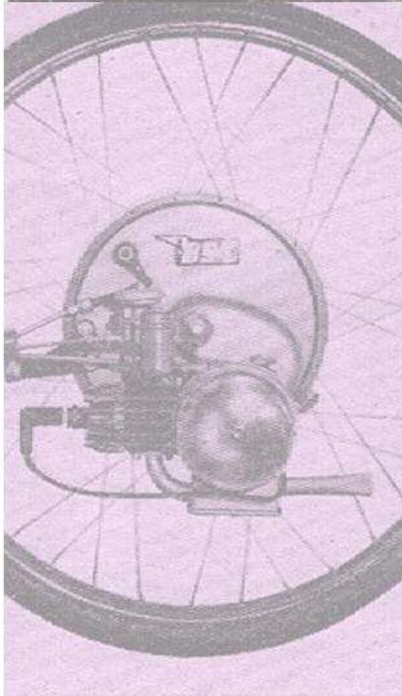


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# Motor Cycle & Cycle TRADER

## TRADER AID SERIES

### Servicing Data Sheet No. 2

# BSA WINGED WHEEL MODEL WI

**L**ARGE numbers of B.S.A. Winged Wheels have been supplied for fitting into customers' own bicycles. They are also being supplied in increasing numbers already fitted to a bicycle developed by B.S.A. Cycles Ltd. The following are the salient features of the unit:

**Engine:** 35 c.c. (36 mm. bore x 34 mm. stroke) two-stroke. Cast-iron cylinder, with detachable alloy-head; 2 piston rings located by pegs in piston (ring end gap .006-.010 in.). Two-stage reduction transmission, incorporating 3-plate cork clutch, giving an 18-to-1 single-speed ratio. A large-diameter internal expanding brake is incorporated in unit.

**Spark Plug:** Champion N7, points gap .020-.022 in.

**Carburettor:** Amal type 335/1, with automatic strangler. Handlebar-lever control. Jet size 27; taper needle in centre-notch position.

**Ignition and Lighting:** Either a Wipac Migemag Series 90 or a Miller type B.S.19 flywheel magneto with lighting coil is fitted. Ignition timing  $5/32$  in. before top dead centre. Contact points gap .018 in. Lighting set output 9w. Uses 6v 6w headlamp bulb and 6v .45A or .5A rear bulb. Special Miller lamp-set available. (Part No. 62-468).

**Fuel Tank Capacity:**  $\frac{1}{2}$  gall. Ratio 25 to 1 (20-1 using S.A.E. 40) (Half-gallon petrol to 2 tank-cap measures of S.A.E. 50 oil). Consumption approx. 185-200 m.p.g. **Gearcase Lubrication:**  $\frac{1}{2}$  pint (1 $\frac{1}{2}$  tank cap measures) of SAE 40 oil.

**Weight:** Engine unit and wheel 26 $\frac{1}{2}$  lb.  
Fuel tank (empty) and carrier 3 $\frac{1}{2}$  lb.  
**Tyre:** 26 in. x 1 $\frac{1}{2}$  in. Dunlop Carrier.  
**Tyre pressures (lb./sq. in.):** 40 43 46 49 52 55  
**Rider's weight (stones):** 7 8 9 10 11 12

#### FITTING UNIT TO CYCLE

The fitting of the unit is simple, but the following points should be watched:

(1) The width of the Winged Wheel is 4 $\frac{1}{4}$  in. in all. If the width of the bicycle fork ends is within plus or minus  $\frac{1}{4}$  in. of this figure, they will easily "spring" this amount. If the width is much less or much more, re-setting of the seatstays and chainstays will be necessary, taking care that chain alignment is kept correct. Washers may be used to take up extra width, if adequate spindle-length is available for chain adjusters, spindle nuts, etc. If oilbath is fitted, it is usually necessary to fit a washer to spindle and a number 4 sprocket to prevent rubbing of the brake drum from taking place.

THE BSA WINGED WHEEL—an illustration which shows its compactness.

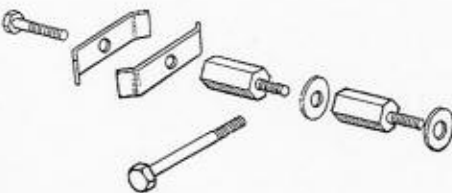
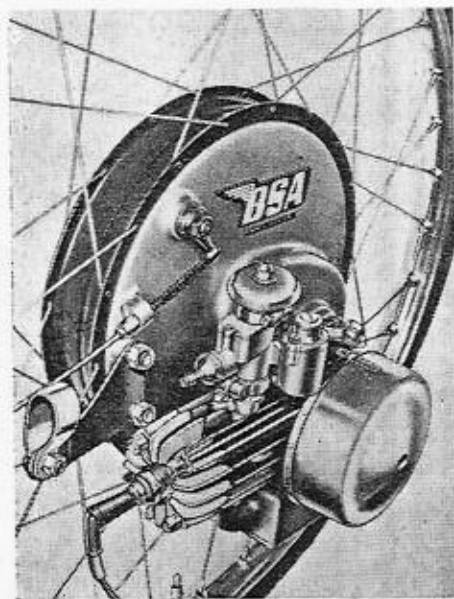


Fig. 1: PETROL TANK ADAPTOR for frames with dropped top tubes.

Fig. 2: LAYOUT OF HANDLEBAR CONTROLS: (a) throttle; (b) rear brake; (c) clutch; (d) throttle ratchet; (e) clutch ratchet.

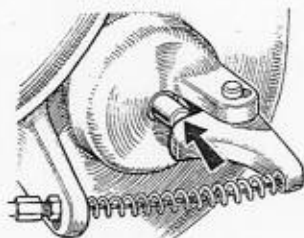
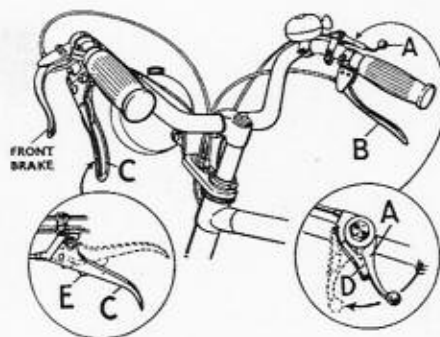


Fig. 3: CLUTCH OPERATING ROD: Adequate clearance must be given at part indicated by arrow, when clutch is disengaged.

Fig. 4: GEARCASE FILLER PLUG: (rear nearside of unit). Fill with  $\frac{1}{2}$  pint (1 $\frac{1}{2}$  filler cap measure) of engine oil (SAE 50).



(2) Fit the petrol tank so that it is either level or slopes downwards towards the petrol tap. For bicycles with low-gravity frame (usually with bent top rail), it will be difficult to do this with the standard tank attachment fittings. It will therefore be necessary to obtain the special fittings set (Part No. 62-378 from B.S.A. Cycles Ltd.—see Fig. 1).

(3) The torque reaction-arm must meet the face of its clip squarely. If the arm is strained sideways, severe damage can be caused to the unit. If the amount of mal-alignment is slight, use washers as packing between clip and arm, otherwise, reset the torque reaction arm. Use correct type of clip (round

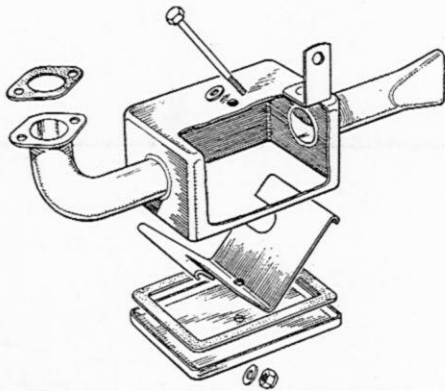


Fig. 5: THE EXHAUST SYSTEM dismantled, showing silencer construction.

When fitting unit to tandem use special length cables:

Clutch cable ..	Part No. 62-391.
Brake cable ..	Part No. 62-394.
Throttle cable ..	Part No. 62-397.

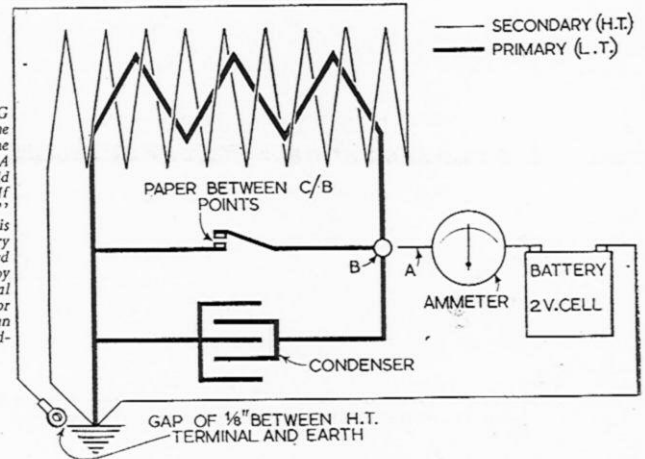
#### SERVICING UNIT

Whenever possible, use the maker's Exchange Replacement Service. The maker's service tools are good and are supplied at cost price (see list given).

**Decarbonising:** Decarbonise silencer and exhaust port every 1,000-1,500 miles; cylinder head and

slot in fly-wheel. Adjust Wipac points by slackening locking-screw, then turning eccentric screw. Adjust Miller points by slackening locking-screw sufficiently to allow contact-plate to be moved by screwdriver pressure. Securely tighten locking screw in both cases. Use fine abrasive paper to clean points. Ensure that they seat squarely over their whole surface. Make sure that pivot for c/b moveable arm is rigid in stator plate and that breaker-arm pivots easily on it. Excessive burning of points indicates a faulty condenser (shown by intense blue sparking at c/b points). There is always some sparking at points, but this is usually harmless, and the condenser is

Fig. 7: LAYOUT FOR TESTING STATOR PLATE (Magnets): Thin line is secondary (HT) circuit, thick line primary (LT) circuit. When lead A is connected to point B, ammeter should show discharge of approx. 4 amps. If no reading is shown, look for "open" in primary circuit. When lead A is disconnected (causing collapse of primary field), a HT current should be induced in the secondary winding, shown by HT spark jumping from terminal to earth. If no spark, look for "short" in primary circuit or an "open" or "short" in secondary circuit.



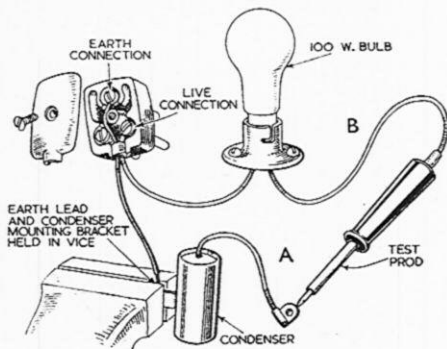
or D-shape), and ensure that it is absolutely tight, using a star lock-washer under the nut.

(4) The controls should be fitted as follows: Rear brake and throttle lever on the right hand bar. Clutch and front brake on left hand bar (see Fig. 2). Brake controls should be adjusted in the normal way. The clutch control must be adjusted to give 3/32 in. slack at the handle bar lever end. Ensure that adequate clearance exists between the end of the clutch push rod and the clutch release lever (see Fig. 3). Lack of clearance would cause thrust on push rod, and rod, release lever and operating plate would wear rapidly. Clutch would slip and burn out. The throttle cable should be adjusted so that the strangler only closes when the handle bar control catch is lifted. Do not use the cable adjuster to set the engine tickover.

(5) Finally, ensure that all nuts are tight, that the wheel alignment is correct and that the correct grade and quantity of engine oil (1/2 pint or 1 1/2 filler cap measures) is in the gearcase. (See Fig. 4).

Number plates are available as follows: Front Plate, Part No. 62-383 and Rear Plate, Part No. 62-381. (Rear plate must be illuminated).

Fig. 6: LAYOUT FOR TESTING CONDENSER: (exercise care, if "mains" are used). Touch condenser lead A with live lead B. Condenser should hold charge for 10-15 seconds, after live lead B is removed and should discharge with an audible crack when lead A is touched to body of condenser. If condenser does not hold charge, or if bulb lights when live lead B is connected, replace condenser.



piston every 2,000-2,500 miles. Loss of power and a muffled exhaust note are warnings that this should be done. Particular attention should be paid to the cleanliness of the exhaust port and the bend of the exhaust pipe and pipe tail.

To remove exhaust system, slacken nut securing slotted silencer clip, remove the two exhaust pipe-flange self-locking nuts, and pull exhaust system downwards. Undo self-locking nut from silencer body bolt; this allows silencer to be dismantled and baffle removed. Clean thoroughly, then re-assemble silencer, taking care to fit sealing washer (see Fig. 5). While exhaust system is removed, the exhaust-port in cylinder can be cleaned, without removing cylinder or head. Rotate engine until piston is at bottom of travel, then clean carbon from port (ensuring that carbon is kept out of cylinder).

To remove cylinder head, take out spark-plug, undo 4 securing nuts and saddle washers from holding-down studs, and lift off head. Use suitable scraper (e.g. flattened stick of solder) to remove carbon from piston crown and cylinder head.

To remove cylinder, slacken carburettor clip, pull off carburettor and slide cylinder off.

To remove piston, take out gudgeon pin circlips, warm piston with rag dipped in boiling water, press out gudgeon pin (service tool 61-3410).

Re-assembly is reverse of above. Use new gudgeon pin circlips, set ring end gaps correctly. Use piston ring compressor (Part No. 62-585) when re-fitting cylinder (ensuring rings are located correctly in relation to piston pegs). Use new gasket with jointing compound at cylinder base. Fit cylinder head (having previously lightly ground head to barrel). Use no jointing compound and ensure that short fins on head are next to brake drum. Replace 4 saddle washers and tighten down the four nuts evenly. Do not over-tighten.

#### IGNITION SYSTEM.

**Spark Plug.** Examine every 500-1,000 miles. Clean on plug cleaning machine. Gap .020-.022 in. Use gap-setting tool and gauge. Never bend central electrode.

**Magneto.** (Wipac and Miller). Keep c/b points clean and free from oil. Apply a few drops of thin oil to cam-pad every 2,000 miles. Set gap to .018 in. (fully open), check every 2,000-3,000 miles through

often unjustly blamed. Emergency test for condenser shown in Fig. 6. In the Miller unit, a key in the taper-seating of crankshaft locates the combined fly-wheel and cam for approximate timing. In the Wipac unit, the cam is separate from the fly-wheel and is keyed to the crankshaft and secured to flywheel (also keyed). In both units, the final set of the ignition timing is done by slackening the stator-plate retaining screws, and turning the stator-plate in the required direction. To check ignition timing, first check that c/b points are set to .018 in. Turn engine until piston is 5/32 in. before T.D.C. The contact points should be just beginning to open. (Check with .002 in. feeler). If timing incorrect, adjust as above. Tighten stator plate screws.

**Removal of flywheel magneto.** Remove centre-nut and lock-washer. Using tool 61-1735 (or two-jaw extractor), pull off flywheel and remove flywheel keys (see Fig. 8). Flywheel will not demagnetise if left without keepers. Remove 2 screws from slots and remove stator plate.

#### Checking stator plate assembly.

**Magneto.** See Fig. 7 for test. If test shows a fault check security of H.T. lead, check leads to c/b assembly, condenser, etc. If all in order, check ignition coil by replacement.

**Lighting Coils.** Using lamp and battery, ensure that continuity exists between lighting output connection and earth.

**Carburettor.** Slacken carburettor securing clip, and take off carburettor from stub. Remove two screws holding float-cover and take off cover. Check flow of petrol. Undo filter chamber cover screw, remove spring, mesh filter and washer. Clean filter and replace. Take out float. Unscrew mixing chamber top, and withdraw throttle assembly. Remove blanking stud and washer from other end of chamber and remove needle jet. Remove blanking screw from bottom of float chamber, and remove main jet. Remove dome nut and cover from air filter. Loosen filter clamp and take off filter. Do not disturb strangler unless necessary. Clean all components in petrol, then dry off with compressed air. Blow through all passage-ways, jets, etc. Examine float needle for wear and float for damage. Replace if necessary with new items. Refit main and needle jets, and refit blanking screws. Dip air filter in light engine oil, allow to drain and refit to stub. Refit



throttle assembly with grooved side in line with strangler. Press down strangler to allow throttle to reach closed position, release strangler and screw top cover to mixing chamber. Replace float ensuring taper needle is upwards. Refit float chamber cover, using new gaskets. Refit carburettor to stub and tighten clamp.

**Wheel bearings.** Both the wheel bearings and the pedalling-gear sprocket bearings are adjusted in one operation. With wheel off the ground and clutch disengaged, slacken offside-wheel spindle nut, slide adjusting cone locking washer along spindle until cone is clear (on older models slacken adjusting cone locknut). Adjust bearings by turning cone until just perceptible play is present at the rim (after replacing locking washer and tightening offside spindle nut). Do not over tighten adjustment and "load" the bearings.

**Hub lock ring.** Excessive play at the rim can be due to this part being slack. It is usually indicated also by radial streaks of oil on the wheel hub. To tighten, remove wheel from frame, remove sprocket side spindle nut, washers, adjusting cone, and sprocket with driver and spring. After releasing tab washer, tighten locking using "C" spanner (tool No. 61-3412) and hide mallet. Relock with tab washer into ring slots. Replace items removed and refit wheel to frame.

**Crankcase drain plug.** Situated on the near side of unit behind magneto. Slacken periodically to drain crankcase.

**Clutch adjustment.** See Fitting Unit to Cycle.

**Dismantling and re-assembling unit.** Disconnect all cables. Remove carburettor. Remove torque arm-bolt, spindle-nuts and chain. Remove wheel from frame. Mount crankcase side spindle in fixture (Tool 61-3411). Remove locknut and cone. Remove dust cover, sprocket assembly and spring. Remove roller cage circlip and withdraw rollers and cage. Mount sprocket carrier in vice and remove (left-hand thread) sprocket locking (Tool 61-3412). Remove sprocket (right-hand thread), then assemble rollers, cage and circlip, and replace the sprocket carrier in hub. Screw up adjuster cone and locknut finger tight. Bend out lock-tab from hub locking and remove (right-hand thread). Lift off wheel from drum, collecting two keys from hub centre. (Tap right-hand spindle, if necessary to free wheel). Do not remove wheel from unit unless sprocket carrier is in position. Remove brake shoes. Reverse unit in fixture 61-3411 (right hand spindle now clamped). Remove magneto generator set (see Servicing Ignition). Remove exhaust, cylinder-head, cylinder and piston, (see De-carbonising). Reverse unit in fixture (gear-case upwards). Remove adjuster cone and withdraw sprocket carrier. Remove 9 gear-cover plate nuts and, easing under projections on outer cover, lift cover plate vertically off unit. Should clutch assembly be left in main case, remove push-rod, and operating lever, insert suitable length of 3/16 in. rod and drive assembly out of main case. Heat casings and remove bearings by tapping casing on wooden block. Bend up tab washer on main shaft nut and with box spanner remove nut (tool 61-3414 on main pinion teeth, or 2 equal-sized wooden blocks jammed between crankcase and gudgeon pin in small-end bush). Remove main shaft pinion.

**Dismantling clutch.** Withdraw clutch assembly from outer cover. Remove ball-race from pushrod end of clutch shaft (tool 61-1735), remove washer. Fit pushrod in shaft and compress spring-cover and pushrod in vice until circlip and washer can be removed. Remove from vice and take off pinion and plates. Remove pushrod, and using tool 61-3417, compress clutch springs until wedge in clutch shaft can be removed. Remove from vice, freeing spring assembly.

**Crankcase dismantling.** Remove 4 crankcase nuts and crankcase outer portion, complete with flywheel assembly. Withdraw flywheel assembly from outer casing, collecting rollers (2 rows) and spacing washer. Flywheel assembly cannot be dismantled further. Lever out oil-seals. Heat casings and tap out roller outer races in crankcases. Wash all parts (less mag. generator) thoroughly in petrol and dry off with air pressure.

**Re-assembly.** Examine all bearing surfaces, etc., for wear and obtain new parts as necessary. Always fit new oil seals and gaskets. Immerse bearings in

clean oil and drain off. Re-assembly is reverse sequence of dismantling. Warm inner crankcase and fit clutch shaft bearings (tool 61-3416). Press drive side oil-seal into crankcase (using s/tool No. 61-3242). Heat crankcase, fit drive-side outer roller race (tool 61-3419). Heat crankcase, fit flywheel side roller race. Do not replace flywheel oil seal at this stage. (Note: Some older units are fitted with two drive-side roller races, these units can be fitted with single drive-side-outer races). Pack rollers in drive-side outer race with grease and fit flywheel assembly to this crankcase (use tool 61-3433). Fit first row of rollers in outer case, fit spacing collar, then fit second row of rollers (retain with grease). Fit over flywheel drive shaft. (Spacers are supplied in various thicknesses of .003 in.). If original rollers and outer races are refitted, it will be found that original spacer will be correct. If new rollers and outer races are fitted, bolt up crankcases with spacer in position and check end-float on crank shaft. This should be .003-.007 in. When correct spacer has been selected, split crankcases, apply jointing compound and bolt up securely. With tool 61-3434 in position, ease flywheel side oil-seal over shoulder on crankshaft and press into casing. Fit crankshaft pinion and using new tab washer tighten to crankshaft with nut (using same method to prevent turning that was used in dismantling). Bend over tab washer.

**Clutch re-assembly.** Compress clutch back-plate, springs and pressure-plate on clutch shaft with tool 61-3417 (as for dismantling), and fit wedge in clutch shaft. Remove from vice. Fit clutch parts on shaft, reversing sequence of dismantling, not forgetting

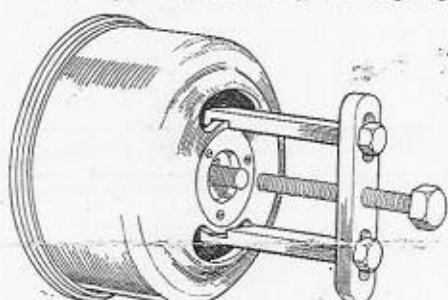


Fig. 8: TOOL FOR REMOVING IGNITION FLYWHEEL: The legs pass through slots in the wheel.

washer and circlip. Insert 3/16 in. rod and compress assembly in vice, securing circlip on shaft. (Rod should be approximately 2½ in. long.)

**Gearcase assembly.** Fit unit in fixture 61-3411, gearcase upwards. With thin dust washer over push-rod end of clutch shaft, tap shaft into bearing in inner crankcase. Fit hub centre and sprocket-carrier on main spindle, and fit adjuster cone finger tight. With inside bevelled-edge inwards, fit dust-washer (thick) on clutch shaft. Heat gearcase cover and with tool 61-3416 fit clutch shaft bearing into cover. Fit gasket and gearcase cover with jointing, tighten down nuts evenly. Fit brake-shoes and cam (with side marked "out" towards the outside of drum). If washers on spring-assembly, positioning brake-shoes are of different size, larger washer goes against brake shoe. Fit two keys and refit brake drum. Fit lock washer and ring, tighten down and bend over tab washer. Fit sprocket and carrier assembly in reverse order of dismantling, ensure conical spring has smaller diameter inwards. Adjust cone bearings. Refit piston, cylinder, cylinder head; refit magneto generator; refit wheel to machine; refit carburettor, all as previously described. Do not drive magneto flywheel on taper, but draw it tight by the securing nut.

#### CURING MINOR TROUBLES

- (1) Failure to start.
  - (a) Lack of fuel. Check that fuel is reaching carburettor and that there are no obvious air leaks (at carburettor stub, etc.)
  - (b) Too much fuel. Carburettor flooding due to foreign matter in the float chamber; punctured float etc. Rectify fault and drain crankcase by slackening drain plug. Tighten drain

plug. Check that air-filter is not clogged.

- (c) Ignition fault. Check ignition (see under "Servicing"). Check if timing has slipped, due to flywheel key shearing. Remove remainder of key. Grind flywheel to shaft (to eliminate cause of key shearing), refit flywheel with new key, adjust timing.

- (2) Clutch slip. Check clutch cable adjustment (see Fitting of Unit). If clutch plates are burnt out, dismantle unit as necessary and replace.
- (3) Loss of power. Check if engine and/or exhaust is carboned up. Check carburation and ignition. Check brake for binding. Check for clutch slip. If considerable mileage covered, check cylinder for wear or crankcase seals for leaks. Check cylinder head joint for blowing.
- (4) Excessive play at rim of wheel. See adjustment of wheel bearings, but first check on hub locking tightness, (see Servicing of Unit).
- (5) Spark plug "whiskering". Usually caused by combination of ethyl content of petrol and excessively-high engine operating temperatures. Check for weak carburation, retarded ignition, or dirt-clogged cylinder fins.
- (6) Tail-Lamp bulbs blowing. Usually caused by incorrect wattage bulbs, or by faulty headlamp switch, allowing full generator output to go to the tail bulb.
- (7) Rich mixture at full throttle. Possibly due to incorrect throttle-cable adjustment, causing strangler to come into operation during "normal" throttle lever range, (i.e. before the lever-catch is lifted.)

#### LIST OF SERVICE TOOLS FOR B.S.A. WINGED WHEEL

Part No.	Description
61-1735	Magneto Extractor Tool
61-3410	Gudgeon Pin Extractor
61-3411A	Bench Fixture
61-3411B	Bench Fixture Packing Tube
61-3412	Lockring Spanner
61-3413	Crankcase Inner Cover Bush and Oil Seal Extractor
61-3414	Crankshaft Pinion Spanner
61-3415	Mainshaft Outer Bearing Removal Tool
61-3416	Clutch Shaft Bearing Assembly Tool
61-3417	Clutch Spring Compressor
61-3419	Drive Side Bearing Assembly Tool
61-3432	Mainshaft Inner Bearing and Oil Seal Assembly Tool
61-3433	Crankshaft Assembly Nozzle (Drive Side)
61-3434	Crankshaft Assembly Nozzle (Magneto-Side)
61-4004	Hub Shell Nut Spanner (For use on all units after Engine No. M.B.W. 16,500)
62-585	Pinion Ring Slipper

The next servicing data sheet in this series will deal with

#### CYCLO BENELUX DERAILEUR GEARS

and will be included in the issue dated 11 June, 1955.

Additional copies of these service sheets may be obtained by readers at 1s. each or 11s. a dozen.