

# Adapting Delayed-Action Couplers

Kadee® wishes you to get the most enjoyment from your model railroading experience and having a coupler system with smooth reliable performance will certainly add to your enjoyment. The following are basic principles of mounting and fine tuning our couplers for the best performance along with some general ideas and information that may help you understand couplers and their related mounting problems.

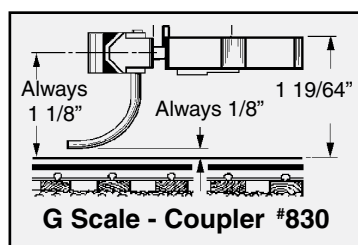
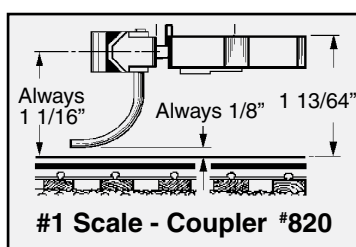
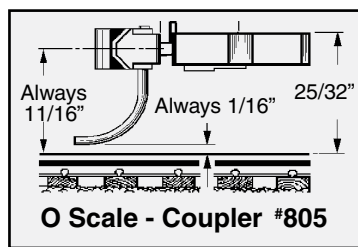
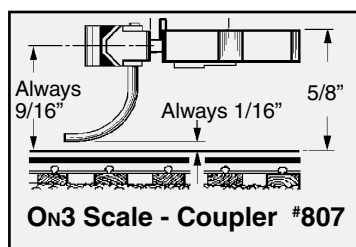
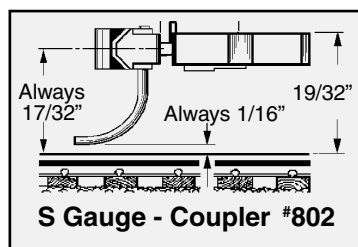
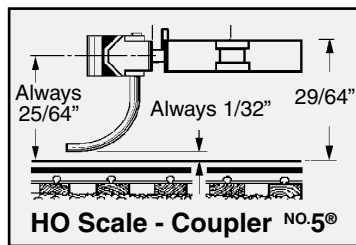
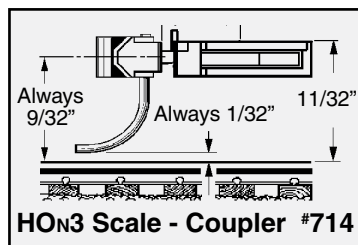
For an explanation and description of Kadee® Delayed-Action Magne-Matic® Couplers and how they work see our “Coupler Primer” and “Kadee® Delayed-Action Magne-Matic® Uncoupling” handouts, catalog or our web site at [www.kadee.com](http://www.kadee.com). and our coupler instructions.

Kadee® couplers are designed to be mounted at the NMRA Standards S-1 coupler heights and our coupler height gauges are set at these standards.

Manufacturers of model railroad locomotives and rolling stock have yet to standardize their coupler pockets, draft gear boxes, or coupler mounting platforms. Most HO scale model makers have adapted some form of “knuckle coupler” over the X2F (or Horn Hook) couplers and some have made efforts to make their coupler pockets to the correct NMRA height. However, there still are many model makers that have little regard for the modelers desire to use delayed-action knuckle couplers. This applies to all scales of model railroading. Even in the large scales the makers have their own knuckle couplers and they are not always mounted at any particular standard coupler height but are mounted according to their particular proprietary coupler designs.

## IMPORTANT POINTS TO REMEMBER:

- There are two issues with mounting functional knuckle couplers, one is to have a coupler system that duplicates the prototypical action of real couplers (function first), second is to mount the couplers and have them look as nice and prototypical as possible (looks second). Finding a balance between these two is not easy with the many different coupler platforms and pockets found on the many styles and types of models produced through the years.



## NMRA Standards S-1 coupler heights

- Couplers work together best when they are all mounted at the “same height”. Kadee couplers are designed to be mounted at the NMRA Standard S-1 coupler heights. Coupler heights are measured from the top of the rail to the “center” of the coupler (head). There is no need to manually measure the coupler height if you use our coupler height gauges and follow the instructions for the appropriate scale.
- Couplers should be mounted along the centerline and as level as possible. Couplers with a slant, droop, or tilt have a better chance of slipping apart under pulling stress or in the transition of a grade where the trailing end of the lead car drops as it begins the ascent.
- The best couplers and mountings can not compensate for bad trackage. Many times couplers are blamed for problems caused by bad track work. Sometimes modelers try to exceed the designs of their models and layouts not understanding the limitations involved with trying to run long cars or locomotives on too tight of radius curves, up or down too steep of grade, and up a grade with a too sharp of transition. All of these will cause problems often blamed on the couplers and not the limits of the models themselves.
- Do not expect all models and couplers to work with each other right out of the box. Most of the different makes of HO scale knuckle couplers will work with each other being they are made to the same basic design. However, in the larger scales this is not always true. Most large scale manufacturers have their own design of knuckle couplers and they are mounted at various heights, which are usually much lower than the NMRA Standards. Modelers get rather frustrated at buying two different makes of large scale models and then finding out that their couplers will not match or work with each other.
- There is no “one size fits all” coupler, although, the #5 or #148 in HO and the #831 in “G” scale are the most commonly used. There are still a great many models that require other styles of couplers. Kadee® offers the largest selection of couplers in HO<sub>n</sub>3 to G scale of any manufacturer and provides the help and information for determining which coupler is best suited or adapted to most models.
- Follow the couplers assembly instructions, much time has been spent developing and testing our couplers to achieve the top performance from each one.
- Extra polishing or burnishing of the coupler shank and a puff of our #231 Greas-em dry graphite lubricant will reduce friction in the moving parts and add to smooth reliable performance.
- All of our coupler pockets, draft gear boxes, and brackets are designed to be mounted with screws. Some coupler packages include screws for normal mounting situations. The instructions in packages that do not contain screws will indicate the appropriate screw to use. Some couplers have so many mounting options that there is no way to include the assortment of screws that would be needed for these options.
- The most common screw sizes used in our couplers are the 2-56 (#2 screw with 56 threads per inch) for most center holes of our draft gear boxes. The holes in our #78 coupler and the side holes (lugs) in our #4 and #5 type of box use 0-80 or 0-48 screws. In “S” and “O” scales use a 2-56 screw in the center holes and 1-72, 0-80, or 0-48 in the side lugs. Many S and O scale models have predrilled holes in their coupler platforms already tapped for 1-72 screws. In the larger scales we use 2-56 and 4-40 screws. Some of our #1 and G scale couplers packages contain #4 self-tapping screws.
- Basic tools for coupler installation may include small common and Phillips screwdrivers, an assortment of files, an assortment of clearance and tap drill bits for the above mentioned screws, pin vice, cutters or nippers, hobby knife and blades, hobby saw (razor or jewelers), tweezers, grippers (screw holding tool), and eye protection.
- Glues and solvent cements are not recommended for attaching couplers except where there is just no other way. Remember that you may need to access the coupler and gluing the box is more or less permanent. Our draft gear boxes are made from styrene and delrin plastic and some from die cast metal (zinc). Use a liquid styrene cement on the styrene boxes and a CA type of glue for the metal boxes. The delrin plastic can not be easily glued. The thicker slow setting CA glues work well enough and some of the sticky glues (like Walthers GOO) may work OK in some situations on the delrin type of plastics.

The following refers mostly to HO models but the basics certainly apply to the larger scale models as well. We do not recommend trying to alter expensive “brass” models and mounting couplers to them is really a matter of coupler selection for the particular model. We have found that most brass models will use a center set shank coupler and is a matter of choosing a draft gear box design that will fit the coupler platform or pocket without modifying the model.

**BASIC PROCEDURES:** Determining which coupler to use: Place the model on a straight piece of track and measure the height from the top of the rail to the mounting surface. Look at our coupler charts, these are found on our coupler handouts, instruction sheets, catalog, and web site at [www.kadee.com](http://www.kadee.com). These HO coupler charts will give you the mounting height of each coupler. Also, you can use our coupler height gauges for all scales. They have a mounting height gauge on the opposite end of the coupler. Select the appropriate coupler according to the measurements. It is easier to add shim stock to lower a coupler than have to remove material from the mounting surface to raise a coupler. Assemble the selected coupler and set it on the mounting surface, if you can, before you drill any holes. Temporarily hold it in place with a piece of tape or a rubber band and check the coupler height with the gauge and check the clearance and function. Then, only when all is checked and adjusted, mark and drill the mounting screw hole(s).

**STEAM LOCOMOTIVES:** Presently "most" steam locomotives come with a functional knuckle coupler on the tender and a "dummy" non functional coupler on the pilot (front). The coupler mountings or platform on the tender usually are similar to that manufacturers common freight cars. The pilots are certainly different and many modelers will not bother converting the pilots to a functional coupler because they either are not planning to use the pilot coupler or they do not want to be bothered with modifying their locomotive. So for larger locomotives that would rarely be used for switching you need to decide if it is worth the effort to convert the pilot.

There are two basic pilots used on steam locos. The cow catcher (road) pilot with a sloped grating and the step board (switcher or step) pilot, usually a straight flat end sill with step boards for a switchman to stand or ride on. Selecting a coupler for either pilot is a matter of clearance for the slope of the road pilot and the steps of the switcher pilot. Most road pilots will use a medium shank length coupler and many of the switcher pilots may use the short couplers. Also, you need to consider the lead wheels and if there is clearance enough for the draft gear box. This is why we recommend using one of our 30 series couplers with the smaller round end draft gear box.

Most of the locomotives will have an area under the deck or just behind the coupler opening that can be used to mount a draft gear box. Some may need to have a level platform made using shim stock cemented to the underside of the deck. The original dummy coupler opening is too narrow for a functional draft gear box so you'll usually need to enlarge the opening. The upper lip of the opening usually is at the correct coupler mounting height and should be left intact and only the sides and bottom should be trimmed or filed. In some cases it is possible to enlarge the opening just enough to slip the coupler shank through then assemble the draft gear box from behind the opening. But on the average you'll need to enlarge the opening to slip the entire assembly through the front. Use a trim and fit method to keep the opening as small as possible. Our #5, 20, 30, and 140 series HO scale draft gear boxes require about a 5/16" wide opening. Our #178 couplers only require 1/4" wide opening.

When the opening is large enough slide the coupler in and hold the draft gear box on the centerline then flex the coupler back and forth to check the clearances. Check the trip pin over the tip of the pilot and check the side to side clearance. Where possible, the edge of the draft gear box should be even with the end of the upper lip or edge of the opening. When all is clear and adjustments made mark the platform through the hole in the draft gear box. Make sure it is on the centerline and drill and tap a hole for the appropriate screw (usually a 2-56 in HO scale). The hole will go through the pilot deck but if you use our black plastic 2-56 screws (#256) you can easily snip off the excess flush with the top of the deck.

Step pilots may not require as much alteration but the mounting methods are similar to the above.

The basics are to enlarge the opening enough for the assembled coupler and to mount it to a level platform with enough clearance for complete side to side movement and trip pin clearance of the mounted coupler and the opposing coupler. If the cow catcher slopes too much for the tip pin to clear the grating you might be able to cut the trip pin off. Then you'll have to use some manual uncoupling method. Some modelers will cut the pin off just to make the pilot of a nice locomotive look better.

On some locomotives there is just no way to mount a functional coupler in a draft gear box into the pilot. You still can mount the coupler only directly into the pocket (opening) without the box. The coupler will not have a centering action yet the knuckle will still open over our uncouplers and if the opposing coupler has full movement they will uncouple reliably.

**DIESEL LOCOMOTIVES:** Most diesel locomotives have the same or similar coupler pockets or mounting platforms on both ends. Many of the larger locomotives also have a snow plow option that requires a longer shank coupler. Most of the recent production diesels have coupler openings large enough that require no or very little alteration. The basic principles for mounting couplers are the same as steam locomotives. The important thing to remember is having or making a level platform to mount the coupler. Make sure that it's mounted at the correct coupler height and has enough clearance for it to function properly.

**ROLLING STOCK:** Usually most rolling stock have coupler mounting platforms, molded on coupler pockets or truck mounted couplers. Adapting knuckle couplers is a matter of using the correct coupler in or on the existing pocket or platform. Measuring the coupler height or using our coupler height gauges, as with the locomotives, will help you to select the correct coupler. If there is a need to adjust the coupler height for a molded on pocket you can add a shim washer (our #208 or #209) between the chassis and the truck to raise the body and thus the coupler. Truck mounted couplers are limited to selecting the correct coupler to achieve the correct coupler heights. Many modelers will simply remove the truck mounted coupler pocket and body mount the coupler using the previously mentioned platform mounting method.

**COUPLER HEIGHT & HEIGHT GAUGES:** For the best and most reliable coupler performance the couplers need to be mounted at the "same height". To achieve the correct coupler height requires a coupler height gauge or couplers mounted correctly on a locomotive or rolling stock to be used as a gauge. Kadee® offers coupler height gauges for HOn3 (#704), HO (#205) or (#206), S (#814), On3 (#813), O (#812), #1 (#829) or (#1929), and "G" (#880) or (#980) scale. The chart on previous page indicates the correct coupler heights for each scale. Also note, that now in HO scale there are couplers made to actual "scale dimensions" (our #58, #78, and #2100) where the coupler head is about 20% smaller than the standard #5 type of coupler. You still can use a #205 HO height gauge with a standard coupler or a scale coupler because you are only measuring or looking at the "center" and not the top or bottom of the coupler regardless of the actual size of the coupler head.

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## TYPICAL PARTS OF KADEE® COUPLERS

The illustrations below will help easily identify the various coupler components. Regardless of scale, all couplers are essentially the same and operate in similar ways.

