID:** 20.052 - 20.055 mm (.7910 - .7917 in)

**Service limit:** 20.052 mm (.7910 in)

**600 models:**
- **Service limit:** 16.020 - 16.060 mm (.6300 - .6302 in)
- **1000 models:**
  - **Service limit:** 16.020 mm (.6302 in)

**Service limit:** 16.020 mm (.6302 in)

**1000 P models onward:**
- **Service limit:** 20.060 mm (.790 in)

**Service limit:** 20.060 mm (.790 in)

**Return pin OD:**
- **600 models:**
  - **Service limit:** 15.994 - 16.000 mm (.6297 - .6299 in)
- **1000 models:**
  - **Service limit:** 19.98 mm (.0787 in)

**Service limit:** 19.98 mm (.0787 in)

**Pistons to piston pin clearance - all models:**
- **Service limit:** 0.002 mm (.00008 in)

**Service limit:** 0.002 mm (.00008 in)
### Connecting rods and bearings (continued)

**Big-end bearing side clearance:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.95 - 0.20 mm (0.037 - 0.008 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 H, J, K, L, M, N models</td>
<td>0.03 - 0.05 mm (0.0012 - 0.0020 in)</td>
</tr>
</tbody>
</table>

**Service limit - all models:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.3 mm (0.012 in)</th>
</tr>
</thead>
</table>

### Crankshaft and main bearings

**Crankshaft main bearing clearance:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.05 mm (0.002 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 models</td>
<td>0.03 mm (0.001 in)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crankcase main bearing clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
</tr>
<tr>
<td>1000 models:</td>
</tr>
</tbody>
</table>

**Main bearing sizes:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.006 mm (0.0002 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
<td>0.005 mm (0.0002 in)</td>
</tr>
<tr>
<td>1000 models:</td>
<td>0.006 mm (0.0002 in)</td>
</tr>
</tbody>
</table>

**Main bearing insert thickness (colour code):**

<table>
<thead>
<tr>
<th>Colour</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pink</td>
<td>0.003 mm (0.00012 in)</td>
</tr>
<tr>
<td>Yellow</td>
<td>0.004 mm (0.00016 in)</td>
</tr>
<tr>
<td>Green</td>
<td>0.005 mm (0.00020 in)</td>
</tr>
<tr>
<td>Brown</td>
<td>0.006 mm (0.00024 in)</td>
</tr>
</tbody>
</table>

**Bearing journal clearance:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.007 mm (0.00028 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
<td>0.005 mm (0.00020 in)</td>
</tr>
<tr>
<td>1000 models:</td>
<td>0.006 mm (0.00024 in)</td>
</tr>
</tbody>
</table>

**Cylinder block**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.015 mm (0.0006 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
<td>0.013 mm (0.00051 in)</td>
</tr>
<tr>
<td>1000 models:</td>
<td>0.014 mm (0.00055 in)</td>
</tr>
</tbody>
</table>

**Maximum overbore:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.015 mm (0.0006 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
<td>0.013 mm (0.00051 in)</td>
</tr>
<tr>
<td>1000 models:</td>
<td>0.014 mm (0.00055 in)</td>
</tr>
</tbody>
</table>

**Piston/cylinder bore:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.020 mm (0.0008 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 models:</td>
<td>0.018 mm (0.00071 in)</td>
</tr>
</tbody>
</table>

**Cylinder block maximum warpage:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.015 mm (0.0006 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
<td>0.013 mm (0.00051 in)</td>
</tr>
<tr>
<td>1000 models:</td>
<td>0.014 mm (0.00055 in)</td>
</tr>
</tbody>
</table>

### Cylinder head

**Maximum warpage:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.01 mm (0.0004 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
<td>0.007 mm (0.0003 in)</td>
</tr>
</tbody>
</table>

**Valve guide and springs**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.018 mm (0.0007 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
<td>0.016 mm (0.0006 in)</td>
</tr>
<tr>
<td>1000 models:</td>
<td>0.017 mm (0.0007 in)</td>
</tr>
</tbody>
</table>

**Exhaust valve clearance:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.019 mm (0.0007 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
<td>0.017 mm (0.0006 in)</td>
</tr>
<tr>
<td>1000 models:</td>
<td>0.018 mm (0.0007 in)</td>
</tr>
</tbody>
</table>

**Intake valve stem OD:**

<table>
<thead>
<tr>
<th>Model</th>
<th>4.57 mm (0.18 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
<td>4.55 mm (0.18 in)</td>
</tr>
<tr>
<td>1000 models:</td>
<td>4.57 mm (0.18 in)</td>
</tr>
</tbody>
</table>

**Intake valve guide clearance:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.019 mm (0.0008 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
<td>0.017 mm (0.0007 in)</td>
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<tr>
<td>1000 models:</td>
<td>0.018 mm (0.0007 in)</td>
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</tbody>
</table>

**Exhaust valve guide clearance:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.020 mm (0.0008 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
<td>0.018 mm (0.0007 in)</td>
</tr>
<tr>
<td>1000 models:</td>
<td>0.019 mm (0.0008 in)</td>
</tr>
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**Valve guide ID - intake and exhaust:**

<table>
<thead>
<tr>
<th>Model</th>
<th>0.021 mm (0.0008 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 models:</td>
<td>0.019 mm (0.0007 in)</td>
</tr>
<tr>
<td>1000 models:</td>
<td>0.020 mm (0.0008 in)</td>
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</table>

**Valve seat width:**

<table>
<thead>
<tr>
<th>Model</th>
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<tbody>
<tr>
<td>600 models:</td>
<td>0.020 mm (0.0008 in)</td>
</tr>
<tr>
<td>1000 models:</td>
<td>0.021 mm (0.0008 in)</td>
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**Intake valve spring free length:**

<table>
<thead>
<tr>
<th>Model</th>
<th>3.34 mm (0.13 in)</th>
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<tbody>
<tr>
<td>600 models:</td>
<td>3.32 mm (0.13 in)</td>
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<tr>
<td>1000 models:</td>
<td>3.33 mm (0.13 in)</td>
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**Exhaust valve spring free length:**

<table>
<thead>
<tr>
<th>Model</th>
<th>3.42 mm (0.135 in)</th>
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<tbody>
<tr>
<td>600 models:</td>
<td>3.40 mm (0.135 in)</td>
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<tr>
<td>1000 models:</td>
<td>3.41 mm (0.135 in)</td>
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**Clutch**

**Type:**

<table>
<thead>
<tr>
<th>Model</th>
<th>Wet, multi-plate</th>
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<tr>
<td>600 models:</td>
<td>6</td>
</tr>
<tr>
<td>1000 models:</td>
<td>9</td>
</tr>
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</table>

**Friction plate:**

<table>
<thead>
<tr>
<th>Model</th>
<th>3.22 - 3.38 mm (0.127 - 0.138 in)</th>
</tr>
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<tbody>
<tr>
<td>Service limit:</td>
<td>3.20 mm (0.126 in)</td>
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**Oiler:**

<table>
<thead>
<tr>
<th>Model</th>
<th>3.24 - 3.58 mm (0.127 - 0.142 in)</th>
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</thead>
<tbody>
<tr>
<td>Service limit:</td>
<td>3.20 mm (0.126 in)</td>
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### Transmission

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Service Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 models</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
</tr>
<tr>
<td>3rd gear</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
</tr>
<tr>
<td>4th gear</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
</tr>
<tr>
<td>5th gear</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
</tr>
<tr>
<td>6th gear</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
</tr>
<tr>
<td>1st gear</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
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### Pinion (Continued)

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<thead>
<tr>
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<th>Description</th>
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<td>3rd gear</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
</tr>
<tr>
<td>4th gear</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
</tr>
<tr>
<td>5th gear</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
</tr>
<tr>
<td>6th gear</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
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<tr>
<td>1st gear</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
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### Primary Drive

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Service Limit</th>
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</thead>
<tbody>
<tr>
<td>600 models</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
</tr>
<tr>
<td>1000 models</td>
<td>Lightweight clutch, 3rd and 4th gear pinion</td>
<td>2.79 (0.228 T)</td>
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</table>
Final drive

<table>
<thead>
<tr>
<th>Type</th>
<th>Chain and sprockets</th>
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<tbody>
<tr>
<td>Ratio:</td>
<td></td>
</tr>
<tr>
<td>600 models</td>
<td>2.033:1 (44/15 T)</td>
</tr>
<tr>
<td>1000 H, J models</td>
<td>2.525:1 (42/17 T)</td>
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<tr>
<td>1000 K models onward</td>
<td>2.470:1 (42/17 T)</td>
</tr>
<tr>
<td>Chain size</td>
<td>50 (teased type)</td>
</tr>
<tr>
<td>No. of links</td>
<td>110</td>
</tr>
<tr>
<td>1000 models</td>
<td>114</td>
</tr>
</tbody>
</table>

Torque settings

| Cam follower holder bolts - 600 models | 1.2 | 9.0 |
| Camshaft cap bolts:                    | 1.2 | 9.0 |
| 600 models                             | 2.1 | 15.0 |
| 1000 models                            | 1.7 | 12.0 |
| 1000 P models onward                   | 2.0 | 14.0 |
| Upper C/chain guide bolts - 600 models | 1.2 | 9.0 |
| Cylinder head cover bolts              | 1.0 | 7.0 |
| Camchain tensioner bolts - 1000 models | 1.4 | 10.0 |
| Cylinder head nuts:                    | 3.7 | 27.0 |
| 600 models                             | 4.6 | 33.0 |
| 1000 models                            | 4.9 | 37.0 |
| Oil cooler pipe to oil cooler body bolts - 1000 models | 5.9 | 45.0 |
| Oil pump driven sprocket bolt          | 1.5 | 10.0 |
| Clutch centre nut:                     | 8.5 | 61.0 |
| 600 models                             | 9.0 | 65.0 |
| 1000 H, J models                       | 12.8 | 93.0 |
| 1000 K models onward                   | 3.0 | 20.0 |
| 1000 P models onward                   | 2.5 | 18.0 |
| Shift drum cam retaining pin bolt      | 2.3 | 17.0 |
| Centre shift fork retaining bolt       | 1.8 | 13.0 |
| Shift fork retaining pin bolts - 1000 models | 1.9 | 14.0 |
| Alternator rotor bolt - 600 models     | 8.5 | 61.0 |
| Barter clutch bolt - 600 models        | 8.5 | 61.0 |
| Cranefastening bolts - 600 models:     | 1.2 | 9.0 |
| 6 mm                                   | 1.2 | 9.0 |
| 8 mm main bearing bolts                 | 1.9 | 14.0 |
| 10 mm                                  | 4.0 | 29.0 |
| Cranefastening bolts - 1000 H, J, K, L, M, N models: | 1.2 | 9.0 |
| 6 mm                                   | 1.2 | 9.0 |
| 8 mm                                   | 2.7 | 20.0 |
| 9 mm main bearing bolts                 | 3.6 | 28.0 |
| 10 mm                                  | 4.8 | 36.0 |
| Cranefastening bolts - 1000 P models onward: | 1.2 | 9.0 |
| 6 mm                                   | 2.4 | 17.0 |
| 8 mm main bearing bolts                 | 3.7 | 27.0 |
| 10 mm                                  | 3.7 | 27.0 |
| Alternator drivehaft nut - 1000 models | 5.9 | 40.0 |
| Alternator base bolts - 1000 models:   | 2.9 | 21.0 |
| H, J, K, L, M, N models:                | 1.2 | 9.0 |
| P models onwards:                      | 1.2 | 9.0 |
| Alternator drive chain tensioner and guide bolts - 1000 models: | 2.4 | 17.0 |
| Oil pass plate bolts - 1000 models:    | 1.2 | 9.0 |
| Connecting rod bolts - 600 models:     | 2.4 | 17.0 |
| 1000 models                            | 3.6 | 26.0 |

Torque settings (continued)

| Engine cooling bolts:                  | 5.0 | 36.0 |
| 1000 models                            | 0.8 | 6.0 |
| Upper rear mounting bolt adjuster      | 2.5 | 18.0 |
| Upper rear mounting bolt locknut       | 6.0 | 43.0 |
| 12 mm mounting bolt - H, J models      | 5.5 | 40.0 |
| 12 mm mounting bolt - K models outward | 4.5 | 33.0 |
| Drive sprocket retainer bolt:          | 5.0 | 40.0 |
| 600 models                             | 5.5 | 40.0 |
| 1000 H, J models                       | 9.0 | 63.0 |
| 1000 K models onward                   | 5.2 | 38.0 |
| Gearshift pedal pin bolt               | 1.0 | 7.0 |
| Exhaust system mountings:              | 1.2 | 7.0 |
| Header retaining nuts                  | 1.2 | 7.0 |
| All other mounting and clamp bolts     | 2.2 | 16.0 |

1 General description

The engine/transmission unit is of water-cooled four-cylinder in-line design, fitted transversely across the frame. The six-speeds are operated by double overhead camshafts, chain driven off the crankshaft. The engine/transmission unit is constructed in the aluminum alloy with the crankcase being divided horizontally. The crankcase incorporates a wet sump, pressure fed lubrication system, and houses a chain driven dual rotor oil pump.

2 Major engine repair general information

1. It is not always easy to determine when an engine should be completely overhauled, as a number of factors must be considered.
2. High mileage is not necessarily an indication that an overhaul is needed, while low mileage, on the other hand, does not preclude the need for an overhaul. Frequency of servicing is probably the single most important consideration. An engine that has regular and frequent oil and filter changes, as well as other required maintenance, will most likely give many miles of reliable service. Conversely, a neglected engine, or one which has never been broken (run) in properly, may require an overhaul very early in its life.

3. Exhaust smoke and excessive oil consumption are both indications that piston rings and/or valve guides are in need of attention, although make sure that the fault is not due to oil leakage. Refer to Section 11 and perform a cylinder compression check to determine if the cylinder and exhaust valve are in good condition.

4. If the engine is making obvious knocking or rumbling noises, the connecting rod and/or main bearings may be faulty.
5. Loss of power, rough running, excessive valve train noise and high fuel consumption rates may also point to the need for an overhaul, especially if they are all present at the same time. A complete tune-up does not remedy the situation; major mechanical work is the only solution.

6. An engine overhaul generally involves restoring this internal parts to the specifications of a new engine. During an overhaul the valve seats are renewed and the cylinder walls are bored and honed. If a rebore is done, then new pistons will also be required. The main and big-end bearings are usually renewed during a major overhaul. Generally the valve seats are serviced as well, since they are usually in less than perfect condition at this point. While the engine is being overhauled, other components such as the carburettor and the starter motor can also be rebuilt. The end result should be a like new engine that will give as many trouble free miles as the original.

7. Before beginning the engine overhaul, read through the related procedures to familiarise yourself with the scope and requirements of the job. Overhauling an engine is not difficult, but it is time consuming. Plan on the motorcycle being tied up for a minimum of two weeks. Check on the availability of parts and make sure that any necessary special tools, equipment and supplies are obtained in advance.

8. Most work can be done with typical shop hand tools, although a number of precision measuring tools are required for inspecting parts to determine if they must be renewed. Often a dealer service department or motorcycle repair shop will handle the inspection of parts and offer advice concerning reconditioning and renewals. As a general rule, time is the primary cost of an overhaul so it does not pay to install worn or substandard parts.

9. As a final note, to ensure maximum life and minimum trouble from a rebuilt engine, everything must be assembled with care in a spotless clean environment.

3 Operations with the engine/transmission unit in the frame

The components and assemblies listed below can be removed without having to remove the engine unit from the frame. If however, any of the procedures require attention at the same time, removal of the engine is recommended.

- Cylinder head - 1000 models.
- Engine sprocket.
- Nut and/or locknut.
- Gearshift (selector) mechanism components.
- Shift drum and forks - 1000 models.
- Water pump.
- Ignition system components.
- Starter motor.
4. Operations with the engine/transmission unit removed from the frame

It is necessary to remove the engine/gearbox unit from the frame and separate the crankcase halves to gain access to the following components:

- Crankshaft assembly
- Main and big-end bearings
- Connecting rods
- Camshaft
- Oil pump drive chain - 1000 models
- Alternator drive chain and tensioner - 1000 models
- Starter clutch and alternator drive components - 1000 models
- Shift (selector) drum and forks - 600 models
- Gearbox shafts and pinions.

5. Engine - removal and installation

Note: Engine removal and installation should be carried out by a professional, as aid of an assistant, personal injury or damage could occur if the engine fails or is dropped. An hydraulic floor-type jack should be used to support and lower the engine to the floor if possible. These can be hired quite cheaply.

Removal

1. If the machine is dirty, wash it thoroughly before starting any major dismantling work. This will make work much easier and rule out the possibility of caked-on lumps of dirt falling into some vital component. Work can also be made easier by raising the machine to a suitable working height on an hydraulic ramp or a suitable platform.

2. Remove the fuel tank as described in Chapter 4, and the lower or side fairings (as applicable) as described in Chapter 6.

3. Place a suitably sized container beneath the engine unit and drain the engine oil as described in Chapter 1. Remove the oil filter and discard it. Disconnect the battery leads (negative lead first) and remove the battery from the machine. If the machine is to be left dismantled for some time, give the battery a regular refreshers charge as described in Chapter 6.

4. On all models slacken the eight nuts which secure the exhaust headers to the cylinder head and remove their mounting collars. Slacken and remove both the muffler and header mounting bolts and manoeuvre the complete exhaust system away from the machine. On 1000 models slacken the left muffler mounting clamp bolts and the muffler mounting bolts then remove the muffler. Remove the right muffler in a similar manner. Slacken the eight nuts which secure the header to the cylinder head, followed by the header mounting bolt; the header assembly can then be lowered away from the machine.

5. Slacken the carburettors as described in Chapter 4. Drain the coolant as described in Chapter 3. Remove the breather pipe from the rear of the cylinder head. Remove the bolts which secure the oil cooler hoses or pipes to the engine. Free the pipes or hoses from any retaining clamps or guides and tape them out of the way of the engine. Remove the flexible coolant hoses from their unions on the water pump, drain the coolant, and remove the cylinder head, and remove the radiator lower mounting bolts and nuts if applicable.

6. On California models, remove the secondary air system pipes and control valves (where fixed to the pipes) from the front of the engine. On 1000 California models, remove the evaporative emission control system canister from the front of the engine. Take note of all hose connections and if necessary label them to ensure correct reassembly.

7. On 1000 models remove the three bolts which secure the clutch slave cylinder to the engine sprocket cover and withdraw the cylinder from the casing. Push the piston as far back as possible by hand and then slowly bring the clutch lever back to the handles and hold it there with a steel elastic band. This will prevent the slave cylinder piston from being expelled by the accidental operation of the clutch lever. On 1000 K models onward, slacken the speedometer cable retaining nut and withdraw the cable from the sprocket case (see illustration). Tie the slave cylinder and speedometer cable (as applicable) to the frame so that they do not hinder engine removal. Withdraw the clutch pushrod from the crankcase (see illustration).

8. On all models slacken the gearshift pedal pivot bolt and remove the pedal from the shaft. Remove the engine sprocket cover noting the drive chain guide plate (600 models) and locating dowels fitted between the cover and crankcase. If the dowels are loose they should be removed and stored with the upper cover for refitting. On 1000 K models onward, note the speedometer drive joint fitted to the cover. The 1000 T models incorporate a noise damper in the sprocket cover which is retained by a plate and two screws.

9. Slacken the engine sprocket retainer bolt whilst locking the engine through the transmission (machine in gear — apply the rear brake to prevent rotation) and remove the sprocket, bolt and washer. Pull the sprocket off the countershaft (output shaft) splines and disengage it from the chain, noting that it may be necessary to first slacken the drive chain to free the chain from the reverse sprocket and the chain from the rear pulley. Slacken the sprocket and allow the chain to hang over the swingarm.

10. Disconnect the lead from the starter motor terminal and disconnect the electrical connections to the pulser coil (pulsed oil pressure switch, as applicable) and release all wiring from any cable ties or locks which secure it to the frame (see illustration). Pull the suppressor caps off the spark plugs and position them clear of the engine. On 600 models remove the fairing mounting brackets from the right and left sides of the oil pan, disconnect the clutch cable from the engine, and remove the earth (ground) strap from the starter motor mounting bolt (see illustrations). On 1000 models slacken the side stand bracket mounting bolts and remove it from the machine, noting that on K models onward it will also be necessary to disconnect the side stand switch wiring (see illustrations).

11. On all models the engine unit should now only be retained by its mounting bolts. Check carefully that all components which may hinder the removal of the unit have been removed and that all cables and leads are wedged or tied out of the way. Position the jack beneath the engine unit to take the weight of the engine unit.

12. Slacken and remove both the right and left upper and lower engine front mounting bolts. Make a note of the correct position of any spacers fitted to the bolts to use as a guide on installation. Slacken both the upper and rear mounting bolts. Note: On 1000 models there is an adjuster fitted to the upper rear mounting bolt on the right lower side of the frame. Loosen the adjuster locknut and screw the adjuster into the frame until there is a gap between the adjuster and engine. On all models ensure the engine is securely supported then withdraw the rear mounting bolts, again noting the position of any spacers. Turn the engine unit slightly so that the cylinder moves upwards and gently lower the engine out of the frame; taking care not to damage the radiator. The engine unit can then be manoeuvred out of the side of the frame (see illustration).

Installation

13. Trace all traces of corrosion from the engine mounting bolts and apply a smear of grease to the shanks to ease installation.

14. Position the engine unit beneath the frame and lift it up into position on the jack. Carefully manoeuvre the engine unit into position and insert the rear mounting bolts and spacers followed by the front mounting bolts and spacers. On 1000 models, once all the mounting bolts are in position tighten the upper rear mounting bolt adjuster to the specified torque setting; secure it in position by tightening the locknut to its specified torque setting. On all models tighten all the engine mounting bolts to the specified torque setting.

15. Connect the lead to the starter motor terminal, tighten its retaining nut securely, and refit its rubber insulating cap. Make the electrical connections to the pulser coil(s), neutral and oil pressure switches and alternator(s) (as applicable) ensuring that the wiring is correctly routed. Refit any cable ties that were removed and refit the wiring to any relevant guide hooks or clamps. On 600 models install the fairing mounting brackets on the oil pan and reconnect the earth (ground) strap to one of the starter motor bolts. Connect the clutch cable to the operating arm and adjust it as described in Chapter 1 (see illustration). On 1000 models refit the side stand bracket, tightening its mounting bolts securely, and on 1000 models connect the side stand switch wiring connector. On all models refit the suppressor caps to the spark plugs using the numbers on the HT leads to ensure they are correctly fitted.

16. Engage the engine sprocket with the drive chain, ensuring that the sprocket’s marked face is upwards, then install it on the sprockles...
5.16 Engage engine sprocket with drive chain and refit sprocket retaining bolt and washer on the crankshaft (output shaft) (see illustration). Fit the sprocket retaining bolt and washer and tighten it to the specified torque setting whilst locking the transmission as described in paragraph 5 to prevent the sprocket rotating. Check the drive chain tension as described in Chapter 1 and adjust if necessary. Fit the two sprocket cover locating dowels (removed and installed the cover, not omitting the drive chain guide plate (600 models) fitted between the cover and crankcase (see illustration). Note: On 1000 K models onward, when installing the cover ensure that the speedometer drive gear engages correctly with the sprocket retaining bolt (see illustration). Fit the gearshift pedal to the shaft, aligning the pin on the shaft with the punch mark on the pedal, and tighten the pin slot to the pin slot of the sprocket cover. Remove the elastic band from the clutch lever and push the drive cylinder piston in as far as possible using hand pressure only. Fit the drive cylinder to the sprocket cover and tighten its retaining bolts securely. Operate the clutch lever repeatedly to bring the piston in contact with the pushrod; if there is evidence of air in the system it must be bled as described in Chapter 7. On 1000 K models onward, refill the speedometer cable to the sprocket cover and tighten its retaining screw securely. On 1000 California models install the calibrator. On all California models, install the air control valves (where located on the engine and the air pipes. Refer to the label on the air cleaner cover for correct connections. On all models install the radiator lower mounting bolts and nuts (as applicable) and tighten them securely. Refill the flexible coolant hoses to their unions on the water pump and cylinder head and securely clamp them in position. Refill the engine’s oil (oil pipes or hoses (as applicable) and refill them to the engine unit, tightening their retaining bolts securely. Ensure the hoses or pipes are correctly routed and pass through any relevant clamps or guides. Refill the breather pipe to the rear of the cylinder head. Refit the carburettors as described in Chapter 4. Place new gaskets in the exhaust ports, using a dab of grease to stick them in place (see illustration). On 600 models offer up the exhaust section, aligning the numbers on the exhaust ports, and fit the muffler and header mounting bolts (see illustration). Refit the mounting collars to the header pipes and secure the headers in position by installing the eight mounting nuts, tightening them finger-tight only at this stage. On 1000 models push the exhaust system onto the exhaust manifolds and secure them in position by tightening the exhaust manifold nuts and checking the exhaust system for leaks. Reconnect the battery, remeasuring the negative terminal last. Working as described in Chapter 1, install a suitable exhaust such as methylated spirits (stoddard solvent), acetone or cellulose thinner. The type of solvent required will depend on the type of compound used. Gasket compound of the non-hardening type can be removed using a soft brass-brass wire of the type used for cleaning shoe soles. A considerable amount of scrubbing can take place without fear of harming mating surfaces. Some difficulty may be encountered when attempting to remove gaskets of the self-vulcanising type, the use of which is becoming widespread, particularly as cylinder head and base gaskets. Use the gasket compound of choice from the mating surface using a sculptor or small oval mouthed brush. Do not resort to scraping with a sharp instrument unless necessary. Gather together the necessary tools and have available an oil filter can filled with clean engine oil. Make sure that all new gaskets and mating surfaces are to hand, also all replacement parts and lubrication required. Nothing is more frustrating than having to stop in the middle of a reassembly sequence because a vital gasket or replacement has been overlooked. A general rule each moving engine component should be lubricated thoroughly as it is fitted to the engine. Make sure that the reassembly area is clean and that there is adequate working space. Refer to the torque and clearance chart where they are given. Many of the smallest bolts are easily sheared and overtightened. Always use the correct size screwscrewdriver bit for crosshead screws and never use an ordinary screwdriver or punch. If any screws show evidence of maltrim in the past, it is advisable to advise them as a complete set. All mating surfaces must be carefully cleaned of all traces of old gaskets or jointing compound and must be absolutely flat and unмарked. Using a clean, lint-free cloth soak a high flash-point solvent, wipe over the mating surfaces to remove all traces of oil and grease. Where necessary, apply a thin, continuous band of sealant to the mating surfaces of the crankcase and assembly. When refitting the sprockets and pegs and paper clips, wrap a small loop of wire through the chain loop before removing the sprockets and linkages from the crankshaft head.

5.18 The great care not to drop the sprocket bolts down into the engine. If a bolt should drop into the engine do not turn the engine over until it has been retrieved. Failure to do so will result in extensive engine damage. 5.19 Each of the crankcase bearing cap bolts by about one turn at a time. The crankshafts are under pressure from the valve springs and will be pushed clear of the bearing surfaces in the cylinder head. Once the valve springs have been released, remove the bolts and place them with the bearing caps in a safe place. Also, if possible, remove all bearing cap dowels and store these with the caps. Disconnect the camshaft drivebelt from the crankshaft pulley and remove the handwheel. Use a piece of angle iron or a fork to pry the camshaft out of the front side of the engine head. Thereafter, it should be possible to remove the camshaft and followers from the engine head. 5.17 Ensure the camshaft and followers are removed with the engine in the frame.

5.17b Do not omit drive chain guide plate when installing sprocket cover - 600 models

5.17c Align punch marks when installing gearshift pedal

5.21a Use grease to hold new gaskets in position

5.21b Align headers with the ports and refit the mounting collars . . . and bolts

5.21c . . . and bolts

5.21d Refit muffler and tighten all mounting and clamping bolts to their specified torque settings

5.21e Align engine sprocket with drive chain and refit sprocket retaining bolt and washer

5.21f Do not omit drive chain guide plate when installing sprocket cover - 600 models
The clearance must not exceed the service limit shown in the Specifications.

11. Camshaft runout can be checked by supporting each end of the camshaft on V-blocks, and measuring any runout using a dial gauge. If the runout exceeds the specified limit the camshaft must be renewed.

12. Inspect the upper camchain guide for wear or damage which will normally be fairly obvious, renew if necessary.

13. On 600 models inspect the camchain tensioner for wear or damage and check that the plunger moves in and out of the body smoothly. If it is not the case the tensioner must be renewed.

Installation

14. If the cam follower adjustment screws were removed, fit the screws to the relevant follower followed by the locknut (see illustration). On 600 models set the adjuster screw so that the distance from the top of the locknuts to the bottom of the screw is 20 mm (0.79 in). On 1000 models set the screw so that the distance between the top surface of the screw and the bottom surface of the locknut is 7 mm (0.28 in). Secure the screw in position by tightening the locknut.

15. Install the follower assembly in the cylinder head by gently tapping the adjuster screw into position using a 10 mm socket, fitted to the locknut, as a drift. If the adjuster screws were not removed simply screw the follower onto the adjuster screw by rotating the screw itself. Fit the locknut and set up the adjuster screw as described above.

16. Fit the cam follower holder dowels to the cylinder head (1000 models only) and install the holders and springs, securing them in position with their retaining bolts (see illustrations). Tighten the retaining bolts securely to the specified torque setting (600 models).

17. Using a socket on the large hexagon nut on the end of the crankshaft, turn the crankshaft in a clockwise direction on 600 models and an anticlockwise direction on 1000 models, until keeping the camchain taut, until the T on the flywheel or crankcase aligns with the index mark visible on the crankcase cover or rotor (as applicable) (see illustration). Apply a few drops of thread-locking compound to the sprocket bolts and install the upper sprocket bolts, tightening them finger-tight only at this stage. Rotate the crankshaft through 1 complete turn (360°) until the T mark aligns with the index mark again, checking that the sprocket timing marks align again with the cylinder head, and fit the remaining sprocket bolts. Tighten all four cam sprocket bolts evenly and progressively to the specified torque setting.

20. Locate the cam sprockets on the camshaft with the UP mark on each facing upwards then locate the sprockets with the chain so that the IN mark on the inlet sprocket is level with the top surface of the cylinder head, and the EX mark on the exhaust sprocket is also level with the cylinder head surface. Fit the exhaust sprocket onto the camshaft then release the cam chain tensioner arm by pressing down on it with a screwdriver whilst fitting the inlet sprocket onto the camshaft. Apply thread-locking compound to the threads of the sprocket bolts and fit one bolt to each sprocket, noting that it may be necessary to rotate the crankshaft slightly to align the sprocket holes with the camshaft drive sprocket through one complete turn (360°) and install the two remaining sprocket bolts. Turn the crankshaft through another complete turn and check that the IN and EX marks are correctly aligned with the cylinder head surface. If this is the case, tighten all the sprocket retaining bolts to the specified torque setting and fit the camchain tensioner with new chain and guide (see illustration).

22. On all models install the upper camchain guide to the cylinder head, ensuring that the arrow stamped on the guide is facing forward, and tighten its retaining bolts to the specified torque setting (600 models) or securely (1000 models) (see illustration). On 600 models position a new gasket on the cylinder block and install the camchain tensioner, tightening its mounting bolts securely (see illustration).

24. On all models rotate the crankshaft a few times, to settle all disturbed components, and check all valve clearances as described in Chapter 1, making adjustments as necessary. Lubricate all bearing surfaces with clean engine oil and wipe the cylinder head and cover gasket surfaces with a rag moistened with high flash-point solvent.

25. Examine the cylinder head cover gasket for signs of damage and renew if necessary. Apply illustrate sealant to the surfaces of the four semi-circular cutouts in the cylinder head cover gasket and fit it to the cover, ensuring that the arrow on the gasket is facing forwards; use a liquid gasket
compound to hold it in place (see illustration). Install the cover on the engine unit so that the arrow cast on the top surface of the cover faces forward (see illustration). Install the cylinder head cover retaining bolt seats ensuring that the UP mark on each seat faces upwards (see illustration). Hold the cover retainer bolts and tighten them evenly and progressively to the specified torque setting, noting that the outboard front cover bolts should be tightened first to ensure the cover gasket is correctly located. These bolts are marked with a triangle cast into the cylinder head cover surface (see illustration).

8 Camchain tensioner - removal, inspection and installation (1000 models)

Note: The camchain tensioner can be removed with the engine in the frame.

Caution: When removing or installing the tensioner, take care not to allow any item to drop down into the engine. If this should occur, do not turn the engine over until it has been retrieved. Failure to do so will result in extensive engine damage.

Removal
1 Remove the camshafts as described in the previous Section.
2 Slacken the four bolts which secure the camchain tensioner to the cylinder head and carefully lift the bolts away from the head.
3 Withdraw the tensioner from the cylinder head and very carefully remove the R-clips from both tensioner guides retaining pins.
4 Remove the pins, separate the tensioner and guide, and remove the camshaft out of position before removing the assembly. Pass a screwdriver through the chain to prevent it from dropping down into the engine unit.

Inspection
4 Inspect the tensioner guide for signs of wear or damage and renew if necessary. Also inspect the camchain front guide which runs down the front of the cylinder block. If this is damaged it must also be renewed; refer to the cylinder head removal procedure in the following Section.
5 Turn the tensioner body upside down and drain all the oil from its chamber. Drain the oil from the plunger by moving the tensioner arm in and out slowly. The spring tension of the arm can only be tested in comparison with a new component. If there is any doubt as to the condition of the spring the tensioner must be renewed.
6 Fill the tensioner chamber up with clean engine oil and prime the plunger by slowly moving the tensioner arm in and out. If the tensioner is in good condition the tensioner arm should look when moved quickly. If this is not the case the tensioner body must be renewed. After inspection, drain the oil from the chamber and plunger.

Installation
7 Position the tensioner body inside the camchain's loop and fit the tensioner guide so that the chain runs up between the guide and body. Insert the guide retaining pins and secure them in position with their R-clips, taking great care not to drop the clips into the engine.
8 Fit the camchain tensioner mounting bolts and tighten them to the specified torque setting. Install the camshafts as described in the previous Section.

9 Cylinder head - removal, inspection and installation

Note: The cylinder head can be removed with the engine in the frame.

Removal
1 If the engine is in the frame, it will first be necessary to remove the fuel tank, carburetors, exhaust system, and camshafts and camchain tensioner using the information given in previous Sections of this Chapter. On all models and 600 models remove the engine oil pickup and drain the oil into a suitable container. On 600 models also remove the timing belt and water pump by removing the camshaft sprockets and oil pump
2 Drain the cooling system as described in Chapter 3. Remove the retaining bolts that secure the metal coolant pipes to the rear of the cylinder head and carefully pull the pipes out, noting the O-rings around their unions.

600 models
3 Slacken the engine front upper mounting bolts on each side of the cylinder head, noting the spacer fitted between the frame and cylinder head on the right side. Remove the domed nut and washer from the rear of the cylinder head and lift out the rear camchain guide (see Illustration).

All models
4 On 1000 models drain the engine oil into a clean container as described in Chapter 1. Remove the two bolts which secure the oil cooler pipes to the front of the engine unit and secure them from the side of the cylinder head. Slacken the rear axle nut and the chain adjuster locknuts, then unscrew the adjuster nuts to obtain the maximum drive chain freeplay possible.
5 Remove the lower radiator mounting bracket from the cylinder head and disconnect the bottom radiator hose from its metal coolant pipe. Free the ignition coil/thermostat housing mounting bracket from the frame by removing its mounting bolts and remove the rubber heat protectors from each side of the cylinder head. Slacken the rear axle nut and the chain adjuster locknuts, then unscrew the adjuster nuts to obtain the maximum drive chain freeplay possible.
6 Slacken all the engine mounting bolts then place a jack or support beneath the machine to take the weight of the engine. Slacken, but do not yet remove, the locknut on the upper rear engine mounting adjuster fitted on the right side of the frame, and screw in the adjuster until there is a gap between it and the engine. Remove all the engine mounting bolts except the upper rear bolt, noting the correct position of any spacers. Carefully jack the engine up into the frame pivoting it about the upper rear mounting bolt.

All models
7 On all models slacken the single bolt which secures the cylinder block to the crankcase and on 600 models remove the bolt which passes up through the front of the block, securing the head to the block (see illustration). On 1000 models also remove the four bolts situated around the inside of the camchain tunnel.
8 Working in the reverse of the tightening sequence shown in Illustration 8.12c slacken the twelve cylinder head nuts by about one turn at a time until all pressure is released, then remove the nuts. Tap around the joint faces of the cylinder head with a soft-faced mallet to free the head. Once the seal has been broken, lift the head clear whilst feeding the camchain through the tunnel.
9 Remove the old head gasket and discard it.

If loose, remove the cylinder head locating dowels from the cylinder block and store them with the head for safekeeping. The front camchain guide can then be fitted out of the cylinder block (see Illustration).

Inspection
10 Remove all traces of carbon from the cylinder head using a blunt-ended scraper (the rounded end of an old steel ruler will do). Polish off by polishing with metal polish to give a smooth shiny surface.
11 Check the condition of the spark plug threads. If the threads are worn or cross-threaded they can be reclaimed by the fitting of a Hollow wire-threaded insert. Most motorcycle repair shops operate a service which is simple, cheap and effective.
12 Lay the cylinder head on a sheet of 1/4 inch plate glass and check for distortion using feeler gauges. Aluminium cylinder heads distort very easily, especially if the cylinder head nuts are tightened down unevenly. If the amount of distortion is only slight, it is permissible to rub the head down by wrapping a sheet of very fine emery cloth around the sheet of glass and rubbing in a rotary motion. Do not forget to check the corresponding surface of the cylinder block for warpage.
13 If the cylinder head is distorted beyond the service limit as shown by frequent blowing of the cylinder head gasket), it will require skimming by a competent engineer experienced in this kind of work. This will of course raise the compression ratio of the engine and if too much is removed, the performance of the engine will be adversely affected. In extreme cases the valve may also strike the pistons, causing serious engine damage. If there is a risk of this happening, the only solution is to renew the cylinder head.
14 Refer to the following Section for information on overhauling the valves.

Installation
15 Ensure both cylinder head and block mating surfaces are clean and fit the locating dowels to the block (if removed). Install the camchain front guide, ensuring that its lugs are correctly located in the slots in the block, and fit a new head gasket over the dowels and studs (see Illustrations). Carefully lower the cylinder head onto the block whilst feeding the camchain up through the head, noting that it may be necessary to lift the camchain guide slightly to allow the head to pass over it (see illustration). Refit all the cylinder head nuts and bolts including their washers (where fitted). Using the correct tightening sequence, tighten the twelve cylinder head nuts evenly and progressively to the specified torque
9.16c Cylinder head nut tightening sequence

### 600 models

17. On 600 models install the camchain rear guide in the camchain tunnel, fit a new sealing washer and secure the guide in position by tightening its domed retaining nut securely.

18. If the work is being carried out with the engine in the frame, refit the engine front upper mounting bolt on each side, not omitting the spacer fitted between the right side of the head and the frame. Tighten all disturbed engine mounting bolts to the specified torque setting.

### 1000 models

19. On 1000 models if the engine is in the frame, lower it back into its original position and install all the engine mounting bolts and spacers. Once all are in position tighten the engine upper rear mounting adjuster to the specified torque setting and secure it in position by tightening its locknut to its specified torque setting. Tighten all the engine mounting bolts to the specified torque settings then adjust the drive chain freewheel as described in Chapter 3.

20. Fill new hoses to the oil cooler pipes and refit the pipes to the engine, tightening their retaining bolts to the specified torque setting. Install the rubber heat protectors on each side of the cylinder head and refit the radiator lower mounting bracket.

### 9.22a

Do not omit the O-rings from the cylinder head coolant pipes.

### 9.22b

... and tighten their retaining bolts securely.

### 10.5c

Refit the valve spring seats, ensuring that their closer-pitched coils are at the bottom...

### 10.5d

Liberally oil all the valve stem and insert it into the guide.

### Inspection

3. Inspect each valve for wear, overheating or burning and renew as a set if set is required. Normally the exhaust valves will need attention or renewal more frequently than the inlet valves, as the latter run at relatively low temperatures. If the valve face is fitted the valve must be renewed; do not attempt to cure this by grinding as this invariably causes the valve seat to become pocketed. Using a micrometer, measure the diameter of each valve stem at a number of points along its bearing surface. If at any point the diameter of the valve is less than the service limit given in the Specifications the valve must be renewed. If it is possible, measure the internal bore of each valve guide at various points along its bearing surface both in the direction of the cam lobe and at right angles to it. Any measurement beyond the specified service limit must be renewed.

5. Inspect the cylinder head valve seats in each of the combustion chambers for signs of cracking, pitting or burning. Measure the width of the valve seat and check that it is within the specified limits. If the width of the valve seat is not within the specified limits, variably around its circumference, or in any way damaged it must be re-cut.

7. The valves should be ground in using oil-bound grinding paste to remove any light pitting or to finish off a newly cut seat. Note that it is not normally necessary to resort to coarse grinding paste which is supplied in the dual-grade containers.

8. Commence by scoring a trace of fine grade grinding compound (boron carbide paste) on the valve seat and apply a suction tool to the head of the valve. Oil the valve stem and insert the valve into its guide so that the valve and valve seat make contact with each other. With a semi-rotary motion, grind in the valve head to the seat, using a back and forth motion. Lift the valve occasionally to ensure that the grinding paste is evenly distributed. Repeat the application until an unbroken ring of light grey matt finish is obtained on both the valve and seat. This denotes that the grinding operation is now complete.

### Disassembly

1. Before removing the valves from the cylinder head, obtain a container and partition it off into 16 separate sections. Clearly label each section with a cylinder number and valve position and place the valve components in their respective sections as they are removed. This will prevent mixing of valve components and ensure that they are installed in their original positions.

2. Remove the cam followers as described in Section 7. Compress the valve springs with a suitable valve spring compressor, and remove both valve collets (keepers). Carefully release the valve spring compressor and lift the spring retainer collar off the valve. Lift off both valve springs noting that they should be fitted with their closer-pitched coils at the bottom, and then slide the valve out of the cylinder head.

3. The oil seals can be carefully levered off the valve guide and both spring seats removed.
11 Cylinder block - removal, inspection and installation

11.1a On 600 models disconnect the coolant hose from the rear of the block.

11.1b Remove the bolt which secures the block to the crankcase.

Inspection

3. Remove all traces of gasket from the sealing faces of the block and check the upper sealing face of the block for wearage as described in Section 9 for the cylinder head.

4. Cylinder wear can be assessed by measuring the bore diameter at the top (just below the wear ridge), middle and bottom of the bore. Measure both along the piston pin axis and at right angles to it so that at least six measurements are taken. If any of the readings obtained exceed the service limit given in the Specifications, the cylinder block will have to be rebored and fitted with oversize pistons. Using the measurements obtained allow the taper and roundness (ovality) of the bore. If either of these exceed the specified service limit a rebore will be required.

5. Honda supply pistons in two oversizes:
   +0.25 mm (+0.01 in) and +0.50 mm (+0.02 in).

6. If boring in excess of 0.25 mm becomes necessary it will be necessary to renew the cylinder block.

7. If new pistons are to be run in a used bore, the bore surface must first be prepared by honing, or glass-blasting. This process, which can also be used to remove marks caused by very light piston seizure, involves the use of a cylinder bore honing tool usually in conjunction with an electric drill to break down the glazed surface which forms on any bore during normal service. The prepared bore will have a very lightly roughened surface which will help the rings to bed in rapidly and fully. This is normally done as a matter of course after reboring. It also has the advantage of removing the lip from the top of the bore which could otherwise wear damage the new top piston ring. Most motorcycle repair shops operate this service.

8. Warmly warn motors in a blue haze tending to develop into a white haze as the wear becomes more pronounced. The other indication is piston slap, a form of metal-to-metal which occurs when there is little load on the engine. If the top of the bore is examined carefully, it will be found that there is a ridge on the thrust side; the depth of which will vary according to the rate of wear which has taken place.

Installation

11.7 On 600 models, if removed, install the oil jets (see illustration) in a surface ensuring that their smaller holes are facing upwards (see Illustration). On all models fit the dowels to the crankcase and install a new base gasket (see Illustration). Inspect the O-rings which are fitted to the rear of each dowel and renew any which are damaged.

9. Note that it is advisable to oil the help of an assistant to refit the cylinder block, lubricate the surfaces and the piston circumference of the cylinder bores with clean engine oil. Pass the crankcase through its tunnel in the block and slide the block into position.

10. The cylinder bores have a generous load-in for the pistons at the bottom, although on a multi-cylinder engine such as this it would be an advantage to use the special Honda piston ring compressors. In the absence of these it is possible to load the pistons into the bores gently, working across from one side to the other, guiding in one ring at a time whilst tapping gently onto the cylinder block top surface (see Illustration).

Cautions: Great care must be taken not to get too much pressure on the piston rings as they are easily broken. The above process takes time and much pressure must not be rushed. Once all the piston rings have been fitted, press the block down until it seats firmly on the base gasket.

11. Install the cylinder block retaining bolt, tightening it only finger-tight at this stage. Check that the crankshaft can be smoothly rotated whilst holding the block down and seating the camchain.

12. On 600 models fit the coolant hose to the rear of the block, securing it using a clamp and tightening its hose clamp securely. On 1000 models check the condition of the coolant pipe O-rings, renewing them if necessary, then refit the pipe to the block, tightening its retaining bolts securely.

12.7 Measuring piston diameter

12.7.1 Measure the piston at end gap, insert the ring into the lower end of its bore, using the crown of the bare piston to locate it. Ensure that it is square in the bore and measure the end gap of the ring using feeler gauges (see illustration). If the ring gap exceeds the limits given, the rings should be renewed as a set.

10. It is also necessary to check the end gap when fitting new rings. If there is insufficient clearance, the rings will break up in the bore whilst the engine is running causing extensive engine damage. If necessary, the end gap can be increased by carefully filing the ends of the rings with a file. Support the ring on the end as much as possible to avoid breakage and ensure that the ring ends are kept square. Remove only a small amount at a time and keep checking the end gap in the bore.

11. Measure the outside diameter of the piston pin at several points along its bearing surface and renew it if it has worn beyond the service limit. It is possible also to measure the inside diameter of the piston pin bore in the piston and the connecting rod small-end bore; compare these with the limits given in the Specifications, renewing components as necessary.

11.8 Ensure dowels are in position and fit a new gasket.

11.9 Carefully install the block as described in text.

12.1 Method of removing rings stuck in their grooves by deposits

Inspection

5. If the cylinders are to be renewed, the existing pistons and rings can do this however they will be replaced with new items. If, however, the bores have been cleaned and checked as described in the preceding Section and are to be re-used, clean check the pistons and rings as follows.

6. Remove all traces of carbon from the piston crowns using a blunt-ended scraper to avoid damaging the piston surface. Finish off by polishing the crowns of the pistons with metal polish to prevent carbon adhering so rapidly in the future. Note: Never use emery cloth on the soft aluminium alloy of the piston.

7. Piston wear usually occurs at the skirt or lower end of the piston and takes the form of vertical scratches or score marks on the thrust side of the piston. Damage of this nature will necessitate renewal and is checked by measuring the outside diameter of the skirt at a point 10 mm (0.4 in) from the base of the piston and at right angles to the piston pin axis (see Illustration). If any piston has worn to or beyond its service limit, it must be renewed.

8. After the engine has covered a high mileage, it is possible that the ring grooves may have become enlarged. Refit the rings to the piston and measure the clearance between the ring and groove using feeler gauges (see Illustration). If the gap exceeds the service limit the piston and/or piston rings must be renewed.

9. To measure the piston ring end gap, insert the ring and the lower end of its bore, using the crown of the bare piston to locate it. Ensure that it is square in the bore and measure the end gap of the ring using feeler gauges (see illustration). If the ring gap exceeds the limits given, the rings should be renewed as a set.

10. It is also necessary to check the end gap when fitting new rings. If there is insufficient clearance, the rings will break up in the bore whilst the engine is running causing extensive engine damage. If necessary, the end gap can be increased by carefully filing the ends of the rings with a file. Support the ring on the end as much as possible to avoid breakage and ensure that the ring ends are kept square. Remove only a small amount at a time and keep checking the end gap in the bore.

11. Measure the outside diameter of the piston pin at several points along its bearing surface and renew it if it has worn beyond the service limit. It is possible also to measure the inside diameter of the piston pin bore in the piston and the connecting rod small-end bore; compare these with the limits given in the Specifications, renewing components as necessary.

12.2 Measuring piston ring groove clearance

12.2.1 Measure the piston at end gap, insert the ring into the lower end of its bore, using the crown of the bare piston to locate it. Ensure that it is square in the bore and measure the end gap of the ring using feeler gauges (see illustration). If the ring gap exceeds the limits given, the rings should be renewed as a set.

10. It is also necessary to check the end gap when fitting new rings. If there is insufficient clearance, the rings will break up in the bore whilst the engine is running causing extensive engine damage. If necessary, the end gap can be increased by carefully filing the ends of the rings with a file. Support the ring on the end as much as possible to avoid breakage and ensure that the ring ends are kept square. Remove only a small amount at a time and keep checking the end gap in the bore.

11. Measure the outside diameter of the piston pin at several points along its bearing surface and renew it if it has worn beyond the service limit. It is possible also to measure the inside diameter of the piston pin bore in the piston and the connecting rod small-end bore; compare these with the limits given in the Specifications, renewing components as necessary.

12.2.2 Method of removing rings stuck in their grooves by deposits

Inspection

5. If the cylinders are to be renewed, the existing pistons and rings can do this however they will be replaced with new items. If, however, the bores have been cleaned and checked as described in the preceding Section and are to be re-used, clean check the pistons and rings as follows.

6. Remove all traces of carbon from the piston crowns using a blunt-ended scraper to avoid damaging the piston surface. Finish off by polishing the crowns of the pistons with metal polish to prevent carbon adhering so rapidly in the future. Note: Never use emery cloth on the soft aluminium alloy of the piston.

7. Piston wear usually occurs at the skirt or lower end of the piston and takes the form of vertical scratches or score marks on the thrust side of the piston. Damage of this nature will necessitate renewal and is checked by measuring the outside diameter of the skirt at a point 10 mm (0.4 in) from the base of the piston and at right angles to the piston pin axis (see Illustration). If any piston has worn to or beyond its service limit, it must be renewed.

8. After the engine has covered a high mileage, it is possible that the ring grooves may have become enlarged. Refit the rings to the piston and measure the clearance between the ring and groove using feeler gauges (see Illustration). If the gap exceeds the service limit the piston and/or piston rings must be renewed.

9. To measure the piston ring end gap, insert the ring into the lower end of its bore, using the crown of the bare piston to locate it. Ensure that it is square in the bore and measure the end gap of the ring using feeler gauges (see illustration). If the ring gap exceeds the limits given, the rings should be renewed as a set.

10. It is also necessary to check the end gap when fitting new rings. If there is insufficient clearance, the rings will break up in the bore whilst the engine is running causing extensive engine damage. If necessary, the end gap can be increased by carefully filing the ends of the rings with a file. Support the ring on the end as much as possible to avoid breakage and ensure that the ring ends are kept square. Remove only a small amount at a time and keep checking the end gap in the bore.

11. Measure the outside diameter of the piston pin at several points along its bearing surface and renew it if it has worn beyond the service limit. It is possible also to measure the inside diameter of the piston pin bore in the piston and the connecting rod small-end bore; compare these with the limits given in the Specifications, renewing components as necessary.
Installation

12.12 Piston ring end gap arrangement

1. Top ring
2. Top ring marking (N or R)
3. Second ring

12.13 Top piston ring can be identified by mark on its upper surface.

Note: The pin can be tapped carefully into position, using a hammer and suitable drift, whilst supporting the connecting rod and piston. Secure each piston pin in position with a new circlip, ensuring that it is correctly seated in its groove (see illustration).

13 Clutch removal

Note: The clutch can be removed with the engine in the frame.

1. Pushrod
2. Bearing
3. Spring retaining bolt - 4 off
4. Lifting plate
5. Spring - 4 off
6. Nut
7. Washer
8. Clutch centre
9. Spring seat
10. Anti-judder spring
11. Outer friction plate
12. Plain plate - 5 off
13. Friction plate - 5 off
14. Pressure plate
15. Clutch drum
16. Needle bearing
17. Centre collar
18. Oil pump drive gear
19. Spacer

600 models

2. Slacken and remove all the right crankcase cover retaining bolts and, if the engine is in the frame, disconnect the cable from the clutch lifting arm, removing it along with its mounting bracket. Carefully lift the cover away from the engine whilst catching any residual oil which may be released as the cover is removed. Note the two locating dowels fitted to the crankcase and remove these for safekeeping if they are loose. Ensure that the clutch pushrod is securely in place in the crankcase cover.

3. Progressively slacken the clutch spring retaining bolts until spring pressure is released then remove the clutch lifting plate and springs.

4. The clutch centre is located to the shaft for security. Prior to its removal, unscrew the nut using a drift, taking great care not to damage the mainshaft input shaft threads.

5. In the absence of the Honda service tool, Part Number 07GMB-KB90100, it will be necessary to devise some method of preventing the clutch centre rotating as the

13.1b Clutch - 1000 models

1. Spring retaining bolt - 5 off
2. Spring - 5 off
3. Pressure plate
4. Bearing
5. Pressure plate lifter
6. Pushrod
7. Nut
8. Washer
9. Inner friction plate
10. Friction plate - 8 off
11. Thrust washer (if models concerned)
12. Spring seat
13. Clutch centre
14. Spring plate - 8 off
15. Thrust washer
16. Clutch drum
17. Needle bearing
18. Centre collar
19. Thrust washer

13.1a Clutch - 600 models

1. Pushrod
2. Bearing
3. Spring retaining bolt - 4 off
4. Lifting plate
5. Spring - 4 off
6. Nut
7. Washer
8. Clutch centre
9. Spring seat
10. Anti-judder spring
11. Outer friction plate
12. Plain plate - 5 off
13. Friction plate - 5 off
14. Pressure plate
15. Clutch drum
16. Needle bearing
17. Centre collar
18. Oil pump drive gear
19. Spacer
1.13.5a On 600 models slacken clutch centre nut . . .
1.13.5b . . . whilst retaining the clutch centre as described in text
1.13.14 On 1000 models hold clutch centre as shown whilst slackening nut
1.14 Withdraw the clutch drum centre collar, using two pairs of pointed nose pliers and remove the needle roller bearing and clutch drum. Remove the thrust washer from the mainshaft.
1.14 4 Clutch - Inspection

1.14.1 After an extended period of service the clutch friction plates will wear and promote clutch slip. Measure the thickness of each friction plate using a vernier caliper. If any plate has worn to or beyond the service limit given in the Specifications, the friction plates must be renewed as a set.
1.14.2 The plain plates should not show any signs of excess heating (blueing). Check for warpage using a flat surface and feeler gauges. If any plate exceeds the maximum permissible amount of warpage, or shows signs of blueing, all plain plates must be renewed as a set.
1.14.3 Inspect the clutch assembly for burns and indentations on the edges of the protruding sags of the friction plates and/or slots in the edge of the clutch outer drum with which they engage. Similarly, wear can occur between the inner tongue of the plain plates and the slots in the clutch drum. Wear of these nature will cause clutch drag and slow disengagement during gear changes, since the plates will snag when the pressure plate is lifted. With care a small amount of wear can be corrected by dressing with a fine file, but if this is excessive the wear components can be renewed. Also inspect the anti-squeak wedge and seat for signs of wear or distortion and renew if necessary.
1.14.4 Inspect the mainshaft (plain shaft), clutch drum centre collar and clutch drum bearing surfaces for signs of wear and damage, along with the needle bearings. If access to the necessary measuring equipment can be gained, the condition of the above components can be judged by direct measurement. If any component shows signs of wear or damage, or has worn beyond its service limit given in the Specifications, it must be renewed.
1.14.5 Check the pressure plate lifting lever for wear. On 600 models the lever is fitted to the clutch lifting plate and on 1000 models it is fitted to the pressure plate. Ensure that the inner race of the bearing spire freely without any sign of notches or tightness and that there is no freeplay between the inner and outer races or the outer race and spire. If necessary, renew the bearing by driving the old bearing out of the plate and tapping the new bearing into position using a hammer and suitable tubular drift which bears only on the bearing's outer race.
1.14.6 Measure the free length of each clutch spring. If any one has sagged to less than the service limit, the clutch springs must be renewed as a set.

1.14.14 Clutch slave cylinder - 1000 models
1.14.14a Insert lifting arm into the cover, fit the return spring and roll pin . . .
1.14.14b . . . and hook the return spring over it
1.14.14c Insert the pushrod and check the operation of the lifting arm

1000 models
10. Roll the clutch pushrod on a flat surface to check that it is not bent. If bent, it can be straightened but if its hardened ends are worn it must be renewed.
11. The clutch master cylinder is similar to that used for the front brake and can be overhauled as described in Chapter 7.
12. Remove the safety led screw for access to the slave cylinder (see Chapter 6). Slacken or hydraulic hose union bolt on the slave cylinder - don't unscrew if it will leak. Remove the three mounting bolts and withdraw the slave cylinder from the sprocket cover.
13. Place the slave cylinder in a plastic bag (to contain brake fluid spills) and apply the clutch lever repeatedly to force the piston and spring out of the slave cylinder body. Unscrew the banjo bolt to free the hydraulic hose from the slave cylinder.
14. Thoroughly clean the slave cylinder's internal components in clean brake fluid (don't use any type of petroleum-based solvents). Check the piston and cylinder bore for wear, scratches and rust, and renew either component if necessary (see illustration).
measuring equipment is available, the piston and slave cylinder bore diameters can be compared with the limits given in the Specifications.

15. The biscuit oil seal is set in the end of the piston and the fluid seal seat in the piston groove must be renewed as a matter of course. Make careful note of which way round both seals are fitted before prying them out of position. Install the new seals in the same fitted direction as the originals and lubricate their working surfaces with new hydraulic fluid.

16. Insert the smaller end of the spring into the piston. Lubricate the bore of the slave cylinder with new hydraulic fluid and insert the piston into the bore, fluid seal and first.

15.1a On 600 models slide the large spacer onto the maingear shaft followed by the clutch drum centre collar

15.1b Engage oil pump sprocket with the drive chain and install them as an assembly

15.1c Apply thread-locking compound to sprocket bolt and tighten it to the specified torque setting

15.3c ... and the outer friction plate and plain plate

15.3d Alternately tighten the remaining clutch plates then install the pressure plate

15.4 Align the friction plate tangs and install into the clutch drum

1000 models
9. Fit the thrust washer to the maingear. Offer up the clutch drum, locating it with the primary drive gear, and slide the needle roller bearing and clutch centre collar along the maingear shaft to locate the drum in position. Refit the large thrust washer (K models onwards), followed by the clutch centre and washer.

10. Fit a new clutch nut - never re-use the old one. On K models onwards, apply engine oil to the nut flanges and threads. On all models, install the nut and tighten it to the specified torque setting whilst preventing the clutch centre from rotating using the method employed on dismantling (see illustration). Secure the nut in position by staking it into the clutch centre with the maingear splines (see illustration).

600 models
1. Slide the large spacer onto the maingear (input shaft) followed by the clutch drum centre collar (see illustration). Assemble the oil pump drive and drive sprockets with the oil pump drive chain (ensure the dogs on the drive gear and the marks on the driven gear face outwards) and offer up the assembly to the engine unit, sliding the drive sprocket along the maingear and engaging the driven sprocket with the oil pump shaft (see illustration). Apply thread-locking agent to the threads of the sprocket retaining bolt and tighten it to the specified torque setting (see illustration).

15.1a Lubricate the needle bearing and fit it onto the centre collar

15.2a Lubricate the needle bearing and fit it onto the centre collar

15.2b Ensure oil pump drive sprocket dogs engage with clutch drum holes when installing the drum

15.3a Fill the spring seat to the clutch centre ...

15.3b ... followed by the anti-judder spring ...

15.5a Ensure the thrust washer is fitted with OUTSIDE mark facing outwards

15.5b Fit a new clutch nut. Tighten it to the specified torque setting and stake it in position as described in text.

15.6 Fit the clutch springs and lifting plate. Tighten the bolts as described in the text.

15.7a Ensure dowels are in position in the crankcase and fit a new gasket

15.7b Install the right crankcase cover as described in text.

15.10a On 1000 models tighten the centre nut to the specified torque setting ...
groove in the mainshaft using a suitable hammer and punch (see illustration).
11 Install the spring seat and anti-judder spring to the clutch centre ensuring that the spring is fitted the correct way around (see illustration). Using the mark made on dismantling fit the inner friction plate to the clutch centre, followed by a plan plate, then alternately install the remaining friction and plain plates (see illustrations). Note: If new clutch plates are being fitted, apply oil to their surfaces to prevent possible scoring.
12 Insert the pushrod into the centre of the mainshaft then grease the inside of the pressure plate lifter and fit it to the end of the pushrod (see illustration). Install the clutch pressure plate and refit the clutch springs and their retaining bolts (see illustration). Tighten the clutch spring bolts evenly in a diagonal pattern and progressively in 2-3 steps until all are securely tightened.
13 Apply a smear of jointing compound to the crankcase surface to cover the area approximately 10-15 mm each side of the crankcase mating points. Fit a new gasket to the crankcase and install the cover and heat protector bar (see illustration). Refit the crankcase cover retaining bolts, not omitting the two wiring clamps, and tighten them evenly and progressively working in a diagonal sequence, until all are securely fastened (see illustration).
14 Replenish the engine oil as described in Chapter 1 and refit the timing section.
16 Gearshift (selector) mechanism - removal, inspection and installation.
Note: The gearshift (selector) mechanism can be removed with the engine in the frame.
Removal
1 On 600 models if the engine is in the frame remove the clutch and oil pump drive chain assembly as described in Section 13 and disengage the gearshift pedal from its shaft (see illustration). On 1000 models if the engine is in the frame drain the engine oil as described in Chapter 1, remove the water pump mounting bolts and the bolt which secures the metal coolant pipe to the front of the engine, then remove the pump from the crankcase and position it clear of the sprocket cover. Note: It is not necessary to disconnect or drain any of the cooling system components. Remove the final drive sprocket 46 described in Section 5. On 1000 K models forward, it will also be necessary to remove the side stand mounting bracket (see illustration).
2 On all 1000 models slacken and remove the gearshift cover retaining bolts and carefully remove the cover and chain guide plates, taking care not to damage the seals on either the gearshift or countershift sprockets. If loose, remove the gearshift cover locating dowels from the crankcase and store them with the cover for safekeeping.
3 On all models carefully withdraw the gearshift shaft from the crankcase, noting the thrust washer fitted between the shaft and crankcase, and remove the collar from the drum shifter mechanism pin. Slacken the two bolts which retain the drum shifter retaining plate and withdraw the plate and drum shifter as an assembly; note that this will involve removal of the shift fork shaft retaining plate on later 600 models.
4 Disengage the shifter (selector) arm from the shift drum and remove the arm along with its return spring, collar and thrust washer. Note the two dowels which are fitted in the crankcase and remove these for safekeeping along with the spacer which is fitted over the upper dowel. If necessary, slacken the shift drum cam retaining pin bolt from the centre of the drum and remove the cam. Withdraw the shift drum cam locating pin from the drum.
Inspection
5 Carefully separate the drum shifter and retaining plate noting that the shifter pads are
16.1b Gearshift mechanism - 1000 models

1. Gearshift shaft
2. Spring anchor pin
3. Thrust washer
4. Circle
5. Return spring
6. Collar
7. Drum shifter
8. Pawl - 2 off
9. Plunger - 2 off
10. Spring - 2 off
11. Bolt - 2 off
12. Drum shifter retaining plate
13. Stopper (pivoted) arm
14. Collar
15. Return spring
16. Dowel - 2 off
17. Thrust washer
18. Spacer
19. Shift drum retaining plate
20. Bolt
21. Retaining pin bolt
22. Shift drum cam
23. Bearing
24. Locating pin
25. Shift drum
26. Shift fork rod
27. Left shift fork
28. Centre shift fork
29. Right shift fork
30. Retaining bolt
31. Lock washer
32. Shift fork shaft retaining plate
33. Lock washer
34. Bolt  

16.5a Carefully separate the drum shifter and retaining plate . . .
16.5b . . . and inspect drum shifter components for wear

16.7a Locate shift drum cam with locating pin on installation

6. On 1000 models check the condition of the three oil seals in the gearshift mechanism cover and renew any which show signs of deterioration or damage. Seals can be levered out of position using a flat-bladed screwdriver and the new items pressed into position. The seals can be tapped in using a hammer and a suitable tubular drift which bears only on the hard outer edge of the seal. Also inspect the gearshift shaft needles bearing for wear, renewing it if necessary.

Installation

7. If removed, refit the shift drum cam locating pin to the drum and install the cam (see illustration). Apply a few drops of thread-locking compound to the threads of the cam retaining pin bolt and tighten it to the specified torque setting (see illustration).

8. Refit the dowel to the crankcase and fit the thrust washer over the lower dowel (see illustration). Fit the collar and return spring to the stopper (pivoted) arm and install them as an assembly ensuring that the stopper arm engages correctly with the shift drum cam (see illustration). Refit the spacer to the upper dowel.

9. Install the springs and plungers in the drum shifter and, using the marks made on dismantling, refit the pawls. Ensure the plungers are correctly located in the pawl groove and refit the drum shifter assembly to the retaining plate (see illustration). Install the drum shifter and retaining plate assembly to the engine and tighten the retaining plate bolts securely (see illustration). On later 600 models, do not forget to install the shift fork retaining plate.

10. Fit the collar to the drum shifter pin and slide the thrust washer along the gearshift shaft (see illustrations). Install the shaft ensuring that its return spring engages correctly with its locating pin and that the hole in the shaft plate locates with the drum shifter collar. Check that the gearshift shaft moves easily and centralises quickly with the pressure of the return spring. Note: On 1000 K models onward, if the work is being carried out with the engine in the frame it may be necessary to fit the gearshift shaft into the cover and install as an assembly with the cover (see illustration). If this is the case.
16.11a On 1000 models fit a new gasket as described in text...

16.11b ...and refit the cover...

16.11c ...and chain guide

16.8b ...and securely tightens its mounting bolts

16.9a Install the oil pan dowels and fit an O-ring over each one

16.9b Use grease to stick a new oil pan gasket to the engine...

Installation 600 models
1. Engage the oil pump driven sprocket with the drive chain, ensuring the O'UT mark on the sprocket face is facing the clutch, and locate it on the oil pump shaft. Apply a few drops of thread-locking compound to the sprocket retaining bolt and tighten it to the specified torque setting.
2. Apply a smear of oil to the oil pipe and relief valve O-rings and install them in the engine unit. Secure the centre oil pipe in position by tightening its retaining bolts securely. Fit the oil strainer to the pump, not omitting the O-ring, and tighten its retaining bolts securely (see illustrations). Smear the relief valve O-ring with engine oil and carefully push the valve into position in the crankcase.
3. Refit the oil pan dowels to the engine unit and fit an O-ring over each one (see illustration). Install a new gasket, using a smear of grease to hold it in position, and refit the oil pan (see illustrations). Install the oil pan retaining bolts and tighten evenly and progressively until all are securely fastened. Refit the clutch as described in Section 15.

1000 models
1. Fit the three oil pump dowels to the crankcase not omitting the O-ring which is fitted to the larger dowel. Manoeuvre the oil pump into position, aligning its shaft with the slot in the water pump drive shaft, and install the pump mounting bolts. Tighten the bolts securely and check that the pump shaft rotates freely.

18 Alternator rotor - removal and installation (600 models)
Note: The alternator rotor can be removed with the engine in the frame.
Note: To remove the alternator rotor the special Honda rotor puller, Part Number 07733-020001, or a pattern equivalent will be required. Do not attempt to remove the rotor using any other method.

Removal
1. Drain the engine oil, and remove the right crankcase cover as described in Section 15.
2. Slacken and remove the rotor retaining bolt and washer whilst holding the rotor to prevent it turning. In the absence of the special Honda service tool, Part Number 07725-00000, the rotor can be retained using a strap wrench. Alternatively, the engine can be locked through the transmission by selecting top gear and applying the rear brake hard (engine in frame).
3. Screw the rotor puller tool into the centre of the rotor and pass a bar through the hole in the puller (see illustration). Remove the rotor from the crankshaft end by tapping sharply on the end of the metal bar to release the rotor's grip on the tapered shaft.
4. Remove the Woodruff key from the crankshaft and store it safely inside the flywheel housing.

Installation
6. Degrease the rotor and crankshaft tapers and remove any metal particles or dirt from the rotor magnet. Install the Woodruff key in the crankshaft taper (see illustration).
7. Align the slot in the rotor taper with the Woodruff key and gently push the rotor onto
18.6a Align rotor slot with the Woodruff key whilst installing the rotor.

the crankshaft (see illustration). Gently tap the rotor centre with a soft-faced hammer to seat it on the crankshaft taper and retighten the rotor retaining bolt and washer (see illustration). Tighten the bolt to the specified torque setting whilst holding the rotor to prevent it from rotating.

18.6b Refit the rotor retaining bolt and washer and tighten to the specified torque setting.

Removal

1. If the engine is in the frame, remove the left lower fairing and drain the engine oil as described in Chapter 1. Remove the fuel tank as described in Chapter 4. Trace the pulser coil wiring back from the left crankcase cover to its block connector and disconnect it from the main wiring loom.

2. Slacken all the bolts which retain the left crankcase cover and carefully remove the cover. Prepare to catch any surplus oil which may be released as the cover is removed. Unless the cover locating dowel is firmly fixed in the crankcase, remove it and store it with the cover.

3. Slacken and remove the starter clutch retaining bolt. Note: If trouble is encountered in slackening the bolt, the crankcase can be held by locking it through the transmission as described in Section 13. Alternatively, if the pistons have been removed the crankcase can be locked by passing a close-fitting bar through the connecting rod small-end bore. Once the bolt has been removed the pulser rotor, starter clutch and splined thrust washer can be slid off the crankshaft.

4. Remove the starter rotor idler gear and pull the idler gear shaft out of the crankcase.

Inspection

5. Separate the starter and drive gear and remove the needle bearing from the starter clutch (see illustration). Inspect the needle bearing for wear together with the bearing surfaces of the driven gear and clutch. The starter clutch rollers should be unmarked with no signs of wear such as pitting or flat spots. The degree of wear on the driven gear can be assessed by measuring the outside diameter of its boss and comparing it with the service limit given in the Specifications. Remove any component which shows signs of wear or damage.

6. Inspect the starter rotor gear and drive gear teeth and renew them as a pair if any teeth are chipped or missing. Check the idler shaft and gear bearing surfaces for signs of wear or damage, and renew if necessary.

Installation

7. Refit the idler gear shaft to the crankcase and slide on the idler gear (see illustration). Liberally oil the needle bearing and fit it to the starter clutch. Refit the driven gear and check that the gear will spin freely in one direction, but not the other.

8. Slide the splined thrust washer onto the crankshaft and install the starter clutch assembly, ensuring that the driven gear teeth engage correctly with those of the idler gear (see illustration). Refit the pulser rotor over the crankshaft splines aligning the punch mark on the crankshaft end with the acta wide spline of the rotor (see illustration). Install the starter clutch retaining bolt and washer and tighten it to the specified torque setting whilst retaining the crankshaft using the method employed on dismantling (see illustration).

9. Ensure the mating surfaces of the cover and crankcase are clean and dry and retighten the dowel pin. Fit a new gasket to the crankcase and carefully install the cover (see illustrations). Refit all the crankcase cover retaining bolts and tighten them securely.

10. If the operation is being carried out with the engine in the frame, reconnect the pulser coil wiring, refill the fuel tank, and reposition the engine oil.

20. Balancer shaft - removal, inspection and installation (1000 models)

Note: The balancer shaft can be removed with the engine in the frame.

Removal

1. Remove the oil pan (jump) as described in Section 17.

2. Remove the bolt which secures the balancer shaft clamp to the crankcase, followed by the shaft retaining bolt which passes up through the casting from the underside of the crankcase. Withdraw the shaft from the crankcase and rotate the balancer weight until it can be manoeuvred out of the crankcase, noting the shouldered thrust washers fitted to each end of the weight.

Inspection

3. Remove the gear from the end of the balancer weight and remove the clutch drive rubber. Withdraw the shaft from the centre of the balancer and fit a new gasket to the weight and withdraw the needle bearings and spacer (see illustration).

4. Inspect the needle bearings for wear or damage along with the bearing surfaces of the weight and shaft. If any component shows signs of wear or scoring remove the shaft, bearings and weight as an assembly. Check the shouldered thrust washers for wear and renew if necessary.

5. Inspect the rubber segments of the clutch drive for wear or deterioration such as compaction, perishing or breakage. Any damage will be evident and the rubbers must be renewed as a set. Check the shaft O-ring for wear or damage and renew if necessary.

Installation

6. Apply oil to the clutch drive rubbers and fit them onto the balancer weight. Refit the gear to the weight ensuring that the punch mark on the face of the gear aligns with index line on the opposite end of the balancer weight. Liberally oil the needle bearings and insert them into the balancer weight along with the spacer, positioned between them. Refit the shouldered thrust washers to each end of the weight ensuring that both are fitted with their shoulders facing inwards.

7. Using a split-case marker, mark the bottom surface of the weight so that the index mark will be visible when the weight is installed in the crankcase. Remove the cap from the left crankcase cover and rotate the crankshaft in an anticlockwise direction until the index mark on the rotor aligns with the T mark on the crankcase. Maneuvre the balancer weight assembly into position in the crankcase and engage it with its drive gear so...
20.9 Adjust balancer shaft backslash using marks on the crankcase and the adjacent line on the crankcase surface.

2. Apply smear of oil to the balancing shaft O-ring and insert the shaft. Secure the shaft in position by retightening the retaining bolt to the underside of the crankcase and tightening it securely. Apply a small amount of gasket sealer to the threads of the balancer shaft retaining clamp bolt and retighten the clamp bolt to the drive unit, tightening it securely. Install the oil pan (sump) as described in Section 17.

21.0 Adjust shaft retaining clamp bolt and rotate the shaft anticlockwise until it stops. Repeat the shaft back in a clockwise direction until it is seated through the graduation marks on the shaft clamp. Secure the shaft in position by tightening the clamp bolt securely. Make sure all threads are fully engaged with the clamp bolt.

2. Install the crankcase halves in the following order:

- Ensure all threads are fully engaged with the clamp bolt.
- Make sure the shaft is centered before tightening the clamp bolt.
- Tighten the clamp bolt securely to ensure the shaft is centered.

2.29 Adjust the shaft retaining clamp bolt and rotate the shaft clockwise until it stops. Repeat the shaft back in a clockwise direction until it is seated through the graduation marks on the shaft clamp. Secure the shaft in position by tightening the clamp bolt securely. Make sure all threads are fully engaged with the clamp bolt.

2.30 Adjust the shaft retaining clamp bolt and rotate the shaft clockwise until it stops. Repeat the shaft back in a clockwise direction until it is seated through the graduation marks on the shaft clamp. Secure the shaft in position by tightening the clamp bolt securely. Make sure all threads are fully engaged with the clamp bolt.

2.31 Adjust the shaft retaining clamp bolt and rotate the shaft clockwise until it stops. Repeat the shaft back in a clockwise direction until it is seated through the graduation marks on the shaft clamp. Secure the shaft in position by tightening the clamp bolt securely. Make sure all threads are fully engaged with the clamp bolt.

2.32 Adjust the shaft retaining clamp bolt and rotate the shaft clockwise until it stops. Repeat the shaft back in a clockwise direction until it is seated through the graduation marks on the shaft clamp. Secure the shaft in position by tightening the clamp bolt securely. Make sure all threads are fully engaged with the clamp bolt.

2.33 Adjust the shaft retaining clamp bolt and rotate the shaft clockwise until it stops. Repeat the shaft back in a clockwise direction until it is seated through the graduation marks on the shaft clamp. Secure the shaft in position by tightening the clamp bolt securely. Make sure all threads are fully engaged with the clamp bolt.

2.34 Adjust the shaft retaining clamp bolt and rotate the shaft clockwise until it stops. Repeat the shaft back in a clockwise direction until it is seated through the graduation marks on the shaft clamp. Secure the shaft in position by tightening the clamp bolt securely. Make sure all threads are fully engaged with the clamp bolt.

2.35 Adjust the shaft retaining clamp bolt and rotate the shaft clockwise until it stops. Repeat the shaft back in a clockwise direction until it is seated through the graduation marks on the shaft clamp. Secure the shaft in position by tightening the clamp bolt securely. Make sure all threads are fully engaged with the clamp bolt.

2.36 Adjust the shaft retaining clamp bolt and rotate the shaft clockwise until it stops. Repeat the shaft back in a clockwise direction until it is seated through the graduation marks on the shaft clamp. Secure the shaft in position by tightening the clamp bolt securely. Make sure all threads are fully engaged with the clamp bolt.

2.37 Adjust the shaft retaining clamp bolt and rotate the shaft clockwise until it stops. Repeat the shaft back in a clockwise direction until it is seated through the graduation marks on the shaft clamp. Secure the shaft in position by tightening the clamp bolt securely. Make sure all threads are fully engaged with the clamp bolt.

2.38 Adjust the shaft retaining clamp bolt and rotate the shaft clockwise until it stops. Repeat the shaft back in a clockwise direction until it is seated through the graduation marks on the shaft clamp. Secure the shaft in position by tightening the clamp bolt securely. Make sure all threads are fully engaged with the clamp bolt.

2.39 Adjust the shaft retaining clamp bolt and rotate the shaft clockwise until it stops. Repeat the shaft back in a clockwise direction until it is seated through the graduation marks on the shaft clamp. Secure the shaft in position by tightening the clamp bolt securely. Make sure all threads are fully engaged with the clamp bolt.
22.2a Install all main bearing bolts and washers and tighten as described in text.

22.2c Install all lower crankcase bolts and washers, using the crankcase template to ensure each bolt is fitted in the correct position. Do not omit the sealing washers from the twelve 8 mm main bearing bolts and the single 6 mm bolt. (number 21 in the tightening sequence) (see illustration). Tighten all the lower crankcase bolts in 3 or 4 stages, until all are tightened to their specified torque settings (see illustration).

22.9b Crankcase lower half bolt tightening sequence - 600 models

- Note: copper sealing washers fitted to bolts 2 to 13 and 21 grooves.
- Note: If the balancer shaft is in position in the lower crankcase half, the balancer shaft timing must be set, as described in Section 22.

12. Ensure that the main bearing inserts are in position in the lower crankcase half and carefully lower the crankcase half onto the upper half. Ensure that the shift fork engages with their respective transmission slots and the balancer weight remain in position as the halves are joined. Check that the lower crankcase half is correctly seated and that all shafts are free to rotate.

11. Apply molybdenum disulphide grease to the threads and seats of the lower crankcase 8 mm bolts and install all the 8 mm and 6 mm lower crankcase bolts and sealing washers, using the crankcase template to ensure all are fitted in their original positions, do not omit the sealing washers (4, 5, K, L, M, N, P, R models only) from the twelve 8 mm main bearing bolts as they are installed (note that new 8 mm bolts must be used on P models onward). First tighten the 8 and 6 mm bolts in 2 to 3 stages, using a diagonal sequence, to their specified torque settings, then tighten all the 6 mm bolts to their specified torque setting.

13. Turn the crankcase over and install the three upper crankcase bolts ensuring that there is a sealing washer fitted to the two 8 mm bolts. Tighten the upper bolts to their specified torque settings.

15. If the starter clutch or alternator has been removed refit the nut and washer to the alternator shaft. Lock up the crankcase by passing a close-fitting bar through the connecting rod small end and tighten the bolts to the specified torque setting. grease the alternator shaft nut cover O-ring for damage, renewing it if necessary, and refit the cover to the crankcase. Install the cover retaining bolt, along with its sealing washer, and tighten it securely.

23 Crankcase and covers

- Inspection 4. Give the transmission shafts a close visual inspection for signs of wear or damage such as broken or chipped teeth, worn dogs or splines. Renew any parts found to be worn. The shaft assemblies can be disassembled and reassembled as described in the following Section. The transmission shafts are unlikely to sustain damage unless the engine has reeled, placing an unusually high load on the transmission, or the machine has covered a very high mileage. Check the surface of the shaft, especially where a pinion turns on it, and renew the shaft if it has scored or picked up. Inspect the threads of the shaft and check them for trueness by fitting a reamer in the shaft and turning the reamer by hand. Damage of any kind can only be cured by renewal of the shaft concerned.

5. On 1000 models measure the diameter of the mainshaft at the point where the 5th gear bushing is fitted, and the countershaft at the point where the 3rd gear bushing (K models onward) is fitted, and the internal diameter of the relevant bushings. If either component has worn beyond its service limit it must be renewed. Calculate the bushing to shaft clearance and renew both components if the clearance exceeds the specified limit.

6. On all models measure the internal diameter of all gears which run on bushes and the external diameter of the bushings which they run on. If either component has worn beyond its service limit it must be renewed. Using the above measurements calculate the gear to bushing clearance, if this exceeds the specified limit renew the relevant gear and bushing as a pair.

7. On 600 models at a gear angle is installed the backlash of each gear can be checked to measure tooth wear. This is done with both shafts installed in the crankcase half. If any gear is found to exceed the maximum permissible backlash, both gears must be renewed as a matched pair.

8. Check that the outer race of the ball journal bearing is fitted to each shaft rotates freely and has no sign of seizure between its inner and outer races. Should either of the ball journal bearings require renewal, a bearing puller will be required to extract the bearing from its shaft. Note the position of the locating groove in the outer race of the bearing prior to removing it and ensure that the new bearing is fitted with the groove in the same position. Pull the bearing off the shaft and fit the new bearing using a hammer and tubular drift which bears only on the inner race of the bearing.

Installation 9. On 600 models literally all the mainshaft rear bearing and install the shaft into the upper crankcase half (see illustration). Apply a few drops of thread locking compound to the threads of the mainshaft retaining plate bolts and refit the plate to the casing, tightening its retaining bolts securely (see illustration). Refit the half ring retainer to its groove in the casing and install the countershaft, ensuring that the groove in the bearing locates with the half ring retainer and the oil seal lip locates with the groove in the casing (see illustrations). Also ensure that the small pin in the ball journal bearing outer race is correctly positioned in the casing cutout (see illustration).
10. On 1000 models both the half ring retainers and the bearing locating pin are held in the journal with the pin being noted as being in the counterclockwise direction. On all models, the half ring retainers must be noted to be in the counterclockwise direction.

11. On all models ensure that the transmission shafts rotate smoothly before proceed further.

Disassembly
1. The transmission shafts should not be disturbed unless damage is obvious, such as chipped or worn teeth. Unless course care is exercised, the transmission shafts may become damaged in the disassembly process.
2. Note: The mainshaft and countershaft (input and output shaft) should be disassembled separately to avoid interchanging components. Disassembling the shafts in wrong order or removing the wrong components can cause problems.

Reassembly
3. Having checked and renewed the transmission components as required, reassemble each shaft, referring to the accompanying line drawing and photographs, as applicable, for guidance. The correct assembly sequence is detailed below. Of the shafts and pinion bushings typically used during assembly. When fitting the circlips to the shafts take care not to expand them any larger than is necessary to slide them over the shaft. When fitting a circlip to a spindled shaft ensure that the ends of the circlip are positioned in the middle of the spline.

25.5a Take the mainshaft and slide on a plain thrust washer and the 8th gear pinion.

25.5b Install 5th gear bush as described in text - 600 shown.

25.5c Secure components in position with first circlip.

25.5d...and the needle bearing.

25.7c. Fit the 2nd gear pinion onto the shaft followed by a plain thrust washer.

25.7d...and secure it in position with the thickest circlip.

25.8a. On 600 models fit the special protective splined washer as described in text.

25.9a Install the 6th gear bush ensuring that its oil holes align with the shaft oilways and fit the 6th gear pinion, then engage the lockwasher with the splined washer to lock it in position. Fit the 2nd gear pinion to the mainshaft followed by a plain thrust washer. Fit the special lock washer and engage its tabs with slots in the splined washer.

25.9b. Slide on the special splined washer, fit the lock washer and engage its tabs with slots in the splined washer.

25.9c. Slide on a splined thrust washer...

25.9d. Install the 6th gear pinion followed by a circlip and splined thrust washer...
25.10a Align the 4th gear bush oil holes with the shaft always and slide it along the shaft.

25.10b Fit the 4th gear pinion onto the bush and fit the special splined washer.

25.10c Fit the special lock washer as described in text, followed by the 3rd gear bush aligning its holes with the shaft always.

Illustration: Lubricate the needle bearing and fit it onto the shaft. Install the 1st gear pinion over the bearing and slide another plain thrust washer onto the shaft so that its shift fork groove is on the right side of the pinion, then fit a plain thrust washer. Slide on a splined thrust washer and secure it in position with a circlip.

Countershaft (output shaft) reassembly - 1000 models

13. On 1000 H and J models the countershaft can be easily identified by its large integral 2nd gear pinion. Holding the shaft by its left (spline) end slide the 6th gear pinion along the shaft so that its shift fork groove is on the right side of the pinion, then fit a plain thrust washer.

14. On 1000 K models onward, the countershaft has no integral pinions. Holding the shaft by its left (spline) end slide on the 3rd gear bushing ensuring that its holes align with the shaft always. Fit the 2nd gear pinion over the bushing so that its recessed surface faces the right end of the shaft. Fit a splined thrust washer and secure it in position with a circlip. The 8th gear pinion is then fitted with its shift fork groove facing the right end of the shaft followed by another circlip. Slide a splined thrust washer up to the circlip.

15. On all 1000 models fit the 3rd gear bushing onto the shaft ensuring that its holes align with the shaft always. Fit the 3rd gear pinion over its bushing so that its recessed surface faces away from the 3rd gear pinion. Slide the special splined thrust washer along the shaft followed by the splined lock washer ensuring the lock washer tabs are facing the left end of the shaft. Rotate the splined washer until its cutouts align with the lock washer tabs then engage the lock washer with the splined washer to lock it in position.

26.1 Starter clutch and alternator drive - 1000 models

26.1.10 O-ring
26.1.11 Alternator base
26.1.12 Drive chain tensioner
26.1.13 Bolt - 3 off
26.1.14 Drive chain
26.1.15 Drive chain guide
26.1.16 Bolt - 2 off
26.1.17 O-ring
26.1.18 Alternator shaft and housing
26.1.20 Bolt - 3 off
26.1.21 Locating pin
26.1.22 Rotor - 4
26.1.23 Washer
26.1.24 Nut
26.1.25 Bearing
26.1.26 Inner cover
26.1.27 Screw and washer - 3 off
26.1.28 Alternator cover
26.1.29 Screw - 3 off
26.1.30 Alternator assembly
26.1.31 O-ring
26.1.32 Alternator cover and stator windings
26.1.33 Bolt - 3 off
26.1.34 Bolt - 3 off

Removal

1. Separate the crankcase halves as described in Section 22, and remove both the transmission shafts as described in Section 24 (see illustration).

2. Bend down the locking tabs from the oil pass plate retaining bolts taking great care not...
to break the tabs off. Slacken the three retaining bolts and remove the plate from the upper crankcase, noting the three O-rings fitted to the oil plate.
3. Slacken the three alternator drive chain tensioner retaining bolts and remove the drive chain. Lift the idler gear shaft from the bearing housing inside the casing. Remove the three bolts which secure the alternator base to the crankcase. Withdraw the alternator from the crankcase half whilst holding the starter clutch drum on the inside of the casing. The starter damper can then be fitted out of the way and the wiring disconnected from the drive chain. Slide the alternator onto the centre of the alternator shaft and remove the starter clutch.
4. If necessary, remove the bolt which retains the starter clutch idler gear shaft in the retaining plate and remove the plate from the casing. Withdraw the shaft and remove the idler gear.

Inspection
5. Check that the alternator shaft turns smoothly and quietly and shows no sign of freeplay between the shaft and bush. If necessary the alternator can be disassembled as described in Chapter 6.
6. Remove the drive gear and needle bearing from the starter clutch. Inspect the needle bearing for signs of wear or damage. The gear should turn with little friction and be smooth and unmarked by contact with the clutch rollers. The rollers themselves must be undamaged and free from pits or scores.

Removal
7. Separate the crankcase halves as described in Section 22. On 600 models the crankcase can then be lifted out of the casing and the rear cover removed (see illustration). On 1000 models remove the alternator drive chain cover plate and starter clutch. With the rear cover removed the alternator tensioner locked up install it in the upper crankcase. Apply a few drops of thread-locking compound to the threads of the tensioner mounting bolts and tighten them to the specified torque setting.
8. Fit the three O-rings onto the oil pass plate and refit the plate to the casing. Apply a few drops of thread-locking compound to the oil pass plate retaining bolts and tighten them to their specified torque setting. Bend up the oil plate tabs against the flats of the bolts and stake the tips of the tabs to the bolt to secure the bolt in position.
9. Refit the transmission shafts as described in Section 24 and join the crankcase halves as described in Section 23.

Inspection
10. The crankshaft should be thoroughly cleaned using a high flash-point solvent. Be very careful to check that all alloys are completely free of dirt and other foreign material.
11. Examine the crankshaft closely. Any obvious signs of damage such as marked pinions, damaged threads or sprockets will mean that it must be renewed. There are however many engineering firms, who advertise regularly in the motorcycle press, who undertake major crankshaft repairs. In view of the expense of a new component it would be worth trying such firms first.
12. Check the sprocket nut can be measured using a dial gauge with the crankshaft mounted on V-blocks. Rotate the crankshaft slowly through at least two complete turns noted the runout. If the crankshaft runout, measured at either centre main bearing journal, exceeds the service limit the crankshaft must be renewed.
13. Inspect closely the main bearing inserts (pins). The bearing surface should be smooth and of even texture, with no signs of scoring or straining on its surface. If any insert is in less than perfect condition, all bearing inserts should be renewed as a set. It is not possible to renew the bearing inserts as a precautionary measure; they are relatively cheap and it is false economy to reuse worn parts.
14. The crankshaft journals should be given a close visual examination, paying particular attention to any signs of wear. Any bearing inserts which have been discovered, if the journals are scored or pitted in any way a new crankshaft will be required. Note that undersizes are not available, prohibiting the option of re-grinding the crankshaft.
15. To select new inserts, use the manufacturers parts code system. The standard crankshaft main bearing journal is divided into two size groups to allow for manufacturing tolerances. If each journal can be determined by the number stamped on the crankcase web (see illustration), Note: Ignore the letters those refer to the big-end crankpins and are discussed in the following Section. On the

Removal
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Installation
1. Position the starter gear idler in the crankcase and start its shaft. Check the
26.3 Measuring big-end side clearance

Pistagage across the relevant crankpin. Carefully refit the connecting rod and tighten its bolts evenly and progressively to the specified torque setting. Note: Do not rotate the connecting rod.

10 Once both bolts are tightened to the specified torque setting carefully remove the con-rod from the crankshaft. Measure the thickness of the compressed Pistagage, using the indicator supplied with the kit, to determine the clearance. If the clearance is within the specified limits the inserts are satisfactory. If the clearance is excessive, even with new inserts (of the correct size), the crankpin is worn and expert advice should be obtained.

26.5 Location of connecting rod size and weight group marks

Removal
1 Separate the crankcase halves as described in Section 20 of this Chapter. The connecting rod can be removed with the crankshaft either in place in the upper crankcase half or with the crankcase removed. Note: Before removing the connecting rods check the big-end side clearance as described in paragraph 3.

2 Slacken and remove the big-end bearing cap nuts from each rod and remove it from the crankshaft. Mark each connecting rod with a spirit-based marker to ensure that they are refitted to their appropriate crankpins on installation.

Inspection
3 Inspect the connecting rods for signs of cracking or distortion, reheating any rod which is not in check condition. Check the connecting rod big-end side clearance, using feeler gauges (see illustration). If this clearance exceeds the specified limit it will be necessary to renew the con-rod or crankshaft as necessary.

4 Inspect the piston pin and small-end bore of the con-rod for scoring or signs of wear. If access to the necessary measuring equipment is available, measure both these components and compare the readings obtained with the service limits given in the Specifications. If either component is damaged or worn renew both as a pair. Connecting rod distortion can only be properly assessed with a good deal of specialised equipment and should therefore only be checked by an expert. If any doubt remains about the condition of a rod it should be renewed.

5 If a connecting rod is to be renewed, it is essential that it is of the correct weight group to minimise vibration. The weight is indicated by a letter stamped on the big-end cap of each rod (see illustration). This letter together with the crankpin diameter mark (see paragraph 7) should be quoted when purchasing new connecting rods.

6 Visually inspect the crankpin journals and inserts as described in paragraphs 5 and 6 of the preceding Section. New inserts can be selected as follows.

7 The standard crankpin journal diameter is divided into two size groups to allow for manufacturing tolerances. The size group of each crankpin can be determined by the letters which are stamped on the left end crank web. Note: Ignore the numbers at these refer to the main bearing journals. On the web will be on 1, followed by letter, made up of the letters A and B, for example L KAB. The letters indicate the diameter of each crankpin, starting with the left crankpin (number 1 cylinder) and finishing with the right crankpin (number 6 cylinder).

8 The connecting rods are also marked with the mark in the form of either a number 1 or 2, being situated next to the weight mark. If the equipment is available, these marks can be checked by direct measurement. The bearing inserts can then be selected using the table below (see illustration).

Connecting Crankshafts

<table>
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<tr>
<th>Insert mark</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Yellow</td>
</tr>
<tr>
<td>B</td>
<td>Green</td>
</tr>
<tr>
<td>A</td>
<td>Brown</td>
</tr>
<tr>
<td>B</td>
<td>Brown</td>
</tr>
</tbody>
</table>

9 Whether new inserts are to be fitted or the existing inserts are to be re-used, use Pistagage to check the clearance as follows. Remove all traces of oil from the bearing inserts and crankpin and lay strip of

28.11 Install bearing inserts...

26.13 ... and tighten bearing cap bolts to the specified torque setting

activity even if new parts have not been fitted. Should the engine persist in not starting, check that the plugs have not become fouled by the oil used during reassembly. Failing this go through the trouble shooting section and work out what the fault is methodically.

2 When the engine does start, keep it running as slowly as possible to allow the oil to circulate. The oil pressure warning light should go out almost immediately the engine has started, although in certain instances a very short delay can occur whilst the oil lines and pressure build. If the light does not go out the engine should be stopped before damage can occur, and the cause determined. Open the choke as soon as the engine will run without it. During the initial running, a certain amount of smoke may be in evidence due to the oil used in the relatively sequence being burnt away. The resulting smoke should gradually subside.

3 Check the engine for blowing gaskets and leaks. Before using the machine on the road, check that all gears select properly, and that the controls function correctly.

4 Warm the engine up to normal operating temperature and thoroughly check for any oil or coolant leaks. If no leaks are present check both oil and coolant levels as described in Chapter 1 and top up as necessary. Do not forget to check these both before and after the machine has been run. Install the fairings as described in Chapter 6 and make a final check that all disturbed components have been securely tightened before taking the machine on the road.

30 Recommended break-in procedure

1 Any rebuilt machine will need time to settle down, even if parts have been installed in their original order. For this reason it is highly advisable to keep the machine gently for the first few miles to ensure oil has circulated throughout the lubrication system and that the new parts fitted have started to bed in.

2 Even greater care is necessary if the engine has been rebored or if a new crankshaft has been fitted. In the case of a nickname, the engine will have to be run in again, as if the machine were new. This means greater use of the transmission and a restraining hand on the throttle until at least 500 miles (800 km) have been covered. There is no point in keeping to any set speed limit; the main requirement is to keep a light loading on the engine and gradually work up performance until the 500 mile (800 km) mark is reached. These recommendations can be lessened to an extent when only a new crankshaft is fitted. Experience is the best guide since it is easy to tell when an engine is running freely.

3 If at any time a lubrication failure is suspected, stop the engine immediately and investigate the cause. If an engine is run without oil even for a short period of time, irreparable damage can result.

4 When the engine has cooled down completely after the initial run, recheck the various settings, especially the valve clearances. During the run most of the engine components will have settled into their normal working locations. Check the various levels, particularly that of the engine oil as it may have dropped slightly now that the various oil passages and reservoirs have filled.
# Chapter 3
## Cooling system

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### Degrees of difficulty

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</table>

### Specifications

#### Coolant

- **Mixture type**: 50% distilled water, 50% corrosion inhibited ethylene glycol antifreeze
- **Total capacity**:
  - 600 models: 2.0 l (2.1 US qt, 1.7 imp qt)
  - 1000 models: 3.0 l (3.2 US qt, 2.5 imp qt)

#### Radiator

- **Testing pressure**:
  - 600 models: 18 psi (1.25 Bar)
  - 1000 models: 20 psi (1.40 Bar)
- **Gap valve opening pressure**:
  - 600 models: 14 - 16 psi (0.95 - 1.10 Bar)
  - 1000 models: 16 - 20 psi (1.10 - 1.40 Bar)

#### Thermostat

- **Opening temperature**: 80 - 84°C (176 - 183°F)
- **Minimum valve lift**: 8 mm (0.32 in) @ 95°C (203°F)
The cooling system uses a water/antifreeze coolant to carry away excess energy in the form of heat. The cylinders are surrounded by a water jacket from which the heated coolant is circulated by thermo-siphonic action in conjunction with a water pump, driven off the oil pump. The hot coolant passes upward to the thermostat and through to the radiator mounted on the frame's front downtubes to take maximum advantage of the passing airflow. The coolant then flows across the radiator core, where it is cooled by the passing air, down to the water pump and back up to the engine where the cycle is repeated (see illustrations).

A thermostat is fitted in the system to prevent the coolant flowing through the radiator when the engine is cold, therefore accelerating the speed at which the engine reaches normal operating temperature. A thermostatically controlled coolant fan is also fitted to aid cooling in extreme conditions.

The complete cooling system is partially sealed and pressurized, the pressure being controlled by a valve contained in the spring-loaded radiator cap. By pressurizing the coolant the boiling point is raised, preventing premature boiling in adverse conditions. The overflow pipe from the system is connected to an expansion tank into which excess coolant is expelled under pressure. The discharged coolant automatically returns to the radiator when the engine cools.

**Warning:** Do not remove the pressure cap from the radiator when the engine is hot. Scalding hot coolant and steam may be blown out under pressure, which could cause serious injury. When the engine has cooled, place a thick rag, like a towel over the pressure cap; slowly rotate the cap anti-clockwise to the first stop. This procedure allows any residual pressure to escape. When the steam has stopped escaping, press down on the cap while turning it anti-clockwise and remove it.

**Warning:** Do not allow antifreeze to come in contact with your skin or painted surfaces of the motorcycle. Rinse off any spills immediately with plenty of water. Antifreeze is highly toxic if ingested. Never leave antifreeze lying around in an open container or in puddles on the floor; children and pets are attracted by its sweet smell and may drink it. Check with local authorities about disposing of used antifreeze. Many communities will have collection centres which will see that antifreeze is disposed of safely.

Caution: At all times use the specific type of antifreeze, and always mix it with distilled water in the correct proportion. The antifreeze contains corrosion inhibitors which are essential to avoid damage to the cooling system. A lack of those inhibitors could lead to a build-up of corrosion which would block the coolant passages, resulting in overheating and severe engine damage.

Distilled water must be used as opposed to tap water to avoid a build-up of scale which would also block the passages.

### 1. Radiator pressure cap check
1. If problems such as overheating or loss of coolant occur, check the entire system as described in Chapter 1. The radiator cap opening pressure should be checked by a Honda dealer with the special tester required to do the job. If the cap is defective, replace it with a new one.
3.3 Carefully remove the radiator cap as described in text - 1000 K models onward shown.

3.4a Coolant drain plug is situated on the water pump.

3.4b On 600 models there are also two drain plugs on the front of the cylinder block.

6.3a Disconnect both the top ... and bottom coolant hoses from the radiator - 600 shown.

6.3c On 1000 K models onward and all 600 models disconnect and remove the horn.


1 The interior of the radiator can most easily be cleaned while the radiator is on the motorcycle, using the flushing procedure described in Section 4 of this Chapter. Additional flushing can be carried out by placing the hose in the uppermost union of the radiator and allowing the water to flow through for about ten minutes. Caution: Under no circumstances should the hose be connected to the union mechanically as any sudden blockage in the radiator outlet would subject the radiator to the full pressure of the mains supply (about 20 psi). The radiator pressure should not exceed the testing pressure given in the Specifications.

2 Generally, if the radiator is found to be leaking, repair is impracticable and a new component must be fitted. Very small leaks may be stopped by the addition of a special sealing agent in the coolant, although if an agent of this type is used, follow the manufacturer's instructions carefully. Soldering, usually solid solder, may be used for caulking a large leak but this is a specialist repair test left to experts.

3. Remove any obstructions from the exterior of the radiator.
36 Cooling system

Core of the radiator using an air line. The con-

glomeration of moths, flies etc, usually

collected in the radiator matrix severely

reduce the overall efficiency of the radiator.

When the core is exercised, bent fins can be

straightened by placing the flat of a

trowel or similar edge of the fin in question

and carefully bending it into its original shape.

Leads damaged fins cannot be repaired. If

 bent or damaged fins obstruct the airflow by

more than 20%, a new radiator will have to be

installed.

inspect the radiator mounting rubbers for

cracking or distortion. Replace the rubbers

if there are any doubts about their condition,

otherwise the radiator may suffer from

excessive vibration.

8 Coolant hoses and pipes

removal, installation and

checking for leaks

Warning: To avoid the risk of personal injury, ensure

the engine is cool before carrying out the

following operation.

1. The cooling system is regarded as semi-

sealed, the only normal coolant loss being

minute amounts through evaporation in

the expansion tank. If significant quantities have

vanished, it must be leaking at some point and the source of the leak should be

immediately investigated.

2. The radiator hoses should be periodically

inspected and any signs of cracking or

perishing are detected, the most

likely areas being where they are

clamped to their unions. Other areas which

should be checked are the unions between

the metal coolant pipes and the engine; all

these unions are sealed with O-rings which

in time could also perish and start to leak.

3. Before removing the hoses or coolant pipes

drain the coolant as described in Section 3.

Use a shop towel to absorb any coolant

should the hose clamps, then slide them back along the hose and clear of the union spigots, noting that it may

be necessary to remove the radiator mounting bolts, or alternatively the coolant

piping retaining bolts, to allow the hoses to be

removed.

Caution: The radiator unions and the metal

coolant pipes are fragile. Do not use excessive

force when attempting to remove the hoses

if a hose proves stubborn, release it by rotating it on its union before working it off.

If the o-rings are not replaced, the hose will not

be tight and may cause overheating, consequently the o-ring must be replaced.

4. Serious leakage will be self-evident, though

slight leakage can be difficult to spot. It is

likely that the leak will only be apparent when the machine is running and the system

is under pressure, and even then the rate of

escape may be such that the hot coolant vapours as soon as it reaches the atmosphere, although traces of antifreeze

should reveal the source of the leak. If not, it

will be necessary to pressurise the system when
cold to enable the leak to be traced. This operation requires specialist equipment and therefore must be entrusted to a Honda dealer.

5. Other possible sources of leakage are the

O-rings on the water pump and thermostat

housing, and the water pump's mechanical

seal. This latter can easily be checked by

examing the drainage hole in the base of

the water pump body. Traces of coolant can be

found around this hole, the seal is faulty and

the pump must be renewed.

6. In very rare cases the leak may be due to a

broken feed gasket in which case the coolant

will be drawn into the engine and expelled

as vapour in the exhaust gas. If this proves to

be the case it will be necessary to remove the

cylinder head for further investigation.

7. On refilling hoses, first slide the clamps

onto the hose and then work them on to its

respective union. Note: Do not use a lubricant of

any kind. If necessary the hose can be

softened by soaking it in very hot water before

installing, although care is obviously

necessary to prevent the risk of personal injury

whilst doing this. When the hose is refitted

rotate it on the union to settle it in position

before sliding the clamps into place and

tightening them securely.

9 Thermostat - removal, testing and installation

Warning: To avoid the risk of personal injury, ensure

the engine is cool before carrying out the

following operation.

1. The thermostat is automatic in operation.

and should give many years service without

requiring attention. In the event of a failure, the

valve will probably open in which case

the engine will take much longer than

normal to warm up. Conversely, if the valve

jams shut, the coolant will be unable to

circulate and the engine will overheat. Neither

condition is acceptable, and the fault must be

investigated promptly.

Removal

2. Drain the cooling system as described in

Section 3 of this Chapter.

3. On 600 models slacken the two bolts which

secure the filler neck to the thermostat

housing and separate the two components

(see illustration). Slacken the two bolts which

retain the thermostat housing to the water

pump cover (see illustration). On 1000 H 1

and models remove the two thermostat

housing bolts and separate the housing. On

1000 K models onward, remove the two bolts

securing the housing to the frame, followed by

the bolts securing the housing to the filler

neck; separate the two components. On all

models, lift out the thermostat and O-ring

(see illustration).

Testing

4. Examine the thermostat visually before

installing the gasket. If it remains in the open

position at room temperature, it should be

discarded.

5. Replace the thermostat by a piece of wire

in a container of cold water. Place a

thermometer in the water so that the bulb is

close to the thermostat. Heat the water

noling when the thermostat opens and how

much valve lift it has when it is fully open, and

compare the results with those given in the

Specifications. If the readings differ from

these given, the thermostat is faulty and

must be renewed.

In the event of thermostat failure, as an

emergency measure only, it can be removed

and the machine used without it. Note: Take
care when starting the engine from cold as it

will take much longer than usual to warm up.

Ensure that a new unit is fitted as soon as

possible.

Installation

7. Install the thermostat by reversing the

removal sequence (see illustrations). Note:

On all 1000 models ensure the thermostat

is positioned so that its small gas-pipe hole is at

top. Renew all O-rings regardless of their

appearance condition, and tighten all bolts

securely. Fill this system as described in

Section 5 of this Chapter, run the engine to

dick out the thermostat operates normally and

there are no leaks.

10 Water pump - removal, inspection and installation

Warning: To avoid the risk of personal injury, ensure

the engine is cool before carrying out the following operation.

1. To prevent leakage of water or oil from the

cooling system to the lubrication system and

vice versa, two seals are fitted on the pump

shaft. On the under-side of the pump body

there is also a drainavage hole, if either seal

fails this hole should allow the coolant or oil

to escape and prevent the oil and coolant mixing.

2. The seal on the water pump side is of the

mechanical type which bears on the rear face

of the impeller. The second seal, which is

mounted behind the mechanical seal is of

the normal shafted type. If the second seal is

available as a separate item as the pump is

sealed unit. Therefore, if on inspection the

drainage hole shows signs of

leakage, the pump must be removed as

follows and renewed.

Removal

3. Drain the coolant as described in Section 3

of this Chapter. Drain the engine oil into a

clean container as described in Chapter 1

and refill.

4. On 600 models, slacken the water pipe

clamps which secure the flexible coolant hoses to the

water pump cover and work both hoses off

their unions. On 1000 models remove the bolt

which retains the metal coolant pipe to the

pump cover then slacken the bolt which

secures the pipe clamp to the overseas and

pull the pipe clear of the pump. Slacken the

clamps which secure the coolant hose and

small-bore air bleed hose to the water pump, pull both hoses off their stubs on the pump.

5. On all models, unscrew the two water

pump mounting bolts and remove the pump from

the machine. Then remove the remaining two

bolts which retain the pump cover and

separate the cover from the pump body.

6. As mentioned in paragraph 2, the pump

assembly is a sealed unit and cannot be

repaired. If either seal fails or the impeller is

damaged or corroded it must be renewed.

New O-rings a matter of course.

Installation

7. The water pump is installed by a reversal

of the removal procedure. Fit new O-rings to

the water pump body and cover then refit

the cover to the pump body and tighten its

retaining bolts securely (see illustrations).

8. Install the pump in the engine unit, ensuring

that the slot on the impeller shaft aligns with

the projection on the oil pump shaft, and

tighten the pump mounting bolts screws

securely (see illustrations).

9. On 1000 models refit the air bleed hose to

the top of the pump and the coolant outlet

hose to the bottom of the pump, secure with

clamps. Fit the metal coolant pipe, using a new O-ring, and tighten its retaining bolt securely. Install the pipe clamp.

10. On 600 models fit the coolant hoses and

tighten both hose clamps securely.

11. On all models, refit the engine oil as

described in Chapter 1, and fit the cooling

system as described in Section 5 of this

Chapter. Finally, thoroughly check for leaks

before taking the machine on the road.

9.3a On 600 models slacken the filler neck

mounting bolts .

9.3b On 600 models remove the thermostat
cover mounting bolts .

9.3c and remove the cover .

9.7a On installation ensure thermostat is

correctly fitted .

9.7b and do not omit any O-rings - 600

shown .

10.7d Fit a new O-ring to the water pump

cover .

10.7e Align the slot in the pump shaft with

the oil pump projection when installing the

water pump.
Chapter 4
Fuel and lubrication systems

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Specifications

Fuel tank capacity

Total including reserve:

- 600 models ...................................................... 16.5 ft³ (4.63 US gal, 3.63 Imp gal)
- 1000 H and J models ........................................... 21.0 ft³ (5.80 US gal, 4.68 Imp gal)
- 1000 K models onward ......................................... 22.0 ft³ (6.01 US gal, 4.94 Imp gal)

Reserve:

- 600 models ...................................................... 3.0 ft³ (0.79 US gal, 0.65 Imp gal)
- 1000 models ...................................................... 3.5 ft³ (0.97 US gal, 0.77 Imp gal)

Fuel grade

Recommended grade ................................................ Unleaded, minimum octane rating 91 (RON/91)
Carburetors

600 H, J and US 600 K

<table>
<thead>
<tr>
<th>Make</th>
<th>600 H and US 600 K</th>
<th>600 L and UK 600 K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keihin</td>
<td>52.0 mm (1.26 in)</td>
<td>32.5 mm (1.28 in)</td>
</tr>
</tbody>
</table>

D mark

UK models
California models
All other US models

Main jet

UK models
California models
All other US models

Pilot jet

UK models
California models
All other US models

Pilot screw - initial settings (turns out)
California models:
1 and 4 carburetors
2 and 3 carburetors
All others

Float height

UK models
California models
All other US models

Carburetors

Make

Keihin

ID mark

38.5 mm (1.52 in)

ID no.

UK models
California model
All other US models

Main jet

UK models
California models
All other US models

Pilot jet

UK models
California models
All other US models

Pilot screw - initial settings (turns out)

Engine lubrication

Recommended oil grade

Honda 4-stroke oil or equivalent good quality SAE 10W/40 SF or SG motor oil

Capacity:

At cold change:

600 models
1000 models

At oil and filter change:

600 models
1000 models

After disassembly:

600 models
1000 models

Oil pressure: 5000 gpd

600 models
1000 models

Oil pump

Sump volume

0.15 mm (0.006 in)

Outer rotor/pump body clearance

0.15 - 0.27 mm (0.005 - 0.010 in)

Seal max. limit

0.50 mm (0.016 in)

Rotor end play

0.02 - 0.07 mm (0.001 - 0.003 in)

Seal min. limit

0.10 mm (0.004 in)

Torque setting

Oil pressure switch

1.2

Oil cooler mounting bolts - 1000 models

1.5

Oil pipe retaining bolts - 1990 models

0.9

General description

On 1000 H, J and all 600 models fuel is fed to the carburetors by means of an electric fuel pump. On 1000 H models onward, the fuel is gravity-fed to the carburetors, its flow being controlled by a vacuum-operated tap. All models uses a bank of four Keihin carburetors; these on P models onward are of the flat-slide type. Air is drawn into the intake system from a moulded plastic air cleaner casing containing a pleated paper type element.

Engine lubrication is of the wet sump type, the oil being contained in an oil pan at the bottom of the crankcase. The transmission is also lubricated from the same source, the whole engine unit being pressure fed by a trochoidal oil pump.

2 Fuel and lubrication systems - general information

1. For information on the following operations, refer to the relevant Sections of Chapter 1.
2. Checking the fuel and emission system for leaks.
3. Synchronizing the carburetors.
4. Adjusting the throttle and choke cables.
5. Cleaning and renewing the fuel filters.
6. Changing the engine/transmission oil and filter.
7. Cleaning the air cleaner element.
8. For information on testing the fuel pump pressure on 1000 H, J and all 600 models only, and oil pressure switch refer to Chapter 8.

3 Precautions to be observed when servicing the fuel system

Warning: Petrol (gasoline) is extremely flammable, particularly when in the form of fumes. Precautions must be taken, as described below, to prevent the risk of fire or explosion when working on any part of the fuel system. Note that petrol (gasoline) vapour is heavier than air and will collect in poorly ventilated corners of buildings. Avoid getting it in your eyes or mouth and try to avoid skin contact. In case of accidents flush the affected area immediately with copious quantities of fresh water and seek prompt medical advice.

1. Always perform service procedures in a well-ventilated area to prevent a build-up of fumes.
2. Never work in a building containing a gas appliance with a pilot light, or any other form of naked flame. Ensure that there are no naked light bulbs or any sources of flame or sparks nearby.
3. Do not smoke (or allow anyone else to smoke) while in the vicinity of petrol (gasoline) or of components containing petrol (gasoline), remembering the possible presence of vapour from these sources and move well clear before smoking.
4. Check all electrical equipment belonging to the house, garage or workshop where work is being undertaken (see the Safety first section of this manual). Remember that certain electrical appliances such as drills, cutters, etc, create sparks in the normal course of operation and must not be used near petrol (gasoline) or any component containing it. Again, remember the possible presence of petrol (gasoline) fumes before using electrical equipment.
5. Always mop up any split fuel and safely dispose of the shop towel or rag used.
6. Any stored petrol (gasoline), or any drained off during servicing work, must be kept in sooted containers that are suitable for holding petrol (gasoline), and clearly marked as such; the containers themselves should be kept in a safe place. Note that this last point applies equally to the fuel tank if removed from the machine; also remember to keep its filler cap closed at all times.
7. The fuel system consists of the fuel tank, with its filler cap and related vent pipes, the fuel pump (where applicable) and filters. Note that on California models, this includes the Evaporative Emission Control System components.
8. Read the Safety first section of this manual carefully before starting work.
9. Owners of machines used in the US,
4.2a On 600 models disconnect the fuel pipe...

4.2b ...and remove the fuel tank mounting bolts

4. Fuel tank - removal, inspection and installation

Warning: Petrol (gasoline) is extremely flammable, especially when in the form of vapour. Take all precautions to prevent the risk of fire and read through Section 3 of this Chapter and the Safety First Section of this Manual before carrying out the following operation.

Removal
1. Remove both right and left side panels and seat, and turn the fuel tap to the OFF position.
2. On 600 models disconnect the fuel pipe from the tap and remove the tank’s front and rear mounting bolts (see illustrations). Lift the fuel tank away from the machine, noting that on California models it will be necessary to disconnect the charcoal canister hose from the underside of the tank.
3. On 1000 H and J models remove the left and right inner covers from the upper fairing and disconnect the fuel level sender unit block connector. Remove both front mounting bolts

4.3 Fuel tank and fuel tap - 1000 models

1. Fuel tank
2. Fuel cap
3. Front mounting bolt - 2 off
4. Washer - 2 off
5. Collar - 2 off
6. Washer
7. Tank insulator
8. Rear pivot bolt
9. Collar
10. Nut
11. Prop stay bracket
12. Prop stay
13. O-ring
14. R-clip
15. Fuel tap - 2 off
16. Fuel tap - 2 off
17. Filter
18. O-ring
19. Control knob
20. Screw
21. Fuel pipe
22. Pipe guard
23. Diaphragm
24. Spacer
25. O-ring
26. Bolt - 2 off
27. Fuel pipe
28. Vacuum pipe
29. Fuel gauge sender
30. O-ring
31. Nut - 4 off

and the rear pivot bolt from the fuel tank and disconnect the fuel pipe from the tap. Disconnect the prop stay and lift the tank away from the machine (see illustration).

4. On 1000 K models onward, remove the tank’s two front mounting bolts and disconnect the fuel level sender block connector (see illustrations). Lift the tank up and remove the R-clip and washer which secures the prop stay to its bracket and disconnect the fuel and vacuum pipes (and vent pipe on US models) from the tap.

Remove the pivot bolt from the rear of the tank and lift the tank clear of the machine (see illustration).

Inspection
5. Inspect the tank mounting rubbers for signs of damage or deterioration and, if necessary, renew them before the tank is refitted.
6. Note that fuel tank repair, whether necessitated by accident or fuel leakage, is a task for the professional. Welding or brazing is not recommended unless the tank is first purged of all fuel vapour, which is a difficult condition to achieve. Resin-based tank sealing compounds are a much more satisfactory method of curing leaks, and are usually available through suppliers who regularly advertise in the motorcycle press.

7. Accidental damage will inevitably involve reassembling the tank, but note that matching of modern paint finishes is a very difficult task, not to be lightly undertaken by the average owner. It is therefore recommended that the tank be removed by the owner and taken to a
4.6 Disconnect fuel tank pump as described under motorcycle dealer or similar expert for professional attention.

1000 K models onward

3 The tap is vacuum-controlled and should allow fuel to flow only when there is a light vacuum present in the vacuum pipe in the engine running. In the event of failure, the most likely culprits are the vacuum pipe or diaphragm. If a leak develops in either of these the tap will not operate. Check the vacuum pipe for obstructions or splits, or cracks, and renew if necessary. If the diaphragm itself is suspect, set the tap over to ON or RES and connect the vacuum pipe to the tap. Buckle gently on the vacuum pipe. If fuel does not flow, remove the tap for inspection as described below.

4 Slacken the two bolts which secure the tap to the tank and remove the tap along with its mounting spacer, taking care not to damage the filter. Slacken the four screws which secure the cover to the back of the unit and lift off the cover. Carefully remove the spring, spacer and diaphragm from the body.

5 Inspect the diaphragm very carefully for splits or tears ensuring it is held up to a good light source. If there is any sign of damage the complete diaphragm assembly must be renewed. Check the body for signs of cracks and remove all traces of dirt from inside it. Check the mounting spacer for signs of damage, renewing it if necessary, and renew both O-rings as a matter of course.

6 On reassembly ensure the diaphragm is correctly fitted and is not released, then fit the spring, spacer and cover.

2. Fuel tap - removal, inspection and installation

Warning: Petrol (gasoline) is extremely flammable, especially when in the form of vapour. Take all precautions to prevent the risk of fire and read through Section 3 of this Chapter and the Safety first! Section of this Manual before carrying out the following operation.

1. Before the tap is removed it will be necessary to remove the fuel tank, and to drain all the fuel into a clean container suitable for holding petrol (gasoline) for temporary storage.

2. Unscrew the tap from the fuel tank and lift it away, taking care not to damage the filter which projects inside the tank. On these models the tap must be treated as a sealed unit, the only spare part available being the fuel filter and body O-ring. If the unit is faulty it must be renewed.

1000 H, J, and all 600 models

6 Fuel system and associated pipes - general

Warning: Petrol (gasoline) is extremely flammable, especially when in the form of vapour. Take all precautions to prevent the risk of fire and read through Section 3 of this Chapter and the Safety first! Section of this Manual before carrying out the following operation.

1. Remove the air cleaner element as described in Chapter 1. Remove the air cleaner housing from the air cleaner assembly to the carburettors. Take the air cleaner filter out of the housing.

2. Air vent hoses to carburettors

7. Air vent hoses to carburettors

7.9a Release clamp screw to free choke cable outer . . .

7.9b . . . and disconnect both breather hoses

7.8b . . . and disconnect the fuel pipe from its union beneath the carburettors

8. Fuel and lubrication systems
7.9c Partially remove the carburetors...

7.9d ...and disconnect the throttle cables from the pulley

7.10 Hole in clamp must fit over peg on intake stub (arrowed) on 1000 P models onward

8. Carburettors - overhaul (all 600 models and 1000 H, J, K, L, M, N models)

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**Warning:** Petrol (gasolene) is extremely flammable, especially when in the form of vapour. Take all precautions to prevent the risk of fire and read through Section 3 of this Chapter and The Safety First! Section of this Manual before carrying out the following operation.

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8.1 Carburettor - 1000 H, J, K, L, M, N models (900 similar)

8.2a Slacken needle retaining plate as described in text...

8.2b ...and remove the plate, spring...

8.3 Inspect needle valve seat filter for damage and renew if necessary

8.4a Main jet is a screw fit into the needle jet...

8.4b ...and needle jet is a screw fit into the carburettor body
8.4c Pilot jet is situated beside main jet

8.6a Unscrew the choke plunger retaining nut . . .

8.5b . . . and withdraw the return spring . . .

10. The needle valve and seat will wear after lengthy service and should be closely examined, with a magnifying glass if necessary. Wear usually takes the form of a groove or ridge, which will cause the needle to seat imperfectly. Test the spring loaded tip on the bottom of the needle valve by pushing it into the body of the needle. The tip should return quickly and easily under spring pressure. If the needle valve or seat are damaged in any way, it must be renewed. The return spring should also be renewed if at all suspect.

7. On 1000 US models remove the two screws which retain the air cut-off valve cover to the carburettor then lift off the cover and carefully remove the spring, diaphragm and O-ring. Check that the diaphragms are not split, perforated or in any way damaged. Holding them up to a strong light will reveal even the smallest hole. The diaphragm must be renewed even if only slight damage is found as it is not repairable.

Inspection

8. Check that the needle is straight by rolling it on a flat surface such as a sheet of glass. If it is bent it must be renewed as a set together with the needle jet.

9. Check that the floats are in good order and are not punctured. If either float is punctured it will produce the wrong fuel level in the float chamber, leading to an over-rich mixture and flooding. If the floats are damaged in any way they must be renewed as a satisfactory repair will not be possible.

8.12a Air vent filter location - 1000 K, L, M, N models

8.12b Separate filter housing . . .

8.12c . . . and clean filter element as described in text

11. Before the carburettors are reassembled by a reversal of the disassembly procedure, they should be cleaned out thoroughly, preferably using compressed air. Avoid using a rag because there is always the risk of fine particles of lint obstructing the internal air passages of the jet oriﬁces. Check carefully the condition of the carburettor body and float bowl, looking for dented or damaged metering surfaces or any other signs of wear. If severe wear or damage is found, the carburettor assembly will have to be renewed. Check the condition of all O-rings and gaskets, renewing any that are worn or displaced.

Caution: Never use a piece of wire or sharp metal to clean a blocked jet. It is only too easy to enlarge a jet under these circumstances and increase the rate of fuel consumption.

12. On later models (K onward) a small air vent filter is also fitted (see illustration). On 600 models this is situated on the underside of the air cleaner housing and on 1000 models it is located on the right side of the frame member which passes across the front of the cylinder head. Remove the vent ﬁlter assembly, separate the ﬁlter housing and remove the foam element (see illustrations). Wash the element in soapy water and inspect it for signs of clogging or damage, renewing it if necessary. Ensure the element is dry and clean and reassemble the filter components.

13. Always use compressed air to clean a carburettor. A type pump makes an admirable substitute when a compressed air line is not available. Do not use excessive force when assembling the carburettor because it is very easy to shear the small jets or some of the smaller screws (see illustrations). Note that if the carburettor is being set up from scratch it is important to check the float height before refilling the float bowl. To this end, refer to Section 11 before installing the carburettors.

Reassembly

14. Insert the washer, needle and spring into the piston and refit the retaining plate. Push down on the piston, using an 8 mm socket, and turn it 90° clockwise until it is locked in position. Insert the piston assembly into the carburettor body and lightly push it down, ensuring the needle is correctly aligned with the needle jet, then press the diaphragm outer edge into its groove ensuring the small tongue is correctly seated in the cutout (see illustrations). Check that the diaphragm is not creased, and that the piston moves smoothly up and down the bore before refilling the spring and top cover (see illustrations). On No 2 carburettor do not forget to refit the throttle cable bracket when installing the cover screens.
9.1 Carburettor detail - 1000 P models onward

1. Top cover screw
2. Top cover
3. Spring
4. Piston and diaphragm
5. Needle holder
6. O-ring
7. Spring
8. Needle
9. Sealing washer
10. Float chamber screw
11. Float chamber
12. Seal
13. Float pivot pin
14. Float
15. Needle valve
16. Main jet
17. Needle jet
18. Pilot jet
19. Pilot screw
20. Spring
21. Washer
22. O-ring
23. Choke plungers nut
24. Spring
25. Choke plungers

15. On 1000 US models refit the air cut-off valve diaphragm to the carburettor and fit a new O-ring, ensuring its flat face faces the carburettor. Refit the spring and cover and tighten the retaining screws securely.

16. On all models, if removed, install the pilot (mixture) screws, screwing them in until they seat lightly, then unscrew each screw by the number of turns noted on dismantling. Note that if new screws are being fitted, set them to the initial position given in the Specifications at the start of this Chapter. Note that this is only an initial setting - once the carburettors are installed on the machine it will be necessary to adjust the pilot screws as described in Section 11.

17. Install the carburettors as described in the previous Section.

9. Carburettors - disassembly, inspection and reassembly (1000 P models onward)

WARNING: Petrol (gasoline) is extremely flammable, especially when in the form of vapour. Take all precautions to prevent the risk of fire and read through Section 3 of this Chapter and the Safety first Section of this Manual before carrying out the following operation.

Disassembly

1. Remove the carburettors from the machine as described in Section 7. Do not separate the carburettors unless absolutely necessary, as each carburettor can be dismantled sufficiently for all normal cleaning and adjustments whilst in place on the mounting brackets (see illustration). If necessary, the carburettors can be separated as described in Section 10.

Caution: Keep the carburettors upright and do not allow them to rest on their air intake funnels.

2. Remove the three screws which retain the vacuum chamber cover and lift it off. Withdraw the large spring and carefully peel the edge of the diaphragm out of its groove, then withdraw the diaphragm/piston assembly (see illustrations).

3. To remove the needle from the piston, thread one of the 4 mm vacuum chamber cover screws into the needle holder and using

pistons, pull the holder and needle out of the piston (see illustration). Once free of the piston, the washer, needle and coil spring can be removed from the holder. Don't push the needle from below to remove it because distortion of the needle is very likely.

4. Remove the three screws to free the float bowl from the base of the carburettor (see illustration). Access can now be gained to the jets and the float assembly.

5. Use a pair of pointed-nose pliers to withdraw the float pivot pin, then lift off the float assembly and needle valve (see illustration). The main jet is a screw fit in the bottom of the needle jet and can be removed with a flat-bladed screwdriver (see illustrations). The needle jet is a screw fit in the carburettor body and can be unscrewed using a suitably-sized spanner or socket (see illustrations). The pilot jet is positioned adjacent to the main jet and can also be unscrewed using a small flat-bladed screwdriver (see illustration).

6. The pilot (mixture) screw is situated at the front of the carburettor body, in the float bowl cutout (see illustration). It can be removed without disturbing the float bowl, although it is strongly advised that its setting is not altered unless absolutely necessary. If removed, the screw will require setting up as described in Section 11.

7. The pilot (mixture) screw can be removed by screwing it in until it seats lightly, counting

each turn until it is tight.
Fuel and lubrication systems

8.6 Pilot screws can be accessed without removing float chambers.

9.8 Air tunnels are retained by four screws (see illustration). Once removed, the tunnels can be separated from the holders.

9.9 A throttle valve spring is fitted to the No. 1 carburettor on 1000 T models onward. The sensor is retained by three screws.

10. The choke assemblies can be removed, providing the carburettors have been separated (see illustration). By unscrewing the nuts which retain them in the carburettor bodies. If any plunger does not operate smoothly and easily or is damaged in any way, it must be renewed. The return spring should also be renewed if at all suspect.

11. On LD models remove the two screws which retain the air cut-off valve to the carburettor then lift off the valve components and recover the O-rings. Note that if the valve diagram is inverted or perished the complete air cut-off valve assembly must be renewed apart from the O-rings, individual parts cannot be purchased for the valve.

Inspection

12. Check that the needle is straight by rolling it on a flat surface such as a sheet of glass. If it is bent it must be renewed as a set together with the needle jet. Check that the piston diaphragm is not holed or cracked (see illustration).

13. Check that the floats are in good order and are not punctured. If either float is punctured it will produce the wrong fuel level in the float chamber, leading to an over-rich mixture and flooding. If the floats are damaged in any way they must be renewed as a satisfactory repair will not be possible.

14. The needle valve and seat will wear after lengthy service and should be closely examined, with a magnifying glass if necessary. Wear usually takes the form of a groove or ridge, which will cause the needle to seat imperfectly. Test the spring-loaded tip on the bottom of the needle valve by pushing it into the body of the needle. The tip should return quickly and easily under spring pressure. If the needle valve is worn or damaged in any way it should be renewed. The seat is part of the carburettor body; if it shows signs of severe wear, the carburettor must be renewed.

15. Check carefully the condition of the carburettor body and float bowl, looking for distorted or damaged mating surfaces or any other signs of wear. If severe wear or damage is found, the carburettor assembly will have to be renewed. Check the condition of all O-rings and gaskets, renewing any that are worn or distorted.

16. A small filter is located in the needle valve seat. Make a visual check that it is clear and use low pressure compressed air applied from inside the carburettor body, to clear any obstructions.

1.7 Air vent filter (arrowed) is mounted to ignition coil bracket

9.2c. Install the O-ring in the carburettor groove

9.2b. Insert air funnel in its holder and rotate it so that its tabs are locked in place

9.2a. Align the cutout in the air funnel with the carburettor lug (arrowed)

9.2b. ...and fit the needle holder and spring. Make sure the O-ring (arrowed) is correctly positioned

9.2c. Insert the jet needle and seating washer into the piston...

9.2d. ...and fit the needle holder and spring. Make sure the O-ring (arrowed) is correctly positioned

9.2b. ...and fit the needle holder and spring. Make sure the O-ring (arrowed) is correctly positioned

9.2c. Insert the piston and locate the diaphragm in the carburettor groove

9.2a. Align the cutout in the air funnel with the carburettor lugs and install it, tighten the four screws securely (see illustration).

21. If the pilot (mixture) screw was disturbed back it out to the previously recorded position, or if a new screw was fitted back it out to the initial position given in the Specifications. Refer to Section 11 for pilot screw adjustment.

22. Fit the washer to the needle and insert the needle into the piston (see illustration). Position a new O-ring in the groove of the holder and fit the spring inside the holder (see illustration). Insert the holder into the piston and press it down until the O-ring is meant to click into the groove in the base of the piston. Insert the piston in the carburettor and seat the diaphragm edges and tabs in the groove (see illustration). Install the spring and vacuum cover top.

23. Engage the needle valve on the float and secure the float with the pivot pin (see illustration). Before installing the float bowl, check the float height as described in Section 11. This is essential if a new float or float hinge has been fitted or if fuel starvation or flooding have been experienced.

24. Install the carburettors as described in Section 7.

10 Carburettors: separation and reassembly

Warning: Petrol (gasoline) is extremely flammable, especially when in the form of vapour. Take all precautions to prevent the risk of fire and read through Section 3 of this Chapter and the Safety first Section of this Manual before carrying out the following operation.

1. Remove the carburettors from the machine as described in Section 7. Mark the body of each carburettor with its cylinder number to ensure that it is positioned correctly on Reassembly. (The cylinders are numbered 1-2-3-4, left to right)

500 models

6. Adjust the throttle stop screw until the bottom of the throttle valves align with the the air funnel with the carburettor lugs and install it, tighten the four screws securely (see illustration).

21. If the pilot (mixture) screw was disturbed back it out to the previously recorded position, or if a new screw was fitted back it out to the initial position given in the Specifications. Refer to Section 11 for pilot screw adjustment.

22. Fit the washer to the needle and insert the needle into the piston (see illustration). Position a new O-ring in the groove of the holder and fit the spring inside the holder (see illustration). Insert the holder into the piston and press it down until the O-ring is meant to click into the groove in the base of the piston. Insert the piston in the carburettor and seat the diaphragm edges and tabs in the groove (see illustration). Install the spring and vacuum cover top.

23. Engage the needle valve on the float and secure the float with the pivot pin (see illustration). Before installing the float bowl, check the float height as described in Section 11. This is essential if a new float or float hinge has been fitted or if fuel starvation or flooding have been experienced.

24. Install the carburettors as described in Section 7.

10 Carburettors: separation and reassembly

Warning: Petrol (gasoline) is extremely flammable, especially when in the form of vapour. Take all precautions to prevent the risk of fire and read through Section 3 of this Chapter and the Safety first Section of this Manual before carrying out the following operation.

1. Remove the carburettors from the machine as described in Section 7. Mark the body of each carburettor with its cylinder number to ensure that it is positioned correctly on Reassembly. (The cylinders are numbered 1-2-3-4, left to right)

500 models

6. Adjust the throttle stop screw until the bottom of the throttle valves align with the
10.4 Remove throttle stop screw bracket before separating Nos. 1 and 2 carburetors.

10.6a Renew all fuel and air union O-rings as a matter of course.

10.6b Do not omit the large throttle linkage spring when joining the carburetors.

10.8c Ensure all air cleaner case dowels are in position.

10.8d Tighten air cleaner case screws as described in text.

10.8b Tighten second sequence for carburetor front mounting screws.

10.9a Then install front mounting bracket and tighten screws as described in text.

10.9b Tightening sequence for carburetor front mounting screws.

10.10 Carburetor linkage - 1000 H, J, K, L, M, N models

1. Front mounting bracket
2. Choke cable clamp
3. Rear mounting bracket
4. Idle speed adjuster
5. Throttle cable bracket

10 Disconnect the fuel pipe from the carburetors. Then slacken all the rear mounting bracket screws and remove the bracket (see illustration). Straighten and remove the right-hand hose from the throttle linkage between Nos. 2 and 3 carburetors and separate the linkage.

11 Slacken all the front mounting bracket screws and remove the bracket from the assembly. Make a note of how the throttle linkage springs are arranged and slacken all the choke operating arm screws. The carburetors can then be separated, and the choke linkage shaft dismantled, whilst taking care not to damage the fuel or air unions or lose the small synchronizing springs.

12 Before reassembling the carburetors, inspect the fuel and air unions for deterioration, renewing them if necessary. Renew all O-rings as described in Paragraph 6.

13 Join Nos. 1 and 2, then Nos. 3 and 4 carburetors as described in Paragraph 6.

14 Refit Nos. 1 and 2 carburetors to the rear mounting bracket, not forgetting to refit the bronze stop screw mounting bracket, and tighten the mounting screws finger-tight only. Refit the choke arms to Nos. 1 and 2 carburetors and install the linkage shaft and spring. Ensure all choke components are correctly positioned and tighten the choke arm screws loosely.

15 Refit the choke arms to Nos. 3 and 4 carburetors than slide the assembly onto the choke shaft, ensuring it passes through both carburetors and arms, and refit the rear mounting bracket screws. Tighten all the rear mounting bracket screws evenly and progressively in the specified order (see illustration).

16 Install the front mounting bracket, ensuring that the choke lever engages correctly with the shaft, and tighten its mounting screws evenly and progressively in the specified order (see illustration). Check that the choke arms are correctly engaged with each choke plugger (see illustration), and then check the choke linkage shaft and spring. Ensure all choke components are correctly positioned and tighten the choke arm screws loosely.

17 Synchronizing screw spring.
Engaged with the plungers they tighten all the choke arm screws securely. Repeat the throttle linkages between Nos 2 and 3 carburettors and refit the washers, securing it in position with a new split pin. Reth the fuel pipe.

### 1000 P models onward

17 To prevent damage to the air funnels, it is advised that they are removed. Remove the four screws and lift the holders and air funnels off the carburettors (see illustration 9.8). Recover the O-rings.

18 Carburettor Nos 1 and 2 are separated from Nos 3 and 4. Release the fuel pipe spring clips and pull the fuel pipes off the unions between each pair of carburettors (see illustration). Similarly, on all models except California, free the air vent pipes from their unions, and then each pair of carburettors.

19 Remove the two screws with their plastic washers which retain the choke shaft (see illustrations). Unhook the choke shaft return spring from between Nos 1 and 2 carburettors and remove the shaft complete with spring and plastic washers (see illustrations). Note that the diameters differ, then refit Nos 3 and 2 carburettor, not omitting the large throttle linkage spring fitted between the two carburettors. Note that a bare of engine oil on the O-rings will aid installation. Once the carburettors are correctly positioned, refit the small springs to the synchronising screw linkage, ensuring that they are correctly positioned. Repin Nos 3 and 4 carburettors using the same procedure.

### Fuel insecurity

20a Take note of the throttle linkage springs and synchronising spring positions before separating the carburettors.

20b Take note of the throttle linkage springs and synchronising spring positions before separating the carburettors described in Section 7. Check the idle speed, adjusting it if necessary, and then go on to check the carburettor synchronisation. Both operations are described in Chapter 1.

### Carburettors - adjustment

#### Warning: Petrol (gasoline) is extremely flammable, especially when in the form of vapour.

Take all precautions to prevent the risk of fire and road through Section 9 of this Chapter and the Safety first! Section of this Manual before carrying out the following operation.

1 The first step in carburettor adjustment is to ensure that the jet sizes and float height are correct, which will require the removal and disassembly of the carburettors as described in Sections 1 and 9.2 as applicable. Before any dismantling is undertaken eliminate all other possible causes of running problems, checking in particular the spark plugs, air cleaner element and the operation of the choke mechanism. Checking and cleaning those items will often resolve a mysterious flat spot or misfire.

### All models

29 Check the operation of both the choke and throttle linkages ensuring that both operate smoothly and return quickly under spring pressure. Install the carburettors as

### Fuel and lubrication systems

Fuel and lubrication systems 4.19
Float height

3 If the carburetor have been removed for the purpose of checking jet sizes, the float height should be measured at the same time. If exactly that once this is set up correctly, there will be a significant amount of variation, unless the float needle or seat have been replaced. These should be checked and renewed as required. With the float bowl now slowly rotate the carburetor until the floats move under gravity until the valve is just closed, but not so far that the needle's spring-loaded lock is compressed. Measure the distance between the gasket face and the bottom of the float with an accurate rule (see Illustration). The correct setting should be as given in the Specifications. If adjustment is required it can be made by bending, by a very small amount, the small tang to which the float needle is attached. Repeat the procedure on the other carburetors.

4 Once the float height are known to be correct refill the float bowls and install the carburetors on the machine as described in Section 7.

Pilot (mixture) screw

Note: The pilot screws on 1000 P models are located in the base of the carburetor bodies, making access impossible with a conventional wrench. Honda provide a special tool (Pt. No. 07900-4200201) in the UK, 0791A-M21010A and 0791A-M21011A in the US which has a flexible drive.

5 If the pilot screws have been renewed or disturbed they must be adjusted as follows.

a) Do not adjust the pilot screws unnecessarily, there is a risk to gain from unsanitary adjustment. The pilot screws are preset at the factory and certain US models are fitted with a limiter cap to prevent unnecessary adjustment. The limiter cap is cemented in place, but can be removed with pliers.

b) Turn each pilot screw in until it seats lightly, then undo it by the number of turns given in the Specifications at the start of this chapter. This is only an initial setting and the pilot screws must then be adjusted as described below.

Note: On 1000 K, L, M, N US models there is also a specified final adjustment, although it is recommended that the following procedure is used.

7 Start the engine, warming it up to normal operating temperature, then set the mixture screw to its specified idle speed by rotating the throttle stop screw. Turn all the pilot screws out a half turn whilst noting the effect on the idle speed. If the engine speed increases by 50 rpm or more, turn all the screws out a further half a turn. Repeat this procedure until the engine speed fails to rise, then return the screws to the specified idle speed using the throttle stop screw. Using No 2 carburetor on all 650 models, No 1 carburetor on all 1000 H, J K, L, M, N models and No 3 carburetor on 1000 P models onward, slowly turn the pilot screw in until noting the effect this now has on the idle speed. Once the idle speed has dropped 50 rpm, stop and back the screw off by one complete turn, reset the engine to the specified idle speed. Repeat this procedure on the remaining pilot screws.

8 On all 600 and 1000 H, J, K, L, M, N US models, once the pilot screws are correctly set it is necessary to fit a new limiter cap to each screw. The cap must be cemented onto the pilot screw (using Locite 691), whilst taking care not to move the screw's position, and then tighten so that its lug is just tight against the limiter cap.

9 On all models ensure that the idle speed smoothly and does not falter and stop after the throttle twistgrip has been opened and closed a few times. Finally, adjust the throttle cables and check that the throttle operates smoothly and returns quickly before taking the machine on the road.

Engine idle speed

10 Refer to the procedure in Chapter 1.

12 Emission control systems (general California models)

1 To comply with legislation in the state of California, machines are fitted with two emission control systems; a system which prevents the vapours from any part of the fuel system entering the atmosphere and a system which prevents the exhaust gases and another system which prevents the exhaust gases from entering the atmosphere.

2 The exhaust emission control system consists of a secondary air supply system connected to the exhaust port through a reed valve and a reed valve arrangement whenever there is a negative pulse in the exhaust system. This charge of fresh air promotes the burning of the unburnt exhaust gases and changes a considerable amount of hydrocarbons and carbon monoxide into relatively harmless carbon dioxide and water.

3 The evaporative emission control system works as follows. Fuel vapour from the fuel tank and carburettor is directed into a canister where it is absorbed and stored whilst the engine is stopped. When the engine is run and the purge control relay diagrammatically, fuel is drawn from the fuel tank and carburettor by the engine and the engine is turned off. The fuel is stored in the canister and then purged out through the specified idle speed with fresh air.

4 Both systems are automatic in operation and should not require normal attention. The canister is purged out at stated intervals and a regular check of the system hoses as described in Chapter 1. However, if at any time ever system is suspected of being faulty the machine must be taken to a Honda dealer who will have the necessary equipment to check the condition of the emission system components. Faults in the exhaust emission control system will lead to the following becoming unstable and a reduction in engine power, often accompanied by backfiring. Faults in the evaporative emission system will lead to the engine becoming difficult to start. The systems are subject to anti-tampering legislation currently in force which means the machine must never be used with any part of its emission control systems disconnected, missing, rendered incorrect or modified in any way. Use only genuine Honda replacement parts if renewal of any component is required.

13 Air cleaner - general

Caution: Never run the engine with the air cleaner removed. Apart from the risk of increased engine wear due to unfiltered air being allowed to enter, the carburettors are fitted to compensate for the presence of the air cleaner and a dangerously weak engine should lead to overheating and possible engine damage, will result if it is omitted.

1. The care and maintenance of the air cleaner element is described in Chapter 1.

2. Owners should note that the air cleaner is subject to the anti-tampering legislation currently in force, which means the machine will not start with the element removed or rendered inoperative, or with the assembly modified in any way. Furthermore, only genuine Honda replacement parts may be used if the renewal of any component is required.

3. Refer to Section 7 of this Chapter for air cleaner attachment details.

14 Lubrication system checking the oil pressure

1 The efficiency of the lubrication system is dependent on the oil pump delivering oil at the correct pressure. This can be checked using an oil pressure gauge and to do this the hands supply a gauge and adapter (Pt. Nos. 07900- 200000 and 07910-4221001).

2 The oil pressure is checked by removing the oil pressure switch and watching the adapter and gage into the cross at the front. On 600 models the switch is located on the top right side of the crankcase, just below the right crankshaft and cover.

3 Remove the necessary fairs to gain access to the oil pressure switch (see Chapter 6). Prior to carrying out the pressure test, check the engine oil level and top up if necessary. Start the engine and warm it up to normal operating temperature. Stop the engine, disconnect the wire from the oil pressure switch, and unscrew the switch from the crankcase whilst taking great care not to burn your hands on the hot engine unit.

Warning: On 1000 models hot oil may be expelled as the switch is removed. Position a clean piece of cloth between the switch and engine to catch any oil. All oil pressure switch gauge and adapter crankcase and on 1000 models pour any oil which may have been released as the switch was removed back into the crankcase, topping up if necessary with fresh oil.

4 Start the engine and increase the engine speed up to 5000 rpm, noting the reading obtained on the pressure gauge. If the system is working normally, the pressure should be within the range given in the Specifications at the start of this chapter. If it exceeds the higher figure by a considerable amount it is likely that the relief valve is stuck closed. If this is the case it must be removed and inspected as described in Section 16. If the oil pressure is significantly below the lower figure the oil pump should be removed for inspection as described in the following section.

Caution: On no account should the machine be used with low oil pressure, as plain bearing engines in particular rely on oil pressure as much as oil quantity for effective lubrication.

5 On installation remove all traces of oil from the threads of the pressure switch and apply a few drops of engine oil to the threads. Fit the switch to the crankcase and tighten it to the specified torque. Reconnect the wire to the switch and refit the fairing components.

15a Check inner rotor tip to outer rotor clearance

15b Outer rotor to pump body clearance
15.4c Measuring pump rotor end play

15.5a Install thrust washer on the pump rotor side of the body...

15.6a Install outer rotors as described in text...

15.6b ... and ensure inner rotor slot engages correctly with the drive pin.

15.7a Do not omit dowel pins when refitting and covers

15.7b Secure covers in position with their retaining screws

15.8a Refit the relief valve piston to the pump...

15.8b ... followed by the spring and spring seat...

15.9b Install the inner rotor ensuring that its slot engages correctly with the drive pin (see illustrations). Check that the two locating dowels are fitted to the pump cover and that it is to the body.

15.9c ... and secure relief valve components in position with a new split pin

16.1 Oil pressure relief valve is a push fit into the crankcase

16.2a Remove the relief valve circlip...

16.2b ... and withdraw the washer...

16.3 Inspect the relief valve O-ring and renew if necessary

16.2c ... spring...

16.2d ... and piston from the valve body

16.3a To remove the oil cooler, slacken the bolts which retain each hose to the oil cooler matrix...

16.3b ... and remove the oil cooler mounting bolts

16.3c Hose bottom connection - 600 shown

16.4 Oil pressure relief valve removal, inspection and installation

1 Remove the oil pan (pump) as described in Section 17 of Chapter 2 and pull the relief valve from its location in the crankcase (see illustration).

2 Remove the circlip from the relief valve body and withdraw the washer, spring and piston (see illustrations). Wash all components in a high flash-point solvent and inspect the piston and valve bore for signs of scoring or other damage. Also check the spring for any sign of fatigue. If any component is worn or damaged in any way, the relief valve must be renewed.

3 Lubricate all components with clean engine oil then refit the piston, spring and washer to the body and secure them in position with the circlip. Ensure the circlip is correctly located in its groove and check that the piston moves smoothly up and down the valve body. Inspect the relief valve O-ring, renewing it if necessary, and lubricate it with engine oil before refitting the valve to the crankcase (see illustration). Install the oil pan (pump) as described in Section 17 of Chapter 2.

17 Oil cooler, hoses and pipes removal, inspection and installation

1 Remove the fairing as described in Chapter 6, then drain the engine oil into a clean container as described in Chapter 1.

2 To remove the oil cooler, slacken the two union bolts which retain each hose and disconnect them from the cooler (see illustration). Remove the oil cooler mounting bolts and lower the cooler matrix away from the engine.
Chapter 5
Ignition system

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Degrees of difficulty

<table>
<thead>
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<th>Easy, suitable for novice with little experience</th>
<th>Fairly easy, suitable for beginner with some experience</th>
<th>Fairly difficult, suitable for competent DIY mechanic</th>
<th>Difficult, suitable for experienced DIY mechanic</th>
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<td>1-2-3-4</td>
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<td>8-9-10</td>
<td>11-12-13</td>
</tr>
</tbody>
</table>

Specifications

**General**
Firing order.................................................................. 1-2-3-4-5
Cylinder identification............................................... 1-2-3-4-5 (left to right No 1 at alternator end)

**Ignition timing**
Inital: 600 K and L models.......................................... 14.5° BTDC @ specified idle speed
All other models....................................................... 10.5° BTDC @ specified idle speed
Full advance: 600 models............................................. Not available
1000 H, J, K, L, M, N models....................................... 38° BTDC @ 5000 rpm
1000 P models onward................................................ 45° BTDC @ 5000 rpm

**Pulser coil**
Resistance: 600 models............................................... 450 - 550 ohm @ 20°C (68°F)
1000 models.......................................................... 460 - 580 ohm @ 20°C (68°F)

**Ignition HT coil**
Primary winding resistance:
600 models.......................................................... 2.5 - 3.1 ohm @ 20°C (68°F)
1000 H, J, K, L, M, N models....................................... 2.5 - 3.2 ohm @ 20°C (68°F)
1000 P models onward.............................................. 2.5 - 3.2 ohm @ 20°C (68°F)
Secondary winding resistance - with HT lead and suppressor cap:
600 models.......................................................... 21 - 25 K ohm @ 20°C (68°F)
1000 H, J, K, L, M, N models....................................... 17 - 23 K ohm @ 20°C (68°F)
1000 P models onward.............................................. 21 - 27 K ohm @ 20°C (68°F)
Secondary winding resistance - without HT lead and suppressor cap:
600 models.......................................................... 11 - 16 K ohm @ 20°C (68°F)
1000 H, J, K, L, M, N models....................................... 13 - 17 K ohm @ 20°C (68°F)
1000 P models onward.............................................. 11 - 17 K ohm @ 20°C (68°F)

**Spark plug**
Type: 600 models and 1000 T model onward.................. NGK DPR6EA-9 or NGK Y2/EFPR-L9
1000 H, J, K, L, M, N, P, R, S models........................ NGK DPR6EA-9 or NGK X27/EFPR-L9
Plug gap............................................................... 0.6 - 0.9 mm (0.032 - 0.035 in)

**Torque settings**
Kgf m (lbf ft)
Pulser coil rotor bolt - 1000 models.......................... 4.9 (25.0)
Pulser coil mounting bolts - 600 models....................... 0.5 (3.8)
1 General description

These models are fitted with a magnetoically-triggered electronic ignition system, which due to its lack of mechanical parts is totally maintenance-free. The system comprises a rotor, pulser coil(s), spark unit and two ignition HT cables. The raised trigger on the rotor, which is fitted to the side of the crankshaft, magnetically operates the pulser coil(s) at the crankshaft. The pulser coil(s) send a signal to the spark unit which then supplies the ignition coils with the power necessary to produce a spark at the plug (see illustration).

Each coil supplies two spark plugs. Cylinders 1 and 4 operate off one coil and cylinders 2 and 3 off the other. For any given cylinder, the plug is fixed twice for every engine cycle, but one of the sparks occurs during the exhaust stroke and therefore performs no useful function. This arrangement is usually known as a 'spare spark' or 'wasted spark' system.

2 Spark plugs - general

1 For information on spark plug removal, renewal and maintenance, and installation refer to Chapter 1.

3 Ignition system - fault diagnosis

1. As no means of adjustment is available, any fault in the system can only be attributed to failure of a system component or a simple wiring fault. Of the two possibilities, the latter is by far the most likely. In the event of failure, check the system in a logical fashion, as described below.

2. Remove the spark plugs from No 3 and No 4 cylinders, giving them a quick visual check, noting any obvious signs of fouling or oiling. Fit the plugs into their plug caps and rest them on the cylinder head so that the metal body of each plug is in good contact with the cylinder head itself. The electrode ends of the plug should be positioned so that sparking can be checked as the engine is turned over using the starter motor.

Warning: The energy levels in electronic systems can be very high. On no account should the ignition be switched on whilst the plugs or plug caps are being held. Shocks from the HT circuit can be most unpleasant. Secondly, it is vital that the plugs are soundly earthed when the system is checked for sparking. The ignition system components can be seriously damaged if the HT system becomes isolated.

3. Having observed the above Warning, check that the kill switch is in the RUN position, turn the ignition switch to ON and turn the engine over on the starter motor. If the system is in good condition a regular, faint blue spark should be evident at the plug electrodes. It the spark appears thin or yellowish, or in any case not evident, further investigation will be necessary. Before proceeding further, turn the ignition off and remove the key as a safety measure.

4. Ignition faults can be divided into two categories, namely those where the ignition system has failed completely, and those which are due to a partial failure. The likely faults are listed below, starting with the most probable source of failure. Work through the list systematically, referring to the subsequent sections of this Chapter for full details of the necessary checks and tests. Note: Before checking the following items ensure that the battery is fully charged and that all fuses are sound.

- Loose, corroded or damaged wiring
- Connections, broken or shorted wiring between any of the components parts of the ignition system
- Faulty ignition or engine kill switch
- Faulty neutral or idler switch (K models onwards)
- Faulty pulser coil(s)
- Faulty ignition HT coils
- Faulty spark unit

5 Ignition system - checking the wiring

1. The wiring should be checked visually, noting any signs of corrosion around the various terminals and connectors. If the fault has developed in wet conditions it follows that water may have entered any of the connectors or switches, causing a short circuit. A temporary cure can be effected by spraying the relevant area with one of the proprietary anti-corrosive aerosols such as WD40 or similar. A more permanent solution is to dismantle the switch or connector and coat the exposed parts with silicone grease to prevent the ingress of water. The exposed ends of cables can be sealed off using a silicone rubber sealant.

2. Light corrosion can normally be cured by scraping or sanding the affected area, although in severe cases it may prove necessary to renew the switch or connector affected. Check the wiring for chafing or breakage, particularly where it passes close to the frame or its fittings. As a temporary measure damaged insulation can be repaired with PVC tape, but the wires concerned should be renewed at the earliest opportunity.

6 Side stand and neutral switches - testing (K models onwards)

1. The ignition system is controlled by the ignition or main switch, mounted on the top yoke. The switch has several terminals, of which two are involved in controlling the ignition system. These are the ignition terminal (red/black lead) and the supply power from the battery (red lead). The two terminals are connected when the switch is in the ON position and the connection should be broken when the switch is in the OFF position.

2. The operation of the switch is suspect, trace the wiring back from the switch, disconnect its block connector from the main wiring loom. Check the operation of the switch using a multimeter set to the resistance (ohms) scale.

3. The engine kill switch situated in the right-hand handlebar switch cluster can be tested in a similar manner. Trace the wiring back from the switch and disconnect it from the main wiring loom. Using the multimeter, continuity should be present between the black and white/white terminals when the switch is in the RUN position and high resistance (open-circuit) should be shown when the switch is in the OFF position.

4. If either switch is found to be faulty it must be renewed. Although the switches are effectively sealed units (no replacement parts being available), there is nothing to be lost by attempting a repair. Depending on the owner's skill, contacts may be renewed by unleashing them with solder or in some cases, simply by cleaning them with a water dispersant spray.

General information

1. The side stand and neutral switches are linked to the ignition system to provide a handy feature which prevents the machine being ridden with the side stand down (see illustration). If at any time the hardwire is put into gear whilst the side stand is down, the power from the spark unit will be
6.1 Side stand switch location - 600 K and L models

automatically transmitted to earth (ground). This effectively breaks the ignition system and kills the engine.

2 A clutch switch and diode are also incorporated in the ignition system from L models onward. The clutch switch overrides the neutral and side stand switches when the lever is pulled in; if necessary, the clutch switch and diode can be tested as described in Chapter 6.

Side stand switch

3 To test the side stand switch it is first necessary to remove the left side panel on 1000 models, and the fuel tank on 600 models. Trace the wiring back from the switch and disconnect its 3-pin block connector (containing green/white, yellow/black, and green wire from the main wiring loom).

4 Using a multimeter set to the resistance (ohms) scale, check for continuity between the green/white and green wires and the yellow and black and green wires on the switch side of the connector. If the switch is in good condition there should be continuity between the green/white and green wires only when the side stand is down. If there is no continuity the switch must be renewed.

5 To gain access to the switch it will be necessary to remove the lower or lower (an applicable) fairing section. Slacken the bolt( ) which secures the switch to the frame and remove it from the frame. On Installation tighten the switch retaining bolt( ) securely and ensure the wiring is correctly routed. Note: On 600 models ensure that the switch contact signing with the side stand lock and the cutout in the switch body locates with the return spring pin.

Neutral switch

6 To test the neutral switch it is necessary to remove the right side panel on 1000 models, and the fuel tank on 600 models. Disconnect the single light green wire from the main loom and check for continuity between the wire and earth grounds. If the switch is in good condition, there should be continuity when the transmission is in neutral and high resistance (open-circuit) when it is in gear. Note: the switch is faulty and must be renewed.

7 On 600 models the pulsar coil[] is mounted inside the left crankcase cover.

8 Installation is by a reversal of the removal procedure. Refit the pulsar coil[] to the cover tightening the retaining bolts to the specified torque setting, having first applied a film of thread-locking compound to their threads. Ensure that the dowel is in position in the crankcase. Check that the crankcase and cover sealing faces are clean and refit the cover to the machine using a new gasket. Tighten all cover bolts evenly and securely and install the fitting section.

9 Top up the engine oil as described in Chapter 5.

1000 models

10 Remove the left side fairing section as described in Chapter 6. On K models onward, slacken the three bolts which secure the left engine protection, removing it from the machine, then slacken the protector mounting bracket bolts and remove the bracket.

11 On all models position a clean container beneath the left crankshaft cover, to catch any oil which may be released, then remove all the bolts which retain the left crankshaft end cover and lift off the cover along with the heat protector bar (H and J models only). Discard the cover gasket and obtain a new one for installation.

12 Remove the rotor retaining bolt from the end of the crankshaft and remove the rotor. Slacken the pulsar coil retaining bolts, remove the pulsar coil and remove the coil( ) from the crankcase.

13 On installation, refit the pulsar coil( ), ensuring that all the leads are correctly routed and refit the rotor ensuring that the projections on its female boss engage correctly with the cutout in the crankshaft end. Apply thread-locking compound to the threads of the rotor bolt and tighten it to the specified torque setting.

14 Ensure that both the crankcase and cover sealing surfaces are clean and that the grommet is correctly positioned. Install the end cover and heat protector bar (where fitted), using a new gasket and tighten its retaining bolts securely. On K models onward, end the engine protector and bracket. On all models install the fitting components as described in Chapter 6.

15 Top up the engine oil as described in Chapter 5.

8.4 Ignition HT coil test connections

Release connectors (A) to make secondary wiring test without HT leads and suppressor caps.

9 Spark unit location and testing

1 If the test shown in the preceding Sections have failed to isolate the cause of an ignition fault it is likely that the spark unit is faulty. Note: Test details are available for the spark unit, but they relate to a special test unit only available to a Honda dealer. It is therefore totally impracticable for the owner to check the unit with home workshop equipment.

2 The spark unit is located behind the left side panel on 600 models (see illustration) and behind the right side panel on 1000 models. On 600 models, to gain access to the unit first remove the seat and side panels, followed by the grab rail and seat covering mounting bolts, then lift the grab rail clasp of the main framing. Disengage the bulbholders from the back of the stoplight lamp and carefully remove the seat covering (see illustrations).

8.5 Ignition HT coil location - 1000 models

they are mounted on the frame below the front of the fuel tank (see Illustration).

2 On 600 models remove the fuel tank as described in Chapter 4. Make a note of how the HT leads are arranged then disconnect them from the coil. Pull the suppressor caps off the spark plugs then slacken the coil mounting bolts and remove the coil.

3 On 1000 H and J models remove the lower inner covers from the upper fairing then on all 1000 models remove the fuel tank from the front mounting bolts then lift up the tank and support it with the prop stay. Ensure the tank is secure and support it with the prop stay. Ensure the tank is secure and support it with the prop stay.

4 On all models, fit the motor to the cranks 1 scale and measure the resistance between the low tension terminals (see illustration). This will give a resistance reading of the primary windings and should be within the limits given in the Specifications.

5 To check the condition of the secondary windings, set the motor to the K ohm scale and connect the motor probes to the two spark plug caps, noting the reading obtained (see illustration 6.4). If this reading is not within the range shown in the Specifications, unhook the HT leads from the coil then measure the resistance between the L5 terminals. If both values obtained differ greatly from those specified it is likely that the coil is defective.

6.4 Ignition HT coil test connections

If only the first reading obtained is suspect it can be assumed that the fault lies in the HT leads and suppressor caps rather than the coil itself - leads and caps are available separately from the coils.

Should any of the above checks not produce the expected result, the coil should be taken to a Honda dealer or suitably-equipped for a more thorough check. If the coil is considered to be faulty, it may be renewed; the coil is a sealed unit and cannot therefore be repaired.

HINT

If only the first reading obtained is suspect it can be assumed that the fault lies in the HT leads and suppressor caps rather than the coil itself - leads and caps are available separately from the coils.

5 On 1000 models it will first be necessary to remove the grab rail...
10 HT leads and suppressor caps - inspection

1. Erratic running faults and problems with the engine suddenly cutting out in wet weather can often be attributed to leakage from the high tension leads and suppressor caps. If this fault is present, it is likely to be caused by worn or damaged leads, and the first thing to do is to check that the leads and caps are clean. It is possible to cure the problem by cleaning the components and using them with an aerosol ignition sealant, which will leave an insulating coating on both components.
2. Water dispersant sprays are also highly recommended where the system has become damp with water.
3. The suppressor leads and caps may break down internally. If this is suspected, both components can be tested as described in Section 8 of this Chapter and renewed as necessary.

11 Ignition timing - check

1. Since no provision exists for adjusting the ignition timing and since no component is subject to mechanical wear, there is no need for regular checks. It is advisable to do so if you suspect that the ignition timing is incorrect.

1. The ignition timing can be checked whilst the engine is running using a strobe lamp, a suitable timing lamp and the appropriate tool. This can be done without the engine being stopped by using an external source of power.

2. Nakai xenon tube lamps should be employed to ensure that the lamp is correctly aligned and the reading taken accurately.

Chapter 6

Frame and suspension

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Rear shock absorber - removal and installation ......................... 6
Side stand - check ..................................................................... 1

Specifications

Forks
Spring free length: 600 models ....................................................... 397.3 mm (15.64 in)
1000 H, J models ..................................................................... 468.8 - 476.2 mm (18.46 - 18.73 in)
1000 K, L, M, N models ............................................................. 419.2 mm (16.53 in)
1000 P models onward ............................................................... 446.3 mm (17.57 in)
Service limit: 600 models .............................................................. 297.3 mm (11.70 in)
1000 H, J models ..................................................................... 464.0 mm (18.22 in)
1000 K, L, M, N models ............................................................. 411.5 mm (16.18 in)
1000 P models onward ............................................................... 457.4 mm (17.99 in)
Fork tube (stanchion) max travel ................................................. 0.2 mm (0.008 in)
Oil capacity - per leg: 600 models ................................................... 261 cc (12.2 US fl oz, 12.7 Imp fl oz)
Right leg .................................................................................. 281 cc (14.5 US fl oz, 13.0 Imp fl oz)
Left leg .................................................................................... 271 cc (15.2 US fl oz, 13.3 Imp fl oz)
1000 H, J models: ................................................................. 485 cc (16.4 US fl oz, 17.0 Imp fl oz)
Right leg .................................................................................. 495 cc (16.7 US fl oz, 17.4 Imp fl oz)
Left leg ................................................................................... 485 cc (16.4 US fl oz, 17.0 Imp fl oz)
1000 K, L, M, N models - both legs ........................................... 409 cc (13.8 US fl oz, 14.3 Imp fl oz)
1000 P models onward - both legs ............................................. 419 cc (14.1 US fl oz, 14.7 Imp fl oz)
Oil level: 600 models ................................................................. 128 mm (4.27 in)
1000 H, J models ................................................................. 145 mm (5.69 in)
1000 K models onward .............................................................. 175 mm (6.89 in)
Fork oil grade - ATF (Automatic Transmission Fluid) or Fork oil

Rear shock absorber
Spring free length: 600 models ....................................................... 146.9 mm (5.78 in)
1000 H, J models ..................................................................... 157.4 mm (6.21 in)
1000 K, L, M, N models ............................................................. 177.1 mm (6.97 in)
Service limit: 600 models ............................................................. 146.0 mm (5.75 in)
1000 H, J models ................................................................. 154.5 mm (6.09 in)
1000 K, L, M, N models ............................................................. 173.6 mm (6.83 in)

Degrees of difficulty

Easy, suitable for novice with little experience
Fairly easy, suitable for beginner with some experience
Fairly difficult, suitable for competent DIY mechanic
Difficult, suitable for expert DIY mechanic
Very difficult, suitable for expert DIY or professional
### Torque settings

<table>
<thead>
<tr>
<th>Parts</th>
<th>Nm</th>
<th>Ft-lb</th>
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### General description

All models covered in this manual employ a damping and breathing system which uses the engine unit as a stressed member. The frame is constructed in a box-section model. Front suspension is by a pair of oil-damped, coil spring, telescoopic fork legs. The 1000 H, J, and all 600 models incorporate an anti-dive system on the left fork leg which increases the damping rate of the forks under braking. Rear suspension is by Honda's Pro-Link system in which the swingarm acts on a gas-charged, hydraulically-damped suspension unit via a two-piece linkage.

### Frame and suspension - maintenance and adjustments

1. For information on the following operations refer to the relevant Section of Chapter 1.

### 3. Fork removal and installation

#### a) Checking the suspension and steering (front and rear)

- Check the suspension settings.

#### b) Adjusting the suspension settings

- Off the front wheel. As described in Chapter 1, remove the two secondary master cylinder mounting bolts (some also secure reflector) and remove the brake pipe union rotating bolt from the right fork leg. Remove the front mudguard (fender).

#### 2. Carefully prise off the circlip from the top of each fork tube (see illustration). Slacken each handlebar pinching bolt and lift the circlip off the fork tube (see illustration). Support each handlebar assembly to prevent straining the hydraulic hose(s) and control cables and keep the master cylinder(s) upright to prevent the possible leakage of fluid.

#### 3. If the fork legs are to be dismantled, it is preferable to slacken the top bolts whilst they are still held in the triple clamp (yoke). To do this, first remove the cap from the top of the fork, then on all models with air-assisted fork legs, press the air valve to release the air pressure from each fork leg. Slacken the fork top bolts with a suitable spanner.

#### 3.4. Slacken the clamp pinching bolts and remove the fork legs with a twisting motion.

#### 3.5. Position the fork legs as described in text.

### Installation

#### 4. Installation is by the reverse of the removal procedure. Remove all traces of oil from the triple clamps (yokes) and slide the fork legs back into place. Position each leg so that the groove on the fork tube aligns with the top surface of the triple clamp. Then tighten the top and bottom fork clamping bolts to the specified torque setting (see illustration).

#### 5. If the fork legs have been dismantled, the fork top bolts should now be tightened to the specified torque setting (see Illustration).

#### 6. Reinstall the handgrip castings to the top of the fork tubes, ensuring that the lug on the bottom of each casting is correctly located with the cutout on the top triple clamp (yoke), and tighten the pinch bolts to the specified torque setting. Install the circlip in the groove at the lug of each fork leg.

#### 7. Install the front wheel and fender as described in Chapter 7. Check the fork air pressure (where applicable) as described in Chapter 1 and re-fit the caps to the top of each fork tube. Finally, check the operation of the front forks and brake before riding the machine.

### 4. Forks - dismantlement, assembly and reassembly

- Note: Always dismantle the fork legs separately to avoid interchange parts and thus causing an accelerated rate of wear. Store all components in separate, clearly-labeled containers.

#### 1. Remove the fork legs as described in Section 3. Clamp the fork slider (lower leg) securely in a vice equipped with soft jaws, being careful not to overtighten it. Then slacken the damper assembly retaining socket (Allen) bolt which passes up through the bottom of the slider. Release the fork leg from the vice.

#### 1000 K models onwards

#### 2. Unscrew the top bolt until it is free from the top of the fork tube (see illustration). Overhaul the top bolt was not slackened whilst the tube was installed in the triple clamps, it will be necessary to temporarily hold the tube firmly in the case whilst it is tightened to the specified torque setting.

#### 3. If the fork leg has been dismantled, tighten the top bolt to the specified torque setting.

#### 3.5. Slacken, take care not to damage the tube's surface. Insert the leg over a suitable container and pump the tube in and out to remove as much air as possible. Carefully clamp the fork slider (lower leg) in the vice and unscrew the top bolt from the damper rod whilst retaining the boxnut with a suitable open-ended spanner. With the aid of an assistant, push the spring spacer downwards, to compress the fork spring, and remove the stoppin spring collar from the damper rod. Slowly release the space until all the spring pressure has been relieved, then withdraw the spring spacers (one each side of the spacer), spacer and fork spring from the tube. Insert the fork leg over the container again and pump the damper rod in and out to remove any more fork oil.

#### 4. Carefully prise out the dust seal from the top of the slider to reveal the fork seat retaining circlip. Carefully remove the circlip whilst taking care not to damage the surface of the tube. Remove the previously-slackened damper socket (Allen) bolt from the bottom of the slider and withdraw the damper assembly from the tube.

#### 5. To separate the tube from the slider it will be necessary to temporarily hold the top bush and oil seal. The lower bush should not pass through the top bush, and this can be used to good effect. Push the tube gently upwards until it stops against the damper seat (take care not to do this forcibly or the seat may be damaged), then pull the tube sharply downwards until the lower bush strikes the top bush. Repeat this operation until the top bush and seat are tapped out of the slider.

#### 6. With the tube removed, the oil seal, washer (which way up it is fitted) and top bush can be slid off its upper end. Slip the oil seal protector off the top of the slider on 1000 P models onwards. The oil seal is then simply pulled out of the slider.

**Cautions:** Do not remove the lower bush from the tube unless it is to be renewed.

#### 7. To dismantle the damper assembly first remove the damper rod locknut from its upper end. Clamp the damper assembly upside down in a vice equipped with soft jaws, taking care not to overtighten and damage its
4.2 Front fork - 1000 K models onward

4.3a Refit the damper rod rebound spring and insert the damper rod into the damper body

4.9c ... and secure it in position with the circlip

4.9d ... and refit the dust seal so that its chamfered edge is facing downwards

4.6 Fit the bottom piece into the damper body...

4.9b Fit the bottom piece into the damper body...

1. Cap
2. Top bolt
3. O-ring
4. Staked cap
5. Spring seat
6. Spacer
7. Spring seat
8. Fork spring
9. Locknut
10. Damper assembly
11. Circlip
12. Fork tube (stanchion)
13. Lower bush
14. Damper rod seat
15. Dust seal
16. Circlip
17. Oil seal
18. Washer
19. Top bush
20. Slicker (lower leg)
21. Oil drain bolt
22. Sealing washer
23. Socket (Allen) bolt
24. Sealing washer
25. Pinch bolts

4.4a Insert the damper assembly into the upper end of the tube at least another 10 times. This will ensure that the fork oil is evenly distributed.

4.4b Refit the damper seat to the end of the damper body and lower the slider down over the fork tube assembly

4.10c Apply thread-locking compound to the damper assembly bolt and tighten it to the specified torque setting

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4.10r A length of tubing with an inside diameter slightly larger than the fork tube and an outside diameter slightly smaller than the slider recess can be used to drive the oil seal into place. Place a large plain washer against the oil seal and then tap it home using the tubing drift as a form of slide-hammer. Take care not to scratch the tube during this operation; if it is best to make sure that the tube is pushed fully inwards so that any accidental scoring is confined to the area above the seal.

4.11a Tap the oil seal into place with a suitable tubular drift...

4.11b ... then secure it in position with its circlip...

4.15a Install the fork spring as described in text...

4.15b ... and refit the spacer and spring seats
1.15c Compress the spring and install the stepped spring collar.

1.16a Screw the top bolt fully onto the damper rod.

1.16b ... and tighten it to the specified torque setting.

4.21a On 1000 H, J and all 600 models, lubricate the piston O-ring and retight the piston to the cover.

1.16c Screw the top bolt fully onto the damper rod and install the stepped spring collar (see illustration).

16. Place a new O-ring to the top bolt and screw it fully onto the damper rod by hand, until it touches the locknut, then tighten the locknut to the specified torque setting (if possible) (see illustration). Screw the top bolt into the fork tube. Note: The top bolt can be tightened to the specified torque setting at this stage if it can be held firmly enough but do not risk over-tightening and damaging the tube in the vice. A better method is to tighten the top bolt when the fork leg has been installed and are securely clamped in the tripod clamps (see illustration 3). 1000 H, J and all 600 models.

17. Extend the fork leg and unscrew the top bolt from the top of the tube, whilst taking care not to allow it to be expelled forcibly by spring pressure, as the last threads of the bolt are unscrewed. Once the top bolt has been removed withdraw the spacer, spring seat and fork spring, noting which way up the spring is fitted (see illustration). Invert the fork leg over a suitable container and pull the tube vigorously to expel as much air as possible.

18. Prise out the dust seal from the top of the slider to gain access to the oil seal retaining circlip. Carefully remove the circlip whilst taking care not to scratch the surface of the tube. Remove the damper rod retaining socket (Allen) bolt from the bottom of the slider. If the damper rod stackers but rotates in the tube rather than unscrewing, retight the spring, spring seat and spacer, and top bolt. Compress the leg to hold the damper rod in place whilst the bolt is unscrewed. The tube can then be separated from the slider as described above in paragraph 5. Note that there is only a damper rod seat fitted to the right fork assembly.

19. To remove the damper rod from the left tube, prise the first circlip off the damper rod and withdraw the oil lock valve, spring and spring seat. Prise off the second circlip then up the damper rod and rebound spring out of the tube. On the right fork leg simply remove the circlip from the damper rod to permit its removal.

20. To disassemble the anti-dive assembly on the left slider, remove the four socket bolts which retain the assembly and remove it from the slider. Prise off the circlip from the piston collar, remove the collar, and withdraw the piston. Check all components for signs of wear and damage, retightening as necessary. Renew the piston and cover O-rings as a matter of course.

21. Anti-dive components are installed by a reverse of the removal procedure. Lubricate the piston and O-ring and insert it into the cover (see illustrations). Retight the collar to the piston and secure in position with the circlip (see illustrations). Retight the spring to the piston, ensuring that its tapered end is facing the piston and retight the assembly to the slider using a new O-ring (see illustration). Apply thread locking agent to the retaining bolts and tighten them to the specified torque setting (see illustration). Once the cover is in position check that the piston moves smoothly and returns quickly under spring pressure.

22. Reassembly can commence once all components have been cleaned and checked as described in paragraph 9 and the next section.

23. Refit the rebound spring to the damper rod and slide it into place in the tube (see illustration). On the left fork leg retight the first circlip to its groove on the damper rod followed by the spring seat, spring and oil lock valve (see illustrations). Secure all...
components in position with the second circlip, ensuring it is correctly fitted in its groove (see illustration). On the right fork lug refit the circlip to the groove on the damper rod and fit the damper rod seat to the end of the rod.

24. Pass a length of dowel, or the fork spring, and spacer, up through the tube to hold the damper rod in place. Oil the tube and support it vertically with the damper rod uppermost. Lower the slider over the tube and refit the damper rod socket (Albin bolt) using a new sealing washer (see illustrations). Apply thread-locking compound to the threads of the bolt and tighten it to the specified torque setting. Note: If necessary, temporarily refit the fork spring, spacer and top bolt to prevent the damper rod from rotating.

4.24a Insert the tube assembly into the slider - left leg shown

4.24b Apply thread-locking compound to the damper rod bolt and tighten it to the specified torque setting

25. Refit the top bush, washer, oil seal, circlip and dust seal as described above in paragraphs 14 through 16.

26. Fill the fork lug with the specified amount and type of oil and pump the fork lug slowly to distribute the oil evenly. Compress the leg fully and check the oil level. Add or subtract oil, as necessary, until it is at the level given in the Specifications at the start of this Chapter.

27. Clamp the tube securely in a vice and insert the fork spring, ensuring that its lighter-pitched coils or tapered end (as appropriate) seats at the bottom (see illustration). Refit the spring seat and spacer and fit a new O-ring to the top bolt (see illustration). Refit the top bolt to the tube (see illustration). Note: The top bolt can be tightened to the specified torque setting at this stage if it can be held firmly enough, but do not risk over tightening the tube in the vice. A better method is to tighten the top bolt when the fork lug is securely clamped in the triple clamps.

All models

5. When reassembly is complete install the fork legs in the triple clamps as described in Section 3.

5.2 Forks inspection and removal

1. If the forks have been damaged in an accident, it is essential to inspect both triple

4.27b and retight the spring seat...

4.27c ...and spacer

4.27d Fit a new O-ring to the top bolt and fit it to the fork bush

5.5 Lower fork bush is split for easy removal

4.27a Install the fork spring as described in text...

4.3a Inspect damper rod piston rings for damage and renew if necessary

4.3b Renew all O-rings regardless of condition

5.7 Slip out inner sleeve for access to needle roller bearings in left fork slider - 1000 P models onward

clamps (yokes), the fork tubes (stanchions) and the sliders (lower legs) for distortion and hairline cracks. Distorted components must be renewed, do not attempt to straighten them.

2. The parts most likely to wear are the sliding surfaces of the bushes. Thoroughly clean the parts in the fork and are designed to wear before damage occurs to the tube or slider. If there are signs of scoring or obvious wear, the bushes must be renewed. Only in extreme cases will the tube or slider be worn; in these cases the affected iron must be renewed (see illustration).

3. Check the tube for signs of scoring. Damage of this type can be caused by dirt trapped below a damaged or worn dust seal and can be avoided by ensuring that it is renewed whenever the oil seal is renewed. If there has been impact damage, check that the tube is straight by rolling them on a flat surface. If the equipment is available the runout can be measured by mounting the tube in a vee-blocks and measuring the runout with a dial gauge. If runout exceeds the maximum limit the tube must be renewed. Do not attempt to straighten a bent fork tube.

4. The oil seals should be renewed whenever they are disturbed, as should all sealing O-rings and sealing washers. Check carefully the condition of the damper rod play rings and renew if there is any doubt about their condition. Note that on 1000 K models forward, none of the damper assembly parts are available separately; if any part of the assembly is faulty, it must be renewed as a complete unit (see illustrations).

5. Measure the free length of the fork springs; if either has settled to less than the specified length both springs must be renewed as a pair.

6. On all 600 and 1000 H and J models check the needle roller bearing and collar fitted to the left slider. If either component shows signs of wear or damage they must be renewed as a set. The bearing can be removed and installed using a drawbrot tool as described in Section 12 of this Chapter.

7. On 1900 P models onward, check the brake caliper pivot needle roller bearings set in the left slider. If they need replacing, slip out the inner sleeve and pry the dust seals from each side of the pivot using a flat-bladed screwdriver (see illustration). The bearings can be removed and installed using a drawbrot tool.

8. Thoroughly clean all components and dry them ready for reassembly.

5.6 Steering stem - removal and installation

Caution: Although not strictly necessary, before removing the steering head it is recommended that the front brake be removed. This will prevent the paintwork being accidentally damaged.

1. Follow the instructions as described in Section 5 of this Chapter. Trace the wiring back from the ignition switch to the block connector and disconnect it from the main wiring loom. On all 600 models remove the two bolts which secure the brake hose union to the bottom triple clamp (yoke), and on all 1000 models remove the bolt(s) which retains the brake hose guide to the bottom triple clamp.

2. Prise off the cap from the steering stem top nut and slacken and remove the nut. The top triple clamp can then be lifted off the steering stem along with the ignition switch.

3. Straighten the tabs of the adjuster nut lock washer then, using a suitable C-spanner stacken and remove the adjuster nut locknut. Remove the lock washer and discard it; a new one must be fitted on reassembly. Support the bottom triple clamp and slacken the adjuster nut. Lift of the nut and dust seal from the top of the steering head and gently lower the bottom triple clamp and steering stem out of the frame. Lift the upper outboard inner race, followed by the bearing itself.

4. Remove all traces of old grease from the bearings and races and check them for wear or damage as described in the following Section.

5. The steering stem is installed by a reverse of the removal procedure. Smear a liberal quantity of general purpose grease on the bearing inner and outer races.

6. Carefully lift the steering stem into position and retight the upper bearing and inner race. Apply grease to the underside of the dust seal and fit it to the steering stem. Retight the adjuster nut and tighten it using hand pressure only.

7. To preload the bearings to the torque specified by the manufacturer (see Specifications) it will be necessary to use the service tool, Pt No 07916-3710100, which consists of a socket designed to fit over the steering stem and into the outboard of the adjuster nut. Using the service tool, tighten the adjuster nut to the specified torque setting, then turn the steering stem from lock to lock approximately 5 times to settle the bearings and races in position. After preloading the bearings, slacken the adjuster nut one full turn then tighten it again 180° to suit the preloaded torque setting. Note: it is important to check the feel of the steering afterwards as described below; if it is too tight re-adjust the bearings as described below.

8. If the service tool is not available, tighten the adjuster nut hand using a commercial C-spanner to preload the bearings than adjust as follows:

9. Slacken the adjuster nut slightly until pressure is just released, then turn it slowly clockwise until resistance is just evident. Caution: Take great care not to apply excessive pressure because this will apply too high a loading on the bearings and cause premature failure. The object is to set the adjuster nut so that the bearings are under a very light loading, just enough to remove any free play.

10. Fit a new lock washer to the adjuster nut and bend down two opposite tabs into the grooves of the adjuster nut. Refit the locknut and tighten it finger-tight only. Hold the adjuster nut, to prevent it from moving, and tighten the locknut approximately 90° more until its tabs align with the remaining lock washer tabs. Secure the locknut in position by bending tab at both the tabs into its slots.

11. Refit the top triple clamp to the steering stem and retight the stem top nut. Temporarily fit the fork legs, to align the triple clamps, tighten the steering stem top nut to the specified torque setting and retight the cap. Reconnect the ignition switch block connector to the main wiring loom. Refit the brake hose union or guide (as applicable), tightening its retaining bolt(s) securely.

12. Install the fork legs as described in Section 5 of this Chapter. As soon as the forks and front wheel are installed, check that the steering head bearings are correctly adjusted. Refering to Chapter 1 for details.

13. Thoroughly check the operation of the front forks and brake before riding the machine.

7. Steering head bearings - Inspection and renewal

1. For straight line steering to be consistently good, the steering head bearings must be in absolutely perfect condition. Even the smallest amount of wear may cause steering wobble at high speeds and judder during front wheel braking.

2. The bearing tracks of the races should be polished and free from indentations, inspect the ball bearings for signs of wear, damage or discoloration, and examine the bearing retainer ring for signs of cracks or splits. If there are signs of wear on any of the above components both upper and lower bearing assemblies must be renewed as a set.
8. Frame - Inspection and renovation

1 The frame is unlikely to require attention unless excessive damage has occurred. In some cases, removal of the frame is the only satisfactory course of action if it is badly out of alignment. Only a few frame repair specialists have the jigs and mandrels necessary for resetting the frame to the required standards of accuracy and even then there is no easy means of assessing to what extent the frame may have been overstressed.

2 After the machine has covered a considerable mileage, it is advisable to examine the frame closely for signs of cracking or splitting at the welded joints. Rust can also cause weakness at these joints. Minor damage can be repaired by welding or brazing, depending on the extent and nature of the damage.

3 Remember that a frame which is out of alignment will cause handling problems. If realignment is suspected as the result of an accident, it will be necessary to strip the machine completely so that the frame can be thoroughly checked, and if necessary renewed.

9. Rear shock absorber - removal and installation

1 Place the machine on its centre stand and remove both the right and left side panels. Place a block of wood under the rear wheel to prevent it from dropping when the shock absorber mounting bolts are removed, then follow the procedure given under the relevant sub-heading.

600 models

2 Slacken and remove the shock absorber's upper and lower mounting bolts and manoeuvre the shock absorber out of the frame.

3 Installation is the reverse of the removal procedure. Check that the mounting bolts are unworn, renewing them if necessary, and apply molybdenum disulphide grease to their shanks. Fill the shock absorber so that the lug on its lower spring seat is facing upwards and install both the upper and lower mounting bolts, tightening them to the specified torque setting (see illustration).

1000 H and J models

4 Remove the three bolts which retain the left muffler (silencer) cover and remove the cover, noting the insulating washers positioned behind it. Follow the same procedure to remove the right muffler (silencer) cover. Loosen both bolts on the clamp which secures the left muffler to the header (exhaust) pipe, then slacken its mounting bolt and remove the muffler from the machine. Remove both pivot bolts which secure the rear suspension connecting link to the frame and relay and manoeuvre the connecting link out of position. Remove the shock absorber's upper and lower mounting bolts and lower it out of the frame.

5 The shock absorber is installed by a reverse of the removal process. Check all mounting and pivot bolts for signs of wear or damage, renewing them if necessary, and smear their shanks with molybdenum disulphide grease. Maneuver the shock absorber into place, ensuring that the spring preload adjuster faces the right side, and refit its upper and lower mounting bolts. Tighten the shock absorber mounting bolts to the specified torque. Install the connecting link and retighten both its pivot bolts, tightening them to the specified torque setting.

6 Check the muffler gasket for wear or damage and renew if necessary. Install the muffler and retighten its mounting bolt. Tighten both the clamp bolts and mounting bolt to their specified torque setting. Refit the muffler surroundings, not omitting the insulating washers that are fitted between each cowling and muffler, and tighten its retaining screws securely.

1000 K models onward

7 Remove the shock absorber linkage as described in Section 11.

8 Slacken and remove the shock absorber upper mounting bolt and lower the shock absorber out of the frame (see illustration).

9 The shock absorber is installed by a reverse of the removal procedure. Inspect all mounting and pivot bolts for signs of wear, renewing them if necessary, and smear their shanks with molybdenum disulphide grease. Offer up the shock absorber, ensuring that the spring preload adjuster is facing the right side, retighten its upper mounting bolt and tighten it to the specified torque setting.

10 Install the shock absorber linkage as described in Section 11.

All models

11 Remove the block of wood from beneath the rear wheel and refit the side panels. Thoroughly check the condition of the rear suspension before riding the machine.

10. Rear shock absorber - disassembly, inspection and reassembly.

Note: To dismantle the shock absorber it is necessary to have access to a suitable spring compressor (600 models) or a hydraulic press and special Honda service tool (1000 H, J, K, L, M, N models). If these are not available, take the unit to a Honda dealer who will have the necessary service tools to dismantle the unit.

600 models

1 Fill the spring compressor to the shock absorber and compress the spring unit. All spring pressure is removed from the circlip at the top of the unit. Remove the circlip and slowly release the spring compressor. Braid the upper seat, spring, dust seal, lower seat, and tighten both its upper...

6.1 On 600 models install the rear shock absorber...

9.3. On 600 models install the rear shock absorber...
610.11 Rear shock absorber and linkage - 1000 models

Note: If necessary, the damper unit can be disposed using the information in paragraph 4 whilst noting that the unit should be centre punched at a point approximately 13 mm (0.5 in) "UP FROM THE LOWER surface of the damper, and that the unit should be strapped secured. Use the pressure to compress the spring and refit the circlip to the damper body. Check that the circlip is correctly located in its groove and then lower the spring and remove the assembly from the press. Check that the hole in the lower end is still aligned with the nuts in the damper and install the screw, tightening it securely.

18 Before disassembling the shock absorber test the preload as described above and align its screw hole with the small circular recesses on the damper body.

14 Refit the service tool to the top of the damper unit and fit the assembly to the press ensuring that the lower end is securely supported. Use the pressure to compress the spring and refit the circlip to the damper body. Check that the circlip is correctly located in its groove and then lower the spring and remove the assembly from the press. Check that the hole in the lower end is still aligned with the nuts in the damper and install the screw, tightening it securely.

1000 K, L, M and N models

10.12 Rear shock absorber disposal drilling point - 1000 H and J models

Refer to text for details
In paragraph 9.

16. To disassemble the shock absorber service tool (Pt No 07XFM-MSD100) and an hydraulic press will be needed. To disassemble the unit, first remove the screw from the preload adjuster and set the preload adjuster to the LOW position. Fit the service tool to the upper end of the shock absorber and fit the assembly in the press ensuring that the lower mounting point is securely supported. Carefully use the press to compress the spring until the spring pressure is removed from the circlip fitted above the preload adjuster. Prise the circlip out of its groove and then slowly release the pressure on the spring and remove the assembly from the press.

17. Remove the service tool and slide the circlip, preload adjuster, upper spring seat, spring and lower spring seat off the damper (see Illustration 10.11).}

18. Inspect all components as described above in paragraphs 5, 6 and 6. Not applicable. If necessary, the damper unis can be disposed of using the information in paragraph 4 noting that the body should be centre punched and the hole drilled, at a point approximately 12 mm (0.48 in) from the top surface of the damper body (see illustration).

10.18 Rear shock absorber disposal - drilling point - 1000 K, L, M, R models

Refer to text for details.

1500 P models onward

20. With the exception of the top mounting eye bush and seals, no replacement parts are available for the shock absorber. If faulty, it must therefore be replaced with a new unit.

All models

21. Install the shock absorber in the frame as described in the previous section and reset the preload adjustment to the required position. Thoroughly check the operation of the rear suspension before riding the machine.

11 Rear shock absorber linkage - removal and installation

1. Place the machine on its centre stand and place a block of wood under the rear wheel to prevent it from dropping when the shock absorber linkage bolts are removed, then follow the procedure given under the relevant sub-section.

600 models

2. Remove both the left and right side panels. Slacken and remove the shock absorber lower mounting bolt and the relay arm to swingarm pivot bolt. Remove the connecting link to frame pivot bolt and lower the relay arm and connecting link assembly away from the machine. Remove the pivot bolt which secures the connecting link to the relay arm and separate the two components.

3. Withdraw the inner sleeves from the relay arm and connecting link and inspect all components for wear or damage, as described in the following Section (see Illustration 10.1). Install the linkage as follows:

4. Lubricate all the seals, needle roller bearings, inner sleeves and pivot bolts with molybdenum disulphide grease. Insert all the inner sleeves and refill the connecting link to the relay arm, tightening the pivot bolt to the specified torque setting. Install the connecting link and relay arm assembly in the machine and refill the connecting link to frame bolt, tightening it to the specified torque setting (see Illustration).

5. Fit the relay arm to swingarm pivot bolt and the shock absorber lower bolt and tighten both to the specified torque setting (see illustrations). Refit the left and right.

1000 H and J models

6. Remove the left muffler and connecting link as described in paragraph 4 of Section 9.

7. Slacken and remove the shock absorber lower mounting bolt and the relay arm to swingarm pivot bolt and remove the relay arm from the machine.

8. Withdraw the inner sleeve from the connecting link to the relay arm and inspect all components for wear or damage, as described in the following Section, before installing the linkage as follows (see Illustration 10.11).

9. Lubricate all the seals, needle roller bearings, inner sleeves and pivot bolts with molybdenum disulphide grease and slide the inner sleeves into position. Install the relay arm and fit the relay arm to swingarm pivot bolt, followed by the shock absorber lower mounting bolt, tightening both to the specified torque setting. Refit the connecting link and tighten both their pivot bolts to the specified torque setting.

10. Install the muffler as described in Section 5, paragraph 6.

1000 K models onward

11. Remove the left side panel, then slacken the two bolts which retain the left pivot side cover and remove the cover (see illustration).

12. Slacken and remove the shock absorber lower mounting bolt, the relay arm to swingarm pivot bolt and the connecting link to frame pivot bolt (see illustrations). Tighten all bolts to their specified torque settings.

13. Install the muffler cowling, not omitting the mounting collar, and tighten the retaining bolts securely. Refit both pivot side covers, tightening their retaining screws securely. Install the side panels.

All models

14. Remove the block of wood from beneath the rear wheel and pull the machine off the centre stand. Thoroughly check the operation of the rear suspension before riding the machine.

15. Install the shock absorber lower mounting bolt . . .

150. . . the relay arm to swingarm pivot bolt . . .

15.11a On 1000 K models onward remove the pivot side covers . . .

15.11b . . . and muffler cowlings as described in text

15.11c . . . and the connecting link to frame pivot . . .

12 Rear shock absorber linkage - inspection and renewal

1. Thoroughly clean all components, removing all traces of dirt, corrosion and old grease.

2. Inspect all components closely, looking for obvious signs of wear such as heavy scoring, or for damage such as cracks or distortion.

3. Carefully lever out the dust seals, using a flat-bladed screwdriver, and check them for signs of wear or damage; renew them if necessary. Worn bushes or bearings can be drifted out of their bores, but note that removal will destroy them; new bushes or bearings should be obtained before work commences. The new bushes or bearings should be pressed or drawn into their bores.

12.5 Draw tool for installing bearings or bushes in rear suspension components

1. Long bolt or threaded rod

2. Bearing or bush

3. Component’s housing

4. Nut

5. Large washers
13.2a Disconnect the turn signal wiring. 

rather than driven into position. In the absence of a press, a suitable drawbolt arrangement can be made up as described below (see illustration).

4. It will be necessary to obtain a long bolt or a length of threaded rod from a local engineering works. The bolt or rod should be about one inch longer than the combined length of either the relay arm or connecting link, and one bearing or bush (as applicable).

Also required are suitable nuts and two large robust washers. In the case of the threaded rod, fit one nut to one end of the rod and take it in place for convenience.

5. Fit one of the washers over the bolt or rod so that it rests against the head, then pass the assembly through the relevant bore. Over the projecting end and place the bush or bearing which should be greased or eased into place.

13.2b ... and remove the left rear footpeg bracket followed by the remaining washer and nut. Holding the bush/bearing to ensure that it is in motion, slowly tighten the nut so that the bush/bearing is drawn into its bore. Once it is fully home, remove the drawbolt arrangement and, if necessary, repeat the procedure to fit the opposite bearing. The dust seals can then be pressed into place.

13.3 Swingarm - removal and installation

1. Remove the rear wheel as described in Chapter 7.

2. 600 models

2. Remove both side panels then slacken and remove all the left rear footpeg bracket mounting bolts, then disconnect the turn signal lamp wiring and lift the footpeg bracket away from the machine (see illustrations).

3. Slacken the four bolts which secure the rear fender to the swingarm and manoeuvre the fender out of position (see illustration). Slacken and remove the split pin from the torque arm to swingarm mounting bolt and remove the bolt to disconnect the two components. Note the collar which is fitted to the torque arm mounting lug on the swingarm and remove it for safekeeping. Slacken and remove the relay arm to swingarm pivot bolt and the shock absorber lower mounting bolt.

4. 1000 H and J models

5. Pull the pivot shaft nut and tighten it to the specified torque setting.

6. Fit the relay arm to swingarm pivot bolt and tighten both to the specified torque setting. Refit the torque arm mounting collar to the swingarm and install the mounting bolt. Tighten the bolt to the specified torque setting, and secure it in position with a new split pin. Install the rear fender and tighten its retaining bolts securely. Refit the left rear footpeg bracket, not forgetting to reconnect the turn signal wiring; tighten its mounting bolts to the specified torque setting. Refit both side panels.

7. 1000 H and J models

3. Slacken the six bolts which secure the rear fender to the swingarm and manoeuvre the fender out of position. Straighten and remove the split pin from the torque arm to swingarm mounting bolt and remove the bolt to disconnect the two components. Remove the torque arm mounting collar from the swingarm for safekeeping. Remove the rear shock absorber as described in Section 9. 1000 K models onward

4. Removing the shock absorber as described in Section 9. Remove the three bolts which secure the chain guard to the swingarm and lift the guard away from the machine.

5. All models

5. Remove the nut from the swingarm pivot shaft and withdraw the shaft whilst supporting the swingarm. If the shaft is stuck firmly in place with corrosion apply a penetrating fluid, such as WD40, and allow time for this to work. Rotate the pivot shaft head in an attempt to free it, or in stubborn cases use a long drift to drive the shaft out. Manoeuvre the swingarm out of the frame.

6. Remove the collar from the right side of the swingarm and withdraw the inner sleeve and collar from the left side of the swingarm (see illustrations). Inspect all components for wear or damage as described in the following Section and before installing the swingarm as follows.

7. Lubricate the seals, bearings, collars and inner sleeve, and the pivot shaft with general purpose grease and refit the collars and inner sleeve to the swingarm. Offer up the swingarm and insert the pivot shaft (see illustration). Refit the pivot shaft nut and tighten it to the specified torque setting (see illustration).

Installation

600 models

1. Install the shock absorber lower mounting bolt and the relay arm to swingarm pivot bolt and tighten both to the specified torque setting. Refit the torque arm mounting collar to the swingarm and install the mounting bolt. Tighten the bolt to the specified torque setting, and secure it in position with a new split pin. Install the rear fender and tighten its retaining bolts securely. Refit the left rear footpeg bracket, not forgetting to reconnect the turn signal wiring; tighten its mounting bolts to the specified torque setting. Refit both side panels.

1000 H and J models

2. Install the shock absorber as described in Section 9. Refit the torque arm to swingarm mounting collar and bolt and tighten the bolt to the specified torque setting. Secure the torque arm bolt in position using a new split pin and install the rear fender, tightening its retaining bolts securely.

1000 K models onward

10. Install the chain guard on the swingarm and tighten its retaining bolts securely. Install the shock absorber as described in Section 9.

All models

11. Install the rear wheel as described in Chapter 7. Thoroughly check the operation of the rear suspension and brake before riding the machine.

14 Swingarm - inspection and renewal

1. Thoroughly clean all components, removing all traces of dirt, corrosion and old grease.

2. Inspect all components closely, looking for obvious signs of wear such as heavy scoring, or for damage such as cracks or distortion due to accidental damage (see illustration). Any damaged or worn component must be renewed.

3. Check the pivot shaft for wear. If the shank is seen to be stepped or badly scored, it must be renewed. Remove all traces of corrosion and hardened grease from the shaft before cleaning it for straightness by rolling it on a flat surface such as a sheet of plate glass; if it is not perfectly straight it must be renewed. Check also that its threads and those of the retaining nut are in good condition.

14.2 Swingarm - 600 models (1000 similar)
14.4 Carefully remove dust seals and inspect them for wear and damage. Replace them as necessary.

14.5 Right side bearings are retained by a circlip.

16.2a. Remove instrument panel mounting bolts.

16.2b. Remove instrument panel wiring.

16.3 Disconnect the tachometer wiring connectors (arrowed) before attempting to remove the instrument panel.

16.4. Check the tachometer wiring for position of each wire to ensure that it is fitted correctly on reassembly.

16.5. Disconnect all the screws which retain the upper fairing inner covers and remove the covers from the fairing. On 1000 L, M and N models also remove the instrument panel cover, and on 1000 P models onward, also remove the windscreen and instrument panel cover. If necessary, refer to Section 19 for further information.

16.6. Remove the instrument panel mounting bolts and partially withdraw the instrument panel cover (see illustration). Disconnect the speedometer cable by slackening its knurled retaining ring and disconnect the instrument panel block connector(s) (see illustrations). On 1000 P models onward, note how the wiring block connectors locate in their clamps on the underside of the instrument panel, carefully lift the panel away from the machine (see illustration).

16.7. If necessary, the panel can be disassembled by removing all the screws from the back of the panel assembly and removing the top cover and lens. The speedometer head can then be removed once its two retaining screws have been slackened. Before removing the tachometer and temperature or fuel gauge (as applicable) it will be necessary to slacken the relevant electrical connections from the back of the panel. Note the original position of each wire to ensure that it is fitted correctly on reassembly.

16.8. If the speedometer suddenly fails, or if the movement is jumpy or sluggish, check whether the cable has broken. Remove the inner cable over the drive flange in the gearbox, remove the two screws which retain each upper fairing inner cover and remove the bolts...
19.5a On 600 models ensure the upper fairing mounting rubbers are correctly fitted.
19.6d ... and install the upper fairing.
19.5b ... connect the headlamp connector.
19.6e ... and the upper fairing mounting bolts - tighten all bolts securely.
19.6f Reconnect both the left and right turn signal block connectors.
19.5c ... and install the upper fairing.
19.6g Securely tighten the retaining screws.
19.7a Install the windshield to the upper fairing ...
19.7b ... and secure it in position with its mounting collars.
19.7c Install the upper inner covers and tighten their retaining screws securely.

Both the left and right lower inner covers from the machine.
4 Remove the single screw which retains each upper fairing upper inner cover and remove both covers from inside the fairing. Note that it is not necessary to remove the windshield in order to remove the upper fairing, but if required proceed as follows. Slacken the windshield mounting screws and remove them along with the collars and washers. Carefully lift the windshield away from the upper fairing.
5 To remove the upper fairing, first disconnect the right and left turn signal block connectors. Depress the rubber cover of each rear view mirror to reveal the mirror mounting bolts. Slacken the bolts and remove both left and right mirrors. Remove the two bolts which secure the lower edge of the upper fairing to the bracket and pull the fairing away from the machine, noting the two mounting rubbers fitted between the upper fairing and bracket at each rear view mirror mounting point. Disconnect the headlamp (and position lamp - UK only) wiring from the rear of the headlamp unit and remove the upper fairing.
6 The fairing is installed by a reverse of the removal procedure. Offer up the upper fairing section to the mounting bracket, ensuring that the mounting rubbers are correctly positioned between the fairing and bracket, and reconnect the headlamp (and position lamp - UK only) wiring connectors (see illustrations). Install the rear view mirrors and the upper fairing mounting bolts and tighten both the fairing and mirror mounting bolts securely (see illustrations). Re-fit the rubber covers to conceal the mirror mounting bolts. Connect the turn signal block connectors (see illustration).
7 Carefully install the windshield to the upper fairing (if removed) and re-fit the mounting collars and screws, ensuring that the washers are fitted between the collars and windshield (see illustrations). Re-fit the upper inner covers to the inside of the upper fairing and tighten their retaining screws.
8 Install the upper fairing lower inner covers.
19.8 Ensure lower inner covers locate correctly with the upper fairing on installation.

19.10 Install the lower fairing side covers and secure them in position with their retaining screws ensuring the tabs on the covers locate correctly with the slots in the lower fairing, and secure them in position with their retaining screws (see illustration). Fit both lower fairing sections carefully aligning its locating tabs with the upper fairing and inner cover. Refit all its mounting bolts and screws, not omitting any collars which are fitted, and tighten them all securely (see illustration). Refit both lower fairing sections in a similar way tightening all its fasteners securely.

19.12 Fairing - 1000 H and J models

11 Remove the two screws which secure each muffle cowling and remove the muffle cowling from the machine, noting the insulating washers fitted between the cowling and muffler. Remove both side panels. 12 Slacken and remove the six bolts which secure the lower fairing section (bally pan) to the side fairings and lower it away from the machine. Both the left and right side fairing sections can then be removed since their mounting bolts have been slackened; each is retained by four bolts (see illustration). 13 Release the three bolts which retain the lower inner covers then lift the covers out of the upper fairing.

19.17a On 1000 K, L, M, N models release the three clips which secure the lower fairing sections together as described in text.

19.17b Remove all the lower fairing section mounting bolts...and remove them from the machine.

14 The windsheild and upper fairing can be removed and installed as described above in paragraphs 4 to 7.

15 Installation is a reversal of the removal procedure, noting that when fitting the side fairing sections, ensure they locate correctly with the upper fairing and inner covers.

16 When installing the left and right muffle cowlings, do not omit the insulating washers behind each cowl.

17 First remove the left and right side panels. Pull out the three trim clips, situated behind the front wheel, which secure the right and left lower fairing sections together (see illustration). Remove the six bolts which

19.17c Fairing - 1000 K, L, M, N models


Caution: Support the area of fairing around each clip as it is withdrawn to avoid damaging the fairing.
18. Slacken the three bolts which secure each upper facing inner cover in position and lift them clear (see illustration). Slacken and remove the four instrument panel cover screws and partially remove the panel. Disconnect the warning lamp block connector and lift the panel away from the upper facing (see illustration).

19. To remove the upper facing first disconnect the headlamp and turn signal block connectors, situated on the left side of the upper facing (see illustration). Disconnect the rubber covers from the rear view mirror stems and slacken the mirror mounting bolts. Remove the mirrors, along with their rubber mountings, and remove the upper facing mounting bolts (one on each side) from the lower edge of the facing (see illustration). The facing can then be lifted away from the machine (see illustration).

20. The facing is installed by a reverse of the removal procedure. Offer up the upper facing section and refit its mounting bolts. Refit the rear view mirrors, noting that their rubber mountings must be fitted so that the FR marks face forwards. Tighten the mirror and facing mounting bolts securely then refit the protective rubber covers to the mirrors. Reconnect the headlight and turn signal block connectors ensuring that all connectors pass through their retaining brackets.

21. Reconnect the warning lamp block connector and install the instrument panel cover in the upper facing, securing it in position with its mounting bolts. Refit the left and right inner covers and tighten their retaining bolts securely. Then refit the right lower facing section taking care to ensure that it is correctly located with the upper facing, and tighten its retaining bolts securely. Then refit the left lower facing section taking care to ensure that it is correctly located with the upper facing, and tighten its retaining bolts securely. Finally refit the right lower section retaining bolts, tightening them securely. Refit the side panels.

**1000 P models onward**

23. First remove the left and right side panels. Withdraw the two trim clips to free the maintenance cover from the underside of the upper facing (see illustration). Simply pull the head of the clips out to allow the body of the clip to be withdrawn. Withdraw the two screws revealed by removal of the maintenance cover (see illustration). Remove the three trim clips which secure the lower half of the trim at the front of the facing (see illustration).

25. Remove the three screws which retain the side protector cover (see illustration). Remove the single screw which retains the side protector piece (see illustration).

26. Remove the upper facing inner panel; each is secured by a single screw and tabs which engage with the upper facing and

**19.24c Fairing lower halves are secured by trim clips . . .**

**19.24d . . . on the front edge**

**19.25a Remove the side protector cover**

**19.25b Side protector piece is retained by a single screw**

**19.25c Fairing lower panel halves are secured by a spring clip (arrowed) at the bottom**

**19.25d Fairing lower panel fastener locations (arrowed)**

**19.25e Removing the windshield from the upper facing**

**19.27a Inner covers are retained by a single screw**

**19.27b Instrument panel cover is retained by a screw on each side at the bottom corner . . .**

**19.27c . . . front face . . .**

**19.27d . . . and top corner**
Chapter 7
Wheels, brakes and tyres

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Degrees of difficulty

Easy, suitable for novice with little experience

Fairly easy, suitable for beginner with some experience

Fairly difficult, suitable for competent DIY mechanic

Difficult, suitable for experienced DIY mechanic

Very difficult, suitable for expert DIY or professional

Specifications
Wheels
Runout (radial and axial) ........................................................................... 2.0 mm (0.08 in)
Axle runout ............................................................................................. 0.2 mm (0.01 in)

Brakes
Disc Thickness (service limit):
Front:
1000 K models onward............................................................................ 4.0 mm (0.16 in)
All 500 models and 1000 H, J models .................................................... 3.5 mm (0.14 in)
Rear:
1000 K, L, M, N models ......................................................................... 5.0 mm (0.20 in)
1000 P models onward ........................................................................... 4.0 mm (0.16 in)
All 500 models and 1000 H, J models .................................................... 4.0 mm (0.16 in)
Disc maximum runout - all models .......................................................... 0.3 mm (0.01 in)

Caliper bore (I) - all 500 models and 1000 H, J, K, L, M, N, P models:
Front:
1000 K, H, J models ............................................................................... 27.090 mm (1.0651 in)
Service limit ............................................................................................ 27.090 mm (1.0651 in)
All 500 models, US 1000 L, M models ................................................... 25.400 - 25.450 mm (1.0000 - 1.0020 in)
Service limit ............................................................................................ 25.400 - 25.450 mm (1.0000 - 1.0020 in)
Rear - all models ...................................................................................... 27.000 - 27.050 mm (1.0650 - 1.0651 in)
Service limit ............................................................................................ 27.000 - 27.050 mm (1.0650 - 1.0651 in)
### Brakes (continued)

Caliper bore ID - 1000 P models onward (front and rear):

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<td>27.0 mm (1.0664 in)</td>
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<td>27.0 mm (1.0664 in)</td>
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Master cylinder bore ID:

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### Torque settings

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### General Description

All models are fitted with cast alloy wheels designed to accept tubeless tyres. Both front and rear brakes are hydraulically-operated disc brakes, the front using a twin disc set up and the rear a single disc. The brake calipers on all 900 models and on the 1000 H, J, K, L, M models are of the dual piston type. The 1000 P models onward use three-piston brake calipers.

### General Information

- Refer to other parts of this manual for information following operations.
- Checking tire pressure - Daily (pre-ride) checks.
- Checking tire wear - Daily (pre-ride) checks.
- An approved filtering mask should be worn when working on the brakes. Do not use any cleaning solvents or gasoline-based solvents to clean brake parts - use brake system cleaner or denatured alcohol only.

### Warning

- Dust created by the brake system contains asbestos, which is harmful to your health. Never blow it off with compressed air and do not inhale any of it.
- Use an approved filtering mask when working on the brakes. Do not use any cleaning solvents or gasoline-based solvents to clean brake parts - use brake system cleaner or denatured alcohol only.
3.2 On 1000 models release the brake hoses from the fork sliders before removing the calipers.

3.4a If necessary, slacken fender mounting bolts...

3.4b ... and remove it for improved access.

3.5a On 1000 H, J and all 600 models refit the speedometer gear box ensuring that it is correctly located.

3.5b Grease the oil seal lips and install the spacer(s).

3.6a Offer up the wheel and insert the axle.

Caution: Whilst the wheel is removed from the machine, insert a wooden wedge between the brake pads of each caliper. This will prevent the pistons being expelled should the brake lever (or pedal on P models onward) be accidentally operated. Do not allow either caliper to hang from its hose(s) once detached from its mountings. Support the calipers so that there is no strain placed on either the brake hoses or pipe.

1. Place the machine on its centre stand and raise the front wheel clear of the ground by placing a support or stand beneath the engine. On all 1000 H, J, K, L, M, N models remove the bolts which secure both brake hoses to the fork sliders, and on all 600 models free the brake hoses from their guides (see illustration). On all models remove the mounting bolts from both brake calipers. Slide the calipers off the discs and tie them up out of the way of the wheel, taking care not to bend the brake pipe (1000 models only). On all 600 and 1000 H and J models, remove the screw which retains the speedometer drive cable and disconnect the cable from its drive gearbox. Also note the collar fitted to the upper left caliper mounting on the fork slider (lower leg) and remove it for safekeeping.

3. On 1000 P models onward, remove the two bolts which retain the secondary master cylinder link brackets to the left fork slider (see illustration). Remove the left caliper lower mounting bolt and ease the caliper off the discs; take great care not to place any strain on the hydraulic hoses or secondary master cylinder pushrod. Remove both mounting bolts from the right caliper and ease the caliper off the disc.

4. On all models, slacken the axle pinch bolts at the bottom of each fork slider (lower leg) and remove the axle bolt from the right side. Withdraw the axle from the left side and manoeuvre the front wheel out of the forks. Note that on some models, it may prove necessary to remove the front mudguard to gain the necessary clearance to remove the wheel. Remove the spacer(s) and/or the speedometer drive gearbox from the hub, having first taken note of their correct positions as a guide to installation (see illustrations).

5. Installation is the reverse of the removal procedure. Ensure the axle is straight and free from corrosion and smear its shaft with high melting-point grease to aid future dismantling. Apply a thin coat of grease to the oil seal lips and refit the spacer(s) and/or speedometer gear box to the hub (see illustrations). Note: When refitting the speedometer gear box (where fitted), ensure that the slots in the gear box are correctly aligned with the drive plate flange in the hub.

6. Offer up the front wheel and insert the axle from the left-hand side (see illustration). Align the index line around the axle's head with the outside face of the fork slider and tighten the left axle pinch bolts to the specified torque setting (see illustrations). When fitted, position the speedometer gear box so that the projection on the gear box is in contact with the rear of the tab on the slider, then refit the axle bolt and tighten it to the specified torque setting (see illustrations). Insert the brake caliper collar (where fitted) into the left slider (lower leg) and install both calipers (see illustrations). Tighten the caliper mounting bolts to their specified torque settings (see illustration). Note that the left-hand caliper's lower mounting bolt on 1000 H, J and all 600 models is also the anti-dive pin and should only be tightened to a torque setting of 1.2 kgf m (2.7 lb ft).

7. Remove the support from under the engine and rest the front wheel on the ground. Pump the front forks a few times to settle all components in position and tighten the right axle pinch bolts to their specified torque setting. Using a 0.7 mm (0.028 in) feeler gauge, check the clearance between the left caliper mounting bracket and disc, on both sides of the disc (see illustration). If the feeler...
4.2 Rear wheel - 1000 models (600 similar)

1. Axle
2. Spacer
3. Grease seal
4. Sprocket carrier bearing
5. Sprocket
6. Noise damper - 1000 H and J models
7. Nut
8. Sprocket carrier
9. Stiff
10. Spacer
11. Cast drive rubber
12. Dust seal - 1000 H and J models
13. Bearings
14. O-ring
15. Spacer
16. Grease seal
17. Brake disc
18. Bolts
19. Spacer
20. Washer
21. Nut

4.3 Ensure that UP marks on the chain adjusters are correctly positioned

Mark on the chain adjusters is facing upwards (see illustration).

4.4a Engage the drive chain with the sprocket...

4.4c ... and slide the caliper onto the disc...

5 Wheel bearings - removal, inspection and installation

Caution: Although not strictly necessary, it is recommended that the brake discs(s) are removed from the wheel. This will prevent damage to them whilst removing and installing the wheel bearings.

Front wheel
1. Remove the wheel as described in Section 3 of this Chapter.
2. Once the wheel has been removed, use a large flatted screwdriver to carefully lever out the grease seal from the left side of the hub and remove the speedometer drive plate (where fitted). Then remove the grease seal from the right side of the hub in a similar manner. Alternatively, both seals can be driven out of position with the bearings, if desired.
3. Support the wheel firmly on two wooden blocks (placed as close to the hub centre as possible to prevent distortion) and ensure that there is enough space beneath the hub to allow the bearing to drop free. Place the end of a small flat-ended drift against the upper surface of the lower bearing and tap the bearing downwards out of the hub. The spacer located between the two bearings may be moved slightly sideways in order to allow the drift to be positioned against the face of the bearing. Move the drift around the face of the bearing whilst drifting it out of position to ensure that it leaves the hub squarely.
4. With the one bearing removed, the wheel may be lifted and the spacer withdrawn from the hub. Invert the wheel and remove the second bearing, using a similar procedure to that used for the first.
5. If the bearing is of the sealed type, or if it is only sealed on one side, wash it thoroughly in a high flash-point solvent to remove all traces of old grease. Check the bearing tracks and balls for wear, pitting or damage to the hardened surfaces. A small amount of side-to-side movement in the bearing is normal but no radial movement should be detectable. Check the bearings for play and roughness when they are spun by hand. All used bearings will emit a small amount of noise when spun but they should not chatter or sound rough. If there is any doubt about the condition of the bearings they should be renewed. Always renew wheel bearings as a pair and never individually.
6. Carefully clean the bearing recesses in the hub and the centre of the cavity. All traces of old grease, which may be contaminated with dirt, must be removed. Inspect the grease seals and renew them if any damage or wear is found.
7. Before installing the bearings pack them with high melting-point grease, noting that this is not necessary on bearings which are sealed on both surfaces. With the wheel hub firmly supported on two wooden blocks, tap the first bearing into place in the hub. Use a hammer and a tubular metal drift or socket which bears only on the outer race of the...
5.7 Drive first wheel bearing into position using a suitable tubular drift ...

5.8a ... then invert the wheel and insert central spacer...

5.8b Grease the cavity and fit the second bearing...

5.9a Locate the speedometer drive plate tags (where fitted) with slots in hub ...

5.9b ... and press the left ...

5.9c ... and right grease seals into position

5.6 Renew the cush drive rubber as a set if perished

5.7a Do not omit the sprocket carrier spacer ...

5.7b ... when fitting the carrier to the wheel

6.0 Rear wheel

11 Remove the wheel as described in Section 4 of this Chapter. Lift out the rear sprocket assembly, noting the spacer fitted to the inside of the sprocket carrier, and remove the cush drive rubbers from the left side of the hub.

12 Due to similarity in design and construction, the procedure for removal, inspection and installation of the rear wheel bearings is exactly the same as those given for the front wheel.

13 Fit the cush drive rubbers to the hub and install the sprocket assembly, ensuring the spacer is fitted to the inside of the sprocket carrier. Install the wheel as described in Section 4 of this Chapter.

6 Rear sprocket and cushion drive assembly - removal, inspection and installation

1 Inspect the teeth of the rear sprocket. If these are hooked, chipped, or otherwise damaged, the sprocket must be renewed.

Note: That it is considered bad practice to renew just one sprocket or the chain alone; both front and rear sprockets and the chain should be renewed as a set.

2 Remove the rear wheel from the machine as described in Section 4 of this Chapter. Lift off the sprocket assembly, noting the spacer fitted to the inside of the sprocket carrier, and remove the cushion drive rubbers from the hub.

3 To remove the sprocket, clamp one of the sprocket carriages in a vice equipped with soft jaws, and slacken and remove the five (1000 P models onward) or six (all other models) sprocket retaining nuts. Lift off the worn sprocket and install the new one. Refit the sprocket retaining nuts and tighten them to the specified torque setting (see illustration). Note that on 1000 H and J models the sprocket is fitted with a noise damper in the form of a rubber ring fitted to the sprocket flange. On these models do not forget to remove this from the old sprocket and transfer it to the new one.

4 Using a large flat-bladed screwdriver, lever out the grease seal from the centre of the sprocket carrier. Alternatively, the seal can be driven out with the bearing. Remove the spacer from the inside of the sprocket carrier and support the assembly on two pieces of wood, positioned as close to the centre of the sprocket as possible, so that there is enough clearance for the bearing to drop free from its housing. Tap the bearing out of position using hammer and suitable drift, moving the drift around the bearing so that it leaves the housing squarely. Inspect the grease seal for wear or damage, renewing if necessary.

7 Install the cushion drive rubber in the wheel hub and refit the sprocket and carrier assembly, ensuring that the sprocket carrier is in position (see illustration). Install the wheel as described in Section 4 of this Chapter.

7.1 Front brake caliper - removal, overhaul and installation

Caution: Brake fluid will discolor or remove paint if contact is allowed. If brake fluid comes in contact with any painted or plastic components it must be washed off immediately with cold water.

Caution: Disassembly, overhaul and reassembly of the brake caliper must be done in a spotlessly clean work area to avoid contamination and possible failure of the hydraulic braking system. If such a work area is not available, have the caliper rebuilt by a Honda dealer. Dismantle the calipers separately to avoid interchanging of components.

1 Have ready a supply of clean rag to catch any hydraulic fluid, then disconnect the union bolt from the brake caliper and drain the fluid into a suitable container (see illustrations). On 1000 P models onward, go on to
disconnect the other hydraulic hose having taken note of their exact positions as a guide to installation.

2. When all the fluid has drained from the hose, clean the connections and secure the hose end and fittings inside a polythene bag to await reasonably. This will prevent the ingress of any foreign matter into the hydraulic system.

3. Remove the brake pads as described in Chapter 1. On 1000 K, L, M, N models, then go on to slacken the caliper mounting bolts and remove the caliper from the piston. On 1000 P models onward, if working on the right caliper remove the two caliper bracket mounting bolts, then remove the bracket from the fork slider; if working on the left caliper, remove the caliper bracket lower mounting bolt, upper mounting bolt, and the secondary master cylinder bracket bolts, then remove the caliper from the disc. On all models separate the brake caliper from its mounting bracket.

4. On 1000 P models onward, remove the backing plate from the caliper. The backing plate is secured by two bolts, which also clamp the pad pin retainer.

5. The pistons may be driven out of the caliper body by compressed air - an all in all a foot pump if necessary. Under no circumstances should any attempt be made to lever or prise the pistons out of the caliper. Ensure that both pistons leave the bores at the same time, if one comes out any time the other piston must be restrained by firm hand pressure so that the pressure can overcome the resistance of the stubborn piston. It is very difficult to extract one piston alone from a caliper without risking damage. If the compressed air method fails, temporarily reconnect the caliper to the brake hose(s) and use hydraulic pressure via the handbrake lever to displace the pistons. Wrap some rag around the caliper to catch the inevitable shower of brake fluid. Once the pistons have been removed, carefully remove the dust and fluid seals from the caliper bores.

6. Label the pistons so that they can be returned to their original boxes in the caliper. Note that the piston on the trailing caliper fitted to 1000 P models onward all have different diameters.

7. Clean the caliper components thoroughly in new hydraulic fluid. Discard all the seals as a matter of course. The replacement cost is relatively small and does not warrant re-use of components so vital to safety. Check the pistons and caliper bores for scoring, rusting or pitting. If any of these defects are evident it is essential that a good fluid seal can be maintained for and for this reason the components should be renewed. If measuring equipment is available, compare the dimensions of the caliper bores and pistons to those given in the Specifications Section of this Chapter, renewing any component that is worn beyond the specified service limit.

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**Warning:** On no account use petrol (gasoline), paraffin (kerosene), or any such substances as these will cause the seals to swell and degrade.

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8. Inspect the shank of each guide pin which the brake caliper slides on for signs of wear or corrosion and clean or renew each one as necessary. Guide pins are a screw fit in either the caliper body or mounting bracket. On refitting apply a drop of thread-screwing compound to the guide pins and tighten them securely. If the matching bores in the caliper body or mounting bracket are worn or damaged, the body or bracket (as applicable) must be renewed. It is essential that the caliper body can move smoothly and easily on the pins. Inspect the rubber boots which are fitted between the caliper body and mounting bracket and renew any which show signs of damage or deterioration.

9. On reassembly, the components must be clean and dry. Cleanliness is essential to prevent the entry of dirt into the system. Dip the new fluid seals in new hydraulic fluid before refitting them to the caliper bores and ensure each one is correctly located in its groove, without being twisted or distorted. Install the new dust seals in the caliper bore grooves, having first smeared them with silicone grease. Smear a liberal quantity of new brake fluid over the pistons and caliper bores then carefully insert the pistons using a twisting motion. Wipe any surplus fluid from the piston head areas when they are in position.

10. On 1000 P models onward, install the caliper backing plate and pad pin retainer. Tighten its two bolts to the specified torque setting.

11. Smear the guide pins with silicone grease and refit the caliper body to the bracket, ensuring that the rubber boots are correctly seated.

12. On 1000 H and J models and all 800 models install the pads and mount the caliper on the fork slider as described in Chapter 1. On all other models, mount the caliper on the fork slider and tighten its bolt to the specified torque setting. Do not forgetting the secondary master cylinder bracket bolts on 1000 P models onward, then install the brake pads as described in Chapter 1.

13. Refit the hydraulic hose to the brake caliper, using new sealing washers on the hose union. Ensure that the lock of the hose union correctly abuts the tab on the caliper. Then tighten the union bolt to the specified torque setting. On 1000 P models onward, reconnect the second hydraulic hose.

14. Fill the master cylinder reservoir with the recommended brake fluid and bleed the system as described in Section 13. Thoroughly check the operation of the braking system before rising the machine.

---

**Caution:** Brake fluid will discolour or remove paint if contact is allowed. If brake fluid comes in contact with any painted or plastic components it must be washed off immediately with cold water.

**Caution:** Disassembly, overhaul and reassembly of the master cylinder must be done in a spotlessly clean work area to avoid contamination and possible failure of the hydraulic brake system. If such a work area is not available, have the master cylinder overhauled by a Honda dealer.

---

1. The front brake master cylinder forms a unit with the hydraulic fluid reservoir and front brake lever and is mounted on the right handside.

2. The unit must be drained before any dismantling can be undertaken. Place a suitable container below one of the front calipers and run a length of plastic tubing from the bleed nipple to the container. Unscrew the bleed nipple one full turn and proceed to empty the system by pumping the front brake lever. Remove the reservoir cover and check the fluid level; when all the fluid has been expelled tighten the bleed nipple and replace the tube.

3. On models fitted with an adjustable front brake lever, remove the adjuster arm pivot screw and the brake lever pivot bolt, then remove the lever and adjuster arm from the master cylinder; note the small spring fitted in the end of the lever blade. Take care not to lose any of the adjuster components as they are withdrawn. On models fitted with a one-piece lever, remove the pivot bolt and remove the lever.

4. Have ready a supply of clean rag to catch any drops of brake fluid, then slacken the union bolt and free the hydraulic hose from the master cylinder body. Place the union bolt in a polythene bag and tie the bag over the end of the hydraulic hose to prevent the entry of dirt into the system. Disconnect the wires from the stop lamps switch end and remove the two bolts which secure the master cylinder clamp half to the body. Lift the master cylinder away from the handbrake, remove the reservoir cover, plate, diaphragm and float (where fitted) and drain any remaining fluid from the reservoir.

5. Carefully remove the rubber boot from the end of the piston bore to expose the piston end and the retaining circlip (see illustration page). Remove the circlip to free the piston. If the piston tends to stick in the bore it can be pulled clear using pointed-nose pliers. As the piston is removed the primary cup and spring will be released. Clean all the disassembled parts with clean brake fluid and inspect them as follows:

6. Check the piston and cups for scoring or wear and renew if necessary. Excessive
scoring may be due to contaminated fluid, and if this is suspected, it is probably worth checking the caliper seals and pistons as well. If this is found to be the case, it is advisable to renew the master cylinder and reservoir and check the fluid levels and condition.

9. Rear brake caliper - removal, overhaul and installation

Caution: Brake fluid will discolor or remove paint if contact is allowed. If brake fluid comes in contact with any painted or plastic components it must be washed off immediately with cold water.

1. Scoring may be due to contaminated fluid, and if this is suspected, it is probably worth checking the caliper seals and pistons as well. If scoring is found, it is advisable to renew the master cylinder and reservoir and check the fluid levels and condition.

2. Remove the brake pads from the caliper as described in Chapter 7. On 1000 K models, remove the rear axle nut and turn it along with the washer. Use a hammer and a suitable drift, tap the rear axle out of position until the brake caliper and mounting bracket assembly can be slid out of the swingarm. Once the caliper assembly has been withdrawn, temporarily push the axis fully home. On all models, separate the caliper from its mounting bracket.

3. The caliper can now be dismantled and reassembled using the procedure in Section 7, paragraphs 4 to 11.

4. The rear brake caliper is installed by reversing the removal process. On 1000 K models, partially withdraw the rear axle nut until the distance is sufficient for the brake caliper to be inserted. Refit the caliper and bracket assembly, ensuring that the axis of the caliper bracket slots into the lug on the swingarm, and turn the axle fully home. Refit the axle nut and washer and tighten it to the specified torque setting. On all models, refit the brake pads as described in Chapter 7.

5. Refit the brake hose to the caliper, positioning the new sealing washer each side of its union. Ensure that the hose union neck abuts the lug on the caliper (on 1000 P models, note that the mounting bracket must abut the caliper body) and tighten the union bolt to the specified torque setting. On 1000 P models, turn the brake hose clamp to the caliper bracket.

6. Fit the master cylinder reservoir with the specified brake fluid, and bleed the system as described in Section 13 of this Chapter. Finally, thoroughly check the operation of the rear brake before riding the machine.
10 Rear brake master cylinder - removal, overhaul and installation

Caution: Brake fluid will discolour or remove paint if contact is allowed. If brake fluid comes in contact with any painted or plastic components it must be washed off immediately with cold water.

Caution: Disassembly, overhaul and reassembly of the master cylinder must be done in a spotlessly clean work area to avoid contamination and possible failure of the hydraulic brake system. If such a work area is not available, have the cylinder overhauled by a Honda dealer.

Removal
1. Remove the right side panel and the lower cover (where fitted). Drain the hydraulic system as described in paragraphs 1 and 2 of section 8.
2. Disconnect the brake hose from the top of the master cylinder. Place the union bolt in a polythene bag and tape the bag over the end of the brake hose to prevent the entry of dirt into the system. Note that there will be two hoses on 1000 P models onward - take note of their fitted position as a guide to installation.
3. Remove the master cylinder mounting bolts, the reservoir mounting bolt and the right footrest bracket mounting bolts. Partially withdraw the footwell bracket then straighten and remove the split pin from the pushrod link pin and remove the pin itself (see illustration). The master cylinder and reservoir assembly can then be removed from the frame.
4. Before disconnecting the reservoir hose from the master cylinder, remove the cap or cover, plate and diaphragm and tip any remaining fluid into the container. Then remove the screw which secures the hose union to the master cylinder and disconnect it noting the O-ring fitted behind the union.
5. Place the rubber boot from the end of the master cylinder boot to reveal the circlip which retains the pushrod assembly. Remove the circlip and pull out the pushrod. As the pushrod is removed the piston assembly and spring will be released. Note: If the link and locnut are to be unscrewed from the pushrod, first measure the amount of thread extending from the lower locnut on the underside of the link - this will ensure that the components can be returned to their original position on installation and the pedal height retained.
6. The master cylinder assembly can be overhauled and reassembled as described in Section 8, paragraphs 6 to 8. Inspect the O-ring which is fitted to the hose union for wear or damage, renewing it if necessary, then refit the hose union and O-ring to the master cylinder, tightening its retaining screw securely.
7. If the link and locnut positions were disturbed, return them to their previously recorded locations on the pushrod. Note that Honda specify a distance of 75 mm (0.95 in) from the eye of the link to the lower mounting hole of the master cylinder body on UK 1000 P models onward and US 1000 L models outward. No settings are available for the other models.

Installation
1. Place the circlip in the master cylinder, positioning a new sealing washer on each side of its union. Ensure that the neck of the hose union(s) sits on the master cylinder body and tighten the union bolt to the specified torque setting. Check that the two hoses are installed correctly on 1000 P models onward. Install in the order of sealing washer, front caliper union, sealing washer, rear caliper union, sealing washer and union bolt.
2. Refit the brake hose to the master cylinder, positioning a new sealing washer on each side of its union. Ensure that the neck of the hose union(s) sits on the master cylinder body and tighten the union bolt to the specified torque setting. Check that the two hoses are installed correctly on 1000 P models onward. Install in the order of sealing washer, front caliper union, sealing washer, rear caliper union, sealing washer and union bolt.
3. Place the footwell bracket in position and refit the master cylinder and reservoir mounting bolts, tightening all bolts to the specified torque settings.
4. Fill the reservoir with the specified brake fluid and bleed the brake as described in Section 13 of this Chapter. Finally thoroughly check the operation of the rear brake and stop lamp switch before road testing the machine.
5. If adjustment of the brake pedal height or stop lamp switch setting is required, refer to Chapter 1 for details.
11.2a Remove pivot bolt to separate link from caliper bracket

5. If the necessary measuring equipment is available, the master cylinder bore diameter and piston diameter can be compared with the limits in the specifications at the beginning of this chapter. The piston should be renewed as a set with the spring, circlip and dust boot if the master cylinder seating that the piston seats should be lubricated with new brake fluid before installation. Make sure the orifice properly locates in its groove in the master cylinder and locates in the sky of the pushrod stopper plate - when correctly seated, it should be possible to rotate the circlip in its groove and the gap between the circlip ear should be at least 5.2 mm (0.2 in.). Slip the boot back into place. If the circlip position on the pushrod was disturbed, make sure that the distance from the eye of the circlip to the lower mounting bolt hole of the master cylinder measures 57 mm (2.2 in.).

8. The caliper can be disconnected from the brake hose after removing the pivot bolt to free it from the caliper body. Make sure that both the caliper link and caliper mounting bracket eye consist of an inner sleeve and needle roller bearing. Install the inner sleeve out and pry the grease seal from each side of the pivot using a flat-bladed screwdriver. The needle roller bearing should be pressed out using a drawbolt tool. Install the master cylinder in a reverse of the removal sequence, noting the following:

- Adjust the master cylinder mounting bolts to the specified torque setting.
- Use new bolts on the triangular link bracket and tighten them to the specified torque setting.
- Use a new split pin to secure the circlip cotter pin and bend its legs to lock it in place.
- New sealing washers should be used on each side of the hose unions.
- Check that the reed of the brake hoses are at the top on the master cylinder and tighten the hose union bolts to the specified torque setting.
- Bleed the brakes as described in Section 13.

Proportional control valve

10. Remove both side panels and the seat. Remove the four bolts retaining the grab rail to the frame and release the seat link from the lock as it is lifted free (see illustration). Disconnect the tachometer wiring connector, then remove the two bolts retaining the seat cover to the frame, and then the seat cover from the frame. Note: Access to the valve is possible with the seat on the bike. The valves can often be seen on the left side of the seat from the left side of the seat, which can often result in overheating or impact damage and may cause brake judder. This is best checked using a dial gauge mounted on the fork leg or swingarm (as applicable) and should not exceed the specified limit (see illustration).

12. Brake discs - inspection and renewal

1. The brake discs can be inspected with the wheel installed. Look for signs of excessive scoring. Score marks of scoring is inevitable, but in severe cases renewal of the disc may prove necessary to restore full braking effect. Check for disc warpage, which can often result in overheating or impact damage and may cause brake judder. This is best checked using a dial gauge mounted on the fork leg or swingarm (as applicable) and should not exceed the specified limit (see illustration).

12. Open the caliper and remove the pistons. Remove the rubber boots from the pistons. Inspect the brake pads for wear and damage. If the brake pads are worn or damaged, they should be replaced. Check the brake drum for scoring or damage. If the brake drum is scored or damaged, it should be replaced.

12.2 Using a micrometer to measure disc thickness

12.4 Tighten disc mounting bolts to the specified torque setting

13.3 Connect brake/clutch bleeding kit as shown

Brake bleeding (1000 P models onward)

Honda utilize a vacuum-type brake bleeder to bleed the brake which operatens by drawing vacuum brake fluid into the system, and then bleed the brake by the conventional pressure method described below. If you find that the conventional method fails to remove all trapped in the brake hoses or pipes, consult the workshop manual for the Honda motorcycle. It is important to bleed the brake system components as a whole and in the following order:

1. Front brake caliper upper bleed nipple - front brake lever pressure.
2. Front brake caliper lower bleed nipple - rear brake pedal pressure.
3. Rear brake caliper upper bleed nipple - rear brake pedal pressure.
4. Rear brake caliper lower bleed nipple - rear brake pedal pressure.
5. Rear brake caliper master cylinder pressure.
6. Rear brake caliper master cylinder body. Using an Allen key, turn the screw anti-clockwise until it seats against the orifice - this is necessary to permit bleeding of the rear calipers (see illustration). If it is not possible to produce a firm feel to the brake lever or pedal the fluid may be aerated. Let the fluid in the system stabilise for a few hours and then repeat the procedure with the brake lever or pedal. If the tiny bubbles in the system have settled out.

HAYNES HINT

If it is not possible to produce a firm feel to the brake lever or pedal the fluid may be aerated. Let the fluid in the system stabilise for a few hours and then repeat the procedure with the brake lever or pedal. If the tiny bubbles in the system have settled out.

Wheels, brakes and tyres 7•17
13.8 Remove the plug (arrowed) from the secondary master cylinder to access the Allen screw

13.10 Right front caliper upper (A) and lower (B) bleed nipples

13.13 Left front caliper upper (A) and lower (B) bleed nipples

14.3 Common tyre sidewall markings

14 Tyres — general information and fitting

General information
1 Only tubeless tyres are suitable for fitting on these wheel rims.
2 Refer to the Daily (pre-ride) checks listed at the beginning of this manual, and to the scheduled checks in Chapter 1 for tyre and wheel maintenance.

Fitting new tyres
3 When selecting new tyres, refer to the tyre information label on the motorcycle and the tyre options listed in the owners manual. Ensure that front and rear tyre types are compatible, the correct size and correct speed rating. If necessary seek advice from a Honda dealer or tyre fitting specialist (see Illustration).

4 It is recommended that tyres are fitted by a motorcycle tyre specialist rather than attempted in the home workshop. The force required to break the seal between the wheel rim and tyre bead is substantial, and is usually beyond the capabilities of an individual working with normal tyre levers. Additionally, the specialist will be able to balance the wheels after tyre fitting.

5 Only certain types of puncture repair are suitable for tubeless motorcycle tyres. Refer to a tyre fitting specialist for advice and to your owners manual for details of the reduced speeds advised for a repaired tyre.
# Chapter 8
## Electrical system

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### Degrees of difficulty

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<tr>
<td>Easy</td>
<td>Suitable for novice with little experience</td>
</tr>
<tr>
<td>Fairly easy</td>
<td>Suitable for beginner with some experience</td>
</tr>
<tr>
<td>Fairly difficult</td>
<td>Suitable for competent DIY mechanic</td>
</tr>
<tr>
<td>Difficult</td>
<td>Suitable for experienced DIY mechanic</td>
</tr>
<tr>
<td>Very difficult</td>
<td>Suitable for expert DIY or professional</td>
</tr>
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</table>

### Specifications

#### Electrical system

- **Voltage**: 12
- **Earth (ground)**: Negative

#### Battery

- **Capacity**:
  - 600 models: 8 Ah
  - 1000 models: 14 Ah
- **Electrolyte specific gravity** - 1000 models: 1.280 @ 20°C (68°F)

#### Alternator

- **Type**: Three-phase AC
- **Output**:
  - 1000 K models onward: 360 watts @ 5000 rpm
  - All other models: 360 watts @ 5000 rpm
- **Charging voltage**:
  - 600 models and 1000 H, J, K, L, M, N models: 13.5 - 15.5 volts @ 5000 rpm
  - 1000 P models onward: 12.6 - 13.0 volts @ 5000 rpm
- **Stator coil resistance**:
  - 600 models: 0.1 - 1.0 ohm
  - 1000 H, J, K, L, M, N models: 0.4 - 0.8 ohm
  - 1000 P models onward: 0 - 0.1 ohm
- **Field coil resistance** - 1000 H, J, K, L, M, N models: 2.0 - 2.6 ohms

#### Starter motor

- **Standard brush length**:
  - 600 models: 12.5 mm (0.49 in)
  - 1000 models: 12.0 - 13.0 mm (0.47 - 0.51 in)
- **Service limit**:
  - 600 models: 8.5 mm (0.33 in)
  - 1000 models: 8.5 mm (0.33 in)
8.4.2 Electrical system

Fuel level sender unit
Resistance: 4 - 10 ohms
Full tank 200 - 150 ohms
Empty tank 0 - 50 ohms

Fuel pump flow rate
600 models 1000 models
650 cc (20.8 US ft oz/22.1 Imp fl oz) per minute 900 cc (30.4 US ft oz/91.7 Imp fl oz) per minute

Fuses
Main fuse 10 A
Fuse A* 10 A
Fuse B* 10 A
Fuse C* 10 A
Fuse D* 10 A
Fuse E* 10 A
Fuse F* 10 A
Fuse G* 10 A

Fuse box location: Under the wiring diagrams at the end of this Chapter for fuse identification.

Bulbs
Headlamp 1000 K models onward
12 V 45/55 W x 2
12 V 60/55 W x 2

Instrument illuminating lamps: 12 V 21 W
12 V 24 W

Warning lamps: 12 V 3 W
12 V 3.4 W
12 V 3.4 W
12 V 3.4 W

Torque settings
Alternator rotor nut - 1000 H and J models
50 kgf m

Cooling fan switch - 600 models
1.8 lb ft

1. General description
On 600 models the power for the complete electrical system is provided by a three-phase alternator mounted on the right side of the engine block. All 1000 models use a brushless field coil type alternator which is mounted on the top left side of the crankcase, behind the cylinder block, and is chain-driven off the crankshaft. On this type of alternator the field coil magnetises the rotor, which then generates power as it passes the stator coil.

On all models the system output from the alternator is conditioned and rectified by the regulator/rectifier unit before being passed to the battery and thence to the main electrical system.

2. Electrical system - general information and preliminary checks

1. In the event of an electrical system fault, always test the battery first. If the battery is good, check the wiring connections and wiring before testing the alternator.

3. Battery - inspection and maintenance

Cautions:

1. Before checking the charging system, it is important to ensure that the battery is fully charged. If the battery is not fully charged, the results of the test may not be accurate.

Warning: Batteries contain sulphuric acid which can be very dangerous if not handled properly. Please read the safety instructions carefully before proceeding.

1. When testing the Alternator, ensure that the battery is fully charged.
2. Check the Electrical System wiring connections are tight and free of corrosion.
3. Check the Battery terminals for corrosion and ensure that they are clean.
4. Check the Fuse links for damage and ensure that they are intact.

Electrical system 8.3
US 600 models
2 Remove the side panels and seat then remove the battery box lid. Check that the ignition switch is turned OFF, then disconnect the lead from the negative (-) battery terminal. Connect a multimeter set to the amperes (A) range (select a high scale at first) to the voltage to the terminal and read the voltage obtained. The meter reading should not exceed 0.01 mA.

All 1000 H, J models and UK 1000 K, L, M, N models
3 Remove the battery box lid from the side panel. Check that the ignition switch is turned OFF. Disconnect the regulator/rectifier wiring connectors from the main wiring loom, then disconnect the lead from the negative (-) terminal of the battery. Connect a multimeter set to the voltage range between the lead and negative (-) terminal battery and note the reading obtained. A reading of 0 volts should be shown on the meter.

US 1000 K models onward and UK 1000 K models
4 Remove the seat. Check that the ignition switch is turned OFF. Disconnect the lead from the negative (-) terminal of the battery. Set a multimeter to the amperes (A) scale (select a high scale at first) to the voltage to the positive (+) probe (the load and the negative probe (-) to the battery negative (-) terminal). A reading of 0 ampere should be obtained on US models and 0 to 0.1 mA on UK models.

All models
5 If the leakage test fails to provide true above result, the charging system wiring is probably at fault and should be tested as described in Section 2 of this Chapter.
6 Is all well, disconnect the meter and reconnect the lead to the battery’s negative (-) terminal.

Start the engine and warm it up to normal operating temperature. Stop the engine and connect a multimeter set to the ohms range to the battery terminals, negative probe to the negative (-) terminal of the battery, and its positive probe to the positive (+) terminal of the battery. Now increase the engine speed to 5000 rpm and note the reading obtained. The voltage should be 0.5 - 1.5 volts on all 600 and 1000 H, J, K, L, M, N models and 12.6 - 15.0 volts on 1000 K models as indicated. If the voltage is below this it will be necessary to check the alternator and regulator performance as described in the following Section. Note: Occasionally the condition may occur where the alternator output is excessively small. This condition is almost certainly due to a faulty regulator/rectifier which should be tested individually.

5 Alternator - testing

6.00 models
1 Remove the fuel tank as described in Section 4 of Chapter 4. Then disconnect the 6-pin block connector which contains the Yellow wires. Using a multimeter set to the ohms x 1 scale measure the resistance between each of the Yellow wires on the alternator side of the connector, taking a total of three readings, then check for continuity between each terminal and earth (ground). If the stator coil windings are in good condition there should be no continuity between any of the terminals and earth (ground) and the three readings should be within the range shown in the Specifications at the start of this Chapter. If not the alternator stator coil assembly is at fault and should be renewed. The coil is then mated to the inner rim of the right crankcase cover which can be removed as described in Chapter 2 (see illustration).

1000 models
2 Remove the seat and left side panel and disconnect the 6-pin alternator block connector. Using a multimeter set to the ohms x 1 scale measure the resistance between each of the Yellow (stator coil) wires on the alternator side of the connector, taking a total of three measurements, then check for continuity between each wire and earth (ground). If the stator coil windings are in good condition there should be no continuity between any of the terminals and earth (ground) and the three readings should be within the range shown in the Specifications at the start of this Chapter. If not the alternator stator coil assembly is at fault and should be renewed. The stator coil assembly can be removed as described in the following sections.

All models
4 If the stator assembly is found to be faulty, check first that the fault is not due to a broken wire or connection to the alternator itself; pinched or broken alternator wires can be quickly repaired by the average private owner. Note that if the coil is confirmed faulty it may be worthwhile seeking the advice of an auto electrical specialist, who may well be able to rewind the damaged coil.

6 Stator coil - removal and inspection (1000 models)
1 Remove the seat and left side panel then remove the lower and left side fairing sections (as applicable). Top up the wiring from the alternator and disconnect the 6-pin block connector from the main wiring loom.

H and J models
3 Slacken the three screws which retain the alternator cover and partially remove the cover. Withdraw the clip which secures the grommet in position then displace the grommet and lift the cover away from the frame.
3 To remove the bearing from the end of the alternator shaft a puller will be required. Caution: Do not attempt to remove the bearing using any other method as the alternator is easily damaged.
1 Care should be taken when removing the transmission into gear and apply the rear brake to prevent the alternator from rotating whilst the rotor nut is slackened. Remove the nut and washer and withdraw the rotor and stator windings.
4 The stator windings are installed by reversing the removal sequence. Fit the windings to the alternator body and fit the rotor ensuring that the pin on the alternator shaft engages correctly with the holes in the rotor body. Refit the rotor shaft nut and washer and tighten it to the specified torque figure whilst retaining the shaft using the method described on disassembly. Fit the bearing onto the shaft and tap it into position using a tubular drift which bears only on the inner race of the bearing. Fit the stator grommet to the cover, securing it in position with the clip, then insert the cover and tighten it retaining screws securely.

K models onward
6 Remove the three bolts which secure the alternator cover in position and remove the cover together with the timing cover. The stator windings are fitted inside the cover. On installation, check the condition of the O-ring and if necessary, then refit the cover and tighten its retaining bolts securely.

All models
6 Connect the alternator block and refit the alternator cover. If the voltage is not acceptable, then check the charging rate as described in Section 6, then refit the side panel and seat.

7.1 Regulator/rectifier test table - 600 models
7 Remove the alternator setscrew and cat seating cover. Disconnect the regulator/rectifier connector then slacken the unit’s mounting bolts and remove it from the machine (see illustration).
8 Once removed from the machine, the regulator/rectifier unit’s internal circuitry can be tested by measuring the resistances present between its various terminals. If the readings do not closely resemble those in the accompanying table the unit can be considered faulty and must be renewed (see illustrations). A list of the unit’s wiring can be made with it installed on the machine. Disconnect the main 7-pin block connector and using a multimeter set to the volts function, connect its positive (+) probe to the red/white wire terminal on the wiring harness side of the connector, and its negative (-) probe to earth (ground). Battery voltage should be shown if the wiring is in good condition. To renew the unit, connect the meter’s positive probe to the black wire, leaving its negative probe connected to earth (ground). No reading should be shown until the ignition is switched OFF, at which point battery voltage should be shown on the meter.

7.1a Regulator/rectifier test table - 600 models

7.2 Regulator/rectifier test table - 1000 K models onward

1000 K models onward
5 Remove the hard top panels and seat cover. Disconnect the regulator/rectifier connector then slacken the unit’s mounting bolts and remove it from the machine (see illustration).
6 Once removed from the machine, the regulator/rectifier unit’s internal circuitry can be tested by measuring the resistances present between its various terminals. If the readings do not closely resemble those in the accompanying table the unit can be considered faulty and must be renewed (see illustrations). A list of the unit’s wiring can be made with it installed on the machine. Disconnect the main 7-pin block connector and using a multimeter set to the volts function, connect its positive (+) probe to the red/white wire terminal on the wiring harness side of the connector, and its negative (-) probe to earth (ground). Battery voltage should be shown if the wiring is in good condition. To renew the unit, connect the meter’s positive probe to the black wire, leaving its negative probe connected to earth (ground). No reading should be shown until the ignition is switched OFF, at which point battery voltage should be shown on the meter.
86 Electrical system

8 Fuses - general

1 Most circuits are protected by fuses of different ratings. All fuses except the main fuse are located in the fusebox situated behind the left upper fairing inner panel. The main fuse is fitted to the starter relay which is behind the right side panel. All fusebox fuses are labelled for easy identification (see illustrations).

2 Blown fuses can be easily recognised by the melted metal strip. Each is clearly marked with its rating and must only be replaced by a fuse of the correct rating.

Caution: Never install a fuse of a higher rating or bridge the terminals with any other substitute, however temporary it may be. Serious damage may be done to the circuit, or a fire may start. Always carry a supply of spare fuses of each rating on the machine.

3 While an isolated fault may occasionally blow a fuse and never occur again, such cases are rare and generally due to faulty connections, although fuses do sometimes blow due to old age or similar factors. However, if the fuse for any circuit blows repeatedly, a more serious fault is indicated which must be traced and remedied as soon as possible.

8.1a Main fuse is fitted to the starter relay ...

9 Starter motor - testing

1 In the event of a starter malfunction, always check first that the battery is fully charged. A partially discharged battery may be able to provide enough power for the lighting system, but not the heavy current required for starting the engine. Look also for broken, chafed, or corroded wiring before proceeding further. Also ensure that all fuses are in good condition.

2 Remove the right sidepanel to gain access to the starter relay (solenooid). Ensure that the transmission is in neutral, the engine kill switch is in the RUN position, and on K and L models that the side stand is up. Turn the ignition switch ON, pull in the clutch lever and operate the starter button whilst listening to the starter relay. If the relay is pressed the relay should be heard to click. If the relay clacking as the button is pressed, the fault lies in the starter motor, which should be removed and examined as described in the following section. If no click is heard the fault lies in the starter circuit components which should be tested as follows.

Starter relay (solenooid)

3 Disconnect the battery terminals, remembering to disconnect the negative (–) terminal first, then disconnect the starter relay wiring connector from the starter relay. Disconnect the starter motor and battery leads from the relay terminals and remove the relay from the machine (see illustration).

4 Set a multimeter to the ohms 1 scale and connect it across the relay terminals. Using a fully-charged 12 volt battery and two insulated auxiliary wires, connect the positive (+) terminal of the battery to the yellow/red terminal of the relay, and the negative (–) terminal to the green/red terminal of the relay. At this point the relay should click and the multimeter will read a value indicating continuity. If this is the case, the relay is proven serviceable and the fault must lie in the starter switch circuit. If the relay is not free to click, it is proven faulty and must be renewed.

Neutral switch

5 If the neutral switch is not operating correctly, it can be tested as described in Section 6 of Chapter 5.

Ignition and engine kill switches

6 The test procedure is described in Section 5 of Chapter 5.

Starter button

7 Trace the wiring from the right handlebar switch to its block connectors. Disconnect them and make the following test on the switch side of the wiring. Using a multimeter set to the ohms 1 scale, check for continuity between the terminals of the switch. If the switch is in the run position and the ignition is ON, the switch should be in the 'on' position and the 'on' light should be illuminated. If the switch is in the kill position and the ignition is ON, the switch should be in the 'off' position and the 'off' light should be illuminated. If the switch is in any other position, the switch should be in the 'neutral' position.

8 Disconnect the relay connector from the relay. Disconnect the relay wiring connector from the starter relay. Disconnect the starter motor and battery leads from the relay terminals and remove the relay from the machine (see illustration).

9 Remove the wire under the handlebar and connect one end of the wire to the yellow/red terminal of the relay, and the other end of the wire to the black/red terminal of the relay. The relay should click and the 'on' light should be illuminated. If the relay does not click and the 'on' light does not illuminate, the relay is faulty and must be renewed.

Clutch lever switch

10 Disconnect the wires from the clutch lever switch and check for continuity between the switch terminals using a multimeter set to the ohms 1 scale. If the switch is in the 'on' position, the switch should be in the 'off' position.

11 The side stand switch can be tested as described in Section 6 of Chapter 5.

10 Starter motor - removal, overhaul and installation

1 On 600 models remove the left lower fairing section. On 1000 models remove the carburettors as described in Section 7 of Chapter 4 and the low and right side fairing sections as (applicable). On all models disconnect the battery terminals (negative (–) terminal first) to prevent the risk of a short-circuit.

2 Slacken and remove the nut which secures the starter motor lead and disconnect it from the motor. Release the starter motor bolts and manoeuvre the motor away from the engine.

3 Wipe clean the splinters of the starter shaft pinion teeth then tape over them to protect the oil seal as the cover is removed. Remove the two long retaining screws from the front of the starter motor and carefully lift off the front cover (see illustrations). Note the number of shims fitted to the rear of the armature and then remove them. Carefully lift off the rear cover, noting that on 600 models the brush plate should come off with the cover. Make a note of the number and position of any shims fitted to the rear of the armature. Then remove the armature from the starter motor body.

4 Disengage the brushes from the brush plate and measure the length of each brush (see illustration). If any brush has worn to or beyond the service limit given in the Specifications, renew the brushes as a set. As the brushes are slotted to either the brush plate (negative brushes) or the terminal bolt (positive brushes), they cannot be renewed separately; both the brush plate and terminal bolt assemblies will be required.

5 If the brush lengths are within the service limits check the brush wiring as follows. Using a multimeter set to the ohms 1 scale, check for continuity between the positive (red/black) and the negative (black/red) terminals. This should be an open circuit (high resistance). On 650 models also check for continuity between the blue/white and black/red terminals. These should be an open circuit between these two when the button is pressed and continuity when the button is released. If the starter button is faulty and must either be replaced or the right handlebar switch renewed.

Control section of wiring loom running up the left side of the frame. On 1000 H and J models the diode is located (behind) the upper fairing section (which must first be removed), where it is situated just behind the speedometer cable. On 1000 K models onward, it can be found behind the left sidepanel (see illustration).

9.8 Test clutch diode as described in text.
10.5b Starter motor - 1000 models

1. Load terminal
2. Boring ring screws
3. Boring ring bearing
4. Mounting bolts
5. O-rings
6. Toileted washer

10.5c Refit the shims to the rear of the armature

10.6a On 600 models ensure the brushplate tab locates with the cover groove

10.6b Refit the shims to the rear of the armature

10.7a ... and fit the armature to the cover

10.7b On 1000 models, fit the brushes to the brush plate and refit the plate to the starter body, aligning its tab with the groove in the body. Hook the brush retaining springs over the end of their holders and push the brushes fully into the holders. Install the armature in the body then push all brush springs back into position ensuring that each spring is correctly seated. Apply a small amount of grease to the rear cover bush and refit the shims to the rear of the commutator using the notes made on disassembly for correct position. On all models, fit the O-rings to the motor body then fit the body to the rear cover ensuring that its slot aligns with the brush plate pin (see illustration). Retfit the shims to the front of the armature, ensuring they are correctly positioned and fit the toileted washer to the front cover so that its teeth locate with the ribs in the cover (see illustrations). Grease the lips of the front cover oil seal and carefully fit the cover making sure that the spinners of the starter shaft are still taped over. Check that the O-rings, plate and washers (as applicable) are still fitted to the starter motor screws then rotate the front cover until the fine cast on its side aligns with that on the rear cover, install the screws and tighten them securely (see illustrations).

10.8a Do not omit the O-rings from the starter motor body

10.8b Fit the body to the rear cover as described in text

10.8c Ensure shims are fitted in their original positions

10.8d Fit the toileted washer to the front cover

10.8e ... and fit the cover to the body so that the index marks (arrowed) align

10.8f Install the starter motor screws and tighten them securely

Note: If any have worn beyond the service limit, renew. At no time is there a continuity (high resistance) that is indicated. Set the motor to the K ohm scale and measure the resistance between the terminals and cover or body (as applicable). If continuity exists, it is likely that the insulation has broken down at some point. If this is the case, remove the terminal bolt retaining nut, followed by all the washers. Make a careful note of how these washers are arranged as a guide to reassembly. Examine the insulating washers for cracks or other damage and renew them if necessary. Note that although they are not listed as being available separately, suitable replacements can be purchased from most automotive suppliers. Also check for continuity between the positive brush holder and brush plate, if continuity exists the brush plate must be renewed.

Clean the commutator segments and grooves with a rag moistened with a high flash point solvent. Check for any longer segments. With a suitable tool, remove any segments of commutator segments that are still attached. Check the condition of the armature windings using a millimeter set to the ohms x 1 scale. Check the resistance between various pairs of commutator segments. If a high resistance is shown between any two segments, one of the windings is open-circuit and the starter motor should be renewed. Set the motor to the K ohm scale and measure the resistance between each commutator segment and the armature shaft. If continuity (high resistance) should be present, continuity will indicate a short between the commutator and shaft and will necessitate starter motor renewal.

If oil is found in the starter motor assembly, the seal pressed into the front cover is faulty and must be renewed (see illustration). However, this seal is not listed as a separate part and is only available as part of the complete starter motor assembly. The same applies to the needle roller bearing fitted behind the seal. To avoid unnecessary expense, it is worth contacting an automotive parts supplier, who may be able to supply a suitable substitute. Ensure that all the relevant seal or bearing markings are quoted so that the correct item is selected. If necessary, take the old components along to use as a pattern.
10.2 Apply small amount of oil to the starter motor O-ring. Refit the motor to the engine until its mounting bolts are tighten securely. (see Illustration). Note: On 600 models do not forget to fit the earth (ground) lead to one of the starter motor mounting bolts. Refit the lead to the starter motor terminal and tighten its retaining nut securely. Ensure the rubber cap is correctly fitted to the terminal bolt. On 1000 models install the carbon brushes as described in Chapter 4, and on all models refit the disturbed facing sections. Reconnect the battery.

11. Oil pressure warning lamp - circuit - testing

The circuit consists of a pressure switch, which illuminates a warning lamp in the instrument panel whenever the ignition is switched on. As soon as the engine is started, and the oil pressure rises above a certain point, the lamp should go out. On 600 models, the pressure switch is located on the top right of the crankcase, just behind the engine number. On 1000 models it can be found on the right side of the crankcase, just behind the oil pressure sensor.

12. Switches - general

1. While the switches should give little trouble, they can be tested using a continuity tester as described in Section 2. Using the information given in the wiring diagrams at the end of this Manual, check that full continuity exists in all switch positions and between the relevant pairs of wires. When checking a particular circuit follow a logical sequence to eliminate the switch concerned.

2. Always disconnect the battery (negative lead first) before removing any of the switches to prevent the possibility of a short-circuit. Most troubles are caused by dirty contacts, which can be cleaned, but in the event of breakdowns, it will be necessary to renew the complete switch.

3. If a switch is tested and found to be faulty, there is nothing to be lost by attempting a repair. It may be that worn contacts can be cleaned and when reassembled the switch will perform satisfactorily. A modified switch can be used as a replacement. The handwheel switches may be dismantled to a certain extent, it is however up to the owner to decide if they have the ability to carry out this sort of work.

4. While none of the switches require routine maintenance, some regular attention will prolong their life. The regular and constant application of a water-dispersant spray not only prevents problems occurring due to water-logged switches and the resulting corrosion, but also makes the switches much easier to operate. A good switch cleaner is Calcium. Alternatively, the switch may be packed with a silicone-based greas to achieve the same result.

13.2 Cooling fan switch is fitted to the left side of the radiator - 600 shown

13.5 Fan switch testing apparatus

14.1 Coolant temperature gauge sender unit is located in the thermostat housing - 1000 K models onwards shown

14.1 Coolant temperature gauge sender unit is located in the thermostat housing - 1000 K models onwards shown

1. In the event of a cooling fan fault, check first that the fan fuse is intact before proceeding as follows.

2. On 600 models remove the left side fairing cover and on 1000 models remove the left lower or side fairing section (as applicable). On all models disconnect the wire from the switch fitted to the left side of the radiator (see Illustration). Turn the ignition switch ON and earth (ground) the fan switch wire. As the wire is earthed (grounded) the fan should come on. If it does not, check that the fan switch is correct and test the fan. If the switch is defective and must be renewed, a more comprehensive test is described below in paragraph 4. If the fan does not come on, the fault lies in either the cooling fan motor or the associated wiring. The wiring can be tested as described in Section 2.

2. To test the cooling fan motor it is necessary to remove the radiator as described in Section 3. Using a 12 volt battery and two insulated auxiliary wires, connect the battery across the terminals of the cooling fan box connector. Once connected, the fan should operate. If not, the fan motor is faulty and must be renewed.

4. To test this fan switch, first slacken the switch using a suitable spanner. Unscrew the switch as far as possible, withdraw it from the radiator and plug the opening to prevent the coolant escaping. To test the switch a thermometer probe is required. The handwheel switch is similar to the thermostat and the instruction panel (see Illustration). If the system malfunctions check first that the battery is fully charged and that all fuses are in good condition.

5. To test the circuit, disconnect the wire from the water sender unit, then turn the ignition switch ON and OFF to secure water for one or two seconds. When the wire is earthed the needle should swing immediately over to the H position. If the needle does not swing immediately over to the H position. If the needle does not swing immediately over to the H position, the sender unit is faulty and must be renewed. Although a more comprehensive test is described below. If the needle’s movement is still faulty, or if it does not swing back to the 0 position, check the switch (see Illustration).

Note: No components should be allowed to touch the switch.

15. Fuel gauge circuit - testing (1000 models)

1. The circuit consists of the sender unit mounted in the thermostat housing and the gauge assembly mounted in the instrument panel (see Illustration). If the system malfunctions check first that the battery is fully charged and that all fuses are in good condition before testing the circuit as follows.

2. To test the circuit, disconnect the wire from the temperature sender unit, then turn the ignition switch ON and OFF to secure water for one or two seconds. When the wire is earthed the needle should swing immediately over to the H position. If the needle does not swing immediately over to the H position, the sender unit is faulty and must be renewed. Although a more comprehensive test is described below.

3. Remove the fuel tank as described in Section 4 of Chapter 4 and turn the ignition switch ON and OFF to secure water for one or two seconds. When the wire is earthed the needle should swing immediately over to the H position. If the needle’s movement is still faulty, or if it does not swing back to the 0 position, check the switch (see Illustration).

Note: The gauge can only be tested by the substitution of a new unit.

15.3 Fuel level sender unit is retained by a threaded nut on the wiring side of the block to the fuel tank. As the terminals are joined to the needle on the gauge should swing immediately over to the H position. If the needle does not swing immediately over to the H position. If the needle does not swing immediately over to the H position, the sender unit is faulty and must be renewed. Although a more comprehensive test is described below.

Caution: Do not join the terminals for any longer than is necessary to test the circuit. If the needle moves as described above, a sender unit fault is indicated and should be removed and tested as described in paragraph 3. If the needle’s movement is still faulty, or if it does not swing back to the 0 position, check the switch (see Illustration). Note: No components should be allowed to touch the switch.

Warning: It is essential that the fuel tank is retained with nuts and bolts, and that all fuses are in good condition before testing the circuit as follows.
16.1a Fuel pump is located behind the left side panel on 600 models

16.1b Fuel pump relay can be tested as described in text

16.2 Fuel pump and relay - testing (1000 H, J and all 600 models)

Warning: Petrol (gasoline) is extremely flammable, especially when in the form of vapour. Take all precautions to prevent the risk of fire and read through the Safety First Section of this Manual before carrying out the following procedure:

1. On 600 models the fuel pump is situated behind the left side panel and the relay is located beneath the fuel tank (see illustration). On 1000 H and J models the pump and relay can be found behind the rear side panel. If the system malfunctions, first ensure that the battery is fully charged and that all fuses are in good condition. Check all relevant wiring for signs of broken or chafed wires and corroded connections as described in Section 2 before carrying out the following procedure.

2. Ensure the ignition switch is turned OFF and disconnect the fuel pump outlet pipe from the fuel tap or joint (as appropriate).

3. Disconnect the fuel pump relay from the wiring loom and use an insulated auxiliary wire to connect the wiring to the battery (1000 models) or black and brown (1000 models) of the relay block connector. Connect the fuel outlet pipe over a suitable container and turn the fuel tap and then the ignition switch ON for a short while. When the ignition switch is ON fuel should be pumped out of the outlet pipe and into the container. If this is the case, the fuel pump is operating correctly and the relay is proving faulty. If the fuel does not flow from the outlet pipe, then the pump is defective and must be renewed.

4. It is also necessary to check that the pump is supplying a sufficient quantity of fuel to the carburettors. To do this place a graduated container of at least 200 cc beneath the disconnected outlet pipe and time the fuel tap and ignition switch ON for 5 seconds and then OFF again. Measure the quantity of fuel collected in the container. If this amount does not exceed 30 cc, the fuel pump flow rate is less than the service limit shown in the Specifications at the start of this Chapter the pump is defective and must be renewed.

17. Tachometer - testing

1. All models use an electronic tachometer operated off the ignition system. If the tachometer malfunctions, yet the ignition system is still operating correctly, first check that all fuses are in good condition before proceeding further.

2. On all models remove the instrument panel as described in Section 16 of Chapter 6 then disconnect the instrument block connectors. Connect a multimeter set to the volts scale between the black/brown (positive) and green (ground/earth) tachometer terminals on the harness side of the wiring, and turn the ignition ON. If battery voltage is shown this indicates that the power supply to the unit is correct. Using a multimeter set to the resistance (ohms) range check the yellow/white wire from the tachometer terminal to the connector of the spark unit for continuity. If continuity exists, the tachometer is proving defective and must be renewed.

3. On 1000 H models, disconnect the wire connectors from the instrument panel and ignition spark unit. Using a multimeter set to the resistance (ohms) range, check the yellow/green wire from the spark unit to the instrument panel for continuity. If the wiring is sound, the fault must lie in the spark unit or tachometer.

18. Turn signal relay - location and testing

1. On 600 models the turn signal relay is located behind the right side panel, behind the starter relay (see illustration). On 1000 H models the relay is situated under the seat cushion, on the right side of the machine behind the spark unit on 1000 H and J models, and on the left side of the machine on K models (see illustration).

2. If the turn signal lamps cease to function correctly, there may be several possible causes before the relay is suspected. First check that the fuses are intact and that the battery is fully charged. Check that the turn signal lamps are securely mounted and that their connections are clean and tight. Check that the bulbs are all of the correct wattage and that corrosion has not developed on the bulbs or in their holders. Any such corrosion must be thoroughly cleaned off to ensure proper bulb contact. Also check that the turn signal switch is functioning correctly and that the wiring is in good order.

3. Faults in any of the above items will produce symptoms for which the turn signal relay may be unfairly blamed. If the fault persists even after the preliminary checks have been made the relay is at fault and must be renewed. The condition of the relay can only be assessed by substitution, no test details being available.

19. Horn - location and testing

1. The horn is either mounted onto the bottom triple clamp (fork) or onto one of the radiator mounting bolts, depending on the model. If the horn fails to work, first check that the fuses are intact. Check that power is reaching the horns by disconnecting the wires and connecting them to a 12 volt bulb. Switch on the ignition and press the horn button. If the bulbs lights, the horn circuit is proven good and the horn is at fault. If not there is a fault in either the wiring or the horn button.

3. To test a horn, connect a fully-charged 12 volt battery directly to the horn itself using two insulated auxiliary wires. If the horn does not sound, a gentle tap on the outside of the horn may free the internal contacts. If this fails, the horn must be renewed; repairs are not possible.

20. Bulbs - renewal

Headlamp bulb and position lamp

Note: The headlamp bulb is of the quartz-halogen type with a conventional H4 fitting. Do not touch the bulb’s glass envelope as skin acids will shorten its service life. If the bulb is accidentally touched, it should be wiped carefully with a rag moistened with methylated spirit (woodstain remover) and allowed to dry before refitting.

1. On 600 models it will probably be necessary to remove the fairing to renew the headlamp bulb, however, some owners may find it possible to renew the bulb with the fairing in place by simply removing the inner covers. Due to the amount of work necessary to remove the fairing it is therefore recommended that an attempt be made to carry out the operation with the fairing on the machine. This applies equally to the parking lamp bulb in the case of UK models.

2. On 1000 H and J models access to the bulb can be gained once the right upper fairing inner cover has been removed. The 1000 K models onward are fitted with twin headlamp bulbs which can be reached once the instrument panel has been removed as described in Section 16 of Chapter 6.

3. On all models, to renew the bulb, disconnect the headlamp bulb connector and remove the rubber bulb cover, noting its correct position. Disengage the retaining spring clip from the headlamp unit and carefully withdraw the bulb. On installation, note that the bulb can only be fitted one way. Secure the bulb in position with the spring clip and fit the rubber bulb cover ensuring that it is fitted with the TOP mark uppermost and that it is correctly seated (see illustration).

Refit the headlamp connector. Check the headlamp beam setting as described in Chapter 1 before riding the machine.

1. On 600 models it will probably be necessary to remove the fairing to renew the headlamp bulb, however, some owners may find it possible to renew the bulb with the fairing in place by simply removing the inner covers. Due to the amount of work necessary to remove the fairing it is therefore recommended that an attempt be made to carry out the operation with the fairing on the machine. This applies equally to the parking lamp bulb in the case of UK models.

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Refit the headlamp connector. Check the headlamp beam setting as described in Chapter 1 before riding the machine.

4. The position lamp bulbholder, fitted to UK models, is a push fit in the headlamp assembly (see illustration). The bulb is a bayonet fit in the holder and can be removed by pressing it in and turning it anticlockwise.

Turn signal lamps

1. On 600 models the front turn signal lamps can be accessed from beneath the upper fairing section (see illustration). On 1000 H and J models it will be necessary to remove the upper fairing inner covers, and on K, L, M, N models the instrument panel must first be removed as described in Section 16 of Chapter 6. On 1000 P models onward, remove the maintenance cover from the upper fairing section and the signal lamps can be accessed from beneath the upper fairing section.
8.14 Electrical system

faing (see illustration 19.24a in Chapter 6);
reach inside the fairing for access to the turn
signals.
7. On all models, remove the bulb holder from
the back of the lamp by turning it
anticlockwise (counterclockwise). The can
then be removed by pressing it in and turning
it anticlockwise (counterclockwise). The bulb
is installed by a reversal of the removal
procedure.
8. To renew the rear turn signal bulbs, remove
the screw from the back of the turn signal
lamp and lift off the lens (see illustration).
The bulb can then be removed from the lamp
by pressing it in and turning it anticlockwise
(counterclockwise) (see illustration). On
installation ensure that the rubber lens gasket
is correctly positioned and refit the lens. Avoid
overtightening the lens retaining screw as the
lenses are easily damaged.

Instrument panel bulbs

9. Remove the instrument panel from the
machine as described in Section 16 of
Chapter 6. All instrument panel bulbs are of
the capless type, being pressed into their
holders, which are also a push fit in the
underside of the instrument panel (see
illustrations). Be careful not to damage the
bulbs' delicate wire terminals when removing
or installing.

20.8a Rear turn signal lenses are retained
by a single screw . . .

20.8b . . . and bulbs are a bayonet fit

20.9a Instrument panel bulb holders are a
push fit in the panel . . .

20.9b . . . and the bulbs are of the capless
type
Dimensions and Weights

**CBR600 models**

<table>
<thead>
<tr>
<th>Model</th>
<th>Length (mm)</th>
<th>Height (mm)</th>
<th>Wheelbase (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>US H, J, K models</td>
<td>2000 (78.7 in)</td>
<td>1110 (43.7 in)</td>
<td>1410 (55.5 in)</td>
<td>180 (397 lb)</td>
</tr>
<tr>
<td>US L model*</td>
<td>2000 (78.7 in)</td>
<td>1110 (43.7 in)</td>
<td>1410 (55.5 in)</td>
<td>180 (397 lb)</td>
</tr>
<tr>
<td>UK H, J models</td>
<td>2000 (78.7 in)</td>
<td>1110 (43.7 in)</td>
<td>1410 (55.5 in)</td>
<td>180 (397 lb)</td>
</tr>
<tr>
<td>UK K, L models</td>
<td>2000 (78.7 in)</td>
<td>1110 (43.7 in)</td>
<td>1410 (55.5 in)</td>
<td>166 (365 lb)</td>
</tr>
</tbody>
</table>

*Kiweights increase by 7 - 9 kg (15.4 - 19.8 lb) on California models

Kerb weight:
- 199 kg (439 lb)
- 204 kg (449 lb)
- 205 kg (452 lb)
Dimensions and weights

<table>
<thead>
<tr>
<th>Model</th>
<th>H and J models</th>
<th>K, L, M, N models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length - US models</td>
<td>2200 mm (86.6 in)</td>
<td>2235 mm (88.0 in)</td>
</tr>
<tr>
<td>Length - UK models</td>
<td>2245 mm (88.4 in)</td>
<td>2235 mm (88.0 in)</td>
</tr>
<tr>
<td>Width</td>
<td>725 mm (28.5 in)</td>
<td>740 mm (29.1 in)</td>
</tr>
<tr>
<td>Height</td>
<td>1185 mm (46.7 in)</td>
<td>1200 mm (47.2 in)</td>
</tr>
<tr>
<td>Wheelbase</td>
<td>1555 mm (61.0 in)</td>
<td>1500 mm (59.1 in)</td>
</tr>
<tr>
<td>Ground clearance</td>
<td>135 mm (5.3 in)</td>
<td>135 mm (5.3 in)</td>
</tr>
<tr>
<td>Dry weight - US models*</td>
<td>224 kg (494 lb)</td>
<td>246 kg (542 lb)</td>
</tr>
<tr>
<td>Dry weight - UK models</td>
<td>222 kg (488 lb)</td>
<td>230 kg (513 lb)</td>
</tr>
<tr>
<td>Kerb weight - US models*</td>
<td>293 kg (645 lb)</td>
<td>269 kg (593 lb)</td>
</tr>
<tr>
<td>Kerb weight - UK models</td>
<td>248 kg (546 lb)</td>
<td>264 kg (582 lb)</td>
</tr>
</tbody>
</table>

*Weights increase by 1 - 3 kg (2.2 - 6.6 lb) on California models

CBR1000

<table>
<thead>
<tr>
<th>Model</th>
<th>P models onward</th>
<th>K, L, M, N models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>2235 mm (88.0 in)</td>
<td>2235 mm (88.0 in)</td>
</tr>
<tr>
<td>Width</td>
<td>740 mm (29.1 in)</td>
<td>740 mm (29.1 in)</td>
</tr>
<tr>
<td>Height</td>
<td>1215 mm (47.8 in)</td>
<td>1200 mm (47.2 in)</td>
</tr>
<tr>
<td>Wheelbase</td>
<td>1550 mm (61.0 in)</td>
<td>1500 mm (59.1 in)</td>
</tr>
<tr>
<td>Ground clearance</td>
<td>140 mm (5.5 in)</td>
<td>135 mm (5.3 in)</td>
</tr>
<tr>
<td>Dry weight - US models*</td>
<td>248 kg (546 lb)</td>
<td>264 kg (582 lb)</td>
</tr>
<tr>
<td>Dry weight - UK models</td>
<td>213 kg (465 lb)</td>
<td>237 kg (521 lb)</td>
</tr>
<tr>
<td>Kerb weight - US models*</td>
<td>271 kg (597 lb)</td>
<td>269 kg (593 lb)</td>
</tr>
<tr>
<td>Kerb weight - UK models</td>
<td>271 kg (597 lb)</td>
<td>269 kg (593 lb)</td>
</tr>
</tbody>
</table>

*Weights increase by 1 - 3 kg (2.2 - 6.6 lb) on California models

Tools and Workshop Tips

Buying tools

A toolkit is a fundamental requirement for servicing and repairing a motorcycle. Although there will be an initial expense in building up enough tools for servicing, this will soon be offset by the savings made by doing the job yourself. As experience and confidence grow, additional tools can be added to enable the repair and overhaul of the motorcycle. Many of the specialist tools are expensive and not often used so it may be preferable to hire them, or for a group of friends or motorcycle club to join in the purchase.

As a rule, it is better to buy more expensive, good-quality tools. Cheaper tools are likely to wear out faster and need to be renewed more often, nullifying the original saving.

Warning: To avoid the risk of a poor quality tool breaking in use, causing injury or damage to the component being worked on, always aim to purchase tools which meet the relevant national safety standards.

For more information about tools, refer to the Haynes Motorcycle Workshop Practice Textbook (Blk. No. 3470).

Manufacturer's service tools

Initially certain tasks require the use of a service tool. Where possible an alternative tool or method of approach is recommended, but sometimes there is no option if personal injury or damage to the component is to be avoided. Where required, service tools are referred to in the relevant procedure.

Service tools can usually only be purchased from a motorcycle dealer and are identified by a part number. Some of the commonly-used tools, such as rotor pullers, are available in aftermarket form from mail-order motorcycle tool and accessory suppliers.

Maintenance and minor repair tools

1. Set of flat-bladed screwdrivers
2. Set of Phillips head screwdrivers
3. Combination open-end and ring spanners
4. Socket set (3/8 inch or 1/2 inch drive)
5. Set of Allen keys or bits
6. Set of Torx keys or bits
7. Files, cutters and self-locking grips (Milwaukee grips)
8. Adjustable spanners
9. C-spanners
10. Tread depth gauge and tire pressure gauge
11. Cable rider clamp
12. Finger gauges
13. Spark plug gap measuring tool
14. Spark plug spanner or deep plug sockets
15. Wire brush and emery paper
16. Calibrated syringe, measuring vessel and funnel
17. Oil filter adapters
18. Oil filter wrench or tray
19. Pump type of can
20. Grease gun
21. Straight-edge and steel rule
22. Continuity tester
23. Battery charger
24. Hydrometer (for battery specific gravity check)
25. Anti-freeze tester (for liquid-cooled engines)
Repair and overhaul tools

Specialist tools

The workbench
- Work is made much easier by raising the bike up on a ramp - components are much more accessible if raised to waist level. The hydraulic or pneumatic types seen in the dealer's workshop are a sound investment if you undertake a lot of repairs or overhauls (see illustration 1.1).

- If raised off ground level, the bike must be supported on the ramp to avoid it falling. Most ramps incorporate a front wheel locating clamp which can be adjusted to suit different diameter wheels. When tightening the clamp, take care not to mar the wheel rim or damage the tire - use wood blocks on each side to prevent this.
- Secure the bike to the ramp using tie-downs (see illustration 1.2). If the bike has only a stand, and hence leans at a dangerous angle when raised, support the bike on an auxiliary stand.

- This auxiliary stand attaches to the swingarm pivot (see illustration 1.3).

1.3 This auxiliary stand attaches to the swingarm pivot

1.1 Hydraulic motorcycle ramp

1.4 Always use a block of wood between the engine and jack head when supporting the engine in this way

Fumes and fire
- Refer to the Safety first page at the beginning of the manual for full details. Make sure your workshop is equipped with a fire extinguisher suitable for fuel-related fires (Class B fire - flammable liquids) - it is not sufficient to have a water-filled extinguisher.
- Always ensure adequate ventilation is available. Unless an exhaust gas extraction system is available for use, ensure that the engine is run outside of the workshop.
- If working on the fuel system, make sure the workshop is ventilated to avoid a build-up of fumes. This applies equally to fume build-up when charging a battery. Do not smoke or allow anyone else to smoke in the workshop.

Fluids
- If you need to drain fuel from the tank, store it in an approved container marked as suitable for the storage of petrol (gasoline) (see illustration 1.5). Do not store fuel in glass jars or bottles.

1.5 Use an approved can only for storing petrol (gasoline)

What to do with old fluids
- Old cleaning solvent, fuel, coolant and oils should not be poured down domestic drains or onto the ground. Package the fluid up in old oil containers, label it accordingly, and take it to a garage or disposal facility. Contact your local authority for location of such sites or ring the oil care hotline.

Note: It is antibacterial and illegal to dump oil down the drain. To find the location of your local oil recycling bank, call this number free.

In the USA, note that any oil supplier must accept used oil for recycling.
2 Fasteners - Screws, bolts and nuts

Fastener types and applications

Bolts and screws
- Fastener head types are either of hexagonal, Torx or splined design, with internal and external variations of each type (see illustrations 2.1 and 2.2). Splined head fasteners are not in common use on motorcycle engines. The standard slotted or Phillips head design is used for certain screws. Bolt or screw length is always measured from the underside of the head to the end of the thread (see illustration 2.11).

2.1 Internal hexagon/Allen (A), Torx (B) and splined (C) fasteners, with corresponding bits

2.2 External Torx (A), splined (B) and hexagon (C) fasteners, with corresponding sockets

2.3 Plain washer (A), penny washer (B), spring washer (C) and serrated washer (D)
- The split-ring spring washer works by applying equal tension between the fastener head and component. If flattened, it is fatigued and must be renewed. If a flat (plain) washer is used, the fastener is driven into the fastener between the fastener and the plain washer.
- Serrated star type washers dig into the fastener and component faces, preventing loosening. They are often used on electrical ground connections to the frame.
- Cone type washers (sometimes called Belleville) are conical and when tightened apply axial tension between the fastener head and component. They must be installed with the distal side against the component and offer an OUTSIDE marking on their outer face. If flattened, they are fatigued and must be renewed.
- Tab washers are used to lock plain nuts or bolts on a shaft. A portion of the tab washer is bent up hard against one flat of the nut or bolt to prevent it loosening. Due to the tab washer being deformed in use, a new tab washer should be used every time it is disturbed.
- Wave washers are used to take up endfloat on a shaft. They provide light springing and prevent excessive side-to-side play of a component. Can be found on rocker arm shafts.

Nuts and split pins
- Conventional plain nuts are usually six-sided (see illustration 2.4). They are sized by thread diameter and pitch. High tensile nuts carry a number on one end to denote their tensile strength.

2.4 Plain nut (A), shouldered locknut (B), nylon insert nut (C) and castellated nut (D)

2.5 Bend split pin (cotter pin) arms as shown (arrow) to secure a castellated nut.

2.6 Bend split pin (cotter pin) arms as shown to secure a plain nut.

2.7 Correct fitting of R-pin.
- Arrow indicates forward direction

Circlets (see illustration 2.8)
- Circlets (or circlips) are used to retain components on a shaft in a housing and have corresponding external or internal ears to prevent removal. Parallel-sided (matched) circlips can be installed either way round in their grooves, whereas stamped circlips (which have a chamfered edge on one face) must be installed with the chamfer facing away from the direction of thrust load (see illustration 2.9).

2.8 External stamped circlip (A), internal stamped circlip (B), bent circlip (C) and wire circlip (D)

- Always use circlip pliers to remove and replace circlips; expand or compress them just enough to remove them. After installation, rotate the circlip in its groove to ensure it is securely seated. If installing a circlip on a spline shaft, always align its opening with a shaft channel to ensure the circlip ends are well supported and unlikely to catch (see illustration 2.10).

2.9 Correct fitting of a stamped circlip

2.10 Align circlip opening with shaft channel
- Circlips can wear due to the thrust of components and become loose in their groove. A wedge-shaped pliers (usually a circlip plier) is required for becoming dislodged in operation. For this reason, renewal is advised every time a circlip is disturbed.
- Wire circlips are commonly used as piston pin retaining clips. If a removal tang is provided, long nosed pliers can be used to dislodge them, otherwise careful use of a small flat-bladed screwdriver is necessary. Wire circlips should be renewed every time they are disturbed.

Thread diameter and pitch
- Diameter of a male thread (screw, bolt or stud) is the outside diameter of the threaded portion (see illustration 2.11). Most motorcycle manufacturers use the ISO (International Standards Organisation) metric system expressed in millimetres. eg: M6 refers to a 6 mm diameter thread. Sizing is the same for nuts, except that the thread diameter is measured across the valleys of the nut.
- Pitch is the distance between the peaks of the thread (see illustration 2.11). It is expressed in millimetres. Thus a common bolt size may be expressed as 50 x 1.0 mm (6 mm thread diameter and 1 mm pitch). Generally pitch increases in proportion to thread size, but there are always exceptions.
- Thread diameter and pitch are related for conventional fastener applications and the accompanying table can be used to cross-check (see illustration 2.11). Additionally, the AF (Across flats), spawner or socket size dimension of the bolt or nut (see illustration 2.11) is linked to thread and pitch specification. Thread pitch can be measured with a thread gauge (see illustration 2.12).

Sealed fasteners
- Corrosion of external fastenings due to water or reaction between two dissimilar metals can occur over a period of time. It will build up sooner in wet conditions or in countries where salt is used on the roads during the winter. If a fastener is severely corroded it is likely that normal methods of removal will fail and its head will be ruined. When you attempt removal, the fastener head should be heated to crack free and unscrew easily - if it doesn’t, stop there before damaging something.
- A sharp tap on the head of the fastener will often succeed in breaking free corrosion which has occurred in the threads (see illustration 2.13).

2.11 Fastener length (L), thread diameter (D), thread pitch (P) and head size (AF)

2.12 Using a thread gauge to measure pitch
- AF Size Thread diameter x pitch [mm]
  8 mm M5 x 0.8
  10 mm M6 x 1.0
  12 mm M8 x 1.25
  14 mm M10 x 1.25
  17 mm M12 x 1.25

2.13 A sharp tap on the head of a fastener will often break free a corroded thread.
2.14 Using an impact driver to free a fastener

2.16 Using a hammer and chisel to free a seized fastener

2.17 Using a stud extractor tool to remove a broken crankcase stud

2.18 Two nuts can be locked together to unscrew a stud from a component

2.19 When using a screw extractor, first drill a hole in the fastener...

2.20 ... then thread the extractor anti-clockwise into the fastener

2.21 Comparison of surface drive ring spanner (left) with 12-point type (right)

2.22 A thread repair tool being used to correct an internal thread

2.23 A thread repair tool being used to correct an external thread

2.24 Using a thread restorer file

2.25 To install a thread insert, first drill out the original thread...

2.26 ... then tap a new thread...

2.27 Install the matching insert tool...

2.28 ... and thread into the component...

2.29 ... break off the tang when complete

Tools and Workshop Tips

Caution: Remember that the component being secured is generally of more value than the bolt, nut or screw - when the fastener is freed, do not unscrew it with force, instead work the fastener back and forth when resistance is felt to prevent thread damage.

2.21 Comparison of surface drive ring spanner (left) with 12-point type (right)

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Tools and Workshop Tips

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Thread locking and sealing compounds

- Locking compounds are used in locations where the fastener is prone to loosening due to vibration or on important safety-related items which might cause loss of control of the motorcycle if they fail. It is also used where important fasteners cannot be secured by other means such as lockwashers or split pins.

- Before applying locking compound, make sure that the threads (internal and external) are clean and dry with all oil and compound removed. Select a compound to suit the component being secured - a non-permanent general locking compound that is suitable for most applications, but a high-strength type is needed for permanent fixing of studs in castings. Apply a drop or two of the compound to the first few threads of the fastener, then thread it into place and tighten to the specified torque. Do not apply excessive thread locking compound otherwise the thread may be damaged on subsequent removal.

- Certain fasteners are impregnated with a dry film type coating of locking compound on their threads. Always renew this type of fastener if it has been removed or as marked.

- Anti-sound compounds, such as copper-bonded greases, can be applied to protect threads from seizure due to extreme heat and corrosion. A common instance is spark plug threads and exhaust system fasteners.

Measuring tools and gauges

Feeler gauges

- Feeler gauges (or blades) are used for measuring small gaps and clearances (see illustration 3.1). They can also be used to measure and set the idle clearance of a component on a shaft where access is not possible with a dial gauge.

- Feeler gauge sets should be treated with care and not bent or damaged. They are engraved with their size on one face. Keep them clean and very lightly oiled to prevent corrosion build-up.

- When measuring a clearance, select a gauge which is a light sliding fit between the two components. You may need to use two gauges together to measure the clearance accurately.

Micrometers

- A micrometer is a precision tool capable of measuring to 0.01 or 0.001 of a millimetre. It should always be stored in its case and not in the general tool box. It must be kept clean and never dropped, otherwise its frame or measuring anvils could be distorted resulting in inaccurate readings.

- External micrometers are used for measuring outside diameters of components and have many more applications than internal micrometers. Micrometers are available in different size ranges, e.g. 25 to 50 mm, 25 to 500 mm, and upwards in 25 mm steps; some large micrometers have interchangeable anvils to allow a range of measurements to be taken. Generally the largest precision measurement you are likely to take on a motorcycle is the piston diameter.

- Internal micrometers (or bore micrometers) are used for measuring inside diameters, such as valve guides and cylinder bores. Telescoping gauges and small hole gauges are used in conjunction with an external micrometer, whereas the more expensive internal micrometers have their own measuring device.

External micrometer

- The conventional analogue type instrument is described. Although much easier to read, digital micrometers are considerably more expensive.

- Always check the calibration of the micrometer before use. With the anvils closed (2 to 25 mm type) or set over a flat gauge (for

3.2 Check micrometer calibration before use

The larger types the scale should read zero (see illustration 3.2); make sure that the anvil and test piece are clean first. Any discrepancy can be adjusted by referring to the instructions supplied with the tool. Remember that the micrometer is a precision measuring tool - don't force the anvils closed, use the ratchet (6) on the end of the micrometer to close it. In this way, a measured force is always applied.

- To use, first make sure that the item being measured is clean. Place the anvils of the micrometer (1) against the item and use the ratchet (6) to bring the spindle (3) tightly into contact with the other side of the item (see illustration 3.3). Don't tighten the spindle down because this will damage the micrometer - instead use the ratchet (6) on the end of the micrometer. The ratchet mechanism applies a measured force preventing damage to the instrument.

- The micrometer is read by referring to the linear scale on the sleeve and the annular scale on the thimble. Read off the sleeve first to obtain the base measurement, then add the fine measurement from the thimble to obtain the overall reading. The linear scale on the sleeve represents the measuring range of the micrometer (e.g. 0 to 25 mm). The annular scale on the thimble will be in graduations of 0.01 mm (or as marked on the face) - one full revolution of the thimble will move 0.5 mm on the linear scale. Take the reading where the datum line on the sleeve intersects the thimble's scale. Always position the eye directly above the scale otherwise an inaccurate reading will result.

- In the example shown the item measures 2.95 mm (see illustration 3.4):

<table>
<thead>
<tr>
<th>Linear scale</th>
<th>2.00 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear scale</td>
<td>0.95 mm</td>
</tr>
<tr>
<td>Annular scale</td>
<td>0.50 mm</td>
</tr>
<tr>
<td>Total figure</td>
<td>2.95 mm</td>
</tr>
</tbody>
</table>

3.4 Micrometer reading of 2.95 mm

Most micrometers have a locking lever (6) on the frame to hold the setting in place, allowing the item to be removed from the micrometer. Some micrometers have a vernier scale on their sleeve, providing an even finer measurement to be taken, in 0.001 increments of a millimetre. Take the sleeve and thimble measurement as described above, then check which graduation on the vernier scale aligns with that of the annular scale on the thimble. Note: the eye must be parallel to the scale when taking the vernier reading - if necessary rotate the body of the micrometer to ensure this. Multiply the vernier scale figure by 0.001 and add it to the base and fine measurement figures.

In the example shown the item measures 46.964 mm (see illustrations 3.5 and 3.6):  

| Linear scale (base) | 46.000 mm |
| Linear scale (vernier) | 0.960 mm |
| Annular scale (fine) | 0.004 mm |
| Value scale | 0.004 mm |
| Total figure | 46.964 mm |

3.5 Micrometer reading of 46.964 mm on linear and annular scales.

Internal micrometer

- Internal micrometers are available for measuring bore diameters, but are expensive and unlikely to be available for home use. It is suggested that a set of telescoping gauges and small hole gauges, both of which must be used with an external micrometer, will suffice for taking internal measurements on a motorcycle.

- Telescoping gauges can be used to measure internal diameters of components. Select a gauge with the correct size range, make sure its ends are clean and insert it into the bore. Expand the gauge, then lock its position and withdraw it from the bore (see illustrations 3.7 and 3.8). Measure across the gauge ends with a micrometer (see illustration 3.8).

- Very small diameter bores (such as valve guides) are measured with a small hole gauge. Once adjusted to a slip fit inside the component, its position is locked and the gauge withdrawn for measurement with a micrometer (see illustrations 3.9 and 3.10).

Vernier caliper

- The conventional linear scalevernier, slacker of the vernier clamp screws (1) and set the jaws open (2), so that the item is to be measured (see illustration 3.11). Slide the jaw into contact, using the thumbwheel (4) for fine movement of the sliding scale (5) then tighten the clamp screws (1). Read off the main scale (6) which is graduated in millimetres and fractions of a millimetre. Check the sliding scale (5) intersects it, taking the whole number to the left of the zero; this provides the basic measurement. Add the reading on the sliding scale and select the division which

3.9 Expand the small hole gauge in the bore, lock its position...

3.10... then measure the gauge with a micrometer

In use exactly as with any of the divisions on the main scale, noting that the divisions usually represents 0.02 of a millimetre. Add this fine measurement to the base measurement to obtain the total reading.
Plastigauge

- Plastigauge is a plastic material which can be compressed between two surfaces to measure the oil clearance between them. The width of the compressed Plastigauge is measured against a calibrated scale to determine the clearance.
- Common uses of Plastigauge are for measuring the clearance between crankshaft journal and main bearing inserts, between crankshaft journal and big-end bearing inserts, and between camshaft and bearing surfaces. The following example describes big-end oil clearance measurement.
- Handle the Plastigauge material carefully to prevent distortion. Using a sharp knife, cut a length which corresponds with the width of the bearing being measured and place it carefully across the journal so that it is parallel with the shaft (see illustration 3.18). Carefully install both bearing shells and the connecting rod. Without rotating the rod on the journal tighten its bolts or nuts (as applicable) to the specified torque. The connecting rod and bearings are then disassembled and the crushed Plastigauge examined.

Dial gauge or DTI (Dial Test Indicator)

- A dial gauge can be used to accurately measure small amounts of movement. Typical uses are measuring shaft runout or shaft endfloat (sideway) and setting piston position for ignition timing on two-stroke engines. A dial gauge set usually comprises with a range of different probes and adapters and mounting equipment.
- The gauge needs to be zeroed when at rest. Rotate the ring around its periphery to zero the gauge.
- Check that the gauge is capable of reading the extent of movement in the work. Most gauges have a small dial set in the face which records whole millimeters of movement as well as the fine scale around the face potentiometer which is calibrated in 0.01 mm divisions. Read off the small dial first to obtain the base measurement, then add the measurement from the fine scale to obtain the total reading.

In the example shown the gauge reads 1.48 mm (see illustration 3.17).
4. Torque and leverage

4.1 Torque wrench index mark to the setting required, in this case 12 Nm

4.2 Angle tightening can be accomplished with a torque-angle gauge...

4.3 ...or by marking the angle on the component

4.4 When slackening, work from the outside inwards

4.5 When tightening, work from the inside outwards

4.6 If you can't pull on the spanner to loosen a fastener, push with your hand open

4.7 Additional leverage is gained by extending the length of the lever. The best way to do this is to use a breaker bar and a regular length tool, or to slip a length of tubing over the end of the spanner or socket wrench.

4.8 If additional leverage is needed, the fastener head is either damaged or firmly corroded in place (see Fasteners).

4.9 The same equipment can be used to install bearings. Make sure the bearing housing is supported on wood blocks and line up the bearing in its housing. Fit the bearing as noted on removal - generally they are installed with their marked side facing outwards. Tap the bearing squarely into its housing using a driver or socket which bears only on the bearing's outer race - contact with the bearing balls/rollers or inner race will destroy it (see Illustrations 5.1 and 5.2).

5. Pullers and slide-hammers

5.1 Using a bearing driver against the bearing's outer race

5.2 Using a large socket against the bearing's outer race

5.3 This bearing puller clamps behind the bearing and pressure is applied to the shaft end to draw the bearing off.

6. Tools and Workshop Tips

6.1 Check for individual components for warpage, such as clutch plain (metal) plates, requires a perfectly flat plate or piece or plate and keyway grooves.

6.2 Installing the bolts/nuts in their correct location and secure them lightly. Their threads must be clean and free of any old locking compound. Unless specified the threads and flange should be dry - oiled threads are necessary in certain circumstances and the manufacturer will take this into account in the specified torque figure. Similarly, the manufacturer may also specify the application of thread-locking compound.

6.3 Tighten the fasteners in the specified sequence until the torque wrench clicks, indicating that the torque setting has been reached. Apply the torque again to double-check the setting. Where different diameter fasteners secure the component, as a rule tighten the larger diameter ones first.

6.4 When the torque wrench has been finished with, release the lock (where applicable) and fully back off its setting to zero - do not leave the torque wrench tensioned. Also, do not use a torque wrench for slackening a fastener.

6.5 Angle-tightening

6.6 Manufacturers often specify a figure in degrees for final tightening of a fastener. The usual practice is to tighten to a specific torque setting. A degree disc can be set and attached to the socket (see illustration 4.2) or a protractor can be used to mark the angle of movement on the bolt/nut head and the surrounding casting (see illustration 4.3).

6.7 Tightening sequences

6.8 If a component is held by more than one fastener it is important that the retaining bolt/nuts are tightened evenly to prevent uneven stress build-up and distortion of sealing faces. This is especially important on high-compression joints such as the cylinder head.

6.9 A sequence is usually provided by the manufacturer, either in a diagram or actually marked in the casting. If not, always start in the centre and work outwards in a cross criss cross pattern (see illustration 4.3). Start off by securing all bolts/nuts finger tight, then set the torque wrench and tighten each fastener by a small amount in sequence until the final torque is reached. By following this practice, the joint will be held evenly and will not be distorted. Important joints, such as the cylinder head and big-end fasteners, often have two- or three-stage torque settings.

6.9 A seating sequence is provided, work in the reverse of this, but do not work from the inside out, in a cross cross-sequence (see illustration 4.4).

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6.9 A seating sequence is provided, work in the reverse of this, but do not work from the inside out, in a cross cross-sequence (see illustration 4.4).
5.6 Expand the bearing puller so that it locks behind the bearing...

5.9 Drawofft component parts assembled on a suspension arm
1. Bolt or length of threaded bar
2. Nuts
3. Washer (external diameter greater than tubing internal diameter)
4. Tubing (internal diameter sufficient to accommodate ball)
5. Suspension arm with bearing
6. Tubing (external diameter slightly smaller than bearing)
7. Washer (external diameter slightly smaller than bearing)

5.7 ...attach the slide hammer to the bearing puller

5.8 Tapping a casing face down on wood blocks can often dislodge a bearing

5.10 Drawing the bearing out of the suspension arm
To extract the bearing/bush you will need a long bolt with nut or piece of threaded bar with two nuts, a piece of tubing which has an internal diameter larger than the bearing/bush, another piece of tubing which has an external diameter slightly smaller than the bearing/bush, and a selection of washers (see Illustrations 5.9 and 5.10). Note that the pieces of tubing must be of the same length, or longer, than the bearing/bush. The same kit (without the pieces of tubing) can be used to draw the new bearing/bush back into place (see Illustration 5.11).

5.11 Installing a new bearing (B) in the suspension arm

Temperature change
- If the bearing's outer race is a tight fit in the casing, the aluminium casing can be heated to release its grip on the bearing. aluminium will expand at a greater rate than the steel bearing outer race. There are several ways to do this, but avoid any localised extreme heat (such as a blow-torch) - aluminium have a low melting point.
- Approved methods of heating a casing are using a domestic oven (heated to 100°C) or immersing the casing in boiling water (see Illustration 5.12). Low temperature range localised heat sources such as a paint stripper heat gun or clothes iron can also be used (see Illustration 5.13). Alternatively, soak a rag in boiling water, wrap it round and wrap it around the bearing. 

5.12 A casing can be immersed in a sink of boiling water to aid bearing removal

5.13 Using a localised heat source to aid bearing removal

- If heating the whole casing note that plastic components, such as the neutral switch, may suffer - remove them beforehand.
- After heating, remove the bearing as described above. You may find that the expansion is sufficient for the bearing to fall out of the casing as under its own weight or with a light tap on the gear or socket.
- If necessary, the casing can be heated with a blowtorch. Always ensure the surrounding area is clear of flammable materials.

5.14 Shell bearings are either plain or grooved. They are usually identifiable by colour code (arrow)

5.15 Tapered roller bearing (A), needle roller bearing (B) and ball journal bearing (C)
- Shell bearings (often called inserts) are usually found at the crankshaft main and connecting rod big-end where they are good at coping with high loads. They are made of a phosphor-bronze material, and are impregnated with self-lubricating properties.
- Ball bearings and needle roller bearings consist of a steel inner and outer race with the balls or rollers between the races. They require constant lubrication by oil or grease and are good at coping with axial loads. Taper roller bearings consist of rollers set in a tapered cage set on the inner race, the outer race is separate. They are good at coping with axial loads and prevent movement along the shaft - a typical application is in the steering head.
- Bearing manufacturers produce bearings to ISO size standards and stamp one face of the bearing to indicate its internal and external diameter, load capacity and type (see Illustration 5.16).
- Metal bushes are usually of phosphor-bronze material. Rubber bushes are used in suspension mounting eyes. Fibre bushes have also been used in suspension pivots.

5.16 Typical bearing marking
- A bearing outer race has an impregnation number in the housing, the housing material is always damaged. You can see a bearing locking compound to bond the outer race in place if damage is not too severe.
- Shell bearings will fail due to damage of their working surface, as a result of lack of lubrication, corrosion or abrasive particles in the oil. (see Illustration 5.17). Small particles of dirt in the oil may shift in the bearing material whereas larger particles will score the bearing and shaft journals. If a number of short journeys are made, insufficient heat will be generated to drive off condensation which has built up on the bearings.

5.17 Typical bearing failures
- Ball and roller bearings will fail due to lack of lubrication or damage to the balls or rollers. Tapered roller bearings can be damaged by overloading them. Unless the bearing is seated on both sides, wash it in paraffin (kerosene) to remove all grease then allow it to dry. Make a visual inspection looking for dented balls or rollers, damaged cages and worn or pitted races (see Illustration 5.16.
- A ball bearing can be checked for wear by listening to it spin. Apply a film light oil to the bearing and hold it close to the ear - hold the outer race with one hand and spin the inner race with the other hand (see Illustration 5.18).

5.18 Hold outer race and listen to inner race when spun

5.19 Oil seal removal and installation
- Oil seals should be renewed every time a component is dismantled. This is because the seal lip will become set to the sewing surface and will not necessarily reseat.
- Oil seals can be prised out of position using a large flat-bladed screwdriver (see Illustration 6.1). In the case of crankcase seals, check first that the seal is not liped on the inside, preventing its removal with the crankcase joints.

6.1 Prise out oil seals with a large flat-bladed screwdriver

6.2 Oil seals

- New seals are usually installed with their marked face (containing the seal reference code) outwards and the spring side towards the inside of the bearing. In some cases, certain shafts are not retained. In these cases, a new shaft end oil seal must be used.
Tools and Workshop Tips

6.2 These oil seal markings indicate inside diameter, outside diameter and seal thickness.

7 Gaskets and seals

Types of gasket and sealant
- Gaskets are used to seal the mating surfaces between components and keep lubricants, fluids, vacuum, or pressure contained within the assembly. Aluminum gaskets are sometimes found at the cylinder joints, but most gaskets are paper-based. If the mating surfaces of the components being joined are undamaged, the gasket can be installed dry, although a dab of sealant or grease will be useful to hold it in place during assembly.
- RTV (Room Temperature Vulcanizing) silicone rubber sealants cure when exposed to moisture in the atmosphere. These sealants are good at fitting pins or irregular gasket faces, but will tend to be forced out of the joint under very high torque. They can be replaced to use a paper gasket, but first make sure that the width of the paper gasket is not essential to the sealing of internal components. RTV sealants should not be used on components containing petrol (gasoline).
- Non-hardening, semi-hardening and hard setting liquid gasket compounds can be used in a gasket or between a metal-to-metal joint. Select the sealant to suit the application: universal non-hardening sealant can be used on virtually all joints; semi-hardening on joint faces which are rough or damaged; hard setting sealant on joints which require a permanent bond and are subjected to high temperature and pressure. Note: Check first if the paper gasket has a bead of sealant impregnated in its surface before applying additional sealant.

- When choosing a sealant, make sure it is suitable for the application, particularly if being applied in a high-temperature area or in the vicinity of fuel. Certain manufacturers produce sealants in either clear, silver or black colours to match the finish of the engine. This has a particular application on motorcycles where much of the engine is exposed.

- Do not over-apply sealant. That which is squeezed out of the outside of the joint can be wiped off, whereas an excess of sealant on the inside can break off and clog oilways.

Breaking a sealed joint
- Age, heat, pressure and the use of hard setting sealant can cause two components to stick together so tightly that they are difficult to separate using finger pressure alone. Do not resort to using levers unless there is a pry point provided for this purpose (see illustration 7.1) or else the gasket surfaces will be damaged.
- Use a soft-faced hammer (see illustration 7.2) or a wood block and conventional hammer to strike the component near the mating surface. Avoid hammering against coolant passages since they may break off. If this method fails, try using a wood wedge between the two components.

Caution: If the joint will not separate, double-check that you have removed all the fasteners.

7.3 Paper gaskets can be scraped off with a gasket scraper tool...

7.1 If a pry point is provided, apply gentle pressure with a flat-loaded screwdriver.

7.2 Tap around the joint with a soft-faced mallet if necessary - don't strike cooling fins.

Removal of old gasket and sealant
- Paper gaskets will most likely come away complete, leaving only a few traces stuck on the sealing faces of the components. It is imperative that all traces are removed to ensure correct sealing of the new gasket.
- Very carefully scrape all traces of gasket away making sure that the sealing surfaces are not gouged or scored by the scraper (see illustrations 7.3, 7.4 and 7.5). Stubborn deposits can be removed by spraying with an aerosol gasket remover. Final preparation of the gasket surface can be made with very fine abrasive paper or a plastic kitchen scoucer (see illustrations 7.6 and 7.7).
- Old sealant can be scraped or peeled off components, depending on the type originally used. Note that gasket removal compounds are available to avoid scraping the components clean; make sure the gasket remover suit the type of sealant used.

8 Chains

Breaking and joining final drive chain
- Drive chains for all but small bikes are continuous and do not have a clip-type connecting link. The chain must be broken using a chain breaker tool and the new chain securely reconnected using a new soft rivet-type link. Never use a clip-type connecting link instead of a rivet-type link, except in an emergency. Various chain breaking and riveting tools are available, either as separate tools or combined as illustrated in the accompanying photographs - read the instructions supplied with the tool carefully.

Caution: Certain soft link pins (particularly on the larger chains) may require their ends to be filed or ground off before they can be pressed out using the tool.
- Check that you have the correct size and strength (hardened or heavy-duty) new soft link - do not reuse the old link. Look for the size marking on the chain sideplate (see illustration 8.10).
- Position the chain ends so that they are engaged over the rear sprocket. On an O-ring
8.11 Chain dimensions

Sizes commencing with a 4 (e.g. 428) have a pitch of 1/2 inch (12.7 mm).
Sizes commencing with a 5 (e.g. 525) have a pitch of 5/8 inch (15.9 mm).
Sizes commencing with a 6 (e.g. 630) have a pitch of 3/4 inch (19.1 mm).

- The second and third digits of the chain size relate to the width of the rollers, again in imperial units, e.g. the 525 shown has 5/16 inch (1.94 mm) rollers (see illustration 8.11).

9 Hoses

Clamping to prevent flow

- Small-bore flexible hoses can be clamped to prevent fluid flow whilst a component is worked on. Whichever method is used, ensure that the hose material is not permanently strained or damaged by the clamps.
  - A brake hose clamp available from auto accessory shops (see illustration 9.1).
  - A wingnut type hose clamp (see illustration 9.2).

9.3 ... two sockets and a pair of self-locking grips...

c) Two sockets placed each side of the hose and twist with straight-hand self-locking grips (see illustration 9.3).
d) Thick card each side of the hose held between straight-hand self-locking grips (see illustration 9.4).

9.10 Typical chain sizes and type marking

8.9 Pin end correctly riveted (A), pin end unriveted (B)

The rivet ends and two pieces of the wood between a G-clamp. Align the clamp to press the sideplate over the pin.

- Assemble the joining tools over one pin following the major instructions) and tighten the tool down to spread the pin securely (see illustrations 8.8 and 8.9). Do the same on the other pin.

Warning: Check that the pin ends are secure and that there is no danger of the sideplate coming loose. If the pin ends are cracked, the soft link must be renewed.

Final drive chain sizing

- Chains are sized using a three digit number, followed by a suffix to denote the chain type (see illustration 8.10). Chain type is either standard or heavy duty (thicker sideplates), and also unalloyed or O-ring type.
- The first digit of the number relates to the pitch of the chain, i.e. the distance from the centre of one pin to the centre of the next pin (see illustration 8.10). Pitch is expressed in eighths of an inch, as follows:

9.4 ... or thick card and self-locking grips

9.9 Cutting a coolant hose free with a sharp knife

9.3 ... a wingnut type hose clamp...

9.1 Hoses can be clamped with an automotive brake hose clamp...

9.2 Typical chain sizes and type marking
Motorcycle Chemicals and Lubricants

A number of chemicals and lubricants are available for use in motorcycle maintenance and repair. They include a wide variety of products ranging from cleaning solvents and degreasers to lubricants and protective sprays for rubber, plastic and vinyl.

- **Contact point/spark plug cleaner** is a solvent used to clean oily film and dirt from points, grie from electrical connectors and oil deposits from spark plugs. It is oil free and leaves no residue. It can also be used to remove gum and varnish from carburettor jets and other orifices.

- **Carburettor cleaner** is similar to contact point/spark plug cleaner but it usually has a stronger solvent and may leave a slight oily residue. It is not recommended for cleaning electrical components or connections.

- **Brake system cleaner** is used to remove grease or brake fluid from brake system components (where clean surfaces are absolutely necessary and petroleum-based solvents cannot be used); it also leaves no residue.

- **Silicone-based lubricants** are used to protect rubber parts such as hoses and grommets, and are used as lubricants for hinges and locks.

- **Multi-purpose grease** is an all purpose lubricant used wherever grease is more practical than a liquid lubricant such as oil. Some multi-purpose grease is coloured white and specially formulated to be more resistant to water than ordinary grease.

- **Gear oil** (sometimes called gear lube) is a specially designed oil used in transmissions and final drive units, as well as other areas where high friction, high temperature lubrication is required. It is available in a number of viscosities (weights) for various applications.

- **Motor oil**, of course. The lubricant specially formulated for use in the engine. It normally contains a wide variety of additives to prevent corrosion and reduce friction. Most motor oils come in various weights (viscosity ratings) of from 5 to 80. The recommended weight of the oil depends on the seasonal temperature and the demands on the engine. Light oil is used in cold climates and under light load conditions; heavy oil is used in hot climates and where high loads are encountered. Multi-viscosity oils are designed to have characteristics of both light and heavy oils and are available in a number of weights from 5W-20 to 10W-50.

- **Petrol additives** perform several functions, depending on their chemical makeup. They usually contain solvents that help dissolve gum and varnish that build up on carburettor and inlet parts. They also serve to break down carbon deposits that form on the inside surfaces of the combustion chambers. Some additives contain upper cylinder lubricants for valves and piston rings.

- **Brake and clutch fluid** is a specially formulated hydraulic fluid that can withstand the heat and pressure encountered in brake/clutch systems. Care must be taken that this fluid does not come in contact with painted surfaces or plastics. An opened container should always be ressealed to make sure the fluid remains uncontaminated by water or dirt.

- **Chain lubricants** are formulated especially for use on motorcycle final drive chains. A good chain lube should adhere well and have good penetrating ability. The lube should be effective as a lubricant inside the chain and on the side plates, pins and rollers. Most chain lubes are either the foaming type or quick drying type and are usually marketed for all types of chains.

- **Waxes and polishes** are used to protect painted and plated surfaces from the weather. Different types of paint may require the use of different types of waxes. Some waxes utilise a chemical or abrasive cleaner to help remove the top layer of oxidised (dull) paint on older vehicles. In recent years, many non-wax polishes (that contain a wide variety of chemicals such as polymers and silicones) have been introduced. These non-wax polishes are usually easier to apply and last longer than conventional waxes and polishes.

- **Degreasers** are heavy duty solvents used to remove grease and grime that may accumulate on engine and frame components. They can be sprayed on and left to dry for a few minutes before being removed with either water or solvent.

- **Solvents** are used alone or in combination with degreasers to clean parts and assemblies during repair and cleaning. The degreaser should use only solvents that are non-flammable and that do not produce irritating fumes.

- **Gasket sealing compounds** may be used in conjunction with gaskets, to improve their sealing capabilities, or alone, to seal metal-to-metal joints. Many gasket sealers can withstand extreme heat, some are impervious to petrol and lubricants, while others are capable of filling and sealing large cavities. Depending on the intended use, gasket sealers either dry hard or stay relatively soft and pliable. They are usually applied by hand, with a brush, or are sprayed on the gasket sealing surface.

- **Thread locking compound** is an adhesive locking compound that prevents threads fasteners from loosening because of vibration. It is available in a variety of types for different applications.

- **Moisture dispersants** are usually sprays that can be used to dry out electrical components such as the fuse block and wiring connectors. Some types can also be used as treatment for rubber and as a lubricant for hinges, cables and locks.

### Electrical System

- **Lights, turn signals, horn and reflector**
  - With the ignition on, check the operation of the following electrical components.
    - ✨ The MOT tester will perform a headlight beam height check using specialised beam setting equipment (see illustration 1). This equipment will not be available to the home mechanic, but if you suspect that the headlight is incorrectly set or may have been maladjusted in the past, you can perform a rough test as follows.
    - ✨ Headlight beam height setting equipment line up the wall central to the centreline of the motorcycle. Switch to dipped beam and check that the beam pattern falls slightly lower than the horizontal line and to the left of the vertical line (see illustration 3).
    - ✨ Check that the beam is continuous and of reasonable volume.

- **Headlight beam height**
  - ✨ Check that there is a red reflector on the rear of the machine, either mounted separately or as part of the tail light lens.
  - ✨ Check the condition of the headlight, tail light and turn signal lenses.

- **Windscreen**
  - ✨ Check that there is a red reflector on the rear of the machine, either mounted separately or as part of the tail light lens.
  - ✨ Check the condition of the headlight, tail light and turn signal lenses.
Exhaust System and Final Drive

- Check that the exhaust mountings are secure and that the system does not foul any of the rear suspension components.
- Start the motorcycle. When the revs are increased, check that the exhaust is neither holed nor leaking from any of its joints. On a linked system, check that the collector box is not leaking due to corrosion.

Final drive

- On chain or belt drive machines, check that the chain/sprocket is secure and that there is no excessive slack. Also check that the sprocket is securely mounted on the rear wheel hub. Check that the chain/belt guard is in place.
- On shaft drive bikes, check for oil leakage from the drive unit and fouling the rear tyre.

Steering and Suspension

- With the front wheel raised off the ground, rotate the steering from lock to lock. The headlight or sidestand must not contact the fuel tank or be close enough to trap the rider’s hand. Problems can be caused by damaged lock stops on the lower yoke and frame, or by the fitting of non-standard handliers.
- When performing the lock to lock check, also ensure that the steering moves freely, without drag or notchiness. Steering movement can be impaired by poorly routed cables, or by overtight head bearings or worn bearings. The tester will perform a check of the steering head bearing lower race by mounting the front wheel on a surface plate, then performing a lock to lock check with the weight of the machine on the lower bearing (see Illustration 4). Any play in the steering head bearings will be felt. Note that in extreme cases, wear of the front fork bushings can be misinterpreted for head bearing play.
- Check that the handlebars are securely mounted.
- Check that the handlebar grip rubbers are secure. They should be bonded to the bar end and to the throttle cable pulley on the right end.

Rear suspension

- With the motorcycle off the stand and an assistant supporting the motorcycle by its handlebars, bounce the rear suspension (see Illustration 9). Check that the suspension components do not foul on any of the cycle parts and check that the shock absorber(s) provide adequate damping.
- Visually inspect the shock absorber(s) and check that there is no sign of oil leakage from its damper. This is somewhat restricted on certain single shock models due to the location of the shock absorber.
- With the rear wheel raised off the ground, grasp the wheel at the highest point and attempt to pull it up (see Illustration 8). Any play in the swingarm pivot or suspension linkage bearings will be felt as movement. Note: Do not confuse play with actual suspension movement. Failure to lubricate suspension linkage bearings can lead to bearing failure (see Illustration 9).
- With the rear wheel raised off the ground, grasp the swingarm ends and attempt to move the swingarm from side to side and forwards and backwards - any play indicates wear of the swingarm pivot bearings (see Illustration 10).
Brakes, Wheels and Tyres

Brakes

✓ With the wheel raised off the ground, apply the brake then free it off, and check that the wheel is about to revolve freely without brake drag.
✓ On disc brakes, examine the disc itself. Check that it is securely mounted and not cracked.
✓ On disc brakes, view the pad material through the caliper mouth and check that the pads are not worn down beyond the limit (see Illustration 11).
✓ On drum brakes, check that the operation lever does not foul any other components.
✓ On disc brakes, examine the flexible hoses from top to bottom. Have an assistant hold the brake on so that the fluid in the hose is under pressure, and check that there is no sign of fluid leakage, bulges or cracking. If there are any metal brake探究 or unions, check that these are free from corrosion and damage. Where a brake-linked anti-dive system is fitted, check the hoses to the anti-dive in a similar manner.
✓ Check that the rear brake torque arm is secure and that its fasteners are secured by self-locking nuts or castellated nuts with splitpins or R-pins (see Illustration 13).
✓ On models with ABS, check that the self-check warning light in the instrument panel works.
✓ The MOT tester will perform a test of the motorcycle’s braking efficiency based on a calculation of rider and motorcycle weight. Although this cannot be carried out at home, you can at least ensure that the braking systems are properly maintained. For hydraulic disc brakes, check the fluid level, lever/pedal toe (length of air if toe springy) and pad material. For drum brakes, check adjustment, cable or rod operation and shoe lining thickness.

Wheels and Tyres

✓ Check the wheel condition. Cast wheels should be free from cracks and if of the built-up design, all fasteners should be secure. Spoked wheels should be checked for broken, corroded, loose or bent spokes.
✓ With the wheel raised off the ground, spin the wheel and visually check the tire and wheel run true. Check that the tire does not foul the suspension or mudguards.
✓ With the wheel raised off the ground, grasp the wheel and attempt to move it about the axle (spindle) (see Illustration 14). Any play felt here indicates wheel bearing failure.

General checks and condition

✓ Check the security of all major fasteners, body panels, seat, fairings (where fitted) and mudguards.
✓ Check that the rider and pillion footrests, handlebar levers and brake pedal are securely mounted.
✓ Check for corrosion on the frame or any load-bearing components. If severe, this may affect the structure, particularly under stress.

Sidecars

A motorcycle fitted with a sidecar requires additional checks relating to the stability of the machine and security of attachment and swivel joints, plus specific wheel alignment (toe-in) requirements. Additionally, tyne and lighting requirements differ from conventional motorcycle use. Enthusiasts are advised to check MOT test requirements with an official test centre.

If the tyre sidewall carries a direction of rotation arrow, this must be pointing in the direction of normal wheel rotation (see Illustration 16).
✓ Check that the wheel axle (spindle) nuts (where applicable) are properly secured. A self-locking nut or castellated nut with a splitpin or R-pin can be used (see Illustration 14).
✓ Wheel alignment is checked with the motorcycle off the stand and a rider seated. With the front wheel pointing straight ahead, two perfectly straight lengths of metal or wood and placed against the sidewalls of both tyres (see Illustration 15). The gap each side of the front tyre must be equidistant on both sides. Incorrect wheel alignment may be due to a cocked rear wheel (often as the result of poor chain adjustment) or an extreme case, a bent frame.
Preparing for storage

Before you start

If repairs or an overhaul is needed, see that it is carried out now rather than left until you want to ride the bike again.

Give the bike a good wash and scrub all dirt from its underside. Make sure the bike dries completely before preparing for storage.

Engine

- Remove the spark plugs and lubricate the cylinder bores with approximately a teaspoon of motor oil using a spout-type oil can (see illustration 1). Install the spark plugs. Crank the engine over a couple of times to coat the piston rings and bores with oil, if the bike has a kickstart, use this to turn the engine over. If not, flick the kill switch to the OFF position and crank the engine over. (See illustration 2. If the nature on the ignition system prevents the starter operating with the kill switch in the OFF position, remove the spark plugs and fit them back in their caps, ensure that the plugs are earthed (grounded) against the cylinder head when the starter is operated (see illustration 3). Warning: It is important that the plugs are earthed (grounded) away from the spark plug holes otherwise there is a risk of anodised fuel from the cylinders igniting.

On a single cylinder four-stroke engine, you can seal the combustion chamber completely by positioning the piston at TDC on the compression stroke.

- Drain the carburettor(s) or otherwise there is a risk of jets becoming blocked by gum deposits from the fuel (see illustration 4).

- If the bike is going into long-term storage, consider adding a fuel stabiliser to the fuel in the tank. If the tank is drained completely, corrosion of its internal surfaces may occur if left unprotected for a long period. The tank can be treated with a rust preventative especially for this purpose. Alternatively, remove the tank and pour half a litre of motor oil into it, install the filter cap and shake the tank to coat its internals with oil before draining off the excess. The same effect can also be achieved by spraying WD40 or a similar water-dispersant around the inside of the tank via its flexible nozzle.

- Make sure the cooling system contains the correct mix of antifreeze. Antifreeze also contains important corrosion inhibitors.

- The air intakes and exhaust can be sealed off by covering or plugging the openings. Ensure that you do not seal in any condensation; run the engine until it is hot.

- Check the electrolyte level and top up if necessary (conventional refillable batteries). Clean the terminals.

- Store the battery off the motorcycle and away from any sources of fire. Position a wooden block under the battery if it is to sit on the ground.

- Give the battery a trickle charge for a few hours every month (see illustration 7).

- Place the bike on its centrestand or an auxiliary stand which will support the motorcycle in an upright position. Position wooden blocks under the tyres to keep them off the ground and to provide insulation from damp. If the bike is being put into long-term storage, ideally both tyres should be off the ground; not only will this protect the tyres, but it will also ensure that no load is placed on the steering head or wheel bearings.

- Deflate each tyre by 5 to 10 psi, no more than the beads may unseat from the rim, making subsequent inflation difficult on tubeless tyres.

- Remove it from the bike in extreme cases of cold the battery may freeze and crack its case (see illustration 6).

- Lubricate all lever, pedal, stand and footrest pivot points. If grease nipples are fitted to the rear suspension components, apply lubricant to the pivots.

- Lubricate all control cables.

Cycle components

- Apply a wax product to all painted and plastic components. Wipe off any excess, but don't polish to a shine. Where fitted, clean the screen with soap and water.

- Coat metal parts with vaseline (petroleum jelly). When applying this to the fork tubes, do not compress the forks otherwise the seals will not seal with contact with the Vasoline.

- Apply a vinyl cleaner to the seat.

Storage conditions

- Aim to store the bike in a shed or garage which does not leak and is free from damp.

- Drape an old blanket or bedspread over the bike to protect it from dust and direct contact with sunlight (which will fade paint). This also hides the bike from prying eyes. Beware of tight-fitting plastic covers which may allow condensation to form and settle on the bike.

Getting back on the road

Engine and transmission

- Change the oil and replace the oil filter. If this was done prior to storage, check that the oil hasn’t emulsified - a thick whitish substance which occurs through condensation.

- Remove the spark plugs. Using a spout-type oil can, squat a few drops of oil into the cylinder(s). This will provide initial lubrication as the piston rings and bores come back into contact. Service the spark plugs, or fit new ones, and install them in the engine.

- Check that the clutch isn’t stuck on. The plates can stick together if left standing for some time, preventing clutch operation. Engage a gear and try rocking the bike back and forth with the clutch lever held against the handlebar. If this doesn’t work on cable-operated clutches, hold the clutch lever back against the handlebar with a strong elastic band or cable to a couple of hours (see illustration 8).

- If the spark plugs or silencer end(s) were blocked off, remove the bung or cover used.

- If the fuel tank was coated with a rust preventative, remove the bung or cover used.
Storage

preventative, oil or a stabiliser added to the fuel, drain and flush the tank and dispose of the fuel sensibly. If no action was taken with the fuel tank prior to storage, it is advised that the old fuel is disposed of since it will go off over a period of time. Refill the fuel tank with fresh fuel.

Frame and running gear

- Oil all pivot points and cables.
- Check the tyre pressures. They will definitely need inflating if pressures were reduced for storage.
- Lubricate the final drive chain (where applicable).
- Remove any protective coating applied to the fork tubes (stanchions) since this may well destroy the fork seals. If the fork tubes weren't protected and have picked up rust spots, remove them with very fine abrasive paper and refinish with metal polish.
- Check that both brakes operate correctly. Apply each brake hand and check that it’s not possible to move the motorcycle forwards, then check that the brake levers off again once released. Brake caliper pistons can stick due to corrosion around the piston head, or on the sliding caliper hypoid, due to corrosion of the slider pins. If the brake doesn’t free after repeated operation, take the caliper off for examination. Similarly drum brakes can stick due to a seized operating cam, cable or rod linkage.

Battery

- If the battery has been previously removal and given top up charge it can simply be reconnected. Remember to connect the positive cable first and the negative cable last.
- On conventional refillable batteries, if the battery has not received any attention, remove it from the motorcycle and check its electrolyte level. Top up if necessary then charge the battery. If the battery fails to hold a charge and a visual check show heavy white sulphation of the plates, the battery is probably defective and must be renewed. This is particularly likely if the battery is old. Confirm battery condition with a specific gravity check.
- On sealed (MF) batteries, if the battery has not received any attention, remove it from the motorcycle and charge it according to the information on the battery case - if the battery falls to hold a charge it must be renewed.

Starting procedure

- If a kickstarter is fitted, turn the engine over a couple of times with the ignition OFF to distribute oil around the engine. If no kickstarter is fitted, flick the engine kill switch OFF and the ignition ON and crank the engine over a couple of times to work oil around the upper cylinder components. If the nature of the ignition system is such that the starter won’t work with the kill switch OFF, remove the spark plugs, fit them back into their caps and earth (ground) their bodies on the cylinder head. Reinstall the spark plugs afterwards.
- Switch the kill switch to FLUK, operate the choke and start the engine. If the engine won’t start don’t continue cranking the engine - not only will this flatten the battery, but the starter motor will overheat. Switch the ignition OFF and try again later. If the engine refuses to start, go through the fault finding procedures in this manual. Note: If the bike has been in storage for a long time, old fuel or a carburettor blockage may be the problem. Gum deposits in carburettors can block jets - if a carburettor cleaner doesn’t prove successful the carburettors must be dismantled for cleaning.
- Once the engine has started, check that the lights, turn signals and horn work properly.
- Treat the bike gently for the first ride and check all fluid levels on completion. Settle the bike back into the maintenance schedule.

1 Starter motor problems
- Starter motor not working
- Starter motor rotates but engine does not turn over
- Starter motor and clutch function but engine will not turn over

2 Engine does not start when turned over
- No fuel flow to carburettor
- Fuel not reaching cylinder
- Engine flooding
- No spark at plug
- Weak spark at plug
- Compression low

3 Engine stalls after starting
- General causes

4 Poor running at idle and low speed
- Weak spark at plug or erratic firing
- Fuel/air mixture incorrect
- Compression low

5 Acceleration poor
- General causes

6 Poor running or lack of power at high speeds
- Weak spark at plug or erratic firing
- Fuel/air mixture incorrect
- Compression low

7 Knocking or pinking
- General causes

8 Overheating
- Firing incorrect
- Fuel/air mixture incorrect
- Lubrication insufficent
- Miscellaneous causes

9 Clutch operating problems
- Clutch slip
- Clutch drag

10 Gear selection problems
- Gear lever does not return
- Gear selection difficult or impossible
- Jumping out of gear
- Overselection

11 Abnormal engine noise
- Knocking or pinking
- Piston slap or rattling from cylinders
- Valve noise or tapping from cylinder head
- Other noises

12 Abnormal transmission noise
- Clutch noise
- Transmission noise

13 Exhaust smokes excessively
- White/Bluish smoke (caused by oil burning)
- Black smoke (caused by over-rich mixture)

14 Oil pressure warning light comes on
- Engine lubrication system failure
- Electrical system failure

15 Poor handling or roadholding
- Directional stability
- Steering bias to left or right
- Handklappro and/or oscillation
- Poor front fork performance
- Front fork judder when braking
- Poor rear suspension performance

16 Abnormal frame and suspension noise
- Front end noise
- Rear suspension noise

17 Brake problems
- Brake lips spongy or inoperative
- Brakes dragging
- Brake lever or pedal pulsates in operation
- Disc brake noise
- Brake induced fork judder

18 Electrical problems
- Battery dead or weak
- Battery overcharged
- Alternator failure
- Circuit failure
- Bulb blowing repeatedly
1 Starter motor problems

Starter motor not rotating
- Engine stop switch off.
- Fuse blown. Check the main fuse located on the starter relay.
- Voltage low. Switching on the headlamp and operating the horn will give a good indication of the charge level. If necessary recharge the battery from an external source.
- Neutral gear not selected.
- Faulty neutral indicator switch, clutch interlock switch or sidestand switch. Check the switch wiring and switches for correct operation.
- Starter switch defective. Check switch for continuity and connections for security.
- Engine stop switch defective. Check switch for continuity in "Run" position. Fault will be caused by insulin, wet or corroded switch contacts. Clean or renew as necessary.
- Starter button faulty. Check continuity of switch. Faults as for engine stop switch.
- Starter relay (solenoid) faulty. If the switch is functioning correctly a pronounced click should be heard when the starter button is depressed. This presumes that current is flowing to the solenoid when the button is depressed.
- Wiring open or shorted. Check first that the battery terminals are tight and corrosion free. Follow this by checking that all wiring connections are dry, tight and corrosion free. Check also for fused or breakers. Usually a wire may become trapped between two moving components, particularly in the vicinity of the steering head, leading to breakage of the internal core but leaving the softer but more resilient outer cover intact. This can cause intermittent intermittent or total power loss.
- Starter motor defective. A badly worn starter motor may cause high current drain from a battery without the motor rotating. If current is found to be reaching the motor, after checking the starter button and starter relay, suspect a damaged motor. The motor should be removed for inspection.

Starter motor rotates but engine does not turn
- Starter motor clutches defective. Suspect jammed or worn engagement rollers.
- Starter motor drive train. Inspect and renew component wherever necessary. Failure in this area is unlikely.

Starter motor and clutch function but engine will not turn over
- Engine seized. Block of the engine is always a result of damage to internal components due to lubrication failure, or component breakage resulting from abuse, neglect or old age. A seizing or partially seized component may go unnoticed until the engine has cooled down and an attempt is made to restart the engine. Suspect first securing of the valves, valve gear and the plunger, instantaneous seizure whilst the engine is running indicates component breakage. In either case major dismantling and inspection will be required.

2 Engine does not start when turned over

No fuel flow to carburetor
- No fuel or insufficient fuel in tank.
- Fuel tap lever position incorrectly selected.
- Faulty fuel pump (where fitted). Inspect as described in Chapter 6.
- Float chambers require priming after running dry.
- Float level cap air vent blocked. Usually caused by dirt or water.
- Clean the vent orifice.
- Float or filter blocked. Blockage may be due to accumulation of rust or paint flakes from the tank's inner surface or of foreign matter from contaminated fuel. Remove the tap and clean it and the filter. Look also for water droplets in the fuel.
- Fuel pipe blocked. Blockage of the fuel line is more likely to result from a kink in the line rather than the accumulation of debris.

Fuel not reaching cylinder
- Float chamber not filling. Caused by float needle or float sticks in up position. This may occur after the machine has been left standing for an extended length of time allowing the fuel to evaporate. When the controls to the engine is often left with carbon to a varnish-like substance. This condition may be worsened by corrosion and crystalline deposits produced prior to the total evaporation of contaminated fuel. Sticking of the float needle may also be caused by wear. In any case removal of the float chamber will be necessary for inspection and cleaning.
- Fuel tap in starting circuit, slow running circuit or jets. Blockage of these items may be attributable to debris from the fuel tank by-passing the filter system or to gumming up as described in paragraph 1. Water droplets in the fuel will also lock jets and passages. The carburetor should be dismantled for cleaning.
- Fuel level too low. The fuel level in the float chamber is controlled by float height. The float height may increase with wear or damage but will never reduce, thus a low float height is inherent rather than development.
- Check the float height and make any necessary adjustment.

Engine flooding
- Float valve needle worn or stuck open. A piece of rust or other debris may prevent correct seating of the needle against the seat thereby preventing an unrestricted flow of fuel. Similarly, a worn nozzle or needle seat will prevent valve closure. Dismantle the carburetor and clean the float bowl for clearing and, if necessary, renewal of the worn components.
- Worn level too high. The fuel level is controlled by the float height which may increase due to wear of the float needle, pivot pin or operating tang. Check the float height, and make any necessary adjustment. A leaking float will cause an increase in fuel level, and thus should be renewed.
- Cold starting mechanism. Check the choke (starter mechanism) for correct operation. If the mechanism jams in the 'On' position subsequent starting of a hot engine will be difficult.
- Blocked air filter. A badly restricted air filter will cause flooding. Check the filter and clean or renew as required. A collapsed inlet hose will have a similar effect.

3 Engine stalls after starting

General causes
- Improper cold start mechanism (choke) operation. Check that the speed tap lever is functioning smoothly and are correctly adjusted. A cold engine may not require application of an enriched mixture to start but initial may build without choke once firing. Likewise a hot engine may start with an enriched mixture but will stop almost immediately if the choke is inadvertently in operation.
- Ignition malfunction. See Section 2, "Spark plug at play."
- Carburetor incorrectly adjusted. Maladjustment of the mixture strength or idle speed may cause the engine to stop immediately after starting. See Chapter 4.
- Intake air leak. Check for security of the carburetor mounting and hose connections, and for cracks or splits in the hoses. Check also that the carburetor float is secure and that the vacuum gauge adaptor plugs are tight.

Weak spark at plug
- Ignition switch not on.
- Engine stop switch off.
- Fuel flow. Check fuel for ignition circuit. See wiring diagram.
- Battery voltage low. The current drain required by a starter motor is sufficiently high that an undercharged battery may not have enough space capacity to provide power for the ignition circuit during starting.
- Spark plug defective. A starter motor with worn brushes and a worn or dirty commutator will draw excessive amounts of current causing power starvation in the ignition system. See the preceding paragraph. Starter motor overhaul will be required.
- Spark plug failure. Clean the spark plugs thoroughly and reset their electrode gaps. Refer to the spark plug section in Chapter 1. If the spark plug shorts internally or has sustained visible damage to the electrodes, core or ceramic insulator it should be renewed. On rare occasions a plug that appears to spark vigorously will fail to do so when refitted to the engine and subjected to the compression pressure in the cylinder.
- Spark plug cap or high tension (HT) lead faulty. Check condition and security. Replace if deterioration is evident.
- Spark plug cap loose. Check that the spark plug cap fits securely over the plug and, when fitted, the screwed terminal on the plug end is secure.
- Shorting due to moisture. Certain parts of the ignition system are susceptible to shorting when the machine is ridden or parked in wet weather. Check particularly the area from the spark plug lead back to the ignition coil. A water dispersant spray may be used to dry out waterlogged components. Recurrence of the problem can be prevented by using an ignition sealant spray after drying out and cleaning.
- Ignition or stop switch shorted. May be caused by water, corrosion or wear. Water dispersant and contact cleaning spray may be used. If this fails to overcome the problem dismantling and visual inspection of the switches will be required.
- Shorting or open-circuit in wiring. Failure in any wire connecting any of the ignition components will cause ignition malfunction. Check all connections are clean and tight. Check the rings result from lack of use, or carbon deposits in the ring grooves. Broken rings result from over-revving, overheating or general wear. In either case a top-end overhaul will be required.

Compression low
- Spark plug loose. This will be self-evident on inspection, and may be accompanied by a hissing noise when the engine is turned over. Remove the plug and check that the threads in the cylinder head are not damaged. Check also that the plug sealing washer is in good condition.
- Cylinder head gasket leaking. This condition is often accompanied by a high pitched squeal from around the cylinder head and oil loss, and may be caused by insufficiently tightened cylinder head fasteners, a warped cylinder head or mechanical failure of the gasket material. Re-torquing the fasteners to the correct specification may seal the leak in some instances but if damage has occurred this course of action will provide, at best, only a temporary cure.
- Valve not seating correctly. The failure of a valve to seat may be caused by insufficient valve clearance, pitting of the valve face, carbon deposits on the valve seat or seizure of the valve stem or valve gear components. Valve spring failure will also prevent correct valve closure. Check the valves are clear of carbon deposits, correct for valve seating and re-adjusting.
- Cylinder, piston and ring wear. Compression pressure will be lost if any of these components are badly worn. Wear in one component is invariably accompanied by wear in another. A top-end overhaul will be required.
- Piston rings sticking or broken. Sticking of the piston rings may be caused by seizure due to lack of lubrication or heating as a result of poor or incorrect fuel composition. Severe pitting of the rings result from lack of use, or carbon deposits in the ring grooves. Broken rings result from over-revving, overheating or general wear. In either case a top-end overhaul will be required.

Weak spark at plug
- Feeble sparking at the plug may be caused by any of the faults mentioned in the preceding Section other than those items in the first 3 paragraphs. Check first the spark plugs, those being the most likely culprits.

Fuel contamination. Check for filter blockage by debris or water which reduces, but does not completely stop, fuel flow or blockage of this circuit in the carburetor by the same agents. If water is present it can often be seen as droplets in the bottom of the fuel bowl. Clean the filter and, where water is in evidence, drain and flush the fuel tank and float chamber.
- Air filter blocked or omitted. A blocked filter will cause an over-rich mixture. The omission of a filter will cause an excessively weak mixture. Both conditions will have a detrimental effect on carburation. Clean or renew the filter as necessary.
- Fuel filter cap air vent blocked - clean the vent orifice (except California models).
- Blown fuse. Refer to preceding Evaporative emission control system component - California models.
8 Overheating

Firing incorrect
- Spark plugs fouled, defective or misaligned. See Section 2 ‘No spark at plug’.
- Spark plug type incorrect. Refer to the Specifications and ensure that the correct plug type is fitted.
- Incorrect ignition timing. Timing that is far too advanced or far too much retarded will cause overheating. Check the ignition timing is correct.

Fuel/air mixture incorrect
- Slow speed mixture strength incorrect. Adjust pilot air screw.
- Main jet wrong size. The carburettor is jetted for sea level atmospheric conditions. For high altitudes, usually above 5000 ft, a smaller main jet will be required.
- Air filter badly fitted or omitted. Check that the filter element is in place and that the air filter casing cover is sealing correctly. Any leaks will cause a weak mixture.
- Induction air leaks. Check the security of the carburettor mountings and hose connections, and for cracks and splits in the hoses. Check also that the carburettor tops are secure and that the vacuum gauge adaptor plugs are tight.

Lubrication inadequate
- Engine oil too low. Not only does the oil serve as a lubricant by preventing friction between moving components, but it also acts as a coolant. Check the oil level and replenish.
- Engine oil contaminated. The lubricating properties of oil are lost slowly during use as a result of changes resulting from heat and other contamination. Always change the oil at the recommended interval.
- Engine oil of incorrect viscosity or poor quality. Always use the recommended viscosity and type of oil.
- Oil filter and relief valve blocked. Renew filter and clean the relief valve.

Miscellaneous causes
- Radiator fins clogged. A build-up of mud in the radiator matrix will decrease the cooling capabilities of the fins. Clean the radiator as required.

9 Clutch operating problems

Clutch slip
- No clutch lever freeplay (600 models). Adjust the clutch lever freeplay as described in Chapter 1.
- Inner cable slack. Adjust the freeplay as described in Chapter 1.
- Worn or damaged friction clutch plate. Replace the plate with a new one. Repair or replace as necessary.
- Excessive fluid in the reservoir (1000 models). Check the fluid level as described in (pre-road) checks.
- Friction plates worn or worn. Overhaul clutch assembly, renewing plates as a set if any are worn to or beyond the service limit.
- Plain plates worn. Overhaul clutch assembly renewing plates as a set if any exceed the service limit.
- Clutch springs broken or worn, Old or damaged. Clutch springs must be renewed. Replace the springs as a set.
- Clutch drum worn. To renew the drum, remove the clutch cover and renew the drum and bearings as described in Chapter 2.
- Insufficient fluid in reservoir (1000 models). Top up as described in Daily checks.
- Air in hydraulic fluid (1000 models). Bleed the system as described in Chapter 7.
- Clutch cylinder defective (1000 models). A worn or damaged piston will not return correctly. Overhaul clutch cylinder clutch components as described in Chapter 2.
- Clutch spring tension uneven. Usually caused by a sagged or broken spring. Check and replace springs as a set.
- Engine oil dehydrated. Badly contaminated oil and a heavy deposit of sludge and carbon on the piston will cause plate sticking. The oil recommended for this machine is of the dehydrated type, therefore it is unlikely that this problem will arise unless regular oil changes are neglected.
- Engine oil viscosity too high. Drag on the plates will result from the use of an oil with too high a viscosity. In very cold weather clutch drag may occur until the engine has reached normal operating temperature.
- Clutch centre and outer drum worn. Indentation by the plate tangs of the centre and drum will prevent easy plate disengagement. If the damage is light the affected areas may be dressed with a fine file. More pronounced damage will necessitate the renewal of the components.
- Clutch outer drum seized to the shaft. Lack of lubrication, severe wear or damage can cause the drum to seize to the shaft. Overhaul of the clutch may be necessary to repair the damage.
- Loose clutch nut. Causes drum and center misalignment, putting a drag on the engine. Engagement adjustment continually varies. Overhaul the clutch assembly.

7 Knocking or pinking

General causes
- Carbon build-up in combustion chamber. After a high mileage it has been found that a large accumulation of carbon may occur. This may go undetected and cause premature ignition of the fuel/mixture, in addition to the possibility of the spark plug becoming plugged. Cylinder head removal will be required to allow inspection and cleaning.
- Fuel, Incorrect. A low grade fuel, or one of poor quality may result in compression induced detonation. The fuel resulting in knocking and pinking (pinging) noises. Old fuel can cause similar problems. A too highly leaded fuel will reduce detonation but will accelerate deposit formation in the combustion chamber and may lead to early pre-ignition as described in the previous paragraph.
- Spark plug heat range incorrect. Incorrect pre-ignition can result from the use of spark plugs with too hot a heat range.
- Weak mixture. Overheating of the engine due to weak mixture can result in pre-ignition occurring according to the fuel resulting in knocking and pinking (pinging) noises. Old fuel can cause similar problems. A too highly leaded fuel will reduce detonation but will accelerate deposit formation in the combustion chamber and may lead to early pre-ignition as described in the previous paragraph.
- Intake air leak. See Section 3 ‘General causes’.
- Mixture strength incorrect. Adjust slow running mixture strength using pilot adjustment screw.
- Carburettor synchronization.
- Float jet or slow running circuit blocked. The carburettor should be removed and dismantled for thorough cleaning. Blow through all jets and air passages with compressed air to clear obstructions.
- Air cleaner clogged or omitted. Clean or fit air cleaner element as necessary. Check also that the element and air filter cover are correctly seated.
- Cold starting mixture (choke) in operation. Check that the choke has not been left on inadvertently and the operation is correct. Also check the operating cable freely.
- Fuel tank air vent obstructed - clean vent orifice (except California models).
- Malfunctioning evaporative emission control system component - California models.
- Valve clearance incorrect. Check, and if necessary, adjust the cam.

Compression loss
- See Section 2.

6 Poor running or lack of power at high speeds

Weak spark at plug or erratic firing
- See Section 4.
- HT lead insulation failure. Insulation failure of the HT lead and spark plug cap due to old age or damage can cause shorting when the engine is driven hard. This condition may be loss noticeable, or not noticeable at all at lower engine speeds.

Fuel/air mixture incorrect
- All items as for Section 4, with the exception of items 2 and 4.
- Main jet blocked. Debris from contaminated fuel, or from the fuel tank, and water in the fuel can block the main jet. Clean the fuel filter, the float chamber area, and if water is present, flush and refill the fuel tank.
- Main jet is the wrong size. The standard carburettor jetting is for sea level atmospheric pressure. For high altitudes, usually above 5000 ft, a smaller main jet will be required.
- Jet needle and needle jet worn. Those can be renewed individually but should be renewed as a pair. Renewal of both items requires partial dismantling of the carburettor.
- Air orifice holes blocked. Dissamble carburettor and use compressed air to blow out all air passages.
- Reduced fuel flow. A reduction in the maximum fuel flow from the fuel tank to the carburettor will cause fuel starvation, proportionate to the engine speed. Check for blockages through debris or a kinked fuel pipe.
- Vacuum diaphragm split. Renew.

Compression loss
- See Section 2.

5 Acceleration poor

General causes
- All items as for previous Section.
- Sticking carburettor piston.

4 Poor running at idle and low speed

Weak spark at plug or erratic firing
- Battery voltage low. In certain conditions low battery charge, especially when coupled with a badly sulphated battery, may result in misfiring. If the battery is in good general condition it should be recharged; an old battery suffering from sulphated plates should be renewed.
- Spark plugs fouled, faulty or incorrectly adjusted. See Section 2 or refer to Chapter 1.
- Spark plug cap or high tension lead shorting. Check the condition of both these items ensuring that they are in good condition and dry and the cap is fitted correctly.
- Spark plug type incorrect. Fit plugs of correct type and heat range as given in Specifications. In certain conditions a plug of hotter or colder type may be required for normal running.
- Ignition timing incorrect. Check the ignition timing statically and dynamically, ensuring that the advance is functioning correctly.
- Faulty Ignition HT coil. Partial failure of the coil internal insulation will diminish the performance of the coil. No repair is possible, a new component must be fitted.
- Faulty pulsar coil. Check the coil(s), referring to Chapter 5.
- Faulty spark unit. Check the spark unit as described in Chapter 5.

Fuel/air mixture incorrect
- Intake air leak. See Section 3 ‘General causes’.
- Mixture strength incorrect. Adjust slow running mixture strength using pilot adjustment screw.
- Carburettor synchronization.
- Float jet or slow running circuit blocked. The carburettor should be removed and dismantled for thorough cleaning. Blow through all jets and air passages with compressed air to clear obstructions.
- Air cleaner clogged or omitted. Clean or fit air cleaner element as necessary. Check also that the element and air filter cover are correctly seated.
- Cold starting mixture (choke) in operation. Check that the choke has not been left on inadvertently and the operation is correct. Also check the operating cable freely.
- Fuel tank air vent obstructed - clean vent orifice (except California models).
- Malfunctioning evaporative emission control system component - California models.
- Valve clearance incorrect. Check, and if necessary, adjust the cam.

Compression loss
- See Section 2.

3 Faulty spark unit. Check the spark unit as described in Chapter 5.
10 Gear selection problems

Jumping out of gear
- Defiant arm assembly worn or damaged. Wear of the arm and the cover with it leads to scuffing and breakage of the defiant arm and can cause inappropriate gear selection resulting in jumping out of gear. Renew the damaged components.
- Gear pinion worn or damaged. Rounding off the dog edges and the mating necessitates in adjacent pinion can lead to jumping out of gear due to poor alignment under load. Renew by grinding to shape and renewed. Attempting to repair the dogs is not recommended.
- Shift forks, gearshift drum and pinion grooves worn. Extreme wear of these interconnected items can occur after high mileages especially when lubrication has been neglected. The worn components should be renewed.
- Gear pinions, bushes and shafts worn. Renew the worn components.
- Bent gearshift shaft. Often caused by dropping the machine on the gear lever.
- Gear pinion tooth broken. Chipped teeth are usually caused by jumping out of gear once the gear has been selected fully; a tooth which is completely broken off, however, may cause problems in this respect and in any event will cause transmission noise.

Overselection
- Defiant arm worn or broken. Renew if damaged.

11 Abnormal engine noise

Knocking or pinking
- See Section 7.

Piston slap or rattling from cylinder
- Cylinder bore/piston clearance excessive. Resulting from wear, partial seizure or impregnation during overhaul. This condition can often be heard when the engine is under little or no load, particularly when power is just beginning to be applied. Reduction of the next correct oversize should be carried out and a new oversize piston fitted.
- Connecting rod bent. This can be caused by over-revving, trying to start a very badly fouled engine (resulting in a hydraulic lock in the cylinder) or by earlier mechanical failure such as a dropped valve at starting. A bent connecting rod are not attempting at straightening a bent connecting rod are not recommended. Careful inspection of the crankshaft should be made before renewing the damaged connecting rod.
- Piston pin, piston boss bore or small bearing wear or seizure. Excess clearance or partial seizure between normal moving parts of these items can cause continuous or intermittent tapping noises. Rapid wear or seizure is caused by lubrication starvation resulting from an insufficient engine oil level or oilway blockage.

Valve noise or tapping from the cylinder head
- Valve clearance incorrect. Adjust the clearances with the engine cold.
- Valve spring broken or weak. Renew the spring set.
- Camshaft or cylinder head worn or damaged. The camshaft lobes are the most highly stressed of all components in the engine and are subject to high wear if lubrication becomes inadequate. The bearing surfaces on the camshaft and cylinder head are also sensitive to a lack of lubrication. Lubrication failure due to blocked

12 Abnormal transmission noise

Clutch noise
- Clutch outer drum/fraction plate tang clearance excessive.
- Clutch outer drum/skiver clearance excessive.
- Clutch outer drum/thrust washer clearance excessive.
- Primary drive gear teeth worn or damaged.

Transmission noise
- Bearings or bushes worn or damaged. Renew the affected components.
- Gear pinions worn or chipped. Renew the gear pinions.
- Metal chips jammed in gear teeth. This can occur when pieces of metal from any failed component are picked up by a machining pinion. The condition will lead to rapid bearing wear or early gear failure.

13 Exhaust smokes excessively

White/blue smoke (caused by oil burning)
- Piston rings worn or broken. Breakage of wear or any ring, but particularly the oil control ring, will allow engine oil past the piston into the combustion chamber. Overhaul the cylinder barrel and piston.
- Cylinder cracked, worn or scored. These conditions can be caused by overheating, lack of lubrication, component failure or advanced normal wear. The cylinder barrel should be renewed or relined and the next oversize piston fitted.
- Valve guides worn or damaged. This can occur as a result of valve guide failure or old age. The emission of smoke is likely to occur when the throttle is closed rapidly after acceleration, for instance, when changing gear. Renew the valve seats and, if necessary, the valve guides.
- Valve guides worn. See the preceding paragraph.

Black smoke (caused by over-rich mixture)
- Air filter element clogged. Clean or renew the element.
- Mixture too rich due to large. Remove the float chambers to check for blockages.
14 Oil pressure warning light comes on

Engine lubrication system failure
- Engine oil defective. Oil pump shaft or locating pin sheared off from integral oil pump, or oil pump drive has been broken.
- Engine oil sludge clogged. Change oil filter and clean streamer grumer.
- Engine oil too low or too high. Inspect for leak or other problem causing low oil level and add recommended lubricant.
- Engine oil viscosity too low. Very old, thin oil, or an improper weight of oil. Change to recommended oil.
- Camshaft or journals worn. High wear causing drop in oil pressure. Replace camshaft and/or head. Abnormal wear could be caused by oil starvation.

15 Poor handling or roadholding

Directional instability
- Steering head bearing adjustment too tight. This will cause rolling or wearing at low speeds. Adjust the bearings.
- Steering head bearings worn or damaged. Correct adjustment of the bearing will prove impossible to achieve if wear or damage has occurred. Incorrect handling will occur including rolling or wearing at low speed and poor directional control at intermediate speeds. The steering head bearing should be dismantled for Inspection and renewed if required. Lubrication should also be carried out.
- Bearing races pitted or dented. Impact damage caused, perhaps, by an accident or rolling over a pot-hole can cause indentation of the bearing, usually in one position. This should be noted as notliness when the handlebars are turned. Renew and lubricate this bearing.
- Steering stem bent. This will occur only if the machine is subjected to a high impact such as hitting a kerb or a pot-hole. The lower triple clamp should be removed, do not attempt to straighten the stem.
- Front or rear tyre pressure too low.
- Front or rear tyre worn. Genera Instability, high speed wobbles and skipping over roughed roads indicates that tyre wear may be required. Tyre induced problems, in some machines, tire combinations, can occur even when the tire in question is by no means fully worn.
- Swingarm bearings worn. Difficulty in holding lane, particularly when cornering or when changing power settings indicates wear in the swingarm bearings. Failure of this form should be removed from the machine and the bearings renewed.
- Swingarm flexing. The symptoms given in the preceding paragraph will also occur. In fact, suitably tuned tires give rise to handling deficiencies. In this case a thorough check should be made of all frame and suspension items which affect stability.

Steering bias to left or right
- Handlebar vibration or oscillates.
- Tyres worn out of balance. Either condition, particularly in the front, will promote swirling of the fork assembly and thus the handlebars. A sudden onset of skidding can result if a balance weight has been displaced during a ride.
- Tyres badly positioned on the wheel rims. A mounted tire on each wheel is provided to assist visual verification that the tire is correctly positioned on the rim. A check can be made by rotating the tire; any misalignment will be immediately obvious.
- Wheel rims warped or damaged. Inspect the wheels for curvature.
- Swingarm bearings worn. Renew the bearings.
- Steering head bearings worn or damaged. Adjust the bearings.
- Loose fork component fasteners. Loose nuts and bolts holding the fork legs, wheel axle, mudguards or steering stem can promote slackness at the head. In addition, any fork mechanism that is slack and suspension should be checked lightened or occasionally to prevent dangerous looseness of components occurring.
- Poor fork performance
- Damaging fluid level incorrect. If the level fluid is too low or too poor suspension control will occur resulting in a general improvement of roadholding and a firm type suspension when cornering and braking. Too much or too little is unlikely to change the fork characteristics unless severe overfilling occurs when the fork action will become stiffer and oil seal failure may occur.
- Damping oil viscosity incorrect. The damping action of the fork is directly related to the viscosity of the damping oil. The lighter the oil used, the less will be the damping action imparted. For general use, use the recommended viscosity of oil, changing to a slightly higher or lower viscosity for special requirements. Overworked oil, or oil contaminated with water which has found its way past the seals, should be renewed to restore the correct damping performance and to prevent outbursting of the forks.

Front fork louder when braking (see also Section 17)
- Wear between the fork tubes and the fork sliders. Renewal of the slide faces will be required.
- Slack steering head bearings. Re-adjust the bearings.
- Worned brake disc; If irregular braking action occurs fork judder can be induced in those are normally serviceable forks. Renew the damaged brake components.

Poor rear suspension performance
- Rear shock absorber damper worn out or leaking. The damping performance of all shocks deteriorates. A brake vibration off with age is a gradual process and thus may not be immediately obvious. Indications of poor damping include hopping of the rear when cornering or braking, and a general loss of positive stability. See Chapter 4.
- Weak shock absorber spring. If the spring fatigues it will promote excessive pitching of the machine and reduce the ground clearance when cornering. Although replacement springs are available separately from the rear suspension damper unit it is probable that if spring fatigue has occurred the damper unit will also require renewal.
- Swingarm flexing or bearings worn. See (Directional instability).
- Bent shock absorber damper rod. This is likely to occur only if the machine is dropped or if the shock has been overused.

16 Abnormal frame and suspension noise

Front end noise
- Oil level too low. This can cause a ‘spurring’ sound and is usually accompanied by irregular fork action.
- Spring weak or broken. A clicking or scraping sound. Fork oil weight has been displaced during a ride.
- Steering head bearings loose or damaged. Clicks when braking. Check, adjust, or renew.

17 Brake problems

Brakes are spongy or ineffective
- Air in brake circuit. This is only likely to happen in service due to neglect in checking the fluid level or because a leak has developed. The problem should be identified and the brake system bled of air.
- Pads worn. Check the pad wear against the wear indicators provided and renew the pads if necessary.
- Contaminated pads. Cleaning pads which have been contaminated with oil, grease or brake fluid is unlikely to prove successful: the pads should be renewed.
- Pads glazed. This is usually caused by overheating. The surface of the pads may be roughened using glass-paper or a fine file.
- Brake fluid. On initial operation firm, but rapidly becomes spongy in use may be falling due to water contamination of the fluid. The fluid should be drained and then the system refilled and bled.
- Master cylinder seal failure. Wear or damage of master cylinder internal seals will probably result in loss of brake fluid. Overhaul the master cylinder.
- Cylinder seals. These will almost certainly be obvious by loss of fluid, a lowering of fluid in the master cylinder reservoir and contamination of the brake pads and caliper.
- Dust in reservoir/s. Clean and replace.
- Brake lever or pedal improperly adjusted. Adjust as described in Chapter 1.

Brakes drag
- Disc warped. The disc must be renewed.
- Caliper piston, caliper or pads corroded. The brake caliper assembly is vulnerable to corrosion due to water and dirt, and unless cleaned at regular intervals and lubricated in the factory at intervals, corrosion will occur.
- Piston seal deteriorated. The seal is designed to return the piston in the caliper to the retracted position when the brake is released. Wear or age can affect this function. The caliper should be overhauled if this occurs.
- Brake hose. Fault material separating from the backing plate due to wear or faulty manufacture. Renew the pads. Faulty installation of a pad will also cause dragging.
- Wheel axle bent. The axle may be straightened if no structural damage has occurred.
- Brake lever or pedal not returning. Check that the lever or pedal works smoothly throughout its operating range and does not stick on any adjacent cycle parts. Lubricate the pivot if necessary.
- Tab worn. Lengthen or renew. This is likely to occur only after impact in an accident. No attempt should be made to re-align the caliper; the bracket should be renewed.
- Secondary piston cylinder failure or incorrect pushrod length (1000 P models onward).
18 Electrical problems

Battery dead or weak
- Battery faulty. Battery life should not be expected to exceed 3 to 4 years, particularly where a starter motor is used regularly. Gradual sublimation of the plates and sediment deposits will reduce the battery performance. Plate and insulator damage can occur as a result of vibration. Complete power failure, or intermittent failure, may be due to a broken battery terminal. Lack of electrolyte will prevent the battery maintaining charge. Refer to Fault Finding Equipment for battery voltage and specific gravity checks.
- Battery loads making poor contact. Remove the battery loads and clean them and the terminals, removing all traces of corrosion and tarnish. Reconnect the loads and apply a coating of petroleum jelly to the terminals.
- Load excessive. If additional items such as spot lamps, are fitted, which increase the total electrical load above the maximum alternator output, the battery will fail to maintain full charge. Reduce the electrical load to suit the electrical capacity.
- Regular battery failure. Refer to Fault Finding Equipment for battery voltage and specific gravity checks.
- Alternator cells open-circuit or shorted. If the charging circuit is open-circuit or shorted. This may be caused by broken or damaged wiring, dirty connectors or a faulty ignition switch. The system should be tested in a logical manner.

Battery overcharged
- Rectifier/regulator faulty. Overcharging is indicated if the battery becomes hot or if it is noticed that the electrolyte level falls repeatedly between checks. In extreme cases the battery will boil causing corrosive gases and electrolyte to be emitted through the vent pipes.
- Battery wrongly matched to the electrical circuit. Ensure that the specified battery is fitted to the machine.

Total electrical failure
- Fuse blown. Check the main fuse. If a fault has occurred, it must be rectified before a new fuse is fitted.
- Battery faulty. Refer to Fault Finding Equipment for battery condition checks.

Bulbs blowing repeatedly
- Vibration failure. This is often an inherent fault related to the natural vibration characteristics of the engine and frame and is, thus, difficult to reduce. Modifications of the lamp mounting, to change the damping characteristics may help.
- Intermittent earth. Repeated failure of one bulb, particularly where the bulb is fitted directly to the generator, indicates that a poor earth exists somewhere in the circuit. Check that a good contact is available at each earth point in the circuit. Refer to Fault Finding Equipment for earth circuit checks.
- Reduced voltage. Voltage to the quartz halogen headlamp (bulb) should be maintained or, if the headlamp is permitted, or if earth fault is caused by a break in the system, resulting in the system's power capacity and ensure that all connection circuits are maintained clean and tight.

Checking engine compression
- Low compression will result in exhaust smoke, heavy consumption, poor starting and poor performance. A compression test will provide useful information about an engine's condition and if performed regularly, can give warning of trouble before any other symptoms become apparent.
- A compression gauge will be required, along with an adapter to suit the spark plug hole thread size. Note that the screw-in type gauge/adapter set up is preferable to the rubber cone type.
- Before carrying out the test, first check the valve clearances as described in Chapter 1. Run the engine until it reaches normal operating temperature, then stop it and remove the spark plugs, taking care not to scold your hands on the hot components.
- Install the gauge adapter and compression gauge in No. 1 cylinder spark plug hole (see illustration 1).
- All spark plugs must be earthed (grounded) against the cylinder head away from the plug holes otherwise there is a risk of atomized fuel escaping from the combustion chambers and igniting. As a safety precaution, cover the top of the valve cover with rags. Now turn the ignition switch ON and kill switch OFF, open the throttle fully and crank the engine over on the starter motor for a couple of revolutions until the gauge readings stabilize.
- After one or two revolutions the pressure should build up to a maximum figure and then stabilize. Take a note of this reading and on multi-cylinder engines repeat the test on the remaining cylinders.
- The correct pressures are given in Chapter 2 Specifications. If the results fall within the specified range and on multi-cylinder engines all are relatively equal, the engine is in good condition. If there is a marked difference between the readings, or if the readings are lower than specified, inspection of the top-studio components will be required.

Checking battery open-circuit voltage
- Warning: The gases produced by the battery are explosive - never smoke or create any sparks in the vicinity of the battery. Never allow the electrolyte to contact your skin or clothing - if it does, wash it off and seek immediate medical attention.
- A noticeable increase in pressure this confirms that the cylinder bore, piston rings, or the cylinder head gasket, worn valve seals, or poor valve seating.
- To distinguish between cylinder/piston wear and valve leakage, pour a small quantity of oil into the bore to temporarily seal the piston rings, then repeat the compression tests (see illustration 3). If the readings show...
Before any electrical fault is investigated the battery should be checked.

1. **You'll need a dc voltmeter or multimeter to check battery voltage.** Check that the leads are inserted in the correct terminals on the meter, red lead to positive (+) and black lead to negative (-). Incorrect connections can damage the meter.

2. A sound fully-charged 12 volt battery should produce between 12.3 and 12.6 volts across its terminals. (12.4 volts for a maintenance-free battery). On machines with a 6 volt battery, voltage should be between 6.1 and 6.3 volts.

3. 1. Set a multimeter to the 0 to 20 volts dc range and connect its probes across the battery terminals. Connect the meter's positive (+) probe, usually red, to the battery positive (i.e. terminal, followed by the meter's negative (-) probe, usually black, to the battery negative terminal (i.e. see Illustration 4).

4. If battery voltage is low below 10 volts on a 12 volt battery or below 5 volts on a six volt battery, charge the battery and test the voltage again. If the battery repeatedly goes flat, investigate the motorcycle's charging system.

**Checking battery specific gravity (SG)**

- Warning: The gases produced by the battery are explosive - never smoke or create any sparks in the vicinity of the battery. Never allow the electrolyte to contact your skin or clothing - if it does, wash it off and seek immediate medical attention.
- The specific gravity check gives an indication of a battery's state of charge.
- A hydrometer is used for measuring specific gravity. Make sure you purchase one which has a small enough hose to insert in the aperture of a motorcycle battery.
- Specific gravity is simply a measure of the electrolyte's density compared with that of water. Water has an SG of 1.000 and fully-charged battery electrolyte is about 26% heavier, at 1.260.
- Specific gravity checks are not possible on maintenance-free batteries. Testing the open-circuit voltage is the only means of determining their state of charge.
  1. To measure SG, remove the battery from the motorcycle and remove the filler cap. Draw some electrolyte into the hydrometer and note the reading (see Illustration 5).
  2. The reading should be in the region of 1.260 to 1.280. If SG is below 1.260 the battery needs charging. Note that SG will vary with temperature; it should be measured at 20°C (68°F). Add 0.007 to the reading for every 10°C above 20°C, and subtract 0.007 from the reading for every 10°C below 20°C. Add 0.004 to the reading for every 10°F above 60°F, and subtract 0.004 from the reading for every 10°F below 60°F.
  3. When the check is complete, rinse the hydrometer thoroughly with clean water.

**Checking for continuity**

- The term continuity describes the uninterrupted flow of electricity through an electrical circuit. A continuity check will determine whether an open-circuit situation exists.
- Continuity can be checked with an ohmmeter, multimeter, continuity tester or battery and bulb test circuit (see Illustrations 6, 7 and 8).

**Battery-powered continuity tester**

**Battery and bulb test circuit**

- **All of these instruments are self-powered by a battery, therefore the checks are made with the ignition OFF.**
- As a safety precaution, always disconnect the battery negative (-) lead before making checks, particularly if ignition switch checks are being made.
- If using a motor, select the appropriate ohms scale and check that the motor reads infinity (-). Touch the motor probes together and check that meter reads zero; where necessary adjust the motor so that it reads zero.
- After using a motor, always switch it OFF to conserve its battery.

**Switch checks**

1. **If a switch is at fault, trace its wiring up to the wiring connectors. Separate the wire connectors and inspect them for security and condition. A build-up of dirt or corrosion here will most likely be the cause of the problem - clean up and apply a water dispersant such as WD40.**

2. **If using a test meter, set the meter to the ohms x 10 scale and connect its probes across the wires from the switch.** (see Illustration 9). Simple ON/OFF type switches, such as brake light switches, only have two

**Continuity check of front brake light switch using a meter - note split pins used to access connector terminals**

**Continuity check of rear brake light switch using a continuity tester**

- A voltage check can determine whether current is reaching a component.
- Voltage can be checked with a dc voltmeter, multimeter set on the dc volts scale, test light or buzzer (see Illustrations 12 and 13). A meter has the advantage of being able to measure actual voltage.
- When using a meter, check that its leads are inserted in the correct terminals on the meter, red to positive (+), black to negative (-). Incorrect connections can damage the meter.
- A voltmeter (or multimeter set to the dc volts scale) should always be connected in parallel (across the load). Connecting it in series will destroy the meter.
- Voltage checks are made with the ignition ON.
Checking for voltage at the rear brake light power supply wire using a meter...

1. First identify the relevant wiring circuit by referring to the wiring diagram at the end of this manual. It is other electrical components share the same power supply (ie are fed from the same fuse), take note whether they are working correctly - this is useful information in deciding where to start checking the circuit.

2. If wiring a meter, check first that the meter leads are plugged into the correct terminals on the meter (see above). Set the meter to the dc volts range, a range suitable for the battery voltage. Connect the meter red probe (+ve) to the power supply wire and the black probe to a good metal earth (ground) on the motorcycle's frame or directly to the battery negative (-ve) terminal (see illustration 14). Battery voltage should be shown on the meter.

Checking the earth (ground)

- Earth connections are made either directly to the engine or frame (such as sensors, neutral switch etc) which only have a positive feed (+ve) or a separate wire into the earth circuit of the wiring harness. Alternatively a short earth wire is sometimes run directly from the battery negative (-ve) terminal to the motorcycle's frame.
- Corrosion is often the cause of a poor earth connection.
- If total failure is experienced, check the security of the main earth lead from the negative (-ve) terminal of the battery and also the main earth (ground) point on the wiring harness. If corroded, disconnect the connection and clean all surfaces back to bare metal.
- 1. To check the earth on a component, use an insulated jumper wire to temporarily bypass its earth connection (see illustration 16). Correct one end of the jumper wire between the earth terminal or metal body of the component and the other end to the motorcycle's frame.
- 2. If the circuit works with the jumper wire isolated, the original earth circuit is faulty. Check the wiring for open-circuits or poor connections. Clean up direct earth connections, removing all traces of corrosion and remake the join. Apply petroleum jelly to the join to prevent future corrosion.

Tracing a short-circuit

- A short-circuit occurs when current shorts to earth (ground) bypassing the circuit components. This usually results in a blown fuse.
- A short-circuit is most likely to occur where the insulation has worn through due to wiring chafing on a component, allowing a direct path to earth (ground) on the frame.

1. Remove any body panels necessary to access the circuit wiring.
2. Check that all electrical switches in the circuit are OFF. Then remove the circuit fuse and connect a test light, buzzer or voltmeter (just to the dc scale) across the fuse terminals. No voltage should be shown.

3. Move the wiring from side to side whilst observing the test light or meter. When the light goes out, buzzer sounds or meter shows voltage, you have found the cause of the short. It will usually shown up as discolored or burned insulation.
4. Note that the same test can be performed on just one component in the circuit, even the switch.

ABS (Anti-lock braking system) A system, usually electronically controlled, that senses incipient wheel lockup during braking and relieves hydraulic pressure at wheel which is about to skid.

Alternator Components suitable for the motorcycle, but not produced by the motorcycle manufacturer.

Alternator A hexagonal wrench which fits into a recessed hexagon hole.

Alternating current (ac) Current produced by an alternator. Requires converting to direct current by a rectifier for charging purposes.

Alternator Converts mechanical energy from the engine into electrical energy to charge the battery and power the electrical system.


Angle-tightening cylinder head bolts

Anti-freeze A substance usually ethylene glycol mixed with water, and added to the cooling system, to prevent freezing of the coolant in winter. Anti-freeze also contains chemicals to inhibit corrosion and the formation of rust and other deposits that would tend to clog the radiator and cool passages and reduce cooling efficiency.

Anti-dive System attached to the fork lower leg (sliders) to prevent fork dive when braking hard.

Anti-seize compound A coating that reduces the risk of seizing on fasteners that are subjected to high temperatures, such as exhaust clamp bolts and nuts.


Asbestos A natural fibrous mineral with high heat resistance, commonly used in the composition of brake friction materials. Asbestos is a health hazard and the dust created by brake systems should never be inhaled or ingested.

ATF Automatic Transmission Fluid. Often used in beef tanks.

ATU Automatic Tiering Unit. Mechanical device for advancing the ignition timing on early engines.

ATV All Terrain Vehicle. Often carries a Quad. Axial play Sideslip at the wheel. Axle A shaft on which a wheel revolves. Also known as a spindle.

Catalytic Converter A device in the exhaust system of some machines which converts certain pollutants in the exhaust gases into less harmful substances.

Cash drive rubber damper out transmission shocks

Circuitry A ring-shaped clip used to prevent movement of cylindrical parts and shafts. An internal circlip is installed in a groove in an external circlip to fit into a groove on the outside of a cylindrical piece such as a shaft. Also known as a snap ring.

Clevis The amount of space between two parts. For example, between a piston and a cylinder, between a bearing and a bolt, etc.

Coil spring A spiral of steel field in various sizes throughout a vehicle, for example as an engine mounting in the suspension and in the valve train. Compression Reduction in volume, and increase in pressure and temperature, of a gas, caused by squeezing it into a smaller space.

Compression ratio The relationship between cylinder volume when the piston is at top dead centre and cylinder volume when the piston is at bottom dead centre.

Continuous The uninterrupted earth in the flow of electricity, little or no measurable resistance.

Crankcase Breather. Usually a breather or check valve, which at low rpm is open.

Crossed cylinder Type typically paired in a V-configuration, usually 90° or 120° apart, such as H94 or 651 in litre code sizes.

Cash drive Rubber damper segments fitted between the rear wheel and final drive sprocket to absorb transmission shocks (see illustration).

Cash drive Rubber dampers dampen out transmission shocks

Degree of degree (dc) Calibrated disc for measuring piston position. Expressed in degrees.

Direct current (dc) Current produced by a dc generator.

Duct gage Duct gage or gauge, used for measuring correct and piston position. Expressed in degrees.

Duct gage The main in an evaporative emission control system (California market only) contains activated charcoal granules to trap vapours from the fuel system rather than allowing them to vent to atmosphere.

Ducted Hemi (or ducted) Impaired air flow to the top of a cast iron wall. For example, a castellated type is called a side jet or spine jet.

Dynamic Convertor A device in the exhaust system of some machines which converts certain pollutants in the exhaust gases into less harmful substances.
Technical Terms Explained

Decarbonization: The process of removing carbon deposits typically from the combustion chamber, valves, and exhaust system parts.

Detonation: Ignition that proceeds abnormally and damaging fuel-air mixture in combustion chamber instead of controlled burning.

Diode (or rotary valve): A diode is a one-way electronic component that allows current to flow in one direction.

Disc valve (or rotary valve): A diode system used in combustion chambers.

Dished-overhead camshaft (DOHC): An engine that uses two overhead camshafts, one for the intake valves, and the other for the exhaust valves.

Drivetrain: A drivebelt used to transmit power to the rear wheels of a vehicle. A drivetrain has also been used to drive the camshafts, pistons, and other components in an engine.

Drive shaft: Any shaft used to transmit motion. Commonly used referring to the final transmission on an axle driving motorcycles.

Earth return: The return path of an electrical circuit, especially within the motorcycle frame.

ECU (Electronic Control Unit): A computer which controls components for ignition, electronic injection systems, etc.

Engage: To put the clutch on and start the engine.

End plate: A metal plate that is used to hold the end of a bearing or other component in place.

Endfloat: The amount of lengthwise movement between two components. As applied to a crankshaft, the distance that the crankshaft can move side-to-side in the crankcase.

Endless chain: A chain having no linking link. Common use for cam chains and other drive chain assemblies.

EP (Extreme Pressure) Oil: Type used in applications where high loads are applied, such as between gear teeth.

Evaporative control system: Describes a canister filled with charcoal which stores fuel vapours before allowing them to vent to the atmosphere. Usually only fitted to Californian motorcycles and referred to as an "EGR".

Expansion chamber: Section of two-stroke engine combustion chamber designed to improve engine efficiency and boost power.

Fleece blazer or gange: A thin strip of hardwoven material, ground to an exact thickness, used to check or measure clearance of parts.

Final drive: Description of the drive from the transmission to the rear wheel. Usually by chain, but sometimes by belt.

Firing order: The sequence in which the engine cylinders fire, or deliver their power strokes, beginning with the number one cylinder.

Flooding: Tame used to describe fuel level in the carburetor float chambers, leading to fuel overflow. Also refers to excess fuel in the combustion chamber due to incorrect starting techniques.

Free length: The free length of a component, such as a valve, when measured. Valve, spring, shims, and spring seats are measured at rest, with no load.

Freepoint: The amount of travel before any action takes place. Freepoint is often specified when a component is at rest, and then the actual point at which the component begins to move.

Fuel injection: The process of delivering fuel into the engine intake ports or directly into the cylinder head, allowing for a precise amount of fuel to be delivered.

Fuel/air mixture: The charge of fuel and air going into the engine.

Gasket: A thin, soft material, usually cork, cardboard, rubber, asbestos or soft metal - installed between two metal surfaces to ensure a good seal. For instance, the cylinder head gasket seals the joint between the block and the cylinder head.

Gear ratio: The ratio of the number of teeth on the input gear to the number of teeth on the output gear.

Glove box: A compartment located under the dash of a vehicle, used for storing personal items.

Grind: The process of removing the valve face and valve seat contact area in the cylinder head.

Gudgeon pin: The shaft which connects the connecting rod end-smear with the piston. Often called a pinion or wrist pin.

Helical gears: Gear teeth are slightly curved, allowing smooth and quiet gear ratios to cut down noise and wear for long life.

Lapping (or Grinding): A process of forming the exhaust gas oxygen content detector by abrasion.

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Magnetic field: A field produced by a magnet or electric current, used to detect or manipulate magnetic materials.

Materials: The properties of a material, such as its density, hardness, or magnetic properties, that determine its suitability for a particular application.

Mechanical structure: The physical arrangement of parts within an object, such as the frame and major components of a motorcycle.

Membrane: A thin, flexible material, often made of plastic or rubber, that is used to seal or configure a component.

Mittens: A pair of gloves, typically made of leather or rubber, worn on the hands to protect against cold weather.

Motorcycle frame: The metal or composite structure that supports the engine, fuel tank, and other components of a motorcycle, providing rigidity and stability.

Muffler: A component, typically made of metal, that is used to reduce the noise level of an engine's exhaust gases.

Nose: The front end of a vehicle, often housing the engine, and is designed to handle frontal impacts. Some motorcycles have an "nose" that is used to keep the front wheel from lifting off the ground.

Octane: A measure of a fuel's resistance to auto-ignition.

OEM (Original Equipment): Relates to components that are manufactured by the motorcycle manufacturer or another manufacturer and included in the motorcycle at the factory.

Optics: The science of light and its applications, including the design, production, and use of optical systems and devices.

Piston: A component, typically made of metal, that slides in the cylinder of an engine, converting the upward pressure of the expanding gases into a downward force to turn the crankshaft.

Piston rings: A set of three rings that seal the space between the piston and the cylinder wall, preventing the escape of combustion gases.

Patent: A legal grant by a government to an inventor, giving them the exclusive right to use, sell, and distribute an invention for a certain period of time.

Permeability: A measure of a material's ability to allow magnetic fields to pass through it.

Phase difference: The lag or lead of one waveform compared to another, indicating the time delay or lead of one signal relative to another.

Premix: The mixture of engine lubrication on older two-stroke engines. Engine oil is mixed with the petrol in the fuel tank in a specific ratio. The petrol reduces the viscosity and reduces the pressure difference caused by carbon build-up. Engine has tendency to run "dull".

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Pressure: A force applied uniformly over a surface, resulting in a measure of the force's effect on that area.

Radiator: A component, often made of metal, that is used to cool the engine by circulating coolant through it.

Ref: A reference or catalog number assigned to a component or system for identification purposes.

Resistance: A measure of how much a material opposes the flow of an electric current.

Reverse: The gear position where the motorcycle or car moves in the opposite direction.

RPM: Revolutions per minute, a measure of how many times a component rotates in a given time period.

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Preserving Our Motoring Heritage

Almost every car you've ever loved, loathed or desired is gathered under one roof at the Haynes Motor Museum. Over 300 immaculately preserved cars and motorcycles represent every aspect of our motoring heritage, from elegant reminders of bygone days, such as the superb Model J Duesenberg to curiosities like the bug-eyed BMW 7etta. There are also many old friends and flames. Perhaps you remember the 1059 Ford Popular that you did your courting in? The magnificent 'Red Collection' is a spectacle of classic sports cars including AC, Alfa Romeo, Austin Healey, Ferrari, Lamborghini, Maserati, MG, Riley, Porsche and Triumph.

A Perfect Day Out

Each and every vehicle at the Haynes Motor Museum has played its part in the history and culture of Motoring. Today, they make a wonderful spectacle and a great day out for all the family. Bring the kids, bring Mum and Dad, but above all, bring your camera to capture those golden memories for ever. You will also find an impressive array of motoring memorabilia, a comfortable 70 seat video cinema and one of the most extensive transport book shops in Britain. The Pit Stop Cafe serves everything from a cup of tea to wholesome, home-made meals or, if you prefer, you can enjoy the large picnic area nestled in the beautiful rural surroundings of Somerset.

The Museum is situated on the A359 Yeovil to Frampton road at Sparkford, just off the A303 in Somerset. It is about 40 miles south of Bristol, and 25 minutes drive from the M5 intersection at Taunton. Open 9.30am - 5.30pm (10.00am - 4.00pm Winter) 7 days a week, except Christmas Day, Boxing Day and New Years Day. Special rates available for schools, coach parties and outings. Charitable Trust No. 292948

Spark Plugs Condition Chart

Electrode gap check - use a wire type gauge for best results.

Electrode gap adjustment - bend the side electrode using the correct tool.

Normal condition - A brown, tan or grey firing and indicates that the engine is in good condition and that the plug type is correct.

Ash deposits - Light brown deposits encrusted on the electrodes and insulator, leading to misfire and hesitation. Caused by excessive amounts of oil in the combustion chamber or poor quality fuel/oil.

Carbon fouling - Dry, black sooty deposits leading to misfire and weak spark. Caused by an over-rich fuel/air mixture, faulty choke operation or blocked air filter.

Oil fouling - Wet oily deposits leading to misfire and weak spark. Caused by oil leakage past piston rings or valve guides (4-stroke engine), or excess lubricant (2-stroke engine).

Overheating - A blistered white insulator and glazed electrodes. Caused by ignition system fault, incorrect fuel, or cooling system fault.

Worn plug - Worn electrodes will cause poor starting in damp or cold conditions and will also waste fuel.
<table>
<thead>
<tr>
<th>Model CBR1000F</th>
<th>SC21</th>
<th>SC24</th>
<th>SC24 – 98KM</th>
<th>SC30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silnik</td>
<td>Czterosuwowy R4, chłodzony cieczą, rozrząd DOHC, 16 zaworów, wałek wyrównowawiający, wał korbowy podparty w 6 punktach, st. Sprężania 10,5:1, średnica cylindra / skok tłoka 77mm/53,6mm, pojemność skokowa 998 cm³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moc maks.</td>
<td>129 KM</td>
<td>132 KM</td>
<td>98 KM</td>
<td>135 KM</td>
</tr>
<tr>
<td>Przy obr.</td>
<td>9500/min</td>
<td>9500/min</td>
<td>9000/min</td>
<td>9500/min</td>
</tr>
<tr>
<td>Moment maks.</td>
<td>87 Nm</td>
<td>104 Nm</td>
<td>6500/min</td>
<td>8500/min</td>
</tr>
<tr>
<td>Gaźniki</td>
<td>4 x 38,5 mm</td>
<td>4 x 37 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Przeniesienie napędu</td>
<td>Sprzęgło wielotarczowe mokre, 6-cio stopniowa skrzynia biegów, łańcuch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rama</td>
<td>Grzbietowa wykonana z profili stalowych</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Zawieszenie przednie</td>
<td>Amortyzatory teleskopowe śr. 41 mm, skok 130 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zawieszenie tylne</td>
<td>Pojedynczy centralny element resorujący Pro-Link, skok 115 mm</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Tarcza hamulc. przód</td>
<td>2 x 296 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tarcza hamulc. tył</td>
<td>276 mm</td>
<td>256 mm</td>
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<tr>
<td>Ogumienie przód</td>
<td>110/80 V 17</td>
<td>120/70 VR 17</td>
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<td></td>
</tr>
<tr>
<td>Ogumienie tył</td>
<td>140/80 V 17</td>
<td>170/60 VR 17</td>
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<td></td>
</tr>
<tr>
<td>Długość / rozstaw osi</td>
<td>2225/1500 mm</td>
<td>2270/1500 mm</td>
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</tr>
<tr>
<td>Masa got. do drogi</td>
<td>262 kg</td>
<td>274 kg</td>
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<td></td>
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<tr>
<td>Ładowność</td>
<td>171 kg</td>
<td>194 kg</td>
<td>182 kg</td>
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<tr>
<td>Paliwo</td>
<td>91 okt. bezołowiowe</td>
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<tr>
<td>Pojemność zbiornika</td>
<td>21 l</td>
<td>22 l</td>
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</tr>
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</table>

### Osiągi

<table>
<thead>
<tr>
<th>Śr. zużycie paliwa</th>
<th>7,5 l/100 km</th>
<th>7,2 l/100 km</th>
<th>6,9 l/100 km</th>
<th>7,0 l/100 km</th>
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<tbody>
<tr>
<td>Teoretyczny zasięg</td>
<td>280 km</td>
<td>291 km</td>
<td>304 km</td>
<td>314 km</td>
</tr>
<tr>
<td>0-100 km/h</td>
<td>3,2 s</td>
<td>3,1 s</td>
<td>3,7 s</td>
<td>3,3 s</td>
</tr>
<tr>
<td>0-200 km/h</td>
<td>b.d.</td>
<td>b.d.</td>
<td>b.d.</td>
<td>b.d.</td>
</tr>
<tr>
<td>0-400 m</td>
<td>b.d.</td>
<td>b.d.</td>
<td>12,0 s</td>
<td>11,3 s</td>
</tr>
<tr>
<td>60-100 km/h, 6 bieg</td>
<td>b.d.</td>
<td>b.d.</td>
<td>6,4 s</td>
<td>6,4 s</td>
</tr>
<tr>
<td>100-140 km/h 6 bieg</td>
<td>b.d.</td>
<td>b.d.</td>
<td>5,6 s</td>
<td>5,6 s</td>
</tr>
<tr>
<td>Prędkość maks.</td>
<td>245 km/h</td>
<td>255 km/h</td>
<td>235 km/h</td>
<td>251 km/h</td>
</tr>
</tbody>
</table>