



Perfecting Railcar Performance

INSTALLATION AND INSPECTION GUIDE

Side Bearings



Draft Gears



Brake Beams





TABLE OF CONTENTS

Overview

Introduction	2
List of Illustrations	2

TecsPak® Constant Contact Side Bearings

General Description	4
Product Identification	5
Shelf Life	9
Installation	
Set Up Height	10
Car Body Wear Plate	12
Side Bearing Installation – Bolt-on Style	13
Standard Travel Retrofit Installation	14
Long Travel Retrofit Selection Guide	15
Long Travel Retrofit Installation	16
TecsPak® Pads	20
Inspection	
Set Up Height	21
Field or Yard Inspection	21
Shop or Repair Track Inspection	23
General	25
Top Cap Wear Indicators	25
TecsPak® Pad Free Height Measurement	26

Draft Gears

General Description	28
Procedure for Determining Serviceability of Miner Draft Gears	29

Brake Beams

General Description	32
Inspection	32
Strut Hand Change Procedure	33



OVERVIEW

INTRODUCTION

This convenient Installation and Inspection Guide provides important technical information regarding Miner's full-line of TecsPak® constant contact side bearings, draft gears and brake beams. In it you will find sections covering product identification, installation, and inspection.

LIST OF ILLUSTRATIONS

TecsPak® Constant Contact (TCC) Side Bearings

Fig. 1	TCC Style	5
Fig. 2	TCC-II.....	5
Fig. 3	TCC-III ST	5
Fig. 4	TCC-III RA.....	5
Fig. 5	TCC-III LT	6
Fig. 6	TCC-IV LT	6
Fig. 7	TCC-8000 RL	6
Fig. 8	TCC-8000 RS.....	6
Fig. 9	TCC-4500 RA	7
Fig. 10	TCC-45 LTR.....	7
Fig. 11	TCC-60 LTR.....	7
Fig. 12	TCC-45 LTRB	7
Fig. 13	TCC-45 LTLP	8
Fig. 14	TCC-45 LTLP-B	8
Fig. 15	Caliper Measurement.....	10
Fig. 16	Block Style Retrofit Set Up Height (LTLP, LTLP-B, LTRB)	10
Fig. 17	Block Style Retrofit Set Up Height Gage	11
Fig. 18	TCC-45/60 LTR Solid Stop Installation.....	16
Fig. 19	TCC-45 LTLP Pocket Installation	17
Fig. 20	TCC-45 LTLP-B	17
Fig. 21	TCC-45 LTRB Housing Securement	18
Fig. 22	Welding Procedure – Cross Section	19
Fig. 23	Pocket Size Adjustment.....	20

TecsPak® Constant Contact (TCC) Side Bearings (con't.)

Fig. 24	Standard Set Up Height Indicators – Inspection	24
Fig. 25	Block Style Retrofit Set Up Height Indicators – Inspection	24
Fig. 26	TCC-IV Wear Indicator	25
Fig. 27	TCC-45/60 LTR & LTRB Wear Indicator	25
Fig. 28	TCC-45 LTLP-B Wear Indicator	25
Fig. 29	TCC-45 LTLP Wear Indicator	25
Fig. 30	TecsPak® Pad Free Height Measurement	26

Draft Gears

Fig. 31	Crown SE™ and Crown SG™ In-Car Inspection	29
Fig. 32	Crown SE™ and Crown SG™ Out-of-Car Inspection	29
Fig. 33	TF-880™ In-Car Inspection	30
Fig. 34	TF-880™ Out-of-Car Inspection	30
Fig. 35	SL-76™ In-Car Inspection	31
Fig. 36	SL-76™ Out-of-Car Inspection	31

Brake Beams

Fig. 37	Miner Series 2008™ Brake Beam - #18	32
Fig. 38	Miner Series 2008™ Brake Beam - #24	32
Fig. 39	Miner Series 2008™ Brake Beam Strut Change	33



Perfecting Railcar Performance

INSTALLATION AND INSPECTION GUIDE

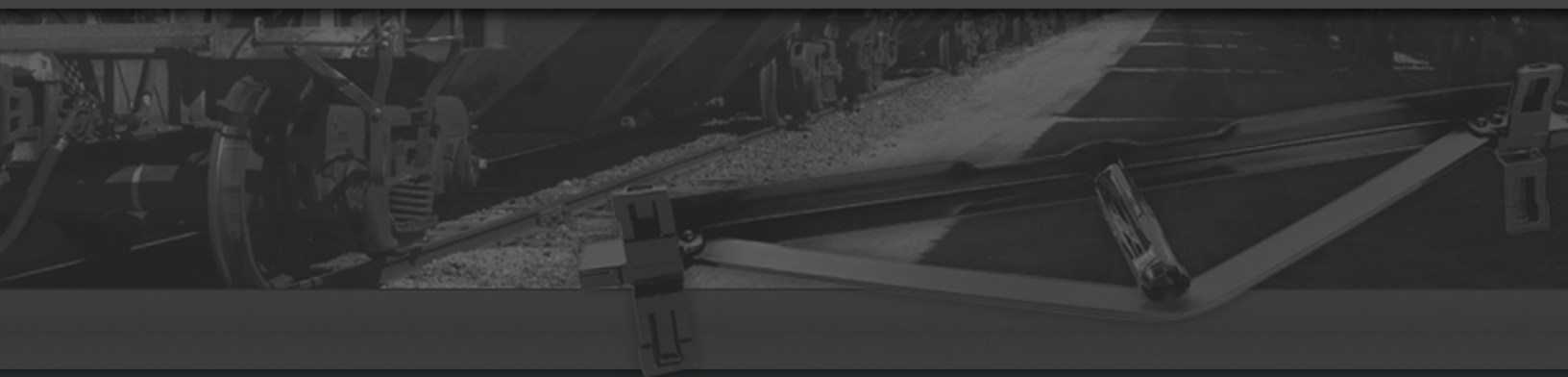
Side Bearings



Draft Gears



Brake Beams





TECS[®]PAK 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 (Page 5) before any installation and/or inspection procedures.

Miner's TecsPak[®] constant contact side bearings are available in a range of preloads and designs. The model name will designate the side bearing preload in pounds (e.g. TCC-8000) or hundreds of pounds (e.g. TCC-IV-60 LT). Some models are also available in:

Standard Travel	5/16" travel from 5-1/16" set up height
Roller Assist	5/16" travel from 5-1/16" set up height
Long Travel	5/8" travel from 5-1/16" 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 bearings, TCC-II-25, -35, -60 and -80S, are all Long Travel (LT).

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

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

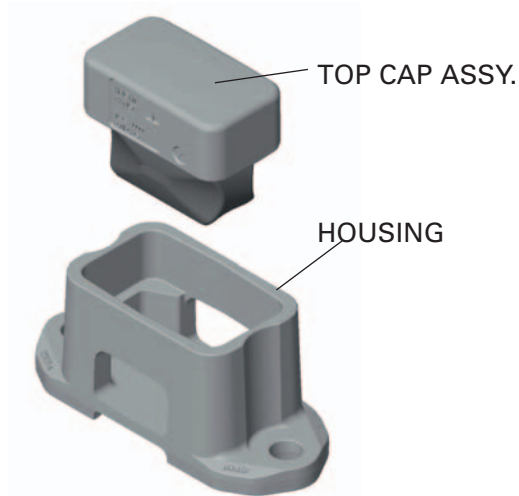
The TCC-45 LTR and TCC-60 LTR are designed to fit into a double roller cage and are Long Travel (LT).

The TCC-45 LTLP is designed to fit into a low profile small pocket and the TCC-45 LTLP-B is designed to fit into a large pocket low profile block style side bearing pocket and are both Long Travel (LT).

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

PRODUCT IDENTIFICATION

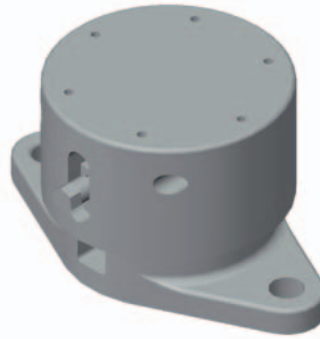
Fig. 1 TCC Style
Standard Travel



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

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

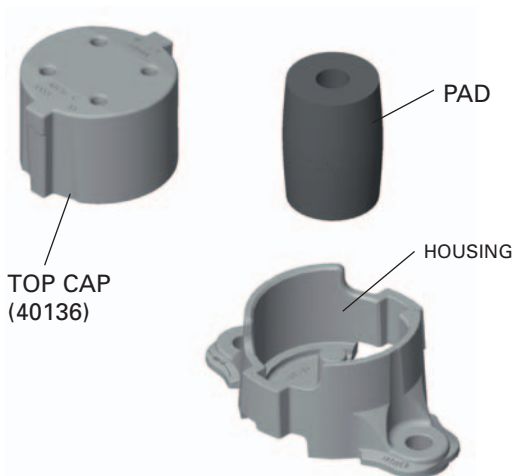
Fig. 2 TCC-II*
Long Travel



*No longer in production.

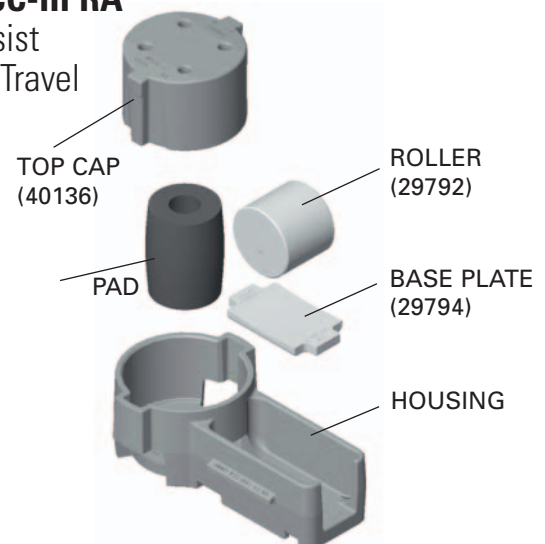
MODEL	REPLACE WITH:
TCC-II-25	TCC-III-30 LT on both sides of axle
TCC-II-35	TCC-III-45 LT on both sides of axle
TCC-II-60	TCC-III-60 LT on both sides of axle
TCC-II-80S	TCC-III-80 LT on both sides of axle

Fig. 3 TCC-III ST
Standard Travel



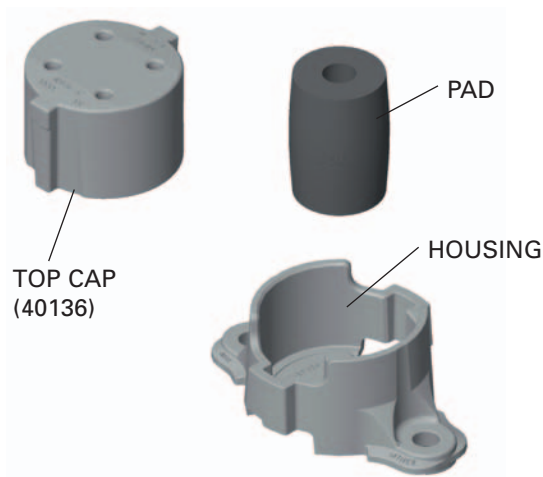
MODEL	HOUSING	PAD
TCC-III-30 ST	40137	T-0305
TCC-III-45 ST	40138	T-0300
TCC-III-60 ST	40139	T-0306
TCC-III-80 ST	40140	T-0307

Fig. 4 TCC-III RA
Roller Assist
Standard Travel



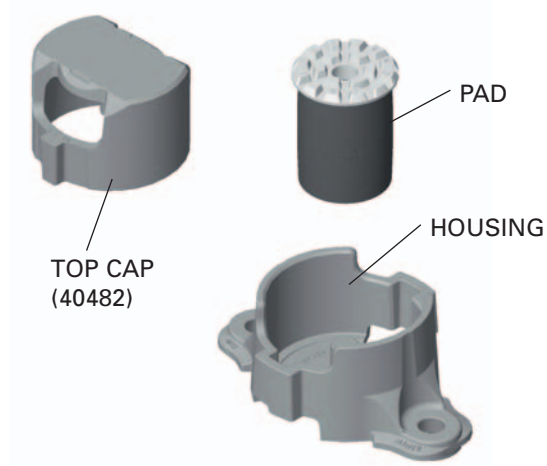
MODEL	HOUSING	PAD
TCC-III-30 RA	40318	T-0305
TCC-III-45 RA	40319	T-0300
TCC-III-60 RA	40320	T-0306
TCC-III-80 RA	40321	T-0307

Fig. 5 TCC-III LT
Long Travel



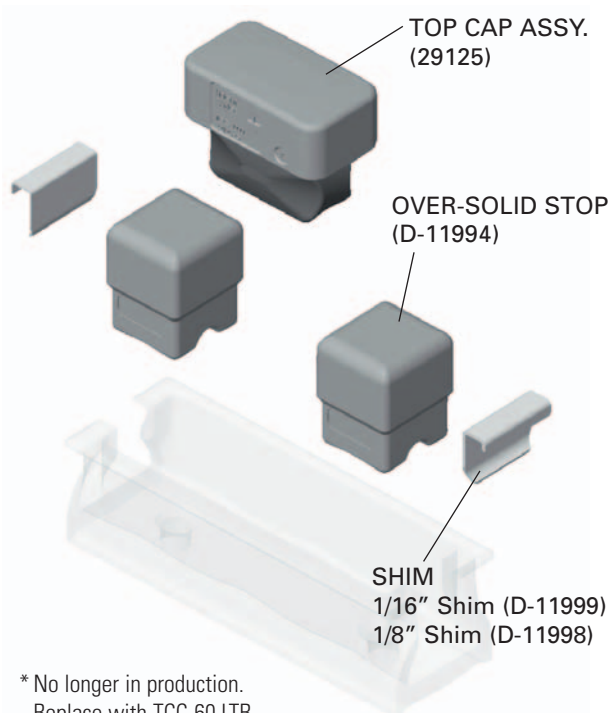
MODEL	HOUSING	PAD
TCC-III-30 LT	40141	T-0305
TCC-III-45 LT	40142	T-0300
TCC-III-60 LT	40143	T-0306
TCC-III-80 LT	40144	T-0307

Fig. 6 TCC-IV LT
Long Travel



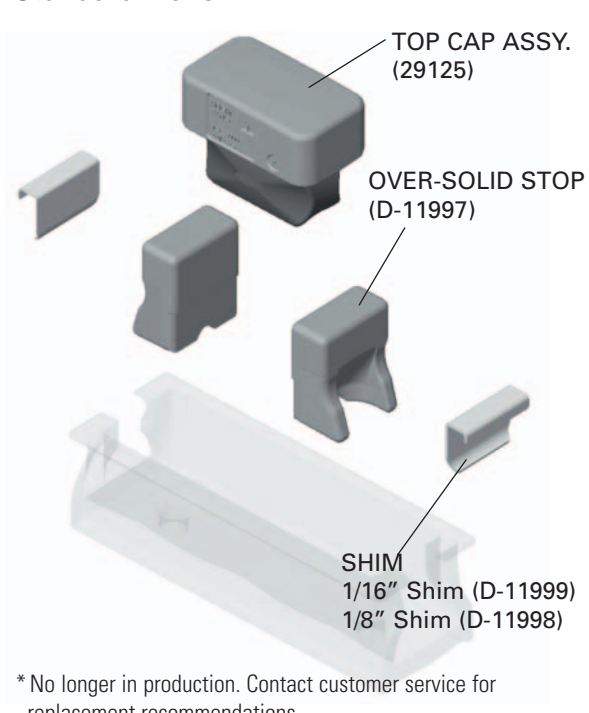
MODEL	HOUSING	PAD
TCC-IV-30 LT	40141	T-0432 (Green Insulator)
TCC-IV-45 LT	40142	T-0430 (Red Insulator)
TCC-IV-60 LT	40143	T-0431 (Blue Insulator)
TCC-IV-80 LT	40144	T-0434 (Grey Insulator)

Fig. 7 TCC-8000 RL*
Standard Travel



* No longer in production.
Replace with TCC-60 LTR.

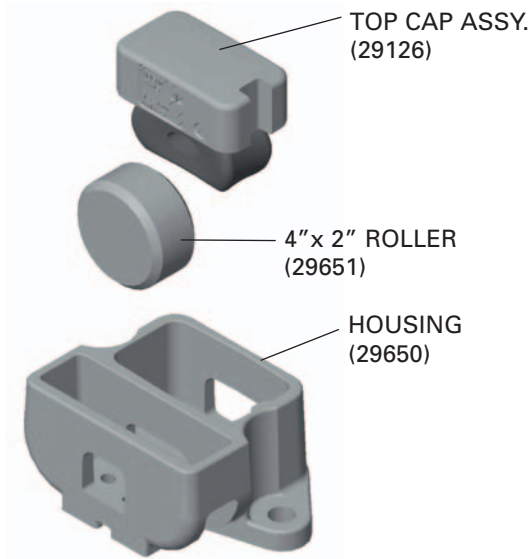
Fig. 8 TCC-8000 RS*
Standard Travel



* No longer in production. Contact customer service for
replacement recommendations

Fig. 9 TCC-4500 RA*

Roller Assist
Standard Travel



* No longer in production. Contact customer service for replacement recommendations.

Fig. 10 TCC-45 LTR

Long Travel

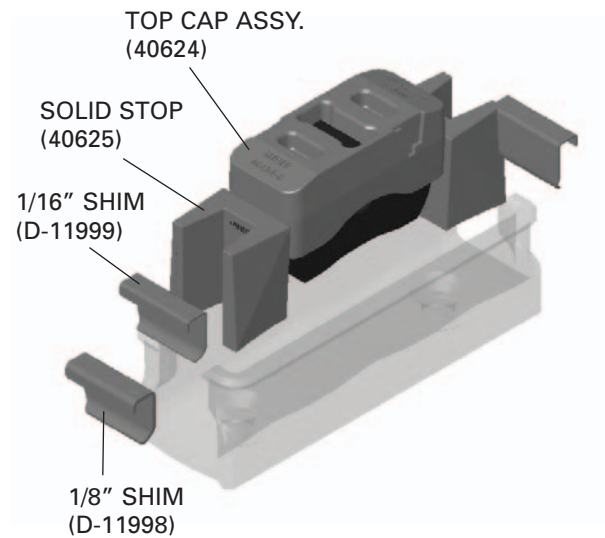


Fig. 11 TCC-60 LTR

Long Travel

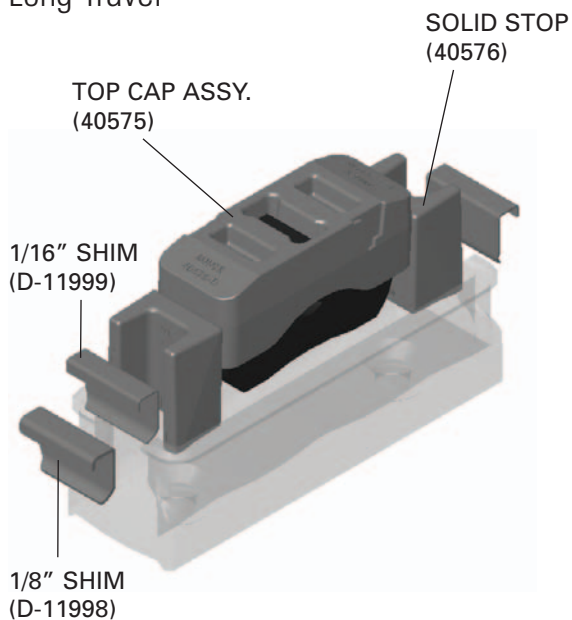


Fig. 12 TCC-45 LTRB

Long Travel

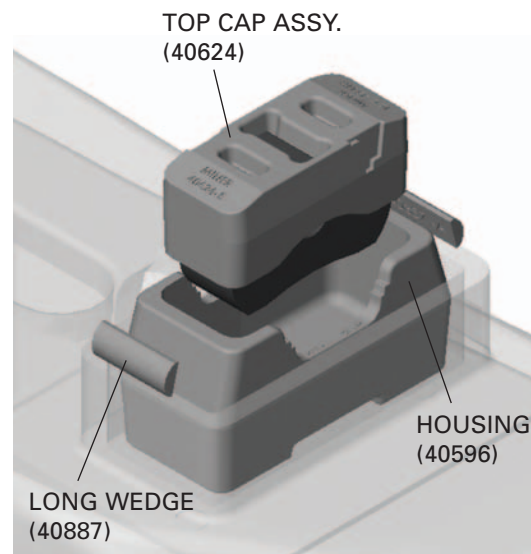


Fig. 13 TCC-45 LTLP
Long Travel

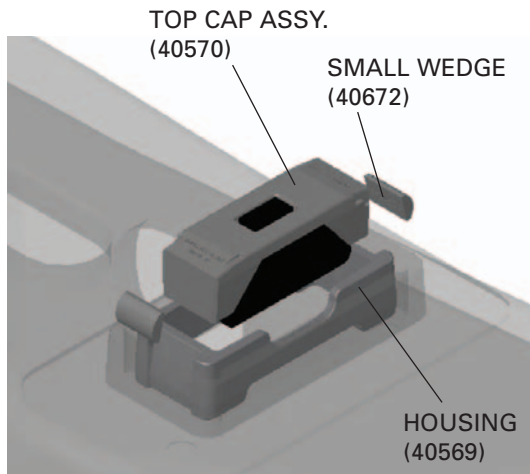
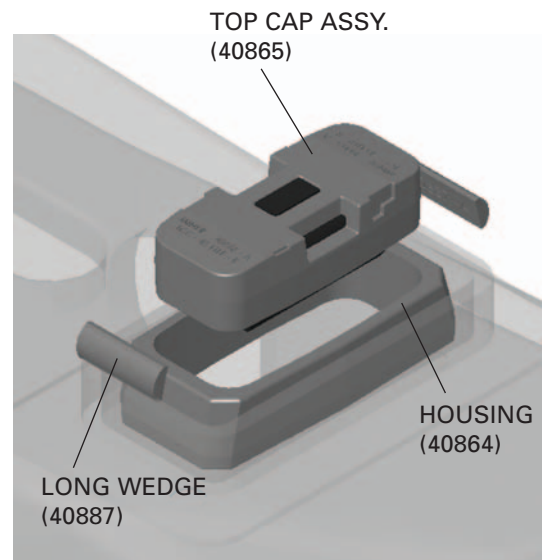


Fig. 14 TCC-45 LTLP-B





SHELF LIFE

The recommended shelf life for 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: 07 025

07 = 2007

025 = the 25th day of the year, January 25th.

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

Occasionally, the first zero was left off. So the date code might look like this;

7025

This is still the same as above.

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.

INSTALLATION

SET UP HEIGHT

The set up height, or the vertical distance between the car body side bearing wear plate and the housing mounting surface, should be measured using inside calipers and a steel rule. A twelve-inch steel straightedge is helpful for checking the flatness of the body wear plate and the bolster mounting surface.

Standard Set Up Height

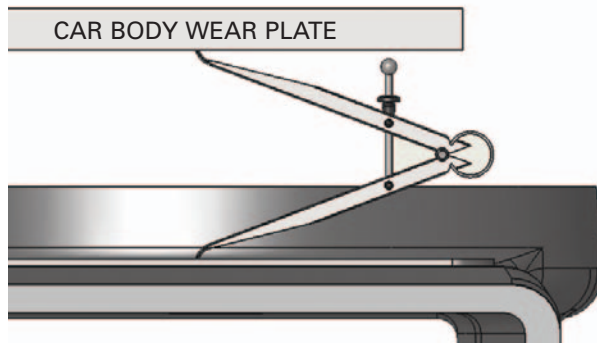


Fig. 15 Caliper Measurement

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
	5-1/16 ± 1/16	5-1/8 ± 1/16
	Range	
	Max: 5-1/8	Max: 5-3/16
	Min: 5	Min: 5-1/16

* Installation and adjustment should be done in empty condition on level track

[^] Male end of articulated connected cars may have a nominal value of 5-3/16

Alternative 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 5-3/16", ± 1/16". On selected autorack cars, the long travel side bearing can have a set up height of 5-1/16", ± 1/8". (Refer to owners' instructions, or stenciling, on these types of cars.) If a new elastomeric horizontal center bowl liner is used, it is recommended that you add 1/16" to the nominal dimension.

Block Style Retrofit Set Up Height

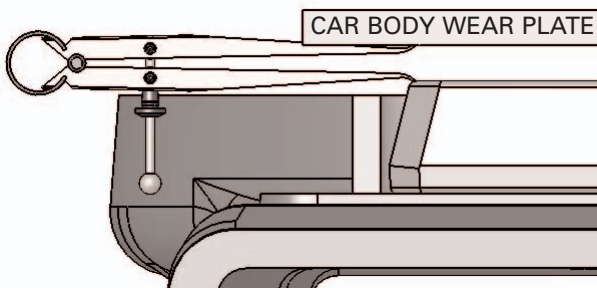


Fig. 16 Block Style Retrofit Set Up Height

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

The housing must extend a minimum of $1/16''$, up to a maximum of $3/8''$, beyond the top of the pocket wall around the entire perimeter.

If the pocket wall is taller than any housing, either:

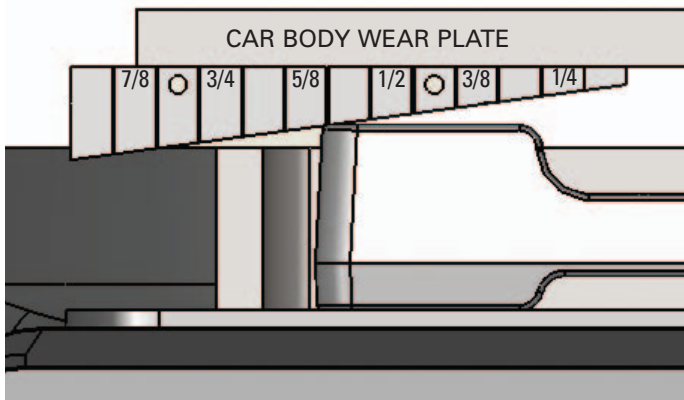
- Add shims under the bottom of the housing covering the entire pocket floor;
- or
- Remove enough material from the top of wall to insure the $1/16''$ minimum extension.

In some cases, adjusting the shim thickness is not an option. It is permissible to use a $3/8''$ wear plate on certain cars according to AAR Field Manual Rule 61 E.2.

Other cases may require shimming of the center bowl. Please refer to AAR Field Manual Rule 47 for specifics on the center bowl shimming.

Block Style Retrofit Set Up Height Gage

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 and LTRB constant contact side bearings. The gage face ranges from $3/16''$ to $1''$ in $1/16''$ increments. The desired distance between the housing (part #40569, #40864 or #40596) and the car body wear plate is $5/8''$, $\pm 1/16''$. If an elastomeric horizontal center bowl liner is used, add $1/16''$ to the nominal dimension. So the desired distance would become $11/16''$, $\pm 1/16''$.



Miner Gage #40766-B (W11525)

Fig. 17 Block Style Retrofit Set Up Height Gage

To check the set up height, put flat end of gage up to the car body wear plate and slide the gage in until it contacts the housing. If the gap is below $5/8''$ then remove the correct amount of shims and if the gap is above $5/8''$ add the correct amount of shims. The gage has $1/8''$ increments lined and labeled with $1/16''$ increments lined, but not labeled. The thickness of the gage is $1/8''$ and can be used as the smallest measurement increment on the gage. Simply turn the gage flat and put one side against the wear plate and slide the gage in.



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. Plates with surface variations between fastener holes greater than 1/8", or greater than 1/16" over any 4" space between the fastener holes, must be replaced. Surface must be reasonably parallel to side bearing mounting surface. Variations should not exceed 1/16" across width or 1/8" end-to-end.

Minimum Wear Plate Size

MODEL	MINIMUM SIZE
TCC, TCC-II, TCC-III LT, TCC-III ST, TCC-IV LT, TCC-45 LTLP-B	4" wide by 12" long
TCC RA, TCC-III RA	Consult car builder

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

Truck Centers	Min. Width	Min. Length
Less than or equal to 70'	4"	12"
Over 70' to 82'	4"	14"
Over 82' to 94'	4"	16"
Greater than 94'	4"	18"

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

Lubrication (For new cars only)

Due to the stiffness of new car trucks and other components ("new car syndrome"), it is recommended that the frictional resistance between the car body wear plate and the side bearing top cap be held to a minimum during the break in period. In order to reduce the friction during the initial break in, apply a thin coat of lubricant (No. 2 lithium grease or equal) to the top surface of the top cap. Do not use Molybdenum disulfide type lubricants since they are too permanent. The lubricant is for initial break in period only and after a short period of service will be wiped away and the side bearing will function to provide proper hunting control. 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 with the advent of field performance detector technology it is recognized that certain car types may react positively with a modest application of lubrication. Care should be exercised when applying lubrication during maintenance to insure hunting performance is not compromised.



Side Bearing Installation – Bolt-on Style

The housing should be mounted to the truck bolster pad utilizing one of the following fasteners:

Miner does not have a preference whether the bolt-head be on top of the housing or under the bolster. The orientation of the bolt-head is left up to the car owner.

Acceptable fasteners on all models **EXCEPT** the TCC-III RA:

- Camcar standard dome head fastener (reference part #794-20100-130).
- Huck fastener (reference part #C71LR-BR24-28/32 and #3LC-2R24GL).
- 7/8"-9 Grade 5 or better HEX 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).

Acceptable fasteners for the TCC-III RA **ONLY**:

- Camcar flat head fastener (reference part #784-20156-140/160).
- 7/8"-9 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).

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

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 and 2, Page 5)

TCC-III LT/ST/RA

The TecsPak® pad inside diameter should easily slide onto the post inside the housing. There is a 1/32" clearance between the post diameter at bottom and the inside diameter of the pad.

Therefore, if the clearance is greater than 1/32", the wrong pad has been applied. The top cap post should slide easily into the pad. 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"-wide flat on the top cap. (Reference Figs. 4-6, Pages 5-6)

TCC-IV LT

Each TCC-IV pad is supplied with a color-coded insulator attached to the top. Each pad assembly is color coded 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" clearance between the post diameter at bottom and the inside diameter of the pad. Therefore, if the clearance is greater than 1/32", or it is difficult to assemble the pad over the housing post, the wrong pad has been applied. The top cap post should slide easily into the insulator/pad. The car body wear plate must cover the 3"-wide flat on the top cap. (Reference Fig. 7, Page 6)



Standard Travel Retrofit Installation

TCC-8000 RL/RS

TCC-8000 RL – *Miner recommends replacing the TCC-8000 RL with the TCC-60 LTR. For the TCC-8000 RS, please contact customer service for replacement recommendations.*

Long Travel Retrofit Selection Guide

Standard Height

TCC-45 LTR

TCC-60 LTR



Set Up Height

5-1/16", +/- 1/16"

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.

Low Profile

TCC-45 LTLP



Pocket Height:

1-1/2" - 2-1/2"

Miner housing **MUST** extend **1/16" to 3/8"**
above pocket wall. Shim under Miner
housing if pocket is 2" or taller.

Min. Pocket Width

3-1/4"

Install with housing shifted toward
the outboard side.

Min. Pocket Length

8-1/8"

Optimal inside length for shimming
should be 8-1/4".

Max. Pocket Length

Shimming on the inside ends of the
housing will be needed if the inside
length is greater than 8-11/16".

Installation instructions available on Page 16.

IF POCKET HEIGHT IS BETWEEN 2-1/2" AND
3-1/8", CALL MINER FOR RECOMMENDATION.

Installation instructions available on Page 16.

Low Profile

TCC-45 LTLP-B



Pocket Height

1-1/2" - 2-1/2"

Miner housing **MUST** extend **1/16"** to **3/8" above pocket wall**. Shim under Miner housing if pocket is 2" or taller.

Min. Pocket Width

4-1/4"

Install with housing shifted toward the outboard side.

Min. Pocket Length

9-1/4"

Optimal inside length for shimming should be 9-3/8".

Max. Pocket Length

Shimming on the inside ends of the housing will be needed if the inside length is greater than 9-5/8".

Installation instructions available on Page 17.

IF POCKET HEIGHT IS BETWEEN 2-1/2" AND 3-1/8", CALL MINER FOR RECOMMENDATION.

Standard Height

TCC-45 LTRB



Pocket Height

3-1/8" - 4-1/4"

Min. Pocket Width

4-1/8"

Install with housing shifted toward the outboard side.

Min. Pocket Length

9"

Optimal inside length for shimming should be 9-1/8".

Max. Pocket Length

Shimming on the inside ends of the housing will be needed if the inside length is greater than 9-1/4".

Installation instructions available on Page 18.

IF POCKET HEIGHT IS BETWEEN 2-1/2" AND 3-1/8", CALL MINER FOR RECOMMENDATION.

Long Travel Retrofit Installation

TCC-45/60 LTR

Preparation – 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 inside edges of the gibs at each end must be free of upset metal that would prevent the over-solid stops or shims from fitting flush against the inside of the gibs. The heads of the cage fasteners must be flush or below the contour of the bottom of the cage. Cage fasteners must be tight.

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.

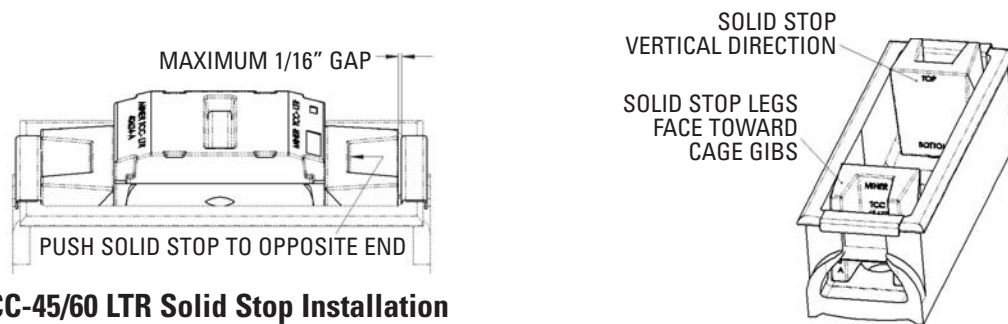


Fig. 18 TCC-45/60 LTR Solid Stop Installation

Shim Adjustment – Install a 1/16" shim on both ends. After installing the top cap, push one solid stop towards the opposite end of the housing. If the resulting gap between the shim and solid stop is greater than 1/16", install thicker, 1/8" shim on one end and recheck. If the gap is too small and does not allow the cap to move freely up and down, remove shims as necessary. (Reference Figs. 8 and 9, Page 7).

TCC-45 LTLP

Preparation - Remove the metal block and clean the pocket of any foreign material. Inspect the pocket for cracks or any other damage, and repair if necessary. Insure that the pocket bottom and end walls are relatively smooth and free of any weld spatter, bumps, etc. Remove all C-Pep pads when installing constant contact side bearings.

Housing Placement - There are many different sizes of pockets that are currently in service. Smaller to medium sized pockets (see below dimensions) may only require two small wedges.

Miner recommends using the TCC-45 LTLP-B for pockets equal to or larger than 9-1/4" x 4-1/4".

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

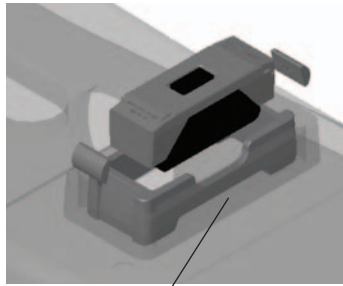
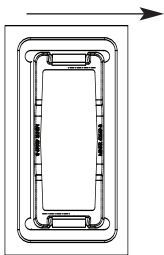
Minimum Inside Length:	8-1/8"
Maximum Inside Length:	8-11/16"
Minimum Inside Width:	3-1/4"

TCC-45 LTLP Installation

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 small wedges in both ends.
3. Insure that the flat side of the wedge is against the Miner housing and the rounded side is against the pocket wall.
4. Insure 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 to the pocket requires welding.

See welding requirements on Page 19.

OUTBOARD SIDE OF BOLSTER



POCKET

Fig. 19 Pocket Installation

TCC-45 LTLP-B

Preparation - Remove the metal block and clean the pocket of any foreign material. Inspect the pocket for cracks or any other damage, and repair if necessary. Insure that the pocket bottom and end walls are relatively smooth and free of any weld spatter, bumps, etc. Remove all C-Pep pads when installing constant contact side bearings.

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

Minimum Inside Length:	9-1/4"
Maximum Inside Length:	9-5/8"
Optimal Inside Length when Shimming:	9-3/8"
Minimum Inside Width:	4-1/4"

(For oversized pockets, see Pocket Adjustment instructions on Page 19.)

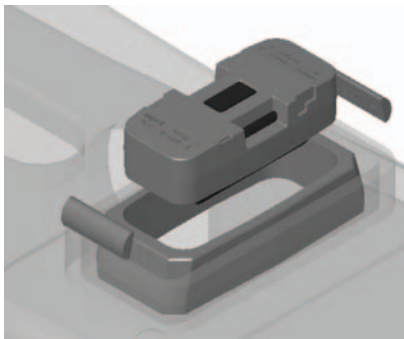


Fig. 20 TCC-45 LTLP-B

TCC-45 LTLP-B Installation

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. Insure that the flat side of the wedge is against the Miner housing and rounded side is against the pocket wall.
4. Insure that the wedges do not extend beyond the housing top surface.
5. Securing the housing to the pocket requires welding.

See welding requirements on Page 19.

TCC-45 LTRB

Preparation - Remove the metal block and clean the pocket of any foreign material. Inspect the pocket for cracks or any other damage, and repair if necessary. Insure that the pocket bottom and end walls are relatively smooth and free of any weld spatter, bumps, etc. Remove all C-Pep pads when installing constant contact side bearings.

Housing Placement – The assembly only requires one set of wedges. Center housing in pocket and insert proper wedges in both ends.

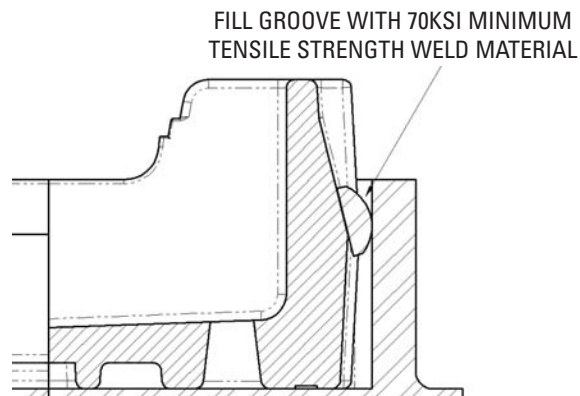
1. Make sure that the flat side of the wedge is against the Miner housing and the rounded side is against the pocket.
2. Insure that both wedges are approximately at the same height and that they do not extend beyond the housing top surface.
3. Securing the housing to the pocket requires welding.

See welding requirements on Page 19.

Warning – Do not weld directly on Miner housing.

Install top cap assembly into housing with the metal cap up. (Reference Fig.14, Page 8)

**Fig. 21 TCC-45 LTRB
Housing Securement**



Housing Securement 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.

Flare bevel groove weld wedge to pocket wall (1-1/2" minimum length) with 70-ksi minimum tensile strength weld material. If the wedge is below the pocket wall, add reinforcement fillet weld on top. Insure that weld and pocket wall are at least 1/16" below housing wall. All surface preparation and welding must comply with ANSI/AWS D15.1 Railroad Welding Specification – Cars and Locomotives, latest edition, including preheat when required.

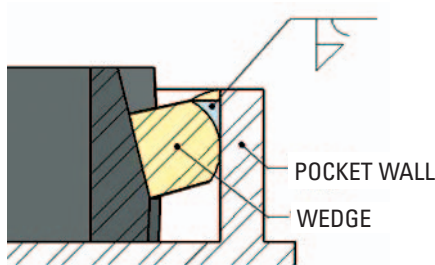


Fig. 22 Welding Procedure – Cross Section

Pocket Size Adjustment

Some pockets may be slightly larger than the TCC-45 LTLP or LTLP-B are designed to fit into. For these applications, follow the procedures below.

TCC-45 LTLP

Inside Length - If the wedges hit the pocket floor before contacting the end wall (inside length greater than 8-11/16"), shim application is required. Optimal inside length after shimming should be 8-1/4". Fabricate the shim so that it is 1/4" shorter than the pocket wall and no wider than the flat portion of the end wall. Leave enough room on the shim width for welding. Fillet weld the shim to one end of the pocket using 70-ksi minimum tensile strength weld material.

Inside Width - If the addition of wedges to the inboard side of the pocket still leaves a gap of greater than 1/8" (inside width greater than 4-5/16"), please use the TCC-45 LTLP-B. Estimate the shim thickness needed to reduce the gap between wedge and the pocket wall to 1/8" or less. Fabricate the shim so that it is approximately 1/4" shorter than the pocket wall and no longer than the flat portion of the pocket side wall. Leave enough room on the shim length for welding. Fillet weld the shim to the outboard side of the pocket using 70-ksi minimum tensile strength weld material.

TCC-45 LTLP-B

Inside Length - If the wedges hit the pocket floor before contacting the end wall (inside length roughly greater than 9-5/8"), shim application is required. Optimal inside length after shimming should be 9-3/8". Fabricate the shim so that it is 1/4" shorter than the pocket wall and no wider than the flat portion of the end wall. Leave enough room on the shim width for welding. Fillet weld the shim to one end of the pocket using 70-ksi minimum tensile strength weld material.

If the pocket has oval cut outs at the each end of it, it is recommended, if space is available, that shims be inserted to each end to insure a good surface to weld the wedge too.

Inside Width – If the inside width of the pocket exceeds 4-5/8", shimming will be required. Estimate the shim thickness needed to reduce the pocket width to between 4-1/4" and 4-1/2". Fabricate the shim so that it is approximately 1/4" shorter than the pocket wall and no longer than the flat portion of the pocket side wall. Leave enough room on the shim length for welding. Fillet weld the shim to the outboard side of the pocket using 70-ksi minimum tensile strength weld material.

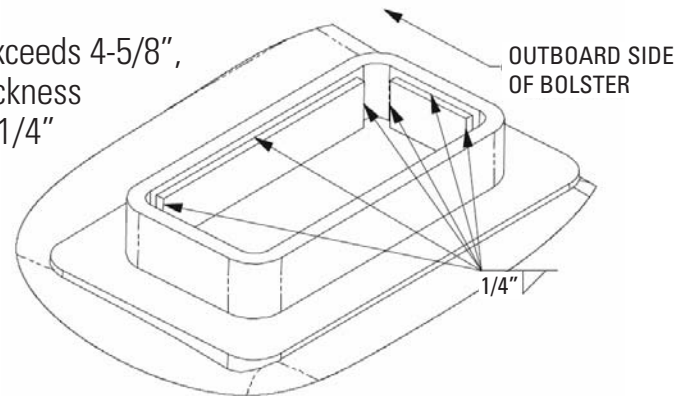


Fig. 23 Pocket Size Adjustment

TecsPak® Pads

The TecsPak® pad must not be exposed 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. 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.



INSPECTION

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

Rule 62 has a couple of notes that dictate which location should be summed.

1. For articulated cars, "sum of the pairs" refers to the side bearings laterally across from each other.
2. For stand alone cars, the following locations must be summed:
 - AL+AR
 - BL+BR
 - AL+BR
 - AR+BL

Set Up Height

The set up height is the vertical distance between the car body side bearing wear plate and the housing mounting surface.

Field or Yard Inspection

Constant contact side bearing heights:

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

Height adjustment is required at any time, empty loaded, when height measured is:

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

- For articulated cars at the articulated truck locations.



Height adjustment is required at any time, empty or loaded, when height measurement is:

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

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

Height adjustment is required at any time, empty or loaded, when height measurement is:

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

- For articulated cars at the articulated truck locations.



Shop or Repair Track Inspection

Constant contact side bearing heights:

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

Height adjustment is required at any time, empty or loaded, when on a Repair Shop (Facility)/Repair Track as defined in Appendix A and height measurement is:

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

- For articulated cars at the articulated truck locations.

Height adjustment is required at any time, empty or loaded, when on a Repair Shop (Facility)/Repair Track as defined in Appendix A and height measurement is:

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

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

Height adjustment is required at any time, empty or loaded, when on a Repair Shop (Facility)/Repair Track as defined in Appendix A and height measurement is:

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

Some models include cast-in markings to assist in a rough estimate of the set up height.

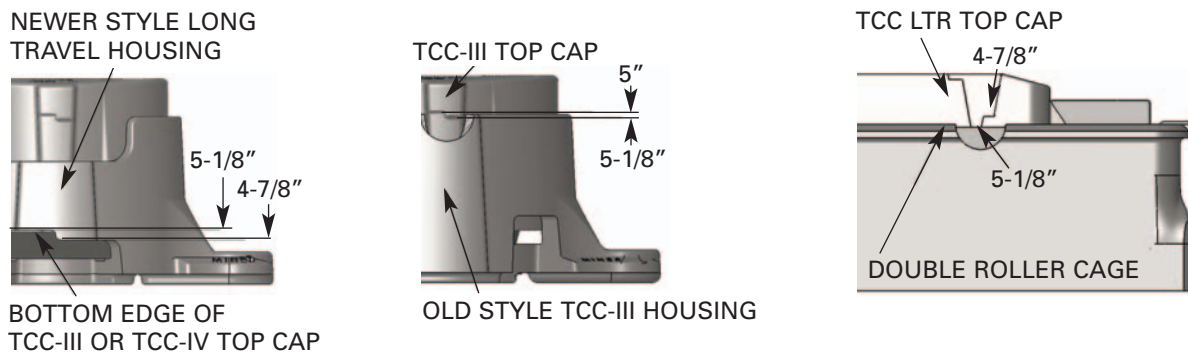


Fig. 24 Standard Set Up Height Indicators

Some models include cast-in markings to assist in a rough estimate of the set up height.

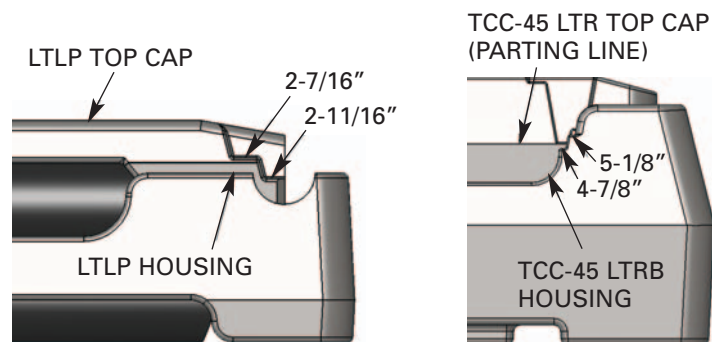


Fig. 25 Block Style Retrofit Set Up Height Indicators

General

Yard or Field – 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.

Shop or Repair Track – Inspect metal parts for cracks and the TecsPak® pads for melting; replace in kind. For optimal performance, it is recommended if the clearance between the top cap OD and the housing ID is greater than 1/8", install new top cap and re-measure. If the clearance is still greater than 1/8", replace both top cap and housing.

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.

The models that have this feature are the TCC-IV, TCC-45 LTR, LTRB, LTLP, LTLP-B, and the TCC-60 LTR.

TCC-IV WEAR INDICATOR

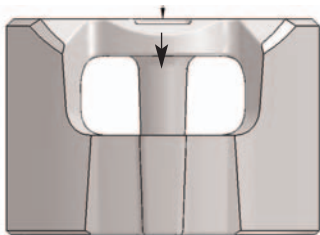


Fig. 26 TCC-IV Wear Indicator

TCC-45 LTLP-B WEAR INDICATOR

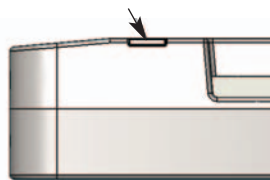
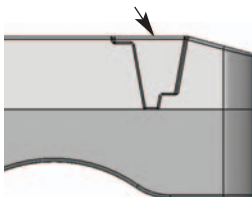


Fig. 28 TCC-45 LTLP-B Wear Indicator

TCC-45/60 LTR & LTRB
WEAR INDICATOR



**Fig. 27 TCC-45/60 LTR & LTRB
Wear Indicator**

TCC-45 LTLP WEAR INDICATOR

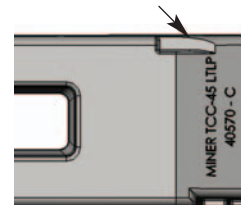


Fig. 29 TCC-45 LTLP Wear Indicator

TecsPak® Pad Free Height Measurement

Shop or Repair Track – 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.

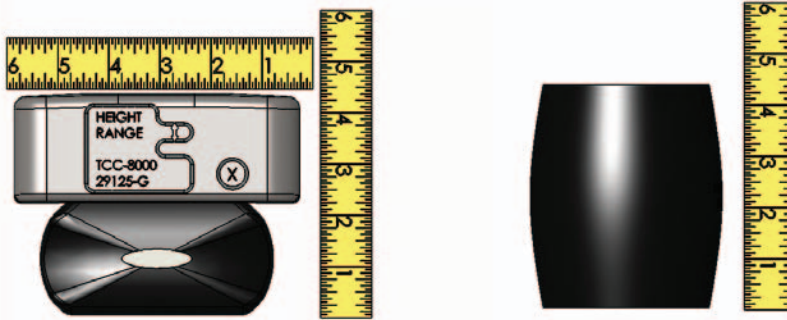


Fig. 30 TecsPak® Pad Free Height Measurement

TCC

To determine if the TecsPak® elastomer pad has sufficient preload, measure the free height of the top cap assembly. To do this, remove the top cap assembly from the housing, then allow two hours for the pad to stabilize. For optimal performance, it is recommended the top cap assembly **be greater than** the following heights:

TCC-2600	4-5/8"
TCC-4500	4-3/4"
TCC-8000	4-1/2"

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").

Warning - Under no circumstances should the retaining bolts be removed unless the side bearing has been compressed to relieve the load on the 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" in thickness, the entire assembly will need to be replaced. Both sides of the truck will need to be replaced at the same time. Contact Miner for replacement recommendation for the side bearing assembly.

Warning - Do not use standard bolts. Contact Miner for replacement recommendation for the side bearing assembly.

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 owners' instructions.



TCC III AND IV FREE HEIGHT INSPECTION

To determine if the TecsPak elastomer pad has sufficient preload, measure the free height of the pad. To do this, remove the pad from the assembly, allow 1 minute for pad to stabilize. For optimal performance, it is recommended the pad **be greater than**:

All Models: 3-15/16"

TCC LTR, LTLP, LTLP-B and LTRB

To determine if the TecsPak® elastomer pad has sufficient preload, measure the free height of the top cap assembly. To do this, remove the top cap assembly from the housing, then allow two hours for the pad to stabilize. For optimal performance, it is recommended the top cap assembly **be greater than** the following heights:

TCC-45 LTR	4-13/16"
TCC-60 LTR	4-7/8"
TCC-45 LTLP	2-15/16"
TCC-45 LTLP-B	2-15/16"
TCC-45 LTRB	4-13/16"



Perfecting Railcar Performance

INSTALLATION AND INSPECTION GUIDE

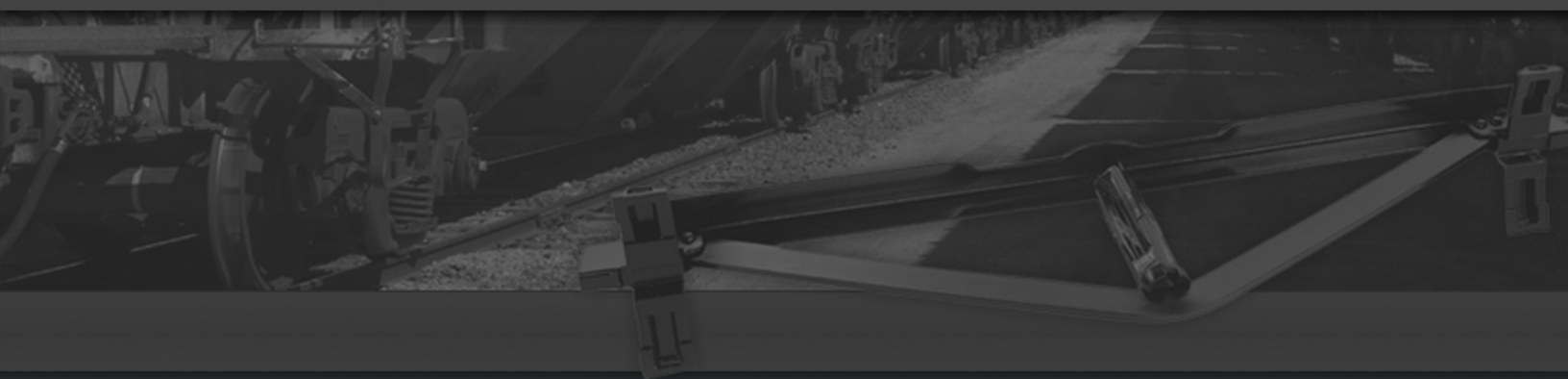
Side Bearings



Draft Gears



Brake Beams



DRAFT GEARS

GENERAL DESCRIPTION

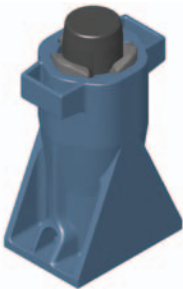
Miner offers a variety of draft gears to satisfy your car protection requirements.



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 TecnPak® 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 $11/16''$ or more.

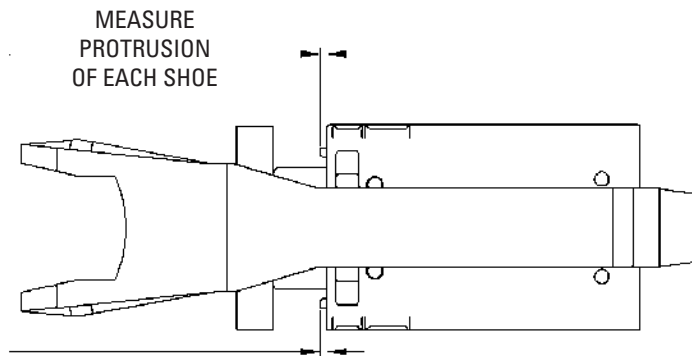


Fig. 31 Crown SE/SG In-Car Inspection

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 $1/8''$ gap, gear should be reconditioned (do not reapply).

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

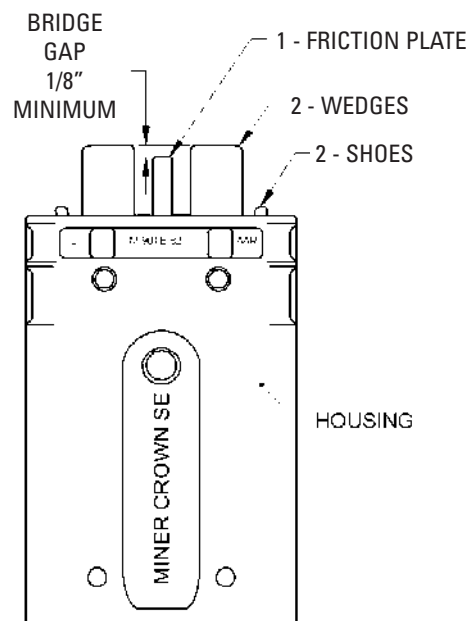


Fig. 32 Crown SE/SG Out-of-Car Inspection

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 $1\frac{1}{8}$ " or more.

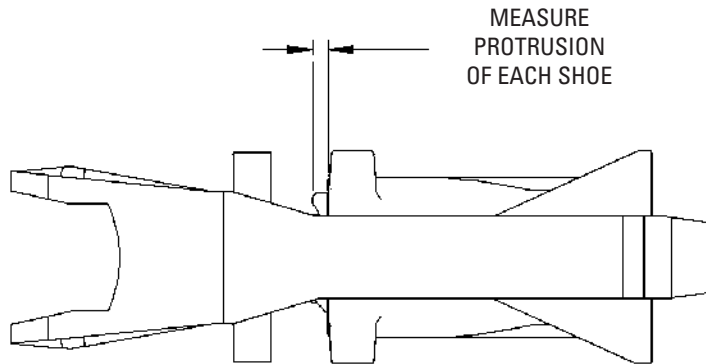


Fig. 33 TF-880 In-Car Inspection

TF-880™ (Out-of-car Inspection)

1. Wedge protrusion should measure approx. $3\frac{5}{16}$ " (draft gear not preshortened).
2. If shoe protrusion averages $1\frac{5}{16}$ " or more, gear should be reconditioned (Do not reapply).

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

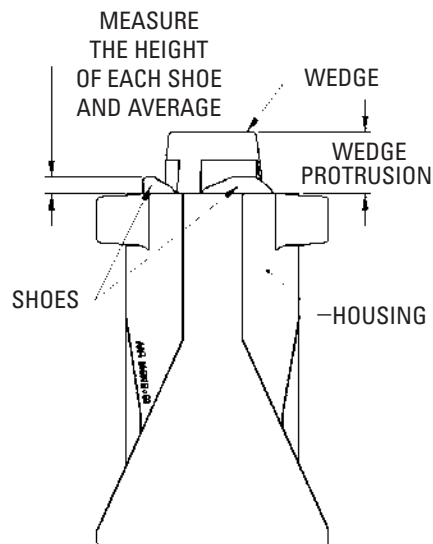


Fig. 34 TF-880 Out-of-Car Inspection

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" or more.

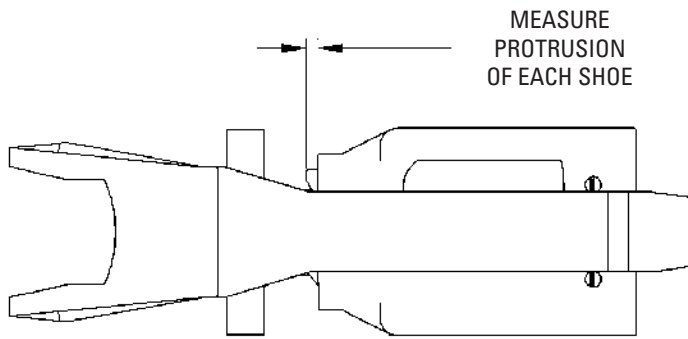


Fig. 35 SL-76 In-Car Inspection

SL-76™ (Out-of-car Inspection)

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

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

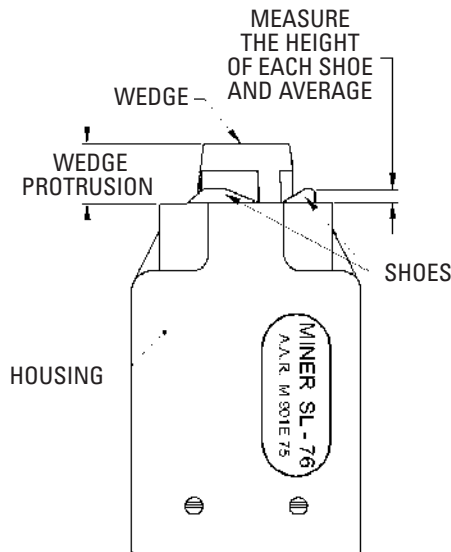


Fig. 36 SL-76 Out-of-Car Inspection



Perfecting Railcar Performance

INSTALLATION AND INSPECTION GUIDE

Side Bearings



Draft Gears



Brake Beams



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

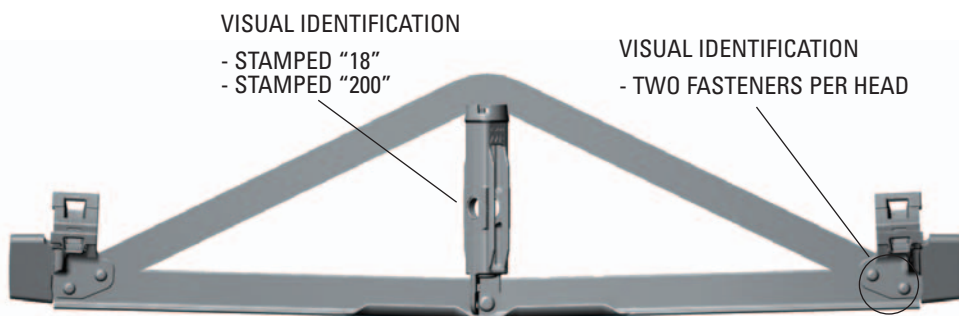


Fig. 37 Miner Brake Beams - #18

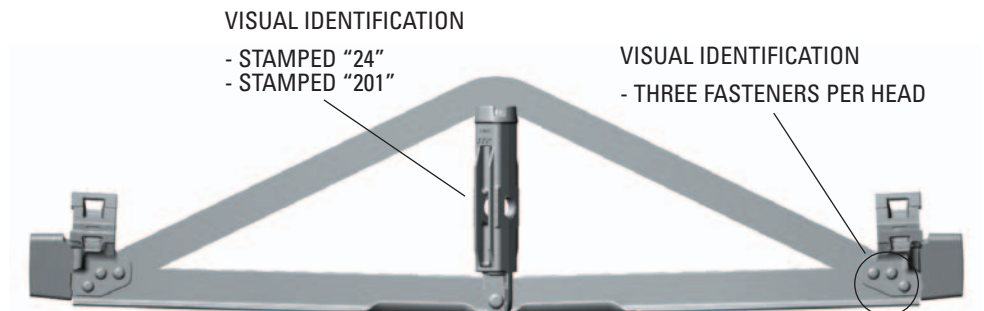


Fig. 38 Miner Brake Beams - #24

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" grade 5 bolt and hex nut, 120-125 ft-lbs, tack weld nut to bolt or peen bolt to prevent nut from loosening

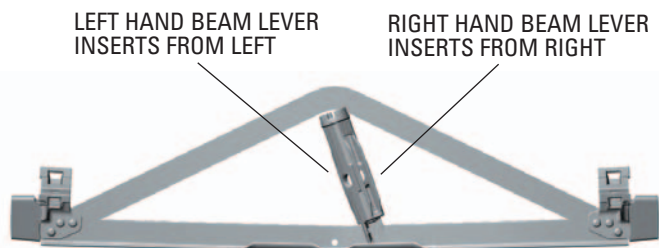


Fig. 39 Miner Brake Beam Strut Change