



M AINTENANCE I NSTRUCTION

SERVICE DEPARTMENT · ELECTRO-MOTIVE DIVISION · GENERAL MOTORS · LAGRANGE, ILLINOIS

LOCOMOTIVE TRUCK ASSEMBLIES SWING HANGER AND SWITCHER TRUCKS

INTRODUCTION

This bulletin covers two basic types of trucks, the swing hanger trucks, Fig. 1, and the rigid (switcher) truck, Fig. 2. Two different models of swing hanger trucks are manufactured. One, a four wheel two motor truck is used in all GP and "F" type freight locomotives and the other, a six wheel two motor truck, is used in all "E" type locomotives. The four wheel two motor rigid truck with the bolster and frame cast as a unit, is used only in switchers.

DESCRIPTION

The 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 nullify these stresses so they will not be transmitted to the locomotive underframe and the equipment mounted on the underframe.

The locomotive tractive horsepower is supplied to the traction motors. The motors are geared to the driving axles which in turn apply this force to the rail through the wheels. The tractive force is transmitted through the axle journal boxes 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 plate to move the locomotive and supply the locomotive draw bar horsepower.

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

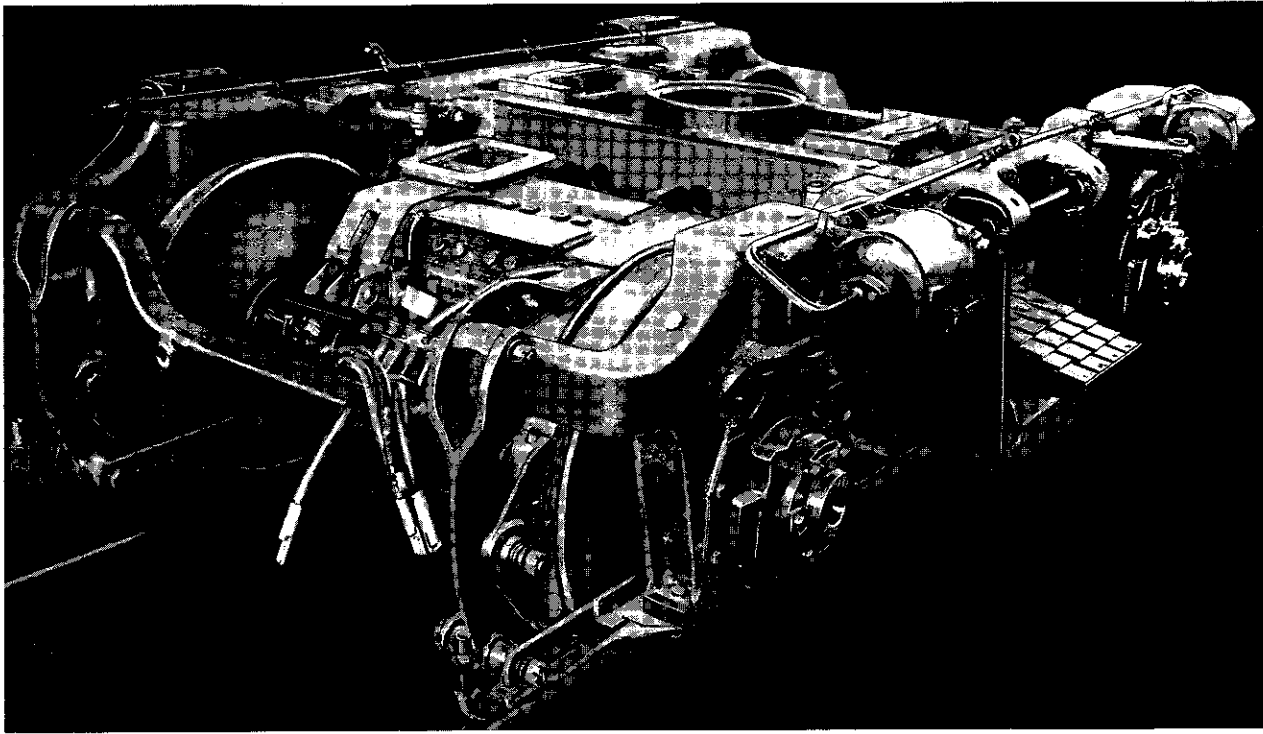
SWING HANGER TRUCKS

The main frame of the swing hanger truck is supported on sets or nests of coil springs, two of which are above each journal box on the four wheel swing hanger truck and two of which are seated in each spring dome on the six wheel swing hanger truck. On the four wheel truck the journal box transmits the load directly from the springs to the axle but on the six wheel truck, equalizer bars spanning the center and end journal boxes, distribute the load from four sets of springs to the six journal boxes.

Each journal box is held between the pedestal jaws, which are an integral part of the frame. Each pair of pedestals is joined at the bottom by a pedestal tie bar, which is an important part of the weight carrying system. Renewable pedestal liners and journal box wear plates provide control of clearances between the pedestals and journal boxes.

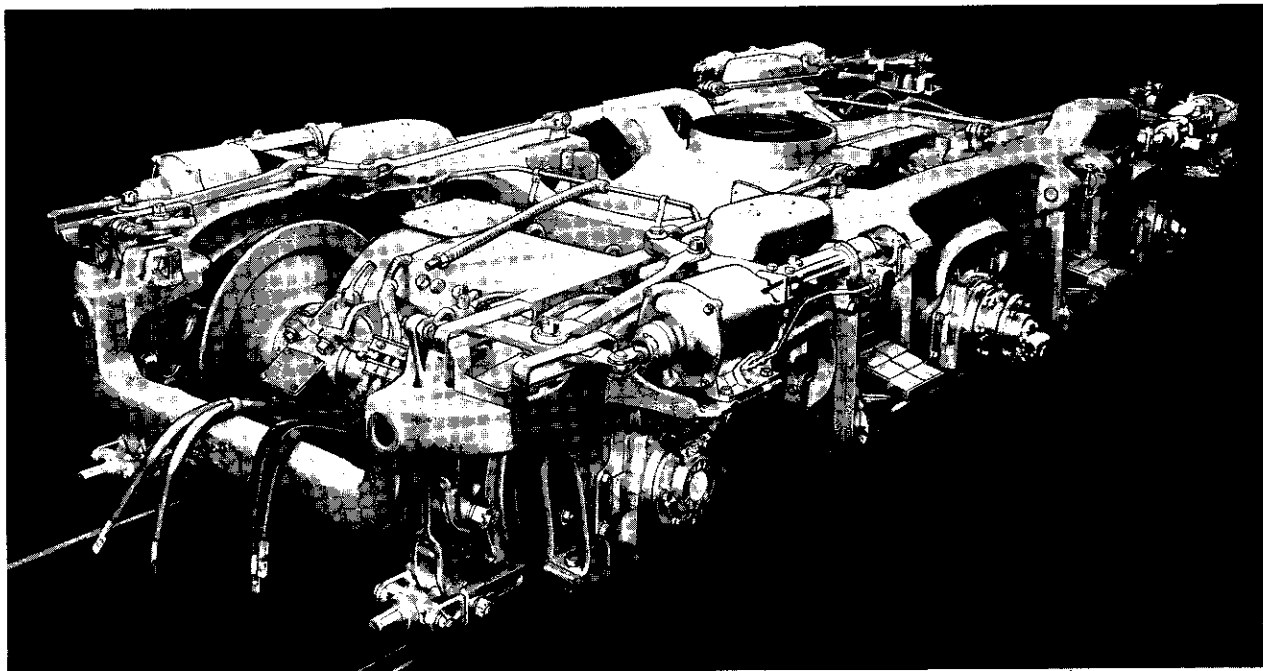
Bosses on both sides of the frames are provided to support the swing hangers, which carry the spring plank. Two spring

*This bulletin supersedes all issues of M.I. 1215.



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Four Wheel



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Six Wheel

Fig. 1 — Four Wheel And Six Wheel Swing Hanger
Truck Assemblies

planks are used on the six wheel truck. Full elliptic springs at each end of the spring plank support the bolster, which is confined between the insides of the frame transoms.

Driving or braking forces are transferred from the frame transoms to the bolster. Wear plates on the inside surface of each transom contact mating wear surfaces on the bolster. The bolster center bearing, in

turn, transfers these motive forces to the carbody center bearing. Side bearings on the truck bolster and matching devices on the carbody limit the lean of the locomotive. Clips bolted to the carbody side bearings hook under the bolster side bearings to allow rotary movement between the carbody truck bolsters but prevent separation of the bolster from the carbody underframe. They also provide anti-slewing protection in case of derailments.

Traction motors are supported on their respective drive axles and at the traction motor nose suspension assembly mounted on the transom. The six wheel truck bolster center casting is designed so that traction motor cooling air can be forced down through it into both traction motors.

Brake cylinder pistons are connected to brake levers to actuate the brake rigging. On the four wheel truck each cylinder actuates the brakes on one wheel, but on the six wheel truck each brake cylinder actuates the linkage to three shoes - two on the end wheel and one on the idler wheel.

SWITCHER TRUCKS

The four wheel switcher truck, Fig. 2, is referred to as a rigid truck since the

bolster and frame are a one piece casting, with no lateral motion being provided between them.

The side frames of the truck are joined at the ends by offset end transoms and at the middle by the integral bolster. The center bearing receives the mating carbody center plate. The center bearing has a circular opening which serves as an air duct for the cooling air to the traction motors. A rectangular opening is provided at each side of the hollow bolster to duct the cooling air through flexible rubber ducts which are connected to the bolster and the traction motor.

The weight supported by the frame is transferred to the journal boxes through a pair of equalizers spanning the boxes, plus a spring system on each side of the frame. A pair of double coil springs and a semi-elliptic spring is held between each pair of equalizers and the side frame. The coil spring upper ends are contained in spring pockets in the frame and supported on spring seats mounted on the equalizers. The ends of the elliptic springs are supported on spring hangers.

Two traction motors, facing opposite directions, are supported on their respective

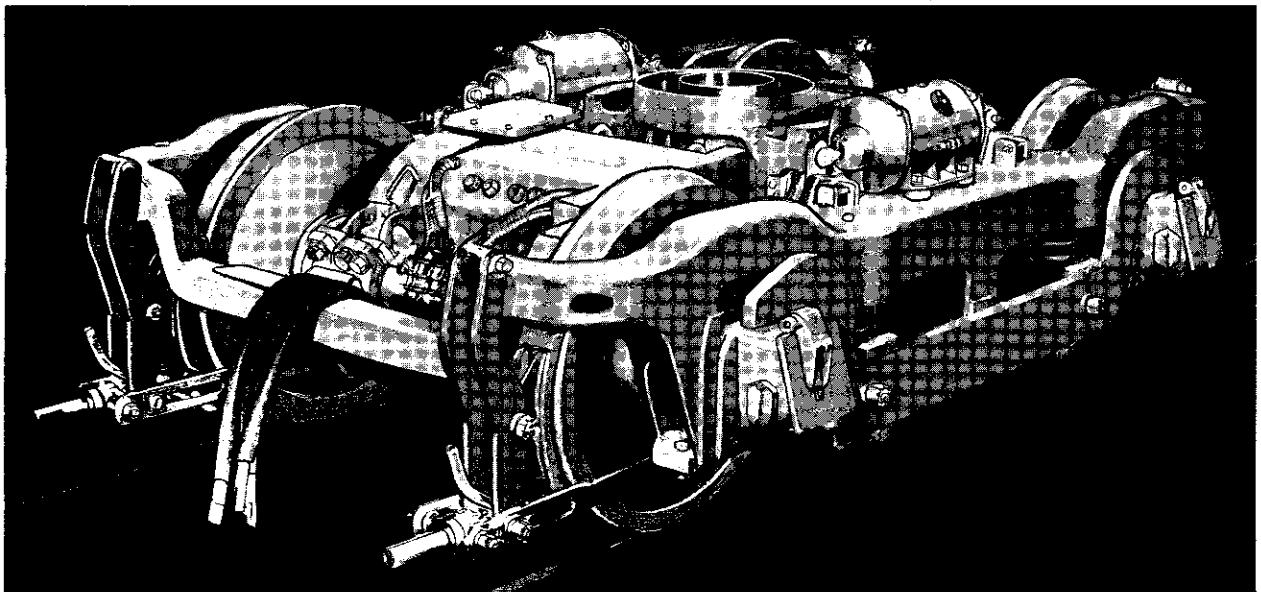


Fig. 2 — Switcher Truck Assembly

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drive axles and at the traction motor nose suspension assembly mounted on the transoms.

One brake cylinder containing two pistons is mounted on each side of the frame. Each cylinder actuates the clasp type friction brakes for both wheels on one side.

GENERAL 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, or roadbed dirt.

The engine should be running to supply air under pressure to the traction motors when the trucks are cleaned under the locomotive. To prevent any liquid spray from entering, the spray should not be directed at the motor air discharge openings.

LUBRICATION

The only periodic lubrication required on the truck itself is at the brake rigging slack adjusters, which should be greased in accordance with the applicable Maintenance Schedule.

The truck center bearing should have seven pints of oil added at the time the unit is trucked. On late model GP type units oil may be added through the fill pipe after trucking and at annual inspection.

No lubrication is required on journal box or pedestal jaw wearing surfaces, and special care should be taken to keep bolster and transom rubbing surfaces free of oil and 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

using a drop pit arrangement to support the locomotive while the trucks are being removed.

The truck safety interlocks or side bearing clips must be removed before any attempt is made to raise the locomotive for truck removal. The safety interlocks are bolted to the underside of the carbody underframe and hook under the side bearings or adjacent to the center bearing on the bolster. On "E" type locomotives the body and truck interlocks are arranged so they can be released from inside the carbody. Access to these interlocks is through removable plates provided on the floor above the interlock wedges. Make certain that all other physical connections between the trucks and the carbody are disconnected. These include the air brake equipment, sanding equipment, traction motor cables, hand brake chain and speed recorder connection.

When jacks are used and only one truck is to be removed, the locomotive should be raised at the opposite truck until the carbody center bearing clears the truck center bearing to prevent damage to the truck center bearing. The end of the locomotive at which the truck is being removed may then be raised as necessary to allow removal of the truck.

Care must be taken that the two jacks at the end of the locomotive are raised equal amounts. This will assure that each jack takes its share of the load, otherwise the carbody might be sprung out of shape. The locomotive should be supported on blocking if it is to be held in a raised position. It may be necessary to block under the coupler pocket on switcher locomotives so the jacks can be removed and the truck removed sideways. Care must be taken to properly block the locomotive to ensure lateral stability.

Various facility drawings are available covering items used in removing and handling of trucks. A listing of these blueprints

and file drawing numbers is given in the Service Tools Catalog.

TANK CLEANING OF INDIVIDUAL TRUCKS

When the truck assembly is removed from the locomotive, the traction motors, wheels, axles, journal boxes, brake cylinders and automatic slack adjusters 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 with hot water. Brake slack adjuster screws should be greased immediately to prevent rust.

COMPLETE TRUCK DISASSEMBLY

The following general procedure for truck disassembly can be applied to all trucks. Since all models are covered in this procedure, some items will not be applicable in all cases.

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 such as brake cylinders, piping and brake rigging, mounted on the truck frame.
3. If space and facilities are available, a considerable saving of time can be made by working the truck from this point on in an upside down position. A turnover fixture can be made for end over end turn over by obtaining File Drawing 250 (293 for "E" locomotives), available upon request from Electro-Motive Service Department, La Grange. This fixture is used in conjunction with an overhead crane. Sufficient head room must be available to accommodate the truck on end.

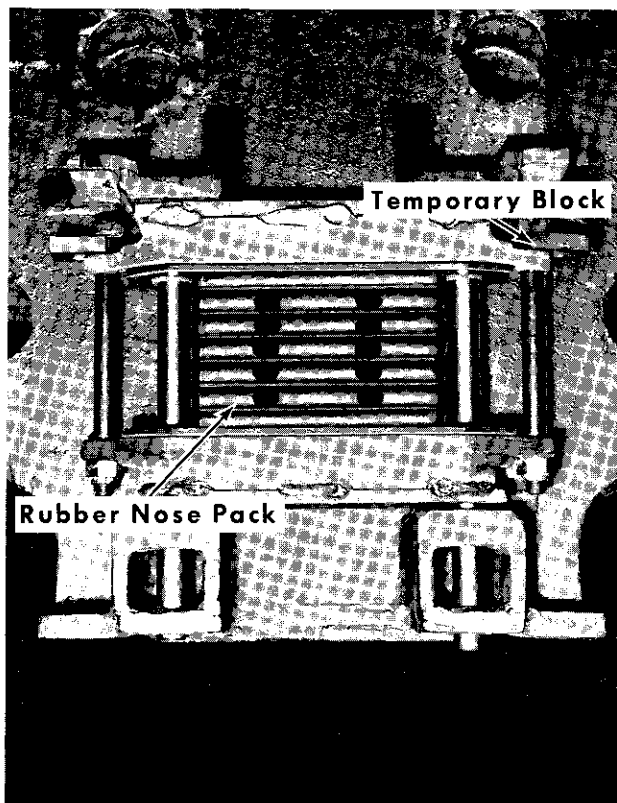
It is now possible to remove the motor, axle, wheels, journal boxes

and gear case as an assembly, rather than piece by piece. Removal of wear plates, springs, spring hangers, spring planks and traction motor nose suspension packs will be accomplished with less labor and more safety in this inverted position.

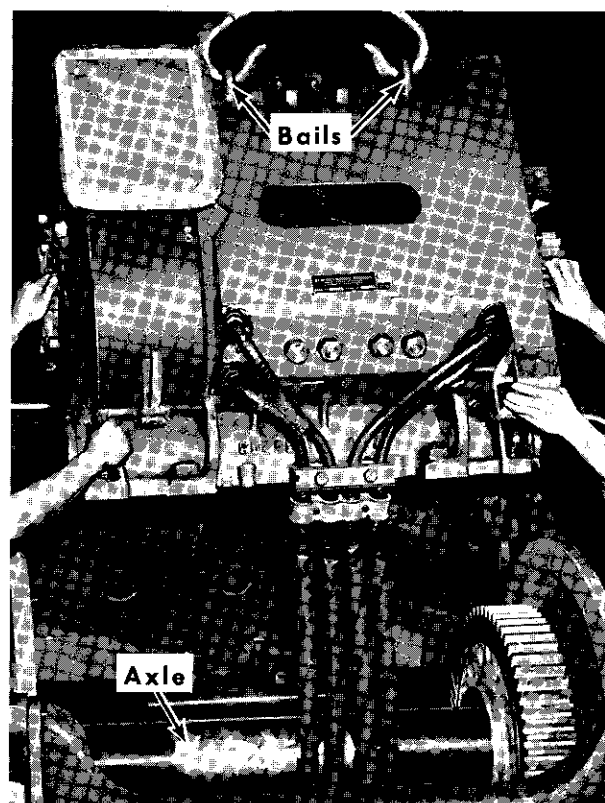
If the upside down method cannot be used, the following procedure may be used.

4. Remove the traction 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 guard 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 temporary blocks about 3/4" thick between the spring holder and bolts as indicated in Fig. 3.
 - 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. 3. Then lift the motor assembly clear of the axle and place it on the floor.

NOTE: Use care in lifting the motor so the support bearings will not fall and be damaged. Pinion protector 8054871 should be



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Fig. 3 -- Removing Traction Motor From Truck

- applied to the motor to prevent damage to the motor after it has been removed. The support bearing caps should also be re-applied at their original location on the motor so the original alignment will be retained.
5. Remove the remaining brake equipment on the truck and turn it over with a hoisting crane.
 6. Remove the pedestal tie bars and then the wheel, axle and journal box assemblies.
 7. On the six wheel swing hanger trucks, remove the bolts holding the spring seats and remove the equalizers.
 8. Remove the pedestal liners, spring seats and coil springs.
 9. Remove the safety hanger straps from the swing hanger trucks.
 10. Compress the elliptic springs; release and remove the swing hangers and swing hanger blocks.
 11. Remove the spring plank(s) and the elliptic springs, then remove the bolster assemblies.

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 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. Broken cast sections may be duplicated with a like shape made from MS-4361 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 from loose rivets 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 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.

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 tapped. An alternate method of reclaiming unsatisfactory threaded holes is to retap them to accomodate 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 and washers.

BOLSTER

The bolster, Figs. 5 and 6, 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. The switcher bolster is an integral part of the truck frame.

A dust guard, Fig. 4, around the two mating parts prevents the entrance of moisture and dirt. The dust guard recess at the top of the center plate receptacle must be free of nicks and burrs which might cut or damage the dust guard boot.

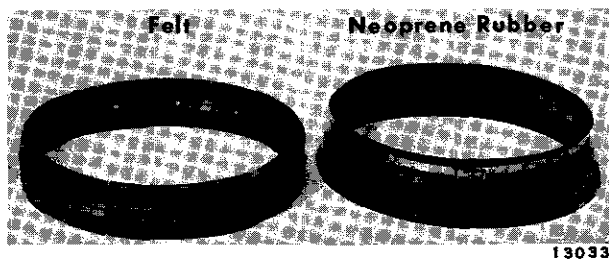


Fig. 4 — Center Bearing Dust Guard

Some early four wheel swing hanger truck bolsters were manufactured with two 1-1/2" wide slots at the top of the center plate receptacle ring. These slots were cut 3/16" below the surface which contacts the dust guard boot. To maintain a dust seal, these slots must be built up with weld and ground smooth on the inner edges to prevent cutting the dust guard boot.

The vertical height from the elliptic spring seat to the center plate on the four wheel swing hanger truck should be 14-7/16" to 14-13/16". If this dimension is 14-3/16" to 14-7/16" the bolster may be used but must be coded for identification when assembling the truck so that a 1/4" thick shim can be applied between the swing hanger and the lower bearing block to compensate for the height deviation. If not corrected, this deviation will result in less clearance between the truckframe and the underframe and possibly cause brake cylinder piping interference.

The vertical height from the bolster side bearing to the center plate on the four wheel swing hanger truck should be maximum 4-5/16" to minimum 4-1/8". If the height exceeds 4-5/16" the side bearing can be machined or ground to within limits providing the side bearing section will not be less than 5/8".

FRAME AND BOLSTER WEAR PLATES

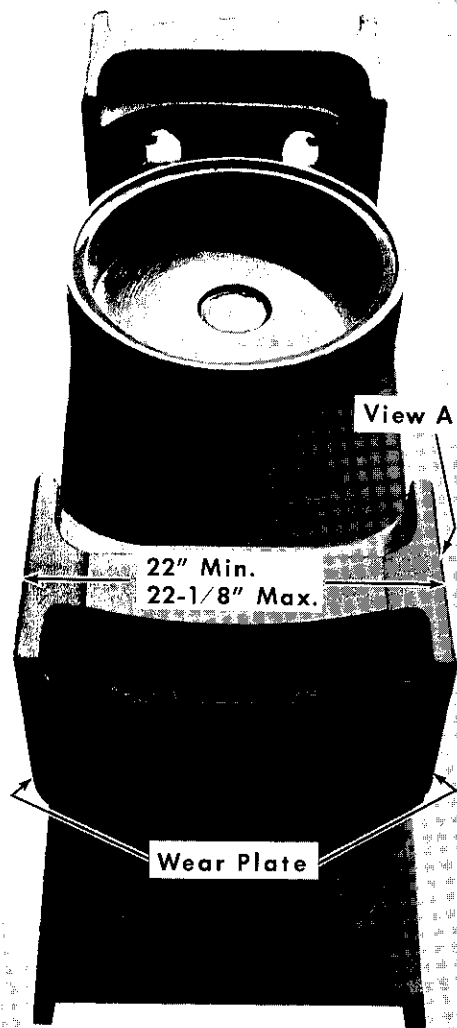
The wear plates on the truck frame and bolster wear as a result of movement between these surfaces. If the clearance exceeds the limits given in Figs. 5 and 6,

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

Original wear plates applied to the bolster and frame transom and bolster on the six wheel swing hanger trucks were applied using 3/4" x 2" round head rivets. Replacement wear plates should be applied by tack welding as shown in Fig. 6. The riveted wear plates can be removed by drilling into the flat head of the rivet with a 7/8" drill. After the wear plate has been removed, drive the wear plate rivets below the mounting pad surface and secure in position with a fillet weld, Fig. 6. This will seal the holes and provide a backing for a plug weld of the existing holes in the replacement wear plate.

Prior to the application of the new plate be sure that the mating surfaces of the parts to be welded are clean, smooth and flat. Use American Welding Society E-6016 electrodes or equivalent. During welding, the part should be held in the correct position and in full contact against its mating part. Care should also be taken that fillet welds are not higher than the wearing surface of the plates. Wear plates which have holes in the plate for welding should have the area of the holes welded first, as this will help to ensure contact at the center of the plate and prevent warping of the plate.

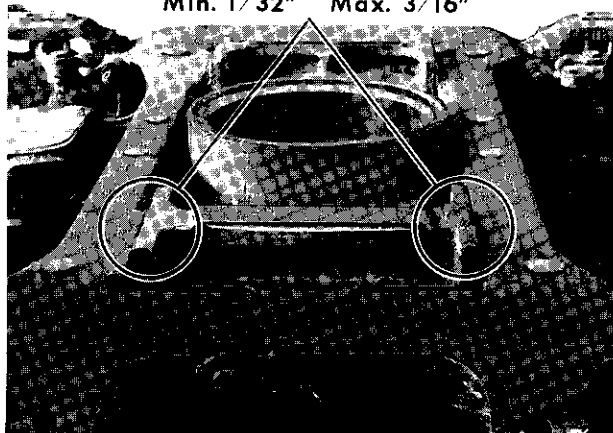
Bolster



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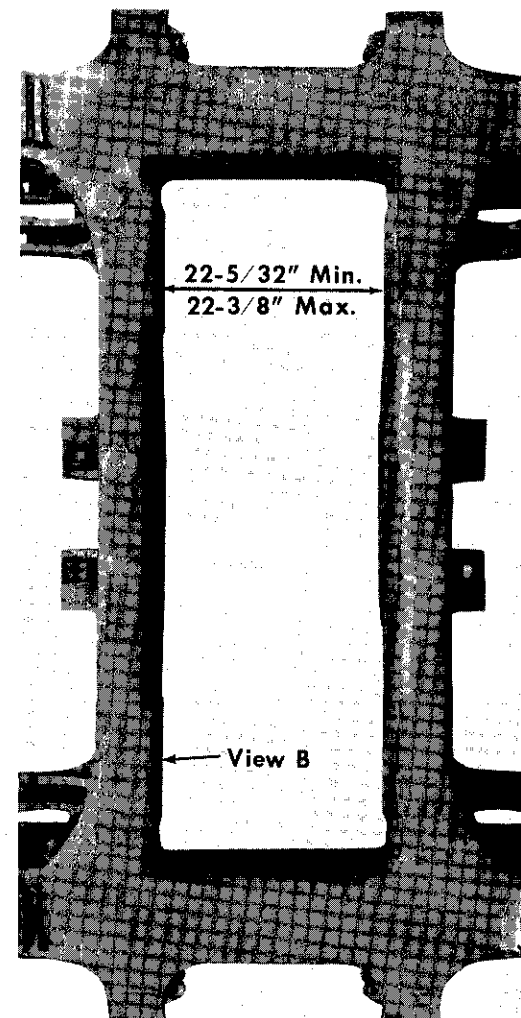
Bolster Installed

Bolster to frame clearance - each side
Min. 1/32" Max. 3/16"



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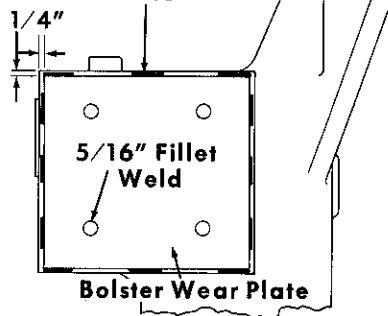
Bolster Pocket



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View A

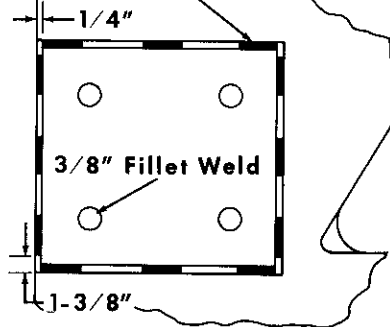
5/16"x2" fillet welds
5" centers on all four
sides



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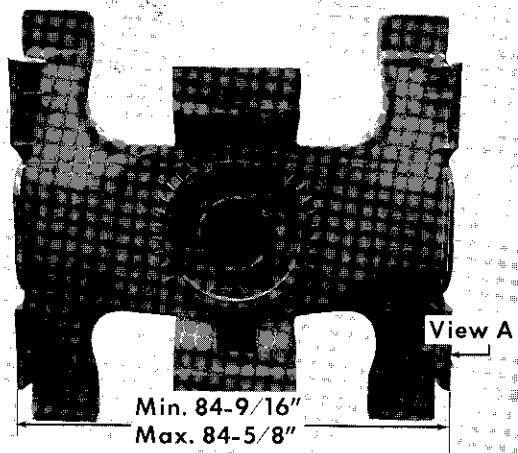
View B

3/8" Fillet Weld, 2" Long



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Fig. 5 - Four Wheel Swing Hanger And Bolster Transom Wear Plates



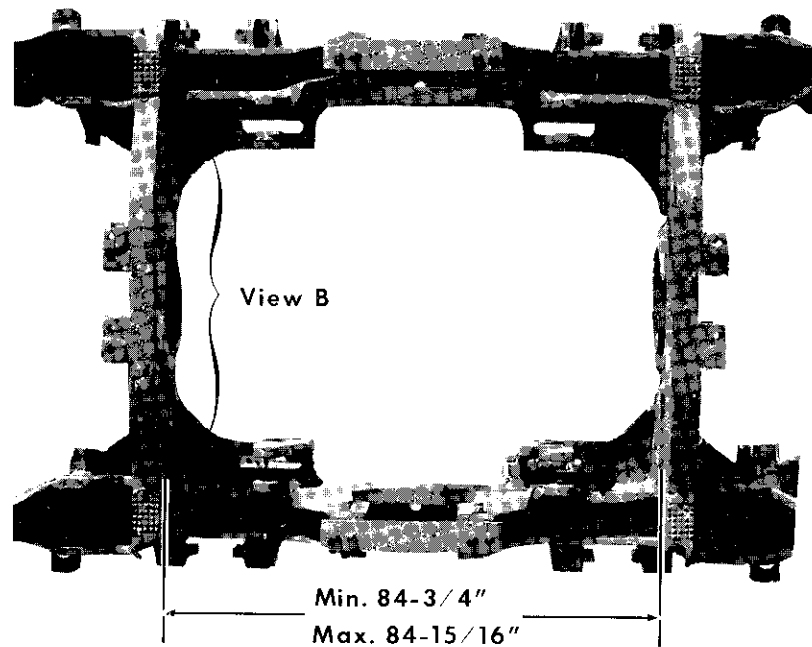
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Clearance
Between Bolster
And Frame With
Bolster Installed:

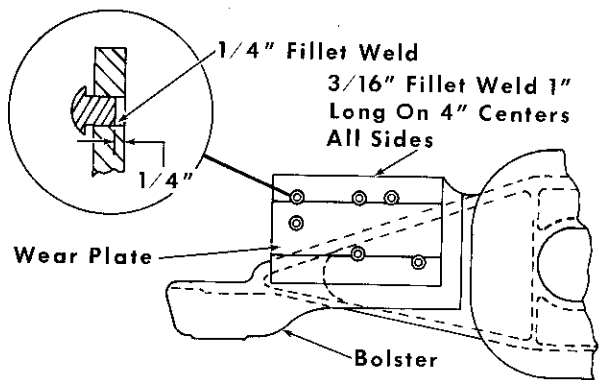
Per Side

Min. 1/16"

Max. 3/16"

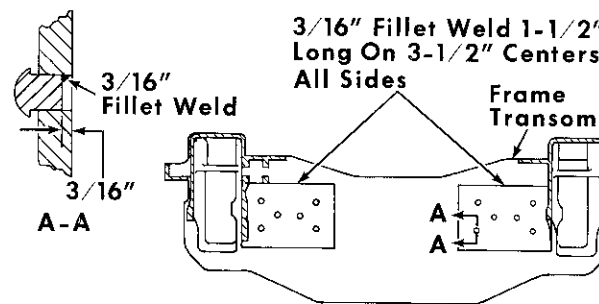


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View A



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View B

Fig. 6 — Six Wheel Swing Hanger Bolster And Bolster Transom Wear Plates

SIDE BEARING WEAR PLATES

The side bearing surfaces on the bolster are designed to mate with similar side bearings mounted beneath the carbody underframe as indicated in Fig. 7.

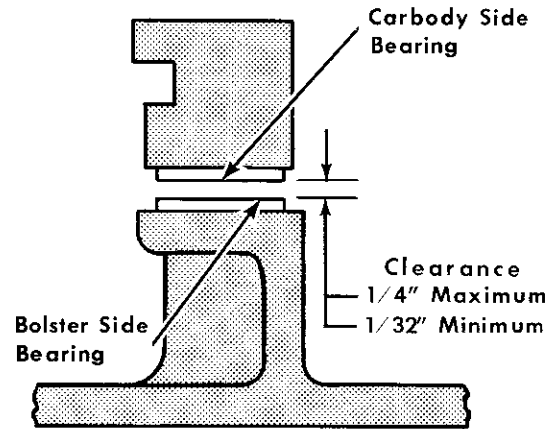
A clearance is provided between the truck bolster side bearings and the carbody side bearings during normal operation. Side bearings are designed to prevent excessive tilting or leaning of the locomotive but are not designed to carry a continuous load.

Side bearing clearance on a new assembly is $5/32$ " minimum to $1/4$ " maximum. The minimum side bearing clearance is $1/32$ ", as shown in Fig. 7. (The #2 truck on the switcher locomotives has a $3/8$ " minimum and $1/2$ " maximum limit.)

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

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

Apply new wear plates using a $1/4$ " fillet weld 3" long on each end and two evenly spaced 2" long fillet welds on each side of the four wheel swing hanger truck side bearing wear plate. The six wheel swing hanger truck side bearing should have a 2" long $1/4$ " fillet weld on the ends and two $1/4$ " fillet welds 2" long and 7" apart on the sides. The switcher side bearing wear plates are welded only on the side next to the center bearing with $3/8$ " fillet welds 2" long and 6" apart.



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Fig. 7 — Side Bearing Clearance

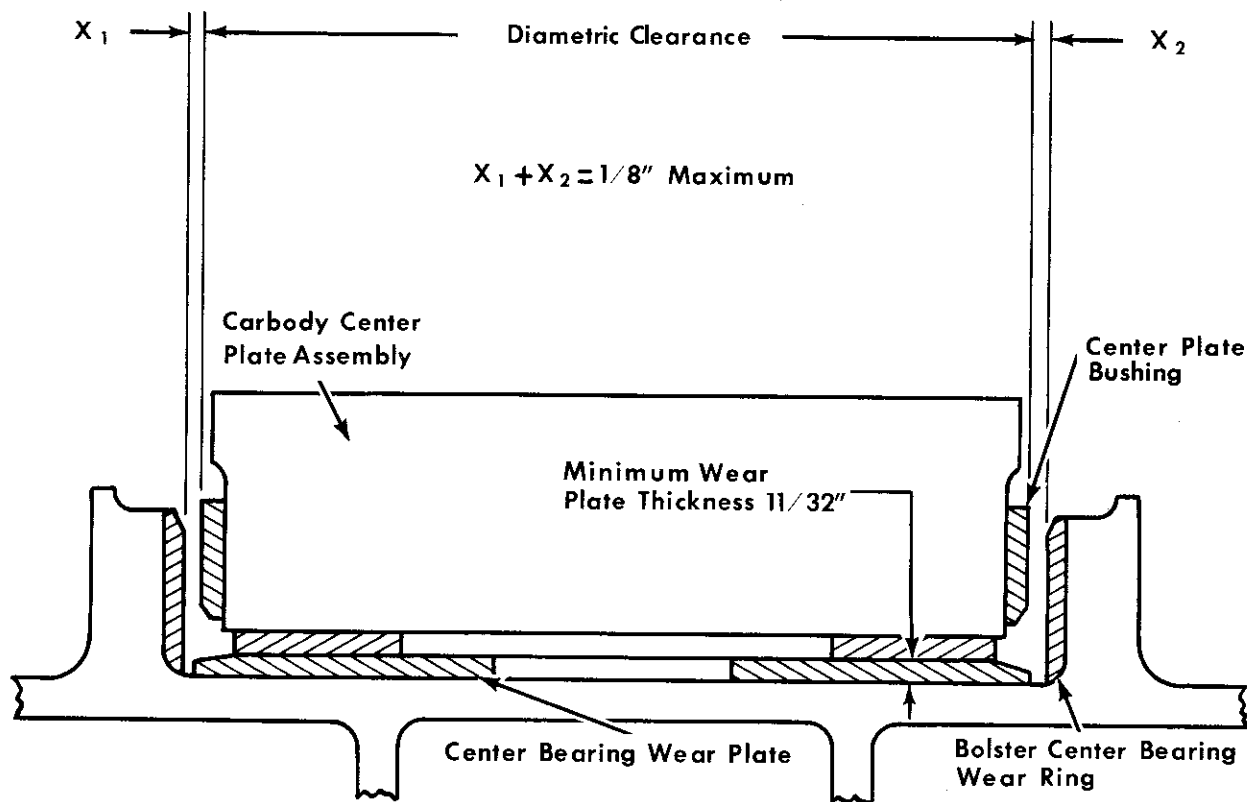
CENTER BEARING WEAR PLATES AND WEAR RING

As mentioned previously, side bearing wear close to the limit is usually an indication of wear at the center bearing wear plate. The limits for the center bearing wear plate are shown in Fig. 8. The thickness of the plate should be checked whenever the plate is accessible. If the plate thickness is above the minimum limit it may be used again.

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

Current center wear plates and wear rings, except for the switcher wear plate, are made of $3/8$ " thick laminated phenolic plates which have a longer service life than the previously used steel or bronze wear plates. The switcher wear plate is $1/2$ " thick when new.

Check the center casting inner ring to make sure there are no cracks or voids which might allow lubricating oil to leak out of the center bearing. This is especially important in the six wheel swing hanger and the switcher truck as any



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Fig. 8 — Bolster Center Bearing Clearance

lubricant that seeps into the center casting air duct could contribute to a traction motor failure. 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 class E-7016 electrode. Peen the second weld pass and each pass thereafter to minimize distortion. Grind off excess weld metal so the bearing surface of the center plate is flat within .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 ring. Check the replacement ring surfaces to see that they are smooth. Apply a lubricant to the outside diameter of the ring and apply the ring to the center bearing bore. The replacement ring has an interference fit in the bore, so it must be forced into position in the bolster center bearing.

PEDESTAL LINERS

Pedestal liners, Fig. 9, are provided to take the wear that occurs from the relative movement between the journal box and the pedestals. For convenience of replacement, the pedestal liners are bolted to the pedestal jaw on swing hanger trucks. Since switcher truck pedestal liners have a much longer service life than liners on trucks used in road service, the switcher truck pedestal liners are welded in place.

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. 10. The truck pedestal to journal box wear limits are shown in Fig. 11. If the clearances are beyond the maximum limits, the wear plates must be replaced. The wear plates must be checked for possible breaks or

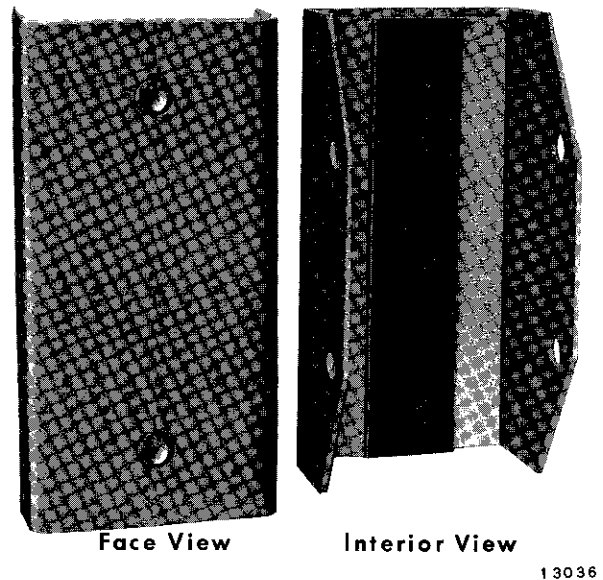
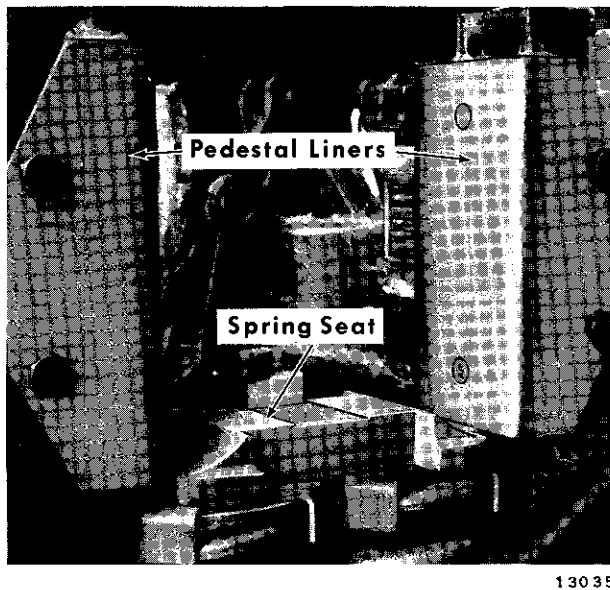


Fig. 9 — Pedestal Liners

cracks by visual and magnaflux inspection if they are to be reused.

The clearance between the journal box and the pedestal can be measured using feeler gauges. Feeler gauges must be approximately 1" wide and 12" long. Care should be taken in making this measurement to see that the gauge is inserted adequately into the clearance and that it fits into the wearing area so a true reading is obtained. All measurements should be taken with the journal boxes in the position they are in

when the locomotive is stopped. No attempt should be made to shift the journal boxes on the axle while the weight of the locomotive is supported by the boxes.

PEDESTAL LINER APPLICATION

Prior to the application of the pedestal liners, inspect the pedestal jaws to be sure that the surfaces are smooth and flat. On early model trucks, the pedestals were 1" narrower than on current models. To compensate for this difference, a filler, Fig. 12, was applied between the pedestal liner and pedestal on each side of the pedestal. These old filler plates may be used with a new liner if desired.

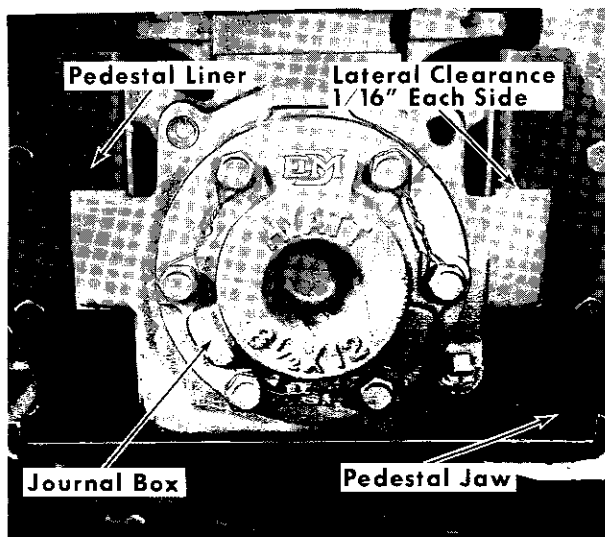


Fig. 10 — Pedestal Liner To Journal Box Clearance

Two types of pedestal liners are available. One is made of carbon steel and the other of manganese steel. The manganese steel liners provide increased liner life before replacement is necessary. The correct liner part numbers are given in the Parts Catalog.

The liners are installed as indicated in Fig. 13. The liners should fit tightly against the pedestal jaws with the mounting holes properly aligned. The mounting bolts

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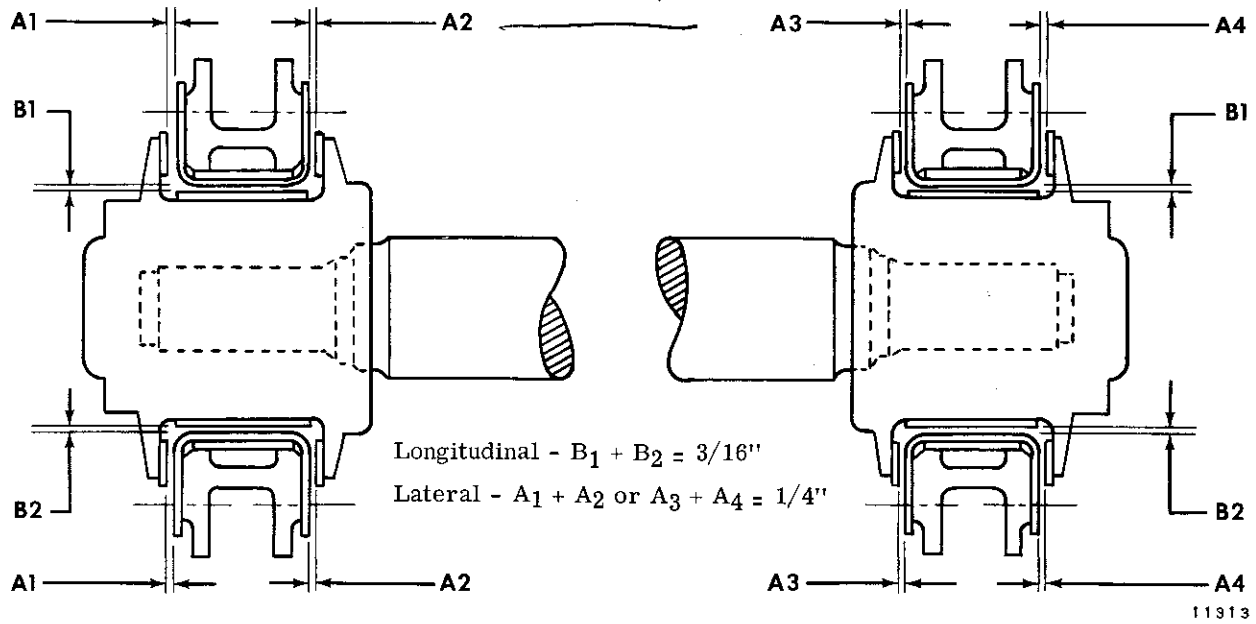


Fig. 11 — Pedestal To Journal Box Wear Limits

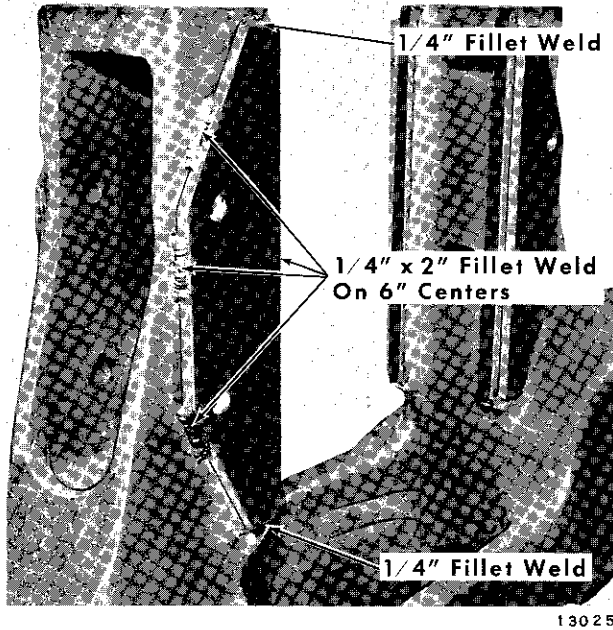


Fig. 12 — Pedestal Liner Filler Plate

should enter the liner and the pedestal holes freely, and should be thoroughly tightened. The longitudinal dimension between the pedestal liners is 15.011" minimum to 15.073" maximum on four wheel swing hanger trucks, 15.015" minimum to 15.102" maximum on six wheel swing hanger trucks and 11.069" minimum to 11.149" maximum on switcher trucks.

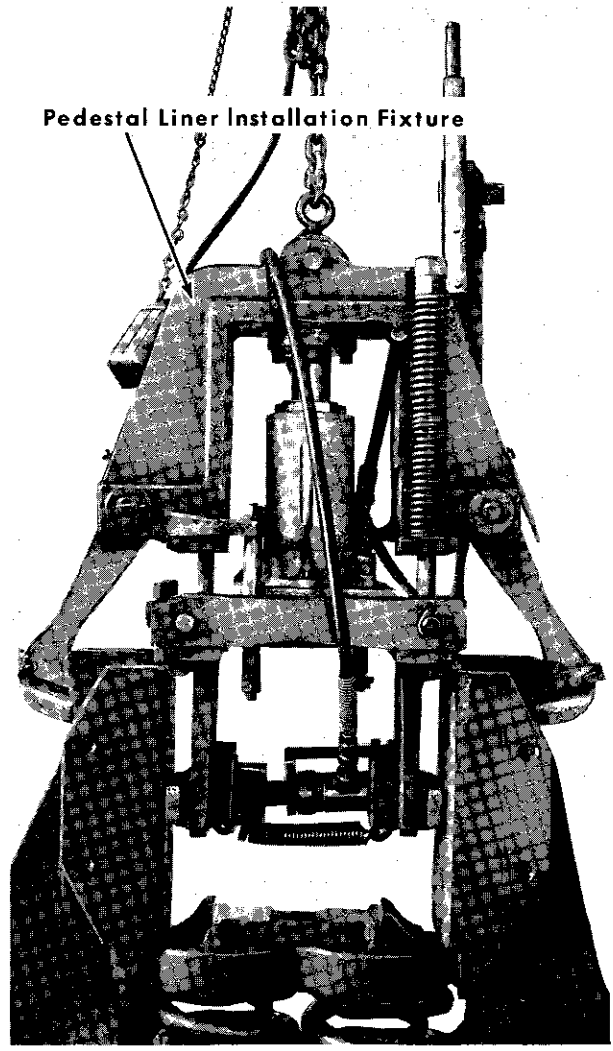
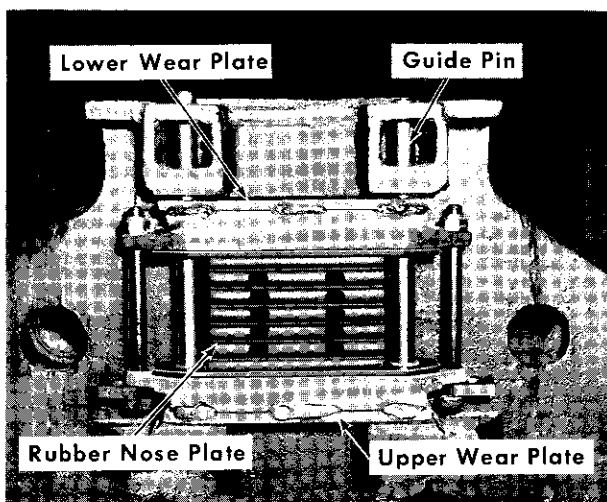
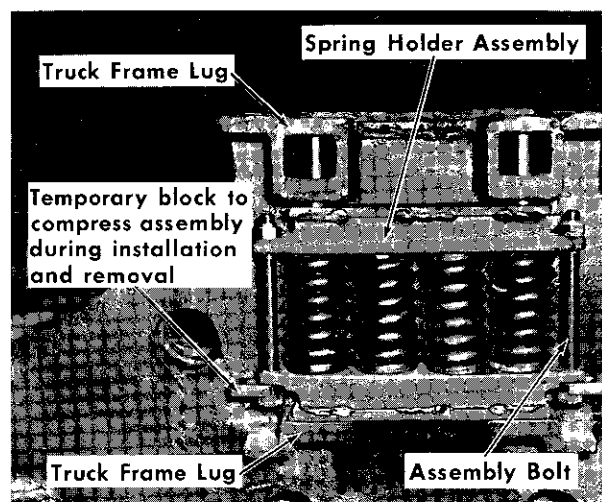


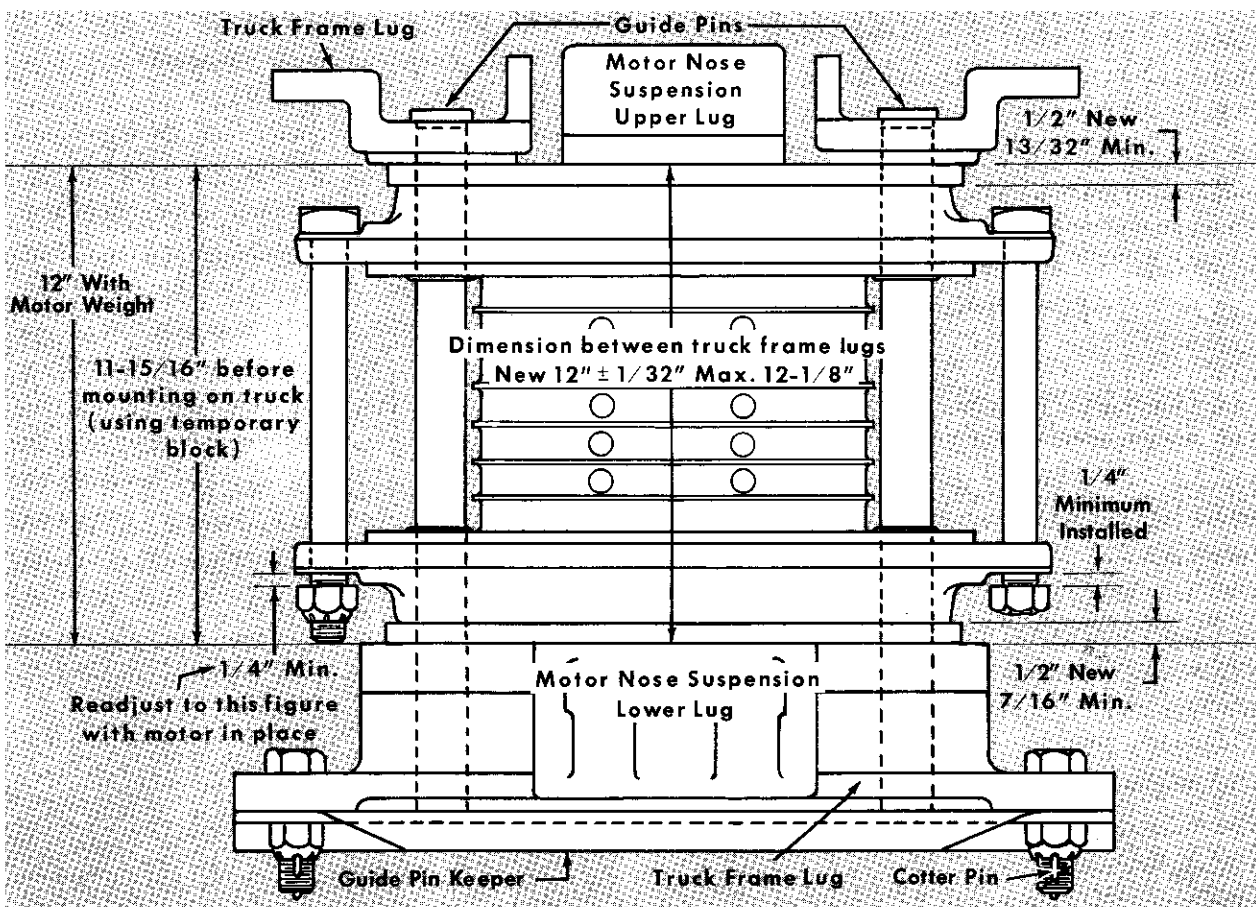
Fig. 13 — Pedestal Liner Application



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Fig. 14 - Traction Motor Nose Suspension

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 on 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 heavy lugs on the motor frame contacting the top and bottom of a rubber nose suspension pack that is fastened to the truck frame bolster as shown in Fig. 14. Older truck frames were

equipped with coil spring type suspension pack, Fig. 14. The coil spring type suspension pack should be replaced with the rubber suspension pack to improve traction motor performance, extend wear plate life and reduce wheel slip. The rubber suspension pack is completely interchangeable with the coil spring type and uses the same springholders, wear plates, pins and bolts.

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 if the wheels slip during rapid changes of torque.

Wear plates should be periodically reconditioned 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 upper and lower wear plates are identical so the lower wear plate, which has a minimum limit of 7/16", may be moved to the upper position where it will still be within the 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. A new manganese steel wear plate has been developed to obtain longer wear plate service life. The manganese steel wear plates are interchangeable on all locomotive models. The new

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 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 wear limit 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" \pm 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 on three sides of the plate 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 still be 12" \pm 1/32".



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Fig. 15 — Truck Frame Suspension Lug Wear Limits

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 lug 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

WHEEL BASE SPACING

The wheel base spacing is the measured distance between the transverse centerline of the truck and transverse line between the jaws of the pedestals or the dimension between the axle centerlines. These dimensions are shown in Figs. 16, 17 and 18.

It is first necessary to locate the truck frame transverse centerline or the middle axle centerline to obtain the wheelbase spacing. This can be done by centering a straight edge between the machined surfaces of the transom on a four wheel truck or by measuring between the middle pedestals on a six wheel truck.

The wheelbase dimension on four wheel trucks is obtained by placing a straight edge along the face of the pedestal jaw and measuring from this straight edge to the transverse centerline. To this dimension add 1/2 the distance measured between the pedestal jaws. On six wheel trucks, measure the distance between the pedestals as shown in Fig. 19. The wheelbase figures obtained should be within the limits given in Figs. 16, 17 and 18. The transverse centerline of the pedestals or axle centerline must be parallel to the transverse centerline of the truck.

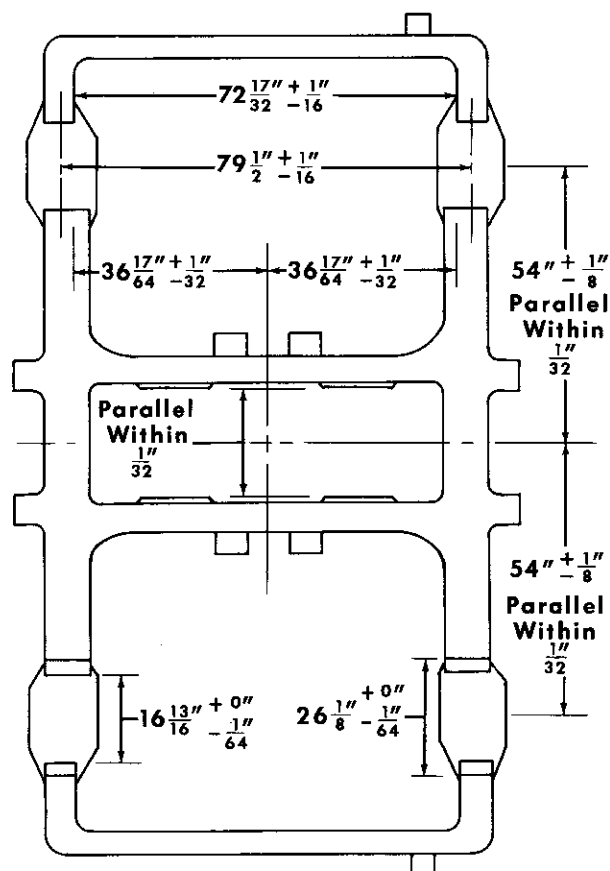
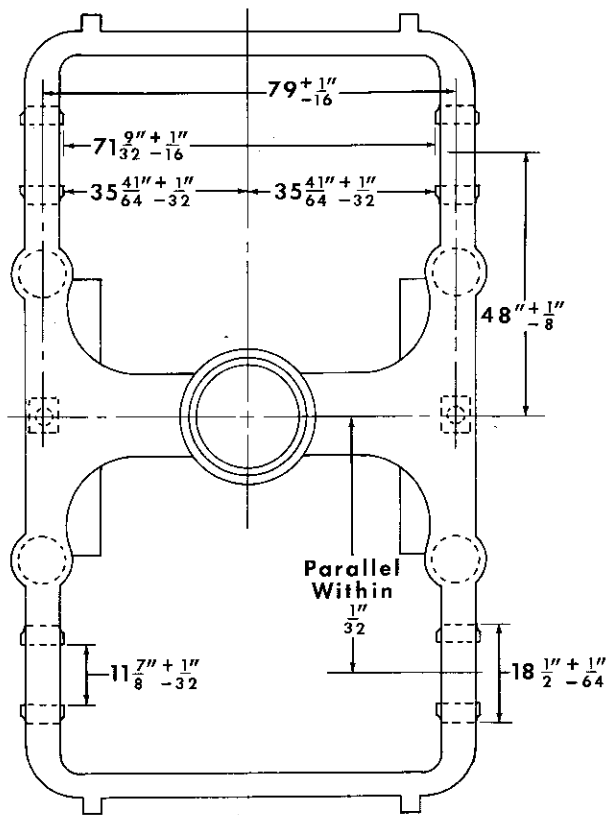


Fig. 16 — Four Wheel Swing Hanger Frame Dimensions

TRANSVERSE PEDESTAL SPACING

The transverse pedestal spacing refers to the dimension between the inside machined surface of pedestal jaws on opposite sides of the truck or between the inside machined surface of the pedestal jaw and the longitudinal centerline of the truck. The dimensions for the individual trucks are shown in Figs. 16, 17 and 18. The transverse measurements may be made as shown in Fig. 19. 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.



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Fig. 17 — Four Wheel Switcher Truck Frame Dimensions

LONGITUDINAL PEDESTAL SPACING

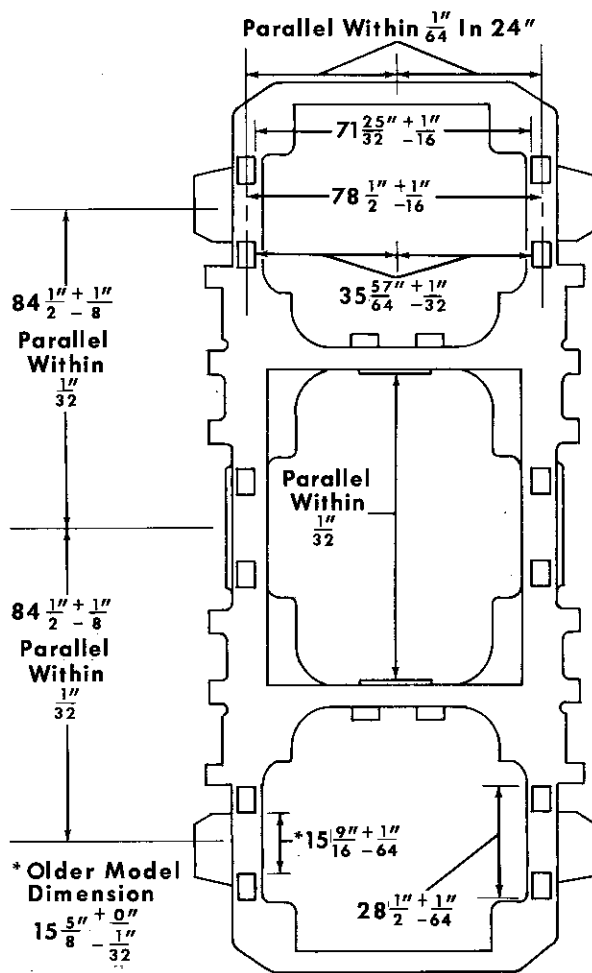
The longitudinal pedestal spacing refers to the distance between the inside surfaces of the pedestal jaws on the same side of the truck as indicated in Fig. 16, 17 and 18 for individual truck frames. Incorrect pedestal spacing is caused by a bent frame or bent pedestals, either of which requires straightening 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. 20. This alignment can be determined by measuring from a straight edge tool or wire spanning the pedestals, as shown in Fig. 20. Misalignment may be no more than 1/8" above or below the pedestal baseline. A condition in excess of this can only be corrected by straightening the truck frame.

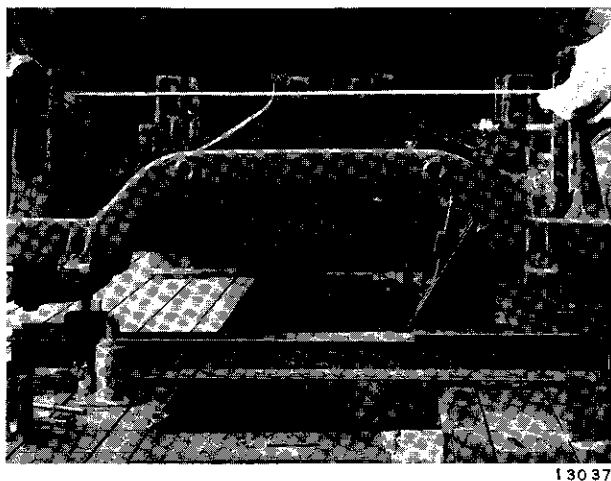
LOCATION OF JOURNAL BOX COIL SPRING SEATS

The centerline of the coil spring retainer seats should be held within 1/8" on either side of the centerline of the truck pedestal opening, as indicated in Fig. 20. The coil spring seat location should be checked for alignment when any rework is done on the pedestals. If the misalignment is more than 1/8" it may be corrected as indicated in Fig. 21. A section of each of the two spring seat flanges is flame cut and spread to accept the coil spring on the new center. Then spread the flanges to their new position and re-weld them as illustrated. Grind the new welds smooth so that no high spots remain which would cause localized loading on the coil springs.

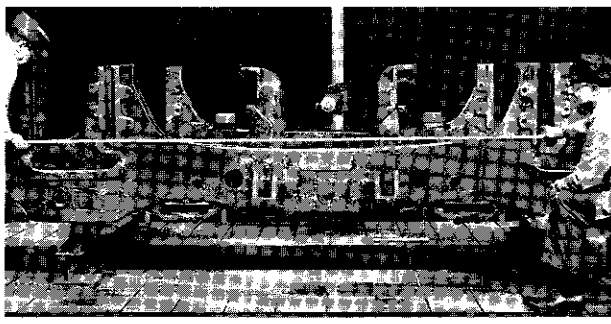


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Fig. 18 — Six Wheel Swing Hanger Frame Dimensions



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Fig. 19 — Measuring Wheelbase And Pedestal Spacing

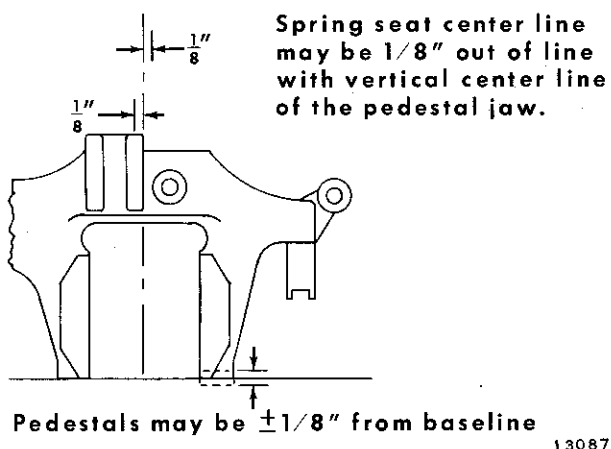
TRAMMING OF TRUCKS

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. 22, indicate which pairs of pedestals should have equal distances between them.

Tramming is accomplished using a trammel beam as shown in Fig. 23 with the truck frame inverted on a level table or level location. In addition to the diagonals shown in Fig. 22, it may be necessary to check the tram of the pedestals both longitudinally and transversely as indicated in Fig. 23.

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



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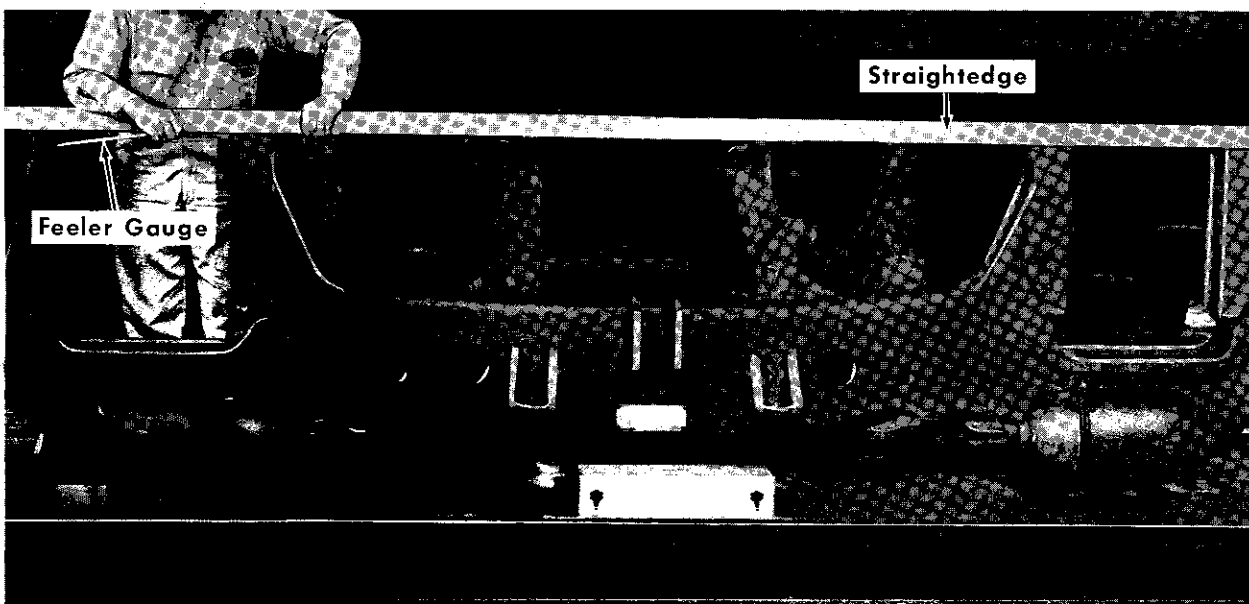


Fig. 20 — Pedestal Base Horizontal Alignment

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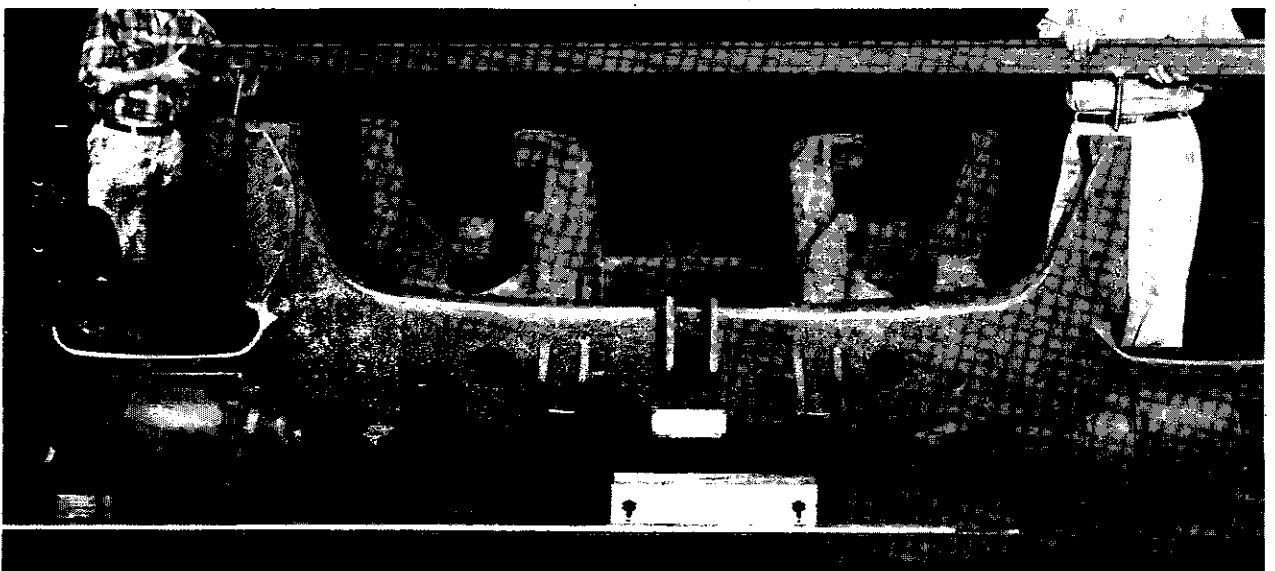
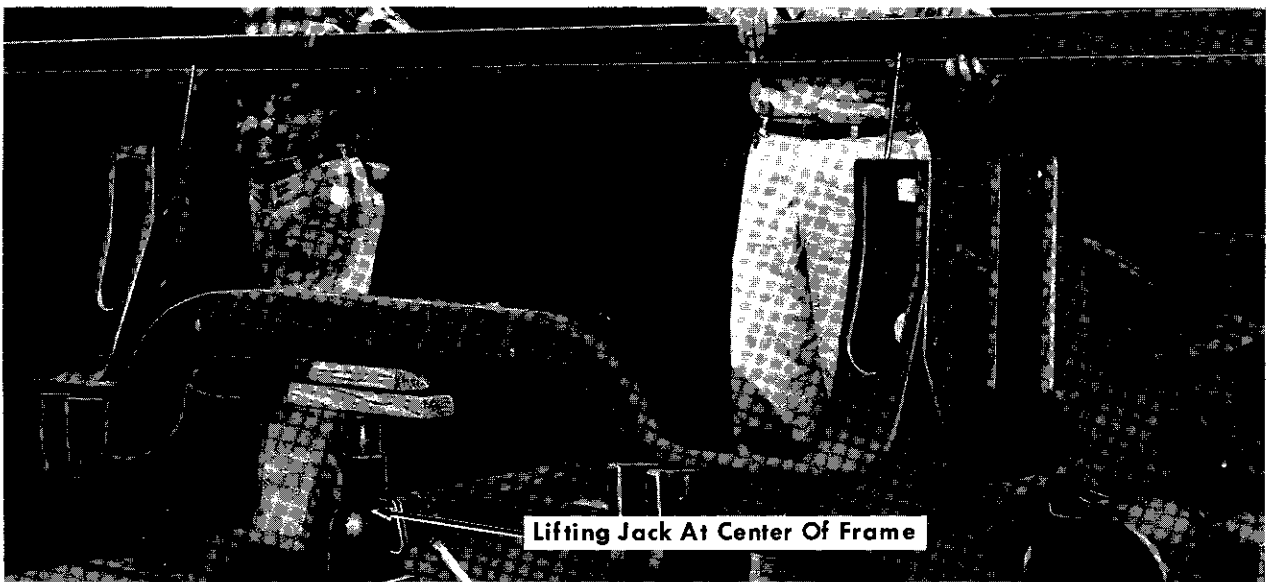
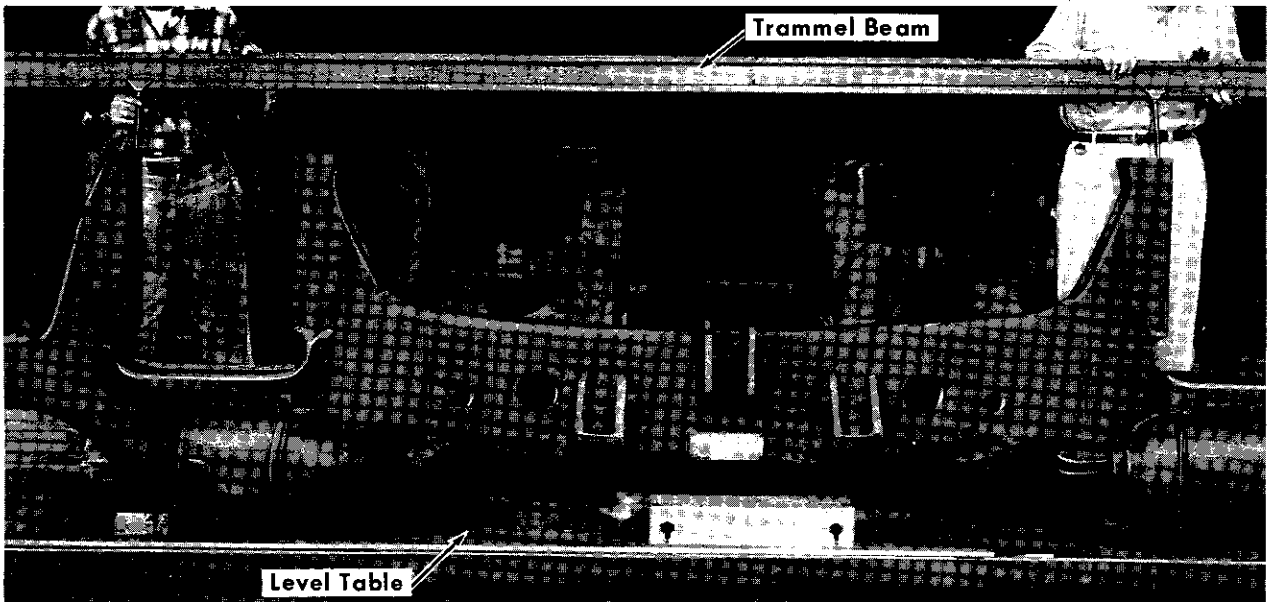


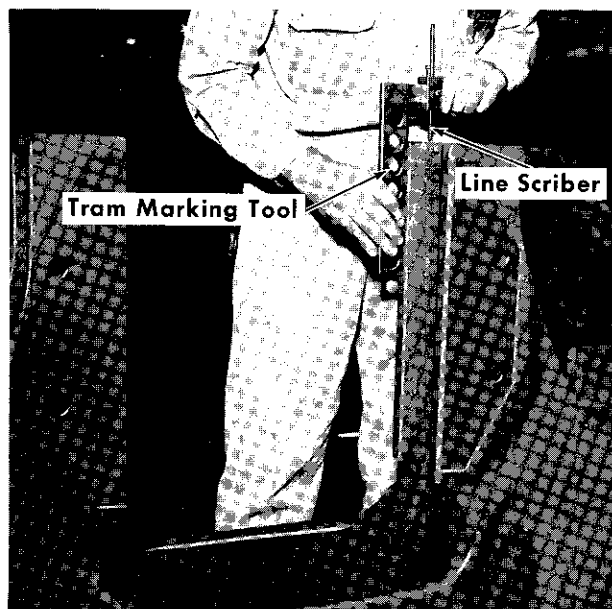
Fig. 23 — Application Of Trammel Beam Between Pedestals

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. 24 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 tramming mark and relocate a new mark.

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



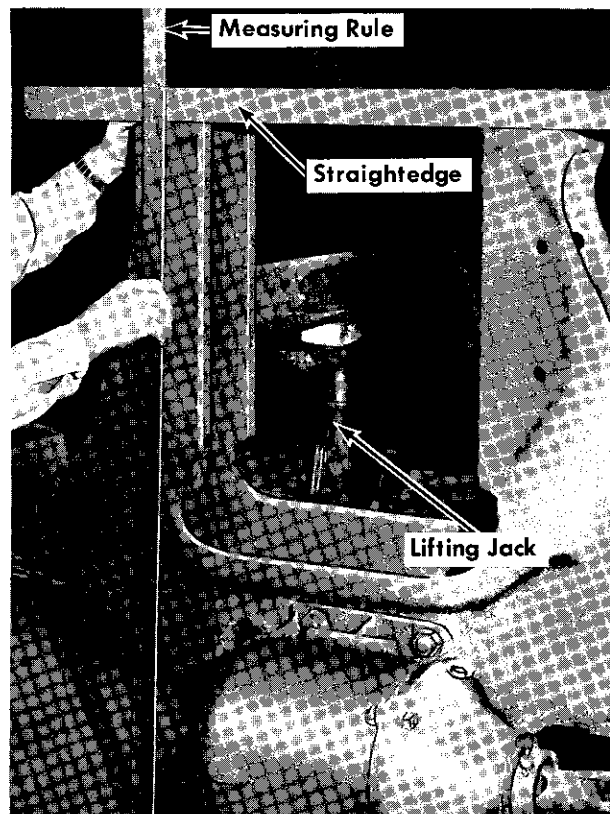
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Fig. 24 — Tram Marking Tool

opposite end of the frame, similar to the support shown in Fig. 23. The end supported by the two jacks is raised to any convenient height, and measured at the top of the end pedestals, Fig. 25. The end pedestals at the center supported end of the frame are raised to the same height as the other end. If one pedestal cannot be raised to a height equal to that of the other pedestal, it indicates that the frame has a slight twist at the end of the lower pedestal.

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. 26.

If the diagonal measurements shown in Fig. 22 are not equal, it will be necessary to tram the pedestals longitudinally and



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Fig. 25 — Leveling Truck Frame

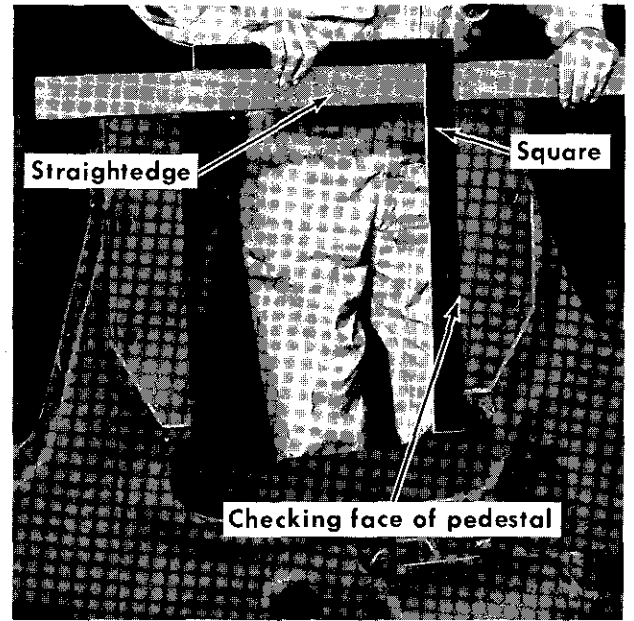
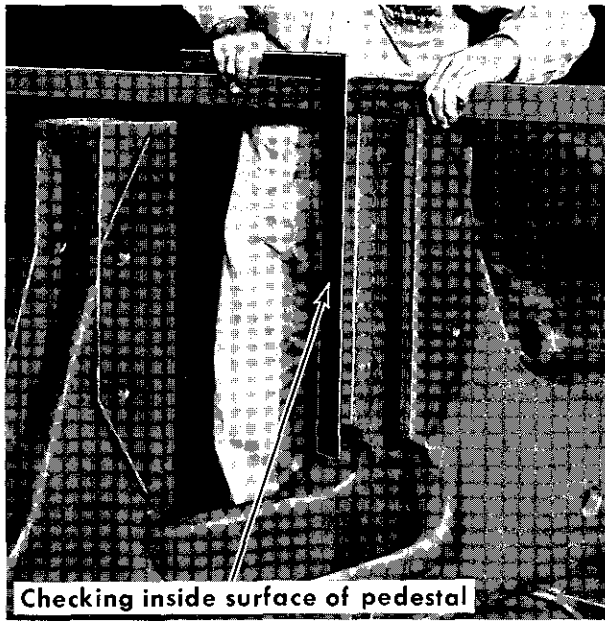


Fig. 26 — Checking Pedestal Squareness

transversely, Fig. 23, 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. 27. 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 $\pm 1/16"$ 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. Trammng also indicates that longitudinally all the pedestals are equal as shown by the equal "0" longitudinal measurements. Transverse trammng indicates that pedestals 7-8 are equal to pedestals 1-2, but pedestals 5-6

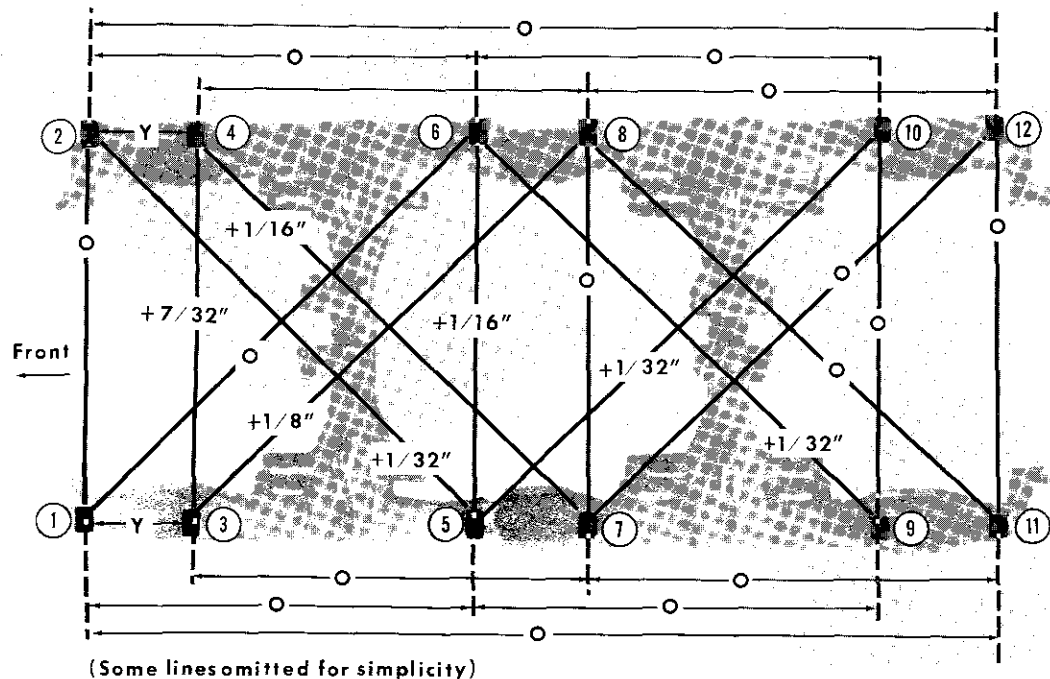


Fig. 27 — Typical Example Of Tram Measurement

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

TRUCK SPRINGS

The swing hanger truck assembly is equipped with coil springs at the pedestals or equalizers and elliptic springs at the bolster. 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. 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 Table A.

SPRING TESTING

Springs may be tested on any reliable calibration type testing press or a spring testing machine, Fig. 28, may be made as outlined in File Drawing 647, available from Electro-Motive upon request. The fixture may be used to test elliptic 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. 28, 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.

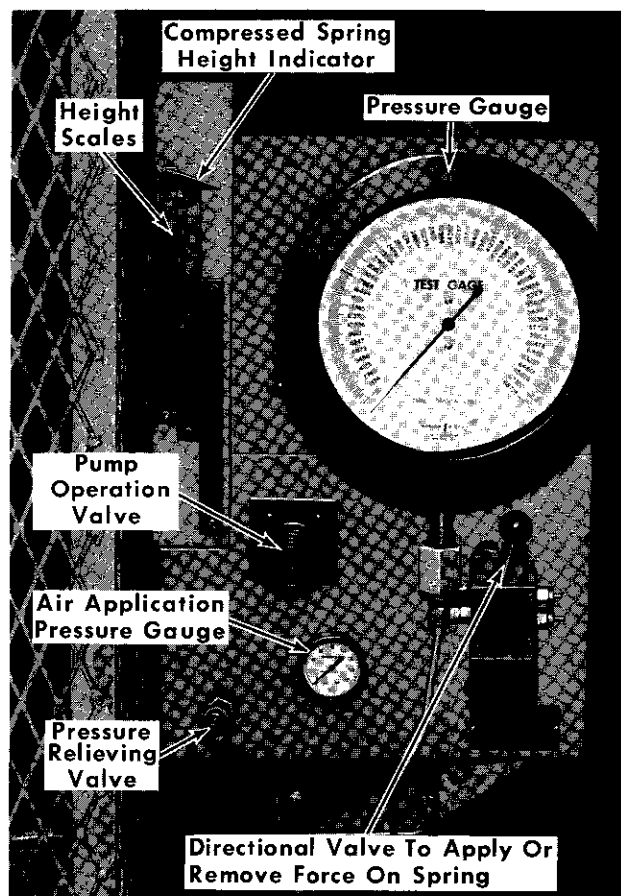
Springs should be tested at the static height and load value provided in Table A, for the particular spring assembly. As the spring is compressed to 1-1/2 times the static load, take a reading at the specified static load and record the height of the spring. Stop the compression of the spring at 1-1/2 times the static load, then gradually decrease the load to the specified static load. Record the height of the spring and average the two height measurements. The static height of the spring should be within the limits given for that particular spring. After determining the static height, mark the spring assembly according to the following color code.

COLOR CODING SPRINGS

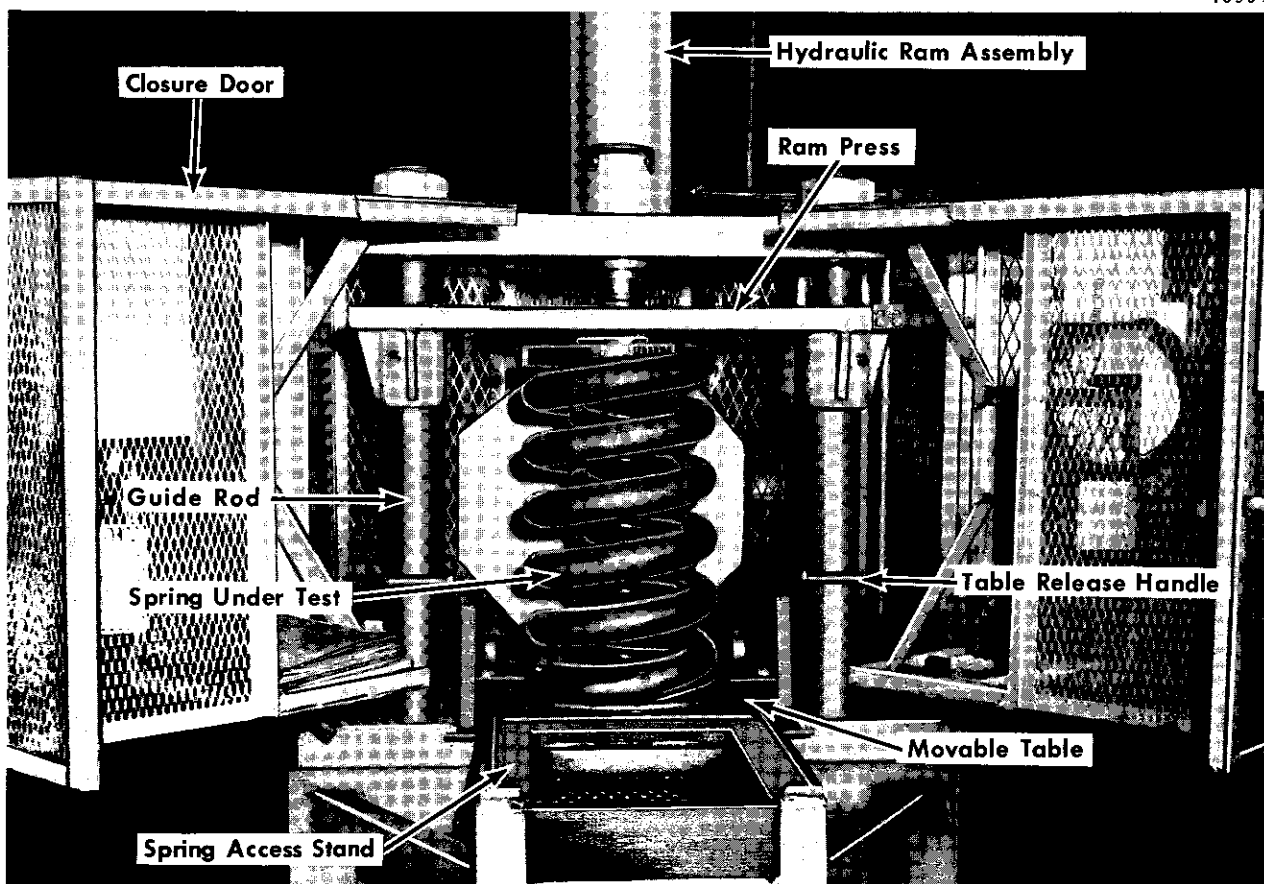
A color code is used to indicate the loaded height of new springs. Brown paint is applied on springs or spring assemblies that are more than $1/16''$ but do not exceed

3/16" limit 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 static load. Green paint is applied on springs or spring assemblies that are more than 1/16" but do not exceed the 3/16" limit 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.

New trucks are equipped with coil springs of a single color code and elliptic springs of a single color code. When coil and elliptic springs are both used on a truck, blue coded coil springs should be used with blue coded elliptic springs, brown



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Fig. 28 — Spring Testing Fixture

coded coil springs should be used with green coded elliptic springs and green coded coil springs with brown coded elliptic springs.

NOTE: The maximum load obtainable on the spring testing apparatus previously described is slightly more than 60,000 pounds. When 1-1/2 times the static load exceeds the 60,000 pounds, use 60,000 pounds as the applied load prior to gradual decrease.

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.

FULL ELLIPTIC SPRINGS

Inspect the spring assembly for evidence of cracked, broken or loose leaves or bands. Replace the spring if any of these conditions are found. Elliptic springs on the same truck should be matched as nearly as possible to prevent body lean.

Inspect the spring end block for wear at the recess which holds the spring nib. Replace the end block if wear in excess of 1/8" has occurred in the recess.

Check the static height of the spring at the static load as given in Table A, and as outlined previously. To be acceptable for re-use, springs must be within 5/16" above to 3/16" below this figure. Springs which fall within a limit 3/16" to 5/16" below the static height can be used by modifying as follows.

Remove both end blocks and install 1/2" thicker end blocks 8309902 in their place. After applying the thicker end blocks, re-check the static load spring height. If the

spring height falls within the +5/16" to -3/16" limit the spring is acceptable for use.

Springs which check 3/16" to 5/16" above the nominal static load height must be color coded with an orange paint. Springs which required the thicker end blocks should be banded in sets to retain the end blocks which were used to qualify the spring for use.

SEMI-ELLIPTIC SPRINGS

Inspect the spring assembly for cracked or broken leaves and cracked, broken or loose bands. If a broken or cracked leaf is found, the spring assembly should be replaced with a satisfactory assembly.

Replace the pin at the center of the band if it is worn more than 1/4". Secure the pin in place with a 1/8" scarf weld. Replace the spring clips used on the leaf spring 8100102 if they are broken or worn more than 1/8" at the 9/16" radius.

Check the height of the spring at the static load given in Table A.

COIL SPRINGS

Check the spring for any 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. Coil springs on the same spring seat should be matched for load height as near as possible.

Replace all double coil spring 8106777 with the current double coil spring 8272084. Check the height of the springs at the static load given in Table A as previously outlined.

SWING HANGER ASSEMBLY

Swing hangers similar to the one shown in Fig. 29, support the springplanks, elliptic springs and bolster, and the entire weight of the locomotive supported by the truck. The locomotive weight is in turn transferred to the truck frame.

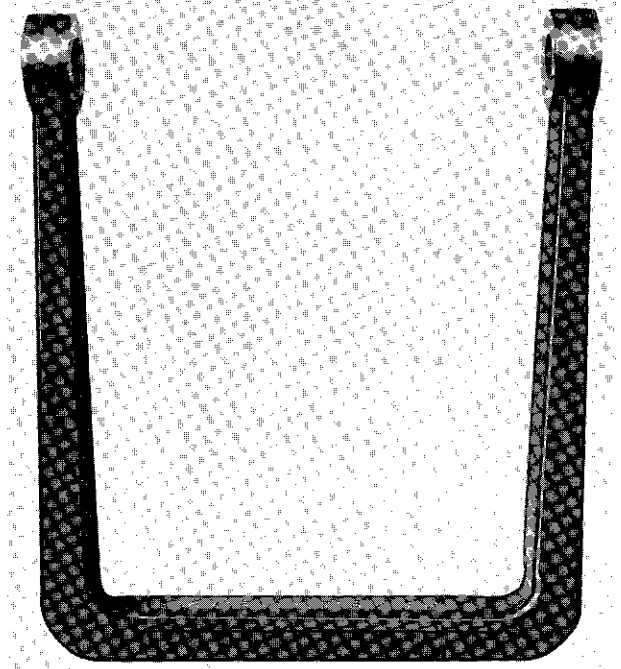
The swing hangers also function to stabilize the locomotive carbody. When the truck is moved laterally, either by a misaligned track or a curve, the swing hangers will swing like a pendulum, and permit the bolster, springs and spring plank to move with the carbody. However, as these items move, the lateral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

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

SWING HANGER

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

1. The swing hanger pin holes may not be more than .050" out of alignment with each other.
2. The centerline of the swing hanger pin holes must be parallel with the lower machined swing hanger surface within 1/32".
3. The dimension from the centerline of the swing hanger to the centerline of each pin hole must be $13\text{-}1/16\text{' + }1/16\text{' - }1/32\text{'}$



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Fig. 29 — Swing Hanger Assembly

4. The swing hanger width at the machined faces of the pin hole may not be worn more than 1/32". In some instances a groove may be worn in this machined face by the truck frame bushing working out of place. This groove should not exceed 1/16".
5. If the swing hanger arms are skewed (not parallel to each other) or racked (parallel to each other but not perpendicular to the bottom machined swing hanger surface) beyond dimensional tolerance they must be scrapped.
6. If any indications of cracks are found, the swing hanger must be scrapped. Particular attention should be given to the two bottom corners of the swing hanger and the areas around the pin hole bushings when inspecting for cracks.
7. The area around the pin holes should be carefully inspected for gouges. If there are any gouges extending to or starting at the outer edges of the bore located in the "B" area, Fig. 30, or within the bore in area "A", the swing hanger must be scrapped.

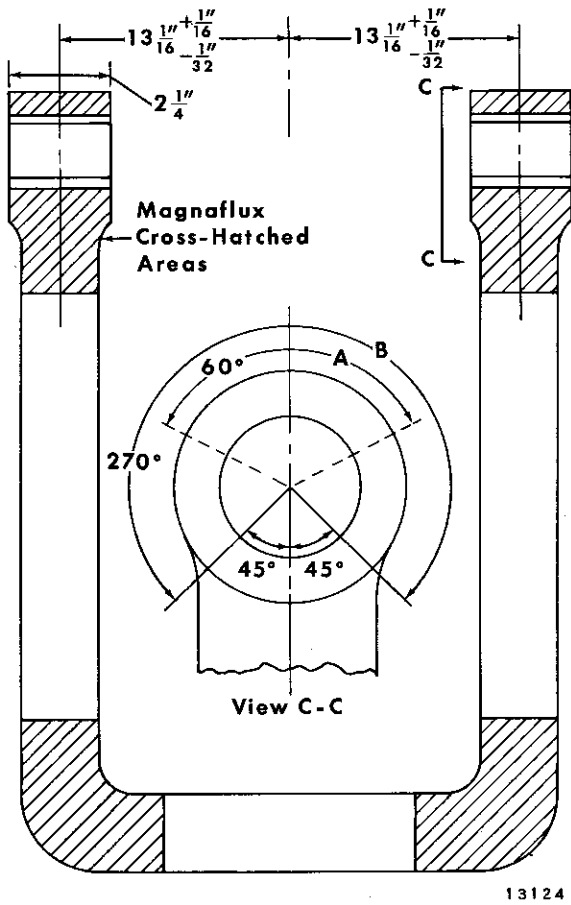


Fig. 30 — Swing Hanger Wear Limits

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

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

8. If there are any gouges on the outside surface of the pin hole bore that are greater than .010" deep, they should be blended out by grinding. Thickness of the pin hole wall must be at least 15/16" after grinding or boring for oversize bushings.

When the swing hanger arms are bent in or out an equal amount from the center line they may be straightened by cold pressing. Any swing hanger which has been straightened must be Magnaflox inspected before being used in a truck assembly.

SWING HANGER PIN AND BUSHINGS

The clearance between the swing hanger pin and bushing should be checked before disassembly. The maximum wear on the pin and bushing is determined by the maximum clearance between the two parts as indicated in Fig. 31. The clearance between these parts, when they are new is 1/32" and the maximum wear limit is 1/8".

If the clearance between the pin and bushing is 1/8" or more on either side of the swing hanger, all the pins and bushings must be removed and replaced with new parts. This includes all swing hanger bushings as well as all the frame lug bushings. New parts should not be used on one side of the swing hanger and used parts on the other side, nor should new pins or bushings be mated with used pins or bushings.

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

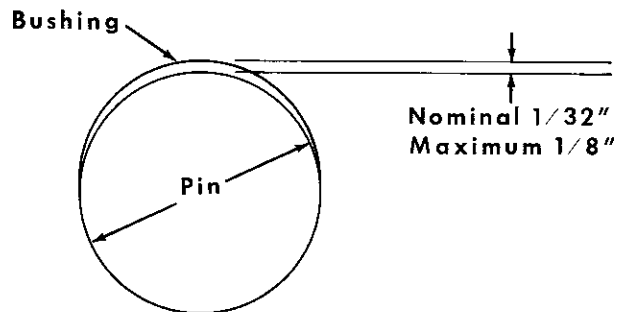


Fig. 31 — Swing Hanger Pin And Bushing Wear Limit

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

If the swing hanger bushings are to be replaced, the holes in the swing hanger must be $2.748" + .000" - .001"$ to use standard bushing 8102087. If the holes do not meet these requirements, the holes should be enlarged to one of the following diameters to accept one of the oversize bushings.

<u>Diameter of bushing bore</u>	<u>Oversize bushing</u>
$2.756" + .000" - .001"$	8309537
$2.778" + .000" - .001"$	8309538
$2.798" + .000" - .001"$	8309539

The bushing must have an interference press fit of .002" to .004" to prevent the bushing from working out. Caution should be taken not to exceed the upper limit or a strain may be placed on the swing hanger eye which could cause the eye to fail in service.

BEARING BLOCKS

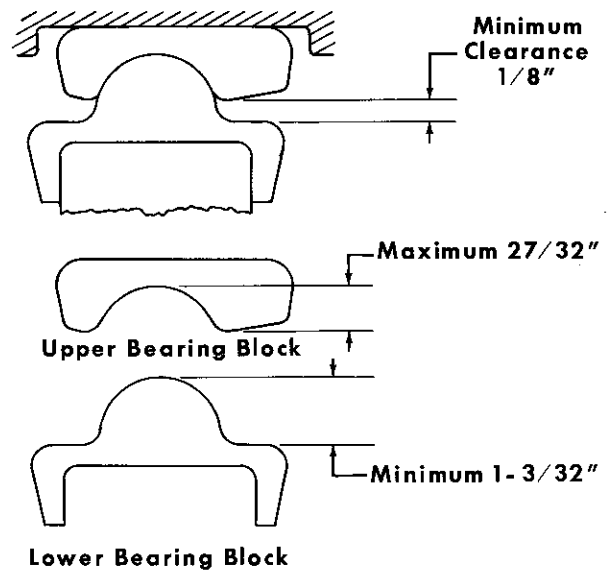
The clearance between the upper and lower halves of the bearing block should be checked before the truck is disassembled. If this measurement is less than $1/8"$, both halves of the bearing block should be replaced.

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

The nominal height of the lower half crown is $1-3/16"$. The minimum limit is $1-3/32"$.

SPRING PLANK

The spring planks should be cleaned by degreasing in a hot caustic solution. Re-



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Fig. 32 — Swing Hanger Bearing Block Wear Limits

move excessive rust and scale to expose the surface to be inspected.

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

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

The clearance between the bottom spring leaf and the spring stop on the four wheel swing hanger spring plank is $1/8" + 1/32"$ using a $1/4"$ spring stop. The condemning limit is $1/32"$. Older model springplanks

used a 5/16" spring stop. When the clearance between these parts reaches 1/32" the truck should be reconditioned to the $1/8" \pm 1/32"$ dimension by the following method.

Grind the top surface of the spring stop until it is 1/4" from the lowest worn spot on the spring plank. Grind the high spots from between the spring nests to obtain a common plane for all spring seats. Spring planks must not be worn more than 3/32".

Another method of providing adequate clearance is to remove the 5/16" spring stop and replace it with a 1/4" spring stop 8308462.

SPRING PLANK SAFETY STRAPS

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

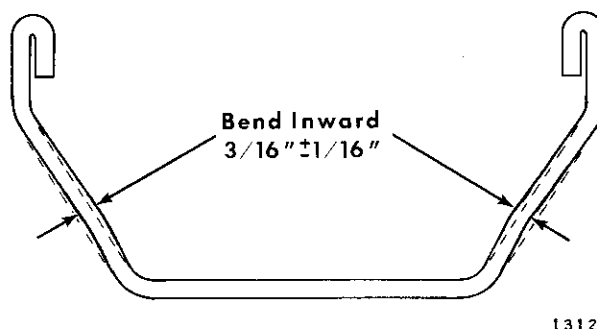
Inspect all safety straps for signs of damage which might lead to a strap failure if the spring hanger load should be imposed upon the safety strap. Also check to see that the load would be carried by the safety strap lips and not the holding bolts. If straps are bent they should be cold straightened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

There should be at least 3/8" clearance between the safety strap and the spring plank. If clearance is not sufficient, check for worn swing hanger assembly parts or add a shim between the spring plank and bearing block.

Check the four wheel swing hanger truck to see that there is a clearance between the slack adjuster hinge lock and the safety strap. If a current model slack adjuster is used with an old style safety strap, the safety strap sides will have to be bent inward $3/16" \pm 1/16"$ as shown in Fig. 33, to clear the slack adjuster hinge lock.

EQUALIZER

The equalizer bars on the six wheel swing hanger and switcher trucks used to distribute the locomotive weight evenly to the



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Fig. 33 — Safety Strap Modification

journal boxes must be checked for small nicks, cracks and excessively worn areas. If any indication of cracking is detected, the equalizer must be scrapped.

Check equalizers for wear at both ends where they contact the journal box wear plates. If they are worn more than 1/4" at these contact points they must be restored to the original dimension, Fig. 34, by repair welding.

The two inside switcher truck equalizers should be checked for wear along their sides, Fig. 34, from loose brake rigging. If wear exists in this area, the equalizer will be acceptable as long as the wear is not more than 3/16" deep and the edges of the worn area are ground smooth. When reapplying an equalizer with brake rigging wear, rotate the equalizer end for end in the truck.

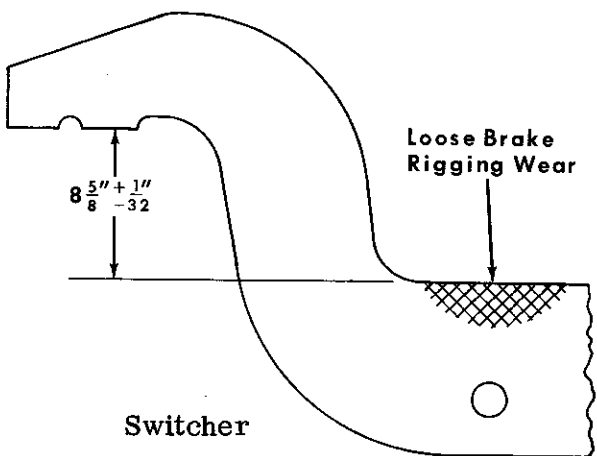
The six wheel swing hanger truck equalizer should be checked to see that the 2-1/16" hole at the drive wheel end contact surface has not been enlarged beyond 2-1/8" in any direction or the hole must be welded and rebored to the correct size.

Any equalizer that requires welding must be stress relieved after welding and Magnaflux inspected for cracks. Neither the switcher truck equalizer or the swing hanger truck equalizer should be bent more than 1/8" in the overall length. If wear exists on the equalizers at any point other than those described, check the truck to determine the cause of the wear.

BRAKE RIGGING

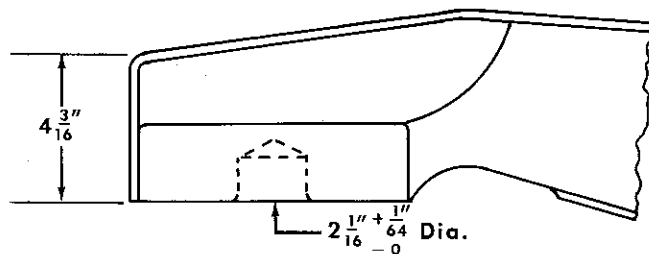
Inspect the brake rigging to ensure that brake pins, bushings and brake shoes are usable. The wear surfaces of the brake rigging are equipped with replaceable hardened bushing, pins and bolts. Any of these connecting parts that are worn more than $1/16$ " should have both parts replaced. Never use a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

Cylinder levers, brake levers, brake rods and connecting straps that are bent can be reused if they are restored to their original shape. Connecting straps worn more than $1/16$ " should be replaced. If wear is caused by the connecting strap contacting the wheel, the lever pins and bushings associated with the worn strap should be carefully examined. Bolts and nuts that are not subject to wear can be reused if they are not damaged but cotter pins should always be replaced.

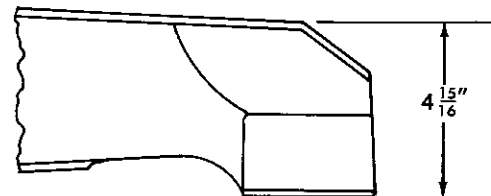


13129

Drive Wheel End



Idler Wheel End



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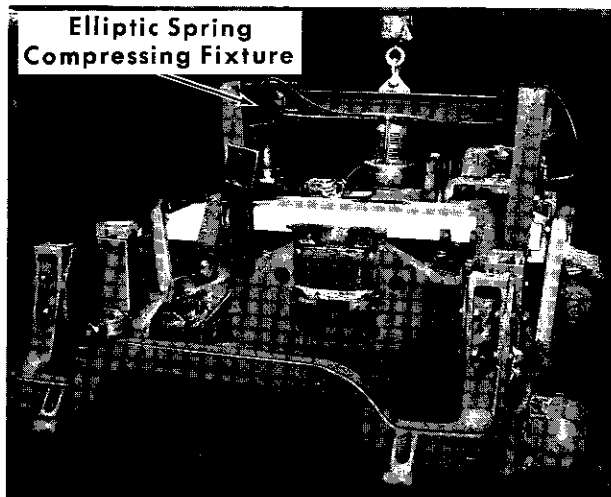
6-Wheel Swing Hanger

Fig. 34 — Equalizer Wear Plates

ASSEMBLY OF TRUCK

SWING HANGER TRUCKS

1. Set the truck frame in an inverted position on the floor with one end sill resting on a turnover fixture similar to that shown in Fig. 37, and the other end blocked so the frame is relatively level. The turnover fixture can be made by using File Drawing 250 (293 for "E" locomotives), available from Electro-Motive on request.
2. Install the inverted bolster into its proper place between the frame transoms. Install coil spring assemblies, spring seats and shims, brake cylinders except on six wheel truck, and pedestal liners to the truck frame; and bolt in place where required.
3. Install the traction motor nose suspension assembly in place between the frame lugs, Fig. 14. Compress the suspension pack assembly by placing temporary blocks under the nose suspension assembly bolt heads and tightening the bolts. Install the suspension pack retainer pins and pin keepers.
4. Set the elliptic spring assemblies in place on the bolster and set the spring plank or planks on the elliptic springs.
5. Place upper and lower swing hanger bearing blocks in place on each spring plank and set swing hanger over bearing blocks and spring plank.



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Fig. 35 — Compressor Swing Hanger
Truck Elliptical Springs

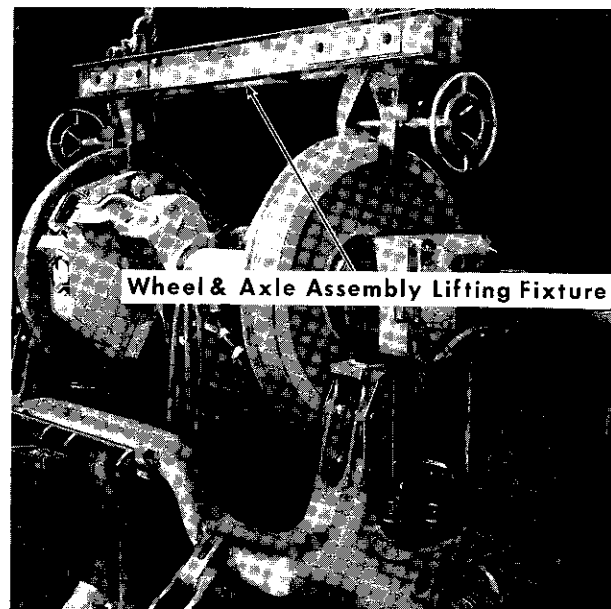
6. A pressing fixture, Fig. 35, can be made as outlined in File Drawing 455 to compress elliptic springs until the swing hanger pin holes are aligned with the truck frame boss pin holes. Insert the swing hanger pins, remove spring press and install safety straps.
7. Install brake lever assemblies on both truck models. On six wheel trucks install the traction motor cooling ducts.
8. Install pre-assembled wheel, axle and motor assemblies in place by lifting the assembly with a lifting fixture similar to the one in Fig. 36, and lowering between the truck frame pedestals until the journal boxes rest on the coil spring seats.
9. Install clasp brake connection straps and connect them to previously installed brake levers. Install stabilizer bars, sanding guide assemblies and pedestal tie bars and bolt down firmly.
10. Turn the truck assembly over on its wheels by attaching a cable or chain to the end sill opposite the one resting on the turnover fixture and lifting as shown in Fig. 37, until the whole truck assembly rotates end over end 180° and is setting on its wheels. Remove the lifting cable and attach it to the end

sill resting on the turnover fixture so that end of the truck can be raised enough to be removed from the fixture.

11. Install air brake piping on both truck models and the brake cylinder on six wheel truck.
12. Install center bearing wear plate and dust guard. Add lubricating oil to the center bearing — 7 pints on GP and "F" trucks; on the "E" trucks fill to 1/8" above the wear plate. See applicable Scheduled Maintenance Instruction for the type of oil to be used.

SWITCHER TRUCKS

1. Set the truck frame on the floor in an upright position with one end sill resting in a turnover fixture similar to the one in Fig. 37. The turnover fixture can be made by using File Drawing 250.
2. Install the brake cylinders on the brake cylinder mounting pads on each side of the frame.
3. Invert the frame by attaching a cable or chain to the end sill not resting on the turnover fixture and lifting the



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Fig. 36 — Installation Of Wheel
And Axle Assembly

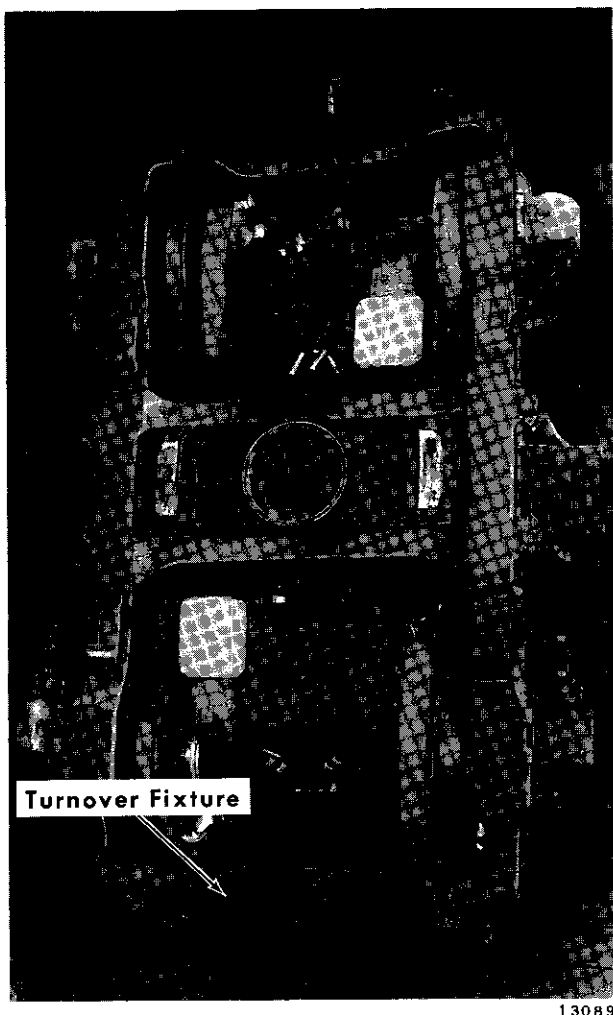


Fig. 37 — Turning Over Swing Hanger Truck

frame end for end. Be sure to block the frame high enough off the floor so that brake cylinders do not contact the floor.

4. Install the brake levers (with brake shoes), traction motor cooling air ducts, traction motor nose suspension assemblies and coil spring assemblies.
5. The equalizer assemblies, the coil spring seats and elliptic spring hangers should be assembled and then installed in the truck as an assembly. This can be done by setting the inside and outside equalizers in an inverted position on a bench or other convenient stand and bolting the spring hangers in

place between the equalizers. Then lay the elliptic springs in place between the equalizers so that spring hangers protrude through the slots in both ends of the elliptic springs far enough to insert the spring hanger key. The equalizers can now be turned over in an upright position and the coil spring seats placed on the top edge of the equalizers. Insert the spring hanger pin through the coil spring seat arms which extend below the elliptic spring. This pin will act as a safety strap to prevent the elliptic spring from dropping to the roadbed in case of a spring hanger failure.

NOTE: There are two types of spring hangers that have been installed in switcher trucks. One is a tee shaped piece with the lower leg protruding through a hole in the end of the elliptic spring. This spring hanger has a slot near the end of the leg where a key is inserted to hold the spring in place. The other spring hanger is an inverted U-shaped piece with its legs bolted to the equalizers and the elliptic spring ends resting in the bottom of the hanger.

6. Set the equalizer assemblies on the frame assemblies so that coil springs fit into the coil spring seats held between the equalizers.
7. Install the pre-assembled wheel, axle and traction motor assembly by lifting the assembly with a lifting fixture similar to the one being used in Fig. 36, and lowering so that journal boxes slide between the truck frame pedestals and rest on the equalizers. The assembly may have to be tilted slightly to allow the traction motor suspension lugs to slip over the traction motor nose suspension assembly. When the wheel and axle assembly is in place,

the temporary blocks may be removed from the traction motor nose suspension assembly.

8. Bolt the pedestal tie bars to the pedestals to hold the wheel and axle assemblies in place.
9. Install the clasp brake connection straps and connect them to previously installed brake levers. Install sanding guide assemblies in place between the brake levers.
10. Turn the truck assembly over on its wheels as previously explained, then

attach the chain or cable to the end sill resting on the turnover fixture so that end of the truck can be raised enough to be removed from the fixture.

11. Install air brake piping to the brake cylinders and install the center bearing wear plate and dust guard to the center bearing.
12. Add lubricating oil to the center bearing so the level is approximately 1/8" above the wear plate. Refer to the applicable Scheduled Maintenance Instruction for the type of oil to be used.

TABLE A
TRUCK SPRING DATA

COIL SPRINGS

	<u>Part Number</u>	<u>Free Height</u>	<u>Nominal Static Height</u>	<u>Static Load Lbs.</u>
Four	*8272084 (Assembly)	15"	11-3/4"	12,600
Wheel	8272255	15"	11-3/4"	8,350
Swing	8272256	14-11/16"	11-3/4"	4,250
Hanger				
Six	8100801 (Assembly)	13-3/8"	11"	15,600
Wheel	8041426	12-7/8"	11"	9,880
Swing	8041427	13-1/16"	11"	4,120
Hanger	8041428	13-3/8"	11"	1,660
Switcher	8100101 (Assembly)	16-1/4"	13-13/32"	14,745
	8097296	15-11/16"	13-13/32"	
	8097295	16-1/4"	13-13/32"	
	8100585 (Assembly)	15-13/16"	13-9/16"	19,440
	8057051	15-13/16"	13-9/16"	12,720
	8057052	15-13/16"	13-9/16"	5,170
	8057053	15-11/16"	13-9/16"	1,560

ELLIPTICAL SPRINGS

Four Wheel Swing Hanger	8106539	13-11/16"	9-3/4"	42,500
Six Wheel	8210943	14"	10-7/8"	33,600
Swing Hanger	8031761	13-15/16"	10-5/8"	27,500
Switcher	8100102	12-5/8"	7-15/16"	11,510
	8100587	12-7/8"	7-5/16"	15,120

*Double coil spring replaces triple coil spring 8106538.