

RADIO-CONTROLLED Manufactured by **Elenco™ Electronics, Inc.** 150 W. Carpenter Avenue Wheeling, IL 60090 CAR KIT **AK-870**

WHAT IT IS

HOW TO USE IT

ne ON/OFF switches on the car antenna on the Remote Control.

Contact Elenco[™] Electror contact your place of pu

se as they will not be able to help you.

y have been given different screws from specified here (and usually contact Elencon it is not be able to help you.). Contact Elencon it is not be able to help you.

PARTS LIST

QTY.

DESCRIPTION
BAG 1

ews 0.4" x 0.1" (10mm x 2.6mm) ews 0.4" x 0.115" (10mm x 3.0mm) ews 0.3" x 0.1" (8mm x 2.6mm), 0.15" head ews 0.3" x 0.1" (8mm x 2.6mm), 0.2" head

In addition to the experience of building the unit, there is also an of its operation, a block diagram, an electronic road map sho electrical circuits, and a troubleshooting section in case of proble showing the The RIGHT lever of Push left to male Push right to male Push to center of Push to ce The LEFT lever on the Remote Control:

Push forward (or forward-right) to make the AK-870 go forward.

Push backward to make the AK-870 go backward.

Push to center or let go to stop. er on the Remote Control:

nake the AK-870 turn left.

make the AK-870 turn right.

er or let go to go straight.

Recommended for ages 12 and up. It takes

YOU WILL NEED:

- Screwdriver (Phillips to Screwdriver (Phillips

These suggestions will help make your car last for years of fun:
Never drive your car in rain, snow, mud, sand, dirt, or on a wet floor, as damage may result.
Do not drive your car on carpet since lint may damage the wheel mechanism.

Turbo King operates best on a wood or tile floon Never operate Turbo King in the street.

ar Springs
ont Spring
ont Wheel Shock Absorber (small spring)
ddle Gear
ar Rod 0.8" x 0.075" (20mm x 2mm)
sering Alignment Wire/Spring
sering Alignment Post
sering Motor Bracket

- 1 9V battery (alkalir
- are highly types of

also need a standard screw driver in step 14.



FCC regulations interference from a causing interference Electronics if you n

for your the AK-870 require you to accept any authorized sources and that you shut down if you are ce with other authorized products. Contact Elencomeed assistance.

r modify the electrical circuit components inside your car rol transmitter as this may cause malfunctions or violate for this product.

The Federal Comr radio frequency sp interfering with eac

nmunications Commission (FCC) regulates use of the pectrum in the United States to prevent products from ch other.

ן ו Frame וtenna

tter Antenna

ng Motor

Motor

6AK870B5E

610910E 484011E

626023E 484010E

6AK870B6E

Front Wheel
It Front Wheel
It Section Cover
It Section Cover
It Bulb Cover
It Bulb Cover

THE FCC





HOW IT WORKS

When the levers in the Remote Control Unit are pushed electrical contacts are made connecting the 9V battery power to the transmitter and indicating which commands the user wants sent to the car. Forwards/Backwards and Left/Right commands are controlled by different levers and use different sets of electrical contacts that are used to encode a sequence of electrical pulses; the number of pulses depends on which command is being sent. In some models Left/Right commands are only sent if Forwards/Backwards commands are also being sent, since there is too much friction to turn the wheels unless the car is moving. An electrical circuit that is tuned to a frequency of 27.9 MHz creates a signal that is sent to the antenna when the pulses are active. The antenna converts this electrical energy into radio energy, creating a stream of radio energy bursts, which travel through the air and are picked up by and understood by the radio receiver in the car. The frequency of 27.9 MHz was selected for your AK-870 with the approval of the FCC (the US government) to minimize radio interference between this product and all other electrical

Radio Receiver:

The car antenna collects radio energy and converts it back into electrical energy; the energy here will always be much less than the energy originally applied to the transmitting antenna. If the car is turned on then the radio receiver in the car is continuously monitoring the electrical energy from its antenna. The receiver is basically a filter which is tuned to amplify any energy around 27.9 MHz and block energy the antenna picks up outside this region. If the Remote Control Transmitter is sending commands then its radio signal will be picked up by the receiver and converted back into the original pulse sequence. Decoding circuitry then determines which commands were sent by measuring the number of received pulses in the sequence. Signals are then sent to the motors to execute the commands.

Characteristics of Radio Reception:

Many factors affect the ability of the AK-870 to receive commands from its Remote Control Transmitter. A weak battery in the Transmitter will result in a weaker transmitted signal; if the battery is very weak then the Transmitter may not function at all. The Transmitter's ability to convert electrical energy to radio energy is best when its antenna is fully extended and degrades as the antenna length is reduced; the same thing also

applies to the car antenna's ability to convert the radio signal back into electrical energy for the receiver. The Transmitter's antenna transmits energy in all directions so as the range between it and the car is increased, less energy is received at the car. When operated with strong batteries and in an open area the range will be at least 40 ft. Obstacles such as walls, furniture, and trees will degrade the radio signal's ability to travel through air and reduce operating range, but will never block it completely. In some cases more radio energy may travel from the Transmitter to the car by going around obstacles than by going through them. In the car, weak batteries will reduce power to the Motor and degrade the receiver's ability to filter, amplify, and decode commands from the Transmitter.

Car Steering Mechanism:

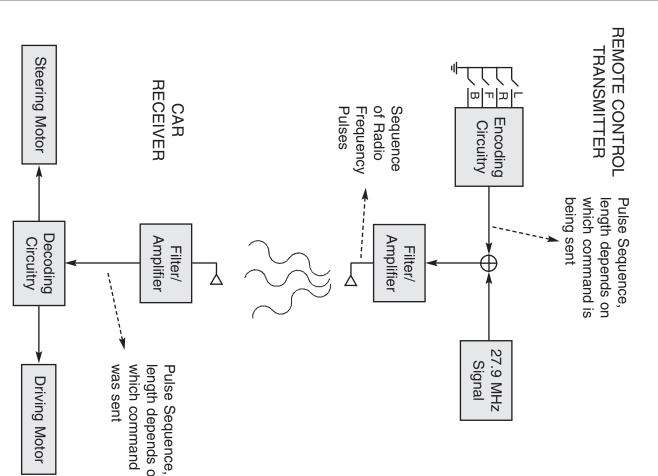
When a command is received to turn left or right, a voltage is applied to the Steering Motor. This voltage across the Motor creates a magnetic field. Inside the motor is a small magnet which is connected to the gear you see on the outside of the motor. The magnetic field turns the magnet in the motor, which turns the gear. The "teeth" on the gear grab the Steering Bar and pull it to one side. Since the Front Wheels are connected to the Steering Bar, the car will turn. To turn the other direction, the voltage to the motor is reversed.

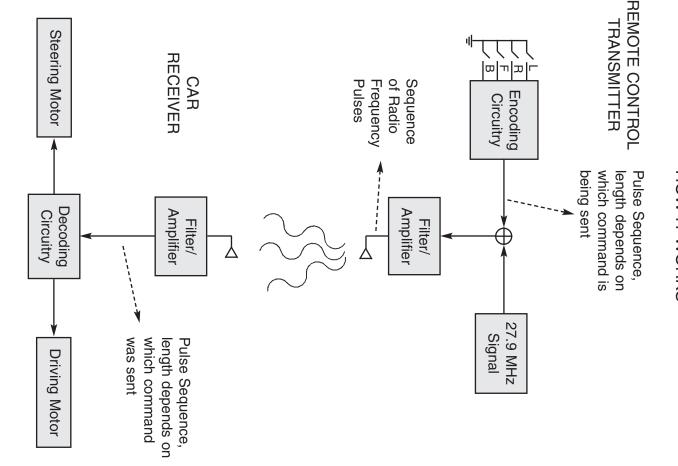
Car Drive Mechanism:

The Driving Motor works the same as the Steering Motor. When a command is received to go forwards, a voltage is applied to the Driving Motor; this voltage is reversed to go backwards. The small gear on the Motor drives the Middle Gear, which drives the gear that is part of the Rear Wheels Assembly, making the wheels move. Note that the gears on the Motor and the Rear Wheels Assembly rotate forward and the Middle Gear rotates backward to drive the car forward, this is because interlocking gears spin in opposite directions. Also notice that between the Motor gear and the Middle Gear and again between the Middle Gear and the Rear Wheels gear, the number of "teeth" is increased by 4:1 and 5:1 respectively, for 20:1 overall. The Motor must rotate 20 times to rotate the rear wheels once. The reason for this is that if the Motor were to drive the wheels directly then the AK-870 would be very hard to control.

BLOCK DIAGRAM

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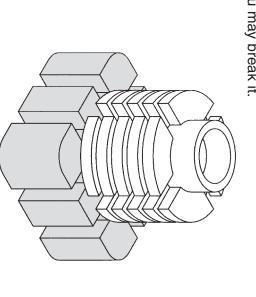


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- Symptom: Car does not go in a straight line when you releasing to control lever.
 Use a non-Phillips type screwdriver to adjust the front wheels alignment control on the underside of the Bottom Frame, assembly step 14.
- Symptom: Car doesn't work at all.
 Make sure that the batteries in both the car and the Remote Control Transmitter are strong and that they are installed with the positive and negative terminals positioned properly. Alkaline or re-chargeable nickel-cadmium batteries are highly recommended, and new ones will last for 30-40 minutes of continuous use. Do not mix old and new or different types of batteries.
 Make sure the ON/OFF switch is ON.
 Move the Transmitter antenna close to the car antenna to be sure your range is not degraded. If range is degraded, see the symptom for reduced range (next).
 Be sure that none of the wiring connections were broken, are contacting any other metal (creating a "short circuit"), or are wired wrong.
- 3e sure that there is no physical damage or "short circuits" on the Circuit Board.
- Open the Remote Control Transmitter and check that the wiring connections are all intact and that there is no damage to its circuit board.
- Symptom: Front wheels do not turn or barely turn.
 On some models LEFT/RIGHT commands are only sent if FORWARD/BACKWARD commands are also being sent, so try pressing both transmitter levers at the same time.
 Lift up the front section (to remove friction with the ground) and see if the wheels turn now.
 Turn one of the front wheels with your hand and be sure that the other wheel turns in the same direction and that the Steering Motor Gear is moved along the Front Wheels Steering Bar smoothly.
 Check the wiring to the Steering Motor and your assembly of the front section.
- be sure that there is no physical damage or "short circuits" on the ircuit Board. If you have a voltmeter, you should measure about VDC across the wires to the Steering Motor when the transmitter is ctivated.

- TROUBLESHOOTING

- Although tunable inductor L1 has been pre-aligned, you may need to adjust it for best performance. You need a very small screwdriver for this. Remove the top cover and flip the ON/OFF switches to on. Activate the transmitter and move it away from the car. Adjust tunable inductor L1 on the circuit board for best range. Be VERY GENTLE, since L1 is FRAGILE. It should turn easily. If you apply too much force you may break it.



Symptom: Light Bulb does not light. Check the wires to the Light Bulb. Check the bulb is not burnt-out. Be sure that there is no physical dark Circuit Board. Make sure the wheels are all free of thread, lint, or hair and that the black rubber on the wheels is not coming off. Spin the rear wheels with your hands. You should feel and hear the Middle and Motor gears spin smoothly. If not, check your assembly of the rear section, adding Vaseline or grease if necessary. Lift up the rear section (to remove friction with the ground) and disconnect the Driving Motor wires from the Circuit Board. Re-connect the Motor wires across a 1.5V battery with your hands, the wheels should spin smoothly. If nothing happens (the motor gear does not spin) then inspect your motor for problems. The Rear Wheels gear must be tight on its rod and the Middle Gear must NOT be tight on its rod. Be sure that there is no physical damage or "short circuits" on the Circuit Board. If you have a voltmeter, you should measure about 1.5VDC across the wires to the Driving Motor when the transmitter is activated and the wheels are not turning, or about 4VDC when the wheels are spinning freely.

b is not burnt-out. there is no physical damage

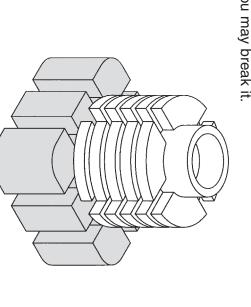
or "short

the

es not go forwards/bacl car batteries are strong

kwards or does so errate and all your wires make

- Symptom: Car has reduced range.
 Make sure that the batteries in both the car and the Remote Control Transmitter are strong and that they are installed with the positive and negative terminals positioned properly.
 Make sure your antenna is properly extended.
 Nearby CB and amateur radio transmitters can interfere with your control of the AK-870. Try moving away from them.
 Make sure the wire between the Circuit Board and the antenna in the car is intact and that the antenna screw is tight.
 Be sure that there is no physical damage or "short circuits" on the Circuit Board.
 Although transmitter and the Remote Control of the AK-1-1-1-1



n: Car runs even though the Remote Control Transmitter is off. onnect the battery in your Transmitter to make sure it is not

place of purch

they will not be able to help

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Say that you have version: **E**

150 W. Car Wheeling, I (847) 541-3

Elenco™ Electronics, Inc.

nter Avenue Web site: /www.elenc.
60090 e-mail: elenco@elenc.
00 Fax: (847) 520-0085

ELECTRONIC ROAD MAPS

Cover

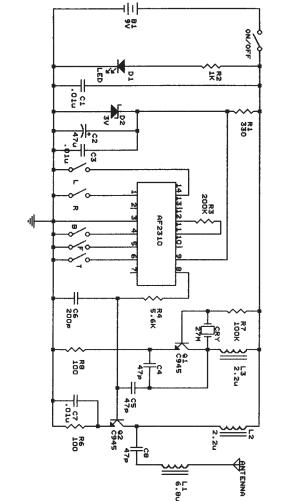
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corative Decals (1 Sheet)
stic Tubing (at least 6")

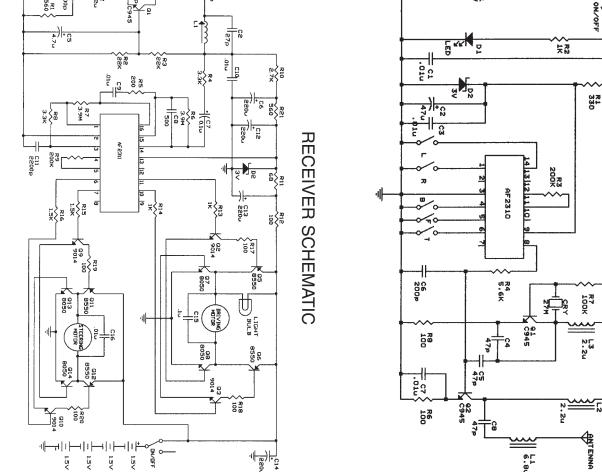
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6AK870B7E

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