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Hand Held DC Generator, Part#: SS4444-RGS

These are designed with economy in mind, and operators should turn the device with care, as the gears are made of plastic and will break if abused.

This simple device demonstrates energy conversion from mechanical to electrical and vice versa. Made with a clear plastic casing, students can clearly see the motor, gears and wiring. **Maximum Voltage**: 6.5 Volts
Read the customer review pasted below for a helpful tip…

★★★★★ Good Value/Performance October 1, 2015

Reviewer: Mark Stephens from Binghamton Univ., NY United States

I've used these economical generators for some time now, in our K-5 outreach programs (very rough service!), and they perform very well.

The clear body makes explanations simple, and they can be used as a stand-alone demo, with the built-in bulb, or it can be removed and connected to other devices with the included alligator wires.

One tip: With repeated cranking, the screw that holds the crank knob usually comes off. To prevent this, I remove this screw, put a small drop of super glue in the screw hole, and reinsert the screw before the glue sets. Now they don't fall off!

Update, 10/01/15. Sci-Supply took my suggestion and now offers the replacement gears for this generator (SS4444A), and at a reasonable price! I fixed several of my units that had been damaged by frenzied crankers, and now they're good as new! A great product is now even better!

(OVER)

Demonstration 1:
By doing work and turning the handle, students can convert their mechanical energy into a DC power supply of up to 6.5 Volts. The bulb on the device will light up when the handle is turned, demonstrating the electrical energy production.

Demonstration 2:
The clear plastic construction allows students to see the small motor that is used to generate the electrical energy. Many students do not realize that a DC motor can:

A. Generate electrical energy by using mechanical energy (an alternator on a car is an example of a practical application).
B. Use electrical energy to produce mechanical energy (a simple electric fan is an example of a practical application).

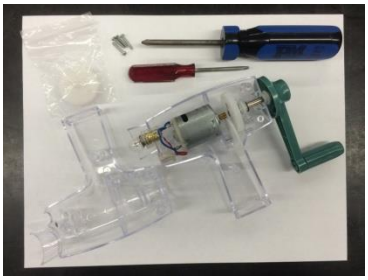
Demonstrate the production of mechanical energy by connecting the red and black wires to a dc power supply (like D batteries in series) of up to 6 volts. **Make sure that the crank handle is free to spin when attached to the power supply.**

Demonstration 3 (multi-person, requires 2 generators):
If you have 2 people and 2 hand generators available, you can connect the alligator clips of both generators together (black to black, red to red). **Remove the light bulbs when connecting the generators together in this configuration**. While one student holds a generator with the crank handle free to move, the other student will (**carefully – don't break the gears!**) turn the crank handle of their generator. Students should first observe the difficulty of turning the handle. This is due to the additional "load" on the system created by the additional work required to move the other generator. Students will be able to observe first hand the transfer of energy from mechanical to electrical and back to mechanical. Did anyone notice that the freely spinning handle moves at a slower pace? This is a good time to discuss efficiencies and energy loss in electrical transmission systems.

Hand Generator Replacement Gears
Part# SS4444A
http://www.sci-supply.com/Hand-Generator-Replacement-Gears-p/ss4444a.htm

Tools needed:
Philips screwdriver, #1 point
Regular/slotted screwdriver, small tip

1. Remove screws: Use the Philips screwdriver to remove the 5 identical screws that are recessed into one side of the generator body, and set them aside.



2. Separate the body: Carefully pull the body apart, making sure that the lower half (on your work surface) retains all of the generator "guts": the hand crank assembly, the motor/generator, the lamp socket, and the electric lead connector. If any of these start coming off with the upper half of the body, just use a finger or screwdriver to push them back down into the lower half of the body.

NOTE: This would be a good time to lubricate the motor/generator, if you have some oil handy. Use a *tiny amount of oil. No need to get carried away.

3. Replace the stepped gear: The stepped gear, which drives the metal gear on the motor/generator, is usually the one that breaks --- one or more teeth on the smaller gear will break off when a furiously cranking student manages to exceed the strength of the nylon teeth! Just lift the gear out, along with its axle. Slide the broken gear off the axle, and throw it out. Place the new stepped gear on the axle, and rest it back in its mounts. It will only fit in the correct way, but it won't be secure until you reassemble the body of the generator.

4. Replace the crank gear: If you're in a hurry, you can skip this step, since this gear will not usually break a tooth. However, the teeth on both nylon gears will wear together with use, so it's a good idea to replace both gears, even if the crank gear seems fine. Lift the crank assembly (crank, shaft, gear, etc.) up out of the generator body --- it won't separate into pieces without your help. To remove the gear, pry off the black retaining ring on the axle, using the small screwdriver tip. Because it's under spring tension, the ring can literally pop off and get lost, so restrain it with a finger or piece of tape so it doesn't fly away! Now that the ring is off, push the gear a few millimeters toward the crank. This will release the retaining pin from the groove in the gear; once this pin is removed (don't lose it!), you can slide the gear off the crank shaft and replace it with the new one. Make sure the groove for the retaining pin is on the proper side. Insert the retaining pin in the shaft, align the groove in the gear with the pin, and slide the gear back until the pin is seated in the groove. Now slide the washers and the nylon bearing back toward the gear, uncovering the groove for the retaining ring. Replace the retaining ring, pushing it into its groove until it snaps in place. You can use the tip of either screwdriver, or a pair of needle-nose pliers. Place the crank assembly back into the body of the generator, making sure that both nylon shaft bearings are seated in their slots.

5. Reassemble the body: Make sure that all of the various pieces are seated properly, and then replace the other half of the body. It should fit with no gaps anywhere along the seam. At this point, hold the two halves together firmly and shake the generator. If anything rattles around inside (like a broken gear tooth), reopen the case and dump it out. Any debris inside could get caught in the gears. You should also turn the crank a few times to make sure that it turns freely.

6. Replace screws: Replace the 4 screws, seating them firmly but not over-tightening them.

You're done, and ready to test your reconditioned generator!