

# KADEE COUPLERS - A TREATISE

by Paul Hobbs

One of the more frequent tasks we have in this hobby is installing couplers. It deserves our best skills.

Badly performing couplers can be a source of endless frustration, as when they uncouple when they shouldn't, or fail to negotiate our curves and hanging up the cars. The first problem is vertical, the second horizontal.

The vertical situation is all about coupler HEIGHT. In HO scale the correct coupler centerline is  $25/64$ ". Any deviation can lead to unplanned separations out on the line. If the couplers are correct, fix the track.

The horizontal problem has to do with GATHERING. This is the couplers' ability to accommodate angular differences between rolling stock as they negotiate curves - the worst case, S curves. Cars of similar length usually work well as their overhang and body swing are evenly matched. Extreme cases are long and short cars coupled together. Even the prototype mentions these in rule-books when necessary.

Our favorite # 5 Kadee coupler works in a majority of situations for average length cars. Most equipment provides for this installation. For long cars (80'+) a personal favorite is the #26 or #36 (plastic) or #46 (metal) long shank coupler. It offers the best gathering of any knuckle coupler.

Except in the most unusual situations, like certain locomotive pilots, avoid offset shanks. They aren't prototypical. Adjust coupler height by correcting the equipment. Add washers at truck bolster to slightly raise body if the coupler is too low. File body bolster or add shims above coupler if too high. Installing prototypically correct 36" wheels on 100 ton (Load Limit 198000# and more, Coal, Grain and other) cars often improves low couplers, instead of washers.

Never rely on glue to hold couplers onto cars or locomotives. Always secure with screws. The flat top of the pocket lid is quite large, but the joint between lid and bottom is small and can let go under load - especially downward pressure.

For best performance couplers need to be prepared before installation. File the shank top, bottom and rear side edges. This removes any ejection dots from the top and bottom; the edges then have a straight surface to present to the leaf spring. The front edge of the leaf spring needs to be smoothed. It is the cut-off point from the original sheet and can be somewhat jagged - and hang-up the coupler.

Modern coupler pockets delivered with Kadee couplers need no functional cleaning as the sprue points are not in critical areas. Some older pockets have both ejection dots and a leading edge to clean. Check existing pockets on any equipment for molding anomalies and clean up accordingly. Ensure the coupler readily moves from side to side of the pocket, and snaps back to center when released.

After installation check for coupler height against the #205 Coupler Height Gauge. Arrange a common or permanent test rig with a known flat surface, and level track for consistent test conditions. If you use delayed uncouplers, set up a track about 3 feet long, with a gauge at each end and an uncoupler in the middle. Two of your longest cars can be tested together on the uncoupler.

Layout design is a critical factor in your equipment performance. Sharp curves are not your enemy, but entry and egress can be a problem. An easement at the beginning provides a gradual entry into the curve for the couplers to adjust to. The worst scenario is the "S" curve, where one curve is abruptly reversed. The situation asks the couplers to adapt quickly between their extreme "gathering limits". Often a redesign will eliminate the reverse curve.

Another critical element is the yard lead. Consider large turnouts, and try to incorporate a slight down-grade in the ladder. Cars will trail with little effort, and minimum pressure on turnout frogs and points.

**Specific considerations: -**

**Athearn**

The metal clip is fraught.

Replace with # 5 in its own box.

Box car and reefer underframes frequently do not snug against the floor.

On tank cars, drill and tap for a screw to secure the existing pocket.

On grain hoppers drill and tap for 2-56 and use # 5 lid for bottom.

On locomotive drill and tap 2-56 and install # 5 in its own box. Adjust height by bending frame.

**Walthers, Accurail, Intermountain, CB&T and others**

Plastic pin.

Remove pin, drill clearance hole in bottom cover.

Drill and tap 2-56 through pivot.

Install with screw.

**Details West**

Coupler pocket is too deep.

Fill with shims.

**Any coupler pocket with pivot post on the bottom (cover).**

These do not allow centering spring to always align with coupler correctly.

Replace where possible with # 5 in own pocket.

Worst are older Atlas Alco S series switchers.

**Narrow pockets.**

The centering spring won't fit.

File out the inside walls of the pocket until spring drops in snugly.

Or try a 30 series pocket.

**Other knuckle couplers.**

Compatible knuckle couplers are provided on currently available equipment. Most are plastic assemblies and many are not very robust. Couplers with a small leaf knuckle spring usually take a "set" in time and become unreliable. Others have relatively thin, soft plastic, knuckles. Under heavy load they may part, causing a train break-in-two.

**Steam Locomotives.**

Steam locomotives can be a particular problem for the front coupler. Fortunately the locomotives most in need of a front coupler usually have a foot-board pilot.

Locomotives with long stave or pipe pilots require compromises for a resolution. Do we want the coupler in the correct place, probably without trip pin, and unable to mate with another due to that one's trip pin fouling on the pilot? Or, do we have it hang out clear of the pilot, working, but giraffe-like?

Large locomotives often have a long reach to the coupler from the nearest driver. On bad track the coupler can be subject to a lot of movement. Some prototypes hide the front coupler when not needed. This too, may be convenient for us.

**Diesel/Electric Locomotives.**

Many manufacturers provide consistent mounting situations, requiring one solution per brand. However, some newer brands are doing strange things with their coupler mountings. Kadee offers specific packages for several brands of F units, providing a realistic 36" back-to-back between units.

**Brass Imports.**

Most imported brass equipment feature metric screws. Usually the pivot screw will be 1.7mm and the side pocket screws 1.4mm.

**Long Cars.**

Manufacturers provide several solutions for long cars, including truck-mounting and multiple pivot mounting. Truck mounted couplers introduce forces on the wheels which can lead to derailments. Multiple pivots (Walthers passenger cars, Proto2000 E-units, and others) are ok when pulling, but introduce strange angles and pressures when pushing. Unless really needed on smaller radius (30" or less), consider replacing these arrangements with body-mounted long-shank couplers.

**Screws/Drills/Taps**

<u>All Kadee variants</u>				<u># 5 pocket</u>	
<u>Center Hole</u>				<u>Side Holes</u>	
Screw	2-56	2.0mm	1.7mm	00-90	1.4mm
Tap	#50	1.6mm (#52)	1.4mm (#54)	#61	1.1mm (#57)
Clear	#43	2.2mm (#43)	1.8mm (#49)	#55	1.5mm (#53)

**Useful tools**

#205	Coupler Height Gauge	essential tool to check coupler and trip pin
#208	0.015 Fiber Washer - Red	raise car at truck pivot
#209	0.010 Fiber Washer - Gray	raise car at truck pivot
#211	# 5 shims	lower coupler pocket
#235	Spring Pic	install knuckle springs without loss
#237	Trip Pin Pliers	Adjust trip pins with good control
#246	Tap & Drill Set, 2-56 tap, #43, #50	get a better tap
#634	# 5 Centering Spring	replace the ones which got bent
	fine files	clean up mold lines on couplers and joints on
	pockets	
	6" mill file	Clean up large flat surfaces
	MEK solvent	glue coupler pocket together
	tap wrench or similar tool	for tap
	small drill holders	for drills
	tweezers	hold coupler pockets until glue dries
	2-56 screws about 3/8" to 1/4"	for American made equipment
	1.4mm and 1.7mm screws 5mm long	for imported brass equipment
	good small screw drivers	Slot and Phillips head types
	fine edge cutting pliers - as used in electronics	

**Planning a Coupler Conversion**

*The idea is to achieve operational compatibility quickly, while spreading the total effort/expense over time.*

- Change all locomotives and cabooses *Front and back of train are compatible*
- Eliminate any minority coupler types *Reduce coupler type count to two*
- Make converter cars using good equipment *Cars in frequent use should be the best*
- All new purchases to new coupler before use *No regression*
- Gradually change other cars *Funding and time*
- Last to convert - trains run as units: the reefer block, coal drag, passenger express
- Done!