

# Engine overhaul TM – KZ – 1st Part

by Stefano Minucci | 8 May 2018 | The do-it-yourself kart | 0 comments

**Overhauling an engine is a fundamental practice to keep it always at TOP performance, it is therefore essential to carry out the operations accurately and consciously.**

Fabio, who for over 20 years , proposes the operations to be performed for the overhaul of a KZ engine. has been dealing with everything related to karting

**SUPPORT** - You can find the exploded views at this [link](#)

## PRELIMINARY

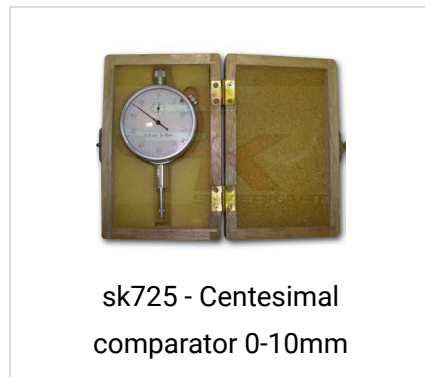
1. Install the timing check tool (sk84 + possible sk725) on the spark plug hole
2. Bring the piston to TDC
3. Go back by turning the crankshaft in the opposite direction to that of rotation until the reference line of the ignition stator coincides with the reference line of the ignition rotor. At this point, read the ignition advance setting value on the comparator.

**The calibration values are generally 1.5mm before the top dead centre, but higher values can also be reached.**

Bear in mind that the more you do a high advance, the more we will have an engine with low pull and vice versa.



sk84 - Phase Control Tool

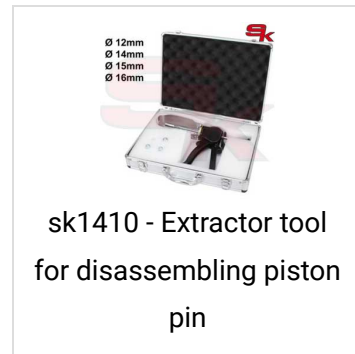


sk725 - Centesimal comparator 0-10mm

Obviously this value also affects the carburetion.

## Engine overhaul

1. Remove the cylinder by removing the 4 nuts which secure it to the engine block
2. Remove the two piston pin clips
3. Pull out the piston pin. (tool sk1410).
4. Remove the cylinder base gasket, measure
5. Note the thickness with the micrometer and then measure the squish
6. Remove the reed valve pack using the 4 fixing screws
7. Remove the pinion retaining segger.
8. Remove the sprocket spacer and the relative sprocket o-ring
9. Remove the ignition rotor, **absolutely avoiding the use of an air pistol** which damages all the various engine components, but use the PVL ignition key sk87 and the PVL ignition puller sk34/09
10. Undo the three screws that secure the PVL stator to the engine block
11. Remove the ignition key from the crankshaft to prevent it from damaging the oil seal upon reassembly.
12. Unscrew the 5 ergal nuts that secure the clutch pressure plate
13. Remove the pressure plate, the clutch springs and all the clutch plates both lined and in steel
14. Unscrew the tambourine nut
15. **We recommend using our sk1093 key**
16. Now remove the shim that is behind the tambourine
17. Remove the oil drain plug located under the engine base and drain the oil
18. Undo all the screws that fix the clutch cover
19. Remove the clutch cover
20. Remove the shim placed on the primary shaft which is under the clutch unit
21. Extract the seeger that secures the primary pair pinion to the crankshaft
22. Remove the primary pinion
23. Extract the gear drive shaft **sk1438** taking care to **with a finger** hold the gear lever return spring **sk1052**
24. Place the engine on its side in order to have easy access to all the screws of the crankcase on the left side and unscrew them all
25. blows **At this point, to separate the two crankcase halves, it**



**is necessary to give light** with a copper hammer on the secondary shaft of the gearbox (basically where the chain sprocket is housed and above the crankshaft) that even if it is misaligned it does not cause a problem because it goes however completely disassembled

26. To ensure that the gearbox remains in its place, it is **very important as soon as the two crankcase halves start to move away from each other, to tilt the engine to the right side** because the change must remain on that side since there is the desmodromic, forks, etc., therefore, you need to apply some pressure on the secondary shaft at the point where the pinion goes so as to remove the left half crankcase and **pay close attention to ensure that the gearbox remains composed on the right side in the meantime**

27. Check with fine pliers that the two pins of the forks do not slip out, but that they remain inserted in the right side of the crankcase.

**In doing so we find the left crankcase half in hand and the entire gearbox and crankshaft on the right side**

28. Remove the crankshaft from the crankcase half by simply sliding it off the main bearing

29. Remove the entire gearbox group.

To do this, **remove the two pins of the forks only from the crankcase half, but not completely** , to prevent the forks from falling out

30. With two hands it is necessary to wrap the two gearbox shafts and with the right hand it is necessary to go well to the bottom of the secondary shaft to go to hold the gear which is placed at the bottom of all as it is not fixed and tends to fall with the relative roller in the center and the relative shim that rests on the bearing at the bottom of the crankcase half

31. A once you have taken the change with both hands as described above, you have to do it a little force to remove the two shafts from the crankcase

32. Now we will find all the complete change of forks, pins and everything how much, in hand, just lay it on a clean cloth so that the oil left on the sprockets flow out.



sk1093 - Wrench for K8,  
K9, K9B, K9C, KZ10  
Clutch Drum  
disassembly

# Engine overhaul TM – KZ – 2nd part

by Stefano Minucci | June 7, 2018 | The do-it-yourself kart | 0 comments

## The technical section dedicated to the " Tm - KZ engine overhaul " continues with the 2nd part

If you missed the first part, this is the [link](#) to consult it.

33. Remove all oil seals from crankcase

34. Remove the two main bearings

*if possible heat the crankcase a little and then it is a good rule to put a contrast support where in practice the crankshaft is housed and on the opposite side with an aluminum cylinder with a diameter of about 30mm and a hammer bring out the two main bearings with a few hits*



**sk380 - Main bearing type 6205 C4 - TM 03004**

35. Thoroughly clean the two half crankcases from oil and gasket residues.



**sk609 - Spring for push rod, TM 16012**

*Use petrol or similar, with a compressor use an air jet for residues of all kinds*

36. Double-check that the two joining surfaces of the two crankcase halves are perfectly smooth and without any residue of gasket paste

37. Take the two new main bearings, sk380

38. Remove the protective bag



39. Put them back in the cardboard box
40. Put them in the freezer
41. Preferably heat the semi-crankcase in an oven or alternatively an air gun like for body builders is also fine

**NOW, as quickly as possible, remove the bearing from the freezer and insert it in the crankcase housing**

If the operation has been performed correctly, the bearing goes inside without applying the slightest pressure on it.

The same operation goes for the two main bearings.

42. Carefully check the various gear wheels for wear
43. Check that the forks are in perfect condition
44. Check that the entire gearbox department is in perfect condition
45. Take the right side cover
46. Remove the screws that fix the plate of the ratchet holder group, they are 2 Allen head screws and two countersunk head screws with recessed Allen key. Pay attention that the two flared screws are a bit delicate and in some cases are stopped with a bit of threadlocker. If the head is damaged it will become difficult to loosen them, therefore it is **strongly recommended to use a high quality wrench in excellent condition** .

47. Once the two plates have been removed, remove the ratchet holder gear **taking care to keep the two ratchets compressed towards the centre** , otherwise having the springs underneath they risk blowing everything up
48. Now gently open your fingers and release the pressure from the two clips
49. It is strongly recommended to always replace the two toe clips (sk609)
50. Check carefully that both the two push rods

### sk817 - Tip for Gear Ratchet, TM 26062



### sk835 - Upper Gear Ratchet, TM 26060



### sk834 - Lower Gear Ratchet, TM 26061



### sk2035 - Gearlock plate KZ10B - KZ10C, TM 26140

(sk817) and the two ratchets (sk835) and (sk834) are in perfect condition otherwise replace them

51. Now reassemble everything being careful to insert the two ratchets and relative push rods in their seats

52. Tighten the 4 fixing screws of the two plates

53. Insert the complete derailleur into its housing simply by carrying out the operation described for disassembly in reverse order.

**It is very important to check before inserting the gearbox that the reference on the desmodromic that identifies the neutral is actually in the neutral position and to do this it is necessary to find the notch on the desmodromic which has the smallest chamfer of all which is the one relating to neutral and place it under the gear lock plate wheel (sk 2035)**

In this way, as soon as the gearbox is inserted in the crankcase half, it is immediately possible to verify that everything has been done correctly, therefore **by turning a shaft the other must remain stationary** because it is in the neutral position. It is also a valid method for checking that the three forks are all inserted correctly. .

# Engine overhaul TM – KZ – 3rd part

by Stefano Minucci | Jun 26, 2018 | The do-it-yourself kart | 0 comments

## The technical section for the " Tm - KZ engine overhaul " continues

If you missed the first and second part this is the [link](#) to consult them.

54. We are in the moment of overhauling the crankshaft and in order to carry out this work correctly we need:

- a hydraulic press to be able to open and close the two half shafts of the crankshaft.
- crankshaft disassembly tool (sk1174).
- crankshaft assembly tool (sk1173).
- bushing for aligning the coupling axis (sk1185).
- crankshaft control tool, but a lathe with relative tailstock can also be used.
- comparator with stand to be able to check the alignment (sk725)

55. As a first operation it is good

*measure the width of the crankshaft with a micrometer a few millimeters away from the coupling axis*



**sk1174 - Crankshaft disassembly tool**



**sk1173 - Crankshaft assembly tool**



**sk1185 - Shaft assembly tool**

in this way we have a reference measure which must be used when we will close the tree.

*It is advisable to always take two or three measurements at that point so as to avoid any errors*



**sk725 - Centesimal comparator  
0-10mm**

crankshaft disassembly tool, [56](#). Using the [sk1174](#) separate the two half-shafts using the press.

57. Now remove the connecting rod, the roller table and the shims and remove the coupling axle from the second half-shaft as well.

**IMPORTANT** – *Remove the coupling pin by pushing it inwards of the tree and not towards the outside because otherwise it gets very stressed plus the material.*

58. Insert the new axis of coupling in one of the two half shafts using the cover of crankshaft fitting tool [sk1173](#) and bushing tool [sk1185](#) to keep the coupling axis perfectly orthogonal.

59. Place one of the two half-shafts inside the "cup", under the press.

60. Position the coupling axle using the bush [sk1185](#).

61. Insert the axle until it is flush with the outside of the drive shaft.

62. Insert this drive shaft into the other part of the shaft fitting tool, ie in the deepest 'cup'.

63. Insert a shim washer in the coupling shaft, the IKO roller table, the connecting rod, the other shim washer.

64. Insert the other bare half-tree into the shallower glass, that one previously used as a support to insert the axis of coupling,

*and very delicately the whole assembly is inserted into the lower part of the shaft assembly tool*



65. Be very careful to make the coupling axis coincide with the half shaft just positioned.

**ADVICE** - Do this operation over the workbench vice open by approx 40 mm so that the half shaft part protrudes from below to the tool and do not disturb while inserting the various details.

## Engine overhaul TM – KZ – 4th part

by Stefano Minucci | 4 Aug 2018 | The do-it-yourself kart | 0 comments

### The technical section for the " Tm - KZ engine overhaul " continues

If you missed the previous releases this is the [link](#) to consult them.

66. Once the final part has also been positioned as described above, use the press and press the shaft fitting tool so that the two semi-cups approach each other.

67. At the moment there is no longer any travel it means that the coupling axis has reached its right position.

68. Open the fitting tool and remove the complete crankshaft.

69. Measure the width of the two shoulders to understand the coupling measure and tile

**ATTENTION** it is useless to start aligning the shaft because during any operations to modify the closure size it would obviously go out of alignment again.

70. Position the shaft on the crankshaft checker to align.

**SUGGESTION.** Possibly it is also possible to use a lathe by placing the shaft between two tailstocks.

71. Position the two dial indicators as far away as possible from the two support points of the shaft in order to better highlight the alignment error.

72. After measuring, remove the shaft from the check shaft checking tool.

73. Using a copper hammer and anvil to contrast, make the necessary corrections so that the comparator is as close as possible to zero.

**NOTE .** Being a racing engine it is **not advisable to go beyond one hundredth of tolerance .**

Other important aspect is the measurement of the two bench supports, which in practice are the two spaces where the main bearings work.

74. With a micrometer it is necessary to measure the diameter which must not be below  $\frac{3}{4}$  cents compared to the measure made by the parent company, otherwise the shaft must be replaced or nickel put back on the seats.

Indeed if it is undersized, there will be a risk of air being sucked from part of the main oil seals, with consequent carburetion jolts e various problems, also the tree will start to vibrate and there is the concrete possibility that on the right side there is an oil intake of the change towards the combustion chamber with consequences of carburetions complicated and very high risk of destroying the gearbox due to lack of oil.

## Engine overhaul TM – KZ – 5th part

by Stefano Minucci | 29 Aug 2018 | The do-it-yourself kart | 0 comments

### The technical section dedicated to the " Tm - KZ engine overhaul " continues with the 5th part

If you missed the previous releases this is the [link](#) to consult them.

75. With the crankshaft ready, we can insert it in the right half crankcase where the entire gearbox was previously inserted



**sk565 - Clutch oil seal 5x9x2, TM 04009**

in this way the left crankcase half will be completely free and it will therefore be easy to apply the silicone paste sk1133 or sk1799.



**sk1133 - Silicone paste, TM 50102**

76. Then apply the paste over the entire coupling surface trying to make it as uniform as possible and of a thickness that, once closed, only a very small amount comes out along the entire perimeter of the coupling.

*This operation becomes accurate after doing it a few times.*



**sk1799 - Gray silicone paste**

77. Now pair.

Pay the utmost attention not to touch the silicone paste just applied with your fingers and check that everything concerning the gearbox enters without forcing.

Be VERY CAREFUL so that the crankshaft does not remain in any position and force you to misalign it. In practice it is important to lower the left crankcase parallel to the right.

78. Once the two surfaces come into contact, insert the individual studs in their respective seats.

79. Be careful, in engines that have different stud lengths, to position everything correctly.

80. Start tightening the screws starting from the longest central ones and then gradually passing to those that are around the crankshaft.

**NOTE:** If you are not using a torque wrench, try to apply the same amount of torque.

81. Now remove the spilled paste with a rag from mating.

82. A brief check of the operation of the gearbox is enough simply insert the shift lever into the spline and carry out the insertion in sequence of the various gears while they are done with one hand turn the two gearbox shafts to avoid jamming. After come back crazy.

83. Start by inserting the ignition side oil seal, applying bearing grease to the edge that it will contact the crankshaft, in this way in the first moments that the engine will turn, but it is not well lubricated yet, or damage to the oil seal.

84. Pay attention that the inner edge of the oil seal do not rub on the shaft rotor keyway why being sharp it would risk ruining it.

**NOTE:** Remember that the oil seal must be positioned flush with the crankcase engine, so it doesn't have to be pushed too far in because it goes stop lubricating the main bearing. In practice the Outer surface of oil seal must be level with crankcase motor.

85. Same thing to do with the side oil seal clutch, but to insert this without damaging it



sk1415 - Primary Pair Pinion Z 19, TM 40313



sk1167 - Primary pair thickness 30x20x2, TM 48003



sk387 - Clutch cover oil seal 40x52x5, TM 04007.1



sk565 - Clutch oil seal 5x9x2, TM 04009



sk564 - Clutch oil seal 20x26x4, TM 04008

since from this side the crankshaft is very sharp it is very important or coat the shaft with adhesive tape and then a lot of bearing grease, or better you can use a cone made of sponge paper that is very fine and well lubricated by fat. In this way the oil seal follows the entire cone, positioning itself on the crankshaft. Remember also in this case to put it level with the engine crankcase.

86. Insert the primary pair pinion 40313 sk1415 on the crankshaft locking it with the special seeger.

87. Insert the shim on the primary shaft, which must be inserted before the clutch cover code 48003 sk 1167.

88. Rest the clutch cover gasket on the crankcase.

89. Fix the clutch cover, to do this it is necessary to remove the large seeger which holds the clutch unit, as soon as the lock is removed the ring gear of the primary pair from the clutch unit.

90. Replace the large oil seal code 04007.1 sk387.

91. Also replace the other clutch oil seals which one is the one which fits on the dipstick whose code is 04009 sk565 and the other which is positioned in front of the roller conveyors whose code is 04008 sk564 which makes the seal on the primary shaft.

92. Reassemble the clutch unit on the clutch cover by fitting the large seeger lock sk 1228.

93. Insert the new clutch cover gasket and fit the clutch cover with the relative fixing screws.



**sk1228 - Seeger Clutch Hub, TM  
49251**

# Engine overhaul TM – KZ – 6th part

by Stefano Minucci | 8 Oct 2018 | The do-it-yourself kart | 0 comments

## The technical section dedicated to the " Tm - KZ engine overhaul " continues with the 6th part

If you missed the previous releases this is the [link](#) to consult them.

94. Assemble the thermal unit, placing a 0.2mm or 0.3mm cylinder base gasket based on the size of the squish that will be read later, the one with the correct value will be chosen.

95. Fit the new piston roller table code [sk381](#) , using the piston seger assembly tool [sk190](#)

96. Position one of the two piston pin clips.

97. Fit piston to connecting rod

98. Insert the piston pin in the special hole located on the piston, paying particular attention to position the piston with the ring closing lock facing the intake side of the engine, in practice with the arrow that is printed on the piston head which indicates the I unload.

99. Also fit second piston pin retainer.

100. Take the new segment and insert it into the cylinder and, using the head of the old piston, bring it down for a couple of centimetres.

101. At this point, using a feeler gauge, measure the distance left between the tips which must not be below 0.30mm, if it is less, the tips of the segment must be filed.

**This is a very important thing because if the space that remains is little, when the temperature of the piston and the group in general rises, the segment lengthens and is automatically hooked by the exhaust port with irreparable damage to the cylinder, piston and other mechanical parts**

102. Position the ring in the piston groove and if there is a letter on one of the two tips of the ring, it must be turned upward. If in doubt, check with a magnifying glass if necessary if one of the two angles forming the segment is rounder than the other. In if so, the rounder corner should be placed upwards.

103. Measure the cylinder checking that there are no out-of-rounds and wear various, based on the size of the cylinder, the size of the piston considering a tolerance of 7 cents . If the cylinder is too shiny, or has wear, marks or light ovalizations it is very useful to pass the Flex Hone [sk2033](#) .

## Engine overhaul TM – KZ – 7th part

by Stefano Minucci | Nov 9, 2018 | The do-it-yourself kart | 0 comments

### The technical section dedicated to the " Tm - KZ engine overhaul " continues with the 7th part

If you missed the previous releases this is the [link](#) to consult them.

104. A cylinder that is too shiny does not have good lubrication because there is no oil left between the piston skirt and the cylinder. That's why those inclined "grooves" are made in the cylinder so that a little oil is retained.

105. Now insert the cylinder on the engine, oiling everything well.

106. Insert the piston inside it without forgetting to position the two tips of the ring near the stop on the piston and to squeeze the ring with two fingers to allow it to enter the cylinder.

107. Once the cylinder has touched the cylinder base gaskets, proceed to fit the 4 nuts to secure the cylinder to the crankcase and tighten crosswise to prevent the cylinder from positioning itself incorrectly.

108. Now fit the two head gasket o-rings, take a piece of 1.5mm diameter tin wire and place it over the piston so that it touches both sides of the cylinder and is positioned parallel to the piston pin.

109. Position the head on the cylinder and insert the fixing screws.

110. Carry out the first tightening.

111. Rotate the crankshaft so that the tin wire is pressed against the head

112. Refit the head by measuring the thickness of the tin wire with a digital caliper or micrometer closest to the cylinder.

This is the size of the squish which should be around 1mm.

**Generally it is not good to go below that because there is a risk of detonations and various damages, and going up beyond the millimeter the engine will then tend to run better at high revs and less at low revs.**

113. Using the cylinder base gaskets, increase or decrease the thickness in order to "regulate" the squish as mentioned above.

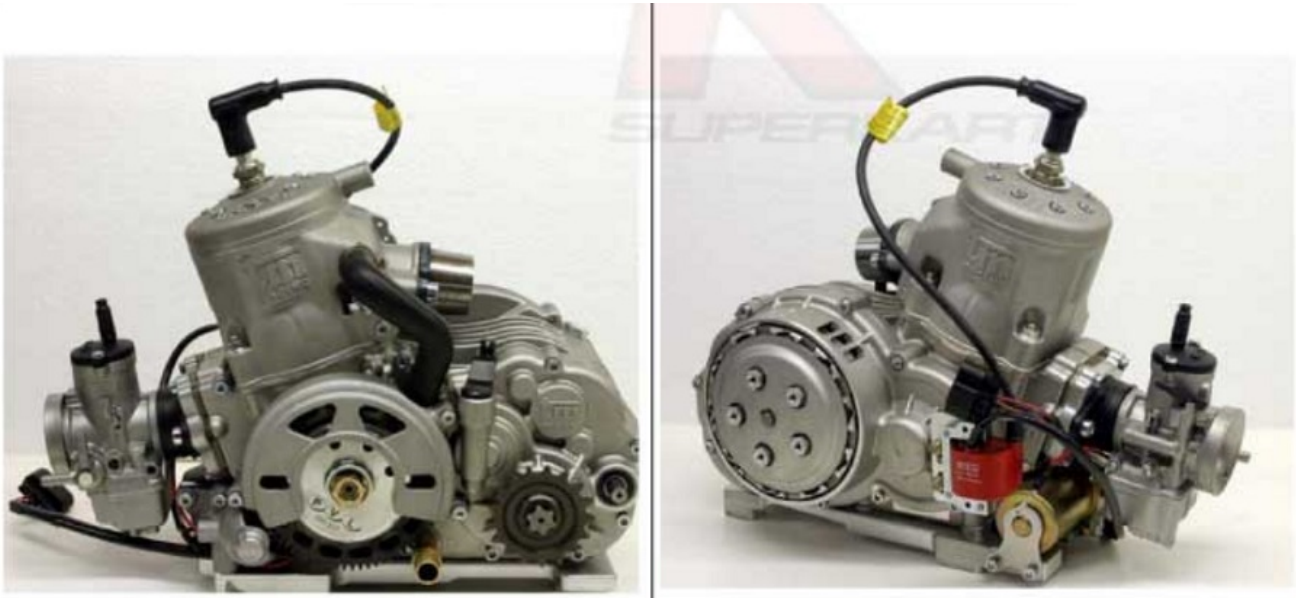
114. Once you are sure that the squish value is correct, carry out the final tightening of the head screws.

115. Insert the candle or a cap to prevent material from entering which could create harmful effects.



## Engine overhaul TM – KZ – 8th and last part

by Stefano Minucci | 7 Dec 2018 | The do-it-yourself kart | 0 comments



### We conclude with the eighth part the technical section intended for the " Tm - KZ engine overhaul "

If you missed the previous releases this is the [link](#) to consult them.

115. Assemble the ignition rotor, then position the key or steady [sk1277](#) on the crankshaft.
116. Insert the rotor on the shaft fixing it with the nut [sk1418](#) and the relevant ignition key [sk87](#) .
117. Now move on to adjusting the ignition timing by installing the timing instrument [sk84](#) and the comparator [sk725](#) on the spark plug hole.
118. Bring piston to top dead centre.
119. Go back by turning the crankshaft in the opposite direction to that of rotation until the reference line of the ignition stator coincides with the reference line of the ignition rotor.
120. Read the ignition advance setting value on the comparator.

The calibration values are generally 1.5mm before the top dead centre, but higher values can

also be reached.

Keep in mind that high advance means having an engine that pulls low.

Obviously this value also affects the carburetion.

121. Once the stator has been positioned in the desired point, tighten the three fixing screws of the stator itself.

122. Position the ignition coil on its bracket **by doing make sure that the black thread on the bobbin is the one with the "eyelet". in contact with the metal body of the coil and that it is grounded put the metal part of the coil in good contact with the crankcase engine** otherwise the coil will burn out after a few moments of operation.

123. Remember to engage the two pins between stator and rotor and it is also good rule to put a small hook and loop strap to prevent con the vibrations can slip off with consequent loss of the race.

124. Fill the gearbox with oil.

It is necessary loosen the socket head cap screw located on the clutch cover on the lower left side near the M6 nut dipstick register, in fact that is the oil level screw.

125. He then inserts the oil from the top cap, holding the engine a little tilted to the left side otherwise the oil goes to the right wall of the clutch cover and false level reading.

Depending on engine models may need from 400cc to 500cc approximately, but this is unimportant, in fact it is fine, after having put about 300cc wait a moment and then bring the engine to level and at the moment that from the level hole you start to see the oil coming out thus obtaining the correct level. Obviously it repeats the operation several times until the result is achieved.

As gearbox oil, Motul Transoil [sk979](#) is excellent, for even more demanding drivers ELF 740 [sk2064](#) is recommended .

TO this point we can place the engine on the frame, install all the various necessary components such as carburetor, chain, jumpers and gradually everything to enjoy the great music of the two-stroke !!!