Product name: Single-cylinder engine (overhead camshaft type)
Product model: DM17–S–T
Main materials: anodic aluminum oxide + stainless steel
Charging voltage: 10–20V DC
Battery capacity: 400mAh*2
Assembly difficulty: ★ ★
Product standards: GB/T9254–2008
GB/T17626.2–2006
Quality grade: A
Assembly instructions for Teching Craftsman

“Teching Craftsman” is a metallic assembly model other than a toy for playing only. It serves to improve hands-on skills of children and youngsters, and let them learn common industrial knowledge mainly. By keeping using our products, the user can reach the goal of assembly — refitting — creation in stages.

The requirements for product assembly are as follows:

◆ Perform assembly rigorously and orderly, keep the tabletop tidy, look at drawings carefully, and pay attention to safety;

◆ If you have any doubt when adjusting any assembly clearance or tightness after the completion of assembly, please refer to our website or WeChat public account;

◆ The user is encouraged to modify part defects or fitting clearances, and apply lubricant under adult supervision to further improve assembly;

◆ The user is encouraged to use simple material removal tools (file, sandpaper, etc.) under adult supervision;

◆ The user is encouraged to modify or generally refit parts of this product to enter the refitting stage as early as possible;

◆ The user may disassemble this product and put it in the package again according to the parts list attached hereto;

◆ If any part is lost, please inquire of or purchase it from us (Teching store on www.taobao.com);

If you are willing to share with us, after completing product assembly tasks of different difficulty levels at different stages, you will receive corresponding gifts, and have a chance to win our special medals and take part in relevant events.
Safety Tips

1. Some safety awareness is required to use this product, and improving safety awareness is also one of the functions of this product;
2. This product is not intended for children below 8 years, and adult guidance on assembly is recommended for children below 10 years;
3. Use assembly tools rationally, assemble the parts in strict conformity with the instruction manual, and avoid forcible handling to avoid scratches; keep sharp points of tools or parts away from the eyes to avoid contusions;
4. This product is made up of metallic parts mainly, and has a certain level of hardness and a certain weight; please place it properly to avoid bodily injuries;
5. During mechanical movement, do not put a finger or any other part of the body within the movement range to avoid contusions;
6. When any mechanical part is turning, do not put a finger or any other part of the body beside it to avoid entanglement and contusions;
7. Wire connectors must be connected according to the marks specified in the instruction manual to avoid short-circuit or failure arising from wrong connection;
8. Charge, discharge and place the battery as required; it is advised to replace the battery when it has not been used for 3 months or more;
9. Do not prevent any part from running forcibly in any form; to do this, turn off the power directly;
10. To refit this product, please pay attention to the relevant part parameters, and avoid using any high-power electric part that may result in an accident.
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I. Basic knowledge on standard parts assembly

1. Mounting of screws

Right

Rong

2. Mounting sequence of screws

Mount the screws diagonally in order of number.
3. The method of installation of circlip

Yes (T)                                NO (F)

parallel push                               Oblique push

4. Lubricant mark

Where this mark is shown, it is recommended to apply create to improve mechanical performance.
II. Assembly instructions

1. Piston and connecting rod mechanism

1.1 Connection between piston and connecting rod

1.2 Mounting of piston pin
1.3 Mounting of snap ring

As shown below, insert the snap rings into the snap ring slots on both ends of the piston pin.
1.4 Connection between connecting rod and crankshaft

1.5 Mounting of connecting rod bearing
2. Crankshaft assembly
2.1 Assembly of oil pump turbine
2.2 Connection of oil tank

- Oil pump turbine (024)
- Oil pump tank
- Front cover of crankcase (001)

2.3 Mounting of end cap of oil pump

- End cap of oil pump (039)
- M3 screw (059)
2.4 Mounting of carrier gear shaft

(Assembly and connection within front cover completed)
2.5 Mounting of carrier gear and oil pump gear

Front cover of crankcase (001)

Carrier gear (042)

Oil pump gear (041)

2.6 Mounting of snap ring

Snap ring (053)

Lubricant (2 positions)
2.7 Mounting of starting motor

(Rear cover of crankcase (002))

(M1.6 screw (062))

(Starting motor (016))

(Assembly and connection within rear cover completed)
2.8 Connection between crankshaft and rear cover of crankcase

Lubricant (3 positions)

Crankshaft (007)

Rear cover of crankcase (002)

Bearing

2.9 Mounting of locating pin

Locating pin (057)

Locating pin hole
2.10 Assembly of crankcase

Locating pin (057)

Rear cover of crankcase (002)

Front cover of crankcase (001)

Locating pin (057)

Crankshaft (007)
2.11 Mounting of connecting screws

(Assembly of crankcase completed)
3. Cylinder head assembly

3.1 Mounting of valves

3.2 Mounting of valve springs and valve caps
3.3 Mounting of spark plug

3.4 Combination of timing pulleys
3.5 Mounting of key

Key (056)

Camshaft (026)

3.6 Assembly of camshaft

M3 screw (059)

Cam timing pulley base (012)

Camshaft (026)
3.7 Connection of camshaft and cylinder head

3.8 Mounting of exhaust pipe
4. Combination of camshaft, cylinder block and cylinder head assembly

4.1 Mounting of cylinder block

(Assembly and connection of cylinder assembly completed)
4.2 Mounting of connecting screws

4.3 Mounting of locating pin
4.4 Connection of cylinder head assembly

- M3 screw (059)
- Locating pin (057)
- Cylinder block (009)

(Assembly completed)
5. Crankcase gear mechanism

5.1 Mounting of key

5.2 Mounting of crankshaft gear
5.5 Inspection of gear turning

Turn the crankshaft to check the clearance

Crankshaft (007)

5.6 Mounting of crankshaft pulley

Crankshaft timing pulley (046)

Crankshaft pulley (044)
5.7 Mounting of base of crankshaft timing pulley and crankshaft cap

Base of crankshaft timing pulley (045)

M3 screw (059)

Crankshaft cap (047)

(Mounting completed)
5.8 Mounting of flywheel

5.9 Mounting of starting gear and gear cover
6. Mounting of circuit system
6.1 Mounting of circuit board
6.2 Mounting of battery pack and power switch

Battery pack (004)

Power switch (006)

Switch notch

6.3 Connection of circuit sockets

Battery socket  Switch socket  Motor socket

Charging socket
6.4 Mounting of battery cover

(Mounting of circuit system completed)
7. Generator assembly

7.1 Generator assembly

7.2 Mounting of connecting screws
7.3 Mounting of pulley

M4 nut (055)  Generator pulley (048)

(Generator assembly completed)
7.4 Combination of crankcase and generator assembly

Crankcase

M3 screw (063)
7.5 Mounting of generator belt

(Generator assembly completed)
8. Mounting of timing belt (timing mechanism)

8.1 Removal of crankshaft timing base

8.2 Connection of timing belt
8.3 Timing adjustment of camshaft

8.4 Timing adjustment of crankshaft — Align the timing points on the crankshaft timing base and the crankcase.
8.5 Mounting of crankshaft timing base and crankshaft cap

Note: When the timing belt is mounted, the upper and lower marks must be aligned!

(Mounting of timing belt completed)
9. Guide pulley mechanism

9.1 Assembly of guide wheel assembly

Guide wheel shaft (051)

Guide wheel (050)

M3 screw (052)

Stand of guide wheel (right) (034)

Stand of guide wheel (left) (035)
9.2 Combination of guide wheel and crankcase
Overall engine assembly completed

Guide wheel assembly
If you have completed assembly successfully, you can record your time of completion and sign your name here.
III. Adjustment of single-cylinder engine

1. Fitting clearances
Pay attention to fitting clearances among moving parts. The user is encouraged to adjust clearances slightly using, for example, sandpaper and calipers, based on his/her own observations and judgments.

The main parts are as follows:
   1.1 Crankshaft and related moving parts
   1.2 Camshaft and related moving parts
   1.3 Starting motor and related moving parts
   1.4 Piston rod and related moving parts

2. Lubrication
Since this product is a metallic mechanical model, the absence of lubricant for shaft movement may result in higher frictions or even seizure of parts during movement. The user is encouraged to apply appropriately more lubricant at shaft assembly positions, and observe the effect after lubricant application.

3. Noise reduction
Shaft moving parts are made of aluminum alloy and have anodized surfaces, and there are loose clearances among some parts, so this product may produce high noise when newly assembled. The user is encouraged to observe and analyze noise producing positions, and may also repair with such tools as sandpaper and file, and apply lubricant to observe the noise reduction effect.
IV. Basic structure and features of single-cylinder engine

Compared to multi-cylinder engines with the same displacement, a single-cylinder engine works on a set of machine parts only, so the inertial force of the moving parts cannot be offset, resulting in high vibration. This is especially true as speed rises. In addition, the moving parts of a single-cylinder engine are relatively larger, which is adverse to speed increase, and is especially true as displacement rises. Therefore, the larger the displacement of a single-cylinder engine is, the lower power per liter will be, but the stronger pulsing will be.

Since single-cylinder engines are simple in structure, they are characterized by light weight and small size as compared to multi-cylinder engines with the same displacement, so a single-cylinder engine helps reduce overall weight and improve overall operating flexibility.
When an engine is in a transversal arrangement, the gyroscopic effect of the rotating crankshaft will prevent the motorcycle from tilting laterally to turn; the heavier the crankshaft is, the greater such resistance will be. Since a single-cylinder engine has a short crankshaft, its gyroscopic effect is much weaker, it can tilt laterally leftward or rightward easily, and the driver will feel that the steering handle is very light.

Due to the above features of single-cylinder engines, off-road motorcycles with a displacement of 250CC mostly use single-cylinder engines, as do super-sport motorcycles. Among ordinary motorcycles, small ones with a displacement of below 125CC usually use single-cylinder engines.
V. Basic principle of piston engine

1. Piston moving down → taking in air and gasoline;
2. Piston moving up → compressing the mixture;
3. Piston moving down → igniting the compressed gas; which burns and expands to drive the piston;
4. Piston moving up → discharging exhaust gas

As shown below:

When the single-cylinder engine is working, for every two turns of the crankshaft, the piston makes 4 straight-line reciprocating motions in the cylinder to complete a working procedure (4 strokes), the mixture in the cylinder is ignited, and the bursting gas pushes the piston to make the crankshaft rotate via the crankshaft connecting rod, realizing the straight-line reciprocating motion of the piston in the cylinder. The continuous vertical motion of the piston turns into the continuous rotary motion of the crankshaft to output power continuously and make the engine run normally.
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<thead>
<tr>
<th>No.</th>
<th>Product name</th>
<th>Qty.</th>
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<tbody>
<tr>
<td>01</td>
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<td>37</td>
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<td><img src="image2.png" alt="Turbine shaft" /></td>
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<td><img src="image3.png" alt="End cap of oil pump" /></td>
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<td><img src="image5.png" alt="Oil pump gear" /></td>
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<td><img src="image11.png" alt="Crankshaft cap" /></td>
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| 61 | ![Image](image1.png) | M2X5  | 8  
| 62 | ![Image](image2.png) | M1.6X4| 4  
| 63 | ![Image](image3.png) | M3X8  | 4  

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User Feedback Form

Username:          Contact information:
User address:

1. Thank you very much for experiencing our assembly model product. In order to further improve our product quality, and enhance user experiences, we strongly expect your valuable comments and suggestions;
2. We will take your comments and suggestions seriously, and expect to see a change made for you in our future products;
3. You may contact us by calling us or mailing this form to us.

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Tel: 400--631--2128
E-mail: teching_mould@126.com

Product model: ____________________

Suggestions:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
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