

# Tomos A3 Workshop Manual

1988

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## TECHNICAL DATA

<b>Engine</b>	Single cylinder, two stroke, air cooled
<b>Bore x stroke</b>	38 x 43 mm (1.496 x 1.693 in)
<b>Piston displacement</b>	49 cm <sup>3</sup> (2.990 in <sup>3</sup> )
<b>Compression ratio</b>	8.5 : 1
<b>Engine output</b>	0.75 -1.5 KW
<b>Gear box</b>	automatic 2-steps, with two centrifugal clutches

<b>Ignition</b>	Flywheel magneto
<b>Ignition advance</b>	1.8-2 mm B.T.D.C.
<b>Contact breaker gap</b>	0.35-0.45 mm (0.014-0.018 inches)
<b>Spark plug gap</b>	0.5 mm (0.020 inches)
<b>Spark plug</b>	NGK B6HS, Champion L86, Bosch W 4 AC

<b>Fuel</b>	Mixture of 86 octane gasoline and two stroke oil (2%, or 50:1)
<b>Gearbox oil/ quantity</b>	Valvomatic type A Suffix A – SAE 10W30 / 220 cm <sup>3</sup>
<b>Front tire pressure</b>	21 psi
<b>Rear tire pressure</b>	31 psi

<b>Gearbox ratio (I)</b>	17: 74, i = 4.3352
<b>Gearbox ratio (II)</b>	26: 64, i = 2.462
<b>Main shaft</b>	11: 71, i = 6.455
<b>Secondary transmission</b>	chain 90-93 rollers, i = 0.846 – 0.923

<b>Crankshaft out-of-round deflection</b>	max 0.01-0.02 mm
<b>Magneto flywheel deflection</b>	max aksialno 0.1mm max radialno 0.3mm
<b>Clutch drum axial play</b>	0.1-0.3 mm



## NUTS, BOLTS, AND TORQUE SPECIFICATIONS

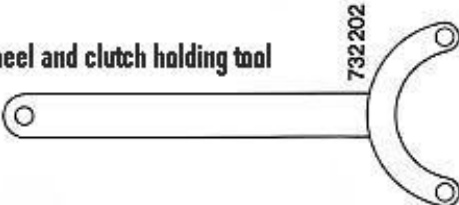
<i>Part</i>	<i>Thread</i>	<i>Torque</i>
<b>Spark plug</b>	M14 x 1.25	18Nm
<b>Cylinder cover</b>	M7	12Nm
<b>Flywheel</b>	M10	30Nm
<b>1<sup>st</sup> speed clutch</b>	M10 x 1	25Nm
<b>2<sup>nd</sup> speed driven gear</b>	M14 x 1	80Nm
<b>Mainshaft chain sprocket</b>	M22	60Nm
<b>Cylinder stud bolts</b>	M7	15Nm
<b>Crankcase</b>	M6	10Nm
<b>LH engine cover</b>	M6	6Nm
<b>RH engine cover</b>	M6	7Nm
<b>Engine-frame fastening screws</b>	M8 x 1	25Nm
<b>Swingarm fastening screw</b>	M12 x 1.25	35Nm
<b>Rear shock</b>	M10	25Nm
<b>Top fork lug</b>	M12	35Nm
<b>Front and rear wheel spindle</b>	M11 x 1	32Nm

## SPECIAL TOOLS


011.008	Gauge pin
702.856	Crankshaft bearings fitting tool
708.253	Connecting rod bush pulling key
714.011	Repair stand
731.155	Crankshaft bearings puller
731.798	Clutch spring fitting tool
732.193	Dial gauge support tool
732.202	Flywheel and clutch holding tool
732.268	Roller clutch installer
732.746	Iskra flywheel puller
735.753	Fork
735.888	Case splitter
736.533	CEV flywheel puller
737.080	Centering pin
975.709	Dial gauge

<b>TOMOS</b>	SPECIALNO ORODJE SPECIAL TOOLS ATREZZI SPECIALI SPEZIALWERKZEUG	<b>AUTOMATIC 3</b>  9
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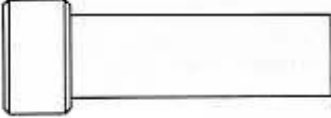
  



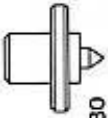
flywheel and clutch holding tool  
732 202



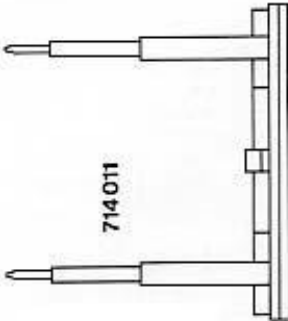
dial gauge  
975 709



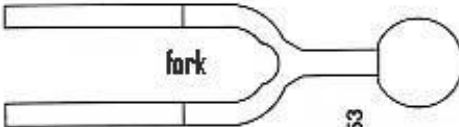
crankshaft bearings fitting tool  
702 856



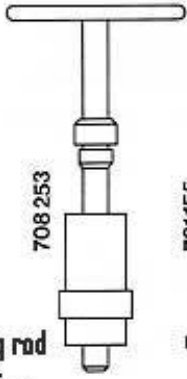
centering pin  
737 080



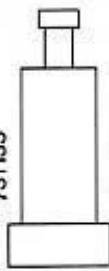
repair stand  
714 011




fork  
735 753




Connecting rod bush pulling key  
708 253



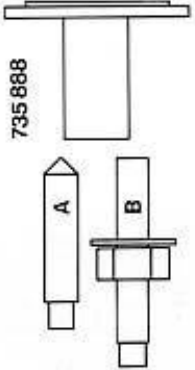
crankshaft bearings puller  
731 155



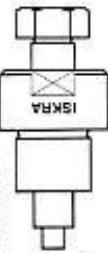
roller clutch installer  
732 268




dial gauge support tool  
732 193



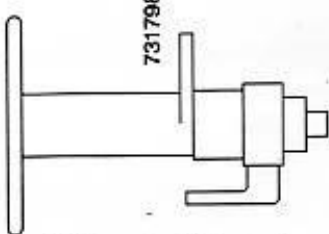
case splitter tool  
735 888




iskra flywheel puller  
732 746



CEV flywheel puller  
736 533



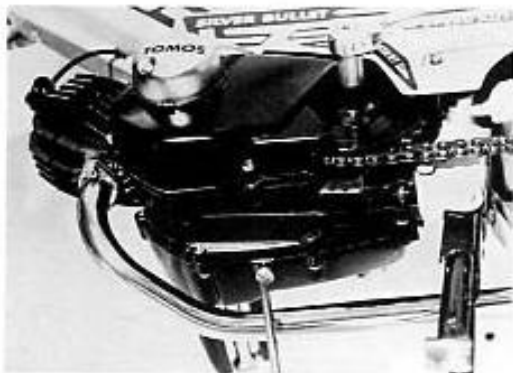
clutch spring fitting tool  
731 796



gauge pin  
011 008

## ENGINE REMOVAL

Drain the oil from the gearbox (fig 1)



1

Unscrew the footrest screw with 17mm wrench (fig 2)



2

With 11mm wrench, unscrew the nut and drive out lever pin (fig 3)



3

For pedal versions, refer to figures 3a and 4a



3a

Remove the hub, cups and springs (fig 4)



4

Unscrew the three screws of LH and RH shield each and detach shields from frame (fig 5)



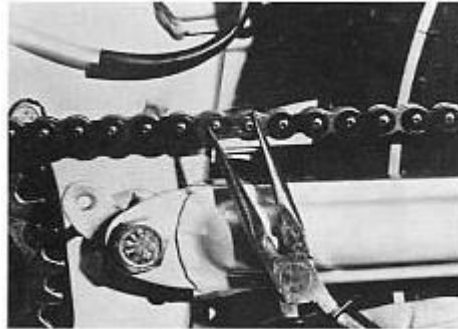
5

Unscrew three screws of magneto cover and detach cover (fig 6)  
For oil pump injection refer to chapter OIL PUMP



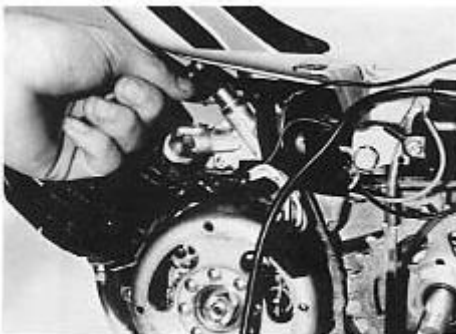
6

Remove the chain by removing master link (fig 7)



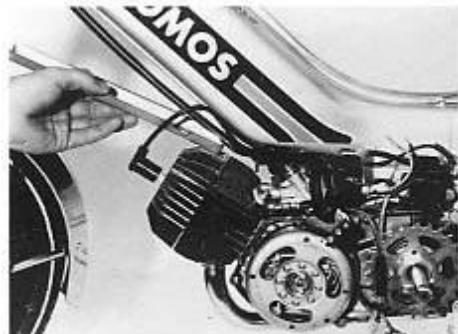
7

Unscrew the crown nut and extract control cable along with throttle piston (fig 8)



8

Unscrew bottom screw on control cable cover and release the spark plug cable (fig 9)



9

Detach all electrical leads (fig 10)



10

Remove fuel supply line. Remove the two exhaust manifold bolts, the fixing screw, and remove the exhaust silencer (fig 11)



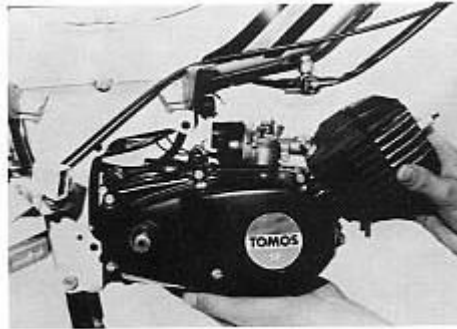
11

Unscrew all three engine screws with two 13mm wrenches (fig 12)



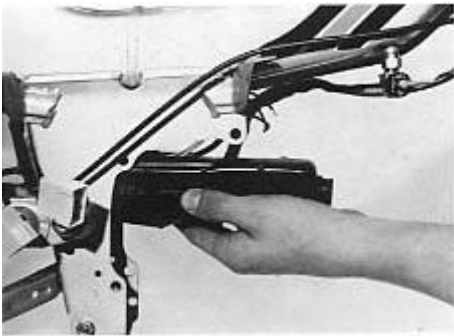
12

Hold the engine by hand. Extract top screw (3) and remove the engine out of the frame (fig 13)



13

Take the intake silencer out of the frame (fig 14)

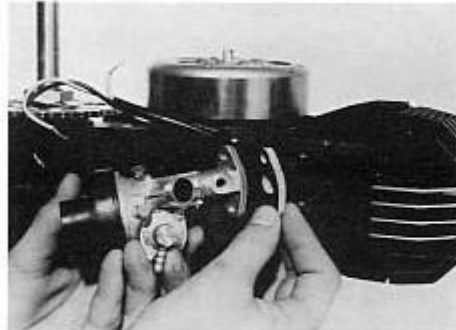


14

## ENGINE DISASSEMBLY



Place the engine on the repair stand (special tool).  
Remove the carburetor and spark plug (fig 15)



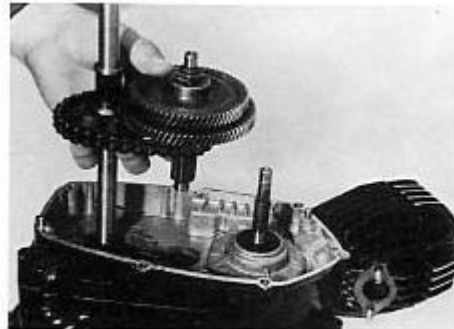
15

Detach clutch drum and sintered bush (fig 18)



18

The pedal shaft and the countershaft are connected by a starter chain, so both shafts will have to be taken out together (fig 19)



19

Remove the standard washers on the crankshaft and on the mainshaft (fig 20)



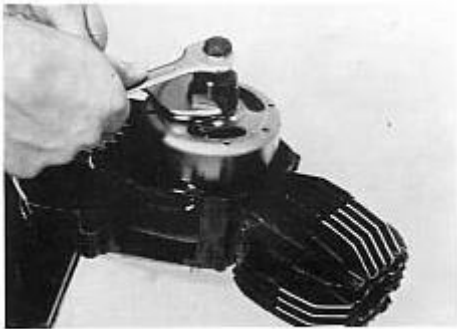
20

Rotate the engine placed on the stand so that the flywheel magneto is on top. Using the flywheel and clutch holding tool to hold the flywheel, use a 17mm socket to remove the flywheel nut (fig 21)



21

The flywheel is removed with the flywheel puller, a 19mm, and a 32mm wrench (fig 22)



22

Make a scribe mark across the bottom of the stator plate and the crankcase in order to facilitate the re-timing. Remove the 3 screws and lift the stator assembly from the engine (fig 23)



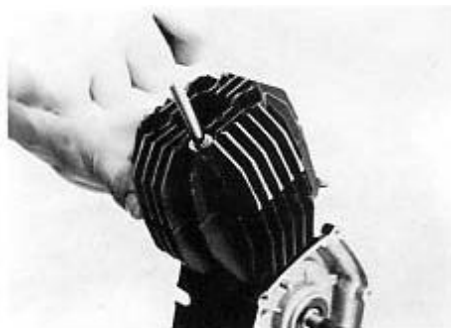
23

Slacken the chain sprocket nut. Using the flywheel and clutch holder tool and a 30mm wrench, remove the sprocket nut (fig 24)



24

Using an 11mm socket, unscrew the 4 cylinder head nuts. Remove the washers, cylinder head, cylinder, and base gasket (fig 25)



25

With pointed nose pliers, remove the gudgeon pin spring circlips (fig 26)



26

Press out the gudgeon pin and remove the piston (fig 27)



27

If the brass bushing in connecting rod needs to be replaced, use the connecting rod bush pulling key, and replace with a new one using same tool (fig 28)



28

Upon installing the new bushing, drill two lubrication holes according to the holes in the connecting rod.

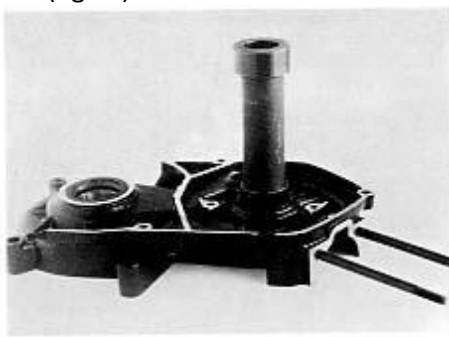
The bush as a spare part has inner diameter 9.80 +/- 0.1 mm and it is necessary to ream it out to increase the inner diameter to 10mm.

Remove the crankshaft and gasket and knock out the mainshaft (fig 31)



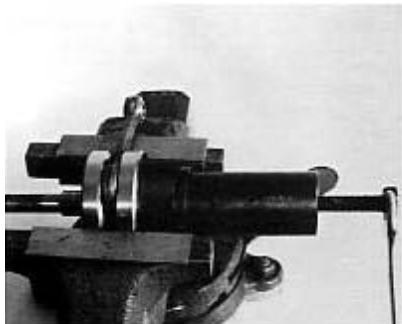
31

In case the crankshaft ball bearing remains in the RH crankcase, use the crankshaft bearings fitting tool (fig 32)



32

If the ball bearing remains on the crankshaft, use the crankshaft bearings puller (fig 33)



33

The mainshaft sealing ring and ball bearing are pressed out by using a suitable socket (fig 34)



34

## CHECKING ENGINE PARTS AND ASSEMBLIES

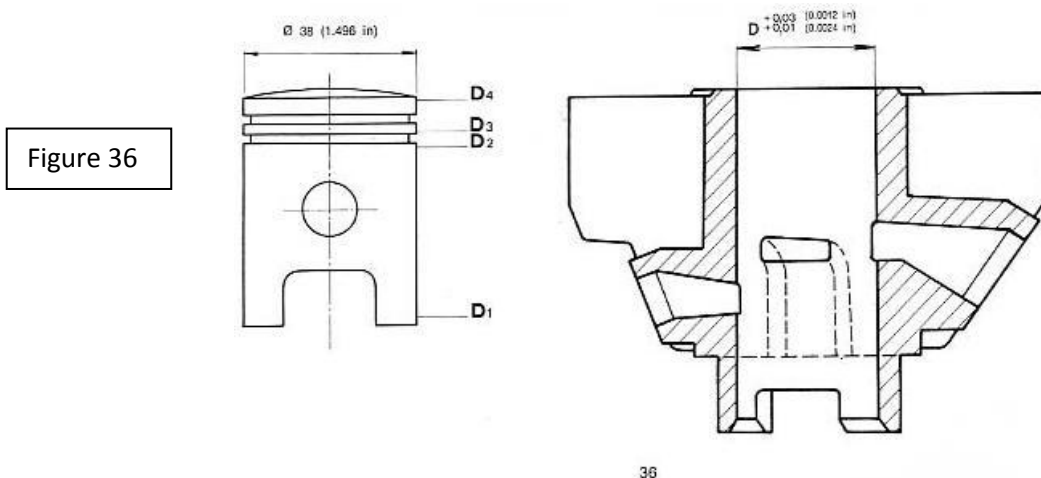
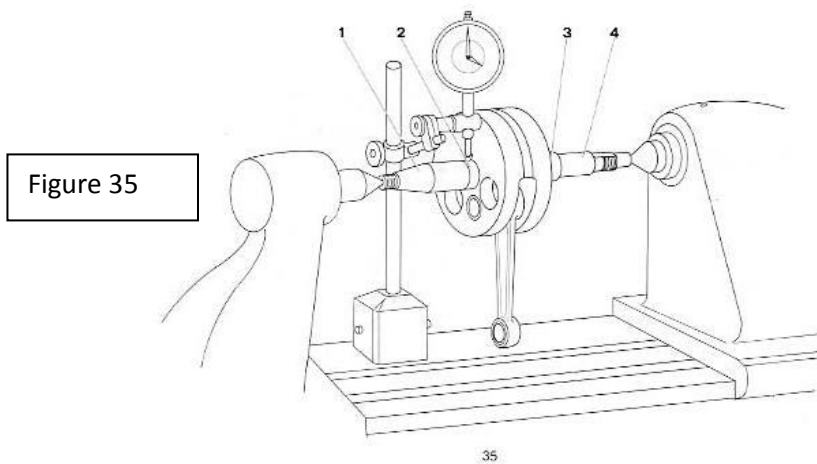
Check both crankcase halves for possible damages or distortions, particularly the joint surfaces, to avoid later leaking of oil from the gearbox.

Check all bearings. If clearance is noticed, the bearings must be replaced.

Check the crankshaft between the center of a horizontal alignment tool and measure out-of-round on all the points indicated in figure 35.

Permissible out-of-round should be within 0.01 mm at check points 2 and 3 and 0.02 mm at check points 1 and 4. Check if the crankshaft conical part is damaged, inspect the thread on semiaxles and the keyway.

Check piston surfaces for possible damages. With micrometer check piston diameter on points d1, d2, d3 and d4 at right angles to gudgeon pin and compare the reading with the corresponding group on piston and in the table (fig 36)



**CYLINDER**

D (mm, in)	
A	B
38.01 <sup>+0.01</sup> (1.4964 <sup>+0.0024</sup> in)	38.02 <sup>+0.01</sup> (1.4968 <sup>+0.0024</sup> in)

$D > D_1$  max 0.012 mm

Max permissible bore taper: 0.006mm

**PISTON**

	D1	D2	D3	D4
A	37.95 <sup>+0.01</sup>	37.91 <sup>+0.01</sup>	37.87 <sup>+0.01</sup>	37.85 <sup>+0.01</sup>
B	37.96 <sup>+0.01</sup>	37.92 <sup>+0.01</sup>	37.88 <sup>+0.01</sup>	37.86 <sup>+0.01</sup>

L = 50 mm

L = 52.5 mm

L = 55 mm

Piston I. oversize:  $\varnothing$  38.50mm

The cylinder must be bored and honed as shown in the table:

**OVERSIZE CYLINDER**

D (mm, in)	
A	B
38.51 <sup>+0.01</sup>	38.52 <sup>+0.01</sup>

## CHECKING, DISMANTLING, AND ASSEMBLING OF THE CLUTCH

Remove the circlip and separate the 1<sup>st</sup> and 2<sup>nd</sup> speed clutches (fig 37)



37

In this manner, brake strips are released, and all three shoes can be removed (fig 39)



39

Fix the main pin of the clutch spring fitting tool with the thinner part facing upwards. The spring joint must be placed in the middle of one shoe. With the lever of the device, insert the spring into the shoes groove (fig 41)



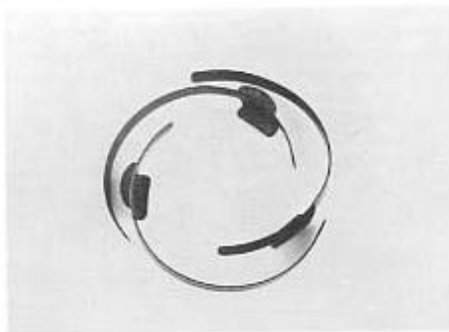
41

Dismantle both clutches. The spring is removed with a screwdriver (fig 38)



38

Press pins out of shoes and check brake strips, spring inside of shoes and 2<sup>nd</sup> speed clutch gear. At first, assemble the 1<sup>st</sup> speed clutch as reversed order of dismantling. Particular care should be taken of brake shoes; they must protect each other from falling out (fig 40)



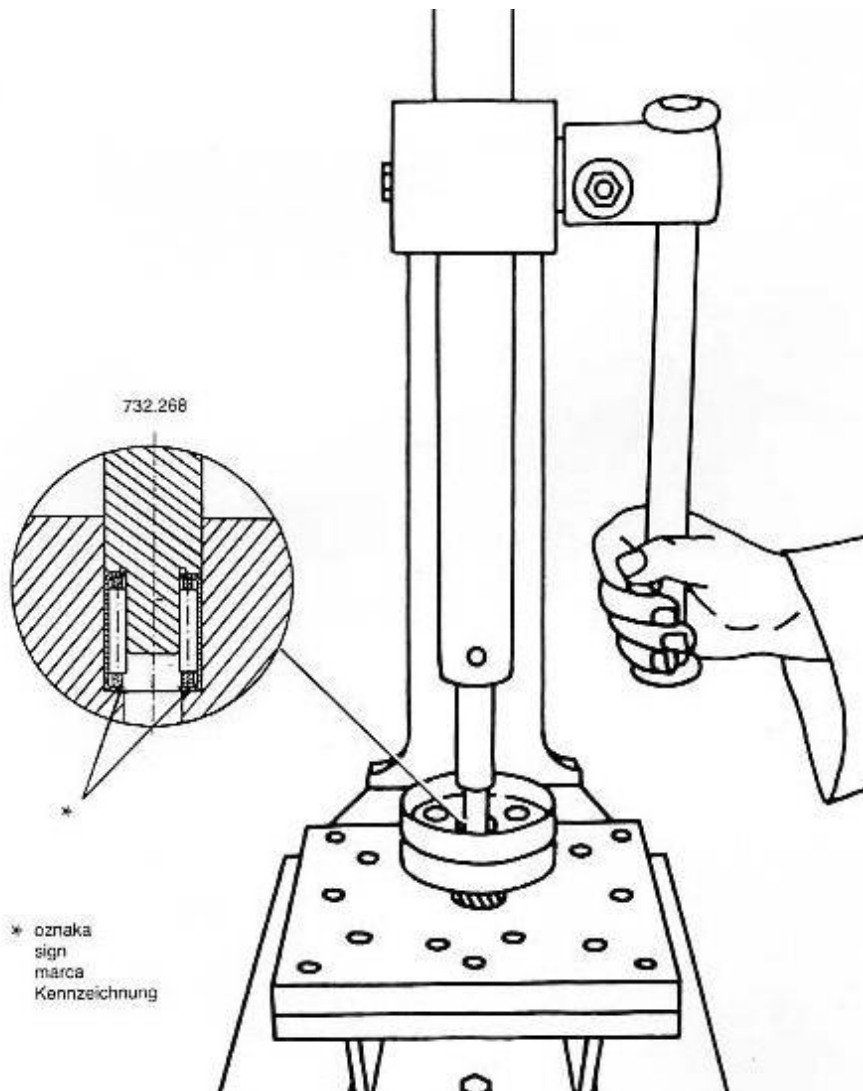
40

To assemble the 2<sup>nd</sup> speed clutch, turn the device over. The clutch hub with gear must be placed in the way the gear is on the bottom and the gap between the two shoes fits with the pin. The manner of mounting the spring is the same as mentioned before for the 1<sup>st</sup> speed clutch (fig 42)



42

Dismantling of the needle clutch is necessary only in case of replacement. A new needle clutch is pressed with special tool "roller clutch installer." The needle clutch must be pushed with the signed side towards the center of the clutch drum, or else it may operate in the reverse direction (fig 43)



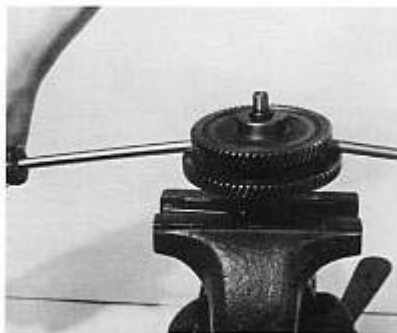
## DISMANTLING, CHECKING, AND ASSEMBLING OF THE COUNTERSHAFT

Fix the countershaft into a vice and unscrew the nut with a 19mm wrench (fig 44)



44

Remove the 2<sup>nd</sup> speed gear (fig 45)



45

Remove the circlip at the shaft's tothing (fig 46)



46

Unfasten the wire spring and separate a small chain sprocket with roller cage (fig 47)



47

Remove the 1<sup>st</sup> speed gear and shake the rollers out (fig 48)



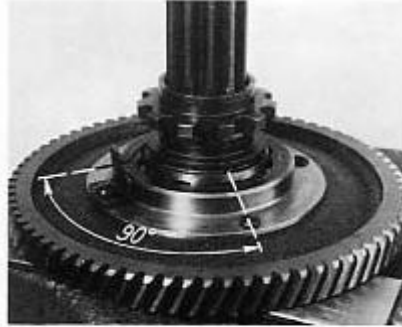
48

If troubles appear in the self-locking clutch, consisting of rollers with 1<sup>st</sup> speed gear hub, possible damage of the countershaft may be repaired by grinding the bearing surface for 0.1mm at the most. When most rollers make small hollows in the hub, the latter can be honed. If hollows are rather large, the gear should be replaced.

Reassemble the countershaft in reverse order of dismantling.

Use of grease is not suggested because it may impede the function of the self-locking clutch.

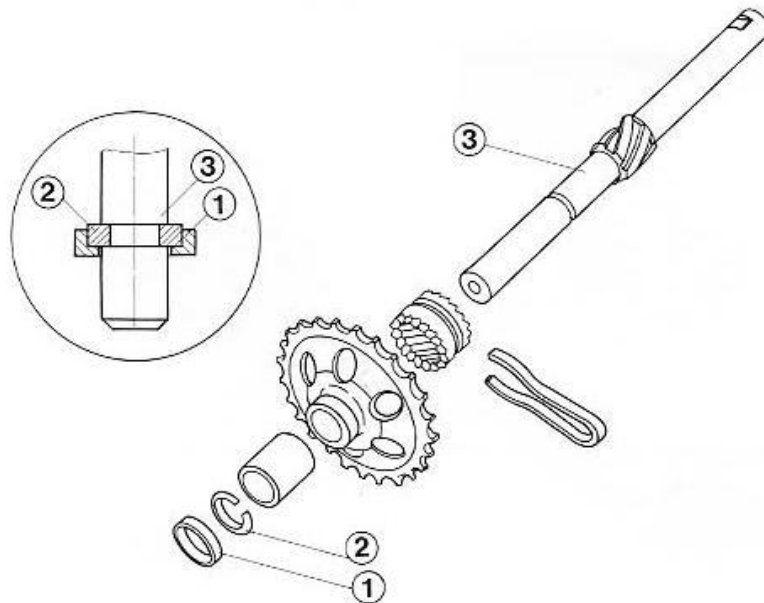
Put the chain sprocket in with cage so that the beginning of the wire spring is turned 90 degrees left-ward from the spring nose (fig 49). Lock the wire spring to riveted nose on the 1<sup>st</sup> speed gear



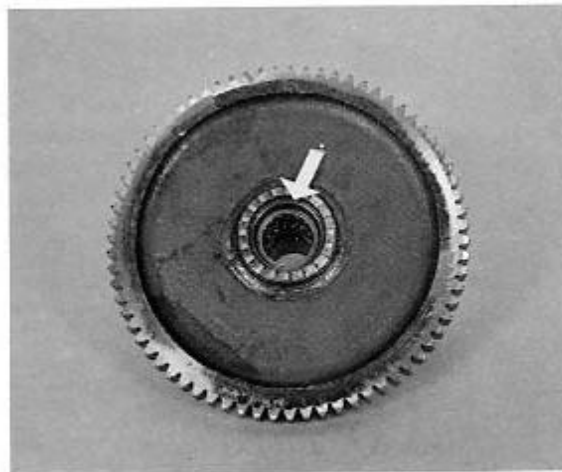
49

## CHECKING PEDAL SHAFT (kickstart) AND TRANSMISSION CHAIN

If it is necessary to replace the chain sprocket or claw collar on the pedal shaft or kick start, first remove the protective ring (fig 50/1) and the spring washer (fig 50/2). During assembly, take care that the thinner part of the collar is mounted forward or else the brake spring will slide across the chain sprocket. Check the chain for overtensioning or other damage. In case of damage, the needle bearings in the main shaft should be replaced with a new complete main shaft (fig 51)



50



51

## CARBURETOR CHECKING

Dismantle the carburetor into component parts (fig 52 Encarwi or 52a Dellorto). Clean the parts with carb cleaner and blow them out with compressed air. Check the parts. In case of wear throttle slide or leakage of float, replace with a new one. When reassembling the carburetor, take care that the float needle fits the float chamber cover. Slightly oil the air filter with light oil.

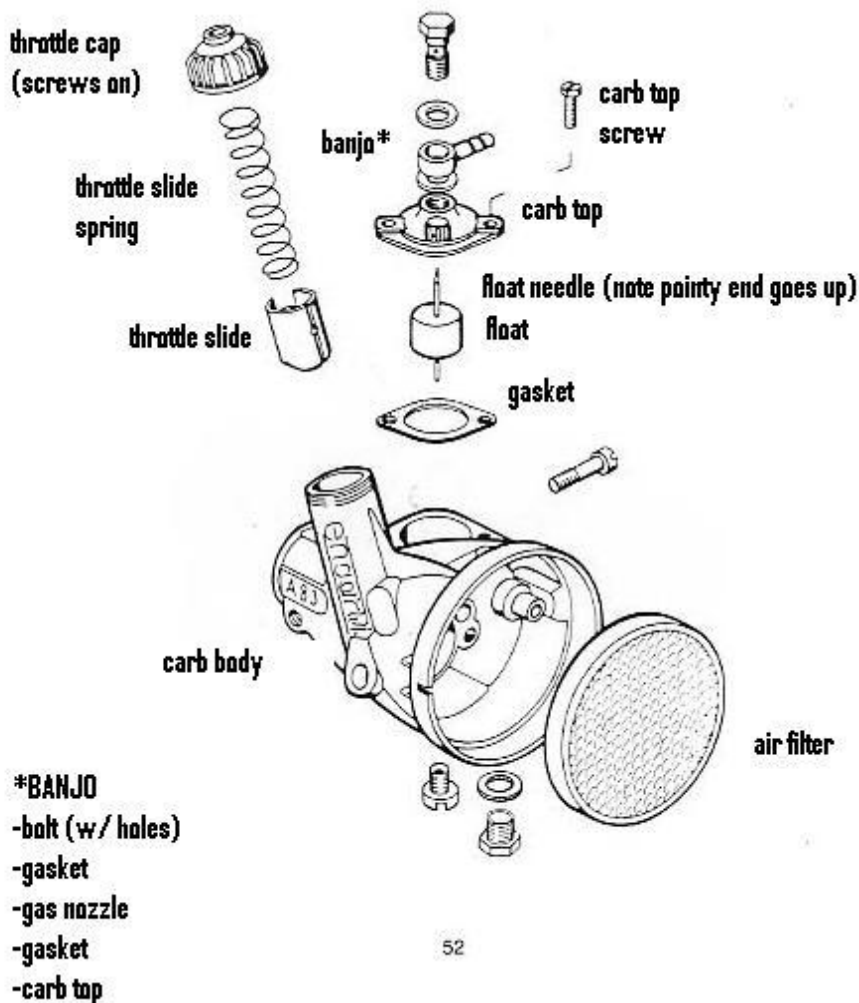


FIGURE 52 – ENCARWI CARBURETOR

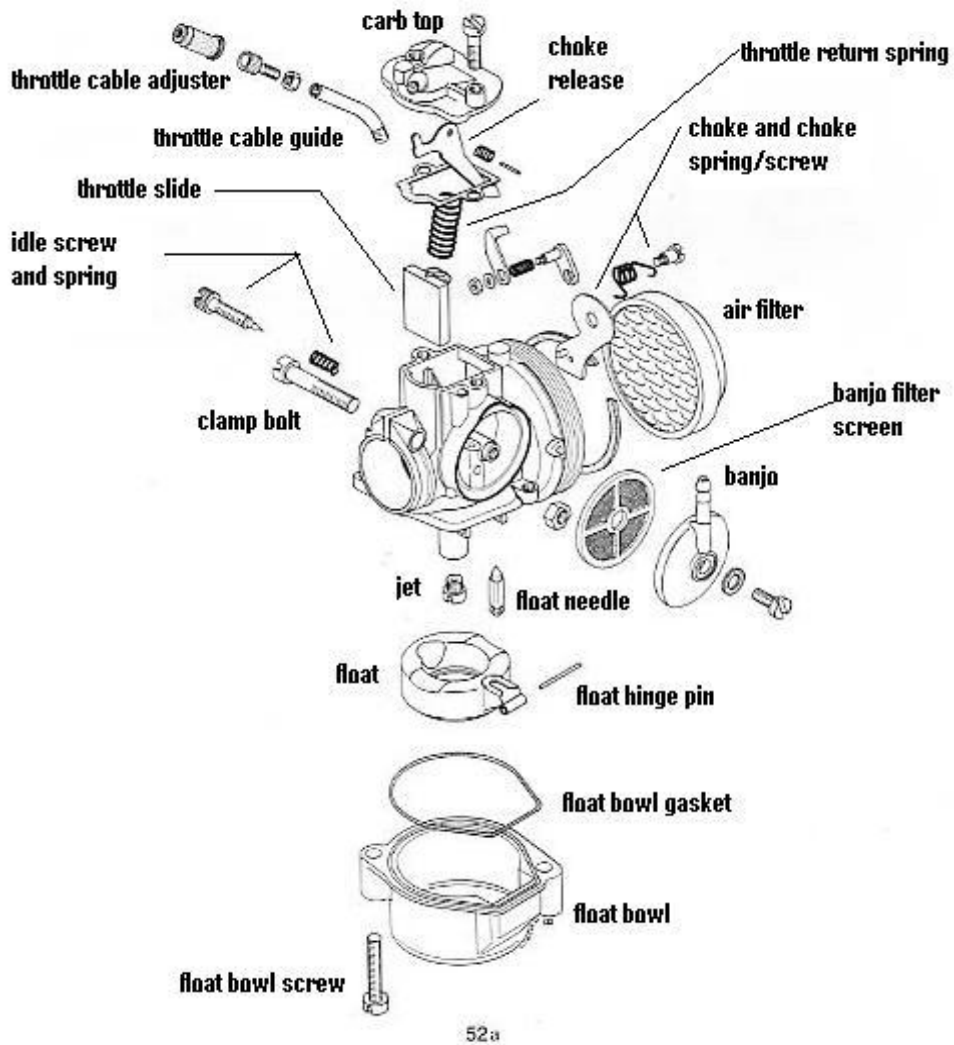
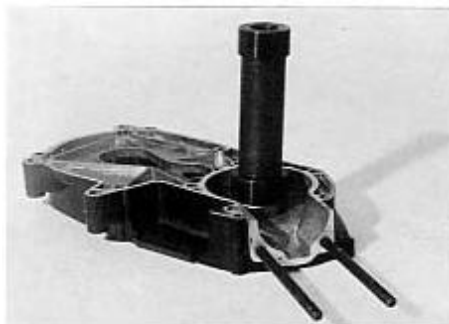


FIGURE 52a – DELLORTO CARBURETOR

## REASSEMBLING THE ENGINE

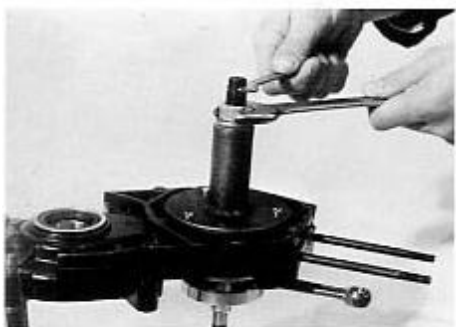
When reassembling the engine, replace all seals and gaskets. All parts of the engine should be thoroughly cleaned and lightly oiled. All gaskets should be given a light coat of grease to insure better fit and seal.

With the crankshaft bearings fitting tool, press the crankshaft ball bearings into both crankcase halves (fig 53)



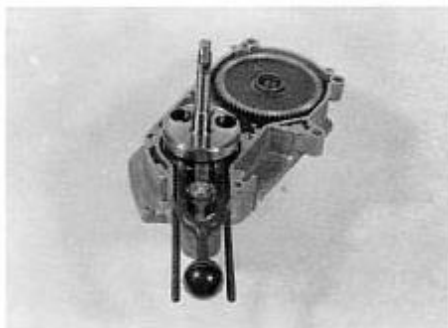
53

Insert the crankshaft into the LH half of the crankcase using the splitter. Through the splitter, screw the device on the crankshaft. With an 11mm and a 24mm wrench, place the crankshaft in the crankcase (fig 54)



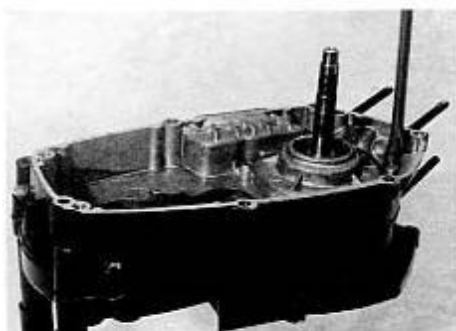
54

Place the mainshaft and a washer on the mainshaft needle bearing. Insert the fork between the two halves of the crankshaft (fig 55)



55

Join the right crankcase with the left one, acting as follows: (1) Press the two crankcases by hand and then lightly tap them together with a mallet (2) Insert the 6 screws in the inner holes and 2 in the outer holes. Slowly tighten the screws (fig 56)



56

With the crankshaft bearings fitting tool, insert both crankshaft seal rings.

**WARNING:** The LH carter seal ring is facing towards the connecting rod, while the RH side is opposite.

Check that the crankshaft turns freely. Insert pedal shaft or kick shaft together with countershaft and chain (fig 57)



57

The claw collar brake spring must seat in the recess in the RH half of the crankcase. Place washer 209.005 and bush 209.072 on the crankshaft (fig 58)



58

Incorporate the clutch drum with mounted 2<sup>nd</sup> speed clutch (fig 59)



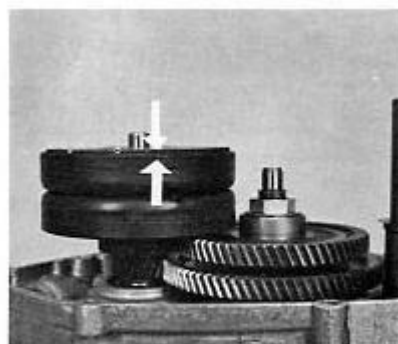
59

Handle the roller clutch carefully and if it is necessary, turn the drum only counterclockwise (direction of free rotation). Place the trust washer under the clutch (fig 60)



60

Incorporate 1<sup>st</sup> speed clutch and protective washer. With the flywheel and clutch holding tool, lock the nut with a 19mm wrench. Torque to 25Nm. Clearance between shoes and clutch drum rim is approx. 0.4 mm. Axial clearance of the clutch drum is from 0.1 mm to 0.3 mm by means of inserting the adjusting thrust washer of 0.3 mm or 0.5mm under the clutch (fig 61)



61

Before securing the nut with washer, it is necessary to check the proper function of the assembly. Firmly hold the 2<sup>nd</sup> speed driven gear with the left hand and the clutch drum with the right hand. When the clutch drum rotates counterclockwise, both clutches idle. When it rotates clockwise, the motion is transmitted to the crankshaft (fig 62)



62

Fit the gasket and cover and tighten 7 screws with torque of 10Nm (fig 63)



63

Turn the engine on the stand 90 degrees. Clean residue of crankcase gasket. Mount the piston so that the arrow sign on the top of the piston is facing the exhaust side of the cylinder (fig 64)



64

Make sure the piston rings are installed properly by aligning them with the stationary pins mounted in the ring grooves of the piston. Compress the piston rings and mount oiled cylinder (fig 65)



65

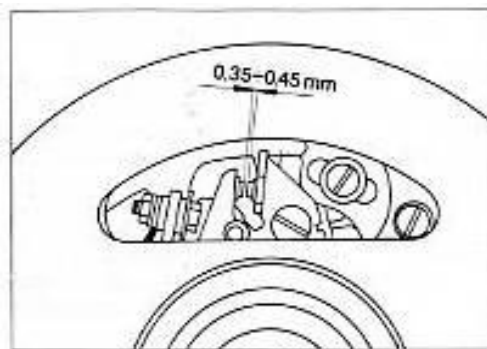
Mount the cylinder head, washers, and nuts. Tighten them in an X pattern, torque to 12 Nm. Turn the engine so that the magneto flywheel side is on top. Install the stator base plate. If necessary, slightly oil the felt inset piece of the base plate. When mounting the magneto flywheel, take care when positioning it. The groove on the flywheel hub and the woodruff key on the crankshaft must coincide. Fit the washer and nut, lock the flywheel with the flywheel and clutch holding tool, and tighten the nut to a torque of 30 Nm.

Place the distance bush, chain sprocket, and protective washer on the main shaft and tighten the nut with a 30 mm wrench. Lock the chain sprocket with the flywheel and clutch holding tool.

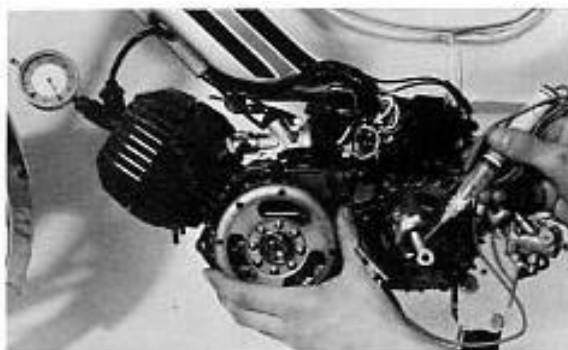
## ADJUSTING THE CONTACT GAP AND IGNITION ADVANCE

These two operations are interrelated and proceed as follows.

- Screw the dial gauge support tool and the dial gauge into the spark plug hole.
- By rotating the flywheel, put the piston at TDC and set the dial gauge to zero.
- The breaker points are fully open at TDC. Check and if necessary, reset the gap between 0.35 and 0.45 mm (fig 66)
- Rotate the flywheel in the clockwise direction until the breaker points connect. With a test light, buzzer or Ohm meter, determine when a connection is made. The testing device must be connected to the short circuit (black) wire and to the ground of the engine (fig 67)
- At the moment of connection of the points, the test battery light will glow brightly, the buzzer will change the acoustic frequency, or the Ohm meter will show approximately zero Ohms. On the dial gauge, read off the value in mm of the ignition advance which must be from 1.8 to 2 mm BTDC.
- In case of excessive advance, the stator base plate should be rotated in the direction of engine rotation (see arrow on flywheel). In case of insufficient advance, turn the plate in the opposite direction.



66

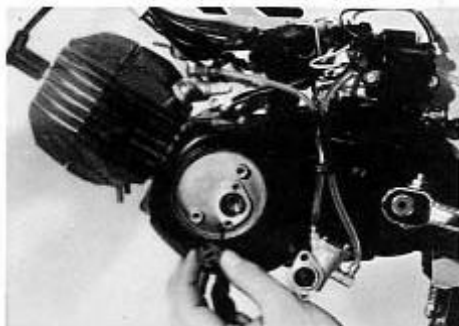


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## OIL PUMP

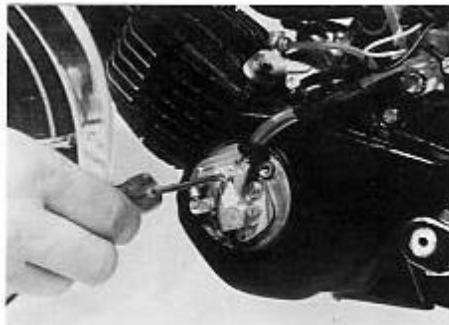
*After assembly or repair of models with oil pump, you must keep to the following instructions*

The pump is connected to the magneto nut on the crankshaft by a special clutch (fig 68)



68

Unscrew the bleed screw on the oil pump and wait until oil from the tank under the seat flows to the pump. The screw is then screwed on (fig 69)



69

Pour approximately 1 liter gas mixture in the ratio of 50:1 (2% oil) into the fuel tank and start the engine. Let the engine run for about 5 minutes so as to make the oil pump push oil into the engine.

Fill up the tank with regular gas.

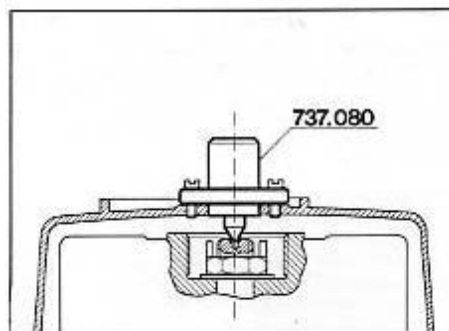
Ensure that the oil level in the oil tank does not fall under the marking MIN (fig 70). Pay special attention to the routing of the oil lines to and from the oil pump. If the outflow line is crimped, oil will not reach the carburetor, causing engine damage.



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Note: When fitting the magneto cover on oil pump models, make sure the oil pump seat axis lines up with the crankshaft axis. Use the centering pin attached to the magneto cover (fig 71) for this purpose. When the center has been found, push the cover by hand onto the crankcase (which is made possible by the spring in the centering tool) and fix the cover by screwing it down.

Major deviations from the center result in the clutch damage, and this, in turn, causes the oil pump drive stoppage. The lubrication of the cylinder, piston, and crankshaft of this unit is thus cut off, which may lead to breakdown of the unit.



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## MAGNETO SETTINGS AND ELECTRICAL EQUIPMENT

The **voltage regulator** should be checked when bulbs blow frequently. During the check, the engine should be operating and the lights switched off-on, alternatively. The voltage should always read 12+/- 0.5 V. Before replacing the regulator, make sure the improper operation is not due to bad grounds.

The **direction indicator relay** should be checked within the wiring system. Previously check the bulbs and direction indicators switch.

The **STOP switch** should be checked by a pilot bulb or OHM-meter. When replacing the switch, make sure the new one is identical to the replaced one since there are two types of STOP switches (those that are switched on in neutral position, and those that are switched off in neutral position)

**Electric wiring** and combination switches are checked according to the wiring diagram. Check the magneto components both within the wiring system and separately.

The **flywheel** should be checked by visual inspection for mechanical damage and proper cone fit. Check deflection by help of the crankshaft. The maximum permissible axial deflection amounts to 0.1 mm and radial deflection to 0.3 mm.

To check the **capacitor** it should be separated from other electrical components of the magneto. Check the capacitor capacitance by means of a capacitance meter and the ability of the capacitor to retain an electric charge.

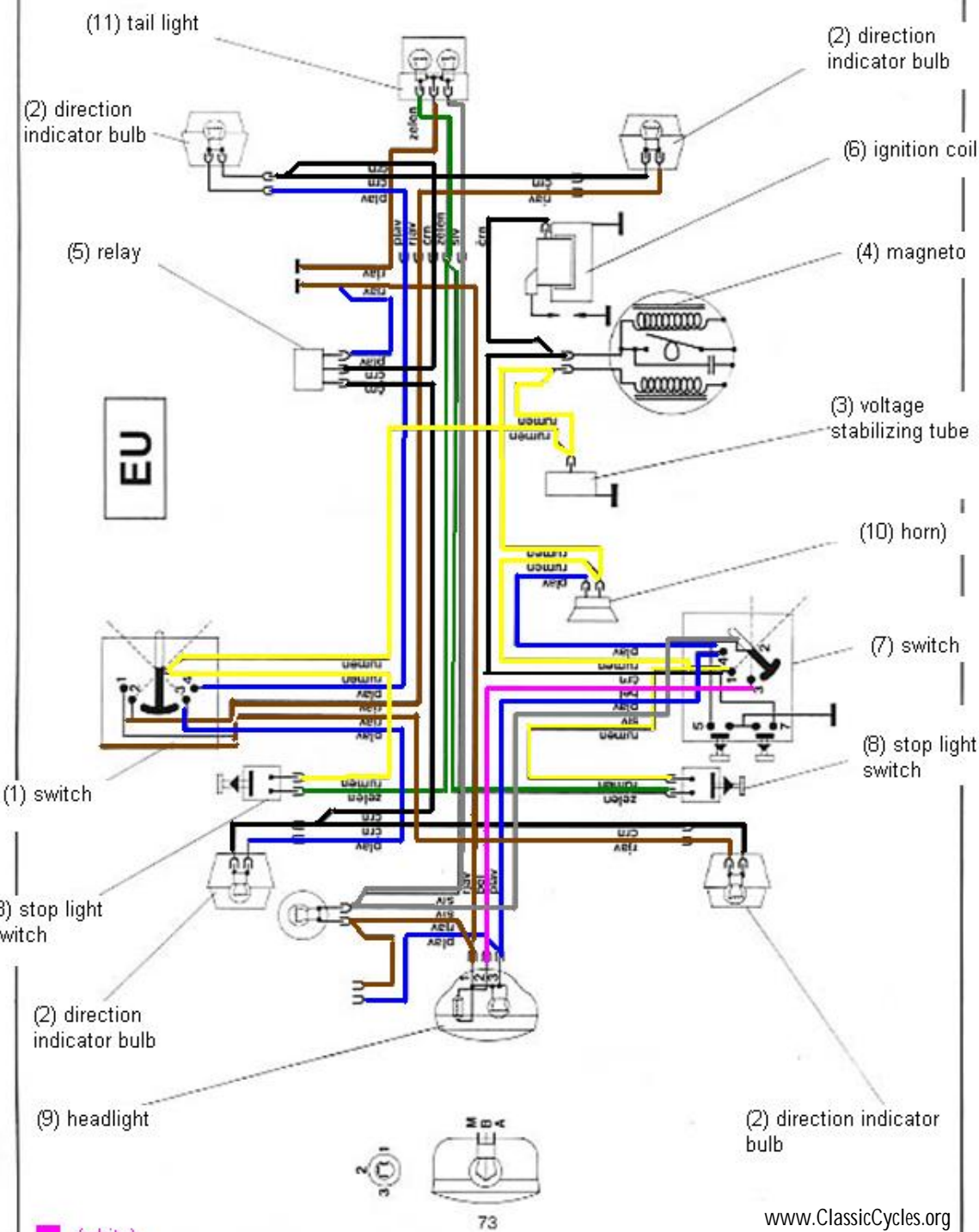
**NOTE:** Caution is recommended in handling the non-insulated parts since there is a possibility of an electric shock. The capacitor should, therefore, be discharged by connecting the two contacts.

**Contact breaker:** check the contacts and the cam nose for wear. Insert insulating mass between the two breaker contacts and by an OHM-meter make sure the parts are electrically disconnected (there exists a possibility of uncture on the bearing bush or fixing bolt insulation)

The **ignition coil** both external and internal can only be checked if a special mototester is available. The checking procedure is laid down by the manufacturer of this device. If this is not available, a possible fault can be established by replacing a truly good sample coil for the existing coil.

The **lighting coil** should be checked with engine in operation (2000-3000 RPM). To check the coil, use a voltmeter and an approximate bulb of the same rated power (W) as the magneto.





ClassicCycles



(11) tail light

