

EXPERIMENT MANUAL



CODE+CONTROL ROBO DOZR



THAMES & KOSMOS



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KIT CONTENTS

Do you have any questions?
 Our tech support team will be glad to help you!
 USA: support@thamesandkosmos.com
 or 1-800-587-2872

What's inside your experiment kit

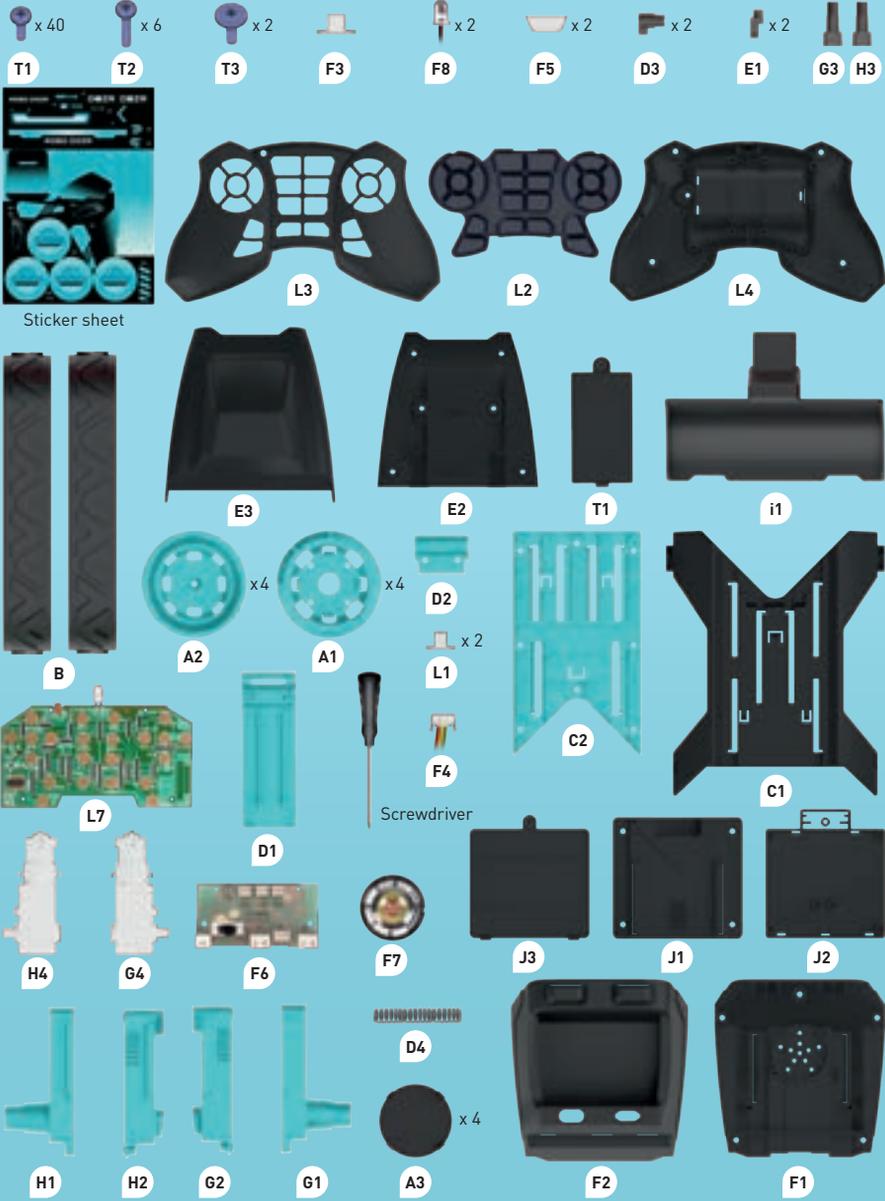


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YOU WILL ALSO NEED:

Scissors or diagonal cutters, nail file, 6 AA batteries (1.5-volt, type LR6)

Checklist:

✓ No.	Description	Quantity
○ T1	Short screw	40
○ T2	Long screw	6
○ T3	Short screw with flange	2
○ F3	Switch cover	1
○ F8	LED with cable	2
○ F5	Cab roof light lens	2
○ D3	Cab connector pin	2
○ E1	Cab mounting bracket	2
○ G3	Motor shaft extender, right	1
○ H3	Motor shaft extender, left	1
○ L3	Wireless controller cover	1
○ L2	Wireless controller button pad	1
○ L4	Wireless controller back	1
○ B	Continuous track belt	2
○ E3	Cab top	1
○ E2	Cab bottom	1
○ T1	Wireless controller battery cover	1
○ i1	Bulldozer blade	1
○ A2	Wheel outside	4
○ A1	Wheel inside	4
○ D2	Cab connector bottom	1
○ L1	Wheel nut	2
○ F4	IR receiver with cable	1

✓ No.	Description	Quantity
○ C2	Chassis bottom	1
○ C1	Chassis top	1
○ L7	Wireless controller PCB	1
○ D1	Cab connector top	1
○ H4	Motor, left	1
○ G4	Motor, right	1
○ F6	Robot PCB (printed circuit board)	1
○ F7	Speaker with cable	1
○ J3	Battery compartment cover	1
○ J1	Battery pack top	1
○ J2	Battery pack bottom	1
○ H1	Motor housing outside, left	1
○ H2	Motor housing inside, left	1
○ G2	Motor housing inside, right	1
○ G1	Motor housing outside, right	1
○ A3	Wheel cover	4
○ F2	Truck bed top	1
○ F1	Truck bed bottom	1
○ Z1	Sticker sheet	1
○ Z2	Screwdriver	1
○ D4	Metal spring	1

Note: The colors of some parts may vary.



SAFETY INFORMATION

WARNING! Not suitable for children under 3 years. Choking hazard — small parts may be swallowed or inhaled.

Store the experiment material and assembled models out of the reach of small children.

WARNING: This toy is only intended for use by children over the age of 8 years, due to accessible electronic components. Instructions for parents or caregivers are included and shall be followed.

Keep packaging and instructions as they contain important information.

Assembly must be performed under adult supervision.

Do not pick up the vehicle during operation.

Keep hands, hair, and clothing away from the tires and tracks when the robot is powered on.

Avoid hitting people, animals, and household furniture with the robot.



SAFETY FOR EXPERIMENTS WITH BATTERIES

- › The wires are not to be inserted into socket-outlets. Never perform experiments using household current! The high voltage can be extremely dangerous or fatal!
- › To operate the models, you will need six AA batteries (1.5-volt, type LR6), which could not be included in the kit due to their limited shelf life.
- › The supply terminals are not to be short-circuited. A short circuit can cause the wires to overheat and the batteries to explode.
- › Different types of batteries or new and used batteries are not to be mixed.
- › Do not mix old and new batteries.
- › Do not mix alkaline, standard (carbon-zinc), or rechargeable (nickel-cadmium) batteries.
- › Batteries are to be inserted with the correct polarity (+ and -). Press them gently into the battery compartment. See page 10. This page shows how the batteries are inserted, removed, and changed.
- › Always close battery compartments with the lid.
- › Non-rechargeable batteries are not to be recharged. They could explode!
- › Rechargeable batteries are to be removed from the toy before being charged.
- › Exhausted batteries are to be removed from the toy.
- › Dispose of used batteries in accordance with environmental provisions, not in the household trash.
- › Avoid deforming the batteries.
- › The toy is not to be connected to more than the recommended number of power supplies.
- › As all of the experiments use batteries, have an adult check the experiments or models before use to make sure they are assembled properly. Always operate the motorized models under adult supervision. After you are done experimenting, remove the batteries from the device compartments.

NOTES ON DISPOSAL OF ELECTRICAL AND ELECTRONIC COMPONENTS

The electronic components of this product are recyclable. For the sake of the environment, do not throw them into the household trash at the end of their lifespan. They must be delivered to a collection location for electronic waste, as indicated by the following symbol:

Please contact your local authorities for the appropriate disposal location.



IMPORTANT INFORMATION**Dear Parents and Supervising Adults,**

Children want to be amazed, understand, and create new things. They want to try everything out and do it for themselves. They want to know! They can do all of this with Thames & Kosmos experiment kits. We hope you and your child have a lot of fun experimenting with your Robo Dozr!

— Before building and experimenting, read the instructions with your child and discuss the safety information together. Stand by to assist your child with any challenging steps of assembly or usage.

— If your child is working on a table, give them something to work on to prevent damage to the furniture.

— Particular care must be taken when cutting the plastic parts out of the frames, as sharp points can be created. These can be removed with the help of scissors or diagonal cutters and a nail file. Please supervise your child whenever he or she is using scissors or diagonal cutters.

— Before operation, check to make sure the robot has been assembled correctly, and assist your child with the experiments.

**CARE AND MAINTENANCE**

- › Replace the batteries if the power decreases.
- › After you are done experimenting, remove the batteries from the battery compartments.
- › Check regularly that the plugs and other parts are not damaged. In case of deterioration, do not use the product until it has been repaired.
- › To clean, wipe the toy gently with a clean dry cloth.
- › The toy may malfunction under electrostatic discharge interference. If the toy does not respond, reset it (turn it off and on again).
- › Do not submerge the toy in water as it can damage the electronic assemblies.
- › To protect the electrical and mechanical components, we recommend that the toy is only operated indoors.
- › Avoid contact with metal objects and liquids.
- › Keep the toy away from direct heat.



Let's go!



Build, Code, and Play

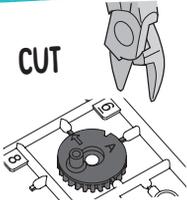
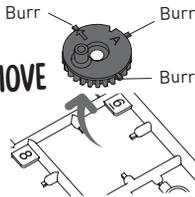
Are you ready? It's time to assemble your Robo Dozr, complete with flexible “tracks” (the belts around the wheels) and a big “blade” (the scoop at the front). First, you will build the subassemblies. For this, parts with the same letter go together. Then you will put the subassemblies together into the complete robot assembly. Finally, you will learn how to remotely control and program your Robo Dozr!



ASSEMBLY TIPS

**TIP****IMPORTANT:****DO NOT REMOVE THE PARTS FROM THEIR FRAMES UNTIL THEY ARE NEEDED.****REMOVE EXCESS MATERIAL (BURRS) BEFORE ASSEMBLY USING DIAGONAL CUTTERS OR A NAIL FILE.**

Scan this QR code for a step-by-step assembly video.

**CUT****REMOVE****TRIM**

Note: The part shown here is just shown for the purpose of explaining how to remove any part from any frame; it is not an actual part in this kit.

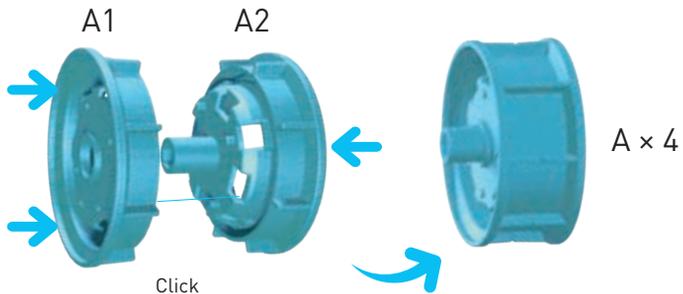
**TIP****IMPORTANT:****MAKE SURE YOU HAVE THE PROPER TOOLS FOR ASSEMBLY.**

Small Phillips-head screwdriver (included)



Diagonal cutters (cutting pliers) or scissors (not included)

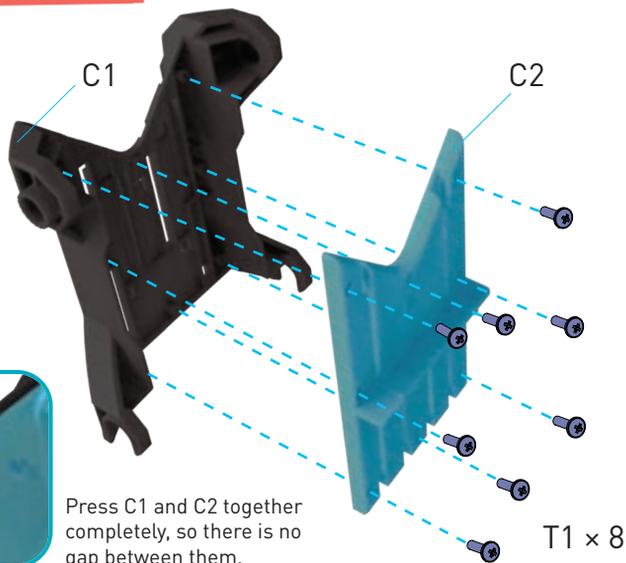
SUBASSEMBLY A: WHEELS

AA1 × 4
A2 × 4

SUBASSEMBLY C: CHASSIS

C

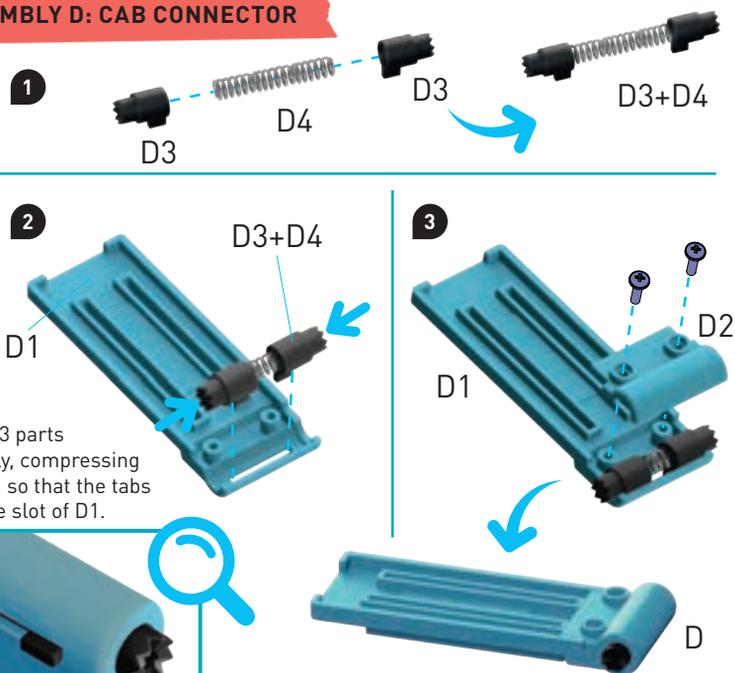
C1
C2
T1 × 8



SUBASSEMBLY D: CAB CONNECTOR

D

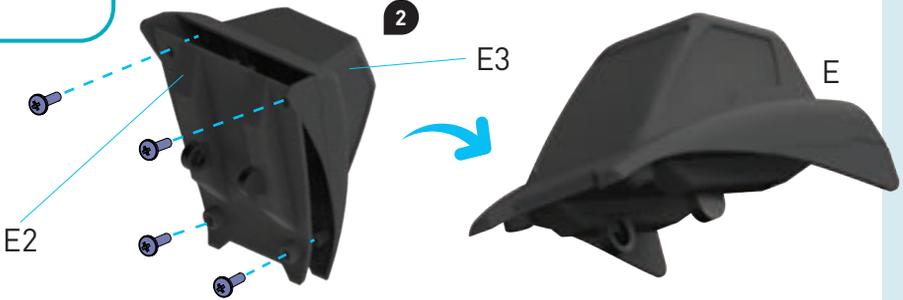
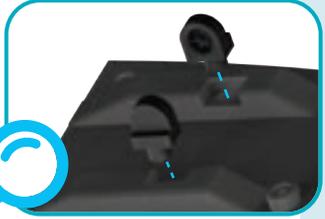
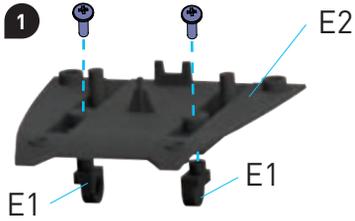
D1
D2
D3 × 2
D4
T1 × 2



SUBASSEMBLY E: CAB

E

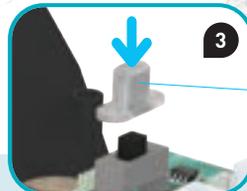
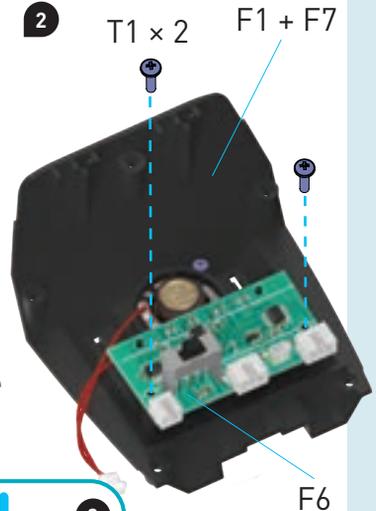
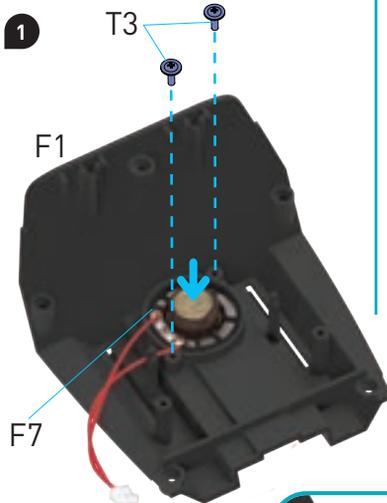
E1 × 2
E2
E3
T1 × 6



SUBASSEMBLY F: TRUCK BED

F

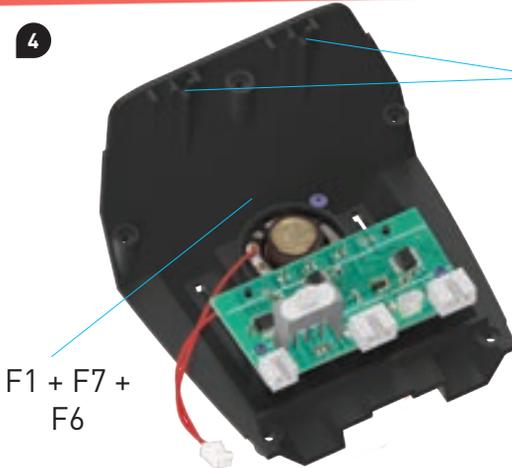
F1
F2
F3
F4
F5 × 2
F6
F7
F8 × 2
T1 × 7
T3 × 2



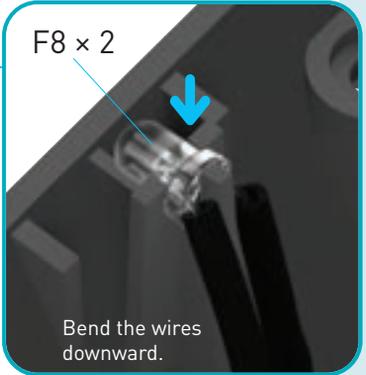
Note: The colors of the electronic parts and wires may vary.

SUBASSEMBLY F (CONTINUED)

4

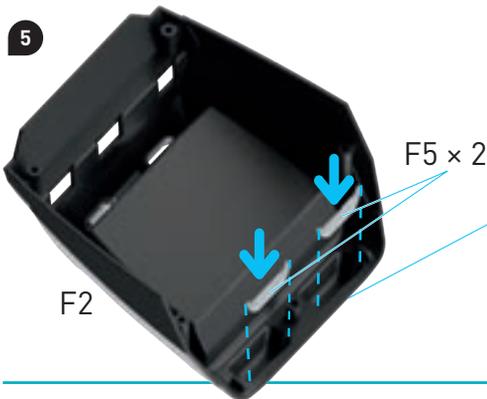


F8 × 2



LED1 & LED2 cables

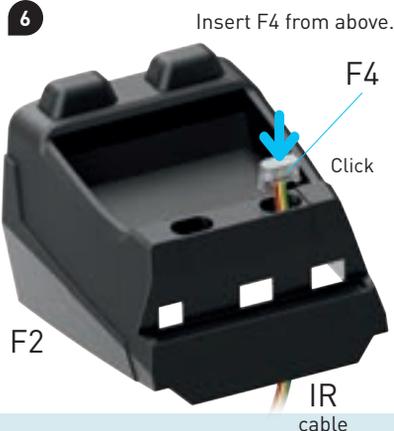
5



Orient F5 so that its smooth side is facing outward.



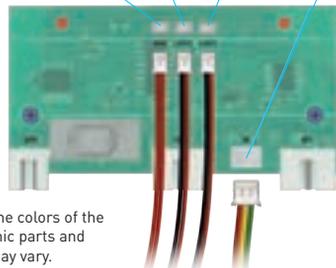
6



7

SPK (F7) LED2 (F8) LED1 (F8) IR (F4)

 Click all cables into their sockets.



Note: The colors of the electronic parts and wires may vary.

SUBASSEMBLY F (CONTINUED)



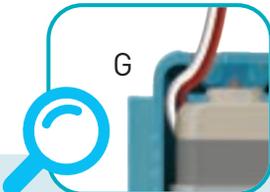
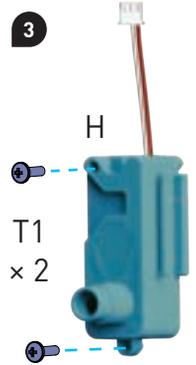
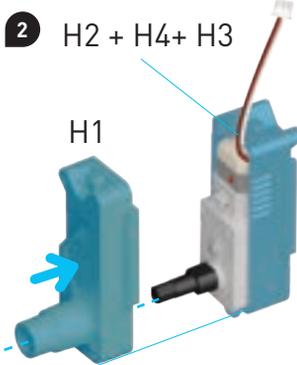
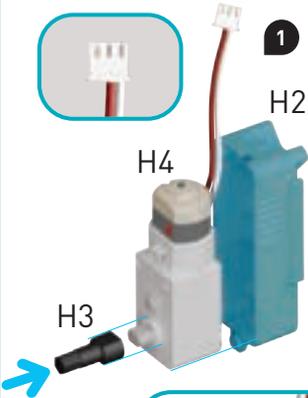
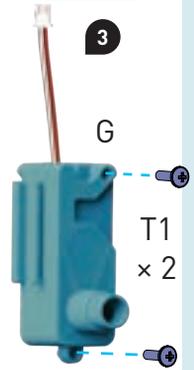
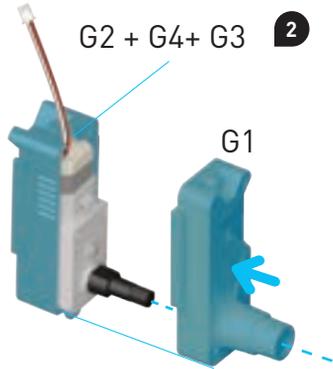
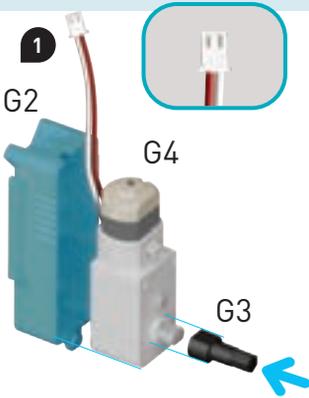
SUBASSEMBLIES G & H: MOTORS

G

- G1
- G2
- G3
- G4
- T1 x 2

H

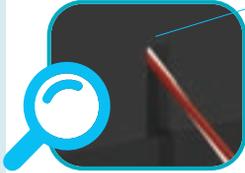
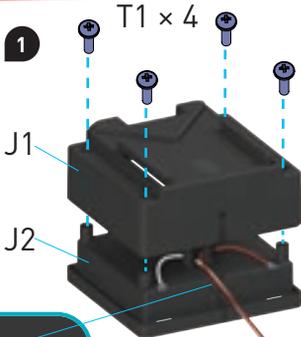
- H1
- H2
- H3
- H4
- T1 x 2



SUBASSEMBLY J: BATTERY PACK

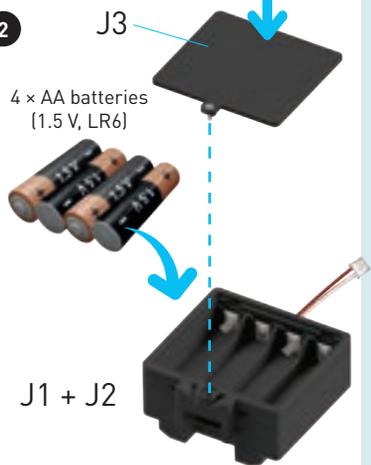
J

J1
J2
J3
T1 × 4



Guide the wires through the slot.

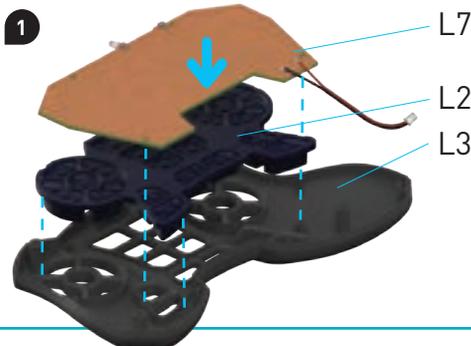
2



SUBASSEMBLY L: WIRELESS CONTROLLER

L

L2
L3
L4
L7
T1 × 4



L3 + L2 + L7

Click

L4



T1 × 4

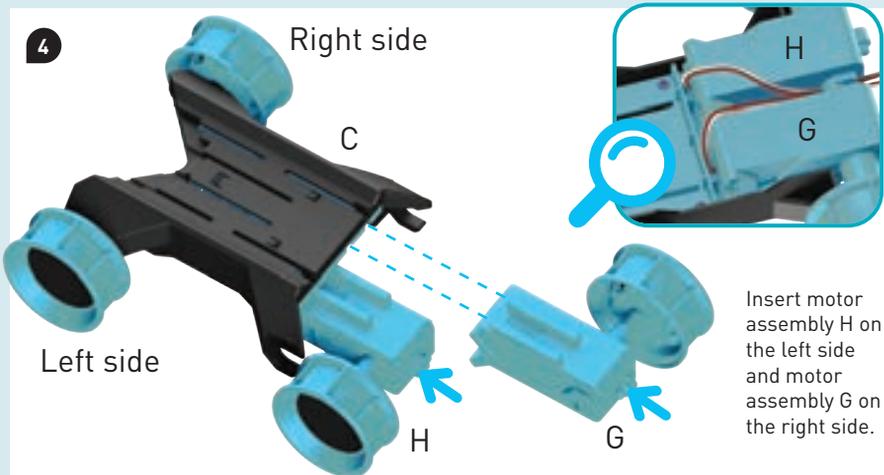
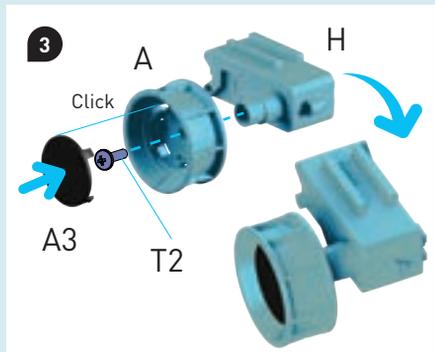
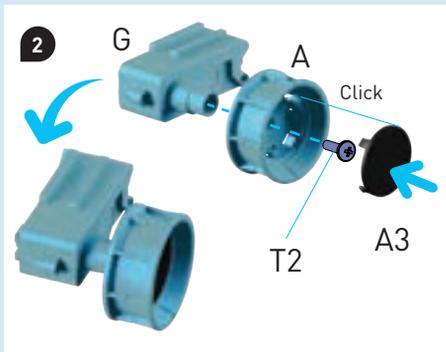
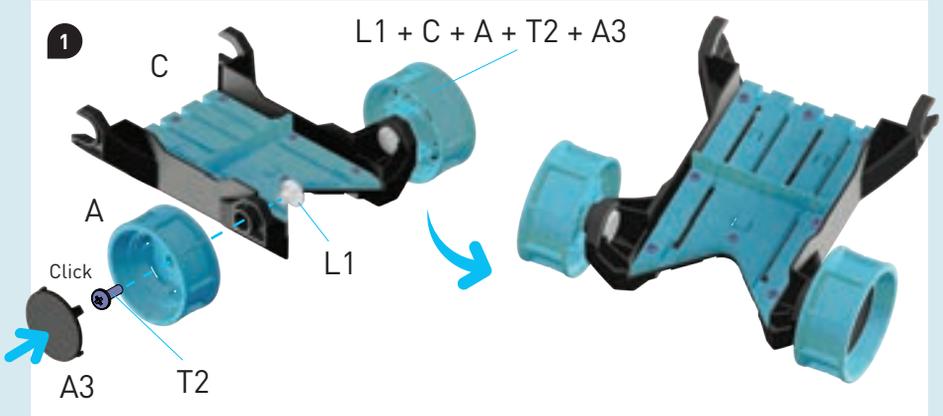
Note: Also use a T1 screw to keep the battery cover secured.



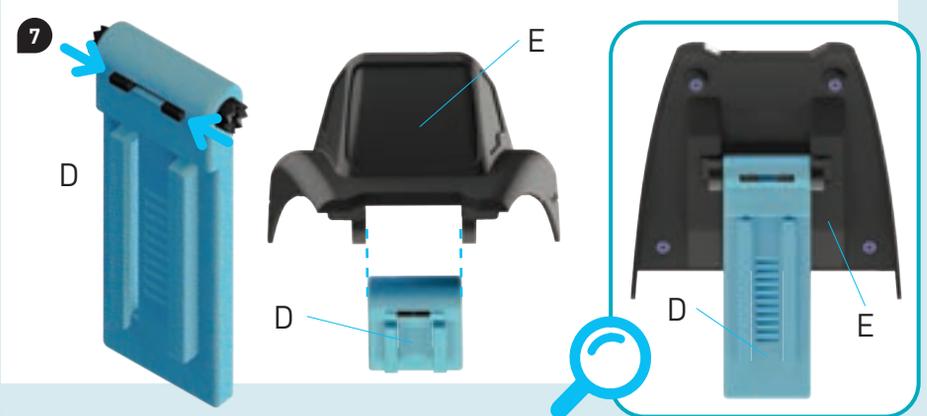
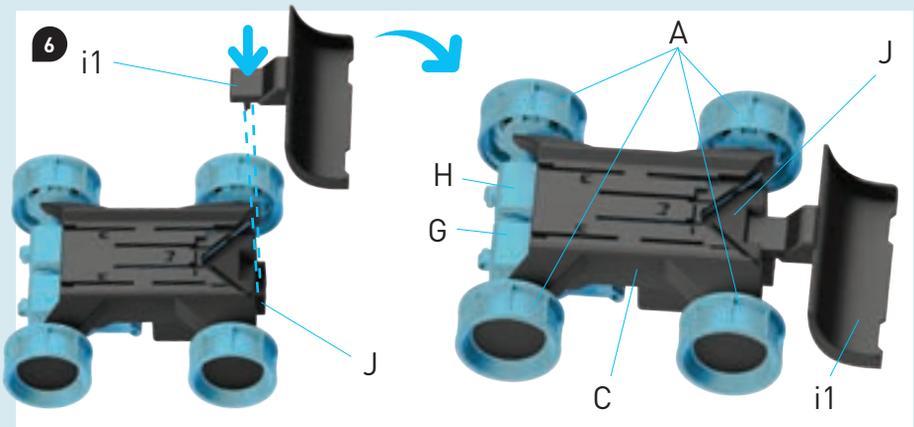
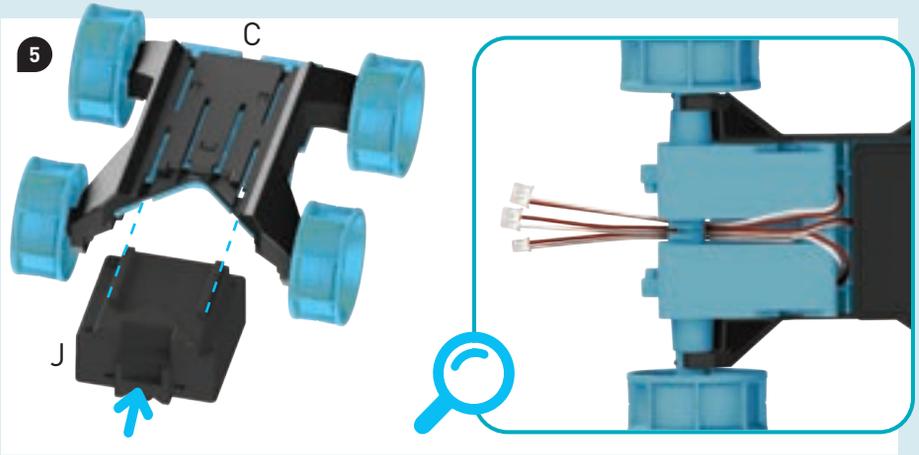
2 × AA batteries (1.5 V, LR6)



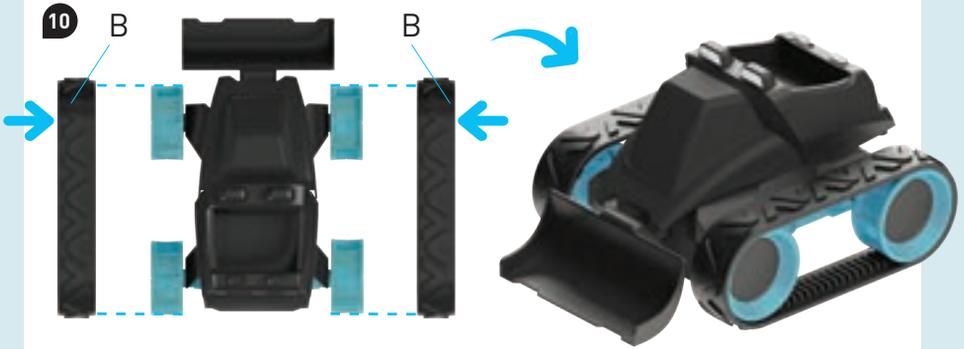
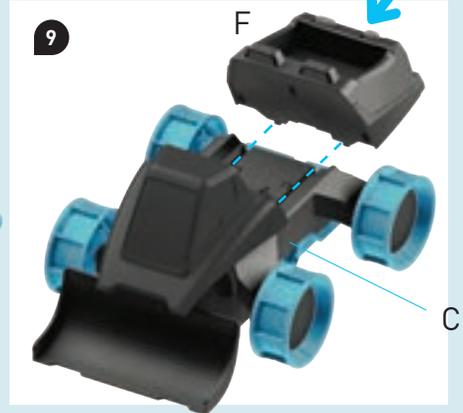
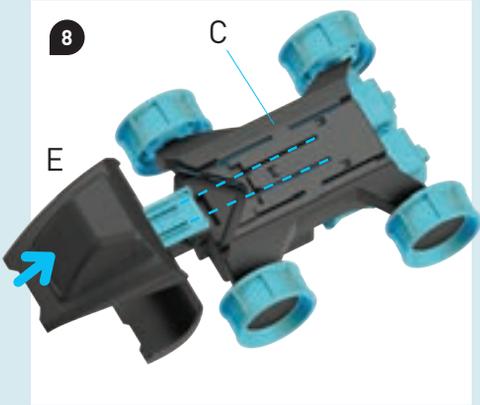
ROBO DOZR ASSEMBLY



ROBO DOZR ASSEMBLY (CONTINUED)



ROBO DOZR ASSEMBLY (CONTINUED)



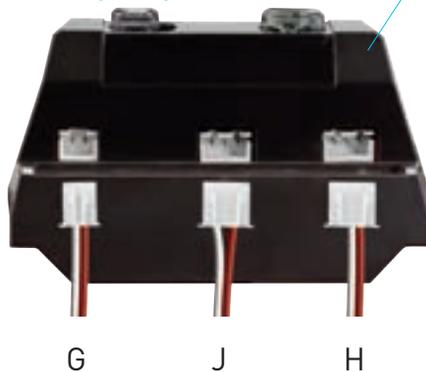
- 11** See the next page for instructions on where to place each sticker on your Robo Dozr.



OFF / ON



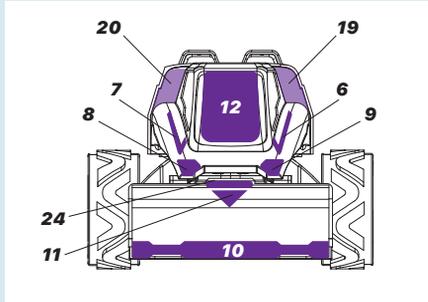
Truck bed (F)



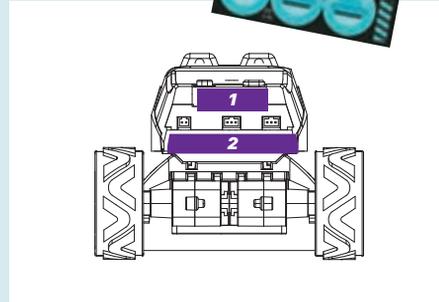
Click all cables into their sockets.

STICKER PLACEMENT

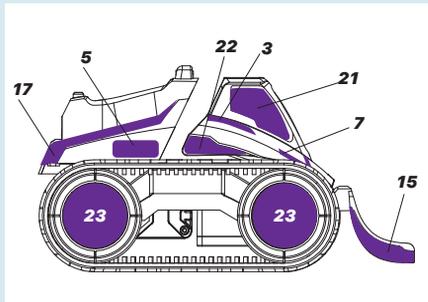
The numbers below correspond to the numbers printed next to the stickers on the sticker sheet. Match the sticker number with its location on the Robo Dozr to position it.



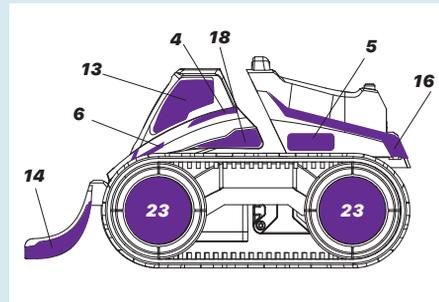
Front view



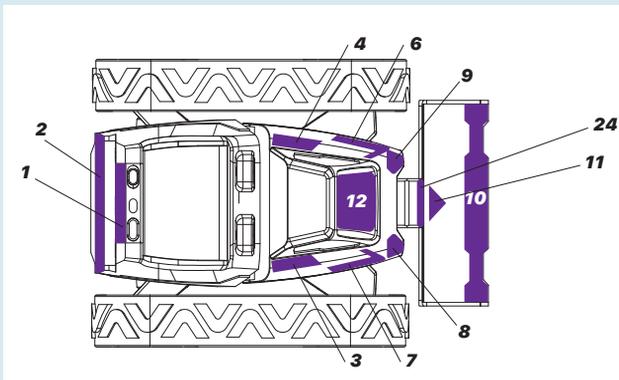
Back view



Right side view



Left side view



Top view

CODE+CONTROL

Your Robo Dozr can be controlled in real time, responding immediately to the commands you give it by pressing buttons on the wireless controller unit. It can also be programmed to follow a series of commands that you enter and save. These programs can then be run in a continuous sequence. The wireless controller uses an infrared beam to communicate with the robot, so make sure there is a direct line of sight between the wireless controller and the robot.



CONTROL MODE: To directly control your Robo Dozr in real time, turn it on and then press the following buttons.

	Move forward or backward a short distance		Move forward or backward a longer distance
	Rotate 45 degrees to the left or right		Rotate 90 degrees to the left or right
	Change speed: Level 3, 2, or 1 (Indicated by the number of beeps)		Rotate 180 degrees
	Turn the volume up or down		Turn on, blink, or turn off the lights
	Play sounds (4 random options)		"Exploration mode" (Preprogrammed movement pattern)
	Play horn sound		Play alarm sound



CODE+CONTROL

CODING MODE: To record and run a program for your Robo Dozr, follow these instructions.



1. Press the program button (the button labeled with the symbol shown above) on the wireless controller to enter coding mode.
 2. Program the sequence of commands that you want your Robo Dozr to perform. To do this, simply press the function buttons on the wireless controller (described on the previous page) in the exact sequence that you want the program to follow.

As you do this, your Robo Dozr is recording the program in its memory. You can record up to 20 commands per program.
 3. When you are done recording your sequence of commands, press the program button again to end the recording period and run the program.
 4. Your Robo Dozr will perform the sequence of commands according to your program.
-



5. If you would like to save a program, after following steps 1 and 2 above, press one of the three numbered program buttons shown above to store and also run the program immediately.

Once a program is stored, you can press the number of the program to run it again. You can record up to 20 different actions for each of the three saved programs (Program 1, Program 2, and Program 3).

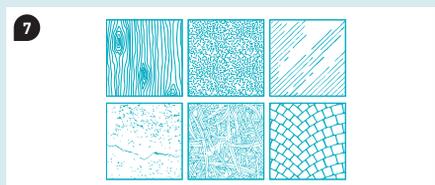
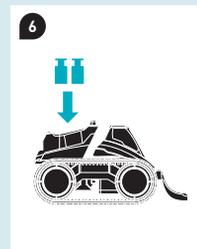
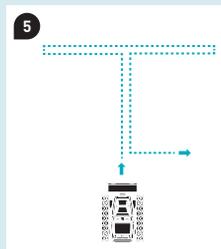
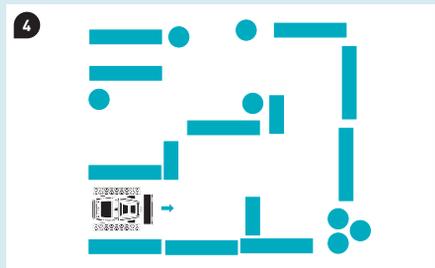
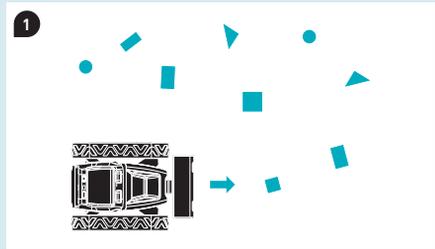
Note: The program memory is cleared when the robot is turned off.



CODE+CONTROL EXPERIMENTS

Here are some ideas for experiments you can try with your Robo Dozr.

- Place a number of small objects (for example, small toys or small building blocks) in different spots on the floor. Write a program to drive your Robo Dozr around the room, collecting the small objects in front of its blade. How many of the objects can you collect and bring to a designated end point?
- Set up a ramp (an inclined plane) with a board and some books to raise one end. Place the Robo Dozr at the bottom of the ramp and some small objects along the ramp in front of it. Drive the Robo Dozr up the ramp and try to push all of the objects to the top. Incrementally (little by little) increase the slope of the ramp, trying the experiment at different slopes. Is there a slope at which the Robo Dozr can no longer climb the ramp?
- Remove the track belts from your Robo Dozr and try driving it without them. What happens? What can you infer about the track belts?
- Construct an obstacle course of large building blocks and other objects. Can you write a program to successfully navigate the Robo Dozr through the obstacle course, without hitting any objects?
- Write a program to make the Robo Dozr spell out your initials in its path along the floor.
- Put heavy objects into the Robo Dozr's truck bed. Do the objects have any effect on the speed or motion of the robot?
- Try driving the Robo Dozr on different surfaces: wood, tile, glass, carpet, fabric, asphalt, concrete, stone, and so on. Which surfaces does it drive best on? Are there any surfaces it cannot drive on at all?





All about continuous tracks

Riding a bike on a smooth road surface is much more fun than riding on a sandy path because on sand the tires sink in and get stuck.

The same is true for any type of vehicle with wheels, unless it carries its own “road” along with it — like a **tracked vehicle** does. Its wheels roll along on two **continuous tracks** that turn in an endless loop.

The lower part of these wide tracks rests firmly on the ground and supports the wheels — and thus the load of the vehicle. At the rear, the track’s segments, which are usually made of metal, are lifted off the ground and carried to the front to be used again.





Advantages

Tracked vehicles have many advantages in off-road locations. The weight of a wheeled vehicle without tracks pushes its wheels deep into soft ground. The tracks, on the other hand, have a much larger **surface area** than the wheels. This spreads the weight of the vehicle over a larger surface area, so it does not sink in as easily.

This large surface area also transfers the driving force to the ground better, so tracked vehicles can move forward more easily on slippery surfaces and can even climb over small obstacles.

Disadvantages

However, tracked vehicles are much more **technically complicated** than ordinary vehicles. They have more drive wheels and rollers, need an especially powerful motor, and the heavy track needs to be guided by stabilizing wheels. They are steered by controlling the running speed of each track individually.

However, this means that a tracked vehicle can turn around on the spot. A tracked vehicle can also brake very effectively.

Tracked vehicles in the real world

Today, continuous tracks are commonly found on numerous **construction vehicles** that need to drive on soft ground, such as excavators, bulldozers, and dump trucks. Thanks to their crawler tracks, **snowmobiles** can also drive on ice and snow. And last but not least, **tanks** use continuous tracks because they must be able to drive on any terrain, despite weighing dozens of tons thanks to their thick metal bodies and ammunition.





Examples of robots with continuous tracks

Continuous-tracked robots like your Robo Dozr are some of the most exciting robots because they are often designed to venture into places that are too dangerous for humans. Here are some examples.



Fire-fighting ROBOTS

This robot has a continuous track which enables it to crawl over debris and rough surfaces, allowing it to get close to fires and put them out. It's a little like a robotic fire extinguisher on track. It even has a bulldozer blade in front, just like the Robo Dozr!



Mine-clearing ROBOTS

Land mines were laid during many wars, and they still pose a great danger to populations today. Mine-clearing robots are increasingly being used to clear these mines, because they can be operated by remote control at a safe distance. In the picture, you can see two models used for mine clearing.



RESCUE ROBOTS

These robots are used to help rescue people in dangerous situations. They were used after the attacks on the World Trade Center on September 11, 2001 and were also deployed after the earthquake and subsequent tsunami in Japan in 2011.

FCC Part 15 Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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