

Rotary Engine



What makes a Wankel tick?

The significant principle is that of replacing the piston, cylinder and crank assemblies with simple rotating discs, which have sections removed to form firing chambers. The reduction of weight and size is also significant. The Wankel is smaller than conventional engines, thus fewer parts; there is less wear, less friction and greater reliability.

The lightweight of the Wankel also results in lower horsepower requirements to achieve the same speeds (much of the power in an automobile has to be used to pull the engine itself).

The “T” type rotor featured in the Wankel was first used in 1588 as part of a water pump and in 1782 James Watt tried and failed to use the same principle in a steam engine.

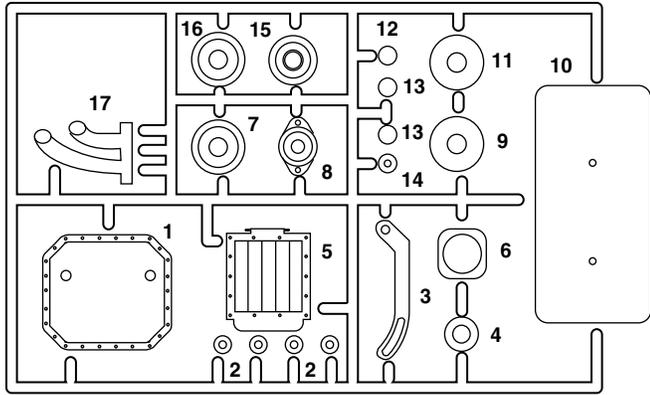
Inventors tried to apply the principles of rotary combustion to engines as early as 1908, but none was successful until 1954 when Felix Wankel devised the first rotary combustion engine, the first working model of which was built three years later.

Minicraft Models, 1501 Commerce Drive, Elgin IL 60123 USA

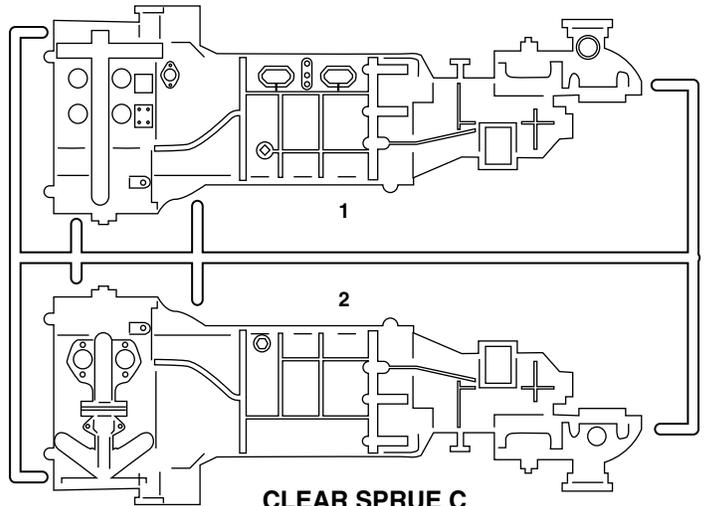
www.minicraftmodels.com

Printed in China

PARTS LOCATING DIAGRAM

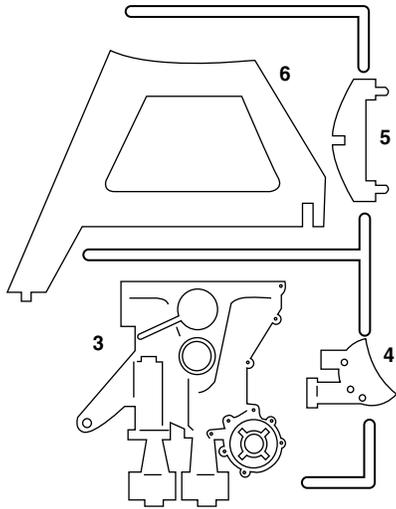


BLACK SPRUE B

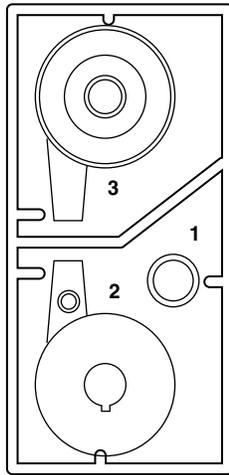


CLEAR SPRUE C

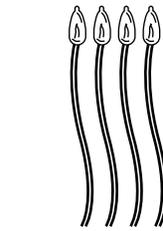
CLEAR SPRUE C



ORANGE SPRUE Y

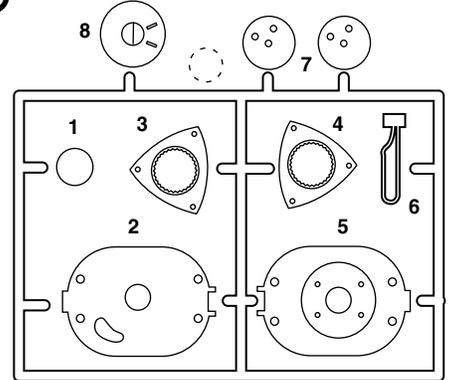


FAN BELT (S)

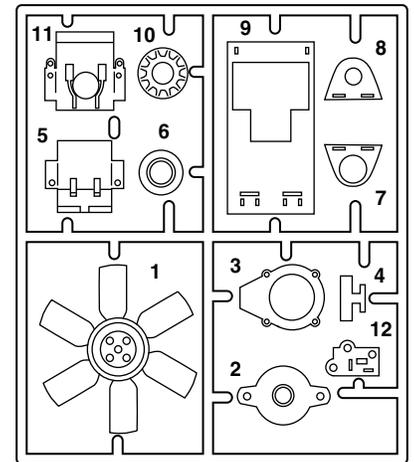


LIGHTBULBS (O)

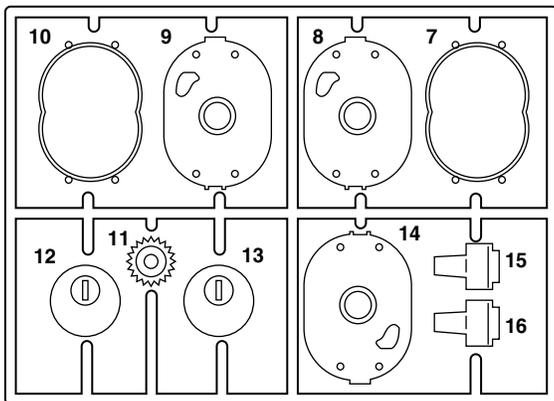
RED SPRUE R



SILVER SPRUE G



CLEAR SPRUE C



MOTOR



TUBING (E)

WIRE (I)



T

SHIFT BOOT (D)



X



Y



Z



R



K (2X)



A



N



Q

J

L (2X)

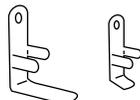
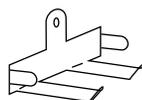
V



O



M

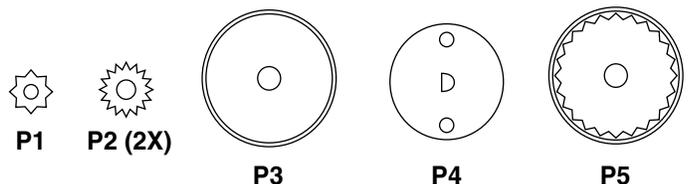


U



W

REDUCTION GEAR ASSEMBLY





Cement
Coller
Kleben
Pegar
Incollare
Colar
Kleven



DO NOT Cement
Ne pas Coller
Nicht Kleben
No Pegar
Non Incollare
Nao Colar
Niet Kleven



Cut away
Couper
Scheiden
Cortar
Tagliere
Cortar
Snijden



Optional parts
Choix
Auswahlmöglichkeit
Elección
Scelta
Opaco
Keuze



Repeat operation
Ripetere l'operazione
Vorgang wiederholen
Repitir la operacion
Ripetere
Repitir a operação
Herhalen

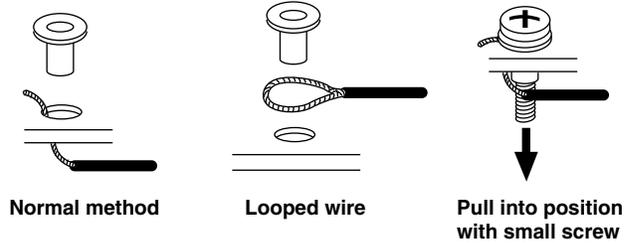


Symmetrical assembly

IMPORTANT ASSEMBLY TIPS

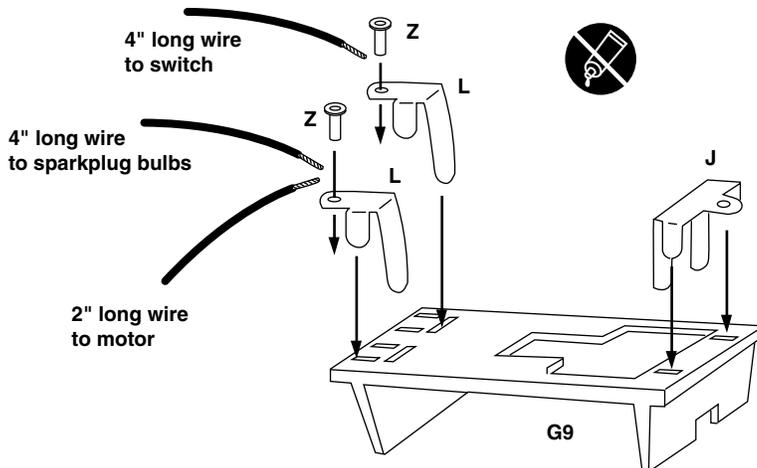
Your Mazda Rotary Engine kit is carefully designed to operate and demonstrate the mechanics of the Wankel rotary engine. Be sure to check all parts for excess plastic and cut parts from the sprues with care. Lubricate all moving parts with small amounts of petroleum jelly. Use care when gluing to avoid applying glue to operating parts. Test the electrical system of your model after each step is completed. Test fit all moving parts to make sure all shafts rotate freely, and clean edges with a hobby knife or fine sandpaper as necessary.

Eyelets are used in this kit to make good electrical connections without soldering. Wire can be twisted through the holes on metal parts without the use of eyelets. Also, wire can be looped around the rivet as shown. A screw can be used to pull the eyelet firmly into position.



1

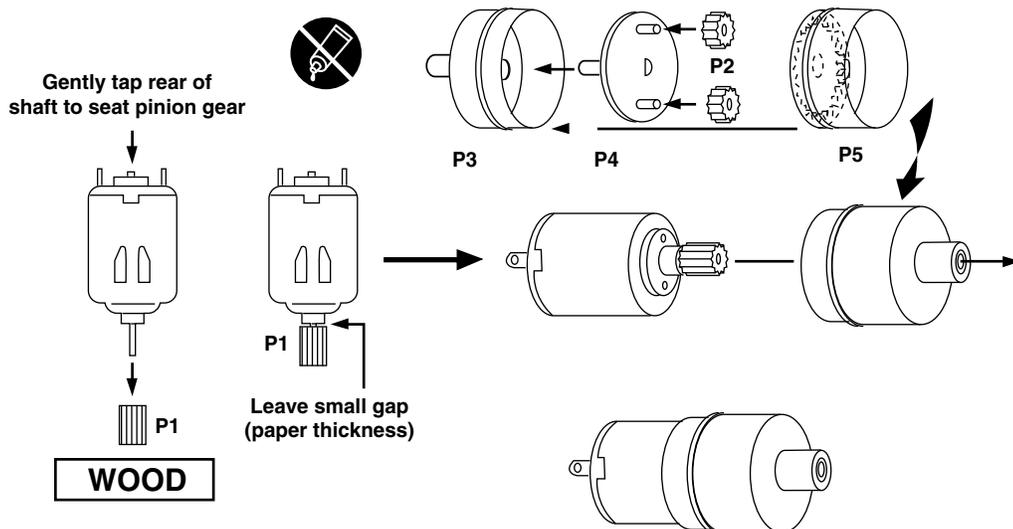
BATTERY BOX



Attach terminal L/J to battery box G9, then bend side tabs inward to secure. Cut wires to length and secure to terminals with eyelets Z or by twisting the wire directly to the metal tabs. Note where wires will connect in later steps.

2

MOTOR & REDUCTION GEAR ASSEMBLY



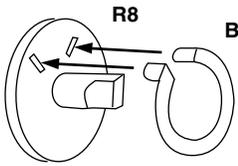
Fit pinion gear P1 to motor shaft by gently tapping the rear of the shaft while resting the pinion gear on a block of wood. DO NOT apply excessive force.

Check all parts for sharp edges or excess plastic and clean up as necessary, then assemble reduction gear parts P2/P3/P4/P5 as shown without gluing. Use fine grease or petroleum jelly to lubricate all gears and shafts. All gears must mesh and rotate freely. Do not glue any parts. Insert motor into gearbox assembly and test operation.

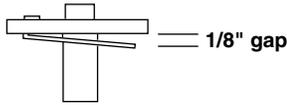
Finished assembly - test with batteries

3

IGNITION / DISTRIBUTOR

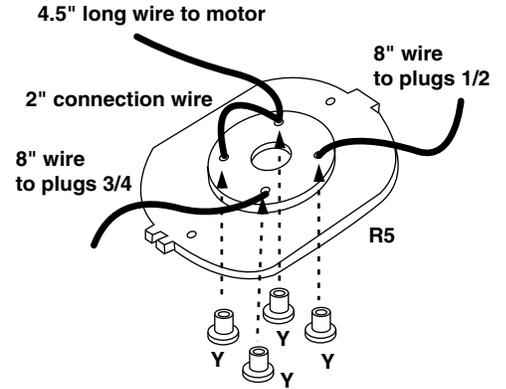


Attach ignition contact B to part R8, then bend tabs to secure. Note contact B must have some spring tension. Use a knife or screwdriver blade to lift part B so there is 1/8" of clearance between the parts.



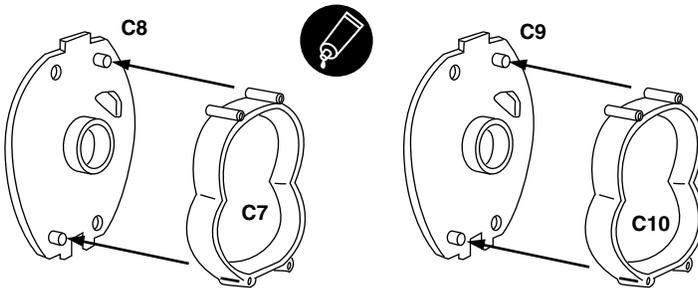
Cut wires to length, strip ends and secure to part R5 with four Y eyelets. Note that these function as electrical contacts and must secure the wires firmly.

Set both assemblies aside for use in Step 6.



4

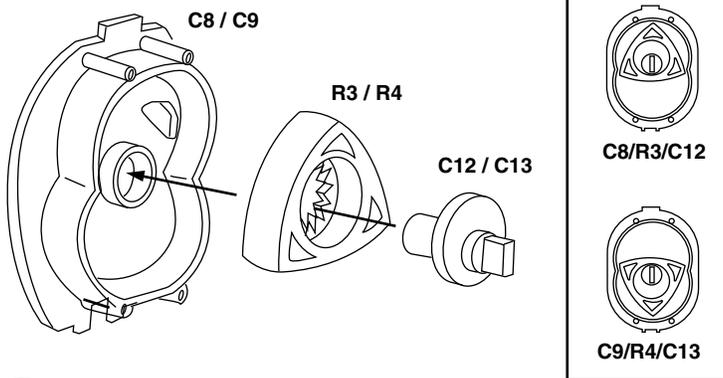
ROTARY CHAMBERS



Carefully glue parts C7 and C8 together, then repeat with parts C9 and C10. Be sure to not allow glue to contact the inside of the chambers.

5

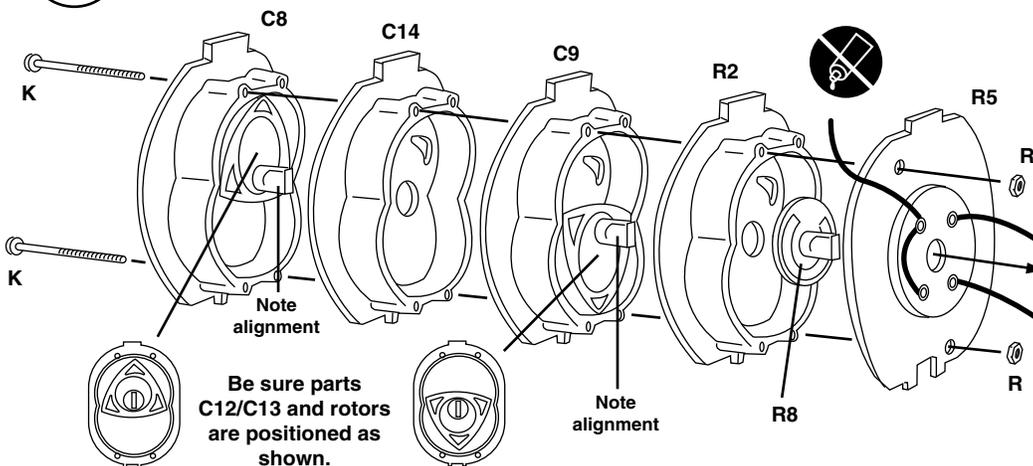
ROTOR ASSEMBLY



Be sure to check and clean up the edges of all parts before assembly. Test fit all parts to check for freedom of movement. Insert eccentric C12 into rotor R3, then place in chamber assembly C8 as shown. Repeat with parts C13/R4 and assembled chamber C9. Note the proper positions of the rotors and eccentrics. Refer to Step 6.

6

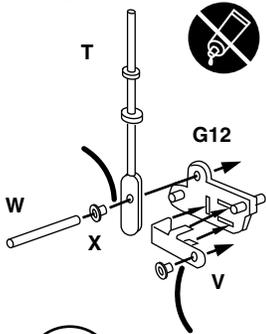
JOIN ROTARY CHAMBERS



DO NOT CEMENT. Be sure to lightly lubricate all moving parts before assembly. Do not apply lubricant to any electrical contact points. Pass bolts K through parts as shown, then secure with nuts R and tighten. Turn shaft of part R8 to insure smooth operation. If assembled parts bind, loosen nuts slightly. If the parts still bind, disassemble and relubricate.

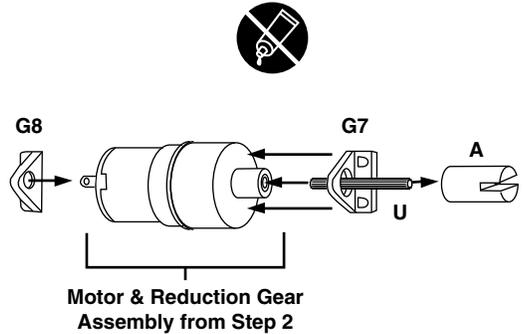
7

SWITCH / MOTOR HOUSING ASSEMBLY



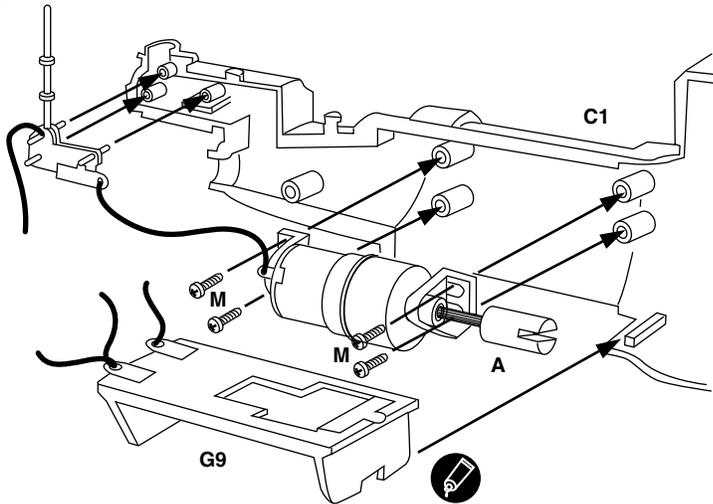
Push bare end of 4" wire and pin W through eyelet X and through parts T and G12, centering pin W. Push tabs on contact V trough slots in G12 and bend tabs to secure. Secure 4" wire to contact V by twisting wire or using an eyelet.

Press G7 and G8 onto ends of motor/gearbox assembly. Slide part A onto shaft U. Insert shaft U into gearbox unit and test for smooth operation of the gears.



8

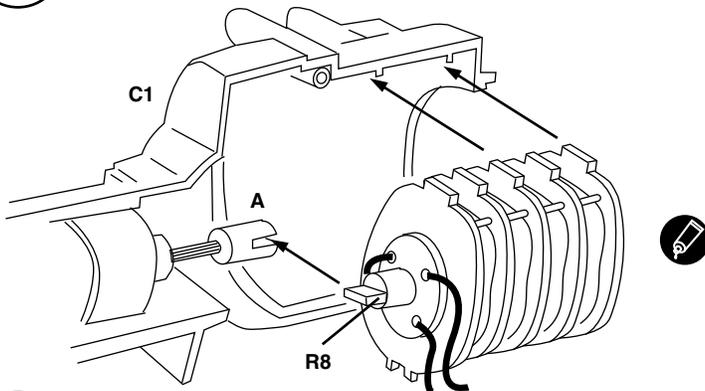
MOTOR / SWITCH/ BATTERY BOX MOUNTING



Connect wires to motor by tightly twisting onto motor terminals. Place switch assembly in part C1 and secure the motor with screws M. Lightly glue battery box G9 in place between alignment ribs in part C1.

9

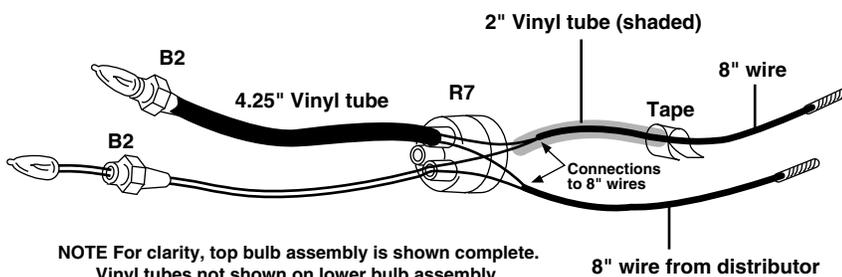
ROTOR ASSEMBLY INSTALLATION



Place rotary chamber assembly in part C1, adjusting part A to align with tab on R8. Connect all wires, referring to Step 11 Wiring Diagram. Insert batteries and test operation. To hold alignment, you may carefully use small amounts of glue to hold the rotor assembly in place.

10

LIGHTBULBS (SPARK PLUGS) / DISTRIBUTORS

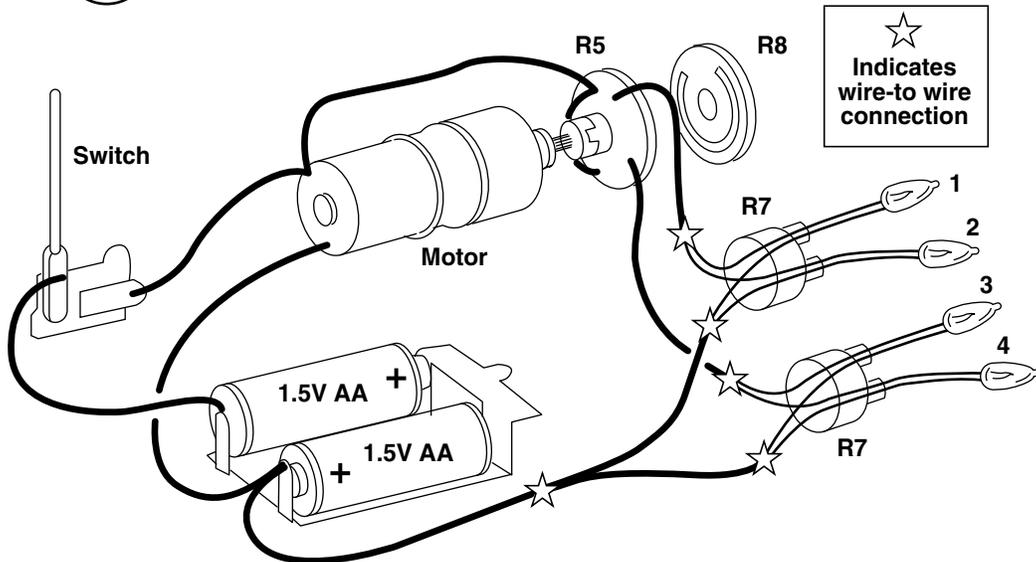


NOTE For clarity, top bulb assembly is shown complete. Vinyl tubes not shown on lower bulb assembly.

Slide part B2 and a 4.5" length of vinyl tube. Repeat for other 3 bulb assemblies. Feed wires as shown through two outer openings in part R7. Connect two bulb wires to one 8" length of wire. Note how wires are crossed and connected. Slide a 2" length on vinyl tube over the 8" wire and secure with tape. Slide a 2" length of vinyl tube onto each 8" wire from the distributor and connect in the same manner. Refer to Step 11 Wiring Diagram. Make two complete assemblies.

11

WIRING DIAGRAM

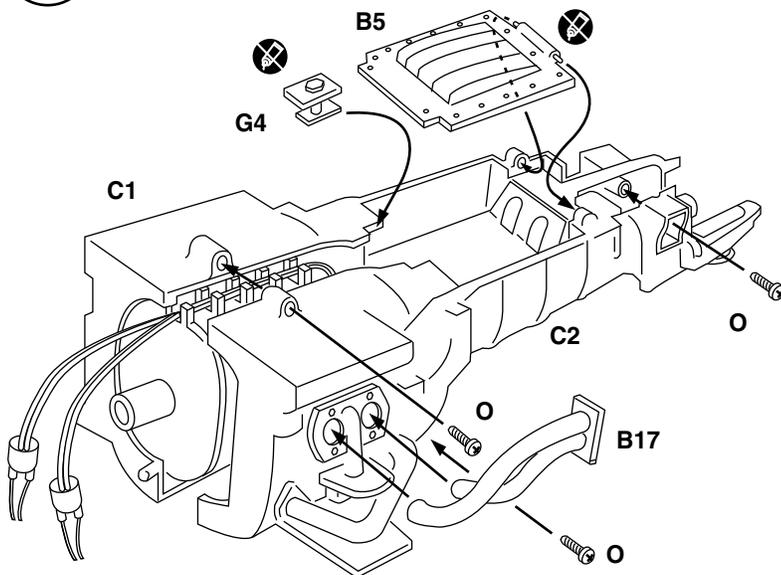


★
Indicates
wire-to-wire
connection

Make any remaining connections. Be sure all connections are tight. Number bulbs with small pieces of tape. Insert batteries in battery box, matching the direction molded into the box. Pull gear shift lever back to 'on' position. Motor should turn rotor and bulbs will flash alternately. If rotor assembly turns but bulbs do not flash, check contact at R5 and R8. If rotor does not turn, check all points of contact, switch and batteries.

12

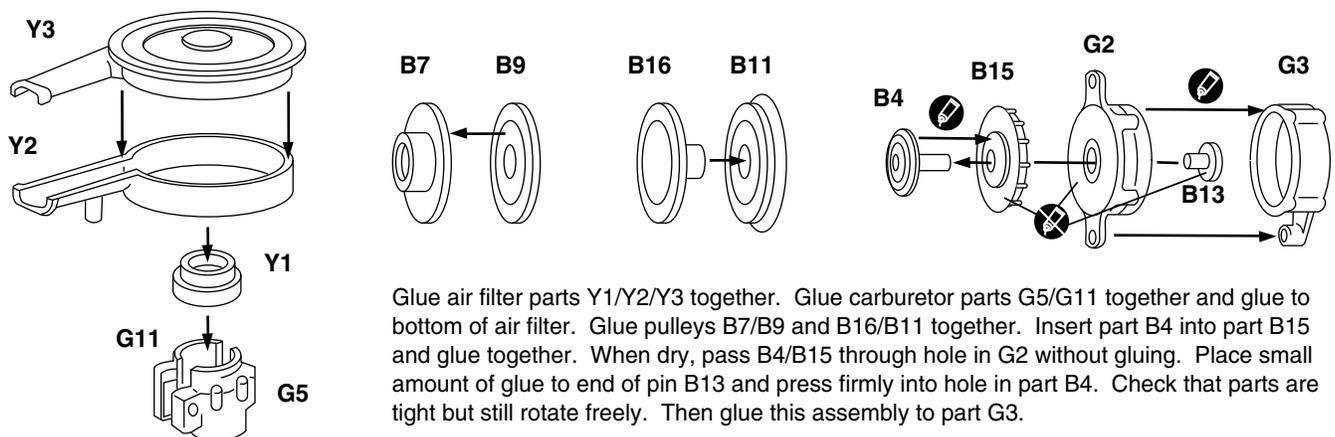
JOIN ENGINE HALVES



Fit C1 to C2, routing spark plug wires through gap at bottom of rotor assembly. Be sure wires are not pinched between engine halves. Remove C2 and apply glue to edges that contact C1. Insert hinge pins of part B5 into holes as shown, then join parts C1/C2. Be sure no glue touches the hinge assembly of part B5. Use three O screws to connect engine halves. Glue exhaust manifold B17 to holes in C2 as shown. Slide (don't glue) part G4 into slot in front of battery case.

13

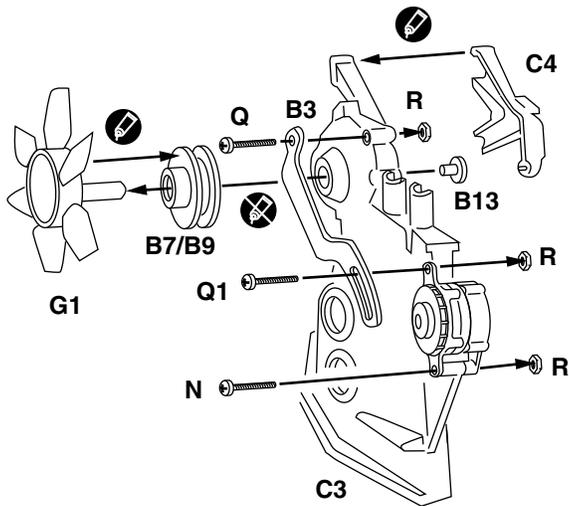
CARBURETOR / AIR FILTER / PULLEYS / ALTERNATOR



Glue air filter parts Y1/Y2/Y3 together. Glue carburetor parts G5/G11 together and glue to bottom of air filter. Glue pulleys B7/B9 and B16/B11 together. Insert part B4 into part B15 and glue together. When dry, pass B4/B15 through hole in G2 without gluing. Place small amount of glue to end of pin B13 and press firmly into hole in part B4. Check that parts are tight but still rotate freely. Then glue this assembly to part G3.

14

FORWARD ENGINE ASSEMBLY 1



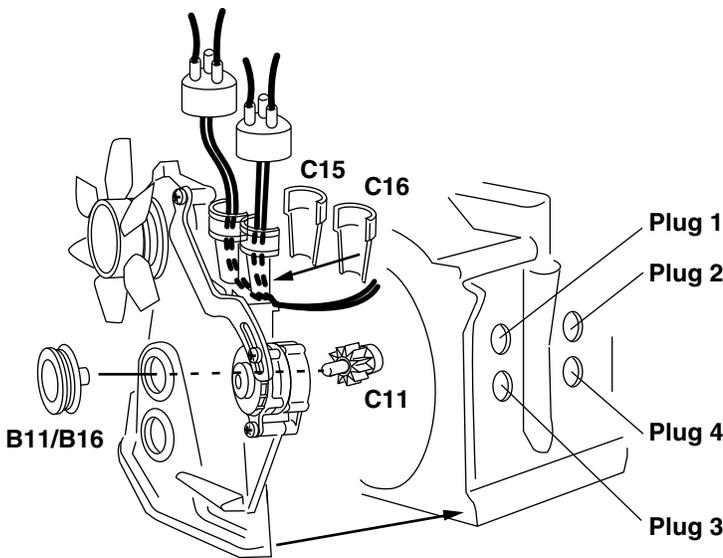
NOTE

Some details not shown for clarity.

Carefully glue fan G1 to pulley B7/B9. Do not allow glue to touch shaft. Pass through part C3 as shown and secure by carefully gluing pin B13 to pulley. Check for free rotation. Place alternator on mount (shown in place) and secure with screw N and nut R. Attach adjustment arm B3 to part C3 at top with screw Q and nut R. Pass screw Q1 through slot in B3, then through upper mounting hole on alternator, securing with nut R. Parts should be snug fitting, but moveable. Glue part C4 to C3 as shown.

15

FORWARD ENGINE ASSEMBLY 2



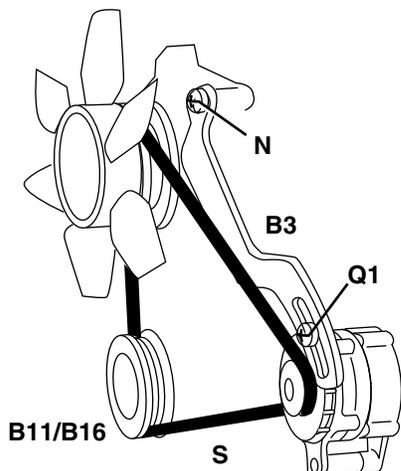
NOTE

Some details not shown for clarity.

Place assembled main engine right side up and route spark plug wires through part C3 as shown. Be sure the wires do not interfere with the output shaft on the rotor assembly. Glue parts C15/C16 into place, trapping the wires. Glue distributor caps to the top of the openings. Glue pinion gear C11 to rotor shaft (shown in place). Glue front engine assembly to front of main engine assembly. Pinion gear will protrude through the hole in engine front. Carefully glue pulley assembly B11/B16 to pinion gear. Route and attach spark plugs in the holes as indicated. Plugs 1/2 will 'fire' on the first flash, plugs 3/4 on the second.

16

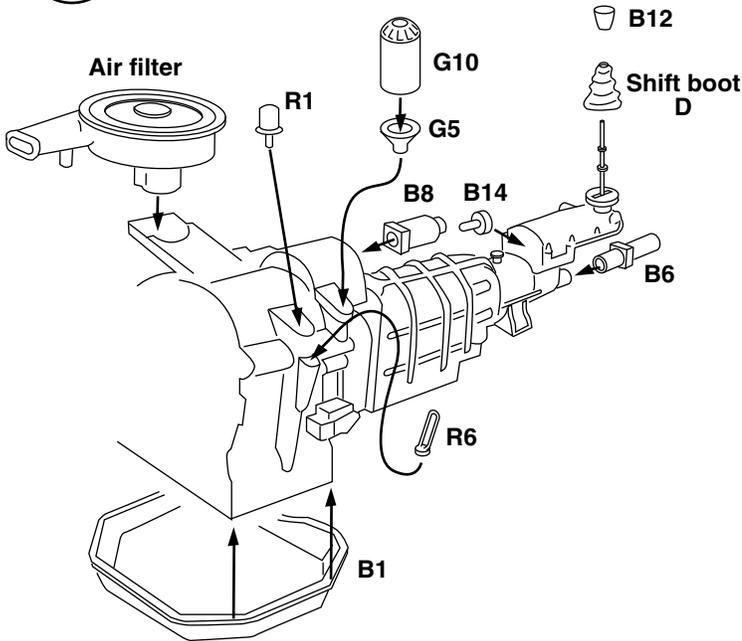
FANBELT



When glue has thoroughly dried, stretch fanbelt S over fan pulley, drive pulley B11/B16 and alternator pulley. Adjust tension for proper operation by loosening screws N/Q1 and moving adjustment arm B3.

17

FINAL ENGINE ASSEMBLY

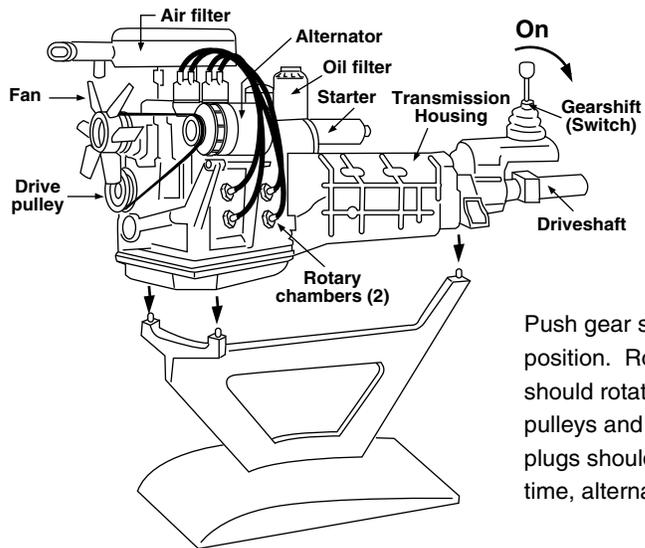
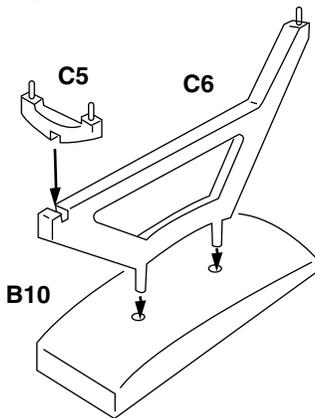


NOTE
Engine front and some details not shown for clarity.

Slide shift boot D over switch handle T and stretch around base. Glue air filter in place. Glue oil pan B1 to bottom of completed engine. Assemble and attach other parts as shown.

18

DISPLAY STAND / PARTS IDENTIFICATION

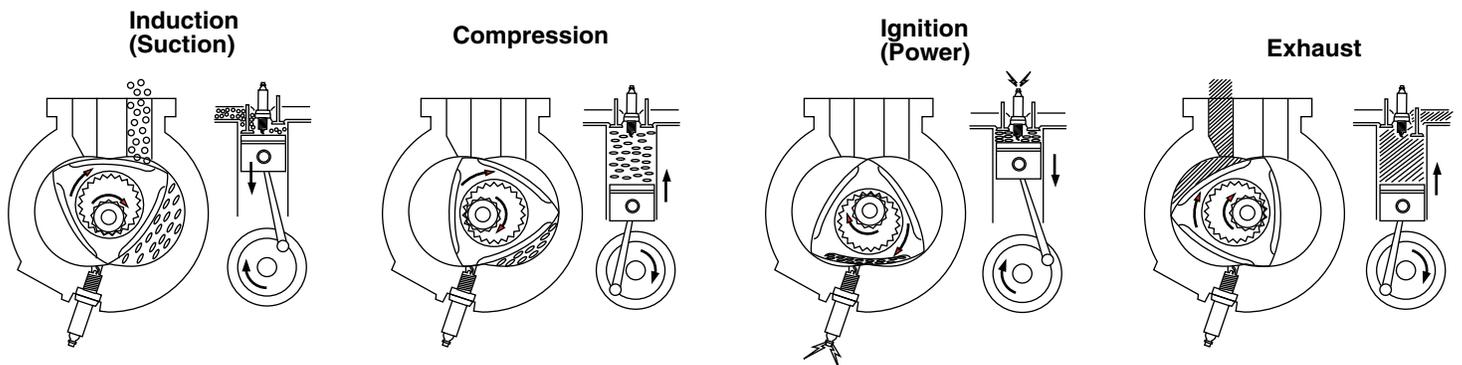


Carefully trim part C5 to fit C6, as forcing the parts together may cause breakage. Glue C5/C6 to stand B10. Press (don't glue) model to stand.

Push gear shift lever into 'on' position. Rotor assembly should rotate causing pulleys and fan to turn; spark plugs should ignite, two at a time, alternately.

19

WANKEL OPERATION



Illustrations show the operation of a Wankel rotary engine in comparison with a standard piston engine.