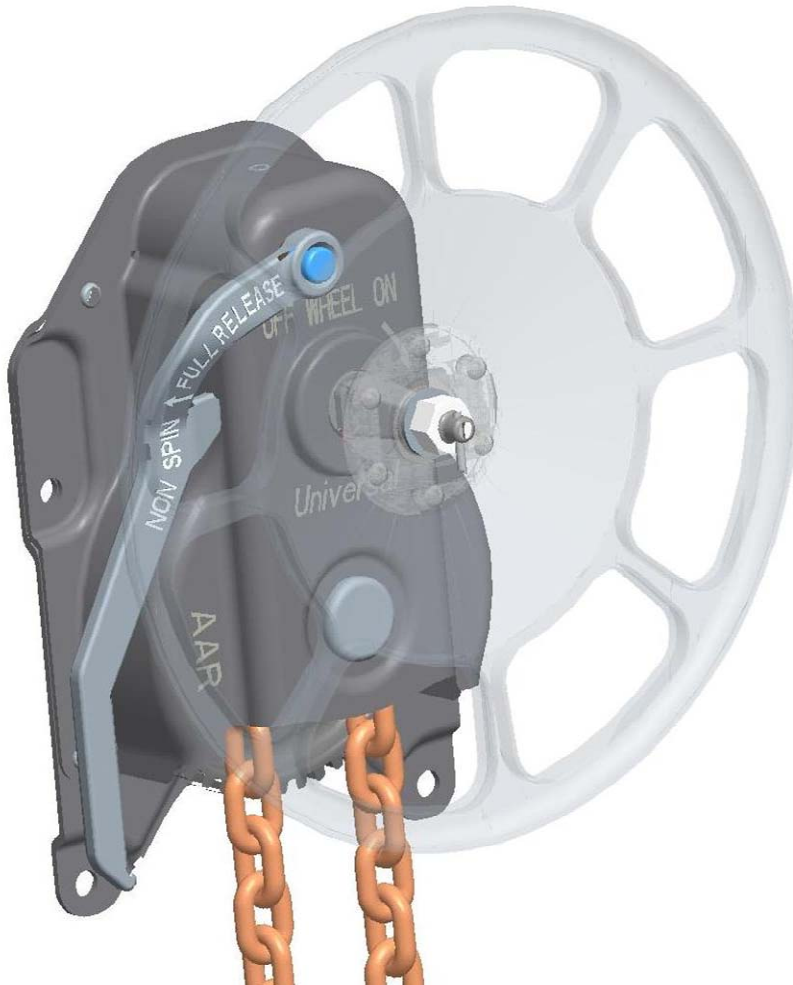




Universal Hand Brake Assembly

Models 7400*, 7400-3*, 6555*, 9200#, 9200-3#, 4475#, 4475-3#, 7500, 9300, 9300-3, 4493 & 4493-3
Maintenance Booklet
U-90304



CARDWELL WESTINGHOUSE
Chicago, Illinois 60620

WABTEC CORP
Wilmerding, Pennsylvania 15148

*(For 7400, 7400-3 & 6555) denotes manufacture discontinued cannot upgrade to comply with S-475-91 specifications.
#(For 9200, 9200-3 & 4475, 4475-3) denotes manufacture discontinued can upgrade to comply with S-475-91 specifications

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References:

Association of American Railroads, Safety Div. "Recommended Safe Practices in the Operation of Geared Hand Brakes:

Association of American Railroads, "Manual of Standards and Recommended Practices, Sections-E, S-475 latest revision

-H Part III, Rule 8 latest revision

Federal Railroad Administration, Title 49, Part 231 latest revision

Association of American Railroads, "Field Manual of the A.A.R. Interchange Rules", Rule 13 latest revision

INSTRUCTIONS FOR ON-CAR INSPECTION

A. VISUAL INSPECTION

1. Check for damaged wheel. If the wheel is damaged, replacement must be made in kind (shallow dish wheel). A 4" minimum clearance between rim of wheel and any part of the car housing is mandatory. 10 3/4" from the mounting surface to the front of the wheel is maximum allowable overall depth, from mounting surface to rim of hand wheel.

2. Check for drooping hand wheel. The most probable cause is worn drive shaft or worn drive shaft bearing. If clearance between drive shaft and bearing exceeds .090", the hand brake must be replaced.

Note: In some cases, the nut holding the wheel to the drive shaft may have loosened. In this case, re-tighten the nut to 160 ft-lb. torque and replace the cotter if necessary.

3. Check for drive shaft end clearance. Move drive shaft rearward as far as possible and scribe a reference line on the drive shaft. Pull the drive shaft forward as far as possible and measure the end clearance to the reference line. Replace the brake if the end clearance exceeds .187".

4. Check for damaged housing or back plate bulged in excess of 1/16". If damage is evident even though the hand brake does operate, the clearances of the internal parts could cause the hand brake to release or jam under heavy loading. Replace the hand brake.

5. Check for damaged release handle. If release handle binds against housing, prevents quick release of hand brake, violates the 4" minimum clearance with inside of rim of hand brake wheel, or violates the 2.5" minimum clearance with any part of the car, the hand brake must be replaced.

6. Check for worn or damaged upper chain, replace the brake (or chain where applicable).

Note: Upper chain links cannot be repaired or cut out and replaced with any type of connecting link. Upper chain must be replaced in kind for that particular model.

7. **For Models 4475, 4475-3, 4493, and 4493-3 only:** Check the shock retarder assembly. Check for cracks, breakage, or bent clevis, mounting plate and rivet. Check condition of elastomer spring. If any abnormalities are present, replace with a new assembly.

B. OPERATIONAL INSPECTION

(Also refer to "Recommended Safe Practices in the Operation of Geared Hand Brakes" A.A.R. Safety Division)

WARNING: *Operating hand brakes without proper training may result in personal injury. Assume a safe operating position on the car. See A.A.R. safety rule.*

1. Turn the release handle from "ON" to "OFF" positions. *(This does not apply to hand brakes with out the quick release feature, 7500)*
 - a. Handle must not bind against housing and move freely.
 - b. Handle must not violate 4" minimum clearance with inside of rim of hand.
 - c. Handle must have 2 1/2" minimum clearance with any part of the car.
2. Operate the hand brake by turning the hand wheel in a clockwise rotation and check for the following conditions:
 - a. If the wheel wobbles more than 1/4" or binds when being turned, the drive shaft may be bent. Replace hand brake if the drive shaft is bent, preventing free rotation of the wheel.
 - b. If the hand brake wheel is hard to turn, lubricate at oil fittings at the top of the housing and around the drive shaft bearing and work hand brake several times. If the hand brake cannot be made to operate easily, replace the brake.
3. Perform the following:
 - a. Apply a sufficient load to the hand brake at the rim of hand brake wheel to bring the brake shoes against the truck wheels.
 - b. Turn the release handle to "OFF" position by applying force on the handle until the release of the brake is accomplished. *(This does not apply to hand brakes with out the quick release feature, the 7500)*
 - c. Apply a sufficient load to the rim of the hand brake wheel to bring the brake shoes against the wheels. Operate the gradual release feature by rotating the hand brake wheel in a counter-clockwise direction. The hand brake wheel should turn freely when the hand brake chain is no longer taut.

C. LUBRICATION

1. Refer to *A.A.R. Manual of Standards and Recommended Practices, Section H III, Rule 8 latest revision*.

D. REPLACEMENT HAND BRAKE

1. If the hand brake must be replaced, refer to *The Field Manual of the A.A.R. Interchange Rules, Rule 13*, for grouping.
2. Operate all phases of replacement hand brake to assure that the hand brake operates properly and that the brake shoes are brought against the truck wheels and holds the applied load.

DISASSEMBLY, INSPECTION AND REPAIR

Refer to Attached Prints U-9300, U-9300-3, U-4493, U4493-3, and U-7500

WARNINGS

- A. In addition to regular shop safety procedures and for personal safety, eye, foot, and body protection must be worn to protect against possible injury.*
- B. The use of solvents as cleaning agents and the use of lubricants can involve health and/or safety hazards. The manufacturers of the solvents and lubricants should be contacted for safety data (such as OSHA Form OSHA-20 or its equivalent). The recommended precautions and procedures of the manufacturers should be followed.*
- C. The use of an air jet, which must be less than 30 PSIG, to blow parts clean or blow them dry after being cleaned with a solvent will cause particles of dirt and/or droplets of the cleaning solvent to be airborne. These particles and droplets may cause skin and/or eye irritation. Personal eye protection must be worn to protect the eyes from possible injury. Do not direct the jet toward another person.*

SPECIAL TOOLS AND EQUIPMENT NEEDED:

- A. The workbench must have a 3" by 5" wide rectangular hole cut out approximately 12" from the front edge of the bench to the front edge of the hole. The drive shaft will be inserted into this hole and will require 5 1/2" minimum clearance below the bench surface.*

Disassembly

- 1. Position the hand brake on the workbench with the back plate facing up. Remove the assembly bolts or rivets. Do not weaken the housing or back plate during this operation.
- 2. Remove the back plate from the housing and remove dirt, grease, etc. by cleaning with solvent and soft bristle brush. The back plate must be inspected for flatness. Any back plate bent more than .032" must be straightened or replaced. Bushings must be removed and replaced with new.
- 3. Remove the gear assembly (including chain) and remove dirt, grease, etc., by cleaning with solvent and soft bristle brush.

Notice: Any 9300 or 9300-3 hand brake removed which has been assembled before 1-1-93, must have all bearings and winding drum removed and replaced with current production.

- a. Inspect the chain for links worn or gouged.
 - i. **For the 4493 and 4493-3:** Replace the chain if worn or gouged.

- ii. **For all other hand brakes:** If the gear assembly can be salvaged , the chain can be removed by pushing the driv-lok fastener out with a drift and replace in kind (refer to Drawing S-7205)
- b. **For the 9300, 9300-3 and 7500 hand brakes only:** Inspect chain anchor pin for wear or deformation
- c. Inspect every gear tooth and replace entire gear assembly if any are found cracked, missing or worn.

Note: For the 9300, 9300-3, and 7500, if the chain can be salvaged, the chain can be removed by pushing the driv-lok fastener out with a drift. (Refer to Drawing S-7205)
- 4. **For the 4493, 4493-3, 9300 and 9300-3 hand brakes only:** Remove stationary cam, movable cam, and clutch collar together, from drive shaft assembly. Remove collar and unscrew movable cam from stationary cam. Remove dirt, grease, etc. by cleaning with solvent and soft bristle brush.
 - a. Inspect ramps on the stationary cam for wear and/or cracks.
 - b. Inspect clutch collar lugs and the inside diameter for wear.
 - c. Scrap movable cam.
- 5. Scrap drive shaft assembly
- 6. Remove tapered spring. Remove dirt, grease, etc. by cleaning with solvent and soft bristle brush. If any coils are broken, or if free height measures less than 1.375", the spring must be replaced.
- 7. Scrap the housing sub-assembly.

ASSEMBLY PROCEDURE

Refer to Attached Prints U-9300, U-9300-3, U-4493, U4493-3, and U-7500

Notes:

- A. See warnings
 - B. All parts must be cleaned and inspected prior to assembly.
 - C. Use only those original parts from the brake being assembled or new replacement parts for this brake.
 - D. Greases to be used in assembly: Amolith all weather or equivalent.
1. Place the housing assembly face down on the workbench. With a soft bristle brush, apply a medium coating of grease to the post of release shaft, tooth of holding pawl and the bushings in the bearing cups.
 2. Holding the drive shaft assembly by the shaft, apply a medium coat of grease to the front and rear bearing surfaces.
 - a. **For the 4493, 4493-3, 9300 and 9300-3 hand brakes only:** Apply a light coat of grease to the surface on the pinion where the clutch collar slides in and out.
 3. Swing the holding pawl up towards top of housing. Insert the drive shaft assembly into housing so the front bearing surface seats in the housing bushing. Swing holding pawl down into ratchet, turning drive shaft assembly until tooth of holding pawl falls into place. Install tapered spring, small end over boss on holding pawl.
- Note: The holding pawl is not noted on the 4493, 4493-3 and 7500 drawings*
4. **For the 4493, 4493-3, 9300 and 9300-3 hand brakes only:** Apply a medium coating of grease to mating ramps of stationary cam and movable cam. Screw movable cam onto stationary cam. Apply a medium coating of grease to flange and inside diameter of clutch collar and install into ears of movable cam. Lower all three parts over drive shaft assembly, collar first, lining up outside guides on stationary cam with tees in housing. At the same time, line up the post of release shaft with fork portion of movable cam, moving release handle slightly, if necessary, and line up inside diameter of clutch collar with outside diameter of pinion.
 5. Take the gear assembly and apply a medium amount of grease to the front and rear bearing surfaces.
 - a. **For the 4493 and 4493-3 hand brakes only:** Take chain and lay into pockets of winding drum. (Note: Weld should be to the outside of winding drum.) Holding both sides of chain and gear assembly, insert into housing bushing and mate the gear teeth with gear teeth of drive shaft pinion.

- b. **For all other hand brakes:** If the chain or gear has been replaced, the chain can then be reinstalled into a gear assembly with a new driv-lok fastener. Insert the gear assembly into housing bushing and mate the gear teeth with the gear teeth of drive shaft pinion.
- 6. Take the back plate and apply a medium amount of grease into the bushings in the bearing cups. Place the back plate over the rear bearing of the drive shaft assembly and rear bearing of the winding drum weldment.
- 7. Align the four holes in the back plate with those in the housing weldment and rivet together.
- 8. After the brake is completely assembled, move the drive shaft assembly in and out to measure the end play. This must not exceed 5/32" to provide proper engagement of the clutch mechanism, but must be such that between the driveshaft can be rotated freely.
- 9. The brake is now completely assembled and must be bench tested for operation and marked as specified in the A.A.R. Manual of Standards and Recommended Practices, Section E, S-475 latest revision. The quick release and gradual release features must also be tested to determine that all the features of the brake are in good working order.
CAUTION: When dynamometer is used to measure loads, do not quick release brake as dynamometer can be damaged. Test quick release feature with dynamometer disconnected.

INSTRUCTIONS FOR UPGRADING 9200 & 9200-3 HAND BRAKES TO 9300 & 9300-3 HAND BRAKE

1. Main Gear Assembly must be replaced
2. If the chain can be salvaged, the chain can be removed by pushing the driv-lok fastener out with a drift.
3. The chain can then be reinstalled into a new main gear weldment with a new driv-lok fastener.
4. The above upgrading instructions are required in addition to reconditioning methods described in the A.A.R. Manual of Standards and Recommended Practices, Section E, Standard S-475 latest revision.

PARTS REQUIRED TO UPGRADE 9200 & 9200-3 HAND BRAKES TO 9300 & 9300-3 HAND BRAKES

<u>Part No.</u>	<u>Description</u>
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T-6085	Main Gear Weldment
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If upper unit chain, part number R-8085, **is** in good condition.

X-141	Driv-Lok Pin - Refer 'Chain Installation Instructions' Dwg. S-7205
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Note: The above components would be required to upgrade hand brakes to 1993 status, in addition to the components required as per manufacturers recommendations for reconditioning.

INSTRUCTIONS FOR UPGRADING 4475 & 4475-3 HAND BRAKE TO 4493 & 4493-3 HAND BRAKES

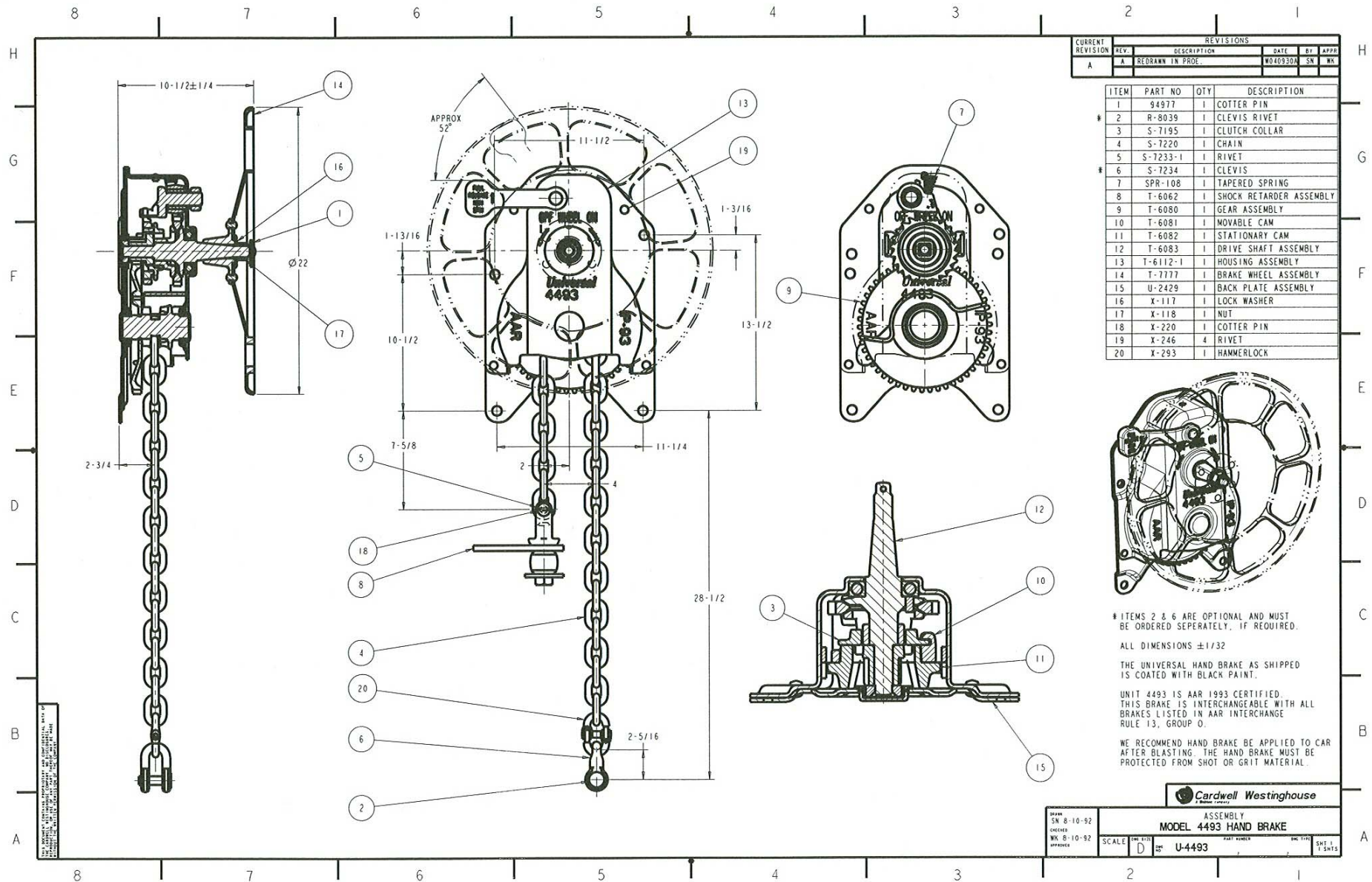
1. The upper unit chain must be replaced with the new upper unit chain regardless of condition.
2. The above upgrading instructions are required in addition to reconditioning methods described in the A.A.R. Manual of Standards and Recommended Practices, Section E, Standard S-475 latest revision.

PARTS REQUIRED TO UPGRADE 4475 & 4475-3 HAND BRAKES TO 4493 & 4493-3

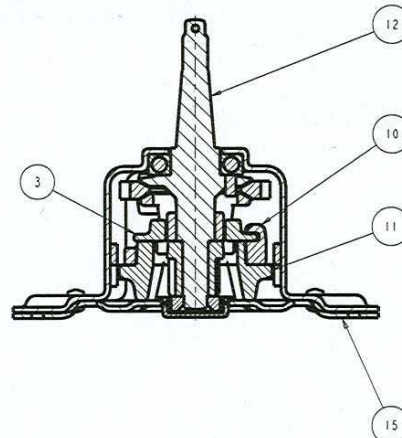
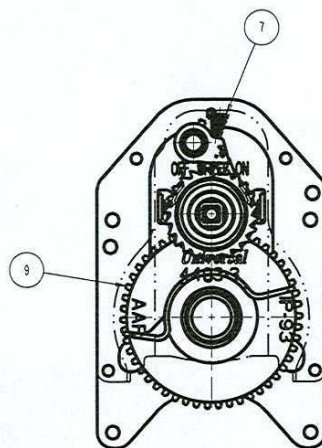
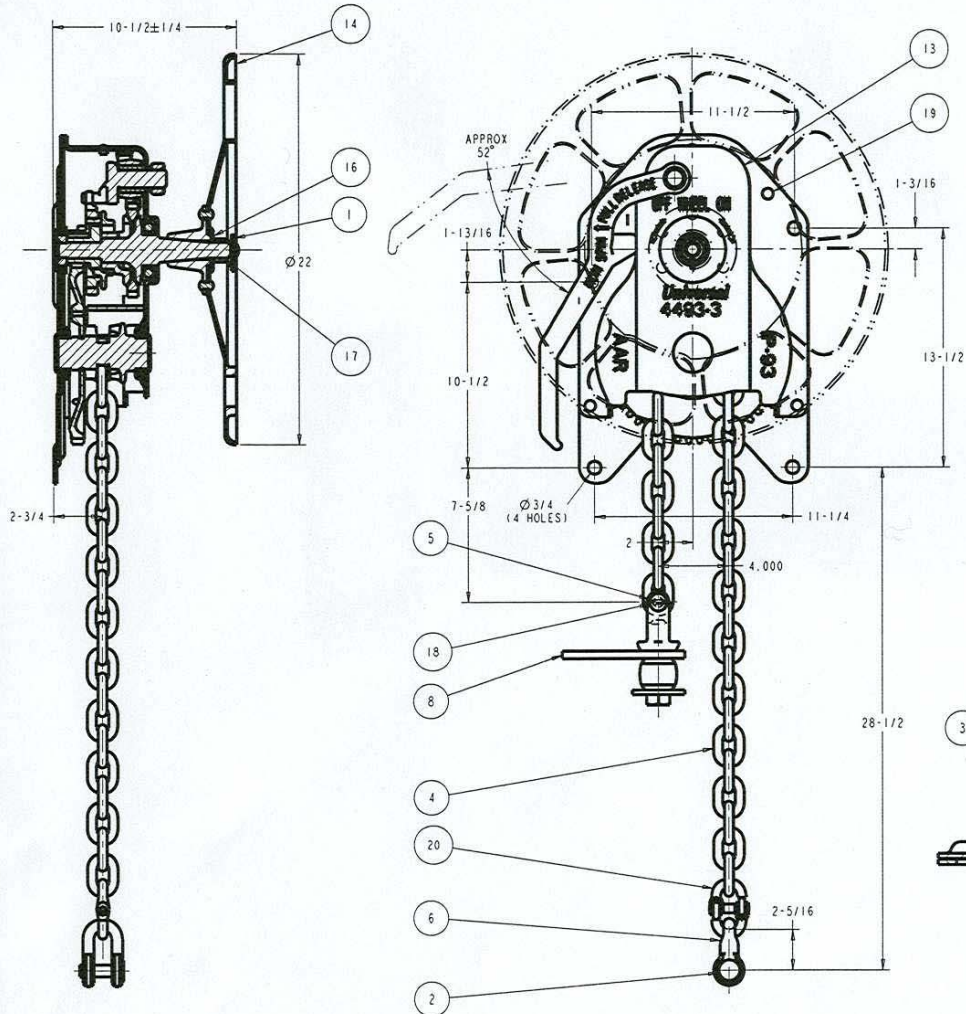
<u>Part No.</u>	<u>Description</u>
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S-7220-K	Upper Unit Chain with Hammerlok Part #X-293
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Note:	The above components would be required to upgrade hand brakes to 1993 status, <u>in addition</u> to the components required as per manufacturers Recommendations for reconditioning.
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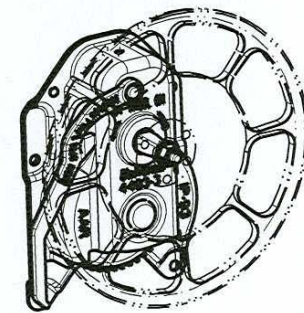


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CURRENT REVISION		REVISIONS			
REV	DESCRIPTION	DATE	BY	APPR	
A	REDRAWN IN PRO	W040930A	SN	WL	

ITEM	PART NO	QTY	DESCRIPTION
1	94977	1	COTTER PIN
2	R-8039	1	CLEVIS RIVET
3	S-7195	1	CLUTCH COLLAR
4	S-7220	1	CHAIN
5	S-7233-1	1	RIVET
6	S-7234	1	CLEVIS
7	SPR-108	1	TAPERED SPRING
8	T-6062	1	SHOCK RETARDER ASSEMBLY
9	T-6080	1	GEAR ASSEMBLY
10	T-6081	1	MOVABLE CAM
11	T-6082	1	STATIONARY CAM
12	T-6083	1	DRIVE SHAFT ASSEMBLY
13	T-6112-1	1	HOUSING ASSEMBLY
14	T-7777	1	BRAKE WHEEL ASSEMBLY
15	U-2429	1	BACK PLATE ASSEMBLY
16	X-117	1	LOCK WASHER
17	X-118	1	NUT
18	X-220	1	COTTER PIN
19	X-246	4	RIVET
20	X-293	1	HAMMERLOCK



* ITEMS 2 & 6 ARE OPTIONAL AND MUST BE ORDERED SEPARATELY, IF REQUIRED.

ALL DIMENSIONS ± 1/32

THE UNIVERSAL HAND BRAKE AS SHIPPED IS COATED WITH BLACK PAINT.

UNIT 4493-3 IS AAR 1993 CERTIFIED. THIS BRAKE IS INTERCHANGEABLE WITH ALL BRAKES LISTED IN AAR INTERCHANGE RULE 13, GROUP O.

WE RECOMMEND HAND BRAKE BE APPLIED TO CAR AFTER BLASTING. THE HAND BRAKE MUST BE PROTECTED FROM SHOT OR GRIT MATERIAL.

Cardwell Westinghouse

BRK SN 8-10-92	ASSEMBLY
CHECKED	MODEL 4493-3 HAND BRAKE
W040930A	SCALE D
APPROVED	U-4493-3

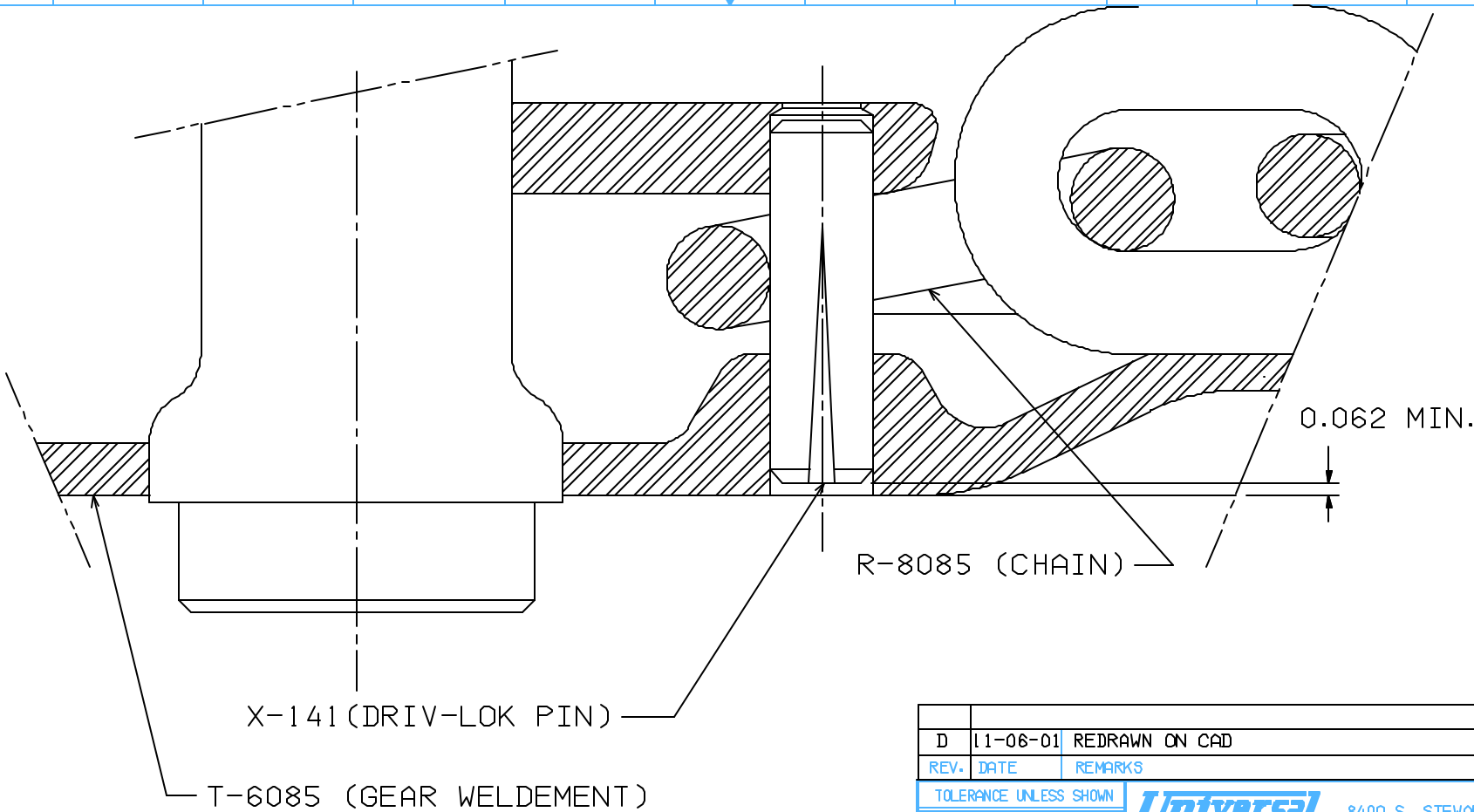
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NOTE:
INSTALL THE CHAIN WITH WELD
AWAY FROM THE HUB

DO NOT SCALE PRINT
CAD DRAWING DO NOT REVISE MANUALLY.

D	11-06-01	REDRAWN ON CAD	WK
REV.	DATE	REMARKS	
TOLERANCE UNLESS SHOWN			
- X = ± .X			
- XX = ± .XX			
- XXX = ± .XXX			
DRAFT = X° XX'			
ANGULAR = ± X°			
FINISH = XX ✓			
RADII = .XXX			
THE DEVICES SHOWN ARE MANUFACTURED BY UNIVERSAL RAILWAY DEVICES CO. AND ARE PROTECTED BY PATENTS.			
WT. = XXX X #		DR - WK	CK
SCALE: NONE		DATE: 07-31-00	S-7205
			REV. D

Universal
RAILWAY DEVICES CO. 8400 S. STEWART AVE.
CHICAGO, ILL. 60620

GEAR ASSEMBLY
FOR MODEL 9300, -3. & 7500 HB

MATERIAL & HEAT TREAT: