M.I. 1508 *REV. A

Maintenance Instruction

Service Department

ELECTRO-MOTIVE

GLC LOCOMOTIVE TRUCK ASSEMBLY

DESCRIPTION

The model GLC trucks 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 axles which in turn apply force to the rail through the wheels. The driving force is transmitted through the axle journal bearing adapters to the truck frame and through truck frame pressure areas to mating pressure areas on the truck bolster. The bolster then transmits the force through its center bearing to the carbody center bearing to provide the locomotive tractive effort.

The locomotive carbody weight is applied at the bolster center bearing. The "H" design bolster is supported at each of its four corners by a truck frame mounted rubber pad. The four corners of the bolster are held between upright pedestals which are an integral part of the frame. This bolster and pedestal arrangement serves to transmit force from

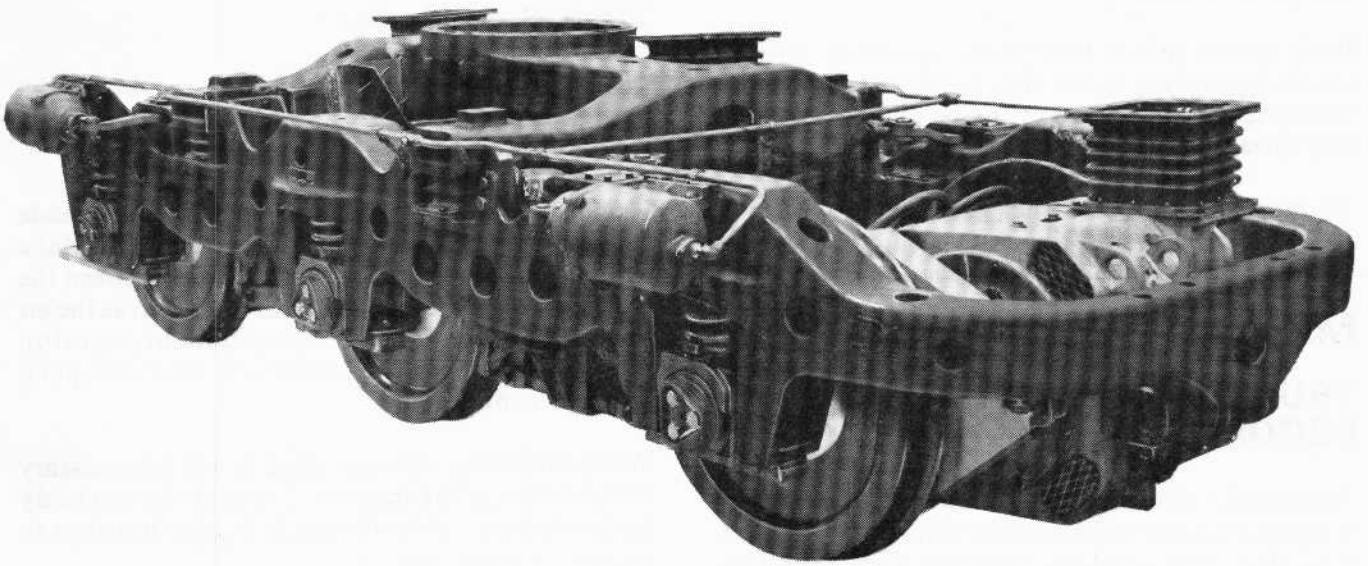

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Fig.1 – GLC Truck Assembly

*This bulletin is revised and supersedes previous issues of this number.
▌ Areas of change are indicated by vertical bars.

the bolster to the frame or the frame to the bolster. Stops are provided on the bolster which may contact the inboard side of the bolster stops on the frame, to limit the bolster side movement.

The main frame of the truck is supported on coil springs above each bearing adapter.

The bearing adapter transmits the load directly from the springs to the axle. Each adapter is held between two pedestal jaws, which are an integral part of the truck frame. Each pair of pedestals is joined at the bottom by a pedestal tie bar. Renewable pedestal wear plates and journal box wear plates provide control of clearances between the pedestals and bearing adapters.

Current model trucks have a heavy duty shock absorber mounted between the truck frame and each center journal bearing to damp excessive vertical and rolling oscillations of the truck frame.

The three traction motors are supported on their respective drive axles and at suspension assemblies mounted on truck frame lugs. This arrangement provides good motor accessibility and good wheel adhesion characteristics.

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 brake shoe at each wheel.

Basic trucks utilize four brake cylinders, two of which operate the brake shoe at individual wheels, while the remaining two cylinders operate shoes at two wheels.

Upon special order, the truck may be equipped with six brake cylinders. In this case, each brake shoe is operated by its own brake cylinder.

MAINTENANCE

TRUCK CLEANING UNDER LOCOMOTIVE

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.

CAUTION

When cleaning trucks under the locomotive, the engine should be running to supply air under pressure to the traction motors. Air discharged from the motors will help prevent overspray from entering the motors. Care should be exercised to direct spray away from any motor openings.

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.

LUBRICATION

No periodic lubrication is required on the truck assembly, however, if the truck is equipped with screw-type brake shoe slack adjusters, the adjuster threads should be lubricated, if found to be dry.

The center bearing should have enough oil added at the time a unit is trucked to cover the center bearing wear plate by 1.6 mm (1/16").

No lubrication is required on bearing adapter or pedestal jaw wear surfaces. Special care should be taken to keep bolster and transom rubbing surfaces free of oil or grease.

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.

Remove the safety links before any attempt is made to raise the locomotive for truck removal. Make sure that all other physical connections between the trucks and carbody are disconnected, such as the air brake equipment, sanding equipment, traction motor cables, hand brake chain and the speed recorder connection.

When removing only one truck it will be necessary to raise the entire locomotive until the carbody center bearings clear the truck bolster bearings to prevent bearing damage.

When jacks are used to raise the locomotive, ensure that all jacks are raised equal amounts. Unequal jacking may cause the carbody to be sprung out of shape. The locomotive should be supported on blocking located under the center sills near the jacking pads.

CAUTION

If the locomotive is equipped with interbogie control, place a block of wood between the truck and the underframe at the left-front and right-rear corners of the locomotive.

TANK IMMERSION CLEANING OF TRUCKS

When the truck assembly is removed from the locomotive, the traction motors, wheels, gears, axles, shock absorbers, bearing adapters, rubber suspension pads, phenolic or composition wear plates, and brake cylinders 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 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.

If the truck is equipped with screw-type brake shoe slack adjusters, the adjuster threads should be lubricated immediately to prevent seizing.

SHOCK ABSORBERS

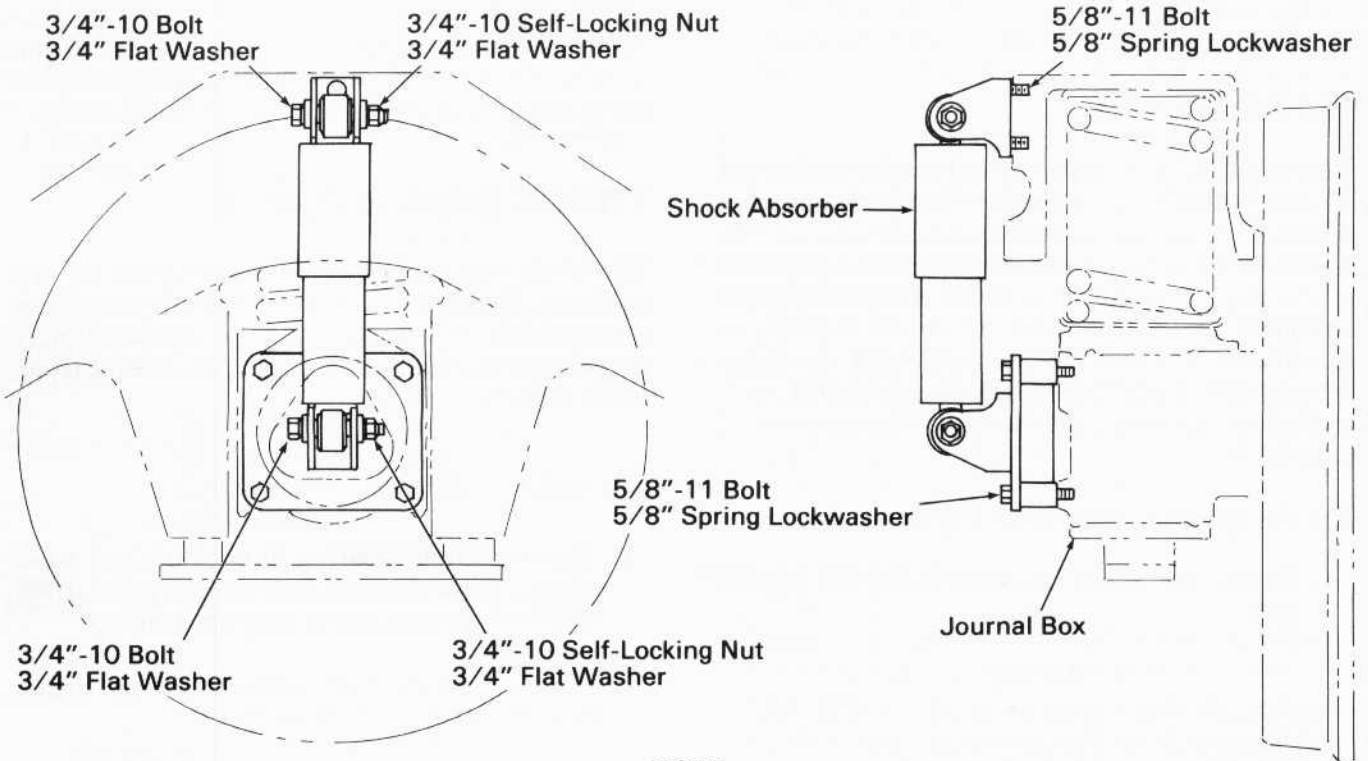
Current model trucks are equipped with vertical shock absorbers, Fig. 2, as basic equipment.

There is rarely a partial failure of a shock absorber. When the shock absorbers fails, there is no resistance to movement in compression or in rebound, or in both directions. A simple check of the shock absorber 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.



NOTE
Torque: 3/4"-10 bolts to 366 N·m (270 ft-lbs)
5/8"-11 bolts to 203 N·m (150 ft-lbs)

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Fig.2 – Shock Absorber Installation

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.

Use the following steps to qualify shock absorbers.

1. Unbolt the shock absorber from the journal box.

NOTE

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 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. 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).

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 is available (at no charge) from EMD Service Publication Department. The work sketch includes construction details of the fixture that can be manufactured by the Customer.

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.

TRUCK DISASSEMBLY

The truck may be disassembled 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 disassemble the truck while in the upright position.

PROCEDURE A

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 and piping from truck.

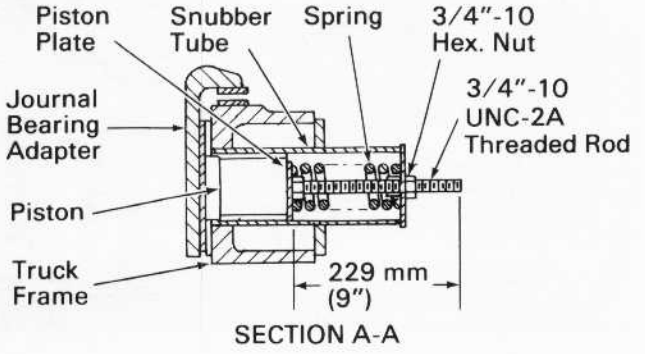
NOTE

Brake rigging can more readily be removed with the truck in the inverted position.

3. Remove bolster from truck frame and unbolt rubber suspension pads.

4. Using an overhead crane of sufficient capacity, turn truck over. Refer to Service Data for file drawing available to fabricate turnover fixture.

5. If unit is equipped with friction snubber assemblies, retract friction snubber pistons located at the middle axle assembly, Fig. 3. To retract snubber pistons, insert a 3/4"-10 UNC–2A threaded rod approximately 230 mm (9") long into small hole in end of snubber tube. Thread rod into end of snubber piston plate. Thread a 3/4"-10 nut onto rod and tighten until snubber piston is retracted.



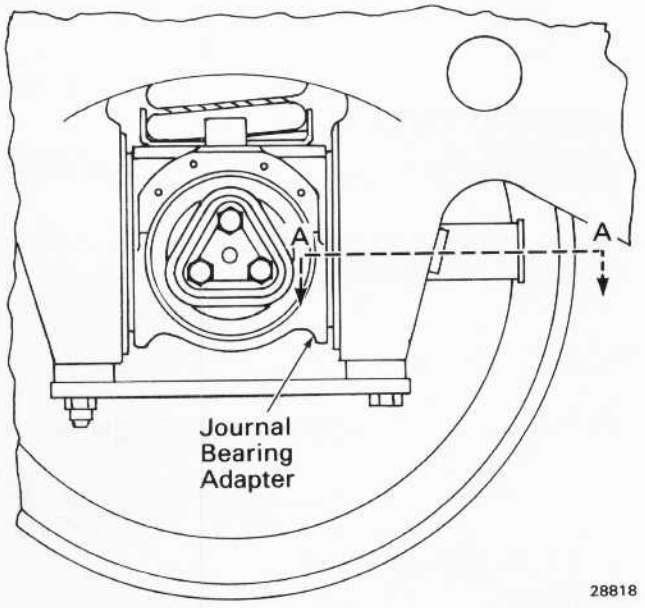


Fig.3 – Friction Snubber Retraction

6. Remove shock absorbers. 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. 4. Refer to Service Data for file drawing available to fabricate lifting fixture.

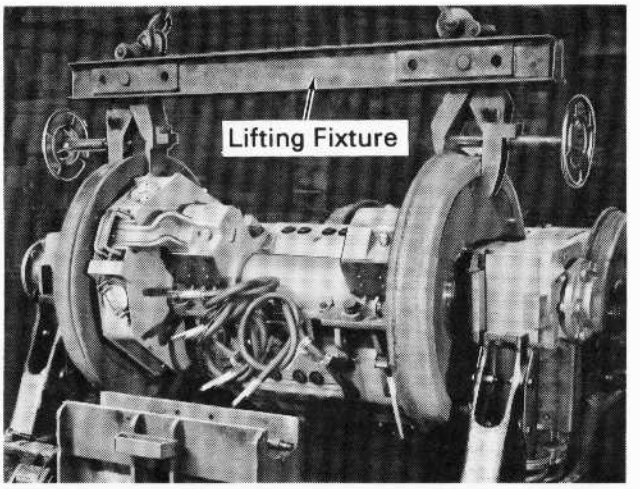


Fig.4 – Removal Of Wheel, Axle, And Motor Assembly

7. Remove coil springs, shims, traction motors nose suspension assemblies, brake rigging, and any remaining smaller parts of the truck as desired.

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 bolster from truck frame and unbolt rubber suspension pads.

4. Remove traction motor gear case bolts and clips. Remove each half of gear case.

5. Remove dust guards, air ducts, traction motor support bearing caps, axle guard, and outer bearing half.

6. Apply lifting chains to bails at nose suspension side of traction motor. Connect lifting hoist to chains.

7. Remove traction motor suspension pin keeper bar to allow pins to drop down.

8. Lift motor slightly to compress rubber nose pack of traction motor suspension. With the suspension assembly compressed, insert temporary blocks about 19 mm (3/4") thick between the nose pack holder and mounting bolts as shown in Fig. 5.

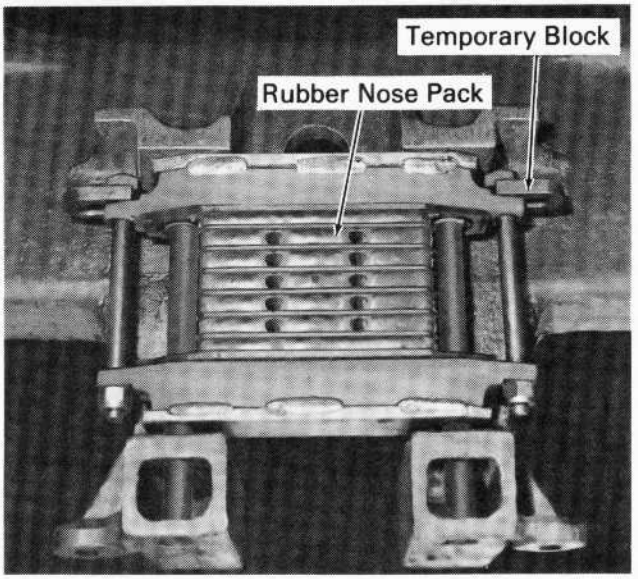


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Fig.5 – Compressing Nose Suspension Assembly

9. Lower motor a small amount to free nose suspension assembly. Remove suspension assembly from truck frame.

CAUTION

Use care in lifting the motor so the support bearings will not fall and be damaged. A pinion protector should be applied to prevent damage to pinion after motor is removed.

10. Hoist motor and allow it to rotate on the axle until the lower lip of the support bearing will clear the axle, Fig. 6. The motor assembly may now be lifted clear of the axle.

11. If unit is equipped with friction snubber assembly, retract friction snubber pistons located at the middle axle assembly, Section A-A of Fig. 3. To retract snubber pistons, insert a 3/4"-10 UNC–2A threaded rod approximately 230 mm (9") long into small hole in end of snubber tube. Thread rod into end of snubber piston plate. Thread a 3/4"-10 nut onto rod and tighten until snubber piston is retracted.

WARNING

Remain clear of truck while lifting frame from wheel and axle assemblies, as the coil springs are not secured.

12. Remove shock absorbers. Remove pedestal tie bars. Lift truck frame from wheel and axle assemblies.

13. Remove coil springs, shims, and any remaining smaller parts of the truck as desired.

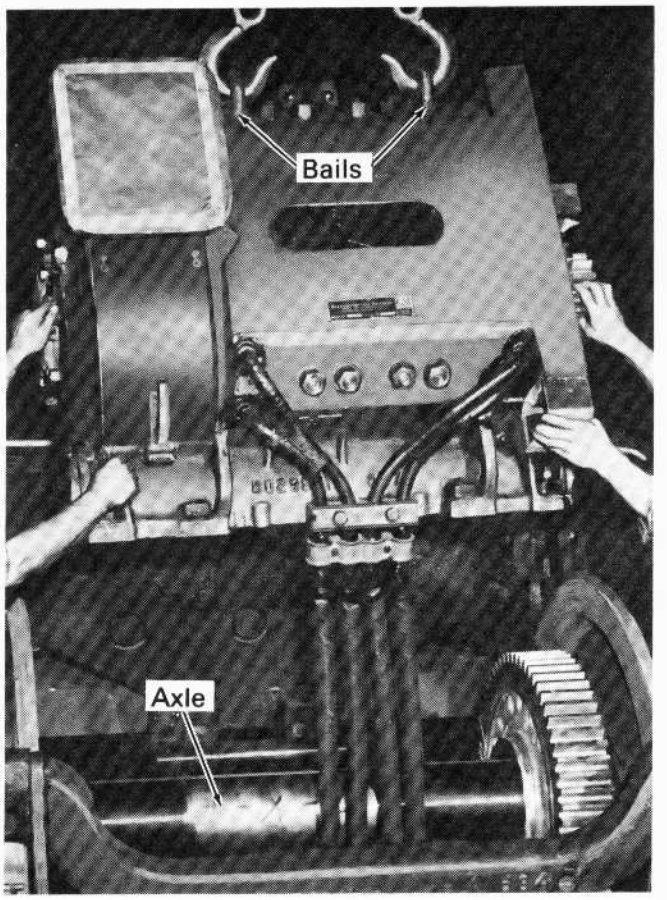

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Fig.6 – Removing Traction Motor From Truck

INSPECTION AND RECONDITIONING

Make a thorough inspection of the truck frame and bolster for the following items and recondition if necessary.

TRUCK FRAME

BROKEN OR CRACKED MEMBERS

Inspect entire truck frame for breaks or cracks. Perform magnetic particle inspection at any areas suspected of being cracked.

Breaks or cracks must be repaired by welding with AWS E-7016 electrode. If the broken section can be removed or straightened, it is permissible to weld it back into place after preparing the joint to obtain a 100% section of weld with reinforcement as shown in Fig. 7.

Broken cast sections may be duplicated with a like shape made from MS-4361 steel, and welded to the truck frame.

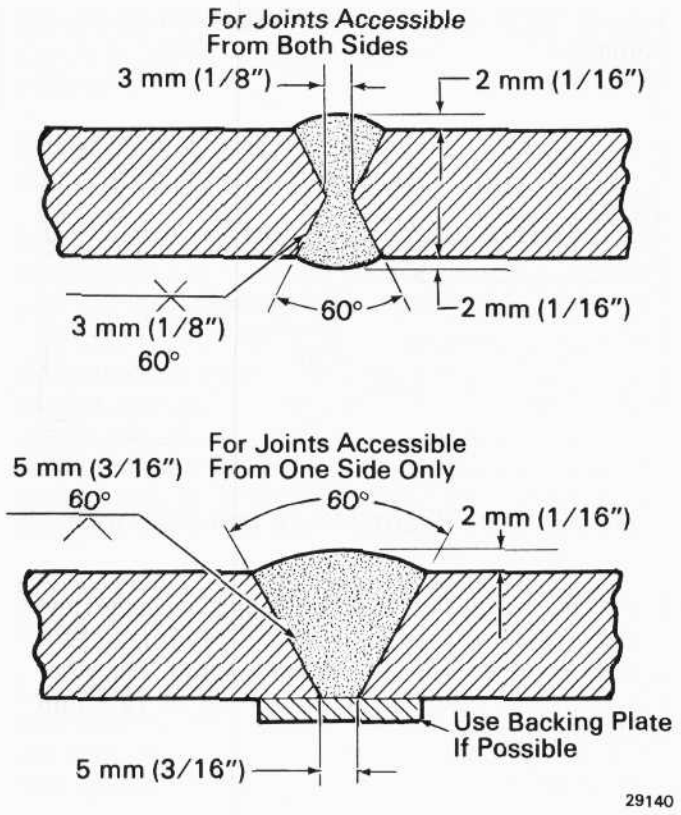


Fig.7 – Preparing Joints For Welding

All welds made on broken or cracked sections should be magnetic particle inspected after welds have cooled to below 204° C (400° F).

BENT SECTIONS

Bent sections may be straightened either cold or after the application of heat. Before straightening any bent section, determine what effect it will have on the adjoining sections. Jacks, turnbuckles or fixtures designed for straightening members will expedite the straightening of bent sections.

WORN SPOTS

The truck frame should be thoroughly checked for worn spots in areas normally not subject to wear. For example, loose brake levers may wear the clevis slots through which they are pinned. Also, excessive wear on the spring seats may necessitate their reconditioning or replacement.

Worn spots can be repaired by building up the affected area with weld using an AWS E-7016 electrode. 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, pins, sleeves or bushings, should be brought back to normal size as determined by comparison with similar locations on a truck in good condition. The holes should not be worn more than 1 mm (3/64") on the radius of the supporting side or 2.5 mm (3/32") on the diameter.

Holes which are beyond the above tolerances 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 overside to permit proper access for the electrode. The hole should be redrilled to proper size after completion of the welding.

WORN BUSHINGS

Bushings worn 2.5 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.

BOLSTER

The bolster, Fig. 8, 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. A neoprene rubber dust guard, Fig. 9, clamps over the truck center casting and rides against the underframe to prevent dust and dirt from entering the center bearing.

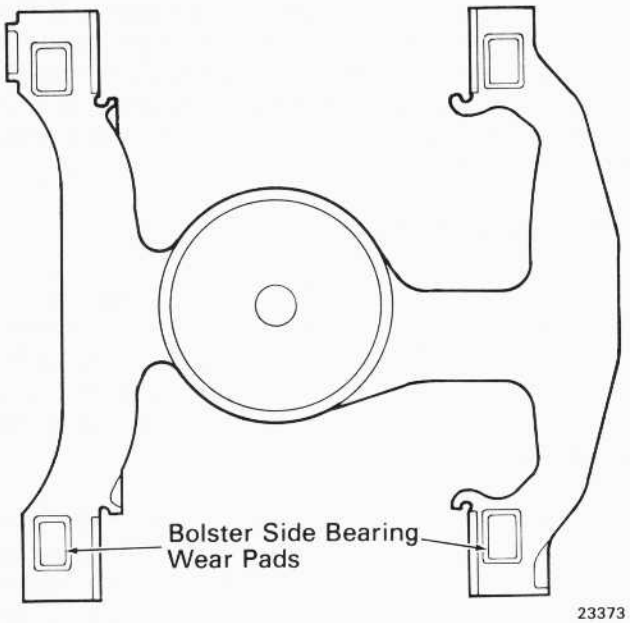


Fig.8 – Bolster Assembly

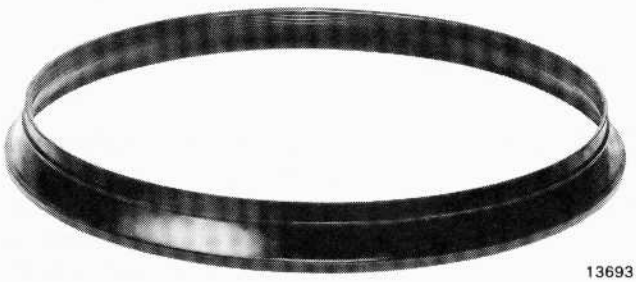


Fig.9 – Center Bearing Dust Guard

SIDE BEARING WEAR PADS

The side bearing surfaces on the bolster are designed to mate with similar side bearings mounted beneath the carbody underframe as indicated in Fig. 10.

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. On a new assembly, clearance at any one pair of side

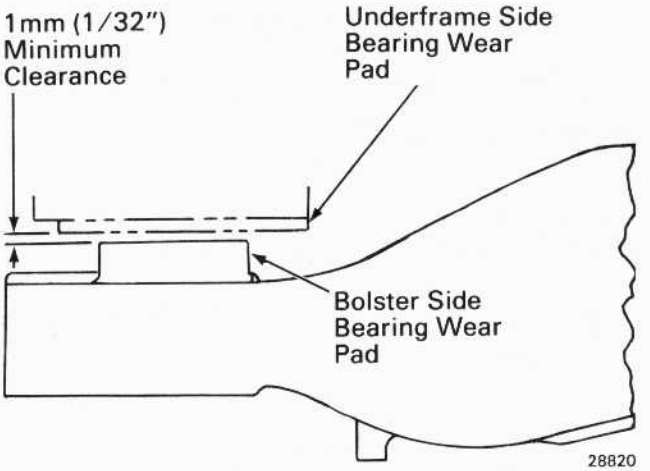


Fig.10 – Side Bearing Wear Pad Clearance

bearing wear pads across the locomotive centerline or diagonally opposite should be 4 mm (5/32") minimum to 10.5 mm (13/32") maximum. The other pair can be 4 mm (5/32") minimum to 12.5 mm (1/2") maximum.

Any time the side bearing clearance approaches the minimum limit, Fig. 10, the bolster center bearing wear plate should be checked for wear. The side bearing wear pads should be flat and in the same plane within 1 mm (1/32") as the side bearing wear pad on the opposite side of the truck. If wear pad is misaligned or is uneven, it may be repaired by building up the surface with weld and grinding to proper level.

A worn side bearing wear pad can be removed by grinding off the fillet welds around the pad. New wear pads should be made of mild steel with the thickness depending on the thickness required to give proper clearance.

BOLSTER WEAR PLATES

Nylatron wear plates, Fig. 12, are bolted to the truck frame-to-bolster contact surfaces to provide an easily replaceable mating surface with the bolster faces. If clearance between these surfaces exceeds the limits shown in Fig. 11, the wear plates must be replaced. Maximum total side clearance between the truck frame and bolster must not exceed 9.5 mm (3/8") or 5 mm (3/16") on each side. The wear plates should be replaced in pairs or complete truck sets so the total clearance on one side of the truck is not more than 1.5 mm (1/16") greater than on the opposite side.

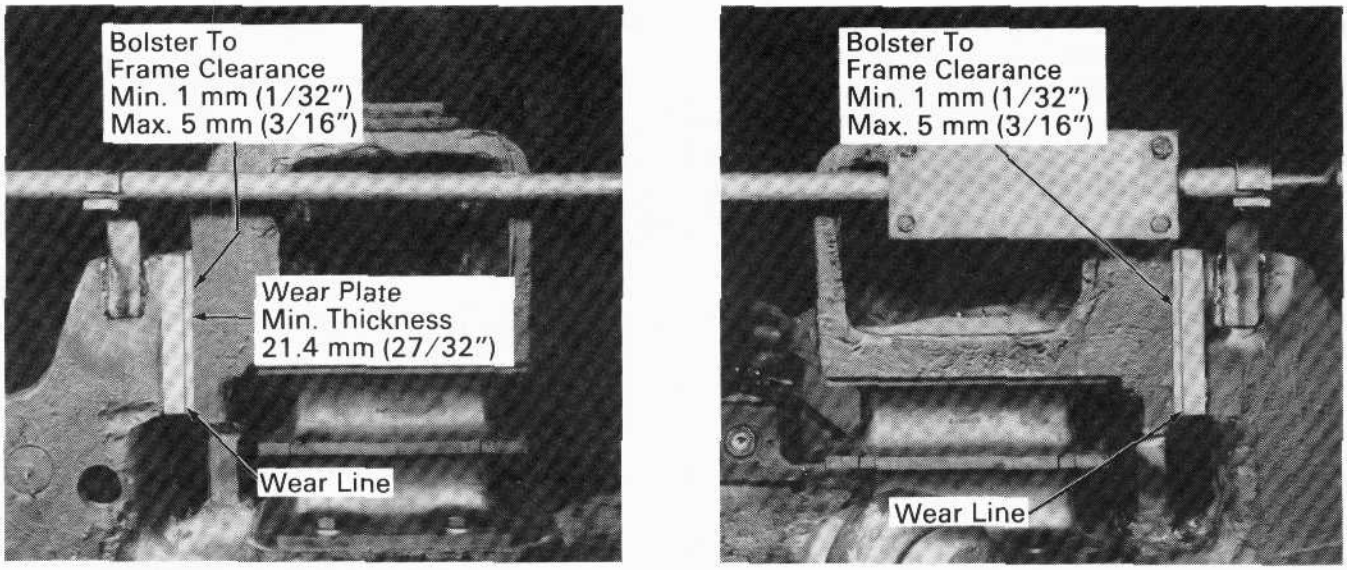


Fig.11 – Bolster-To-Frame Clearance

The wear plates are bolted to the truck frame with *5/8"-11 bolts and lockwashers, Fig. 12. Torque* bolts to 176 N·m (130 ft-lbs).

A wear line is located 6 mm (1/4") from the outer surface of the wear plate to help determine the amount of wear on the wear plate without measuring.

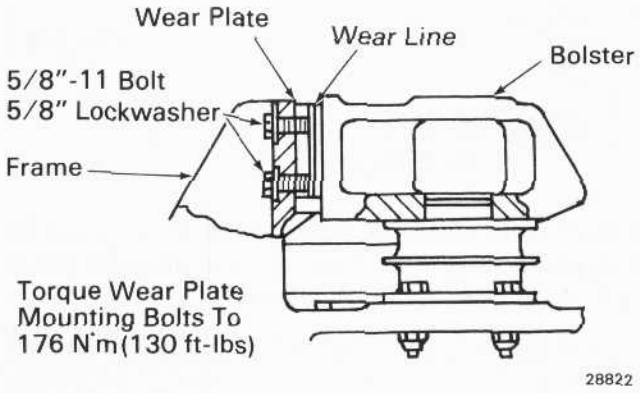


Fig.12 – Bolster-To-Frame Wear Plate

CENTER BEARING WEAR PLATE AND WEAR HALF-RING

The center bearing on each truck, supports half the weight of the locomotive. Also, the center bearing transfers tractive force to the locomotive carbody. The load on these parts and the relative movement between them will cause the parts to wear.

Side bearing clearance 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. 13. The thickness of the plate should

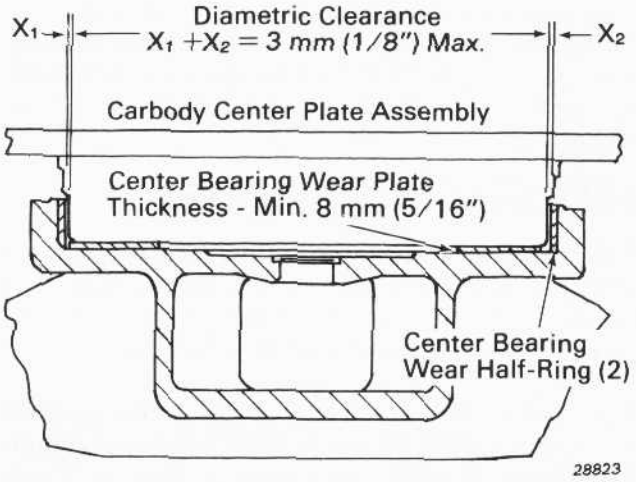


Fig.13 – Center Bearing Wear Plate And Wear Half-Ring Limits

be checked whenever the plate is accessible. If the plate thickness is above the minimum limit it may be used again. The truck center bearing wear plate may be used as long as it is not completely deteriorated or broken and as long as there is a positive clearance between the side bearings.

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 maximum clearance between these parts is 3 mm (1/8") as indicated in Fig. 13.

Center bearing wear plates and wear half-rings are made of 10 mm (3/8") thick laminated phenolic material or Nylatron.

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 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-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.

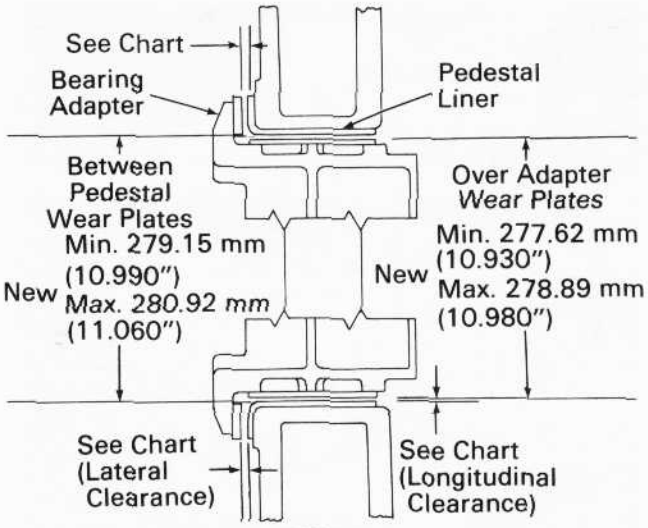
PEDESTAL WEAR PLATES

Pedestal wear plates and journal bearing adapter wear plates are provided to absorb the wear that occurs from the relative movement between the journal bearing adapter and the pedestals.

The dimension between new pedestal wear plates is a minimum of 279.15 mm (10.990") and a maximum 280.92 mm (11.060") as shown in Fig. 14. These dimensions provide for a maximum total longitudinal clearance of 3.3 mm (.130") or a minimum of 0.25 mm (.010") with new journal bearing adapter wear plates and new pedestal wear plates. The maximum total clearance limit is 6.4 mm (1/4"). The lateral clearance limits between the adapter lugs and the pedestal wear plates are shown in Fig. 14. If the dimensions or clearances are beyond the maximum limits, the wear plates should be replaced with new wear plates.

Worn pedestal wear plates can be removed by grinding or chipping off the welds. Care must be exercised to avoid gouging the pedestal. Any gouges should be welded and ground smooth before applying new plates.

The machined pedestal surface should be inspected and the flatness should be checked. This surface should be flat within 0.51 mm (.020"). If beyond this limit, the pedestal should be welded and re-machined.



***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 CLEARANCE	mm	(inch)
Standard Truck		
Lateral (Total)		
New	9.5	3/8
Max.	12.7	1/2
GT18MC And GT26 Locomotive Trucks		
Lateral (Total)		
New	6.4	1/4
Max.	9.5	3/8
All Trucks		
Longitudinal (Total)		
New	0.4 - 3.2	1/64 - 1/8
Max.	9.5*	3/8*

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Fig.14 – Journal Bearing Adapter To Pedestal Clearance

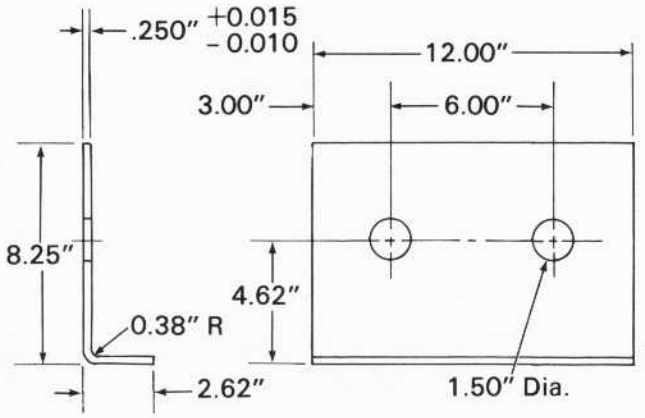
Ensure wear plates are fully annealed. This can be determined by checking with a magnet since annealed plates are non-magnetic.

To assemble new plates to the pedestal, tightly clamp the wear plates to the pedestal to obtain contact over at least 75% of the wear plate area. This can be checked with a thin feeler gauge around the wear plate perimeter. Ensure dimension between pedestal wear plates of Fig. 14 is maintained.

CAUTION

When welding the pedestal wear plates, use only one pass welding and do not weld over tack welds. Multiple pass welding and welding over tack welds will cause the wear plates to crack.

Pedestals prior to 1984 were equipped with lateral and longitudinal wear plates. The current pedestals are equipped with a one piece wear plate as shown in Fig. 15.



METRIC CONVERSION CHART			
(inch)	mm	(inch)	mm
0.010	0.25	3.00	76.2
0.015	0.38	4.62	117.3
0.38	9.6	6.00	152.4
1.50	38.1	8.25	209.6
2.50	63.5	12.00	304.8
2.62	66.6		

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Fig.15 – Pedestal Wear Plate

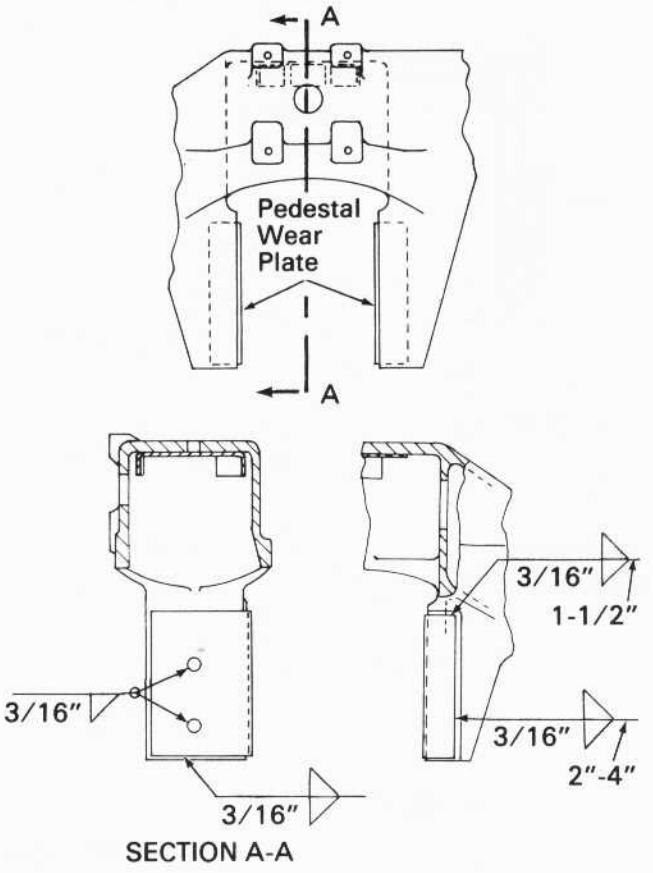
Weld the wear plates as shown in either Fig. 16 or Fig. 17, using AWS-E-Fe-Mn-A, E-308-16, or E-310-16 electrode. Weld the holes of the wear plate first to assure contact with the pedestal at the center.

JOURNAL BEARING ADAPTER

The cylindrical housing type journal bearing is contained in a journal bearing adapter which is held between the truck pedestal jaws.

The dimension over the journal bearing adapter wear plates is a minimum of 277.62 mm (10.930") and a maximum of 278.89 mm (10.980") as shown in Fig. 14. These dimensions provide for a maximum total longitudinal clearance 3.3 mm (.130") or a minimum of 0.25 mm (.010") with new journal bearing adapter wear plates and new pedestal wear plates. The maximum total clearance limit is 6.4 mm (1/4"). The lateral clearance limits between the adapter lugs and the pedestal wear plates are shown in Fig. 14. If the dimensions or clearances are beyond the maximum limits, the wear plates should be replaced with new wear plates.

Adapter wear plates which are cracked or worn beyond their limits should be replaced. The old wear plates can be removed by grinding or chipping off the welds securing the plates. The wear plates should not be removed by any form of flame cutting. Care should be taken not to damage the surface of the bearing adapter to which the new plates will be applied.



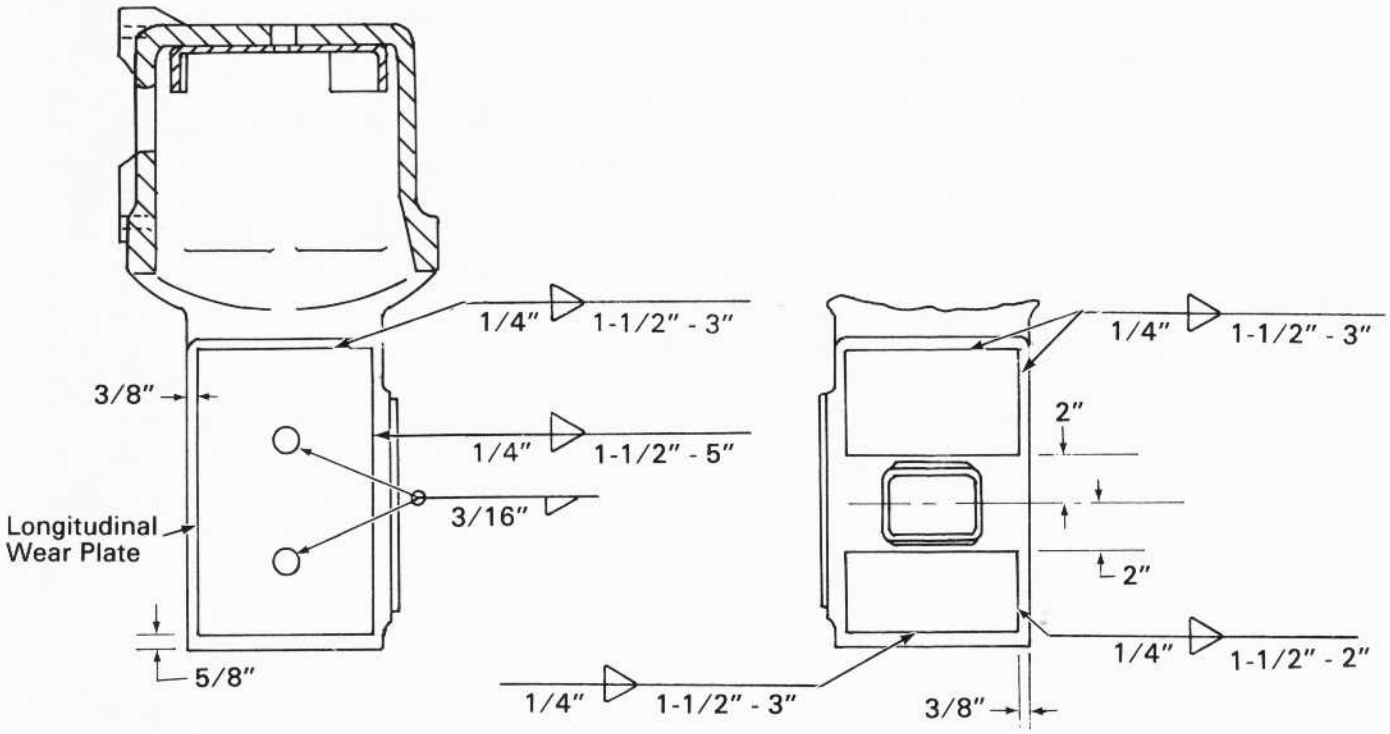
METRIC CONVERSION CHART	
(inch)	mm
3/16	5
1-1/2	38
2	51
4	102

28826

Fig.16 – Application Of Pedestal Wear Plates

The journal bearing should be removed from the adapter before applying new plates. The new wear plates may be positioned and welded to the pedestals as shown in Fig. 18. Welding electrode E-Fe-Mn-A, E-308-16, or E-310-16 is recommended to be used in wear plate application.

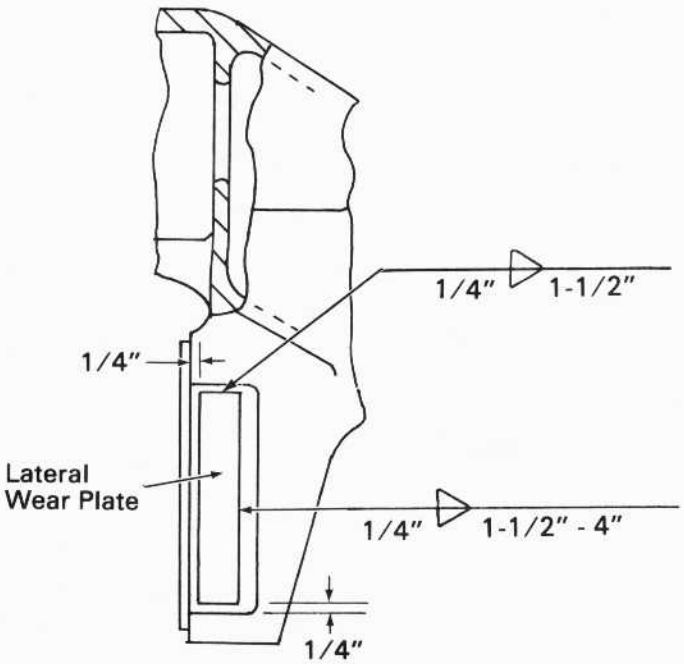
When applying wear plates that have holes provided for welding, apply the weld to the holes before welding the outer edges. This will help to ensure contact at the centers of the wear plates and prevent warping. Clamps should also be used to hold the wear plates tightly against the bearing adapter while they are being applied.



BASIC PEDESTAL

PEDESTAL WITH FRICTION SNUBBER

LONGITUDINAL WEAR PLATES

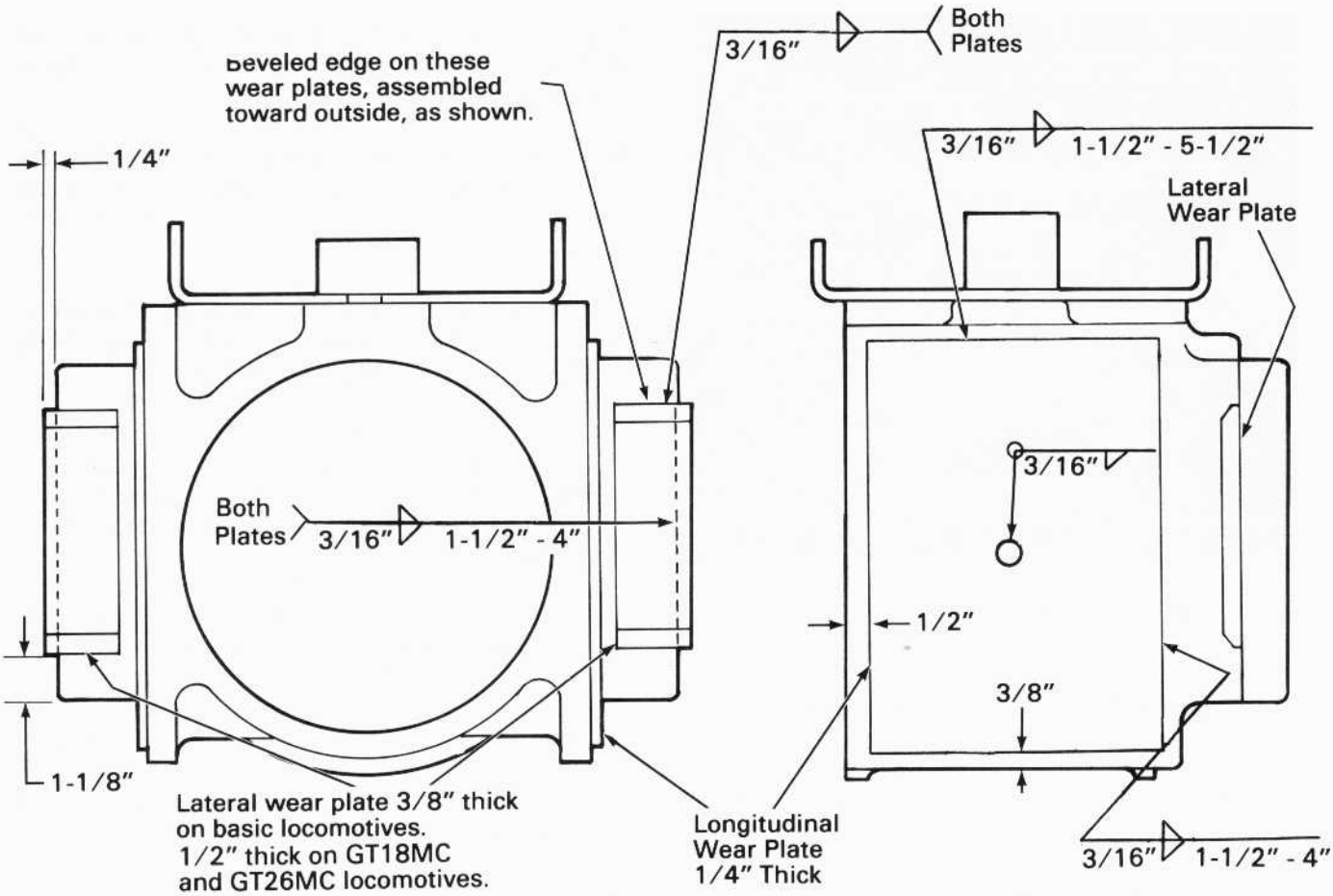


METRIC CONVERSION CHART			
(inch)	mm	(inch)	mm
3/16	5	1-1/2	38
1/4	6	2	51
3/8	9.5	2-1/2	64
5/8	16	3	76
1	25	4	102
1-1/4	32	5	127

LATERAL WEAR PLATES

28827

Fig.17 – Former Model (Prior To 1984) Pedestal Wear Plates



METRIC CONVERSION CHART			
(inch)	mm	(inch)	mm
3/16	5	1-1/8	29
1/4	6	1-1/2	38
3/8	9.5	4	102
1/2	12.5	5-1/2	140

28828

Fig. 18 – Application Of Journal Bearing Adapter Wear Plates

TRACTION MOTOR NOSE SUSPENSION

SUSPENSION PACKS

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 dampening rubber suspension pack which is mounted as shown in Fig. 19.

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 slip.

To obtain maximum cushioning effect from the suspension pack, wear plates should be periodically

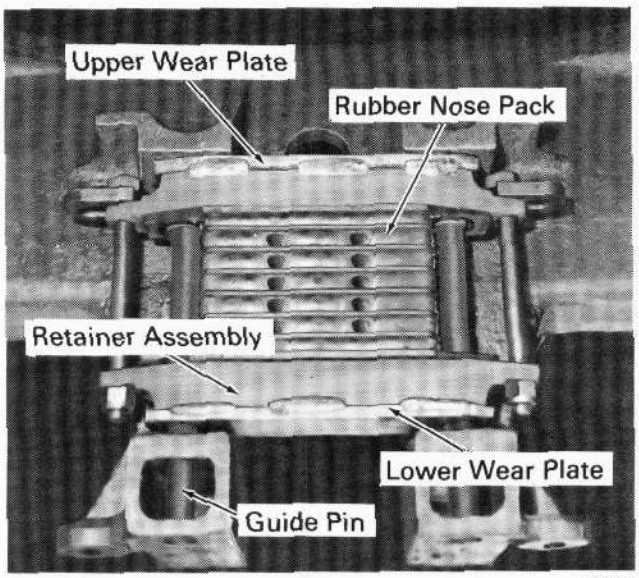


Fig.19 - Traction Motor Nose Suspension Assembly

replaced to ensure there is not more than 6 mm (1/4") free movement in the traction motor nose suspension. If the wear plates, which are 12.5 mm (1/2") thick when new, are worn enough to permit more than the 6 mm (1/4") free movement, or if the wear plates are worn more than the limits given in Fig. 20, 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 mm (7/16"). The lower wear plate may be moved to the upper position if it is still within the 10.5 mm (13/32") upper wear plate limit.

The old wear plate can be removed from the spring pack by grinding or chipping off the tack welds holding it. The new wear plate should conform to the dimensions of the original plate.

The steel wear plate should be applied to the suspension retainer with two 6 mm (1/4") fillet welds 114 mm (4-1/2") long. Use AWS E-7016 welding electrode.

MOTOR NOSE SUSPENSION WEAR PADS

The steel wear pads on the truck frame transom lugs that support the traction motor suspension assembly, are subject to wear due to the chafing of the traction motor suspension assembly. The dimension between these surfaces when new is 188.90 mm +0.51 -1.27 (7.437" +.020, -.050), Fig. 20. The wear pads should be replaced with new pads when the dimension between the surfaces is 192 mm (7-9/16").

Worn wear pads can be removed from the lugs by grinding or chipping. Any gouges in the lugs should be welded and ground smooth before applying new wear pads.

Check guide pin holes in the frame lugs. If the holes are worn or elongated by 2.4 mm (3/32") or more, the holes should be reworked as follows:

NOTE

If it is not desired to bush the upper holes as outlined in Steps 1 and 2, the elongated holes should be welded and re-drilled to 20 mm (25/32").

1. The upper holes should be built up with weld and drilled and reamed to 24.99 mm +000 -0.05 (.984" +000 -.002).

2. Insert spring bushing 9550451 with 20 mm (.787") inside diameter into this hole to provide a hard replaceable wear surface. The spring bushing must be flush with the wear plate mounting surface.

3. The lower holes should be built up with weld and drilled and reamed to 20 mm (25/32") in line with upper holes. Optionally, the lower holes can be drilled and reamed for spring bushing 9550451 (Steps 1 and 2) if wear of lower holes is a problem.

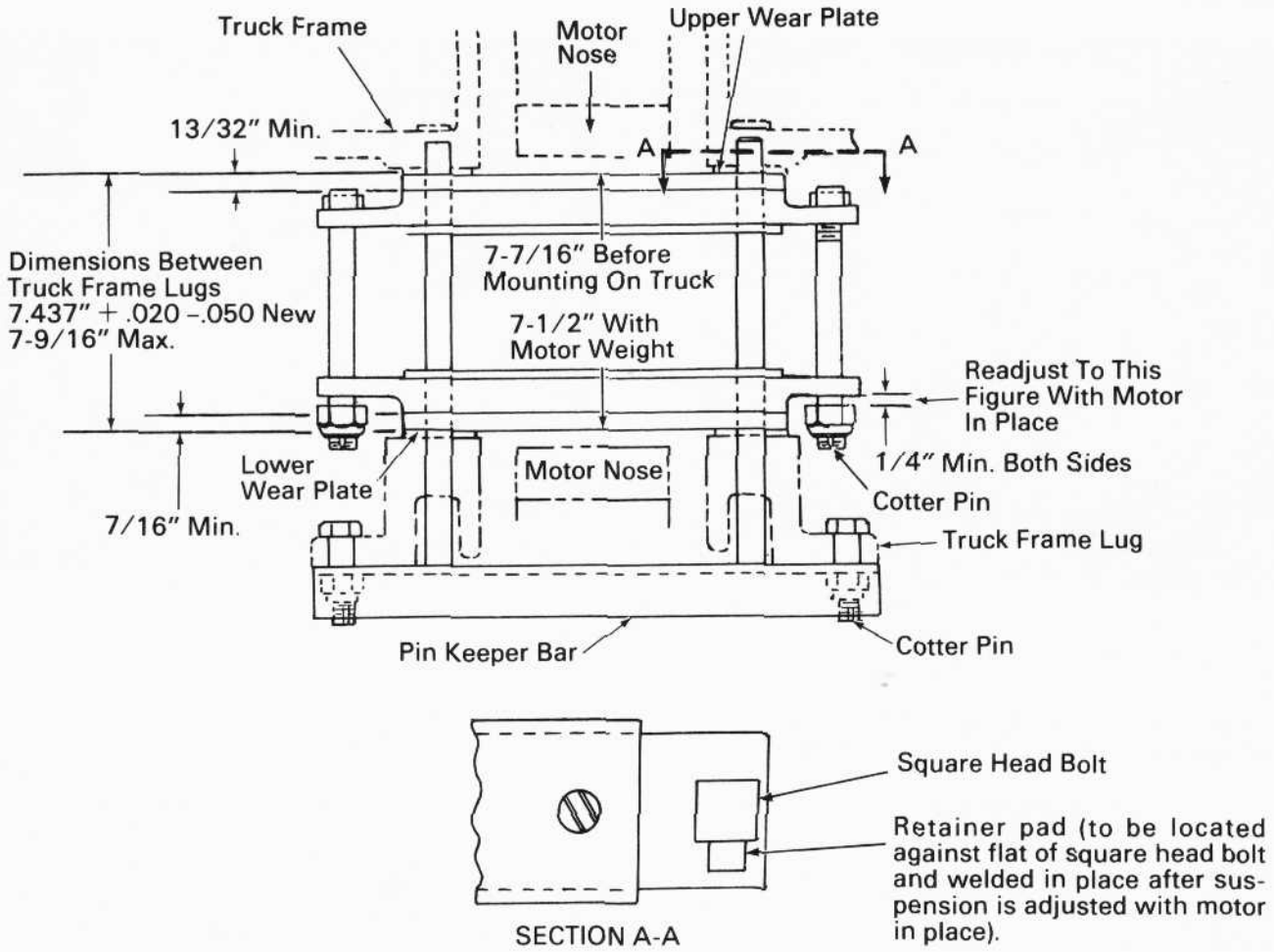
Ensure the wear pads are fully annealed. This can be determined by checking with a magnet since annealed pads are non-magnetic.

To assemble new wear pads to the suspension lugs, tightly clamp the wear pads to the truck frame to obtain contact over at least 75% of the wear pads contact area. This can be checked with a thin feeler gauge around the wear pads perimeter. This is critical to prevent bending stress on the welds.

Position the wear pads to avoid obstructing the keeper pin holes.

CAUTION

When welding the wear pads use only one pass welding and do not weld over tack welds. Multiple pass welding and welding over tack welds will cause the manganese wear pads to crack.



METRIC CONVERSION CHART			
(inch)	mm	(inch)	mm
0.020	0.5	7/16	11
0.050	1.3	7.437	188.90
1/4	6	7-7/16	189
13/32	10.5	7-9/16	192

28829

Fig.20 – Traction Motor Nose Suspension Wear Plates

Weld the wear pads on three sides with a 4.8 mm (3/16") fillet weld as shown in Fig. 21 with AWS-E-Fe-Mn-A, E-308-16, or E-310-16 electrode.

After the wear plates are applied, the surfaces must still be in the same plane and the dimension between the upper and lower lugs must be 188.90 mm +0.51 -1.27 (7.437" +.020 -.050).

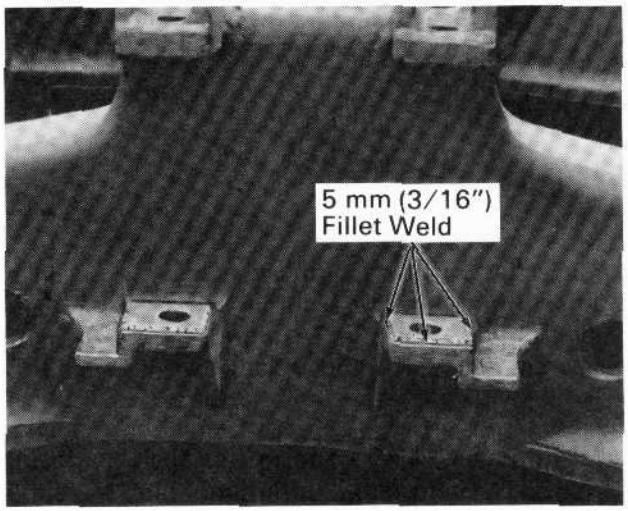


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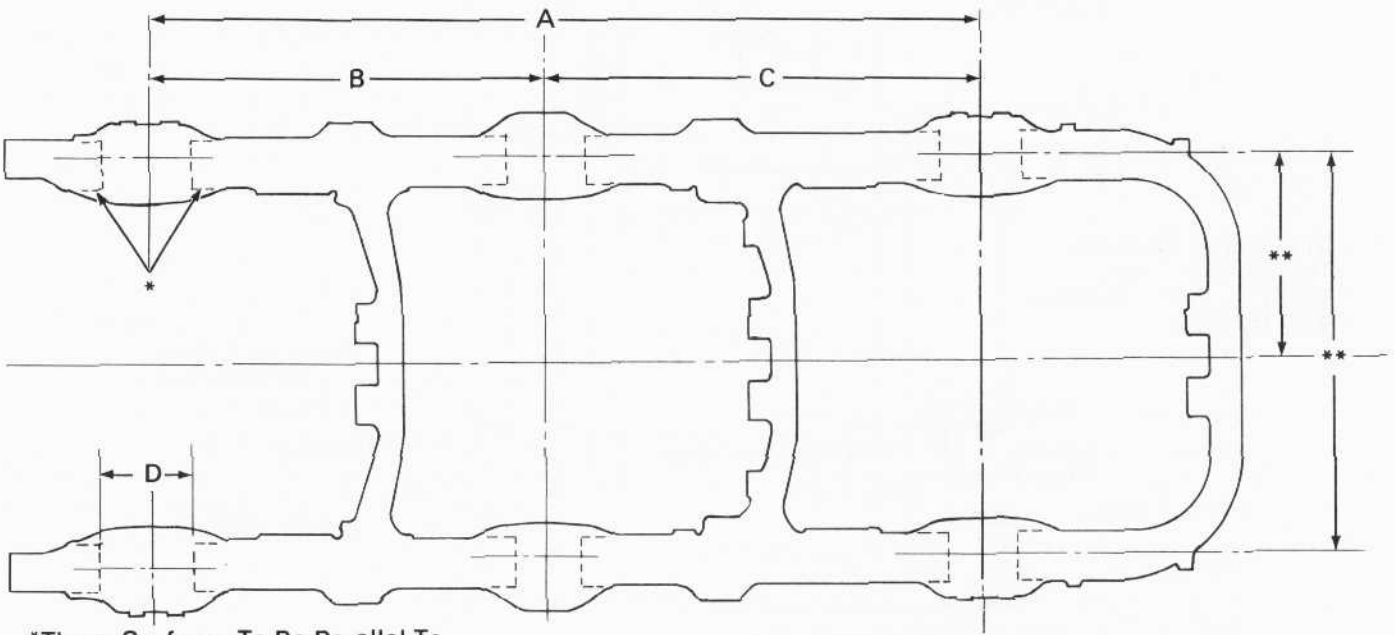
Fig.21 – Applying Traction Motor Nose Suspension Wear Pads

TRUCK FRAME PEDESTAL REPAIR

WHEEL BASE SPACING

The wheel base is the measured distance between the axle centerlines, as shown in Fig. 22. To determine the wheel base it is first necessary to locate the truck



*These Surfaces To Be Parallel To Centerline Of Truck Within 1 mm (1/32")

**Dimension Variable Dependent On Truck Gauge, Refer to Specific Truck Drawing

Typical Applications

	Dimensions	
	(inch)	mm
A	129-1/2	3 289
B	61-1/4 ±1/8	1 556 ±3
C	68-1/4 ±1/8	1 734 ±3
D	11.510 +0.030 −0.000	292.35 +0.76 −0.00

S.A.R. Special GT18MC Locomotives

	Dimensions	
	(inch)	mm
A	130	3 302
B	61-1/2 ±1/8	1 562 ±3
C	68-1/2 ±1/8	1 740 ±3
D	11.510 +0.030 −0.000	292.35 +0.76 −0.00

28831

Fig.22 – Truck Frame Dimensions

frame middle axle centerline or transverse centerline. This can be done by measuring between the middle pedestals. The wheel base can then be found by measuring between the transverse centerline and each axle centerline.

TRANSVERSE PEDESTAL SPACING

The transverse pedestal spacing refers to the dimension between the center of the pedestal jaw and the longitudinal centerline of the truck or the opposite pedestal jaw, as shown in Fig. 22. 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 center of the pedestal jaw.

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. 22. Incorrect longitudinal pedestal spacing may be caused by a bent frame, bent pedestals, or wear between the pedestal liner and pedestal face.

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. 23. This alignment can be determined by measuring from a straight edge tool or wire, spanning the pedestals, as shown in Fig. 23, 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.

LOCATION OF JOURNAL BEARING ADAPTER COIL SPRING CAPS

The centerline of the coil spring caps should be held within 3 mm (1/8″) on either side of the centerline of the pedestal opening, as indicated in Fig. 23. The coil spring cap location should be checked for alignment when any rework is done on the pedestals. If misalignment is more than 3 mm (1/8″), it will be necessary to remove the spring cap and relocate it to the center of the spring pocket.

The basic spring cap is secured to the frame using 5 mm (3/16″) fillet welds 51 mm (2″) long on three sides, as shown in Fig. 24. The optional spring seat, is secured using 6 mm (1/4″) fillet welds 51 mm (2″) long on two sides. Any high spots in the welds should be ground off to avoid localized loading on the coil springs.

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 or within the allowable limits. The diagrams shown in Fig. 25, indicate which pairs of pedestals should have equal distances between them.

Tramming is accomplished by using a trammel beam with the truck frame inverted on a level table

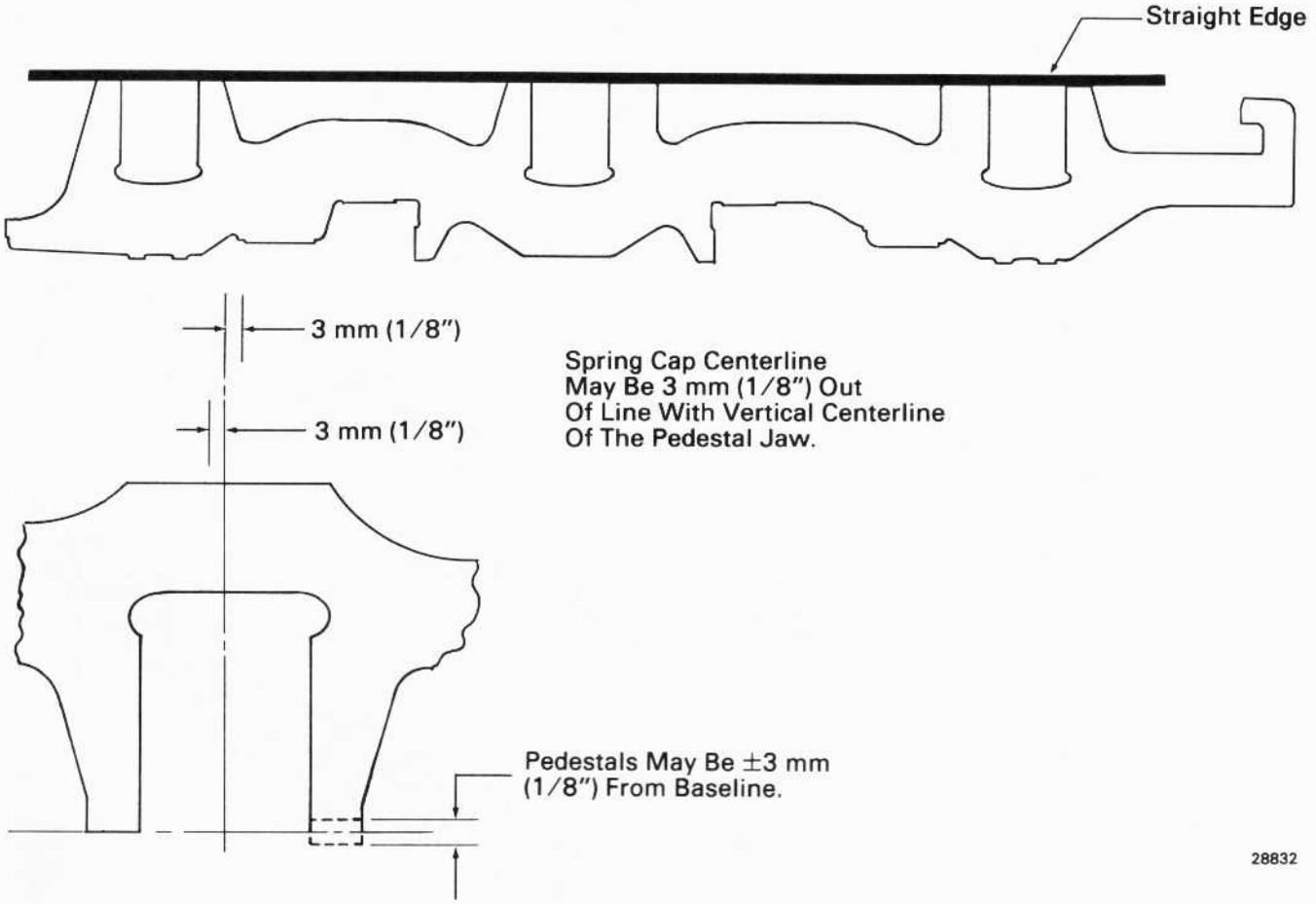


Fig.23 – Checking Pedestal Base Horizontal Alignment

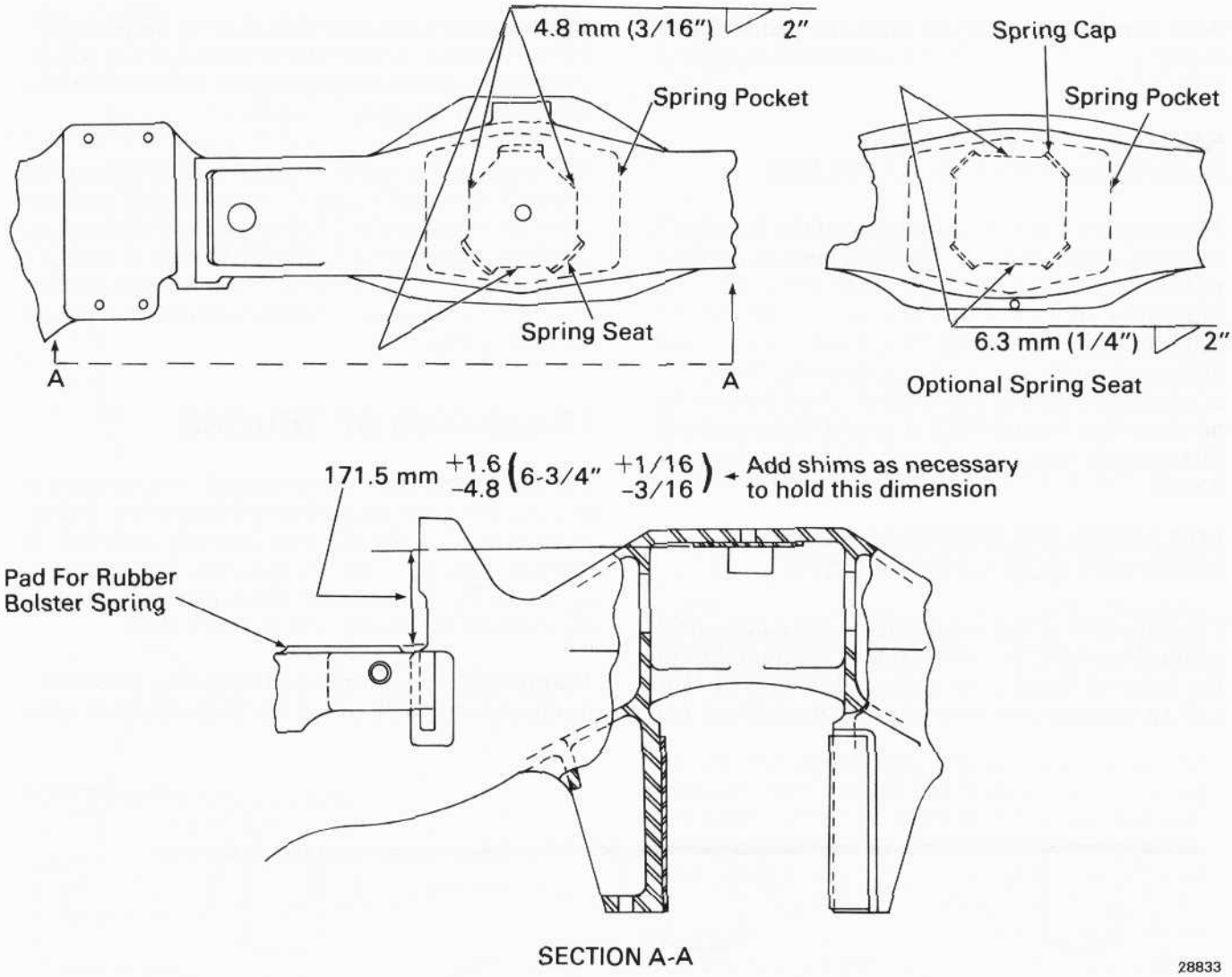


Fig.24 – Welding Journal Bearing Adapter Coil Spring Caps

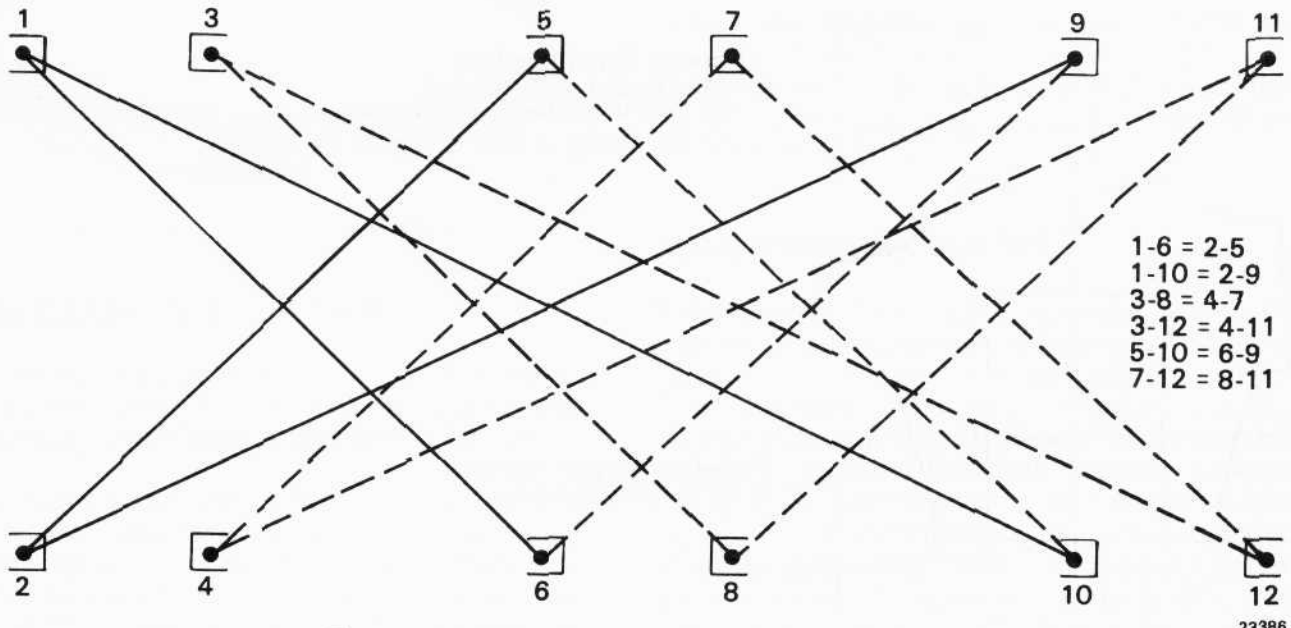


Fig.25 – Truck Frame Tramming Diagram

or level location. In addition to the diagonals shown in Fig. 25, it may be necessary to check the tram of the pedestals both longitudinally and transversely.

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 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. 26 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.

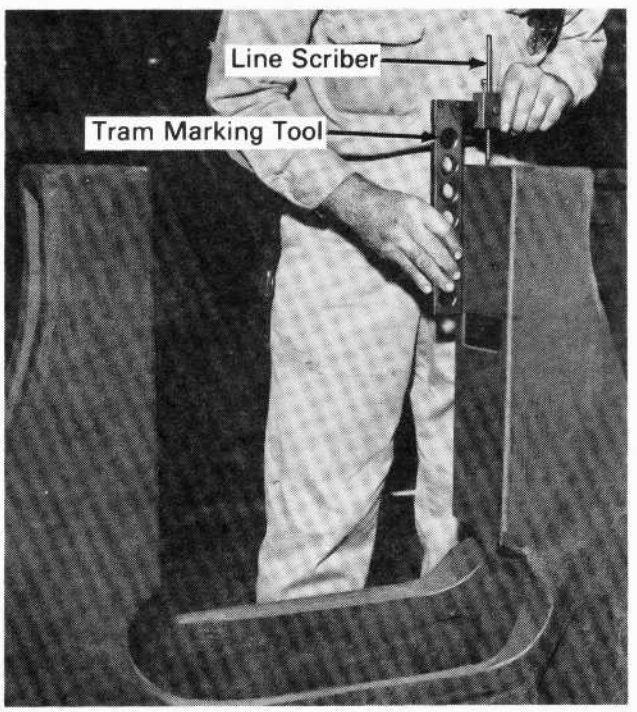


Fig.26 – Tram Marking Tool

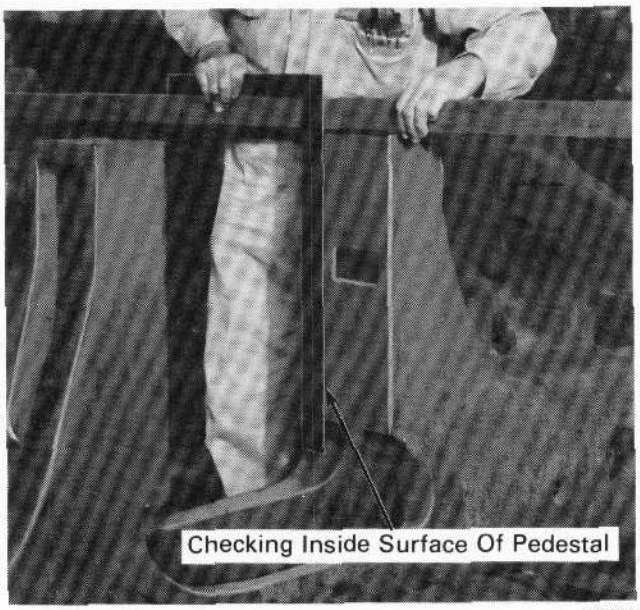
In the event of rework on the truck such as straightening of bent pedestals, it will be necessary to remove the old tramming mark and relocate a new mark.

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, Fig. 27.

If the diagonal measurements shown in Fig. 25 are not equal, it will be necessary to tram the pedestals longitudinally and transversely, 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. 28. The diagonal trams 3-8, 1-6, 2-5, and 4-7 are shown to be unequal by plus 3 mm (1/8″), 0, plus 0.8 mm (1/32″) and plus 1.5 mm (1/16″) respectively. The diagonal trams are allowed a tolerance of ±1.5 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 1.5 mm (1/16″) and 5.5 mm (7/32″) respectively.

Since pedestals 3-4 are plus 5.5 mm (7/32″) it accounts for the plus 3 mm (1/8″) and plus 1.5 mm (1/16″) length of the diagonal trams 3-8 and 4-7 going to these pedestals. Since 3-8 plus 3 mm (1/8″) is twice the plus 1.5 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 1.5 mm (1/16″), the diagonals 3-8 and 4-7 will be reduced and diagonal 3-8 will be within the limit of 1.5 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.



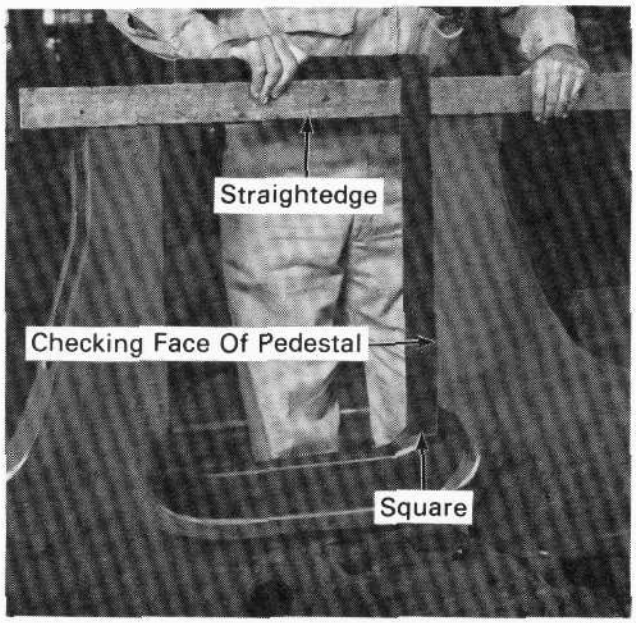


Fig.27 – Checking Pedestal Squareness

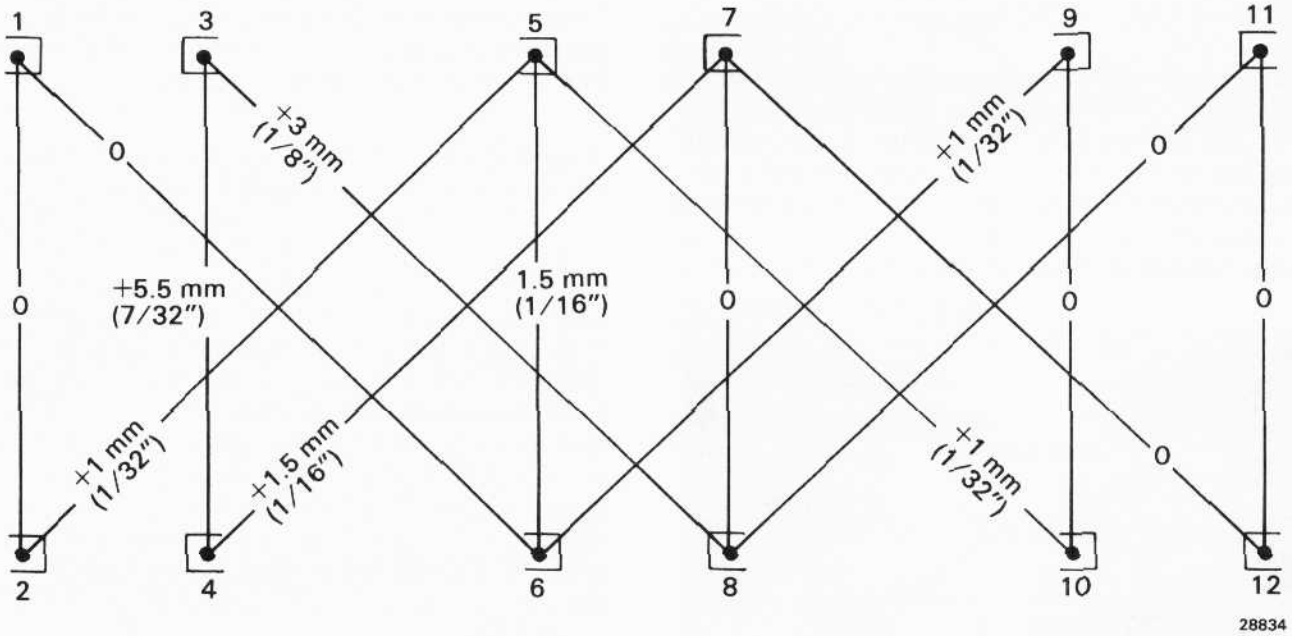


Fig.28 – Example Of Tram Measurements

TRUCK SPRINGS

The truck assembly is equipped with coil springs above each journal bearing adapter. Various combinations of springs are used to accommodate the loads which may be applied according to the weight specification of a particular locomotive. Spring shim plates and shims of different thickness are used to maintain the proper coupler height.

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.

ASSEMBLY OF TRUCKS

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. Set the truck frame in an inverted position on the floor.

2. Install coil spring assemblies, spring seats, and shims.

3. Install traction motor nose suspension assemblies in place between the frame lugs. Compress traction motor suspension pack assembly by placing temporary blocks between nose pack holder and mounting bolt heads and tightening bolts. Install suspension pack keeper pins and pin keeper bar.

4. Install brake levers in place, leaning them back to provide enough clearance for the wheel and axle assembly.

5. If unit is equipped with friction snubber assemblies, install friction snubber piston and spring in each of the snubber tubes located at the middle axle pedestals. Retract snubber piston by inserting a 3/4"-10 UNC-2A threaded rod approximately 230 mm (9") long into the small hole in end of snubber tube, Fig. 29. Thread rod into end of snubber piston plate. Thread 3/4"-10 nut onto rod and tighten until snubber piston is retracted and piston can be pushed into tube.

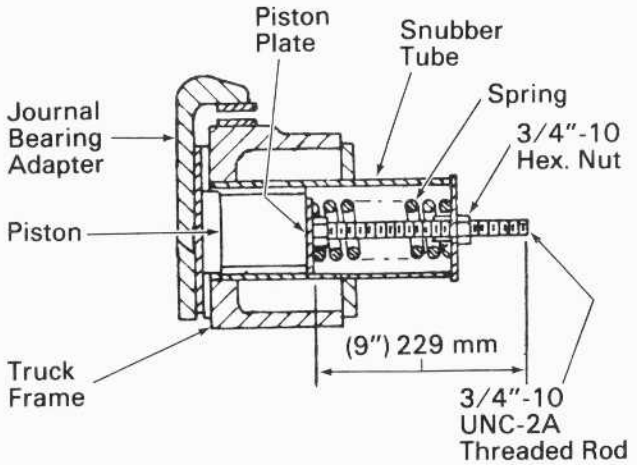


Fig.29 – Friction Snubber Retraction

6. Install pre-assembled wheel, axle, and motor assemblies in place by lifting the assembly with a lifting fixture similar to the one in Fig. 30, and lowering between the truck frame pedestals until the journal box adapters rest on the coil spring seats. Remove temperary blocks from traction motor nose suspension assembly.

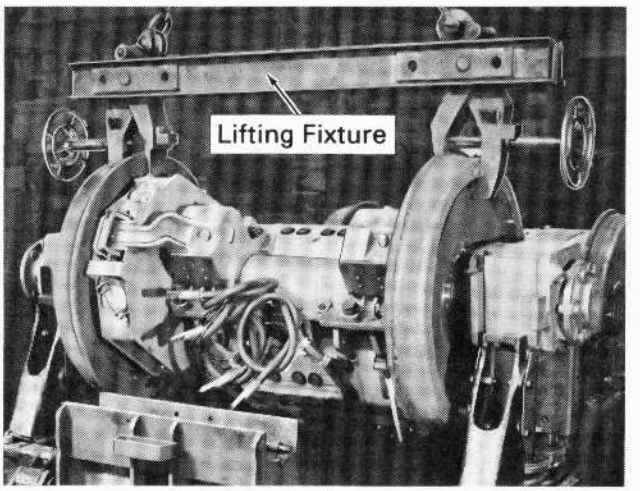


Fig.30 – Installing Wheel, Axle, And Motor Assembly

7. Install pedestal tie bars, slack adjusters and sander guide assemblies.

8. Turn truck assembly over onto its wheels and install air brake piping, brake cylinders, shock absorbers, and any remaining brake rigging.

9. If unit is equipped with friction snubber assemblies, release friction snubbers by removing threaded rod from snubber tubes.

10. Install bolster support pads, then set the bolster in place between bolster pedestals.

11. Install center bearing wear plate and wear half rings. Apply a coat of grease to the dust guard and install it on the bolster center casting. Apply oil to the truck center bearing as explained in Lubrication section.

PROCEDURE B

1. Space wheel and axle assemblies so that when the truck frame is lifted it can be placed over the assemblies.

2. Lift truck frame and lower it over the wheel and axle assemblies. Install coil spring assemblies, spring seats, and shims before fully lowering the frame. Install pedestal tie bars after frame is lowered.

3. Compress traction motor suspension pack assembly by placing temporary blocks between nose pack holder and mounting bolt heads and tightening bolts.

4. Apply lifting chains to bails at nose suspension side of traction motor. Connect lifting hoist to chains.

5. Hoist motor and place lower lip of support bearing on top of axle, Fig. 31. 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.

6. Install traction motor gear case, outer bearing half, axle guard, support bearing caps, and dust guards.

7. Install brake lever assemblies and traction motor cooling ducts.

8. Install slack adjusters and sander guide assemblies.

9. Install shock absorbers, air brake piping, brake cylinders and rigging.

10. If unit is equipped with friction snubber assemblies, release friction snubbers by removing threaded rod from snubber tubes.

11. Install bolster support pads, then set the bolster in place between bolster pedestals.

12. Install center bearing wear plate and wear half rings. Apply a coat of grease to the dust guard and install it on the bolster center casting. Apply oil to the truck center bearing as explained in Lubrication section.

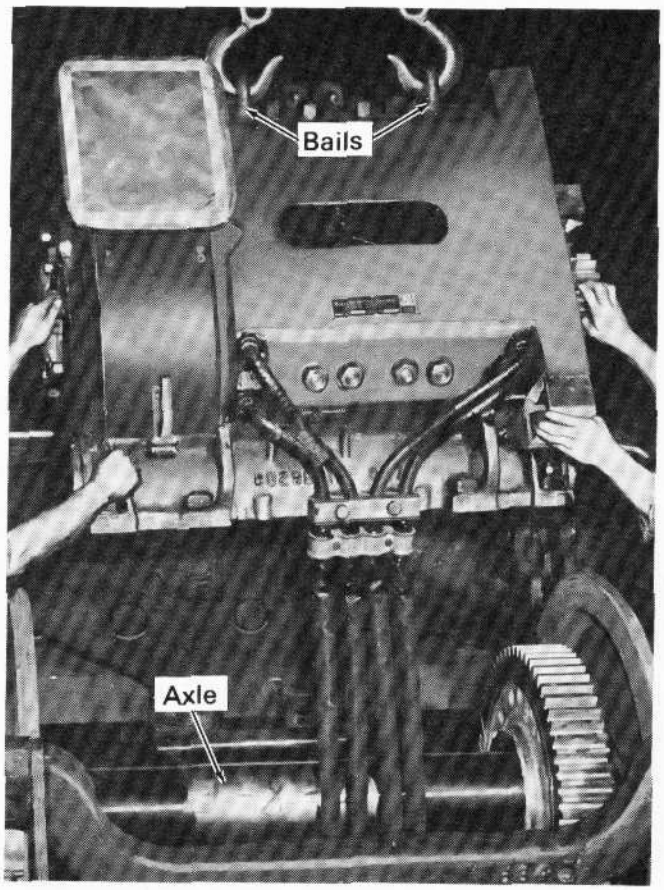


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Fig.31 – Installing Traction Motor

SERVICE DATA

REFERENCES

Coil, Elliptic, And Rubber Truck Spring Qualification And Replacement	M.I. 1512
Wheels, Axles, Axle Gears, And Pinions	M.I. 1519
Grease Lubricated Cartridge-Type Journal Bearings	M.I. 1553
Lubricant Specifications	M.I. 1756

EQUIPMENT

Turnover Fixture (six wheel trucks)	*File No. 293
Lifting Fixture (traction motor, axle and wheel assembly)	*File No. 288
Tram Marking Tool	*File No. 615
Wall Mounted Fixture To Test Shock Absorber	Work Sketch 41089

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

• • • • A Service Department Publication • • • •

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