ELECTRO-MOTIVE DIVISION • GENERAL MOTORS CORPORATION
SERVICE DEPARTMENT
MAINTENANCE INSTRUCTION

HT-C TRUCK ASSEMBLY

DESCRIPTION

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

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

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

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

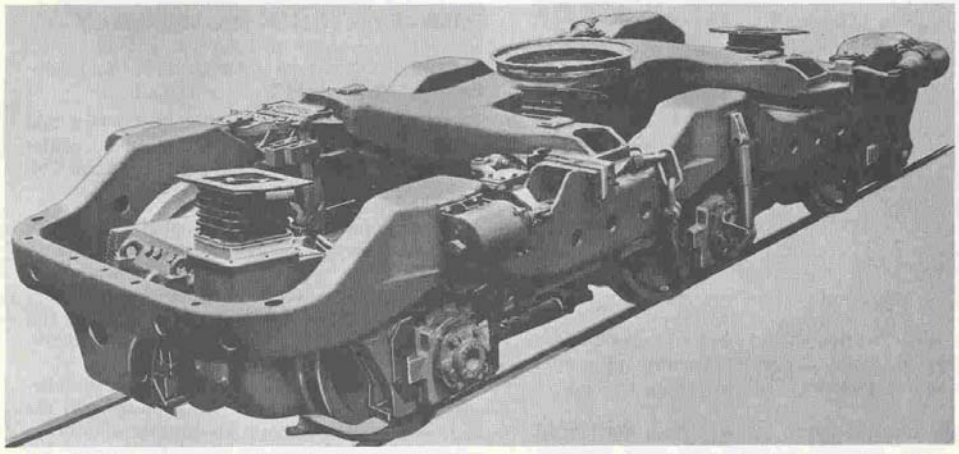

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Fig. 1 – HT-C Truck Assembly

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

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

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

MAINTENANCE

TRUCK CLEANING UNDER LOCOMOTIVE

The trucks should be cleaned as often as needed while under the locomotive to remove heavy accumulations of oil, sand, dust and roadbed dirt.

The engine should be running to supply air under pressure to the traction motors when the trucks are cleaned under the locomotive in order to prevent any liquid spray from entering. Care should be taken that no spray is directed at the motor air discharge openings.

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 enough oil added at the time a unit is trucked to cover the center bearing wear plate by 1/16".

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

REMOVAL OF TRUCK FROM LOCOMOTIVE

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 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 if it is to be held in a raised position.

TANK CLEANING OF INDIVIDUAL TRUCKS

When the truck assembly is removed from the locomotive, the traction motors, wheels, axles, journal boxes, rubber bolster springs, shock absorbers, motor nose suspension packs, and brake cylinders should be removed if the truck is to be immersed in a cleaning tank containing an alkaline solution. After a sufficient time to assure removal of all foreign material, remove the assemblies and rinse them using hot water. Phenolic or composition wear plates should not be immersed in alkaline solution.

COMPLETE TRUCK DISASSEMBLY

The following general procedure for truck disassembly can be applied:

1. Remove the center bearing dust guard and wear plates and wipe up the oil in the center bearing. Also drain the oil from the traction motor support bearings.
2. Remove individual items mounted on the truck frame such as brake cylinders, piping and brake rigging.
3. Remove the bolster from the truck frame and unbolt the rubber bolster pads from the frame.
4. If space and facilities are available, a considerable time saving can be made by working the truck from this point on in an upside down position. This can be done by turning the frame over endways or sideways with an overhead crane.

5. After removal of the pedestal tie bars the motor, axle, wheels, journal boxes, and gear case can be removed as an assembly, rather than piece by piece. Removal of wear plates, springs, and traction motor nose suspension assemblies will also be accomplished with less labor and more safety with the truck in an inverted position.

6. If the truck cannot be inverted the following method may be used to remove the motors from the wheel and axle assembly.

   a. Remove the bolted traction motor air duct and gear case.

   b. Remove the dust guards, traction motor bearing support caps, axle guards and outer bearing half.

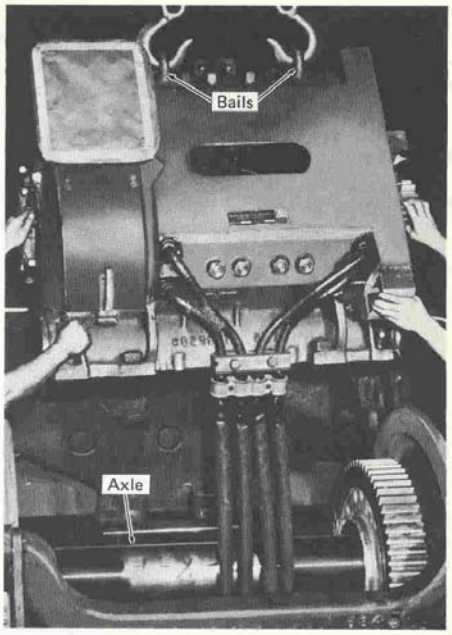
   c. Apply the hoist lifting chains to the bails on the traction motor at the nose suspension side. After the suspension pin keeper bar is removed, and the keeper pins drop down, lift the motor to compress the springs of the suspension assembly. With the suspension assembly compressed, insert 3/4" thick temporary blocks between the spring holder and bolt as indicated in Fig. 2.

   d. Lower the motor sufficiently to free the suspension assembly and remove the assembly by sliding it out of its place between the truck frame lugs.

   e. After the suspension assembly is removed, again lift the motor, allowing it to rotate on the axle until the lower lip of the support bearing clears the axle, Fig. 2. Then lift the motor assembly clear of the axle.

NOTE: Use care in lifting the motor so the support bearings will not fall and be damaged. Pinion protector 8054871 should be applied to the motor to prevent damage to the motor after it has been removed. The support bearing caps should be reapplied at their original location on the motor, since these caps are not interchangeable between motors.

7. To remove the wheel and axle assemblies, remove the pedestal tie bars so when the truck frame is lifted the wheel and axle assemblies will remain on the floor.



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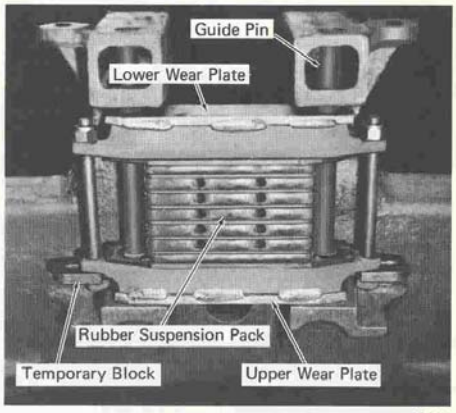

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Fig. 2 – Removing Traction Motor (Truck Inverted)

8. Remove the remaining brake equipment and pedestal liners from the truck frame.

WARNING: Be careful when removing pedestal liners that the springs and spring seats do not fall and cause injury.

GENERAL INSPECTION AND REPAIR

Make a thorough inspection of the truck frame and bolster for the following items and repair as stated.

BROKEN OR CRACKED MEMBERS

Breaks or cracks must be repaired by welding with AWS-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. Broken cast sections may be duplicated with a like shape made from SAE 1018 or 1020 steel, and welded to the truck frame.

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.

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 3/64" on the radius or 3/32" on the diameter.

Holes which are beyond these 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 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 3/32" or more on the inside 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 reamed 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 and reaming to accept the new bushing.

MUTILATED 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 retapped. 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.

MISSING PARTS

Make a thorough inspection to see if all the necessary parts are intact. Special attention should be given to wear plates, cotter pins and washers.

BOLSTER

The bolster, Fig. 3, 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. 4, clamps over the truck center casting and rides against the underframe to prevent dust and dirt from entering the center bearing.

BOLSTER CHAFING PLATES

Phenolic chafing plates, Fig. 5, are bolted to the truck frame bolster stops to provide an easily replaceable mating surface with the bolster faces. If clearance between these surfaces exceeds the limits shown in Fig. 5, the phenolic chafing plates must be replaced. Maximum total side clearance between the truck frame and bolster on one side must not exceed 3/8". The chafing plates should be replaced in pairs or complete truck sets so the total clearance on one side of the truck is not more than 1/16" greater than on the opposite side.

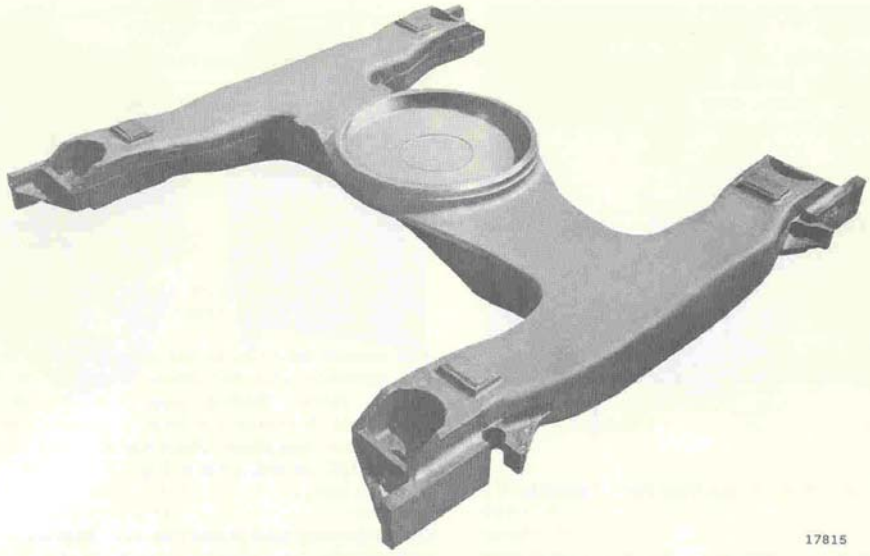

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Fig. 3 – Truck Bolster

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Fig. 4 – Center Bearing Dust Guard

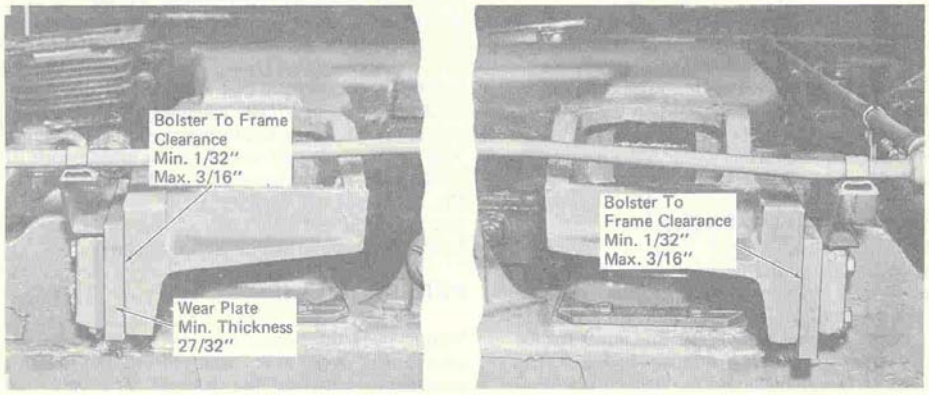

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Fig. 5 – Bolster Wear Plates

SIDE BEARING WEAR PLATES

The side bearing wear plates, located at the four corners of the bolster, are designed to mate with similar side bearing wear plates mounted on the carbody underframe as indicated in Fig. 6.

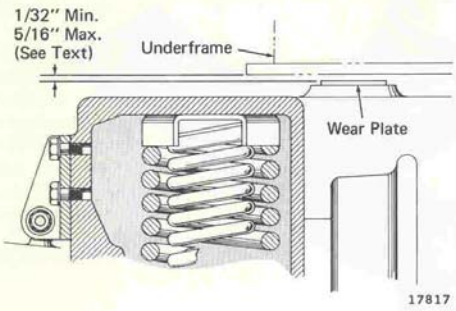

Fig. 6 – Side Bearing Wear Plate Clearance

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

Side bearing clearance on a new assembly is 5/32" to 5/16". While in service the minimum allowable side bearing clearance is 1/32", as shown in Fig. 6. Any time the side bearing clearance approaches the minimum limit, the bolster center bearing wear plate should be checked for wear.

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

CENTER BEARING WEAR PLATES AND WEAR RING

As mentioned previously, 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. 7. 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.

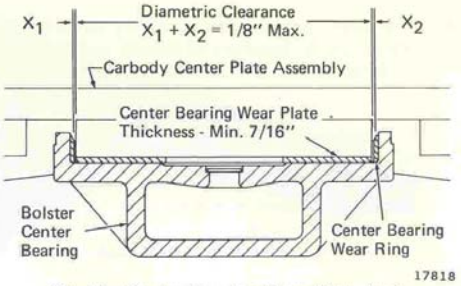

Fig. 7 – Center Bearing Wear Plate And Wear Ring Limits

The outside diameter of the carbody center bearing assembly and the inside diameter of the bolster center bearing wear ring should be checked to determine the total clearance between them. The maximum clearance between these parts is 1/8" as indicated in Fig. 7.

Center bearing wear plates and wear rings are made of 1/2" thick laminated phenolic material.

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

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

PEDESTAL LINERS

Nylon pedestal liners, Fig. 8, 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 jaws.

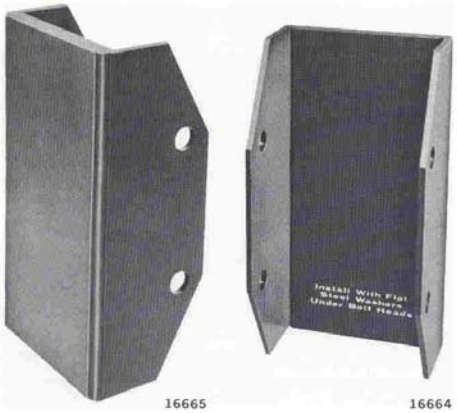

Fig. 8 -- Pedestal Liners

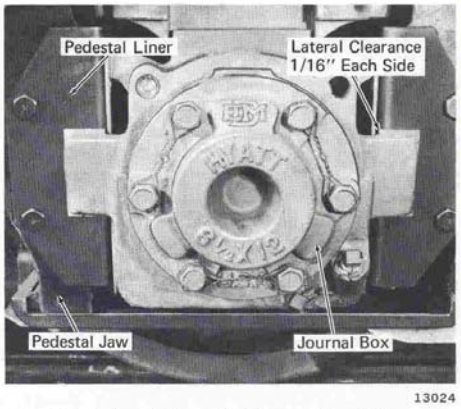

Fig. 9 -- Pedestal Liner To Journal Box Clearance

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 nominal lateral clearance between the journal box and the pedestal liner is 1/16" at each side of the pedestal as shown in Fig. 9. The pedestal liner to journal box wear limits are shown in Fig. 10. If the clearances are beyond the maximum limits, both pedestal liners at that journal location should be replaced. The journal box wear plates should be checked for possible breaks or cracks by visual and magnaflux inspection if they are to be reused.

The clearance between the journal box and the pedestal liner can be measured using feeler gauges. Feeler gauges should be approximately 1" wide and 12" long. Care should be taken in making the measurement to see that the gauge is inserted adequately into the clearance and that it fits into the wearing area so that 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.

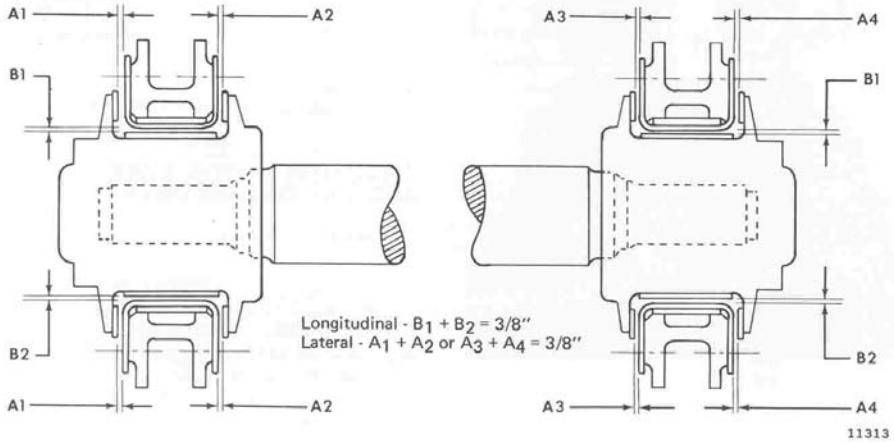

Fig. 10 -- Pedestal Liner To Journal Box Wear Limits

PEDESTAL LINER APPLICATION

Inspect the pedestal jaws to be sure that the surfaces are smooth and free of any raised areas such as may be caused by nicks, that might interfere with the application of the liners. Chamfer any sharp corners on journal box wear plates. The liners should fit tightly on the pedestal jaw with the mounting holes mating with the pedestal bolt holes. The mounting bolts should enter the liner and pedestal bolt holes freely and should be thoroughly tightened. Particular attention should be given to the position of the worn pedestal liners before being removed so that the replacement liners can be applied in exactly the same position.

The dimension between the liner faces should be 15.011" minimum or 15.073" maximum. A special liner pressing tool, Fig. 11, may be made as outlined in File Drawing 649 to aid in the installation of the pedestal liners. This file drawing is available on request.

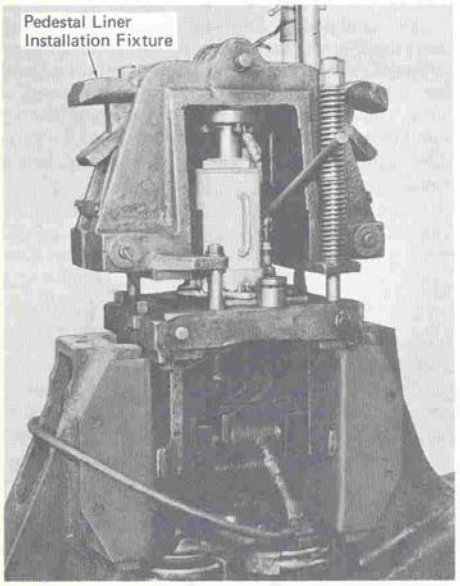

Fig. 11 -- Pedestal Liner Application

COIL SPRING SEAT

Spring seat 8354098 is used between the coil springs and journal box to provide a means to secure the springs to the journal box. On a new installation with 40" diameter wheels a 1" shim plate 8455982 is used between the journal box and spring seat.

The 6-axle locomotive underframe height should be maintained at 48-1/8" from the rail to the bottom of the underframe. Shimming between the journal box and the journal spring seat 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. 12.

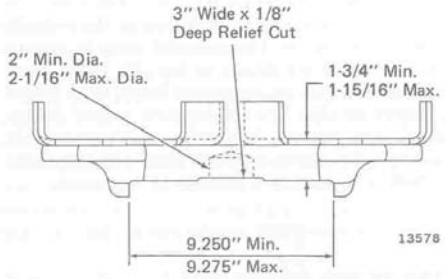

Fig. 12 – Spring Seat Wear Limits

TRACTION MOTOR NOSE SUSPENSION ASSEMBLY

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 damping rubber suspension pack, which is mounted as shown in Fig. 13.

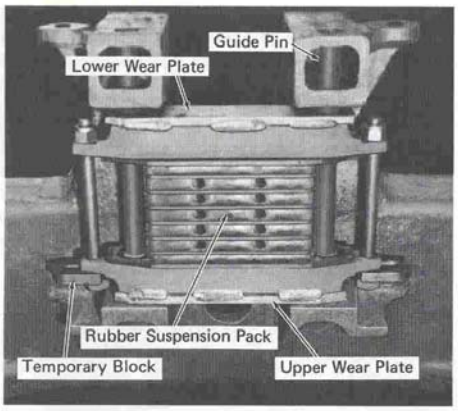

Fig. 13 – Traction Motor Nose Suspension Assembly (Truck Inverted)

Wear plates should be periodically replaced to ensure not more than 1/4" free movement in the traction motor nose suspension to obtain maximum cushioning effect from the suspension pack. If the wear plates, which are 1/2" thick when new, are worn enough to permit more than the 1/4" free movement or if the wear plates are worn more than the limits given in Fig. 14, the suspension pack should be removed and the wear plates replaced.

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

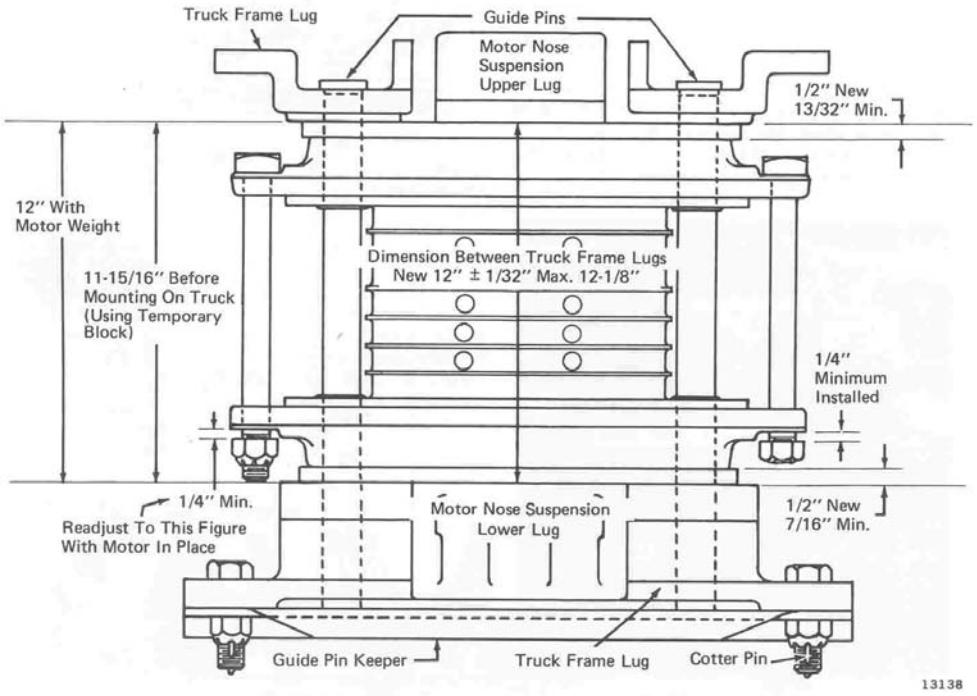

Fig. 14 – Traction Motor Nose Suspension Assembly

The hardened steel wear plate should be applied to the suspension pad with 3/8" fillet welds 2-1/4" long spaced 3-3/4" apart.

TRUCK FRAME MOTOR NOSE SUSPENSION LUGS

The lugs on the truck frame transom that support the traction motor suspension assembly are subject to wear due to the chafing of the suspension assembly. The maximum dimension between these surfaces is 12-1/8" as shown in Fig. 14. If this limit is exceeded, it will be necessary to build up the lug faces by welding and machining or grinding to obtain the original dimension of 12" plus or minus 1/32". The ground or machined surfaces of the lugs should be in the same plane within 1/32".

Current practice is to install a 3/16" thick manganese steel wear plate on each of the four truck frame suspension lugs. This will reduce wear at these points and allow an extended period between rework. The wear plates are applied to the lugs with a 3/16" fillet weld using an AWS-E-FeMn-A welding rod. Weld the plate on three sides as shown in Fig. 15. 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 12" ± 1/32".

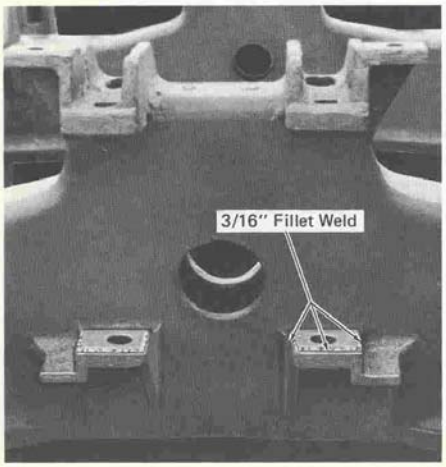

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Fig. 15 – Truck Frame Motor Nose Suspension Lugs

The guide pin holes in the frame lugs should be checked for size. The holes are drilled to a nominal 1-5/16" diameter when new. If they become worn or elongated by 3/32" or more, they must be ring or plug welded and redrilled to the correct dimension. An optional method of repairing the guide pin holes is to drill the worn holes to 1.875" ± .002" and press in bushing 8308240. Weld the bushing to the support lugs after it is pressed into position. The guide pins are 1.250" in diameter when new and should be replaced when they have worn to a diameter of 1.220".

TRUCK FRAME PEDESTAL REPAIR

WHEELBASE SPACING

The wheelbase spacing is the measured distance between the axle centerline, as shown in Fig. 16.

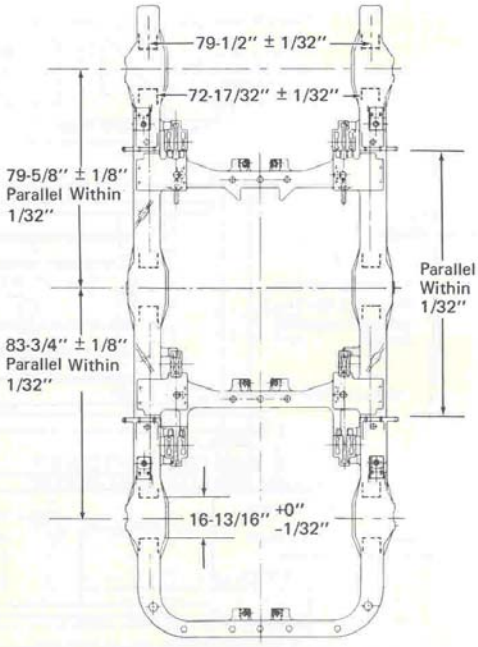

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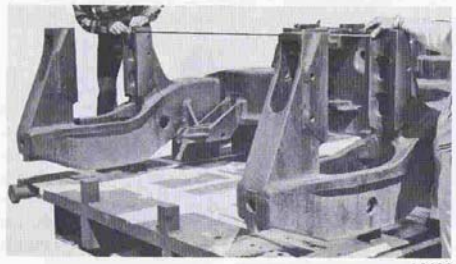
Fig. 16 – Truck Frame Dimensions

To determine the wheelbase it is first necessary to locate the truck frame middle axle centerline or transverse centerline. This can be done by measuring between the middle pedestals. The wheelbase can then be found by measuring between the transverse centerline and each axle centerline, as shown in Fig. 17.



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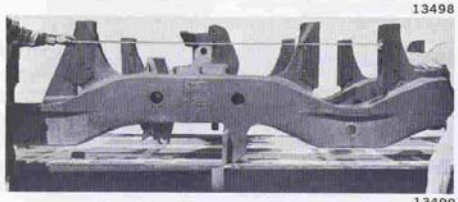

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Fig. 17 – Measuring Wheelbase And Pedestal Spacing

TRANSVERSE PEDESTAL SPACING

The transverse pedestal spacing refers to the dimension between the inside machined surface of the pedestal jaw and the longitudinal centerline of the truck, as shown in Fig. 16. The transverse measurements may be made as shown in Fig. 17. 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.

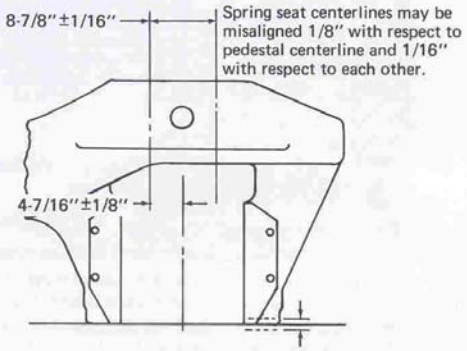
Pedestals which do not conform to the dimensional limits can be corrected by straightening the truck frame, hot or cold.

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. 16. Incorrect pedestal spacing is caused by a bent frame or bent pedestals, either of which require straightening to obtain the correct pedestal spacing.

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. 18. This alignment can be determined by measuring from a straight edge tool or wire spanning the pedestals, as shown in Fig. 18, and may be above or below the pedestal baseline by no more than 1/8". A condition in excess of this can only be corrected by straightening the truck frame.



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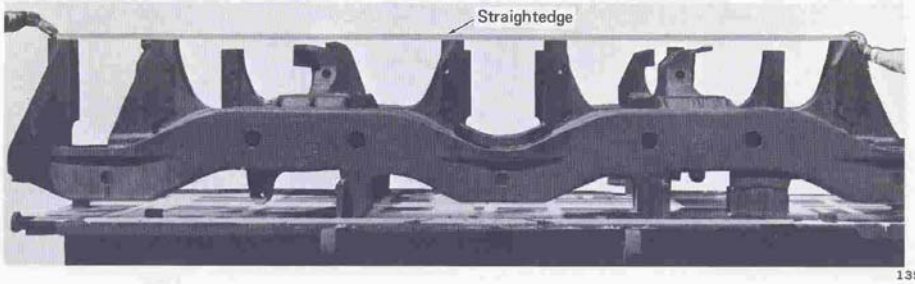

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Fig. 18 – Pedestal Base Horizontal Alignment

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 may be 4-7/16" ± 1/8" from the centerline of the truck pedestal opening, as indicated in Fig. 18. If the misalignment is more than 1/8", it may be corrected by moving the spring seats. The distance between the two spring seat centerlines should be held within 8-7/8" ± 1/16", as indicated in Fig. 18.

The spring seat can be removed by cutting the welds, and should be rewelded, or a new spring seat applied, as shown in Fig. 19. Shims located between the spring seat and the truck frame provide the proper height from the spring seat to the bottom of the pedestal. If the spring seats are removed, care should be taken to replace them with the proper shims. The spring seats should be flat to prevent uneven loading on the coil springs.

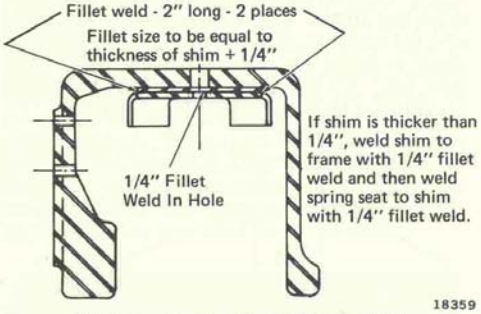


Fig. 19 – Application Of Spring Seat

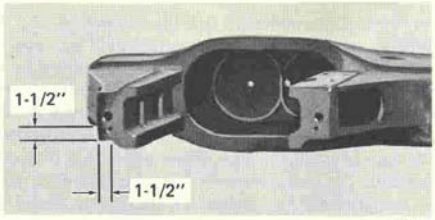
TRAMMING OF TRUCKS

The truck pedestals are trammed to determine if they are in correct alignment with each other, that is, to determine if the distance between pedestals is equal to or within the allowable limits. The diagrams shown in Fig. 20 indicate which pairs of pedestals should have equal distances between them.

Tramming is accomplished using a trammel beam as shown in Fig. 21 with the truck frame inverted on a level table or level location. In addition to the diagonals shown in Fig. 20, it may be necessary to check the tram of the pedestals both longitudinally and transversely as indicated in Fig. 21.

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

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



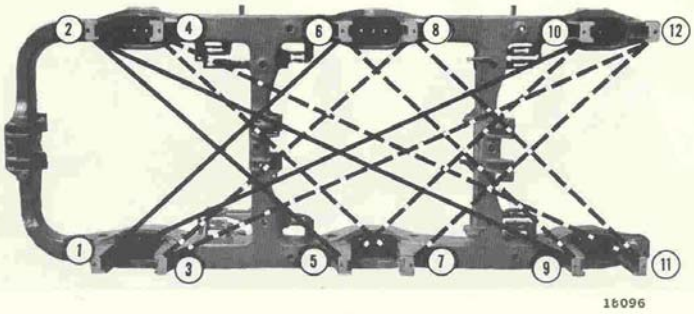
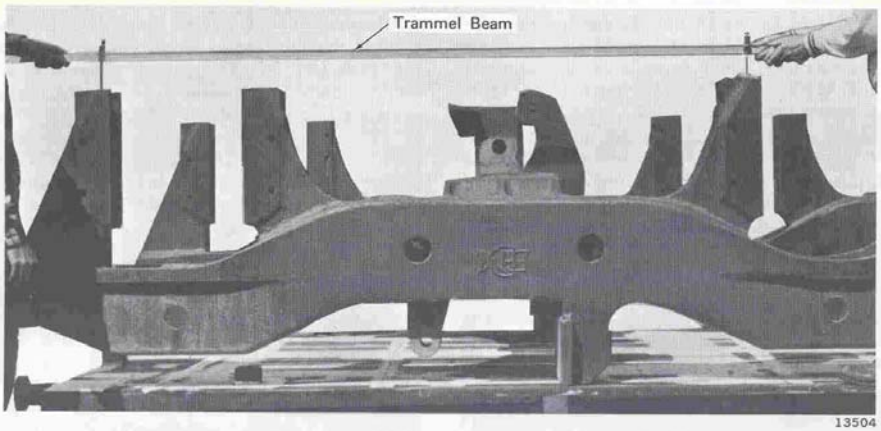


Fig. 20 – Truck Frame Tramming Diagram



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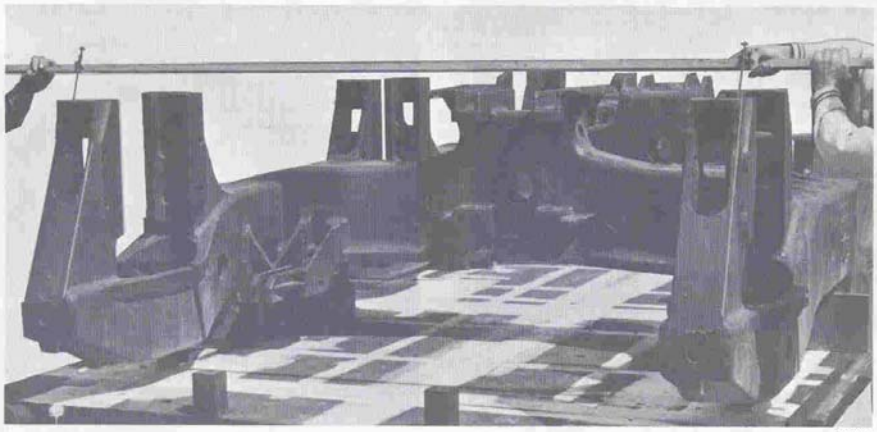

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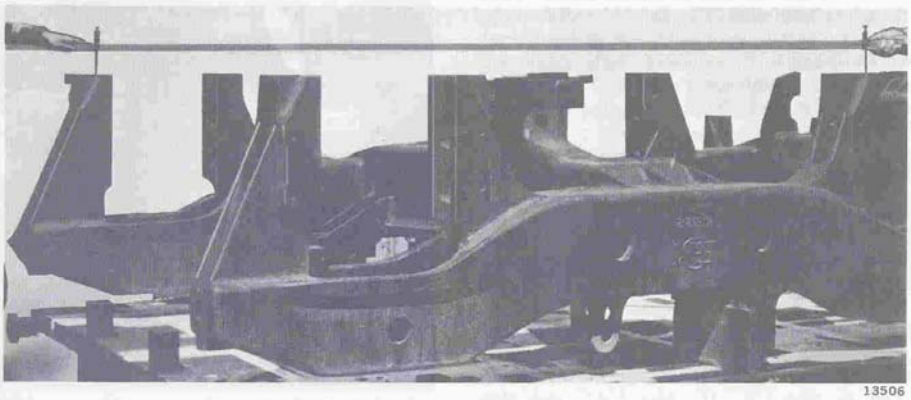

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Fig. 21 – Application Of Trammel Beam

A special tool shown in Fig. 22 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 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 trammir mark and relocate a new mark.

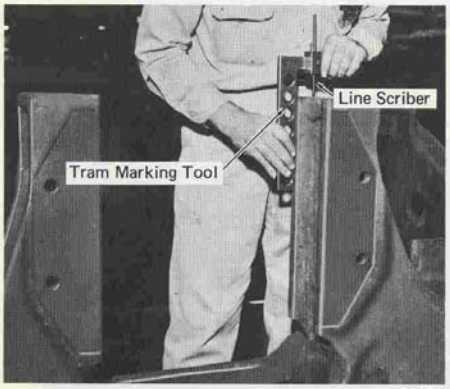


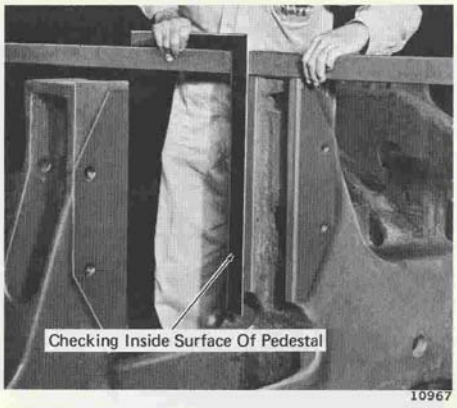
Fig. 22 – Tram Marking Tool

Each pedestal should be checked for leaning at the inside surface and the side facing the center of the truck before tramming. The pair of pedestals opposite each other (one on each side of the frame) which are found to be square or nearly square, are used as starting points for tramming. The pedestals are checked using a straight edge and square, as shown in Fig. 23.

If the diagonal measurements shown in Fig. 20, are not equal, it will be necessary to tram the pedestals longitudinally and transversely, as shown in Fig. 21, 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 on a six wheel truck is shown in Fig. 24. The diagonal trams 3-8, 1-6, 2-5, and 4-7 are shown to be unequal by plus 1/8", 0", plus 1/32" and plus 1/16" respectively. The diagonal trams are allowed a tolerance of ± 1/16" so the only pedestals exceeding this limit is the 3-8 diagonal. This indicates the 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 the pedestals 7-8 are equal to pedestals 1-2, but pedestals 5-6 and 3-4 are wider than the other two pair by 1/16" and 7/32" respectively.

Since pedestals 3-4 are plus 7/32", it accounts for the plus 1/8" and plus 1/16" length of the diagonal trams 3-8 and 4-7 going to these pedestals. Since 3-8 plus 1/8" is twice the plus 1/16" of 4-7, it can be seen that pedestal 3 needs to be bent inward twice as much as pedestal 4. If pedestal 3 is bent inward 5/32" and 4 is bent inward 1/16", the diagonals 3-8 and 4-7 will be reduced and diagonal 3-8 will be within the limit of 1/16". The same



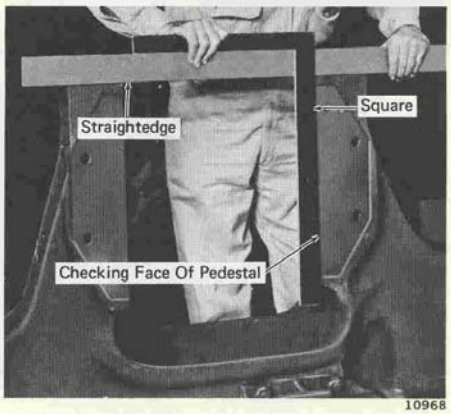


Fig. 23 – Checking Pedestal Squareness

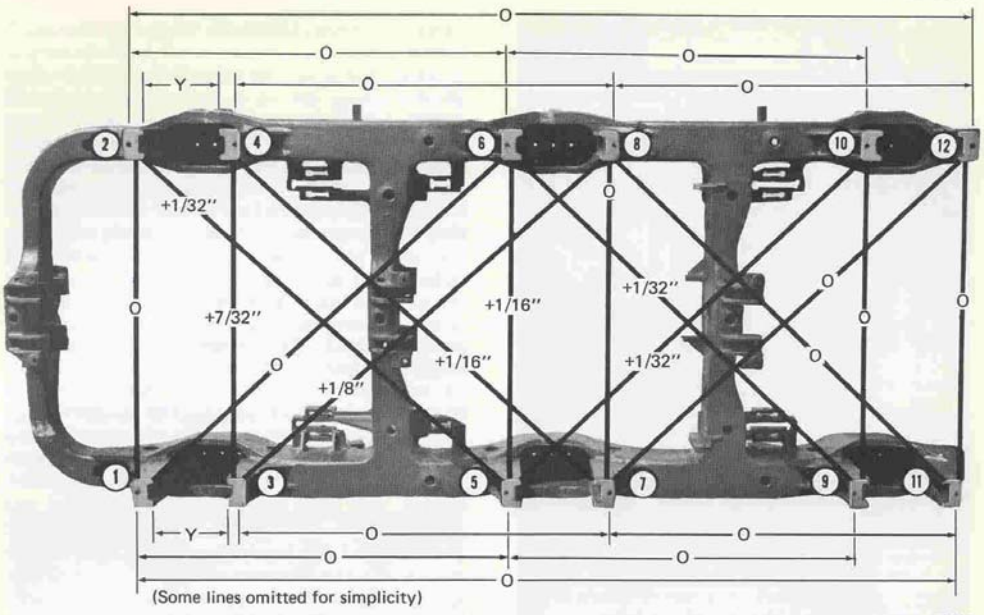


Fig. 24 -- Typical Example Of Tram Measurements

correction would be necessary for pedestals 5-6, if diagonals 1-6 or 2-5 were out of their limits.

TRUCK SPRINGS

The truck assembly is equipped with coil springs above each journal box. It is important to identify each of the springs according to part number so the spring may be tested at the proper value as listed in the table in the Service Data at the end of this bulletin.

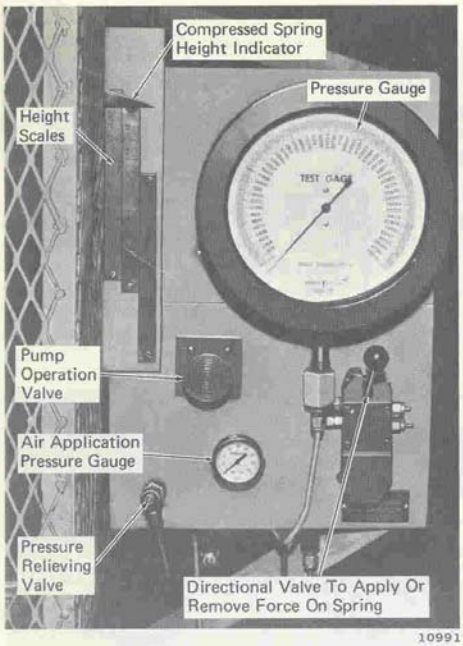
SPRING TESTING

Springs may be tested on any reliable calibration type testing press or a spring testing machine, Fig. 25, may be made as outlined in File Drawing 647, which is available from Electro-Motive upon request. The fixture may be used to test elliptic type spring assemblies as well as coil springs. Safety wire mesh encloses the working parts of the fixture. When the two hinged doors at the front of the fixture are opened, a movable table within the fixture can be pulled out to facilitate the application of the spring assembly to be tested. The table with the spring to be tested is then pushed into place in the fixture and the eccentric rollers supporting the table are released to provide complete support for the spring. The protective front access doors are closed and locked in place before testing.

A hydraulic jack arrangement above the spring is actuated to apply force to locate the spring at the correct height for the test. A pressure gauge adjacent to the fixture shows the pounds of force applied to the spring. A pointer at the side of the fixture indicates the height of the spring under test.

To operate the spring tester, the directional valve, Fig. 25, is positioned so the ram will compress the spring when force is applied. The pump application valve is then opened to initiate the force to lower the spring below the static height to be measured. The directional valve is then placed in the neutral or non-directional position. The relieving valve is then opened slightly to adjust the hydraulic ram pressure to the static pressure at which the spring should be tested.

Check the loaded height of the complete spring set and individual springs per information given in the Service Data at end of this bulletin. Record the spring set height on the initial compression and color code the springs as described below.



COLOR CODING SPRINGS

A color code is used to indicate the loaded height of new springs. Brown paint is applied on springs or spring assemblies that are more than 1/16" but do not exceed 3/16" above the nominal static height specified for the spring. Nominal height is the spring height which is used for purposes of identification and as a base for the tolerance limits. Blue paint is applied on springs or spring assemblies that are 1/16" below to 1/16" above the nominal static height specified for the spring when under the specified load. Green paint is applied on springs or spring assemblies that are more than 1/16" but do not exceed 3/16" below the nominal static height specified.

White paint is applied on springs to identify springs or spring assemblies that are 3/16" to 5/16" below the nominal static height specified for the spring.

Springs that have been tested, color coded and qualified for use should be stored in a protected area to avoid the formation of rust and pits. Pits can cause stress concentration that may result in spring failure when under load. The springs should be stored in groups corresponding to their color code to make their selection easier.

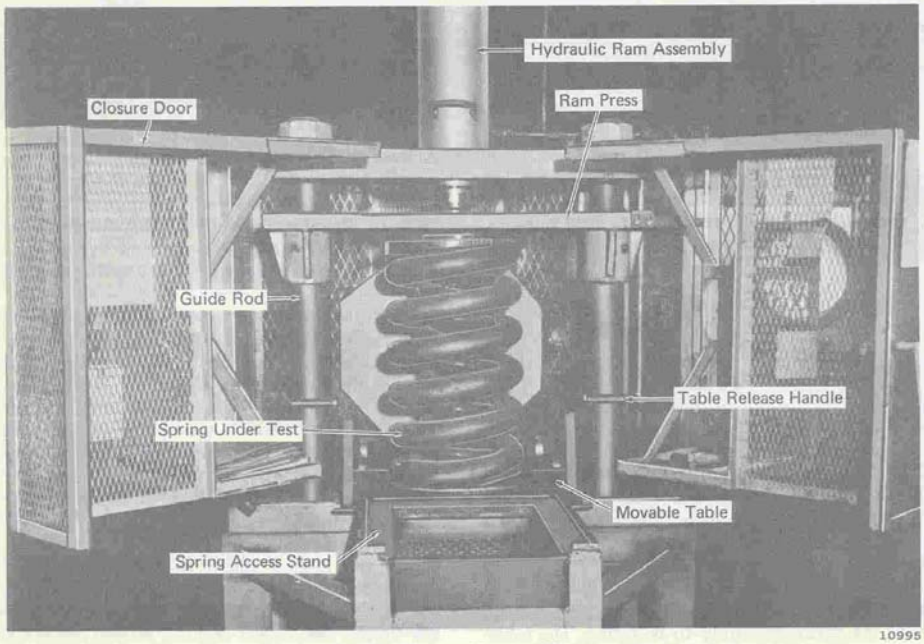


Fig. 25 – Spring Testing Fixture

When coil springs are removed from a truck assembly, check them for evidence of cracked or broken coils and replace the assembly if found defective. Recommended practice is to replace both spring sets on one spring seat if any coils have failed. However, if a satisfactory loaded height can be maintained on the old spring set, then the old set may be used. For best performance, individual coils should be matched in assemblies by color and assemblies should be matched as near as possible in trucks.

RUBBER BOLSTER SPRINGS

The secondary suspension consists of rubber springs, Fig. 26, used at four locations between the bolster and truck frame. One spring is used for either the basic weight or heavy weight locomotives. Since oil has a detrimental affect on the life of the rubber spring, care should be taken to keep grease and oil deposits on the rubber at a minimum.

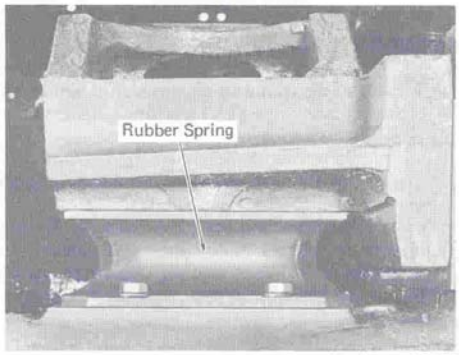


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Fig. 26 – Rubber Bolster Spring

When springs are removed from the truck, check them for cracks or tears in the rubber and replace those found defective. Replace any spring which is found to have a cut exceeding 1" in length and 1/4" in depth. Always replace the springs in sets of four according to their free height. When replacing, the free height of the springs should be held within 1/16" on one side of the truck, with a maximum free height variation of 1/8" between the four springs.

Rubber bolster springs are color coded as to their height at their rated load. When replacing them, be sure all springs on each individual truck are color coded the same.

SHOCK ABSORBER

The heavy duty shock absorbers, Fig. 27, mounted across the primary suspension at the center axle on each side of the frame, are designed to damp the vertical motion of the truck.

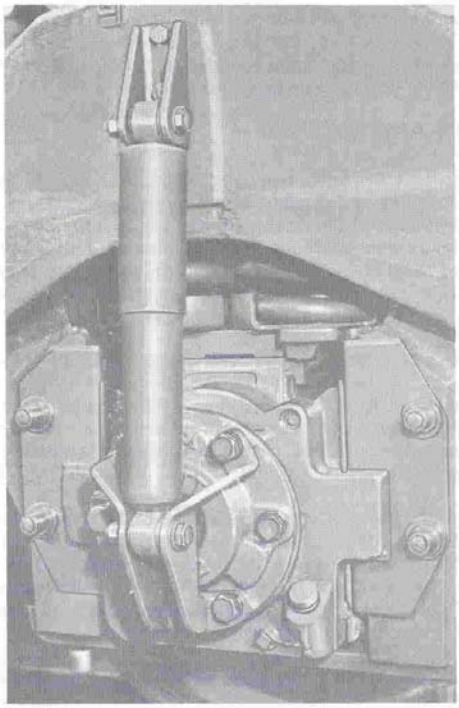

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Fig. 27 – Shock Absorber Installation

Inspect the shock absorber periodically for oil leaks. Leaking oil indicates a faulty seal and the shock absorber should be replaced.

Check the shock absorbers to see that they are tight and are not allowed to rotate. The mounting bolts should be torqued to 270 ft-lbs. If the shock absorber is found to be loose, the rubber grommets and the metal insert bushings should be inspected. The rubber grommets will develop small cracks during normal use, due to weathering and wear, however, they should be inspected for excessive cracking. The metal insert bushing should also be inspected for cracks. If either excessive cracking or wear of the rubber grommets or insert bushing exists the shock absorber should be replaced.

To provide the longest possible service life, the shock absorbers should be kept free of excessive amounts of oil and dirt.

When truing the wheels on the center axle, remove the journal box cover and loosen the upper mounting bolt of the hydraulic shock absorber. Then swing the shock absorber and the lower mounting bracket out of the way. Upon reassembly, the shock absorber mounting bolts must be torqued to the proper value as shown above.

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 1/16" should have both parts replaced. Never use a new pin with an old bushing or vice versa.

Cylinder levers, brake levers, and slack adjusters that are bent should be re-used only if they are restored to their original shape. Bolts and nuts that are not subject to wear can be re-used if they are not damaged but cotter pins should always be replaced.

A composition brake shoe is used in the single shoe brake system. Since erroneous installation of cast iron brake shoes to the single shoe brake system would result in low braking effort, the brake heads have been designed so that application of the cast iron shoes is impossible.

A screw type brake shoe slack adjuster has been developed to accommodate wheel size variation from 37" to 42-1/2". Slack adjustment can be made by raising the hinged lock, and turning the slack adjuster screw, Fig. 28, until the brake shoe clears the wheel by at least 3/8". Brake cylinder travel should be 1-1/8".

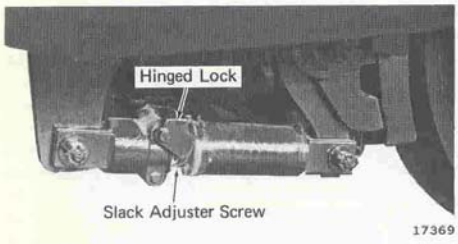

Fig. 28 – Screw Type Brake Shoe Slack Adjustment

A pin type slack adjuster, Fig. 29, is available upon request. To adjust the pin type assembly, unlock the pin lever and remove the pin. Move the rod assembly in or out of the tube assembly until the brake shoe clears the wheel by at least 3/8". Be sure the pin assembly holes are aligned in the rod and tube and re-install the pin assembly, then turn the pin lever to the locked position.

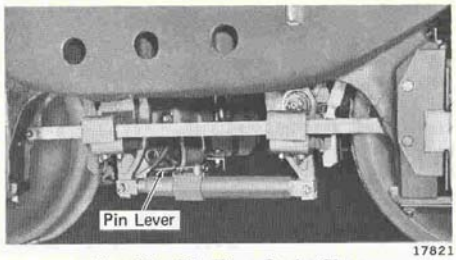

Fig. 29 – Pin Type Brake Shoe Slack Adjustment

ASSEMBLY OF TRUCK

1. Set the truck frame in an inverted position on blocks at any convenient working height.

2. Install the traction motor nose suspension assembly in place between the frame lugs. Compress the suspension pack assembly by placing temporary blocks under the nose suspension assembly bolt heads and tightening the nuts. Install the suspension pack retainer pin and pin keepers.

3. Install coil spring assemblies, spring seats, spring shims, and pedestal liners and bolt in place where required.

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

5. Install pre-assembled wheel, axle and motor assemblies in place by lifting the assembly with a lifting fixture similar to the one in Fig. 30 and lowering between the truck frame pedestals until the journal boxes rest on the coil spring seats.

6. Install the pedestal tie bars, remainder of brake rigging, and sander guide assemblies.

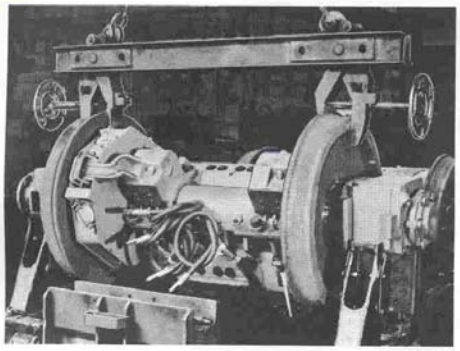

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Fig. 30 – Installing Wheel And Axle Assembly

7. Turn the truck assembly over on its wheels and install air brake piping, brake cylinders and shock absorbers.

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

9. Install center bearing wear plate and wear ring. Apply a light coat of grease to the dust guard and install on the center casting.

10. Add 6-1/2 pints of lubricating oil or enough to cover center bearing wear plate by 1/16".

SERVICE DATA

SPECIFICATIONS

TRUCK SPRING DATA

	Part Number	Free Height	Nominal Static Height	Static Load (lbs.)
Journal Springs				
Basic – 360,000 - 390,000 lbs. locomotive weight	8433006 (Assy.)		14.11"	14,150
	8433003	18-5/8"	14-1/8"	10,700
	8433004	18-5/8"	14-1/8"	3,450
Heavy – 390,000 - 420,000 lbs. locomotive weight	8433007	18-5/8"	14.08"	15,300
	8433003	18-5/8"	14-1/16"	10,700
	8433005	18-5/8"	14-1/16"	4,600
Rubber Bolster Pad	8433137	3-11/16"	2-7/8"	43,000

EQUIPMENT

Pinion protector	8054871
Compression Fixture	File 454
Tram Marking Tool	File 615
Spring Testing Machine	File 647
Pedestal Liner Pressing Tool	File 649

NOTE: File drawings can be obtained by contacting Electro-Motive Division Service Department, LaGrange, Ill.

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