

Maintenance Instruction

Service Department



HT-C TRUCK ASSEMBLY

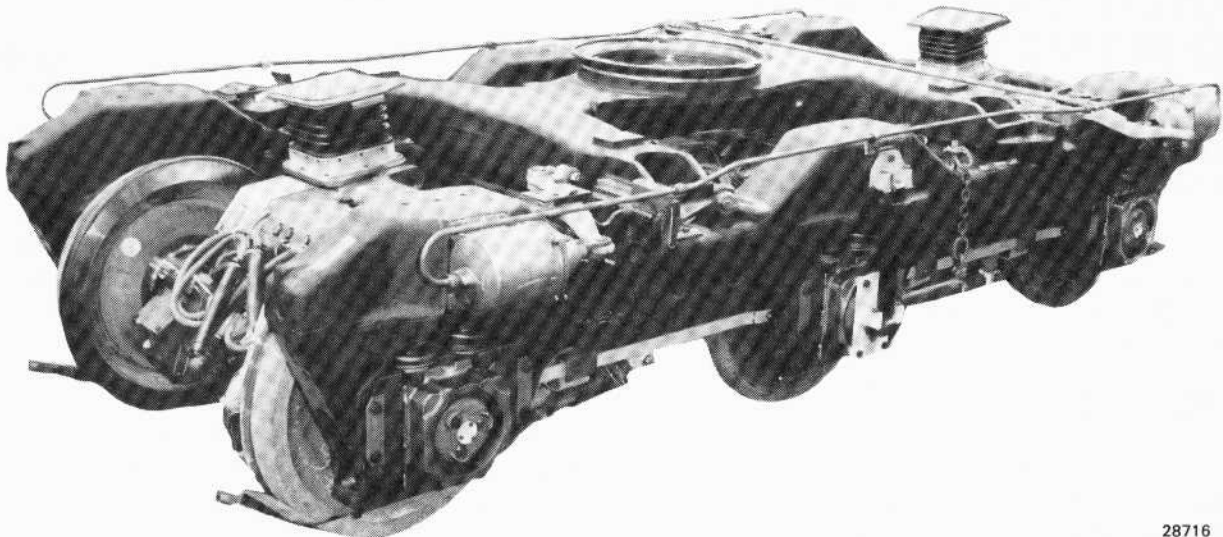
DESCRIPTION

The model HT-C (high traction) trucks, Fig. 1, support the weight of the locomotive and provide a means for transmission of power to the rails. They are designed to withstand the stress resulting from road shock due to normal variations in the roadbed and other conditions encountered during operation. An important function of the truck assembly is to absorb and isolate these shocks so they will not be transmitted to the locomotive underframe and the equipment mounted on the underframe.

Three traction motors, mounted in the truck, convert electrical energy into locomotive tractive effort. The motors are geared to the driving axes which in turn apply force to the rail through the

wheels. The driving force is transmitted to the truck frame by the axle journal bearings and from the truck frame to the bolster at the truck and bolster chafing plate interfaces. The bolster then transmits the force at the center bowl to the carbody center bearing to provide the locomotive tractive effort.

The locomotive carbody weight is transferred to the truck frame through the "H" design bolster. Four truck mounted rubber spring pads, located at the corners of the bolsters, provide the mating part between the truck and bolster. The primary suspension consists of twelve double coil journal springs; two located at each journal. A heavy duty shock absorber is mounted between the truck frame and each center journal bearing to damp excessive vertical and rolling oscillations of the truck frame.



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Fig.1 – HT-C Truck Assembly

*This bulletin is revised and supersedes previous issues of this number.

Lateral stops are provided at two locations on the bolster to limit the lateral movement between the truck and bolster. The bolster chafing plate mounting surfaces also function as stops for the vertical motion between the truck and bolster. Anti-sluing stops are welded to the underframe to prevent excessive truck rotation. Safety links installed at three locations, provide a means of lifting the truck along with the carbody and prevent separation of the truck and bolster from the locomotive in case of a derailment.

The three traction motors are supported on their respective drive axles and at motor nose assemblies mounted on separate truck frame transoms. A main feature of the HT-C truck design is the orientation of the traction motors in one direction. This arrangement provides good motor accessibility and good adhesion characteristics.

The journal bearing transmits the vertical load from the springs to the axle. Each journal bearing is located between two pedestal jaws which are joined at the bottom by a pedestal tie bar. Renewable pedestal liners and journal bearing or bearing adapters wear plates provide for control of clearances between the pedestals and journal bearings or bearing adapters.

Air brake cylinders and brake rigging mounted on the trucks are used to apply retarding forces to the wheels to slow and stop the locomotive. A single shoe brake system is used which utilizes one composition shoe at each wheel.

ROUTINE MAINTENANCE AND INSPECTION

The following paragraphs contain information necessary for performing routine truck maintenance, adjustments, and inspection while the locomotive is trucked.

More detailed inspection and rework procedures are provided in the Inspection And Reconditioning section.

LUBRICATION

Periodic lubrication is not required on the truck assembly. However, the oil level in the journal bearings should be inspected periodically and oil added when necessary. If slack adjuster (if so equipped) threads are found to be dry they should be lubricated.

The center bearing should have approximately 1.5 liters (3-1/4 pints) of oil added before the unit is trucked. This will be enough to cover the center bearing wear plate by approximately 1.6 mm (1/16"). Another 1.5 liters (3-1/4 pints) of oil should be added after the unit is trucked to make up the required 3.1 liters (6-1/2 pints).

NOTE

Do not add all 3.1 liters (6-1/2 pints) of oil before the unit is trucked or a portion of the oil may be pumped out during trucking.

Special care should be taken to keep the journal box wear surfaces, pedestal jaw wear surfaces, and rubber bolster springs free of oil or grease.

TRUCK CLEANING

The trucks should be cleaned periodically to eliminate any accumulations of oil, sand, dust, and road dirt. Accumulations of the above tend to increase wear as well as detract from the general appearance of the truck.

Two methods of cleaning are described. The first method is used when the trucks are still in position under the locomotive. The second method, tank immersion, is used when facilities are available and the truck is completely disassembled.

UNDER LOCOMOTIVE

When using this method, run the diesel engine to supply air under pressure to the traction motors. Air discharged from the motors will help prevent any overspray from entering the motors.

Using a wetting agent and an alkaline solution cleaner, spray the truck, being careful to direct the spray away from any motor openings.

Let the cleaning solution remain on the truck for 10 to 15 minutes. Then, using steam and an alkaline solution in a mixing gun, thoroughly spray the truck assembly.

The truck may now be rinsed, using hot water if desired; however, rinsing is not generally required.

TANK IMMERSION

When the truck assembly is removed from the locomotive, the traction motors, wheels, gears, axles, journal boxes, rubber bolster springs, shock absorbers, brake cylinders, phenolic or composition wear plates, and slack adjuster guides should be removed if the truck is to be immersed in a cleaning tank containing an alkaline solution.

After removal of the above components, the truck and bolster may be immersed in the cleaning solution. After allowing sufficient time to assure removal of all foreign material, the assemblies should be removed and rinsed with hot water. Brake slack adjuster screws (if so equipped) should be greased immediately to prevent seizing.

SHOCK ABSORBERS

This truck is equipped with vertical shock absorbers as basic equipment. Upon special customer request, the truck can be equipped additionally with lateral shock absorbers for high speed operation.

There is rarely a partial failure of a shock absorber. When it fails there is no resistance to movement in compression, in rebound, or in both directions and a simple manual test can detect the failure.

If a shock absorber is new or has not been used for some time, it must be stroked to obtain consistent motion before being checked for control. Resistance developed during testing is proportional to the velocity of the test stroke.

Shock absorbers should be periodically inspected. Use the following steps as a guideline. The procedures under Manual Qualification, are easily performed prior to wheel truing operations.

Shock absorbers contain a reserve of hydraulic fluid and allow seepage to lubricate the piston rod. A light film of oil is normal and is not cause for rejection. However, it is not possible to ascertain the amount of reserve fluid in the shock absorber and predict remaining life.

PERIODIC CHECKS

Perform the following at wheel truing or when loss of damping action is suspected.

1. Check for leaking fluid. Make certain that oil has not been deposited from some other source and check shock absorber per Manual Qualification Procedures before condemning.

2. Perform manual qualification tests to detect gross loss of control.
3. Inspect bushing integrity. Bushings should not permit gross vertical or lateral movements of the shock absorber.
4. If a failed shock absorber is detected, inspect journal springs.

MANUAL QUALIFICATION PROCEDURES

NOTE

Shocks which are found to be reusable should never be disassembled using a flame cutting device. The bushings will be damaged by high temperatures.

GO/NO-GO TEST

This is a quick and easy test that can be performed without completely removing the shock absorber from the locomotive. One end of the shock absorber is unbolted and the shock absorber is stroked manually. If there is a force output in both compression and rebound, the shock absorber is acceptable. If control is gone in either direction, replace with a qualified shock absorber. If there is indication of internal looseness, renew regardless of control.

VERTICAL SHOCK ABSORBERS

Use the following steps to qualify vertical shock absorbers.

1. Unbolt the shock absorber from the journal box.

NOTE

Vertical shock absorbers must be tested in the normal vertical position. Precautions must be made to avoid damaging the shock absorber bushings during the testing or wheel maintenance. For standard bolt mount shock absorbers, the upper mounting bolts must be loosened before the shock is tilted away from the journal box. Tilting the shock without loosening the upper mounting bolt will result in damage to the bushing. Bar mounted or huckbolt fastened shock absorbers must not be tilted or rotated under any circumstance. If necessary, the entire shock assembly should be removed during truck maintenance.

2. Loosen the upper mounting bolt.

3. Manually stroke the shock absorber while retaining the normal vertical position.
4. Renew shock absorber if necessary. If shock tests good reapply the mounting bolts and torque to 366 N·m (270 ft-lbs).

LATERAL SHOCK ABSORBERS

Lateral shock absorbers are recommended for high speed locomotive operation. The shock absorbers are similar in appearance and it is physically possible to interchange some types. Incorrect installation will cause the shock absorbers and/or the mounting hardware to fail. Each shock absorber has a label marked "L" or "V" which identifies it for lateral or vertical applications.

The lateral shock absorbers can be checked by disconnecting only the outer end of the assembly and manually stroking it. Position during the test is not significant for the lateral shock absorber. After the test, torque mounting bolts at both ends of the assembly to 366 N·m (270 ft-lbs). Inspect lateral shock absorber mounting brackets for fatigue failures due to undersize welds. If fatigue cracks are detected, rework the brackets to full 13 mm (1/2") weld specified for the application.

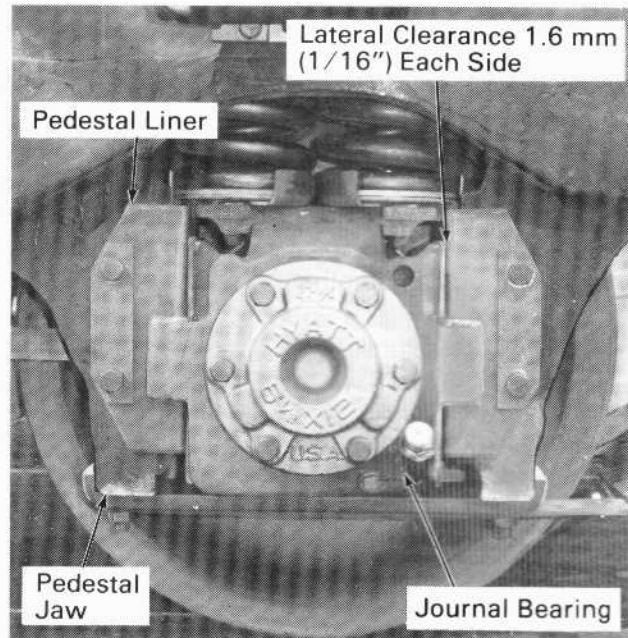
MANUAL COMPARISON TEST

A wall mounted fixture has been designed to test and compare used shock absorbers with new shock absorbers of the same type. A torque wrench may be employed with the fixture. Work Sketch 41089 giving details is available upon request from any EMD regional office.

A shock absorber may be re-used if the torque reading at the same stroke velocity is 75% or more of the reading obtained with a new shock absorber.

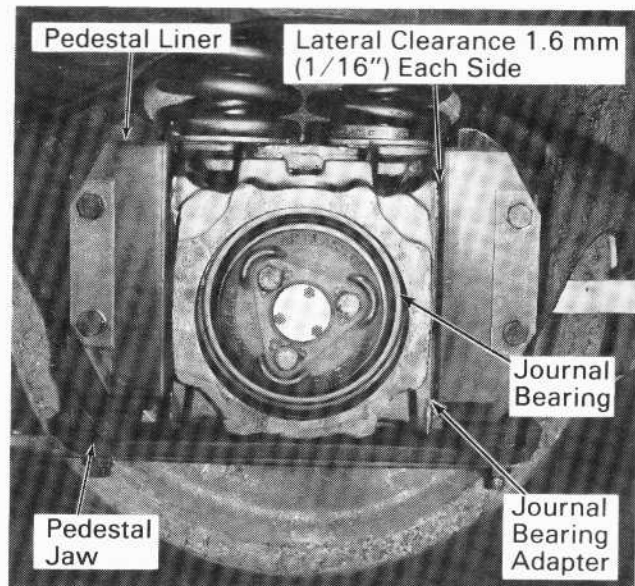
JOURNAL BEARING-TO-PEDESTAL LINER CLEARANCE

Each journal bearing or bearing adapter is located between two pedestal jaws, Figs. 2 and 3. Renewable pedestal liners and journal bearing or bearing adapter wear plates provide for control of clearances. Clearance limits between the longitudinal and lateral wear surfaces are such that in normal operation, the clearance will not exceed the maximum in the period between truck reconditioning.



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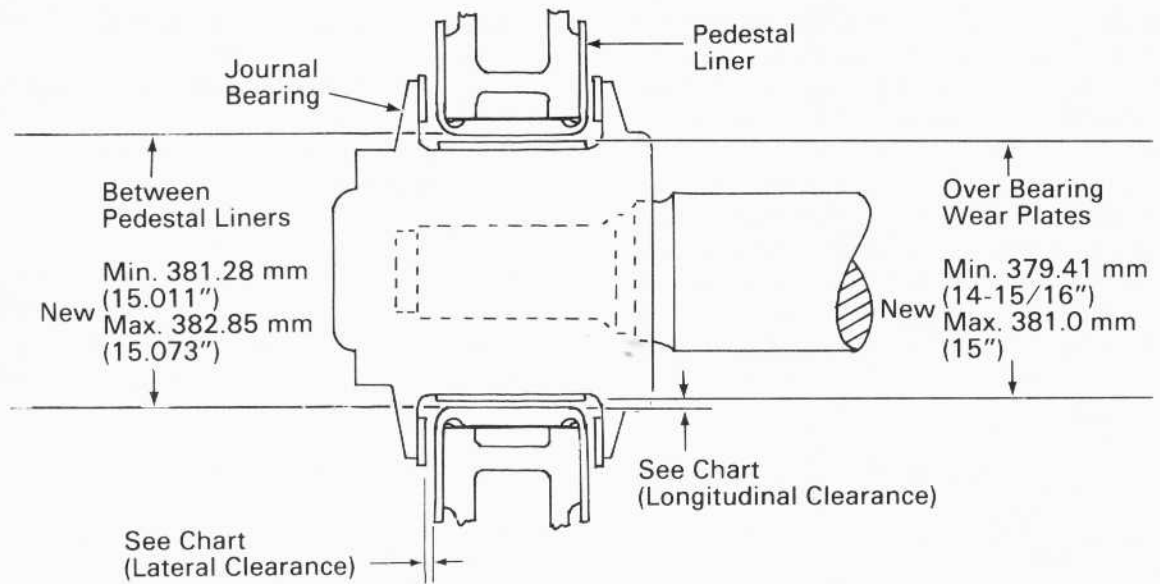
Fig. 2 - Pedestal Liner-To-Cylindrical Journal Bearing Clearance



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Fig. 3 - Pedestal Liner-To-Tapered Journal Bearing Adapter Clearance

The truck pedestal liner-to-cylindrical journal bearing wear limits are shown in Fig. 4. The truck pedestal liner-to-tapered journal bearing adapter wear limits are shown in Fig. 5. If the clearances are beyond the maximum limits, the wear plates must be replaced. The wear plates must be given a visual inspection for possible cracks or excessive wear if they are to be reused.



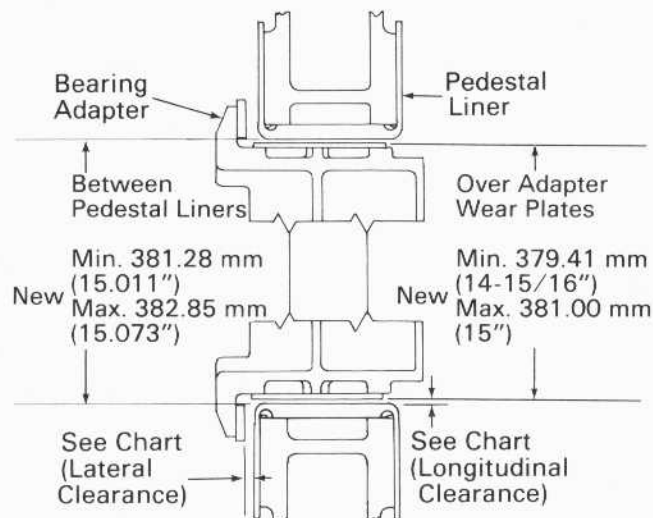
***NOTE**

This tolerance should be maintained at 6.4 mm (1/4") maximum for trucks used in high speed (over 113 km/h [70 MPH]) service.

BEARING TO PEDESTAL LINER CLEARANCE					
Lateral (Total)	mm	(inch)	Longitudinal (Total)	mm	(inch)
New	3.2	1/8	New	0.4 - 3.2	1/64 - 1/8
Max.	9.5	3/8	Max.	9.5*	3/8*

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Fig.4 - Truck Pedestal Liner-To-Cylindrical Journal Bearing Wear Limits



***NOTE**

This tolerance should be maintained at 6.4 mm (1/4") maximum for trucks used in high speed (over 113 km/h [70 MPH]) service.

BEARING ADAPTER TO PEDESTAL LINER CLEARANCE					
Lateral (Total)	mm	(inch)	Longitudinal (Total)	mm	(inch)
New	3.2	1/8	New	0.4 - 3.2	1/64 - 1/8
Max.	9.5	3/8	Max.	9.5*	3/8*

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Fig.5 - Truck Pedestal Liner-To-Tapered Journal Bearing Wear Limits

The clearance between the journal bearing or bearing adapter and the pedestal can be measured using feeler gauges. Feeler gauges must be approximately 25 mm (1") wide and 305 mm (12") long. Care should be taken in making this measurement to see that the gauge is inserted adequately into the clearance and that it fits into the wearing area so a true reading is obtained. All measurements should be taken with the journal bearings in the position they are in when the locomotive is stopped. No attempt should be made to shift the journal bearings on the axle while the weight of the locomotive is supported by the bearings.

NOTE

Refer to Service Data page for reference information concerning measuring internal journal bearing clearances.

WHEEL AND AXLE INSPECTION

Wheels should be inspected for visible defects each trip. This is part of the inspection required by the Federal Locomotive Inspection Laws. Wheels are periodically checked for wear, sharp flanges, shelling, cracks, and flat spots to see that they are within the limits prescribed by the Federal Railroad Administration, Department of Transportation.

Wheel and axle defects which require the removal of any particular wheel set are fully defined and illustrated in the "Wheel And Axle Manual" published by the Association of American Railroads (AAR), 59 East Van Burnen Street, Chicago, Illinois 60605.

NOTE

Refer to the AAR "Wheel And Axle Manual" for complete information, including use of gauges for checking wear and defects. The AAR gauge and the wheel defect gauge may be purchased from the Pratt And Whitney Company

Detailed wheel and axle inspections and wear limit information is provided in M.I. 1518 titled Wheels, Axles, Axle Gears And Pinions for domestic application or M.I. 1519 for export application.

Use the following guidelines in conjunction with M.I. 1518 or M.I. 1519 when determining wheel and axle condition.

- Minimum wheel diameter after last truing operation.
- Maximum diameter mismatch of two wheels on a common axle.

- Maximum diameter mismatch between wheels on one axle compared to those of any other axle. This includes wheels on the same truck.
- Minimum rim thickness. As specified by the Federal Railroad Administration.

NOTE

Any accurate conventional method may be used to determine wheel size. However, EMD recommends use of an AAR wheel gauge to measure to the machined edge of the outer wheel rim.

- Axle longitudinal limits.
- Circumferential defects on or below the axle surface.
- Axle runout.

TRUCK REMOVAL

The trucks may be removed from the locomotive by using an overhead crane or jacks to raise the locomotive, or by use of a drop table.

The truck safety interlock clips must be removed before any attempt is made to separate the trucks from the carbody. The safety interlock clips are bolted to the carbody side bearings and hook under the truck side bearings. Make sure that all other physical connections between the trucks and the carbody are disconnected, such as the air brake equipment, sanding equipment, traction motor cables, hand brake chain, and the speed recorder connection.

When lifing or jacking a locomotive to remove one or both trucks, all four corners should be raised equally to a height which will permit end removal of complete trucks. The locomotive should be supported on blocking located under the center sills near the jacking pads, if it is to be held in a raised position.

TRUCK DISASSEMBLY

The truck may be disassembled using one of two methods, provided facilities and height requirements are available, the normal procedure is to disassemble the truck in the inverted position. Procedure A provides a general guideline for disassembling the truck in the inverted position. Procedure B may be used when necessary to disassemble the truck in the upright position.

PROCEDURE A

1. Remove center bearing dust guard, wear plate and wear half-rings. Wipe oil from center bearing and drain oil from journal boxes and traction motor support bearings.
2. While truck is in the upright position, remove individual items such as brake cylinders, rigging, and piping from truck. Some portions of the brake rigging may be more easily removed when the truck is inverted.
3. Remove the bolster from the truck frame and unbolt the rubber bolster pads from the frame.
4. Turn truck over with an overhead crane of sufficient capacity. Refer to Service Data for file drawing available to fabricate a turnover fixture to turn over the truck assembly sideways as shown in Fig. 6.

WARNING

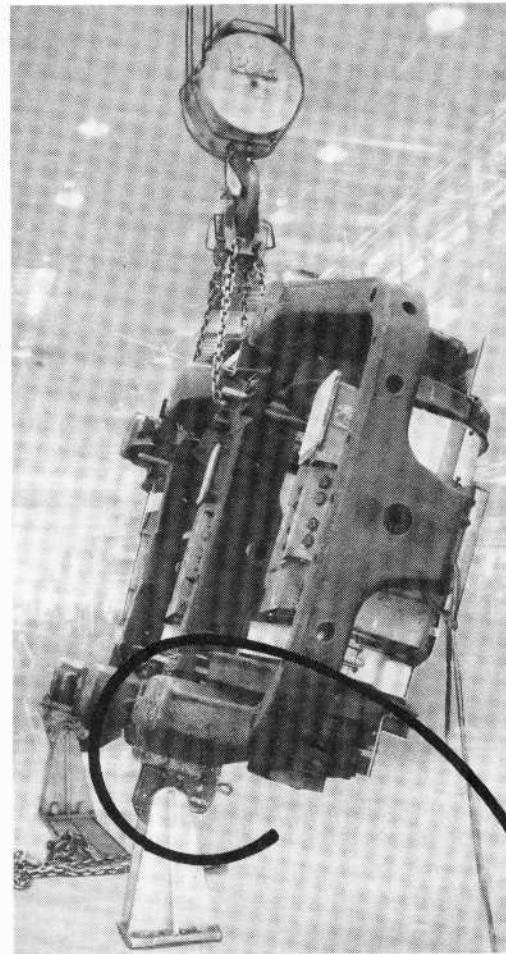
If pedestals are equipped with floating pedestal liners, extreme care must be exercised during wheelset removal to avoid personal injury.

The bolt-on pedestal liners hold the journal springs, shims, and spring seat in place during wheelset removal. Floating pedestal liners, however, cannot restrain the parts without the tie bar in place.

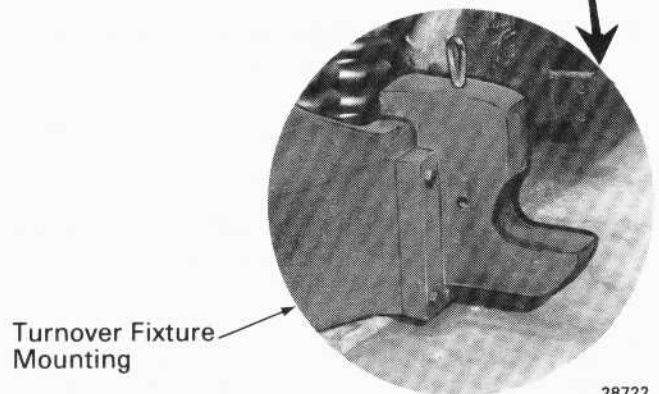
To avoid accidents and personal injury, fixtures are required to support the journal spring seats as the wheelset is removed.

Refer to Pedestal Repair paragraphs of Inspection And Reconditioning section of this Maintenance Instruction for application of floating pedestal wheelset changeout fixture.

5. Disconnect vertical shock absorbers and remove pedestal tie bars. Remove traction motor, axle, wheels, gear case, and journal bearings as a single assembly using a lifting fixture as shown in Fig. 7. Refer to Service Data for file drawing available to fabricate lifting fixture.
6. Remove pedestal liners, coil springs, coil spring seats, and shims.
7. To remove traction motor nose suspension assembly, Fig. 8:
 - a. Remove pin keeper bar and remove traction motor suspension pins.



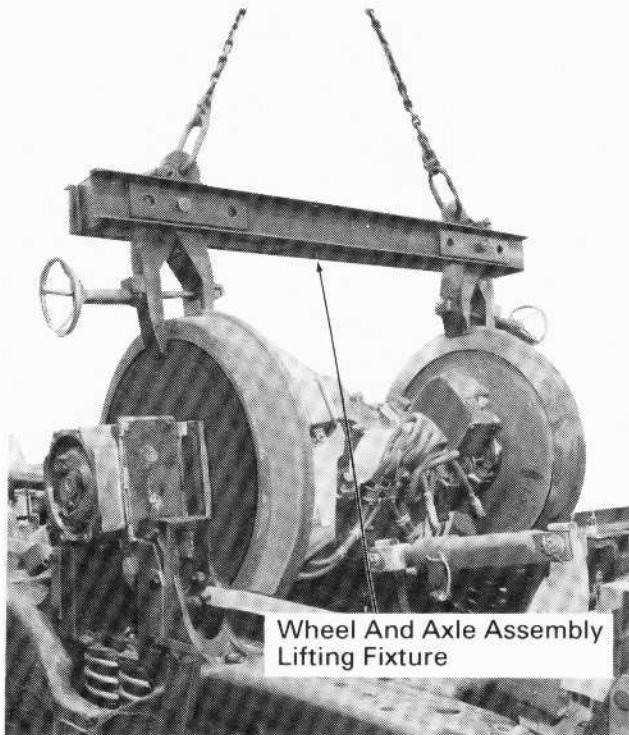
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Fig.6 – Turning Over Truck Assembly

- b. Compress suspension assembly by loosening the assembly bolts and placing temporary blocks between the bolt heads and frame of nose suspension assembly. Retighten bolts to compress rubber nose pack and remove assembly.

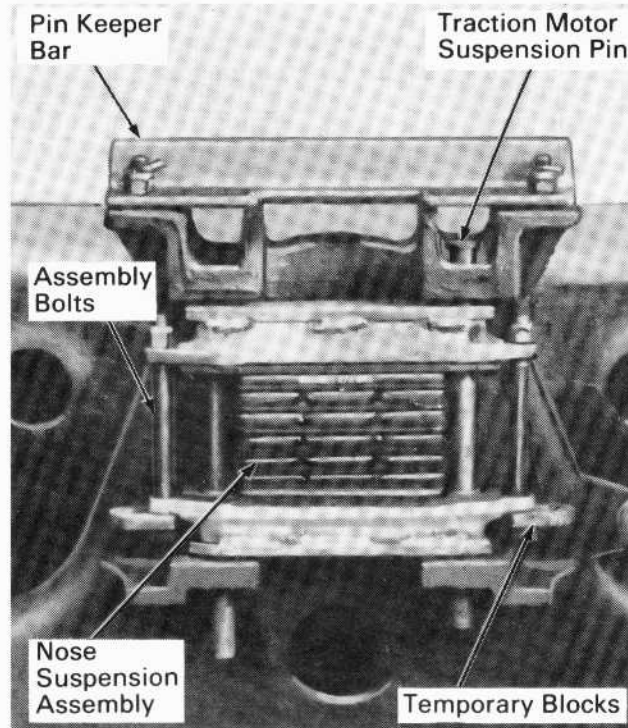


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Fig.7 – Removal Of Wheel And Axle Assembly

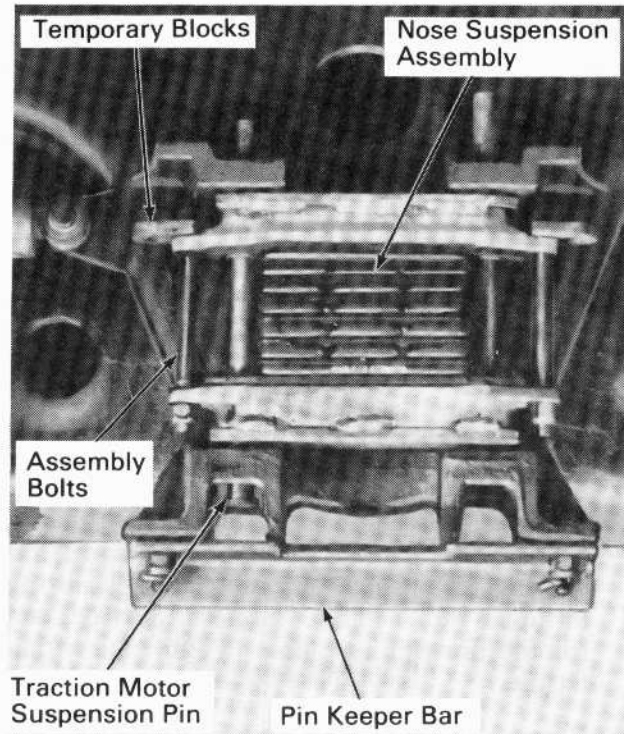
PROCEDURE B

1. Remove center bearing dust guard and wear plates. Wipe oil from center bearing and drain oil from traction motor support bearings.
2. Remove individual items such as brake cylinders, rigging, and piping from truck.
3. Remove traction motor gear case bolts and clips. Remove each half of gear case.
4. Remove dust guards, traction motor support bearing caps, axle guard, and outer bearing half.
5. Apply lifting chains to lifting eyes at nose suspension side of traction motor. Connect lifting hoist to chains.
6. To remove traction motor nose suspension assembly, Fig. 9:
 - a. Remove pin keeper bar to allow traction motor suspension pins to drop down.
 - b. Lift traction motor to compress rubber nose pack. With the rubber nose pack compressed, insert temporary blocks about 19 mm (3/4") thick between the rubber nose pack holder and the assembly bolts.
 - c. Lower traction motor a small amount to free nose suspension assembly. Remove suspension assembly from truck frame.



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Fig.8 – Traction Motor Nose Suspension Removal, Inverted View



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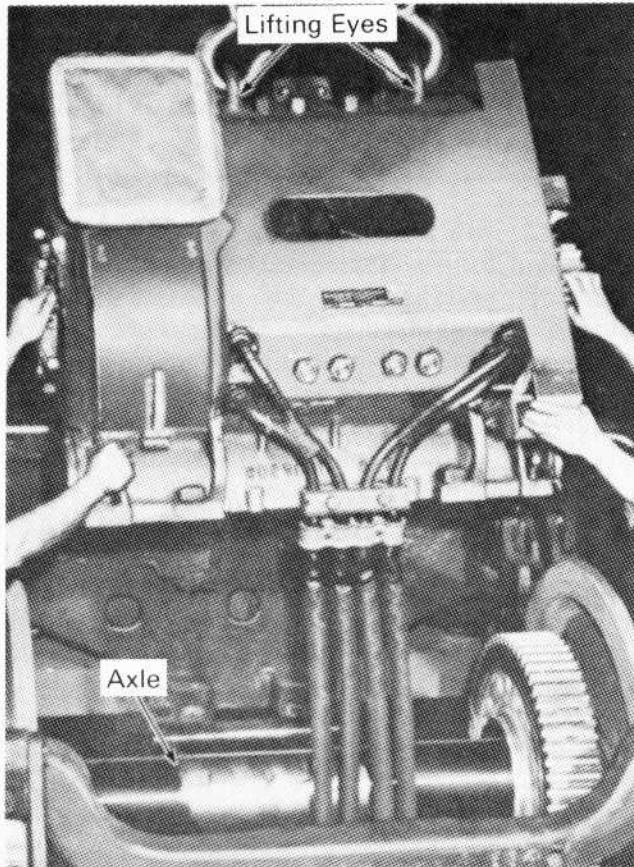
Fig.9 – Compressing Nose Suspension Assembly For Removal

- c. Lower traction motor a small amount to free nose suspension assembly. Remove suspension assembly from truck frame.

CAUTION

Use care when lifting traction motor so that support bearings will not fall out and be damaged. It is recommended that a pinion protector be applied to prevent damage to pinion after traction motor is removed.

7. Hoist traction motor and allow it to rotate on axle until lower lip of support bearing will clear axle, Fig. 10. The motor assembly may now be lifted clear of the axle.



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Fig.10 – Removing Traction Motor From Truck

8. Remove pedestal tie bars and vertical shock absorbers.
9. Lift truck frame from wheel and axle assemblies.
10. Remove pedestal liners, spring seats and shims, coil springs and any remaining smaller parts of the truck as desired.

INSPECTION AND RECONDITIONING

The following paragraphs describe the inspection and reconditioning of major truck components. At

this time, the pertinent inspections covered in the Routine Maintenance And Inspection section, should also be performed.

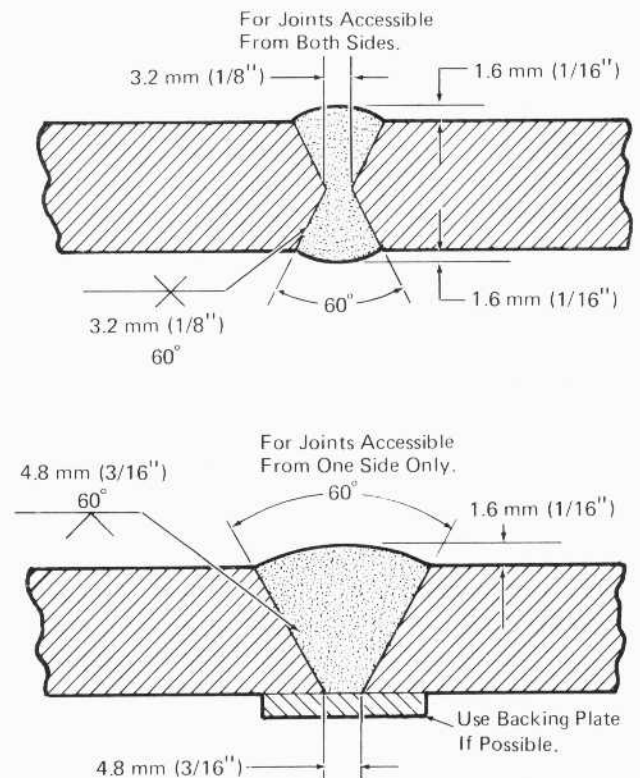
TRUCK FRAME

Make a thorough inspection for the following and recondition if necessary.

BENT, BROKEN, OR CRACKED MEMBERS

Inspect all truck frame members and welds for breaks or cracks. Perform magnetic particle inspection at any areas suspected of being cracked. Bent sections, other than the obvious, will be revealed during the truck tramping procedure.

Breaks or cracks are repaired by welding, using AWS E-7016 electrode. It is permissible to remove a broken or bent section for straightening if it can be welded back into place after preparing the joint to obtain a 100% section of weld with reinforcement as shown in Fig. 11. To minimize localized stressing, when several welds are required, allow sufficient time for frame to cool to the touch between welding passes. Water soaked rags or air fans may be used to cool the welding area. Make certain that area to be welded is dry before welding. To further minimize localized stress distortion, each welding pass, except the root pass, should be 100% needle peened. Peen



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Fig.11 – Preparing Joints For Welding

immediately after each pass, except for the final pass. Peen final pass after it has cooled to below 66° C (150° F). Use a needle peening gun with a minimum of twenty-eight 3 mm wires with rounded end. Avoid excessive peening that will impair the quality of the welds.

All welds should be magnetic particle inspected after welds have cooled to below 204° C (400° F).

Bent sections may be straightened either cold or after application of heat. Before straightening any bent section, determine what effect the straightening will have on the adjoining sections. If necessary, the

affected section should be removed from the frame assembly and rebuilt provided the welding criteria described above can be complied with.

Jacks, turnbuckles or fixtures designed for straightening members will expedite the straightening of bent sections, Fig. 12.

WORN SPOTS

The truck frame should be checked for worn areas. Worn spots can be repaired by building up the affected area with weld as outlined in the above paragraphs. After welding operation is complete, grind the area smooth to match its original form.

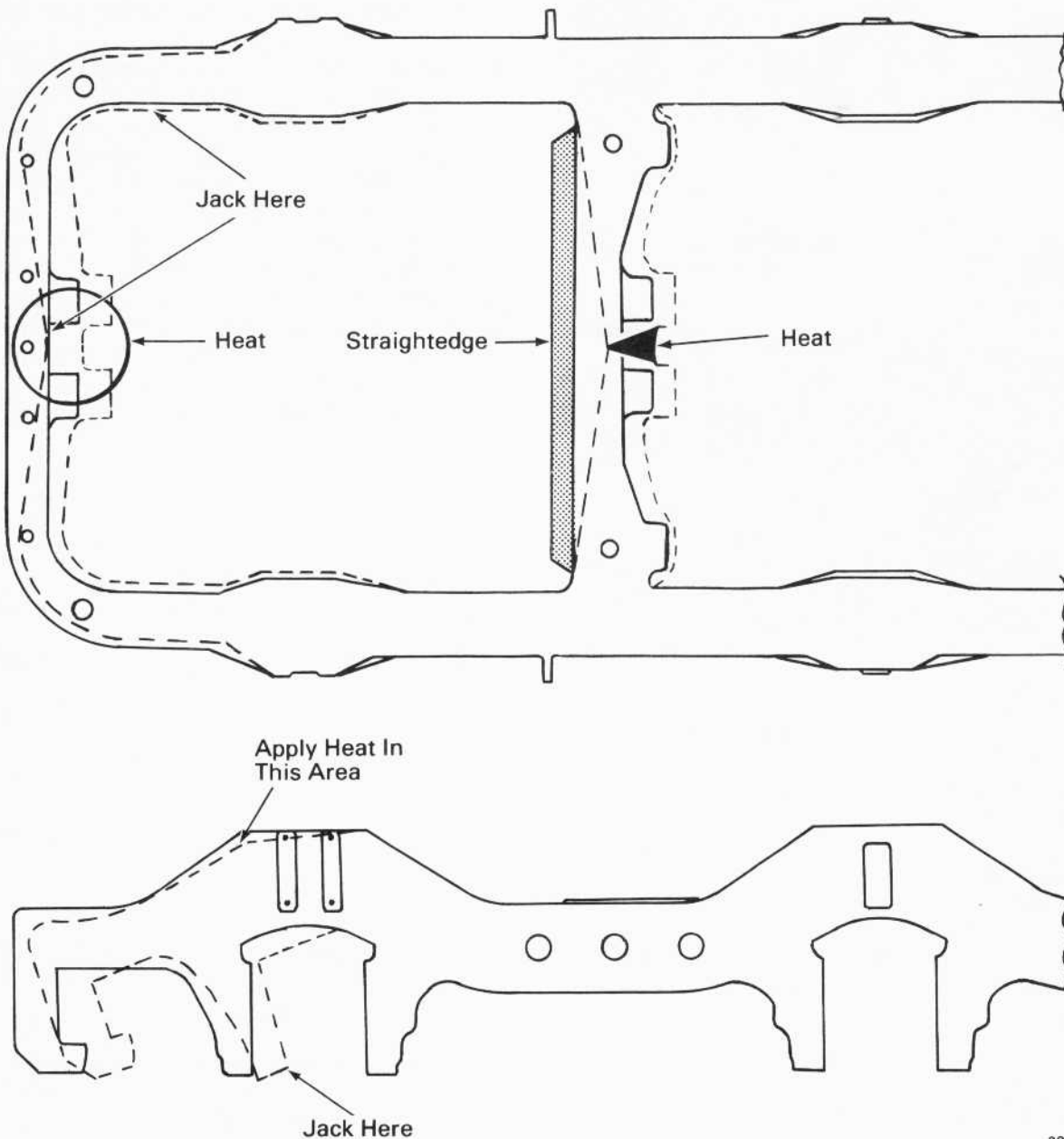


Fig.12 - Straightening Bent Frame Sections

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ELONGATED OR OVERSIZE HOLES

Drilled holes elongated by wear due to loose bolts, screws, sleeves, or bushings can be reconditioned by either ring or plug welding. Holes which are too small to permit proper manipulation of the welding electrode should be drilled oversize to permit proper access for the electrode. The hole should be redrilled to proper size after completion of the welding.

WORN BUSHINGS

Bushings worn 2.4 mm (3/32") or more on the diameter should be replaced with new bushings. Where bushings are paired to carry a single load, both of the bushings should be replaced if one bushing is worn sufficiently to warrant its replacement.

Worn bushings can be pressed out. After the bushing is removed, inspect the drilled hole in the frame for wear or an out-of-round condition. Holes found unsuitable for a new bushing can be reconditioned by ring welding and then drilling to accept the new bushing. Holes which are only slightly oversize may be shrunk by applying a band of heat parallel with the drilled hole.

DAMAGED THREADS

All threaded holes should be checked and retapped if required. If the threaded holes cannot be reconditioned by retapping they should be plug welded, redrilled and tapped. An alternate method of reclaiming unsatisfactory threaded holes is to retap them to accommodate an oversize bolt.

BROKEN OR BENT STUDS

Replace any broken or bent studs with studs which are in satisfactory condition.

MISSING PARTS

Make a thorough inspection to see that all the necessary parts are intact. Special attention should be given to wear plates, cotter keys, washers, bushings, studs, brake guides; and brake pins.

PEDESTAL REPAIR

WHEELBASE SPACING

The wheelbase spacing is the distance between the axle centerlines.

To determine the wheelbase spacing, use a straight-edge and measure the distance between points A and C of Fig. 13. This dimension can be checked by measuring between points B and D. Measure the distance between points C and E and check between points D and F.

The distance between the middle axle centerline and the axle centerline at the open end of the truck should be 2 022 mm ± 3 (79-5/8" $\pm 1/8$). These axle centerlines should be parallel within 0.8 mm (1/32") at the outer face of the pedestal jaws. The distance between the middle axle centerline and the axle centerline at the closed end of the truck should be 2 127 mm ± 3 (83-3/4" $\pm 1/8$). These axle centerlines should be parallel within 0.8 mm (1/32") at the outer face of the pedestal jaws.

If the truck pedestal spacing is not within tolerance, there are several methods to correct:

1. If the frame is only slightly bent, straightening alone may bring the wheel base within tolerance.
2. It may be necessary to grind the face of one pedestal and add a shim to the other.
3. It may be necessary to remove and relocate the pedestals.

TRANSVERSE PEDESTAL SPACING

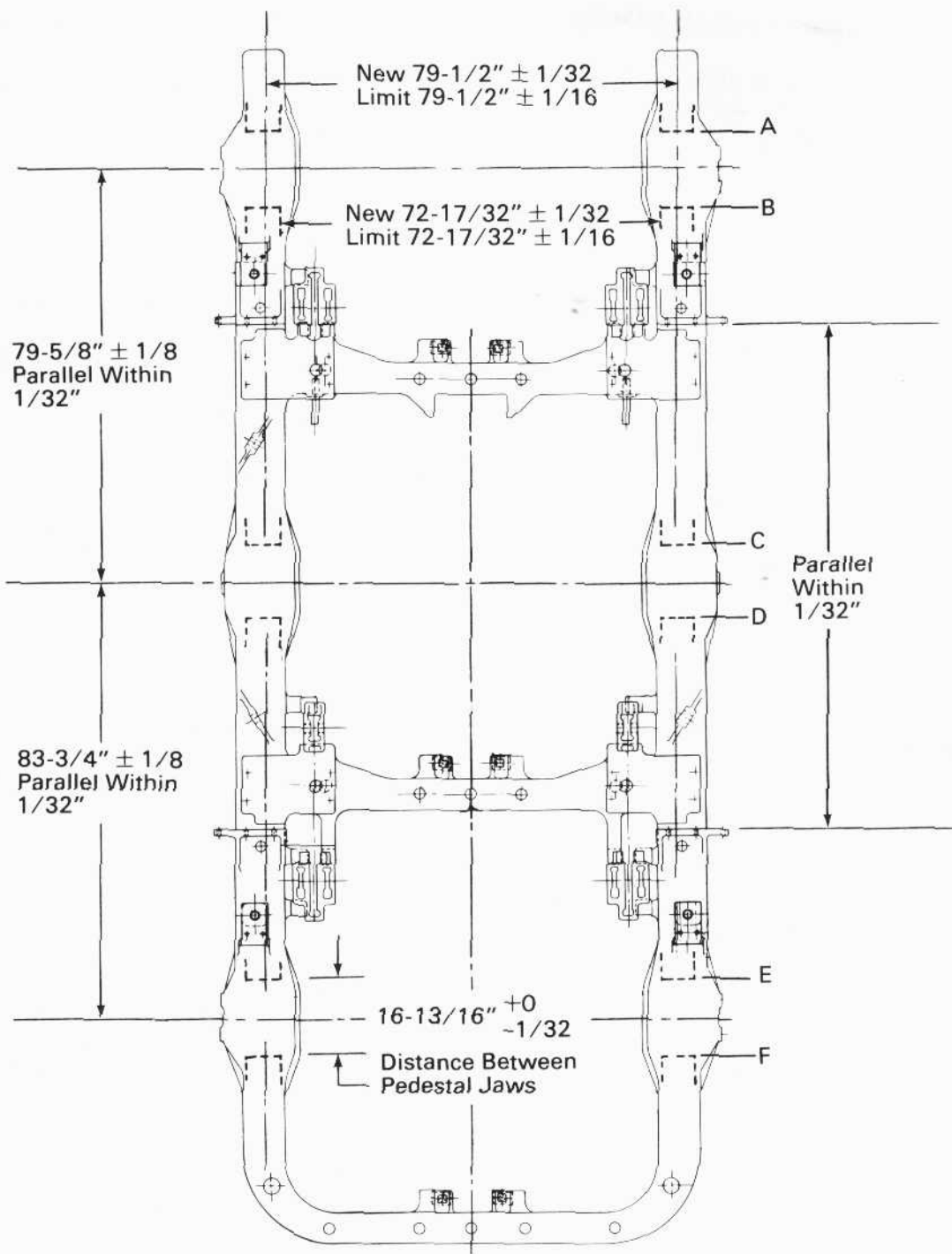
The transverse pedestal spacing refers to the dimension between pedestal jaws on opposite sides of the truck, Fig. 13. The dimensions should be 2 019 mm ± 1.6 (79-1/2" $\pm 1/16$) between the longitudinal centers of the pedestals or 1 842 mm ± 1.6 (72-17/32" $\pm 1/16$) measured at the machined faces of the pedestals as shown in Fig. 13.

Pedestals may lean in or out, providing both pedestals of each set lean in the same direction and are within tolerance from the longitudinal centerline of the truck frame to the inside face of each pedestal.

Pedestals which do not conform to the dimensional limits can be corrected by straightening the truck frame, hot or cold.

LONGITUDINAL PEDESTAL SPACING

The longitudinal pedestal spacing refers to the distance between the inside surfaces of the pedestal jaws on the same side of the truck, as indicated in Fig. 13. Incorrect longitudinal pedestal spacing may be caused by a bent frame, bent pedestals, or wear between the pedestal liner and pedestal face.



METRIC CONVERSION CHART			
(inch)	mm	(inch)	mm
1/32	0.8	72-17/32	1 842
1/16	1.6	79-1/2	2 019
1/8	3.2	79-5/8	2 022
16-13/16	427	83-3/4	2 127

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Fig.13 - Truck Frame Dimensions

A bent frame or bent pedestals can only be corrected by straightening to correct pedestal spacing.

Wear between the pedestal liner and pedestal face should be corrected by welding and remachining the pedestal face.

HORIZONTAL PEDESTAL ALIGNMENT AT THE BASELINE

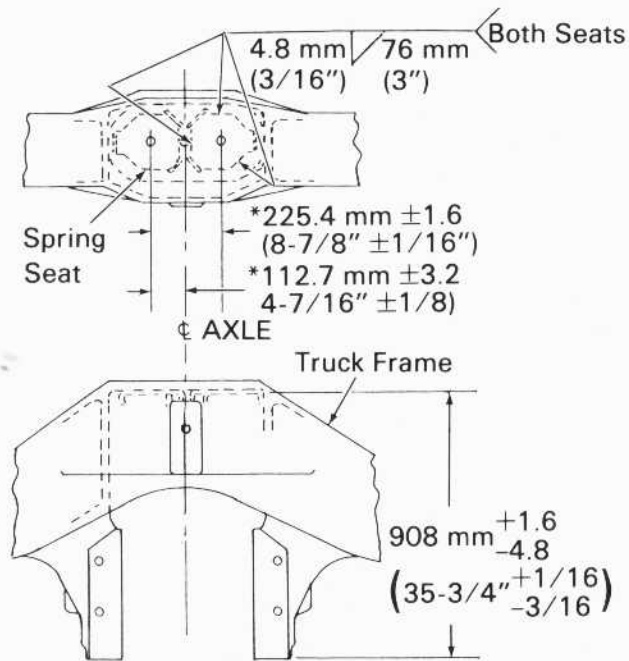
The horizontal pedestal alignment at the baseline is the relationship from one pedestal jaw to any other pedestal jaw on the same side of the truck frame, as indicated in Fig. 14. This alignment can be determined by measuring from a straight edge tool or wire spanning the pedestals, as shown in Fig. 14, and may be above or below the pedestal baseline by no more than 3 mm (1/8"). A condition in excess of this can only be corrected by straightening the truck frame.

A truck frame with deep gouges on the counterface surface on back of the pedestal holes can be corrected by weld buildup and back counterfaced.

LOCATION OF TRUCK FRAME COIL SPRING SEATS

The coil spring seats welded to the truck frame should be checked for alignment after any rework is done to the pedestals. The spring seat centerlines should be 112.7 mm \pm 3.2 (4-7/16" \pm 1/8) from the centerline of the truck pedestal opening, as indicated in Fig. 15. If the misalignment is more than 3.2 mm (1/8"), it should be corrected by moving the spring seats. The distance between the two spring seat centerlines should be held within 225.4 mm \pm 1.6 (8-7/8" \pm 1/16), as indicated in Fig. 15.

The spring seat can be removed by cutting the welds, and should be rewelded or a new spring seat applied. Shims located between the spring seat and the truck frame provide the proper height from the spring seat



*Spring seat centerlines may be misaligned 3.2 mm (1/8") to pedestal centerline and 1.6 mm (1/16") to each other.

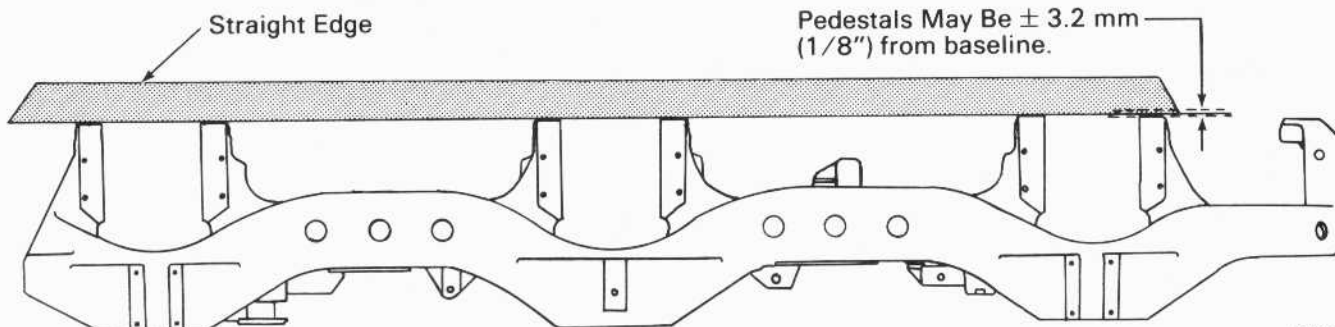
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Fig.15 - Coil Spring Seat Location

to the bottom of the pedestal. Care should be taken to use the proper shims when replacing spring seats. The spring seats should be flat to prevent uneven loading on the coil springs.

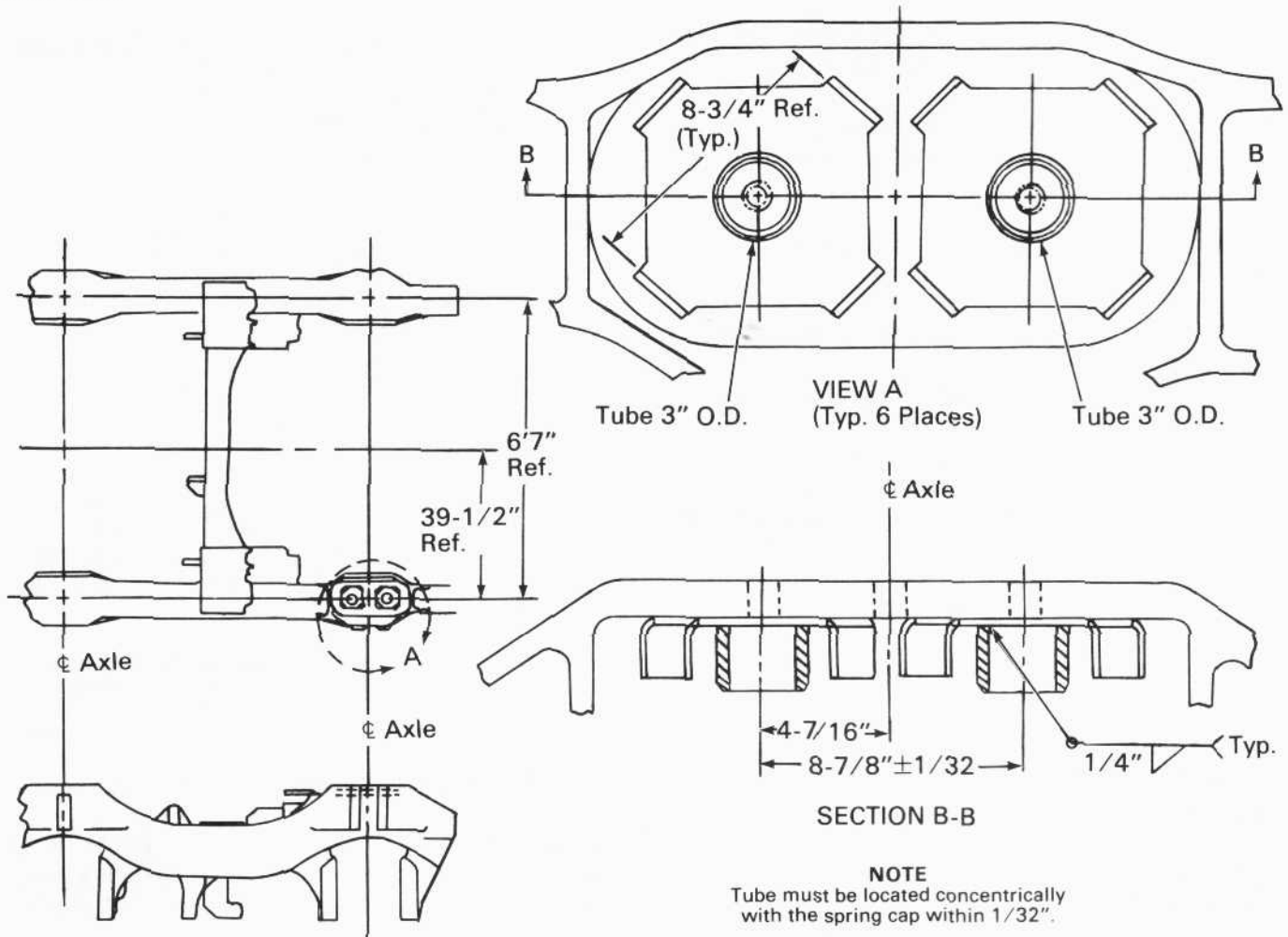
TAPERED JOURNAL BEARING COIL SPRING SEAT MODIFICATION

Truck frames with tapered journal bearings must use a smaller outside diameter journal coil spring than cylindrical journal bearings and require a locating tube 9539517 be welded to the center of the spring seat, Fig. 16. The tube should be positioned with the aid of the jig which fits inside of the spring seat and having a centering hole for the placement of the locating tube. The tube should be fastened to the



28728

Fig.14 - Pedestal Base Horizontal Alignment



METRIC CONVERSION CHART			
(inch)	mm	(inch)	mm
1/32	0.8	8-3/4	222.2
1/4	6.4	8-7/8	225.4
3	76.2	39-1/2	1 003.3
4-7/16	112.7	6'7	2 006.6

28730

Fig.16 - Truck Frame Coil Spring Seat Location (Tapered Journal Bearing)

spring seat with a 3.2 mm (1/8") fillet weld along the inside intersection between the inside tube surface and the spring seat.

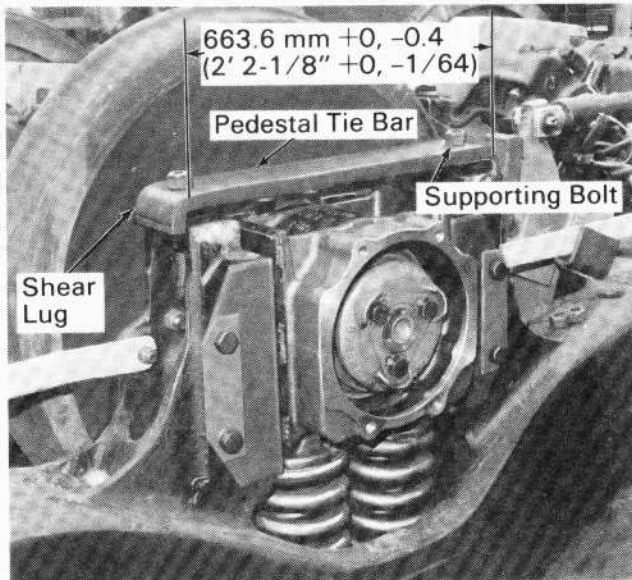
PEDESTAL TIE BAR

The two opposing pedestal faces are held together by a tie bar, Fig. 17. The function of the tie bar is to transfer the load from one pedestal face to the other through the tie bar shear lugs (not through the supporting bolts).

The nominal dimension for the location of the tie bar shear lugs is 663.6 mm +0, -0.4 (2' 2-1/8" +0, -1/64). This dimension must be held even if weld buildup or grinding is required.

Bolt holes for supporting the pedestal tie bar can be reamed for proper location to the extent that it does not affect interchangeability with a new tie bar.

Plug welding and redrilling of the tie bar support bolt holes will only be necessary in cases of extreme damage or out-of-alignment condition.



28731

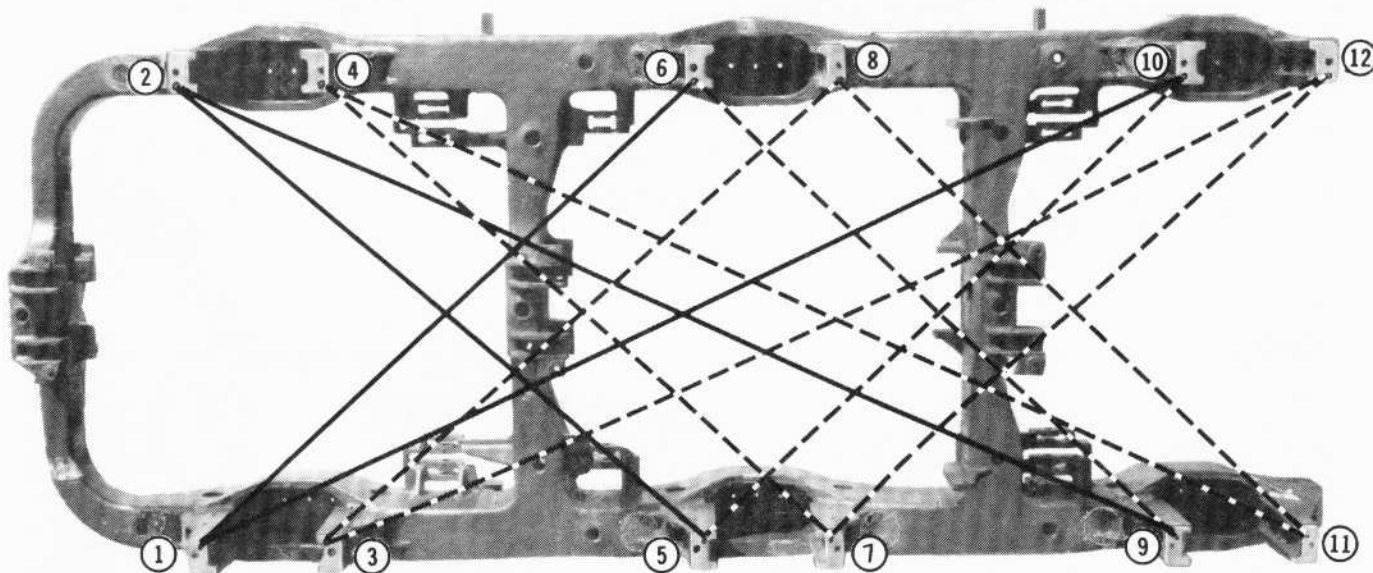
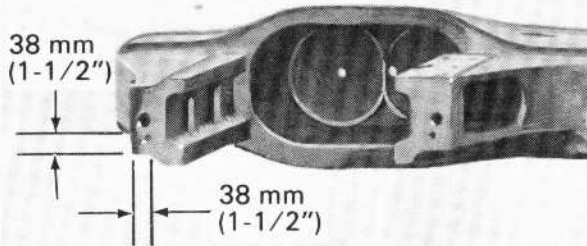
Fig.17 - Pedestal Tie Bar

Tramming is accomplished using a trammel beam as shown in Fig. 19 with the truck frame inverted on a level table or level location. In addition to the diagonals shown in Fig. 18, it may be necessary to check the tram of the pedestals both longitudinally and transversely as indicated in Fig. 19.

The tram assembly is made up of two trammels attached to a wooden or metal beam of such construction that it will hold the assembly rigid. This assembly facilitates taking comparative measurements of varying lengths, which could not be done using conventional dividers. The adjustable trammels permit any distance separation on the beam so the various dimensions to be trammed can be compared.

TRAMMING OF TRUCKS

The truck pedestals are trammed to determine if they are in correct alignment with each other, that is, to determine if the distance between pedestals is equal to or within the allowable limits. The diagrams shown in Fig. 18 indicate which pairs of pedestals should have equal distances between them.

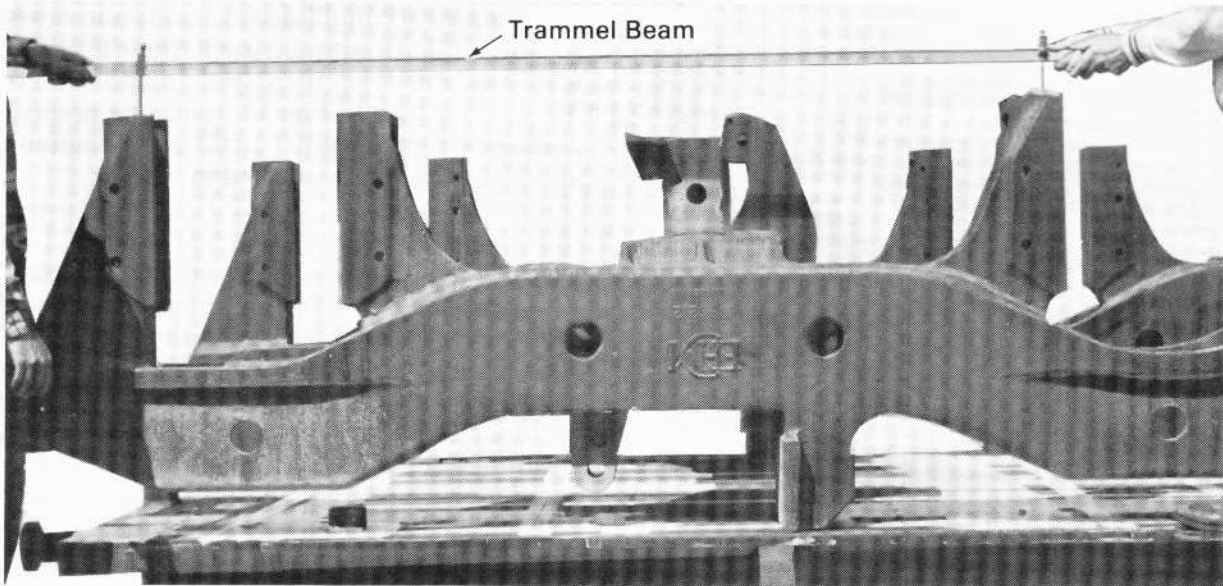


- 1-6 = 2-5
- 1-10 = 2-9
- 3-8 = 4-7
- 3-12 = 4-11
- 5-10 = 6-9
- 7-12 = 8-11

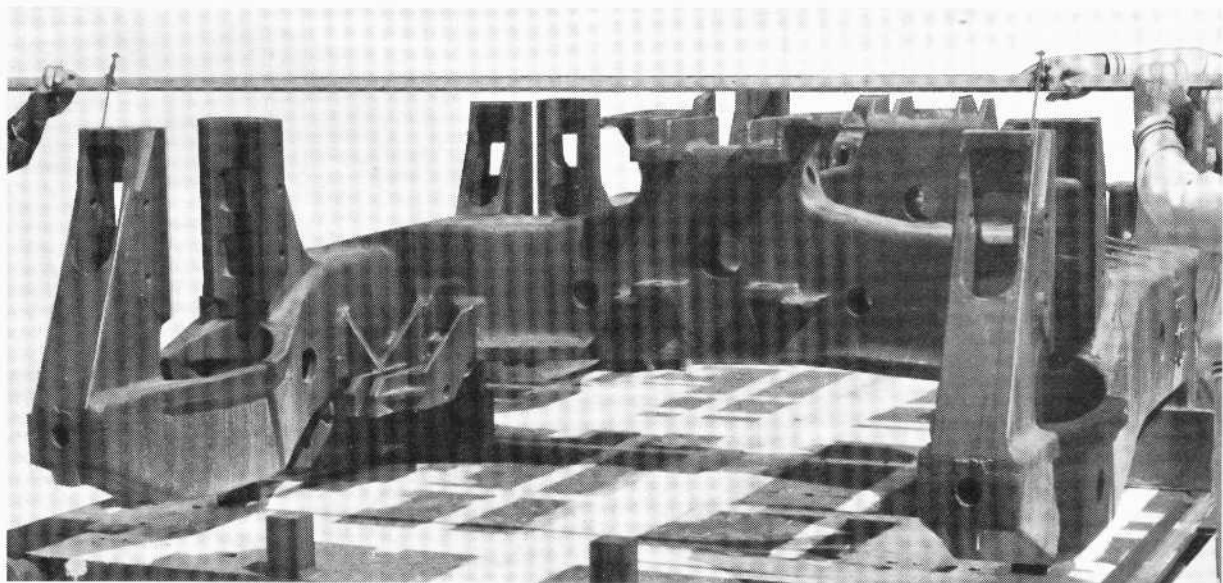
All measurements to be equal within 3 mm (1/8").

Fig.18 - Truck Frame Tramming Diagram

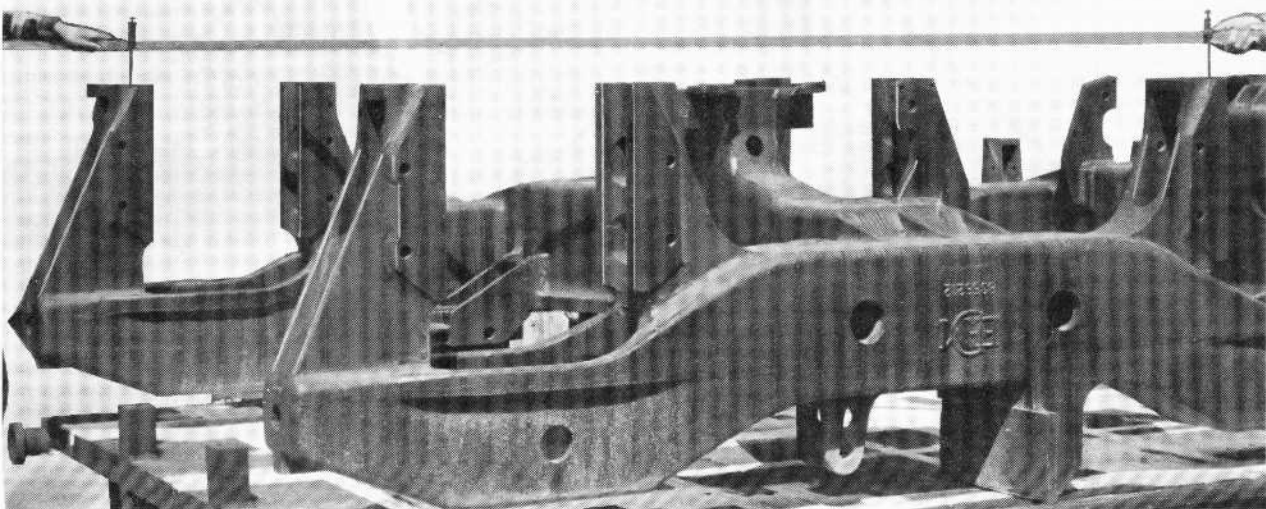
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13504



13505

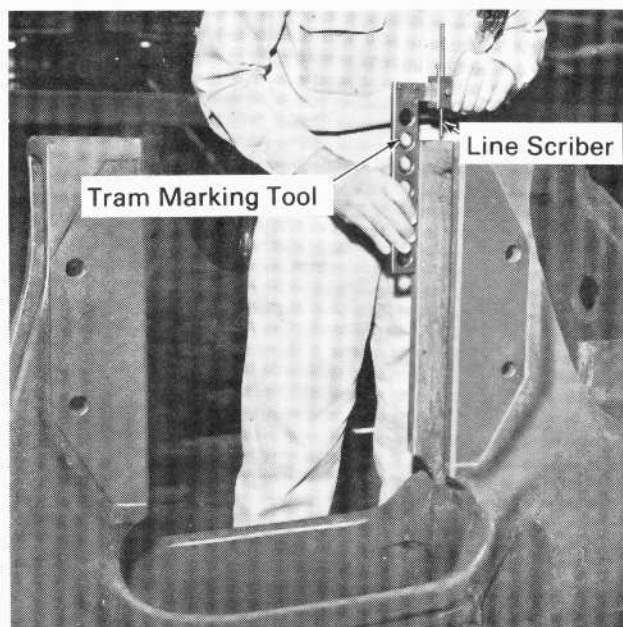


13506

Fig.19 - Application Of Trammel Beam

Tram marks are made on the end or bottom of each pedestal jaw at the time of original manufacturing inspection of the truck frame. These marks, which are small punch indentations, are placed at identical locations on each pedestal to assure an accurate comparison. They may be either 38 mm (1-1/2") from the outside corner of the pedestal or on the longitudinal centerline of the pedestal just inward from the tie bar bolt hole. The important consideration is that the mark is made at an identical location on each pedestal.

A special tool shown in Fig. 20 for locating the tram marks on the pedestal can be made from File Drawing 615, which is available upon request. This tool is used to make two scribe marks at right angles to each other at the 38 mm (1-1/2") or other required dimension on the bottom of the pedestal. The hardened end of the scriber on the tool is placed at the intersection of the scribe lines and is lightly tapped with a hammer to make a small indentation in the metal for the tram points. To aid in locating the tram marks, the bottom of the pedestal should first be cleaned and then coated with blue layout dye. In the event of rework on the truck such as straightening of bent pedestals, it will be necessary to remove the old tramming mark and relocate a new mark.

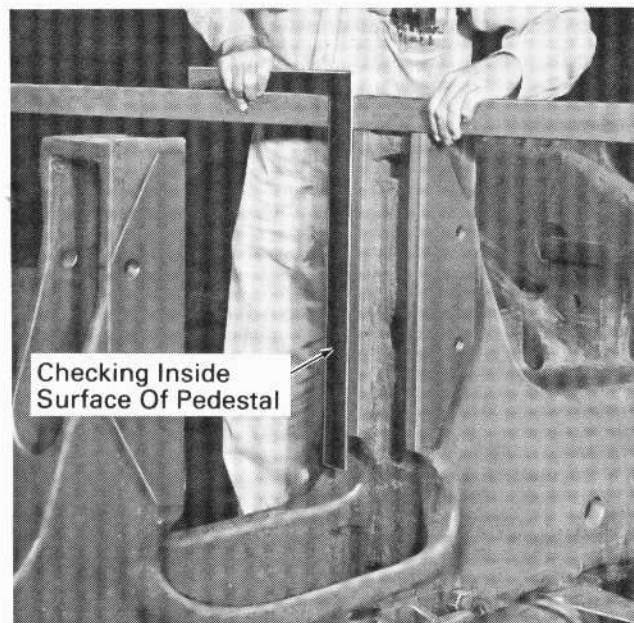


10970

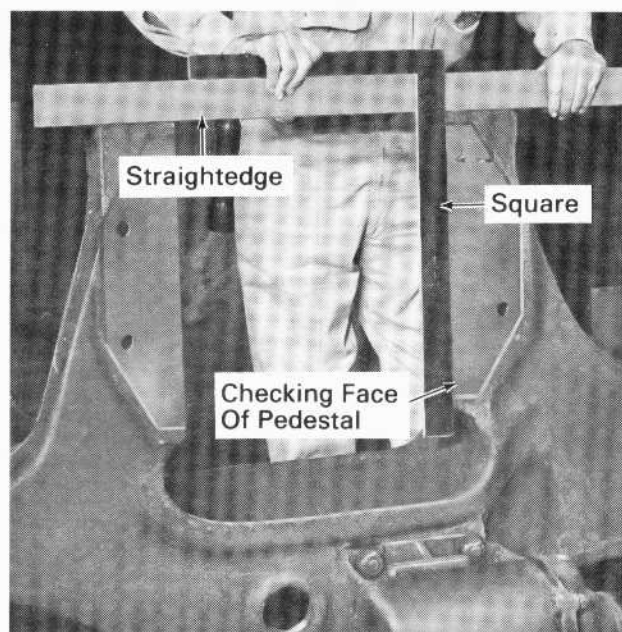
Fig.20 – Tram Marking Tool

Each pedestal should be checked for leaning at the inside surface and the side facing the center of the truck before tramming. The pair of pedestals opposite each other (one on each side of the frame)

which are found to be square or nearly square, are used as starting points for tramming. The pedestals are checked using a straight edge and square, as shown in Fig. 21.



10967



10968

Fig.21 – Checking Pedestal Squareness

If the diagonal measurements shown in Fig. 18, are not equal, it will be necessary to tram the pedestals longitudinally and transversely, as shown in Fig. 19, to locate the pedestals that are out of alignment and determine how much they are out of alignment.

A typical example of the tram measurements is shown in Fig. 22. The diagonal trams 3-8, 1-6, 2-5, and 4-7 are shown to be unequal by +3.2 mm (1/8"), 0", +0.8 mm (1/32") and +1.6 mm (1/16") respectively. The diagonal trams are allowed a tolerance of ±1.6 mm (1/16") so the only pedestals exceeding this limit are on the 3-8 diagonal. This indicates that pedestals 3-8 are out of alignment either longitudinally or transversely. Tramming also indicates that longitudinally all the pedestals are equal as shown by the equal "0" longitudinal measurements. Transverse tramming indicates that pedestals 7-8 are equal to pedestals 1-2, but pedestals 5-6 and 3-4 are wider than the other two pair by 1.6 mm (1/16") and 5.6 mm (7/32") respectively.

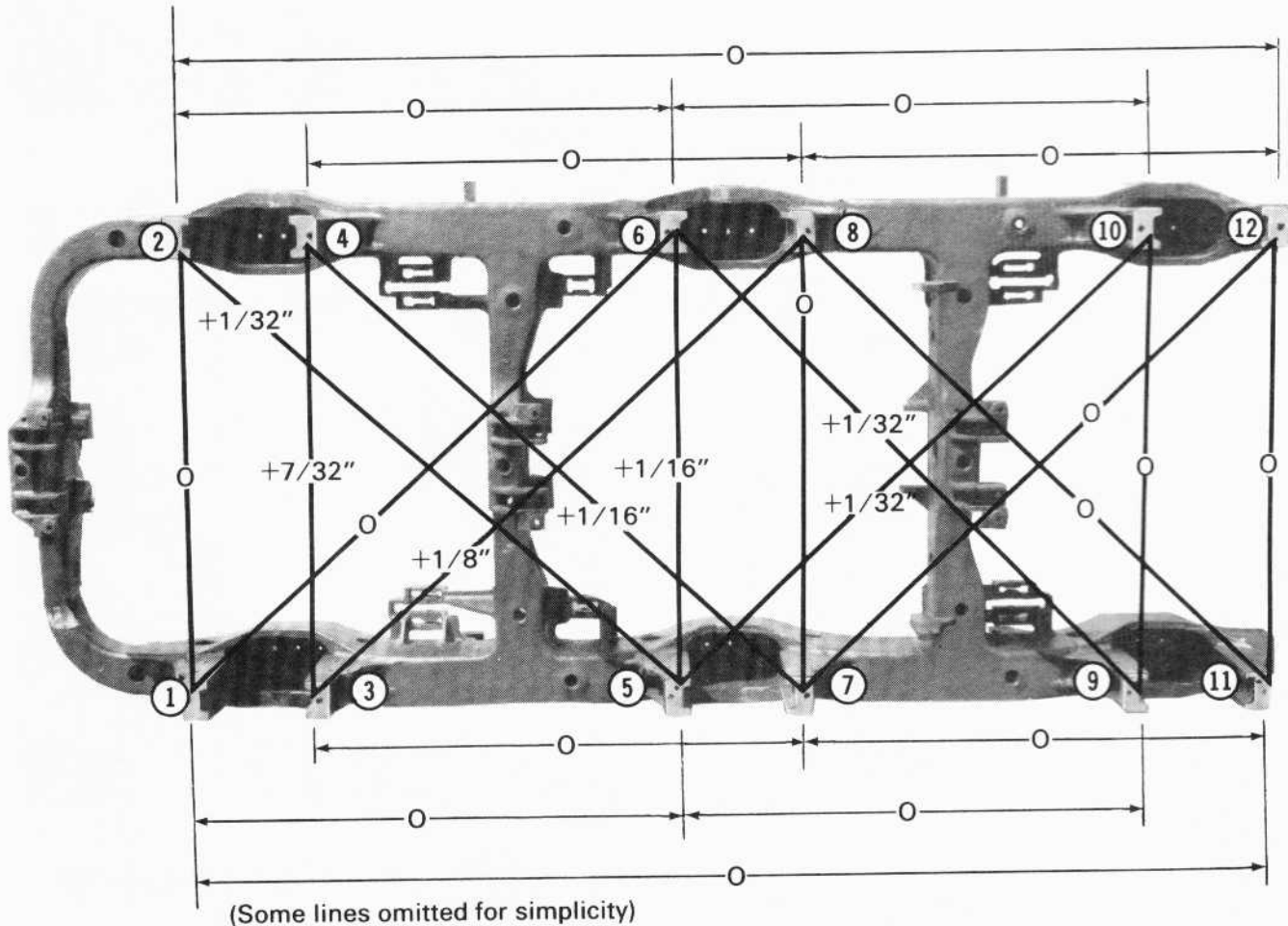
Since pedestals 3-4 are +5.6 mm (7/32") it accounts for the +3.2 mm (1/8") and +1.6 mm (1/16") length of the diagonal trams 3-8 and 4-7 going to these

pedestals. Since pedestal 3-8 +3.2 mm (1/8") is twice the +1.6 mm (1/16") of 4-7, it can be seen that pedestal No. 3 needs to be bent inward twice as much as pedestal No. 4. If pedestal No. 3 is bent inward 4 mm (5/32") and No. 4 is bent inward 1.6 mm (1/16"), the diagonals 3-8 and 4-7 will be reduced and diagonal 3-8 will be within the limit of 1.6 mm (1/16"). The same correction would be necessary for pedestals 5-6, if diagonals 1-6 or 2-5 were out of their limits.

PEDESTAL LINERS

Pedestal liners, Fig. 23, are provided to absorb the wear that occurs from the relative movement between the journal bearing and the pedestals. The basic pedestal liners are bolted to the pedestal jaw.

An optional floating Nylatron pedestal liner is available. The floating pedestal liner is applied as



METRIC CONVERSION CHART			
(inch)	mm	(inch)	mm
1/32	0.8	1/8	3.2
1/16	1.6	7/32	5.6

28733

Fig.22 - Typical Example Of Tram Measurements

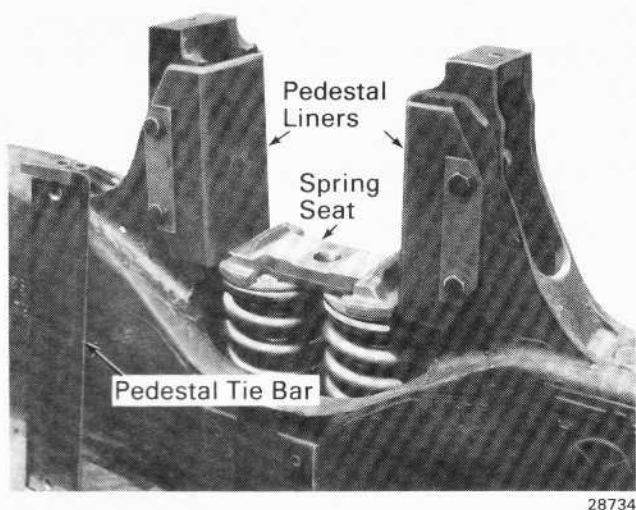


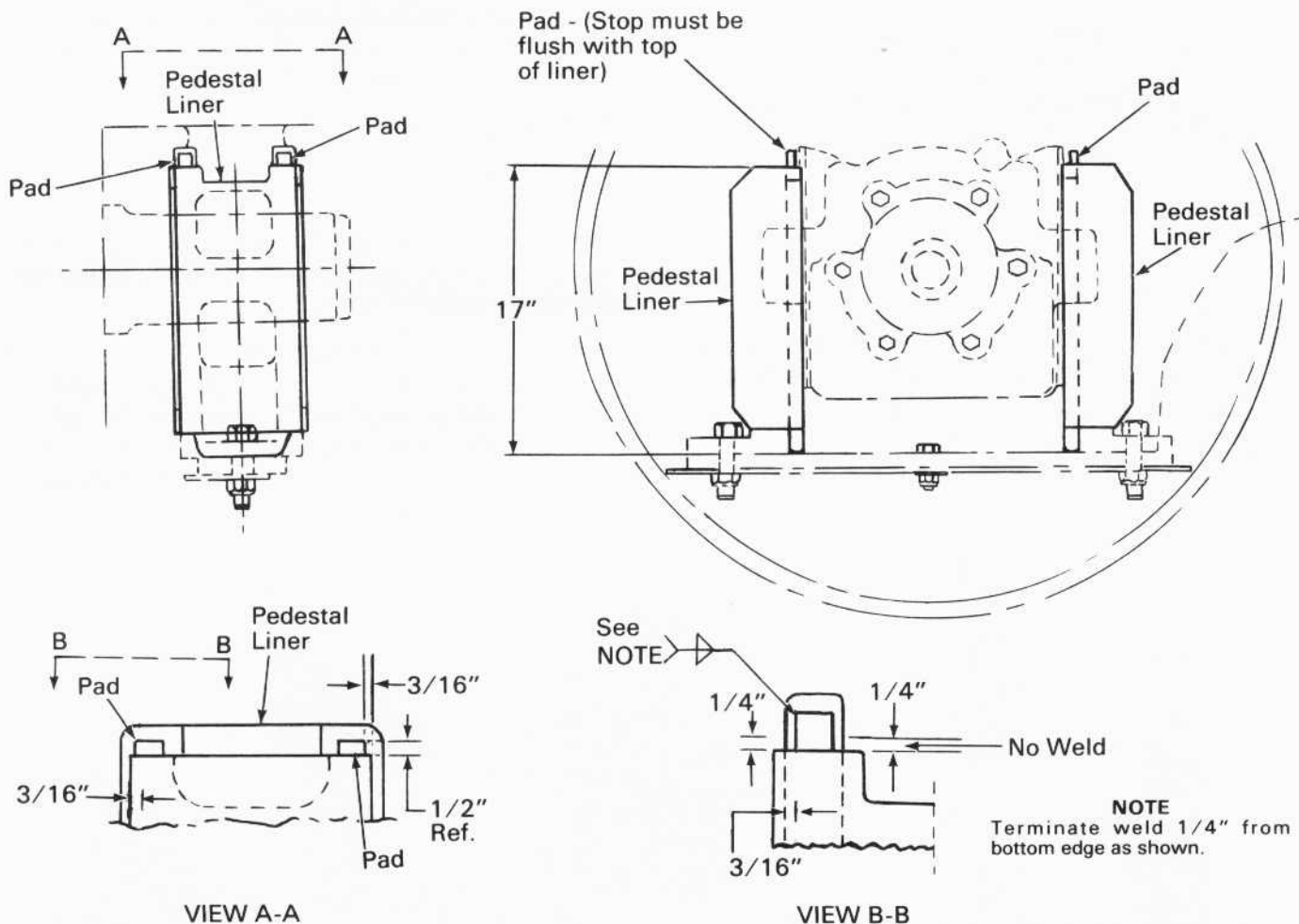
Fig.23 - Notched Nylatron Pedestal Liners

shown in Fig. 24. Note that the use of vertical stops welded to the truck pedestal legs will restrict the floating liner from creeping upward and getting damaged against the journal pockets of the truck. Once the stops have been applied, the subsequent liner changes can be made by just replacing the liner.

WARNING

The use of floating pedestal liners requires extreme care to avoid personal injury during wheelset removal.

The bolt-on pedestal liners hold the journal springs, shims, and spring seat in place during wheelset removal. Floating pedestal liners, however, cannot restrain the parts without the tie bar in place.

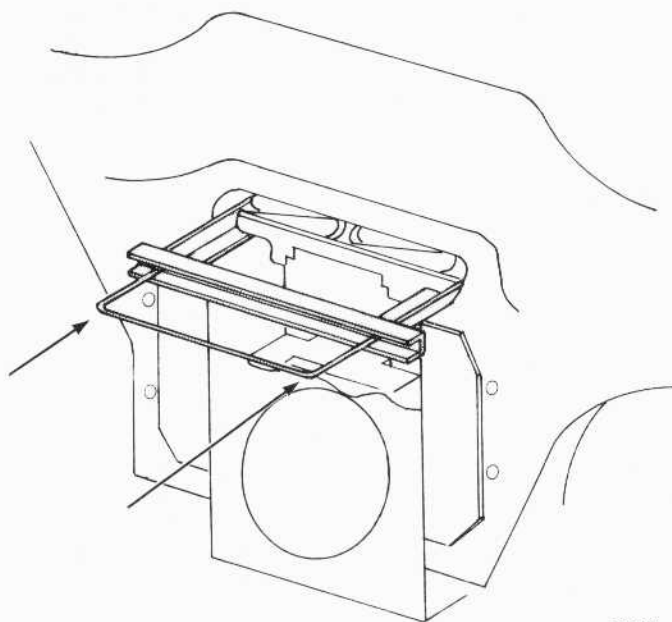


METRIC CONVERSION CHART			
(inch)	mm	(inch)	mm
3/16	5	1/2	13
1/4	6	17	432

Fig.24 - Floating Pedestal Liner Application

To avoid accidents and personal injury, two fixtures are required to support the journal spring seat as the wheelset is removed.

Wheelset changeout fixtures can be made to prevent the parts from falling out when the journal boxes are lowered. A drawing is available from EMD, without charge, to enable local fabrication. Refer to Service Data for Wheelset Changeout Fixture part number. The changeout fixture is inserted between the truck frame and the spring seat, Fig. 25, and supports the journal spring and other parts while wheelsets are removed. Two fixtures are required per truck.



28736

Fig.25 – Floating Pedestal Liner Wheelset Changeout Fixture Application

Mounted equipment such as shock absorbers must be removed from the truck to provide access for the changeout fixture.

Nylatron pedestal liners are basic equipment on all domestic trucks. Metallic liners are available upon request. See the Parts Catalog for the correct part numbers.

In 1977 a “notched” Nylatron pedestal liner became basic replacing the previous unnotched liner Fig. 26. The notch on the top edge of the liner reduces the journal spring force when the spring seat is allowed to rest on the pedestal liner during truck buildup or wheel-axle changeouts. In addition, increased groove radius at the ends of the inside corners reduces stress. The notched pedestal liner is interchangeable with the previous design.

NOTE

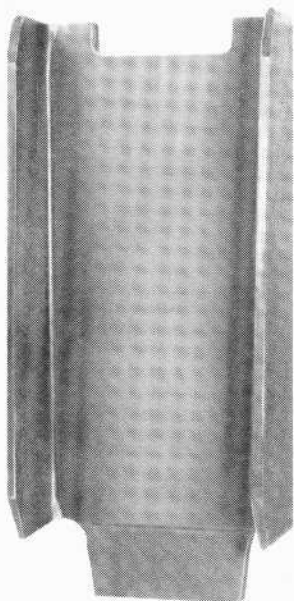
Refer to Routine Maintenance And Inspection for journal bearing or bearing adapter-to-pedestal liner clearances.

PEDESTAL LINER APPLICATION

Inspect pedestal jaws to make certain that surfaces are smooth and free of any raised areas that might interfere with application of liners. Chamfer any sharp corners on the journal box liners, to prevent damage to pedestal liners.

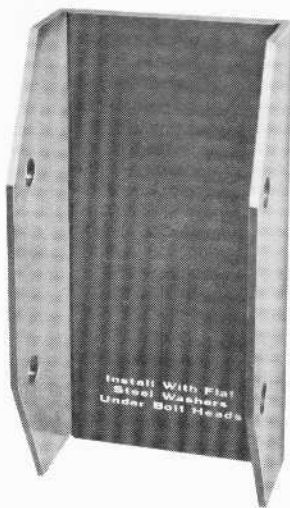
WARNING

To prevent liner breakage and possible injury to personnel, apply notched pedestal liners only in pairs. This will ensure that the journal spring seats are level during truck buildup or wheel-axle changeouts.



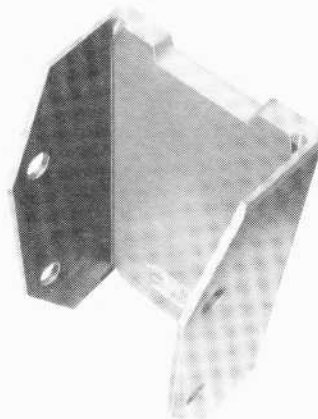
28737

Optional Floating Liner



29678

Former Liner



29738

Current Notched Liner

Fig.26 – Pedestal Liners

NOTE

Effective mid 1986, pedestal liners are attached to the pedestals with a simplified through-bolt arrangement. Two 229 mm (9") bolts replace the four 83 mm (3-1/4") bolts.

Customers can, at their option, continue to use the four bolt application on existing truck frames.

CAUTION

Do not over-torque pedestal liner bolts. Damage to the liner and bolt can occur.

Apply liners using a liner pressing tool, Fig. 27. Refer to Service Data for file drawing available to fabricate pressing tool. The notch (in the pedestal liners) must be positioned next to the spring seat with the ear on the spring seat nestled into it. Liners should fit tightly on the pedestal jaw with the mounting holes mating with the pedestal bolt holes and liner driving face in complete contact with the pedestal jaw. Mounting bolts should enter liner and pedestal bolt holes freely. Apply bolts and washers, torque bolts to between 237 and 305 N·m (175 and 225 ft-lbs).

NOTE

A plate type washer 9515453 is available to replace pedestal mounting bolt washer 106269. The plate washer spans both pedestal liner mounting bolts to reduce liner stresses.

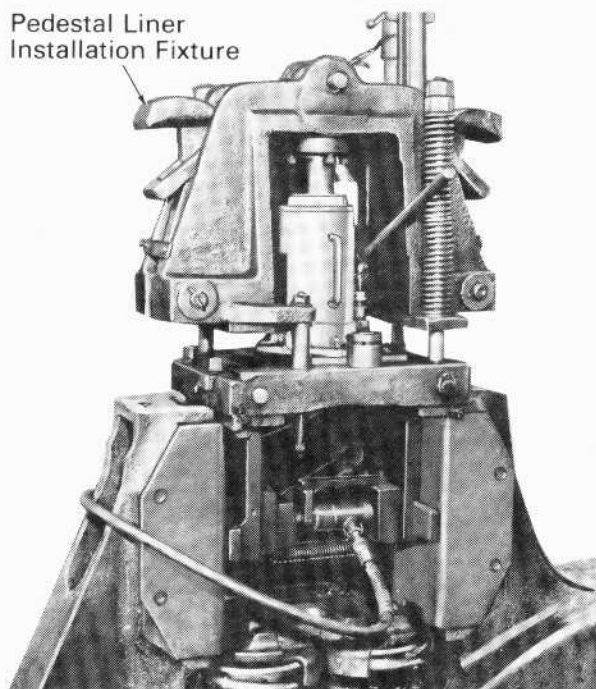


Fig.27 - Installing Pedestal Liners

COIL SPRING SEAT

A spring seat is used between the coil springs and journal bearing to provide a means to secure the springs to the journal bearing. Spring seats are also located in the truck frame journal spring pockets.

At the journal bearing, shim plates are used between the spring seat and springs to maintain proper locomotive height for different weight locomotives. Shim plates are used at the journal spring pockets, between the truck frame and the upper spring seat, to maintain the dimension shown in Fig. 28.

A locomotive equipped with the type of trucks described in this instruction and using 1 016 mm (40") diameter wheels, should maintain a height from the rail to the bottom of the underframe of 1 222 mm (48-1/8"). A locomotive using 1 067 mm (42") wheels, should maintain a height from the rail to the bottom of the underframe of 1 248 mm (49-1/8").

Inspect all spring seats during truck reconditioning for evidence of distortion or damage. Limits for dimensions which are subject to change because of wear are shown in Fig. 28. Information required to renew upper spring seats is also provided in Fig. 28.

If the spring seats are out-of-plane beyond the specified limits, rework as follows:

Remove the spring seats and the shim(s). Either remove or add shim(s) to bring the seat into alignment.

Available shims

Shim 8393583, 4.8 mm (3/16") thick
Shim 8393582, 3.2 mm (1/8") thick

Weld the shim(s) to the spring seat with 3.2 mm (1/8") fillet weld, 50.8 mm (2") long, 4 places, and around the 63.5 mm (2-1/2") diameter hole.

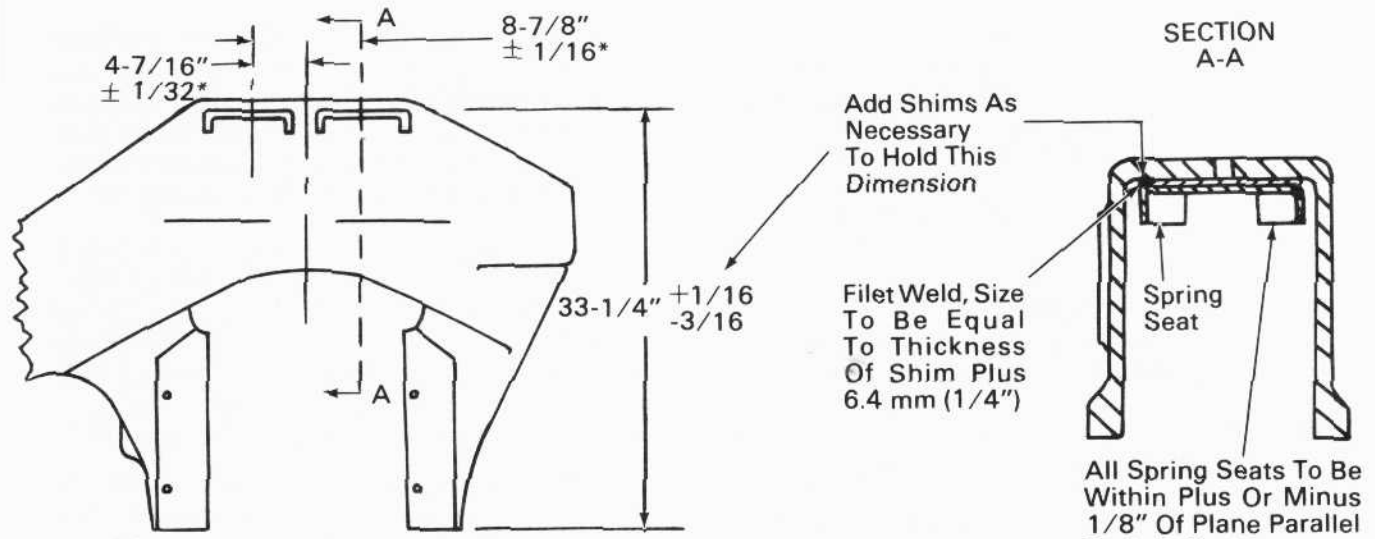
When more than a 4.8 mm (3/16") thick shim is required to bring the spring seat within 3.2 mm (1/8") of plane, the frame should be re-examined for distortion and corrective measures taken.

TRUCK SHIMMING

Journal bearing or journal spring seat shimming is provided to maintain the coupler height and a reasonable equal axle load distribution on the rail. For complete information on application of shims, see M.I. 1518, Wheels, Axles, Axle Gears, And Pinions for domestic application or M.I. 1519 for export application.

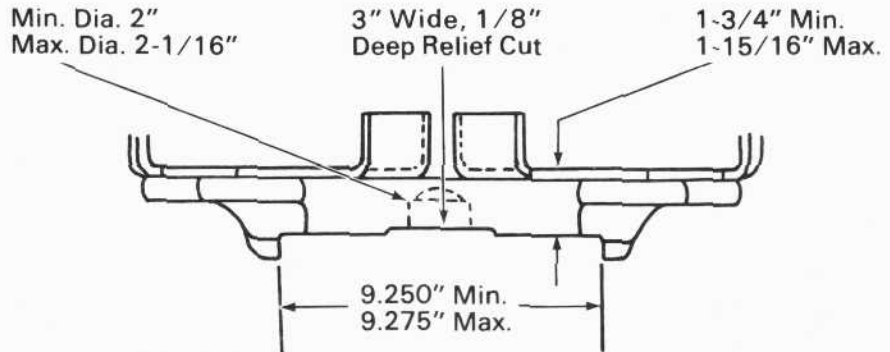
There have been several changes to journal bearing or journal spring seat shimming since the original HT-C truck assembly. The following paragraphs summarize these changes and list the recommended shimming.

The original HT-C truck assemblies built between August 1971 and December of 1973 with 1 016 mm (40") wheels, used a 25.4 mm (1") shim between the journal bearing or bearing adapter and the spring seat to achieve the same height as the 1 067 mm (42") wheels.



*Upper spring seat centerlines may be misaligned 1/8" with respect to pedestal centerline and 1/16" with respect to each other.

UPPER SPRING SEAT



LOWER SPRING SEAT

METRIC CONVERSION CHART			
(inch)	mm	(inch)	mm
1/32	0.8	2	50.8
1/16	1.6	2-1/16	52.4
1/8	3.2	3	76.2
3/16	4.8	4-7/16	112.7
1/4	6.4	8-7/8	225.4
1-3/4	44.4	9.250	234.95
1-15/16	49.2	9.275	235.59
		33-1/4	844.6

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Fig.28 – Spring Seat Wear Limits

From December of 1973 to August 1974, to accommodate some railroads with a height restriction, a modification was made to the bolster. The modification provided additional clearance in the area between the traction motor and the bolster to allow a 12.7 mm (1/2") shim with the 1 016 mm (40") wheel.

In August of 1974, the traction motor pinion end lifting lug was modified to reduce the height of the lifting lug by 9.5 mm (3/8") to provide additional clearance between the lifting lug and the bolster.

In October of 1976, the 12.7 mm (1/2") shim was removed from the journal bearing and two 7.9 mm (5/16") shims were placed on the journal springs to improve the distribution of the spring loads on the spring seat. This increased the overall height of the

springs and shims from 368 mm (14-1/2") to 381 mm (15") while the truck center plate height remained the same.

From December 1976 to date, the traction motor nose support is lowered 12.7 mm (1/2") to provide better traction motor alignment relative to truck frame and further eliminate contact between the top of the traction motor lifting lug and the bottom of the truck bolster. This modification reduces interference between the traction motor pinion end lifting lug and the bolster and allows interchangeability of any vintage traction motor without risk of contact with the bolster.

Refer to the following table which summarizes the type of shimming originally used and the type of shimming preferred for standardization of all HT-C

TRUCK SHIMMING STANDARDIZATION TABLE

Approx. Delivery Date	Original Shimming 40" Wheels		Recommended Shimming (for standardization) 40" or 42" Wheels		Center Plate Height With Recommended Shimming		Comments
	Journal Bearing	Journal Springs	Journal Bearing	Journal Springs	40" Wheels	42" Wheels	
Aug. 1971 Dec. 1973	1"	None	1/2" Shim	Two 5/16" Shims	48-1/16"	49-1/16"	
Dec. 1973 Aug. 1974	1/2"	None	None	Two 5/16" Shims	47-9/16"	48-9/16"	Bolster modified to provide additional clearances and changed the shim.
Aug. 1974 Oct. 1976	1/2"	None	None	Two 5/16" Shims	47-9/16"	48-9/16"	*Traction motor pinion end lifting lug reduced 3/8" in height.
Oct. 1976 Dec. 1976	None	Two 5/16" Shims	None	Two 5/16" Shims	47-9/16"	48-9/16"	Improved journal spring support, transferred shim to journal springs.
Dec. 1976 To Date	None	Two 5/16" Shims	None	Two 5/16" Shims	47-9/16"	48-9/16"	Lowered traction motor nose supports to provide better alignment of motor for 40" wheels.

*Traction motors prior to August 1974 have the high pinion end lifting lugs which must be modified to reduce the height by 3/8" on the #2 and #5 axle positions to provide additional clearance between the lifting lug and bolster.

(inch)	mm	(inch)	mm	(inch)	mm
1/4	6.4	1	25.4	48-1/16	1 220.8
5/16	7.9	40	1 016	48-9/16	1 233.5
3/8	9.5	42	1 067	49-1/16	1 246.2
1/2	12.7	47-9/16	1 208.1		

truck assemblies. The recommended truck shimming applies to both the 1 016 mm (40") and 1 067 mm (42") wheels.

TRACTION MOTOR NOSE SUSPENSION

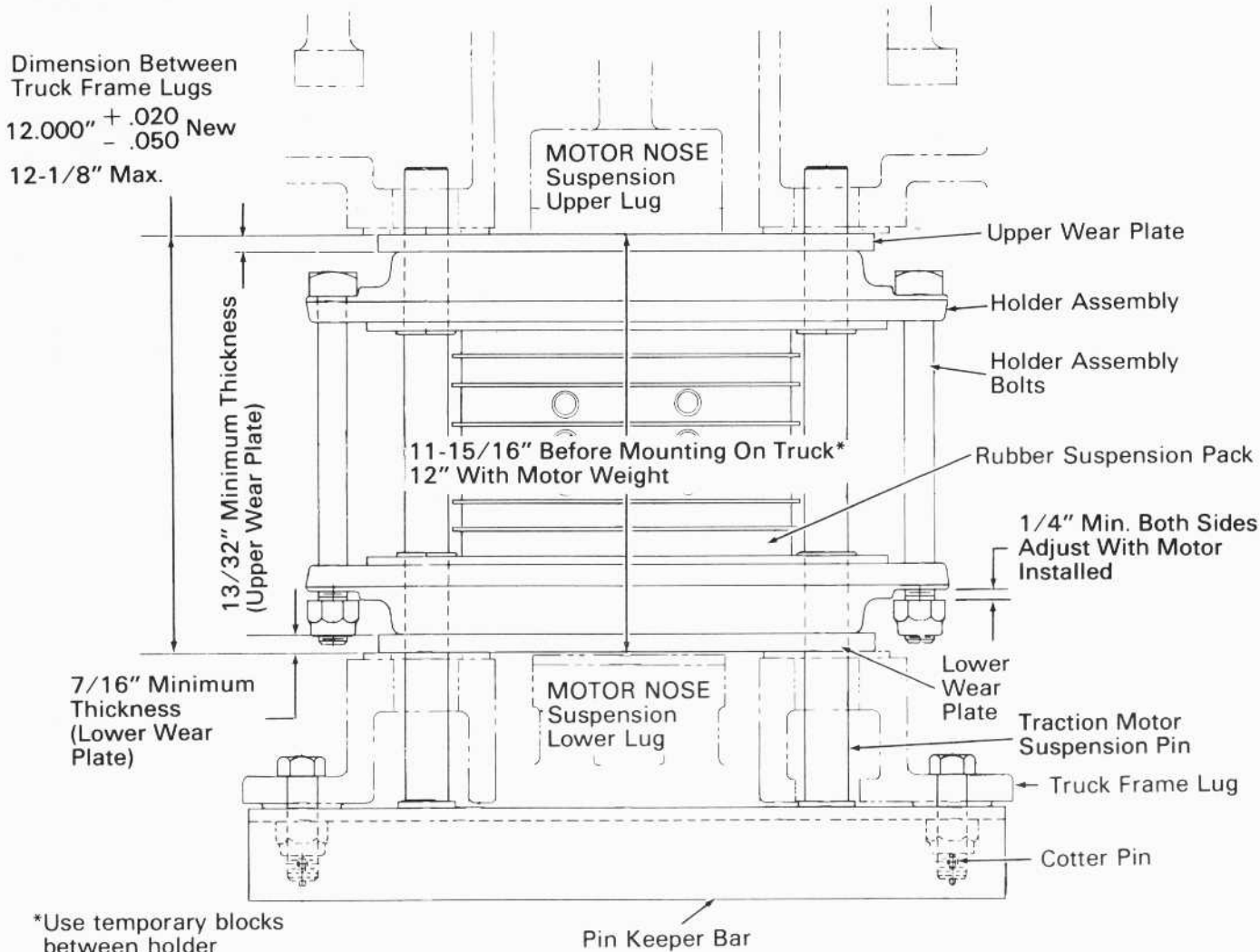
SUSPENSION PACK

Each time power is applied to the traction motors, the pinion of each motor tries to ride around the axle gear, raising the motor up or pulling it down,

depending on the direction of motion. This movement of the motor is arrested by securing the motor to the truck frame transom through a shock damping rubber suspension pack which is mounted as shown in Fig. 29.

WEAR PLATES

The wear plates on the suspension assembly are subjected to severe shocks and tremendous pressures, causing them to wear, resulting in free movement between the traction motor frame and the suspension



*Use temporary blocks between holder assembly bolt nuts, and holder assembly.

METRIC CONVERSION CHART			
(inch)	mm	(inch)	mm
0.020	0.51	7/16	11.1
0.050	1.27	11-15/16	303.2
1/4	6.4	12.000	304.80
13/32	10.3	12-1/8	308.0

Fig.29 – Traction Motor Nose Suspension

assembly. As this movement increases, due to wear, the severity of the shocks increases, especially during the rapid changes of torque caused by wheel slips.

To obtain maximum cushioning effect from the suspension pack, wear plates should be periodically replaced to ensure there is not more than 6.4 mm (1/4") free movement in the traction motor nose suspension. If the wear plates, which are 12.7 mm (1/2") thick when new, are worn enough to permit more than the 6.4 mm (1/4") free movement, or if the wear plates are worn more than the limits given in Fig. 25, the suspension pack should be removed and the wear plates replaced.

The upper wear plate is identical to the lower wear plate, which has a minimum limit of 11.1 mm (7/16"). The lower wear plate may be moved to the upper position if it is still within the 10.3 mm (13/32") upper wear plate limit.

The old wear plate can be removed from the spring pack holder by grinding or chipping off the welds holding it. The new wear plate should conform to the dimensions of the original plate. Information required to renew the wear plates, is provided in Fig. 30.

TRUCK FRAME MOTOR NOSE SUSPENSION LUGS

The steel wear plates on the upper and lower truck frame transom lugs that support the motor suspension assembly are subject to wear due to chafing of the motor suspension assembly. The dimension between these surfaces when new is 304.8 mm +0.51 mm -1.27 mm (12.00" +.020 -.050). The wear plates should be renewed when the dimension between the surfaces reaches 308 mm (12-1/8").

The old wear plates can be removed from the lugs by grinding or chipping off the welds holding it. The new plates should conform to the dimensions of the original plates. Apply the new plates to the lugs with a 4.8 mm (3/16") fillet weld using an AWS E-Fe Mn-A, E-308-16, or E-310-16 welding electrode. Weld the plate on three sides as shown in Fig. 31. Center wear plate on lug so that the hole through the wear plate does not obstruct or lap hole through lug.

After the wear plates are applied, the surfaces must still be in the same plane and the dimension between the upper and lower lugs should be 304.8 mm ±0.8 mm (12" ±1/32").

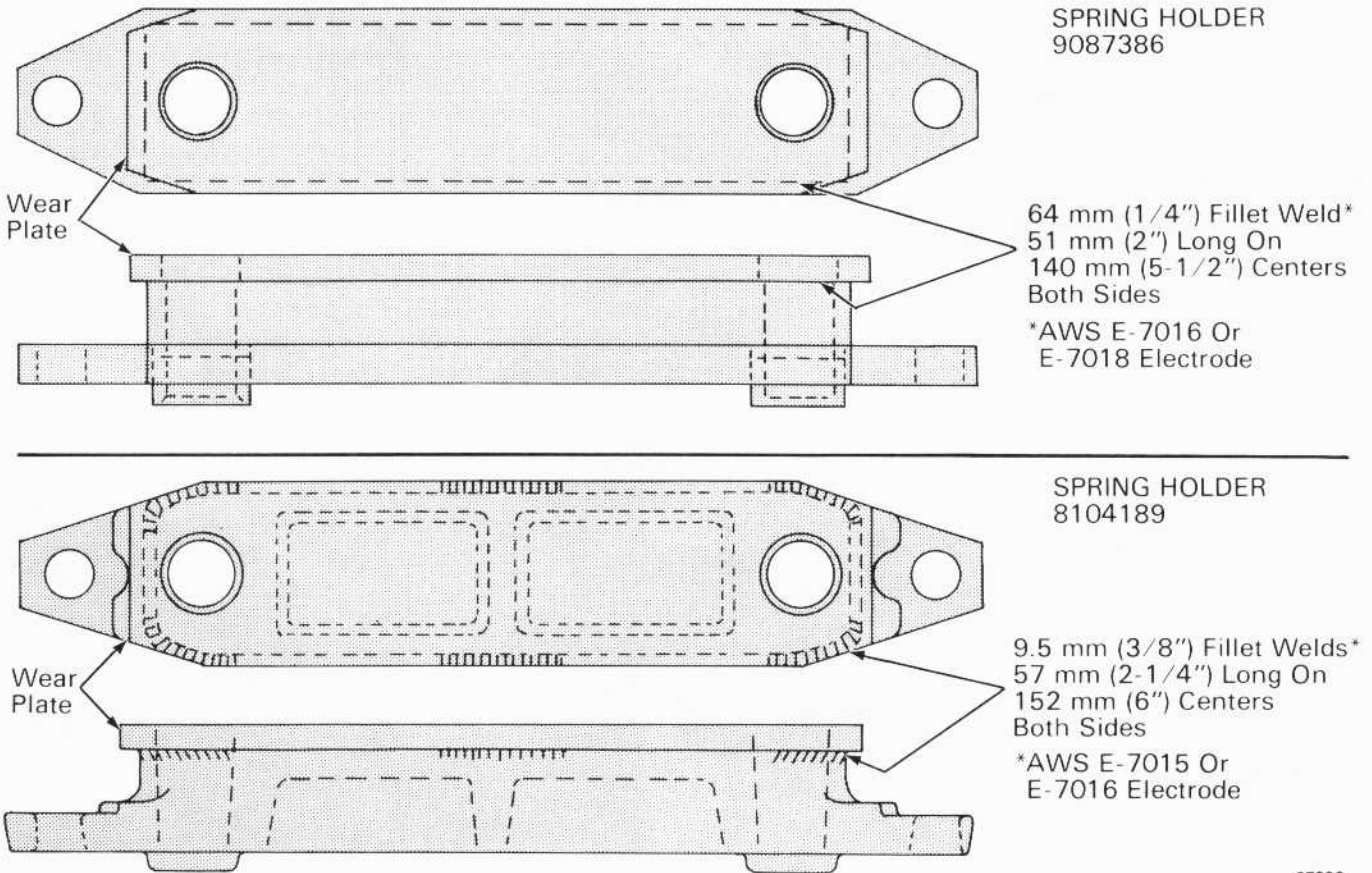
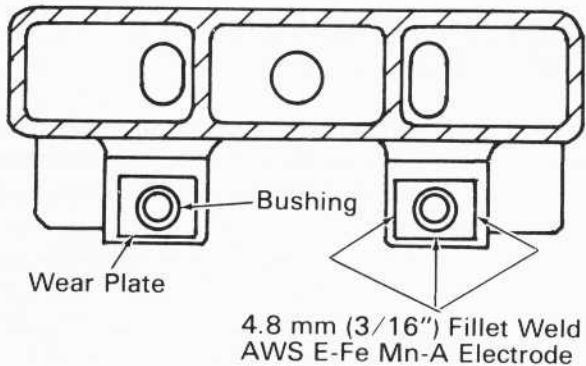


Fig.30 - Nose Suspension Wear Plates



24366

Fig.31 - Applying Motor Suspension Lug Wear Plate (Top View Of Transom Cross-Section)

The guide pin holes in the frame lugs should be checked for size. If worn excessively, renew bushings which line the holes.

BOLSTER

The bolster, Fig. 32, is a steel casting used to transfer the locomotive weight to the truck frame. As previously explained, the truck bolster center bearing mates with the locomotive underframe center bearing.



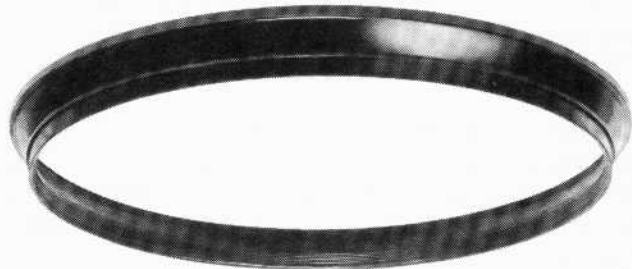
Fig.32 - Truck Bolster

17815

Inspect the entire bolster assembly members and welds for breaks or cracks. Perform magnetic particle inspection at any areas suspected of being cracked. Refer to paragraphs under the Truck Frame section, when checking bolster for bent sections, worn spots, and elongated or oversize holes.

Follow all welding notes and procedures covered in the Truck Frame section when bolster repairs are necessary.

A neoprene rubber dust guard, Fig. 33, around the two mating parts prevents the entrance of moisture and dirt. The dust guard recess at the top of the center plate receptacle must be free of nicks and burrs which might cut or damage the dust guard boot.



13693

Fig.33 - Center Bearing Dust Guard

BOLSTER WEAR PLATE

Nylatron wear plates are bolted to the truck frame bolster stops to provide an easily replaceable mating surface with the bolster faces. If clearances between these surfaces exceeds the limits of Fig. 34, the Nylatron wear plates must be replaced. A wear line is located 6.4 mm (1/4") from outer surface to help determine the amount of wear on the wear plate without measuring. The wear plates should be replaced in pairs or complete truck sets.

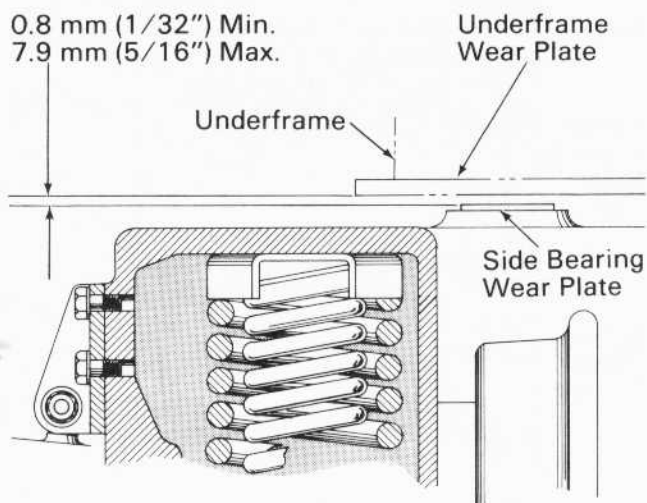
SIDE BEARING WEAR PLATES (Trucks Built Prior To 1977)

On trucks built prior to 1977, side bearing wear plates are located at the four corners of the bolster. The plates mate with similar side bearing wear plates mounted on the carbody underframe as shown on Fig. 35.

In 1977, it was determined that the side bearings received negligible wear and the wear plates were eliminated. The boss which supported the wear plate is enlarged in height to maintain the same clearance dimension.

A clearance is provided between the truck bolster side bearing plates and the carbody side bearing plates during normal operation. Side bearings are designed to prevent excessive tilting or leaning of the locomotive but are not designed to carry a continuous load.

Side bearing clearance on a new assembly is 3.9 mm (5/32") to 7.9 mm (5/16"). While in service the minimum allowable side bearing clearance is 0.8 mm (1/32"), as shown in Fig. 35. Any time the side bearing clearance approaches the minimum limit, the bolster center bearing wear plate should be checked for wear.



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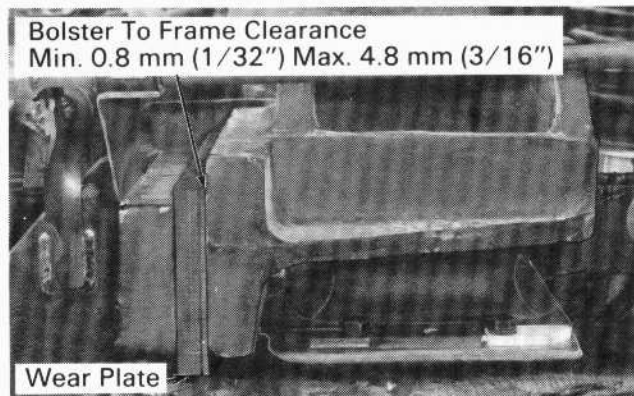
Fig.35 – Side Bearing Wear Plate Clearance (Trucks Built Prior To 1977)

The side bearing wear plates on the truck bolster should be flat and in the same plane within 0.8 mm (1/32"). A worn side bearing wear plate can be removed by grinding off the fillet welds around the wear plate. New wear plates should be of mild steel 6.3 mm (1/4") thick and should be applied using a 6.3 mm (1/4") fillet weld.

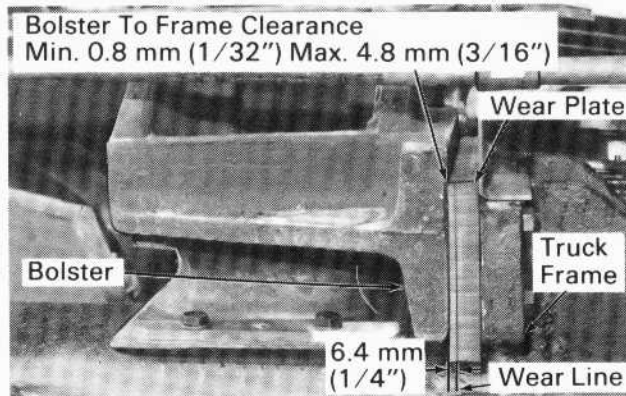
CENTER BEARING WEAR PLATES AND WEAR RING

The limits for the center bearing wear plate are shown in Fig. 36. The thickness of the plate should be checked whenever the plate is accessible. If the plate thickness is above the minimum limit it may be used again.

The outside diameter of the carbody center bearing assembly and the inside diameter of the bolster center bearing wear half-ring should be checked to determine the total clearance between them. The

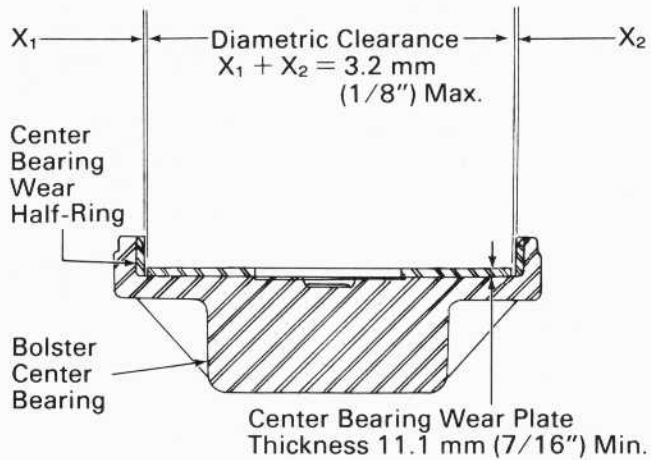


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Fig.34 – Bolster Wear Plates



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Fig.36 - Center Bearing Wear Plate
And Wear Half-Ring Limits

maximum clearance between these parts is 3.2 mm (1/8") as indicated in Fig. 36.

Center bearing wear plates and wear rings are made of 12.7 mm (1/2") thick laminated phenolic or Nylatron material.

Check the center bearing area of the bolster to make sure there are no cracks or voids which might allow lubricating oil to leak out. If any cracks are found, they must be completely removed by flame cutting, chipping, or grinding, and a 60° "V" groove provided for welding. Weld the crack with AWS-E-7016 electrode. Peen the second weld pass and each pass thereafter to minimize distortion. Grind off excess weld metal so the surface of the center bearing plate will be flat within 0.51 mm (.020").

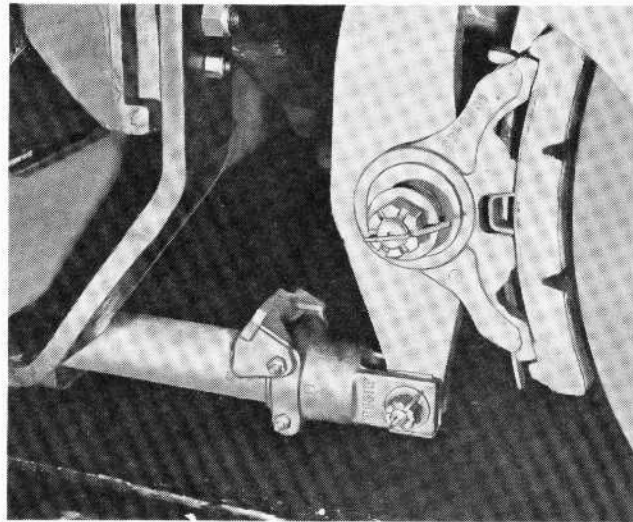
After the old wear plates and wear rings are removed and the necessary repairs made, the bearing bore should be cleaned and the surfaces smoothed so they offer little resistance to the application of the new replacement half-rings. Check the replacement half-ring surfaces to see that they are smooth. Apply a lubricant to the outside diameter of the half-rings and apply the half-rings to the center bearing bore. The replacement half-rings have an interference fit in the bore, so they must be forced into position in the bolster center casting. Apply so that the split line between the half-rings will be 90° from the longitudinal centerline of the locomotive.

BRAKE RIGGING

Inspect the brake rigging to ensure that brake pins, bushings and brake shoes are usable. The wear surfaces of the brake rigging are equipped with replaceable hardened bushings, pins, and bolts. Any of these connecting parts that are worn more than 1.6 mm (1/16") should have both parts replaced. Never use a new pin with an old bushing or vice versa.

Cylinder levers and brake levers that are slightly bent can be reused if they are restored to their original shape without any damage. Bolts and nuts that are not subject to wear can be reused if they are not damaged but cotter pins should always be replaced.

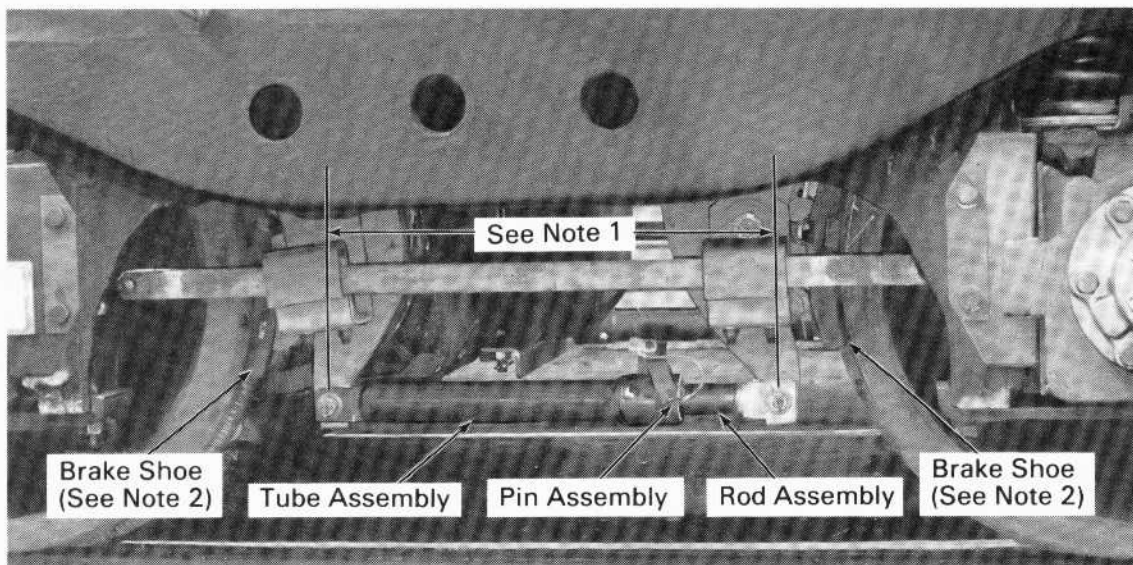
Screw type and pin type brake shoe slack adjusters are available. Adjustment of the screw type slack adjuster, Fig. 37, can be made by raising the hinged lock and turning the slack adjuster screw until both brake shoes clear the wheels by 9.5 mm (3/8"). Brake cylinder piston travel should be 60.3 mm (2-3/8").



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Fig.37 - Screw Type Brake Shoe
Slack Adjustment

To adjust the pin type slack adjuster, Fig. 38, unlock the pin lever and remove the pin. Move the rod assembly in or out of the tube assembly until both brake shoes clear the wheels by at least 9.5 mm (3/8"). Align the pin holes in the rod and tube assemblies and re-install the pin. Turn the pin lever to the locked position.



NOTE: 1. 740 mm (29-1/8") New Installation, 1 016 mm (40") Wheel
 2. With Brake Cylinder Released, Set Slack Adjuster For 10 mm (3/8") Release, Per Wheel

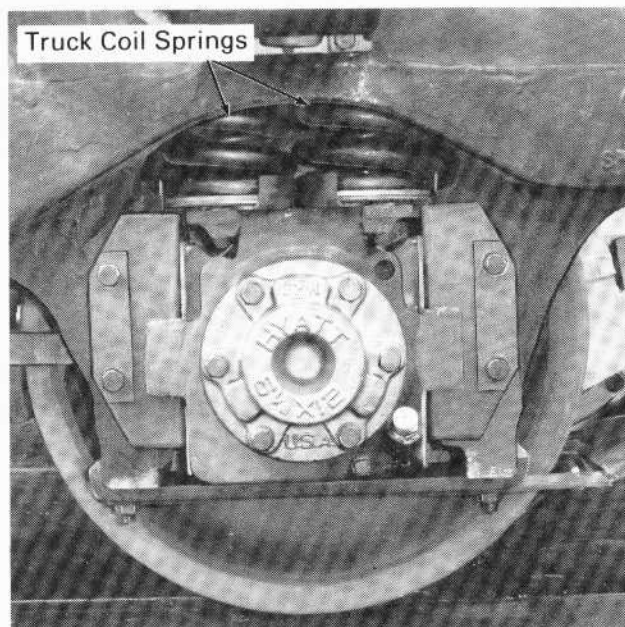
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Fig.38 – Pin Type Brake Shoe Slack Adjustment

TRUCK SPRINGS

COIL SPRINGS

The truck assembly is equipped with steel, helical coil springs, Fig. 39. The springs provide deflection which assists in wheel load equalization and improves ride quality.



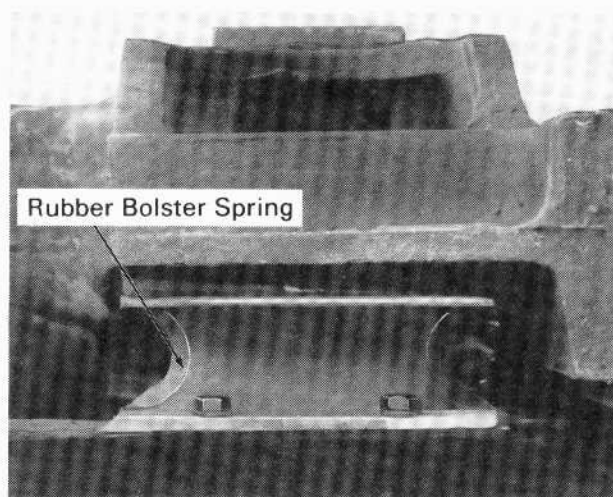
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Fig.39 – Truck Coil Springs

Refer to Maintenance Instruction M.I. 1512, Coil, Elliptic, And Rubber Truck Spring Qualification And Replacement for inspection, qualification, and application of the coil springs.

RUBBER BOLSTER SPRINGS

The secondary suspension of the truck assembly consists of rubber springs, Fig. 40, used at four locations between the bolster and the truck frame. Truck assemblies manufactured since January 1977 have a softer rubber bolster spring.



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Fig.40 – Rubber Bolster Spring

Refer to Maintenance Instruction M.I. 1512 Coil, Elliptic, And Rubber Truck Spring Qualification And Replacement for inspection, qualification, and application of rubber bolster springs.

BOLSTER TO TRUCK ASSEMBLY LATERAL STOP CLEARANCE

Truck assemblies manufactured since January 1977 have the clearance between the truck assembly lateral stops and the bolster assembly increased from 31.8 mm (1-1/4") per side to 44.4 mm (1-3/4") per side as shown in Fig. 41. Older trucks should be reworked to the 44.4 mm (1-3/4") clearance dimension.

For frames to be used with the solid bolsters, no modification to the frame is required as the increased lateral clearance is accommodated by changes to the bolster.

For frames to be used with the hollow rebuild bolsters 8428691, it is necessary to change the spacing of the lateral stops on the open end of the frame to 381.0 mm \pm 1.6 (15" \pm 1/16). Use caution if the lugs must be removed so as not to undercut or otherwise damage the transom.

The nominal truck frame lateral stop distance at the middle transom for the bolster is 1 790 mm \pm 3.2 (70-1/2" \pm 1/8). The rebuild tolerance for this dimension should be 1 790 mm +9.5, -3.2 (70-1/2" +3/8, -1/8). If this dimension exceeds the tolerance, the frame should be reworked by weld buildup and grinding.

ASSEMBLY OF TRUCK

The truck may be assembled using one of two methods. Procedure A may be used when facilities are available to invert the truck. Procedure B may be used when it is desirable to assemble the truck in the upright position.

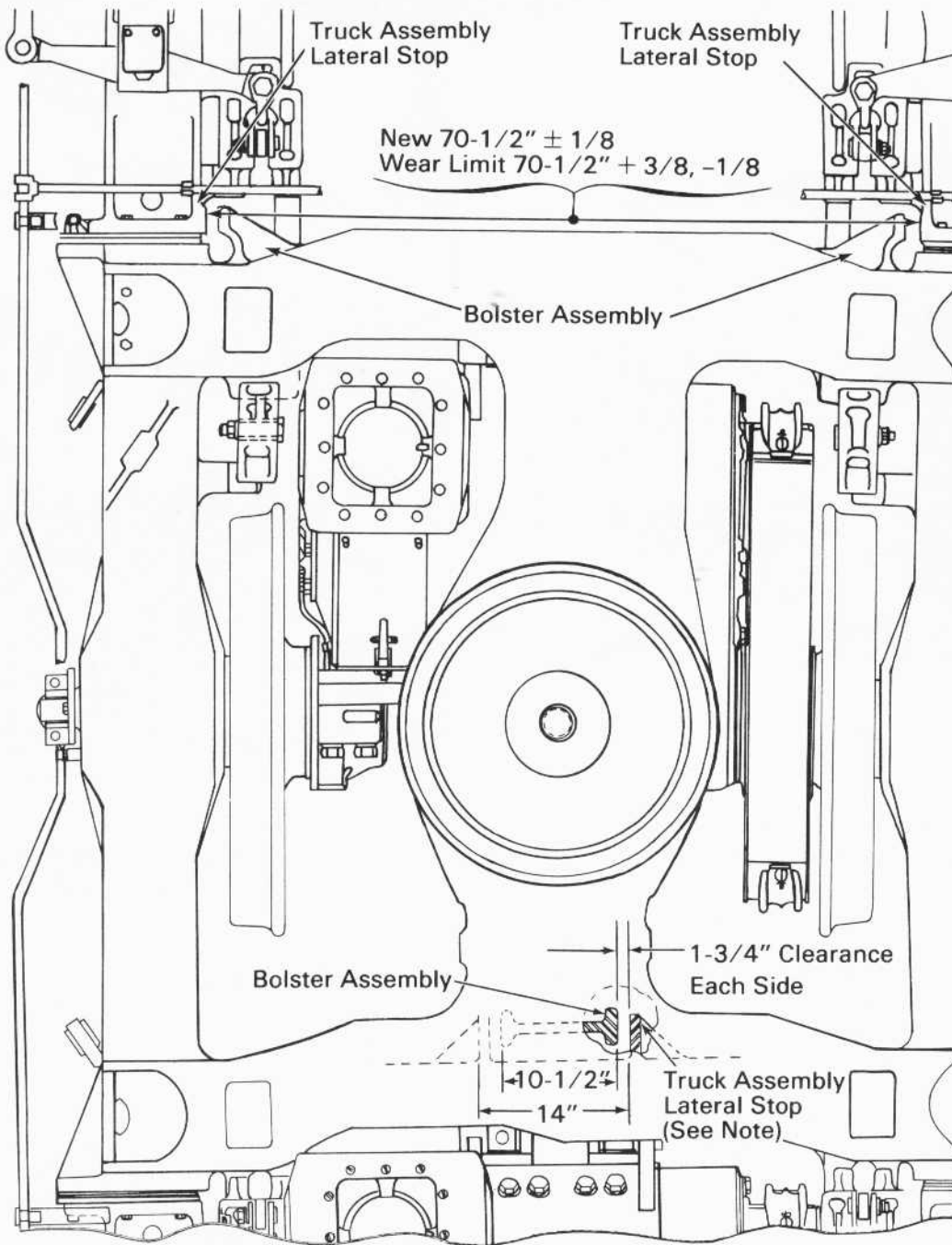
PROCEDURE A

1. Set the truck frame in an inverted position on blocks at a convenient height.
2. Install the traction motor nose suspension assembly in place between the frame lugs. Compress the suspension pack assembly by placing temporary blocks under the nose suspension assembly bolt heads and tighten the nuts. Install the traction motor suspension pins and pin keeper bar.

3. Install coil spring assemblies, spring seats, spring shims, and pedestal liners and bolt in place where required.
4. Install brake levers in place, leaning them back to provide enough clearance for the wheel and axle assemblies to be installed.
5. Install pre-assembled wheel, axle, and motor assemblies in place by lifting the assembly with a lifting fixture similar to the one shown in Fig. 42 and lowering between the truck frame pedestals until the journal bearing or bearing adapter rests on the coil spring seats.
6. Install slack adjusters, slack adjuster guides, pedestal tie bars, and sander guide assemblies and bolt down firmly.
7. Turn the truck assembly over on its wheels and install air brake piping, brake cylinders and shock absorbers.
8. Install the rubber bolster springs, then set the bolster in place between the bolster pedestals and the lateral stops.
9. Install center bearing wear plate and wear half-rings. Refer to Center Bearing Wear Plate And Half-Rings procedure for application instructions. Install center bearing dust guard and apply a 9.5 mm (3/8") high bead of bearing grease to the top edge of the dust guard. Apply oil to the center bearing as explained in Lubrication section.

PROCEDURE B

1. Install coil springs, spring seats, and shims. Refer to Pedestal Liner Application section and install pedestal liners.
2. Space the wheel and axle assemblies so that when the truck frame is lifted it can be placed over assemblies.
3. Lift the truck frame and lower it over the wheel and axle assemblies. Install spring seats, shims, and pedestal tie bars. Torque bolts to 617 N·m (455 ft-lbs).
4. Compress traction motor nose suspension assembly to a height of 303 mm (11-15/16") by loosening the assembly bolts and placing temporary blocks between the bolt heads and frame of the nose suspension assembly.



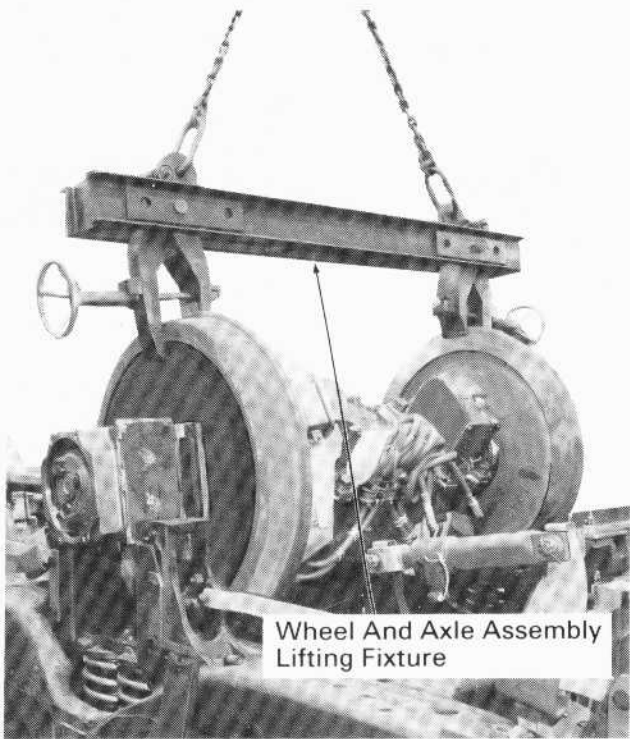
NOTE

On a truck frame used with rebuild hollow bolster 8428691, it is necessary to change the lateral stop spacing at the open end of the transom from 14" to 15" to obtain the required 1-3/4" clearance between the bolster and the lateral stop.

METRIC CONVERSION CHART			
(inch)	mm	(inch)	mm
1/8	3.2	14	355.6
3/8	9.5	15	381.0
1-3/4	44.4	70-1/2	1 790.7
10-1/2	266.7		

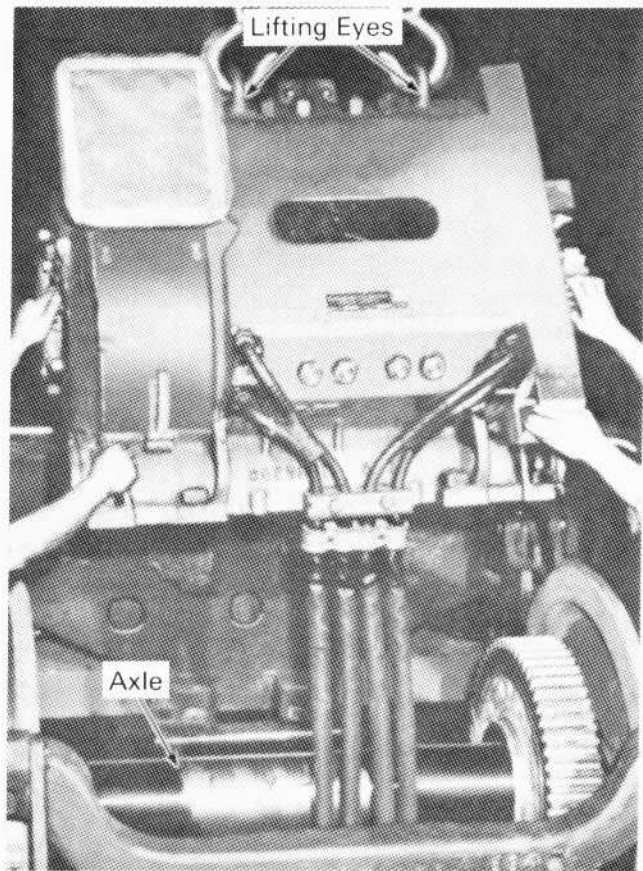
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Fig.41 - Bolster To Truck Assembly Lateral Stop Clearance



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Fig.42 – Installation Of Wheel And Axle Assembly



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Fig.43 – Installing Traction Motor Assembly, Typical

5. Connect lifting hoist to the lifting eyes at the nose suspension side of the traction motor.
6. Hoist the motor and place lower lip of support bearing on top of the axle, Fig. 43. Rotate motor on axle until traction motor nose suspension assembly can be mounted. Install suspension pack keeper pins and pin keeper bar and remove temporary blocks.
7. Install traction motor gear case, outer bearing half, axle guard, support bearing caps and dust guards.
8. Install slack adjusters, slack adjuster guides, sander guide assemblies and bolt down securely.
9. Install air brake piping, brake cylinders, and shock absorbers.
10. Install rubber bolster springs and set bolster in place between the bolster pedestals and the lateral stops.
11. Install center bearing wear plate and wear half-rings. Refer to Center Bearing Wear Plate And Wear Half-Ring section for application instructions. Install center bearing dust guard and apply 9.5 mm (3/8") high bead of bearing grease to the top edge of the dust guard. Apply oil to the center bearing as explained in the Lubrication section.

SERVICE DATA

REFERENCES

Coil, Elliptic, And Rubber Truck Spring	
Qualification And Replacement	M.I. 1512
Wheels, Axles, Axle Gears And Pinions	M.I. 1518
Wheels, Axles, Axle Gears And Pinions - Export	M.I. 1519
Cylindrical Roller Oil Lubricated Journal Box	M.I. 1552
Grease Lubricated Cartridge-Type Journal Bearings	M.I. 1553
Lubrication Specifications	M.I. 1756

EQUIPMENT

Wall Mounted Fixture To Test Shock Absorber	*Work Sketch No. 41089
Pinion Protector	8054871
Wheelset Changeout Fixture (Floating Pedestal Liner)	9556740
Truck Turnover Fixture	*File No. 939
Lifting Fixture (Traction Motor, Wheel And Axle Assembly)	*File No. 288
Tram Marking Tool	*File No. 615
Liner Pressing Tool	*File No. 649

*File number drawings and work sketches represent facility drawings that are available (at no charge) from EMD Service Department. These drawings include construction details of tooling that can be manufactured.