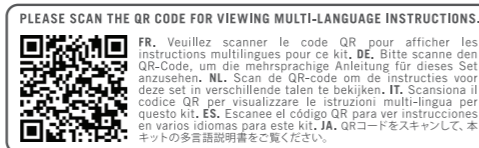


MOTORISED ROBOT HAND



WARNING:
CHOKING HAZARD - Small parts
Not for Children under 3 years.
TO PARENTS: PLEASE READ THROUGH THESE INSTRUCTIONS BEFORE GIVING GUIDANCE TO YOUR CHILDREN.

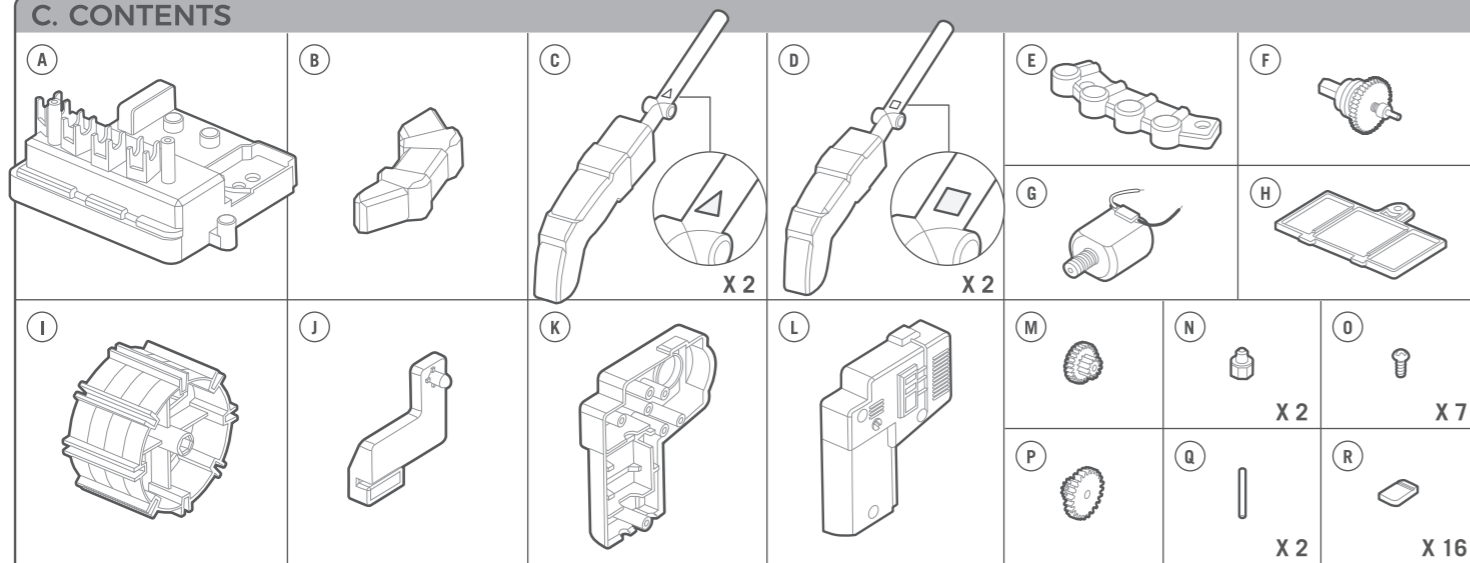
A. SAFETY MESSAGES

1. Adult assistance and supervision are required at all times. 2. This kit is intended for children over 8 years of age. 3. This kit and its finished product contain small parts which may cause choking if misused. Keep away from children under 3 years old. 4. To prevent possible short circuits, never touch the contacts inside the battery case with any metal objects. 5. Only install batteries after you have assembled the product. Adult supervision is required. 6. Do not insert any objects into the drum.

B. USE OF BATTERIES

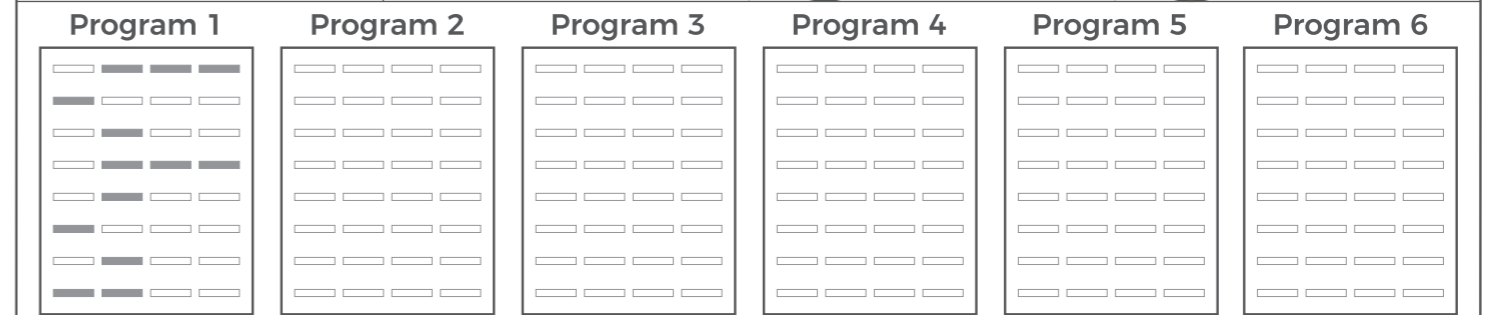
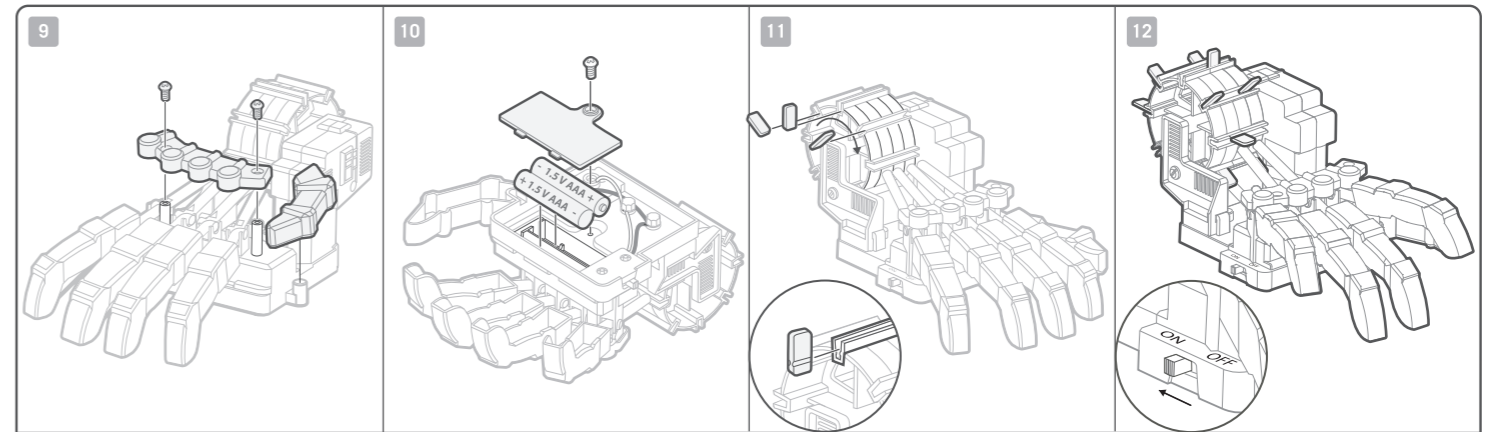
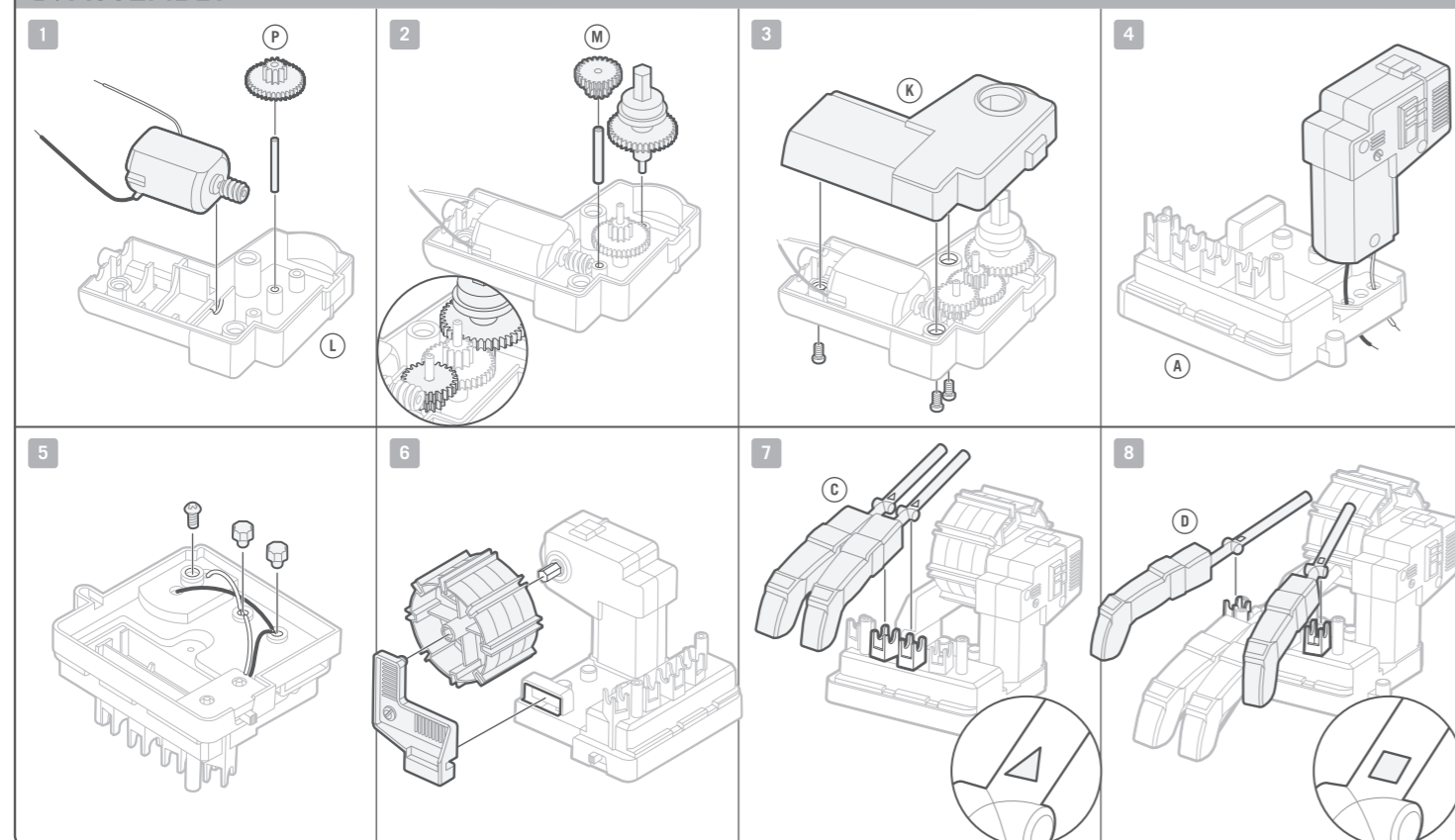
1. Requires two 1.5V AAA batteries (not included). 2. For best results, always use fresh batteries. 3. Make sure you insert the batteries with the correct polarities. 4. Remove the batteries from the kit when not in use. 5. Replace exhausted batteries straight away to avoid possible damage to the kit. 6. Rechargeable batteries must be removed from the kit before recharging. 7. Rechargeable batteries should be recharged under adult supervision. 8. Make sure that the supply terminals in the battery case are not short circuited. 9. Do not attempt to recharge non-rechargeable batteries. 10. Do not mix old and new batteries. 11. Do not mix alkaline, standard (carbon-zinc), or rechargeable batteries.

C. CONTENTS



Part A: Base x 1, Part B: Thumb x 1, Part C: Finger with a triangle mark x 2, Part D: Finger with a square mark x 2, Part E: Hinge cover x 1, Part F: Clutch axle x 1, Part G: Motor x 1, Part H: Battery cover x 1, Part I: Drum x 1, Part J: Drum support x 1, Part K: Left gearbox cover x 1, Part L: Right gearbox cover x 1, Part M: Small gear set x 1, Part N: Terminal cap x 2, Part O: Screws, Part P: Large gear set x 1, Part Q: Axle x 2, Part R: Peg x 16. Also required but not included in this kit: a small crosshead screwdriver and two 1.5V AAA batteries.

D. ASSEMBLY



- Slot the motor into the right gearbox cover, with the wires facing down. Slot an axle into the central hole, as shown in the diagram. Slide the large gear set onto the axle, with the smaller gear wheel uppermost.
- Slot the second axle into the hole closest to the motor worm gear. Slide the small gear set onto the axle, with the larger gear wheel uppermost. The teeth on the larger gear should interlock with the worm gear on the motor, and the teeth on the smaller gear should interlock with the teeth on the larger gear on the next-door axle. Fit the clutch axle into the remaining hole, with the hexagonal spindle facing upwards. The teeth on this gear wheel should interlock with the teeth on the small gear on the central axle.
- Position the motor wires into their grooves, then carefully put the left gearbox cover on top of the right gearbox cover. Secure the halves together with three screws.
- Place the base on your work area. Pass the wires from the motor through the two holes in the base then slot the gearbox into the base.
- Holding onto the gearbox, turn the base over and use a screw to secure the gearbox to the base. Put the red wire from the motor and the red wire from the battery case into one of the terminals, making sure that the bare metal of the wires touches the metal of the terminal. Secure the wires with a terminal cap. Repeat with the black wires from the motor and the battery case.
- Place the drum onto the spindle on the gearbox. Then push the drum support into the base so that its spindle supports the other end of the drum.
- Place the two fingers that are marked with a triangle onto the two central pivots, as shown.
- Place the two fingers that are marked with a square onto the two outer pivots, as shown.
- Place the hinge cover over the fingers, in line with the pivots, and secure it with two screws. Also slot the thumb onto its pivot.
- Insert two 1.5-volt AAA batteries into the battery compartment, matching the positive (+) and negative (-) symbols on the batteries with those in the case. The negative (flat) ends of the batteries must press against the springs. Put on the battery cover and secure it with a screw.
- Now you can add pegs to the drum, so that when the drum rotates, the pegs make the fingers rise and fall. Slide the pegs into the slots in the drum from the side. There is space for four pegs in each slot — one for each of the fingers. The pegs will only fit one way up. The pattern of pegs you create is like a program that controls the fingers. Try setting up program 1 in the diagram above. Start by copying the pattern of pegs in the top row of the diagram onto the top slot on the drum. Then turn the drum until the next slot is at the top, and copy the pattern on the second row to this slot. Keep going until you have set the pegs in all the slots.
- Switch on and the motor will make the drum turn slowly. The pegs will make the fingers rise and fall, tapping out the programmed pattern! Try programming your own tapping patterns using the program templates. Then transfer your patterns to the drum and test them out. How do your patterns sound?

E. HOW IT WORKS

The operation of the Motorised Robot Hand is quite simple. When the switch is turned on, electric current flows to the motor, making it spin. The gears in the gearbox slow the speed of the motor down so that the drum turns slowly. There is a mechanism called a ratchet in the gearbox. It allows the motor to keep turning if the drum becomes jammed. This protects the gears and motor. Each finger is a lever. When a peg presses down on one end, the tip of the finger is lifted.

F. TROUBLESHOOTING

- If the motor does not turn: make sure that the batteries are the correct way round in the battery compartment, and also that the bare wires under the base are touching the metal terminals. Otherwise replace the batteries with fresh batteries.
- If the drum turns in the wrong direction, swap the wires in the terminals so that the two red wires and the two black wires are connected.
- If the gears jam or make a lot of noise, open the gearbox and put a drop or two of oil on the gear wheels.
- If the fingers do not move as expected, make sure that the pegs are lined up with them properly.

G. FUN FACTS

- Your Motorised Robot Hand is a programmable machine! Changing the pattern of the pegs on the drum changes how the fingers tap.
- A traditional musical box works in the same way as the Motorised Robot Hand. Inside is a drum with a pattern of pins on it. As the drum turns the pins flick the fingers on a metal soundboard, and each finger sounds a different note.
- In the past inventors built robot people called automatons. The faces and limbs on the machines were moved by mechanisms similar to the Robot Hand.
- The very first programmable machine was a loom that wove cloth. The patterns in the cloth were controlled by a pattern of holes in a series of cards.

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QUESTION AND COMMENTS: We value you as a customer and your satisfaction with this product is important to us. If you have comments or questions, or you find any part of this kit missing or defective, please do not hesitate to contact our distributor in your country. You will find the address printed on the package. You are also welcome to contact our Marketing Support Team: Email: infodesk@4m-ind.com, Fax (852) 25911566, Tel: (852) 28936241, Web site: WWW.4M-IND.COM