



204 - 205

WORKSHOP MANUAL

*Welcome to the BCS family of dealers.
This handbook has been developed to enable you to maintain and service the BCS models 204 and 205 faster and more profitably.
It includes all the directions you'll need to provide your customers with outstanding service.
If you find it necessary to seek additional maintenance or servicing advice, please call during working hours and our technical service manager will be glad to help.*

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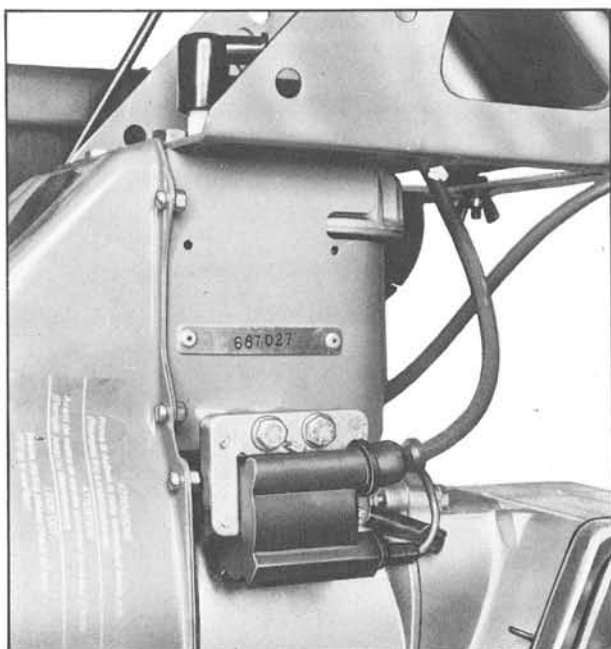
3.5 Snow thrower

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ENGINE SERIAL NO.



MACHINE SERIAL NO.



INTRODUCTION

This handbook contains the instructions for repairing BCS models 204 and 205 and their implements. Every effort has been made to provide simple and accurate instructions. They are current to the date indicated on the front cover. Please follow the instructions carefully and follow all the precautions listed in this guide.



WARNING

General safety

To avoid accidents, please follow the precautions listed below:

- Always wear suitable clothes when working.
- Protect yourself with safety glasses and gloves.
- Never service the machine when engine is running.
- Do not smoke in presence of gasoline or fuels.
- Do not use gasoline or flammable fluids for cleaning.
- Use non-toxic solvents.
- Engine should be run only in a well ventilated area.
- Maintain a clean work area.
- Do not refuel when the engine is running.
- Before starting the engine, check fluid levels and be sure the gearbox and P.T.O. are out of gear.

General instructions

This guide is divided into four parts 0. specifications and maintenance, 1. engine BCS 180, 2. machine 3. implements.

Unless instructed otherwise repairs and maintenance are the same for the 204 and 205. To assemble reverse the order of disassembly.

Service rules

- Disassemble and overhaul the parts only if service is necessary.
- Replace all worn parts to prevent more costly repairs at a later date.
- To keep the machine at its original level of quality and running condition, use BCS spare parts only.
- Order spare parts by giving the machine model, the full part number and the description as shown in the spare part catalogue.
- Use proper tools to avoid damage to parts.
- If it is necessary to hammer for adjusting or to separate parts, always use mallets made of soft material.
- Lubricate the parts before assembly.
- Where suggested, use an antifriction grease.
- Replace gaskets, oil seals and o-rings before reassembly.
- Use a press for the assembly and disassembly of bearings.
- Use proper size pins in bearing presses.
- Lubricate oil seals and o-rings before assembly.
- Use care in reassembly to avoid seal damage.
- When overhauling replace the spring roll pins.
- Make sure circlips are seated.
- Always tighten bolts and nuts at the specified torques.
- Clean and check all parts before reassembly.

0. SPECIFICATIONS AND MAINTENANCE

0.1 Technical features

0.1.A) Technical features engine BCS 180

Type	BCS 180
Cycle	4 stroke
Displacement	179 cc - 10.92 cu.in.
Diameter	65 mm - 2.56"
Stroke	54 mm - 2.13"
Cylinder number	1
Compression ratio	6.2 : 1
Max power	5 HP
Max r.p.m.	3.600 r.p.m.
Idle r.p.m.	1.000 r.p.m.

Clockwise rotation as viewed from the recoil starter side.

Forced air cooling through fan flywheel.

Ignition by flywheel magneto with protected contact breaker and exterior high voltage coil.

Splash lubrication.

Centrifugal automatic speed governor.

0.1.B) Machine technical features

Type	BCS 204
Gearbox is die-cast light weight alloy	
Constant mesh gearbox	
Number of gears	
Transmission ratios:	2 forward 1 reverse
1st speed	1 : 3.92
2nd speed	1 : 1.81
Reverse speed	1 : 3.25

Final reduction by worm screw-helical gear.

Final reduction ratio:

	1 : 22
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Transmission total ratios:

1st speed	1 : 86.24
2nd speed	1 : 39.82
Reverse speed	1 : 71.50

Forward speeds with pneumatic wheels 4.10/3.50-6 and engine at highest revolution rate:

1st speed	1.5 mph
2nd speed	3.4 mph
Reverse speed	1.9 mph

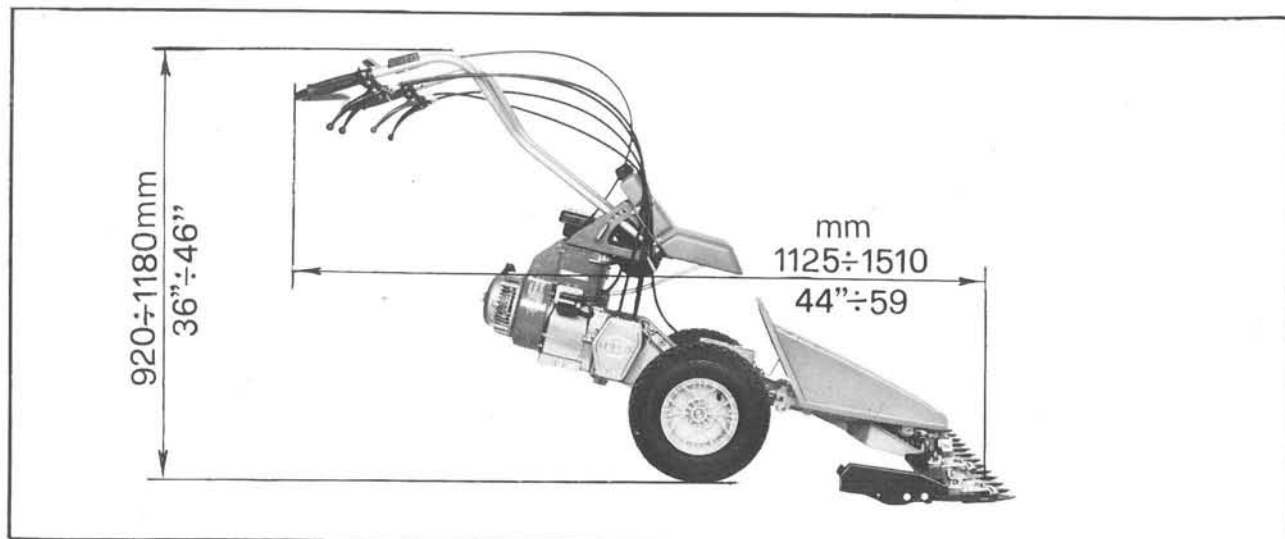
Power-take-off independent from gearbox

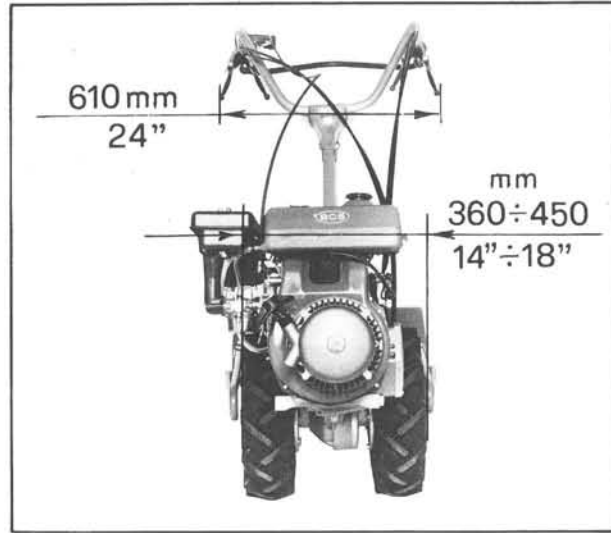
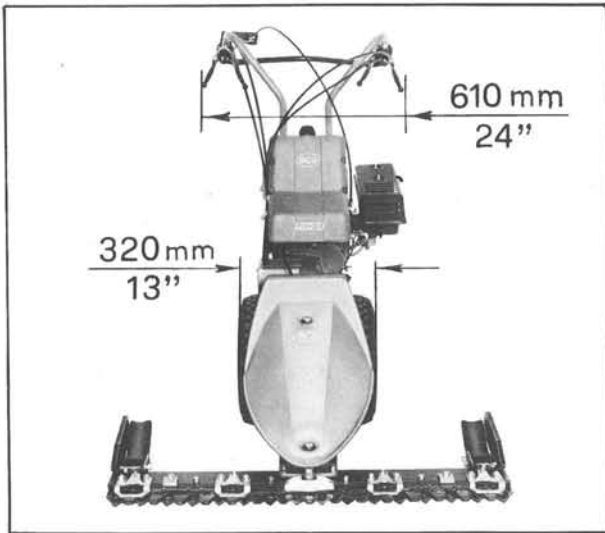
Rotation peak with engine at highest r.p.m.:

	920 r.p.m.
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Weights:

Ground machine with wheels 4.10/3.50-6	77 lbs.
Machine with front rotary hoe	112 lbs.
Cutter bar	51 lbs.
Lawn mower	66 lbs.
Snow thrower	64 lbs.





Sizes:

Type BCS 205

Same features as model 204, plus:
Planetary reverser-reducers built-in in the wheel rims.

Reduction-ratio 1 : 3.125

Transmission total ratios:

1st speed 1 : 269.50

2nd speed 1 : 124.44

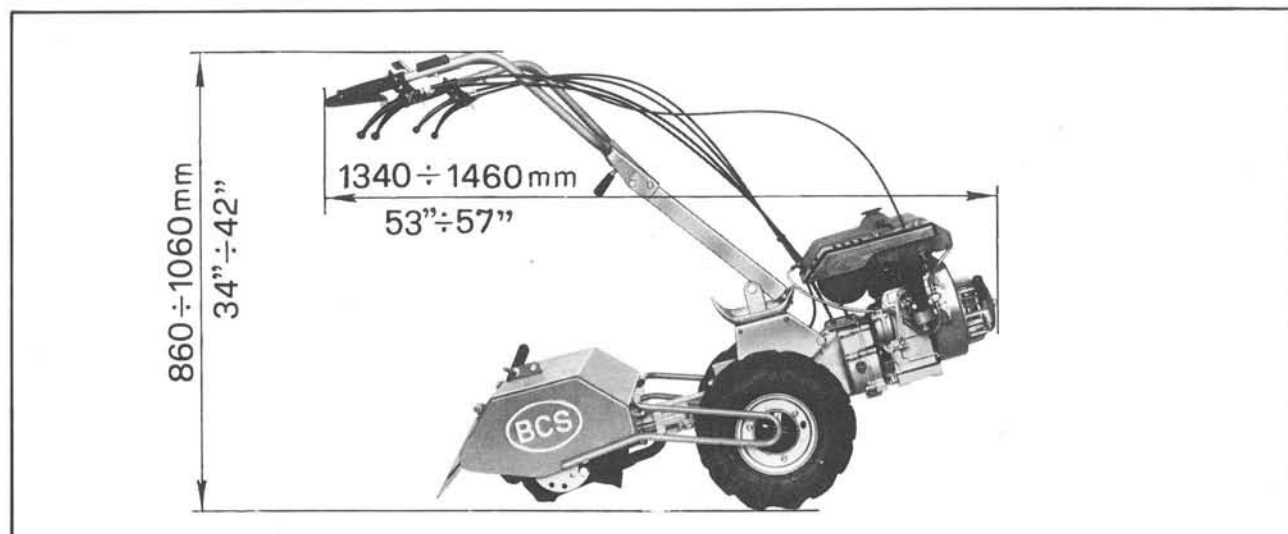
Reverse speed 1 : 223.44

Forward speeds with pneumatic wheels 3.50-6 and engine at highest revolution rate: (normal)

1st speed 1.7 mph.

2nd speed 3.7 mph.

Reverse speed 2.0 mph.



Forward speeds with pneumatic wheels 3.50-6 and engine at highest revolution rate: (reversed)

1st speed	0.5 mph.
2nd speed	1.2 mph.
Reverse speed	0.7 mph.

Weights:

Ground machine with wheels 3.50-6 and reducers:	95 lbs.
Rear rotary hoe:	49 lbs.

0.2 Maintenance

0.2.A) Maintenance program

OPERATION	Every use	First month or 20 hours	Every month or 20 hours	Every 6 months or 50 hours	Every year	Every 500 hours	Every 1000 hours
Check crankcase oil level	•						
Check breaker point gap							•
Clean fuel filter				•			
Clean head cooling fins			•				
Clean spark plug				•			
Clean air filter	•						
Replace engine crankcase oil		•		•			
Replace spark plug						•	
Check bolt and nut tightenings		•					
Check gearbox oil level				•			
Adjust control lever play		•		•			
Lubricate control cables				•			
Check tire pressure					•		
Clean fuel tank					•		
Check lawn mower oil level				•			
Check snow thrower oil level				•			
Check rear rotary hoe oil level				•			
Replace gearbox oil					•		
Replace lawn mower oil					•		
Replace snow thrower oil					•		
Replace rear rotary hoe oil					•		

0.2.B) Fuel and oil specifications

PART TO BE FILLED	FLUID NATURE	LEVEL
Engine fuel tank	Regular gas 84-86	
Engine crankcase	Oil SAE 40 (Summer) SAE 20 (Winter) or equivalent	up to spill point
Gearbox	Oil SAE 80W/90 EP or equivalent	up to spill point
Lawn mower casing Snow thrower casing Rear rotary hoe casing	Oil SAE 80W/90 EP or equivalent	50 mm (2") from the line of the filling hole.
Tire pressure		14.2 psi

0.2.C) Special storage instructions

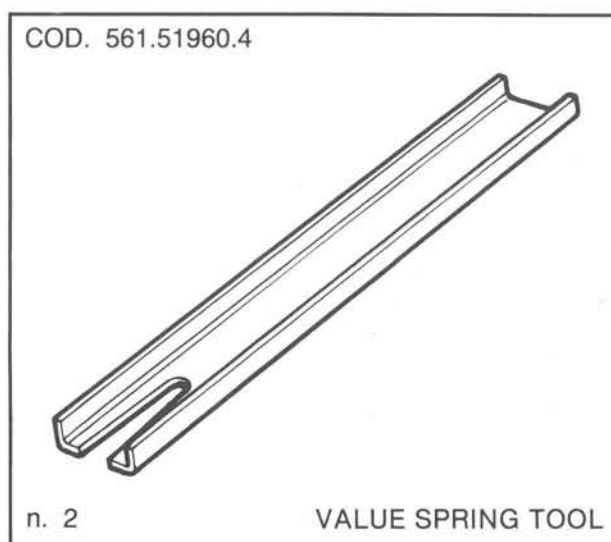
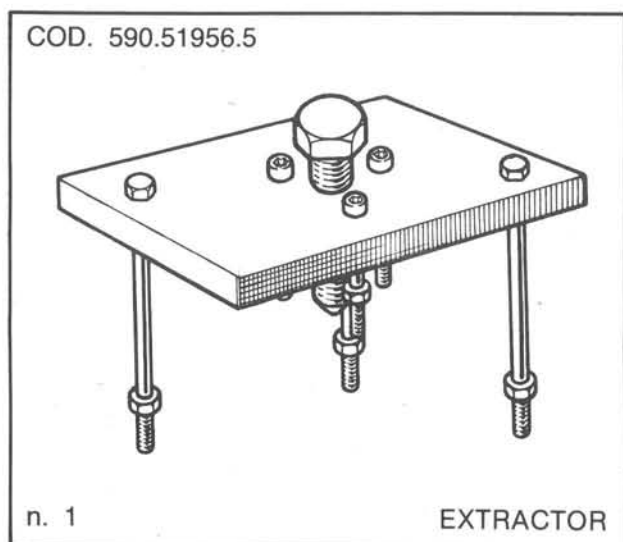
The following steps must be taken to protect the machine when it is stored for long periods of time:

- Empty the fuel tank
- Drain oil from engine.
- Lubricate the engine cylinder and pour one tab-

lespoon oil into the spark plug hole (manually rotate engine 6-8 times).

- Clean engine and machine with soft brush and/or compressed air.

0.2.D) Shop tools



COD. 590.51962.4



n. 3

VALVE GUIDE EXTRACTOR

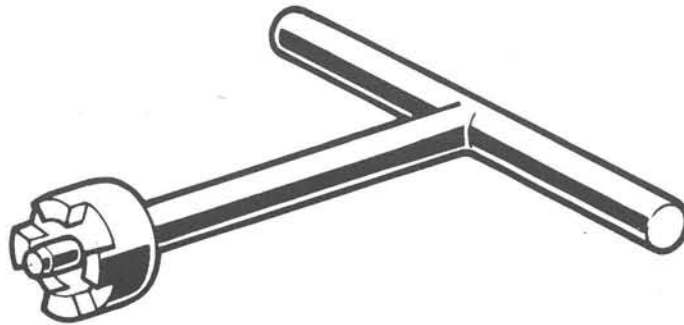
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n. 4

SEAL SLEEVE

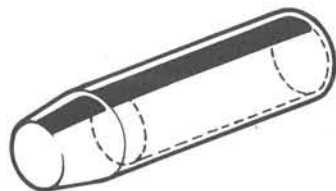
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n. 5

PTO WRENCH

COD. 561.51972.2



n. 6

SEAL DRIVING TOOL

COD. 561.51974.4



n. 7

SEAL SLEEVE

0.2.E) Trouble shooting

PROBLEM	CAUSES	REMEDIES	REF
1) Engine does not start	a) No fuel b) Throttle lever in STOP position c) Spark plug wire disconnected d) Flooded engine e) Dirty or defective spark plug f) Accelerator lever out of adjustment g) Breaker contact out of adjustment	a) Fill tank b) Put lever in ON-position c) Connect wire d) Remove and clean the spark plug e) Clean or replace spark plug f) Adjust accelerator control g) Adjust breaker contacts	 2.1.D 1.4.D
2) Hard starting or power loss	a) Dirt or water in the fuel tank b) Vent in fuel cap clogged c) Dirty air filter d) Dirty gas. filter e) Incorrect valve clearance f) Insufficient compression	a) Clean fuel tank b) Clean vent c) Clean filter d) Clean filter e) Adjust play f) Overhaul engine	 1.2.C 1.2.C 1.4.C.
3) Engine overheats	a) Incorrect spark plug b) Dirty air filter c) Low oil level d) Dirty cooling fins	a) Replace spark plug b) Clean air filter c) Fill with oil d) Clean cooling fins	 1.2.C 0.2.B
4) Engine consumes too much oil	a) Worn components b) High oil level	a) Replace components b) Bring level at prescribed limits	 1.2.D 0.2.B
5) Engine knocks	a) Carbon deposits in the combustion chamber b) Incorrect fuel (too low octane)	a) Clean combustion chamber b) Replace fuel	 1.2.A 0.2.B
6) Difficult to shift	a) Control cables out of adjustment	a) Adjust cables	 2.1.D
7) Recoil starter rope does not rewind	a) Spring 581.50106.0 does not slide well on coupling 581.50105.6 b) Spring 581.50101.2 is broken	a) Put some drops of oil into coupling groove 581.50105.6 b) Replace spring 581.50101.2	

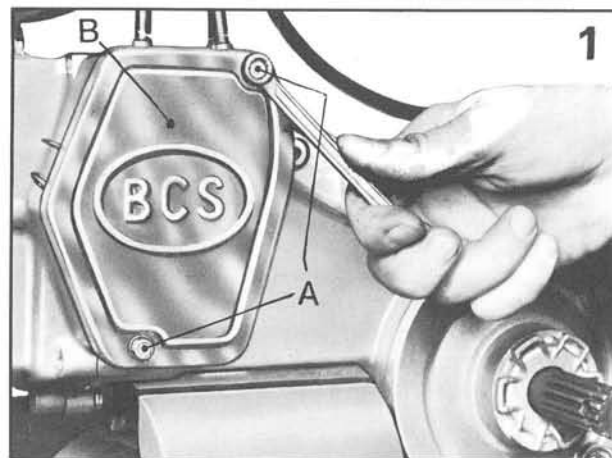
1. ENGINE

1.1 Removal

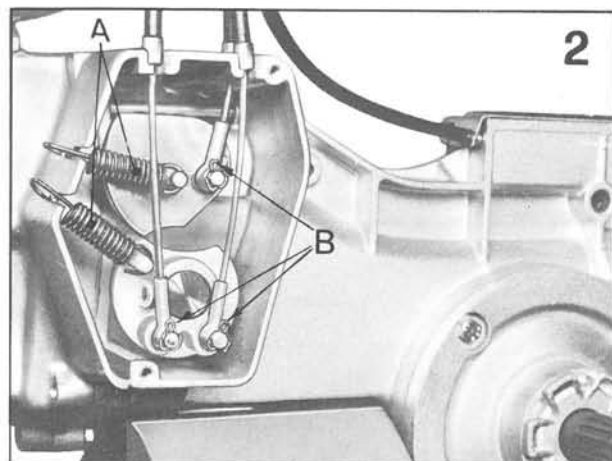
1.1.A Separation engine/gearbox

- Remove screws A and cover B (fig. 1)

NOTE: screws are self-threading. When replacing the gearbox, use self-threading screws.

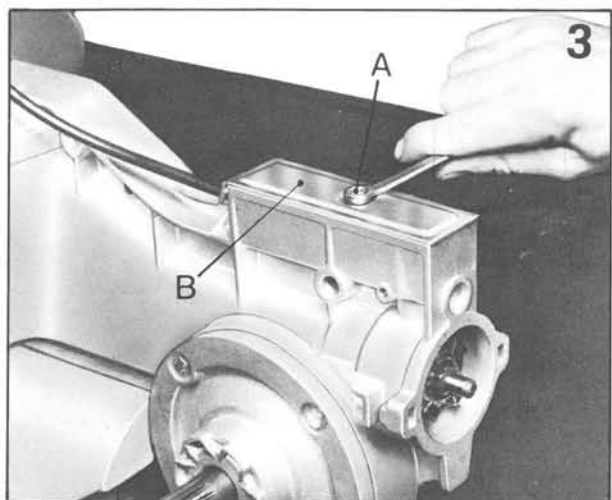


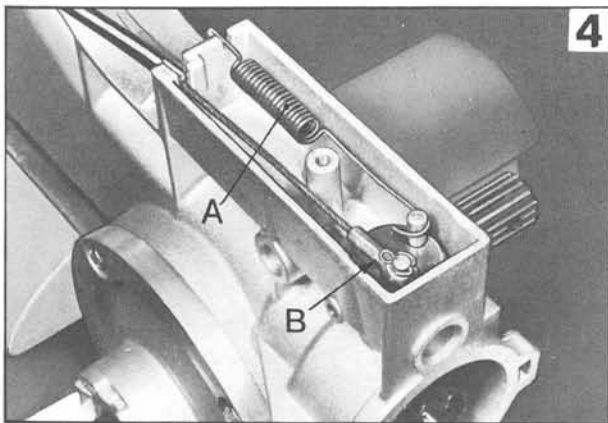
- Remove springs A, remove pins B and detach the control cables (fig. 2)



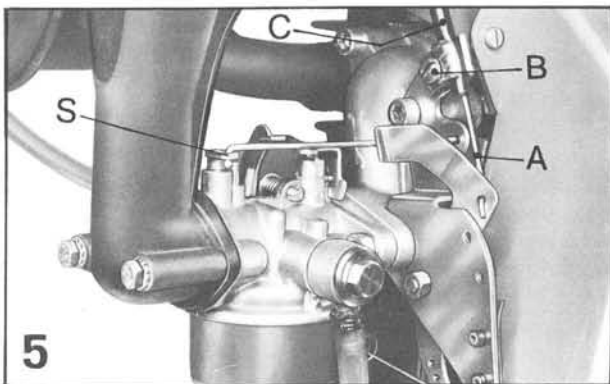
- Remove screw A and cover B (for 204 only) (fig. 3)

NOTE: screws are self-threading type. When replacing the gearbox, use self-threading screws.

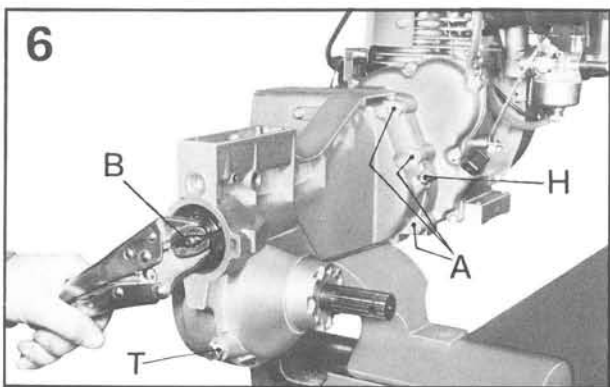




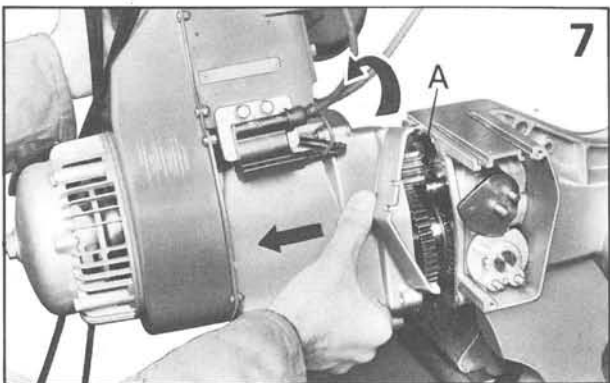
- Remove spring A, pin B and detach the control cable of PTO (for 204 only) (fig. 4)



- Loosen clamp B and disconnect accelerator cable A (for 205 only) (fig. 5)



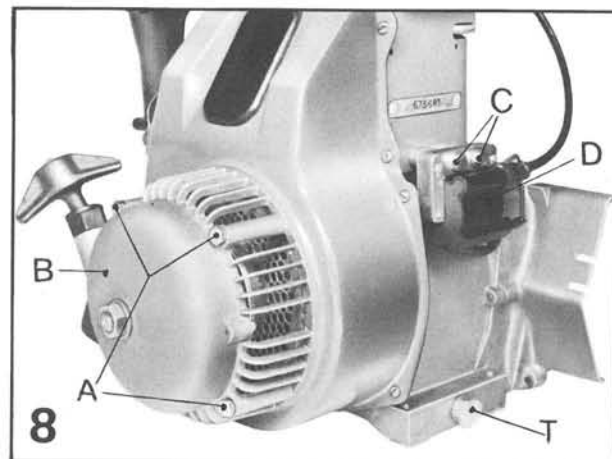
- Drain oil from cap T. Unscrew the 6 fastening screws A. Lock shaft B in place (fig. 6)



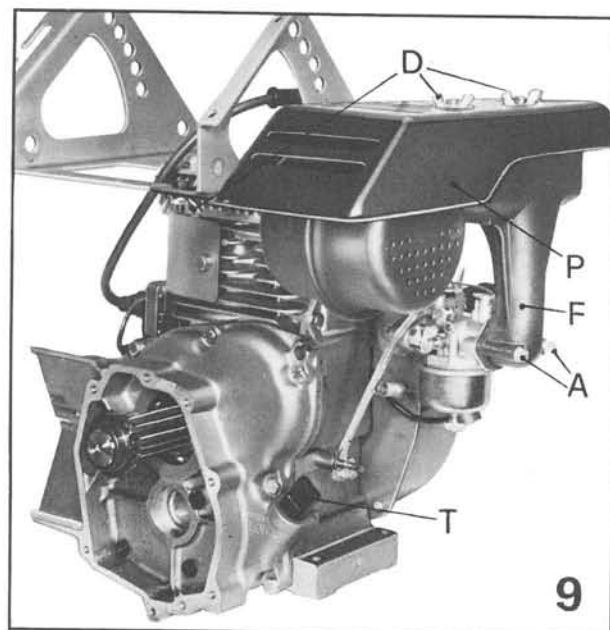
- Pull back on engine and turn it counterclockwise to free gear A. Separate engine from gearbox.

1.1.B Engine removal

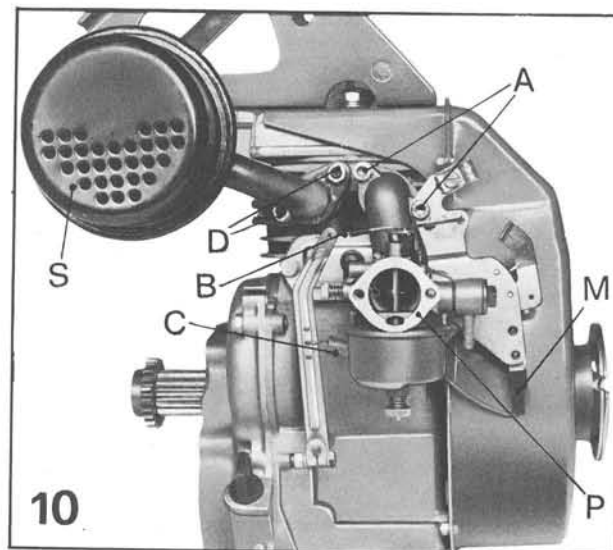
- Remove handlebar (for 204 only)
- Detach the gasoline lines (one for 204 - two for 205). Drain fuel from tank. Remove the fastening bolts and the tank.
- Drain oil from cap T (fig. 8)
- Unscrew screws A and remove the recoil starter B (fig. 8)
- Unscrew screws C, detach the electric connections and remove coil D (fig. 8)

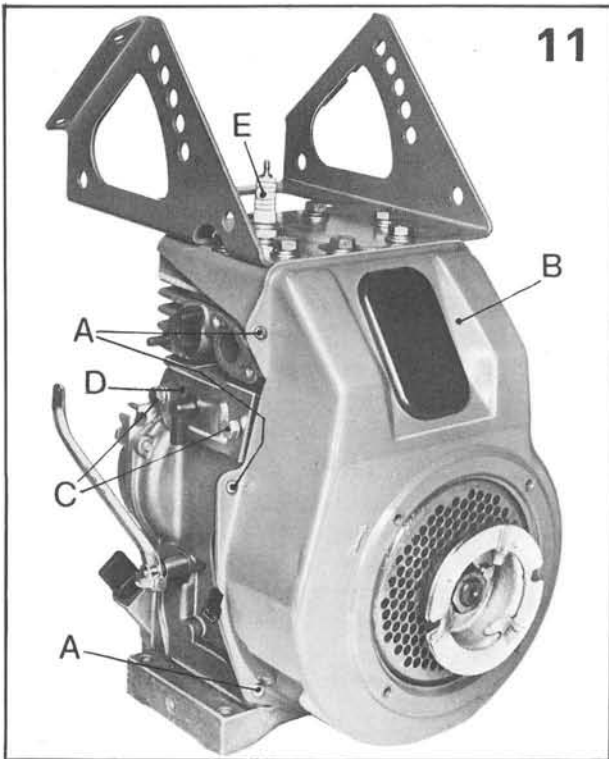


- Unscrew nuts D. Remove protection P (fig. 9)
- Unscrew screws A. Remove air filter F (fig. 9)

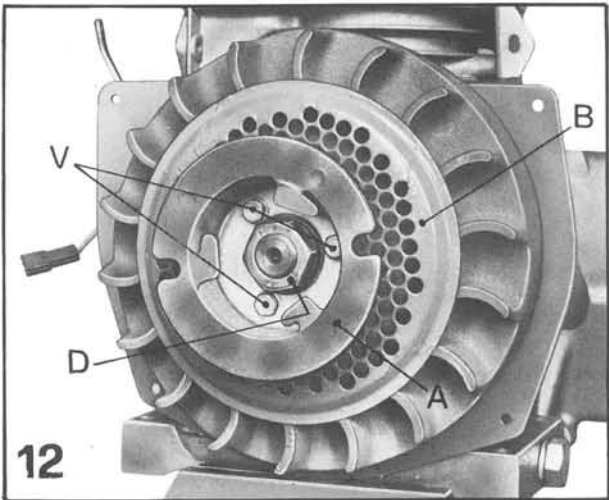


- Unscrew nuts D and remove muffler S (fig. 10)
- Unscrew screws A. Release tie rod B and spring C. Detach ground wire M. Remove carburetor P (fig. 10)

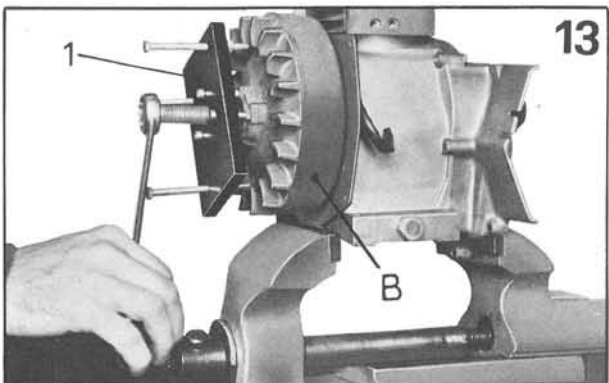




- Remove bolts A. Remove fan housing B. (fig. 11)
- Unscrew screws C. Remove the breather valve D (fig. 11)
- Remove spark plug E (fig. 11)

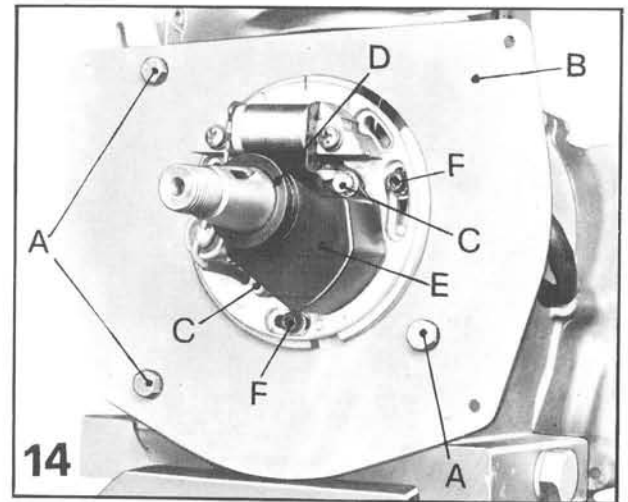


- Unscrew screws V. Remove pulley A and screen B. Unscrew nut D (right thread) (fig. 12)

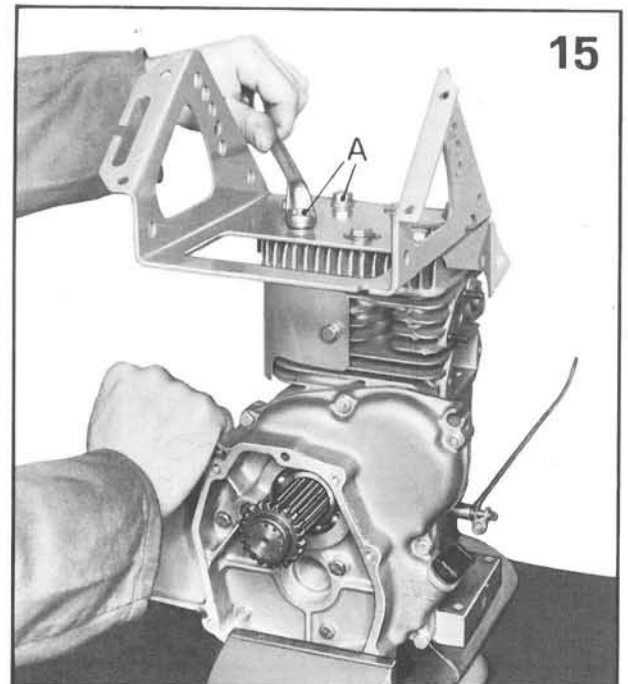


- Using extractor No. 1, remove the flywheel from the crankshaft.

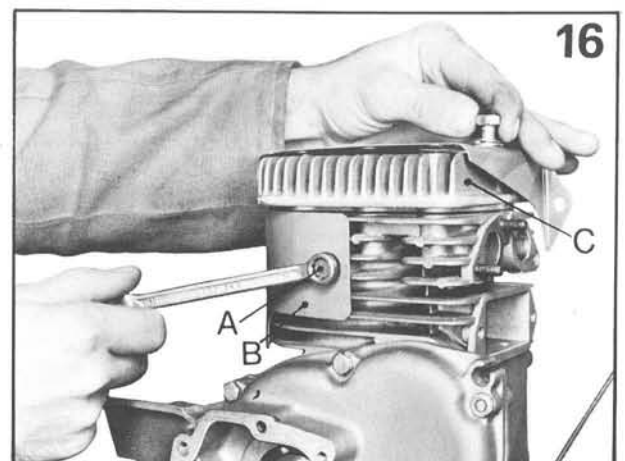
- Unscrew screws A, remove plate B (fig. 14)
- Unscrew screws C. Remove ring D and cap E (fig. 14)
- Unscrew screws F and remove the complete stator. Remove the felt ring (fig. 14)

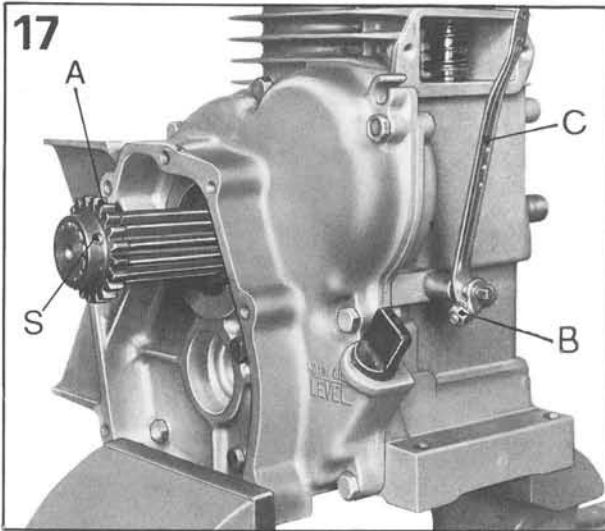


- Unscrew screws A and remove the handlebar support (204) or the tank support (205) (fig. 15)

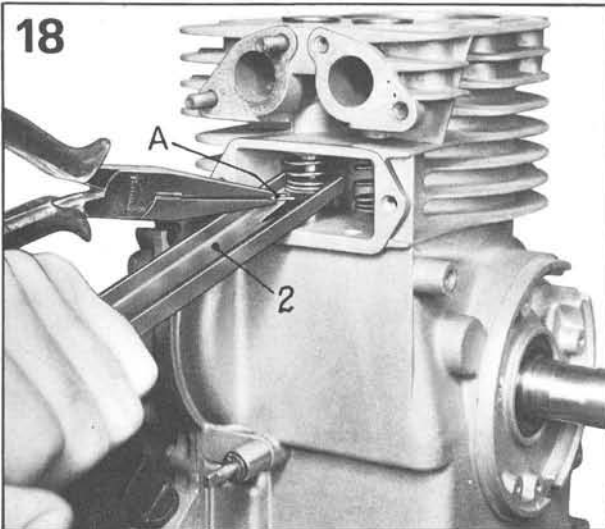


- Unscrew screw A. Remove shroud B and head C (fig. 16)
- NOTE: to avoid warping the cylinder head, remove it when it is cold.

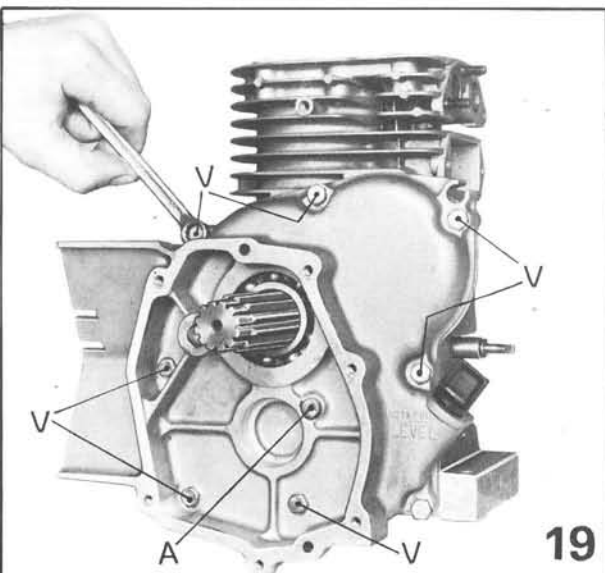




- Remove pin S and gear A (fig. 17)
- Unscrew bolt B and remove the lever of the speed governor C (fig. 17)

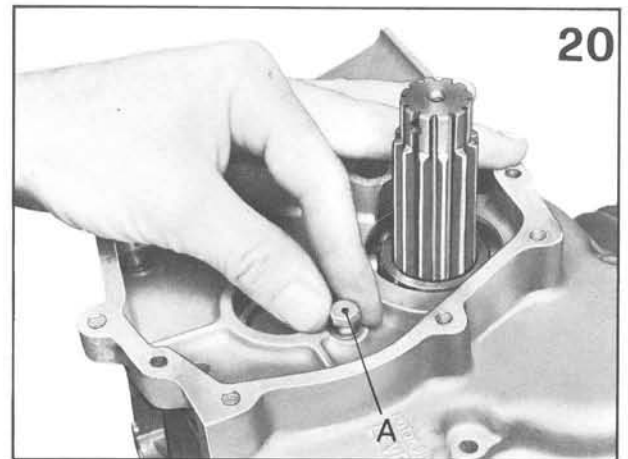


- Compress the valve springs using tool No. 2. Extract clamp A, remove the valves, springs and caps. Before disassembling the valves, mark their location to aid in reassembly.

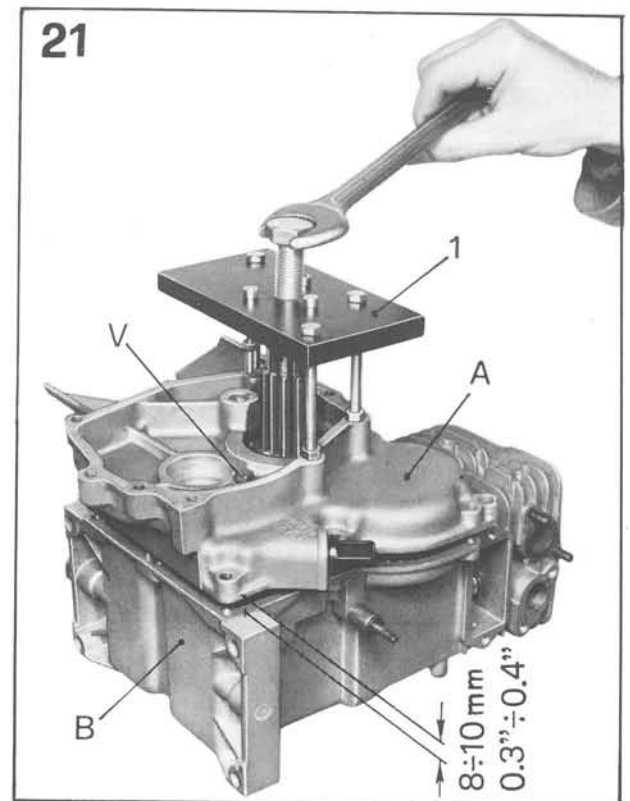


- Unscrew the 8 fastening screws V of the cover. Remove fastening screw A of the speed governor pin (fig. 19)

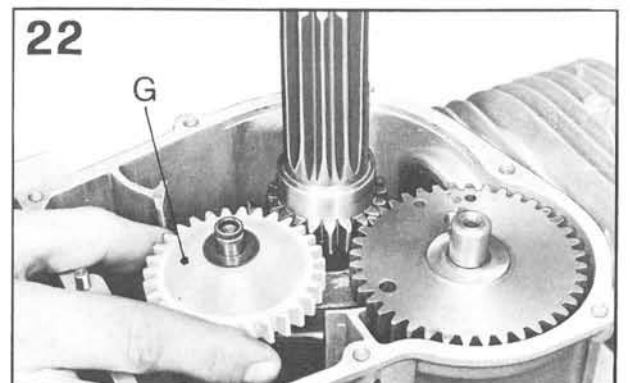
- Loosen the governor screw a couple of turns.

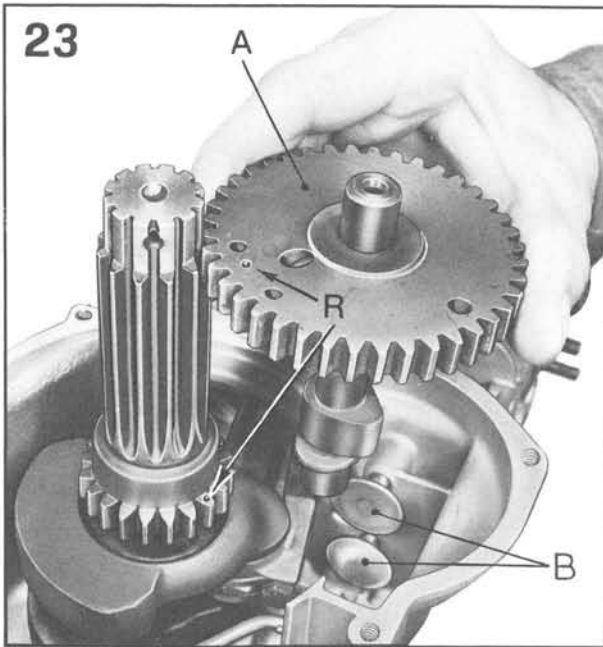


- Place the engine with the shaft vertical. Install extractor No. 1 while using the extractor tap on the fastening screw of the speed governor pin until the cover A is detached 8÷10 mm 0.3"÷0.4" from block B.
Check that the speed governor is detached from the cover. Remove screw V and complete the disassembly (fig. 21)

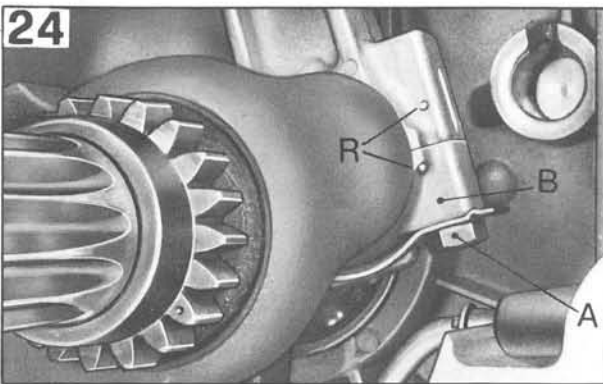


- Remove the speed governor G (fig. 22)

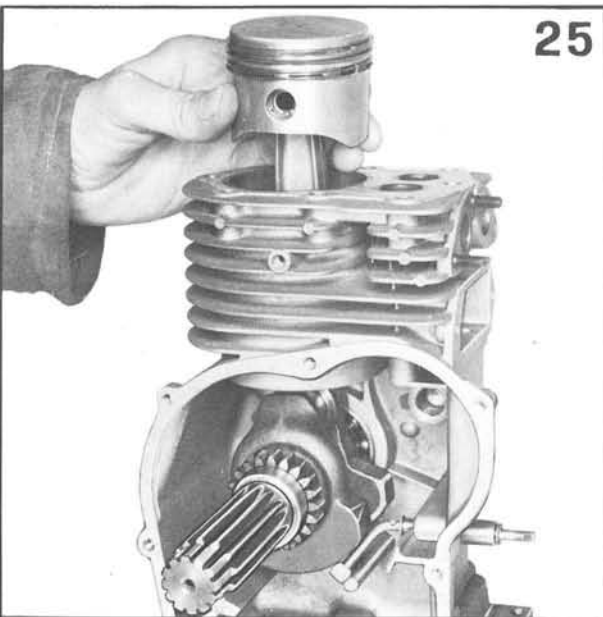




- Notice the timing marks R on the camshaft and the crankshaft A. Mark the lifters in order to reassemble them in the same position. Extract the lifters (fig. 23)

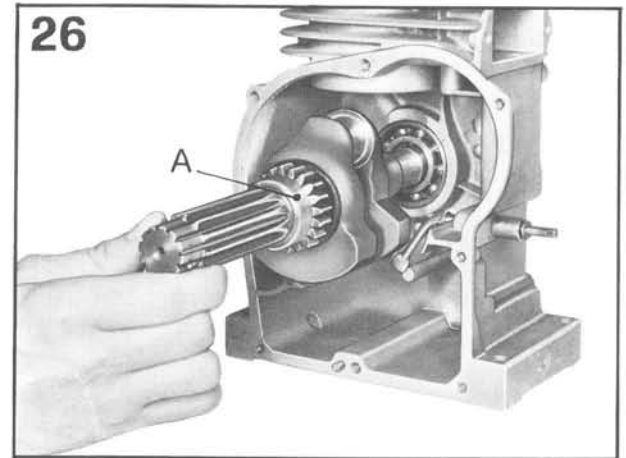


- Bend the retainer clip. Unscrew screws A and remove the connecting rod cap B (fig. 24)

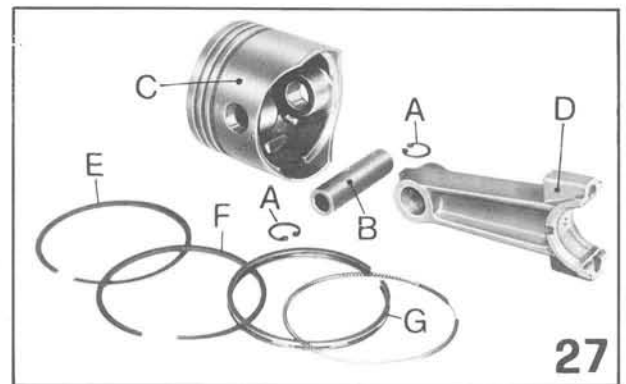


- Extract the piston/connecting-rod group from the cylinder head side (fig. 25)

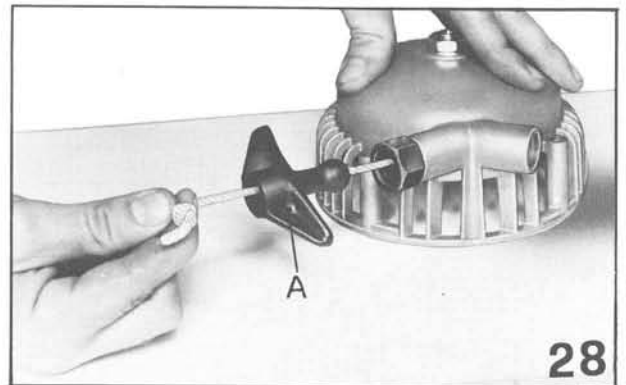
- Extract crankshaft A (fig. 26)



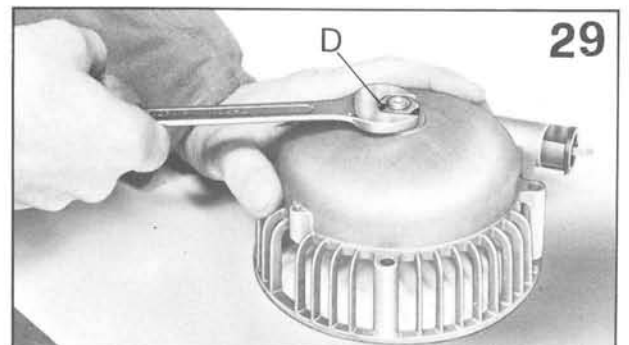
- Remove the wrist pin rings A. Extract pin B. Separate piston C from connecting-rod D. Disassemble the rings E and F and the scraper ring G, also remove the spring (fig. 27)

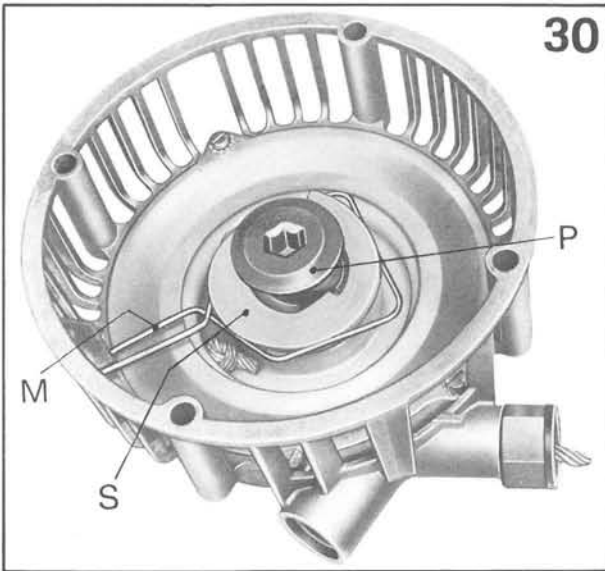


- Untie the knot located in the grip and remove the grip allowing the rope to rewind onto the pulley (fig. 28)

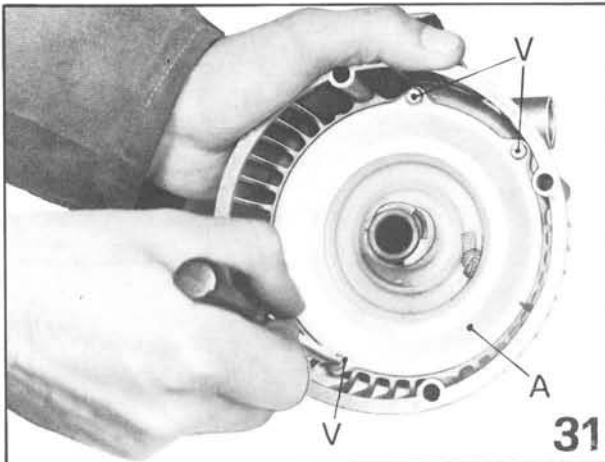


- Unscrew nut D (fig 29)

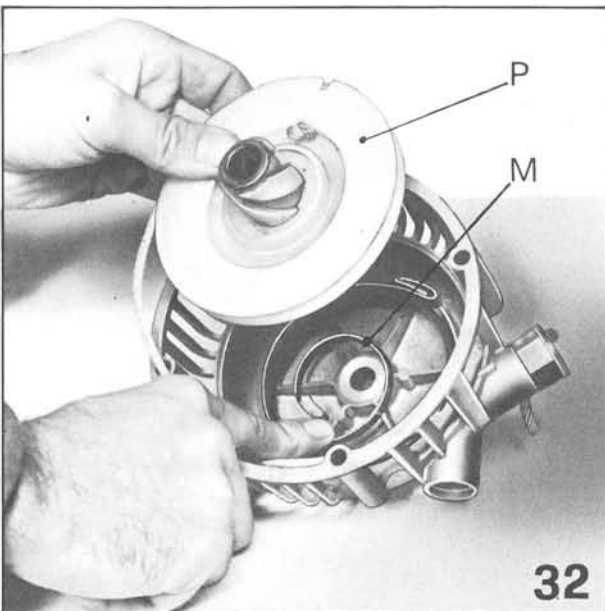




— Remove pin P, coupling S and spring M (fig. 30)



— Unscrew screws V, remove disc A (fig. 31)

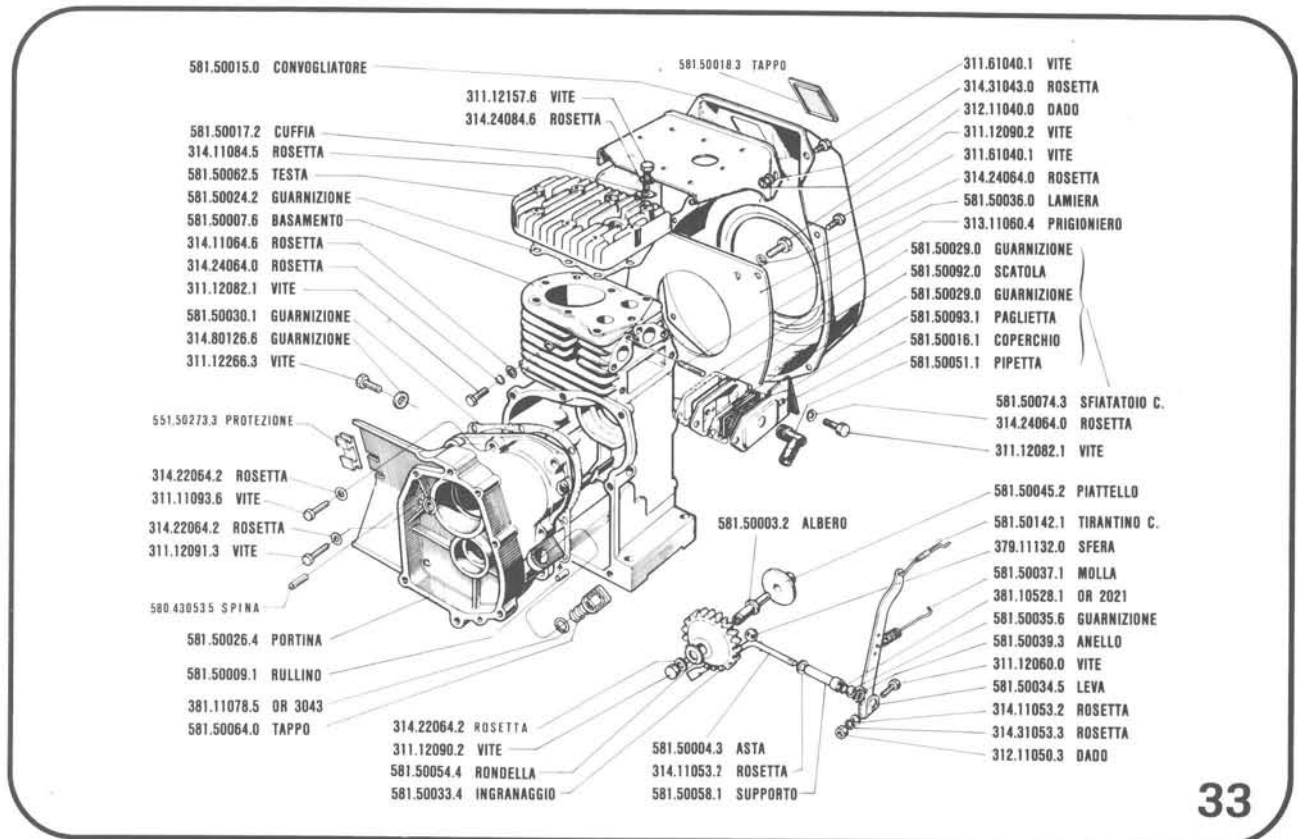


— Carefully remove pulley P.
WARNING: spring M is under tension. Put on safety glasses and gloves before removing the pulley.

1.2 Inspections and repairs

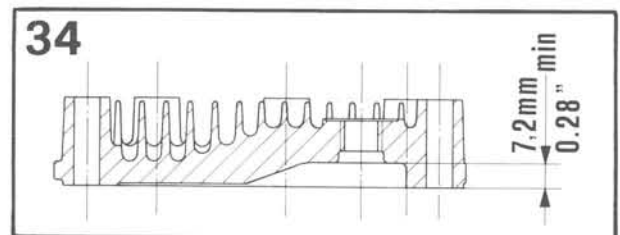
Make the following checks and necessary repairs and/or replacements.

1.2.A Head (fig. 33)



33

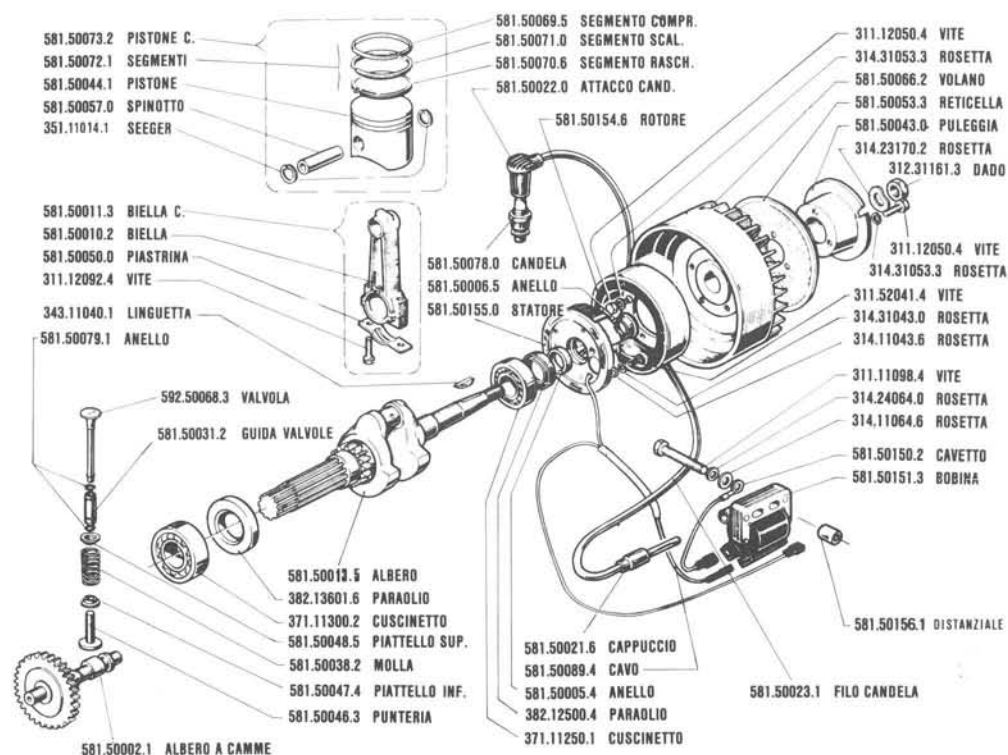
- Carefully clean the head 581.50062.5 of carbon deposits. Check the head surface. In case of big deformations, resurface it removing the least amount of material you can. Retain the depth indicated in figure 34.
- Check the condition of the spark plug thread.



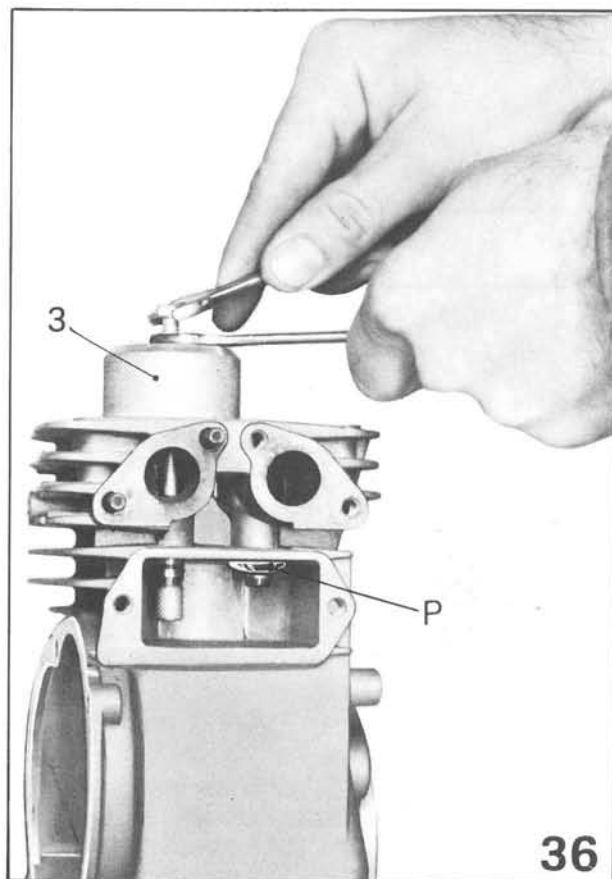
1.2.B Valves, springs, guides and housings (fig. 35)

- Visually check the sealing surfaces between valves 581.50068.3 and their seats. They must have a uniform width and colouring. If not, they are not sealing. Valves must have the

correct play and must not show any burning or deformation. Check that seats are not damaged and that guides are not scored or ovalized. Make following operations if necessary.



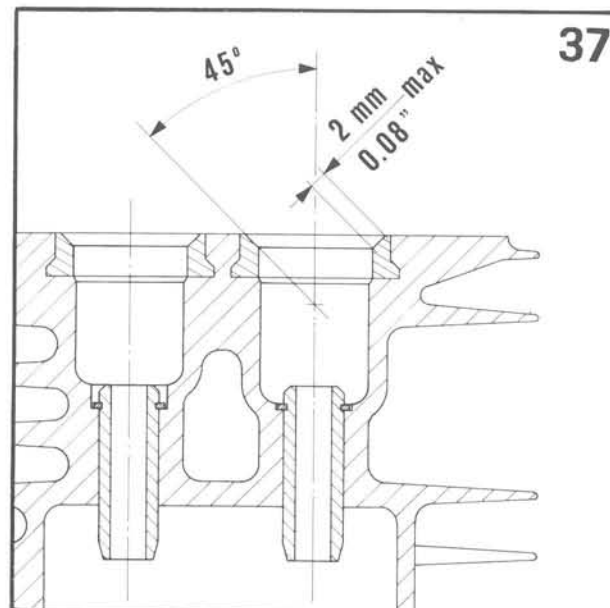
35



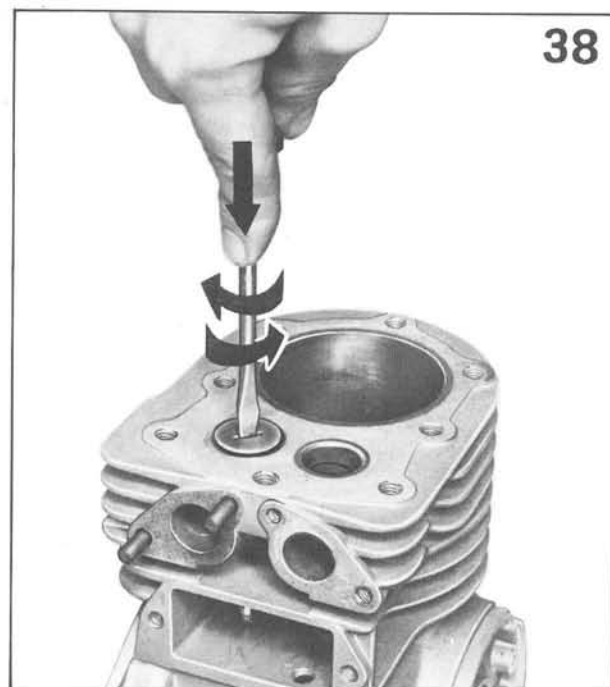
36

- Extract the valve guides using extractor No. 3. Before this operation always remove upper plate P bearing the valve spring and lubricate that under part of the guide (fig. 36)
- Warm the cylinder block in oil to abt. 1200° C/ 250° F. Fit ring 581.50079.1 on the new valve guide 581.50031.2. Fit the guide by using a detent going into the valve box. After the guide replacement it is necessary to mill and to grind in the valve seats.

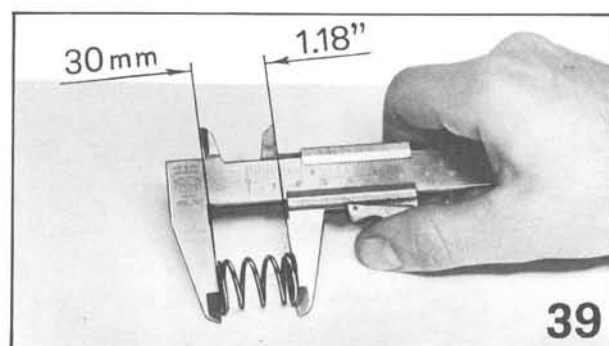
- Mill the valve seats by using a milling cutter at 45° . Remove the smallest quantity of material only. Keep the measure indicated in figure 37.



- The grinding-in must be effected by covering the valve seat with a fine grain lapping compound. Rotate the valve on the seat with an alternated movement, press until the perfect setting of both surfaces. Wash with oil to eliminate any trace of lapping (fig. 38)



- Check valve springs 581.50038.2. They must not present any crack or sign of yield. Replace them if the free length is under 28 mm / 1.1" (fig. 39).
- Check the condition of plates 581.50048.5 and 581.50047.4. Check the condition of valve clamp.
- After having reassembled the valves, check the play and adjust it if necessary (See 1.4.C)



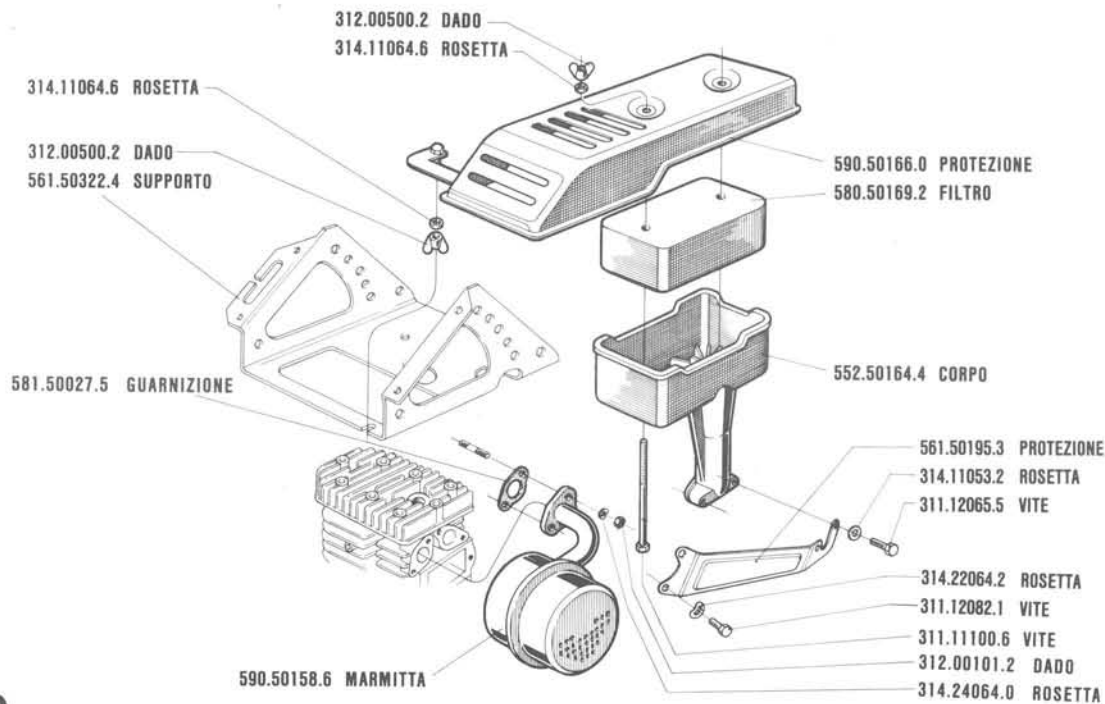
1.2.C Filters (fig. 40 - 51)

- Check the condition of air filter 580.50169.2 and of case body 552.50164.4.
- Clean the filtering sponge by washing it with solvent.
Dry it well and impregnate it with motor oil SAE 20.
Wring it out to eliminate the excess oil.
Carefully follow this operation. If filter is not well impregnated, its efficiency is much lower

and could affect the engine life.

WARNING: gasoline is highly inflammable. Do not assemble the filter impregnated with gasoline, to avoid fire dangers.

- Check the conditions of gasoline filter 581.50124.4. The mesh must not have large holes. Clean filter by washing it carefully with solvent.



40

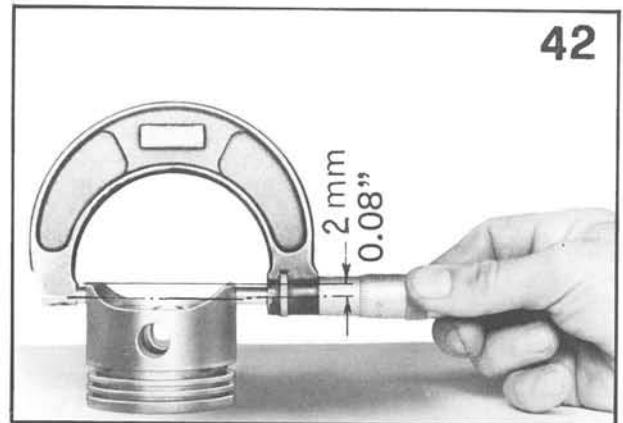
1.2.D Cylinder, piston and piston rings (fig. 33-35)

- Check the cylinder diameter by a bore measuring device. Take three measurements: in the upper, middle and lower part of cylinder.
- Check the ovalization by crossed measurements.
- Compare the measurements with the nominal dimensions (see Appendix). If the wear does not exceed 0.1 mm/0.004" and the ovalization does not exceed 0.06 mm/ 0.002" and no deep scoring are found, roughen the cylinder with crossed movement, using emery cloth having a grain of 80 + 100, impregnated with gas and oil mixture, until obtaining a surface with crossed hatches.
- Replace piston rings (fig. 41)



41

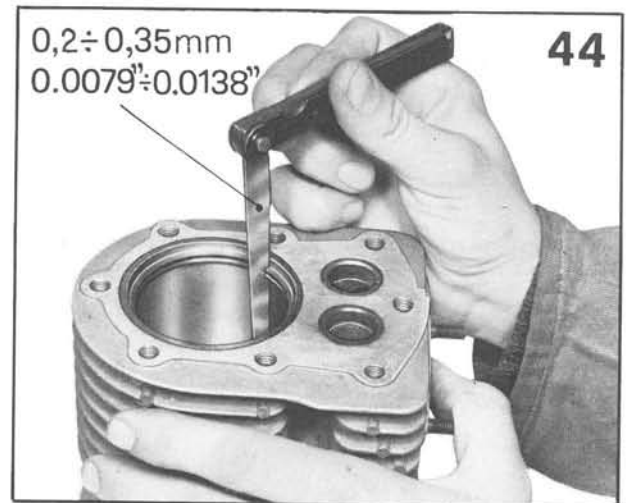
- If the cylinder presents scorings or excessive wear, bore it and fit increased pistons and piston rings (see Appendix).
- Carefully clean piston 581.50044.1 of carbon deposits and check that no scoring or seizure beginnings are found.
- Measure the diameter of piston as shown in fig. 42.
- Compare the measurement with the nominal dimension (see Appendix). Wear must not exceed 0.13 mm / 0.005" and play in comparison with the cylinder must not exceed 0,2 mm / 0.008".



- Measure the ring play in the grooves. Replace rings 581.50072.1 if play is higher than 0.1 mm / 0.004" (fig. 43)



- Check the adherence of rings to the cylinder and measure the dimension shown in figure 44.



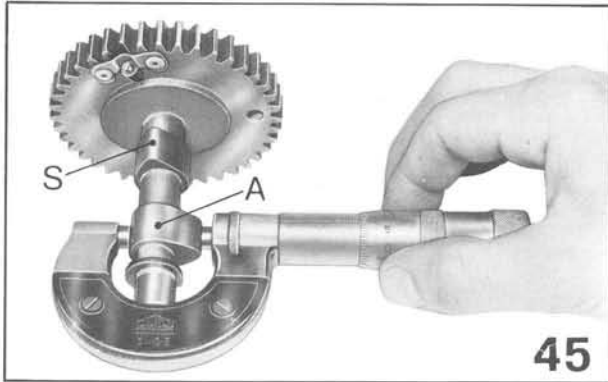
1.2.E Piston pin and connecting rod (fig. 35)

- Replace the piston pin 581.50057.0 if too scored or worn.
- Check that the connecting rod 581.50011.3 has no deformations. Check that the crankshaft has no scoring or ovalization. Make sure that the holes for the oil passage in the connecting rod

end and small end are not obstructed. The coupling play with the crankshaft must be lower than 0.1 mm / 0.004". If necessary, recondition the crank and fit a smaller connecting rod (see Appendix).

1.2.F Crankshaft (fig. 35)

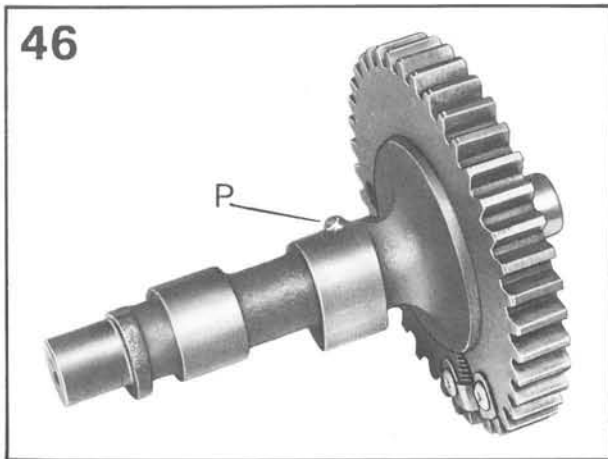
- Check the condition of teeth on shaft 581.50013.5.
- Main journals cannot be reconditioned. The small scorings in correspondence with oil seals can be eliminated with an emery cloth with very thin grain.



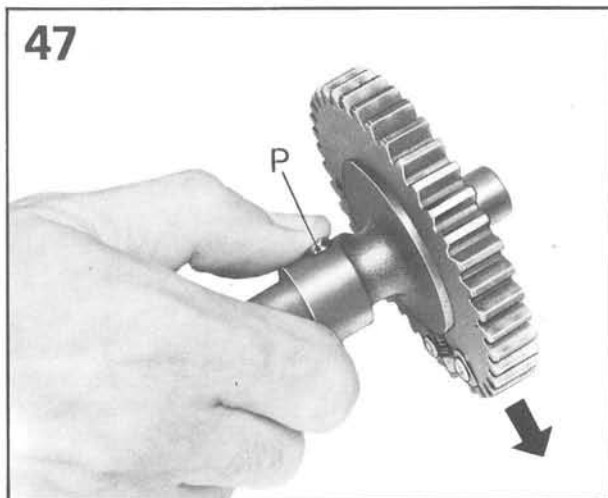
- Check that the connecting rod pin is not scored or worn.
If necessary, recondition and fit a smaller connecting rod (see Appendix).
- Check the condition of main journals 371.11300.2 and 371.11250.1.

1.2.G Camshaft (fig. 35)

- Check the condition of the gear on cam shaft 581.50002.1.
- Check that the cam is not scored or worn. Measure the dimensions shown in figure. Replace the camshaft if this dimension is lower than 23.6 mm / 0.93" for the intake cam A and 23 mm / 0.9" for the exhaust cam S (fig. 45)



- The camshaft is provided with an automatic decompression device. This device prevents the full closing of the exhaust valve with stopped engine. Check that cap P comes out in comparison with the cam profile (fig. 46)



- Slightly tap on a soft surface (wood, plastic material) the gear of the camshaft while pressing on cap P. Check that in these conditions the cap does not come out from the cam profile.
Replace the camshaft if the decompression device does not operate (fig. 47).

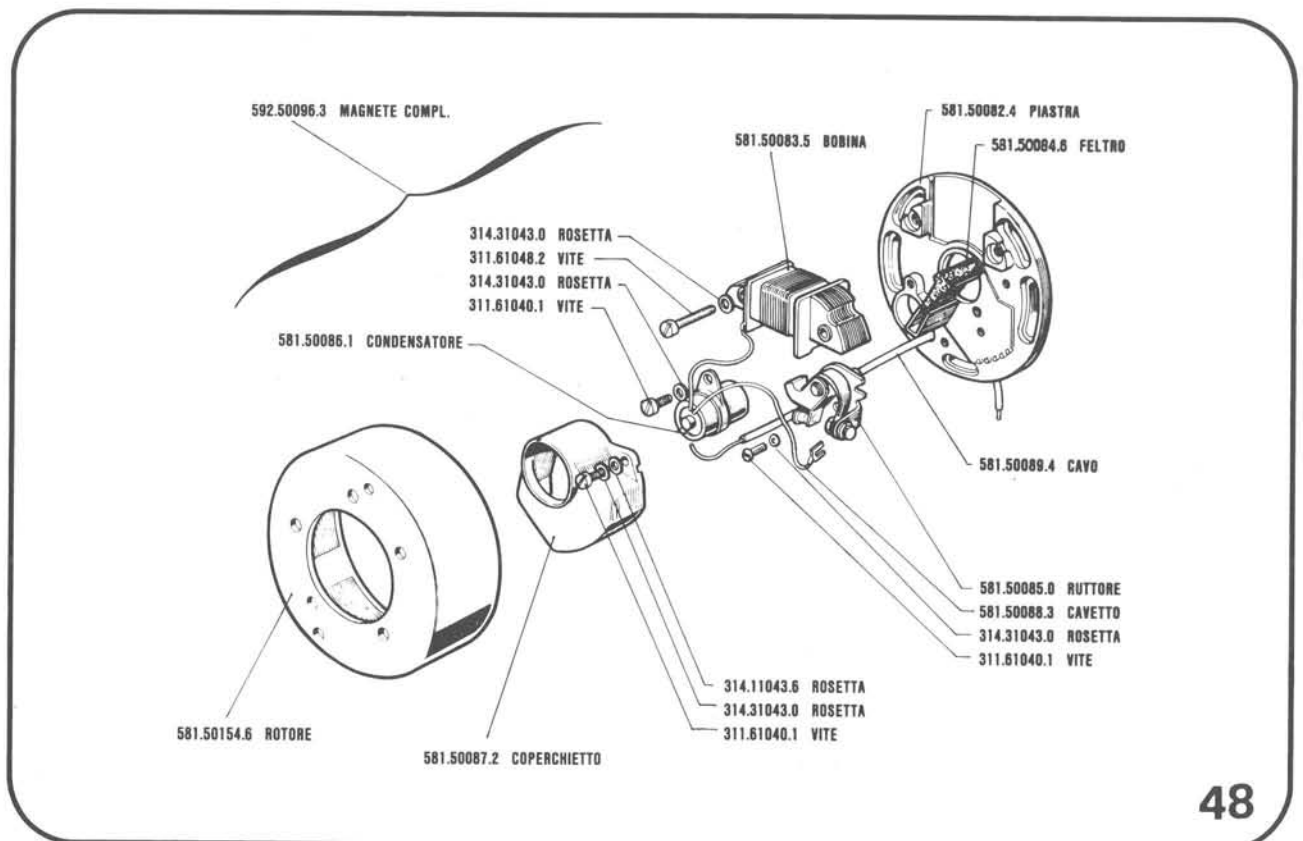
1.2.H Governor (fig. 33)

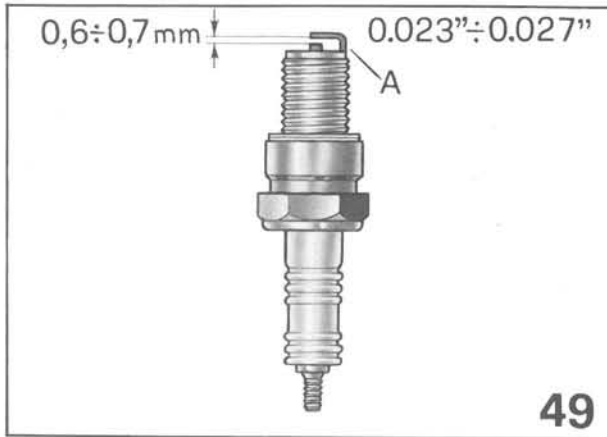
- Check the teeth of gear 581.50033.4 and verify it can slide and rotate on shaft 581.50003.2.
- Check that plate 581.50045.2 has no marks and that it slides well on the axle of shaft 581.50003.2.
- Check that balls 379.11132.0 are free in the corresponding seats obtained in gear 581.50033.4.
- Check the lever rod 581.50004.3. It must freely rotate in its bushing. The whole system of lever and springs of the speed governor must have uniform and regular motion.

1.2.K Cylinder block and timing system cover (fig. 33)

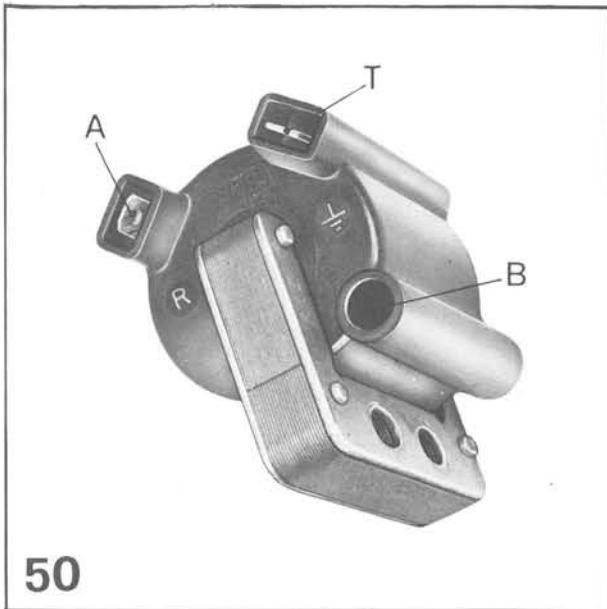
- Check the condition of cylinder block 581.50007.6.
 - Check the tablet-shaped valve placed in breather box 581.50092.0. It must have no deep groovings or breakages.
- Check also that its stroke is $0.4 + 0.7 \text{ mm} / 0.015 + 0.027''$.
- If the breather does not function properly, crankcase pressure will force oil by the seals.

1.2.L Ignition (Fig. 35 - 48)





- Check the condition of ignition spark plug 581.50078.0. Replace it if electrodes are worn or if the insulating coating is broken. Clean by means of a metal brush. Reset the distance between electrodes by bending the side electrode A until you obtain the indicated gap. Use spark plugs with prescribed dimensions and features only (see Appendix) (fig. 49).
- Check the condition of all electrical connections. Verify that the insulation of the high voltage wire connecting coil to spark plug is in perfect condition.



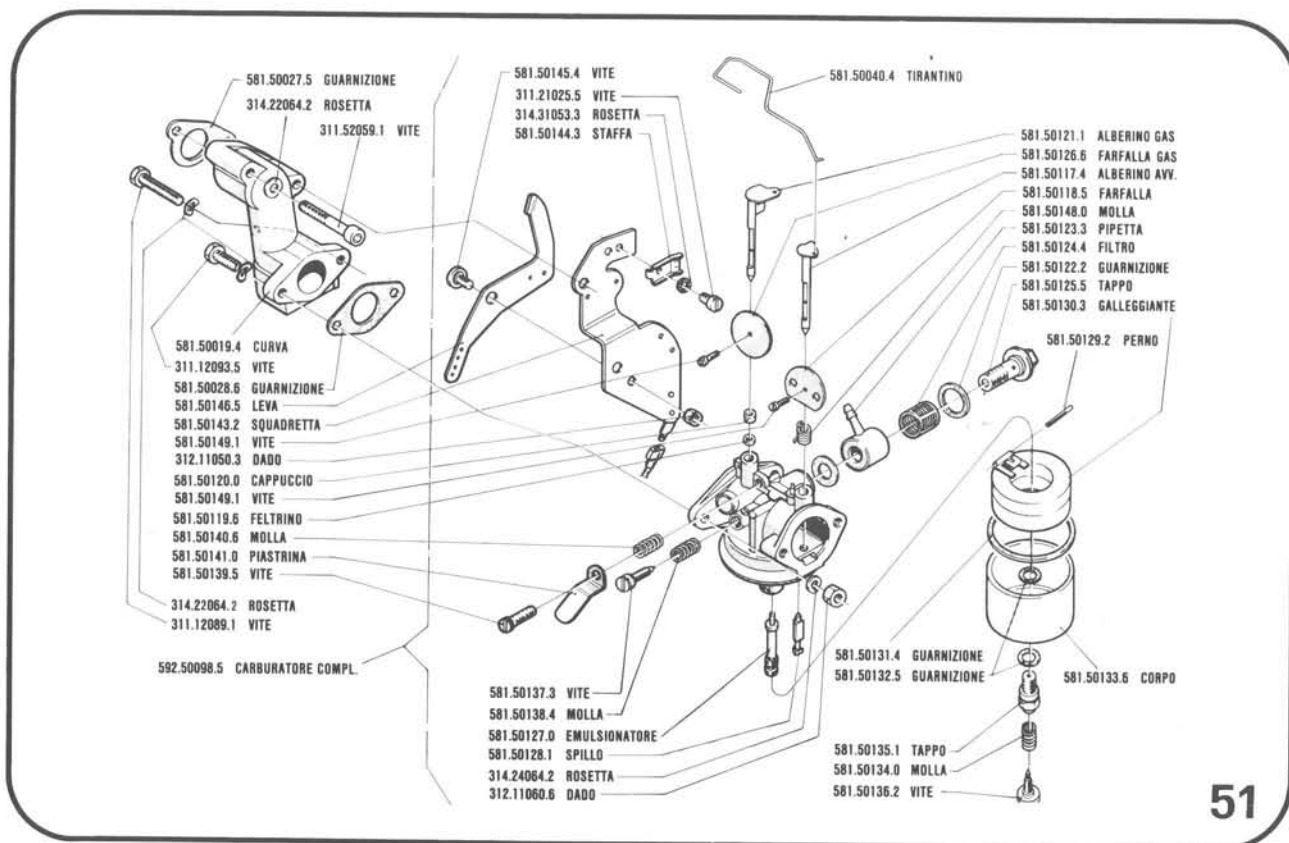
- Check that rotor 581.50154.6 placed in fly-wheel 581.50066.2 is not worn due to small stones or abrasive material. Also check the seat for key 343.11040.1.
- Check the outside high voltage coil 581.50151.3. Check the continuity of the primary winding and that the resistance between T and A is $0.8 \div 0.9$ ohm. Check the continuity of the secondary winding and that resistance between T and B is $4.500 \div 5000$ ohm (fig. 50)

- Check the continuity of the inside low voltage coil 581.50083.5.
- Check that condenser 581.50086.1 is efficient. If necessary, replace it. The capacity is $0.22 \pm$

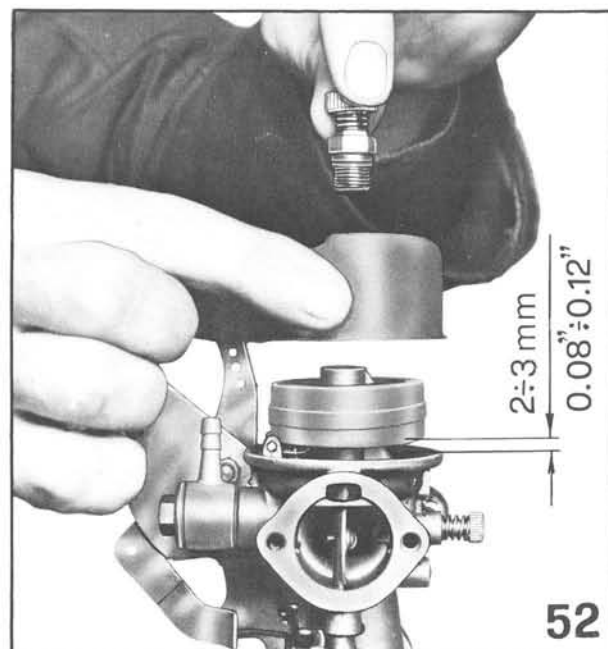
- 10% microfarad.
- Check that breaker contacts 581.50085.0 are clean and in good condition. If necessary adjust them (Operation 1.4.D)

1.2.M Carburetor (fig. 51)

- Remove and wash all parts of carburetor using a suitable solvent. Dry thoroughly using compressed air and make all checks.
- Check that the jet of diffuser 581.50127.0 is clean. Clean the hole, if necessary, with compressed air. Never use metal wires using.
- Check that shafts 581.50121.1 and 581.50117.4 have no excessive play.
- Check that needle valve 581.50128.1 fully closes and freely runs in its seat.
- Replace the defective or worn gaskets.

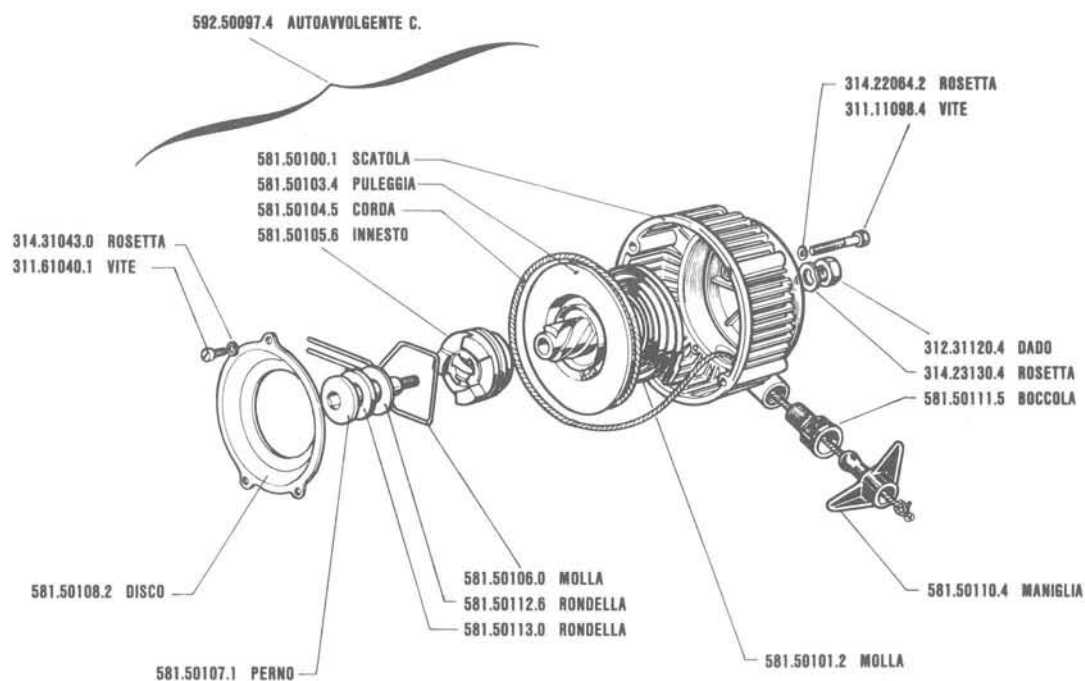


- Check the level in the float chamber measuring the indicated dimension. If necessary, bend the float tab connected with the needle valve (fig. 52).
- Check that float 581.50130.3 is not damaged or punctured.



1.2.N Recoil starter (fig. 53)

- Check the inside profile and the front teeth on coupling 581.50105.6.
- Check the helical profile of pulley 581.50103.4.
- Check the condition of rope 581.50104.5.
- Check the condition and efficiency of spring 581.50101.2.

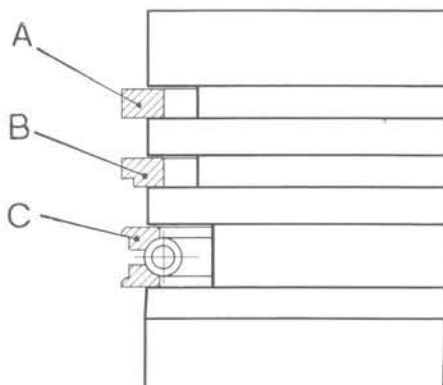


53

1.3 Assembly

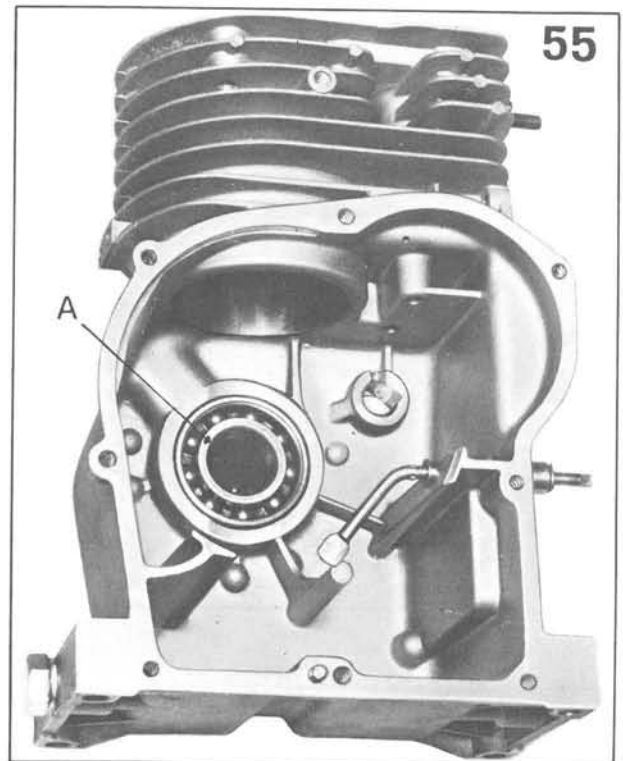
1.3.A Engine assembly

- Assemble piston C with the connecting rod D by means of pin B. Fit the circlips A and check they are in entirely in the groove (fig. 27)
- Assemble rings A and B and scraper ring C with spring according to the diagram in figure 54.



54

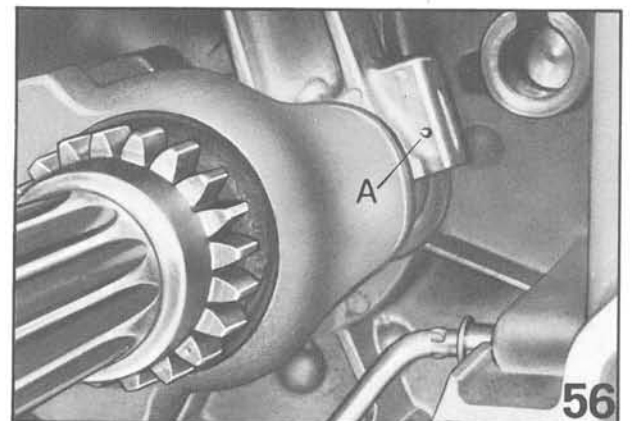
- Position the cylinder block with the open side up. Fit bearing A (fig. 55)
- Install the crankshaft A (fig. 26)



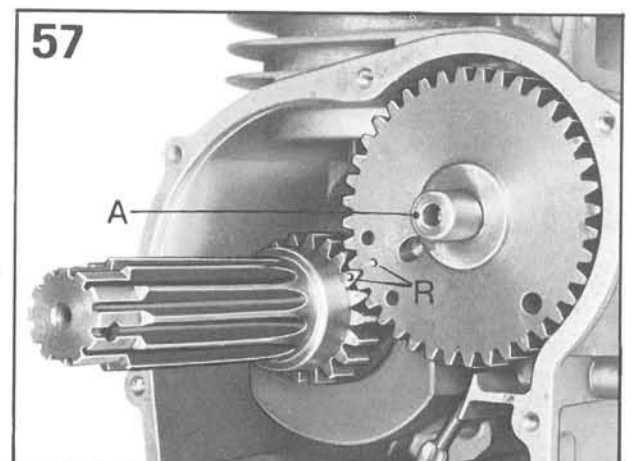
- Stagger the ring gaps at approximately 120° of each other, but not in the line with the piston pin. Lubricate the cylinder. Assemble the piston/connecting rod unit, onto the crankshaft pin. Install the rod with the dot mark A toward the open side of the block as shown in figure 56.
- Lubricate abundantly, fit the connecting rod cap B with the dots matching R as shown in the figure 24. Tighten screws A at the torque of 8 lbsxft. Bend the retainer plate edges (fig. 24).

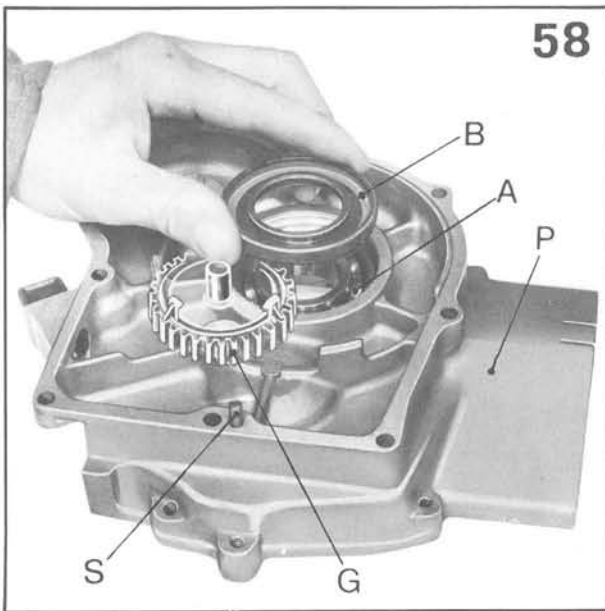
NOTE: over torquing the rod screws can deform the cap.

- Lubricate and fit tappets B (fig. 23).

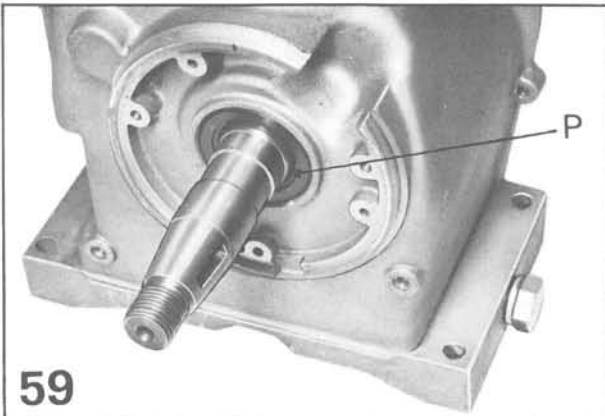


- Lubricate camshaft supports and fit the cam shaft A. The dots R must line up for the timing. In case of replacement of the crankshaft, or the camshaft or if references are missing, follow the timing operation (see 1.4.A) (Fig. 57).

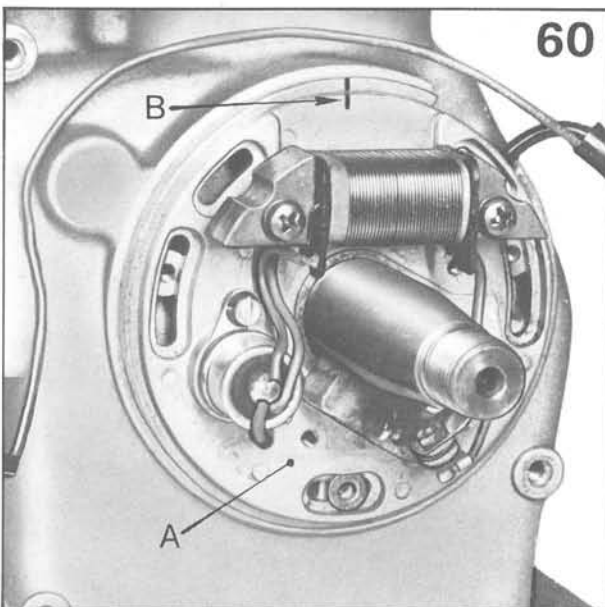




- Install the bearing A, oil seal B and dowel pin S on the timing cover (Fig. 58)
- Install speed governor G. Fasten it by its screw. Check that gear freely rotates on pin (fig. 58)
- Replace the gasket. Fit the cover on engine. The speed governor must engage with crankshaft.
Tighten the 8 screws V at the torque of 4.3 lbs. x ft. (fig. 19)
- Fit the valves, springs and plates. Fit retainers A. Check the tappet play (Operation 1.4.C) (Fig. 18)

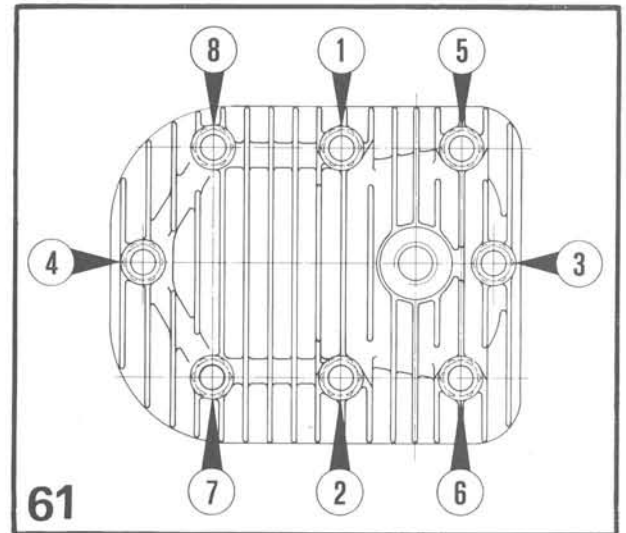


- Install a new oil seal P (fig. 59)

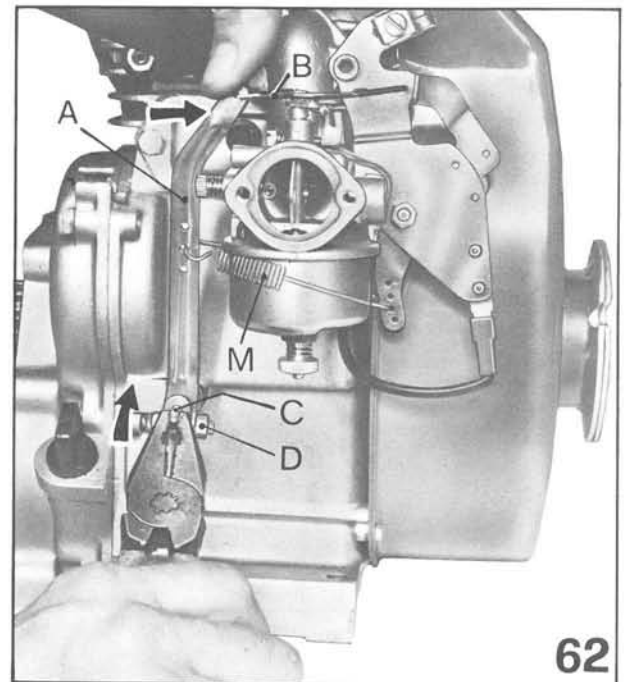


- Fit the felt ring and stator plate A. The references B for timing must coincide. In case of replacement of the cylinder block, of the stator plate or in case of reference missing, follow the ignition timing (Operation 1.4.B) (Fig. 60)
- Check the breaker contact play (Operation 1.4.D)
- Check the correct timing of ignition (Operation 1.4.B)
- Tighten screws F, fit ring D and cover E. Fit screws C. Fit the plate guard B. Tighten screws A (Fig. 14)
- Replace the gasket, install head C, housing B and fit screw A (fig. 16)

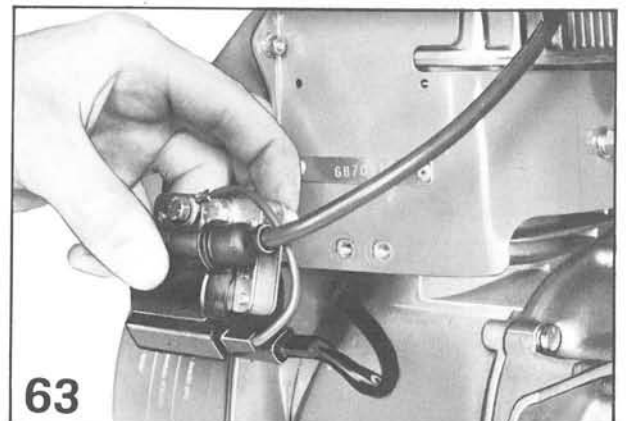
- Install the handlebar support (204) or the tank support (205). Tighten the fastening screws of the head at the torque of 14.5 lbs x ft. Tighten gradually in the given order (fig. 61)
- Fit gear A and fasten it by pin S (fig. 17)
- Set key and fit flywheel B (fig. 13)
- Tighten nut D at the torque of 72 lbs x ft. Fit the screen disc B, pulley A and screws V (fig. 12)
- Install the spark plug E and tighten it at the torque of 3 Kgm/29 Nm/22 lbs x ft. (fig. 11)
- Install breather D using the gaskets. Tighten not excessively screws C (fig. 11)
- Fit the cover B. Tighten bolts A (fig. 11)

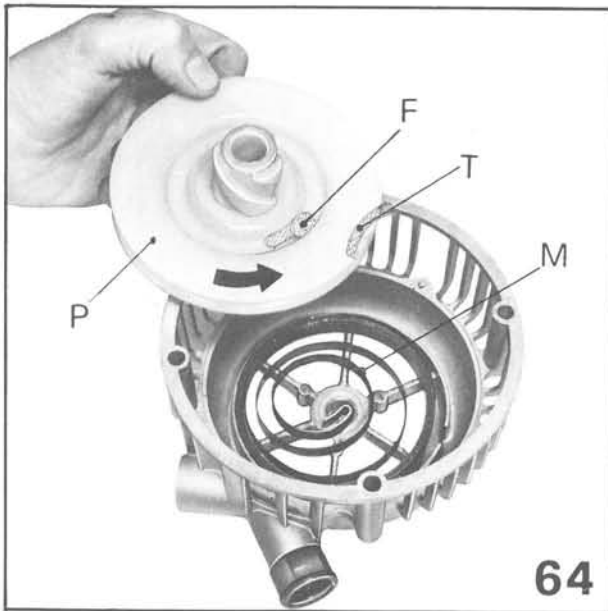


- Install a new gasket, fit silencer S, tighten nuts D (fig. 10)
- Install a new gasket, fit carburetor P, tighten Screws A and connect ground wire M (fig. 10)
- Connect lever A to tierod B and fit it on rod C without tightening bolt D. Rotate rod C completely clockwise. Pull up lever A until you open the throttle valve. Tighten bolt D. Hook spring M as shown in figure 62.
- Install a new gasket. Fit air filter F with its filtering sponge. Tighten screws A. Fit protection P and nuts D (fig. 9)



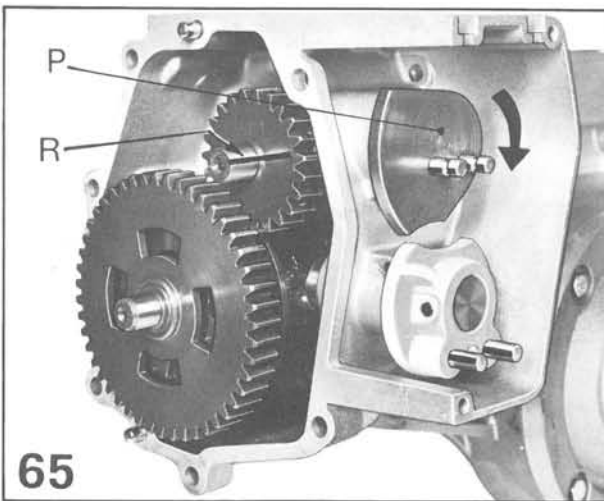
- Connect the electric connections to the coil as shown in figure 63.
- Fit coil D with the spacer. Tighten screws C (fig. 8)





- Wind up the rewind spring M and place it in the housing. Grease the spring. Slip the rope in the inside hole F of pulley P and knot it. Wind up in the direction indicated and stop it in notch T (fig. 64)
- Set pulley P into the rewind spring M (fig. 32)
- Fit slider S and pin P (fig. 30)
- Tighten nut D (fig. 29)
- Load rewind spring by rotating the pulley abt. three turns. Slip rope out. Fit handle A and fasten it with knot (fig. 28)
- Fit disc A. Tighten screws V (fig. 31)
- Fit spring M (fig. 30)
- Fit the recoil starter B on the engine. Tighten screws A (fig. 8)
- Fill the engine with oil. (See 0.2.B fuel and oil specifications)

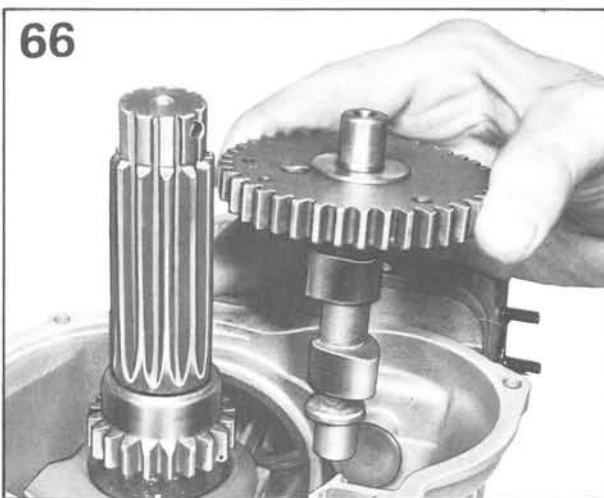
1.3.B Reassembling engine-gearbox



- Turn control pin P until you bring the sliding assembly of reverse speed R completely out, as shown in figure 65.
- Note the lower pins. Install a new gasket, approach the engine to the gearbox and rotate it slightly clockwise to engage gear A (fig. 7)
- Adjust the assembly of the main shaft B pulling it towards the engine (fig. 6)
- Tighten the 6 fastening screws A at the torque of 8 lbs x ft. (fig. 6)
- Refill the gearbox with oil (fig. 6) (See 0.2.B fuel and oil specifications)

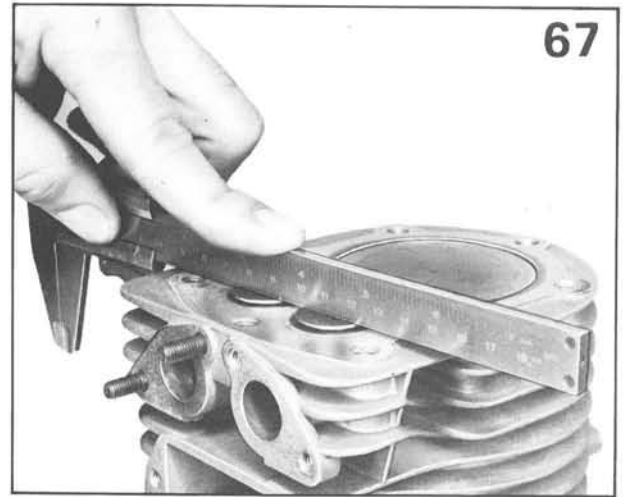
1.4 Adjustments and setting up

1.4.A Timing of timing system



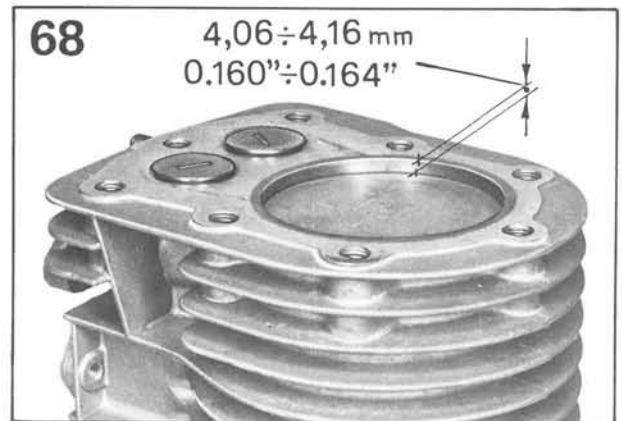
- With the marks R lined up as shown in the figure, the timing system is correct (fig. 57)
- Perform the following operations in case of replacement of the crankshaft or camshaft or if marks are missing.
- Set piston at Top Dead Center.
- Install the camshaft with the two cams as shown in figure 66.

- Temporarily install the side cover. Rotate the crankshaft one full turn and check that, with piston at Top Dead Center, the valves are both open approximately in the same distance (fig. 67)
- If distances are different, remove the camshaft and replace it turned one tooth on the crankshaft.

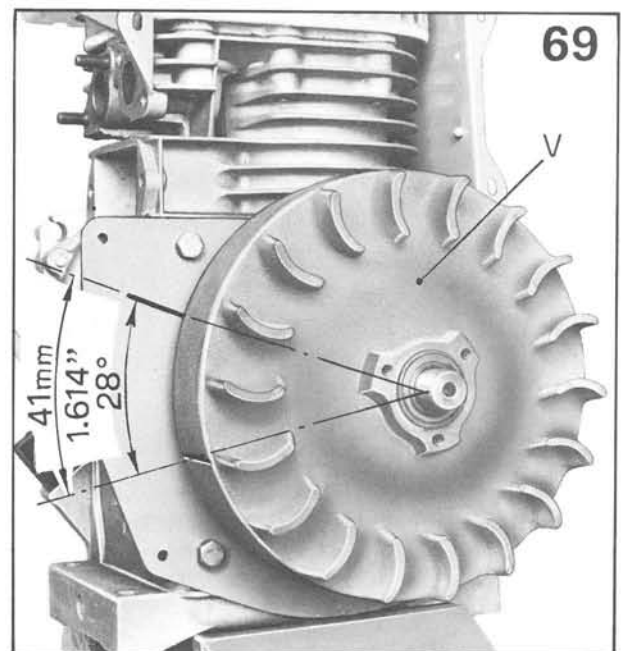


1.4.B Ignition timing

- With the marks B lined up as shown in figure, ignition is in timing (fig. 60)
- Perform the following operations in case of replacement of the cylinder block or of the stator plate or the timing marks are missing.
- Fit the stator plate A and align it as shown in figure 60.
- Check the play of the breaker contacts and adjust it, if necessary (Operation 1.4.D).
- If the head is disassembled, rotate the crankshaft until contacts are opening. Measure the dimension in the figure. Adjust the stator plate position until you obtain the indicated measure (fig. 68)



- If head is assembled, temporarily install the flywheel V. Bring piston to Top Dead Center. Mark a reference on flywheel and on the case. Rotate flywheel anticlockwise in comparison with the distance shown in figure. Remove the flywheel without moving the crankshaft from its position and fasten the stator plate in such a way that contacts are going to open (fig. 69)



1.4.C Valve play adjustment

- With cold engine and tappets at rest, the play G must be of 0.25 mm / 0.01" for intake and 0.30 mm / 0.012" for exhaust (fig. 70)
- In case of excess play, mill the valve seat (see 1.2.B).
- In case of lower play, carefully grind the valve stem ends as much as necessary.

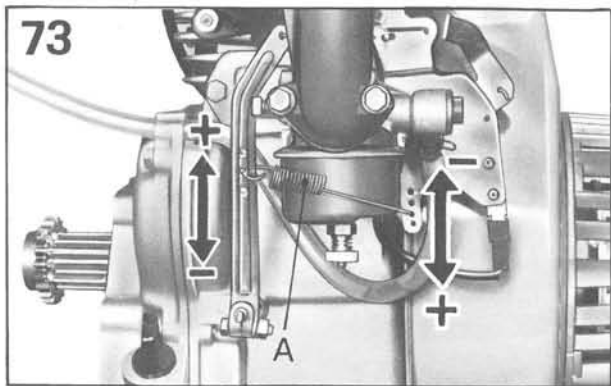
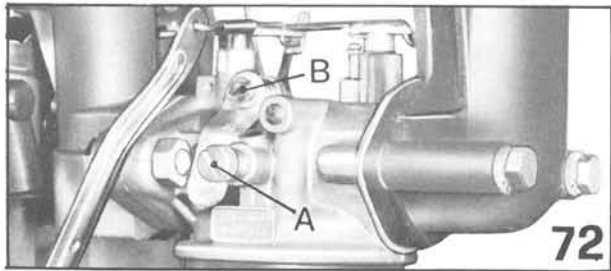
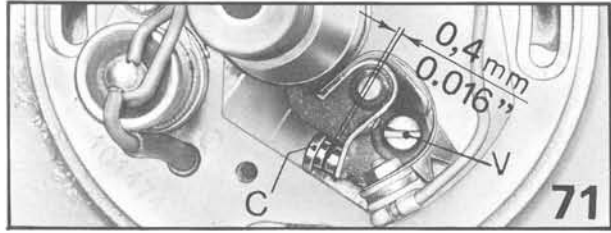
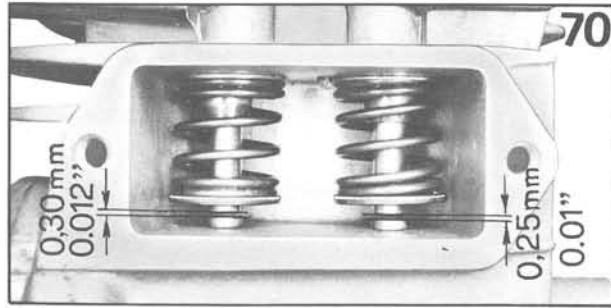
1.4.D Contact breaker play adjustment

- Adjust breaker points to .016" (fig. 71)
- For adjustment loosen screw V and move contact C as much as necessary (fig. 71)
- Tighten the lock screw V (fig. 71)
- After the adjustment, clean the contacts.

1.4.E Carburetor and speed governor adjustment

- Gently seat screw A. Unscrew 3/4 turn (fig. 72)
- Start the engine and adjust screw B until, with the accelerator at idle, engine rotates at abt. 1.000 rpm (fig. 72)
- Let engine run at idle until it is warmed up.
- Adjust the position of screw A until the running is as smooth as possible. Check the minimum speed and adjust screw B if necessary (fig. 72)

- Check that with the accelerator at maximum the r.p.m. of engine is 3500 - 3600 rpm.
- If necessary, move spring A into the indicated holes to change the r.p.m. (fig. 73)



1.4.F Breaking-in

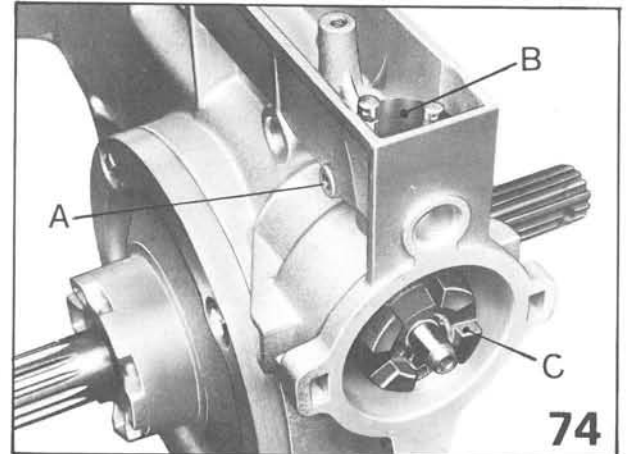
- Let engine run for abt. 10 minutes. Let it cool down. Check and adjust the torque of the head screws (fig. 61) (See 1.3.A).
- During the first 10 hours of running avoid keeping engine at high load and r.p.m. for a long time.
- During the first hours of running frequently check the oil level in order to insure that there are no losses or abnormal consumptions.
- After the first hours of running check bolt and nut tightening torques.

2. MACHINE

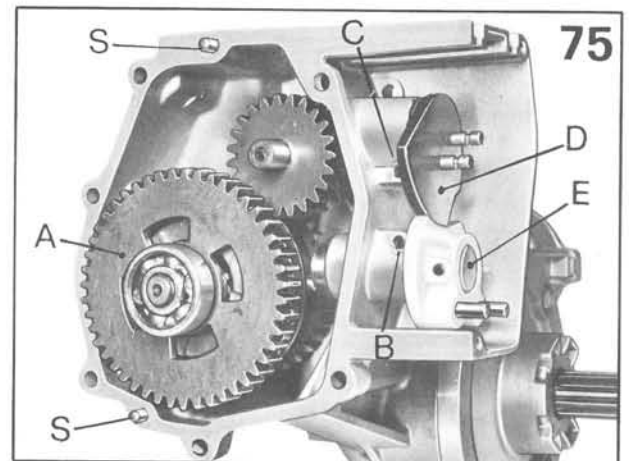
2.1 Gearbox

2.1.A Gearbox removal

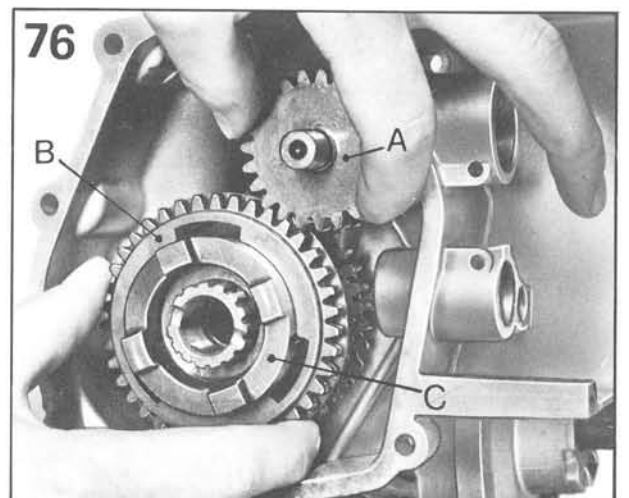
- Separate engine from gearbox (Operation 1.1.A).
- Remove pin A, take out pin B, remove coupling C with its sliding block (fig. 74)

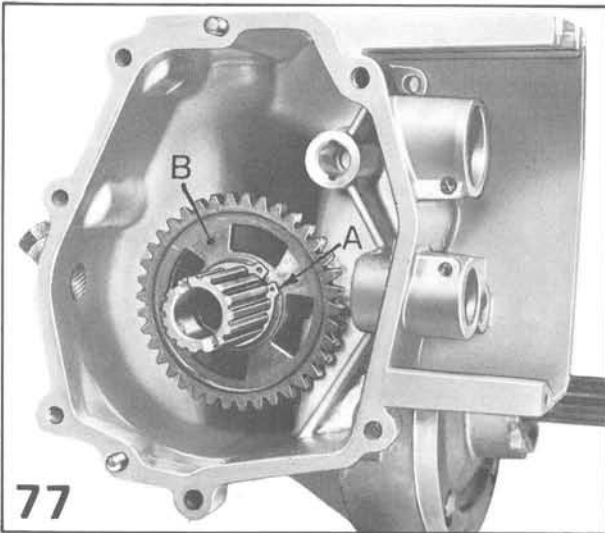


- Extract shaft A and washer (fig. 75)
- Remove pins B and C. Extract pins D and E with their sliding blocks, the spring and ball (fig. 75)

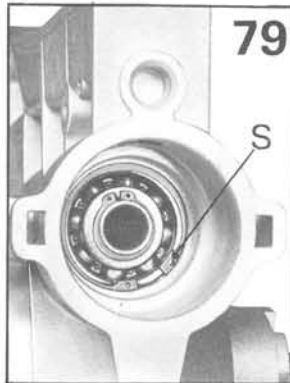
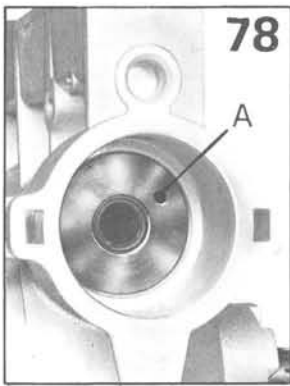


- Extract gears A and B (fig. 76)
- Extract hub C (fig. 76)

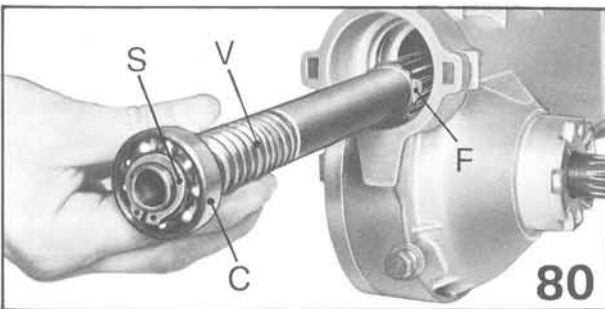




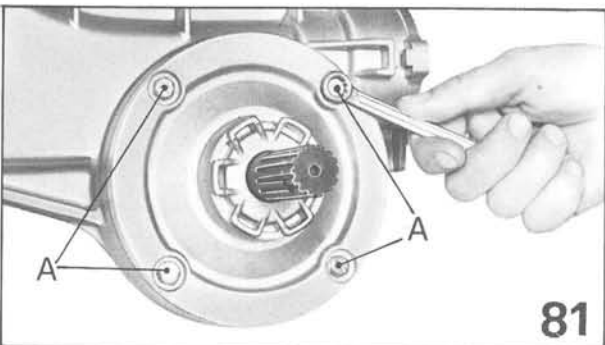
- Remove circlip A, the washer and extract gear B (fig. 77)



- Remove oil seal A (fig. 78)
- Remove circlip S (fig. 79)

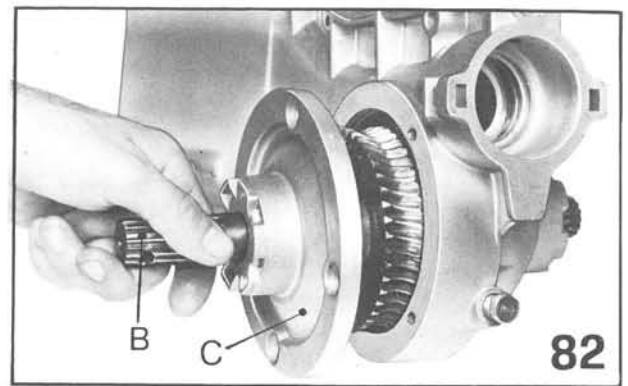


- Position the shoulder F as shown and remove worm screw V from PTO side (fig. 80)



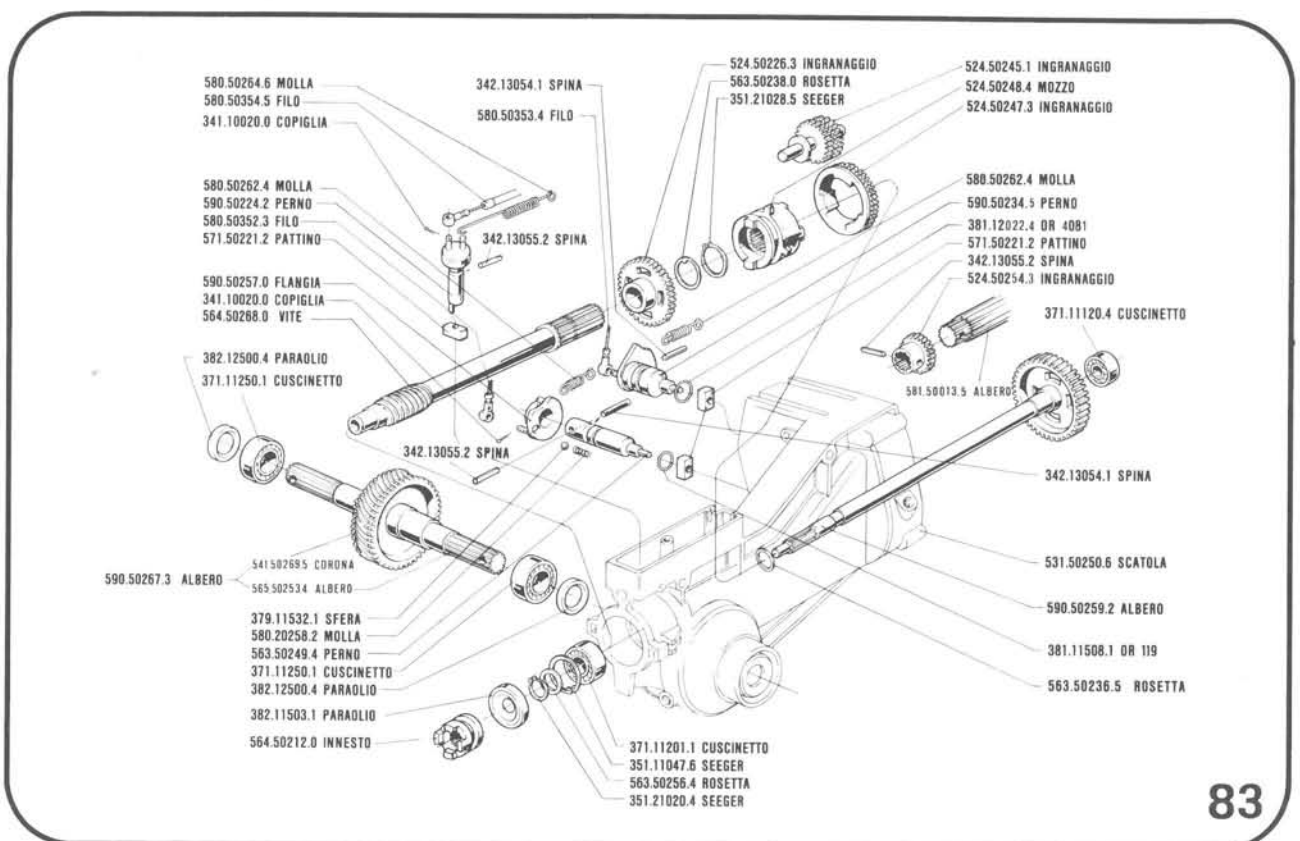
- Unscrew screws A (fig. 81)

— Remove shaft B and cover C (fig. 82)



2.1.B Gearbox overhauling

Make following checks and replace any worn parts (fig. 83):



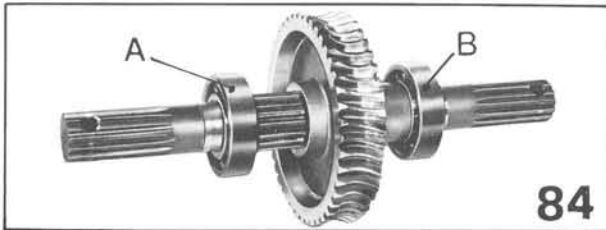
- Check the wear of pin 590.50224.2 at the shank and slot for pin. Make sure there is no play in the pressed stakes.
- Check slider 571.50221.2
- Check that springs 580.50264.6 and 580.50262.4 are not stretched.

- Check pins 590.50234.5 and 563.50249.4. Check to insure pins are tight.
- Check that the flange in plastic material 590.50527.0 has no play on pin 563.50249.4. If necessary remove pin and replace flange.

- Check shaft 590.50259.2 on the gear teeth and on spline. Also check the reconditioned seats, which must not present any scoring, seizing or abnormal heating sign.
- Check teeth and the side seats on gear 524.50245.1.
- Check teeth, the inside reconditioned seat and the coupling slots on gear 524.50247.3
- Check broaching and the coupling teeth on hub 524.50248.4. Check the outside reconditioned seat which must not present any scoring or excessive wear.
- Check the teeth and the coupling slots of gear 524.50226.3.
- Check washer 563.50238.0. Check the condi-

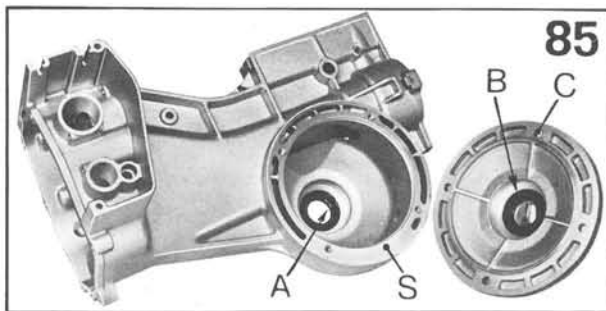
tion of the pawl.

- Check the wear of worm screw 564.50268.0. Check the spline and the inside and outside reconditioned seats, which must not present any scoring or seizing sign.
- Check the broaching and front teeth on coupling 564.50212.0.
- Check washer 563.50256.4.
- Check shaft 590.50267.3 (204) or 590.50270.6 (205). Check the wear of the bronze gear and its fit on shaft. Check that splines have no signs of dents, wear or deformation and that holes are not ovalized.
- Check the condition of bearings 371.11120.4, 371.11201.1 and 371.11250.1.

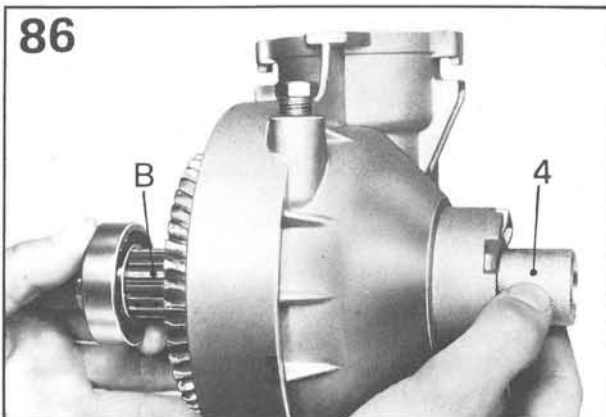


2.1.C Gearbox assembly

- Assemble bearings A and B (fig. 84)

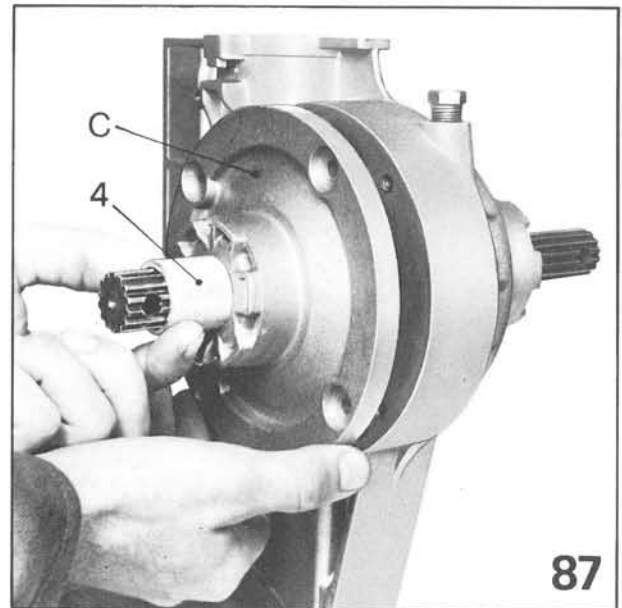


- Insert new oil seals A and B on box S and cover C (fig. 85)

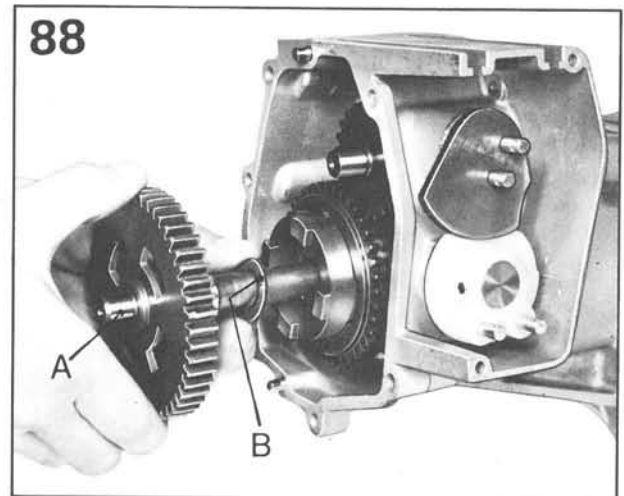


- Place guard No. 4 on oil seal and insert shaft B (fig. 86)

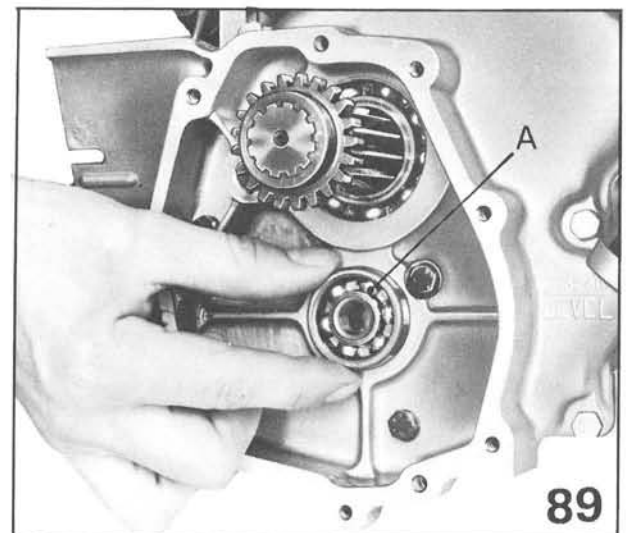
- Place guard No. 4 on oil seal. Replace the original gasket and install cover C (fig. 87)
- Tighten screws A at the torque of 8 Lbs x ft. (fig. 81)
- Fit bearing C on the worm screw V and fasten it with the washer and circlip S (fig. 80)
- Fit worm screw V from P.T.O. side. Orientate it in order to introduce the shoulder F into the box (fig. 80)
- Fit a new oil seal A (fig. 78)
- Put *antifriction grease* on the worm screw spline, fit gear B, the washer with its detent and circlip A (fig. 77)
- Verify that slider freely slides in the slot of hub C, then introduce the hub into its seat (fig. 76)



- Set the detent ball with its spring, fit pin E with its slider and fasten it with pin B (fig. 75)
- Be sure that slider freely slides in the slot of the Reverse Speed gear A. Put *antifriction grease* on the outside surface of hub C and the seats of gear A. Fit in its seat the whole reverse speed assembly formed by gears A and B (fig. 76)
- Fit pin D with its slider and fasten it with pin C (fig. 75)
- Put *antifriction grease* on spline and seats. Introduce shoulder washer B and fit shaft A. Do not damage the oil seal at PTO side (fig. 88)



- Check that slider slides easily in the groove of coupling C. Fit the coupling and slider, fit pin B and set pin A (fig. 74)
- Fit bearing A on the engine cover (fig. 89)
- Fit the centering pins S (fig. 75)
- Assemble the engine on gearbox (Operation 1.3.B)



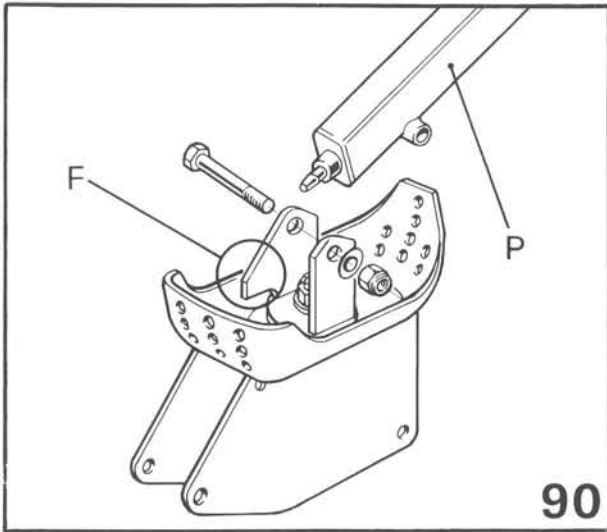
2.1.D Control adjustment

Accelerator control

- Put the lever on handlebar in START position
- Check on carburetor that the lever of choke S is at the end of stroke (fig. 5)
- If it is not loosen clamp B and let slide sheath C as much as necessary. Lock clamp B (fig. 5)
- Start the engine and check that it stops when you bring the accelerator lever to the stop position.

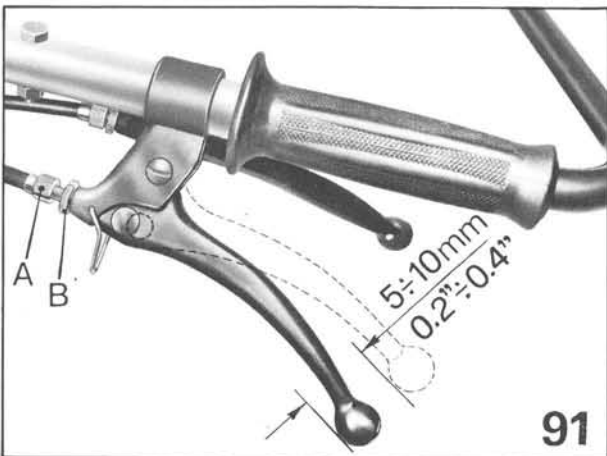
Handlebar 205

- Fit the handlebar column P and the detent wing F in the position shown in figure 90.



P.T.O. Control

- Set adjustment A after having loosened the lock nut B, so that the lever has freeplay as shown in figure 91.
- Check that lever freely moves through the whole stroke



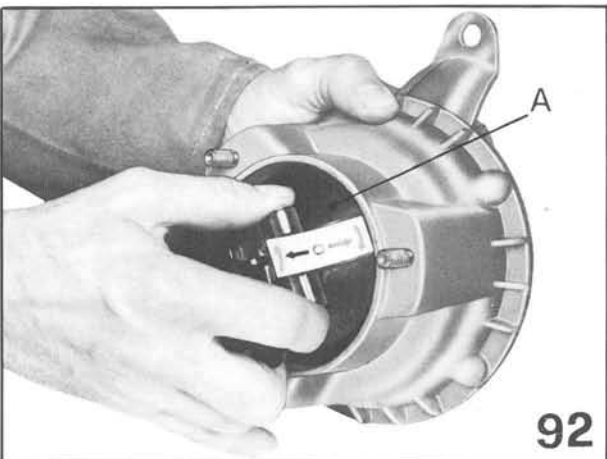
Gearbox controls

- Set adjustment A after having loosened the lock nut B so that the levers have the freeplay as shown in figure 91.
- Start the engine. Check that gears engage regularly and that levers can make the whole stroke.
- Check that the simultaneous engagement of reverse speed and one forward speed is not possible.

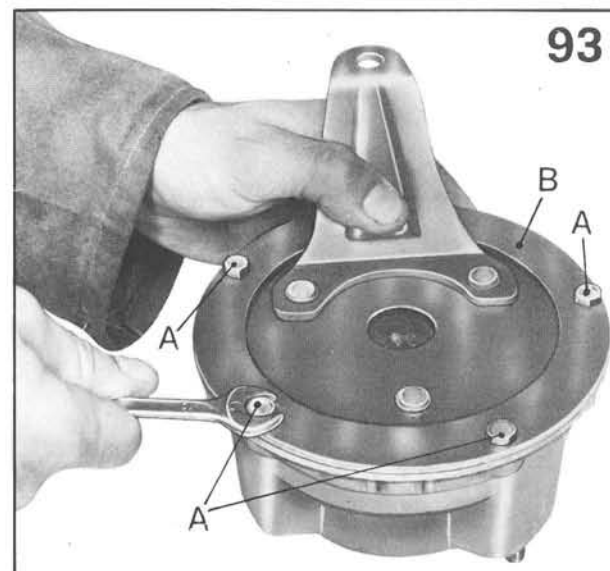
2.2 Reverser-Reducer 205

2.2.A Reverser-Reducer removal 205

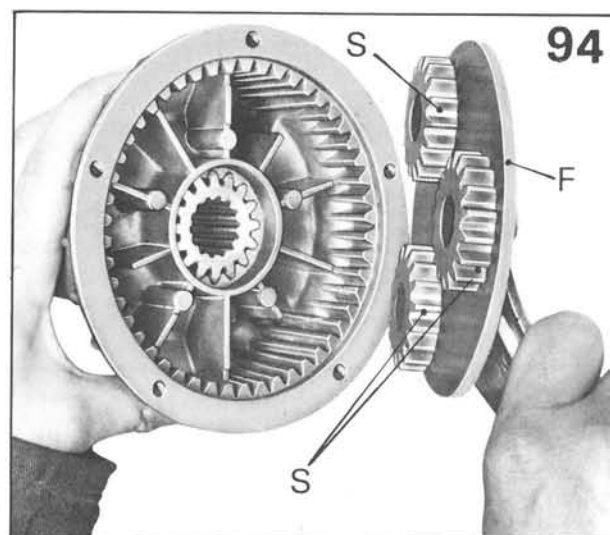
- Remove cap A by pulling it outside (fig. 92)



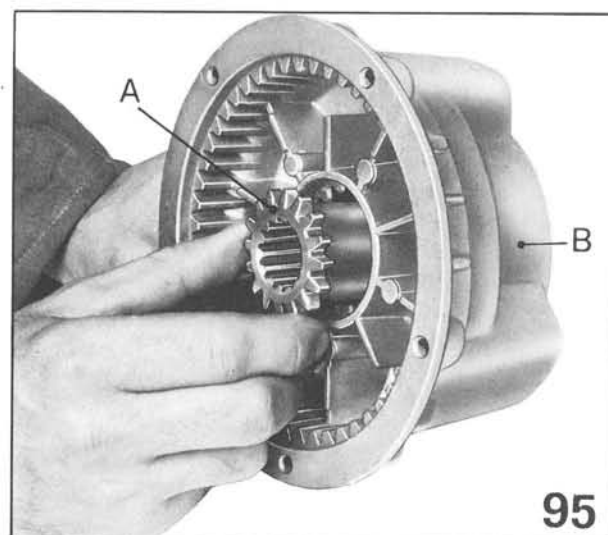
- Unscrew screws A, remove circlip B (fig. 93)



- Remove the planetary gear-holder flange F and separate the planetary gears S (fig. 94)

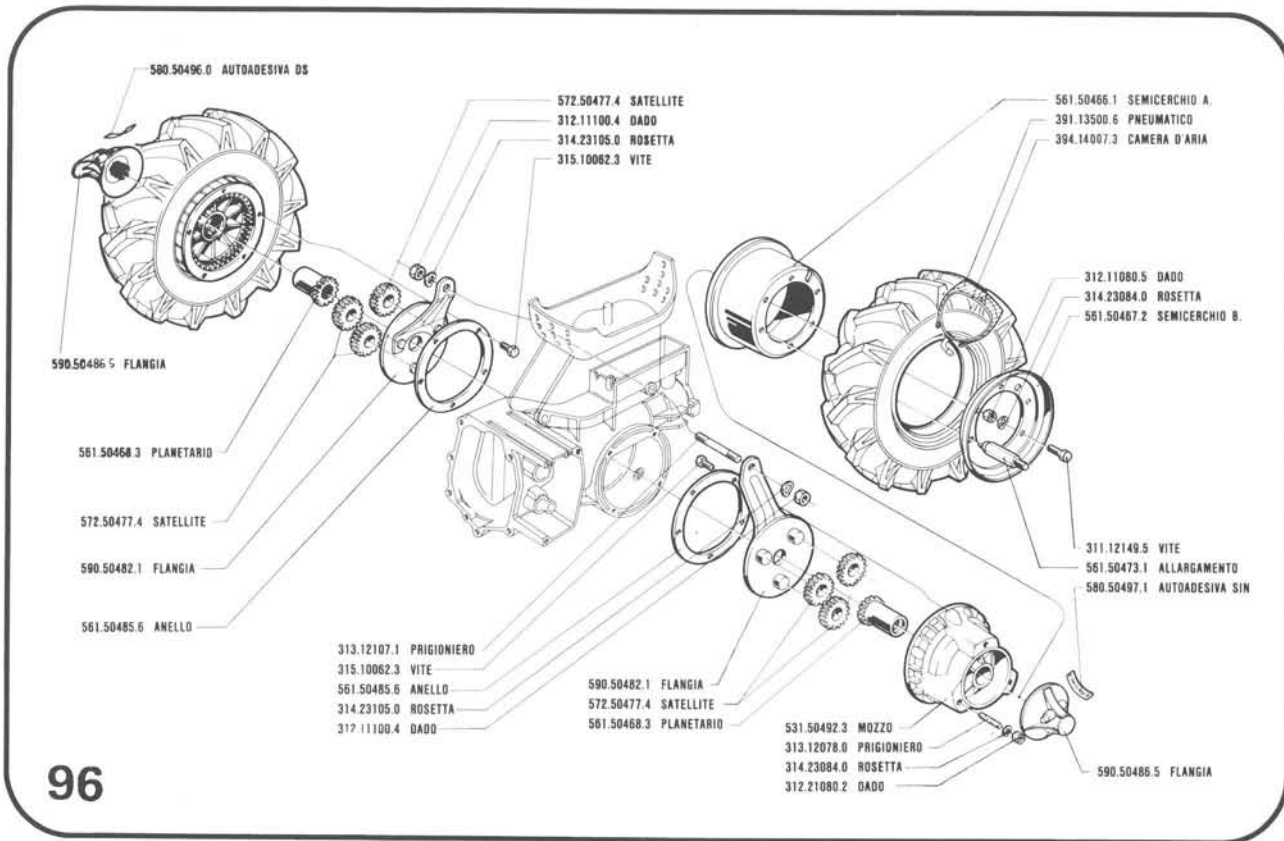


- Remove crown wheel A (fig. 95)



2.2.B Reverser-Reducer overhauling for 205

Make following checks and replace any worn part (fig. 96):



96

- Check hub 531.50492.3. The inside teeth must be perfect and must not have any excessive wear. Check that the central hole is not elongated.
- Check that the push button on flange 590.50486.5 freely slides and is not worn inside. Check that the teeth with click coupling to crown wheel are not broken.
- Check outside teeth and broaching on crown wheel 561.50468.3.
- Check the teeth of crown wheels 572.50477.4. The inside hole must not be worn or elongated.
- Check that the pins riveted on flange 590.50482.1 have no play.

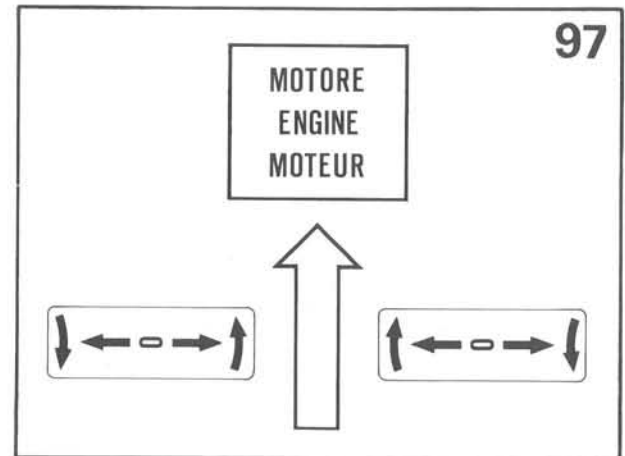
2.2.C Reverser-Reducer assembly 205

- Grease the coupling surface and install crown wheel A into hub B (fig. 95)
- Fit planetary gears S on flange F. Grease abundantly and fit on hub (fig. 94)
- Fit ring B and tighten screws A (fig. 93)

NOTE: screws are self-threading when replacing the hub use self-threading screws.

- Fit flange A and press it into the crown wheel (fig. 92)

NOTE: Set the assembly position of wheels as instructed in the self-adhesive label on the control flange of the reducer/reverser (fig. 97)

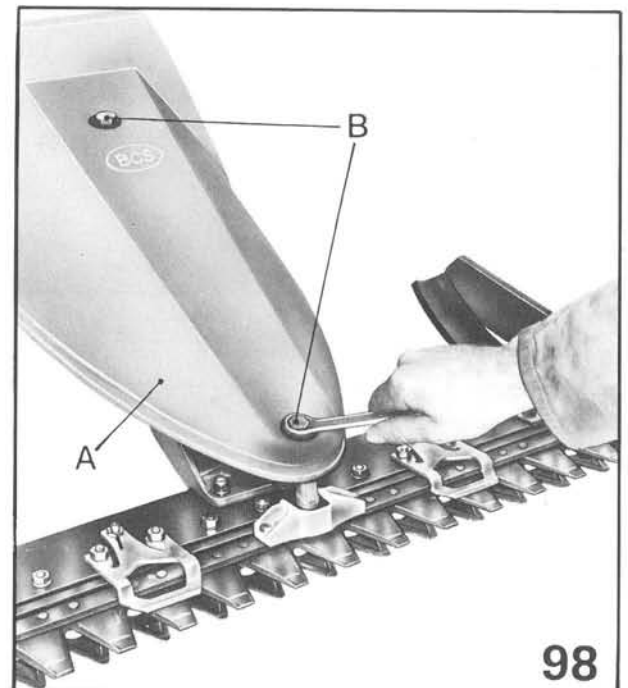


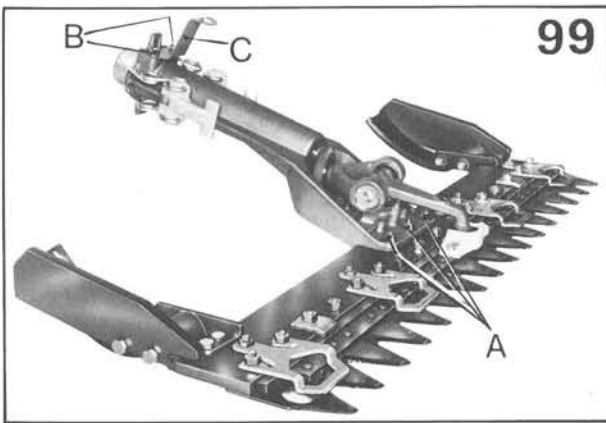
3. IMPLEMENTS

3.1 Cutter bar

3.1.A Blade control removal

- Remove the oscillating protector A by removing bolts B (fig. 98)

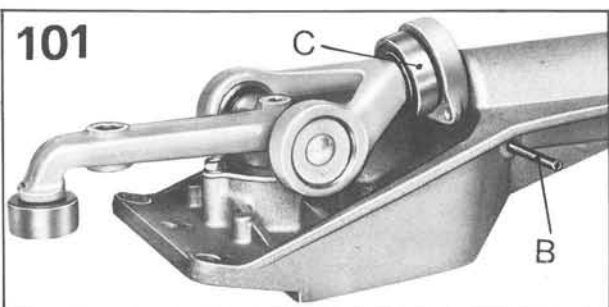




- Remove bolts A and separate the cutter bar from the blade control assembly (fig. 99)
- Remove screws B and coupling C (fig. 99)

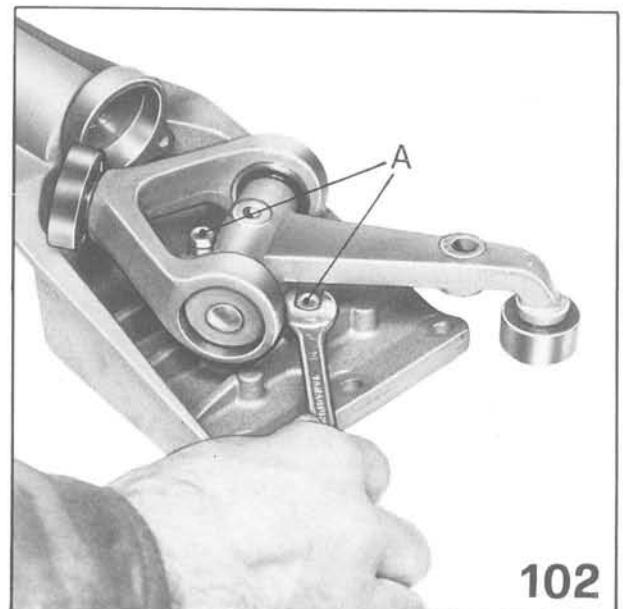


- By working through the support hole, remove the pin and extract coupling A (fig. 100)

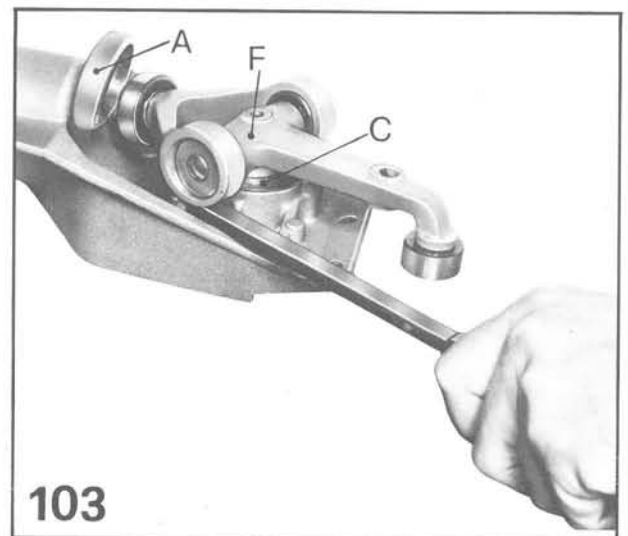


- Remove pin B (fig. 101)
- Line up eccentric shaft as shown in the figure and bring it back until bearing C is free (fig. 101)

- Unscrew screws A (fig. 102)



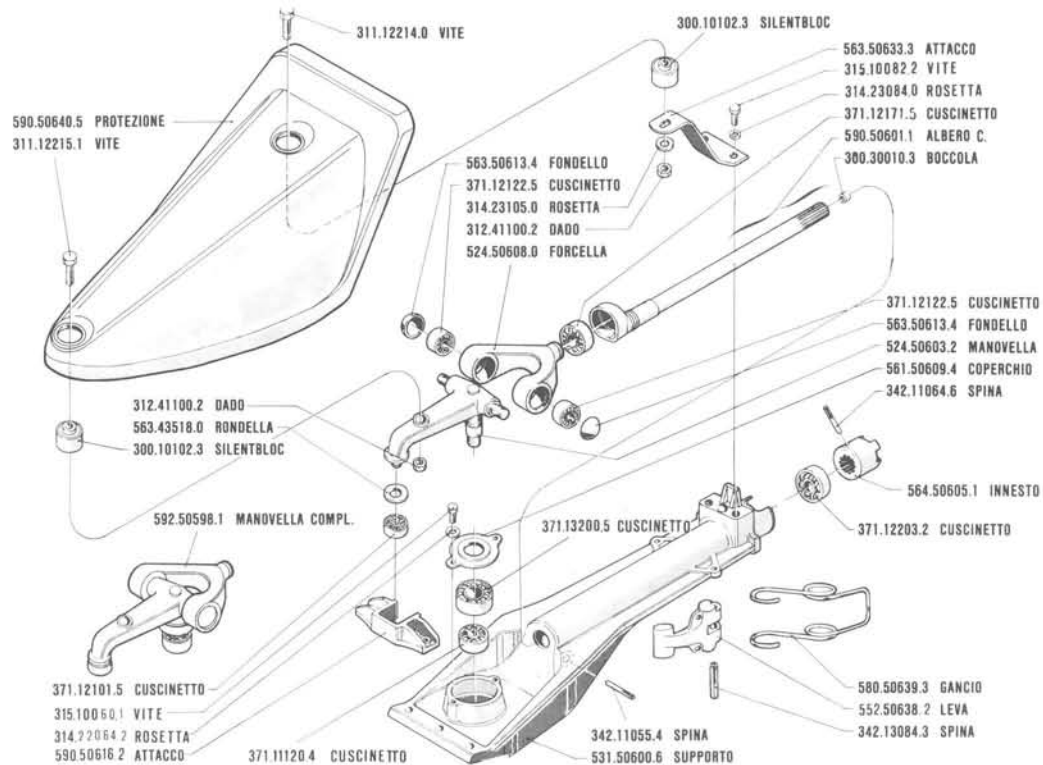
- Remove the fork-crank assembly F and eccentric shaft A (fig. 103)



3.1.B Blade control overhauling

Make following checks and replace any worn parts (fig. 104):

- Check the condition of bearings on the fork-crank assembly.
If you find any damage replace the full crank 592.50598.1.
- Check the broaching and the front teeth on coupling 584.50605.1.
- Check the spline and the condition of the bushing on shaft 590.50601.1.
- Check that there are no cracks or deformations in the oscillating protection 590.50640.5.
- Check the condition of isolators 300.10102.3.
- Check that hooks 580.50639.3 are not stretched and that they can assure a perfect connection between machine and implement. Check the condition of levers 552.50638.2. If necessary, remove pins 342.13084.3. Orientate the hook in comparison with the lever and widen it until both parts are separated.
- Check the condition of bearings 311.12171.5 and 371.12203.2.



104

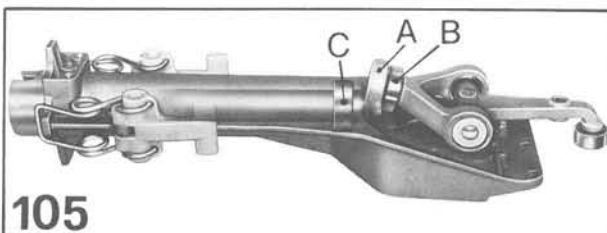
3.1.C Blade control assembly

- Set in its seat shaft A with bushing (fig. 103)
- Install fork-crank assembly F with bearings and cover C (fig. 103)
- Tighten screws A (fig. 102)

NOTE: screws are self-threading. When replacing the cutter bar support, use self-threading screws.

- Introduce bearing C, set eccentric shaft A as shown in the figure and fit simultaneously bearings C and B.

Tap on the inside ring of bearing C with a pipe of suitable sizes (fig. 105)



105

- Set pin B (fig. 101)
- Fit coupling A and fasten it with the pin from the hole on support (fig. 100)
- Fit coupling C and tighten screws B (fig. 99)

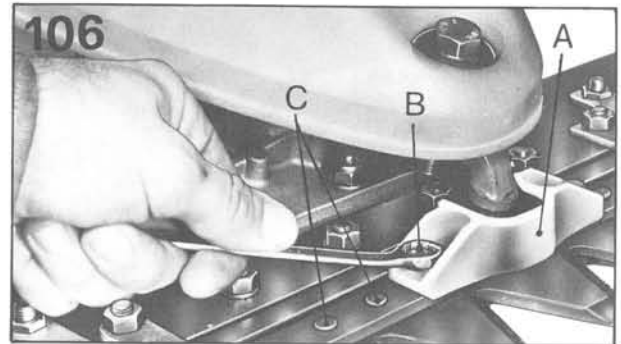
NOTE: screws are self-threading. When replacing the cutter bar support, use self-threading screws.

- Fit the cutter bar to the blade control assembly. Tighten bolts A at the torque of 18 lbs x ft. (fig. 99)
- Fit the oscillating protection A. Tighten bolts B at the torque of 37 lbs x ft. (fig. 98)

3.1.D Cutter bar adjustment

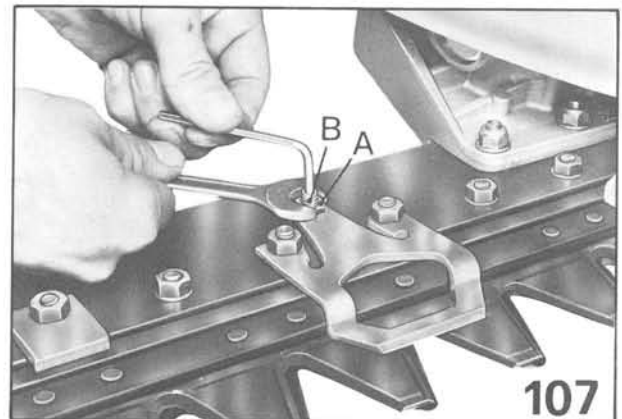
Blade sharpening

- Withdraw the blade from the cutter bar by removing the blade coupling A fastened with the screws B (fig. 106)
- Check the fastening of rivets C (fig. 106)
- Grind the blade with an abrasive stone on the higher side of the fingers.
- Install the blade and tighten the screws B (fig. 106)



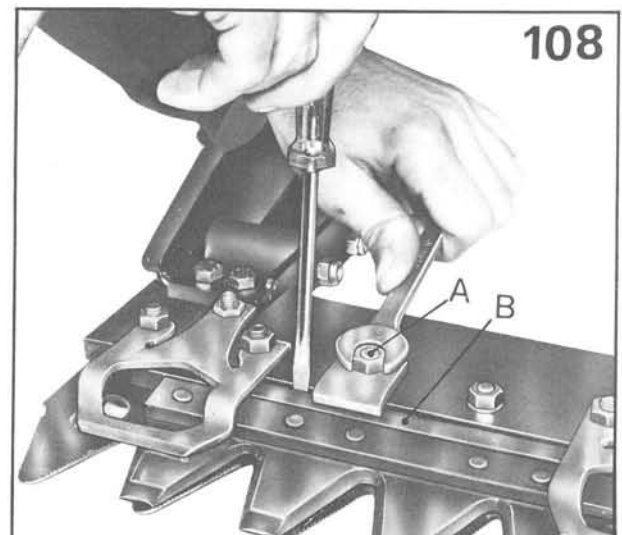
Blade holder adjustment

- Loosen lock nut A (fig. 107)
- Adjust the setscrew B so that blades ride perfectly on fingers. Do not tighten too much to avoid the blade binding (fig. 107)
- Tighten lock nut A (fig. 107)



Wear strip adjustment

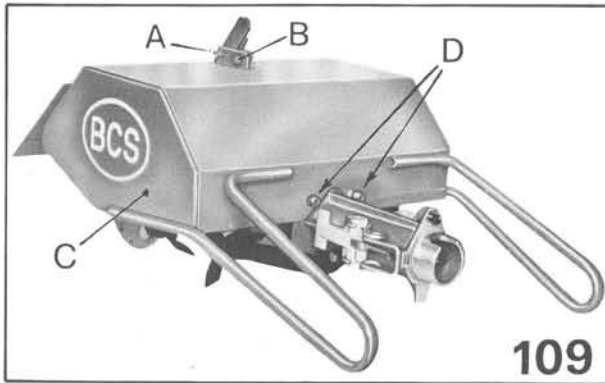
- Loosen the screws of the strip holders A (fig. 108)
- Adjust the blade clearance by moving forward strip B (fig. 108)



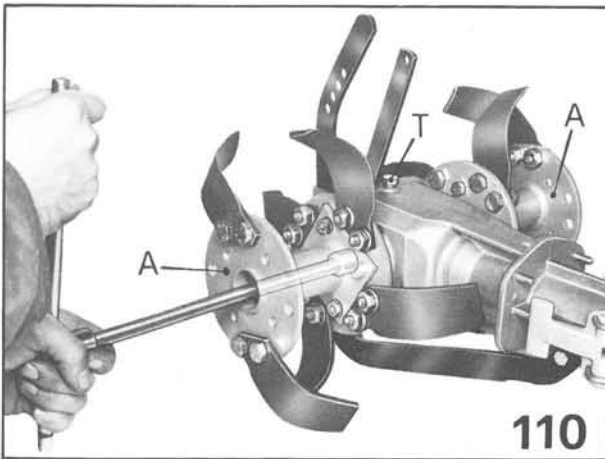
3.2 Rear rotary hoe

3.2.A Rear rotary hoe removal

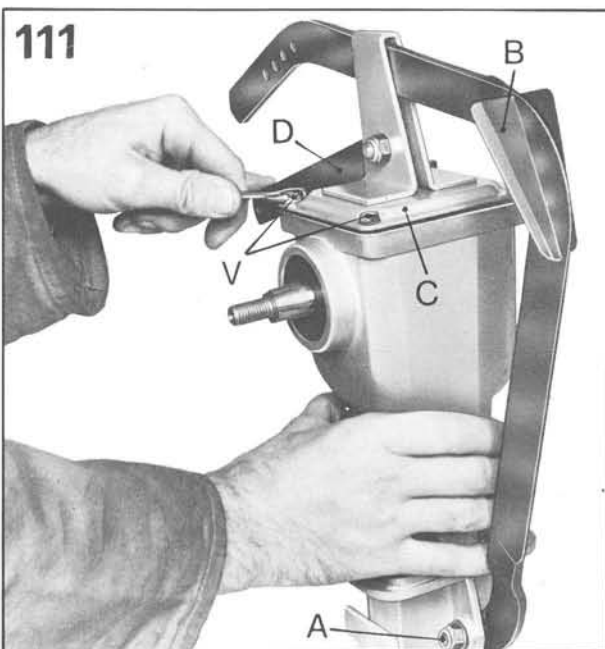
- Remove pin A, bolt B and unscrew nuts D. Remove cover C with its flap (fig. 109)



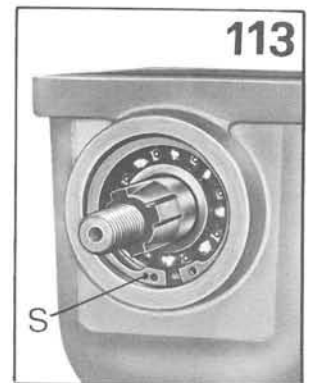
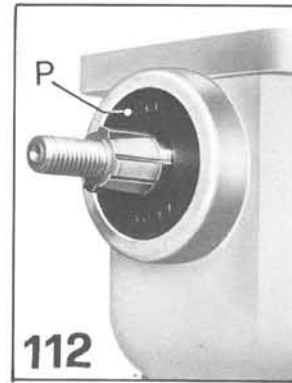
- Unscrew the fastening nuts and remove the blade holder assemblies A. Tap slightly to free the flanges from cone (fig. 110)



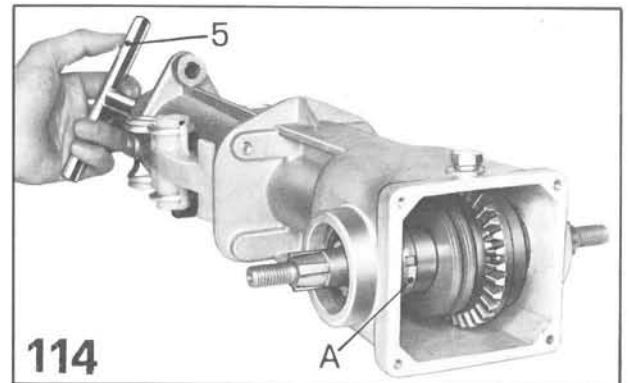
- Remove bolt A, the central knife B. Unscrew screws V and remove cover C with the support rod D. Drain oil (fig. 111)



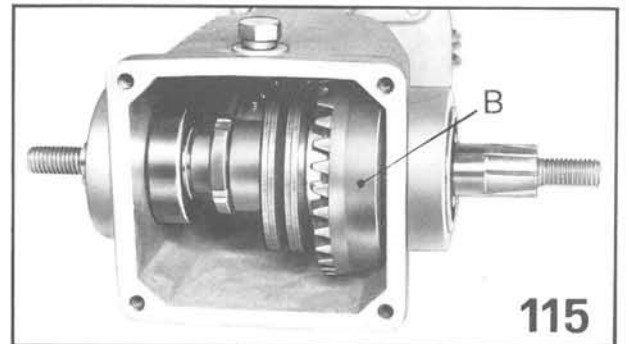
- Remove oil seals P (one each side) (fig. 112)
- Remove circlips S (one each side) (fig. 113)



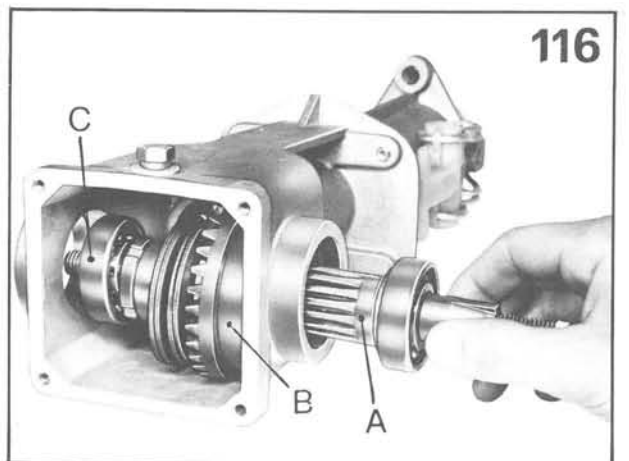
- Lock the rotation of the bevel gear with wrench No. 5. Unscrew ring nut A (right thread) (fig. 114)

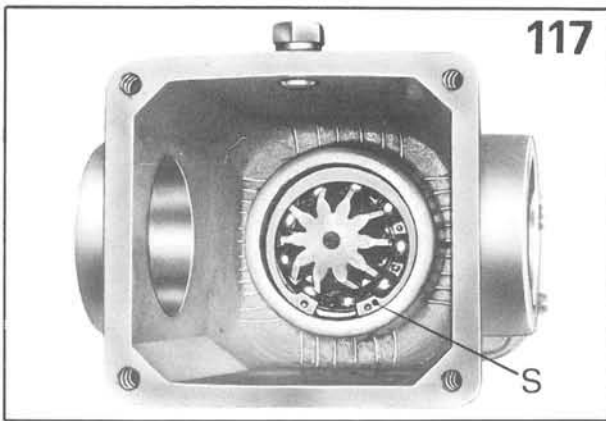


- Press on bearing from the side opposite the ring bevel gear B until it is against the rotary hoe body (fig. 115)

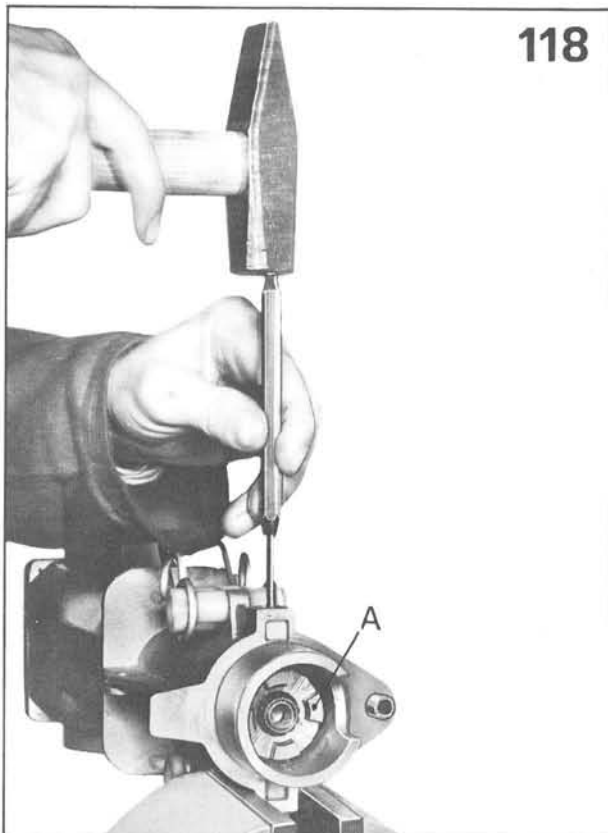


- Pull the knife holder A until bearing C is free. Remove bevel gear B and the spring drive mechanism (fig. 116)

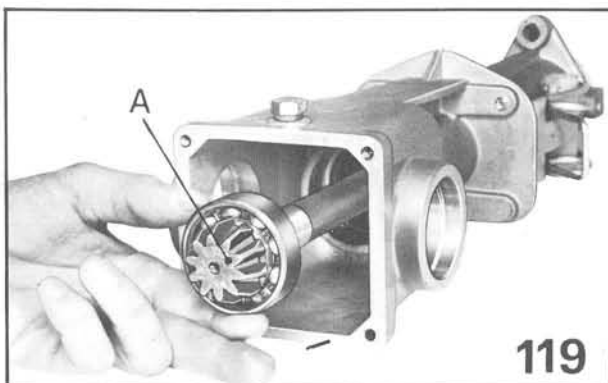




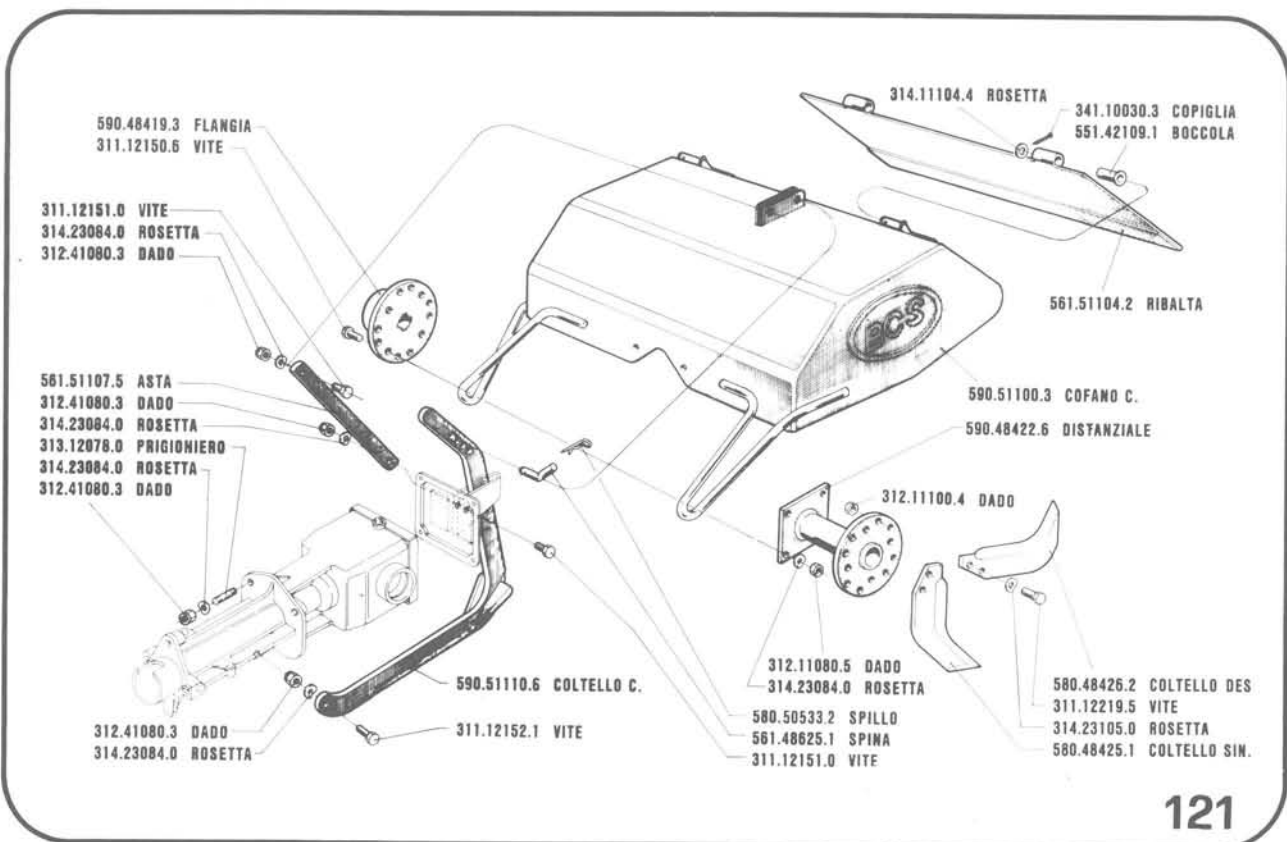
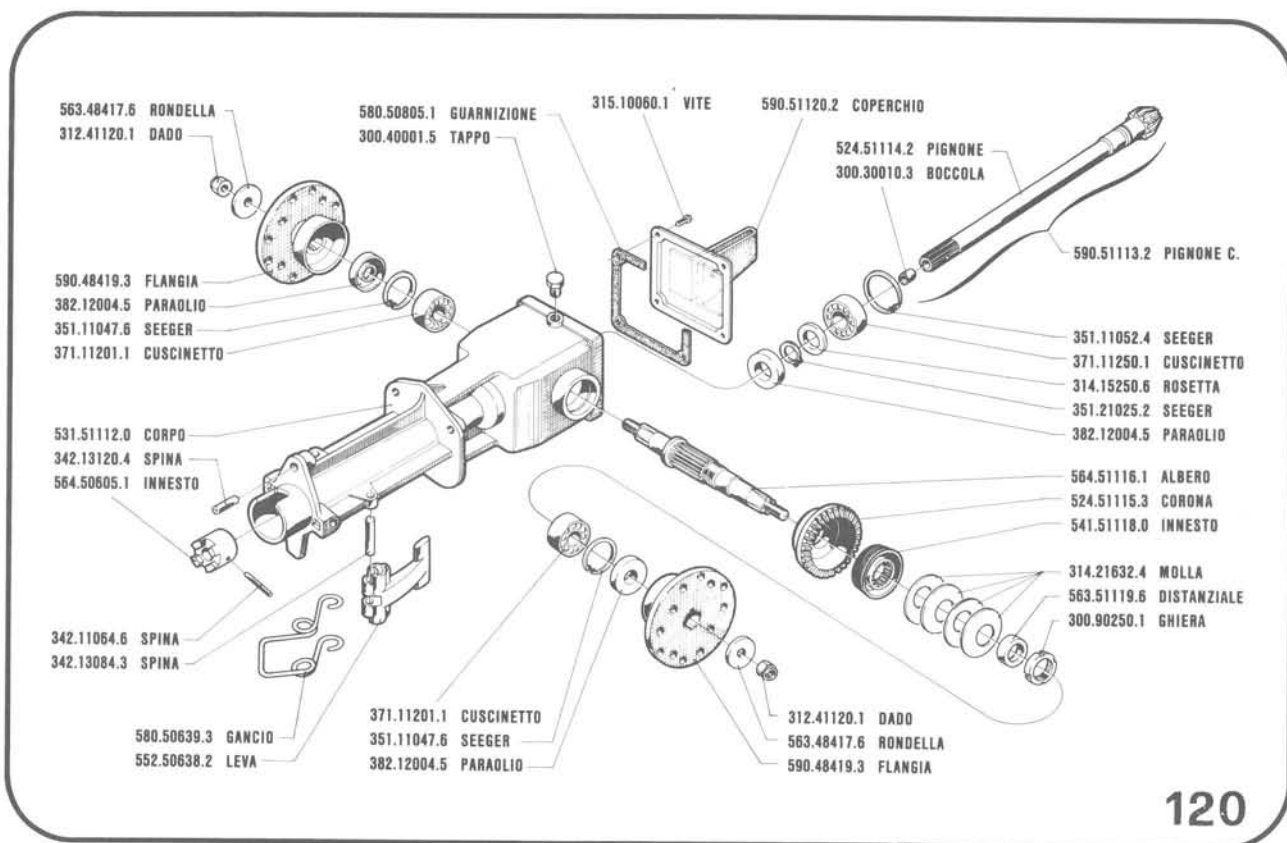
— Remove circlip S (fig. 117)



— Remove pin from the hole on the rotary hoe assembly. Remove coupling A (fig. 118)



— Remove shaft A (fig. 119)

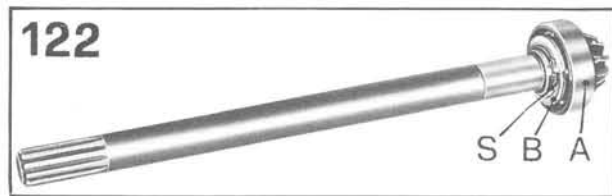


3.2.B Rear rotary hoe overhauling

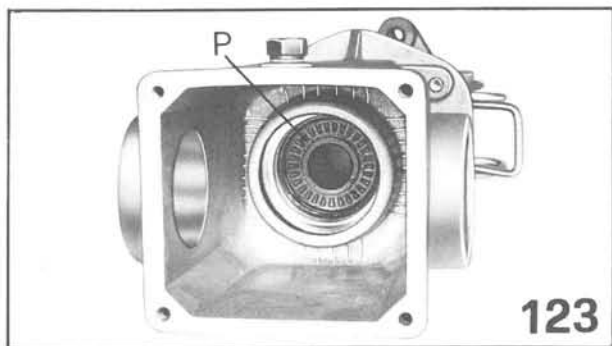
Make following checks and replace any worn part (fig. 120-121):

- Check the wear of the rotary hoe knives and of the central knife.
 - Check that the surfaces of spacers 590.48422.6 are straight and parallel.
 - Check the spline, teeth and condition of the bush on pinion 590.51113.2
 - Check the condition of the front teeth on coupling 564.50605.1.
 - Check the spline on shaft 564.51116.1
 - Check the condition of the teeth on ring bevel gear 524.51115.3.
- Check that the cylindrical hole has no seizing signs inside.
Check that the conical seat is not scored or worn.

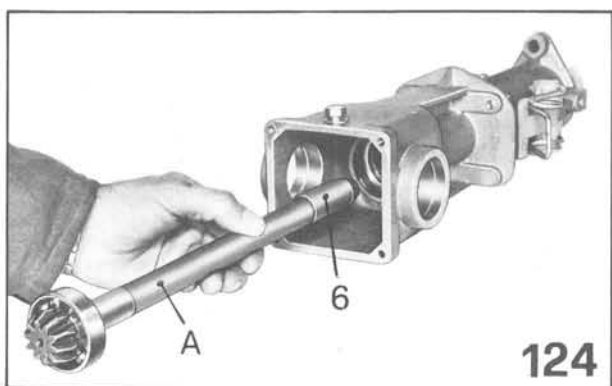
- Check the spline on coupling 541.51118.0. Check that the score crests obtained on cone are not excessively worn.
- Check the springs 314.21632.4. The length of new piece is 4.25 mm/0.167".
- Check that hooks 580.50639.3 are not stretched and that they assure a perfect fastening between machine and implement. Check the condition of levers 552.50638.2. If necessary, remove pins 342.13084.3. Orientate the hook in comparison with the lever and widen it until the two pieces are separated.
- Check the condition of bearings 371.11201.1 and 371.11250.1.



- Fit bearing A, washer B and circlip S (fig. 122)

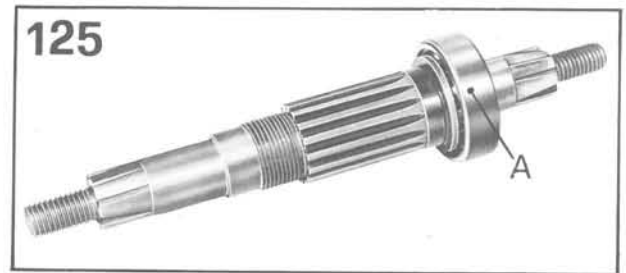


- Fit oil seal P on rotary hoe assembly (fig. 123)

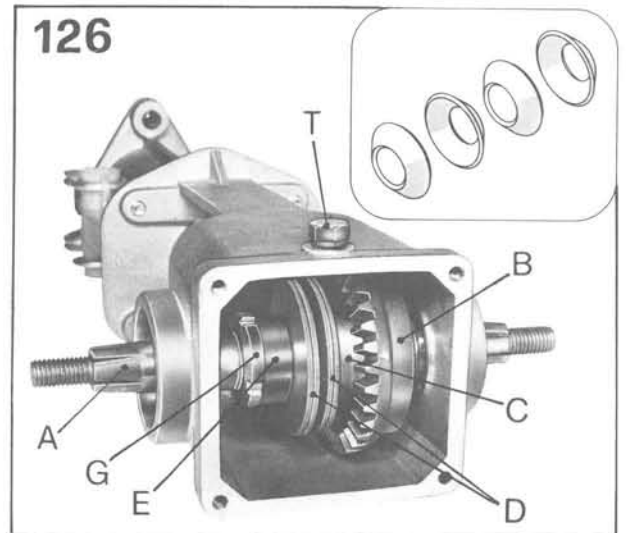


- Protect the spline using the seal driving tool No. 6 and fit in its seat shaft A (fig. 124)
- Fit circlip S (fig. 117)
- Fit coupling A lining up the hole with the one of shaft. Set the pin from the hole on the rotary hoe body (fig. 118)

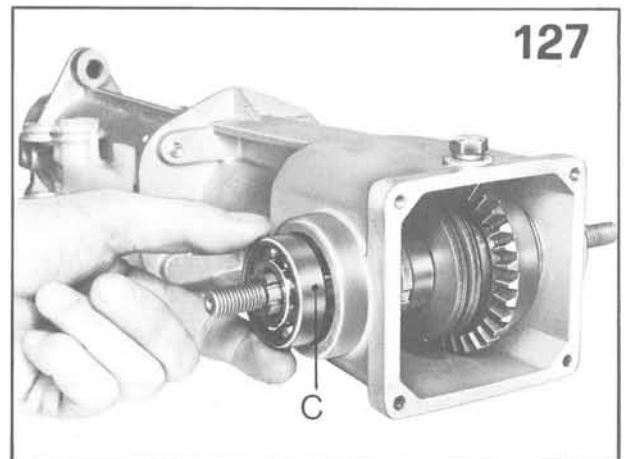
- Fit bearing A (fig. 125)



- Set the knife-holder shaft A. Put antifriction grease on the hole of the ring level gear B and install it into the rotary hoe body. Grease with oil the cone surface of coupling C and fit it in its seat. Introduce springs D in the direction shown in the figure. Introduce spacer E and screw down ring nut G. Press on the outside ring of bearing and fit shaft in its seat. To find the correct fitting side, refer to the position of cap T (fig. 126)



- Install the second bearing C (fig. 127)



- Fit circlips S (one each side (fig 113)
- Protect the cone spline using seal tool No. 6.
- Fit new oil seals P (fig. 112)
- Lock the rotation of the bevel gear with wrench No. 5. Tighten ring nut A (fig. 114)
- Set a new gasket, fit cover C with support rod D.

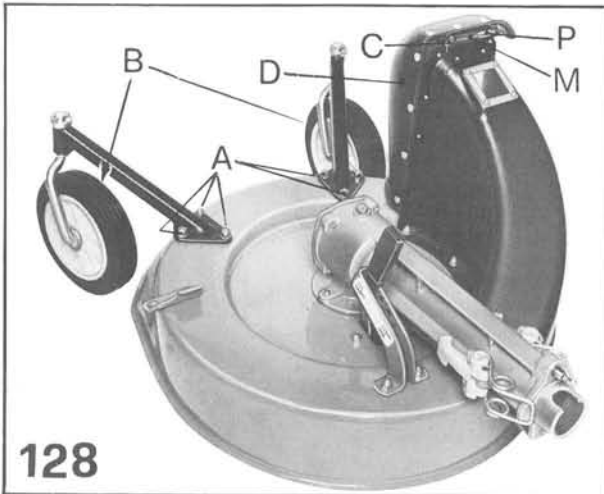
Tighten screws V. Fit central knife B with bolt A (fig. 111)

NOTE: screws are self-threading. When replacing the rotary hoe body, use self-threading screws.

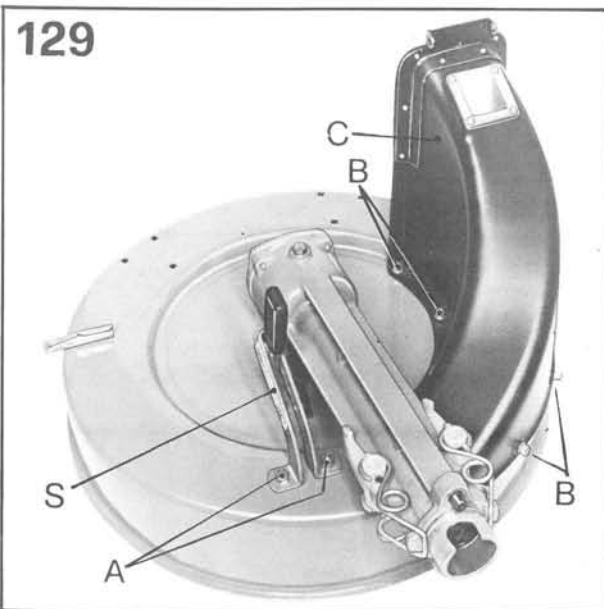
- Fit the knife-holder assemblies A. Put on the special washers. Fit the fastening nuts and tighten at the torque of 63 lbs x ft. Fill with oil through cap T (fig. 110) (See 0.2.B Fuel and oil specifications).

3.3 Lawn mower with front grass bag

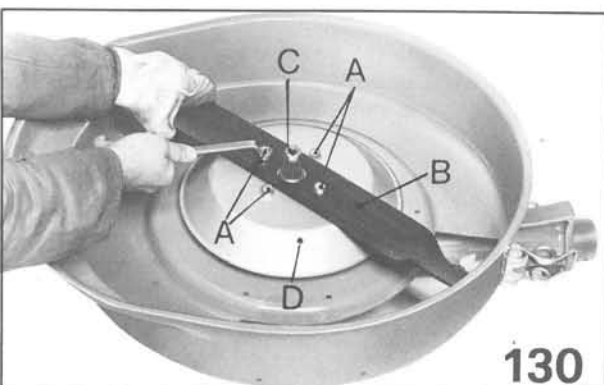
3.3.A Lawn mower removal



- Unscrew screws A. Remove wheels B with spindles and supports. Remove split pin C, extract pin P, remove spring M and deflector D (fig. 128)



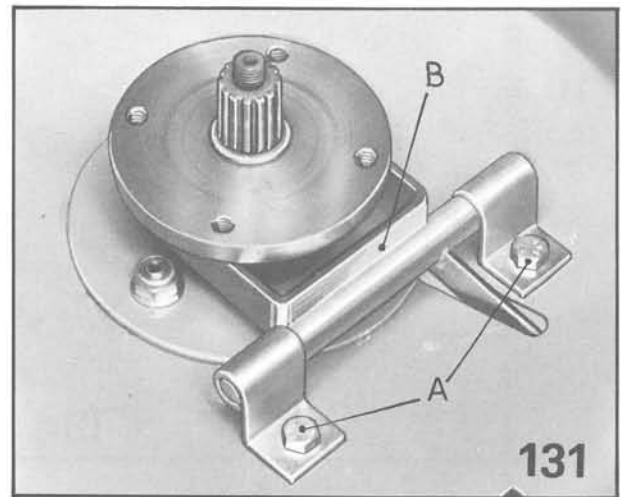
- Unscrew bolts B. Remove chute C. Unscrew bolts A, remove selector S (fig. 129)



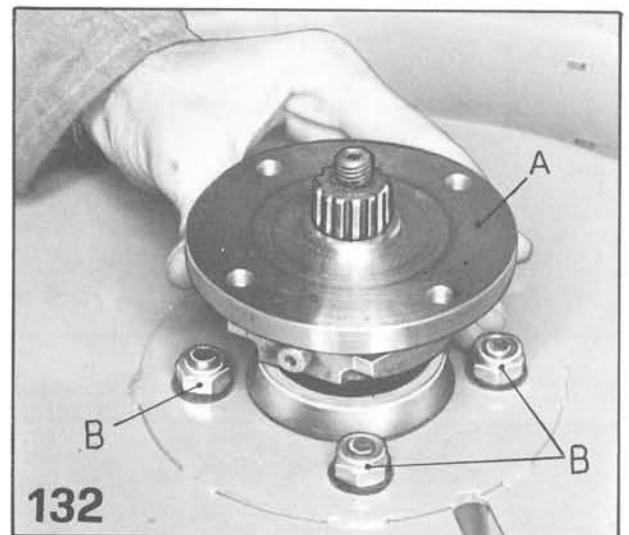
- Unscrew nut C. Unscrew screws A, remove blade B and disc D (fig. 130)

WARNING: when stopping the blade rotation, wear protective gloves to avoid injury.

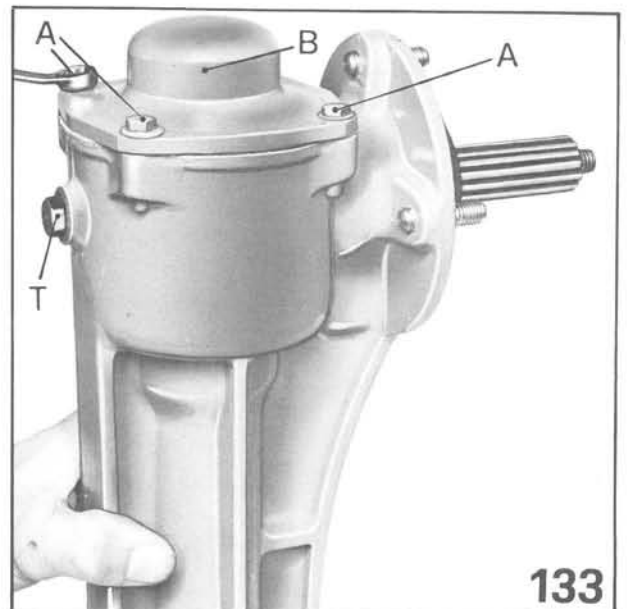
- Unscrew bolts A, remove lever B (fig. 131)

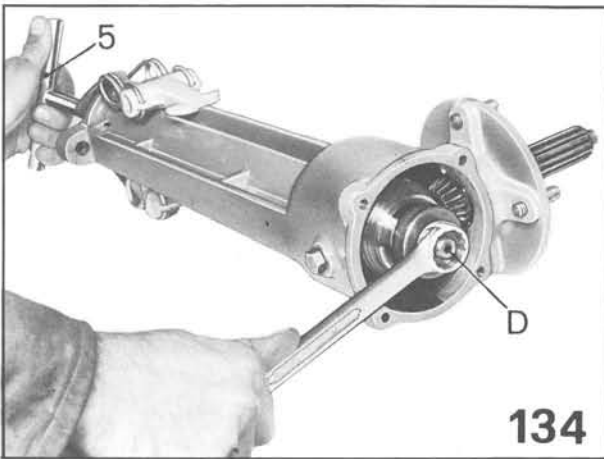


- Extract the blade-holder hub A, unscrew nuts B and separate the crankcase from the blade control assembly (fig. 132)

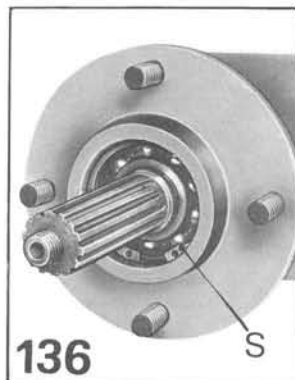
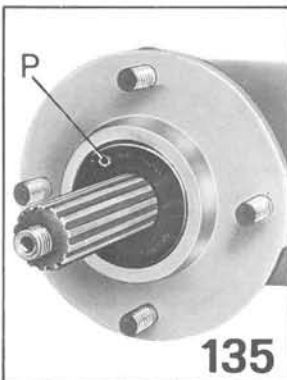


- Unscrew screws A. Remove brake bell B and drain oil (fig. 133)

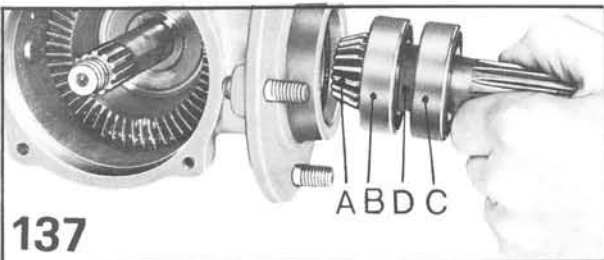




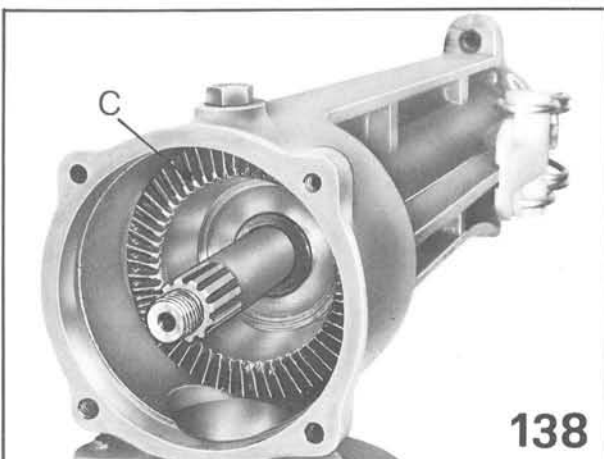
- Lock the rotation of driving shaft using wrench No. 5.
- Unscrew nut D and remove the starting and brake mechanism (fig. 134)



- Remove oil seal P (fig. 135)
- Remove circlip S (fig. 136)

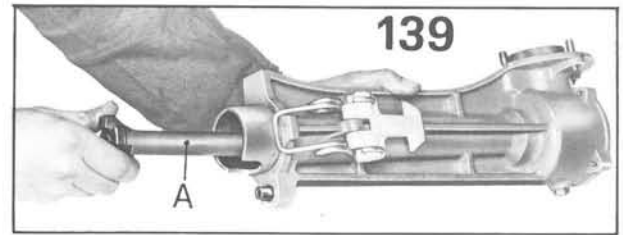


- Remove pinion A with bearings B and C and spacer D (fig. 137)



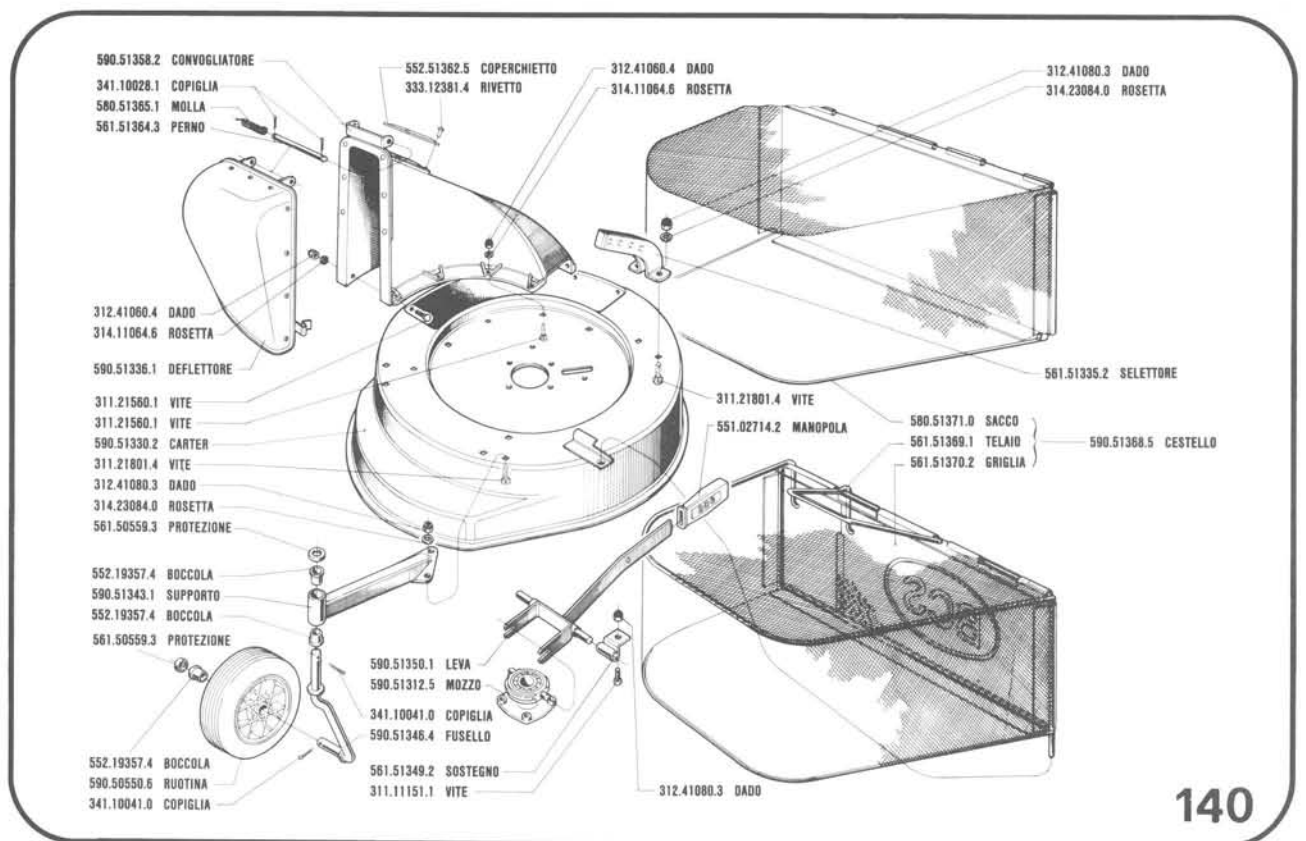
- Extract ring bevel gear C. Remove the rear positioned washer (fig. 138)

— Remove shaft A (fig. 139)



3.3.B Lawn mower overhauling

Make following checks and replace any worn part (fig. 140-141):

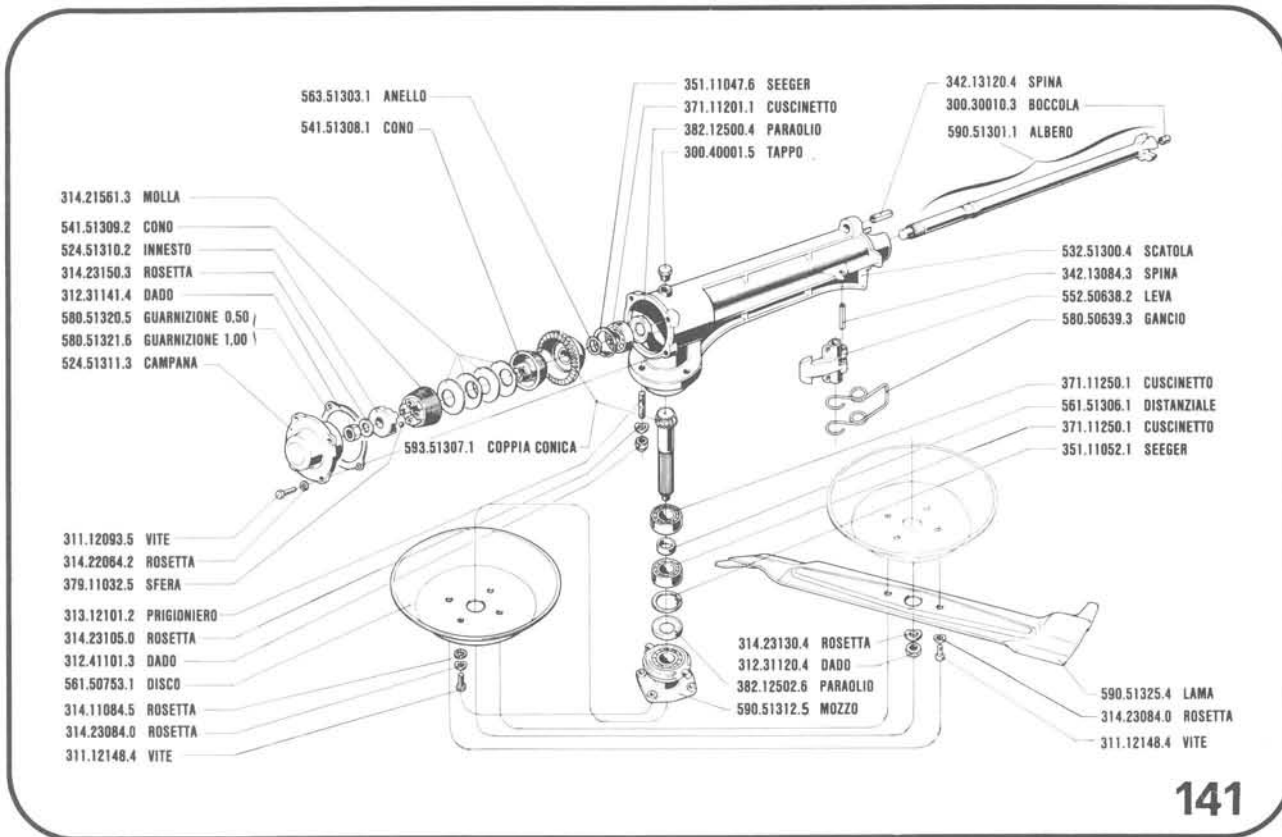


- Check the free rotation of wheels 590.50550.6 and of spindles 590.51346.4 in the supports 590.51343.1. If necessary, take apart, removing split pins 341.10041.0 and replace bushes 552.19357.4.
- Check the sharpening of blade 590.51325.4. If necessary, grind it with a grinding stone on the lower part of the blade.
- Check that frame 561.51369.1 is not deformed and that bag 580.51371.0 is not damaged. If necessary, open the rubber boot and separate both parts.

- Check that chute 590.51358.2 has no crack or breakage. Check that window 552.51362.5 assures a good view. If necessary, replace it by removing rivets 333.12381.4.
- Check that deflector 590.51336.1 has no crack or signs of breakage.
- Check crankcase 590.51330.2. It must not have excessive dents, cracks or breakage signs.
- Check the condition of the bearing fitted on hub 590.51312.5.

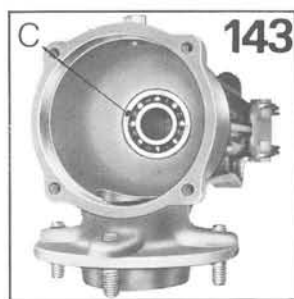
- Check teeth of pinion 593.51307.1.
- Check that the seat of brake bell 524.51311.3 is not scored or worn.
- Check the condition of teeth on ring bevel gear 593.51307.1. Check that the cylindrical hole has no seizure sign.
Check that cone seat is not scored or worn.
- Check the spline and front teeth on coupling 524.51310.2.
- Check that the crests of the scoring obtained on brake cone 541.51309.2 and on starting cone 541.51308.1 are not worn. Check the condition of the front teeth.
- Check the springs 314.21561.3. The length of

- new piece is 3.5 mm / 0.138".
- Check the front teeth, the spline, the reconditioned seats and the condition of the bush on shaft 590.51301.1.
- Check that hooks 580.50639.3 are not stretched and that they assure a correct tightening between machine and implement. Check the condition of levers 552.50638.2.
If necessary, remove pins 542.13084.3. Orientate the hook in comparison with the lever and widen it until the two parts are separated.
- Check the condition of bearings 371.11201.1 and 371.11250.1.

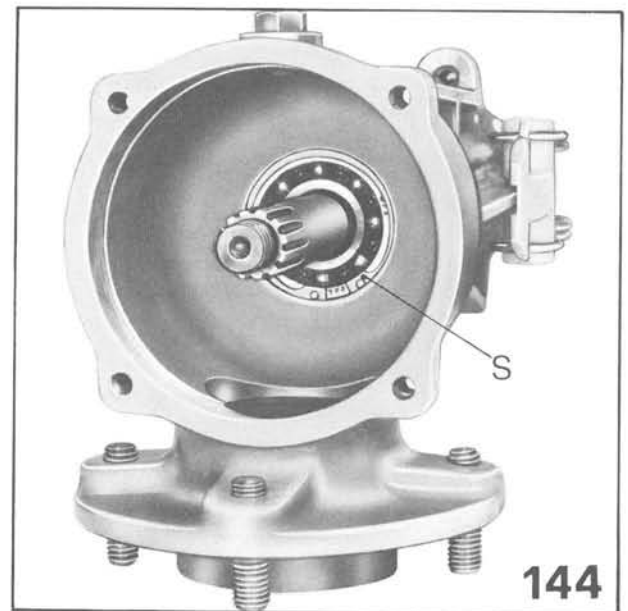


3.3.C Lawn mower assembly

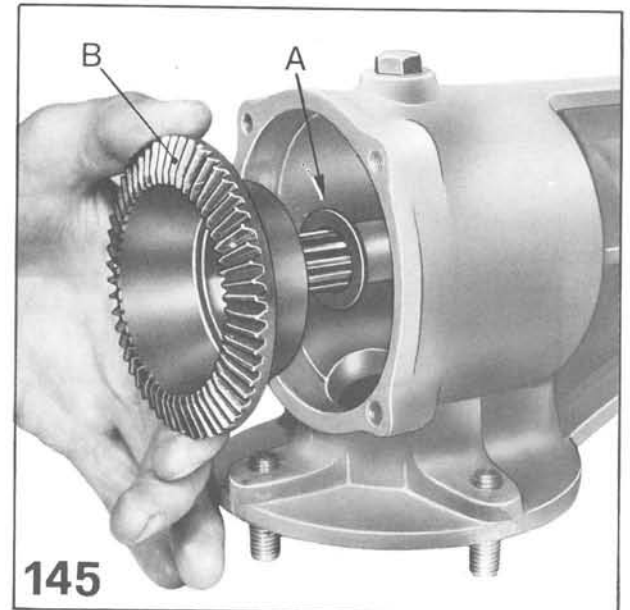
- Fit a new oil seal P (fig. 142)
- Fit bearing C (fig. 143)
- Introduce carefully shaft A, in order not to damage the oil seal already fitted in its seat (fig. 139).



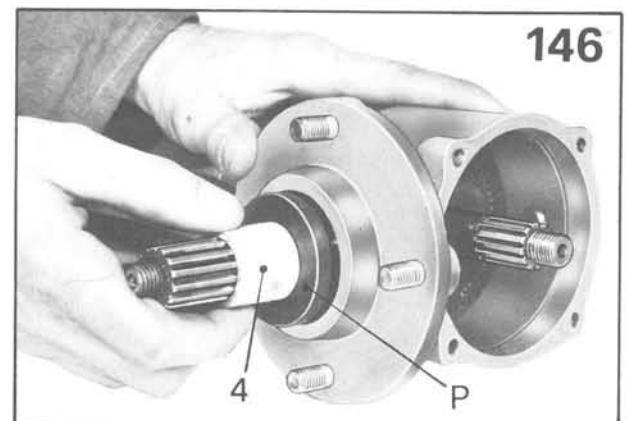
- Fit circlip S (fig. 144)

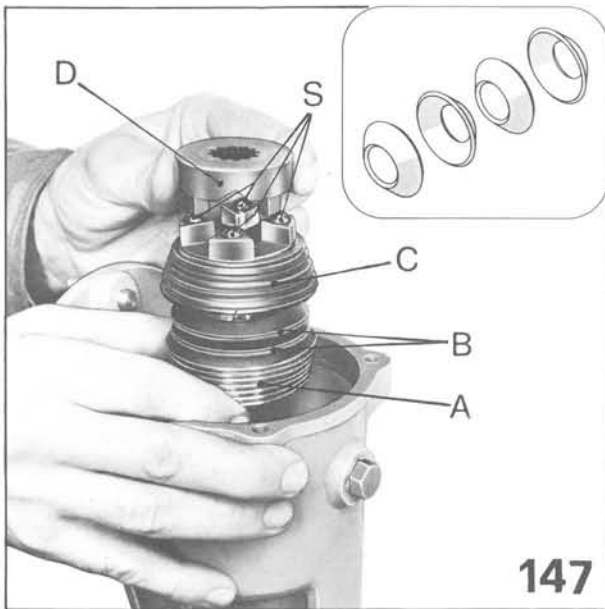


- Install the washer A. *Put antifriction grease* on the cylindrical hole and fit the ring bevel gear B (fig. 145)
- Fit the bevel pinion A with bearings B, C and spacer D (fig. 137)
- Fit circlip S (fig. 136)

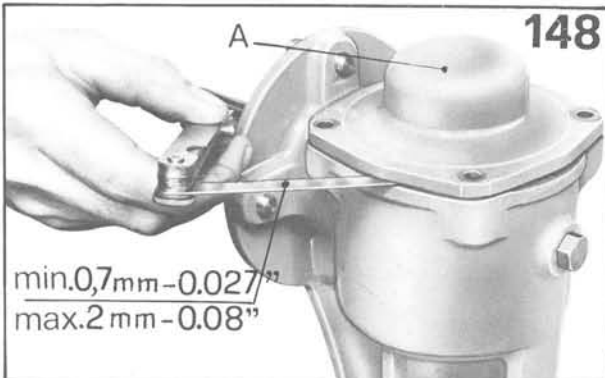


- Install a new oil seal P using tool No. 4 and fit it in its seat (fig. 146)





- Lubricate with oil the bevel surfaces. Fit the starting cone A and springs B in the assembly direction shown in figure. Fit the brake cone C with balls S and coupling D (fig. 147)
- Lock the rotation of the driving shaft with wrench No. 5. Tighten nut D (fig. 134)



- Set the brake bell A without gasket and check with a thickness gauge the measure shown in figure. If measurement is lower than 1.3 mm/0.052", fit the gasket with thickness 0.5 mm/0.02". If measure is higher, fit the gasket with thickness 1 mm/0.04". If measure is lower than 0.7 mm/0.027" or higher than 2 mm/0.08" overhaul the mechanism (See 3.3.B) (fig. 148)

- Fit the brake bell A, tighten screws B at the torque of 8 lbs x ft. Fill with oil through cap T (fig. 133) (See 0.2.B Fuel and oil specifications)
- Fit the crankcase and tighten nuts B at the torque of 37 lbs x ft. Fit the blade-holder hub A (fig. 132)
- Fit lever B introducing the fork ends into the stakes of the blade-holder hub. Tighten screws A (fig. 131)
- Fit disc D and blade B. Tighten screws A at the torque of 18 lbs x ft. Fit nut C and tighten it thoroughly (fig. 130)

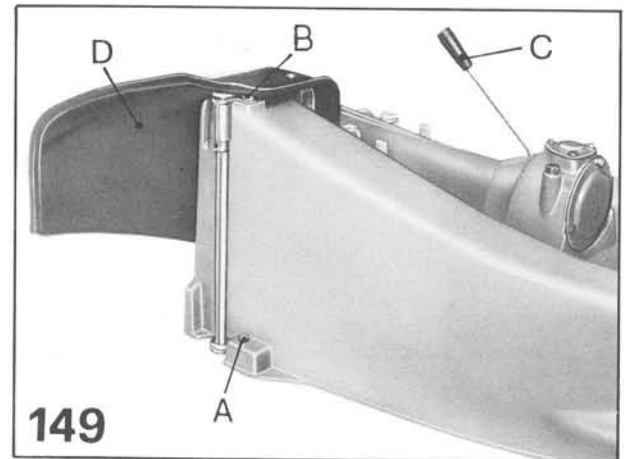
WARNING: when stopping the blade rotation, wear protective gloves to avoid injury.

- Fit the complete lawn mower on the machine. Start the engine and bring it to operating temperature. Put the accelerator at half throttle. Engage P.T.O. by pulling the lever on handlebar and check that the blade smoothly starts while engine is running. Disengage P.T.O. by releasing the lever on handlebar and check that the blade stops completely within three seconds.

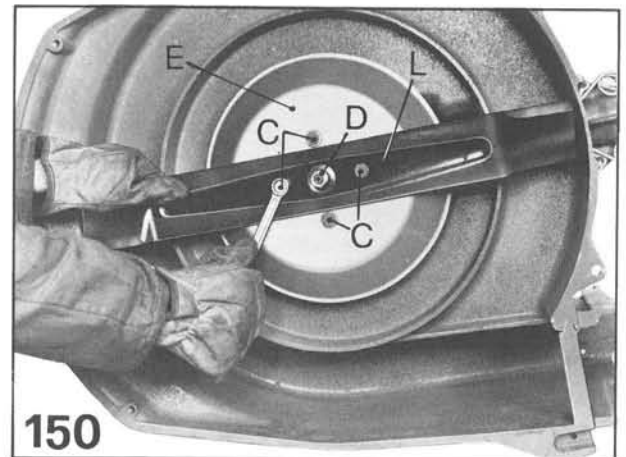
3.4 Lawn mower with side grass bag

3.4.A Lawn mower removal

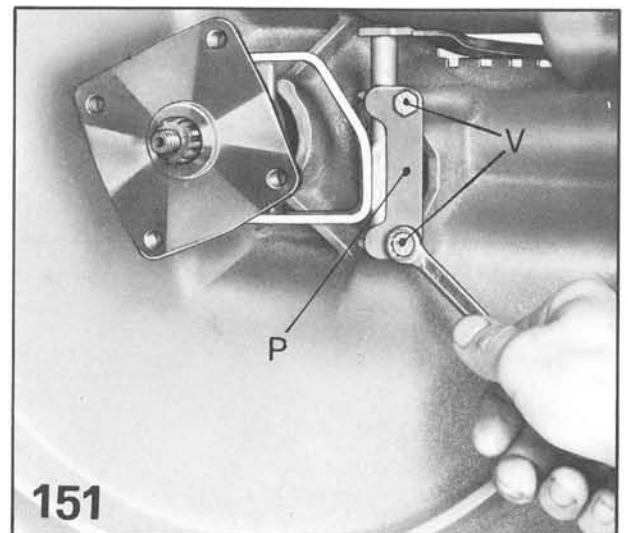
- Unscrew screws A and B. Remove deflector D. Remove knob C (fig. 149).

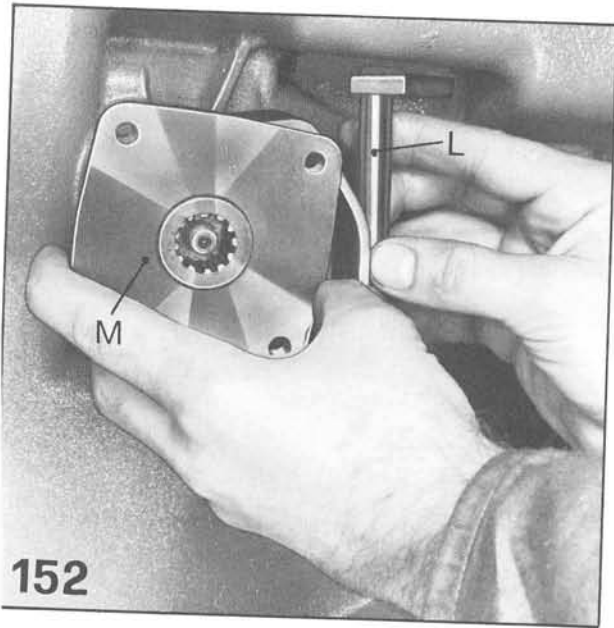


- Remove nut D. Unscrew screws C, remove blade L and disc E (fig. 150)
WARNING: when stopping the blade rotation, wear protective gloves to avoid injury

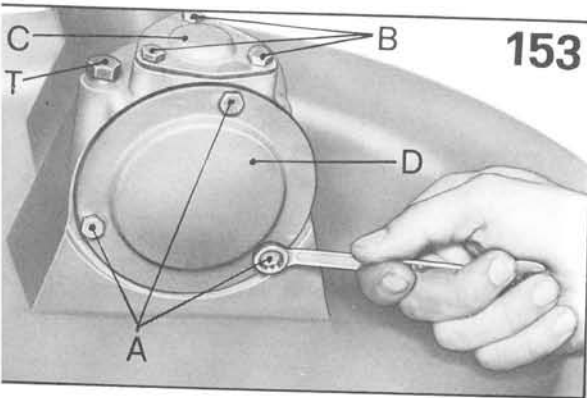


- Unscrew screws V and remove plate P (fig. 151)

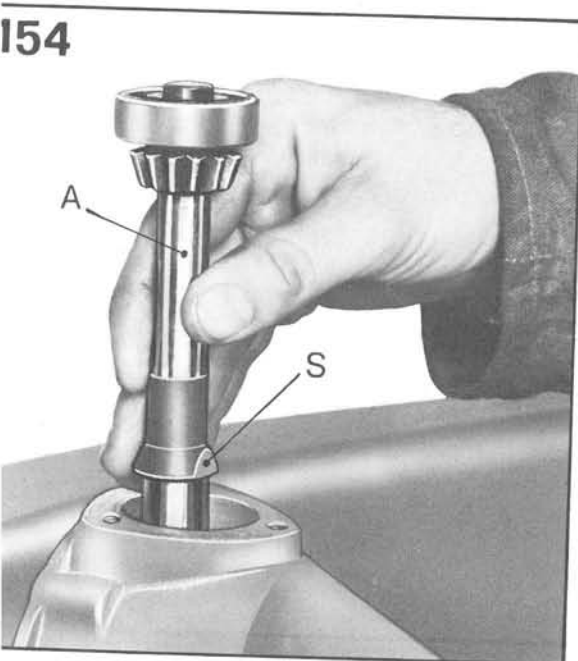




— Extract hub M and lever L (fig. 152)

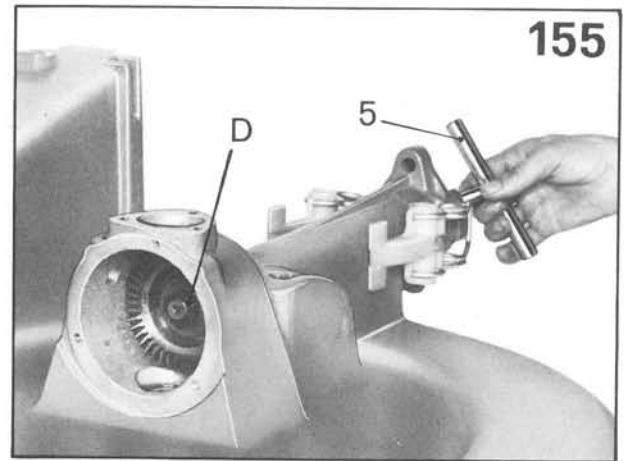


— Drain oil from cap T. Unscrew screws A and B. Remove covers C and D (fig. 153)

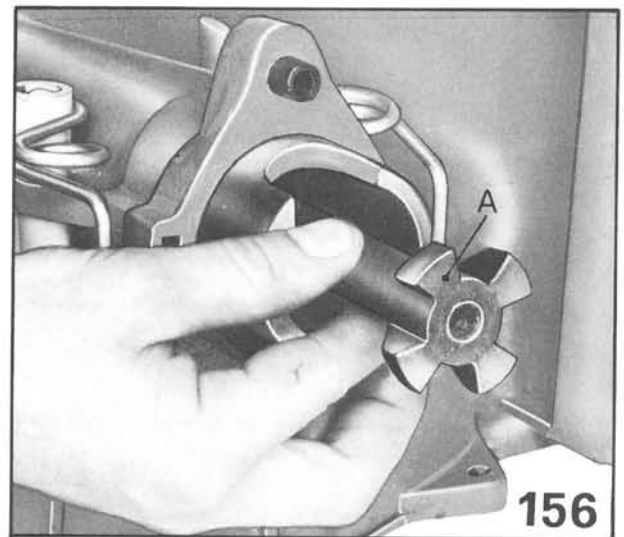


— Position the milled shoulder S as shown in figure and remove shaft A (fig. 154)

- Lock the rotation of driving shaft using wrench No. 5.
Unscrew nut D. Remove from the crankcase the starting mechanism and the ring bevel gear (fig. 155)



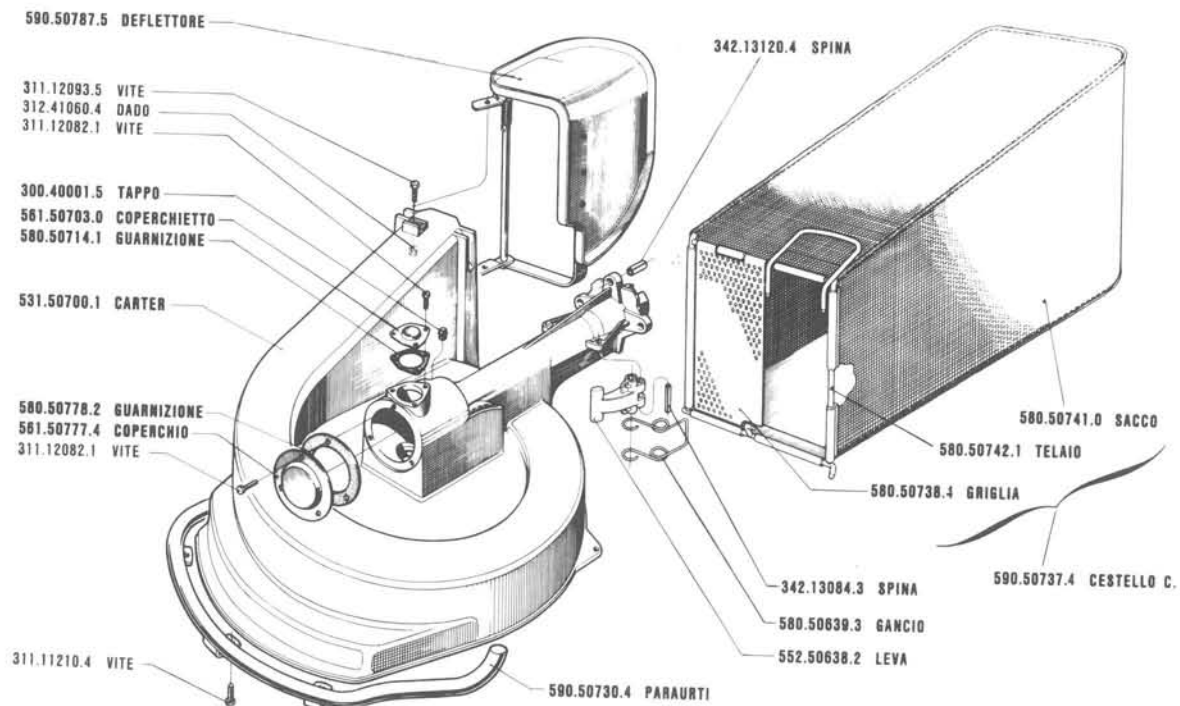
- Disassemble shaft A (fig. 156)



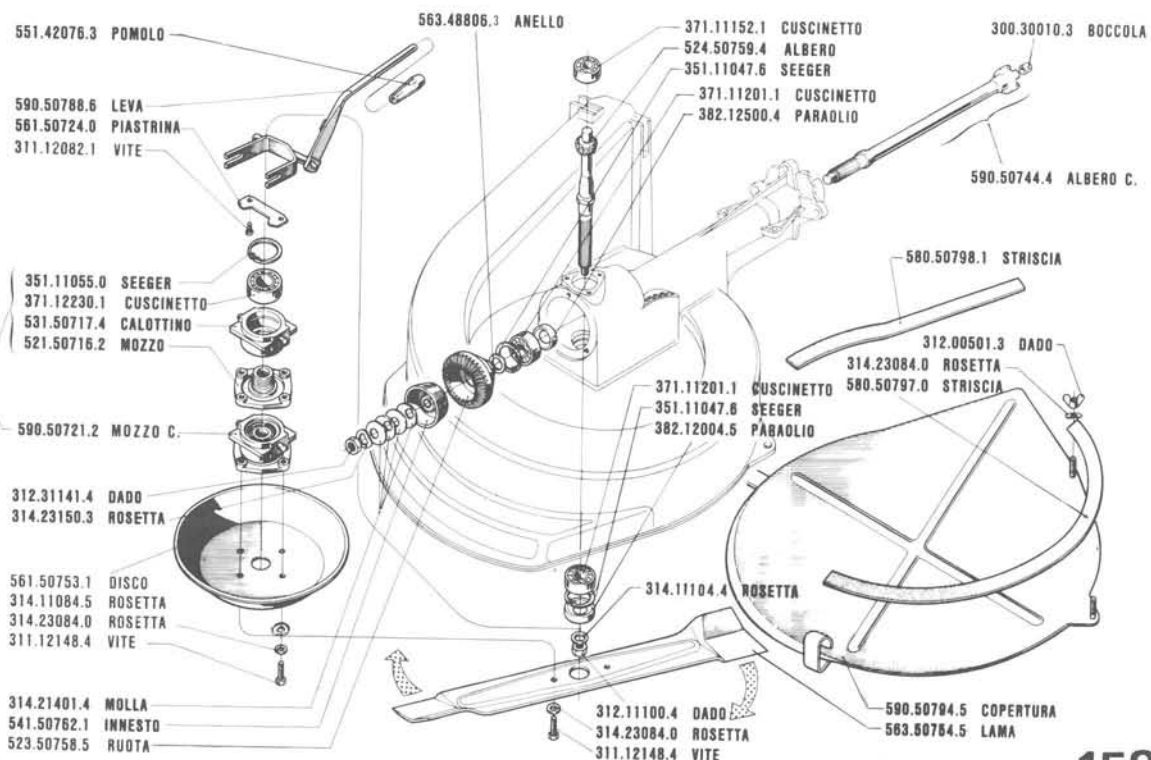
3.4.B Lawn mower overhauling

Make following checks and replace any worn part (fig. 157-158)

- Check the sharpening of blade 563.50754.5. If necessary grind it using an abrasive stone on the lower side of the blade.
- Check that frame 580.50742.1 is not deformed and that bag 580.50741.0 is not damaged. If necessary, widen the rubber boot and separate both parts.
- Check that deflector 590.50787.5 has no cracks or signs of breakage.
- Check the condition of the bearing fitted on hub 590.50721.2.
- Check the teeth on bevel pinion and the spline on shaft 524.50759.4.
- Check the condition of conical teeth on ring bevel gear 523.50758.5. Check that the cylindrical hole has no seizure sign. Check that the cone seat is not scored or worn.
- Check the spline of coupling 541.50762.1. Check that the crests of the scoring obtained on the cone are not too worn.
- Check the springs 314.21401.4. The length of new piece is 2.65 mm/0.104".
- Check the front teeth, the spline, the reconditioned seats and the condition of the bush on shaft 590.50744.4.
- Check that hooks 580.50639.3 are not stretched and that they assure a correct fastening between machine and implement. Check the condition of levers 552.50638. 2. If necessary, remove pins 542.13084.3. Orientate the hook in comparison with the lever and widen it until the two parts are separated.
- Check the condition of bearings 371.11152.1 and 371.11201.1.



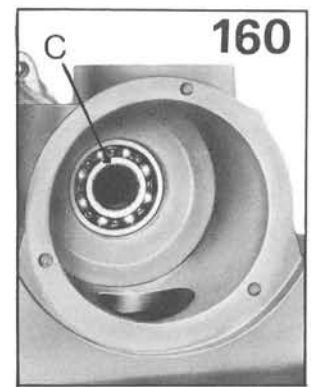
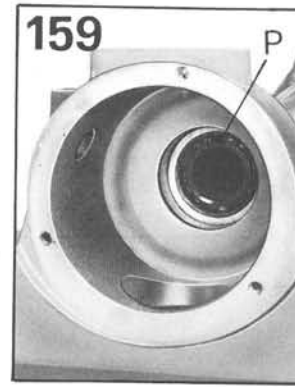
157



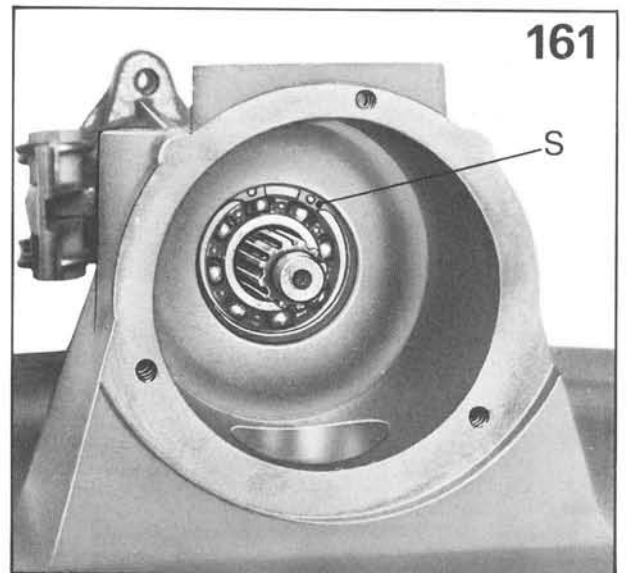
158

3.4.C Lawn mower assembly

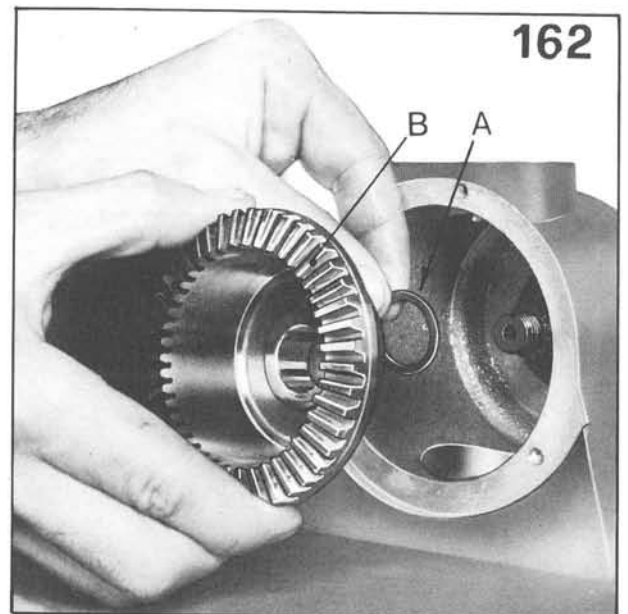
- Install a new oil seal P (fig. 159)
- Install bearing C (fig. 160)
- Install carefully shaft A to avoid damage to the oil seal (fig. 156)

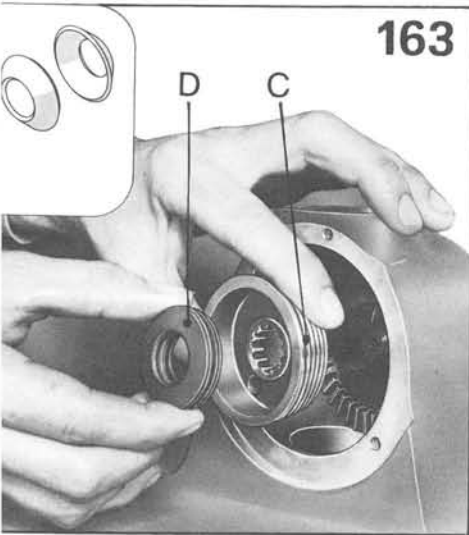


- Fit circlip S (fig. 161)

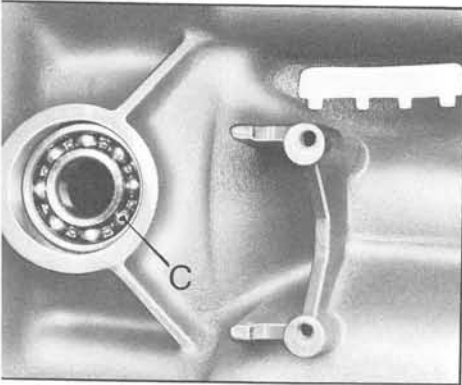


- Set washer A. Put antifriction grease on the cylindrical hole and fit ring bevel gear B (fig. 162)

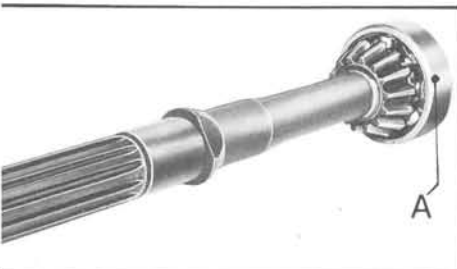




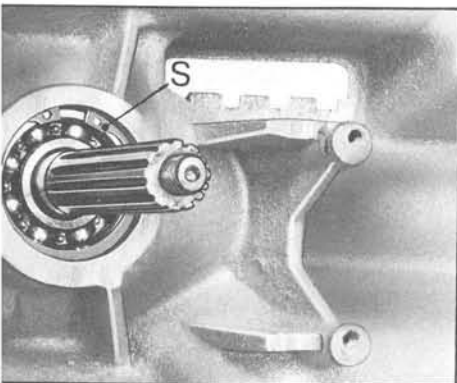
- Lubricate with oil the conical surface of coupling C and fit it into its seat. Fit springs D in the assembly direction shown in figure 163.
- Lock the rotation of driving shaft with wrench No. 5.
Tighten nut D (fig. 155)



- Fit bearing C (fig. 164)



- Fit bearing A on the blade-holder shaft (fig. 165)
- Fit a detent under the inner ring of the bearing fitted on crankcase. Move the milled shoulders as shown in the figure and fit shaft A (fig. 154)

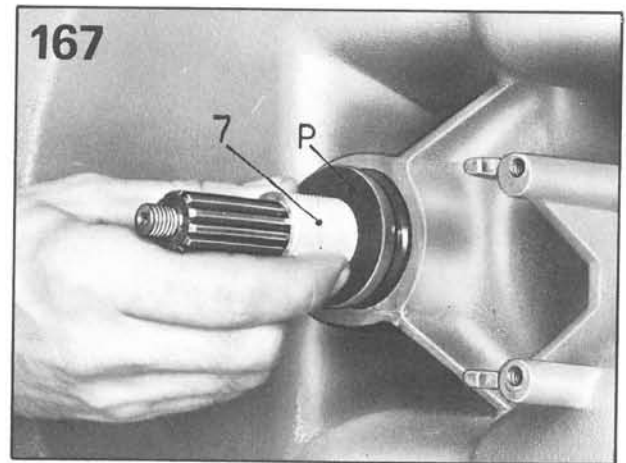


- Fit circlip S (fig. 166)

- Install a new oil seal P onto sleeve No. 7 and assemble it into its seat (fig. 167)
- Install new gaskets. Fit covers C and D, tighten screws A and B. Put oil into crankcase from cap T (fig. 153) (See 0.2.B Fuel and oil specifications).
- Assemble hub M and lever L, introducing the fork ends into the stakes (fig. 152)
- Fit plate P. Tighten screws V (fig. 151)
- Install disc E and blade L. Tighten screws C at the torque of 18 lbs x ft. Fit and tighten nut D (fig. 150)

WARNING: when stopping the blade rotation, wear protective gloves to avoid injury

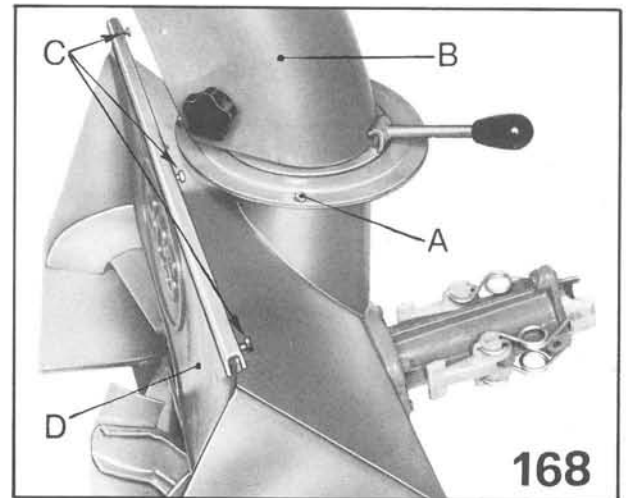
- Attach the complete lawn mower to the machine. Start the engine and bring it to operating temperature. Put accelerator at half throttle. Engage P.T.O. pulling the lever on handlebar and check that blade rotates smoothly while engine is running.



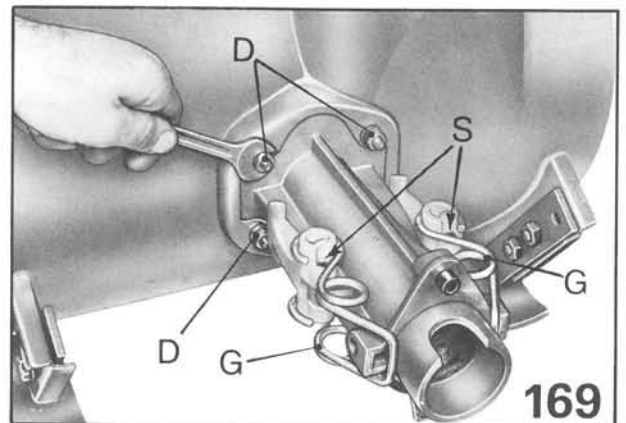
3.5 Snow thrower

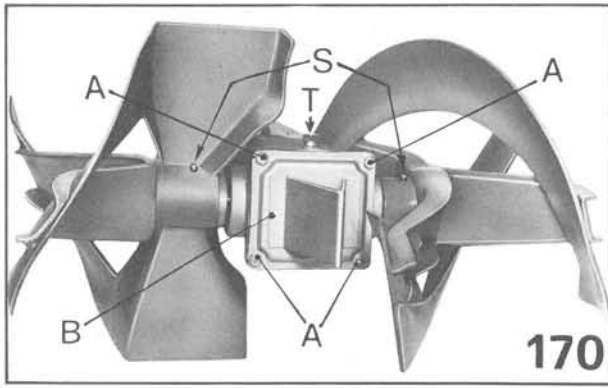
3.5.A Snow thrower removal

- Unscrew bolts A and remove chute B. Unscrew screws C and remove snow flaps D (fig. 168)

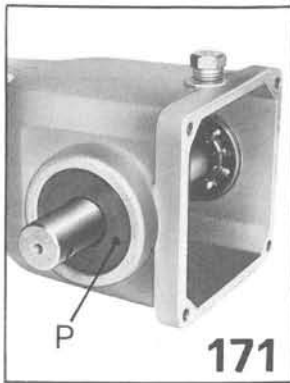


- Remove pins S and hooks G with their levers. Unscrew nuts D and separate the crankcase from the turbine assembly (fig. 169)

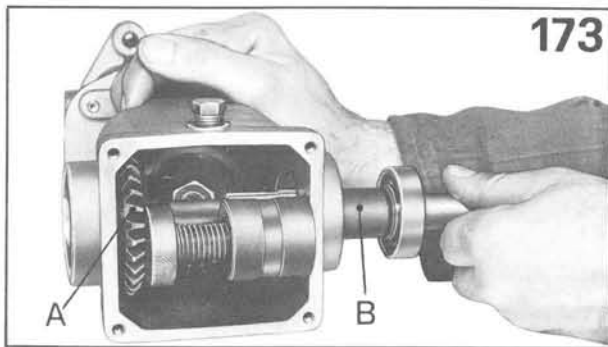




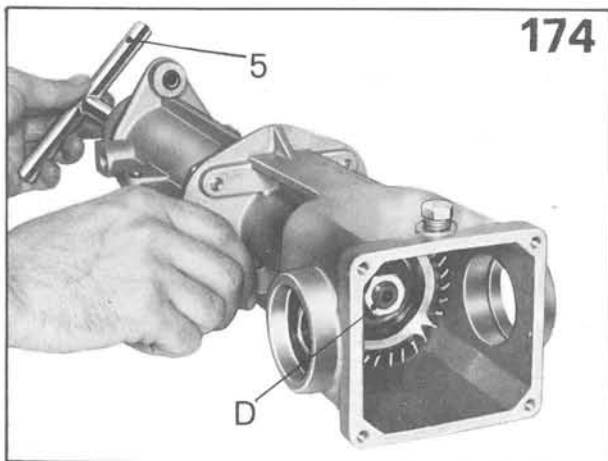
- Remove pins S and turbines. Unscrew screws A, remove cover B and drain oil (fig. 170)



- Remove oil seals P (one each side) (fig. 171)
- Remove circlips S (one each side) (fig. 172)

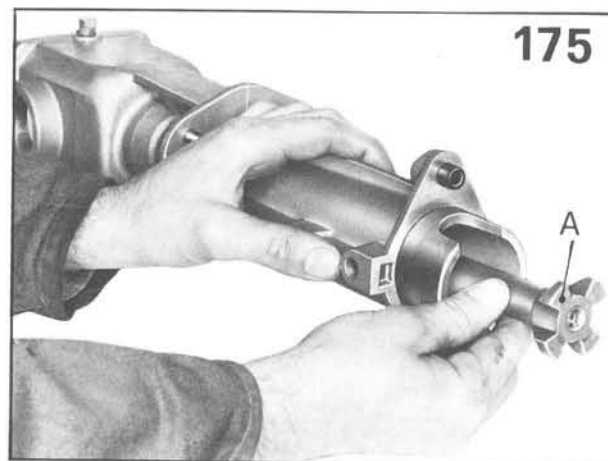


- Support ring bevel gear A. Press on the turbine-holder shaft A and disassemble it (fig. 173).



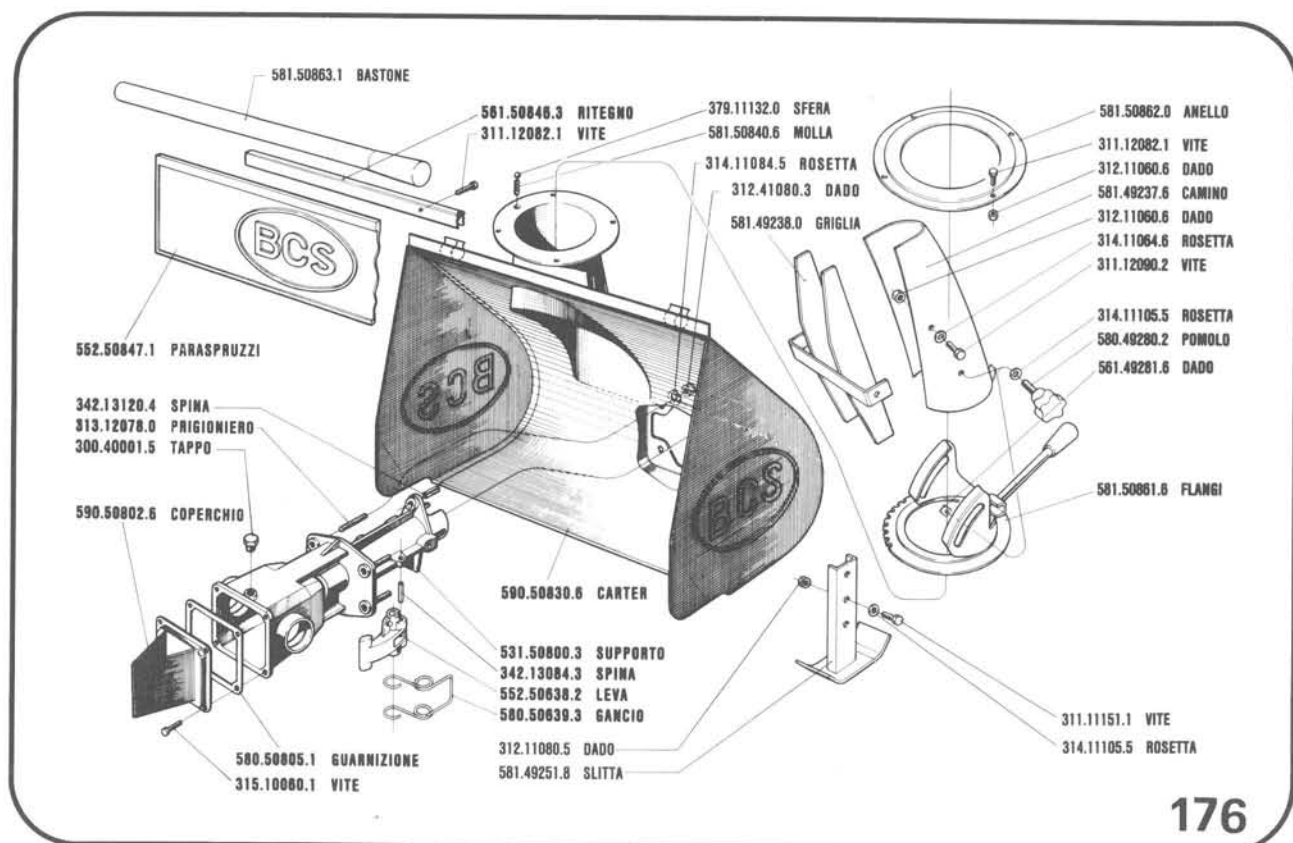
- Lock the rotation of driving shaft by wrench No. 5. Unscrew nut D, remove the starting mechanism and the ring bevel gear (fig. 174)

— Disassemble shaft A (fig. 175)



3.5.B Snow thrower overhauling

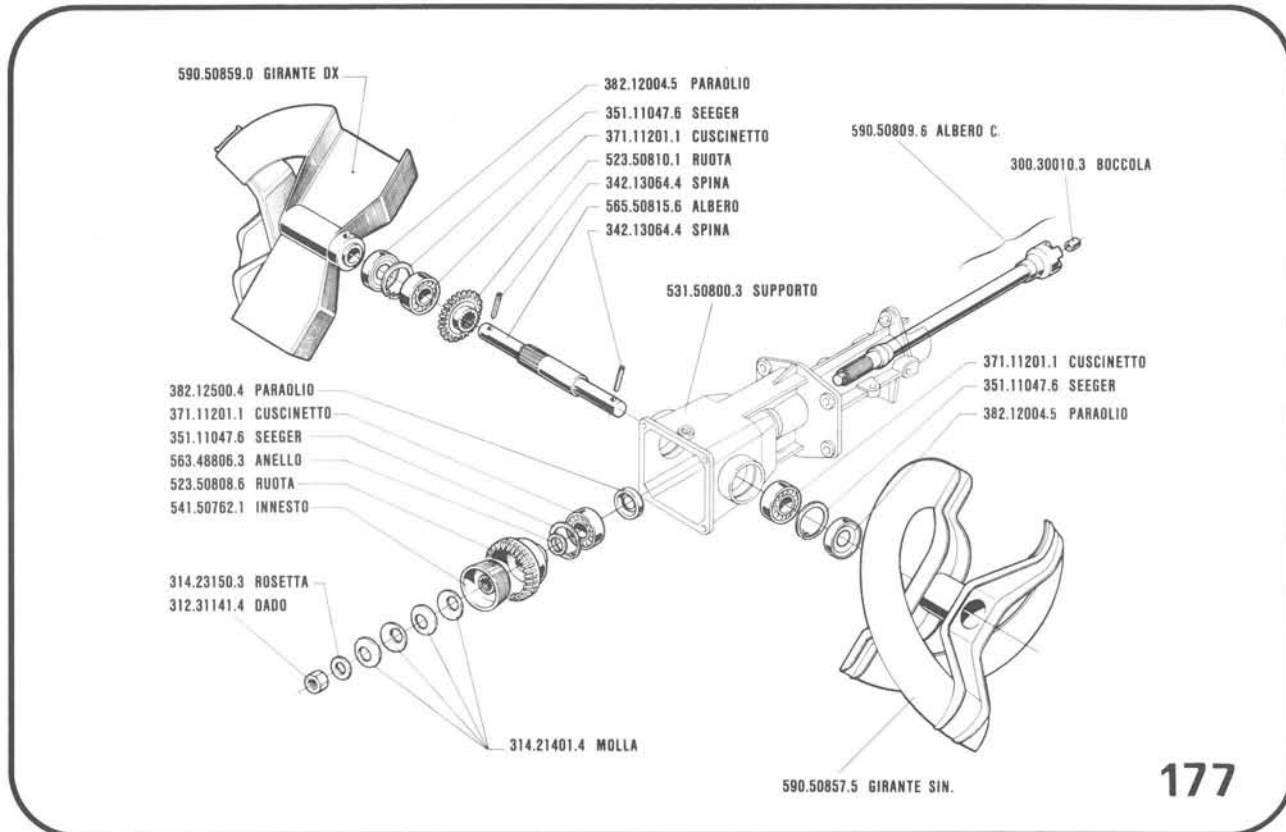
Make following checks and replace any worn part (fig. 176 - 177).



- Check that turbines rotate freely and that the crankcase has no cracks or deformations.
- Check the splines on shaft 565.50815.6.
- Check the condition of the conical teeth on

ring bevel gear 523.50808.6.
Check that the cylindrical hole has no seizing signs. Check that the cone seat is not scored or worn.

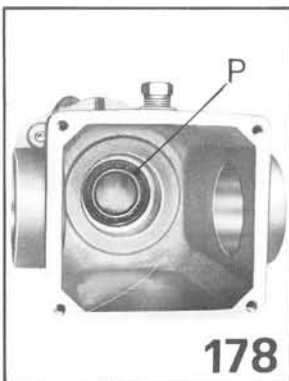
- Check the spline on coupling 541.50762.1. Check that the crests of the scoring obtained on the cone are not too worn.
- Check springs 314.21401.4. The length of new piece is 2.65 mm / 0.104".
- Check the front teeth, the spline, the reconditioned seats and the condition of the bush on shaft 590.50809.6.
- Check that hooks 580.50639.3 are not stretched and provide a tight fit between machine and implement.
- Check the condition of levers 552.50638.2. If necessary, remove pins 542.13084.2. Move the hook in comparison with the lever and widen it until the two parts are separated.
- Check the condition of bearings 371.11201.1.



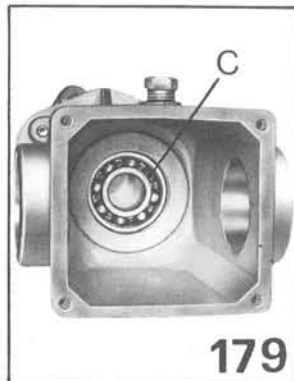
177

3.5.C Snow thrower assembly

- Fit a new oil seal P (fig. 178)
- Install bearing C (fig. 179)
- Carefully introduce shaft A to avoid damages to the oil seal (fig. 175)

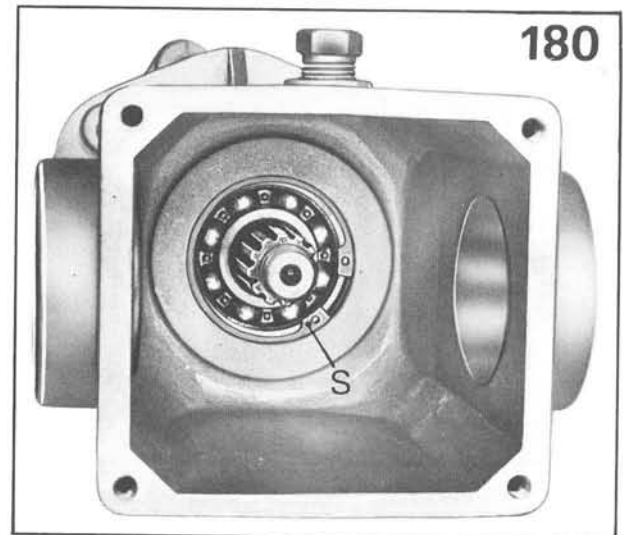


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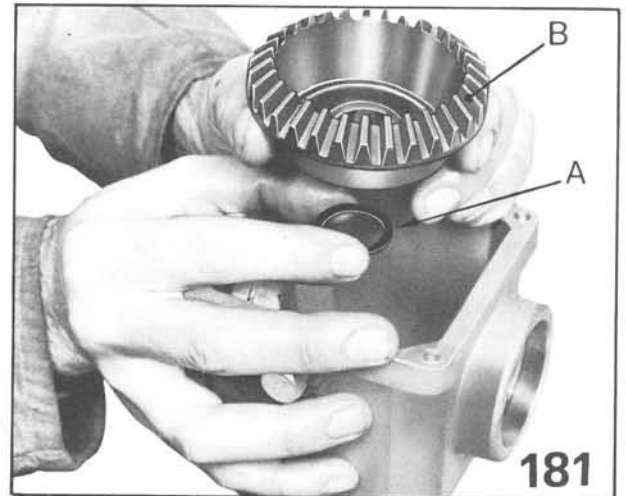


179

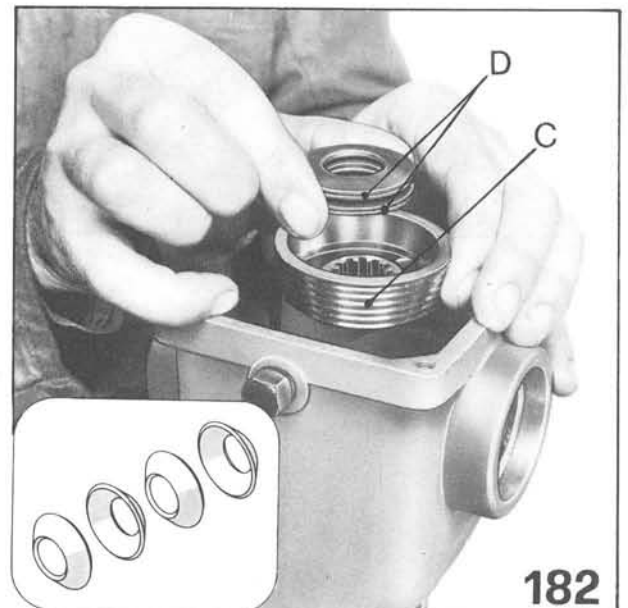
- Fit circlip S (fig. 180)

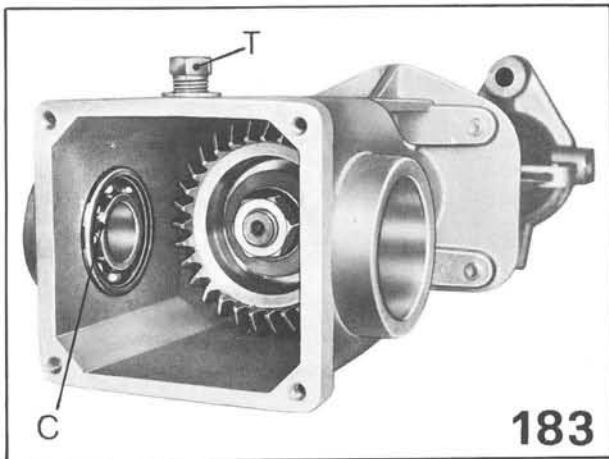


- Set washer A. *Put antifriction grease* on the cylindrical hole and fit ring bevel gear B (fig. 181)

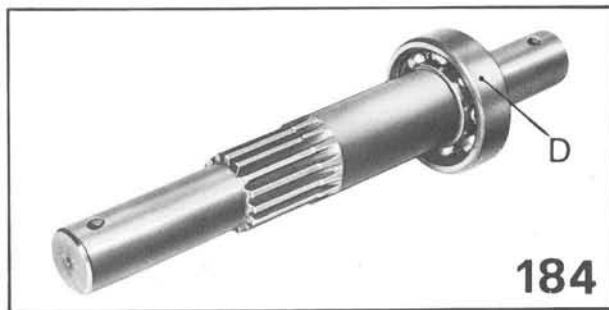


- Lubricate with oil the conical surface of coupling C and fit it into its seat. Install springs D in the direction shown in figure 182.
- Lock the rotation of the driving shaft with wrench No. 5. Tighten nut D (fig. 174)

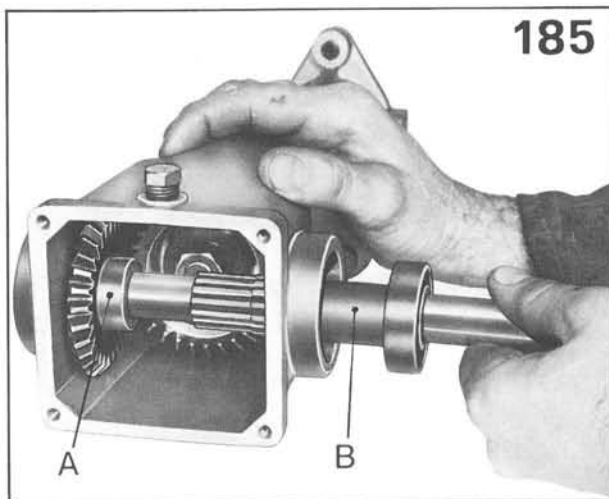




- Install bearing C. To find the correct fitting side, refer to the position of cap T (fig. 183)



- Assemble bearing D (fig. 184)



- Install ring bevel gear A. Assemble shaft B (fig. 185)

- Insert circlips S (one each side) (fig. 172)
- Protect the drilled ends of the turbine-holder shaft with tool No. 6 and replace the oil seals P (one each side) (fig. 171)
- Install a new gasket, fit cover B, tighten screws A. Assemble turbines and pins S. Be careful and do not invert their position. Fill with oil through cap T (fig. 170) (See 0.2.B Fuel and oil specifications).

NOTE: screws are self-threading. When replacing the snowthrower body, use self-threading screws.

- Attach the complete snow thrower to the machine. Start the engine and bring it to operate temperating temperature. Put accelerator at half throttle. Engage P.T.O. by pulling the lever on the handlebar and check that the turbine moves smoothly while engine is running.

TIGHTENING TORQUES OF NUTS AND BOLTS

Position	No.	Part number	Sizes	Kgm.	Nm	lbs x ft
Engine						
Fastening screws for connecting rod cap	2	311.12092.4	M6x35	1.1	10.4	8.0
Fastening screws for crankcase cover	5	311.12089.1	M6x25	0.6	5.9	4.3
Fastening screws for crankcase cover	3	311.12091.3	M6x40	0.6	5.9	4.3
Fastening screws for head	8	311.12157.6	M8x50	2.0	19.6	14.5
Fastening nut for flywheel	1	312.31161.3	M16x1.5 lock	10.0	98.0	72.0
Spark plug	1	581.50078.0	M14x1.25	3.0	29.0	22.0
Gearbox						
Screws for side cover	4	311.12093.5	M6x20	1.1	10.4	8.0
Fastening screws engine/gearbox	5	311.13090.1	M6x30	1.1	10.4	8.0
Fastening screw engine/gearbox	1	311.12096.1	M6x85	1.1	10.4	8.0
Cutter bar						
Fastening bolts for cutter bar	3	311.12153.2	M8x35	2.5	24.6	18.0
Fastening bolts for oscillating protector	1	311.12215.1	M10x60	5.1	50.1	37.0
	1	311.12214.0	M10x45	5.1	50.1	37.0
Rear rotary hoe						
Fastening nuts for knife-holder assemblies	2	312.41120.1	M12 selflocking	8.7	84.8	63.0
Lawn mower with front grass bag						
Fastening screws brake bell	4	311.12093.5	M6x20	1.1	10.4	8.0
Fastening nuts for crankcase	4	312.41101.3	M10 selflocking	5.1	50.1	37.0
Fastening screws for blade	4	311.12148.4	M8x14	2.5	24.6	18.0
Lawn mower with side grass bag						
Fastening screws for blade	4	311.12148.4	M8x14	2.5	24.6	18.0

DIMENSIONS OF ENGINE B C S 180

Dimension	mm		in	
	Min.	Max.	Min.	Max.
Standard cylinder diameter	65.000	65.010	2.5591	2.5594
Cylinder diameter - First upratio	65.500	65.510	2.5787	2.5791
Cylinder diameter - Second upratio	66.000	66.010	2.5984	2.5988
Standard piston skirt diameter	64.945	64.955	2.5569	2.5573
Piston skirt diameter - First upratio	65.445	65.455	2.5766	2.5770
Piston skirt diameter - Second upratio	65.945	65.955	2.5963	2.5967
Standard big end diameter	25.026	25.036	0.9853	0.9857
Big end diameter - First underratio	24.766	24.776	0.9750	0.9754
Big end diameter - Second underratio	24.516	24.526	0.9652	0.9656
Standard crank pin diameter	24.990	25.000	0.9839	0.9843
Crank pin diameter - First underratio	24.740	24.750	0.9740	0.9744
Crank pin diameter - Second underratio	24.490	24.500	0.9642	0.9646
Groove width of first compression ring	2.035	2.050	0.0801	0.0807
Groove width of second compression ring	2.020	2.035	0.0795	0.0801
Groove width of scraper ring	4.020	4.035	0.1583	0.1589
Pin diameter	13.994	14.000	0.5509	0.5512
Diameter of pin seat on piston	13.992	13.996	0.5509	0.5510
Diameter of connecting rod small end	14.010	14.021	0.5516	0.5520
Diameter of journal at cover side	24.996	25.005	0.9841	0.9844
Diameter of journal at flywheel side	25.002	25.011	0.9843	0.9847
Distance between points with fitted segments	0.200	0.350	0.0079	0.0138
Diameter of camshaft at cover side	13.973	13.984	0.5501	0.5506
Diameter of camshaft at cylinder block side	13.966	13.984	0.5498	0.5506
Height of intake cam	24.725		0.9734	
Height of exhaust cam	24.030		0.9461	
Height of breaker contact cam	22.100		0.8701	
Play of intake valve	0.250		0.0098	
Play of exhaust valve	0.300		0.0118	
Width of valve seats	1.410		0.0555	
Angle of valve seats	45°			
Diameter of valve stem	5.963	5.975	0.2348	0.2352
Diameter of valve guides	6.020	6.032	0.2370	0.2375
Free height valve springs	30.000		1.1811	

Spark plug features

Threading	M14x1.25
Thread length	12.0 ÷ 12.7 mm / 1/2"
Head range	175 (Bosch scale)

Mark	Type
MAGNETI MARELLI	CW 5 N
BOSCH	W 175 T1
CHAMPION	L 86

BEARING SIZE

Position	No.	Part number	Type	Sizes mm
Engine				
Main bearing cover side	1	371.11300.2	6206	30 x 62 x 16
Main bearing flywheel side	1	371.11250.1	6205	25 x 52 x 15
Gearbox				
P.T.O. shaft support	1	371.11120.4	6301	12 x 37 x 12
Worm screw support	1	371.11201.1	6204	20 x 47 x 14
Wheel shaft support	2	371.11250.1	6205	25 x 52 x 15
Cutter bar				
Eccentric shaft support	1	371.12203.2	6004 2RS	20 x 42 x 12
Crank higher support	1	371.13200.5	6204 Z	20 x 47 x 14
Crank lower support	1	371.11120.4	6301	12 x 37 x 12
Blade control	1	371.12101.5	62200 2RS	10 x 30 x 14
Fork rear support	1	371.12171.5	6203 2RS	17 x 40 x 12
Rear rotary hoe				
Pinion support	1	371.11250.1	6205	25 x 52 x 15
Supports for blade-holder shaft	2	371.11201.1	6204	20 x 47 x 14
Lawn mower with front grass bag				
Main shaft support	1	371.11201.1	6204	20 x 47 x 14
Blade-holder shaft support	2	371.11250.1	6205	25 x 52 x 15
Lawn mower with side grass bag				
Main shaft support	1	371.11201.1	6204	20 x 47 x 14
Blade-holder shaft higher support	1	371.11152.1	6302	15 x 42 x 13
Blade-holder shaft lower support	1	371.11201.1	6204	20 x 47 x 14
Blade-holder hub support	1	371.12230.1	6006 2RS	30 x 55 x 13
Snow thrower				
Main shaft support	1	371.11201.1	6204	20 x 47 x 14
Turbine-holder shaft support	2	371.11201.1	6204	20 x 47 x 14

OIL SEAL AND O-RING SIZE

Position	no.	part. no.	Sizes mm
Engine			
Driving shaft, cover side	1	382.13601.6	36 x 62 x 7
Driving shaft, flywheel side	1	382.12500.4	25 x 40 x 7
Speed governor rod	1	381.10528.1	OR 2021 5.28 x 1.78
Gearbox			
P.T.O. shaft	1	382.11503.1	15 x 50 x 7
Wheel shaft	2	382.12500.4	25 x 40 x 7
Forward speed control pin	1	381.11508.1	OR 119 15.08 x 2.62
Reverse speed control pin	1	381.12022.4	OR 4081 20.22 x 3.53
Rear rotary hoe			
Pinion shaft	1	381.12004.5	20 x 47 x 7
Knives-holder shaft	2	382.12004.5	20 x 47 x 7
Lawn mower with front grass bag			
Main shaft	1	382.12500.4	25 x 40 x 7
Blade-holder shaft	1	382.12502.6	25 x 52 x 7
Lawn mower with side grass bag			
Main shaft	1	382.12500.4	25 x 40 x 7
Blade-holder shaft	1	382.12004.5	20 x 47 x 7
Snow thrower			
Main shaft	1	382.12500.4	25 x 40 x 7
Turbine-holder shaft	2	382.12004.5	20 x 47 x 7

CIRCLIP SIZE

Position	no.	part no.	Sizes mm
Engine			
Pin	2	351.11014.1	INSIDE Ø 14
Gearbox			
Worm screw support	1	351.11047.6	INSIDE Ø 47
Worm screw, P.T.O. side	1	351.21020.4	OUTSIDE Ø 20
Worm screw, engine side	1	351.21028.5	OUTSIDE Ø 28
Rear rotary hoe			
Pinion shaft	1	351.21025.2	OUTSIDE Ø 25
Pinion shaft support	1	351.11052.4	INSIDE Ø 52
Knives-holder shaft support	2	351.11047.6	INSIDE Ø 47
Lawn mower with front grass bag			
Main shaft support	1	351.11047.6	INSIDE Ø 47
Lower support of blade-holder shaft	1	351.11052.1	INSIDE Ø 52
Lawn mower with side grass bag			
Main shaft support	1	351.11047.6	INSIDE Ø 47
Lower support of blade-holder shaft	1	351.11047.6	INSIDE Ø 47
Blade-holder hub	1	351.11055.0	INSIDE Ø 55
Snow thrower			
Main shaft support	1	351.11047.6	INSIDE Ø 47
Turbine-bolder shaft supports	2	351.11047.6	INSIDE Ø 47

SPRING ROLL SIZE

Position	no.	part no.	Sizes mm
Engine			
Driving gear of gearbox	1	342.13055.2	5 x 32 SPIRAL
Gearbox			
Flange for forward speed engament	1	342.13055.2	5 x 32 SPIRAL
Pin for forward speed engagement	1	342.13054.1	5 x 24 SPIRAL
Pin for reverse speed engagement	1	342.13054.1	5 x 24 SPIRAL
Pin for implement engagement	1	342.13055.2	5 x 32 SPIRAL
Cutter bar			
Eccentric shaft support	1	342.11055.4	5 x 40
Cutter bar engagement	1	342.11064.6	6 x 40
Lever for implement connection	2	242.13084.3	8 x 40 SPIRAL
Rear rotary hoe			
Rotary hoe engagement	1	342.11064.6	6 x 40
Centering machine/implement	1	342.13120.4	12 x 26
Lever for implement connection	2	342.13084.3	8 x 40 SPIRAL
Lawn mower with front grass bag			
Centering machine/implement	1	342.13120.4	12 x 26
Lever for implement connection	2	342.13084.3	8 x 40 SPIRAL
Lawn mower with side grass bag			
Centering machine/implement	1	342.13120.4	12 x 26
Lever for implement connection	2	342.13084.3	8 x 40 SPIRAL
Snow thrower			
Centering machine/implement	1	342.13120.4	12 x 26
Lever for implement connection	2	342.13084.3	8 x 40 SPIRAL
Turbine fastening	2	342.13064.4	6 x 40

BCS reserves the right to change components or accessories at any time and without notice. This may be done without revising this publication.

BCS S.p.A.



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