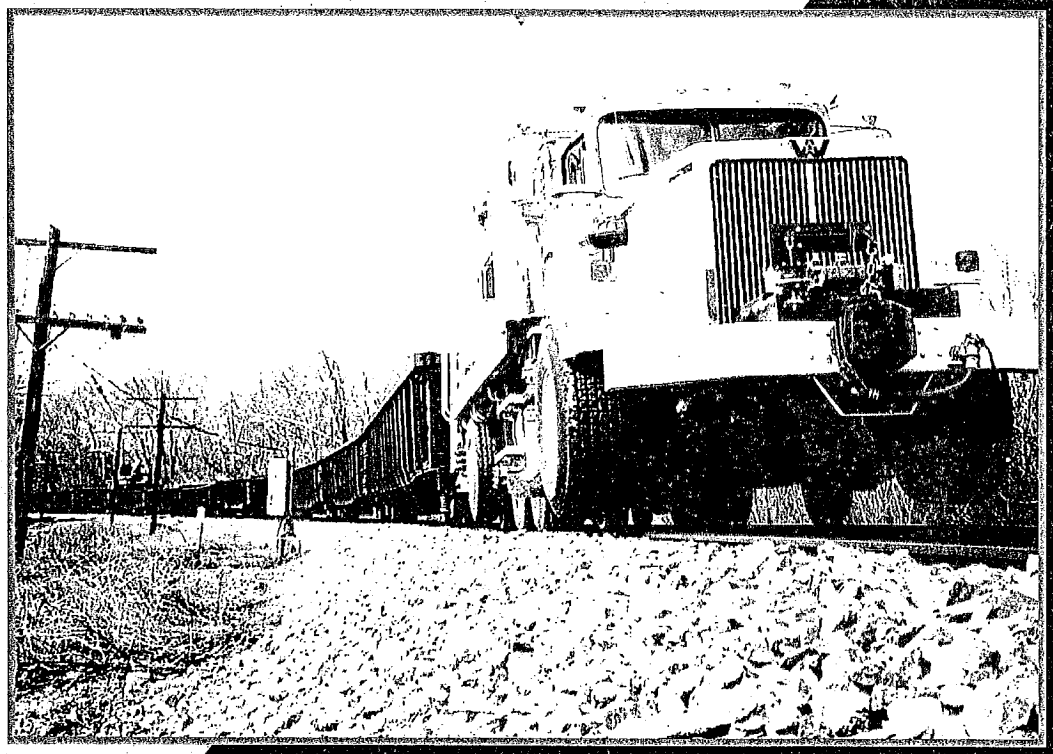
Brandt

ROAD RAIL CORP.



Operators Manual

26 C BRAKE

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LIMITED WARRANTY

BRANDT ROAD RAIL CORPORATION warrants to the buyer that the new machinery is free from defects in material and workmanship.

This warranty is only effective as to any new machinery which has not been altered, changed, repaired or treated since its delivery to the buyer, other than by BRANDT ROAD RAIL CORPORATION or its authorized dealers or employees, and does not apply to accessories, attachments, tools or parts, sold or operated with the new machinery, if they have not been manufactured by BRANDT ROAD RAIL CORPORATION.

BRANDT ROAD RAIL CORPORATION shall only be liable for defects in the materials or workmanship attributable to faulty material or bad workmanship that can be proved by the buyer, and specifically excludes liability for repairs arising as a result of normal wear and tear of the new machinery or in any other manner whatsoever, and without limiting the generality of the foregoing, excludes application or installation of parts not completed in accordance with BRANDT ROAD RAIL CORPORATION Operator's Manual, specifications, or printed instructions.

Written notice shall be given by registered mail, to BRANDT ROAD RAIL CORPORATION within seven (7) days after the defect shall have become apparent or the repairs shall have become necessary, addressed as follows: BRANDT ROAD RAIL CORPORATION,
P.O. Box 1876, 302 Mill Street, Regina, Saskatchewan, Canada, S4P 3E2.

This warranty shall expire one (1) year after the date of delivery of the new machinery.

If these conditions are fulfilled, BRANDT ROAD RAIL CORPORATION shall at its own cost and at its own option either repair or replace any defective parts provided that the buyer shall be responsible for all expenses incurred as a result of repairs, labour, parts, transportation or any other work, unless BRANDT ROAD RAIL CORPORATION has authorized such expenses in advance.

The warranty shall not extend to any repairs, changes, alterations, or replacements made to the new equipment other than by BRANDT ROAD RAIL CORPORATION or its authorized dealers or employees.

This warranty extends only to the original owner of the new equipment.

Other warranty is limited to the terms stated herein and is in lieu of any other warranties whether express or implied, and without limiting the generality of the foregoing, excluded all warranties, express or implied or conditions whether statutory or otherwise as to quality and fitness for any purpose of the new equipment. BRANDT ROAD RAIL CORPORATION disclaims all liability for incidental or consequential damages.

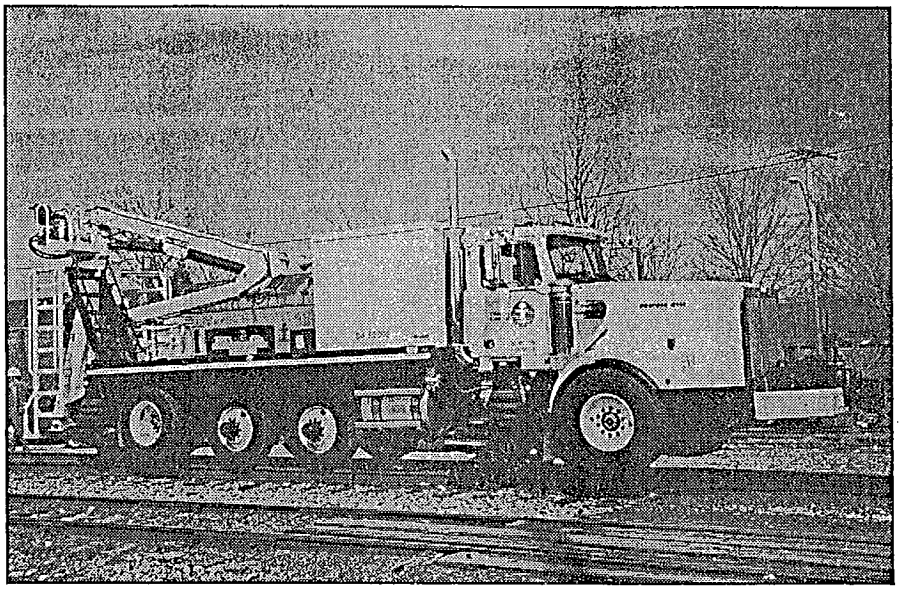
This Brandt Road Rail Power Unit is subject to design changes and BRANDT ROAD RAIL CORPORATION shall not be required to retro-fit or exchange items on previously sold units except at its own option.

BRANDT ROAD RAIL CORPORATION

1.1 INTRODUCTION

Congratulations on your purchase of a Brandt Road Rail Power Unit to complement your rail operation. This equipment has been designed and manufactured to fulfill the customers requirements for function, efficiency, convenience, flexibility and durability.

Safe, efficient and trouble-free operation of your Road Rail Power Unit requires that anyone who will be operating or maintaining the Power Unit read and understand the information contained within this manual.



Use this manual in conjunction with the manual provided with the Western Star Truck.

This manual covers all additional systems of the Power Unit plus the most common options. Although there may be some variations between units, the function, operation and maintenance information will be common.

Use the Table of Contents and Index as a guide in searching for specific information. Keep the manual handy for frequent reference and pass on to new operators. Call the factory if you need assistance, information or additional copies of the manual.

Machine Orientation: The directions left, right, front and rear as mentioned throughout the manual are as seen from the driver's seat and facing in the direction of road transport.

1.2 SERIAL NUMBERS

All components and systems on your vehicle are referenced to Western Star Truck vehicle serial number listed with the label on the upper driver's door frame of the vehicle. Refer to the truck manual for more information. For your convenience it is recommended that the serial numbers for all conversion components be noted and listed here for easy reference. Always provide the serial numbers for each component before requesting service or operating information on the machine.

SERIAL NUMBERS

Engine _____

Transmission _____

Reversing Transmission _____

Axles _____

Air Compressor _____

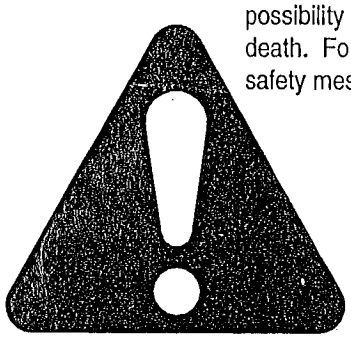
Crane _____

1.3 SAFETY

1.3.1 SAFETY ALERT SYMBOL

This Safety Alert symbol means
ATTENTION! BECOME ALERT!
YOUR SAFETY IS INVOLVED!

The Safety Alert symbol identifies important safety messages on the Brandt Industries Road Rail Power Unit and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.



Why is SAFETY important to you?

3 Big Reasons

Accidents Disable and Kill
Accidents Cost
Accidents Can Be Avoided

SIGNAL WORDS:

Note the use of the signal words **DANGER, WARNING and CAUTION** with the safety messages. The appropriate signal word for each message has been selected using the following guidelines.

DANGER - An immediate and specific hazard which WILL result in severe personal injury or death if the proper precautions are not taken.

WARNING- A specific hazard or unsafe practice which COULD result in severe personal injury or death if proper precautions are not taken.

CAUTION - Unsafe practices which COULD result in personal injury if proper practices are not taken, or as a reminder of good safety practices.

1.3 SAFETY (cont'd)

1.3.2 Operator Responsibility

YOU are responsible for the **SAFE** operation and maintenance of your Brandt Industries Road Rail Power Unit. **YOU** must ensure that you and anyone else who is going to operate, maintain or work around the Power Unit be familiar with the operating and maintenance procedures and related **SAFETY** information contained in this manual. This manual will take you step-by-step through your working day and alerts you to all good safety practices that should be adhered to while operating the Power Unit.

Remember, **YOU** are the key to safety. Good safety practices not only protect you but also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** operating this equipment and maintenance procedures and follows all the safety precautions. Most accidents can be prevented. Do not risk injury or death by ignoring good safety practices.

- All operators must be given operating instructions before operating the Power Unit. Review the training at least annually thereafter. A person who has not been trained, has neither read nor understood all operating and safety instructions is not qualified to operate the machine. An untrained operator exposes himself and others to possible serious injury or death.

- The most important safety device on this equipment is a SAFE operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the manual and to follow these. All accidents can be avoided.

- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety and could affect the life of the equipment.

- Think **SAFETY!** Work **SAFELY!**

1.3.3 General Safety

1. Read and understand the Operator's Manual and all safety signs before operating, maintaining or adjusting the Power Unit.

2. Only trained competent persons shall operate the Power Unit. An untrained operator is not qualified to operate the machine.

3. Have a first-aid kit available for use should the need arise and know how to use it.

4. Have a fire extinguisher available for use should the need arise and know how to use it.

5. Do not allow riders on the machine deck.

6. Wear appropriate protective gear. This list includes but is not limited to:

   - A hard hat
   - Protective shoes with slip resistant soles.

7. Place all controls in neutral, set parking brake, stop engine, remove ignition key and wait for all moving parts to stop before servicing, adjusting or repairing.

8. Review safety related items with all personnel annually.

1.3 SAFETY (cont'd)

1.3.4 Operating Safety

1. Read and understand all Operator's Manuals and safety signs before operating, maintaining, adjusting or servicing the Road Rail Power Unit.
2. Go through the pre-operation checklist before operating the Power Unit. Be sure the unit is in good operating condition before starting.
3. Know where all personnel are located before starting the Power Unit.
4. Be sure that all lights and reflectors are clean and in good working order.
5. Set park brake before leaving cab.
6. Do not exceed 100 kph/60 mph in the road transport mode.
7. Lock coupler and attach air line before moving load.
8. Do not allow riders on the deck when the Power Unit is moving.
9. Do not exceed 90 psi in the tires.

1.3.5 Transportation Safety

1. Only those with a commercial truck driver's license and with air brake certification are qualified to operate the Road Rail Power Unit on the road.
2. Do not exceed 100 kph/60 mph in the road transport mode.
3. Lock coupler and attach air line before moving load.
4. Do not allow riders on the deck when the Power Unit is moving.

1.3 SAFETY (cont'd)

1.3.6 MAINTENANCE SAFETY

1. Follow ALL the operating, maintenance and safety information in the manual.

2. Place all controls in neutral, set parking brake, stop engine, remove ignition key and wait for all moving parts to stop before servicing, adjusting or repairing.

3. Follow good shop practices. Keep service area clean and dry. Be sure electrical outlets and tools are properly grounded. Use adequate light for the job at hand.

- Keep service area clean and dry.
- Be sure electrical outlets and tools are properly grounded.
- Use adequate light for the job at hand.

4. Use only tools, jacks, and hoists of sufficient capacity for the job.

5. Make sure all guards and doors are in place and properly secured when maintenance work is completed.

6. Never wear ill-fitting, baggy or frayed clothing when working around or on any of the drive system components.

7. Before applying pressure to a hydraulic system, make sure all lines, fittings and couplers are tight and in good condition.

8. Relive pressure from hydraulic circuit before servicing, disconnecting or repairing system.

9. Clear the area of bystanders, when carrying out any maintenance and repairs or making any adjustments.

1.3.7 HYDRAULIC SAFETY

1. Replace any worn, cut, abraded, flattened or crimped hoses and metal lines.

2. Relieve pressure before working on the hydraulic system.

3. Do not attempt any makeshift repairs to the hydraulic lines, fittings, or hoses by using tape, clamps or cements. The hydraulic system operates under extremely high-pressure. Such repairs will fail suddenly and create a hazardous and unsafe condition.

4. Wear proper hand and eye protection when searching for a high-pressure hydraulic leak. Use a piece of wood or cardboard as a backstop instead of hands to isolate and identify a leak.

5. If injured by a concentrated high-pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection or toxic reaction can develop from hydraulic fluid piercing the skin surface.

6. Before applying pressure to the system, make sure all components are tight and that lines, hoses and couplings are not damaged.

1.3.8 TIRE SAFETY

1. Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion which may result in serious injury or death.

2. Do not attempt to mount a tire unless you have the proper equipment and experience to do the job.

3. Have a qualified tire dealer or repair service perform required tire maintenance.

1.3 SAFETY (cont'd)

1.3.6 STORAGE SAFETY

1. Store unit in an area away from human activity.
2. Do not permit children to play on or around the stored Power Unit.

1.3.10 REFUELING SAFETY

1. Handle fuel with care. It is highly flammable.
2. Shut off engine before refueling. Clean up spilled fuel before restarting engine.
3. Do not refuel the machine while smoking or when near open flame or sparks.
4. Fill fuel tank outdoors.
5. Prevent fires by keeping machine clean of accumulated trash, grease and debris.

1.3.11 BATTERY SAFETY

1. Keep all sparks and flames away from batteries as gas given off by electrolyte is explosive.
2. Avoid contact with battery electrolyte: wash off any spilled electrolyte immediately.
3. Wear safety glasses when working near batteries.
4. Do not tip batteries more than 45 degrees, to avoid electrolyte loss.
5. To avoid injury from spark or short circuit, disconnect battery ground cable before servicing any part of electrical system.

1.3.7 SAFETY DECALS

1. Keep safety decals and signs clean and legible at all times.
2. Replace safety decals and signs that are missing or have become illegible.
3. Replaced parts that displayed a safety should also display the current sign.
4. Safety decals or signs are available from our Parts Department.

How to Install Safety Decals:

- Be sure that the installation area is clean and dry.
- Decide on the exact position before you remove the backing paper.
- Remove the smallest portion of the split backing paper.
- Align the decal over the specified area and carefully press the small portion with the exposed sticky backing in place.
- Slowly peel back the remaining paper and carefully smooth the remaining portion of the decal in place.
- Small air pockets can be pierced with a pin and smoothed out using the piece of decal backing paper.

1.3 SAFETY (cont'd)

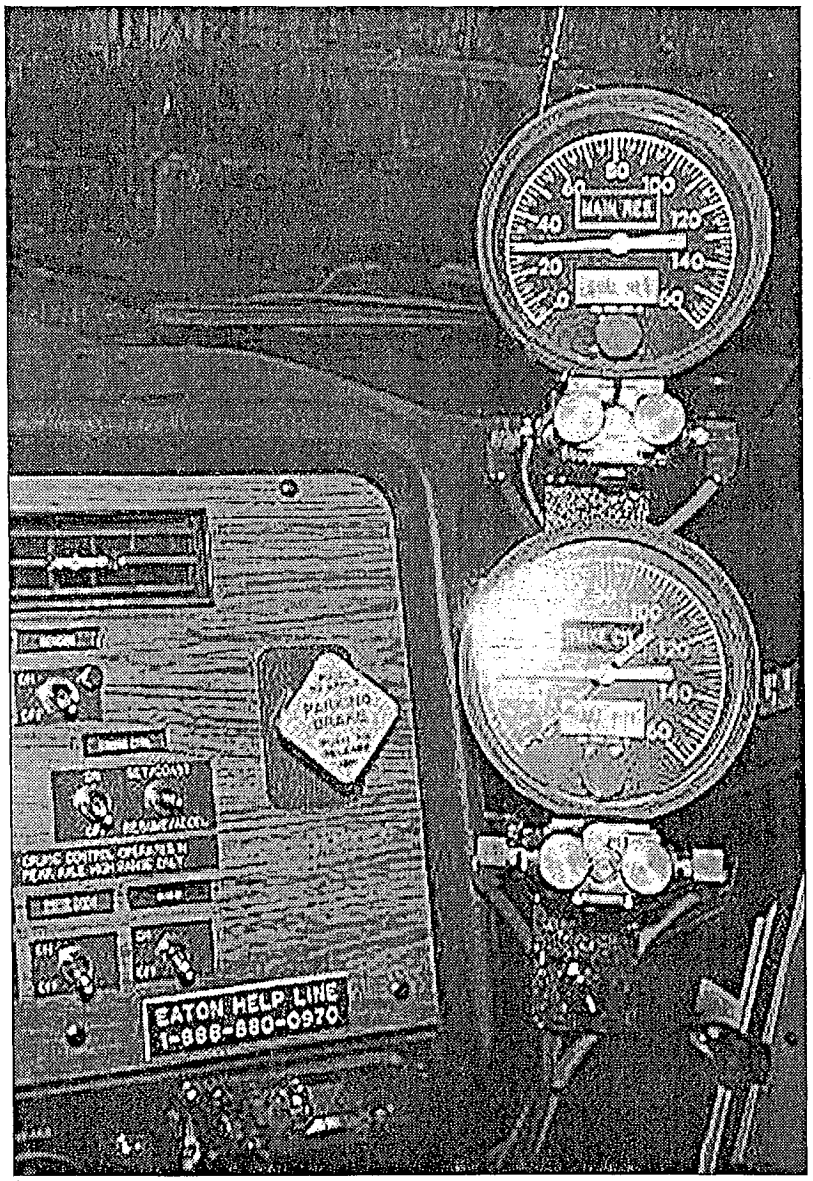
1.3.13 SAFETY DECAL LOCATIONS

The types of decals and locations on the equipment are shown in the illustration below. Good safety requires that you familiarize yourself with the various Safety Decals, the type of warning and the area, or particular function related to that area, that requires your **SAFETY AWARENESS.**

* Think SAFETY! Work SAFELY!

A

WARNING
BEFORE SHIFTING TO
(FORWARD OR REVERSE)
1. STOP THE VEHICLE
2. SHIFT TO NEUTRAL
3. APPLY PARKBRAKE
DAMAGE MAY OCCUR IF PROCEDURE IS NOT FOLLOWED



B

CAUTION HIGHWAY SPEED NOT TO EXCEED 100 KPH

REMEMBER - If Safety Decals have been damaged, removed, become illegible or parts replaced without decals, new decals must be applied.

1.3 SAFETY (cont'd)

1.3.14 Sign-Off Form

Anyone who will be operating and/or maintaining the Power Unit must read and clearly understand ALL Safety, Operating and Maintenance information presented in this manual. Do not operate or allow anyone else to operate this equipment until such information has been reviewed. Annually review this information as part of your safety program.

Make these periodic reviews of SAFETY and OPERATION a standard practice for all of your equipment. We feel that an untrained operator is unqualified to operate this machine.

A sign-off sheet is provided for your record keeping to show that all personnel who will be working with the equipment have read and understand the information in the Operator's Manual and have been instructed in the operation of the equipment. Make a copy of this page to continue the record.

SIGN-OFF FORM

DATE	EMPLOYEES SIGNATURE	SUPERVISORS SIGNATURE

1.4 SPECIFICATIONS

1.4.1 MECHANICAL

Cab & Chassis
Western Star
Model #4964 S
Full instrument Gauge package
Air Ride Cab

ENGINE
Cat 3406C HP @ 2000 ATAAC
1450 lb. ft. @ 1250 RPM
or Cat 3406E 475 HP
1650 lb. ft. @ 1400 RPM

TRANSMISSION
RTO-14109 BAT Fuller-Eaton
Ceemat/Cooler or
RTO-16109 BAT Fuller-Eaton

DIFFERENTIAL
46,000 lb Rear Axles - 2 speed
4.56/6.20 Rear Axle ratio

SUSPENSION
Neway Air Ride
ARDSTM/L-246-6

FRAME
3/8"x11 1/2" DC Steel Rails
(R.B.M. 4,478,000 inch lb.)

COMPRESSOR & EQUIPMENT
30 CFM Engine driven
130 gallon or 21 ft³ Primary Reservoir
Supplementary Reservoir for Rail
Brake System

BRAKES
Two separate braking systems
Road - D.O.T. approved truck brakes

Brakes (cont'd)
26c Railbrake with Direct Release
Automatic Train Control and Load
Proportional
Independent Operation

HYDRAULIC SYSTEM
Pump Selection
Depends on
Aux. Hyd. Equipment chosen

DIMENSIONS
Length 1061.72 cm/418" over pulling faces
of couplers
Width 259.08 cm/102"
Height 396 cm/156"

ROAD/RAIL CONVERSION TIME
2-3 minutes

TRACTIVE EFFORT (Draw Bar Pull)
30,000 lbs.
Higher drawbar pull available with
weight transfer

OPTIONAL EQUIPMENT
Crane (CORMACH 13500E-8 ton
shown)
Sanders
Bell
Locomotive Headlights
Work Lites
Auxiliary Compressor.

Warranty
Standard Western Star Warranty
on truck and components. (150
Service Centres in North
America).
One year on Brandt Road Rail
components.

ROAD TIRES
Front 445/65R22.5
Rear 12R22.5

RAIL WHEELS
CB-28 with AAR Profile
AAR 6" x 11" AP Roller Bearings
Axle AAR - Class E

RAIL GAUGE
1435 mm (56.5")

COUPLERS
Sharon 10-A contour with vertical
pin front and rear
Air activated-optional

WARNING EQUIPMENT
Approved 3 Note Locomotive
Horn
Rotating Beacons
Back-up Alarm

WEIGHT
24,000 kgs/52,000 lbs.

FUEL CAPACITY
155 U.S. gallons

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

1.4 SPECIFICATIONS (cont'd)

1.4.2 TORQUE SPECIFICATIONS

CHECKING BOLT TORQUE

The tables shown below give correct torque values for various bolts and capscrews. Tighten all bolts to the torques specified in chart unless otherwise noted. Check tightness of bolts periodically, using bolt torque chart as a guide. Replace hardware with the same strength bolt.

ENGLISH TORQUE SPECIFICATIONS

Bolt Diameter "A"	Bolt Torque * SAE 2 N.m	(lb-ft)	SAE 5 N.m	(lb-ft)	SAE 8 N.m	(lb-ft)
1/4"	8	(6)	12	(9)	17	(12)
5/16"	13	(10)	25	(19)	36	(27)
3/8"	27	(20)	45	(33)	63	(45)
7/16"	41	(30)	72	(53)	100	(75)
1/2"	61	(45)	110	(80)	155	(115)
9/16"	95	(70)	155	(115)	220	(165)
5/8"	128	(95)	215	(160)	305	(220)
3/4"	225	(165)	390	(290)	540	(400)
7/8"	230	(170)	570	(420)	880	(650)
1"	345	(225)	850	(630)	1320	(970)

METRIC TORQUE SPECIFICATIONS

Bolt Diameter "A"	Bolt Torque 8.8 N.m	(lb-ft)	10.9 N.m	(lb-ft)
M3	.5	(.4)	1.8	(1.3)
M4	3	(2.2)	4.5	(3.3)
M5	6	(4)	9	(7)
M6	10	(7)	15	(11)
M8	25	(18)	35	(26)
M10	50	(37)	70	(52)
M12	90	(66)	125	(92)
M14	140	(103)	200	(148)
M16	225	(166)	310	(229)
M20	435	(321)	610	(450)
M24	750	(553)	1050	(774)
M30	1495	(1103)	2100	(1550)
M36	2600	(1917)	3675	(2710)

Torque figures indicated above are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or capscrews unless otherwise specified in this manual. When using locking elements, increase torque values by 5%.

* Torque value for bolts and capscrews are identified by their markings.

1.4 SPECIFICATIONS (cont'd)

1.4.2 TORQUE SPECIFICATIONS (cont'd)

TIGHTENING HYDRAULIC O-RING FITTINGS *

1. Inspect O-ring and seal for dirt or obvious defects.
2. On angle fittings, back the lock nut off until washer bottoms our at top of grove.
3. Hand tighten fitting until back-up washer or washer face (if straight fitting) bottoms on face and O-ring is seated.
4. Position angle fitting by unscrewing no more than one turn.
5. Tighten straight fittings to torque shown.
6. Tighten angle fittings to torque shown while holding body of fitting with a wrench.

* The torque values shown are based on lubricated connections as in reassembly.

Tube Size	Nut Size Across Flats	Torque Value*		Recommended Turns to Tighten (After Finger Tightening)	
(in.)	(in.)	(N.m)	(lb-ft)	(Flats)	(Turns)
3/8	1/2	8	6	2	1/3
7/16	9/16	12	9	2	1/3
1/2	5/8	16	12	2	1/3
9/16	11/16	24	18	2	1/3
3/4	7/8	46	34	2	1/3
7/8	1	62	46	1-1/2	1/4
1-1/16	1-1/4	102	75	1	1/6
1-3/16	1-3/8	122	90	1	1/6
1-5/16	1-1/2	142	105	3/4	1/8
1-5/8	1-7/8	190	140	3/4	1/8
1-7/8	2-1/8	217	160	1/2	1/12

TIGHTENING HYDRAULIC FLARE-TYPE TUBE FITTINGS*

1. Check flare and flare seat for defects that might cause leakage.
2. Align tube with fitting before tightening.
3. Lubricate connection and hand tighten swivel nut until snug.
4. To prevent twisting the tube(s), use two wrenches. Place one wrench on the connector body and with the second tighten the swivel nut to the torque shown.

* The torque values shown are based on lubricated connections as in reassembly.

Tube Size OD	Nut Size Across Flats	Torque Value*		Recommended Turns to Tighten (After Finger Tightening)	
(in.)	(in.)	(N.m)	(lb-ft)	(Flats)	(Turns)
3/16	7/16	8	6	1	1/6
1/4	9/16	12	9	1	1/6
5/16	5/8	16	12	1	1/6
3/8	11/16	24	18	1	1/6
1/2	7/8	46	34	1	1/6
5/8	1	62	46	1	1/6
3/4	1-1/4	102	75	3/4	1/8
7/8	1-3/8	122	90	3/4	1/8

General: Your Western Star Tractor is equipped with a full complement of gauges, dials, switches and controls for monitoring and operating the unit. Each truck control is covered and explained in detail in the Western Star Operator's Manual. Additional controls, gauges, switches and systems are added to the unit during the conversion to Power Unit. Use the truck manual in conjunction with this section to familiarize yourself with the location and function of all controls and auxiliary systems on the Power Unit. Review both manuals to familiarize yourself with all controls and systems before operating the unit.

2.1 IN -CAB CONTROLS

A. Left Dash:

1. Spare Switches:

A spare switch has been mounted into the right dash which the customer can use for any auxiliary or special application per their needs.

Fig. 1 RIGHT DASH

2.1 IN-CAB CONTROLS (cont'd)

B. RAIL BRAKES (Fig. 2):

This control and monitoring system is located between the dash and the console.

Fig. 2 BRAKE CONTROLS

1. Independent Brake:

The independent brake lever controls the rail brakes on the Power Unit only. Move the lever towards the passenger seat to apply brakes. Move the lever towards the the driver seat to release.

Watch the red pointer in the lower gauge to read the application pressure. Gradual brake applications can made between 0 psi and 85 psi. The higher the pressure reading the greater the braking force being applied.

When it is desired to release the brakes on the Power Unit while applying the brakes on the cars, ensure this lever is in the REL position.

2. Automatic Brake (Train Brake):

The automatic brake lever controls the brakes on the train only.

Move the lever towards the driver seat to apply the brakes. Move the lever towards the passenger seat to release.

NOTE

There are 6 positions on the Automatic Brake body.

a) "REL" - RELEASE

In this position the brakes are released The red pointer in the lower gauge should return to 0 psi. The white pointer in the lower gauge should return to the brake pipe pressure. The white pointer in the upper gauge should return to brake pipe pressure and the red pointer, Main RES, should return to system pressure.

NOTE

After returning the Automatic Brake Lever to REL, a pause is required to allow the train brakes to release. Attempting to drive before allowing the train brakes to fully release will result in premature tire wear.

b) "MIN" - MINIMUM

In this position the brakes are in minimum application and will apply a minimum of braking force. As the lever is moved towards FS the application pressure is increased. Watch the red pointer in the lower gauge to read the application pressure.

c) "FS" - FULL SERVICE

In this position the brakes are fully applied. The red pointer on the lower gauge should read approximately 35 psi.

2.1 IN-CAB CONTROLS (cont'd)

D) "SUPP" - SUPPRESSION

This position is used only after an emergency Brake application has been made. The lever must be moved to SUPP and kept in this position for 1 minute following an emergency brake application. This enables the system to re-set and recharge itself and to release the brakes. Before attempting to proceed in forward or reverse ensure that brake pipe pressure and Main Reservoir pressure have been re-established.

F) "EM" - EMERGENCY

In this position all brakes are fully applied by way of completely exhausting the air from the brake pipe. The lever must be left in "EM" position for 2 minutes before moving to "SUPP"

3. PRESSURE GAUGES (Fig. 3)

UPPER GAUGE - The red pointer in the upper gauge reads the air pressure in the MAIN RESERVOIR (MAIN RES) usually 125 psi. This is the system pressure which maintains all brake functions. The white pointer in the upper gauge reads the air pressure in the EQUALIZING RESERVOIR (EQUAL RES) usually 85 psi. All braking is achieved through controlling air pressure in the EQUALIZING RESERVOIR.

LOWER GAUGE - The red pointer in the lower gauge reads the air pressure in the BRAKE CYLINDERS (BRAKE CYL). Always at 0 psi unless brakes are applied. An increase in brake cylinder pressure causes an increased brake application. A decrease in brake cylinder pressure causes a reduction in brake application. The white pointer in the lower gauge reads the BRAKE PIPE (BRAKE PIPE) pressure usually 85 psi. The brake pipe is the air line which "feeds" air to the train brake system.Changes in brake pipe pressure cause the application and release of the train brake system.

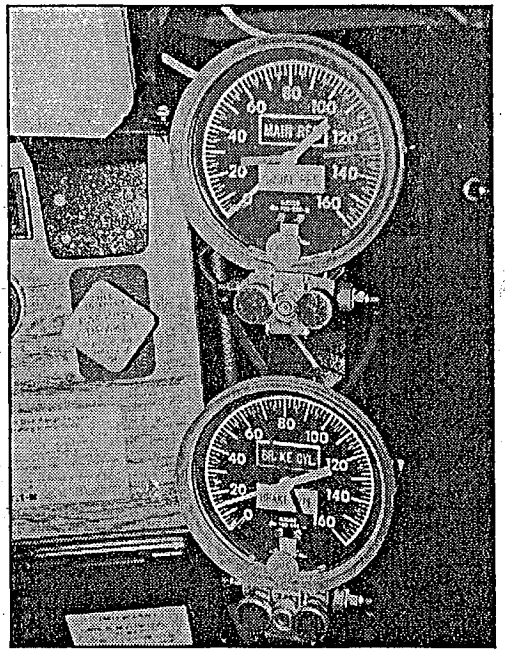


Fig. 3 BRAKE GAUGES

2.1 IN-CAB CONTROLS (cont'd)

C. RIGHT CONSOLE (Fig. 4):

1. REVERSING GEARBOX CONTROL:
   This lever is used to shift the reversing gearbox into its forward or reverse modes. It allows the Power Unit to travel the same speeds going forward or reverse. Refer to Section 3 - Operation for the shifting procedure.

2. TRACTIVE EFFORT CONTROL:
   This dial is used to control the air pressure in the rail axle airbags. Move the dial counter clockwise to decrease the air bag pressure and to transfer more weight to the drive axles. Move the dial clockwise to increase the air pressure and to reduce weight on the drive axles. Use the gauge (#3) to monitor the air bag pressure. Set 35 psi for normal operation in the rail configuration.

3. REAR RAIL AXLE AIRBAG PRESSURE:
   This gauge displays the air pressure in the rear rail bag axle air bag which is controlled automatically

4. DRIVE AXLE AIRBAG PRESSURE
   This gauge displays the air pressure in the drive axle airbags

5. SANDER CONTROL
   Move this toggle switch forward for front sanders and rearward for reverse sanders.

6. CAMERA LIGHT:
   This toggle switch controls the light that illuminates the area under the rail wheel cameras. Move the switch forward to turn ON and rearward to turn OFF.

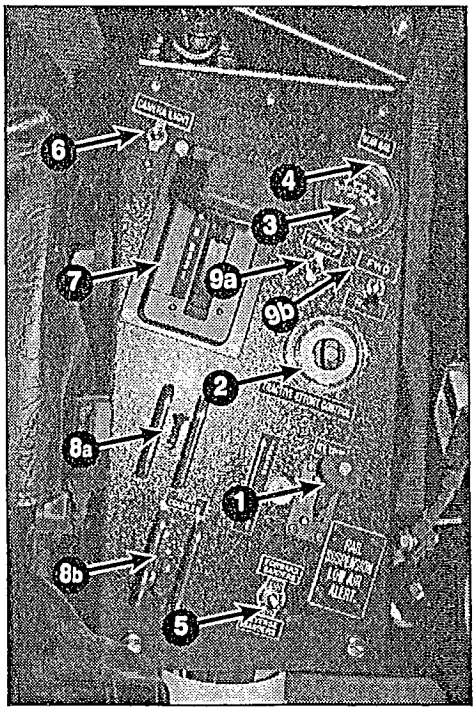


Fig. 4 RIGHT CONSOLE

7. TRANSMISSION SHIFT LEVER:
   This lever sets the operating mode for the automatic transmission. The operating modes are Reverse, Neutral, Drive, 3, 2, and 1. See Transmission Operators Manual for a full description of the CEEMAT Transmission.

8. COUPLER CONTROLS:
   These toggles control the position of the couplers on the front and the back of the Power Unit.

   a. FRONT COUPLER:
      Move the toggle switch rearward to open the coupler.

   b. REAR COUPLER:
      Move the toggle switch forward to open the coupler.

9. TRACDRY SYSTEM
   a. Turn the toggle switch to the on position to turn on the TracDry system

   b. The forward position for the TracDry direction toggle blows air in front of the tires. The reverse position blows air behind the tires.

2.1 IN-CAB CONTROLS (cont'd)

D. OTHER CONTROLS:

1. STEERING WHEEL LOCK (Fig. 5)
   The steering wheel lock is located on the right side of the steering column and is used to lock the steering during rail operation.

2. TRAIN AIR HORN:
   An additional train horn control is mounted in the cab. Operation of the horn is controlled by pulling the cable next to the drivers door.

3. VIDEO MONITOR (Fig 6)
   The video monitor is located on the dash and enables the operator to view the left rail wheels and the area behind the Power Unit. The operator can select the area to be viewed by pushing the buttons on the front of the monitor

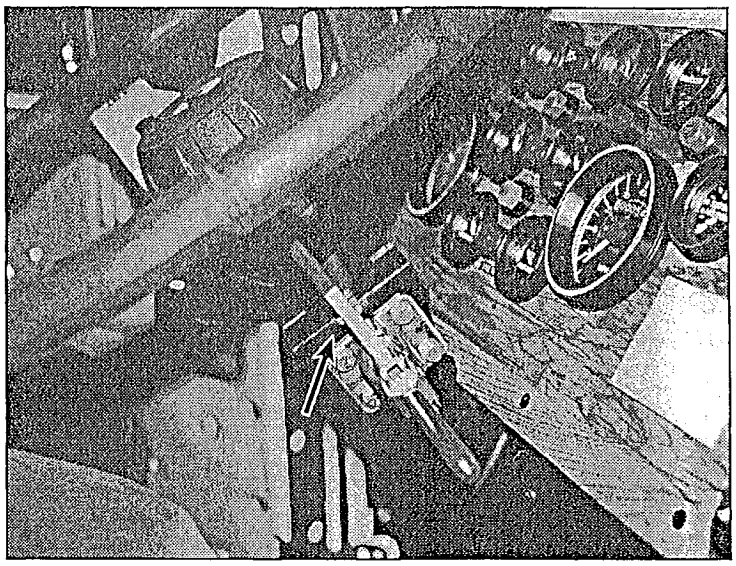


Fig. 5 STEERING WHEEL LOCK

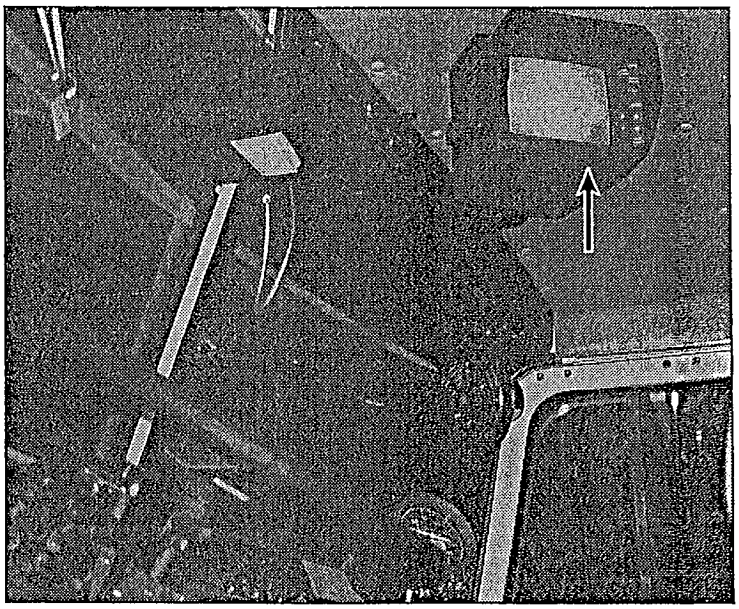


Fig. 6 VIDEO MONITOR

2.2 CONTROL PANEL

The control panel is situated at deck level on the driver's side. The Road to Rail (Rail to Road) conversion procedures are controlled from this panel. The proper sequence of these procedures are mounted on the cabinet door. Follow each of these steps closely.

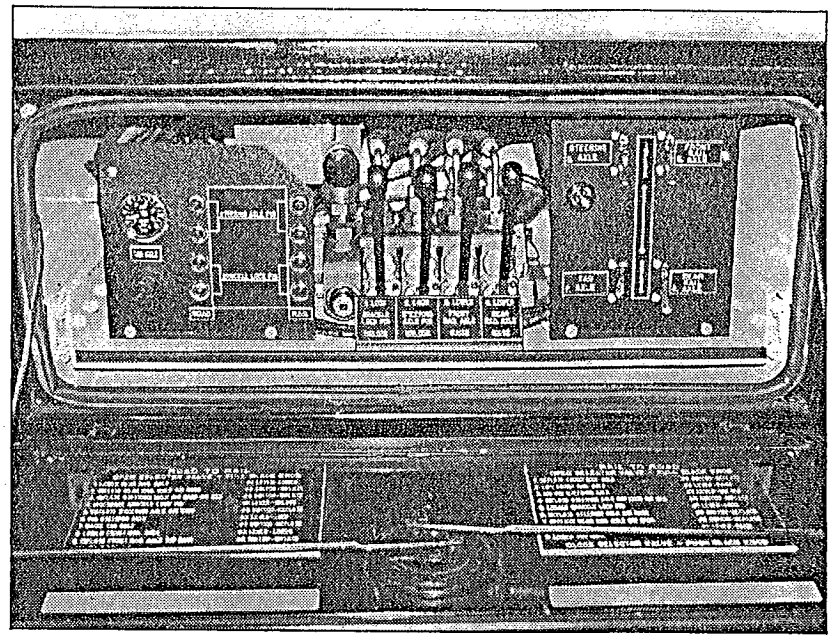


Fig 7. CONVERSION PANEL

2.2 CONTROL PANEL (cont'd)

A. Operating Conversion Controls:

All hydraulic levers and switches used in the conversion procedure have been numbered and defined on labels next to the control. ALWAYS FOLLOW THE PROCEDURE WHEN CONVERTING.

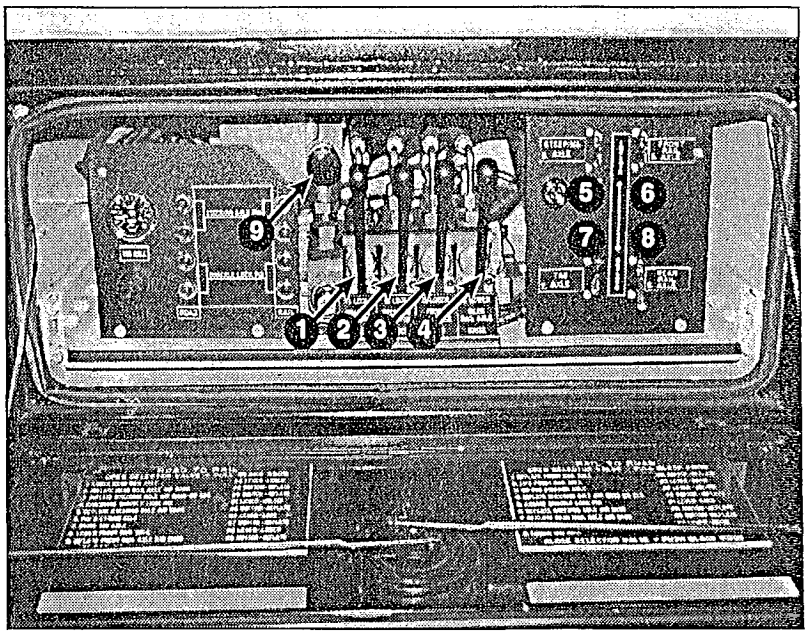


Fig. 8 CONTROLS

1. CONTROL LEVER #1:
   This lever controls the locking and unlocking of the shackle lock pin on the steering axle. Push on the lever to lock the shackle and pull to unlock. The illumination of the lights on the panel will indicate when the Shackle is locked or unlocked.

2. CONTROL LEVER #2:
   This lever controls the locking and unlocking of the steering axle pin. Push on the lever to lock the steering axle pin and pull to unlock. The illumination of the lights on the panel will indicate when the steering axle pin is locked or unlocked.

3. CONTROL LEVER #3:
   This lever controls the raising and lowering of the front rail axle. Push on the lever to lower the front rail axle and pull to raise. Visually check the position of the front rail axle while going through the conversion procedure to ensure that the wheels are properly positioned on the track.

4. CONTROL LEVER #4:
   This lever controls the raising and lowering of the rear rail axle. Push on the lever to lower the rear rail axle and pull to raise. Visually check the position of the rear rail axle while going through the conversion procedure to ensure that the wheels are properly positioned on the track.

5. SWITCH #5:
   This switch controls the inflation and deflation of the air bags on the steering axle. Move the switch up to inflate the air bag on the steering axle and down to deflate. These air bags are to be inflated only during the conversion process. They should be deflated when ever the conversion is complete. DO NOT DRIVE WITH THESE AIR BAGS INFLATED!

6. SWITCH #6:
   This switch controls the inflation and deflation of the air bags on the front rail axle. Move #6 the switch up to inflate the air bag on the front rail axle and down to deflate.

7. SWITCH #7
   This switch controls the inflation and deflation of the air bags on the tag axle. Move the switch up to inflate the air bag on the drive axle and down to deflate.

8. SWITCH #8
   This switch controls the inflation and deflation of the air bags on the rear rail axle. Move the switch up to inflate the air bags on the rear rail axle and down to deflate it.

9 SELECTOR VALVE - KNOB #9
   This valve controls the flow of oil to the bank of control valves. Pull the knob out to open the valve and supply oil to the valves. Push in to close the valve and stop the flow.

2.2 CONTROL PANEL (cont'd)

B. CONVERSION INDICATORS

Detailed conversion instructions and monitors are located inside the panel door. Follow the instructions and watch the indicators while going through the conversion process.

1. ROAD TO RAIL: This 9 step sequence of instructions tells how to convert the Power Unit from the road configuration into rail configuration.

2. RAIL TO ROAD: This 9 step sequence of instructions tells how to convert the Power Unit from the rail configuration into road configuration.

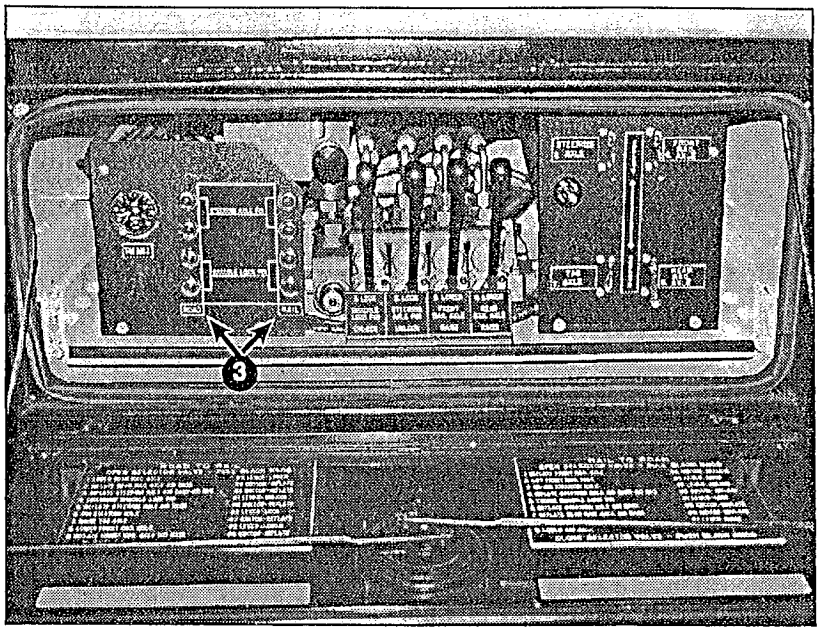


Fig. 9 CONTROL CABINET

3. LOCK PIN INDICATOR LIGHTS:

   a. STEERING AXLE PIN - ROAD: Both of these green lights must be illuminated when the steering axles are pinned in the road configuration.

   b. STEERING AXLE PIN - RAIL: Both of the red lights must be illuminated when the steering axles are pinned in the rail configuration.

   c. SHACKLE LOCK PIN - ROAD: Both of these green lights must be illuminated when the rear shackle lock pins are positioned for road transport.

   d. SHACKLE LOCK PIN - RAIL: Both of these red lights must be illuminated when the rear shackle lock pins are positioned for rail transport.

2.3 EQUIPMENT CABINET

1. TRAIN AIR SYSTEM:

The Equipment Cabinet houses a complex train brake system. The system consists of two main reservoirs, a number of smaller reservoirs, valves and relays. For a full description of the train brake system see the Brake Manual.

a. **AIR RESERVOIRS:**
The reservoirs for the train brake system are located in this cabinet.

b. **TANK DRAIN CABLES:**
Several tanks are equipped with drain valves. The valve is attached to a cable. Pull on the cable to drain the tank. This must be done daily.

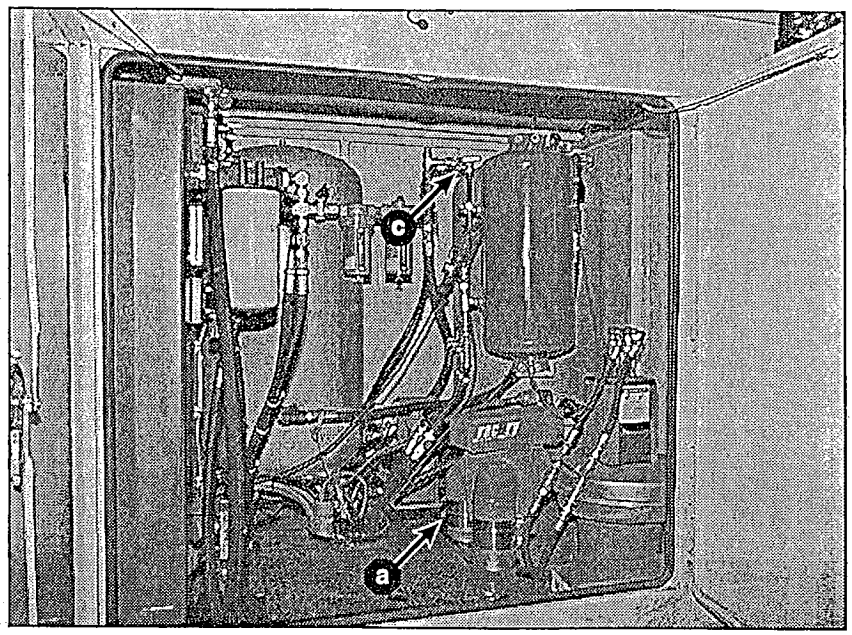


Fig. 10 RAIL BRAKE AIR SYSTEM

c. **WILKERSON FILTER (F300-08-F00): (PARTICULATE FILTER)**
Inspect and clean element twice annually.
(Replacement Element #FRP-95-209)

2.3 EQUIPMENT CABINET (cont'd)

2. HYDRAULIC SYSTEM:

a. OIL RESERVOIR:
A blue hydraulic reservoir is located in the equipment cabinet.

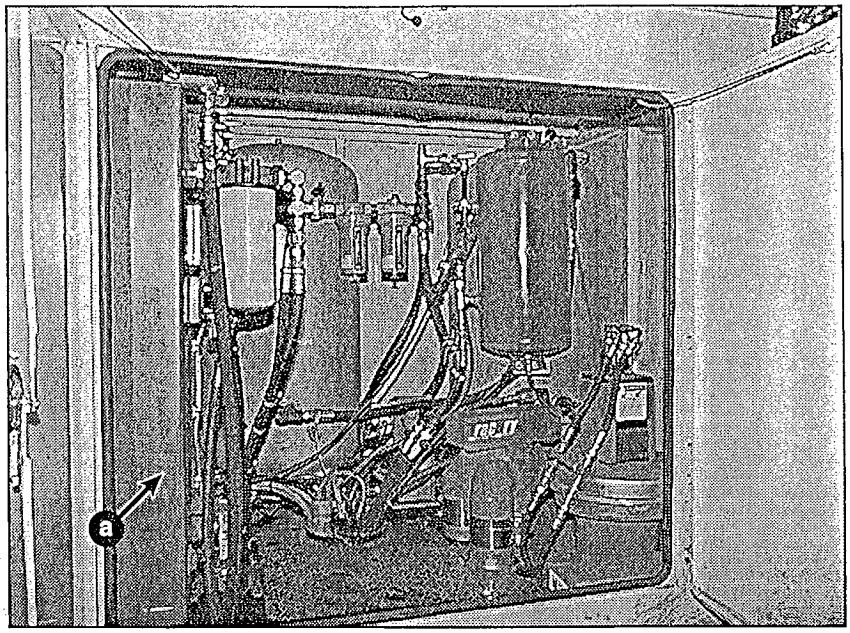


Fig. 11 HYDRAULIC SYSTEM OIL RESERVOIR

b. RETURN FILTER:
Vickers V0211B2R05
Element H0211C3KNB2V05
Fill Filter Element
Greasen #K22001

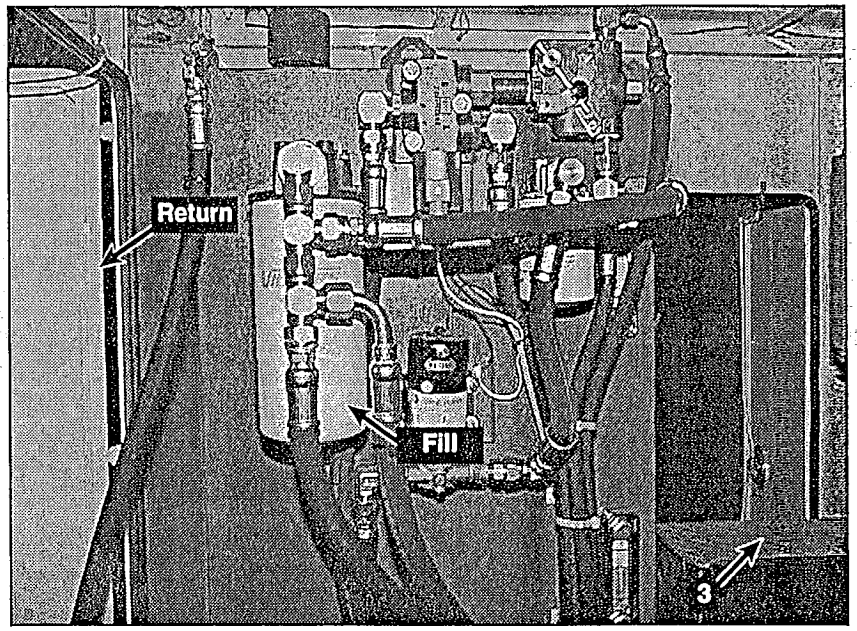


Fig. 12 HYDRAULIC OIL SYSTEM FILTERS

3. BATTERIES:

4 batteries are located in the battery box which is located in the equipment cabinet. The batteries are used to start the engine and provide electrical power to the Power Unit. These batteries are accessible through the equipment cabinet side door (not shown)

GENERAL: Use this section of the manual in conjunction with the Western Star truck manual for a detailed description of the Power Unit and how to operate it.

3.1 PRE-OPERATION CHECKLIST AND INSPECTION

It is the responsibility of the driver to go through this checklist and to inspect the Power Unit prior to starting and operating it. Refer to the Western Star manual for the detailed truck inspection procedures.

Be sure the Power Unit is located on the level with the parking brakes set or the tires blocked before starting the inspection.

1. ENGINE COMPARTMENT:

a. Unlatch, and flip open the hood.
b. Check all fluid levels: Coolant, engine oil, windshield washer reservoir and power steering.
c. Check that there are no fluid leaks. Correct any leaks before starting.
d. Check the condition of all hoses. Tighten any loose connections and replace any worn or damaged hoses.
e. Check the tension and condition of all belts. Re-tension as required and replace any damaged or worn hoses.
f. Check electrical system connections and condition of wires and fasteners.
g. Check mechanical integrity of steering system.
h. Perform regular service procedures as specified in Maintenance section.
I. Close and latch the hood.

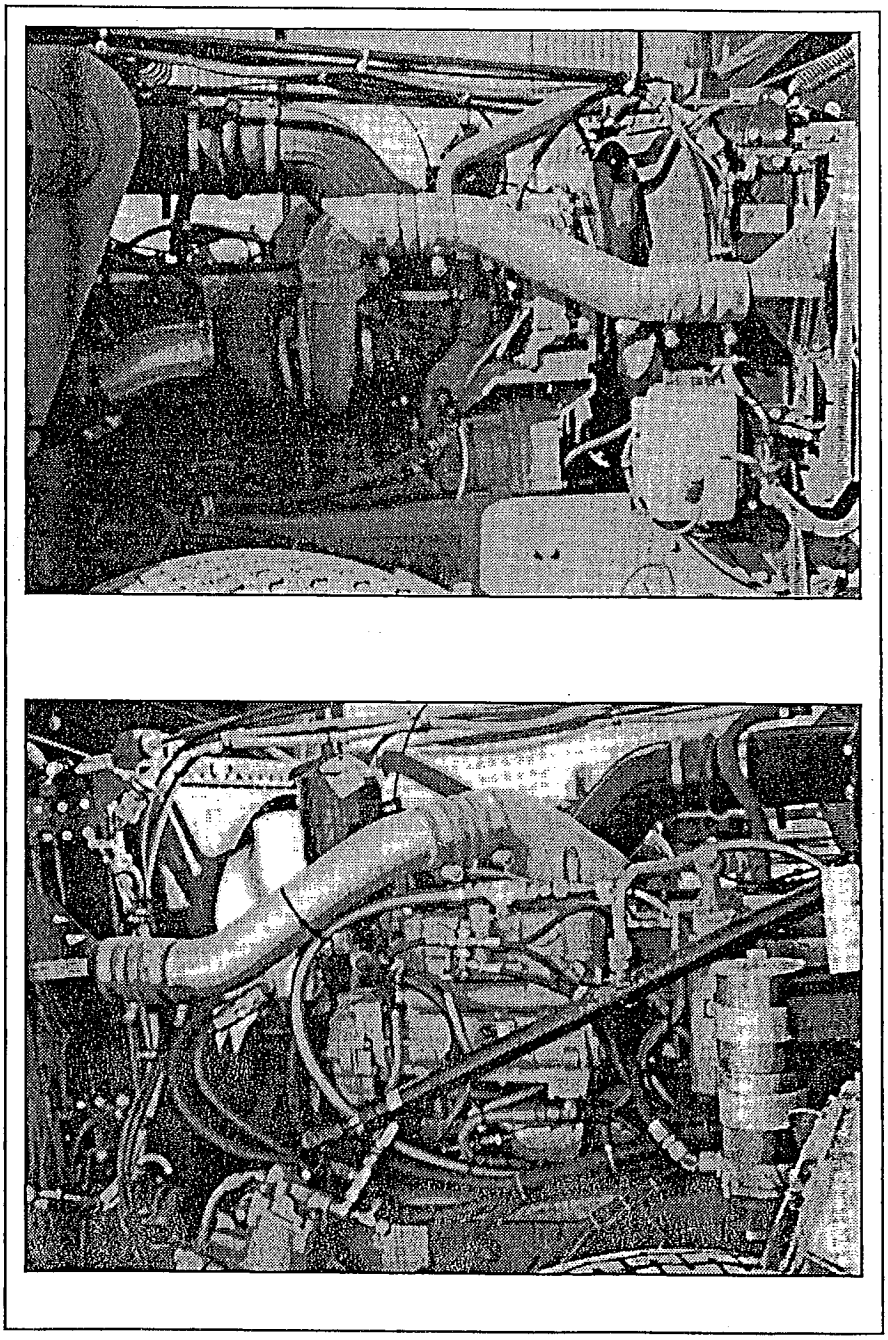


Fig 13. ENGINE COMPARTMENT

3.1 PRE-OPERATION CHECKLIST AND INSPECTION (cont'd)

2. DRIVING COMPARTMENT:

Start the engine, set park brake and perform the following checks:

a. Check that the low pressure warning indicators function during engine start-up and that they go off when operating conditions are reached.

b. Check that all gauges and indicators work.

c. Check that turn signals and hazard flashers work.

d. Shift the transmission into reverse and check that the back up alarm works.

e. Stop the engine and check for air leaks.

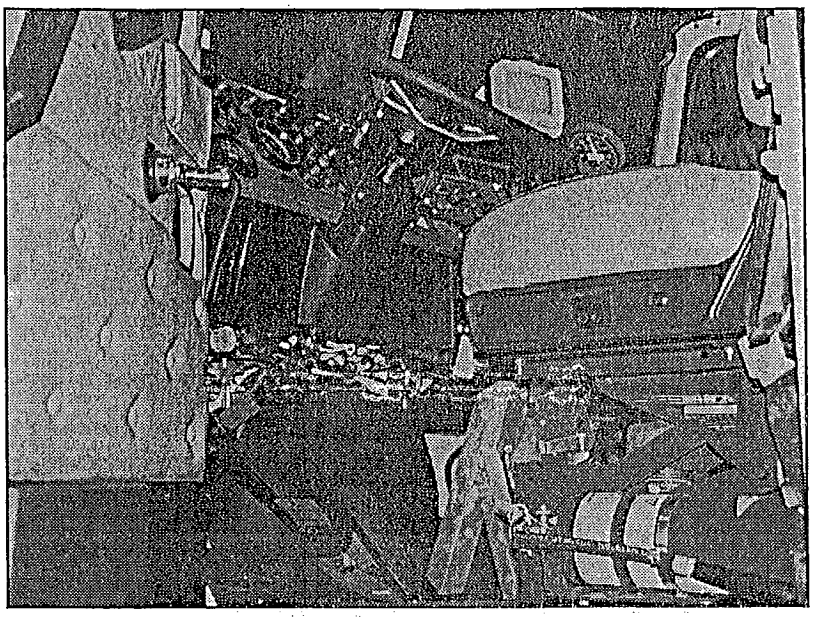


Fig 14. CAB

3.1 PRE-OPERATION CHECKLIST AND INSPECTION (cont'd)

3. OUTSIDE:

a Check that lamps, turn signals, marker lights and headlights (high and low beam) are working.

b. Check the tire pressure and wear.

IMPORTANT
Check the tire pressure when they are cold and maintain at 90 psi. They will provide optimum rail wrap and give the best traction and wear.

DO NOT EXCEED 90 psi

c. Check rims and torque lug bolts.

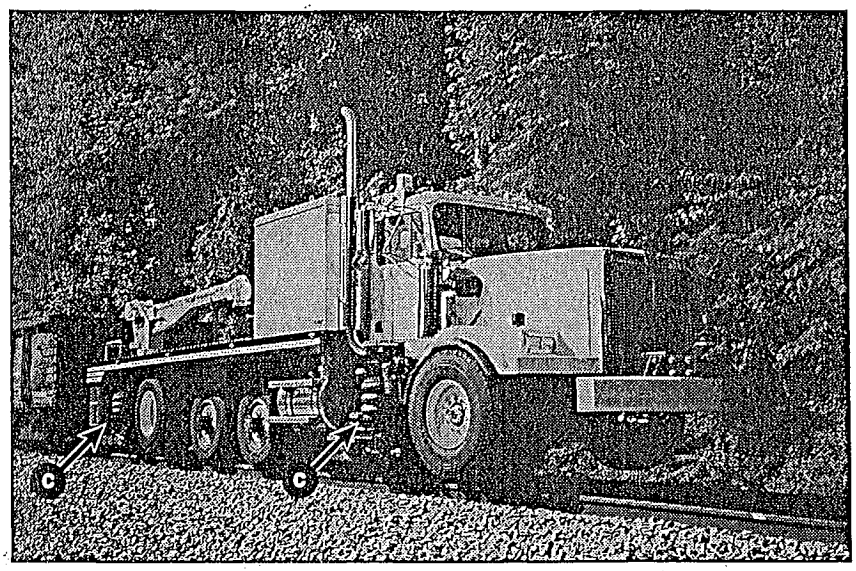
d. Check brake adjustment (slack adjusters).

e. Bleed air tanks daily.

f. Check condition of air bags.

g. Manually check the function of the front and rear couplers.

h. Check that front coupler guard is securely latched before road use.



RIGHT

LEFT

a. Air Tank Cables
b. Manual coupler switch
c. Air Bags

Fig. 15 OUTSIDE

3.1 PRE-OPERATION CHECKLIST AND INSPECTION (cont'd)

4. RAIL BRAKE COMPARTMENT:

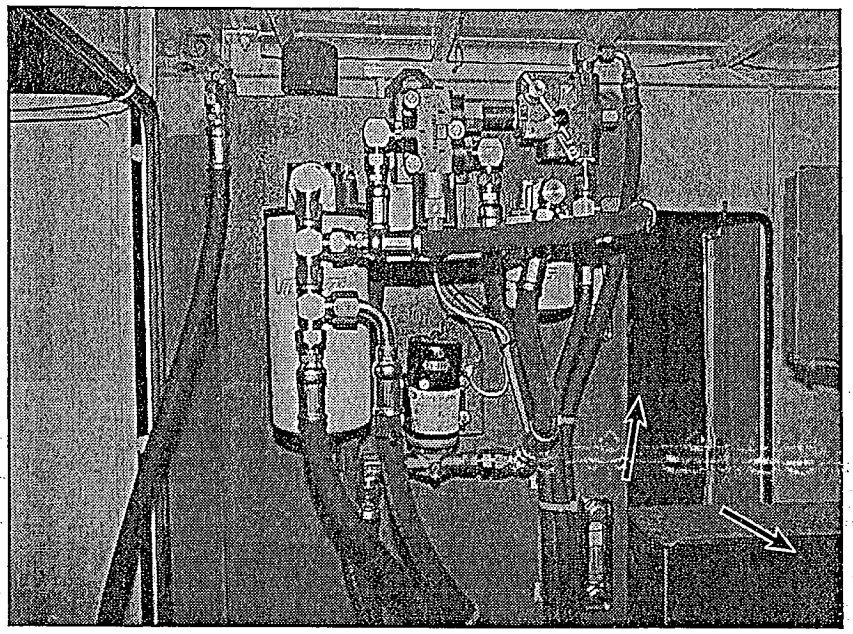
Open all the doors to the compartment.

a. Check the fluid level in the hydraulic reservoir.

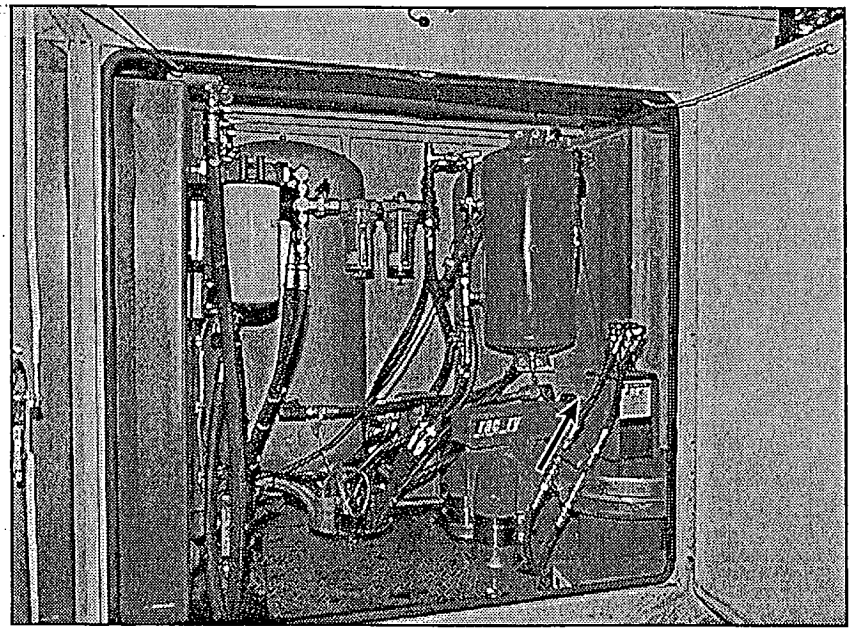
b. Check the condition of the batteries and the terminals.

c. Bleed the air tanks daily.

d. Check for air leaks.



OIL LEVEL AND BATTERY BOX



BLEED AIR TANKS DAILY

Fig. 16 INSIDE EQUIPMENT CABINET

4. TRUCK BRAKE

Truck brakes are not to be used to stop the train. **"Use train brake only".**

5. NUMBER OF CARS

Attempting to pull too many cars for the conditions will result in premature tire wear.

On a dry level track (100 lb.rail) the Brandt Power Unit will pull 15 fully loaded 100 ton hopper cars. However, the length of train should be determined by the ruling grade as follows: - grades of up to 1% - up to 6 cars.

- grades of up to 1 1/2% - up to 3 cars.
- grades of up to 2% - up to 2 cars.

Tire wear can be further reduced by keeping stop and start operation to a minimum on grades.

6. TRUCK TRANSMISSION

When train is stopped always ensure that the truck transmission is in Neutral (N).

Tire life of up to 24,000 miles is achievable if the above guidelines are followed. It has been our experience that tire life is greatest and maintenance, in general, is least if the number of operators is kept to a minimum.

We strongly recommend that all Brandt Power Unit operators receive training from our trainer.

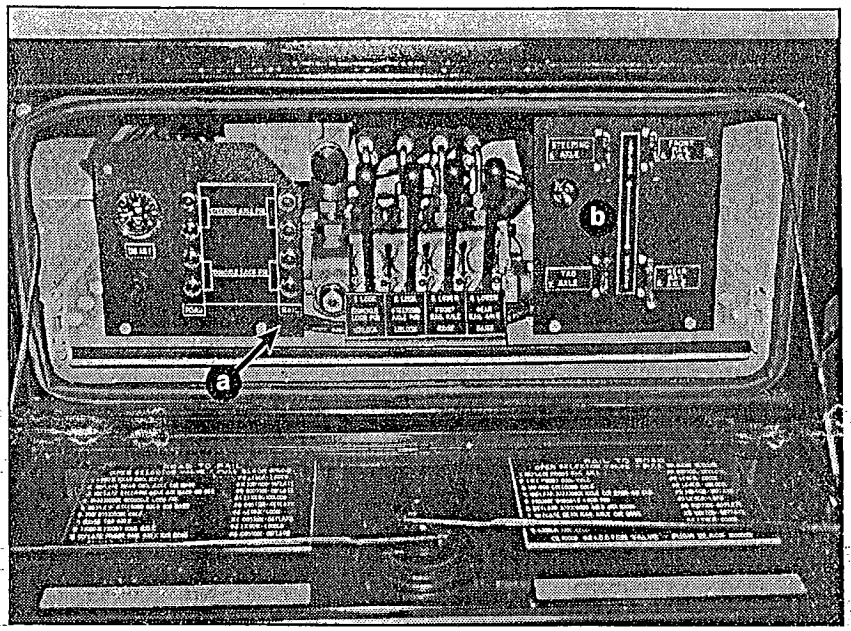
3.1 PRE-OPERATION CHECKLIST AND INSPECTION (cont'd)

5. RAIL OPERATION CHECK:

The following items must be visually checked before operating in rail mode.

a. Be sure the 4 red lights on the side control panel are illuminated

b. Be sure #5 switch is in its deflated position.

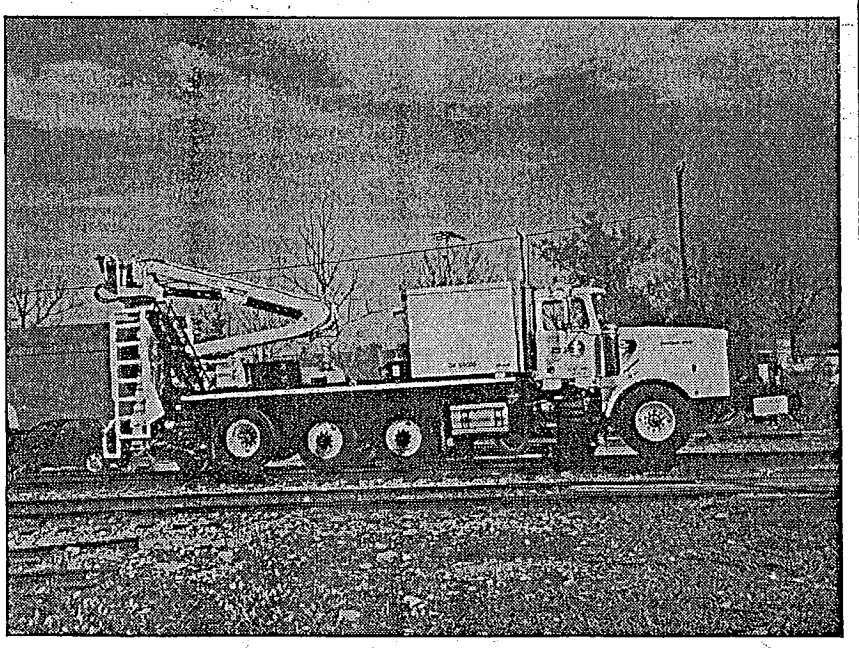


CONTROL PANEL - RED LIGHTS

c. Be sure all the wheels are in position on the track.

d. Be sure the steering axle is raised.

e. Be sure that couplers are centered.



POWER UNIT

Fig. 17 RAIL OPERATION

3.2 ROAD-TO-RAIL CONVERSION

The road-to-rail conversion procedure is posted inside the control panel. When converting to "rail", follow this procedure:

1. Position the rear rail wheels over the rails as in fig. 18 (Use your rear rail wheel camera to ensure the unit is lined up).

NOTE
WHEN CONVERTING AT A CROSSING, IT IS RECOMMENDED THAT THE POWER UNIT BE DRIVEN PAST THE RAILS AND THEN BACKED UP TO ALIGN THE REAR RAIL WHEELS WITH THE TRACK.

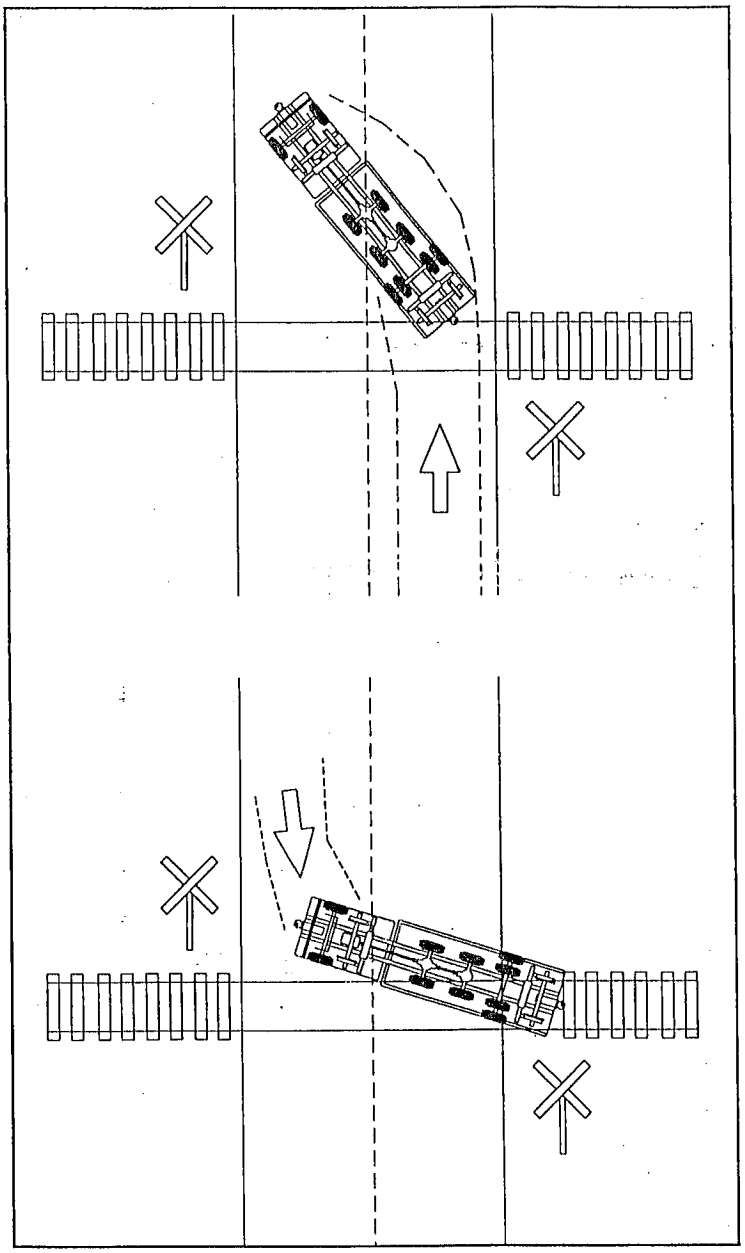


Fig. 18 ALIGNMENT

3.2 ROAD-TO-RAIL CONVERSION

2. Set tractive effort control dial to 15 psi.

3. Open control panel door and follow the conversion instructions.

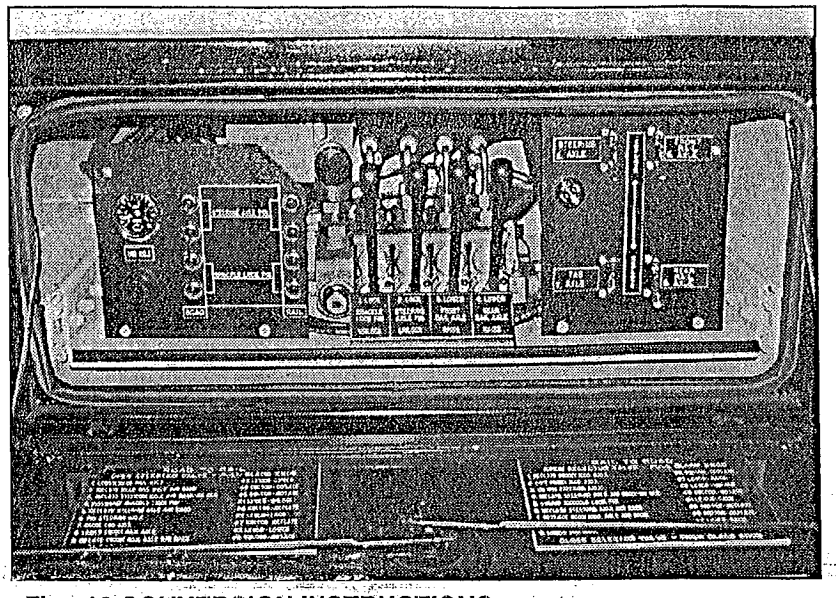


Fig. 19 CONVERSION INSTRUCTIONS

4. Open Selector Valve. Pull on the black knob. This opens the hydraulic circuit to the bank of valves.

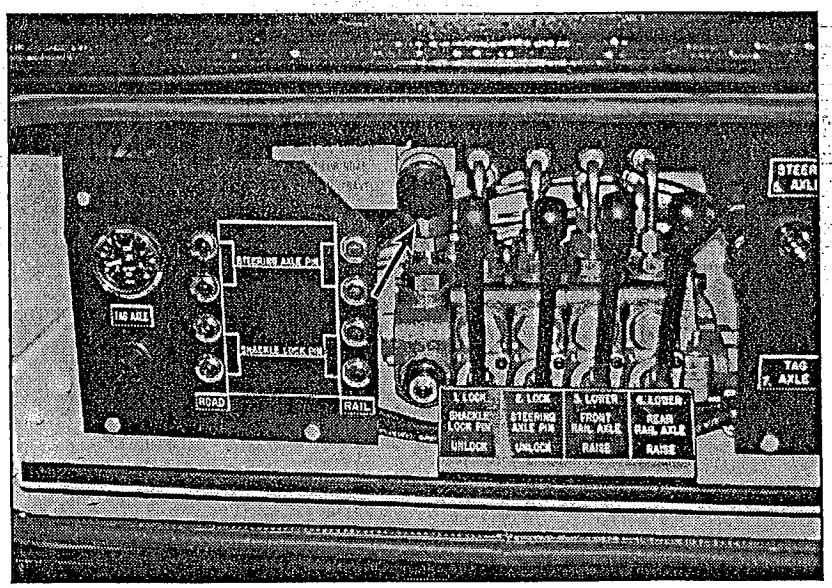
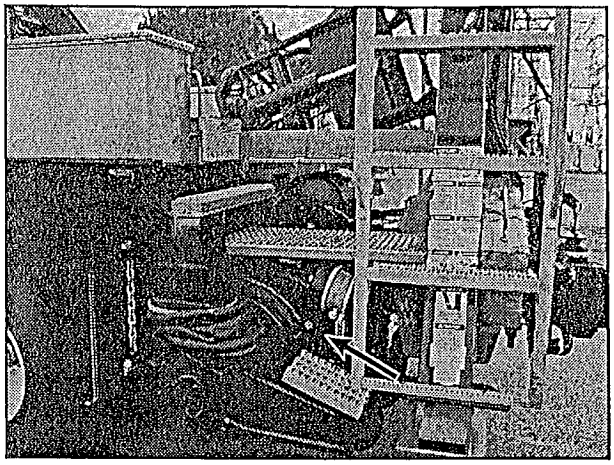


Fig. 20 SELECTOR VALVE

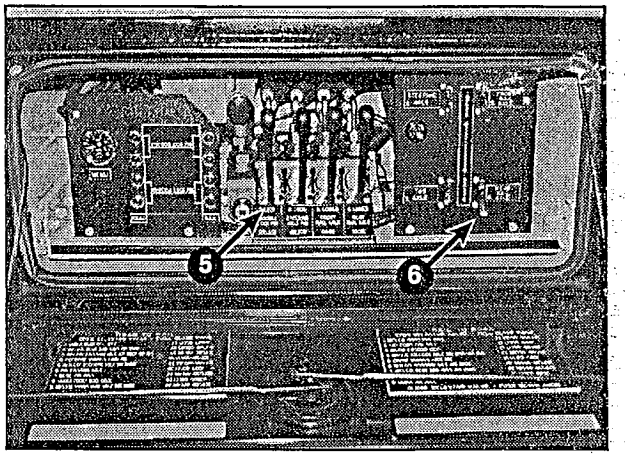
3.2 ROAD-TO-RAIL CONVERSION

5. **Step # 1 - Lower Rear Rail Axle.** Push on the # 4 lever to lower the rear rail axle. Visually check that the rear rail axle is on the rail.

6. **Step # 2 - Inflate Rear Rail Axle Air Bag.** Move switch # 8 up to inflate the rear rail axle air bag. Visually check that the air bag is inflating. System will inflate air bag to required pressure and position.



Rear Rail Wheel



Controls

Fig. 21 REAR RAIL AXLE

7. Align the front rail wheels with the tracks.

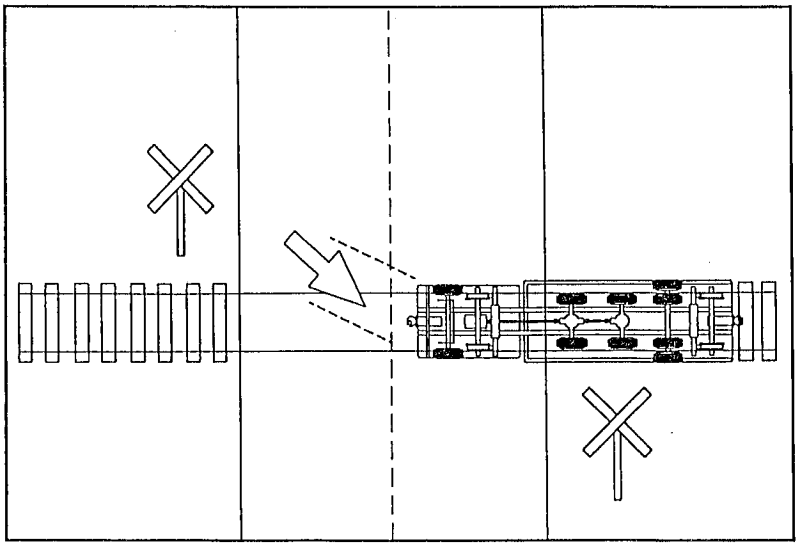


Fig. 22 FRONT RAIL WHEEL ALIGNMENT

3.2 ROAD-TO-RAIL CONVERSION

8. **Step # 3 - Inflate Steering Axle Air Bags.** Move switch # 5 up to inflate the front steering axle air bag, System will inflate air bags to required pressure and position. Wait for 60 seconds until air bag is fully inflated.

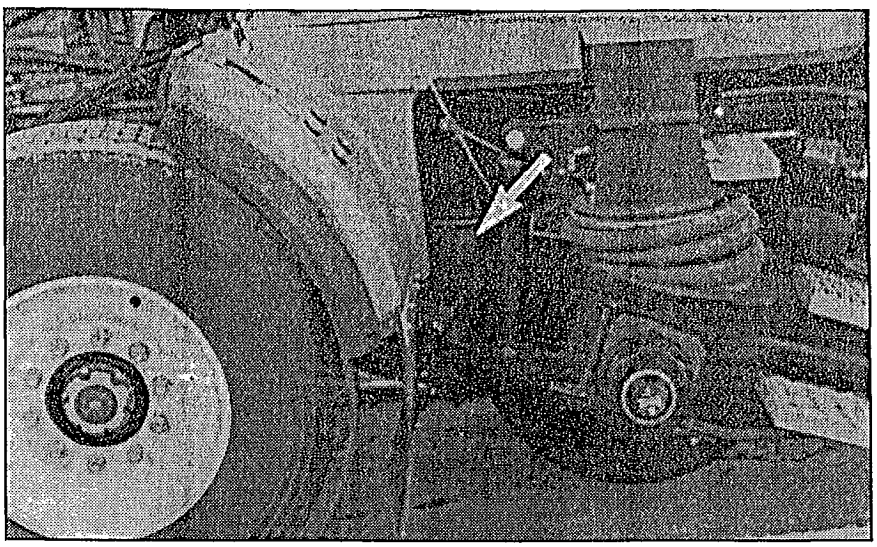
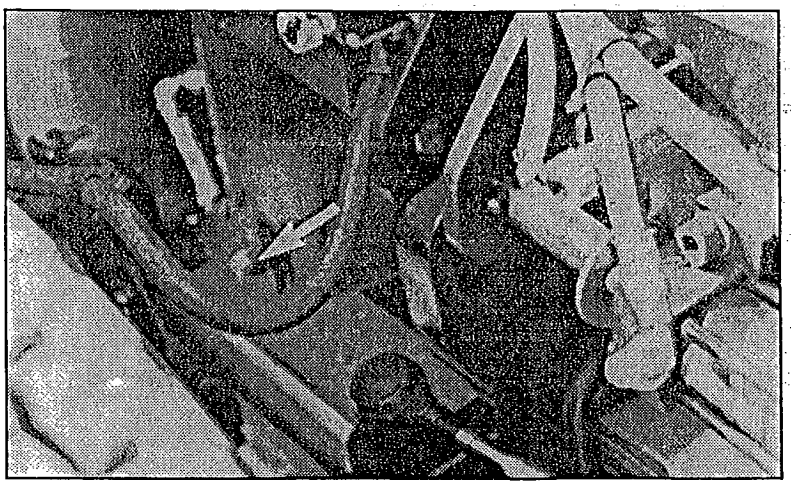


Fig. 23 STEERING AXLE AIR BAG

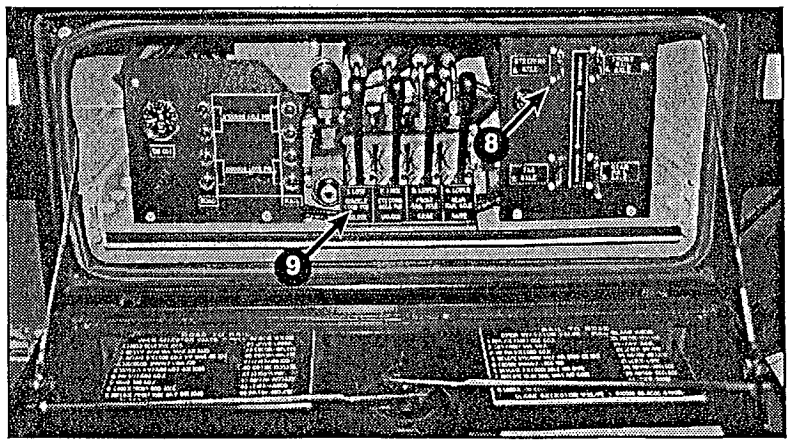
9. **Step # 4 Disengage Shackle Lock Pin.** Pull on lever # 1 to disengage the shackle lock pin. Visually check that the pin is out of the shackle. The two green lights adjacent "shackle lock pin" will go out and the two red lights will come on.

WARNING

Components are shown with engine hood opened for illustrative purposes only. Do not operate with hood open.



Lock Pin



Controls

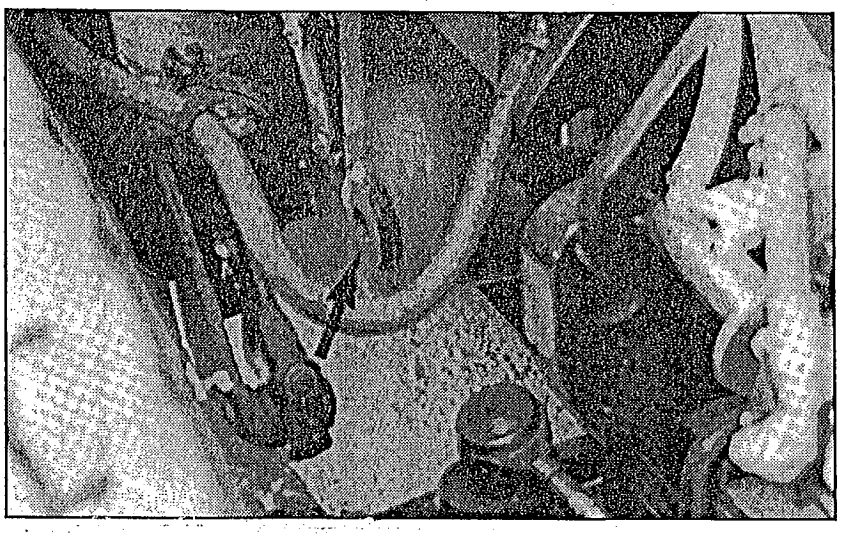
Fig. 24 SHACKLE LOCK PIN

3.2 ROAD-TO-RAIL CONVERSION

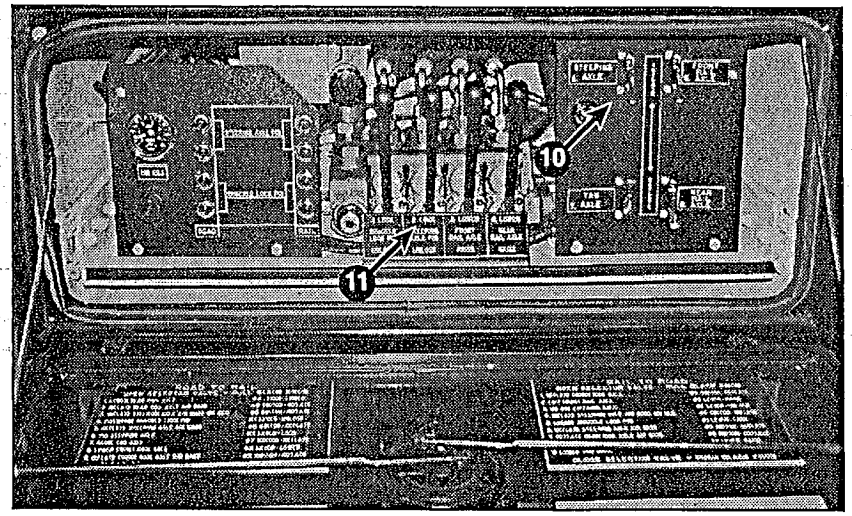
10. **Step # 5 - Deflate Steering Axle Air Bag.** Move switch # 5 down to deflate the steering axle air bag. Wait 30 seconds for the air bags to become fully deflated.

WARNING

Components are shown with engine hood opened for illustrative purposes only. Do not operate with hood open.



Shackle Yoke



Controls

Fig. 25 YOKE HOLE ALIGNMENT

11. **Step # 6 - Pin Steering Axle.** Push in lever #2 to pin the steering axle. Visually check that the pin is in position through the steering axle eye. The two green lights adjacent "steering axle in" will go out and the two red lights will come on.

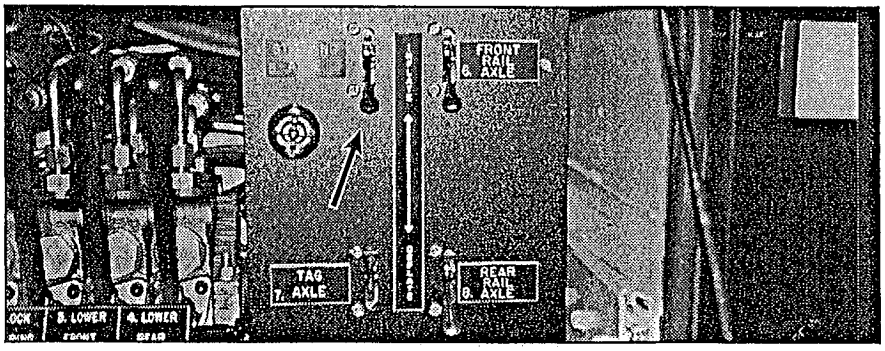


Fig. 26 AXLE SUSPENSION SWITCH

3.2 ROAD - TO- RAIL CONVERSION (cont'd)

12. **Step # 7 - Deflate Tag Axle.**
Move #7 switch down to deflate.

WARNING

Components are shown with engine hood opened for illustrative purposes only. Do not operate with hood open.

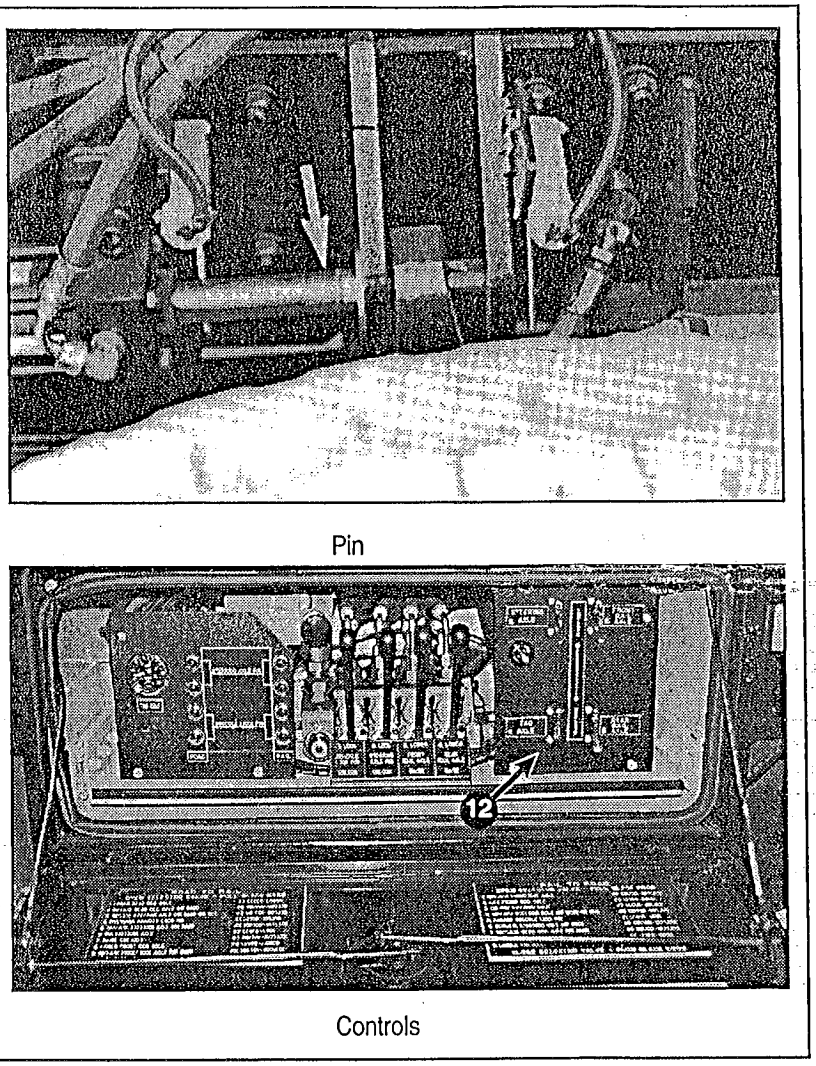
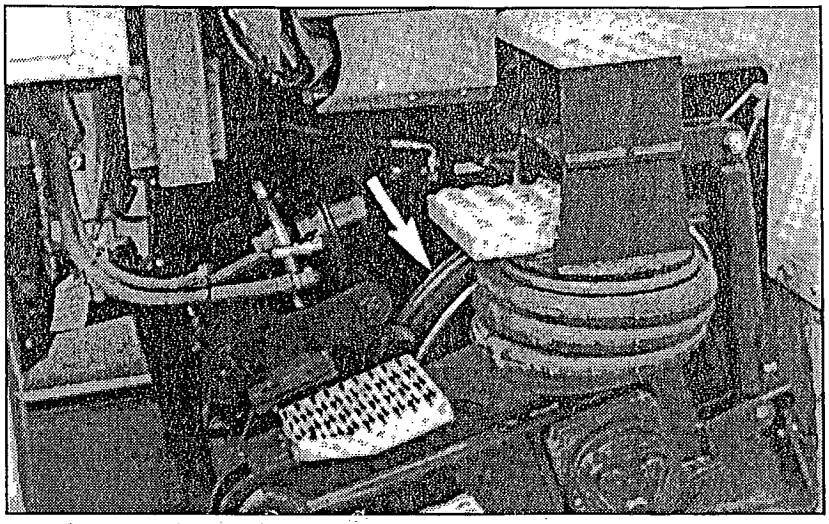


Fig. 27 TAG AXLE

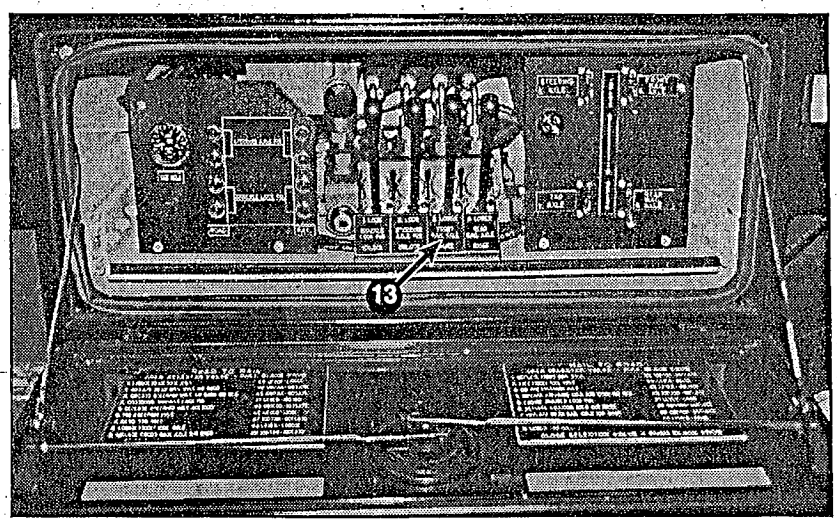
3.2 ROAD - TO - RAIL CONVERSION (cont'd)

13. **Step # 8 - Lower Front Rail Axle.**

Push on lever # 3 to lower the front rail axle into its rail position. Visually check that the rail wheels have extended into their operating position and are properly situated on the track.



Rail Axle



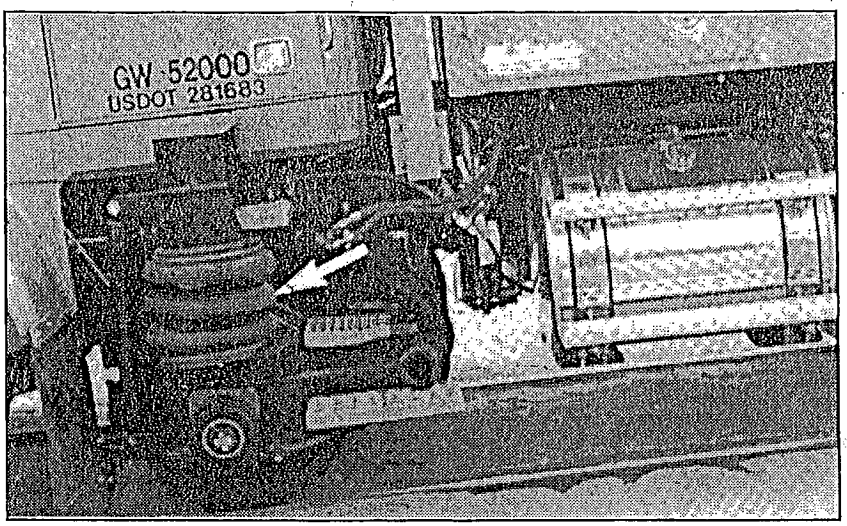
Controls

Fig. 28 LOWERING FRONT RAIL AXLE

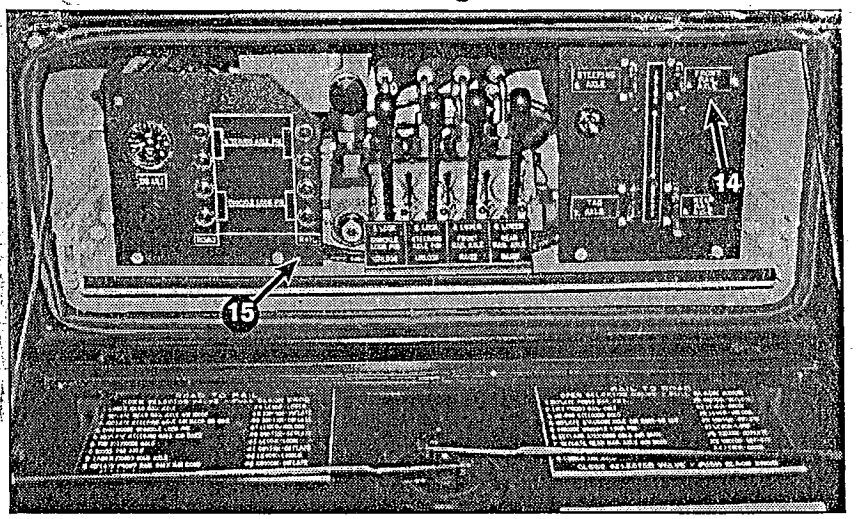
3.2 ROAD - TO- RAIL CONVERSION (cont'd)

14. Step #9 - Inflate Front Rail Axle Air Bags.
Move switch # 6 up to inflate the front rail axle air bag. Visually check that the air bag has inflated. The system will inflate the air bag to the required pressure and position in approximately 60 seconds.

15. Be sure that all 4 red indicator lights above RAIL are lit.



Air Bags



Controls

Fig. 29 FRONT RAIL AXLE AIR BAG

16. Close selector valve, Push IN on the black knob. This closes the hydraulic circuit and will prevent the hydraulic cylinders from creeping.

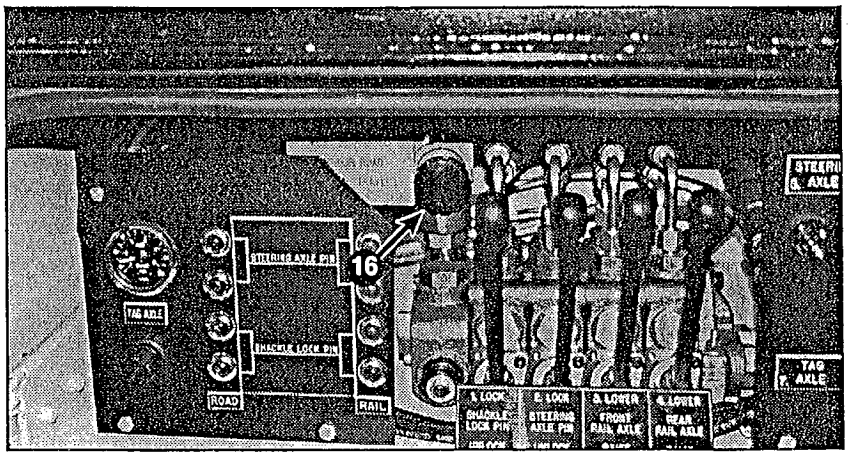


Fig. 30 SELECTOR VALVE

3.3 RAIL - TO- ROAD CONVERSION

The rail - to road conversion procedure is posted inside the control panel door. When converting to the "Road", follow this procedure.

1. Position the front tires on a roadway area. When converting at a crossing, it is recommended that the front steering tires be positioned over the level crossing area.

NOTE

Attempting to convert from rail to road where there is no road crossing will cause severe tire damage and is not recommended.

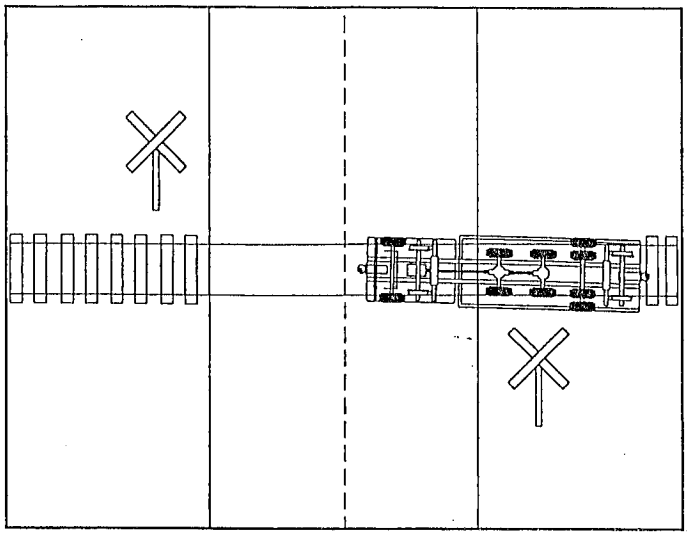


Fig. 31 POSITIONING

2. Open control panel door and follow the conversion instructions.

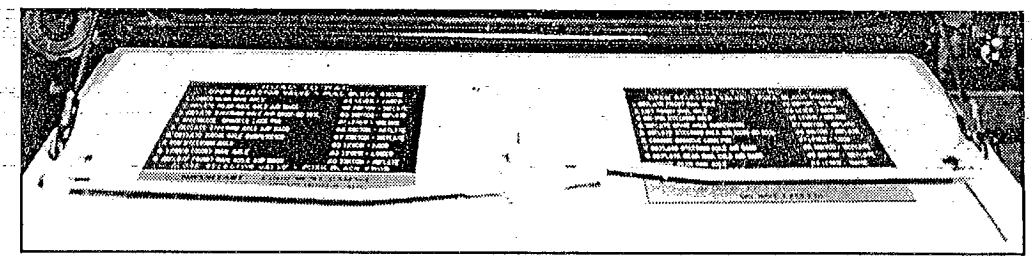


Fig. 32 CONVERSION INSTRUCTIONS

3. Open Selector Valve.
   This opens the hydraulic circuit to the bank of hydraulic valves.

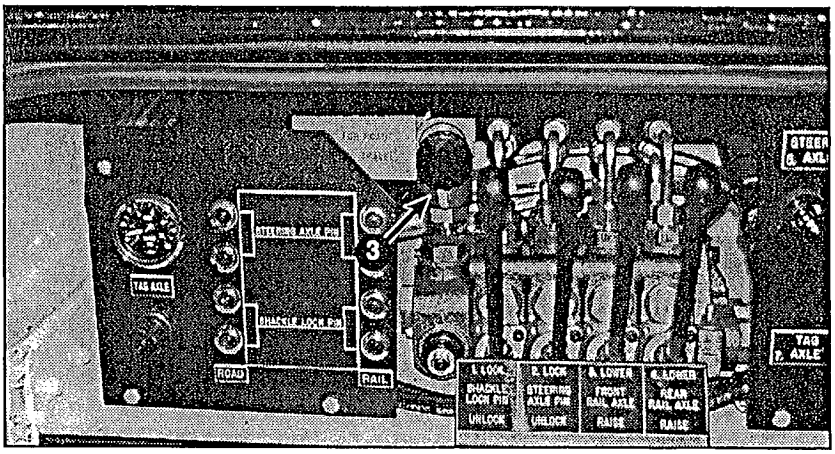
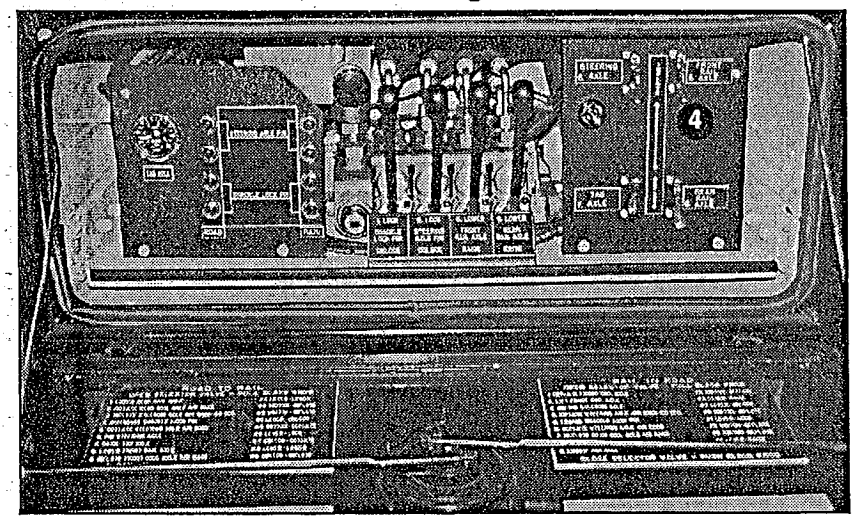


Fig. 33 SELECTOR VALVE

3.3 RAIL - TO - ROAD CONVERSION (cont'd)

4. **Step # 1 - Deflate Front Rail Axle Air Bag.**
Move switch # 6 down to deflate the front rail axle air bag, Visually check that the air bag has deflated. The system will automatically exhaust all the air to atmosphere.

Air Bag

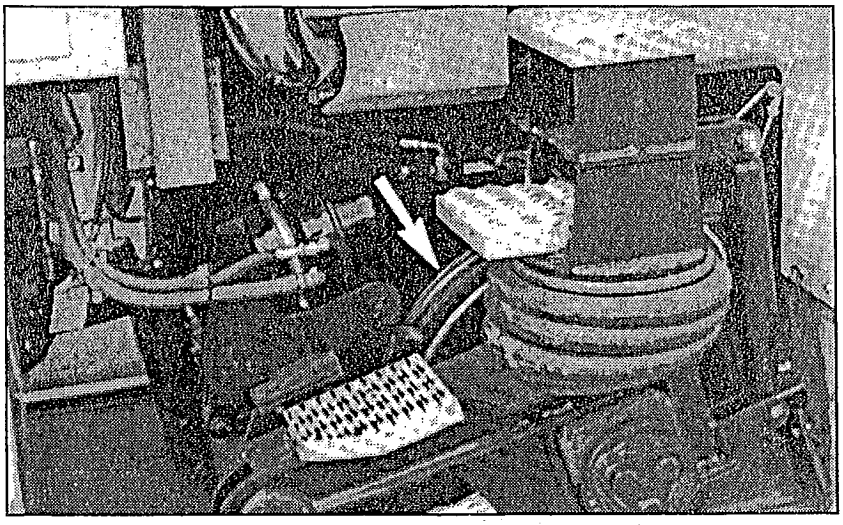


Controls

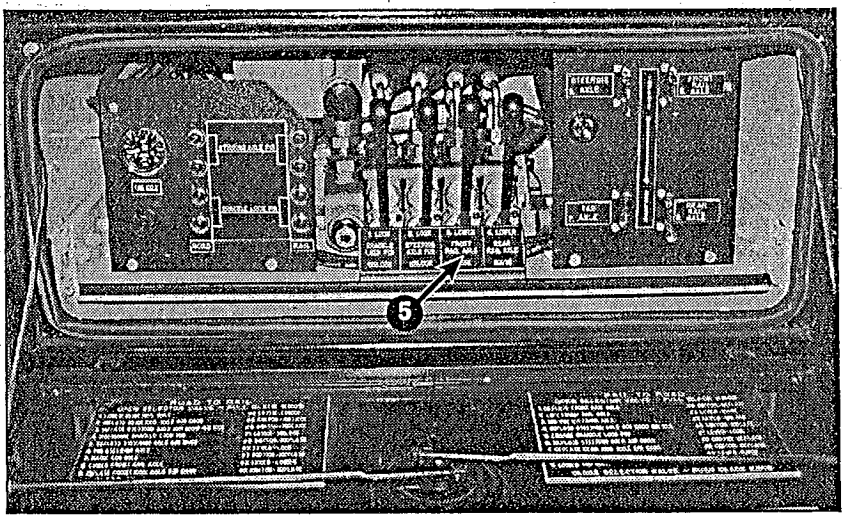
Fig. 34 FRONT RAIL AXLE AIR BAG

3.3 RAIL - TO - ROAD CONVERSION (cont'd)

5.. Step # 2 - Lift Front Rail Axle.
Pull on lever # 3 to lift the front rail axle into its position. Visually check that the rail wheels have retracted into their stowed position.



Rail Axle



Controls

Fig. 35 LIFTING FRONT RAIL AXLE

3.3 RAIL - TO - ROAD CONVERSION (cont'd)

6. Step # 3 - Unpin Steering Axle.
Pull on lever # 2 to unpin the steering axle. Visually check that the pin has been pulled out of its hole. The two red lights adjacent Steering Axle Pin will go out and the two green lights will come on.

WARNING

Components are shown with engine hood opened for illustrative purposes only. Do not operate with hood open.

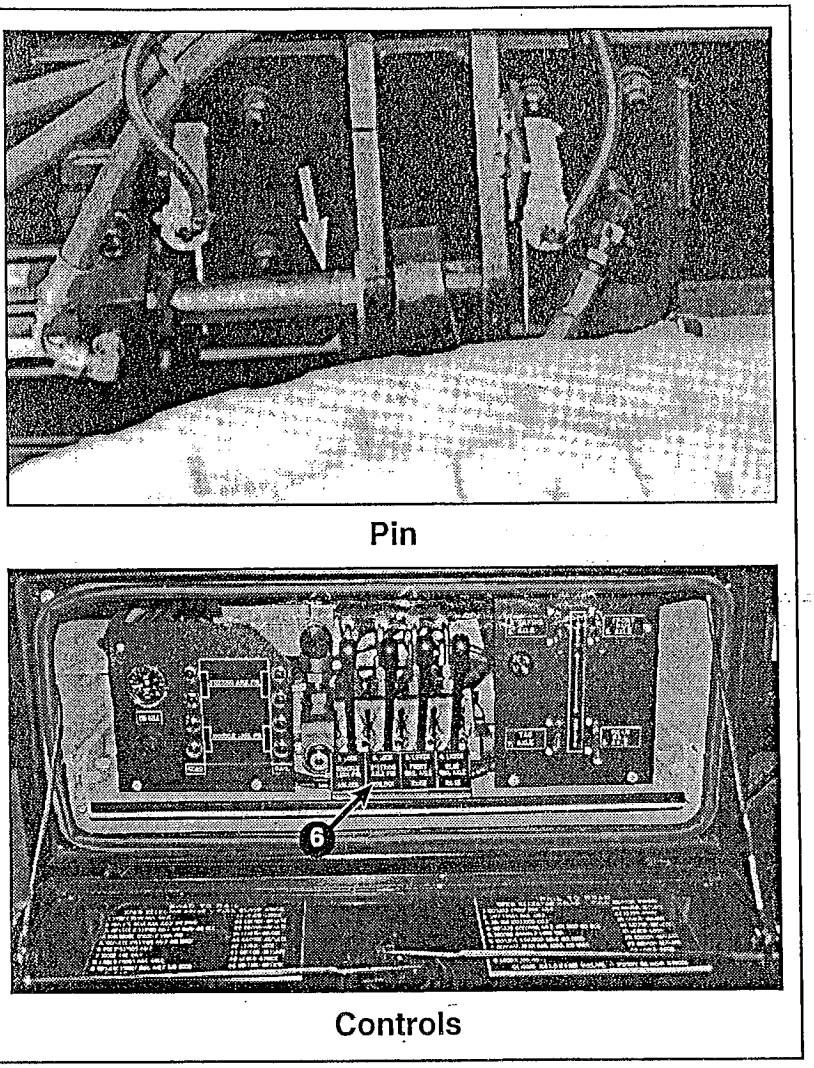
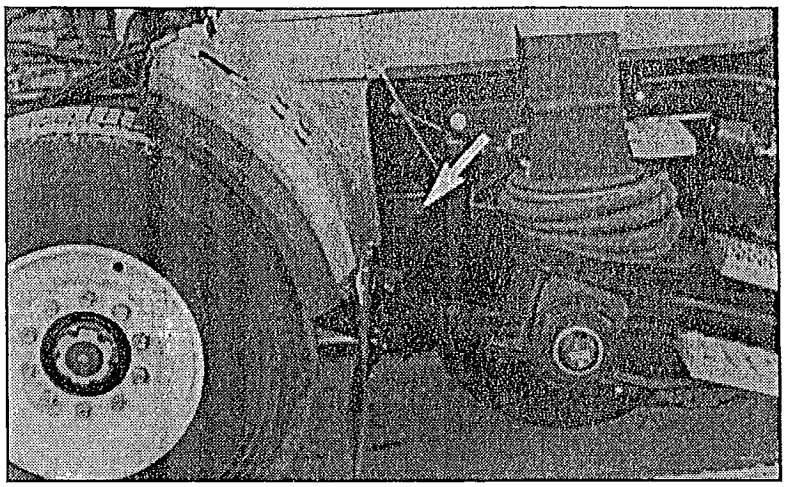


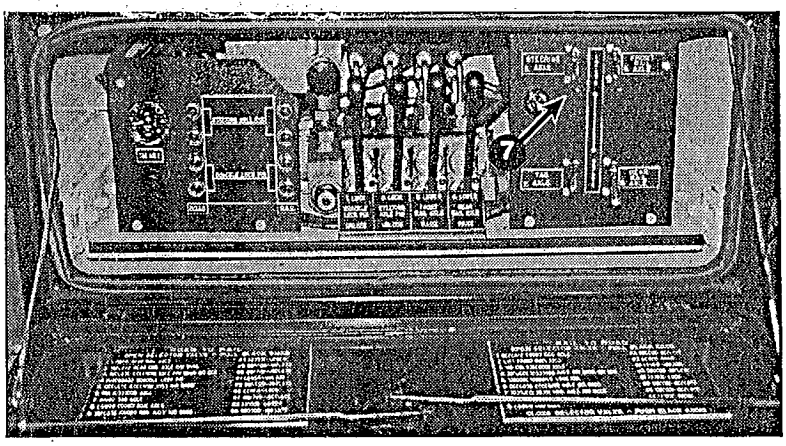
Fig. 36 UNPINNING STEERING AXLE

3.3 RAIL - TO - ROAD CONVERSION (cont'd)

7. **Step # 4 - Inflate Steering Axle Air Bags.** Move switch # 5 up to inflate the steering axle air bag. Visually check that the air bags are inflating. The system will inflate the air bag to the required pressure and position in approximately 60 seconds.



Air Bags



Controls

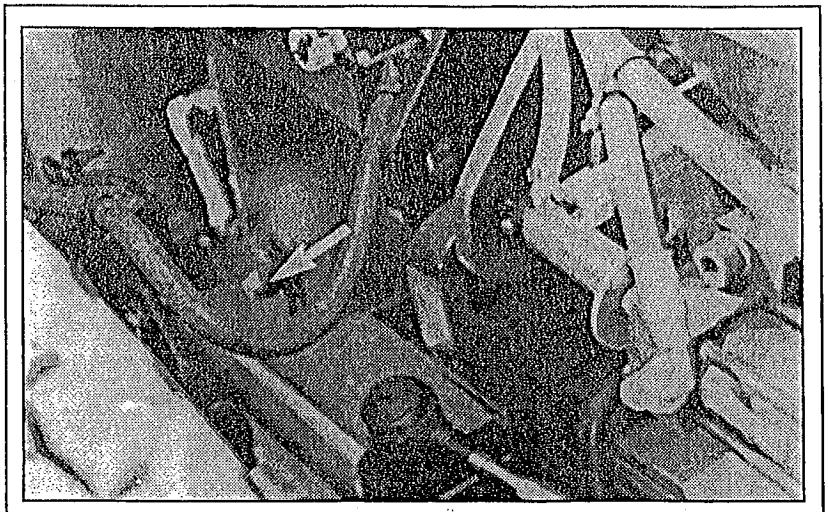
Fig. 37 INFLATING STEERING AXLE AIR BAG

3.3 RAIL - TO - ROAD CONVERSION (cont'd)

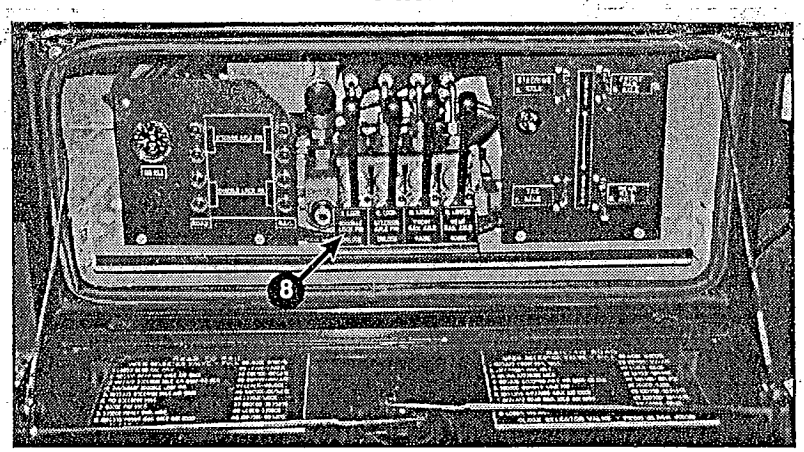
8. Step # 5 - Engage Shackle Lock Pin. Push on lever # 1 to engage the shackle lock pin. Visually check that the pin is through the shackle. The two red lights adjacent "shackle lock pin" will go off and the two green lights will come on.

WARNING

Components are shown with engine hood opened for illustrative purposes only. Do not operate with hood open.



Pin

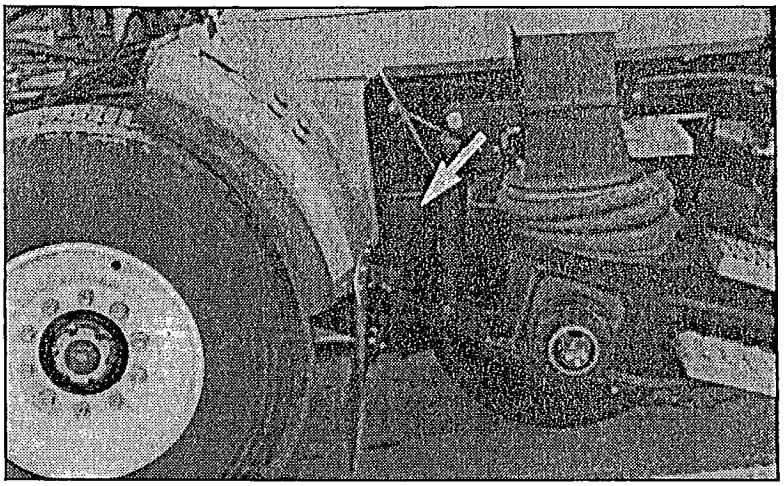


Controls

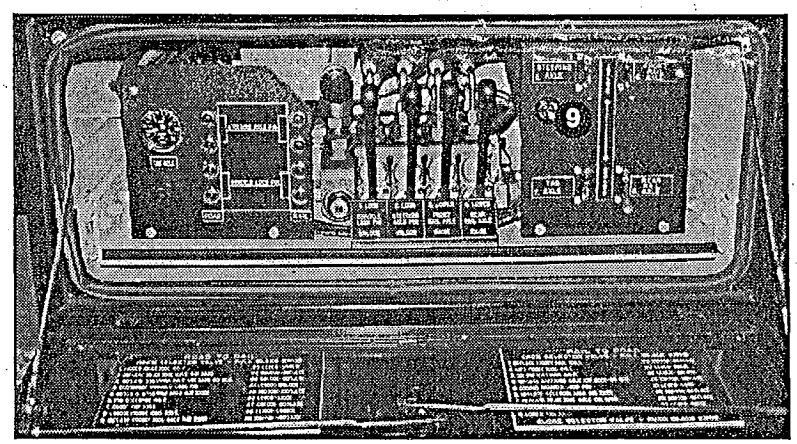
Fig. 38 ENGAGING SHACKLE LOCK PIN

3.3 RAIL - TO - ROAD CONVERSION (cont'd)

9. **Step # 6 - Deflate Steering Axle Air Bags.** Move switch # 5 down to deflate the steering axle air bags. Visually check that air bags are deflating. The system will exhaust air bag to atmosphere.



Air Bags



Controls

Fig. 39 DEFLATING STEERING AXLE AIR BAGS

3.3 RAIL - TO - ROAD CONVERSION (cont'd)

10. Move the Power Unit forward until the drive wheels are on the level surface. The Power Unit can be turned while moving to align with the roadway.

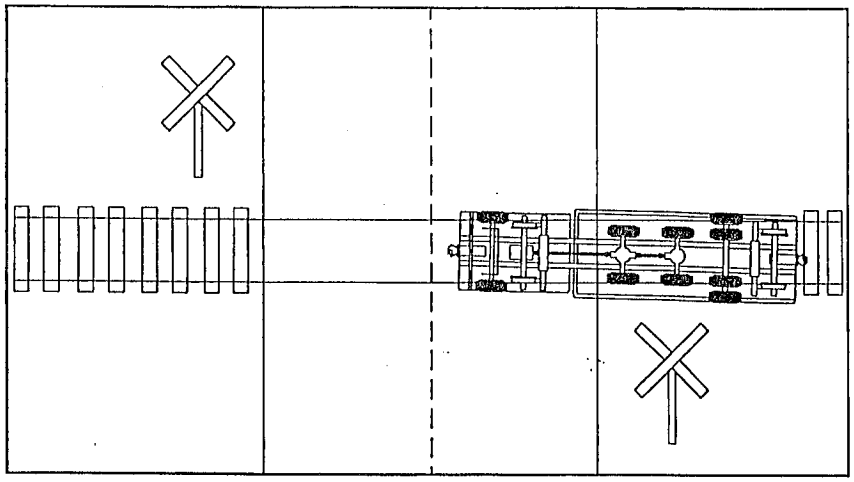
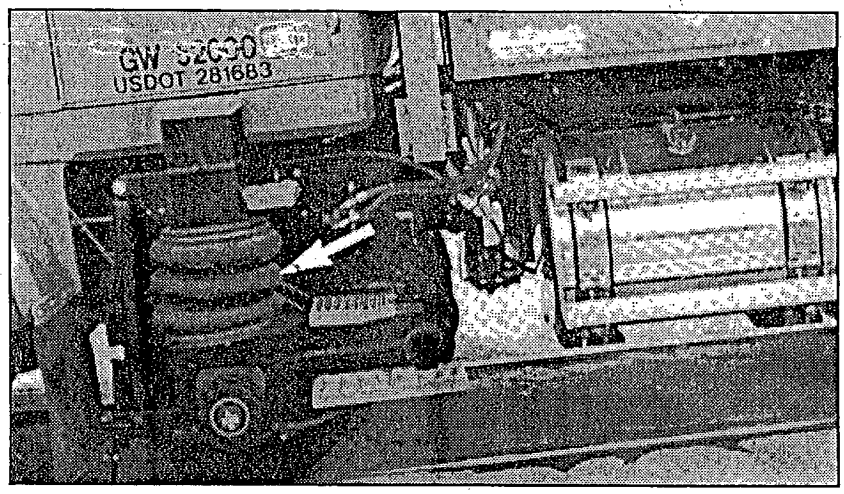
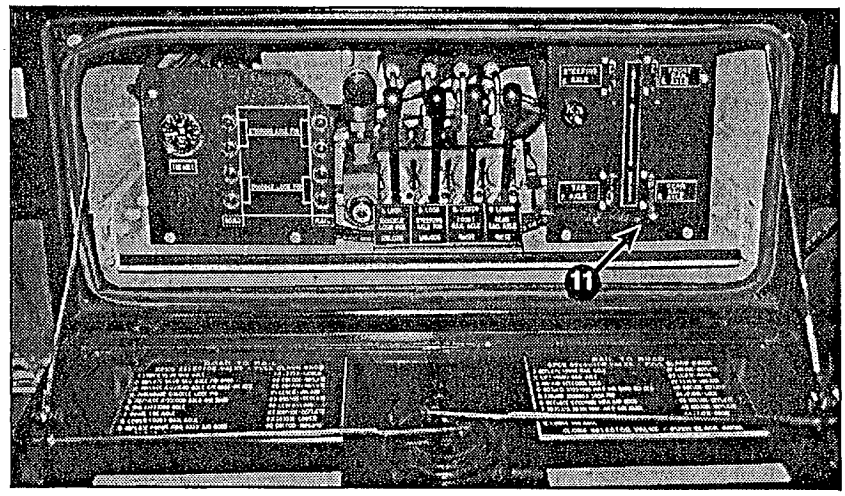


Fig. 40 MOVING FORWARD

11. **Step # 7 - Deflate Rear Rail Axle Air Bag.**
Move switch # 8 down to deflate the rear rail axle air bag. Visually check that the air bags on the rear rail axle are deflating. The system will exhaust air bags to atmosphere.



Air Bags

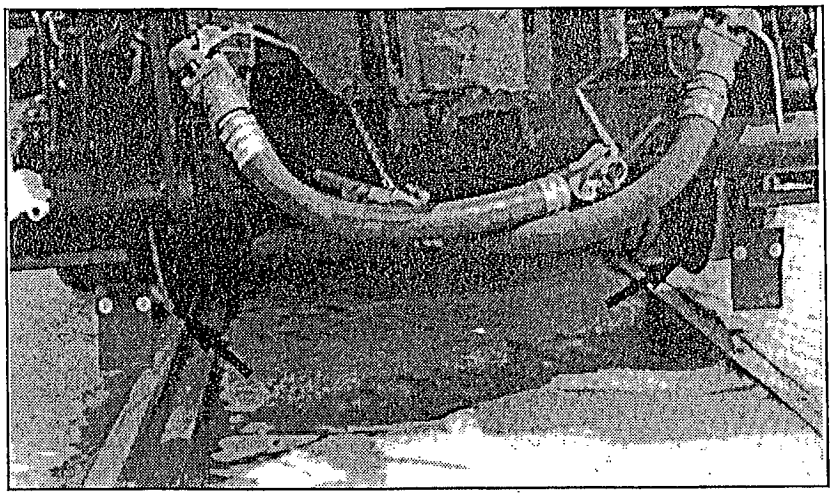


Controls

Fig. 41 DEFLATING REAR RAIL AXLE AIR BAGS

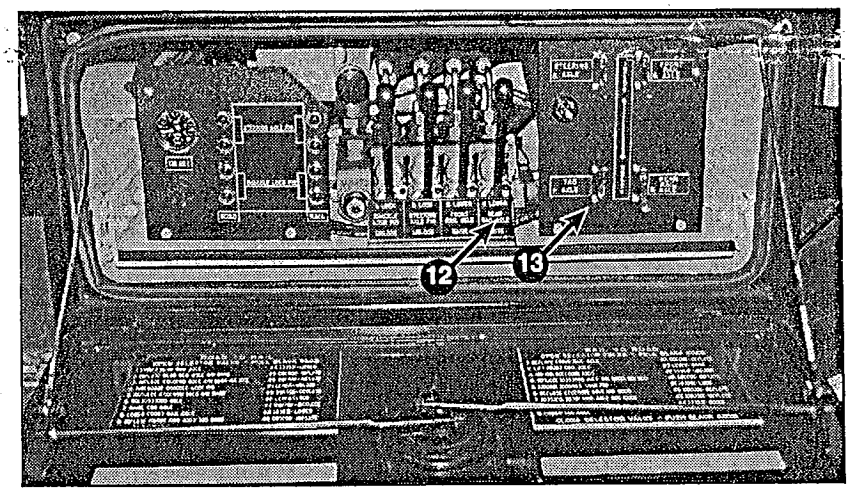
3.3 RAIL - TO - ROAD CONVERSION (cont'd)

12. Step # 8 - Raise Rear Rail Axle.
Pull on lever # 4 to raise the rear rail axle. Visually check that the rear rail axle is raised into its stowed



Rear Rail Axle

13. Step # 9 - Lower Tag Axle.
Move # 7 switch up to inflate.
Visually check that tag axle is down. Allow for up to two minutes for full inflation of tag axle suspension.



Controls

Fig. 42 RAISING REAR RAIL AXLE

3.3 RAIL - TO - ROAD CONVERSION (cont'd)

14. Be sure that all green indicator lights above Road are lit.

15. Close selector valve. Push IN on the black knob. This closes the hydraulic circuit and will prevent the hydraulic cylinders from creeping.

16. Fasten Safety Chains on all Rail Wheels.

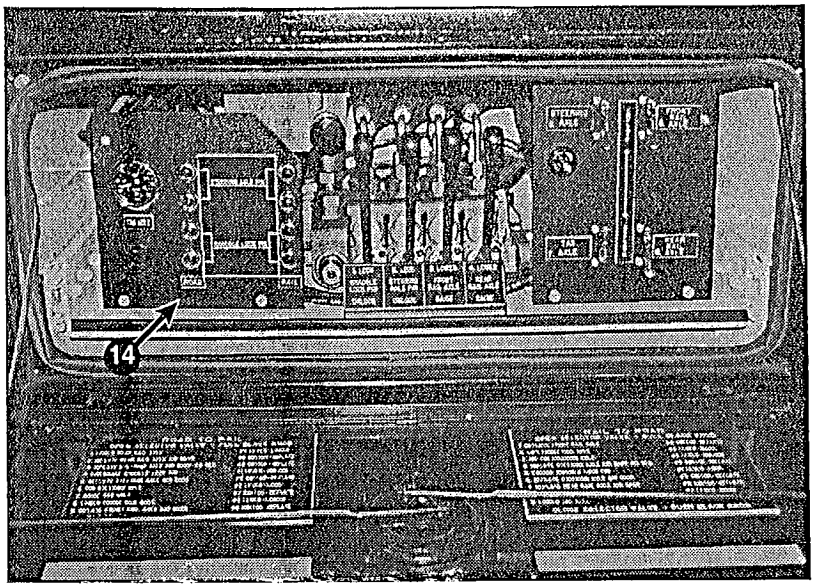


Fig. 43 INDICATOR LIGHTS

17. Close and latch the side door to control panel.

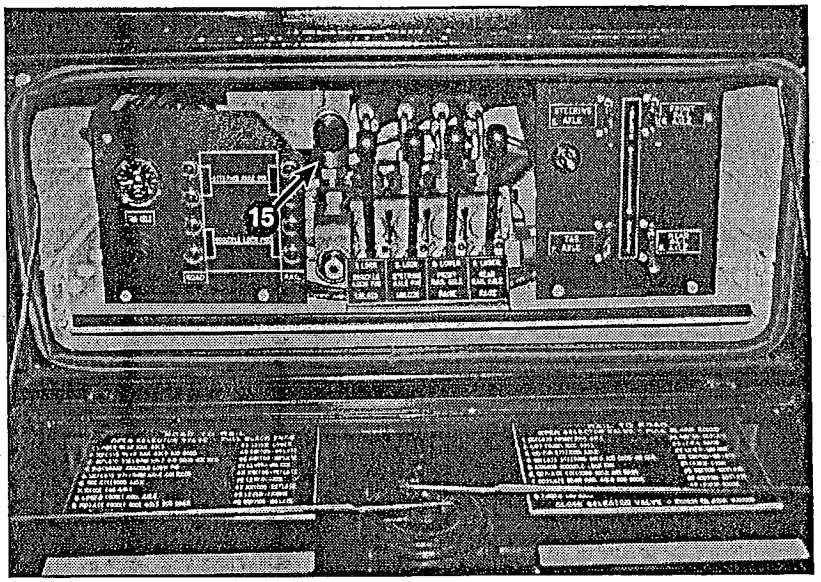


Fig. 44 SELECTOR VALVE

3.4 "MOVING CARS"

Refer to the Western Star manual for the instructions relating to the truck. When the Power Unit is used for switching, follow this procedure:

1. Go through the Pre-Operation Checklist and Inspection (Section 2.1) before starting.

2. Be sure everyone is clear of the Power Unit and adjacent area before starting. It is recommended that the driver honk the truck horn to alert others that the engine is being started.

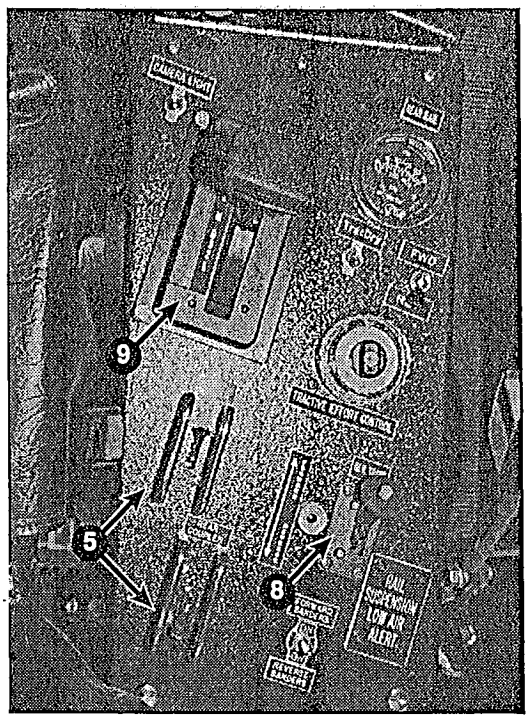


Fig. 45 CONSOLE CONTROLS

3. Start the engine (refer to truck manual).
   a. Apply park brake.
   b. Place transmission in neutral and all other controls in the OFF or neutral position as appropriate.
   c. Turn ignition key to the RUN position.
   d. Depress starter button to engage starter.

   NOTE

   Use the cold starting assist if required.

4. Run the engine at 1/3 throttle until the air system has come up to pressure.

5. Use the switches on the console to open the required coupler. The coupler will close automatically when coupling to a car.

6. Shift the axles into Low Range.

7. Engage "DIFF-LOCK".

8. Shift the Reversing Transmission into REVERSE OR FORWARD as required.

   NOTE

   The Reversing Transmission will reverse the output direction of the main transmission and provide equivalent forward and reverse speed.

9. Shift the main transmission into gear 1 if starting a load.

   NOTE

   Shift into 1 while depressing service brake. Move shifter to D (drive). The transmission will start in gear 1 and shift into a higher gear as required. Refer to transmission manual.

3.4 "MOVING CARS" (Cont'd)

10. Release the park brake and move the Power Unit to the load to be moved.
11. Move the coupling jaws into position.
12. Place the main transmission in neutral.
13. Set the Power Units park brake and connect the air line to the rail car if required.
14. Conduct brake test.
15. Place the Reversing Transmission into Forward or Reverse as required.
16. Move the main transmission into gear 1 to start the load. Refer to Step 9.
17. Release the Power Units' park brake.
18. Move the rail car to its desired position.
19. Use the Tractive Effort control dial to maintain a minimum of 30 psi pressure in the airbags. Normally 15 psi is required when starting heavy loads.

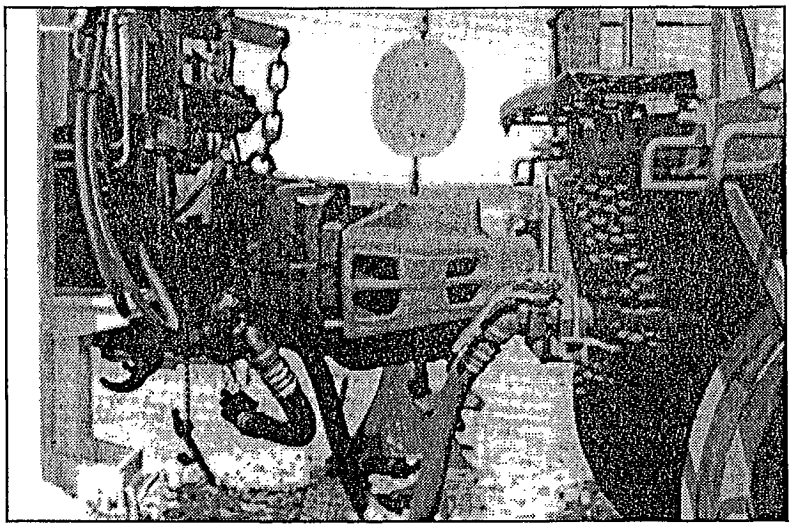


Fig. 46 COUPLING

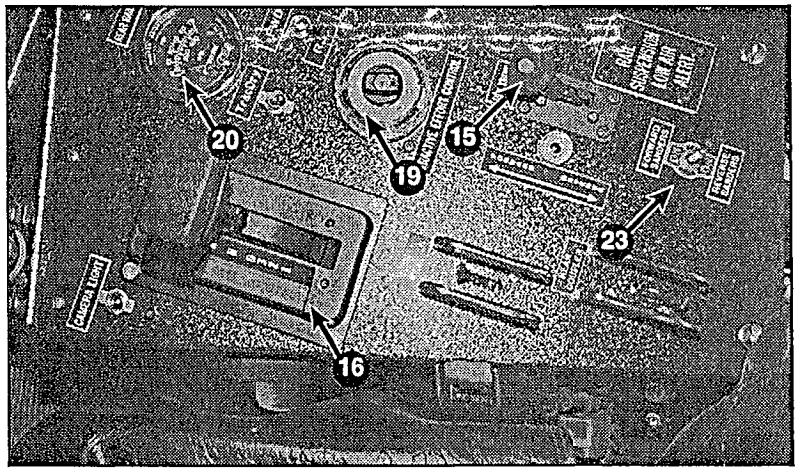


Fig. 47 TRACTIVE EFFORT CONTROL

20. Monitor the Rail Air Bag pressure with the pressure gauge on the side console.
21. Decrease the pressure if the drive tires start to slip.
22. When no longer accelerating the load, increase the air bag pressure to 30 35 psi This pressure will provide maximum tire life.
23. Open the Forward or Reverse sanding compartments (if so equipped) if the rails are icy. (Ensure sander hoses are installed.)
24. Stop the travel movement by applying the train brakes as required.
25. Place the main transmission in Neutral.
26. Apply the Power Unit independent brake.
27. Open the coupler.
28. Close angle cock. Air line at the coupler will disconnect automatically as Power Unit and cars separate.
29. Proceed with the next task.

MAINTENANCE SAFETY

1. Follow ALL the operating, maintenance and safety information in the manual.

2. Place all controls in neutral, set parking brake, stop engine, remove ignition key and wait for all moving parts to stop before servicing, adjusting or repairing.

3. Follow good shop practices. Keep service area clean and dry. Be sure electrical outlets and tools are properly grounded. Use adequate light for the job at hand.

   - Keep service area clean and dry.
   - Be sure electrical outlets and tools are properly grounded.
   - Use adequate light for the job at hand.

4. Use only tools, jacks, and hoists of sufficient capacity for the job.

5. Make sure all guards and doors are in place and properly secured when maintenance work is complete.

6. Never wear ill-fitting, baggy or frayed clothing when working around or on any of the drive system components.

7. Before applying pressure to a hydraulic system, make sure all lines, fittings, and couplers are tight and in good condition.

8. Relieve pressure from hydraulic circuit before servicing, disconnecting or repairing system.

9. Clear the area of bystanders, when carrying out any maintenance and repairs or making any adjustments.

4.2 SERVICE

4.2.1 FLUIDS AND LUBRICANTS

1. Grease
   Use an SAE multi purpose high temperature grease with extreme pressure (EP) performance. Also acceptable is an SAE multi-purpose lithium base grease.

2. Diesel Fuel
   Use Grade No. 2 fuel, as defined by ASTM Designation D975 for Diesel Fuels. When operating in cold ambient temperatures, the use of a mixture of No. 1 and No. 2 is permitted for a short period of time.

   Fuel Specifications:

   Sulfur Content: Less than 1% by weight, preferably less than 0.5%.

   Cloud Point: At least 10%F below lowest expected ambient temperature.

   Water and Sediment: Less than 0.1% by weight.

   Cetane Number: 40 Minimum. In cold weather or high altitudes, 45 to 55 is desirable.

   Viscosity: Over 1.3 centistokes at all times to provide adequate lubrication to the fuel system.

   Fuel Tank Capacity: 155 U.S. Gal (580 liters).

3. Coolant:
   Use a 50:50 mixture of a good commercial grade ethylene-glycol base antifreeze that meets the chemical composition of GM 6038-M. This mixture should be used down to an ambient temperature of -37 Deg. C. (-34 Deg. (F). Use 60:40 mixture for temperatures down to -54 Deg C (-65 Deg F.) Do not use oil base or alcohol base antifreezes.

Coolant Capacity:

Cat 3406: 28.5 U.S. gal, 23.7 Imp gal 108 liter

4.1 SERVICE AND MAINTENANCE (cont'd)

4. **Power Steering and Automatic Transmission,**
Use a premium grade Dexron III oil.

Hydraulic Reservoir Capacity.
205 Liters (45 Imp. Gal)
Use UNIVIS N 22 - EXON

Power Steering: 2 US qt (2 liters)

Automatic Transmission: 8 Imp. Gal, 9 U.S. gal (35 liters) Dexron III
Observe dipstick reading.

Reversing Transmission : 8 Imp. gal, 9 U.S. gal (35) liters). Use 75w90 Synthetic Gear Oil.
Observe dipstick reading.

5. Engine Oil:
Use an SAE 15w40 Multi viscosity oil meeting the American Petroleum Institute (API) Classification of CE/SF for most operating conditions. CD/SF oil may be used in areas where CE/SF is not available. Consult engine manuals for unusual operating temperature. Do not mix oil types or viscosities.

Crankcase Capacity:

Cat 3406: 36 U.S. qt, 29 Imp. qt.
34 liters with filter change

6. Drive Axles:
Use an SAE 85w90 gear oil for all operating conditions between 40 deg. and 100 deg. F.
Use SAE 85w140 above 100 deg. F.

Axle Capacity: 23.5 U.S. qt, 19 Imp. qt.
(22 liters).

7. Storing Lubricants
Your machine can operate at top efficiency only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture and other contaminants.

42.2 GREASING

Refer to Section 5.1.1 for recommended grease
Use the Maintenance Checklist provided to keep a record of all scheduled maintenance.

1. Use only a hand-held grease gun for all greasing. Air powered greasing systems can damage the seals on bearings and lead to early bearing failure.

2. Wipe grease fitting with a clean cloth before greasing to avoid injecting dirt and grit.

3. Replace and repair broken fittings immediately.

4. If fittings will not take grease, remove and clean thoroughly. Also clean lubricant passage. Replace fitting if necessary.

NOTE

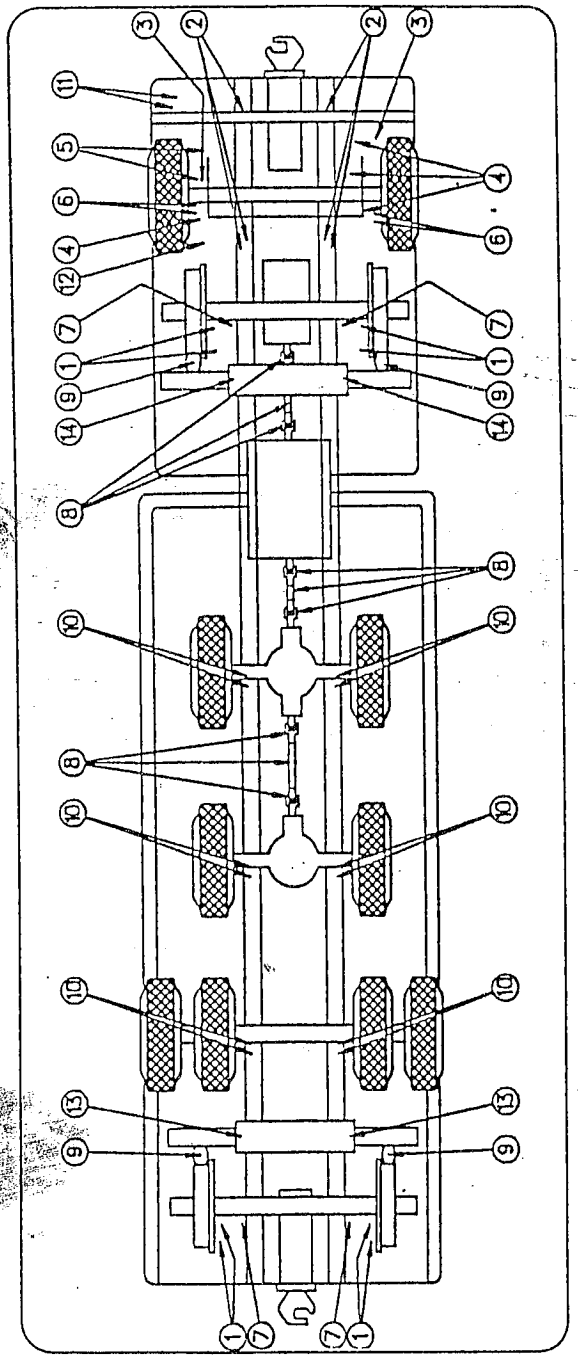
Failure to ensure that all grease fittings accept grease will result in mechanical failure in the future.

4.1 SERVICE AND MAINTENANCE (cont'd)

4.2.3 Service Points

LUBRICATION CHART

Grease Weekly



1. Drag Link - 8 Grease Fittings
2. Spring Shackles - 6 Grease Fittings
3. King Pins - 4 Grease Fittings
4. Tie Rods - 4 Grease Fittings
5. Power Steering Ram - 2 Grease Fittings
6. Left & Right - Slack Adjusters & Brake Shaft Bushings - 4 Grease Fittings.
7. Hyd. Cylinder Ends - 4 Grease Fittings.
8. Universal Joint & Slip Joint 9 Grease Fittings.
9. Rail Brake Front & Rear 8 Grease Fittings.
10. Shack Adjuster & Brake Shaft bushings 8 Grease Fittings.
11. Steering Column - 2 Grease Fittings.
12. Steering Column - Inside Cab 2 Grease Fittings.
13. Rail Guide Rear Wheel Suspension 2 Grease Fittings.
14. Rail Guide Front Wheel Suspension 2 Grease Fittings.

4.1 SERVICE AND MAINTENANCE (cont'd)

4.2.4 Filter Servicing

Refer to the Western Star manual for information on the engine and automatic transmission servicing requirements. This section describes the filter servicing requirements for the auxiliary systems.

1. **Train Air Brake Filter and Dryer.**
   The Train brake filter and dryer system consists of two (2) CR Brake Master -Turbo 2000 assemblies mounted under the deck at the front one on each side. Each "dryer" features a spin-on replaceable desiccant cartridge. To ensure a continuous supply of clean dry air, replace each cartridge every 6 months.

2. **Reversing Transmission Oil.**
   Reversing transmission uses 75w90 Synthetic Gear Oil. Oil should be replaced every 6 months.

3. **Hydraulic System Oil and Filter.**
   Hydraulic system uses UNIVIS N 22 oil. (See page 22).

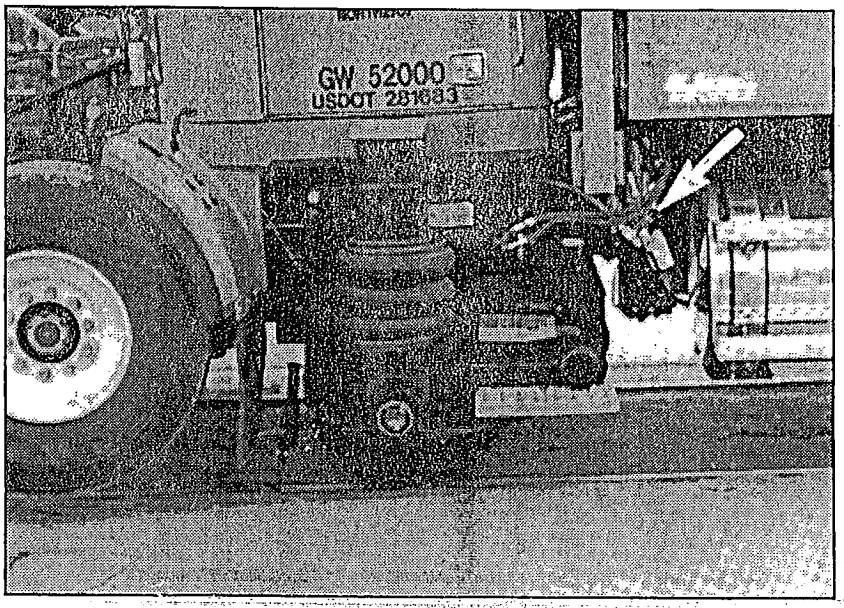


Fig. 49 TRAIN AIR BRAKE SYSTEM FILTERS

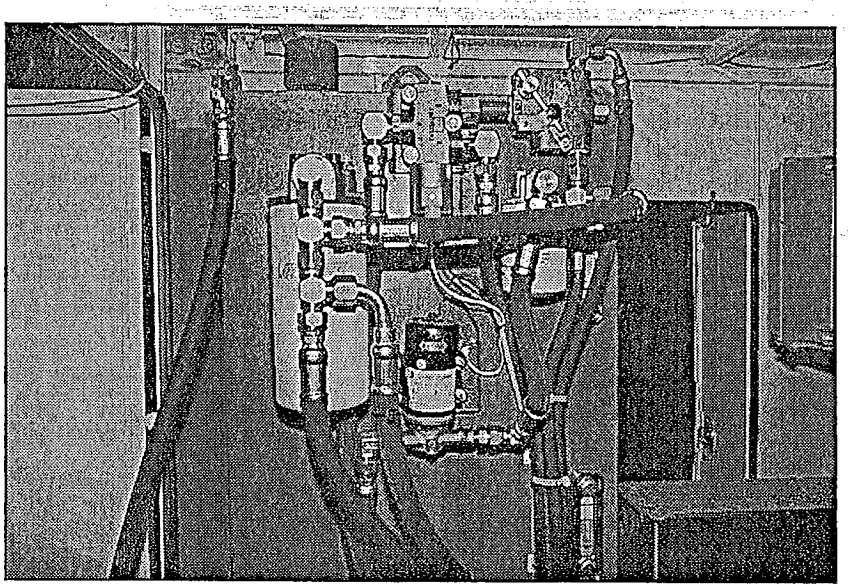


Fig. 50 HYDRAULIC SYSTEM FILTERS

4.1 SERVICE AND MAINTENANCE (cont'd)

4.2.5 Reversing Transmission Oil Level

The oil level in the reversing Transmission can be checked using the dip stick that is accessible in the deck mounted equipment cabinet. Check weekly and add as required. Top up oil level with 75w90 Synthetic Gear Oil.

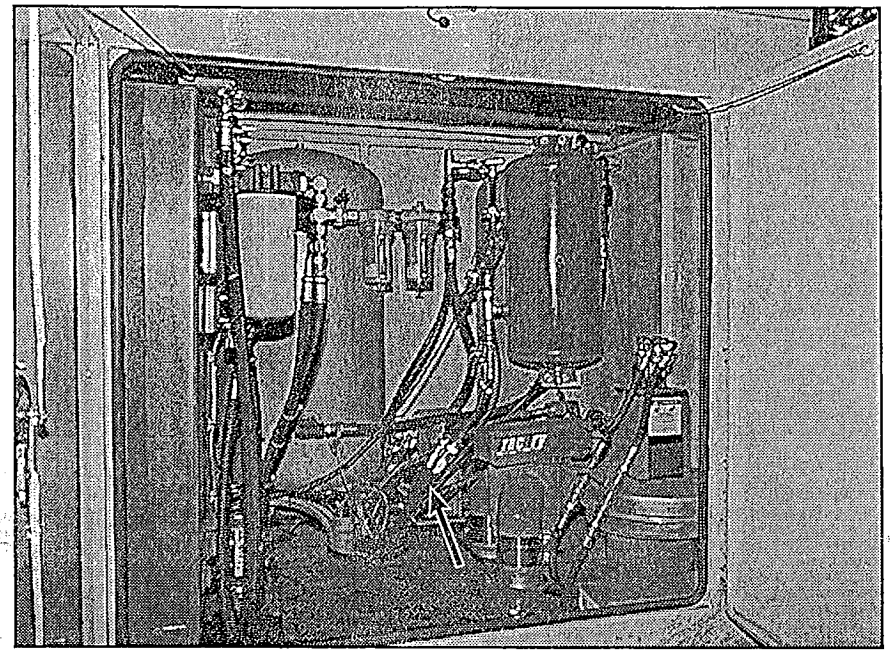


Fig. 51 REVERSING TRANSMISSION OIL LEVEL

4.1 SERVICE AND MAINTENANCE (cont'd)

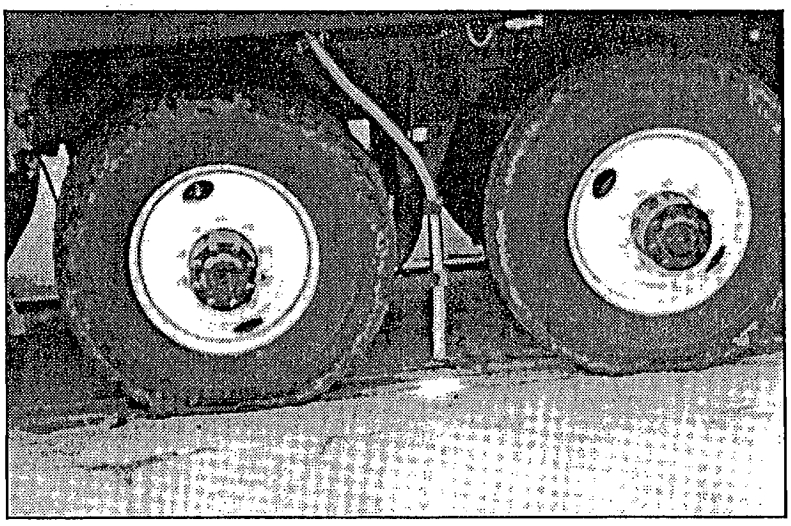
4.2.6 Sanding System (Optional)

The Power Unit is equipped with a system that distributes sand in front of the drive tires to improve traction.

1. **Sand Reservoirs:** 3 Reservoirs are located on each side of the Power Unit. Arrows in the photo Fig. 51 show their location.

Reservoirs

2. **Sanding:** Attach the guide tubes to the bottom of the reservoir and secure using the over-center cam lock couplers. Position the tube one inch above the rail. Using the toggle switch mounted on the console release sand as required.



Tubes

5 TROUBLE SHOOTING

Brandt Road Rail Corporation adds retractable rail wheels to a transport tractor for use as a Power Unit on the Highway or rails. It is a simple and reliable system that requires minimal maintenance.

In the following section, we have listed many of the problems, causes and solutions to the problems that you may encounter.

If you encounter a problem that is difficult to solve, even after having read through this trouble shooting section, please call the factory. Before you call, please have this Operator's Manual and the serial numbers from your machine ready.

PROBLEM	CAUSE	SOLUTION
Derailing	Too much pressure in drive axle tires.	Reduce Tire pressure to 90 psi.
Truck stops while transmission shifter is 1,2,or D	Low Transmission Oil	Check transmission oil level.
Extreme tire Wear or slipping tires.	Attempting to pull cars before car brakes are fully released.	After moving automatic brake lever to "REL", ensure that brakes on all cars are released before attempting to pull.
	Load is too heavy to pull	Limit train to 25 empty cars
		Limit train to 12 loaded cars on 0 deg. grade.
	As the grade increases the length of the train must be reduced.	Limit train to 5 loaded cars (650 tons) on 1.5% adverse grade.
	Insufficient weight on drive axles	Increase weight on drive axles by moving Tractive Effort Control Dial lever situated on the console.
Drive Tires become hot.	Too much weight on drive axles at high speeds.	After achieving 4 or 5 mph, reduce weight on drive axles by moving the Tractive Effort Control Dial to a higher setting.

5 TROUBLE SHOOTING (cont'd)

PROBLEM	CAUSE	SOLUTION
Independent brake will not stop Power Unit on track.	Insufficient weight on rail axles.	Reduce weight on drive axles by moving Drive Axle Air Bag lever situated on the console.
Rear Rail Axle dragging on road.	Insufficient air pressure in Tag axle suspension.	Increase air pressure in tag axle suspension by rotating conversion compartments tag axle knob in a clockwise direction. Ensure that the #7 air toggle switch is in the "Up" position.
	Faulty hydraulic lock valve, causing cylinders to "creep".	Inspect hydraulic lock valve.
Front Rail Axle creeps down from stowed position while in Road mode.	Faulty hydraulic lock valve, causing cylinders to "creep".	Inspect hydraulic lock valve.
Insufficient clearance under front tires while in "Rail" mode.	Faulty ride height control valve.	Inspect ride height control valve. These are factory set. Consult Brandt Road Rail Corporation before adjusting or replacing.
	Steering Axle Pin not properly engaged.	Inflate steering Axle Air Bags (#5 Switch inflate). Pause 60 seconds. Unlock shackle pin (Pull on lever # 1). Red light MUST come on. If it does - deflate Steering Axle Air Bags (#5 Switch deflate) Lock Steering Axle Pin (Push on lever # 2). Inflate front Rail Axle Air Bags (#6 Switch inflate).
Sand will not flow on to rail track	Sand box is empty.	Replenish sand.
	Sand is "caked" due to moisture.	Remove sand and replace with dry sand. A wire probe may be required to clear the obstruction.
Truck brakes won't release	System air pressure is too low.	Allow time, with engine running, for main reservoir to fill to 80 psi.

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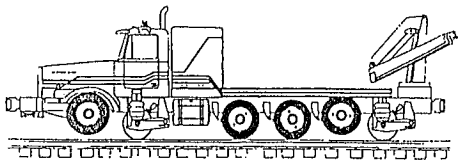
Brandt
ROAD RAIL CORP.



SERVICE BULLETIN

TOPIC: ENHANCED TIRE LIFE ON THE BRANDT POWER UNIT.

Tire life (on the drive wheels) is very much in the hands of the operator. Paying attention to several key factors will enhance the life of these tires dramatically.

1. TIRE PRESSURE

The tire inflation pressure should not exceed 90 p.s.i. Pressures above 90 p.s.i. reduce the size of the foot print (contact area) of the tire on the rail head. This results in increased slippage which in turn contributes to tire wear.

2. GRADUAL ACCELERATION

Tire life can be maximized with the operators conscious decision to accelerate slowly when pulling away from a stop. Foot pressure on the accelerator pedal should be light, then gradually increased as the "train" accelerates. If slippage occurs, reduce pressure on the accelerator until the train begins to pick up speed.

3. TRAIN BRAKE RELEASE

Train brakes must be **fully released** before attempting to move. Move the train brake lever into the "Release" position and wait until all brakes are fully released. (This could take up to 2 minutes). The train brake equipment reacts slowly to any changes in lever position. The very best tires on the driest track will not overcome the rolling resistance caused by non-released train brakes.

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