



**TRINITYRAIL®**

## **Inspection, Installation and Repair of Thrall Car Radial End Doors™**

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## Explanation of Caution and Warning Headings

The headings shown below are used to alert you to possible or even probable threats to your safety or health if you are not aware and cautious. As these paragraphs appear in the text read them carefully and follow their instructions completely.

### DANGER

Danger is indicated when operator death or injury is probable if the message is ignored.

### WARNING

A Warning is indicated where operator death or injury is highly likely or damage to equipment is probable if the message is ignored.

### CAUTION

A Caution is indicated where operator injury is possible or damage to the equipment is likely if the message is ignored.

### NOTICE

A Notice is indicated where information is important to the operation of the equipment or to the operator's understanding.

### NOTE

A Note indicates information that may be useful to the operator but does not involve issues of safety or health.

## Thrall Car Radial End Door™ Manual

### Safety First

Always use Extreme Care when working on any autorack. This manual is intended for use by those who are familiar with autorack repair and sound railroad safety procedures.

#### WARNING

Each door weighs about 400 pounds. Don't pinch your fingers under the door.

#### CAUTION

Each door must be locked in the open position before entering the rack.

#### CAUTION

Visually inspect the door before opening it. If there is any doubt about the structural condition of the door or its operating condition, **Do Not Open the Door** without first securing it to a crane or fork lift.

If there is any question about safety, **STOP!** Contact your supervisor or *TrinityRail* Products Engineering.

Whenever an autorack is removed from service for any reason, the doors should be inspected for wear and operation. The goal of each repair facility should be to put a rack back into service, so that it will operate maintenance-free until the next scheduled certification. Proper repairs using quality parts should allow each facility to reach its goal of eliminating down time.

## Thrall Car Radial End Door™ Manual

### Introduction

This manual has been developed to aid in the proper inspection, repair, and maintenance of all Thrall Car Radial End Doors™. The radial door has been in service since 1976. Many of the original doors are still operating today with years of service life remaining. There have been dozens of design improvements over the years to reduce the openings around the doors and make the doors more secure. There have also been many other design improvements to increase the service life of the doors. The Radial Door was replaced by Thrall / *TrinityRail* Seal Safe Radial Door in 1997. Refer to the *TrinityRail* SSRD Manual for that end door.

*TrinityRail's* replacement doors are designed to extend the life of the autorack. With only proper maintenance, Thrall's Radial Doors™ will operate from one certification to the next. Elimination of "Bad Order" down time is a primary goal for our products.

Doors fail due to improper handling, rough ride caused by truck hunting, or due to lack of maintenance. In order to achieve the goal of NO time out of service, it becomes extremely important to perform proper maintenance and repairs when the rack is recertified. Proper maintenance means bringing the door back to a near new structural condition. This requires the replacement of worn parts with high quality replacement parts. Trinity provides a fully engineered parts-replacement business, providing parts that meet the original rack specification. All door rollers, shafts, and 'J' plates are made of specific steel, which is hardened to reduce wear.

Lock brackets, lock pins, and cross pins (in the lock pin), will not provide full service if not fabricated from the proper material. Door extensions not made to specification can cause other door failures due to excess weight. We recommend the use of replacement parts supplied by Trinity Service Parts.

Not only are proper parts critical, proper repairs are also important. Any structural repair must be as strong as or stronger than the original part being repaired. Simply welding a crack in a door member typically will not last until the next certification.

The suggested repair procedures outlined in this manual were developed to reach and maintain our goal of continuous service between certifications. The Prep Tracks and Loading Ramps must perform inspections and make the necessary minor running repairs. The Pool Repair Shops and Certification Shops must also perform inspections and thoroughly repair racks in their programs. With this team effort, the number of racks removed from service for "Bad Ordered" radial doors can be eliminated. If minor repairs are found and fixed on a timely basis, major repairs and replacements could be avoided. Proper inspections and repairs will reduce the number of racks out of service and over all can reduce costs.

#### NOTICE

The operations detailed in this manual must be performed in shop facilities that are approved by the Association of American Railroads [AAR] and by mechanics trained by Trinity North American Freight Car, Inc. [*TrinityRail*]. Please contact *TrinityRail* Customer Service department at (800) 227-8844 to request training and / or the latest version of the procedures.

Huck® Fasteners is a registered trademark of Alcoa Fastener Systems.

## Section 1 Inspection

### Inspection at Prep Tracks or Loading Ramps

#### Before opening the doors inspect:

1. the alignment of the two doors; the gap between doors should be relatively constant from the top to the bottom (1¼" to 2").
2. for gouges at the ends of the deck cutouts.
3. to ensure that one upper guide finger is on each side of the upper door track angle.
4. the upper and lower lock pin engagement by looking through the slot or space between the ladder and the door or post. The bottom lock pin should be engaged completely. The lock cable extending to the upper lock should be tight with no slack.

#### Open both doors then:

1. Look for interference or binding parts and immediately make the repair. Proper lower door track lubrication will make a substantial difference in the operation of the door.
2. Make sure that both door lock pins fall completely into the lock receivers when the door is fully open. **This is important!** Both lock pins must engage the receiver before people climb up the ladder and use the door to climb into the rack. If both lock pins do not engage, locate the problem immediately and correct it or close the door.

CAUTION
Never enter or exit an autorack using a door which is not properly locked in the open position!

3. Examine the lower door track for excessive wear where the rollers and 'J' plates rest with the doors locked in the closed position. Also inspect for bi-pass coupler damage to the end of the lower door track near the striker bar.
4. Inspect the upper door track at the end for excessive wear.
5. Inspect the upper guide fingers for excessive wear.
6. Inspect all lock pins and other lock components for excessive wear.
7. Inspect the general structural condition of the doors:
  - A. Look for cracks where the door vertical members connect to the door horizontal members.
  - B. Look for cracks around the locks.
  - C. If the door has been extended from a ¾-height door, look for cracks or missing Huck bolts where the original door meets the door extension kit.
  - D. Look for cracks around the upper guide attachment to the door.
  - E. Inspect the door pivot arm.
  - F. Inspect the door lock welds for cracks.
8. Inspect the safety cable and its connections.
9. Inspect the anti-vandal chain and rod at the top of the door, if so equipped.

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Correct any problems found based on the above inspections, meeting the tolerances listed in Appendix A. Use the Radial Door Repair Procedures (Section 3) as a guide to performing proper repairs. Never allow a rack to be loaded before the door repairs are completed.

Bad Order the car if the repair work cannot be completed before loading. Allowing the car to make a trip with a "Bad Order" door can cause extensive damage to the door, putting the rack out of service while the major repair or replacement work is performed.

### Inspection at Certification or Pool Repair Facilities

All of the visual inspections, which are done at the Prep Track or loading dock, are also performed during this inspection. However, this inspection must be more intensive in order to check for wear and provide adjustments to prevent future wear and eventual out of service time.

#### Inspect the Lower Door Track and 'J' Plates for:

1. Grooves in the lower door track where the rollers are positioned when the doors are in the closed position.
2. Wear where the 'J' plates contact the lower door track.
3. Wear or binding of the 'J' plates.

#### Roller Inspection:

**WARNING**

Each door weighs approximately 400 pounds. Don't pinch your fingers under the door.

1. Use a pry bar to lift the door off the roller (one roller at a time). Use a wood block to hold up the door. With the weight removed from the roller, check the roller for proper spin. The wheel should spin on the shaft freely. The shaft should not turn in the housing. Also, check for "play" between the roller and the shaft. If "play" is felt, the roller and/or shaft must be replaced.
2. If the door is equipped with a middle (third) roller it should be removed. This should be done whenever the double roller housing is apart for any reason.
3. After correcting all problems found in the above inspections, the doors should be locked open and locked closed and roller contact with the door track should be checked. The front and rear rollers must both contact the door track when the door is locked.

#### To Inspect Door Locks:

1. The lower door lock must fall easily and completely into both the open and closed position receiver holes.
2. The top lock must also fall easily and completely into both the open and closed positions. The top lock will not fall if the lower lock has not first fallen.
3. Look for wear between the lock pins and the lock brackets. If there is more than  $\frac{1}{8}$ " total gap between the lock pin and the lock bracket the assembly should be replaced.

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4. The drive pin, which goes through the lock pin under the spring, must extend past the spring on each side. If it is worn more than 30%, replace the cross pin with a solid, 'type A' hardened drive pin. Roll pins and cotter pins should not be used.
5. Look for wear in the receivers.
6. Look for wear in the lock arms and attachment bolts.
7. Look for cracks in the attachment welds on both locks. There should always be an overhead attachment weld on the bottom side of the upper lock.

### **Guidelines for Upper Door Track and Upper Guide Assembly:**

1. If the upper door track is worn 30% or more at the end where the upper guide fingers rest, repair the track.
2. If the upper guide fingers are worn 30% or more, replace the fingers. On the Zeftek wear pad type finger, the wear pad should be measured on the plastic pad only. **Do not** measure the total of the plastic and steel for calculating wear.
3. Each finger should stick up 1" above the bottom of the upper door track angle.
4. Check for cracks around the upper guide attachment to the door vertical frame.
5. Check the upper track attachment welds.
6. Check the stop plate at the end of the track for wear or broken welds.

### **Pivot Arm and Attachments**

The total gap between the pivot arm and the door attachment bail should not exceed  $\frac{3}{16}$ ". If excessive wear is found on the pivot arm or at the arm-to-door attachment part, repairs must be made

### **Safety Cable**

Check for wear or missing parts. A thimble should be inside the loop at each end of the cable.

### **Sliding 'BL' Handbrake Door Panel**

If the door is equipped with a 'BL' Handbrake Door Panel, check for wear and ease of operation.

### **Anti-Vandalism Chains and Rods**

If the rack is equipped with anti-vandalism chains and rods, check for wear and ease of operation.

### **Inspect for any Structural Problems Including:**

1. Cracks at the ends of the horizontal members.
2. Cracks in the door skin.
3. Missing Huck bolts.
4. Cracks around the bottom roller.
5. Grab irons or fasteners.
6. Cracks or gouges from contact with the corner of the decks.



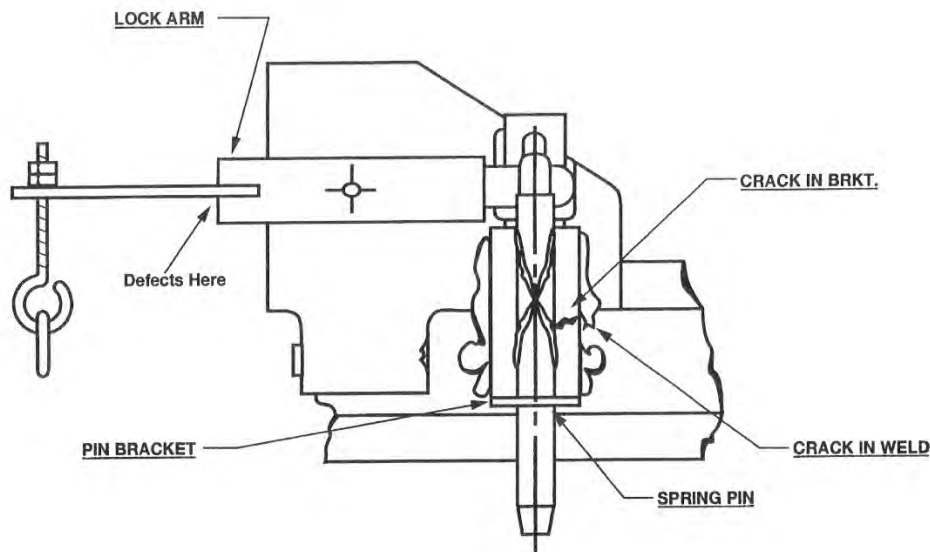
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We recommend that necessary repairs be made as described in Section 3 of this manual. Any problems found in your inspections must be corrected in order to properly return an autorack to service.

### Whitehead & Kale's Radial Doors

#### Unreinforced Upper Locks

1. The earliest radial doors (models 8004, 8005) built before May 1979 had very narrow upper lock brackets which tended to crack (see Figure 1).



**Figure 1**

2. If a cracked upper lock bracket is found, replace it with a new upper lock assembly using the "Recommended Procedure for Replacing an Upper Door Lock Assembly" found in this manual.

#### Unreinforced Lock Arms

1. The original style upper lock arms on radial doors were a two bar fabricated design. These original unreinforced arms were applied to doors built before May 1979 (models 8004, 8005). These original arms occasionally deflected at the splice where the two bars were welded together.
2. If one of these original lock arms is found it should be replaced with a new upper lock arm using the "Recommended Procedure for Replacing an Upper Lock Arm" found in this manual.

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### Door Rollers

Bottom door rollers should be inspected whenever an autorack enters a shop. It is recommended that only high-quality, original-equipment hardened rollers with sealed bearings, or approved plastic rollers be used as replacements. Proper shaft material is most important to ensure long component life. At certification we recommend that all rollers be removed, inspected for wear and, if acceptable, then cleaned and repacked with approved grease. Any rollers or shafts which are found to have wear must be replaced.

#### **The rollers can be inspected two ways:**

##### Without removing the roller from the door:

1. Remove the weight from the roller by lifting on the bottom of the door with a pry bar.

#### WARNING

Each door weighs 400 lb. Place a wood block under the door to protect fingers during the inspection.

2. With the roller removed from the track: check for spin and "play". If "play" is found, replace the roller and/or shaft as described below.
3. The shaft should not spin in the roller housing. The shaft must remain still as the wheel spins on it. If the shaft spins, replace the shaft, wheel, 'J' plate, or housing to correct the problem.

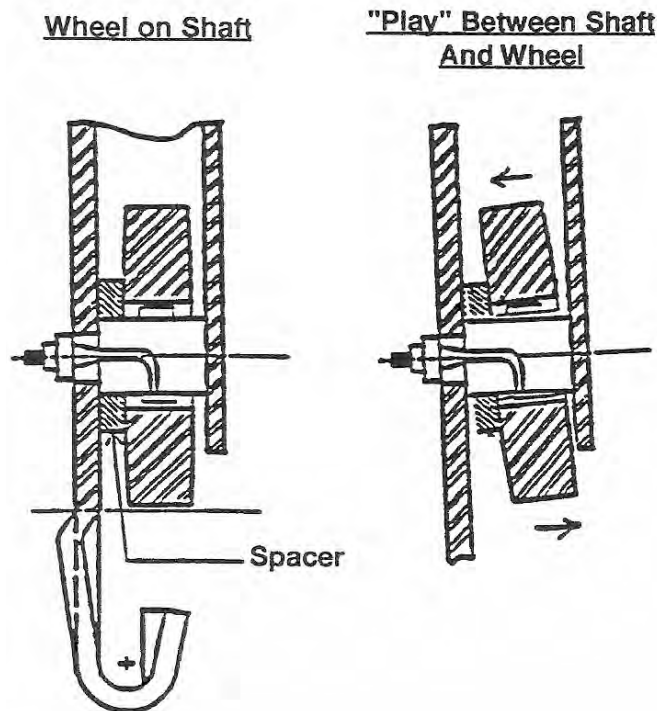
##### By removing the roller from the door:

#### CAUTION

Always be sure the door is in the locked closed position before removing a roller.

1. Check for "play" between the door roller and the shaft (see Figure 2). If "play" is found, replace the roller on the shaft and check it again. If play is still present, it is then necessary to also replace the shaft. The roller must spin freely on the shaft.
2. Reassembly of the roller and 'J' plate.
  - A. New steel rollers have a built-in spacer machined on one side of the roller. This spacer is always installed on the side of the wheel toward the 'J' plate. (See Figure 2).

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**Figure 2**

- B. Older style roller assemblies have a separate wheel and spacer. The loose spacer is always applied toward the 'J' plate.
  - C. If a 'J' plate is worn more than 25% at any point it should be replaced. We recommend using high quality Trinity parts. Substitute designs or material may greatly reduce service life.
  - D. Bolt the 'J' plate to the housing using high strength bolts and lock nuts.
3. Lubricate the doors as shown on the door lubrication diagram in Appendix B.
  4. Operate the doors. If binding is found between the door track and the door 'J' plates a slight adjustment may be needed. The 'J' plate can be bent inward or outward or twisted slightly using a hammer and a wedge. Never spread open the 'J' where it entraps the lower door track bottom angle. This would cause the door track, 'J' plates, and other door components to wear prematurely.

### Final Inspection Procedure

1. The top and bottom door lock pins must fall easily into the open and closed receiver assemblies. Full engagement is required. The bottom of the pin must be even with the bottom of the receiver bushing.
2. The door rollers must touch the bottom door track with the door in the locked open and the locked closed positions.
3. The upper guide fingers must have a 1" engagement to the top door track with the door in the "open" and "closed" positions. Replace if worn.
4. Door fingers **must** have free play (rattle) with the doors in locked positions. (Do not heat and spread fingers.)
5. Doors must be lubricated and operate freely.

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6. Check the structural condition of the door. Replace worn parts and repair any damage.

### Thrall Car Radial Door Roller Contact

It has always been Thrall Car's position that both Radial Door Rollers should contact the lower door track when the door is locked in the open or closed positions. These doors should be adjusted and roller contact should be checked with the car or rack sitting on a measured level track.

With variations and distortions in the car or rack structures, it is acceptable to have a maximum gap under the rear door roller of  $\frac{1}{32}$ ", with the door in the closed and locked position.

NOTE
A piece of banding wire measuring .035" thick may be used as a gauge. If the banding wire passes under the wheel, the gap is too large and an adjustment must be made.

In order to obtain roller contact, it may be necessary to locally move the door track up or down. It is also may be necessary to move the upper lock receiver assembly position in order to maintain this roller contact.

If you have any questions please contact *TrinityRail* Customer Service.

## Thrall Car Radial End Door™ Manual

### Section 2 Installation

#### Objectives for Installing a Replacement Thrall Car Radial Door™

1. The door **must** operate easily by one person standing on the ground.
2. The door should have virtually no contact with the rack structure (decks, ladders, roof, closure plates, etc.).
3. The bottom rollers **must** make contact with the lower track when the door is both in the "locked open" and "locked closed" positions.
4. The upper lock pin **must** have full engagement with the open and closed retainer assemblies. The bottom of the pin must be even with or below the bottom of the retainer bushing.
5. The upper guide fingers **must** stick up above the bottom of the upper door track at least one inch on each side.
6. The upper guide fingers **must** have free play with the door in the locked open or locked closed position. There cannot be pressure between either finger and the upper door track. One must be able to easily wiggle the fingers back and forth on the track angle when the door is locked.

#### NOTICE

Adjusting any part of the door can change or affect another part of the door. After each adjustment, the entire inspection of the door must be rechecked to ensure that all of the above "Objectives" are met.

#### Installation Procedures for a Replacement Thrall Car Radial Door™

#### NOTICE

The following steps must be performed in shop facilities that are approved by the Association of American Railroads [AAR] by mechanics trained by Trinity North American Freight Car, Inc. [*TrinityRail*]. Please contact *TrinityRail* Customer Service department at (800) 227-8844 to request training and / or the latest version of the procedures.

#### WARNING

Radial doors weigh 400 pounds each and must be handled with care.

1. Carefully remove the old door. With care, damage to the door tracks or door arm can be eliminated.
  - A. Attach a crane or a fork lift to the door before attempting to remove it from the rack.
  - B. The U shaped piece that connects the pivot arm to the doorframe should be flame cut from the door. If not damaged, this piece can be reused.
  - C. If the rack has an anti-vandalism chain, detach it from the roof closure.
  - D. Unbolt the bottom roller housings.

## Thrall Car Radial End Door™ Manual

- E. The "L" shaped cable bracket (which connects the safety cable to the door) must be flame cut from the doorframe.
- F. Lift the door from the rack and place aside.
2. The rack must now be repaired to its original condition.
  - A. Repair bent or sagging decks.
  - B. Repair or replace bent or damaged lower door tracks. Fill any grooves with weld metal where the rollers rest. (SK 821027 – Refer to repair procedure.)
  - C. Straighten or replace bent ladders.
  - D. Replace the door pivot arm, if bent.
  - E. Repair or replace the upper door track if damaged or worn at the point where the upper guide fingers rest when the door is in the closed position. (Refer to Section 3, Upper Door Track Replacement Procedure.)
  - F. Repair any cracked welds on the door tracks.
3. Hang the new door.
  - A. Remove the bottom roller 'J' plates by removing the four nuts from the four bolts on each assembly.
  - B. Safely and carefully lift the door into place using a crane or fork lift.
  - C. The bottom leg of the upper door track must be placed between the upper guide fingers.
  - D. Insert the lower lock pin in the bottom closed lock retainer.
  - E. Reassemble the bottom rollers and 'J' plates. Make certain that the inside of the 'J' plate is hooking the lower vertical leg of the bottom door track angle. Ensure that the roller, roller shaft, and spacer, if any, are re-assembled in the proper order (grease fitting outside, spacer on outside of roller, etc.). Tighten all the nuts.
  - F. Weld the safety cable attachment to the door horizontal member just below the deck. The cable must be installed so it is almost tight with the door in the closed position.
  - G. Weld the door pivot arm bracket onto the doorframe. Set it at the same height as the other door on the same end of the car.
  - H. Attach the anti-vandalism chain on the top of the door to the closure plate or roof canopy. The chain should be almost tight. Remove any extra links and weld the last link.
  - I. Unhook the crane or fork lift.
4. Set the upper door lock height.
  - A. Put the upper lock pin in the open receiver hole.
  - B. Set the bottom of the lock bracket two inches above the top of the upper lock retainer. While holding the upper lock straight, tighten the  $\frac{5}{8}$ " bolt. The bottom of the upper lock pin should be flush or below the bottom of the retainer bushing.

NOTE
There are two different slots on the upper lock, through which the bolt can be inserted to obtain the two-inch height dimension. There are also two different nuts located on the back of the lock attachment plate on the door. Use a combination of slot and nut as required to obtain the two-inch dimension.

- C. Weld the upper lock to the door. The lock must have a  $3\frac{1}{2}$ -inch vertical up weld applied to each side. There must be a 6-inch overhead weld also applied on the bottom of the upper lock assembly.

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5. Set the upper locking cable.
  - A. With the doors in the closed position, adjust the upper lock arm pivot bolt up or down to provide for full travel of the lock pin.
  - B. Open the door slightly so the lower lock pin is just barely out of the receiver hole resting on the lower door track angle.
  - C. Tighten or loosen the nuts on the locking cable eyebolt until the bottom of the upper lock pin is ¼-inch above the upper lock retainer assembly.
  - D. Tighten the lock nut on the eyebolt. This locking cable adjustment is now set. **Do not** adjust the loading cable in the open position.
6. Adjust the door upper lock retainer assembly to meet the installation "Objectives".
  - A. Lock both doors in the closed position (top and bottom lock).
  - B. Stand back and compare the new door to the door adjacent to it. There should be a relatively even space (1½ to 2 inches) between the two doors at the centerline of the car. Both doors should also be even with each other vertically. (Neither door can extend past the end of the striker bar.)
  - C. To reposition either door it will be necessary to flame cut the closed upper lock receiver assembly free from the deck. Position the lock pin in the loose assembly and re-weld it to the deck at the proper location, where the doors are straight relative to each other.
7. Adjust the lower door track for door roller contact, with the door in the closed position.
  - A. With the doors in the locked closed position, both rollers must contact the lower door track.
  - B. If the rollers don't make contact with the lower track, the lower door track must be raised or lowered so both wheels touch the track at the same time. Sometimes this can be done using a large hammer. It may be necessary to burn one or more of the door track supports loose to properly relocate the track.
  - C. After the track is adjusted, re-weld any track supports which were removed.
  - D. Check all lower door track welds to ensure that no welds are cracked. Repair as necessary.
8. Adjust the upper door track for one-inch "finger engagement" and for "free play".
  - A. The upper door track attachments may have to be carefully removed from the rack.
  - B. Reset the upper track angle to obtain the one-inch finger engagement and the door free play. Only tack weld the track attachments at this time.
9. Adjust the open upper lock retainer.
  - A. Open the door until the lower lock pin falls into the receiver. The upper lock pin should also fall at the same time. The bottom of the upper lock pin should be flush or slightly below the bottom of the retainer assembly.
  - B. If the lock pin contacts the retainer assembly as the door is opened it will be necessary to burn the retainer free from the post and reposition it. (Use caution not to gouge the post.) Re-weld the assembly to the post in the proper position so that the bottom of the lock pin is flush with the bottom of the retainer.
  - C. If the lock pin does not protrude sufficiently into the retainer assembly, it will be necessary to adjust the height of the retainer assembly as in B (above). **DO NOT** re-adjust the lock cable. The cable is set for the door closed position.

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- D. If the bottom of the lock pin just clears the top of the retainer assembly by  $\frac{1}{4}$  inch, but does not fall into the bushing freely, adjust it as follows:
  - Burn the retainer assembly free from the angle.
  - Reposition the assembly on the angle so that the pin falls freely.
  - Re-weld the retainer assembly to the angle on the post.
10. Adjust the lower door track for roller contact with the door in the locked open position.
  - A. Open and lock the door (top and bottom locks).
  - B. If both rollers do not make contact, adjust the track as necessary.
  - C. Re-weld the track supports if necessary.
11. Final adjustment of the upper door track.
  - A. Operate the door from the locked open to the locked closed position. Watch the upper finger engagement on the upper track. The fingers should maintain the one inch of engagement with the upper track. The track may have to be lowered or raised to obtain this one-inch engagement.
  - B. The upper guide fingers must also have "free play" with the door locked in the open position. This is obtained by adjusting the back end of the door track inward or outward.
  - C. Check the upper guide "finger engagement" and "free play" with the door in the locked open and locked closed positions. Final weld the track if the inspection is acceptable.
12. Paint the door.
13. Lubricate the door. Refer to Appendix B, Door Lubrication Diagram.
  - A. Grease the bottom roller shafts
  - B. Grease the door locks.
  - C. Grease the door lock retainers.
  - D. Use an AAR approved dry lubricant to lubricate the upper track vertical leg.
  - E. Apply dry lubricant to the lower track where the lock pin rides and also lubricate the lower vertical legs where the 'J' plate hooks the door track angle.
  - F. Apply lubricant on both the inside and outside surfaces of the bottom track angle where the 'J' plates contact the track.
14. Final inspection of the door.
15. Check the door to ensure that the "Objectives" stated at the beginning of Section 2 have been met.

### NOTICE

**REMEMBER!** Adjusting any part of the door can change or affect another area. (For example, adjusting the lower door track may cause the upper lock pin to fail to fall into the receiver or the upper door guide fingers may have insufficient "engagement.") After each adjustment, recheck all areas to be sure all of the "Objectives" are met.



## Section 3 Radial Door Repair Procedures

### Middle Door Roller Repair Procedure

#### NOTICE

The following steps must be performed in shop facilities that are approved by the Association of American Railroads [AAR] by mechanics trained by Trinity North American Freight Car, Inc. [*TrinityRail*]. Please contact *TrinityRail* Customer Service department at (800) 227-8844 to request training and / or the latest version of the procedures.

The middle roller is no longer required on older doors. It should be removed in the following manner:

#### WARNING

Radial doors weigh 400 pounds each and must be handled with care.

#### CAUTION

Lock the door in the closed position before attempting to work on door rollers.

1. Remove the five bolts from the double roller housing.
2. If the shaft is not equipped with a grease fitting remove the existing shaft and replace with a new type shaft.
3. Inspect the rollers according to the Door Rollers section of this manual.
4. Inspect all nuts and bolts. Replace nuts if damaged, only with locknuts.
5. Inspect the outside housing 'J' plates. Replace if they are damaged or worn more than 25%.
6. Reinstall the roller closest to the striker bar, shaft and roller spacer.
7. Reinstall the middle shaft without roller. Don't forget the spacer bushing for the middle bolt.
8. Reinstall and tighten all five nuts and bolts.
9. Repair grooves in lower door track wear bar using recommended procedure SK821027 found in the section on Bottom Door Track Repair Procedures.
10. Adjust the lower track (up or down) to ensure that both rollers make contact with track when the door is locked in the open or closed position.
11. Check the condition of all welds on all lower track supports. Repair any damaged areas using proper AAR welding practices.
12. Lubricate the door and tracks according to the "Door Lubrication Diagram" found in Appendix B.
13. Operate the door from the locked open to the locked closed position. Ensure that both the upper and lower lock pins fall completely into the receivers. If the lock pins do not fall completely and easily, it may be necessary to relocate an upper lock receiver assembly.

## Thrall Car Radial End Door™ Manual

14. Check the upper guide finger engagement (1" minimum) and the upper guide finger "free play" when the door is in the open and closed locked positions. If the engagement or "free play" is not present, reset the upper door track as required.
15. Close both doors on one end of the autorack when the procedure is complete. Check the alignment of the doors for large gaps and for any areas where the two doors touch or nearly touch each other. If alignment problems do exist, one or both doors will need to have the lower track and the upper lock receivers reset using the procedures in this section.

### Bottom Door Track Repair Procedure

#### NOTICE

The following steps must be performed in shop facilities that are approved by the Association of American Railroads [AAR] by mechanics trained by Trinity North American Freight Car, Inc. [*TrinityRail*]. Please contact *TrinityRail* Customer Service department at (800) 227-8844 to request training and / or the latest version of the procedures.

1. All grooves in the bottom door track wear plate should be welded and ground smooth as shown in Figure 3.
2. All worn spots in the lower track angle caused by contact with the 'J' plates should be repaired if more than 25% of the angle is worn away.
3. If the majority of the wear is on the outside of the angle, the area should be built up with Low Hydrogen weld and then ground smooth.
4. If the wear is primarily on the backside of the angle, a section of the angle must be removed and replaced. The replacement piece must be beveled on three sides to prepare the joint for a 100% penetration weld. Grind the welds smooth when complete.

## Thrall Car Radial End Door™ Manual

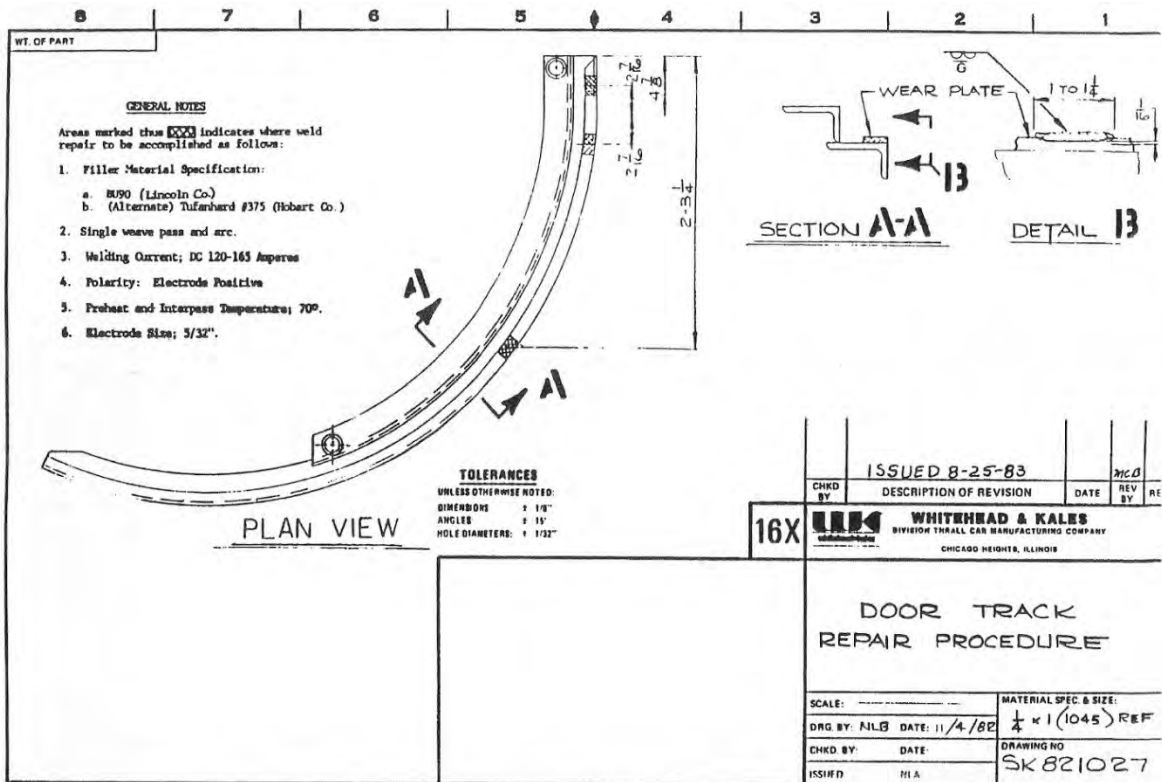


Figure 3

### Upper Lock Bracket and Lock Pin Repair Procedures

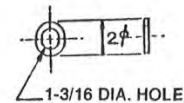
NOTICE	
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1. Check the clearance between the upper lock pin and the upper lock pin support. When new, proper clearance is 1/16". If the clearance is more than 3/16", the support should be repaired using the following procedure. (See View 1 in Figure 4.)
  - A. Fabricate the quantity of two washers (Item 14 in View 2 of Figure 4) for each upper lock to be repaired.
  - B. Remove the lock pin by driving out the 3/16" pin. Remove the bolt and nut at the top of the lock pin. Remove the lock pin, spring and washer. Remove the grease cups if so equipped.
  - C. Weld two washers (Item 14) to the door lock support using a 3/16" fillet weld. This is shown in View 2 of Figure 4.
  - D. If any gouges more than 1/16" deep exist in the lock pin replace the pin.
  - E. Reassemble the upper lock assembly using a new drive pin.

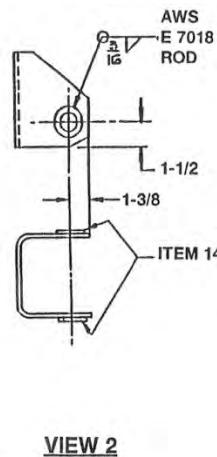
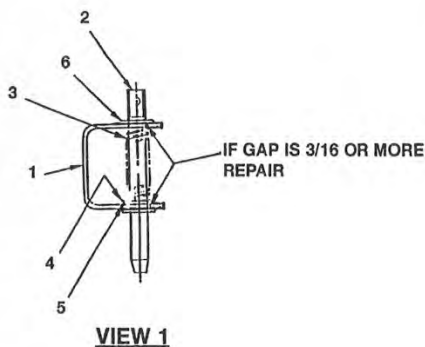
## Thrall Car Radial End Door™ Manual

2. Lubricate the doors according to the "Door Lubrication Diagram" found in Appendix B and check for other worn parts. Repair any worn or broken parts using the recommended procedures in this manual.
3. Open and close the doors to verify that lock pins fall completely into the receivers. Adjust the locks or doors as necessary.
4. As an alternate to the above repair procedure, the entire lock assembly may be replaced. See the following procedure for replacing the upper door lock assembly.

DESCRIPTION	PART NO.	ITEM
DOOR LOCK SUPPORT	2D-131-1	1
LOCK PIN	(2)DD 100001	2
SPRING	(2)MB 100005	3
WASHER, 1-1/8 DIA. STD. FLAT	CF 106001	4
DRIVE PIN, 3/16 DIA. x 0-2	CM 106003	5
GREASE CUP	(2)ML 102001	6



**ITEM 14 - WASHER**  
PLT 2" DIA. X 1/4 - 1045 WEAR STEEL



**Figure 4**

### Upper Door Lock Assembly Repair Procedure

#### NOTICE

The following steps must be performed in shop facilities that are approved by the Association of American Railroads [AAR] by mechanics trained by Trinity North American Freight Car, Inc. [TrinityRail]. Please contact *TrinityRail* Customer Service department at (800) 227-8844 to request training and / or the latest version of the procedures.

1. Before removing the existing upper lock assembly, check to be certain that the upper door guide, safety cable, and door pivot arm are functioning properly.
2. Repair the lower track, rollers, lower lock, and upper guide, if required, must be made before working on the upper lock. The upper lock is one of the last items to be reworked on the door.
3. Remove the upper lock assembly.

## Thrall Car Radial End Door™ Manual

4. Reapply a new upper lock assembly using the original adjustment bolt with the door in the closed position. The original lock pin pivot can be reused if it is not worn more than 1/8".
5. The bottom of the lock bracket must be set 2" above the lock receiver plate with the door in the closed position. The lock assembly must also be applied perpendicular to the deck. If the lock cannot be properly applied then the upper lock receiver must be flame cut so that it is free from the deck. Bolt and clamp the new lock assembly to the door.
6. Weld the upper lock assembly to the door. There must be a 3½" vertical up weld (fillet size 3/16") applied to each side of the lock. There also must be a 6" overhead weld (fillet size 3/16") applied to the bottom of the lock assembly.
7. Reapply the upper closed lock receiver to the deck plate so that the lock pin is free to move up and down with the bottom lock engaged. The gap between the two closed doors should be  $1\frac{3}{4} \pm \frac{1}{4}$ ".
8. With the lock functioning properly in the closed position, open the door approximately one inch. The lock cable can now be adjusted. A new eyebolt may be required if the threads are damaged on the existing eyebolt. Adjust the eyebolt so that the top lock pin clears the lock receiver plate by ¼". The lock nut must then be tightened to the first nut on the eyebolt. Finally trim off the excess eyebolt.
9. Move the door to the fully open position. The bottom of the lock pin should clear the open receiver by ¼". The pin should fall into the open receiver as soon as the lower pin falls into the receiver hole. If the lock pin does not fall easily or completely, remove the open receiver and reset it on the number one post in the proper position. DO NOT reset the lock cable. The lock cable is set for the closed position only. Any adjustment for the open position is made by moving the open receiver assembly on the post.
10. Lubricate the locks and receivers using an AAR approved grease. Apply adequate lubricant but do not over apply.
11. Operate the door five times to be sure the locks fall easily and completely each time.
12. If the procedure was properly followed, the lock pin should have full engagement. (The bottom of the top lock pin must be even or below the bottom of the lock receiver pipe). This full lock pin engagement is required in both the open and closed positions.
13. Recheck the bottom roller to door track engagement in both the open and closed positions.

### Upper Lock Arm

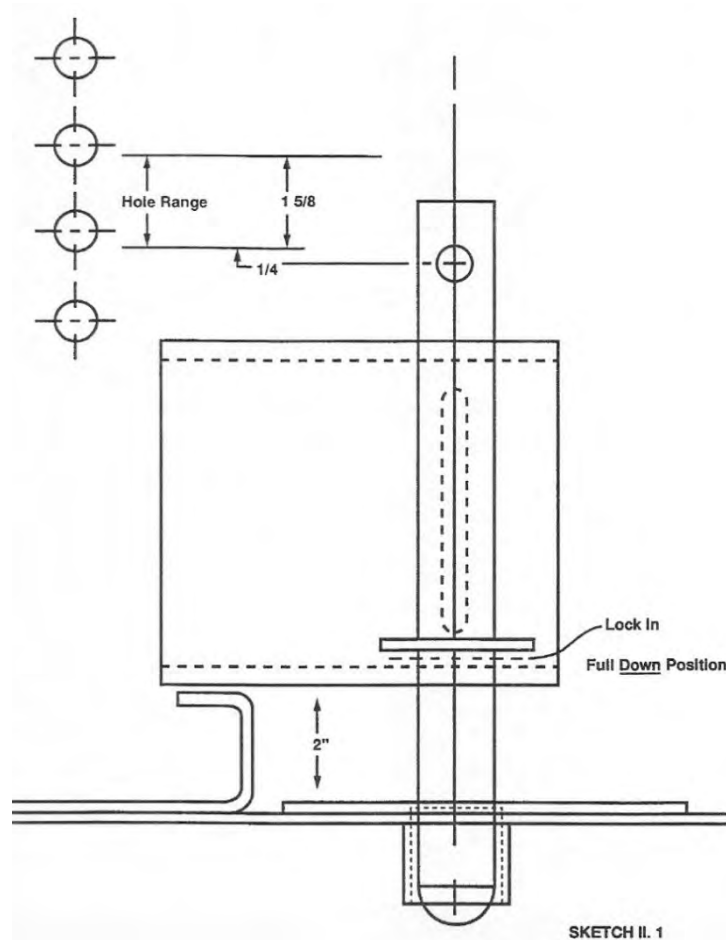
#### NOTICE

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1. Remove the existing upper lock arm by removing the pivot bolt, nut and bushing. Remove the nut and bolt connecting the lock pin to the arm. Save all nuts, bolts, and bushings for re-use but discard the arm. Remove the lock cable.
2. Apply the new upper lock arm (30-009-15/16) as shown in Figure 5. Select the pivot hole which is at least a ¼" above the center of the lock pin hole, but no more than 1<sup>5</sup>/<sub>8</sub>" above the lock pin hole.

## Thrall Car Radial End Door™ Manual

3. Bolt the new arm in place using the selected hole and the previously removed hardware. (Do not forget the bushing.) (See Figure 6)
4. The lock cable will need to be shortened. Cut the cable in half. Strip the plastic coating back at each end. Overlap the two ends approximately 3" and apply the two cable clamps. (See Figure 7) The overlap dimension may need to be adjusted after trying the lock. After final adjustment apply a second nut to each threaded end of the 'U' bolt and tighten the two nuts together.
5. The cable final adjustment sequence follows.
  - A. Unlock the bottom lock and open the door about  $\frac{1}{2}$ ".
  - B. Tighten the eyebolt until the bottom of the lock pin is  $\frac{1}{4}$ " above the lock receiver. (See Figure 6).
  - C. Tighten the jam nut onto the eyebolt.
  - D. Test the door.
  - E. Remove all extra threads on the eyebolt.
6. Lubricate the locks and receivers. (Apply AAR approved lubricant but do not over apply).
7. Try the door to ensure the lock pin falls easily and completely into the receiver in both the open and closed positions.



**Figure 5**

Thrall Car Radial End Door™ Manual

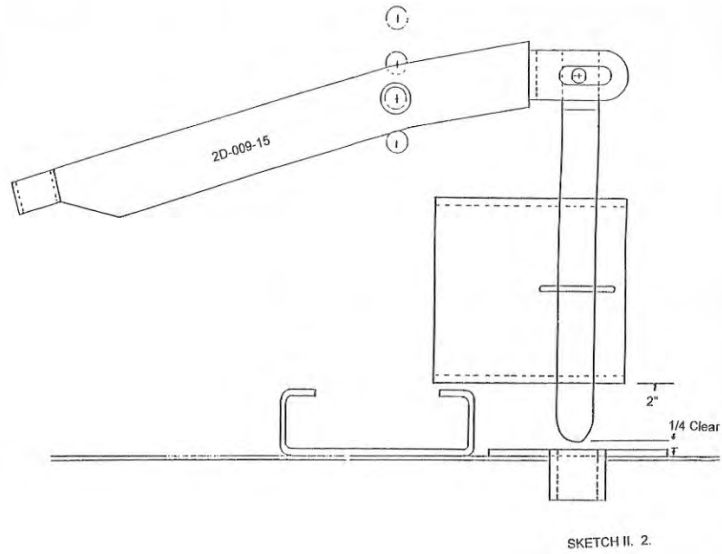


Figure 6

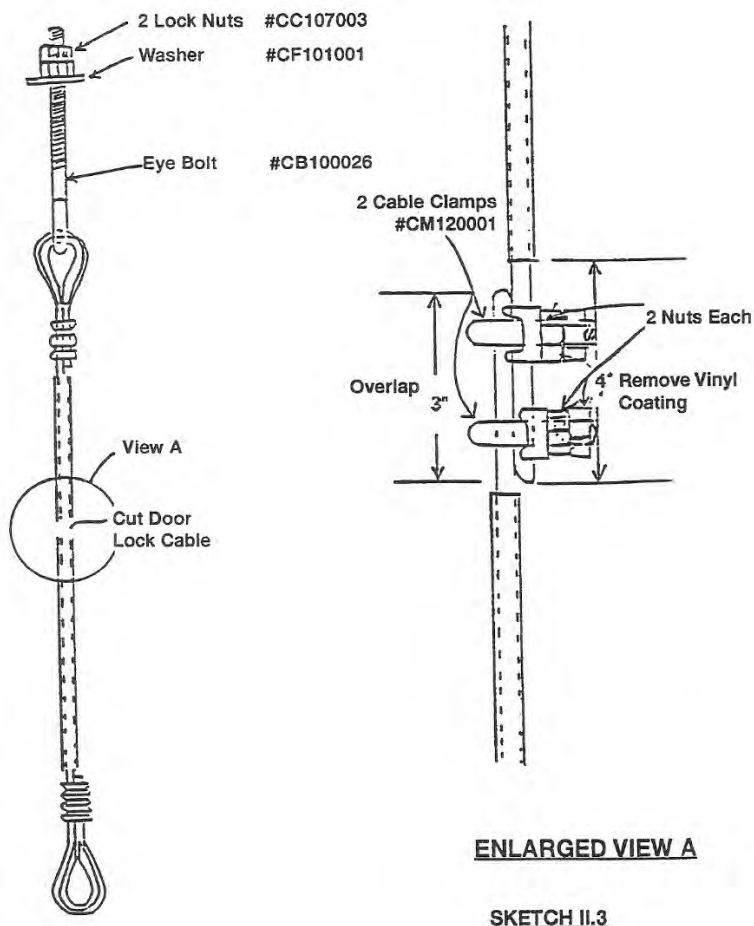


Figure 7

## Thrall Car Radial End Door™ Manual

### Upper Guide Fingers Repair Procedure

TrinityRail has used wear resistant fingers on all new Radial Doors™ since 1988. We strongly recommend that original equipment fingers be replaced with fingers of the same type. It is recommended using two ½" diameter Huck bolt fasteners to ensure that the fingers are tight against the guide bar.

#### NOTICE

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When replacing upper guide fingers:

1. First repair the upper track if necessary as described in Upper Track Repair Procedure in this section.
2. Apply the fingers so there is a minimum 1-inch engagement between the finger and the vertical leg of the upper door track.
3. Allow for "free play" between the fingers and the upper track when the door is in the open or closed locked position. Neither finger should bind against any part of the track including the end stop plate.

If there is a problem obtaining finger-to-upper track free play or engagement, the upper track must be cut free and re-set. Never spread the fingers open to obtain "free play". It is also advisable to repair the lower door track and rollers before repairing the upper track or upper guide.

### Upper Door Track Repair Procedure

#### NOTICE

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1. Remove the square stop plate at the end of the upper door track. If this plate is not damaged it can be reused.
2. Burn out the vertical leg of the door track angle as shown in the cutting diagram (View A-A of Figure 8).
3. Fabricate a new part as shown on Figure 8, Item 13.



### Thrall Car Radial End Door™ Manual

4. Clamp and tack weld Item 13 to the door track. Weld complete using a Low Hydrogen electrode as shown in Figure 8 View B-B. Grind the vertical weld at the splice until it is smooth.
5. Reapply the square stop plate to the end of the upper track. Apply  $\frac{3}{16}$ " fillets which are 2" long. The fingers should not touch the stop plate.
6. Check the door operation. Ensure that the top and bottom locks fall completely into the receivers when the door is in the fully open and the fully closed positions. Some adjustment of the upper track or the lock receivers may be necessary. There must be "free play" between the upper guide fingers and the upper track.
7. Inspect the remainder of the door and repair any worn or broken parts using the recommended procedures found in this manual.
8. Finally, lubricate the doors and the door tracks.

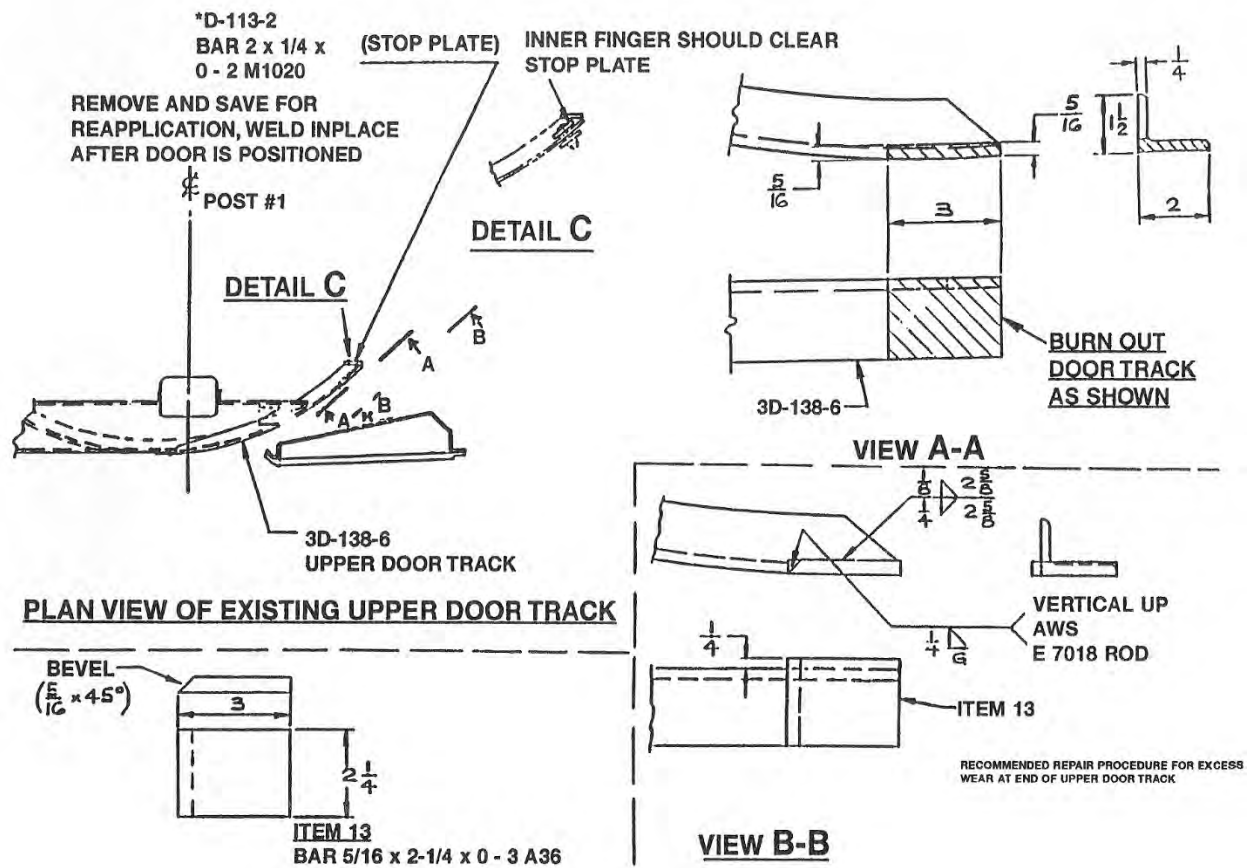


Figure 8

## Thrall Car Radial End Door™ Manual

### Top Anti-Vandalism Chain and Rod Repair Procedures

Door models 8007 through 8017 have large cut outs in the top of the door and require one or two anti-vandalism chains (two chains are required to meet M-941). The newer style Radial Doors, models 8020 and above (without the large cutouts), applied to Trinity autoracks built since mid-1988, do not require anti-vandalism chains (See Figure 9).

The proper application of the additional chain and rod assembly is covered in the "Modification of Older Thrall Car Radial Doors™ to approximate AAR spec. M-941 Manual – Section I.C.

#### NOTICE

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1. The chains and rods must be inspected for wear. If the chain or rod is worn more than 33%, replace the part.
2. The chain must also be inspected for proper tension. A loose chain will not prevent the top of the door from being pried open. After the door is repaired and the locks are functioning, proper chain tension should be checked. There should be ½" of slack in the chain with the door locked closed.
3. If necessary, cut the end of the chain loose and re-apply to achieve a ½" maximum slack condition.
4. Operate the door to ensure that the chain does not hang up on the rod.
5. If necessary, open the end chain link on the rod to make it slide easier.

# Thrall Car Radial End Door™ Manual

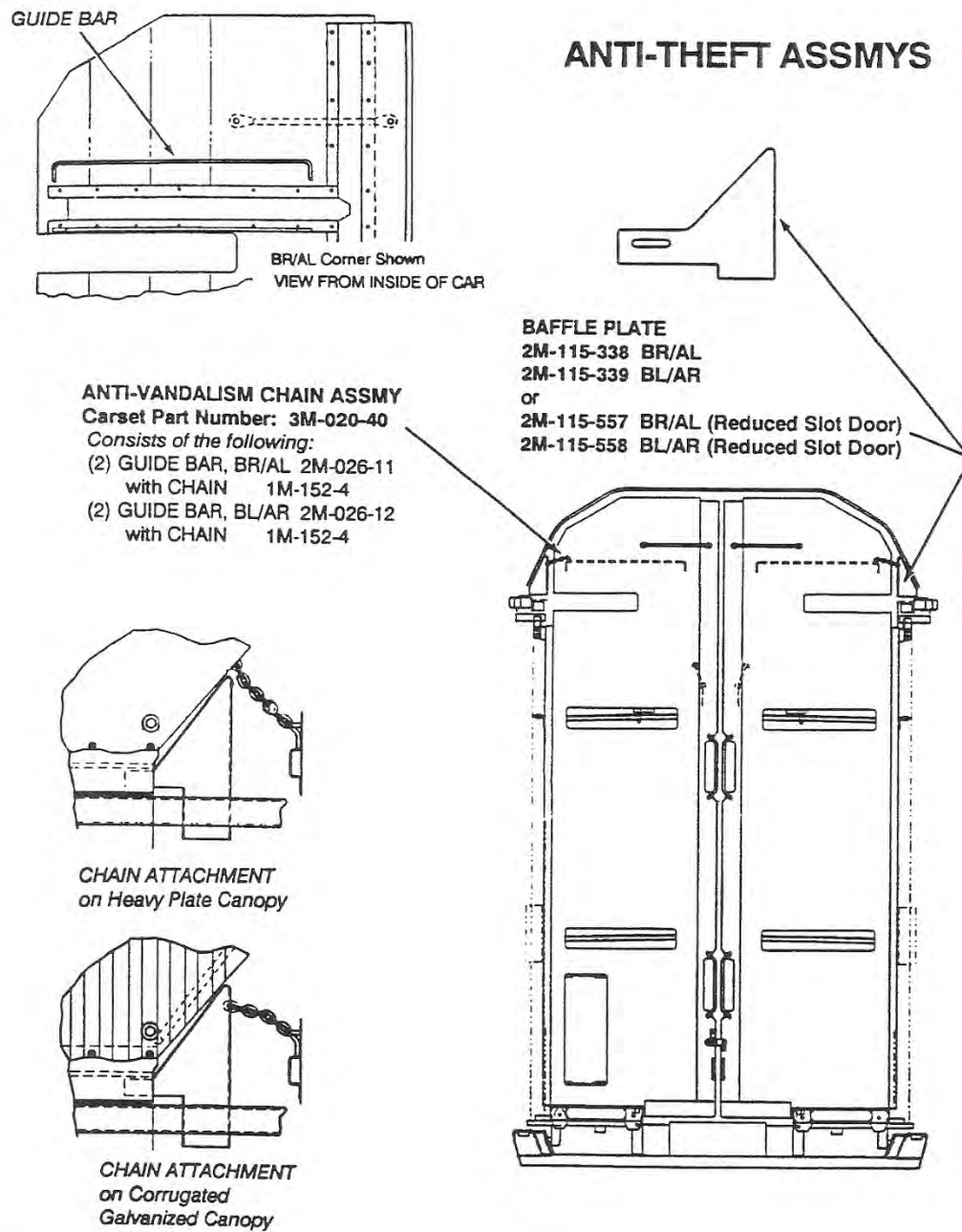


Figure 9

## Thrall Car Radial End Door™ Manual

### Inspection and Repair of the Door to Roof Interlock Connection

**Patrick T. Ameen**  
Assistant Vice President -  
Technical Services



**Wednesday, April 05, 2000**

**c-9120**

**EW-159-S1**

**Subject: Multi-Level End Doors Equipped With Roof Interlock Plates**

**To: MEMBERS AND PRIVATE CAR OWNERS**

**File Number: SEFCC**

Early Warning Letter EW-159 (c-8773) was issued September 29, 1997 advising of incidents where the roof/end door interlock plate on multi-level autorack cars had separated from the end of the roof canopy sheet and fallen. The roof interlock plate (also called a "mushroom") is designed to secure the top of the end doors to the roof to assist in preventing unauthorized entry. At least six (6) other autoracks had been located with various degrees of cracking in the roof-to-interlock support area. This EW Supplement is to advise that there have recently been additional reports of these interlock plates falling when the end door was opened. In addition to the original design of the interlock plates that had one row of five (5) fasteners, there have also been incidents of cracked roof canopies on autoracks equipped with a newer designed plate that has a 1-3-1 bolt pattern. In all cases where defects have been noted, corrugated type roof sheets have been involved--not the solid steel design as on some autoracks. The interlock system was produced and installed by the rack manufacturer on new equipment as well as sold in kit form for retrofit applications. The system, and/or a very similar system has also been sold as a retrofit kit by component suppliers. The rack manufacturer has developed a recommended repair/replacement procedure and kit for application. Please be advised that extreme care should be exerted when opening and closing end doors on multi-levels equipped with a roof/end door interlock system. The interlock system should be inspected and all loose or defective interlock plates and all cars with a cracked roof canopy should have repairs made immediately. When a crack develops, it appears that vibration during transit aggravates the cracking of the roof canopy around the interlock plate until there is total failure and separation. The AAR Specially Equipped Freight Car Committee is aggressively working with the rack manufacturer, autorack owners and retrofit suppliers. Please distribute this information to personnel at all multi-level loading and unloading facilities as well as other locations that require opening and closing of multi-level end doors. As additional information, a videotape entitled: "Safety Update: Autorack Roof to End Door Interlock System" was previously distributed to all motor vehicle loading and unloading facilities. It is recommended that this video again be reviewed by all personnel working on and around multi-level autoracks.

**Sincerely,**  
**Patrick T. Ameen**  
**Assistant Vice President - Technical Services**  
**202-639-2140 202-639-2179 [Email:pameen@aar.org](mailto:pameen@aar.org)**

**Safety & Operations**  
**Association of American Railroads**  
**425 Third Street, SW, Suite 1000, Washington D.C. 20024**

# Thrall Car Radial End Door™ Manual

**Patrick T. Ameen**  
Assistant Vice President -  
Technical Services



**EARLY WARNING**

**Friday, April 21, 2000**

**c-9130**

**EW-159-S2**

**Subject: Multi-level Cars Equipped with Roof/End Door Interlock Systems**

**To: MEMBERS AND PRIVATE CAR OWNERS**

**File Number: SEFCC**

Early Warning Letter EW-159 (c-8773) was issued September 29, 1997 advising of incidents where the roof/end door interlock plate on multi-level autorack cars had separated from the end of the roof canopy sheet and fallen. The roof interlock system is designed to secure the top of the end doors to the roof to assist in preventing unauthorized entry. At least six (6) other autoracks had been located with various degrees of cracking in the roof-to-interlock support area. Supplement 1 to EW-159 was issued April 9, 2000 in Circular Letter c-9120 to advise that there had been additional reports of these interlock plates falling when the end door was opened. In addition to the original design of the interlock plates that had one row of five (5) fasteners, there have also been incidents of cracked roof canopies on autoracks equipped with a newer designed plate that has a 1-3-1 bolt pattern. In all cases where defects have been noted, corrugated type roof sheets have been involved---not the solid steel design as on some autoracks. The interlock system was produced and installed by the rack manufacturer on new equipment as well as sold in kit form for retrofit applications. The system, and/or a very similar system, has also been sold as a retrofit kit by component suppliers. The AAR Specially Equipped Freight Car Committee (SEFCC) has continued to investigate the problem which now seems to be focused on cars with corrugated, galvanized type roof canopies. We are unsure how many racks had this system applied by third parties as a retrofit application. Approximately 13,500 multi-level racks were manufactured with this type of interlock system. The Technical Services Working Committee has approved the following actions: Specific car series have not been developed so we will not be "loading" car numbers in an Early Warning pool in UMLER. Empty Cars at Pre-trip Locations, Designated Satellite Shops or Repair Facilities (with galvanized, corrugated roof sheets & radial type end doors) Inspect the roof interlock systems on both ends of the rack: Multi-level pre-trip locations that have the capability to safely remove the interlock system (the interlock plate & the locking rod), regardless of condition, should do so on both ends of the car. If a loose or defective interlock plate or a cracked roof sheet are found and the pre-trip location cannot safely remove the interlock system, bad order the car to a repair track or disposition the car to a designated satellite shop for interlock systems removal. Empty Cars at Pre-trip Locations, Designated Satellite Shops or Repair Facilities (with non-corrugated, steel roof sheets & radial type end doors) Inspect the roof interlock systems on both ends of the rack: If a cracked roof sheet is found, remove the interlock systems (the interlock plate & the locking rod) from both ends of the car. If a loose fastener(s), broken interlock plate, or worn locking rod ("mushroom stem") are found, repair accordingly. If a loose or defective interlock plate or a cracked roof sheet are found and the pre-trip location cannot safely remove the interlock system, bad order the car to a repair track or disposition the car to a designated satellite shop for interlock systems removal or interlock plate/locking rod repairs. Loaded Cars (all cars) Extreme care should be exerted when opening and closing end doors on multi-levels equipped with roof/end door interlock systems. Interlock System Removal Procedures Both the interlock plate at the end of the roof sheet and the locking rod ( i.e. "mushroom") must be removed from both ends of the rack. Carefully burn off (taking care not to damage the roof sheet) the fasteners & remove the entire interlock plate. Do not leave any fastener pieces in or on top of the roof sheet. Remove the top of the locking rod (i.e. the "mushroom cap") from both end doors by cutting the "stem" even with the top of the radial end door---taking precautions not to damage the radial end doors. A sketch depicting the interlock system location on the rack and a typical interlock system is appended to this circular. Tracking & Other Information Multi-level Reload Project and Railinc personnel are developing a process to track inspection and removals. The SEFCC is working with the rack manufacturer to develop a more effective rack modification or retrofit kit. Please distribute this information to personnel at all multi-level loading and unloading facilities as well as other locations that require opening and closing of multi-level end doors.

**Sincerely,**  
**Patrick T. Ameen**  
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**Safety & Operations**  
**Association of American Railroads**  
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## Thrall Car Radial End Door™ Manual

### Door Vertical Member Repair Procedures

#### NOTICE

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It is often easier to do major repairs if the doors are removed from the car and worked on a flat table. See the section, Installation Procedures for a Replacement Radial Door or the recommended removal and installation procedures.

#### WARNING

Radial doors weigh 400 pounds each and must be handled with care.

#### NOTICE

All welds described in this procedure should be welded with a mild steel electrode such as M6018.

1. Ensure that the door is not bent. Brace it or straighten it, if necessary.
2. If a crack exists around the hat section of a vertical member or a splice is being made, remove sufficient door skin to expose the backside of the vertical member at the gouged area. Apply a 2" x  $\frac{3}{16}$ " x 2¼" backup bar (Figure 12, Item 10) against the gouge, crack or splice from the outer side of the door. Weld the backup bar as shown on Figure 12, Section A-A. Then reapply or replace the door skin, which was removed.
3. On the inside of the door, remove the weld around the two welding tabs located at the end of the horizontal members. Heat and bend these tabs back (inside view of door).
4. "V" out the crack. Weld the crack or gouge 100% to the backup plate (Item 10). Grind off any excess weld as shown in Section A-A.
5. For gouges or cracks in the deck cutout area, make (or buy from Thrall Car Service Parts) a reinforcement plate as shown on the reference drawing from C1020 steel, 4 $\frac{7}{8}$ " x  $\frac{3}{16}$ " x 24". Refer to Figure 12, Item 11.

**OR**

For use on other cracks or splices, make (or buy from Thrall Car Service Parts) a reinforcement plate as shown on the reference drawing from a steel plate 4 $\frac{7}{8}$ " x  $\frac{3}{16}$ " x 12", C1020 steel. Refer to the Figure 12, Item 12.

6. If the crack extends past the hat shape section on either side, arc or grind it out. Apply a backup bar (1" x  $\frac{3}{16}$ " by the required length) wherever possible. Weld around the backup bar. Weld the crack 100% to the backup bar.
7. Apply the reinforcement plate to the vertical door member. Center the proper plate (Item 11 or 12) over the gouge, crack, or splice, and weld complete. (Refer to the welding instructions on the drawing.)

### Thrall Car Radial End Door™ Manual

8. Reheat and refit the welding tabs at the ends of the horizontal door members. Fit them tightly to the reinforcement plate and weld complete. If the tabs are cracked, repair them using the "Horizontal Door Member Repair Procedure" found in this manual.
9. Check the door operation and adjust as necessary.
10. Make other repairs as required (upper guides or locks, etc.).
11. Clean and paint the repaired door section. Do not apply paint or allow over spray on door lock pins, grease cups, or door lock springs.

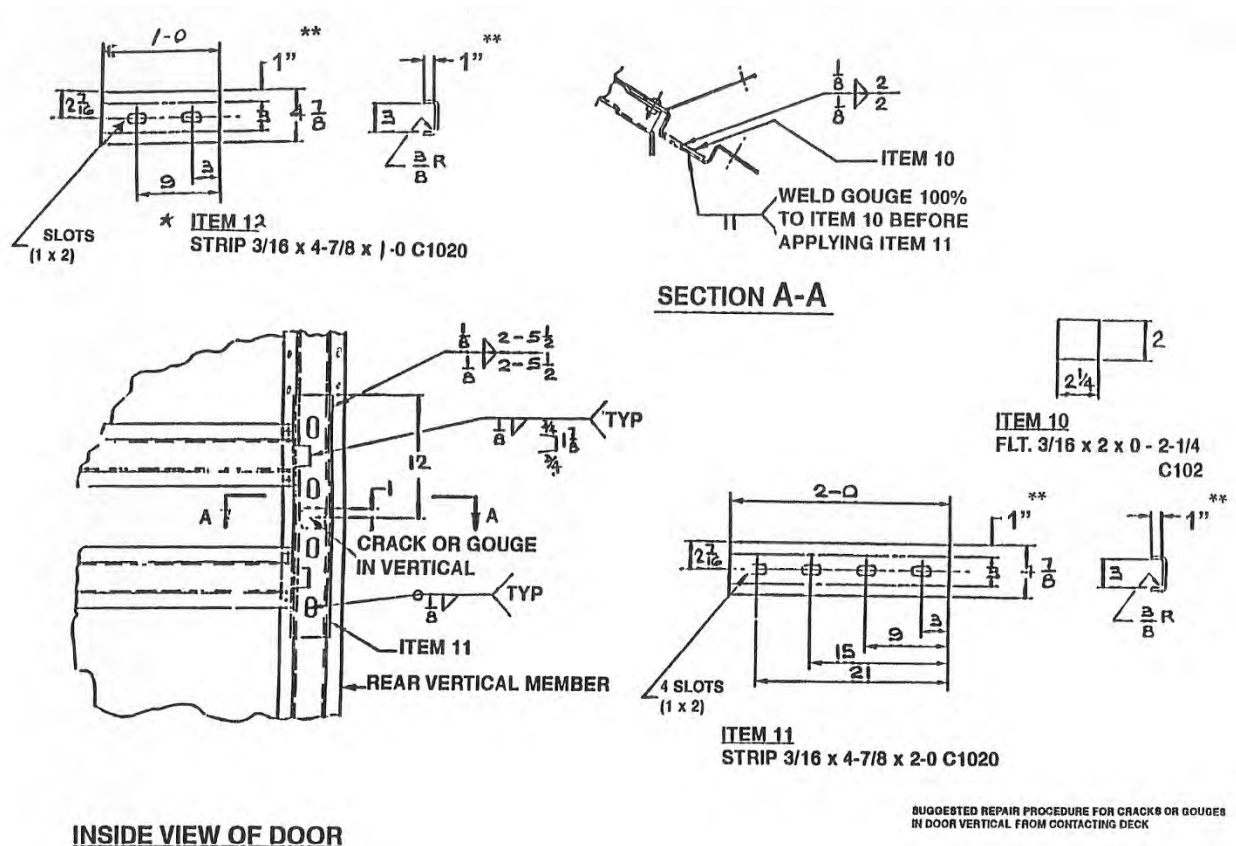


Figure 12

## Thrall Car Radial End Door™ Manual

### Nose Vertical "BL" Door Member Repair Procedure

#### NOTICE

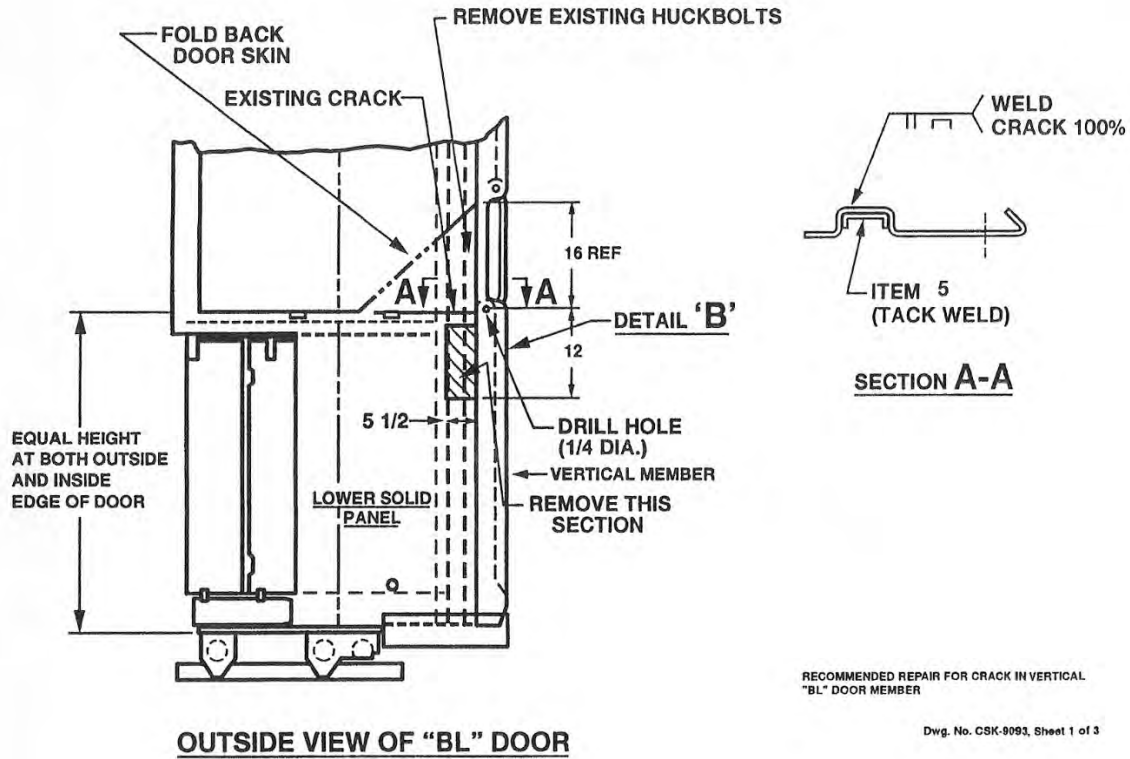
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1. Lock the door in the closed position, ensuring that both top and bottom locks engage.
2. Remove the door skin from the vertical door member for a section 16" above the crack, by removing the Huck bolts. (See Figure 13.)
3. Remove a section of the lower solid panel 5½" wide and 12" below the crack. Use care when removing this section so as not to damage the vertical member behind it (Figure 13).
4. Drill a ¼" diameter hole at the end of the crack (See outside view.)
5. Fabricate backup strips, (Figure 13, Item 5) a minimum of 11-gauge 1" wide. Tack weld these strips into place on the outside of the vertical member. Use heat, if necessary, to fit these back up strips tightly to the vertical door member. The strip may have to be pieced together to ensure that it follows the crack. Grind or air arc out the crack and re-weld using a 100% penetration weld to the backup bar (Figure 13, Section A-A).
6. Place a ⅛" weld 2" long every 4" on the left side of the vertical member (Figure 14, Detail B).
7. Fabricate a ⅜" plate, 24" long and 7" wide, (Figure 14, Item 6). Place the bottom of this plate into the location where the lower plate was removed. Leave a ⅜" gap on the side and a ⅛" gap at the bottom. Weld the new plate to the old plate on the left side and on the bottom side using 100% solid weld (Figure 14, Detail B). Grind smooth when complete.
8. For the balance of the perimeter of Figure 14, Item 6, weld the plate to the vertical door member using a ⅛" fillet by 2" at 6" centers. No weld should be placed within 1" of the vertical member radius. (Figure 14, Detail B).
9. Use Item 6 as a backup plate and grind out the crack on the inside of the door to Item 6. Weld 100% (Figure 14, Section C-C.)
10. If the crack extends past the side of plate 'A', a backup, plate, item 7, must be applied to the inside of the door. Grind out the crack to the ¼" hole and then weld 100%. (Section C-C)
11. Drill ⅝" holes through Item 6 at each location a Huck bolt was removed from (Figure 14, Detail B).
12. Replace the outer door skin and reapply using ¼" Hucks.
13. Fabricate a ⅜" plate, 24" long and 6" wide, (Figure 15, Item 8). Form this plate into an angle with slots as shown in the drawing.
14. Clamp this plate to the inside of the door vertical member. (Ensure that all Hucks are applied before applying plate 'B'). Apply this plate, centered vertically over the crack similar to the application of plate 'A'. Weld plate 'B' (⅛" fillet weld around the slots) and ⅛" to 2" at 6" on both sides (Refer to Figure 14, Section D-D).
15. Clean and paint all bare metal and the area affected by these repairs.
16. Repair the upper door track and upper door guide as necessary.



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17. Check the upper lock to ensure that the pin is fully engaging in both the open and closed positions. It may be necessary to reposition or adjust the upper lock or upper lock receiver.
18. Lubricate the doors.



**Figure 13**

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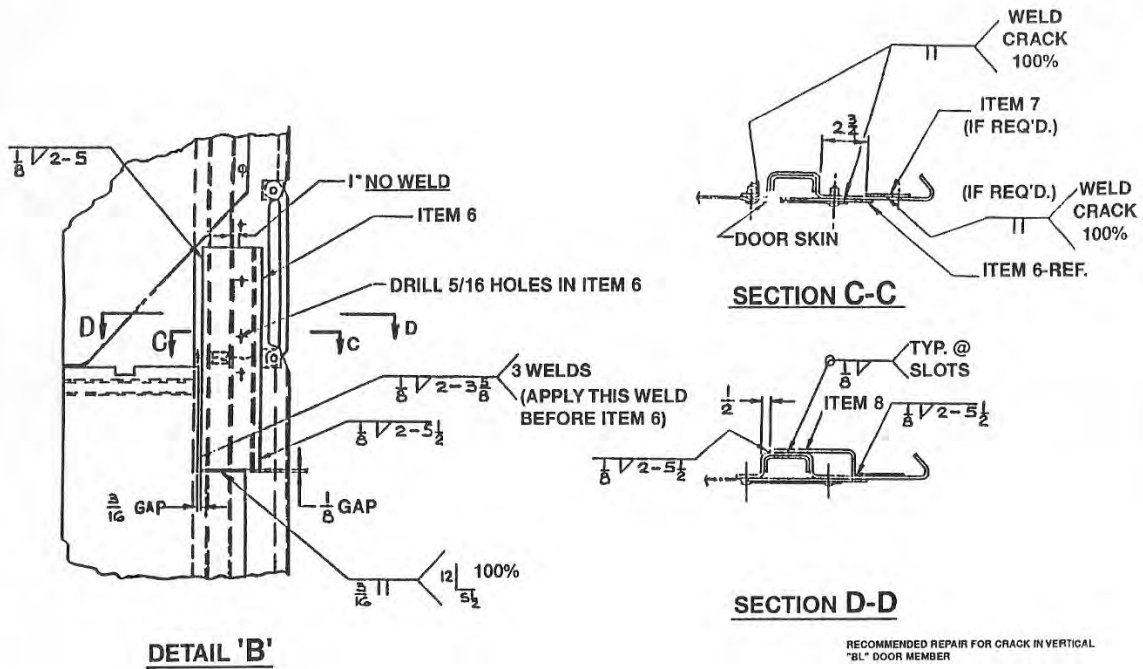


Figure 14

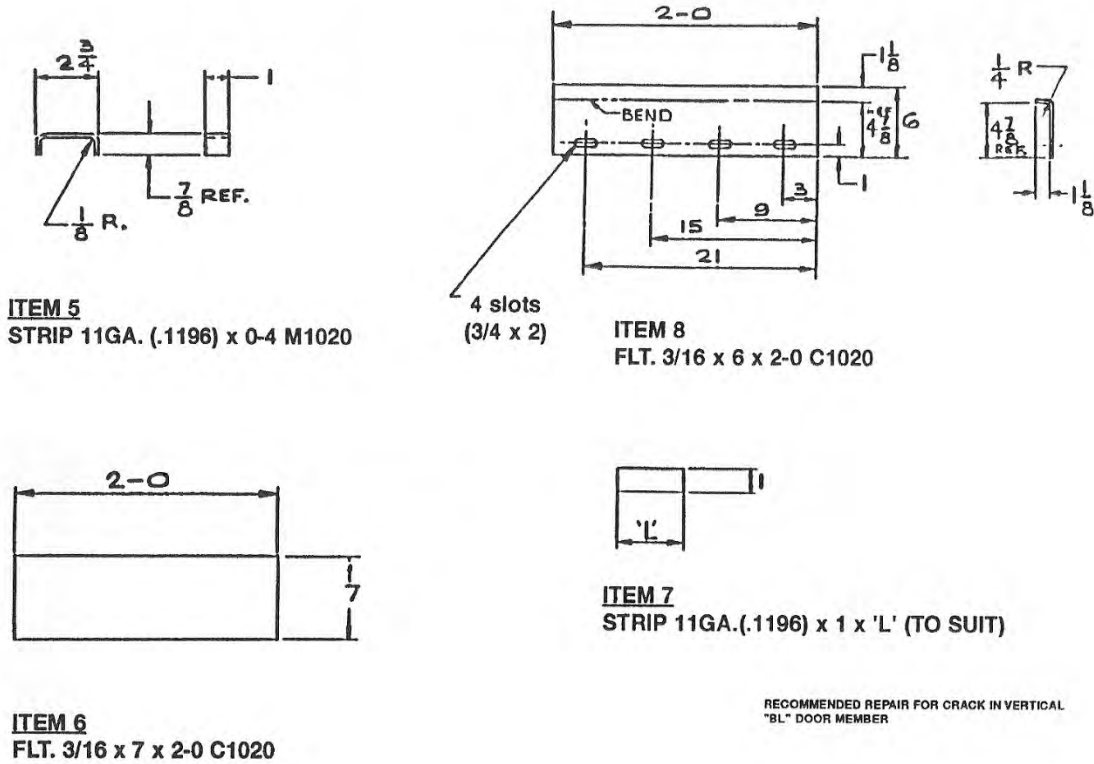


Figure 15

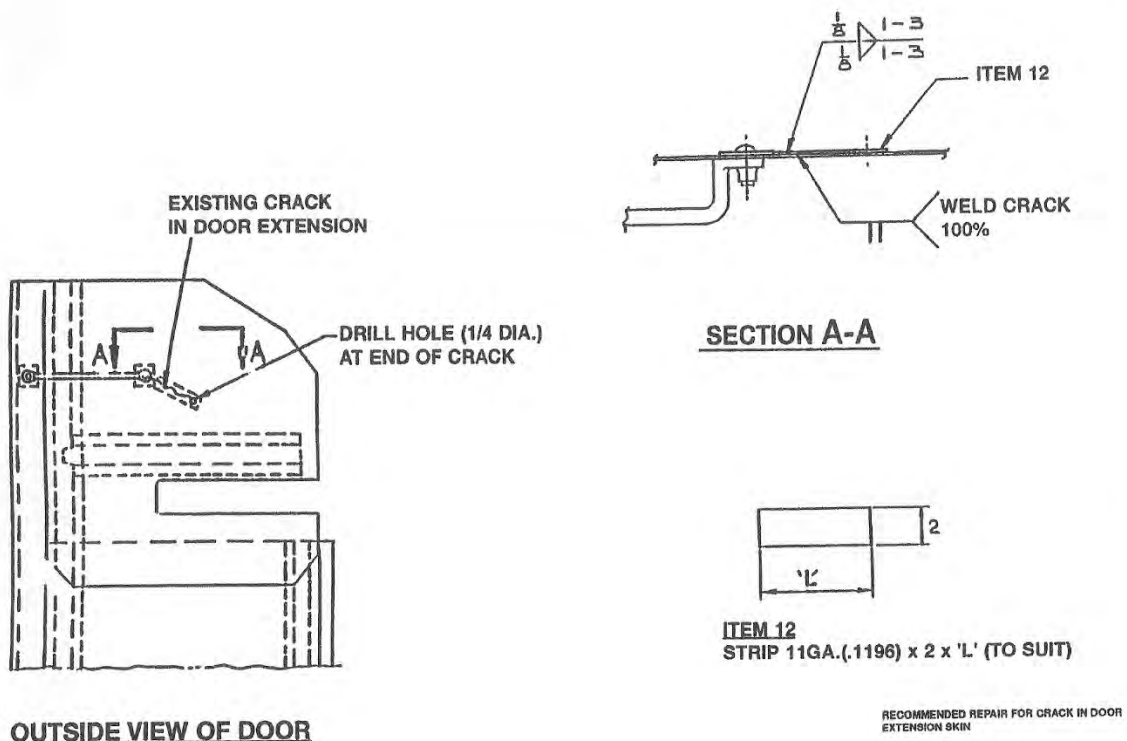
## Thrall Car Radial End Door™ Manual

### Door Extension Skin Repair Procedure

**NOTICE**

The following steps must be performed in shop facilities that are approved by the Association of American Railroads [AAR] by mechanics trained by Trinity North American Freight Car, Inc. [TrinityRail]. Please contact *TrinityRail* Customer Service department at (800) 227-8844 to request training and / or the latest version of the procedures.

1. Straighten any cracked areas in the door extension skin.
2. Drill  $\frac{1}{4}$ " holes at the end of each crack; this must be done for a successful repair.
3. On the inside of the door apply a patch plate (Figure 16, Item 12), made of 11-gauge mild steel, over each crack. This patch **must** extend at least 1" on each side of the crack. (Refer to Figure 16, Section A-A).
4. Fit the patch plate tightly to the door skin and weld using a  $\frac{1}{8}$ " fillet weld 1" at 3" centers around the perimeter.
5. Grind out the crack in the skin to  $\frac{1}{16}$ " then re-weld the crack 100% to the backup plate. (Refer to Section A-A).
6. Grind the area free of sharp edges.
7. Repaint the section of the door affected by these repairs.



**Figure 16**

## Thrall Car Radial End Door™ Manual

### Inner Door Vertical Members Repair Procedures

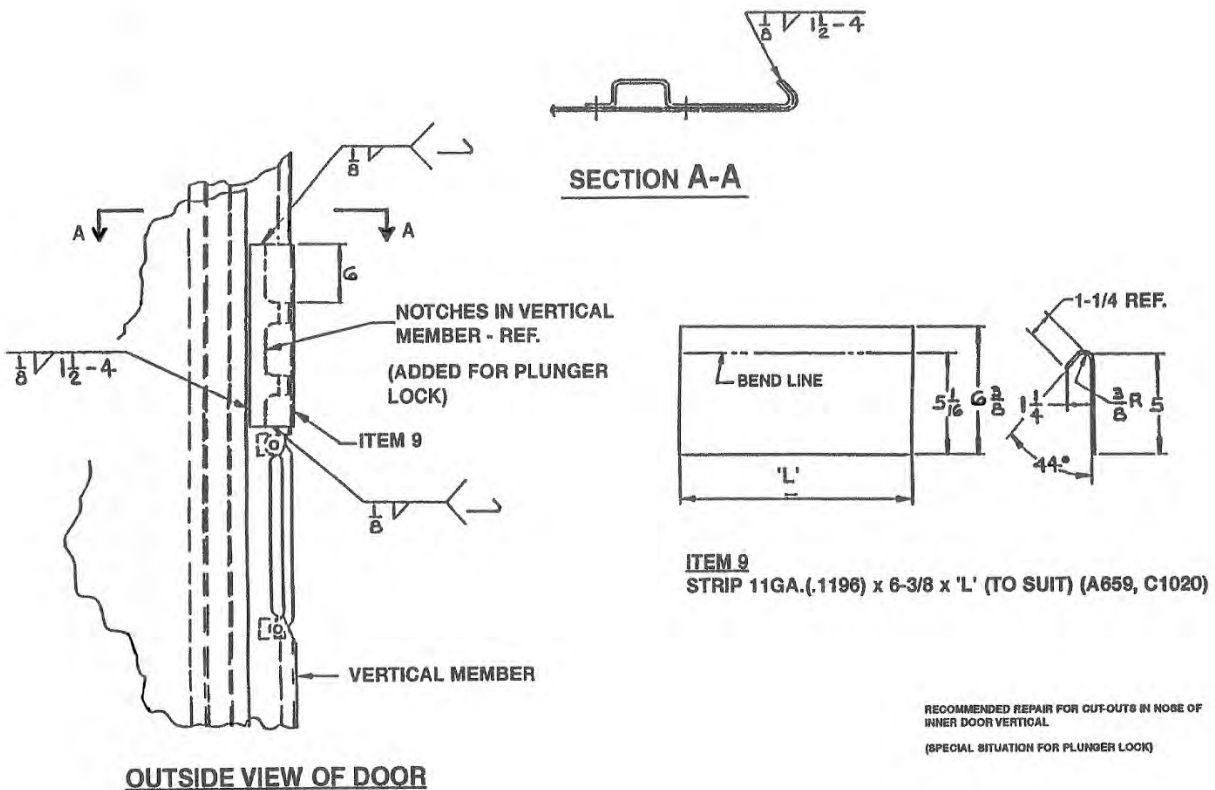
**NOTICE**

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**NOTE**

This is a special situation caused by deck plunger locks.

1. Remove the 'T' section on the 'B' deck if it interferes with the proper operation of the door.
2. Add a patch plate, (Figure 17, Item 9), as shown in "Outside View of Door". The repair plate should extend 6" above the top cutout and as low as the grab iron permits.



**Figure 17**

## Thrall Car Radial End Door™ Manual

### Horizontal Door Member Repair Procedure

#### NOTICE

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1. If a crack exists in the tab at the end of the horizontal cross member, very carefully remove this tab. Use care so as not to damage or gouge the vertical door member. (Refer to Figure 18 Inside View – Existing Condition)
2. Make a new reinforcement piece as shown (Figure 18, Item 1) using mild steel such as M1020.
3. Clamp the reinforcement to the horizontal member and tack weld in to place. Next, clamp the reinforcement to the vertical member. Use heat if necessary to obtain the proper fit up. (Figure 18, Inside View – Repaired)
4. Weld the reinforcement using the proper procedure shown on the sketch. Use a mild steel electrode such as 6018.
5. Clean and paint the affected area.
6. Check for any other cracks or defects in the doors. Repair these cracks using the recommended procedures found in this manual.
7. Operate the doors and check for the proper locking, operation and clearances. Adjust as necessary.
8. If a crack is found in the cross member at any location other than the weld tab, a new cross member should be applied.

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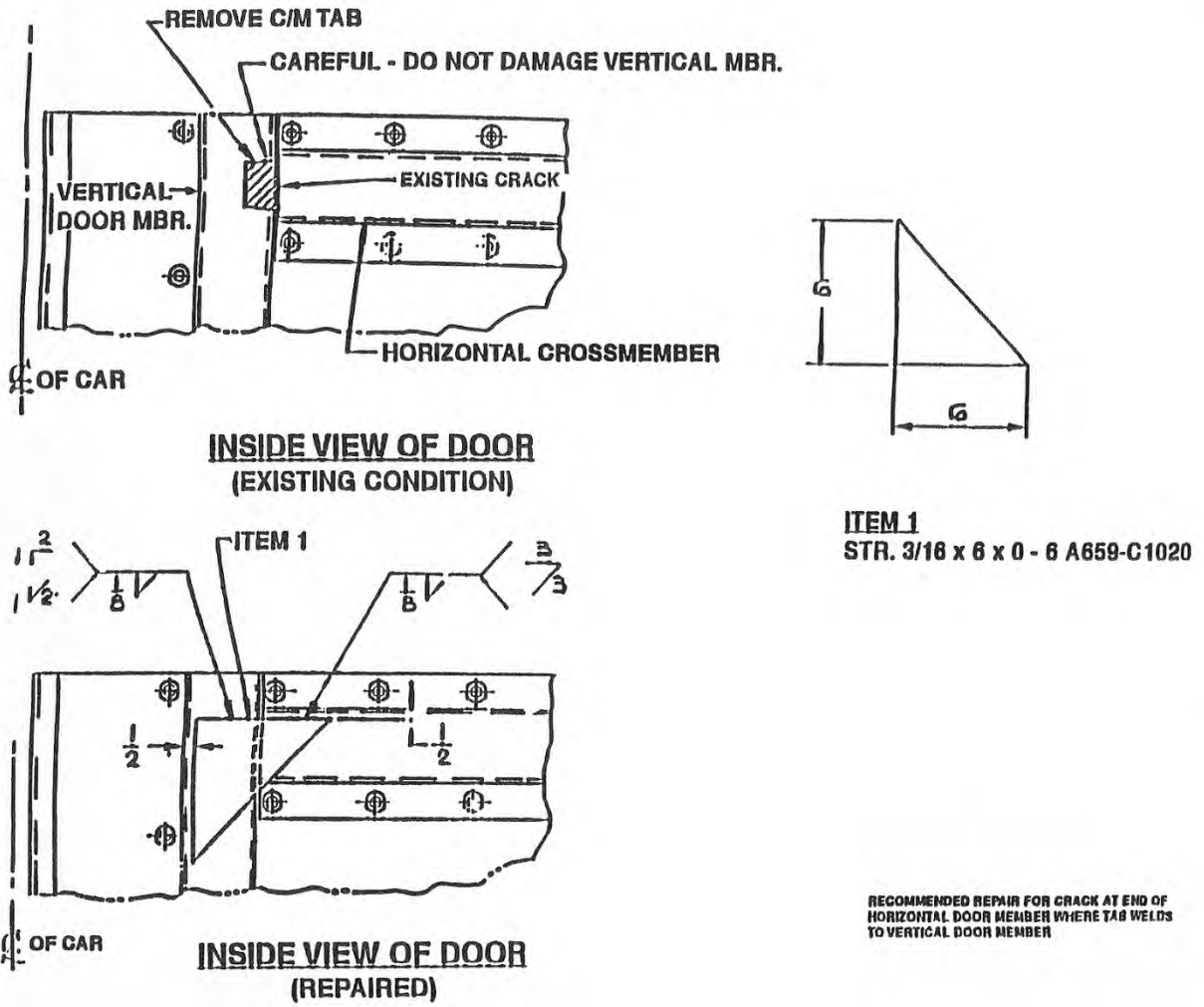


Figure 18

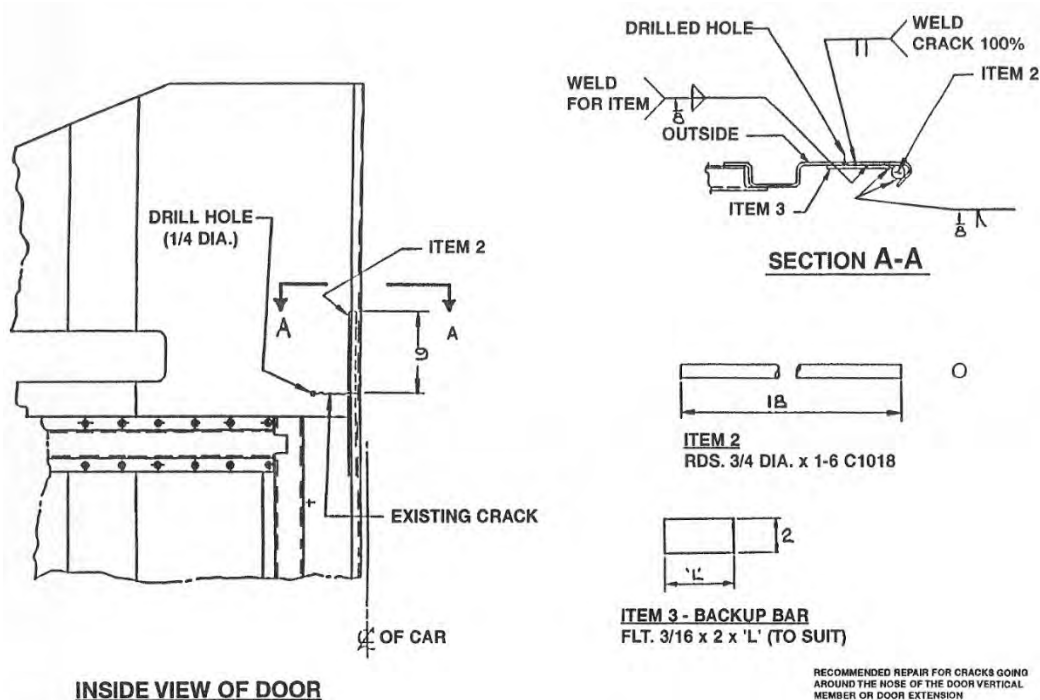
## Thrall Car Radial End Door™ Manual

### Cracks Around the Nose of the Door Vertical Member or Door Extension

**NOTICE**

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1. It is most important to drill a 1/4" hole at the end of the crack (See Figure 19, Inside View).
2. Clamp a 3/4" round bar, 18" long, (Item 2), to the inside of the nose piece as shown in Figure 19. Place the bar vertically so that the rod is centered 9" below the crack.
3. Perform a vertical up weld to the round bar, as shown on the inside view, using the mild steel electrode and proper welding procedures.
4. Grind out the crack.
5. Place backup bars (Item 3) onto the inside of the door. The bars should extend 1" beyond the crack in every direction, if possible. Weld the backup bars as shown in Figure 19, Section A-A.
6. Weld the crack with 100% penetration from the outside of the door, welding into the backup bar as shown in Section A-A.
7. Clean and paint the affected area.
8. Check all doors for other defects or wear. Repair and adjust as necessary.



**Figure 19**

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### Missing Pieces at the Top of the Door Outer Vertical at the Upper Door Guide (Narrow Doors Only)

#### NOTICE

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1. Carefully pull back the door skin at the area of repair to avoid damage.
2. Cut off the top 15<sup>1</sup>/<sub>8</sub>" of the outer vertical door member. (Refer to Figure 20, Outside View of Door – Existing Condition.)
3. Tack weld a new piece (Figure 20, Item 15 or 16) after adding new gusset (Item 17), leaving <sup>1</sup>/<sub>8</sub>" gap between the two pieces for a 100% penetration weld. (Hold the hole-spacing on the outer row of Huck holes to 6" on center).
4. Tack a <sup>3</sup>/<sub>16</sub>" back up bar 5" x 10" (Item 19 or 20) to the inside of the door, using heat as necessary to form the part to follow contour of the door member.
5. Weld the splice from the outside of door, using a 100% penetration weld to the backup bar (Refer to Section A-A, Figure 21).
6. Weld the backup bar on the inside - using a continuous weld (Refer to Section A-A).
7. Re-Huck the skin to the repaired member.
8. Apply the new upper guide assembly. Refer to Detail C, Figure 21.
9. Re-weld the end of the top horizontal member to the repaired vertical member. Apply a <sup>3</sup>/<sub>16</sub>" bar (2" X 3") to the end of the horizontal member where the welding tab was broken (Item 18). Weld the other side of the bar to the vertical member (Refer to Detail C).
10. Operate the door to check for proper clearance and operation. It may be necessary to adjust the upper door track. Repair the upper door track if worn.
11. Clean and repaint the section of the door affected by these repairs.

#### NOTICE

Use a mild steel weld rod such as 6018 for all repairs. All parts in this section are mild steel similar to M1020.



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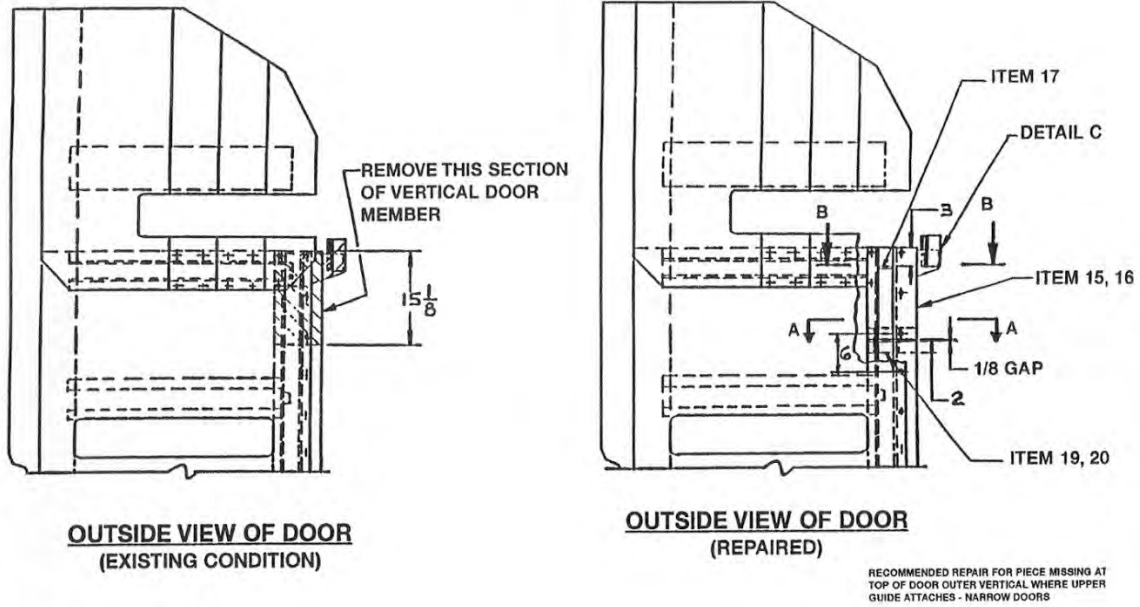


Figure 20

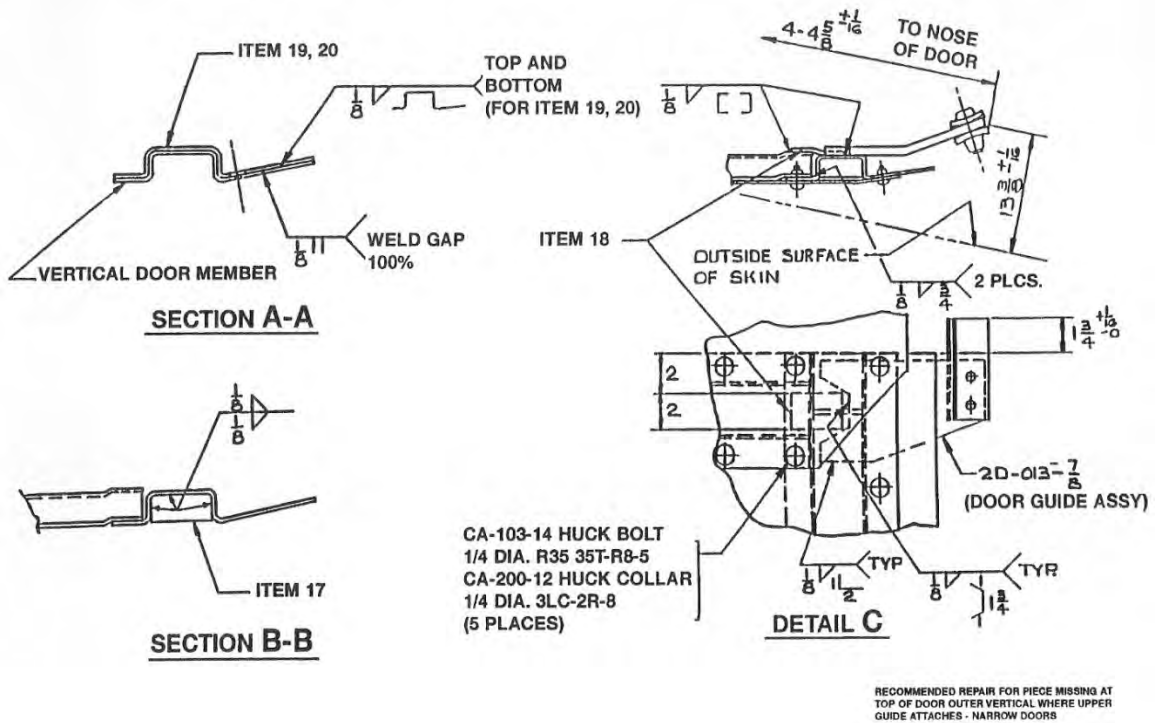


Figure 21

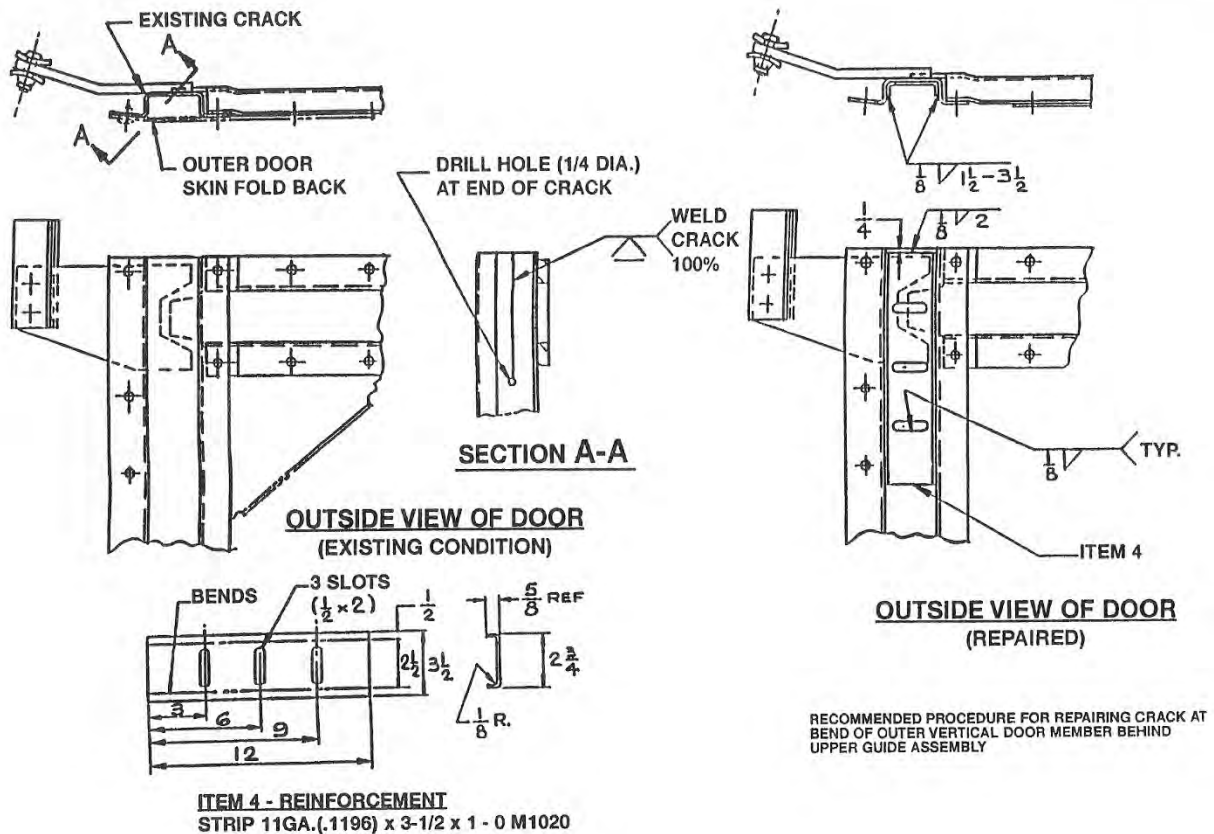


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**NOTICE**

Ensure that the upper guide fingers have "free play" while in the locked position.

8. Check all doors and their operation and replace or repair worn parts as needed.



**Figure 23**

**Stiffener Addition to the 'BL' Doors with a Sliding Handbrake Panel**

Radial doors, built before 1981, models 8004, 8005, some 8006 and some 8007, require a stiffener on the bottom horizontal member. If a stiffener has not been added, part CSK7779 should be applied.

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1. Check the bottom horizontal member for cracks.
2. If a crack is found, the door must be removed and a new bottom horizontal member applied.
3. If no crack is found, apply a new stiffener (CSK7779) as shown in Figure 24.

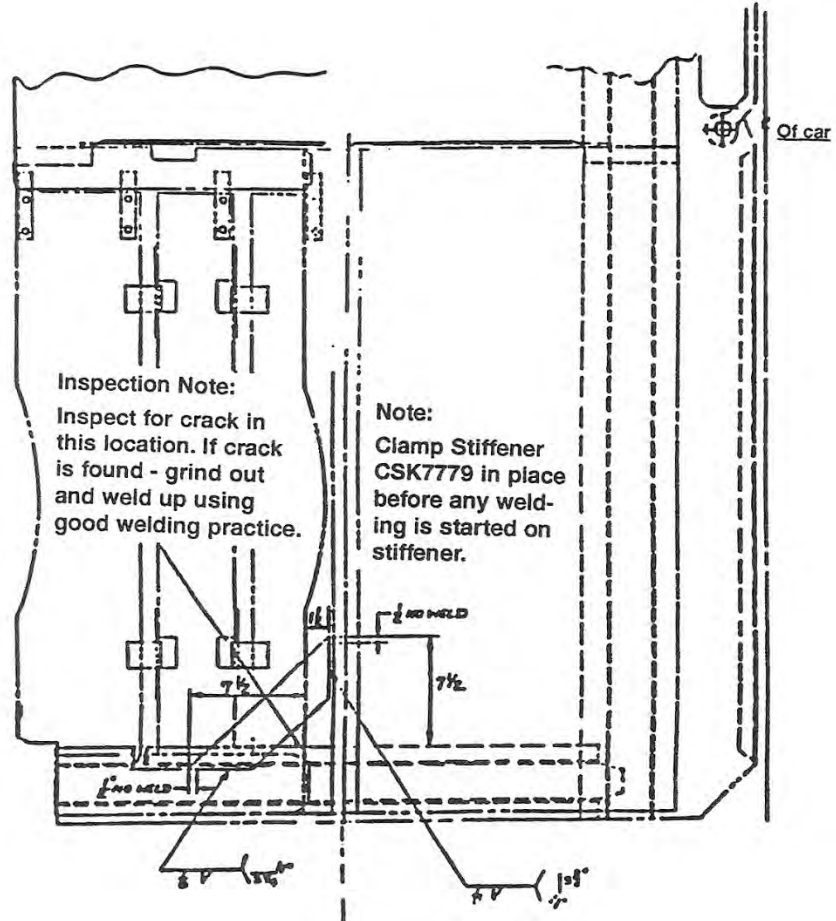


Figure 24

#### STIFFENER "BL" DOOR

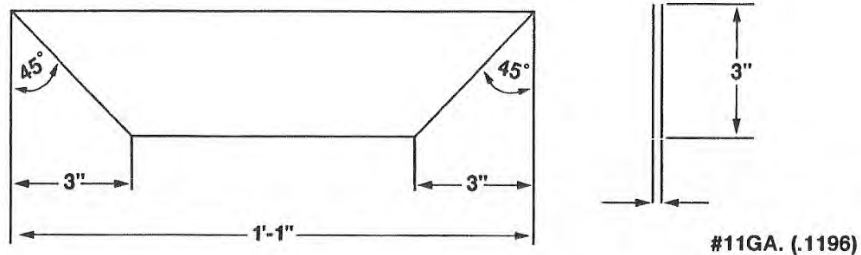


Figure 25

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### Suggested Alternate Vertical Member Repairs

#### NOTICE

The following steps must be performed in shop facilities that are approved by the Association of American Railroads [AAR] by mechanics trained by Trinity North American Freight Car, Inc. [*TrinityRail*]. Please contact *TrinityRail* Customer Service department at (800) 227-8844 to request training and / or the latest version of the procedures.

It is often difficult to perform one of the previous vertical member repairs exactly, due to many varying factors such as:

1. More than one crack is located in a short distance.
2. The vertical is so badly damaged or gouged that it is beyond repair.
3. The vertical is bent, dented, or twisted beyond reasonable repair.
4. The vertical has too many old, incorrect repairs; therefore, a proper sound repair is impossible.

#### NOTICE

After all vertical member repairs, some door straightening and readjustment will always be required.

#### Alternate #1

It is often more cost effective, quicker and stronger to replace the entire vertical member. Replacement parts can be ordered through Trinity Service Parts.

#### Alternate #2

A new section of the vertical can be spliced to the original vertical. The damaged portion can be cut out and a new section can be spliced in using the Door Vertical Member Repair Procedures at all splices.

#### Alternate #3

When two cracks are only a foot or so apart, it is impossible to use a standard part as shown on Figure 12, Item 11. The length of Item 11 can be increased so it can be applied over both cracks with 12" beyond each crack.

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### Appendix A, Wear Limits

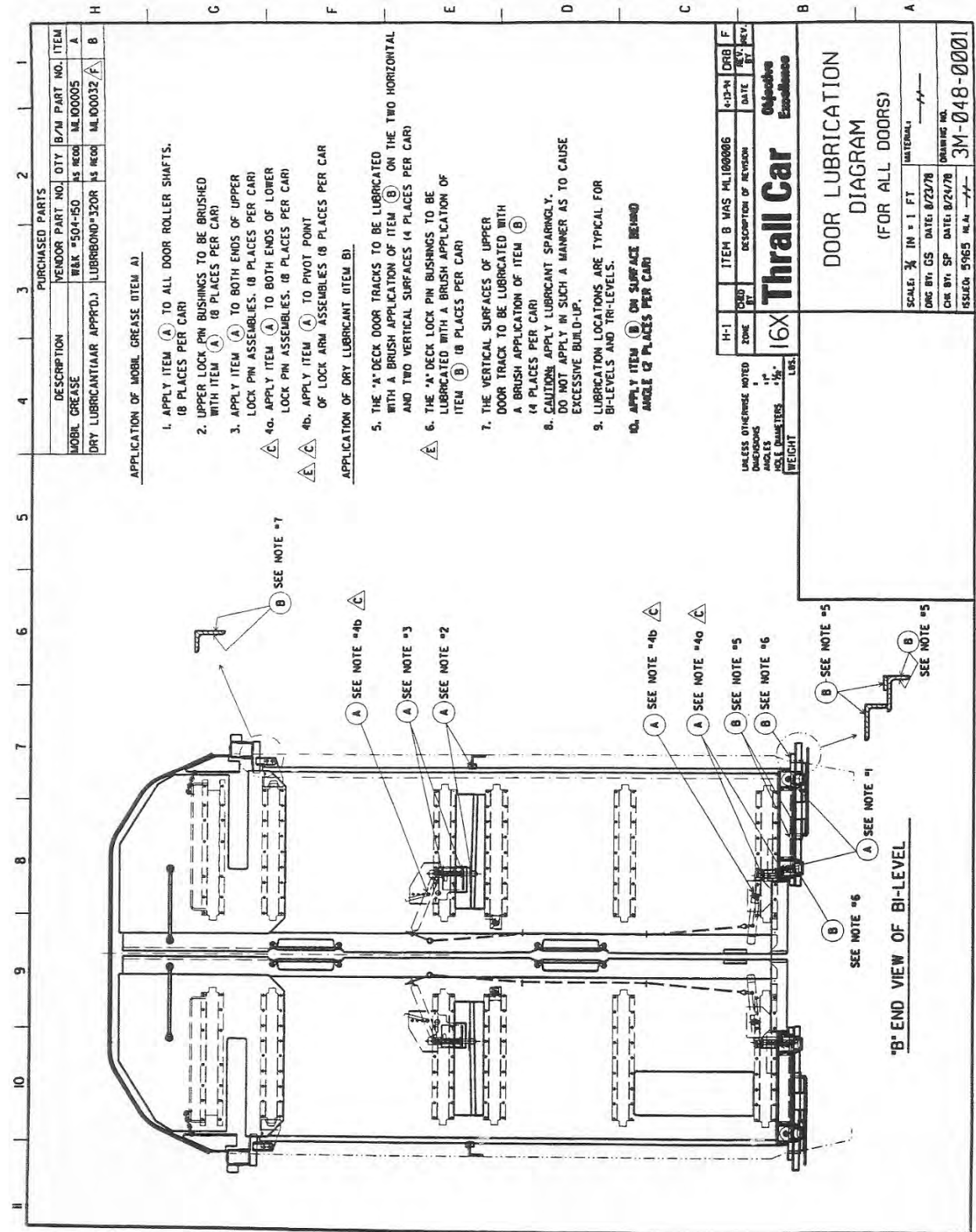
Maximum wear before repair or replacement

	At Prep Track		At Certification Shop	
	In %	In Inches	In %	In Inches
Upper Guide Fingers				
Round Rod	50%	3/8"	30%	1/4"
Flat Bar	50%	1/8"	30%	3/32"
Zeftek	50%	plastic gone	30%	plastic 1/8" worn
Upper Door Track	50%	1/8"	30%	3/32"
Roof Interlock Rod	50%	3/8"	25%	3/32"
Chain & Rod Assy.	33%	1/8"	33%	1/8"
Lock Pin to Bracket		3/16"		1/8"
Cross Pin in Lock Pin				
1/8" Pin (old style)	50%	1/16"	any wear *	any wear *
3/16" Pin (new style)	50%	3/32"	any wear *	any wear *
Roller	when won't roll	when won't roll	any free play	any free play
"J" Plate	50%	1/8"	25%	1/16"
Lower Track Groove		1/8" deep	any groove	any groove
Lower Track Vertical Behind "J"	50%	1/8"	25%	1/16"

*\* Revised 10/96 to meet M-970 August 1996 Revisions*

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Appendix B, Door Lubrication Diagram



## Appendix C, AAR Specification M-970-99

Association of American Railroads Multi-Level Manual Specification M-970-99

### 2.5.6 Radial End Doors

Inspect, repair or replace components of radial end doors as follows:

- Replace any portion of top door track if worn in excess of 25%.
- Replace rear door guide (bolted self-locking nuts) if worn in excess of 25%.
- Bottom guide track must be free of wear pockets and deformations. Straighten as necessary. Repair wear pockets by hard face welding and grind to original contour.
- Replace safety cable if worn or defective.
- Door pivot arm:
  - Cracked or broken pivot arms must be replaced.
  - Pivot arms that have cracks or fractures that have been repaired by welding must be replaced.
  - Pivot arm mounting brackets worn in excess of 25% must be replaced.
- Replace spring if broken or missing.
- Tighten loose nuts; replace missing nuts.
- Upper and lower lock assemblies:
  - Replace broken or missing springs.
  - Replace broken locking pin bracket.
  - Repair cracked door panels and door members per manufacturer's recommendations.
  - Replace unlocking cable if worn.
  - If unlocking arm can be moved sideways manually, check diameter of bolt and hole; if worn in excess of 1/4", replace unlocking arm.
- Adjust radial arm and door lock receiver if upper and lower locking pins do not automatically engage in locking pinhole. Replace radial arm if necessary.
- Full width of lower roller must be in contact with door track; if not, adjust as necessary.
- Door rollers must be removed, cleaned, inspected, and replaced if necessary after blast cleaning.
- Middle roller should be removed and bottom track adjusted to obtain proper contact with rollers.
- Door extension:
  - If cracked, repair in accordance with manufacturer's instructions.
  - If bent, straighten as required.
  - Replace loose or missing door roller guide assembly bolts.
  - Replace handbrake sliding panel if guide pins are worn in excess of 25%.
  - Replace guide chain if broken or worn in excess of 25%. Apply two additional 1/4" chains to handbrake sliding panel and No. 1 column to provide added security at that location.
  - Apply grease fitting shaft and grease fittings on all door rollers, except those with sealed door rollers.
  - Replace door locks or components if broken or worn more than 1/8".
  - Replace "J" plates when worn more than 25%.
  - Repair or replace lower door track vertical leg behind "J" plate if worn more than 25%.
  - Replace roof interlock rod if worn more than 15%.
  - Replace door lock cross pins. Use manufacturer's approved hardened drive pins.





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