

NASA To Go Cart  
Basic Assembly Guide  
October 2009

NASA TO GO CARTS are a flexible, exciting, and inexpensive way to bring NASA to your special events. These demonstration carts are shippable, self-contained, and easy to set up and tear down. The basic shape is maintained, but the contents inside create unique, engaging demonstrations. This Guide is designed to create a starting point from which to assemble similar units and examples of units already built. Another feature of these carts is their ability to be adapted to fit new demonstrations without major changes to the unit itself. BUT, this is meant to just be a guide. If you would like additional help, please contact NASA exhibits at [www.nasa.gov/about/exhibits](http://www.nasa.gov/about/exhibits)

### **The Base Cabinet**

The base cabinet is a standard science demonstration cart found in science classrooms across the country. It is a wood design with two sliding doors, a small lock to secure the doors, and a countertop that is designed to handle light chemical spills and resist scratches and gouges. Some cabinets come with swinging doors rather than sliding. The sliding doors are a vital feature, as swinging doors would be blocked by the case's tray (below).

When ordered, this cabinet is then modified to accommodate the needs of the unit. First, the casters are not installed since heavy-duty casters are included on the shipping case. Also, the cabinet is requested unfinished. Normally, the cabinet comes stained and lacquer-finished. Keeping the cabinet unfinished allows for custom painting and decals.



### **The Shipping Case**

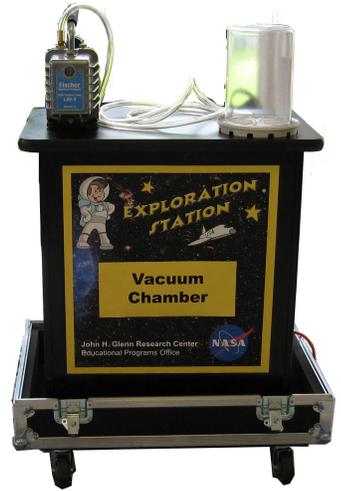
The case is a style typically used as an amplifier shipping case for concerts. The reason this type of case is used is that the majority of the case is the lid, and only a small tray is left on the bottom. This tray includes four heavy-duty casters. Two of the casters are locking-style, and are positioned along one long side of the case. This becomes the "presenter side" of the case. The free-moving wheels sit on the "audience side" of the case.

When shipping, the cabinet sits in the middle of the tray. The lid then slides down over the cabinet and locks to secure. There are cups on the top of the lid to allow the cases to be stacked (no more than two high) when shipping or storing. When setting up, the lid can be used as an auxiliary table, if necessary.



## Assembling the Units

The key to successfully assembling the two major components is coordination of dimensions when ordering. The interior of the shipping case must be designed to fit the exterior dimensions of the cabinet. The countertop is slightly larger than the cabinet's footprint, so it must be accounted for when designing the case. One simple way to adjust for this is to have the cabinet built based off of countertop dimensions. The cabinets built for NASA Glenn's Educational Programs Office (EPO) were thirty inches tall with a countertop size of thirty inches long by twenty inches deep. The cases were built to match. This leaves the cabinet slightly short, but the casters on the bottom of the case elevate it to a more reasonable height.



When the pieces arrive, the cabinets will need to be finished. The cases at NASA Glenn were primed with a grey spray paint primer and then finished with a satin black spray paint for outdoor use. The countertop and all trim was covered with masking tape prior to painting. Outdoor paint was used because these carts are used both indoors and out, and the outdoor paint resists damage from sunlight or rain showers that may spring up before the carts can be repacked in the protective cases.

## Other Modifications

Some of the demonstrations NASA Glenn uses require electricity (for example Vacuum Chamber and Moon Phases). To minimize safety concerns, holes were drilled into these cabinets' sides to allow cords to remain largely inside of the units.



To make them more convenient, a 100-foot extension cord with reel was secured inside the cabinets of those activities requiring power. This allows for the cart to be used anywhere within a 100-foot radius of a power outlet.

Using a reel with a handle provides a convenient and tangle-free way to store the extension cord. In addition, the cord is easily wound back into the cart after disconnecting from the power outlet. Securing the reel, rather than leaving it loose in the cart, ensures that an extension cord is available every time the cart travels.

## **Supplying the Units**

The units are supplied with all of the items necessary to conduct the demonstrations. These items are divided into several categories:

- Documentation – This includes all paperwork needed to operate the unit. This paperwork should be laminated or protected by a plastic document cover, as demonstrations can get messy (e.g. materials list, steps for setup and teardown, procedure for the demonstration, background information and frequently asked questions, related lithographs or diagrams).
- Permanent Supplies – These are items that are added to the cart once and used every time (e.g. tarps, tools, measuring utensils, containers, laminated photos and diagrams).
- Consumables – These items are used up over the course of operating the carts (e.g. cans of soda, chemicals, balloons, soil, wipes, paper towels, or trash bags for clean up).
- Perishables – These are consumables that may not keep from one event to the next, and therefore may need to be resupplied prior to each event (e.g. marshmallows, dry ice).

Items will need to be purchased with the limited space of the cabinet in mind. For most demonstrations, the cabinets will be quite full.



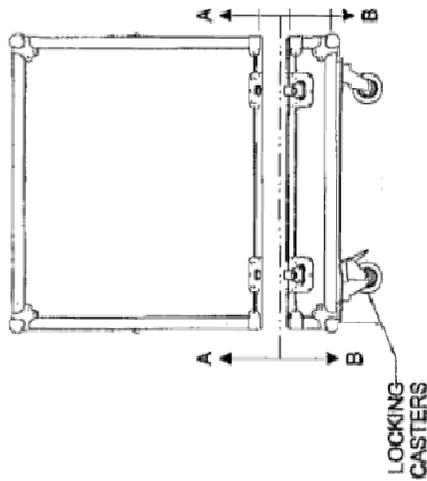
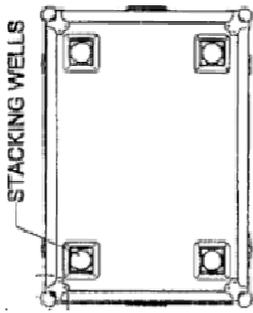
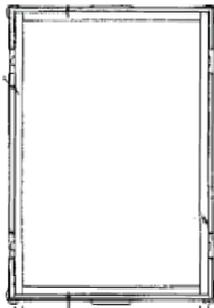
## **Case and Cabinet Schematics**

Included on the following pages are the schematic diagrams for assembling the cabinets and carts. These were provided by the vendors used by NASA Glenn's EPO and included with permission by the vendors. The actual dimensions and scales were omitted at the request of the vendors.

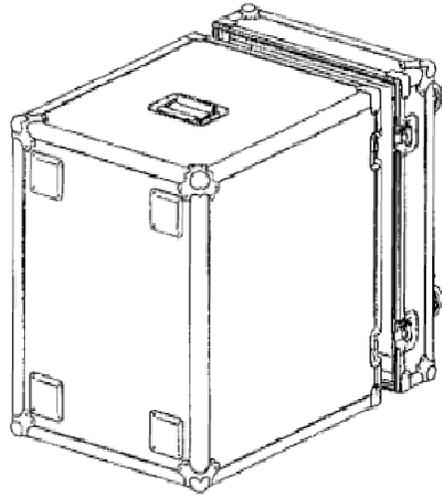
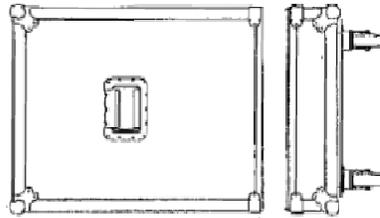


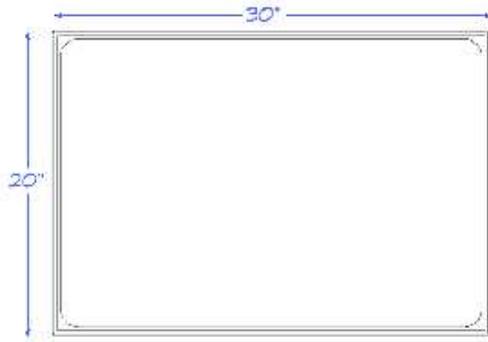
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LID TOP VIEW



BASE TOP VIEW

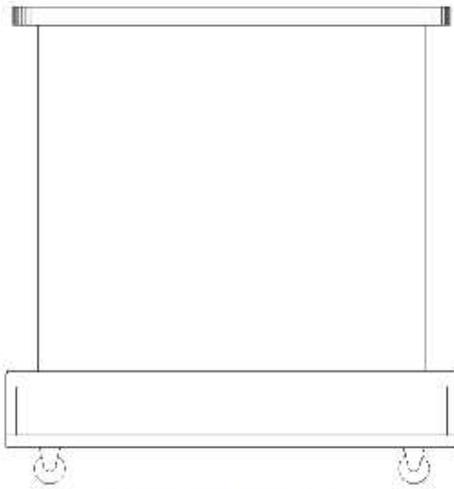




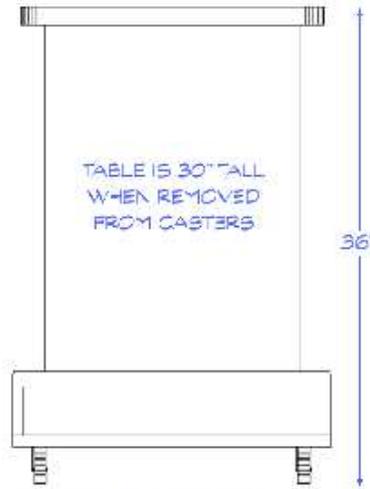
PLAN



NOT TO SCALE  
ALL DIMENSIONS APPROXIMATE



FRONT ELEVATION

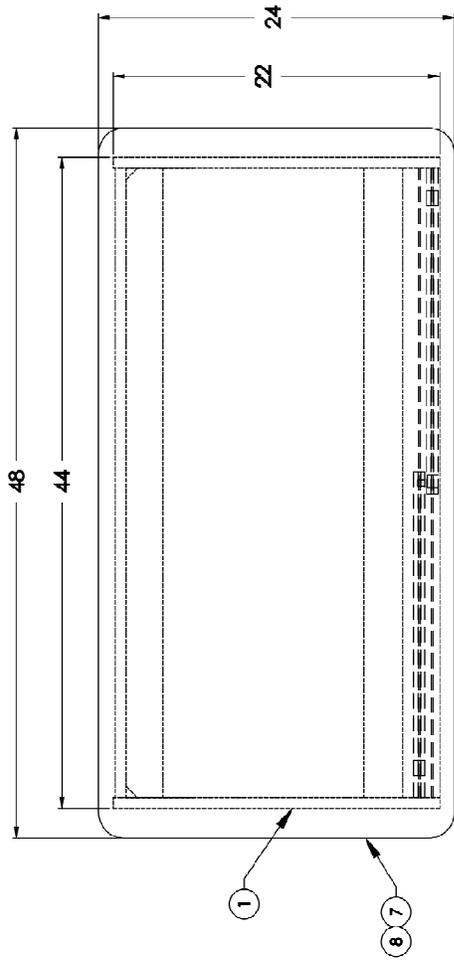


RIGHT SIDE ELEVATION



# Exhibits Activity Cart

MSFC Exhibits  
1-Apr-09



NOT SHOWN: 9 10

