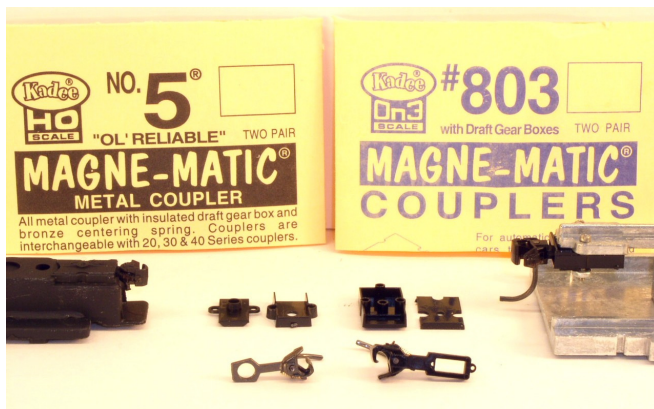


# I. Couplers

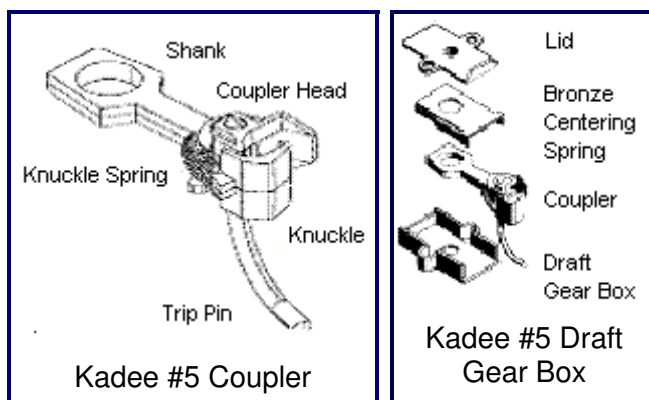
The trend in On30 is to use HO standard gauge couplers at HO coupler height. This is because On30 was originally kitbashed from HO standard gauge rolling stock. An alternate practice is to use On3 couplers at On3 height. These two concepts are still the norm for On30 model trains.

## Kadee Automatic Couplers

Automatic knuckle couplers have a scale appearance and allow trains to be made up and taken apart without physically handling the cars and engines. The tracks for making up trains can be located where the trackplan allows and do not need to be within reach of the operator.



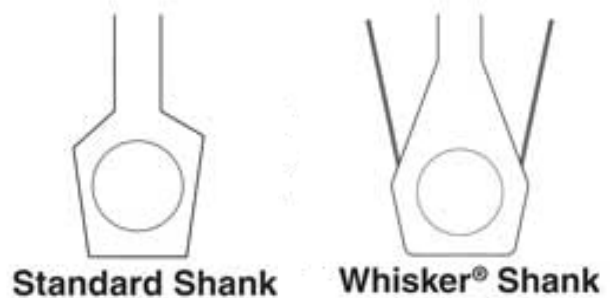
Kadee #5 HO and #803 On3 couplers and height gauges.



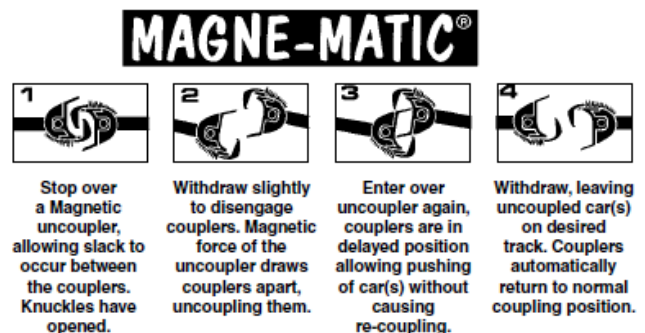
The coupler is a single piece of cast metal. The rear portion is the shank and the front portion the coupler head. The knuckle fits into a slot on the coupler head and is held in place by the trip pin. The knuckle pivots outward but is pushed back into place by the knuckle spring

that fits on a nub on the coupler head and a nub on the knuckle.

The draft gear provides a way for the coupler to attach to the car and to pivot. It is composed of a plastic box, a plastic lid, and a bronze centering spring. The lid has a cast in lug that holds the coupler and the centering spring in place. The centering spring touches the sides of the box and the sides of the coupler shank, thereby keeping the coupler centered over track gauge, but allowing the coupler to pivot on the lug.



Kadee has designed a new coupler with a built in centering spring. This is #148 Whisker Coupler. It is a metal replacement for plastic couplers or can be used on a new installation as it has its own draft gear box.



Cars are coupled by pushing them together. The knuckles touch, forcing them to open and allowing them to move past each other. Then the knuckle springs push the knuckles back into place, thereby coupling the cars.

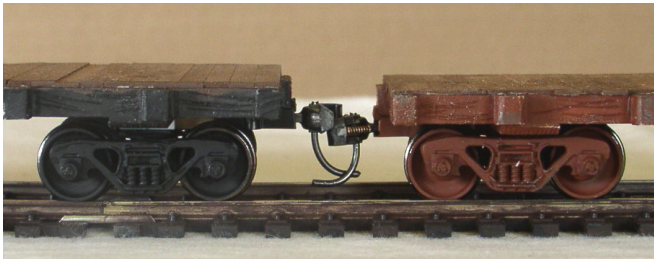
Uncoupling is done by placing a Kadee magnet either between or underneath the rails. These magnets have their poles along their length. When a pair of coupled cars are stopped over the magnet, the trips pins are forced

outward, thereby opening the knuckles and allowing the cars to uncouple. The magnet replaces the need for physically handling the train.

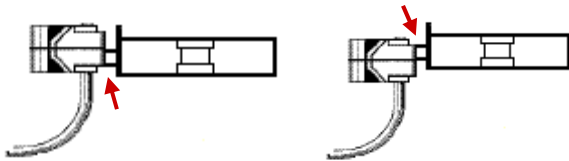
## Coupler Placement

### Height from Rail

Couplers should be mounted on all cars and engines at the same height from the top of the rail so they can engage properly.



On level track, one coupler can be slightly higher than the other and the cars still remain coupled. Problems can occur when coupler height offset is greater than the thickness of the coupler knuckle or the track changes elevation.



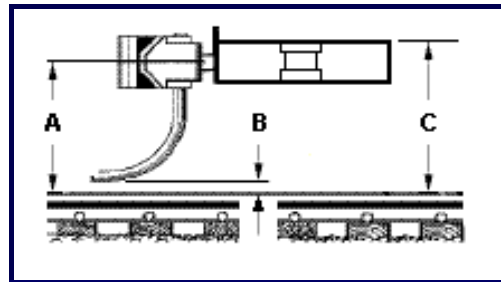
If the car design does not allow the knuckle to set at the proper height, Kadee makes couplers with the knuckle offset from the shank.

Left: coupler with underset shank—the bottom of the knuckle is even with the bottom of the shank.

Right: coupler with overset shank—the top of the knuckle is even with the top of the shank.

Setup	Trucks	Couplers
HO	HO	HO
Hybrid	On30 On3 (regauged)	HO
On3	On30 On3 (regauged)	On3

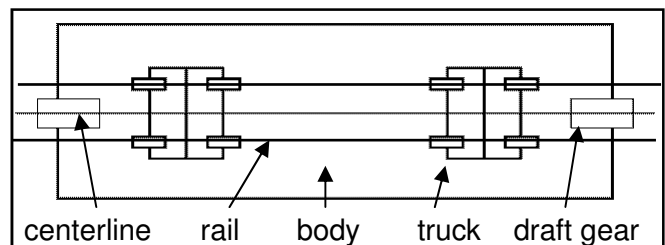
Current truck and coupler combinations in use on On30 rolling stock.



Height from Top of Rail to:	HO	On3
<b>A</b> Center of Coupler	25/64"	9/16"
<b>B</b> Trip Pin	1/32"	1/16"
<b>C</b> Top of Draft Gear	29/64"	5/8"

Coupler height and trip pin settings vary for the scale of the coupler used.

### Alignment



It is important that the couplers are mounted over the center of the track gauge as too much side-to-side offset will not allow the knuckles to connect nor allow the trip pins to be centered over a track magnet.

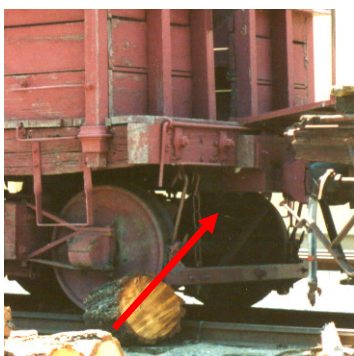
The centerline of the length of a car is determined by the mounting locations of the trucks because the mounting hole in the truck bolster is over the center of the track gauge.

In order for the body to be centered over the track gauge, the trucks must be mounted on the body centerline, which is found by measuring across the body width on each end, finding the center, and drawing a line along the length.

If the trucks are mounted on the body centerline, then the couplers can be mounted on the body centerline also, as this centerline is over the center of track gauge.

## Relationship to Endsills

The relationship between the draft gear box and the endsill is dependent on the type of car.



Older standard gauge cars and a lot of narrow gauge cars have draft gear which bolt to the bottom of the car underframe, thereby placing the coupler below the endsill.

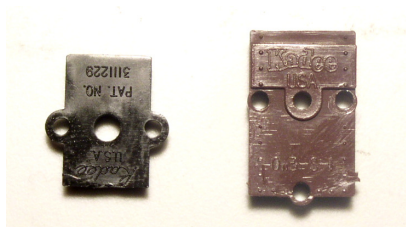


Newer steel cars have the draft gear built into the frame, so the coupler extends from the center of the endsill.

## Installing Couplers

### Mounting Kadee Draft Gear w/Screws

Couplers are mounted to the body of the car either with their own draft gear or with draft gear cast into the car underframe.



The Kadee #5 draft gear box (left) has three mounting holes while the #803 (right) has four. Each has a center hole that goes through the coupler pivot lug, and a hole on each side of the main hole. The #803 has a fourth hole on the back end of the box.

Mounting through the center hole is usually all that is necessary as long as the draft gear is prevented from pivoting by the lid lip setting against the end sill or the draft gear box touching the car somewhere else. If this is not possible, use a pin in one of the side holes or use the back hole. Too often a single screw in the main hole cannot be tightened enough to hold the draft gear in place and allow the coupler to pivot.

The screw used for mounting should have a diameter large enough to fill the mounting hole, otherwise, the draft gear box can slide out of place when the screw or bolt is tightened.

The side nubs of the draft gear can be removed if necessary to allow for fitting.

### Built-In Draft Gear

Some kits have the draft gear box built into the car underframe and include a lid and a screw. The modeler must supply the coupler and the centering spring. Mounting is straightforward: insert the centering spring and the coupler, cover these with the lid and insert the screw. Check for coupler pivoting and automatic centering.

### Cementing/Gluing the Draft Gear

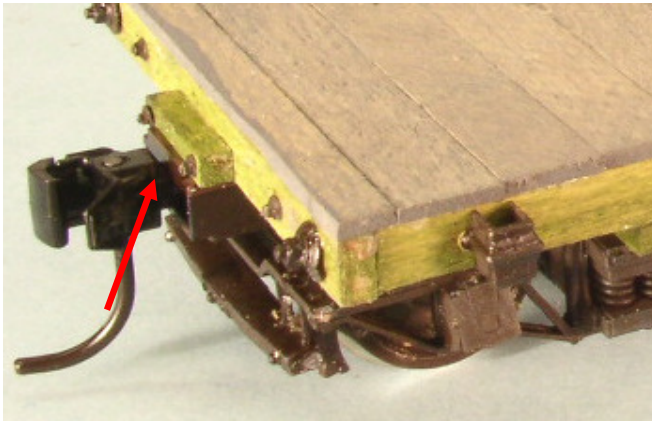
If the body or underframe material is too thin to use a bolt or screw, the draft gear has to be glued in place.

1. Fit the draft gear and the coupler to the car underframe. Make sure that the alignment is correct along with coupler height. The mounting surface should be flat.

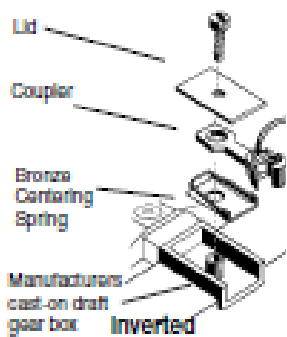
2. Remove the draft gear and take out the coupler, reassemble the draft gear box and lid. Put a small amount of tube cement on the lid and set the draft gear in place on the underframe (squirt some of the cement on a palette and use a straight pin to rub a small amount onto the lid). Let the glue set long enough so the lid is held in place. Remove the box without changing the lid's location. This is done so the box doesn't glue to the lid.

3. Once the cement has dried, assemble the coupler and draft gear on the lid and secure the box with a tiny amount of CA glue at the joint where the box touches the lid. CA glue dries when it is denied air, so only a small amount is needed, use a straight pin to apply. The point is to be able to pry the box off if the coupler needs to be changed. The lid can also be CA glued to the car underframe to provide a way to remove it later.





Morgan Hill Models flat car with Kadee On3 couplers. The Kadee draft gear is mounted to the bottom of the body and the lip sets against a wood buffer block.



Kadee #5 HO coupler fitting into a cast in draft gear box. Usually the draft gear is molded as part of the underframe.



An Alan Curtis log car shown with cast in draft gear holding a Kadee #5 coupler.

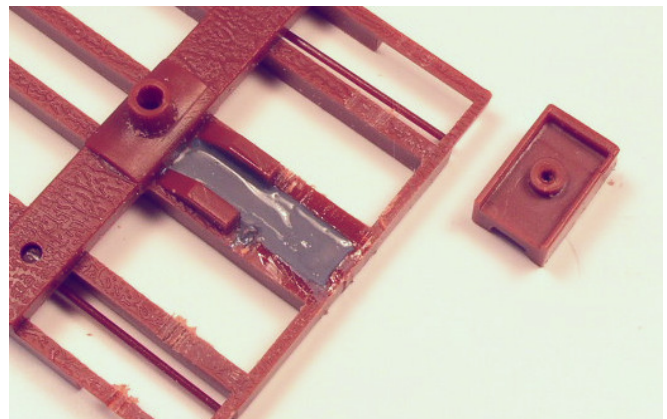
Coupler and truck mounting, and coupler height adjustment should be one of the first steps in construction of a kit or a scratchbuilt car. This is because they have specific requirements for location and clearance that may not be able to be met once details or body parts are installed. Plus handling a well detailed car to install trucks and couplers is an opportunity to break off parts.

## Installing Kadee S/On3 Couplers on Bachmann Equipment

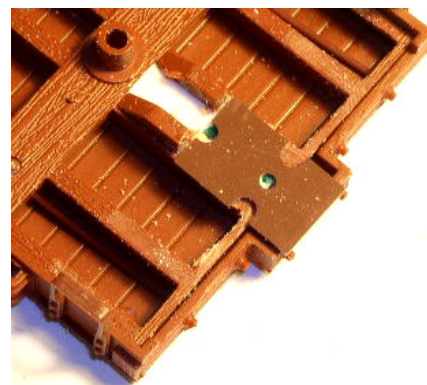
The Bachmann equipment utilizes HO couplers at HO height but runs on larger trucks. To achieve proper coupler height, the couplers are mounted so low that a realistic appearance is lost. Some modelers think that the HO couplers are too small for the size of the equipment and therefore use Kadee #803 couplers at On3 height.

## Freight Car Underframe

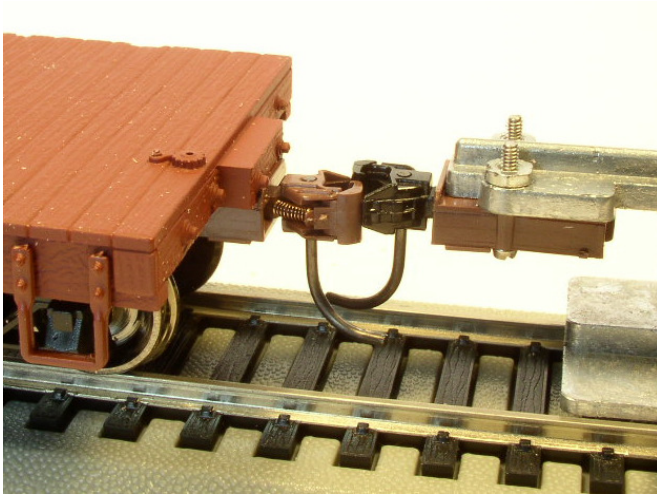
This is the underframe used on a variety of freight cars.



Remove the underframe from the body and cut off the cast on draft gear box even with the sills. Fill the area with .060 styrene. Measure back from the end 3/8" and cut the remainder of the two sills.

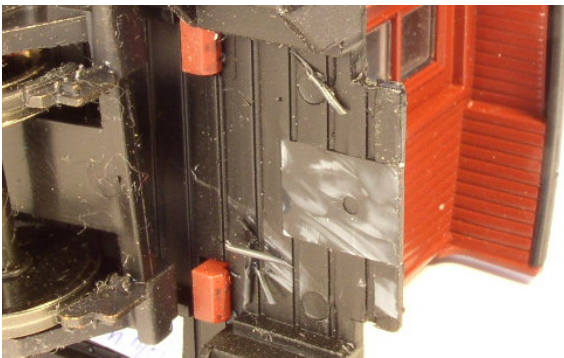


Slip the underframe into the body. Lay the lid in place with the lip against the end block and centered on the inner sills. Mark the two mounting holes and drill with a #54 bit. Install the draft gear using the screws that come with the couplers. The screws will need to be cut off in order to allow the frame to fit inside the body.

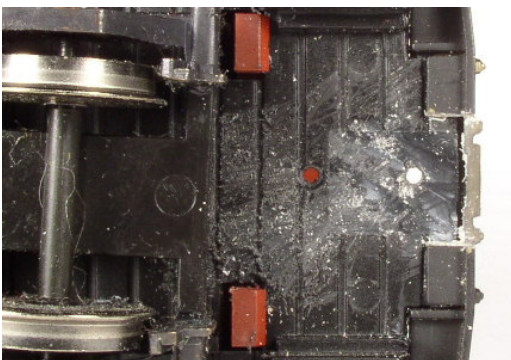


Reassemble car and check coupler height with a Kadee coupler height gauge. This is perfect height for S scale but a little low for On3. If needed, trim off more of the sills so the coupler will be higher off the rails.

### Passenger Car



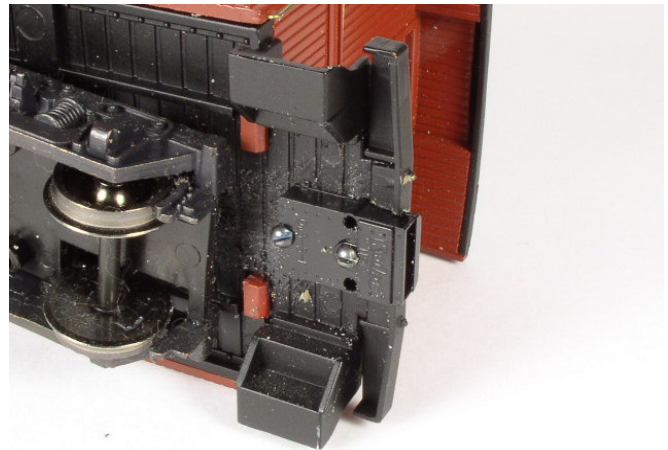
Remove the end beam and cut away the draft gear box. Smooth the area even with the floorboards.



Slip the end beam back on and remove enough material to allow the draft gear box to lay flat.



Notch the end beam to allow the draft gear to fit.



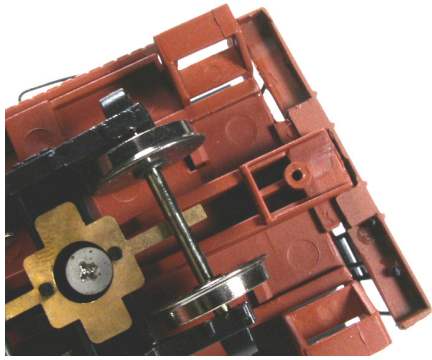
Install the draft gear and cut the screws even with the top of the platform. Paint as needed.



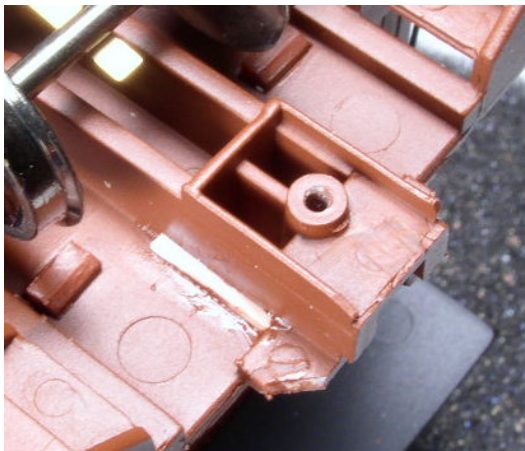
Completed installation. Handrails are removed for clarity.



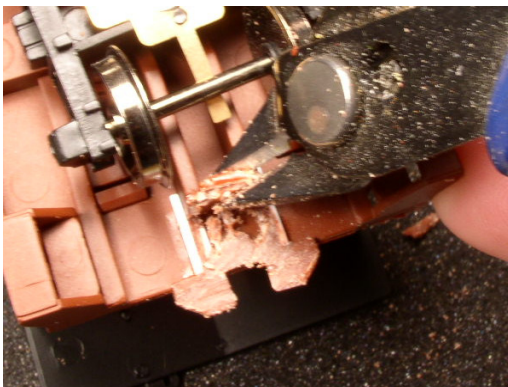
## Caboose



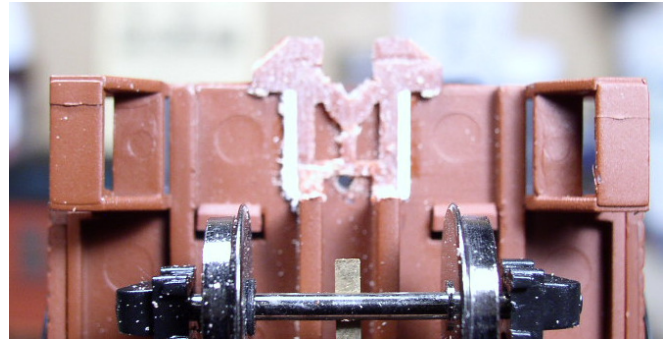
Pry the end beam off of the frame. The caboose is similar to the coach, but there is less space to work in—the steps are closer together and the trucks are difficult to remove.



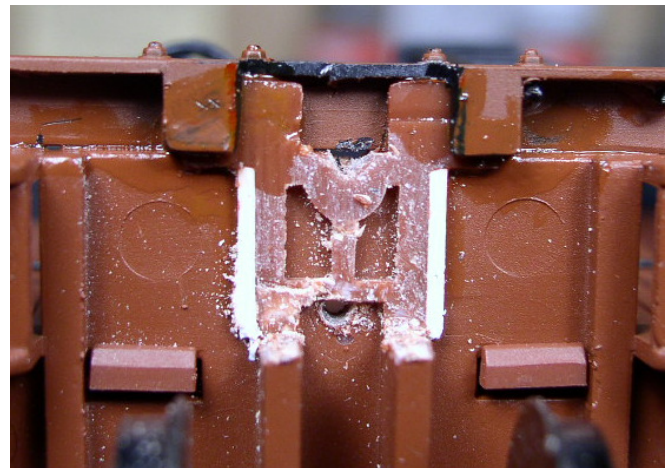
Glue .030 X .030 X 3/8 styrene strips along side of the cast in coupler pockets. The end of the strips should touch the outer edge of the lug that holds the end sill. The strips are used as depth guides when cutting off the draft gear.



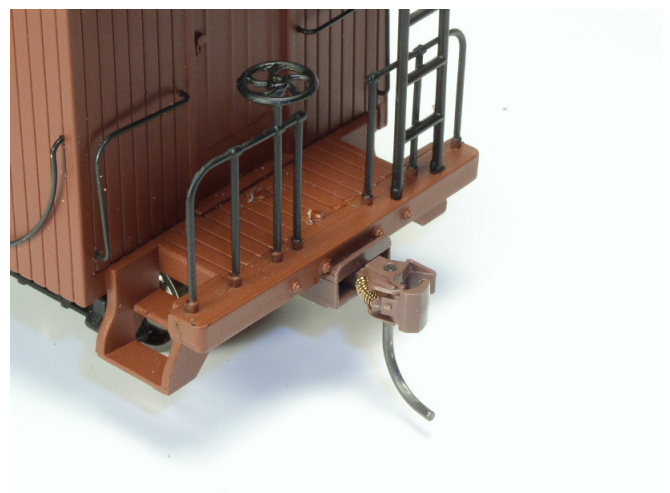
Use a saw and cut the draft gear box horizontally. Use the styrene strips as guidelines. Cut as much as possible and then use the nippers to cut the rest.



The draft gear is removed.

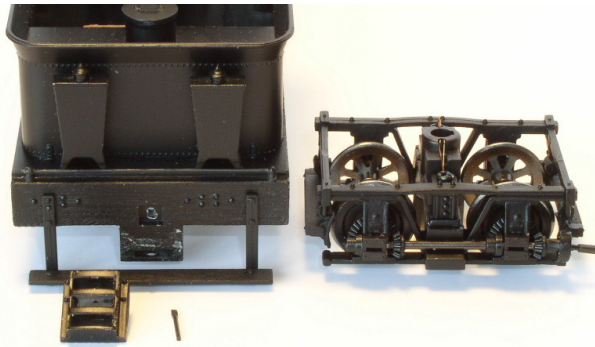


Glue on the end sill. Fit the draft gear into the space by filing or cutting as needed. Drill and mount. Cut off the screws so they are level with the platform boards.



Coupler installed.

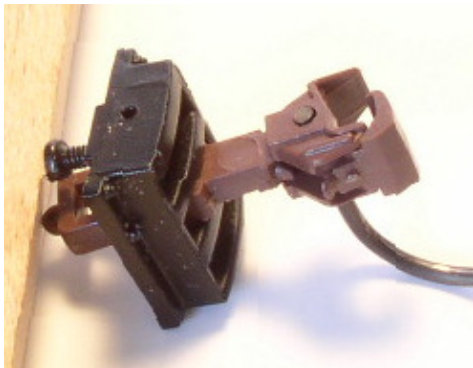
## Shay



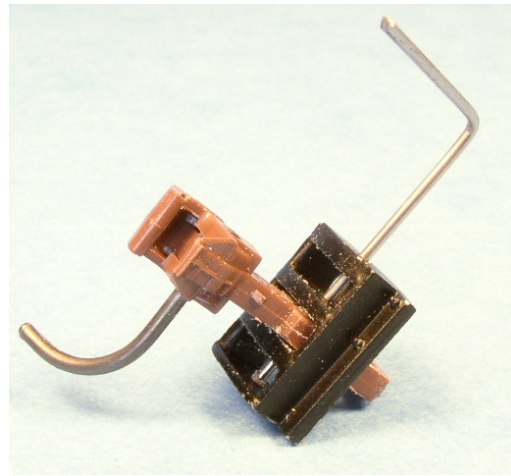
Due to the lack of space on the underside of the body, the couplers have to be mounted in the link carrier. This achieves a scale appearance but the coupler does not automatically center itself. Remove the HO couplers. Remove the truck screws and the trucks. Remove the carrier by taking out the tiny screw and pulling it off the beam.



File the raised portion of the coupler shank until it is the same size as the rest of the shank.



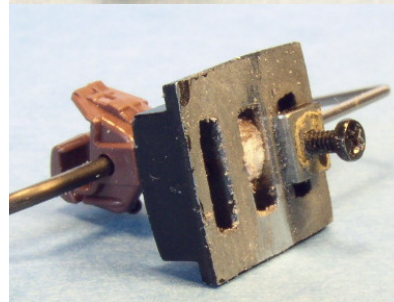
File out the middle slot in the carrier until the coupler easily slides into it.



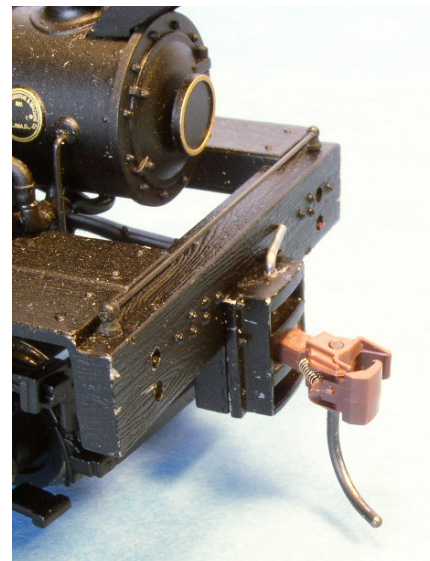
Drill down through the three plates. Stop at the bottom. Also drill through the coupler at the widest part of the shank.



Cut off the back of the shank.



Round it so when it pivots in the carrier it doesn't protrude.



On3 coupler mounted on the front of the Shay. A piece of wire is used to hold it in.

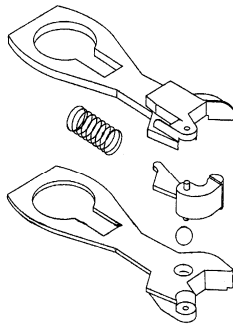


### Sergeant Semi Automatic Couplers

Sergeant couplers are accurate S scale representations of the AAR Type E coupler. They provide a scale appearance and allow manual (hands off) uncoupling.



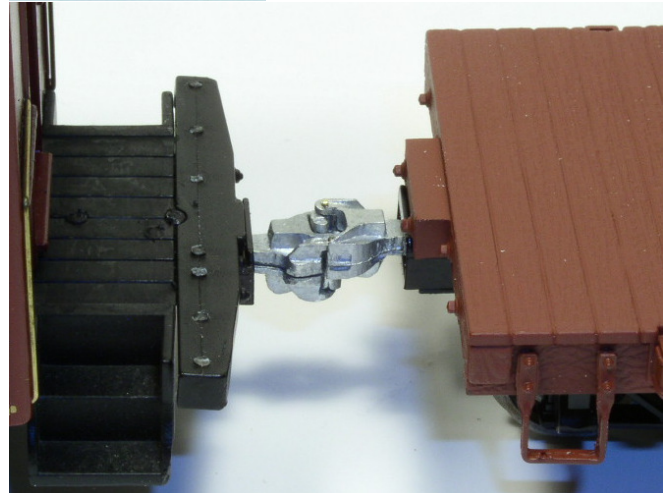
Shown are one package (2 pr.) of couplers and a Local Uncoupling Tool.



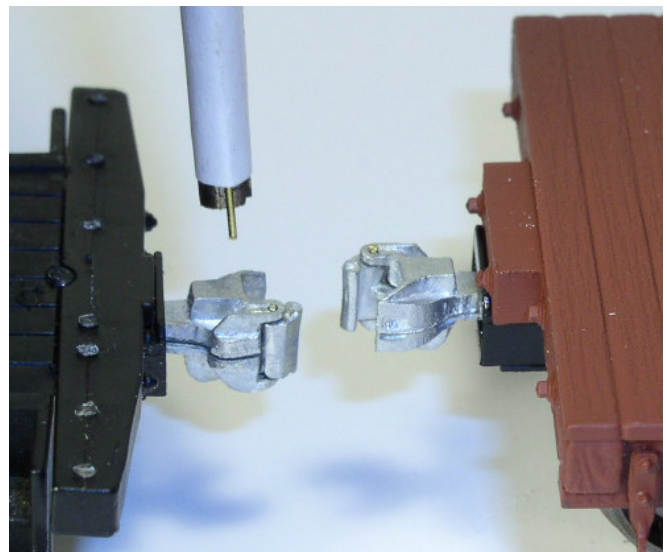
The coupler is composed of five pieces: drawbar upper and lower, knuckle, steel ball, and tension spring. The knuckle freely rotates between the drawbar halves and is held in the locked position by the steel ball. When the steel ball is lifted by a hand held magnet, the knuckle is allowed to open and stays in the open position until it is pushed against something, returning it to the closed position and allowing the steel ball to drop down and lock.



They fit in the Kadee On3 coupler pocket and can be used anywhere the Kadee pocket can be mounted.



Sergeant couplers mounted on a Bachmann coach and flatcar using Kadee On3 draft gear boxes.



The Sergeant Local Uncoupling Tool is used to lift the steel ball in the coach coupler. Then the coach is pulled away causing the knuckle to open. Removing the magnet does not close the knuckle; the knuckle closes when cars are coupled.