High School evGrand Prix
Electric Go Kart Curriculum and Classroom Materials

Winter Disassembly, Redesign, and Rebuild Manual

A Partnership Between

Purdue University Motorsports
Indiana Department of Education
Ivy Tech Community College

Version 01/17/2019
Getting Started

This manual was developed as a guide to assist returning High School Karting teams as they disassemble their karts during the winter months. A photograph of the disassembled kart, and its components, must be sent to Stuart White at white152@purdue.edu All returning teams wishing to compete in the evGrand Prix Worlds Finals at the Indianapolis Motor Speedway (IMS) must obtain confirmation of their kart being disassembled prior to competition. The information contained herein is meant to be a reference tool and not a detailed step by step method for disassembling an electric go kart.

Please be aware that the final authority for kart setup is the Vehicle and Team Equipment Specifications document found on the website evgrandprix.org and all karts will be inspected for compliance to these rules prior to racing in the World Finals event at the Indianapolis Motor Speedway.

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Tools

1. Box Wrench Set – Used to loosen a bolt or nut. Various sizes required.

2. Socket Wrench Set – Used to loosen a bolt or nut based on the switch setting. Various socket sizes required. Can be used in tight spaces where a regular wrench may not work easily.

3. Allen Wrench Set – Used to loosen specific crews and blots. Various sizes required. Hexagonal shaped tool bent to form an “L”.

4. Wire Cutters – Used to cut zip ties and other fastening material. Caution: cut small ends have a tendency to fly through air upon cutting.

5. Needle-Nose Pliers – Used to remove safety wire, clips, etc.

6. Screwdrivers – used to loosen screws. Flat tipped and phillips head required. Not meant as a prying tool.
7. Dead Blow Hammer – Used to remove stubborn part or components.

Rear Axle Disassembly

Summary
Rear axle disassembly does not require bearings to be removed from cassettes. Disassembly does require many fasteners to be loosened during the disassembly process. This allows for ease of reassembly and proper alignment of parts which will enhance the ease of maintenance and repair should part failure occur. All bolts, nuts, screws and other safety features will require checks for proper functioning and ware prior to the kart being reassembled. Once the axle is removed all moving parts should be lubricated and cleaned.

Knowledge of how to disassemble the axle is important because it is needed for maintenance purposes. A go kart can break down for a variety of reasons and it might be necessary to take the kart apart in order to replace or modify damaged kart components. Most karts have the same type of rear axle assembly. Common variations come from how the axle is mounted to the frame and kart specific sub-assemblies. The karts may have different types of bolts and mountings but will have the same relative locations of where parts are attached.

Tools

- Box end wrench set
- Socket set with long extension
- Allen wrench

Step 1 – Remove wheel lugs and separate rear tires from wheel hubs

Step 2 – Remove Chain and chain guard. Place chain in a small container and submerge it in a light grade motor oil

Step 3 – Remove Wheel Hubs from axle
Step 4 – Loosen set screws from bearings, sprocket bracket, and rotor bracket.

Step 5 – Slide axle free of bearings, sprocket bracket, and rotor bracket. You do not need to remove the rotor from the rotor bracket or the axle sprocket from the sprocket bracket.

Step 6 – Remove rear axle bearing cassette bolts from mounting brackets welded onto frame. Spray the axle bearings with a product like Tru-Flow. Continue spraying until the fluid coming out of the bearings is as clean as the fluid going in. Bearings should be rotated during this process. If your kart has the rear brake caliper attached to the cassette mounting bracket, go ahead and remove the caliper but leave brake lines attached.

Bearing Set Screw  Rotor Bracket Set Screw  Sprocket Bracket Set Screw

Bearing Cassettes

Brakes and Motor
Disassembling brakes will not include removing brake lines from the master cylinder or the brake caliper. You will want to remove the drive sprocket from the motor until a decision has been made on a gearing ratio. Although it is important to know how to assemble the brake system this is only needed for maintenance purposes. If your kart brake system should break down for a variety of reasons and it might be necessary to take the brake system apart in order to replace damaged brake lines, master cylinder, or caliper.
Most karts have the same type of brake assembly. Common variations come from how the brake is mounted to the frame and kart specific sub-assemblies. The karts may have different types of bolts and mountings but will have the same relative locations of where parts are attached.

The motor mount will be removed from the kart with the motor still attached. There is no reason to remove the motor from the motor mount unless the motor needs replacing.

Tools

- Box end wrench set
- Socket set
- Allen wrench

**Step 1** – Remove he brake foot pedal connection to the master cylinder. The brake pedal can remain attached to the kart chassis.

**Step 2** – Remove the master cylinder from chassis mount by removing bolts from the bracket welded to the frame.

**Step 3** – Remove the brake caliper by removing bolts from bracket welded to the kart frame. If your caliper is attached to the bearing cassette bracket, this step was completed during the axle removal.
Step 4 – Loosen chain tension bolt from motor mount.

Step 5 – Remove motor and motor mount by removing bolts securing the motor mount to the chassis. Kart will need to be raised in order to access these bolts.
Steering Assembly

The steering wheel and steering column, which is attached to the chassis, can be removed as one unit. One end of the tie rods connect to an attachment point on the steering column while the other ends of the tie rods connect to the spindle axle arms. These will need to be removed from either side. However, jam nut adjustment is not necessary at this point. The spindle axles are bolted to the chassis and will need to be removed from the chassis and from the front wheels. Knowledge of how to disassemble the steering is important because it is needed for maintenance purposes or if the go kart should break down for any reason. It might be necessary to take the kart apart in order to replace or modify damaged kart components.

Most karts have the same type of steering linkage. Common variations in steering come from how the steering rod is mounted to the frame and tie rods are attached to the rod. The karts may have different types of bolts and mountings but will have the same relative locations of where parts are attached.

Tools

- Box end wrench set
- Socket set
- Allen wrench

Step 1 – Remove front wheels from spindles.

Step 2 – Remove steering wheel fairing.

Step 3 – Remove the tie rods from the spindle axle and steering shaft by removing the bolt securing the tie rod to the spindle and the bolt securing the tie rod to the steering shaft.

Step 4 – Remove the steering column shaft from the kart chassis by removing the nut on the bottom of the chassis mounting bracket.

Step 5 – If your key switch is mounted on the steering wheel, disconnect key switch and steering wheel E-Stop if installed. Remove the steering column support box.
from the frame support bracket by removing the bolt holding the support box in place. Lift the steering shaft out of the chassis mounting bracket.

**Step 6** – Remove the spindle from the spindle mount welded to the kart chassis by removing the King Pin holding the spindle in place.
Bumpers and Guards Assembly

The front, back, and side bumpers are attached to the frame via clamps. The bumpers provide protection for the driver during a race and protect vital components of the kart.

Tools

- Box end wrench set
- Socket set
- Allen wrench set

Step 1 – Remove the front crushable bumper from front of chassis by removing the crushable bumper clamps and bumper mounting bracket from the chassis

Step 2 – Remove rear metal bumper by loosening bumper bolts and removing the rear bumper assembly from the chassis. You do not need to disassemble rear bumper assembly.

Step 3 – Remove the E-Stop from the battery box and then remove Battery boxes from nerf bars.

Step 4 – Remove side pods, if attached, and nerf bars by removing bolts attaching nerf bar to chassis. Slide nerf bar free of chassis. Your nerf bars may be attached with an accompanying spring which will need to be removed prior to detaching nerf bar from chassis.
Electronics and Wiring

Components including the connector, contactor, fuse, shunt resistor, emergency stop, and controller must be removed after battery pack harness is removed. The throttle must be unbolted from the floor pan however, the pedal may remain attached to the frame. Removal of the batteries should have taken place prior to rear axle disassembly.

Knowledge of how the electrical assembly is put together can help one grasp a basic understanding of how the system works. This not only empowers that person to be able to troubleshoot malfunctions given the possibility that problems may occur on the track. There are many possible ways to assemble your components. This section describes how to disassemble the individual components. The order is random as components can be removed in any order.

Tools

- Box end wrench set
- Socket set
- Screw drivers
- Wire cutters

**Step 1** – Remove motor controller by disconnecting electrical connections and unbolting from kart chassis.

**Step 2** – Remove E-Z-Go throttle potentiometer by unbolting from chassis and cutting zip ties (or electrical type) securing electrical connections to chassis.

**Step 3** – Remove contactor by disconnecting electrical connections and unbolting from chassis. Do not remove pre-charge resistor from contactor.

Pre Charge Resistor
Step 4 – Remove 300 amp fuse assembly by unbolting from chassis. Remove only the electrical connector on the battery side of the fuse. Ensure key switch side of fuse assembly is left intact.

Step 5 – Cut all zip ties and or electrical tape connecting electrical wires to the chassis. Collect all wires and cables to store with electrical components.

Step 6 – Remove floor pan from kart by unbolting from chassis.

Step 7 – Remove seat from kart by unbolting from chassis