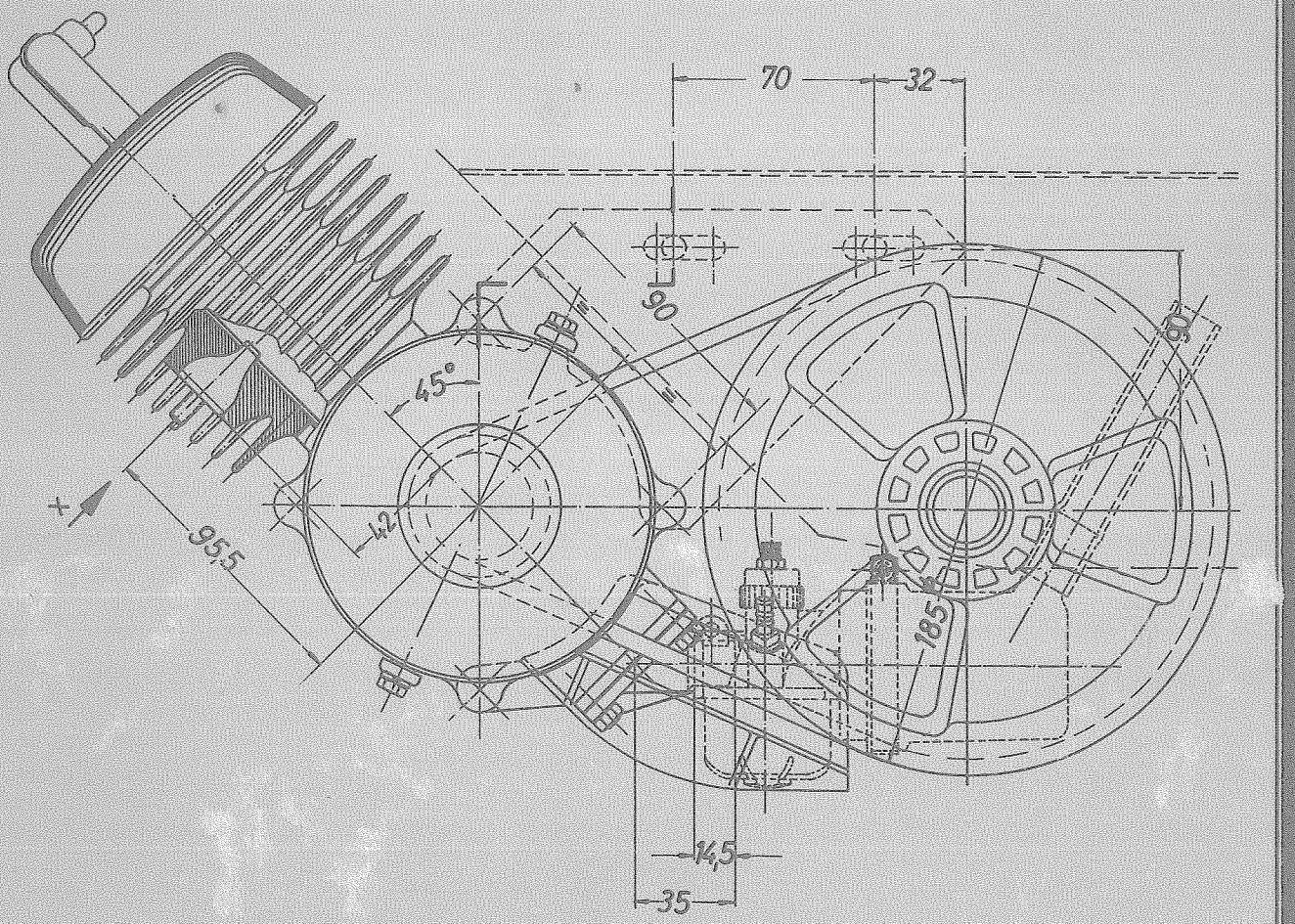
Odyssey

Service Instructions for Mofa/Moped Engines Type 236 and 237 Type 254 and 255 with Water Cooling



INTRODUCTION

This service manual is intended for the workshop and contains all of the information required to service and repair the SOLO engine described herein. The owner's manual and blow-up drawings of the parts list will facilitate dismantling and assembling component parts. Genuine SOLO replacement parts and special tools must be used to repair the engine quickly and properly.

When repairing the engine it is especially important to note whether maintenance and service hints as contained in the Owner's Manual have been observed. If not, you should point out to the customer just what he has been doing wrong.

In the interest of product improvement, occasionally there could be modifications on some of the component parts without prior notice.

Contents

Specifications	Engine Type 236/237	Different Data for Engine Type 254/255
Type of engine:	Single-cylinder, 2-stroke engine with loop scavenging and reed-valve control	
Bore x stroke:	1.496" x 1.653" (38 x 42 mm)	
Stroke: bore ratio:	1.1 : 1	
Displacement:	2.904 in.^{2} (47.6 cm^3)	
Compression ratio:	Type 236 = 8.3 : 1 Type 237 = 7.5 : 1	Type 254 = 8.33 : 1 Type 255 = 10.0 : 1
Output:	Type 236 = 1.45 HP at 3250 rpm Type 237 = 2.1 HP at 5000 rpm (always in reference to German version)	Type 254 = 1.75 HP at 4000 rpm Type 255 = 2.6 HP at 5000 rpm
Max. torque:	Type 236 = 2.343 ft./lbs. 324 mkg at 3200 rpm Type 237 = 2.170 ft./lbs. 3 mkg at 5000 rpm (always in reference to Standard models)	Type 254 = 2.351 ft./lbs. 325 mkg at 4000 rpm Type 255 = 2.748 ft./lbs. 38 mkg at 5000 rpm
Cylinder:	Cast light alloy, 2 transfer ports, cast steel sleeve	Type 255 = cast light alloy, 3 transfer ports. cast steel sleeve
Cylinder head:	Cast light alloy, with gasket, bolted with 4 M 6 nuts on studs passing thru head, in crankcase.	Cast light alloy, with gasket and seal, bolted with 4 M 6 nuts on studs passing thru head, in crankcase.
Cooling:	Air	Air + coolant
Piston:	Light alloy	
Piston tolerance:	.0016 – .0024" or 0.04 – 0.06 mm	
Piston rings:	Two, .059"/1.5 mm wide	
Seal clearance:	.008 – .020" or 0.2 to 0.5 mm	
Groove clearance:	.0010 – .0018" or 0.025 to 0.045 mm	
Gudgeon pin:	Sliding seat – .394" dia. x 1.244" long (10 mm ϕ, 31.6 mm), held by 2 circlips in grooves.	
Gudgeon pin bearing:	Special needle cage 10 x 14 x 13 mm (.394 x .551 x .512")	
Crankshaft seal:		

	Engine Type 236/237	Different Data for Engine Type 254/255
Clutch and ignition ends:	= 15 x 25 x 5 mm (BA) (.590 x .984 x .197")	15 x 35 x 7 and 15 x 25 x 5 mm (.590 x 1.378 x .275" and .590 x .984 x .197")
Clutch bearing seal:	Seal 15 x 21 x 3 mm (.590 x .826 x .118")	
Crankshaft bearing, left and right:	Grooved ball bearing 15 x 35 x 11 mm 6202 C 3 (.590 x 1.378 x .433")	
Con rod bearing, lower:	Special needle cage 14 x 18 x 10 mm (.551 x .709 x .394")	
Gudgeon pin bearing:	Special needle cage 10 x 14 x 13 mm (.394 x .551 x .512") press fit	
Clutch bearing:	Needle sleeve 15 x 21 x 16 mm (.590 x .826 x .630")	
Large pulley:	Needle sleeve 16 x 22 x 22 mm (.630 x .866 x .866")	
Crankshaft:	5-piece, 2 main bearings	
Clutch:	Single plate, dry	
Clutch speed:	Type 236: 2600 rpm Type 237: 2850 rpm	Type 254: 2600 rpm Type 255: 2850 rpm
Clutch disc:	Special material .150"/3.8 mm thick, manual starting device	
Pulley:	For Z profile belts	
Belt:	Z profile 10 x 6 mm (.394 x .236")	
Ignition:	BOSCH centrifugal magneto BOSCH Type 0 212 005 011, right rotation	
Coil:	6 V, 17 W	
Breaker Points gap:	0.14 to .018" 0.35 to 0.45 mm	
Ignition timing:	Type 236 = .094" or 2.4 mm BTDC Type 237 = .094" or 2.4 mm BTDC	Type 254 = .120" or 3.0mm BTDC Type 255 = .120" or 3.0mm BTDC
Break-away gap:	.236 – .354 or 6 to 9 mm	
Spark plug:	Type 236 : W 95 (e.g.BOSCH W 95 T 1, BERU 95/14 CHAMPION L–8.) Type 237 : W 175 = (e.g. BOSCH W 175 T 1, BERU 175/14, CHAMPION L–86)	Type 254 = W 175 (e.g. BOSCH 0241235008 W 175 T 1, BERU 175/14, CHAMPION L–86) Type 255 = W 225 = (e.g. BOSCH 0241245008 W 225 T 1, BERU 225/14, CHAMPION H–88.)
Spark plug gap:	.020" or 0.5 mm	
Carburetor:	BING Float Carburetor Type 1/10/112* .394"/10 mm opening Main jet = 58* Choke cable operated, wet or dry air filter cartridge, needle jet 2 and 12, needle position III *Standard models	

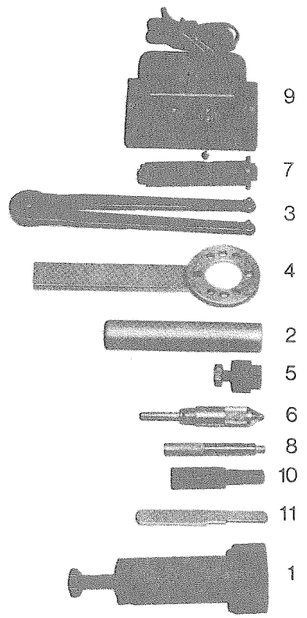
Lubrication:

Fuel/oil mixture 25 to 1 (4 %)
Mixing Oil Viscosity SAE 40-50 or Two Stroke Oil
Observe the instructions of the manufacturer if 2-stroke self-mixing oils are used. We recommend a mixing ratio of 40 to 1 in conjunction with "SOLO" 2-stroke oil, Order No. 00 83 116 – 125 cc can. We recommend a mixing ratio of 50 to 1 for a water-cooled engine in conjunction with, "Castrol Super TT Two-Stroke Oil" or equivalent.

Dimensions:

Piston O. D.	1.494"/37.96 mm
Cylinder I. D.	1.496"/38.00 mm
Crankshaft thread, ignition end	M 8 left hand
Crankshaft thread, clutch end	M 10 x 1 right hand
Spark plug thread	M 14 x 1.5
Cylinder stay bolt	M 6
Carburetor neck	.590"/15 mm outside dia.

All specifications subject to change without notice



Special Tools

Pos.	Description	SOLO Order No.	Remarks
1	Ball bearing puller	00 80 295	1.378"/35 mm outside dia.
2	Seal punch	00 80 351	.945"/24 mm outside dia. .670"/17 mm inside dia.
3	Face hole wrench	00 80 248	To hold flywheel
4	Special wrench	00 80 368	To hold clutch
5	Flywheel puller	00 80 166	M 22 x 1.5 mm
6	TDC tester	00 80 162	
7	Seal punch	00 80 135	.590"/15 mm inside dia. .984"/25 mm outside dia.
8	Gudgeon pin knocker	00 80 292	For piston pin
9	Elec. ignition tester	00 80 181	BOSCH, battery operated
10	Piston stop pin	00 80 271	
11	Magneto breack gauge	00 80 370	.354"/9 mm

Torque Specifications

Crankshaft nut on clutch end	27.5 ft. lbs./3.8 mkg
Crankshaft nut on ignition end	22 – 25 ft. lbs./3 – 3.5 mkg
Cylinder head mounting nuts	8.7 ft. lbs./1.2 mkg
Crankcase mounting screws	7.2 ft. lbs./1.0 mkg
Clutch pressure plate mounting nuts (6)	5 ft. lbs./0.7 mkg

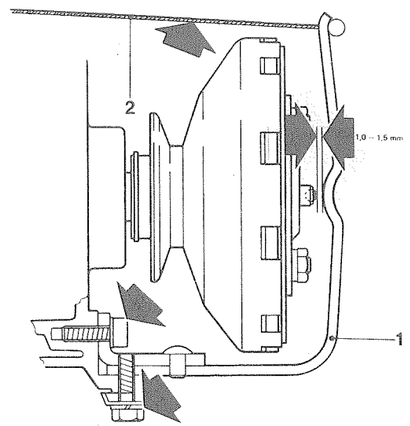
TROUBLE SHOOTING HINTS

1. Is fuel in tank sufficient and clean? Use only specified mixture calling for 25 parts of regular grade gasoline to 1 part of a good 2-cycle oil.
2. Is tank cap vent plugged?
   Open with compressed air.
3. Does fuel flow? If not, check fuel hose and fuel filter, replacing fuel filter if necessary.
4. Is the carburetor (jets) contaminated or plugged, and is the engine receiving fuel? Are the spark plugs dry? Clean and check carburetor.
5. Is the carburetor float caught or jammed? The engine will flood if it receives too much fuel.
6. Is the air filter clean? Clean dirty filter in gasoline and dry with compressed air. Also lubricate air filter if wire mesh wet type.
7. Is choke cable adjusted correctly and does the clutch engage when operating the choke?
8. Check spark plug specifications (see Specifications). Spark plug gap is. 020"/0.5 mm. Clean oily and sooty spark plugs, and check spark as follows.
   a) Hold spark plug with connected ignition cable against engine block or cylinder head and turn engine. If a strong blue spark does not jump from the plug electrode, then
   b) disconnect spark plug and terminal, hold end of ignition cable about 1/4" (5mm) away from engine block or cylinder head and turn engine. If there is a strong blue spark *now*, the plug is defective and must be replaced. If there is *no* spark, the ignition system must be checked. First check ignition cable for breaks, then check breaker points.
9. Notes on Engine Trouble
   a) Can the engine be turned easily or without noticeable compression resistance? Is the spark plug installed correctly? Check cylinder head mounting bolts.
   b) Is the engine difficult or impossible to turn? A seized piston can sometimes be determined at the exhaust port (remove Muffler) If not remove cylinder and piston, and check.
   c) Does the engine make noise or rattle when running? Con rod bearing perhaps defective, flywheel gear loose, clutch defective or loose.
   d) Is the mixture too lean or has pure gasoline been used? Engine seized, perhaps due to completely plugged cylinder cooling fins.
   e) Has engine run without air filter or with a defective air filter?
   f) Are foreign particles in cylinder? Engine ran too fast – insufficient lubrication during downhill driving.
   g) Engine runs hot due to false air through loose cylinder bolts, defective cylinder base gasket, loose carburetor connection, worn or damaged shaft seals.
10. Does clutch function properly? Are the clutch discs in good condition? Axial play of installed clutch is max. .020"/0.5 mm.

ENGINE ADJUSTMENTS

1. Starter Cable

Procedure
Remove cover, loosen cable with adjusting screw on clutch lever until the gap between the arrows (see illustration) is not larger than .020 to .040"/0.5 to 1.0 mm. Now tighten the adjusting screw again. When the cable is completely relaxed, the gap between both arrows, at clutch holder, should be 1.5 to 2 mm or .059 to .079". If necessary the holder can be bent accordingly in a vise. Also make sure that the cable, after it has been adjusted, does not sag directly behind the activator, because rotating clutch parts could cause damage.



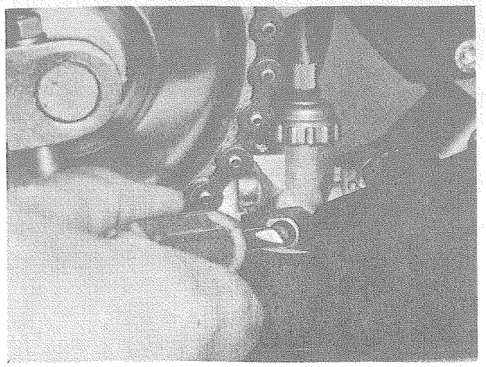
1 = Activator
2 = Starter Cable

2. Carburetor/Idling

(Carburetor Type with Cable Operated Choke)
Choke Plate
Choke control lever on handle bars should be adjusted to a slack of about .40 to .080"/1 to 2 mm. If there is no slack, this could cause insufficient output and excessive fuel consumption because the carburetor will not open completely for full throttle operations.

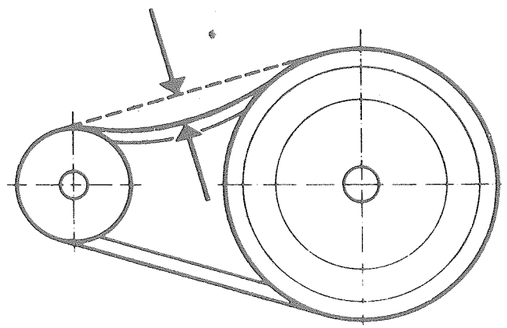
Idling
Adjust by means of idle check screw. It is accessible from the ignition end and is located above the carburetor cup (see illustration).

The idle setting must be adjusted so that the clutch does not yet engange and the drive train remains inactive.

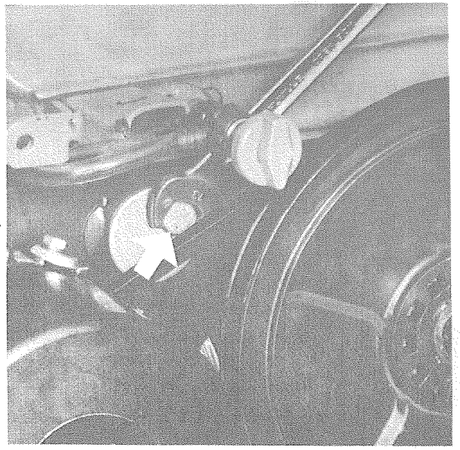


3. Belt Tension

Correct belt tension is important. If the belt is too tight, belt, clutch bearing and pulley will be subject to exessive wear. A loose belt will slip and may even burn. It will be necessary to check the belt more often at the beginning. When checking it should only be possible to press the belt together by 1/4"/5 mm (see illustration).



The belt tension ist corrected by moving the entire engine. This means removing the footrests (various versions) and loosening both engine mounting bolts. The front bolt of the two has an eccentric (see illustration), so that turning this screw will adjust the belt to specifications. When adjusting the belt tension, make sure that engine is moved forward equidistant and evenly. If necessary counterhold one side with a tire iron. If these instructions are not followed correctly, both pulleys will not align with each other. Some vehicles require that the muffler be disconnected at the exhaust manifold before the belt tension can be adjusted.



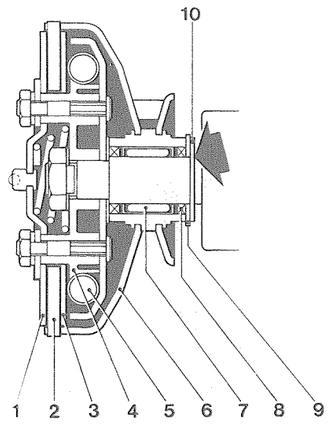
4. Contact Breaker Points

Remove ignition over – RH side of engine. Direction of rotation, with ignition magneto in sight, is clockwise (marked with arrow on flywheel). Turn flywheel clockwise until the contact breaker points underneath the flywheel slot are completely open. Check points gap with a feeler gauge. Correct gap is .014 to .018"/0.35 to 0.45 mm. Adjust gap as follows: Loosen contact breaker mounting screw, adjust point with tip of screwdriver in opening at base of contact breaker, tighten mounting screw again, check gap again and repeat procedure if necessary. Do not attempt to repair worn or burnt points, but replace them.

CLUTCH

1. Replacing Clutch Discs

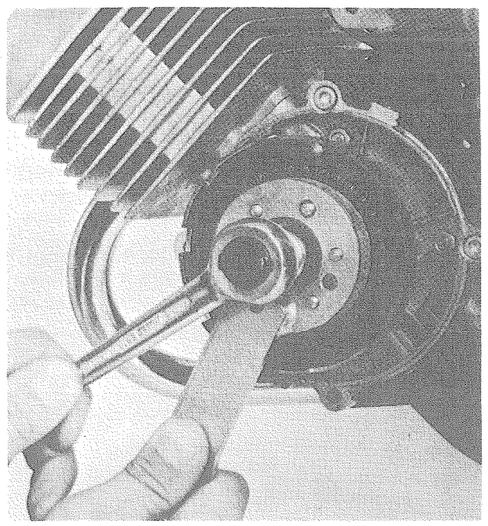
Remove cover and disconnect clutch cable at activator, unscrew activator, remove 6 mounting screws (wrench size 9 mm) and dismantle end cover and clutch disc. Now take out clutch disc. Before installing a new disc, check if the outer cams fit properly in the openings of the clutch drum and do not jam. If necessary the openings in the clutch drum can be corrected somewhat with a file. The large center spring must always be installed with the large opening toward the engine.

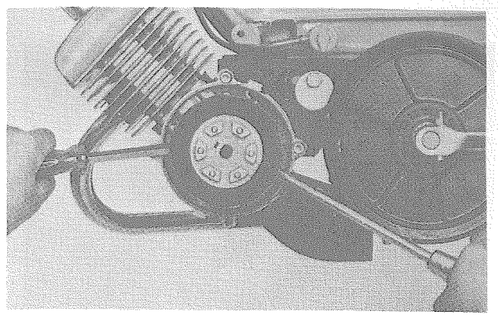


1 = Clutch disc
2 = Clutch plate
3 = Steel disc
4 = 2 B clutch bell housing
5 = 2 B spring
6 = 2 B clutch drum
7 = Needle bearing sleeve
8 = Seal
9 = Spring retainer
10 = Circlip

2. Dismantling the Clutch

Remove clutch disc as previously described. Loosen belt – see "Belt Tension" – and remove belt. Straighten lockplate underneath center hex nut, and remove nut (wrench size 17 mm) and lock washer. Use the special wrench for the clutch on this operation (see illustration). Loosen clutch drum from shaft with two screwdrivers (drum and clutch hub are one piece) – see illustration. Make sure that spring retainer 28 x 12.2 (1.102 x .480") is installed correctly, and in fact behind the drum with domed side of inside diameter facing engine. The complete clutch assembly will now be easy to pull off the crankshaft.





Clean needle bearing in clutch drum thoroughly and lubricate with bearing grease. If the bearing is replaced, make sure that pressure is only applied to the side of the bearing sleeve with the bearing make stamped on it.

Otherwise the bearing will be damaged and cause follow-up damage. Also use this opportunity to check the shaft seal in the crankcase. It is essential to replace this seal if the crankcase is damp in this area. Also check if the clutch springs are assembled correctly, i. e. the ends of the springs must be turned into each other by four coils.

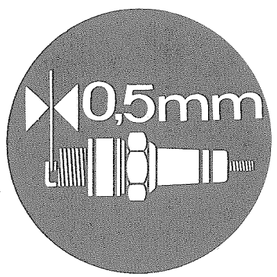
3. Assembling the Clutch

The entire clutch is assembled again in reverse sequence of dismantling. Be very careful when sliding the clutch onto the shaft. Working too fast could cause damage to the sealing lips of the seals. After tightening the center mounting nut (wrench size 17 mm) the lock plate must be installed with its tab engaging in the proper hole of the clutch hub and, using flat pliers, one side of this lock plate is bent against a chamfer of the hex nut (locked).

IGNITION SYSTEM

Spark Plug

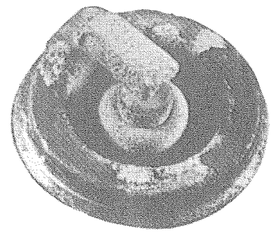
Heat range = 95 (for engine Type 236), 175 (for moped engine Type 237). Electrode gap = .020"/0.5 mm. – For liquid – cooled engines usw 175 (254 model), 225 (255 moped model).



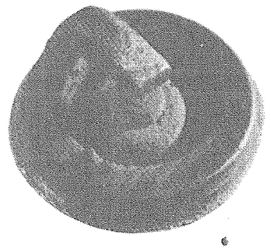
Clean oily or sooty plug. Replace a plug which is damaged; also a plug with a heavily burnt electrode or defective insulator. Use only spark plugs with the proper heat range. Defective spark plugs cannot be repaired. If available, clean and check the spark plug with testing and cleaning equipment.

"The Plug's Appearance"

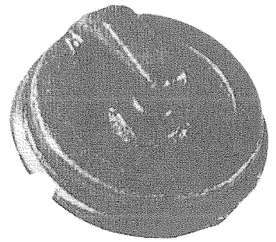
The appearance of the part of the spark plug which extends into the combustion chamber of the engine will provide information on the heat range, plug function, fuel grades applied, condition of engine (piston etc.) and operating conditions as well as reasons for ignition failure.



Plug correct/normal



Plug oily



Plug sooty

Plug overheated

Gap Bridging

On two-stroke engines bridging between the spark plug electrodes can occur, causing ignition failure. The bridging is made up of combustion remainders such as soot, carbon, lead oxide etc. and from other materials introduced from the outside.

Bridging Causes Which Can Be Prevented

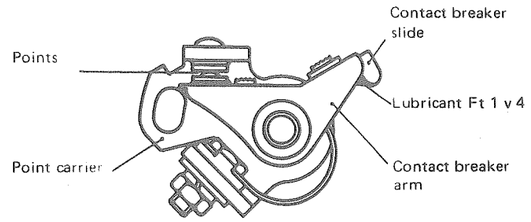
1. Incorrect Fuel oil ratio (usually too lean – plug overheats).
2. Improper fuel or bad oil used fo mixture (combustion deposits).
3. Engine runs hot (lean mixture through false air leakage of crankcase, gaskets, shaft seals etc.).
4. Insufficient air filtration due to dirty or defective air filter.
5. Contaminated spark plug or fouled engine (too much carbon – combustion deposits on piston and in cylinder chamber).

Checking the Spark

Refer to Troubleshooting 8a + b, Page 5

Checking and Adjusting Contact Breaker Points

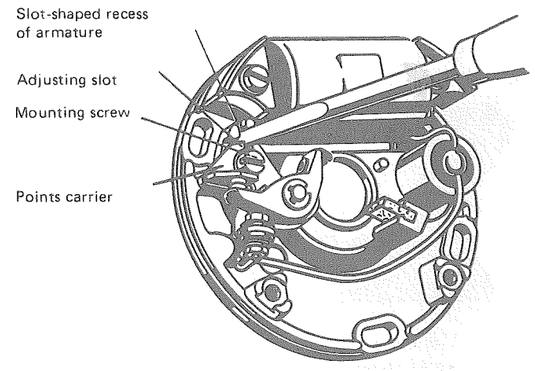
Remove ignition cover, turn flywheel clockwise until the contact points open all the way and are located below an opening of the flywheel.



Check contact breaker points for burns or pitting, and also check gap (.014 to .018"/0.35 to 0.45 mm).

The points gap can be corrected after loosening the mounting screw (refer to "Adjusting Contact Breaker Points").

Clean ignition chamber with compressed air. Be careful not to blow out the contact breaker cam lubrication felt pad from its holder.



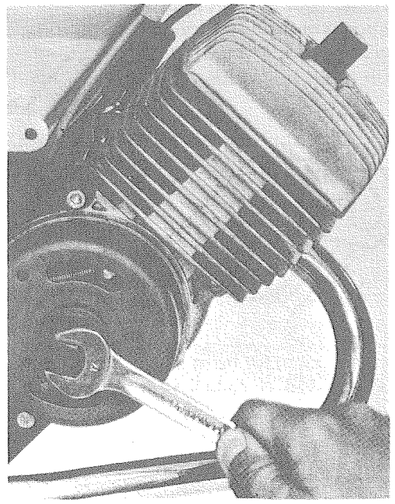
Please note:
If ignition failure is due to contaminated contact breaker points, cleaning the points with a file will only be a temporary solution. This is why we must recommend not to repair burnt or damaged points, but to replace them always.

An oil covered ignition chamber indicates a defective shaft seal. Blue discolored contact breaker points indicate excessive heat due to a defective condenser.

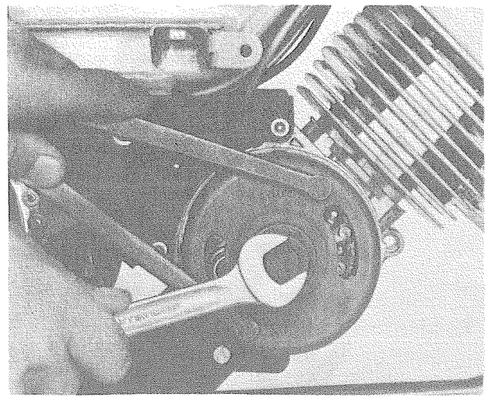
General Inspection of the Ignition System

Dismantle the ignition as follows to check and adjust the ignition system.

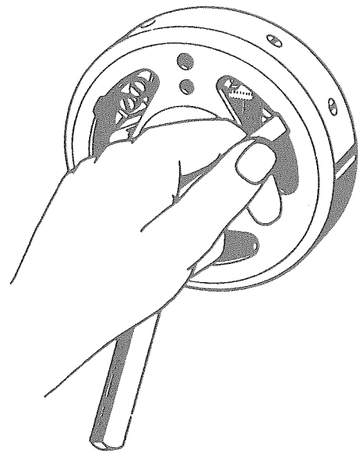
1. Dismantle flywheel by using piston stop pin 00 80 271 and puller 00 80 165.



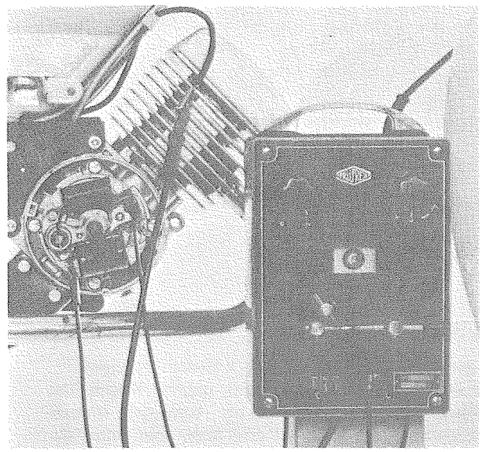
2. Check all wires of condenser, ignition coil and contact breaker points for mechanical defects.



3. The clearance between the ignition coil and magneto poles of the magneto gear should be .008 to .010"/ 020 to 0.25 mm. If the ignition coil shoe scrapes on the magnet, loosen ignition coil or perhaps the entire armature plate. Place a feeler gauge (.008 or .010"/0.20 or 0.25 mm blade) between the magnet and ignition coil while tightening all mounting screws again. Timing must be re-set after loosening the armature plate mounting screws.



4. Ignition coil and condenser are only very seldom the cause for ignition failure. For example, it is not necessary to install a new condenser when replacing the contact breaker points.
5. Check the ignition coil for external damage or improper insulation, especially where the wires are connected to the coil. The coil can be checked for other points only with a coil tester.

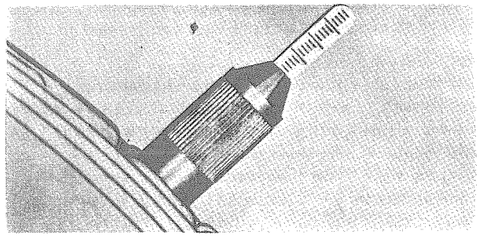


6. The condenser should be checked if previous checks of all other ignition parts indicate a defective condenser. The check can be made easily on an installed condenser with the help of a second engine and a second unit (a condenser tester should be used if available as follows.)

   Place wire end of condenser being tested about 1/4" (6 to 8 mm) from free end of ignition cable on second engine (second unit) and produce spark by starting this engine about 10 times. This will charge the condenser. After waiting about one minute, connect condenser wire end to ground. If there is not a strong spark, the condenser is defective and must be replaced. If there is a strong spark, the condenser has discharged itself normally and is in good condition. In this case recheck all wire connections of the ignition system.

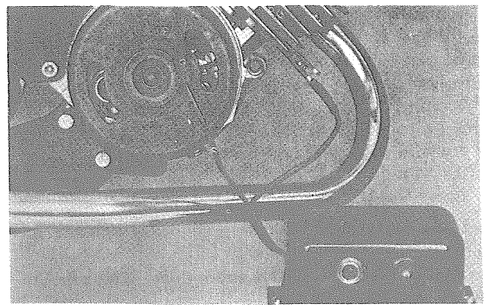
Adjusting Ignition Timing

1. Install TDC tester 00 80 162 in cylinder head in place of the spark plug. With the flywheel installed, position the piston to one of the following distances before top dead center (BTDC).
   Engine Type 236 = .094"/2.4 mm BTDC
   Engine Type 237 = .079"/2.0 mm BTDC
   (The piston must stop at this position – keep flywheel fixed in position.)

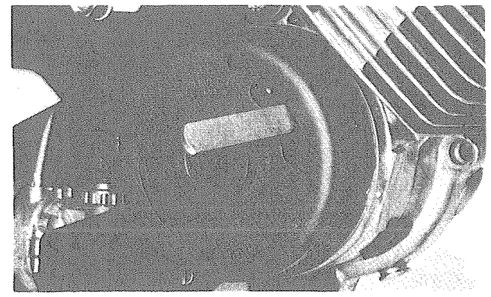


2. Loosen both armature plate mounting screws.

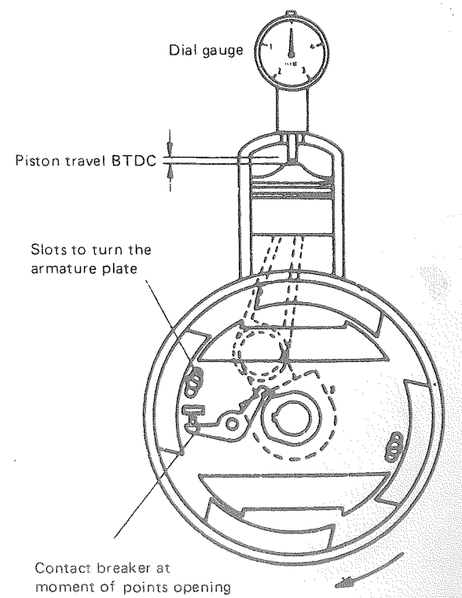
   Connect one wire from ignition tester 00 80 181 to ground and the other to the moving part of the contact breaker points.



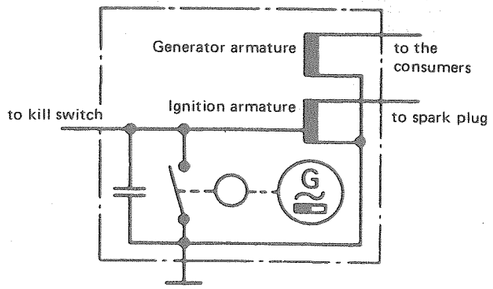
3. Turn the armature plate with a screwdriver, which is placed between the opening of the flywheel, until the points just barely begin to open (the indicator lamp just comes on). Make sure that the piston is still in the above-mentioned position of .094"/2.4 mm or .079"/2.0 mm (see Point 2).
4. Now check the pole shoe break. The pole shoe break-away gap is the distance between the edge of the ignition coil and edge of the magnet at the exact moment when the points open. This gap or distance must be between 1/4" (6 and 9 mm.) If the break-away gap is too large it will impair starting and if too small it will cause ignition failure at high engine speeds.



Note
The engine's ignition is adjusted correctly if at the exact moment when the points begin to open the piston is at specified TDC and the break-away gap meets specifications.



Magneto
As used on chain saws, stationary engines, marine engines, lawn mowers etc.



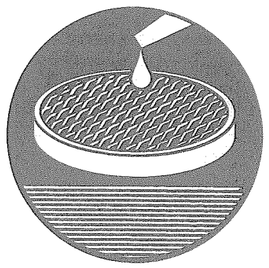
FUEL SUPPLY AND CARBURETOR

Fuel Filter

Clean fuel is a prerequisite for proper fuel supply. In the section on Troubleshooting we pointed out that the fuel filter must be checked for foreign matter and, if necessary, to replace the filter element. When replacing this micro mesh fuel filter note the direction of flow as indicated by an arrow.

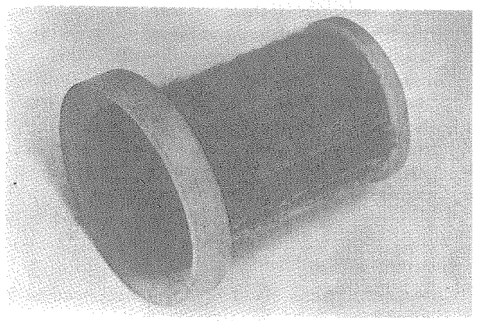
Air Filter

1. The air filter has direct influence on the function and service life of an engine. This is why it is important to clean it regularly and to keep it in good condition. If an air filter is defective, dirt and dust will find their way into the engine and cause rich fuel/air mixtures by contaminating and clogging the engine. Both conditions will impair the engine's service life. Engine damage which can be traced back to improper air filter maintenance cannot be considered under our warranty terms. The air filter must be checked and serviced each time a mofa/moped engine is brought in for inspection or repairs. If the air filter shows signs of improper care, show the filter to the customer before cleaning it and explain to him how he can assure a long service life for his engine through proper care.
2. Special Version: wire-mesh cartridge, wet air filter.



Remove the air filter cartridge for cleaning, rinse in gasoline, dry with compressed air and then coat with several drops of normal engine oil.

3. Special Version: Viledon cartridge, dry air filter. Remove the air filter cartridge for cleaning, rinse with gasoline or normal cleaning solutions. Then dry with compressed air.



Carburetor

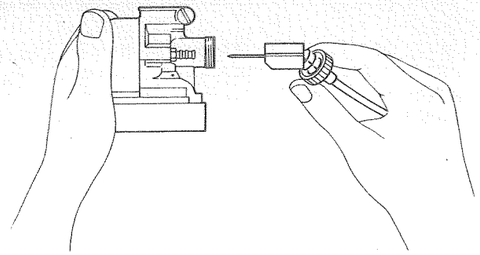
A BING float carburetor is installed. It has a built-in choke which is operated separately by cable. The factory adjusts the jet needles (position III) for optimum carburetor performance. Except for cleaning, no other adjustments are necessary. Never use hard items, such as wire etc., to clean jet openings and other ducts. Simply wash in gasoline and dry with compressed air.

Please note:
Adjustments are not necessary as the carburetor is equipped with a fixed jet size. However the cable needs adjusting to assure proper idle speeds and maximum engine output. A new cable will of course stretch, making the slack larger than specified. This will alter the idle adjustment which is regulated by a stop screw (refer to "Adjustments on Engine", "Idling").

Checking the Carburetor

The carburetor must be cleaned and checked for damage on needles, jets, float, seals etc. . Proceed as follows: Shut fuel cock, remove intake silencer with air filter, disconnect fuel line, unscrew cap nut on throttle slide housing and pull out throttle slide from above, loosen carburetor clamping screw and remove carburetor from carburetor neck. Unscrew float cup (wrench size 14 mm). Unscrew main jet from needle jet with a screwdriver, being careful not to damage same. Unscrew needle jet from housing with a socket wrench (wrench size 5 mm). Unscrew fuel line nipple (wrench size 10 mm). Check gasket. Wash all parts in clean gasoline and dry with compressed air. Check float and needle for free movement.

The float needle must shut before the float reaches top of carburetor housing – align carefully if necessary (it is recommended to remove entire float). Check round float chamber seal.



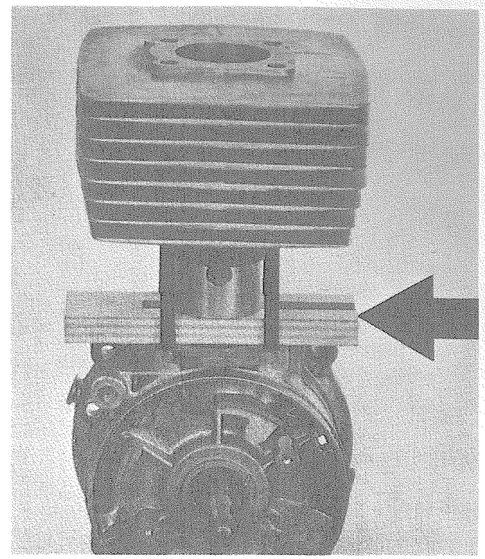
Assemble all parts in reverse sequence. Don't forget to wash throttle slide in gasoline. After assembling, it is essential to check idle and adjust if necessary.

CHECKING OR REPLACING CYLINDER, PISTON AND PISTON RINGS
(without removing engine)

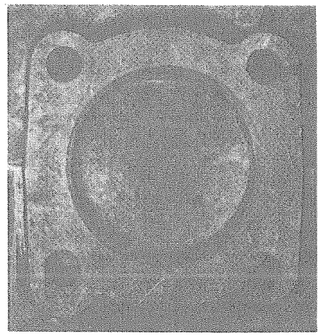
It is possible to inspect the surface of the cylinder, piston and piston rings through the exhaust port after removal of the exhaust manifold. If the bike is difficult to start or engine output drops considerably, this is an excellent method to see if piston seizure or broken piston rings are the cause for poor engine performance.

For thorough inspection and disassembly of the cylinder and piston, (proceed as follows:)

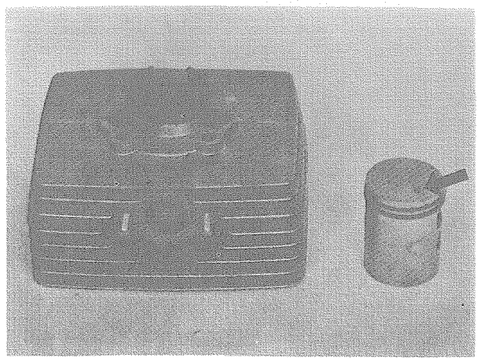
1. Pull off spark plug terminal, remove muffler check exhaust gasket, remove the 4 cylinder mounting nuts (use socket wrench size 10 mm), remove cylinder head with aluminum gasket, check sealing surfaces and pull complete cylinder off the 4 stay bolts.
2. Check piston rings and replace with new ones if damaged. Check cylinder and piston walls for scoring or other damage.
3. Move piston with connecting rod up and down with 2 fingers and check if lower con rod bearing and piston pin bearing are still in good condition.
4. Make sure that the transfer and exhaust ports are completely unrestricted and not clogged with carbon.
5. Check if the exhaust is clogged with soot or carbon.
6. Clean all parts in gasoline, dry with compressed air and replace damaged or worn parts. Clean all sealing surfaces thoroughly before assembling the cylinder. Always install new gaskets and seals.
7. Coat cylinder walls with oil before installing the piston, to prevent damage to the greatest possible extent. Use a wooden board between crankcase and piston.



The gudgeon pin bearing is a needle bearing, or actually a needle sleeve. This requires observance of the following points when installing a new needle sleeve. Apply the knocker only to the side of the cage imprinted with the manufacturer's make or emblem. The other side is not hardened and could be damaged by the pressure. This would lead to bearing damage (also refer to "Engine, Clutch Bearings"). When installing a new piston make sure that the arrow on the piston crown faces the exhaust port.



Only match pistons and cylinders with the same codes – N or U.

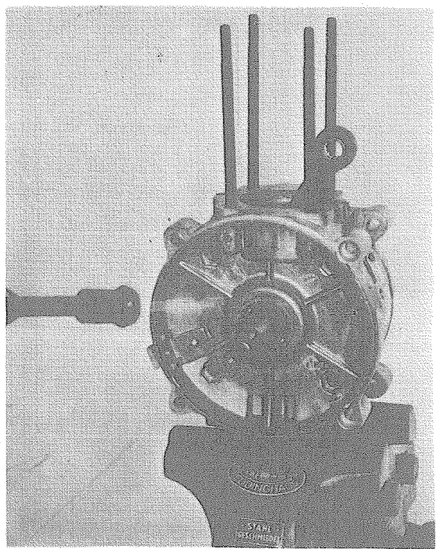


CRANKSHAFT AND CRANKCASE

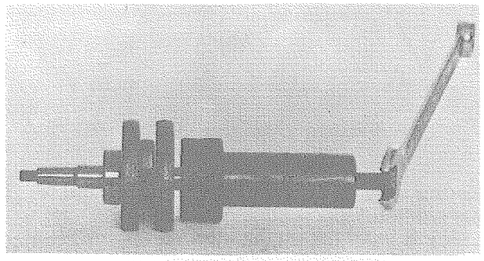
Dismantling the Engine

This requires that the engine be taken out of the frame of the vehicle.

1. Detach ignition, clutch, engine suspension, carburetor connector and reed valve. Remove cylinder head, cylinder, piston and exhaust manifold. Remove the 4 inner case mounting screws (M 6 x 45 socket head capscrews). Don't forget the two double nuts (wrench size 10 mm) in the area of the reed valve.
2. Heat bearing seat area on clutch end of crankcase to about 210° F/100° C. A propane torch is most suitable for this. The crankcase halves can be speareted by carefully applying a plastic or mallex hammer to the case bosses on the oppsite side.



3. Usually the ball bearing will remain on the crankshaft. If this bearing is to be replaced, it can be pulled off easily with the bearing puller 00 80 295.



4. A crankshaft with noticeable readial bearing tolerances in the con rod bearing must be replaced as a complete unit. Replacement crankshaft are available only complete with bearing.
5. If a new ball bearing is being installed, heat it to about 212° F/100° C before sliding it onto the end of the crankshaft. Hot oil or a hot plate may suffice.

Assembling the Engine

1. To facilitate assembly of the crankcase halves, heat the bearing seats of both main bearings to about 392° F/200° C. It must be possible to install both housing halves on the crankshaft main bearings without too much pressure. Always use a new gasket.
2. Always install new shaft seals after a job of this nature. The bearing seats must be cold before inserting new shaft seals. Damaged shaft seals, blowholes in the crankcase or defective gaskets could be the cause for false air in the crankcase. This will also alter the composition of the gas mixture. A damaged seal on the clutch end can be removed and replaced after taking off the clutch. The shaft seal on the ignition end can be replaced only after removing the complete ignition system. Damaged shaft seals can usually be recognized by dampness and oil near the shaft seals.
3. Check the following before assembling further: The shaft seal surface on the crankshaft, the flywheel taper, the condition of the keyway, the condition of the thread on the ends of the crankshaft.

   After installing the crankshaft and tightening the crankcase bolts, turn the crankshaft to check for smooth running.

   Continue assembling the engine in reverse sequence of dismantling.

Maintenance Instructions for SOLO WATER COOLED Engines 254/255 for Mofas/Mopeds

General Notes
"Water cooled" means that the cylinder bearing sleeve is surrounded by a hermetically sealed water jacket. This water jacket even extends somewhat into the cylinder head.

Water volume
= 0.4 US pints or 200 cm^3 (0.2 litres).

Fluid coolant
= a mixture of water and prestone (protection down to – 13° F/– 25° C). When mixing the coolant add 2/3 normal water to 1/3 commercial antifreeze. Observe instructions of antifreeze manufacturers. The coolant need only be replaced if the coolant has been drained, as during repairs.

Caution!
The coolant of a hot engine is under high pressure! The engine must *cool down completely before* removing the cylinder head or cylinder. (These instructions do not apply to removal of the spark plug.)

Workshop Hints
Proceed as follows to repair cylinder head, cylinder and piston:

1. Let engine cool down completely!
2. Remove filler plug (don't lose seal).
3. Remove drain plug (don't lose seal).
4. Drain all coolant (it might be necessary to tilt vehicle/engine back and forth). Never reuse drained coolant.
5. Now remove cylinder head.
6. Always use new gaskets when assembling. The rubber seal must fit properly in the cylinder head groove. Torque the cylinder head nuts (4) to 8.7 ft. lbs. or 1.2 mkg.
7. Install drain plug and seal again.
8. Add coolant until *full* with engine in normal position and install filler plug with seal.
9. Check coolant level. After removing the filler plug, the fluid level must be at the top edge of the filler opening. The engine must be in normal position – vehicle on flat ground. The cylinder (engine) should never be vertical when filling water. This would require that the amount of fluid (0.4 US pints/0.2 litres) be measured.

Troubleshooting on Water-Cooled Engines
Water/vapor leakage at cylinder head

Possible Causes
1. Loose cylinder head nuts.
2. Rubber seal in cylinder head damaged or installed incorrectly.

If coolant has been lost, more coolant must be added (see Point 9 of the Workshop Hints).

If pure water is used, i. e. without antifreeze, damage could result from outside temperatures below freezing.

1 = Drain plug
2 = Filler plug