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### 7 Rear axle – disassembly, inspection and assembly – KLT110 models

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- 1 Remove the rear axle. See Section 6.
- 2 The hubs can be separated from the wheels by unscrewing the wheel lug nuts, if required. Refit the hubs to the wheels and tighten the nuts in a diagonal sequence to the specified torque setting on installation.
- 3 Remove fully the two brake drum retaining nuts and withdraw the drum. Pull the axle shaft out of the bearing housing/brake panel.
- 4 Disassemble and service the brake components as described in Chapter 7.
- 5 Place the bearing housing/brake panel on two wooden blocks, pry the tube to one side, then use a hammer and drift to tap out the left bearing with the spacer tube. Invert the housing and tap out the remaining bearing.
- 6 Examine the bearings and renew them if necessary as described in Chapter 7. Renew the axle if it is bent, worn or damaged.
- 7 Remove and service the sprocket assembly described in Section 5.
- 8 On installation, pack the bearings with grease, and fit first the left bearing with its sealed surface outwards. Use a tubular drift such as a socket spanner which bears only on the bearing outer race to drive the bearing in until it is flush with the surrounding housing. Fit the spacer tube with its flange on the left and fit the second bearing as described for the first.
- 9 Assemble the sprocket and brake components as described.
- 10 Refit the axle to the machine.

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### 8 Rear axle – disassembly, inspection and assembly – KLT200 B and KLT250 A models

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- 1 Remove the rear axle. See Section 6.
- 2 Remove the hub nuts and outer washers then slide off the wheel/hub assemblies followed by the inner washers. Withdraw the bearing housings and springs.
- 3 Flatten back the raised tabs of the two lock washers, remove the four nuts and bolts and withdraw the brake drum and sprocket.
- 4 Disassemble and service the brake components as described in Chapter 7.
- 5 Service the sprocket as described in Section 5.
- 6 Check the condition of the bearings as described in Chapter 7. If they rotate roughly or with signs of binding, or if they are obviously damaged or worn, they must be renewed. They can only be removed and installed using a press with the appropriate fittings; take the assembly to a Kawasaki Service Agent or competent repair shop for the work to be done.
- 7 Check that the axle is straight and undamaged, looking carefully at the splines and threads for signs of damage. Renew the axle if necessary.
- 8 On installation, fit the sprocket and brake drum to the axle flange, tighten the nuts in a diagonal sequence to the specified torque setting and secure the nuts by bending up an unused tab of the lock washer against a flat of each nut. Note that each lock washer can be used twice only and must then be renewed; never re-use lock washer tabs.
- 9 Reverse the removal procedure to fit the remaining components. Grease the axle splines before refitting the wheel/hub assemblies and tighten the hub nuts to the specified torque setting. Install new cotter pins to secure the nuts.

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### 9 Rear axle – disassembly, inspection and reassembly – KLT200 A models

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- 1 Remove the rear axle. See Section 6.
- 2 Remove the hub nuts and washers and pull off the wheel/hub assemblies, then remove the circlips from the axle.
- 3 Slide off the bearing housings and differential cover, then remove the four self-locking nuts and pull off the brake drum and sprocket.
- 4 If the differential is in the locked-axle mode (see Section 12), remove the locking plate and slacken the locknut and adjuster.
- 5 Unscrew the four differential case clamp bolts and separate the case halves, then remove the adjuster assembly, the spider gears and shaft and slide out the axle shafts noting any thrust washers present.

6 If bearing removal is necessary, the bearings must be pressed off the hubs and differential case halves. Examine the bearings as described in Chapter 7 and take the assemblies to a Kawasaki Service Agent or reputable repair shop for the old bearings to be removed and new ones to be pressed into place.

7 Measure the inside diameter of the differential bushings in the vertical and horizontal planes at the inside and outside of each bushing. If any measurement exceeds the service limit specified, the case must be renewed on A1, A2 and A3 models. On A4 and A4A models the bushings can be renewed, but this requires the use of a press with suitable fittings. If this is the case, take the differential case halves to a Kawasaki Service Agent or reputable repair shop for the work to be done.

8 Measure the thickness of the thrust washer under the axle gears and behind each spider gear. If any are worn to less than the specified service limit, or if any are scored, damaged or discolored, they must be renewed.

9 Measure the spider gear internal diameters and the outside diameter of the spider gear shafts. If any component is worn at any point to beyond the specified service limit, it must be renewed. It is recommended that if one spider gear is renewed, then both gears, the shaft and the thrust washers should be renewed as well.

10 Check the axle shaft gears and locking gear for wear or damage. The axle gears are splined to the shafts and can be pulled off after removing the retaining circlips, if free play is felt and the gears are to be renewed.

11 Use a dial gauge and two V-blocks to measure the amount of each axle shaft. If the runout exceeds the specified service limit, replace the shaft. Measure the shaft diameter at the points where it bears on the differential case bushing. If the shaft is worn at any point to less than the specified service limit, it must be renewed.

12 Thoroughly clean all components in high flash-point solvent and make a careful examination of each. If any cracks or splits are found, or signs of excessive wear or damage are noted, the component concerned must be renewed.

13 Disassemble and service the brake components as described in Chapter 7.

14 Service the sprocket as described in Section 5.

15 On installation, lubricate the differential bushings and all components with Sears No. 59071 grease. A maximum of 100 cc (3.4 fl oz) is to be packed into the casing and should be smeared over all points of contact such as gear teeth and shaft bearing surfaces.

16 Push the gears on to the axle shaft splines and refit the circlips with the rounded edge of each circlip against its gear. **Caution:** if the circlip is not installed as described, it may slip out of its groove when the machine is turning, allowing the inside rear wheel and axle shaft to pull out of the housing; the sharp edge must be fitted to take the thrust.

17 Fit the thrust washer on each axle shaft next to the gear and fit the shafts to the case halves, pushing them through from the inside. Note that the longer axle shaft is fitted to the case whose clamping bolt holes are not threaded. Fit the larger circlip in the groove in each axle shaft's outer end, with the rounded edge facing outwards. **Note:** if each circlip is not installed as described it may slip out of its groove when the hub nut is tightened, allowing excessive side load to be applied to the bearings, which would soon fail; the circlip sharp edge must be fitted to take the thrust.

18 Select the case half with the longer axle shaft and check that all four locating dowels are in place in it. Fit the spider gears to their shaft and refit the thrust washers in the same positions as before removal, then install the assembly in the casing. Screw the differential adjuster nut as far as possible against the gear, so that it is in the unlocked mode and fit the assembly in the casing. Check that the full amount of grease has been packed in.

19 If serious grease leaks have been encountered, apply a thin bead of sealant to the case mating surfaces. Fit the two case halves together then refit the bolts from right to left. Screw them fully into place then tighten them in a diagonal sequence to the specified torque setting.

20 Refit the sprocket and brake drum, then check that the self-locking nuts are in good condition. If they no longer lock firmly, they must be renewed. Tighten the nuts in a diagonal sequence to the specified torque setting.

21 Slide the bearing housings into place over the inner bearings and fit the hubs so that their bearings fit inside the housings. Install the washers and nuts and tighten both hub nuts to the specified torque setting.

22 The axle assembly must have some side play in its housings or the

bearings will be overstressed and will fail. Install the axle temporarily in the frame and support the rear of the vehicle on a stand so that the wheels are clear of the ground. Push the left wheel as far to the right as possible then push the right wheel as far to the left as possible and measure the amount of movement at the end of the left bearing housing. If side play is correct, a movement of 0.5 – 4.5 mm (0.020 – 0.180 in) should be measured.

### 10 Rear axle – disassembly, inspection and reassembly – KLT200 C, KLT250 C and P models

- 1 Remove the axle from the machine. See Section 6.
- 2 Disassemble the differential shifter. See Section 11.
- 3 Remove the right hub cover. Slacken the hub nuts and unscrew them, then pull off the wheel/hub assemblies. The hubs can be removed from the wheels, if required, by removing the four wheel lug nuts.
- 4 Slide off the right bearing housing and the left bearing housing/brake panel.
- 5 Remove the four self-locking nuts and washers and remove the brake drum and sprocket. Do not lose the washers, which are specially hardened.
- 6 Hold the differential casing in a vise padded with rag and unscrew the case clamp bolts. Do not lose the washer under each bolt head as these are specially hardened. Tap the case sections with a soft-faced mallet to break the joint and separate the three parts. Mark the left and right end sections to avoid confusion on assembly.
- 7 Slide the pinion gears off their shafts, unscrew the Allen bolts and withdraw the bolts, special washers and O-rings, then press out the shafts.
- 8 Pull the shifter and shifter rod out of the left axle shaft, remove the circlip inside the shifter and pull the shifter off its rod. The remaining circlip may now be removed if required.
- 9 Slide the axle gears off the axle splines, remove the circlip and thrust washer from each axle and pull out the axle shafts. The left shaft has a small oil seal in its inside end which must be prised out and renewed as a matter of course.
- 10 Similarly pry out the oil seals in the case left and right end sections and renew them. If the case bushings or bearings are to be renewed, they must be pressed off or out of the casing using a press with suitable fittings. Take the assembly to a Kawasaki Service Agent for the worn items to be removed and new ones fitted. Note that the bushings should be pressed in from the inside.
- 11 To remove the bearing at the outer end of each housing, remove the retaining circlip and press out the bearing. The collar inserted in each bearing may be removed with a press, if required. Note that the collar shoulder must be on the inside on installation.
- 12 If the differential was packed with grease, remove every trace of it, washing all components in high flash-point solvent, and fill the casing with the specified quantity and type of oil. See Chapter 1.
- 13 Disassemble and service the brake components as described in Chapter 7.
- 14 Service the sprocket as described in Section 5.
- 15 Check all bearings as described in Chapter 6. If any are worn or damaged they must be renewed as described in paragraphs 10 and 11 above.
- 16 Measure the inside diameter of the bushings in the case right and left end sections, taking measurements in the vertical and horizontal planes at several points along each bushing. Measure the axle diameter at the points of contact with the bushings. If any component is worn at any point to beyond the service limit specified, it must be renewed.
- 17 Measure the thickness of the axle shaft thrust washers. If any is worn to less than the specified service limit or if it is seen to be scored, damaged or discolored it must be renewed.
- 18 Measure the inside diameter of each pinion gear at several points and the diameter of each shaft. If any is worn to beyond the specified service limit it must be renewed.
- 19 Hold a straight edge across the mating surface of each case end section and use a vernier caliper depth gauge to measure the distance from the straight edge to the thrust surface. Take two measurements at several points, one on an unworn part, the other in the worn area, then subtract the smaller measurement from the larger. If the result is more than the specified service limit (there should be no reasonable wear, or difference between measurements, in an unworn case) the case must be renewed.

20 Check that the axle shafts are undamaged with no trace of distorted splines, bending or other wear. Use a dial gauge and two V-blocks to measure each shaft's runout. If this is greater than the specified service limit the shaft must be renewed.

21 Check that all components are thoroughly cleaned and inspect each one. Any that show signs of obvious damage or wear must be renewed.

22 Before installation, check that all bearings, bushings and oil seals have been renewed (if necessary) and are correctly installed.

23 The shorter axle shaft should be inserted into the case left end section (which should have a locating dowel pin in its gasket surface); fit the thrust washer and circlip then tap on the plain axle gear. Note that the left axle shaft should have a new shifter rod oil seal fitted in its inner end. Fit the longer axle shaft, with its thrust washer, circlip and gear (with locking holes) to the case right end section.

24 Do not forget to lubricate all components, as they are refitted, with the specified lubricant. See Chapter 1.

25 Insert the inner circlip into the shifter, fit the shifter rod with its end plate inside the shifter to engage with the shifter splines then fit the second circlip. Fit the large spring over the shifter rod, smear oil over the shifter rod and seal lips, then install the shifter assembly, pressing it fully onto the left axle shaft splines.

26 Fit the pinion gear shafts from the inside into the holes in the center case, press new O-rings into the grooves on the outside, apply thread locking compound to their threads and install the two Allen bolts with their special washers (do not substitute ordinary washers). Tighten the bolts to the specified torque setting. Wipe all gasket surfaces with a rag soaked in solvent to degrease them.

27 Coat the gasket surfaces of all the three cases with Kawasaki Bond Sealant (part number 92104-002) or similar. When the sealant is tacky, place the correct gasket (note the locating dowel hole) on to the left case gasket surface and press it down. Lubricate the pinion gear shafts, refit the pinion gears and fit the center and left cases together ensuring that the locating dowel aligns correctly.

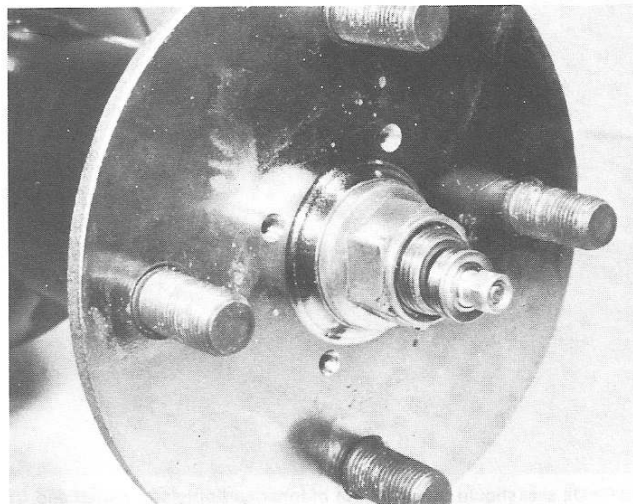
28 Fit the correct gasket to the right case, as described above, refit it on to the assembly then refit the case clamp bolts with their special washers (do not use ordinary washers, which may distort under pressure). Tighten the case bolts in a diagonal sequence to the specified torque setting.

29 Install the sprocket and brake drum on the case assembly and fit the special washers to each mounting bolt end (do not use ordinary washers). Check that the self-locking bolts are in good condition; if they no longer lock firmly they must be renewed. Fit the nuts and tighten them in a diagonal sequence to the specified torque setting.

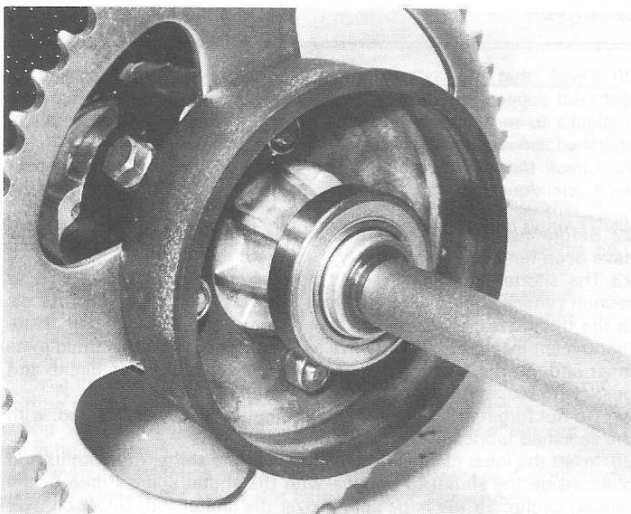
30 Install the bearing housings and grease the axle splines before refitting the wheel/hub assemblies. Tighten the hub nuts to the specified torque setting.

31 Refit the differential shifter. See Section 11.

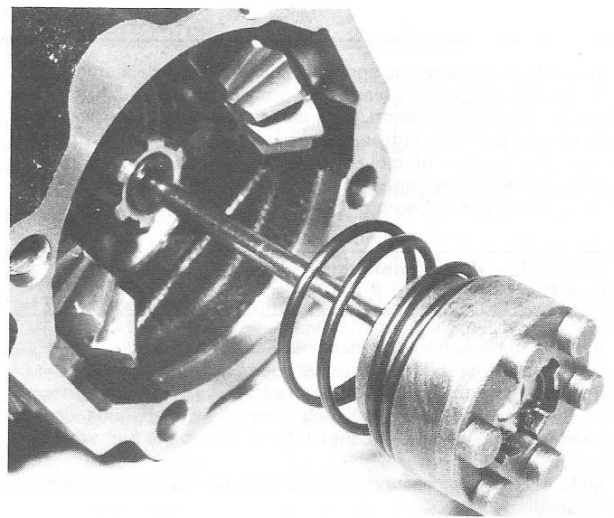
32 Fill the axle with the correct amount of the specified lubricant when it has been refitted to the machine.



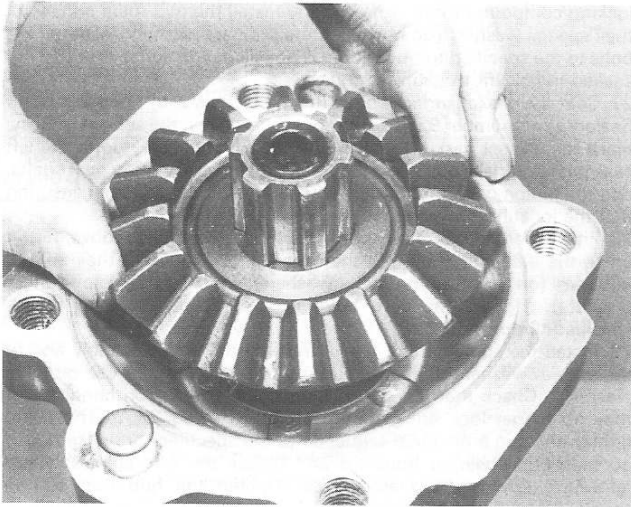
10.2 Remove differential shifter to allow access to left hub nut



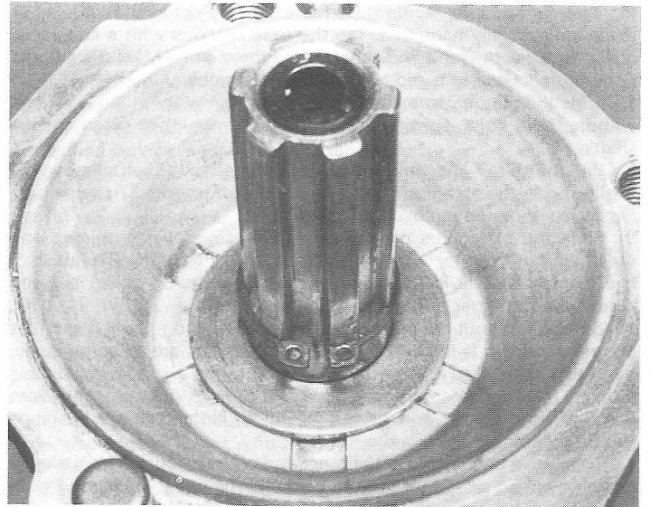
10.5 Remove four nuts and washers to release brake drum and sprocket from differential – bearings must be pressed off casing



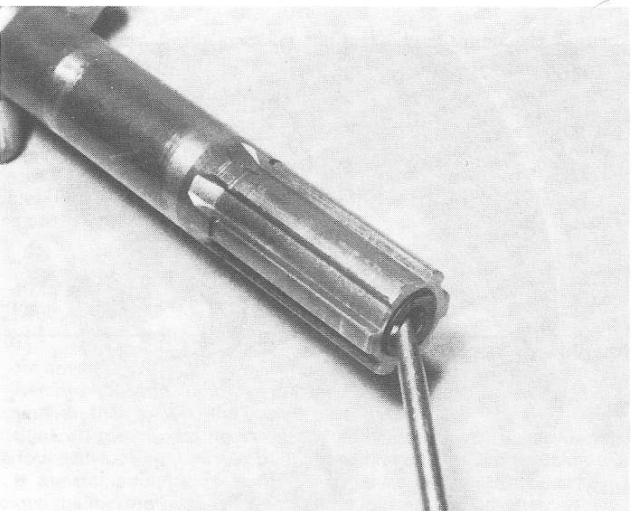
10.8 Pull differential shifter and shifter rod out of left axle shaft



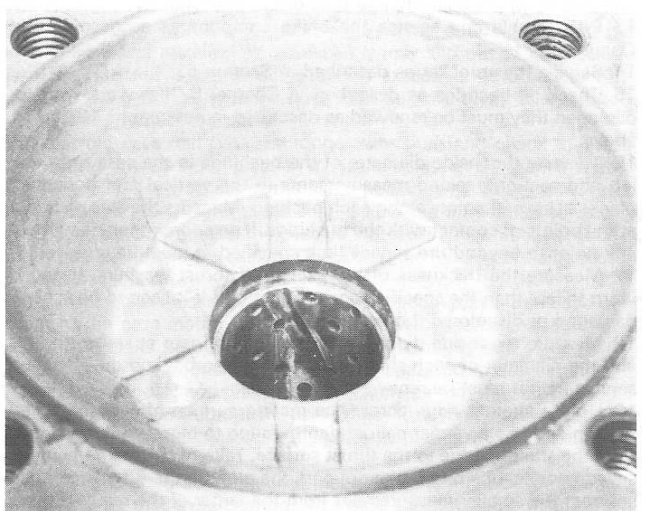
10.9a Pull axle gears off shafts ...



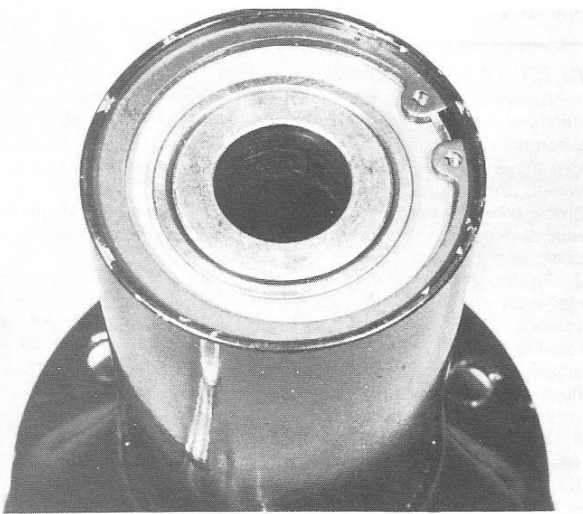
10.9b ... then withdraw circlip and thrust washer to release each shaft



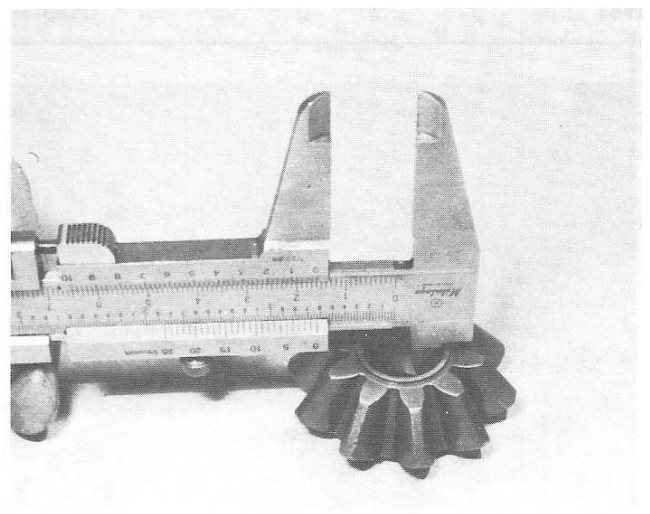
10.9c Oil seal should be prised out of inner end of left axle shaft and renewed whenever it is disturbed



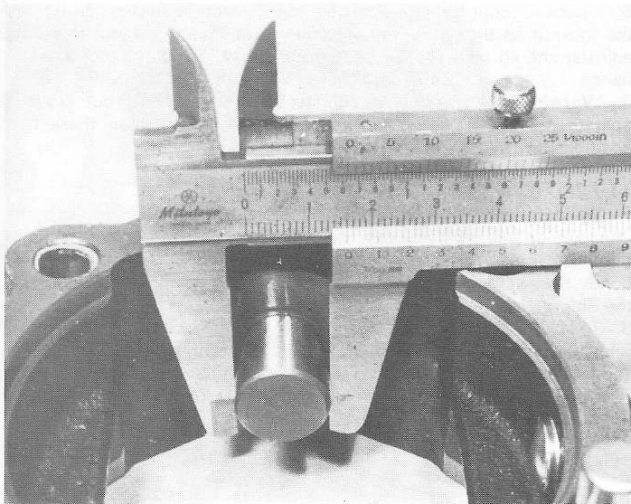
10.10 Bushings in differential case halves can only be removed or refitted using a press



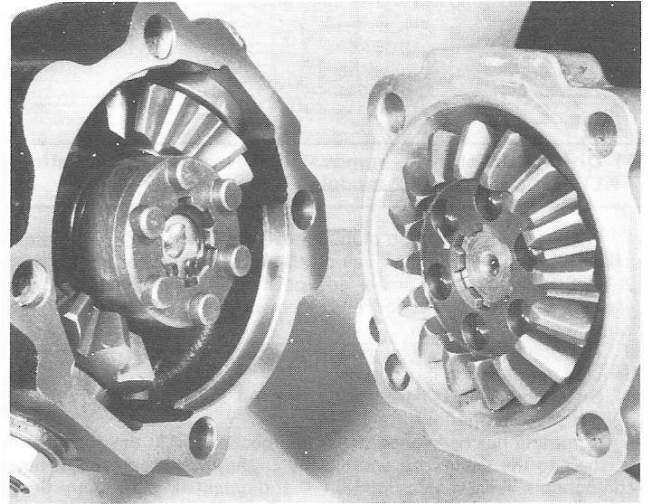
10.11 Withdraw circlip to allow axle bearings to be pressed out – note correct fitted position of centre collar



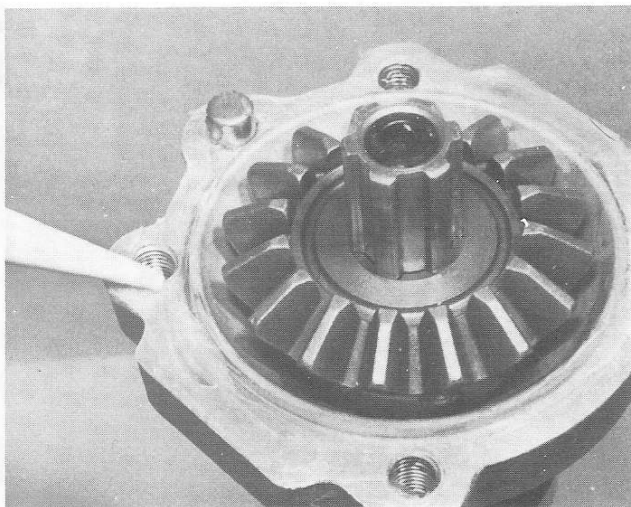
10.18a Measuring inside diameter of differential pinion gear



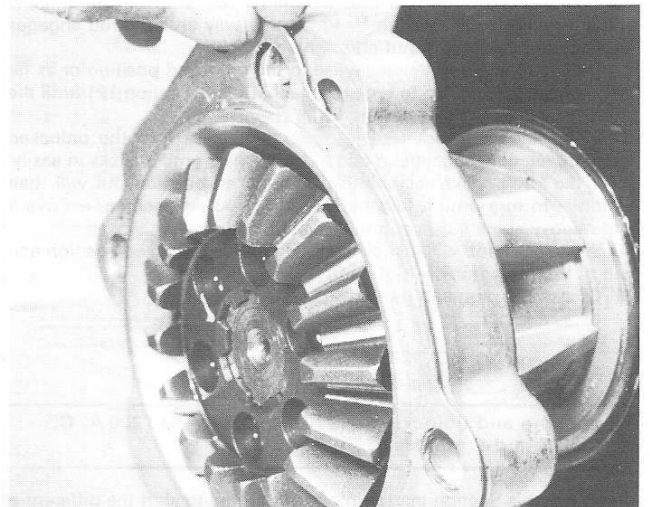
10.18b Measuring pinion gear shaft diameter



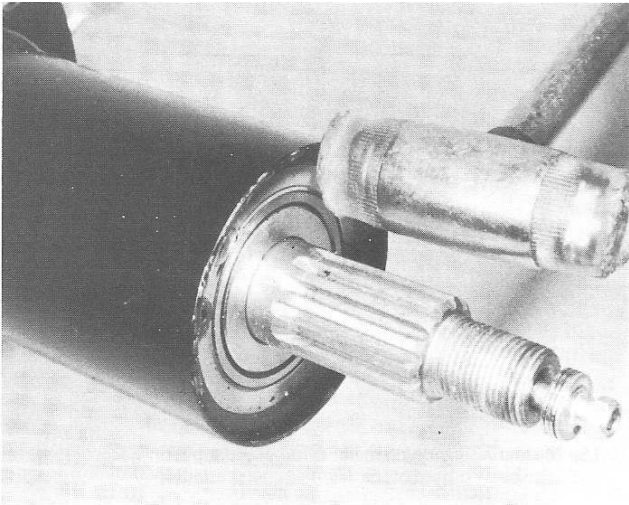
10.26 Ensure all components are correctly refitted, then clean gasket surfaces ...



10.27a ... apply thin coat of specified sealant – note dowel pin in left case half



10.27b Ensure correct gasket is used on each joint – right case shown



10.30 Tap bearing housings over inner bearings

### 11 Differential shifter – removal, inspection and installation – KLT200 C, 250 C and P models

- 1 Pry out the shifter knob plug, remove the locknut and collar from inside the shifter knob, then pull off the knob and rubber boot.
- 2 Noting their exact number and position, remove the adjustment washers from the shifter rod end, then remove the four screws and withdraw the shifter cam.
- 3 Thoroughly clean all components, check each one for wear or damage and renew it if necessary.
- 4 On assembly install the shifter cam on the left wheel hub and tighten securely the four screws.
- 5 If nothing has been changed in the mechanism, fit the adjustment washers to the shifter rod end exactly as they were removed. If new components have been fitted in the differential, start with three washers.
- 6 Grease the inside of the rubber boot at each end, then slide the larger end on to the shifter knob. Fit the collar into the shifter knob then push the knob assembly on to the cams in the locked (furthest in on the cam track) position so that the shifter rod projects through the collar; turn the knob through  $\frac{1}{4}$  turn either way until the rod engages correctly. Install the locknut and tighten it lightly.
- 7 Turn the knob counterclockwise to the unlocked position or as far as it will go. It may help to rock the machine (see Section 12) until the shifter engages, then repeat the test.
- 8 If the knob will not turn far enough to click into the unlocked position, remove it again and add more washers until it clicks in easily.
- 9 If the knob clicks easily into the unlocked position but will then continue to turn until it falls back into the locked position, remove it and remove some washers until the action is correct.
- 10 When the knob will just click easily into the unlocked position and will not turn any further, tighten the locknut.
- 11 Grease the plug and press it into the knob.

### 12 Locking and unlocking the differential – KLT200 A, C, KLT250 C and P models

**Caution:** this Section merely informs you how to shift the differential from one mode to the other. Refer to your vehicle's Owners Manual for advice on the very different techniques necessary when riding a KLT in either the locked- or unlocked-axle modes.

#### KLT200 A model

1 Before shifting the differential mode, wash all dirt away from the differential cover inspection plate so that none drops into the chain case when the cover is removed. Lift the rear of the machine on to a stand so that the wheels are clear of the ground, remove the plate and turn the wheels until the shifter appears.

**Note:** take care not to drop anything into the chain case. Recovery will require the careful use of a magnet or similar, or the disassembly of the chain case.

2 To shift into locked-axle mode, slacken the adjuster locknut with a 14 mm spark plug wrench (supplied in the vehicle's toolkit), then screw in (clockwise) the adjuster with an Allen-type hex wrench, while slowly rotating one wheel, until the adjuster stops. **Do not** overtighten the adjuster as this may damage the differential assembly; it should be nearly flush with the nut or 11.0 – 11.5 mm (0.43 – 0.45 in) proud of the flange (see accompanying illustration).

3 Hold steady the adjuster and tighten the locknut securely. If a torque wrench is available, tighten the locknut to a torque setting of 4.2 kgf m (30 lbf ft). Finally install the locking plate, tightening its two screws securely. Ensure the slate engages fully with the adjuster.

4 To unlock the axle, ie to shift into differential mode, remove its two bolts and withdraw the locking plate; store all three components in the vehicle's toolkit for future use. Slacken the locknut with the spark plug wrench.

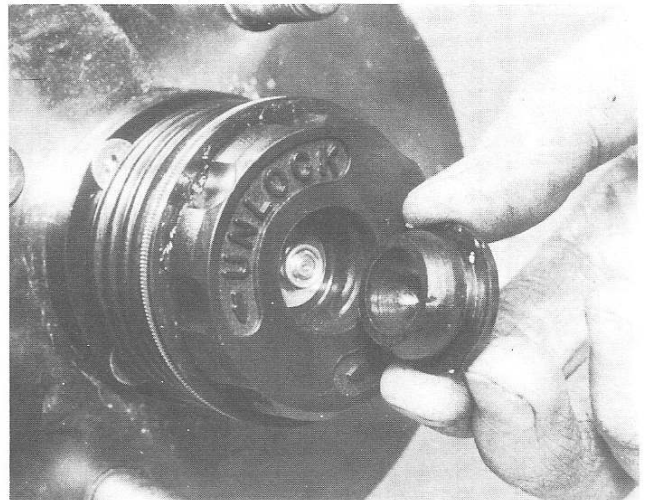
5 Unscrew (counterclockwise) the adjuster until it stops, then tighten the locknut securely; use the specified torque setting if possible. The adjuster should now be 19.5 – 20.0 mm (0.77 – 0.79 in) proud of the flange.

6 **Warning:** always have the adjuster screwed fully in or out. **Do not** operate the vehicle with the adjuster anywhere between these two positions or the differential may be damaged.

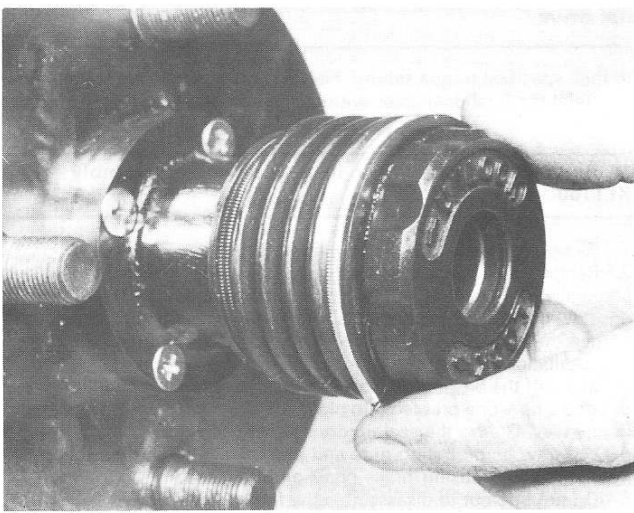
#### KLT200 C, KLT250 C and P models

7 To shift into the locked-axle mode, stop the machine with the transmission in neutral and turn the shifter knob (situated in the center of the left rear wheel)  $\frac{1}{4}$  turn to the right (clockwise). Rock the machine gently backwards and forwards until the shifter is felt to engage inside the differential.

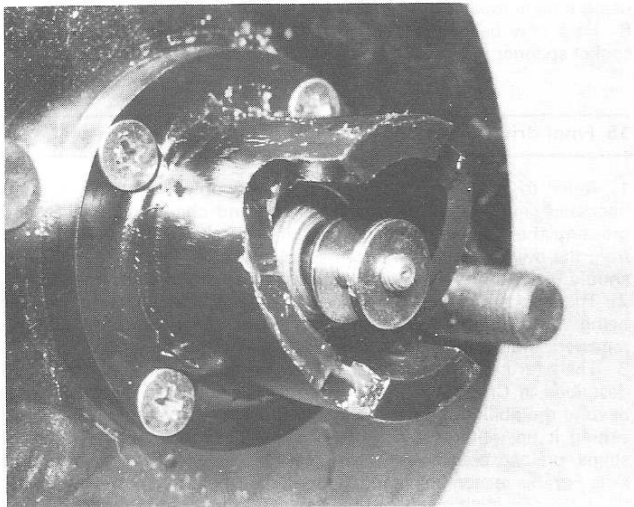
8 To shift into differential mode, ie to unlock the axle, stop the machine with the transmission in neutral and turn the knob  $\frac{1}{4}$  turn to the left (counterclockwise). If the knob will not turn, push the handlebar on to full lock (either side) and rock the machine gently backwards and forwards until the shifter disengages and the knob clicks into place.



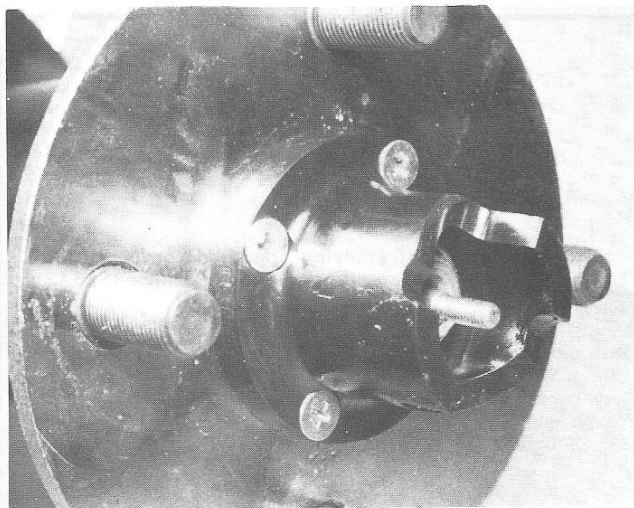
11.1a Pry out shifter knob plug, unscrew locknut and collar ...



11.1b ... then withdraw knob and boot

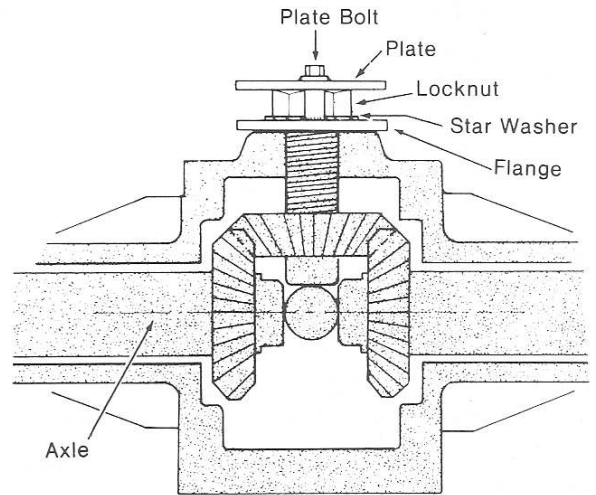
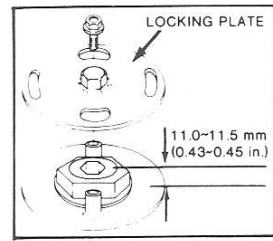


11.2 Note exact number and position of adjustment washers before removing



11.4 Tighten mounting screws securely on refitting shifter cam

*Locked axle mode*



*Differential mode*

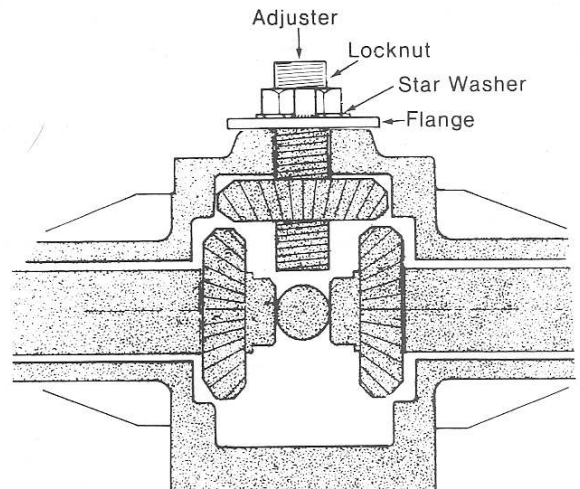
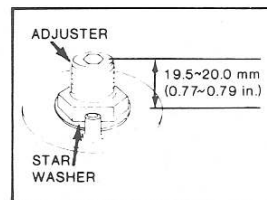


Fig. 6.8 Differential shifter - KLT200 A (Sec 12)

### 13 Rear axle – removal and installation – KLT160

- 1 Drain the final drive gear case oil. See Chapter 1.
- 2 If the axle is to be disassembled, remove the cotter pins, apply the rear brake and slacken both rear hub nuts. Also, remove the four retaining bolts and slide back the brake cover, then apply the rear brake and slacken both brake drum retaining nuts.
- 3 Lift the rear of the machine on to a stand so that the rear wheels are clear of the ground.
- 4 Unscrew the brake adjusting nuts and pull out the operating rod and cable, taking care not to lose the joints, washers and springs.
- 5 Slacken the clamp securing the propeller shaft cover rear end to the final drive case.
- 6 Remove the four bolts securing the final drive case to the frame or its mounting bracket, then remove the four bolts securing the bearing housing/brake panel to the frame. Withdraw the case bracket and pull the breather hose out of the frame, noting carefully its routing.
- 7 Pull the rear axle out of the frame, noting that the coil spring should come off with the axle. If the oil has not been drained, be careful to keep the axle the correct way up to prevent oil from leaking out of the breather hose.
- 8 Installation is the reverse of removal, noting the following points. Inspect the propeller shaft joint and splines, and lubricate them before installation. See Chapter 1.
- 9 Fit the coil spring to the final gear case pinion nut and rotate the axle shaft to engage the propeller shaft and gear case splines, then insert the axle with the brake cam in the 2 o'clock position. Tighten the eight mounting bolts to their specified torque settings.
- 10 Routing it carefully, pass the breather hose up into the frame top tube. Tighten the propeller shaft cover clamp. Connect the brake rod and cable to the camshaft lever.
- 11 To tighten the brake drum retaining nuts two suitable open-ended spanners will be required; Kawasaki supply such spanners under part number 57001-1195. Apply thread locking compound to the nut threads, apply firmly the rear brake and screw the nuts on to the axle threads. Using a spring balance or similar, apply a force of 34 kg (75 lb) to the spanner via the hole provided. Since this hole is 250 mm (9.84 in) from the axle centre, the nut is automatically tightened to a torque setting of 8.5 kgf m (81 lbf ft); if the specified spanners are not available a substitute can be used if the force is carefully calculated to suit the spanner's length. (see accompanying illustration). When the inner nut is tightened, hold it to prevent rotation and use the second spanner to tighten the outer (lock) nut.
- 12 Fit the drum cover with its drain hole to the underside of the machine. Note that its dust seal, if disturbed, must be refitted so that the lip side is outwards. Adjust the rear brake. See Chapter 1.
- 13 If they were removed, grease the axle splines before refitting the wheel/hub assemblies, then apply the rear brake and tighten both nuts

to their specified torque setting. Fit new cotter pins to secure the nuts.  
14 Refill the final drive case with oil. See Chapter 1.

### 14 Rear axle – disassembly, inspection and reassembly – KLT160

- 1 Remove the rear axle. See Section 13.
- 2 Remove the nuts and washers, then slide off the wheel/hub assemblies. The wheels can be separated from the hubs, if required, by unscrewing the wheel lug nuts. Refit the hubs to the wheels and tighten the nuts in a diagonal sequence to the specified torque setting on installation.
- 3 Slide off the brake drum cover. Its dust seal can be carefully levered out and a new one pressed into place if it is cracked, damaged or worn in any way. Grease the seal lip on installation.
- 4 Unscrew its mounting nuts and pull off the brake drum, followed by the bearing housing/brake panel and the spacer.
- 5 Do not attempt to disassemble the final gear case. See Section 15.
- 6 Service the brake components as described in Chapter 7.
- 7 Check the bearing as described in Chapter 7. If renewal is necessary, place the bearing housing/brake panel on two wooden blocks (having removed the brake shoes) then drive out the bearing using a hammer and drift to tap evenly all around its inner race.
- 8 Fit a new bearing using a hammer and a tubular drift such as a socket spanner which bears only on the bearing outer race.

### 15 Final drive – general – KLT160

- 1 Refer to Chapter 1 for details of the only maintenance tasks necessary, ie changing the gear case oil and checking its level, and greasing the propeller shaft splines. If excessive backlash and noise from the drive train indicate that serious wear is present the machine should be taken to a competent Kawasaki dealer for expert attention.
- 2 The propeller shaft can be checked for wear at any time that work is being done on the drivetrain, but if wear is found it can only be renewed; the universal joint is a sealed part of the assembly.
- 3 The gear case is very similar in design to the front gear case unit described in Chapter 2. While it is simple enough in layout and not beyond the ability of most owners to dismantle or rebuild, the task of setting it up requires a number of specialist tools, a large range of shims, preload collars and thrust washers, as well as a great deal of skill. For this reason it is recommended that the ordinary private owner takes the complete machine to a Kawasaki dealer for attention.
- 4 Check that there are no obvious signs of wear or damage, such as cracked castings, worn or distorted threads or splines or bent axle shafts.

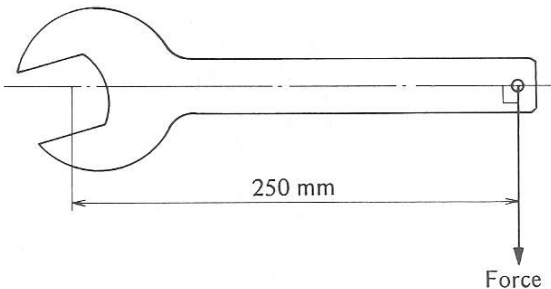


Fig. 6.9 Method of applying specified torque setting using a specially adapted open-ended spanner (Sec 13)

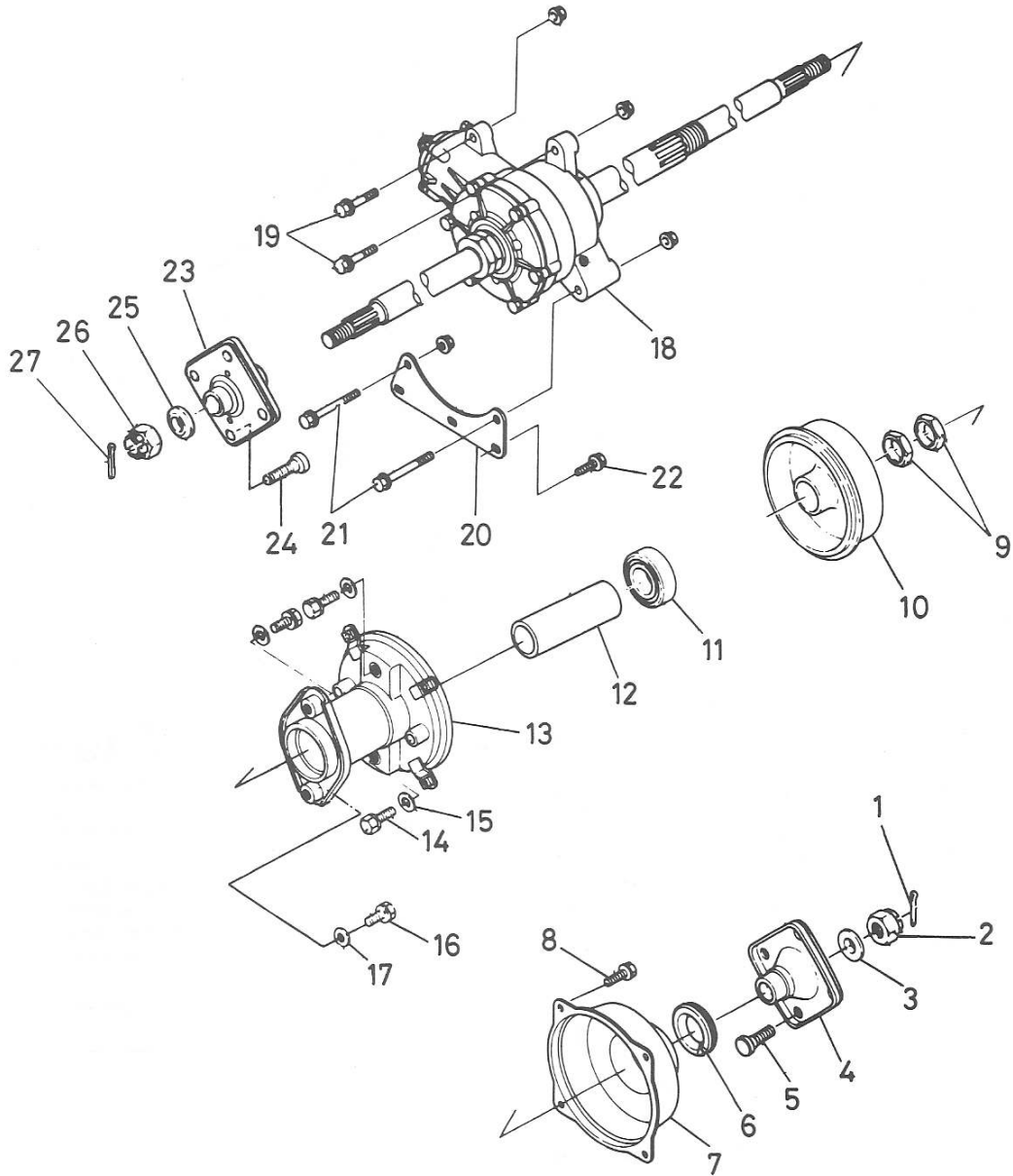


Fig. 6.10 Rear axle – KLT160 (Sec 13)

- |                    |  |                     |
|--------------------|--|---------------------|
| 1 Cotter pin       | 11 Bearing                             | 20 Mounting bracket |
| 2 Nut              | 12 Spacer tube                         | 21 Bolt             |
| 3 Washer           | 13 Bearing housing/brake panel         | 22 Bolt             |
| 4 Hub              | 14 Bolt                                | 23 Hub              |
| 5 Stud             | 15 Spring washer                       | 24 Stud             |
| 6 Dust seal        | 16 Bolt                                | 25 Washer           |
| 7 Brake drum cover | 17 Spring washer                       | 26 Nut              |
| 8 Bolt             | 18 Final drive rear gear case assembly | 27 Cotter pin       |
| 9 Nuts             | 19 Bolt                                |                     |
| 10 Brake drum      |  |                     |



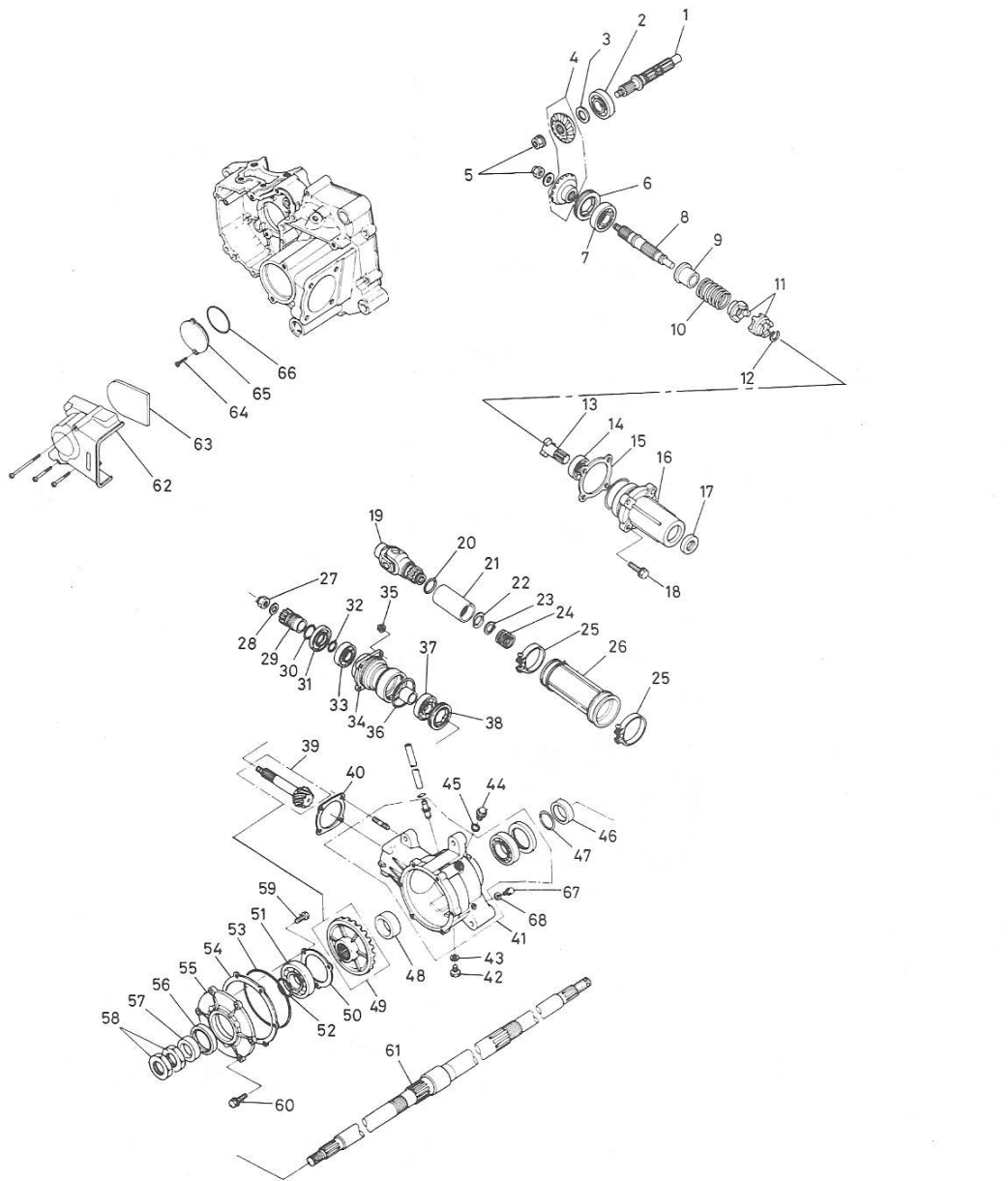


Fig. 6.11 Final drive – KLT160 (Sec 15)

- |  |                           |                          |                              |
|--|---------------------------|--------------------------|------------------------------|
| 1 Transmission output shaft                | 18 Bolt                   | 35 Nut                   | 52 O-ring                    |
| 2 Bearing                                  | 19 Propeller shaft        | 36 O-ring                | 53 O-ring                    |
| 3 Shim                                     | 20 O-ring                 | 37 Bearing               | 54 Shim                      |
| 4 Front bevel gears                        | 21 Propeller shaft joint  | 38 Bearing retainer      | 55 Gear case cover           |
| 5 Nuts                                     | 22 Washer                 | 39 Pinion gear           | 56 Seal                      |
| 6 Bearing holder                           | 23 Circlip                | 40 Shim                  | 57 Collar                    |
| 7 Bearing                                  | 24 Spring                 | 41 Final drive gear case | 58 Nuts                      |
| 8 Driven gear output shaft                 | 25 Boot clamp             | 42 Oil drain plug        | 59 Bolt                      |
| 9 Spring seat                              | 26 Boot                   | 43 Washer                | 60 Bolt                      |
| 10 Spring                                  | 27 Nut                    | 44 Oil filler plug       | 61 Rear axle                 |
| 11 Damper cam and follower                 | 28 Washer                 | 45 O-ring                | 62 Cover                     |
| 12 Circlip                                 | 29 Pinion gear joint      | 46 Collar                | 63 Damper                    |
| 13 Shaft end                               | 30 O-ring                 | 47 O-ring                | 64 Screw                     |
| 14 Bearing                                 | 31 Oil seal               | 48 Spacer                | 65 Cap                       |
| 15 Shim                                    | 32 O-ring                 | 49 Ring gear             | 66 Gasket                    |
| 16 Front driven gear/cam<br>damper housing | 33 Bearing                | 50 Bearing holder        | 67 Oil level inspection plug |
| 17 Oil seal                                | 34 Bearing housing flange | 51 Bearing               | 68 Washer                    |

# Chapter 7 Wheels, brakes and tires

## Contents

General information .....	1	Brakes – removal and installation .....	6
Front wheel – removal and installation .....	2	Brakes – inspection .....	7
Rear wheels – removal and installation .....	3	Tires – removal and installation .....	8
Front wheel bearings – removal, inspection and installation .....	4	Tires – repair .....	9
Rear wheel bearings – general information .....	5	Valve – removal, inspection and installation .....	10

## Specifications

### Wheels

Type ..... Pressed steel, one-piece rim

### Front brake

Type ..... Internally expanding, single leading shoe, drum  
 Drum inside diameter ..... 110.0 to 110.16 mm (4.331 to 4.337 in)  
 Service limit ..... 110.75 mm (4.360 in)  
 Shoe lining thickness ..... 3 mm (0.12 in)  
 Service limit ..... 1.5 mm (0.06 in)  
 Shoe spring free length ..... 30.8 to 31.2 mm (1.212 to 1.228 in)  
 Service limit ..... 34 mm (1.338 in)  
 Cam shaft diameter ..... 11.957 to 11.984 mm (0.470 to 0.472 in)  
 Service limit ..... 11.83 mm (0.465 in)  
 Backplate cam shaft hole diameter ..... 12.0 to 12.03 mm (0.472 to 0.473 in)  
 Service limit ..... 12.70 mm (0.5 in)  
 Lever free play ..... 4 to 5 mm (0.157 to 0.197 in)

### Rear brake

Type .....	<b>KLT110 and 160</b>	<b>KLT200 and 250</b>
Drum inside diameter .....	Internally expanding, single leading shoe, drum	Internally expanding, single leading shoe, drum
	130.10 to 130.25 mm	140 to 140.16 mm
	(5.122 to 5.128 in)	(5.512 to 5.518 in)
	Early KLT110 models –	
	130 to 130.1 mm	
	(5.118 to 5.122 in)	

	KLT110 and 160	KLT200 and 250
Service limit .....	130.75 mm (5.147 in)	140.75 mm (5.541 in)
Shoe lining thickness .....	4 mm (0.157 in)	4 mm (0.157 in)
Service limit .....	2 mm (0.078 in)	2 mm (0.078 in)
Shoe spring free length .....	N/Av	47.5 to 48.5 mm (1.870 to 1.909 in)
Service limit .....	N/Av	50 mm (1.968 in)
Cam shaft diameter .....	11.957 to 11.984 mm (0.470 to 0.472 in)	14.95 to 14.99 mm (0.588 to 0.590 in)
Service limit .....	11.83 mm (0.465 in)	14.83 mm (0.583 in)
Backplate cam shaft hole diameter .....	12.0 to 12.03 mm (0.472 to 0.473 in)	15.50 to 15.70 mm (0.610 to 0.618 in)
Service limit .....	12.70 mm (0.5 in)	15.90 mm (0.626 in)
Parking brake lever free play .....	4 to 5 mm (0.157 to 0.197 in)	N/App
Pedal free play .....	20 to 30 mm (0.78 to 1.18 in)	50 mm (1.968 in)

## Tires

	KLT110 A1 and 200	KLT110 A2 and 160	KLT250
Size:			
Front .....	22 x 11.0-8	21 x 9.00-8	22 x 11.00-8
Rear .....	22 x 11.0-8	22 x 11.0-8	25 x 12.00-9
Pressures:			
Front .....	0.15 kg/cm <sup>2</sup> (2 psi)	0.21 kg/cm <sup>2</sup> (3 psi)	0.15 kg/cm <sup>2</sup> (2 psi)
Rear .....	0.15 kg/cm <sup>2</sup> (2 psi)	0.15 kg/cm <sup>2</sup> (2 psi)	0.15 kg/cm <sup>2</sup> (2 psi)

## Torque wrench settings – kgf m (lbf ft)

Component	
Wheel nuts .....	4.2 (30.0)
Front wheel spindle:	
KLT160 .....	7.0 (51.0)
All other models .....	7.4 (54.0)
Front wheel spindle clamp nuts:	
KLT160 only .....	1.0 (7.2)
Handlebar lever clamp nuts:	
KLT160 .....	0.8 (5.8)

## 1 General information

The wheels are of the one-piece type, similar to automobile wheels and are fitted with tubeless tires.

The brakes are single-leading shoe front and rear.

## 2 Front wheel – removal and installation

### KLT110 A2 and KLT160 models

- Slacken fully both brake cable adjusters. Slacken the axle clamp nuts and the axle itself.
- Support the machine on a stand so that the front wheel is raised clear of the ground.
- Unscrew the axle and withdraw it, lowering the wheel clear of the forks until the brake panel can be removed.
- On installation, grease the axle and check that the clamp is refitted with the 'Up' mark at the top and that the long collar has its slit facing rearwards. Insert the axle partially into the collar.
- Fit the brake panel to the wheel and raise the wheel into the forks so that the tongue on the left fork leg engages in the slot in the brake panel. Fit the short collar between the hub and the long collar, press the axle into place and tighten it.
- Lower the machine to the ground and tighten the axle to its specified torque setting. Tighten the clamp upper nuts first to the correct torque

setting then the two lower nuts; there should only be a gap at the bottom of the clamp.

- Adjust the front brake. See Chapter 1.

### All other models

- Slacken fully both brake cable adjusters, then slacken the axle nut.
- Lift the machine on to a stand so that it is supported securely with the wheel clear of the ground.
- Remove the axle nut and washer then tap out the axle noting the position of all the washers and collars. Lower the wheel clear of the forks until the brake panel can be removed.
- On installation grease the axle and fit the brake panel into the hub. On KLT250 models, ensure that the speedometer drive tabs engage with the notches in the hub center boss.
- Insert the axle through the left fork side, not forgetting the washer, and into the hub left collar (where fitted). Lift the wheel into position so that the stopper lug on the fork engages with the slot in the brake panel. Push the axle through the hub.
- Hold the dust seal and hub right collar in position and push the axle fully into place. Refit the nut and washer.
- Lower the machine to the ground and tighten the nut to its specified torque setting.
- Adjust the front brake. See Chapter 1.

### All models

- Note that the hub is attached to the wheel by four bolts or studs. To remove the hub, unscrew the four mounting nuts. On installation, ensure that the hub is fitted so that the tire valve will be on the opposite side to the brake drum. Tighten the nuts in a diagonal sequence to the specified torque setting.

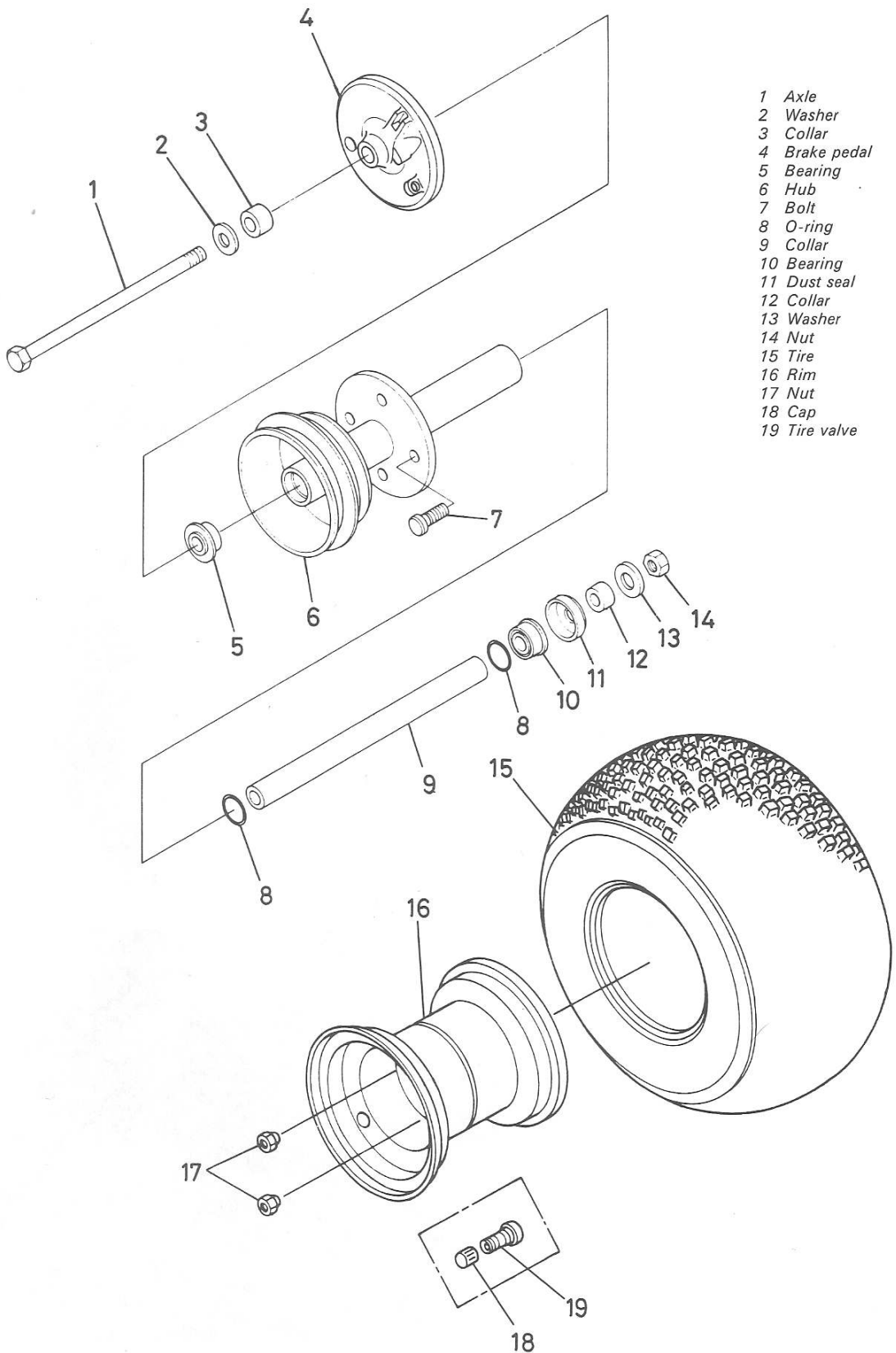


Fig. 7.1 Front wheel – KLT110, 200 and 250 models (Sec 2)

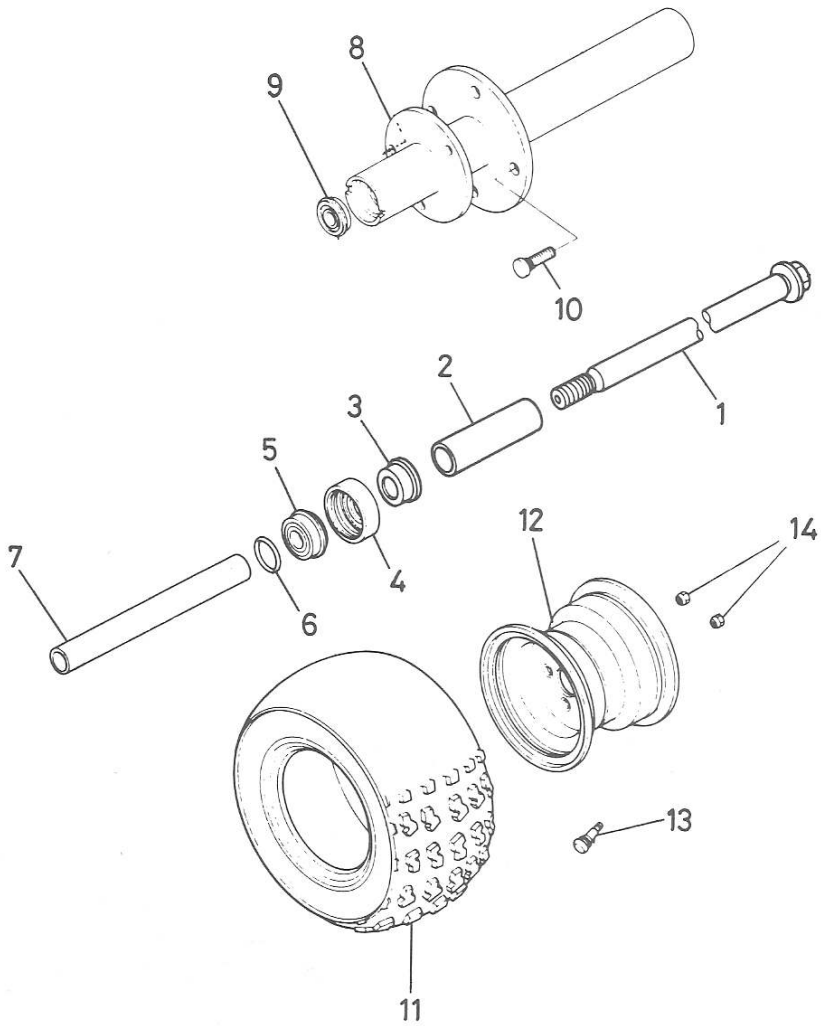
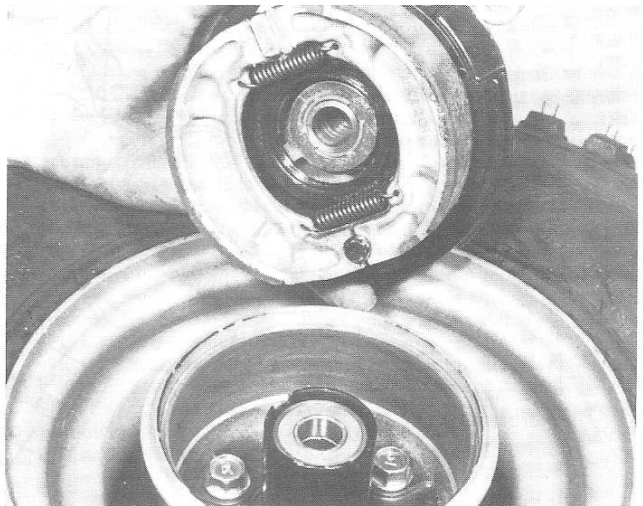
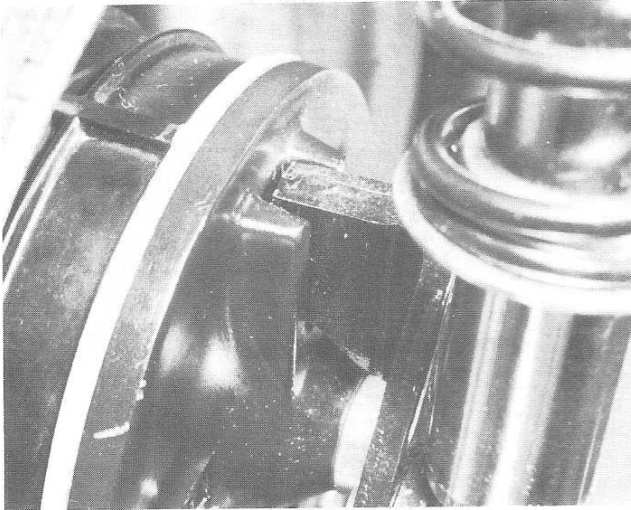


Fig. 7.2 Front wheel – KLT160 (Sec 2)

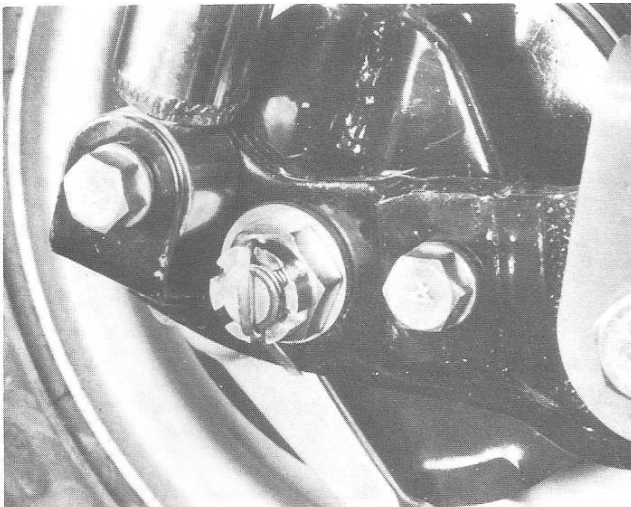
- 1 Axle
- 2 Short collar
- 3 Collar
- 4 Dust seal
- 5 Bearing
- 6 O-ring
- 7 Long collar
- 8 Hub
- 9 Bearing
- 10 Bolt
- 11 Tire
- 12 Rim
- 13 Tire valve
- 14 Nut



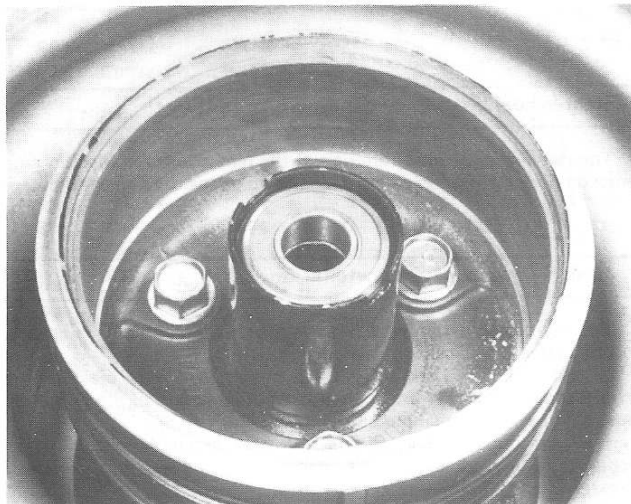
2.11 Refitting front wheel, KLT250 – ensure that tabs of speedometer drive engage with notches in hub centre boss



2.12 Stopper lug on fork must engage with slot in brake panel, as shown



2.13 Tighten axle nut to specified torque setting and secure by refitting cotter pin (where fitted) as shown



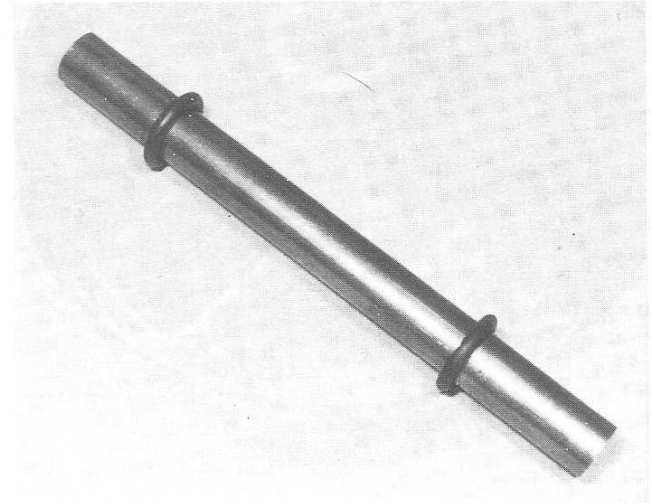
2.16 Front hub/brake drum is attached to wheel by four bolts or studs

### 3 Rear wheels – removal and installation

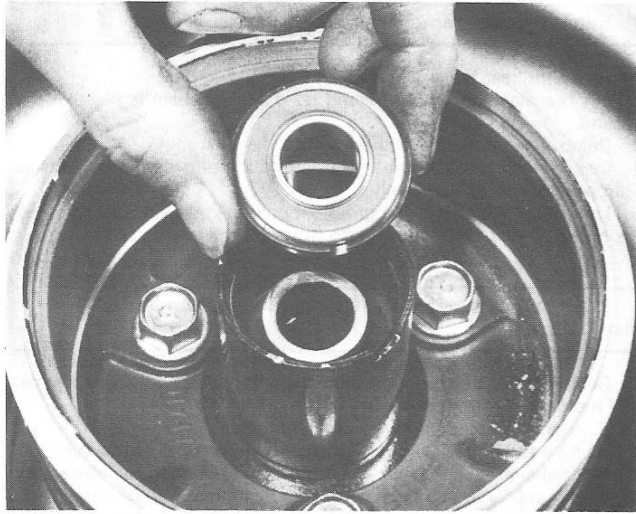
- 1 Apply the rear brake and slacken the four lug nuts.
- 2 Lift the machine on to a stand so that the wheel is clear of the ground.
- 3 Remove the nuts and withdraw the wheel.
- 4 Install the wheel with the valve stem to the outside. Fit the nuts as tight as possible by hand only.
- 5 Lower the machine to the ground, apply the rear brake and tighten the nuts in a diagonal sequence to the specified torque setting.

### 4 Front wheel bearings – removal, inspection and installation

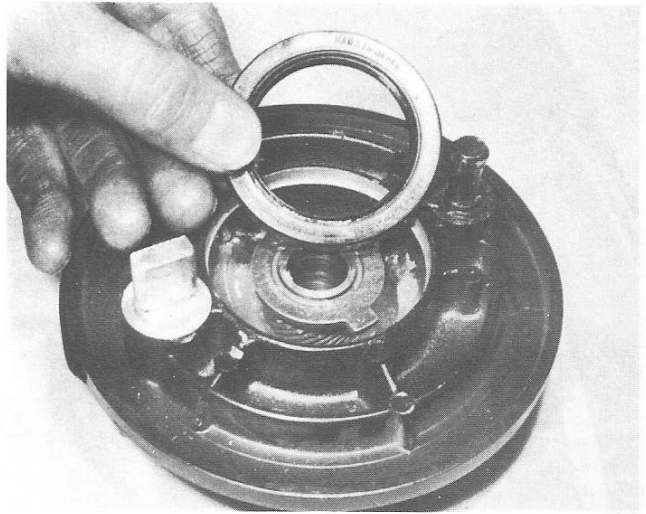
- 1 Remove the wheel from the machine and withdraw the brake panel and the dust seal from each end of the hub.
- 2 Support the wheel on two wooden blocks.
- 3 Using a torch, quickly apply heat to the upper end of the hub until the painted area **just begins** to discolor. Quickly invert the wheel, pry the central spacer to one side and tap the bearing out of the heated hub end, applying a hammer and drift to the exposed end of the spacer.
- 4 Heat the hub around the remaining bearing until the paint **just begins** to discolour, then refit the spacer tube and tap out the bearing using a hammer and drift. Carefully deburr the spacer tube if necessary.
- 5 **Caution:** when heating the hub, take care to prevent personal injury and be careful not to touch any heated components. Apply the heat only to the hub immediately around the bearing and heat the hub just enough to discolor the paint, as described. Excessive heat is not necessary and will damage the bearing seals and spacer tube O-rings(s).
- 6 Wait until all components have cooled down.
- 7 Examine the bearings carefully. If they appear damaged or worn, or if they are rough and jerky when rotated, they must be renewed.
- 8 Check the hub for cracks, wear or other damage; renew it if necessary.
- 9 On installation, pack the bearings with grease. Tap the first bearing into the hub using a tubular drift such as a socket spanner which bears only on the bearing outer race. Install the bearings so that the wider part of the outer race fits into the hub and drive them in until the circlip butts against the hub end.
- 10 KLT160 models – Fit the O-ring to the spacer tube, mid-way along its length.
- 11 All other models – Fit the O-rings 6 mm from each end of the spacer tube.
- 12 Fit the spacer tube into the hub and install the second bearing as described above.
- 13 Refit the brake panel and dust seal, then install the wheel in the machine.



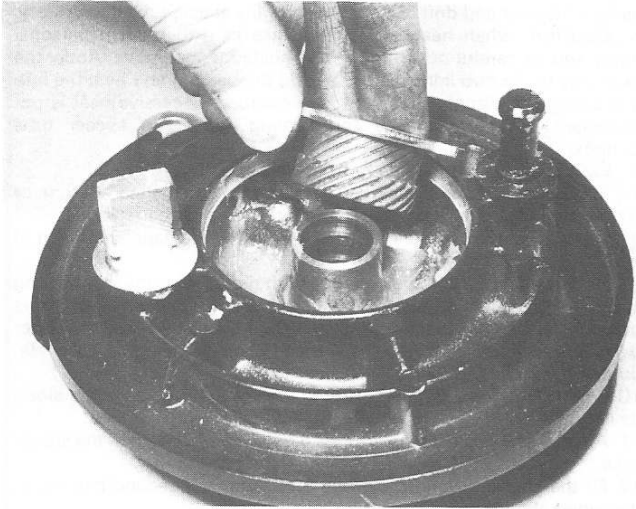
4.11 Position spacer tube O-rings as described in text



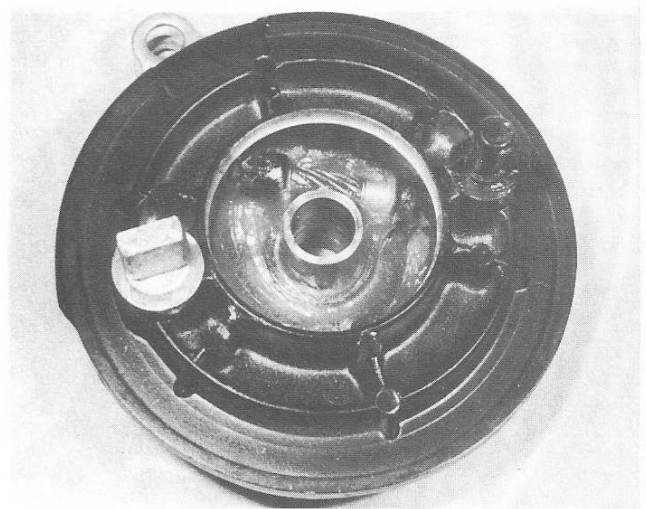
4.12 Bearings are installed with sealed surface outwards – drive in until circlip butts against hub



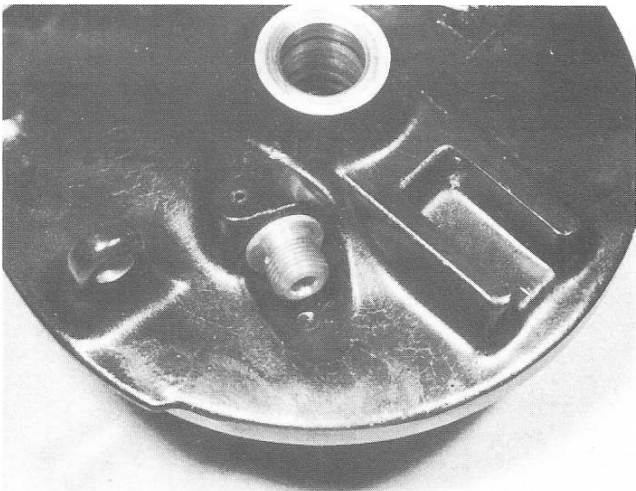
4.13a KLT250 – pry out grease seal ...



4.13b ... so that speedometer drive gear can be withdrawn and checked for wear ...



4.13c ... pack speedometer recess with grease on installation ...



4.13d ... remaining speedometer drive components are retained by a roll pin pressed into hub

---

## 5 Rear wheel bearings – general information

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The rear wheel bearings are part of the rear axle assembly and are removed during the course of disassembling the axle. Refer to Chapter 6.

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## 6 Brakes – removal and installation

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- 1 The front brake assembly is fitted in the wheel hub and is removed and refitted with the wheel. See Section 2.
- 2 Except for KLT160 and KLT200 A1 models, where the brake drum is bolted to the hub, the brake drum is an integral part of the hub and must be renewed as a single unit with the hub.
- 3 The rear brake is part of the rear axle assembly and can be dismantled only after the axle has been removed and partially disassembled. Refer to Chapter 6.
- 4 Refer to Chapter 1 for information on brake adjustment and other items of routine maintenance.

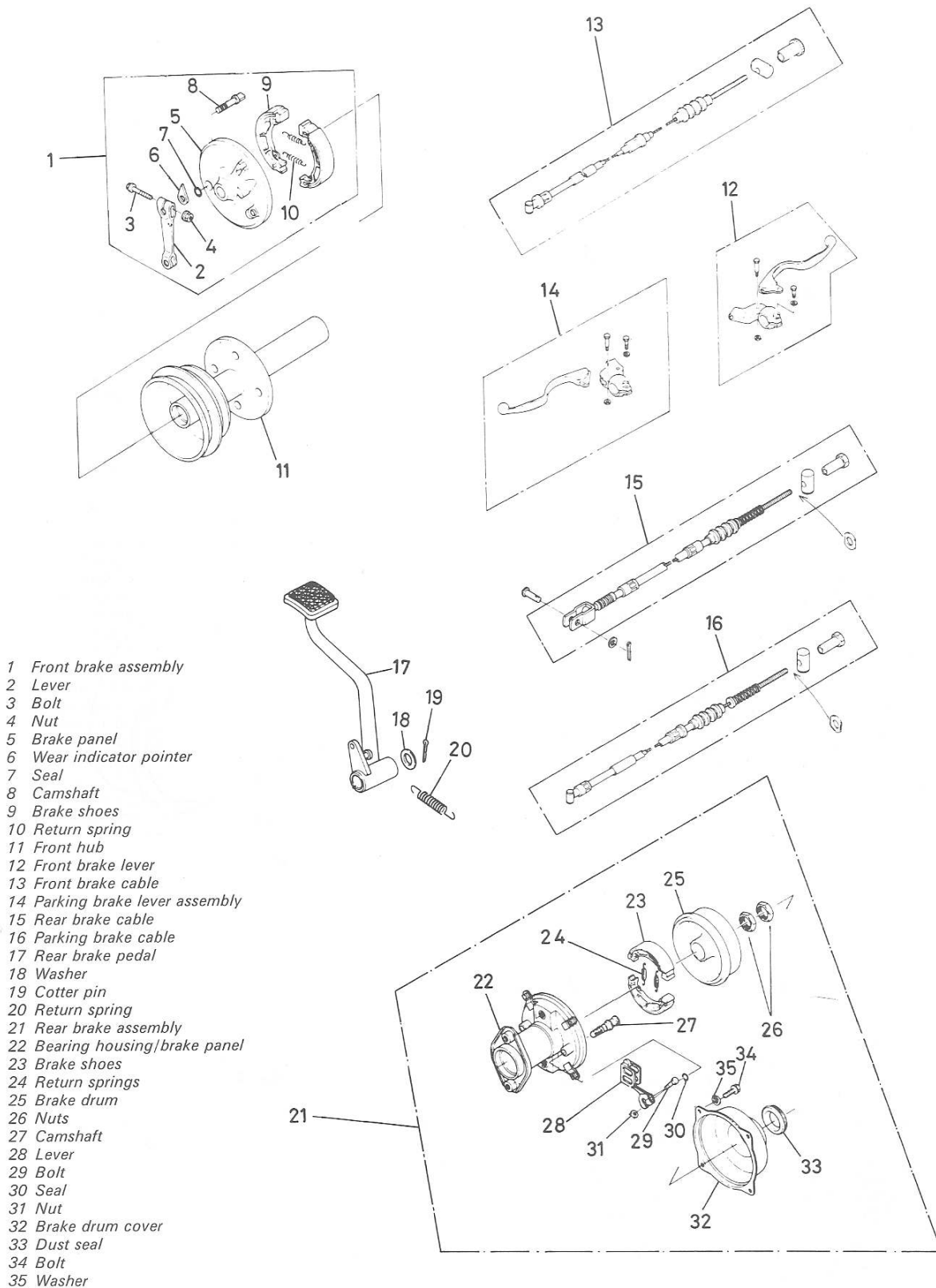


Fig. 7.3 Brake components – KLT110 – KLT160 similar (Sec 6)



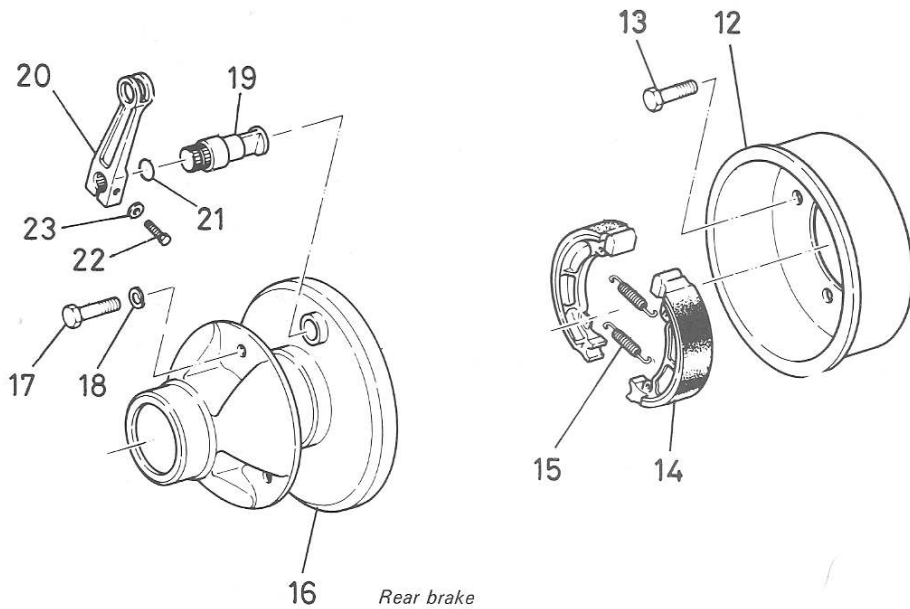
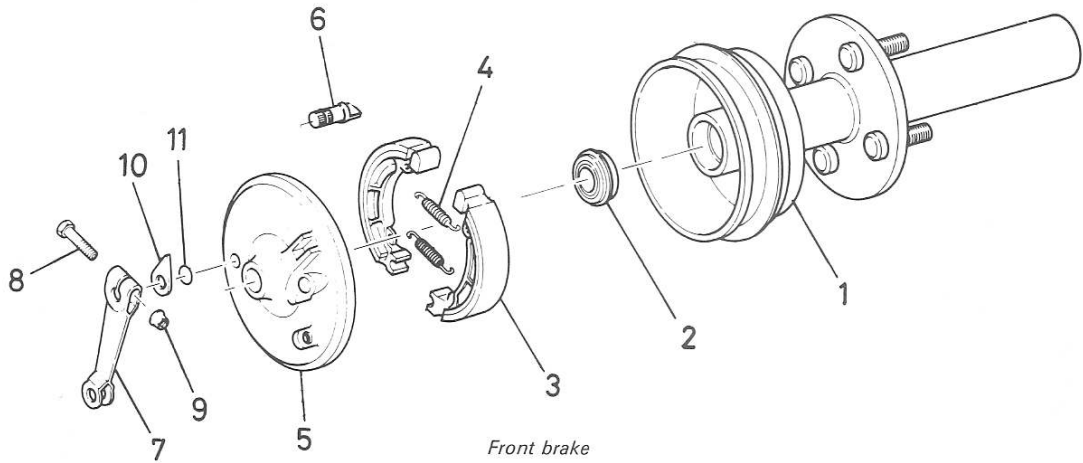


Fig. 7.4 Brake components – KLT200 and 250 – typical (Sec 6)

- |                  |                           |                                |             |
|------------------|---------------------------|--------------------------------|-------------|
| 1 Front hub      | 7 Lever                   | 13 Bolt                        | 19 Camshaft |
| 2 Bearing        | 8 Bolt                    | 14 Brake shoes                 | 20 Lever    |
| 3 Brake shoes    | 9 Nut                     | 15 Return springs              | 21 Seal     |
| 4 Return springs | 10 Wear indicator pointer | 16 Bearing housing/brake panel | 22 Bolt     |
| 5 Brake panel    | 11 Seal                   | 17 Bolt                        | 23 Washer   |
| 6 Camshaft       | 12 Brake drum             | 18 Spring washer               |             |

## 7 Brakes – inspection

- 1 Remove the front wheel or remove and disassemble the rear axle to withdraw the brake components to be serviced.
- 2 Use a punch or felt marker to mark the original position of the brake camshaft and the brake lever. Remove the pinch bolt and lever. Remove the wear indicator pointer and dust seal, then the brake shoes by prying them up evenly and removing them followed by the brake camshaft.
- 3 Take off the brake shoe return springs. Inspect the brake drum for scoring, wear or ovality. If the drum is scored or warped slightly, it is possible to have it skimmed on a lathe by a specialist repairer but if the scoring is too deep or the warpage too great, a new drum or hub is necessary.
- 4 Inspect the brake shoes for excessive or uneven wear, or for oil or grease on the linings. If the friction material of either shoe is worn at any point to the service limit given, both shoes must be renewed. If they are fouled with oil or grease they must be renewed regardless of the amount of wear remaining.
- 5 Check that the return springs are not corroded, marked or damaged in any way, also that they have not stretched to the service limits given or beyond. If damage or excessive wear is found, both springs must be renewed.
- 6 Where measurements are given in the Specifications Section of this Chapter, check that the camshaft and brake panel are not worn. On all other models, check that the camshaft is a reasonably tight fit with no excessive signs of sloppiness when installed. Renew any components found to be excessively worn or damaged.
- 7 On reassembly, apply a thin smear of high-melting point grease to the brake camshaft bearing surfaces and to the brake panel pivot pins and camshaft passage. Refit the camshaft and dust seal, ensuring that they are correctly aligned, then assemble the shoes and return springs as a single unit before pressing them into place. If the original shoes are being re-used, the wear indicator pointer and lever should be refitted in their original positions. If new shoes are to be fitted, install the pointer so that it aligns with the extreme right-hand (or forward) end of the 'Usable Range' arc; the position of the lever may require adjustment so that the angle between it and the brake rod is 80 – 90° with the brake firmly applied, as described in Chapter 1. Ensure that the lever is tapped firmly into place on the camshaft splines and that the pinch bolt is securely fastened.

## 8 Tires – removal and installation

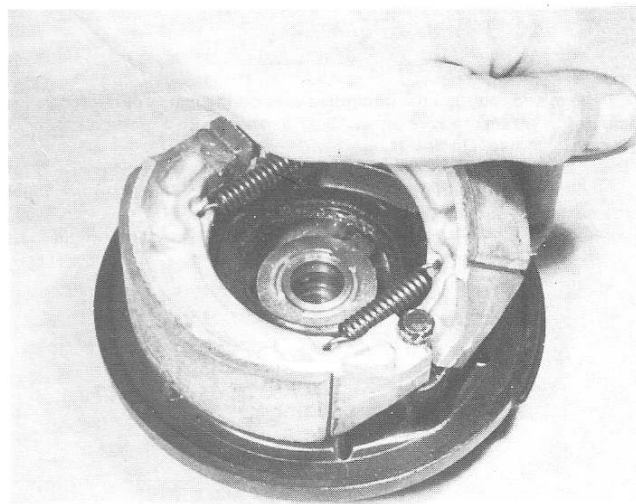
- 1 Tubeless tires come as standard equipment on all models. They are generally safer than tube-type tires, but if problems occur they require special repair techniques.
- 2 Because the force required to break the rim seal involves special equipment, it is suggested that you take the wheel to a dealer or reputable repair shop. Servicing these units is often frustrating.
- 3 Remove the wheel. See Section 2 or 3 as appropriate.
- 4 Unscrew the valve cap and use the correct tool to unscrew the valve core; deflate the tire fully.
- 5 Apply a solution of soapy water or a quantity of rubber lubricant to the tire beads and rim flanges. **Note:** do **not** use engine oil or gasoline as a lubricant as these will attack the rubber of the tire.
- 6 Assemble the Kawasaki tire bead-breaking tool part number 70009-04 on to the hub and tighten it down until the bead has broken away completely from the rim and can be pressed into the center well. Repeat the operation to break the other bead from the rim.
- 7 If the specified tool is not available use a length of smooth hardwood approximately 18 inches long, three to four inches wide and 1/2 to 3/4 inch thick. Chamfer one end of the wood to an angle that will fit between the tire and the rim at the bead. Insert the angled end deeply into the joining surfaces and drive it down into the bead with a large hammer, forcing the bead away from the rim at several locations around the rim perimeter until the bead is released. Lubricate the bead with soapy water if it proves obstinate.
- 8 Smear a set of tire irons with soapy water or rubber lubricant. Press the first bead into the center well opposite the valve and kneel on it to keep it in the well. Using the irons with care to avoid scratching the rim sealing surface or bending the rim, pry the bead over the rim flange. Start next to the valve and work around the rim a little at a time.

- 9 When the first bead is removed, lift the second bead up into the center well and pry it off with the irons.
- 10 Check the rim for dents, scratches or nicks on the flanges and tire sealing surfaces. If the rim is dented the wheel must be renewed, but scratches or nicks can be polished out using fine emery cloth to prevent the escape of air. See the accompanying illustration.
- 11 Renew the valve if necessary. See Section 10.
- 12 Check the tire carefully. If it is cut or cracked at any point, if the vertical edges have been rounded off the knobs, or if there are any lumps or bulges on the tread or sidewalls (check inside the tire as well as outside) which indicate damage to the carcass, the tire should be renewed. Remove any foreign objects from the tread, check for leaks with a solution of soapy water and repair if necessary. See Section 9.
- 13 Use soapy water or rubber lubricant to lubricate the tire beads, rim flanges and tire irons.
- 14 Slide the first bead as much as possible over the rim flange opposite the valve, pressing it over the flange and into the center well. Use the tire irons carefully to fit the remainder of the bead.
- 15 Use the same procedure to fit the second bead.
- 16 Bounce the wheel on the ground to center the tire on the rim, then apply more lubricant to the beads and rim flanges.
- 17 Inflate the tire to its maximum pressure to seat the beads. For the OE tires fitted to these machines, the **maximum** tire pressures are as follows:

<i>KLT250 (front tire)</i>	<i>7 psi (0.5 kg/cm<sup>2</sup>)</i>
<i>KLT110 A1, 200 B,C and KLT250 (rear tire)</i>	<i>10 psi (0.7 kg/cm<sup>2</sup>)</i>
<i>KLT200 A (except A1)</i>	<i>15 psi (1.05 kg/cm<sup>2</sup>)</i>
<i>KLT110 A2 and 160</i>	<i>20 psi (1.4 kg/cm<sup>2</sup>)</i>
<i>KLT200 A1 and all non-standard tires</i>	<i>See tire sidewall</i>

**Never** inflate a tire above the maximum pressure as it may explode, with a risk of severe personal injury. **Always** check the maximum pressure on the tire sidewall and do not exceed it.

- 18 With the tire at maximum pressure, the beads should spring out to seat on the rim. Check to see that the rim lines on both sides of the tire are parallel with the rim flanges. If not, deflate the tire, bounce the wheel again and re-lubricate the beads and rim flanges before starting over.
- 19 When the beads are properly seated, deflate the tire to 5 psi (0.35 kg/cm<sup>2</sup>), lay the wheel on its side and apply soapy water around the bead. If any bubbles appear the air is leaking out and the tire must be removed again to rectify the leak. Do not forget to repeat the check on the other bead.
- 20 When the tire is correctly refitted with no leaks, deflate it to the specified pressure and refit the wheel to the machine.



7.2 Removing brake shoes from panel

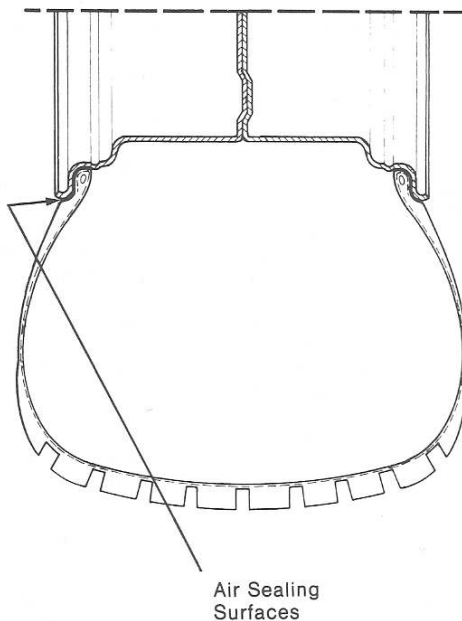


Fig. 7.5 Air sealing surfaces of tire bead and rim flange (Sec 8)

## 9 Tires – repair

- 1 The repair of tubeless tires is a difficult operation that is best left to the expert. It is suggested the wheel is taken to a dealer or reputable repair shop. Remember to check the valve first if the exact location of a slow puncture is unknown.
- 2 Kawasaki state that it is permissible for the operator to fit an inner tube as an emergency puncture repair only. This is **not** a permanent solution and the tire should be properly repaired as soon as possible using the Kawasaki tubeless tire repair kit part number T96000-010. Follow carefully the instructions contained in the kit.
- 3 Given below is a basic outline of the best type of repair, the cold patch method. Also given is an emergency repair procedure to be used if the tire is punctured when the machine is far from home or from a repair shop.

### *Repair – cold patch method*

- 4 Check the tire tread for foreign objects. Chalk mark the punctured area and remove the object.
- 5 Clean and roughen the punctured area on the inside of the tire with a tire rubber cleaner or wire brush. Clean the area with a greaseless solvent such as acetone. *Do not use gasoline.*
- 6 Apply rubber cement around the torn area on the inside of the tire and allow it to dry until tacky before applying the patch. Do not touch the cemented surface with your hands.
- 7 Remove the lining from the patch, center it over the puncture and

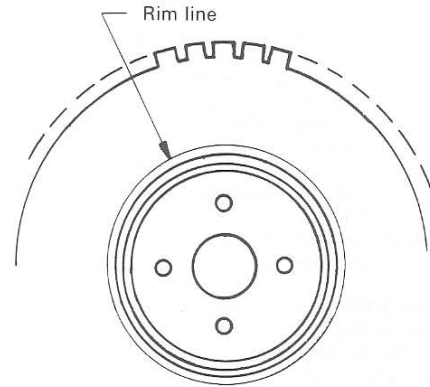


Fig. 7.6 Location of tire rim lines which must be parallel with the rim flanges (Sec 8)

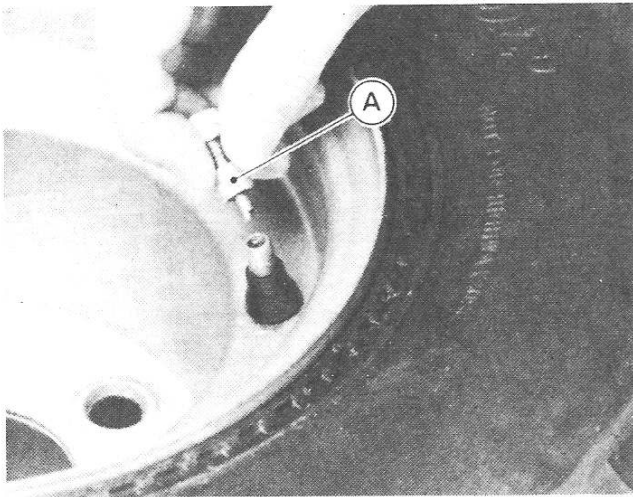
press the patch against the puncture with a patch roller or the handle of a screwdriver. Press hard and hold it for at least 30 seconds.

### *Repair – plug method*

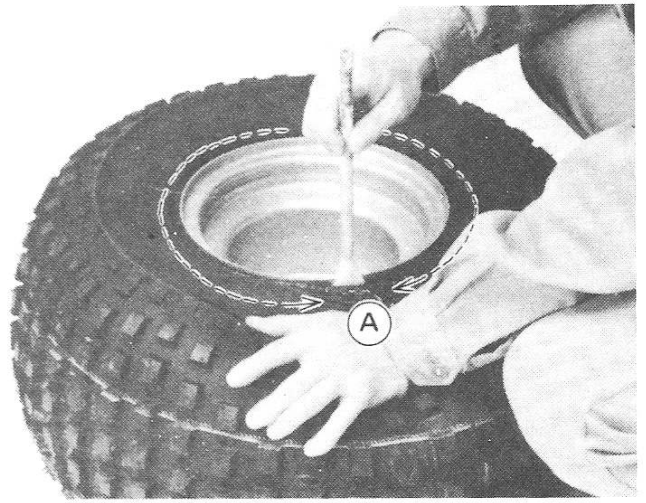
- 8 *This method is to be used only for emergency repair.* Replace the plug as soon as possible with a cold patch.
- 9 It is not necessary to remove the rim from the vehicle or the tire from the rim. Find the puncturing object, mark its location and remove it from the tire.
- 10 Insert the rubber plug through the eye of the inserting needle (this equipment is available at auto parts stores), apply the cement to the plug and insert the needle until the plug is all the way in the tire. Twist the needle several times and pull it straight out. Trim the plug  $\frac{1}{16}$  in (2 mm) from the tire surface.

## 10 Valve – removal, inspection and installation

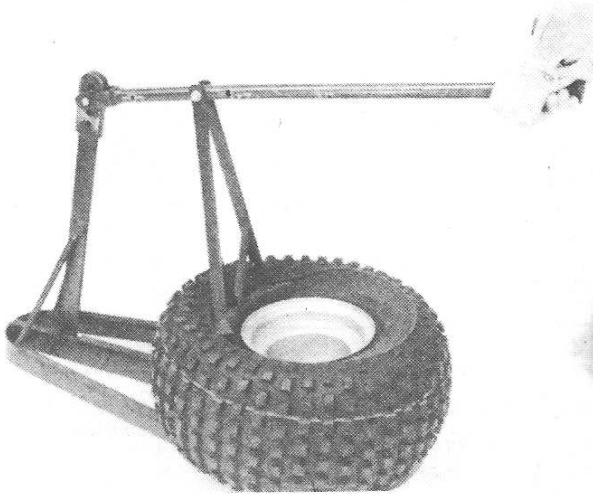
- 1 If the valve is thought to be leaking, remove the cap and apply spittle to the end of the valve. If bubbles appear the valve is defective and should be renewed, although it may be possible to fit a valve core alone to cure the problem, if a suitable type can be found.
- 2 To check the seating for leaks, pour soapy water over the valve and again watch for air bubbles. Renew the valve if the seat is leaking.
- 3 If the valve is to be renewed, the wheel must be removed from the machine and the tire removed from the wheel. See Section 8.
- 4 Using a sharp knife, cut off the valve seat inside the rim and pull the valve out.
- 5 Smear the new valve with soapy water or similar lubricant and push it through the rim from the inside. Pull the valve threaded end (screw a suitable nut on to the valve and use vise-grips or similar to apply tension) through the rim until the seating snaps into place.
- 6 The valve dust cap is an essential part of the valve. Not only does it keep dirt out of the valve, but it also acts as a secondary seal to prevent the sudden escape of air if a valve core should fail.



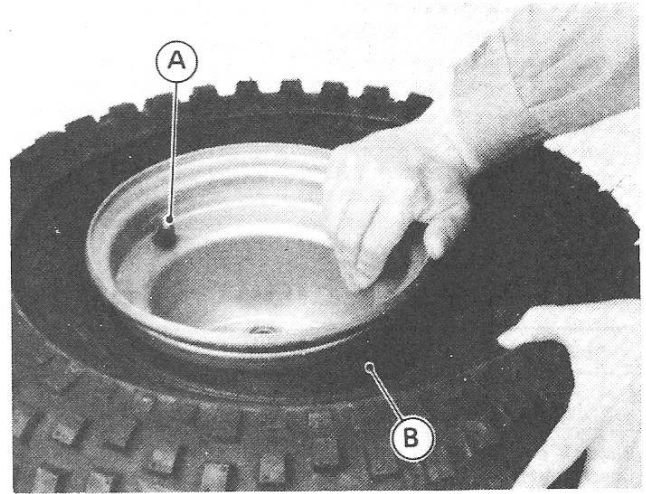
Use correct tool "A" to unscrew valve core



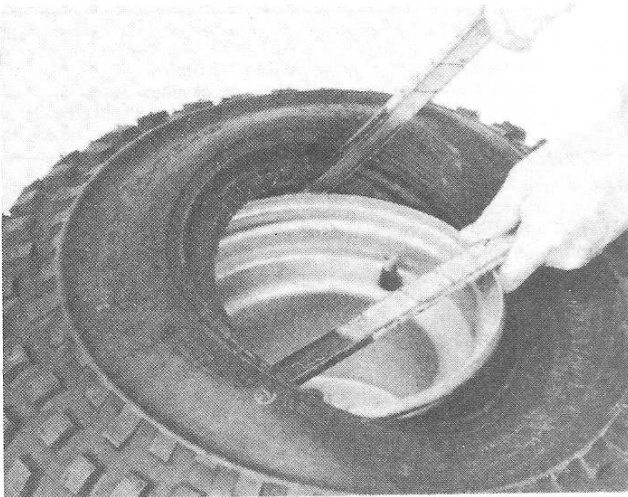
Apply a solution of soapy water or a quantity of rubber lubricant to the tire beads and rim flanges



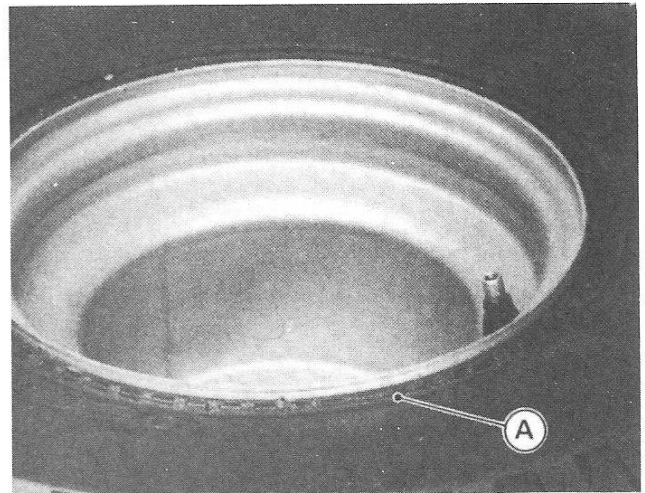
Use a typical bead breaker tool to break the tire bead away from both sides of the rim



Press first bead into center well "B", opposite the tire valve "A"



Pry the first bead over the rim a little at a time using tire irons whilst keeping the remainder of bead pressed into the center well



Inflate tire to the maximum specified pressure to seat the beads. Check that tire rim lines "A" are parallel to the wheel rim flanges

# Chapter 8 Electrical system

## Contents

General information .....	1	Starter motor – inspection – KLT200 and 250 models .....	7
Electrical system – general information and preliminary checks ....	2	Starter relay and switch – testing – KLT200 and 250 models .....	8
Battery – charging – KLT200 and 250 models .....	3	Handlebar switches – removal and installation .....	9
Checking the charging system – KLT200 and 250 models .....	4	Handlebar switches – check .....	10
Checking the generator output .....	5	Bulbs – removal and installation .....	11
Checking the regulator/rectifier unit – KLT200 and 250 models ...	6	Neutral indicator circuit – testing – KLT200 and 250 models .....	12

## Specifications

### AC generator

Lighting coil resistance .....	<b>KLT110</b> 0.56 to 0.84 ohm	<b>KLT160</b> 0.8 to 1.5 ohm
Lighting coil output at 3000 rpm .....	10 volt or more	11.5 volt or more

### Bulbs

Headlight .....	12V, 35W	12V, 45W
Tail light .....	12V, 8W	12V, 8W

### Battery

Voltage .....	<b>KLT200 and 250</b> 12 volt
Capacity:	
200 A .....	10 Ah
All other models .....	12 Ah
Electrolyte specific gravity .....	1.26 at 20°C (68°F)
Earth .....	Negative

### Fuses

Rating:	
Main .....	20 amp
Accessory (where fitted) .....	10 amp

### Voltage regulator

Type .....	Short circuit
Output .....	12.5 to 15.0 volt DC

**AC generator**

Charging coil resistance (cold) .....	0.36 to 0.54 ohm
Charging output:	
Voltage at 4000 rpm .....	Approx 14.5 volt
Amperage at idle:	
Lights on .....	2 to 6 amp
Lights off .....	0.5 to 1.5 amp
Total output at 4000 rpm .....	Approx 60 volt DC

**Starter motor**

Brush length .....	11.0 to 11.5 mm (0.43 to 0.45 in)
Service limit .....	5.5 mm (0.216 in)
Commutator groove depth .....	0.5 to 0.8 mm (0.02 to 0.03 in)
Service limit .....	0.2 mm (0.008 in)
Chain length (over 20 links) .....	155.7 to 155.9 mm (6.129 to 6.137 in)
Service limit .....	158 mm (6.220 in)

**Fuel pump**

Rating:	
KLT200 A4 (A) .....	12V, 18W
All other models (where fitted) .....	12V, 15W

**Bulbs**

Headlight:	
KLT200 .....	12V, 35W
KLT250 .....	12V, 45W
Tail light:	
KLT200 A1/A2/A3 and 250 A1 .....	12V, 5.3W
All other models .....	12V, 8W
Neutral indicator light .....	12V, 3.4W
Auxiliary light (where fitted) .....	12V, 37W

**Torque wrench setting – kgf m (lbf ft)**

Component	
Starter motor casing screws .....	0.55 (4.0)

**1 General information**

The KLT110 and KLT160 models are fitted with minimal electrical systems comprising a generator source coil which provides power for a headlight and tail-light via an on/off switch only when the engine is running. Since there is no form of voltage control, the bulbs must be of exactly the correct type and rating at all times to match the generator output.

KLT200 and KLT250 models are fitted with a much more comprehensive system in which current supplied by a generator is rectified and controlled by an electronic voltage regulator before being used to charge a battery. These models are all fitted with electric starters and the later versions use electric fuel pumps.

**2 Electrical system – general information and preliminary checks**

1 In the event of an electrical system fault, always check the physical condition of the wiring and connectors before attempting any of the test procedures described here and in subsequent Sections. Look for chafed, trapped or broken electrical leads and repair or renew these as necessary. Leads which have broken internally are not easily spotted, but may be checked using a multimeter or a simple battery and bulb circuit as a continuity tester. This arrangement is shown in the accompanying illustration. The various multi-pin connectors are generally trouble-free but may corrode if exposed to water. Clean them carefully, scraping off any surface deposits, and pack with silicone grease during assembly to avoid recurrent problems. The same technique can be applied to the handlebar switches.

2 A sound, fully charged battery is essential to the normal operation of the system on KLT200, 250 models. There is no point in attempting to locate a fault if the battery is partly discharged or worn out. Check battery condition and recharge or renew the battery before proceeding further.

3 Many of the test procedures described in this Chapter require that

voltages or resistances be checked. This requires the use of some form of test equipment such as a simple and inexpensive multimeter of the type sold by electronics or auto accessory shops.

4 If you doubt your ability to check safely the electrical system entrust the work to a Kawasaki Service Agent. In any event have your findings double checked before consigning expensive components to the scrap bin.

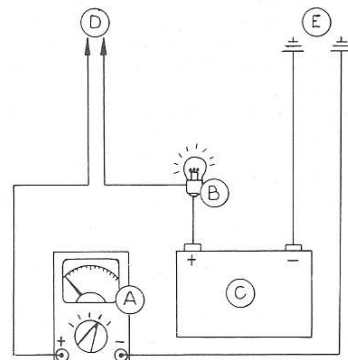


Fig. 8.1 Test circuits for checking the wiring (Sec 2)

- |              |                  |
|--------------|------------------|
| A Multimeter | D Positive probe |
| B Bulb       | E Negative probe |
| C Battery    |                  |

**3 Battery – charging – KLT200 and 250 models**

- 1 Remove and install the battery as described in Chapter 1.
- 2 When new, the battery is filled with an electrolyte of dilute sulphuric acid having a specific gravity of 1.280 at 20°C (68°F). Subsequent evaporation, which occurs in normal use, can be

compensated for by topping with distilled or demineralised water only. Never use tap water as a substitute and do not add fresh electrolyte unless spillage has occurred.

3 The state of charge of a battery can be checked using a hydrometer.

4 The normal charge rate for a battery is  $\frac{1}{10}$  of its rated capacity, thus for a 12 ampere hour unit charging should take place at 1.2 amp. Exceeding this figure could cause the battery to overheat, buckling the plates and rendering it useless. Few owners will have access to an expensive current controlled charger, so if a normal domestic charger is used, check that after a possible initial peak, the charge rate falls to a safe level. If the battery becomes hot during charging, **stop**. Further charging will cause damage. Note that cell caps should be loosened and vents unobstructed during charging to avoid a build-up of pressure and risk of explosion.

5 After charging, top up with distilled water as required, then check the specific gravity and battery voltage. Specific gravity should be above 1.250 and a sound, fully charged battery should produce 15 - 16 volts. If the recharged battery discharges rapidly if left disconnected it is likely than an internal short caused by physical damage or sulphation has occurred. A new battery will be required. A sound one will tend to lose its charge at about 1% per day.

#### 4 Checking the charging system – KLT200 and 250 models

1 Before attempting to test the output of the charging system, check the wiring connections and battery condition (Sections 2 and 3). Open or remove the battery cover to gain access to the battery terminals. Set the multimeter on the 0-20 volts dc scale, and attach the negative (-) probe to the negative terminal and the positive (+) probe to the positive terminal. Start the engine, and note the meter reading at about 4000 rpm. If all is well a reading of about 14.5 volts should be indicated.

2 A reading significantly in excess of 14.5 volts indicates a possible defective regulator/rectifier unit or loose or broken wiring connections. Check these and repeat the test to find out if the problem has been resolved. At idle, battery voltage will be shown on the meter. If this does not increase as the engine speed rises, the alternator or regulator/rectifier may be at fault or disconnected.

#### 5 Checking the generator output

##### *KLT200 and 250 models*

1 Trace and disconnect the yellow output leads after the engine has been warmed up to normal operating temperature. Set the meter to the 250 volts ac scale and connect the probes to the output leads. Start the engine and measure the voltage at about 4000 rpm. Note the reading. A reading of about 60 volts should be obtained, in which case the fault must lie with the regulator/rectifier unit.

2 A reading significantly lower than that shown above indicates a fault in the generator itself, and the generator winding resistances should be measured to discover the nature of the fault. With the engine off, measure the resistance between the leads. The multimeter should be set on the ohm x 1 scale. A sound winding will give a reading similar to that given in the Specifications Section. If infinite resistance is shown, the windings are open (broken), whilst a much lower reading or zero resistance indicates a short. In both instances the generator stator must be renewed.

3 Set the meter on its highest resistance range, normally ohm x 1000 or kilo ohms, and check for insulation between each alternator lead and earth (ground). Anything less than infinity is indicative of a short between the stator core and its windings, again requiring renewal.

##### *KLT110 and 160 models*

4 Remove the headlight unit to reach its wires or plug the meter probes into the connectors at the headstock. Do not disconnect the headlamp.

5 Connect the meter between the red/black and black/yellow wires, set it to the 25 volts ac scale, switch on the headlamp and start the engine.

6 At low engine speed the voltage should be low, rising to the specified value at 3000 rpm. Stop the engine as soon as the reading is noted.

7 If not correct, check the lighting coil. Disconnect the yellow wire from the generator and connect the meter between the yellow wire terminal and a good ground contact. With the meter set to the ohm x 1 scale, a good coil should give a reading similar to that specified.

8 If the coil is faulty it must be renewed either on its own (KLT110) or as part of the stator plate (KLT160).

9 If the voltage reading was low, but the coil is in good condition, then it is probable that the rotor magnets have weakened and the rotor must be renewed.

#### 6 Checking the regulator/rectifier unit – KLT200 and 250 models

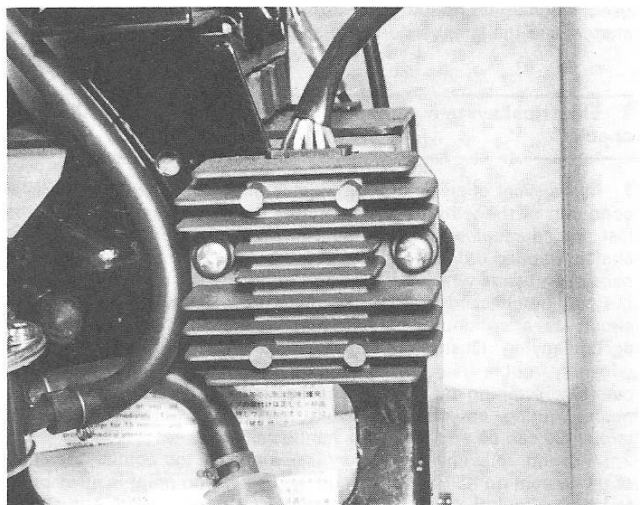
1 Remove the seat and rear fender. See Chapter 5. Disconnect the unit wires and remove its mounting screws to release it.

2 Set the multimeter on the ohm x 1000 (k ohm) scale, and measure the resistance between the red/white lead and each of the yellow leads. Note the reading, then reverse the meter probes and repeat. Once these four tests have been completed, repeat the sequence using the black lead in the connector in place of the red/white lead, another four tests. In each test, a very high resistance should be shown in one direction, with a very low reading if the meter probes are reversed. The actual resistance figures are not important, but a large difference between the two readings indicates that the particular diode is functioning normally. If with any pair of leads a similar reading is shown in both directions, a diode has failed and the unit must be renewed.

3 To check the regulator unit, three 12 volt car or motorcycle batteries and a 12 volt bulb rated at 3-6W will be required. Using the accompanying illustration for reference, connect the topmost battery with the test lamp as shown, that is, with the positive (+) battery terminal to one of the yellow leads and the negative (-) terminal to the black lead via the test bulb. The bulb should remain off at this stage.

4 Connect the remaining two batteries in series as shown to produce a 24 volt source, connecting the positive (+) terminal to the brown lead. Read the notes below before connecting the negative (-) lead. **Important note:** Do not use a meter or bulb of a different wattage in place of the test lamp specified. It acts both as an indicator and as a current limiter. On no account apply more than 24 volts to the unit and do not apply even this voltage for more than a few seconds. The unit may be destroyed if these precautions are not observed.

5 Touch the negative (-) lead from the 24 volt source **briefly** against the black terminal of the connector. If the regulator stage is functioning normally, the test lamp should light. Repeat the test with the 12 volt positive (+) lead connected to the other yellow lead. It should be noted that whilst the above tests will usually reveal a regulator fault, the sequence is not infallible. If the tests indicate a sound unit, no other charging system faults can be found but the problem persists, it will be necessary to check the unit by substitution.



6.1 Location of regulator/rectifier unit – KLT200, 250

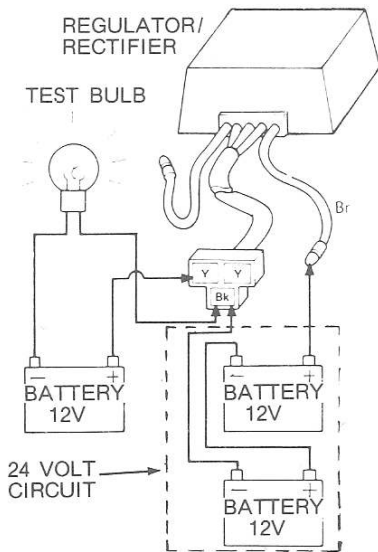


Fig. 8.2 Testing the regulator unit – KLT200 and 250 (Sec 6)

## 7 Starter motor – inspection – KLT200 and 250 models

1 Remove and refit the starter motor, and inspect the drive components as described in Chapter 2.

2 Place the motor on a clean workbench and dismantle it, following the photographic sequence which accompanies this Section. Lay out each part in sequence as a guide during reassembly. Clean the motor components using a high flash-point solvent. It will be noted that the motor shown in the photographs is of the later, four brush, type. Earlier models made use of a two brush motor of similar construction, and this may be dismantled as follows.

3 Remove the two long retaining screws and lock washers and remove the starter motor end covers. Remove the toothed washer, thrust washers and armature from the right-hand end of the motor. Moving to the left-hand end, release the screw which retains the field coil lead to the brush plate and remove the plate and brushes. **Do not** attempt to remove the field coil windings from the motor body. Clean and repack with grease the planetary gears; if worn or damaged the motor assembly must be renewed.

*Two brush motors*

4 Pull back and displace the brush springs to allow the carbon brushes to be measured. Renew them if they are 5.5 mm (0.216 in) or less in length. The brush springs should exert a pressure of 495 – 605 grams. In practice, the brush springs can be considered serviceable if they press firmly on the brushes. Clean the commutator surface with fine abrasive paper to restore a smooth, polished surface. Clean out the grooves

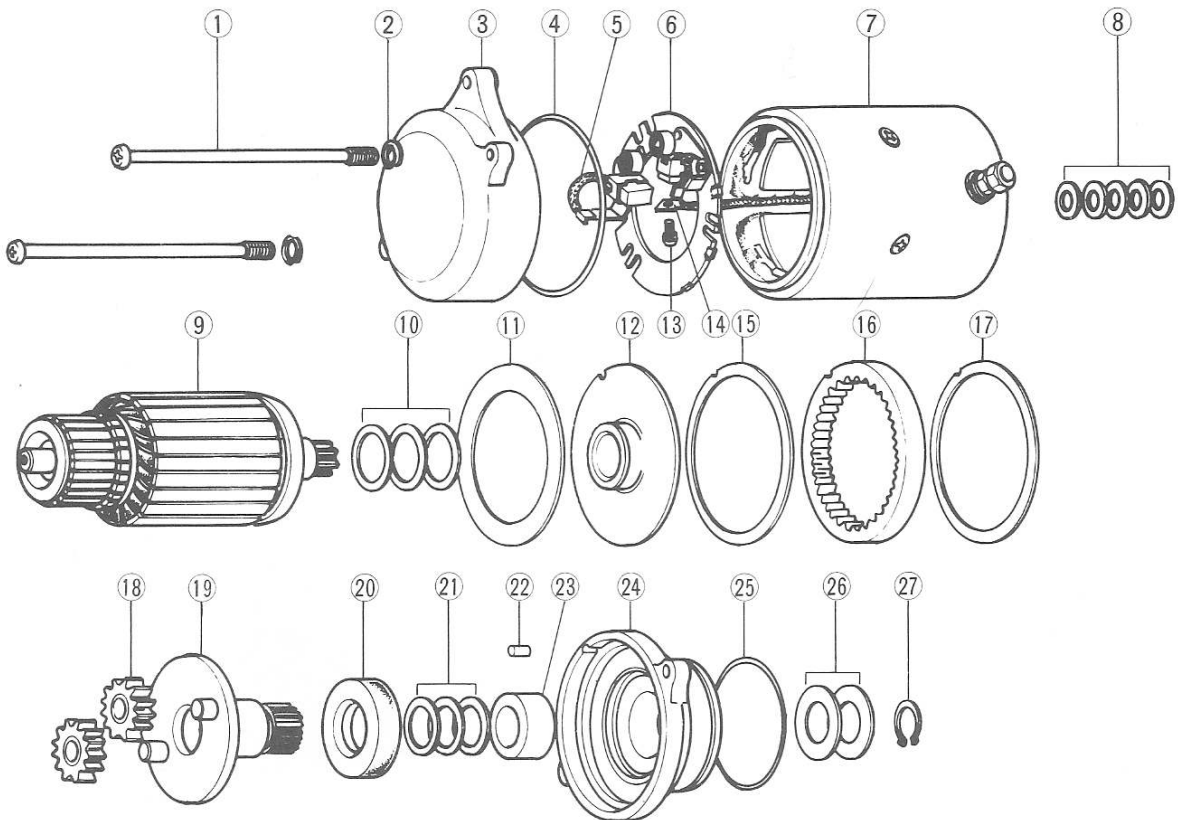


Fig. 8.3 Starter motor – KLT200 A1, A2 and early A3 (Sec 7)

- |                 |                    |                   |                   |
|-----------------|--------------------|-------------------|-------------------|
| 1 Screw         | 8 Thrust washers   | 15 Gasket         | 22 Key            |
| 2 Spring washer | 9 Armature         | 16 Outer gear     | 23 Bushing        |
| 3 End cover     | 10 Thrust washers  | 17 Gasket         | 24 End cover      |
| 4 O-ring        | 11 Gasket          | 18 Planet gears   | 25 O-ring         |
| 5 Brush lead    | 12 End plate       | 19 Drive shaft    | 26 Thrust washers |
| 6 Brush plate   | 13 Screw           | 20 Seal           | 27 Circlip        |
| 7 Motor body    | 14 Field coil lead | 21 Thrust washers |                   |



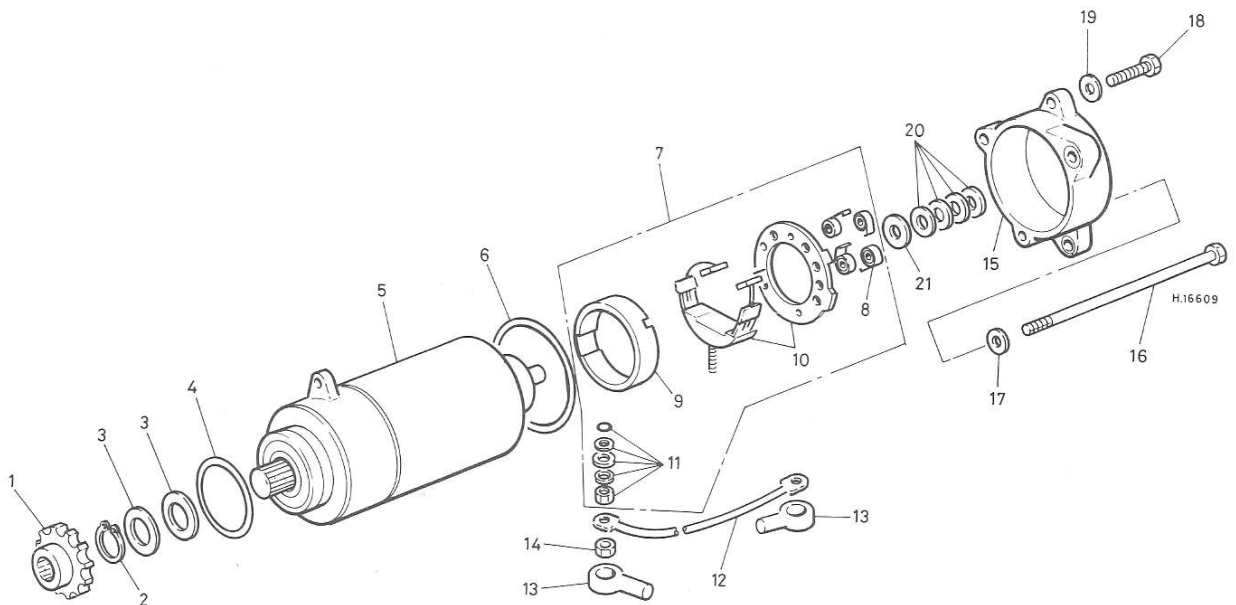


Fig. 8.4 Starter motor – KLT250 and all other 200 models (Sec 7)

1 Drive gear	7 Brush assembly	12 Lead	17 Spring washer – where fitted
2 Circlip	8 Springs	13 Cap	18 Bolt
3 Washers $\Delta$	9 Holder $\square$	14 Nut	19 Washer
4 O-ring	10 Brush plate	15 End cover	20 Thrust washers
5 Motor body	11 Lead terminal	16 Screw	21 Washer
6 O-ring			

$\Delta$  KLT200 A3 late models, A4, A4A and 250 A1 models only

$\square$  KLT200 B1, C1, C2, 250 A2, C1, C2, C3 and P1 models only

between the commutator segments, using a hacksaw blade ground to the correct width. Each segment should be straight sided, with an undercut of 0.5 – 0.8 mm (0.020 – 0.032 in). If the depth of undercut is less than 0.2 mm (0.008 in) the armature should preferably be renewed. It is possible to re-cut the grooves, using the modified hacksaw blade mentioned above, but this requires care and patience. Do not cut into the segment material, or leave the groove anything other than square sided.

5 Set the multimeter on the ohm x 1 scale, then check the resistance between any two segments of the commutator. A very high or infinite resistance indicates an open circuit and the armature must be renewed. Next, set the multimeter on its highest resistance scale, normally ohm x 1000 (kilo ohms) and check the resistance between the armature and each of the commutator segments. There should be no conductivity shown in this test, any reading indicating a partial or complete short circuit, again necessitating renewal.

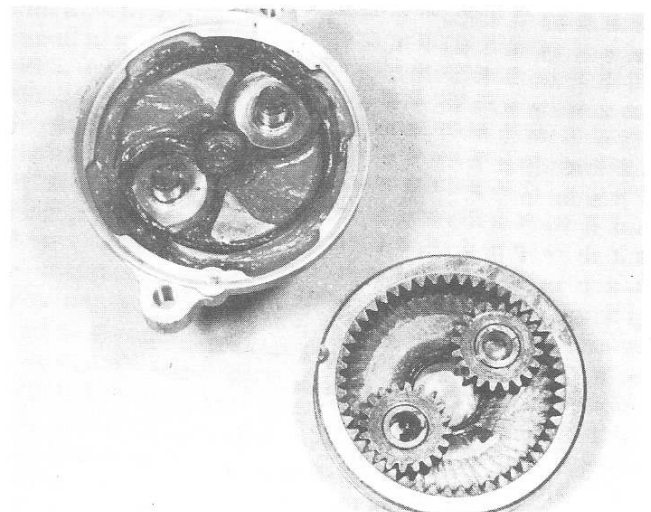
6 Place the motor body on the workbench with the brushes towards you and the starter motor lead terminal to the right-hand side. With the meter on the ohm x 1 range, check for continuity between the positive (+) brush (located on the left-hand side, opposite the terminal) and the terminal. If a reading close to zero ohms is not obtained, the field coil windings are open (broken) and the assembly should be renewed. Now set the meter on its highest range and check for resistance between the positive (+) brush and the motor body. Anything other than infinite resistance indicates a short circuit, again requiring renewal.

#### Four brush motors

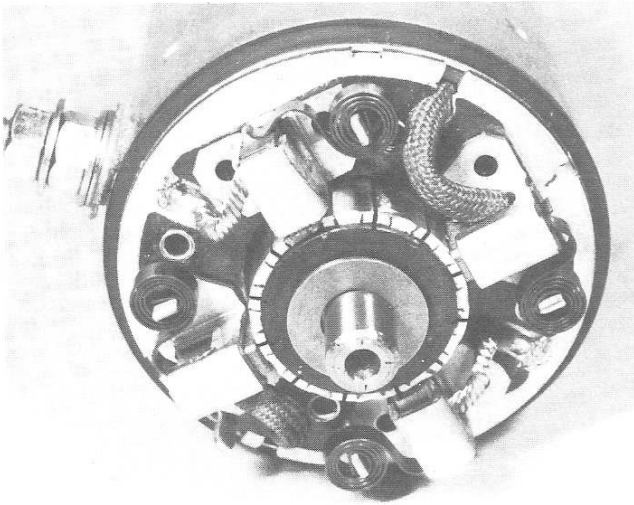
7 These should be dealt with as described above, except for the following points. Brush spring tension has been increased to 680 – 920 grams, but again in practice the springs can be considered acceptable if they bear firmly upon the brushes. Measure the resistance between each positive (+) brush (attached to the motor body) and the body, with the meter set on the ohm x 1000 scale. No reading should be shown. Next, set the meter to ohm x 1 and measure the resistance between the two positive (+) brushes. Unless the reading is at or close to zero ohms,

renew the brushes and leads to correct the open (broken) circuit.

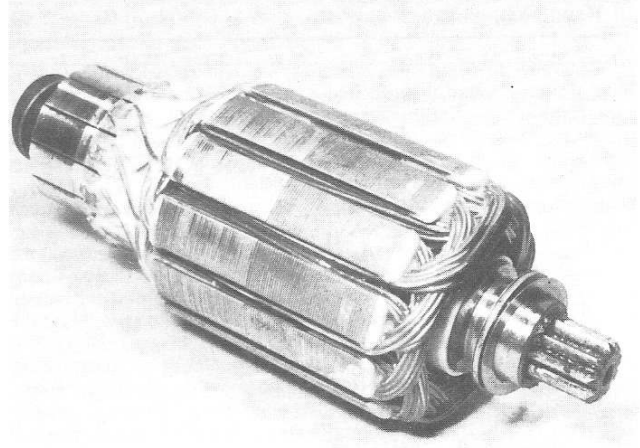
8 Moving to the brush plate and the negative (–) brushes, set the meter on the ohm x 1 scale and check for resistance between the two negative brushes. If a high or infinite resistance is shown, the brush plate assembly should be renewed. Set the meter on the ohm x 1000 scale and measure the resistance between each brush holder and the brush plate. There should be no conductivity between the two, any reading indicating the need for renewal.



7.3 Note planetary gears in starter right end cover – clean, check for wear and pack with grease whenever starter is disassembled



7.4 Renew brushes if any are worn to specified service limits or less – check that they can move freely in their holders



7.5 Shims at each end of armature must be installed in their original positions

## 8 Starter relay and switch – testing – KLT200 and 250 models

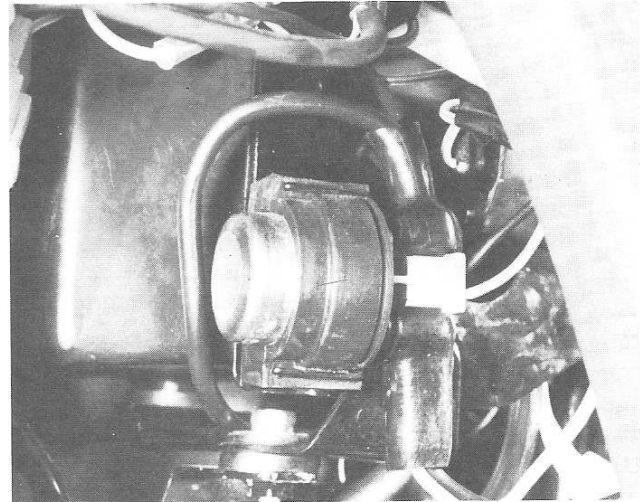
### *Starter solenoid (relay)*

1 Remove the seat and rear fender to gain access to the relay, then detach the heavy starter motor lead from the relay terminal. Set the multimeter to the ohm  $\times 1$  scale and connect one lead to the starter motor lead terminal and the other to earth (ground). Switch on the ignition and press the starter button. An audible click from the relay should be accompanied by a zero ohm reading if the unit is sound.

2 If the relay clicks normally but the meter still indicates that the contacts are open, the unit must be considered defective and renewed. If there is no sign of activity from the relay, check that the starter switch circuit is operating correctly.

### *Starter switch circuit*

3 Disconnect the black lead and the yellow/red lead from the relay. Set the multimeter on the 0–20 volts dc scale, and connect the negative (–) probe to the yellow/red lead and the positive (+) probe to the black lead. Switch on the ignition and press the starter button. If battery voltage is shown, but the relay would not work when tested as described above, it should be considered defective and renewed. It is a sealed unit and cannot be repaired. If battery voltage is not shown, check the wiring and connections to locate the fault.



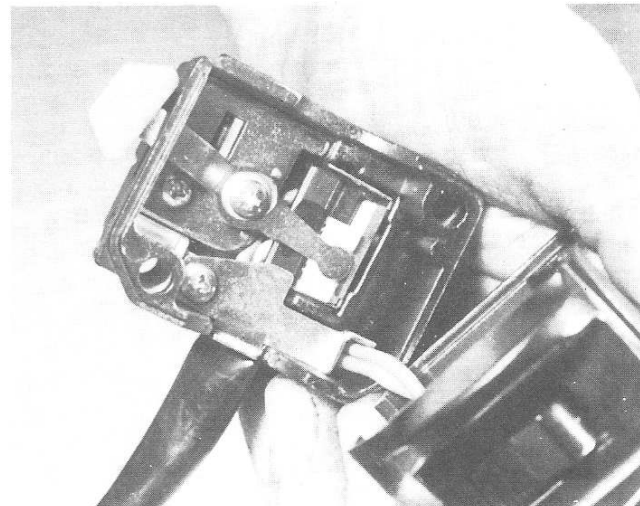
8.1 Location of starter solenoid (relay) – KLT200, 250

## 9 Handlebar switches – removal and installation

1 The handlebar switches are composed of two halves that clamp around the handlebars. They are easily removed for cleaning or inspection by taking out the clamp screws and pulling the switch halves away from the handlebars.

2 To completely remove the switches, the wiring harness should be unplugged and pulled out of position from behind the headlight shell, and any cable ties should be released or cut and replaced with new ones.

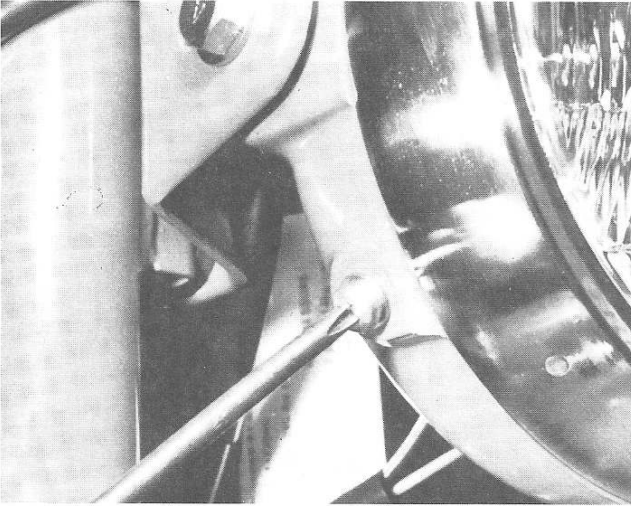
3 When installing the switches, make sure the wiring harnesses are properly routed to avoid pinching or stretching the wires. Tighten the forward screw first and ensure that the alignment post on the switch is seated in the hole on the handlebar.



9.1 Handlebar switches are easily removed for inspection and cleaning

## 10 Handlebar switches – check

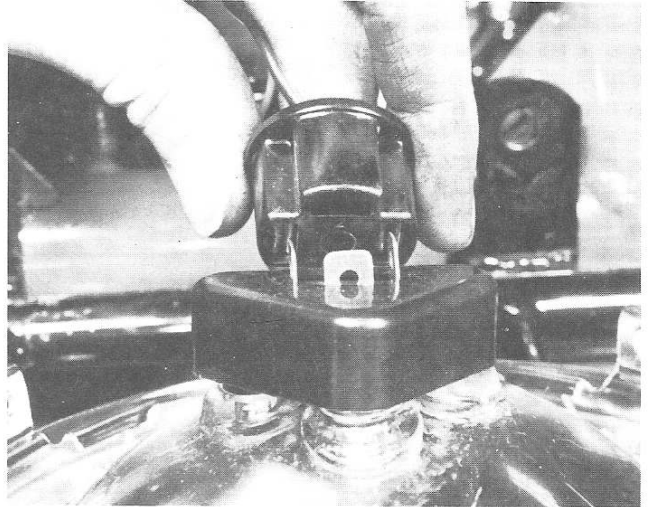
- 1 Generally speaking, the switches are reliable and trouble-free. Most troubles, when they do occur, are caused by dirty or corroded contacts, but wear and breakage of internal parts is a possibility that should not be overlooked. If breakage does occur, the entire switch and related wiring harness will have to be replaced with a new one since individual parts are not usually available.
- 2 Check the switches for continuity with an ohmmeter or a continuity test light.
- 3 Using the ohmmeter or test light, check for continuity between the terminals of the switch harness with the switch in the various positions shown in the relevant wiring diagram. Continuity should exist between the terminal wires connected by the solid line when the switch is in the indicated position.
- 4 If the continuity test indicates that a problem exists, disassemble the switch and spray the switch contacts with electrical contact cleaner. The contacts can be scraped clean with a knife or polished with emery cloth. If switch components are broken, it will be obvious when the switch is disassembled.



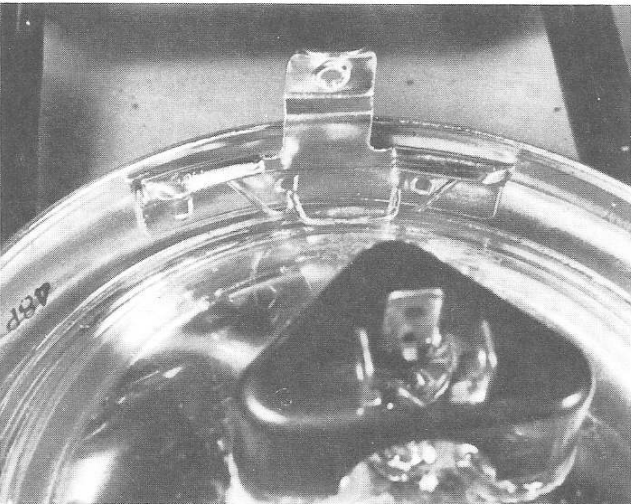
11.6a Headlight bulb renewal, KLT250 – remove two retaining screws ...

## 11 Bulbs – removal and installation

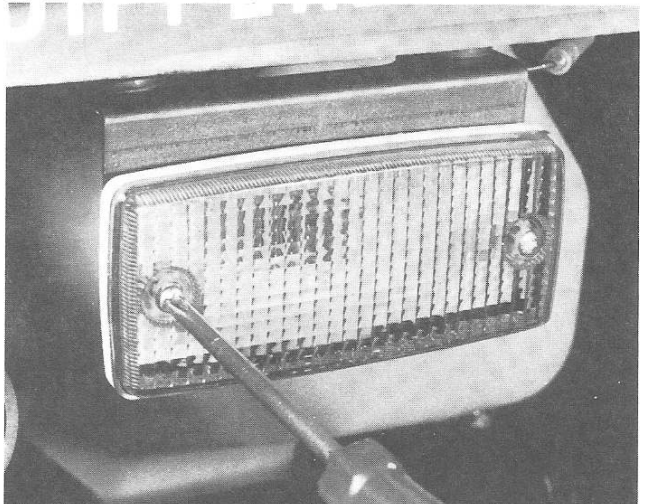
- 1 To remove the headlight bulb proceed as follows:
- 2 KLT110 and 160 models – Remove two bolts and pull forward the headlight shell.
- 3 KLT200 A and B models – Unhook the two rubber straps, remove the single screw and pull forward the shell.
- 4 KLT200 C models – Remove three bolts to release the shell.
- 5 Except KLT250 models – Twist the socket counterclockwise to release it, then press the bulb in, twist counterclockwise and pull it out. Reverse to assemble.
- 6 KLT250 models – Remove the two screws and pull out the headlamp assembly, disconnect the bulb socket and remove the retaining clips. Withdraw the headlight. On installation, the headlight tab engages with the notch in the rim. Use a pair of pliers to secure the clips.
- 7 All models – To remove the taillight bulb, remove the two lens screws and withdraw the lens. Press the bulb in, twist counterclockwise and pull it out. Reverse this procedure to install, but do not overtighten the screws.



11.6b ... disconnect bulb socket ...



11.6c ... and remove retaining clips to release headlight from rim



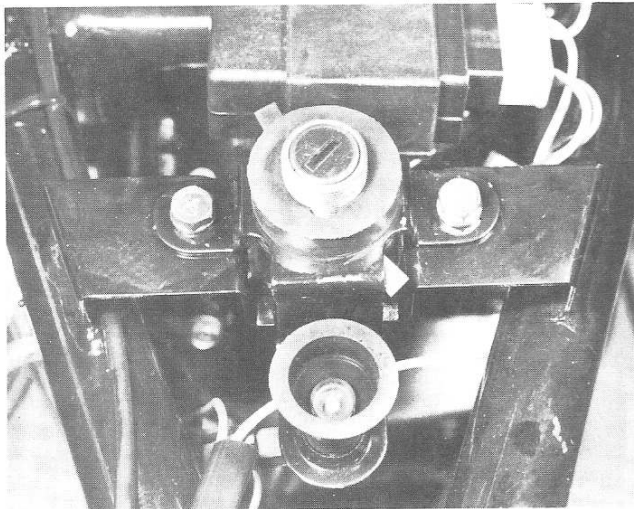
11.7a Remove two retaining screws and withdraw lens ...



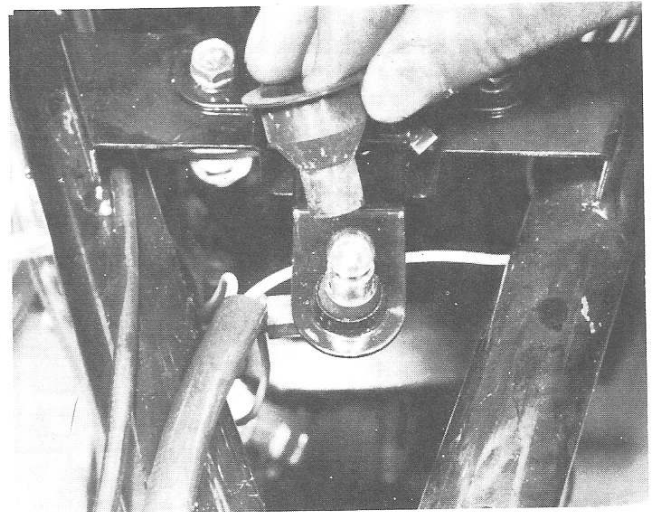
11.7b ... to remove taillight bulb

## 12 Neutral indicator circuit – testing KLT200 and 250 models

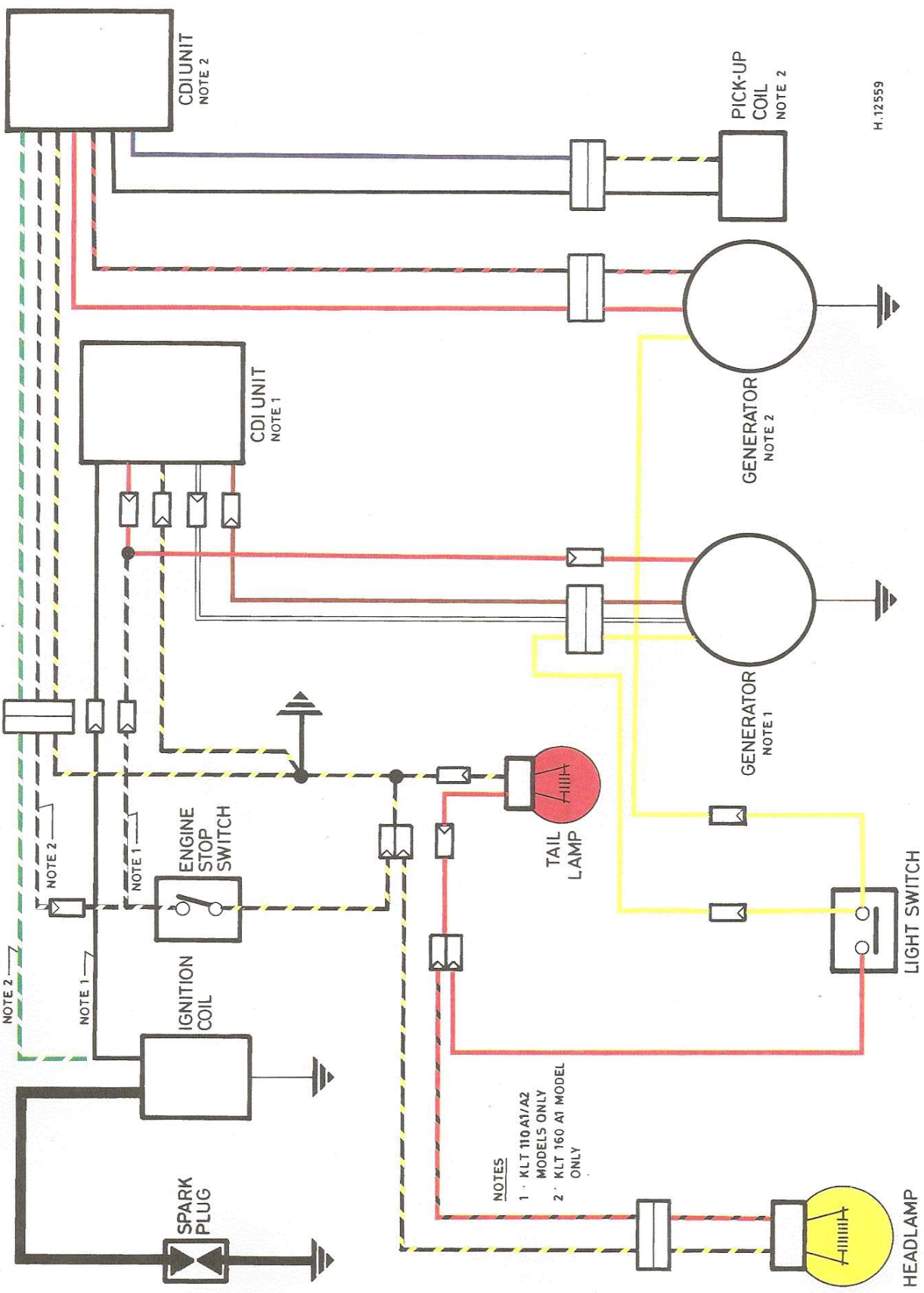
- 1 First check that the bulb is in good condition, then use a meter set to the 20V dc range to ensure that full battery voltage is available at the bulb holder when the ignition is switched on.
- 2 Remove the front cover to gain access to the bulb holder. See Chapter 5.
- 3 If the fault is not located remove the outer chain case (KLT200 A1) or the front outer chain case (all other models). See Chapter 6.
- 4 Disconnect the switch wire and check for continuity between the green wire terminals at the switch and bulb holder. If the wire is not broken or shorting to earth, the switch is almost certainly at fault.
- 5 Check that neutral is selected. Switch on the ignition and check that full battery voltage is available at the switch terminal.
- 6 To check the switch remove it (see Chapter 1) and test for resistance between the terminal and the spring loaded pin; no resistance should be measured. Check that there is no continuity between the switch body and its terminal or pin. If anything less than infinite resistance is measured, the switch is defective and must be renewed.



12.2a KLT200, 250 – remove front cover ...



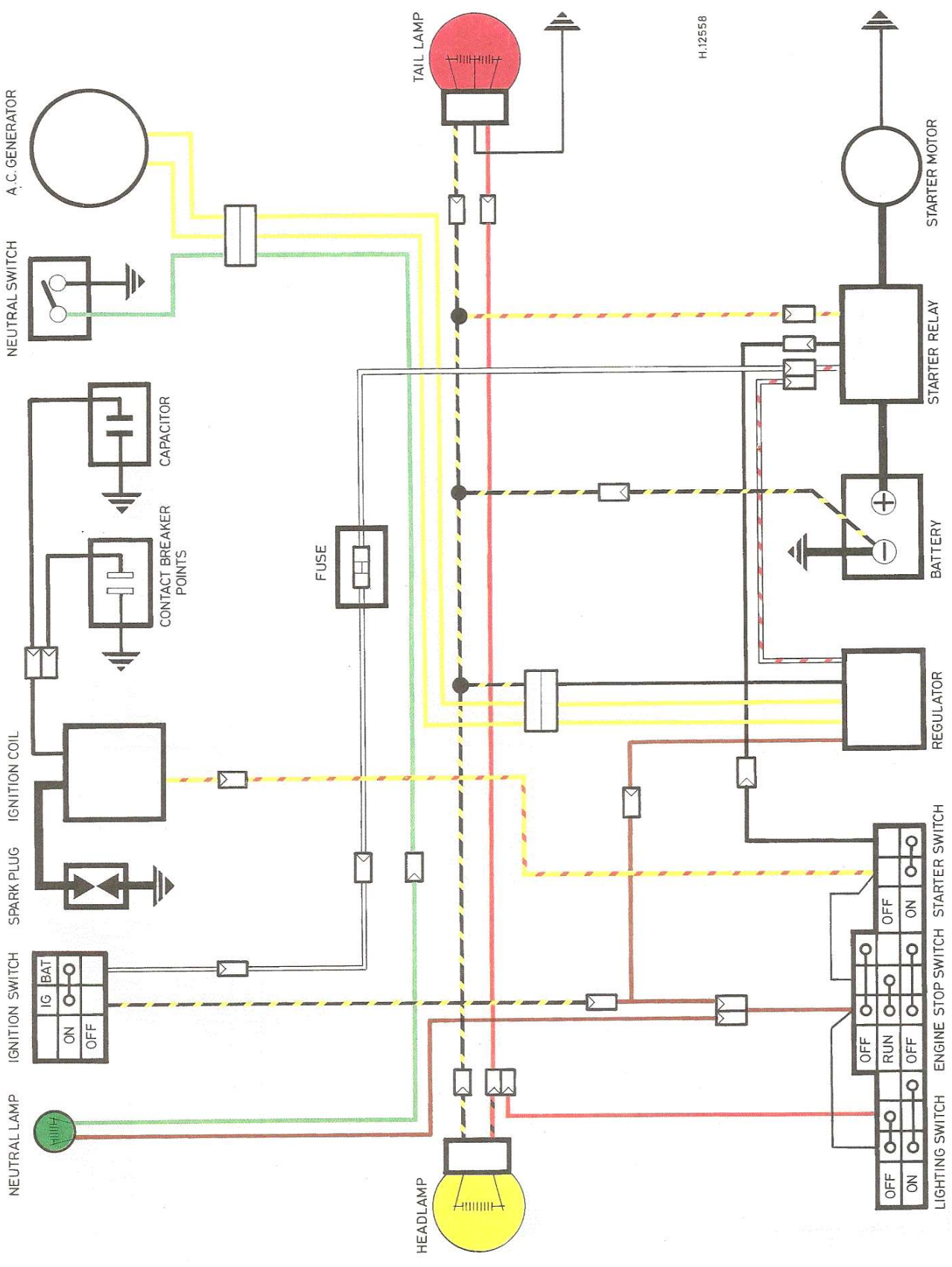
12.2b ... and withdraw rubber sleeve to expose neutral indicator bulb



H.12559

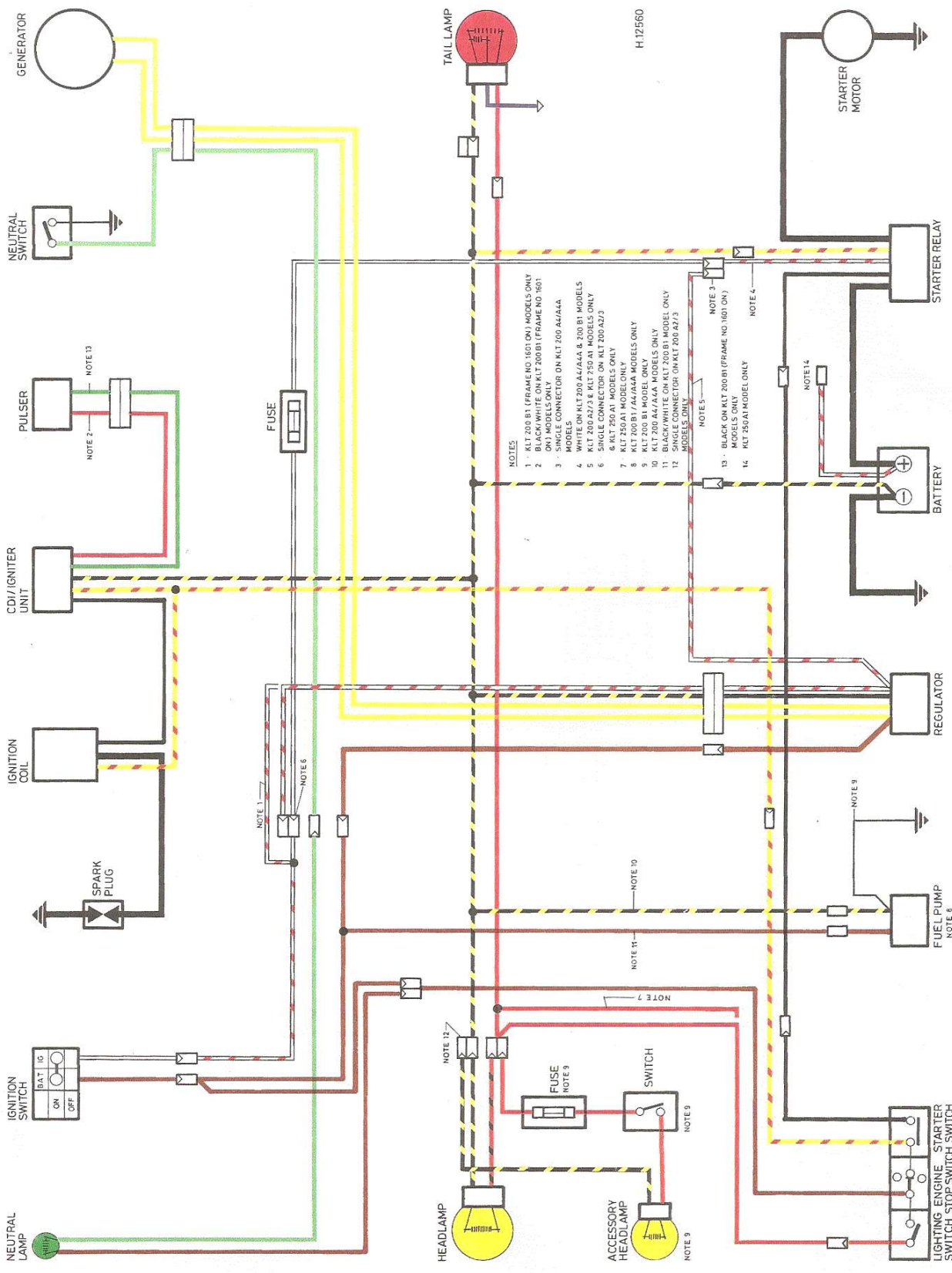
**NOTES**  
 1 · KLT 110 A1/A2  
 MODELS ONLY  
 2 · KLT 160 A1 MODEL  
 ONLY

Wiring diagram - KLT110 and 160 models



H.12558

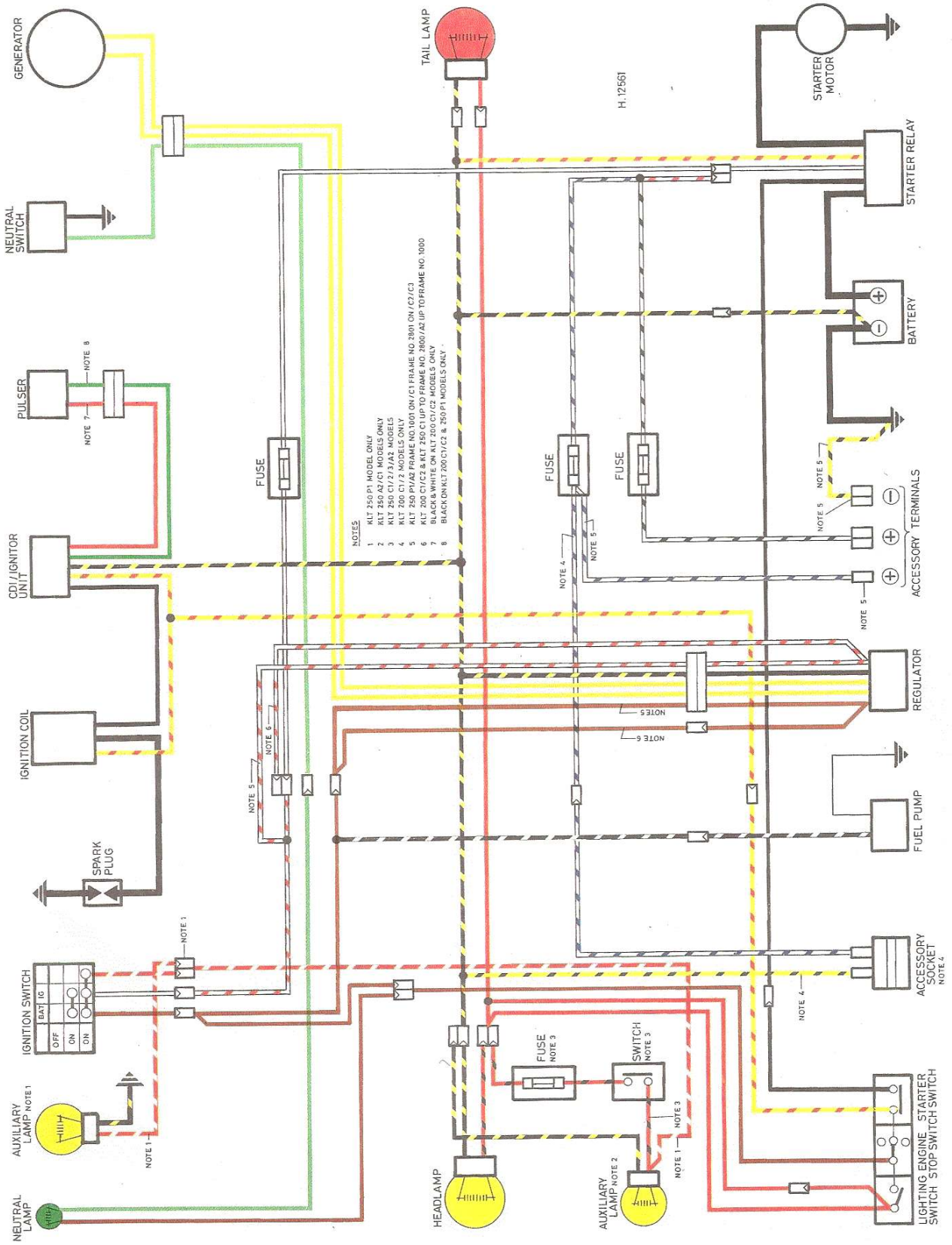
Wiring diagram - KLT200 A1 model



- NOTES
- 1 - KLT 200 B1 (FRAME NO. 1601 ON) MODELS ONLY
  - 2 - BLACK/WHITE ON KLT 200B1 (FRAME NO. 1601 ON) MODELS ONLY
  - 3 - SINGLE CONNECTOR ON KLT 200 A4/A4A MODELS
  - 4 - WHITE ON KLT 200 A4/A4A & 200 B1 MODELS
  - 5 - KLT 200 A2/3 & KLT 250 A1 MODELS ONLY
  - 6 - SINGLE CONNECTOR ON KLT 200 A2/3 MODELS
  - 7 - KLT 250 A1 MODEL ONLY
  - 8 - KLT 200 B1 MODEL ONLY
  - 9 - KLT 200 A4/A4A MODELS ONLY
  - 10 - KLT 200 A4/A4A MODELS ONLY
  - 11 - BLACK/WHITE ON KLT 200 B1 MODEL ONLY
  - 12 - SINGLE CONNECTOR ON KLT 200 A2/3 MODELS ONLY
  - 13 - BLACK ON KLT 200 B1 (FRAME NO. 1601 ON) MODELS ONLY
  - 14 - KLT 250 A1 MODEL ONLY

H-12560

Wiring diagram - KLT200 A1, A2, A3, A4, A4A, B1 and 250 A1 models



Wiring diagram - KLT200 C1, C2, 250 A2, C1, C2, C3 and P1 models



# 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 <sup>3</sup> )	X 16.387 = Cubic centimetres (cc; cm <sup>3</sup> )	X 0.061 = Cubic inches (cu in; in <sup>3</sup> )
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 <sup>2</sup> ; lb/in <sup>2</sup> )	X 0.070 = Kilograms-force per square centimetre (kgf/cm <sup>2</sup> ; kg/cm <sup>2</sup> )	X 14.223 = Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )
Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )	X 0.068 = Atmospheres (atm)	X 14.696 = Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )
Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )	X 0.069 = Bars	X 14.5 = Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )
Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )	X 6.895 = Kilopascals (kPa)	X 0.145 = Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )
Kilopascals (kPa)	X 0.01 = Kilograms-force per square centimetre (kgf/cm <sup>2</sup> ; kg/cm <sup>2</sup> )	X 98.1 = Kilopascals (kPa)

## 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, Imperial (mpg)	X 0.354 = Kilometres per litre (km/l)	X 2.825 = Miles per gallon, Imperial (mpg)
Miles per gallon, US (mpg)	X 0.425 = Kilometres per litre (km/l)	X 2.352 = Miles per gallon, US (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 (Imperial) x l/100 km = 282 and mpg (US) x l/100 km = 235

# Index

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## A

- About this manual 5
- Accessories – choosing and fitting 17
- Acknowledgements 2
- ACR unit (KLT160 models) 66
- Adjustments:-
  - brakes 32
  - carburetor 119
  - clutch 34
  - control cables 33
  - steering head bearings 38
  - valve clearances 39
- Advancer (KLT200 A1 models) 130
- Air cleaner:-
  - element:
    - cleaning 34, 121
    - type 104, 105
  - removal and installation 121

## B

- Balancer drive (KLT200 B, C, 250 A2, C and P models) 86
- Battery (KLT200 and 250 models):-
  - charging 175
  - checking 38
  - specifications 174
- Bearings:-
  - engine 101
  - steering head 38
  - wheel 41, 167, 168
- Bearings and oil seals:-
  - removal, inspection and installation 101
- Brakes:-
  - adjustment 32
  - checking 32
  - inspection 171
  - removal and installation 168
  - specifications 163
  - troubleshooting 26
- Bulbs:-
  - removal and installation 180
  - specifications 174, 175
- Buying:-
  - accessories 17
  - spare parts 8
  - tools 10
- Bypass valve (KLT200 and 250 models) 125

## C

- Cables – control 33
- Cam chain and guides 75
- Cam chain tensioner 59
- Camshaft:-
  - removal, inspection and installation 56
  - specifications 48, 51
- Carburetor:-
  - adjustment 119
  - checking the settings 119
  - disassembly, inspection and reassembly 117
  - removal and installation 112
  - specifications 103, 104, 105
- Chain – final drive 145
- Charging system (KLT200 and 250 models) – checking 176
- Chassis – specifications 28
- Checks:-
  - battery 38
  - brakes 32
  - carburetor settings 119
  - charging system (KLT200 and 250 models) 176
  - daily or pre-ride 30
  - drive chain and sprockets 38
  - electrical system 175
  - final drive gear case 36
  - generator output 176
  - handlebar switches 180
  - ignition timing 42, 128
  - regulator/ rectifier unit (KLT200 and 250 models) 176
  - wheel bearings 41
- Chemicals – motorcycle 16
- Cleaning:-
  - air cleaner element 34, 121
  - engine oil filter 39
  - fuel filter 109
  - fuel system 35
  - fuel tank 106
  - spark arrester 45
  - spark plug 41
- Clutch:-
  - adjustment 34
  - release mechanism 77
  - removal, inspection and installation 78
  - specifications 48, 52
  - torque wrench settings 49, 53
  - troubleshooting 23
- Coils:-
  - ignition HT 128

- pickup (pulser) 129
  - source (exciter) – KLT110 and 160 models 129
  - Condenser (capacitor) – KLT200 A1 models 131**
  - Control cables – adjustment 33**
  - Conversion factors 186**
  - Crankcase right cover:-**
    - removal and installation 76
  - Crankcases:-**
    - disassembly and reassembly 89
  - Crankshaft:-**
    - inspection 92
    - specifications 48, 52
  - Cylinder barrel:-**
    - removal, inspection and installation 66
    - specifications 46, 50
  - Cylinder head:-**
    - disassembly, inspection and reassembly 64
    - removal, inspection and refitting 61
    - specifications 47, 51
- D**
- Differential 158**
  - Dimensions – model 7**
  - Drive chain and sprockets – check 38**
- E**
- Electrical system:-**
    - battery (KLT200 and 250 models) 175
    - bulbs 174, 175, 180
    - charging system (KLT200 and 250 models) 176
    - general information and preliminary checks 175
    - generator 176
    - handlebar switches 179, 180
    - neutral indicator circuit (KLT200 and 250 models) 181
    - regulator/rectifier unit (KLT200 and 250 models) 176
    - specifications 174
    - starter motor (KLT200 and 250 models) 177
    - starter relay and switch (KLT200 and 250 models) 179
    - troubleshooting 26
    - wiring diagrams 182 to 185
  - Engine:-**
    - ACR unit (KLT160 models) 66
    - bearings and oil seals 101
    - break-in procedure recommended 102
    - cam chain and guides 75
    - cam chain tensioner 59
    - camshaft 56
    - crankcase right cover 76
    - crankcases 89
    - crankshaft 92
    - cylinder 66
    - cylinder head 61, 64
    - disassembly and reassembly – general information 55
    - general information 53
    - generator 72
    - kickstart assembly (KLT200 A1, A2 and A3) 53, 85
    - major repair – general note 53
    - oil changing 36
    - oil filter 39
    - oil pump 86
    - piston and rings 46, 47, 50, 67
    - recoil starter (KLT110 and 160 models) 70
    - removal and installation 54
    - repair operations requiring engine removal 54
    - rocker shaft and rockers 60
    - specifications 28, 46, 50
    - starter motor and drive (KLT200 and 250 models) 20, 74, 175, 177
    - start-up after overhaul 102
    - torque wrench settings 29, 49, 53
    - troubleshooting 20 to 24
    - valves 47, 51, 63, 64
    - valve seats and valve guides 63
- Exhaust system 122**
- F**
- Filters:-**
    - fuel 109
    - oil 39
  - Final drive:-**
    - differential (KLT200 A, C and 250 C and P models) 158
    - drive chain (KLT110, 200 and 250 models) 145
    - drive chain case and tensioner (KLT110, 200 and 250 models) 141
    - general (KLT160 models) 160
    - rear axle 147, 154, 155, 160
    - specifications 49, 53, 140
    - sprockets (KLT110, 200 and 250 models) 146
    - torque wrench settings 141
  - Final drive chain (KLT110, 200 and 250 models):-**
    - inspection and maintenance 145
    - removal and installation 145
  - Final drive gear case:-**
    - checking 36
    - oil changing 45
  - Final drive sprockets (KLT110, 200 and 250 models) 146**
  - Frame:-**
    - ancillary components removal and installation 139
    - inspection 133
  - Frame and forks:-**
    - frame 133
    - frame ancillary components 139
    - front cover 138
    - front fender 138
    - front forks 133
    - front suspension 136
    - rear fender 138
    - seat 137
    - specifications 132
    - steering head 136
    - torque wrench settings 132
  - Front cover (KLT200 and 250 models):-**
    - removal and installation 138
  - Front fender:-**
    - removal and installation 138
  - Front forks:-**
    - oil changing (KLT110 A2, 160 models) 81
    - removal and installation 133
    - specifications 32
    - torque wrench settings 133
  - Front suspension – removal, inspection and installation:-**
    - KLT110 A2 and KLT160 models 136
    - KLT200 C and KLT250 models 136
  - Front wheel:-**
    - bearings removal, inspection and installation 167
    - removal and installation 164
  - Fuel and vent hoses – inspection 109**
  - Fuel filter – cleaning 109**
  - Fuel pump (KLT200 and 250 models):-**
    - removal, inspection and installation 109
    - specifications 104, 105
    - testing 109
  - Fuel system:-**
    - air cleaner 121
    - carburetor 112, 117, 119
    - cleaning 35
    - fuel and vent hoses 109
    - fuel filter 109
    - fuel pump 104, 105, 109
    - fuel tank 103, 104, 105, 106
    - fuel tap 108
    - specifications 103, 104, 105
  - Fuel tank:-**
    - capacity 103, 104, 105
    - removal, inspection, cleaning and installation 106
  - Fuel tap (KLT110, 160 and 250 models) 108**

**G****Gearshift mechanism** 88**Generator:-**

- components removal and installation 72
- output checking 176
- specifications 174

**General information:-**

- electrical system 175
- engine, clutch and transmission 46
- final drive 141
- frame and forks 133
- fuel system and lubrication 103
- ignition system 126
- wheels, brakes and tires 164

**H****Handlebar switches:-**

- checking 180
- removal and installation 180

**HT coil – ignition:-**

- removal and installation 128
- testing 128

**I****Ignition/CDI unit:-**

- removal and installation 129
- testing 130

**Ignition system:-**

- advancer (KLT200 A1 models) 130
- condenser (capacitor) – KLT200 A1 models 131
- HT coil 128
- ignition/CDI unit 129, 130
- locating and identifying faults 127
- pickup (pulser) coil 129
- source (exciter) coil (KLT110 and 160 models) 129
- specifications 126
- timing 42, 126, 128
- troubleshooting 21, 127

**Ignition timing:-**

- checking 42, 128
- specifications 126, 127

**K****Kickstart assembly (KLT200 A1, A2 and A3 models):-**

- removal, inspection and installation 85
- specifications 53

**L****Lubrication:-**

- bypass valve (KLT200 and 250 models) 125
- engine oil changing 36
- final drive gear case oil changing 45
- front fork oil changing (KLT110 A2, 160 models) 41
- general 36
- lubricants:
  - general 16
  - recommended 29
- oil filter 39
- oil pressure 123
- oil pump 86, 123
- propeller shaft joint (KLT160 models) 41
- specifications 104, 105
- steering head bearings 38
- wheel bearings 41

**M****Maintenance:-**

- routine 28 - 45
- techniques 9

**Model:-**

- dimensions 7
- weights 7

**N****Neutral indicator circuit (KLT200 and 250 models):-**

- testing 181

**Nuts, bolts and fasteners – tightening** 34**O****Oil filter – cleaning/renewal** 39**Oil pressure (KLT200 and 250 models) – testing** 123**Oil pump:-**

- dismantling, inspection and reassembly 123
- removal and installation 86

**Oil seals** 101**P****Pickup (pulser) coil – testing** 129**Piston:-**

- removal, inspection and installation 67
- specifications 46, 50

**Piston rings:-**

- removal, inspection and installation 67
- specifications 47, 50

**Primary drive:-**

- removal, inspection and installation 78
- specifications 49

**Propeller shaft (KLT160 models) – greasing** 41**R****Rear axle:-**

- disassembly, inspection and assembly:
  - KLT110 models 154
  - KLT160 models 160
  - KLT200 A models 154
  - KLT200 C, KLT250 C and P models 155
  - KLT200 B and KLT250 A models 154
- removal and installation:
  - KLT110, 200 and 250 models 147
  - KLT160 models 160

**Rear fender:-**

- removal and installation 138

**Rear wheels:-**

- bearings 168
- removal and installation 167

**Recoil starter (KLT110 and 160 models):-**

- removal, inspection and installation 70

**Regulator/rectifier unit (KLT200 and 250 models):-**

- checking 176

**Rocker shaft and rockers:-**

- removal, inspection and installation 60

**Routine maintenance** 28 - 45**S****Safety precautions** 15**Seat – removal and installation** 137**Source (exciter) coil (KLT110 and 160 models) – testing** 129**Spanner size comparison** 14**Spare parts – ordering** 8

**Spark arrester – cleaning** 45

**Spark plug:-**

- cleaning/renewing 41
- operating conditions (color) 43
- specifications 126, 127

**Specifications:-**

- chassis 28
- clutch and transmission 46
- electrical system 174
- engine 28, 46
- final drive 140
- frame and forks 132
- fuel system 103
- ignition system 126
- lubrication 29, 104
- wheels, brakes and tires 163

**Starter motor (KLT200 and 250 models):-**

- drive mechanism 74
- inspection 177
- relay 179
- specifications 175
- switch 179
- troubleshooting 20

**Steering head:-**

- bearings 38
- inspection 136

**Switches – handlebar** 179, 180

## T

**Timing – ignition** 42, 126, 128

**Tires:-**

- pressures 164
- removal and installation 171
- repair 172
- specifications 164
- valve removal, inspection and installation 172

**Tools** 10

**Torque wrench settings** 14, 29, 49, 53, 132, 141, 164, 175

**Transmission:-**

- balancer drive components (KLT200 B, C, 250 A2, C and P models) 86
- disassembly, inspection and reassembly 92
- front gear case (KLT160 models) 102
- gearshift mechanism external components 88
- specifications 49, 52
- torque wrench settings 49, 53

**Troubleshooting:-**

- abnormal frame or suspension noise 26
- brake problems 26
- clutch operating problems 23
- electrical problems 26
- engine:
  - abnormal noise 24
  - fails to start when turned over 20
  - knocking or pinking 22
  - overheating 22
  - poor acceleration 22
  - poor running at idle and low speed 21
  - poor running or lack of power at high speeds 22
  - stalls after starting 21
- exhaust smokes excessively 24
- handling or roadholding poor 25
- starter motor 20
- transmission:
  - abnormal noise 24
  - gear selection problems 23

**Trunk (KLT250 models) – removal and installation** 138

**Tune-up and routine maintenance** 28-45

## V

**Valves:-**

- clearances adjustment 39
- disassembly, inspection and reassembly 64
- seats and guides servicing 63
- servicing 63
- specifications 47, 51
- springs specifications 48, 51
- timing specifications 47, 51

## W

**Weights – model 7**

**Wheels:-**

- bearings 167, 168
- front 164
- rear 167
- type 163

**Wiring diagrams** 182-185

**Working facilities** 11