

Field Guide

Constant Contact Side Bearings
Draft Gears
Brake Beams

630-232-3000

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Version 7.2a

TecsPak® Constant Contact Side Bearings

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TECSPAK® CONSTANT CONTACT (TCC) SIDE BEARINGS

General Description

Miner's TecSPak® constant contact side bearings feature a unique metal-on-metal design enabling them to provide a more stable ride by instantaneously counteracting the rotational motion of truck hunting. Their superior design breaks friction and dissipates energy before truck hunting impacts car stability and component wear. When installing and/or inspecting any of Miner's side bearings, it is critical to identify the proper bearing and its components. Miner side bearings include: TCC, TCC-II, TCC-III, TCC-IV and retrofit models. Please refer to the Product Identification section before any installation and/or inspection procedures.

Miner's TecSPak constant contact side bearings are available in a range of preloads and designs. **The preload is the force produced when the side bearing is at the proper installed height.** The model name will designate the side bearing preload in pounds (e.g. TCC-8000 = 8000lbs). Some models are also available in:

Standard Travel	5/16 in. travel from 5-1/16 in. set up height
Roller Assist	5/16 in. travel from 5-1/16 in. set up height
Long Travel	5/8 in. travel from 5-1/16 in. set up height
Block Style	5/8 in. travel from 5/8 in. set up height
Bolt-on	5/8 in. travel from 5/8 in. set up height

The first generation of Miner TCC side bearings, TCC-2600*, -4500 and -8000, are Standard Travel (ST). The TCC-4500 RA* is a roller assist model.

The second generation of side bearings, TCC-II-25*, -35*, -60* and -80*, are all Long Travel (LT).

The third generation of side bearings, TCC-III-30, -45, -60 and -80, are available as either Standard Travel (ST), Long Travel (LT) or Roller Assist (RA) models.

The fourth generation of side bearings, TCC-IV-30, -45, -60 and -80, are all Long Travel (LT).

The TCC-8000 RL* retrofit side bearings are designed to fit into a Stucki 688-B double roller cage and are Standard Travel (ST).

The TCC-8000 RS* retrofit side bearings are designed to fit into a Stucki 656-C single roller cage and are Standard Travel (ST).

The TCC-45 LTR and TCC-60 LTR are designed to fit into a Stucki 688-B double roller cage and are Long Travel (LT).

The TCC-45 LTLP & TCC-45 LTLP-B are designed to fit into a low profile small pocket and are both Long Travel (LT).

The TCC-45 LTLP-C is designed as a bolt-on, low profile and is Long Travel (LT).

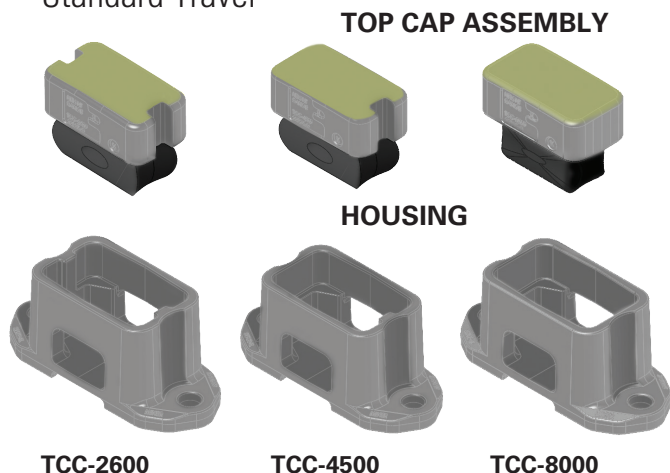
The TCC-45 LTRB is designed to fit into a tall block style side bearing pocket and is Long Travel (LT).

* No longer in production. Current model equivalent in product identification.

Product Identification

Fig. 1 TCC Style

Standard Travel

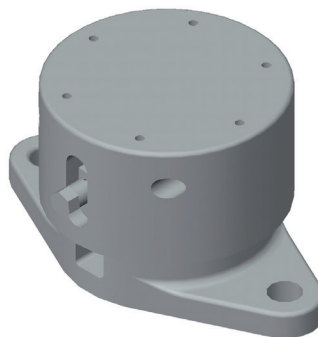


MODEL	TOP CAP ASSY.	HOUSING
TCC-2600*	29127	29130
TCC-4500	29126 W10043	29129 W10086
TCC-8000	29125 W10033	29128 W10090

* No longer in production. Replace with TCC-III-30 ST on both sides of axle.

Fig. 2 TCC-II*

Long Travel



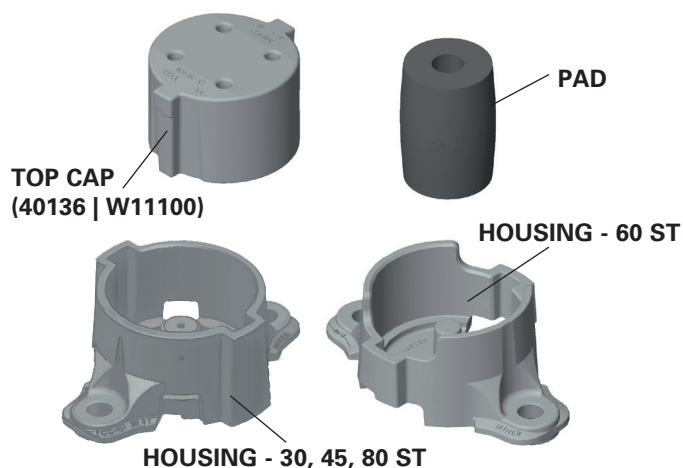
MODEL REPLACE WITH:

TCC-II-25	TCC-III-30 LT on both sides of axle
TCC-II-35	TCC-III-45 LT on both sides of axle
TCC-II-60	TCC-III-60 LT on both sides of axle
TCC-II-80	TCC-III-80 LT on both sides of axle

*No longer in production.

Fig. 3 TCC-III ST

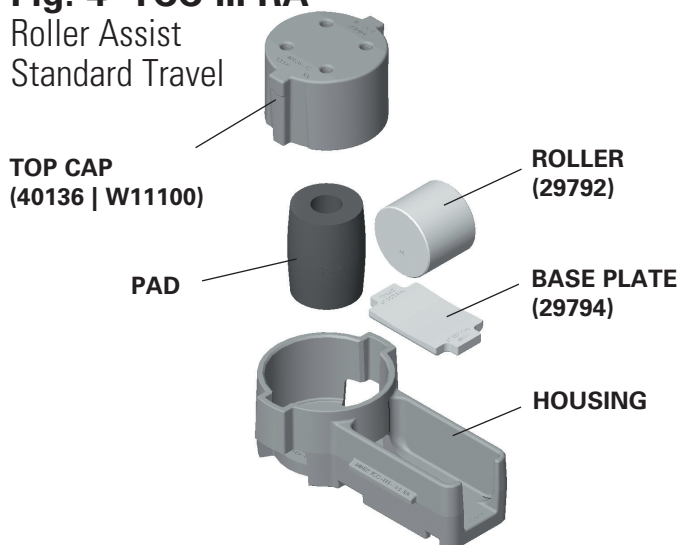
Standard Travel



MODEL	HOUSING	PAD
TCC-III-30 ST	40137 W11101	T-0305 W10321
TCC-III-45 ST	40138 W11157	T-0300 W10163
TCC-III-60 ST	40139 W11158	T-0306 W10157
TCC-III-80 ST	40140 W11159	T-0307 W10322

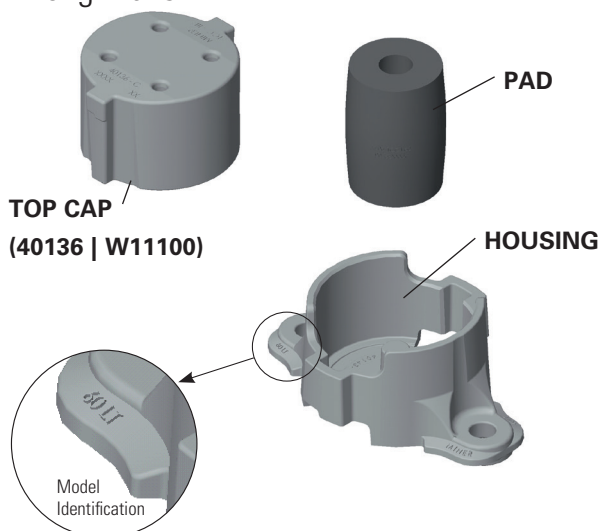
Fig. 4 TCC-III RA

Roller Assist
Standard Travel



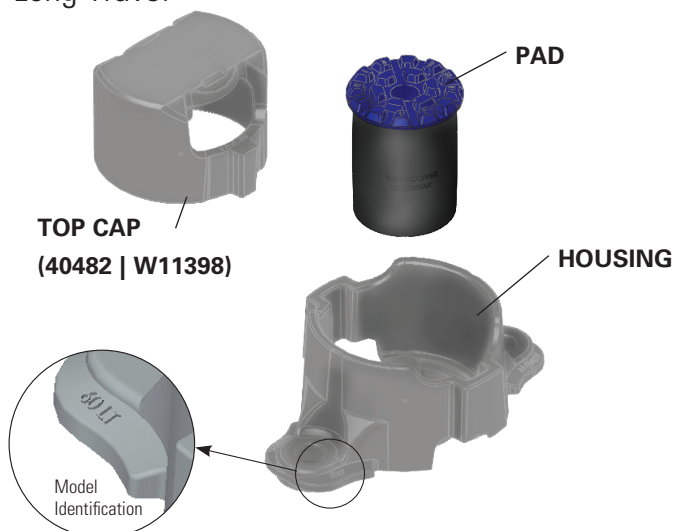
MODEL	HOUSING	PAD
TCC-III-30 RA	40318 W11304	T-0305 W10321
TCC-III-45 RA	40319 W11305	T-0300 W10163
TCC-III-60 RA	40320 W11306	T-0306 W10157
TCC-III-80 RA	40321 W11307	T-0307 W10322

Fig. 5 TCC-III LT
Long Travel



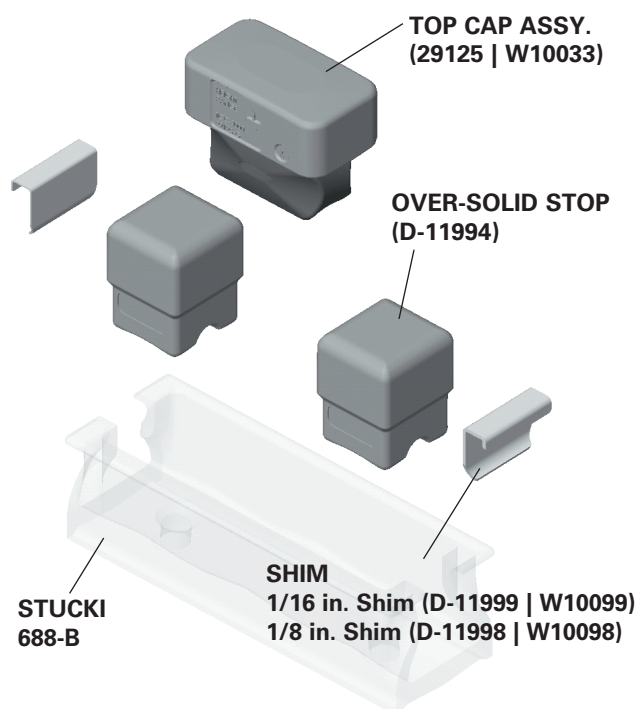
MODEL	HOUSING	PAD
TCC-III-30 LT	40141 W11099	T-0305 W10321
TCC-III-45 LT	40142 W11111	T-0300 W10163
TCC-III-60 LT	40143 W11149	T-0306 W10157
TCC-III-80 LT	40144 W11156	T-0307 W10322

Fig. 6 TCC-IV LT
Long Travel



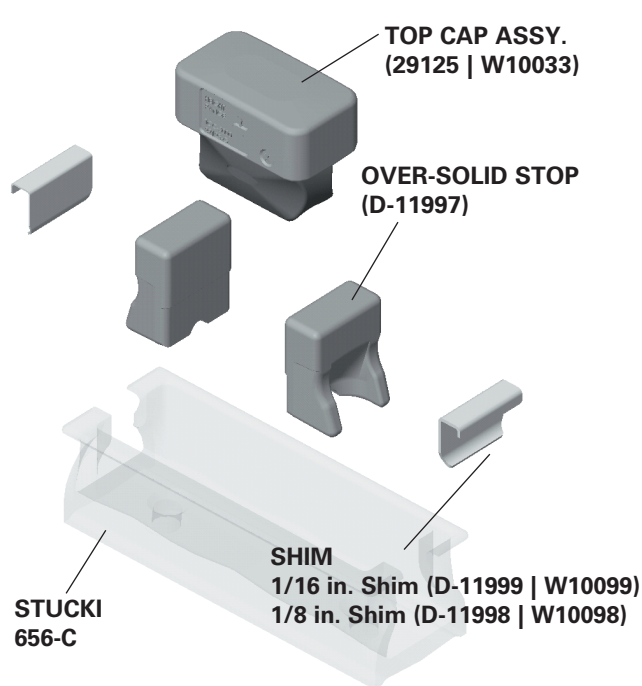
MODEL	HOUSING	PAD
TCC-IV-30 LT	40141 W11099	T-0432 W11422 Green
TCC-IV-45 LT	40142 W11111	T-0430 W11423 Red
TCC-IV-60 LT	40143 W11149	T-0431 W11424 Blue
TCC-IV-80 LT	40144 W11156	T-0434 W11435 Grey

Fig. 7 TCC-8000 RL*
Standard Travel



* No longer in production. Direct replacement is TCC-III 80 ST.
For long travel, replace with TCC-60 LTR or TCC III or IV 80 LT.
However, top cap assembly is still available.

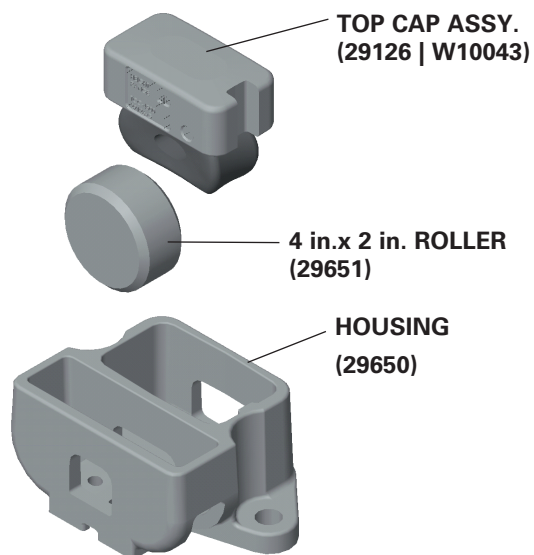
Fig. 8 TCC-8000 RS*
Standard Travel



* No longer in production. Direct replacement is TCC III 80 ST.
For long travel, use TCC III or IV 80 LT.
Top cap assembly is still available.

Fig. 9 TCC-4500 RA*

Roller Assist
Standard Travel



* No longer in production. Direct replacement is TCC III 45 ST.
For long travel, use TCC III or IV 45 LT. Top cap assembly is still available.

Fig. 10 TCC-45 LTR

Long Travel

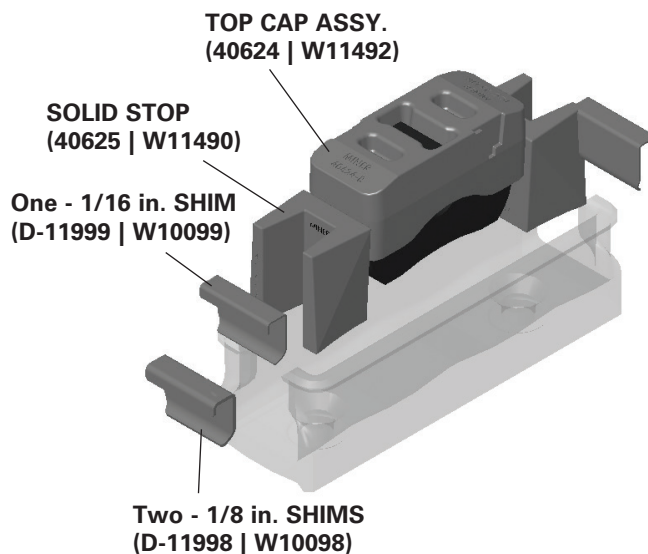


Fig. 11 TCC-60 LTR

Long Travel

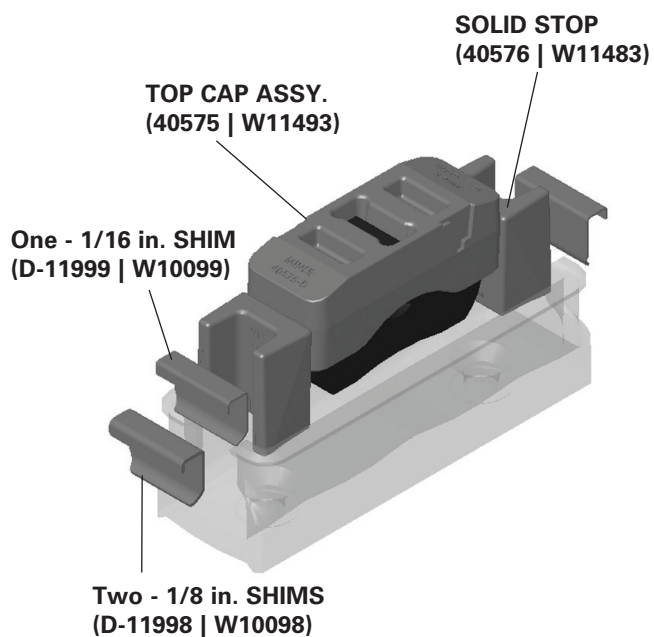


Fig. 12 TCC-45 LTRB

Long Travel

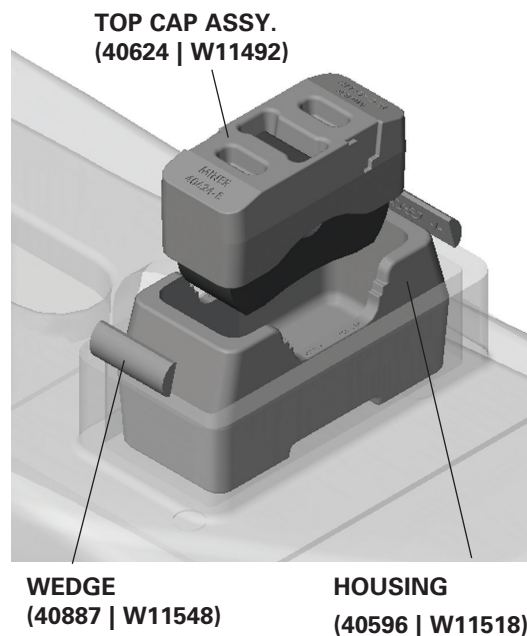


Fig. 13 TCC-45 LTLP
Long Travel

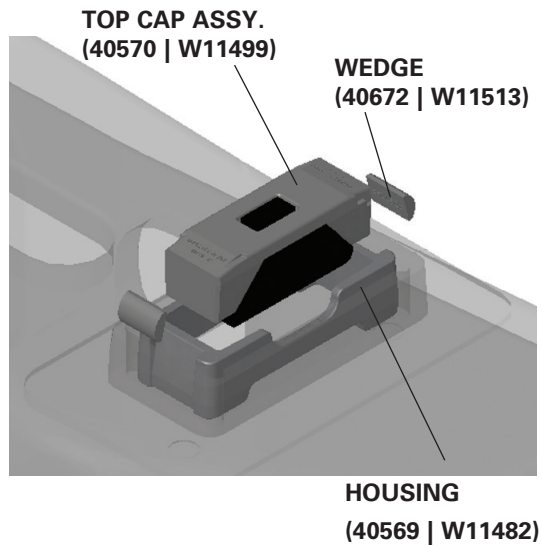


Fig. 14 TCC-45 LTLP-B
Long Travel

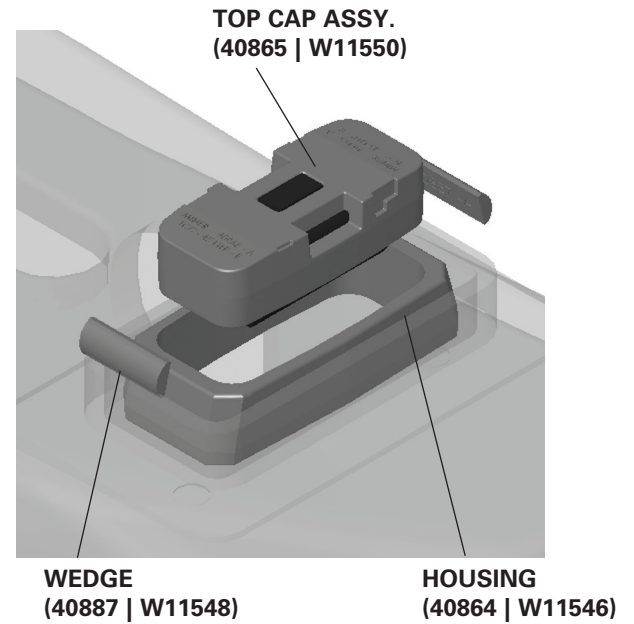
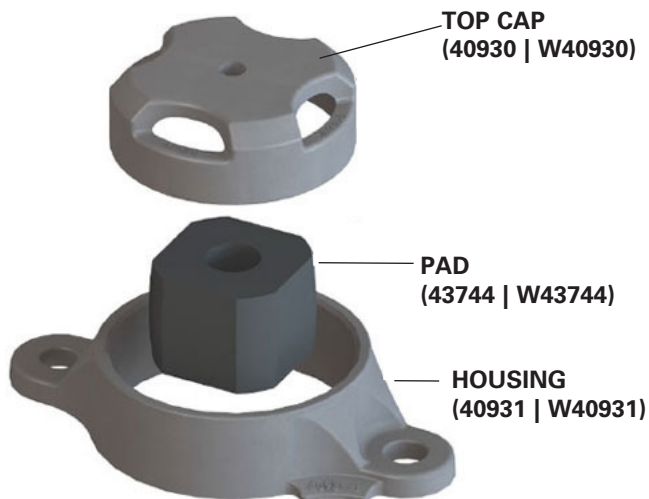


Fig. 15 TCC-45 LTLP-C
Long Travel





General Knowledge

Shelf Life

The recommended shelf life for new Miner TecsPak® pads is 5 years from the date of manufacture.

There is an alpha-numeric code on the outside of a TecsPak pad that can be used to determine the date it was produced. The first 5 digits are the ones that interpret the date manufactured.

Example:

1st five digits on TecsPak pad: 15 246

15 246

15 = 2015

246 = the 246th day of the year, September 3rd.

The rest of the numbers are for Miner's internal tracking.

In most cases, the pad will need to be cleaned to see the date code. Sometimes just simply wiping it with your hands is fine and other times you may need some water to wash off the dust and dirt.

TecsPak® Pad Temperature Caution

Do not expose pads to temperature environments higher than 200 °F or 175 °F for extended periods of time (2-3 hours).

After the side bearings have been installed, and the car body lowered onto the trucks, the set up height will probably be greater than the original set up. Initial set needs to take place and this height will gradually reach the designed set up height.

It may take longer to reach the set up height in colder environments. At temperatures lower than 40 °F this may require at least 24 hours. For this reason, the TecsPak pads should be maintained at a 40 °F or higher temperature for at least 24 hours before assembly on a car.

Remove TecsPak pads and top cap assemblies prior to welding. Allow ample time for cooling before replacing pad or top cap assembly.

Warning – Do not weld near TecsPak pads.



Car Body Wear Plate

The car body wear plate must conform to AAR standard S-235. The car body side bearing wear plate must be smooth. Any weld spatter, heavy rust or surface projections must be removed by grinding. Fastener heads must be smooth and flush below wear plate surface, and the fasteners securely tightened. A twelve-inch steel straightedge is helpful for checking the flatness of the body wear plate and the truck bolster side bearing mounting surface. Plates with surface variations between fastener holes greater than 1/8 in., or greater than 1/16 in. over any 4 in. space between the fastener holes, must be replaced. Surface must be reasonably parallel to truck bolster side bearing mounting surface. Variations should not exceed 1/16 in. across width or 1/8 in. end-to-end.

Minimum Wear Plate Size

Model	Minimum Size
TCC, TCC-II, TCC-III LT, TCC-III ST, LTLP-B, TCC-IV LT	4 in. wide by 12 in. long (101.6 mm x 305 mm)
TCC RA, TCC-III RA	Consult car builder

TCC-45 LTR, LTRB, LTLP, LTLP-C and TCC-60 LTR

Truck Centers	Min. Width	Min. Length
70 ft. (21 m) or less	4 in. (101 mm)	12 in. (305 mm)
70 ft. (21 m) to 82 ft. (25 m)	4 in. (101 mm)	14 in. (356 mm)
82 ft. (25 m) to 94 ft. (29 m)	4 in. (101 mm)	16 in. (406 mm)
Greater than 94 ft. (29 m)	4 in. (101 mm)	18 in. (458 mm)

Please refer to AAR Field Manual Rule 61 for more detailed information regarding body wear plates.

Lubrication

For **new** car applications it is recommended to add a thin coat (1/4 tsp.) of lithium lubricant to the top surface of the top cap to help reduce the frictional resistance during the break-in period. Do not use Molybdenum disulfide type lubricants since they are too permanent. Some recommended lubricants are Texaco Multifak 2, Amoco Amolith EP-2, Citgo H-2, Mobil Grease 2, Shell Alvania 2 or Exxon Lidok EP-2.

Miner does not recommend lubrication when new side bearings are applied for maintenance. However, this is at the discretion of the car owner. Care should be taken when applying lubrication during maintenance to ensure hunting performance is not compromised.

TecsPak® Pad Free Height Measurement

The spring used in Miner constant contact side bearings is called a TecsPak® pad. With use, the pads can lose some of their preload. For optimal performance, the free height of the pad should be measured to determine suitability for continued service.

Top Cap Assembly Method

1. Remove the top cap assembly
2. Allow 1 minute to stabilize
3. Measure height (see picture below)



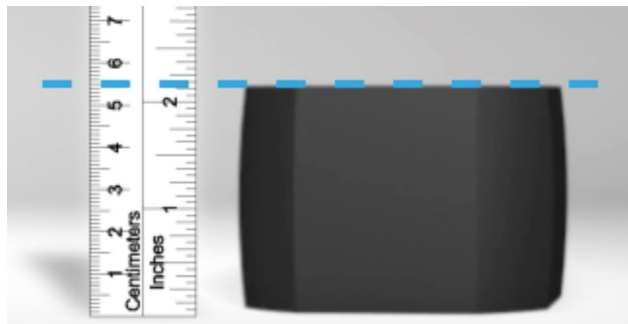
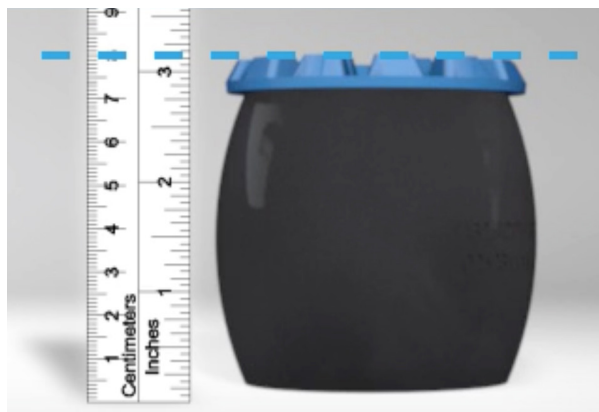
It is recommended that the height be greater than:

TCC-2600*	4-3/8 in.
TCC-4500	4-3/8 in.
TCC-8000	4-3/8 in.
TCC-8000 RL/RS	4-3/8 in.
TCC-45 LTLP	2-3/4 in.
TCC-45 LTLP-B	2-3/4 in.
TCC-LTRB	4-5/16 in.
TCC-45 LTR	4-5/16 in.
TCC-60 LTR	4-5/16 in.

*No longer in production. Replace with TCC-III ST on both sides of axle.

Pad Free Height Method

1. Remove the pad from the assembly
2. Allow 1 minute to stabilize
3. Measure height to the top of the pad or color coded insulator (see pictures below)



It is recommended that the height be greater than:

TCC-IV	3-15/16 in.
TCC-III	3-15/16 in.
TCC-45 LTLP-C	2-3/8 in.

Note: for all preloads



TCC-II

The TCC-II side bearings are pre-assembled at the factory and normally should not need to be disassembled. The TecsPak® pads are contained within the housing and top cap. The top cap is held in position by two retaining bolts, thus maintaining approximately 2,000 lbs. on the pads when the side bearing is at free height (5-7/8 in.).

Note: When car body is raised off the side bearing, top cap should extend to the free height. If the bottom of the cap slot does not maintain contact with the bottom of the retaining bolts, replace side bearings per owner's instructions.

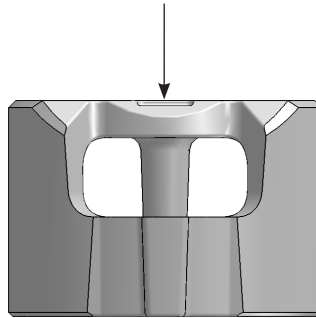
Warning - Under no circumstances should the retaining bolts be removed unless the side bearing has been compressed to relieve the load on the bolts. Do not use standard bolts.

Both sides of the bolts will develop a flat spot after a certain amount of service. If the bolts are broken, missing, or worn to less than 1/4 inch in thickness, the entire assembly will need to be replaced. Both sides of the truck will need to be replaced at the same time. Please refer to page 2 for the appropriate model replacement as this model is no longer in production.

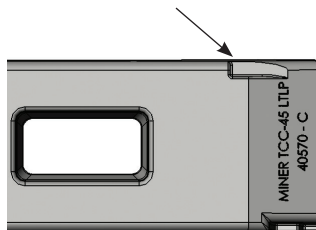
When the car body is raised off the side bearing, the top cap should extend to free height. If the bottom of the top cap slot does not maintain contact with the bottom of the retaining bolts, replace side bearing per owner's instructions.

Top Cap Wear Indicators

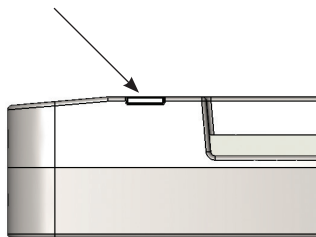
Some of Miner's top caps have built-in wear indicators that will allow the inspector to determine if the top cap has been worn down due to contact with the car body wear plate. If the indicator has been worn down flush to the bottom surface, the top cap will need to be replaced.



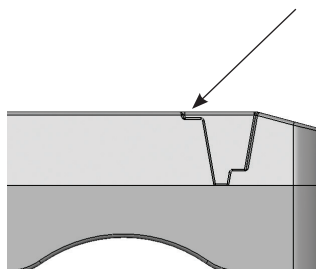
TCC-IV



TCC-45 LTLP



TCC-45 LTLP-B

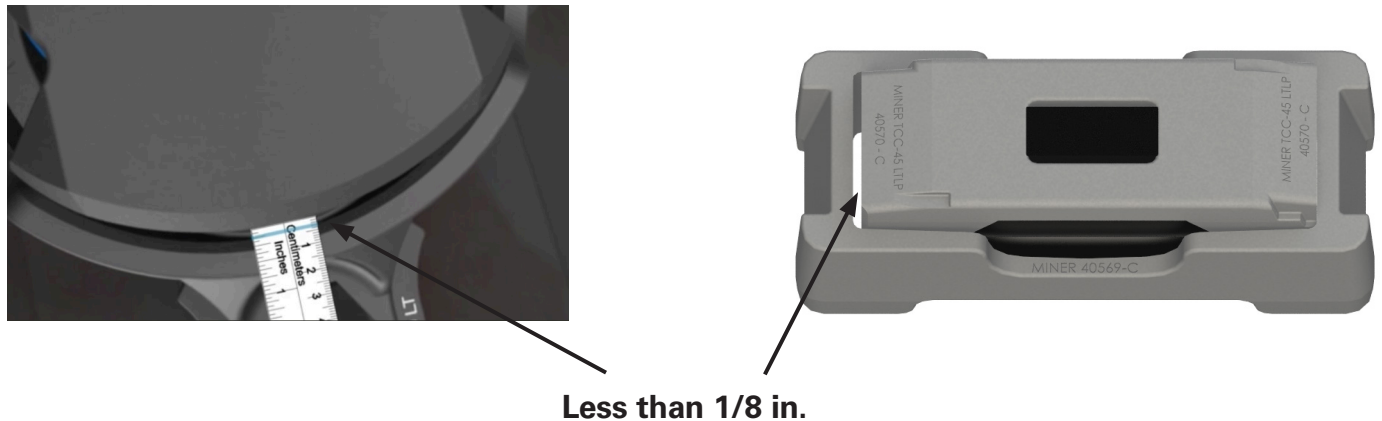


TCC-45/60 LTR & LTRB

Checking for Wear Between Top Cap and Housing

For optimal performance, it is recommended the clearance between the top cap and the housing be less than 1/8 in.

1. If the measured gap is 1/8 in. or greater, remove the top cap or top cap assembly
2. Replace with a new top cap or top cap assembly
3. If the gap is still 1/8 in. or greater, replace the housing as well



Set Up Height

Accurate set up height measurement is critical for optimal performance. The set up height should be measured using inside calipers and a steel rule.

Standard Set Up Height (5 1/16 in.)

The set up height is the vertical distance between the underside of the car body wear plate and the truck bolster side bearing mounting surface, measured as close to the center as possible.

Block Style Set Up Height (5/8 in.)

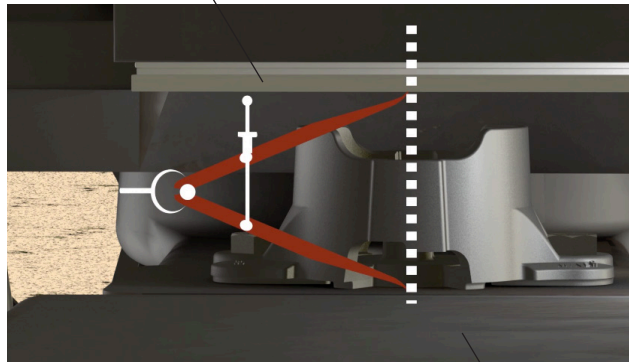
The set up height is the vertical distance between the top corner of the housing to the underside of the car body wear plate.

Miner's #40766-B (W11525) triangular aluminum gage is designed to be used for set up height check and adjustment for the TCC-45 LTLP, LTLP-B, LTRB, and LTLP-C constant contact side bearings. (See page 13)

Standard Set Up Height

Models	Installation or Adjustment	
	Metal Liner	New Non-Metallic Liner or Lube Disc
TCC, TCC II, TCC III, TCC IV, TCC 45/60 LTR	Nominal Tolerance	Nominal Tolerance
	$5\text{-}1/16 \pm 1/16$	$5\text{-}1/8 \pm 1/16$
	Range	
	Max: $5\text{-}1/8$ Min: 5	Max: $5\text{-}3/16$ Min: $5\text{-}1/16$

Car Body Wear Plate



Caliper Measurement

Truck Bolster Side Bearing
Mounting Surface

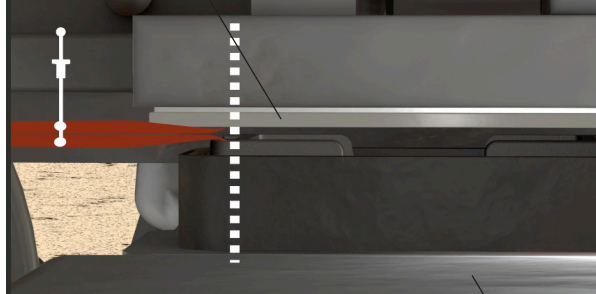
- Installation and adjustment should be done in empty condition on reasonably level track.
- Top cap and pad must be removed from housing.
- Male end of articulated connected cars may have a nominal value of $5\text{-}3/16$ in.

Articulated Car Set Up Height

Miner side bearings allow greater flexibility in the set up height. On some articulated intermodal cars, at the male location of the articulated connection, the side bearing can have a set up height of $5\text{-}3/16$ in., $\pm 1/16$ in.. On selected autorack cars, the long travel side bearing can have a set up height of $5\text{-}1/16$ in. $\pm 1/8$ in. (Refer to owner's instructions, or stenciling, on these types of cars.) If a new elastomeric horizontal center bowl liner or lube disc is used, it is recommended that you add $1/16$ in. to the nominal dimension.

Block Style / Bolt-On Retrofit Set Up Height

Car Body Wear Plate



Caliper Measurement

Truck Bolster Side Bearing
Mounting Surface

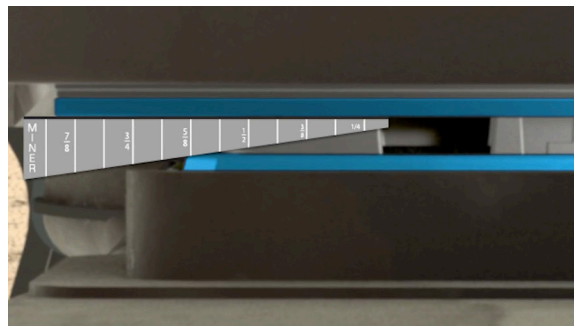
Models	Installation or Adjustment	
	Metal Liner	New Non-Metallic Liner or Lube Disc
TCC 45 LTLP, TCC 45 LTLP-B TCC 45 LTRB TCC 45 LTLP-C	Nominal Tolerance	Nominal Tolerance
	$5/8 \pm 1/16$	$11/16 \pm 1/16$
	Range	
	Max: $11/16$ Min: $9/16$	Max: $3/4$ Min: $5/8$

Block Style Retrofit Set Up Height Gage Tool

Miner's #40766-B (W11525) triangular aluminum gage is designed to be used for set up height check and adjustment for the TCC-45 LTLP, LTLP-B, LTRB, and LTLP-C constant contact side bearings. The gage face ranges from $3/16$ in. to 1 in. in $1/16$ in. increments. The desired distance between the housing and the car body wear plate is $5/8$ in. $\pm 1/16$ in. If an elastomeric horizontal center bowl liner or lube disc is used, add $1/16$ in. to the nominal dimension. So the desired distance would become $11/16$ in. $\pm 1/16$ in.

To check the set up height:

1. Put flat edge of gage up to the car body wear plate
2. Slide the gage in until it contacts the housing
3. Read the indicator mark. The gage has $1/8$ in. measurements labeled and $1/16$ in. measurements lined.
4. If the gap is below $9/16$ in. then remove the correct amount of shims and if the gap is above $11/16$ in. add the correct amount of shims.



**Miner #40766-B (W11525)
Block Style Retrofit Set Up Height Gage**



Set Up Height Adjustment

Standard Height	5-1/16 in. \pm 1/16 in.
Block Style	5/8 in. \pm 1/16 in.
Articulated Car	Per stenciling on car

Note: If a new elastomeric horizontal center bowl liner or lube disc is used, it is recommended that you add 1/16 in. to the nominal dimension.

If setup heights are not within the height requirement, adjustments are required.

Add or remove shims from between wear plate and the car body as needed to achieve the correct setup height. For example, if the setup height measured is 4 and 15/16 inches, you must remove the car body wear plate and remove a 1/8 inch shim to achieve a 5 and 1/16 inch standard set-up height. If the height measured is 5 and 3/16 inches you must add a 1/8 inch shim to achieve a 5 and 1/16 inch standard setup height.

A maximum of two shims can be used per location with a minimum thickness of 1/16 inch. Shims may be applied up to a total shim thickness of 3/4 inch maximum at each body side bearing. A maximum of three removable shims totaling up to 1 inch at articulated connector locations are allowed.

In some cases, proper setup height may not be achievable and therefore it is permissible to use a 3/8 in. wear plate on certain cars according to AAR Field Manual Rule 61.

When the side bearing clearance cannot be adjusted, the use of a one-piece steel center plate shim per Rule 47 is permissible.

INSPECTION (FIELD/YARD AND SHOP/REPAIR TRACK)

For side bearing wear limits and cause for renewal, please refer to Rule 62 of the Field Manual of the AAR Interchange Rules.

Condemnable At Any Time

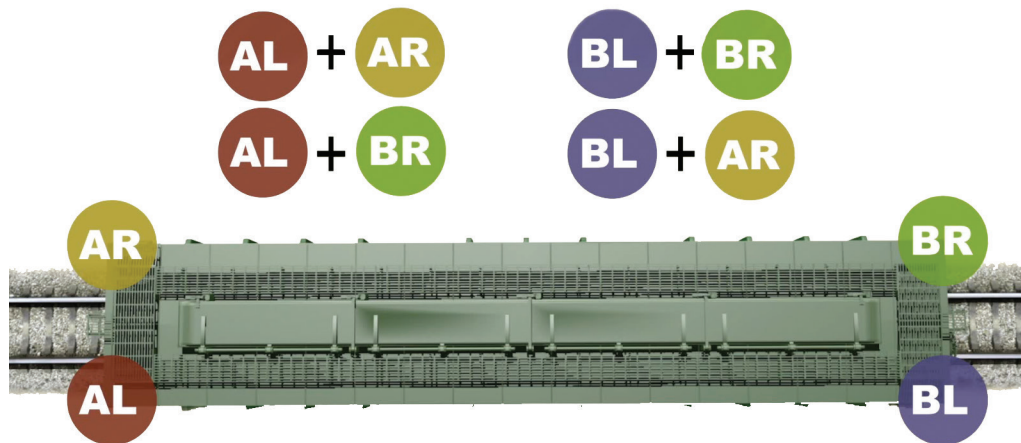
- Bent, broken or missing components other than base plate
- Side bearing cage fastener, loose or missing
- Heat damaged or missing elastomer element
- Metal caps worn through wear limit indicators, where such indicators exist
- Broken welds

Field or Yard Inspection

The housing and top cap castings must be free of cracks and be securely fastened to the truck bolster. Do not shop a car because of TCC-II bolt wear. The bolt wear does not affect the safe operation of the car.

Sum-of-Pairs

Accurately measuring individual side bearing setup height requires reasonably level track. When evaluating side bearing setup height on unlevel track (such as in the field), there is a "sum of pairs" setup height evaluation method. The sum of pairs method is illustrated as such:



- For cars with **standard** 5-1/16 in. setup height and 8-1/2 in. mounting holes, typically on 4-axle cars.

Height adjustment is required at any time, empty or loaded, if any summed pair is:

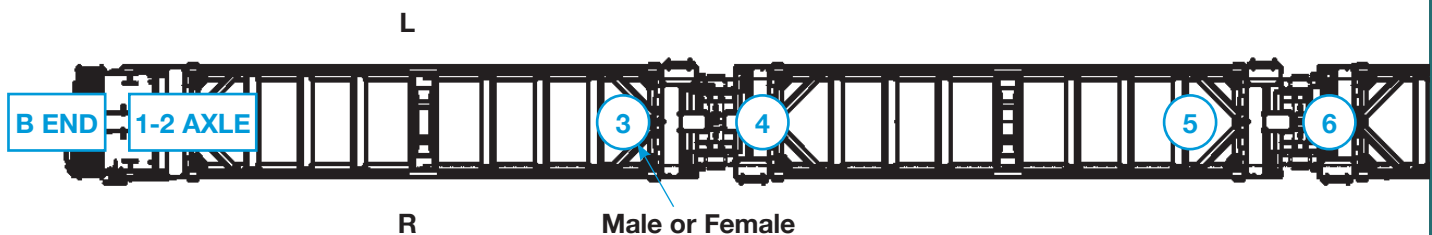
Sum-of-Pairs Measurement (Condemning Limit)
Less than 9-3/4 in. or Greater than 10-1/2 in.

- For cars with **low profile** short or tall solid block style side bearing pockets (integral cast or welded on ring).

Height adjustment is required at any time, empty or loaded, if any summed pair is:

Sum-of-Pairs Measurement (Condemning Limit)
Less than 7/8 in. or Greater than 1-5/8 in.

- For **articulated** cars, sum of pairs refers to side bearings laterally across from each other.



Height adjustment is required at any time, empty or loaded, if any summed pair is:

Articulated Connector Portion	Nominal Setup Height (or as stenciled on car)	Sum-of-the-Pairs Measurement (Condemning Limit)
Female	5-1/16 in.	Less than 9-3/4 in. or Greater than 10-3/8 in.
Male	5-3/16 in.	Less than 9-3/4 in. or Greater than 10-5/8 in.
Either (Female or Male)	Any Other	Less than 9-3/4 in. or Greater than 1/4 in. above two times the stenciled set-up height



Shop or Repair Track Inspection

Refer to the condemnable criteria on page 15. Check for top cap to housing gap, refer to page 11; replace in kind.

Constant contact side bearing heights:

- For cars with **standard** 5-1/16 in. setup height and 8-1/2 in. mounting holes.
Typically on 4-axle cars and end trucks of articulated cars.

Height adjustment is required at any time, empty or loaded, when measured on a Repair Shop (Facility)/Repair Track on a reasonably straight and level track and exceeds the condemning limit and height measurement for each individual location is:

Single Side Bearing Measurement (Condemning Limit)
Less than 4-15/16 in. or Greater than 5-3/16 in.

Online tool: http://www.minerent.com/field_guide/inspect-shop-standard.html

- For cars with **low profile** or short or tall solid block style side bearing pockets (integral cast or welded on ring).

Height adjustment is required at any time, empty or loaded, when measured on a Repair Shop (Facility)/Repair Track on a reasonably straight and level track and exceeds the condemning limit and height measurement for each individual location is:

Single Side Bearing Measurement (Condemning Limit)
Less than 1/2 in. or Greater than 3/4 in.



- For **articulated** cars at the articulated truck locations.

Height adjustment is required at any time, empty or loaded, when measured on a Repair Shop (Facility)/Repair Track on a reasonably straight and level track and exceeds the condemning limit and height measurement for each individual location is:

Articulated Connector Portion	Nominal Setup Height (or as stenciled on car)	Single Side Bearing Measurement (Condemning Limit)
Female	5-1/16 in.	Less than 4-15/16 in. or Greater than 5-1/8 in.
Male	5-3/16 in.	Less than 4-15/16 in. or Greater than 5-1/4 in.
Either (Female or Male)	Any Other	Less than 4-15/16 in. or Greater than 1/16 in. the nominal set-up height

Online tool: http://www.minerent.com/field_guide/inspect-shop-articulated-3-unit.html



INSTALLATION

Warning – Remove all C-Pep pads when installing constant contact side bearings.

Standard Setup Height (Bolt-on or Drop-in / Retrofit) 5-1/16 inches

The Miner constant contact side bearing models that utilize this setup height are the TCC, TCC-II, TCC-III, TCC-IV, and the TCC-45 and 60 LTR.

Setup Height

Refer to page 12 for appropriate setup height and adjustment (page 14). Measure the setup height by taking the measurement between the truck bolster side bearing mounting surface and the underside of the car body wear plate using inside calipers and a steel rule. Measurement should be taken nearest to the center of the housing on the outboard side of the bolster.

Car Body Wear Plate

Refer to page 7. The car body wear plate criteria pertains to all side bearing applications and follows the specifications and tolerances per AAR S-235 which talks about the condition of the wear plate surface and AAR S-394 and S-3013 which covers mounting surface. A twelve-inch straightedge is helpful for checking the flatness of the body wear plate.

Fastener Heads

- smooth and not protruding below wear plate surface
- fasteners securely tightened

Preparation

1. Surface must be clean and smooth and free of protrusions. Reference AAR standards:
 - S-3013 Side Bearing Mounting Surface - Surface Requirements
 - S-394 Side Bearing Pad for Two Hole Application
2. Remove weld spatter, heavy rust or surface projections by grinding.
3. AAR bolt hole location is 8-1/2 inches.
4. Bolt housing to bolster using appropriate fasteners and torque requirements.

Fastener Selection

Miner does not have a preference for bolt head orientation. However, the TCC-III RA is an exception in that it **MUST** use a flat-head bolt oriented from the top of the bolster.

- Any fastener that produces a clamping force between 20,000-30,000 lbs. per bolt.
- 7/8 inch Grade 5 or better HEX head bolt with self-locking nut.

Acceptable fasteners for the TCC-III RA **ONLY** (see below illustration):

- 7/8 inch Grade 5 or better FLAT head bolt with self-locking nut.



Torque:

- Dry: 375-425 ft.-lbs. (Produces a clamping force of 20,000-30,000 lbs. per bolt).
- Waxed or well lubricated: 280-320 ft.-lbs. (Roughly 25% reduction from dry values).

For the latest information related to fastener clamping force, please contact a supplier directly. Below are a couple of well-known manufacturers.

Acument Global Technologies (parent company of the Camcar® brand)
acument.com 815-961-5000

Alcoa Fastening Systems & Rings (parent company of the brand Huck)
afsrhuck.net/us/ 254-751-5543



Final assembly for 5-1/16 inch setup height.

TCC

Install top cap assembly into housing with the metal cap up. Ensure that top cap end slots mate with housing lugs. (Reference Fig.1, Page 2) TCC-8000 has no lugs and TCC-4500 has one.

TCC-III ST/RA/LT

The TecsPak® pad inside diameter should easily slide onto the post inside the housing. There is a 1/32 inch clearance between the post diameter at bottom and the inside diameter of the pad. Therefore, if the clearance is greater than 1/32 inch, or it is difficult to assemble the pad over the housing post, the wrong pad has been applied. With the TCC-III RA, install the base plate into the rectangular section of the housing with the writing facing up, then place the roller on it. The car body wear plate must cover the 3 inch-wide flat on the top cap. (Reference Figs. 3-5, Pages 2-3)

TCC-IV LT

Each TCC-IV pad is supplied with a color-coded insulator attached to the top as follows: TCC-IV-30 (Green), TCC-IV-45 (Red), TCC-IV-60 (Blue) and TCC-IV-80 (Grey). The TecsPak pad inside diameter should easily slide onto the post inside the housing with the insulator facing up. There is a 1/32 inch clearance between the post diameter at bottom and the inside diameter of the pad. Therefore, if the clearance is greater than 1/32 inch, or it is difficult to assemble the pad over the housing post, the wrong pad has been applied. The car body wear plate must cover the 3 in.-wide flat on the top cap. (Reference Fig. 6, Page 3)

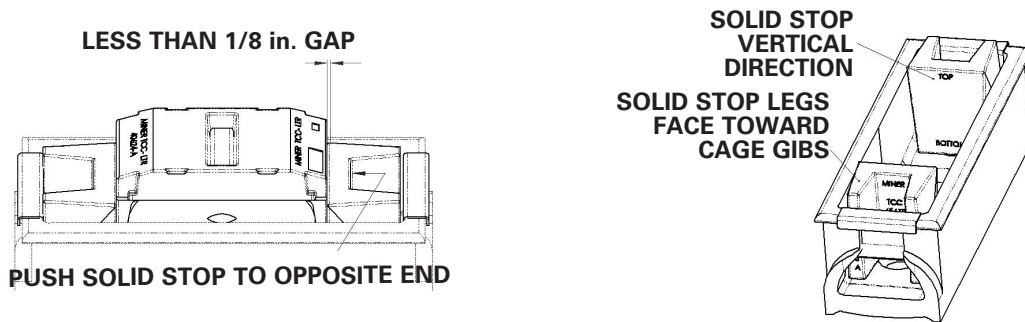
TCC-45 & -60 LTR

(Reference Figs. 10-11, Page 4)

- Remove the double rollers and clean the inside of the cage of any foreign material.
- The existing cage must be free of cracks, tears and deformation.
- The over-solid stops or shims must fit flush against the inside of the gibs, remove any obstructions to prevent complete full contact between the solid stops and/or steel shims and gibs.
- The heads of the cage fasteners must be flush or below the contour of the bottom of the cage and fasteners must be tight.

(TCC LTR Series cont.)

Solid Stop Installation – The assembly requires that the two solid stops be placed on either end of the cage with the legs facing outward and orientated with the marked topside facing up.



Shim Adjustment – The kit comes with two different size shims, a 1/16 inch shim and two 1/8 inch shims. These supplied shims help take up space within the cage and are to be used as needed. Drop in your top cap assembly, upside down to check the gap between the top cap assembly and the solid stops. Use supplied shims as needed to achieve a less than 1/8 inch gap between the solid stops and the top cap assembly. Once the gap is correct, turn your top cap assembly over to its proper position and put into the housing.

Setup Height Recheck (5-1/16 inches)

Recheck of set up height should be done after the side bearings have been installed properly and the car body lowered onto the truck. Initially, the setup height will probably be greater than the original setup. Settling of the pad needs to take place gradually to reach the original setup height.

Block Style / Retrofit Setup Height (Bolt-on or Drop-in) 5/8 inches

The Miner constant contact side bearing models that utilize this setup height are the LTLF, LTLF-B, LTRB, and LTLF-C.

Setup Height

Refer to pages 13-14 for appropriate setup height check and adjustment. Measure the setup height by taking the measurement between the top of housing and the underside of the car body wear plate using inside calipers and a steel rule. Measurement should be taken at the top corner of the housing on the outboard side of the bolster.

LONG TRAVEL RETROFIT SELECTION GUIDE



Standard Height

TCC-45 LTR
TCC-60 LTR

Set Up Height

5-1/16 in., +/- 1/16 in.

Cage Size

ONLY for use in 688-B
Double Roller Cages

Minimum Car Body Weight*

TCC-45 LTR	21,176 lbs.
TCC-60 LTR	28,235 lbs.

Installation instructions beginning
on Page 19.

* Car body weight is lightweight minus trucks.



Low Profile Small Pocket

TCC-45 LTLP

Set Up Height

5/8 in., +/- 1/16 in.

Pocket Height: 1-1/2 in.- 2-1/2 in.

Pocket Width 3-1/4 in.

Pocket Length 8-1/8 in.-8-11/16 in.

Installation instructions available on Page 25.

LONG TRAVEL RETROFIT SELECTION GUIDE



Low Profile Big Pocket

TCC-45 LTLP-B

Set Up Height

5/8 in., +/- 1/16 in.

Pocket Height: 1-1/2 in.- 2-1/2 in.

Pocket Width 4-1/4 in.

Pocket Length 9-1/4 in.-9-5/8 in.

Installation instructions available on Page 27.



Block Style Tall Pocket

TCC-45 LTRB

Set Up Height

5/8 in., +/- 1/16 in.

Pocket Height 3-1/8 in.- 4-1/4 in.

Pocket Width 4-1/8 in.

Pocket Length 9-1/8 in.- 9-1/4 in.
(When using one wedge)

Pocket Length 9-1/2 in.- 9-5/8 in.
(When using two wedges)

Installation instructions available on Page 29.



TCC-45 LTLP

Preparation

Pocket / Mounting Surface

- Remove the metal friction block and clean the pocket of any foreign material.
- Inspect the pocket for cracks or any other damage, and repair if necessary.
- Ensure that the pocket bottom and end walls are relatively smooth and free of any weld spatter, bumps, etc.

Car Body Wear Plate

- The car body side bearing wear plate surface must be smooth. Any weld spatter, heavy rust or surface projections must be removed by grinding.
- Fastener heads must be smooth and not protruding below wear plate surface, and the fasteners securely tightened.
- Plates with surface variations between fastener holes greater than 1/8 in., or greater than 1/16 in. over any 4 in. space between the fastener holes, must be replaced.
- Surface must be reasonably parallel to side bearing mounting surface. Variations should not exceed 1/16 in. across width or 1/8 in. end to end.

The wedges are designed to install the TCC-45 LTLP into the following pocket dimensions:

Minimum Inside Width:	3-1/4 in.
Minimum Inside Length:	8-1/8 in.
Maximum Inside Length:	8-11/16 in.
Optimal Inside Length (after shimming):	8-1/4 in.

*Use the TCC-45 LTLP-B for pockets equal to or larger than 9-1/4 in. x 4-1/4 in.
If pocket adjustment is needed, follow instructions below.*

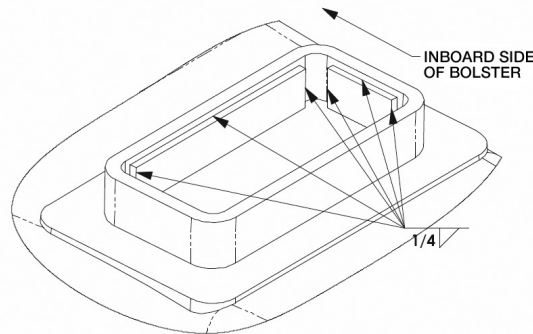
Pocket Size Adjustment - If Required

- Is the Miner housing above the pocket wall around the entire perimeter, up to a maximum of 3/8 in?
If not, use a steel shim on the pocket floor to raise the housing OR grind the pocket down.
- Is the pocket length and width within the acceptable range?

Inside Length - If the wedges hit the pocket floor before contacting the end wall (inside length greater than 8-11/16 in.), steel shim application is required. Fabricate the steel shim so that it is 1/4 in. shorter on all four sides to allow space for welding. Weld the shim per welding instructions on page 32.

(TCC-45 LTLP cont.)

Inside Width - If there is a gap greater than 1/4 in. along the width of the pocket, shimming is required. Estimate the steel shim thickness needed to reduce the gap between wedge and the pocket wall to 1/8 in. or less. Fabricate the steel shim so that it is 1/4 in. shorter on all four sides to allow space for welding. Weld the shim per instructions on page 32.



Check Setup Height

Without the top cap assembly in place, measure the setup height (see pages 11 & 13). If the setup height is **less than** 5/8 in. remove shim(s) from the car body wear plate. If the setup height is **greater than** 5/8 in. you can add shim(s) to the car body wear plate.

If this does not achieve the 5/8 in. set up height you can:

1. Reduce the wearplate thickness (per AAR Field Manual Rule 61) to a minimum of 3/8 in.

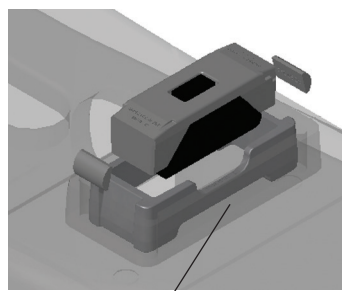
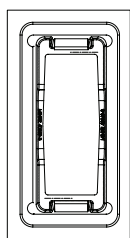
And/OR

2. Add shims to the center bowl if allowed per AAR Field Manual Rule 47.

Housing Securement / Welding

1. Shift the housing in the pocket to the outboard side of the bolster.
2. Center housing along its length in the pocket and insert wedges in both ends.
3. Ensure that the flat side of the wedge is against the Miner housing and the rounded side is against the pocket wall.
4. Ensure that the wedges on the ends are approximately at the same height and that all wedges do not extend beyond the housing top surface.
5. Securing the housing requires welding wedges to the pocket. Welding instructions are on page 32.

OUTBOARD SIDE OF
BOLSTER



POCKET



(TCC-45 LTLP cont.)

Welding Procedure

- (see page 32)

Final Assembly

1. After the weld has cooled, place top cap assembly into housing and lower car.
2. After the side bearings have been installed, and the car body lowered onto the trucks, **recheck setup height** (see pages 11 & 13).
3. The set up height will probably be greater than the original set up. At temperatures lower than 40° F, the settling time for the setup height may require at least 24 hours.
4. Initial set needs to take place and this height will gradually reach the design set-up height.

TCC-45 LTLP-B

Preparation

Pocket / Mounting Surface

- Remove the metal friction block and clean the pocket of any foreign material.
- Inspect the pocket for cracks or any other damage, and repair if necessary.
- Ensure that the pocket bottom and end walls are relatively smooth and free of any weld spatter, bumps, etc.

Car Body Wear Plate

- The car body side bearing wear plate surface must be smooth. Any weld spatter, heavy rust or surface projections must be removed by grinding.
- Fastener heads must be smooth and not protruding below wear plate surface, and the fasteners securely tightened.
- Plates with surface variations between fastener holes greater than 1/8 in., or greater than 1/16 in. over any 4 in. space between the fastener holes, must be replaced.
- Surface must be reasonably parallel to side bearing mounting surface. Variations should not exceed 1/16 in. across width or 1/8 in. end to end.

The wedges are designed to install the TCC-45 LTLP-B into the following pocket dimensions:

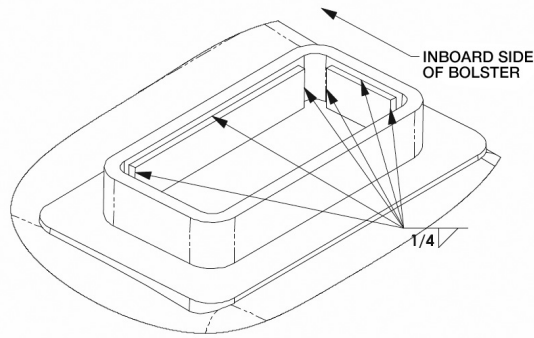
Minimum Inside Width:	4-1/4 in.
Minimum Inside Length:	9-1/4 in.
Maximum Inside Length:	9-5/8 in.
Optimal Inside Length (after shimming):	9-3/8 in.

(TCC-45 LTLP-B cont.)

Pocket Size Adjustment - If Required

- Is the Miner housing above the pocket wall around the entire perimeter, up to a maximum of 3/8 in? If not, use a steel shim on the pocket floor to raise the housing OR grind the pocket down.
- Is the pocket length and width within the acceptable range?

Inside Length - If the wedges hit the pocket floor before contacting the end wall (inside length greater than 9-5/8 in.), steel shim application is required. Fabricate the steel shim so that it is 1/4 in. shorter on all four sides to allow space for welding. Weld the shim per welding instructions on page 32.



Inside Width - If there is a gap greater than 1/4 in. along the width of the pocket, shimming is required. Estimate the steel shim thickness needed to reduce the gap between wedge and the pocket wall to 1/8 in. or less. Fabricate the steel shim so that it is 1/4 in. shorter on all four sides to allow space for welding. Weld the shim per instructions on page 32.

Check Setup Height

Without the top cap assembly in place, measure the setup height (see pages 11 & 13). If the setup height is **less than** 5/8 in. remove shim(s) from the car body wear plate. If the setup height is **greater than** 5/8 in. you can add shim(s) to the car body wear plate.

If this does not achieve the 5/8 in. set up height you can:

1. Reduce the wearplate thickness (per AAR Field Manual Rule 61) to a minimum of 3/8 in.
- And/OR
2. Add shims to the center bowl if allowed per AAR Field Manual Rule 47.

Housing Securement / Welding

1. Shift the housing in the pocket to the outboard side of the bolster.
2. Center housing along its length in the pocket and insert wedges in both ends.
3. Ensure that the flat side of the wedge is against the Miner housing and the rounded side is against the pocket wall.
4. Ensure that the wedges on the ends are approximately at the same height and that all wedges do not extend beyond the housing top surface.
5. Securing the housing requires welding wedges to the pocket. Welding instructions are on page 32.



(TCC-45 LTLP-B cont.)

Welding Procedure

- (see page 32)

Final Assembly

1. After the weld has cooled, place top cap assembly into housing and lower car.
2. After the side bearings have been installed, and the car body lowered onto the trucks, **recheck setup height** (see pages 11 & 13).
3. The set up height will probably be greater than the original set up. At temperatures lower than 40° F, the settling time for the setup height may require at least 24 hours.
4. Initial set needs to take place and this height will gradually reach the design set-up height.

TCC-45 LTRB

Preparation

Pocket / Mounting Surface

- Remove the metal friction block and clean the pocket of any foreign material.
- Inspect the pocket for cracks or any other damage, and repair if necessary.
- Ensure that the pocket bottom and end walls are relatively smooth and free of any weld spatter, bumps, etc.

Car Body Wear Plate

- The car body side bearing wear plate surface must be smooth. Any weld spatter, heavy rust or surface projections must be removed by grinding.
- Fastener heads must be smooth and not protruding below wear plate surface, and the fasteners securely tightened.
- Plates with surface variations between fastener holes greater than 1/8 in., or greater than 1/16 in. over any 4 in. space between the fastener holes, must be replaced.
- Surface must be reasonably parallel to side bearing mounting surface. Variations should not exceed 1/16 in. across width or 1/8 in. end to end.

Center housing in pocket and insert wedges in both ends to meet the following pocket dimensions:

Pocket Length (One wedge):	9-1/8 in.-9-1/4 in.
Pocket Length (Two wedges):	9-1/2 in.-9-5/8 in.
Minimum Inside Width:	4-1/8 in.

(TCC-45 LTRB cont.)

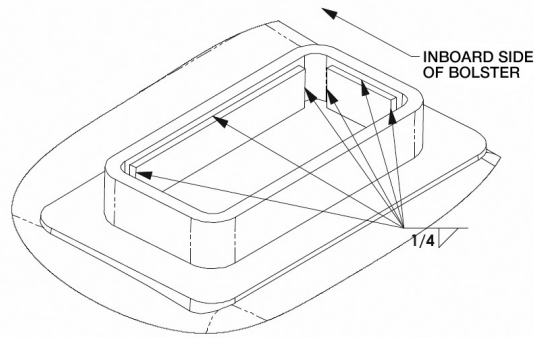
Pocket Size Adjustment - If Required

- Is the Miner housing above the pocket wall around the entire perimeter?

If not, use a steel shim on the pocket floor to raise the housing OR grind the pocket down.

- Is the pocket length and width within the acceptable range?

Inside Length - If the pocket length is between 9-1/4 and 9-1/2 in. (with one wedge), or exceeds 9-5/8 in. (with two wedges), shim application is required. Determine the shim thickness required to achieve the pocket length noted. Fabricate the steel shim so that it is 1/4 in. shorter on all four sides to allow space for welding. Weld the shim per welding instructions on page 32.



Inside Width - If there is a gap greater than 1/4 in. along the width of the pocket, shimming is required. Estimate the steel shim thickness needed to reduce the gap between wedge and the pocket wall to 1/8 in. or less. Fabricate the steel shim so that it is 1/4 in. shorter on all four sides to allow space for welding. Weld the shim per instructions on page 32.

Check Setup Height

Without the top cap assembly in place, measure the setup height (see pages 11 & 13). If the setup height is **less than** 5/8 in. remove shim(s) from the car body wear plate. If the setup height is **greater than** 5/8 in. you can add shim(s) to the car body wear plate.

If this does not achieve the 5/8 in. set up height you can:

1. Reduce the wearplate thickness (per AAR Field Manual Rule 61) to a minimum of 3/8 in.

And/OR

2. Add shims to the center bowl if allowed per AAR Field Manual Rule 47.

Housing Securement / Welding

1. Shift the housing in the pocket to the outboard side of the bolster.

2. Center housing along its length in the pocket and insert wedges in both ends.

3. Ensure that the flat side of the wedge is against the Miner housing and the rounded side is against the pocket wall.

4. Ensure that the wedges on the ends are approximately at the same height and that all wedges do not extend beyond the housing top surface.

5. Securing the housing requires welding wedges to the pocket. Welding instructions are on page 32.

(TCC-45 LTRB cont.)

Welding Procedure

- (see page 32)

Final Assembly

1. After the weld has cooled, place top cap assembly into housing and lower car.
2. After the side bearings have been installed, and the car body lowered onto the trucks, **recheck setup height** (see pages 11 & 13).
3. The set up height will probably be greater than the original set up. At temperatures lower than 40° F, the settling time for the setup height may require at least 24 hours.
4. Initial set needs to take place and this height will gradually reach the design set-up height.

TCC-45 LTLP-C (low-profile, bolt-on application)

The set up height should be adjusted by measuring between the top of the housing and the underside of the car-body wear plate with an empty car positioned on reasonably level track before installing the top cap or applying solid center plate lube. The set up height can also be measured from the bolster pad to the underside of the wear plate. If measuring from top of housing to the underside of the car-body wear plate adjust shims as necessary to achieve 5/8 in. otherwise the setup height should be 2-5/8 inches. (Reference Fig. 15, Page 5)



Welding Procedure

(TCC-45 LTLP, LTLP-B AND LTRB)

Remove the top cap assembly from housing prior to welding.

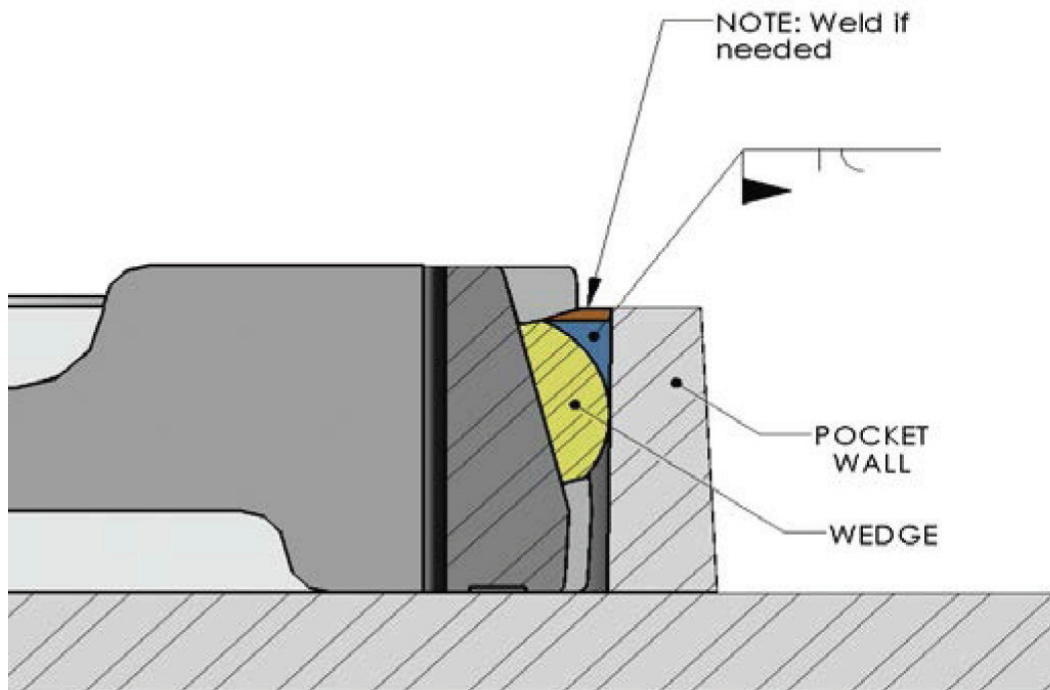
Warning – Do not weld near the top cap assembly.

Warning – Do not weld directly to either Miner housing or top cap.

Welding Instructions

All surface preparation and welding must comply with AWS D15.1 Railroad Welding Specification – Cars and Locomotives, latest edition.

1. Grind, clean and prepare for welding
 2. For cast pockets, AAR M-214 recommends preheating between 300 °F and 600 °F, not exceeding 600 °F.
 3. Materials
 - Type of weld: Flare bevel groove
 - Wedge: Cast Steel ASTM-A-27 Grade 65-35
 - For cast in pockets determine Grade of Steel of the bolster casting: Reference AAR Standard S-312
 - Grade B bolsters use AWS electrode E7018, or equivalent
 - Grade B+ bolsters use AWS electrode E8018, or equivalent
 - Grade C bolsters use AWS electrode E9018, or equivalent
 - For fabricated pocket, identify material and choose appropriate electrode per AWS D15.1
- If the wedge is below the pocket wall, add reinforcement fillet weld on top.



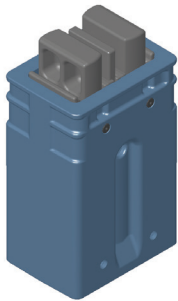
DRAFT GEARS

General Description

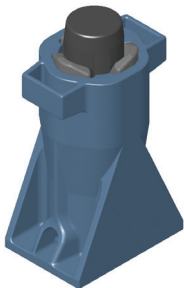
Miner offers a variety of draft gears to satisfy your car protection requirements.



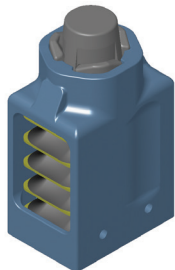
Crown SG™ is Miner's all-steel draft gear that meets AAR Specification M-901G. Its robust spring package provides maximum protection for the industry's heaviest cars. The Crown SG can be used in any freight car including intermodal and stand-alone 125-ton cars.



Crown SE™ is a high capacity all-steel draft gear certified under AAR specification M-901E. The Crown SE is engineered to provide long service life in freight cars with minimum wear of draft gear pocket and attachments.



TF-880™ is the lightest weight high performance draft gear meeting AAR specification M-901E. The TF-880 incorporates Miner's proven friction clutch design in combination with the patented TecSPak® elastomer compression spring package to provide exceptional car protection. It is an ideal all-purpose gear, suitable for all freight cars up to and including 110-ton capacity.

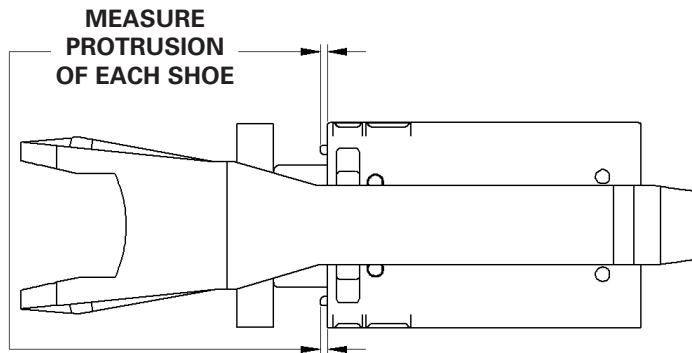


SL-76™ is specifically designed to meet the most severe requirements of today's railcars. Miner's service proven friction clutch mechanism and natural rubber spring package provide extra heavy-duty car protection and less operating slack.

PROCEDURE FOR DETERMINING SERVICEABILITY OF MINER DRAFT GEARS

Crown SE™ and Crown SG™ (In-car Inspection)

Inspect for excessive draft slack, coupler horn/striker contact, and excessive wear on carrier plate and sill walls, indicating possible unsatisfactory draft gear performance. To remain in service, draft gear should be tight in pocket and free of loose or broken parts. Change out draft gear if protrusion of both shoes out of the housing averages 11/16 in. or more.

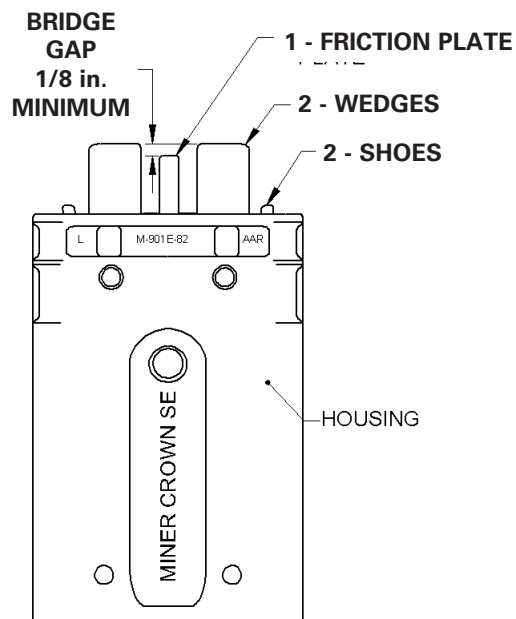


Crown SE/SG In-Car Inspection

Crown SE™ and Crown SG™ (Out-of-car Inspection)

1. Tap friction plate in with hammer.
2. Bridge wedges and measure gap between wedges and friction plate.
3. If less than 1/8 in. gap, gear should be reconditioned (do not reapply).

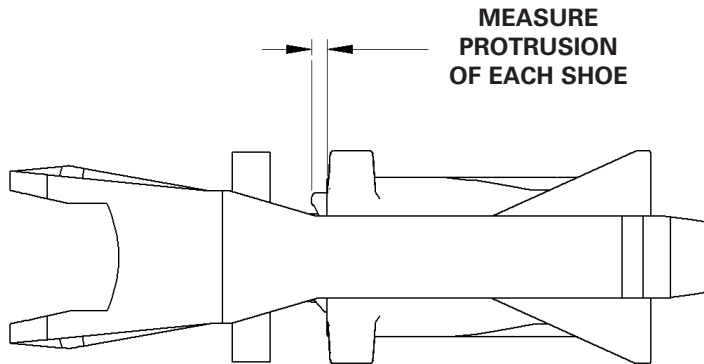
Before applying any draft gear, inspect for conformance to AAR Rule 21, Sections A & B.



Crown SE/SG Out-of-Car Inspection

TF-880™ (In-car Inspection)

Inspect for excessive draft slack, coupler horn/striker contact, and excessive wear on carrier plate and sill walls, indicating possible unsatisfactory draft gear performance. To remain in service, draft gear should be tight in pocket and free of loose or broken parts. Change out draft gear if protrusion of the three shoes out of the housing averages 1-1/8 in. or more.

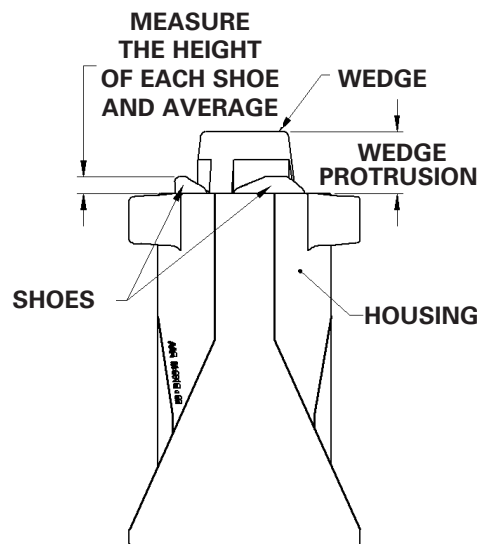


TF-880 In-Car Inspection

TF-880™ (Out-of-car Inspection)

1. Wedge protrusion should measure approx. 3-5/16 in. (draft gear not preshortened).
2. If shoe protrusion averages 1-5/16 in. or more, gear should be reconditioned (Do not reapply).

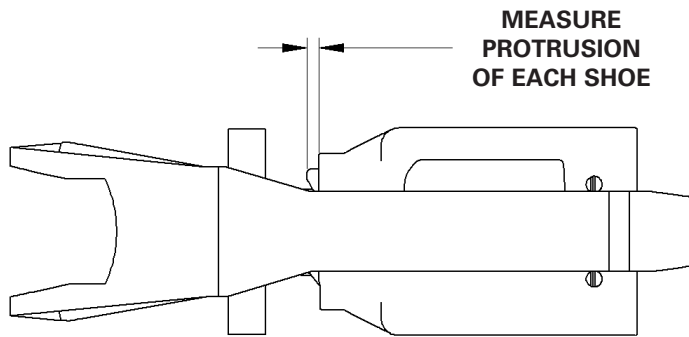
Before applying any draft gear, inspect for conformance to AAR Rule 21, Sections A & B.



TF-880 Out-of-Car Inspection

SL-76™ (In-car Inspection)

Inspect for excessive draft slack, coupler horn/striker contact, and excessive wear on carrier plate and sill walls, indicating possible unsatisfactory draft gear performance. To remain in service, draft gear should be tight in pocket and free of loose or broken parts. Change out draft gear if protrusion of the three shoes out of the housing averages 1-1/8 in. or more.

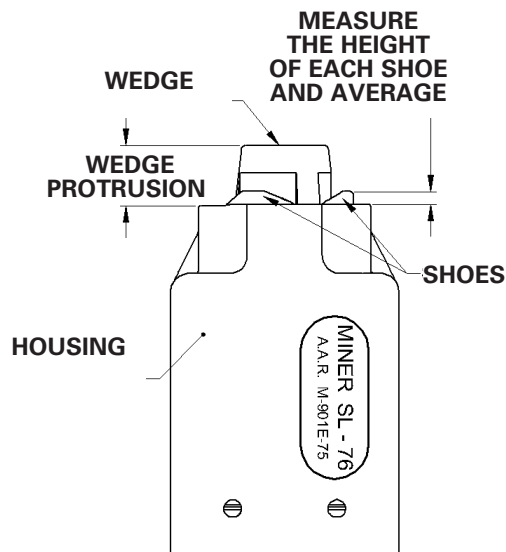


SL-76 In-Car Inspection

SL-76™ (Out-of-car Inspection)

1. Wedge protrusion should measure approx. 3-5/16 in. (draft gear not preshortened).
2. If shoe protrusion averages 1-5/16 in. or more, gear should be reconditioned (Do not reapply).

Before applying any draft gear, inspect for conformance to AAR Rule 21, Sections A & B.



SL-76 Out-of-Car Inspection

BRAKE BEAMS

General Description

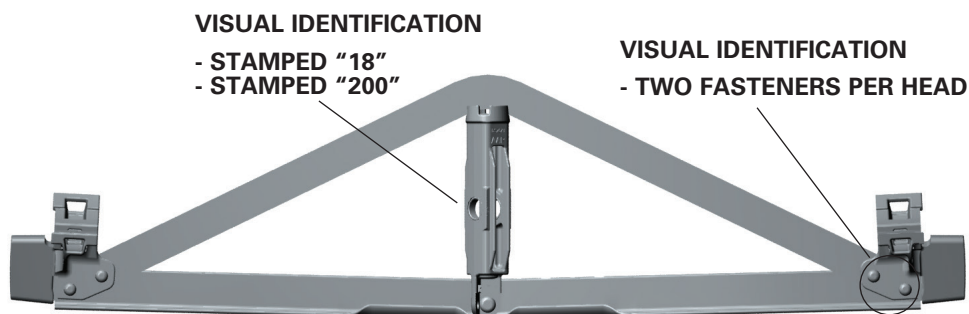
Miner Brake Beams feature a rugged design with an extra-sturdy compression member and castings. They cut maintenance costs by reducing uneven wear on brake shoes and extending their service life. Miner brake beams are available in #18 and #24 for both composition and cast shoe designs.

Inspection

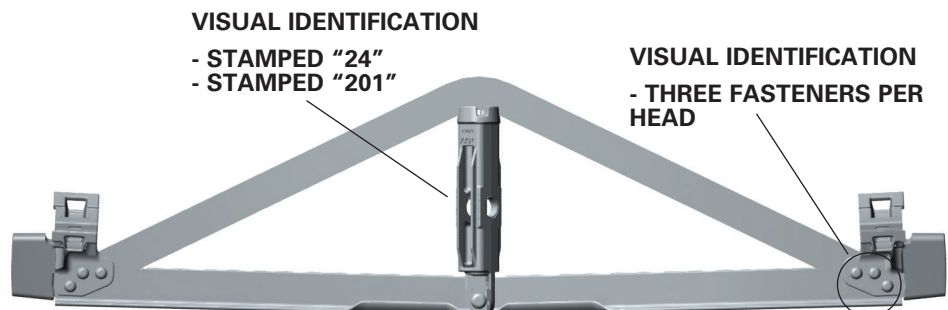
For brake beam wear limits and cause for renewal please refer to Rule 6 of the Field Manual of the AAR Interchange Rules.

Inspection includes but is not limited to checking for:

1. Cracks or missing parts
2. Twisted beam
3. Wear on tension and compression members
4. Loose brake heads (move laterally by hand)
5. Bent or twisted struts
6. Wear on strut pin holes and lever slots
7. Damage or wear on the brake head casting
8. Wear on end extensions
9. Wear on brake beam wear liners



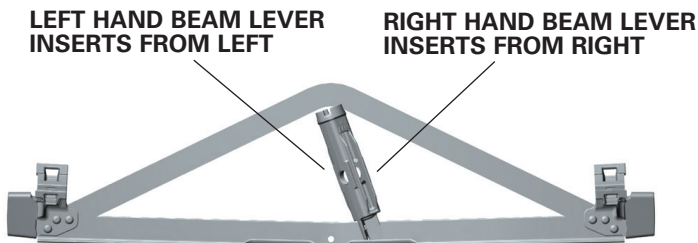
Miner Brake Beams - #18



Miner Brake Beams - #24

Strut Hand Change Procedure

1. Remove two-piece rivet from strut
 - a. Cut off rivet collar
 - b. Remove rivet pin
2. Remove the strut
 - a. Tap the strut near the rivet end to rotate it sideways until the "crown" end of the strut is free of the tension member
3. Reverse the strut to the opposite hand
4. Install the strut in the beam
 - a. With the strut rotated approximately 30°, place the crown of the strut over the tension member
 - b. Hit the strut near the rivet end to rotate the strut until the holes line up
 - c. Rivet in place using one of the following
 - i. Huck: Pin LC-2R20G, Collar 3LC-2R20G
 - ii. 5/8 in. grade 5 bolt and hex nut, 120-125 ft-lbs, tack weld nut to bolt or peen bolt to prevent nut from loosening



Miner Brake Beam Strut Change