Kawasaki ZX900, 1000 & 1100 Liquid-cooled Fours

Service and Repair Manual

by Mark Coombs and Penny Cox

Models covered

(1681-248-10Y4)

ZX900 A (GPZ900R). 908cc. UK April 1984 to 1996
ZX900 A (Ninja). 908cc. US November 1983 to 1986
ZX1000 A (GPZ1000RX). 997cc. UK November 1985 to September 1989
ZX1000 A (Ninja 1000R). 997cc. US September 1985 to 1987
ZX1000 B (ZX-10). 997cc. UK December 1987 to April 1991
ZX1000 B (Ninja ZX-10). 997cc. US April 1988 to 1990
ZX1100 C (ZZ-R1100). 1052cc. UK March 1990 to December 1992
ZX1100 C (Ninja ZX-11C). 1052cc. US 1990 to 1993
ZX1100 D (ZZ-R1100). 1052cc. UK December 1992 to 1997
ZX1100 D (Ninja ZX-11D). 1052cc. US 1993 to 1997

AB

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3 Engine/transmission oil level

Before you start:

✔ Place the motorcycle on the centerstand, then start the engine and allow it to reach normal operating temperature.

Caution: Do not run the engine in an enclosed space such as a garage or shop.

✔ Stop the engine and allow the machine to sit undisturbed for about five minutes.

Bike care:

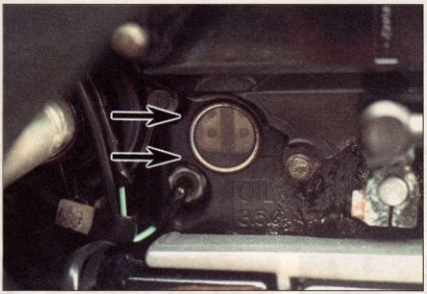
● If you have to add oil frequently, you should check whether you have any oil leaks. If there is no sign of oil leakage from the joints and gaskets the engine could be burning oil (see Fault Finding in the Reference section).

The correct oil

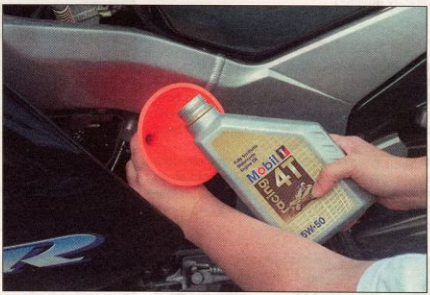
● Modern, high-revving engines place great demands on their oil. It is very important that the correct oil for your bike is used.

● Always top up with a good quality oil of the specified type and viscosity and do not overfill the engine.

Oil type	API grade SE or SF (minimum)
Oil viscosity	SAE 10W/40, 10W/50, 20W/40 or 20W/50



1 The oil level is checked via the oil sightglass set in the left-hand outer casing. The oil should be visible half way up the plastic window, between the level marks (arrowed).



2 Top up using the recommended oil by way of the filler cap at the top of the casing.

4 Suspension, steering and drive chain

Suspension and steering:

● Make sure the steering operates smoothly, without looseness and without binding.

● Check front and rear suspension for smooth operation.

Drive chain:

● Make sure the drive chain isn't out of adjustment.

● Although the chain fitted as standard equipment is of the O-ring type, grease 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 drying up. A heavy (SAE 90) gear oil or one of the proprietary aerosol applied chain lubricants is best.

Warning: 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 chains.

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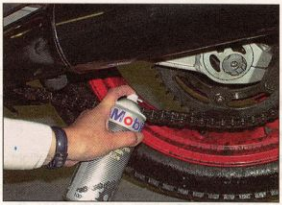
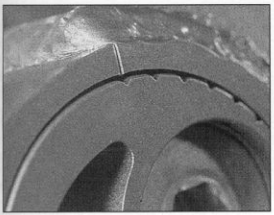
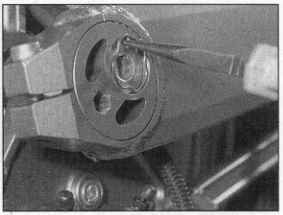
Apply chain lubricant to the joints between the side plates, pins, bushings and rollers to provide lubrication of the internal load bearing areas - not the middle of the rollers. With the bike on its centerstand, hold the plastic nozzle near the edge of the chain and turn the wheel by hand as the lubricant sprays out; repeat this procedure on the inside edge of the chain.



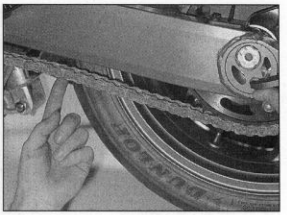
Whilst spinning the back wheel, spray chain lube onto the top of the chain's lower run – centrifugal force will work the lube into the chain when the bike is moving.



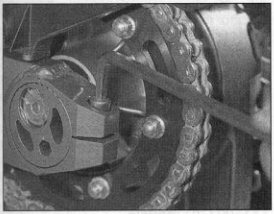
1.6a Set wheel alignment using the notches in the adjusters . . .



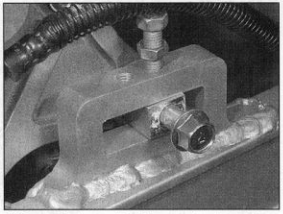
1.6b . . . then tighten spindle to the specified torque setting and refit circlip



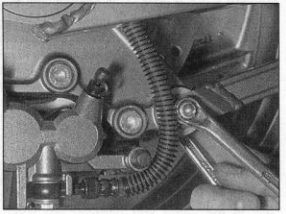
1.8a Rotate both chain adjusters until chain tension is correct . . .



1.8b . . . then tighten both chain adjuster pinch bolts to specified torque setting . . .



1.8c . . . followed by the rear brake caliper and collar fixing bolts on ZX900 models . . .



1.8d . . . or the torque arm mounting bolt on ZX1000 and ZX1100 C/D models

(see illustrations). Once the wheel alignment is correct proceed to check the chain tension as follows before securing the caliper bolts.

7 Chain tension is adjusted with the machine on its centre stand and with the rear wheel clear of the ground. Find the tightest spot of the chain by rotating the rear wheel and feeling the amount of freeplay present on the bottom run of the chain, midway between the sprockets, testing along the complete length of the chain. When the tightest spot has been found, measure the total amount of up and down movement available. This measurement should be within the limits given in the Specifications.

8 To adjust the chain, slacken the rear brake caliper and collar fixing bolts on ZX900 models, and the caliper to torque arm mounting bolt on all other models. Slacken the chain adjuster pinch bolts and rotate the adjusters by an equal amount until the correct amount of freeplay required is obtained **(see illustration)**. Once the chain is correctly adjusted tighten the chain adjuster pinch bolts to their specified torque setting, followed by the rear brake caliper and collar fixing bolts or the caliper to torque arm mounting bolt (as applicable) **(see illustrations)**. Finally lubricate the chain as described in *'Daily (pre-ride) checks'* at the beginning of this manual and check the operation of the rear brake before taking the machine out on the road.

2 Suspension settings check

1 To ensure the machine handles well and is safe to ride, it is essential that both front and rear suspension settings (as applicable) are regularly checked. **Note:** *when checking the air pressures do not use a tyre pressure gauge as they are not accurate enough and lose too much air when disconnected. Kawasaki produce a suitable gauge under Part Number 52005-1003. When adding air to the suspension components NEVER use an airline, because they operate at far too high a pressure and could damage the seals.* It is recommended that only a bicycle pump or one of the specialist aftermarket kits is used to add air, the latter usually comes equipped with its own built-in gauge and is extremely accurate in use. Note that the standard settings given are recommended for solo riding with a rider of average build, weighing approximately 68 kg (150 lb).

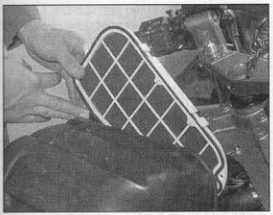
Front forks

ZX900 A1 - A6 and ZX1000 A models

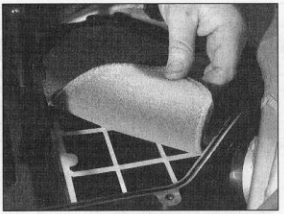
2 The front forks fitted to these models are air-assisted and feature a 3 position adjustable anti-dive unit. When checking the air pressure raise the front wheel clear of the ground to prevent the pressure in the fork being artificially increased due to the weight of the machine. To achieve this, it will be necessary to position the machine on its centre stand, then remove the lower fairing section as described in Chapter 6, and place a suitably-sized block or stand underneath the crankcases.

3 The fork legs on ZX900 A1 to A6 models and early ZX1000 A1 models are linked by an air balance pipe, fitted just above the bottom yoke, and are adjusted via the valve at the top of the right-hand stanchion On later ZX1000 A1 and all A2, A3 models, the pressure in each fork leg is adjusted separately via a valve at the top of each stanchion; it is essential to ensure that equal pressure exists in each fork leg. Take the pressure reading when the forks are cold. The standard air pressure is 0.5 kg/cm² (7 psi), with a usable range of 0.4 - 0.6 kg/cm² (5.7 - 8.5 psi). On no account should the air pressure in the forks ever exceed 2.5 kg/cm² (36 psi) as this will almost certainly damage the fork seals. Refit the valve dust cap when complete.

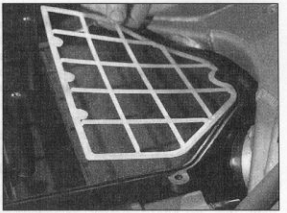
4 On both models ensure that the anti-dive units, fitted on the front of each lower fork leg, are set to the same position. They are adjusted using the thumb-wheel situated at the bottom of the unit. The present position is indicated by the index mark on the front of the unit which aligns with a number on the thumb-wheel. Position 1 is the softest setting and position 3 the strongest. To make adjustment, turn the thumb-wheel until it clicks and the



14.5a On ZX1000 and ZX1100 C models the element is fitted with the gauze on the carburettor side



14.5b Install the air filter element with its grey foam side uppermost - ZX1100 D models

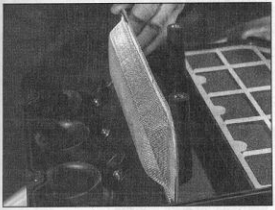


14.5c Place the support frame over the element - ZX1100 D models

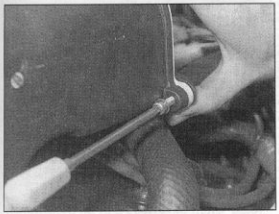
(stoddard solvent); petrol (gasoline) is not recommended due to the fire risk. Squeeze it gently to remove any old oil and dirt, taking care not to break or deform the frame. Dry the element with compressed air or by shaking it and place the element to one side to allow any remaining solvent to evaporate.

4 When it is completely dry, soak the element in a clean SE class SAE 30 motor oil and carefully squeeze out the excess oil. Wrap it in a clean rag and continue squeezing the element until it is as dry as possible and only slightly oily to the touch.

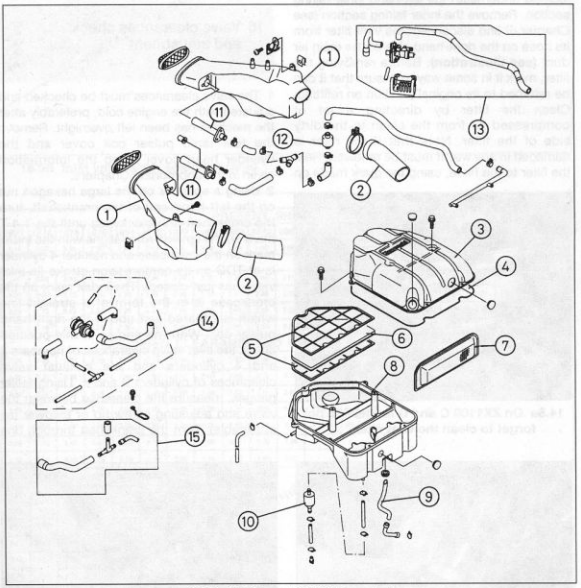
5 On refitting, check that the element is correctly seated and is secured by the plastic wedge (ZX900 models only). Note that on ZX1000 and ZX1100 models, ensure the element is positioned so that the gauze which supports the foam is on the carburettor side of the element **(see illustration)**. On ZX1100 D models, install the element (grey foam side upwards, yellow side downwards) complete with support frames. Check that the air screen is correctly installed (protrusion facing the carburettor air intakes) and that the seal is in position **(see illustrations)**. On all models reassemble the air filter housing, ensuring that all disturbed sections or covers are correctly seated, then tighten the retaining screws securely **(see illustrations)**.



14.5d Protrusion on air screen must face the carburettor intakes - ZX1100 D models



14.5fe Tighten all housing screws securely - ZX1100 C models



14.5f Air filter - ZX1100 D models

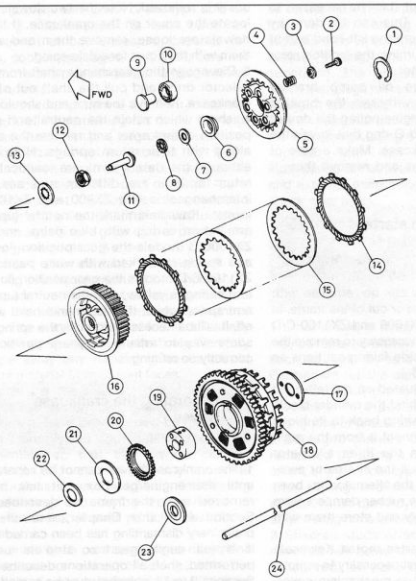
1 Air intake ducts
2 Connecting hoses to filter housing
3 Housing cover
4 Seal
5 Element support frames
6 Air filter element
7 Air screen
8 Housing
9 Crankcase breather hose
10 Oil reservoir
11 Carburettor air intakes
12 Air vent filter
13 Vacuum valve - California only
14 Air suction vacuum switch valve
15 Alternative connections for California

	Thickness	Colour code
Big-end rod bearing insert size:		
ZX900 models:		
Thin	1.475 - 1.480 mm (0.0581 - 0.0583 in)	Brown
Medium	1.480 - 1.485 mm (0.0583 - 0.0585 in)	Black
Thick	1.485 - 1.490 mm (0.0585 - 0.0587 in)	Blue
ZX1000 A models:		
Thin	1.470 - 1.475 mm (0.0579 - 0.0581 in)	Brown
Medium	1.475 - 1.480 mm (0.0581 - 0.0583 in)	Black
Thick	1.480 - 1.485 mm (0.0583 - 0.0585 in)	Blue
ZX1000 B and ZX1100 C/D models:		
Thin	1.475 - 1.480 mm (0.0581 - 0.0583 in)	Black
Medium	1.480 - 1.485 mm (0.0583 - 0.0585 in)	Blue
Thick	1.485 - 1.490 mm (0.0585 - 0.0587 in)	White
Bearing insert/crankpin clearance:		
ZX900 and ZX1000 B models	0.036 - 0.066 mm (0.0014 - 0.0026 in)	
Service limit	0.10 mm (0.0039 in)	
ZX1000 A models	0.046 - 0.076 mm (0.0018 - 0.0030 in)	
Service limit	0.11 mm (0.0043 in)	
ZX1100 C/D models	0.037 - 0.065 mm (0.0015 - 0.0025 in)	
Service limit	0.10 mm (0.0039 in)	
Big-end bearing side clearance:		
ZX900 and ZX1000 models	0.13 - 0.33 mm (0.0051 - 0.0130 in)	
Service limit	0.50 mm (0.0197 in)	
ZX1100 C/D models	0.13 - 0.38 mm (0.0051 - 0.0150 in)	
Service limit	0.60 mm (0.0236 in)	
Crankshaft runout	Less than 0.05 mm (0.0020 in)	
Crankshaft endfloat	0.05 - 0.20 mm (0.0020 - 0.0079 in)	
Service limit	0.40 mm (0.0157 in)	
Crankcase main bearing ID	39.000 - 39.016 mm (1.5354 - 1.5361 in)	
Size groups:		
Crankcase marked 'O'	39.000 - 39.008 mm (1.5354 - 1.5357 in)	
Crankcase unmarked	39.009 - 39.016 mm (1.5358 - 1.5361 in)	
Crankshaft journal OD	35.984 - 36.000 mm (1.4167 - 1.4173 in)	
Service limit	35.960 mm (1.4157 in)	
Size groups:		
Crankshaft unmarked	35.984 - 35.992 mm (1.4167 - 1.4170 in)	
Crankshaft marked '1'	35.993 - 36.000 mm (1.4171 - 1.4173 in)	
Main bearing insert size:	**Thickness**	**Colour code**
Thin	1.490 - 1.494 mm (0.0587 - 0.0588 in)	Brown
Medium	1.494 - 1.498 mm (0.0588 - 0.0590 in)	Black
Thick	1.498 - 1.502 mm (0.0590 - 0.0591 in)	Blue
Bearing insert/journal clearance	0.020 - 0.044 mm (0.0008 - 0.0017 in)	
Service limit:		
ZX900 and ZX1000 models	0.080 mm (0.0031 in)	
ZX1100 C/D models	0.070 mm (0.0027 in)	

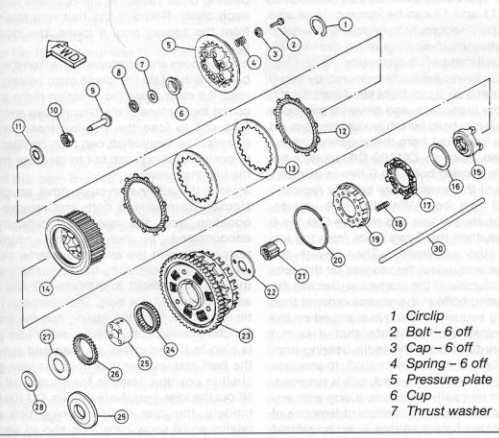
Gearbox

Type	6 speed, constant mesh
Ratios:	
1st	2.800 : 1 (42/15 T)
2nd (except ZX1100 C/D4, D5)	2.000 : 1 (38/19 T)
2nd (ZX1100 C/D4, D5)	2.055 : 1 (37/18 T)
3rd	1.590 : 1 (35/22 T)
4th	1.333 : 1 (32/24 T)
5th	1.153 : 1 (30/26 T)
6th	1.035 : 1 (29/28 T)
Gear backlash - all pinions	0.06 - 0.23 mm (0.0024 - 0.0091 in)
Service limit	0.30 mm (0.0118 in)
Gear pinion selector fork groove width	5.05 - 5.15 mm (0.199 - 0.203 in)
Service limit	5.3 mm (0.209 in)
Selector fork end thickness	4.9 - 5.0 mm (0.193 - 0.197 in)
Service limit	4.8 mm (0.189 in)
Selector fork guide pin thickness	7.9 - 8.0 mm (0.311 - 0.315 in)
Service limit	7.8 mm (0.307 in)
Selector drum groove width	8.05 - 8.20 mm (0.317 - 0.323 in)
Service limit	8.30 mm (0.327 in)

1 Circlip
2 Bolt – 6 off,[1] 5 off [2]
3 Cap – 6 off [1]
4 Spring – 6 off, [1] 5 off [2]
5 Pressure plate
6 Cup
7 Thrust washer [1]
8 Thrust bearing [1]
9 Short pushrod [2]
10 Thrust bearing [2]
11 Short pushrod [1]
12 Nut
13 Lock washer
14 Friction plate 9 off, [1] 8 off [2]
15 Plain plate 8 off, [1] 7 off [2]
16 Clutch centre
17 Thrust washer
18 Clutch drum
19 Centre collar
20 Oil pump drive gear
21 Thrust washer – [1] and late [2]
22 Thrustwasher – [1] and late [2]
23 Chamfered thrust washer – early [2]
24 Main pushrod
[1] ZX1000 models
[2] ZX900 models

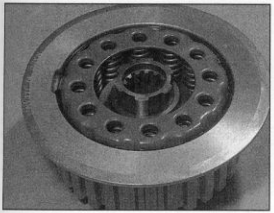


11.6a Clutch – ZX900 and ZX1000 B models

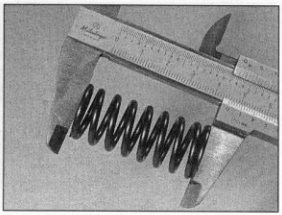


1 Circlip
2 Bolt – 6 off
3 Cap – 6 off
4 Spring – 6 off
5 Pressure plate
6 Cup
7 Thrust washer
8 Thrust bearing
9 Short pushrod
10 Nut
11 Lock washer
12 Friction plate – 9 off
13 Plain plate – 8 off
14 Clutch centre
15 Damper cam follower
16 Spacer
17 Spring seat
18 Spring – 12 off
19 Damper plate
20 Circlip
21 Clutch shaft
22 Thrust washer
23 Clutch drum
24 Needle roller bearing – ZX1100 only
25 Centre collar
26 Oil pump drive gear
27 Thrust washer – ZX1100 and late ZX1000 models
28 Thrust washer – ZX1100 and late ZX1000 models
29 Chamfered thrust washer – early ZX1000 models
30 Main pushrod

11.6b Clutch ZX1000 A and ZX1100 C/D models



29.6 Clutch centre damper mechanism is retained by a circlip



29.8 Measuring clutch spring free length

damage. On all models, renew worn components as necessary.

6 On ZX1000 A and ZX1100 C/D models, the clutch centre is fitted with a damper mechanism which consists of twelve springs and a cam set up. If, after a high mileage, the clutch operation becomes harsh or excessive transmission slop has been noted, it is probably this which is at fault. Compress the damper plate, which has the pressure of the twelve damper springs on it, and remove the large circlip from the back of the clutch centre **(see illustration)**. Slowly release the damper plate and remove the springs and damper cam follower. Examine the bearing surface of the damper cam and follower and renew any worn component. The springs can only be tested by comparison with new items and should be renewed as a set if in any doubt as to their condition. Fit the springs, cam follower and damper plate to the clutch centre, compress the damper plate and refit the circlip.

7 On all models check that the teeth of the crankshaft drive gear and the clutch outer drum are unworn. If a dial gauge (DTI) is available the gear backlash can be measured. If the backlash exceeds the service limit, both components must be renewed as a pair.

8 Measure the free length of each clutch spring **(see illustration)**. If any one has settled to less than the service limit, the clutch springs must be renewed as a complete set.

9 The clutch pushrod should be rolled 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.

10 The clutch master cylinder is very similar to that which is used for the front brake and can be dismantled and overhauled as described in Section 10 of Chapter 7. The slave cylinder can also be overhauled using the information given in Section 9 of Chapter 7. Ensure the new seal is fitted the correct way around and seats fully in its groove in the piston. On reassembly fill the master cylinder reservoir with new hydraulic fluid and bleed the system as described in Section 13 of Chapter 7.

30 Gearbox components - examination and renovation

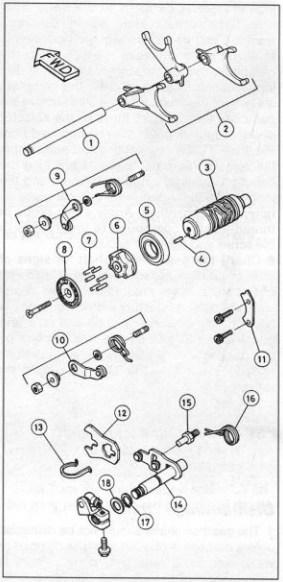
1 Give the gearbox components a close visual inspection for signs of wear or damage such as broken or chipped teeth, worn dogs, damaged or worn splines and bent selector forks. Renew any parts found to be worn; there is no satisfactory way in which they can be reclaimed **(see illustration)**. The shaft assemblies can be dismantled and reassembled as described in the following section.

2 If a dial gauge is available the gear backlash can be checked to measure tooth wear, if any pair of gears is found to exceed the maximum permissible backlash both gears must be renewed as a pair.

3 The gearbox shafts are unlikely to sustain damage unless the engine has seized, placing an unusually high loading on the gearbox, or unless the machine has covered a very high mileage. Check the surfaces of the shaft, especially where a pinion turns on it, and renew the shaft if it has scored or has picked up. Examine the threads of the shafts and check them for trueness by setting them up in V-blocks and measuring any runout with a dial gauge. Damage of any kind can only be cured by renewal of the shaft concerned. Renew any bushes that show signs of wear.

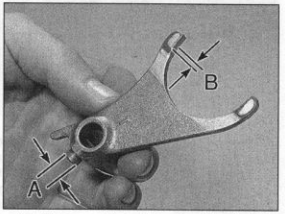
4 The selector forks should be examined closely to ensure that they are not badly damaged or worn. Measure the width of both fork ends and the diameter of its guide pin **(see illustration)**. If either fork end or the guide pin has worn to less than its service limit the selector fork(s) must be renewed. The selector fork shaft can be checked for trueness by rolling it along a flat surface. A bent shaft will cause difficulty in selecting gears and make the gearchange action heavy. The shaft must be renewed if it is bent.

5 Measure the width of the three grooves in the selector drum at several points along their length. If at any point the width of a groove exceeds the service limit the selector drum must be renewed. Check that the bearing fitted to the drum rotates freely and has no

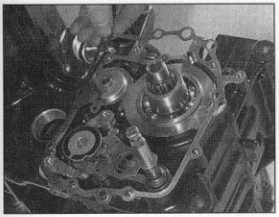


30.1 Gearchange mechanism

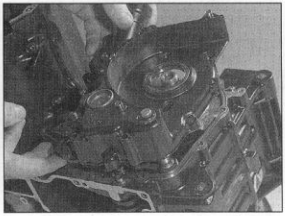
1 Selector fork shaft
2 Selector forks
3 Selector drum
4 Camplate locating pin
5 Bearing
6 Camplate
7 Change pins
8 Pin retaining plate
9 Gear position detent arm assembly
10 Neutral detent arm assembly
11 Drum retaining plate
12 Selector claw
13 Spring
14 Gearchange shaft
15 Locating post
16 Return spring
17 Circlip
18 Washer



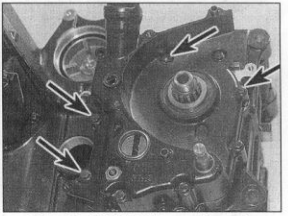
30.4 Measure the width of guide pin (A) and fork ends (B), renewing selector fork if necessary



37.3a Refit dowels to the crankcase and position a new gasket over them



37.3b Refit the gearchange casing



37.3c On ZX1100 C/D models apply threadlocking compound to four bolts arrowed

torque settings are given in the specifications at the start of this Chapter. Then tighten the 7 mm bolt (ZX1100 C/D and late ZX900 A7-on models only), followed by all the 6 mm bolts, to their specified torque settings. Refit the upper crankcase bolts, again using the cardboard template to ensure each bolt is refitted in its original position. **Note** - *on ZX1100 C/D and late ZX900 A 7-on models do not omit the washer from the front 8 mm bolt. First tighten the 8 mm bolts, then the 6 mm bolts, to their specified torque settings.*

5 Check that the crankshaft rotates smoothly and easily, as should the gearbox shafts. It is impossible to select any gears other than 1st or neutral unless the output shaft can be spun fast enough to disengage the neutral finding mechanism. If there are any signs of undue stiffness or of any other problem, the fault must be rectified before work can proceed further. Plug the crankcase mouths with clean rag to prevent debris entering the crankcase until the cylinder block has been refitted.

37 Gearchange components - refitting

1 The neutral and gear position detent arms are refitted as described in Section 34 of this Chapter.

2 Check that the locating post for the gearchange shaft return spring is secure. If it is loose remove the post, apply a thread-locking compound to its threads, refit it and tighten it securely. Ensure that the circlip and washer are fitted to the gearchange shaft and offer up the gearchange to the casing. As the shaft is fitted, ensure that the selector claw engages correctly with the end of the selector drum, and that the return spring engages correctly with its locating post. Check that the gearchange shaft moves easily and centralises quickly with the pressure of the return spring.

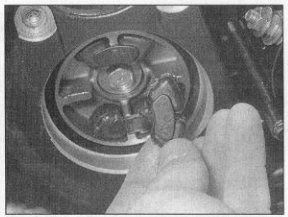
3 Refit the two dowels to the crankcase and place a new gasket over them **(see illustration)**. Apply a small amount of grease to the lips of the output and gearchange shaft oil seals and offer up the cover. Ease it over the ends of the shafts, to prevent damaging the oil seals, and carefully slide it into place **(see illustration)**. On ZX900 and ZX1000 models apply a thread locking compound to all the gearchange cover retaining bolts and tighten them securely. On ZX1100 C/D models apply thread-locking compound to the four bolts **(see illustration)** and tighten the bolts to the specified torque setting.

38 Alternator and starter motor - refitting

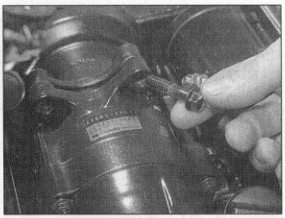
1 Clean the three alternator mounting points on both the crankcase and the alternator itself. This is most important as the mounting points are used to earth the alternator. Failure to earth the alternator properly will almost certainly lead to it being damaged.

2 Insert the cush drive rubbers into the coupling on the shaft and fit a new O-ring to the alternator **(see illustration)**. Apply engine oil to the O-ring and cush drive rubbers to aid the refitting procedure. Refit the alternator to its drive coupling ensuring that the rubber segments of the cush drive remain in position and engage correctly with the alternator **(see illustration)**. Apply a thread-locking compound to the alternator mounting bolts and tighten them to the specified torque setting.

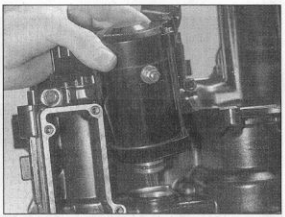
3 Ensure the starter motor mounting points on both the crankcase and the motor itself are clean and free from corrosion. This is most important as the mountings are used to earth the motor. Fit a new O-ring to the starter motor and insert its mounting bolts into their respective holes **(see illustration)**. Apply a small amount of engine oil to the starter motor O-ring and manoeuvre the assembly into position. Push the motor into the crankcase and tighten its mounting bolts securely. If necessary, refit the external gearchange mechanism cover as described in the previous section.



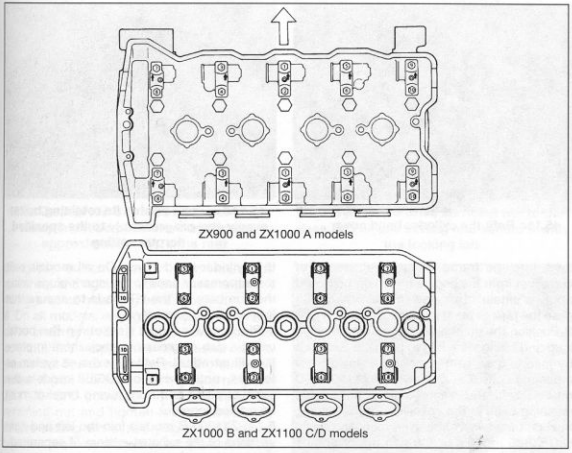
38.2a Refit cush drive rubbers to the alternator coupling



38.2b Refit alternator – apply thread-locking compound to its bolts and tighten to specified torque setting

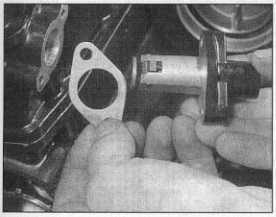


38.3 Apply engine oil to starter motor O-ring and install starter motor, tightening its bolts securely



45.5c Camshaft cap bolt tightening sequence

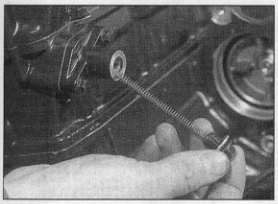
upwards **(see illustration)**. Push the tensioner hard against the cylinder block, remove the screwdriver, and refit its mounting bolts finger-tight only. **Note** - *at no point should the tensioner body be allowed to come away from the cylinder block. If pressure is released on the tensioner and it is pushed away from the block, the tensioner must be removed and the whole installation procedure repeated.* Once the tensioner is correctly installed, tighten its mounting bolts to the specified torque setting, refit the cap bolt and tighten it securely.



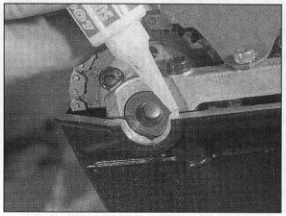
45.9a Fully retract the tensioner pushrod and refit the tensioner using a new gasket

9 On ZX900 A7-on, ZX1000 B and ZX1100 C/D models remove the cap bolt from the tensioner body and withdraw the spring. Release the tensioner locking mechanism by pulling the pushrod stopper back towards the tensioner body, and pushing the tensioner pushrod back until it is fully retracted in the tensioner body. Using a new gasket, refit the tensioner to the cylinder block ensuring that the arrow cast on it is facing upwards; tighten its mounting bolts to the specified torque setting **(see illustrations)**. Install the tensioner spring, refit the cap bolt and tighten it securely.

10 On all models rotate the crankshaft a few times, using a ring spanner on the large hexagon ignition rotor nut, to settle all the disturbed components. Check the valve clearances as described in Chapter 1 and adjust if necessary. Lubricate all bearing surfaces with clean engine oil and wipe both the cylinder head and cover gasket surfaces with a rag moistened in a high flash-point solvent. Examine all the cylinder head cover rubber gaskets for signs of damage, renewing them if necessary. Apply silicone sealant to the surfaces of the four semicircular cutouts in the cylinder head **(see illustration)**.

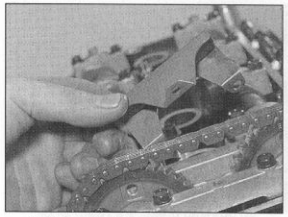


45.9b Tighten tensioner mounting bolts to the specified torque setting and refit the cap bolt and spring

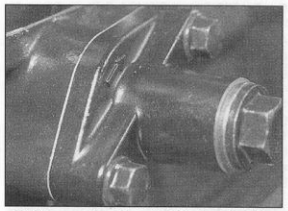


45.10 Apply silicone sealant to the four semi-circular cutouts in the cylinder head

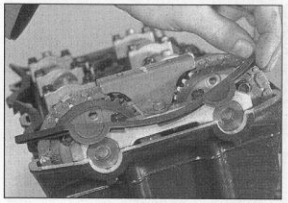
11 On ZX900 and ZX1000 A models refit the dowels to the cylinder head cover and refit all the gaskets to the cover. Apply a liquid gasket compound to the gaskets to help hold them in place, and take great care to ensure that the dowels do not drop out of the cover as it is refitted to the cylinder head **(see illustration)**.



45.7 Refit the top camchain guide as described in text



45.8 Ensure tensioner is fitted so that the arrow on the tensioner body points upwards



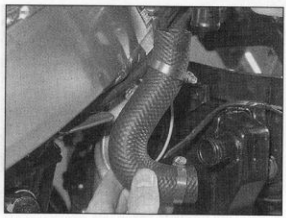
45.11a On ZX1000 B and ZX1100 C/D models refit cylinder head cover gaskets to the cylinder head

neck. A further bleed bolt is situated on the thermostat housing, in the form of a bleed valve. Slacken the bleed valve and allow coolant to flow from the valve whilst adding coolant via the filler neck. When the flow of coolant is free of air bubbles, tighten the bleed valve to the specified torque setting. Check that the coolant level is topped up to the base of the filler neck and refit the radiator cap. Fill the expansion tank to its upper level line and refit the expansion tank cap.

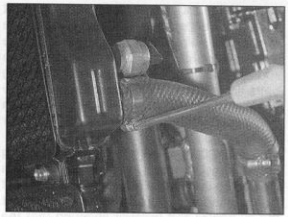
6 Start the engine and allow it to idle until it reaches normal operating temperature and the cooling fan comes on. Stop the engine at this point and allow it to cool. When the engine is cool check the level in the expansion tank as described in *'Daily (pre-ride) checks'* at the beginning of this Manual and top up if necessary.

7 When the machine has been ridden for the first time after refilling, allow the engine to cool down and check the level at the radiator filler cap to ensure that no further pockets of air have been expelled, topping up if necessary. All subsequent checks of the level at the recommended maintenance intervals should be checked at the expansion tank, as described in *'Daily (pre-ride) checks'* at the beginning of this Manual.

5 Radiator - removal, cleaning, examination and refitting



5.3a Slacken the clamps and remove both the upper . . .



5.3b . . . and lower radiator hoses

1 Remove the fairing as described in Chapter 6. On ZX1000 B and ZX1100 C/D models it is also necessary to remove the fuel tank as described in Chapter 4. **Note:** *on all models the cooling fan and switch are connected directly to the battery, enabling the fan to operate with the ignition switched off. For this reason ensure that the engine is cold before attempting to remove the radiator and disconnect the battery negative lead. Failure to do so could lead to injury from the fan blades should the fan come on unexpectedly.*

2 Drain the coolant as described in Section 2 of this Chapter.

3 Slacken the hose clamps on both the lower and upper radiator hoses and disconnect the hoses from the radiator **(see illustrations)**. On ZX900 models remove the mounting bolts from the lower fairing mounting bracket and push the bracket downwards to disengage it from the peg on the bottom of the radiator. On ZX1000-A models remove the mounting bolts from both the oil cooler and its mounting bracket, and push the oil cooler mounting bracket clear of the radiator. Tie the oil cooler to the frame to avoid placing any strain on its hoses. On ZX1000 and ZX1100 C/D models disconnect both the horns and remove them along with their mounting brackets. Each horn bracket is retained by a single mounting bolt.

4 On all models, remove the radiator mounting bolts and disconnect the cooling fan and switch electrical connectors **(see illustrations)**. On ZX900 and ZX1000 A models note that it will not be possible to disconnect these until the radiator is partially removed. The radiator can then be carefully manoeuvred out of position. If necessary the radiator and cooling fan can be separated by removing the three bolts which secure the fan to the back of the radiator.

5 Remove any obstructions from the radiator matrix using compressed air from behind. To prevent the radiator vanes from being damaged keep the air jet perpendicular to the radiator and at least 20 inches away from the radiator core. The conglomeration of moths, flies and road dust which usually builds up in the radiator matrix restricts the air flow and severely reduces the efficiency of the cooling system.

6 The interior of the radiator is easily cleaned whilst the radiator is in position on the machine, using the flushing procedure described in Section 3. Additional flushing can be carried out by placing a hose in the radiator filler, neck and allowing water to flow through for about ten minutes. Under no circumstances should the hose be connected to the filler neck mechanically as a sudden blockage in the radiator outlet would subject the radiator to the full pressure of the mains supply (about 50 psi). The radiator should never be pressurised to more than 15 psi.

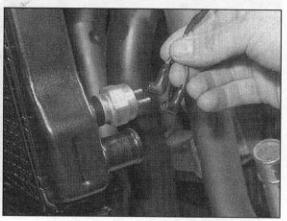
7 Bent fins can be straightened, if care is exercised, by using a flat-bladed screwdriver. Badly damaged fins cannot be repaired. As a rule a new radiator should be fitted if bent fins obstruct more than 20% of the air flow.

8 If the radiator is found to be leaking, repairs are usually impractical and a new component will have to be fitted. Very small leaks may sometimes be stopped by the addition of a special sealing agent in the coolant. If an agent of this type is used follow the manufacturer's instructions very carefully. Soldering, using soft solder, may be effective for caulking large leaks but this is a specialist repair which is best left to the experts.

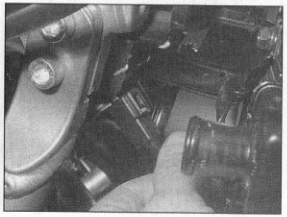
9 Inspect the radiator mounting rubbers for perishing or compaction. Renew the rubbers if there is any doubt as to their condition. The radiator could be damaged by vibration if the isolating effect of the rubbers is lost.

10 The radiator is refitted by a reversal of the removal sequence. Remount the cooling fan on the radiator and tighten its mounting bolts

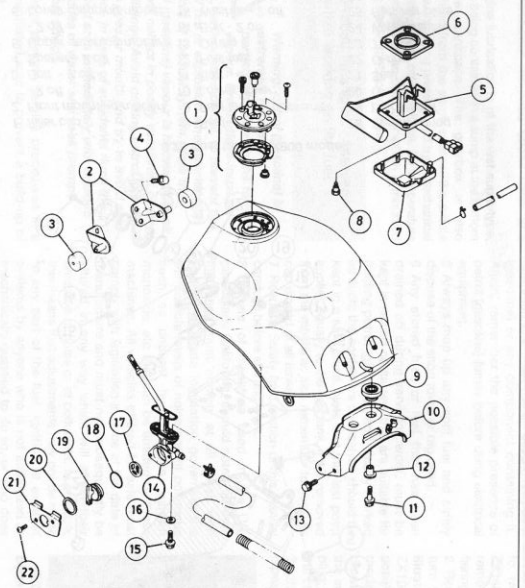
5.4a Remove the radiator mounting bolts . . .



5.4b . . . and disconnect the cooling fan switch . . .

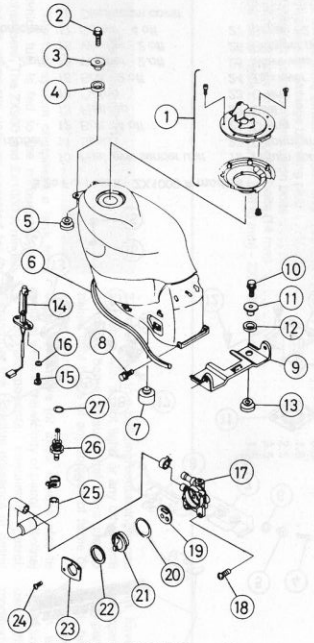


5.4c . . . and cooling fan wiring – ZX1100 C shown



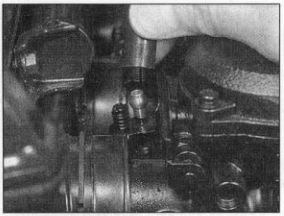
3.2d Fuel tank - ZX1000 B models

1 Filler cap
2 Front mounting brackets
3 Front mounting rubber - 2 off
4 Bolt - 4 off
5 Fuel level sender unit
6 Seal
7 Lower cover
8 Bolt - 4 off
9 Rear damping rubber - 2 off
10 Rear mounting bracket
11 Bolt - 2 off
12 Spacer - 2 off
13 Bolt - 4 off
14 Fuel tap
15 Bolt - 2 off
16 Washer - 2 off
17 Seal
18 O-ring
19 Tap lever
20 Wave washer
21 Retainer plate
22 Screw - 2 off



3.2e Fuel tank - ZX1100 C models

1 Filler cap
2 Bolt - 2 off
3 Spacer - 2 off
4 Upper mounting rubber - 2 off
5 Lower mounting rubber - 2 off
6 Trim
7 Rear mounting rubber - 2 off
8 Bolt - 2 off
9 Rear mounting bracket
10 Bolt - 2 off
11 Spacer - 2 off
12 Upper mounting rubber - 2 off
13 Lower mounting rubber - 2 off
14 Fuel level sender unit
15 Screw - 2 off
16 Washer - 2 off
17 Fuel tap
18 Screw - 2 off
19 Seal
20 O-ring
21 Tap lever
22 Wave washer
23 Retainer plate
24 Screw - 2 off
25 Connecting pipe
26 Fuel filter
27 O-ring



12.2 Vacuum take off points - ZX900 models

12 Carburettors - synchronisation

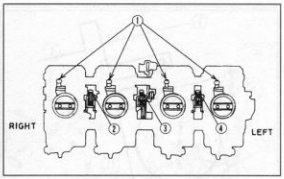
1 Carburettor synchronisation must be checked at the interval specified in Chapter 1, and whenever the carburettors have been disturbed or if the engine is running roughly. Always check the valve clearances before starting work. A set of accurate vacuum gauges is essential for the synchronisation, and if these are not available the job should be entrusted to an authorized Kawasaki dealer. On no account attempt to adjust synchronisation by 'feel'. It will almost certainly make things worse.

2 Remove the fuel tank and arrange a temporary fuel supply, either by using a small temporary tank or by using extra long fuel pipes to the now remote fuel tank on a nearby workbench. **Note:** if the vacuum pipe is bypassed (where applicable) it is important to plug its open end before attempting the check. Connect the vacuum gauge hoses to the four vacuum take-off points, having first disconnected the relevant hoses(s) and cap(s); the vacuum take-off points are to be found on the top or bottom of the intake stubs, or on the top of each carburettor body, where it enters the intake stub **(see illustration)**. 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 needle flutter is just eliminated but so that they can still respond to small changes in pressure.

3 Running the engine at idle speed, check that all needles produce the same reading. A tolerance of up to 2 cm Hg between cylinders 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 cylinders. Stop the engine and allow it to cool down if it overheats.

4 The carburettors are adjusted by the three screws which are situated in between the carburettors in the throttle linkage **(see illustration)**. First check that the two left-hand carburettors are the same, then check that the two right-hand carburettors are equal. Adjust them if necessary, using the outer adjusting screws, then balance both pairs against each other using the centre screw. Do not press down on the screw whilst adjusting it, otherwise a false 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.

5 When the carburettors are correctly synchronised, stop the engine, disconnect the gauges and refit all disturbed components.



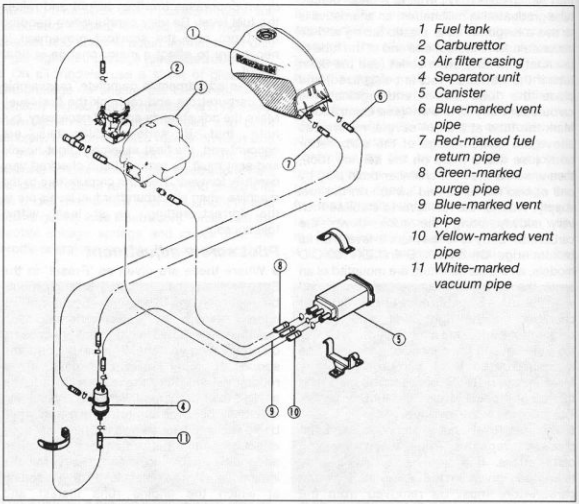
12.4 Synchronisation screw locations

1 Vacuum gauge take-off points
2 Adjusting screw for cylinders 3 and 4
3 Adjusting screw for left and right-hand pairs
4 Adjusting screw for cylinders 1 and 2

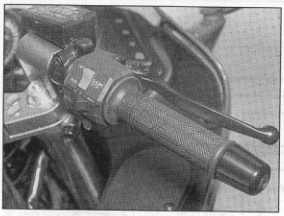
13 Evaporative Emission Control System - description and examination - California models

1 To comply with legislation in force in California and applying to all machines sold from 1984 onwards, these machines are fitted with equipment which prevents the escape into the atmosphere of any vapours produced by evaporation in any part of the fuel system. The equipment consists of a modified fuel tank, a canister of activated charcoal and a separator/pump unit, in addition to the connecting pipes and fittings **(see illustrations)**.

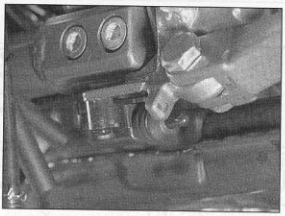
2 Whilst the engine is stopped, vapour emitted by the evaporation of fuel in the tank passes through a blue-marked vent pipe to the top of the separator, where some of it condenses and passes through the separator into the pump unit, but the majority passes into the canister. Vapour emitted from the carburettor float chambers passes through a yellow marked pipe directly to the canister. From there it can only escape to the atmosphere by passing through the activated charcoal which traps the vapour completely. This works equally well in reverse when the engine is running, air passing via the air filter and the green-marked purge pipe to the canister and backwards through the system into the fuel tank and carburettors to compensate for the fuel consumed.



13.1a Evaporative Emission Control System - ZX900 California models



5.3 Engine kill switch is located in the right-hand handlebar switch



5.5 Sidestand switch is mounted on frame, below footrest

4 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 dewatering 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 backs of connectors can be sealed off using a silicone rubber sealant.

2 Light corrosion can normally be cured by scraping or sanding the affected area, though in serious 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 part of the frame or its fittings. As a temporary measure damaged insulation can be repaired with PVC tape, but the wire concerned should be renewed at the earliest opportunity.

3 Using the appropriate wiring diagram at the end of this manual, check each wire for breakage or short circuits using a multimeter set on the resistance scale or a dry battery and bulb, wired as shown illustraton in 2.1 in Chapter 8. In each case, there should be continuity between the ends of each wire.

5 Ignition, engine kill and side stand switches - testing

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 (yellow lead) and the power supply from the battery (white 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 If the operation of the switch is suspect, reference should be made to the wiring diagrams at the end of the manual. The switch connections are shown in diagrammatic form and indicate which are connected in the various switch positions. Trace the wiring back from the switch, disconnect it from the main wiring loom, and check the operation of the switch using a multimeter set to the resistance scale.

3 The engine kill switch is incorporated in the right-hand handlebar switch and can be tested in a similar manner **(see illustration)**. Trace the wiring back from the switch to its block connector and disconnect it from the main wiring loom. Using the multimeter, continuity should be present between the yellow/red and red terminals when the switch is in the RUN position and an open circuit when the switch is in the OFF position.

4 If either switch is found to be faulty it must be renewed. While each is a sealed unit and can only be repaired by renewal, note that there is nothing to be lost by attempting a repair. Depending on the owner's skill, worn contacts may be reclaimed by building them up with solder or in some cases, simply by cleaning them with WD40 or a similar water dispersant spray.

5 The side stand switch is also linked into the ignition system and is designed to kill the ignition if the clutch is engaged with the transmission in gear whilst the side stand is down **(see illustration)**. Trace the wiring back from the switch, disconnect it and carry out the following test on the switch side of the wiring.

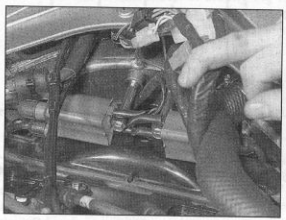
6 On ZX900 and ZX1000 A models when the side stand is up there should be continuity between the brown and black/yellow terminals, and when the stand is down there should be continuity between the black/yellow and green/white terminals. If not, the switch is at fault and must be renewed.

7 On ZX1000 B and ZX1100 C/D models there should be continuity between the two switch terminals when the stand is down and an open circuit when the stand is up. If not, the switch is faulty and must be renewed.

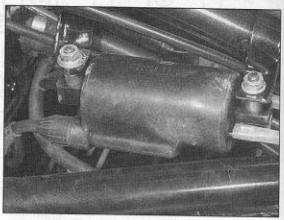
6 Ignition HT coils - testing

1 The ignition coils are situated underneath the fuel tank where they are mounted on the frame **(see illustrations)**, except on ZX1000 A models where they are mounted on the bottom of the fairing bracket. By far the most accurate method of testing the ignition coils is to use the Kawasaki spark gap tester, but some idea of the condition of the coil can be gained by measuring the resistances of its primary and secondary windings as follows. These tests can be performed with the coils fitted to the machine.

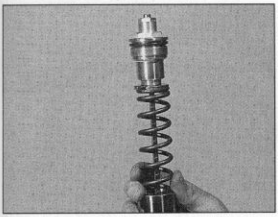
2 To check the condition of the primary windings, disconnect the low tension leads from the terminals on the ignition coil and, using a multimeter set to the ohms x 1 scale, measure the resistance between the two terminals. To check the secondary winding, unscrew the suppressor caps from the HT leads and set the meter to the K ohms x 1 scale. Connect a meter probe to each HT lead, ensuring a good contact is made, and note the reading obtained. Compare both the primary and secondary resistance readings to those given in the Specifications. If either of the results obtained are not within the specified limits the coil should be taken to an authorized Kawasaki dealer for confirmation of your findings by testing the coils on a spark gap tester. If either coil is proved faulty it should be renewed; a satisfactory repair will not be possible.



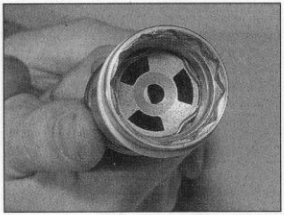
6.1a HT coil location - ZX1000 B and ZX1100 C/D models



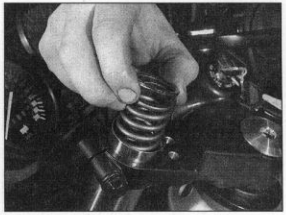
6.1b HT coil location - ZX900 models



3.10a On ZX1100 C models fit the fork spring, spring seat and top plug as an assembly . . .



3.10b . . .and ensure the damping adjuster rod engages correctly with damper rod

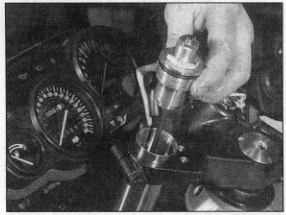


3.10c On ZX1100 D models install plain washer on top of fork spring . . .

upper end **(see illustrations)**. Tighten the top plug by hand only at this stage as it is much easier and safer to tighten it once the fork is clamped in the yokes. On ZX1100 D models note that there is a special washer, spacer and plain washer situated on top of the fork spring **(see illustrations)**.

4 Front forks - examination and renovation

3.10d . . . followed by spacer and special washer . . .



3.10e . . . then install top bolt

1 Wash all fork components thoroughly to remove all traces of old oil. Check particularly carefully that all dirt has been removed from the bottom of the fork lower leg and from the passageways in the damping mechanism. On ZX900 A1 to A6 models and ZX1000 A models, it is advisable to remove the anti-dive valve unit so that one can be certain of cleaning it thoroughly and drying it completely. Refer to Section 6.

2 Discard the fork oil seal; this should be renewed whenever it is disturbed. Similarly check the dust seals for splits, cracks or other damage, and check all sealing O-rings and washers. Renew any component that is found to be worn or damaged. On models so equipped, do not forget the seals around the air valves and, where applicable, in the air union. Also check the piston ring around the head of the damper rod. This ring must fit closely and seal tightly in its bore if the damping mechanism is to function efficiently.

3 On ZX900 A1 to A6 and ZX1000 models check the TCV (Travel Control Valve), especially if damping problems have been experienced. The valve assembly should not be dismantled and no replacement parts are available; if found to be faulty, it must be renewed. If a fault is suspected first inspect the piston ring of the damper rod before turning attention to the TCV, then go on to check that the oil holes of the TCV are clear. If no damage is found the TCV must be renewed. Note that the valve depends on an accurate fork oil level for correct operation.

4 Apart from the above, the only other components likely to wear are the bearing surfaces of the stanchion and lower leg. I nsert the stanchion into the lower leg, complete with bushes, and feel for free play between the two at all points, from full compression to full extension. No specifications are given, therefore if free play appears to be excessive, the worn components should be renewed. Excessive wear is normally revealed by score marks on one or both surfaces; if such signs are found the component concerned must be renewed. Take the components to an authorized Kawasaki dealer for an expert opinion if in doubt. Note that both the top and bottom bushes are available separately.

5 The stanchions can be checked for straightness by rolling them on a flat surface such as a sheet of plate glass; any bending or distortion should immediately be evident. It is usually possible to straighten slightly bent stanchions provided that the work is undertaken only by an expert; any local motorcycle dealer should be able to recommend such a person. However if the stanchion is bent so much that the tubing has creased or even split, it must be renewed; straightening, even if possible, would induce severe stresses resulting in a fatigue failure at a later date.

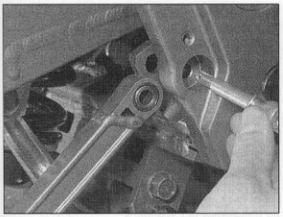
6 Check that the stanchions' upper surfaces are clean and free from chips, dents or corrosion which might weaken the tubing or cause oil seal failure. Use fine emery paper to polish off any corrosion; but chips or dents, if minor, can be filled with Araldite or similar and rubbed down to restore the original shape when the filling compound has set. UK owners should note that such damage will cause the machine to fail its MOT test certificate. If in doubt about the stanchion's strength, renew it in the interests of safety.

7 The fork springs will take a permanent set after considerable usage and will require renewal if the fork action becomes spongy. The service limit for the total spring free length is given in the Specifications.

8 Make a careful check of all other fork leg components, checking for cracks in castings, damaged threads, defective air valves, and any other signs of wear or damage, renewing any faulty components.

5 Front forks - refitting

1 Apply a small amount of grease to the stanchion upper end and the air union sealing O-rings (where fitted). Insert the stanchion into the bottom yoke and slide the air union and its retaining clamp (where fitted) into position. Slide the stanchion through the top yoke, whilst holding the air union against the bottom yoke, and lightly tighten the top and bottom pinch bolts.



18.5b Refit the rear brake torque arm, tightening its retaining bolt to the specified torque . . .

torque arm, tightening its mounting bolts to the specified torque setting, and secure the brake hose guides and chainguard to the swinging arm **(see illustration)**. **Note**: *Make sure that the brake hose is held well clear of the brake disc by the clamps on the swinging arm*. Fit the right-hand footrest bracket and rear brake assembly to the machine and tighten the reservoir and footrest bracket mounting bolts securely. Reconnect the stop lamp switch wiring.

All models

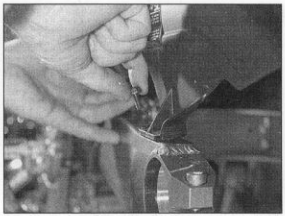
6 Refit the rear wheel as described in Section 5 of Chapter 7 and thoroughly check the operation of the rear suspension and brake before taking the machine on the road.

19 Footrests, stands and controls - examination and renovation

1 At regular intervals all footrests, the stand, the brake pedal and the gearchange lever should be checked and lubricated at the intervals specified in Chapter 1. Check that all mounting nuts and bolts are securely fastened, using the torque settings where these are given. Check that any securing split pins are correctly fitted.

2 Check that the bearing surfaces at all pivot points are well greased and unworn, renewing any component that is excessively worn. If lubrication is required, dismantle the assembly to ensure that grease can be packed fully into the bearing surface. Return springs, where fitted, must be in good condition with no traces of fatigue and must be securely mounted.

3 If accident damage is to be repaired, check that the damaged component is not cracked or broken. Such damage may be repaired by welding, but note that welding of aluminium components should only be entrusted to an expert in this field. Note, however, that such a repair will destroy the finish of the component, and renewal may therefore be the most satisfactory course of action. If a steel component is merely bent it can be straightened after the affected area has been heated to a dull cherry red colour, using a blowlamp or welding torch. Again the finish will be destroyed, but the surface can be refinished at relatively low cost.



18.5c .. and fit the chainguard to the swinging arm

20 Speedometer and tachometer heads - removal, examination and refitting

1 The instrument assembly is secured to the fairing mounting bracket by two bolts. On ZX900 and ZX1000 A models these bolts are readily accessible, although on ZX1100 C/D models it will first be necessary to remove the upper fairing, and on ZX1000 B models the upper fairing inner sections and screen.

2 Remove the instrument panel mounting bolts and partially withdraw the assembly. Unscrew the speedometer drive cable retaining ring from the underside of the panel and separate the instrument panel wiring from the main loom. The assembly can then be lifted clear of the machine.

3 Slacken all the screws which retain the bottom cover and remove it from the assembly. Release the two nuts which secure the instruments to the mounting bracket and separate the two components **(see illustration)**. The top cover can be removed once its retaining screws have been withdrawn.

4 Each instrument head is mounted onto the housing by two small crosshead screws. Before removing the speedometer on ZX900 and ZX1000 models it is first necessary to remove the upper speedometer drive gearbox. This is also retained by two small crosshead screws. On all models disconnect the tachometer wiring before attempting to remove the instrument head **(see illustration)**.

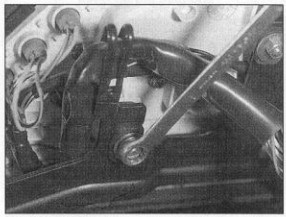
5 Note that these instruments are delicate and should be handled carefully at all times. Do not drop them or hold them upside down as this will damage the heads. Also do not allow them to come into contact with any dirt, grease, oil or water.

6 The speedometer and tachometer heads are sealed units and cannot be dismantled any further. Apart from defects in the drive or drive cable (speedometer) or relevant wiring (tachometer) an instrument is difficult to repair and must be renewed. Alternatively, it may be possible to have the instrument repaired by a suitable specialist or to obtain a second-hand item from a breaker.

7 The electronic tachometer can be tested as described in Chapter 8.

8 Remember that a speedometer in correct working order is a statutory requirement in the UK. Apart from this legal necessity, reference to the odometer readings is the most satisfactory means of keeping track with the maintenance schedules.

9 The instrument heads are refitted by a reversal of the removal procedure, taking care not to overtighten the instrument panel screws. Examine the damping rubbers fitted to the mounting bracket, renewing them if necessary.

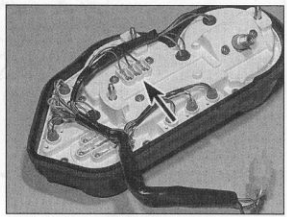


20.3 Instrument are retained to mounting bracket by two nuts

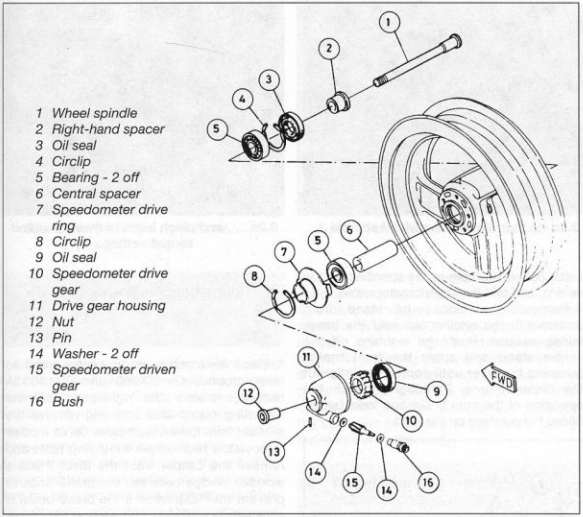
21 Speedometer and tachometer drives - examination and renovation

Speedometer

1 On ZX900 and ZX1000 models the speedometer has two drive gearboxes, the main one being mounted on the left-hand side of the front wheel and the other just under the instrument. The ZX1100 C/D models use only the wheel mounted gearbox. The gearbox in the instrument assembly (where fitted) serves



20.4 Disconnect the tachometer wiring connectors (arrowed) before attempting to remove it from the panel



2.4 Front wheel - typical

1 General description

All models use cast alloy wheels which are designed to run with tubeless tyres. Although the wheels vary in size and style, all are very similar in construction. Both front and rear brakes are hydraulically operated discs, a twin disc set up at the front and a single at the rear.

On ZX900 A1 to A6 models and ZX1000 A models, the front braking system is also used to actuate the anti-dive units fitted to the front forks. These are hydraulically operated from a junction box situated on each lower fork leg.

2 Front wheel - removal

1 Place the machine on its centre stand, leaving adequate space around the wheel area. Slacken the knurled ring which retains the speedometer cable to its drive gearbox and pull the cable clear of the wheel.

2 On all models except the ZX900 A1 to A6, remove the brake caliper mounting bolts and lift both calipers clear of the discs. Place a wooden wedge between the brake pads to prevent their expulsion if the brake lever is accidentally operated, and tie both calipers to the frame to avoid straining the hydraulic hoses.

3 On ZX900 A1 to A6 models it is necessary to remove only one of the calipers. Remove the caliper mounting bolts and wait until the wheel has been lowered out of the forks as described below before removing the caliper.

4 On all models, release the wheel spindle pinch bolt(s) situated on the right-hand lower fork leg and slacken the wheel spindle from the right-hand side **(see illustration)**.

5 Remove the lower fairing, as described in Chapter 6, and place some blocks or a suitable stand underneath the engine so that the front wheel is raised clear of the ground. Support the wheel and withdraw the spindle from the right-hand side. The wheel can then be lowered to the ground and removed from the machine. On ZX900 A1 to A6 models slide the caliper off the disc, placing a wedge between the pads and tying the caliper to the machine as described above.

6 Note that the wheel should not be placed on its side with the weight resting on one of the brake discs as this could distort the disc. Place a wooden block beneath the wheel rim or rest the wheel against a wall.

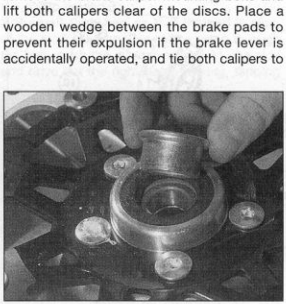
7 Refer to Chapter 1 for details of wheel examination.

3 Front wheel - refitting

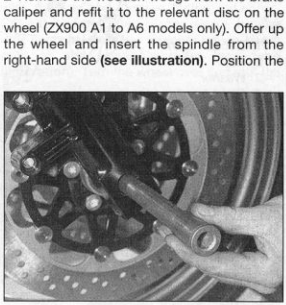
1 On reassembly, grease the speedometer gearbox and the lips of the oil seal fitted to the right-hand side of the hub. Refit the speedometer gearbox to the left-hand side of the wheel, ensuring that the tangs on its drive plate engage correctly with the slots in the hub **(see illustration)**. Insert the spacer into the right-hand side of the hub **(see illustration)**. Check that the spindle is straight and free from corrosion and smear a small amount of high melting-point grease along its shank.

2 Remove the wooden wedge from the brake caliper and refit it to the relevant disc on the wheel (ZX900 A1 to A6 models only). Offer up the wheel and insert the spindle from the right-hand side **(see illustration)**. Position the

3.1a Refit speedometer gearbox ensuring that it is correctly located . . .



3.1b . . . and refit spacer to right-hand side of the wheel



3.2a Manoeuvre the wheel into position and refit the spindle

Specifications

Electrical system

Voltage	12
Earth (ground)	Negative

Battery

Capacity:	
ZX1100 D models	12 Ah
All other models	14 Ah
Electrolyte specific gravity	1.280 @ 20°C (68°F)

Alternator

Type	Three-phase AC
Rated output:	
ZX900 and ZX1000 A models	25A @ 6000 rpm, 14 volts
ZX1000 B models	24A @ 6000 rpm, 14 volts
ZX1100 C/D models	28.6A @ 6000 rpm, 14 volts
Charging voltage - headlight on:	
ZX900 and ZX1000 A models	13.5 volts @ 4000 rpm
ZX1000 B and ZX1100 C/D models	14.5 volts @ 4000 rpm
Stator coil resistance	Less than 1 ohm
Rotor coil resistance:	
ZX1000 B2 and B3 models	Approximately 6 ohms
All other models	Approximately 4 ohms
Slip ring diameter	14.4 mm (0.57 in)
Service limit	14.0 mm (0.55 in)
Carbon brush projection length	10.5 mm (0.41 in)
Service limit	4.5 mm (0.18 in)

defective and must be renewed. If the lamp still fails to come on the wiring between the switch and warning lamp is at fault, and this should be checked with a continuity tester as described in Section 2 to trace the wire breakage.

3 If the lamp lights while the engine is running, pull over and stop the engine immediately; serious engine damage is likely if the engine is run with low oil pressure. Check first the level of the engine oil and top up if necessary. If this does not cure the problem check the oil pressure, as described in Chapter 4, at the earliest possible opportunity. If the oil pressure is correct the oil pressure switch is likely to be faulty. The switch can be tested only by the substitution of a new component.

11 Switches - general

1 While the switches should give little trouble, they can be tested using a multimeter set to the resistance function or a battery and bulb test circuit. (See 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.

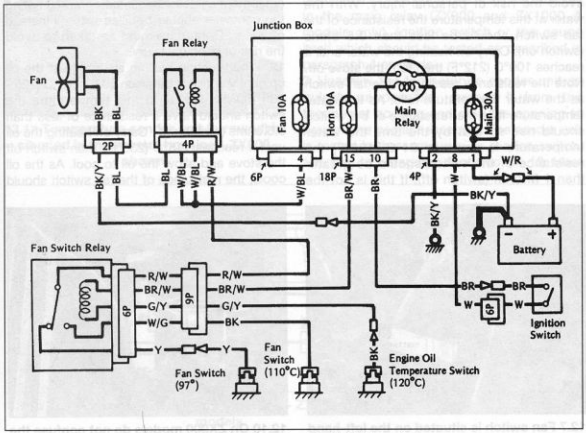
2 As a simple precaution always disconnect the battery (negative lead first) before removing any of the switches, to prevent the possibility of a short circuit. Most troubles are caused by dirty contacts, which can be cleaned, but in the event of the breakage of some internal part, it will be necessary 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 built up with solder, or that a broken wire terminal can be repaired, again using a soldering iron. The handlebar switches may be dismantled to a certain extent. It is however up to the owner to decide if he has the skill 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 WD40 or a similar water-dispersant spray not only prevents problems occurring due to water-logged switches and the resulting corrosion, but also makes the switches much easier and more positive to use. Alternatively, the switch may be packed with a silicone based grease to achieve the same result.

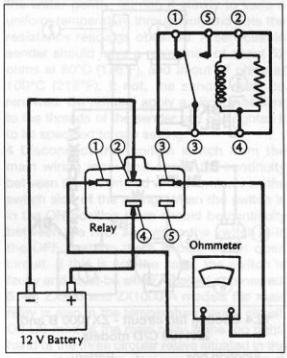
12 Cooling fan system - testing

1 In the event of a malfunction in the cooling fan system, check first that the fan fuse is intact. Refer to the accompanying circuit diagrams and examine all the relevant wiring and connectors for signs of broken or chafed wires or corroded connections. If the fault cannot be traced to the wiring, test the circuit components as described below.



12.2b Cooling fan circuit - ZX900 models

BK Black BL Blue BR Brown G Green R Red W White Y Yellow



12.2a Cooling system fan switch relay test connections - ZX900 models

ZX900 models

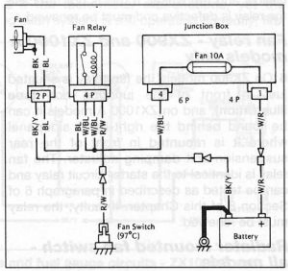
2 Disconnect the 6-pin block connector from the fan switch relay situated below the headlamp unit in the upper fairing section. Using an auxiliary wire connect the red/white wire from the wiring side of the connector to earth **(see illustrations)**. If the fan operates, the fault lies in either the fan switch relay or the fan and oil temperature switches. If not, either the fan relay or the cooling fan itself is at fault.

ZX1000 A models

3 Disconnect the red/white lead from the fan switch on the radiator and ground it to earth **(see illustration)**. If the fan comes on the switch is at fault, and if not either the fan relay or the cooling fan is defective.

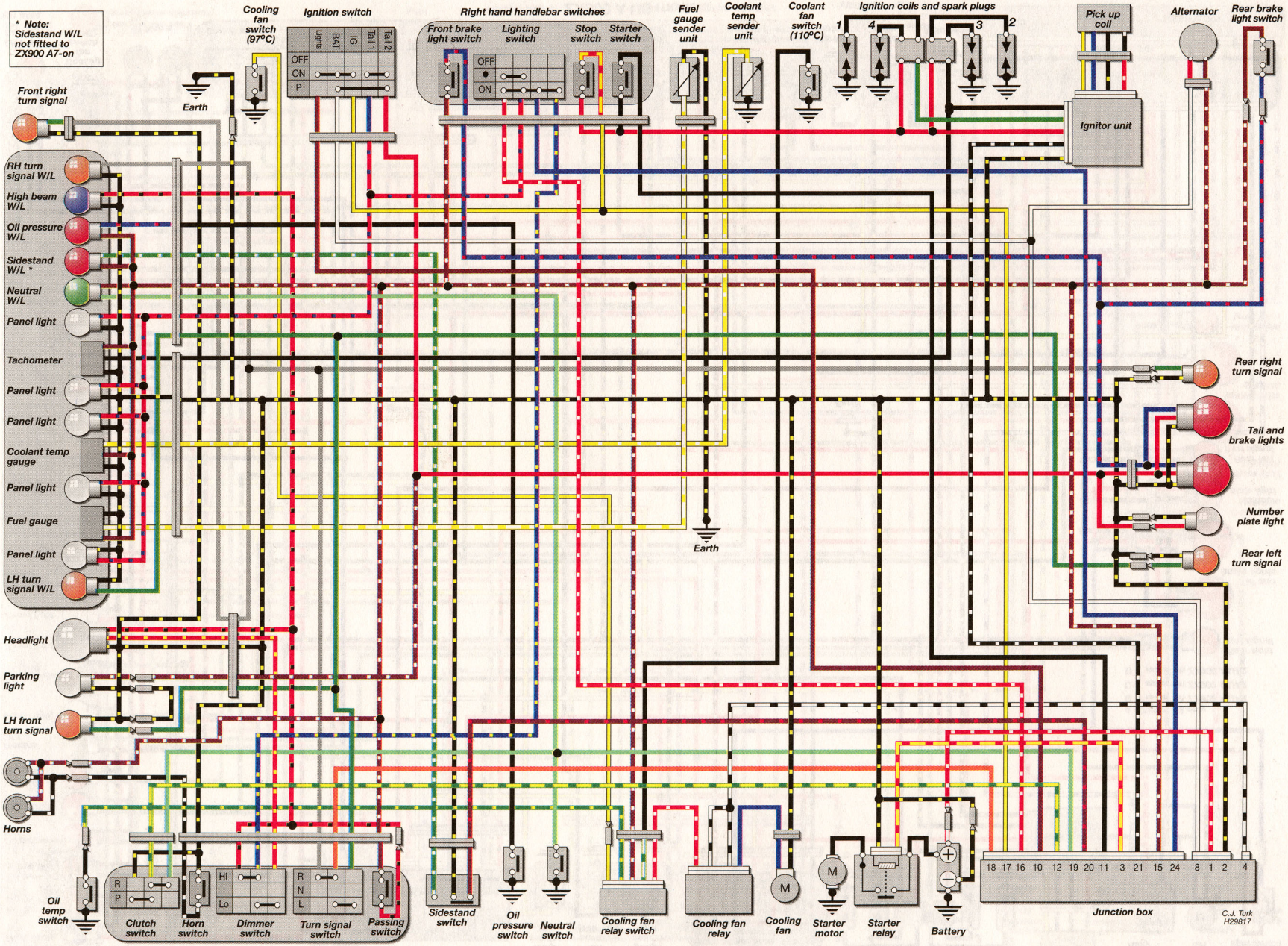
ZX1000 B and ZX1100 C/D models

4 Disconnect the two wires from the fan

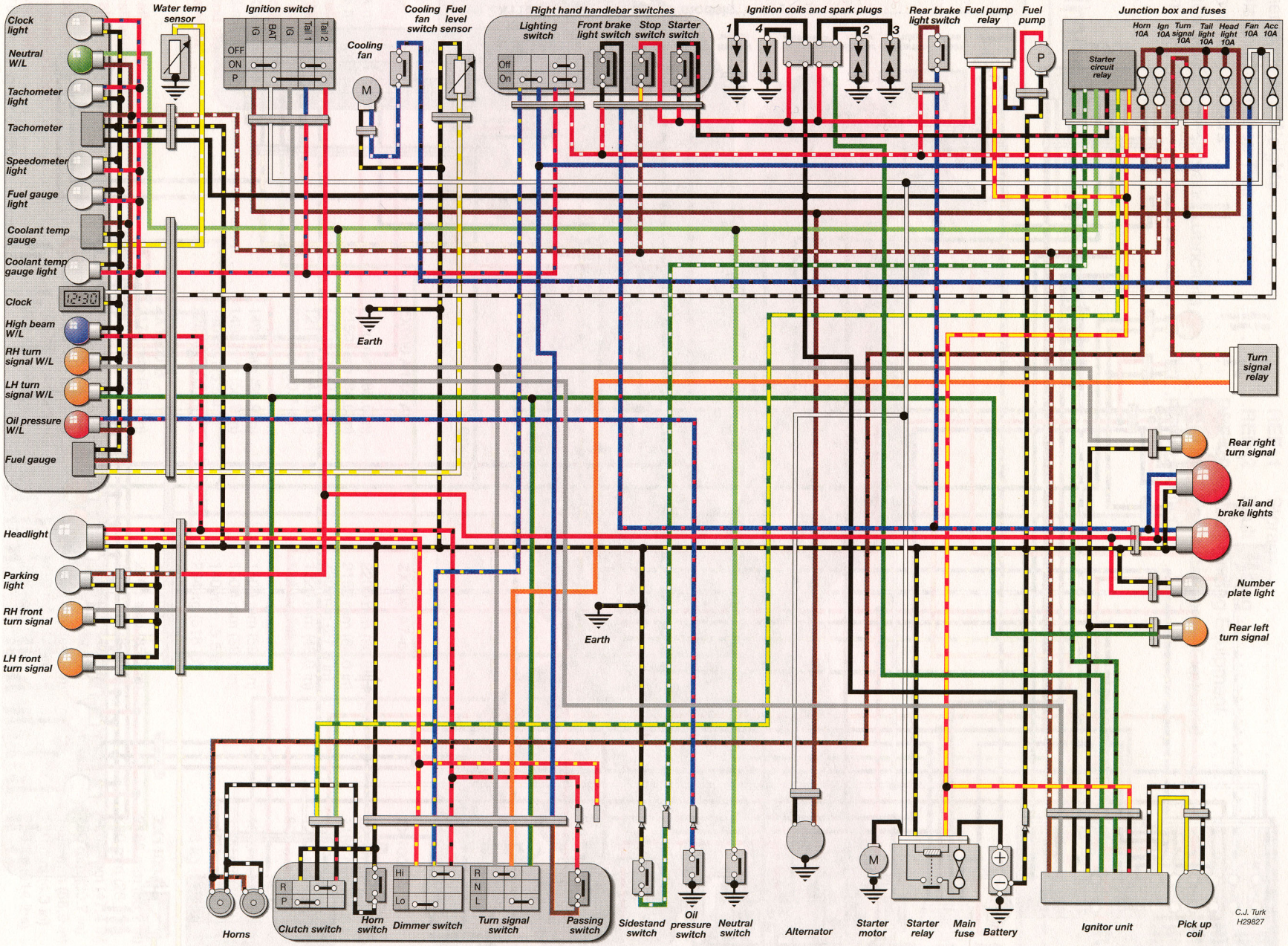


12.3 Cooling fan circuit - ZX1000 A models

BK Black R Red Y Yellow
BL Blue W White



ZX900 A UK models

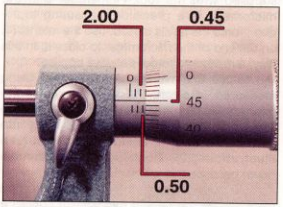


ZX1100 D3, D4 and D5 UK models

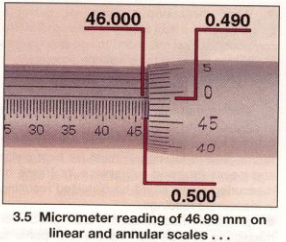
on the thimble will be in graduations of 0.01 mm (or as marked on the frame) - one full revolution of the thimble will move 0.5 mm on the linear scale. Take the reading where the datum line on the sleeve intersects the thimble's scale. Always position the eye directly above the scale otherwise an inaccurate reading will result.

In the example shown the item measures 2.95 mm **(see illustration 3.4)**:

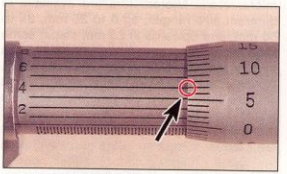
Linear scale	2.00 mm
Linear scale	0.50 mm
Annular scale	0.45 mm
Total figure	**2.95 mm**



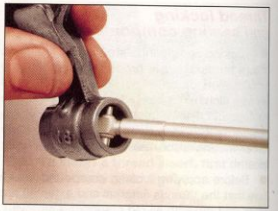
3.4 Micrometer reading of 2.95 mm



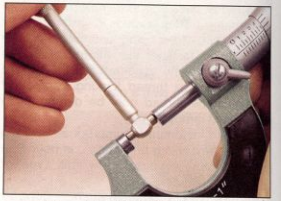
3.5 Micrometer reading of 46.99 mm on linear and annular scales . . .



3.6 . . . and 0.004 mm on vernier scale



3.7 Expand the telescoping gauge in the bore, lock its position . . .



3.8 . . . then measure the gauge with a micrometer

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 perpendicular 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 46.994 mm **(see illustrations 3.5 and 3.6)**:

Linear scale (base)	46.000 mm
Linear scale (base)	00.500 mm
Annular scale (fine)	00.490 mm
Vernier scale	00.004 mm
Total figure	**46.994 mm**

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 illustration 3.7)**. Measure across the gauge ends with a micrometer **(see illustration 3.8)**.

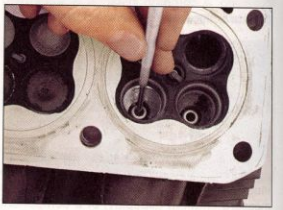
● Very small diameter bores (such as valve guides) are measured with a small hole gauge. Once adjusted to a slip-fit inside the component, its position is locked and the gauge withdrawn for measurement with a micrometer **(see illustrations 3.9 and 3.10)**.

Vernier caliper

Note: *The conventional linear and dial gauge type instruments are described. Digital types are easier to read, but are far more expensive.*

● The vernier caliper does not provide the precision of a micrometer, but is versatile in being able to measure internal and external diameters. Some types also incorporate a depth gauge. It is ideal for measuring clutch plate friction material and spring free lengths.

● To use the conventional linear scale vernier, slacken off the vernier clamp screws (1) and set its jaws over (2), or inside (3), the item 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) where the zero on the sliding scale (5) intersects it, taking the whole number to the left of the zero; this provides the base measurement. View along the sliding scale and select the division which lines up exactly 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.



3.9 Expand the small hole gauge in the bore, lock its position . . .

3.10 . . . then measure the gauge with a micrometer

Conversion Factors

Length (distance)

Inches (in)	x 25.4	=	Millimetres (mm)	x 0.0394	=	Inches (in)
Feet (ft)	x 0.305	=	Metres (m)	x 3.281	=	Feet (ft)
Miles	x 1.609	=	Kilometres (km)	x 0.621	=	Miles

Volume (capacity)

Cubic inches (cu in; in^3)	x 16.387	=	Cubic centimetres (cc; cm^3)	x 0.061	=	Cubic inches (cu in; in^3)
Imperial pints (Imp pt)	x 0.568	=	Litres (l)	x 1.76	=	Imperial pints (Imp pt)
Imperial quarts (Imp qt)	x 1.137	=	Litres (l)	x 0.88	=	Imperial quarts (Imp qt)
Imperial quarts (Imp qt)	x 1.201	=	US quarts (US qt)	x 0.833	=	Imperial quarts (Imp qt)
US quarts (US qt)	x 0.946	=	Litres (l)	x 1.057	=	US quarts (US qt)
Imperial gallons (Imp gal)	x 4.546	=	Litres (l)	x 0.22	=	Imperial gallons (Imp gal)
Imperial gallons (Imp gal)	x 1.201	=	US gallons (US gal)	x 0.833	=	Imperial gallons (Imp gal)
US gallons (US gal)	x 3.785	=	Litres (l)	x 0.264	=	US gallons (US gal)

Mass (weight)

Ounces (oz)	x 28.35	=	Grams (g)	x 0.035	=	Ounces (oz)
Pounds (lb)	x 0.454	=	Kilograms (kg)	x 2.205	=	Pounds (lb)

Force

Ounces-force (ozf; oz)	x 0.278	=	Newtons (N)	x 3.6	=	Ounces-force (ozf; oz)
Pounds-force (lbf; lb)	x 4.448	=	Newtons (N)	x 0.225	=	Pounds-force (lbf; lb)
Newtons (N)	x 0.1	=	Kilograms-force (kgf; kg)	x 9.81	=	Newtons (N)

Pressure

Pounds-force per square inch (psi; lbf/in^2; lb/in^2)	x 0.070	=	Kilograms-force per square centimetre (kgf/cm^2; kg/cm^2)	x 14.223	=	Pounds-force per square inch (psi; lbf/in^2; lb/in^2)
Pounds-force per square inch (psi; lbf/in^2; lb/in^2)	x 0.068	=	Atmospheres (atm)	x 14.696	=	Pounds-force per square inch (psi; lbf/in^2; lb/in^2)
Pounds-force per square inch (psi; lbf/in^2; lb/in^2)	x 0.069	=	Bars	x 14.5	=	Pounds-force per square inch (psi; lbf/in^2; lb/in^2)
Pounds-force per square inch (psi; lbf/in^2; lb/in^2)	x 6.895	=	Kilopascals (kPa)	x 0.145	=	Pounds-force per square inch (psi; lbf/in^2; lb/in^2)
Kilopascals (kPa)	x 0.01	=	Kilograms-force per square centimetre (kgf/cm^2; kg/cm^2)	x 98.1	=	Kilopascals (kPa)
Millibar (mbar)	x 100	=	Pascals (Pa)	x 0.01	=	Millibar (mbar)
Millibar (mbar)	x 0.0145	=	Pounds-force per square inch (psi; lbf/in^2; lb/in^2)	x 68.947	=	Millibar (mbar)
Millibar (mbar)	x 0.75	=	Millimetres of mercury (mmHg)	x 1.333	=	Millibar (mbar)
Millibar (mbar)	x 0.401	=	Inches of water (inH_2O)	x 2.491	=	Millibar (mbar)
Millimetres of mercury (mmHg)	x 0.535	=	Inches of water (inH_2O)	x 1.868	=	Millimetres of mercury (mmHg)
Inches of water (inH_2O)	x 0.036	=	Pounds-force per square inch (psi; lbf/in^2; lb/in^2)	x 27.68	=	Inches of water (inH_2O)

Torque (moment of force)

Pounds-force inches (lbf in; lb in)	x 1.152	=	Kilograms-force centimetre (kgf cm; kg cm)	x 0.868	=	Pounds-force inches (lbf in; lb in)
Pounds-force inches (lbf in; lb in)	x 0.113	=	Newton metres (Nm)	x 8.85	=	Pounds-force inches (lbf in; lb in)
Pounds-force inches (lbf in; lb in)	x 0.083	=	Pounds-force feet (lbf ft; lb ft)	x 12	=	Pounds-force inches (lbf in; lb in)
Pounds-force feet (lbf ft; lb ft)	x 0.138	=	Kilograms-force metres (kgf m; kg m)	x 7.233	=	Pounds-force feet (lbf ft; lb ft)
Pounds-force feet (lbf ft; lb ft)	x 1.356	=	Newton metres (Nm)	x 0.738	=	Pounds-force feet (lbf ft; lb ft)
Newton metres (Nm)	x 0.102	=	Kilograms-force metres (kgf m; kg m)	x 9.804	=	Newton metres (Nm)

Power

Horsepower (hp)	x 745.7	=	Watts (W)	x 0.0013	=	Horsepower (hp)

Velocity (speed)

Miles per hour (miles/hr; mph)	x 1.609	=	Kilometres per hour (km/hr; kph)	x 0.621	=	Miles per hour (miles/hr; mph)

Fuel consumption*

Miles per gallon (mpg)	x 0.354	=	Kilometres per litre (km/l)	x 2.825	=	Miles per gallon (mpg)

Temperature

Degrees Fahrenheit = (°C x 1.8) + 32

Degrees Celsius (Degrees Centigrade; °C) = (°F - 32) x 0.56

** It is common practice to convert from miles per gallon (mpg) to litres/100 kilometres (l/100km), where mpg x l/100 km = 282*

This Section provides an easy reference-guide to the more common faults that are likely to afflict your machine. Obviously, the opportunities are almost limitless for faults to occur as a result of obscure failures, and to try and cover all eventualities would require a book. Indeed, a number have been written on the subject.

Successful troubleshooting is not a mysterious 'black art' but the application of a bit of knowledge combined with a systematic and logical approach to the problem. Approach any troubleshooting by first accurately identifying the symptom and then checking through the list of possible causes, starting with the simplest or most obvious and progressing in stages to the most complex. Take nothing for granted, but above all apply liberal quantities of common sense.

The main symptom of a fault is given in the text as a major heading below which are listed the various systems or areas which may contain the fault. Details of each possible cause for a fault and the remedial action to be taken are given. Further information should be sought in the relevant Chapter.

1 Starter motor problems

- ☐ Starter motor not rotating
- ☐ 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 inadequate
- ☐ 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 cylinder
- ☐ Valve noise or tapping from cylinder head
- ☐ Other noises

12 Abnormal transmission noise

- ☐ Clutch noise
- ☐ Transmission noise

13 Exhaust smokes excessively

- ☐ White/blue smoke (caused by oil burning)
- ☐ Black smoke (caused by over-rich mixture)

14 Oil pressure indicator lamp goes on

- ☐ Engine lubrication system failure
- ☐ Electrical system failure

15 Poor handling or roadholding

- ☐ Directional instability
- ☐ Steering bias to left or right
- ☐ Handlebar vibrates or oscillates
- ☐ 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

- ☐ Brakes are spongy or ineffective
- ☐ Brakes drag
- ☐ Brake lever or pedal pulsates in operation
- ☐ Disc brake noise
- ☐ Brake induced fork judder

18 Electrical problems

- ☐ Battery dead or weak
- ☐ Battery overcharged
- ☐ Total electrical failure
- ☐ Circuit failure
- ☐ Bulbs blowing repeatedly