



MAINTENANCE INSTRUCTION

GP TRUCK ASSEMBLY WITH SINGLE SHOE BRAKE RIGGING AND INCLINED RUBBER SUSPENSION

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INTRODUCTION

This instruction describes major components which comprise the truck assembly. In addition, routine maintenance and overhaul data, including truck disassembly, inspection, and assembly are included.

GENERAL DESCRIPTION

Two GP inclined rubber suspension truck assemblies, 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. A function of the truck assembly is to absorb and isolate these shocks so they will not be transmitted to the locomotive underframe.

Two traction motors, mounted in the truck, convert electrical energy into locomotive tractive effort. The motors are geared to the driving axles which in turn apply force to the rail through the wheels. The driving force is transmitted to the truck frame by the axle journal boxes and from the truck frame to the

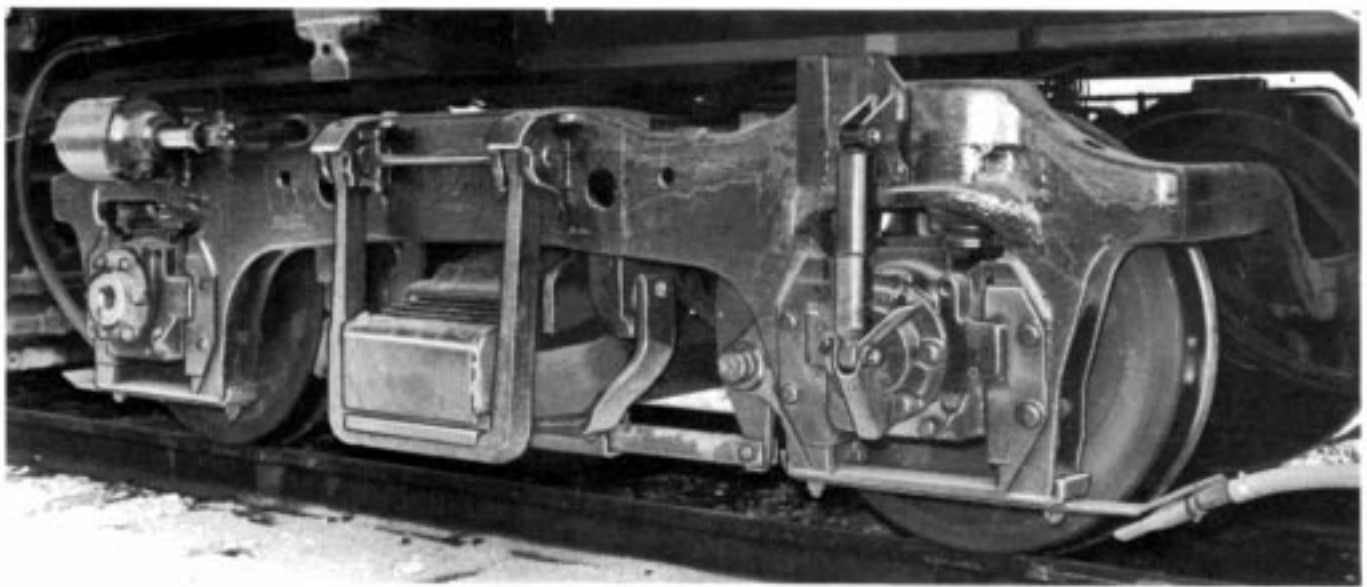


Fig.1 - GP Truck Assembly With Single Brake Shoe Rigging And Inclined Rubber Suspension

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bolster at the truck and bolster chafing plate interfaces. The bolster then transmits the force at the center bearing to the carbody center bearing to provide the locomotive tractive effort.

The frame of the truck is supported on two coil spring assemblies above each journal box. The journal box transmits the vertical load directly from the springs to the axle.

Each journal box is held between the pedestal jaws, which are an integral part of the frame. Each pair of pedestals is joined at the bottom by a pedestal tie bar, which transfers a portion of the driving force from one pedestal to the other.

Renewable pedestal liners and journal box wear plates provide control of clearances between the pedestals and journal boxes. See M.I. 1552 for information on journal boxes.

Bosses on both sides of the frames are provided to support the swing hangers, which carry the spring plank. Two inclined rubber bolster springs at each end of the spring plank support the bolster, which is confined between the center frame transoms.

A heavy duty shock absorber is mounted between the truck frame and journal box at opposite corners of the truck to damp excessive vertical and rolling oscillations of the locomotive carbody.

Driving or braking forces are transferred from the frame transoms to the bolster. Wear plates on the inside surface of each transom contact mating wear surfaces on the bolster. The bolster center bearing, in turn, transfers these motive forces to the carbody center bearing. Matching side bearings on the truck bolster and the carbody limit the lean of the locomotive. Lateral forces between the bolster and spring plank are transmitted through the inclined rubber springs. Clips bolted to the carbody side bearings hook under the bolster side bearings to allow rotary movement between the carbody and truck bolsters but prevent separation of the truck bolster from the carbody underframe. They also provide anti-slewing protection in case of derailments.

Traction motors are supported on their respective drive axles and at the traction motor nose suspension assemblies mounted on the center transoms.

Air brake cylinders and brake rigging mounted on the trucks are used to apply retarding force to the wheels to slow and stop the locomotive.

Brake cylinder pistons are connected to brake levers to actuate the brake rigging. One cylinder is mounted on each side of the truck frame at opposite corners and actuates the two brake shoes on that side of the truck.

NOTE

The single shoe brake system must be equipped with composition brake shoes.

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 boxes should be inspected periodically and oil added when necessary. If slack adjuster threads are found to be dry they should be lubricated.

The center bearing should have approximately 1.7 liters (3-1/2 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 1.7 liters (3-1/2 pints) of oil should be added after the unit is trucked to make up the required 3.3 liters (7 pints).

NOTE

Do not add all 3.3 liters (7 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 frame bolster, and spring plank 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 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 is 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 Step 2 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 main-

tenance. For standard bolt mount shock absorbers, the upper mounting bolt 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.

VERTICAL CLEARANCES

SPRING PLANK-TO-BOLSTER

The vertical clearance measured between the bolster and spring plank is expected to change with time as a result of set and drift in the rubber springs. When new, this clearance is set at 38.1 mm (1-1/2").

During routine maintenance or prior to a major overhaul, measurements should be made before the locomotive is untrucked to determine if any shimming is required.

Four measurements are required on each truck, a fore and aft measurement on both sides of the spring plank adjacent to the rubber springs, Fig. 2. When the average of these four measurements becomes less than 25.4 mm (1"), additional shimming is recommended to increase the vertical stop clearance. If this occurs before a major truck overhaul is scheduled, the trucks will have to be removed and shims added on each side of the spring adapters. It is important to add shims equally on both sides of the rubber springs either adjacent to the spring adapter or to the spring plank pocket. The addition of four

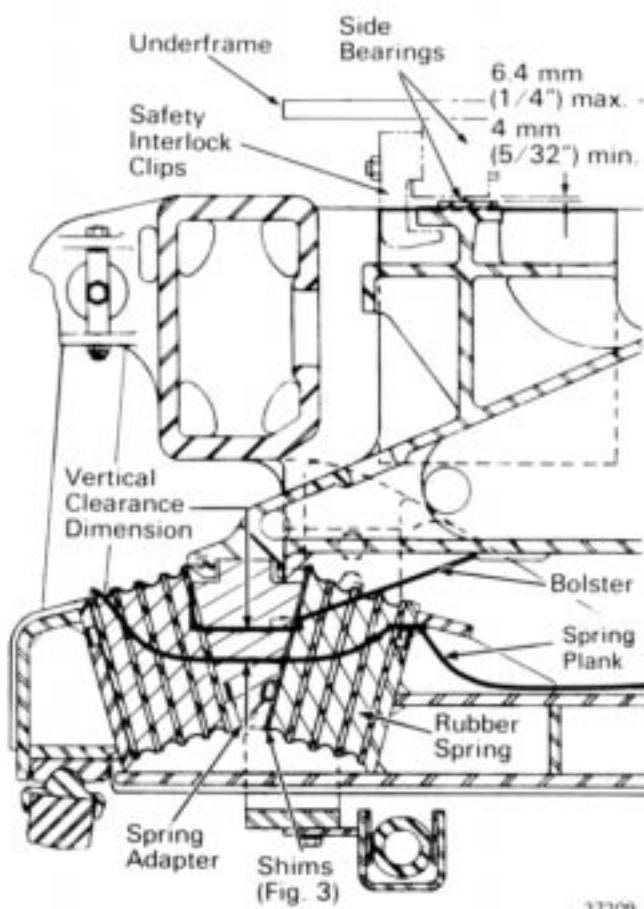


Fig. 2 - Vertical Clearances

1.6 mm (1/16") shims, Fig. 3, adjacent to each side of the adapters will increase the vertical height approximately 12.7 mm (1/2").

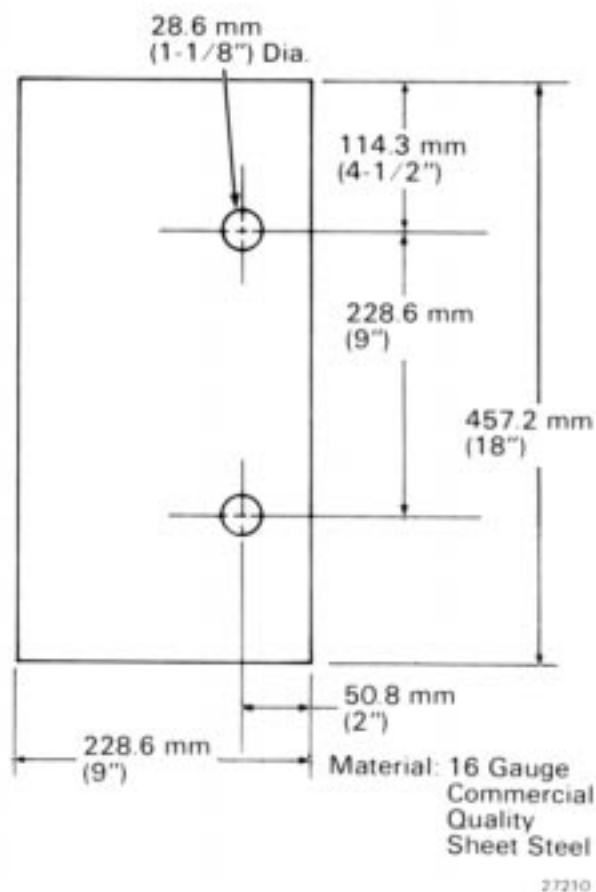


Fig. 3 - Rubber Spring Shim Dimensions

SIDE BEARINGS

Side bearing clearances should be checked as shown in Fig. 2.

Clearances approaching the minimum indicate that the center bearing wear plate is at its minimum thickness and should be renewed.

Information concerning replacement of worn or missing side bearings is provided in the Inspection And Reconditioning section.

JOURNAL BOX-TO-PEDESTAL LINER CLEARANCE

Clearance limits between the longitudinal or lateral wear surfaces, are such that in normal operation the clearance will not exceed the maximum in the period between truck reconditioning. The normal new lateral clearance between the journal box and the pedestal liner is 1.6 mm (1/16") at each side of the pedestal.

The truck pedestal to journal box wear limits are shown in Fig. 4. 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.

The clearance between the journal box 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 boxes in the position they are in when the locomotive is stopped. No attempt should be made to shift the journal boxes on the axle while the weight of the locomotive is supported by the boxes.

NOTE

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

WHEEL AND AXLE INSPECTION

Wheels and axles 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.

Use the following guidelines in conjunction with M.I. 1518 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.

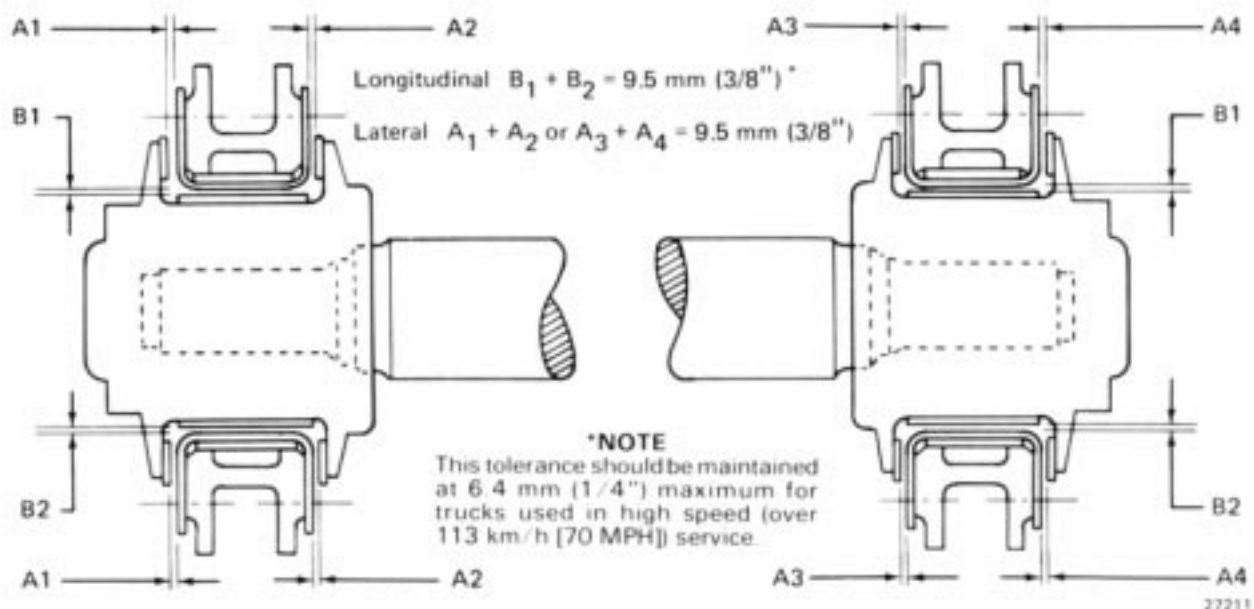


Fig.4 - Typical Truck Pedestal Liner-To-Journal Box Wear Limits

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, Fig. 2. 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 lifting 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

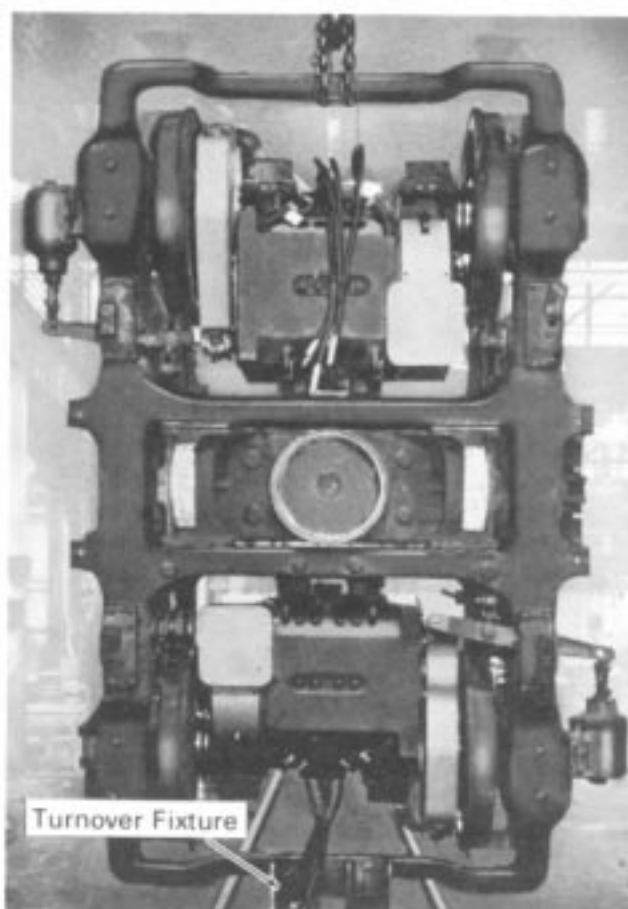
1. Remove center bearing dust guard, wear plate and wear half rings. Wipe oil from center bearing and drain oil from journal boxes and traction motor support bearings.
2. While truck is in the upright position, remove individual items such as brake cylinders,

rigging, and piping from truck. Some portions of the brake rigging may be more easily removed when the truck is inverted.

CAUTION

Before turning truck to an upside down position, wire the swing hangers to the safety straps. This will prevent hangers from swinging out when the truck is inverted.

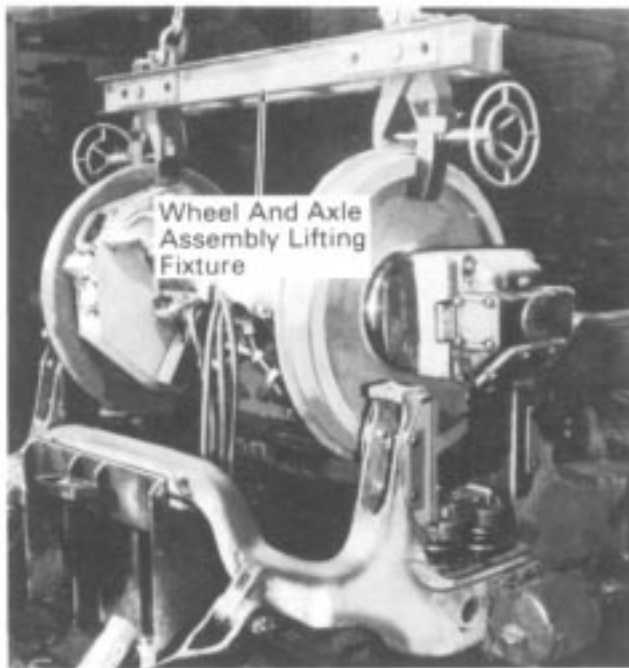
3. Turn truck upside down using a locally fabricated turnover fixture and an overhead crane of sufficient capacity, Fig. 5. Adequate overhead clearance must be available to accommodate full length of truck. Refer to Service Data for file drawings available to fabricate turnover fixture.



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Fig.5 - Turning Over Typical Swing Hanger Truck

4. Disconnect vertical shock absorbers and remove pedestal tie bars. Remove traction motor, axle, wheels, gear case, and journal boxes as a single assembly using a lifting fixture as shown in Fig. 6. Refer to Service Data for file drawing available to fabricate lifting fixture.
5. Remove pedestal liners, coil springs, coil spring seats, and shims.



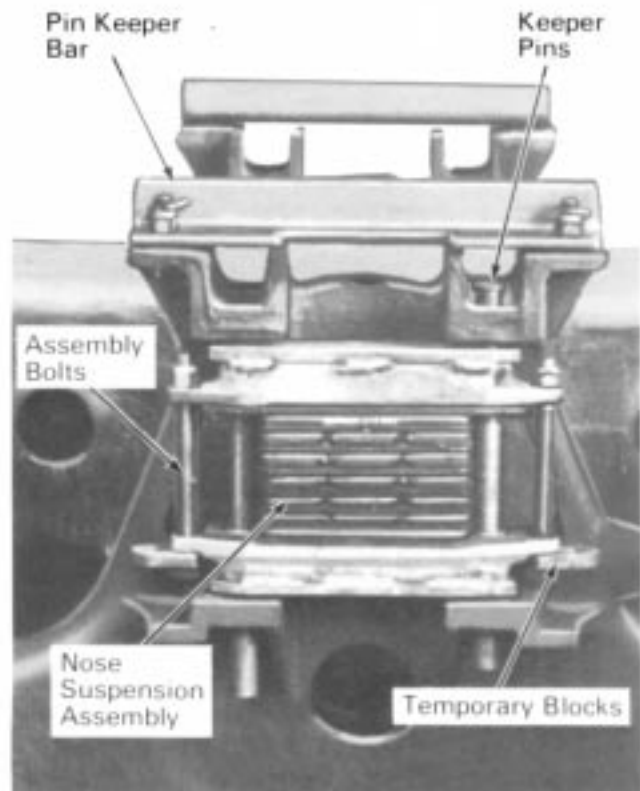
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Fig. 6 - Removal Of Wheel And Axle Assembly

6. Remove wires tying swing hangers to spring plank safety straps. Remove swing hangers, swing hanger blocks, and safety straps.
7. Remove spring plank, inclined rubber bolster springs, bolster spring adapters, shims, and bolster assembly.
8. Remove pedestal liners, spring seats and shims, coil springs, and any remaining smaller parts of the truck as desired.
9. To remove traction motor nose suspension assembly:
 - a. Remove pin keeper bar and remove keeper pins, Fig. 7.
 - 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 pack and remove 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.



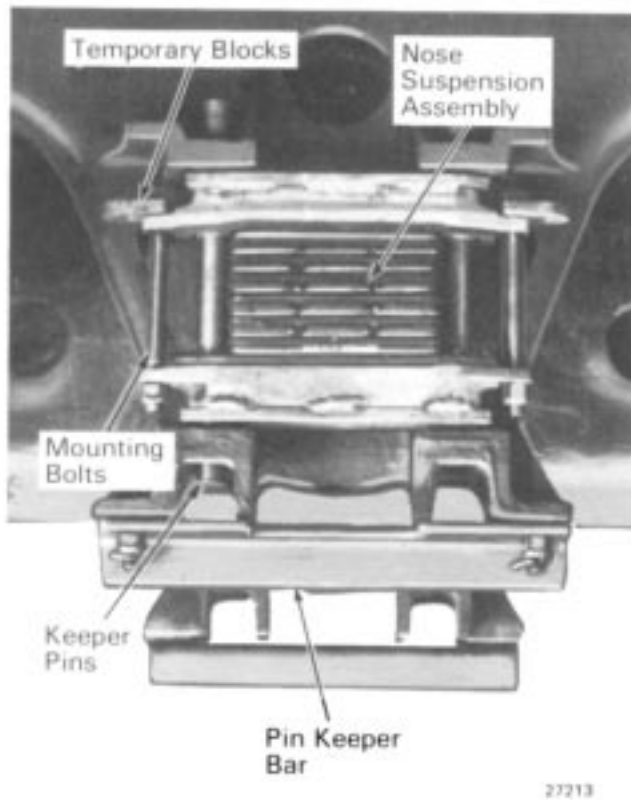
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Fig. 7 - Traction Motor Nose Suspension Removal, Inverted View

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. Remove traction motor suspension pin keeper bar to allow keeper pins to drop down.
7. Lift motor to compress rubber nose pack. With the rubber nose pack compressed, insert temporary blocks about 19 mm (3/4") thick between the nose pack holder and mounting bolts as shown in Fig. 8.
8. Lower motor a small amount to free nose suspension assembly. Remove suspension assembly from truck frame.

CAUTION

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



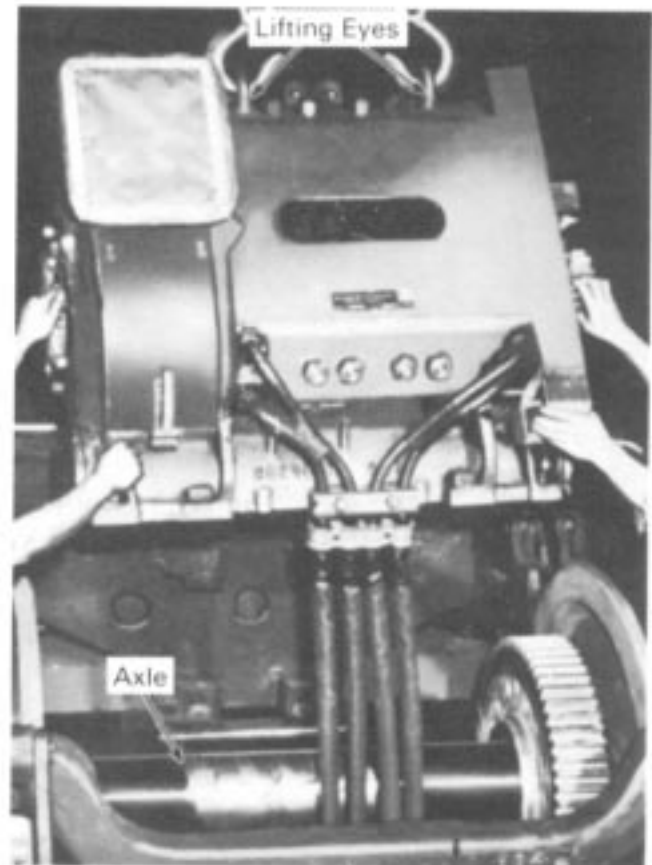
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Fig. 8 - Compressing Nose Suspension Assembly

9. Hoist motor and allow it to rotate on axle until lower lip of support bearing will clear axle, Fig. 9. The motor assembly may now be lifted clear of the axle.
10. Remove pedestal tie bars, spring plank safety straps, swing hanger pin spacers, and vertical shock absorbers.
11. Compress rubber bolster springs slightly by placing jacks under spring plank. Tap out swing hanger pins and remove swing hangers and swing hanger blocks. Lower spring plank assembly, rubber springs, spring adapters, and bolster.
12. Lift truck frame from wheel and axle assemblies.
13. 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



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Fig. 9 - Removing Traction Motor From Truck

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 either AWS E-6010 or E-6011 electrodes, for all root passes, and AWS E-7016 or E-7018, for all

subsequent passes. AWS E-7024 welding electrodes are not to be used on this assembly. 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. 10. 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 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.

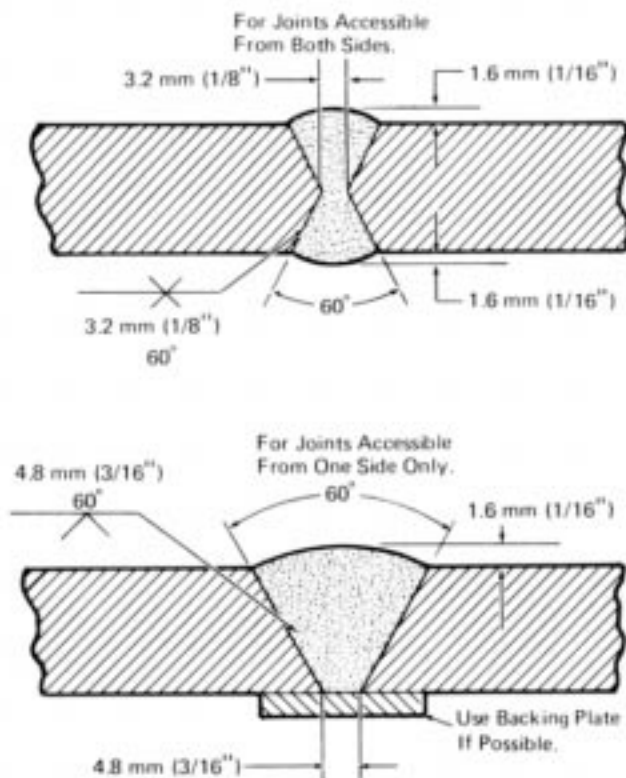


Fig.10 - Preparing Joints For Welding

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. 11.

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.

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.

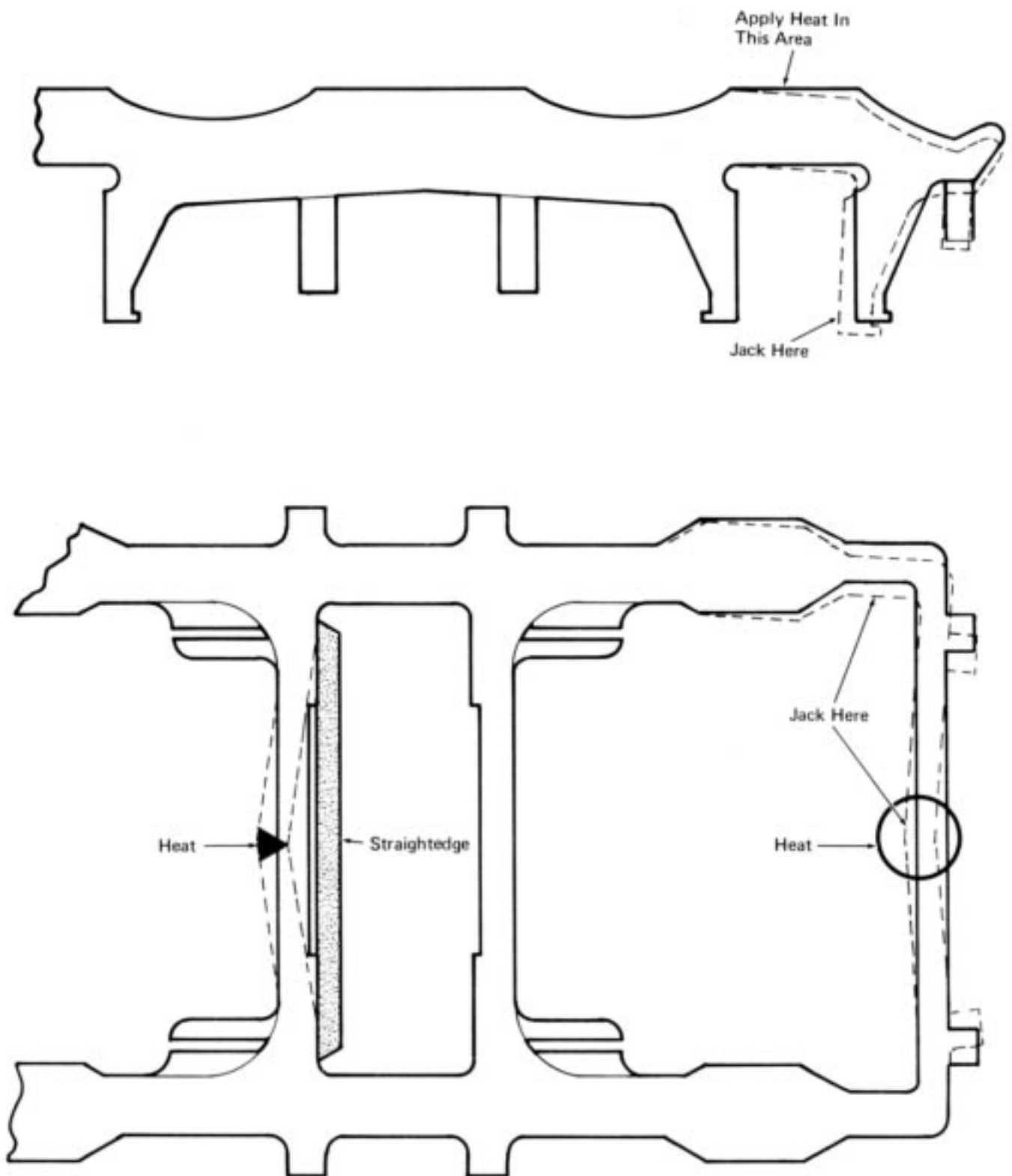


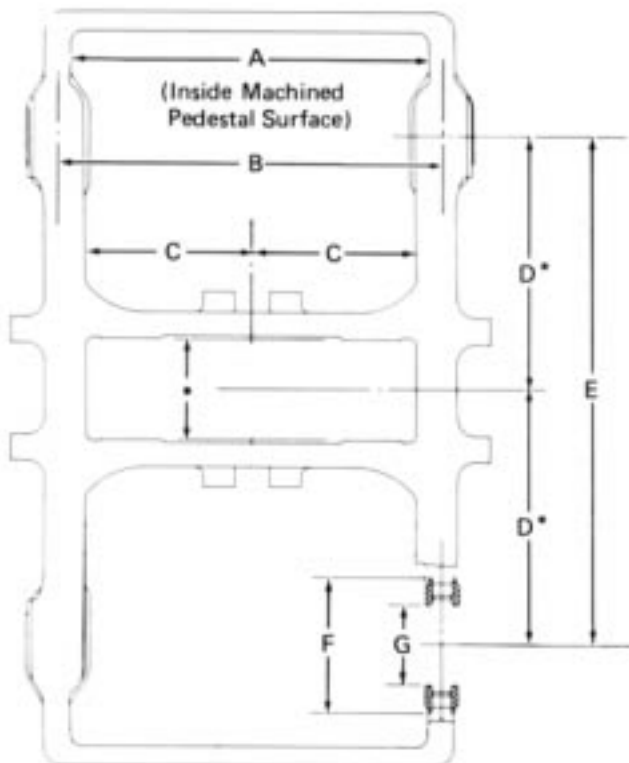
Fig.11 - Straightening Bent Sections

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PEDESTAL REPAIR

WHEEL BASE SPACING

The wheel base spacing is the measured distance between the transverse centerline of the jaws of the pedestals or the dimension between the axle centerlines. These dimensions are shown in Fig. 12.



*Parallel within 0.79 mm (1/32")

Dimensions		
	Metric	Standard
A	1 842.3 mm ± 1.6 mm	72-17/32" ± 1/16"
B	2 019.3 mm ± 1.6 mm	79-1/2" ± 1/16"
C	921.2 mm ± 0.8 mm	36-17/64" ± 1/32"
D	1 371.6 mm ± 3.2 mm	54" ± 1/8"
E	2 743.2 mm ± 6.4 mm	108" ± 1/4"
F	663.6 mm + 0 - 0.4 mm	26-1/8" + 0 - 1/64"
G	427.1 mm + 0 - 0.8 mm	16-13/16" + 0 - 1/32"

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Fig.12 – Four Wheel Swing Hanger Truck Frame Dimensions

To obtain the wheelbase dimension, first place straight edge along the inboard face of both pedestal jaws and measure the distance between them. To this measurement add 1/2 the distance between each pedestal jaw.

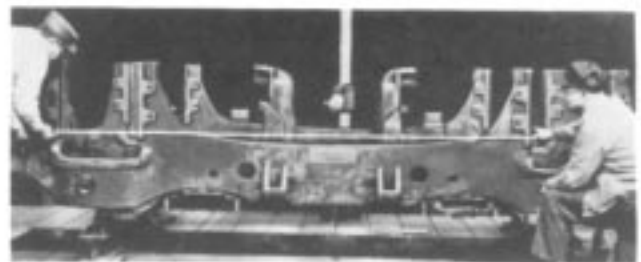
The wheelbase figures obtained should be within the limits given in Fig. 12. The transverse centerline of

the pedestals or axle centerline must be parallel to the transverse centerline of the truck within 0.8 mm (1/32").

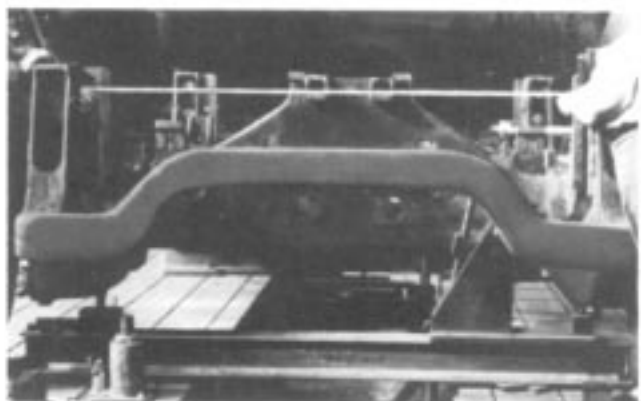
TRANSVERSE PEDESTAL SPACING

The transverse pedestal spacing refers to the dimension between the inside machined surface of pedestal jaws on opposite sides of the truck, Fig. 12.

The transverse measurements may be made as shown in Fig. 13. The pedestals may lean in or out, providing both pedestals of each set lean in the same direction and are within the plus or minus tolerance allowed from the longitudinal centerline of the truck frame to the inside face of the pedestal.



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Fig.13 – Measuring Wheelbase And Pedestal Spacing

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 or over the outside surfaces of the pedestal jaws on the same side of the truck as indicated in Fig. 13. Incorrect pedestal spacing is caused by a bent frame or bent pedestals, either of which requires straightening to obtain the correct pedestal spacing.

NOTE

With single shoe braking, the pedestal tie bar is a very important part of the load carrying system. Therefore, the dimension over the outside pedestal surfaces, $663.6 \text{ mm} +0 -0.4 \text{ mm}$ ($26-1/8" +0 -1/64"$) must be maintained so that the pedestal tie bar fits tightly over the pedestal jaws.

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 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. Misalignment may be no more than 3.2 mm ($1/8"$) above or below the pedestal baseline. A condition in excess of this can only be corrected by straightening the truck frame.

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 $112.7 \text{ mm} \pm 3.2 \text{ mm}$ ($4-7/16" \pm 1/8"$) from the centerline of the truck pedestal opening, as indicated in Fig. 14. 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 $225.4 \text{ mm} \pm 1.6 \text{ mm}$ ($8-7/8" \pm 1/16"$), as indicated in Fig. 14.

Dimensions	
Metric	Standard
$225.4 \text{ mm} \pm 1.6 \text{ mm}$	$8-7/8" \pm 1/16"$
$112.7 \text{ mm} \pm 3.2 \text{ mm}$	$4-7/16" \pm 1/8"$
3.2 mm	$1/8"$

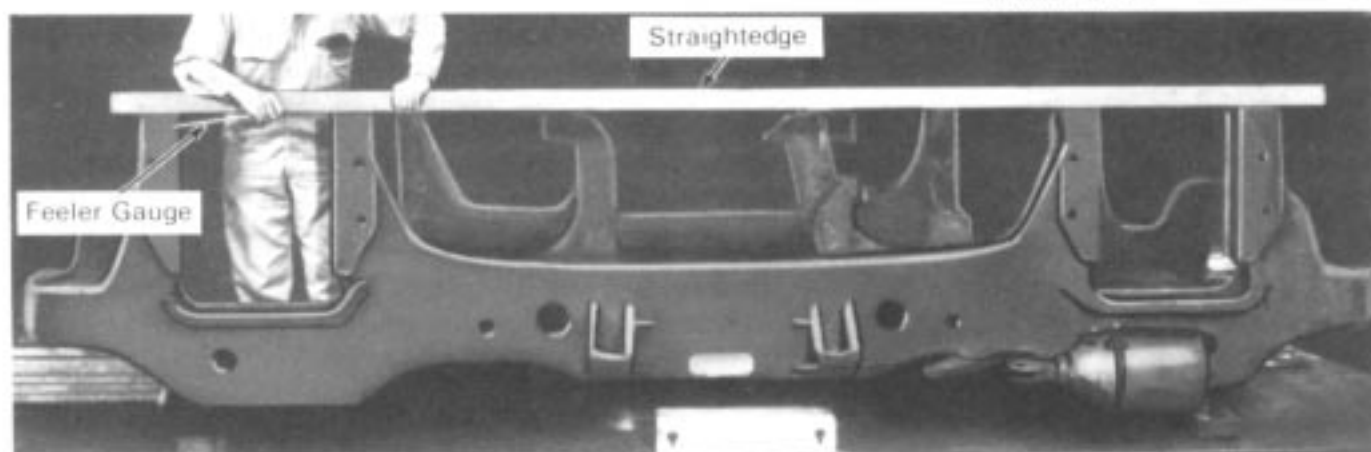
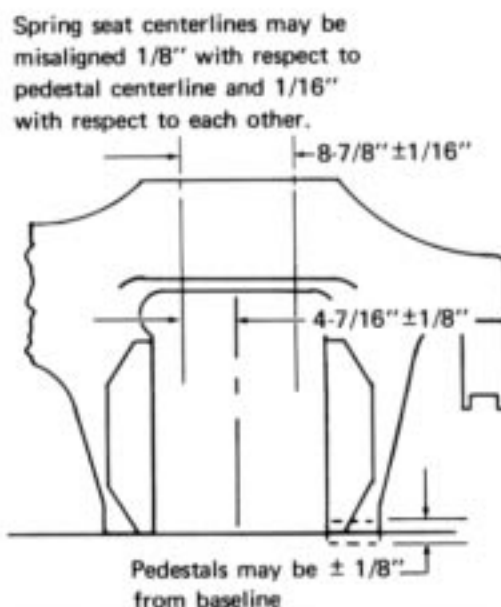


Fig.14 - Pedestal Base Horizontal Alignment

The spring seat can be removed by cutting the welds, and should be rewelded or a new spring seat applied, as shown in Fig. 15. Shims located between the spring seat and the truck frame provide the proper height from the spring seat 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.

TRAMMING

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 or within the allowable limits. The diagram shown in Fig. 16 indicates which pairs of pedestals should have equal distances between them.



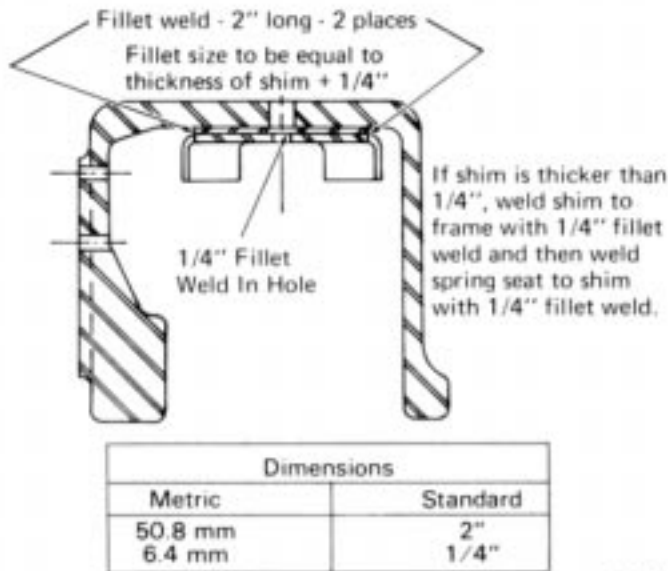


Fig.15 - Application Of Spring Seat

Tramming is accomplished by using a trammel beam as shown in Fig. 17 with the truck frame inverted on a level table or level location. In addition to the diagonals shown in Fig.16, it may be necessary to check the tram of the pedestals both longitudinally and transversely as indicated in Fig. 17.

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 trammels permit any distance separation on the beam so the various dimensions to be trammed can be compared.

Tram marks are made on the end or bottom of each pedestal 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 38.1 mm (1-1/2") from each inside face 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. 18 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 38.1 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.

The truck frame should be leveled before tramming. Support the truck frame on two small jack screws under the end pedestal spring pockets at one end of the frame and by one jack screw or hydraulic jack placed on the longitudinal centerline at the opposite end of the frame, similar to the support shown in

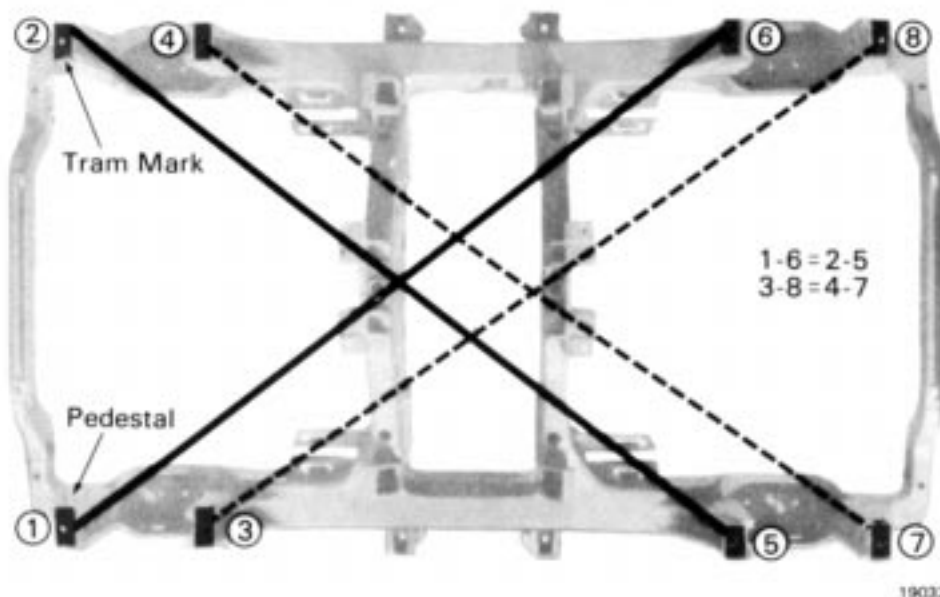
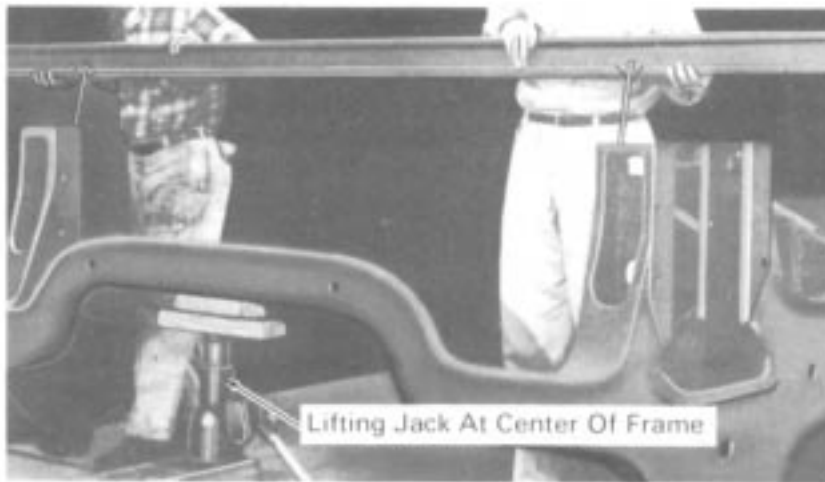


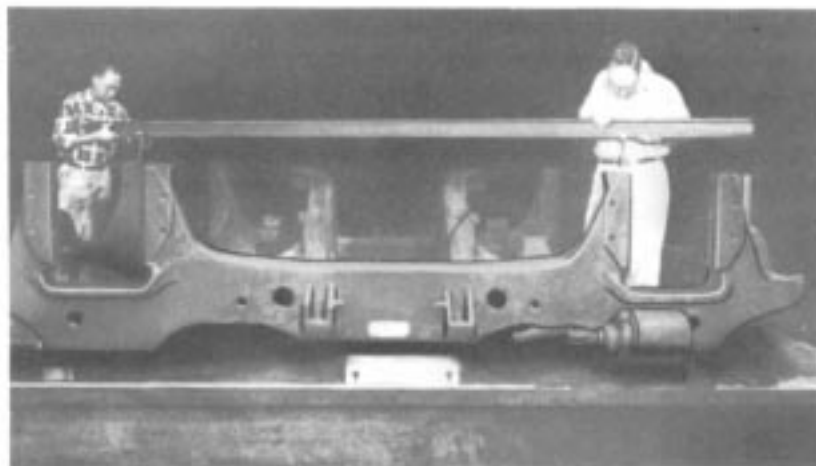
Fig.16 - Truck Frame Tramming Diagram



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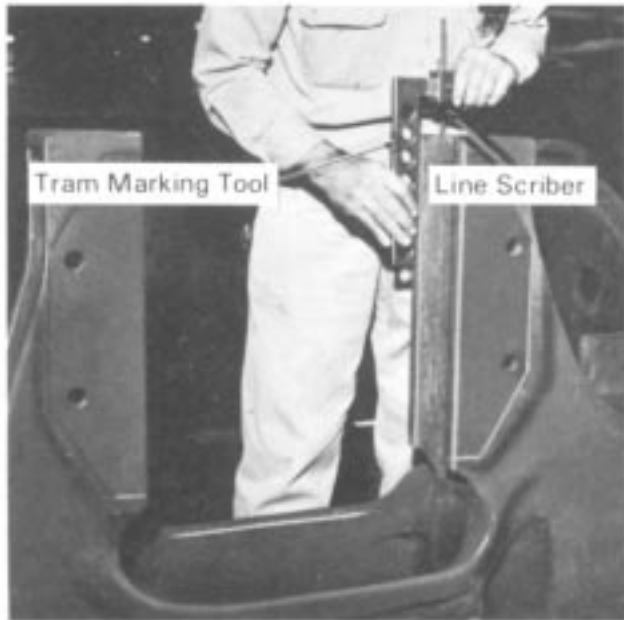


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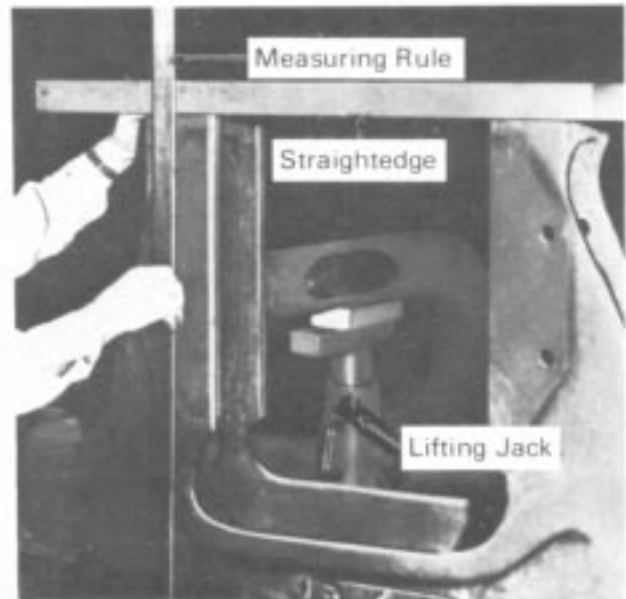
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**Fig.17 - Application Of Trammel Beam
Between Pedestals**



19070

Fig.18 - Tram Marking Tool



10963

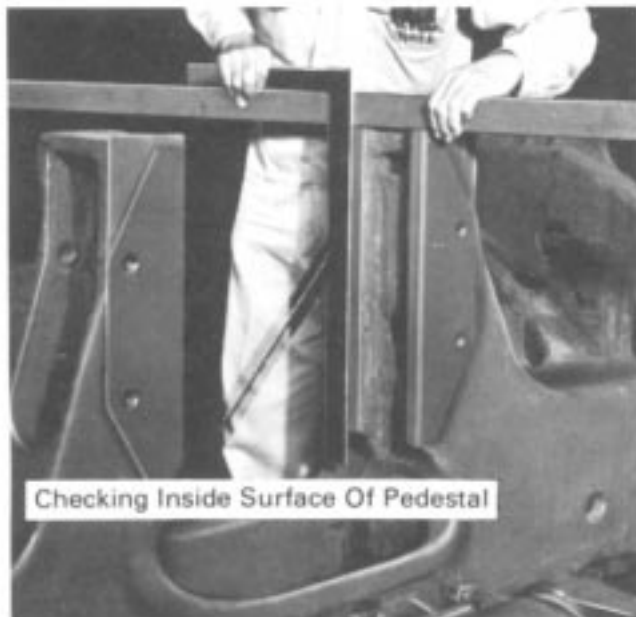
Fig.19 - Leveling Truck Frame

Fig. 17. The end supported by the two jacks is raised to any convenient height and measured at the top of the end pedestals, Fig. 19. The end pedestals at the center supported end of the frame are raised to the same height as the other end. If one pedestal cannot be raised to a height equal to that of the other pedestal, it indicates that the frame has a slight twist at the end of the lower pedestal.

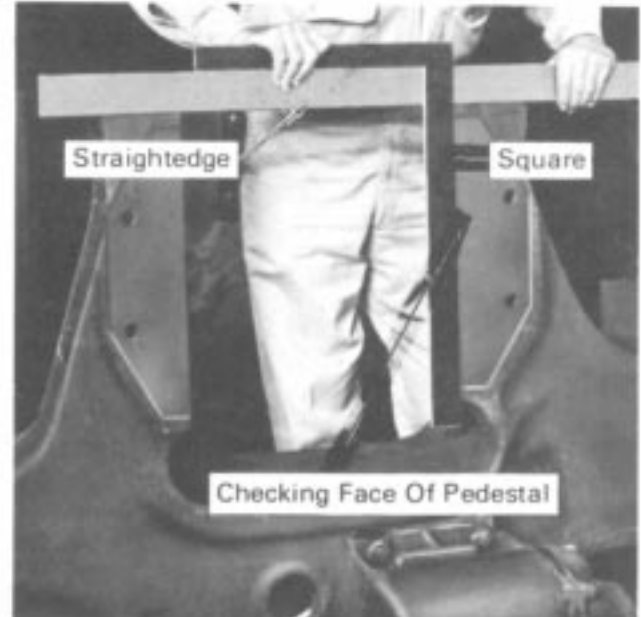
truck before tramping. The pair of pedestals opposite each other (one on each side of the frame) which are found to be square or nearly square, are used as starting points for tramping. The pedestals are checked using a straight edge and square, Fig. 20.

Each pedestal should be checked for leaning at the inside surface and the side facing the center of the

If the diagonal measurements shown in Fig. 16 are not equal, it will be necessary to tram the pedestals longitudinally and transversely, Fig. 17, to locate the pedestals that are out of alignment and determine how much they are out of alignment.



19067



19068

Fig.20 - Checking Pedestal Squareness

A typical example of the tram measurements are shown in Fig. 21. The diagonal trams 3-8, 1-6, 2-5, and 4-7 are shown to be unequal by plus 3.2 mm ($1/8''$), 0", plus 0.8 mm ($1/32''$) and plus 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. Trimming also indicates that longitudinally all the pedestals are equal as shown by the equal "0" longitudinal measurements. Transverse trimming 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 plus 5.6 mm ($7/32''$) it accounts for the plus 3.2 mm ($1/8''$) and plus 1.6 mm ($1/16''$) length of the diagonal trams 3-8 and 4-7 going to these pedestals. Since 3-8 plus 3.2 mm ($1/8''$) is twice the plus 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. 22, are provided to absorb the wear that occurs from the relative movement between the journal box and the pedestals. For convenience of replacement, the pedestal liners are bolted to the pedestal jaw.

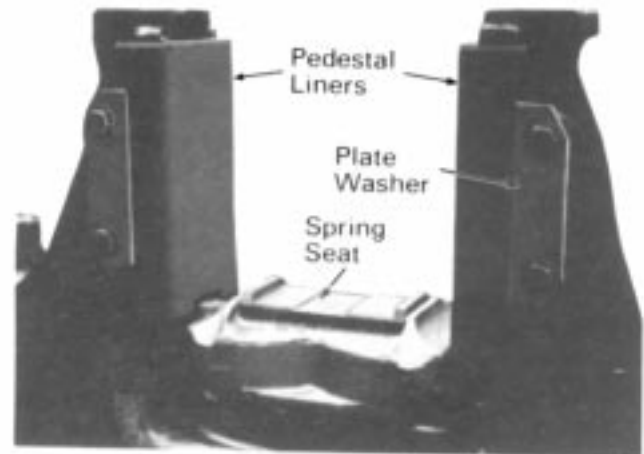


Fig.22 - Notched Nylatron Pedestal Liners

27217

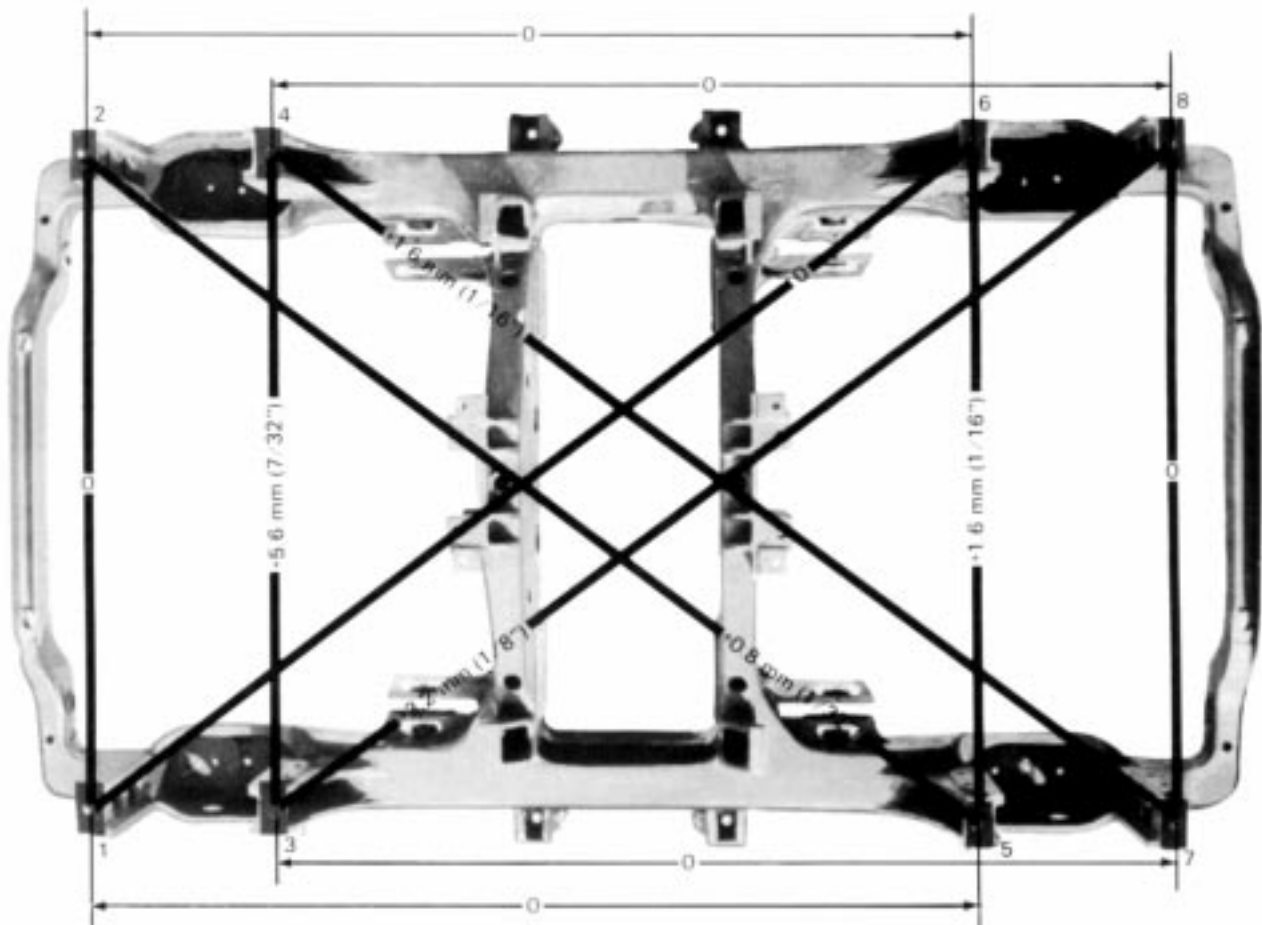


Fig.21 - Typical Example Of Tram Measurements

27225

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. 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 box-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.

Apply liners using a liner pressing tool, Fig. 23. Refer to Service Data for file drawing available to

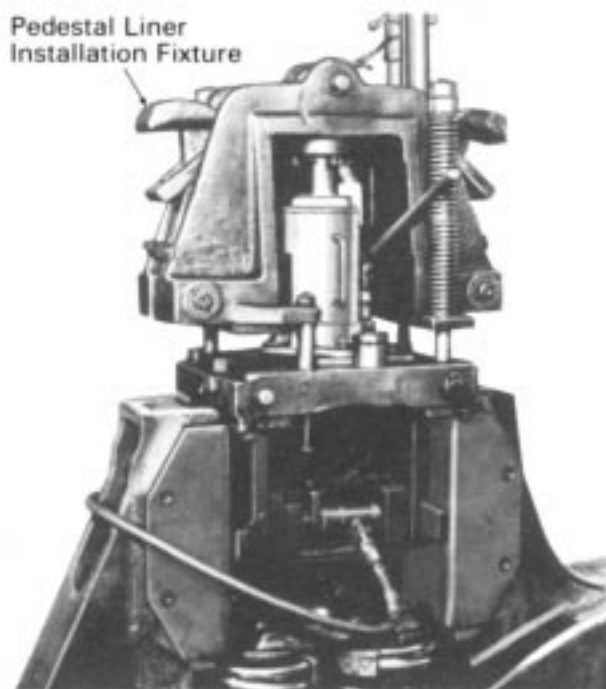


Fig.23 - Installing Pedestal Liners

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.

COIL SPRING SEAT

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

At the journal box, 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. 24.

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 1 165 mm (45-7/8"). Journal box spring seat shimming is provided to maintain the coupler height and a reasonably equal axle load distribution on the rail. For complete information on application of shims see M.I. 1518, Wheels, Axles, Axle Gears And Pinions.

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. 24. Information required to renew upper spring seats is also provided in Fig. 24.

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. 25.

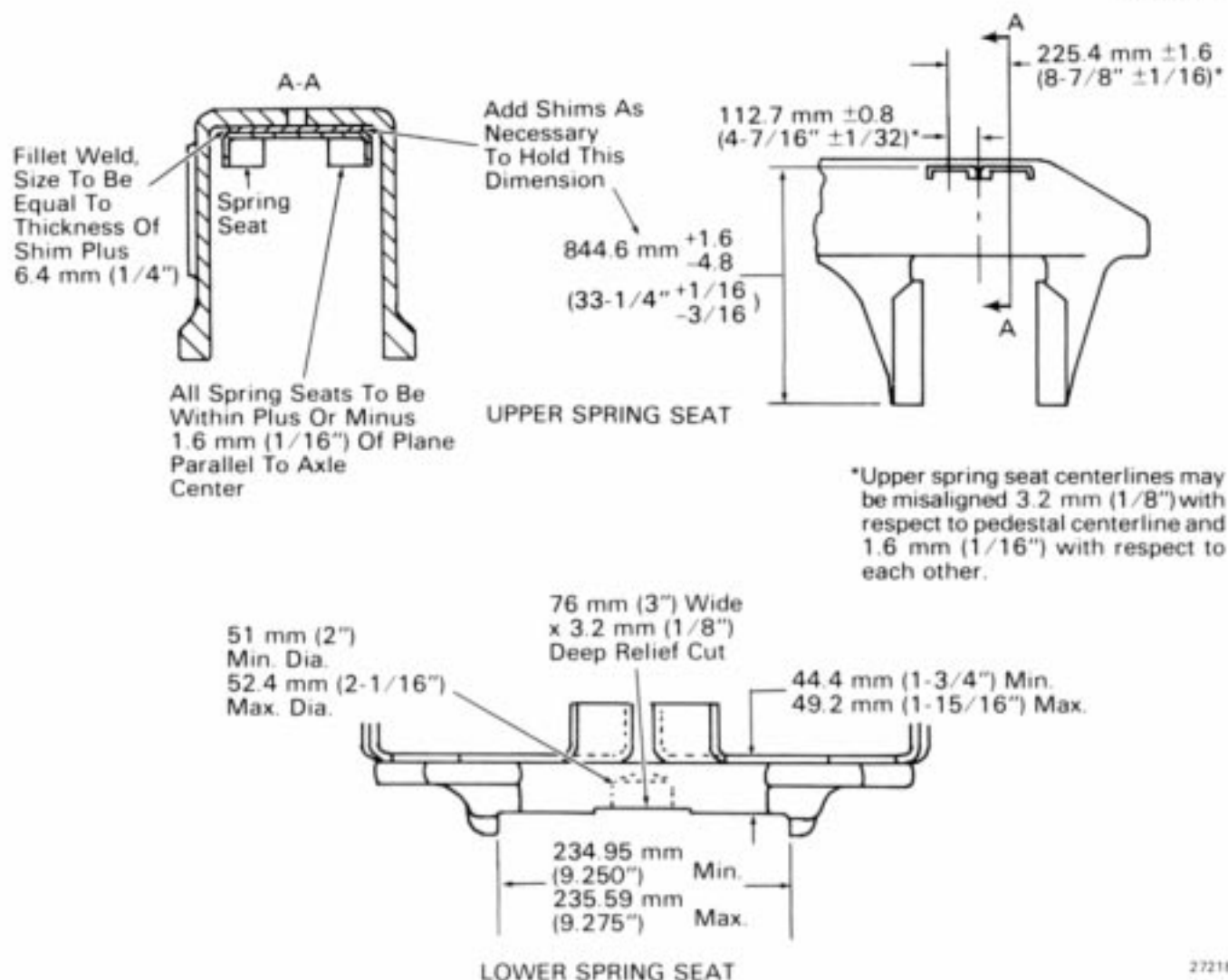


Fig.24 - Spring Seat Repair

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 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.

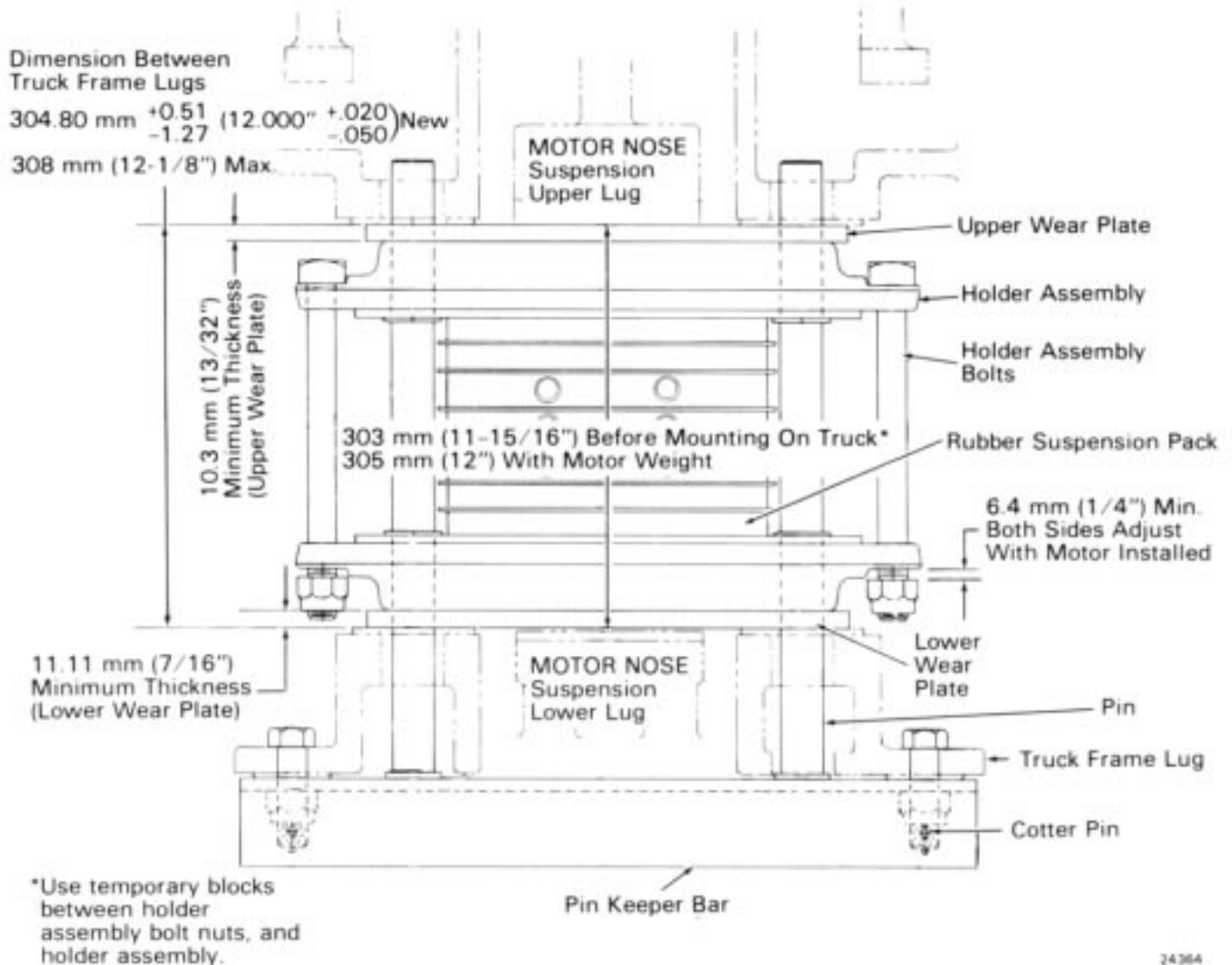
To obtain maximum cushioning effect from the suspension pack, wear plates should be periodically replaced to ensure there is not more than 6.4 mm (1/4") free movement in the traction motor nose suspension. If the wear plates, which are 12.7 mm (1/2") thick when new, are worn enough to permit more than 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. 26.

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



24364

Fig.25 - Traction Motor Nose Suspension

-1.27 mm (12.00" $+0.020$ -0.050). 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 welding electrode. Weld the plate on three sides as shown in Fig. 27. 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 \pm 0.8 mm (12" \pm 1/32").

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, 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.

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. 28, around the two mating parts prevents the entrance of moisture and dirt. The dust guard recess at the top of the

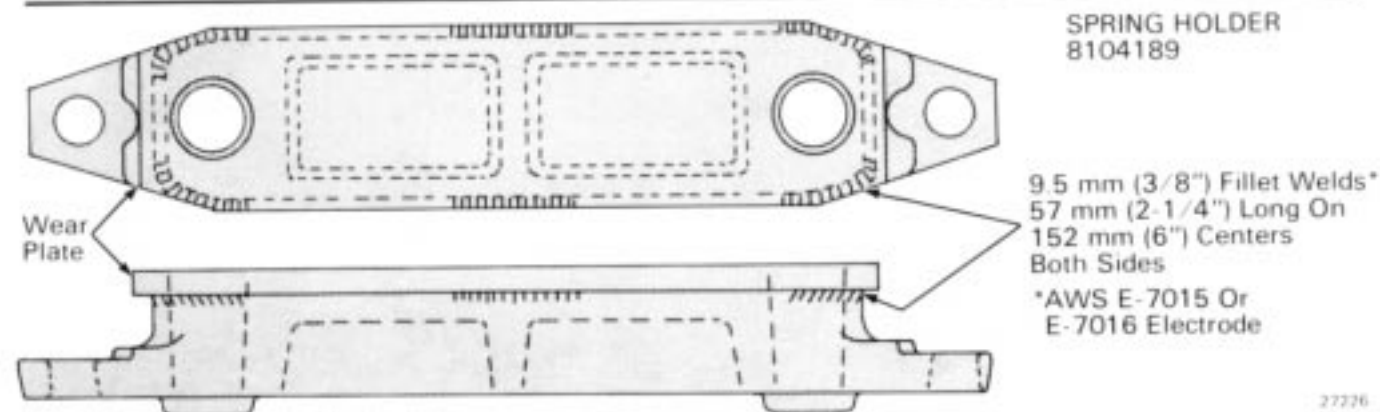
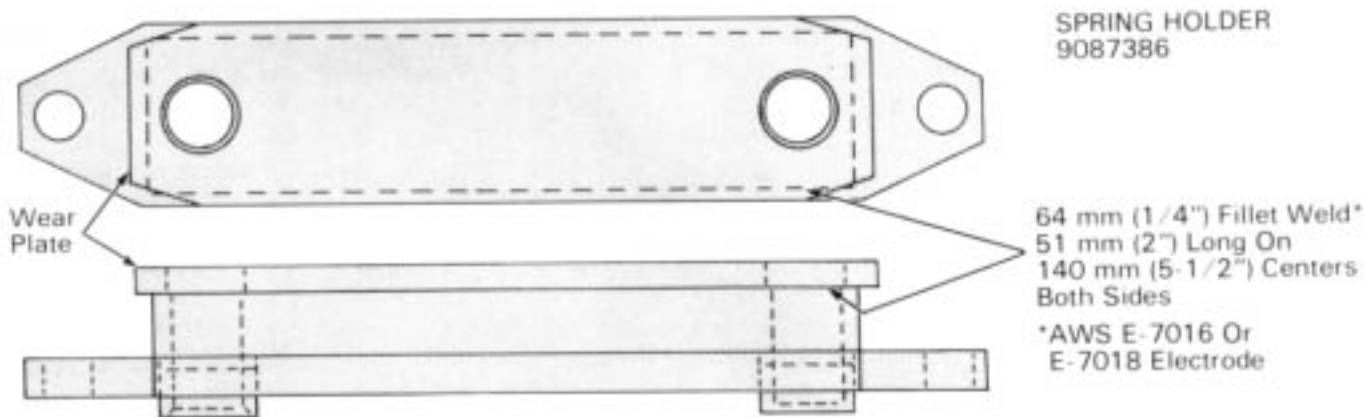


Fig.26 – Nose Suspension Wear Plates

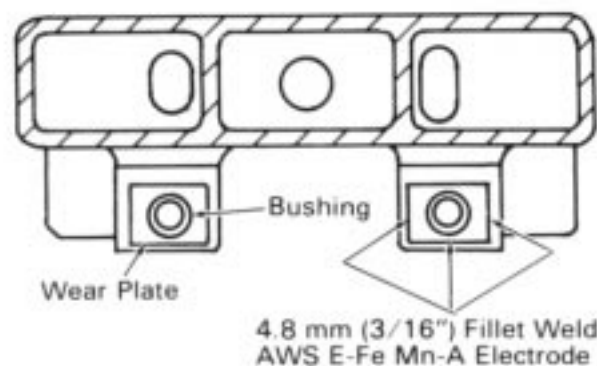


Fig.27 – Applying Motor Suspension Lug Wear Plate (Top View Of Transom Cross Section)



Fig.28 – Center Bearing Dust Guard

center plate receptacle must be free of nicks and burrs which might cut or damage the dust guard boot.

The vertical height from the rubber bolster spring adapter seat to the center plate should be 366.7 mm (14-7/16") to 376.2 mm (14-13/16").

If this dimension is 360.4 mm (14-3/16") to 366.7 mm (14-7/16") the bolster may be used but must be

coded for identification when assembling the truck so that a 6.4 mm (1/4") thick shim can be applied between the swing hanger and the lower bearing block to compensate for the height deviation. If not corrected, this deviation will result in less clearance between the truck frame and the underframe and possibly cause interference.

The vertical height from the bolster side bearing to the center plate on the four wheel swing hanger

truck should be maximum 109.5 mm (4-5/16") to minimum 104.8 mm (4-1/8"). If the height exceeds 109.5 mm (4-5/16") the side bearing can be machined or ground to within limits providing the side bearing section will not be less than 15.9 mm (5/8").

FRAME AND BOLSTER WEAR PLATES

The wear plates on the truck frame and bolster wear as a result of movement between these surfaces. If the clearance exceeds the limits given in Fig. 29, either the bolster or truck frame wear plates or both should be replaced. The wear plates and their welds should be inspected using the magnetic particle method of inspection. Generally, residual magnetism in these truck parts is sufficient to provide an indication when the inspection particles are applied to their surfaces. The wear plates can be removed by grinding or chipping off the fillet welds that secure the plates. If one wear plate is removed, the wear plate at the similar location on the other side of the truck frame or bolster should be removed, as these plate surfaces should be parallel within 0.8 mm (1/32"). The replacement wear plate should conform to the specifications of the original plate.

Prior to the application of the new plate be sure that the mating surfaces of the parts to be welded are clean, smooth, and flat. Use American Welding Society E-7016 electrodes or equivalent for SAE 1060 heat treated steel wear plate.

NOTE

In some applications other types of wear plates may be used. For manganese wear plates, use AWS E-Fe Mn-A electrode and for SAE 1095 heat treated steel wear plates, use AWS E-310-16 stainless steel electrode.

During welding, the part should be held in the correct position and in full contact against its mating part. Care should also be taken that fillet

welds are not higher than the wearing surface of the plates. Grind down any weld material that overlaps onto the surface of the wear plate. Wear plates which have holes in the plate for welding should have the area of the holes welded first, as this will help to ensure contact at the center of the plate and prevent warping of the plate.

SIDE BEARING WEAR PLATES

The side bearing surfaces on the bolster are designed to mate with similar side bearings mounted beneath the carbody underframe as indicated in Fig. 30.

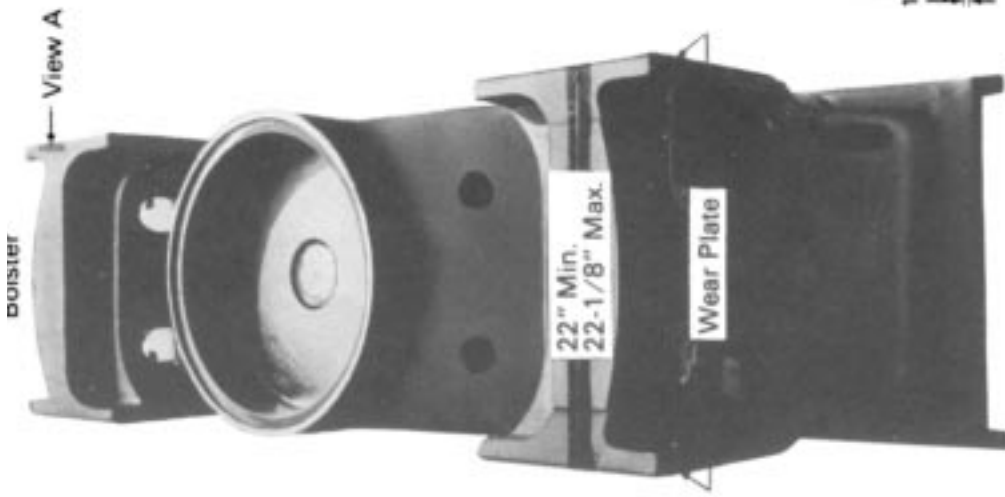
A clearance is provided between the truck bolster side bearings and the carbody side bearings during normal operation. Side bearings are designed to prevent excessive tilting or leaning of the locomotive but are not designed to carry a continuous load.

Side bearing clearance on a new assembly is 4 mm (3/32") minimum to 6.4 mm (1/4") maximum. The minimum side bearing clearance is 0.8 mm (1/32") as shown in Fig. 30.

Any time the side bearing clearance approaches the minimum limit the bolster center bearing wear plate should be checked for wear. Side bearings should be flat and in the same plane within 0.8 mm (1/32") as the side bearing on the opposite side of the truck. If bearing is misaligned or is uneven, it may be repaired by building up the surface with weld and grinding to a proper level.

The old wear plates can be removed by grinding off the fillet welds around the plate. New plates should be of mild steel material 6.4 mm (1/4") to 9.5 mm (3/8") thick depending on the thickness required to give the proper clearance.

Apply new wear plates using a 6.4 mm (1/4") fillet weld 76 mm (3") long on each end and two evenly spaced 51 mm (2") long fillet welds on each side.



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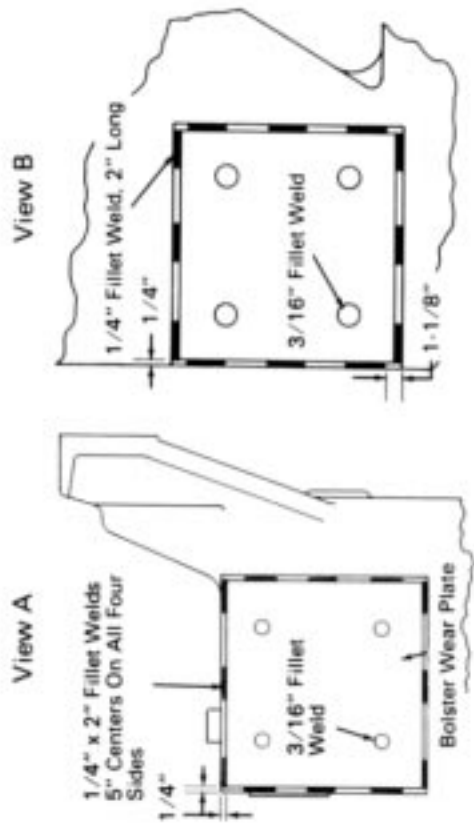
DIMENSIONS	
Metric	Standard
559 mm	22"
562 mm	22-1/8"
4.8 mm	3/16"
6.4 mm	1/4"
50.8 mm	2"
127 mm	5"
9.5 mm	3/8"
28.6 mm	1-1/8"
563 mm	22-5/32"
568 mm	22-3/8"

27219

Bolster Installed

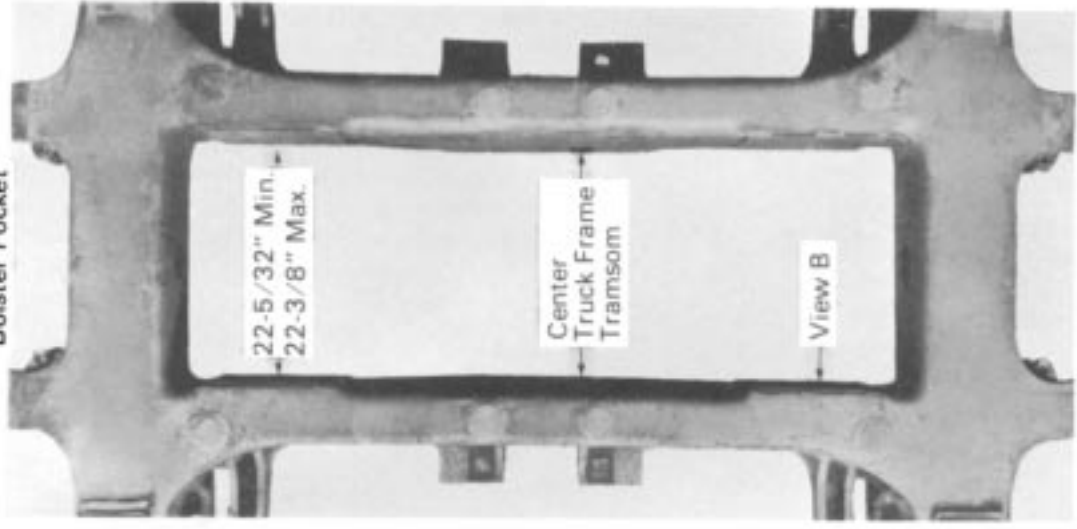


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27465

Bolster Pocket



13034

Fig.29 - Frame And Bolster Wear Plates

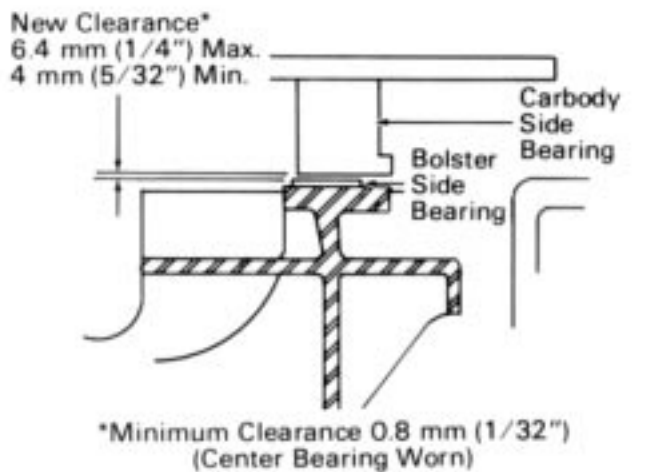


Fig.30 - Side Bearing Wear Surfaces

BRAKE LEVER LATERAL STOPS

Stops are provided on the underside of the truck frame at the two live brake lever locations. A 6.4 mm (1/4") hardened steel wear plate is welded to each stop and mates against a 31.8 mm (1-1/4") hardened steel wear block welded on the brake hanger lever to prevent excessive lateral movement of the brake lever assembly. If the wear limits shown in Fig. 31 are exceeded, replace the wear plate or block as necessary. Transverse alignment of the stop should be checked. As shown in Fig. 31 the surface of the stop (not including the wear plate) should be 55.6 mm \pm 1.2 mm (2-3/16" \pm 3/64") from the inside machined surface of the pedestal jaw.

CENTER BEARING WEAR PLATES AND WEAR RING

As mentioned previously, side bearing wear close to the limit is usually an indication of wear at the center bearing wear plate. The limits for the center bearing wear plate are shown in Fig. 32. 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 plate bushing and the inside diameter of the bolster center bearing wear half ring should be checked to determine the total clearance between them.

The recommended clearance is shown in Fig. 32. The maximum clearance between these parts is 3.2 mm (1/8") as indicated.

Current center wear plates and wear half rings, are made of 13 mm (1/2") thick laminated phenolic or Nylatron material.

If any cracks are found in the bolster center bearing bowl, they must be completely removed by flame cutting, chipping, or grinding, and a 60° "V" groove provided for welding. Weld the crack with AWS class E-7016 electrode. Peen the second weld pass and each pass thereafter to minimize distortion. Grind off excess weld metal so the bearing surface of the center plate is flat within 0.5 mm (.020").

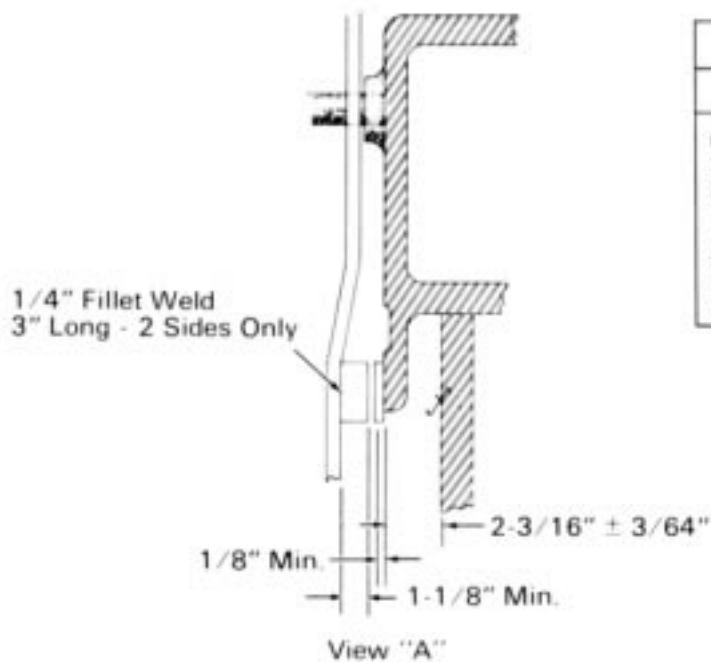
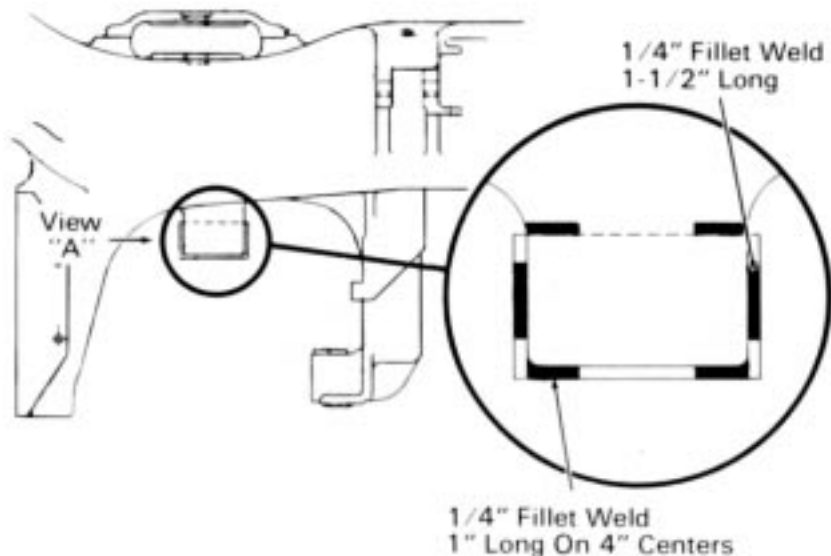
After the old wear plates and wear half rings are removed and the necessary repairs made, the bearing bore should be cleaned and the surfaces smoothed so they offer little resistance to the application of the new replacement half rings. Check the replacement half ring surfaces to see that they are smooth. Apply a lubricant to the outside diameter of the half ring 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.

SWING HANGER ASSEMBLY

Swing hangers similar to the one shown in Fig. 33, support the spring planks, bolster springs, and bolster, and the entire weight of the locomotive supported by the truck. The locomotive weight is in turn transferred to the truck frame.

The swing hangers also function to stabilize the locomotive carbody. When the truck is moved laterally, either by a misaligned track or a curve, the swing hangers will swing like a pendulum, and permit the bolster, bolster springs, and spring plank to move with the carbody. However, as these items move, the lateral force is converted to an upward curved force by the swing hanger and the force is then absorbed in lifting the locomotive. This same action causes the locomotive to lean when going around a curve. The swing hanger and related items are designed to permit sufficient lateral movement to ensure proper lateral control of the locomotive.

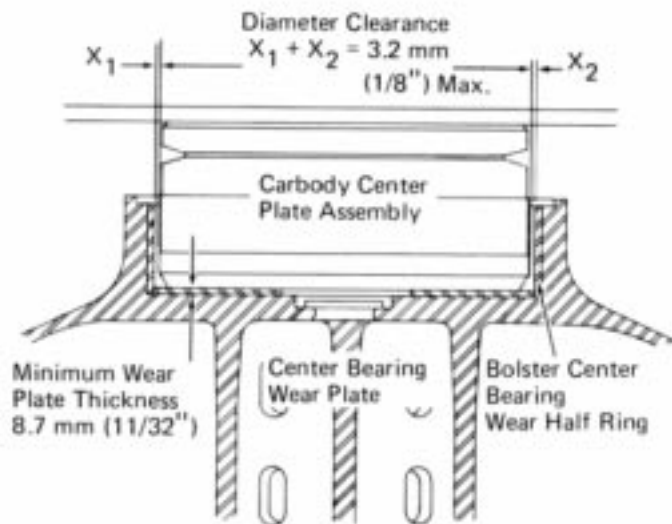
The swing hanger and its associated components such as the swing hanger bearing and bearing block should be inspected and reconditioned, if necessary, prior to reuse.



DIMENSIONS	
Metric	Standard
6.4 mm	1/4"
38.1 mm	1-1/2"
25.4 mm	1"
101.6 mm	4"
76.2 mm	3"
55.6 ± 1.2 mm	2-3/16" ± 3/64"
3.2 mm	1/8"
28.6 mm	1-1/8"

27220

Fig.31 - Brake Lever Lateral Stop



22010

Fig.32 - Bolster Center Bearing Clearance



13039

Fig.33 - Swing Hanger Assembly

SWING HANGER QUALIFICATION

To qualify for reuse the swing hanger should meet requirements for a new part with the following exceptions.

1. The swing hanger pin eyes may not be more than 1.27 mm (0.050") out of alignment with each other.

2. The horizontal centerline of the swing hanger pin eyes must be parallel with the lower machined swing hanger surface within 0.8 mm (1/32").
3. The dimension from the centerline of the swing hanger to the vertical centerline of each pin eye must be 331.8 mm (13-1/16") + 1.6 mm (1/16") - 0.8 mm (1/32").
4. The swing hanger width at the machine faces of the pin eye may not be worn more than 0.8 mm (1/32"). In some instances a groove may be worn in this machined face by the truck frame bushing working out of place. This groove should not exceed 1.6 mm (1/16").
5. If the swing hanger arms are skewed (not parallel to each other) or racked (parallel to each other but not perpendicular to the bottom machined swing hanger surface) beyond dimensional tolerance they must be scrapped.
6. If any indications of cracks are found, the swing hanger must be scrapped. Particular attention should be given to the two bottom corners of the swing hanger and the areas around the pin eye bushings when inspecting for cracks.
7. The area around the pin eyes should be carefully inspected for gouges. If there are any gouges extending to or starting at the outside surface of the eyes located in the "B" area, Fig. 34, or within the bore in area "A", the swing hanger must be scrapped.

Gouges which are present in areas other than those described above and are not more than 2.4 mm (3/32") deep or 12.7 mm (1/2") long are acceptable. It will be necessary to stress relieve the swing hanger prior to machining if oversize bushings are to be applied.

Stress relieve the swing hanger by heating in suitable furnace at 593° to 649° C (1100° to 1200° F) for a minimum period of 3 hours. Cool the swing hanger slowly in the furnace until the temperature is down to 204° C (400° F) then cool to ambient temperature outside the furnace.

8. If there are any gouges on the outside surface of the hanger pin eye that are greater than 0.25 mm (0.010") deep, they should be blended out by grinding. Thickness of the hanger pin eye wall must be at least 23.8 mm (15/16") after grinding or boring for oversize bushings.

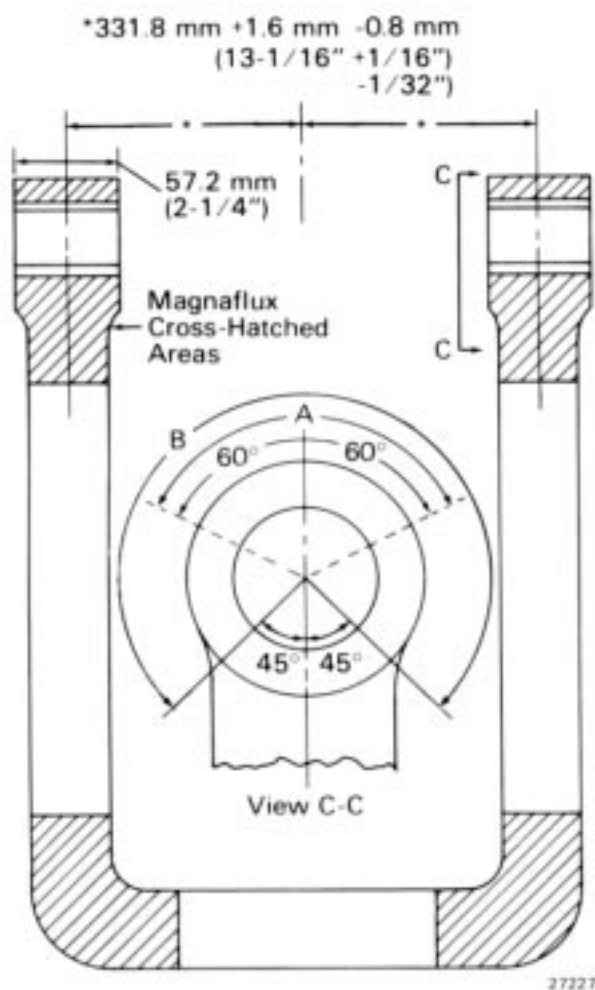


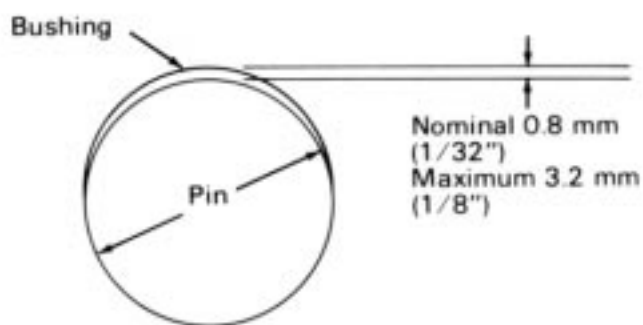
Fig.34 - Swing Hanger Wear Surfaces

When the swing hanger arms are bent in or out from the centerline they may be straightened by cold pressing to conform to the dimensions in Fig. 34. Any swing hanger which has been straightened must be Magnaflux inspected before being used in a truck assembly.

SWING HANGER PIN AND BUSHINGS

The clearance between the swing hanger pin and bushing should be checked before disassembly. The maximum wear on the pin and bushing is determined by the maximum clearance between the two parts as indicated in Fig. 35. The clearance between these parts, when they are new is 0.8 mm (1/32") and the maximum wear limit is 3.2 mm (1/8").

If the clearance between the pin and bushing is 3.2 mm (1/8") or more on either side of the swing hanger, all the pins and bushings must be removed and replaced with new parts. This includes both swing hanger bushings as well as both the frame lug bushings. New parts should not be used on one side



27481

Fig.35 - Swing Hanger Pin And Bushing Wear Limit

of the swing hanger and used parts on the other side, nor should new pins or bushings be mated with used pins or bushings.

If inspection was not performed before disassembly, the clearance can be checked by applying the pin to the bushing as in their normal operating position in the truck frame or swing hanger. If the clearance is more than 3.2 mm (1/8") in either case, replace the used parts with new parts.

If it is desirable to qualify the swing hanger components in the disassembled condition, the maximum pin limit is 55.12 mm (2.170"). The maximum limit for bushing 8102087 is 58.37 mm (2.298").

If the swing hanger bushings are to be replaced, the hanger pin eyes in the swing hanger must be 69.80 mm (2.748") +0.00 mm (0.000") -0.03 mm (0.001") to use standard bushing 8102087. If the eyes do not meet these requirements, the eyes should be enlarged to one of the following diameters to accept one of the oversize bushings.

<u>Diameter of bushing bore</u>	<u>Oversize bushing</u>
70.00 mm +0.00 mm -0.03 mm (2.756" +0.000" -0.001")	8309537
70.56 mm +0.00 mm -0.03 mm (2.778" +0.000" -0.001")	8309538
71.07 mm +0.00 mm -0.03 mm (2.798" +0.000" -0.001")	8309539

The bushing must have an interference press fit of 0.05 mm (0.002") to 0.10 mm (0.004") to prevent the bushing from working out. Caution should be taken

not to exceed the upper limit or a strain may be placed on the swing hanger eye which could cause the eye to fail in service.

BEARING BLOCKS

The clearance between the upper and lower halves of the bearing block should be checked before the truck is disassembled. If this measurement is less than 3.18 mm (1/8"), both halves of the bearing block should be replaced.

When qualifying the bearing blocks after the truck is disassembled, the nominal depth of the upper half at the point of contact with the lower half is 19.0 mm (3/4"). The maximum limit is 21.4 mm (27/32") as indicated in Fig. 36.

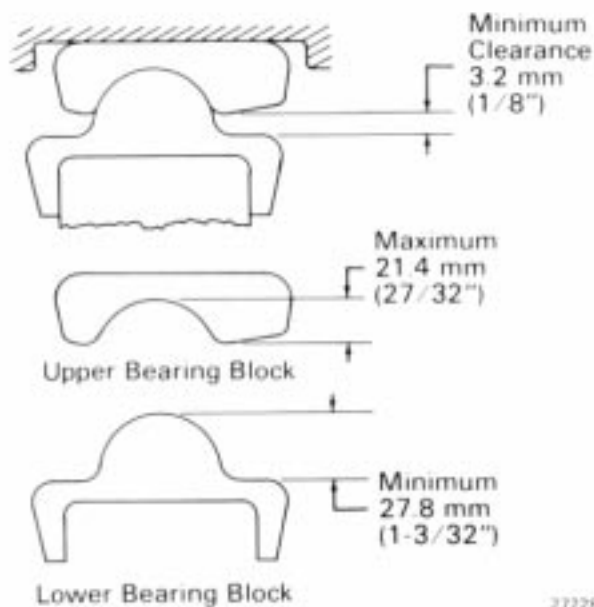


Fig.36 – Swing Hanger Bearing Block Wear Limits

The nominal height of the lower half crown is 30.2 mm (1-3/16"). The minimum limit is 27.8 mm (1-3/32").

SPRING PLANK

The spring planks should be cleaned by degreasing in a hot caustic solution. Remove excessive rust and scale to expose the surface to be inspected.

Inspect the spring planks for cracks, bent sections or excessively worn areas. If possible cracks are suspected the spring plank should be magnaflux inspected. Bent sections may be straightened hot or cold.

Cracks should be completely removed by grinding, flame cutting or carbon arc gouging before welding repair is made. If the defect is accessible for welding at both sides, a double "V" scarf weld should be made. If only one side of the defect is accessible, a single "V" groove having a root opening large enough to accept a 4.8 mm (3/16") back up plate should be provided. Scarf welds should equal a 60° included angle. During welding procedure the spring plank should be positioned to allow proper handling of the welding electrode and all welding should be in accordance with accepted welding standards.

SPRING PLANK SAFETY STRAPS

Safety straps are used to prevent the spring plank from dropping on the tracks in the event of a swing hanger failure.

Inspect all safety straps for signs of damage which might lead to a strap failure if the spring hanger load should be imposed upon the safety strap. Also check to see that the load would be carried by the safety strap lips and not the holding bolts. If straps are bent they should be cold straightened before they are reused.

There should be at least 9.5 mm (3/8") clearance between the safety strap and the spring plank. Check for worn swing hanger assembly parts or add a shim between the spring plank and bearing block.

Check the truck to see that there is a clearance between the slack adjuster hinge lock and the safety strap. If a current model slack adjuster is used with an old style safety strap, the safety strap sides will have to be bent inward 4.8 mm (3/16") ± 1.6 mm (1/16") as shown in Fig. 37 to clear the slack adjuster hinge lock.

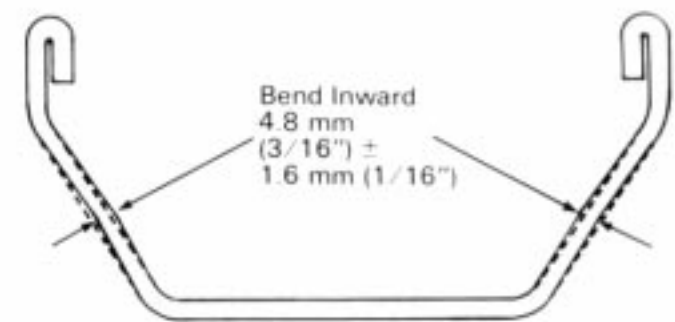


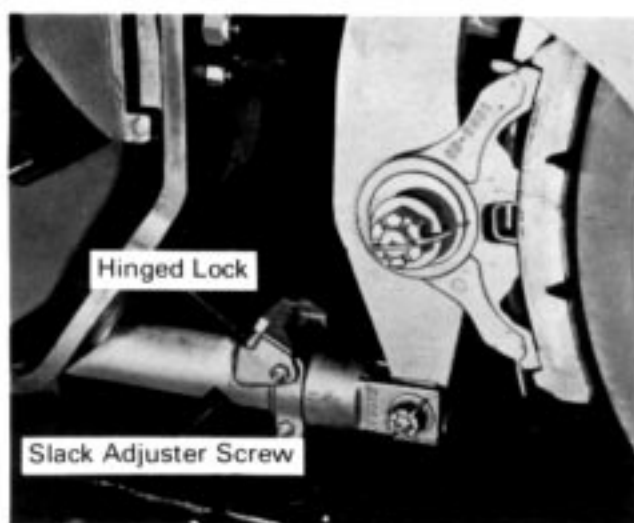
Fig.37 – Safety Strap Modification

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.

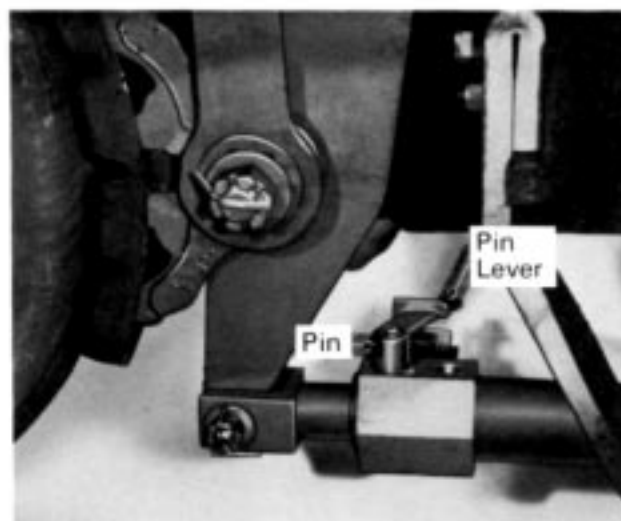
Screw type and pin type brake shoe slack adjusters are available. Adjustment of the screw type slack adjuster, Fig. 38, can be made by raising the hinged lock and turning the slack adjuster screw until both brake shoes clear the wheels by 9.5 mm (3/8"). Brake cylinder piston travel should be 60.3 mm (2-3/8").



17833

Fig.38 – Screw Type Brake Shoe Slack Adjustment

To adjust the pin type slack adjuster, Fig. 39 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 the 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.



17834

Fig.39 – Pin Type brake Shoe Slack Adjustment

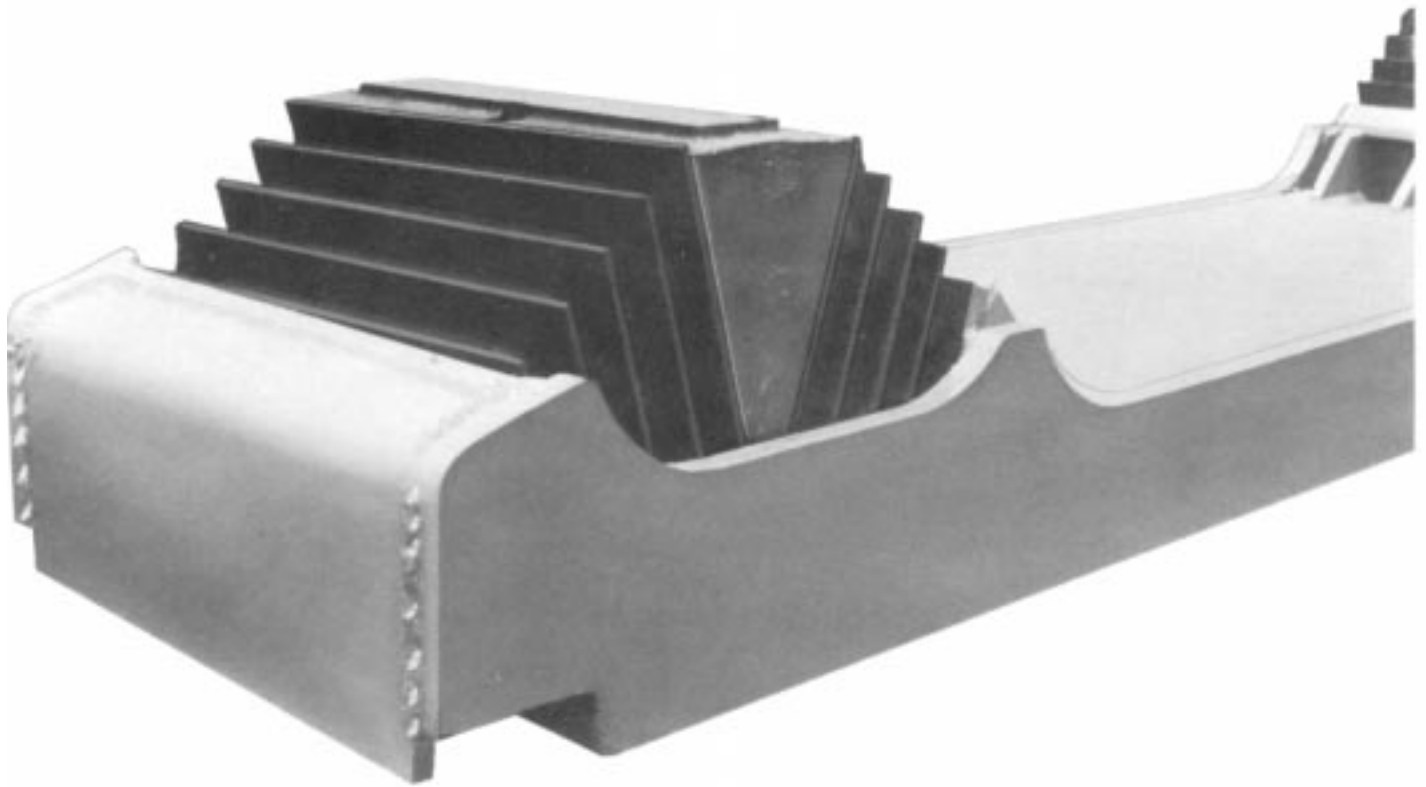
ASSEMBLY OF TRUCK

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 while in the upright position.

PROCEDURE A

1. With the truck frame inverted, install coil springs, spring seats, and shims. Referring to the Pedestal Liner Application section, install pedestal liners.
2. Install the inverted bolster into its proper place between the frame transoms.
3. The spring plank assembly should be built up prior to assembly into truck frame Fig. 40. Install inclined rubber springs and spring adapters on the spring plank. Use long bolts and keeper plates to hold inclined rubber springs and adapters to the spring plank. Install spring plank onto inverted bolster.

Since the the inclined rubber springs and adapters are not bolted in, it will be required during assembly to hold down these parts when the spring plank is inverted. For convenience two tapped 3/4-10 holes are provided in the bottom side of the wedge adapter. Long bolts with a keeper plate inserted through the holes in the bottom of the spring plank can be screwed into the adapter to hold the rubber springs and adapter in place until positioned into the truck.



27222

Fig.40 - Spring Plank Buildup

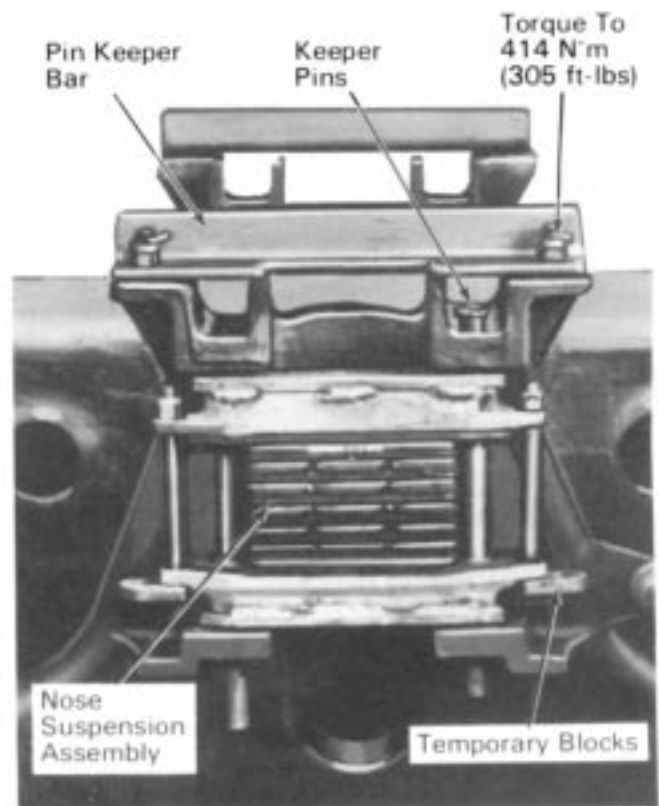
The use of shims 9519787 should be used with each rubber spring pad to compensate for set and drift and to prevent premature height adjustments before the next major truck overhaul. When above shims are used they should be placed on each side of spring adapters and on both sides of the spring plank, for a total of four shims per spring plank.

4. Install the traction motor nose suspension assembly in place between the frame lugs, Fig. 41. Compress the suspension pack assembly by placing temporary blocks under the nose suspension assembly bolt heads and tightening the bolts. Install the suspension pack keeper pins and pin keeper bar.
5. Install safety straps and place upper and lower swing hanger bearing blocks in place on the spring plank.

NOTE

The wider portion of the upper bearing block should be on the inboard side.

6. Set swing hanger over bearing blocks and align the swing hanger pin holes with the truck frame boss pin holes. It may be necessary to slightly preload rubber springs to align holes. Insert the swing hanger pins. Wire the swing hanger to

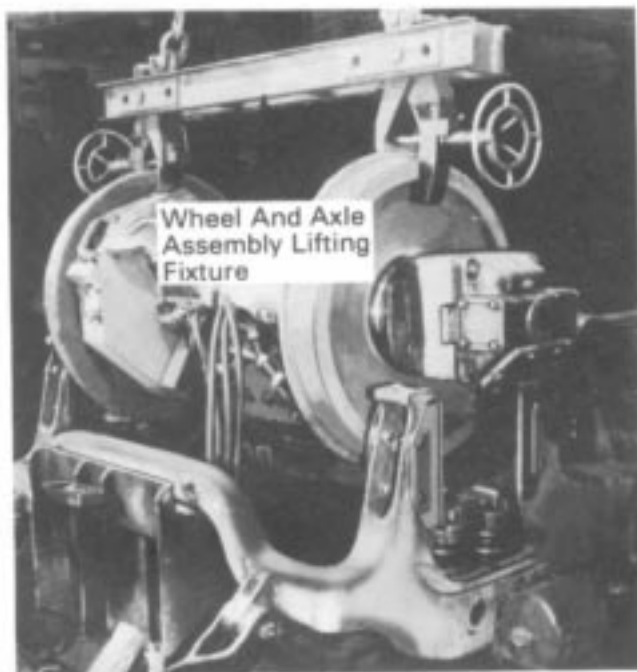


27223

Fig.41 - Traction Motor Nose Suspension Application, Inverted View

safety strap so that swing hanger remains in place over the bearing blocks.

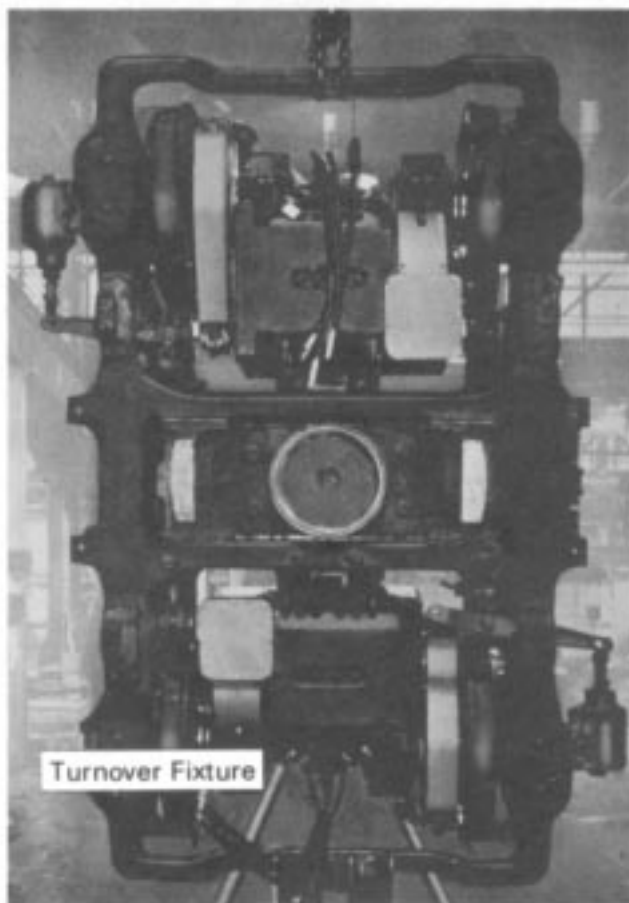
7. Remove long bolts and keeper plates holding inclined rubber springs and adapters in place while bolster was inverted.
8. Install brake levers in place, leaning them back to provide enough clearance for the wheel and axle assemblies to be installed.
9. Install pre-assembled wheel, axle and motor assemblies in place by lifting the assembly with a lifting fixture similar to the one in Fig. 42 and lowering between the truck frame pedestals until the journal boxes rest on the coil spring seats. Remove temporary blocks from traction motor nose suspension assembly.



24099

Fig.42 – Installation Of Wheel And Axle Assembly

10. Install slack adjuster, slack adjuster guides, pedestal tie bars, and sander guide assemblies and bolt down firmly.
11. Turn the truck assembly over on its wheels by attaching a cable or chain to the end sill opposite the one resting on the turnover fixture and lifting as shown in Fig. 43 until the whole truck assembly rotates end over end 180° and is setting on its wheels. Remove the lifting cable and attach it to the end sill resting on the turnover fixture so that end of the truck can be raised enough to be removed from the fixture.



18934

Fig.43 – Turning Over Truck Assembly

12. Remove wires tying swing hangers to safety straps. Install air brake piping, brake cylinders, brake cylinder levers, and shock absorbers.
13. Install center bearing wear plate and wear half rings. Refer to Center Bearing Wear Plate And Half Rings section 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 the Lubrication section.

PROCEDURE B

1. Install coil springs, spring seats, and shims. Referring to Pedestal Liner Application section, install pedestal liners.
2. Buildup spring plank as shown in Fig. 40. Install inclined rubber springs and spring adapters on the spring plank. Use long bolts and keeper plates to hold inclined rubber springs and adapters to the spring plank. Install spring plank onto inverted bolster.

Since the inclined rubber springs and adapters are not bolted in, it will be required during assembly to hold down these parts when the spring plank is inverted. For convenience two tapped 3/4-10 holes are provided in the bottom side of the wedge adapter. Long bolts with a keeper plate inserted through the holes in the bottom of the spring plank can be screwed into the adapter to hold the rubber springs and adapter in place until positioned into the truck.

The use of shims 9519787 should be used with each rubber spring pad to compensate for set and drift and to prevent premature height adjustments before the next major truck overhaul. When above shims are used they should be placed on each side of spring adapters and on both sides of the spring plank, for a total of four shims per spring plank.

3. Place spring plank assembly on jacks. Space the wheel and axle assemblies next to the bolster so that when the truck frame is lifted it can be placed over the assemblies.

Position bolster assembly onto the spring plank.

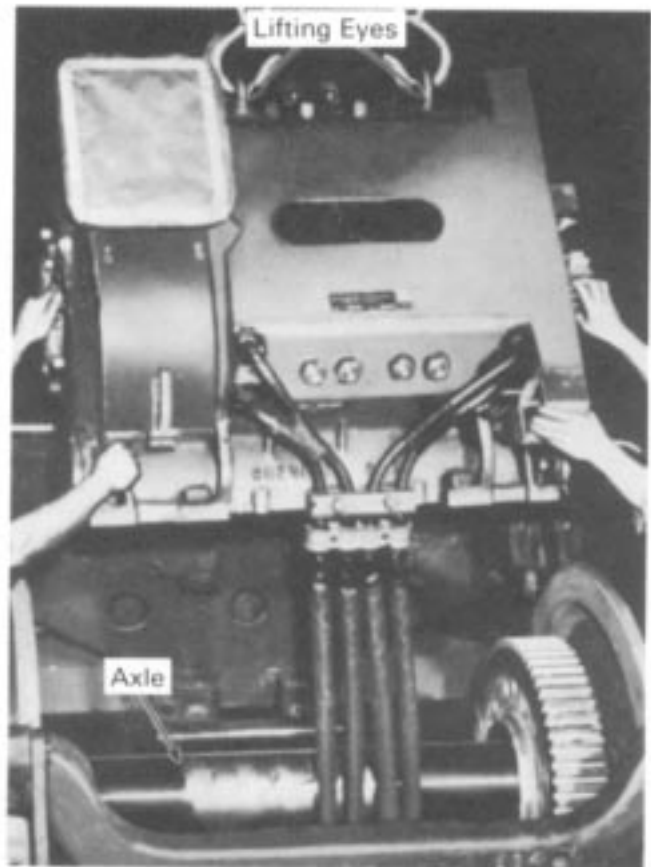
4. Lift truck frame and lower it over the bolster and the wheel and axle assemblies. Install coil springs, spring seats, shims, and pedestal tie bars. Torque bolts to 617 N·m (455 ft-lbs).
5. Compress rubber bolster springs slightly using the jacks under the spring plank. Install upper and lower swing hanger bearing blocks at each spring plank end. While holding the swing hanger in place jack spring plank until swing hanger pin holes are aligned with the truck frame boss pin holes.

6. Insert swing hanger pins. Lower and remove jacks and install spring plank safety straps and swing hanger pin spacers.

Remove long bolts and keeper plates holding inclined rubber springs and adapters in place.

7. 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 nose suspension assembly.
8. Connect lifting hoist to lifting eyes at nose suspension side of traction motor.

9. Hoist motor and place lower lip of support bearing on top of axle, Fig. 44. 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.



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Fig.44 – Installing Traction Motor Assembly, Typical

10. Install traction motor gear case, outer bearing half, axle guard, support bearing caps and dust guards.
11. Install center bearing wear plate and wear half rings. Refer to Center Bearing Wear Plate And Wear Half Rings section 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 under the Lubrication section.
12. Install brake rigging, piping, brake cylinders and sander guide assemblies.

SERVICE DATA

REFERENCES

Coil, Elliptic, And Rubber Truck Spring Qualification And Replacement	M.I. 1503
Wheels, Axles, Axle Gears And Pinions	M.I. 1518
New Departure-Hyatt Journal Boxes With Resilient Thrust Units	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 41089
Pinion Protector	8054871

File Drawings

Turnover Fixture	File 250
Lifting Fixture (traction motor, wheel and axle assembly)	File 288
Tram Marking Tool	File 615
Liner Pressing Tool	File 649

NOTE

File Drawings And Work Sketches can be obtained by contacting Electro-Motive Division Service Department, La Grange, Illinois 60525.

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