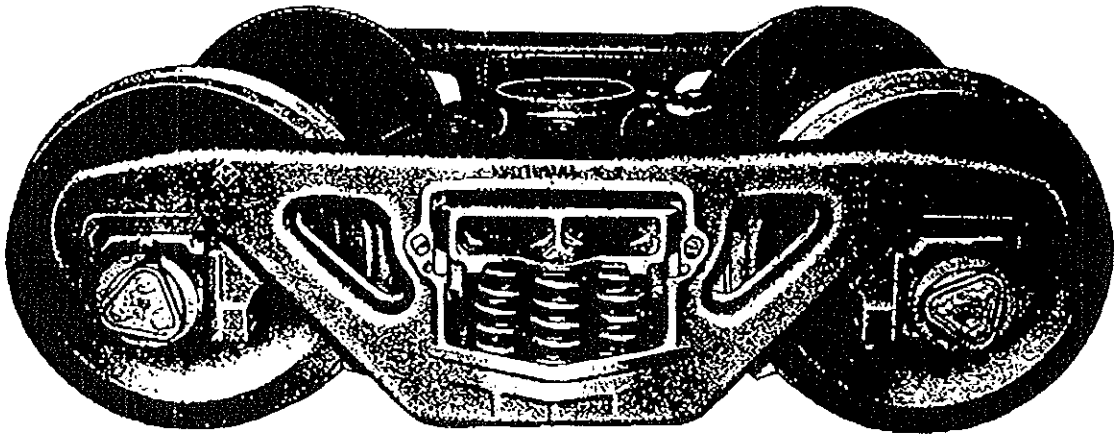
NATIONAL C-1 TRUCK

INSTRUCTIONS GOVERNING INSPECTION, MAINTENANCE AND RECLAMATION

Circular No. 5358-E



ASF-Keystone, Inc.
1700 Walnut Street, Granite City, IL 62040

618-452-2111
800-621-8442

www.asfglobal.com

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Inspection and Maintenance

Reclamation

NATIONAL C-1 TRUCK

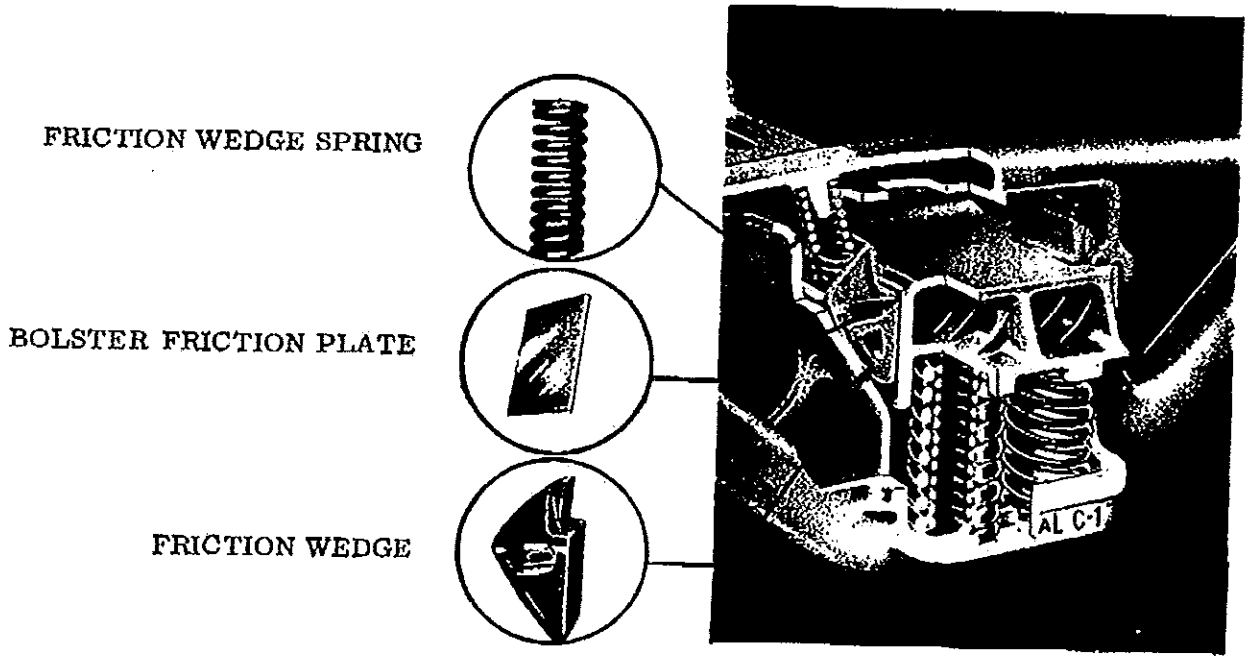
INSTRUCTIONS GOVERNING INSPECTION
MAINTENANCE AND RECLAMATION

Circular No. 5358-E

Introduction

Based on experience of many years, the National C-1 truck has been found to provide outstanding service performance, and depending upon service conditions, requires little if any maintenance. The purpose of this Circular, however, is to acquaint railroad shop personnel with the component parts of truck, method of assembly and disassembly, plus the procedure covering inspection, maintenance and reclamation, if and when it becomes necessary.

The primary portion of the C-1 truck which may eventually require some maintenance is the friction control mechanism. The parts involved are the friction wedge, friction wedge spring and bolster friction plate, each of which is illustrated and identified below.



PART I
INSPECTION AND MAINTENANCE

Truck Disassembly

To dismantle the truck, the friction wedges must first be retracted to permit separation of the side frames and bolster. The procedure required to perform this operation is as follows:

1. Insert pinch bar, No. 42865-2 or 34885-2 (see details page 6), into hole "A" in side frame (Figure 1) to engage top hole in wedge. Press free end of bar downward, bisecting the angle of the friction wedge until lower hole in wedge is visible through hole "B" in side frame. See Figure 1.

2. With wedge thus raised insert wedge retaining pin No. 42865-1 or 34885-1 (see details on page 6), through hole "B" and into the wedge.

3. Repeat this operation on the opposite side to raise other wedge.

4. If wedges are of the current design shown in Figure 2, the top surface, marked "X" must be driven into the wedge pocket of the side frame to provide sufficient clearance for removal of the side frame from the bolster.

5. The friction wedges are usually left in retracted position in the side frame to facilitate re-assembly of the truck. They need to be removed only if worn sufficiently to justify replacement.

Note: If for any reason the wedge is lower than normal in the wedge pocket to prevent satisfactory use of the prescribed pinch bar, a pointed pinch bar should be used to raise the wedge partially to permit insertion of a 1/4" shim between the wedge and bolster friction plate. With the wedge held in this higher position, the prescribed pinch bar can then be utilized to fully retract the wedge.

Friction Wedge

The wedges in all C-1 trucks have a "wear limit" notch 3/8" deep at the top edge and bottom corners of the friction surface as illustrated in Figures 3 and 4. Simple visual inspection of the notch can be made with truck under car, or during truck disassembly, to readily determine if the wedge is worn sufficiently to require replacement. Wedges should be replaced when the remaining depth of the notch is 1/16" or less. Where cars are maintained over prolonged periods of service, the change out of wedges should become a matter of judgment and economics, based on the mileage accumulated between maintenance periods versus the amount of wear life remaining in the wedge. A rule of thumb to follow with wedge change outs would be to allow 100,000 miles of service, approximately, for each 1/16" remaining on the wear limit notch.

To replace wedges the side frame and bolster must be disengaged by following the procedure outlined under "Truck Disassembly." When the side frame has been freed of the bolster a journal jack is placed between the retracted wedges (see method No. 1, page 10). When sufficient pressure is applied to the wedges, the retaining pins can be removed freely by hand. Journal jack pressure is subsequently released and the wedge castings and wedge springs are removed from the side frame.

Two sizes of wedges are used for 5x9, 5-1/2x10, 6x11 and 6-1/2x12 size C-1 trucks. Both wedges are alike in all respects except in width. Wedge No. 37039 is 5-1/4" wide and is applicable to both 5x9 and 5-1/2x10 size trucks. Wedge No. 37100 is 6-5/8" wide for use with 6x11 and 6-1/2x12 size trucks.

Wedges No. 37039 and 37100 supersede the original design of wedge Nos. 33843 and 34153, respectively. The difference between the two designs is readily apparent as may be seen by comparing Figures 3 and 4. Both styles are interchangeable and the procedures covering assembly and disassembly, as described in this Circular, apply to both designs.

Friction Wedge Spring

Design principles in the C-1 friction system also result in a very low stressed friction wedge spring. Based on many years of service experience, replacement of the wedge spring is necessary only when the spring is found broken.

Inspection of the spring does not require disassembly of the truck. However, if the side frame is removed for any other reason, further inspection of the spring may be made when the wedge and spring are in retracted position. The lesser force required to retract the wedge plus visual inspection will serve to detect any spring failures.

For ready reference, page No. 7 shows the wedge springs used in 5x9, 5-1/2x10, 6x11 and 6-1/2x12 C-1 trucks with various load spring deflections ranging from 2-1/2" to 3-11/16".

Bolster Friction Plates

Three styles of bolster friction plates are currently in use for the C-1 trucks. Style No. 1, the original design of plate shown in Figure 5, was used exclusively until April, 1966, at which time it was superseded by style No. 2, shown in Figure 6. In 1968 we began offering style No. 3 shown in Figure 7 as an optional design for those customers preferring the bolted application instead of the standard welded application. All three plates are of hardened steel material 3/8" thick. Style No. 1, though obsolete, will be continued to be furnished for maintenance to bolsters equipped with this plate initially. Plate styles are not interchangeable, however, plate style No. 2 (welded design) can be applied to a bolster arranged for plate style No. 3 (bolted design) by welding if plate style No. 3 is not available. Likewise, plate style No. 3 can be applied by welding to a bolster designed for style No. 2 if style No. 2 plates are not available. These substitutions should not be made, however, without the car owners approval except in an emergency.

Complete inspection of the plate is made after side frames have been removed from the bolster. Plates should be checked for wear and cracks. Cracked wear plates should be replaced. The amount of wear is determined by measuring the distance over both wear plates at the bolster end as shown in Figure 8. Wear plates must be replaced when this dimension reaches 13-1/8" or less for 5x9 and 5-1/2x10 bolsters or 17-5/8" or less for 6x11 and 6-1/2x12 bolsters.

Style No. 1 and style No. 2 wear plates must be checked for cracked or broken wear plate retaining welds. Rewelding of an existing plate or new plate requires use of a welding rod of AWS Class E-70XX or better. We recommend a rod of AWS Class E-308, E-312 or equivalent. Weld is to be applied as shown in Figure 9, and is to be solid and free of cracks. It is important that plates be firmly clamped to the bolster preparatory to welding. During the welding operation avoid heating the plate to an extent that could impair its hardness and wearing qualities.

Style No. 3 wear plates must be checked for proper tightness of the bolts and nuts. Nuts should be retightened where there is any evidence of looseness. The application procedure for new or loose existing plates is shown in Figure 10.

Truck Load Springs

Load springs should be checked for free height and permanent set in accord with A.A.R. Interchange Rules and Recommended Practices.

For use as reference, various A.A.R. load spring groups used with the C-1 truck are shown on page 11.

Truck Assembly

Assembly of the C-1 truck on the rip track, or during initial assembly by car builders, can be done by one of the following methods. Basically, each method pertains to the application of the friction wedge and friction wedge spring to the side frame, since this operation is the most essential from an educational standpoint and shop "know how." Regardless of the method used, following the application and retraction of wedges to the side frame, it will become necessary to drive the top surface of each wedge (if of the present design) into the wedge pocket of the side frame in order to provide clearance for bolster assembly. This procedure is repetitious of step No. 4, under "Truck Disassembly."

Method No. 1 - Journal Jack Application

This method is generally used during rip track operations and employs the use of a journal jack. Normally, during disassembly of the truck, the wedges are left in their retracted position in the side frame leaving nothing to be done with regard to the wedge and wedge spring, except to remove the wedge retaining pins after assembly of the truck.

If for some reason the wedges were removed, they are to be reapplied as follows and as illustrated on page 10.

1. Insert wedge and wedge spring in each pocket of frame.

2. Place journal jack, with sufficient blocking material supporting same, between both wedges and by applying pressure, force wedges upward into side frame pockets.

3. When lower hole of wedge is visible through hole "B" of frame apply retaining pins to hold wedges in retracted position and remove jack.

Method No. 2 - Air Cylinder Application

This method is generally used by the carbuilder for assembly of new trucks. It consists of an air cylinder arrangement illustrated on page 10.

The procedure of assembly is similar to method No. 1, except for the substitution of the air cylinder in place of the journal jack. The air cylinder, however, does provide a more expedient means for friction wedge application.

Removal Of Friction Wedge Retaining Pins

It is most important to remove friction wedge retaining pins, following truck assembly, to insure proper truck performance. To do this, simply insert the pinch bar required (as noted on page 6) into the pinch bar hole "A" in the frame and apply downward pressure on the free end of the bar until the retaining pin can be manually removed.

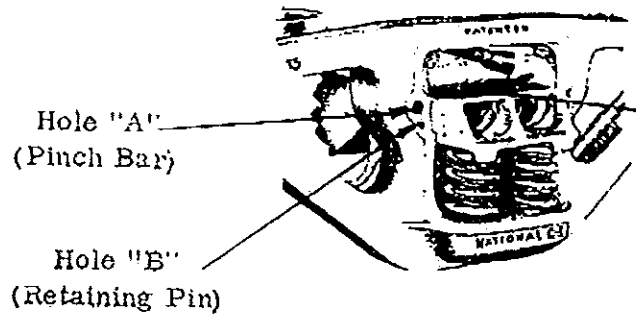
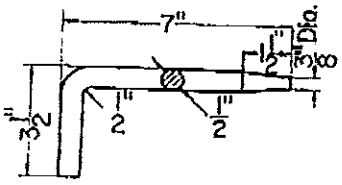


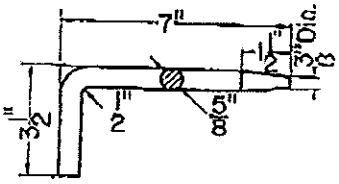
Figure 1

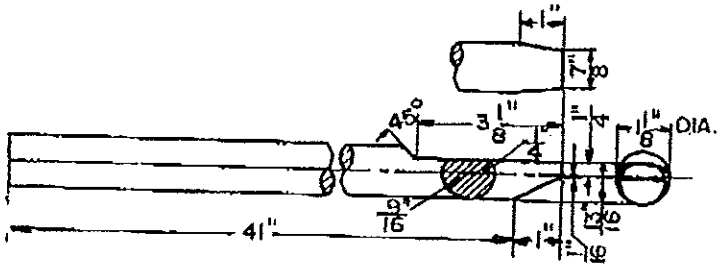
Figure 2

Retaining Pin
No. 34885-1
Hardened Steel
- Req'd Per Truck



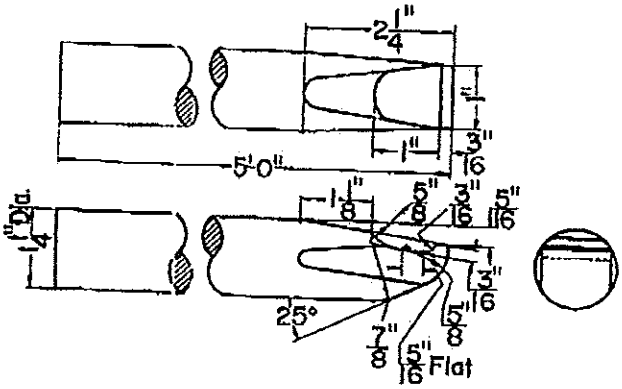
Retaining Pin
No. 42865-1
Hardened Steel
4 - Req'd Per Truck





Pinch Bar No. 34885-2
AISI - 4140 Steel
Tip or Nose to be Hardened
Brinell 339-360
1 - Req'd

For use with original design C-1 frame having 1-3/8" dia. Pinch Bar Holes "A" Side Frames produced prior to July 1954



Pinch Bar No. 42865-2
AISI - 4140 Steel
Tip or Nose to be Hardened
Brinell 339-360
1 - Req'd

For use with present design C-1 frame having Elongated Pinch Bar Holes "A" Side Frames produced after July 1954

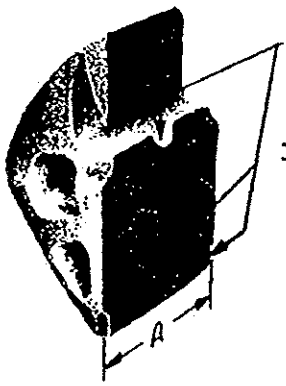


Figure 3

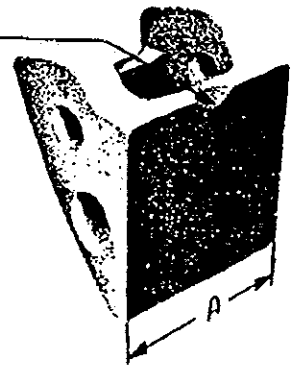


Figure 4

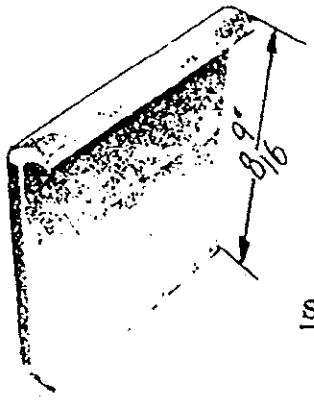
Present Design
No. 37039 (5x9 & 5-1/2 x 10) A - 5-1/4"
No. 37100 (6x11 & 6-1/2 x 12) A - 6-5/8"

Original Design
No. 33843 (5x9 & 5-1/2 x 10) A - 5-1/4"
No. 34153 (6x11) A - 6-5/8"

NOTE: Wear limit notches at bottom corners of wedge (Fig. 3) incorporated in wedges produced after January 1, 1965.

C-1 Truck Friction Wedge Springs

Wedge Spring Drwg. No.	Free Height	Solid Height	Journal Size	Load Spring Deflection
35106	9-3/8"	6"	5x9 & 5-1/2 x 10	3-11/16"
35102	9-3/8"	6-3/8"	"	3-1/16"
"	"	"	6x11	3-11/16"
35101	9-7/16"	6-5/8"	5x9 & 5-1/2 x 10	2-1/2"
"	"	"	6x11	3-1/16"
35166	9-1/4"	6-3/4"	"	2-1/2"
43261	9-23/32"	"	6-1/2 x 12	3-11/16"
"	"	"	"	2-1/2"
"	"	"	"	3-1/16"



Style No. 1

Plate No.	"A"	Truck Size
33846	5-1/2"	5x9 & 5-1/2x10
34155	7"	6x11 & 6-1/2x12

Figure 5

Style No. 2

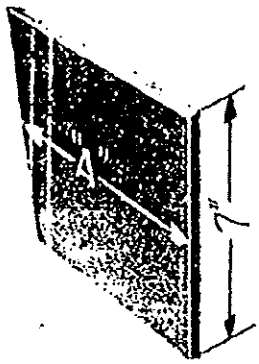


Plate No.	"A"	Truck Size
40698-3	5-1/2"	5x9 & 5-1/2x10
40698-2	7"	6x11 & 6-1/2x12

Figure 6

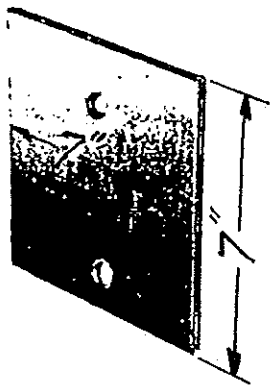
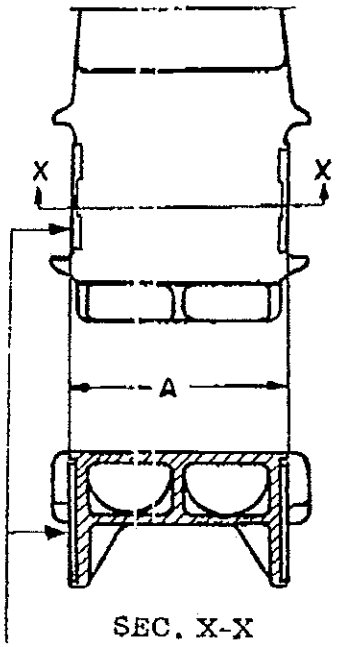


Plate No.	Truck Size	Spring Deflection
47439-1	6x11	3-11/16

Figure 7



SEC. X-X

Bolster friction plates to be renewed when dimension "A" measures 13-1/8" or less for 5x9 & 5-1/2 x 10 trucks and 17-5/8" or less for 6x11 & 6-1/2x12 trucks.

Figure 8

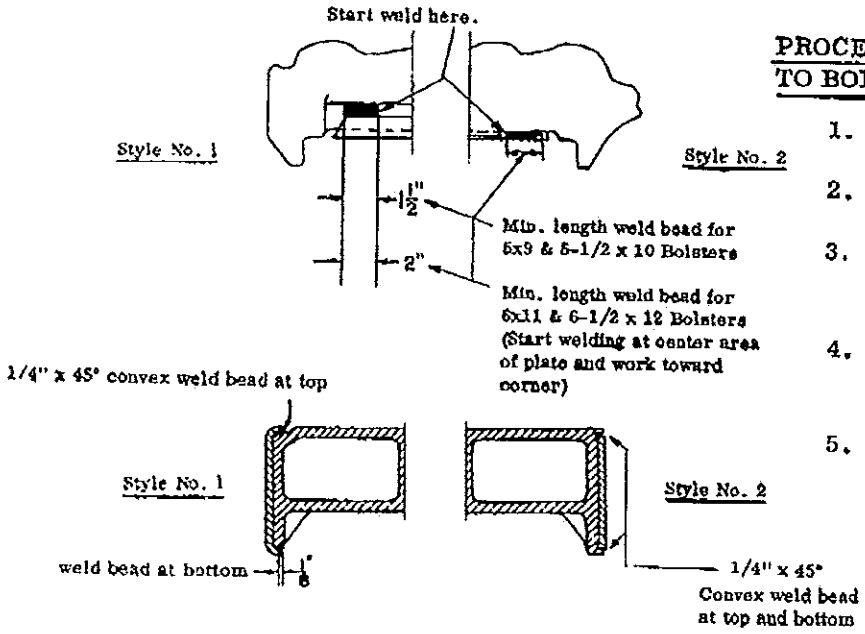


Figure 9

PROCEDURE FOR WELDING FRICTION PLATES TO BOLSTER

1. Clamp plates firmly and securely to bolster.
2. Do not remove clamps until all welding has been completed.
3. Use welding rod A.W.S. E-7015, E-7016, E-7018 or equivalent. All welds to be solid and free of cracks or porosity.
4. Weld bead to be applied only at top and bottom of plate at the four corners, as shown.
5. No preheating of bolster or friction plate is necessary.

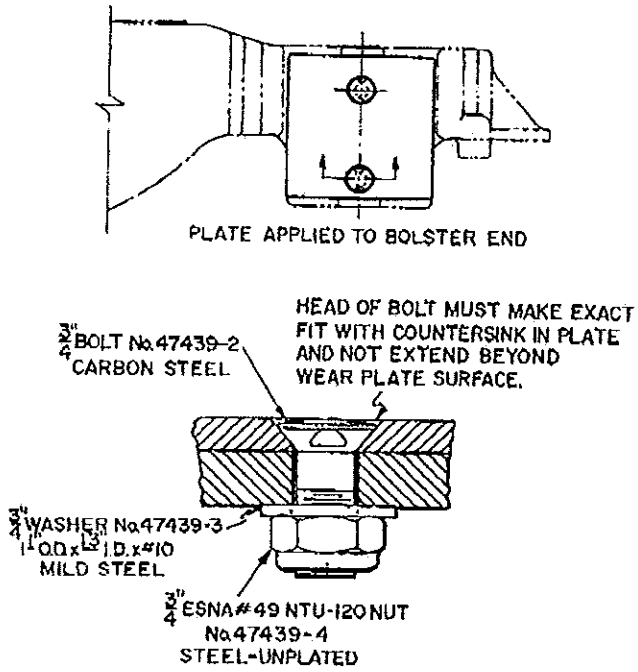
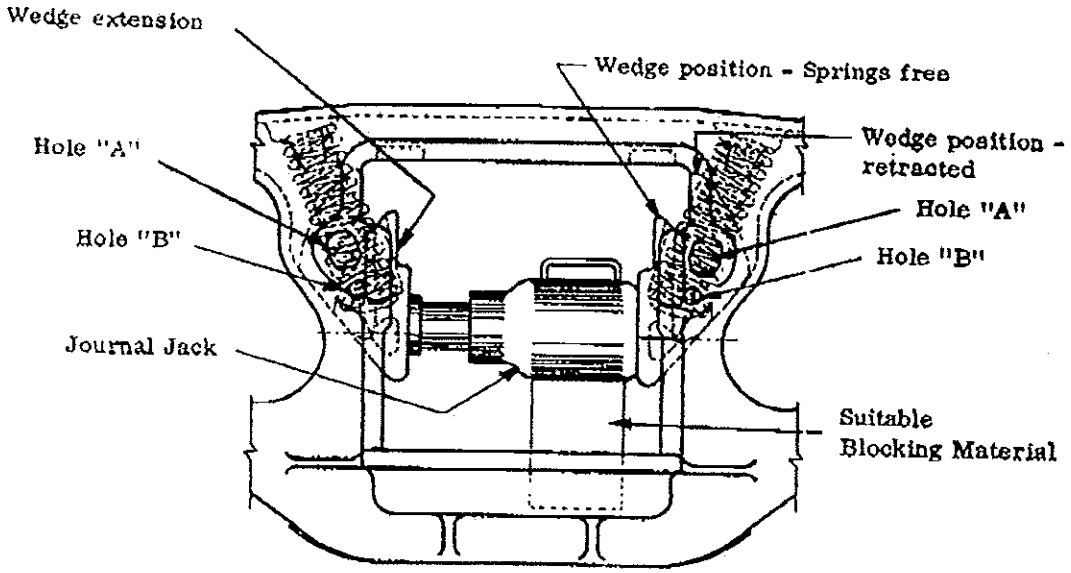


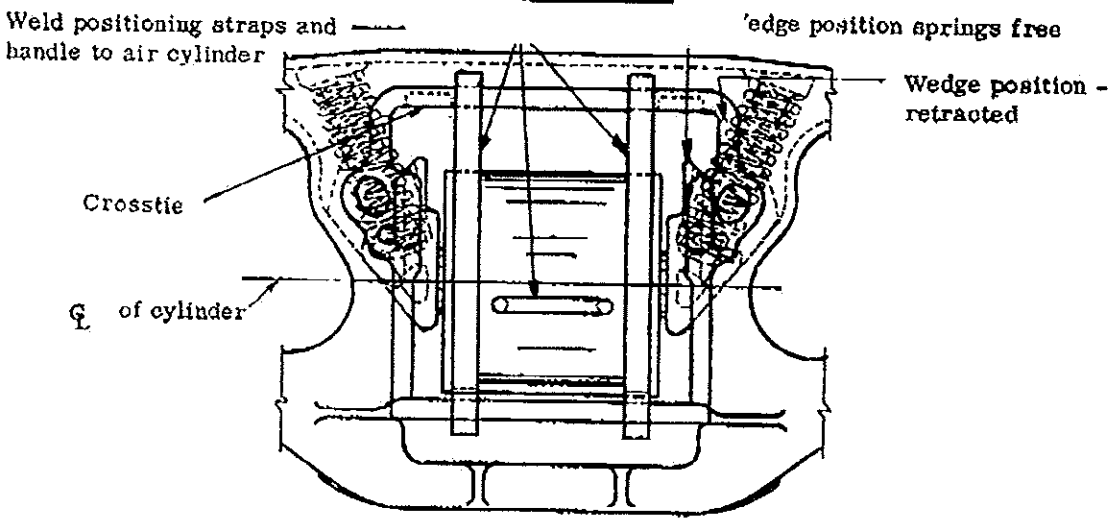
Figure 10

PROCEDURE FOR BOLTING PLATES

1. Nut threads should be lightly lubricated to prevent galling. Care must be used to assure that no lubricant gets on the friction plate.
2. Nuts to be applied with 175-225 ft-lbs torque. Two bolt threads must extend beyond not after application of proper torque.



METHOD No. 1

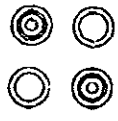
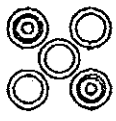
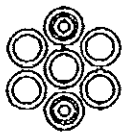
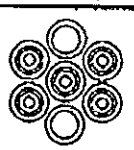
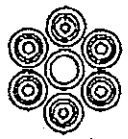
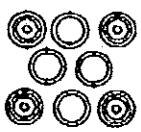
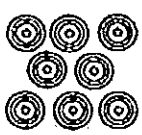
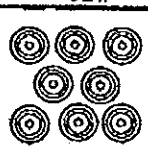


METHOD NO. 2
FOR BUILDING NEW CARS

Use center section of 10" diameter air brake cylinder, 11" long, fitted with two pistons and springs, and weld on 1/2" heads. Tap at center for air to enter between pistons. Complete details of cylinder are covered by drawing No. 41161. (Prints available upon request).

Note: When wedges are forced up into columns, insert retaining pins into side frame holes "B" to hold wedges in retracted position. Use pinch bar between compression member cross tie and top of wedge to force wedge extension rearward for bolster entry during assembly. After truck is assembled, remove retaining pins by using pinch bar in side frame hole "A". Pinch bar and retaining pin details are shown on page 6.

C-1 TRUCK

Type of Spring A.A.R. Std.		D3	D4	D5	D6
Total Spring Travel		2 1/2"	3 1/16"	3 11/16"	
Spring Drawing Number		34365	34366	34367	43932
Free Height of Spring	Outer	9 1/16"	9 5/8"	10 1/4"	.....
	Inner	9 1/16"	9 5/8"	10 5/16"	9 1/16"
Solid Height of Spring	Outer	6 7/16"	6 7/16"	6 7/16"	.....
	Inner	6 7/16"	6 7/16"	6 7/16"	6 7/16"
Load rate per inch of deflection	Outer	4089#	2845#	2140#	.....
	Inner	1641#	1070#	1070#	1334#
Outside Diameter	Outer	5 1/2"	5 1/2"	5 1/2"	.....
	Inner	3 1/4"	3 3/8"	3 3/8"	3 7/16"
Bar Diameter	Outer	1 1/16"	1"	41/64"	.....
	Inner	21/32"	5/8"	5/8"	21/32"
Capacity Solid	Outer	10223#	8713#	7891#	.....
	Inner	4103#	3277#	4013#	4500#
Weight per Coil	Outer	21.75#	20.75#	20#	.....
	Inner	8#	8#	8#	8.25#
5 x 9 MAX. RAIL LOAD 142,000 LBS.					
Number of Springs per Group	Outer	4 D3	5 D4	5 D5	
	Inner	2 D3	2 D4	3 D5	
Total Group Capacity at Solid Height		49,098#	50,119#	51,494#	
Wt. per car set of four groups		412#	479#	496#	
5 1/2 x 10 MAX. RAIL LOAD 177,000 LBS.					
Number of Springs per Group	Outer	5 D3	5 D4	5 D5	
	Inner	3 D3	5 D3	5 D6	
Total Group Capacity at Solid Height		63,424#	64,080#	61,955#	
Wt. per car set of four groups		531#	575#	565#	
6 x 11 MAX. RAIL LOAD 220,000 LBS.					
Number of Springs per Group	Outer	7 D3	7 D4	7 D5	
	Inner	2 D3	5 D4	6 D5	
Total Group Capacity at Solid Height		79,767#	77,376#	79,315#	
Wt. per car set of four groups		673#	741#	752#	
6 1/2 x 12 MAX. RAIL LOAD 263,000 LBS.					
Number of Springs per Group	Outer	8 D3	8 D4	8 D5	
	Inner	4 D3	8 D4	8 D5	
Total Group Capacity at Solid Height		98,196#	95,920#	95,232#	
Wt. per car set of four groups		824#	920#	896#	

PART II

RECLAMATION

Following years of service and depending upon the type of service involved, side frames and bolsters may develop a worn condition. When such wear reaches condemning limits, it will become necessary to restore worn areas to insure satisfactory truck performance.

Areas of wear which may require reclamation cover the following:

(A) Bolster gibs. See Figure 11.

(B) Bolster friction plate surface resulting from the lack or loss of plate. See Figure 12.

(C) Side frame column pad and friction wedge pocket. See Figure 14.

Instructions pertaining to welding and heat treatment will be found on the concluding page of this circular.

Reclamation Procedure

(A) Bolster Gib Wear

Bolster gibs when worn in excess of 1/4" at either inboard or outboard side will require reclamation. The inboard gibs should be built up with weld to their approximate original condition and then be dressed smooth with a grinding wheel. The outboard gibs on solid bearing trucks of all journal sizes and on roller bearing trucks of 5x9 and 5-1/2x10 journal sizes should be built up with weld to their approximate original condition and then be dressed smooth with a grinding wheel to provide gib spacing (dimension A) as shown in Figure 11.

On 6x11 and 6-1/2x12 size trucks equipped with roller bearings the outboard gibs should be restored by welding and grinding to provide gib spacing as shown in Figure 11 regardless of the original spacing. On many bolsters manufactured before 1967, it will be necessary to build up the outside of the outboard gib with weld and grind on the inside of the gib in order to restore dimension "A". In other words, on older 6x11 and 6-1/2x12 roller bearing trucks, during reclamation, you will be actually be moving the outboard gibs out about 5/16". Naturally if one outboard gib on a bolster is restored in this manner, then the other three should also be restored regardless of wear.

(B) Bolster Friction Plate Surface Wear

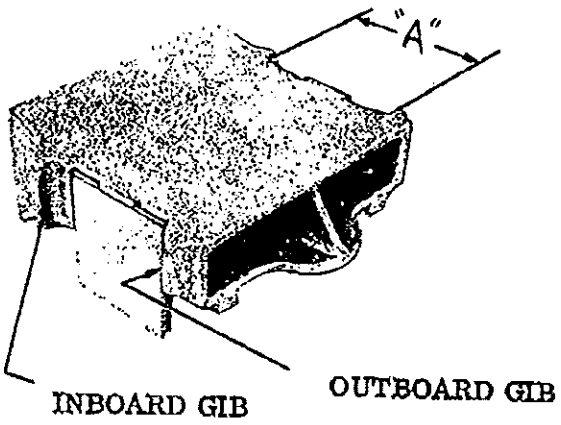
Reclamation of the bolster friction plate surface may become necessary only if the truck is permitted to operate in service without the friction plate, either through neglect of application or through breakage and subsequent loss in service.

Restoration of the worn area (Figure 12) can be accomplished by building up the worn surface with weld or by the application of a steel shim.

Shim thickness will be determined by depth of wear and must be a minimum of 1/8" thick. Variations in the depth of wear will bring about similar variations in shim thickness, however, welding and/or grinding may be utilized to condition the worn surface for the shim thickness required. Additionally, the worn surface must be dressed to a uniform flatness prior to shim application. Shim to be tack welded as shown in Figure 13.

All rough or uneven spots, following the welding operation, must be dressed smooth preparatory to reapplication of the bolster friction plate as illustrated in Figure 9.

Following application of friction plate or plates, the distance over both plates must correspond to dimension "B" shown in Section AA, Figure 12.

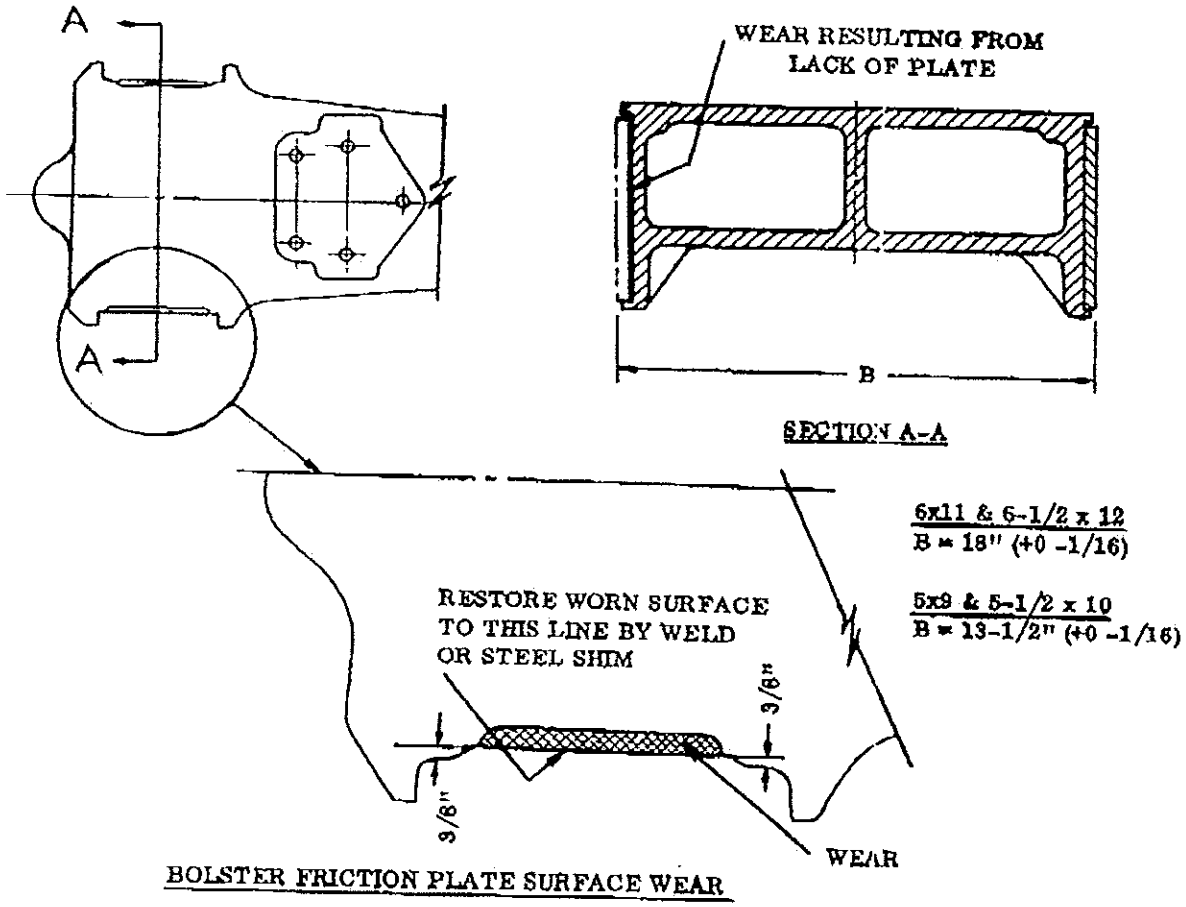


Journal Size	Journal Type	Dim. "A" (+1/8"-0)
5x 9 & 5-1/2x10	All	8-1/8"
6x11 & 6-1/2x12	Solid Bearing	9-5/8"
6x11 & 6-1/2x12	Roller Bearing	9-15/16"

BOLSTER GIB WEAR

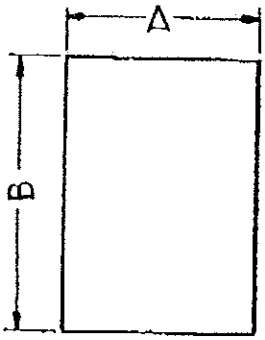
Bolster Gib Wear

Figure 11



BOLSTER FRICTION PLATE SURFACE WEAR

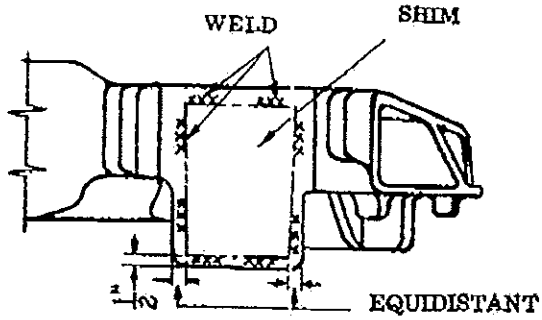
Figure 10



Shim Plate Mild Steel
1/8" Thick Minimum

5x9 & 5-1/2 x 10
A = 5"
B = 7"

6x11 & 6-1/2 x 12
A = 6-1/2"
B = 7"



SHIM APPLICATION

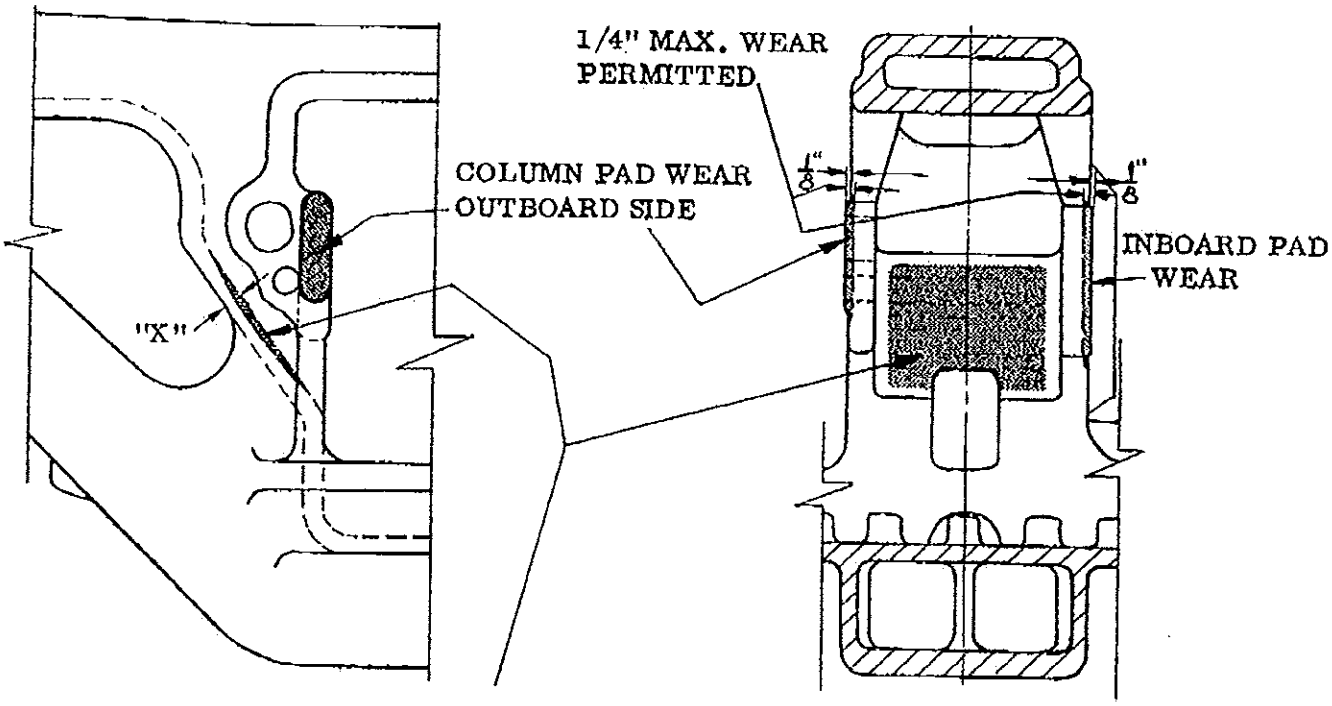
LOCATE SHIM 1/2" FROM BOTTOM AND CENTER LATERALLY ON WEDGE BEARING SURFACE. TACK WELD AS SHOWN, THEN APPLY FRICTION PLATE AS PER Figure 9.

Figure 13

(C) Side Frame Column and Friction Wedge Pocket Wear
Side frame column pads when worn 1/4" maximum must be built up with weld to the approximate original surface, 1/8" (maximum) above the adjacent unworn area. See Figure 14.

The electrodes recommended for this purpose are A.W.S. Class E-7015, E-7016, E-7018 or equivalent low hydrogen type rod.

Friction wedge pocket wear is determined by measuring wall thickness "X" in Figure 14, with a lock joint transfer type outside caliper. When "X" reaches condemning limit of 3/8", the worn wedge surface must be restored by welding thereto, spring steel wear plate No. 46526 (see table) as shown in Figure 15. The electrodes recommended for this purpose are A.W.S. Class E-308, E-312 or equivalent. Following welding operation dress off weld with cup grinder.



WEDGE SURFACE TO BE RESTORED WHEN DIM. "X" MEASURES 3/8" OR LESS. USE LOCK JOINT TRANSFER TYPE CALIPER TO OBTAIN "X".

SIDE FRAME COLUMN PAD AND FRICTION WEDGE POCKET WEAR

Figure 14

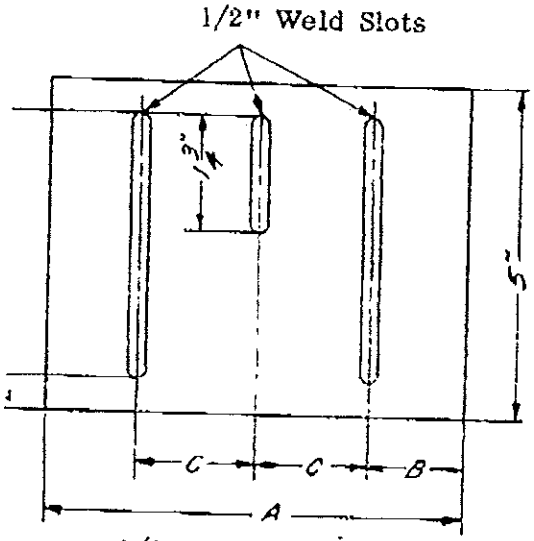
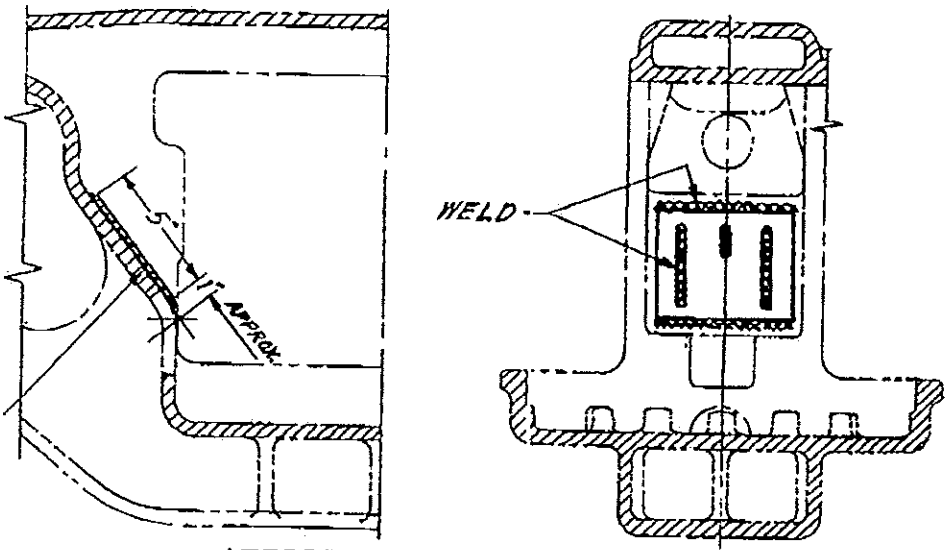


Plate No.	Truck Size	A	B	C
46526-1	5x9 & 5-1/2x10	4-1/2"	1-1/8"	1-1/8"
46526-2	6x11 & 6-1/2x12	6"	1-3/8"	1-5/8"

3/16" Steel Plate
Material A.I.S.I. C-1046



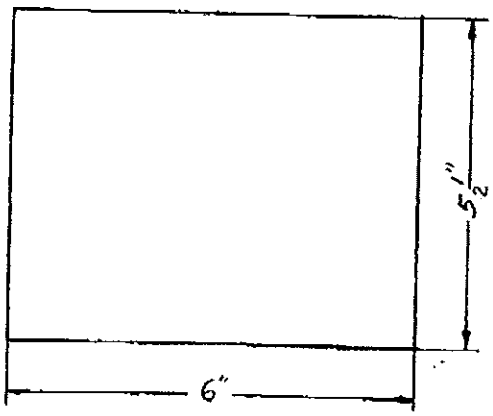
WELD PLATE ALONG TOP AND BOTTOM EDGES AND IN WELD SLOTS

APPLICATION OF PLATE
TO WORN SIDE FRAME POCKET

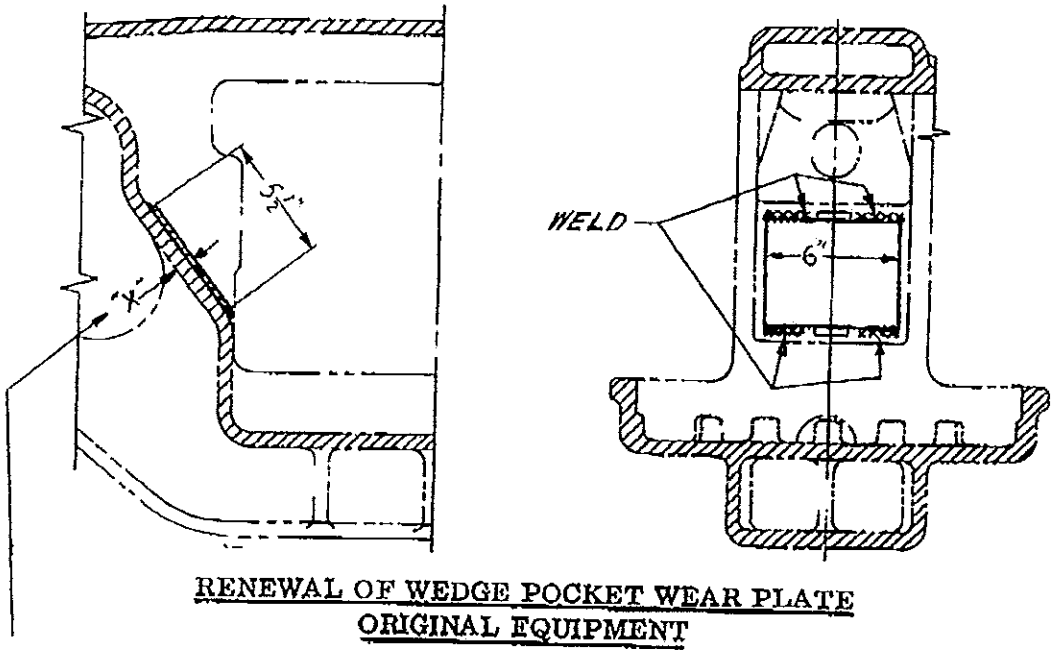
Figure 15

(D) Optional Wedge Pocket Wear Plates Applied to New Side Frames

At the option of the customer, 6x11 and 6-1/2x12 C-1 side frames can be equipped new with wedge pocket wear plate of hardened spring steel, 3/8" thick. Replacement of plate (No. 44719), becomes necessary when the overall plate and wall thickness measures 3/4", measured at point "X", Figure 16. Plate is to be secured by weld, as shown, using electrodes A.W.S. E-7015, E-7016, E-7018 or equivalent low hydrogen type rod. Location of plate determined by lugs provided on wedge bearing surface.



3/8" Steel Plate
Material A.I.S.I. C-1045
No. 44719
(Supplied with 6x11 & 6-1/2x12
side frames only).



RENEWAL OF WEDGE POCKET WEAR PLATE
ORIGINAL EQUIPMENT

PLATE TO BE REPLACED
WHEN DIM. "X" REACHES
CONDEMNING LIMIT OF 3/4".
USE LOCK JOINT TRANSFER
TYPE CALIPER TO OBTAIN "X".
WELD ALONG TOP AND BOTTOM
EDGES ONLY AS SHOWN.

Figure 16

Welding Instructions

Welding operations referred to herein shall consist of a metal-electrode arc welding process which will result in sound weld deposits.

In reclaiming any worn surfaces by weld build-up, the castings must be at a temperature of 40°F. or more at the time of welding. Castings may be locally preheated until the minimum or higher temperature is reached. When preheating precautions should be taken not to cause undue stresses by thermal shock through sudden application of heat.

The electrodes recommended for this purpose are A.W.S. Class E-70XX or equivalent low hydrogen type rod.

Heat Treatment

Stress relieving of the welded casting is not required for any of the welding operations described and referred to herein if the casting is of AAR Grade B steel. If the casting is of AAR Grade C steel, then all welding other than the application of wear plates should be followed by the heat treatment specified in the AAR Interchange rules. When heat treatment is required for either Grade B steel or Grade C steel castings, it is necessary to remove wedges, wedge springs and wedge pocket wear plates from side frames and center plate wear liners and friction plates from bolsters prior to heat treatment. These items are all hardened steel and will be damaged if heat treated.

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