THE BOOK

CONRAIL

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Car Inspection and Repair
General Information

CONRAIL

CENTRAL REGION TRANSPORTATION GUIDE FOR CAR INSPECTION & REPAIR

ISSUED 1-16-80

SAFETY

All employes in the M. of E. Department are governed by the Safety Rules set forth in Booklet S-7-D. While each rule is important, some will be more pertinent than others.

1. Report any injury immediately.

2. Immediate supervisor is responsible for the instruction and safe performance of those under his jurisdiction and must take the necessary action to know they comply with the rules.

3. Use of drugs or alcohol while on duty or 8 hours prior to going on duty is prohibited.

4. Wear proper clothing.

5. Look where you are going.

6. Keep your mind on your job.

7. Keep area clean - Good Housekeeping.

8. Use proper method of lifting, pushing and pulling.

9. Be certain track is properly protected before fouling equipment.

10. Give unprotected equipment a minimum of 10 feet clearance.

11. Wear proper eye protection.

12. Use proper tool for job.

13. Be careful placing hands and feet so they cannot be caught by object being handled.

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TIME LIMITS FOR PERIODICALS

	DESCRIPTION	TIME LIMITS
1.	A. B. BRAKE	72 MONTHS
2.	ABD & ABDW BRAKE	168 MONTHS
3.	A. B. HOSE	8 YEARS
4.	IN DATE TEST	90 DAYS (IN SHOP)
5.	SINGLE CAR TEST DEVICE	DAILY
6.	SINGLE CAR TEST DEVICE GAUGE	30 DAYS
7.	MASTER WEIGHT GAUGE	30 DAYS
8.	CABOOSE GAUGE	90 DAYS
9.	RPK OD	30 MOS. (STABILIZED)
10.	RPK OD	24 MOS. (OTHERS)
11.	R.B. LUB	72 MOS.
12.	R.B. LUB MACHINE	30 DAYS
13.	NO FIELD LUB	NOT REQUIRED
14.	TRAILER HITCHES	6 MOS.
15.	LUB SIDE DOORS	WHEN IN SHOP - NO CHARGE FOR LABOR
16.	BULK HEADS	12 MOS. IN SHOP
17.	TANK CARS & SAFETY VALVES	REFER TO AAR INTERCHANGE RULE 88
18.	CABOOSE WATER BOTTLES	DISCARD AFTER 30 DAYS
19.	MICROPHOR CHLORINATOR	30 DAYS
20.	FILTER LUBRICATOR	30 DAYS
21.	FIRE EXTINGUISHER	1 YEAR
22.	OXYGEN & ACETYLENE GAUGES	1 YEAR

LOCOMOTIVE MAINTENANCE

1 - MONTHLY
2 - QUARTERLY
3 - SEMI-ANNUALLY
4 - YEARLY
5 - BI-ANNUAL

NOTE: FRA INSPECTION - REFER TO AAR INTERCHANGE RULES 1 AND RULE 130.

REGARDING FUTURE CHANGES IN TIME LIMITS FOR PERIODIC ATTENTION, REFER TO RESPECTIVE MANUALS.

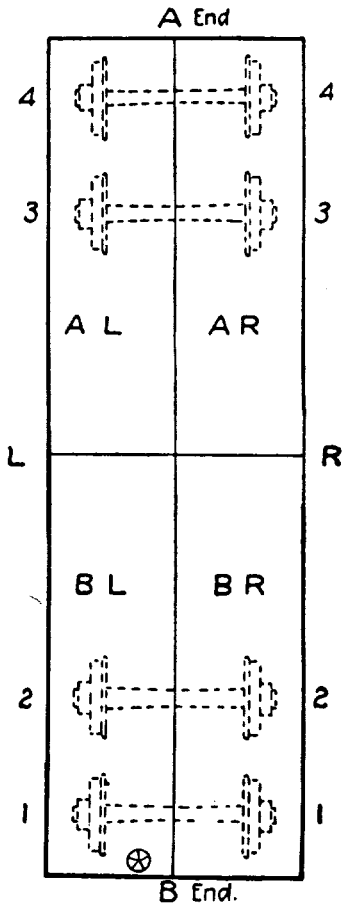
For designation of locations on car at which damage occurred or repairs made, the following will govern:

a. Cars equipped with four wheel trucks.

(1) The end of car upon which the brake shaft is located shall be known as B end and the opposite end shall be known as A end. If the car has two brake shafts, the owner shall have the respective ends, A and B, stenciled on car, on both sides, near each end.

(2) Facing the B end of car in their order on the right side, wheels, journal boxes, brake beams and other truck parts shall be known as R1, R2, R3 and R4. Similarly those on the left side shall be known as L1, L2, L3 and L4. The main structure of car is divided into four sections known as BR, BL, AR and AL. See Figure A.

Figure A



STATUS OF FREIGHT CAR REPAIRS

THE FOLLOWING CATEGORIES INDICATE STATUS OF CARS WHICH MAY REQUIRE ATTENTION AND REPAIRS THAT CAN BE PERFORMED BY CAR INSPECTORS AND REPAIRMEN:

REPAIRS IN TRAIN	STATUS II REPAIRS IN YARD	STATUS I REPAIRS IN SHOP
AIRBRAKE HOSE	COUPLER	YOKES
BRAKE SHOE KEYS	CARRIER IRON	DRAFT GEARS
BRAKE SHOE	RENEW BRAKE RODS	WHEELS
ADJUST PISTON TRAVEL	DOORS	COT&S
BOX LIDS	LOAD REPAIRS	REPACK OVER DATE
CLOSE DOORS	TRAIN LINE	DOORS - (R & R)
KNUCKLE	LUBRICATION	LOAD REPAIRS
COTTER KEYS	HAND BRAKE ASSEMBLY	BODY WORK
TRAIN LINE	BRAKE STEPS	TRUCK WORK
BRAKE DISCS	SAFETY APPLIANCE R & R	OTHER PERIODICALS
SAFETY APPLIANCE S.O.C.	CUT LEVER R & R	DRAFT SILL
BRAKE WHEELS	CUT LEVER BRACKET	END SILL REPAIRS
CUT LEVER S.O.C.	ANGLE COCK BRACKET	
	BRAKE LEVERS	

KNOW YOUR ABC'S

What are the ABC's? These are the three items that must be checked on all cars on a repair track, namely coupler inspection, hand brake inspection and journal box inspection.

The ABC's should be automatically performed on each car as it is first manned for repairs:

A - Coupler Inspection

1. Inspect coupler for cracks or fractures.
2. Inspect yoke for cracks or fractures.
3. Inspect coupler and draft arrangement - 1 in. free slack allowed.
4. Inspect draft gear and follower plates.
5. Inspect coupler shank and cross-key wear.
6. Inspect cross-key retainer, retainer lock and cotter key.
7. Check coupler contour.
8. Check knuckle wear.
9. Check coupler height.
10. Check toggle clearance.
11. Check anti-creep.
12. Using coupler release lever handle only, does knuckle properly open without using your hand?
13. When using hoisting equipment, know what you want to do, secure item properly and use correct signals.
14. Use proper ladders and scaffolding when working above ground level. Do not jump from cars or platforms. Use ladders.
15. Do not set up conditions which will start or feed fires.
16. Only qualified people should work on electrical equipment.

B - Hand Brake

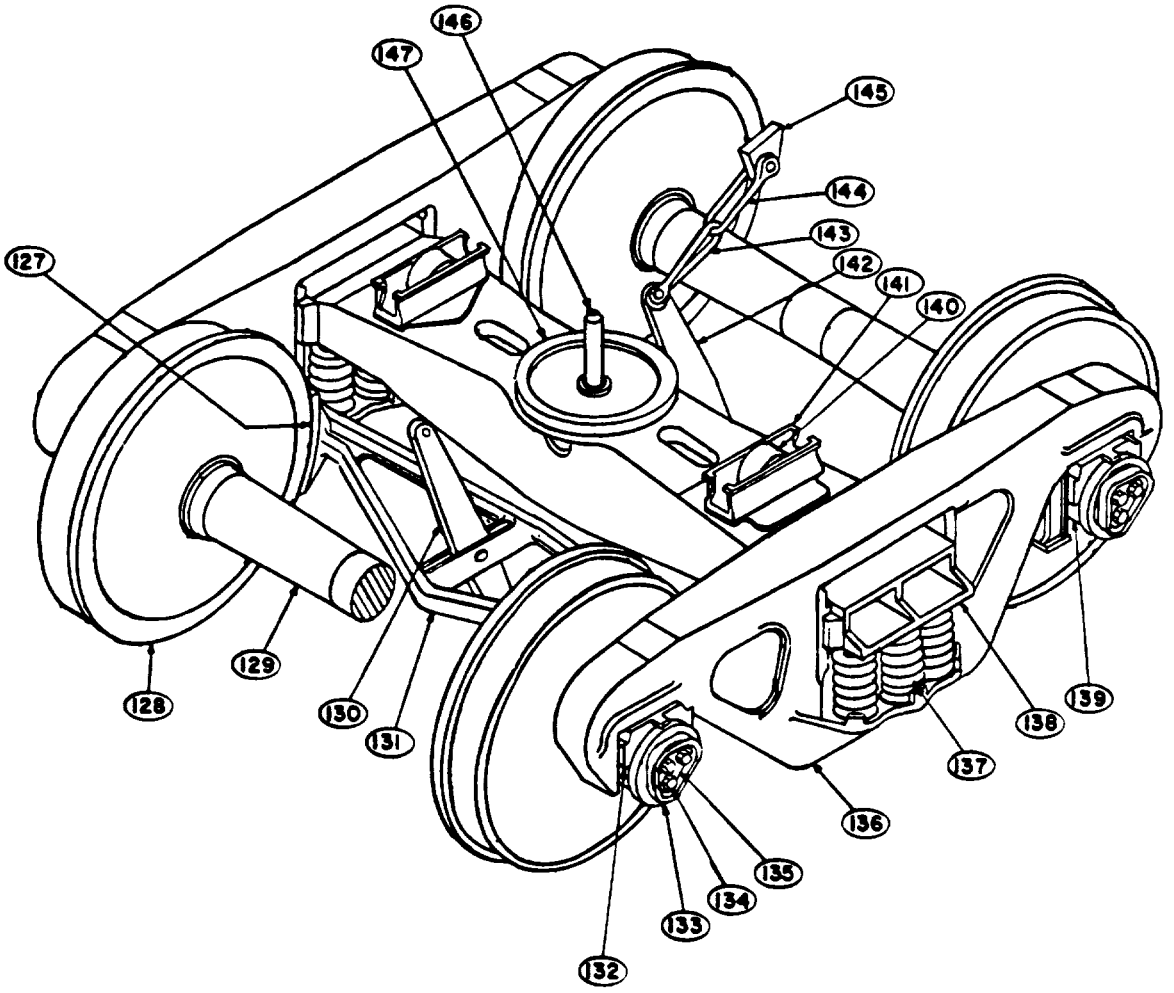
1. Apply hand brake.
2. Check bell crank position.
3. Check snugness of shoes against wheels.
4. Check for worn shoes and brake rigging in general.
5. Oil all geared hand brakes.
6. Release hand brake.

C - Lubrication

1. Inspect lubricator pad for position and worn and torn condition.
2. Inspect journal bearings for broken lugs, collar or lining.
3. Check journals with feeler hook for cuts, pitted or rough journal.
4. Check journal wedges to make sure they are seated in top of box and not distorted.
5. Check journal box lid.
6. Check all boxes for free oil (1/2"); add if necessary.

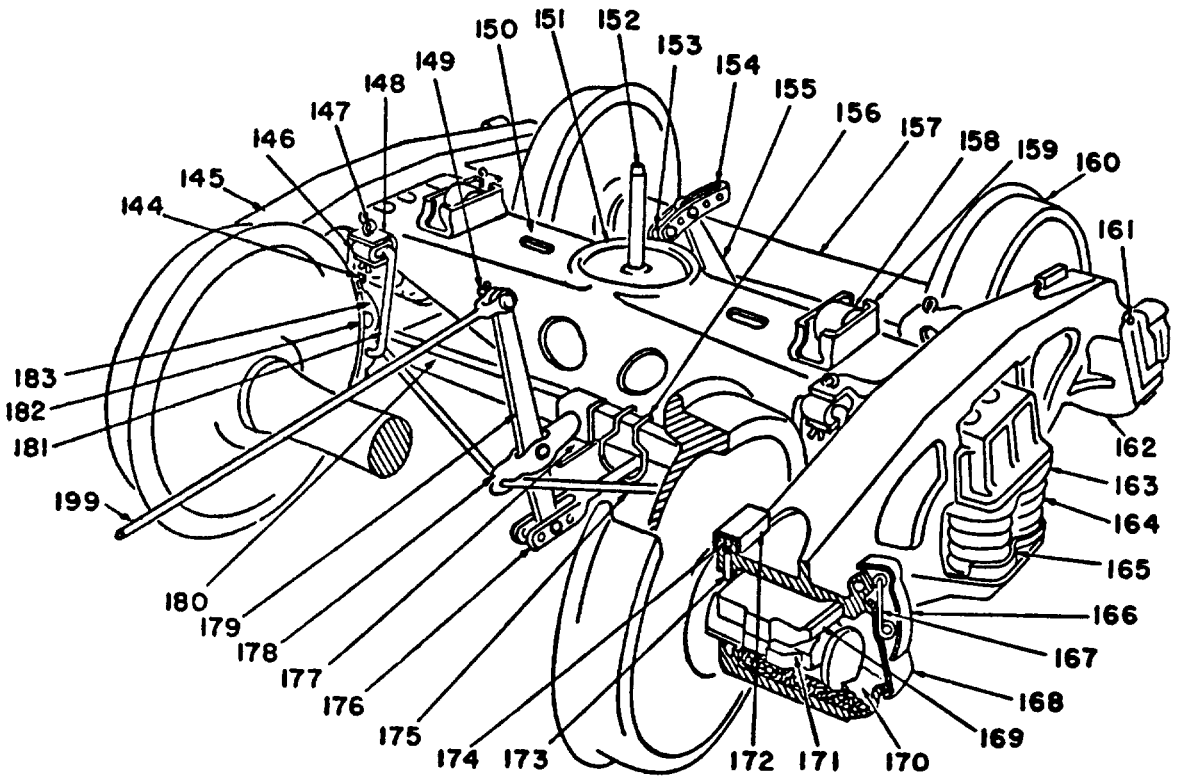
NOTE: If journal boxes are to be repacked or if trucks are to be dismantled, above work can be done at time of same.

FREIGHT CAR TRUCK COMPONENTS



127 - Brake Shoe
128 - Wheel
129 - Axle
130 - Truck Live Lever
131 - Brake Beam
132 - Roller Bearing Adapter
133 - Roller Bearing End Cap
134 - End Cap Retaining Bolt
135 - End Cap Locking Plate
136 - Truck Side Frame
137 - Truck Spring
138 - Truck Bolster
139 - Roller Bearing Assembly
140 - Truck Side Bearing Roller
141 - Truck Side Bearing Housing
142 - Truck Dead Lever
143 - Clevis At Dead Lever
144 - Clevis At Dead Lever Fulcrum
145 - Dead Lever Anchor-Underframe Mounted
146 - Center Pin
147 - Truck Center Plate Cast Integral With Truck Bolster

FREIGHT CAR TRUCK COMPONENTS (FRICTION)



144 - Brake Shoe Key
145 - Truck Side Frame
146 - Brake Hanger Wear Plate
147 - Brake Hanger Key
148 - Brake Hanger Bracket, Cast Integral With Side Frame
149 - Brake Pin And Cotter
150 - Truck Bolster
151 - Truck Center Plate, Cast Integral With Truck Bolster
152 - Center Pin
153 - Dead Lever Guide Bracket
154 - Dead Lever Guide
155 - Dead Truck Lever
156 - Bottom Rod Safety Support
157 - Axle
158 - Truck Side Bearing Roller
159 - Truck Side Bearing With Roller Guide
160 - Wheel
161 - Journal Box Lid
162 - Journal Box, Cast Integral With Truck Side Frame
163 - Top Spring Plate
164 - Truck Spring
165 - Bottom Spring Plate
166 - Journal Box Lid Hood
167 - Journal Box Lid Spring
168 - Journal Box Lid
169 - Journal Bearing Wedge
170 - Journal Lubricator
171 - Journal Bearing Or Journal Brass
172 - Dust Guard Cap
173 - Dust Guard
174 - Dust Guard Wedge Or Plug
175 - Brake Beam Truss Rod
176 - Bottom Brake Rod
177 - Brake Beam Safety Support
178 - Brake Beam Strut
179 - Live Truck Lever
180 - Brake Beam Compression Member
181 - Brake Hanger Or Brake Beam Hanger
182 - Brake Shoe
183 - Brake Head

DISASSEMBLY AND ASSEMBLY of A 70-TON UNIT BRAKE BEAM, RIDE CONTROL TRUCK (Friction Bearings 6" x 11")

In this program you will see the proper proceedures for disassembly and assembly of a 70 ton Ride Control Truck with 6" x 11" friction bearings.

The basic tools necessary to repair this truck are:

1) Hammers and drift pins

2) Journal bearing tongs

3) Packing hook

4) Ride control pins

To start the disassembly of the truck, the load carrying springs must be compressed and the Ride Control Pins inserted in holes in the bolster.

This can be best accomplished by using a hydraulic press at the center plate bowl or by driving wedges between the top of the bolster and the side frames.

When the bolster is compressed, apply the (4) pointed "Ride Control" pins in the holes in the bolster to secure the "Ride Control" friction castings.

We are now ready to begin the disassembly of the brake rigging.

First, the cotter keys and pins must be removed from the brake rigging.

The levers, lever fulcrums and the spreader bar can be removed from the truck.

Remove the (4) brake shoe keys and the brake shoes.

Next the (4) journal box covers must be removed. Pins are inserted through the lids to maintain spring tension. Using a drift pin and hammer, remove the (4) covers.

We can now remove the lubricating pads from each journal box, with the aid of the journal packing hook.

The truck sides must now be raised to remove the bearing wedges and friction bearings from the journal boxes.

Using the bearing tongs, remove the wedges. Remove the journal bearings by gripping the lug on the side of the bearing.

The sides are now lowered and the bolster raised to remove the spring sets as shown.

Next, remove the side bearings and the bolster center pin.

The bolster is now lowered to a height that the side frames can be spread apart sufficiently to remove the brake beams.

The side frames can now be separated from the bolster and the wheels and axles rolled away.

The truck is now disassembled and the various components should be cleaned and inspected prior to assembly.

	The side frame wear plates should be inspected for excessive wear, cracks or broken welds. the bolster gibs, shown here, are gauged and if worn excessively they are rewelded. The bolster center plate must be inspected for cracks and welded if necessary. Bearing wedges are gauged for wear and hammer tested. Wheel and axle sets are inspected, and sent to Hollidaysburg if repairs are necessary. Inner dirt guards are replaced. We are now ready to assemble the truck. The bolster is positioned and the Wheels and axles rolled into place. A uniform practice for marking truck side frames, to permit pairing of frames on the same truck, with respect to dimensions between the centers of journal boxes, has been adopted. Button heads are welded on the side frames to indicate the variations over the normal dimensions. Sides having the same number of buttons, or with one more, or less, are selected for use on the same truck. After selecting the correct side frames, insert the lubricator pads in the journal boxes. The truck side frames are properly positioned.

The brake beams are lifted into place as the side frames are applied to the bolster.

The bolster should now be raised to hold the sides in place.

Lubricator pads are positioned under the axle journal using the packing knife.

Next we will apply the bearings and wedges. Using the special bearing tongs, and being careful not to scratch or damage the bearing surfaces, insert the bearings over the axles.

Place the bearing wedges on the bearings making sure they are seated properly.

We are now ready to apply the spring sets. Note that springs are gauged for condemning heights and checked for excessive corrosion or pitting as per Rule 50 of your AAR Field Manual.

A qualified spring set is made up and applied to the spring pockets.

The bolster is lowered on the springs.

The journal box covers should now be applied. Journal box covers may have a poured seal, shown here, or a snap on seal such as this. Apply the covers and remove the pins to release the spring pressure.

The next step is to connect the spreader bar, brake levers and brake lever fulcrums to the brake rigging.

Insert the spreader bar through the bolster.

Apply the brake levers to the spreader bar and brake beams. The upper portion of the brake lever is applied to the bracket on the bolster. Pins and cotter keys are applied.

Apply the brake shoes and keys.

Next, the rivets in the side bearing cages are checked, and if loose, are replaced. A "bucking bar" must be used to insure the rivets are driven tight.

When completed, the side bearings are placed in the cages.

The center pin is inserted in the bolster.

As in the beginning of the program, it is now necessary to press the bolster down to remove the "ride control" pins from the bolster by use of a hydraulic press or wedges. Remove the pins and the truck is completely assembled.

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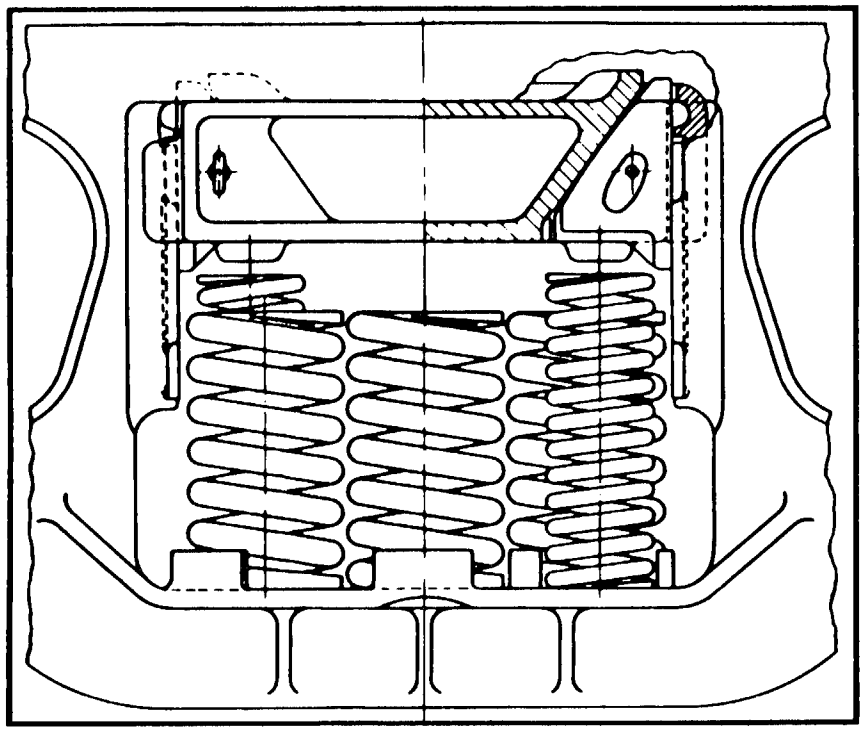
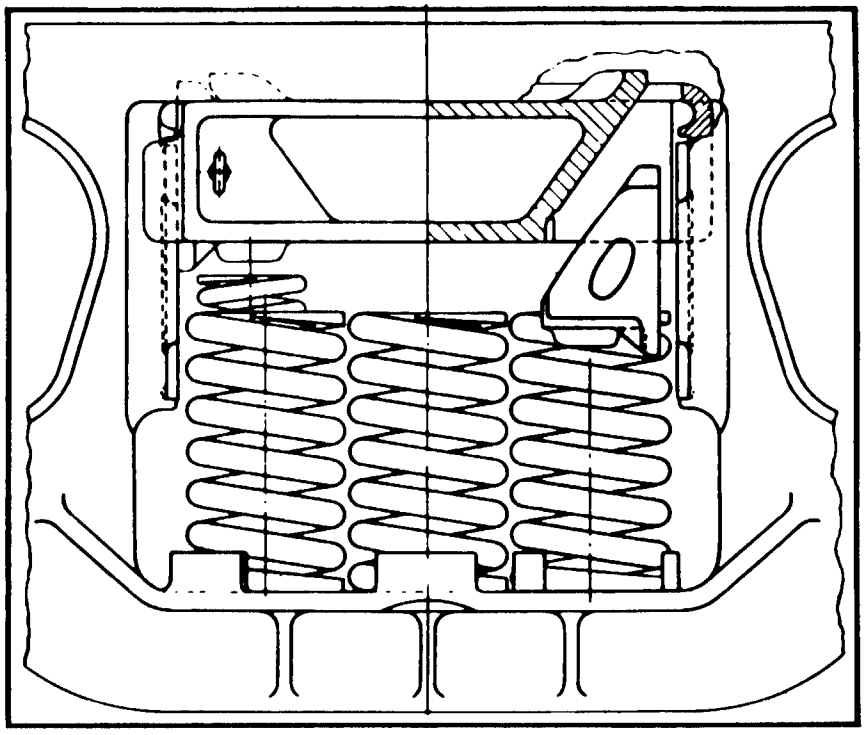
IMPORTANT!

- **Proper inspection and maintenance are important for optimum truck performance and greater car utilization.**
- **All parts shown in this manual are the latest design and are interchangeable with parts produced earlier.**
- **For your convenience, Selector Tables in this manual have a blank column where you can write-in your own railroad part numbers.**

HOW TO REPLACE BARBER® FRICTION CASTINGS AND SIDE SPRINGS



TO REMOVE worn friction casting, lift truck bolster off of springs as shown above. Remove outboard corner load springs to gain access to side spring and casting.



REMOVE side spring and spring cotter. Friction casting will drop out of bolster pocket as shown.

TO INSTALL

new Barber Friction Castings & Side Springs:

(1) Insert friction casting into bolster pocket;

(2) Insert special cotter;

(3) Replace side spring under friction casting;

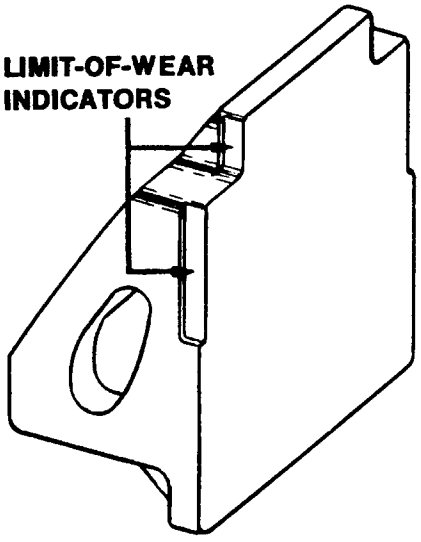
(4) Replace outboard corner load springs;

(5) Lower the truck bolster.

TRUCK BOLSTER REMOVAL IS NOT REQUIRED FOR REPLACEMENT OF FRICTION CASTINGS OR SIDE SPRINGS. IF BOLSTER REMOVAL IS REQUIRED FOR OTHER REASONS, SUCH AS REPLACING COLUMN WEAR PLATES, NO PINNING OF FRICTION CASTINGS OR SPECIAL TOOLS ARE NEEDED IN BARBER STABILIZED TRUCKS.

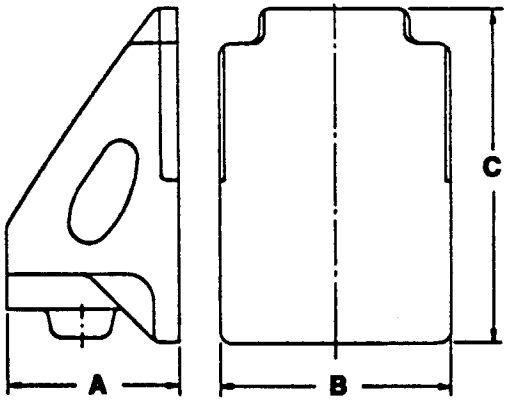
FRICTION CASTING SELECTOR FOR REPLACEMENT

WHEN SHOULD YOU REPLACE FRICTION CASTINGS?

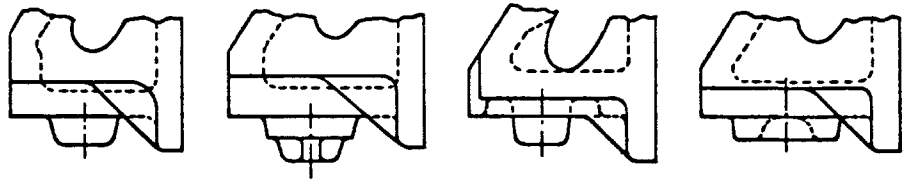


Check condition of Barber Friction Castings regularly. When friction faces have worn and Limit-of-Wear Indicators are obliterated, friction castings should be replaced. To establish proper stabilization and prevent extra downtime, it is recommended that both friction castings be replaced during any maintenance overhaul. At the same time, check side springs and hardened steel wear plates, and replace when necessary.

WHAT FRICTION CASTING TYPE AND PART NUMBER SHOULD YOU USE?



BARBER FRICTION CASTING



TYPE 1 — SINGLE SIDE SPRING ONLY

TYPE 2 — SINGLE AND DOUBLE SIDE SPRING

TYPE 3 — SINGLE AND DOUBLE SIDE SPRING

TYPE 4 — SINGLE AND DOUBLE SIDE SPRING

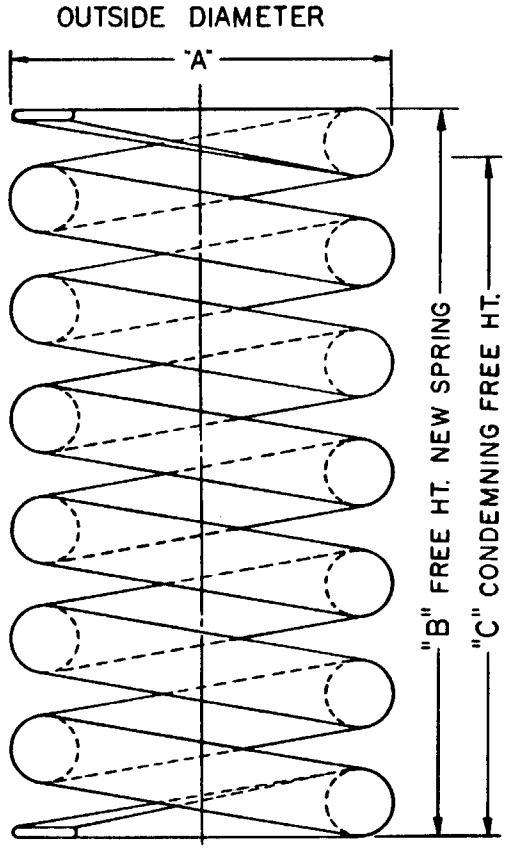
TYPES OF SPRING BOSSES ON BOTTOM OF FRICTION CASTINGS

BARBER FRICTION CASTING SELECTOR

BARBER FRICTION CASTING PATTERN NUMBER	CAR CAPACITY	A.A.R. SPRING TRAVEL	TYPE OF SPRING BOSS	DIMENSIONS			DRAWING NUMBER	RAILROAD PART NUMBER
				A	B	C		
601-C	40 T.	D-3	1	3⅝"	4½"	7"	2236	
[1] 604-C	50 T.	D-3	1	3¾"	5"	6¾"	2291	
606-C	50 T.	D-3	1	3¾"	5"	7¼"	2296	
[2] 675-C	40 T., 50 T.	D-4, D-5	1	3¾"	5"	7"	2846	
[3] 678-C	70 T., 100 T.	D-4, D-5	1	4⅛"	5½"	6¾"	3027	
609-D	70 T., 100 T.	D-3	2	4¼"	5½"	7½"	2295	
787-C	70 T., 100 T.	D-4, D-5	3	4⅛"	5½"	6¾"	3973	
762-C	125 T.	D-3, D-4, D-5	4	4⅜"	6½"	7"	3828	

1—Double truss type trucks.
2—Low conveyance—179,000 lb. rail load.
3—Used in bolsters cast prior to April, 1971.

BARBER SIDE SPRINGS



BARBER S-2 TRUCKS / D-3 SPRINGS

CAR CAPACITY	FRICTION CASTING	SPRING USE	SPRING NUMBER	O.D. "A"	NEW HT. "B" ± 1/4"	SCRAP HT. "C"	R.R. PART NO.
40 TON	601-C	SINGLE	B-321	2 7/8"	10 1/8"	9 3/16"	
50 TON	606-C	SINGLE					
70 TON & 100 TON	609-D	SINGLE OR OUTER	B-421	3 11/16"	10 3/8"	9 3/16"	
		INNER	B-422	2 3/16"	9 3/4"	8 11/16"	
125 TON	762-C	OUTER	B-423	3 3/4"	10 1/4"	9 3/16"	16-748228
		INNER	B-422	2 3/16"	9 3/4"	8 11/16"	16-748210

BARBER S-2 TRUCKS / D-4 OR D-5 SPRINGS

CAR CAPACITY	FRICTION CASTING	SPRING USE	SPRING NUMBER	O.D. "A"	NEW HT. "B" ± 1/4"	SCRAP HT. "C"	R.R. PART NO.
40-50 T	675-C	SINGLE	B-331	3 3/16"	11 1/4"	10 3/8"	
70 TON & 100 TON	787-C *	SINGLE OR OUTER	B-432	3 7/8"	11 1/16"	10 3/8"	
		INNER	B-433	2 13/32"	11 3/8"	10 3/4"	
125 TON	762-C	OUTER	B-432	3 7/8"	11 1/16"	10 3/8"	
		INNER	B-434	2 13/32"	10 3/4"	10"	
LOW DECK CAR D-4 ONLY	675-C	SINGLE	B-111	3 1/4"	10 3/8"	9 3/4"	

BARBER SIDE SPRINGS ARE LONGER THAN CENTER SPRINGS.

* BOLSTERS CAST BEFORE APRIL 1971 REQUIRE CASTING 678-C FOR SINGLE SIDE SPRING APPLICATIONS.

BARBER S-2 TRUCKS / D-2 (1 5/8") SPRINGS.

FRICTION CASTINGS: REPLACE WITH SAME PART NUMBER

SIDE SPRINGS: CONTACT STANDARD CAR TRUCK CO. FOR RECOMMENDATIONS.

SPRING USE

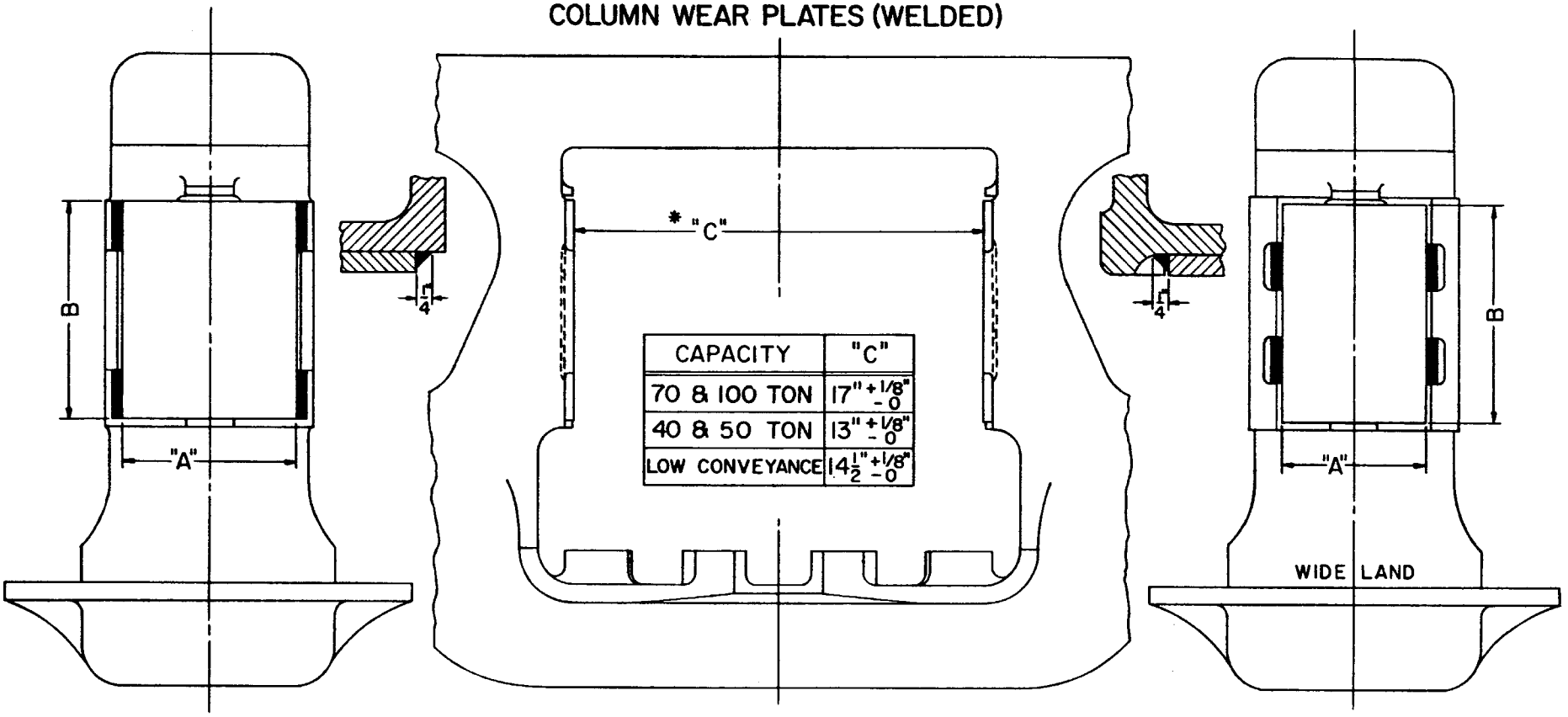
"SINGLE" INDICATES SINGLE COIL SIDE SPRING

"OUTER" INDICATES THE OUTER COIL OF DOUBLE COIL SIDE SPRG.

"INNER" INDICATES THE INNER COIL OF DOUBLE COIL SIDE SPRG.

WHENEVER SHIMMING IS REQUIRED BOTH THE SIDE SPRINGS AND CENTER SPRINGS MUST BE SHIMMED ALIKE.

COLUMN WEAR PLATES (WELDED)



SECURE WEAR PLATES TO SIDE FRAME BY WELDING. FOR A SATISFACTORY WELD THE FOLLOWING PROCEDURE IS RECOMMENDED.

1. FORCE WEAR PLATES TIGHTLY AGAINST COLUMN DURING THE WELDING OPERATION.

2. POSITION FOR DOWNHAND WELDING.

3. AMERICAN WELDING SOCIETY ELECTRODE GRADE E-6016 OR E-7016 TO BE USED OF A SIZE CONSISTENT WITH GOOD PRACTICE.

4. USE A CURRENT AS LOW AS POSSIBLE.

5. WELDS SHALL BE BUILT BEGINNING NEAREST THE MIDDLE OF PLATE AND WORKED TOWARD THE END.

6. NO PREHEAT IS NECESSARY EITHER ON THE SIDE FRAME OR WEAR PLATES.

WELDING TO BE DONE IN A WORKMANLIKE MANNER, BE HOMOGENEOUS, FREE OF GAS AND FOREIGN INCLUSIONS.

WEAR PLATES MISSING, BROKEN OR WORN TO LESS THAN 1/4" SHOULD BE REPLACED.

CRACKED WEAR PLATE WELDS SHOULD BE REWELDED.

* SHIMS MAY BE REQUIRED BEHIND WEAR PLATES IF DIMENSION "C" IS 1/4" GREATER THAN SHOWN IN TABLE.

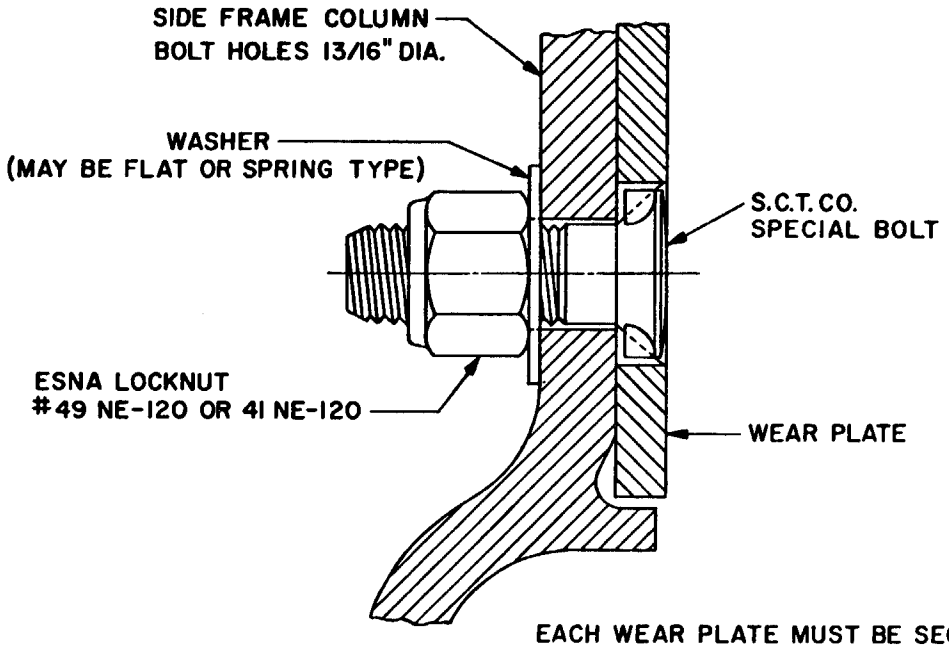
WELD NOT TO EXTEND BEYOND FACE OF COLUMN WEAR PLATE OR BEYOND SIDE FACES OF COLUMN.

ALL COLUMN WEAR PLATES MUST BE FREE OF PAINT BEFORE AND AFTER APPLICATION.

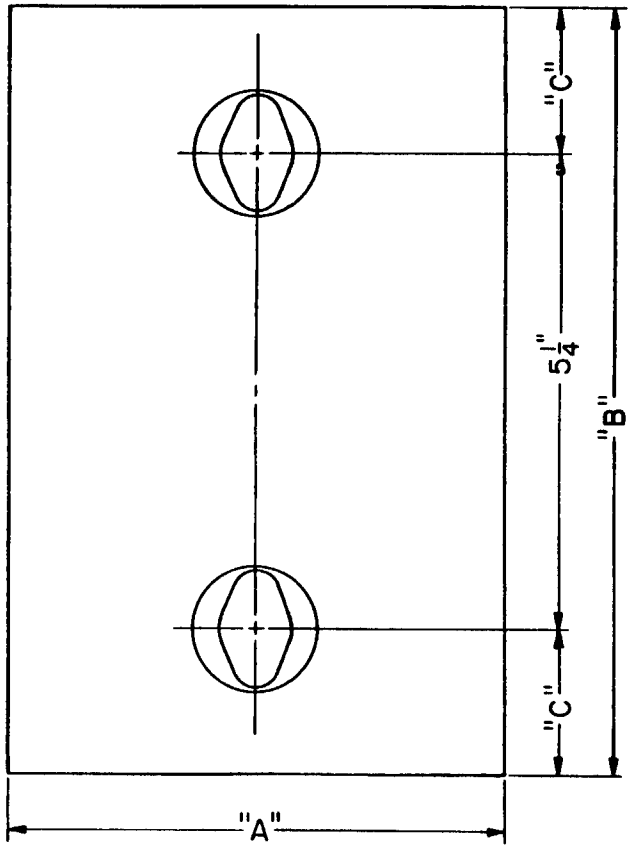
ALL COLUMN WEAR PLATES ARE 3/8" THICK HEAT TREATED SAE 1095 STEEL.

S.C.T.CO.	LINE NO.	"A"	"B"	R.R. PART NO.
DRAWING 2794	1	4 1/2"	8 1/2"	
	2	4 1/2"	9"	
	3	5"	8 1/2"	
	4	5"	9"	
	5	5 1/2"	8 1/2"	
	6	5 1/2"	9"	
	7	7 1/2"	9 11/16"	
	8	7 1/2"	9 3/16"	
3829		6 1/2"	9 1/2"	

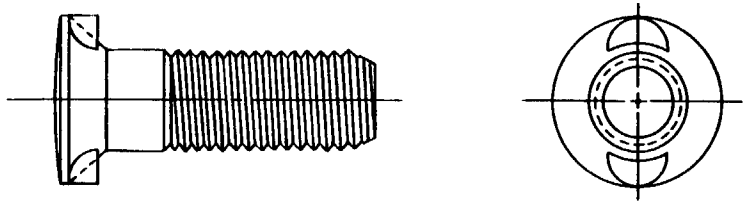
COLUMN WEAR PLATES (BOLTED)



EACH WEAR PLATE MUST BE SECURED BY TWO BOLTS WITH ESNA LOCKNUTS APPLIED WITH 175 FT. LBS. TORQUE ± 25 FT. LBS. (USE SLIGHT LUBRICATION TO PREVENT GALLING)

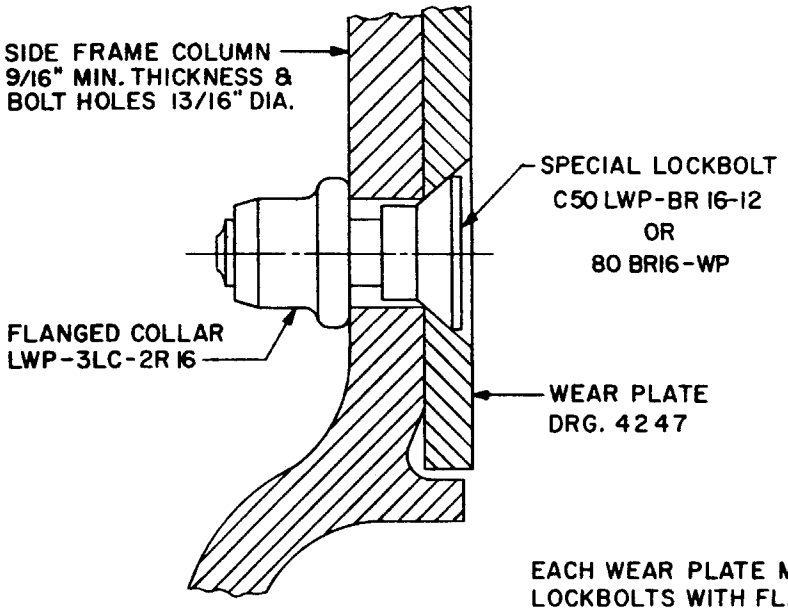


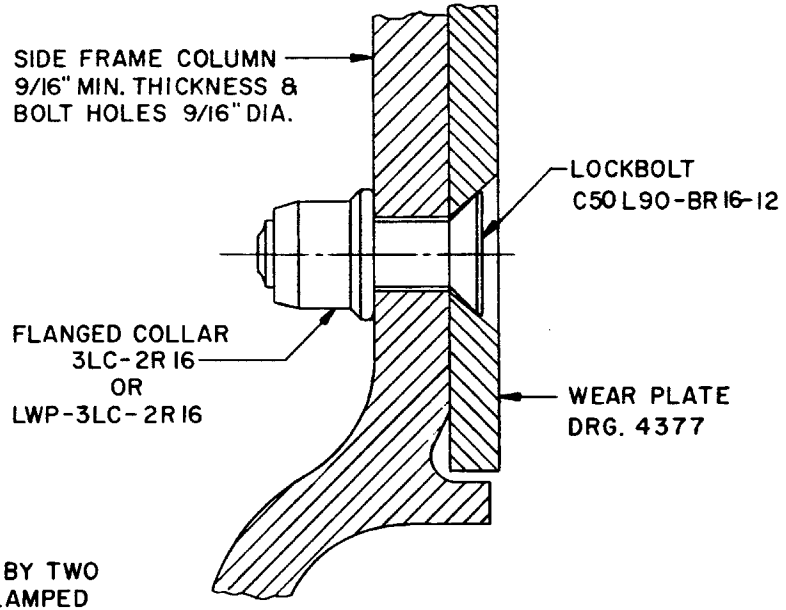
S.C.T. CO.	LINE NO.	"A"	"B"	"C"	R.R. PART NO.
DRAWING 3994 SHEET-2	1	4½"	8½"	1⅝"	
	2	4½"	9"	1⅞"	
	3	5"	8½"	1⅝"	
	4	5"	9"	1⅞"	
	5	5½"	8½"	1⅝"	
	6	5½"	9"	1⅞"	
	7	7½"	9 11/16"	2 7/32"	
	8	7½"	9 3/16"	1 31/32"	
	9	6½"	9½"	2⅛"	



SPECIAL BOLT
(FURNISHED BY S.C.T.CO.)

COLUMN WEAR PLATES (LOCKBOLTED)





EACH WEAR PLATE MUST BE SECURED BY TWO LOCKBOLTS WITH FLANGED COLLARS CLAMPED ON LOCKBOLTS BY A POWER DRIVEN PULLING TOOL.

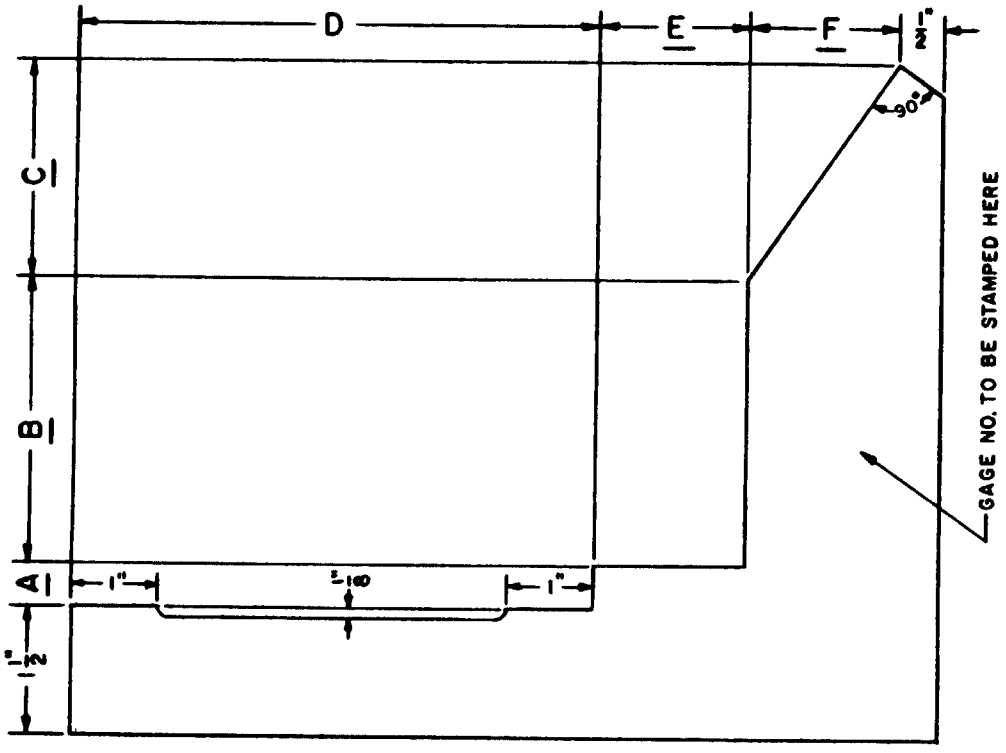
S.C.T. CO.	LINE NO.	"A"	"B"	"C"	R.R. PART NO.
DRAWING 4247	1	4 1/2"	8 1/2"	1 5/8"	
	2	4 1/2"	9"	1 7/8"	
	3	5"	8 1/2"	1 5/8"	
	4	5"	9"	1 7/8"	
	5	5 1/2"	8 1/2"	1 5/8"	
	6	5 1/2"	9"	1 7/8"	
	7	7 1/2"	9 11/16"	2 7/32"	
	8	7 1/2"	9 3/16"	1 31/32"	
	9	6 1/2"	9 1/2"	2 1/8"	

FOR DIMENSIONS "A" "B" & "C" REFER TO BOLTED COLUMN WEAR PLATES PAGE

S.C.T. CO.	LINE NO.	"A"	"B"	"C"	R.R. PART NO.
DRAWING 4377	1	4 1/2"	8 1/2"	1 5/8"	
	2	4 1/2"	9"	1 7/8"	
	3	5"	8 1/2"	1 5/8"	
	4	5"	9"	1 7/8"	
	5	5 1/2"	8 1/2"	1 5/8"	
	6	5 1/2"	9"	1 7/8"	
	7	7 1/2"	9 11/16"	2 7/32"	
	8	7 1/2"	9 3/16"	1 31/32"	
	9	6 1/2"	9 1/2"	2 1/8"	

NOTE: LOCKBOLTS AND COLLARS NOT FURNISHED BY S.C.T. CO.

GAGE FOR BOLSTER POCKET RESTORATION



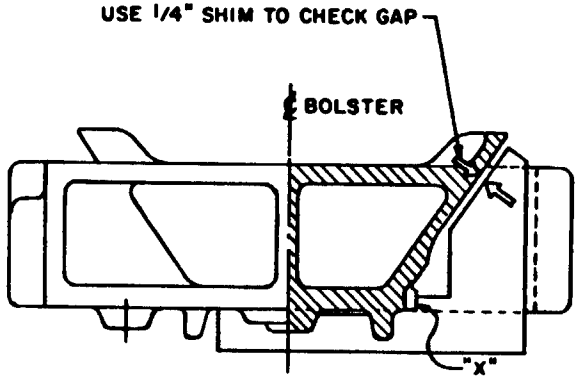
MATERIAL: $\frac{1}{8}$" O.H.S.

UNDERSCORED DIMENSIONS ARE IMPORTANT

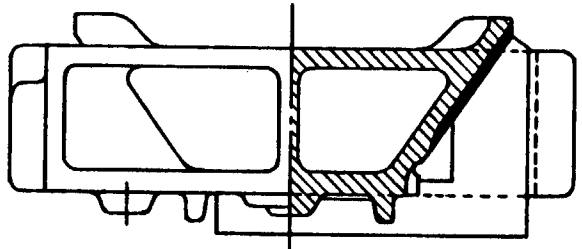
TYPE OF BOLSTER	A	B	C	D	E	F	GAGE NO.	WEAR PLATE DRG.	WEAR PLATE LINE
5" X 9" S-2-A	.5"	3.1875"	2.3125"	5"	1.4375"	1.625"	1	4477	1
5 1/2" X 10" S-2-A	.5"	3.25"	2.3125"	5"	1.50	1.625"	2	"	2
6" X 11" S-2-A 6 1/2" X 12" S-2-A	.5"	3.25"	2.50"	6"	1.75"	1.75"	3	"	3
7" X 12" S-2-A S-2-C	.5"	3.00"	2.50"	8"	1.875"	1.75"	4	"	4
5" X 9" S-2-C 5 1/2" X 10 S-2-C	.5"	2.875"	2.3125"	5"	1.50"	1.625"	5	"	2
6" X 11" 6-2-C 6 1/2" X 12" 6-2-C	.5"	2.50"	2.50"	6"	1.375"	1.75"	6	"	3
6" X 11" S-2-B	.5"	2.875"	2.3125"	5"	1.50"	1.625"	5	4580	—

LOW CONVEYANCE - 179,000 LBS. RAIL LOAD, FOR ALL OTHER S-2-B BOLSTERS USE S-2-C GAGES.

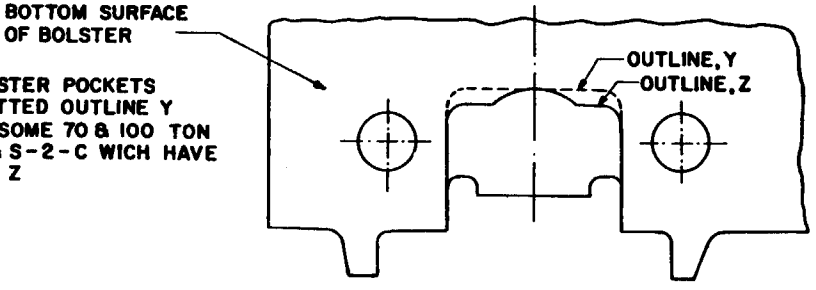
WHEN GAGE CONTACTS POCKET SURFACE "X" AND GAP EXCEEDS 1/4", REPAIR WORN BOLSTER POCKET BY APPLICATION OF WEAR PLATE OR BUILD UP WITH WELD.



GAGE IN WORN BOLSTER POCKET



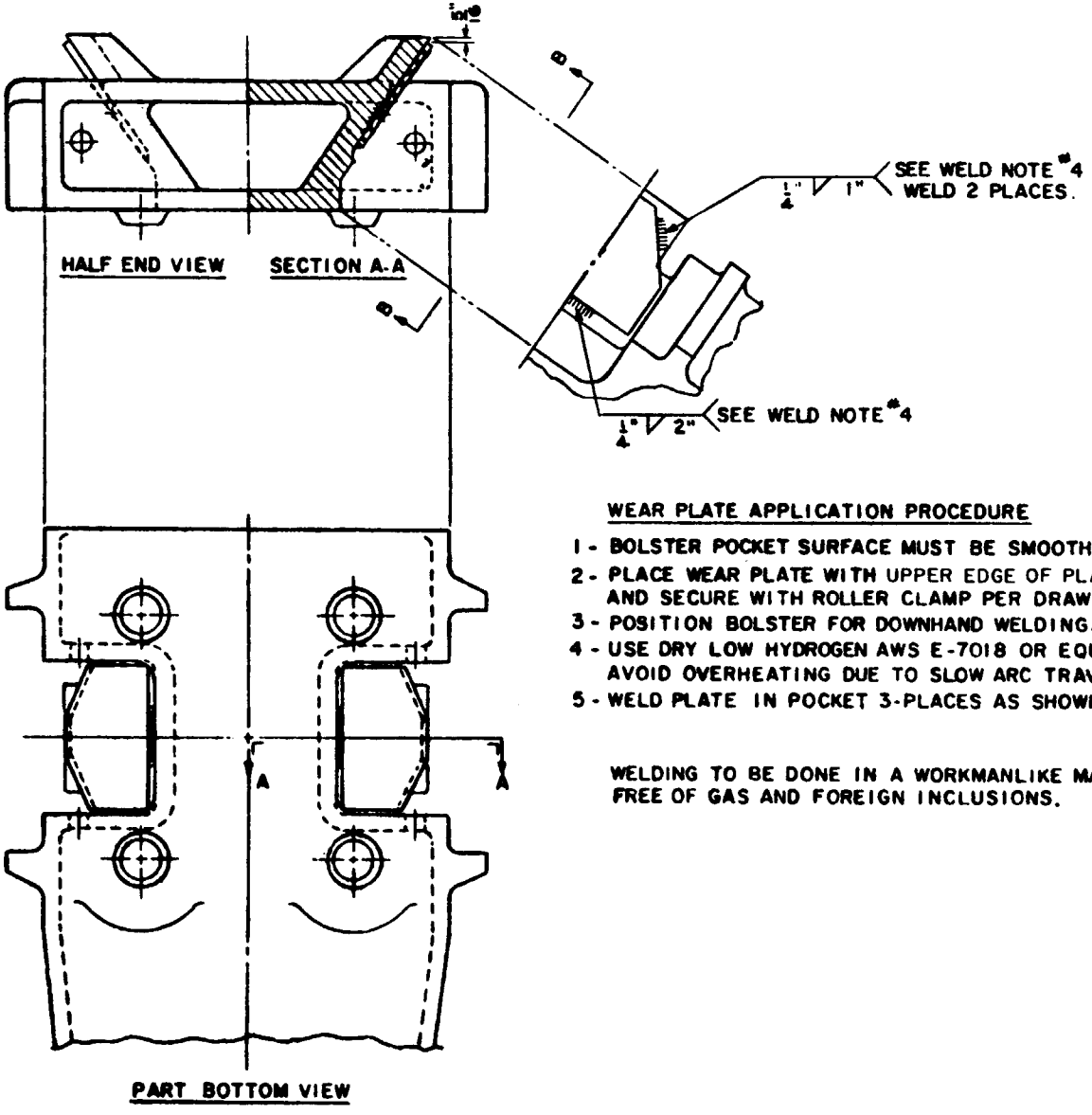
GAGE IN REPAIRED BOLSTER POCKET

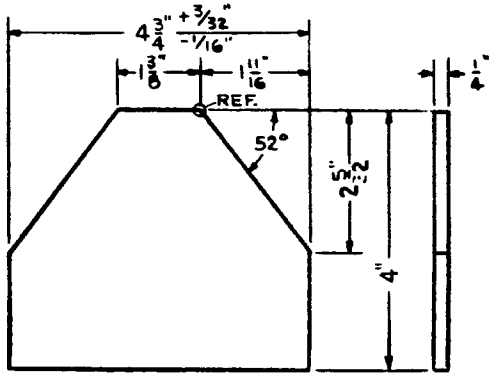


WHEN USING GAGE 5 AND POCKET HAS DOTTED OUTLINE Y A 3/8" SHIM MUST BE INSERTED BETWEEN SURFACE X AND GAGE.

WEAR PLATE FOR BOLSTER POCKET RESTORATION

LOW CONVEYANCE - 179,000 LBS. RAIL LOAD TRUCK BOLSTER





WEAR PLATE
MATERIAL: A.S.T.M. A-514 TYPE "B"
MIN. B.H.N. 321
PLATE WARPAGE MUST NOT EXCEED .025
SCT. CO. DRG. 4580

WEAR PLATE APPLICATION PROCEDURE

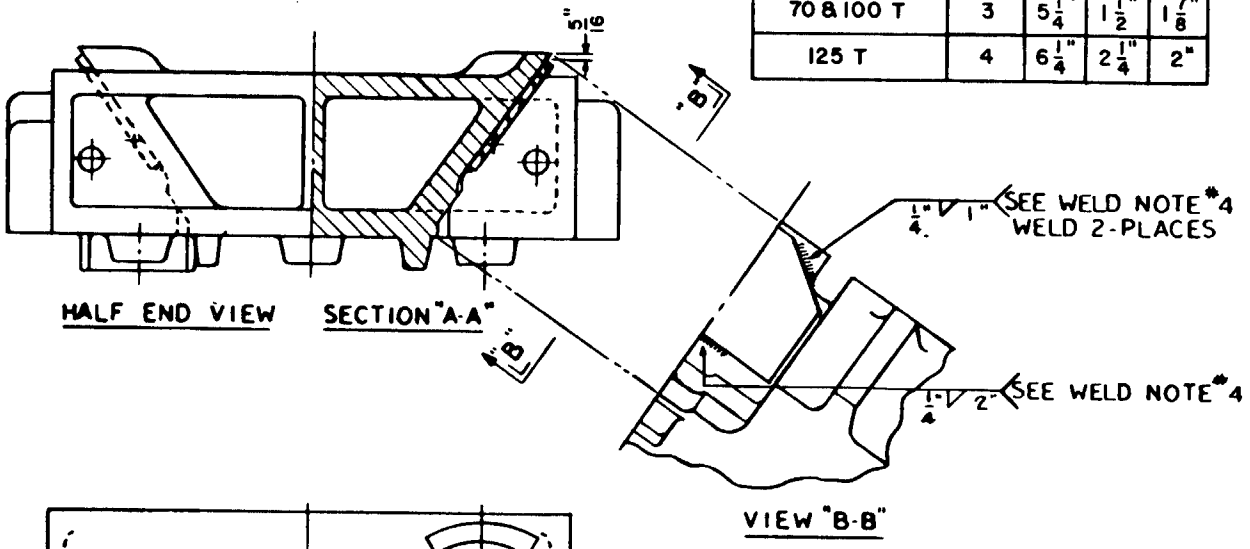
1 - BOLSTER POCKET SURFACE MUST BE SMOOTH, TRUE, DRY & TEMPERATURE OVER 50° F.
2 - PLACE WEAR PLATE WITH UPPER EDGE OF PLATE 5/16" BELOW TOP SURFACE OF POCKET EXTENSION AND SECURE WITH ROLLER CLAMP PER DRAWING 4439.
3 - POSITION BOLSTER FOR DOWNHAND WELDING.
4 - USE DRY LOW HYDROGEN AWS E-7018 OR EQUIVALENT WELDING ROD (5/32" MAX. DIA.) AVOID OVERHEATING DUE TO SLOW ARC TRAVEL.
5 - WELD PLATE IN POCKET 3-PLACES AS SHOWN IN VIEW "B-B".

WELDING TO BE DONE IN A WORKMANLIKE MANNER, BE HOMOGENEOUS, FREE OF GAS AND FOREIGN INCLUSIONS.

WEAR PLATE FOR BOLSTER POCKET RESTORATION

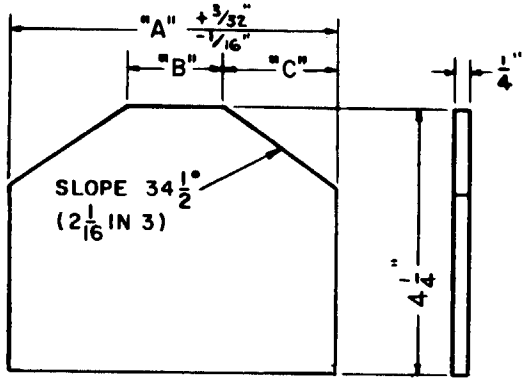
CONDITIONS ILLUSTRATED ARE FOR 100 TON S-2-C BOLSTERS. OTHER BARBER STABILIZED BOLSTERS HAVE SIMILAR GENERAL CHARACTERISTICS.

SCT. DRG. NO. 4477				
CAPACITY	LINE	A	B	C
40 T	1	$4\frac{1}{4}$"	$1\frac{1}{2}$"	$1\frac{3}{8}$"
50 T	2	$4\frac{3}{4}$"	$1\frac{1}{2}$"	$1\frac{5}{8}$"
70 & 100 T	3	$5\frac{1}{4}$"	$1\frac{1}{2}$"	$1\frac{7}{8}$"
125 T	4	$6\frac{1}{4}$"	$2\frac{1}{4}$"	2"



HALF END VIEW SECTION "A-A"

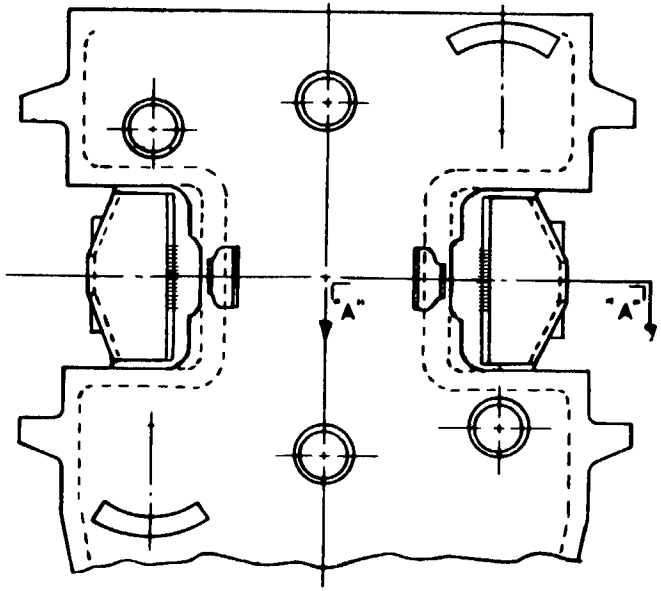
VIEW "B-B"



WEAR PLATE

MATERIAL: A.S.T.M. A-514 TYPE "B"
MIN. B.H.N. 321.

PLATE WARPAGE MUST NOT EXCEED .025"



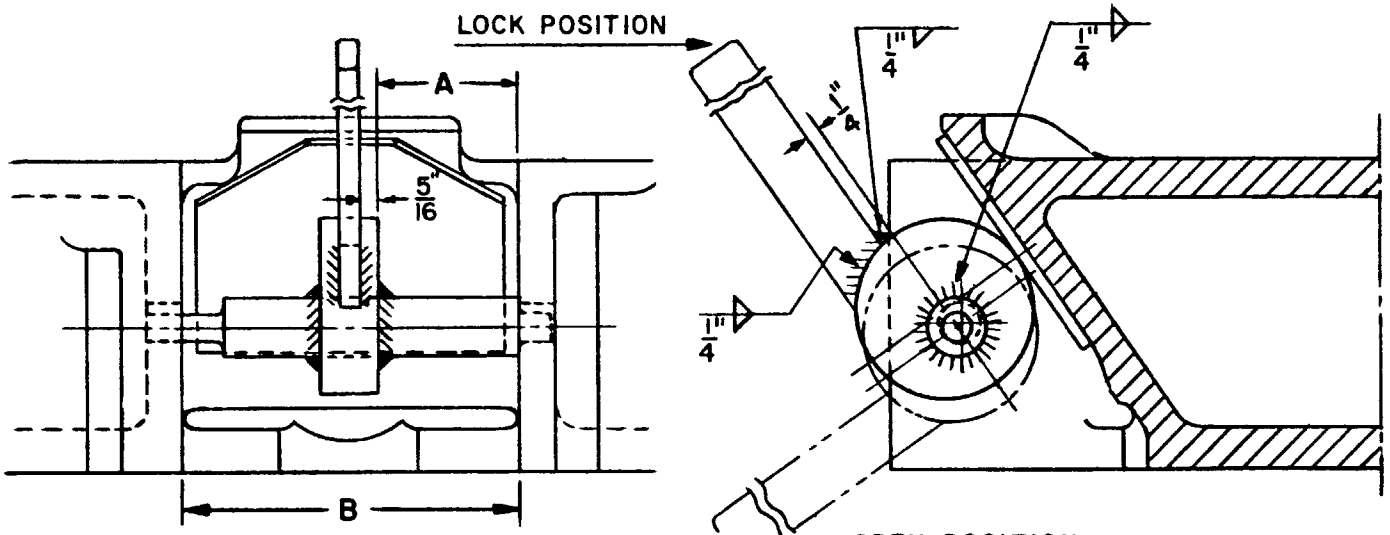
PART BOTTOM VIEW

WEAR PLATE APPLICATION PROCEDURE:

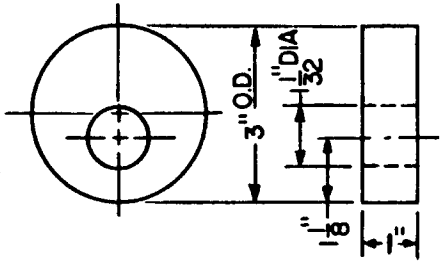
1 - BOLSTER POCKET SURFACE MUST BE SMOOTH, TRUE, DRY & TEMPERATURE OVER 50° F.
2 - PLACE WEAR PLATE WITH UPPER EDGE OF PLATE 5/16" BELOW TOP OF BOLSTER EXTENSION AND SECURE WITH ROLLER CLAMP PER DRAWING 4439.
3 - POSITION BOLSTER FOR DOWNHAND WELDING.
4 - USE DRY LOW HYDROGEN AWS E-7018 OR EQUIVALENT WELDING ROD. ($\frac{5}{32}$" MAX. DIA.) AVOID OVERHEATING DUE TO SLOW ARC TRAVEL.
5 - WELD PLATE IN POCKET 3-PLACES AS SHOWN IN VIEW "B-B."

WELDING TO BE DONE IN A WORKMANLIKE MANNER, BE HOMOGENEOUS, FREE OF GAS AND FOREIGN INCLUSIONS.

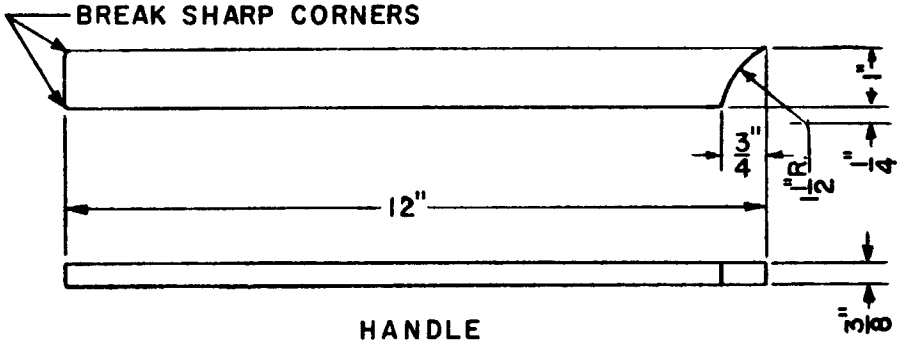
WELDING FIXTURE FOR BOLSTER POCKET RESTORATION



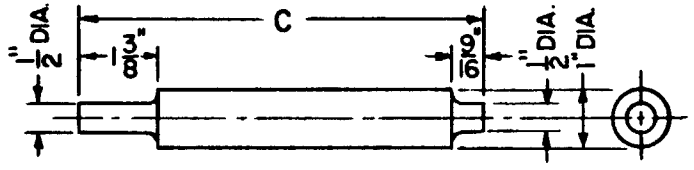
CLAMP APPLICATION



ECCENTRIC ROLLER



HANDLE

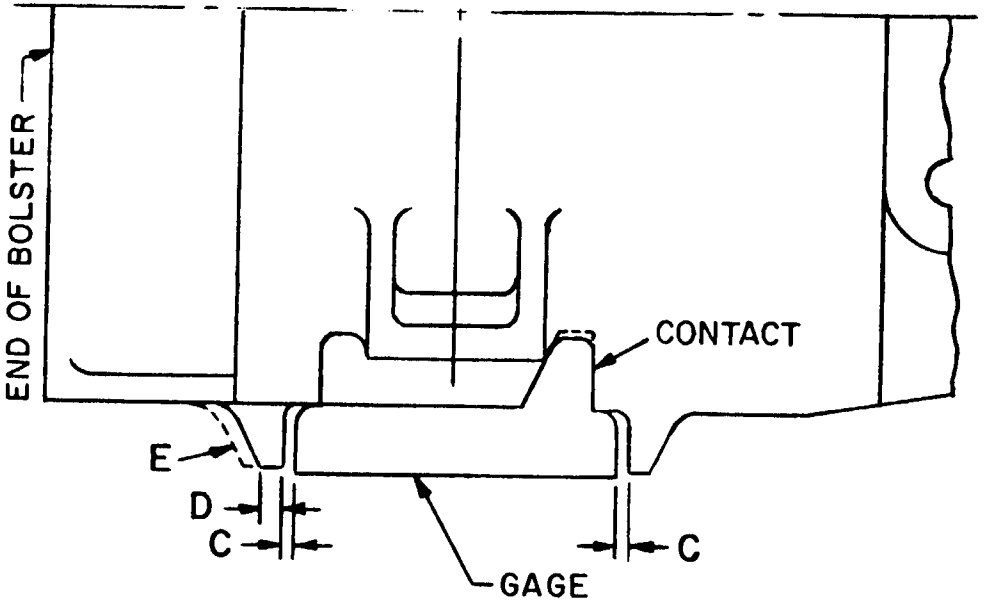


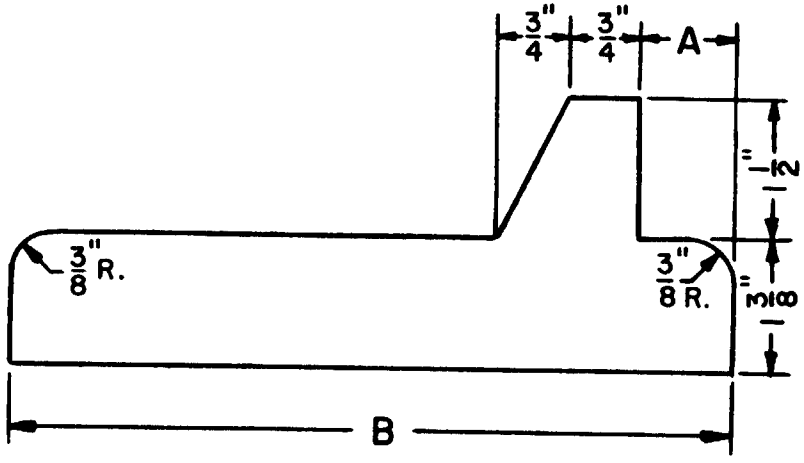
SHAFT

	A	B	C
40 TON	1 5/8"	4 3/4"	6
50 TON	2 1/8"	5 1/4"	6 1/2"
70 TON 100 TON	2 3/8"	5 3/4"	7
125 TON	2 7/8"	6 3/4"	8
LOW CONV.	SAME AS 50 T.		

MATERIAL: S.A.E. 4140 STEEL
HEAT TREATED TO B.H.N. 364-415

GAGE FOR BOLSTER GIB RESTORATION





GAGE OUTLINE

TOLERANCE FOR NEW BOLSTER BETWEEN GIBS IS $+\frac{1}{8}" - 0$

C. IF THIS GAP IS 1/4" OR MORE, BUILD UP WITH WELD TO FIT GAGE.

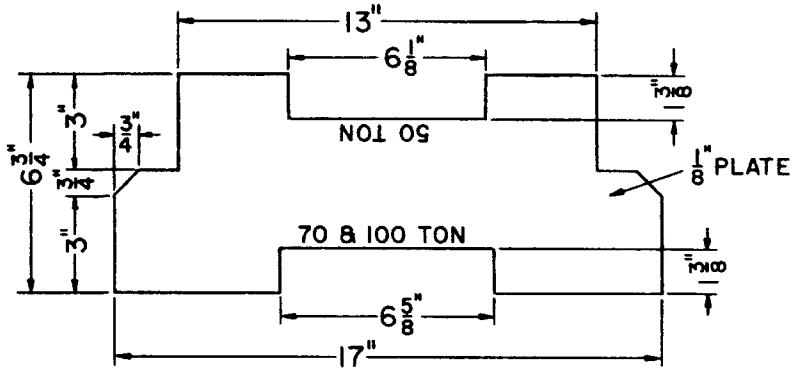
NOTE:

IF BOLSTER WAS CAST BEFORE 1967 DIMENSION "D" SHOULD BE 5/8" MIN. (BUILD UP BACK OF GIB AT "E" IF NECESSARY)

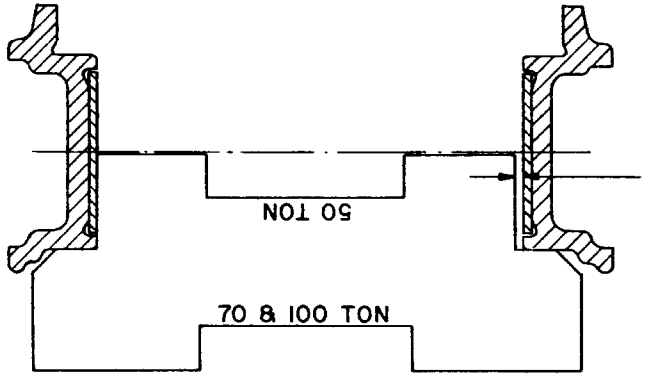
TYPE & CAPACITY	A	B
40 & 50 TON REGULAR BARBER	$\frac{5}{8}"$	$6\frac{1}{2}"$
70 & 100 TON REGULAR BARBER	$\frac{5}{8}"$	$7\frac{3}{8}"$
125 TON REGULAR BARBER	2"	$11\frac{1}{8}"$
* LOW CONVEYANCE	$1\frac{3}{8}"$	$8\frac{3}{8}"$
100 TON COMBINATION	$1\frac{5}{8}"$	9"
100 TON LOW PROFILE COMBINATION	$1\frac{5}{8}"$	$9\frac{3}{8}"$
40 TON WIDE LAND	$1\frac{3}{8}"$	$7\frac{1}{2}"$
50 TON WIDE LAND	$1\frac{3}{8}"$	8"
70 & 100 TON WIDE LAND	$1\frac{3}{8}"$	$8\frac{1}{2}"$

* FOR 179000 LBS. RAIL LOAD

GAGES FOR SIDE FRAME COLUMN RESTORATION

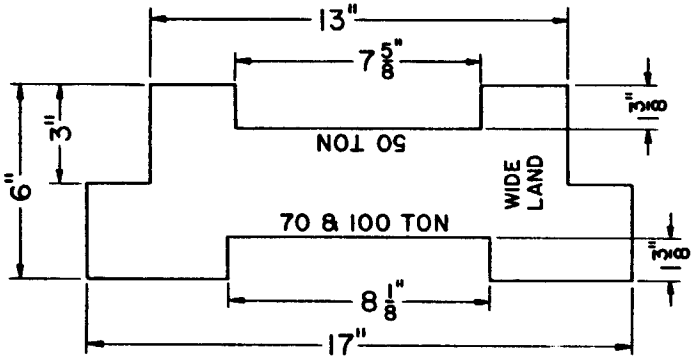


REGULAR BARBER

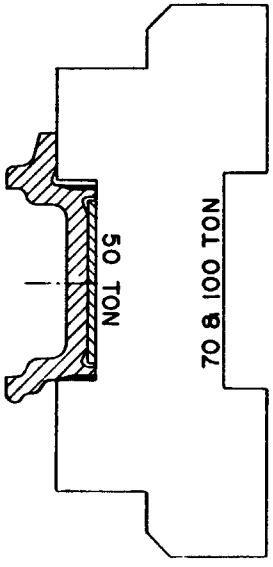


USE 3/8" SHIM BETWEEN END OF GAGE AND WEAR PLATE TO CHECK MAX. DISTANCE BETWEEN WEAR PLATES.

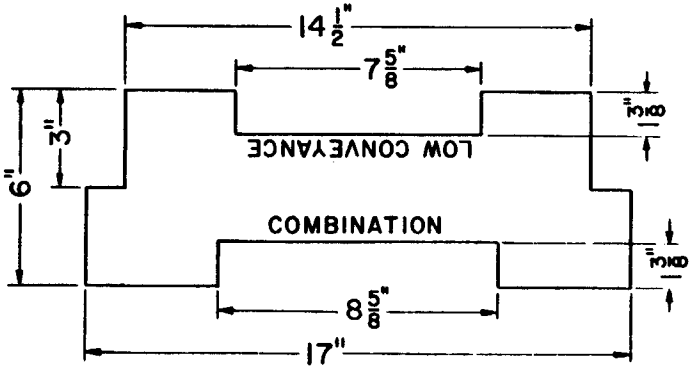
GAGE SHOULD BE USED TO CHECK WEAR PLATES FOR PARALLELISM VERTICALLY.



BARBER WIDE LAND



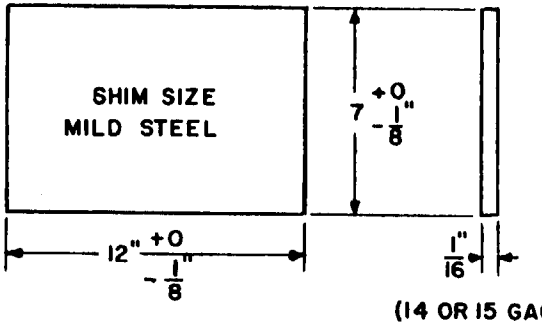
APPLICATION OF GAGE TO CHECK SIDE FRAME COLUMNS AFTER REPAIR.



LOW CONVEYANCE & COMBINATION

C-PEP—CENTER PLATE EXTENSION PADS

1. Once properly applied, C-PEP *requires no post-application adjustments.* The ideal C-PEP assembly has preload on each pad when the car is on *level track.*
2. Reshim only when new pads are applied or when *both pads* on the *same* truck bolster are loose.
   A. To reshim, spot car on *level track.*
   B. Remove one retaining angle.
   C. Remove shims from under pads, place pads back on bolster, lower car on truck *(without lubricant in center plate).* See Figure 1.
   D. Fill space above each pad with 1/16″ thick shims (14 or 15 gage). See Figure 2.
   E. Total shims needed to preload each pad must be 1/16″ more than will go into smallest opening between that pad and car body wear plate. If gap is less than 1/16″, for example 1/32″, then add 1/8″ shim.
      Example: 1/16″ shim max. inserted above pad, use 1/8″ total shims under that pad
      1/4″ of shims max. above pad, use 5/16″ total shims under, etc. (See Table).
   F. Place proper shims under each pad and weld retaining angles. See Figure 3.
3. Maximum allowable gap between inner contact surface and pad top is 1/8″. See Figure 3.
4. Side bearing clearance should be 1/4″ to 5/16″ *before* C-PEP has been shimmed (AAR Approved).
5. Center plate lubricating liners cannot be used with "C-PEP" applications.
6. Replace C-PEP pads if rubber separation from plates exceeds 1-1/2″ in depth. See Figure 4.
7. Pads and body spacers have the part number on each for replacement information. Wear plates are a special hardened steel available by size.



(14 OR 15 GAGE)

SHIM DATA TABLE							
SHIMS ACCEPTED ABOVE PAD	NONE	1/16"	1/8"	3/16"	1/4"	5/16"	MORE THAN 5/16"
TOTAL SHIMS REQ'D UNDER PAD	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	LOWER THE CAR CONTACT SURFACE

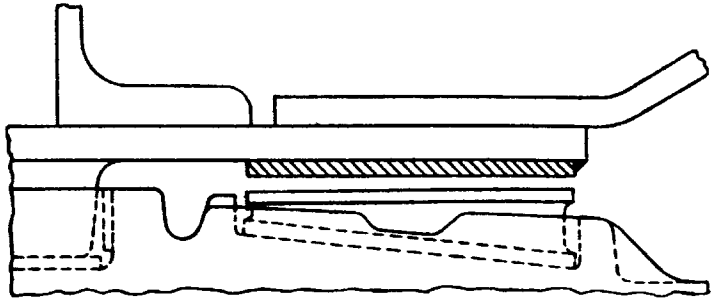


FIGURE 1

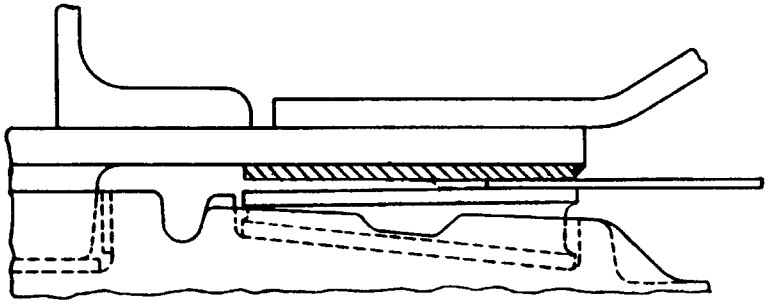


FIGURE 2

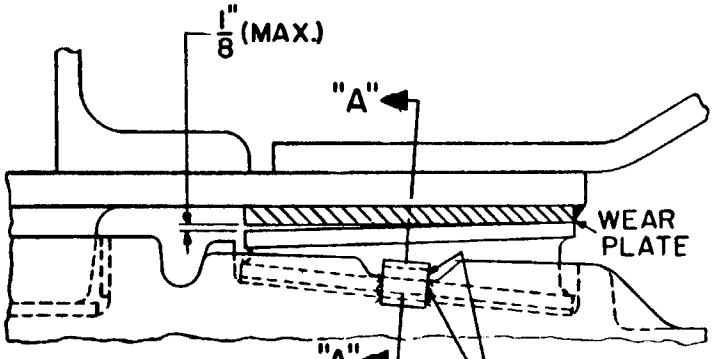


FIGURE 3

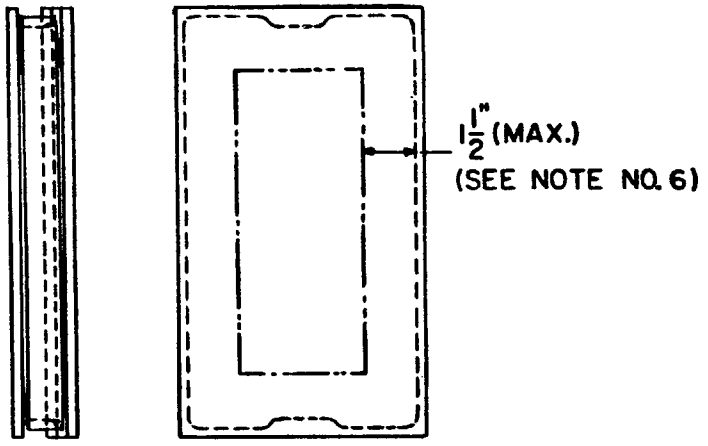
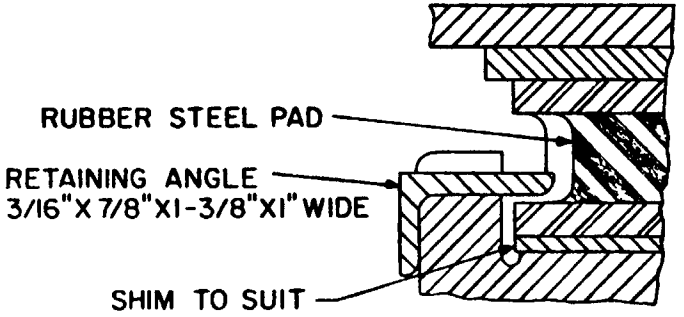


FIGURE 4



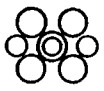
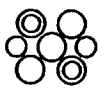
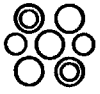
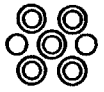
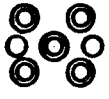
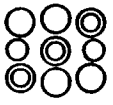
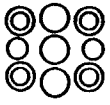
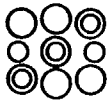
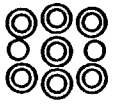
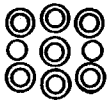
SECTION "A-A"

FIGURE 5

AAR SPRING GROUPS FOR BARBER S-2 TRUCKS

SINGLE SIDE SPRING DESIGN

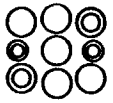
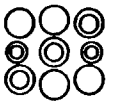
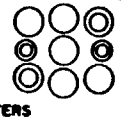
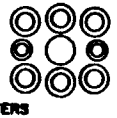
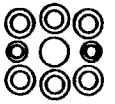
2½"	3 1/16"	3 11/16"
9 1/16"	9 3/8"	10 1/4" (OUTER COIL)
6 2/16"	6 2/16"	6 2/16"

 4-OUTERS D3 2-INNERS D3 2-SIDE B-321	 5-OUTERS D4 1-INNER D4 2-SIDE B-331	 5-OUTERS D5 2-INNERS D5 2-SIDE B-331
 5-OUTERS D3 2-INNERS D3 2-SIDE B-321	 5-OUTERS D4 5-INNERS D4 2-SIDE B-331	 6-OUTERS D5 5-INNERS D5 2-SIDE B-331
 6-OUTERS D3 5-INNERS D3 2-SIDE B-421	 7-OUTERS D4 3-INNERS D4 2-SIDE B-432	 7-OUTERS D5 4-INNERS D5 2-SIDE B-432
 7-OUTERS D3 3-INNERS D3 2-SIDE B-421	 7-OUTERS D4 7-INNERS D4 2-SIDE B-432	 7-OUTERS D5 7-INNERS D5 2-SIDE B-432

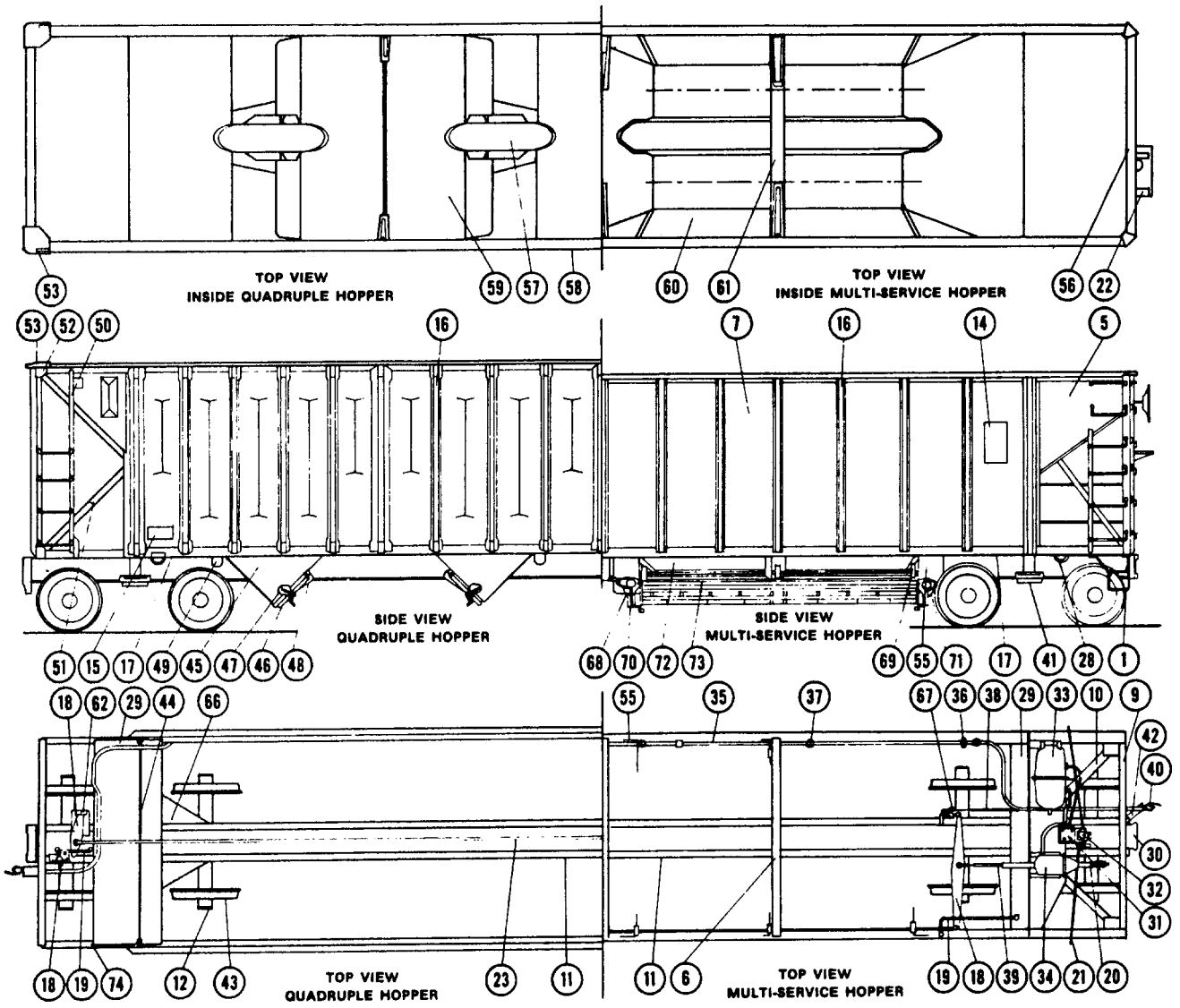
SPRING TRAVEL
FREE HEIGHT (AAR SPRGS.)
SOLID HEIGHT
5" X 9" JOURNALS 142,000 LBS. ON RAIL
5½" X 10" JOURNALS 177,000 LBS. ON RAIL
6" X 11" JOURNALS 220,000 LBS. ON RAIL
6½" X 12" JOURNALS 263,000 LBS. ON RAIL

DOUBLE SIDE SPRING DESIGN

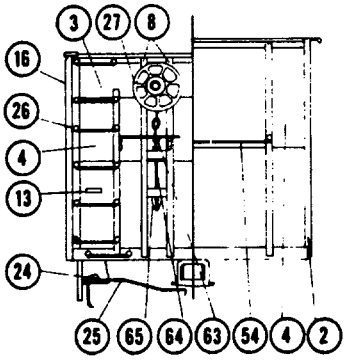
2½"	3 1/16"	3 11/16"
9 1/16"	9 3/8"	10 1/4" (OUTER COIL)
6 2/16"	6 2/16"	6 2/16"

 8-OUTERS D3 4-INNERS D3 2-OUTER SIDE B-421 2-INNER SIDE B-422	 7-OUTERS D4 2-INNERS D4 2-OUTER SIDE B-432 2-INNER SIDE B-433	 7-OUTERS D5 3-INNERS D5 2-OUTER SIDE B-432 2-INNER SIDE B-433
 7-OUTERS D3 2-INNERS D3 2-OUTER SIDE B-421 2-INNER SIDE B-422	 7-OUTERS D4 6-INNERS D4 2-OUTER SIDE B-432 2-INNER SIDE B-433	 7-OUTERS D5 6-INNERS D5 2-OUTER SIDE B-432 2-INNER SIDE B-433

NOMENCLATURE - HOPPER CARS

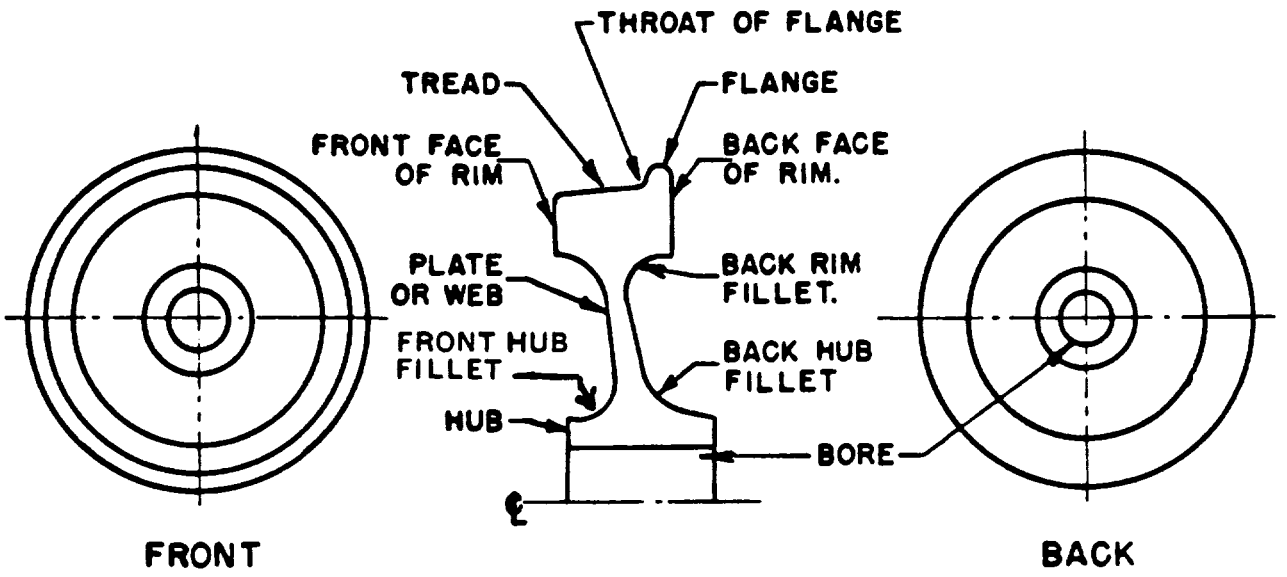


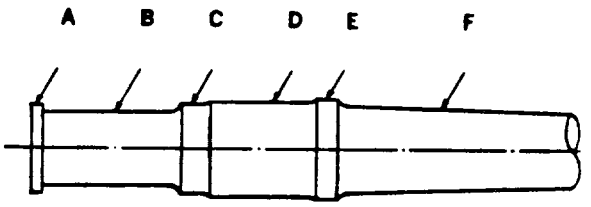
1. Sill Step
2. Corner Post
3. End Sheet
4. End Slope Sheet
5. End Slope Sheet Side
6. Cross Ridge Partition
7. Side Sheet
8. Hand Brake Posts
9. End Sill
10. Diagonal Brace
11. Center Sill
12. Axles
13. Defect Card Holder
14. ACI Label
15. Route Card Board
16. Side Stake
17. Side Sill
18. Body Lever
19. Fulcrum Lever Guide
20. Brake Cylinder Push Rod
21. Brake Release Rod
22. Safety Brake Step
23. Center Rod
24. Uncoupling Rod Bracket
25. Uncoupling Rod
26. Ladder Grab
27. Hand Brake Wheel
28. Roping Staple
29. Body Bolster Top Shear Plate
30. Striker
31. Air Brake Valve
32. Release Valve
33. Combined Auxiliary and Emergency Reservoir
34. Brake Cylinder
35. Brake Pipe
36. Buttweld Fittings
37. Pipe Clamps
38. Cylinder and Truck Lever Connecting Rod
39. Cylinder Lever Connecting Rod
40. Angle Cock
41. Body Bolster
42. Angle Cock Bracket
43. Wheel
44. Bolster Web
45. Hopper Chute
46. Door
47. Door Latch
48. Door Hinge
49. Floor Support Connect Plate at Side Sill
50. Ladder Stile
51. Floor Sheet Brace
52. Corner Post Connector
53. Corner Cap
54. Handhole
55. Door Shaft Support Gusset
56. End Top Angle
57. Center Sill Hood
58. Top Side Angle
59. Crossridge Floor Sheet
60. Outside Hopper Sheet
61. Crossridge Brace
62. Fulcrum Lever Bracket
63. Brake Chain
64. Brake Pod
65. Bell Crank
66. Bolster Tie Plate
67. Clevis
68. Ratchet Handle Assembly
69. Chain Roller
70. Ratchet Handle
71. Door Brace
72. Hopper Chute
73. Longitudinal Door
74. Side Sill Extension at End



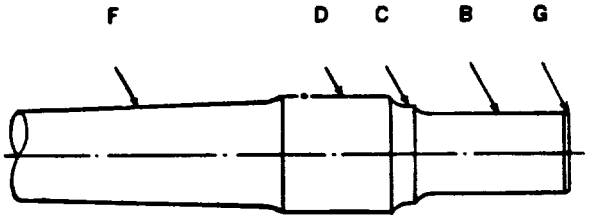
END VIEW
MULTI-SERVICE
HOPPER

END VIEW
QUADRUPLE
HOPPER





Plain Bearing Black Collar Axle



Roller Bearing Raised Wheel Seat Axle

A: End Collar, B: Journal, C: Dust Guard Seat, D: Wheel Seat,
E: Wheel Seat Collar, F: Body, G: Tapered End.

Nomenclature for Wheels and Axles

Wheel Markings 1978 and Later

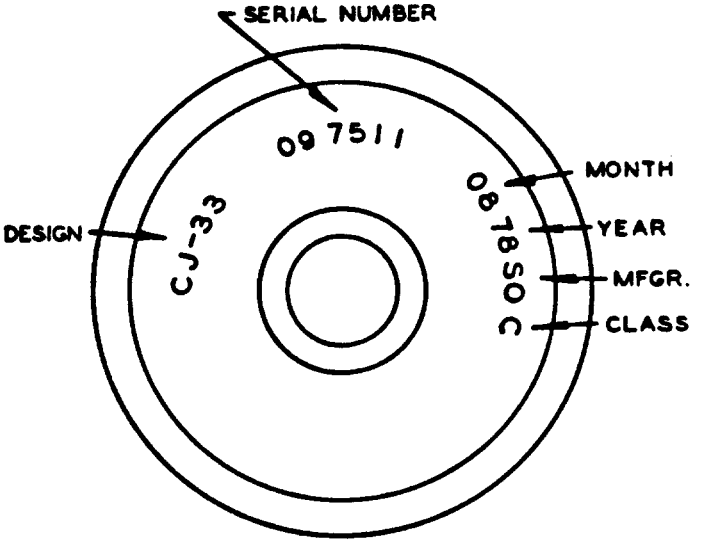
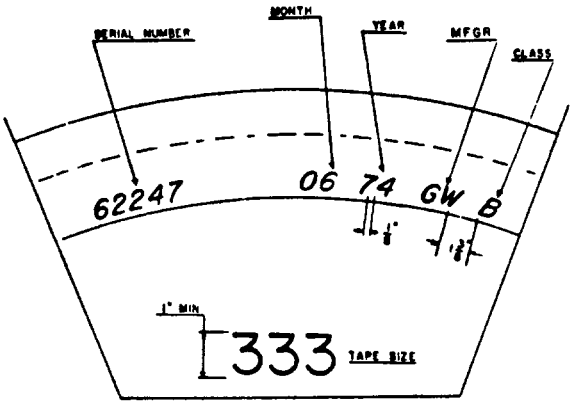
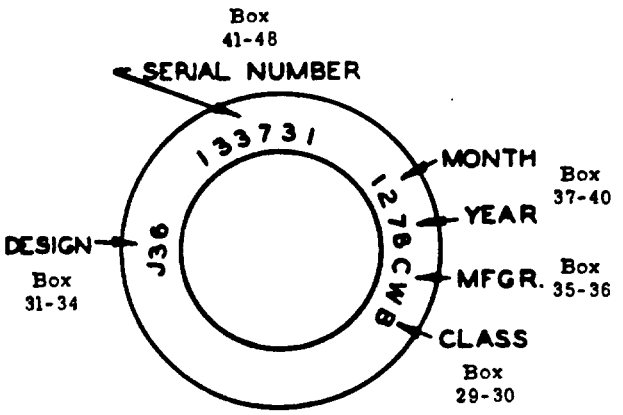


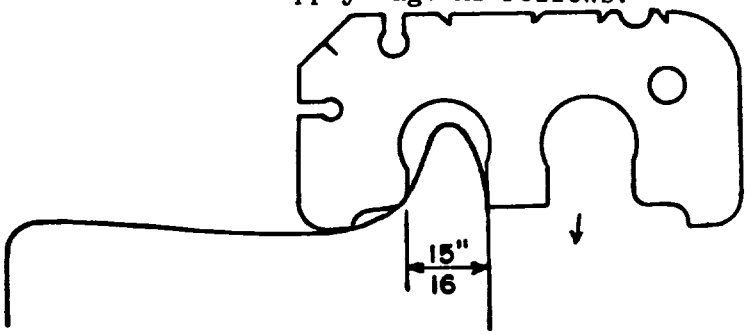
Plate Marking (ABEX)
Rim Stamping (Locomotive Only)



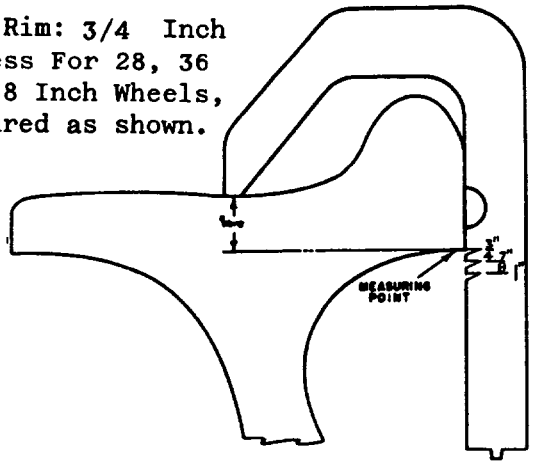


Hub Stamping

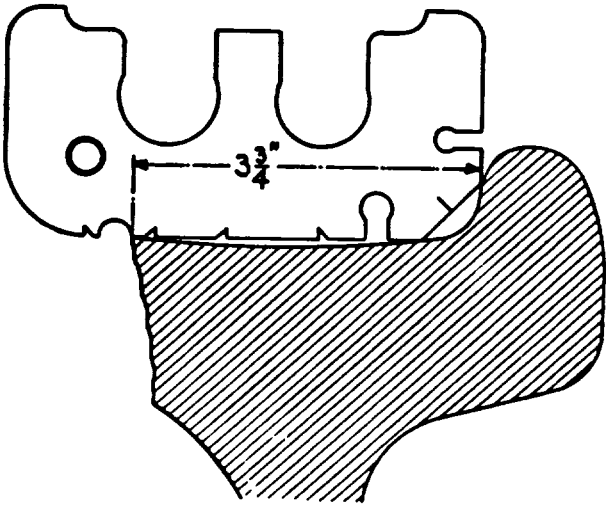
Condemnable At Any Time.
Thin Flange: 15/16 Inch Thick
Or Less. Apply Gage As Follows:



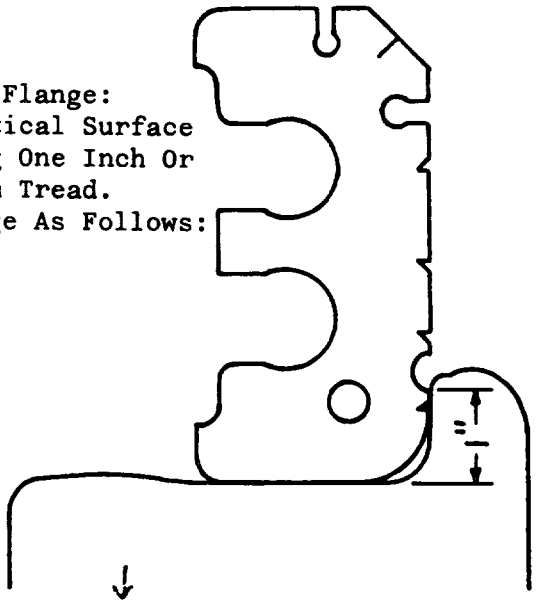
Thin Rim: 3/4 Inch
Or Less For 28, 36
And 38 Inch Wheels,
Measured as shown.



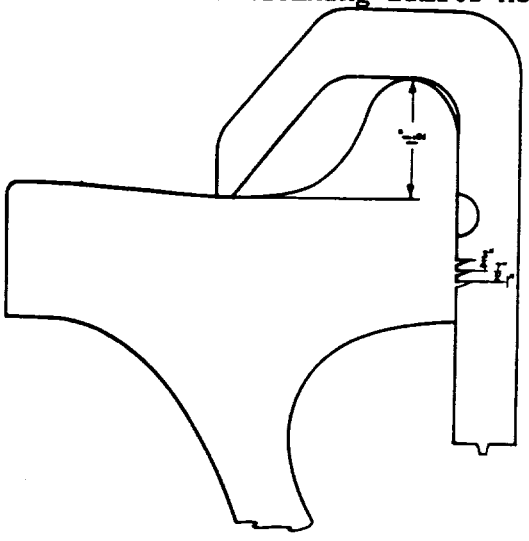
Cracked Or Broken Flange- Any Length.
Chipped Flange Must Exceed 1½ Inch In
Length By ½ Inch In Width And Not Merely
A Flaking Of Surface. Cracked Or Broken
Rim: Width Of Tread 3 3/4 Inches Or Less.
Apply Gage As Follows:



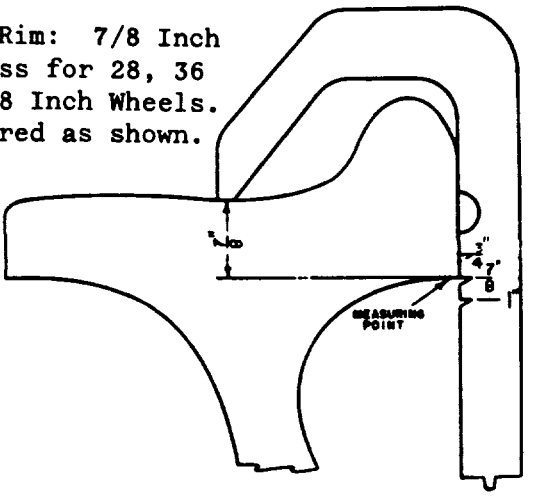
Vertical Flange:
Flat Vertical Surface
Extending One Inch Or
More From Tread.
Apply Gage As Follows:

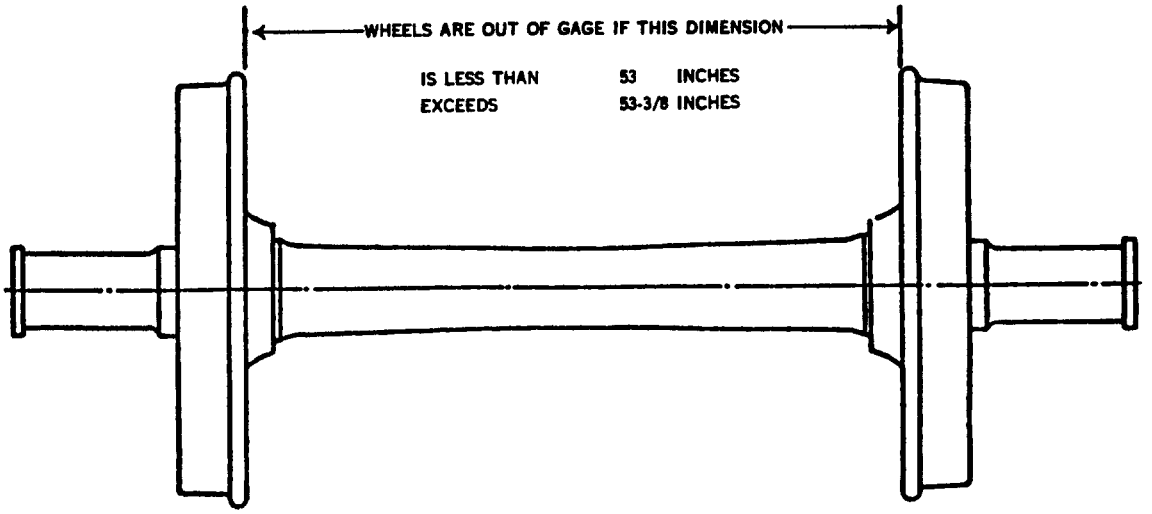


The Simplified Steel
Wheel Gage May Be Used To
Check Condemning Limits As Shown.



Thin Rim: 7/8 Inch
Or Less for 28, 36
And 38 Inch Wheels.
Measured as shown.





WHEELS MANUFACTURED PRIOR TO 1965 WILL BE OUT OF GAGE IF THE BACK-TO BACK DIMENSION IS LESS THAN 52-15/16 INCHES.

b. **Load Limit** — Maximum permissible weight that can be loaded into car. Calculated by deducting the lightweight of car from the total allowable weight on rail for applicable axle size shown below:

Journal Size	Total Weight On Rail (4 Axles Per Car)		Nominal Capacity	
	Lb.	Kg.	Lb.	Kg.
4¼ x 8	103,000	46,700	60,000	27,000
5 x 9	142,000	64,400	88,000	39,500
5½ x 10	177,000	80,300	110,000	49,500
6 x 11	220,000	99,800	154,000	69,500
6½ x 12	263,000	119,300	200,000	90,500
7 x 12	315,000	142,900	250,000	113,000

MANUFACTURER	MONOGRAM	INITIALS
AMERICAN STEEL FOUNDRIES	G or A or E	ASF
BIRDSBORO CORPORATION	D 1967	BIRDSBORO
BUCKEYE STEEL CASTINGS CO.	B	NONE
CANADIAN STEEL FOUNDRIES	NONE	ASF or ASF & CANCAR or ASF & CSF
DOMINION FOUNDRIES & STEEL	D	Dofasco
DRESSER TRANSPORTATION (SYMINGTON WAYNE/GOULD)	G	GOULD
NATIONAL CASTINGS DIV.	N or M	NM & SC CO or NONE
OHIO STEEL FOUNDRY CO.		OSF
PITTRON (PITTSBURGH)	NONE	PSF
SCULLIN STEEL CO.		NONE

CONRAIL

POCKET GUIDE FOR REPORTING CAR FAILURES

TRUCK SIDE FRAME / BOLSTER

GMS - CARS

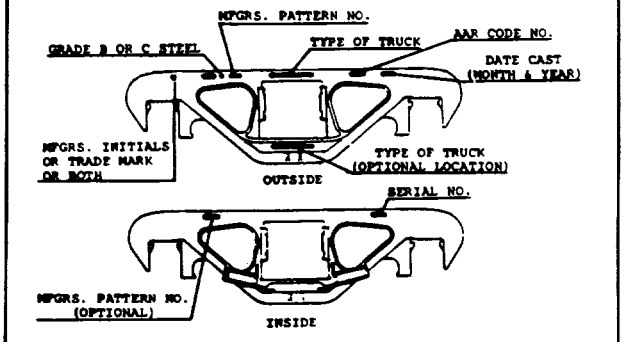
WHY MADE CODES

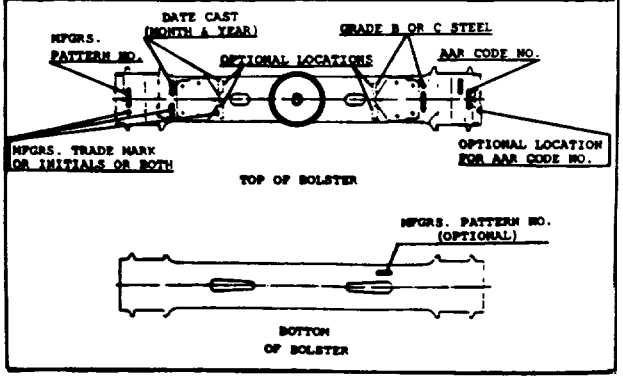
01 - WORN OUT
02 - BROKEN
03 - MISSING
05 - BENT
06 - BENT BEYOND REPAIRS
07 - OBSOLETE MATERIAL
08 - WRONG (NOT STANDARD TO CAR)
19 - INSUFFICIENT CLEARANCE
33 - DERAILMENT DAMAGE PER RULE 95

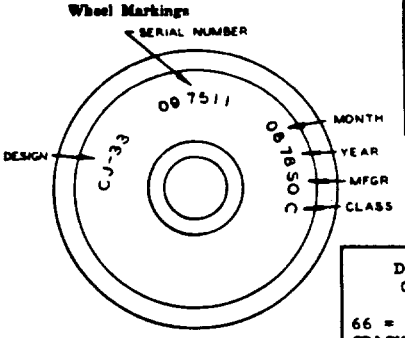
EXPLANATION OF SUPPLEMENTAL SNUBBING CODES

01 - NONE
02 - TWO OR MORE FRICTION SNUBBERS
03 - ASF SIMPLEX SIDE BEARINGS
04 - UNITY SIDE BEARINGS
05 - CPEP (NEXT TO CENTER PLATE)
06 - MDA (HYDRAULIC DEVICE BETWEEN SIDE SILL & FRAME)
07 - MDA (HYDRAULIC SNUBBER IN SPRING GROUP)
08 - STUCKI (HYDRAULIC SNUBBER IN SPRING GROUP)
09 - 12 - NOT USED AT THIS TIME

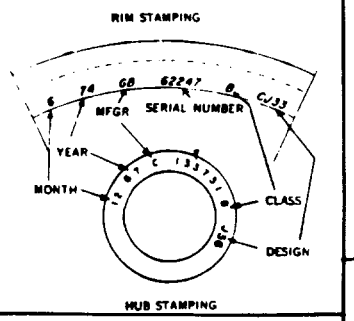
MARKING LOCATION DIAGRAMS







WHEEL FAILURE



DEFECT CODES

66 = FLANGE CRACKED/BROKEN

68 = RIM CRACKED/BROKEN

71 = RIM SHATTERED

74 = THERMAL CRACKS

83 = PLATE CRACKED/BROKEN

85 = WHEEL LOOSE

MANUFACTURERS' MARKINGS

A - ARMCO
B-BW - BETHLEHEM
C-CW-G - U.S. STEEL
E-EW - EDGEWATER
F-FW - CREUSOT-LOIRE (FRANCE)
J-JW - SUMITOMO (JAPAN)
K-KW - KLOCKNER (GERMANY)
L-LW - ITALSIDER (ITALY)
S-SW - STANDARD STEEL
P-T-TW - BRITISH STEEL (ENGLAND)
V-VW - USINOR (FRANCE)
Z-ZW - CANADIAN STEEL WHEEL
GC-GK-GL-GY-GI-GT-GB-GS - GRIFFEN
FM - FUNDICIONES DE HIERRO Y ACERO (MEXICO)
SO - ABEX (SOUTHERN)
XX - UNKNOWN OR NOT LEGIBLE

"CLASS" OF HEAT TREATMENT

A, B, C, L - RIM TREATED

U - UNTREATED

AE, BE, CE, LE - ENTIRE WHEEL TREATED

U1 - UNTREATED

BRAKE SHOES

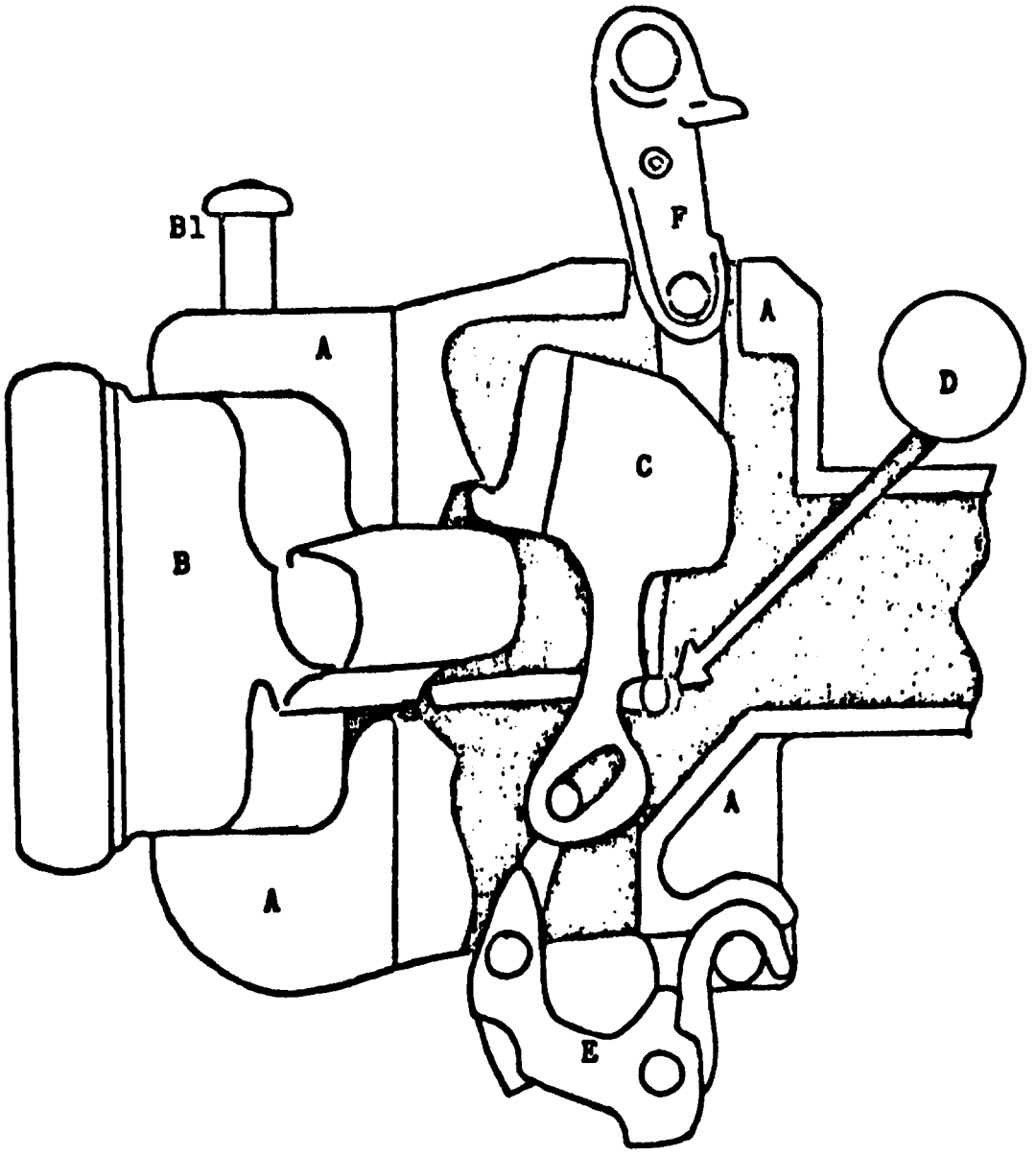
C - COMP. SHOE (HI-FRIC.)

P - HIGH PHOSPHOROUS CAST IRON

S - STANDARD CAST IRON

U - UNKNOWN

Wheel Design Designation	Wheel Rim Type	Capacity-Tons
A-28, CA-28	M-W	100
B-28, CB-28	1-W	Not over 22,400 lbs. Per Wheel
D-28, CD-28	1-W	
A-30, CA-30	M-W	100
AX-30, CAX-30	M-W	50
A-33, CA-33	1-W	50
G-33, CG-33	M-W	100
J-33, CJ-33	1-W	50 to 70
K-33, CK-33	2-W	50
M-33, CM-33	2-W	70
N-33, CN-33	M-W	50
R-33, CR-33	M-W	70
H-36, CH-36	1-W	100
J-36, CJ-36	2-W	100
K-36, CK-36	M-W	100
B-38, CB-38	1-W	125
C-38, CC-38	2-W	125



COUPLER PART IDENTIFICATION

A. COUPLER BODY

B. KNUCKLE

B1. KNUCKLE PIN

C. LOCK BLOCK

D. THROWER

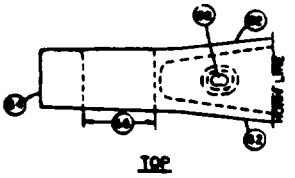
E. BOTTOM LOCK LIFT

F. TOP LOCK LIFT

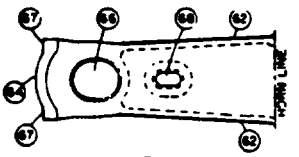
COUPLERS: A.A.R. Coupler Shanks and Knuckles Nomenclature

COUPLER SHANK	
No	NOMENCLATURE
61	TOP WALL
62	SIDE WALL
63	BOTTOM WALL
64	BUTT
65	KEY SLOT
66	PIN HOLE
67	ALIGNING SHOULDER
68	CORE SUPPORT HOLE
69	DRAW LINE LUGS
70	SHANK LOOPS
71	BUSHING

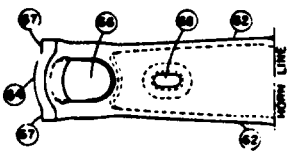
RIGID SHANK
E COUPLER



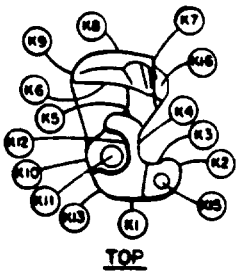
E/F COUPLER SHANK

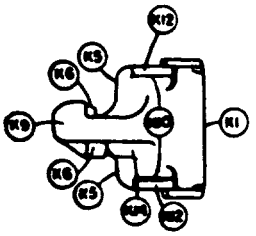


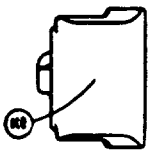
F INTERLOCKING
COUPLER SHANK

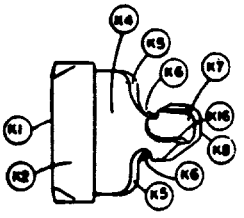


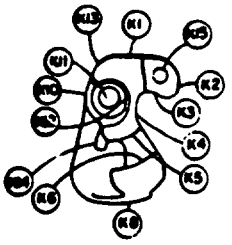
COUPLER KNUCKLE





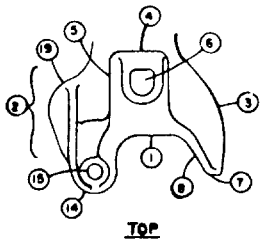




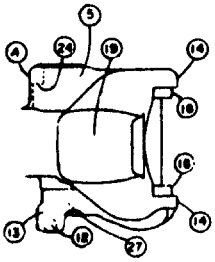


No	NOMENCLATURE
K1	FRONT FACE
K2	NOSE
K3	PULLING FACE
K4	THROAT
K5	BUFFING SHOULDER
K6	PULLING LUG
K7	LOCKING FACE
K8	TAIL
K9	TAIL STOP
K10	HUB
K11	PIVOT PIN HOLE
K12	PIN PROTECTOR
K13	HEEL
K14	THROWER PAD
K15	FLAG HOLE
K16	LOCK SHELF

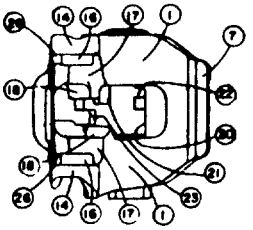
COUPLERS: A.A.R. Coupler Bodies Nomenclature



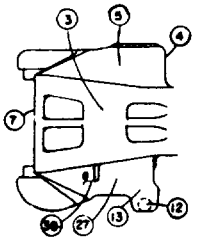
TOP



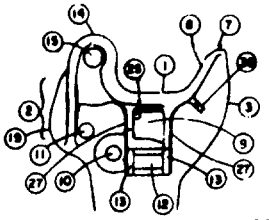
KNUCKLE SIDE



FRONT



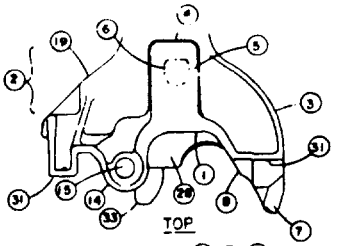
GUARD ARM SIDE



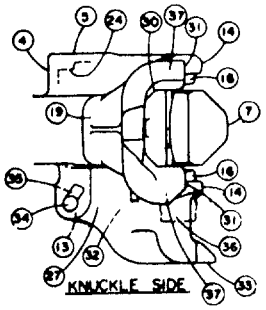
BOTTOM

TYPE E AND E/F COUPLER HEAD

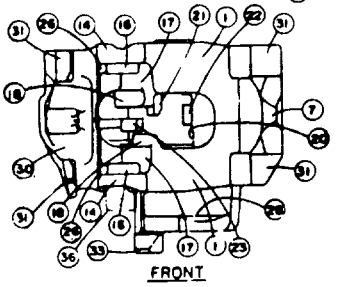
COUPLER HEAD	
No	NOMENCLATURE
1	FRONT FACE
2	KNUCKLE SIDE
3	GUARD ARM
4	HORN
5	LOCK CHAMBER
6	TOP LOCKLIFT HOLE (E AND E/F-HT COUPLERS)
7	GUARD ARM NOSE
8	GUARD ARM FACE
9	LOCK HOLE
10	THROWER HOLE
11	DRAIN HOLE
12	ROTARY SHAFT
13	ROTARY SHAFT WALL
14	PIVOT LUG
15	PIVOT PIN HOLE
16	PIN PROTECTOR
17	BUFFING SHOULDER
18	PULLING LUG
19	KNUCKLE TAIL WALL
20	LOCK WALL
21	LOCK GUIDE - KNUCKLE SIDE
22	LOCK GUIDE - GUARD ARM SIDE
23	THROWER RETAINING LUG
24	TOP OPERATION ANTICREEP LEDGE
25	ROTARY OPERATION ANTICREEP LEDGE
26	KNUCKLE STOP
27	LOCK HOLE WALL
28	SUPPORT SHELF
29	VERTICAL GATHERING SURFACE
30	INTERLOCKING WING POCKET
31	LATERAL ALIGNING SURFACE
32	STEAM LINE SUPPORT LUG
33	AUXILIARY INTERLOCKING LUG
34	ROTOR SHAFT HOLE
35	ROTOR SHAFT KEYWAY
36	INVERTED PIN SUPPORT
37	INTERLOCKING LUG
38	CHAIN LUG



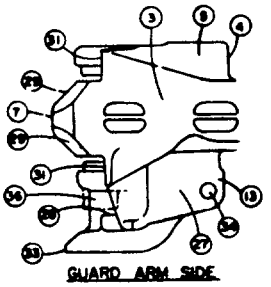
TOP



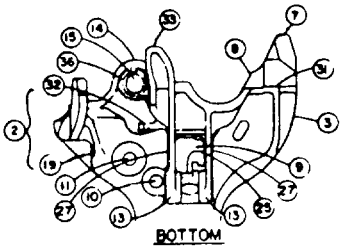
KNUCKLE SIDE



FRONT



GUARD ARM SIDE

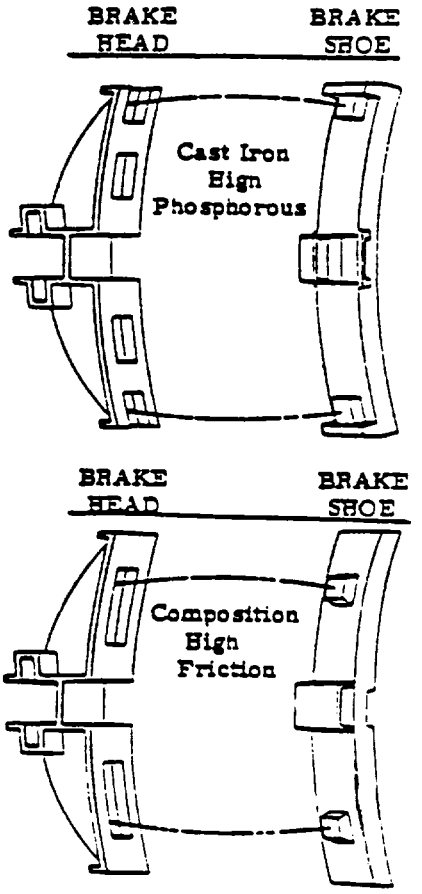


BOTTOM

TYPE F INTERLOCKING COUPLER HEAD

5. All high friction composition brake shoes must be equipped with rejection feature which prevent application to freight cars equipped with brake heads intended for use with cast iron high phosphorous shoes per correct substitution. Figure A.

CORRECT REPAIR



NOTE

Wear limits for cast iron high phosphorous brake shoes ½".

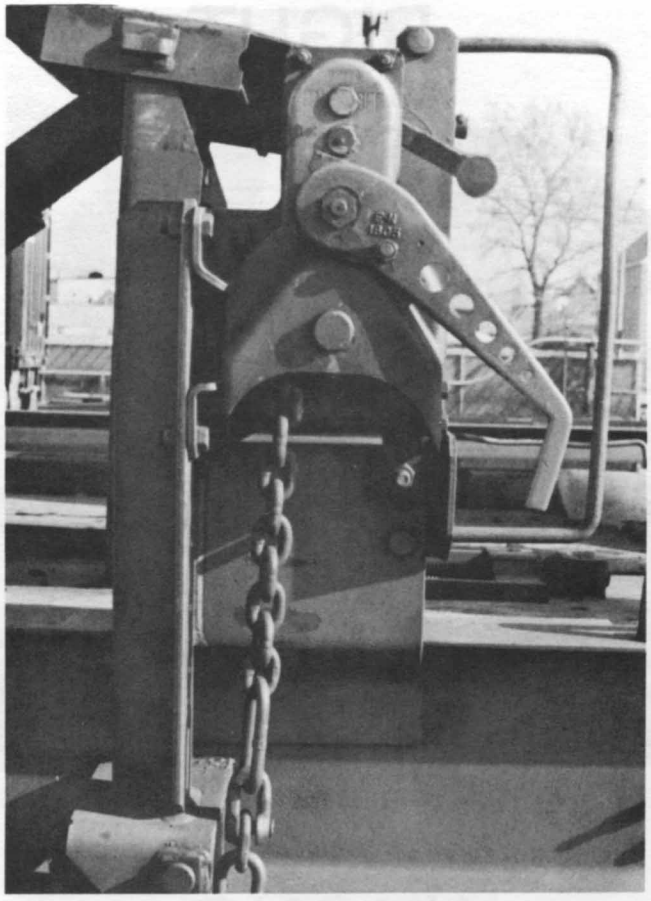
NOTE

Wear limits for composition brake shoes 3/8" including backing plate.

BRAKE SHOES

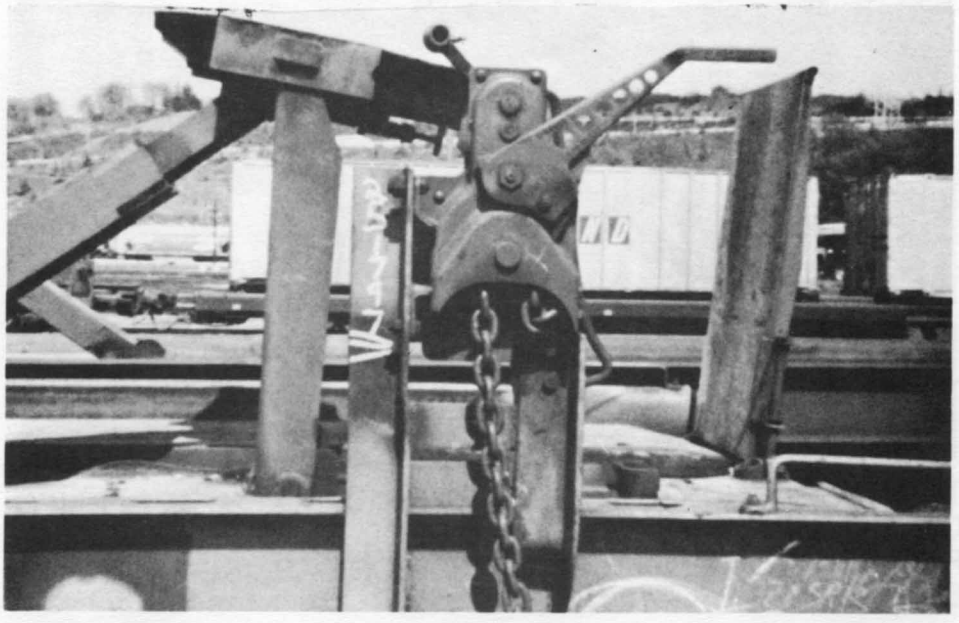
Removed	What Can Be Applied	Remarks
Comp. High Friction 1¼" Type H1, H1A	Comp. High Friction 1½" Type H2	None.
Comp. High Friction 1½" Type H2, H2A	Comp. High Friction 1½" Type H2	None.
Comp. High Friction1¾" Type H3, H3A	Comp. High Friction 1½" Type H2	None.
Comp. High Friction 2" Type H4, H4A	Comp. High Friction 2" or 1½", Type H4 or H2	Apply 2" Thickness Where Possible.
High Phosphorous Cast Iron	High Phosphorous Cast Iron 1½"	None.

RIGHT



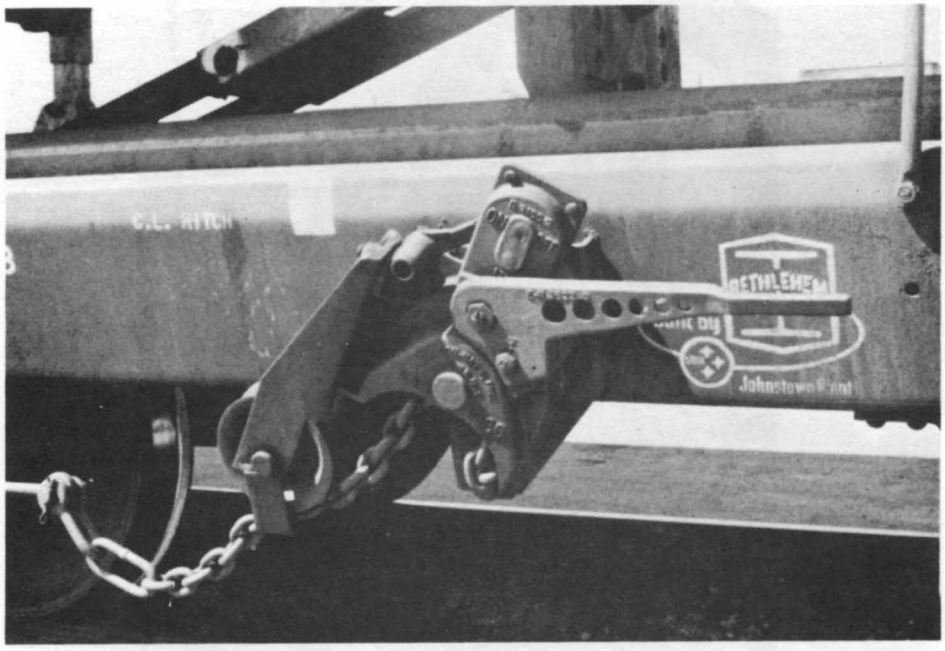
ELLCON-NATIONAL D-2150 GROUP "F" HANDBRAKE WITH HANDLE EN-1805 AND OTHER GROUP "F" HANDBRAKES CAN BE MOUNTED ABOVE THE DECK ON CARS EQUIPPED WITH PROPERLY SPACED ANGLES. GROUP "F" HANDBRAKES ARE **NOT** TO BE APPLIED BELOW DECK.

WRONG



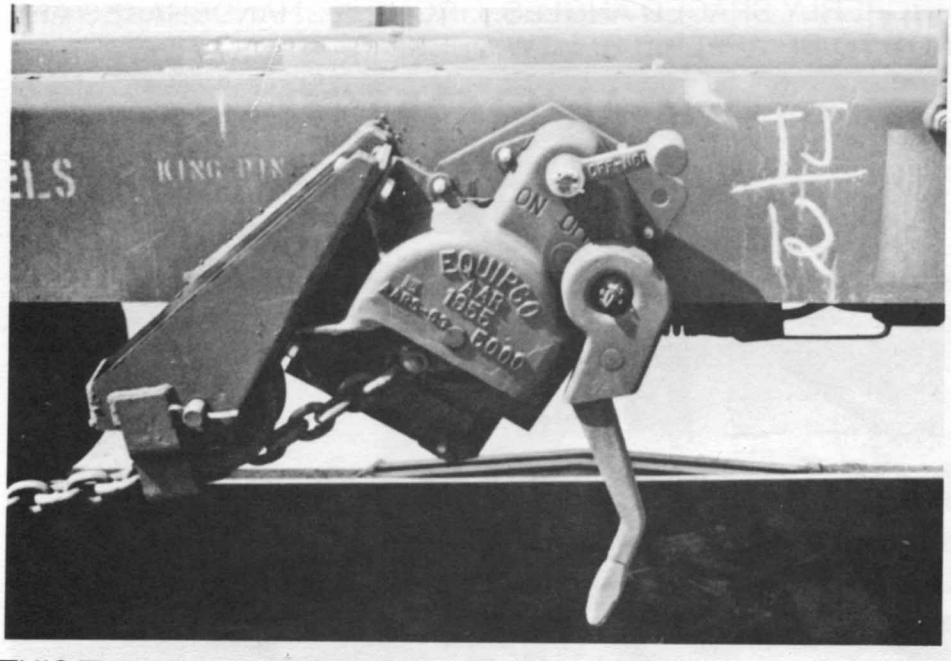
ELLCON-NATIONAL 2150-2 WITH HANDLE EN-3632 OR ANY GROUP "M" HANDBRAKE ARE NOT TO BE MOUNTED ABOVE THE DECK ON CARS EQUIPPED WITH PROPERLY SPACED ANGLES. (SEE NOTE "C" BELOW).

RIGHT



ORIGINAL HANDBRAKE — ELLCON NATIONAL D-2150-2 WITH EN-3632 HANDLE. (SEE NOTE "A" BELOW).

WRONG

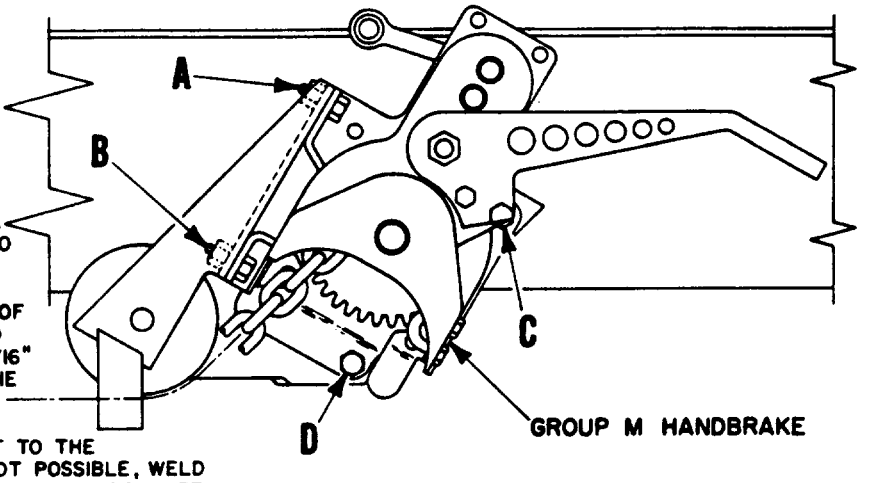


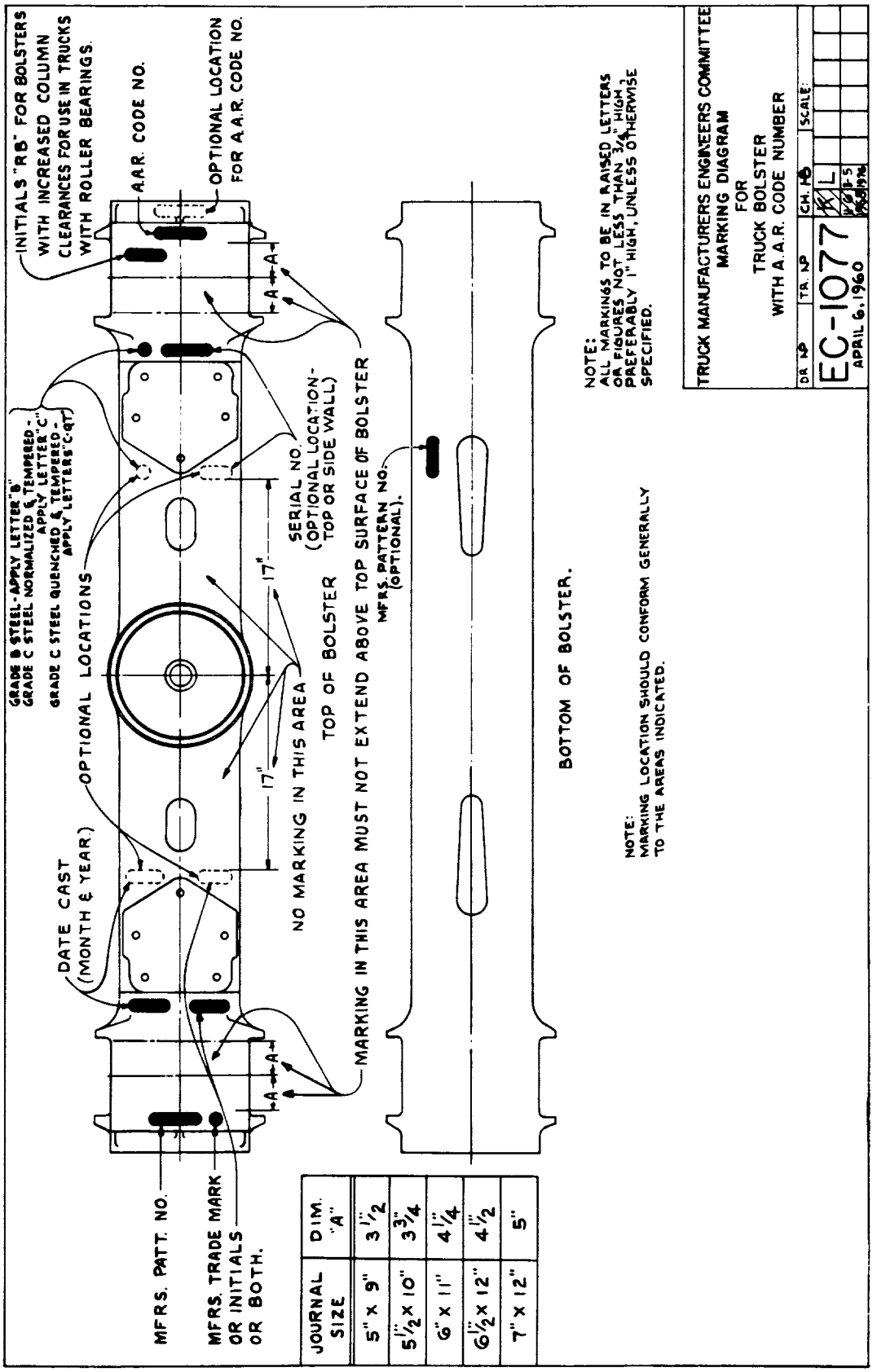
THIS TYPE HANDBRAKE, GROUP "F" ARE NOT TO BE APPLIED ON TTAX/TTCX TYPE CARS. THESE TYPES CANNOT BE PROPERLY OPERATED FROM SIDE OF CAR. (SEE NOTE "B" BELOW).

REPLACEMENT INSTRUCTIONS
D-2150-2 TO D-4320
LEVER STYLE THIN LINE BRAKE

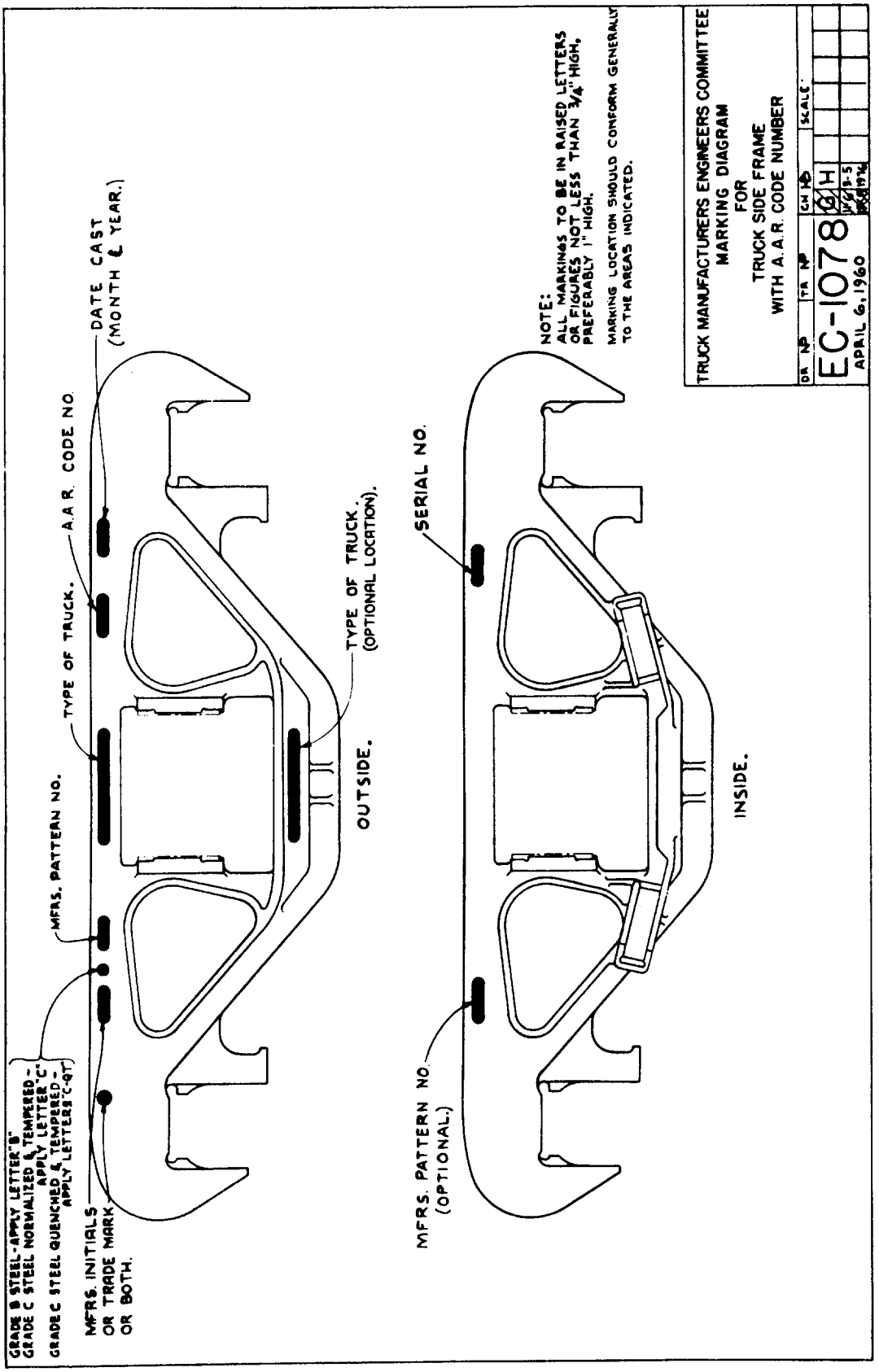
NOTE: DUE TO DIFFERENT MOUNTING CONFIGURATIONS, THE FOLLOWING STEPS ARE NECESSARY.

1.) REMOVE DEFECTIVE D-2150-2 BRAKE.
2.) REMOVE ALL SPACERS FROM THE MOUNTING PLATE ATTACHED TO THE SIDE SILL.
3.) APPLY EXISTING SHEAVE WHEEL BRACKET TO D-4320 REPLACEMENT BRAKE USING MOUNTING HOLES A & B.
4.) REAM EXISTING MOUNTING HOLE C TO 13/16" DIA. AND SECURE BRAKE TO CAR AT THIS POINT.
5.) POSITION BRAKE SO THAT THE TOP OF THE BRAKE HANDLE IS PARALLEL TO THE DECK OF THE CAR. CUT NEW 13/16" DIA. MOUNTING HOLE D THROUGH THE BRACKET AND ATTACH BRAKE AT THIS POINT AS WELL.
6.) WELD THE SHEAVE WHEEL BRACKET TO THE SIDE SILL OF THE CAR. IF THIS IS NOT POSSIBLE, WELD A 3"x 3", 3/8" ANGLE, 8" IN LENGTH TO THE BRACKET AND THE SILL TO PERMANENTLY AFFIX THE SHEAVE WHEEL BRACKET TO THE SILL. MAKE CERTAIN THAT THE POSITIONING OF THE ANGLE DOES NOT RESTRICT THE REMOVAL OF THE NUTS ON MOUNTING BOLTS A & B.
7.) ANY QUESTIONS REGARDING THESE INSTRUCTIONS, CONTACT TRAILER TRAIN COMPANY - (312) 786-1200 EXT. 216.

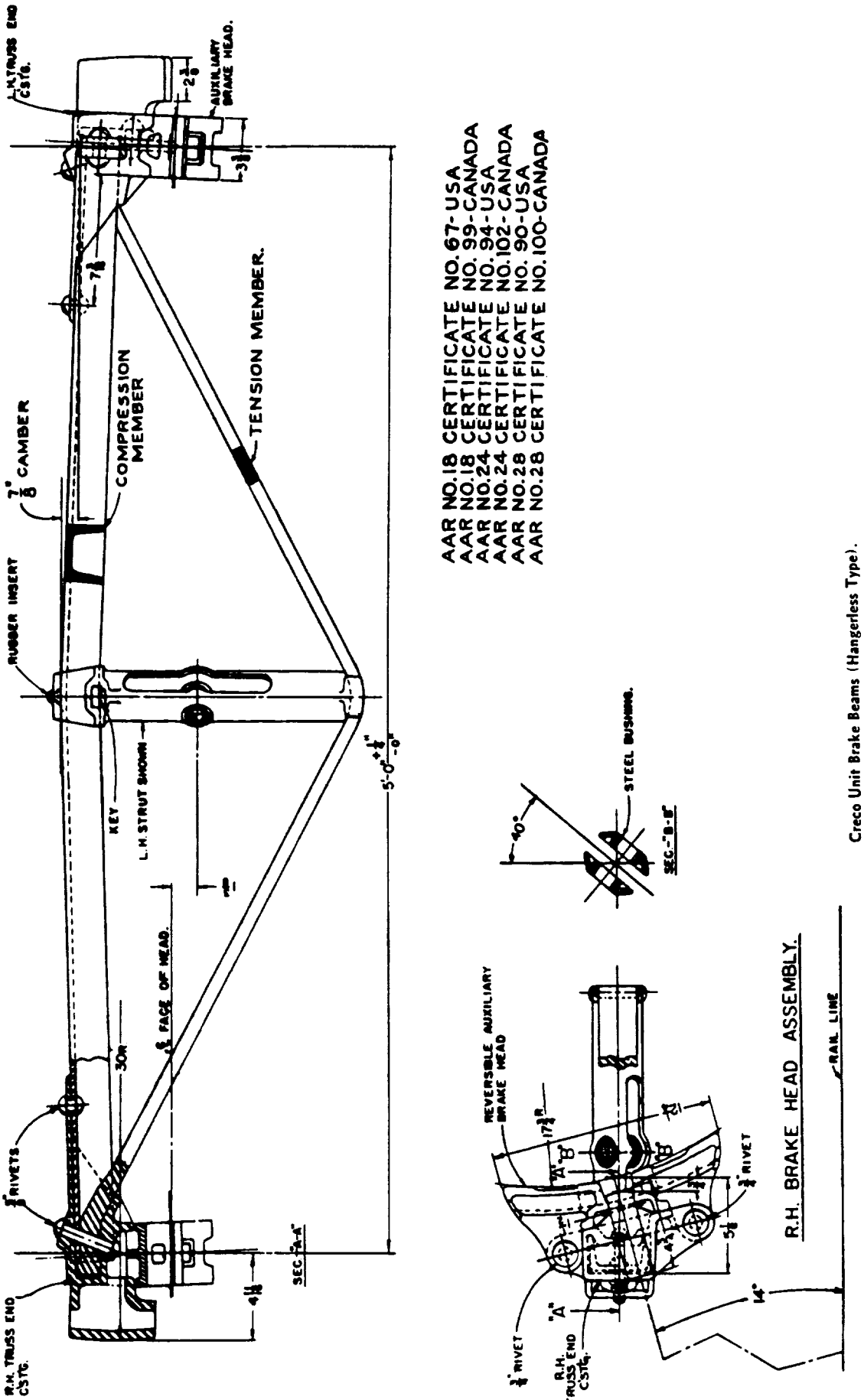




JOURNAL SIZE	DIM. "A"
5" x 9"	3 1/2"
5 1/2" x 10"	3 3/4"
6" x 11"	4 1/4"
6 1/2" x 12"	4 1/2"
7" x 12"	5"


GRADE B STEEL - APPLY LETTER "B"
GRADE C STEEL NORMALIZED & TEMPERED - APPLY LETTER "C"
GRADE C STEEL QUENCHED & TEMPERED - APPLY LETTERS "C-QT"
MFRS. INITIALS OR TRADE MARK OR BOTH.
MFRS. PATTERN NO.
A.A.R. CODE NO.
DATE CAST (MONTH & YEAR.)
TYPE OF TRUCK.
TYPE OF TRUCK. (OPTIONAL LOCATION).
OUTSIDE.
SERIAL NO.
MFRS. PATTERN NO. (OPTIONAL.)
INSIDE.
NOTE:
ALL MARKINGS TO BE IN RAISED LETTERS OR FIGURES NOT LESS THAN 3/4" HIGH, PREFERABLY 1" HIGH.
MARKING LOCATION SHOULD CONFORM GENERALLY TO THE AREAS INDICATED.
TRUCK MANUFACTURERS ENGINEERS COMMITTEE
MARKING DIAGRAM
FOR
TRUCK SIDE FRAME
WITH A.A.R. CODE NUMBER
DR NO
TR NO
CH NO
SCALE
EC-1078
APRIL 6, 1960

BRAKE GEAR: Brake Beam



Creco Unit Brake Beams (Hangerless Type).

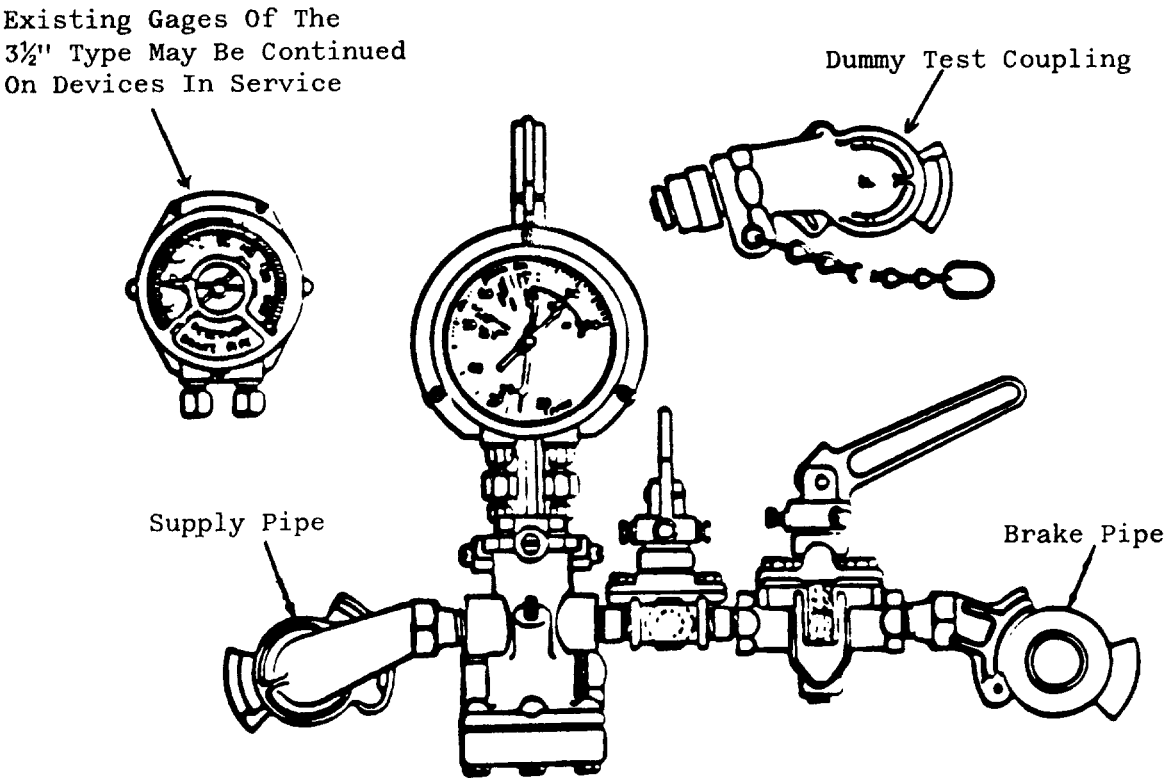


FIG. 1. OUTLINE OF FREIGHT SINGLE CAR TESTING DEVICE WITH FLOWRATOR

CONSOLIDATED RAIL CORPORATION

INSTRUCTIONS
No. 5039-4 Sup. 1
JANUARY, 1977
SINGLE CAR TESTING DEVICE CODE OF TESTS
ADOPTED BY ASSOCIATION OF AMERICAN RAILROADS

FREIGHT EQUIPMENT
Standard Single Capacity "AB" Type Equipment
TEST CODE

The tests are to be made with the feed valve or reducing valve adjusted for 70 pounds. Before the test apparatus is attached to the supply line, the line must be blown out.

TEST FOR TESTING DEVICE
(At Least Once Each Day)

Before coupling the device or device outlet hose (if used) to car move device handle to position No. 2, then close and open FLOWRATOR by-pass cock and observe that float does not stay at top of tube. Move device handle to position No. 3 (Lap), then couple the dummy test coupling, Pc. 552603, to the B. P. or coupling end of the device and move the device handle to position No. 1. Close the FLOWRATOR by-pass cock and note that the FLOWRATOR ball float rises and floats in the tube in the zone between the condemning line and the top of the glass. Move the device handle to position No. 3 (Lap). Open the FLOWRATOR by-pass cock and remove the dummy test coupling. Leakage from the brake pipe connection or exhaust port of the device when detected with soap suds, must not exceed 1" bubble in 5 seconds.
NOTE - It is important that the FLOWRATOR be within 15 degrees of vertical when readings are being made.

CONNECTING DEVICE TO CAR

Connect the device end marked B.P. or the coupling end of the device hose to the brake pipe hose at one end of the car (preferably at "B" end of car). Move device handle to position No. 1 after making sure that the FLOWRATOR by-pass cock is open. With both angle cocks open, note that a continuous blow of air from the open hose occurs at the other end of the car. Attach dummy coupling to air hose coupling at opposite end of car. Make certain that retaining valve is in "DIRECT EXHAUST" position.
NOTE 1 - If car is equipped with auxiliary brake pipe reduciton devices - Quick Service Valve and/or Vent Valve, the following tests "A" for Quick Service Valve and "B" for Vent Valve must be per-formed prior to proceeding with "Leakage Test".
NOTE 2 - For very special cars refer to car badge plate for charging time and testing procedure.

PROCEDURE FOR TESTING AUXILIARY BRAKE PIPE REDUCTION DEVICES - QUICK SERVICE VALVES AND VENT VALVES

Close combined dirt collector and cut-out cock handle to cut out the "AB" Type Control Valve.

TEST NO. A - QUICK SERVICE VALVE

With brake pipe fully charged to 70 pounds, place the device handle in position No. 4. Observe that brake pipe pressure is being reduced as indicated by the gage.

The exhaust at the quick service valve must be observed, noting that intermittent exhaust occurs during this reduction. When this has been noted, reduction should be continued to not less than 20 or more than 30 pounds, then place device handle in position No. 3 (Lap).

TEST NO. B - VENT VALVE

With the device handle still in No. 3 (Lap) position, quickly flip open the test device 3/8" cock. The vent valve must function and immediately vent brake pipe pressure to zero.
NOTE - When testing cars equipped with a vent valve only: After brake pipe is fully charged, make a reduction of not less than 20 or more than 30 pounds with handle in position No. 5. Place device handle in No. 3 (Lap) position prior to making the test.

At completion of the test, close test device 3/8" cock, then move device handle to position No. 1 and open Combined Dirt Collector and Cut-Out Cock handle to cut in the "AB" Type Control Valve, and proceed directly to the Standard Freight Equipment Tests, starting with "Leakage Test".

LEAKAGE TEST

Close FLOWRATOR by-pass cock to determine whether excessive leakage exists. If the float is not above the condemning line, open the FLOWRATOR by-pass cock and proceed with the test. If any part of the float is above condemning line, it indicates that brake system is not charged or that excessive leakage exists. Open the FLOWRATOR by-pass cock and make a complete check for leakage, (with soap suds when weather conditions permit) of all pipes and connections, including angle cocks, hoses, reservoir separation plate gasket, "AB" valve covers and vent valve exhaust and correct any leakage found, making such repairs as necessary to reduce leakage to where the float of the FLOWRATOR stays below the condemning line when FLOWRATOR by-pass cock is closed. Open FLOWRATOR by-pass cock and proceed to Test No. 1.
NOTE - If a car is on repair or shop track due to inoperative brake and all leakage has been corrected and float will not return below condemning line, it would indicate a slow charging valve.

1. APPLICATION TEST AND BRAKE CYLINDER LEAKAGE TEST

With the equipment charged to 70 pounds, move device handle to position No. 4 to make a 3 pound brake pipe reduction, then promptly return the handle to position No. 3 and leave it in this position for a period of one minute. A brake application must be obtained with this reduction. The brake pipe reduction must continue to drop to a total of not less than 4 pounds, nor more than 10 pounds and at some point between the values the reduction should decrease in rate or stop entirely. If the reduction continues beyond this point in excess of 3 pounds, a defective quick service limiting valve, excessive leakage from the brake cylinder or its associated piping, or brake cylinder release feature is indicated.

Proceed with Release Test No. 2 except on cars with 60 feet or more of brake pipe. On these cars, continue the reduction to provide a total of 10 pounds, wait at least 20 seconds (on special long cars exceeding 100 feet in length wait at least 2 minutes), then proceed with Release Test No.2.
NOTE - When testing single cars equipped with a continuous type of quick service valve, a greater quick service activity will be indicated and the brake pipe reduction may exceed the 10 pounds maximum specified above but must not exceed 14 pounds. If the total brake pipe reduction exceeds 14 pounds, it may be due to the above-mentioned causes.

2. RELEASE TEST

Move device handle to position No. 2 Brake must release within 45 seconds.

During the release test, the feed or reducing valve pressure must not drop below 70 pounds but if it does, means must be provided for increasing it to 70 pounds and the test repeated.

3. SERVICE STABILITY TEST

Move the device handle to position No. 1 to charge the brake pipe and reservoirs to 70 pounds. Move device handle to position No. 5, reducing brake pipe pressure 20 pounds. Then slowly return handle to position No. 3 (Lap). This test must not produce an emergency application. Observe if piston travel is correct or what adjustment is required.
NOTE - When testing single cars having AB-1-B or similar type equipment wait thirty (30) seconds before proceeding with Test No. 4. If brake releases, it may be due to safety valve or to selector valve diaphragm leakage.

4. EMERGENCY TEST

With the device handle still in position No. 3 (Lap) quickly flip open the test device 3/8" cock. This test must produce an emergency application as indicated by the venting of brake pipe pressure to zero.

5. RELEASE TEST AFTER EMERGENCY AND RETAINING VALVE TEST

At the completion of the emergency test, turn handle of retaining valve to "High Pressure" position.

Close the test device 3/8" cock, wait approximately one minute then move test device handle to position No. 1 and charge the brake pipe to 28 pounds, then immediately return the device handle to position No. 3 (Lap) and note that brake pipe pressure continues to rise, due to the air from the auxiliary reservoir flowing into brake pipe. This will indicate that the emergency piston has moved to accelerated release position.

Then move device handle to position No. 1 to move valve to release position.

After the expiration of three (3) minutes note position of brake cylinder piston to determine that brake has remained applied, then turn retaining valve handle to "Direct Release" position and observe that a blow of air is obtained at retaining valve exhaust. If no blow is obtained or if brake does not remain applied during the three (3) minute period, excessive leakage of brake cylinder, retaining valve or their related piping is indicated. Necessary repairs must be made and test repeated.
NOTE - For cars equipped with ABDW Control Valves, after the retaining valve test has been passed, immediately move test device handle to position No. 4. Intermittent exhaust at the emergency valve must be observed during this reduction. When this has been noted, reduction should be continued to not more than 20 pounds, then place device handle in position No. 3 (Lap).

MISCELLANEOUS INSPECTION AND TESTS

On freight cars not equipped with automatic slack adjusters, make necessary adjustments to obtain nominally 7 inch piston travel or minimum travel for car or equipment. Reapply the brake by making a 20 pound brake pipe reduction with test device in position No. 5, return handle to position No. 3 (Lap) and recheck piston travel.

If car is equipped with automatic slack adjuster, it must be observed that piston travel is within permissable limits and that automatic slack adjuster operates during these tests. If slack adjuster is inoperative, or not maintaining proper piston travel, necessary repairs must be made. Do not change automatic slack adjuster sensing device settings if the slack adjuster is operating and maintaining piston travel within required limits.

If car is equipped with manual brake cylinder release feature, make an emergency brake application by opening test device 3/8" cock, with device handle in position No. 3 (Lap). Wait 90 seconds, then pull handle of brake cylinder release valve rod or common release rod through its full travel and hold it for 3 seconds, then release it. Note that the brake cylinder piston returns fully to release position and remains there. Close test device 3/8" cock, then move device handle to position No. 1 and charge brake pipe. During the release of the brake, the brake cylinder piston must remain in release position. Before disconnecting the single car testing device, move device handle to position No. 3 (Lap) and open the test device 3/8" cock. Note that the brakes apply thereby indicating that brake cylinder release feature has reset.

CONRAIL

PROCEDURE FOR CLEANING AND TESTING "AB" TYPE BRAKES ON REPAIR TRACKS

PRELIMINARY PREPARATION
1. Close Branch Pipe Cock
2. Drain Reservoirs and Brake Cylinders
3. Remove Dirt Collector Cup-Do Not Reapply
4. Disconnect Release Valve Handle(s)-Leave Attached To Release Rod(s)

CLEAN BRAKE PIPE, BRANCH PIPE, EXTERIOR SURFACES OF PIPE BRACKET AND ADJACENT CAR AREAS
1. Blow Dirt and Water From Yard Line and Supply Hose
2. Couple Single Car Test Device To Yard Line and Car Brake Pipe
3. Charge Brake Pipe - Keep Yard Supply Attached
4. Open Angle Cock At Opposite End - Blow Dirt From Brake Pipe
5. Apply Dummy Coupling This End
6. Leave Both Angle Cocks Open - Open Branch Pipe Cock - Blow Dirt From Branch Pipe
7. Close Branch Pipe Cock

REMOVE EMERGENY CONTROL PORTION
1. Remove Vent Protector From Emergency Portion - Apply Vent Protector Plug
2. Remove Emergency Portion From Pipe Bracket
3. Move Piston ("AB" Only) To Release Position - Handle Carefully - Avoid Entrance Of Dirt Water Or Damage To Internal Parts
4. Immediately Apply Shipping Cover - Tighten Holding Nuts

NEVER DISMANTLE, REMOVE OR REPLACE ANY PARTS OF OPERATING PORTIONS AT THE CAR UNLESS AUTHORIZED BY AAR INTERCHANGE RULE

REMOVE SERVICE CONTROL PORTION
1. Remove Service Portion And Pipe Bracket Strainer From Pipe Bracket
2. Handle Carefully Avoid Entrance Of Dirt Water Or Damage To Internal Parts
3. Immediately Apply Shipping Cover - Tighten Holding Nuts
4. Apply Stem Guard To "ABD" And "ABDW" Portions - Secure With Cotter-Pin
5. Remove And Replace Pipe Bracket Strainer

VALVE PORTIONS REMOVED WITH EVIDENCE IN PORTIONS OR PIPE BRACKETS OF SUBMERSION IN WATER
Special Additional Cleaning Operations Required As Directed In Section 7 AAR Standard Instruction Leaflet 2391, sup 1

CARS EQUIPPED WITH BRAKE CYLINDER RELEASE VALVE
1. Disconnect Handle - Leave Attached To Release Rod
2. Clean Adjacent Areas As With Control Portions
3. Remove Brake Cylinder Release Valve From Pipe Bracket Or Adapter
4. Immediately Apply Shipping Cover - Tighten Holding Nuts

CARS EQUPPED WITH EMPTY—LOAD EQUIPMENT
Refer To Paragraphs 1 1 8a And 1 1 14 AAR Standard Instruction Leaflet 2391 sup 1

CARS EQUPPED WITH QUICK SERVICE VALVE, VENT VALVE, REDUCTION RELAY VALVE OR "J" TYPE RELAY VALVE
1. Clean Adjacent Areas As With Control Valves
2. Remove Valve Portions
3. Apply Shipping Cover - Tighten Holding Nuts

CARS EQUIPPED WITH DEMOUNTABLE RETAINING VALVE
1. Remove Valve And Strainer From Bracket
2. Clean Adjacent Areas As With Control Portions
3. Handle Carefully - Avoid Entance Of Dirt, Water Or Damage To Internal Parts
4. Immediately Aply Shipping Cover - Tighten Bolts

CARS EQUIPPED WITH NON—DEMOUNTABLE VALVE
1. Remove Caps And Wasp Excluder - Do Not Reapply
2. Protect Properly From Dirt, Water And Damage To Internal Parts

CARS EQUIPPED WITH RESERVOIR CHARGING CHECK VALVE (MOUNTED ON "AB" PIPE BRACKET)
1. Remove Cap Nut, Spring And Check Valves
2. Examine Internal Parts For Excessive Wear Or Damage - Replace If Necessary
3. Reassemble Check Valve

CLEAN PIPE BRACKETS AND ADAPTER - APPLY GASKETS
1. Use Suitable Scraper - Loosen Dirt In Brake Pipe Passages - Strainer Chamber And Connecting Passages
2. Use Blower Hose Fitted With Nozzle - Remove Loose Dirt And Scale Retaining Valve Body And Pipe - Blow From Pipe Brackets And Valve Ends Face of Brackets - Strainer Chamber - Connecting Passages Blow Toward Open Dirt Collector
3. Properly Clean And Carefully Inspect Used Body Gaskets
4. Reject And Replace Gaskets With Flattened Or Broken Beads, Cracks Or Cuts
5. Remove And Replace With New Gaskets On "ABD" & "ABDW" Control Valves
6. Place And Fully Seat Gaskets At Their Locking Projection

MOUNT CLEAN EMERGENCY CONTROL PORTION
NEVER REMOVE SHIPPING COVER FROM ANY CLEAN VALVE PORTION UNTIL IMMEDIATELY PRIOR TO MOUNTING THEM ON PIPE BRACKET

1. Remove Shipping Cover From Clean Emergency Portion
2. Place AB Emergency Piston In Release Position
3. Immediately - Slowly & Carefully Slide Portion On Studs Against Pipe Bracket
4. Coat Threads Lightly With Brake Cylinder Lubricant
5. Apply and Tighten Holding Nuts Evenly Then Firmly
6. Clean Or Renew If Necessary Vent Protector
7. Remove Vent Protector Plug
8. Apply and Securely Tighten Protector To Cleaned Emergency Portion

MOUNT CLEAN SERVICE CONTROL PORTION
1. Apply New Throw-Away Type Strainer To Cavity In Pipe Bracket
2. Guide Strainer Carefully Into Proper Position With Wood Mandrel
3. Inner End Of Strainer Must Engage Sealing Bead
4. All Nut Threads Must Be Visible
5. Apply Strainer Holding Nut - Tighten Firmly With Special Wrench Provided
6. Remove Shipping Cover From Clean Service Portion
7. Place "AB" Piston In Release Position
8. Immediately - Slowly And Carefully - Slide Portion On Studs Against Pipe Bracket
9. Coat Threads Lightly With Brake Cylinder Lubricant
10. Apply And Tighten Holding Nuts - Evenly Then Firmly
11. Remove Stem Guard

CARS EQUIPPED WITH BRAKE CYLINDER RELEASE VALVE
1. Remove Shipping Cover From Clean Valve Portion
2. Immediately - Carefully Apply Valve Portion On Pipe Bracket (Or Adapter)

CARS EQUIPPED WITH QUICK SERVICE VALVE, VENT VALVE OR REDUCTION RELAY VALVE
1. Apply New Strainer To Pipe Bracket
2. Inspect 3/64" Drill Plug In A-2-A Pipe Bracket For Obstructions And Proper Size
3. Inspect Choke Plugs In B-1 Quick Service Valve Face Of Pipe Bracket For Obstructions And Proper Size
4. Cars 75 Ft And Over In Brake Pipe Length -
   Remove Choke B Pc 94033 With #62 Drill Choke
   Replace With Pc 578254 With #54 Drill Choke
   STENCIL PIPE BRACKET BODY WITH 1/4" HIGH "X" TO INDICATE MODIFICATION MADE

CARS EQUIPPED WITH "J" TYPE RELAY VALVE
1. Remove Shipping Cover From Valve Portion
2. Immediately - Carefully Apply Valve To Its Respective Mounting Face

CARS EQUIPPED WITH DEMOUNTABLE RETAINING VALVE

1. Carefully Insert Properly New Strainer In Retaining Valve Pipe Bracket
2. Remove Shipping Cover From New Or Cleaned Retaining Valve
3. Set Gasket Firmly In Place
4. Immediately - Carefully Apply Retaining Valve On Pipe Bracket
5. Fasten Securely With Cap Screws

CLEANING RETAINING VALVE AT CAR

1. Disassemble And Clean Valves, Valve Seats And Wasp Excluder
2. Wash With Suitable Solvent If Necessary To Insure Free Operation Of Parts
3. Inspect Vent Parts And Drilled Passages For Restrictions, Dirt Or Visible Defects
4. Lightly Lubricate Male Threads On Retaining Valve Caps With Brake Cylinder Lubricant
5. Assemble
6. Note Retaining Valve Is Properly Secured To Car In Vertical Position - Handle Moves Freely
7. A Cleaned And Tested Retainer May Be Substituted

CONNECT RELEASE VALVE HANDLES ATTACHED TO RELEASE ROD TO RELEASE VALVE HANDLE END PLATE

1. Secure With 3/8" Cotter
2. Note If Release Rod Is Connected To Handle By 5/16" Cotter - If Not, Replace With 5/16" Cotter

ASSEMBLE DIRT COLLECTOR

1. Clean And Blow Dirt From Dirt Chamber
2. Clean Check Valve
3. Clean Or Renew Gasket ("ABD"/"ABDW" Equipped Cars Require New Gasket)
4. Lubricate Bolt Threads Lightly With Brake Cylinder Lubricant
5. Reassemble Dirt Chamber On Dirt Collector

INSPECT CYLINDER — RESERVOIR — PIPE BRACKET

1. Renew Or Tighten Missing Or Loose Supporting Bolts And Nuts
2. Solidly Tighten All Flange Pipe Fittings

CARS EQUIPPED WITH "AB" OR "UC" TYPE BRAKE CYLINDERS

1. Disconnect and Remove Brake Cylinder Push Rod
2. Inspect Hollow Rod Collar - Must Hold Non Pressure Head Securely On Hollow Rod
3. Remove Piston, Release Spring And Non-Pressure Head Assembly Complete
4. Handle Carefully - Avoid Damage To Piston Packing Cup, Lubricator Swab And Other Parts
5. Place Piston Assembly In Suitable Shipping Container
6. Transport To Shop For Reconditioning
7. Examine Non-Pressure Head Gasket - Do Not Remove If Unbroken And Providing Good Seal
8. Remove Gasket - Clean Seat When Cleaning Cylinder - Apply New Gasket on "ABD"/"ABDW" Equipped Cars
9. Use Dull Rounded Scraper - Thoroughly Remove All Grease And Dirt From Cylinder
10. Use Suitable Solvent - Soften Gummy Deposits Remove Rust Spots
11. Thoroughly Clean Cylinder With Rags - Wipe Dry
12. Use Suitable Brush To Thoroughly Coat Cylinder Wall With Thin Coat Of Brake Cylinder Lubricant
13. Place Non-Pressure Head Gasket In Correct Position In Cylinder Flange Recess
14. Coat Cylinder Wall Bearing Surface Of Packing Cup With Brake Cylinder Lubricant
15. Fill Grease Groove Of Swab Retainer With Brake Cylinder Lubricant
16. Immediately Apply Piston Assembly To Cylinder
17. Apply Non-Pressure Head Bolts - Tighten Evenly
18. Apply And Connect Push Rod

CARS EQUIPPED WITH TRUCK MOUNTED BRAKE ASSEMBLIES

1. Drain Air From All Reservoirs And Brake Cylinders
2. Disconnect Brake Cylinder Hoses At Cylinder Flanges - Inspect For Abrasion, Cracks, Soft Spots, And Loose Or Defective Fittings
3. Disconnect Hand Brake Chain
4. Jack Car - Roll Truck Out
5. Remove Brake Shoes
6. Inspect Cylinders And Levers For Damaged Or Missing Parts - Refer To Car Badge Plate For Correct Cylinders And Lever Sizes

REMOVE OLD BRAKE CYLINDER AND PISTON ASSEMBLIES FOR CLEANING

1. Examine Push Rod Holder For Holding Security — Mark For Position At Lock Nut
2. Remove Cotter Pin And Push Rod Pin
3. Push Brake Unit Body Bolster — Loosen Push Rod Lock Nut
4. Remove Push Rod — Place On Bolster — Return Damaged Push Rod To Shop For Repair — Replace With One Of Same Length
5. Remove Brake Cylinder Nuts and Bolts — Remove Cylinder And Piston Assembly
6. Protect Assembly From Damage And Contamination — Transport To Shop For Cleaning
7. Remove Brake Cylinder Gasket — Clean Rust And Dirt From Bolting Face
8. Clean Spring And Strainer (Hair Type Only) In Unit Body, Replace Felt Or Styrofoam Type Strainer

APPLY CLEANED BRAKE CYLINDER ASSEMBLIES

1. Make Certain Hollow Rod Guide Gasket Of Hollow Rod Guide Is In Place
2. Apply Thin Film Of Lubricant On Both Sides Of Spring Seat Stop Flange And Unit Body Bolting Face To Hold Gaskets In Place
3. Align Spring Seat Stop And Cylinder Flange Bolt Holes With Those Of Unit Body
4. Face Spring Seat Stop Drain Hole Downward
5. Position Assembly In Unit Body Cavity — Start Nuts On Top Bolts
6. Position Hollow Rod Guide In Unit Body Recess — Grasp Push Rod End — Shift Unit Release Spring Pushes Guide Into Place
7. Install Lower Bolts — Tighten All Nuts Evenly And Securely (75 Ft. Lb. Torque For 5/8" and 140 Ft. Lb. Torque For 3/4"
8. Clean And Lubricate Push Rod Threads — Replace Push Rod
9. Turn Push Rod End Two (2) Turns Beyond Mark Previously Placed On Push Rod
10. Align Pin Holes In Push Rod With Pin Holes In Brake Unit Bodies
11. Insert Pins — Lock With Cotter Pins

ADJUST PISTION TRAVEL

1. Insert Spacing Blocks Between Brake Heads Of Both Bodies And Four Wheels As Close As Possible To Flanges
2. Adjust Push Rod If Required To Permit Spacing Block Insertin — Rotates Push Rod End To Shorten Rod
3. Adjust Both Push Rods To Snug Spacing Blocks Against Wheels — Rotate Both Push Rod Ends To Lengthen Push Rods — Then Rotate Push Rod ½ Turn To Shorten Rod For Easy Spacing Block Removal
4. Remove Spacing Blocks — Mount Brake Shoes
5. Securely Tighten Push Rod Lock Nut
6. Replace Truck Under Car — Remove Hose Fitting Flange Face Protection
7. Ascertain That Strainer Is In Place If Cylinder Is So Equipped
8. Apply Hose Flange Fitting Gasket — Connect Brake Cylinder Hoses
9. Apply Hand Brake Chain And Pull Rod At Hand Brake Levers And Secure With Cotter Pins On Hand Brake Truck

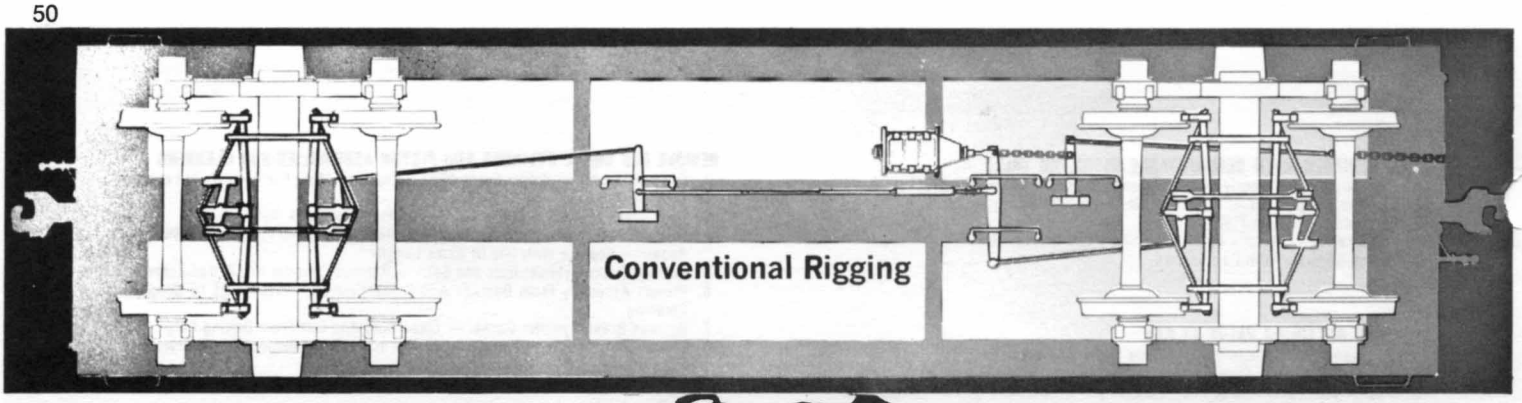
ADJUST HANDBRAKE — NOT NORMALLY REQUIRED UNLESS TRUCK WHEELS HAVE BEEN REPLACED

1. Release Hand Brake Fully — Horizontal Hand Brake Chain Should Be Nearly Taut. If Adjustment Is Proper. If Not Nearly Taut Follow Step 2
2. Disconnect Adjustment Pin At Anchor Clevis. Pull On Pull Rod By Hand. Insert Pin In Farthest Hole Possible. Slack Adjustment Is Proper. If Horizontal Chain Now Is Nearly Taut If Not, Follow Step 3
3. If Necessary, As In Step 2, Move Pin At One End Of Bottom Rod To Outside Hole. Horizontal Chain Should Be Taut. If Not, Tighten Chain At Anchor Clevis As In Steps 1 And 2

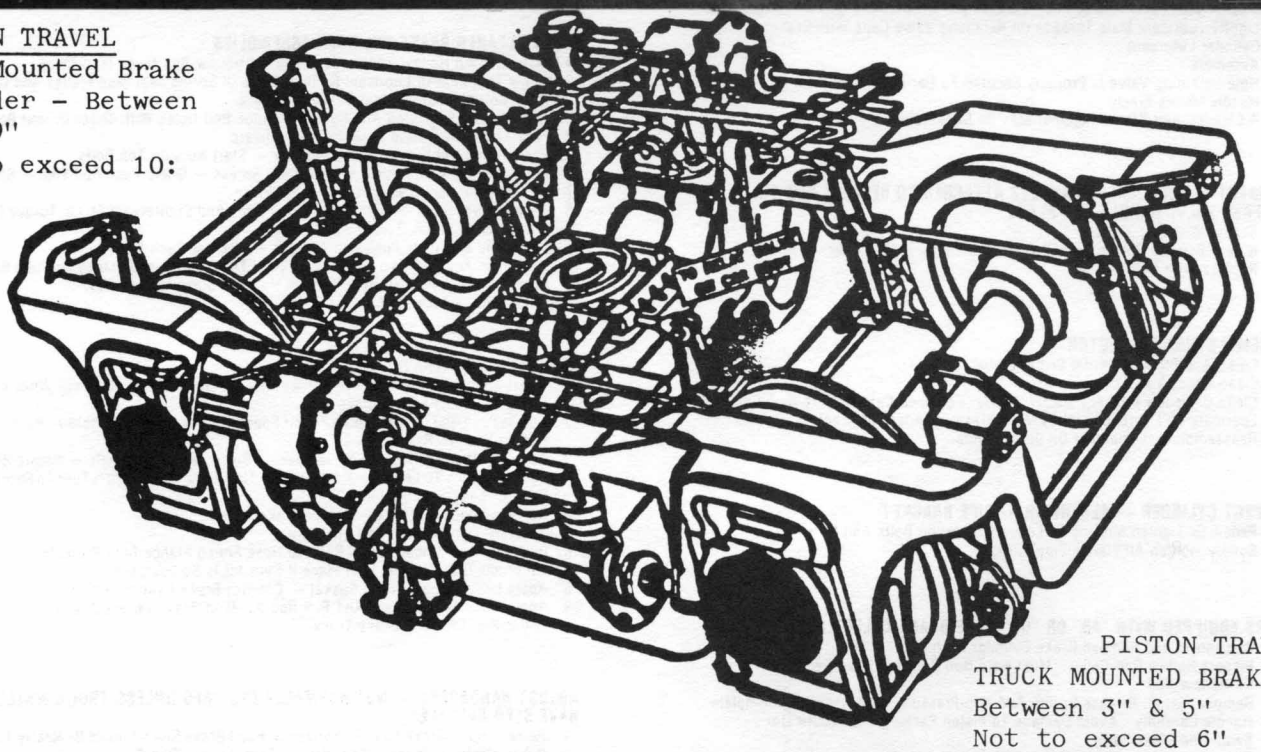
TEST ENTIRE BRAKE EQUIPMENT BY TEST CODE I.P. 5039-4 SUP. 1

1. Inspect Slack Adjusters On Cars So Equipped — Repair Or Renew
2. Inspect For Loose Or Missing Pipe Clamp And Improperly Located Angle Cocks
3. Make Needed Repairs
4. Apply New Gaskets To Both Brake Pipe Hose Couplings

APPLY NEW C.O.T.S. AND IDT DATE WITH STENCIL AFTER COMPLETION OF ALL WORK



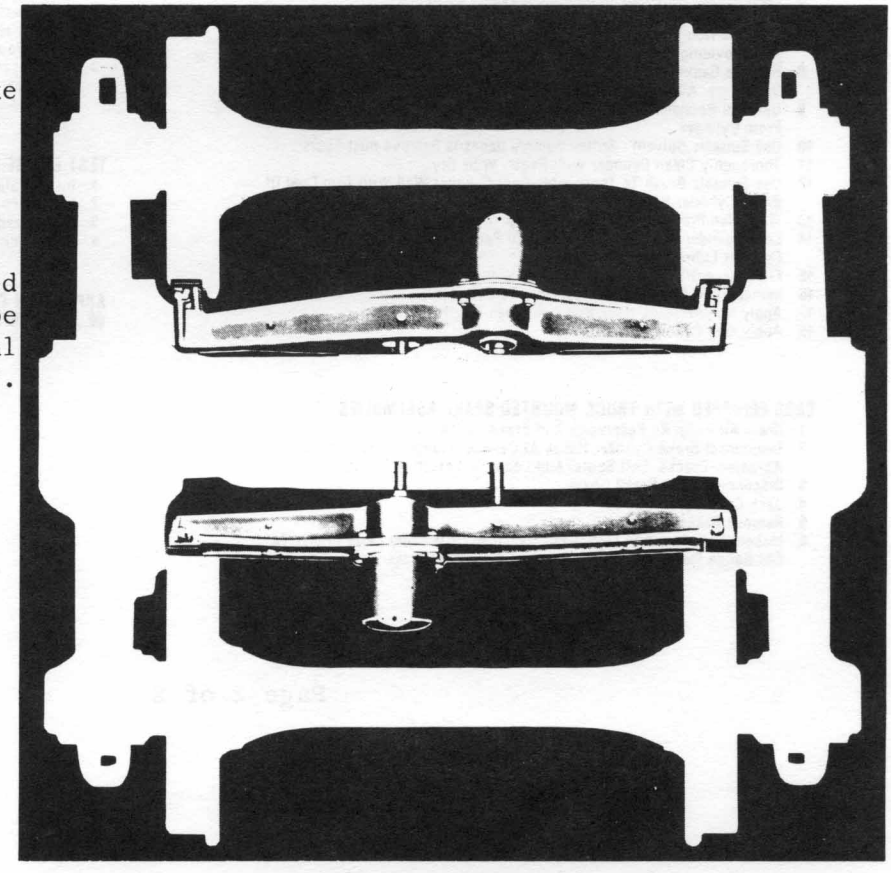
PISTON TRAVEL
Body Mounted Brake Cylinder - Between 7" & 9"
Not to exceed 10:



PISTON TRAVEL
TRUCK MOUNTED BRAKE CYLINDER
Between 3" & 5"
Not to exceed 6"

PISTON TRAVEL
Brake Cylinder Mounted On Brake Beams (WABCO TYPE) - Between 2½" - 3½" Not To Exceed 4". Normal Piston Travel is 3½".

NOTE: On All New Composition Brake Shoes When Applied To A Car With WABCO Type Brake Heads, The Nominal Piston Travel Is 1-1/8".



ASSOCIATION OF
AMERICAN RAILROADS
OPERATIONS AND MAINTENANCE DEPARTMENT • MECHANICAL DIVISION
AMERICAN RAILROADS BUILDING • WASHINGTON, D. C. 20036 • (202) 293-4150

•72018•

January 10, 1977

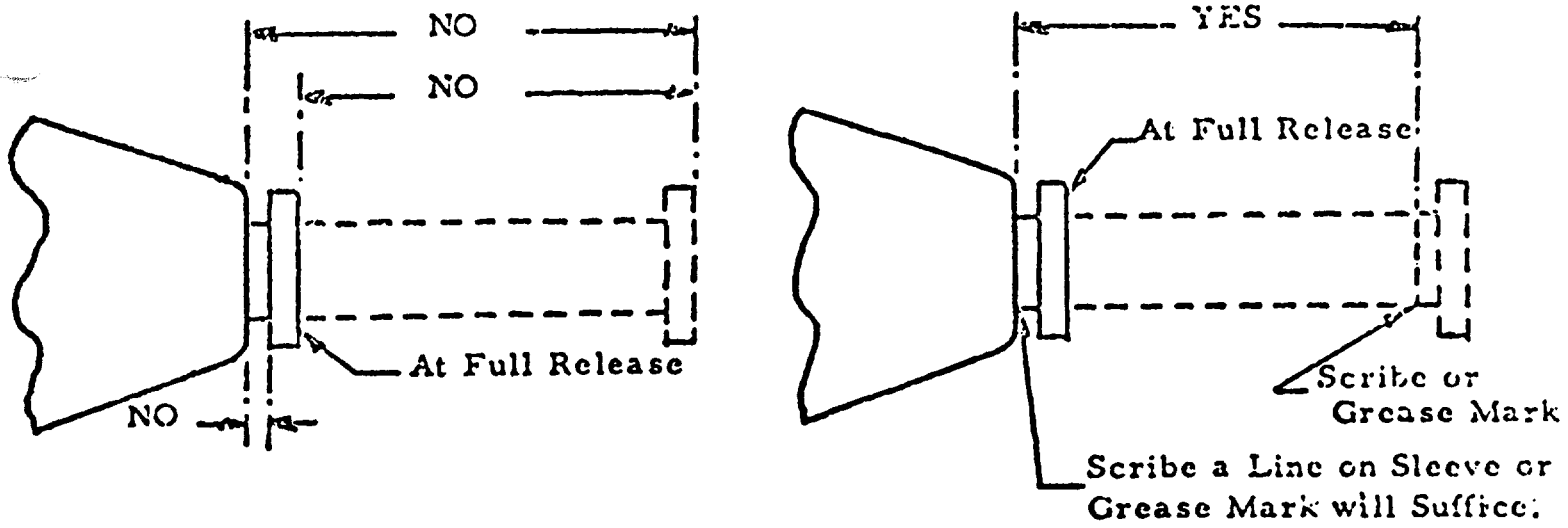
Subject: Proper Method of Measuring Piston Travel on Freight Car Brake Cylinder

REFER TO FILE NO. BBE-332 (c-6078)

TO THE MEMBERS AND PRIVATE CAR OWNERS

Gentlemen:

The Brake Equipment Committee was requested to clariiy the proper distance to be measured for brake cylinder piston travel. The actual movement of the piston is the distance that must be measured. The typical sketches shown below should clarify this matter.



YES = Actual Piston Travel Distance

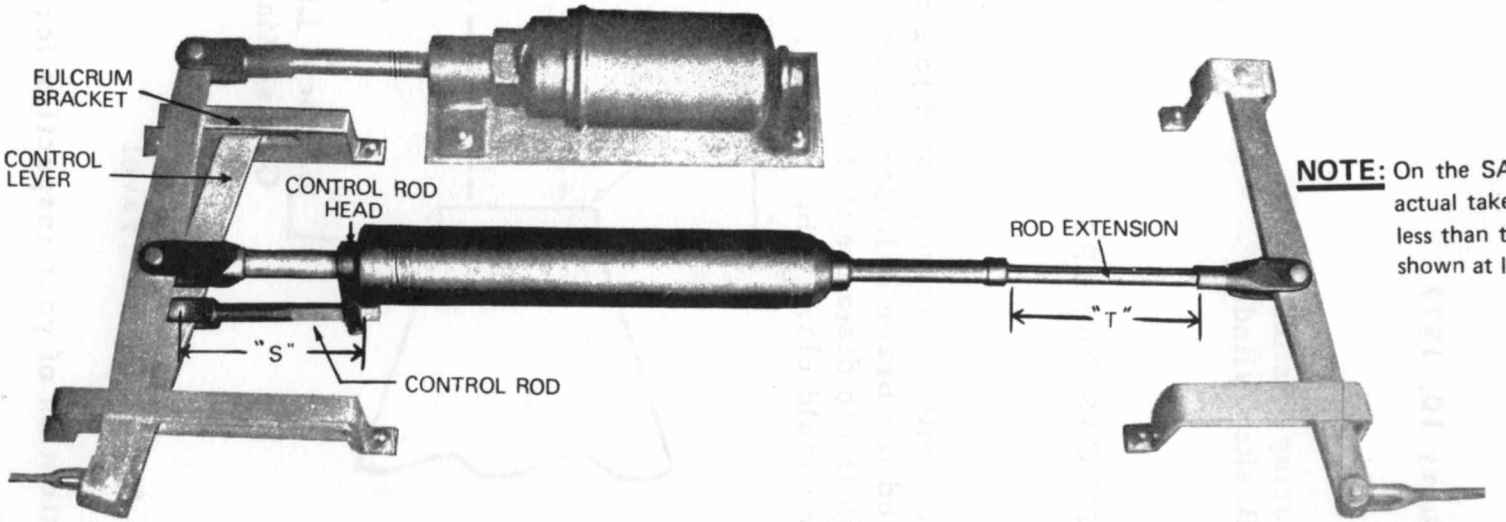
NO = Distance not to be Included in the Actual Piston Travel

Please call this to the attention of your inspection forces, as necessary.

Sincerely,

R. C. Reber

Secretary



NOTE: On the SAB Slack Adjuster, actual take-up capacity is 2" less than the "T"-Measure shown at left.

INSPECTION OF SLACK ADJUSTER AND BRAKE RIGGING

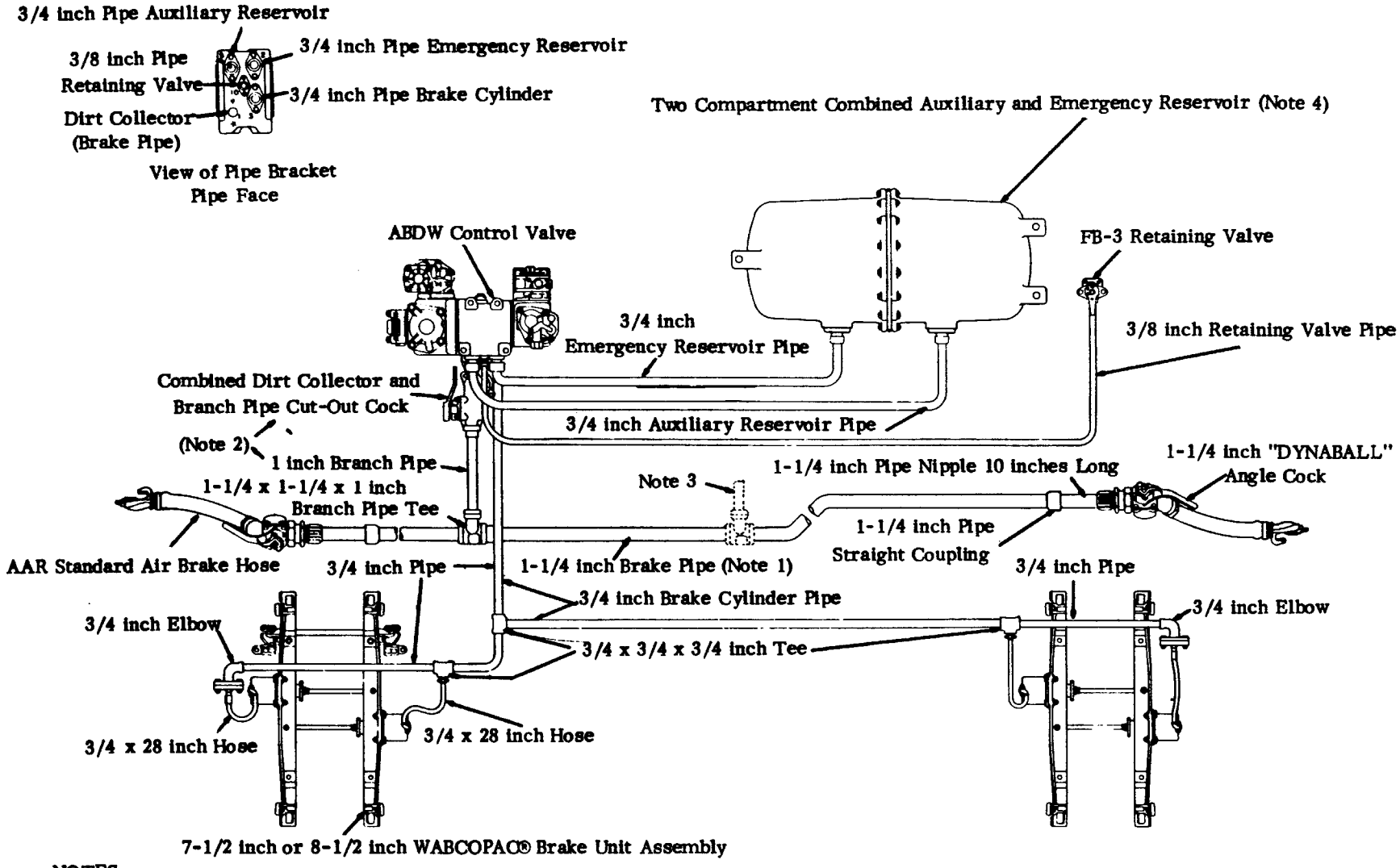
Inspect all parts of brake rigging including brake shoes, levers, brake beams, pins, fulcrum brackets, rods and rod carriers for damage.
Inspect slack adjuster, control rod, control lever, control lever bracket and carrier brackets for damage.

Any items that are found to be bent or damaged should be repaired or replaced.

TEST PROCEDURE

1) Connect Single Car Tester and charge air system to 70 p.s.i.
2) Make a full service reduction (20 lbs.) release and recharge the system.
3) Make a second full service application and with brakes applied repeat the inspection tests. At this time check all items to determine that fouling does not exist at any point. Measure and record rod extension "T" and Piston Travel.
4) Release brakes and recharge the system. Remove a brake shoe from the car.
5) Repeat test (2) and (3). Rod extension "T" should now be shortened and piston travel the same as test (3).
6) Release brake and recharge the system. Reapply the brake shoe that was removed in test (4).
7) Repeat test (2) and (3). Rod extension "T" and piston travel should now be the same as test (3).
8) If slack adjuster does not perform in accordance with test procedure, it should be replaced.

NOTE: Above Field Test can be used for all automatic slack adjusters.



NOTES:

1. All air brake piping to be extra heavy iron except nipples at angle cocks, which may be extra heavy or standard weight.
2. The length of branch pipe including combined dirt collector and cut-out cock shall be 22 to 40 inches. Flexible branch pipe hose on cushion type underframes MUST BE installed in accordance with AAR Standards.
3. Reduction Relay Valve, when required, MUST BE installed in accordance with AAR Standards.
4. Pressure in the Two-Compartment Reservoir MUST NOT exceed 110 psi.
5. Piping and installation of the equipment is the responsibility of the car builder.

FIGURE 27 - AB FREIGHT BRAKE EQUIPMENT WITH ABDW CONTROL VALVE AND 7½ OR 8½ INCH WABCOPAC BRAKE UNIT ASSEMBLY - PIPING DIAGRAM

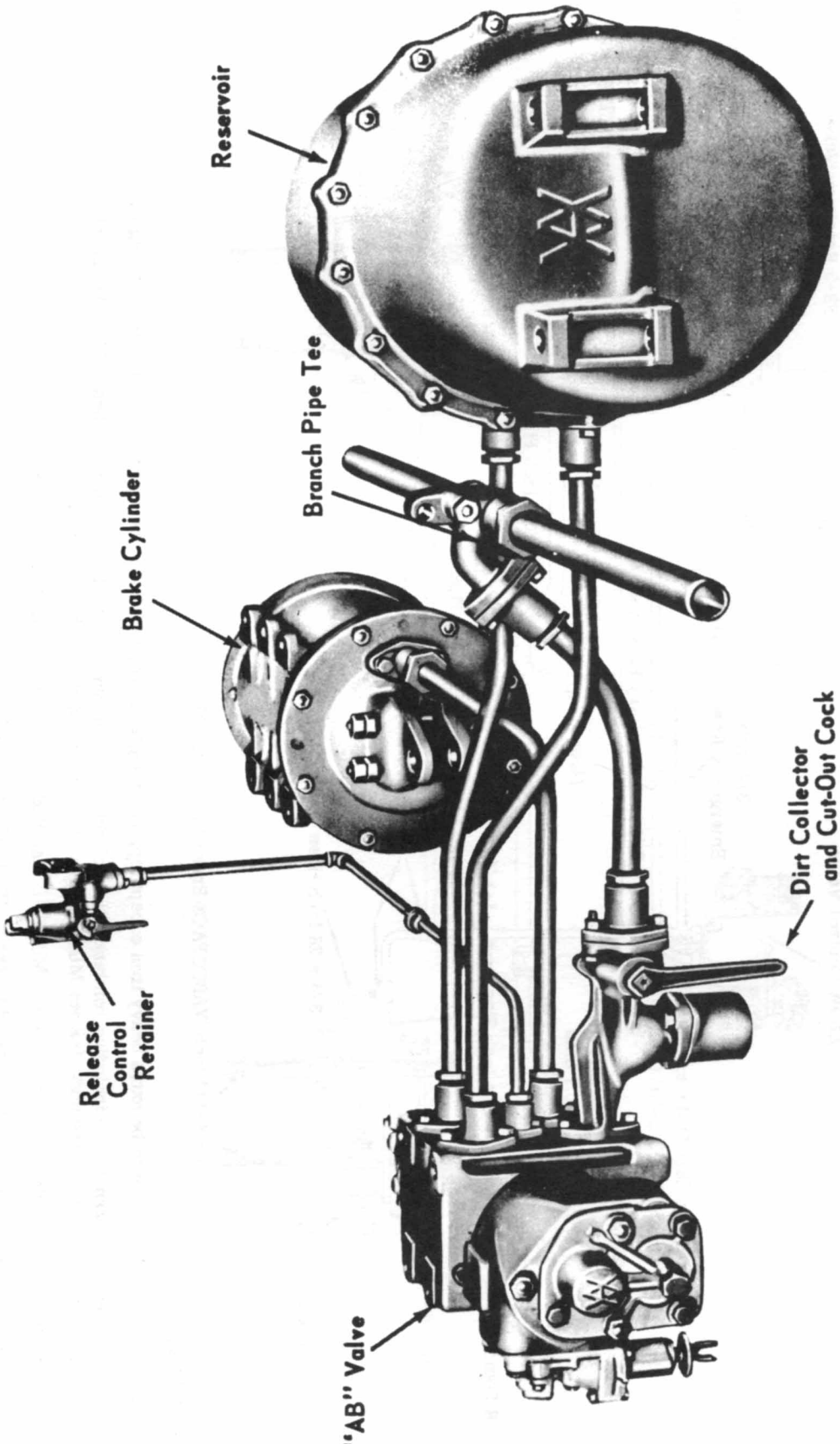
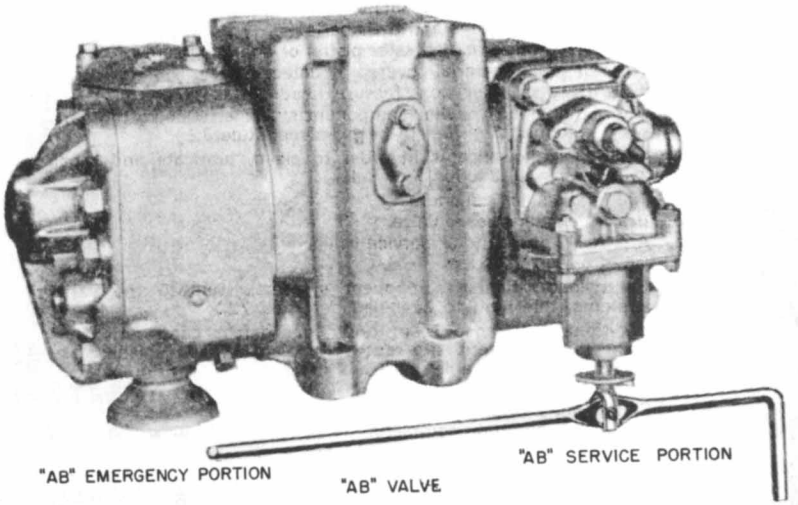


FIGURE 4 AB FREIGHT BRAKE EQUIPMENT

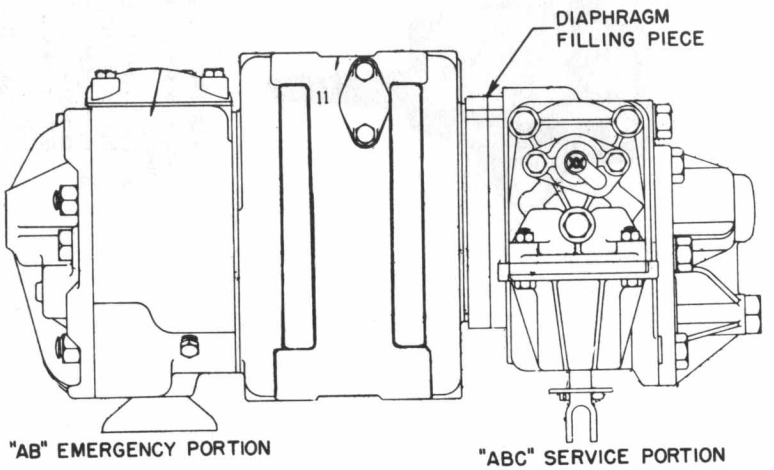
RULE 2

FIGURE - 1



MAX. C.O.T.S. PERIOD — 48 MONTHS

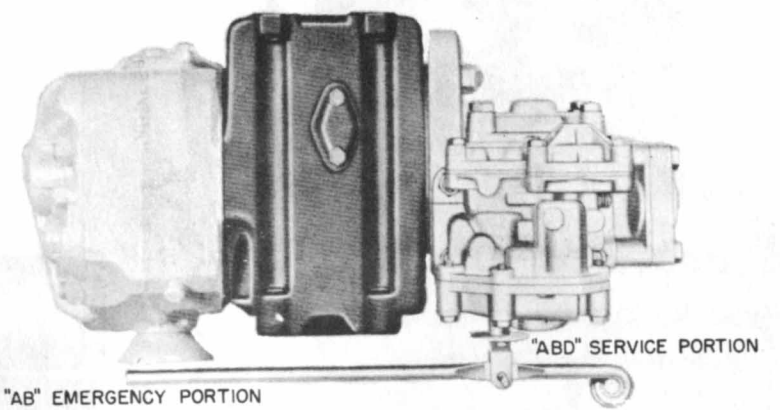
FIGURE - 2



MAX. C.O.T.S. PERIOD — 48 MONTHS

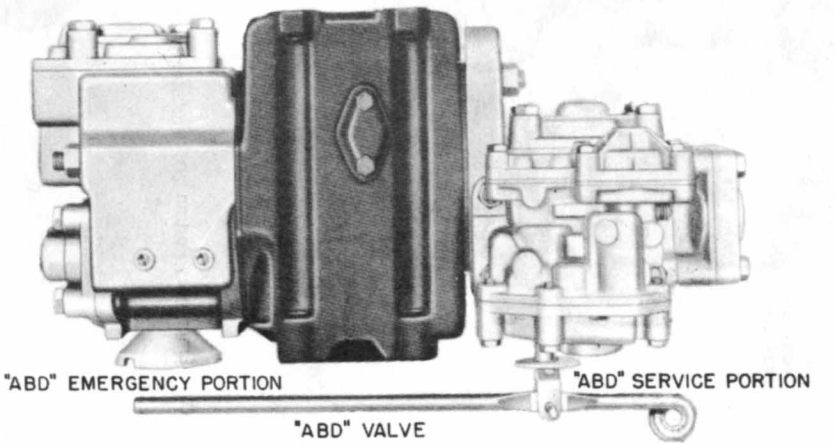
RULE 2

FIGURE - 3

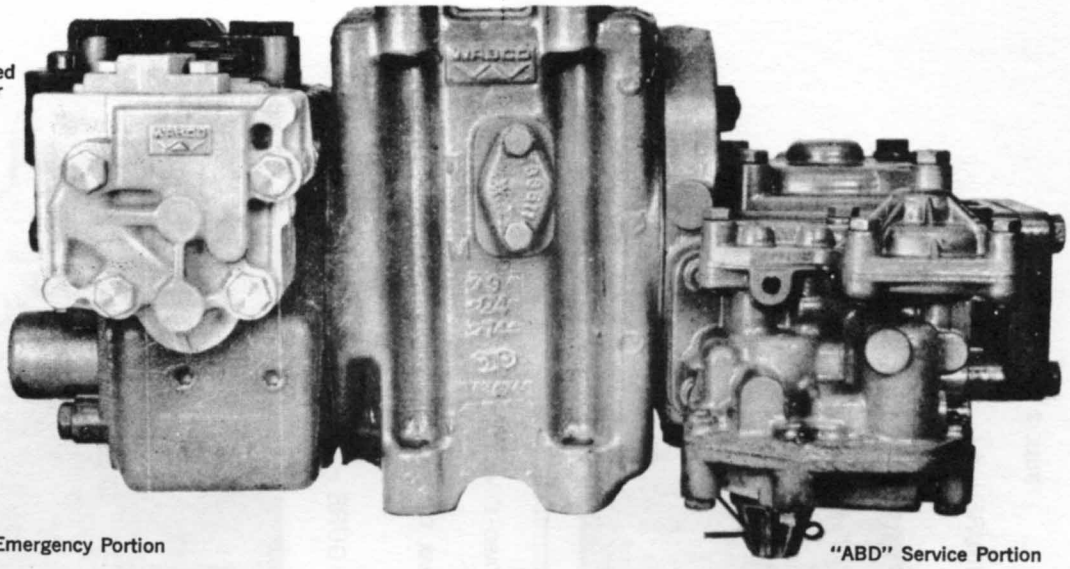


MAX. C.O.T.S. PERIOD — 48 MONTHS

FIGURE - 4



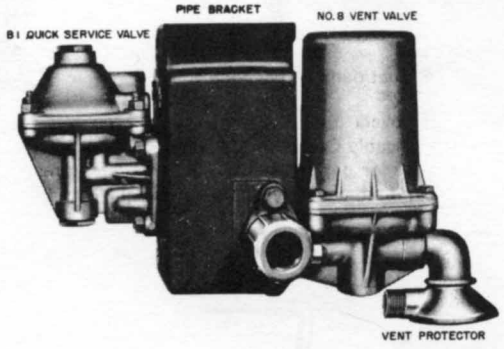
MAX. C.O.T.S. PERIOD — 120 MONTHS



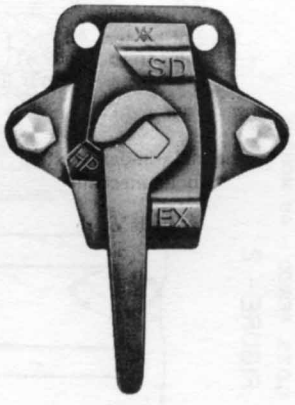
ABDW VALVE

Max. C.O.T.&S. Period — 144 Months

20. For identification purposes shown below is a A-1 Reduction Relay valve.



A1 REDUCTION RELAY VALVE



AAR 1967 Three Position

Handle positions are as follows:

a. EX — (Direct Exhaust) — handle pointing downward.
b. HP — (High Pressure Retained) — handle 45° to 60° clockwise from EX position.
c. SD—(Slow Direct Exhaust) — handle 135° to 150° clockwise from EX position.

Four Position

Handle positions are as follows:

a. EX (Direct Exhaust) — handle pointing downward.
b. HP (High Pressure Retained) — handle 45° clockwise from EX position
c. LP (Low Pressure Retained) — handle 90° clockwise from EX position
d. SD (Slow Direct Exhaust) — handle 180° clockwise from EX position

The three position spring type retainer converted to four position, can be identified by two high cap nuts having a groove cast across the top.

The obsolete type of retainer valve can be identified by two short cap nuts having the numerals 8, 10 or 8-10 cast across the top.

INITIAL TERMINAL TRAIN AIR BRAKE TESTS

11. Train Test Requirements

All trains must be given inspection and test as specified by Instructions 11a through 11d at points where:

a) Train is originally made up or classified (INITIAL TERMINAL).
b) Train consist is changed other than by adding or removing a solid block of cars and train brake system remains charged.
c) Train is received in interchange.

11-a. Charging and Inspection

An examination of the train brake system must be made and it must be known that:

1) Train air brake system is charged to required air pressure.
2) All air hose are coupled and in suitable condition for service.
3) Angle cocks, cut-out cocks and handles of retaining valves are properly positioned.
4) Reservoir drain cocks are closed.
5) Necessary repairs are made to reduce leakage to a minimum.
6) Brake rigging does not bind or foul.
7) All parts of brake equipment are properly secured.
8) Retaining valves and retaining valve pipes are in condition for service.
9) Hand brakes are released unless required by grade.
10) If electro-pneumatic operation, brake circuit cables are properly connected.

11-b. Train Brake Test

1) After the air brake system on a freight train is charged to within 15 pounds of the setting of the feed valve on the locomotive (not less than 60 pounds with 70 pound feed valve setting) as indicated by an accurate gauge at rear end of train, and on a passenger train when charged to not less than 90 pounds, and upon receiving the signal to apply brakes for test, a 15 pound brake pipe service reduction must be made in automatic brake operation, the brake valve lapped, wait an additional 30 seconds for brake pipe pressure to settle throughout the train after brake pipe exhaust at brake valve has stopped, and the number of pounds of brake pipe leakage per minute noted as indicated by brake pipe gauge, after which brake pipe reduction must be increased to full service. Brake pipe leakage must not exceed 5 pounds per minute.

Inspection of train brakes must be made to determine that angle cocks are properly positioned, that the brakes are applied on each car and locomotive unit, that piston travel is correct, that brake rigging does not bind or foul, and that all parts of brake equipment are properly secured. When this inspection has been completed, release signal must be given and brakes released, and each brake inspected to see that all properly released.

When the locomotive used to haul the train is provided with means for maintaining brake pipe pressure at a constant level during service application of the train brakes, this feature must be cut out during train air brake tests.

Continued: Page 1 of 2

INITIAL TERMINAL TRAIN AIR BRAKE TESTS

Continued: Page 2 of 2

With 26L brake equipment the test will be made as follows:

With the system properly charged as specified above and the brake valve cut-off valve in "IN" position, make a 15 pound brake pipe service reduction. As soon as the brake valve exhaust has stopped completely depress and move the brake valve cut-off valve to "OUT" position. Wait 30 seconds for brake pipe pressure to settle througout the train then note the number of pounds of brake pipe leakage as indicated by brake pipe gauge. Further reduce equalizing reservoir pressure to obtain full service brake pipe reduction, then move the brake valve cut-off valve to "IN" position. This may require the handle to be moved to "Handle OFF" position until required reduction is obtained then return handle to "Suppression" position. After brake vlave exhaust has stopped the brake valve cut-off valve must be moved to "OUT" position and remain in this position until signal to release brakes has been received.

11-c. Piston Travel

1) At initial terminal, piston travel of body mounted brake cylinders on freight and passenger cars which is less than 7 inches or more than 9 inches must be adjusted to nominally 7 inches.

2) Piston travel of brake cylinders on freight cars equipped with other than standard single capacity brakes, must be adjusted as indicated on badge plate or stencilling located in a conspicuous place on car near brake cylinder.

3) Minimum brake cylinder piston travel, or equivalent, of truck mounted brake cylinders must be sufficient to provide proper brake shoe clearance when brakes are released. Maximum piston travel must not exceed 6 inches.

Before adjusting piston travel or working on brake rigging, cut-out cock in brake pipe branch pipe must be closed and air reservoirs drained unless car is equipped with brake cylinder cut-out cock, in which case the latter only need be closed.

11-d. Tests from Yard Plant

1) When train air brake system is tested from a yard test plant, an engineer's brake valve or standard test device must be used and be connected to end which will be nearest to the hauling road locomotive. This device must provide increase and reduction of brake pipe air pressure at the same or a slower rate as with engineer's brake valve.

2) When a yard test plant is used, the train air brake system must be charged and tested in accordance with Instructions 11a through 11c and, when practicable, should be kept charged until road motive power is coupled to train.

3) When a train has been given complete test and inspection for an initial terminal and has been kept charged until the road motive power is coupled, an automatic application and release test of air brakes on rear car must be made before proceeding.

4) When a train has not been kept charged after initial terminal air brake test, the brakes must again be tested in accordance with Instructions 11a through 11c.

Air brakes tests on run-through and unit run-through trains.

(a) For the purposes of this section -

(1) "Run-through train" means a train which passes from one carrier to another carrier with no change in consist (including locomotive) other than the addition or removal of a block of one or more cars; and

(2) "Unit run-through train" means a run-through train operated by more than one carrier on a continuous round-trip cycle and consisting of assigned equipment.

(b) The carriers involved shall jointly notify the Federal Railroad Administrator in writing of run-through trains and unit run-through trains operating over their tracks. The notice must identify points of interchange and all other points where equipment and air brake inspections are made.

(c) Each run-through train shall be inspected and tested as prescribed by 232.12(c)-(j) -

(1) Where the train is originally made up (initial terminal);

(2) Where train consist is changed other than by adding or removing a solid block of cars and train brake system remains charged; and

(3) At intermediate inspection points not more than 500 miles apart, subject to the requirements of paragraph (f) of this section.

(d) Each unit run-through train shall be inspected and tested as prescribed by 232.12(c)-(j) -

(1) Where the train is originally made up and where it is reassembled after being broken up;

(2) Once during each round-trip cycle of less than 500 miles at an inspection point designated in writing by the carriers involved; and

(3) At intermediate inspection points not more than 500 miles apart, subject to the requirements of paragraph (f) of this section.

(e) Each carrier that adds a block of one or more cars to a run-through train or unit run-through train after the train is originally made up, shall inspect and test the block as follows:

(1) In accordance with 232.12(c)-(j) at the point where the block is added; or

(2) In accordance with 232.13(d)(1) at the point where the block is added, and 232.12(c)-(j) at the next point on its line where the inspections and tests can be performed, but not beyond a designated 500-mile inspection point.

(f) For the purpose of the intermediate inspections and tests required by paragraphs (c)(3) and (d)(3) of this section -

60

(1) Piston travel of a body-mounted 10-inch brake must not exceed 10 inches; and

(2) Piston travel on all other brakes -

(i) Must not exceed the nominal travel specified by more than 2 inches; and

(ii) Must not exceed the maximum travel specified by the badge plate or stencil on the car.

(g) The inspections and tests made under 232.12(c)-(j) as required by this section shall be performed by qualified carrier personnel at locations where adequate repair facilities are available to maintain power brake systems in effective operating condition in conformity with this part. Defective cars shall be repaired or removed from service at the point of inspection and testing.

(h) Each carrier shall record the inspections and tests made under 232.12(c)-(j) as required by this section at the time they are performed by completing Form FRA F-6180-48 in duplicate. This form shall be signed by the supervisor or other carrier employee responsible for the inspections and tests. One copy of the form shall be kept in the cab of the locomotive until the train arrives at its final terminal, and one copy shall be retained for 3 months at the terminal where the inspections and tests are made.

(i) At locations where the crew of one carrier takes over control and operation of a run-through train or unit run-through train from the crew of another carrier, the receiving carrier shall inspect and test the train to determine that -

(1) The cab of the locomotive contains a Form FRA F-6180-48 completed as required by paragraph (h) of this section;

(2) Brake pipe leakage does not exceed 5 pounds per minutes; and

(3) Brakes apply and release on the rear car from a 20-pound service brake pipe pressure reduction.

If the cab of the locomotive does not contain a completed Form FRA F-6180-48, the train must be inspected and tested as prescribed by 232.12(c)-(j) before it proceeds.

At designated inspection and maintenance terminals, where qualified personnel are on duty for the primary purpose of inspecting freight cars, each car placed in train, or those cars not having received such inspection at point where originally placed in train outside this terminal, shall receive safety inspection in accordance with the following. If any of the listed defects are found, the cars shall not be continued in service except they may be moved for repair:

A.

1. A freight car with any defect that makes it unsafe for movement shall be corrected or set out of train.
2. No part of the freight car, nor anything attached to the car, may be hanging low enough to foul a road crossing or track structure and must have a minimum clearance of 2-1/2" above top of rail.
3. Open top loads, including trailers and containers on flat cars, must be safely loaded.
4. Where width or height appears close to clearance lines, it must be known that the movement has been cleared with the proper authority.
5. Freight cars carrying bad order tags, that are safe for movement, may be taken in train to the point where repairs can be made.

B. Wheels.

1. Thin Flange: Flange 15/16" or less in thickness.
2. Vertical Flange: Flange having vertical surface extending 1" or more from tread.
3. High Flange: Flange 1-1/2" or more high above the approximate center-line of tread.
4. Thin Rim: Rim 3/4" or less in thickness.
5. Broken: Broken or cracked rim, flange, plate or hub, except fine superficial lines or checks on the surface of the wheel tread.
6. Shelled-Tread: Tread having pieces of metal broken out of the surface more or less continuously around the rim of wheel.
7. Slid Flat: Flat spot more than 2-1/2" in length or two adjoinint spots each more than 2" in length.
8. Loose Wheel: Evidence of movement on wheel seat or oil seepage on the back-plate from inside of wheel fit.
9. Overheated Wheel: Wheel which has been overheated as evidenced by reddish brown discoloration from heat on front and back face of rim and plate extending into the plate 1/2 of the distance from the tread surface to the axle with decreasing intensity.

C. Other Truck Components.

1. Side frame or bolster broken, or cracked to the extent it has lost structural integrity.

2. (a) Side bearings or roller missing or broken.

   (b) Side bearings at one end of car on both sides are in contact with body bolster except by design.

3. Spring plank broken or missing except by design.

4. Spring assembly solid or snubber broken or missing.

D. Couplers and Draft Arrangements.

1. Couplers: Coupler height varying more than 4" on adjacent coupled cars or coupler shank or knuckle broken, cracked or worn to the extent it has lost structural integrity. Uncoupling lever or lock lifter inoperative or bent so as to interfere with other parts on curves and result in unintentional uncoupling, as indicated by visual inspection.

2. (a) Broken or missing draft gear or yoke.

   (b) Draft gear carrier broken, missing, cracked or worn to the extent that it has lost structural integrity.

   (c) Cross Key retainer missing or broken cross key.

3. A cushioning device broken, inoperative or missing a part may be set out of train but must not be moved for repair until a qualified person determines under what conditions it is safe to move for repair.

E. Car Body.

1. Car Sides and Ends: Spread beyond published line clearances or defective to the extent of failing to secure, restrain or contain the load, unless car has been cleared for movement to unloading or load transfer point.

2. Underframe: Centersill broken or cracked to the extent it has lost structural integrity.

F. In the revised Railroad Freight Car Safety Standards 49 CFR 219- effective March 1, 1980:

THERE IS NO LONGER A REQUIREMENT TO PERIODICALLY REPACK JOURNAL BOXES OR LUBRICATE ROLLER BEARINGS.

Note: The new Freight Car Safety Standard will be published in a revised Conrail MP 28 for distribution to Field Personnel.

G. General.

1. Safety appliance and air brake equipment must comply with Federal requirements.

INSTRUCTIONS FOR SAFETY INSPECTION - TRAIN CREWS

Each car placed in train, where personnel are not on duty for the primary purpose of inspecting freight cars, may be moved after receiving safety inspection in accordance with the following standards:

1. A freight car with any defect that makes it unsafe for movement shall be corrected or set out of train.

2. No part of the freight car, nor anything attached to the car, may be hanging low enough to foul a road crossing or track structure.

3. Open top loads, including trailers and containers on flat cars, must be safely loaded.

4. Where width or height appears close to clearance lines, it must be known that the movement has been cleared with the proper authority.

5. Freight cars carrying bad order tags, that are safe for movement, may be taken in train to the point where repairs are to be made.

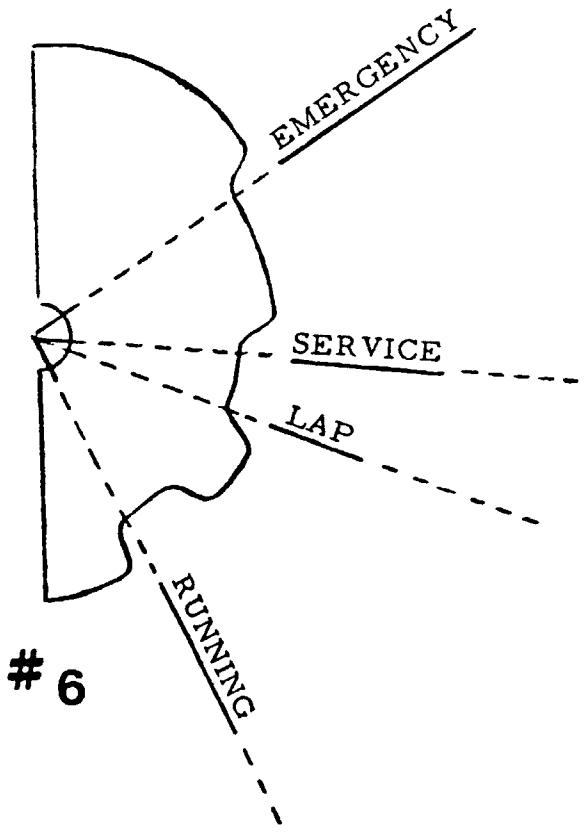
FUNDAMENTALS AFFECTING TRAIN OPERATION

Some of the fundamental factors effecting train pressure brake operations are:

1. leakage
2. pressure level
3. time
4. gradient
5. train length

Regular 50 or 70 ton cars have at least 55 separate sealing surfaces which are potential sources of leakage.
Special cars with additional brake control devices can have twice this number.
Single car tests performed over a period of years conclude 32 percent of all cars have failed this test.
The largest individual items contributing to these conditions is the angle cock and the branch pipe cut out cock.
Improvements have been made to correct this condition.
Remaining sources of leakage that failed the single car test were spread over many items without any significant patterns.
These conditions affect the brake pipe gradient in trains.
Since the leakage in the brake pipe must not exceed 5 PSI/min. it is apparent that all minor leaks must be corrected.
It is evident that weather conditions effect sealing surfaces of individual cars. This could cause a considerable increase in both leakage and gradient.
The proper use of head end and rear end gauges and correcting minor leaks will improve leakage and train gradient.

AUTOMATIC BRAKE VALVE HANDLE POSITIONS



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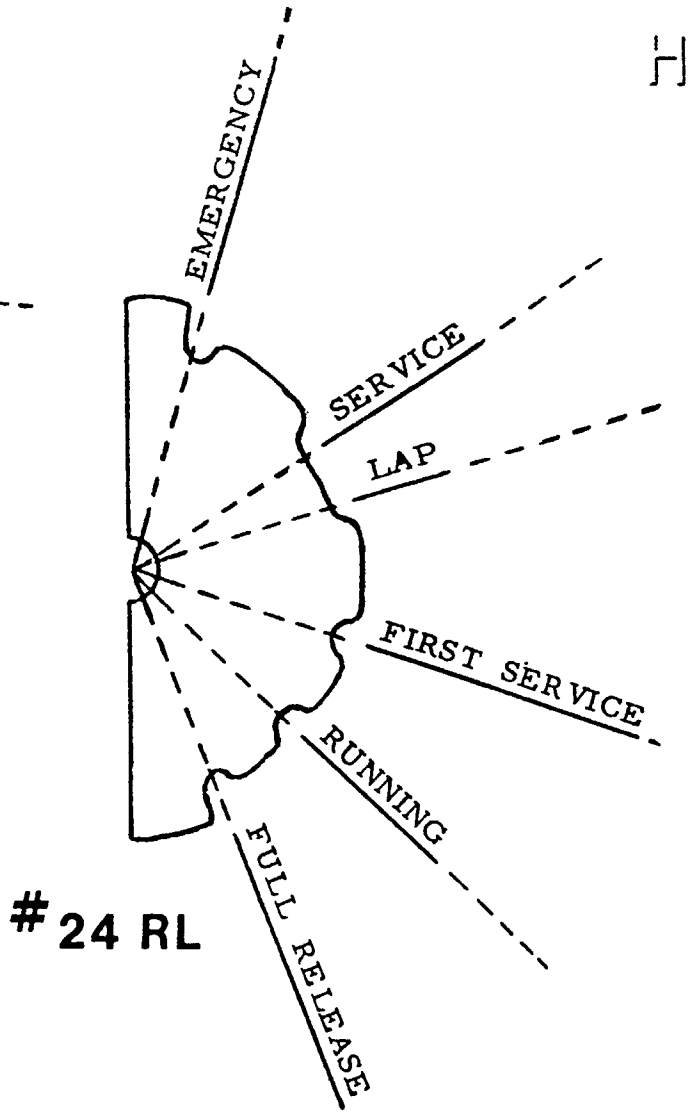

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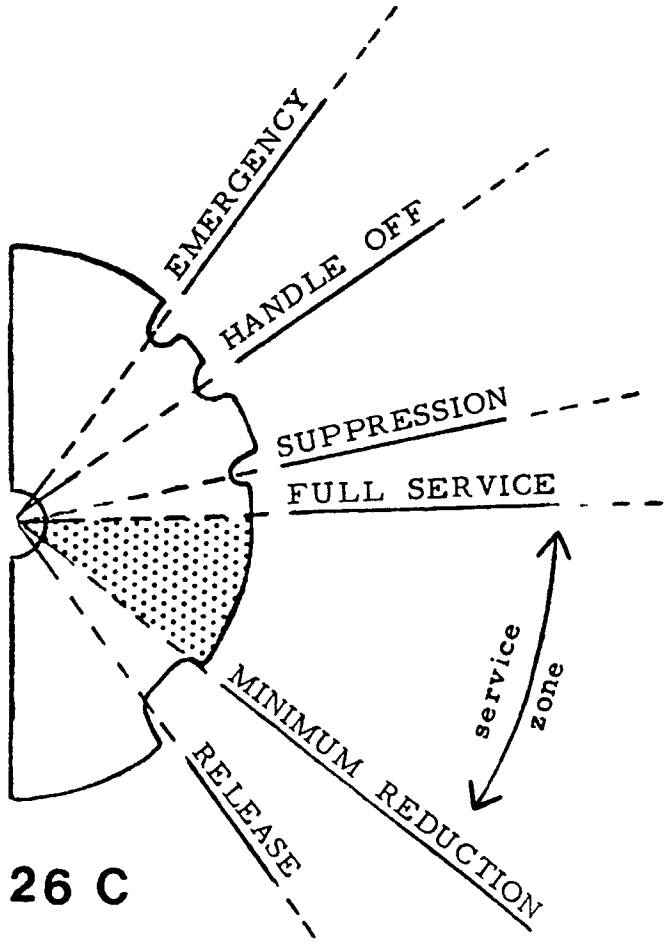

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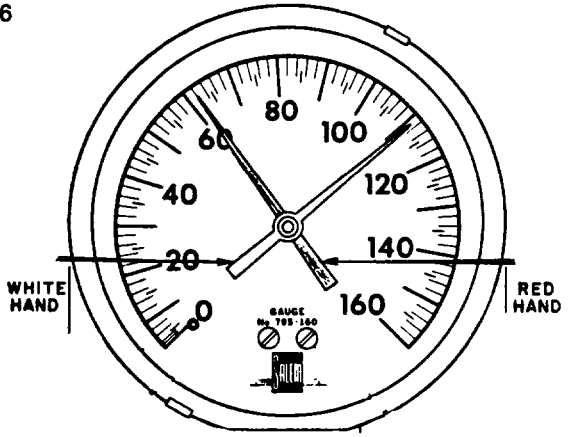
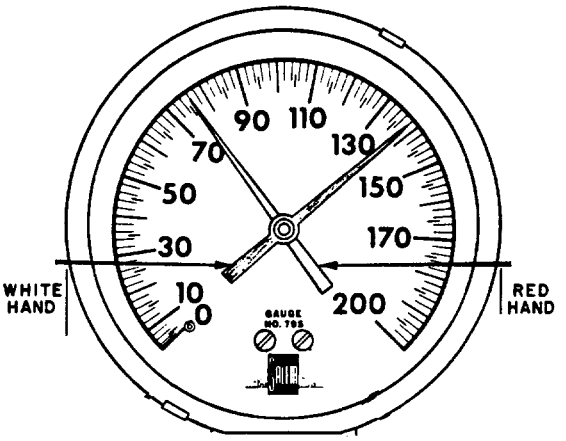


RED - MAIN RESERVOIR
WHITE - EQUALIZING RESERVOIR



RED - BRAKE CYLINDER
WHITE - BRAKE PIPE

NOTE:- EQUALIZING RESERVOIR GAUGE SHOULD BE WITHIN 3 PSI OF BRAKE PIPE PRESSURE GAUGE. MAXIMUM ALLOWABLE GRADIENT WITH 80 PSI ON LOCOMOTIVE BRAKE PIPE READING IS 65 PSI ON CABOOSE OR REAR END GAUGE.

DURING THE INITIAL CHARGING OF A TRAIN, MAIN RESERVOIR PRESSURE MAY DROP CONSIDERABLY. IF IT DROPS BELOW 120 LBS., THE OUTPUT OF THE AIR COMPRESSOR ON A DIESEL LOCOMOTIVE MAY BE INCREASED BY INCREASING DIESEL ENGINE SPEED. THE REVERSE HANDLE MUST BE PLACED IN "NEUTRAL" AND THE GENERATOR FIELD SWITCH IN "OFF" BEFORE OPENING THE THROTTLE. THE THROTTLE SHOULD NOT BE ADVANCED BEYOND RUN 5 POSITION, NOR HELD IN ANY POSITION THAT WILL CAUSE THE UNITS TO VIBRATE. WHEN THE MAIN RESERVOIR GAUGE INDICATES NORMAL CYCLING, THE THROTTLE SHOULD BE RETURNED TO "IDLE" FOR THE REMAINDER OF THE CHARGING TIME. IT IS NOT NECESSARY TO PLACE THROTTLE IN RUN 5 AS LONG AS MR PRESSURE DOES NOT DROP BELOW 120 PSI.

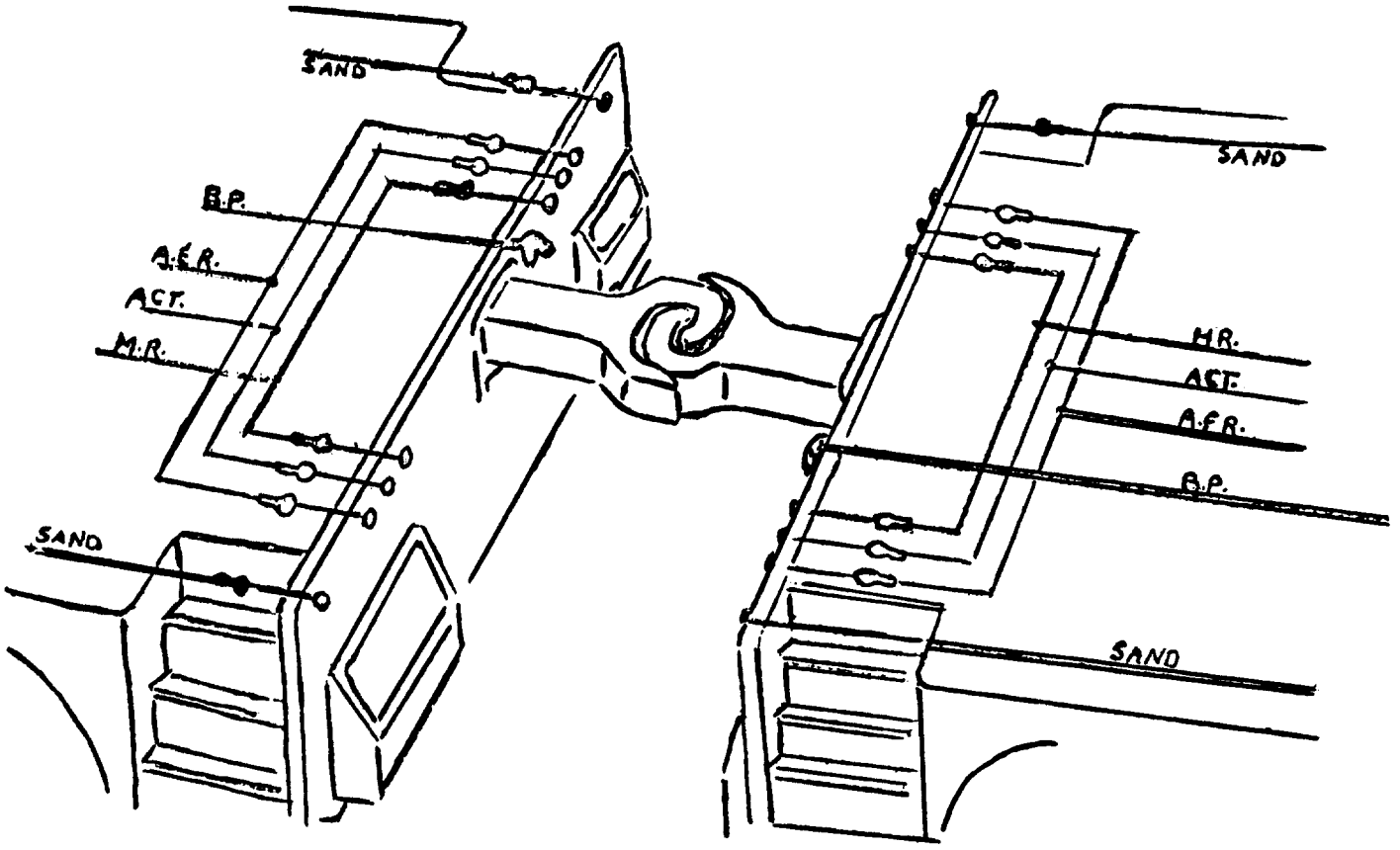
CONDITION

LOW MAIN RESERVOIR PRESSURE (115 PSI) ON CONTROLLING UNIT OF MULTIPLE UNIT CONSIST. MAIN RESERVOIR PRESSURES ARE NORMALLY (125-140 PSI) ON TRAILING UNITS.

CAUSE

MAIN RESERVOIR EQUALIZING LINE OBSTRUCTED BY FREEZING OR MU CORK CLOSED BETWEEN LEAD AND SECOND UNIT.

MU PIPING - TRAIN LINE AIR CONNECTIONS



(1) THREE (3) LINES ARE DUPLICATED OR MIRRORED ON EACH SIDE OF THE COUPLER. IT IS NECESSARY TO COUPLE ONLY ONE OF EACH BETWEEN UNITS. THESE LINES, FROM THE COUPLER OUTWARD ARE:

1. MAIN RESERVOIR EQUALIZING
2. ACTUATING
3. APPLICATION & RELEASE - SOMETIMES LABELED BRAKE CYLINDER EQUALIZING.

THE BRAKE PIPE HOSES ARE COUPLED UNDER THE COUPLER. CARE MUST BE TAKEN NOT TO CRISS-CROSS HOSE CONNECTIONS.

INSPECTOR'S REPORT ON CONDITION OF AIR BRAKES PRINTED IN USA MU
MP 261-C R4 4-76 **CONSOLIDATED RAIL CORPORATION**

Train No.	**Locomotive No.**	**No. of Cars in Train**
Initial Terminal Test per Instruction 11-a through 11-d of EC-99 Made at		**Track**
Brake Pipe Pressure Used for Air Test	**Brake Pipe Leakage Lbs. per Minute**	**No. of Cars with Operative Brakes**
No. of Retainers Set Up in Slow Direct Exhaust Position		

SIGNATURE OF EMPLOYEE - OCCUPATION

ENGINEMAN	LOCOMOTIVE NO.	FEED VALVE SETTING	NO. CARS IN TRAIN	BRAKE PIPE LEAKAGE COMPLETE TRAIN	CONDITION OF BRAKES

WHEN SECTIONS OF A TRAIN ARE TESTED FROM A YARD PLANT ON SEVERAL TRACKS, A FORM MUST BE FILLED OUT FOR EACH SECTION.

PENN CENTRAL TRANSPORTATION COMPANY

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

AIR BRAKE INSPECTION and TEST CERTIFICATE

PRTD IN U.S.A. MU **MP-262 REISSUED 6-72**

OMB Approval No 04-R-4030

This certificate is required by the Federal Railroad Administration for each train brake test and inspection given run-through and unit run-through trains under 49 CFR 232.19 and does not relieve the carrier from full compliance with the provisions of 49 CFR 232.12 and 13 where appropriate. It must be prepared in duplicate and signed by the supervisor when available, or other employee responsible for the train brake test and may be prepared from information supplied by employees who made the test. One copy to be retained for three months at the terminal where the inspection and test was made and one copy to be retained in cab of locomotive of run-through train until train arrives at final terminal.

CARRIER	LOCATION	DATE
TRAIN NO.	NO. OF CARS	LOCOMOTIVE NO.
CABOOSE NO.	TRAIN MADE COMPLETE	TRAIN BRAKES APPLIED

CERTIFICATE COMPLETED *(date and time)* CERTIFYING EMPLOYEE *(signature and title)*

I certify the train brake system of this train received the prescribed test and inspection required by the Power Brake Law (check one)

( ) Initial Terminal Train Brake Test and Inspection
( ) 500-Mile Test and Inspection
( ) Test and inspection of any block of one or more cars added to the train

The test and inspection included each of the following items:

___ 1. All air brake hoses are properly coupled and are in condition for service
___ 2. All angle cock handles are properly positioned for service
___ 3. The air brakes on each car are cut in and operative
___ 4. Brake rigging does not bind or foul and all parts of brake equipment are properly secured
___ 5. Piston travel is within prescribed limits
___ 6. Brake pipe leakage does not exceed five pounds per minute
___ 7. Air brakes on each car applied from a 20-pound service brake pipe reduction
___ 8. All defective cars were repaired or set out

THIS IS AN OFFICIAL FORM: False execution may subject the offender to criminal prosecution under Title 18, Section 1001, U.S. Code

FORM FRA F 6180-48 (6-72)

Inclement weather car limits

The following car limits will be observed in dispatching freight trains at sub-freezing temperatures:

Temperatures				Car Limit
Between	20	and	30 Degrees	125
Between	10	and	20 Degrees	100
Between	0	and	10 Degrees	85
Between	0	and	-10 Degrees	70
Between	-10	and	-20 Degrees	60
Between	-20	and	-30 Degrees	50

PRINTED IN U.S.A.

AD 1928-R5 1-74

PENN CENTRAL TRANS. CO.

C D	LOCATION	R S	DATE REPAIRED	CAR INITIAL	CAR NUMBER	E/L	ORIGINAL RECORD OF REPAIRS - EMERGENCY ENROUTE			KIND OF CAR
6	-601-9	3	- -							
	REG CENTER GF		MO DY YR				TRAIN	M.P.	LOCATION	

RULE	ITEM OF REPAIR	LOCATION	QTY	COND	WHY MADE	MOD 1	RESP
(12)	01 BRAKE SHOE AAR CAST IRON		01 02	1 NEW 2 SH	01 WORN OUT 02 BROKEN 03 MISSING		①
(04)	40 ANGLE COCK SEAL OR BALL TYPE W/U BOLT		01 02	1 NEW 3 REC	03 MISSING 02 BROKEN 15 LEAKING		② ①
(05)	01 AIR HOSE		01 02	1 NEW 2 SH	03 MISSING 04 DEFECTIVE		② ①
(16)	05 KNUCKLE PIN	A B	01 02	1 NEW 2 SH	01 WORN OUT 02 BROKEN 03 MISSING		①
(16)	18 KNUCKLE	A B	01 02	1 NEW 2 SH	01 WORN OUT 02 BROKEN 03 MISSING	01 E TYPE 02 F TYPE	①

SHOW CORRECT INITIAL & NUMBER

REPORT ALL REPAIRS

SHOW KIND OF CAR

KIND OF EQUIPMENT CODE

B BOX	G GONDOLA
R RFGR.	H HOPPER
S STUCK	L COV. HOPPER
T TANK	F FLAT

SIGNATURE

SEE BACK FOR INSTRUCTIONS

FIVE EASY STEPS FOR REPORTING

1. REPORT ALL REPAIRS TO EVERY CAR SEPARATELY.
2. FILL OUT TOP "HEADING" LINE:
   - A) MARK REGION
   - B) MARK DATE REPAIRED.
   - C) MARK CAR INITIAL (FROM LEFT) & CAR NUMBER (FROM RIGHT).
   - D) MARK EMPTY OR LOADED (E - EMPTY, L - LOADED).
   - E) WRITE TRAIN - MILE POST - LOCATION & STATE.
3. CIRCLE CODING - ONE OF EACH SELECTION.
   - A) QTY. (QUANTITY) - (01 - ONE, 02 - TWO).
   - B) CONDITION - (1 - NEW OR RENEWED, 2 - SECONDHAND).
   - C) ALL ITEMS REPAIRED (IF KNUCKLE CIRCLE TYPE).
   - D) CLOSEST REASON WHY MADE.
4. SIGN YOUR NAME.
5. TURN IN WITH SERVICE TIME REPORT TO DESIGNATED REPRESENTATIVE.

REG.	CENTER	DESCRIPTION
C	601	P&LE R. R.
E	601	CANTON R. R.
F	601	PAE R. R.
L	601	LONG ISLAND R. R.
M	601	PRSL R. R.
Z	601	P. C. R. R. (ALL REGIONS)

INSTRUCTION A

For Servo and General Electric Hot Box Detector

The Operator must examine the tape as soon as the train has passed over the detector. When tape indicates the limits listed below, the train must be stopped and crew will examine the bearings involved to determine if car or engine must be set off.

SOLID BEARINGS

(a) When difference of two bearings on any axle equals or exceeds six (6) MM.

(b) When the reading for any bearing equals or exceeds ten (10) MM.

ROLLER BEARING PASSENGER CARS, FREIGHT CARS AND ALL ROAD ENGINES

(a) When difference of two bearings on any axle equals or exceeds eleven (11) MM.

(b) When the reading for any bearing equals or exceeds fourteen (14) MM.

NOTES:

1. A normal solid bearing will have a one millimeter deflection.
2. All PC passenger and road freight diesel engines have roller bearings.
3. When all bearings on a car or engine show a reading of 3 millimeters or more, you will be governed by roller bearing instructions.

INFORMATION AND INSTRUCTIONS CONCERNING HOT BOX DETECTORS

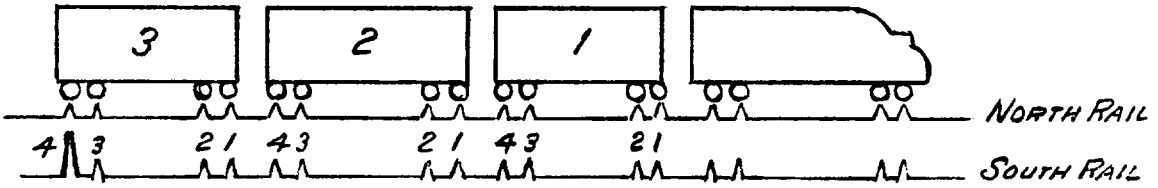
Electronic trackside devices are installed at various locations to detect heat given off by passing journals and report this heat to an observer by tracing a series of marks or pips on a tape. Journals that are running hot will be larger than its neighbors and steps can be taken to stop the train for inspection.

The tape will show a series of pips, one produced by each journal box. There are two such rows of pips, one for each rail; the following sketch shows the relation between groups of pips and wheels of car. Each cluster of four pips represents the rear truck of one car and the front truck of the next car. The longer space between clusters represents a car body.

The location of a hot box is determined by counting these spaces.

The chart is ruled with lines one millimeter apart, and the height must be determined in millimeters, also the height of the pip of the journal on the opposite end of the same axle is also determined.

The height of the normal pip is then subtracted from the suspected pip and if this difference exceeds a predetermined amount, the car is considered as having a defective journal.



The hot journal is third car, No. 4 journal, south side.

On roller bearing equipped cars and engines heat generated is radiated easier than friction bearing and the pips are higher; this can be detected because all eight journals will be high.

All tapes must be examined when the train has passed over the detector.

Only when tape indicates the following limits will the train be stopped and crew will examine the bearings involved to determine if car or locomotive must be set off. A normal solid bearing car will have a one millimeter pip or one line deflection. A roller bearing car or locomotive will be determined when all bearings show a reading of 3 millimeters or more. This is your guide line to determine friction or roller bearing journals.

Solid Bearing

(a) When difference of two bearings on any axle equals or exceeds SIX (6) millimeters.

(b) When the reading for any bearing equals or exceeds TEN (10) millimeters.

ROLLER BEARING PASSENGER CARS AND ALL ROAD LOCOMOTIVES

(a) When difference of the two bearings in any axle equals or exceeds eleven (11) millimeters.
(b) When the reading for any bearing equals or exceeds fourteen (14) millimeters.

Freight Car Roller Bearings

(a) When difference of two bearings on any axle equals or exceeds fifteen (15) millimeters.
(b) When the reading for any bearing equals or exceeds eighteen (18) millimeters.

When the difference is two less than the above limits, the next block station in advance must be advised, and observed by the Block Operator for evidence of overheating; the Train Dispatcher will also be advised and will arrange to notify the next location where the train would normally be inspected.

RECOMMENDED PROCEDURES FOR MAKING PERIODIC INSPECTION

1. Shops selected to perform FRA Periodic Inspections must be equipped with all necessary tools, gages, and all technical manuals as required for performance of the work as outlined in the FRA Freight Car Safety Standards, Part 215.

2. If a preliminary inspection reveals defects which are beyond the capability of the inspecting shop to repair, then arrangements must be made to safely move the car to home shop. Disposition must be obtained from owner and car moved as per Circular No. OT-49.

3. Persons designated by the railroad to perform FRA periodic inspection must have the knowledge and ability to inspect railroad freight cars for compliance with the requirements of Part 215.

4. The procedure shown below should be followed when making periodic inspections:

   a. Check for prohibited or restricted couplers.

   b. Inspect and gage couplers for defects. Type E/F couplers in Grade C steel manufactured before March 1970 (date stamped on underside) must be removed for a close inspection of the shank and butt area. Remove Type E coupler of Grade B steel (E60, BE60 and E61) and renew per Correct Repair Chart Section B, Rule 16).

   c. Inspect the uncoupling mechanism for defects and operate to assure that the mechanism and knuckle function properly.

   d. Inspect side bearings for defects at all locations.

   e. Inspect car body for defects. This includes minimum height above the rail, coupler carriers, center sills, body bolsters, body bolster center plates, center pins, cross bearers, and side sills. Check for prohibited and restricted items.

   f. Inspect draft gear support plate and fasteners, inspect yoke, draft gear, follower plate, draft lugs, fasteners, draft key, key retainer and retainer lock for defects. Excessive free slack (normally more than 1") indicates a closer inspection and/or disassembly. Check for prohibited and restricted components.

   g. Inspect cushioning devices for broken or missing parts and inability to assume neutral position.

   h. Inspect truck bolsters and side frames for defects. Check for restricted and prohibited pattern numbers and types.

   i. Inspect spring plank (if so equipped) for defects.

   j. Inspect spring assemblies for defective and/or missing springs and snubbers (includes all friction snubbers).

   k. Inspect wheels and axles for defects. Check for restricted and prohibited items.

Continued - Page 1 of 2

RECOMMENDED PROCEDURES FOR MAKING PERIODIC INSPECTION

Continued - Page 2 of 2

m. The procedure shown below should be followed on cars equipped plain journal bearings:

(1) Inspect box lid for defects and check for proper opening and closure.

(2) Inspect journal boxes for defects.

(3) Inspect journal stops (if so equipped) to see they are in place and properly secured.

(4) Inspect journal, journal bearing, wedge and seals for visible defects.

(5) Inspect lubricator pad for visible defects and lubrication for contamination.

(6) Periodic repacking (when applicable) must be performed in accordance with the FRA Railroad Freight Car Standards. Bearings repacked on a 30-month cycle must have rear seals, box lid seals and stabilized journals, (i.e., journal stops or hi-hat or flat back bearing).

n. The procedure shown below should be followed on cars equipped with journal roller bearings:

(1) Inspect for prohibited or restricted roller bearings.

(2) Check for overheated bearings.

(3) Inspect adapters for broken, cracked, warped or other distorted condition and excessive wear.

(4) Check for loose, broken or missing cap screws and improperly applied locking plate.

(5) Inspect for loose or defective seals.

(6) On integral box side frames, check to determine that stop block is properly secured.

(7) Periodic lubrication when applicable must be performed in accordance with FRA Railroad Freight Car Safety Standards.

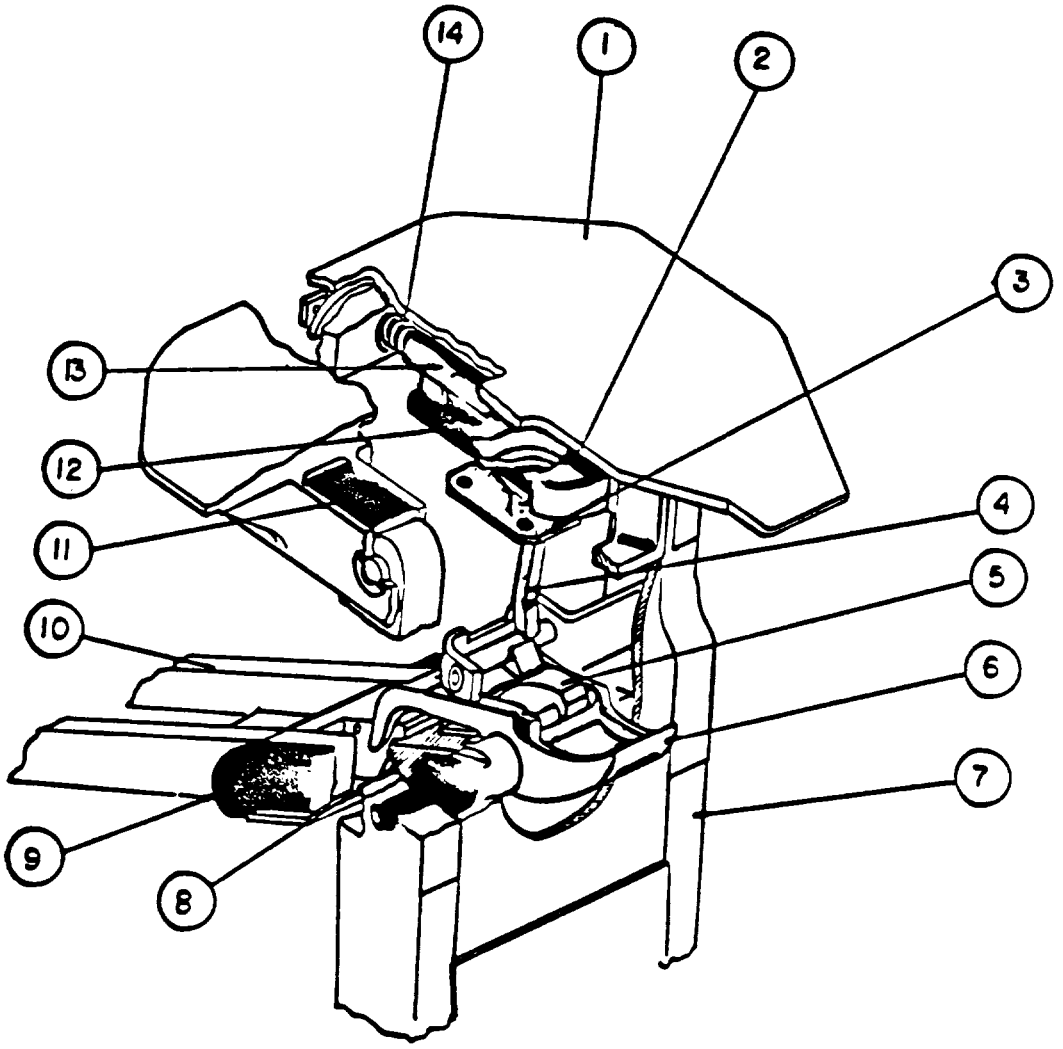
o. Stenciling

(1) Check car owner reporting marks and car number for compliance with FRA Standards.

(2) Apply consolidated stencil to comply with FRA Standards.

Pullman Standard

TRAILER HITCH OPERATING MANUAL

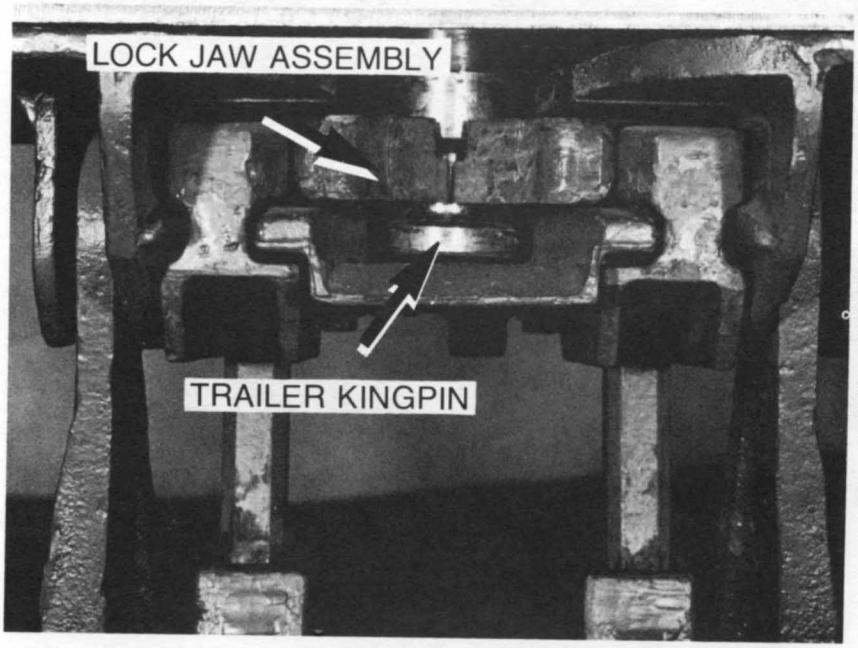


AUTOMATIC HITCH NOMENCLATURE

1. KING PIN LOCING PLATE
2. ROTOR
3. ROTOR SUPPORT PLATE
4. ACTUATOR LEVER
5. LEVER CAM
6. UNLOCKING AND KNOCKDOWN LEVER
7. VERTICAL STRUT
8. DIAGONAL LOCK PLUNGER
9. UPPER DIAGONAL STRUT
10. LOWER DIAGONAL STRUT
11. STABILIZER CUSHION
12. PLUNGER ROD
13. LOCK PLUNGER
14. LOCK PLUNGER SPRING

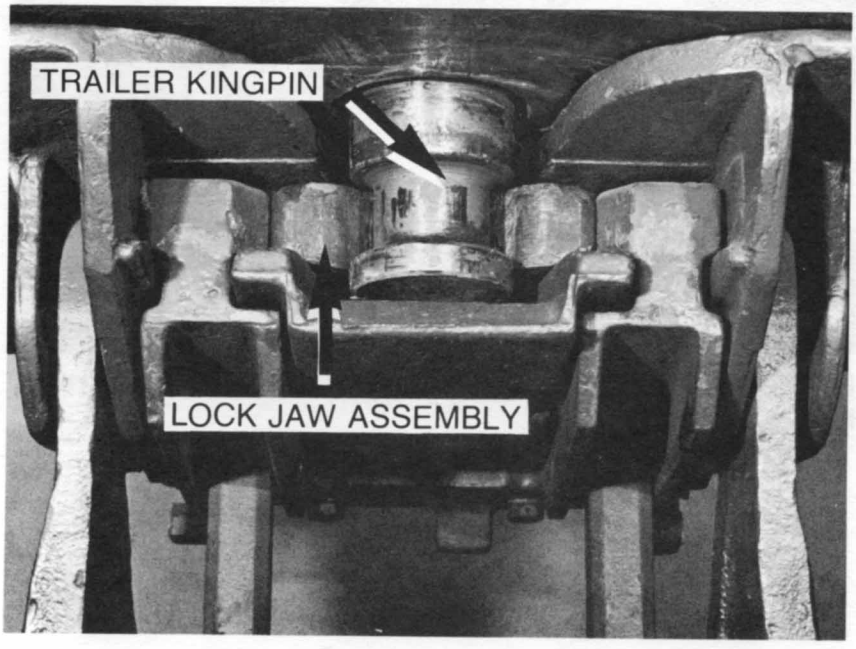
ACF TRAILER HITCHES

RIGHT



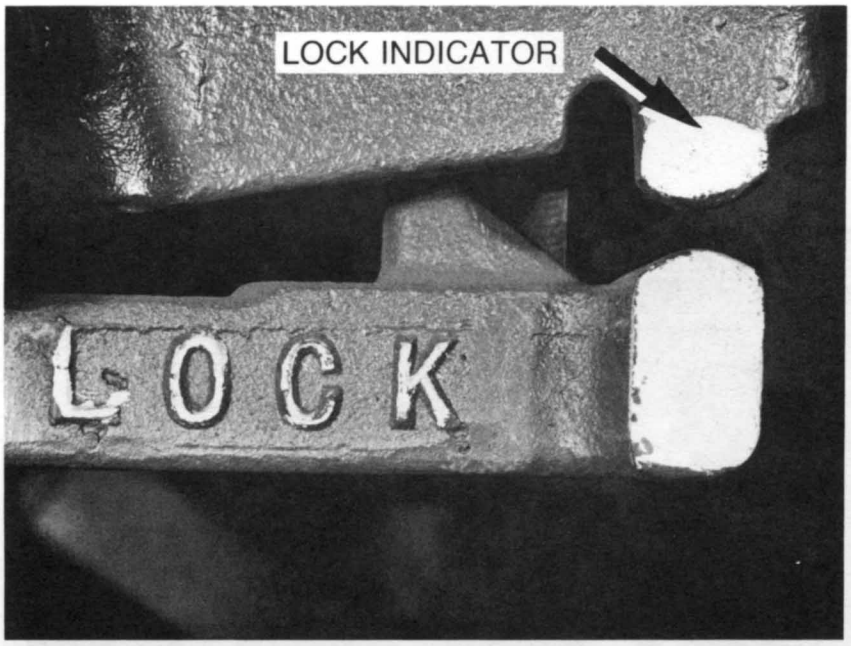
KING PIN MUST BE SECURELY LOCKED BEHIND JAWS.

WRONG



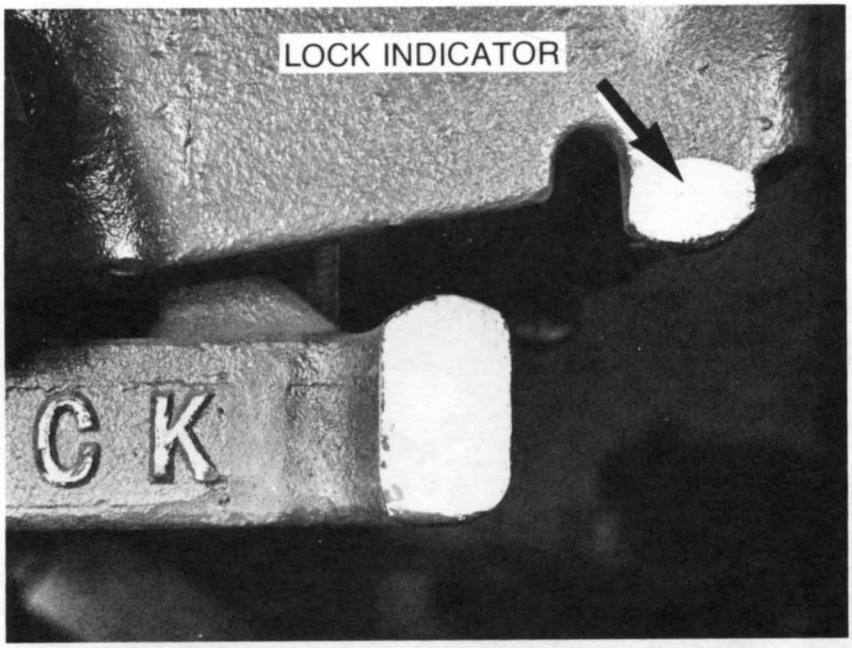
KING PIN NOT PROPERLY SECURED BEHIND JAWS.

RIGHT



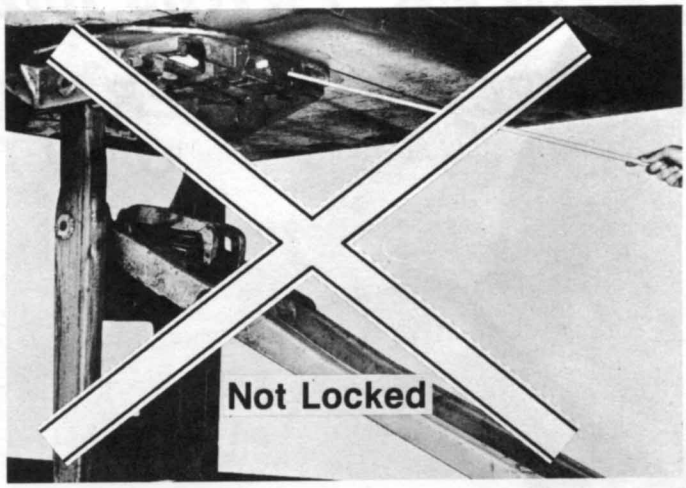
LOCK INDICATORS MUST BE IN VERTICAL ALIGNMENT TO INDICATE LOCKED CONDITION.

WRONG

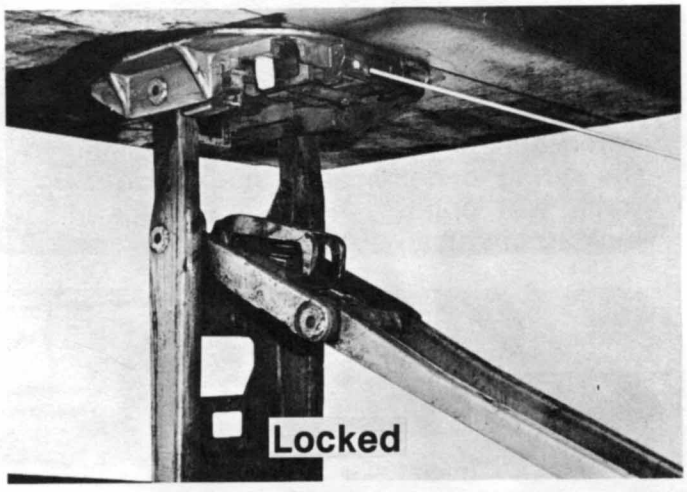


INDICATORS NOT IN VERTICAL ALIGNMENT — **HITCH NOT LOCKED.**

Semi-Automatic Hitch Overhead Loading



CAUTION:
VISUALLY INSPECT TO SEE THAT KINGPIN IS SECURELY ENGAGED, THEN CHECK KINGPIN LOCK INDICATOR, WHICH IS LOCATED IN THE REAR VERTICAL FACE OF HITCH TOP PLATE, FOR LOCKED POSITION. LOCK INDICATOR STEEL ROD SHOULD BE FLUSH WITH REAR VERTICAL FACE OF HITCH TOP PLATE.



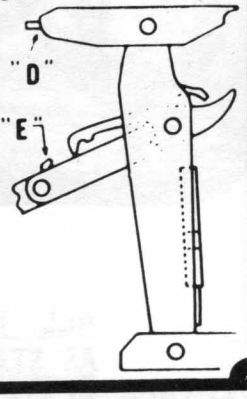
NOTE INDICATOR "D" ON WARNING PLATE ATTACHED TO HITCH WHICH ILLUSTRATES POSITION OF KINGPIN LOCK INDICATOR.

WARNING

DO NOT RELEASE CAR FOR TRANSIT UNLESS HITCH AND TRAILER ARE LOCKED: -

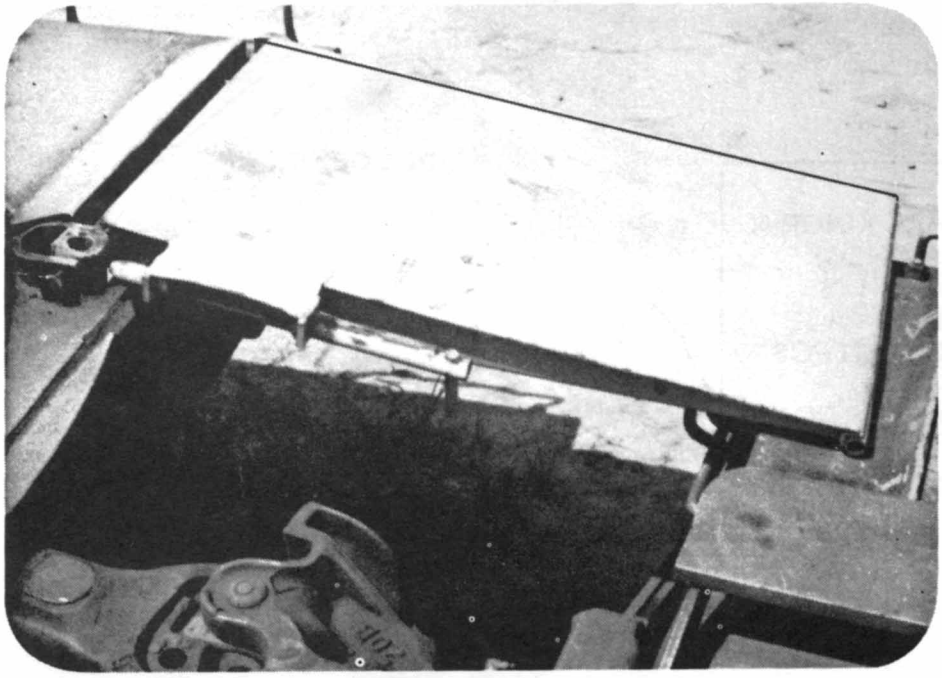
KINGPIN LOCK - INDICATOR "D"
LOCKED--Rod in and flush
UNLOCKED--Rod protruding

DIAGONAL STRUT LOCK - INDICATOR "E"
LOCKED--Indicator down and flush
UNLOCKED--Indicator protruding



TRAILER TRAIN MAINTENANCE ALERT

SUBJECT: IMPROPER BRIDGE PLATE APPLICATIONS ON TTAX CARS



48 INCH BRIDGE PLATE SHOWN ON TTAX CAR WITH HYDRAULIC END OF CAR CUSHIONING UNIT COMPRESSED IN BUFF COUPLED TO STANDARD GEAR CAR

48 INCH BRIDGE PLATE SHOWN ON SAME TTAX CAR WITH HYDRAULIC END OF CAR CUSHIONING UNIT EXTENDED IN NORMAL POSITION COUPLED TO SAME STANDARD GEAR CAR

NOTICE

ALL TTAX CARS REQUIRE 60 INCH BRIDGE PLATES AS STANDARD EQUIPMENT TO CAR. 48 INCH BRIDGE

CAUTION: PLATES INSTALLED ON TTAX CARS WILL DROP BETWEEN CARS, WITH COUPLERS EXTENDED IN NORMAL POSITIONS.

TRAILER TRAIN COMPANY
MECHANICAL DEPARTMENT
AUGUST – 1977

TRAILER TRAIN COMPANY
MAINTENANCE BULLETIN

NO. B03-1

DATE 2-1-75

SUBJECT : Brakes - Rigging Adjustment

All Trailer Train standard level piggyback and container cars are equipped with three lever trucks and 33" multiple wear wheels. The truck lever ratio on these cars is such that up to 21 inches of slack can be generated in the foundation rigging as a result of brake shoe and wheel wear.

Under certain conditions, when wheel and shoe wear simultaneously approach condemning limits, one of three problems can develop:

1. The double clevis end of the truck horizontal lever can foul the bolster and the brakes become inoperative on that truck.

2. The foundation rigging cross-over levers can foul the center sill slots, and the brakes become inoperative on the entire car.

3. The slack adjuster can run out of take-up capacity; piston travel will extend, lowering brake effectiveness, and the control rod will ultimately be damaged.

To avoid these brake rigging problems on cars with multiple wear wheels, Trailer Train recommends the following procedure:

TRAILER TRAIN MAINTENANCE BULLETIN

NO. B03-1

DATE 2-1-75

A manual one hole truck bottom rod adjustment should be made in the trucks of all Trailer Train standard level cars with 33" multiple wear wheels whenever:

a. Wheels are changed out and smaller diameter wheels are installed. (Either truck - as required)

b. The clearance between the double clevis end of the horizontal truck lever and the bolster is 2 inches or less with the brakes applied. (Either truck, as required) See Figure 1.

c. The clearance between either body cross-over lever and the brake cylinder end of its center sill slot is 4" or less with the brakes applied. (A end truck only) See Figure 2.

These adjustments, made without special tools or equipment, will restore slack adjuster take up capacity, and will assure proper brake rigging angularities and good brake performance throughout the wear cycle of wheels and brake shoes.

Trailer Train Company
Mechanical Services

TRAILER TRAIN MAINTENANCE BULLETIN

NO. B03-1

DATE 2-1-75

PAGE 3 OF 3

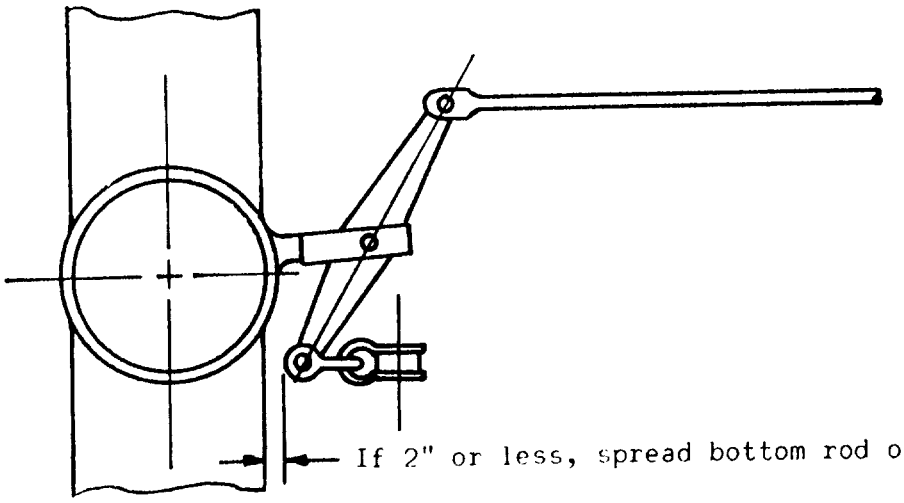


Figure 1

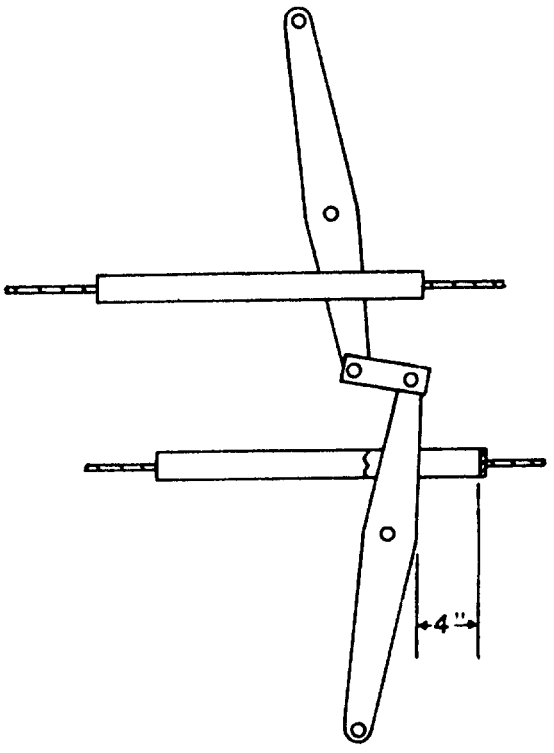


Figure 2

CIRCULAR 43

ASSOCIATION OF AMERICAN RAILROADS

Operations and Maintenance Department
OPERATING - TRANSPORTATION DIVISION

American Railroads Building
1920 L Street N.W.
Washington, D.C. 20036

R. R. MANION, Vice-President
Operations and Maintenance
Department

March 1976

RULES GOVERNING THE LOADING, BLOCKING AND BRACING OF FREIGHT IN CLOSED TRAILERS AND CONTAINERS for TOFC/COFC SERVICE

ISSUED BY

ASSOCIATION OF AMERICAN RAILROADS
INTERMODAL STEERING COMMITTEE
AND
DAMAGE PREVENTION COMMITTEE

APPROVED BY
GENERAL COMMITTEE
OPERATING - TRANSPORTATION DIVISION

RULES GOVERNING LOADING, BLOCKING AND BRACING OF FREIGHT IN CLOSED TRAILERS AND CONTAINERS FOR TOFC/COFC SERVICE

SECTION I

INTRODUCTION

These rules which supersedes GIS No. 539 as revised November, 1965, apply both to trailers and containers regardless of plan used.

These rules are designed for the benefit of all parties concerned. By adhering to the rules, both lading and equipment will be protected in the absence of unforseen unusual circumstances.

It must be understood that trailers or containers may move in a backwards or reverse direction for all or a portion of its journey. During its journey normal transportation forces may topple an unbraced load or cause lading to exert excessive pressure against the rear doors. It is therefore, imperative that trailers or containers moving in rail service be loaded in strict compliance with the General Rules.

These rules cover lading of all types and kinds. If loading rules, illustrations or principles contained in this publication appear not to cover a specific shipment being tendered for TOFC/COFC movement, origin carrier's loss and damage prevention representative must be contacted for assistance and/or instructions.

Reference to or illustrations of trailers in this pamphlet includes both containers and trailers.

SECTION II

GENERAL RULES

1. Carrier's rules regarding safe loading, protection of equipment and protection of lading must be adhered to. First and foremost trailer doors are not designed to restrain longitudinal movement of lading without resulting damage to equipment and lading. Therefore, it is absolutely necessary that lading be so secured as to prevent longitudinal movement.

2. Trailers must be inspected prior to being loaded to assure they are in suitable condition to carry loads safely and damage free to destination.

SECTION II

GENERAL RULES

3. Prior to loading, clean and prepare trailers carefully, sweeping floors if necessary, and removing all nails, cleats, straps or other protrusions that might cause damage to lading.

4. Lading which is obviously unsuitable for movement in trailers as far as safety in handling and protection to lading and equipment are concerned must not be loaded.

5. Lading weight in trailers must be evenly distributed both crosswise and lengthwise and the combined weight of lading and trailer must conform to all Federal, State and Local regulations and transportation services used at origin and to final destination.

6. Lading must be blocked in such a manner as to prevent it from shifting either crosswise or lengthwise, so as to assure proper weight distribution and position in trailer from origin to destination.

7. Proper loading to prevent damage to lading and equipment requires preplanning and study. Whenever there is any doubt as to procedures to follow, contact should be made with origin carrier's loss and damage prevention representative for instructions. When there are new Intermodal Shippers or those shipping new commodities, advance instruction and assistance must always be obtained from origin carrier.

8. Lading shall be loaded, blocked and braced both crosswise and lengthwise to minimize void areas and protect lading.

9. Bracing and blocking must be such as to restrain lading from pushing through doors or walls of trailers.

10. Suitable dividers or separators must be used between adjacent stacks of different sized containers, if the nature of the lading is such, that damage will result from uneven contact of the layers. Heavier items must be loaded in bottom layers and lighter items in top layers.

11. The loading, blocking and bracing of explosives, flammable and other dangerous commodities must be in accordance with Department of Transportation Regulations as published in R. M. Graziano's tariff, and any other legally regulatory agency.

12. The presence of hazardous materials in mixed freight shipments (FAK) must be specifically made known to carrier by being so identified as to type and character on all bills of lading.

SECTION II

GENERAL RULES

13. Trailers equipped with interior bulkhead doors, or other devices, must be used in accordance with instructions set forth in trailer. Particular care should be taken to be sure they are properly locked in place both after completion of loading and unloading. The use of any type material handling equipment to unlock and raise or lower and lock bulkhead doors is prohibited.

14. All lumber used for blocking and bracing must be of sound material and free of defects which impair its strength or interferes with proper nailing.

15. Adequate size and number of nails must be used (driven straight with no toenailing) in the construction and assembly of blocking and bracing and in the securement of same within trailer (do not nail into sidewall of trailer).

16. Strapping used for load securement must be of sufficient strength and amount and be so applied as to hold load secure from crosswise or lengthwise movement.

17. In securing or bracing and blocking loads shippers will find it to their advantage to use devices built into trailers such as belt rails, tie-downs, etc. Lading anchor devices are available which can be used in securing strapping into belt rails.

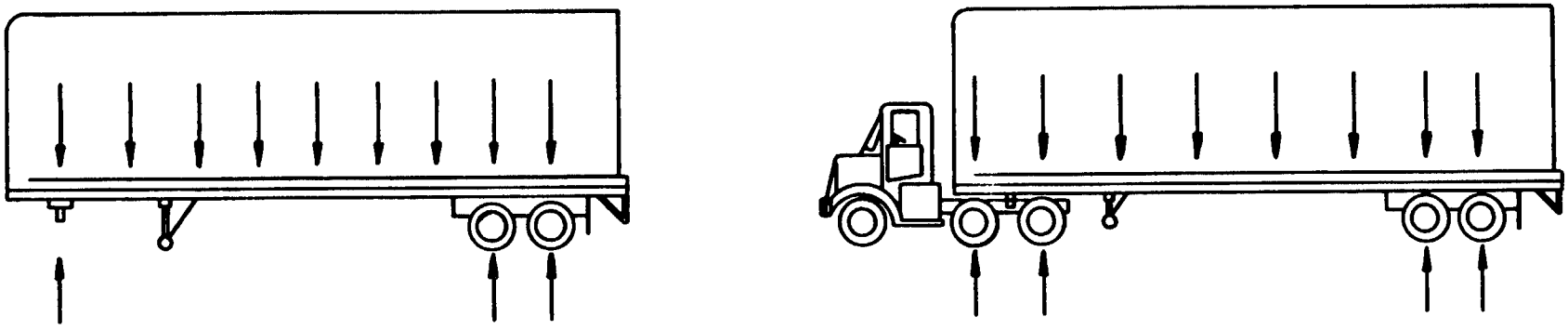
18. Trailers with rounded or angled ends should be squared when lading is loaded into this area which is not similarly contoured. This can be accomplished through construction and use of bulkheads or gates.

SECTION III

GENERALLY ACCEPTED LOADING METHODS

The illustrations contained in this Section indicate some — though not all — of the methods that may be employed to conform with the General Rules of Section II.

WEIGHT DISTRIBUTION WITHIN TRAILER



Trailers are designed for uniform load distribution as shown. The payload should be distributed equally between the rear tires and the fifth wheel which transfers its load to the truck tractor.

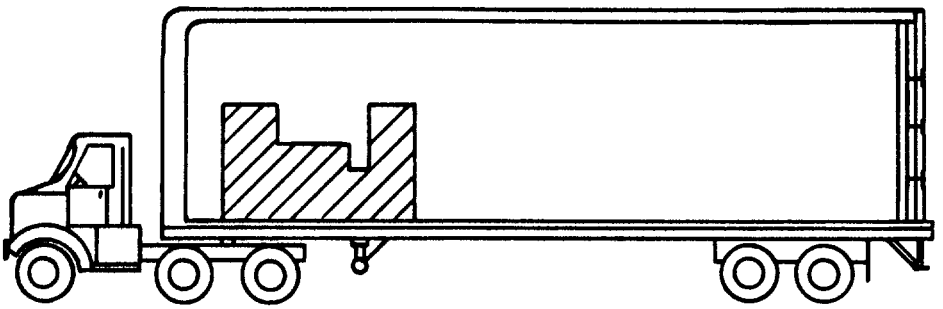
ILLUSTRATION NO. 1

WRONG

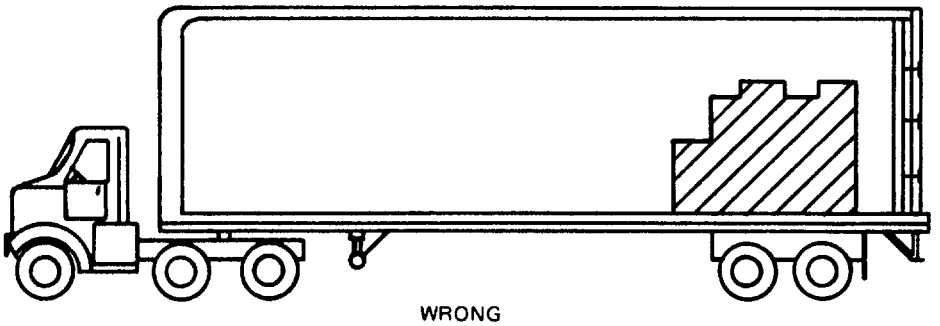
RIGHT

Crosswise weight should be equally distributed. A heavy load should not be loaded at one side. This will overload springs and the tires at that side. Place load so weight will be equal on rear tires and eliminate possible twisting of frame and overloading of axle housing and wheel bearing.

ILLUSTRATION NO. 2



WRONG



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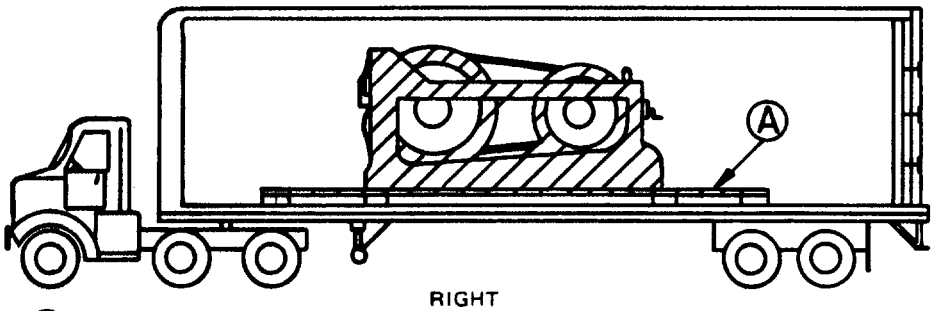
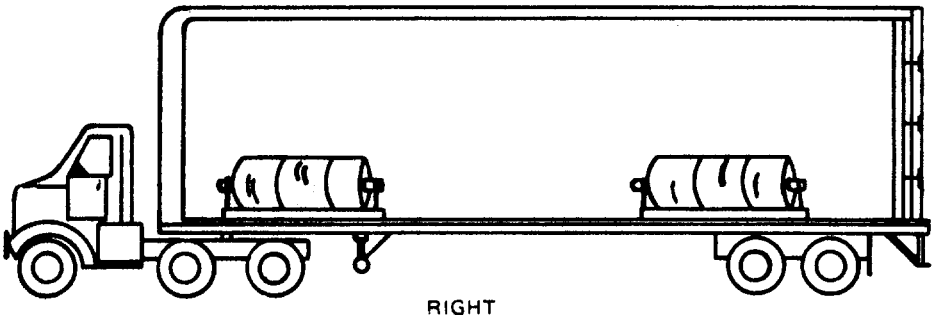


RIGHT

Ⓐ Skid of adequate length and construction to properly distribute weight.



RIGHT

ILLUSTRATION NO. 3

LOADING HEAVY CONCENTRATED LOADS NOT OCCUPYING FULL TRAILER FLOOR AREA

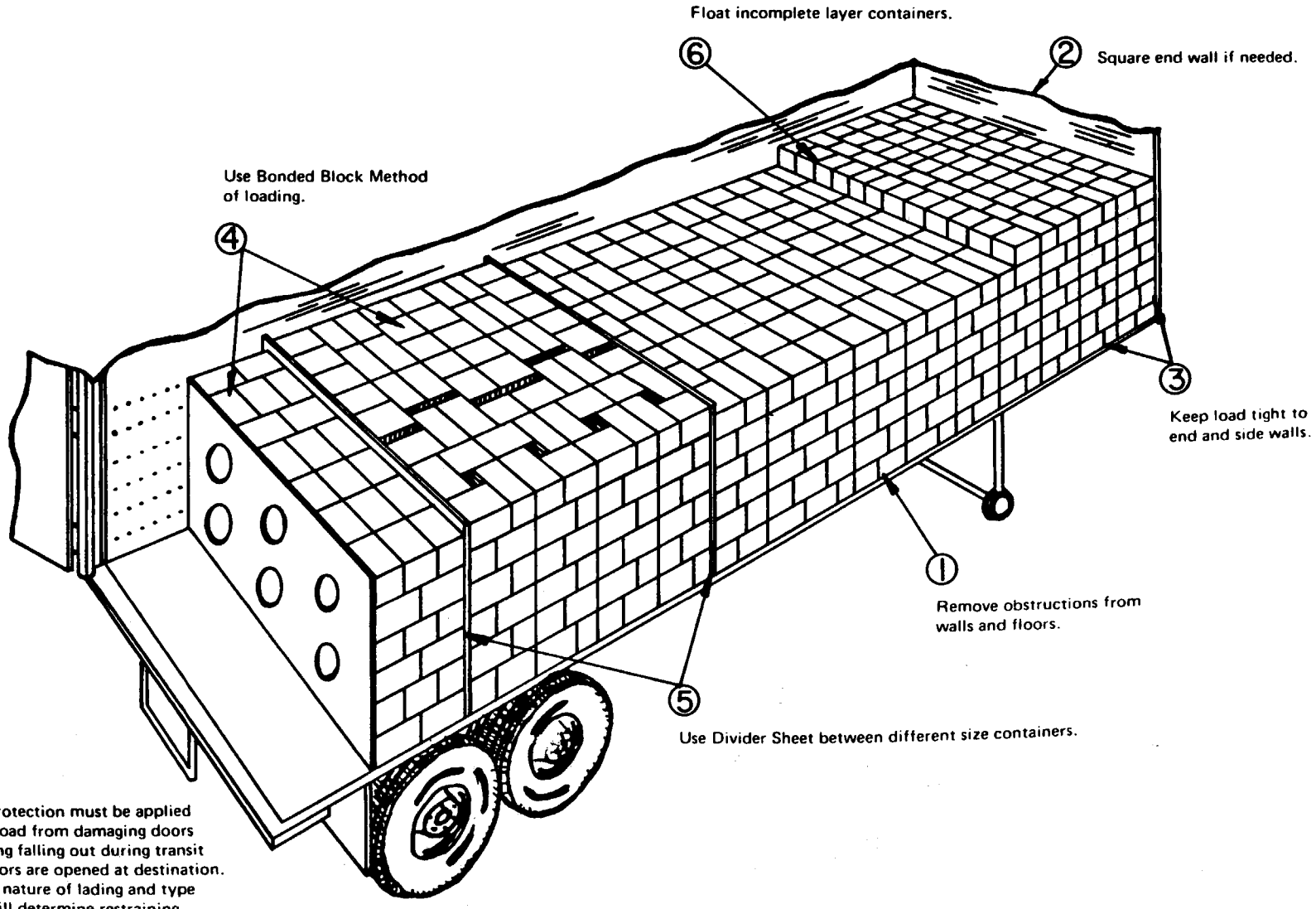
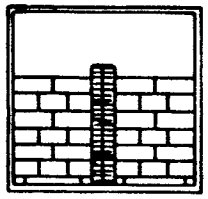


ILLUSTRATION NO. 4
LOADING FIBREBOARD CONTAINERS



Corrugated Fibreboard
Fillers Down The
Center Line

Note: Dimensions of fillers should be sufficient to maintain alignment and protect lading from falling into the void.

Alternate Method 2

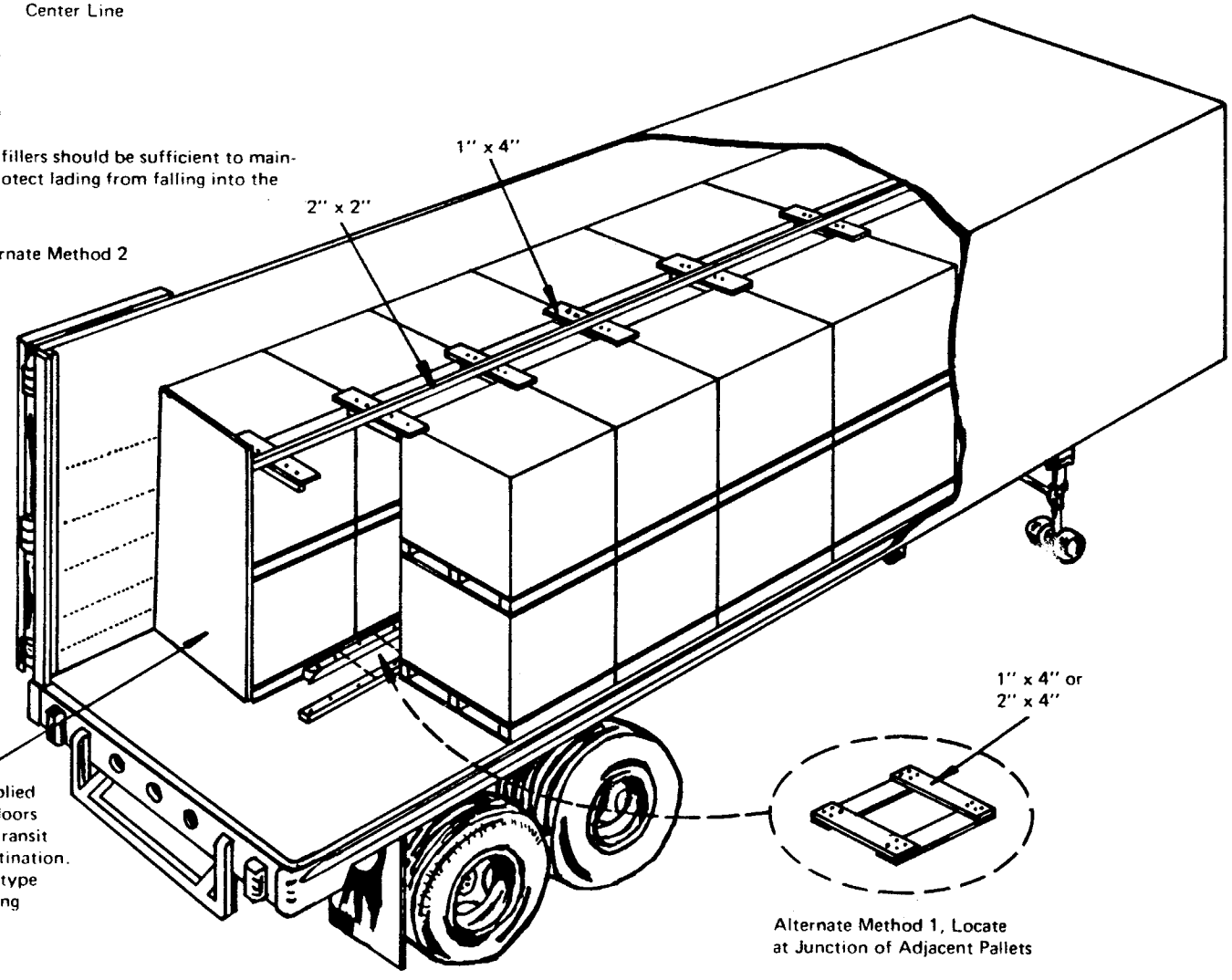


ILLUSTRATION NO. 5

APPLICATION OF CROSS BRACING

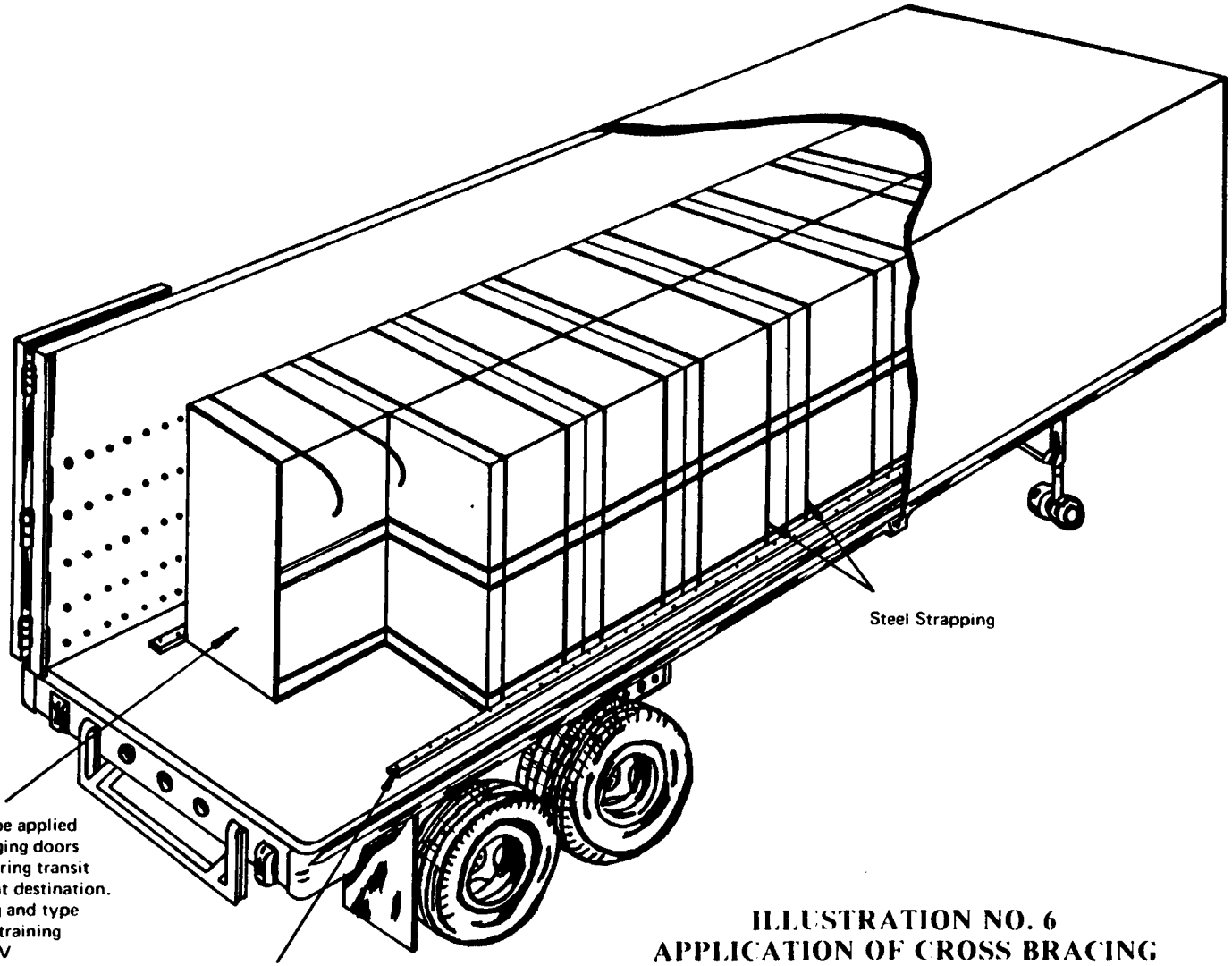


ILLUSTRATION NO. 6
APPLICATION OF CROSS BRACING
(Rows Located Along Center Line)

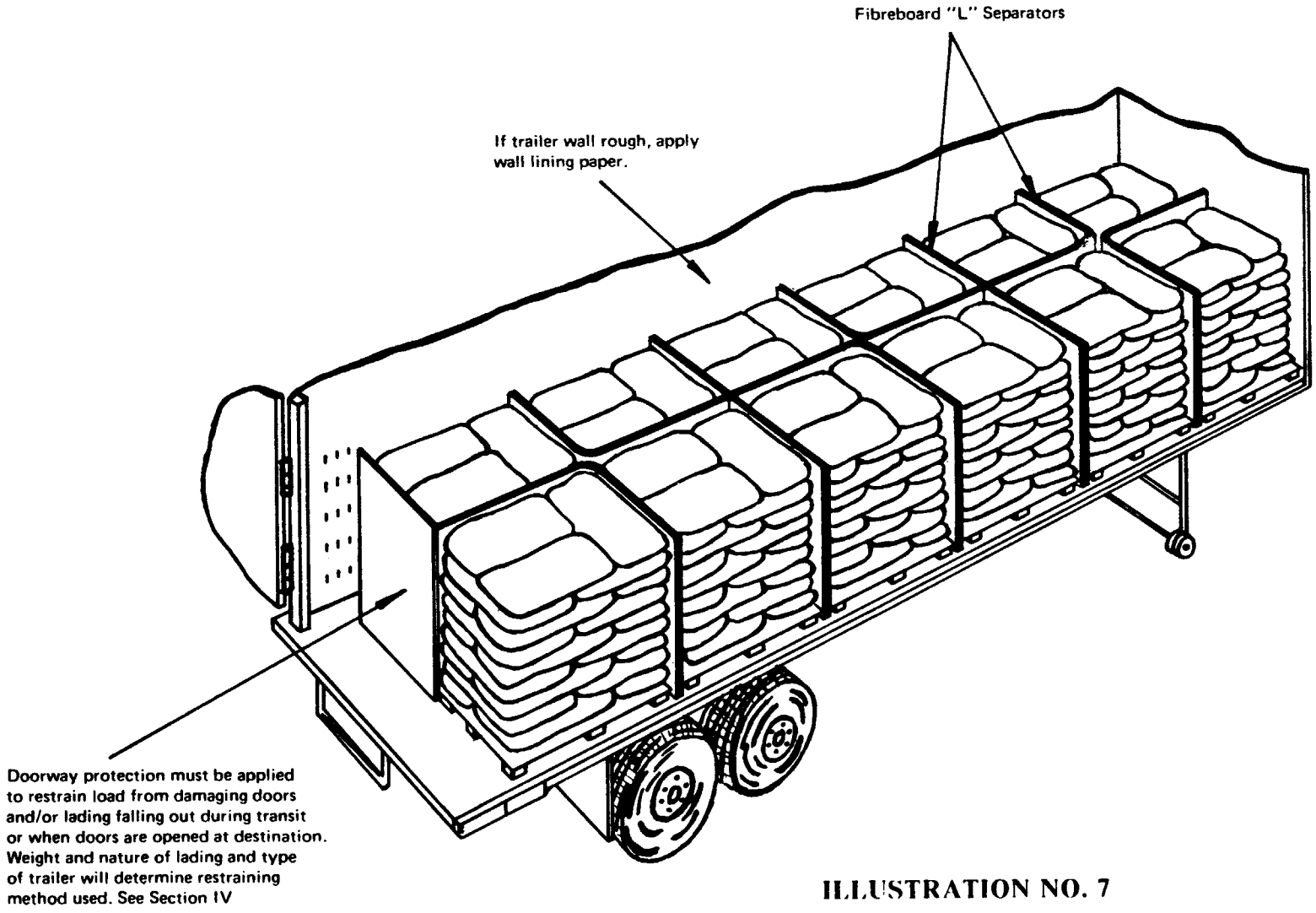
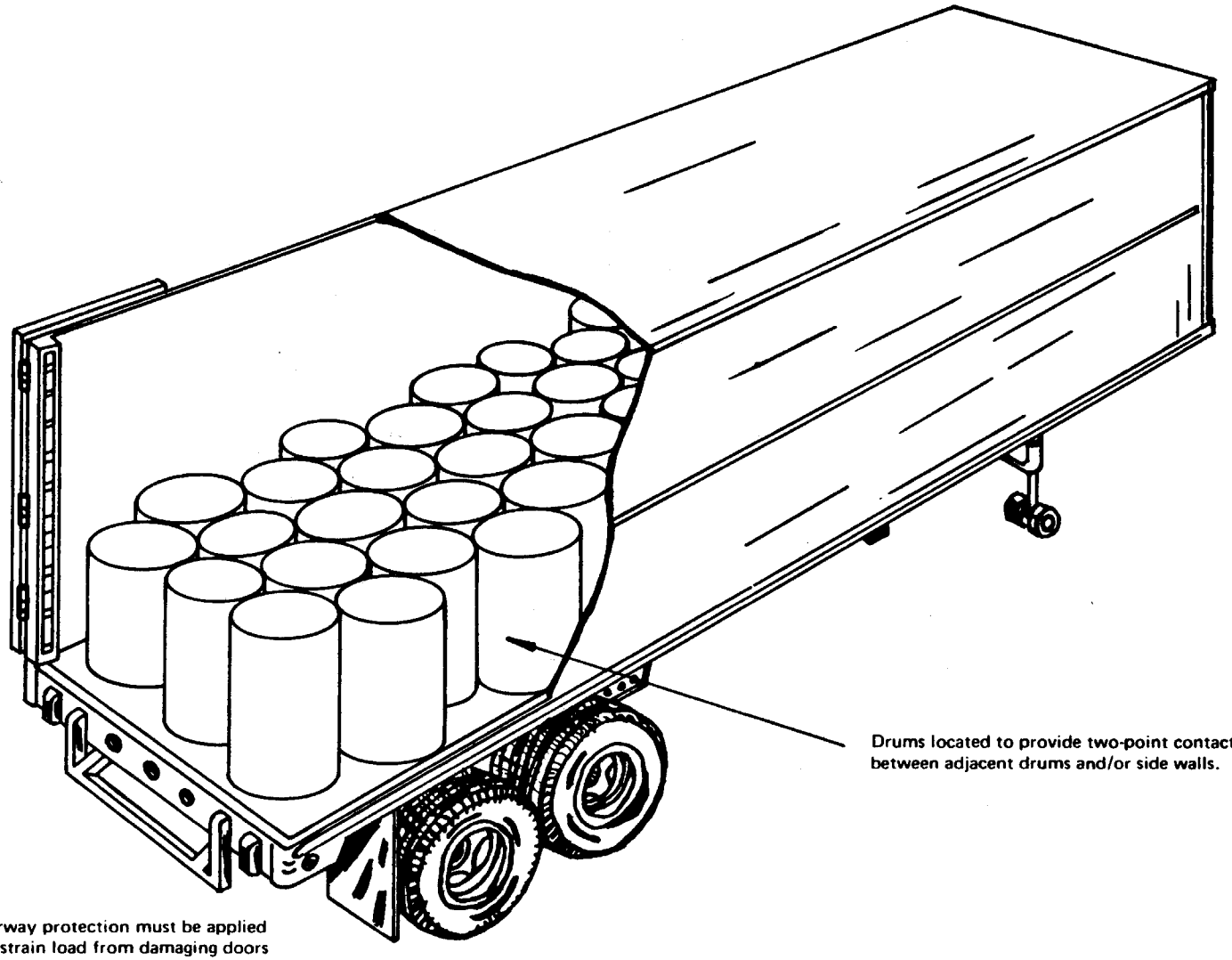


ILLUSTRATION NO. 7

PALLETIZED BAG LOADING

(If pallet is hand loaded in trailer use same type pattern.)



Doorway protection must be applied to restrain load from damaging doors and/or lading falling out during transit or when doors are opened at destination. Weight and nature of lading and type of trailer will determine restraining method used. See Section IV

ILLUSTRATION NO. 8

RECESS METHOD OF LOADING STRAIGHT SIDED DRUMS

SECTION IV

LOAD RESTRAINING METHODS

The illustrations contained in this Section indicates some — though not all — of the acceptable load restraining methods that may be employed to conform with the General Rules of Section II.

1. Load restraining systems or devices that are integral to the trailer or obtained commercially often require the installation of supplemental dunnage to assure safe transportation of some commodities.

2. Capacity loads of high density commodities, i.e., flat rolled steel, coils of steel, steel rods, pipe, ingots, etc., often require additional blocking and bracing — supplemental to the trailer's load restraining components — in order to maintain load balance and for the protection of the equipment during transit.

3. Most commodities packaged in fibreboard boxes, bags, pails and drums require rigid full-face bulkheads or, bulkheads that contact the strongest areas of the lading to prevent damage.

4. The nature of the loading and/or the restraining method employed may require, that the load be restrained at more than one load location.

5. Many of the load restraining methods illustrated in the AAR Closed Car Loading Pamphlets, also Section No. 7 of the "Open Top Rules" and Pamphlet No. 6-C of the Bureau of Explosives are adaptable for loads in closed trailers.

6. The type and amount of restraining devices, methods, materials, etc., used in any given load must have the capability to safely restrain the lading.

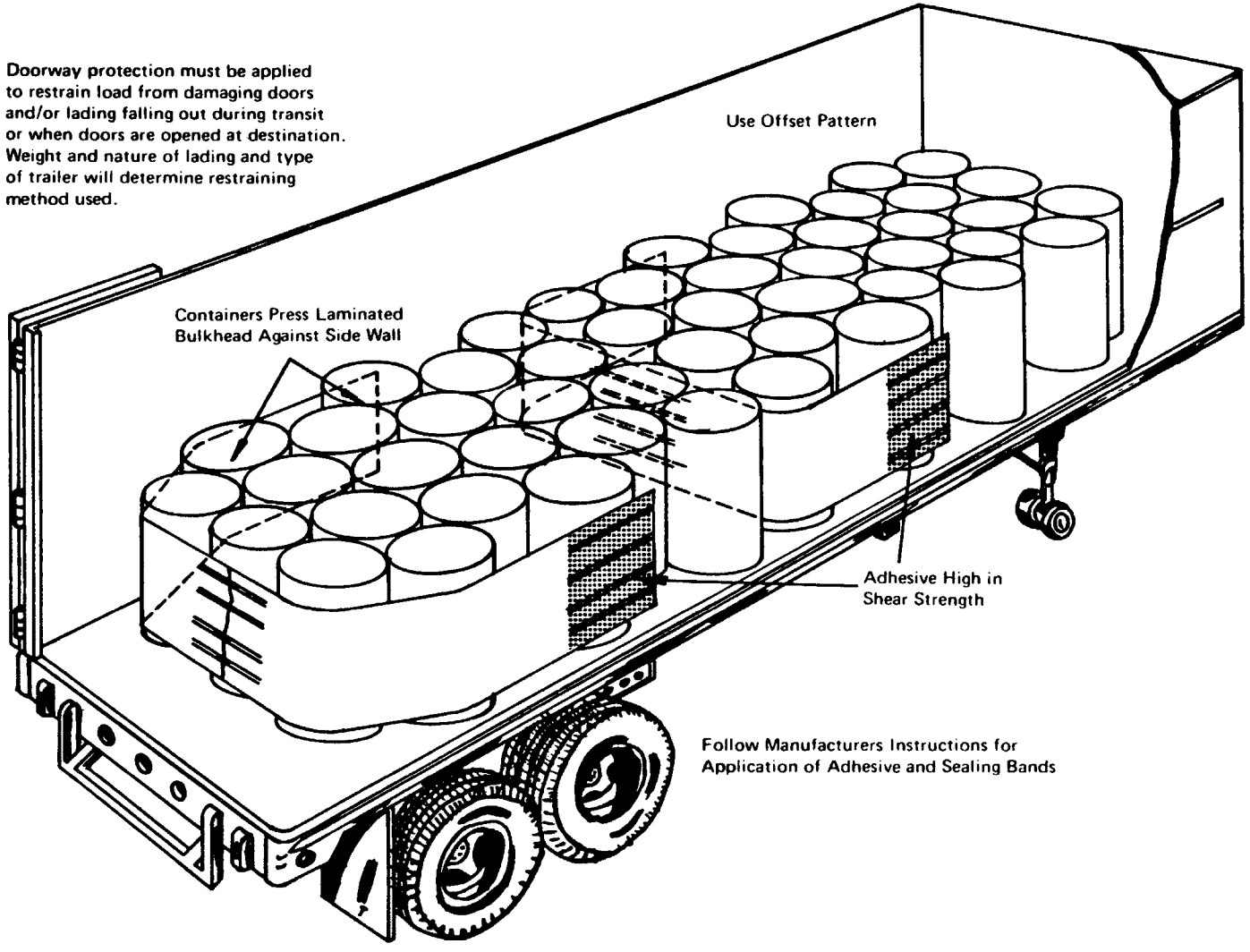


ILLUSTRATION NO. 9

APPLIED LAMINATED BULKHEAD

CAPTIVE LOAD-RESTRAINING SYSTEMS

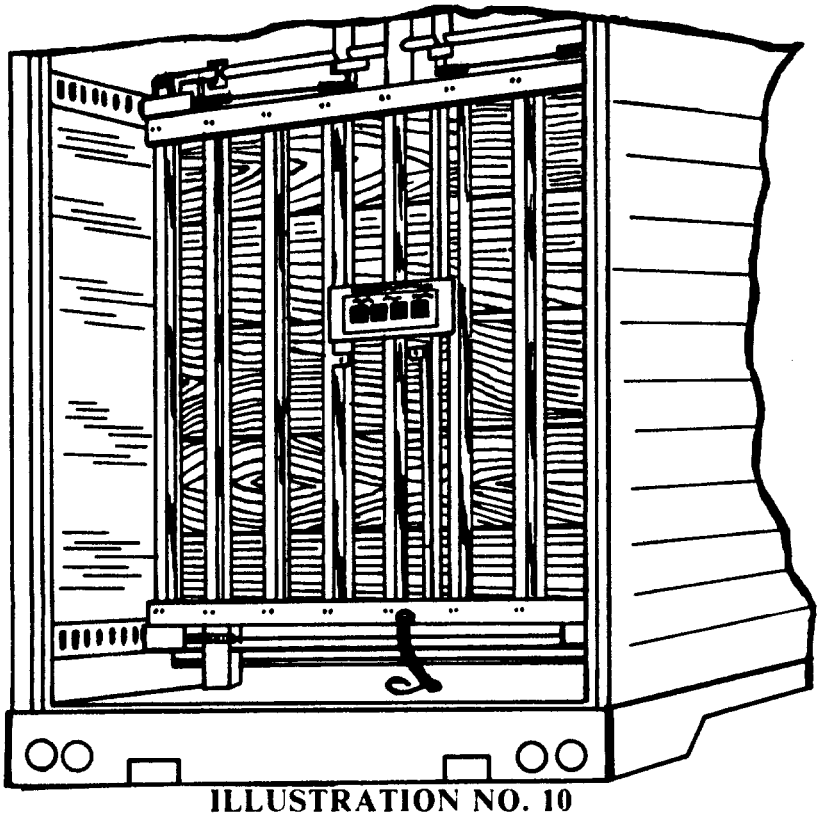


ILLUSTRATION NO. 10

A self-adjusting load-restraining bulkhead, for full-face full-height loads.

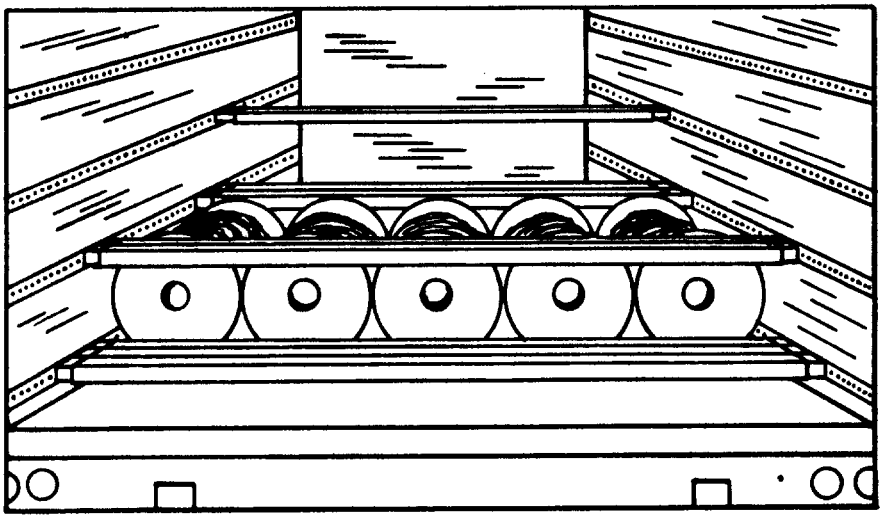
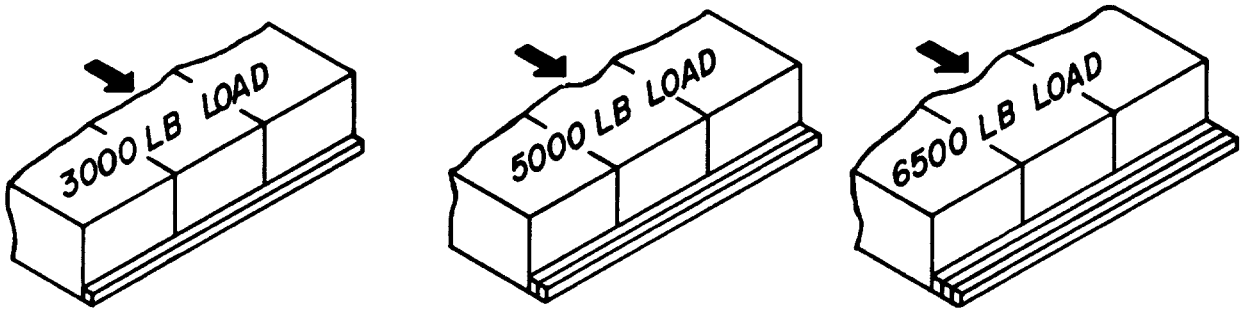


ILLUSTRATION NO. 11

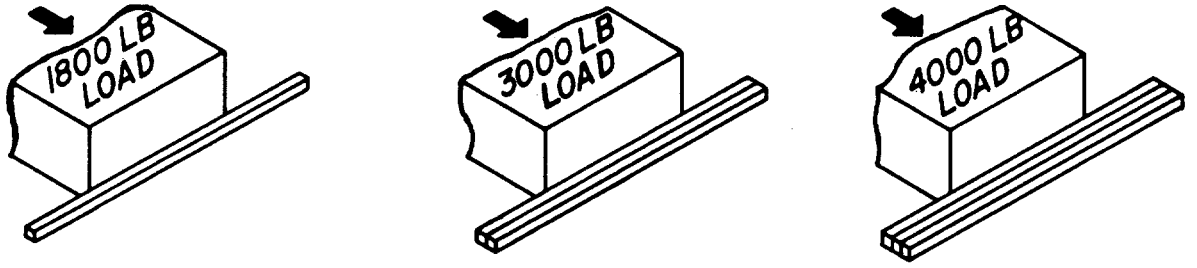
Trailer equipped with belt-rails and cross members, for restraining lading at various locations. Note plywood divider is used between cross members and fragile lading loaded in nose of trailer, thus spreading area of contact over full-face of lading at that point. See Illustration No. 12 for "Cross Member Load Ratings."

CROSS MEMBER LOAD RATINGS



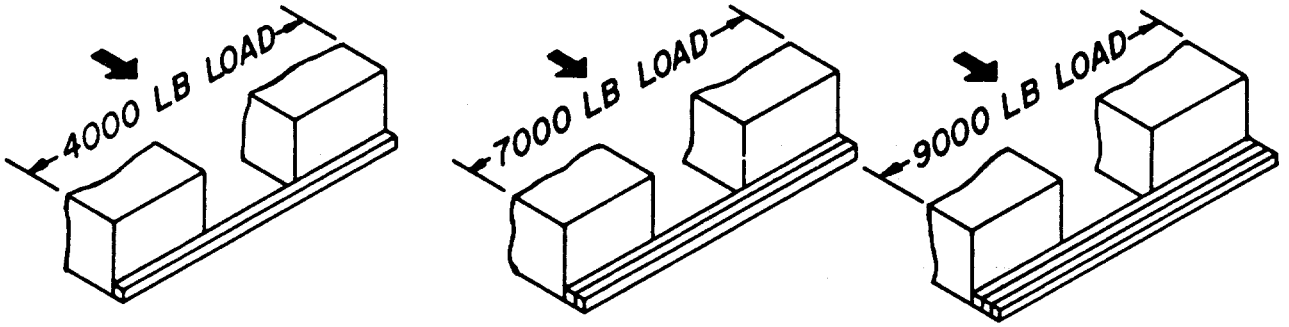
SINGLE DOUBLE TRIPLE

Load evenly distributed across full length of cross member.



SINGLE DOUBLE TRIPLE

Load concentrated in center area (½ trailer width) of cross member.



SINGLE DOUBLE TRIPLE

Load concentrated at end areas (1/3 trailer width each end) of cross member.

➡ INDICATES DIRECTION OF LOAD APPLICATION.

ILLUSTRATION NO. 12

TYPICAL LOAD APPLICATIONS ON CROSS MEMBERS

LOAD-RESTRAINING SYSTEMS

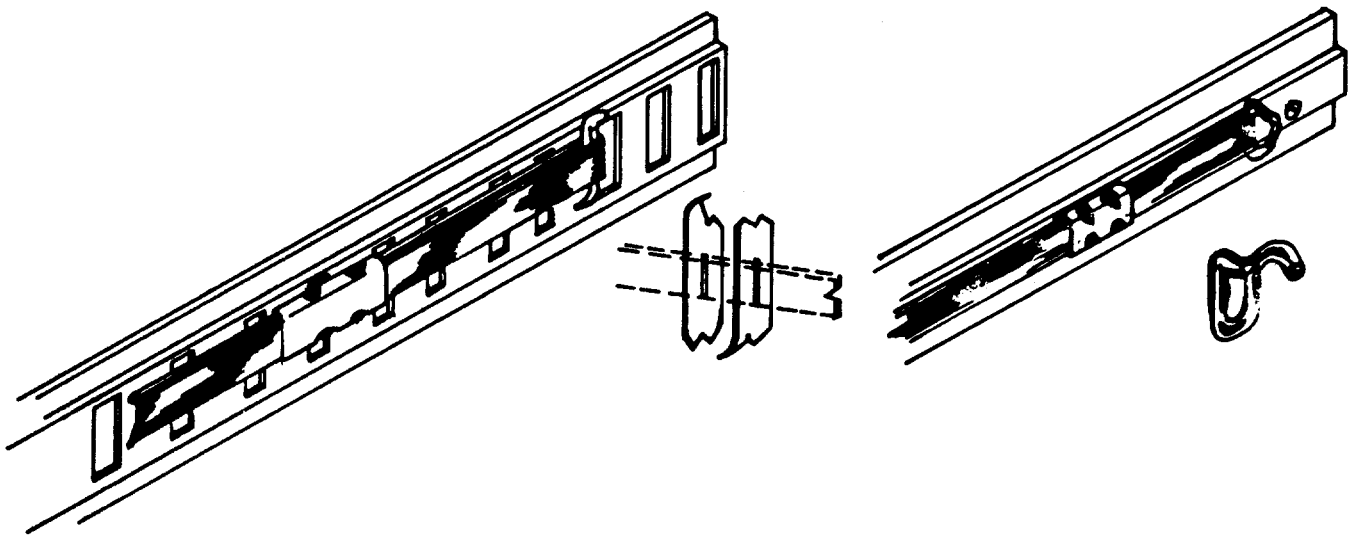
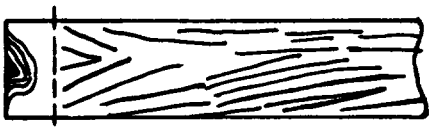


ILLUSTRATION NO. 13

LOAD ANCHORS

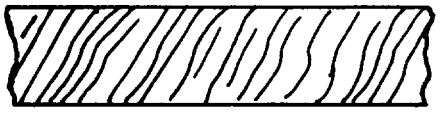
The anchors must be attached at least 18" to 24" back of the face of the load. For most lading, it will also be necessary that proper end gates, trusses and/or reaction strap applications be employed to insure protection for the lading. Such gates may be found in Pamphlet No. 14 and other loading publications.

IMPORTANT FEATURES TO BE WATCHED IN SELECTING BLOCKING AND BRACING MATERIALS



Knots that interfere with nailing should be cut off at dotted line.

Large knots weaken members. Cut off as shown and use short pieces for cleats, etc.



Never use lumber with cross grain for structural members.

Small amount of bark does not mean that lumber should be rejected.

ILLUSTRATION NO. 14

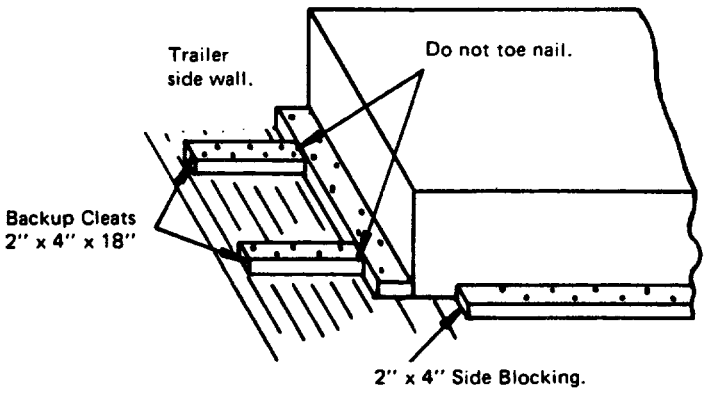


ILLUSTRATION NO. 15

FLOOR BLOCKING

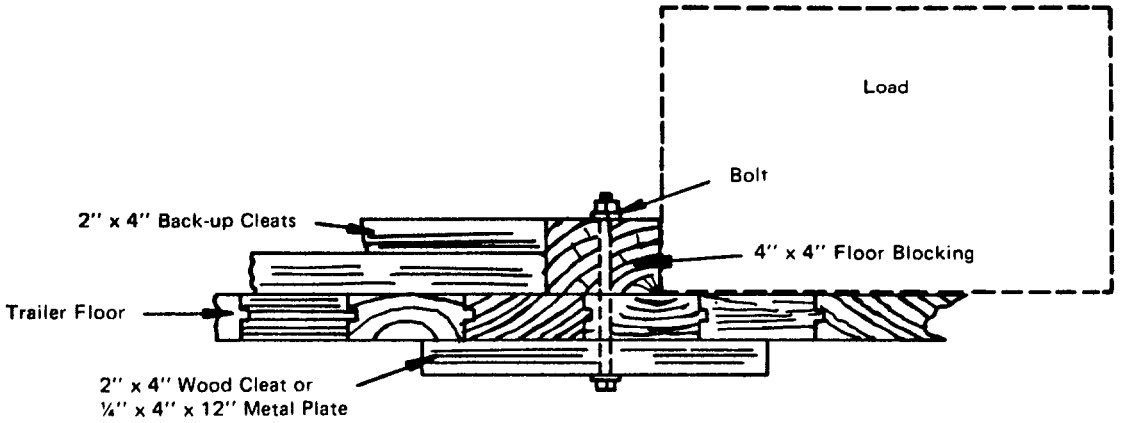


ILLUSTRATION NO. 16

METHOD OF SECURING BLOCKING TO FLOOR WITH BOLTS

REAR GATES FOR USE IN TRAILERS WITH POSTS

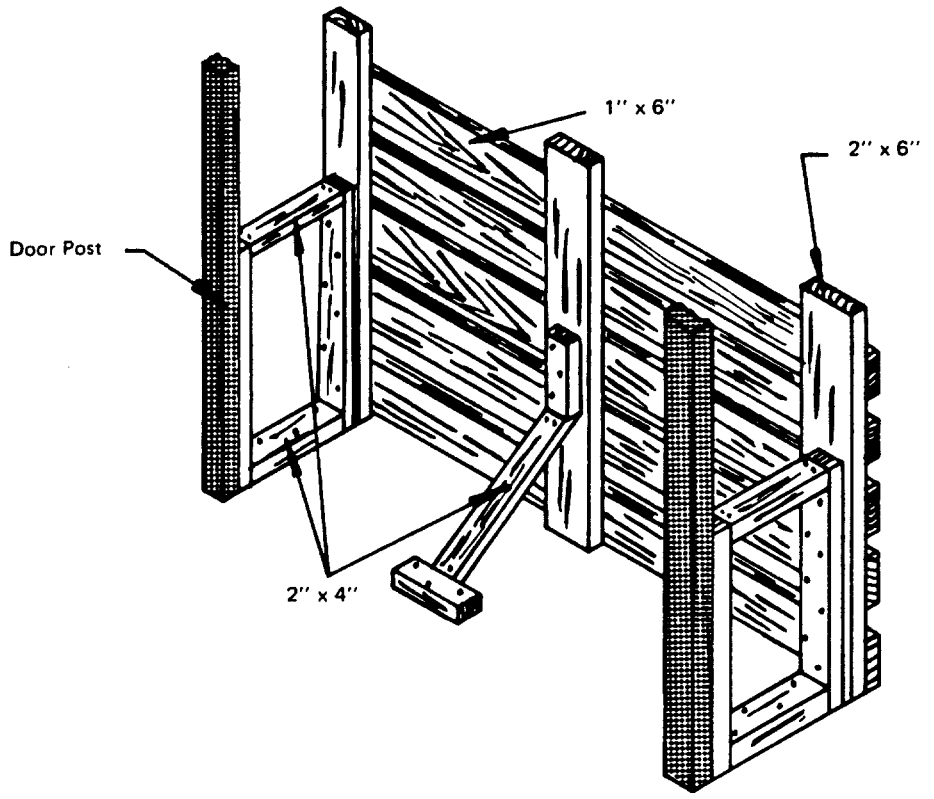


ILLUSTRATION NO. 17

CIRCULAR NO. 42-F

(Supersedes Circular No. 42-E)

ASSOCIATION OF AMERICAN RAILROADS

Operations and Maintenance Department
OPERATING — TRANSPORTATION DIVISION

American Railroads Building
1920 L Street N.W.
Washington, D.C. 20036

J. E. Martin, Vice President
Operations and Maintenance Department

February 1, 1978

GENERAL RULES COVERING LOADING OF CARLOAD SHIPMENTS OF COMMODITIES IN CLOSED CARS

To the Members:

The "General Rules" quoted in Circular No. 42—E, dated October 1, 1975, have been revised as shown herein.

These "General Rules" MUST be observed for all closed car loading and take precedence over the "Loading Methods" referred to, or included, in the loading pamphlets listed on Page 12. Those pamphlets contain detailed methods for loading specific commodities.

On behalf of the General Committee.

Respectfully,
J. J. Robinson
Executive Director & Secretary

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GENERAL RULES — CLOSED CARS

GENERAL RULES COVERING LOADING OF CARLOAD SHIPMENTS OF COMMODITIES IN CLOSED CARS

The following Rules have been formulated for the purpose of providing SAFE methods of loading closed cars and MUST be observed. Primary purpose of these rules is safe transit of the rail car from origin to destination.

RULE 1. INSPECTION AND SELECTION OF CARS

(A) Cars must be inspected by carrier before placing for loading. Cars must also be inspected by shipper at loading point to see that they are in suitable condition to carry load safely to destination.

(B) (1) Box cars for the loading of metals of heavy concentrated weight - for example; tin plate, copper anodes, lead ingots, cathodes, zinc slabs and spelters and all other high density commodities - must be inspected by the originating carrier (either before they are placed for loading or at loading point), to see that they are in suitable condition to safely carry loads to destination.

(2) When ordering box cars for loading concentrated weights of heavy commodities, shippers have the responsibility of notifying serving carriers of this purpose and of not loading any cars not inspected per Rule 1(B)(1).

(3) Box cars selected for loading of metals of heavy concentrated weight - for example; tin plate, copper anodes, lead ingots, cathodes, zinc slabs and spelters and all other high density commodities must meet one of the following requirements:

a. Car stenciled adjacent to door opening 25K or 50K which indicates floor loading capacity.
b. Have wood floor of 2¼ inch thickness in sound condition supported by at least three metal floor stringers on each side of center sill full length of car.
c. If equipped with sliding sill underframe, have wood floor of 2¼ inch thickness in sound condition supported by at least two metal floor stringers on each side of center sill full length of car.
d. If equipped with steel floors or special type wooden flooring full length of car provided, the overall strength of the floor is not less than that of a floor with three stringers as specified in the foregoing.

If in doubt, verification of the floor strength is to be obtained from the Mechanical Department of Car Owner.

Also, such floors and supporting structure must be in good condition when cars are loaded.

(4) Shippers have the responsibility of attaching a Concentrated Floor Loading card, Figure 1, to the routing or placard board on each side of box cars in which metals with densities exceeding 400 lbs. per cubic foot are loaded and/or 800 lbs. per square foot floor bearing area.

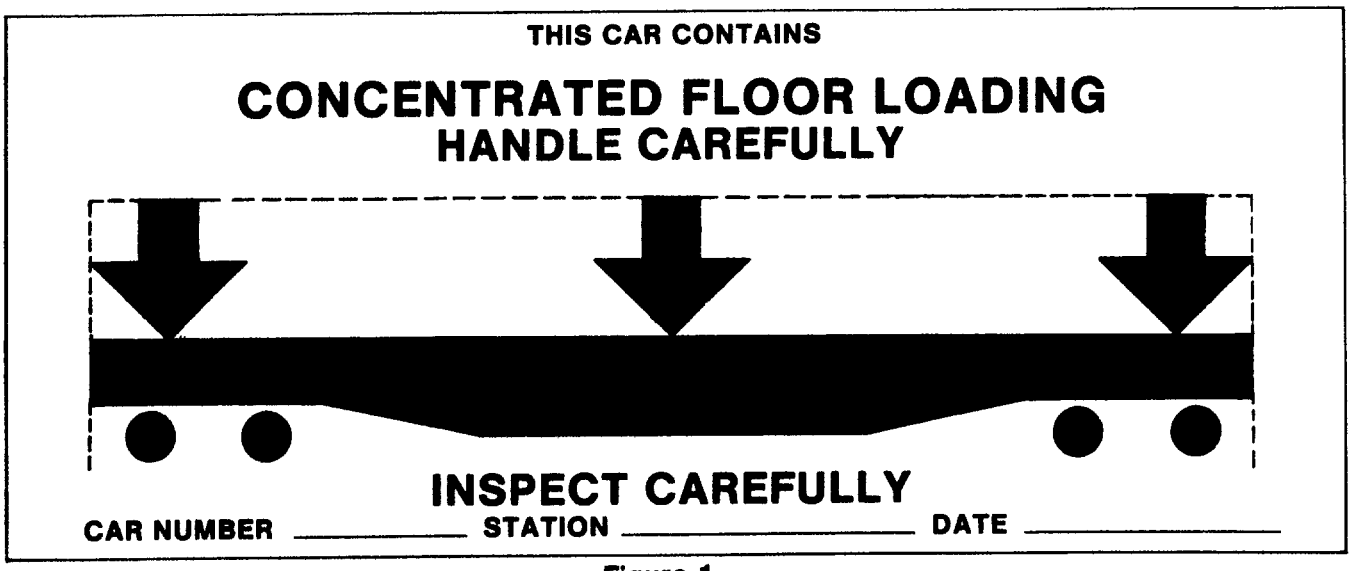


Figure 1

(5) Loads, occupying less than total floor space, must be secured so as not to permit movement that would have an accumulative effect of overloading one end or one side of car when loaded in accordance with Rule 4(I).

GENERAL RULES — CLOSED CARS

RULE 2. CLEARANCE AT SIDE BEARING — LOADED CARS

For cars not equipped with constant-contact type side bearings (zero clearance normal) there must be clearance at side bearings to permit free curvature of trucks.

RULE 3. MAXIMUM LOAD WEIGHT

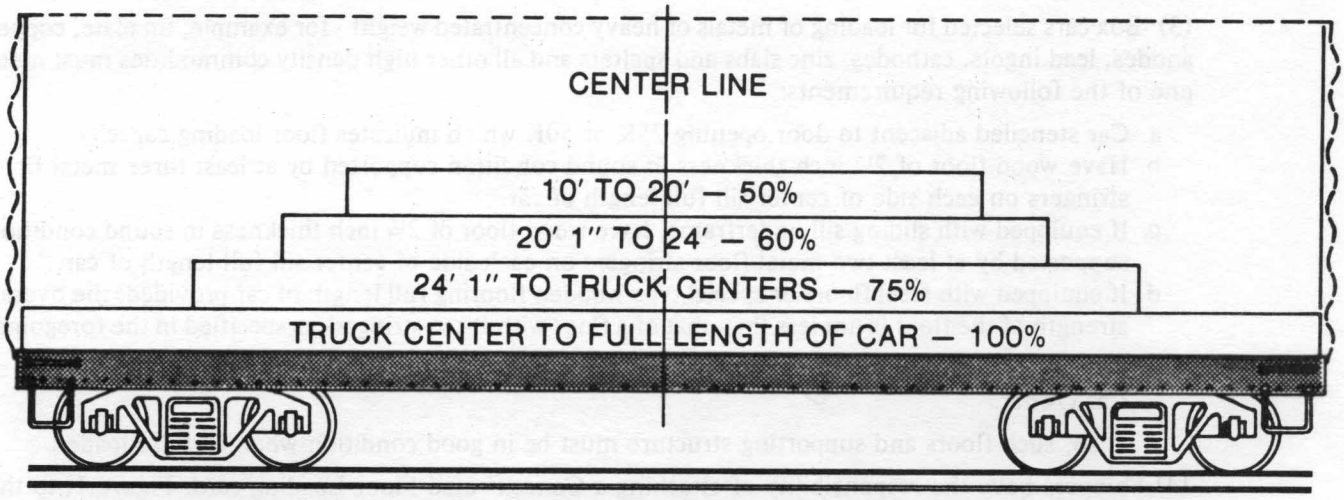
(A) The weight of load in car must not exceed the load limit stencilled on car.

(B) The weight of load on one truck must not exceed one-half of the load limit stencilled on car.

RULE 4. DISTRIBUTION OF WEIGHT LENGTHWISE IN CARS

(A) For all box cars except staggered double-door cars built prior to 1966, the percentages of stencilled load limits, as shown below, must not be exceeded for loads located between truck centers, measuring lengthwise of car, unless car owner has otherwise designated by note in the Official Equipment Register that these percentages may be changed.

10 ft. to 20 ft. 50%
20 ft. 1 inch to 24 ft. 60%
24 ft. 1 inch to truck centers 75%
Truck centers to full length of car 100%



(B) For staggered double-door box cars built prior to 1966, the percentages listed in Rule 4(A) will be as shown below:

Inside Length of Car		Length of Load
40 ft.	**50 ft.**	
40%	35%	10 ft. to 20 ft.
45%	40%	20 ft. 1 inch to 24 ft.
75%	75%	24 ft. 1 inch to truck centers
100%	100%	Truck centers to full length of car.

Further, if the maximum load is 40% of stencilled load limit, the provisions of Rule 3(A) and (B) would not apply.

(C) Weight of material loaded in either end between truck centers and end of car must not exceed 15% of stencilled load limit for box cars built prior to January 1, 1966, and 25% for cars built subsequent January 1, 1966.

(D) When loading covered hopper cars all compartments are to be uniformly loaded to an equal height unless the car is listed in The Official Railway Equipment Register as being designed for unequal compartment loading. When loaded with high density material to gross rail load and less than 60 percent of available volume, car owner must be contacted for approval.

(E) Covered hopper if subjected to stopover unloading may have the compartments listed below partially or completely unloaded:

(1) 2 compartment car — not permitted.
(2) 3 compartment car — both end compartments or the center compartment.
(3) 4 comparment car — both center or both end compartments.

Consignee must inspect car before releasing to ensure that remaining load is equally distributed and meets the provisions of Rule 5.

(F) When length of load is less than the distance between truck centers, and load is not located in center of car, the center of load weight must not be nearer to either truck center than shown below:

When load weight is reduced to	50% or less	Any place between truck centers.
	60%	One-sixth distance between truck centers.
	66.6%	One-fourth distance between truck centers.
	75%	One-third distance between truck centers.
	87%	Three-sevenths distance between truck centers.
	90%	Nine-twentieths distance between truck centers.

(G) When crosswise bearing pieces are used, the distance between the outside bearing pieces (center to center) must exceed the minimum distances specified in above Rules (A) and (B) for that percentage of the stencilled load limit being loaded and in sufficient number to assure uniform distribution of lading on car floor.

(H) Bearing pieces lengthwise of car, extending beyond the lading may be used in order to spread weight distribution over a greater area. In such cases, "length of bearing pieces" is substituted for "length of load" in above Rules (A) and (B). Bearing pieces must definitely be of suitable strength in relation to percentages stated and continuous and in sufficient number to assure uniform distribution of lading on car floor.

(I) No lengthwise shift of lading is permissible unless load is secured as a floating unit under the following conditions:

(1) All recommended securement and doorway protection methods are observed.

(2) Retardation aids are used on all floating loads in closed cars where specified in individual loading pamphlets to prevent excessive shifting on car floor.

RULE 5. DISTRIBUTION OF WEIGHT — CROSSWISE OF CAR

(A) The load must be located so that the weight along both sides of car is about equal for the entire length of the load.

(B) When the load is of such a character that it cannot be placed so as to obtain equal distribution of weight, crosswise of car, suitable ballast properly secured must be used to equalize the weight.

(C) In box cars lading must be secured to prevent tipping or moving towards car sides where the vacant space across car exceeds the following:

(1) A total of eighteen (18) inches between lading and lading and car sides.

(2) Vacant cross car space of less than 18 inches as may be specified in pamphlets covering methods for loading, bracing and blocking carload shipments of individual commodities.

(D) (1) Box cars equipped with adjustable side wall fillers at diagonally opposite sides of car, for filling void space crosswise of car, may be used providing such space does not exceed 15 inches. All lateral void space must be taken up when using adjustable side wall fillers.

(2) Box cars equipped with full side wall fillers at both sides in both ends of car, for filling void space crosswise of car, may be used provided such space does not exceed 6 inches from each side of car. All lateral void space must be taken up when using adjustable side wall fillers.

(E) Partial unloading of covered hopper cars crosswise of car or complete unloading of any compartment along one side, in cars with longitudinal partition sheets, is prohibited.

GENERAL RULES — CLOSED CARS

RULE 6. LOADING, BLOCKING AND BRACING — BOX CARS

(A) Lading must be so loaded and secured so as to permit unloading from either side of rail car, EXCEPT when dimensions of individual units of freight prohibit.

(B) All lumber used for blocking and bracing must be of sound material, free of defects which impair its strength or interfere with proper nailing.

(C) Machines and other items, having high center of gravity or narrow base, must be secured to prevent them from tipping over in transit.

(D) When car floor is not satisfactory for use of material handling equipment in loading and/or unloading operation, suitable steel plates or other adequate material must be placed in car to facilitate use of equipment and prevent equipment from breaking through floor.

(E) High-tension bands or wires securing the load must be machine tensioned and sealed or twist tied, respectively.

(F) Metal protectors, such as corner guards or plates, sufficient to provide a suitable radius must be used to protect bands and wires at all points on lading having sharp edges. Apply so as to prevent displacement.

(G) The manner of attaching metal ties to car walls must be in accordance with the methods prescribed for the individual commodities reducing to a minimum the possibility of anchor plates pulling loose or metal ties shearing.

(H) The threads on rods or bolts used as bracing or blocking, or in connection therewith, must be chisel checked immediately behind single or double nuts to insure nuts remaining in original position. Two or more threads must extend beyond nuts. Not required when nut locks or lock nuts are used and properly seated and torqued to manufacturer's recommended minimum ft.-lb. value.
NOTE: Lock washers are not acceptable substitutes.

(I) Where high-tension bands or high-tension wires are specified in the detailed rules, they may be substituted for each other, if of equal load strength, provided all the other items used to secure the load are equal in number and strength.

(J) Unless otherwise specified in the loading pamphlets, the number of bands or wire for rigid braced loads must have the combined joint strength in each longitudinal impact direction, equal the weight of the lading being secured.

(K) The proper combination of steel bands or wire, seals and sealing tools must be used to provide the minimum joint strength for sizes listed below.

Width & Thickness Inches	Minimum Joint Strength-Pounds	Recommended Minimum No. of Pairs of Notches on Joint	Recommended Minimum No. of Pairs of Crimps on Joint		
			Surface Finish		
		Surface Finish All Types	Uncoated Dry	Coated Not Waxed	Waxed
1¼ x .031	3400	2	3	4	4
1¼ x .035	3400	2	3	4	4
1¼ x .044	5100	4	4	4	4
1¼ x .050	5100	4	4	4	4
2 x .044	8075	4	4	4	4
2 x .050	8075	4	4	4	4

Notes — A sufficient number of seals must be applied to accommodate the recommended number of pairs of notches or crimps.

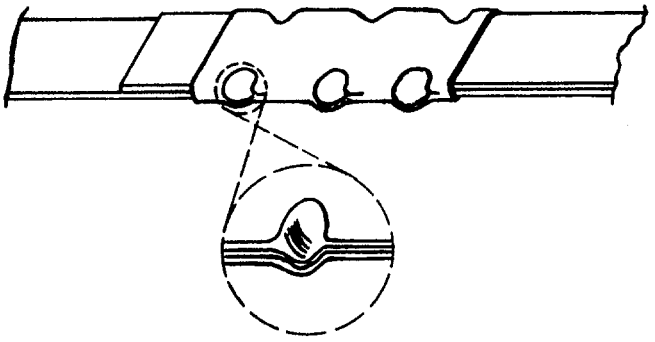
The above recommended minimum number of notches or crimps are based on current general recommendations of high-tension banding manufacturers on the basis of tensioning and sealing tools being in proper operating condition. A lesser number of notches or crimps may be used provided the shipper can demonstrate that the joint has the minimum strength shown in table under column "Minimum Joint Strength — Pounds".

GENERAL RULES – CLOSED CARS

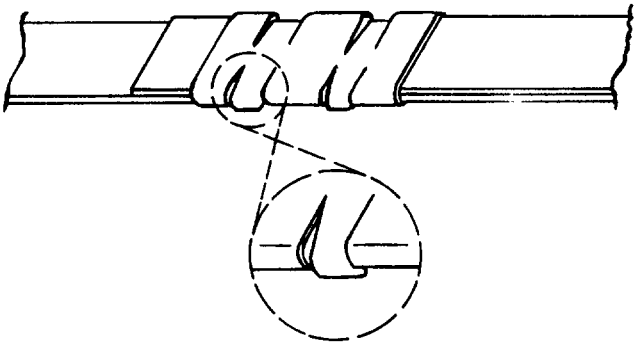
In all cases, a sufficient number of notches or crimps must be used to achieve the minimum joint strength — pounds, as shown in the column headed "Minimum Joint Strength — Pounds".

Users of tensioning and sealing equipment should be properly instructed in the correct use of these tools and tools should be checked periodically to ensure their efficiency.

Following are illustrations of crimp and notch types of seal joints:



CRIMP-TYPE JOINT
THREE PAIR SHOWN



NOTCH-TYPE JOINT
TWO PAIR SHOWN

High-tension band sizes 1¼" and 2" used for load securements, are to be marked to indicate manufacturer's or supplier's name and the letters "AAR".

Markings shall consist of the letters "AAR", the manufacturer's or distributor's name, or abbreviated name, or registered trademark, or symbol, or AAR code consisting of two digits. Markings shall be in characters not less than 1/8" high for steel die imprint and not less than 1/4" high for paint, ink surface printing or embossing, spaced at not more than 5 foot intervals.

The following methods of marking for purpose of identification have been assigned to manufacturers and suppliers whose products have been tested by the AAR and found to meet the requirements of this Rule.

Name	Method of Marking	Markings
Acme Steel Company of Canada, Ltd.	Ink Print	AAR 22
American Banding Corporation	Ink Print	AAR 24
Brainard Strapping Division, Sharon Steel Corporation	Ink Print	AAR 26
Delta Strapping Industries	Ink Print	AAR 27
A.J. Gerrard & Company	Steel Die Imprint	AAR 28
Gibraltar Steel Corporation	Steel Die Imprint	AAR 29
Interlake, Incorporated	Steel Die Imprint	AAR 30
Pacific Steel & Supply	Ink Print	AAR 32
Samuel Strapping Systems, Ltd.	Ink Print	AAR 33
Signode Corporation	Paint Emboss	AAR* [redacted]
Signode Canada, Ltd.	Ink Print	AAR 35
Stanley Strapping Systems, Division of The Stanley Works	Ink Print	AAR 36
Stanley Strapping Systems, Division of The Stanley Works, Ltd.	Ink Print	AAR 37
Steel Distributors, Ltd.	Ink Print	AAR 45
U.S. Steel Corporation, Cuyahoga Works	Paint Emboss	AAR 39
United States Steel Supply Division	Steel Die Imprint	AAR 42
Kasle Steel Corporation	Paint Emboss	AAR 43
Unimart, Incorporated	Paint Emboss	AAR 44
Kohan Kogyo Company, Ltd.	Ink Print	AAR ®
Concept Metals, Ltd.	Ink Print	AAR 46

*Reg. Signode Trademark.

IMPORTANT — High-tension bands must be applied to packages and/or loads with markings facing outward.

GENERAL RULES — CLOSED CARS

HIGH-TENSION WIRE

Gage	Diameter Inches	Minimum Joint Strength-Pounds
8	.1620	1700
10	.1350	1700
11½	.1130	1150
12	.1055	1080

(L) The following are the dimensions and breaking strengths of common annealed wire, rods and bolts:

COMMON ANNEALED WIRE

Gage	Diameter Inches	Minimum Breaking Strength-Pounds
3	.2500	2200
7	.1875	1100
8	.1719	950
9	.1562	800
11	.1250	500

RODS AND BOLTS

Diameter Inches	Minimum Breaking Strength-Pounds*
½	5200
⅝	8100
¾	11700
⅞	16200
1	21100
1⅛	25800
1¼	32800
1⅜	38600
1½	46900

*At root of thread.

RULE 7. DOORWAY PROTECTION

When there is a possibility of lading falling or rolling out of doorway or coming in contact with sliding side doors, openings must be protected with wood doorway protection, steel straps or other material of sufficient strength and number and adequately secured. Plug type doors do not normally require doorway protection except with cylindrical items such as rolls of paper or drums. (See applicable commodity pamphlets).

RULE 8. CENTER OF GRAVITY

(A) Combined center of gravity of rail car and contents must not exceed 98 inches above top of rail. In closed cars there is no practical possibility of exceeding this center of gravity limitation except in cars which exceed Plate C. dimensions.

(B) Cars exceeding Plate C dimensions may extend to 17 feet above top of rail. Certain ladings, such as rolled paper, when loaded two layers high may result in excessive combined center of gravity dimension. Determination of loading limitations in cars exceeding Plate C dimensions should be handled with Mechanical Department of origin carrier.

RULE 9. SPECIAL EQUIPMENT

Load protection devices in specially equipped cars must be used in accordance with carrier instructions. Crossmembers or other equipped restraining devices must be left in car when empty and properly secured.

RULE 10. OPENING AND CLOSING OF DOORS

Mechanical trucks (fork lifts, etc.) must not be used to open or close freight car doors unless doors are equipped with special door opening or closing devices.

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GENERAL RULES — CLOSED CARS

LIST OF LOADING PAMPHLETS-CLOSED CARS
(Bracketed date indicates latest issue)

No.	Title
1	Forwarder Freight (June 1973)
2	Wheeled Vehicles (April 1949)
3	Bags-Commodities In (Nov. 1964)
4	Barrels, Drums or Kegs (Nov. 1965)
8	Plywood in Closed Cars (June 1971)
13	Products in Cans and Glass-Loading of (June 1973)
14	Minimum Car Loading Requirements for Freight (Oct. 1977)
18	Cylindrical Steel Containers (Small)-Commodities & Mixed Loads in Larger Steel Drums (Jan. 1955)
21	Machinery (April 1967)
23	Steel Products (April 1977)
26	Gypsum, Plasterboard, Lath & Plaster (April 1963)
34	Tank Cars Transporting Non-Dangerous Commodities (Nov. 1965)
36	Grain & Other Bulk Commodities (Jan. 1971)
38	Unsaturated Roofing Felt (Nov. 1965)
39	Newsprint (Oct. 1970)
40	Vitrified Clay Sewer Pipe (Jan. 1963)
42	Glass, Rolled & Plate (Nov. 1965)
O-T	Div. CIRCULAR
42-F	General Rules-Covering Loading of Carload Shipments of Commodities in Closed Cars (Feb. 1978)
43	Rules Governing the Loading, Blocking and Bracing of Freight in Closed Trailers and Containers For TOFC/COFC Service (March 1976)

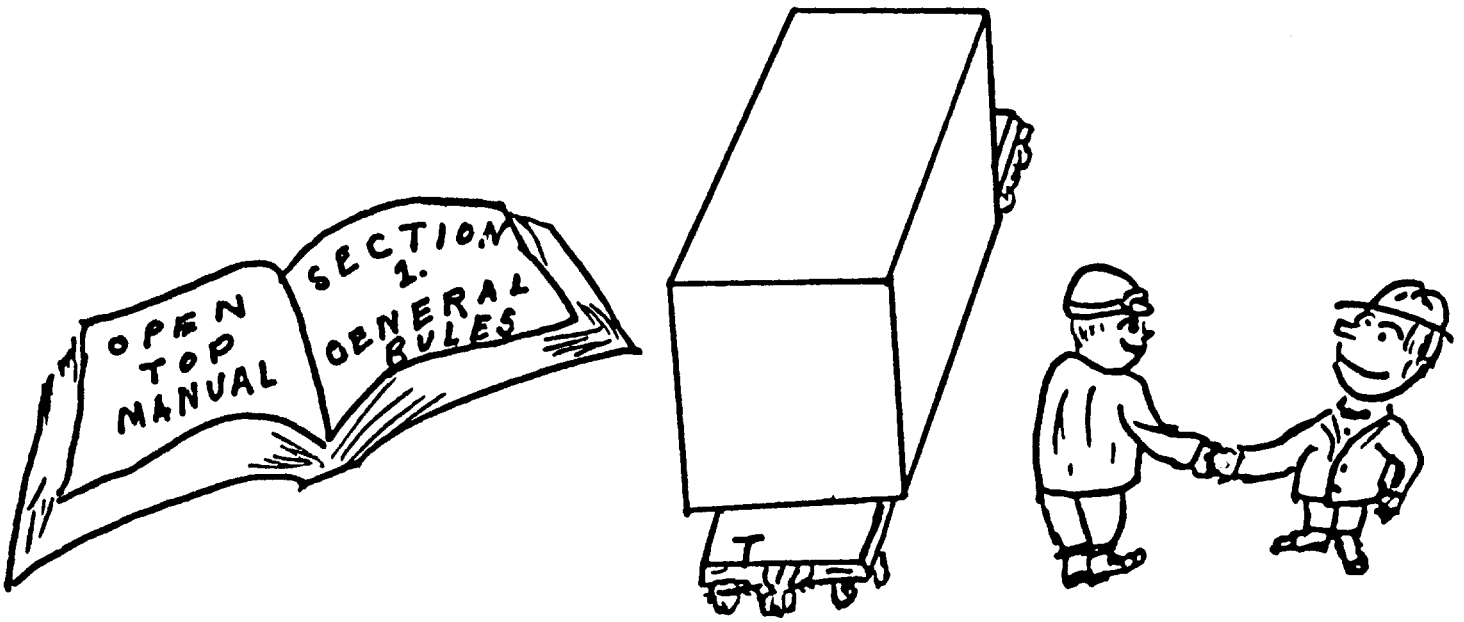
FOR COPIES ADDRESS:
DAMAGE PREVENTION SECTION
ASSOCIATION OF AMERICAN RAILROADS
59 E. VAN BUREN STREET
CHICAGO, ILL. 60605

CONRAIL

EXCERPTS

GENERAL RULES GOVERNING THE LOADING OF COMMODITIES ON

OPEN TOP CARS



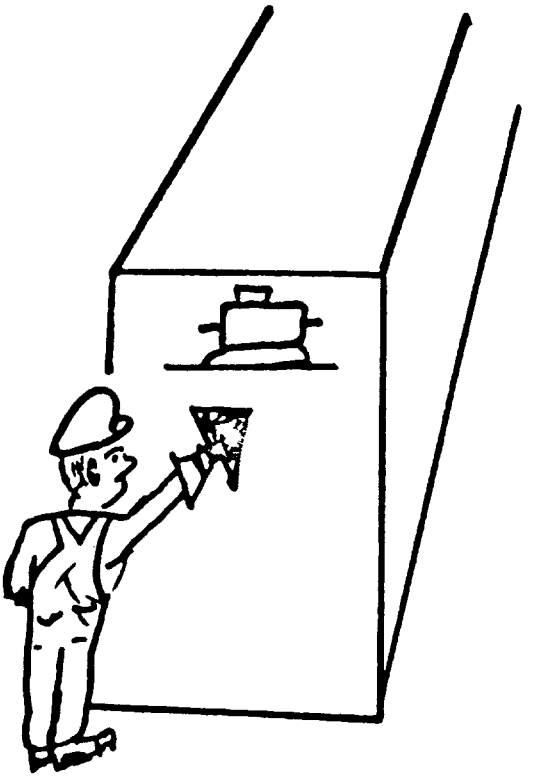
THESE RULES HAVE BEEN FORMULATED FOR THE PURPOSE OF PROVIDING UNIFORM, SAFE AND ECONOMICAL METHODS OF LOADING ON OPEN TOP CARS AND ARE MINIMUM REQUIREMENTS.

ALL OF THE GENERAL RULES AND THE REQUIREMENTS FOR BLOCKING AND SECURING OF LOADS AS OUTLINED UNDER THE INDIVIDUAL FIGURES ARE MANDATORY.

OPEN TOP LOADING RULES

Rule 1 - a-8

FIXED SUPPORTS, BRACKETS OR OTHER APPURTENANCES ON LADING MUST BE OF SUFFICIENT STRENGTH TO SAFELY SUPPORT UNIT IN TRANSIT OR BODY OF SAME MUST BE ADE@UATELY SUPPORTED FOR RAIL TRANSPORTATION.



Rule 1 - a-9

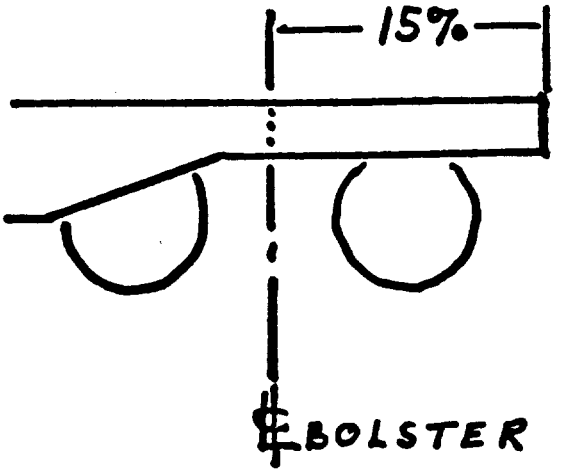
ALL ITEMS DESCRIBED UNDER. THE FIGURES FOR SECURING LOADS MUST BE APPLIED AS SPECIFIED, EXCEPT WHEN OTHERWISE INDICATED UNDER EACH FIGURE.

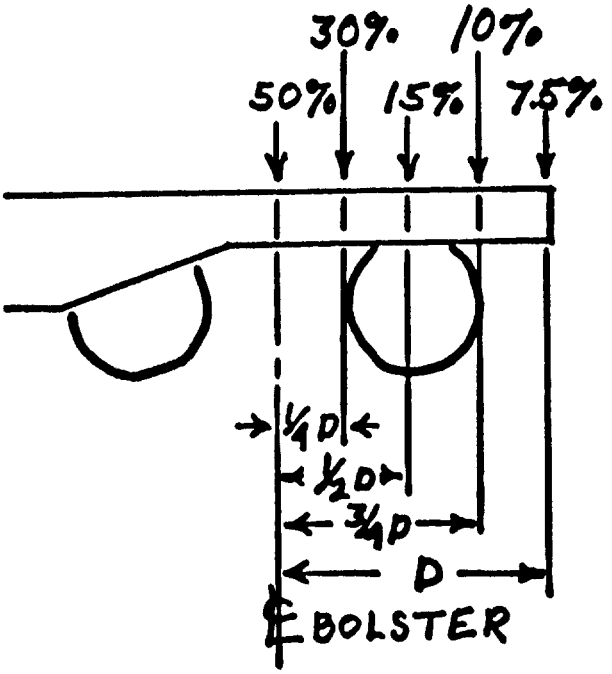
OPEN TOP LOADING RULES

Rule 4 - c

WEIGHT, UNIFORMLY DISTRIBUTED, OF MATERIAL LOADED FROM TRUCK CENTERS TO ENDS OF CAR MUST NOT EXCEED 30% OF STENCILED LOAD LIMIT.

(I.E. 15% EACH END)





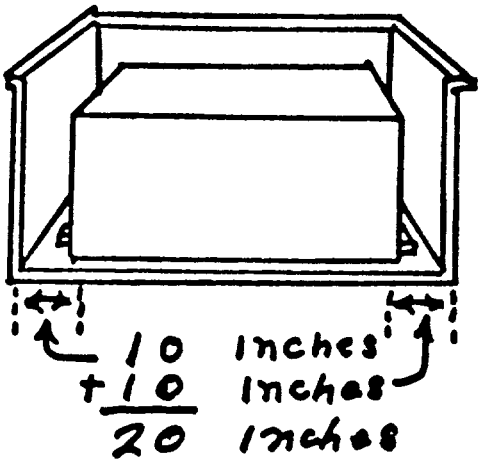
LOAD CONCENTRATIONS BETWEEN BODY BOLSTERS AND END SILLS MUST NOT EXCEED THE FOLLOWING PERCENTAGES:

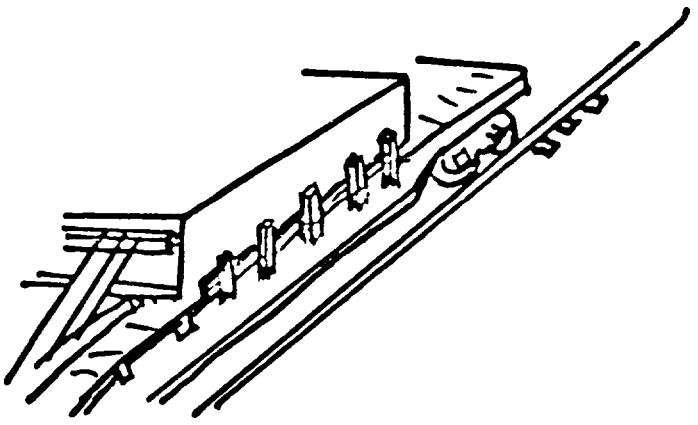
OPEN TOP LOADING RULES

Rule 5 - c

GONDOLA CARS

WHEN SPACE ACROSS CAR - BETWEEN LOAD AND CAR SIDES EXCEEDS 18 INCHES - LOAD MUST BE SECURED TO PREVENT MOVING OR TIPPING TOWARD SIDES OF CAR.





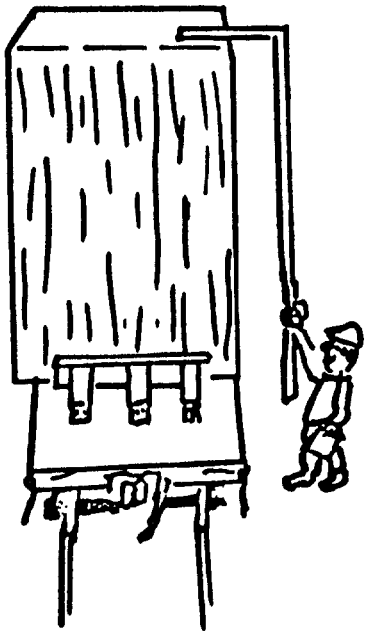
ALL CARS d

REGARDLESS OF VACANT SPACE ACROSS CAR, THE LOAD MUST BE SECURED SO AS TO PREVENT IT FROM FALLING OFF CAR.

OPEN TOP LOADING RULES

Rule 7 CLEARANCES

HEIGHT, WIDTH & LENGTH OF A LOAD ON ONE CAR FOR UNRESTRICTED MOVEMENT MUST BE WITHIN THE CLEARANCE LIMITS OF RAILROADS OVER WHICH IT WILL MOVE.



A SHIPMENT SHOULD BE MEASURED & REPORTED AS A POSSIBLE DIMENSION LOAD ON FORM CT-925 WHEN

1. SHIPMENT EXCEEDS PUBLISHED CLEARANCES

2. ANY LOAD EXCEEDING WIDTH OF CAR.

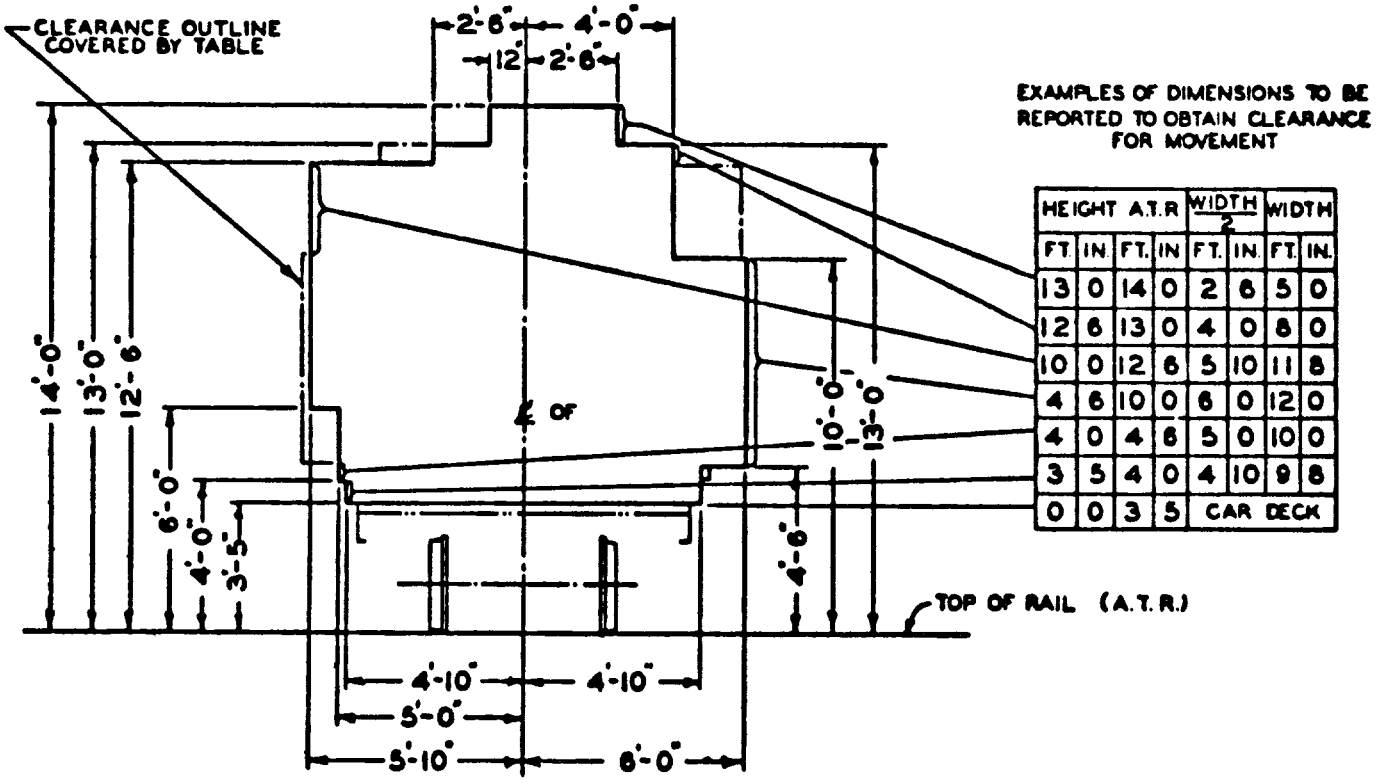
3. ANY SINGLE LOAD WITH OVERHANG, UNLESS OVERHANG COMES WITHIN A GONDOLA.

4. ANY PIVOTED BOLSTER LOAD.

OPEN TOP LOADING RULES

Rule 7

MEASURING DIMENSIONAL LOADS



EXAMPLES OF DIMENSIONS TO BE REPORTED TO OBTAIN CLEARANCE FOR MOVEMENT

HEIGHT A.T.R				WIDTH ½		WIDTH	
FT.	IN.	FT.	IN.	FT.	IN.	FT.	IN.
13	0	14	0	2	6	5	0
12	6	13	0	4	0	8	0
10	0	12	6	5	10	11	8
4	6	10	0	6	0	12	0
4	0	4	6	5	0	10	0
3	5	4	0	4	10	9	8
0	0	3	5	CAR DECK			

END VIEW
BOX TYPE LOAD

SINGLE LOADS ON OPEN TOP EQUIPMENT THAT COME WITHIN THE MEASUREMENTS SHOWN ABOVE AND MOVING ENTIRELY ON CONRAIL WILL NOT REQUIRE INDIVIDUAL AUTHORITY FROM CLEARANCE BUREAU.

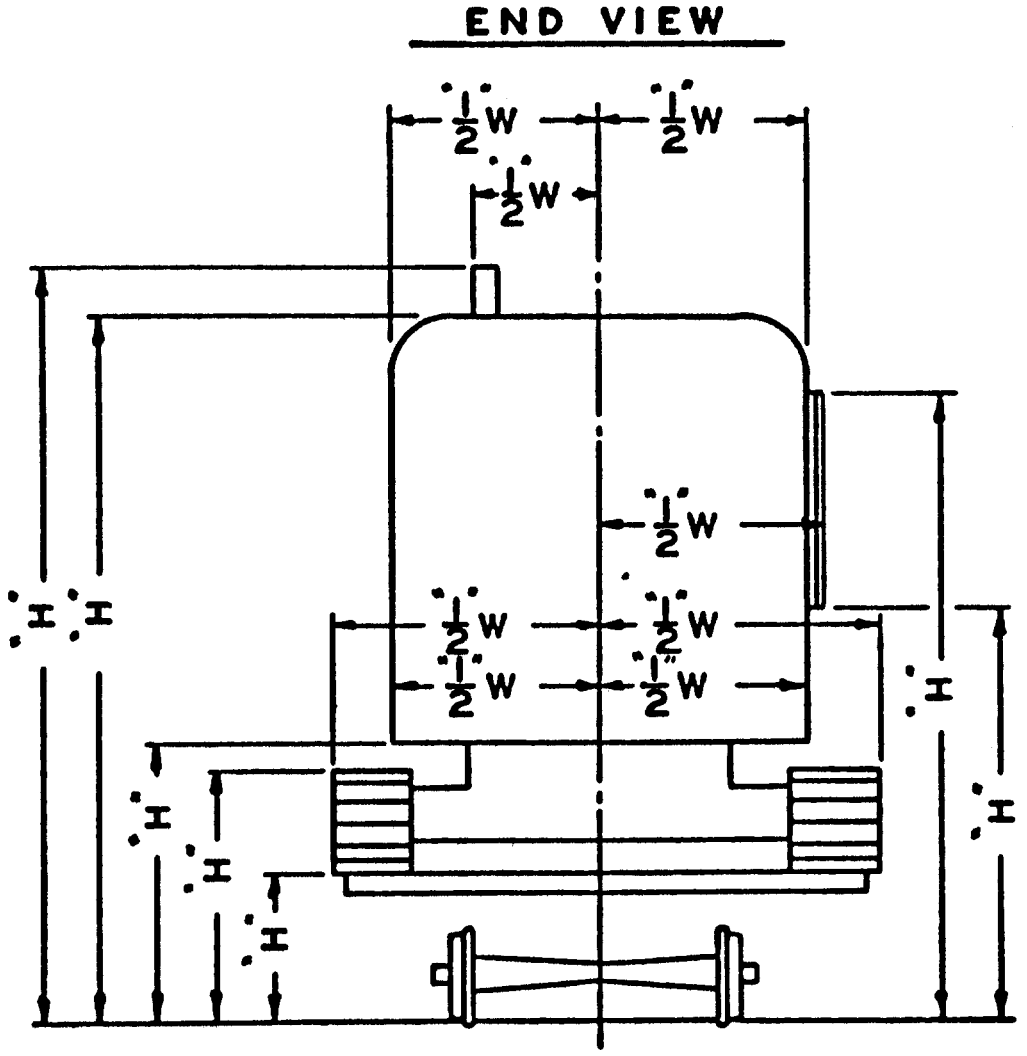
HEIGHT	14'6"	14'2"	14'0"	13'9" 3'5"
WIDTH	9'6"	10'0"	10'4"	10'6" 10'5"

OPEN TOP LOADS WHICH DO NOT MEET THE ABOVE REQUIREMENTS "MUST" BE MEASURED AND REPORTED TO CLEARANCE BUREAU FOR DISPOSITION.

OPEN TOP LOADING RULES

Rule 7

MEASURING DIMENSIONAL LOADS

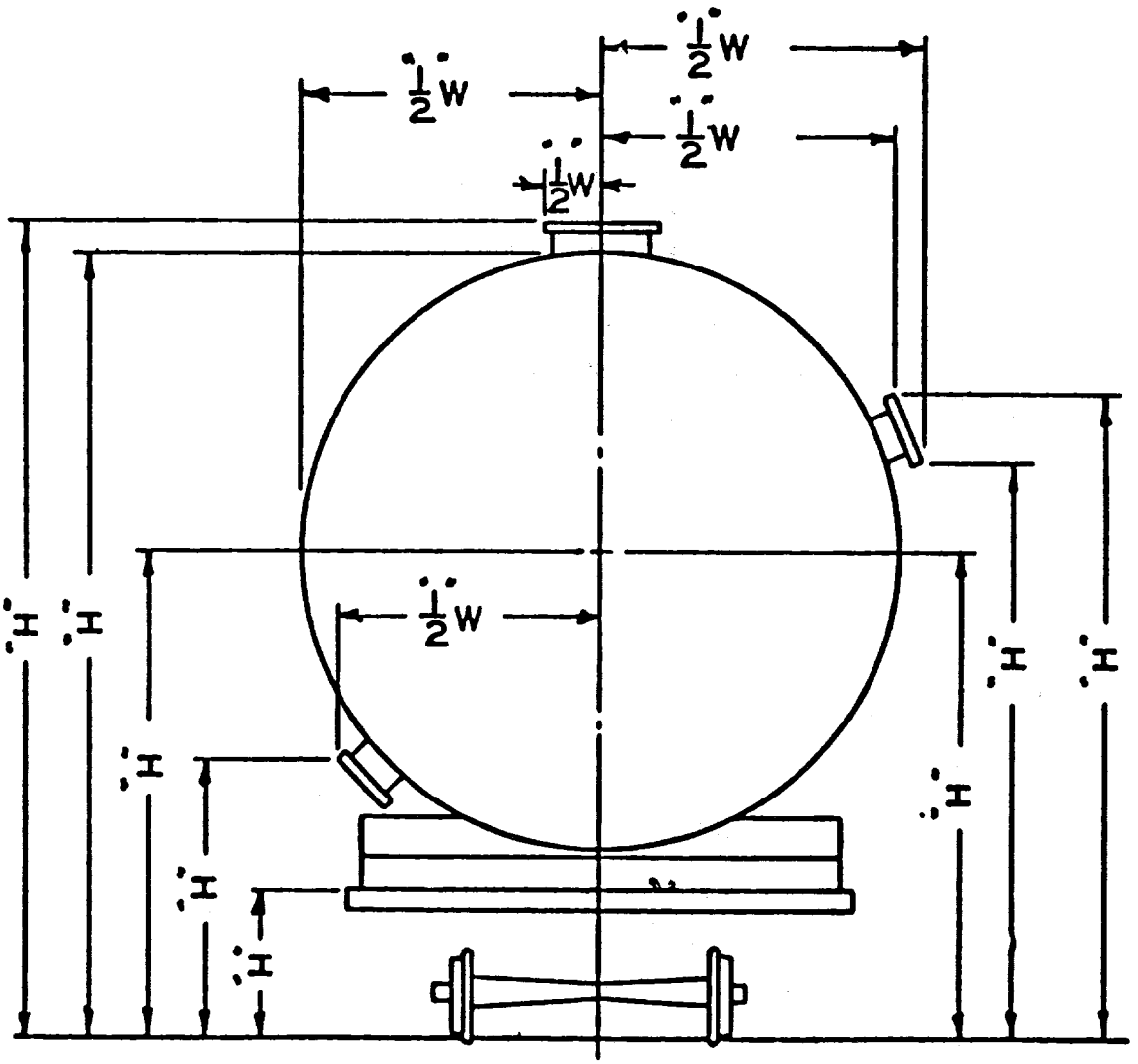


MACHINE TYPE LOAD

OPEN TOP LOADING RULES

Rule 7

MEASURING DIMENSIONAL LOADS

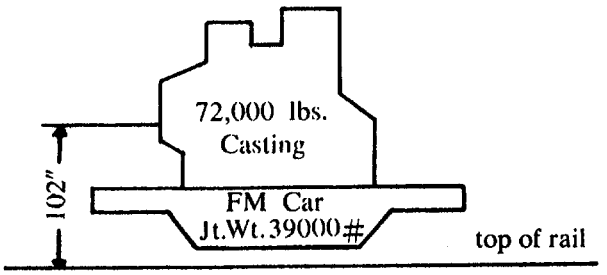


END VIEW

CYLINDRICAL TYPE LOAD

CENTER OF GRAVITY
Methods of Locating—Loaded Cars

Load "B"



Rail

NOTE: When measuring distance from top of rail to center of load—extreme care and judgment must be used to get center of weight of load

Example Load "B"

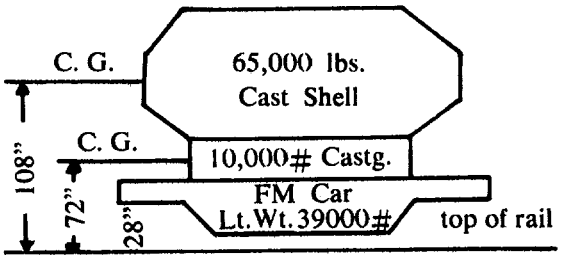
28" x	39,000#	=	1,092,000 @
102" x	72,000#	=	7,344,000
	111,000#		8,436,000
111,000)	8,436,000		(76." Center of grav.

NOTE: Combined center of gravity of car and center of gravity of car and lading must not exceed 84" for normal handling.

@—Center of gravity of cars can be obtained from: Equipment Register — special cars Mechanical Superintendent—standard cars.

CENTER OF GRAVITY
Methods of Locating—Loaded Cars

Load "A"



Rail

NOTE: When measuring distance from top of rail to center of load—extreme care and judgment must be used to get center of weight of load.

Example Load "A"

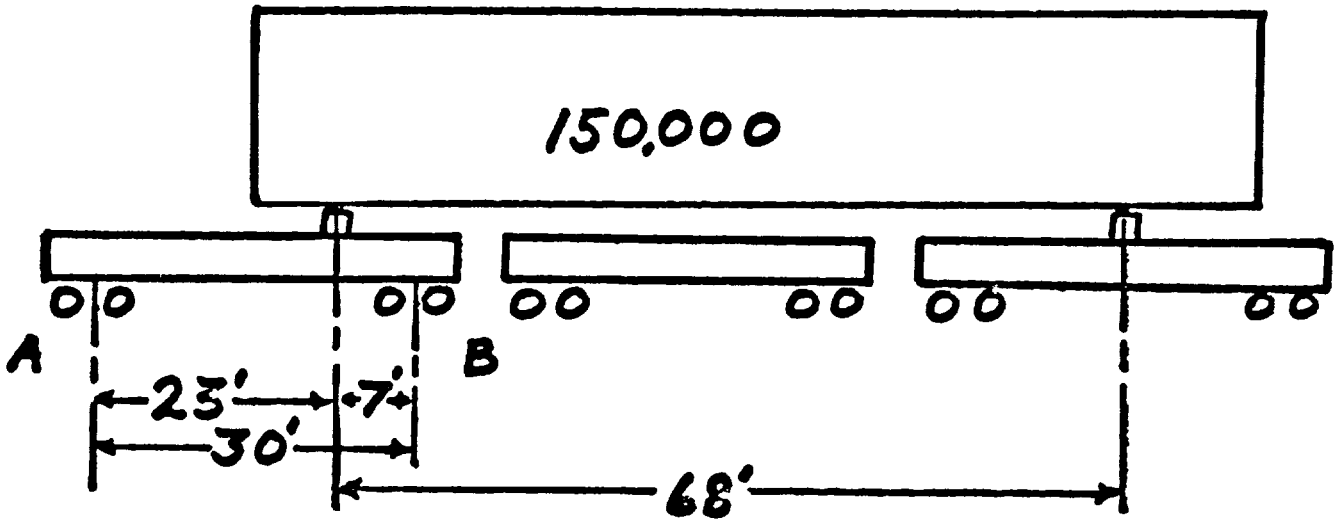
28" x	39,000#	=	1,092,000 @
72" x	10,000#	=	720,000
108" x	65,000#	=	7,020,000
	114,000#		8,832,000
114,000)	8,832,000		(77.4" Center of grav.

NOTE: Combined center of gravity of car and lading must not exceed 84" for normal handling.

@—Center of gravity of cars can be obtained from: Equipment Register — special cars Mechanical Superintendent—standard cars.

OPEN TOP LOADING RULES

METHOD OF CALCULATING WEIGHT ON EACH TRUCK TWIN OR TRIPLE LOAD



23' T_C TO CENTER LINE BEARING

$$\frac{75000 \times 23}{30} = 57500$$

B - END

7' CENTER LINE BEARING TO T_C

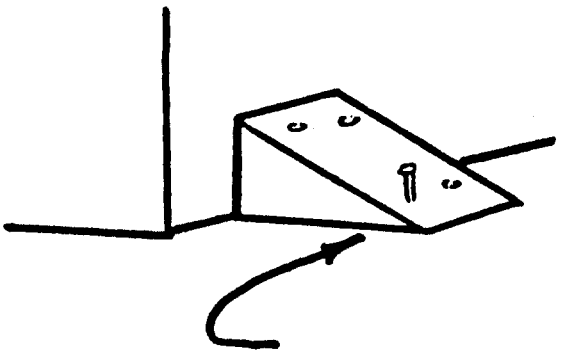
$$\frac{75000 \times 7}{30} = 17500$$

A - END

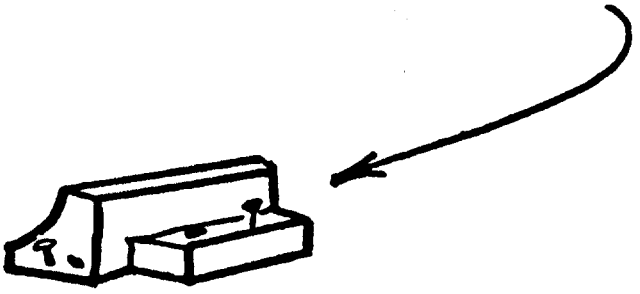
OPEN TOP LOADING RULES

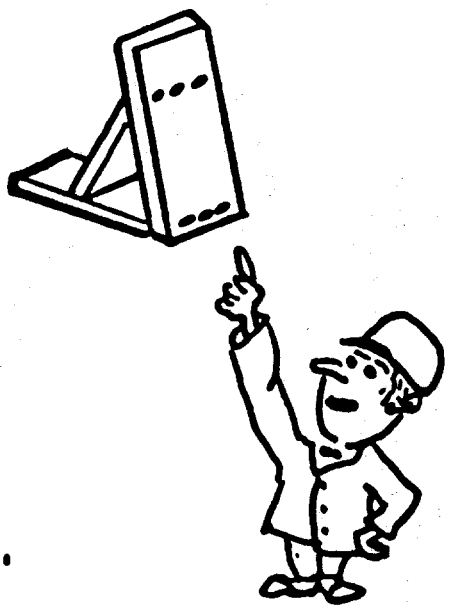
Rule 9

WHEN SLOPING WEDGES ARE USED FOR END BLOCKING AGAINST VERTICAL SURFACES THE FLAT SIDE OF WEDGE SHOULD BE PLACED ON FLOOR.



NAILS OR SPIKES IN THE BLOCKING SHOULD, WHEN PRACTICABLE, BE DRIVEN VERTICALLY.



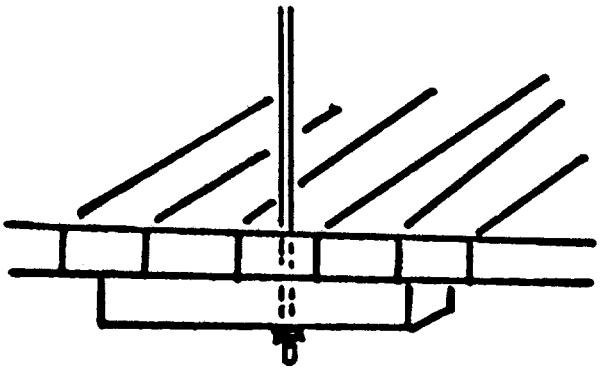


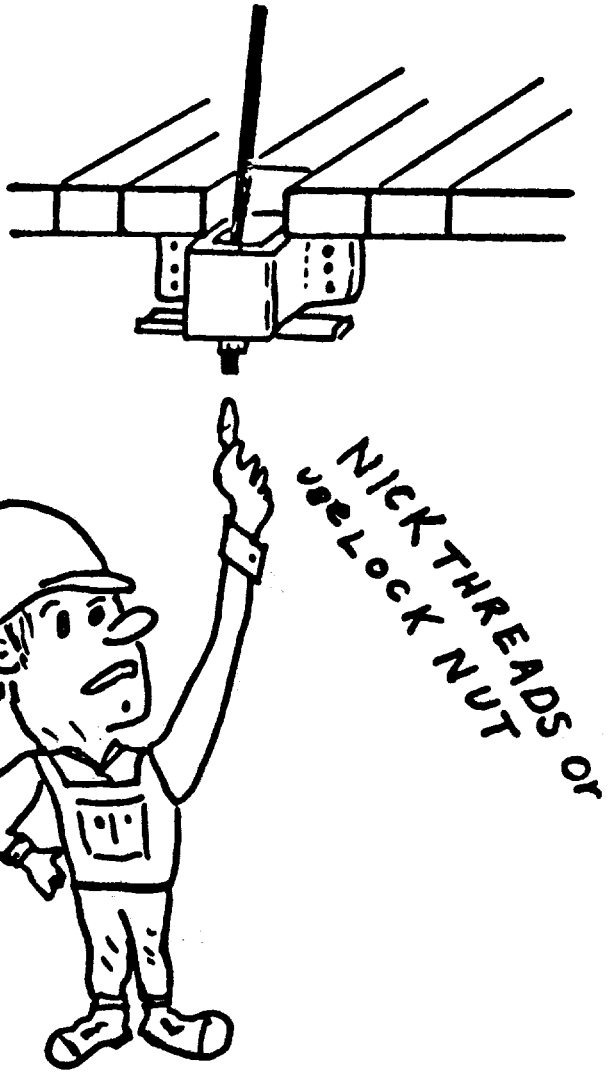
BLOCKING CONSISTING OF 2 OR MORE PIECES - NAILS ONE INCH LONGER THAN THICKNESS OF MEMBER - AND USE ONE NAIL EQUALLY SPACED FOR EACH 2 INCH WIDTH OR FRACTION THEREOF.

OPEN TOP LOADING RULES

Rule 9 - e

WHEN RODS, ETC. USED TO SECURE LOADS NOT COVERED IN DETAIL FIGURES ARE PASSED THRU FLOOR OF CAR, A





4" x 4" x 18"
HARDWOOD CLEAT
OR
1/2" x 4" x 18"
STEEL PLATE MUST
BE PLACED LENGTHWISE
OF CAR UNDER FLOOR.

WHEN RODS, ETC. PASS THRU STAKE POCKETS, A
1/2" x 4" x 10"
STEEL PLATE MUST BE
PLACED LENGTHWISE OF CAR
UNDER STAKE POCKET.

OPEN TOP LOADING RULES

RULE 10-

LAMINATED STAKES PERMISSIBLE

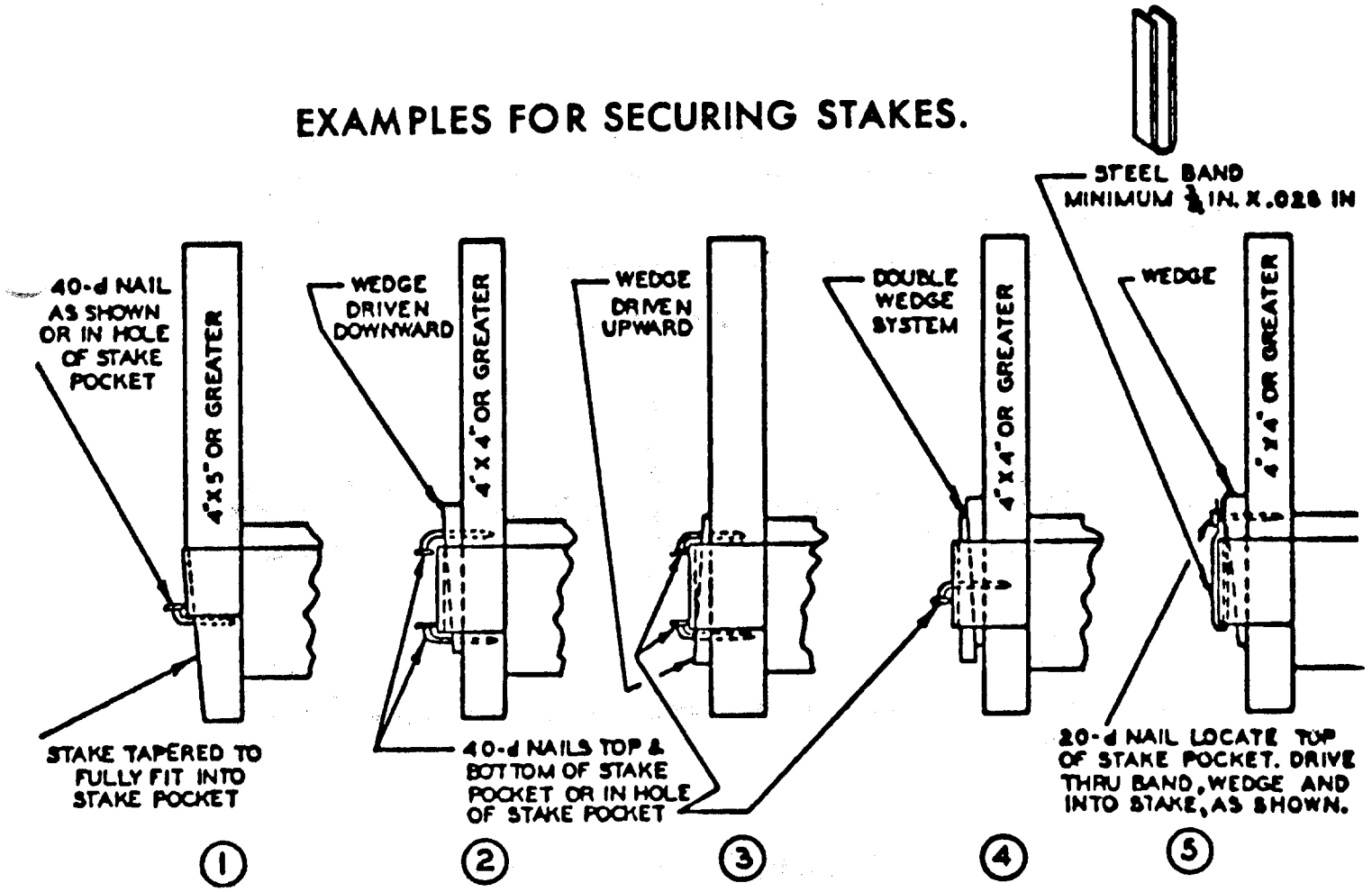
EXCEPT

ON LOADS OF POLES.

3 PAIRS PER PILE 20ft. OR LESS.

4 PAIRS PER PILE OVER 20ft.

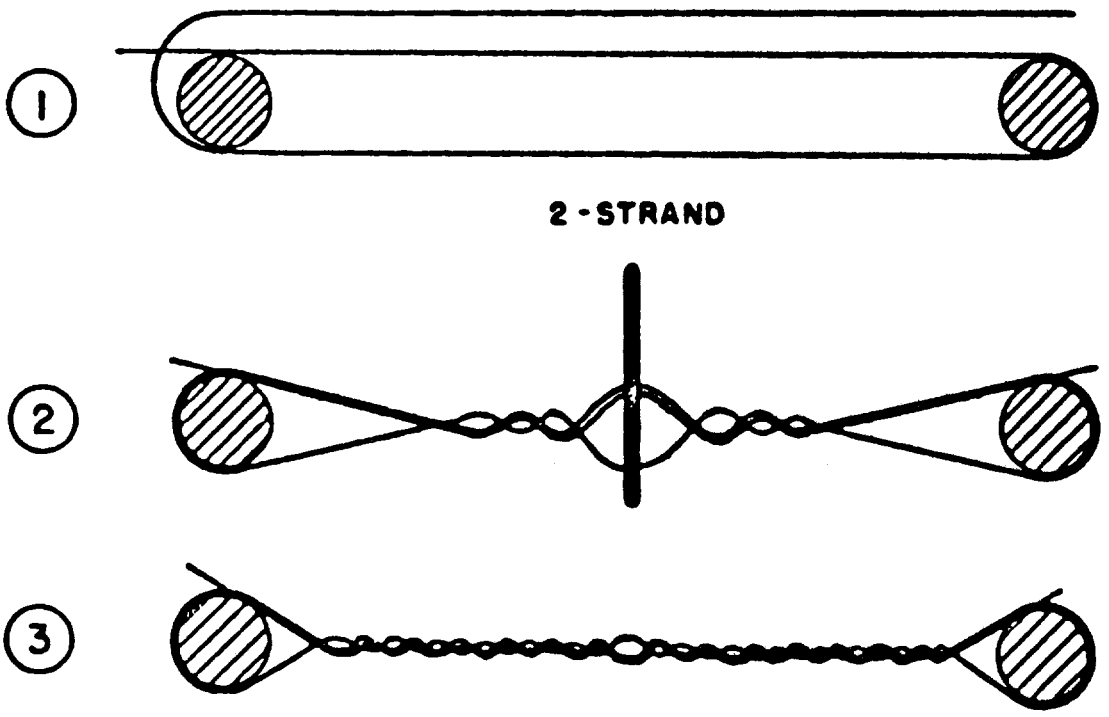
EXAMPLES FOR SECURING STAKES.



OPEN TOP LOADING RULES

Rule 10

EACH COMPLETE LOOP FORMED DOUBLES THE NUMBER OF STRANDS. STAPLE OR BEND NAILS OVER TO PREVENT BANDS OR WIRES FROM WORKING OFF.



EXAMPLES FOR TYING

OPEN TOP LOADING RULES

RULE 11

ALL ATTACHED PARTS OR ACCESSORIES OF A LOAD MUST BE ADEQUATELY SECURED TO PREVENT LOOSENING DAMAGE OR LOSS IN TRANSIT.

RULE 12

VACANT

RULE 13

Rule 14. Nails.

(a) Where nails are designated by penny-weight, for example "40-D", in the rules and detailed figures, they may be either common or cement-coated, unless otherwise specified.

Size of Common Nails				Size of Cement-Coated Nails			
8-D	2½ Inch	20-D	4 Inch	8-D	2⅜ Inch	20-D	3¾ Inch
9-D	2¾ Inch	30-D	4½ Inch	10-D	2⅞ Inch	30-D	4¼ Inch
10-D	3 Inch	40-D	5 Inch	12-D	3⅛ Inch	40-D	4¾ Inch
12-D	3¼ Inch	50-D	5½ Inch	16-D	3¼ Inch	60-D	5¾ Inch
16-D	3½ Inch	60-D	6 Inch				

(b) Power driven nails may be used but the number specified in the applicable figure must be increased by one-third. The approved size substitution is as follows:

Common Nail		Power Driven Nail
10-D	or	8-D or 10-D
20-D	or	16-D or 20-D

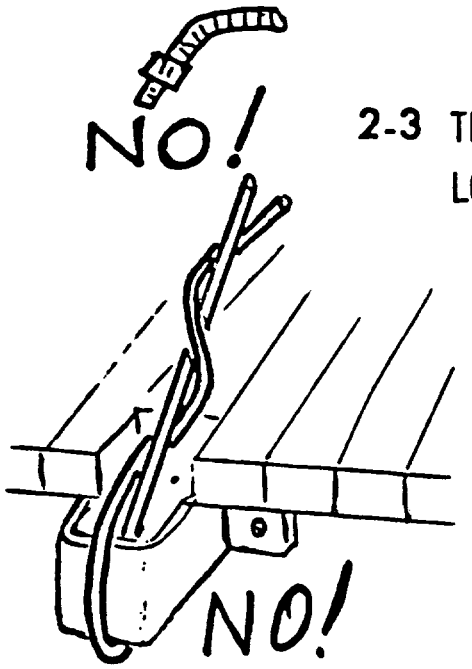
(c) Manufacturers who have had their power driven nails tested by the AAR are listed below with approved nail sizes shown.

Manufacturer	Power Driven Nail Sizes
PASLODE	8-D, 16-D and 20-D
SENCO	8-D and 10-D
FASTENER	8-D and 10-D

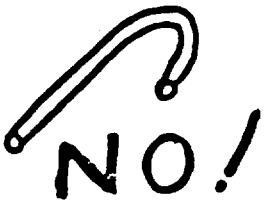
OPEN TOP LOADING RULES

Rule 15 - a-1 BOLTS-RODS-BANDS-WIRE-CABLE-ETC.

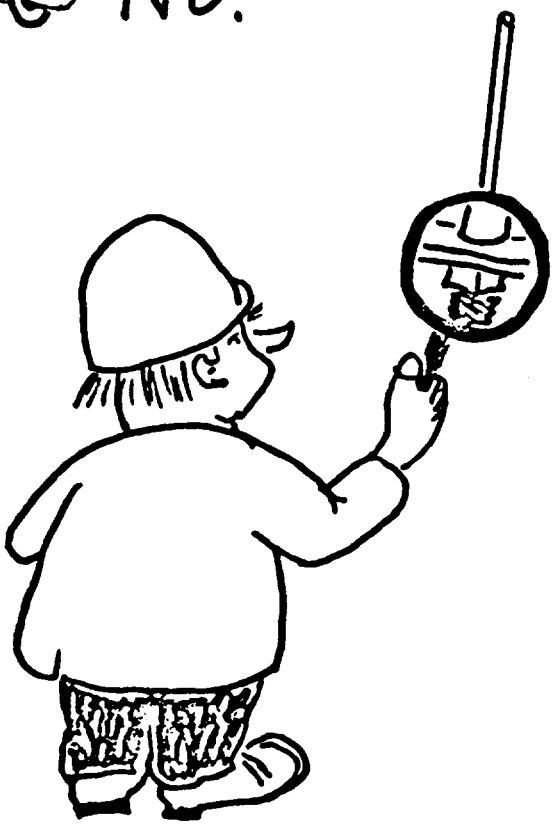
BENDING OF THREADED PORTION IS PROHIBITED



2-3 THE USE OF RODS WITH OPEN HOOK ENDS ON LOAD OR CAR IS PROHIBITED



2-6 BENDING OF RODS AROUND STAKE POCKET AND WELDING PROHIBITED



2-5

TO RETAIN NUTS IN ORIGINAL POSITION 3 OR MORE THREADS ON ROD OR BOLTS MUST BE NICKED IMMEDIATELY BEHIND NUTS. RIVET ENDS OF RODS OR BOLTS OVER WHEN LESS THAN 3 THREADS EXTEND BEYOND NUT.

NOT REQUIRED WHEN NUT LOCKS OR LOCK NUTS ARE USED.

NOTE - LOCK WASHERS ARE NOT ACCEPTABLE SBUSTITUTES.

OPEN TOP LOADING RULES

Rule 15

b-1

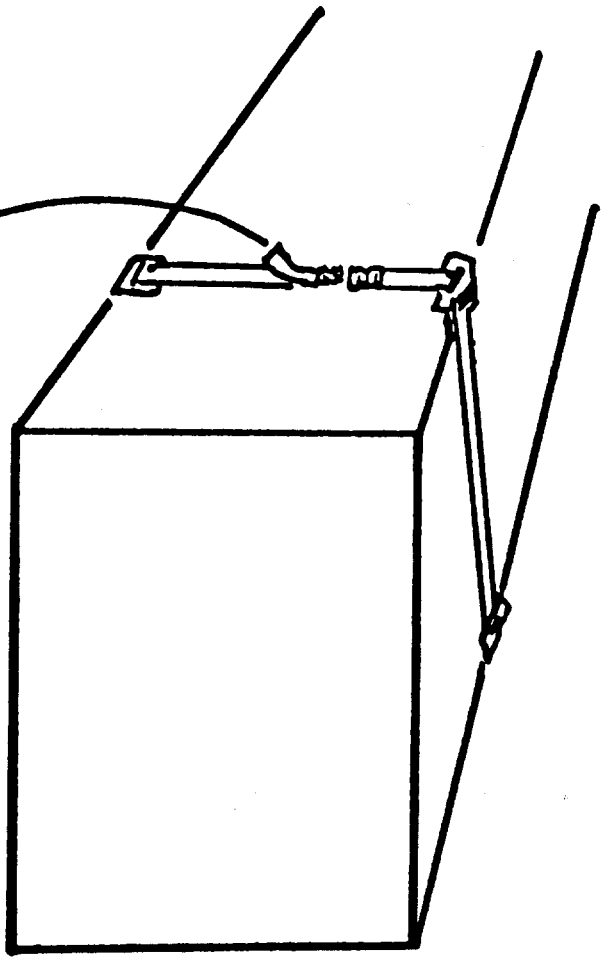
SHIPPER SHOULD BE IN POSITION TO SHOW THAT A BANDING OR WIRE PRODUCT USED FOR SECUREMENT OF OPEN TOP LOADS MEETS A.A.R. REQUIREMENTS.

b-3

BANDS ENCIRCLING PILE MUST BE SEALED ON TOP OF LOAD, WHEN POSSIBLE, AND AS FAR AWAY FROM END OF LOAD AS PRACTICAL.

b-5

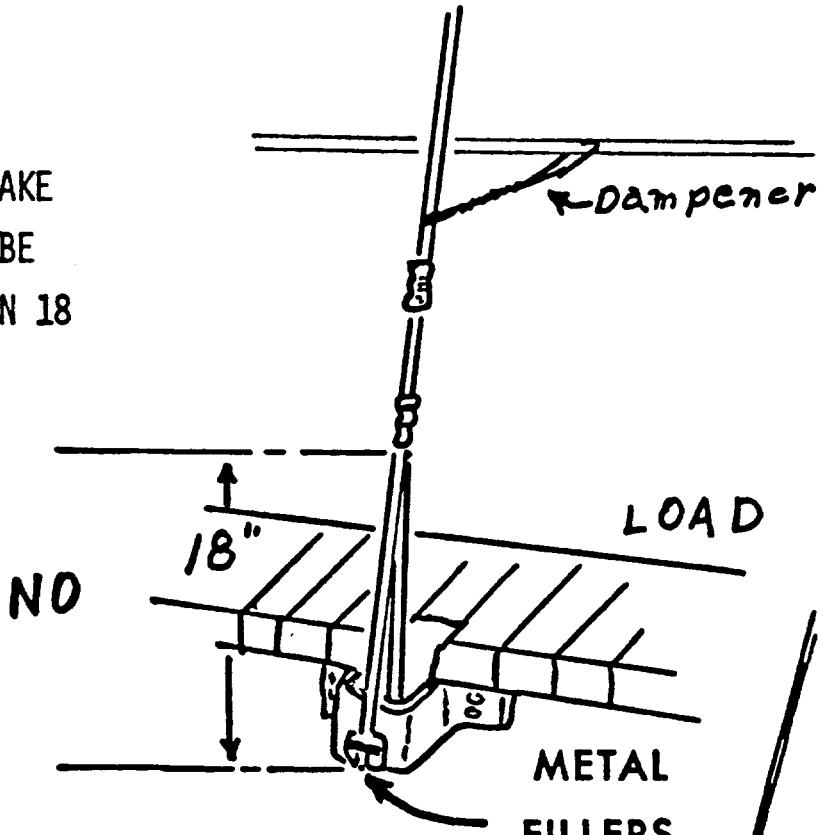
FREE END OF BAND NOT MORE THAN 12" FROM SEAL.

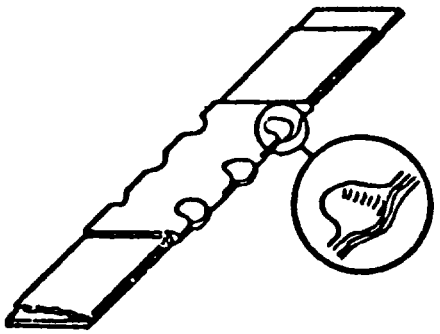


OPEN TOP LOADING RULES

Rule 15 - b-4

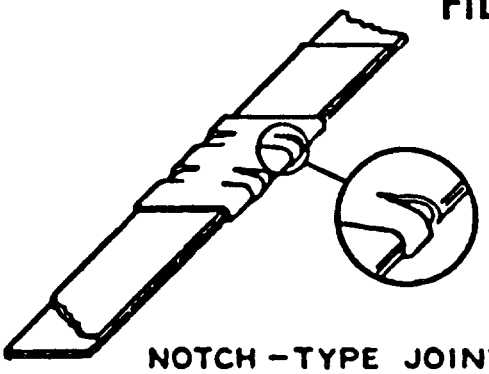
BANDS ATTACHED TO STAKE POCKETS, ETC., MUST BE SEALED NO CLOSER THAN 18 INCHES FROM POINT OF ANCHORAGE.





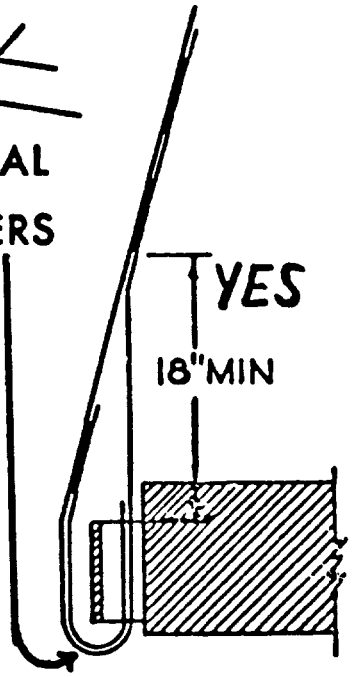
CRIMP-TYPE JOINT
THREE PAIR SHOWN

SKETCH 1



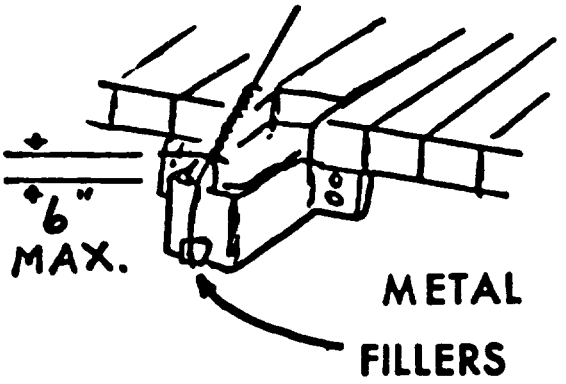
NOTCH-TYPE JOINT
TWO PAIR SHOWN

SKETCH 2



SKETCH 3

C4 HIGH TENSION WIRES MUST BE MACHINE TENSION - LOCATING TWIST TIE OR WASHER ATTACHMENT NOT TO EXCEED 6 INCHES FROM POINT OF ANCHORAGE.



OPEN TOP LOADING RULES

Rule 15

b-7 BANDS MUST BE APPLIED WITH MARKINGS FACING OUTWARD.

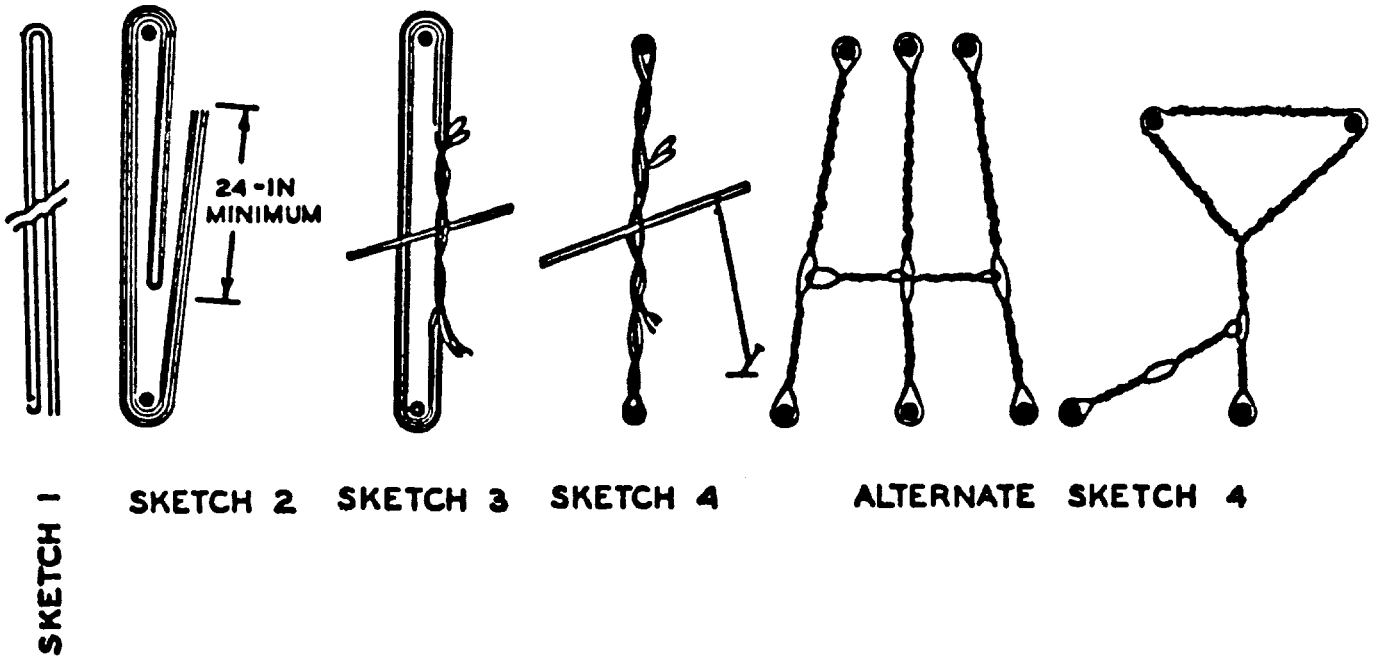
b-8 WELDING OF BANDS OR WIRES FOR ITEMS COVERED IN THESE RULES. **P R O H I B I T E D**

NOTE:

DON'T USE SECOND HAND OR RECLAIMED HIGH TENSION BANDS OR WIRES FOR ITEMS COVERED IN THESE RULES.

OPEN TOP LOADING RULES

Rule 15 - c



Single strand of wire eight times length of span between tie-down points plus 8 feet. Double in half and double in half again.

Apply the strand around one point of attachment and around the other, having strands overlap approximately half way between points of attachment.

Hand-twist the strands ends.

Finish twisting taut at center with appropriate length of pipe, rod, or 8-in. x 8-in. lumber. Do not remove twister. Secure to car floor or tiedown point to prevent untwisting.

Twister may be removed when tie-downs are wired to prevent untwisting as shown above.

OPEN TOP LOADING RULES

Rule 15 - d

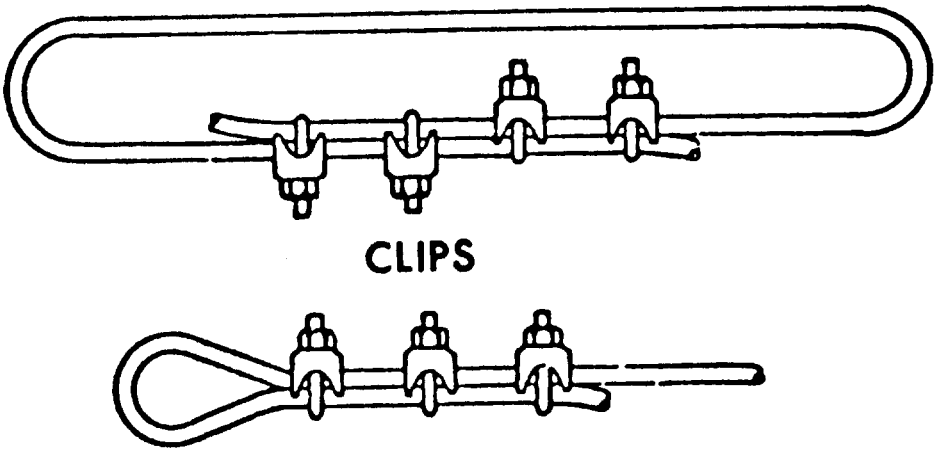
USE PROPER TYPE, SIZE AND NUMBER OF CLIPS OR CLAMPS.

APPLY THIMBLES AT SHARP TURNS AND EDGES.

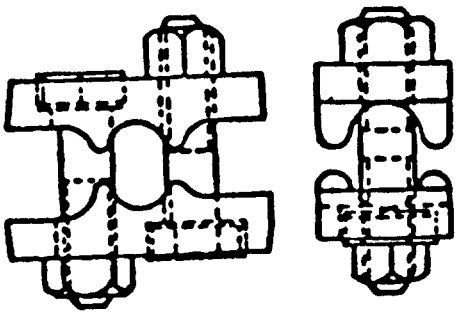
DISTANCE BETWEEN CLIPS/CLAMPS EQUALS 6 TIMES DIAMETER OF WIRE ROPE.

ENDS OF WIRE ROPE MUST OVERLAP A MINIMUM OF 12".

DON'T SADDLE A DEAD HORSE.

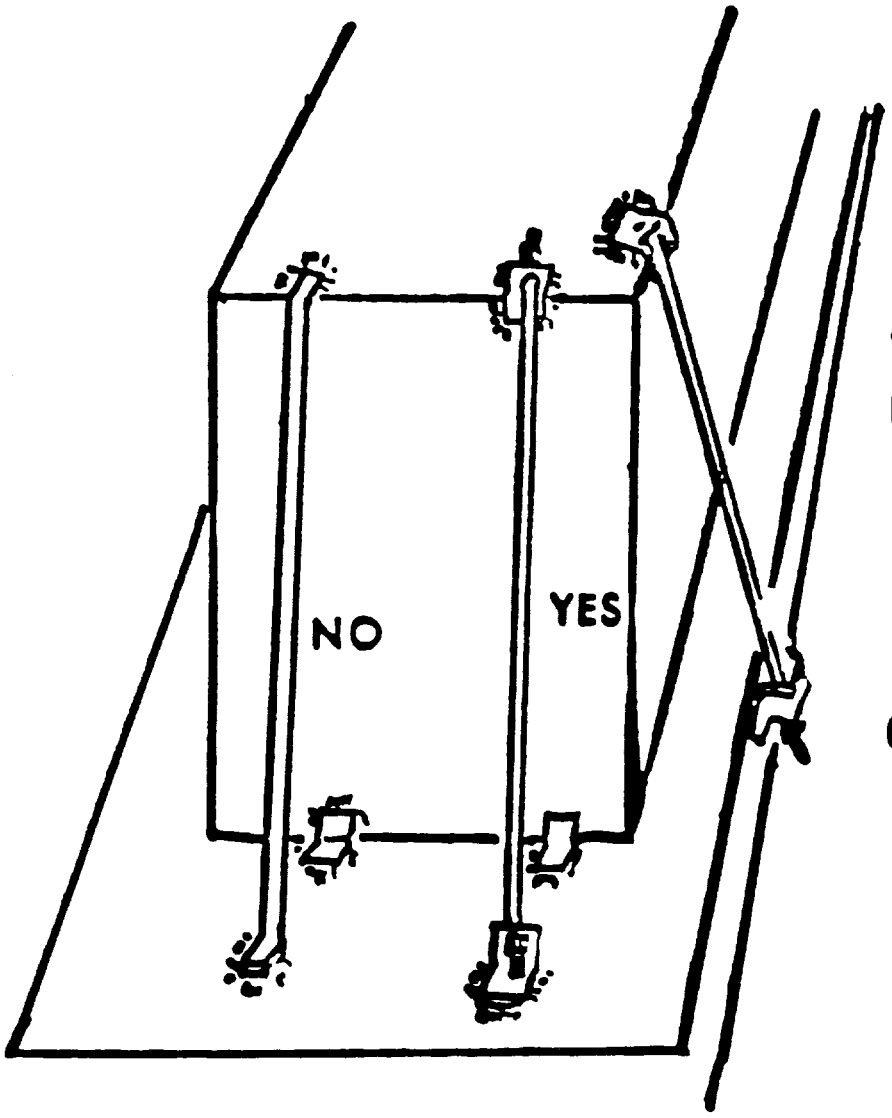


CLIPS



CLAMPS

OPEN TOP LOADING RULES



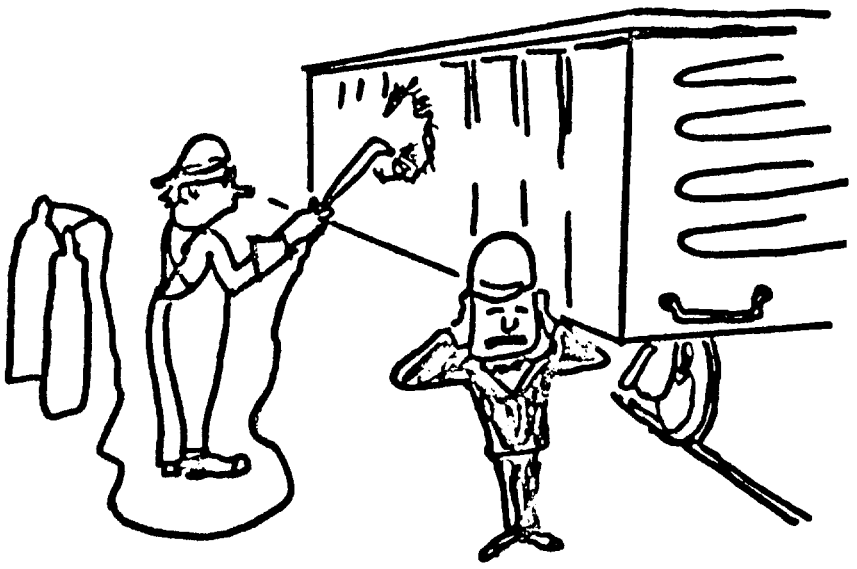
Rule 15 - f

WELDING OF SUCH ITEMS AS RODS, FLAT BARS AND STRAPS DIRECTLY TO BOTH THE LOAD AND CAR IS PROHIBITED.

WELDING OF LOAD DIRECTLY TO CAR IS PROHIBITED.

ONE END OF THE AFOREMENTIONED ITEMS MAY BE WELDED TO EITHER LOAD OR CAR, AND THE OPPOSITE END SECURED IN AN APPROVED MANNER TO PROVIDE FOR RETENSIONING.

OPEN TOP LOADING RULES



Rule 15 - f

HOLES NOT TO EXCEED 1 1/2 IN. MAY BE MADE IN CAR BODIES (EXCLUDING - STAKES, BRACES & SILLS) FOR THE APPLICATION OF WIRES, BOLTS OR RODS AND NOT TO EXCEED 1 IN. DIAMETER IN TOP CORD ANGLES.

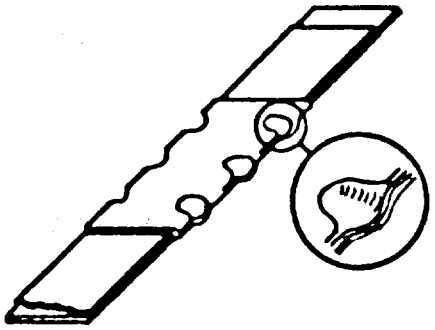
DRILLING HOLES IS PREFERRED TO CUTTING.

SLOTS 1/2" x 2 1/2" MAY BE MADE IN CAR BODIES (EXCLUDING TOP CORD ANGLES, STAKES, BRACES, SILLS) EXCEPT WHEN EQUIPPED WITH LADING STRAP ANCHORS THE LENGTH OF SLOT MUST NOT EXCEED 1 1/2 IN. FOR THE APPLICATION OF WIRES OR BANDS.

OPEN TOP LOADING RULES

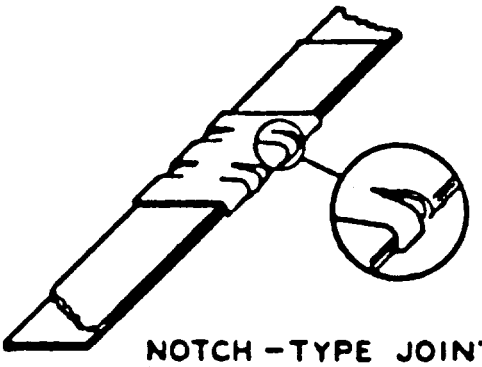
Rule 15 - j-2

A SUFFICIENT NUMBER OF NOTCHES OR CRIMPS MUST BE USED TO ACHIEVE THE MINIMUM JOINT STRENGTH



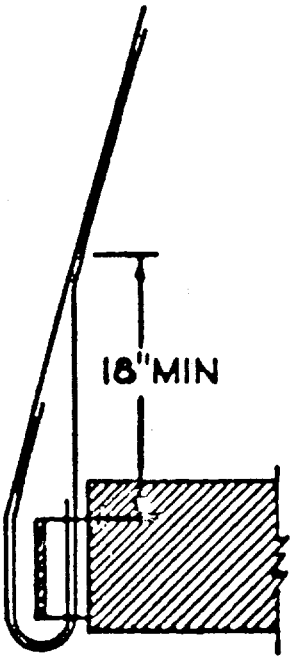
CRIMP-TYPE JOINT
THREE PAIR SHOWN

SKETCH 1



NOTCH-TYPE JOINT
TWO PAIR SHOWN

SKETCH 2



SKETCH 3

j-4

TENSIONING AND SEALING TOOLS SHOULD BE CHECKED PERIODICALLY TO ENSURE THEIR EFFICIENCY.

OPEN TOP LOADING RULES

Rule 15 (continued)

(2) COMMON ANNEALED WIRE

Gage	Diameter Inches	Minimum Breaking Strength—Pounds
3	1/4	2200
7	3/16	1100
8	11/64	950
9	5/32	800
11	1/8	500

(1) HIGH TENSION WIRE

Gage	Diameter Inches	Minimum Breaking Strength—Pounds	Minimum Joint Strength—Pounds
No. 8	.1620	2000	1700
No. 10	.135	2000	1700
No. 11½	.113	1350	1150
No. 12	.1055	1275	1080

HIGH TENSION BANDS

Width & Thickness Inches	Minimum Breaking Strength-Pounds	Minimum Joint Strength-Pounds	Recommended Minimum No. of Pairs of Notches on Joint (Except—See Note 3)	Recommended Minimum No. of Pairs of Crimps on Joint (Except—See Note 3)					
				Surface Finish					
			Surface Finish All Types	Uncoated - Dry		Coated - Not Waxed		Waxed	
1/2 x .020	1280	1000	2	Nil		Nil		Nil	
5/8 x .020	1600	1250	2	Nil		Nil		Nil	
3/4 x .023	2280	1780	2	Nil		Nil		Nil	
3/4 x .025	2280	1780	2	Nil		Nil		Nil	
3/4 x .028	2280	1780	2	Nil		Nil		Nil	
3/4 x .031	2850	2125	2	2		3		4	
3/4 x .035	2850	2125	2	2		3		4	
3/4 x .044	4050	2975	2	2		4		4	
3/4 x .050	4050	2975	2	2		4		4	
1 1/4 x .031	4750	3400	2	3		3		4	
1 1/4 x .035	4750	3400	2	3		3		4	
1 1/4 x .044	6750	5100	4	4		4		4	
1 1/4 x .050	6750	5100	4	4		4		4	
1 1/4 x .065	8900	6940	Nil	4		4		6	
				Std.	Grit	Std.	Grit	Std.	Grit
2 x .044	10600	8075	4	4	4	4	4	6	4
2 x .050	10600	8075	4	4	4	4	4	6	4
2 x .065	13800	10765	4	4	4	4	4	6	4

Plow Steel (6 x 7) Hemp Center

Diameter Inches	Minimum Strength-Pounds	Minimum Joint Strength-Pounds	Minimum Number Clips or Clamps
3/8	8,800	7,400	2
1/2	15,500	13,100	3
5/8	24,100	20,400	3
3/4	34,400	29,200	4
7/8	46,400	39,400	4
1	60,000	51,000	4

Plow Steel (6 x 19) Hemp Center

Diameter Inches	Minimum Strength-Pounds	Minimum Joint Strength-Pounds	Minimum Number Clips or Clamps
3/8	9,200	7,800	2
1/2	16,200	13,800	3
5/8	25,200	21,400	3
3/4	36,000	30,600	4
7/8	48,700	41,400	4
1	63,300	53,800	4

OPEN TOP LOADING RULES

Rule 15 (continued)

(l) **RODS AND BOLTS**
Dimensions and Breaking Strength

Diameter Inches	Minimum Breaking Strength—Pounds*
1/2	5,200
5/8	8,100
3/4	11,700
7/8	16,200
1	21,100
1 1/8	25,800
1 1/4	32,800
1 3/8	38,600
1 1/2	46,900

*At root of thread.

(m) **FLAT BARS AND PLATES**
Dimensions and Breaking Strength*

Size Inches	Minimum Breaking Strength—Pounds	Size Inches	Minimum Breaking Strength—Pounds	Size Inches	Minimum Breaking Strength—Pound
1/16 x 2	5,800	1/4 x 10	102,500	1/2 x 3	57,000
1/16 x 3 1/2	10,300	1/4 x 12	123,000	1/2 x 4	76,000
1/8 x 1	5,500	3/8 x 7/8	12,800	1/2 x 5	95,000
1/8 x 1 3/4	9,600	3/8 x 1 1/8	16,500	1/2 x 6	114,000
1/8 x 2 1/2	13,800	3/8 x 1 1/2	22,000	1/2 x 12	228,000
1/8 x 3 1/2	19,300	3/8 x 1 7/8	27,400	5/8 x 1	23,100
1/8 x 4 1/2	24,800	3/8 x 2	29,250	5/8 x 1 1/8	26,000
3/16 x 2	16,100	3/8 x 2 3/8	34,700	5/8 x 1 1/2	34,700
3/16 x 5	40,350	3/8 x 2 7/8	42,000	5/8 x 1 3/4	40,500
1/4 x 1/2	5,100	3/8 x 3	43,900	5/8 x 2	46,300
1/4 x 7/8	9,000	3/8 x 3 1/2	51,200	5/8 x 3	69,400
1/4 x 1 1/4	12,800	3/8 x 4	58,500	3/4 x 3/4	20,300
1/4 x 1 3/4	18,000	3/8 x 5	73,100	3/4 x 1	27,000
1/4 x 2 1/4	23,100	3/8 x 6	87,750	3/4 x 1 1/4	33,800
1/4 x 2 3/4	28,200	3/8 x 12	175,500	3/4 x 1 1/2	40,500
1/4 x 3	30,750	1/2 x 7/8	16,600	3/4 x 1 3/4	46,300
1/4 x 3 3/4	38,500	1/2 x 1 1/8	21,400	3/4 x 2	54,000
1/4 x 4	41,000	1/2 x 1 3/8	26,100	3/4 x 2 1/2	67,500
1/4 x 4 1/4	43,600	1/2 x 1 3/4	33,300	3/4 x 3	81,000
1/4 x 6	61,500	1/2 x 2	38,000	3/4 x 6	162,000
1/4 x 7	71,750	1/2 x 2 1/8	40,400	1 x 6	210,000
1/4 x 9	92,250	1/2 x 2 5/8	50,000	1 1/8 x 6	229,500

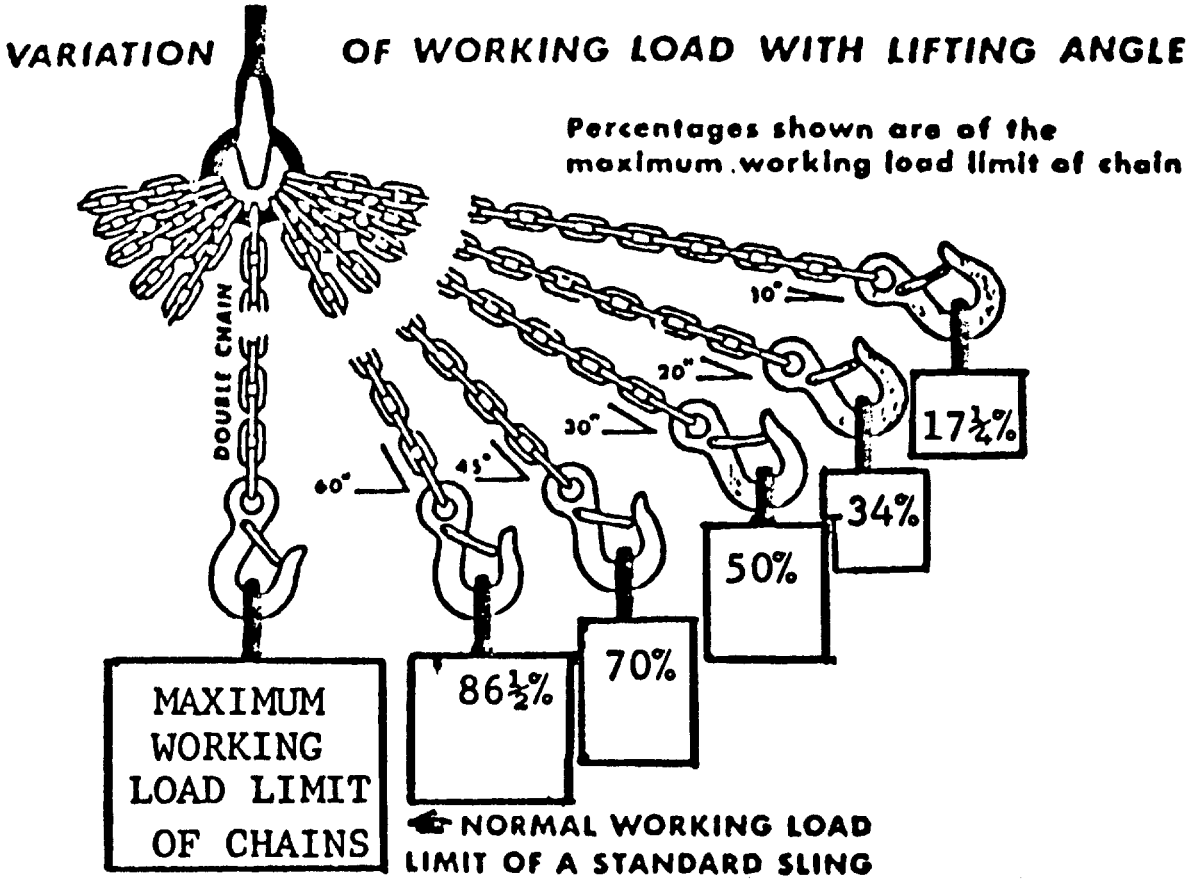
*Breaking strength of flat bars or plates, must be based on sectional area material, measured through bolt hole.

(g) Chain and Chain Assemblies, Dimension and Working Loads

1. Welded link chain working load limit in pounds.

Nominal Size Inches	High Test Steel Chain, ASTM-Spec, A-413 (Latest Rev.)	Alloy Steel Chain, ASTM Spec, A-391 (Latest Rev.)
3/8	5,100	6,600
1/2	8,200	11,250
5/8	11,500	16,500
3/4	16,200	23,000

OPEN TOP LOADING RULES



—Diagram shows how the angle of the sling affects the working load limit.

WORKING LOAD LIMITS, PROOF TEST LOADS AND MINIMUM BREAKING LOADS FOR ALLOY STEEL CHAIN

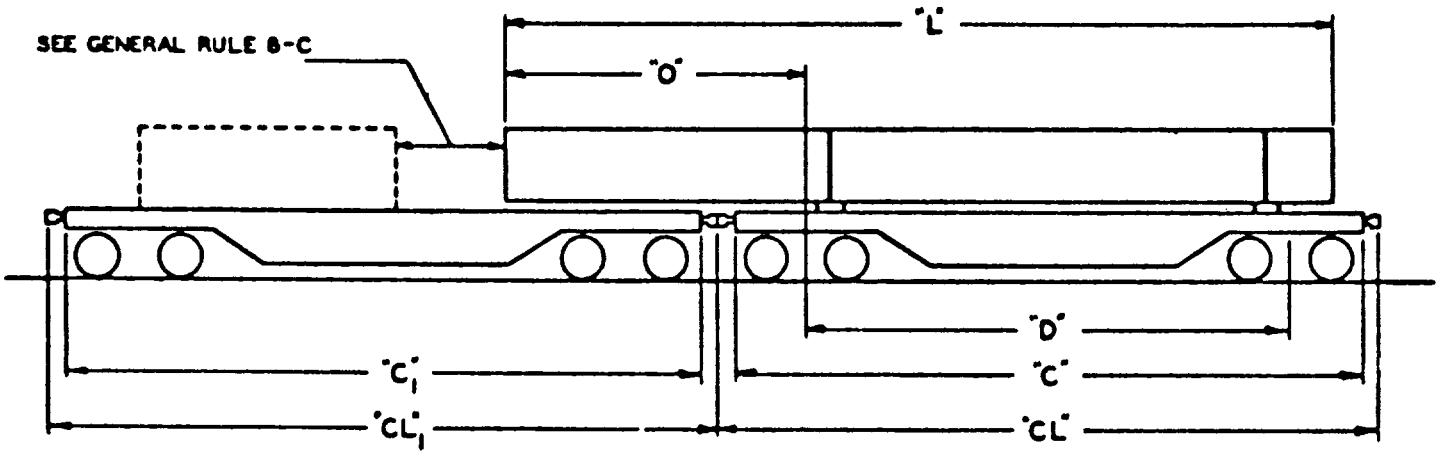
Nominal Size of chain (in.)	*Working Load limit (lb)*	*Proof Test (lb)*	*Minimum Break (lb)*
1/4	3,250	6,500	10,000
3/8	6,600	13,200	19,000
1/2	11,250	22,500	32,500
5/8	16,500	33,000	50,000
3/4	23,000	46,000	69,500
7/8	28,750	57,500	93,500
1	38,750	77,500	122,000
1 1/8	44,500	89,000	143,000
1 1/4	57,500	115,000	180,000
1 3/8	67,000	134,000	207,000
1 1/2	80,000	160,000	244,000
1 3/4	100,000	200,000	325,000

OPEN TOP LOADING RULES

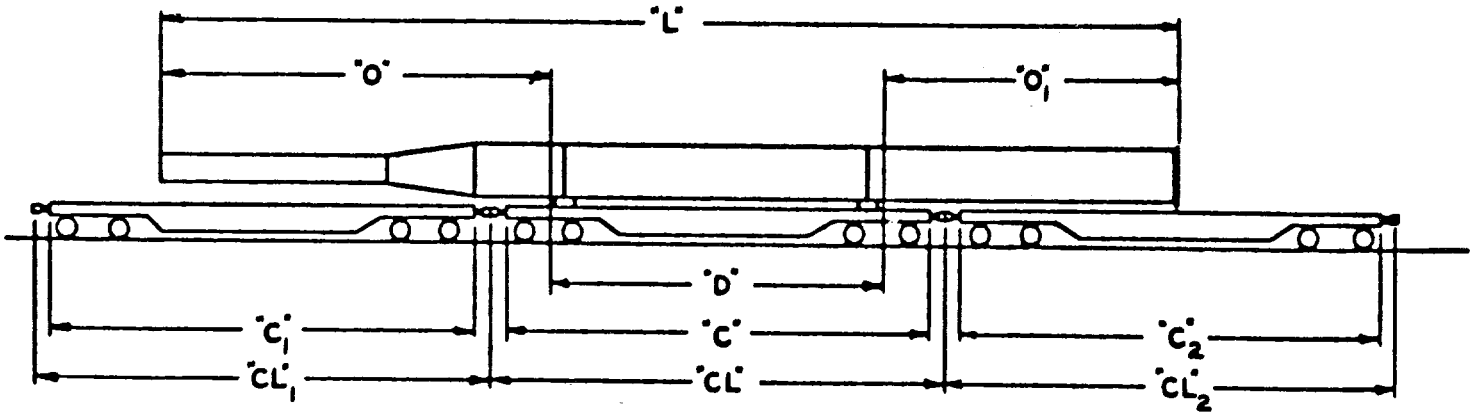
Rule 16

MEASURING DIMENSIONAL LOADS

SINGLE END OVERHANG LOAD



DOUBLE END OVERHANG LOAD

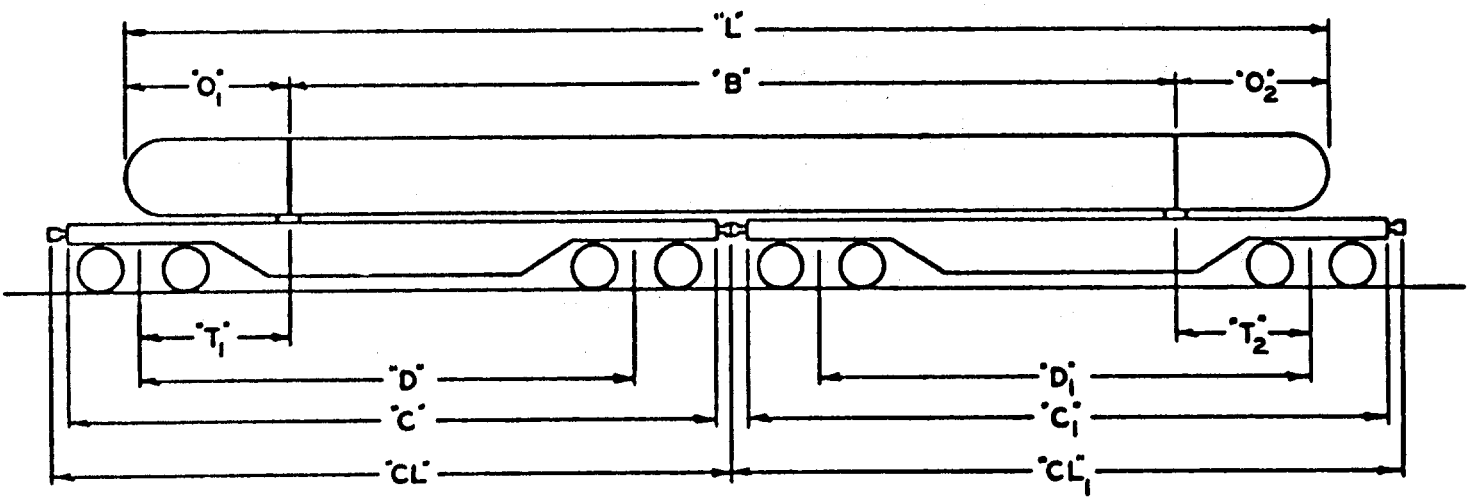


OPEN TOP LOADING RULES

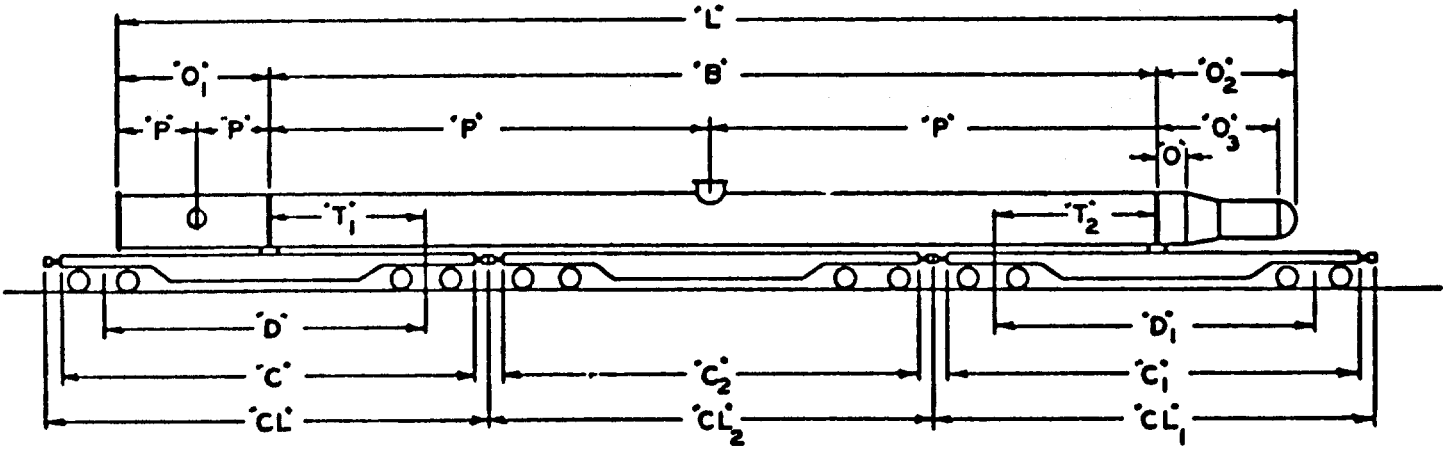
Rule 18

MEASURING DIMENSIONAL LOADS

DOUBLE LOAD



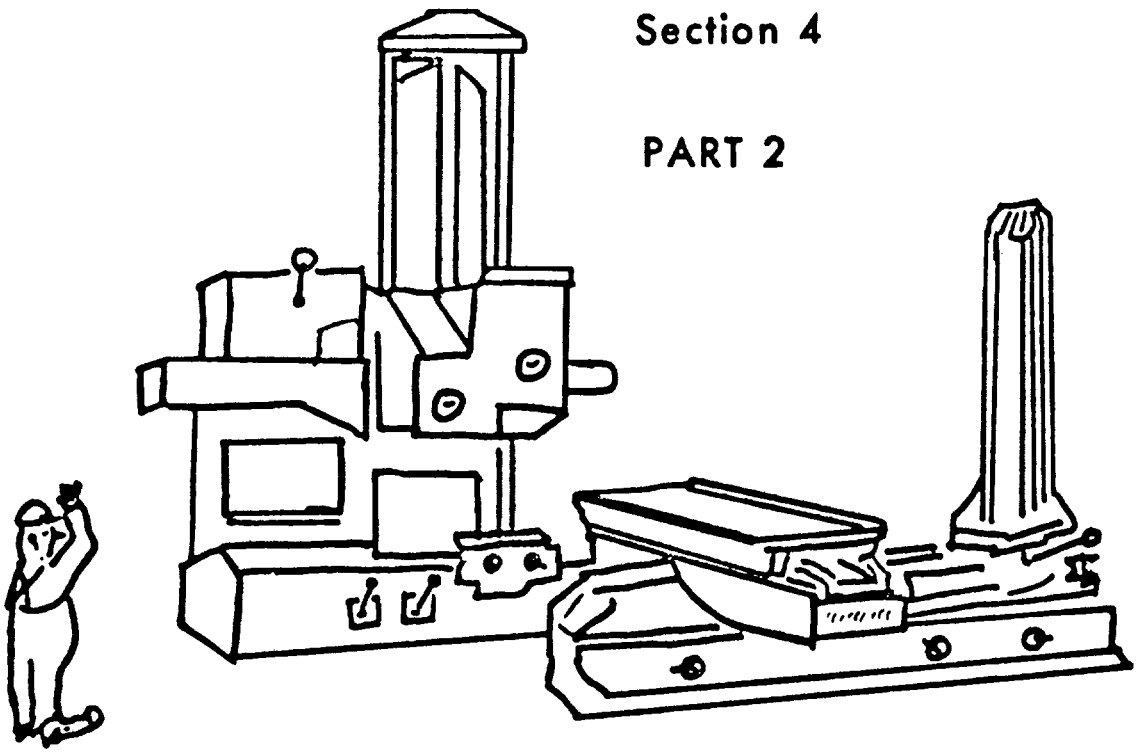
TRIPLE LOAD



OPEN TOP LOADING RULES

Section 4

PART 2



NOTE 1 SECURING MACHINES

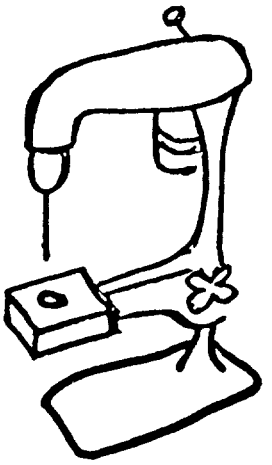
SKID ALL MACHINES EXCEPT SOLID BASE TYPE - WHICH MAY BE PLACED DIRECTLY ON CAR FLOOR AND SECURELY BOLTED OR BLOCKED INTO POSITION.

SKIDS SUPPORTING OTHER THAN SOLID BASE TYPE MUST NOT BE BOLTED TO CAR FLOOR.

OPEN TOP LOADING RULES

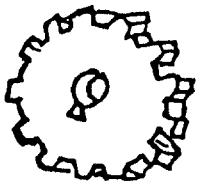
SECURING MACHINES (continued)

SECURING MACHINES (CONT'D)

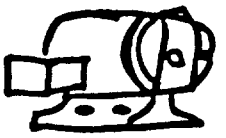


B. ALL MACHINE HEADS MUST BE LOCKED IN LOWERED POSITION. COUNTER-WEIGHTS, ETC.... REMOVED OR LOCKED IN LOWER POSITION.

C. LATERAL SHAFTS, FLYWHEELS GEARS, ETC. SECURED WITH PINS...MUST BE ADEQUATELY SECURED TO PREVENT MOVEMENT OR LOSS IN TRANSIT.



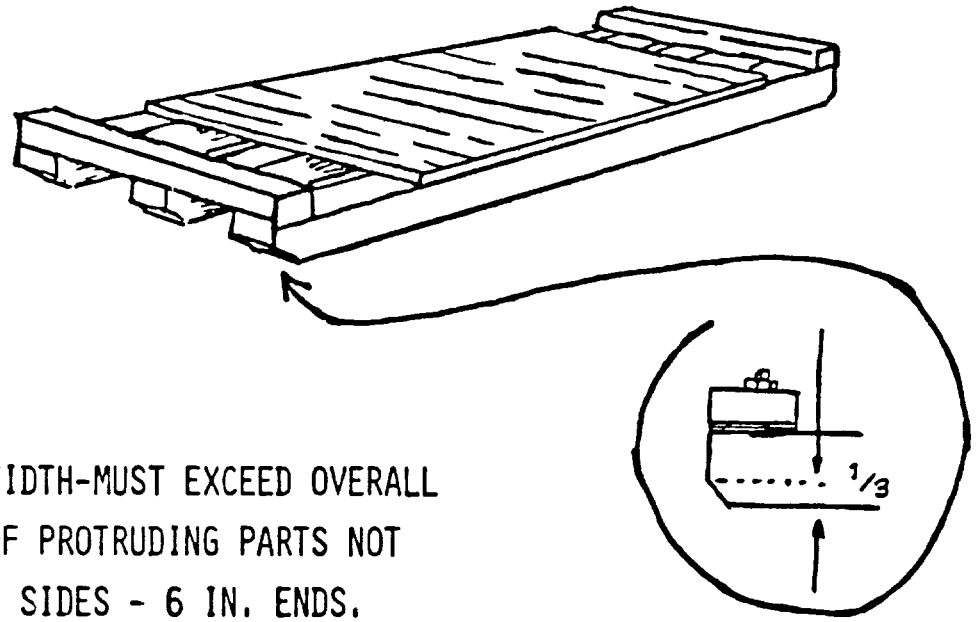
D. REMOVABLE PARTS SUCH AS BRACKETS, ARMS, TABLES, MOTORS, PUMPS, ETC. WHICH ARE DIFFICULT TO SUPPORT OR PROTECT AND CAN NOT BE SECURED ADEQUATELY TO MACHINE, MUST BE REMOVED AND SEPARATELY SECURED OR BOXED.



E. USE SUITABLE BRACING OR RODS TO PREVENT BREAKAGE OF LEGS, PEDESTALS OR END FRAMES.

OPEN TOP LOADING RULES

Section 4 Note 2 SKIDS



A. LENGTH-WIDTH-MUST EXCEED OVERALL DIMENSIONS OF PROTRUDING PARTS NOT LESS - 2 IN. SIDES - 6 IN. ENDS.
THE ENDS OF ALL SKID MEMBERS MUST BEVELED NOT TO EXCEED 1/3 HEIGHT OF SKID.

B. SIZE OF CROSS MEMBERS MUST BE IN ACCORDANCE WITH TABLE 3. SECURE TO SKID MEMBERS WITH 3/4 IN. DIA. BOLTS-WASHERS UNDER HEAD AND NUT. COUNTER BORE UNDER SIDE SKID MEMBERS TO ACCOMODATE BOLTHEADS.

DANGEROUS COMMODITIES

MANY ARTICLES OF COMMERCE POSSESS DANGEROUS CHARACTERISTICS THAT MUST BE REGULATED DURING TRANSPORTATION IN ORDER TO PREVENT PERSONAL INJURY, LOSS OF LIFE AND DAMAGE TO PROPERTY. IN RECOGNITION OF THIS, THE CONGRESS OF THE U.S. BY LAW, HAS DIRECTED THAT THE DEPT. OF TRANSPORTATION SHALL FORMULATE REGULATIONS FOR THE SAFE TRANSPORTATION OF EXPLOSIVES AND OTHER DANGEROUS ARTICLES. THE LAW PROVIDES CRIMINAL PENALTIES FOR WHOEVER KNOWINGLY VIOLATES ANY REGULATION. THE STATED PURPOSE OF THESE REGULATIONS IS TO PROMOTE THE UNIFORM ENFORCEMENT OF LAW AND TO MINIMIZE THE DANGERS TO LIFE AND PROPERTY, AND EMPLOYEES MUST BE THOROUGHLY INSTRUCTED IN RELATION THERETO. THIS BOOKLET LISTS 8 HAZARDOUS CLASSIFICATIONS:

(HAZARDOUS MATERIALS REGULATIONS: GENERAL NOTICE 225)

(1) EXPLOSIVES
(2) POISONOUS ARTICLES
(3) FLAMMABLE LIQUIDS
(4) FLAMMABLE SOLIDS
(5) OXIDIZING MATERIAL
(6) CORROSIVE LIQUIDS
(7) COMPRESSED GASES
(8) RADIOACTIVE MATERIAL

A CAR CONTAINING SUCH MATERIAL WILL HAVE PLACARDS ON IT. THESE PLACARDS MAY BE DIAMOND-SHAPED, SQUARE, OR RECTANGULAR. THEY CONTAIN SUCH WORDS AS: EXPLOSIVE, DANGEROUS, RADIOACTIVE, POISON, GAS, ETC. HERE IS A SLIDE OF ONE SUCH PLACARD. IN THE CASE OF FLAMMABLE OR EXPLOSIVE MATERIAL, SPECIAL CARE MUST BE TAKEN IN EXAMINING JOURNAL BOXES AND TRUCKS, AS WELL AS ON ADJACENT CARS, SO AS TO REDUCE TO A MINIMUM THE POSSIBILITY OF HOT JOURNALS OR OTHER FAILURES RESULTING IN HEAT OR SPARKS. FURTHER, THERE ARE SPECIAL RESTRICTIONS AS TO LOCATION WITHIN A TRAIN ON MOST OF THESE CARS. PAY SPECIAL ATTENTION TO THE POSSIBILITY OF TANK CAR LEAKS. IF ANY DOUBT, NOTIFY YOUR SUPERVISOR.

PENN CENTRAL TRANSPORTATION COMPANY

INSTRUCTIONS FOR INSPECTING AND CARDING CARS FOR COMMODITY LOADING

① CLASSIFY CARS TO HIGHEST POSSIBLE GRADE

② FOR: GONDOLA CARS

③ IF: UNDERFRAME, SUPERSTRUCTURE, DRAFT GEARS, COUPLERS, BRAKES, SAFETY APPLIANCES — ARE IN SAFE AND SUITABLE CONDITION

④ AND: THE GENERAL CONDITION IS ONE OF THE FOLLOWING:

⑤ Classify Car	A	B	C	D	F	G	U	X
SIDES	• NO HOLES OR OPENINGS	• SMALL HOLES OR OPENINGS	• LARGE HOLES OR OPENINGS	• NO HOLES OR OPENINGS	• MEDIUM TO LARGE HOLES		• POOR — UNFIT	SPECIAL EQUIPMENT
ENDS	• INTACT • NO HOLES	• INTACT • SMALL HOLES	• INTACT • LARGE HOLES	• INTACT • NO HOLES	• INTACT • MEDIUM TO LARGE HOLES	• END OR ENDS MISSING	• POOR — FOR LOADING	
FLOOR	• STEEL • GOOD • NO HOLES	• STEEL • SMALL HOLES	• STEEL • LARGE HOLES	• WOOD • GOOD	• WOOD • FAIR		• POOR	

① GENERAL SERVICE BOX CARS

② CLASSIFY CARS TO HIGHEST POSSIBLE GRADE

③ IF: UNDERFRAME, SUPERSTRUCTURE, DRAFT GEARS, COUPLERS, BRAKES, SAFETY APPLIANCES — ARE IN SAFE AND SUITABLE CONDITION

④ AND: THE GENERAL CONDITION IS ONE OF THE BELOW:

⑤ Classify Car	A	B	C	D	E	H	U	X
ROOF	• IS WATERTIGHT	• IS WATERTIGHT	• IS WATERTIGHT	• LEAKS	• IS WATERTIGHT		• LEAKS • POOR	SPECIAL EQUIPMENT
FLOOR	• IS SMOOTH • HAS NO SPLINTERS • NO LEAKS, ODOR, OIL SPOTS, CONTAMINATION • HAS NO PROTRUDING NAILS, STRAPS, ETC.	• WON'T LEAK GRAIN • NO ODORS, OIL SPOTS, CONTAMINATION • HAS NO PROTRUDING NAILS, STRAPS, ETC.	• IN PLACE • HAS NO PROTRUDING NAILS, STRAPS, ETC.	• WILL HOLD COAL AND ROUGH FREIGHT	• IS SMOOTH • HAS NO SPLINTERS • NO LEAKS, ODOR, OIL SPOTS, CONTAMINATION • HAS NO PROTRUDING NAILS, STRAPS, ETC. • IS WOOD	• CONTAMINATED • HANDLE PER RS 136	• POOR	
LINING	• ARE SMOOTH • HAVE NO SPLINTERS • NO PROTRUDING NAILS, STRAPS, ETC. • ARE WATERTIGHT	• HAVE NO SPLINTERS • NO PROTRUDING NAILS, STRAPS, ETC. • ARE WATERTIGHT	• NO PROTRUDING NAILS, STRAPS, ETC. • ARE WATERTIGHT	• POOR	• ARE SMOOTH • HAVE NO SPLINTERS • NO PROTRUDING NAILS STRAPS, ETC. • ARE WATERTIGHT		• POOR	
Special Instructions				• ROUGH FREIGHT • CASTINGS • DRUMS	• EXPLOSIVES • AMMUNITION OR GRADE "A" LOADING	• HANDLE PER RS 136	• NOT GOOD FOR LOAD SYSTEM CAR • STORE OR HANDLE BY SYSTEM ORDER • FOREIGN CAR HOME SHOP	

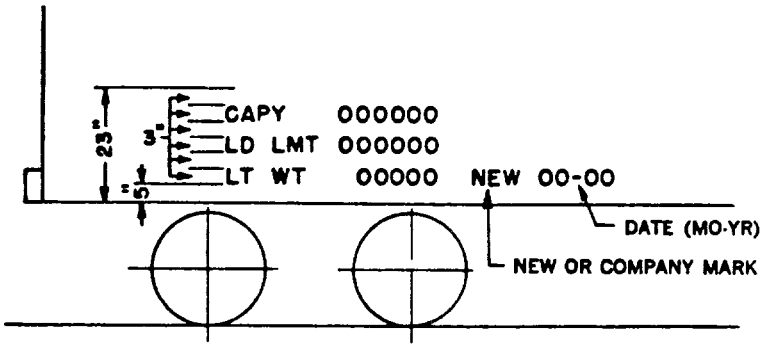
PER DIEM VALUES

CAR TYPES:	PER HOUR	TOTAL * PER DAY (INCENTIVE PERIOD)
40' Plain Box	.15	* 5.04
50' Plain Box	.35	* 11.52
40' XF	.12	* 4.56
50' XF	.56	* 21.36
Typical Short Line XM 50' Box	.50	* 24.00
RBOX	.48	11.52
ABOX	.60	14.40
40' Equipped Box	.20	4.80
50' Equipped Box	.32	7.68
60' Equipped Box	.44	10.56
86' Equipped Box	.53	12.72
40' RB/RBL	.20	4.80
50' RB/RBL	.37	8.88
70 Ton OTH	.26	6.24
100 Ton OTH	.38	9.12
Low Cube Covered Hopper	.24	5.76
High Cube Covered Hopper	.38	9.12
52' Plain Gon	.24	* 8.16
65' Plain Gon	.21	* 7.20
Equipped Gon	.27	6.48
Coil Steel Car	.37	8.88
50' Plain Flat	.17	4.08
RR Equipped Flat	.32	7.68
89' Plain Flat TTX	.46	11.00
60' Plain Flat TTX	.40	9.55
Tri-Level Open	.98	19.20
Tri-Level Enclosed	1.59	38.16
Bi-Level	.87	20.88
Bi-Level Enclosed	1.49	35.76

* - Sept. - Feb. each year for XM
All year for plain gondolas and XF cars.

Per Diem Values continue to rise. If you want to be more specific, Joe Galasso on Extension 2650 in Philadelphia, can provide the average per diem by trainmaster district for either system, foreign or combined system and foreign.

NOTE: The per diem values of special equipment such as Heavy Duty Flat Cars exceeds $90.00 per day.



DEFINITIONS:

a. Lightweight — Scale weight of car to the nearest 100 pounds (nearest 50 kilograms in metric).

(1) If the scale weight indicates an even 50 pounds, the lower multiple must be used. For cars to be stenciled in single units of measurement (pounds), see Example (2). For cars to be stenciled in dual units of measurement (pounds and kilograms), see Example (3).

(2) Examples of scale and stencil weigths for single units of measurement:

(a) Scale weight in pounds (Even 50 pounds)	33,350
Stencil weight in pounds (Lower multiple of 100 pounds)	33,300
(b) Scale weight in pounds	33,351
Stencil weight in pounds (Nearest 100 pounds)	33,400

(3) Examples of scale and stencil weights for dual units of measurement:

NOTE: Weight in pounds is multiplied by a factor of 0.4536 to obtain weight in kilograms.

(a) Scale weight in pounds (Even 50 pounds)	33,350
Stencil weight in pounds (Lower multiple of 100 pounds)	33,300
Stencil weight in kilograms (Stencil weight in pounds multiplied by 0.4536, rounded to nearest 50 kilograms)	15,100
(b) Scale weight in pounds	33,351
Stencil weight in pounds (Nearest 100 pounds)	33,400
Stencil weight in kilograms (Stencil weight in pounds multiplied by 0.4536, rounded to nearest 50 kilograms)	15,150

LIGHTWEIGHING OF FREIGHT CARS

DEFINITIONS:

1. Capacity - The normal load in pounds or gallons which the car is designed to carry.

2. Load Limit - The maximum weight of lading and is the difference between the stenciled lightweight of car and the maximum gross weight on rails.

3. Lightweight - The total weight of the empty car including trucks and all appurtenances considered part of the car.

EXAMPLE: Regular gondola equipped with 4 pair, 6" X 11" wheels, total weight on rail permitted, is 220,000 lbs.

Car was lightweighed - 57,000 pounds.
Subtract lightweight, 57,000 from capacity, 220,000 = Answer: 163,000 pounds.

In order to obtain weight in kilograms, multiply factor of 0.4536 X lightweight of 57,000 - (25,855 kilograms). When obtaining weight in kilograms, the stencil weight is rounded to nearest 50 kilograms; thus 25,855 kilograms = 25,850 kilograms.

STATUS CODES FOR CD-5 and CD-5D

Status		Explanation
K	-	Railroad Hold
L	-	Patron Hold
M	-	GMT-MTY Hold
O	-	Class 4 Shop Stored
P	-	Railroad Reclaim
Q	-	Hold for Assignment
R	-	Hold for Modification
S	-	Constructive Placement
V	-	Delivered to Patron
X	-	Car Enroute
1	-	Class 4 - Awaiting Material
2	-	Class 4 - Awaiting Transfer of Lading
3	-	Class 4 - Awaiting Load-up Car
8	-	No Bill
9	-	No Transportation Reporting

NOTE: The above codes will be displayed under the "SC" column on CD-5 and CD-5D only

CABOOSE LISTING - JAN. 1, 1980

CR 18000 to 18194	N6A	Yard Service
CR 18197 to 18394	N9	Yard Service
CR 18404 to 18449	N5	Yard Service
CR 18450 to 18599	N11	Yard Service
CR 18601 to 18701	N5G	Yard Service
CR 18705 to 18890	N4	Yard Service
CR 19026 to 19575	N5	Yard Service
CR 19600 to 19678	N3	Yard Service
CR 19797 to 19883	NE6	Yard Service
CR 19900 to 22000	N8D	Yard Service
CR 20001 to 20070	N5B	Yard Service
CR 21000 to 21169	N7B	Pool
CR 21201 to 21313	N21	Pool
CR 21496 to 21798	N7	Pool
CR 22000 to 22010	N8	Yard Service
CR 22201 to 22313	N21	Pool
CR 22130 to 22139	N20	Pool
CR 22796 to 23179	N5	Pool
CR 23200 to 23679	N8	Pool
CR 23800 to 23880	NE6	Pool
CR 24000 to 24049	N10	Pool
CR 24500 to 24549	N12	Pool

"INTERESTING FACTS ABOUT CONRAIL CABOOSES"

Conrail has a total of 2,086 cabooses in ownership. A total of 1,122 are assigned in Pool Service, while 964 are assigned in Yard Service. An average of 13% of the caboose fleet is bad ordered daily. By the end of 1980, all PC initials will be restenciled CR.

Presently, we are installing two (2) high intensity marker lights on 12V cabooses (one each end at right corner). In the event a light bulb burns out, an extra bulb is located in the fixture and can be replaced easily by removing head shield. 6V cabooses will be equipped with portable high intensity lights.

Presently the cost of building a new caboose is $65,000.

Cabooses that resemble a "box on a flat car" are called "transfer cabooses" and are classed as N9 and N11. In the near future "Thermostatically Controlled Carburetors" will be installed to the stove of 300 cabooses as a deterrent to fire damage. They have proven successful in Canada.

Microphor water drain valves are being installed to the water system. When the temperature reaches 39 degrees above zero, air operated microphor water drain valve automatically drains water raising system (1.75 gals. per minute). An improvement over the present Ogontz Valve.

Continued

The overhead water tanks have a capacity of 30 gals. The fuel tank has a capacity of 30 gals., except the new N21 cabooses, which have a fuel capacity of 50 gals.

It must be noted when carburetors are on full open position, the consumption of fuel is approximately ½ gallon for each hour of use.

When not occupied, doors and windows must be closed and secured so that dust and debris will not enter caboose. Protection from the elements is most important.

Upon arrival at terminals, train crews must report condition of cabooses so that corrective measures will be taken by the Mechanical Department.

CONRAIL

LOCOMOTIVE FLEET

-1-

CONRAIL LOCO. NO.	BLDR. MODEL	H.P.	TOTAL UNITS
+1000-1023	MT-4	-	24
+1100-1128	MT-6	-	29
+1600-1699	GP15-1	1500	100
1707-1866	F7A	1500	24
+1900-2023	B23-7	2250	124
2031-2040	RS32	2000	3
2048-2059	C430	3000	12
2073&2074	C420	2000	2
2100-2112	GP20	2000	13
2168-2249	GP30	2250	82
2250-2399	GP35	2500	146
2401-2407	RS27	2400	2
2420-2459	C425	2500	30
2500-2685	U25B	2500	173
2700-2798	U23B	2250	99
2800-2816	B23-7	2250	17
2822&2823	U28b	2800	2
2830-2889	U30b	3000	59
2890-2970	U33b	3300	80
2971-2974	U36b	3600	4
3000-3274	GP40	3000	271
3275-3385	GP40-2	3000	111
3620-3692	GP35	2500	73
3800-3839@	GP9(B)	1750	38
4014-4063	E8A	2250	4
4100-4112	GP40P	3000	13
4249&4256	E8A	2250	2
4400-4437*	E44	4400	38
4438-4459*	E44A	5000	22
4460-4465*	E44	4400	6
4601-4610*	E33	3300	10
4715-4731*	S2E	792	3
4750-4755*	E10B	1000	6
4800-4894*	GG1	4620	20
5000-5028#	FL9	1750	17
5030-5059#	FL9	1800	27
5400-5462	GP8	1600	49
5500-5520	RS3	1600	5
5600-5999	GP7	1500	267
6000-6051	SD35	2500	52
6066-6239	SD45	3600	174
6240-6357	SD40	3000	116
+6358-6524	SD40-2	3000	167

+ = Includes New Locos. on Order
@ = B Units
* = Electric Locos.
# = Diesel - 3rd Rail Electric
6000 - 6999 = 6-Axle Units

CONRAIL

LOCOMOTIVE FLEET

-2-

CONRAIL LOCO. NO.	BLDR. MODEL	H.P.	TOTAL UNITS
6535-6539	U30C	3000	5
6540-6578	U33C	3300	39
6579-6583	U30C	3000	5
6587-6599	U36C	3600	13
6600-6609	C30-7	3000	10
6654-6666	SD45-2	3600	13
6667-6699	SDP45	3600	33
6700-6718	U23C	2250	19
6722-6751	C628	2750	8
6753-6778	C630	3000	21
6781-6794	C636	3600	14
6800-6819	U25C	2500	20
6820-6834	U28C	2800	15
6849	AEH12	1200	1
6900-6924	SD9	1750	25
6925-6959	SD38	2000	35
6998-6999	SD7	1500	2
7000-7483	GP9	1750	352(4)
7496-7499	GP18	1800	4
7500-7508	GP9	1750	4
7513-7597	GP10	1850	76
7600-7617	RS11	1800	6
7644	RS11 Mod.	2000	1
7651&7652	RS11	1800	2
7656-7939	GP38	2000	282
+7940-8281	GP38-2	2000	340
8400-8599	SW1	600	98
8600-8627	SW8	800	28
8628-8657	SW900;M	900	26(3)
8664-8700	SW8;M	800	37
8701-8721	SW900	900	21
8836-9001	SW7,9	1200	159
9008	SW9 Mod.	1200	1
9009-9150	SW7,9	1200	99
9151-9194	NW2 Mod.	1200	44
9200-9296	NW2	1000	96
9301-9314	SW1200 Mod.	1200	8
9315-9382	SW1200	1200	68
9400-9424	SW1001	1000	25
9500-9620	SW1500	1500	121
9621-9630	MP15	1500	10
9839	S2	1000	1
9846	T6	1000	1
9900-9999	RS3 Mod.	1200	74
TOTAL CR UNITS			+4778(7)

(7) = Cleveland Union Term. Units

7-01-79
CMO-L

FUEL CONSUMPTION

Electro-Motive has prepared several Product Application Bulletins to assist in cutting locomotive fuel consumption. The first installment appeared in the October 1973 issue, page 15, and showed graphically what the effects of lower operating speeds would be on reducing fuel consumption.

EMD has prepared Tables A and B to show the reduction in fuel that can be achieved through slowing the speed of several consists of 3000-hp six-motor SD40 and four-motor GP40 locomotives by increasing trailing tonnage. A comparison of Columns 4 and 7 reveals a relationship between horsepower per trailing ton and gallons per thousand gross ton miles (MGTW). As the horsepower per ton is lowered (speed is reduced), the gallons per MGTM diminishes. In all cases, the SD40 and GP40 units are at full throttle and the additional tonnage accounts for the speed reduction.

For example, 5000 tons, pulled by three SD40's, is rated at 1.80 HP/Ton and the consist will consume 1.75 gal./MGTM, or 9.0 gal./mile. The same train, pulled by two SD40's and rated at 1.2 HP/Ton, will consume 1.43 gal./MGTM, or 7.15 gal./mile. If this 5000-ton train is pulled by a single SD40, rated at 0.6 HP/Ton, it will consume 1.04 gal./MGTM, or 5.2 gal./mile. This represents fuel reductions of 1.85 and 3.80 gal./mile as the number of units is reduced. Speed is reduced from 58 mph to 47 mph to 33mph.

The same relationships prevail for the GP40 locomotives in Table B.

Another way to illustrate the reduction in the number of locomotive units is shown in Tables C and D. Both compare two and three unit operation of locomotives pulling a 5000-ton train. This is a theoretical run of 100 miles over level track.

Table C shows at the left how much fuel is saved by a three-unit SD40 locomotive as speeds are reduced from 60 mph (actually 58 mph balancing speed) to successively lower speeds. Note that a reduction to 47 mph would save approximately 110 gallons of fuel. Reduced Throttle Positions 6 and 7 would have to be "jockeyed" to maintain the 47 mph.

The right-hand portion of Table c indicates that a two-unit SD40 would maintain 47 mph in Throttle 8 with the 5000-ton train. This consist would save 148 gallons, or 38 more gallons in 100 miles as compared with the three-unit train operating in lower throttle positions.

These savings are at the expense of time. A loss of 25 minutes running time is suffered by both the two- and three-unit consists over the three-unit locomotive that has a running time of 1 hr. 43 min. at 58 mph. The same relationships exist with the GP40 locomotive consists in Table D. When two units are used in place of three, ruling grade tonnage ratings must not be exceeded.

SEE TABLE NEXT PAGE

TABLE A

SD40 Locomotives on Level Tangent Track

1 Speed MPH	2 Trailing Tons	3 Units per Consist	4 H.P. per T. Ton	5 Gals. per Hour	6 Gals. per T. Tons	7 Gals. per MGTM
60	4500	3	2.00	504	.112	1.86
58	5000	3	1.80	504	.101	1.75
55	5451	3	1.65	504	.092	1.67
50	6651	3	1.35	504	.075	1.50
47	5000	2	1.20	336	.067	1.43
45	5456	2	1.10	336	.062	1.38
40	6730	2	0.90	336	.050	1.25
35	8478	2	0.70	336	.040	1.14
33	5000	1	0.60	168	.034	1.04
30	5457	1	0.55	168	.031	1.03

These fuel reductions are accomplished by increasing tonnage to the speeds indicated on the left column.. For an example: 50 mph with 6651 trailing tons (6.651 MGT's) × 1.5 gal./MGTM = 9.97 gal./mile, compared to 40 mph with 6730 trailing tons (6.730 MGT's) × 1.25 gal./MGTM = 8.41 gal./mile or a saving of 1.56 gal./mile for nearly the same tonnage. This is equivalent to an 18% saving in fuel. Care must be exercised not to exceed ruling grade tonnage ratings.

TABLE B

GP40 Locomotives on Level Tangent Track

1 Speed MPH	2 Trailing Tons	3 Units per Consist	4 H.P. per T. Ton	5 Gals. per Hour	6 Gals. per MGTM†
60	4515	3	2.00	504	1.86
55	5466	3	1.65	504	1.68
50	6663	3	1.35	504	1.51
45	5514	2	1.10	336	1.35
40	6806	2	0.90	336	1.23
35	8540	2	0.70	336	1.12
30	5405	1	0.55	168	1.04

These fuel reductions are accomplished by increasing tonnages to the speeds indicated on the left column. The throttle remains at full load while the heavier train drags the speed down. For an example: 50 mph with 6663 trailing tons (6.663 MGT's) × 1.51 gal./MGTM = 10.06 gal./mile, compared to 40 mph with 6806 trailing tons (6.806 MGT's) × 1.23 gal./MGTM = 8.37 gal./mile. This is a decrease of 1.69 gal./mile while increasing the train weight by 143 tons. Two units were used in place of three for the slower train. Had three units been used for the slower train the consist would have been 10210 tons, while the gallons per MGTM would have remained the same. Lowering the speed from 50 to 40 miles per hour increased the running time by 25%. Where two units are used to pull the heavier tonnage, care must be taken not to exceed the ruling grade tonnage ratings.

†MGTM represents Thousand Gross Ton Miles.

TABLE C

SD40 Locomotives on Level Tangent Track

5000 Trailing Tons

3 UNITS						2 UNITS			
	Gals. per Hour		Thr.	Gallons			Gallons		Run. Time
Speed MPH	Unit	Consist	Pos.	100 Mi.	Saving	Thr. Pos.	100 Mi.	Saving	Hrs.: Mins.
60			*						1:40
58	168	504	8	865					1:43
55	154	462		839	26				1:49
50	132	396	7	792	73	*			2:00
47	118	354		755	110	8	717	148	2:08
45	110	330	6	732	133		678	187	2:13
40	90	270		675	190	7	625	240	2:30
35	73	219	5	624	241	6	570	295	2:51
30	59	177	4	590	275	5	527	338	3:20

*A 5000 ton train reaches balance speed at 57.5 mph with three SD40's and 47 mph with two SD40's. Since rolling resistance varies with each consist the curves were extended to show 60 mph with three units and 50 mph with two units. Where two units are used to accomplish a fuel reduction, as opposed to reducing throttle with three units, care must be exercised not to exceed ruling grade tonnage ratings.

TABLE D

GP40 Locomotives on Level Tangent Track

5000 Trailing Tons

3 UNITS						2 UNITS			
	Gals. per Hour		Thr.	Gallons			Gallons		Run. Time
Speed MPH	Unit	Consist	Pos.	100 Mi.	Saving	Thr. Pos.	100 Mi.	Saving	Hrs.: Mins.
60			*						1:40
58	168	504	8	865					1:43
55	154	462		839	26				1:49
50	132	396	7	792	73	*			2:00
47	118	354		755	110	8	717	148	2:08
45	110	330	6	732	133		678	187	2:13
40	90	270		675	190	7	625	240	2:30
35	73	219	5	624	241	6	570	295	2:51
30	59	177	4	590	275	5	527	338	3:20

*A 5000 ton train reaches balance speed at 57.5 mph with three GP40's and 47 mph with two GP40's. Since rolling resistance varies with each consist the curves were extended to show 60 mph with three units and 50 mph with two units. Where two units are used to accomplish a fuel reduction, as opposed to reducing throttle with three units, care must be exercised not to exceed ruling grade tonnage ratings.

Permissable Tonnage

Route	HP/Ton	GP-38 Tons/Unit HP/T Ratio	GP-38 Maximum Ton. Rating	SD-40 Tons/Unit HP/T Ratio	SD-40 Maximum Ton. Rating	GP-40 Tons/Unit HP/T Ratio	GP-40 Maximum Ton. Rat
E.St.Louis-IND.	0.8	2,500	2,525	3,750	5,175	3,750	2,600
IND.-Columbus	1.1	1,818	2,350	2,727	3,850	2,727	2,420
Colum.-Conway	1.3	1,538	1,950	2,308	3,100	2,308	2,009
Sol. Pit	1.3						
Conway-Enola							
(No Help)	2.0	1,000	1,525	1,500	2,325	1,500	1,570
(With Help)	1.2	1,667	3,800	2,500	4,150	2,500	3,914
Enola-Waverly	0.8	2,500	2,625	3,750	3,850	3,750	2,704
Waverly-Enola	1.0	2,000	2,750	3,000	4,125	3,000	2,833
Enola-Conway							
(No Help)	3.0	667	1,025	1,000	1,600	1,000	1,056
(With Help)	1.4	1,428	2,425	2,143	2,850	2,143	2,498
Conway-Columbus	1.3	1,538	2,075	2,308	3,275	2,308	2,137
Columbus-IND.	1.0	2,000	2,325	3,000	3,400	3,000	2,395
IND-E. St. Louis	1.0	2,000	2,250	3,000	3,700	3,000	2,318
Chicago-Conway	1.4	1,428	1,950	2,143	3,100	2,143	2,009
Conway-Chicago	1.3	1,538	1,775	2,308	2,725	2,308	1,828
Chicago-Elkhart	0.9	2,222	3,250	3,333	5,080	3,333	3,410
Elkhart-Collinwood	0.8	2,500	3,900	3,750	6,100	3,750	4,100
Collinwood-Buffalo	1.0	2,000	3,080	3,000	4,810	3,000	3,230
Buffalo-Selkirk	1.0	2,000	2,900	3,000	4,510	3,000	3,040
Selkirk-Buffalo	1.2	1,667	2,100	2,500	3,390	2,500	2,290

Central Region

			TV	FRT.
Columbus	-	Pitcairn	1.7	1.3
Pitcairn	-	Harrisburg	1.5 with H.	1.2
Pitcairn	-	Harrisburg	2.5 without H.	2.0
Conway	-	Enola	3.0 without H.	2.0
Conway	-	Enola	1.4 with H.	1.2
Chicago	-	Conway	1.6	1.4
Orrville	-	Binghamton	1.5	1.3
Pitcairn	-	Columbus	2.1	1.3
Conway	-	Columbus	2.1	1.3
Conway	-	Chicago	1.6	1.3
Binghamton	-	Orrville	1.7	1.5

ALLEGHENY DIVISION
Central Region

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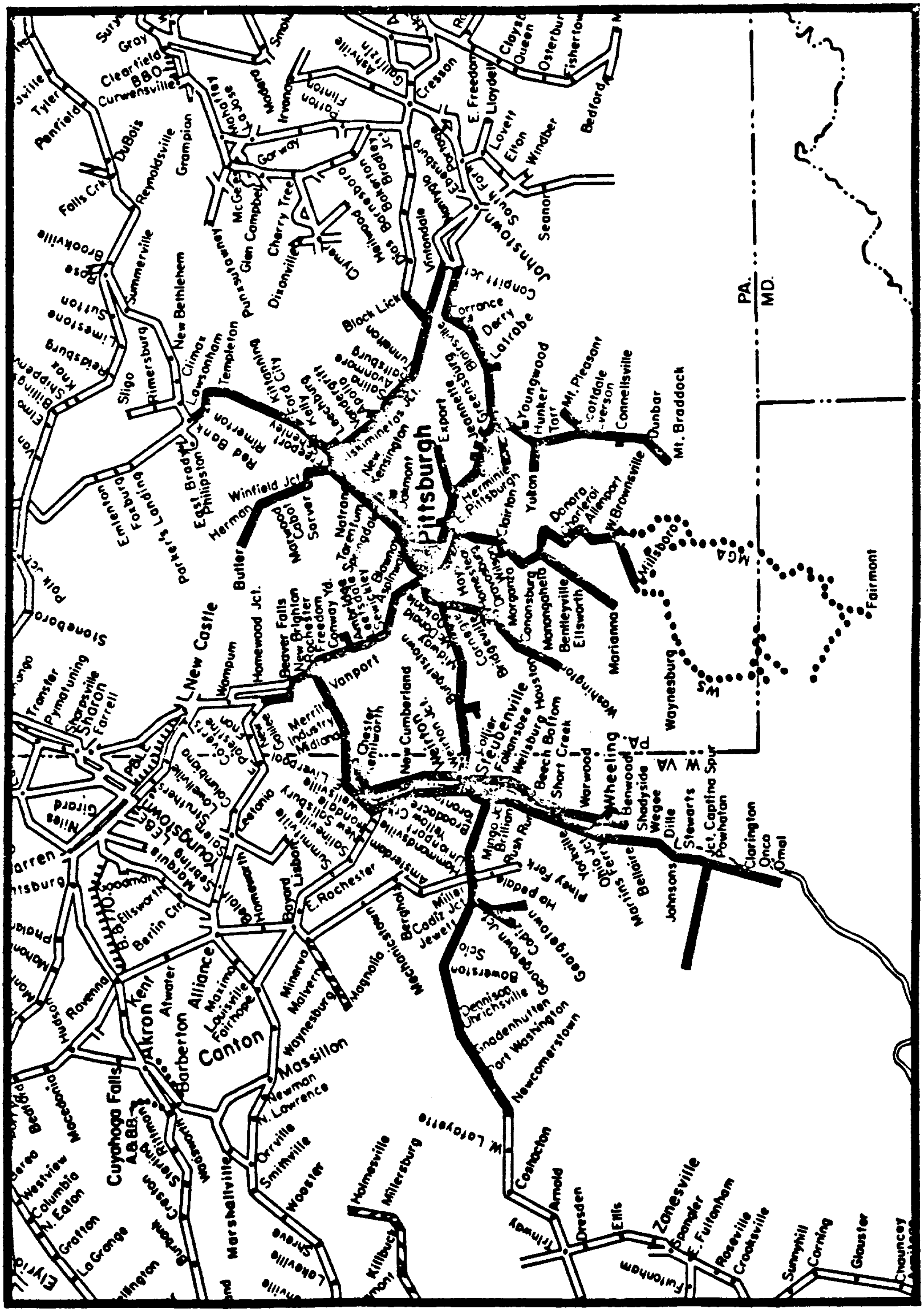
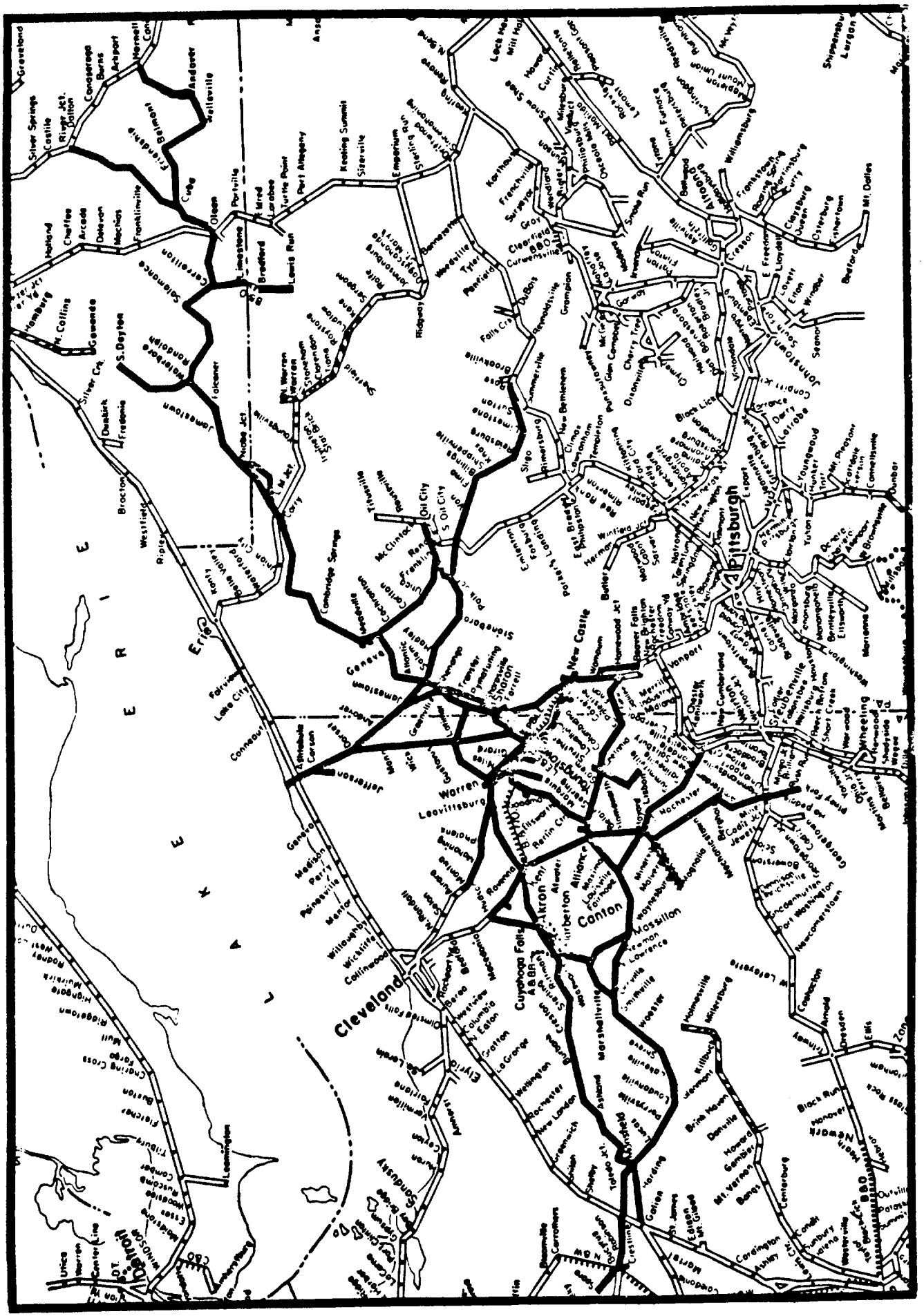


PITTSBURGH DIVISION
Central Region



YOUNGSTOWN DIVISION
Central Region

SUMMARY OF SELECTED FREIGHT TRAIN PERFORMANCE

Pittsburgh, Pa. _____ 19 _____

	Number Operated	Number On Time	Percent On Time	No. Made Schedule	Percent Made Schedule
Current Date					
Current Month					
Previous Month					
Same Month Previous Year					

SELECTED STAR (*) BLUE RIBBON FREIGHT TRAINS OPERATED CENTRAL REGION

WESTBOUND — NORTHBOUND

Symbol	Passing Point	Time	Actual	Passing Point	Time	Actual
BEPI	Banks	4.10P		Cway.	3.45A	
CRME	Hornell	12.45P		Mdvle.	7.30P	
ENPI	Banks	10.30P		Cway.	10.00A	
GPPI	Banks	5.45P		Cway.	4.15A	
JCPI	Banks	6.20A		Cway.	4.20P	
KEPI	Banks	2.45P		Cway.	8.00A	
MEBR	Mdvle.	5.30P		Colsan	12.25P	
MECO	Mdvle.	9.30P		Crestline	9.30A	
MEGI	Mdvle.	11.59P		Colsan	12.05P	
MOPI	Banks	7.30P		Cway.	5.40A	
MYCO	Hudson	11.30P		Galion	9.45A	
PFPI	Banks	4.20A		Cway.	2.20P	
PGPI	Banks	12.45A		Cway.	12.30P	
PIAS	Cway.	8.45P		Town	1.45A	
PIBN	Cway.	9.30P		Colsan	5.10A	
PIBU	Cway.	6.00P		Ash.	4.30A	
PICO	Cway.	4.15A		Town	9.15A	
PIDJ	Cway.	11.00P		Colsan	8.50A	
PIDT	Cway.	2.00A		Hudson	10.00A	
PIEL	Cway.	11.45P		Colsan	10.40A	
PIIN	Cway.	7.00A		Town	11.30A	
PILN	Cway.	2.45A		Town	7.45A	
PILO	Cway.	1.00P		Town	6.00P	
PIUP	Cway.	10.15P		Colsan	6.00A	
PISF	Cway.	1.15A		Colsan	7.25A	
PITO	Cway.	11.00P		Colsan	10.30A	
YOBU	Ystwn.	4.00P		Ash.	8.00P	
YOEL	Ystwn.	8.00P		Colsan	8.30A	
ENIN	Banks	11.30P		Town	5.15P	
WITO	Banks	7.00P		Colsan	10.40P	

EASTBOUND — SOUTHBOUND

Symbol	Passing Point	Time	Actual	Passing Point	Time	Actual
ASEN	Town	12.45P		Banks	10.40A	
BUPI	Ash.	6.45A		Cway.	5.15P	
CIPI	Town	2.30A		Cway.	7.00A	
CLPI	Hudson	2.00A		Cway.	8.45A	
COEN	Town	8.00P		Banks	3.45P	
COME	Crestline	1.30A		Mdvle.	4.30P	
COPI	Town	5.35A		Cway.	11.05A	
COMY	Galion	7.45A		Hudson	5.00P	
DJPI	Colsan	4.15A		Cway.	12.25P	
DTPI	Hudson	11.10A		Cway.	5.45P	
ELPI	Colsan	9.00A		Cway.	3.30P	
IHCR	Colsan	2.20P		Hornell	2.20P	
IHEN	Colsan	12.01P		Banks	6.15A	
IHPI	Colsan	3.45A		Cway.	12.01P	
LOPI	Town	11.00P		Cway.	4.30P	
PIOI	Cway.	2.00A		Banks	2.30P	
PIMO	Cway.	9.00P		Banks	11.30A	
PIWA	Cway.	1.00P		Banks	1.00A	
PIWI	Cway.	4.30P		Banks	8.15A	
PXEN	Colsan	10.30P		Banks	4.45P	
SLEN	Town	12.35A		Banks	3.15A	
TOPIB	Colsan	11.15A		Cway.	11.00P	
TOYO	Colsan	12.30P		Ystwn.	11.00P	
SFPI	Colsan	4.30A		Cway.	2.15P	

ALLEGHENY ZONE B

BUEN	Gravity	5.45P	Molly	8.45A	
CNEN	Gravity	4.30P	Molly	10.00A	
ENCN	Molly	3.45P	Gravity	7.15A	

SUMMARY OF MAIL AND TRAIL VAN TRAINS

	Number Operated	Number On Time	Percent On Time	No. Made Schedule	Percent Made Schedule
Current Date					
Current Month					
Previous Month					
Same Month Previous Year					

TV-1	Banks	11.15A	Colsan	2.05A	TV-2	Colsan	7.10A	Banks	9.25P
TV-3M	Banks	2.15A	Town	1.20P	TV-4	Town	4.30P	Banks	3.55A
TV-43	Banks	8.00A	Town	7.05P	TV-12M	Colsan	5.10A	Banks	7.25P
TV-11	Banks	6.25A	Colsan	8.40P	TV-26	Hudson	9.30A	Banks	11.10P
TV-25	Banks	10.30A	Hudson	2.25A	TV-44	Town	4.40P	Banks	3.45A
TV-61	Banks	7.00A	Colsan	11.15P	TV-62	Colsan	8.40A	Banks	11.25P
No. 9	Banks	8.55A	Colsan	10.30P	No. 8	Colsan	12.35P	Banks	1.15A
No. 11	Banks	12.20P	Town	9.30P	No. 10	Town	1.15P	Banks	10.30P

SUMMARY OF NON-STARRED (*) FREIGHT TRAINS - CENTRAL REGION 1A

Pittsburgh, Pa., _____ 19_____

	Number Operated	Number On Time	Percent On Time	No. Made Schedule	Percent Made Schedule
Current Date					
Current Month					
Previous Month					
Same Month Previous Year					

SELECTED STAR (*) BLUE RIBBON FREIGHT TRAINS OPERATED CENTRAL REGION

WESTBOUND — NORTHBOUND							EASTBOUND — SOUTHBOUND						
Symbol	Passing Point	Time	Actual	Passing Point	Time	Actual	Symbol	Passing Point	Time	Actual	Passing Point	Time	Actual
BAPI	Banks	5.40A		Cway.	6.40P		BNPI	Colsan	8.15P		Cway.	6.30A	
CAPI	Banks	3.00P		Cway.	4.30A		CHPI	Colsan	5.30A		Cway.	5.15P	
ENPI A	Banks	1.00P		Cway.	5.00A		INPI	Town	3.00P		Cway.	3.00P	
ENPI E	Banks	7.00P		Cway.	9.00A		PIEN A	Cway.	3.00A		Banks	7.45P	
MM-1	Mdvle.	5.00A		Crest.	8.30P		PIEN B	Cway.	10.30A		Banks	1.30A	
METO	Mdvle.	11.00A		Colsan	11.45P		PINO/						
NOPI/							PICA	Cway.	5.15P		Banks	10.45A	
HP-1	Alt.	8.15P		Cway.	4.30A		PIRU	Cway.	12.30A		Banks	1.20P	
PIGI	Cway.	5.00A		Colsan	5.45P		TOPI A	Colsan	12.15P		Cway.	12.35A	
PSIN	Scully	2.00A		Town	8.30A								
WIPI	Banks	10.00A		Cway.	5.00A								
ALLEGHENY ZONE B													
ENBU	Molly	6.30P		Gravity	11.00A								
ENNF	Molly	1.45A		Gravity	3.45P								
ENSY	Molly	4.30P		J.Shore	9.15P		SYEN	J.Shore	8.45P		Molly	3.00A	
ASSIGNED CYCLE POWER COUPLETS													
CAC-1	Cway.	3.00A		Canton	11.30A		CAC-2	Canton	2.00A		Cway.	10.30A	
SWA-1	Yngwd.	5.00P		Cway.	12.30A		SWA-2	Cway.	9.30A		Yngwd.	4.30P	
SC-9	S.Oaks	7.30P		Cway.	5.00A		SC-10	Cway.	10.00A		S.Oaks	6.00P	
CFM-1/							MFC-2	Mdvle.	8.30A		Cway.	8.30P	
CBC-1	Cway.	6.30A		Mdvle.	6.30P		PH-2	Cway.	3.30A		Hollbrg.	12.30P	
HP-1	Hlldbrg.	2.30P		Cway.	11.30P		PY-2/						
PY-1	Cway.	9.00A		Br.Hill	4.00P		CBC-2	Br.Hill	11.30A		Cway.	6.30P	
CW-1	Cway.	6.30A		W.Jct.	2.30P		CW-6	W.Jct.	11.30P		Cway.	7.30A	
KC-1/							KC-2/						
RBC-1	Kiski	8.30A		Cway.	4.30P		CRB-2	Cway.	11.00A		Kiski	6.00P	
CBC-1	Br.Hill	8.15A		E.55th St.	12.30P		CBC-2	E.55thSt.	1.00A		Br.Hill	5.15A	
CM-1	Cway.	5.30P		M.Jct.	1.00A		CM-2	M.Jct.	2.30A		Cway.	10.30A	
							SR-2/1	Cway.	9.00A		Cway.	7.00P	
							CP-8/9	Cway.	9.30P		Cway.	7.30A	
							TO-2/1	Cway.	1.00A		Cway.	11.30P	

DERAILMENT INVESTIGATION CHECK LIST

ACTION AT FIRST NOTICE OF DERAILMENT

Obtain information on train, weather:

Train	Number, direction of travel, track number, number of cars, number of locomotives, train consist, derailed cars.
Weather	Sky conditions, visibility, ground cover, temperature, humidity, wind direction, wind velocity.

Designate accident investigator(s). Insure that all required equipment will be available at the site in order that no time is wasted in beginning the investigation.

Arrange for train crew interviews.

Acquire waybill information.

ACTION UPON ARRIVAL AT THE SCENE

Sketch and photograph positions of all cars and components. Develop preliminary theory as to cause(s). Set investigation priorities.

DETERMINATION OF POINT OF DERAILMENT

Examine for following marks on rail:

Short marks perpendicular to ball of rail
Long marks on ball of rail
Marks at regular intervals on one rail
Rail abrasion
Marks on turnouts
Wheel marks, both rails
No marks on rail; disturbed track base
Unexplained marks, rail and track

TRANSPORTATION DEPARTMENT

Conduct crew interview as soon as possible after derailment. Interview crew members separately.
Develop following:

Position on engine and caboose
Train handling
Receipt of train order
Messages

Check personnel records.

MAINTENANCE OF WAY DEPARTMENT

Investigate track structure and geometry for:

Rail	Weight, section, date rolled, date laid, type of steel, whether controlled cooled. Curve worn, battered joint end, flattened head, rust on track base, old or new break.
Track Fastening	Joint bars, spikes, anchors, joint location.
Track Structure	Ties, ballast, subgrade.
Turnout	Number of turnout, type of lock. Switch point, guard rails, flange way, track gage, self-guarding frog, switch stand, frog, components.
Track Geometry	Track alignment, curve characteristics, spiral, line, surface, cross elevation, rate of change of cross elevation and vertical profile. Twist, wide gage.

MECHANICAL DEPARTMENT

Inspect, as a minimum, first car to derail, cars immediately preceding and following first car, all locomotive units:

Wheels	Loose, broken or cracked, out-of-round; flange defect, worn tread, gage.
Axles	Broken hub (hot or cold), cracked, lateral motion.
Trucks	Broken side frame or bolster, springs, anchor plate, center pin, snubbers, brake rigging.
Car Body	Load, empty, length, capacity, center of gravity, date built, truck center spacing. Center plate, coupler, shifted load, missing components, side bearings, angle locks.
Inspection Data	Journals, IDT, interchange and yard inspections.
Locomotives	Unit numbers, position in consist, long or short hood leading, speed tapes, speedometer inspection. Inoperative equipment, brake feed valve, couplers, bolsters, axle boxes, angle cocks, MU connections, date of last inspection.

ORGANIZATION OF INVESTIGATIVE EFFORT

Because of the complexity of the derailment situation, no single organization plan can be effective for all railroads and all accidents. A viable investigative organization must exercise good judgment in the performance of their duties, taking into consideration special conditions and environmental constraints. These considerations include the experience, speciality, and availability of personnel; and the severity and technical aspects associated with the derailment.

There are several objectives, however, that should be incorporated into the design of organizational plan to investigate major unexplained derailments. These include:

Flexibility and depth. The plan should be adequate to handle derailments ranging from the simple to the most complex. It should anticipate the need for, and designate, special-function personnel such as photographers, hazardous materials experts and so forth.

Responsibility. Investigative personnel should have responsibility solely for the investigation. They should not be responsible for cleanup operations during the course of the investigation.

Several derailment investigative management and organizational techniques have successfully functioned within the industry. Two ideas for meeting the organizational challenge are presented below.

Standing Committee--System and Division Levels

One technique utilizes the organization of a standing committee prepared to go to an accident upon short notice. It is usually comprised of representatives of Maintenance of Way, Mechanical and Transportation Departments. Specialists in other pertinent areas are designated and assigned as required. A team utilizing system personnel could assist at major derailments. Similar teams may be designated by Division Management for local minor derailments.

Inter-Divisional or Inter-Territory Use of Personnel

This concept recognizes the fact that sufficient personnel may not be available at the Division level to perform derailment clean-up operations and investigative duties simultaneously. This problem may be solved by establishing standard operational plans whereby personnel may be borrowed from neighboring divisions on an as-needed basis. Personnel on loan may be assigned specialized tasks such as photography; used for general investigative purposes; or used in clean-up operations, freeing local personnel to perform investigative tasks.

APPROACH

There are several major sources of information that will usually provide numerous clues as to the cause of the derailment in a relatively short period of time. These are the train crew statements, and the marks found about the point of derailment (POD). It is imperative that high priority be assigned to early collection of information from both sources.

INITIAL TRAIN CREW INTERVIEW

The train crew involved in the accident should be interviewed as soon as possible after the accident. Many times, this can be accomplished by phone from the dispatcher's office during the early phases following an accident. However, it is recommended that phone interviews be followed up by personal interviews. The thrust of the initial crew interview should be directed toward developing the inter-relationships of track train dynamics, track profile, and train handling. It is emphasized that the goal of this interview is to gather information and not to determine responsibility.

If no obvious starting point presents itself for the interview, an effective approach is to develop and explore the interrelationship of track train dynamics, and train handling based on the profile of the territory involved. In the following paragraphs, three hypothetical derailment situations are presented to illustrate this approach. These situations are not to be taken as an all-inclusive list of possible profile occurrences, or a suggested order of question development.

Case 1

Profile: Derailment point at the bottom of a grade with the train running off the grade.

Question Development:

- Was there light or heavy brake application to control train's speed?
- Was initial speed down the grade greater than maximum authorized?
- Was train tonnage evenly distributed throughout the train, or in concentrated blocks?
- What were signal indications?

Case 2

Profile: Derailment point on flat and level track.

Question Development:

- Were malfunctions of locomotives noted?
- Did train set out or pick up cars in the last 20 miles?
- Was braking required because of temporary slow order, bridge interlocking plant, or village with permanent speed restriction?

Case 3

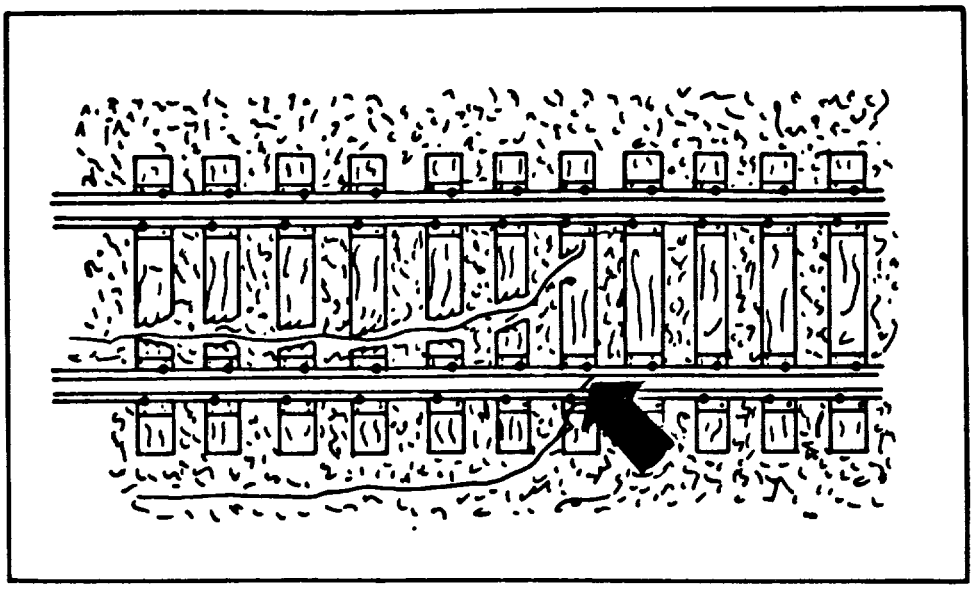
Profile: Derailment point on an ascending grade with train moving up the grade.

Question Development:

- Was the grade long enough in length that train was in a stretched condition?
- Was the derailment point near the top or the bottom of the grade?
- Is there a descending grade proceding the ascending grade on the profile charts? Did the train run off of a descending grade before starting up the ascending grade? Was this the grade on which the derailment occurred?

DETERMINATION OF THE POINT OF DERAILMENT

In most cases, the point of derailment (POD) can be determined by locating marks on the ball of the rail or other track structure components, or both. In addition, individual marks and mark patterns may be found on the rail and track structure preceding the POD. Probable causes and interpretation of the various marks commonly found on the track structure at the POD are discussed below.



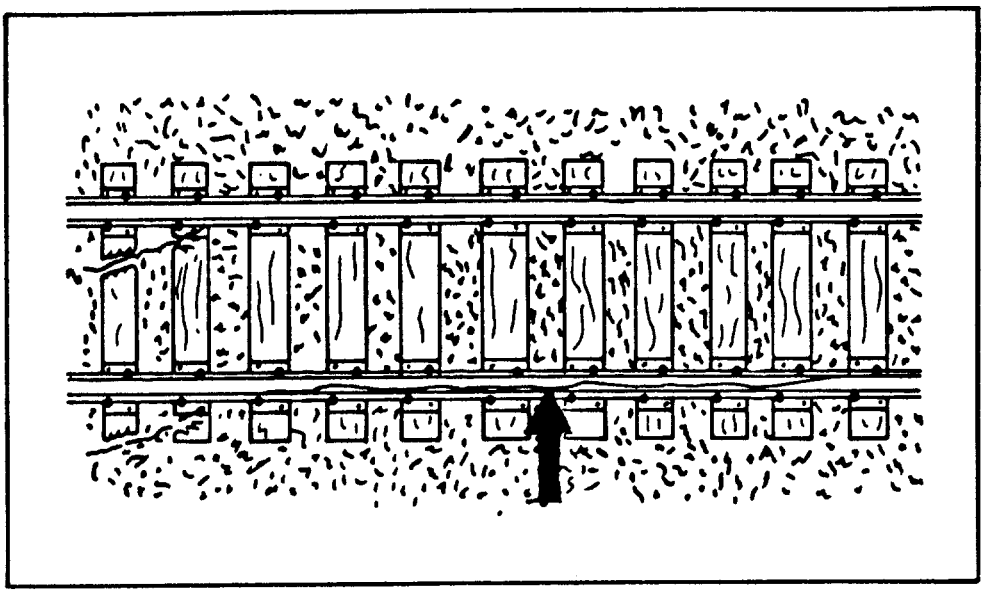
1. Short Marks Perpendicular to Ball of Rail

Possible Causes: These marks are usually caused by a flange of the wheel as it is forced off the rail. The shortness of the mark is an indication that the forces causing the car to derail were severe enough to suddenly force the wheel over the rail. Within a short distance following the mark, evidence will usually be found indicating the spot where the car wheel(s) contacted the ground. This evidence would include disturbed ballast; marked ties, tie plates, rail anchors, and joint bar; and marks on grade crossings and set-offs.

Factors that may have contributed to derailments of this nature include:

- Sudden load shift
- Improperly loaded car
- Excessive speed around curves
- Harmonic rocking initiated by low joints or crosslevel irregularity
- Slack action induced by a possible Train Handling error
- Broken wheels
- Component failures e.g. broken springs, cracked side frames, broken bolsters, etc.

It should be noted that these factors can work in combination with one another.

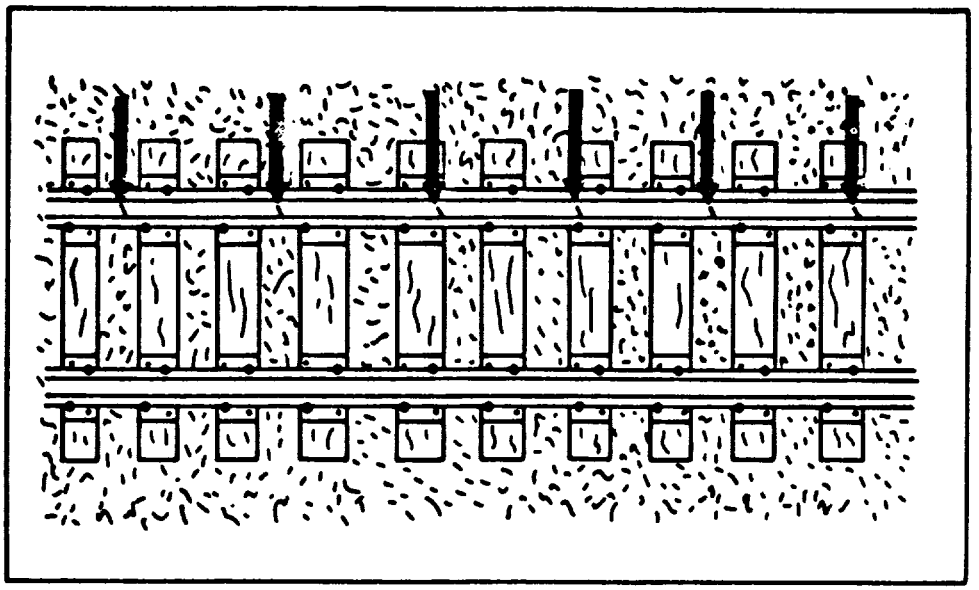


2. Long Marks on Ball of Rail

Possible Causes: When marks of this nature are found, it denotes that the derailing forces were powerful enough to overcome the normal tracking ability of the car, yet not sufficient to cause a sudden derailment. In this situation, the flange climbs the rail, rides the ball, then usually slips off the field side of the ball. Flange marks up to 40 feet in length are not uncommon in these cases. Where the car contacted the ground will be indicated by the disturbance of ballast and/or the track base structure.

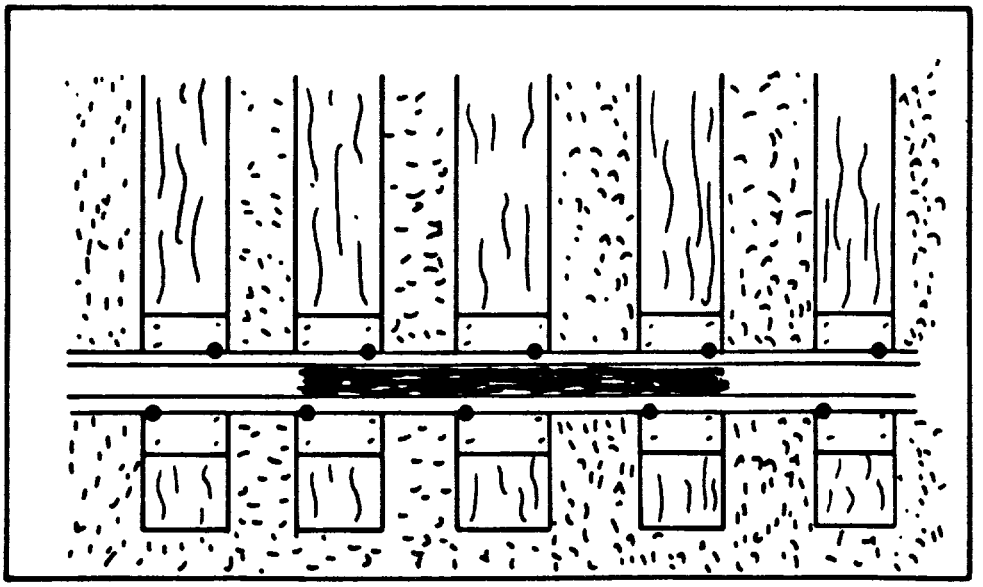
Such derailments have been caused by:

- Irregularities in cross elevation
- Irregularities in track alignment
- Wide gage
- Improper train handling
- Excessive or free lateral in trucks
- Sharp flanges
- Shifted loads
- Loss of truck spring
- Slack action
- Binding of truck slew action



3. Marks Occurring at Regular Intervals on One Rail

Possible Causes: Such marks are usually caused by a broken wheel. With each revolution of the wheel, the sharp edge of the break nicks the rail. The nick marks can appear on the top or side of the ball.

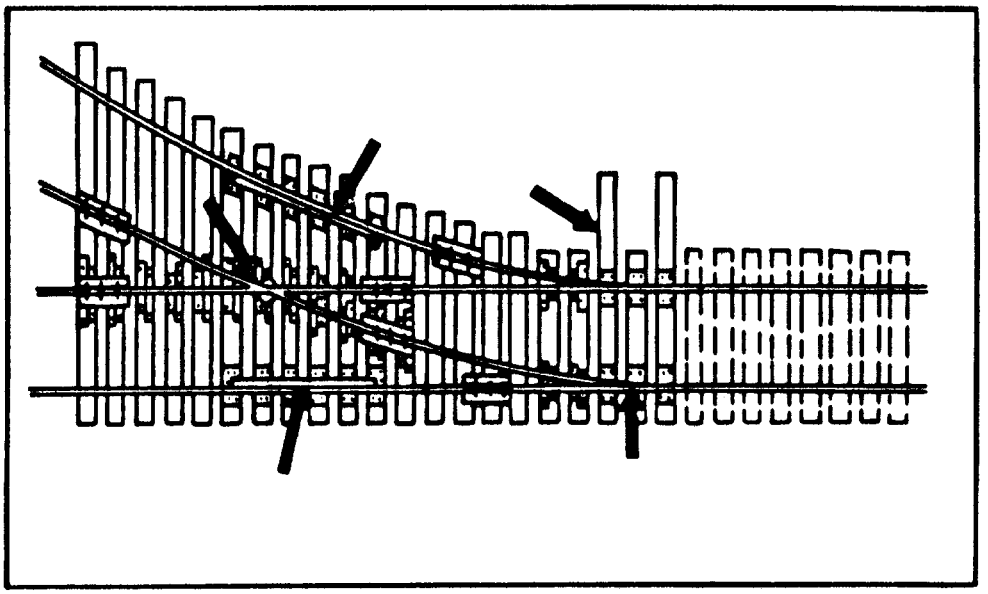


4. Rail Abrasion

Possible Causes: This type of mark is usually caused by a wheel that is not gripping the rail on which it is riding.

Probable causes include:

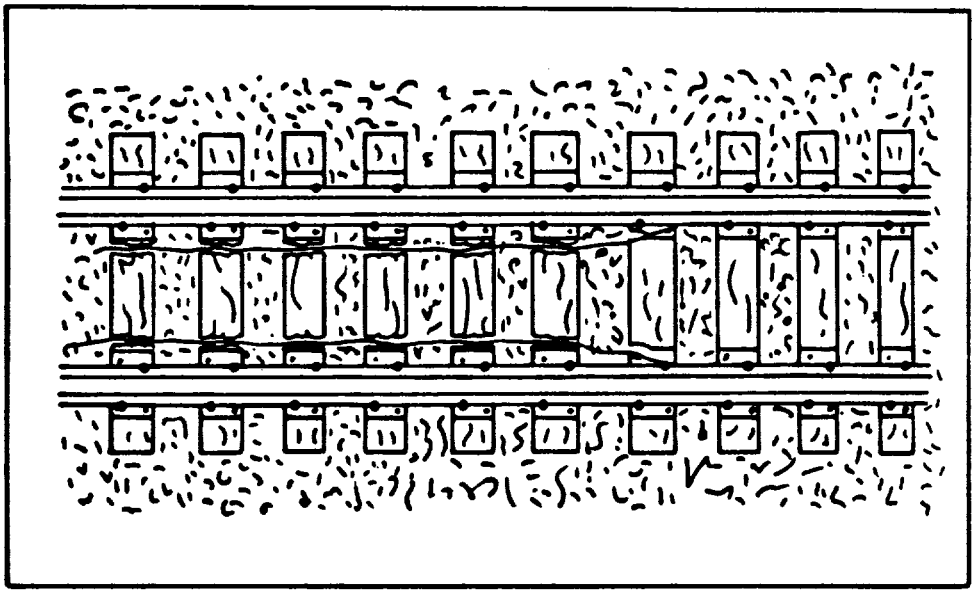
- Sticking brakes
- Flat wheel
- Powered wheel slip caused by locomotives
- Frozen powered or idler wheel on locomotive



5. Marks on Turnouts

Possible Causes: If a turnout is involved in a derailment, marks will usually be found in the area of the switch point, frog and/or guard rail. The immediate question that arises is whether defects in the turnout or mechanical and transportation factors contributed to or caused the accident. Thorough inspections of the car and turnout are required. Particular attention should be given to the truck, wheels and flanges of the car; and the switch point, guard rail gage, flange ways and frog of the turnout.

The possibility of a combination of causes should be considered, such as: (1) a sharp flange and a worn switch point; (2) harmonic rock and a worn or battered frog; or (3) train movement through a previously run through switch.



6. Wheel Marks, Inside Both Rails

The major factors to be considered in this situation are loose wheel or wheels and/or wide gage.

7. No Marks on Rail--Disturbed Track Base

Possible Causes: This situation usually indicates a "lift off". Two major causes of "lift off" are high buff forces action, and harmonic roll.

Squeeze action "lift off" occurs when a car is squeezed between preceding and following cars with sufficient vertical or horizontal force for wheels to climb the rail. One or more of the following factors could be involved.

- Slack action
- Reaction to train braking
- Light and/or long cars
- Steep ascending or descending grades

Harmonic rocking occurs when rail joints closely approximates truck centers of a vehicle at a speed which synchronizes with the natural roll frequency of the equipment. As a general guide, car roll might be experienced by 50- and 60-foot loaded cars travelling at a speed of approximately 15 mph over jointed rail; however, this condition should not be assumed.

As a rule, a curve, faulty switch, or train action may also be involved. If harmonic rock and roll is suspected in a derailment, the following items should be investigated:

- Critical speed--generally 12 mph to 25 mph
- Low joints--causing irregular cross level
- Truck centers--33 feet to 47 feet, or over 70 feet
- Number of consecutive low joints
- Length of rail
- Center of gravity--84 inches and over
- Faulty or missing snubbers
- Side bearing clearance

8. Miscellaneous and Unexplained Marks. One or Both Rails and Base Structure

Possible Causes: It is not unusual to find marks on the rail and rail structure that do not appear to fit the developing theories or circumstances. There are a number of possible causes for these marks--each of which would have a major impact on the investigation findings. Some of the possibilities are:

- Vandalism
- Dragging equipment
- Marks made by prior trains or maintenance of way work equipment.
- Unintentional outside interference (for example, construction equipment, non-railroad-related and working in the vicinity of the track, accidentally striking the track structure)

REPORTING OF DERAILMENTS, SIDESWIPES, ETC.
(PER A.A.R. RULE 95)

As soon as possible, but not later than 48 hours after a derailment, it shall be the responsibility of the General Foreman in whose territory the derailment occurred to telephone the A. A. R. Services Bureau, Altoona, Pennsylvania, telephone extension SMART number 8-422-2541, and furnish the following information:

1. Date and time of accident
2. Train symbol and engine number
3. Place of accident
4. Cause (if known)
5. Car initial and number
6. Loaded or empty car
7. Type, if foreign car, or lot, class, or other identification if System car.
8. Lightweight
9. Date built or rebuilt
10. Estimated damage in dollars
11. Recommended disposition (repair and release; home on own wheels; load up; settle)

The above information must be furnished as soon as possible, but not later than forty-eight (48) hours after incident.

It must be understood that this is the initial report. Original report, consisting of the following, must be prepared for each car and sent to AAR Services Department, Room 214, G.O.B., Juniata, Altoona, Pa:

1. MP 200 (damage report)
2. MP 341 (disposition request)
3. MP 44 (Joint Inspection Certificate)
4. MDM 37 (TTX Report of Damage to car involved in wreck)
5. Pictorial Diagram of Tank Car, if applicable.

Cars bearing Consolidated Rail Corporation markings must be checked on listings for leased and insurance cars. When applicable, MP 24 (complete cost including rerailing) must be completed and forwarded to Manager, Car Classification, Philadelphia, Pa.

Continued - Page 1 of 2

REPORTING OF DERAILMENTS, SIDESWIPES, ETC.
(PER A.A.R. RULE 95)

Continued - Page 2 of 2

No cars may be sold without clearance from AAR Services Department. Due to high prices of freight cars, extreme care must be used when determining the following:

1. Depreciated value of car
2. Cost to repair
3. Disposition of car, i.e., home on own wheels, repair and release, home load up or destroy.
4. Preventing additional damage when rerailing car.

A program has been developed to properly identify and protect the disposition of empty bad order cars moving to home shop on their own wheels.

This will greatly reduce the need for the General Car Foreman and Yard Clerks to physically hand carry waybill information back and forth and the forwarding of same to AAR Services Department in Altoona.

All cars for which disposition has been requested through AAR Services, Altoona, Pa., must be shown on AD 1909 Freight Car Shop Control Report. The two columns, disposition and release (OK) or Set-Back, of the AD 1909 will be used to notify the Yard Clerks as to status of car per requirement of FRA OT-49 regulation governing the movement of bad order cars.

The upper half of the space in the disposition column will show defects (one or two word description) such as door, draft sill, side sheet, hitches, B deck, etc. When car has been ok'd for release from shop, yard or trailer train terminal "062" must be shown in the ok/sb column. If car not ok'd to move show sb. The pink copy of AD 1909 must be forwarded promptly to yard office before cars are pulled.

If there are any questions, call Altoona, 8-422-2638, Attn: G. M. Knab.

DAMAGE PREVENTION DEPARTMENT

Damage Prevention Department Functions Performed in Cooperation with Transportation and Mechanical Departments to Insure the Safe and Efficient Delivery of Commodities:

1. Assist with open top and closed car loadings.

2. Assist in establishing violations when safety is involved (e.g., at derailments, unusual occurrences, etc.)

3. When assistance is needed, make recommendations for transfers and aid in:

    a. Securing special empty equipment.

    b. Engaging outside contractors.

    c. Assuring that the transferred loads comply with all Association of American Railroads' loading regulations.

    d. Determining cost of lading so that cost-savings ratio can be established where a decision is necessary as to whether or not a transfer is economically feasible.

    e. Preventing any damage during the actual transfer operation.

    f. Insuring the damage free delivery of the transferred goods.

4. Assist in recovering material involved in unusual occurrences, fall-offs, etc.

5. Arrange for outturn requests on traffic from problem shippers.

6. Send wires for the protection of high value and vulnerable shipments enroute.

7. Initiate prevention activities on traffic having repetitive damage or problems, such as excessive shopping for shifted loads, bulging doors, etc.

8. Assist in developing loading configurations, car type requirements, etc., for new business shipments.

It is Damage Prevention's policy to conduct regular rip track surveys to establish proper repairs, transfers, lading adjustments, and handling of unidentifiable lading. Shop Foremen should notify Damage Prevention in the event that any problems develop in these areas. When warranted, Damage Prevention personnel can then take corrective measures with the origin carrier to prevent recurrences.

Pittsburgh, PA
1-16-80

IF YOU EXPERIENCE DIFFICULTY:

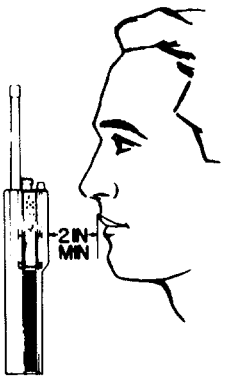
Check the following items before requesting service.

1. Review steps in Basic Operating Procedure.
2. On multiple-frequency models, be sure the selector switch is set to the correct channel.
3. If you have a "Private-Line" model and cannot receive in fringe areas, check the squelch control setting. It must be set to threshold position as described in the basic operating instructions.
4. If operation is poor, check the antenna. It must be undamaged and operated in the vertical position for maximum range. Collapsible antennas must be fully extended. Also, collapsible antennas provide better operation than helical antennas in fringe areas.
5. Try several different operating locations.
6. Transmitter check - Transmit to another portable radio, or communications receiver. If the receiver has a signal strength 'S' meter, comparison readings can be made against another portable radio.
7. Recheck the complete operating procedure.

SAFETY INFORMATION

The United States Department of Labor, through the provisions of the Occupational Safety and Health Act of 1970 (OSHA), has established an electromagnetic energy safety standard which applies to this equipment. Proper use of this radio will result in exposure below the OSHA limit.

DO NOT hold the radio such that the antenna is very close to, or touching, exposed parts of the body, especially the face or eyes, while transmitting. The radio will perform best if the microphone is two or three inches away from the lips and the radio is vertical.



DO NOT hold the transmit (PTT) switch on when not actually desiring to transmit.

DO NOT allow children to play with any radio equipment containing a transmitter.

DO NOT operate a portable transmitter near unshielded electrical blasting caps or in an explosive atmosphere unless it is a type especially qualified for such use.

CONTROLS AND SWITCHES

VOLUME CONTROL - Turns the radio on and off and adjusts the receiver audio volume.

SQUELCH CONTROL - Mutes background noise and reduces unwanted signals.

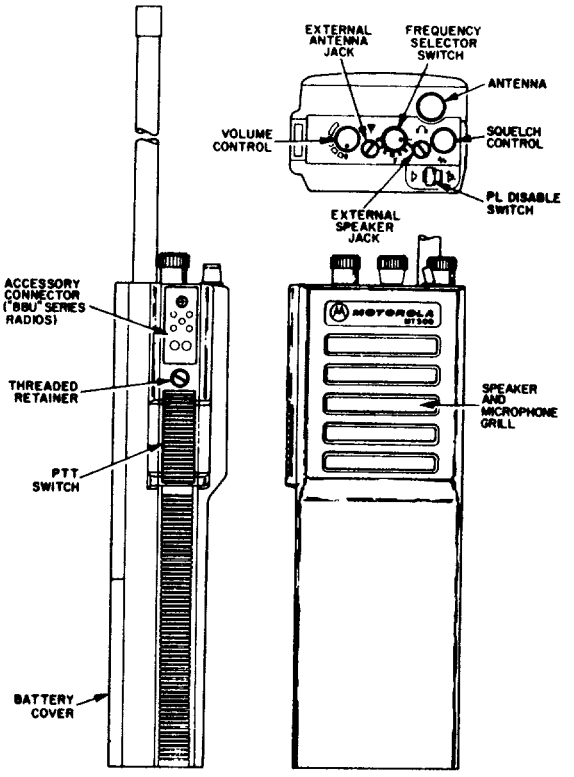
PTT (Push-to-Talk) SWITCH - Press to talk via the transmitter. Receiver operates only when released.

FREQUENCY SELECTOR SWITCH - Selects the operating channel - - toggle switch on two-channel radios, rotary switch on 3 - to 6 or 8 - channel radios.

"PL" DISABLE SWITCH - Used on "Private-Line" models. Receiver operates only with the proper "Private-Line" signal in the " ▷̸ " position. Receiver responds to all on-channel signals when in the " ▷ " position.

ACCESSORY CONNECTOR - Normally used to attach an external speaker-microphone. Present only on universal (BBU) models.

ANTENNA - Fixed antennas normally supplied. Optional collapsible type must be extended before operation.



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SMART

Save Money And Rail-road Time

frequently called numbers

NAME	AREA CODE	TELEPHONE NO.	NAME	AREA CODE	TELEPHONE NO.
EMERGENCY CONTACTS					
BUREAU OF EXPLOSIVE					
PERSONNEL:					
C. L. HINES)	412	835-0377			
SENIOR SUPERVISOR)	412	928-7000			
		EXT.601			
CHEMTREX-TOLL FREE	800	424-9300			
DISEASE CONTROL	404	633-5313			

SMART

Save Money And Rail-road Time

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NAME	AREA CODE	TELEPHONE NO.	NAME	AREA CODE	TELEPHONE NO.

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