

Truck Maintenance

ALCO

ALL LOCOMOTIVES

ALCO PRODUCTS, INC.

Schenectady 5, New York

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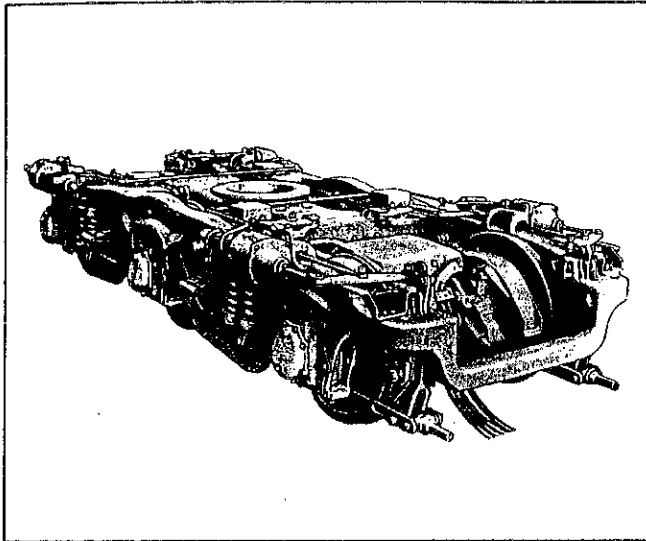
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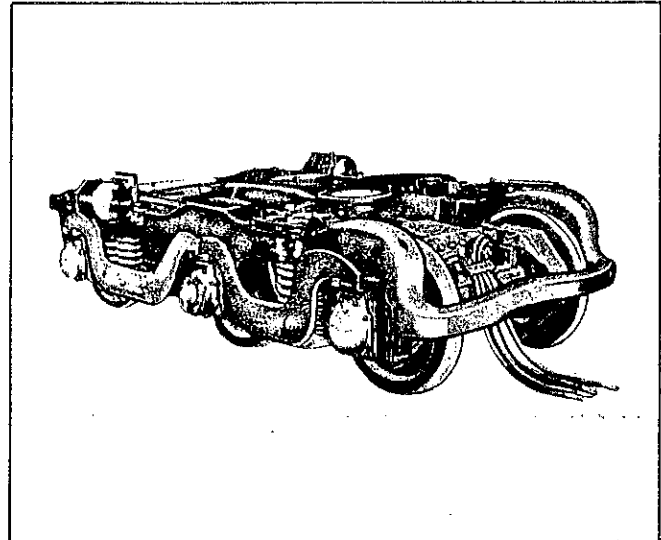
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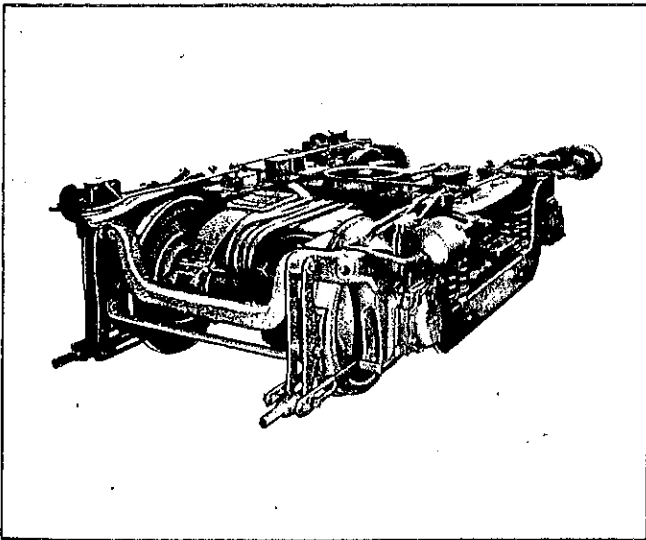
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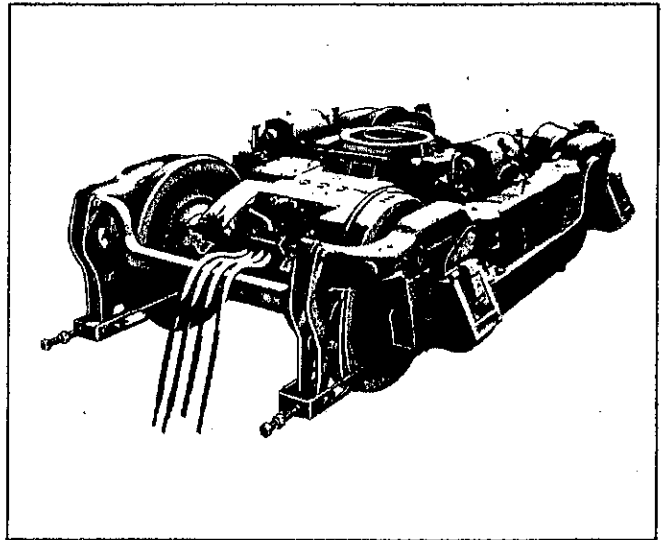
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**SWITCHER
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TRUCKS

2250HP PASSENGER A & B UNITS 6 WHEEL, 2 MOTOR TRUCK

DESCRIPTION

This truck is a fully equalized 6-wheel, 2-motor swing bolster, swivel type. The swing bolster provides 2-1/4" lateral movement each side of center. In addition to the center swivel bearing carrying the cab weight, there are four friction side bearings, faced with wear plates, cast integral with the bolster to insure stability.

The truck spring system consists of four double elliptic springs carrying the bolster, the springs in turn resting on cast steel spring planks suspended from the truck frame, by swing hangers.

In addition to the bolster springs, the truck spring system includes eight (8) twin coil spring nests which transfer the load through equalizers to the axle assemblies.

Axle journal boxes are mounted in pedestals cast integral with the truck frame. Journal boxes, Timken or S.K.F. roller bearing type, take the lateral thrust directly through the bearings. There is a total lateral per axle of the boxes in the pedestals amounting to 13/32" for the end assemblies and 21/32" for the center assemblies.

The brakes are clasp type (double shoe) powered by four (4) cylinders per truck. Cylinder brackets as well as hanger and equalizer brackets are cast integral with the truck frame. Both automatic and manually operated slack adjusters are provided in order to compensate for brake shoe and wheel wear. Provisions are made for application of a hand brake chain.

REMOVAL OF AXLE, WHEEL AND BOX ASSEMBLY (WITH MOTORS)

To remove an Axle, Wheel and Box Assembly from a truck that is under a locomotive, a drop table is necessary. It is assumed that this equipment is the single table type, large enough to handle a complete truck. The use of such a table requires the locomotive to be supported at the jacking pads. Using this equipment, when the table is lowered with a single axle, wheel & box assembly, the truck remains suspended on the safety hooks. The removal procedure will be as follows:

1. Before relieving swivel bowl of cab weight, remove top brake pull rods over the bolster to prevent damage to them by the upward movement of the bolster. It is also advisable to place steel blocks 6" long x 3" thick x 3" wide, and with 1/2" radius on the bottom edge of the width, between the legs of the bolster safety strap to reduce the distance between

frame transom and bottom of strap, and to prevent bending the safety straps when they carry the frame weight.

2. Locate body supports under locomotive jacking pads.
3. Remove pedestal caps or tie bars under assembly to be removed.
4. Remove sander pipes (end assemblies).
5. Disconnect motor leads.
6. Disconnect any journal box attachments such as speed recorders, speedometer or transition generators, etc.
7. If end driving assembly is being dropped, remove bottom brake pull rods.
8. Jack motor nose and remove suspension assembly. See Item 6, DISASSEMBLY OF TRUCKS.
9. Lower motor nose until motor safety lugs rest on truck frame brackets.
10. Allow drop table to settle slowly keeping the motor nose up by jacks so that the safety lugs will pass the frame lugs. Remove motor air duct from motor before the assembly is completely dropped as the top plate of this device will not pass by the brake fulcrum bracket.
11. Continue to lower assembly until it is free from truck.

REINSTALLATION OF AXLE, WHEEL AND BOX ASSEMBLY

This operation should be performed in practically the reverse sequence of removal.

1. With the axle assembly resting on the drop table, and the motor correctly positioned and tilted at the nose end so that the lugs will pass the frame lugs, raise the assembly until the safety lugs can again rest on top of the frame lugs. As soon as clearance conditions permit, bolt air duct boot to top of motor.
2. Continue to raise assembly to its normal position in pedestal and apply caps.

3. Reapply motor nose suspension spring assembly. See Item 10, REASSEMBLY OF TRUCK.
4. Reapply bottom brake pull rods.
5. Reconnect motor leads.
6. Reapply sander pipes and adjust.
7. Reconnect journal box attachments.
8. Adjust brakes.
9. Check journal box lubricant.

REMOVING EQUALIZER SPRINGS (TRUCKS UNDER LOCOMOTIVE)

1. With lifting rigging and overhead crane.
 - a. Remove pedestal caps from end pedestals, both sides of truck, nearest springs to be removed.
 - b. Remove top brake pull rod over bolster.
 - c. Disconnect bottom brake pull rods at end opposite slack adjuster.
 - d. Use blocking between bolster safety straps and frame transoms of truck being lifted. See Item 1, REMOVAL OF AXLE, WHEEL AND BOX ASSEMBLY.
 - e. With sling from crane attached to locomotive lifting lugs, raise cab until safety hooks between cab and trucks are engaged. See REMOVAL OF TRUCK for blocking instructions.
 - f. Continue lifting until weight is removed from springs and they are free from frame pockets.
 - g. Remove springs.
2. With Jacks

NOTE: Lifting one end of locomotive excessively high, while the truck swivel bowl at the other end is still engaged, is not recommended. To remove coil springs, however, only an approximate lift of 7-1/2" is required and it will be satisfactory to lift the cab at one end this distance to remove springs from the truck at the same end.

- a. Remove pedestal caps and top brake pull rod as in 1-a and 1-b above. Disconnect bottom brake pull rod as in 1-c above.
- b. Insert blocking in bolster safety straps as in 1-d above.

- c. With jacks under lifting lugs nearest the truck from which the springs are to be removed, lift the locomotive approximately 7-1/2".

- d. Remove springs.

3. With Drop Table and Body Support

Following same procedure as above, except with cab supported by body support under lifting lugs, lower axle and wheel assembly on drop table a sufficient amount to release springs and allow their removal.

REMOVING ELLIPTIC SPRINGS (TRUCKS UNDER LOCOMOTIVE)

1. With lifting rig and overhead crane.
 - a. Clamp or tie elliptic springs to prevent them going free when unloaded.
 - b. Remove bolster safety straps and top brake pull rods from truck from which the spring is being removed.
 - c. Remove spring plank safety strap nearest spring being removed.
 - d. With sling from crane attached to locomotive lifting lugs (See "Removal of Truck" for blocking instructions) nearest the truck from which the springs are being removed lift end of locomotive, and thereby the bolster just enough to free springs in pockets.
 - e. Jack up spring plank at end nearest spring being removed and remove spring hanger seat and liner.
 - f. Lower plank end to hanger.
 - g. Lift spring out over equalizer, jacking up truck frame if necessary for extra clearance.

2. With Jacks

Clamp spring and proceed as with lifting rig above, except jacks are placed under locomotive lifting lugs.

3. With Drop Table and Body Supports

- a. Clamp or tie elliptic springs.
- b. Remove bolster safety straps and top brake pull rods from truck from which the spring is being removed.

- c. With body supports located under lifting lugs nearest the truck from which the springs are being removed, lower truck frame and wheel assemblies until elliptic springs are free and remove them over equalizer, jacking up truck frame if necessary for extra clearance.

REINSTALLATION OF SPRINGS

Reverse removal procedure

REMOVAL OF TRUCK

Before a complete truck can be removed from beneath a locomotive unit, it is necessary to relieve the truck or trucks of the cab weight. This requires either a crane, hoist or jacks to lift the locomotive body, or stationary body supports used in conjunction with a drop table installation. The jacking and lifting diagram, Fig. 40 shows the location at which the units should be lifted or supported, and the approximate loads involved. The following precautions should be observed: Wood blocking should be used between chassis support points (jacking pads) and lifting devices, and lifts should be uniform on both sides of cab to prevent unnecessary strain on the cab structure. The cab should not be lifted excessively more at one end than the other until the body swivel castings have become disengaged from the truck swivel bowl or center plate. Before removing a truck by any method, the safety hook (one on each side of the center plate bowl) must be swung clear. The hook itself is held in place by two pins. Remove the larger; the hook will then swing clear on the smaller pin yet remain attached to the cab. Disconnect air brake piping hose, hand brake chains, sander, traction motor leads, and any truck box attachments. If the truck is not to be dismantled, the lift required can be reduced if blocking is inserted between bottom of journal boxes and pedestal tie bars so that the equalizer springs cannot raise the truck frame. If the truck is to be dismantled, clamp or tie elliptic springs to prevent them going free when unloaded. Regardless of whether the elliptic springs are retained or not, it is advisable to remove the top brake pull rods, crossing over the bolster, in order to prevent them from becoming bent by the rise of the bolster when the cab weight is removed from it.

A truck may then be removed by any one of three different procedures.

1. By a drop table which requires the use of stationary body supports, or a lifting rig with overhead crane.
2. By jacking or lifting cab a sufficient amount to disengage swivel castings, and to provide clearance above trucks so that they may be moved laterally from beneath locomotive using

a turntable or transfer table. When using jacks to remove the front truck on an "A" unit, the side ladder below the operating cab door must be removed. Removing this ladder also reduces the lift necessary for truck removal.

3. By jacking or lifting as in Item 2 above a sufficient amount to remove trucks longitudinally along the track. For the front truck of the "A" unit it will be necessary to lift the cab far enough to permit the truck to pass under the pilot. For the rear truck of the "A" unit and both front and rear trucks of the "B" unit, it is only necessary to lift the cab far enough for the trucks to pass under the draw casting. Reference should be made to the jacking and lifting diagram Fig. 40, for details of lifts and loads involved. In addition to the four regular lifting or jacking pads located on each side of the cab over each truck, there are additional pads on the "A" unit located on the side sills ahead of the front truck behind a removable section of the pilot skirt. The units may also be raised by jacking under the rear corners of the "A" and the front and rear corners of the "B" after the steps have been removed.

DISASSEMBLY OF TRUCK

1. Remove all pedestal tie bars.
2. Remove safety straps from bottom of the bolster.
3. Remove traction motor air ducts from top of motors.
4. Lift out bolster, elliptic spring and spring plank.
5. Remove brake slack adjusters, bottom pull rods, and brake head tie bars.
6. Remove all motor nose suspension spring nests as follows. See Fig. 1.
 - a. Jack or lift motor nose sufficiently to compress nests approximately one-half inch (1/2").
 - b. Remove cotters and tighten nuts on spring holder bolts (or use split washer to take up space between nuts and spring holders).
 - c. Lower motors so that nose lugs are free of spring nests.
 - d. Remove pin keepers and drop vertical pins.
 - e. Slide spring nests out sidewise.

7. Again raise motor noses to provide clearance preparatory to removing truck frame. Raise noses a sufficient amount so that truck frame lugs will clear motor safety lugs when the frame is lifted upward and off the axle, wheel and box assemblies.

8. With crane, raise truck frame until equalizers ride on wall of pedestal jaws. Continue to raise frame until coil springs are free of pockets, then remove springs.

9. Lift truck frame and equalizers completely clear of axle, wheel & box assemblies, having equalizer end seats on journal boxes. Block journal boxes to prevent rotation.

10. Remove equalizers from truck frame.

a. Set truck frame and equalizer assembly on blocking so as to remove equalizer weight from filler blocks of center pedestal.

b. Remove center pedestal wear plates.

c. Remove center pedestal leg filler blocks. This operation requires drilling out the rivet heads and driving out the rivets.

d. Lift up frame so that equalizers drop clear of center pedestal and they may be withdrawn from end pedestals.

11. If a truck is being disassembled over a pit, it is possible to remove motors without disturbing the rest of the truck as follows:

a. Remove suspension spring nests as in Item 6 preceding.

b. Remove gear case and dust guard.

c. Lift motor nose using lifting lugs until cap at suspension bearing is at bottom.

d. Unbolt cap and remove.

CAUTION: Exercise greatest care in handling suspension bearings. Bearings are in two halves. One half may be removed with the cap and the other half removed after the cap is dropped. If not removed, restrain inner half of bearing when lifting motor from axle so that it will not drop and injure personnel.

e. Lift motor clear of axle.

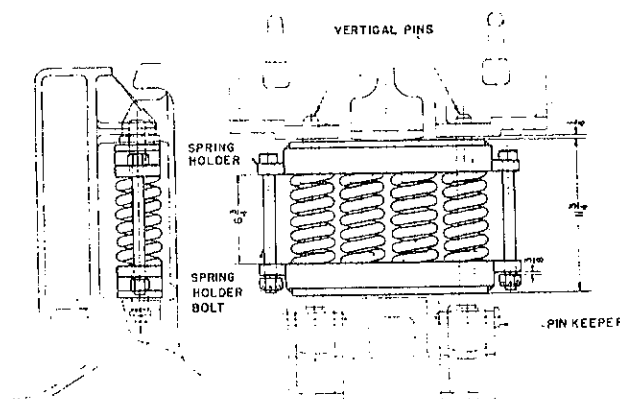


Fig. 1 - TRACTION MOTOR NOSE SUPPORT

INSPECTION AND MAINTENANCE

1. The following items should be inspected and compared with Fig. 2 for clearance and wear limits.

a. Vertical and horizontal steel liners in both body and truck swivel casting.

b. Pedestal wearing faces and the corresponding faces on journal housings.

c. Side bearing wear plates.

d. Truck bolster wear plates - both frame and bolster.

e. Swinger hanger pins and bushings.

f. Brake hanger restraint bracket wear plates. See also FOUNDATION BRAKES.

g. Brake hanger and equalizer pins and bushings. See also FOUNDATION BRAKES.

2. When applying new liners, be sure that all edges are rounded where they contact other surfaces.

3. For roller bearings refer to manufacturer's instructions.

4. Check lubrication of swivel bowl and axle bearings.

5. Tighten all pipe connections and check piping.

6. Inspect the motor nose spring holder for wear, and if necessary replace the wear plate.

7. When trucks are dismantled or springs removed, check liners in spring pockets. If badly worn, replace.

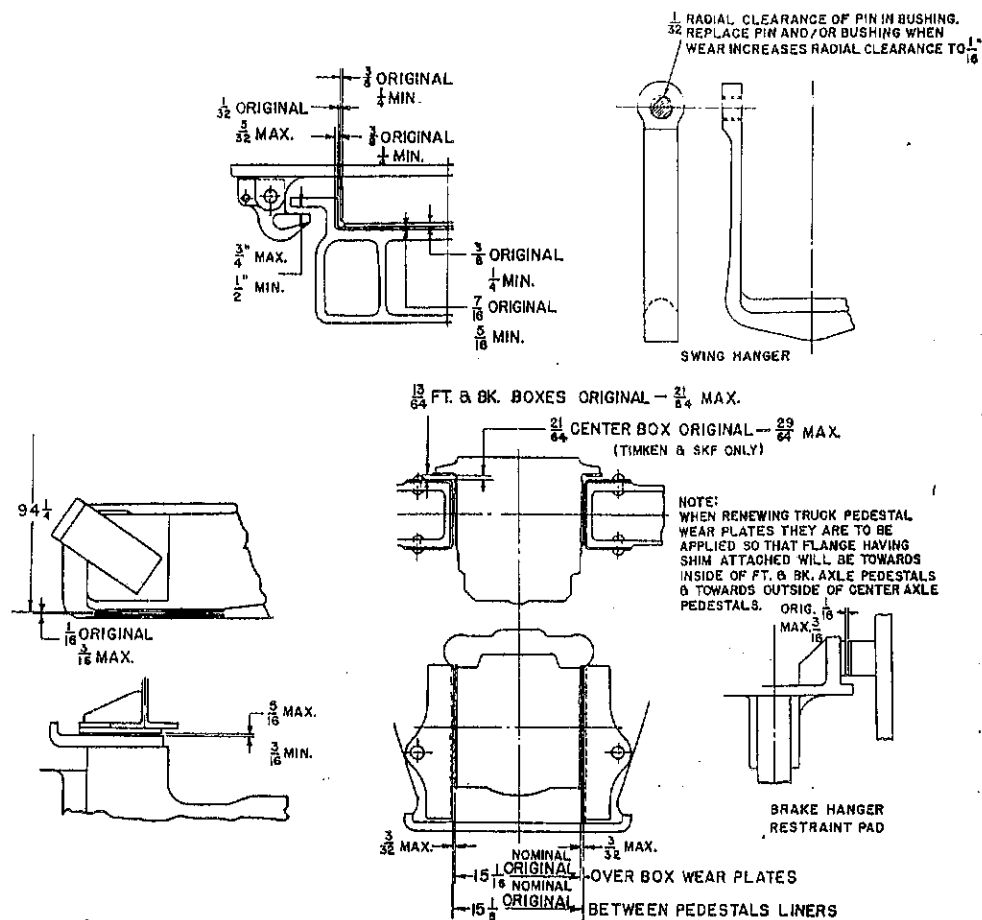


Fig. 2 - CLEARANCES AND WEAR LIMITS

8. Check for wear in Foundation Brake equipment. If parts show excessive wear they should be replaced. See **FOUNDATION BRAKES**.
9. For Traction Motor Maintenance refer to Maintenance Instruction Booklet, MI-2001, "Traction Motor Maintenance".
10. Keep sliding shoes at ends of equalizers thoroughly lubricated by applying grease through Alemite fitting provided.

WHEELS

1. When turning or replacing wheels, the I. C. C. Rule requires "The diameter of the wheels on the same axle shall not vary more than 3/32". This is equivalent to approximately 2-1/2 tapes. It is our further recommendation that wheels should not continue in service if the diameter in the same truck varies more than 1/2" (12-1/2 tapes) or under the same locomotive unit if they vary more than 1" (25 tapes). When turning, or replacing with new wheels, it is our recommendation that wheels should not vary more than 1/2 tape on the same axle, 2 tapes in the same truck, and 14 tapes in the same locomotive.

2. Wheels should be checked periodically for wear in accordance with I. C. C. regulations. If excessive wear is found, check to determine:
 - a. If the brake shoes are free and not binding on the flange or wheel tread.
 - b. If the brake hangers and levers are hanging true, and are not causing misalignment of the shoe on the wheel tread.
 - c. If wear plates on hangers, levers, and frame brackets have proper clearances. See **FOUNDATION BRAKES** and **INSPECTION & MAINTENANCE**.
 - d. If sandpipes or other parts are free and not fouling the brake rigging, thus preventing normal operation.
 - e. If axle lateral is normal and not excessive by reason of worn pedestal liners.
 - f. Excessive variation in wheel diameters. See Item 1 above.
3. When applying new shoes, they must hang true in the heads. Nuts on brake head pins should be adjusted so that vibrational shock will not cause shoe to drag on wheel, but still permit face of shoe to conform to wheel as wear progresses. See also **FOUNDATION BRAKES**.
4. For wheel mounting refer to Fig. 3.

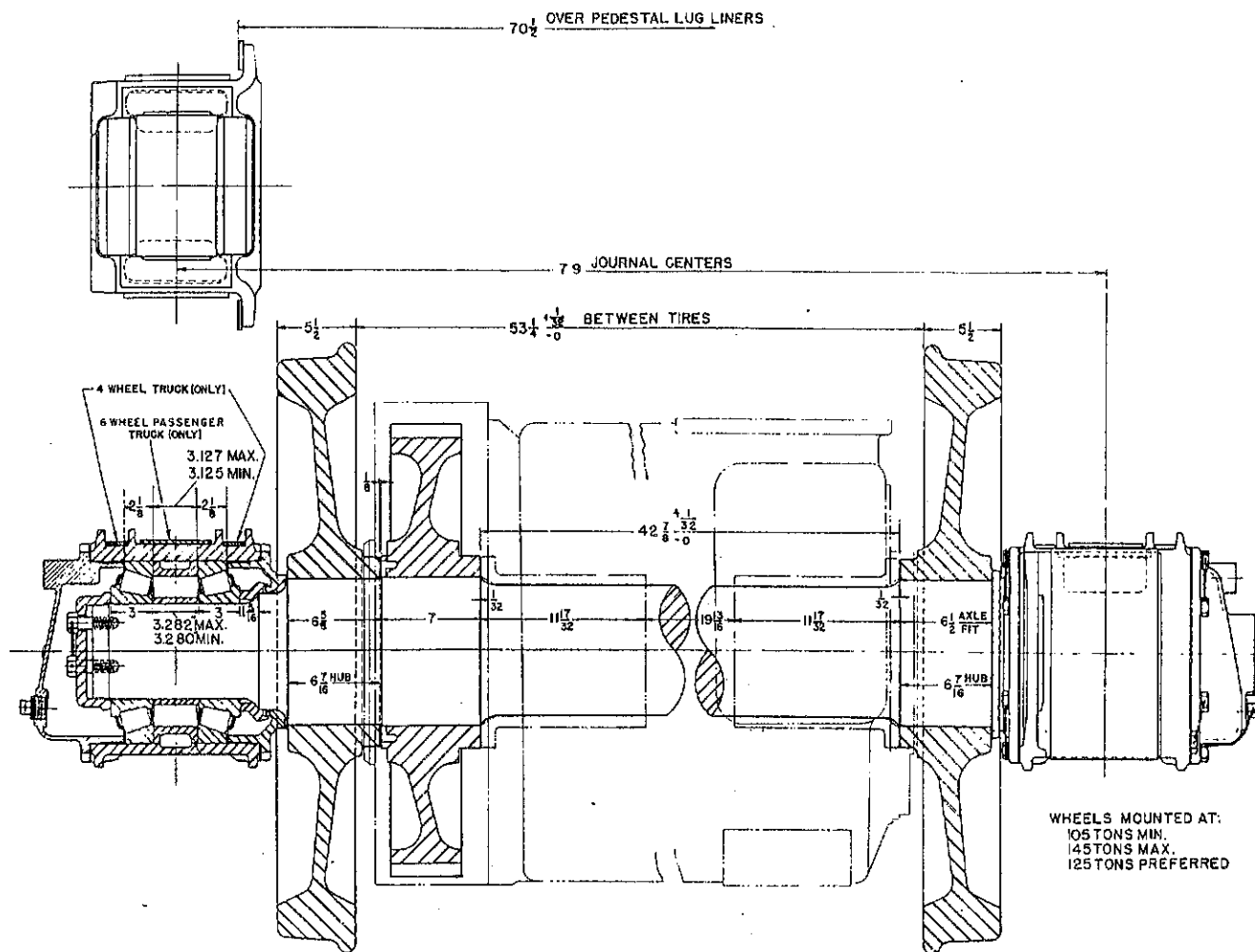


Fig. 3 - WHEEL, AXLE AND BOX ASSEMBLY

AXLE GEAR

The mounting of an axle gear is based on an interference fit regardless of tonnage pressure. The recommended interference fits are as follows:

Bore of axle gear	9.991" +.001", -.000"
Diameter of axle gear fit	10.000" +.001", -.000"

For complete axle gear instructions, see Maintenance Instruction Booklet MI-2001, "Traction Motor Maintenance".

MOTOR SUSPENSION BEARINGS

Diameter of axle in suspension bearing when new is 9.000" \pm .002". As the axle wears, it may be turned to the following three (3) successive diameters, and undersize replacement bearings obtained:

$$\begin{aligned} 8.938'' \pm .002'' \\ 8.875'' \pm .002'' \\ 8.813'' \pm .002'' \end{aligned}$$

For complete axle bearing instructions, see Maintenance Instruction Booklet MI-2001, "Traction Motor Maintenance". See Parts Bulletin DRP-1317 for undersize bearings.

FOUNDATION BRAKES

The manual slack adjusters are initially set to provide 3/8" shoe release. With new wheels and brake shoes this then will allow approximately 3" of piston travel per brake application. The automatic slack adjuster will maintain uniform piston movement for its total take-up of 6".

Replace the following brake parts when specified maximum wear is obtained:

- a. Pins or bushings when worn to $3/64$ " radial clearance. Normal clearance for new pins and bushings is $1/64$ " radial clearance.
- b. Hanger levers and equalizers when thickness at pins is worn $1/8$ ".
- c. Hangers and friction arms when thickness at pins is worn $1/16$ ".

- d. Brake heads, pull rods and slack adjusters when each jaw member is worn 1/16".
- e. Hangers and equalizer fulcrum brackets when pin supports are worn 1/16" in thickness.
- f. Clevises when pin holes and interlocking surfaces are worn 1/8".
- g. Brake heads when face radius becomes worn to the extent that new shoe keys will no longer hold the shoe tightly.
- h. Brake shoes when worn to the limit of wear mark indicated on same.
- j. Wear plates on hanger levers and spring seats when clearance between the two becomes 3/16".
- k. Wear plates on equalizers and supports when worn to 1/8" thickness.

SLACK ADJUSTER LUBRICATION

Lubricate at regular intervals through Alemite grease fitting provided.

REASSEMBLY OF TRUCK

1. Make certain that axles having splined holes used to drive axle mounted equipment such as speed recorders, speedometer or transition generators, etc., are positioned in the same way as they were when the truck was removed from the locomotive.
2. With the traction motor nose supporting lugs facing inward, space the wheel, axle and motor assemblies at 7' - 9" centers from the center idling axle. Raise the motor noses slightly above horizontal so that the truck frame will clear them when lowered into place, and block in this position.
3. Assemble equalizers into truck frame and install center pedestal jaw filler blocks and pedestal wear plates.
4. With brake hangers, beams, swing hangers, etc., in place on truck frame lower it by means of a crane and suitable sling so that pedestal jaws fit over the journal boxes.
5. Set equalizer end seats in place on journal boxes before further lowering the frame.
6. Apply equalizer spring seats, lower spring seat liners, coil springs and upper liner. Then complete lowering frame onto coil springs, carefully positioning and seating equalizer ends.

7. Apply pedestal tie bars, bottom pull rods, slack adjusters and hanger cross tie bars.
8. Apply seats and liners to the swing hangers, and lower the spring plank into position. The elliptic springs may now be positioned on the plank to receive the bolster.
9. Lower bolster onto elliptic springs and apply bolster safety straps.
10. Lower traction motor nose so that suspension spring nest may be slid in between lugs of motor and frame. Push vertical pins into the spring nests from the bottom and apply pin keepers. If truck is not assembled over a pit it will be necessary to raise truck in order to insert the suspension pins.

NOTE: With suspension spring seats in position, and before further lowering motors, back off nuts in spring holder bolts (or remove split washer) until the spring holders are fully expanded between frame lugs. Then back off nuts 1/4" further and insert cotters.

11. Lower traction motor noses until they rest on suspensions.
12. Reapply motor air duct boots.
13. Reapply loose horizontal liner in swivel bowl.

REAPPLICATION OF TRUCK TO LOCOMOTIVE

Any of the previously mentioned methods of truck removal can be employed to reapply it, and in the following sequence of procedure.

1. Fill swivel bowl with oil to approximately 1/2" over horizontal liner.
2. Position trucks under locomotive cab so that swivel bowls line up with cab outer plate, and the axle driven equipment such as speed recorders, speedometer or transition generators, etc., are correctly located.
3. Lower the cab to the truck, or raise truck to cab, taking care to guide the center plate smoothly into the truck swivel bowl without jamming.
4. Apply center plate dust seal or check and tighten if it is already on center plate.
5. Apply top brake pull rods.
6. Reapply air brake piping hose.
7. Release elliptic springs if previously restrained.
8. Swing safety hooks into position and insert pins.

9. Connect hand brake chains.
10. Connect traction motor leads.
11. Adjust brakes. (See FOUNDATION BRAKES.)
12. Connect any journal box attachments.
13. Check lubricant in journal boxes.

14. Connect sander hose and adjust sand pipe, at rail.
15. Remove all tools, rags or blocking equipment that may be on trucks or chassis.

ADJUSTMENT OF CENTER PLATE HEIGHT

The center plate may be raised a total of 1" to compensate for wheel wear by the addition of 1/2" thick liners in helical spring pockets, both top and bottom.

1000HP AND 1600HP ROAD SWITCHERS, 1600HP FREIGHT-PASSENGER A & B UNITS 4 WHEEL, 2 MOTOR TRUCK

DESCRIPTION

This truck is a fully equalized 4-wheel, swing bolster swivel type. A swing bolster provides 2-1/4" lateral movement each side of center. In addition to the center swivel bearing, there are two friction side bearings, faced with wear plates, cast integral with the bolster to insure stability.

The truck spring system consists of two triple elliptic springs carrying the bolster which in turn rests on cast steel spring planks suspended from the truck frame and pivoted therefrom, by swing hangers. In addition to bolster springs the truck frame is supported on eight triple coil spring nests which transfer the load through equalizers to the axle assemblies.

Axle journal boxes are mounted in pedestals cast integral with the truck frame. The boxes may be the plain or roller bearing type. With plain bearings there is a 1/4" total lateral movement of each axle within the boxes in addition to 1/16" total movement of the boxes in the pedestals. With roller bearings (Timken or S. K. F.) the total lateral per axle is 1/4", and is obtained by the movement of boxes in the pedestals. The lateral thrust in a plain bearing box is taken directly through an axle end stop in each journal box, but with Timken or S. K. F. equipment, the thrust is taken directly by the bearings; no end thrust bearing is required.

Trucks applied to 1600 H. P. Road Switcher locomotives, supplied with dynamic braking, are equipped with bolster stops which reduce the bolster swing from 2-1/4" to 1" on each side. These stops can be removed and the same truck then used in the freight-passenger units provided it is roller bearing equipped. Trucks equipped with plain bearings are not recommended for use on the Freight-Passenger units.

The brakes are clasp type (double shoe), powered by four cylinders per truck. Cylinder brackets and hanger brackets are cast integral with the truck frame. Manually operated slack adjusters are provided in order to compensate for brake shoe and wheel wear. Provisions are made for application of a hand brake chain.

REMOVAL OF AXLE, WHEEL AND BOX ASSEMBLY (WITH MOTORS)

To remove an Axle, Wheel and Box Assembly from a truck that is under a locomotive, a drop table is necessary. It is assumed that this equipment is the single table type, large enough to handle a complete truck. The use of such a table will require that the locomotive be supported at the jacking pads. Using this equipment, when the table is lowered to remove a single axle, wheel and box assembly, the truck remains suspended on the safety hooks, and the procedure will be as follows:

1. Locate body supports under locomotive jacking pads.
2. Chain equalizers to truck frame or block beneath.
3. Remove pedestal caps or tie bars.
4. Disconnect motor leads.
5. Disconnect the traction motor air ducts of the motor. Ducts on the 1600 HP Road Switcher may be held at working height by wiring top and bottom together through loops provided on the upper and lower plates. Remove duct on the 1600 Road Switcher as soon as clearance permits.
6. Disconnect any journal box attachments such as speed recorders, speedometer generators, etc.
7. Remove foundation brake bottom pull rods and safety hangers (if any).
8. Jack motor nose and remove suspension assembly (See Item 8, DISASSEMBLY OF TRUCKS).
9. Lower motor nose until motor safety lugs rest on truck frame suspension spring brackets.

10. Allow drop table to settle slowly keeping the motor nose up by jacks so that the motor safety lugs will pass the truck frame lugs.

CAUTION: Exercise care with motor air duct assembly so as not to damage it.

11. Continue to lower assembly until it is free of truck.

REINSTALLATION OF AXLE, WHEEL AND BOX ASSEMBLY

This operation should be performed in practically the reverse sequence of removal.

1. With the axle assembly resting on the drop table, and the motor correctly positioned and tilted at the nose so that the safety lugs will pass the frame lugs, raise the assembly until the safety lugs can again rest on top of the frame lugs.
2. Bolt air duct boot on motor. Installation will be easier on the 1600 H. P. Road Switcher if boot is compressed and retained by wires through loops provided.
3. Continue to raise assembly to its normal position in pedestal and apply caps.
4. Reapply motor nose suspension spring assembly. See Item 12, REASSEMBLY OF TRUCK.
5. Reapply bottom pull rods.
6. Reconnect motor leads.
7. Reconnect journal box attachments.
8. Check brake adjustment.
9. Readjust sander pipe position.
10. Check box lubricant, and packing if assembly has plain bearing boxes.
11. Bolt air duct boot to under frame (Freight-Passenger locomotive only). Remove retaining wires used in application on 1600 H. P. Road Switcher.

REMOVING EQUALIZER SPRINGS (TRUCKS UNDER LOCOMOTIVE)

1. With Lifting Rig and Overhead Crane.
 - a. Remove pedestal caps from pedestals on both sides of truck from which the springs are to be removed and disconnect brake bottom pull rods.

- b. With sling from crane attached to locomotive lifting lugs, raise cab until safety hooks between cab and trucks are engaged. See REMOVAL OF TRUCK for blocking instructions.

- c. Continue lifting until weight is removed from springs and they are free from frame pockets. Side pedestal projections will then be nearly in contact with the bottom of the equalizers directly over them.

- d. Remove coil springs.

2. With Jacks.

- a. Remove pedestal caps and disconnect brake bottom pull rods as in Item 1-a above.

- b. With jacks under lifting lugs nearest the truck from which the springs are to be removed lift the locomotive approximately 7". Side pedestal projections will then be nearly in contact with the bottom of the equalizers directly over them as in Item 1-c above.

- c. Remove springs.

3. Droptable Stationary Body supports may also be used following procedure similar to above.

REMOVING ELLIPTIC SPRINGS (TRUCKS UNDER LOCOMOTIVE)

1. With Lifting Rig and Overhead Crane.
 - a. Clamp or tie elliptic springs to prevent them going free when unloaded.
 - b. Remove bolster restraint bars from truck frame.
 - c. With slings from crane attached to locomotive lifting lugs nearest the truck from which the springs are being removed, lift end of locomotive just enough to allow clearance between spring pocket in bolster and spring band.
 - d. Jack up spring plank close to hangers just enough to take weight of plank and springs off hanger gibs.
 - e. Push hangers and gib away from plank until they touch inside equalizer and lower end of plank.
 - f. Unseat spring and move out over equalizer as far as possible.
 - g. Jack up truck frame until springs can be removed out over equalizers.

2. With Jacks.

Clamp springs and proceed as with lifting rig above, except jacks are placed under locomotive lifting lugs.

3. Droptable and stationary Body Supports may be used following procedure similar to above.

REINSTALLATION OF SPRINGS

Reverse removal procedure.

REMOVAL OF TRUCK

Before a complete truck can be removed from beneath a locomotive unit, it is necessary to relieve the truck or trucks of the cab weight. This requires either a crane, hoist or jacks to lift the locomotive body, or stationary body supports used in conjunction with a droptable installation. The jacking or lifting diagrams Figs. 41, 42 or 43, shows the location at which the unit should be lifted or supported, and the approximate loads involved. The following precautions should be observed: Wood blocking should be used between chassis support points (jacking pads) and lifting devices and lifts should be uniform on both sides of cab to prevent unnecessary strain on the cab structure. The cab should not be lifted excessively more at one end than at the other until the body swivel castings have become disengaged from the truck swivel bowl or center plate. Before removing a truck by any method disconnect the safety hooks (one on each side of locomotive at the ends of bolster), air brake piping hose, hand brake chains, sander, traction motor leads, traction motor air duct (Freight-Passenger locomotive only), and any truck box attachments. If the truck is not to be dismantled, the lift required can be reduced if blocking is inserted between bottom of journal boxes and pedestal tie bars so that the equalizer springs cannot raise the truck frame. If the truck is to be dismantled, clamp or tie elliptic springs to prevent them going free when unloaded.

A truck may then be removed by any one of three different procedures:

1. By a drop table which requires the use of stationary body supports, or a lifting rig with overhead crane.
2. By jacking or lifting cab a sufficient amount to disengage swivel castings, and to provide clearance above the trucks so that they may be moved laterally from beneath locomotive using a turntable or transfer table. When using jacks to remove the front truck on a freight-passenger locomotive, it is necessary to first remove the side ladder below the operating cab door.

3. By jacking or lifting, as in Item 2 above, a sufficient amount to remove trucks longitudinally along the track after raising the cab sufficiently to allow truck to pass under the draft gear; the pilot, steps, ladders and uncoupling rigging support brackets having first been removed on Road Switchers. The front truck of the Freight Passenger "A" Unit must pass under the pilot. Reference should be made to the jacking and lifting diagrams, Fig. 41, 42 and 43, for details of lifts and loads involved.

DISASSEMBLY OF TRUCK

1. Remove all pedestal tie bars.
2. Remove bolster restraint bars from truck frame. The bolster may then be lifted out of frame.
3. Remove traction motor air duct from top of motors.
4. Lift out elliptic springs and remove spring plank.
5. Slide spring plank gibs out of hanger slots.
6. Loosen or remove brake hanger cross ties.
7. Remove brake slack adjusters and bottom pull rods.
8. Remove all motor nose suspension spring nests as follows. See Fig. 4.
 - a. Jack or lift motor nose sufficiently to compress nest approximately one-half inch ($1/2''$).
 - b. Remove cotters and tighten nuts on spring holder bolts (or use split washers to take up space between nuts and spring holders).
 - c. Lower motors so that nose lugs are free of spring nests.
 - d. Remove pin keepers and drop vertical pins.
 - e. Slide spring nest out sidewise.
9. Again raise motor noses to provide clearance preparatory to removing truck frame. Raise noses a sufficient amount so that truck frame lugs will clear motor safety lugs when the frame is lifted upward and off the axle, wheel and box assemblies.
10. With crane, raise truck frame sufficiently to allow pedestal flange projections to contact the equalizers. Continue to hoist frame until the equalizer ends are free of pockets or seats in the top of journal boxes.

11. Remove coil springs and unbolt and remove spring seat.
12. Using a pry bar, slide each equalizer off the truck frame pedestal projection so that they drop onto edge of journal box equalizer pockets.
13. Then with equalizers resting on journal boxes, and clear of pedestal projections, truck frame may be raised free of axle, wheel and box assemblies.
14. Block the journal boxes to prevent rotation and remove all equalizers.
15. If a truck is being disassembled over a pit, it is possible to remove motors without disturbing the rest of the truck as follows:
 - a. Remove suspension spring nest as in Item 8 preceding.
 - b. Remove gear case and dust guard.
 - c. Lift motor nose using lifting lugs until cap at suspension bearing is at bottom.
 - d. Unbolt cap and remove.

CAUTION: Exercise greatest care in handling suspension bearings. Bearing is in two halves. One half may be remov-

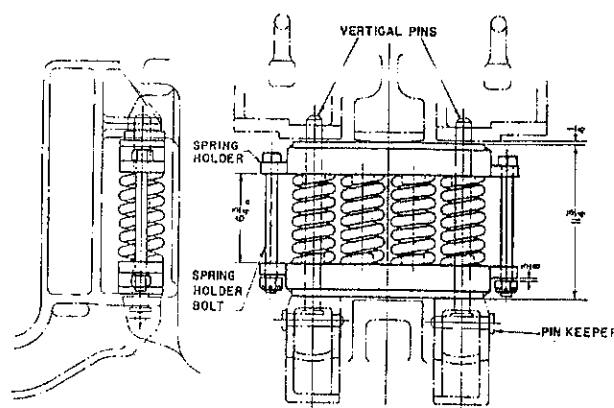


Fig. 4 - TRACTION MOTOR NOSE SUPPORT

ed with the cap and the other half removed after the cap is dropped. If not removed, restrain inner half of bearing when lifting motor from axle so that it will not drop and injure personnel.

- e. Lift motor clear of axle.

INSPECTION AND MAINTENANCE

1. The following items should be inspected and compared with Fig. 5 for clearance and wear limits.
 - a. Vertical and horizontal steel liners in both body and truck swivel casting.

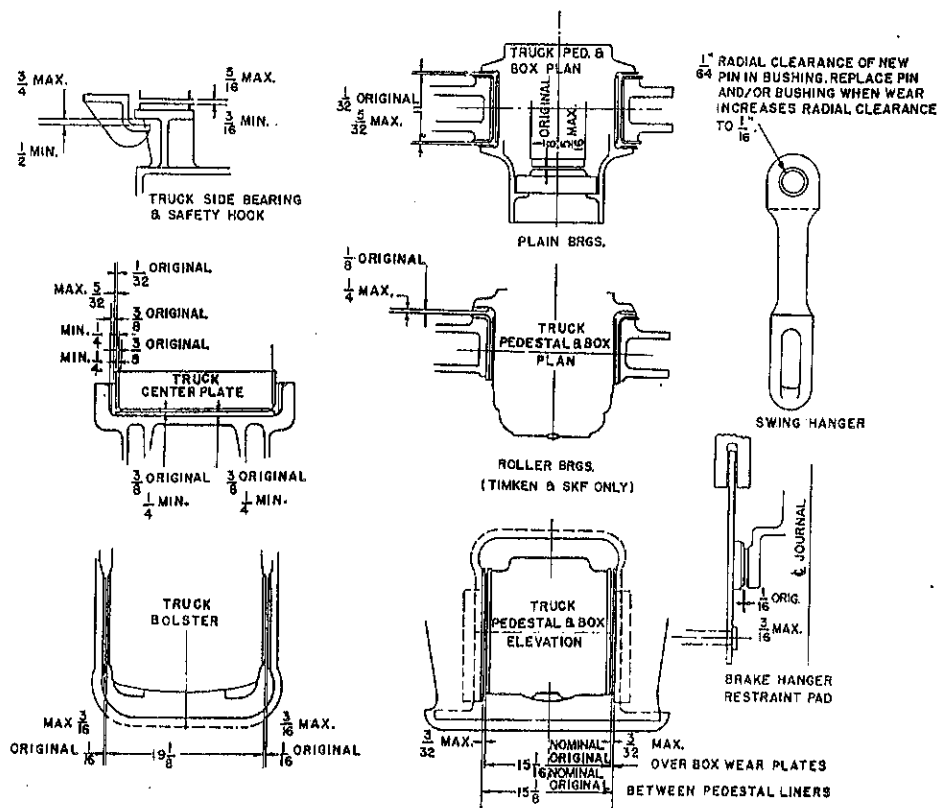


Fig. 5 - CLEARANCES AND WEAR LIMITS

- b. Pedestal wearing faces and the corresponding faces on journal housings.
 - c. Side bearing wear plates.
 - d. Truck bolster wear plates - both frame and bolster.
 - e. Swing link pins and bushings.
 - f. Brake hanger restraint bracket wear plates. See also FOUNDATION BRAKES.
 - g. Brake hangers and equalizer pins and bushings. See also FOUNDATION BRAKES.
2. When applying new liners be sure that all edges are rounded where they contact other surfaces.
 3. For plain journal bearing and wedge wear limits, follow A.A.R. standard practice and I.C.C. Regulations.
 4. For roller bearing refer to manufacturer's instructions.
 5. Check lubrication of swivel bowl and axle bearings. If plain journal bearings, check packing.
 6. Tighten all pipe connections and check piping.
 7. Inspect the motor nose spring holders for wear; and, if necessary, replace the wear plate.
 8. When trucks are dismantled or springs removed, check liners in spring pockets. If badly worn, replace.
 9. Check for wear in Foundation Brake equipment. If parts show excessive wear, they should be replaced. See FOUNDATION BRAKES.
 10. For traction Motor maintenance refer to Maintenance Instruction Booklet MI-2001, "Traction Motor Maintenance".

WHEELS

1. When turning or replacing wheels, the I.C.C. rule requires "the diameter of the wheels on the same axle shall not vary more than $3/32$ ".

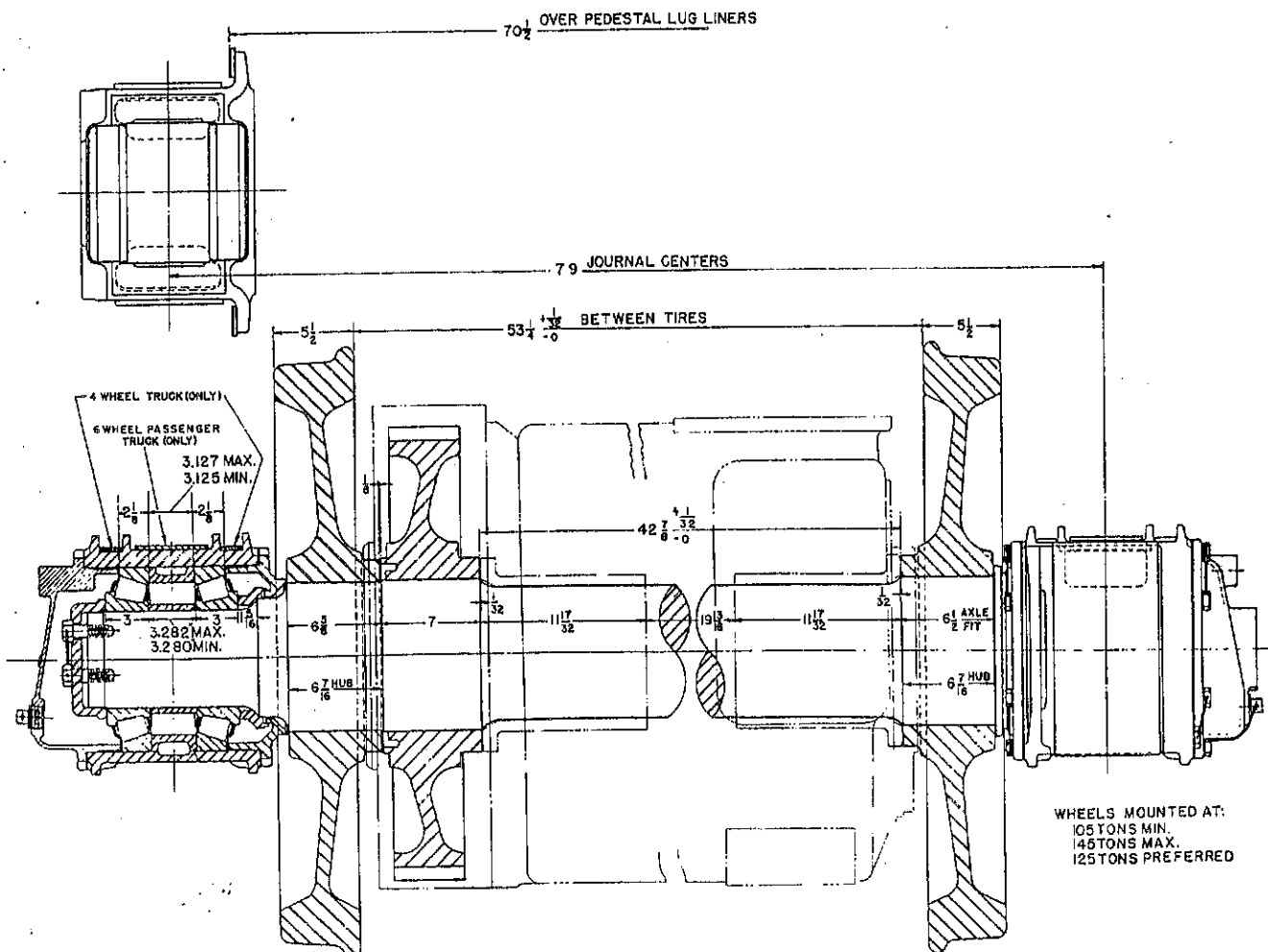


Fig. 6 - WHEEL, AXLE AND BOX ASSEMBLY - 1600 HP
Road Switcher and Freight Passenger A & B Units

1600 H. P. ROAD SWITCHER AND FREIGHT-PASSENGER A&B UNITS

Bore of axle gear 9.991" \pm .001" $-$.000"
Diameter of axle gear fit 10.000" \pm .001" $-$.000"

1000 H. P. ROAD SWITCHER

Bore of axle gear 9.241" \pm .001" $-$.000"
Diameter of axle gear fit 9.250" \pm .001" $-$.000"

For complete axle gear instructions on the 1600 H. P. Road Switcher and Freight-Passenger Locomotives see Maintenance Instructions Booklet MI-2001, "Traction Motor Maintenance". For the 1000 H. P. Road Switcher see Maintenance Manual, TP700.

MOTOR SUSPENSION BEARINGS

Diameter of axle in suspension bearing when new is 9.000" \pm .002". As the axle wears, it may be turned to the following three (3) successive diameters, and undersize replacement bearings obtained:

1600 H. P. ROAD SWITCHER AND FREIGHT-PASSENGER A&B UNITS

8.938 \pm .002"
8.875 \pm .002"
8.813 \pm .002"

1000 H. P. ROAD SWITCHER

Diameter of axle in suspension bearing when new is 8.250 \pm .002". As the axle wears it may be turned to the following three (3) successive diameters, and undersize replacement bearings obtained:

8.188 \pm .002"
8.125 \pm .002"
8.063 \pm .002"

For complete axle bearing instructions on the 1600 H. P. Road Switcher and Freight-Passenger Locomotives, see Maintenance Instruction Booklet, MI-2001, "Traction Motor Maintenance". For the 1000 HP Road Switcher see Maintenance Manual, TP 700. See Parts Bulletin DRP 1317 for undersize bearings.

FOUNDATION BRAKES

Manual slack adjusters are initially set to provide 3/8" shoe release. With new wheels and brake shoes this setting will then allow approximately 2-1/2" piston travel per brake application

Nuts on brake head pins should be adjusted so that vibrational shock will not cause shoes to drag or wear, but still permit face of shoe to conform to wheel as wear progresses.

Replace the following brake parts when specified maximum wear is obtained:

- a. Pins or bushings when worn to 3/64" radial clearance. Normal clearance for new pin and bushings is 1/64" radial clearance.
- b. Hanger levers and equalizers when thickness at pins is worn 1/8".
- c. Hangers and friction arms when thickness at pins is worn 1/16".
- d. Brake heads, pull rods and slack adjusters when each jaw member is worn 1/16".
- e. Hangers and equalizer fulcrum brackets when pin supports are worn 1/16" in thickness.
- f. Clevises when pin holes and interlocking surfaces are worn 1/8".
- g. Brake heads when face radius becomes worn to the extent that new shoe keys will no longer hold the shoe tightly.
- h. Brake shoes when worn to the limit of wear mark indicated on same.
- j. Wear plates on hangers and truck frame pads when clearance between the two becomes 3/16".
- k. Wear plates on equalizers and supports when worn to 1/8" thickness.

SLACK ADJUSTER LUBRICATION

Lubricate at regular intervals through Alemite grease fitting provided.

REASSEMBLY OF TRUCK

1. Make certain that axle, wheel and box assemblies, with axles having splined holes in the ends used to drive journal box mounted equipment such as speed recorders, speedometer or transition generators, etc., are positioned in the same way as they were when the truck was removed from the locomotive.
2. With the traction motor nose supporting lugs facing inward, space the axle assembly at 9'-4" centers. Raise the motor noses slightly above horizontal so that the truck frame will clear them when lowered into place, and block in this position.
3. Using a crane and suitable sling, place the equalizers on the journal boxes so that they rest on the outer edges of the journal box equalizer pockets. The equalizers must be out of the pockets and spread as much as possible on top of each box so that the pedestal and their projectors may pass down between them.

4. With all brake hangers and swing links in place on truck frame, lower it so that the pedestal jaws engage journal boxes. Continue to lower until frame rests on boxes.
5. Insert bottom brake pull rod pins into hangers making certain that the heads are toward the equalizers.
6. Using a pry bar, drop equalizers into their journal box pockets.
7. Place the coil spring seats in their proper position between the equalizers. Bolt seats in place and drop into pockets the proper thickness of liners.
8. Raise truck frame until pedestal projections contact the equalizers. Insert coil springs and apply upper liners. Lower truck frame onto coil springs and apply pedestal tie bars.
9. Place spring plank gib in swing hanger slots. Apply spring plank seats and wear plates to gibs. Lower spring plank into position. Lower elliptic springs into position on spring plank.
10. Lower bolster onto elliptic springs. Unless the elliptic springs had been compressed and clamped before application, the bolster restraint bars cannot be applied until locomotive cab weight is placed on swivel bowl.
11. Apply slack adjusters to outer brake hangers, connect bottom pull rods, and apply hanger cross tie bars.
12. Lower traction motor nose so that suspension spring nest may be slid in between lugs of motor and frame. Push vertical pins into the spring nests from the bottom and apply pin keepers. If truck is not assembled over a pit, it will be necessary to raise truck in order to insert the suspension pins.

NOTE: With suspension spring nests in position, and before further lowering motors, back off nuts on spring holder bolts (or remove split washers) until the spring holders are fully expanded between frame lugs. Then back off nuts 1/4" further and insert cotters.

13. Lower traction motor noses until the lugs rest on suspensions.
14. Reapply motor air duct boots.
15. Reapply loose horizontal liner in swivel bowl.

REAPPLICATION OF TRUCK TO LOCOMOTIVE

Any of the previously mentioned methods of truck removal can be employed to reapply it, and in the following sequence of procedure.

1. Fill swivel bowl with oil to approximately 1/2" over horizontal liner.
2. Position trucks under locomotive-cab so that the swivel bowls line up with the cab center plate, and the axle driven equipment such as speedometer generators, speed recorder devices, etc., are correctly located.
3. Lower the cab to the truck (or raise truck to cab), taking care to guide the center plate into the truck swivel bowl without jamming.
4. Apply center plate dust seal or check and tighten if it is already on center plate.
5. Apply bolster restraint bars.
6. Reapply air brake piping hose.
7. Bolt traction motor air duct boot to under-frame (Freight-passenger locomotives only).
8. Assemble side bearing safety hooks.
9. Connect hand brake chains.
10. Connect traction motor leads.
11. Adjust brakes. See FOUNDATION BRAKES.
12. Connect any journal box attachments such as speedometer generators, speed recorder drives, etc.
13. Check lubricant (and packing if plain bearings) in journal boxes.
14. Connect sander hose and adjust sand pipes at rail.
15. Connect center plate oil pipe (1000 H.P. and 1600 H.P. Road Switcher).
16. Remove all tools, rags, or blocking equipment that may be on truck or chassis.

ADJUSTMENT OF CENTER PLATE HEIGHT

When it becomes necessary to raise center plate height to compensate for worn wheels, it may be done as follows:

1. A 1/2" thick liner may be applied in each helical spring pocket, both top and bottom.
2. A 1/2" liner may be applied to the truck swivel bowl under the loose horizontal wear plate. When this is done the side bearings and safety hooks must be adjusted accordingly.

1600HP ROAD SWITCHER AND 1600HP FREIGHT-PASSENGER A & B UNITS 6 WHEEL, 2 MOTOR TRUCK

DESCRIPTION

In addition to the four (4) wheel trucks furnished as standard on 1600 H.P. Road Switchers, and Freight-Passenger A & B Units, a six (6) wheel - two motor truck has been applied to these locomotives as a modification or by few alterations to the same type locomotives presently equipped with four (4) wheel trucks.

The six-wheel two motor truck is a fully equalized swing bolster type. A swing bolster provides 2-1/4" lateral movement each side of center. In addition to the center swivel bearing, there are four (4) friction side bearings faced with wear plates, cast integral with the bolster to insure stability.

The truck spring system consists of four (4) groups consisting of two (2) outer and two (2) inner helical coils each. All four groups have the inner coil of the set nearest the center wheel working in conjunction with a friction snubber.

Axle journal boxes are mounted in pedestals cast integral with the truck frame. Journal boxes may be plain or roller bearing type. With plain bearings there is a 1/4" total lateral movement of each axle within the boxes in addition to 1/16" total movement of the boxes in the pedestals. With roller bearings (Timken or S. K. F.) the total lateral per axle is 1/4" and is obtained by the movement of boxes in the pedestals. The lateral thrust in a plain bearing box is taken directly through an axle end stop in each journal box, but with Timken or S. K. F. equipment the thrust is taken directly by the bearings; no end thrust bearing is required.

The brakes are single shoe type (one shoe per wheel) powered by two cylinders. Cylinder brackets and hanger brackets are cast integral with the truck frame. Manually operated slack adjusters are provided in order to compensate for brake shoe and wheel wear.

Provisions are made for application of a hand brake chain.

REMOVAL OF AXLE, WHEEL AND BOX ASSEMBLY (WITH MOTORS)

To remove an Axle, Wheel and Box Assembly from a truck that is under a locomotive, a drop table is necessary. It is assumed that this equipment is the single table type, large enough to handle a complete truck. The use of such a table will require the locomotive to be supported at the jacking pads. Using this equipment, when the table is lowered to remove a single axle, wheel and box assembly, the truck remains suspended on the safety hooks, and the procedure will be as follows:

1. Locate body supports under locomotive jacking pads.
2. Chain equalizers to truck frame or block beneath.
3. Remove pedestal caps or tie bars.
4. Disconnect motor leads.
5. Disconnect traction motor air ducts at motor. Ducts on the Road Switcher locomotive may be held at working height by wiring top and bottom together through loops provided on upper and lower plates. Remove ducts as soon as clearances permit.
6. Disconnect any journal box attachments such as speed recorders, speedometer generators, etc.
7. Remove sander pipe at end assemblies of each truck.
8. Disconnect bottom slack adjusters and retract all others to provide clearance between wheels and brake shoes.
9. Jack motor nose and remove suspension assembly. See Item 4, DISASSEMBLY OF TRUCKS.
10. Lower motor nose until motor safety lugs rest on truck frame suspension spring brackets.
11. Allow drop table to settle slowly keeping the motor nose up by jacks so that the motor safety lugs will pass the truck frame lugs.
CAUTION: Exercise care with motor air duct assembly so as not to damage it.
12. Continue to lower assembly until it is free of truck.

REINSTALLATION OF AXLE, WHEEL AND BOX ASSEMBLY

This operation should be performed in practically the reverse sequence of removal.

1. With the axle assembly resting on the drop table, and the motor correctly positioned and tilted at the nose so that the safety lugs will pass the frame lugs, raise the assembly until the safety lugs can again rest on top of frame lugs.

2. Bolt air duct boot on motor. Installation will be easier on the Road Switcher locomotive if boot is compressed and retained by wires through loops provided.
3. Continue to raise assembly to its normal position in pedestal and apply caps.
4. Reapply motor nose suspension spring assembly. See Item 7 REASSEMBLY OF TRUCK.
5. Reconnect bottom slack adjusters.
6. Reconnect motor leads.
7. Reconnect journal box attachments.
8. Check brake adjustment.
9. Readjust sander pipe position.
10. Check box lubricant and packing if assembly has plain bearing boxes.
11. Bolt air duct boot to under frame (Freight-Passenger locomotives only).
12. Check box end stop facing for wear if assembly has plain bearing boxes.

REMOVING EQUALIZER SPRINGS (TRUCKS UNDER LOCOMOTIVE)

1. With Lifting Rig and Overhead Crane.
 - a. Remove pedestal caps or tie bars from both sides of truck frame under end boxes nearest the spring being removed, and also from center pedestals of the same truck. Release all brake slack adjusters to completely free brake shoes.
 - b. With sling from crane attached to locomotive lugs, raise cab until safety hooks between cab and trucks are engaged.
 - c. Continue lifting until weight is removed from springs and they are free from frame pockets.
 - d. The coil group nearest the center wheel of each truck (group including snubber) may then be lifted clear of the equalizer spring seat, dropped down between equalizers and removed.
 - e. The coil group nearest the end wheels may then be removed.

2. With Jacks.

- a. Remove pedestal caps as in Item 1-a above, and release brake slack adjusters.
- b. Place jacks under jacking pads on each side of locomotive nearest the truck from which the springs are to be removed, and raise until frame is clear of springs.
- c. Remove springs as previously described in Item 1.
- d. Drop table and stationary body supports may be used following procedure similar to above.

REINSTALLATION OF EQUALIZER SPRINGS

Reverse removal procedure.

NOTE: When reinstalling, the group with the snubber is always toward the center wheel (R&L) of each truck. Replace correct thickness liner under each spring group.

REMOVAL OF TRUCK

Before a complete truck can be removed from beneath a locomotive unit, it is necessary to relieve the truck or trucks of cab weight. This requires either a crane, hoist or jacks to lift the locomotive body, or stationary body supports used in conjunction with a drop table installation. The jacking or lifting diagrams Figs. 42 and 43 show the location at which the units should be lifted or supported, and the approximate loads involved. The following precautions should be observed: Wood blocking should be used between chassis support points (jacking pads) and lifting devices, and lifts should be uniform on both sides of cab to prevent unnecessary strain on the cab structure. The cab should not be lifted excessively more at one end than at the other until the body swivel castings have become disengaged from the truck swivel bowl or center plate. Before removing a truck, disconnect the safety hooks (one front and back of center plate bowl). The hook itself is held in place by two pins. Remove the larger; the hook will then swing clear on the smaller pin yet remain attached to the cab. Then disconnect air brake piping hose, hand brake chains, sanders, traction motor leads, traction motor air duct (Freight-Passenger locomotives only), and any truck box attachments. If the truck is not to be dismantled, the lift required can be reduced if blocking is provided between bottom of journal boxes and pedestal tie bars so that the equalizer springs can not raise the truck frame.

A truck may then be removed by any one of three different procedures:

1. By a drop table which requires the use of stationary body supports, or a lifting rig with overhead crane.
2. By jacking or lifting cab a sufficient amount to disengage swivel castings, and to provide clearance above the trucks so that they may be moved laterally from beneath the locomotive using a turntable or transfer table. When using jacks to remove the front truck on a Freight-Passenger locomotive, it is necessary to first remove the side ladder below the operating cab door.
3. By jacking or lifting, as in Item 2 above, a sufficient amount to remove trucks longitudinally along the track after raising the cab sufficiently to allow truck to pass under the draft gear; the pilot, steps, ladders and uncoupling rigging support brackets having first been removed.

Reference should be made to the jacking and lifting diagrams Fig. 42 and 43 for details of lifts and loads involved.

DISASSEMBLY OF TRUCK

1. Remove all pedestal tie bars.
2. Remove bottom slack adjusters and retract all others so that brake shoes are clear of wheels.
3. Remove traction motor air duct from top of motors.
4. Remove all motor nose suspension spring nests as follows. See Fig. 8.
 - a. Jack or lift motor nose sufficiently to compress nest approximately one-half inch ($1/2"$).
 - b. Remove cotters and tighten nuts on spring holder bolts (or use split washer to take up space between nuts and spring holders).
 - c. Lower motors so that nose lugs are free of spring nest.
 - d. Remove pin keepers and drop vertical pins.
 - e. Slide spring nests out sidewise.
5. Again raise motor noses to provide clearance preparatory to removing truck frame and bolster. Raise nose a sufficient amount so that truck frame lugs will clear motor safety lugs when the frame and bolster assembly is lifted upward and off the axle, wheel and box assemblies.
6. With frame and bolster free of truck remove upper hanger pins and lift frame free of bolster.

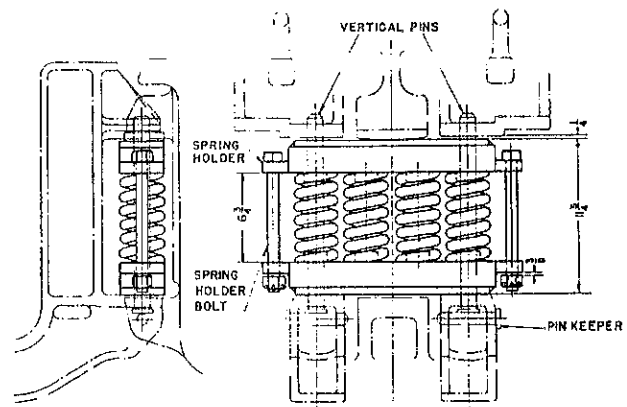


Fig. 8 -TRACTION MOTOR NOSE SUPPORT

7. Remove equalizer springs, unbolt and drop spring seats.
 8. Block the journal boxes to prevent rotation and remove all equalizers.
 9. If a truck is being disassembled over a pit, it is possible to remove motors without disturbing the rest of the truck as follows:
 - a. Remove suspension spring nests as in Item 4 preceding.
 - b. Remove gear case and dust guard.
 - c. Lift motor nose using lifting lugs until cap at suspension bearing is at bottom.
 - d. Unbolt cap and remove.
- CAUTION: Exercise greatest care in handling suspension bearings: Bearing is in two halves. One half may be removed with the cap and the other half removed after the cap is dropped. If not removed restrain inner half when lifting motor from axle so that it will not drop and injure personnel.
- e. Lift motor clear of axle.

INSPECTION AND MAINTENANCE

1. The following items should be inspected and compared with Fig. 9 for clearance and wear limits.
 - a. Vertical and horizontal steel liners in both body and truck swivel casting.
 - b. Pedestal wearing faces and the corresponding faces on journal housings.
 - c. Side bearing wear plates.
 - d. Truck bolster wear plates - both frame and bolster.

- e. Swing link pins and bushings.
 - f. Brake hanger restraint bracket wear plates.
See also FOUNDATION BRAKES.
 - g. Brake hangers and equalizer pins & bushings. See also FOUNDATION BRAKES.
2. When applying new liners, be sure that all edges are rounded where they contact other surfaces.
 3. For plain journal bearing and wedge wear limits, follow A.A.R. standard practice and I.C.C. Regulations.
 4. For roller bearing refer to manufacturer's instructions.
 5. Check lubrication of swivel bowl and axle bearings. If plain journal bearings, check packing.
 6. Tighten all pipe connections and check piping.
 7. Inspect the motor nose spring holders for wear; and, if necessary, replace the wear plate.
 8. When trucks are dismantled or springs removed, check liners in spring pockets. If badly worn, replace.
 9. Check for wear in Foundation Brake equipment. If parts show excessive wear they should be replaced. See FOUNDATION BRAKES.
 10. For Traction Motor maintenance refer to Maintenance Instruction Booklet, MI-2001, "Traction Motor Maintenance".

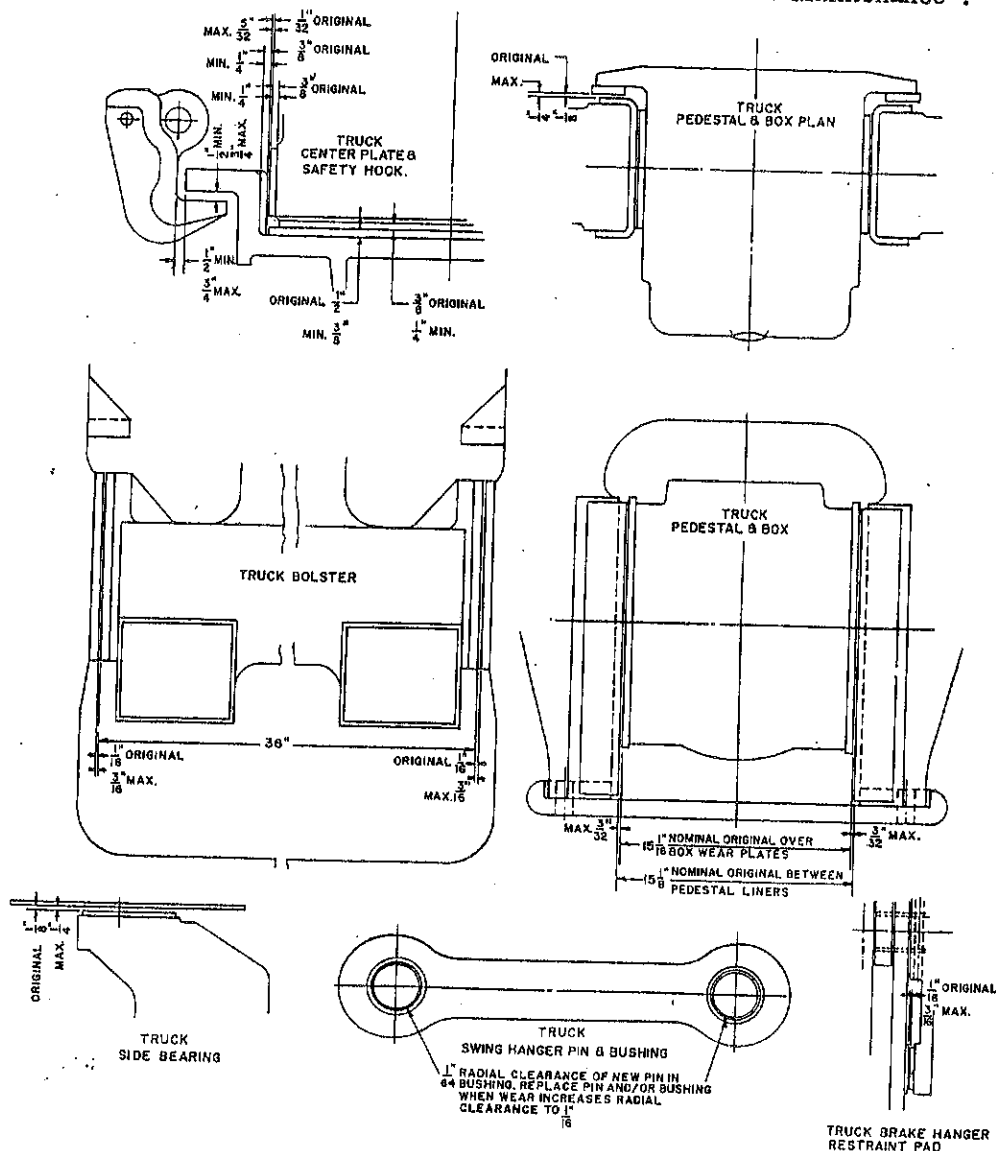


Fig. 9 - CLEARANCES AND WEAR LIMITS

WHEELS

1. When turning or replacing wheels, the I. C. C. rule requires "the diameter of the wheels on the same axle shall not vary more than $\frac{3}{32}$ ". This is equivalent to approximately 2-1/2 tapes. It is our further recommendation that wheels should not continue in service if the diameter in the same truck varies more than $\frac{1}{2}$ " (12-1/2 tapes) or under the same locomotive unit if they vary more than 1" (25 tapes). When turning, or replacing with new wheels, it is our recommendation that wheels should not vary more than $\frac{1}{2}$ tape on the same axle, 2 tapes in the same truck, and 14 tapes on the same locomotive.
2. Wheels should be checked periodically for wear in accordance with I. C. C. regulations. If excessive wear is found, check to determine:
 - a. If brake shoes are free and not binding on the flange or wheel tread.
 - b. If the brake hangers and levers are hanging true and not causing misalignment of the shoe.
 - c. If wear plates on hangers, levers, and also brackets have the proper clearances. See FOUNDATION BRAKES and INSPECTION AND MAINTENANCE.
 - d. If sand pipes or other parts are free and not fouling the brake rigging thus preventing normal operation.
 - e. If axle lateral is normal and not excessive by reason of worn pedestal liners and axle end stops.
 - f. Excessive variation in wheel diameters. See Item 1 above.
3. When applying new shoes, they must hang true in the heads. Nuts on brake head pins should be adjusted so that vibrational shock will not cause shoe to drag on wheel, but still permit face of shoe to conform to wheel as wear progresses. See also FOUNDATION BRAKES.
4. For wheel mounting refer to Fig. 10 or 11.

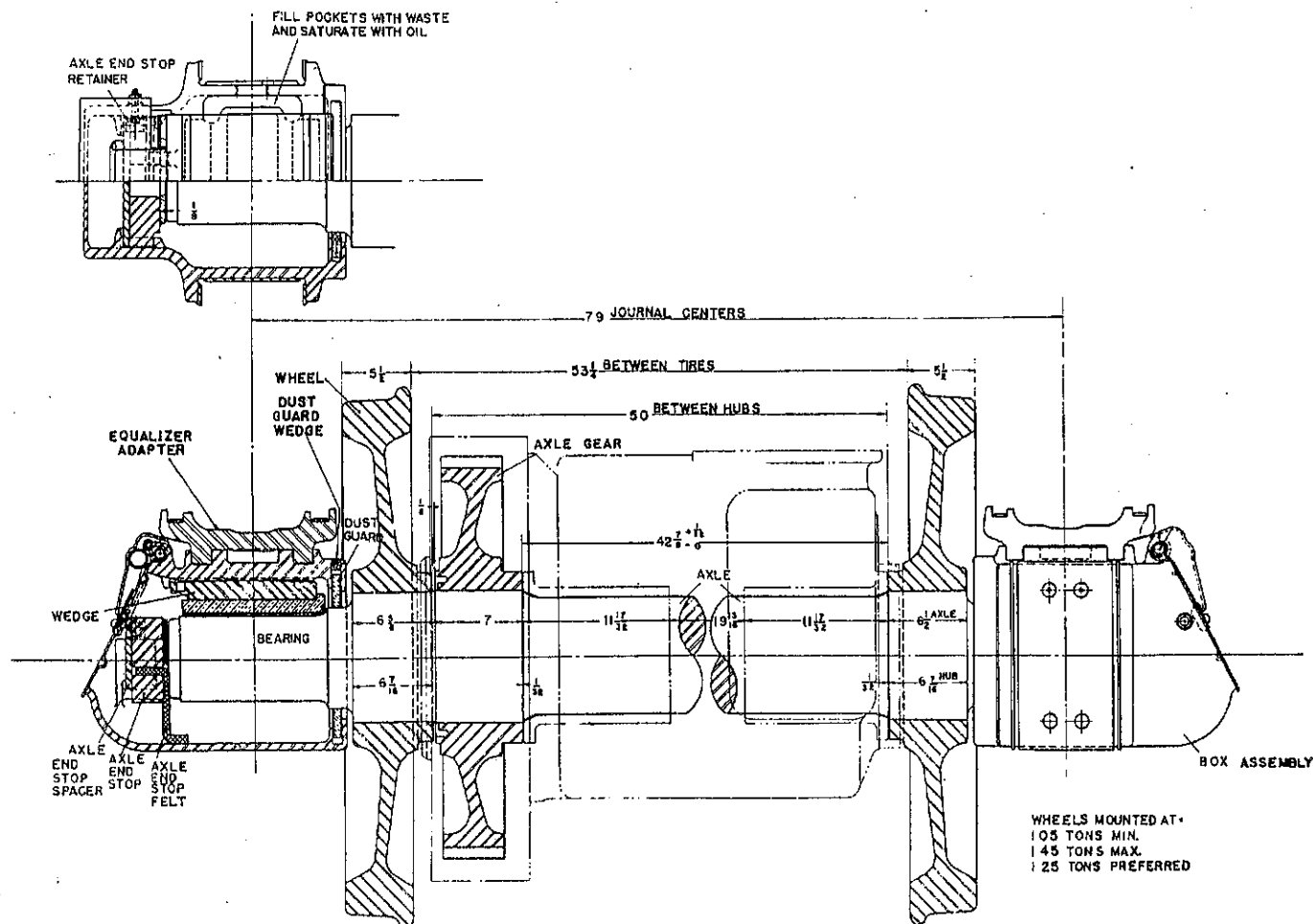


Fig. 10 - WHEEL, AXLE AND BOX ASSEMBLY WITH FRICTION BEARINGS

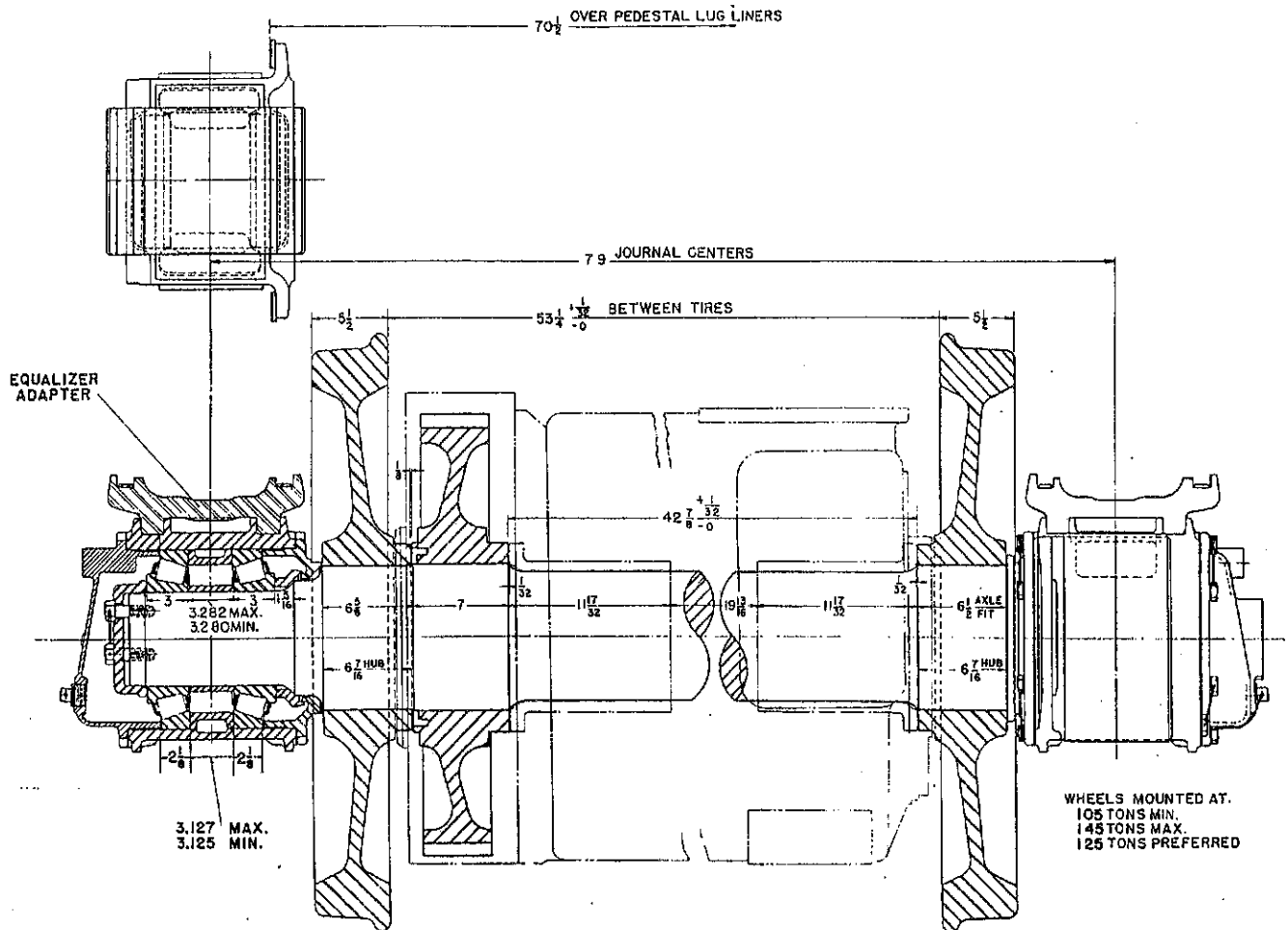


FIG. 11 - WHEEL, AXLE AND BOX ASSEMBLY WITH ROLLER BEARINGS

AXLE GEAR

The mounting of an axle gear is based on an interference fit regardless of tonnage pressure. The recommended interference fits are as follows:

Bore of axle gear	9.991" + .001" - .000"
Diameter of axle gear fit	10.000" + .001" - .000"

For complete axle gear instructions see Maintenance Instruction Booklet MI-2001, "Traction Motor Maintenance".

MOTOR SUSPENSION BEARINGS

Diameter of axle in suspension bearing when new is 9.000" ± .002". As the axle wears, it may be turned to the following three (3) successive diameters, and undersize replacement bearings obtained:

8.938 ± .002"
8.875 ± .002"
8.813 ± .002"

For complete axle bearing instructions, see Maintenance Instruction Booklet MI-2001, "Traction Motor Maintenance". See parts Bulletin DRP-1317 for undersize bearings.

FOUNDATION BRAKES

Manual slack adjusters are initially set to provide 1/2" shoe release. With new wheels and brake shoes this setting will then allow approximately 3-3/4" piston travel per brake application.

Nuts on brake head pins should be adjusted so that vibrational shock will not cause shoes to drag or wear, but still permit face of shoe to conform to wheel as wear progresses.

Replace the following brake parts when specified maximum wear is obtained.

- Pins or bushings when worn to 3/64" radial clearance. Normal clearance for new pins and bushings is 1/64" radial clearance.
- Hanger levers and equalizers when thickness at pins is worn 1/8".
- Hangers and friction arms when thickness at pins is worn 1/16".
- Brake heads, pull rods and slack adjusters when each jaw member is worn 1/16".

- e. Hangers and equalizer fulcrum brackets when pin supports are worn 1/16" in thickness.
- f. Clevises when pin holes and interlocking surfaces are worn 1/8".
- g. Brake heads when face radius becomes worn to the extent that new shoe keys will no longer hold the shoe tightly.
- h. Brake shoes when worn to the limit of wear mark indicated on same.
- j. Wear plates on hanger lever and truck frame pad when clearance between the two becomes 3/16".

SLACK ADJUSTER LUBRICATION

Lubricate threads at regular intervals so as to maintain a freely operating mechanism.

REASSEMBLY OF TRUCK

1. Make certain that axle, wheel and box assemblies with axles having splined holes in the ends used to drive journal box mounted equipment such as speed recorders, speedometer or transition generators, etc., are positioned in the same way as they were when the truck was removed from the locomotive.
2. With the traction motor nose supporting lugs facing inward, space the wheel, axle and motor assembly at 5'-6" centers from the center idling axle. Raise the motor noses slightly above horizontal so that the truck frame and bolster assembly will clear them when dropped into place, and block in this position.
3. Using a crane and suitable sling, place the equalizers on the journal boxes, bolt in spring seats and install springs. NOTE: Spring nests with snubbers are always nearest center wheels. Replace correct thickness liners in all spring pockets.
4. With all foundation brake equipment except bottom slack adjusters assembled to truck frame, and with bolster installed in frame, lower frame into position between the equalizers and finally onto coil springs.
5. Attach bottom slack adjusters.
6. Attach pedestal tie bars.
7. Lower traction motor nose so that suspension spring nest may be slid in between lugs of motor and frame. Push vertical pins into the spring nests from the bottom and apply pin keepers. If truck is not assembled over a pit, it will be necessary to raise truck in order to insert the suspension pins.

NOTE: With suspension spring seats in position, and before further lowering motors, back off nuts on spring holder bolts (or remove split washer) until the spring holders are fully expanded between frame lugs. Then back off nuts 1/4" further and insert cotters.

8. Lower traction motor noses until the lugs rest on suspensions.
9. Reapply motor air duct boots.
10. Reapply loose horizontal liner in swivel bowl.

REAPPLICATION OF TRUCK TO LOCOMOTIVE

Any of the previously mentioned methods of truck removal can be employed to reapply it, and in the following sequence of procedure.

1. Fill swivel bowl with oil to approximately 1/2" over horizontal liner.
2. Position truck under locomotive cab so that the swivel bowl lines up with the cab center plate and the axle driven equipment such as speedometer generators, speed recorder devices, etc., are correctly located.
3. Lower the cab to the truck (or raise truck to cab) taking care to guide the center plate into the truck swivel bowl without jamming.
4. Apply center plate dust seal or check and tighten if it is already on center plate.
5. Reapply air brake piping hose.
6. Bolt traction motor air duct boot to under-frame (Freight-Passenger locomotives only).
7. Swing safety hooks into position and insert pins.
8. Connect hand brake chains.
9. Connect traction motor leads.
10. Adjust brakes. See FOUNDATION BRAKES.
11. Connect any journal box attachments such as speedometer generators, speed recorder drives, etc.
12. Check lubricant, (and packing if plain bearings) in journal boxes.
13. Connect sander hose and adjust sand pipes at rail.
14. Remove all tools, rags, or blocking equipment that may be on truck or chassis.

ADJUSTMENT OF CENTER PLATE HEIGHT

When it becomes necessary to raise center plate height to compensate for worn wheels, it may be done as follows:

1. A 1/2" thick liner may be applied in each hel-

ical spring pocket, both top and bottom.

2. A 1/2" liner may be applied to the truck swivel bowl under the loose horizontal wear plate. When this is done, the side bearings and safety hooks must be adjusted accordingly.

1600HP ROAD SWITCHER 6 WHEEL, 3 MOTOR TRUCK

DESCRIPTION

This truck is of the rigid bolster swivel type, and fully equalized. In addition to the conventional swivel bearing about which the truck swings, and which bears a portion of the cab load, there are two pads, one on each side, carrying the balance of the cab load. The trucks are so positioned under the locomotive that the pads are located towards the center of the locomotive. The swivel bearing and pads thus form a three point support to carry the load on each truck. The lateral spacing of the pads afford stability against tipping forces of the locomotive on a curve, and the frictional resistance on the pads prevents nosing at high speeds.

The truck spring system consists of four groups, 2 outer and 2 inner helical coils each. All four groups have the inner coil of the set nearest the center wheel working in conjunction with a friction snubber.

Axle journal boxes are mounted in pedestals cast integral with the truck frame. The boxes may be plain or roller bearing type. With plain bearings there is a 1/4" total lateral movement of each axle within the boxes in addition to 1/16" total movement of the boxes in the frame pedestals. With the roller bearings (Timken or SKF) the total lateral per axle is 1/4", and it is obtained by the movement of boxes in the pedestals. The lateral thrust in a plain bearing box is taken directly through an axle end stop in each journal box; but with Timken or SKF equipment, the thrust is taken directly by the bearings; no end thrust bearing is required.

The brakes are single shoe type, powered by two cylinders per truck. Cylinder brackets are cast integral with the frame. Manually operated slack adjusters are provided in order to compensate for brake shoe and wheel wear. Provisions are made for application of a hand brake chain.

REMOVAL OF AXLE, WHEEL AND BOX ASSEMBLY (WITH MOTORS)

To remove an Axle, Wheel and Box Assembly from a truck that is under a locomotive, a drop table is necessary. It is assumed that this equipment is the single table type, large enough to handle

a complete truck. The use of such a table will require the locomotive to be supported at the jacking pads. Using this equipment, when the table is lowered to remove a single axle, wheel and box assembly, the truck remains suspended on the safety hooks, and the procedure will be as follows:

1. Locate body supports under locomotive jacking pads.
2. Chain equalizers to truck frame or block beneath.
3. Remove pedestal caps or tie bars.
4. Unbolt air duct boot flange at top of motor.
5. Disconnect motor leads.
6. Disconnect any journal box attachments such as speed recorders, speedometers, etc.
7. Remove sander pipe at end assemblies of each truck.
8. Disconnect bottom slack adjusters and retract all others to provide clearance between wheels and brake shoes.
9. Jack motor nose and remove suspension assembly. See Item 4, DISASSEMBLY OF TRUCKS.
10. Lower motor nose until motor safety lugs rest on truck frame suspension brackets.
11. Allow drop table to settle slowly keeping the motor nose up by jacks so that the motor safety lugs will pass the truck frame lugs.

CAUTION: Exercise care with motor air duct boot assembly during the above operation and remove it as soon as clearance permits.

12. Continue to lower assembly until it is free of truck.

REINSTALLATION OF AXLE, WHEEL AND BOX ASSEMBLY

This operation should be performed in practically the reverse sequence of removal. Set air duct boot on top of motor but not bolted to it. See CAUTION note.

1. With the axle assembly resting on the drop table, and the motor correctly positioned and tilted at the nose end so that the safety lugs will pass the frame lugs, raise the assembly until the safety lugs can again rest on the top of the frame lugs.

CAUTION: Again exercise care with motor air duct to prevent damage to it. To facilitate installation compress and retain by wire through loops on top and bottom plates.

2. Continue to raise assembly to its normal position in pedestal and apply caps.
3. Reapply motor nose suspension spring assembly. See Item 8, REASSEMBLY OF TRUCK.
4. Reconnect bottom slack adjusters.
5. Reconnect motor leads.
6. Reconnect journal box attachments for speed recorders, etc.
7. Reapply sander pipes.
8. Remove equalizer retainers.
9. Bolt air duct to motor.
10. Adjust brakes.
11. Check box end stop facing for wear if assembly has plain bearing box.
12. Check box lubricant, and packing if assembly has plain bearing box.

REMOVING EQUALIZER SPRINGS (TRUCKS UNDER LOCOMOTIVE)

1. With Lifting Rig and Overhead Crane
 - a. Remove opposite pedestal caps or tie bars from the truck frame under end boxes nearest the springs being removed, and also from opposite center pedestals of the same truck. Release all brake slack adjusters to completely free brake shoes.
 - b. With sling from crane attached to locomotive lifting lugs, raise cab until safety hooks between cab and trucks are engaged.

- c. Continue lifting until weight is removed from springs, and they are free from frame pockets.

- d. The coil group nearest the center wheel of each truck (group including snubber) may then be lifted clear of the equalizer spring seat, dropped down between the equalizers and removed.

- e. The coil group nearest the end wheels may then be removed.

2. With Jacks

- a. Remove pedestal caps as in Item 1-a above, and release brake slack adjusters.

- b. Place jack under jacking pad on each side of locomotive nearest the truck from which the spring or springs are to be removed, and raise until frame is clear of springs.

- c. Remove springs as previously described in Item 1.

3. Drop table and Stationary Body supports may be used following procedure similar to above.

REINSTALLATION OF EQUALIZER SPRINGS

Reverse removal procedure.

NOTE: When reinstalling, the group with the snubber is always toward the center wheel (R&L) of each truck. Replace correct thickness liner under each spring group.

REMOVAL OF TRUCK

Before a complete truck can be removed from beneath a locomotive unit, it is necessary to relieve the truck or trucks of the cab weight. This requires either a crane, hoist or jacks to lift the locomotive body, or stationary body supports used in connection with a drop table installation. The jacking and lifting diagram Fig. 44, shows the location at which the units should be lifted or supported, and the approximate loads involved. The following precautions should be observed: Wood blocking should be used between chassis support points (Jacking pads) and lifting devices, and lifts should be uniform on both sides of cab to prevent unnecessary strain on the cab structure. The cab should not be lifted excessively more at one end than at the other until the body swivel castings have become disengaged from the truck swivel bowl.

Before removing a truck, disconnect the safety hooks (one on each side of the truck at swivel bowl bolster and one at inboard transom), air brake piping hose, hand brake chains, sanders, traction motor leads, and truck box attachments. If the

truck is not to be dismantled, the lift required can be reduced if blocking is provided between the bottom of the journal boxes and pedestal tie bars so that the equalizer springs cannot raise the truck frame. A truck may then be removed by any one of the three different procedures:

1. By a drop table which requires the use of stationary body supports, or a lifting rig with overhead crane.
2. By jacking or lifting cab a sufficient amount to disengage swivel castings and loading pads, and to provide clearance above the trucks so that they may be moved laterally from beneath locomotive using a turntable or transfer table.
3. By jacking or lifting, as in 2 above, a sufficient amount to remove trucks longitudinally along the track after raising the cab sufficiently to allow truck to pass under the draft gear; the pilot, steps, and uncoupling support brackets having first been removed.

Reference should be made to the jacking and lifting diagram Fig. 44 for details of lifts and loads involved.

DISASSEMBLY OF TRUCK

1. Remove all pedestal tie bars.
2. Remove brake bottom slack adjusters and retract all others so that brake shoes are clear of wheels.
3. Remove motor air duct connecting boots.
4. Remove all motor nose suspension spring nests as follows. See Fig. 12.
 - a. Jack or lift motor nose sufficiently to compress nests approximately one-half inch ($1/2''$).
 - b. Remove cotters and tighten nuts on spring holder bolts (or use split washers to take up space between nuts and spring holders).
 - c. Lower motors so that nose lugs are free of spring nest.
 - d. Remove pin keepers and drop vertical pins.
 - e. Slide spring nests out sidewise.
5. Again raise motor noses to provide clearance preparatory to removing truck frame. Raise nose a sufficient amount so that frame lugs will clear motor safety lugs when the frame is lifted upward and off the axle, wheel and box assemblies.

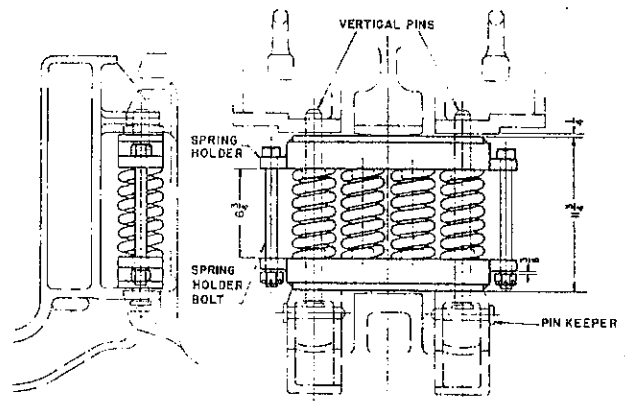


Fig. 12 - TRACTION MOTOR NOSE SUPPORT

6. With motor noses clear raise frame off axle, wheel and box assemblies until all weight is removed from springs. Then lift spring assemblies from seat between equalizers and remove by dropping them down between the equalizers, or springs may remain on seats between equalizers and be removed at the time equalizers are disassembled and removed.
7. Remove truck pedestal liner top bolts at location marked (see Fig. 13) and pass $7/8''$ dia. bars, 15" long through the holes from which the bolts were removed. These bars will engage and lift the equalizers along with the truck frame when it is being removed from the axle assemblies.
8. Lift frame and equalizer assembly off axle assemblies. Before the frame pedestals are entirely clear of boxes, block the latter so that they will not rotate on axles.
9. Lower frame and equalizer assemblies on suitable blocking placed under equalizers until equalizers are free of restraining bars. Remove bars and lift frame from equalizer assemblies. Equalizers and spring seats may then be disassembled.
10. If a truck is being disassembled over a pit, it is possible to remove end motors without disturbing the rest of the truck as follows:
 - a. Remove suspension spring nest as in Item 4 preceding.
 - b. Remove gear case and dust guard.
 - c. Lift motor nose using lifting lugs until cap at suspension bearing is at bottom.
 - d. Unbolt cap and remove.

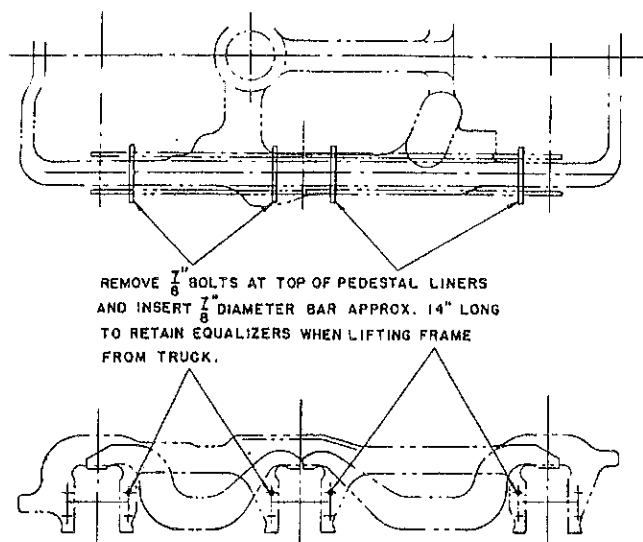


Fig. 13 - DISASSEMBLY-THREE MOTOR TRUCK

CAUTION: Exercise greatest care in handling suspension bearing. Bearings are in two halves. One half may be removed with the cap and the other half removed after cap is dropped. If not removed restrain inner half when lifting motor off axle so that it will not drop and injure personnel.

e. Lift motor clear of axle.

INSPECTION AND MAINTENANCE

1. The following items should be inspected and compared with Fig. 14 for clearance and wear limits.

- a. Vertical and horizontal steel liners on both body and truck swivel castings.
- b. Wear plates at the loading pads, both in truck pan and on cab.
- c. Pedestal wearing faces and the corresponding faces on journal housings.

2. When applying new liners, be sure that all edges are rounded where they contact other surfaces.
3. For plain journal bearing and wedge wear limits follow A.A.R. standard practice and I.C.C. Regulations.
4. For roller bearings refer to manufacturer's instructions.
5. Check lubrication (Swivel Bearing and Loading Pads).
6. Check lubrication (Axle Bearings). If plain bearings, check packing.
7. Tighten all pipe connections and check piping.
8. Inspect the motor nose spring holders for wear; and, if necessary, replace the wear plates.
9. When trucks are dismantled or springs removed, check liners in spring pockets. If badly worn, replace.

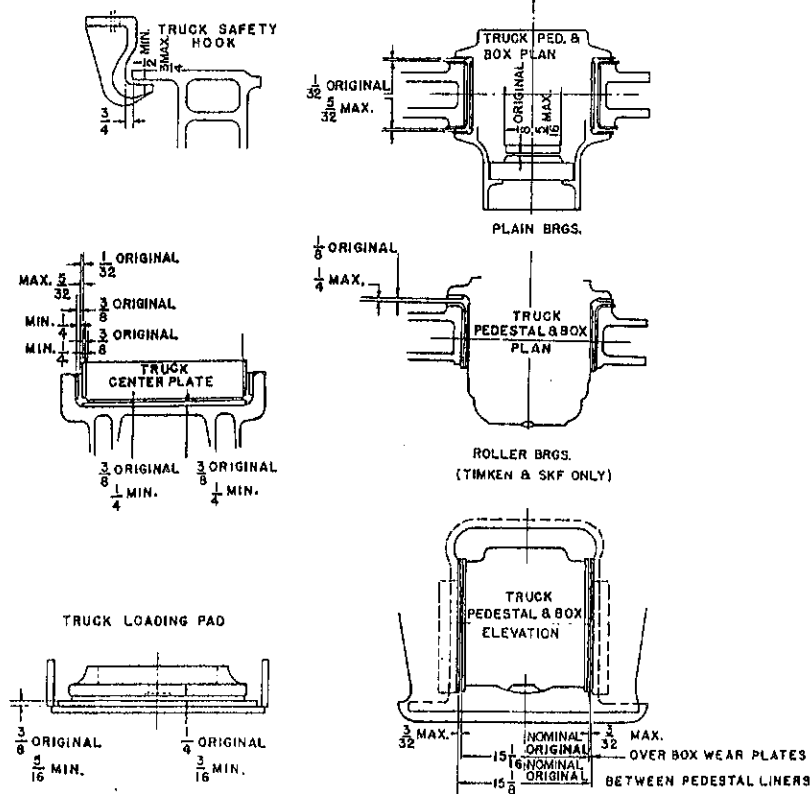


Fig. 14 - CLEARANCES AND WEAR LIMITS

10. Check for wear in Foundation Brake equipment. If parts show excessive wear, they should be replaced. See FOUNDATION BRAKES.
11. For traction motor maintenance refer to Maintenance Instruction Booklet, MI-2001, "Traction Motor Maintenance".

WHEELS

1. When turning or replacing wheels, the I. C. C. rule requires "the diameter of the wheels on the same axle shall not vary more than $\frac{3}{32}$ ". This is equivalent to approximately 2-1/2 tapes. It is our further recommendation that wheels should not continue in service if the diameters in the same truck vary more than 1/2 inch (12-1/2 tapes) or under the same locomotive unit if they vary more than 1 inch (25 tapes). When turning, or replacing with new wheels, it is our recommendation that wheels should not vary more than 1/2 tape on the same axle, 2 tapes in the same truck, and 14 tapes in the same locomotive.
2. Wheels should be checked periodically for wear in accordance with I. C. C. regulations. If excessive wear is found, check to determine:
 - a. If brake shoes are free and not binding on the flange or wheel tread.
 - b. If the brake hangers and levers are hanging true and are not causing misalignment of the shoe.
 - c. If wear plates on hangers, levers and also brackets have the proper clearance. See FOUNDATION BRAKES and INSPECTION AND MAINTENANCE.
 - d. If sandpipes or other parts are free and not fouling the brake rigging thus preventing normal operation.
 - e. If axle lateral is normal and not excessive by reason of worn pedestal liners and end stops.
 - f. Excessive variation in wheel diameters. See Item 1 above.

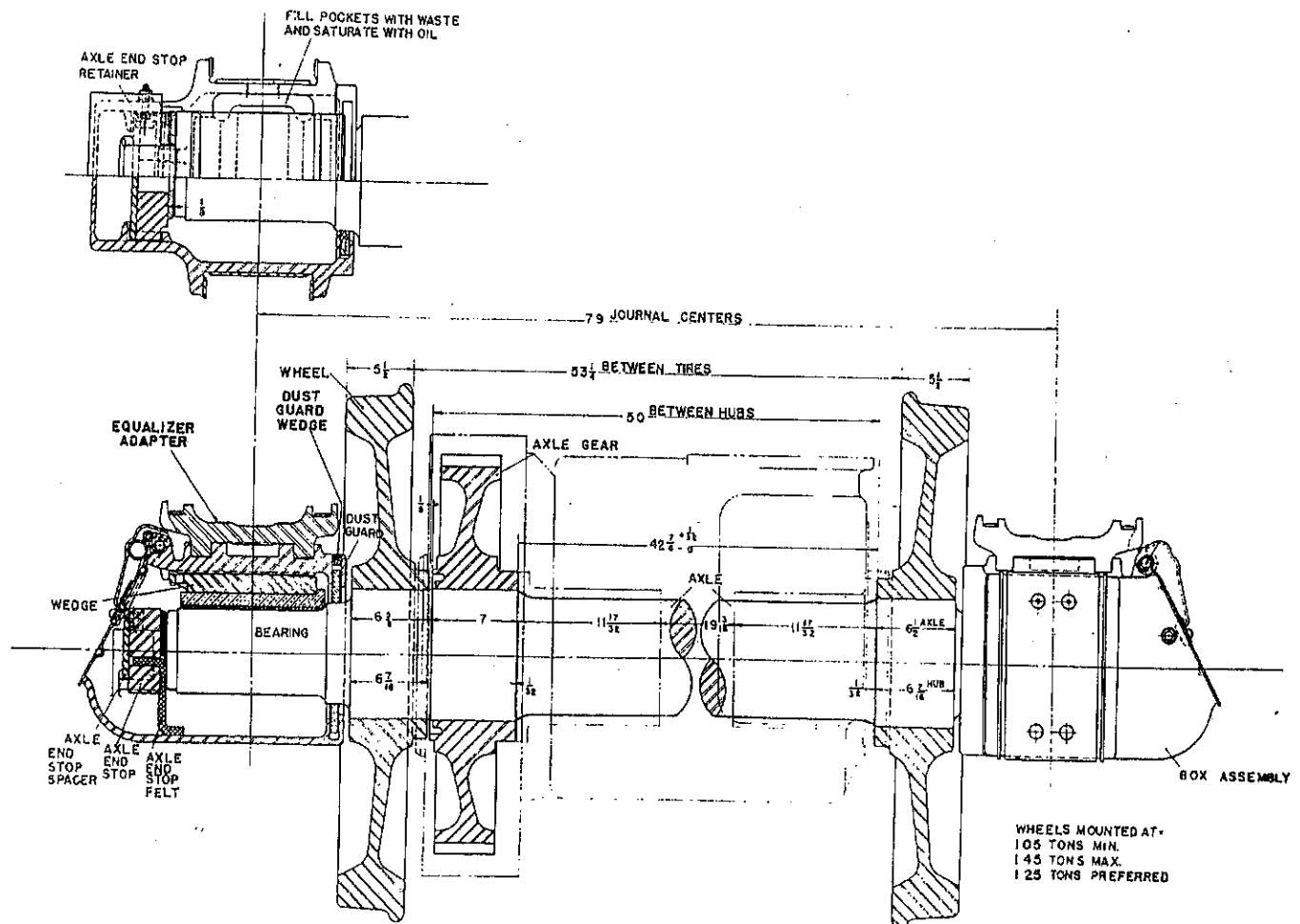


Fig. 15 - WHEEL, AXLE AND BOX ASSEMBLY WITH FRICTION BEARINGS

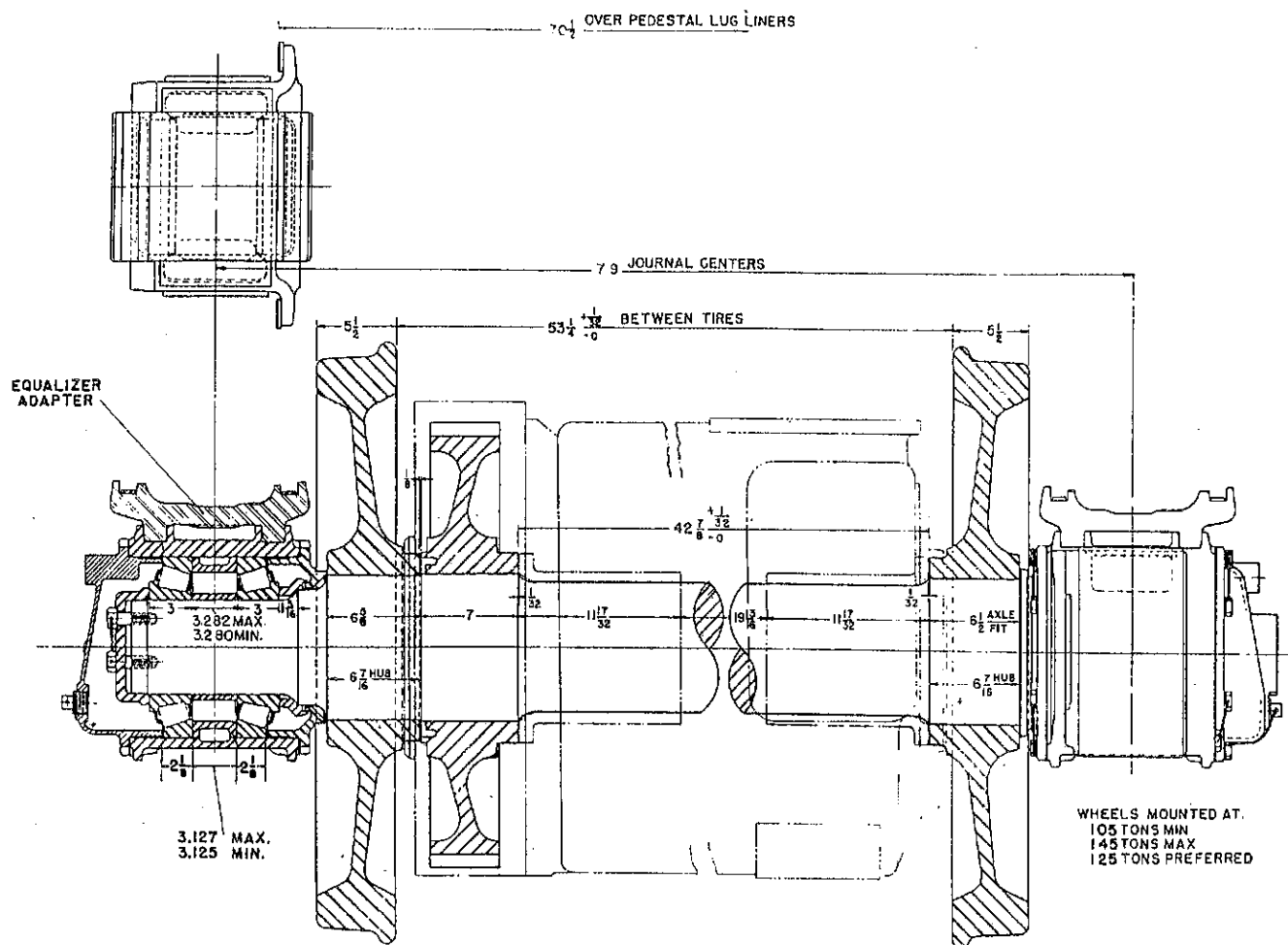


Fig. 16 - WHEEL, AXLE AND BOX ASSEMBLY WITH ROLLER BEARINGS

3. When applying new brake shoes, they must hang true in the head. Nuts on brake head pin should be adjusted so that vibrational shock will not cause shoe to drag on wheel, but still permit face of shoe to conform to wheel as wear progresses. See also FOUNDATION BRAKES.

4. For wheel mounting refer to Figs. 15 or 16.

AXLE GEAR

The mounting of an axle gear is based on an interference fit regardless of tonnage pressure. The recommended interference fits are as follows.

Bore of gear $9.991" + .001" - .000"$
 Diameter of axle gear fit $10.000" + .001" - .000"$

For complete axle gear instructions, see Maintenance Instruction Booklet MI-2001, "Traction Motor Maintenance".

MOTOR SUSPENSION BEARINGS

Diameter of axle in suspension bearing when new is $9.000" \pm .002"$. As the axle wears, it may be turned to the following three successive diameters

and undersize replacement bearings obtained.

$8.938" \pm .002"$
 $8.875" \pm .002"$
 $8.813" \pm .002"$

For complete axle bearing instruction see Maintenance Instructions Booklet MI-2001, "Traction Motor Maintenance". See parts bulletin DRP-1317 for undersize bearings.

FOUNDATION BRAKES

Slack adjusters are initially set to provide $3/8"$ shoe release. With new wheels and brake shoes this setting will then allow approximately $3-3/4"$ piston travel per brake application.

Nuts on brake head pins should be adjusted so that vibrational shock will not cause shoe to drag or wear, but still permit face of shoe to conform to wheel as wear progresses.

Replace the following brake parts when specified maximum wear is obtained.

- a. Wear plates on hangers, or hanger levers and truck frame pads when clearance between the two becomes $3/16"$.

- b. Pins or bushings when worn to $3/64$ " radial clearance. Normal clearance for new pins and bushings is $1/64$ " radial clearance.
 - c. Hanger levers and equalizers when thickness at pins is worn $1/8$ ".
 - d. Hangers and friction arms when thickness at pins is worn $1/16$ ".
 - e. Brake heads, pull rods and slack adjusters when each jaw member is worn $1/16$ ".
 - f. Hanger and equalizer fulcrum brackets when pin supports are worn $1/16$ " in thickness.
 - g. Clevises when pin holes and interlocking surfaces are worn $1/8$ ".
 - h. Brake heads when face radius becomes worn to the extent that new shoe keys will no longer hold the shoe tightly.
 - i. Wear plates on equalizers and equalizer supports when worn to $1/8$ " thickness.
 - j. Brake shoes when worn to the limit of wear mark indicated on same.
2. Assemble equalizers, springs and spring seats and position on blocking so that truck frame can be lowered between them. The longer equalizers will be at the loading pad end of truck, and the shorter at the swivel plate end. When reinstalling springs, the groups with snubbers are always toward the center wheels of the truck. Replace correct thickness liners under each spring group.
 3. With all foundation brake equipment except bottom slack adjusters assembled to truck frame, lower frame down between the equalizer assembly. See Item 2 above.
 4. Then with frame in position between equalizers, pass bars (see Item 7, DISASSEMBLY OF TRUCKS) through top bolt holes of pedestal legs and liners and underneath the equalizer neck.
 5. With all journal boxes blocked in vertical position with equalizer pocket upward, raise truck frame and equalizer assembly and guide into position so that the pedestal jaws drop over the journal boxes. If the springs were not previously installed in spring seat, do so before frame is completely lowered. Then continue lowering until frame spring pockets rest on coil springs. Reapply top pedestal liner bolts.
 6. Attach bottom slack adjusters.
 7. Attach pedestal tie bars.
 8. Lower traction motor noses, but only enough so that suspension spring nests may be slid in between lugs of motor and frame.

SLACK ADJUSTER LUBRICATION

After the manual slack adjusters have been extended, due to brake shoe and wheel wear, and it becomes necessary to collapse the slack adjusters for the purpose of applying new shoes or turned (or new) wheels, the exposed threads of the slack adjusters should be cleaned and greased before collapsing the adjusters.

REASSEMBLY OF TRUCK

1. Set two axle, wheel and box assemblies, with motors assembled on the axles, on tracks (preferably over a pit) with the suspension ends of both motors facing one another, and assemblies spaced 6'-11" from wheel center to wheel center. Then set the third assembly with the center of wheels 5'-7" from the center of wheels of adjoining assembly, and with suspension end of motor inward toward the center of truck. With the wheels as above the longer wheel spacing (6'-11") will be the loading pad end of truck, and the shorter spacing (5'-7") will be the swivel plate end. Then raise and block the motors with the suspension ends (noses) slightly above the horizontal so that the truck frame will clear the motor safety lugs when dropped into place over the boxes.

Install vertical pins from the bottom and apply pin keepers. If truck is not assembled over a pit, it will be necessary to raise truck in order to insert the suspension pins.

NOTE: With suspension spring seats in position, and before further lowering motors, back off nuts on spring holder bolts (or remove split washers) until the spring holders are fully expanded between frame lugs. Then back off nuts $1/4$ " further and insert cotters.

9. Lower traction motor noses until the lugs rest on suspensions.
10. Reapply motor air duct boots.

11. Reapply loose horizontal liners in swivel bowl and loading pad pan.
12. With horizontal loose liners in both swivel bowl and loading pad pan check vertical distance between the two. It must be $1" \pm 1/32"$. This dimension must match the underframe connections within the same tolerances.
10. Check lubricant (and packing if plain bearings) in journal boxes.
11. Reconnect any journal box attachments such as speed recorders, etc.

SYMINGTON GOULD SPRING SNUBBERS

REAPPLICATION OF TRUCK TO LOCOMOTIVE

Any of the previous mentioned methods of truck removal can be employed to reapply it, and in the following sequence of procedure:

1. Fill loading pad oil pan with oil to the level of the filling hole, and swivel bowl to approximately $1/2"$ over horizontal liner.
2. Position truck, or trucks, so that the swivel bowl and loading pads line up with matching equipment on the locomotive frame. The loading pads of both front and rear trucks are always in toward the center of the locomotive.
3. Either by lowering the locomotive on the truck, or trucks, or by raising the truck to the locomotive, carefully guide the swivel plates and loading pads into position. Before the cab is completely in position, see that the loading pad cover slots are correctly positioned in relation to the retaining lugs on truck pan.
4. Reassemble safety hooks at both swivel plate transom (one on each side) and inner transom.
5. Check oil seals at swivel bowls and at loading pads.
6. Reconnect traction motor leads to generator leads on locomotive frame.
7. Reconnect brake piping hose, hand brake chain, and sanders.
8. Readjust brakes.
See FOUNDATION BRAKES.
9. Remove all tools, rags or blocking equipment that may be on truck or chassis.

DESCRIPTION

The Symington Type "S" Truck Spring Snubber, Fig. 17, provides constant friction for control of the spring group, this friction being generated by friction shoes rubbing up and down inside a friction sleeve. It is this constant control which prevents harmonic action of the spring group, stopping bounc-

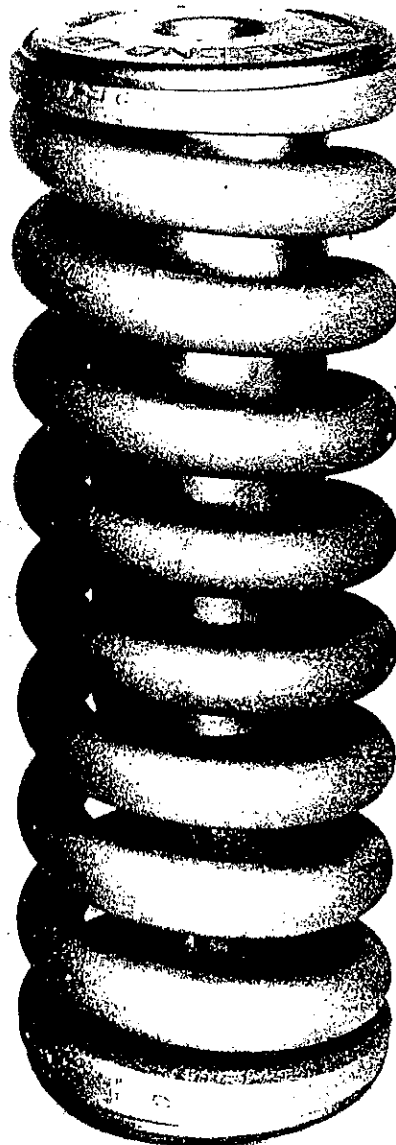


Fig. 17 - SYMINGTON TYPE "S" SPRING SNUBBER

ing and eliminating over-solid blows. The snubber is of simple construction, comprising a low carbon, case-hardened sleeve to which is welded a forged steel cap, a bottom ring and three (3) alloy steel friction shoes held in assembly with the sleeve by six (6) pre-compressed friction shoe springs which are equally spaced vertically and radially, and an outer coil spring. The outer coil spring is of relatively high capacity so that the snubber unit may be substituted for one of the coil springs in a coil snubber group and still maintain the desired supporting capacity of the group as a whole.

OPERATION AND LUBRICATION

The snubber, as shipped from the factory, is a complete unit. When applied to the locomotive trucks, the snubber unit ordinarily replaces the inner coil of a double coil group.

No lubrication should be applied to the snubber unit. Each of the three shoes used in the assembly has lead inserts on the outside surface. The friction sleeve has a lead insert on the inside diameter near the open end. These lead inserts provide a dry lubricant which is ample to insure against any tendency of galling between the friction surfaces of the shoes and sleeve.

PERIODIC MAINTENANCE

The service life of the snubber is such that it should require very little attention before the loco-

motive trucks are scheduled for a general overhaul. At that time the unit should be examined carefully; and, if all parts are held tightly in the unit, no repairs are necessary. If the friction shoes are loose in the sleeve, the unit should be disassembled and new parts added where necessary.

OVERHAUL

To disassemble a Symington snubber follow the procedure shown in Fig. 20. A press, the equivalent of that shown in Fig. 20, one dismantling head and two cleats are required.

After disassembly check the inside diameter of the friction sleeve with "No-Go" gauge, Fig. 18. Check thickness of friction shoes with "No-Go" gauge, Fig. 19. Replace worn or broken parts.

To assemble the snubber follow the procedure indicated in Figs. 21 through 29. Fig. 26 is the subassembly comprising 3 friction shoes, 3 friction shoe springs, 3 friction spring shims and 1 friction shoe ring. In addition to the friction shoe ring, it will be noted that a wire band (#12 iron wire) is used to hold the assembly in alignment. This wire band must be removed after the subassembly has been entered into the friction sleeve. See Fig. 28. The snubber should be compressed several times to check operation. See Fig. 29.

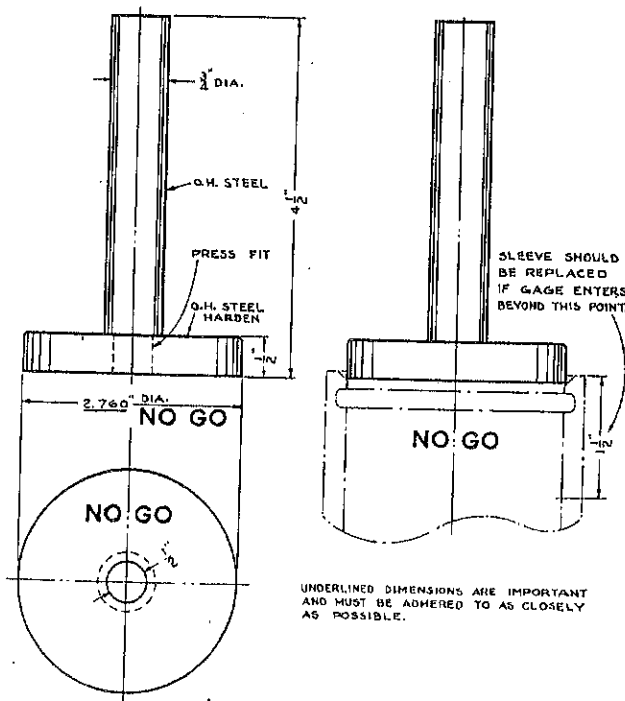


Fig. 18 - SLEEVE "NO-GO" GAUGE

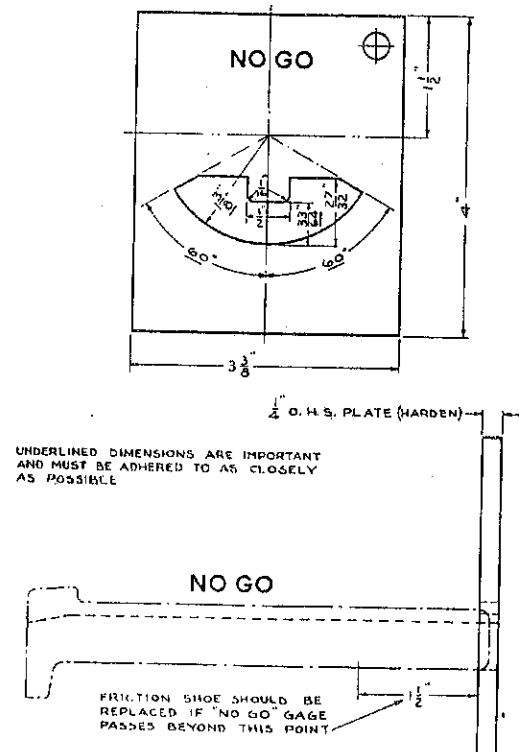
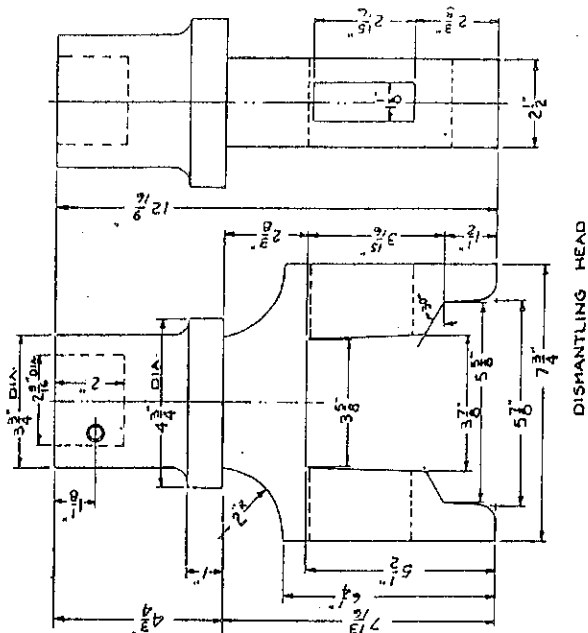
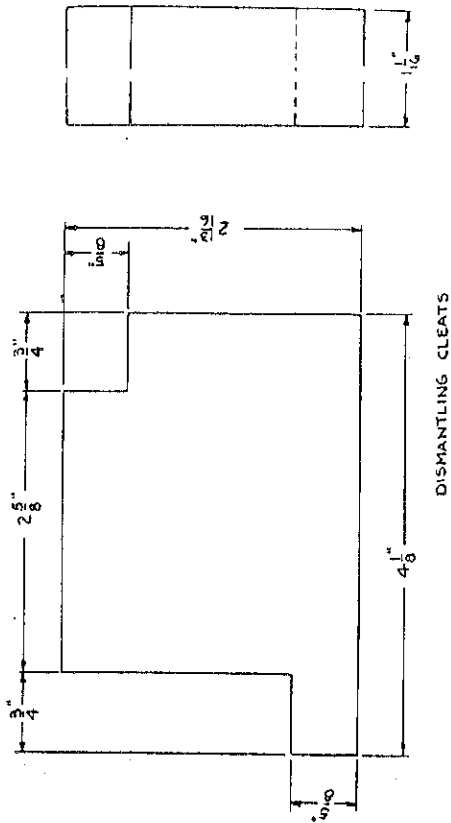
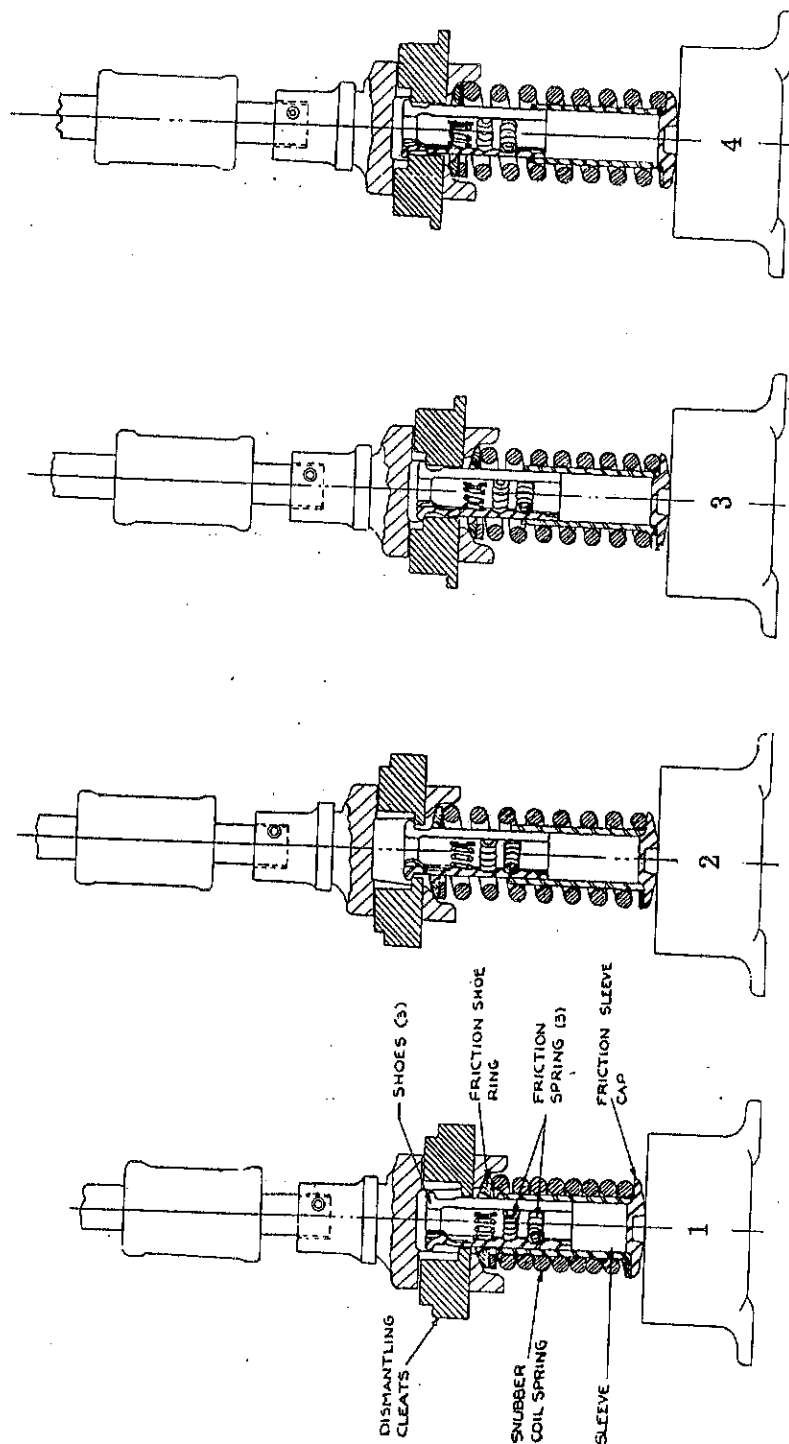


Fig. 19 - SHOE "NO-GO" GAUGE





1. Compress snubber coil spring to solid thus causing shoes to be exposed. Insert dismantling cleats as shown.
2. Release snubber coil spring to free height. Dismantling cleats will engage shoes and force shoes up in sleeve.
3. Again, compress snubber coil spring to allow dismantling cleats to be removed and reversed as shown.
4. Again, release coil spring to allow dismantling cleats to engage shoes thus forcing shoes up and out of the sleeve. If shoes are not completely out of the sleeve, remove snubber from machine. Shoes can be tapped loose with a hammer.

Fig. 20 - SNUBBER DISMANTLING OPERATION

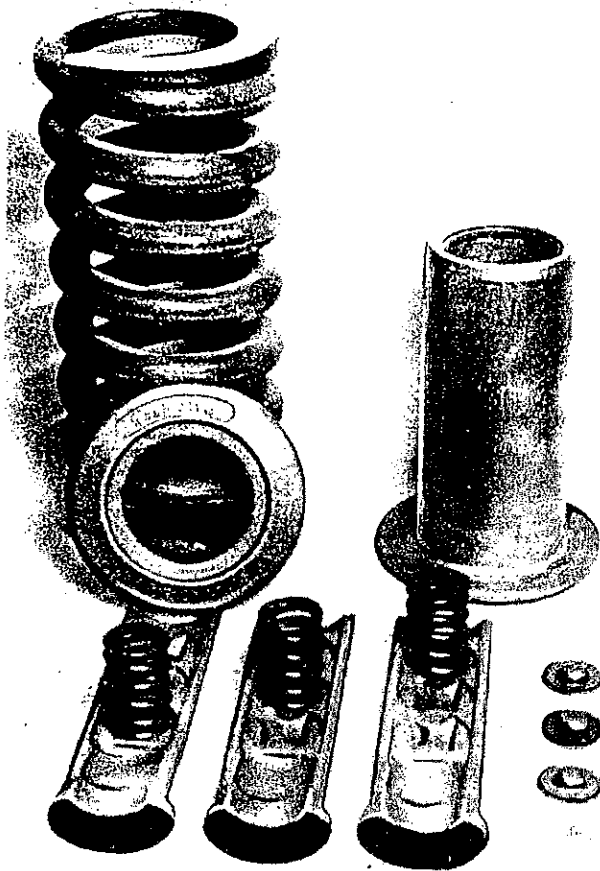


Fig. 21 - SNUBBER DISASSEMBLED

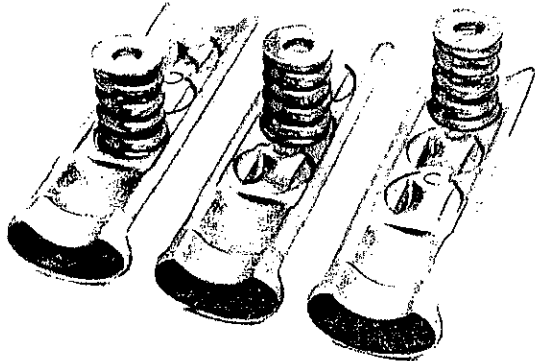


Fig. 22 - FRICTION SHOES, SPRINGS AND SNUBBERS



Fig. 23 - POSITION OF FRICTION SHOES, SPRINGS AND SHIMS

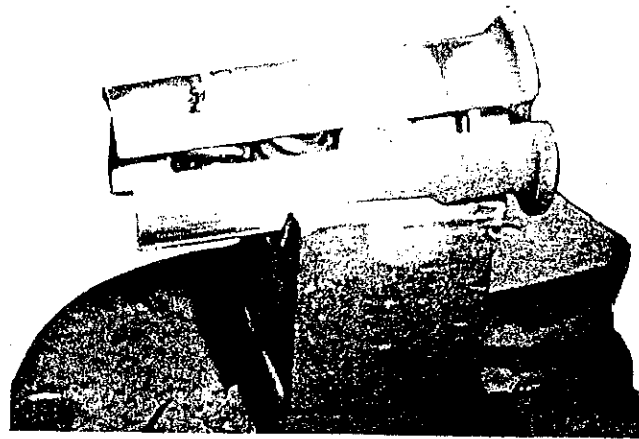


Fig. 24 - FRICTION UNIT, in position for application of friction shoe ring

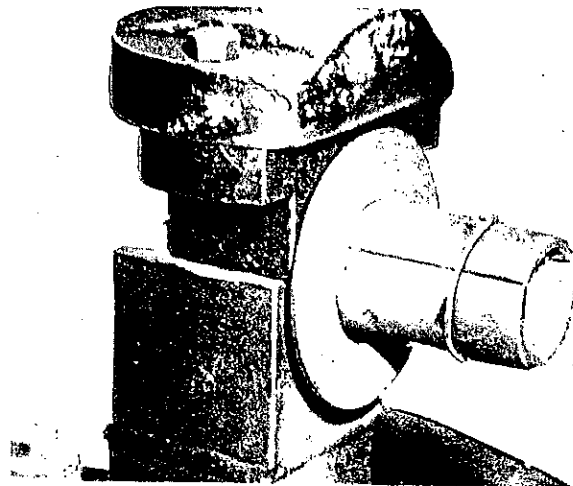


Fig. 25 - FRICTION UNIT COMPLETE, with ring and wire band in assembly fixture

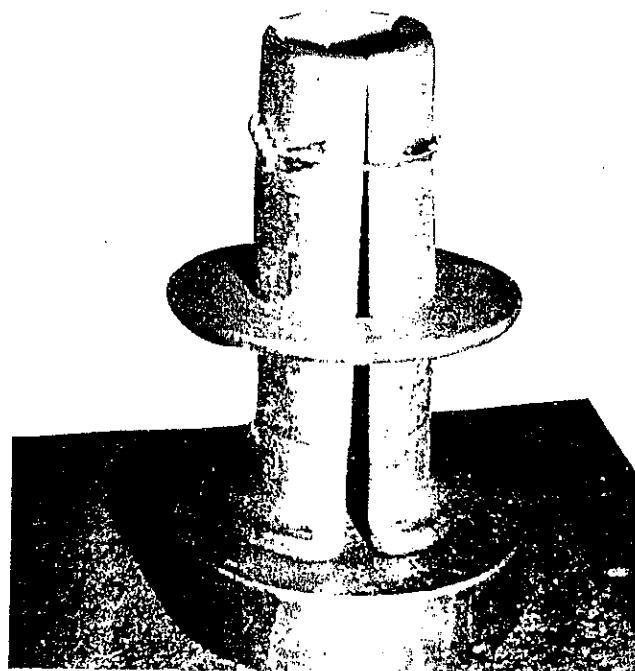


Fig. 26 - FRICTION UNIT COMPLETE, ready for assembly with friction sleeve and coil spring

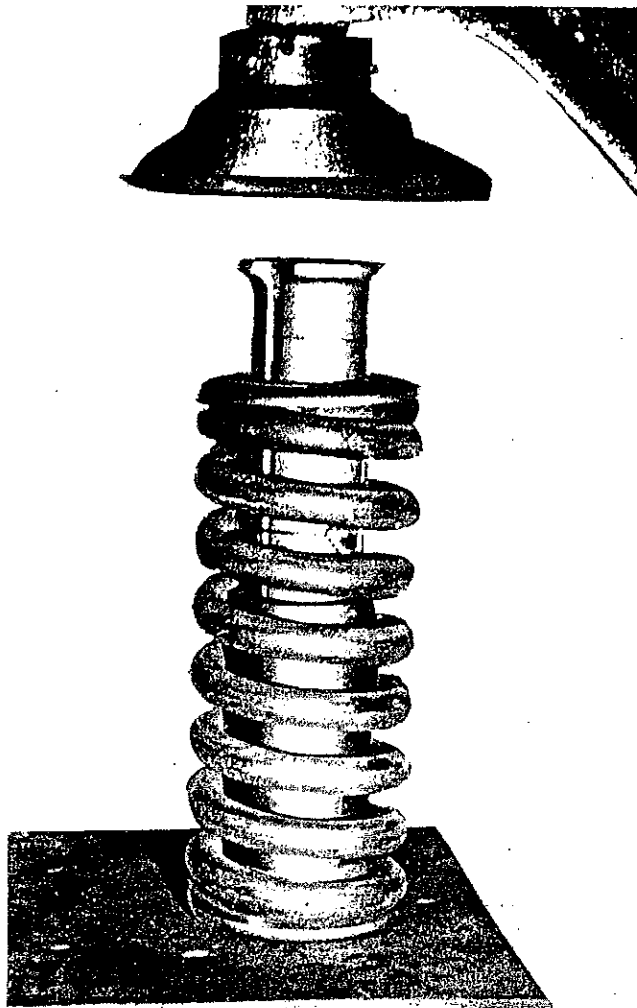


Fig. 27 - ALL PARTS IN POSITION FOR FINAL ASSEMBLY

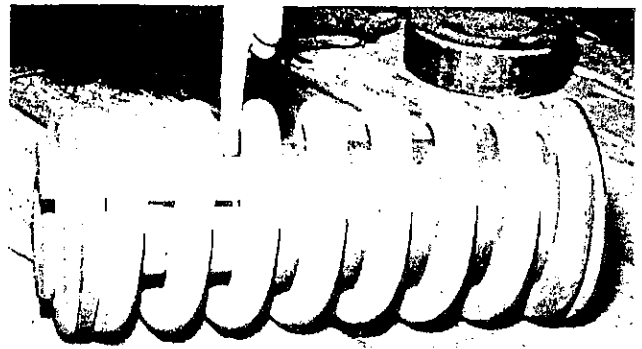


Fig. 28 - REMOVING WIRE HOLDING BAND, before compressing snubber

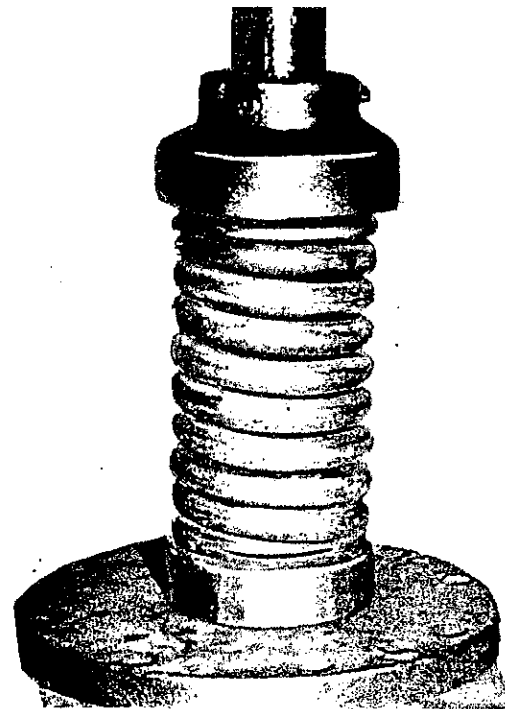


Fig. 29 - ASSEMBLY COMPLETE - compress snubber a number of times to check operation

2250HP ROAD SWITCHER 6 WHEEL, 3 MOTOR TRUCK

DESCRIPTION

This truck is of the rigid bolster swivel type, and fully equalized. In addition to the conventional swivel bearing about which the truck swings, and which bears a portion of the cab load, there are two pads, one on each side, carrying the balance of the cab load. The trucks are so positioned under the locomotive that the pads are located towards the center of the locomotive. The swivel bearing and pads thus form a three point support to carry the load on each truck. The lateral spacing of the pads affords stability against tipping forces of the locomotive on a curve, and the frictional resistance on the pads prevents nosing at high speeds.

The truck spring system consists of four groups, two outer and two inner helical coils each. All four groups have the inner coil of the set nearest the center wheel working in conjunction with a friction snubber.

Axle journal boxes are mounted in pedestals cast integral with the truck frame. The boxes are the roller bearing type. When either Timken or S. K. F. bearings are used, the total lateral per axle is $1/4$ ", and it is obtained by the movement of the boxes in the pedestal. The lateral thrust is taken directly by the bearings, no end thrust bearing being required.

The brakes are of the clasp type, powered by four (4) cylinders per truck. Cylinder brackets

are cast integral with the frame. Manually operated slack adjusters are provided in order to compensate for brake shoe and wheel wear. Provisions are made for application of a hand brake chain.

REMOVAL OF AXLE, WHEEL AND BOX ASSEMBLY (WITH MOTORS)

To remove an Axle, Wheel and Box Assembly from a truck that is under a locomotive, a drop table is necessary. It is assumed that this equipment is the single table type, large enough to handle a complete truck. The use of such a table will require the locomotive to be supported at the jacking pads. Using this equipment, when the table is lowered to remove a single axle, wheel and box assembly, the truck remains suspended on the safety hooks, and the procedure will be as follows:

1. Locate body supports under locomotive jacking pads.
2. Chain equalizers to truck frame or block beneath.
3. Remove pedestal caps or tie bars.
4. Unbolt air duct boot flange at top of motor.
5. Disconnect motor leads.
6. Disconnect any journal box attachments such as speed recorders, speedometers, etc.
7. Remove sander pipe at end assemblies of each truck.
8. Disconnect bottom slack adjusters and retract all others to provide clearance between wheels and brake shoes.
9. Jack motor nose and remove suspension assembly. See Item 4, DISASSEMBLY OF TRUCKS.
10. Lower motor nose until motor safety lugs rest on truck frame suspension spring brackets.
11. Allow drop table to settle slowly keeping the motor nose up by jacks so that the motor safety lugs will pass the truck frame lugs.

CAUTION: Exercise care with motor air duct boot assembly during the above operation and remove it as soon as clearance permits.

12. Continue to lower assembly until it is free of truck.

REINSTALLATION OF AXLE, WHEEL AND BOX ASSEMBLY

This operation should be performed in practically

the reverse sequence of removal. Set air duct boot on top of motor but not bolted to it. See **CAUTION** note.

1. With the axle assembly resting on the drop table, and the motor correctly positioned and tilted at the nose end so that the safety lugs will pass the frame lugs, raise the assembly until the safety lugs can again rest on the top of the frame lugs.
- CAUTION:** Again exercise care with motor air duct to prevent damage to it. To facilitate installation compress and retain by wire through loops on top and bottom plates.
2. Continue to raise assembly to its normal position in pedestal and apply caps.
 3. Reapply motor nose suspension spring assembly. See Item 8, REASSEMBLY OF TRUCK.
 4. Reconnect bottom slack adjusters.
 5. Reconnect motor leads.
 6. Reconnect journal box attachments for speed recorders, etc.
 7. Reapply sander pipes.
 8. Remove equalizer retainers.
 9. Bolt air duct to motor.
 10. Adjust brakes
 11. Check box end stop facing for wear if assembly has plain bearing box.
 12. Check box lubricant, and packing if assembly has plain bearing box.

REMOVING EQUALIZER SPRINGS (TRUCKS UNDER LOCOMOTIVE)

1. With lifting rig and overhead crane
 - a. Remove opposite pedestal caps or tie bars from the truck frame under end boxes nearest the springs being removed, and also from opposite center pedestals of the same truck. Release all brake slack adjusters to completely free brake shoes.
 - b. Disconnect snubbers.
 - c. With a sling from crane attached to locomotive lifting lugs, raise cab until safety hooks between cab and trucks are engaged.
 - d. Continue lifting until weight is removed from springs, and they are free from frame pockets.

- e. The coil group nearest the center wheel of each truck may then be lifted clear of the equalizer spring seat, dropped down between the equalizers and removed.
- f. The coil group nearest the end wheels may then be removed.
2. With jacks
 - a. Remove pedestal caps, as in Item 1-a above, and release brake slack adjusters.
 - b. Disconnect snubbers.
 - c. Place jack under jacking pad on each side of locomotive nearest the truck from which the spring or springs are to be removed, and raise until frame is clear of springs.
 - d. Remove springs as previously described in Item 1.
3. Drop table and stationary body supports may be used following procedure similar to above.

REINSTALLATION OF EQUALIZER SPRINGS

Reverse removal procedure.

NOTE: Replace correct thickness liner under each spring group.

REMOVAL OF TRUCK

Before a complete truck can be removed from beneath a locomotive unit, it is necessary to relieve the truck or trucks of the cab weight. This requires either a crane, hoist or jacks to lift the locomotive body, or stationary body supports used in connection with a drop table installation. The jacking and lifting diagram Fig. 45, shows the location at which the units should be lifted or supported, and the approximate loads involved. The following precautions should be observed: Wood blocking should be used between chassis support points (jacking pads) and lifting devices, and lifts should be uniform on both sides of cab to prevent unnecessary strain on the cab structure. The cab should not be lifted excessively more at one end than at the other until the body swivel castings have become disengaged from the truck swivel bowl.

Before removing a truck, disconnect the safety hooks (one on each side of the truck at swivel bowl bolster and one at inboard transom), air brake piping hose, hand brake chains, sanders, traction motor leads, and truck box attachments. If the truck is not to be dismantled, the lift required can be reduced if blocking is provided between the bottom of the journal boxes and pedestal tie bars so that the equalizer springs cannot raise the truck frame. A truck may then be removed by any one of three different procedures:

1. By a drop table which requires the use of stationary body supports, or a lifting rig with overhead crane.
2. By jacking or lifting cab a sufficient amount to disengage swivel castings and loading pads, and to provide clearance above the trucks so that they may be moved laterally from beneath the locomotive using a turntable or transfer table.
3. By jacking or lifting as in Item 2 above, a sufficient amount to remove trucks longitudinally along the track after raising the cab sufficiently to allow truck to pass under the draft gear; the pilot, steps, and uncoupling support brackets having first been removed.

Reference should be made to the jacking and lifting diagram Fig. 45 for details of lifts and loads involved.

DISASSEMBLY OF TRUCK

1. Remove all pedestal tie bars and disconnect snubbers.
2. Remove brake bottom slack adjusters and retract all others so that brake shoes are clear of wheels.
3. Remove motor air duct connecting boots.
4. Remove all motor nose suspension spring nests as follows. See Fig. 30.
 - a. Jack or lift motor nose sufficiently to compress nests approximately one-half inch ($1/2''$).
 - b. Remove cotters and tighten nuts on spring holder bolts (or use split washers to take up space between nuts and spring holders).
 - c. Lower motors so that nose lugs are free of spring nest.
 - d. Remove pin keepers and drop vertical pins.
 - e. Slide spring nests out sidewise.
5. Again raise motor noses to provide clearance preparatory to removing truck frame. Raise nose a sufficient amount so that frame lugs will clear motor safety lugs when the frame is lifted upward and off the axle wheel and box assemblies.
6. With motor noses clear raise frame off axle, wheel and box assemblies until all weight is removed from springs. Then lift spring assemblies from seat between equalizers and remove by dropping them down between the.

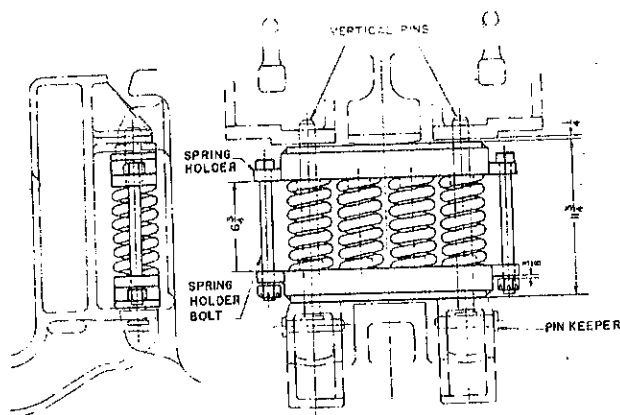


Fig. 30 - TRACTION MOTOR NOSE SUPPORT

equalizers, or springs may remain on seats between equalizers and be removed at the time equalizers are disassembled and removed.

7. Remove truck pedestal liner top bolts at location marked (see Fig. 31) and pass $\frac{7}{8}$ " dia. bars, 15" long through the holes from which the bolts were removed. These bars will engage and lift the equalizers along with the truck frame when it is being removed from the axle assemblies.
8. Lift frame and equalizer assembly off the axle assemblies. Before the frame pedestals are entirely clear of boxes, block the latter so that they will not rotate on axles.
9. Lower frame and equalizer assemblies on suitable blocking placed under equalizers until equalizers are free of restraining bars. Remove bars and lift frame from equalizer assemblies. Equalizers and spring seats may then be disassembled.
10. If a truck is being disassembled over a pit, it is possible to remove end motors without disturbing the rest of the truck as follows:
 - a. Remove suspension spring nest as in Item 4 preceding.
 - b. Remove gear case and dust guard.
 - c. Lift motor nose lifting lugs until cap at suspension bearing is at bottom.
 - d. Unbolt cap and remove.

CAUTION: Exercise greatest care in handling suspension bearing. Bearings are in two halves. One half may be removed with the cap and the other half removed after cap is dropped. If not removed, restrain inner half when lifting motor off axle so that it will not drop and injure personnel.

- e. Lift motor clear of axle.

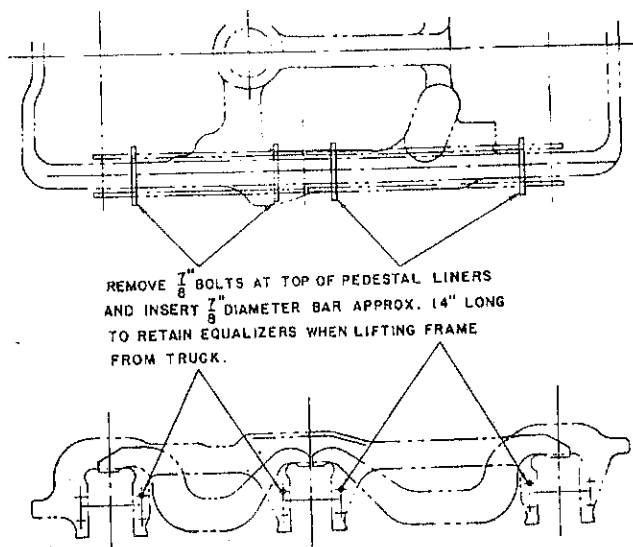


Fig. 31 - DISASSEMBLY-THREE MOTOR TRUCK

INSPECTION AND MAINTENANCE

1. The following items should be inspected and compared with Fig. 32, for clearances and wear limits.
 - a. Vertical and horizontal steel liners on both body and truck swivel castings.
 - b. Wear plates at the loading pads, both in truck pan and on cab.
 - c. Pedestal wearing faces and the corresponding faces on journal housings.
2. When applying new liners be sure that all edges are rounded where they contact other surfaces.
3. For plain journal bearing and wedge wear limits follow A.A.R. standard practice and I.C.C. regulations.
4. For roller bearings refer to manufacturer's instructions.
5. Check lubrication (Swivel Bearing and Loading Pads).
6. Check lubrication (Axle Bearings). If plain bearings, check packing.
7. Tighten all pipe connections and check piping.
8. Inspect the motor nose spring holders for wear; and, if necessary, replace the wear plates.
9. When trucks are dismantled or springs removed, check liners in spring pockets. If badly worn, replace.

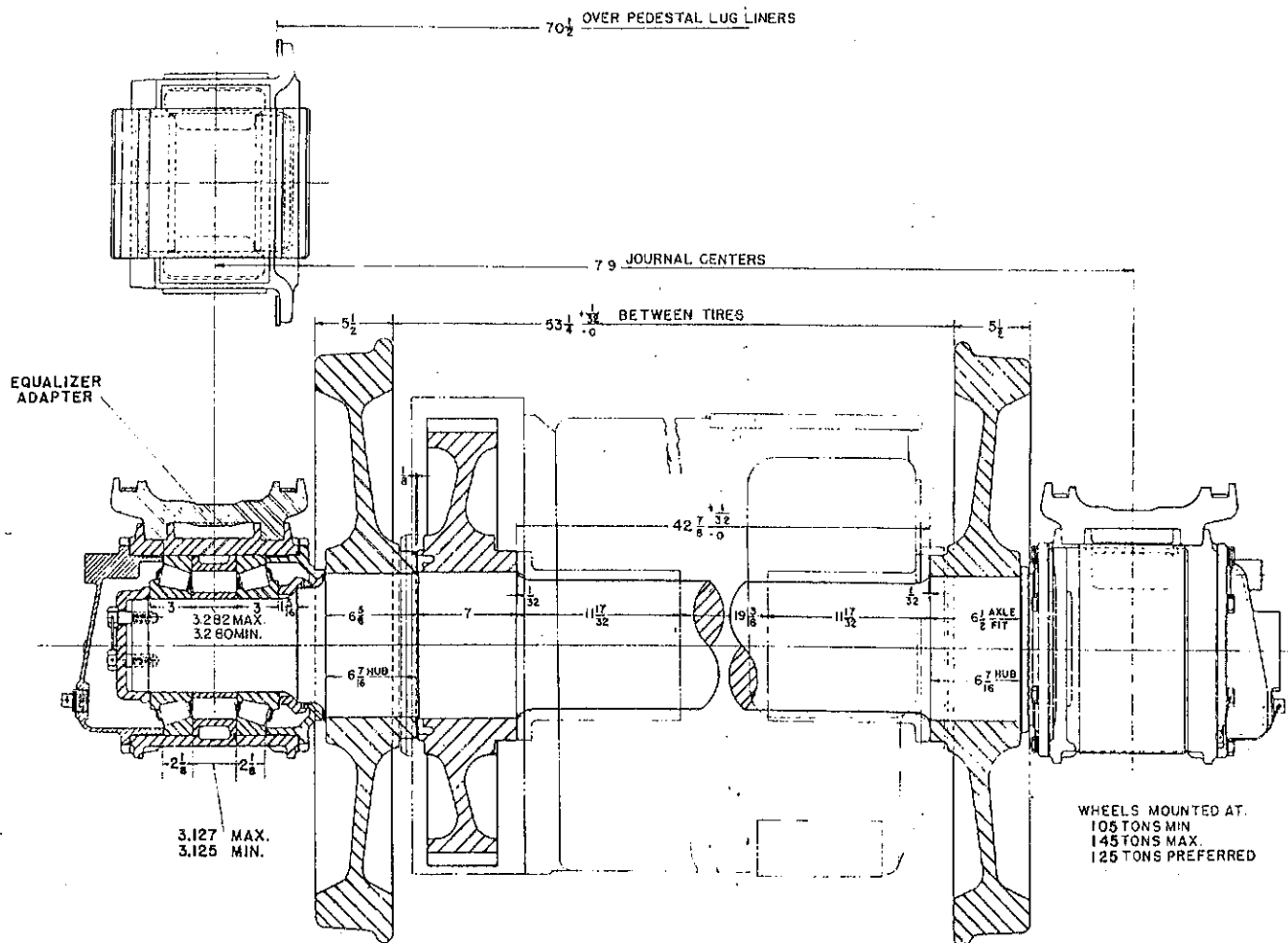


Fig. 33 - WHEEL, AXLE AND BOX ASSEMBLY

Bore of gear $9.991'' + .001'' - .000''$
 Diameter of axle gear fit $10.000'' + .001'' - .000''$

For complete axle gear instructions, see Maintenance Instruction Booklet MI-2001, "Traction Motor Maintenance".

MOTOR SUSPENSION BEARINGS

Diameter of axle in suspension bearing when new is $9.000'' \pm .002''$. As the axle wears, it may be turned to the following three successive diameters and undersize replacement bearings obtained:

$8.938'' \pm .002''$
 $8.875'' \pm .002''$
 $8.813'' \pm .002''$

For complete axle bearing instructions see Maintenance Booklet MI-2001, "Traction Motor Maintenance". See Parts Bulletin DRP-1317 for undersize bearings.

FOUNDATION BRAKES

Slack Adjusters are initially set to provide $3/8''$ shoe release. With new wheels and brake shoes this setting will then allow approximately $3-1/4''$

piston travel, per brake application. Compensate for brake shoe and/or wheel wear by use of slack adjusters located at each end of the truck and between the wheels. Extra holes are also provided in end of top pull rod to relocate pins for further adjustment.

Nuts on brake head pins should be adjusted so that vibrational shock will not cause shoe to drag or wear, but still permit face of shoe to conform to wheel as wear progresses.

Replace the following brake parts when specified maximum wear is obtained:

- Wear plates on hangers, or hanger levers, and truck frame pads when clearance between the two becomes $3/16''$.
- Pins or bushings when worn to $3/64''$ radial clearance. Normal clearance for new pins and bushings is $1/64''$ radial clearance.
- Hanger levers and equalizers when thickness at pins is worn $1/8''$.
- Hangers and friction arms when thickness at pins is worn $1/16''$.

- e. Brake heads, pull rods and slack adjusters when each jaw member is worn 1/16".
- f. Hanger and equalizer fulcrum brackets when pin supports are worn 1/16" in thickness.
- g. Clevises when pin holes and interlocking surfaces are worn 1/8".
- h. Brake heads when face radius becomes worn to the extent that new shoe keys will no longer hold the shoe tightly.
- j. Wear plates on equalizers and equalizer supports when worn to 1/8" thickness.
- k. Brake shoes when worn to the limit of wear mark indicated on same.

SLACK ADJUSTER LUBRICATION

After the manual slack adjusters have been extended, due to brake shoe and wheel wear, and it becomes necessary to collapse the slack adjusters for the purpose of applying new shoes or turned (or new) wheels, the exposed threads of the slack adjusters should be cleaned and greased before collapsing the adjusters.

REASSEMBLY OF TRUCK

1. Set two axle, wheel and box assemblies, with motors assembled on the axles on tracks (preferably over a pit) with the suspension ends of both motors facing one another, and assemblies spaced 6'-11" from wheel center to wheel center. Then set the third assembly with the center of wheels 5'-7" from the center of wheels of adjoining assembly, and with suspension end of motor inward toward the center of truck. With the wheels as above the longer wheel spacing (6'-11") will be the loading pad end of truck, and the shorter spacing (5'-7") will be the swivel plate end. Then raise and block the motors with the suspension ends (noses) slightly above the horizontal so that the truck frame will clear the motor safety lugs when dropped into place over the boxes.
2. Assemble equalizers, springs and spring seats and position on blocking so that truck frame can be lowered between them. The longer equalizers will be at the loading pad end of truck, and the shorter at the swivel plate end. Replace correct thickness liners under each spring group.
3. With all foundation brake equipment except bottom slack adjusters assembled to truck frame, lower frame down between the equalizer assembly. See Item #2 above.

4. Then with frame in position between equalizers, pass bars (see Item 7, DISASSEMBLY OF TRUCKS) through top bolt holes of pedestal legs and liners and underneath the equalizer neck.
5. With all journal boxes blocked in vertical position with equalizer pocket upward, raise truck frame and equalizer assembly and guide into position so that the pedestal jaws drop over journal boxes. If the springs were not previously installed in spring seat, do so before frame is completely lowered. Then continue lowering until frame spring pockets rest on coil springs. Reapply top pedestal liner bolts and connect snubbers.
6. Attach bottom slack adjusters.
7. Attach pedestal tie bars.
8. Lower traction motor noses, but only enough so that suspension spring nests may be slid in between lugs of motor and frame. Install vertical pins from the bottom and apply pin keepers. If truck is not assembled over a pit, it will be necessary to raise truck in order to insert the suspension pins.

NOTE: With suspension spring seats in position, and before further lowering motors, back off nuts on spring holder bolts (or remove split washers) until the spring holders are fully expanded between frame lugs. Then back off nuts 1/4" further and insert cotters.

9. Lower traction motor noses until the lugs rest on suspensions.
10. Reapply motor air duct boots.
11. Reapply loose horizontal liners in swivel bowl and loading pad pan.
12. With horizontal loose liners in place in both swivel bowl and loading pad pan check vertical distance between the two. It must be 1" \pm 1/32". This dimension must match the underframe connections within the same tolerances.

REAPPLICATION OF TRUCK TO LOCOMOTIVE

Any of the previously mentioned methods of truck removal can be employed to reapply it, and in the following sequence of procedure.

1. Fill loading pad oil pan with oil to the level of the filling holes, and swivel bowl to approximately 1/2" over horizontal liner.

2. Position truck, or trucks, so that the swivel bowl and loading pads line up with matching equipment on the locomotive frame. The loading pads of both front and rear trucks are always in toward the center of the locomotive.
3. Either by lowering the locomotive on the truck, or trucks, or by raising the truck to the locomotive, carefully guide the swivel plates and loading pads into position. Before the cab is completely in position, see that the loading pad cover slots are correctly positioned in relation to the retaining lugs on truck pan.
4. Reassemble safety hooks at both swivel plate transom (one on each side) and inner transom.
5. Check oil seals at swivel bowls and at loading pads.
6. Reconnect traction motor leads to generator leads on locomotive frame.
7. Reconnect brake piping hose, hand brake chain, and sanders.
8. Readjust brakes. See FOUNDATION BRAKES.
9. Remove all tools, rags, or blocking equipment that may be on truck or chassis.
10. Check lubricant (and packing if plain bearings) in journal boxes.
11. Reconnect any journal box attachments such as speed recorders, etc.
5. Compress the snubber with the spacer ring (H) in place. Six to ten tons force is required to press the press fit spring retainer (J) free of the wedge bolt.
6. When the retainer (J) is free, remove it, then the spring (F), shims (E), free wedge ring (D), and three shoes (B). The remaining wedge bolt can then be easily removed.
7. Replace worn or defective parts. Apply Lubriplate No. 320 grease to the wedge surface of the wedge bolt (C) and free wedge ring (D) surfaces and the press fit portion of wedge bolt to assist assembly.
8. Insert the entire assembly into the barrel. The color-coded end of the spring should be placed toward the top of the snubber.

HOUDAILLE-HERSHEY SPRING SNUBBERS

COMPLETE DISASSEMBLY

1. Remove snubber from locomotive truck reversing INSTALLATION instructions.
2. Remove double faced rocker, Fig. 34.
3. a. The snubber should be extended so that there is 1-1/2" between the spring retainer (J) and the end of the barrel (G), Fig. 34. This can be done with a press equipped for pulling. If vise-type grips are used, caution should be used not to damage the threads on the studs of the snubber.
- b. If a press is not available, a crow bar used between blocks of suitable height, and the end of the barrel (G), Fig. 34, can be used to extend the snubber.
4. Insert split spacer ring (H) (Houdaille Hershey tool no. B6 23884) between the bottom of the barrel (G) and the top of the spring retainer (J), Fig. 34.

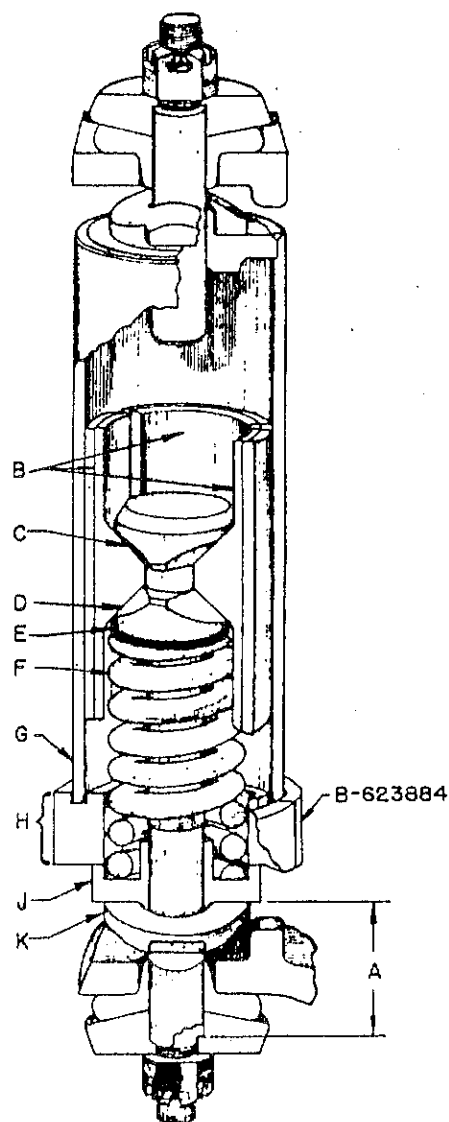


Fig. 34-HOUDAILLE-HERSHEY SPRING SNUBBER

9. Press on spring retainer (J) to the "A" dimension shown in Fig. 34. For snubber (long shoe) numbers A-17524, C-625934 and D-626957, $A = 2.260 - 2.270$ " (snubber number can be found on the snubber barrel nameplate).
10. Replace the snubber on truck according to INSTALLATION instructions.

DISASSEMBLY TO REPLACE FRICTION SHOE AND LINING ASSEMBLY ONLY

1. Shoes should be withdrawn so that 1.75" of the friction shoes (M), Fig. 35 are exposed (using method described in item 3-a under COMPLETE DISASSEMBLY, and clamp shoes tightly with clamp (N) (Houdaille Hershey tool no. B-623548). Pull shoes out a maximum of 2" further and place a second clamp (Houdaille Hershey tool no. B-623548) around the shoes, making sure to clamp securely.

CAUTION: Do not pull shoes out further than instructed above, or too rapidly. These shoes are heavily spring loaded and will be pushed outward at high velocity if pulled beyond the snubber barrel without both clamps securely in place.

For snubbers with short shoes, shoes should be withdrawn so that 1.75" of the friction shoes (M), Fig. 35, are exposed (using method described in Item 3-a under "Complete Disassembly") and clamp shoes tightly with clamp (N) (Houdaille Hershey tool no. B-623548). The shoes should not be extended further than 1.75" beyond the first clamp until the second clamp is securely in place.

2. After the second clamp is securely in place, remove the entire assembly. Now slowly and evenly loosen the six (6) bolts on the two clamps. When the spring tension is relieved, the clamps and shoes can be removed.
3. Replace the worn shoes with the proper replacement shoes. Apply Lubriplate No. 320 to wedge bolt (C), Fig. 34, and free wedge ring (D) Fig. 34.
4. Reassemble shoes and clamps, tightening all clamp bolts evenly, and place the assembly back into the barrel as far as possible.
5. Remove the top clamp and press the assembly together as far as possible (until the bottom clamp hits the barrel). Remove the bottom clamp slowly.
6. Replace the snubber on the truck according to INSTALLATION instructions.

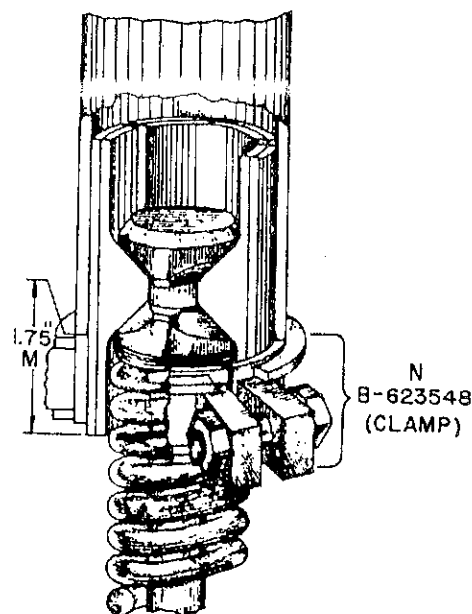


Fig. 35 - SNUBBER-PARTIAL VIEW
INSTALLATION

1. The snubber must always be mounted with the open end down.
2. Remove all mounting parts except rocker "A", Fig. 36-a.
3. Insert lower stud (B) through hole in lower bracket (C) making sure rocker is properly located so it lies flat on the bracket with the wings against the steps. See Fig. 36-b.
4. If snubber is extended too far to permit the upper stud to enter the upper bracket, remove it from the lower bracket and bump the bottom stud on a wood block until it is collapsed to the proper length. Reinsert lower stud in lower bracket, again making sure rocker is properly placed.
5. Place rubber mounting block (D) over stud (B) with small neck inserted in hole in bracket. Place end cap (E) over stud with the rounded side against the rubber mounting block. Assemble standard hex nut (F) and tighten to about 100 pounds pull on a fifteen inch wrench, or until the shoulder in the end cap is drawn solidly against the shoulder on the stud. See point (X) on Fig. 36-a. This will squeeze the rubber mounting block to the proper degree of compression.
6. Assemble the McLean-Fogg lock nut (G) and tighten until it is distorted to the point where the concave surface becomes flat against the standard hex nut.
7. With the upper rocker in place on the upper stud, place a pinch bar under the lower edge

of the barrel (H) and pry upward until the upper stud is extended fully through the hole in the upper bracket making sure the rocker is properly seated on the underside of the bracket. Assemble rubber mounting block, end cap and nuts in the same manner described for the lower mounting.

8. If the snubbers are installed on the trucks before they are placed under the car body they can be assembled without collapsing, if the bolster can be lifted and dropped so the hole in the bracket comes down over the upper stud.
9. When snubbers are supplied with slotted nuts and cotter pins follow same instructions except insert cotter pin instead of assembling McLean-Fogg nut.

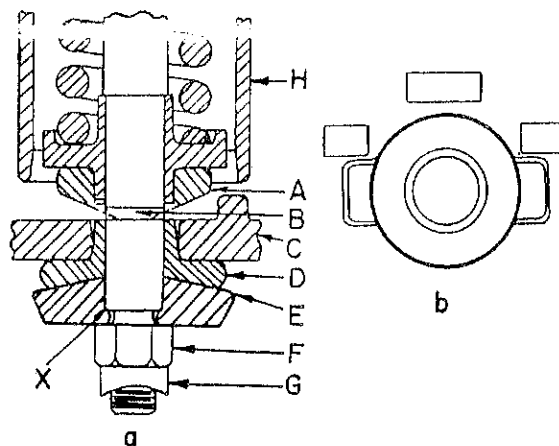


Fig. 36 - SNUBBER INSTALLATION

660HP, 800HP, 900HP AND 1000HP SWITCHERS 4 WHEEL, 2 MOTOR TRUCK

DESCRIPTION

This truck is a rigid bolster, 4-wheel swivel type, and fully equalized for proper weight distribution on both axles. It has a one piece frame of cast steel.

The frame is spring supported through parallel arrangements of coil and semi-elliptic springs carried by two equalizers on each side.

In addition to the center swivel bearing, there are two side bearings, faced with wear plates, cast integral with the frame. Truck safety locks and swivel limiting devices are located at the side bearings.

Axle journal boxes (standard plain bearing journals) are mounted in pedestals cast integral with the frame. There is a 1/4" total lateral movement of each axle within the boxes, in addition to 1/16" total movement of the box in the pedestal. Lateral axle thrust is taken directly through axle end stops in each journal box. One traction motor drives each axle through a single gear and pinion. The motors are carried by suspension bearings on the axles, and by a spring mounting on the truck frame carrying the nose end. Cooling air is supplied to the motors through a hollow bolster and center plate.

The brakes are clasp type powered by two (2) duplex cylinders per truck mounted on pads cast integral with the truck frame. Brake hanger brackets are also cast integral with the frame. Manually operated slack adjusters are provided in order to compensate for brake shoe and wheel wear. Provision is made in the foundation brake equipment for a hand brake connection.

REMOVAL OF AXLE, WHEEL AND BOX ASSEMBLY (WITH MOTORS)

To remove an Axle, Wheel and Box Assembly from a truck that is underneath a locomotive, a drop table is necessary. With this provision the procedure is as follows:

1. Remove flexible air duct boot connecting the motor with the truck frame bolster.
2. Place blocking underneath equalizers on both sides of locomotive to hold them from dropping when the axle, box and wheel assembly is lowered.
3. Remove pedestal tie bars from pedestal of assembly to be dropped.
4. Disconnect motor leads.
5. Remove sander pipe at end assemblies of each truck.
6. Remove brake's bottom pull rods.
7. Jack motor nose and remove suspension assembly. See Item 3 "DISASSEMBLY OF TRUCKS".
8. Lower motor nose until safety lugs of motor rest on truck frame suspension spring bracket.
9. Allow drop table to settle slowly, keeping the motor nose up by jacks so that the motor safety lugs will pass the lugs on the truck frame.
10. Continue to lower assembly until it is free of trucks.

REINSTALLATION OF AXLE, WHEEL AND BOX ASSEMBLY

This operation should be performed in practically the reverse sequence of removal. It is assumed that the equalizers are still blocked for assembly removal.

1. Then with the axle assembly resting on the drop table, and the motor correctly positioned and tilted at the nose end so that the safety lugs will pass the frame lugs, raise the assembly until the safety lugs can again rest on top of the frame lugs.
2. Continue to raise assembly to its normal position in pedestal and apply caps.
3. Remove blocking from under equalizers.
4. Reapply motor nose suspension spring assembly. See Item 7, REASSEMBLY OF TRUCK.
5. Reapply bottom pull rods.
6. Reconnect motor leads.
7. Reapply sander pipes.
8. Apply motor air duct boot.
9. Adjust brakes.
10. Check box lubricant and packing.

REMOVING EQUALIZER SPRINGS (TRUCKS UNDER LOCOMOTIVE)

1. Remove pedestal tie bars and traction motor air duct boots.
2. Drop brake pull rods at slack adjuster ends to free brake rigging.
3. With lifting rig from an overhead crane or by jacks, preferably lifting rig, raise the locomotive cab at the lifting lugs until safety hooks between cab and trucks are engaged. A drop table and stationary body supports may be used under which circumstances the Axle and wheel assemblies should be lowered from truck frame instead of frame being lifted from them by hoist or jacks.
4. Continue lifting until weight is removed from semi-elliptic springs.
5. With jacks supporting the semi-elliptic spring, remove hanger pins and drop hangers.
6. Continue raising locomotive until coil springs can be lifted high enough to allow equalizer spring seats to be moved toward center truck, and from under coil springs.

7. Drop coil springs down between equalizers.
8. Remove equalizer spring seats.
9. Remove semi-elliptic spring by lowering down between equalizers.

REINSTALLATION OF SPRINGS

Reverse removal procedure.

REMOVAL OF TRUCK

Before a complete truck can be removed from beneath a locomotive unit, it is necessary to relieve the truck or trucks of the chassis weight. This requires either a crane, hoist or jacks to lift the locomotive body, or stationary body supports used in connection with a drop table installation. The Jacking and Lifting diagram Fig. 46, 47 or 48, shows the location at which the unit should be supported and the approximate loads involved. The following precautions should be observed: Wood blocking should be used between chassis support points (jacking lugs) and lifting devices, and lifts should be uniform on both sides of cab to prevent unnecessary strain on the cab structure. The cab should not be lifted excessively more at one end than at the other until the body swivel casting has become disengaged from the truck swivel bowl.

Before removing a truck, disconnect the safety hooks (one on each side of truck at side bearings), air brake piping hose, hand brake connections, sanders, and traction motor leads. If the truck is not to be dismantled, the lift required can be reduced if blocking is provided between the bottom of the journal box, and pedestal tie bars so that the equalizer springs cannot raise the truck frame.

A truck may then be removed by any one of three different procedures:

1. By a drop table which requires the use of stationary body support or a lifting rig with overhead crane.
2. By jacking or lifting chassis a sufficient amount to disengage swivel castings and to provide clearance above the trucks so that they may be moved laterally from beneath locomotive using a turntable or transfer table.
3. By jacking or lifting, as in Item 2 above, a sufficient amount to remove trucks longitudinally along the track after raising the chassis sufficiently to clear the draft gear; the steps having first been removed.

Reference should be made to Jacking and Lifting

diagram, Fig. 46, 47 or 48, for details of lifts and loads involved.

NOTE: When using jacks, place them under cab lifting lugs and proceed as with lifting rig above. If available jacks have only a limited travel, it may be necessary to block under cab after reaching limit of initial jack travel and reset jacks for a repeated lift.

DISASSEMBLY OF TRUCK

1. Remove all pedestal tie bars.
2. Remove traction motor air duct boots from between motors and bolsters.
3. Remove all motor nose suspension spring nests as follows. See Fig. 37.
 - a. Jack or lift motor nose sufficiently to compress nest approximately 1/2".
 - b. Remove cotters and tighten nuts on spring holder bolts (or use split washers to take up space between nuts and spring holders).
 - c. Lower motors so that nose lugs are free of spring nest.
 - d. Remove pin keepers and drop vertical pins.
 - e. Slide spring nests out sidewise.
4. Again raise motor noses to provide clearance preparatory to removing frame. Raise noses a sufficient amount so that frame lugs will clear motor safety lugs when the frame is lifted upward off the Axle, Wheel and Box Assemblies.
5. Provide frame and equalizer clamping devices consisting of 8 1-1/4" diameter bolts 31" long threaded 6" long at each end with nut and 8 steel bars 18-3/4" x 3" x 1" each with a 1-3/8" diameter hole at each end. The holes to be 14-3/4" apart, center to center.
6. With the parts noted in Item 5, compress the frame and equalizer assemblies by placing one of the bars on top of the frame, both sides and at each end of the brake cylinder so that the hole on one end of each bar is directly over the slot in the frame through which the top of the brake lever projects. Pass bolts down through the holes in the top bars, and through the slot until they hang with the lower end hanging beneath the bottom edge of the equalizers. Then pass bolts down through the holes in outside of the equalizers. Apply the bottom bar to each pair of bolts underneath the equalizers and apply nuts.
7. Tighten nuts, top and bottom, until springs are compressed a sufficient amount to remove pull rod pins, on ends opposite slack adjuster, past bottom edge of equalizer.
8. Remove pull rod pins at slack adjuster ends and remove pull rods.
9. With crane, lift frame and equalizer assembly off wheel and axle assembly.
10. Release clamps, remove, and lift frame from equalizer assembly.
11. Remove springs and disassemble springs and equalizer assembly.
12. If a truck is being disassembled over a pit, it is possible to remove a motor without disturbing the rest of the truck as follows:
 - a. Remove suspension spring nests as in Item 3 above.
 - b. Remove air duct boot between motor and truck frame bolster.
 - c. Remove gear case and dust guard.
 - d. Lift motor at nose end until cap at suspension bearing is at bottom.
 - e. Unbolt cap and drop.
 - f. Lift motor clear of axle.

CAUTION: Exercise care in handling suspension bearings. Bearing is in two halves. One half may be removed with the cap and the other half removed after the cap is dropped. If not removed, restrain inner half when lifting motor off axle to prevent injury to personnel doing the work.

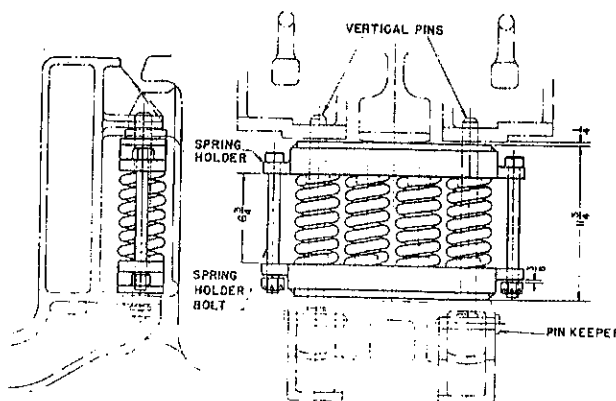


Fig. 37 - TRACTION MOTOR NOSE SUPPORT

INSPECTION AND MAINTENANCE

1. The following items should be inspected and compared periodically with Fig. 38 for clearances and wear limits.
 - a. Vertical and horizontal steel liners on both body and truck swivel castings.
 - b. Pedestal wearing faces and the corresponding faces on journal bearings.
 - c. Side bearing wear plates on both truck and cab underframe.
 - d. Spring hanger pins and bushings.
2. When applying new liners be sure that all edges are rounded where they contact other surfaces.
3. For journal bearing and wedge wear limits follow A.A.R. standard practice and I. C. C. Regulations.
4. Check lubrication of swivel bowl.
5. Tighten all pipe connections and check piping.
6. Inspect the motor nose spring holders for wear and if necessary replace wear plates.
7. Brake rigging pins and bushings. When excessively worn, brake parts should be re-

placed. See FOUNDATION BRAKES.

8. Check clearance between brake shoes and wheels. See FOUNDATION BRAKES.
9. For traction Motor Maintenance on the 660 H.P. and 1000 H.P. Locomotives see Maintenance Manual TP700. For the 800 HP and 900 HP locomotives see Maintenance instruction Booklet MI-2001, "Traction Motor Maintenance".

WHEELS

1. When turning or replacing wheels, the I. C. C. rule requires "the diameter of the wheels on the same axle shall not vary more than $\frac{3}{32}$ of an inch". This is equivalent to approximately 2-1/2 tapes. It is our further recommendation that wheels should not continue in service if the diameter in the same truck varies more than $\frac{1}{2}$ " (12-1/2 tapes) or under the same locomotive unit if they vary more than 1" (25 tapes). When turning, or replacing with new wheels, it is our recommendation that wheels should not vary more than $\frac{1}{2}$ tape on the same axle, 2 tapes in the same truck, and 14 tapes in the same locomotive.
2. Wheels should be checked periodically for wear in accordance with I. C. C. regulations. If excessive wear is found, check to determine:

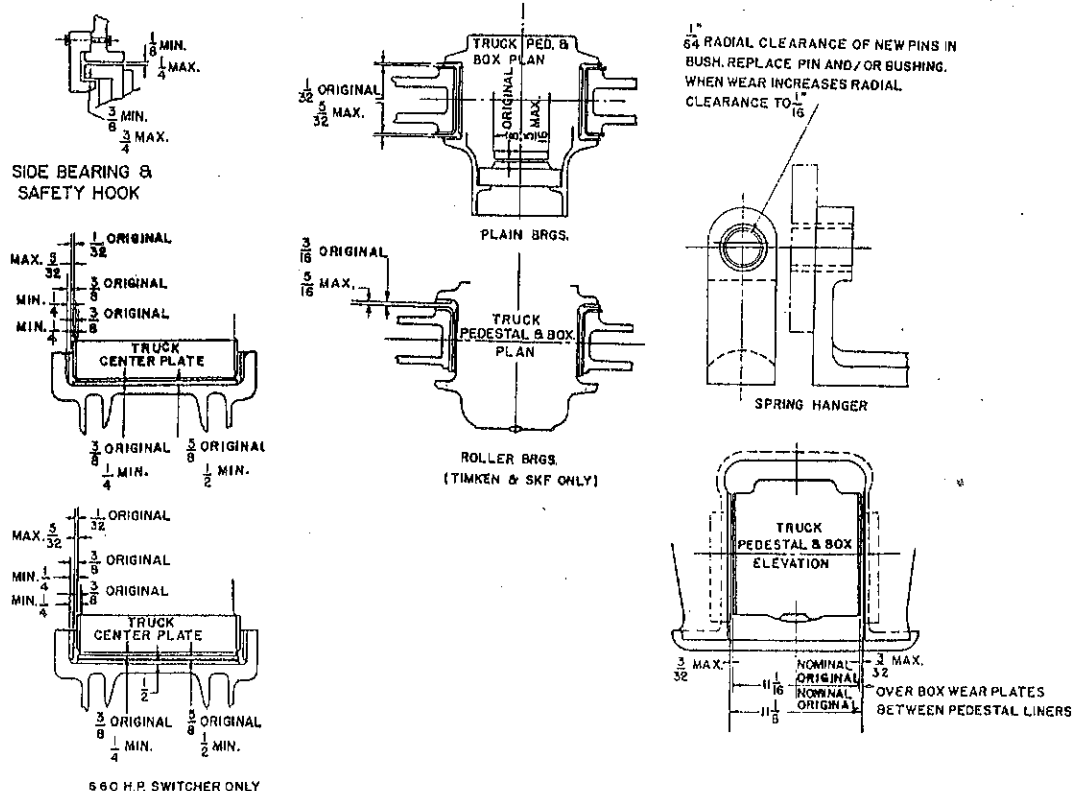


Fig. 38 - CLEARANCES AND WEAR LIMITS

- a. If brake shoes are free and not binding on the flange or wheel tread.
 - b. If the brake hangers and levers are hanging true and not causing misalignment of the shoe.
 - c. If sand pipes or other parts are free and not fouling the brake rigging thus preventing normal operation.
 - d. If axle lateral is normal and not excessive by reason of worn pedestal liners and axle end stops.
 - e. Excessive variation in wheel diameter. See Item 1 above.
3. When applying new shoes, they must hang true in the heads. Nuts on brake head pins should be adjusted so that vibrational shock will not cause shoe to drag on wheel, but still permit face of shoe to conform to wheel as wear progresses. See also FOUNDATION BRAKES.
 4. For wheel mounting refer to Fig. 39.

AXLE GEAR

The mounting of an axle gear is based on interference fit regardless of tonnage pressure. The recommended interference fits are as follows:

800 and 900 H. P.

Bore of Axle Gear	9.991" - 9.992"
Diameter of Axle Gear Fit	10.000" - 10.001"

660 and 1000 H. P.

Bore of Axle Gear	9.241" - 9.242"
Diameter of Axle Gear Fit	9.250" - 9.251"

For complete axle gear instructions on the 660 H. P. and 1000 H. P. locomotives, see Maintenance Manual, TP700. For the 800 H. P. and 900 H. P. locomotives, see Maintenance Instruction Booklet MI-2001, "Traction Motor Maintenance".

MOTOR SUSPENSION BEARINGS

800 and 900 H. P. - Diameter of axle in suspension bearing when new is $9.000" \pm .002"$. As the axle wears, it may be turned to the following three successive diameters, and undersize replacement bearings obtained.

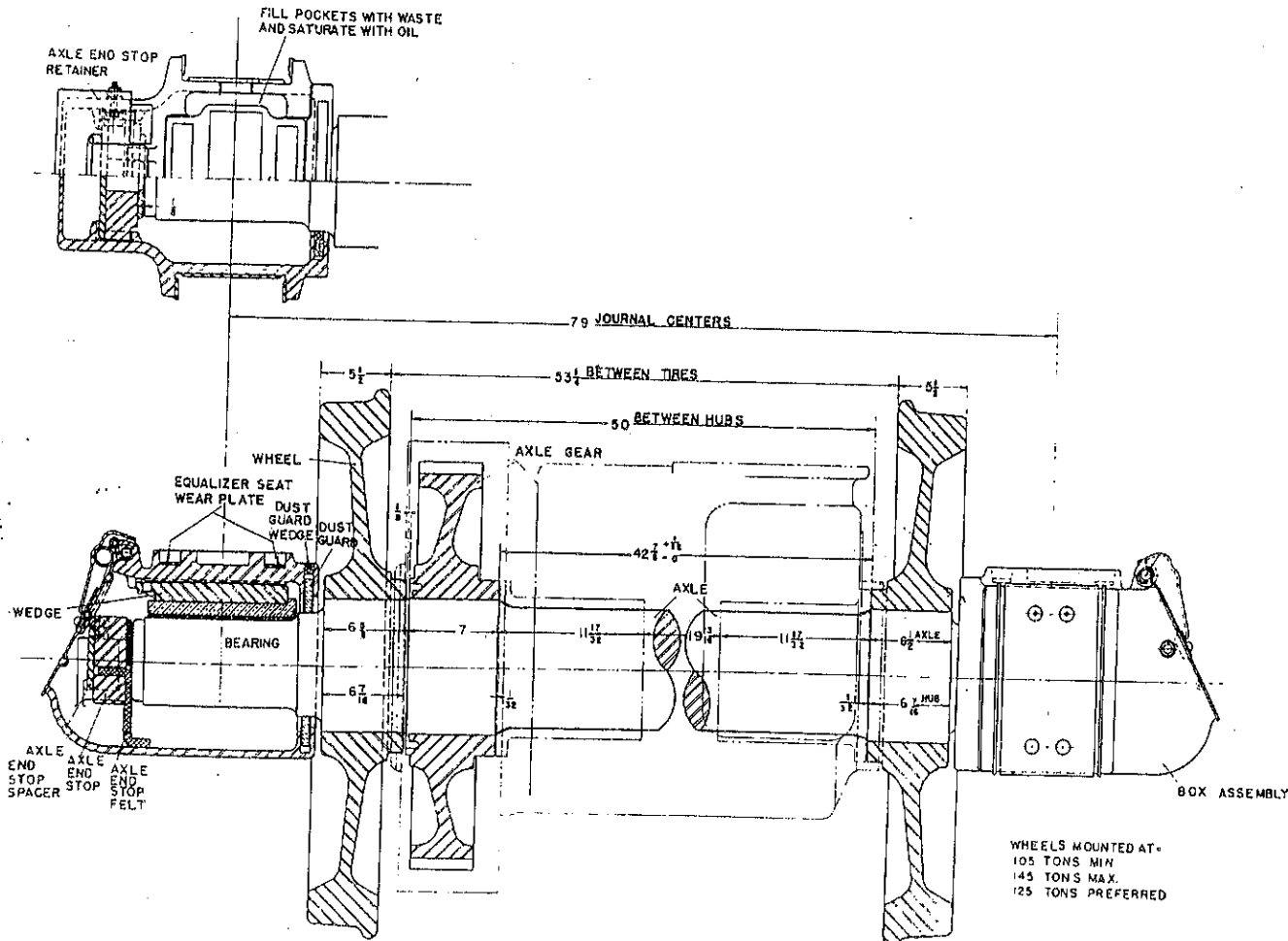


Fig. 39 - WHEEL, AXLE AND BOX ASSEMBLY

8.938" \pm .002"
 8.875" \pm .002"
 8.813" \pm .002"

660 and 1000 H. P. - Diameter of axle in suspension bearing when new is 8.250" \pm .002". As the axle wears it may be turned to the following three successive diameters, and undersize replacement bearings obtained:

8.188" \pm .002"
 8.125" \pm .002"
 8.063" \pm .002"

For complete axle bearing instructions on the 660 H. P. and 1000 H. P. locomotives, see Maintenance Manual, TP700. For the 800 H. P. and 900 H. P. locomotives see Maintenance Instruction Booklet MI-2001, "Traction Motor Maintenance". See Parts Bulletin, DRP-1317 for undersize bearings.

FOUNDATION BRAKES

Manual slack adjusters are set initially to provide approximately 3/8" shoe release. With new wheels and brake shoes this setting will then allow approximately 2" piston travel for a brake application. The slack adjusters will take up approximately 1-1/8" brake shoe wear plus 1-1/2" radial wheel wear. When piston travel reaches 4" by reason of shoe and wheel wear, adjustment should be made to again obtain the normal 2" piston travel.

When applying new shoes, release all adjusters, insert new shoes and then set slack adjusters to obtain the initial 2" piston travel.

Nuts on brake head pins should be adjusted so that vibrational shock will not cause shoe to drag on wheel, but still permit face of shoe to conform to wheel as wear progresses.

Replace the following brake parts when specified maximum wear is obtained:

- a. Pins or bushings when worn 3/64" radial clearance. Normal clearance for new pins and bushings is 1/64" radial clearance.
- b. Hanger levers when thickness at pin is worn 1/8".
- c. Brake heads, pull rods, and slack adjusters when each jaw member is worn 1/16".
- d. Clevises when pin holes and interlocking surfaces are worn 1/8".
- e. Brake heads when face radius becomes worn to the extent that new shoe keys will no longer hold the shoe tightly.
- f. Brake shoes when worn to the limit of wear mark indicated on same.

SLACK ADJUSTER LUBRICATION

Slack adjuster screw will have longer life and operate much easier if oiled, whenever used, at the oil hole provided in the screw block.

REASSEMBLY OF TRUCK

1. Assemble equalizers and replace springs.
2. Replace frame on equalizer assembly and clamp. See Items 5, 6 and 7, DISASSEMBLY OF TRUCKS.

With the traction motor nose supporting lugs facing inward, space the axle assemblies at 8'-0" centers.

3. Raise and block motor noses so that truck frame will clear motor safety lugs and block in this position.
4. With crane lift frame and equalizer assembly and drop into place on Axle, Wheel, Box and Motor Assembly.
5. Replace brake bottom pull rods and pins.
6. Remove clamping devices.
7. Lower traction motor noses but only enough to allow the suspension spring nests to be slid in between lugs of motor and frame. Push vertical pins into the spring nests from the bottom and apply pin keepers and cotters.

NOTE: With suspension spring nests in position, and before further lowering motors, back off nuts on spring holder bolts (or remove split washers) until the spring holders are fully expanded to their limits between frame lugs. Then back off nuts 1/4" further and apply cotters.

8. Lower traction motor noses so that the lugs rest on suspensions.
9. Attach traction motor air duct boots.
10. Attach pedestal tie bars and bolts.

REAPPLICATION OF TRUCK TO LOCOMOTIVE

Any of the previous mentioned methods of truck removal will, of course, be satisfactory to reapply it, and in the following sequence of procedure.

1. Fill swivel bowl with oil to the level of the filling hole.
2. Check seal ring inside of frame center casting. If worn or damaged replace.

3. Either by lowering the locomotive to the truck or raising the truck to the locomotive, guide the swivel plate into position.

CAUTION: Exercise care so as not to damage air duct sleeve protruding from center of truck bowl.

4. Reassemble side bearing safety hooks.
5. Reconnect traction motor leads to generator leads coming from cab.
6. Reconnect brake piping, hand brake assembly and sander piping.
7. Remove any tools, rags, or blocking equipment that are on the truck or chassis.
8. Check lubricant and packing in journal box.

ADJUSTMENT OF CENTER PLATE HEIGHT

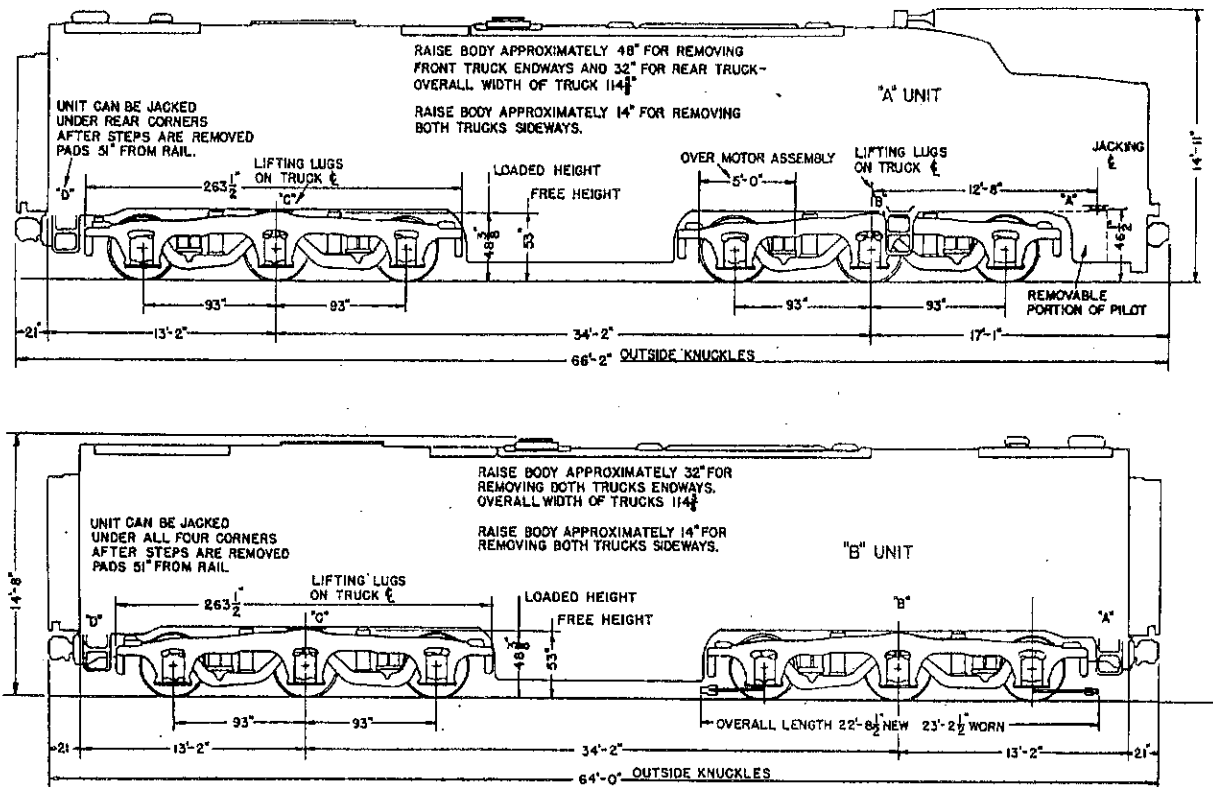
When it becomes necessary to raise center plate height to compensate for worn wheels, it may be done as follows:

1. Additional liners up to a total of 1" may be applied under coil springs in equalizer spring seat.
2. An additional liner 1/2" thick may be applied on top of coil spring in frame pocket.

NOTE: This liner must have a 2-1/2" dia. hole at center to allow seating over spring pocket retaining rivet.

3. An additional 1/4" liner may be applied in the box equalizer pockets under the ends of each equalizer.

WARNING: WHEN RAISING LOCOMOTIVE BODY FOR TRUCK REMOVAL, THE END OPPOSITE FROM THE TRUCK TO BE REMOVED MUST BE RAISED HIGH ENOUGH TO SEPARATE THE CENTER PLATES TO PREVENT SEIZING OR BREAKING OF THE TRUCK CENTER CASTING.



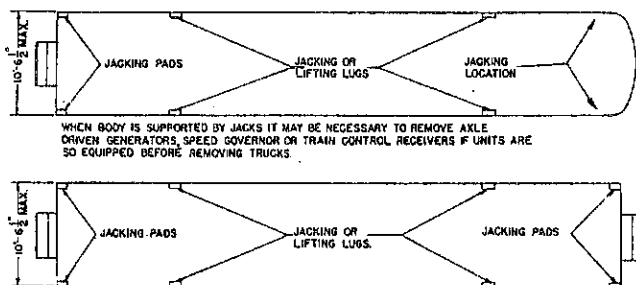
① JACKING AND LIFTING DATA WITH TRUCKS ATTACHED - SEE TABLE BELOW - LINES 1 THRU 8

② JACKING AND LIFTING DATA WITHOUT TRUCKS - SEE TABLE BELOW - LINES 9 THRU 12

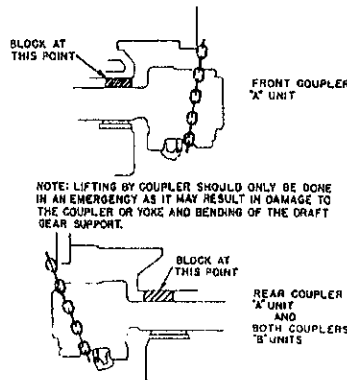
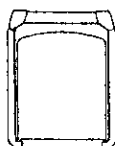
"A" UNIT - MAXIMUM LOADED WEIGHT 320,000 LBS

LINE	JACK OR LIFT AT	FULCRUM	LOAD "A"	LOAD "B"	LOAD "C"	LOAD "D"	RAIL LOAD FT. TRUCK	RAIL LOAD BK. TRUCK
1	A	C	114,465	---	---	---	---	205,535
2	B	C	---	158,900	---	---	---	163,100
3	C	B	---	163,100	---	---	158,900	---
4	D	B	---	---	---	118,335	201,645	---
5	A & C	---	114,465	---	205,535	---	---	---
6	A & D	---	158,900	---	---	163,100	---	---
7	B & C	---	---	158,900	163,100	---	---	---
8	B & D	---	---	201,645	---	118,335	---	---
9	A & C	---	73,610	---	134,330	---	---	---
10	A & D	---	102,660	---	---	105,340	---	---
11	B & C	---	---	100,900	107,100	---	---	---
12	B & D	---	---	130,280	---	77,720	---	---

WEIGHT OF ONE MOTOR TRUCK COMPLETE 56,000 LBS



CONSTRUCTION DRAWING OF THE LIFTING RIG MAY BE OBTAINED FROM THE MANUFACTURER.



① JACKING AND LIFTING DATA WITH TRUCKS ATTACHED - SEE TABLE BELOW - LINES 1 THRU 8

② JACKING AND LIFTING DATA WITHOUT TRUCKS - SEE TABLE BELOW - LINES 9 THRU 12

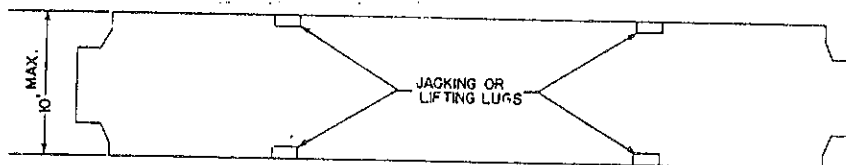
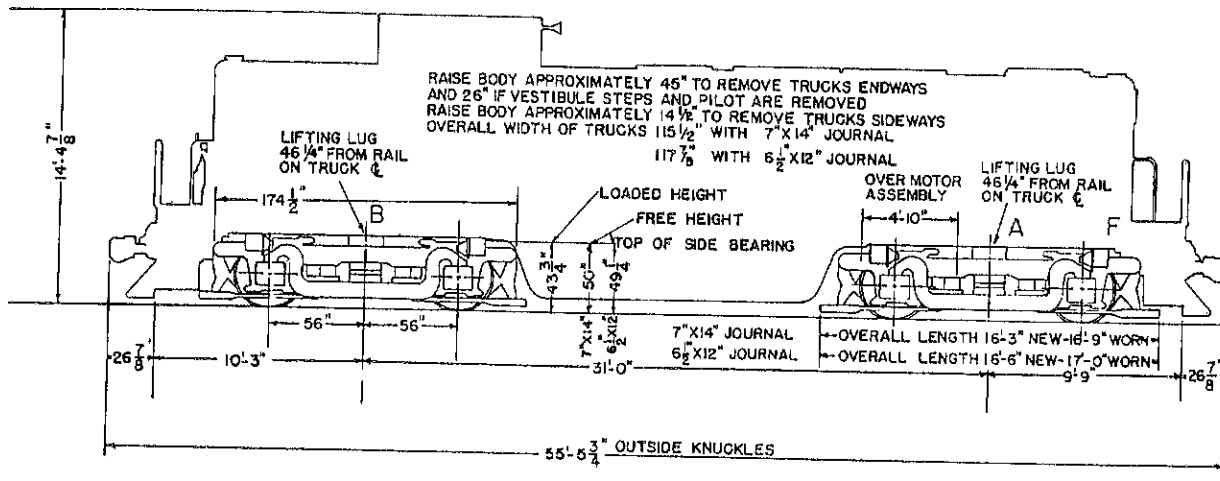
"B" UNIT - MAXIMUM LOADED WEIGHT 316,700 LBS

LINE	JACK OR LIFT AT	FULCRUM	LOAD "A"	LOAD "B"	LOAD "C"	LOAD "D"	RAIL LOAD FT. TRUCK	RAIL LOAD BK. TRUCK
1	A	C	111,830	---	---	---	---	204,870
2	B	C	---	155,000	---	---	---	161,700
3	C	B	---	161,700	---	---	155,000	---
4	D	B	---	---	---	116,720	---	199,980
5	A & C	---	111,830	---	204,870	---	---	---
6	A & D	---	155,460	---	---	160,240	---	---
7	B & C	---	---	155,000	161,700	---	---	---
8	B & D	---	---	199,980	---	116,720	---	---
9	A & C	---	71,460	---	132,240	---	---	---
10	A & D	---	100,460	---	---	104,240	---	---
11	B & C	---	---	99,000	105,700	---	---	---
12	B & D	---	---	128,400	---	76,300	---	---

WEIGHT OF ONE MOTOR TRUCK COMPLETE 56,000 LBS

Fig. 40 - JACKING AND LIFTING - PASSENGER "A" & "B" UNITS

WARNING: WHEN RAISING LOCOMOTIVE FOR TRUCK REMOVAL THE END OPPOSITE FROM THE TRUCK TO BE REMOVED MUST BE RAISED HIGH ENOUGH TO SEPARATE THE CENTER PLATES TO PREVENT SEIZING OR BREAKING OF THE TRUCK CENTER CASTING.



WHEN BODY IS SUPPORTED BY JACKS, IT MAY BE NECESSARY TO REMOVE AXLE DRIVEN GENERATORS, SPEED GOVERNOR OR TRAIN CONTROL RECEIVERS IF UNITS ARE SO EQUIPPED BEFORE REMOVING TRUCKS SIDEWAYS.

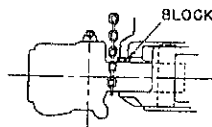
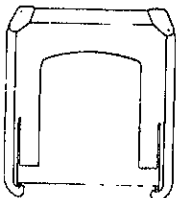
① JACKING AND LIFTING DATA WITH TRUCKS ATTACHED
SEE TABLE BELOW-LINES 1 THRU 3

② JACKING AND LIFTING DATA WITHOUT TRUCKS
SEE TABLE BELOW-LINE 4

MAXIMUM LOADED WEIGHT					
LINE	JACK OR LIFT AT	FULCRUM	LOAD "A"	LOAD "B"	RAIL LOAD
1	A	BK. TRUCK	122,700	—	128,500
2	B	FT. TRUCK	—	128,500	122,700
3	A & B	—	122,700	128,500	—
4	A & B	—	83,200	89,000	—

LOADED WEIGHTS

WEIGHT OF ONE MOTOR TRUCK COMPLETE 40,000 LBS. (7"x14" JOURNAL TRUCK)
39,500 LBS. (6 1/2"x12" JOURNAL TRUCK)



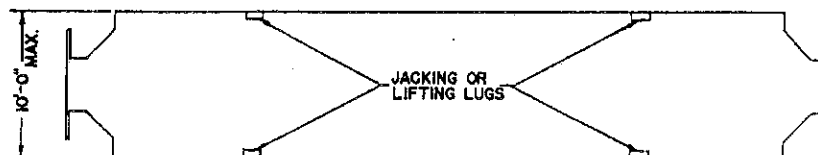
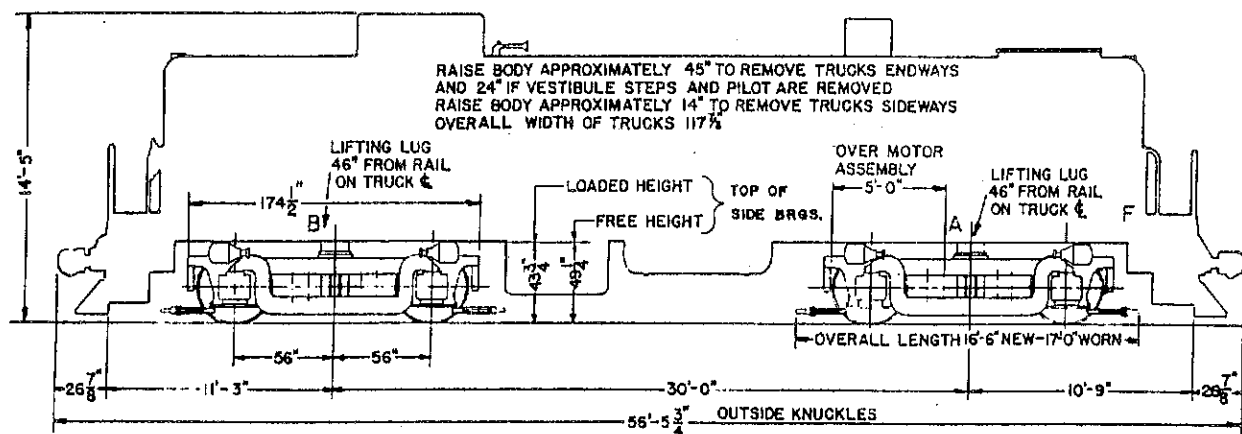
FRONT AND BACK COUPLERS

NOTE: LIFTING BY COUPLER SHOULD ONLY BE DONE IN AN EMERGENCY AS IT MAY RESULT IN DAMAGE TO THE COUPLER OR YOKE AND BENDING OF THE DRAFT GEAR SUPPORT.

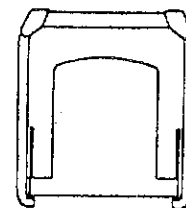
CONSTRUCTION DRG 994 S 977240 OF THE LIFTING RIG MAY BE OBTAINED FROM THE MANUFACTURER.

Fig. 41 - JACKING AND LIFTING - 1000 HP ROAD SWITCHER

WARNING: WHEN RAISING LOCOMOTIVE FOR TRUCK REMOVAL THE END OPPOSITE FROM THE TRUCK TO BE REMOVED MUST BE RAISED HIGH ENOUGH TO SEPARATE THE CENTER PLATES TO PREVENT SEIZING OR BREAKING OF THE TRUCK CENTER CASTING.



WHEN BODY IS SUPPORTED BY JACKS, IT MAY BE NECESSARY TO REMOVE AXLE DRIVEN GENERATORS, SPEED GOVERNOR OR TRAIN CONTROL RECEIVERS IF UNITS ARE SO EQUIPPED BEFORE REMOVING TRUCKS ENDWAYS.



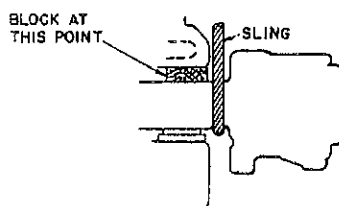
CONSTRUCTION DWG. OF LIFTING RIG MAY BE OBTAINED FROM THE MANUFACTURER.

① JACKING AND LIFTING DATA WITH TRUCKS ATTACHED
SEE TABLE BELOW—LINES 1 THRU 5

② JACKING AND LIFTING DATA WITHOUT TRUCKS
SEE TABLE BELOW—LINES 6 THRU 10

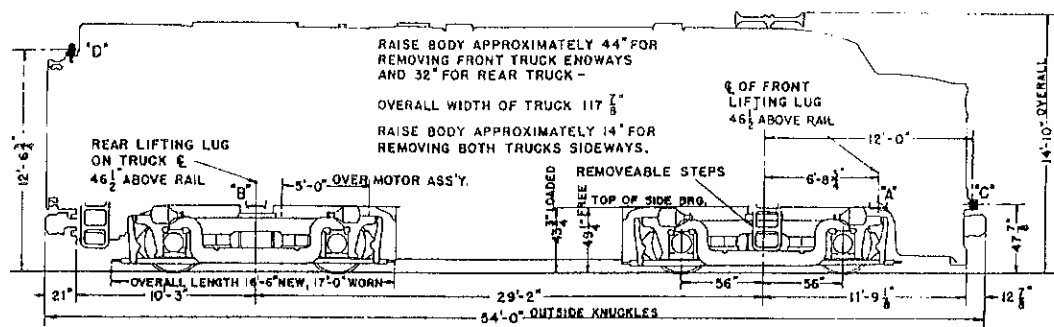
MAXIMUM LOADED WEIGHTS								
LINE	JACK OR LIFT AT	FULCRUM	LOAD "A"	LOAD "B"	LOAD FT. COUPLER	LOAD BK. COUPLER	RAIL LOAD FT. TRK.	RAIL LOAD BK. TRK.
1	A	B	125,000	—	—	—	—	125,000
2	B	A	—	125,000	—	—	125,000	—
3	A & B	—	125,000	125,000	—	—	—	—
4	FRONT COUPLER	B	—	—	89,820	—	—	160,180
5	BACK COUPLER	A	—	—	—	88,760	161,240	—
6	A	B	82,800	—	—	—	—	125,000
7	B	A	—	82,800	—	—	125,000	—
8	A & B	—	82,800	82,800	—	—	—	—
9	FRONT COUPLER	B	—	—	59,500	—	—	148,300
10	BACK COUPLER	A	—	—	—	58,790	149,010	—

WEIGHT OF ONE MOTOR TRUCK COMPLETE 42,200 LBS.



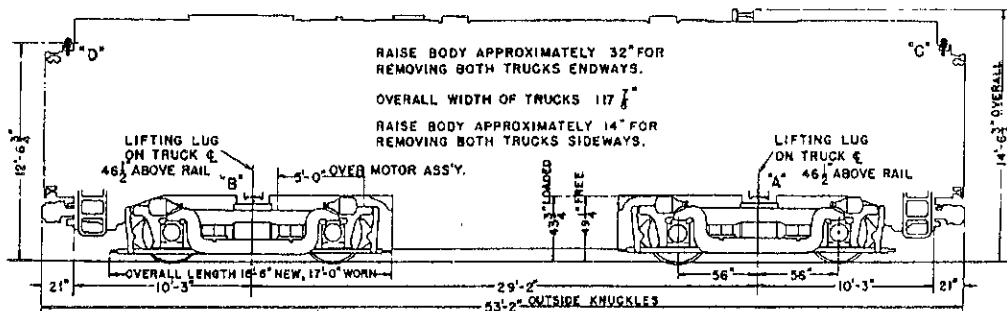
NOTE - LIFTING BY COUPLER SHOULD ONLY BE DONE IN AN EMERGENCY AS IT MAY RESULT IN DAMAGE TO THE COUPLER OR YOKE.

Fig. 42 - JACKING AND LIFTING - 1600 HP, FOUR MOTOR ROAD SWITCHER

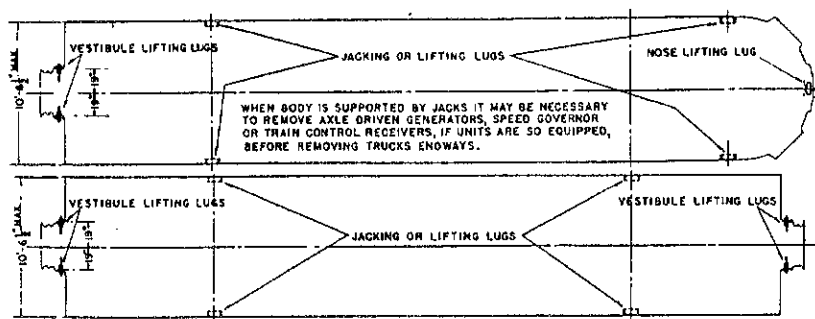


FREIGHT-PASSENGER "A" UNIT

WARNING-- WHEN RAISING LOCOMOTIVE BODY FOR TRUCK REMOVAL, THE END OPPOSITE FROM THE TRUCK TO BE REMOVED MUST BE RAISED HIGH ENOUGH TO SEPARATE THE CENTER PLATES TO PREVENT SEIZING OR BREAKING OF THE TRUCK CENTER CASTING.



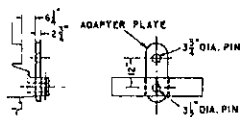
FREIGHT-PASSENGER "B" UNIT



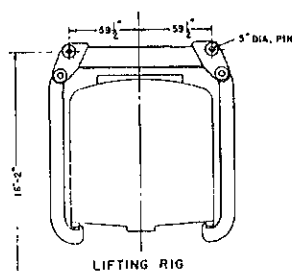
LINE	JACK OR LIFT AT	FULCRUM	LOAD "A"	LOAD "B"	LOAD "C"	LOAD "D"	RAIL LOAD FT. TRUCK	RAIL LOAD BK. TRUCK
1	A	BK. TRK.	105,630	—	—	—	—	154,370
2	B	FT. TRK.	—	130,000	—	—	130,000	—
3	C	BK. TRK.	—	—	92,105	—	—	167,895
4	D	FT. TRK.	—	—	—	95,190	164,810	—
5	A&B	—	105,630	130,000	—	—	—	—
6	A&D	—	140,995	—	—	113,005	—	—
7	B&C	—	167,895	92,105	—	—	—	—
8	A	BK. TRK.	71,260	—	—	—	—	146,440
9	B	FT. TRK.	—	87,700	—	—	130,000	—
10	C	BK. TRK.	—	—	64,215	—	—	153,485
11	D	FT. TRK.	—	—	—	64,215	133,485	—
12	A&B	—	71,260	104,140	—	—	—	—
13	A&D	—	95,115	—	—	80,285	—	—
14	B&C	—	—	113,285	62,135	—	—	—

WEIGHT OF ONE MOTOR TRUCK COMPLETE 42,300 LBS.

LINE	JACK OR LIFT AT	FULCRUM	LOAD "A"	LOAD "B"	LOAD "C"	LOAD "D"	RAIL LOAD FT. TRUCK	RAIL LOAD BK. TRUCK
1	A	BK. TRK.	130,000	—	—	—	—	130,000
2	B	FT. TRK.	—	130,000	—	—	130,000	—
3	C	BK. TRK.	—	—	95,190	—	—	164,810
4	D	FT. TRK.	—	—	—	95,190	164,810	—
5	A&B	—	130,000	130,000	—	—	—	—
6	A&D	—	164,810	—	—	95,190	—	—
7	B&C	—	—	164,810	95,190	—	—	—
8	C&D	—	—	—	130,000	130,000	—	—
9	A	BK. TRK.	87,700	—	—	—	—	130,000
10	B	FT. TRK.	—	87,700	—	—	130,000	—
11	C	BK. TRK.	—	—	64,215	—	—	153,485
12	D	FT. TRK.	—	—	—	64,215	133,485	—
13	A&B	—	87,700	87,700	—	—	—	—
14	A&D	—	111,185	—	—	64,215	—	—
15	B&C	—	—	111,185	64,215	—	—	—
16	C&D	—	—	—	87,700	87,700	—	—

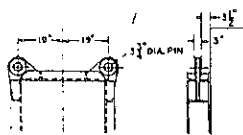


NOSE LIFTING LUG



LIFTING RIG

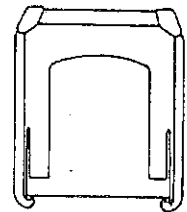
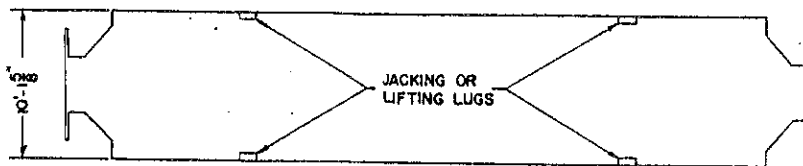
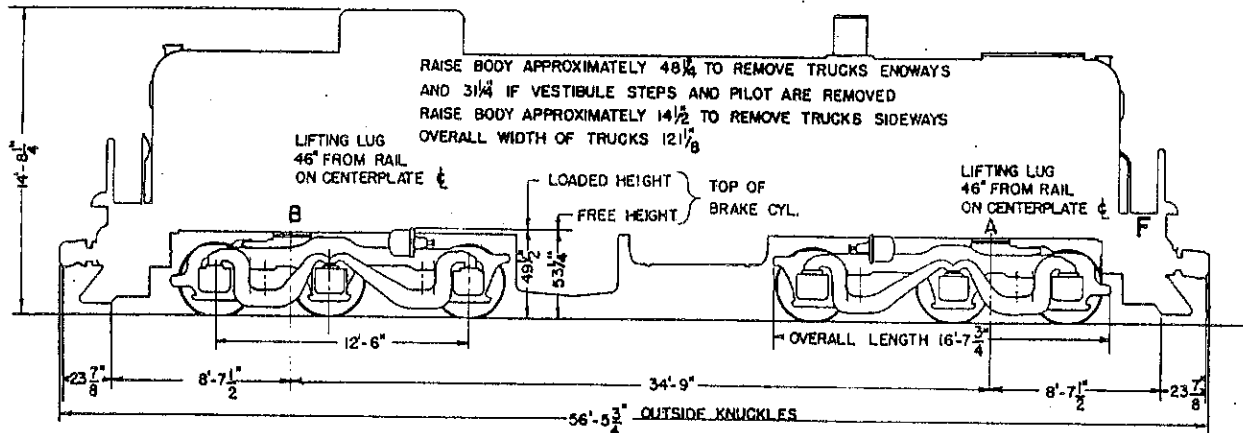
CONSTRUCTION DIM. OF LIFTING RIG MAY BE OBTAINED FROM THE MANUFACTURER.



VESTIBULE LIFTING LUGS

Fig. 43 - JACKING AND LIFTING - FREIGHT PASSENGER "A" & "B" UNITS

WARNING WHEN RAISING LOCOMOTIVE FOR TRUCK REMOVAL
THE END OPPOSITE FROM THE TRUCK TO BE REMOVED MUST BE
RAISED HIGH ENOUGH TO SEPARATE THE CENTER PLATES TO
PREVENT SEIZING OR BREAKING OF THE TRUCK CENTER CASTING



WHEN BODY IS SUPPORTED BY JACKS IT MAY BE NECESSARY
TO REMOVE AXLE DRIVEN GENERATORS, SPEED GOVERNOR OR TRAIN
CONTROL RECEIVERS IF UNITS ARE SO EQUIPPED BEFORE
REMOVING TRUCKS ENDWAYS.

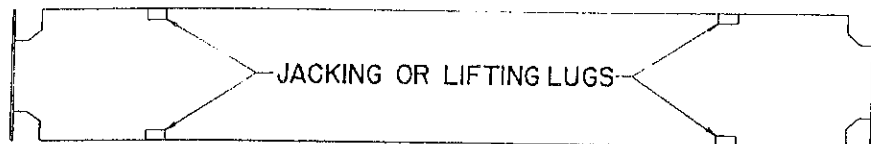
CONSTRUCTION DRAWING OF THE
LIFTING RIG MAY BE OBTAINED FROM THE
MANUFACTURER

- ① JACKING AND LIFTING DATA WITH TRUCKS ATTACHED
SEE TABLE BELOW - LINES 1 THRU 3
- ② JACKING AND LIFTING DATA WITHOUT TRUCKS
SEE TABLE BELOW - LINE 4

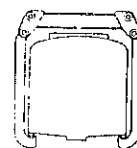
MAXIMUM LOADED WEIGHT						
LINE	JACK OR LIFT AT	FULCRUM	LOAD "A"	LOAD "B"	RAIL LOAD FT. TRK.	RAIL LOAD BK. TRK.
1	A	BACK TRK.	167,900	—	—	192,100
2	B	FRONT TRK.	—	167,900	192,100	—
3	A & B	—	180,000	180,000	—	—
4	A & B	—	124,500	124,500	—	—

WEIGHT OF ONE MOTOR TRUCK COMPLETE 55,500 LBS.

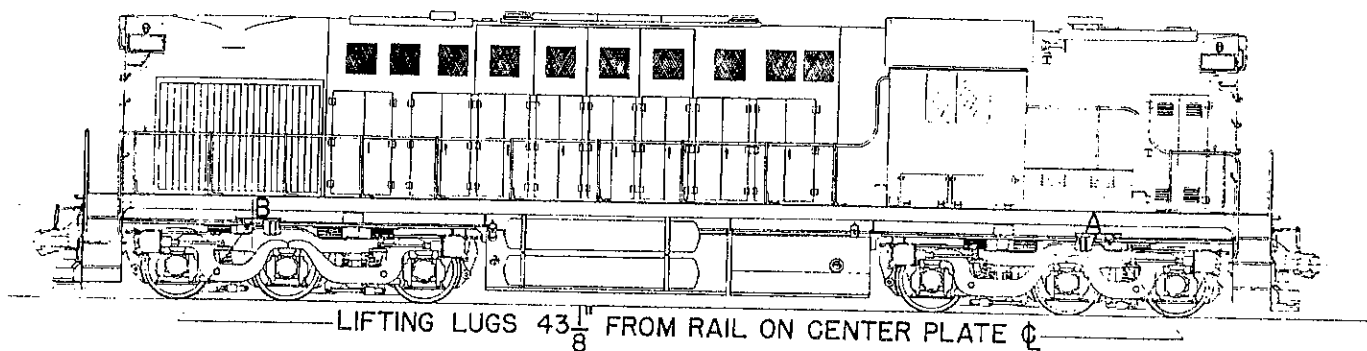
Fig. 44 - JACKING AND LIFTING - 1600 HP, SIX MOTOR ROAD SWITCHER



WHEN BODY IS SUPPORTED BY JACKS, IT MAY BE NECESSARY TO REMOVE AXLE DRIVEN GENERATORS, SPEED GOVERNOR OR TRAIN CONTROL RECEIVERS IF UNITS ARE SO EQUIPPED BEFORE REMOVING TRUCKS ENDWAYS.



LIFTING RIG
CONSTRUCTION DWG. OF LIFTING RIG MAY BE OBTAINED FROM THE MANUFACTURER.

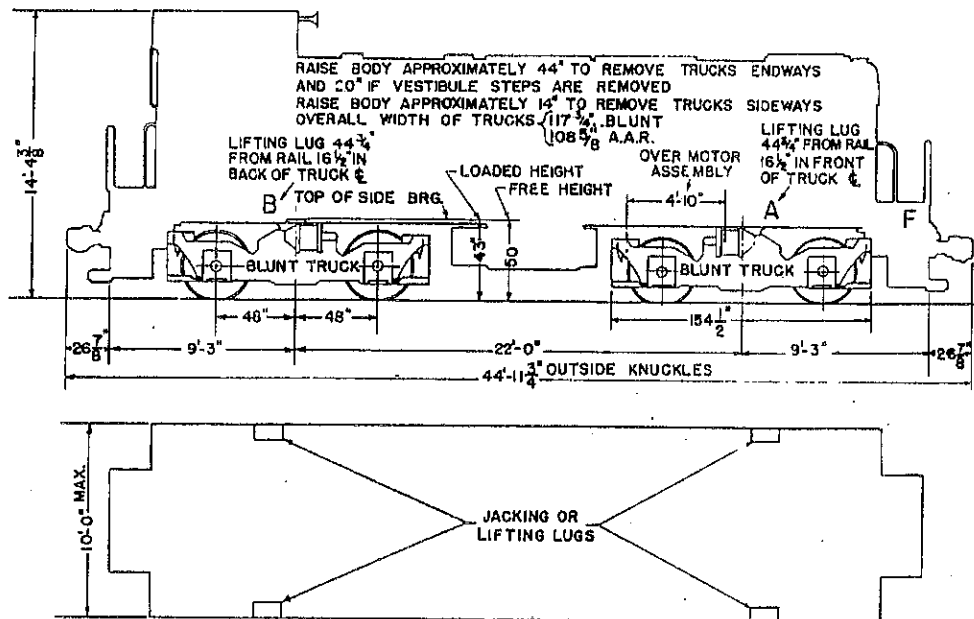


1. DIAMETER OF TRUCK WHEEL — 40"
2. WEIGHT OF ONE TRUCK COMPLETE WITH MOTORS — 56,700 LBS.
3. MAXIMUM WEIGHT ON ONE TRUCK AT RAIL — 195,000 LBS.
4. FOR JACKING AND LIFTING DATA WITH TRUCKS ATTACHED SEE TABLE BELOW, LINES 1-3
5. FOR JACKING AND LIFTING DATA WITHOUT TRUCKS SEE TABLE BELOW, LINE 4
6. OVERALL HEIGHT OF TRUCK LOADED — 45 5/8", LIGHT 51 1/2"

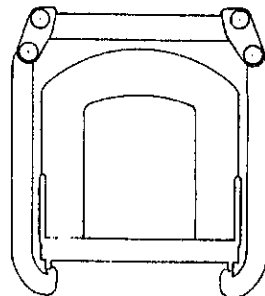
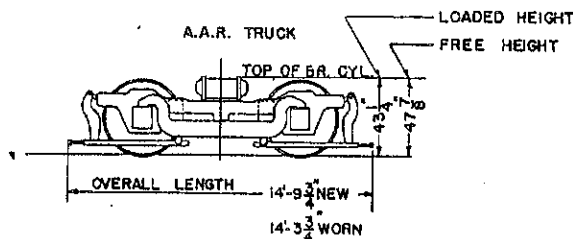
LINE	JACK OR LIFT AT	FULCRUM	LOAD "A"	LOAD "B"	RAIL LOAD FRONT TRUCK	RAIL LOAD BACK TRUCK
1	A	BACK TRUCK	184,750	—	—	205,250
2	B	FRONT TRUCK	—	184,750	205,250	—
3	A & B	—	195,000	195,000	—	—
4	A & B	—	138,300	138,300	—	—

Fig. 45 - JACKING AND LIFTING - 2250 HP ROAD SWITCHER

WARNING: WHEN RAISING LOCOMOTIVE FOR TRUCK REMOVAL THE END OPPOSITE FROM THE TRUCK TO BE REMOVED MUST BE RAISED HIGH ENOUGH TO SEPARATE THE CENTER PLATES TO PREVENT SEIZING OR BREAKING OF THE TRUCK CENTER CASTING.



WHEN BODY IS SUPPORTED BY JACKS, IT MAY BE NECESSARY TO REMOVE AXLE DRIVEN GENERATORS, SPEED GOVERNOR OR TRAIN CONTROL RECEIVERS IF UNITS ARE SO EQUIPPED BEFORE REMOVING TRUCKS ENDWAYS.



CONSTRUCTION DRG. 994S977240
OF THE LIFTING RIG MAY BE
OBTAINED FROM THE MANUFACTURER.

① JACKING AND LIFTING DATA WITH TRUCKS ATTACHED
SEE TABLE BELOW—LINES 1 THRU 3

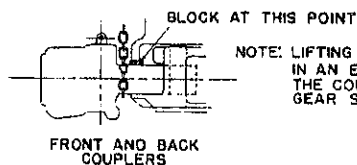
② JACKING AND LIFTING DATA WITHOUT TRUCKS
SEE TABLE BELOW—LINE 4

LOADED WEIGHT STD. LOCO.

LINE	JACK OR LIFT AT	FULCRUM	LOAD "A"	LOAD "B"	RAIL LOAD FT. TRUCK	RAIL LOAD BK. TRUCK
1	A	BK. TRUCK	93,900	—	—	104,000
2	B	FT. TRUCK	—	92,840	105,080	—
3	A & B	—	99,480	98,420	—	—
4	A & B	—	64,480	63,420	—	—

LOADED WEIGHTS

WEIGHT OF ONE MOTOR TRUCK COMPLETE 35,000 LBS. BLUNT
34,000 LBS. A.A.R.

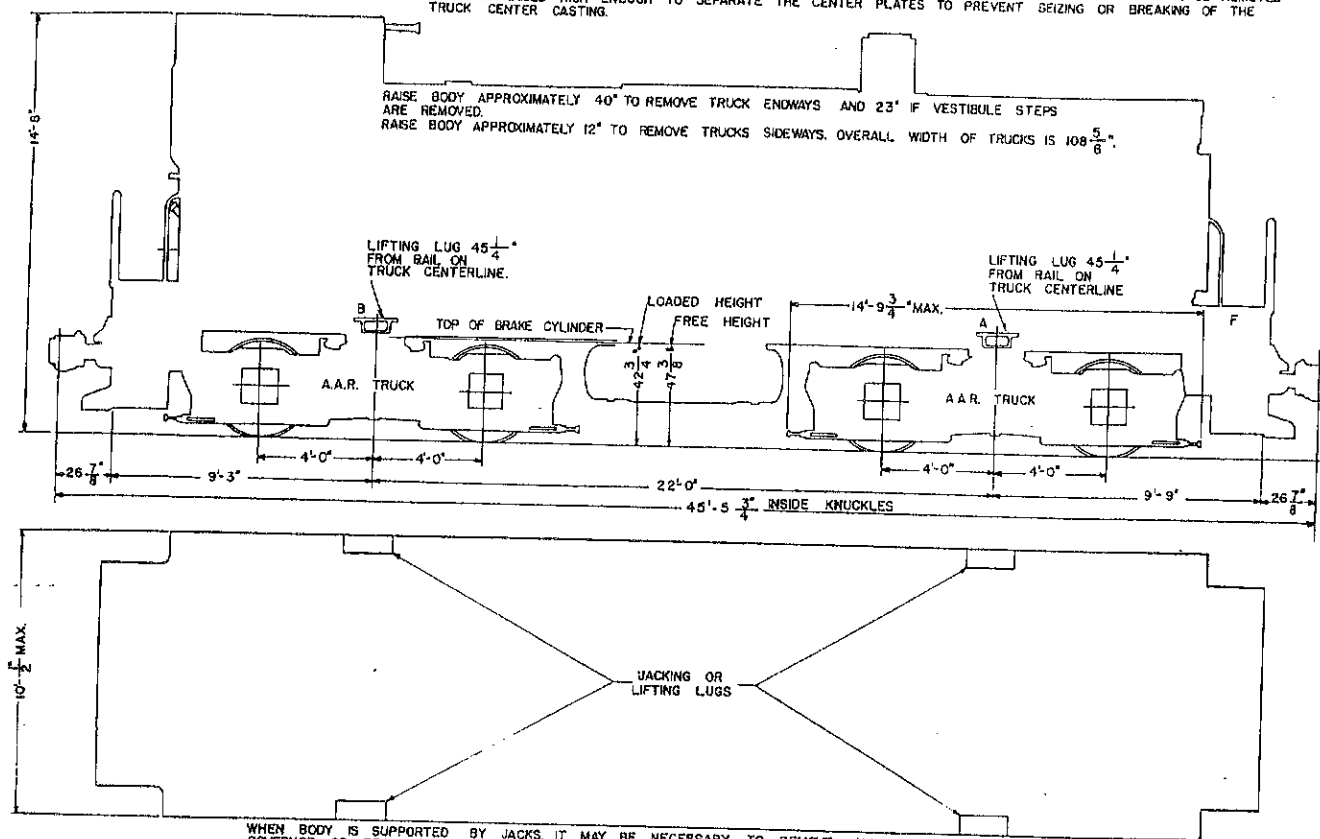


NOTE: LIFTING BY COUPLER SHOULD ONLY BE DONE IN AN EMERGENCY AS IT MAY RESULT IN DAMAGE TO THE COUPLER OR YOKE AND BENDING OF THE DRAFT GEAR SUPPORT.

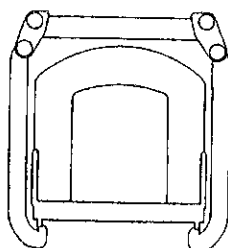
Fig. 46 - JACKING AND LIFTING - 660 HP SWITCHER

WARNING! WHEN RAISING LOCOMOTIVE FOR TRUCK REMOVAL THE END OPPOSITE FROM THE TRUCK TO BE REMOVED MUST BE RAISED HIGH ENOUGH TO SEPARATE THE CENTER PLATES TO PREVENT SEIZING OR BREAKING OF THE TRUCK CENTER CASTING.

RAISE BODY APPROXIMATELY 40" TO REMOVE TRUCK ENDWAYS AND 23" IF VESTIBULE STEPS ARE REMOVED.
RAISE BODY APPROXIMATELY 12" TO REMOVE TRUCKS SIDEWAYS. OVERALL WIDTH OF TRUCKS IS $108\frac{5}{8}$ ".



WHEN BODY IS SUPPORTED BY JACKS, IT MAY BE NECESSARY TO REMOVE ALL DRIVEN GENERATORS, SPEED GOVERNOR OR TRAIN CONTROL RECEIVERS, IF UNITS ARE SO EQUIPPED, BEFORE REMOVING TRUCKS ENDWAYS.



CONSTRUCTION DRG. 9945977240
OF THE LIFTING RIG MAY BE
OBTAINED FROM THE MANUFACTURER.

① JACKING AND LIFTING DATA WITH TRUCKS ATTACHED
SEE TABLE BELOW-LINES 1 THRU 3

② JACKING AND LIFTING DATA WITHOUT TRUCKS
SEE TABLE BELOW-LINE 4

LOADED WEIGHT STD. LOCO.

LINE	JACK OR LIFT AT	FULCRUM	LOAD "A"	LOAD "B"	RAIL LOAD FT. TRUCK	RAIL LOAD BK. TRUCK
1	A	BK. TRUCK	114,300	—	—	115,700
2	B	FT. TRUCK	—	115,700	114,300	—
3	A & B	—	114,300	115,700	—	—
4	A & B	—	77,400	78,900	—	—

WEIGHT OF ONE MOTOR TRUCK COMPLETE 36,900 LBS. A.A.R.

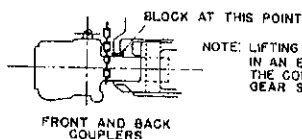
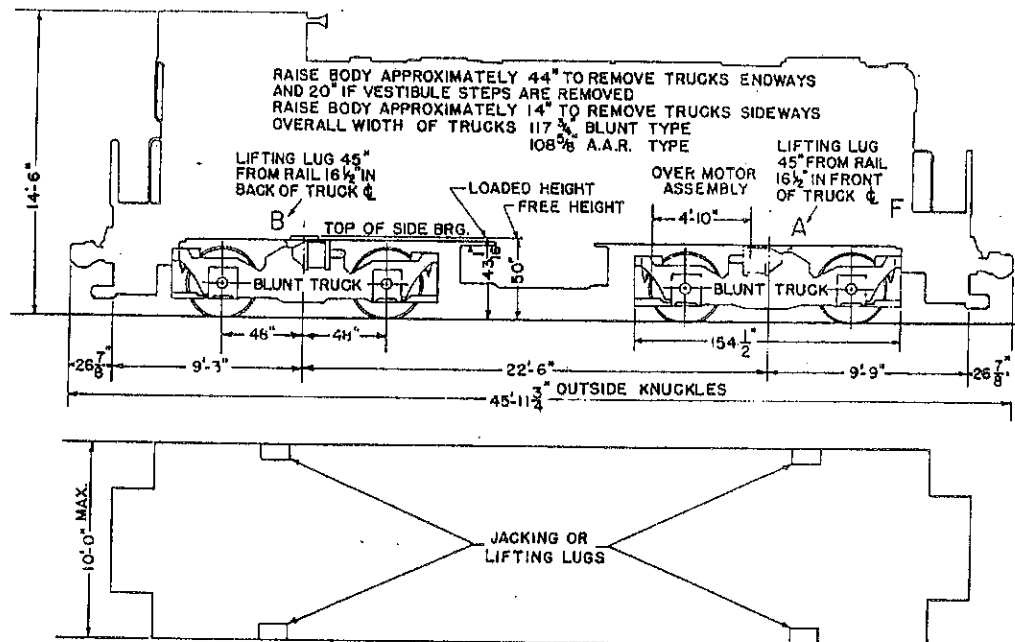
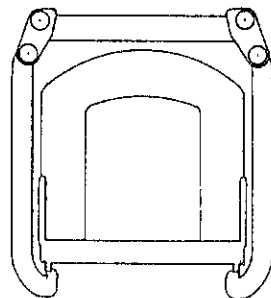
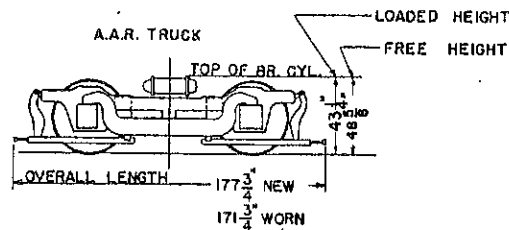


Fig. 47 - JACKING AND LIFTING - 800 HP AND 900 HP SWITCHERS

WARNING: WHEN RAISING LOCOMOTIVE FOR TRUCK REMOVAL THE END OPPOSITE FROM THE TRUCK TO BE REMOVED MUST BE RAISED HIGH ENOUGH TO SEPARATE THE CENTER PLATES TO PREVENT SEIZING OR BREAKING OF THE TRUCK CENTER CASTING.



WHEN BODY IS SUPPORTED BY JACKS, IT MAY BE NECESSARY TO REMOVE AXLE DRIVEN GENERATORS, SPEED GOVERNOR OR TRAIN CONTROL RECEIVERS IF UNITS ARE SO EQUIPPED BEFORE REMOVING TRUCKS ENDWAYS.



CONSTRUCTION DRG. 994S977240
OF THE LIFTING RIG MAY BE
OBTAINED FROM THE MANUFACTURER

① JACKING AND LIFTING DATA WITH TRUCKS ATTACHED
SEE TABLE BELOW-LINES 1 THRU 3

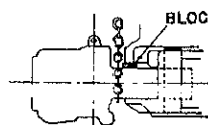
② JACKING AND LIFTING DATA WITHOUT TRUCKS
SEE TABLE BELOW-LINE 4

LOADED WTS. STANDARD LOCO.

LINE	JACK OR LIFT AT	FULCRUM	LOAD "A"	LOAD "B"	RAIL LOAD FT. TRUCK	RAIL LOAD BK. TRUCK
1	A	BK. TRUCK	108,000	—	—	122,000
2	B	FT. TRUCK	—	109,000	121,000	—
3	A & B	—	114,500	115,500	—	—
4	A & B	—	79,500	80,500	—	—

LOADED WEIGHTS

WEIGHT OF ONE MOTOR TRUCK COMPLETE 35,000 LBS. BLUNT
34,000 LBS. A.A.R.

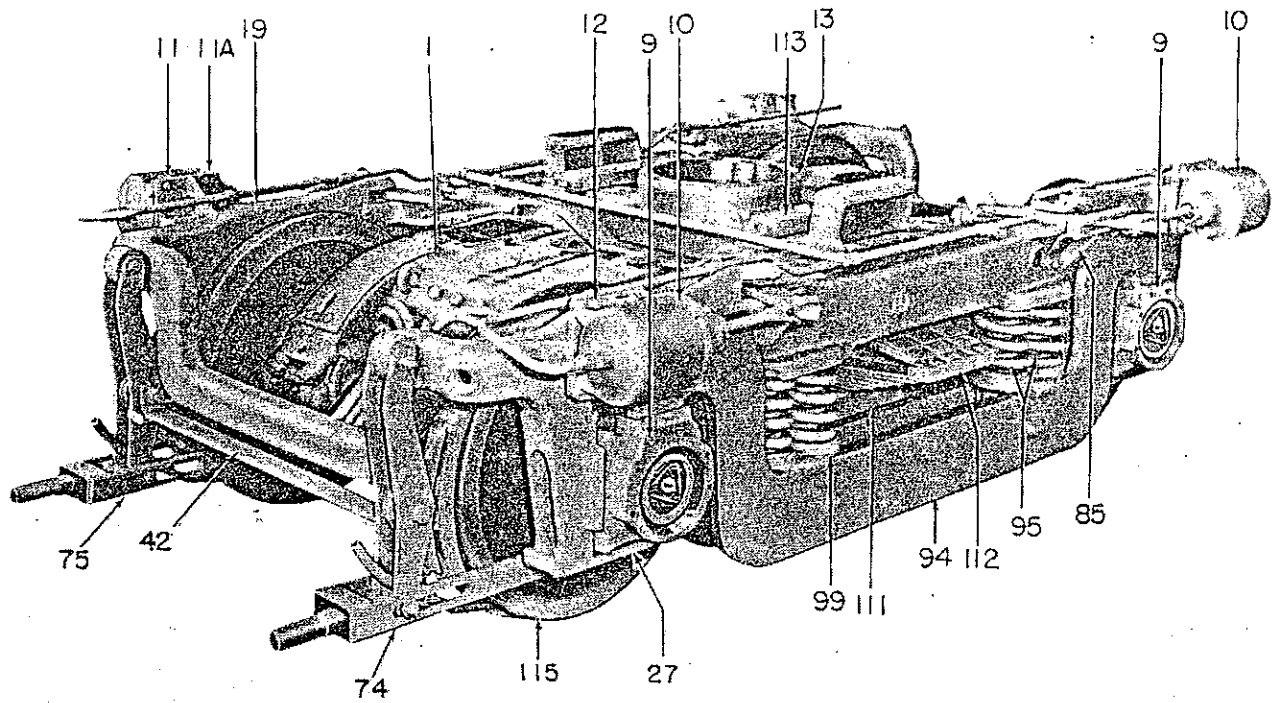


FRONT AND BACK COUPLERS

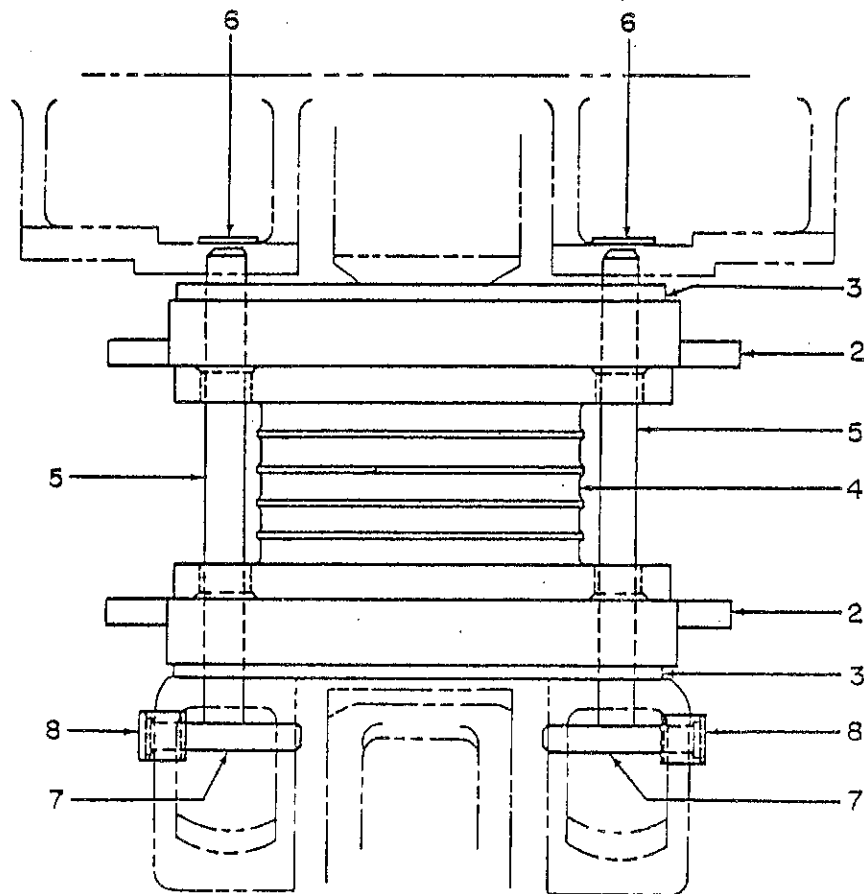
NOTE: LIFTING BY COUPLER SHOULD ONLY BE DONE IN AN EMERGENCY AS IT MAY RESULT IN DAMAGE TO THE COUPLER OR YOKE AND BENDING OF THE DRAFT GEAR SUPPORT.

Fig. 48 - JACKING AND LIFTING - 1000 HP SWITCHER

GENERAL  ELECTRIC



(Representative Illustration)
FIG. 1



(Representative Illustration)
FIG. 2

Fig. No.	Ref. No.	Part No.	Quantity Required Column			DESCRIPTION
			A	B	C	
1	1	*1X3620	1	-	-	TRUCK, complete including Model 5GE752 traction motors, brake cylinders and piping, brake and spring rigging, wheels, axles and journal bearing with housing and accessories (U25, GEAR RATIO 74:18)
		*1X4977	-	1	-	TRUCK, complete including Model 5GE752 traction motors, brake cylinders and piping, brake and spring rigging, wheels, axles and journal bearing with housing and accessories (U50, GEAR RATIO 74:18)
		*1X3622	-	-	1	TRUCK, complete including Model 5GE752 traction motors, brake cylinders and piping, brake and spring rigging, wheels, axles and journal bearing with housing and accessories (U25, GEAR RATIO 85:18)
		-----	2	2	2	MOTOR, traction (SEE INDEX)
		-----	2	2	2	GEAR CASE, traction motor (SEE INDEX)
		-----	2	2	2	PINION, traction motor (SEE INDEX)
		-----	4	4	4	BEARING, traction motor support (SEE INDEX)
		-----	2	2	2	GUARD, dust, traction motor support bearing (SEE INDEX)
		-----	2	2	2	DEFLECTOR, traction motor air (SEE INDEX)

MOTOR NOSE SUSPENSION

2	2	41B510242G3	2	2	2	SUSPENSION with seats, mount, guide pins and retaining pins, motor
2	3	6732493G3	4	4	4	SEAT with wearing plate
2	4	*41B515915P2	4	4	4	#PLATE, wearing
2	5	41B510241P2	2	2	2	MOUNT, suspension
2	6	4768526P6	4	4	4	PIN, mount and support guide
2	7	41A210496P8	4	4	4	#WASHER
2	8	*8861284P2	4	4	4	PIN, retaining
2		8861285P1	4	4	4	RETAINER, pin

TRUCK

1	9	1X3623	1	-	-	TRUCK, complete less traction motors, gear cases and motor nose suspensions (INCLUDES BRAKE CYLINDERS AND PIPING, BRAKE AND SPRING RIGGING, WHEELS, AXLES AND JOURNAL BEARINGS)
		1X4978	-	1	-	TRUCK, complete less traction motors, gear cases and motor nose suspensions (INCLUDES BRAKE CYLINDERS AND PIPING, BRAKE AND SPRING RIGGING, WHEELS, AXLES AND JOURNAL BEARINGS)
		1X3624	-	-	1	TRUCK, complete less traction motors, gear cases and motor nose suspensions (INCLUDES BRAKE CYLINDERS AND PIPING, BRAKE AND SPRING RIGGING, WHEELS, AXLES AND JOURNAL BEARINGS)
		-----	4	4	4	BEARING, journal (SEE INDEX) (WHEELS, AXLE, GEAR AND JOURNAL BEARING ARRANGEMENT)
		-----	4	4	4	CYLINDER with push rod, brake (SEE INDEX)
		41A216439P1	4	4	4	#PAD, brake cylinder mounting (USE ON LOCOMOTIVES EQUIPPED WITH 9 IN. DIA. BRAKE CYLINDERS)
		N22P35048	8	8	8	BOLT, brake cylinder mounting, 3/4 in.-10, 3 in., hex. hd.
		*N203P35B	16	16	16	\$NUT, 3/4 in.-10, hex. (IF APPLIED)
1	12	499A906A8P6	16	16	16	\$NUT, self-locking, 3/4 in.-10 (ELASTIC STOP NUT CORP., PART NO. 49NU120)
		N405P48	16	16	16	WASHER, lock, 3/4 in.

TRUCK BOLSTER PARTS

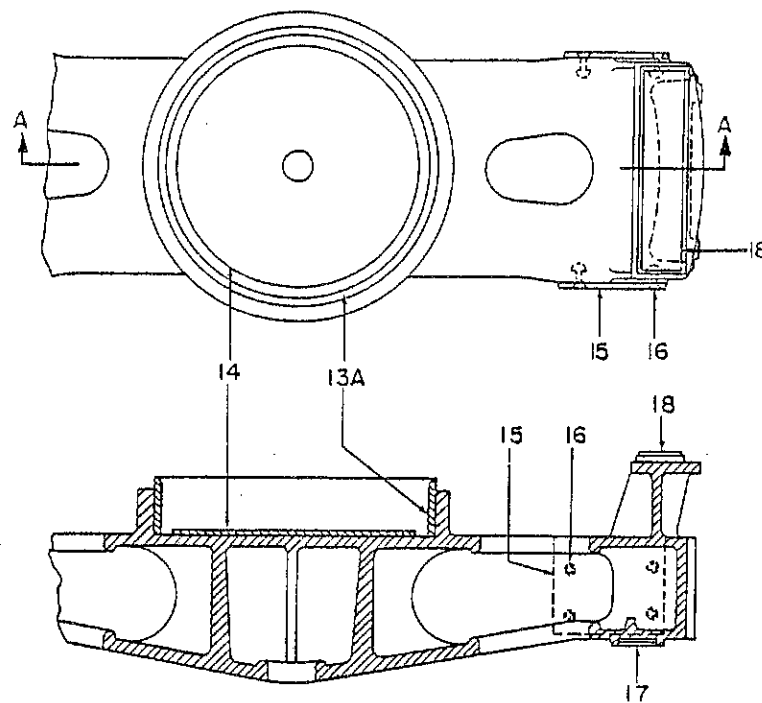
1	13	1X3212	1	1	1	BOLSTER with center plate, wearing ring, wearing plates and stops
3	13A	6747460P22	1	1	1	#RING, center plate wearing, 21.515 in. I.D., 22.515 in. O.D., 5 in. wide
3	14	6747460P20	1	1	1	#PLATE, center plate wearing
3	15	41A211628P1	4	4	4	PLATE, side wearing
3	16	357X19	16	16	16	RIVET, wearing plate, 3/4 in. by 2 1/8 in., butt. hd.
3	17	8861458P1	4	4	4	#STOP, spring
3	18	489A574P52	2	2	2	#PLATE, side bearing wearing
		484A806G1	2	2	2	STOP, bolster

*Added or changed since last issue.

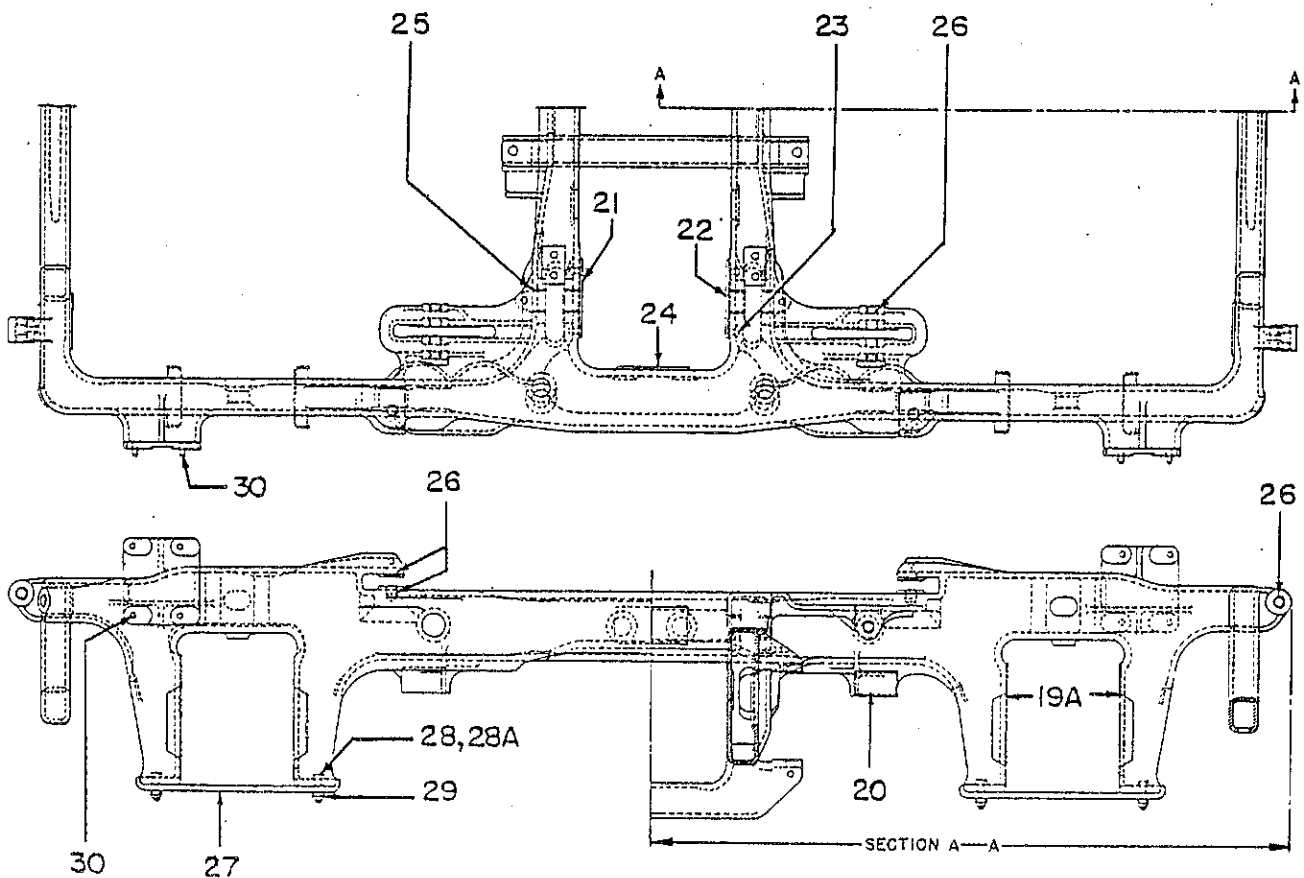
#Must be welded in position when furnished separately.

\$\$Several designs furnished.

MARCH, 1981



SECTION A-A
(Representative Illustration)
FIG. 3



(Representative Illustration)
FIG. 4

TRUCK BOLSTER PARTS (Cont'd.)

Fig. No.	Ref. No.	Part No.	Quantity Required Column			DESCRIPTION
			A	B	C	
		N22P33040	4	4	4	BOLT, bolster stop, 5/8 in.-11, 2 1/2 in., hex. hd.
		499A906ABP5	4	4	4	NUT, self-locking, 5/8 in.-11 (ELASTIC STOP NUT CORP., PART NO. 49NU101)

TRUCK FRAME PARTS

1	19	1X3213	1	1	1	FRAME with pedestal tie bars and brake cylinder mounting studs
4	19A	41A212173P1	8	8	8	#LINER, pedestal
4	20	957X48	4	4	4	#PLATE, wearing, brake hanger
4	21, 22	957X46	4	4	4	#PLATE, wearing, bolster side
4	23	604X82	12	12	12	RIVET, wearing plate, 3/4 in. by 2 in., butt. hd.
4	24	1X1122	2	2	2	#PLATE, wearing, bolster ends
4	25	957X49	8	8	8	BUSHING, swing hanger pin, 2 3/4 in. I.D., 3 1/4 in. O.D., 1 13/16 in. long
4	26	499A913AAP8	32	32	32	BUSHING, brake lever pin, 1 1/4 in. I.D., 1 5/8 in. O.D., 1 in. long
4	27	491A294P1	4	4	4	CBAR, pedestal tie (PLAIN)
1, 4	27	1X5486	2	-	2	CBAR with support, pedestal tie, left-hand facing side of truck
		41B511226P2	2	-	2	#SUPPORT, sand pipe
		1X5487	2	-	2	CBAR with support, pedestal tie, right-hand facing side of truck
		41B511226P1	2	-	2	#SUPPORT, sand pipe
		41C611211G2	2	2	2	STABILIZER, tie bar, left-hand facing side of truck (IF APPLIED)
		41C611211G1	2	2	2	STABILIZER, tie bar, right-hand facing side of truck (IF APPLIED)
4	28	41A210528G4	8	8	8	\$BOLT, pedestal tie bar, 3 1/4 in. long
4	28A	41A210528G5	8	8	8	\$BOLT, pedestal tie bar, 3 3/4 in. long
4	29	499A906ABP7	8	8	8	NUT, self-locking, 7/8 in.-9 (ELASTIC STOP NUT CORP., PART NO. 49NU149)
4	30	4768359P5	8	8	8	\$#STUD, brake cylinder mounting, 2 3/4 in. long
4	30	4768359P6	8	8	8	\$#STUD, brake cylinder mounting, 2 7/8 in. long
4	30	4768359P10	8	8	8	\$#STUD, brake cylinder mounting, 3 3/8 in. long

BRAKE RIGGING

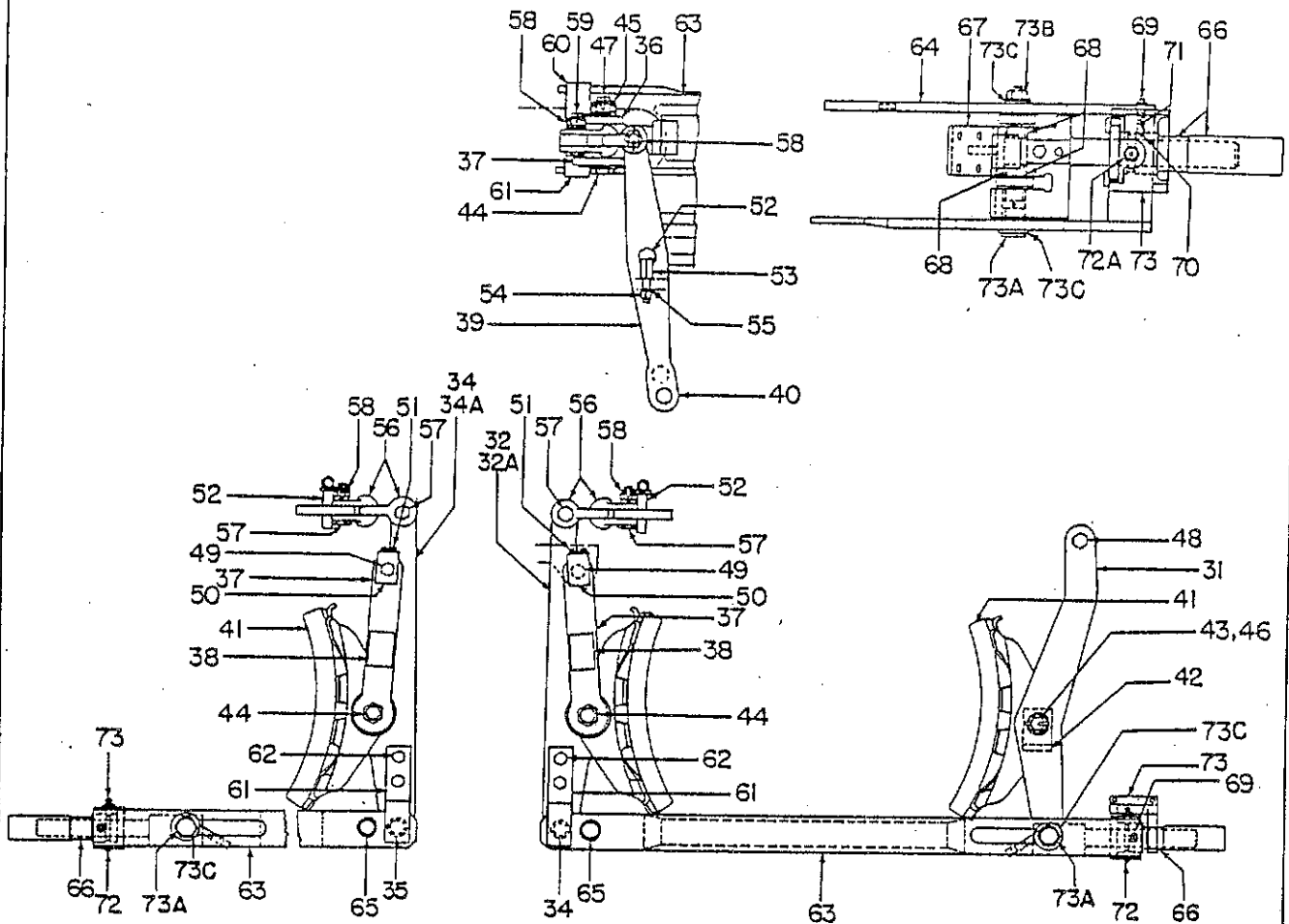
5	31	41D710486G3	8	-	8	LEVER with bushings, brake
5	31	41D711156G3	-	8	-	LEVER with bushings, brake
5	32	41D711156G1	-	2	-	LEVER with bushings, brake
5	32A	1X3210	2	-	2	LEVER with bushings, solid pin and cotter pin, brake
		41D710486G1	2	-	2	LEVER with bushings, brake
5	33	41A211122P1	2	2	2	PIN, 8 1/4 in. long
		N503P3364B	2	2	2	PIN, cotter, 3/8 in. by 4 in.
5	34	41D711156G2	-	2	-	LEVER with bushings, brake
5	34A	1X3211	2	-	2	LEVER with bushings, solid pin and cotter pin, brake
		41D710486G2	2	-	2	LEVER with bushings, brake
5	35	41A211122P1	2	2	2	PIN, 8 1/4 in. long
		N503P3364B	2	2	2	PIN, cotter, 3/8 in. by 4 in.
5	36	41D710486G6	4	4	4	HANGER with bushings, inner brake
5	37	41D710486G7	4	4	4	HANGER with bushings and wearing plate, outer brake
5	38	499A280P20	4	4	4	#PLATE, wearing
5	39	41D710486G4	Δ	4	Δ	LEVER with bushings, cylinder
5	40	41D710486G5	Δ	-	Δ	LEVER with bushings and brake extension, cylinder
5	41	-----	8	8	8	BRAKE SHOE, HEAD AND KEY (SEE INDEX)
5	42	41D710486G10	2	-	2	STRAP, brake head tie
5	42	41B510944G1	-	2	-	STRAP, brake head tie
5	43	41A211480P1	4	4	4	BOLT, 1 3/8 in.-6, brake lever, brake shoe and tie strap, 7 3/8 in. long
5	44	41A211480P2	4	4	4	BOLT, 1 3/8 in.-6, brake lever, brake hanger and brake shoe head, 6 7/8 in. long
5	45	N216P43	5	3	3	NUT, 1 3/8 in.-6, hex., sl.

#Must be welded in position when furnished separately.

CTwo designs available.

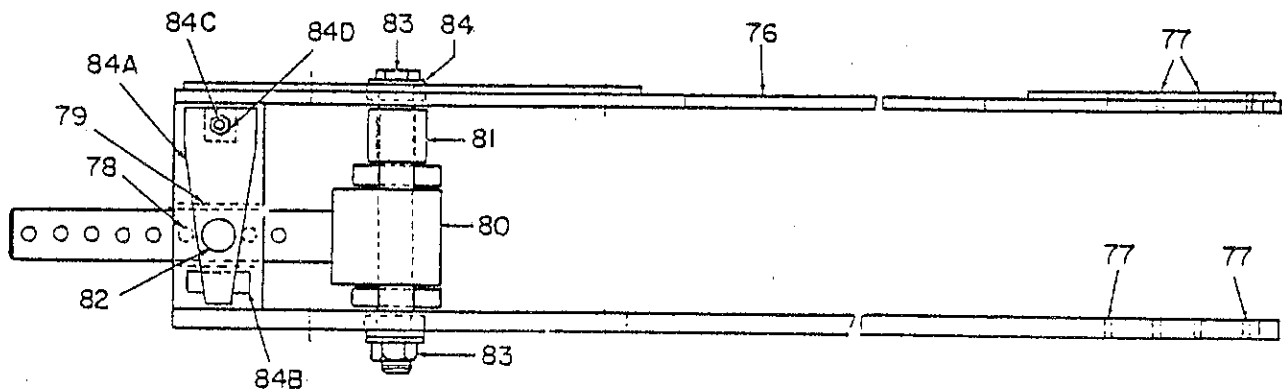
\$Several designs furnished.

ΔAs required.



(Representative Illustration)

FIG. 5



(Representative Illustration)

FIG. 5A

BUSHINGS FOR HANGERS AND LEVERS

Bushings				No. Required for Part Number									
Part No.	Dimensions			1X3210	1X3211	41D710486					41D711156		
	I.D.	O.D.	Length			G3	G4	G5	G6	G7	G1	G2	G3
41B510329P2	1.125	1.490	3/4	-	-	1	-	-	-	-	-	-	1
41B510329P3	1.125	1.490	1	-	-	-	1	2	-	-	1	1	-
41B510329P12	1.250	1.615	3/4	-	-	1	-	-	1	1	-	-	1
41B510329P13	1.250	1.615	1	1	1	-	2	2	-	-	1	1	-
41B510329P22	1.375	1.740	3/4	-	-	1	-	-	1	1	-	-	1
41B510329P24	1.375	1.740	1 1/4	1	1	-	-	-	-	-	1	1	-

BRAKE RIGGING (Cont'd.)

Fig. No.	Ref. No.	Part No.	Quantity Required Column			DESCRIPTION
			A	B	C	
5	46	497A738P10	12	12	12	WASHER, springlox
5	46	N402P53	12	12	12	WASHER, plain, 1 3/8 in.
5	47	N503P2848B	8	8	8	PIN, cotter, 5/16 in. by 3 in.
5	48	41A210766P3	4	4	4	BOLT, 7/8 in.-9, brake lever suspension, 6 3/8 in. long
		N216P37	4	4	4	NUT, 7/8 in.-9, hex., sl.
		N417P19	4	4	4	WASHER, plain, 7/8 in.
		N405P49	4	4	4	WASHER, lock, 7/8 in.
		N503P1732B	4	4	4	PIN, cotter, 3/16 in. by 2 in.
5	49	495A614P4	8	8	8	PIN, brake hanger suspension, 2 7/8 in. long
5	50	41D710486P21	8	8	8	RETAINER, pin
5	51	N22P25014B	8	8	8	BOLT, retainer, 3/8 in.-16, 7/8 in., hex. hd.
		*N405P43B	8	8	8	WASHER, lock, 3/8 in.
5	52	495A614P5	4	4	4	PIN, cylinder lever pivot, 3 1/2 in. long
5	53	489A419P7	4	4	4	BOLT, 3/4 in.-10, pivot pin retaining, 4 in. long
5	54	*N203P35B	4	4	4	NUT, 3/4 in.-10, hex.
5	55	N405P48	4	4	4	WASHER, lock, 3/4 in.
5	56	41A211178P3	8	8	8	CLEVIS, brake hanger or cylinder lever
5	57	41A210766P6	8	8	8	BOLT, 7/8 in.-9, clevis, 3 13/16 in. long
5	58	N216P37	8	8	8	NUT, 7/8 in.-9, hex., sl.
		N417P19	8	8	8	WASHER, plain, 7/8 in.
		N405P49	8	8	8	WASHER, lock, 7/8 in.
5	59	N503P1732B	8	8	8	PIN, cotter, 3/16 in. by 2 in.
5	60	41D710486P22	4	4	4	RETAINER, inner brake rod
5	61	41D710486P23	4	4	4	RETAINER, outer brake rod
5	62	N22P35048	8	-	8	\$BOLT, retainer, 3/4 in.-10, 3 in., hex. hd.
5	62	499A232P13	8	8	8	\$BOLT, retainer, 3/16 in. hole, 3 in. long
		*N203P35B	8	-	8	NUT, 3/4 in.-10, hex.
		4768073P6	-	8	-	NUT, hex., sl.
		N405P48	8	-	8	WASHER, lock, 3/4 in.

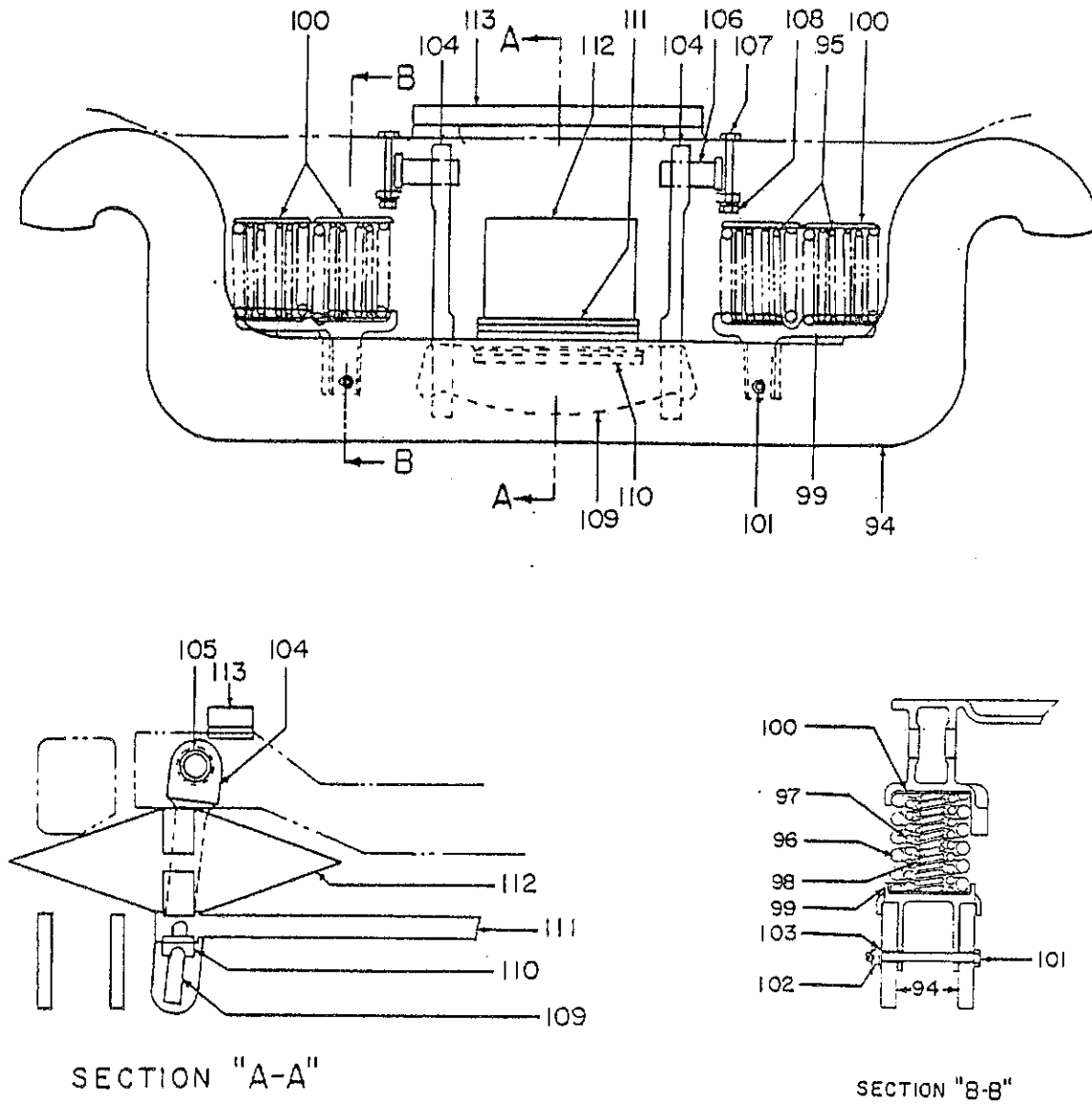
SLACK ADJUSTER EQUIPMENT

5	63	41D711156G6	-	4	-	ADJUSTER with rods, bushings, adjuster nut, crosshead and spring, slack (THREAD DESIGN)
5	63	41D710495G4	4	-	4	\$ADJUSTER with rods, bushings, adjuster nut, crosshead, spring and locking device, slack (THREAD DESIGN)
5	64	41D710495G5	4	-	4	RODS with bushings, brake
5	64	41D711156G5	-	4	-	RODS with bushings, brake
5	65	41B510329P31	16	24	16	BUSHING, 1 1/2 in. I.D., 1.865 in. O.D., 5/8 in. long
5	66	41A212643G1	4	-	4	NUT, adjuster
5	66	41B510930P1	-	4	-	NUT, adjuster
5	67	41C610612G1	4	-	4	CROSSHEAD with bushings, brake rod
5	67	41D711156G7	-	4	-	CROSSHEAD with bushings, brake rod
5	68	41B510329P2	16	8	16	BUSHING, 1 1/8 in. I.D., 1.490 in. O.D., 3/4 in. long
5	69	N5700P41	4	4	4	PLUG, pipe, 3/8 in., sq. hd.

*Added or changed since last issue.

\$Several designs furnished.

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(Representative Illustration)
FIG. 6

SPRING AND SWING HANGER RIGGING (Cont'd.)

Fig. No.	Ref. No.	Part No.	Quantity Required Column			DESCRIPTION
			A	B	C	
6	98	41A211892P3	8	8	8	SPRING, inner coil
1,6	99	41A211359P1	4	4	4	SEAT, spring (USE WITH GENERAL ELECTRIC DESIGN TRUCK)
1,6	99	41B510612P1	Δ	-	Δ	SEAT, spring (USE WITH GENERAL ELECTRIC REBUILD TRUCK)
6	100	9962052P1	16	16	16	PLATE, wearing, spring seat
		1X7156	4	4	4	BOLT with locknut, spring seat
6	101	N22P39188	4	4	4	BOLT, 1 in.-8, 11 3/4 in., hex. hd.
		499A906ABP8	4	4	4	NUT, self-locking, 1 in.-8, hex. (ELASTIC STOP NUT CORP., PART NO. 49NU168)
6	102	N216P39	4	4	4	NUT, 1 in.-8, hex., sl.
6	103	N402P50	4	4	4	WASHER, plain, 1 in.
		N503P2232B	4	4	4	PIN, cotter, 1/4 in. by 2 in.
6	104	8836250G1	4	4	4	HANGER with bushings, spring
6	105	3861675P23	4	4	4	BUSHING, 2 3/4 in. I.D., 3.250 in. O.D., 2 1/8 in. long
6	106	8861220P1	4	4	4	PIN, swing hanger, 6 1/8 in. long
6	107	6729550P63	4	4	4	BOLT, pin locking, 9 1/4 in. long
6	108	499A906ABP5	4	4	4	NUT, self-locking, 5/8 in.-11 (ELASTIC STOP NUT CORP., PART NO. 49NU101)
		N402P47P	4	4	4	WASHER, plain, 5/8 in.
6	109	3358669P1	2	2	2	GIB, swing hanger
6	110	8861219P2	2	2	2	SEAT, spring plank
		41A201716P6	-	2	-	SHIM, spring seat, 5/16 in. thick
6	111	1X2608	1	1	1	PLANK with stops, spring
6	112	41B510769G1	2	2	2	@SPRING, elliptic (6 LEAF SPRING SECTIONS)
		41B510769P1	12	12	12	SPRING SECTION, upper or lower
		41B510769P3	4	4	4	BLOCK, end
6	113	485A230P1	2	2	2	STRAP, safety
		4768365P7	8	8	8	STUD, safety strap
		N258P39	8	8	8	NUT, 1 in.-8, hex.
		N405P50P	8	8	8	WASHER, lock, 1 in.
JOURNAL BEARING PARTS						
1	9	-----	4	4	4	BEARING with housing and accessories, journal (SEE INDEX)
SAND PIPE ARRANGEMENT						
		-----	1	1	1	SAND PIPE ARRANGEMENT (SEE INDEX — TRUCK EQUIPMENT ARRANGEMENT)
WHEELS AND AXLE						
1	115	-----	2	2	2	WHEELS, AXLE AND GEAR (SEE INDEX)

ΔAs required.

@Elliptic spring, Part 3358656G1 using 7 leaf spring sections, will no longer be furnished.

It has been replaced by elliptic spring with 6 leaf spring sections Part 41B510769G1.

The spring sections are not interchangeable.

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