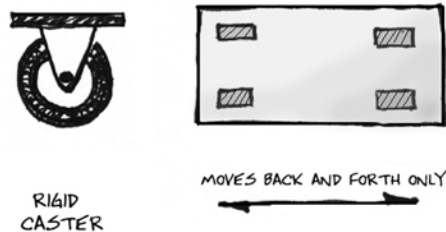


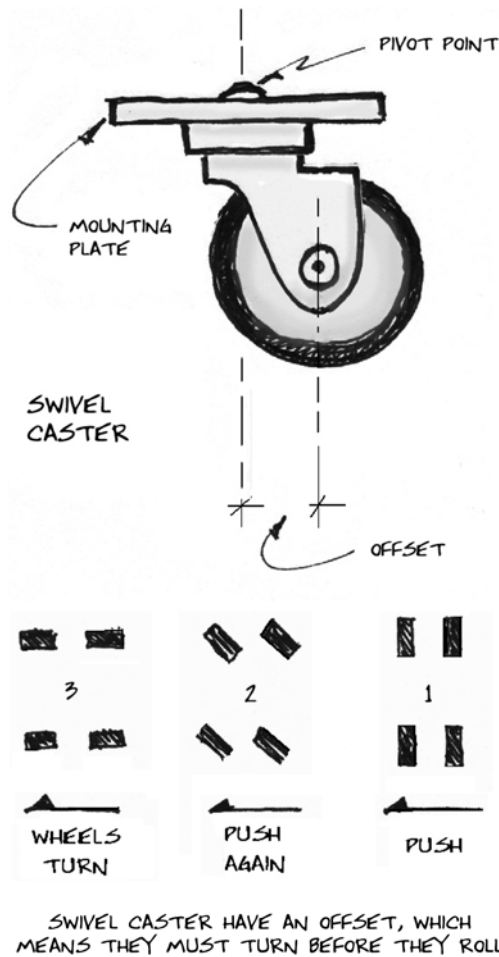
# How Do You MAKE ...

## NOTES ON MOUNTING CASTERS

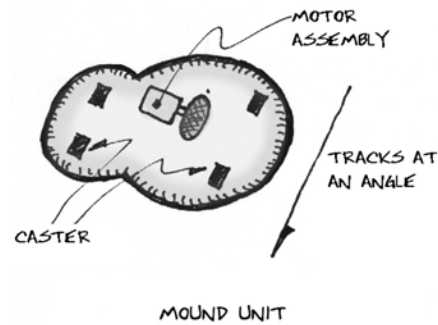
There are two main types of casters: swivel and rigid. As the names imply, the *swivel casters* rotate around a vertical axis and can line up with any direction of travel. *Rigid casters* are fixed, and once bolted to a platform they allow it to move only back and forth along the same line. Stagehands sometimes call these *smart* and *dumb wheels*.



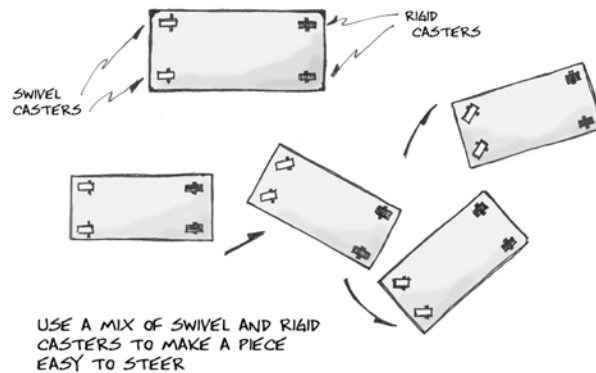
At first glance, it would seem that swivel casters would always be more useful than rigid, because of their ability to change direction, but this is not necessarily so. The center of the wheel of a swivel caster is *offset* somewhat from its pivot point on the mounting plate. When in motion, the wheel of the caster follows behind this pivot point, and it is this “drag” principle that causes the caster to rotate in the first place. If the wheel were directly under the pivot point, it would have no reason to turn and align itself with the direction the scenery is moving.



I was once on a tour of *Camelot* designed to use a large mound unit, on rigid casters, which had to track up- and downstage at an angle. There was no deck used in the show, and hence no way to use any sort of winch or tracking system. The unit was animated by a large DC motor and a soft rubber tire for traction. After a few trips back and forth, the mound would creep out of alignment. The entire crew would gather around and wrestle it back into place every few performances. Although there were some obvious engineering problems, it worked well enough for the purpose.



One excellent technique is to mix rigid and swivel casters on the same piece. If you put two rigid casters on the front of the unit, and two swivel casters on the rear, it will steer more or less like a car in reverse. Pushing the back end to the left will cause the unit to move right, and pushing right induces a leftward turn. The advantage is that the scenery doesn't tend to drift in the wrong direction and one person can easily steer it. The bad side is that just like parallel parking, if you don't hit the mark, you'll just have to back up and try again, because there is no way to scoot it over sideways.

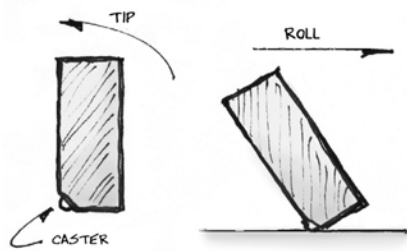


As a result, it is necessary to apply extra force to the unit to get it to begin moving not only because of the inherent inertia problem, but also because of the necessity of forcing all of the casters to turn and line up with one another. The unit will invariably lurch to the side a bit when this happens, and it is difficult to get it to track straight without some effort. The stagehands can overcome this problem by lining the unit up offstage, pushing onstage a bit to align the casters, and then leaving it alone until time for the cue. This works fine when going onstage, but there is no way to repeat the process going off. Also, if a unit has four swivel casters, it will often tend to drift to one side or the other, especially if one of the casters becomes hung on something.

If you are sure that a platform will need to move on only one track, all rigid casters can be used. It is important to align the casters with one another and with the unit so that the wheels will turn smoothly without chattering. Use a straightedge to keep the caster plates parallel to one another. Rigid casters are often used with a pallet, especially one meant to be operated with a push stick.

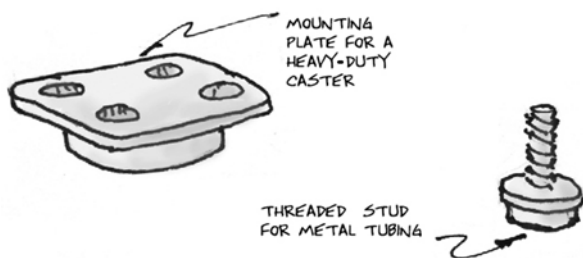
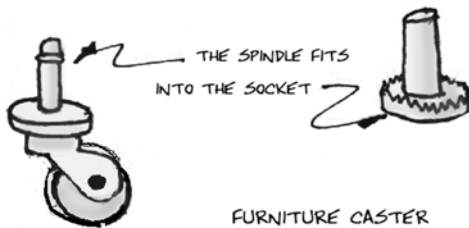
Another solution for some units is to use just two rigid casters, placed so that the scenery can be tipped on one side where the wheels are, and then maneuvered

like a two-wheeled dolly. Obviously this will work only when the size and weight of the piece are reasonable. One advantage is that there is no need to lock the unit in position. This method works best if the piece in question is between chest-high and head-high. It is often used on large concert speaker cabinets.



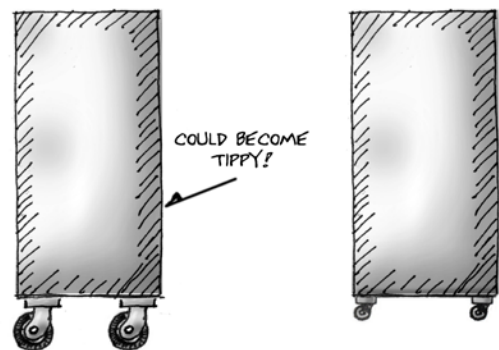
TIP AND ROLL UNIT

It seems appropriate to spend a moment discussing some of the parts and qualities of casters. Casters used in the theatre almost always have a *mounting plate*. In contrast, many furniture casters use a spindle that is intended to fit inside a socket, like you would find on a chair leg. The latter are not very helpful in theatre, because the spindle method of mounting is not really strong enough to hold much weight. I have on occasion used casters with a bolt or threaded stud connector when joining the caster to a piece of steel square tube. Because this type bolts all the way through the steel, it is much sturdier.



In general, the larger the wheel on a caster, the easier it is to roll and the less likely it is to hang up

on a rough floor surface. On the other hand, large wheels are harder to get to swivel and change direction. Softer wheels are more difficult to roll than harder ones, but they make less noise. A high-quality caster rated to carry a lot of weight often has ball bearings that make it roll more smoothly than a cheaper type. More moderately priced casters may use roller bearings or sleeves. If a caster makes a horrible squealing noise when it rolls, then the load is too heavy. Good casters have a *load rating* that tells you how much weight you can put on them. You should probably order these from a supply house rather than get them at the local hardware store. Good casters are expensive but will pay for themselves over time, especially at a resident company or school.

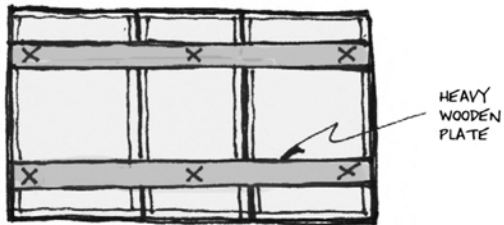


LARGER WHEELS ROLL BETTER, AND ARE LESS LIKELY TO GET STUCK IN HOLES IN THE STAGE FLOOR

SMALLER CASTERS TEND TO HAVE A LOWER LOAD RATING, BUT THEY CHANGE DIRECTION MORE EASILY THAN A LARGER WHEEL

SOMETIMES A LARGER WHEEL CAN BE PROBLEMATIC WHEN THE FOOTPRINT OF THE UNIT IS SMALL, AND THE OFFSET OF THE CASTER MAKES IT TIPPY!

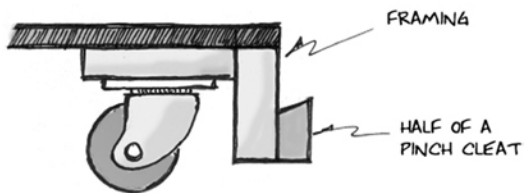
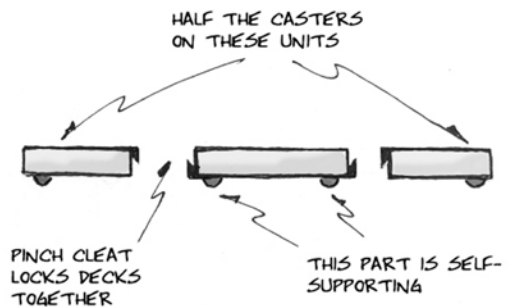
Always mount casters on the bottom of the framing. If you mount them on the underside of a platform lid, the framing will become disconnected and fail. If you must caster to the lid on a lightweight piece, take extra steps to ensure that the plywood holds. Use bolts, screws, steel plates, or whatever seems appropriate to beef up the joinery. Stock 4 × 8 platforms can be problematic as rolling units when several of them must be joined together to make one. One way around that is to run a plate under them and attach the casters to that plate. This method works well when there are several small sections to be ganged together, but it isn't very low to the ground. Use only as many casters as you need for the load involved. Fewer casters make a sweeter rolling unit, but there must be enough wheels to properly support the structure.



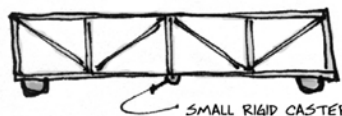
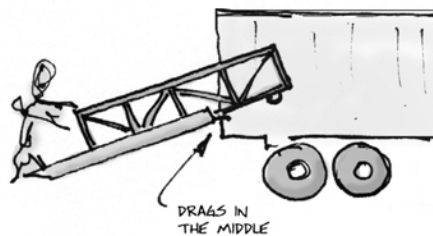
X = CASTER PLACEMENT

BOTTOM OF A ROLLING UNIT  
MADE FROM THREE 4X8 PLATFORMS

Sometimes it is possible to use a starter section that has enough casters to stand on its own, and then add on more sections that are supported half by the original section, and half by their own casters. This will drastically reduce the number of casters that must be used. This method works well when the unit must be disassembled for transport.



If you have a large and/or long piece that must move from one level to another (like up a ramp into a truck) it is often helpful to install two rigid casters in the center of the unit to help it over the hump. If these casters are smaller than the regular ones, they will only touch the ground when necessary.



A SMALL CASTER IN THE CENTER OF THE TRUSS MAKES IT EASIER TO GET THE PIECE UP A RAMP